THIN SECTION:	U1309B-1R-1, 114-115 cm	**Piece No.**:		**Unit**: n/a	**TS#: 1**			**OBSERVER: AMcC**	
ROCK NAME:	Sediment grain mount								
GRAIN SIZE:									
TEXTURE:									

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**			**Composition**	**MORPHOLOGY**	**COMMENTS**
			min.	**max.**	**av.**			

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron)**				**REPLACING / FILLING**	**COMMENTS**
			min.	**max.**	**av.**			
Talc								
Serpentine								
Tremolite								
Chlorite								
Clays								

TOTAL ALTERATION: 95%

STRUCTURE : In addition to fossils, rock fragments are mainly serpentinite, talc rocks, talc schists, tremolite schists and combinations of these. There is one rutile grain, one probable gabbro, a couple of highly altered basalts, and a clast of angular quartz sandstone of uncertain origin.

PHOTOMICROGRAPHS:

1309B_1R_1_114_115_1

1309B_1R_1_114_115_2

THIN SECTION:	U1309B-1R-3, 10-17 cm	**Piece No.** 2 chip A	**Unit**: 1	**TS#: 2**	**OBSERVER: AMcC, ESA, GH**
ROCK NAME:	Tremolite schist				
GRAIN SIZE:	Fine grained				
TEXTURE:	Schistose, isoclinal fold				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	0	~50	0.01	0.5	0.7		Lath	Assumed diabase/basalt protolith
Clinopyroxene	0	~50						Assumed basalt/diabase protolith
Spinel	<1				0.1		Granular	Spinel grains (mentioned as chromite grains below) is common in MOR mafics rocks as inclusions in plagioclase and olivine phenocrysts.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Tremolite	70		<.01	0.15	0.1			Strongly to weakly schistose
Chlorite	25							Concentrated in folded band, possibly dike margin
Talc	3							
Magnetite	2							
Chromite	<1							Suggests partly ultramafic protolith

TOTAL ALTERATION: 100%

STRUCTURE : Moderate to strong schistosity defined by bands of talc/tremolite + chlorite - approximately axial planar to a near-isoclinal fold (see photographic record sheet). Main protolith appears to be basaltic, but rare chromite grains suggest ultramafic component.

PHOTOMICROGRAPHS:

1309B_1R_3_10_17_A_1
1309B_1R_3_10_17_A_2
1309B_1R_3_10_17_A_3
1309B_1R_3_10_17_A_4

THIN SECTION:	U1309B-1R-3, 10-17 cm	**Piece No.** 2 chip B	**Unit**: 1	**TS#: 3**			**OBSERVER: MA, GH**	
ROCK NAME:	talc-tremolite-chlorite schist probably of mixed mafic-ultramafic protolith							
GRAIN SIZE:	fine							
TEXTURE:	schistose							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**			**Composition**	**MORPHOLOGY**	**COMMENTS**
			min.	**max.**	**av.**			
?								No primary mineral or relict of primary minerals to identify with certainty. Completely altered beyond recognition of the protolith (by ESA)

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron)**				**REPLACING / FILLING**	**COMMENTS**
			min.	**max.**	**av.**			
Talc	50		25	700	50			
Chlorite	30		40	100	60			
Magnetite	2		10	900	200			
Tremolite	17							
rutile	Trace				150			
Apatite	1							

TOTAL ALTERATION: 100

STRUCTURE : Highly foliated with S/C structure; Some late brittle deformation of apatite porphyroclast, cut by anastomozing shears of talc.

PHOTOMICROGRAPHS:

1309B_1R_3_10_17_B_1
1309B_1R_3_10_17_B_2
1309B_1R_3_10_17_B_3
1309B_1R_3_10_17_B_4
1309B_1R_3_10_17_B_5
1309B_1R_3_10_17_B_6
1309B_1R_3_10_17_B_7

THIN SECTION:	U1309B-1R-3, 10-17 cm	**Piece No.** 2 chip C	**Unit**: 1	**TS#:4**			**OBSERVER: MA, ESA, GH**	
ROCK NAME:	Talc schist / peridotite protolith							
GRAIN SIZE:								
TEXTURE:	Schistose							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**			**Composition**	**MORPHOLOGY**	**COMMENTS**
			min.	**max.**	**av.**			
Chromite / spinel	1	~1		1			Fragmented, medium granular	Mechanically broken but still coarse-grained, original morphology is similar to spinel grains in peridotites

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron)**				**REPLACING / FILLING**	**COMMENTS**
			min.	**max.**	**av.**			
Talc	50							Pictures :
Chlorite	35							1309b_1r_3_10_17_c_1.tif
Amphibole (Tremolite/Actinolite)	10							1309b_1r_3_10_17_c_2.tif
Magnetite	2-3							

TOTAL ALTERATION:100

STRUCTURE : Brecciated talc schist. Breccia clasts ar previously foliated. Talc aggregates show kink bands associated with brecciation. Chlorite appears to form in dilatant "jogs". Breccia is cut by talc veins-some grains exhibit cracks with fibrous and unoriented talc.

PHOTOMICROGRAPHS:

1309B_1R_3_10_17_C_1
1309B_1R_3_10_17_C_2
1309B_1R_3_10_17_C_3
1309B_1R_3_10_17_C_4
1309B_1R_3_10_17_C_5
1309B_1R_3_10_17_C_6

THIN SECTION:	U1309B-1R-3, 10-17 cm		**Piece No.**:2 chip D		**Unit**: 1	**TS#: 5**		**OBSERVER: MD, ABC, GH**
ROCK NAME:	Basalt							
GRAIN SIZE:	Fine-grained groundmass							
TEXTURE:	Aphanitic, Porphyritic							
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**			**Composition**	**MORPHOLOGY**	**COMMENTS**
			min.	**max.**	**av.**			
Matrix		90						Too fined grained to be distinguished, assumed to be composed of ~ equal amounts of plagioclase and clinopyroxene. Some places look to be devitrified glass. Possibly 1 or 2 vesicles.
Clinopyroxene	0	< 1		1.75				Phenocrysts, completely altered to amphiboles.
Olivine	0	2			0.2		Anherdal	Phenocrysts, completely replaced.
Plagioclase	6	10	0.002	2			Subhedral	Phenocrysts and microphenocrys, one contains an opaque but altered inclusion (probably spinel) (common in MOR basalts)
SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron)**				**REPLACING / FILLING**	**COMMENTS**
			min.	**max.**	**av.**			
Chlorite	10		20	100	30		Plagioclase	
Tremolite	80		10	200	20		Clinopyroxene, olivine	In clasts with chlorite
Talc	2				100			In fibrous vein with chlorite
TOTAL ALTERATION: ~ 90%								
STRUCTURE : Little to no magmatic fabric. A few small disp veins cut section								

PHOTOMICROGRAPHS:

1309B_1R_3_10_17_D_1
1309B_1R_3_10_17_D_2
1309B_1R_3_10_17_D_3
1309B_1R_3_10_17_D_4

THIN SECTION:	U1309B-1R-3, 17-21 cm	**Piece No.** 3	**Unit**: 1	**TS#: 6**	**OBSERVER: AMcC, ESA, GH**
ROCK NAME:	Talc tremolite rock / peridotite protolith				
GRAIN SIZE:					
TEXTURE:	"cuspate"				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Olivine	0	?						
Spinel	2			5	0.6		Fragmented	Undeformed. Relict traces of coarse-grained pyroxene is associated with the spinel crystals. Morphology and color and size of spinel is very similar to MOR peridotites. (Photo 1309b_1r_3_17_21_3.tif and 1309b_1r_3_17_21_4.tif).

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Talc	65		<1	200	10			In matrix and veins
Chlorite	15							In veins and patches
Tremolite	10							Mainly in magnetite-rich cusps
Sulfide	2							In talc-pyrite ?pyrrhotite veins
Serpentine	3							Single vein rimmed by chlorite?
Magnetite	2		<1	20	5			Very fine in dark cuspate areas

TOTAL ALTERATION: 100%

Photomicrographs: 1309b_1r_3_17_21_5.tif dark cuspate relict; 1309b_1r_3_17_21_6.tif dark cuspate relict XPL; 1309b_1r_3_17_21_6.tif chromite and dark cuspate relict, talc vein; 1309b_1r_3_17_21_6.tif chromite and dark cuspate relic, XPL

STRUCTURE : Dark magnetite-rich clasts are schistose and probably preserve texture of pre-existing serpentinite. Pervasive deformation is ruled out by unbroken chromite. Talc has overprinted these textures with many late veins, both cross-fiber and shear fiber. These shears cut small aspect ratio serpentine cracks. The cracks - which exhibit en echelon microstructure and crack interaction structures- cut fine-grained matrix of serpentine/talc (can t tell at thin section scale).

PHOTOMICROGRAPHS:

1309B_1R_3_17_21_1
1309B_1R_3_17_21_2
1309B_1R_3_17_21_3
1309B_1R_3_17_21_4
1309B_1R_3_17_21_5
1309B_1R_3_17_21_6
1309B_1R_3_17_21_7
1309B_1R_3_17_21_8

THIN SECTION:	U1309B-1R-3, 124-125 cm	**Piece No.** 14	**Unit**: 2	**TS#: 7**	**OBSERVER: RF, GH and ABC**
ROCK NAME:	Basalt				
GRAIN SIZE:	Fine Grained				
TEXTURE:	Subophitic				

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	43	45	0.1	0.1	0.4		Subherdal laths	Relatively fresh, few strained grains with sweeping extinction. Many melt
Clinopyroxene	17	40	0.1	0.9	0.4		Anhedral, poikolitic	Not as fresh as plagioclase, 40 % altered.
Olivine?	0	1		0.5			Completely altered	If once present, completely altered to tremolite and chlorite
Opaques	7	7						Magnetite, fresh.
Plagioclase	< 1	< 1		4.3				Phenocryst
Clinopyroxene	< 1	< 1		3.5				Phenocryst

SECONDARY MINERALOGY	**PERCENT**		**SIZE (mm) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Actinolite	20		mic.	500	250		Pyroxene	Fresh, in matrix and up to 1mm in veins
Chlorite	Trace						Plagioclase	
Epidote								

TOTAL ALTERATION: ~ 20%

STRUCTURE : Magmatic fabric 1a; no obvious magmatic fabric or shear bands of phenocrysts. Pervasive grain scale cracks without evidence for shear displacement.

PHOTOMICROGRAPHS:

1309B_1R_3_124_125_1

1309B_1R_3_124_125_2

THIN SECTION:	U1309B-2R-1, 12-14 cm	**Piece No.** 1c	**Unit**: 4	**TS#: 8**	**OBSERVER: RF, ABC, GH**
ROCK NAME:	Basalt				
GRAIN SIZE:	Fine-grained				
TEXTURE:	Sparsely plagioclase-phyric, aphanitic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	40	47	0.09	0.9	0.2		Subhedral, Laths	Mostly fresh, some cataclastics in more highly brecciated zone. Minor alignment of laths, remanence of igneous texture in non-cataclastic zones
Clinopyroxene	0	47						Replaced by amphibole, size and texture can not be determined.
Opaque minerals		5			0.03		Subhedral to anhedral	Disseminated in the groundmass
Plagioclase	1	1		0.9			Subhedral	Phenocrysts, with undulatory zoning observed in some crystals.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Amphiboles	50						Pyroxene, Plagioclase	Concentrated in breccia matrix, but also throughout clasts
Chlorite	<5						Plagioclase	Traces in breccia matrix
Epidote	<5						Plagioclase	In breccia clasts intergrown with amph

TOTAL ALTERATION:60%

STRUCTURE : Brecciation observed between contact of two igneous units. No obvious offsets on most of these zones. However, significant cataclasis in of plagioclase is observed within these breccias. Some magamatic fabric in "younger" basaltic area. Very well cemented breccia with "fuzzy" clasts.

PHOTOMICROGRAPHS:

1309B_2R_1_12_14_1

1309B_2R_1_12_14_2

THIN SECTION:	U1309B-2R-1, 27-30 cm	**Piece No.** 3		**Unit**: 4		**TS#: 9**		**OBSERVER: MA/MD, ESA, GH**
ROCK NAME:	Basalt							
GRAIN SIZE:	Fine grained							
TEXTURE:	Microcrystalline							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**			**Composition**	**MORPHOLOGY**	**COMMENTS**
			min.	**max.**	**av.**			
Plagioclase	43	43	0.06	0.7	0.5		Subhedral	Relatively fresh
Pyroxene	0	45			0.4		Replaced by amphibole	Altered to amphibole
Olivine	0	~2			0.03		Anhedral	Completely altered, relict texture remains
Apatite	Trace	Traces		0.03	0.008		Euhedral to subhedral	Very fine inclusions in plagioclase
Opa' ue minerals	2	2	0.06	1	0.4		Subhedral	Disseminated in the matrix

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron)**				**REPLACING / FILLING**	**COMMENTS**
			min.	**max.**	**av.**			
Amphibole (Actinolite/Tremolite)	55		50	150			Pyroxene	Also in veins
Chlorite	Trace						Possible in the vein	
Rutile	1				50			
Oxides	<1				50			
								Plagioclase is almost fresh

TOTAL ALTERATION:55%

STRUCTURE : Basalt with no magmatic fabric. Several amphibole veins, minor cataclasis.

PHOTOMICROGRAPHS:

1309B_2R_1_27_30_1
1309B_2R_1_27_30_2
1309B_2R_1_27_30_3
1309B_2R_1_27_30_4

THIN SECTION:	U1309B-2R-1, 71-73 cm	**Piece No.** 7	**Unit**: 5	**TS#: 10**	**OBSERVER: MD, ABC**
ROCK NAME:	Cataclasitic gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Cataclastic, recrystallized				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	0	40						Completely recrystallized to secondary plagioclase
Pyroxene	0	60						Completely replaced by actinolite

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Actinolite	60				350		Plagioclase, pyroxene	Schistose
Chlorite	5				200		Plagioclase	
Secondary plagioclase	35				250		Plagioclase	
Magnetite	<1							
Hornblende (brown)	1							

TOTAL ALTERATION: ~ 80%

STRUCTURE : Crystal plastic fabric overprinted by brittle deformation and fine-grained amphibole/silicate minerals. Crystal plastic features are best observed in plagioclase rich areas with flattened, asymmetric grains and recrystallized grain boundaries. A moderately strong LPO in the plagioclase rich areas. Brittle features include grain fracture, domains of micro-breccia, and shear bands. Some stylolitic features are also present.

PHOTOMICROGRAPHS:

1309B_2R_1_71_73_1
1309B_2R_1_71_73_2
1309B_2R_1_71_73_3
1309B_2R_1_71_73_4

THIN SECTION:	U1309B-2R-1, 100-104 cm	**Piece No.** 9a	**Unit**: 6	**TS#: 11**	**OBSERVER: MA, ESA**
ROCK NAME:	Basalt				
GRAIN SIZE:	Fine-grained				
TEXTURE:	Intergranular to subophitic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase		48	0.08	1	0.6		Subhedral	Aligned laths define emplacement/flow direction at chilled margin
Clinopyroxene		40					Replaced	Replaced
Olivine	0	2		0.09	0.3		Anhedral	Completely altered, relict texture remain
Opa' ues	7	7	0.03	0.3	0.1			
Dike mineralog								
Plagioclase		45	0.02	0.7	0.6		Subhedral to anhedral	Laths have irregular (resorbed or altered?) and contains many inclusions. Most crystals have undulatory extinction. Altered inclusions (0.05mm) in plagioclase crystals might have been smaller grained pyroxenes.
Pyroxene							Replaced	Replaced by amphibole
Brown amphibole		15			0.5			Many amphibole crystals are in oriented either parallel or normal to C section
Fine-grained section								
Plagioclase		5 (phenocryst)	0.2	0.8	0.4		Subhedral	Plagioclase is both present as micro-phenocryst and in the groundmass.
Olivine		2			0.02		Anhedral	Completely altered, relict remains
Groundmass								Composed of very fine plagioclase laths and alteration amphibole
Apatite (?)		Trace						Very fine inclusions in plagioclase (in the dike)

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Tremolite	55						Pyroxene	
Chlorite	5						Plagioclase	
Magnetite/oxides	14							
Epidote	1							Vein with brown amphibole and few carbonates.

TOTAL ALTERATION:75%

STRUCTURE : Branched dike cuts horizontally across slide. Grain sizes decrease in the up direction, toward a (~200 micron-wide) chilled margin. Either amygdule or olivine phenocryst is altered chlorite + epidote + amphibole.

PHOTOMICROGRAPHS:

1309B_2R_1_100_104_1

1309B_2R_1_100_104_2

THIN SECTION:	U1309B-2R-1, 116-119 cm	**Piece No.** 9b	**Unit**: 7	**TS#: 12**	**OBSERVER: ABC**
ROCK NAME:	Basalt				
GRAIN SIZE:	Fine-grained				
TEXTURE:	Seriate, porphyric				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	40	40	0.2	0.1	0.5		Subhedral	Partially altered
Clinopyroxene	10	40						Completely altered, original size and shape can not be determined
Olivine	0	20	0.4	10	1		Anhedral	Phenocrysts, completely altered
Carbonate / titanite?	1	1	0.2	0.5	0.4		Subhedral	High relief and interference colors, equant, with cleavage
Opaques	< 1	< 1						

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Tremolite/actinolite	49						Clinopyroxene, olivine, plagioclase	

TOTAL ALTERATION: ~49% patches are more altered

STRUCTURE : Primary igneous texture

PHOTOMICROGRAPHS:

1309B_2R_1_116_119_1

1309B_2R_1_116_119_2

THIN SECTION:	U1309B-2R-2, 26-29 cm	**Piece No.** 2b	**Unit**:	**TS#** 13	**OBSERVER: Ron Frost, ABC, GH**
ROCK NAME:	Altered diabase				
GRAIN SIZE:	Medium grained				
TEXTURE:	Subophitic, Trachytic, Olivine Phyric				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	45	45	0.1	1.4	0.8		Subhedral	Texture is subophitic at top and base of thin section, middle is trachytic or flow aligned plagioclase laths. Grain size does not decrease from the diabasic section to the flow-aligned section.
Pyroxene	0	40		1.4	0.6		Anhedral, poikilitic	Altered to amphibole
Olivine	0	4		2.9	0.7		Anhedral	Completely altered, relict texture remains
Opaque minerals	2	2	0.03	0.3	0.2		Subhedral	Equally distributed in matrix.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Amphibole	55%				1mm		Pyroxene/olivine	Amphibole ranges from hornblende to actinolite, abundance depends on plagioclase abundance.
Chlorite	Trace							Fine amphibole replaces olivine
								Coarse amphibole replaces pyroxene

TOTAL ALTERATION: 35-60% depending on the abundance of plagioclase; yellowish spots are chlorite plus amphibole, green spots pure amphibole, after olivine

STRUCTURE : Strong magmatic fabric on downhole side of section (obvious in thin section scan).

PHOTOMICROGRAPHS:

1309B_2R_2_26_29_1

1309B_2R_2_26_29_2

THIN SECTION:	U1309B-3R-1, 18-19 cm	**Piece No.** 4	**Unit**: 13	**TS#: 14**	**OBSERVER: ABR, ESA, ABC**
ROCK NAME:	Diabase				
GRAIN SIZE:	Medium-grained				
TEXTURE:	Subophitic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	40	42	0.1	1.4	0.5	Labradorite(?)	Subhedral laths	Slightly altered.
Pyroxene	20	50	0.08	0.2	0.11		Subhedral-anhedral granular	Moderately replaced and altered, significant amount still remain in the matrix
Olivine	0	3	0.6	2.2	0.8		Anhedral	Completely replaced by secondary mineral, only relict texture remains (Photo 1309b_3r_1_18_19_3.tif)
Magnetite	5	~5	0.08	2.25	0.17		Subhedral to euhedral granular	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite	30		100	500	300		Pyroxene	
Chlorite	5		20	100	80		Plagioclase, olivine	

TOTAL ALTERATION: ~ 35%

STRUCTURE : Only primary textures/structures

PHOTOMICROGRAPHS:

1309B_3R_1_18_19_1

1309B_3R_1_18_19_2

1309B_3R_1_18_19_3

THIN SECTION:	U1309B-3R1, 36-38 cm	**Piece No.**: 5	**Unit**: 14	**TS#:** 15	**OBSERVER: AMcC, ESA**
ROCK NAME:	basalt and breccia				
GRAIN SIZE:	fine-grained				
TEXTURE:	porphyritic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
plagioclase	20	20	0.06	0.7	0.3		fine-grained laths	relatively unaltered
pyroxene		2			0.3		subhedral(?)	replaced by chlorite. Subhedral clinopyroxene clast (~0.7 mm) with associated plagioclase phenocryst noted near the boundary between the basalt and the alteration vein.
opaque minerals	2	2	0.02	0.1	0.8		subhedral to anhedral	disseminated in the ground mass
ground mass	~35							Fine-grained and altered. Degree of alteration increases and brecciation is observed along the alteration vein (probably hydrothermal) cutting through a section of the rock.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
actinolite	30-40		30	600	60		olivine? (one xenocryst), pyroxene	in groundmass of breccia and diabase. Hard to tell if present in aphanitic basalt groundmass. Occurs in veins and vein halos
chlorite	2						pyroxene	probably mainly hydrothermal breccia intruded by basalt. One schistose amphibole clast inside an altered basalt clast. Series of thin variably altered intrusions at base of slide. Late actinolite veins crossing basalt have halos with fine magnetite consolidated into larger grains, and more actinolite

TOTAL ALTERATION: ~40%

STRUCTURE : Brecciation and cataclasis of pre-existing diabasic and gabbroic material. Altered clasts demonstrate pre-breccia alteration. Internally brecciated clasts indicate a second, earlier brecciation. Domains within the breccia have coarse feldspar clasts, testament to earlier gabbroic inclusions.

PHOTOMICROGRAPHS:

1309B_3R_1_36_38_1
1309B_3R_1_36_38_2
1309B_3R_1_36_38_3
1309B_3R_1_36_38_4
1309B_3R_1_36_38_5

THIN SECTION:	U1309B-3R-1, 65-68 cm	**Piece No.** 10	**Unit**: 14 / 15	**TS# 16**			**OBSERVER: RF, ESA**	
ROCK NAME:	Basalt/diabase breccia							
GRAIN SIZE:	Variable							
TEXTURE:	Various basaltic textures							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Basalt with flow texture i								
Plagioclase	25	25	0.06	0.73	0.31		Subhedral laths	(Note: given percentage and grain sizes are phenocryst content) Aligned laths show flow direction horizontal, across slide, perdendicular to the core lenght. Relatively unaltered.
Pyroxene		2			1.12		Anhedral	Completely altered
Olivine		<1			0.4		Anhedral	Completely replaced
Opaque minerals		2			0.02		Anhedral	Disseminated in the matrix
Groundmass							Aphanitic	Very fine-grained ground mass, sharp but corrugated boundary between the intruding rock and the host rocks
Sparsely Plagioclase-p								
Plagioclase	2	2		0.71	0.5		Subhedral laths	(Note: given percentage and grain sizes are phenocryst content) Phenocrysts are unaltered and have no preferred orientation.
Pyroxene					0.06		Altered to amphibole	Altered to amphibole, present in the ground mass
Opaque minerals	2	2	0.03	0.02	0.08		Subhedarl to anhedral	Disseminated in the ground mass
Groundmass							Intergranular	Composed of plagioclase laths (~0.05 mm) and pyroxene (altered to amphibole) of nearly the same size. In sharp but corrugated boundary with the diabase unit (basalt cut the diabase).
Diabase								
Plagioclase	40	40	0.08	0.8	0.4		Subhedral	Relatively unaltered.
Pyroxene	0	46			0.3		Replaced by amphibole	Intergrown with plagioclase
Opaque minerals	4	4			0.02		Subhedral to anhedral	Occurs in stretched and complex shapes.
Basalt with related brecc								
Plagioclase	3	3	0.08	0.84	0.45		Euhedral to subhedral	More defined flow allignment along the margins of the dike and become more randomly oriented towards the center.
Groundmass								Fine-grained and highly altered. In sharp but corrugated contact with the host rocks. In some sections, a margin of altered zone bounds the fragments. Contains lesser plagioclase phenocrysts compared to the basalt with well defined flow texture, but there is still possibility that they came from the same intrusive event.
Breccia fragments								The clasts are mainly composed of the diabase and older basalts. Clasts are have angular shapes.

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Amphibole	80%				up to .5 mm		glass, pyroxene, olivine	Amphibole ranges from brown - hornblende, to colorless - tremolite
								An amphibole-plagioclase clast with a slightly foliated gabbroic texture occurs in one corner of the slide

TOTAL ALTERATION:80%

STRUCTURE : Multiple intrusive domains include a basalt with internal magmatic foliation (preferred orientation of plag. phenocrysts), other domains have more typical diabasic textures. Very little pervasive brecciation, although the alteration is pervasive.

PHOTOMICROGRAPHS:

1309B_3R_1_65_68_1
1309B_3R_1_65_68_2
1309B_3R_1_65_68_3
1309B_3R_1_65_68_4

THIN SECTION:	U1309B-3R-1, 80-82 cm	**Piece No.** 11		**Unit**: 15	**TS#: 17**		**OBSERVER: AMcC, JM**	
ROCK NAME:	Diabase breccia with tremolite schist clast							
GRAIN SIZE:	Fine grained							
TEXTURE:	Aphanitic, Breccia							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Matrix	35	85						Mostly altered, assumed to be ~ e' ual proportions of plagioclase and clinopyroxene.
Chromite	<1	<1						Single grain in tremolite clast, dark reddish brwon to opa' ue
Plagioclase	8	8		0.6			Euhedral, lath-shaped	Phenocrysts, microphenocrysts in basalt clast (1-10 mm in size)
Clinopyroxene	1	1		0.4			Subophitic	Phenocrysts, microphenocrysts in basalt clast (1-10 mm in size), altered to amphibole
Iron oxide	3	3		0.1			E' uant, rounded	In basalt clast (1-10 mm in size)

SECONDARY MINERALOGY	**PERCENT**		**SIZE (mm) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
tremolite			<.01	0.6	0.1		Ultramafic rock	Restricted to 5 cm clast in breccia. Coarse tremolite replaced by fine main mineral in breccia matrix, locally schistose
actinolite			<.01	0.6	0.1		Pyroxene in mafic clasts	In breccia matrix and locally in clasts
chlorite								
?hornblende	<1				0.1			Rare brown grains surrounded by actinolite
??orthoamphiobole	<1				0.2			Higher relief grains in tremolite schist
magnetite					0.05			Distributed throughout mafic rocks and breccia
smectite?					<.005			Dark brown cataclastic seams may contain lower grade minerals

TOTAL ALTERATION: In mafic clasts 40%; in breccia matrix 95%; in tremolite schist clast 100%. Overall ~70%

Sequence of Events: 1) talc-tremolite schist altered from ultramafic rock; 2) intrusion of diabase, greenshist facies metamorphism; 3) ? Amphibolite facies hydrothermal/fault brecciation (rare brown amphibole) 4) Main greenschist facies brecciation/faulting; 5) Intrusion of porhyritic basalt 6) further cataclasis at lower grade (?)

Photomicrographs: 1309b_3r_1_80_82_3.tif tremolite schist clast in breccia; 1309b_3r_1_80_82_4.tif chromite in tremolite schist clast and basalt in breccia PPL;

STRUCTURE : Diabase and basaltic fragments (subrounded clasts with shape anisotropy) in a fine-grained matrix. Lithologies (e.g. diabase or basalt) are concentrated in separate areas. A domain of schist is also incorporated into the breccia, and some of the silicates are incorporated into the (partly foliated) breccia-matrix.

PHOTOMICROGRAPHS:

1309B_3R_1_80_82_1
1309B_3R_1_80_82_2
1309B_3R_1_80_82_3
1309B_3R_1_80_82_4
1309B_3R_1_80_82_5
1309B_3R_1_80_82_6
1309B_3R_1_80_82_7
1309B_3R_1_80_82_8

THIN SECTION:	U1309B-3R-1, 109-111 cm	**Piece No.** 14		**Unit**: 16	**TS#: 18**		**OBSERVER: RF/MD, JM**	
ROCK NAME:	Altered Gabbro							
GRAIN SIZE:								
TEXTURE:								

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	45	55	1	6	3		Anhedral	Deformed, cracked, recrystallized
Clinopyroxene	0	45	1	5	3		?	Altered to amphiboles
Olivine	0	1	1	3	2		Rounded	Completely altered to chlorite and amphibole
Opaques	0	trace		0.1				Contained in clinopyroxenene
Brown amphibole	trace	trace	0.1	0.4	0.2		Blebby within and rim to clinopyroxene	Magmatic?

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Chlorite	10				250		Plagioclase	
Actinolite	45				500		Pyroxene	
Brown hornblende	<1						May be pyroxene	
								Picture : 1309b_3r_1_109_111_3.tif

TOTAL ALTERATION: ~ 50%

STRUCTURE : Relict igneous texture (best observed across the whole thin section), overprinted by intense microcracking that in places gives way to micro-breccias (best observed in plagioclase-rich areas). Interestingly, no evidence of a high temperature deformation or shear strain via cataclasis. A narrow (80 micron) band of alteration is most likely a relict vein overprinted by further alteration and brittle deformation.

PHOTOMICROGRAPHS:

1309B_3R_1_109_111_1
1309B_3R_1_109_111_2
1309B_3R_1_109_111_3
1309B_3R_1_109_111_4
1309B_3R_1_109_111_5
1309B_3R_1_109_111_6

THIN SECTION:	U1309B-4R-1, 13-16 cm	**Piece No.** 3		**Unit**: 19	**TS#: 19**		**OBSERVER: AMcC, ESA, GH**	
ROCK NAME:	Diabase + basalt							
GRAIN SIZE:	Fine grained							
TEXTURE:	Ophitic / porphyritic							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Basalt								
Plagioclase	10	10	0.08	1	0.4		Subhedral laths	(Note: Percentage given is percentage of phenocrysts in central section of the basaltic dike.) Plagioclase phenocryst concentration along the boundaries noted. Laths then to align parallel to subparallel to the contact showing flow texture.
Opaque minerals	3	3	0.03	0.14	0.06		Subhedral	Disseminated in the groundmass
Groundmass	1	85						Groundmass is very fine grained and moderately to highly altered.
Pyroxene xenocryst	1	1		2			Rounded	The xenocryst is composed of two-pyroxene, a large orthopyroxene with an associated smaller (0.13 mm) clinopyroxene embedded in one of the sides. The crystals have rounded edges with resorbed borders and are moderately altered.
Plagioclase xenocryst	1	1		0.9			Rounded	The plagiclase xenocrysts exhibit undulatory extinction, rounded edges and resorbed texture along the boundaries. Some smaller grains of xenocrysts are also observed near the contact to the diabase.
Cataclastic Diabase								
Plagioclase	5	35	0.03	0.5	0.4		Suhedral to anhedral	Moderately altered
Pyroxene	0	65			0.3		Completely replaced	Replaced by amphibole
Opaque minerals	1	1	0.02	0.08	0.03		Anhedral	Disseminated in the matrix
Recrystalized Plagioclase	10						Subhedral to anhedral	Occurs along an alteration vein. Undulatory extinction noted. Associated with carbonate minerals. Opaque minerals aligned along the boundary of the vein.

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Actinolite	~ 50		<10	2000	50		Pyroxene	Abundant in both diabase and later intrusion, and in veins before and after intrusion
Chlorite	~ 10				<10			In pale patches in basalt groundmass
Albite	~ 10							Veins in basalt
Zeolite	<2						Plagioclase	
Titanite	2							In veins cutting basalt, including plag-rich segregation
Magnetite								Secondary in veins

TOTAL ALTERATION: 75%

STRUCTURE : Greenschist amphiboles cut by cataclastic bands/veins. Subsequently intruded by basalt with magmatic flow texture parallel to the contact. Later cut by plagioclase viens.

PHOTOMICROGRAPHS:

1309B_4R_1_13_16_1
1309B_4R_1_13_16_2
1309B_4R_1_13_16_3
1309B_4R_1_13_16_4
1309B_4R_1_13_16_5

THIN SECTION:	U1309B-4R-1, 30-31 cm	**Piece No.** 5a		**Unit**: 19	**TS#** 20		**OBSERVER: Ron Frost / Allison Charney**	
ROCK NAME:	Brecciated microgabbro with basalt dike							
GRAIN SIZE:	fine grained							
TEXTURE:								

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	20	55						Highly deformed and granulated, grains are cracked and strained.
Clinopyroxene	0	40						Completely altered amphibole.
Olivine	0	2						
Magnetite	1	< 1						
Basalt								
Groundmass	0	98						Completely altered, microcrystalline
Plagioclase	2	2	0.08	0.5	0.6		Subhedral	Laths are aligned to show flow direction

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Amphibole	40%				up to 1mm		Pyroxene	Amphibole ranges from hornblende to actinolite
Chlorite	Trace				very fine			Hornblende after pyroxene is coarse, hornblende in veins very fine.
Zeolite	Trace				<.01		Plagioclase	
Recrystallized plagioclase	40							

TOTAL ALTERATION:100%, if you count the granulated plagioclase

STRUCTURE : Magmatic foliation in basalt (defined by plagioclase phenocrysts) and glomeroclasts (defined by plagioclase clumps). No evidence for crystal plastic deformation in either basalts or microgabbro. Brecciation is restricted to microgabbro and along intrusive margins/contacts between basalt and microgabbro. Cataclastic local shear bands and pre-existing amphiboles record an early, amphibolite-grade alteration followed cataclasis.

PHOTOMICROGRAPHS:

1309B_4R_1_30_31_1
1309B_4R_1_30_31_2
1309B_4R_1_30_31_3
1309B_4R_1_30_31_4

THIN SECTION:	U1309B-4R-1, 50-51 cm	**Piece No.** 5B	**Unit**: 19	**TS#: 21**			**OBSERVER: AMcC, JM, GH**	
ROCK NAME:	Basalt intruding metagabbro? Felsic vein?							
GRAIN SIZE:	Basalt microcrystalline, metagabbro? Unknown, felsic vein? fine-grained							
TEXTURE:	Basalt aphyric, metagabbro? unknown, felsic vein? Equigranular							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Basalt								
Plagioclase	trace	trace	0.1	0.8	0.3		Lath shaped, dendritic in some case	Microlite
Olivine	trace	trace	0.1	0.3	0.2		Pseudomorph, completely altered	Microlite
Metagabbro?								
Plagioclase	30	?						
Clinopyroxene	0	?						
Felsic vein?								
Plagioclase	60?	70?	0.1	0.5	0.3		Subhedral/anhedral	Altered

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Actinolite	65		<10	1000			Locally pseudomorphing pyroxene (with chlorite)	In veins and throughout groundmass of basalt, coarser in metagabbro
Chlorite	15						Plagioclase, pyroxene	In groundmass and replacing plagioclase in metagabbro (with albite)
Albite/secondary plag	10						Plagioclase	
Magnetite	1							In veins and groundmass of basalt

TOTAL ALTERATION: 90% in metagabbro, 80% in basalt

STRUCTURE : Basalt intrudes highly altered gabbro with a cataclastic foliation. Late veins cutting the contact contain actinolite, some chlorite and albite (some display small shear offset). There are also some magnetite and magnetite-actinolite veins of uncertain age cutting the basalt. Altered felsic vein? (1 mm thick) along the contact.

PHOTOMICROGRAPHS:

1309B_4R_1_50_51_1
1309B_4R_1_50_51_2
1309B_4R_1_50_51_3

THIN SECTION:	U1309B-5R-1, 29-31 cm	**Piece No.** 6	**Unit**: 19	**TS#: 22**	**OBSERVER: AMcC, ESA, GH**
ROCK NAME:	Tremolite-actinolite altered rock				
GRAIN SIZE:	Fine-grained				
TEXTURE:	Schistose				

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Clinopyroxene	< 1	?		0.3			Anhedral	Very rare grains, Noted relict clinopyroxene is associated with clustered plagioclase crystals. In between clusters are altered areas with fine needle-like amphiboles which are probably altered pyroxene also.
Plagioclase	< 1	?		0.7	0.2		Anhedral	Found asscociated wih relict and altered pyroxene. Also observed as inclusion in opaque mineral
Granular opaque	5	?		1.5			Anhedral	Occurs as augen-like sequence of broken minerals and are very coase-grained.

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Tremolite/ actinolite	75		< 5	150	10		Pyroxene?	Variable composition
Chlorite	20							Intergrown with amphibole and cracks in oxides

TOTAL ALTERATION: 100%

STRUCTURE : Talc-tremolite-actinolite(??) schist with strong foliation cutting domains of large brecciated opaque grains (which are surrounded by what GH thinks was serpentine!) and inclusions of plagioclase that appear to preserve an early crystal plastic texture. Talc-rich regions show evidence of multiple deformation events and are apparently weaker than serpentine rich regions.

PHOTOMICROGRAPHS:

1309B_5R_1_29_31_1
1309B_5R_1_29_31_2
1309B_5R_1_29_31_3
1309B_5R_1_29_31_4

THIN SECTION:	1309B 5R-1, 36-38 cm	**Piece No.** 7	**Unit**: 19	**TS#: 23**		**OBSERVER: AM and ABC**		
ROCK NAME:	Basalt/diabase							
GRAIN SIZE:	Aphanitic to microcrystalline							
TEXTURE:	Brecciated to schistose, porphyritic							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**			**Composition**	**MORPHOLOGY**	**COMMENTS**
			min.	**max.**	**av.**			
Plagioclase	27	50	0.05	0.5	0.3		Subhedral to euhedral	Laths in diabase
Clinopyroxene	0	45						Completely replaced
Magnetite	4	4					Equant to elongate	Skeletal grains and also surrounds ?sphene
Plagioclase	1	1		2.5				Xenocrysts and broken up relics of metagabbro

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron)**				**REPLACING / FILLING**	**COMMENTS**
			min.	**max.**	**av.**			
Green-brown amphibole	2		50	400	100			Rare relics in former metagabbro - needs to be confirmed
Actinolite	65		<1	100	50			Present in matrix of basalt and diabase, and main component of breccia
Chlorite	1							Restricted to late veins
?Epidote/clinozoisite	?							Possible fine grains in groundmass of diabase

TOTAL ALTERATION: 65% (very hard to assess degree of alteration in fine basalt

STRUCTURE : A basaltic and diabasic unit - one with a magmatic foliation (defined by plag phenocrysts) - mixed by brecciation. The basalt has a fracture pattern that forms non-planar clast boundaries. Areas rich with relict gabbro (defined by large grains of unstrained feldspar) and schistose clasts are also mixed in the breccia. There is no evidence of crystal plastic deformation in the relict gabbro. Altogether there is a record of a complex sequence of events - 1) gabbro, then 2) amphibolite facies metamorphism (subject to confirmation) then 3) alteration and brecciation, some shearing, intrusion of diabase and basalt under greenschist facies conditions. There are a few chlorite/actinolite vein. The contact between the basalt and diabase can not be determined, although brecciated, it is a gradual transition from aphanitic to microcrystaline. Therefore, the basalt is a chilled margin of the diabase. The unit was then brecciated.

PHOTOMICROGRAPHS:

1309B_5R_1_36_38_1
1309B_5R_1_36_38_2
1309B_5R_1_36_38_3
1309B_5R_1_36_38_4

THIN SECTION:	U1309B-5R-1, 129-130 cm	**Piece No.** 18	**Unit**: 20	**TS#: 24**	**OBSERVER: MD / ABC**
ROCK NAME:	Diabase				
GRAIN SIZE:	Medium				
TEXTURE:	Subophitic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	50	50	0.4	2.2	1.2		subhedral	Many strained grains. Magmatic zoning of phenocrysts and few grains in matrix. Minor aligned and faulted grains suggest shear, settling, or compaction.
Clinopyroxene	23	40						Original size and shape can not be determined
Olivine	0	< 5	0.8	2.2	1.4			Totally altered to amphibole.
Opaques	5	5						Uniformly distributed

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite	2				to 1 mm		Pyroxene	
Tremolite	20				to 0.5 mm		Pyroxene	
Chlorite	Trace				0.1		Plagioclase	
Epidote	Trace				0.1		Plagioclase	

TOTAL ALTERATION: ~ 20%

STRUCTURE : Diabase with no magmatic fabric, or at least very little. Numerous fractures, but no brittle deformation fabric.

PHOTOMICROGRAPHS:

1309B_5R_1_129_130_1

1309B_5R_1_129_130_2

THIN SECTION:	U1309B-5R-2, 70-72 cm	**Piece No.** 5	**Unit**: 20	**TS# 25**	**OBSERVER: ABR, ESA, GH**
ROCK NAME:	Diabase				
GRAIN SIZE:	Medium-grained				
TEXTURE:	Ophitic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	38	40	0.1	2.7	1.5		Subhedral laths	Relatively unaltered
Pyroxene	1	45	0.3	3	1.5		Subhedral to anhedral	Pseudomorphs are composed of either green amphibole or fine fibrous tremolite.
Olivine	0	5		3	1.3		Anhedral	Completely replaced
Opaque minerals	1	1	0.6	0.6	0.3		Subhedral to anhedral	Magnetite dissolving to Ilmentite

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite	40		400	3500	600		Pyroxene	
Chlorite	3				<10		Olivine	Chlorite + tremolite may replace olivine
Tremolite	3		10	900	100		Olivine	Chlorite + tremolite may replace olivine

TOTAL ALTERATION: ~ 45%

STRUCTURE : Primary texures with no magmatic fabric. Pervasive alteration with no evidence for significant cataclasis.

PHOTOMICROGRAPHS:

1309B_5R_2_70_72_1

1309B_5R_2_70_72_2

THIN SECTION:	U1309B-6R-1, 20-22 cm	**Piece No.** 5	**Unit**: 21	**TS#: 26**	**OBSERVER:** ABR, JM
ROCK NAME:	Schist				
GRAIN SIZE:	variable				
TEXTURE:	brecciated				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	23	50	0.1	0.7	0.3		Anhedral, rounded	Primary features unknown
pyroxene	0	50						Primary features unknown

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite	45		20	300	50		Pyroxene	
Chlorite	15		10	50	30			
Secondary plagioclase	15		10	80	40		Plagioclase	Also vein filling with amphibole
Talc	1		40	300	80		Vein filling	
Green-brown hornblende	1							Relicts in actinolite
Magnetite	<1		10	850	120			

TOTAL ALTERATION: ~ 80%

STRUCTURE : Photos 1309b_6r_1_20_22_3.tif, 1309b_6r_1_20_22_4.tif. Intense late brittle deformation overprints earlier textures. Interestingly, the section is similar to Sample U1309B-2R1, 71-73 cm (TS 10) except for a more intense brittle overprint. The brittle overprint makes it difficult to recognize a plagioclase LPO (a property of Sample U1309B-2R1, 71-73 cm) or evaluate the character or presence of a pre-brittle deformation crystal plasticity. Late amphibole vein has shear offset. Note there is a strong flattening fabric defined by brecciated former plagioclase and pyroxene (now amphibole) in one part of the slide, apparently overprinted by later alteration/brecciation.

PHOTOMICROGRAPHS:

1309B_6R_1_20_22_1
1309B_6R_1_20_22_2
1309B_6R_1_20_22_3
1309B_6R_1_20_22_4
1309B_6R_1_20_22_5

THIN SECTION:	U1309B-6R-1, 102-105 cm	**Piece No.** 9		**Unit**: 22	**TS#: 27**		**OBSERVER: Ron Frost, ESA, GH**	
ROCK NAME:	Diabase							
GRAIN SIZE:	Medium grained							
TEXTURE:	Ophitic							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**			**Composition**	**MORPHOLOGY**	**COMMENTS**
			min.	**max.**	**av.**			
Clinopyroxene	20	~50	0.1	2.4	1		Anhedral	Variable degree of alterations in different sections of the slide. Replaced by green amphibole.
Plagioclase	44	~44	0.08	2.24	0.98		Subhedral	Relatively unaltered, some exhibit undulatory zoning
Olivine	0	4	0.5	1.7	1		Anhedral	Completely replaced by chlorite
Magnetite and ilmenite	2	2	0.08	0.4	0.3		Subhedral	

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron)**				**REPLACING / FILLING**	**COMMENTS**
			min.	**max.**	**av.**			
Hornblende	-				up to 1mm		Pyroxene	
Actinolite	29%			up tp 0.8 mm			Pyroxene, hornblende	Percentage is for total amphiboles
Chlorite	5%			up to 0.5 mm			Plagioclase	

TOTAL ALTERATION: 35%

STRUCTURE: Primary texures with no magmatic fabric. Pervasive alteration with no evidence for significant cataclasis.

PHOTOMICROGRAPHS:

1309B_6R_1_102_105_1

1309B_6R_1_102_105_2

THIN SECTION:	U1309B-6R-2, 61-63 cm	**Piece No.** 5	**Unit**: 22	**TS#: 29**	**OBSERVER: MD,NH, ESA**
ROCK NAME:	Oxide Diabase				
GRAIN SIZE:	Medium-grained				
TEXTURE:	Subophitic				

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	40	40	0.1	2.6	0.7		Subhedral laths	Relatively unaltered.
Pyroxene	3	57	?	2.5	0.8		Subhedral to anhedral	Replaced by amphibole
Olivine	0	1	?	0.8	0.5		Anhedral	Completely replaced by chlorite, relict texture remains.
Opa' ue minerals	3	3	0.07	1	0.5		Subhedral to anhedral	Magnetite & ilmenite.

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Actinolite	30						Pyroxene	
Tremolite	30						In vein, pyroxene	
Chlorite							In vein	

TOTAL ALTERATION: ~ 40%

STRUCTURE : Altered primary texture. The vein in sample does not have well-defined vein walls in thin section.

PHOTOMICROGRAPHS:

1309B_6R_2_61_63_1

1309B_6R_2_61_63_2

THIN SECTION:	U1309B-6R-2, 66-69 cm	**Piece No.** 6	**Unit**: 23	**TS#: 28**	**OBSERVER: ESA, MA**
ROCK NAME:	Brecciated gabbro / cataclasite				
GRAIN SIZE:	Coarse grained				
TEXTURE:	Originally equigranular(?) but brecciation and alteration is intense				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	27	~60	0.1	0.7	0.3		Coarse-granular subhedral	Coarse-grained with extensive albite twinning. Most of the crystals are rimmed by alteration zone.
Pyroxene	0	~40		1.4	0.8		Subhedral	Matrix is intensely altered and pyroxene is replaced by amphiboles. Minimum grainsize cannot be measured
Spinel	1	~1	0.02	0.6	0.4		Granular	Crystals vary from subhedral to anhedral. Most of the crystals are opaque (crystal is too thick) but one mineral in upper-rigtht section of the slide clearly shows spinel color.
Brown amphibole		<1			0.3		Anhedral but cut along the c-section with clear cleavage.	Bounded by coarse-grained plagioclases, alteration green amphibole in one side of the grain. Usually found along the boundary between plagioclase and altered pyroxene.

SECONDARY MINERALOGY	PERCENT		SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.		REPLACING / FILLING	COMMENTS
Actinolite/tremolite	55			mm	500		Pyroxene	Also from breccia matrix
Chlorite	15			100	300		Plagioclase	In clasts and in breccia matrix
Oxides	1		1mm	2mm				
Brown amphibole	<1				500		Relics in some clasts	

TOTAL ALTERATION: ~70%

STRUCTURE: A breccia with gabbroic clasts. The plagioclase preserves crystal plastic textures along grain boundaries. Other gabbro clasts preserve only igneous textures. Cataclastic regions exhibit a brittle foliation.

PHOTOMICROGRAPHS:

1309B_6R_2_66_69_1
1309B_6R_2_66_69_2
1309B_6R_2_66_69_3
1309B_6R_2_66_69_4

THIN SECTION:	U1309B-7R-1, 6-8 cm	**Piece No.** 1		**Unit**: 24	**TS#: 30**		**OBSERVER: MA, ESA**	
ROCK NAME:	Cataclastic gabbro with felsic vein							
GRAIN SIZE:	Coarse-grained							
TEXTURE:	Cataclastic							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Gabbro								
Plagioclase	30	40		4	1.5		Anhedral	Large crystals are broken into smaller fragments and twinning planes are slightly bent or diffused. Crystal boundaries are very irregular.
Clinopyroxene	30	50		3.4	1.14		Anhedral	Shows stress-bent lamellae and exolutions. Also present as neoblastic (recrystallized) (0.03 mm average) crystals along fractures in coarse-grained clinopyroxenes. Some of the grains are altered to amphiboles.
Felsic-vein								
Plagioclase			0.03	0.2	0.1		Anhedral	Interlocking anhedral crystals with cloudy texture and undulatory extinction. No developed twinning but has extenive exsolutions.
Zircon			0.08	0.2	0.2		Subhedral to euhedral	Occurs along melt-infiltrated zones, usually associated with brown amphibole and plagioclase.
Apatite					0.02		Euhedral prisms	Inclusions inside zircon, brown hornblede and
Brown hornblende					0.3		Anhedral to subhedral	Contains apatite and zircon inclusions.

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Actinolite/tremolite	25						Pyroxene	In breccia zone, in veins
Chlorite	5						Plagioclase	
Brown hornblende	8							
Albite	10							
Zircon	2							

TOTAL ALTERATION: ~50%

STRUCTURE : Primary texture preserved, overprinted by a narrow amphibolite grade shear zone observed with crystal plastic deformation of (recrystallized) plagioclase and hornblende. A narrow band of recrystallized plagioclase has a strong LPO. Brittle deformation (transgranular fracture and local cataclasis) overprints the crystal plastic texture. A second set of cataclastic shear zones overprints some of the (earlier) brittle deformation. The second cataclastic shear zones involve a low-temperature alteration.

PHOTOMICROGRAPHS:

1309B_7R_1_6_8_1
1309B_7R_1_6_8_2
1309B_7R_1_6_8_3
1309B_7R_1_6_8_4
1309B_7R_1_6_8_5
1309B_7R_1_6_8_6
1309B_7R_1_6_8_7
1309B_7R_1_6_8_8
1309B_7R_1_6_8_9
1309B_7R_1_6_8_10

THIN SECTION: U1309B-7R-1, 24-25 cm **Piece No.**: 2A **Unit**: 24 **TS#: 31** **OBSERVER: MD, ESA**
ROCK NAME: Brecicated gabbro with low-Ca plagioclase dike
GRAIN SIZE: Coarse-grained
TEXTURE: E' uigranular but brecciated and altered

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	60	75	?	2.6	2.1		Anhedral	Crystals are brecciated, hence minimum size is not determined. Well formed twinning and clear lattice.
Clinopyroxene	0	20	?	?			Anhedral(?)	Completely replaced by amphibole. Estimation of size and morphology is complicated due to overprinting amphibole replacement and alteration, however, relict suggests anhedral morphology and coarse-grained texture.
Olivine (?)	0	<5	?	?	1		Anhedral	Some features are similar to relict texture of olivine. Cavities rimmed by actinolite and chlorite.
Anorthositic dike								
Plagioclase	~90	90	0.2	3	2		Anhedral	Crystals are very anhedal with very irregular shapes but interlocking grains. Lattice are usually cloudy and crystals with cleavage traces are sometimes as diffused.
Brown amphibole	10	10	0.2	4.2	1.4		Anhedral	Strongly pleochroic from brownish-green to green. Although anhedral cleavage traces are is very well defined. Contains zircon and apatite as inclusions.
Zircon		<1	0.1	0.18	0.07		Euhedral to subhedral	Accessory minerals associated with the anorthostic dike. Strongly asscociated with the brown amphiboles.
Apatite		<1	0.1	0.25			Euhedral	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Tremolite/actinolite	20						Pyroxene	In fractures, in veins
TOTAL ALTERATION: ~20%								

STRUCTURE : Moderate brittle fabric overprints a weak crystal plastic fabric. Plagioclase exhibits bent twin lamellae, deformation twins, sweeping extinction, and locally subgrains. Large euhedral hornblendes (transitional between brown and green), vuggy albitic plagioclase (possibly with Zircons). The magmatic texture is overprinted by actinolite-bearing breccia. Feldspars are locally altered to a daughter feldspar grain that can be optically continuous with the parent.

PHOTOMICROGRAPHS:
1309B_7R_1_24_25_1
1309B_7R_1_24_25_2
1309B_7R_1_24_25_3

THIN SECTION:	U1309B-7R-1, 67-69 cm	**Piece No.** 7	**Unit**: 24	**TS#: 32**	**OBSERVER: AMcC, JM, GH**
ROCK NAME:	Deformed Gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Equigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	45	65	0.5	4	2		Anhedral to subhedral	Some areas altered/recrystallized, bent lamellae
Clinopyroxene	0	35		7	4		Anhedral	Completely replaced, original grain size can not be determined

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Green-brown hornblende	10		100	3000	1000		Clinopyroxene	Main amphibole phase in little-deformed gabbro
Secondary plagioclase	10						Plagioclase	Plagioclase is pervasivley altered along fractures to dirty secondary plagioclase
Tremolite/actinolite	33		<5	3000	10			Mainly in shear zone. Some large grains in matrix
Talc?	2							In shear zone

TOTAL ALTERATION: 55% (amphibolite facies 25%, greenschist 30%)

STRUCTURE : Cataclasite from gabbro with a fault zone: Slight crystal plastic strain in the feldspar (recrystallization along grain boundaries, slight undulose extinction, and deformation-induced twinning); cataclasis intensifies toward the fault zone, which contains syntectonic amphiboles and chlorite and a greenschist-like foliation with porphyroclasts of plagioclase. The fault/shear zone also contains a dramatically folded pale amphibole, presumably a porphyroclast (photos U1309B-039 and 040). The matrix varies from highly schistose needles of pale green tremolite with subordinate Mg-rich chlorite to random orientations near the margins and in embayments.

PHOTOMICROGRAPHS:

1309B_7R_1_67_69_1
1309B_7R_1_67_69_2
1309B_7R_1_67_69_3
1309B_7R_1_67_69_4
1309B_7R_1_67_69_5
1309B_7R_1_67_69_6
1309B_7R_1_67_69_7
1309B_7R_1_67_69_8

THIN SECTION:	U1309B-8R-1, 48-52 cm	**Piece No.** 5	**Unit**: 28	**TS#:33**	**OBSERVER: ABR / ABC**
ROCK NAME:	Mylonitic gabbro				
GRAIN SIZE:	Fine to coarse grained				
TEXTURE:	Mylonitic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	25	50		6				Grains recrystallized to secondary plagioclase, original sizes can not be determined
Clinopyroxene	5	50						Replaced by amphiboles

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Secondary plagioclase	30		30	80	50		Plagioclase	
Actinolite	20		50	1500	800		Pyroxene	
Cummingtonite	7						Pyroxene	Commonly with rim of hornblende
Brown hornblende	7						Pyroxene	
Chlorite	5						Plagioclase	

TOTAL ALTERATION: 70%

STRUCTURE : Mylonitic texture across the section (Crystal Plastic intensity of 3). The microstructure is typified by extensively recrystallized plagioclase grain boundaries, some of which follow planar orientations suggestive of a semi-brittle texture. Plagioclase also has undulose extinction. Amphiboles are also strained in places creating an LPO along some grains.

PHOTOMICROGRAPHS:

1309B_8R_1_48_52_1
1309B_8R_1_48_52_2
1309B_8R_1_48_52_3
1309B_8R_1_48_52_4
1309B_8R_1_48_52_5
1309B_8R_1_48_52_6
1309B_8R_1_48_52_7
1309B_8R_1_48_52_8
1309B_8R_1_48_52_9

THIN SECTION: U1309B-8R-1, 84-87 cm **Piece No.**: 10 **Unit**: 28 **TS#:34** **OBSERVER: MA / ABC**
ROCK NAME: Gabbro
GRAIN SIZE: Coarse
TEXTURE: Seriate

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	25	50	0.1	6	4		Anhedral	Grains strained, bent, recrystallized, one with magmatic oscillatory zoning
Clinopyroxene	0	50						Completely altered, original size and shape can not be determined
Zircon	< 1	< 1			0.1		Anhedral	Three or four grains, one large.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Brown hornblende	25						Pyroxenes	Large, subhedral
Actinolite	25						Brown hornblende, pyroxenes	
Epidote	T						In plagioclases	
Chlorite	T						Plagioclases	
Recrystallized plagioclase	25							Probable amphibolite facies recrystallisaion

TOTAL ALTERATION: 20%

STRUCTURE : Relict Igneous textures preserved. Plagioclase grain size is bimodal; recrystallization appears to be common in pockets of plagioclase, along with minor undulatory extinction. Brittle fractures cut across the matrix as well as large grains of both plagiocalse and pyroxene altered to amphbole.

PHOTOMICROGRAPHS:
1309B_8R_1_84_87_1
1309B_8R_1_84_87_2

THIN SECTION: U1309B-8R-1, 118-119 cm **Piece No.**: 13 **Unit**: 28 **TS#: 35** **OBSERVER: MA, ABC**

ROCK NAME: Gabbro

GRAIN SIZE: Coarse

TEXTURE: Seriate

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	45	50	1	8	6		Subhedral	Bent lamellae, sweeping extinction.
Clinopyroxene	0	50						Completely altered, original size and shape can not be determined.
Olivine	0	1						Completely altered, original size and shape can not be determined.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Amphiboles	35						Pyroxenes, plagioclase	Cummingtonite, actinolite, tremolite
Hornblende	15						Pyroxene	Primary or secondary? Large, many subhedral
Albite	5						Plagioclase	
Chlorite	1						Plagioclase	

TOTAL ALTERATION: 55%

STRUCTURE : Igneous textures preserved by some large plagioclase and clino-pyroxene grains. Sweeping extinction, bent grains, and deformation twins observed in plagioclase indicate minor crystal plastic deformation (intensity 1.5). Brittle deformation and associated cataclasis are observed along a 1 mm shear zone. Fractures infilled with green amphibole are common in plagioclase, but show little to no offset. The hornblende may be indicative in this sample of an amphibolite grade metamorphic event, although its origin is not clear. Hornblende grains are undeformed.

PHOTOMICROGRAPHS:

1309B_8R_1_118_119_1

1309B_8R_1_118_119_2

THIN SECTION:	U1309B-8R-2, 8-10 cm	**Piece No.** 1	**Unit**: 28	**TS#: 36**	**OBSERVER:MD, VDH**
ROCK NAME:	Orthopyroxene-bearing gabbro				
GRAIN SIZE:	Coarse-grained				
TEXTURE:	Seriate-mylonitic				

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	47	50					?	Shape and size not determined because of intensive recrystallization
Clinopyroxene	5	45	2	6			Subhedral	Clinopyroxenes deformed and almost completely replaced by amphibole
Orthopyroxene	1	3			6		Subhedral	One single grain at thin section edge
Black opaques	< 0.1	< 0.1					Elongated	Secondary, only in orthopyroxene

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Hornblende	1				to 1 mm		Pyroxene	
Tremolite	2						Pyroxene, hornblende	
Chlorite	T				0.1		Plagiocalse	
Actinolite	30				to 1mm		Orthopyroxene	Halo around altered clinopyroxene and orthopyroxene with actinolite exsolution

TOTAL ALTERATION: ~ 30% **picture : U1309B 8R-2 8-10 1-1, U1309B 8R-2 8-10 1-2**

STRUCTURE : Protomylonitic crystal plastic texture expressed by recrystallization along plagioclase grain boundaries (crystal plastic intensity of 3). Recrystallization of amphiboles created finer grains that mantle optically continuous cores. Amphiboles (pyroxenes?) have bent cleavage planes. Recrystallized amphibole provides reverse sense of shear indicators in the core reference frame along steeply dipping faults. Cataclastic shear bands are filled with a lower temperature amphibole, locally overprinted/cut by tremolite-actinolite.

PHOTOMICROGRAPHS:

1309B_8R_2_8_10_1
1309B_8R_2_8_10_2
1309B_8R_2_8_10_3
1309B_8R_2_8_10_4
1309B_8R_2_8_10_5
1309B_8R_2_8_10_6

THIN SECTION:	U1309B-9R-1, 38-41 cm	**Piece No.** 3A	**Unit**: 28	**TS#: 37**	**OBSERVER: ABR, JM**
ROCK NAME:	Gabbro				
GRAIN SIZE:	Coarse-grained/fine-grained				
TEXTURE:	Equigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	55	65	1	10	5		Anhedral/subhedral	
Clinopyroxene	15	35	1	8	4		Anhedral/subhedral	Replacement and alteration under several conditions.
Opaque mineral	trace	trace		0.05			Equant	
Brown hornblende	trace	trace		0.4			Bleb-like within or rim to clinopyroxene	Magmatic?
Fine-grained part								
Plagioclase	60	60	0.2	0.5	0.3		Anhedral, granular	
Clinopyroxene	30	40	0.2	0.5	0.3		Anhedral, granular	
Opaque mineral	trace	trace		0.03			Equant	
Brown hornblende	trace	trace		0.2			Bleb-like within or rim to clinopyroxene	Magmatic?

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite	15				1000		Pyroxene	
Cummingtonite	1				400		Pyroxene	
Brown hornblende	5				300		Pyroxene	
Secondary plagioclase	5				50		Plagioclase	
Chlorite	5				20		Plagioclase	

TOTAL ALTERATION: 30%

STRUCTURE : Coarse-grained (dominant) and fine-grained part are distinguished. Preserved magmatic texture with some creep microstructures (e.g. subgrain boundaries) in the plagioclase (crystal-plastic intensity of 2). Amphibolite-grade alteration with a minor semi-brittle deformational component. Much of the alteration replaces grains without overprinting the magmatic texture and therefore took place without extensive cataclasis.

PHOTOMICROGRAPHS:

1309B_9R_1_38_41_1
1309B_9R_1_38_41_2
1309B_9R_1_38_41_3
1309B_9R_1_38_41_4
1309B_9R_1_38_41_5
1309B_9R_1_38_41_6

THIN SECTION:	U1309B-9R-1, 94-97 cm	**Piece No.** 5	**Unit**: 28	**TS#:** 38	**OBSERVER: ABC with JM, MA**
ROCK NAME:	Gabbro and vein				
GRAIN SIZE:	Coarse				
TEXTURE:	Equigranular (originally)				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Gabbro								
Plagioclase	55	60		6	5		Anhedral	Deformed and altered. Very thin and subtle veinlets with diffuse boundary of sodic plagioclase are observed within large plagioclase grains.
Clinopyroxene	0	40		10	6		Anhedral	Altered to amphibole.
Vein?								
Brown amphibole				5			Subhedral	Greenish brown to reddish brown amphiboles with subhedral shape are observed within the dike(?). Magmatic origin?

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Red-brown hornblende	2						Pyroxene	In (breccia?) vein
Actinolite	20						Pyroxene , veins	Main matrix component of the green unit, can be folded
Tremolite/ cummingtonite	10						Pyroxene	in gabbro
Secondary plagioclase	13						Plagioclase	In the small grained (breccia?) vein

TOTAL ALTERATION: ~45%

STRUCTURE : Cataclastic vein has well-developed, euhedral amphiboles within intense breccias, and in other places well-developed actinolite that is kinked within the deformation of the breccia. Plagioclases are relatively large and unstrained with only local recrystallization. Brown, gouge-like veins protrude from the breccia-zone wall although their trace is lost in the matrix of the breccia.

PHOTOMICROGRAPHS:

1309B_9R_1_94_97_1
1309B_9R_1_94_97_2
1309B_9R_1_94_97_3

THIN SECTION: U1309B-10R-1, 3-4 cm **Piece No.** 1 **Unit**: 28 **TS#: 39** **OBSERVER: MA / ABC**
ROCK NAME: Gabbro
GRAIN SIZE: Medium
TEXTURE: Seriate

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	70	70	0.1	3	1		anhedral	Grains showing recrystallization, undulose extinction, bent lamellae
Clinopyroxene	0	27						Completely altered, original size, shape can not be determined
Olivine ?	0	< 3						Completely altered, original size, shape can not be determined

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Amphibole (actinolite/tremolite)	29						Pyroxenes	Actinolite in veins
Chlorite	1						Present in green veins	
Brown hornblende	T						Pyroxenes	

TOTAL ALTERATION: 30%

STRUCTURE : Recrystallization of plagioclase and amphibole is localized along planes that might have been earlier fractures (e.g. semi-brittle texture). Low-temperature brown veins (gouge-like) cut green veins.

PHOTOMICROGRAPHS:
1309B_10R_1_3_4_1
1309B_10R_1_3_4_2

THIN SECTION: U1309B-10R-1, 64-66 cm **Piece No.** 7 **Unit**: 28 **TS#: 40** **OBSERVER: MD, JM**
ROCK NAME: Olivine-bearing gabbro
GRAIN SIZE: Medium
TEXTURE: No magmatic texture

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	60	60		3	2		?	Altered and deformed
Olivine	0	2?		3			?	Completely altered
Clinopyroxene	10	35		4	3		Anhedral	Altered

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Tremolite/actinolite	30						Pyroxene	
Chlorite	2						Plagioclase	
Brown hornblende	1						Pyroxene	Hornblend intergrown with tremolite
Magnetite	<1							

TOTAL ALTERATION: ~ 30%

STRUCTURE : Primary texture preserved within an early crystal plastic (intensity of 2.5) texture expressed as recrystallized plagioclase. Low temperature amphiboles involved in local shear bands that trace into plagioclase as fracture and cataclastic domains. Interestingly, a high temperature brittle deformation appears to be absent.

PHOTOMICROGRAPHS:
1309B_10R_1_64_66_1
1309B_10R_1_64_66_2
1309B_10R_1_64_66_3

THIN SECTION: 41	U1309B-10R-1, 111-113 cm	**Piece No.** 14	**Unit**: 29	**TS#: 41**	**OBSERVER: Ron Frost, JM**
ROCK NAME:	Layered gabbro and troctolite				
GRAIN SIZE:	Medium-grained				
TEXTURE:	Equigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
altered gabbro								
Plagioclase	30	50	1	3	2		Subhedral	Twin lamella slightly distorted
Clinopyroxene	10	50	1	8	4		Subhedral to anhedral	Primary clinopyroxene with densely spaced cleavage and clear probably later clinopyroxene with widely spaced cleavage which replaces the primary one. Replacement and alteration under several conditions.
Olivine	0	Trace		1				Altered to cummingtonite which is contained in altered clinopyroxene
Brown hornblende		Trace		0.3			Bleb-like in clinopyroxene, rim on clinopyroxene	Magmatic?
altered troctolite								
Plagioclase	25	60?	1	6	3?		Anhedral	
Olivine	0	40?		5?	3?		?	Completely altered to chlorite and amphibole

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Cummingtonite	-				up to 1mm		Orthopyroxene, olivine?	
Hornblende	-				0.4 mm		Clinopyroxene	
Actinolite	30%				up to 2mm		Clinopyroxene, hornblende	Total amphiboles = 30%
Chlorite	5%						Plagioclase	

TOTAL ALTERATION: 35%

STRUCTURE : Layering of troctolite and gabbro. Crystal plastic textures (intensity of 1.5-2) expressed as minor recrystallization and undulose extinction of plagioclase overpint a well-preserved magmatic texture. Magmatic foliation defined by shape preferred orientation of augite (no LPO). Cataclasis and low temperature (i.e. actinolite) alteration is minor, although local shear bands include preferred orientations of amphibole grains.

PHOTOMICROGRAPHS:

1309B_10R_1_111_113_1
1309B_10R_1_111_113_2
1309B_10R_1_111_113_3
1309B_10R_1_111_113_4
1309B_10R_1_111_113_5
1309B_10R_1_111_113_6

THIN SECTION:	U1309B-11R-1, 7-10 cm	**Piece No.** 1A	**Unit**: 31	**TS#:42**			**OBSERVER: ABR, JM**	
ROCK NAME:	Gabbro							
GRAIN SIZE:	Medium							
TEXTURE:	Equigranular							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**			**Composition**	**MORPHOLOGY**	**COMMENTS**
			min.	**max.**	**av.**			
Plagioclase	40	60		6	3		Anhedral	Altered and deformed, some recrystallization and bent lamellae
Clinopyroxene	15	40		5	3		Anhedral	Deformed and altered

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron)**				**REPLACING / FILLING**	**COMMENTS**
			min.	**max.**	**av.**			
Actinolite	20						Pyroxene	Total amphibole = 20%
Chlorite	10							
Tremolite	-							
Brown hornblende	<1						Pale hornblende	
Secondary plagioclase	20						Plagioclase	
Clay	1						Vein filling	

TOTAL ALTERATION: ~55%

STRUCTURE : Relatively strong crystal plastic strain of plagioclase (intensity of 3) including an LPO of plagioclase. Syntectonic and coeval amphibole and plagioclase recrystallization pins this deformation to high amphibolite grade conditions. Brittle deformation includes fracture and cataclasis all associated with low temperature (i.e. actinolite) alteration. Interestingly, the amphibolite-grade cataclasis and semi-brittle textures are absent.

PHOTOMICROGRAPHS:

1309B_11R_1_7_10_1

1309B_11R_1_7_10_2

THIN SECTION:	U1309B-11R-1, 87-90 cm	**Piece No.** 8		**Unit**: 32	**TS#: 43**		**OBSERVER: AvdH, BRF**	
ROCK NAME:	Harzburgite / Olivine gabbro contact							
GRAIN SIZE:	Coarse granular / coarse grained							
TEXTURE:	Protogranular - secondary porphyroclastic							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Olivine	80	90	< 0.1	6				Affected by crystal plastic deformation close to the contact
Orthopyroxene	< 1	<1			4		E' uant, round	Difficult to estimate modal percent because of limited area and alteration
Clinopyroxene	10	10	2	5			Sube' uant	Magmatic clinopyroxene, not relict, modal content decreases away from the contact; undulouse extinction, commonly deformed
Spinel	1	1	0.05	0.9			E' uant-interstitial	very dark brown, associated with sulfides (rare)
Olivine gabbro mineralog								
Plagioclase	8	50	< 0.1	2.5			Euhedral-subhedral	Plagioclase affected by crystal-plastic deforrmation, original percent difficult to estimate because of intense alteration
Clinopyroxene	10	20	0.1	5			Euhedral - anhedral	Anhedral as plagioclase inclusion, euhedral as porphyroblast; orthopyroxene exsolutions
olivine	0	30						

Comment: Gabbro and peridotite are separated by a 4 mm carbonate-talc-tremolite band

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Gabbro								
Chlorite	35						Olivine	
Tremolite/actinolite	25						Olivine, pyroxene	Cummingtonite is possible
Talc	20							At the contact between gabbro and peridotite
Aragonite	2							
Peridotite								
Serpentine	10						Olivine	
Tremolite	Trace						Growing against clinopyroxene	

TOTAL ALTERATION: 80% in gabbro, 10% in peridotite picture : 1309B 11R-1 87-90 8-1

STRUCTURE : In the peridotite domain: Olivine grains that have undulose extinction and subgrain boundaries with poikiloblasts of pyroxene with bent cleavage planes. Grains are cut by narrow bands of recrystallized (not mylonitic) olivine. Protogranular; Crystal plastic intensity of 2 (in a peridotite scale). Transgranular and grain boundary fractures, with magnetite along some, and serpentinite along others. Healed fractures cut the olivine without serpentine, and contain fluid inclusions. Strong serpentine foliation with talc-rich regions that appear to have grown statically. There is a contrast across the thin section in alteration zones that have a strong serpentine foliation and those that do not. **In the gabbroic domain:** a crystal plastic deformation (intensity 2) overprinted by a static actinolite-tremolite alteration.

PHOTOMICROGRAPHS:

1309B_11R_1_87_90_1
1309B_11R_1_87_90_2
1309B_11R_1_87_90_3
1309B_11R_1_87_90_4
1309B_11R_1_87_90_5
1309B_11R_1_87_90_6
1309B_11R_1_87_90_7
1309B_11R_1_87_90_8
1309B_11R_1_87_90_9
1309B_11R_1_87_90_10

THIN SECTION:	U1309B-11R-1, 98-100 cm	**Piece No.** 8	**Unit**: 32	**TS#: 44**	**OBSERVER: MA,AvdH**
ROCK NAME:	Harzburgite				
GRAIN SIZE:	Coarse-grained				
TEXTURE:	E' uigranular to porpbyroclastic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Olivine	25	75						Only cores are preserved
Orthopyroxene	3	22	1.2	10	4		E' uant-sube' uant	Undulouse extinction and bending occurs in some orthopyroxene grains
Clinopyroxene	1	1	0.1	1.2			E' uant-sube' uant	Occurs as bleb and exsolutions in orthopyroxene and intergranular penetrating an orthopyroxene grain
Spinel	< 1	< 1	0.1	1.5			E' uant	Fresh, red brown in color; spinel train in color

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Serpentine	40				<1		Olivine, pyroxene	
Talc	10				100		Pyroxene	
Chlorite	2				100		In small veins	
Magnetite	8				20			

TOTAL ALTERATION: 60%

STRUCTURE : Protogranular serpentinite/peridotite with a crystal plastic intensity of 1. Possible olivine LPO, but analysis restricted by thin section scale. Four or five spinels suggest a lineation. Possible displacements across shear bands but overall brittle deformation appears to be isotropic. Obli' uity between purported spinel lineation and LPO.

PHOTOMICROGRAPHS:

1309B_11R_1_98_100_1
1309B_11R_1_98_100_2
1309B_11R_1_98_100_3
1309B_11R_1_98_100_4
1309B_11R_1_98_100_5
1309B_11R_1_98_100_6
1309B_11R_1_98_100_7
1309B_11R_1_98_100_8
1309B_11R_1_98_100_9
1309B_11R_1_98_100_10
1309B_11R_1_98_100_11
1309B_11R_1_98_100_12
1309B_11R_1_98_100_13
1309B_11R_1_98_100_14
1309B_11R_1_98_100_15
1309B_11R_1_98_100_16

Extinction	Subgrains	Ad/subtract
8	**none**	**+**
42	**none**	**+**
52	vertical	+
22	**none**	**+**
25	**none**	**+**
11	vertical	+
45	vertical	+
8	none	+
30	none	+
70	vertical	+
25	none	-
10	**none**	**+**
12	**none**	**+**
32	vertical	+
20	vertical	+
54	none	-
65	none	+
34	none	+
34	horizontal	-
26	none	+
45	vertical	+
38	vertical	+
45	none	+
24	vertical	+
36	none	+
46	vertical	+
60	vertical	+
26	vertical	+
4	vertical	+
54	vertical	+

spinel lineation is 14

THIN SECTION:	U1309B-11R-2, 8-10 cm	**Piece No.** 1A		**Unit**: 32	**TS#: 45**		**OBSERVER: RF/ABR, ESA**	
ROCK NAME:	Serpentinized harzburgite							
GRAIN SIZE:	Coarse-grained							
TEXTURE:	Equigranular to secondary porphyroclastic							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Olivine	3 to 5	78					Equant	Serpentinized but fresh crystals still remain in the cores of the crystals and along grain boundaries of coarse-grained pyroxene.
Orthopyroxene	~10	20	0.6	3.4	2.2		Porphyroclastic	Moderately to highly altered and shows bent lamellae. Some crystals still have fresh cores.
Clinopyroxene	1	1	0.1	1.7			Equant	Small grain inbetween two coarse-grained orthopyroxenes.
Spinel	1	1	0.2	2.1	0.8		Interstitial to vermicular	Dark red-brown color
Gabbro vein in upper corner but destroyed by thin section preparation. Big clinopyroxene grain survived								

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Serpentine	95						Olivine	Mesh texture; chrysotile in veins
Carbonate	<1				<5		Vein filling	In serpentine veins
Chlorite	<1							In zones
Tremolite	1						Olivine?	Also in veins
Talc	1						Orthopyroxene	
Magnetite	2		<10	100	10		Olivine	
TOTAL ALTERATION: 95-100%								

STRUCTURE : Altered peridotite (much more altered than thin section #44). Crystal plastic intensity of 1 (protogranular) and minor subgrains. Amphibole (randomly oriented tremolite-actinolite) veins are cut by serpentine-carbonate veins that cut all other features. Chrysotile-carbonate veins; tremolite veinlets

PHOTOMICROGRAPHS:

1309B_11R_2_8_10_1

1309B_11R_2_8_10_2

THIN SECTION:	U1309B-11R-2, 32-34 cm	**Piece No.** 1B	**Unit**: 32	**TS#:** 46	**OBSERVER: RF/ABR, ESA**
ROCK NAME:	Serpentinized harzburgite				
GRAIN SIZE:	Coarse-grained				
TEXTURE:	Porphyroclastic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Olivine	0	87					Serpentinized	
Orthopyroxene	5	12	1.1	5.5	1.5			Exsolving clinopyroxene, most of the grains show bent lamellae and irregular shapes.
Spinel		1		2	1.4		Holly leaf and exsolution	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Serpentine	95*		<5	30	10		Olivine.pyroxene	(*) % in dark part of thin section; mesh texture
Magnesite	1				<5		Vein filling	very fine grained
Magnetite	1		<5	25	5		Olivine	
Talc	50**		10	400	50			Vein filling; (**) % in light part of thin section
Tremolite	50**		10	800	30			Vein filling; (**) % in light part of thin section

TOTAL ALTERATION: 95-100%

STRUCTURE : Serpentinite (dark part on thin section) with talc-tremolite schist (containing chromite) as vein filling (light part on thin section). Talc-tremolite schist is a shear zone with strong LPO of talc and kinematic indicators providing a reverse sense of shear on a steeply dipping shear zone. Protogranular texture (Crystal plastic intensity of 1).

PHOTOMICROGRAPHS:

1309B_11R_2_32_34_1
1309B_11R_2_32_34_2
1309B_11R_2_32_34_3
1309B_11R_2_32_34_4
1309B_11R_2_32_34_5
1309B_11R_2_32_34_6
1309B_11R_2_32_34_7
1309B_11R_2_32_34_8
1309B_11R_2_32_34_9
1309B_11R_2_32_34_10
1309B_11R_2_32_34_11
1309B_11R_2_32_34_12
1309B_11R_2_32_34_13

THIN SECTION:	U1309B-11R-2, 88-90 cm	Piece No. 7	Unit: 32	TS#: 47	OBSERVER: RF/ABR and ABC
ROCK NAME:	Serpentinite / Hazburgite				
GRAIN SIZE:					
TEXTURE:					

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Olivine	5	75			0.8		Serpentinized	Only cores are preserved
Orthopyroxene		22						Reaction rim, highly altered along lamellae, undulouse extinction
Clinopyroxene		1						Round as exsoluion of orthopyroxene
Spinel	<2	2						

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Serpentine	90		<5	30	10		Olivine+ orthopyroxene (+clinopyroxene)	Mesh texture + hourglass?
Tremolite	2		25	100	50		Clinopyroxene	
Talc	2			600				
Magnetite	1				5		Olivine	

TOTAL ALTERATION: ~95%

STRUCTURE : Protogranular texture (Crystal plastic intensity of 1) with some fresh olivine. Measured LPO on 20 grains. Photo 1309b_11r_2_88_90_3.tif

PHOTOMICROGRAPHS:

1309B_11R_2_88_90_1
1309B_11R_2_88_90_2
1309B_11R_2_88_90_3

THIN SECTION:	U1309B-12R-1, 122-125 cm	**Piece No.** 8		**Unit**: 34	**TS#:** 48		**OBSERVER: ABR and ABC**	
ROCK NAME:	Diabase							
GRAIN SIZE:	Medium-grained							
TEXTURE:	Ophitic							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**			**Composition**	**MORPHOLOGY**	**COMMENTS**
			min.	**max.**	**av.**			
Plagioclase	40	43	0.4	1.8	1		Subhedral	Some altered and strained grains
Clinopyroxene	20	45					Anhedral	Several fresh
Olivine	0	5	0.6	0.8	0.8		Anhedral	Replaced by amphibole
Oxides	7	7	0.2	0.8	0.5		Equant, disseminated	Possibly ilmenite, scatter homogeneously throughout.

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron)**				**REPLACING / FILLING**	**COMMENTS**
			min.	**max.**	**av.**			
Actinolite	30		20	250	80		Pyroxene, olivine	
Tremolite	1		10	100	50			
Chlorite	1				<10			

TOTAL ALTERATION: ~30%

STRUCTURE : Pervasively altered with locally weak magmatic fabric. Pervasive grain-scale cracks . Intensity scale of 1a.

PHOTOMICROGRAPHS:

1309B_12R_1_122_125_1

1309B_12R_1_122_125_2

THIN SECTION:	U1309B-13R-1, 120-121 cm	**Piece No.** 9A	**Unit**: 35	**TS# 49**	**OBSERVER: ABR, JM**
ROCK NAME:	Diabase				
GRAIN SIZE:	Medium-grained				
TEXTURE:	Ophitic to subophitic				

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	55	55	0.1	2	1		Subhedral, lath-shaped	Plagioclase phenocryst (4 mm long)
Clinopyroxene	4	40	0.1	1	0.5		Anhedral	Subophitic, altered to amphibole
Oxides	5	5	0.1	0.5	0.2		Equant	

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**	**Composition**	**REPLACING / FILLING**	**COMMENTS**
Actinolite	40		50	500	300		Proxene	
Chlorite	3		<5	20	5		Olivine?	Occurs with amphibole in amygdales, may replace olivine

TOTAL ALTERATION: ca. 40%

STRUCTURE : Pervasively altered with locally weak magmatic fabric. Pervasive grain-scale cracks . Intensity scale of 1a.

PHOTOMICROGRAPHS:

1309B_13R_1_120_121_1

1309B_13R_1_120_121_2

THIN SECTION:	U1309B-13R-2, 9-10 cm	**Piece No.** 1			**TS#: 50**		**OBSERVER: MA, JM**	
ROCK NAME:	Contact of basalt and gabbro							
GRAIN SIZE:	Microcrystalline for basalt and medium-grained for gabbro							
TEXTURE:	Aphyric for basalt and e' uigranular for gabbro							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**			**Composition**	**MORPHOLOGY**	**COMMENTS**
			min.	**max.**	**av.**			
Basalt								
Plagiolcase	0.5	0.5		2	1.5		Subhedral / euhedral	Phenocryst
Olivine	0.5	0.5		1	0.3		Subhedral rounded?	Phenocryst, completely replaced by amphibole
Gabbro								
Plagioclase	85	85	1.5	8	4		Subhedral / anhedral	
Clinopyroxene	5	15		4	1		Anhedral	
Brown amphibole	1<	1<		1			Replacing shape	Zoned brown amphibole within actinolite aggregate (pseudomorph of clinopyroxene) is observed. Maybe metamorphic origin.

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron)**				**REPLACING / FILLING**	**COMMENTS**
			min.	**max.**	**av.**			
Actinolite/tremolite	40						Olivine, plagioclase, hornblende	
Chlorite	2-5						Plagioclase	
Brown amphibole	10						Pyroxene	
Clays??								At the contact between basalt and gabbro

TOTAL ALTERATION: ~50%

STRUCTURE : In basalt, phenocrysts and microlites form a fabric that is parallel to a non-planar contact. Phenocryst foliation within the basalt is also present. Within the gabbro there are intercumulate pyroxene grains and coarse grained feldspar. Low temperature alteration cuts across the contact between the gabbro and basalt. Gabbro deformation intensity is <1.5.

PHOTOMICROGRAPHS:

1309B_13R_2_9_10_1
1309B_13R_2_9_10_2
1309B_13R_2_9_10_4
1309B_13R_2_9_10_5
1309B_13R_2_9_10_6

THIN SECTION:	U1309B-13R-2, 23-26 cm	**Piece No.** 2		**Unit**: 37	**TS#: 51**		**OBSERVER: MA and ABC with JM**	
ROCK NAME:	Altered troctolitic gabbro							
GRAIN SIZE:	Medium							
TEXTURE:	Equigranular							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**			**Composition**	**MORPHOLOGY**	**COMMENTS**
			min.	**max.**	**av.**			
Plagioclase	50	60	0.2	4	2		Sub to anhedral, equant to tabular	Altered to actinolite and chlorite, broken, recrystallized
Clinopyroxene	1	5	0.2	4	2.5		Assumed anhedral	95% altered to amphibole, origin shape and size can not be determined. three fresh, euhedral grains.
Olivine	0	25	0.2	4	2		Assumed anhedral	
Opaques	< 1	< 1					Equant to disseminate	Commonly follows texure of mineral being replaced
Apatite	Trace	Trace					Euhedral	
Zircon	Trace	Trace					Euhedral	

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron)**				**REPLACING / FILLING**	**COMMENTS**
			min.	**max.**	**av.**			
Actinolite	50				200		Pyroxene, olivine	
Chlorite	5				200		Plagioclase	
Clays					<1		In vein	
Cllinozoisite	Trace							
Plagioclase							Plagioclase	Recrystallizing

TOTAL ALTERATION: 55%

STRUCTURE : Cut by veins. Beautiful zircon and apatite related to felsic or anorthositic vein. The vein exhibits a weak crystal plastic fabric (intensity <1) and is cut by a low-grade shear zone. The low-grade shear zone exhibits reverse sense of shear indicators. Away from the vein the rock is statically altered with no crystal plastic textures.

PHOTOMICROGRAPHS:

1309B_13R_2_23_26_1
1309B_13R_2_23_26_2
1309B_13R_2_23_26_3
1309B_13R_2_23_26_4
1309B_13R_2_23_26_5
1309B_13R_2_23_26_6
1309B_13R_2_23_26_7

THIN SECTION:	U1309B-14R-1, 55-58 cm	**Piece No.** 7	**Unit**: 39	**TS#:** 52	**OBSERVER: RF, AM, ESA**
ROCK NAME:	Troctolitic gabbro (with cross-cutting felsic intrusion)				
GRAIN SIZE:	Coarse-grained				
TEXTURE:	Equigranular (with melt infiltration)				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	30	80	0.07	4.4	1.5		Anhedral	Primary plagioclase has well developed twinning, bent lamellae, whereas anorthitic melt-related plagioclase has no twins.
Olivine	0	~10	?	?	1		Anhedral	Completely replaced by crosscutting amphibole.
Clinopyroxene		~7	?	3.5	0.7		Anhedral	Completely replaced by amphibole but pseudomorph can be distinguished.
Opaques	3	3						

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Amphibole	35							Tremolite and some brown amphiboles.
Chlorite	5							Replacing olivine in sheared gabbro
Plagioclase	30							Amphibolite facies recrystallized plagioclase in mylonitic fabric with brown hornblende.

TOTAL ALTERATION: 70% in metagabbro (almost all plagioclase is dynamically recrystallised I.e., metamorphic) 20% in anorthositic intrusion

STRUCTURE : Mylonitic fabric with strong LPO in recrystallized plagioclase. Crystal plastic deformation affects brown (high-temperature) amphiboles, although it is difficult to determine if there is some pre-amphibole deformation. The felsic intrusion post-dates the recrystallized high-temperature amphibole, but contains low-temperature amphibole alteration.

PHOTOMICROGRAPHS:

1309B_14R_1_55_58_1
1309B_14R_1_55_58_2
1309B_14R_1_55_58_3
1309B_14R_1_55_58_4

THIN SECTION:	U1309B-14R-1, 89-91 cm	**Piece No.** 8	**Unit**: 39	**TS#: 53**	**OBSERVER: RF, VDH,AM**
ROCK NAME:	Cavity in gabbro				
GRAIN SIZE:	Medium-grained				
TEXTURE:					

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	30	55	0.1	5			Subhedral-anhedral	Altered to albite, mostly recrystallized, but cataclastic area in upper corner.
Clinopyroxene?	0.5	45						Remnants of clinopyroxene visible in altered matrix, but too small to estimate size and shape

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite/tremolite	40				0.5mm		Pyroxene	Agree some clionpyroxene visible in altered patch. Not necessarily the same origin as the large patch nearby
Chlorite	Trace							
Secondary plagioclase	30						Plagioclase	This is the other end of the anothositic intrusion seen in slide 52, much more altered here. Total plagioclase = 60%, it is uncertain the relative amounts of primary and recrystallized varieties.

TOTAL ALTERATION: 70%

STRUCTURE : Magmatic felsic vein with primary low-calcium plagioclase, overprinted by actinolite-producing alteration. Cataclastic shear zone cuts the felsic material. Actinolite patch is isotropic.

PHOTOMICROGRAPHS:

1309B_14R_1_89_91_1

1309B_14R_1_89_91_2

THIN SECTION:	U1309B-14R-1, 118-119 cm	**Piece No.** 12	**Unit**: 40	**TS#: 54**				**OBSERVER: MD, JM**	
ROCK NAME:	Basalt (sparsely plagioclase-phyric basalt)								
GRAIN SIZE:	Microcrystalline								
TEXTURE:	Porphyritic								

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	1	1		4			Subhedral lath-shaped	Phenocryst
Clinopyroxene	Trace	Trace		0.5			Anhedral	Spherulitic intergrowth with plagioclase
Olivine	0	Trace		0.5			Rounded	Pseudomorph, completely altered

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Chlorite	2						Plagioclase	Around plagioclase, in fractures of plagioclase
Tremolite/actinolite	30						Plagioclase, pyroxene?	
Clay	3						Plagioclase	

TOTAL ALTERATION: ~35%

STRUCTURE : Basalt with a weak magmatic fabric (1b on the intensity scale); fabric is oriented subparallel to 90° (in core reference frame).

PHOTOMICROGRAPHS:

1309B_14R_1_118_119_1

1309B_14R_1_118_119_2

THIN SECTION: U1309B-14R-1, 123-126 cm **Piece No.** 15 **Unit**: 41 **TS#: 55** **OBSERVER: MA, ABC**
ROCK NAME: Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Protomylonitic

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	50	60		3			Subhedral	Recrystallization and strongly bent lamellae
Clinopyroxene	0	40	0.5	6			Subhedral	Highly altered, deformed
Spinel	Trace	Trace			0.01			

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Metamorphic pyroxene	40							Recrystallized pyoxene
Secondary plagioclase	5							Recrystallized plagioclase in mylonitic seams
Actinolite/tremolite	15							

TOTAL ALTERATION: ~20%

STRUCTURE : Crystal plastic (intensity 2) texture overprinted by a type semi-brittle texture (intensity 5) that has local cataclastic domains. Actinolite veins and alteration are incorporated into the brittle fabric.

PHOTOMICROGRAPHS:
1309B_14R_1_123_126_1
1309B_14R_1_123_126_2

THIN SECTION:	U1309B-15R-1, 15-17 cm	**Piece No.** 3		**Unit: 46**	**TS#: 56**		**OBSERVER: JM, MD, AM**	
ROCK NAME:	Layered gabbro (olivine gabbro and troctolite)							
GRAIN SIZE:	Medium-grained							
TEXTURE:	Equigranular (coronitic)							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**			**Composition**	**MORPHOLOGY**	**COMMENTS**
			min.	**max.**	**av.**			
Olivine gabbro								
Plagioclase	60	65	0.5	2	1.5		Subhedral to anhedral	Altered
Olivine	0	15	0.5	2	1.5		Anhedral, rounded?	Completely altered to chlorite and amphibole
Clinopyroxene	20	20	0.5	2	1.5		Anhedral	Altered
Oxide	trace	trace		0.1			Equant, irregular	
Troctolite								
Olivine	0	50?	0.5	2	1.5		Anhedral, rounded?	Completely altered to chlorite and amphibole
Plagioclase	0	50?	0.5	2	1.5		Anhedral, rounded?	Completely altered to chlorite
Oxide	trace	trace						

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron)**				**REPLACING / FILLING**	**COMMENTS**
			min.	**max.**	**av.**			
Chlorite	20						plagioclase	In coronitic textures with amphibole
Tremolite/actinolite/cummi	15						pyroxene, plagioclase, olivine	Pyroxene, in plagioclase fractures
Talc	5							In coronitic textures with amphibole
Secondary plagioclase	20							Much of plagioclase is turbid

TOTAL ALTERATION: 60% overall, 80% in olivine rich layers

STRUCTURE : Magmatic fabric parallel to compositional banding; banding is defined by orientation of elongate pyroxene grains. No evidence of crystal plasticity. Severely altered. Thin troctolitic layer (5 mm thick) within olivine gabbro is observed. Photo: 1309b_15r_1_16_17_3.tif

PHOTOMICROGRAPHS:

1309B_15R_1_16_17_1
1309B_15R_1_16_17_2
1309B_15R_1_16_17_3
1309B_15R_1_16_17_4
1309B_15R_1_16_17_5
1309B_15R_1_16_17_6
1309B_15R_1_16_17_7
1309B_15R_1_16_17_8

THIN SECTION: U1309B-15R-1, 110-112 cm **Piece No.** 14 **Unit**: 46 **TS#: 57** **OBSERVER: Ron Frost, JM, AM**
ROCK NAME: Altered troctolite
GRAIN SIZE: Coarse
TEXTURE: Equigranular (coronitic)

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Olivine	1	40		6	5		Anhedral?	Although almost completely altered to opaque mineral, chlorite and amphibole, fresh olivine is observed at two places.
Plagioclase	25	60		10	5		Anhedral?	Altered

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Tremolite	13				0.1		Vein in plagioclase	Some of amphibole in coronas
Chlorite	25				<.1mm		Plagioclase	
Cummingtonite	20				.6mm		Olivine	Some amphiboles replacing olivine may be tremolite
Talc	10				0.4		Olivine	
Carbonate	5				0.2		Olivine	May be magnesite
Oxide (magnetite?)	2						Olivine	Intergrown with talc etc

TOTAL ALTERATION: 75%

STRUCTURE : Relict igneous textures, no crystal plastic textures, static alteration. Corona textures olivine-talc+magnetite-amphibole-chlorite-plagioclase

PHOTOMICROGRAPHS:
1309B_15R_1_110_112_1
1309B_15R_1_110_112_2
1309B_15R_1_110_112_3
1309B_15R_1_110_112_4

THIN SECTION:	U1309B-15R-2, 84-85 cm	**Piece No.** 6b		**TS#:** 58	**Ron Frost, JM**
ROCK NAME:	Altered troctolitic gabbro				
GRAIN SIZE:	Medium-grained				
TEXTURE:	equigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	70	74	1	4	2		Anhedral, tabular or rounded	Slightly altered
Olivine	0	18	1	3	2		Anhedral, ounded	Completely altered to chlorite and amphibole.
Clinopyroxene	5	8	1	3	2		Anhedral	Altered to amphibole

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Chlorite	10				0.1		Plagioclase + olivine	Also in veins
Actinolite	15				100		Plagioclase + olivine, also climopyroxene	0.22 when replacing plagioclase + olivine, 1 mm when replacing clinopyroxene
Cummingtonite							Plagioclase + olivine, also climopyroxene	Hard to tell cummingtonite from tremolite for % estimation

TOTAL ALTERATION:25%

STRUCTURE : Pervasive cracks and alteration over a relict igneous texture, but no crystal plastic deformation (intensity scale 1a).

PHOTOMICROGRAPHS:

1309B_15R_1_84_85_1
1309B_15R_2_84_85_2
1309B_15R_2_84_85_3
1309B_15R_2_84_85_4
1309B_15R_2_84_85_5
1309B_15R_2_84_85_6

THIN SECTION:	U1309B-16R-1, 31-33 cm	**Piece No.** 5		**Unit**: 48	**TS#: 59**		**OBSERVER: MD, ESA**	
ROCK NAME:	Medium-grained Gabbro and fine-grained basalt intruded and brecciated by alteration vein (anorthositic) (in fault gouge)							
GRAIN SIZE:								
TEXTURE:	Brecciated							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Basalt								
Plagioclase	5	5	0.07	1.5	0.4		Subhedral laths	(Note: Percentage given is phenocryst modal composition) Occurs as phenocryst in microcrystalline basalt. Slight orientation preference shown by the bigger crystals. Also occurs as fine-grained laths in the groundmass.
Pyroxene	0	~2	?	~1.2	0.2		Subhedral to anhedral	(Note: Percentage given is phenocryst modal composition) Altered to amphibole.
Olivine	0	3	?	0.5	0.9		Subhedral	(Note: Percentage given is phenocryst modal composition) Completely replaced by chlorite.
Opaque minerals	5	5	0.02	0.2	0.07		Subhedral to anhedral	Finely disseminated in the matrix. Some crystals show some degree of alteration.
Groundmass								Fine-grained crystals of pyroxene (altered to amphibole) and plagioclase laths. Basalt is broken into angular fragments by brecciation.
Brecciated/Altered Gabbro								
Plagioclase	15	?	?	1.22	1		Anhedal	Occurs as clasts (individual or clusters) in strongly deformed and altered vein network. Clasts are usually rounded and can be differentiated from secondary plagioclase by their size and well-defined twinning.
Pyroxene			?	2.1	0.9		Anhedal	Pseudomorphs suggest medium grained crystals of pyroxenes. Occurs as clasts (individual or clusters) in strongly deformed and altered vein network.
Brown amphibole				3.5			Anhedal	Occurs as anhedral crystals with very irregular grain boundaries. Usually surrounded by secondary plagioclase and have apatite or Zircon inclusions.
Apatite	<1		?	0.03	?		Subhedral to Euhedral	Accessory minerals. Occurs as inclusions or near brown amphiboles.
Zircon	<1		?	0.2	?		Subhedral	Accessory minerals. Occurs as inclusions or near brown amphiboles.

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Tremolite/actinolite	40						Pyroxene	Schistose between clastes and fibrous after pyroxene
Secondary plagioclase	25						Plagioclase	total plagioclase = 40% - it is unclear how much is primary and how much is recrystallized.
Chlorite	trace							In schistose zone (note mineralogy of dark schistose material assumed to be mainly amphibole)
Brown hornblende	15						Pyroxene	High T recrystallization in clasts

TOTAL ALTERATION: 85% clasts have some fresh plagioclase and locally pyroxene picture : 1309b_16r_1_31_33_3.tif

STRUCTURE : Cataclastic zone (gouge or breccia) rich in diabase clasts at one end of slide, and metagabbro at the other. The texture is one of a mature fault gouge and not an intrusive texture. Inclusions in the breccia include (dynamically) recrystallized amphibole and plagioclase.

PHOTOMICROGRAPHS:

1309B_16R_1_31_33_1
1309B_16R_1_31_33_2
1309B_16R_1_31_33_3
1309B_16R_1_31_33_4
1309B_16R_1_31_33_5
1309B_16R_1_31_33_6

THIN SECTION:	U1309B-16R-1, 45-46 cm	**Piece No.6**		**Unit**: 48	**TS#: 60**		**OBSERVER: AM, JM, CBG**	
ROCK NAME:	Oxide-gabbro							
GRAIN SIZE:	Medium							
TEXTURE:	Equigranular (originally)							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	10	48	2	?	?		Anhedral	Strongly deformed to neoblasts.
Clinopyroxene	5	48	?	4	3		Anhedral	Strongly deformed and altered to amphibole.
Ilmenite	3	3	?	?	?		Anhedral	Modal amount opaques is about 10% at the central oxide-rich part. Magnetite intergrown with ilmenite.
Rutile	Trace	Trace		0.3	0.1		Euhedral to subhedral	Accompanied with opaque minerals

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Green-brown amphibole	20		50	600	200		Pyroxene	As pressure shadows around pyroxene, relicts in green amphibole and in veins cutting ilmenite (photo)
Actinolite	20		<10	1500	100		Pyroxene, green-bown amphibole	In veins cutting hornblende veins (photo) and large patches
Secondary plagioclase	40		50	200	100		Plagioclase	Extensive high T recrystallization and also in veins with actinolite and titanite
Titanite	1						Rutile/ilmenite	Mantles rutile and in veins near ilmenite (photo)
Magnetite?	1							Intergrown with ilmenite

TOTAL ALTERATION: 60%

STRUCTURE : This section shows patches of strongly recrystallized plagioclase and occasional unrecrystallized grains with undulose extinction and deformation twins (crystal plastic intensity 3). Green and brown amphibole have also undergone recrystallization. A localized brittle shear zone 1-3 mm wide contains angular clasts of plagiocalse and actinolite/tremolite in a matrix of fine-grained, fibrous amphibole and clays. Within the shear zone is a breccia clast with fragments of similar composition, indicating two episodes of brecciation. Away from the shear zone, actinolite/tremolite veins are observed cutting grains. Early hornblende veins cut by actinoilite +/- titanite and albite. These later veins also cut fluid inclusion trails. Isolated fluid inclusions up to 20 micron are present (photo).

PHOTOMICROGRAPHS:

1309B_16R_1_45_46_1
1309B_16R_1_45_46_2
1309B_16R_1_45_46_3
1309B_16R_1_45_46_4
1309B_16R_1_45_46_5
1309B_16R_1_45_46_6
1309B_16R_1_45_46_7

THIN SECTION: U1309B 16R-2, 26-29 cm **Piece No.**: 5 **Unit**: 50 **TS#:** 61 **OBSERVER:** JM, MA
ROCK NAME: Gabbro
GRAIN SIZE: Coarse
TEXTURE: Equigranular

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	30	60		8	5		Subhedral to anhedral	Strongly deformed amd small neoblasts are observed.
Clinopyroxene	20	40		8	5		Anhedral	Deformed and altered to amphibole.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Recrystallized pyroxenes	10						Pyroxenes	
Actinolite/tremolite	20						Pyroxenes, plagioclase, and in veins,	
Secondary plagioclase	20						Plagioclase	As high T recrystallized areas and late cloudy (fluid inclusion rich - photo) alteration associated with actinolite
Chlorite	2						Plagioclase	

TOTAL ALTERATION: ~50 %

STRUCTURE : Gabbroic rock with a thin-section intensity of deformation of two. Sample is cut by a thin crystal plastic shear zone (intensity four), with evidence for recrystallized pyroxene. Alteration and brecciation (greenschist grade) superposed on the crystal plastic deformation with no evidence of shear strain.

PHOTOMICROGRAPHS:

1309B_16R_2_26_29_1
1309B_16R_2_26_29_2
1309B_16R_2_26_29_3
1309B_16R_2_26_29_4
1309B_16R_2_26_29_5

THIN SECTION:	U1309B-16R-2, 71-73 cm	**Piece No.**: 10B	**Unit**: 50	**TS#: 62**	**OBSERVER: JM/ABC/AM/CBG**
ROCK NAME:	Olivine gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Equigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	45	55	1	7.2	5		Subhedral to anhedral	Veined and deformed
Olivine	10	33	1	9	6		Subhedral to anhedral	Fresh olivine observed.
Clinopyroxene	10	12	1	5.5	4		Anhedral	Altered and "interfingering texture" (Maeda et al.) observed
Magnetite	2	2						

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Magnetite	2						Olivine	
Chlorite	10						Plagioclase	Fibrous zoned grains around plagioclase, also vein
Talc	15						Olivine	
Tremolite	10						Olivine and plagioclase	

TOTAL ALTERATION: 35%

STRUCTURE : Well preserved igneous texture overprinted by mild crystal plastic deformation (intensity of 1) expressed as undulatory extinction and occasional rerystallization in plagioclase, and minor bent cleavage in pyroxene. Plagioclase recrystallization is restricted to two or three areas adjacent to fractures. Static alteration as reaction textures are common; well formed chlorite, and tremolite + talc coronas form around many grains. Chlorite filled fractures can be seen disecting optically continuous grains of plagiocalse.

PHOTOMICROGRAPHS:

1309B_16R_2_71_73_1
1309B_16R_2_71_73_2
1309B_16R_2_71_73_3
1309B_16R_2_71_73_4
1309B_16R_2_71_73_5

THIN SECTION:	U1309B-16R-3, 26-27 cm	**Piece No.** 1	**Unit**: 50	**TS#: 63**	**OBSERVER: Frost, JM, ABC**
ROCK NAME:	Olivine gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Equigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	60	64	1	6	2		Subhedral	
Clinopyroxene	10	18	1	8.3	2.5		Anhedral	Altered
Olivine	0	18	1	6	2.5		Anhedral	Now tremolite+chlorite

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite	10				.4mm		Clinopyroxene/olivine	Alteration mainly around olivine, coronitic textures
Cummingtonite	5				0.6		Orthopyroxene, mildle portion of olivine-plag reaction zone	
Chlorite	10				0.2		Plagioclase	Alteration mainly around olivine, coronitic textures
Hornblende	Trace						Clinopyroxene/olivine	Rare brown pieces
Secondary pyroxene	2							

TOTAL ALTERATION:30 %

STRUCTURE : Troctolitic and olivine gabbroic parts are identified. Patchy alteration of trochtolite, particularly expressed as stretched (now altered to actinolite-chlorite) olivine grains. The plagioclase on the other hand shows relatively little strain other than local recrystallization. Clinopyroxene grains also show an intermediate amount of strain (to the stretched relict olivines and unstretched feldspar).

PHOTOMICROGRAPHS:

1309B_16R_3_26_27_1

1309B_16R_3_26_27_2

THIN SECTION:	U1309B-16R-3, 83-85 cm	**Piece No.** 4	**Unit**: 50	**TS#: 64**	**OBSERVER: ABR, JM**
ROCK NAME:	Gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Equigranular (originally)				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	65	65	?	6	5		Subhedral to anhedral	Deformed and altered.
Clinopyroxene	20	35	2	10	6		Anhedral	Replaced by later, clear clinopyroxene. Altered to amphibole.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite	20		20	1700	150		Pyroxene	
Secondary plagioclase	2				50		Plagioclase	
Secondary pyroxene	5				60		Pyroxene	
Chlorite	5		10	400	50		Vein filling	In major cloudy vein
Apatite	<1		30	200	80		Vein filling	In major cloudy vein

TOTAL ALTERATION: ~30%

STRUCTURE : Relict igneous textures are preserved, and there are traces of a magmatic fabric. Superposed on the igneous texture are recrystallized plagioclase and amphibole grain boundaries with some small shear zones (crystal plastic deformation). A small (low-temperature) amphibole vein is not offset across the shear zone. Other veins crosscutting plagioclase: mainly chlorite, minor amphibole + apatite; smaller veins of amphibole

PHOTOMICROGRAPHS:

1309B_16R_3_83_85_1

1309B_16R_3_83_85_2

THIN SECTION: U1309B-17R-1, 72-76 cm **Piece No.**: 8 **Unit**: 51 **TS#: 65** **OBSERVER: MA, JA, ABC**
ROCK NAME: Olivine gabbro
GRAIN SIZE: Medium
TEXTURE: Equigranular

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	55	65	1	6	3		Subhedral	Cataclastically deformed
Olivine	0	20	1	4	2		Anhedral	Completely altered to chlorite and amphibole
Clinopyroxene	1	15	1	3.5	2		Anhedral	Altered to amphibole
Zircon	< 1							Few grains near the vein

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite	15						Pyroxene	
Talc	5						In vein and pyroxene	
Chlorite	20						Plagioclase, in the vein, olivine	
Clays?							In vein	
Recrystallized Plagioclase	5							

TOTAL ALTERATION: ~ 45%

STRUCTURE : Low temperature alteration across the thin section superposed on a magmatic fabric (based on alignment of pyroxene cleavage planes and grain boundaries), intensity >2. Amphibole (low-T actinolite?) vein cuts across the earlier fabrics.

PHOTOMICROGRAPHS:
1309B_17R_1_72_76_1
1309B_17R_1_72_76_2

THIN SECTION:	U1309B-17R-2, 0-4 cm	**Piece No.**: 1	**Unit**: 53	**TS#: 66**	**OBSERVER: ABR, JM**
ROCK NAME:	Troctolite and gabbro (boundary)				
GRAIN SIZE:	Medium for troctolite and coarse for gabbro				
TEXTURE:	Equigranular for both				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Troctolite								
Plagioclase	60	63	1	7	3		Subhedral	Cataclastically deformed. Although size of plagiolase in troctolite is smaller than that in gabbro, in general, large plagioclase grain is also observed in troctolite.
Olivine	0	35	1	4	2		Anhedral	Completely altered to chlorite and amhibole
Clinopyroxene	1	2	0.5	3	1.5		Anhedral	Altered to amphibole
Gabbro								
Plagioclase	40	50	2	10	5		Subhedral	
Clinopyroxene	40	50	2	8	6		Anhedral	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite	20		10	800	80		Pyroxene	
Chlorite	8		<5	30	20		Plagioclase	
Tremolite	5		10	150	80		Olivine	
Clay	2				<5		Olivine	
Secondary plagioclase	5		30	500	150		Plagioclase	
Secondary pyroxene	2						Clinopyroxene	

TOTAL ALTERATION: ~40%

STRUCTURE : Primary igneous texture, intense microcraking in plagioclase.

PHOTOMICROGRAPHS:

1309B_17R_2_0_4_1
1309B_17R_2_0_4_2
1309B_17R_2_0_4_3

THIN SECTION:	U1309B-18R-1, 13-15 cm	**Piece No.**: 2	**Unit**: 54	**TS#: 67**	**OBSERVER: ABC, MD**
ROCK NAME:	Basalt				
GRAIN SIZE:	Aphanitic				
TEXTURE:	Porphyritic, Trachytic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	45	50	0.05	0.6	0.2		Euhdral	Flow-aligned laths, matrix
Clinopyroxene	0	40					Anhrdeal	Completely altered, matrix
Olivine	5	5			0.3		Anhedral	Completely altered, matrix
Opaques	3	3		0.05	< .05			
Plagioclase	1	1	0.4	12	1.4		Xenocryst, subherdal	Strong oscillatory zoning, small-sized amalgamation of plagioclase xenocrysts have high dispersion, high temp of formation.
Clinopyroxene	< 1	< 1			0.6		Phenocryst, anhedral	Altered to amphibole

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Tremolite/actinolite	40						Pyroxene	

TOTAL ALTERATION: ~ 40%

STRUCTURE : Modest plagioclase-defined foliation,roughly parallel to a contact with an older basalt. At the contact there is a contact-parallel layering of, or foliation defined by, an alteration phase.

PHOTOMICROGRAPHS:

1309B_18R_1_13_15_1

1309B_18R_1_13_15_2

THIN SECTION:	U1309B-18R-2, 34-35 cm	**Piece No.**: 4	**Unit**: 56	**TS#: 68**	**OBSERVER: RF, JM**
ROCK NAME:	Gabbro				
GRAIN SIZE:	Medium-grained				
TEXTURE:	Equigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	58	58	1	5	3		Anhedral	Altered and deformed. Crystals are cracked, have bent lamellae and sweeping extinction. Recrystallization present at plagioclase-plagioclase grain boundaries.
Clinopyroxene	20	42	1	6	3		Anhedral	Altered

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite	10						Pyroxene	In vein
Chlorite	3						Plagioclase	In vein
Metamorphic pyroxene	5						Clinopyroxene	

TOTAL ALTERATION: ~15%

STRUCTURE : Preserved igneous texture with no magmatic foliation. Minor amount of recrystallization along grain boundaries and subgrains along plagioclase. Fractures cut across all grain boundaries, are filled with actinolite (and other minerals) and there is no shear offset across them.

PHOTOMICROGRAPHS:

1309B_18R_2_34_35_1

1309B_18R_2_34_35_2

THIN SECTION:	U1309B-18R-2, 50-52 cm	**Piece No.**: 5			**TS#: 69**		**OBSERVER: MA, JM, VDH**	
ROCK NAME:	Mylonitized (or deformed) gabbro							
GRAIN SIZE:	Coarse							
TEXTURE:	E' uigranular							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	70	75	1	8	5		Anhedral, deformed	Strongly deformed cataclastic/plastic? With small neoblast
Clinopyroxene	0	25	2	10	6		Anhedral	Almost completedly altered
Zircon	Trace	Trace			< 0.1			Tiny
Apatite	Trace	Trace						Tiny

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Tremolite/actnolite	20						Pyroxene	
Chlorite	5						Pyroxene, plagioclase	

TOTAL ALTERATION: ~ 25%

STRUCTURE : Recrystallized plagioclase with LPO, cut by amphibole veins.

PHOTOMICROGRAPHS:

1309B_18R_2_50_52_1

1309B_18R_2_50_52_2

THIN SECTION:	U1309B-18R-3, 48-51 cm	**Piece No.**: 9	**Unit**: 57 / 58	**TS#: 70**	**OBSERVER: ABC / ABR**
ROCK NAME:	Basalt / mylonitic gabbro				
GRAIN SIZE:	Aphanitic / coarse grained				
TEXTURE:	Porphyritic / granular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Basalt:								Matrix too small to be determined
Plagioclase	3	3	0.04	1.9	0.2		Subhedral to euhedral	Phenocrysts and microphenocrysts
Oxides	2	2					Subhedral, skeletal	
Gabbro:								
Plagioclase	18	20		7			Anhedral	Recrystallized grains
Clinopyroxene	0	80					Anhedral	Completely altered, original size / shape can not be determined

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Basalt:								
Actinolite/tremolite	40				<5		Glass	
Chlorite	40				<5		Glass	
Gabbro:								
Actinolite/tremolite	15		10	1100	100		Pyroxene	
Chlorite	5				10		Plagioclase	
Secondary plagioclase	5				60		Plagioclase	
Secondary pyroxene	5				40		Pyroxene	
Brown hornblende	Trace				40		Amphibole	

TOTAL ALTERATION: basalt: 80% / gabbro: 30%

STRUCTURE : Thin section contains two rock types (basaltic dike intruding into gabbro). Contact zone with amphibole + chlorite. Strong foliation defined by plagioclase near the contact that dips (in the thin section) 27 degrees to the right-hand side of the thin section. Non-continuous amphibole veins in gabbro. Veins and weak crystal plastic deformation (intensity >2) predate intrusion. Layering in basalt due to oxide distribution: dark zones contain finely dispersed oxides, light zones contain clots of oxides.

PHOTOMICROGRAPHS:

1309B_18R_3_48_51_1

1309B_18R_3_48_51_2

THIN SECTION: U1309B-18R-3, 118-119 cm **Piece No.**: 16 **Unit**: 60 **TS#: 71** **OBSERVER: ABC, ABR**
ROCK NAME: Diabase
GRAIN SIZE: Fine
TEXTURE: subophitic

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	30	45	0.2	1	0.5		Subhedral, elongate	Strained:sweeping exinction
Clinopyroxene	0	35			0.4			Completely altered to to amphibole
Olivine	0	10	0.5	2	0.7		Anhedral to subhedral	Completely altered to to amphibole
Opaques	8	8					Equant, elongate	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite	45		10	500	150		Pyroxene	May be weathered to clay
Tremolite	5				20		Olivine	May be weathered to clay
Chlorite	10				10		Plagioclase (olivine)	
Secondary plagioclase	?						Plagioclase	
Sulfides	<1							

TOTAL ALTERATION: 60%

STRUCTURE : Igneous texture. Vein with chlorite and minor amphibole and titanite filling.

PHOTOMICROGRAPHS:

1309B_18R_3_118_119_1
1309B_18R_3_118_119_2
1309B_18R_3_118_119_3
1309B_18R_3_118_119_4

THIN SECTION:	U1309B-19R-2, 40-42 cm	**Piece No.** 4	**Unit**: 62	**TS#: 72**	**OBSERVER: ABC with JM, MD**
ROCK NAME:	Diabase				
GRAIN SIZE:	Medium				
TEXTURE:	Subophitic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	60	60	?	4	2		Subhedral to enhedral	Lath-shaped
Clinopyroxene	25	40	?	3	1.5		Anhedral	Partly altered to amphibole.
Olivine	0	<1	?	1?	1?		Subhedral?	Completely altered to talc?
Titanomagnetite	2	2	?	0.5	0.3		Equant and irregular shape	Titanomagnetite with ilmenite oxyexsolution

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Tremolite/actinolite	18						Pyroxene	Pseudomorphic in part
Chlorite	2						Plagioclase	

TOTAL ALTERATION: 20%

STRUCTURE : Igneous texture, pervasive microfracturing in plagioclase.

PHOTOMICROGRAPHS:

1309B_19R_2_40_42_1
1309B_19R_2_40_42_2
1309B_19R_2_40_42_3
1309B_19R_2_40_42_4

THIN SECTION: U1309B-19R-2, 69-72 cm **Piece No.**: 5 **Unit**: 62 **TS#:73** **OBSERVER: ABC, ABR, BRF**

ROCK NAME: Diabase

GRAIN SIZE: Medium / coarse

TEXTURE: Subophitic

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	53	55	0.4	3	1.2		Subhedral	Grains strained, sweeping extinction
Clinopyroxene	5	43	?	1.4	0.8		Anhedral	
Olivine	0	1			0.6		Anhedral	Completely replaced
ilmenite	2	1	0.1	0.2	0.7			ilmenite

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite	30		10	1000	250		Pyroxene	Partly altered to clay?
Tremolite	5							
Chlorite	5				10		Plagioclase (olivine)	
Brown hornblende	Trace		50	300	80		Amphibole	

TOTAL ALTERATION: 40%

STRUCTURE : Primary igneous texture. Relicts of high-T titanomagnetite persist but magnetite has been consumed by metamorphic reactions, leaving skeletal ilmenite

PHOTOMICROGRAPHS:

1309B_19R_2_69_72_1
1309B_19R_2_69_72_2
1309B_19R_2_69_72_3

THIN SECTION:	U1309B-20R-2, 80-83 cm	**Piece No.**: 5	**Unit**: 62	**TS#: 74**	**OBSERVER: MD, ESA**
ROCK NAME:	Basalt with xenocrysts				
GRAIN SIZE:	Fine-grained				
TEXTURE:	E' uigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	50	50	0.1	0.7	0.5		Subhedral laths	Unaltered (percentage given if from matrix).
Pyroxene in matrix	15	47	?	?	0.2		Subhedral to anhedral	(Note: Percentage given if from matrix) Fresh (0.2 mm) anhedral to subhedral crystals are in the matrix but some most are replaced by amphibole.
Pyroxene xenocryst(?)					7.3		Subhedral to anhedral	The large xenocrysts are interlocking and contain plagioclase (7 mm maximum size), smaller clinopyroxene and highly pleochroic amphibole inclusions. The grains are rounded on the edges. Highly pleochroic amphiboles (probably magmatic in origin) are surrounded by chlorite and fibrous tremolite. The xenocryst likely derived from a pegmatitic gabbro.
Olivine		<1			0.3		Subhedral	(Percentage given if from matrix) completely replaced
Altered area on the ege of slide								Composed of fine-grained rounded clinopyroxenes (~0.5 mm) crystals with very irregular boundaries. Highly pleochroic brown amphiboles (~0.1 mm) and black mineral (~1 mm) are also found inside the altered area. This is probably an altered xenocryst.
Opa' ue minerals	3	3	0.1	0.3	0.2		Subhedral to anhedral	(Note: percentage given if from matirix) disseminated in the matrix
Clinopyroxene in pod					0.1		Anhedral	Fresh and altered clinopyroxene and olivine in a tear-shaped pod (2.6 mm across) occur in the matrix. Contact is sharp. Probably a trapped or recrystallized ultramafic (olivine-clinopyroxenite?) melt or xenocryst. Vesicle is ruled out due to the subparallel alignment of plagioclase laths along the boundary of the pod. Shape may be a product of the flow.
Olivine in pod					0.7		Anhedral	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Tremolite/actinolite	30				300		Pyroxene	In fractures of clinopyroxene phenocryst
Chlorite	few				100			In vein

TOTAL ALTERATION: ~ 30%

STRUCTURE : Only primary igneous texture with altered basalt patch.

PHOTOMICROGRAPHS:

1309B_20R_2_80_83_1
1309B_20R_2_80_83_2
1309B_20R_2_80_83_4
1309B_20R_2_80_83_5

THIN SECTION:	U1309D-1R-1, 41-44 cm	**Piece No.** 1		**Unit**: 1		**TS#: 75**		**OBSERVER: ESA, ABC,Md.BRF**
ROCK NAME:	Diabase with quartz vein							
GRAIN SIZE:	Medium grained							
TEXTURE:	Subophitic							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Diabase								
Plagioclase	~ 43	45	0.1	2.5	1		Subhedral to anhedral	Relatively unaltered, some grains with sweeping extinction. Many grains contain melt inclusions and are highly fractured, possible compaction
Pyroxene	0	50	?	1.5	0.8		Anhedral to subhedral	Altered to brown amphibole.
Olivine	0	< 2	?	0.8	0.6		Anhedral	Completely replaced by chlorite and actinolite.
Opaque minerals / Ilmenite	2	2	0.03	0.6	0.4		Anhedral to subhedral	Magnetite being converted to ilmenite. Some show skeletal features.
Quartz vein								
Chalcedony		100					Anhedral	Interlocking grains with undulatory and radial extinction. Diffused irregular boundary between the quartz vein and the diabase.

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Quartz	Trace							Mm-width vein on edge of slide
Chlorite	8						After plagioclase, in quartz vein, olivine	
Actinolite	47						Pyroxene, olivine	

TOTAL ALTERATION: 55%

STRUCTURE : No obvious magmatic fabric (intensity 1a). Quartz vein is undeformed, but no obvious relationship can be seen between it and the late fine grained chlorite.

PHOTOMICROGRAPHS:

1309D_1R_1_41_44_1
1309D_1R_1_41_44_2
1309D_1R_1_41_44_3
1309D_1R_1_41_44_4

THIN SECTION: U1309D-1R-3, 0-4 cm **Piece No.**: 1 **Unit**: 3 **TS#: 76** **OBSERVER: BRF, ESA**

ROCK NAME: Tremolite talc chlorite chromite schist (probably ultramafic protolith)

GRAIN SIZE: Variable, some grains micron sized, late blades of amphibole up to 2 mm.

TEXTURE: Felted schistose rock

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Pyroxene		30	?	5	4		Anhedral	Completely replaced by fibrous amphibole but pseudomorphs can be recognized. Morphology and grain size is consistent with ultramafic protolith.
Chromite / Spinel	2	2	0.1	1.8				Spinel grains shows intergrown and granular morphology also suggesting ultramafic rock origin.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Tremolite	*		0.01 mm	2 mm				Some tremolite is post-tectonic
Cummingtonite	60							Total amphibole (tremolite + cummingtonite) = 60%
Chlorite	20							
Talc	18							

TOTAL ALTERATION: 98%, presence of chromite suggests protolith was peridotitic

STRUCTURE : Fine grained tremolite forms a well-developed schistosity; euhedral actinolite grains postdate tremolite in places, and elsewhere are part of the schistosity. Clasts of previously foliated material are inclusions in the schist. Shear bands in different orientations show different sense of shear, consistent with flattening (as exemplified by indicators toward the center of the section).

PHOTOMICROGRAPHS:

1309D_1R_3_0_4_1
1309D_1R_3_0_4_2
1309D_1R_3_0_4_3
1309D_1R_3_0_4_4
1309D_1R_3_0_4_5
1309D_1R_3_0_4_6
1309D_1R_3_0_4_7
1309D_1R_3_0_4_8
1309D_1R_3_0_4_9
1309D_1R_3_0_4_10
1309D_1R_3_0_4_11
1309D_1R_3_0_4_12
1309D_1R_3_0_4_13
1309D_1R_3_0_4_14

THIN SECTION: U1309D-1R-3, 9-11 cm **Piece No.** 2 **Unit**: 3 **TS#: 77** **OBSERVER: BRF, JM**

ROCK NAME: Tremolite talc chlorite schist (probably metagabbro)

GRAIN SIZE: Variable, some grains micron sized, late blades of amphibole up to 2 mm.

TEXTURE: Felted schistose rock

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Clinopyroxene	5	40		1.5			Rounded shape	Strongly altered and deformed

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Tremolite	*		0.01 m	2 mm				Some tremolite is post-tectonic
Brown hornblende	Trace							
Cummingtonite	35							Total amphibole (tremolite + hornblende + cummingtonite) = 22%
Chlorite	50						Plagioclase?	
Talc?*	10							Not sure about talc (AM) fine grained material may be talc or tremolite

TOTAL ALTERATION: 95%, presence of brown hornblende suggests protolith was gabbroic

STRUCTURE : Lower part of thin section preserved largely isotropic (in terms of fabric) aggregate fine-grained mineral (parallel extinction, fibrous). Above a distinctive contact there is a somewhat crenulated schistosity with coarse grained (syn-to-post tectonic) amphibole (tremolite) grains around coarser grained amphiboles (cummingtonite according to secondary mineralogy). Between the altered amphiboles the "matrix" appears to be dominated by chlorite that does not define a deformational fabric. Brown veins form Y-plane and Riedel sets, with possible shear sense indications (normal?) in the fibrous internal habit of the veins.

PHOTOMICROGRAPHS:

1309D_1R_3_9_11_1
1309D_1R_3_9_11_2
1309D_1R_3_9_11_3
1309D_1R_3_9_11_4
1309D_1R_3_9_11_5
1309D_1R_3_9_11_6
1309D_1R_3_9_11_7

THIN SECTION:	U1309D-1R-3, 46-48 cm	**Piece No.** 6	**Unit**: 4	**TS#: 78**	**OBSERVER: ABC, AM,DC**
ROCK NAME:	Brecciated Basalt				
GRAIN SIZE:	Fine Grained				
TEXTURE:	Intersertal				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	~ 38	40	0.06	0.3	0.15		Subhedral, bladed - acicular	Grain size decreases while grain alignment intensity increases downhole, as the brecciated zone is approached; brecciated at chilled margin.
Clinopyroxene	0	45		0.3	0.2		Anhedral	Completely altered to amphibole, original size and morphology may be misleading.
Olivine	0	1		0.4			Anhedral	Completely altered to amphibole, original size and morphology may be misleading.
Magnetite	1-2	1-2			0.08			Dispersed uniformly in matrix, forms aggregates in aphantic clast.
Plagioclase	1	1		1.1			Anhedral to subhedral, bladed	Phenocrysts, general horizontal alignment, strained, some show oscillatory zoning. In aphanitic clast, swallow-tail plagioclase is observed looking down the c-axes (rapid quenching).

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite	55				50		Pyroxene	In matrix of basalt and in clots after ?olivine
Chlorite	<5						Olivine?	In clots and also in veins with actinolite and sphene
Titanite	<5						Pyroxene	In veins and probably finely divided in matrix intergrown with actinolite
Magnetite/ilmenite								Some seconadary, but hard to tell how much
Sulfide (pyrite)	<1							Rare clots

TOTAL ALTERATION: 60%

STRUCTURE : There are three distinct, but similar fine-grained-aphanitic basalts -- at least one of the finer grained basalts is in intrusive contact with a slightly coarser basalt clast. A homogeneous, moderate magmatic fabric is preserved in the upper basalt, and dips at approximately 30 degrees toward 270 in the core reference frame. A diffuse breccia zone affecting aphanitic basalt at margin of the two coarser intrusive phases is rich in actinolite. There are three distinct, but similar fine-grained-aphanitic basalts -- at least one of the finer grained basalts is in intrusive contact with a slightly coarser basalt clast.

PHOTOMICROGRAPHS:

1309D_1R_3_46_48_1
1309D_1R_3_46_48_2
1309D_1R_3_46_48_3
1309D_1R_3_46_48_4
1309D_1R_3_46_48_5
1309D_1R_3_46_48_6
1309D_1R_3_46_48_7
1309D_1R_3_46_48_8
1309D_1R_3_46_48_9
1309D_1R_3_46_48_10

THIN SECTION:	U1309D-2R-1, 97-100 cm	**Piece No.** 8	**Unit**: 5	**TS#: 79**	**OBSERVER: ESA, ABC,MD,BRF**
ROCK NAME:	Diabase				
GRAIN SIZE:	Medium grained				
TEXTURE:	Subophitic				

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Plagioclase in matirx	40	43	0.07	2.5	1.2		Anhedral, elongate	Relatively unaltered. All grains show significant straining and sweeping extinction, many with exsolution lamellae. Possibly a higher temperature plagioclase.
Plagioclase xenocryst (?)	1	< 1		5			Euhedral to Subhedral	One grain shows resorbed grain boundary, rimmed with opaques and then a second stage regrowth rim (Microphotos 1309d_2r_1_97_100_3.tif, 1309d_2r_1_97_100_4.tif). Glomerocrystic plagioclase crystals with euhedral spinel crystals (Microphoto 1309d_2r_1_97_100_5.tif). All phenocrysts contain oscillatory zoning.
Pyroxene	5	50	?	2	1		Anhedral	Partly altered to amphibole. Fresh pyroxene is still present in some sections.
Olivine	0	3	?	1.4	1.2		Anhedral	Completely replaced by chlorite and actinolite.
Ti-Magnetite	3	3	0.1	0.4	1		Anhedral to subhedral	Relatively abundant. Magnetite is partially replaced by ilmenite.
Spinel	Trace	Trace	0.07	0.2	0.14		Subhedral to euhedral	Inclusions in plagioclase phenocrysts. Occurs along the contact between glomerous plagioclase phenocrysts.

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Epidote	Trace							
Brown hornblende	Trace							
Actinolite	51						After pyroxene and olivine	
Chlorite								

TOTAL ALTERATION: 51%

STRUCTURE : Large plagioclase laths are oriented with subhorizontal dips, particularly in the central part of the thin section. Crystal plastic intensity of 1a.

PHOTOMICROGRAPHS:

1309D_2R_1_97_100_1
1309D_2R_1_97_100_2
1309D_2R_1_97_100_3
1309D_2R_1_97_100_4
1309D_2R_1_97_100_5

THIN SECTION:	U1309D-4R-1, 21-23 cm	**Piece No.** 3	**Unit**: 6	**TS#: 80**	**OBSERVER: ABC, AM**
ROCK NAME:	Altered Diabase				
GRAIN SIZE:	Fine				
TEXTURE:	Subophitic				

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**			**Composition**	**MORPHOLOGY**	**COMMENTS**
			min.	**max.**	**av.**			
Plagioclase	~ 40	45	0.1	1.6	0.4		Anhedral, tabular to subequant	Grains are strained, shown by sweeping extinction, some of the largest show oscillatory zoning and possibly rims of a another growth stage.
Clinopyroxene	2	50					Anhedral	Almost completely replaced with amphibole, few relicts remain, the original sizes can not be determined.
Olivine	0	2	0.3	1.8			Anhedral, equant	Completely replaced by amphibole and chlorite, size and morphology is preserved.
Magnetite / Ilmentite		1.5	0.05	0.8	0.4		Equant	Magnetite is 1 % to 40 % percent replaced by ilmenite.

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron)**				**REPLACING / FILLING**	**COMMENTS**
			min.	**max.**	**av.**			
Actinolite	50						Pyroxene, olivine	Fair amount (10%) of relict clinopyroxene. A paler green amphibole occurs in clots after ?olivine, sometimes with chlorite
Chlorite	Trace						Olivine	
Titanite?	Trace							In groundmass with actinolite

TOTAL ALTERATION: 50%

STRUCTURE : Mylonitic gabbro (crystal plastic intensity of 3-4), overprinted by later finer grained shear zone with clasts of basalt. Basaltic fragments are not angular and exhibit a diffuse boundaries with adjacent gabbro. Assemblage is overprinted by actinolite veins and other greenschist alteration.

PHOTOMICROGRAPHS:

1309D_4R_1_21_23_1

1309D_4R_1_21_23_2

THIN SECTION:	U1309D-4R-1,67-70 cm	**Piece No.** 11A	**Unit**:	**TS#: 81**			**OBSERVER: BRF, ESA**	
ROCK NAME:	Brecciated (Cataclastic) Gabbro							
GRAIN SIZE:	Medium-grained							
TEXTURE:	Cataclastic							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**			**Composition**	**MORPHOLOGY**	**COMMENTS**
			min.	**max.**	**av.**			
Plagioclase	20	~60	?	4.3	0.8 to 1		Anhedral	A few large, and apparently primary, plagioclase grains survive in microlithons. Most plagioclase has recrystallized into fine-grained mosaics.
Pyroxene		~40		3.5	0.7		Anhedral	Broken pieces of pyroxene occur in pod-shaped bodies ~9-10 mm in length. These pods are subparallel to each other. Altered to amphibole
Sheared Matrix								Composed mainly of recrystallized plagioclase (0.07 to 0.15 mm), altered amphiboles and clay.

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron)**				**REPLACING / FILLING**	**COMMENTS**
			min.	**max.**	**av.**			
Secondary plagioclase	30							
Actinolite/hornblende	30						Pyroxene	Actinolite >> hornblende
Clay	10							Dark matrix to sheared breccia

TOTAL ALTERATION: 80%, with some in amphibolite facies, most In greenschist facies, and 10% to clay.

STRUCTURE : Rock seems to record a long complex history of deformation from amphibolite grade to low grade.

PHOTOMICROGRAPHS:

1309D_4R_1_67_70_1
1309D_4R_1_67_70_2
1309D_4R_1_67_70_3

THIN SECTION:	U1309D 4R-1, 135-137 cm	**Piece No.** 22	**Unit**: 8	**TS#: 82**	**OBSERVER: BRF, MD, ABC, AM**
ROCK NAME:	Brecciated Gabbro				
GRAIN SIZE:					
TEXTURE:					

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	30	50	< 0.05	2	0.6		Anhedral, Equant	Grains are heavily brecciated, with areas of recrystallization, possibly albitization as well.
Pyroxene	1	50		6	4		Anhedral	Mostly altered to amphibole, brecciated.
Olivine	0	1	0.6	1.2			Anhedral	Completely altered.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Green-brown amphibole	10						In veins and after pyroxenes	* Total amphibole = 50%
Cummingtonite	*							
Actinolite	40						Pyroxene	In breccia matrix
Secondary plagioclase (albite?)	5							May be zeolite or albite. In steep (core reference frame) veins cutting plagioclase
Dark matrix	25							May be clay rich. Also actinolite and ?titanite

TOTAL ALTERATION: 80%

STRUCTURE : Cataclasite breccia with some gabbroic clasts exhibiting weak crystal plastic deformation (Intensity 2). Gabbro clasts also contain hornblende amphibole veins. Matrix contains mostly fine grained plagioclase and actinolite. The dark matrix material contains brecciated clasts of actinolite breccia.

PHOTOMICROGRAPHS:

1309D_4R_1_135_137_1
1309D_4R_1_135_137_2
1309D_4R_1_135_137_3
1309D_4R_1_135_137_4
1309D_4R_1_135_137_5
1309D_4R_1_135_137_6
1309D_4R_1_135_137_7
1309D_4R_1_135_137_8
1309D_4R_1_135_137_9

THIN SECTION:	U1309D-4R-2 20-23 cm	**Piece No.** 4	**Unit**: 8	**TS#: 83**	**OBSERVER: ESA, AM**
ROCK NAME:	Cataclastic Gabbro				
GRAIN SIZE:	Medium-grained				
TEXTURE:	Catataclastic				

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Plagioclase		~60	?	3.2	0.5 to 1.4		Anhedral	Slightly altered. Broken pieces range in size from medium to fine-grained. Fine-grained crystals and possibly recrystalized ones occur in the sheared matrix.
Clinopyroxene		~40	?	3.5	1.4		Anhedral	Moderately altered to amphibole. Recrystallized fine-grained pyroxenes common along grain boundaries of coarse-grained pyroxenes.
Sheared Matrix								The sheared matrix is composed of broken fragments of plagioclase, pyroxene and amphiboles (from 0.0074 to 0.35 mm) and dark clay materials.

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Actinolite	35						Pyroxene, brown hornblende	Most pyroxenes are pseudomorphed by pale green amphibole. Darker green amphibole forms most of the breccia matrix
Secondary plagioclase	10						Plagioclase	In veins and turbid patches
Brown-green hornblende	10						Pyroxene	Rimming pyroxene and clast in breccia
Fine dark matrix	10							Unresolvable, possibly with clay minerals and titanite

TOTAL ALTERATION: 65%

STRUCTURE : Cataclastically deformed gabbro. Host rock is a gabbro preserving an igneous texture, and does not appear to have undergone crystal plastic deformation. Cataclastic matrix material is foliated. Higher temperature brecciation is clearly crosscut a lower temperature event; brown hornblende veins are cross cut by the cataclastic fabric. Possible evidence for basalt intrusion into cataclasis. Fault gouge where not noted in previous efforts.

PHOTOMICROGRAPHS:

1309D_4R_2_20_23_1

1309D_4R_2_20_23_2

THIN SECTION:	U1309D 4R-2 108-110 cm	**Piece No.** 18A	**Unit**: 8	**TS#: 84**	**OBSERVER: BRF, MD, JM**
ROCK NAME:	Gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Equigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	60	65		5	2		Anhedral-subhedral	Deformed, twin lamellae bending
Clinopyroxene	10	35		4	3		Anhedral	Almost completely altered to amphibole
Opaque	Trace	Trace		0.05				

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Green-brown amphibole	30						in veins, after pyroxenes	High temperature veins dip obliquely with respect to core axis, and have parallel fluid inclusion trails
Cummingtonite	Trace							
Actinolite	10							Cores of former pyroxene often contain paler amphibole. Also late grain boundary alteration
Rutile	<1							Primary or secondary?

TOTAL ALTERATION: 45% - amphibolite facies alteration

STRUCTURE : Low strain crystal plastic deformation overprinted by high temperature brecciation with veins of brown, coarse grained hornblende. Fluid inclusion trails are subparallel to amphibole veins, and are cut by them. Diffuse, low temperature alteration is observed around pyroxene grains.

PHOTOMICROGRAPHS:

1309D_4R_2_108_110_1
1309D_4R_2_108_110_2
1309D_4R_2_108_110_3
1309D_4R_2_108_110_4
1309D_4R_2_108_110_5
1309D_4R_2_108_110_6
1309D_4R_2_108_110_7
1309D_4R_2_108_110_8
1309D_4R_2_108_110_9

THIN SECTION:	U1309D-4R-3, 11-14 cm	**Piece No.** 2	**Unit**: 8	**TS#:** 85	**OBSERVER:** ABR, JM
ROCK NAME:	Gabbro with amphibole-bearing vein				
GRAIN SIZE:	Medium for gabbro				
TEXTURE:	Equigranular for gabbro				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	55	65		5	2		Subhedral-anhedral	Original magmatic plagioclase grains become "dirty" by effect of veining with black, fine-grained inlusions and "sodic plagioclase" very thin veinlets.
Clinopyroxene	5	25		3	2		Anhedral	Altered to amphibole
Olivine?	0	<1		3	1		Anhedral	Completely altered
Pale brown amphibole	10	10		4			Subhedral-anhedral	As a vein mineral. Rather fresh compared to brown amphibole replacing clinopyroxene.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite	30		50	2500	300		Pyroxene	Some large euhedral crystals, more frequently small crystallites
Cummingtonite	"			1000	400		Pyroxene	
Brown hornblende	"			1100	500		Pyroxene	Total amphibole 30%
Chlorite	15		<5	100	10		Plagioclase	In pockets possibly with oxides
Secondary plagioclase	25				100		Plagioclase	

TOTAL ALTERATION: 70%

STRUCTURE : Plagioclase exhibits low (but some) intracrystalline strain and possibly some semibrittle recrystallization along relict fractures. Most noteworthy is the brecciation and microcracking that still preserves igneous textures. In places the microcracking is radial, away from amphibole (hornblende?) filled vugs. Early, euhedral hornblende grains have boundaries extensively altered. Coarse grained amphibole is associated with vuggy plagioclase. Igneous texture is preserved in gabbro host rock.

PHOTOMICROGRAPHS:

1309D_4R_3_11_14_1
1309D_4R_3_11_14_2
1309D_4R_3_11_14_3
1309D_4R_3_11_14_4
1309D_4R_3_11_14_5
1309D_4R_3_11_14_6
1309D_4R_3_11_14_7

THIN SECTION:	U1309D 5R-1 135-137 cm	**Piece No.** 14	**Unit**: 9	**TS#: 86**	**OBSERVER: MA,BRF, ESA**
ROCK NAME:	Brecciated olivine-bearing gabbro				
GRAIN SIZE:	Coarse-grained				
TEXTURE:	Brecciated				

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	15	60		6	0.9		Anhedral	Plagioclase occur as primary minerals (large grains) and broken and/or neoblastic (smaller grains). Given average size is the common size of broken and rounded plagioclase grains. The true size might be much larger, as shown by some remaining primary crystals. All plagioclase grains are anhedral, undulatory exticntion and have very irregular boundaries.
Pyroxene		~34	?	?	?		Anhedral	Nearly completely replaced by amphibole. Relict texture suggest that the original crystals were also broken, thus estimation of grain size is not possible.
Olivine		<5	?	?	?		Anhedral	Completely replaced chlorite and actinolite. One isolated relict of olivine measured 2.5 mm, but other relicts are coarse grained and could have been composed of several grains.
Opaque minerals		<1	?	0.1			Anhedral	Rare occurence within the host rock.

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Matrix alteration								
Recrystallized plagioclase	35						High-T recrystallized plagioclase, may be same composition as host	
Brown amphibole	*							
Cummingtonite	*						After olivine	
Actinolite	40						After oliivine	* Total amphibole = 40%
Chlorite	10							
Breccia zone alteration								
Dark fine grained matrix	20						Restricted to deformation zone in center of section	Under refractive index oil the poorly polished dark areas contain fibrous amphibole, chlorite and albite (?) overgrown by coarser amphibole. There was no evidence for clay minerals
Amphibole	20							Includes hornblende, cummingtonite, and actinolite
Recrystallized plagioclase	60						New plagioclase is locally altered to zeolite or albite	Restricted to 3 mm-wide zone in center of slide

TOTAL ALTERATION: 85% in matrix, 100% in shear zone

STRUCTURE : Evidence for high temperature deformation in recrystallized plagioclase and deformed pyroxene (Thin section intensity 3). Former pyroxenes and bands of recrystallized plagioclase define a foliation which is cut by a coarse grained hornblende - plagioclase rich zone. The pre-existing foliation is also cut by a patch rich in actinolite and chlorite. Low temperature brecciation is observed along grain boundaries of plagioclase.

PHOTOMICROGRAPHS:

1309D_5R_1_135_137_1
1309D_5R_1_135_137_2
1309D_5R_1_135_137_3
1309D_5R_1_135_137_4
1309D_5R_1_135_137_5
1309D_5R_1_135_137_6

THIN SECTION:	U1309D-5R-2, 10-15 cm	**Piece No.** 1	**Unit**: 9	**TS#:** 87	**OBSERVER:** MD, JM, AM
ROCK NAME:	Mylonitized gabbroic rock				
GRAIN SIZE:	Original grain size unknown				
TEXTURE:	Original texture unknown				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	20	65					Unknown due to mylonization and alteration	Highly deformed and altered
Clinopyroxene	0	?					Unknown due to mylonization and alteration	Highly deformed and altered
Olivine	0	?					Unknown due to mylonization and alteration	Highly deformed and altered

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite	15						Pyroxene, olivine	
Secondary plagioclase	40							Medium/high temperature dynamic recrystallization, abundant turbid plagioclase associated with chlorite in less deformed areas
Chlorite	10						Plagioclase	Locally some corona texture. Also large chlorite patches
Green brown hornblende	15							High temperature recrystallization

TOTAL ALTERATION: 80%

STRUCTURE : Low-strain side of the section has tremolite. The more intense strain texture (a mylonite) has a strong LPO of plagioclase. Recrystallization of green (low temperature) hornblende - one of the lower temperature mylonites from Site U1309. Isotropic blades of tremolite overprint the mylonitic texture. Very little evidence for brittle deformation, but protomylonitic area shows evidence for a low-grade hydrothermal alteration (e.g. turbid plagioclase, semibrittle bands of recrystallized plagioclase).

PHOTOMICROGRAPHS:

1309D_5R_2_10_15_1
1309D_5R_2_10_15_2
1309D_5R_2_10_15_3

THIN SECTION:	U1309D-5R-2, 49-52 cm	**Piece No.** 2B	**Unit**: 9	**TS#: 88**	**OBSERVER: BRF, JM**
ROCK NAME:	Troctolitic gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Equigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	40	53		5	3		Anhedral-subhedral	Twin lamella bending
Olivine	0	40		4	3		Anhedral	Completely altered to chlorite and amphibole
Clinopyroxene	Trace	7		3	2		Anhedral	Almost completely altered to amphibole

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Brown hornblende	*							
Actinolite	40						Pyroxene and olivine	* Total amphibole = 40%
Cummiingtonite	*						Pyroxene and olivine	
Chlorite	20						Ol ivine and cummingtonite	

TOTAL ALTERATION: 60%

STRUCTURE : Deformed gabbro (Thin section intensity 2). Lower temperature static alteration is pervasive, producing actinolite and chlorite. The same minerals occur in veins which crosscut the overall fabric. A brown amphibole vein may have been preexisting, but has been broken up by the low temperature deformation. Much of the deformation occurred before the olivine was replaced by chlorite-actinolite.

PHOTOMICROGRAPHS:

1309D_5R_2_49_52_1
1309D_5R_2_49_52_2
1309D_5R_2_49_52_4
1309D_5R_2_49_52_5

THIN SECTION:	U1309D-5R-3, 20-23 cm	Piece No. 3	Unit: 9	TS#:89	OBSERVER:BRF, ESA
ROCK NAME:	Breccia (Troctolitic Gabbro)				
GRAIN SIZE:	Medium-grained				
TEXTURE:					

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Troctolitic Gabbro	Note: This thin section is from a brecciated portion of Troctolitic Gabbro.							
Plagioclase	20	~70	?	3.5	1.5		Anhedral	About 20% primary plagioclase from a gabbro are present. Bent twinning planes observed in the plagioclase crystals.
Pyroxene		~15	?	?	?		Anhedral	Estimation of grainsize is not possible due to anhedral morphology and complex relict texture.
Olivine		~15	?	2.1	1.75		Anhedral	Completely replaced by crisscrossing actinolite and chlorite.
Felsic Alteration (vein)/ Breccia								
Plagioclase				1.5			Anhedral	Occurs as altered broken pieces from the gabbro and as fine-grained recrystallized minerals.
Pyroxene					1.2		Anhedral	Altered to amphiboles.
Amphibole							Subhedral top anhedral	Green colored and slightly pleochroic. Associated with apatite.
Apatite							Euhedral	Inclusions in amphibole

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite/hornblende	45		10 mm				Pyroxene	Locally with hornblende cores, Large crystals (up to 10 mm) growing in a fine-grained clast that may originally have been basalt.
Secondary plagioclase	50							
Clay	5						Amphibole?	

TOTAL ALTERATION: 80%

STRUCTURE : Pegmatitic, clear amphiboles are observed crosscutting the boundary between the fine grained "basalt" and turbid plagioclase. A recrystallized brown hornblende vein is observed.

PHOTOMICROGRAPHS:

1309D_5R_3_20_23_1
1309D_5R_3_20_23_2
1309D_5R_3_20_23_3
1309D_5R_3_20_23_4
1309D_5R_3_20_23_5
1309D_5R_3_20_23_6
1309D_5R_3_20_23_7
1309D_5R_3_20_23_8
1309D_5R_3_20_23_9

THIN SECTION:	U1309D-5R-3, 107-110 cm	**Piece No.** 12	**Unit**: 9	**TS#: 90**	**OBSERVER: BRF, VDH**
ROCK NAME:	Troctolitic gabbro				
GRAIN SIZE:	Medium-grained				
TEXTURE:	Too altered and deformed to estimate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	40	50	0.1	4	3		-	Deformation twins, subgrain boundary formation
Clinopyroxene	0	10			-		-	Modal percentage, grain size and shape are difficult to estimate because of intense alteration
Olivine	0	40			-		-	Modal percentage, grain size and shape are difficult to estimate because of intense alteration

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Actinolite	40						Pyroxene and olivine	* Total amphibole = 40%
Cummingtonite	*						Pyroxene and olivine	
Chlorite	20						Olivine and amphibole	

TOTAL ALTERATION: 60%

STRUCTURE : Deformed gabbro similar to Sample U1309D-5R-2,49-52 cm (Thin section intensity 2). Lower temperature static alteration is pervasive, producing actinolite and chlorite. Brecciation related to the alteration is pervasive, but with no shear displacement.

PHOTOMICROGRAPHS:

1309D_5R_3_107_110_1
1309D_5R_3_107_110_2
1309D_5R_3_107_110_3
1309D_5R_3_107_110_4
1309D_5R_3_107_110_5
1309D_5R_3_107_110_6
1309D_5R_3_107_110_7
1309D_5R_3_107_110_8
1309D_5R_3_107_110_9

THIN SECTION:	U1309D-5R-3, 142-143 cm	**Piece No.** 13	**Unit**: 9	**TS#: 91**	**OBSERVER: BRF, JM**
ROCK NAME:	Olivine gabbro (?) cut by alteration vein				
GRAIN SIZE:	Coarse for olivine gabbro				
TEXTURE:	Equigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	40	50		6.5	3		Anhedral-subhedral	Altered, deformed, slightly fractured by veins
Clinopyroxene	<2	25?		5	3		Anhedral	Almost completely altered, and estimation of original % is just estimation
Olivine	0	25?		3	3		Anhedral	Completely altered, and estimation of original % is just estimation
Chromian spinel	Trace	Trace		0.2			Euhedral	Only one grain as inclusion in plagioclase, opaque.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Brown amphibole	10						Coarse grains, after pyroxene	
Cummingtonite	*						Pyroxene	
Actinolite	30						Pyroxene	* Total colorless amphibole = 30%
Chlorite	20						Olivine and plagioclase	

TOTAL ALTERATION: 60% - assuming plagioclase did not change composition during deformation

STRUCTURE : Deformed gabbro similar to Sample U1309D-5R-3, 107-110 cm (Thin section intensity 2). Lower temperature static alteration is pervasive, producing actinolite and chlorite. Brecciation related to the alteration is pervasive, but with no shear displacement. hornblende filled fractures are broken up by lower temperature assemblage. Alteration vein cutting across the sample is composed of vuggy plagioclase and amphiboles (actinolite and brown amphibole) and other secondary minerals.

PHOTOMICROGRAPHS:

1309D_5R_3_142_143_1
1309D_5R_3_142_143_2
1309D_5R_3_142_143_3
1309D_5R_3_142_143_4

THIN SECTION:	U1309D-6R-1, 121-124 cm	**Piece No.** 17A	**Unit**: 11	**TS#:** 92	**OBSERVER:** JM
ROCK NAME:	Olivine gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Equigranular for original olivine gabbro				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	45	65		6	4		Primary morphology is unknown due to deformation	Alignment of plagioclase due to deformation
Olivine	0	20		4	3		Primary morphology is unknown due to deformation	Completely altered
Clinopyroxene	0	15		6	3		Primary morphology is unknown due to deformation	Completely altered

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Green-brown hornblende	5						Pyroxene	Small relics in actinolite
Actinolite (+/- cummingtonite)	40						Pyroxene, olivine	Large crystals pseudomorph pyroxene, fine intergrowths with chlorite in corona textures. Also in moderate to steeply dipping vein networks
Chlorite	15						Olivine	In coronas
Secondary plagioclase	15						Plagioclase	Some high temperature recrystallization, but mainly in turbid zones (fluid and solid inclusions) cut by thin actinolite veins

TOTAL ALTERATION: 75%

STRUCTURE : Foliation is partly defined by a pre-existing magmatic fabric of large aligned plagioclase laths. This fabric is locally overprinted by localized bands of recrystallized plagioclase and brown hornblende (Thin section intensity of 2). The entire rock is then overprinted by low temperature alteration. A late fracture cuts the pervasive low temperature alteration, and exhibits a normal sense of shear. This fracture cuts across the entire sample and appears to be a sheared actinolite vein. The fracture dips 70 degrees toward 90 degrees in the core reference frame.

PHOTOMICROGRAPHS:

1309D_6R_1_121_124_1
1309D_6R_1_121_124_2
1309D_6R_1_121_124_3
1309D_6R_1_121_124_4
1309D_6R_1_121_124_5
1309D_6R_1_121_124_6

THIN SECTION:	U1309D-6R-2 72-75 cm	**Piece No.** 8	**Unit**: 11	**TS#: 93**	**OBSERVER: BRF, VDH, ABC**
ROCK NAME:	Diabase				
GRAIN SIZE:	Fine-grained				
TEXTURE:	Subophitic to Intergranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	40	~ 40	0.1	1.2	0.4		Subhedral, Bladed	Weak sweeping and undulatory extinction. Possibilty of weak alignment of matrix plagioclase.
Clinopyroxene	5	50	?	?	0.4		Anhedral	Strongly altered, is difficult to determine igneous size, morphology and texture.
Olivine	0	4	0.2	1.4	0.6		Anhedral	Replaced by chlorite.
Ti-magnetite	5	5	0.03	0.3	0.4		Equant	Evenly distributed in the matrix.
Xenocrysts	1	1	~.4	3.5	?		Anhedral	Strongly resorbed plagioclase xenocrysts, one with olivine inclusion (opaques in olivine), ones with overgrowth textures have a rim opaques. Some with, deformed twins, concentric zoning, bent cleavage, and undulatory extinction. All have same c-axes subvertical orientation.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite	40						Pyroxene + olivine (?)	A few circular clots of actinolite after olivine

TOTAL ALTERATION: 40%

STRUCTURE : Weak alignment of large plagioclase phenocrysts dips 55 degrees toward 90 degrees in the core reference frame.

PHOTOMICROGRAPHS:

1309D_6R_2_72_75_1

1309D_6R_2_72_75_2

THIN SECTION:	U1309D-6R-3, 12-15 cm	**Piece No.** 1	**Unit**: 12	**TS#: 94**			**OBSERVER: BRF, ABC**	
ROCK NAME:	Diabase							
GRAIN SIZE:	Medium and fine							
TEXTURE:	Medium and fine-grained domains of subophitic texture							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	50	50	0.1	1.8	0.9		Subhedral	Grains show sweeping extinction, few are zoned. Weak horizontal alignment. Possible complicated magmatic history. Plagioclase is surrounded by subophtic clinopyroxene. The interstial liquid is fine grained and also has a subophitic texture. Fine and medium grained domains are thus defined.
Clinopyroxene	10	45	0.1	1.2	0.4		Anhedral	Possibly only crystalled as residual liquid?
Titanomagnetite	5	5	0.1	0.4	0.2		Subhedral	Minimally present to non-existent in interstial liquid domains.
Olivine	0	1	0.3	0.7	0.5		Anhedral	

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Brown hornblende	*						After pyroxene	
Cummingtonite	*						After olivine	
Actinolite	30						After olivine and pyroxene	* Total amphibole = 30%
Chlorite	5						After olivine and plagioclase	

TOTAL ALTERATION: 35%

STRUCTURE : Well preserved igneous fabric. No magmatic fabric observed.

PHOTOMICROGRAPHS:

1309D_6R_3_12_15_1
1309D_6R_3_12_15_2
1309D_6R_3_12_15_3
1309D_6R_3_12_15_4
1309D_6R_3_12_15_5
1309D_6R_3_12_15_6
1309D_6R_3_12_15_7

THIN SECTION:	U1309D-7R-2, 2-5 cm	**Piece No.** 1		**Unit**: 14	**TS#: 95**		**OBSERVER: MD, ABC**	
ROCK NAME:	Oxide Diabase							
GRAIN SIZE:	Medium							
TEXTURE:	Subophitic							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**			**Composition**	**MORPHOLOGY**	**COMMENTS**
			min.	**max.**	**av.**			
Plagioclase	35	46	0.2	3.2	0.9		Anhedral, Elongate	Strained. Relatively fresh, most grains have sweeping extinction and exsolution lamellae, highly fractured. One grain bent. Laths show a weak alignment, grain size decreases toward the botom of the slide.
Pyroxene	15	46	0.2	2.2	0.6		Anhedral, Equant or Elongate	Suspicious habit of elongate grains. Twins preserved. Similar texture to Sample U1309D-6R-3 12-15 cm.
Apatite	Trace	Trace	0.1	0.5	0.2		Euhedral, Elongate	Inclusions in plagioclase
Opaques	8	8	0.08	1.3	0.35		Subhedral, Equant or Elongated upto 1.3 mm	Magnetite with lesser Ilmenite. Sulfides occur in trace amounts and partially fill a thin vein.

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron)**				**REPLACING / FILLING**	**COMMENTS**
			min.	**max.**	**av.**			
Actinolite/Tremolite	30		300	1000	500		Pyroxene	
Secondary plagioclase	10						Plagioclase	Turbid zones cutting plagioclase

TOTAL ALTERATION: 40%

STRUCTURE : Very weak magmatic fabric observed possibly with two orientations. Dip between 50 and 80 degrees toward 270 degrees in the core reference frame. Oxides are weakly aligned parallel to the magmatic fabric orientations.

PHOTOMICROGRAPHS:

1309D_7R_2_2_5_1
1309D_7R_2_2_5_2
1309D_7R_2_2_5_3

THIN SECTION:	U1309D 7R2 24-26 cm	**Piece No.** 1	**Unit**: 14	**TS#:96**			**OBSERVER:MA, ABC**	
ROCK NAME:	Diabase							
GRAIN SIZE:	Medium							
TEXTURE:	Subophitic							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	45	48	0.3	4	1.5		Euhedral, Elongate	Many grains show zoning, sweeping extinction. Few faulted laths, evidence for compaction?
Pyroxene	45	48		2	1.2		Anhedral	Many fresh. Smaller grains most altered.
Oxides	1 - 2	1 - 2	0.1	0.7	0.4		Equant	Fresh, evenly distributed in matrix.
Olivine?	Trace	0.5		0.2			Anhedral	If present, completely altered.

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Actinolite/Tremolite	30						Pyroxene	Also in veins and cracks in plagioclases
								Picture 1309d_7r_2_24_26_1.tif

TOTAL ALTERATION: 30%

STRUCTURE : No magmatic fabric or crystal plastic deformation (Thin section intensity 1a). A few small actinolite veins are dipping 25 degrees toward 270 degrees in the core reference frame.

PHOTOMICROGRAPHS:

1309D_7R_2_24_26_1
1309D_7R_2_24_26_2
1309D_7R_2_24_26_3
1309D_7R_2_24_26_4
1309D_7R_2_24_26_5

THIN SECTION:	U1309D-7R-3, 0-1 cm	**Piece No.** 1	**Unit**: 14	**TS#: 97**	**OBSERVER: ABR, ABC**
ROCK NAME:	Basalt				
GRAIN SIZE:	Fine Grained				
TEXTURE:	Intergranular, Plagioclase Phyric				

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	25	40	0.04	0.1	0.3		Subhedral, Elongate	Partially altered laths.
Clinopyroxene	0	50			~ 0.15		Anhedral	Completely altered to amphibole, original size and shape is estimated.
Olivine	0	1	0.2	0.8			Anhedral	Completely altered to amphibole, original size and shape is estimated.
Magnetite	7	7					Equant	Generally unaltered.
Plagioclase Phenocrysts	1	1	0.4	2.7	0.5		Subheral, Tabular	Possibly xenocrysts, some with ocillatory zoning, and overgrowth rims.
Apatite	Trace	Trace					Euhedral, Elongate	As inclusions in plagioclase.

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Actinolite	50			150	50		Pyroxene	In small vein as well
Chlorite	20				10		Plagioclase	

TOTAL ALTERATION: 70%

STRUCTURE : Fine grained basalt with some alignment of the large phenocrysts. Two small actinolite veins are observed.

PHOTOMICROGRAPHS:

1309D_7R_3_0_1_1

1309D_7R_3_0_1_2

THIN SECTION:	U1309D-7R-3, 101-102 cm	**Piece No.** 16	**Unit**: 16	**TS#:** 98	**OBSERVER:** ABR, JM
ROCK NAME:	Gabbro (with vein?)				
GRAIN SIZE:	Medium				
TEXTURE:	Equigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	65	70		7	2.5		Anhedral-subhedral	Altered slightly. Lower vein (?) part, smaller grain size and higher degree of alteration.
Clinoyrpoxene	10	30		3	2		Anhedral-subhedral	Altered to amphiboles. Lower vein (?) part, smaller grain size and higher degree of alteration.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite	30			4400	300		Pyroxene	Also in vein
Brown hornblende	"			300	120		Pyroxene	Also in vein
Cummingtonite	"			1000	100		Pyroxene	
Chlorite	5				10		Plagioclase	
Secondary plagioclase	10				30		Plagioclase	

TOTAL ALTERATION: 45%

STRUCTURE : In the lower part of this thin section, there is a smaller grain size and higher degree of alteration especially in plagioclase. Boundary between both parts is rather clear, so the lower part is occupied by vein or is invaded by veins. Fractures change from brown/green amphibole to fluid filled along their length. Crystal plastic deformation is mild, overprinted by high to low temperature brittle deformation. (Thin section intensity 2).

PHOTOMICROGRAPHS:

1309D_7R_3_101_102_1
1309D_7R_3_101_102_2
1309D_7R_3_101_102_3
1309D_7R_3_101_102_4
1309D_7R_3_101_102_5
1309D_7R_3_101_102_6

THIN SECTION:	U1309D 8R-1 68-71 cm	**Piece No.** 9		**Unit**: 17		**TS#: 99**		**OBSERVER: MA, ESA**
ROCK NAME:	Mylonitic Gabbro							
GRAIN SIZE:	Coarse-grained							
TEXTURE:	Mylonitic							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Plagioclase		?	?	2.5	?		Anhedral	Surviving primary plagioclase crystals have very irregular shapes and boundaries. They also have hent and diffused twinning planes.
Pyroxene		?	?	10.5	?		Anhedral	Remaining pyroxene crystals are coarse-grained. Stress is shown by bent to sinusoidal cleavage.
								Note: Coarse-grained pyroxene and plagioclase occur as "megacryst" islands separated by bands of mylonite composed of recrystallized plagioclase and altered pyroxene and amphibole. Pyroxene and plagioclase crystals are commonly rimmed by neoblastic pyroxene.
Alteration Vein	Note: The vein cuts the mylonite bands and is therefore a later event than the mylonitization.							
Plagioclase			?	1.3	0.9		Anhedral	Moderately altered fragments from the gabbro.
Tremolite (?)				0.2 to 0.5			Acicular	It is the dominant mineral in the vein. The vein has thickness ranging from 3.5 to 5 mm.
Clay								

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Recrystallized pyroxenes	15						In foliation and in vein (?) in the lower right corner of the section (core oriented)	High temperature dynamic recrystallization under granulite-amphibolite facies
Recrystallized plagioclase	20						In foliation and in the vein (?) cutting the lower part of the section (core oriented).	High temperature dynamic recrystallization under granulite-amphibolite facies. Possibly lower temperature secondary plagioclases in the vein with actinolite (?).
Brown hornblende	10						Pyroxene	Amphibolite facies alteration rimming big pyroxene and within the foliation after recrystallized pyroxenes.
Actinolite	35						Pyroxene	Later greenschist facies alteration after pyroxene and in veins.
Titanite	Trace							With amphibole(?) in thin dark veins that are cut bythe alteration of the foliation.

TOTAL ALTERATION: 80%

STRUCTURE : Crystal plastic intensity 4. Strong LPO in plagioclase is crosscut by a diorite intrusion. Actinolite veins pre-date as well as post-pate pervasive static greenschist grade alteration.

PHOTOMICROGRAPHS:

1309D_8R_1_68_71_1
1309D_8R_1_68_71_2
1309D_8R_1_68_71_3
1309D_8R_1_68_71_4
1309D_8R_1_68_71_5
1309D_8R_1_68_71_6
1309D_8R_1_68_71_7

THIN SECTION:	U1309D 8R-1 87-89 cm	**Piece No.** 11	**Unit**: 17	**TS#: 100**	**OBSERVER: BRF, ESA**
ROCK NAME:	Mylonitic Gabbro				
GRAIN SIZE:	Coarse-grained				
TEXTURE:	Mylonitic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	20	?	?	6	?		Anhedral	Recrystallized plagioclase are abundant. Undulatory extinction and bent twinning planes suggest show effect of stress.
Clinopyroxene	5	?		1.75			Anhedral	The given maximum size is from unaltered clinopyroxene. Cleavage traces are bent showing stress deformation. Pseudomorphs of altered pyroxene can reach up to 5 mm. Smaller crystals and neoblastic clinopyroxene usually surround or are found near primary clinopyroxene crystals.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Brown hornblende	*						Coarse grains, after pyroxene	
Cummingtonite	*						Pyroxene and olivine	
Actinolite	40						Pyroxene and olivine	* Total amphibole = 40%
Chlorite	22						Olivine and plagioclase	
Talc	15						Olivine	Presence of talc and strong chloritization of plagioclase suggest and ultramafic layer(s) were present
Serpentine	1							
Pyrite	1							

TOTAL ALTERATION: 79% - assuming plagioclase did not change composition during deformation

STRUCTURE : Strong crystal plastic deformation and mylonitization (This section intensity 4). Later isotropic alteration of mafic phases to actinolite and chlorite. Fine grained recrystallized plagioclase exhibits a strong LPO. Recrystallized bands of hornblende and oxide occur parallel to the foliation defined by plagioclase. Recrystallized pyroxenes likely preserve a separate, higher temperature deformation event than the one responsible for amphibole recrystallization.

PHOTOMICROGRAPHS:

1309D_8R_1_87_89_1
1309D_8R_1_87_89_2
1309D_8R_1_87_89_3
1309D_8R_1_87_89_4
1309D_8R_1_87_89_5
1309D_8R_1_87_89_6
1309D_8R_1_87_89_7
1309D_8R_1_87_89_8
1309D_8R_1_87_89_9
1309D_8R_1_87_89_10

THIN SECTION: U1309D-8R1 125-127 cm **Piece No.**: 15 **Unit**: 18 **TS#:** 101 **OBSERVER:** AM, JM
ROCK NAME: Troctolite and gabbro
GRAIN SIZE: Original grain size: coarse? for both lithologies
TEXTURE: Original texture unknown due to deformation

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Troctolite								
Plagioclase	25	?		5			Primary morphology and grain size are unknown due to deformation and alteration	Porphyroclastic and neoblastic crystals
Olivine	0	?		?			Primary morphology and grain size are unknown due to deformation and alteration	Completely altered
Gabbro								
Plagioclase	35	65?		5			Primary morphology and grain size are unknown due to deformation	Porphyroclastic and neoblastic crystals
Clinopyroxene	5	35?		6			Primary morphology and grain size are unknown due to deformation and alteration	Almost completely altered to amphibole or replaced by aggregates of recrystallized small grains of clinopyroxene
Olivine								

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
In layer 1 (up in core reference frame)								
Chlorite	25						Plagioclase	In corona textures with amphibole
Green-brown amphibole	10				200		Pyroxene ?olivine	Hard to tell if it is directly produced in corona textures
Pale amphibole (tremolite/cummingtonite /actinolite)	35				250		Olivine	In corona textures, not very deformed before alteration and undeformed after
Secondary plagioclase	5				40			
In layer 2 (down in core reference frame)								
Green-brown amphibole	25				200		Pyroxene	Recrystallized in mylonitic texture and replacing pyroxene
Secondary clinopyroxene	5				200		Clinopyroxene	Recrystallized but not very strung out
Secondary plagioclase	25				50		Plagioclase	High temperature recrystallized, little albite
Green amphibole	20						Brown amphibole, pyroxene	
Chlorite	5							In isolated corona textures

TOTAL ALTERATION: 75%

STRUCTURE : Contact between troctolite and gabbro is observed in this thin section. The troctolite has a magmatic foliation defined by elongate pyroxenes and large plagiocalse laths. Plagioclase recrystallization is observed throughout the troctolite (Thin section intensity 2) and becomes abundant nearer the contact with the gabbro. Plagioclase in the gabbro is extensively recrystallized (Thin section intensity 3). The entire section is cut by low temperature fractures containing actinolite.

PHOTOMICROGRAPHS:
1309D_8R_1_125_127_1
1309D_8R_1_125_127_2
1309D_8R_1_125_127_3

THIN SECTION:	U1309D-8R-2 26-28 cm	**Piece No.** 2	**Unit**: 18	**TS#: 102**				**OBSERVER: BRF, ESA**	
ROCK NAME:	Troctolite and mylonitized olivine gabbro								
GRAIN SIZE:	Variable								
TEXTURE:	Pseudomorphic in the troctolite, high-temperature mylonitic in the olivine gabbro								

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
(Troctolite)								
Plagioclase	10	~50	?	5.6	?		Anhedral	About 20% of plagioclase is porphyroclasts that may retain original composition. Maximum measurements include alteration halo.
Olivine	0	~50	?	?	?		Anhedral	Completely replaced by chlorite and actinolite.
(Olivine Gabbro)								
Plagioclase	20	~50		5.3			Anhedral	Estimates are approximate because of intense deformation. Plagioclase occurs as porphyroclastic and neoblastic crystals. Neoblasts commonly are as large as o.7 to 1 mm. Plagioclase neoblasts are abundant between coarse-grained porphyroclasts.
Pyroxene	1	~25					Anhedral	Completely replaced by amphibole. Relict texture suggests that the pyroxene grains were mechnically broken.
Olivine		~25					Anhedral	Completely replaced by clhorite and actinolite.
Zircon		Trace		0.5			Euhedral	Broken pieces of zircon occur along the boundary between troctolite and olivine gabbro. In Hole U1309B and U1309D, zircon is consistently related to felsic veins cutting the lithologies. This implies the possibility of a former felsic vein between the two rocks and was obliterated during the mylonitization of the olivine gabbro.

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Troctolite								
Chlorite	40							
Actinolite	50							* Total amphibole abundance = 50%
Cummingtonite	*							
Mylonitized gabbro								
Epidote	Trace							
Rutile	Trace							
Brown hornblende	*							
Tremolite/actinolite	*							
Cummingtonite	40							*Total amphibole = 40%
Chlorite	10							
Secondary plagioclase	30							

TOTAL ALTERATION: mylonitized gabbro= 80% (counting plagioclase), troctolite = 90%

STRUCTURE : Evidence for granulite-grade deformation. Strongly recrystallized plagioclase and brown amphibole display a strong LPO (Thin section intensity 4). This mylonitized olivine gabbro is separated from a mildly recrystallized (Thin section intensity 2) troctolite by a darker, more amphibole-rich band that is also strongly deformed. Static alteration at greenschist grade is pervasive. **Photos 1309d_8r_2_26_28_1.tif, 1309d_8r_2_26_28_2.tif**

PHOTOMICROGRAPHS:

1309D_8R_2_26_28_1
1309D_8R_2_26_28_2
1309D_8R_2_26_28_3
1309D_8R_2_26_28_4
1309D_8R_2_26_28_5
1309D_8R_2_26_28_6
1309D_8R_2_26_28_7

THIN SECTION:	U1309D-8R-2, 70-72 cm	**Piece No.** 7	**Unit**: 18	**TS#: 103**	**OBSERVER: ABR, ESA**				
ROCK NAME:	Mylonitic gabbro + Troctolite + magmatic dike (fault zone)								
GRAIN SIZE:	Medium grained								
TEXTURE:	E' uigranular								

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Olivine Gabbro part	The thin section may not be representative of the whole rock, it was taken in a part with no olivine occurrence (see close-up photo).							
Plagioclase	70	67	?	7.1	3		Anhedral	Very irregular boundaries with recrystallized and smaller broken plagioclase crystals interstitial to the coarse-grained ones. Cleavage trace are bent and most show undulatory extinction suggesting the crystals have undergone high stress event.
Pyroxene	0	30	?	?	1.8 to 3.5		Anhedral	Altered to amphiboles. Some relict texture suggests that some of the pyroxenes were also broken and recrystallized to smaller grains. In this rock, pyroxene may have two types of relict texture, one is replacement by whole crystal light brown amphiboles and the other is small, aggregated crystals with the same orientation associated with dark minerals.
Olivine	0	3	?	?	1.4 to 3.2		Anhedral	The relict texture of olivine in this rock is distinguished from pyroxene relict texture by the crisscrossing, multi-orientation fibrous replacement minerals and the cavity the alteration leaves behind.
Troctolite part								
Plagioclase			?	4.2	2 to 3		Anhedral	Almost all coarse-grained plagioclase are rimmed by 0.3 to 0.7 mm thick fibrous chlorite. This is caused by the reaction of plagioclase and olivine. This rim appears dark green in hand specimen and defines a corona texture. All the boundaries of remaining plagioclase crystals show resorbed texture. Recrystallized plagioclase is also present, commonly associated with coarse-grained primary plagioclase.
Olivine			?	?	2		Anhedral	Completely altered to fibrous actinolite in crisscrossing orientation.
Fault zone	(Note:The fault zone may be composed of materials from the olivine gabbro. In hand sample, the gabbro section shows drag texture near the fault, which is consistent with the presence of plagioclase and pyroxene along the fault zone.							
Plagioclase				2.45	0.5 to 0.7		Anhedral	Broken crystals of plagioclase with subrounded edges. Clast size s are variable and some are recrystallized and lost their twinning. Bent crystals are also observed.
Pyroxene					0.5 to 1.0		Anhedral	Altered to brown hornblende. Can be observed interlocking with plagioclase.
Amphibole			?	?	?		Anhedral and fibrous	Fine-grained crystals which serves as the matrix of the fault zone supporting the plagioclase and pyroxene clasts. They form wavy texture in the matrix. These are also found on both wallls of the fault zone together with recrystallized plagioclase.

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Gabbro-part:								
Secondary Plagioclase	30				50		Plagioclase	High-temperature defomation and recrystallization
Secondary Pyroxene	5				30		Pyroxene	High-temperature defomation and recrystallization
Actinolite/ tremolite	20				150		Pyroxene	
Clay	5				<5		?Amphibole	
Troctolite-part:								
Secondary Plagioclase	10				50		Plagioclase	High-temperature defomation and recrystallization
Secondary Pyroxene	10				30		Pyroxene	High-temperature defomation and recrystallization
Tremolite/ actinolite	35				250		Pyroxene, Olivine	
Chlorite	30		10	350	60		Plagioclase near Olivine	
Clay	1				<5		?Amphibole	
Magmatic dikelet								
Actinolite + brown hornblende	35				200		Magmatic hornblende	
Clay	15				<5		?Amphibole	

TOTAL ALTERATION: Gabbro: 60%, Troctolite: 80%

STRUCTURE : Crystal plastic intensity of 2. Recrystallized plagioclase and slightly stretched relict olivine grains. Plagioclase and hornblende intrusion that cuts all of the mylonitization. Static alteration defined by distributed and vein amphibole (clear amphibole). Might be small shear strain near boundary of plagioclase-hornblende vein (dipping 50 degrees toward 90) with a reverse sense.

PHOTOMICROGRAPHS:

1309D_8R_2_70_72_1
1309D_8R_2_70_72_2
1309D_8R_2_70_72_3
1309D_8R_2_70_72_4
1309D_8R_2_70_72_5
1309D_8R_2_70_72_6
1309D_8R_2_70_72_7

THIN SECTION:	U1309D-8R-2, 138-141 cm	**Piece No.** 16	**Unit**: 19?	**TS#:** 104	**OBSERVER:** MA, MD, JM				
ROCK NAME:	Mylonite (protolith: boundary between troctolite and gabbro)								
GRAIN SIZE:	Original grain size for troctolite: medium?, and for gabbro: coarse?								
TEXTURE:	Original texture unknown due to deformation								

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Troctolite								
Plagioclase	1	40?		>4			Anhedral?	Mylonitized and almost completely altered to tremolite
Olivine	0	55?		>4			Anhedral?	Almost completely altered to tremolite and chlorite
Clinopyroxene	1	5?		>4			Anhedral?	Almost completely altered to amphibole
Gabbro								
Plagioclase	55	55		4?			Primary morphology and grain size are unknown due to deformation	Porphyroclast and neoblast
Clinopyroxene	20	45		13?			Primary morphology and grain size are unknown due to deformation	Large porphyroclast (> 1.3 cm in size)

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Upper portion								
Chlorite	40						Olivine, plagioclase	
Actinolite	50						Olivine, plagioclase	* Total amphibole abundance = 50%
Cummingtonite	*							
Lower portion								
Actinolite/Tremolite	35						Pyroxene	
Brown hornblende	5						Pyroxene	
Secondary plagioclase	38							High temperature dynamic recrystallization
Oxides (magnetite)	2							

TOTAL ALTERATION: lower portion = 80% (counting plagioclase), upper portion = 90%

STRUCTURE : Evidence for granulite-grade deformation. Mylonitic gabbro (Thin section intensity 4) which was subsequently altered in contact with a lower strain troctolitic rock (Thin section intensity 2) which exhibits some recrystallization. A large (approximately 1 cm) pyroxene porphyroclast is internally folded and crystal plastically deformed. Photos 1309d_8r_2_138_141_3.tif, 1309d_8r_2_138_141_4.tif. Protolith: troctolite (upper half) and gabbro (lower half).

PHOTOMICROGRAPHS:

1309D_8R_2_138_141_1
1309D_8R_2_138_141_2
1309D_8R_2_138_141_3
1309D_8R_2_138_141_4
1309D_8R_2_138_141_5
1309D_8R_2_138_141_6
1309D_8R_2_138_141_7
1309D_8R_2_138_141_8
1309D_8R_2_138_141_9
1309D_8R_2_138_141_10
1309D_8R_2_138_141_11

THIN SECTION:	U1309D-9R-1, 40-42 cm	**Piece No.** 6		**Unit**: 22	**TS#: 105**		**OBSERVER: MA, ESA, ABC**	
ROCK NAME:	Diabase							
GRAIN SIZE:	Medium-grained							
TEXTURE:	Subophitic to intergranular							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**			**Composition**	**MORPHOLOGY**	**COMMENTS**
			min.	**max.**	**av.**			
Plagioclase	40	40	0.1	2.2	1		Anhedral to subhedral	Although dominantly medium grained, grain size ranges from fine-grained to medium-grained.
Pyroxene	2	56	0.1		0.3		Anhedral	Highly altered to amphibole but some fresh grains still remain.
Olivine?	0	Trace			0.4		Anhedral	Completely altered to chlorite.
Magnetite / Opaques	3	3	0.1	0.6	0.4		Subhedral to anhedral	Magnetite partially replaced by Ilmenite

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron)**				**REPLACING / FILLING**	**COMMENTS**
			min.	**max.**	**av.**			
Actinolite/tremolite	40						Pyroxene	
Brown hornblende	Trace						Pyroxene	Possible relicts

TOTAL ALTERATION: 40%

STRUCTURE : Diabase with no obvious magmatic fabric. No veins observed.

PHOTOMICROGRAPHS:

1309D_9R_1_40_42_1

1309D_9R_1_40_42_2

THIN SECTION:	U1309D-9R-1, 71-73 cm	**Piece No.** 11	**Unit**: 23	**TS#:** 106				**OBSERVER:** MD, JM	
ROCK NAME:	Olivine gabbro (upper part: mylonitized)								
GRAIN SIZE:	Medium								
TEXTURE:	Equigranular								

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	65	65		8	3		Subhedral-anhedral	Mylonitized in the upper part
Olivine	0	15		4	2		Anhedral	Altered to chlorite and amphibole, mylonitized in the upper part
Clinopyroxene	10	20		5	3		Anhedral	Altered to amphibole, mylonitized in the upper part

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Upper part								
Actinolite/tremolite	40						Pyroxene	In veins
Chlorite	2						Plagioclase	
Brown hornblende	Trace						Pyroxene	
Lower part								
Secondary plagioclase	30							High temperature dynamic recrystallization
Actinolite/tremolite	20						Pyroxene	
Brown hornblende	Trace						Pyroxene	

TOTAL ALTERATION: upper part : 42% lower part : 50%

STRUCTURE : Original lithologies in both sides are similar.

PHOTOMICROGRAPHS:

1309D_9R_1_71_73_1
1309D_9R_1_71_73_2
1309D_9R_1_71_73_3
1309D_9R_1_71_73_4
1309D_9R_1_71_73_5
1309D_9R_1_71_73_6
1309D_9R_1_71_73_7
1309D_9R_1_71_73_8

THIN SECTION:	U1309D-9R-1, 101-104 cm	**Piece No.** 12A	**Unit**: 23	**TS#:** 107	**OBSERVER:**MD, JM
ROCK NAME:	Gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Original: equigranular ?				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	40	60		5			Anhedral?	Deformed, particularly in central part where all plagioclase grains are recrystallized ones.
Clinopyroxene	20	40		10	3		Anhedral	Replaced by later clinopyroxene, deformed and altered
Orthopyroxene	Trace	Trace		3			Anhedral	Altered to talc and amphibole

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite/tremolite	30						Pyroxene	Later green-schist facies alteration after pyroxene and in veins.
Secondary plagioclase	40							High temperature dynamic recrystallization
Brown hornblende	2						Pyroxene	Amphibolite facies alteration, relics replaced by actinolite/tremolite
Chlorite	3						Plagioclase	
Talc	1						Pyroxene	Form a rim around pyroxene with actinolite
Recrystallized pyroxenes	10							High temperature dynamic recrystallization under granulite-amphibolite facies

TOTAL ALTERATION: 85%

STRUCTURE : Deformation intensity is greatest toward the center of the slide (a shear zone), with recrystallized amphibole and plagioclase. The plagioclase exhibits an LPO with grain sizes greater than one hundred microns. The shear zone has a deformation intensity of 3, and away from the shear zone the intensity is 2. Amphibole veins (greenschist grade) cut everything. Some healed semibrittle fractures. One semibrittle texture follows a relict (now healed) fracture and traces directly into a greenschist-grade vein.

PHOTOMICROGRAPHS:

1309D_9R_1_101_104_1
1309D_9R_1_101_104_2
1309D_9R_1_101_104_3
1309D_9R_1_101_104_4
1309D_9R_1_101_104_5
1309D_9R_1_101_104_6
1309D_9R_1_101_104_7

THIN SECTION:	U1309D-9R-2, 50-53 cm	**Piece No.** 5	**Unit**: 25	**TS#:**108	**OBSERVER:** MA, JM
ROCK NAME:	Deformed Gabbro				
GRAIN SIZE:	Medium or coarse?				
TEXTURE:	Equigranular?				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	60	65		7			Unknown due to deformation	Deformed and altered
Clinopyroxene	10	35		8			Anhedral	Altered to amphibole.
Zircon	trace	trace		0.3			Subhedral to Euhedral	~ 20 crystals located just above the vein from the left to central portion of the slide. Possibly a deformed anorthitic vein cut by an amphibole vein.
Apatite	trace	trace		0.4			Subhedral to Euhedral	Several grains in the area where zircon grains are found

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Secondary plagioclase	20						Plagioclase	
Actinolite/Tremolite	20						Pyroxenes and brown amphibole	Also in thin fibrous veins
Brown hornblende	5						Pyroxenes	Commonly in relicts rim around pyroxenes
Chlorite	5							Fills the main vein with some actinolite

TOTAL ALTERATION: 50%

STRUCTURE : Some evidence of an original magmatic fabric overprinted by moderate crystal plastic deformation (Thin section intensity 2.5). Recrystallization of plagioclase can be quite extensive. Hornblende can also be observed undergoing recrystallization. The crystal plastic foliation is cut by later actinolite veins.

PHOTOMICROGRAPHS:

1309D_9R_2_50_53_1
1309D_9R_2_50_53_2
1309D_9R_2_50_53_3
1309D_9R_2_50_53_4
1309D_9R_2_50_53_5

THIN SECTION:	U1309D-9R-3, 39-42 cm	**Piece No.** 5	**Unit**: 25	**TS#:** 109	**OBSERVER:** JM, MD
ROCK NAME:	Mylonitized gabbro with vein				
GRAIN SIZE:	Coarse for gabbro				
TEXTURE:	Equigranular for original gabbro				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Gabbro								
Plagioclase	50	50		3?			Primary morphology is unknown due to strong deformation	Deformed to porphyroblasts and recrystallized neoblasts
Clinopyroxene	5	50		7			Anhedral	Deformed to porphyroclastic form and altered to amphibole
Vein								
Plagioclase		70		1			Subhedral	
Amphibole		5		1			Anhedral, poikilitic in some cases	
Clinopyroxene	trace	trace		5			Anhedral	May be derived from the gabbro
Zircon	trace	trace			0.2		Euhedral	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	
Gabbro								
Actinolite/tremolite	20						Pyroxene	
Secondary plagioclase	25							High temperature dynamic recrystalliztion
Brown hornblende	2						Pyroxene	relict
Vein								
Actinolite/tremolite	35						Pyroxene	
Secondary plagioclase	10							High temperature dynamic recrystalliztion

TOTAL ALTERATION: Gabbro: 47% **Vein** : 45%

STRUCTURE : This thin section is mylonitized (olivine?) gabbro (Thin section intensity is 3.5), which is cut or invaded by a amphibole-plagioclase vein bearing zircon. Plagioclase in this vein occurs as fine-grained equant crystal, usually showing optical zoning. The other side of the plagioclase amphibole vein is relatively undeformed gabbro (Thin section intensity 1-2). The mylonite is cut by actinolite veins. The low temperature alteration appears to be static.

PHOTOMICROGRAPHS:

1309D_9R_3_39_42_1
1309D_9R_3_39_42_2
1309D_9R_3_39_42_3

THIN SECTION:	U1309D-10R1, 5-7 cm	**Piece No.** 2	**Unit**: 27	**TS#: 110**	**OBSERVER: MD, ESA**
ROCK NAME:	Gabbro				
GRAIN SIZE:	Coarse-grained				
TEXTURE:	Equigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase		75	0.4	7	1.8 to 5		Subhedral to anhedral	Interlocking medium to dominantly coarse-grained crystals.
Pyroxene		25	?	3.15	2.3		Anhedral	Anhedral grains interstitial to the plagioclase crystals. Adjacent grains can form networks. Altered to hornblende.
Olivine	0	<1						

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite/tremolite	40						Pyroxene	In veins and plagioclase fractures
Brown hornblende	Trace						Pyroxene	Possible relicts
Chlorite	5						Plagioclase	
Secondary plagioclase	5							High temperature dynamic recrystallization

TOTAL ALTERATION: 50%

STRUCTURE : Sample mostly preserves an igneous texture (Thin section intensity 1a). It is cut by a mylonitic band with recrystallized plagioclase exhibiting a strong LPO. This band also contains zircon, suggesting that it is a late magmatic?

PHOTOMICROGRAPHS:

1309D_10R_1_5_7_1

1309D_10R_1_5_7_2

THIN SECTION:	U1309D-10R-1, 91-94 cm	**Piece No.** 12	**Unit**: 28	**TS#: 132**	**OBSERVER: VDH, MA**
ROCK NAME:	Troctolite-peridotite contact				
GRAIN SIZE:	Medium-grained				
TEXTURE:	Protogranular/ equigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Troctolite								
Olivine	0	30					too altered	Completely altered to talc
Plagioclase	0%	65						Completely altered to chlorite
Pyroxene	0	3					Poikilitic	Occurs only as interstitial phase in corner
Spinel	1	1					Interstitial	Formed along grain boundaries, nice shape with pointy tips
Peridotite								
Olivine	15	50					Granular	Serpentinized, undulose extinction and subgrain formation, occur also as (unstrained if visible) inclusion in pyroxene
Plagioclase	1	12					Interstitial	Occurs as interstitial phase in the matrix
Pyroxene	3	28						Big grains that enclose olivine grains and/or spinel cluster
Amphibole	1	3					Equant	Narrow diffuse dike of colorless amphibole that branches and cuts pyroxenes
Spinel	2	2					Equant	Occurs as cluster inclusion in pyroxene as well as in olivine matrix

Sharp change in olivine alteration at the troctolite-ultramafic contact, percentage and shape of plagioclase is continuous over the contact but apparently with a slight decrease away from the contact but might be due to higher alteration and poor quality of the thin section toward the edge. Talc-tremolite vein is crossing.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Troctolite								
Talc	30						Olivine	
Chlorite	45						Plagioclase	
Tremolite	15						Pyroxenes and around chlorite replacing plagioclase	They tend to grow perpendicular to the former plagioclase grains.
Magnetite	5						Olivine, Pyroxenes	
Peridotite								
Tremolite	40						Pyroxenes and in veins	Also around ancient plagioclases replaced by chlorite.
Brown hornblende	Traces						Pyroxenes	
Serpentine	5						Olivine	In rims around olivine, with magnetite (mesh texture)
Chlorite	10						Plagioclase	
Magnetite	10						Olivine, Pyroxenes	
Carbonate	10						Olivine and in veins	In center of rims, and in late veins
Oblique deformed zone or vein								Talc, Chlorite, with few Tremolite (and possibly serpentine)

TOTAL ALTERATION: 95% in troctolite, 75% in ultramafic rock

STRUCTURE : Olivine has subgrain boundaries (undulatory extinction), large clinopyroxene with chadacrysts of olivine and spinel. None of the grains appear to have been deformed, but secondary alteration is intense throughout the section. The relict pyroxene does not appear to have been deformed whereas the olivine had, consistent with an ultramafic deformation predating the impregnation by gabbroic material.

PHOTOMICROGRAPHS:

1309D_10R_1_91_94_1
1309D_10R_1_91_94_2
1309D_10R_1_91_94_3
1309D_10R_1_91_94_4
1309D_10R_1_91_94_5
1309D_10R_1_91_94_6

THIN SECTION:	U1309D-10R-1 99-102	Piece No. 12	Unit: 28	TS#:133	OBSERVER:BRF, VDH
ROCK NAME:	Harzburgite and gabbro				
GRAIN SIZE:					
TEXTURE:					

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Olivine	35	50						Small area with recrystallized olivine in upper left corner, olivine shows common weak undulouse extintction, difficult to estimate modal estimate as highly altered to talc (?) in the dikes.
Clinopyroxene	5	20						Little clinopyroxene dike in upper left corner.
Orthopyroxene								no fresh preserved, some probably present and altered to bastite
Plagioclase	2	20					Anhedral	Occurs mostly in gabbroic vein with coarse grain size. Less frequent as interstitial blebs in matrix, occur also as vermicular intergrowth in clinopyroxene. Almost completely altered to chlorite
Hornblende	8	10					Euhedral	Commonly with twins, occur only in a dike in the right part of the thin section
Spinel	<1	<1						Holly leaf shaped, with spongy alteration rim in gabbroic dike, primary?

dikes and host rock are not subdivided because of diffuse interfingering relationships that make it difficult to estimate meaningful modal data

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Carbonate vein	2							It may be aragonite
Gabbro horizon								
Brown hornblende	20			2mm			May be primary	
Actinolite/	5						Growing on hornblende	
Tremolite/cummingtonite	30						After pyroxene	Total colorless amphibole = 30%
Talc	15						Olivine	
Chlorite	20						Plagioclase	
Serpentine	3						Olivine	
Harzburgite								
Serpentine	5						After olivine	
Tremolite/cummingtonite	2						After pyroxene	
Chlorite	2						After plagioclase?	
Talc	1							

TOTAL ALTERATION: In dike = 95%, in peridotite = 10%

STRUCTURE : Olivine with a possible protogranular texture with subgrain boundaries, equigranular pyroxene, and interstitial plagioclase. Exsolution lamellae in pyroxene varies between grains. Crosscutting the cumulate (sensu lato) texture, are veins with a dioritic composition, and associated magmatic hornblende. Alteration is primarily static.

PHOTOMICROGRAPHS:

1309D_10R_1_99_102_1
1309D_10R_1_99_102_2
1309D_10R_1_99_102_3
1309D_10R_1_99_102_4
1309D_10R_1_99_102_5
1309D_10R_1_99_102_6
1309D_10R_1_99_102_7
1309D_10R_1_99_102_8
1309D_10R_1_99_102_9
1309D_10R_1_99_102_10
1309D_10R_1_99_102_11
1309D_10R_1_99_102_12
1309D_10R_1_99_102_13

THIN SECTION:	U1309D 10R-1 127-129 cm	**Piece No.** 14	**Unit**: 30	**TS#:** 111	**OBSERVER:** AM, JM
ROCK NAME:	Gabbro mylonite				
GRAIN SIZE:	Coarse				
TEXTURE:	Primary texture is unknown due to strong deformation				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	60	60		15			Primary morphology is unknown due to strong deformation	Strongly deformed to porphyroblasts and recrystallized neoblasts
Clinopyroxene	10	40		15			Anhedral	Strongly deformed and altered to amphibole

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Green-brown hornblende	10				100		Pyroxene	Very brown near rutile/ilmenite. Green-brown hornblende is concentrated in high temperature shear zones
Actinolite	25			1000	300		Pyroxene	Only a few areas of pyroxene escaped alteration
Secondary plagioclase	10				100		Plagioclase	Mainly in high temperature shear zones
Ilmenite	1							

TOTAL ALTERATION: 45%

STRUCTURE : Coarse gabbro moderately deformed crystal plastically (Thin section intensity 3). Recrystallized plagioclase associated with the mylonitization has a strong LPO. The boundaries of amphibole grains also show recrystallization suggesting that this shear zone was activate at amphibolite grade conditions.

PHOTOMICROGRAPHS:

1309D_10R_1_127_129_1
1309D_10R_1_127_129_2
1309D_10R_1_127_129_3
1309D_10R_1_127_129_4
1309D_10R_1_127_129_5
1309D_10R_1_127_129_6
1309D_10R_1_127_129_7

THIN SECTION:	U1309D-11R-2, 32-35 cm	**Piece No.** 2	**Unit**: 34	**TS#:** 112	**OBSERVER:** BRF, JM
ROCK NAME:	Troctolitic gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Equigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	50	70		7	3		Anhedral	Magmatic lamination
Olivine	0	20		6	3		Anhedral	Completely altered
Clinopyroxene	2	10		5	3		Anhedral	Deformed and altered

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite/cummingtonite	18						Olivine	
chlorite	10						Plagioclase	
Secondary Plagioclase	10							Alteration along and in major fracture zone cutting the middle of the section
Clay	10							In major fracture cutting the middle of the rock and also in middle of pseudomorphs after olivine

TOTAL ALTERATION: 48%

STRUCTURE : Shape preferred orientation of plagioclase defines magmatic layering. The magmatic flow type/intensity is 1b. Very weak crystal plastic texture (minor recrystallization of plagioclase). Vein cutting the section is probably an alteration (as opposed to magmatic) feature given the mineral assemblage (i.e. little hornblende) and a distribution of fractures and greenschist alteration that increases towards the vein. However, some aspects of the vein might be attributed to a high temperature origin.

PHOTOMICROGRAPHS:

1309D_11R_2_32_35_1

1309D_11R_2_32_35_2

THIN SECTION:	U1309D-12R-1, 65-67 cm	**Piece No.** 6	**Unit**: 34	**TS#: 113**	**OBSERVER: ABR, JM**
ROCK NAME:	Troctolitic gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Equigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	40	65		6	3		Anhedral	Bending of twin lamellae, rounded shape and small neoblast due to deformation
Olivine	0	20		4	3		Anhedral	Almost completely altered
Clinoyroxene	0	15		5	3		Anhedral	Almost completely altered

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Tremolite	30		10	300	150		Olivine	
Actinolite	"			200	60		Pyroxene	Total amphibole = 30%
Chlorite	15		<5	150	30		Plagioclase	
Secondary plagioclase	15		30	120	60		Plagioclase	

TOTAL ALTERATION: 60%

STRUCTURE : Mildly deformed troctolitic gabbro with a crystal plastic intensity of 2 (deformation twins and recrystallization og plagioclase). Pervasive static alteration to secondary mineralogy. Actinolite filled fractures cut the section.

PHOTOMICROGRAPHS:

1309D_12R_1_65_67_1
1309D_12R_1_65_67_2
1309D_12R_1_65_67_3
1309D_12R_1_65_67_4
1309D_12R_1_65_67_5
1309D_12R_1_65_67_6

THIN SECTION:	U1309D 12R3 50-53 cm	**Piece No.** 5	**Unit**: 34	**TS#:** 114	**OBSERVER: MD, JM**
ROCK NAME:	Altered gabbro with vein				
GRAIN SIZE:	Medium for gabbro				
TEXTURE:	Equigranular for gabbro				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Gabbro								
Plagioclase	60	70		4	2		Anhedral-subhedral	Altered and slightly deformed
Clinopyroxene	5	30		5	2		Anhedral	Completely altered
Vein								
Plagioclase	70	75		4	2		Anhedral	Strong zoning and replacement by sodic? plagioclase
Greenish-brown amphibole	5	5		4	2		Anhedral-subhedral	Deformation observed in the long-prismatic amphibole in central part
Clinopyroxene?		20		2	1.5		Anhedral	Almost completed altered to dark material?
Zircon	Trace	Trace		0.3			Euhedral	Contained within altered clinopyroxene(?) and also within plagioclase grains

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite/tremolite	30						Pyroxene	
Brown hornblende	"			1700				Total amphibole = 30%
Secondary plagioclase	3							High-temperature recrystallization
Chlorite	3							

TOTAL ALTERATION: 33%

STRUCTURE : Lower one-third is medium-grained altered gabbro. In this part, no olivine pseudomorphs can be observed, although dominant lithology of Unit 34 is troctolite. Top of this thin section may be pseudomorph of olivine in troctolite. Central, one-third is occupied by amphibole-plagioclase vein with many grains of zircon. Plagioclase in this vein is characterized by rather strong optical zonation. Within the vein, there are network-like occurrences of dark altered material (altered clinopyroxene from the host gabbro?). Zircon grains exist within this dark colored material as well as in zoned plagioclase grains. Inclusions of zircon in plagioclase, zoned plagioclase, and high temperature brown amphibole suggest that this vein is likely magmatic?

PHOTOMICROGRAPHS:

1309D_12R_3_50_53_1
1309D_12R_3_50_53_2
1309D_12R_3_50_53_3

THIN SECTION:	U1309D-13R-1, 68-70 cm	**Piece No.** 4	**Unit**: 35	**TS#:** 115	**OBSERVER:** MD, JM
ROCK NAME:	Mylonitic Gabbronorite				
GRAIN SIZE:	Original grain size: medium?				
TEXTURE:	Original texture: equigranular?				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	65	70		9			Unknown	Unknown to original morphology and grain size due to deformation
Clinopyroxene	10	20		6	3		Anhedral	Altered to amphiboles
Orthopyroxene	5	10		6	3		Anhedral-subhedral	Altered to talc. Very weak development of clinopyroxene exsolutiuon paralle to (100)

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite/tremolite	20						Pyroxene	Also in veins
Secondary plagioclase	30				100		Plagioclase	High temperature dynamic recrystallization
Talc	5				5		Olivine	Olivine relicts altered to talc
Chlorite	1				10		Plagioclase	Rims around fresh plagioclase
Magnetite	<1				15		Olivine	Dispersed in talc coronas
Secondary pyroxene	5				60		Pyroxene	

TOTAL ALTERATION: ~60% photo: 1309d_13r_1_68_70_1.tif, 1309d_13r_1_68_70_4.tif

STRUCTURE : Magmatic foliation (1b) preserved by the shape preferred orientation of plagioclase and clinopyroxene. A crystal plastic intensity of 2.5 overprints the magmatic fabric, including recrystallization of plagioclase and pyroxene. Plagioclase also shows well preserved subgrains. Late veins cut the fabric in variable orientations and are filled with actinolite/tremolite.

PHOTOMICROGRAPHS:

1309D_13R_1_68_70_1
1309D_13R_1_68_70_2
1309D_13R_1_68_70_4
1309D_13R_1_68_70_5

THIN SECTION:	U1309D-13R-2, 93-96 cm	**Piece No.** 7B	**Unit**: 35	**TS#:** 116	**OBSERVER: MD, ESA**
ROCK NAME:	Olivine-bearing gabbro				
GRAIN SIZE:	Coarse-grained				
TEXTURE:	Generally seriate with poikilitic coarse-grained crystals				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	~60	63	0.2	10	4		Anhedal	Occurs in variable sizes from medium to coarse-grained, but dominantly coarse-grained. Shows bent cleavage and undulatory exticntion. Coarse-grained crystals have pyroxene inclusions (1-2 mm size of inclusions).
Clinopyroxene		35	0.4	15	3.2		Anhedral to subhedral	Dominantly coarse-grained. Medium-grain sizes usually occur as inclusions. Coarse-grained crystals have olivine, plagioclase and pyroxene inclusions (~1.5 to 4 mm size). Moderately altered to amphibole.
Olivine	0	2	?	2	1.7		Anhedral	Completely replaced by chlorite and actinolite.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite	35						Pyroxene, olivine	
Chlorite	20						Olivine	Form patches with actinolite after olivine and rims around plagioclase
Secondary plagioclase	15							High temperature dynamic recrystallization
Talc	Traces						Olivine	
Recrystallized pyroxene	15							High temperature dynamic recrystallization

TOTAL ALTERATION:85%

STRUCTURE : Large pyroxene grains including recrystallized augite. The crystal plastic intensity is 3. Intergrowths of augite and plagioclase are reminiscent of symplectites/myrmekites. Semibrittle deformation overprints the high temperature features. Possible recrystallization of turbid plagioclase and amphibole. Low-temperature amphibole overprints other textures statically. Large pyroxene grains contain olivine (now chlorite) chadocrysts.

PHOTOMICROGRAPHS:

1309D_13R_2_93_96_1

1309D_13R_2_93_96_2

THIN SECTION:	U1309D-14R-1, 25-27 cm	**Piece No.** 4		**Unit**: 41	**TS#:** 117		**OBSERVER:ESA, BRF**	
ROCK NAME:	Olivine-bearing gabbro							
GRAIN SIZE:	Coarse-grained and medium grained							
TEXTURE:	Equigranular (Note: The contact between coarse and medium-grained gabbro is not sharp.)							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**			**Composition**	**MORPHOLOGY**	**COMMENTS**
			min.	**max.**	**av.**			
Coarse-grained Gabbro								
Plagioclase	60	70		7.3			Subhedral to anhedral	Some crystals have bent cleavage, altered along fractures and completely cloudy surface. Smaller broken fragments and recrystallized grains occur betweeen coarser-grained crystals
Pyroxene	0	25		7.3			Anhedral	Replaced by amphibole. Occurs intertitial to the plagioclase grains.
Olivine	0	5						
Troctolite ?	Rock has clusters of amphiboles reminiscent of olivine pseudomorphs but lacks chlorite. It may have altered to the abundant clay that is concentrated in the clusters.							
Plagioclase	0	70	?	?	1.75		Anhedral	Nearly all grains are altered. None to very weak traces of twinning is visible and all have cloudy appearance. There is a narrow band of plagioclase along the boundary between the coarse and medium-grained gabbro.
Pyroxene	0	5	?	?	?		Anhedral	Completely altered to amphibole
Olivine	0	25	0.3	?	?		Anhedral	Completely altered to chlorite

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron)**				**REPLACING / FILLING**	**COMMENTS**
			min.	**max.**	**av.**			
Coarse grained gabbro								
Chlorite	5						Plagioclase	
Actinolite	30						Olivine and pyroxene	
Clay	5						Actinolite	
Troctolite?								
Plagioclase	60							Plagioclase is riddled with inclusions and cut by low-relief mineral that probably is albite. Probably little of the original plagioclase remains.
Actinolite	35							
Clay	5							
Epidote							Plagioclase	A few grains of epidote
TOTAL ALTERATION: Gabbro = 40%, Troctolite = 100%								

STRUCTURE : Weak crystal plastic texture crosscut by a dioritic intrusion. Low-temperature deformation (microcracking, semibrittle-to-brittle deformation) overprints the diorite and crystal plastic textures. Albitization and actinolite coexist with semibrittle textures; the trace of one actinolite vein turns into a breccia zone within the gabbro.

PHOTOMICROGRAPHS:

1309D_14R_1_25_27_1

1309D_14R_1_25_27_2

THIN SECTION:	U1309D-14R-1, 64-67 cm	**Piece No.** 11	**Unit**: 41	**TS#:** 118	**OBSERVER:** GH, AM, JM
ROCK NAME:	Troctolite / gabbro (alternation or domains)				
GRAIN SIZE:	Medium				
TEXTURE:	Equigranular for troctolite, poikilitic for gabbro				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Troctolite								
Plagioclase	70	70		4	3		Anhedral-subhedral	Twin lamellae bending, altered to chlorite
Olivine	0	30		4	2		Anhedral	Completely altered to chlorite and amphibole
Clinopyroxene	trace	trace			2		Anhedral	Altetred to amphibole
Gabbro								
Plagioclase	55	55		4	3		Anhedral-subhedral	Twin lamellae bending
Clinopyroxene	25	45	1	12	2.5		Anhedral, poikilitic	Chadacryst: plagioclase and possibly olivine
Olivine	0	trace					Anhedral?	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite/tremolite/ cummingtonite	25						Olivine	Corona textures
Chlorite	15						Plagioclase	Rimming grains and in radial veins around coronas
Secondary plagioclase	<5						Plagioclase	Some high-temperature recrystallization and a few albite veins and alteration

TOTAL ALTERATION: 40%

STRUCTURE : Thin section intensity 2 overprinting 1A. Pervasive grain-scale cracks associated with alteration. Kink bands in pyroxenes. Static alteration. Radial chlorite/actinolite filled cracks around coronas and possible deformation in plagioclase and pyroxene (kinks, twins) related to volume increase.

PHOTOMICROGRAPHS:

1309D_14R_1_64_67_1
1309D_14R_1_64_67_2
1309D_14R_1_64_67_3
1309D_14R_1_64_67_4
1309D_14R_1_64_67_5
1309D_14R_1_64_67_6
1309D_14R_1_64_67_7
1309D_14R_1_64_67_8
1309D_14R_1_64_67_9
1309D_14R_1_64_67_10
1309D_14R_1_64_67_11
1309D_14R_1_64_67_12
1309D_14R_1_64_67_13

THIN SECTION:	U1309D-14R-1, 92-95 cm	**Piece No.** 15	**Unit**: 41	**TS#:** 119	**OBSERVER: ESA,MD**
ROCK NAME:	Troctolite				
GRAIN SIZE:	Coarse-grained				
TEXTURE:	E' uigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	20	71		13	5		Subhedral to anhedral	Rimmed by fibrous chlorite (0.2 mm thick) and has resorbed boundaries. Contains 0.7 to 1 mm olivine inclusions. Most of the grains show bent cleavage.
Olivine	0	25		2.1	1.2		Anhedral	Altered to actinolite and chlorite.
Pyroxene	3	~4(?)	0.3	2				Medium-grained pyroxene in the top of the slide may be part of the olivine-gabbro near where the thin-section was taken. The lower 3/4 of the slide is characterized by smaller pyroxenes that are interstitial to coarse-grained plagioclase. They are altered to amphibole, usually with oriented cleavage.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite/tremolite	40						Pyroxene, olivine	
Chlorite	30						Plagioclase, olivine	Rims around plagioclase with actinolite and forms patches after olivine. In plagioclase fractures.
Secondary plagioclase	5							

TOTAL ALTERATION: 75%

STRUCTURE : Crystal plastic fabric of 1a (very weak) overprinted by a brittle fabric associated with greenschist grade alteration. Corona textures on plagioclase and olivines, with radial fractures around relict olivine (now chlorite).

PHOTOMICROGRAPHS:
1309D_14R_1_92_95_1
1309D_14R_1_92_95_2

THIN SECTION:	U1309D-14R-2, 120-123 cm	**Piece No.** 12		**Unit**: 42	**TS#: 120**		**OBSERVER: ABR, ABC**	
ROCK NAME:	Oxide-Basalt							
GRAIN SIZE:	Fine-Grained							
TEXTURE:	Intersertal, plagioclase-phyric, aphanitic							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Matrix	0	80						The matrix is assumed to consist of roughly equal amounts of plagioclase and pyroxene.
Phenocrysts	< 1	< 1	1	1.5			Subhedral, Elongate	
Amygdules	< 1	< 1		0.4	0.3			Filled with clay.
Microphenocrysts								
Plagioclase	10	10	0.04	0.5	0.3		Subhedral, Elongate	Alignment and variation in size and abundance of laths portrays initial injection, emplacement, and flow directions
Olivine / Clinopyroxene ?	0	1		0.3			Anhehedral, Rounded	Completely altered to amphibole.
Opaques	10	10	0.01	0.1	0.03		Equant	Equally distributed in matrix. Total opaque phases = 10% Ilmenite > Pyrrhotite

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Actinolite/tremolite	50				15		Pyroxene, ?olivine	
Chlorite	30				10		Plagioclase	
Clay	Trace				<5		Amphibole, ?olivine	Amygdule fillings
Titanite	Trace				600		In vein	

TOTAL ALTERATION: 80%

STRUCTURE : Basalt with plagioclase phenocryst alignment dipping toward 90 degrees. Another fine-grained unit has a different internal magmatic fabric. Plagioclase fabric is parallel to a coarse-grained diabase vein that preserved relict chilled margins. Schlieren of coarse grained diabase are found within the basalt. Cut by a vein bearring titanite in tremolite. Another (probably lower temperature) vein also cuts the basalt.

PHOTOMICROGRAPHS:

1309D_14R_2_120_123_1

1309D_14R_2_120_123_2

THIN SECTION:	U1309D-15R-2, 122-125 cm	**Piece No.** 1	**Unit**: 44	**TS#: 121**	**OBSERVER: ABR, ABC**
ROCK NAME:	Diabase				
GRAIN SIZE:	Medium-grained				
TEXTURE:	Subophitic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	45	45	0.2	3.5	2.3		Anhedral to subhedral	Realtively unaltered, but many grains are strained, sweeping extinction. Some grains have ocillatory zoning or faults.
Pyroxene	20	50		2.8	2.1		Anhedral	Fresh grains present. But most altered to amphibole.
Olivine	0	< 1	?	1.5	1		Anhedral	Altered to chlorite and actinolite.
Magnetite + Ilmentite	2	2	0.1	1.8	1		Anhedral to subhedral	Some crystals shows skeletal morphology.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite	30				120		Pyroxene	

TOTAL ALTERATION: 30%

STRUCTURE : Coarse grained diabase with no magmatic fabric. Crosscut by a few actinolite-albite veins. No obvious alignment of oxides.

PHOTOMICROGRAPHS:

1309D_15R_2_122_125_1

1309D_15R_2_122_125_2

THIN SECTION:	U1309D-16R-2, 58-61 cm	**Piece No.** 4	**Unit**: 44	**TS#:** 122	**OBSERVER:** BRF, ABC
ROCK NAME:	Diabase				
GRAIN SIZE:	Medium grained				
TEXTURE:	Subophitic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	48	50	0.2	4	1.3		Subhedral, tabulate	Partially altered, fractured, strained.
Augite	5	45	0.1		0.4		Anhedral	Almost completely altered, maximum length can not be determined.
Ti-magnetite	*	4	0.1	0.7	0.2		Equant, Tabulate up to 1mm in length	Exsolution to Ilmenite
Ilmenite	*	0					As oxyexsolution from Ti-mag and as isolated platelets.	
Pyrrhotite	5	1		0.3	0.13		Anhedral	* = total opques phases = 5%
Apatite	Trace	Trace					Euhedral, elongate	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite	30						After pyroxene	
Chlorite	7							

TOTAL ALTERATION: 37%

STRUCTURE : Coarse grained diabase with no magmatic fabric.

PHOTOMICROGRAPHS:

1309D_16R_2_58_61_1

1309D_16R_2_58_61_2

THIN SECTION:	U1309D-16R-4, 113-115 cm	**Piece No.** 8	**Unit**: 44	**TS#: 123**	**OBSERVER: MD, ABC**
ROCK NAME:	Diabase				
GRAIN SIZE:	Fine				
TEXTURE:	Intergranular to subophitic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	40	45	0.05	0.6	0.3		Anhedral, Tabular	Partially altered, grains show sweeping extinction.
Clinopyroxene	Trace	45			0.2		Anhedral	Due to intense alteration, original size and morphology is estimated.
Olivine	0	1	2				Anhedral	Very large (minimal size shown, cut off by section) phenocryst, completely altered to amphibole and chlorite.
ilmenite/Ti magnetite	7	7	0.08	0.3	0.2		Subhedral, Equant or Elongate	Primary Ti-Magnetite and Ilmenite
Phenocrysts	1	1	1	5	2		Subhedral, Equant or Elongate	Plagioclase (with olivine inclusion) and clinopyroxene glomerocrysts. Crystals are partially altered and show no evidence of variation in composition, oscillatory zoning, or other out of equilibrium with melt features.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite/Tremolite	43		100	500	250		Pyroxene	Hornblende cores to some amphiboles
Chlorite	5		50	150	100		Plagioclase	In plagioclase megacryst fractures
Calcite	Trace							
Titanite	2							

TOTAL ALTERATION: 50%

STRUCTURE : Xenocrysts of gabbro in diabase. There is not a strong magmatic fabric in the diabase. We do not observe evidence for large strain in the plagioclase.

PHOTOMICROGRAPHS:

1309D_16R_4_113_116_1
1309D_16R_4_113_116_2
1309D_16R_4_113_116_3
1309D_16R_4_113_116_4

THIN SECTION:	U1309D-16R-4, 136-139 cm	**Piece No.** 12	**Unit**: 45	**TS#:** 124	**OBSERVER:** ABC,MD
ROCK NAME:	Basalt				
GRAIN SIZE:	Fine-grained				
TEXTURE:	Intersertal, apbanitic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Matrix	0	85						Completely altered matrix, but mostly glass. Shows only one melt, but with a second injection, along brecciated, wavy contact, emplaced as the initial injection was imediately quenched.
Plagioclase microlites	3	3	0.03	0.5			Euhedral	Show features associated with quenching. Flow aligned in secondary injection around the contact of the initial injection.
Plagioclase phenocrysts	<< 1	<< 1		1.3			Subhedral	Faulted by vein.
Clinopyroxene	<< 1	<< 1					Anhedral	Almost completely altered. Also occurs as a glomerocryst or xenolith consisting of euhedral laths 0.10 mm long.
Olivine?	1	1			0.15		Anhedral, few euhedral relics remain	Completely altered.
Vesicles	2	2					Round or imbricated	Volatiles exsolved as melt was emplaced and cooled.
Magnetite	10	10					Equant	Dispersed equally in matrix, outline vesicles.
Sulfide	<< 1	<< 1		0.03				
Melt Inclusions	1	1		0.08			Pseudo-crystalline	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite/tremolite	78						Pyroxene	Matrix alteration
Chlorite	2						Plagioclase, olivine	
								Almost completely altered. Also occurs as a glomerocryst or xenolith consisting of euhdral laths 0.10 mm in size.

TOTAL ALTERATION: 80%

STRUCTURE : Basalt with plagioclase (microlites) alignment near chilled margin. Actinolite and brittle deformation is concentrated at intrusive contact, but is post-magmatic. Fresh parts of the clinopyroxene, and grain shape is parallel to the plagioclase fabric.

PHOTOMICROGRAPHS:

1309D_16R_4_136_139_1

1309D_16R_4_136_139_2

THIN SECTION:	U1309D-16R-5, 1-4 cm	**Piece No.** 1		**Unit**: 46		**TS#:** 125		**OBSERVER:** ABC	
ROCK NAME:	Brecciated Diabase								
GRAIN SIZE:	Fine								
TEXTURE:	Microcrystalline, Plagioclase Phyric								

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	30	40	0.01	1.2	0.3		Anhedral, elongate	Laths are fractured, rotated. Many grains are highly altered.
Clinopyroxene	0	55			0.3		Anherdal	Completely altered, minimum and maximum sizes can not be
Plagioclase phenocrysts	<< 1	<< 1		3.6				
Opaques	1 - 2	1 - 2		0.12	0.04			Magnetite > Ilmenite
Apatite	Trace	Trace		0.05			Euhedral	

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Hornblende	50						Pyroxene and plagioclase	Hornblende grows in breccia zones
Actinolite	7							Local zones with actinolite rimming hornblende
Clay	2							Minor clay-filled fractures cut high-grade breccia zones
Chlorite	1							Minor, in some clay-rich fractures

TOTAL ALTERATION: 60%

STRUCTURE : Brecciated diabase; plagioclase exhibits the brecciation as angular fragments in the finer grained matrix. No gabbro, one single plagioclase xenocryst. Brittle fractures and some brecciation postdate others - i.e. more than one phase of brittle deformation.

PHOTOMICROGRAPHS:

1309D_16R_5_1_4_1
1309D_16R_5_1_4_2
1309D_16R_5_1_4_3

THIN SECTION:	U1309D-16R-5, 18-21 cm	**Piece No.** 2	**Unit**: 47	**TS#:** 126	**OBSERVER:** MA, JM
ROCK NAME:	Gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Equigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	60	60		12	7		Anhedral	Deformed and recrystallized
Clinopyroxene	30	40		10	6		Anhedral	Deformed and altered

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite	28						Pyroxene	Also in veins cutting the whole section.
Secondary plagioclase	5						Plagioclase	
Recrystallized pyroxene	2						Pyroxene	High temperature dynamic recrystallization

TOTAL ALTERATION: 35%

STRUCTURE : Igneous texture preserves with some high-temperature recrystallization of plagioclase and pyroxene (intensity <2). Overprinted by greenschist brecciation (pervasive actinolite veins and microcracks). Semibrittle deformation textures with annealed fracture.

PHOTOMICROGRAPHS:

1309D_16R_5_18_21_1

1309D_16R_5_18_21_2

THIN SECTION:	U1309D-16R-5, 48-50 cm	**Piece No.** 4	**Unit**: 47	**TS#:** 127	**OBSERVER:** AM, GH, JM
ROCK NAME:	Gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Equigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	65	65		13	?		Unknown due to deformation and recrystallization	Deformed and recrystallized
Clinopyroxene	10	35		8	6		Anhedral	Deformed and altered

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Green-brown amphibole	5			200	50		Clinopyroxene	
Secondary pyroxene	10			150	50		Clinopyroxene	In tails around porphyroclasts
Secondary plagioclase	15				100			Mainly high temperature, some low temperature with actinolite
Green amphibole (actinolite)	10							

TOTAL ALTERATION: 40

STRUCTURE : Gradient in intensity of crystal plastic texture from 2 to 4. Preserves recrystallized pyroxene. Possibly the thin section is cut oblique to the fabric (note: many fabrics in hand specimen are lineation). Perspective provides confusing flow textures. Veins cut the fabric and contain chlorite and actinolite (?) and there is a separate set of hornblende veins. Hornblende veins are cut by actinolite veins. Recrystallized augite is not exsolved (i.e. deformation below exsolution to orthopyroxene).

PHOTOMICROGRAPHS:

1309D_16R_5_48_50_1
1309D_16R_5_48_50_2
1309D_16R_5_48_50_3
1309D_16R_5_48_50_4
1309D_16R_5_48_50_5
1309D_16R_5_48_50_6

THIN SECTION:	U1309D-17R-1, 57-60 cm	**Piece No.** 5B	**Unit**: 49	**TS#:** 128	**OBSERVER:** JM
ROCK NAME:	Anorthositic troctolitic gabbro				
GRAIN SIZE:	Medium to coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	80	80		10	4		Anhedral	Bending twin lamellae
Olivine	0	10		4	2		Anhedral	Completely altered to chlorite and amphibole
Clinopyroxene	3	5		3	2		Anhedral	Altered to amphibole

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite	3						Olivine/pyroxene	Commonly forms on the outer rim of a amphibole cluster
Tremolite/Cummingtonite	12						Olivine	
Chlorite	2						Plagioclase	

TOTAL ALTERATION: 17%

STRUCTURE : Magmatic fabric (1a) overprinted by a crystal plastic fabric (intensity of 2) overprinted by a greenschist brittle deformation associated with olivine alteration (i.e. a corona texture) .

PHOTOMICROGRAPHS:

1309D_17R_1_57_60_1

1309D_17R_1_57_60_2

THIN SECTION:	U1309D-17R-2, 59-61 cm	**Piece No.** 4	**Unit**: 49	**TS#:** 129	**OBSERVER:** JM, BRF
ROCK NAME:	Olivine-bearing gabbro wih vein				
GRAIN SIZE:	Coarse to medium				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	50	65		7	3		Anhedral	Deformed and recrystallized, altered near veins
Clinopyroxene	15	30		8	3		Anhedral	Altered to amphibole
Olivine	0	5		3	2		Anhedral	Completely altered
Zircon				0.1				In altered plagioclase grain near vein

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Hornblende	5			2mm			Replacing clionpyroxene	Hornblende grown in well-formed crystals, may have grown from late-magmatic fluids
Actinolite	25						Pseudomorphic pyroxene, and olivine also in veins	
Chlorite	5							

TOTAL ALTERATION: 40%

STRUCTURE : Pyroxenes involved in alteration and brown (high-temperature) hornblende veins. The vein central to the section part of the class of magmatic veins defined elsewhere, although it has a more hydrothermal/alteration quality. Magmatic fabric (1a) overprinted by a crystal plastic fabric (2).

PHOTOMICROGRAPHS:

1309D_17R_2_59_61_1

1309D_17R_2_59_61_2

THIN SECTION:	U1309D-20R-1, 73-76 cm	**Piece No.** 8	**Unit**: 52	**TS#: 130**	**OBSERVER: MD, ABC**
ROCK NAME:	Diabase				
GRAIN SIZE:	Fine				
TEXTURE:	Subohitic				

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Plagioclse	40	40	0.1	1.6	0.6		Subhedral to Euhedral	Relatively fresh, some with sweeping extinction.
Clinopyroxene	1	50	0.2	0.8	0.5		Anhedral	Almost completely replaced by amphibole.
Olivine	0	8	0.4	2.3	0.9		Anhedral	Completely replaced by amphibole and chlorite.
Ti-magnetite	*	*					Equant	Skeletons of oxyexsolved ilmenite are all that remain
Chromite	Trace	Trace					Cluster of grains in actinolite pseudomorph after olivine	
Ilmenite	1	1					Primary laths	Total oxides = 1%

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Actinolite/tremolite	40		50	500	150		Pyroxene	
Chlorite	Trace						Plagioclase	

TOTAL ALTERATION: 40%

STRUCTURE : Diabase showing pervasive low temperature alteration. No crystal plastic or magmatic fabrics observed.

PHOTOMICROGRAPHS:
1309D_20R_1_73_76_1
1309D_20R_1_73_76_2

THIN SECTION:	U1309D 22R-2, 8-10 cm	**Piece No.** 1	**Unit**:	**TS#: 136**	**OBSERVER: ABR, ESA**
ROCK NAME:	Troctolitic Gabbro				
GRAIN SIZE:	Medium-grained				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	60	70	0.1	5.2	1.5 to 2		Subhedral to anhedral	Interlocking grains with seriate texture but dominantly medium grained (1.5-2 mm). Long axis of the crystals have subparallel orientation. They have weak to moderate alteration degree.
Olivine	0	20			1		Anhedral	Completely replaced by actinolite rimmed by chlorite.
Pyroxene	7	10	0.1	5	1.6		Anhedral	Pyroxene occurs in two forms. One is completely replaced by hornbelnde, the other occurs as fresh grains. Both seem to be interstitial. Fresh clinopyroxene has rounded plagiocalse inclusions (0.2 to 0.4 mm). Clinopyroxene also occurs as fine-grained recrystallized interstitial crystals.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite/ tremolite	20				200		Olivine, pyroxene	
Chlorite	15				30		Plagioclase	Forming coronas around former olivine
Clay	<1							

TOTAL ALTERATION:

STRUCTURE : Magmatic fabric is weak (1b) with a shape preferred orientation of plagioclase and olivine. Olivine pseudomorphs are very elongate, some with aspect ratios up to 5:1. No crystal plastic deformation. Brittle fractures and greenschist grade alteration throughout the section.

PHOTOMICROGRAPHS:

1309D_22R_2_8_10_1
1309D_22R_2_8_10_2
1309D_22R_2_8_10_3
1309D_22R_2_8_10_4

THIN SECTION:	U1309D-22R-2, 48-51 cm	**Piece No.** 2	**Unit**: 55	**TS#:** 134	**OBSERVER:** MD, JM
ROCK NAME:	Anorthositic troctolite				
GRAIN SIZE:	Medium				
TEXTURE:	Equigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	75	82		6	3		Anhedral-subhedral	Very weak alignment
Olivine	0	14		3	2		Anhedral	Completely altered to chlorite and amphibole
Clinopyroxene	2	4		4	2.5		Anhedral	Altered to amphibole

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite/tremolite	30						Pyroxene, olivine	
Chlorite	20						Olivine	Reaction between olivine and plagioclase gives actinolite + chlorite
Brown hornblende	2						Pyroxene	Form relict rims around pyroxene
Talc	Trace						Olivine	

TOTAL ALTERATION: 52% photo : 1309d_22r_2_48_51_3.tif

STRUCTURE : Weak magmatic fabric (1b). This fabric appears to be related to compositional layering. No crystal plastic deformation. Brittle deformation at greenschist facies is observed, along with veins of actinolite. The radial fractures extending around olivine grains are not observed in this section.

PHOTOMICROGRAPHS:

1309D_22R_2_48_51_1
1309D_22R_2_48_51_2
1309D_22R_2_48_51_3

THIN SECTION:	U1309D 22R-2, 79-81 cm	**Piece No.** 2	**Unit: 55**	**TS#: 137**	**OBSERVER: ABR, JM**
ROCK NAME:	Troctolite with clinopyroxene-rich band (gabbro)				
GRAIN SIZE:	Medium				
TEXTURE:	Equigranular for troctolite, seriate for clinopyroxene-rich band (gabbro)				

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Troctolite								
Plagioclase	75	75		3	2		Anhedral-subhedral	Very fresh
Olivine	0	20		3	2		Anhedral-subhedral	Completely altered to talc and amphibole
Clinopyroxene	2	5		2	1		Anhedral	Altered to amphibole
Brown amphibole	trace	trace					Anhedral	Rim on clinopyroxene, very pleochroic brown, magmatic?
Clinopyroxene-rich band (gabbro)								
Plagioclase	70	70		5	2		Anhedral-subhedral	Very fresh
Clinopyroxene	25	30		3	2		Anhedral	Altered to amphibole, recrystallization of clear clinopyroxene grains and replacement of clear clinpyroxene along cleavages are observed.
Brown amphibole	Trace	Trace					Anhedral	Rim on clinopyroxene, very pleochroic brown, magmatic?

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Actinolite/ tremolite	20				200		Olivine, pyroxene	
Brown hornblende	Trace				100		Pyroxene	
Chlorite	15				30		Plagioclase	Forming coronas around former olivine
Clay	<1				<5			

TOTAL ALTERATION:

STRUCTURE : Magmatic fabric (1b) defined mostly by compositional banding, but no SPO is observed. No crystal plastic deformation. Greenschist grade, brittle deformation observed with which the alteration of olivine is associated.

THIN SECTION:	U1309D-22R-3, 27-30 cm	**Piece No.** 2	**Unit**: 55	**TS#:** 135	**OBSERVER:** MA, JM
ROCK NAME:	Anorthositic olivine gabbro				
GRAIN SIZE:	Medium to coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	80	85		10	3		Anhedral-subhedral	Very weak magmatic lamination/alignment
Olivine	0	6		4	2		Anhedral	Completely altered
Clinopyroxene	4	9		3	2		Anhedral	Altered to amphibole
Zircon	Trace	Trace		0.2			Subhedral	Left-handed side of the lower part

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Chlorite	10						Plagioclase, Olivine	Chlorite forms as outer margins of pseudomorphs after olivine and as thin veins cutting plagioclase
Tremolite/cummingtonite	20						Olivine, Pyroxene	It forms as mats pseudomorphing olivine , tremolite>cummingtonite
Brown hornblende	2						Pyroxene	They seem to be aligned along the oblique edge of the section.
Clays (?)	3						Pyroxene and tremolite	They form a more or less extended rim around altered pyroxene grains.

TOTAL ALTERATION: 35%

STRUCTURE : Weak magmatic fabric (1b). No crystal plastic deformation. Brown amphibole, zircon, and turbid plagioclase are noted along the left-hand side of the thin section, suggesting the presence of a dioritic vein. Cracks are observed around the altered olivine grains with a preferred orientation, but are not radial. These dip at 60 degrees toward 90 in the core reference frame.

PHOTOMICROGRAPHS:

1309D_22R_3_27_30_1

1309D_22R_3_27_30_2

THIN SECTION:	U1309D-22R-3, 39-42 cm	**Piece No.** 4	**Unit**: 55	**TS#:** 131	**OBSERVER: ESA, BRF**
ROCK NAME:	Troctolitic Gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Equigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	70	70		5.6	1.8-2.8		Anhedral	Relatively fresh
Pyroxene	~15	15		7.5	2		Anhedral	Slightly altered. All grain have exolution lamellae. Many of the grains show bent lamellaes. Some grains seem to show two stages or two kind of exolution.
Olivine	0	15	?	?	2		Anhedral	Completely altered to chlorite and actinolite.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Chlorite	7						Plagioclase	Chlorite forms as outer margins of pseudomorphs after olivine and as minor veins cutting plagioclase
Tremolite/Cummingtonite	8						Olivine, Pyroxene	Colorless amphibole forms as mats pseudomorphig olivine and as very small overgrowths on pyroxene

TOTAL ALTERATION: 15%

STRUCTURE : Magmatic fabric (intensity 1b) with shape (and lattice) preferred orientation of plagioclase. Olivine pseudomorphs are flattened (perhaps more so than the pyroxenes). No evidence for crystal plastic deformation. Overprinted by a coarse grained tremolite (after Secondary Mineralogy report) vein. Alteration of rock is not very high, but seems to be associated with the olivine alteration.

PHOTOMICROGRAPHS:

1309D_22R_3_39_42_1

1309D_22R_3_39_42_2

THIN SECTION:	U1309D 23R-1 84-87 cm	**Piece No.** 15	**Unit**: 57	**TS#: 141**	**OBSERVER: MD, DC, GH**
ROCK NAME:	Troctolite				
GRAIN SIZE:	Medium				
TEXTURE:	Intergranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	60	60			1-2		Anhedral, equigranular	Minor alteration along cracks and cleavage planes. Fresh overall.
Olivine	<5	40			1-2		Anhedral, equigranular	Almost completely altered to patches of randomly oriented actinolite needles surrounded by a corona of chlorite.
Clinopyroxene	<5	1			1		Anhedral, Intergranular to plagioclase	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Chlorite	40						Olivine	The reaction between olivine and plagioclase gives chlorite and actinolite. Chlorite replace olivine and forms a rim around plagioclase. There is chlorite in plagioclase cracks.
Actinolite	10						Olivine	Actinolite forms patches after olivine.
Brown hornblende	1						Pyroxene	Relict around pyroxene.

TOTAL ALTERATION: 50% photo : 1309d_23r_1_84_87_4.tif, 1309d_23r_1_84_87_3.tif

STRUCTURE : TS Intensity 1b, no crystal plastic deformation. Weak alignment of "olivine" and plag rich bands. Limited brittle deformation associated with alteration of olivine.

PHOTOMICROGRAPHS:

1309D_23R_1_84_87_1
1309D_23R_1_84_87_2
1309D_23R_1_84_87_3
1309D_23R_1_84_87_4

THIN SECTION:	U1309D 23R-1 142-145 cm	**Piece No.** 25	**Unit**: 58	**TS#:142**	**OBSERVER: BRF, ESA, GH**
ROCK NAME:	Wehrlite/Plagioclase peridotite				
GRAIN SIZE:	Medium-grained				
TEXTURE:	Equigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Olivine	20	70	0.6	3	1-1.2		Anhedral	Completely altered in the serpentinized section and the vein-infiltrated section, but relatively fresh in the central section.
Clinopyroxene	20	25	0.2	5	1.6		Anhedral	Some pyroxene may have originally been orthopyroxene. Most pyroxene seems to be altered to tremolite. Because the alteration mineral is tremolite instead of talc, primary pyroxene was likely diopside.
Spinel	<1	<1	.0.3	0.4			Subhedral to anhedral	subhedral to anhedral grains concentrated in the lower left portion of the slide. May be altered to magnetite due to serpentinization.
Plagioclase	0	5						

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Upper Vein								
Serpentine	30						Olivine	
Talc	55							
Tremolite	10						In small vein	
Calcite/Aragonite	5						In veins	
Middle Wehrlite								
Serpentine	30							
Tremolite	30						After clinopyroxene	
Upper Plagioclase Peridotite								
Serpentine	80							
Chlorite	20						May be pseudomorph after plagioclase	

TOTAL ALTERATION: Upper zone = 100%, Wehrlite = 60%, Troctolite = 100%

STRUCTURE : Thin section intensty of 1a overprinted by 2. Minor recrystallization of clinopyroxene and plagioclase. Several parallel bands of cracks and veins associated with greenschist alteration.

PHOTOMICROGRAPHS:

1309D_23R_1_142_145_1

1309D_23R_1_142_145_2

THIN SECTION:	U1309D 23R2 21-24 cm	**Piece No.**: 3	**Unit**: 58	**TS#: 148**	**OBSERVER: MA,DC, GH**
ROCK NAME:	Troctolite				
GRAIN SIZE:	Medium				
TEXTURE:	Subhedral granular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Olivine	0-30	50					Anhedral	Patchy alteration from 100 - 30%
Plagioclase	0-40	50	1	4	3		Subhedral, intergranular to olivine.	
Pyroxene	0	0						

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Serpentine	30						Olivine, Pyroxene and in veins	Serpentine form the classical mesh texture after olivine in the lower part of the section.
Chlorite	20						Olivine and in veins	It forms a rim around olivine.
Prehnite	5						Plagioclase	
Magnetite	5						Olivine, Chromite	
Tremolite	10						Olivine	In veins with few chlorite
Carbonate	Traces						Late carbonate veins in the center of serpentine veins	
Hydrogarnet	Traces							Observed in plagioclases altered to prehnite in the upper part of the section.
Unidentified mineral	Traces							Observed in plagioclases altered to prehnite in the upper part of the section.

TOTAL ALTERATION: 70%

STRUCTURE : Magmatic fabric defined by compositional banding. Olivine does not appear to have a strong LPO based on cursory optical analysis. Plagioclase and oikocrystic clinopyroxene are undeformed. Thin section 1a overprinted by brittle deformation associated with greenschist grade alteration. No obvious displacement is observed on fracture network.

PHOTOMICROGRAPHS:

1309D_23R_2_21_24_1
1309D_23R_2_21_24_2
1309D_23R_2_21_24_3

THIN SECTION:	U1309D-23R-2 98-101 cm	**Piece No.** 11	**Unit**: 58	**TS#:143**				**OBSERVER: BRF, GH,DC**	
ROCK NAME:	Wehrlite and Troctolite: Three parts, Upper Wehrlite, Lower troctolite, and between the two is a mixed zone								
GRAIN SIZE:	Medium								
TEXTURE:	Subhedral granular								

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Troctolite								
Plagioclase	26	50	1	2	2		Subhedral, intergranular to olivine	
Olivine	15	50	1	2	2		Anhedral	
Mixed zone								
Plagioclase	20	50	1	2	2			
Olivine	20	50	1	2	2			
Peridotite								
Plagioclase	3	5	<1	3	2		Anhedral, interstitial	
Olivine	55	70	1	3	2		Anhedral	
Clinopyroxene	25	25	1	2	2		Anhedral	
Common phases								
Chromite	1	1					Approximately e' ual density in troctolite and wehrlite	
Sulfide	<1	<1					Approximately e' ual density in troctolite and wehrlite	

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Troctolite								
Serpentine	1%						Thin veins in olivine	
Chlorite	25						Replacing plagioclase	
Tremolite	20						Replacing olivine	
Prehnite	12						Replaces some plagioclase in both troctolite and peridotite	Prehnite
Mixed zone								
Serpentine	20							
Prehnite	14							
Chlorite	20							
Tremolite	10							
Peridotite								
Serpentine	5						Forms minor fractures on olivine	
Chlorite	10						Forms rims between olivine and plagioclase	
Tremolite	1						Locally rims clinopyroxene	
Prehnite	1						Small amounts in plagioclase	
Common Phase								
Magnetite	T						Associated with serpentinite but also makes pseudomorphs after pentlandite with heazlewoodite? or millerite?	In serpentinite as rims on some spinels

TOTAL ALTERATION: Troctolite = 58%, Mixed zone = 64%, Peridotite = 17%

STRUCTURE : Sample exhibits a magmatic fabric defined by a somewhat weak SPO of plagioclase and compositional layering. No evidence for crystal plastic deformation of plagioclase or clinopyroxene. Olivine displays subgrain boundaries. There is no obvious displacement on the network of alteration bands/veins.

PHOTOMICROGRAPHS:

1309D_23R_2_96_101_1
1309D_23R_2_96_101_2
1309D_23R_2_96_101_3
1309D_23R_2_96_101_4

THIN SECTION:	U1309D 24R-1, 104-107 cm	**Piece No.** 14G	**Unit**: 60	**TS#: 144**	**OBSERVER: ABR, GH,DC**
ROCK NAME:	Troctolite (?)				
GRAIN SIZE:	Coarse				
TEXTURE:	Intergranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	35	60	2	>10	10			Too coarse for accurate mode estimates
Olivine		40	20	10	10			Some large grains survived
Clinopyroxene	1	?					Intergranular to plagioclase	Rare, in actinolite alteration

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite/ tremolite	10			350	100		Olivine	
Chlorite	13			100	30		Plagioclase	
Talc	20			300	60		Olivine	
Secondary plagioclase	<1				40		Plagioclase	High temperature alteration, ductile deformation later than olivine alteration
Magnetite	7				50		Olivine	Up to 20% in altered zones

TOTAL ALTERATION: 50%

STRUCTURE : Grain size is too large to adequately assess magmatic fabric, but it looks like there may be a weak SPO of plagioclase and olivine (I.e., 1b). Magmatic fabric is overprinted by thin section intensity 2. Subgrain boundaries observed in plagioclase and olivine. Minor recrystallization of both phases. Not much to go on for the clinopyroxene. No evidence for significant displacement on network of cracks and veins associated with alteration.

PHOTOMICROGRAPHS:

1309D_24R_1_104_107_1

1309D_24R_1_104_107_2

THIN SECTION:	U1309D-24R-2 0-2 cm	**Piece:** 1	**Unit**: 60	**TS#:145**	**OBSERVER: BRF. DC, GH**
ROCK NAME:	(Olivine?) gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Intergranular.				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	30?	40	1	5			Subhedral, prismatic	Some sub-grain recrystallization
Clinopyroxene	30?	60	1	3			Sub- anhedral	Two forms with different degrees of alteration
Olivine	0	?						Typical actinolite-chlorite replacement rare. May be missing from several holes in slide

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Cummingtonite	*						After olivine	* Total amphibole = 45
Tremolite	4						After olivine and augite	
Chlorite	1						After plagioclase	`

TOTAL ALTERATION: 5% Includes chlorite+amphibole clusters after olivine and two mm-wide veins cutting section

STRUCTURE : Thin section intensity of 1a, overprinted by greenschist grade brittle deformation associated with alteration of pyroxene and olivine. Undulatory extinction and subgrains in plagioclase

PHOTOMICROGRAPHS:

1309D_24R_2_0_2_1

1309D_24R_2_0_2_2

THIN SECTION: U1309D 24R-2 95-98 cm **Piece No.**: 12 **Unit**: 60 **TS#: 146** **OBSERVER: BRF, GH, AM,DC**
ROCK NAME: Gabbro cut by a breccia zone
GRAIN SIZE: Coarse
TEXTURE:

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	60	60	2	10			Prismatic	Extensive sub-grain recrystallization. Too coarse for accurate mode.
Clinopyroxene	30	40	2	5			Intergranular	Altered along cleavage and deformed

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Host Rock								
Tremolite/actinolite	15						Rims on clinopyroxene, replacing clinopyroxene	Also in veins
Cummingtonite	*							Total amphibole percentage = 10%
Green-brown amphibole	<5%						Rims on clinopyroxene	Adjacent to breccia zone, suggesting it was originally a dioritic intrusion
Secondary plagioclase	5						Plagioclase	High temperature recrystallization locally, and also albite associated with amphibole and chlorite veins
Chlorite	<5						Plagioclase	In veins
Clay (?)							The pyroxene is dusty and plucked by the polishing. This may have been caused by partial alteration of pyroxene to clay.	With immersion oil the edges of the holes can be seen to be amphibole topotactically replacing pyroxene (AM)
Breccia								
Secondary Plagioclase	50						May contain some zeolites	
Tremolite	10							
Chlorite	10							
holes	30						Holes may be the site site of weathered amphibole (I.e. clay alteration), or more likely chlorite	

TOTAL ALTERATION: 20% in host rock, 100% in breccia

STRUCTURE : Thin section intensity 1a overprinted by 2. Plagioclase shows undulatory extinction, subgrains and minor recrytallization. One nice example of a kinked clinpyroxene grain. Gabbro is cut by breccia zone with rather sharp boundaries; turbid plagioclase is observed both on the edge of the breccia zone and with the breccia zone. There is also evidence for distributed cataclasis associated with greenschist grade alteration (For example, just beneath the 24 on the sample label on the left hand side of the thin section).

PHOTOMICROGRAPHS:
1309D_24R_2_95_98_1
1309D_24R_2_95_98_2

THIN SECTION:	U1309D 25R-1, 24-26 cm	**Piece No.** 2B	**Unit**: 62	**TS#: 149**	**OBSERVER: ABR, GH, JM**
ROCK NAME:	Olivine-bearing gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Equigranular to seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	45	50		8	5		Anhedral	Fracturing, recrystallization and bending of twin lamellae due to deformation
Clinopyroxene	35	47		12	5		Anhedral	Replacement by small clinopyroxene grains, and also small amphibole grains. Deformed and altered to amphibole.
Olivine	0	3		4	3		Anhedral?	Completely altered

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite/tremolite	6			1200	200		Olivine, pyroxene	Actinolite around pyroxene, tremolite in alteration patches after olivine, late veins
Chlorite	7				30		Plagioclase	Around olivine alteration and in plagioclase cracks
Talc	2			300	30		In crosscutting veins	Late stage talc-chlorite-actinolite veins
Secondary plagioclase	10				100			High temperature deformation

TOTAL ALTERATION: 15% within greenschist facies; earlier high temperature event recorded in plagioclase deformation. If large holes were altered olivine/plagioclase total alteration would be nearer 40%

STRUCTURE : Thin section intensity 1a overprinted by 2. Subgrains and minor recrystallization of plagioclase. There is also evidence for semibrittle deformation of plagioclase associated with initial chlorite forming reaction.

PHOTOMICROGRAPHS:
1309D_25R_1_24_26_1
1309D_25R_1_24_26_2

THIN SECTION:	U1309D 25R-3 24-25 cm	**Piece No.** 2	**Unit**: 62	**TS#: 147**	**OBSERVER: MD, GH, JM**
ROCK NAME:	Olivine-bearing gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Equigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	60	65		4	3		Anhedral to subhedral	Although almost fresh, fractured and veined
Clinopyroxene	30	33		8	3		Anhedral and oikocrystic to subhedral	Oikocrystic in some places, replaced by amphibole
Olivine	0	2		3	2		Anhedral to subhedral	Completely altered

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite/tremolite	15						Pyroxene,olivine	Forms rim around pyroxene.
Chlorite	10						Plagioclase, olivine	Forms rim around plagioclase, and in plagioclase cracks. Forms patches with tremolite after olivine.
Talc	5						Olivine,orthopyroxene	Forms rim around orthopyroxene.

TOTAL ALTERATION: 30%

STRUCTURE : Thin section intensity of 1a overprinted by minor brittle deformation associated with greenschist grade alteration. There may be a weak magmatic fabric defined by SPO of plagioclase; hard to tell with relatively large grain size. There is no recrystallization of plagioclase, although some grains exhibit subgrains and deformation twins.

PHOTOMICROGRAPHS:

1309D_25R_3_24_25_1

1309D_25R_3_24_25_2

THIN SECTION:	U1309D- 26R-1 12-15 cm	**Piece No.** 4	**Unit**: 63	**TS#:150**	**OBSERVER: BRF, JM**
ROCK NAME:	Olivine gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate and poikilitic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	50	55		5			Anhedral to subhedral	Recrystallization of small grains along original grain boundaries and bending of twin lamellae due to deformation, reaction between olivine grains
Clinopyroxene	20	20		12			Anhedral, oikocrystic	Oikocryst with subhedral lath-shaped plagioclase grains
Olivine	5	25		10			Anhedral	Although almost completely altered to talc and amphibole, fresh olivine is observed.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Chlorite	5						Plagioclase	
Tremolite/Cummingtonite	12						Olivine	
Talc	8						Olivine	
Serpentine	5						Olivine	The serpentine probably replaces olivine that had survived an earlier, high temperature hydration event.
Sulfide	1						Olivine	Restricted to central parts of corona textures, probably pyrite

TOTAL ALTERATION: 30%

STRUCTURE : Thin section intensity 1a, no magmatic fabric observed at scale of thin section. Plagioclase shows subgrains and very minor recrystallization. Subgrains not obvious in relict olivine. Overprinted by brittle deformation associated with greenschist grade alteration.

PHOTOMICROGRAPHS:

1309D_26R_1_12_15_2
1309D_26R_1_12_15_3
1309D_26R_1_12_15_4

THIN SECTION:	U1309D 26R-2 12-14 cm	**Piece No.** 1	**Unit**: 64	**TS#: 151**	**OBSERVER: MD, MA, JM**			
ROCK NAME:	Olivine gabbro							
GRAIN SIZE:	Coarse							
TEXTURE:	Equigranular							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	40	55		10			Subhedral	Bending of twin lamellae due to deformation
Olivine	0	20		10			Unknown due to alteration	Completely altered
Clinopyroxene	20	25		10			Anhedral, poikilitic	Slightly altered

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Actinolite/tremolite	10						Olivine, pyroxene	It is observed in the external rim of the coronitic alteration texture of olivine together with chlorite and it is also around pyroxene.
Serpentine (?)	5						Olivine	Forms the internal rim of the coronitic alteration texture of olivine with few talc.
Chlorite	10						Olivine	Forms the external rim of the coronitic alteration texture of olivine. Also in cracks with tremolite (volume expansion).
Talc	20						Olivine	Forms the intermediate rim of the coronitic alteration texture of olivine.
Sulfide	5						Olivine	In the internal rims of the coronitic alteration texture of olivine. Probably pyrite
Carbonate	5						Olivine	In the center of the coronitic alteration texture of olivine.
Brown hornblende	T							One grain in the talc rim of the olivine alteration texture.

TOTAL ALTERATION: 55% due to olivine alteration.

STRUCTURE : TS intensity 1a. Only very minor crystal plastic deformation (undulose extinction, deofrmation twins in plagioclase), and well preserved igneous textures. Minor brittle deformation observed as fractures cutting plagioclase and pyroxene filled with acinolite and chlorite.

THIN SECTION:	U1309D 26R2 50-53 cm	**Piece No.**: 1		**Unit**: 64		**TS#: 152**		**OBSERVER: MA, CG, DC**
ROCK NAME:	Gabbro (with shear zone)							
GRAIN SIZE:	Coarse							
TEXTURE:	Subhedral intergranular							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	50	50	2	5	3		Subhedral prisms	Still quite fresh in undeformed region at lower part of slide
Clinopyroxene	<5	50	2	5	5		Subhedral intergranular	Partially to completely altered to actinolite, beginning along cleavage

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Recrystallized plagioclase								High temperature recrystallization
Talc	10						In the oblique central shear vein	
Chlorite	10						Plagioclase and in the oblique central vein	Locally in rims around plagioclase, also locally replacing pyroxene cores
Tremolite/Actinolite	15						Pyroxenes	Also in the thin veins network cutting plagioclases.
Clays?	5						Pyroxenes	Clays may give the brown color in the center of altered pyroxenes?

TOTAL ALTERATION: 40% in the greenschist facies

STRUCTURE : Thin section records a well developed local shear zone with a thin section intensity 3. Plagioclase is strongly recrystallized and in some areas looks to have undergone some annealing recrystallization. Large plagioclase cores near the shear zone have subgrains and deformation twins. Clinopyroxene is brittlely deformed, and in one grain exhibits sharp kink bands. The shear zone is overprinted by brittle fractures filled with actinolite. below the shear zone, the rock is largely undeformed with an igneous texture. Plagioclase exhibits very minor crystal plastic deformation. brittle fractures occur throughout the rock.

PHOTOMICROGRAPHS:

1309D_26R_2_50_53_1

1309D_26R_2_50_53_2

THIN SECTION:	U1309D 26R-2 125-127 cm	**Piece No.** 9	**Unit**: 65	**TS#:153**	**OBSERVER:BRF, JM, GH**
ROCK NAME:	Olivine gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Equigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	60	65		4	3		Subhedral	Bending of twin lamellae due to deformation
Clinopyroxene	20	25		5	3		Anhedral, granular	Slightly altered
Olivine	0	10?		3	1.5		Anhedral? unclear due to alteration	Completely altered, so some grains of orthopyroxene may be treated as olivine.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Chlorite	10						After plagioclase	
Tremolite	8						After olivine, orthopyroxene, clinopyroxene	
Talc	2						Orthopyroxene	Some of the coronas around orthopyroxene look similar to those around olivine.

TOTAL ALTERATION: 20%

STRUCTURE : Thin section intensity of 1b, overprinted by minor brittle deformation associated with greenschist grade alteration. Magmatic fabric defined by SPO of pyroxene, plagioclase and olivine (pseudomorphs)

PHOTOMICROGRAPHS:

1309D_26R_2_125_127_1

1309D_26R_2_125_127_2

THIN SECTION:	U1309D 26R-4 34-36 cm	**Piece No.** 1	**Unit**: 66	**TS#: 154**	**OBSERVER: MD, JM, GH**
ROCK NAME:	Olivine-bearing gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Equigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	52	55		5	3		Anhedral to subhedral	Almost colorless and fresh
Olivine	0	3		3	2		Unknown due to alteration	Compltely altered
Clinopyroxene	30	42		6	4		Anhedral, oikocrystic	Slightly altered, compositional zoning?

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Actinolite/tremolite	15						Pyroxene, olivine	Forms rim around pyroxene.
Chlorite	10						Olivine	Forms patches with tremolite after olivine and rims around these patches.
Talc	1						Olivine	

TOTAL ALTERATION: 26% photo: 1309d_26r_4_34_36_3.tif

STRUCTURE : Thin section intensity of 1a, overprinted by minor brittle deformation associated with greenschist grade alteration. No magmatic fabric observed at scale of thin section. Plagioclase shows some subgrain boundaries.

PHOTOMICROGRAPHS:

1309D_26R_4_34_36_1
1309D_26R_4_34_36_2
1309D_26R_4_34_36_3

THIN SECTION:	U1309D 26R-4 102-104 cm	**Piece No.** 5		**Unit**: 66	**TS#: 155**		**OBSERVER: BRF, GH.DC**	
ROCK NAME:	Gabbro							
GRAIN SIZE:	Coarse							
TEXTURE:	Intergranular							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	60	60	1	>5	5		Subhedral, intergranular	Fresh. Recrystallized (dynamic?) close to vein.
Clinopyroxene	<5	40	1	10	10		Subhedral, intergranular	Mostly preserved as irregular zones in otherwise altered grains

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Host rock								
Chlorite	2						After plagioclase	
Tremolite/actinolite	13						After olivine and pyroxene	
Cummingtonite	*						After pyroxene	* Total amphibole = 13%
Holes							Many pyroxenes are plucked and areas around those holes are dusty. The plucked pyroxenes may have been altered to clay. This alteration does not appear in any calculations.	
Breccia zones								
Secondary Plagioclase	20						May be albite	
Amphibole	30							
Plucked	50						May have originally been amphibole, but may also have been clay	

TOTAL ALTERATION: Host rock = 15%, breccia zones = 100%

STRUCTURE : Thin section intensity 1a overprinted by greenschist grade breccia zone. Zone of turbid plagioclase associated with breccia zone extends approximately 10 mm into the gabbro. It is difficult to determine if the breccia zone has an igneous origin. There are no obvious large high temperature hornblendes as observed in other places.

PHOTOMICROGRAPHS:

1309D_26R_4_102_104_1

1309D_26R_4_102_104_2

THIN SECTION:	U1309D 26R-4, 137-139 cm	**Piece No.** 8	**Unit**: 66	**TS#: 156**	**OBSERVER: ABR, ESA, GH**
ROCK NAME:	Olivine-bearing gabbro				
GRAIN SIZE:	Coarse-grained				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	65	70	0.2	6	2 to 4		Anhedral	Very low degree of alteration. Plagioclase crystals are broken off by crack radiating from relict olivine connecting to adjacent olivines. It also occurs as inclusions in coarse-grained pyroxenes.
Pyroxene	20	30	~0.6	6.4	?		Anhedral	Slightly altered.
Olivine	0	1	?	3	?		Anhedral	Completely replaced by chlorite and actinolite.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite/ tremolite	10			700	100		Pyroxene, olivine	
Chlorite	9				30		Plagioclase	
Talc	1				50		Olivine	
Quartz	15			500	200		Felsic dikelet	Later alteration with chlorite, euhedral void-filling crystals show radial sector extinction

TOTAL ALTERATION: 20% in greenschist facies

STRUCTURE : Thin section 1a overprinted by brittle deformation associated with greenschist alteration. The alteration assemblage is crosscut but quartz-rich vein assemblage. There is some alteration of plagioclase (the plagioclase becomes turbid) associated with the quartz vein.

PHOTOMICROGRAPHS:

1309D_26R_4_137_139_1

1309D_26R_4_137_139_2

THIN SECTION:	U1309D 27R-1-86-88 cm	**Piece No.** 9	**Unit**: 68	**TS#: 157**	**OBSERVER: BRF, GH, DC**
ROCK NAME:	Olivine Gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Intergranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	55	55	1	3	2		Anhedral-subhedral intergranular	
Augite	20	40	1	2	2		Subhedral intergranular	Exsolution lamellae common. Pervasively turbid.
Olivine	0	5			1		Anhedral intergranular	Typical replacement by actinolite surrounded by chlorite. Mode difficult to determine as similar alteration features contain relict clinopyroxene.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Chlorite	10						After olivine	
Tremolite/actinolite	15						After olivine and pyroxene	
Cummingtonite	*						After pyroxene	* Total amphibole = 13%

TOTAL ALTERATION: Host rock = 25%,

STRUCTURE : Thin section intensity of 1b overprinted by modest brittle deformation associated with greenschist grade alteration. The magmatic fabric is defined by SPO of plagioclase and compositional bands.

PHOTOMICROGRAPHS:

1309D_27R_1_86_88_1

1309D_27R_1_86_88_2

THIN SECTION:	U1309D 27R2 48-52 cm	**Piece No.**: 5	**Unit**: 68	**TS#: 158**	**OBSERVER: MA, GH, DC**
ROCK NAME:	Olivine gabbro				
GRAIN SIZE:	Medium - coarse (Increases up-section at vein)				
TEXTURE:	Intergranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Olivine	0	30	1	>3	>3		Anhedral intergranular	Completely altered, original size not determinable.
Plagioclase	57	60	1	3	3•		Subhedral intergranular	Clusters to 10 mm.
Clinopyroxene	5	10	1	10	2,5*		Subhedral intergranular	Exsolution lamellae common. *Two sizes for medium and coarse parts.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Chlorite	20						Plagioclase	It forms coronas around the altered grains.
Tremolite/Actinolite	10						Olivine, and in thin veins	In the center of the altered grains. Actinolite is also observed in the oblique central vein as a later alteration event.
Brown hornblende	2						Clinopyroxene	Especially at the edges of the oblique central vein.
Talc	5						Olivine	In the center of some altered grain together with amphiboles.
Secondary plagioclase	3						In the oblique central vein	
Quartz	3							In the vein at the label end of the slide. Shows typical zoned extinction

TOTAL ALTERATION: 38%

STRUCTURE : Thin section intensity 1a overprinted by relatively pervasive brittle deformation associated with alteration. There are networks of cracks parallel to the brown hornblende/turbid plagioclase veins. In some cases there is secondary plagioclase associated with these parallel cracks. Despite the relatively intense microcracking, there is no evidence for significant shear displacement during the brittle deformation events.

PHOTOMICROGRAPHS:

1309D_27R_2_48_52_1

1309D_27R_2_48_52_2

THIN SECTION: U1309D 27R3 4-7 cm **Piece No.**: 1 **Unit**: 69 **TS#: 159** **OBSERVER: MA, GH, JM**
ROCK NAME: Dunite
GRAIN SIZE: Unknown due to serpentinization
TEXTURE: Unknown due to serpentinization

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Olivine	0	93		?			Unknown due to perfect serpentinization	Completely altered to serpentine
Orthopyroxene	2	4		4			Anhedral	Exsolution of clinopyroxene lamella
Clinopyroxene	1	2		2			Anhedral	Exsolution of orthopyroxene lamella
Plagioclase?	0	1						Local pockets
Spinel	1	1		1			Euhedral, rounded and equant	Dark brown grains surrounded by opaque rim possibly by alteration

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Serpentine	65						Olivine and pyroxene	It forms a mesh texture after olivine
Talc	8						Pyroxene(?)	It tends to form a rim around the pyroxene.
Magnetite	20						Olivine	In the rim of the mesh texture
Carbonate	3						Olivine	Essentially in the core of the mesh texture and possibly in the pyroxene.
Chlorite	2						In veins	May be locally in the core of the mesh texture ?? Local pockets after plagioclase at lower (core reference frame) end of slide
Sulfide	Trace							

TOTAL ALTERATION: 98%

STRUCTURE : Mesh texture serpentinite that shows no evidence for crystal plastic deformation in the relict orthopyroxene or clinopyroxene. There is no evidence of shear displacement on the serpentine vein network.

PHOTOMICROGRAPHS:

1309D_27R_3_4_7_1
1309D_27R_3_4_7_2
1309D_27R_3_4_7_3
1309D_27R_3_4_7_4
1309D_27R_3_4_7_5
1309D_27R_3_4_7_6

THIN SECTION:	U1309D 28R-2 80-83 cm	**Piece No.** 3	**Unit**: 71	**TS#: 160**	**OBSERVER: MD, GH, JM**
ROCK NAME:	Gabbro cut by microgabbro vein				
GRAIN SIZE:	Medium (gabbro), fine (vein)				
TEXTURE:	Seriate (gabbro), equigranular (vein)				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Gabbro								
Plagioclase	69	69		8	3		Anhedral to subhedral	Almost fresh, bending of twin lamellae due to deformation
Clinopyroxene	20	30		3	2		Anhedral	Altered to amphibole
Olivine	0	1		3	2		Anhedral	Completely altered
Zircon	Trace	Trace		<0.1			Euhedral to subhedral	Near the vein
Microgabbro vein								
Plagioclase	45	55			0.1		Anhedral, locally euhedral	Dirty and strong zoning
Clinopyroxene	5	15			0.2		Anhedral	Altered
Green amphibole	30	30			0.5		Anhedral	Replacing clinopyroxene?

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite/tremolite	15						Pyroxene, olivine	Rims around pyroxenes.
Secondary plagioclase	20							High temperature dynamic recrystallization.
Brown/green hornblende	5						Pyroxene	Relicts, especially near fine magmatic intrusion, and replaces pyroxene
Chlorite	5						Olivine	Forms patches with tremolite after olivine.
Pyroxene recrystallization	15							High temperature dynamic recrystallization.

TOTAL ALTERATION: 57% due to high temperature recrystallisation of pyroxene and plagioclase. Plagioclase and pyroxene are relatively fresh in the other part of the thin section.

STRUCTURE : The majority of this section is a gabbro exhibiting a thin section deformation intensity of 1b overprinted by brittle deformation associated with greenschist grade alteration. The magmatic fabric in the gabbro is stongest at the bottom of the section. This assemblage is crosscut by a fine-grained gabbro that exhibits a strong magmatic fabric parallel to the contact. There is an relatively strong crystal plastic shear directly adjacent to the fine-grained intrusion, containing recrytallized plagioclase, pyroxene and amphibole. The zone of crystal plastic deformation is much narrower than suggested by the fine-grained region seen in the whole-thin section photo. The plagioclase both within and adjacent to the fine-grained intrusion is strongly zoned.

PHOTOMICROGRAPHS:

1309D_28R_2_80_83_1

1309D_28R_2_80_83_2

THIN SECTION:	U1309D 28R4 26-29 cm	**Piece No.**: 4	**Unit**: 71	**TS#: 161**	**OBSERVER: MA, GH, JM, AM**
ROCK NAME:	Gabbronorite				
GRAIN SIZE:	Coarse				
TEXTURE:	Equigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	60	65		9	5		Subhedral to anhedral	Almost fresh, fractured and bending of twin lamellae due to deformation
Clinopyroxene	17	25		9	5		Subhedral to anhedral, short prismatic	Replacement/alteration to amphibole
Orthopyroxene	3	10		7	5		Subhedral to anhedral, short prismatic	Very thin exsolution of clinopyroxene, altered to talc

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Talc	7						Orthopyroxene	
Chlorite	5						Orthopyroxene and in thin veins replacing plagioclase	Sometimes it forms a rim at the contact between the altered orthopyroxene and neighboring plagioclases
Tremolite	5						Pyroxenes	
Brown hornblende	3						Pyroxenes	

TOTAL ALTERATION: 20%

STRUCTURE : Thin section intensity of 1b overprinted by brittle deformation associated with greenschist alteration. The magmatic fabric is defined by SPO of plagioclase and pyroxene rich bands. The plagioclase exhibits deformation twins and subgrains.

PHOTOMICROGRAPHS:

1309D_28R_4_26_29_1
1309D_28R_4_26_29_2
1309D_28R_4_26_29_3
1309D_28R_4_26_29_4

THIN SECTION:	U1309D 29R-2, 26-28 cm	**Piece No.** 4	**Unit**: 72	**TS#:** 162			**OBSERVER:**BRF, JM, AM, GH	
ROCK NAME:	Gabbro with contact to "diorite" vein in upper right portion of slide							
GRAIN SIZE:	Coarse for gabbro, fine for "Diorite" dike							
TEXTURE:	Equigranular							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Gabbro								
Plagioclase	50	60		12	5		Anherdral	Bending of twin lamella due to deformation. Many thin "veinlets" of Na-rich plagioclase with diffusive boundaries possibly related to the "Diorite" vein. Also fracturing is observed.
Clinopyroxene	30	40		6	5		Anherdral	Altered to amphibole
Zircon	Trace	Trace						Near the "diorite" vein
Vein								
Plagioclase	0	50		2	1		Anhedral	The rock is too altered to tell the original mineralogy
Unknown mafic silicate(s)	0	50		1			?	Completely altered

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Hornblende	5							Both brown and green hornblende is present
Actinolite	35							
Cummingtonite	*							* = total actinolite + cummingtonite = 35% with actinolite << than cummingtonite
Sphene	T							
Secondary Plagioclase	10							especially adjacent to matted amphibole veins
"Diorite								
Secondary plagioclase	50							
Amphibole	48							Amphibole forms a very fine grained brown mat making it impossible to identify mineralogy
Titanite	2							Tiny, high relief grains may be titanite

TOTAL ALTERATION: Gabbro has 50% alteration, "diorite" is 100% altered.

STRUCTURE : Gabbro has thin section intensity of 1a overprinted by 2, then overprinted by 5 (semibrittle deformation). It is difficult to determine the timing of the dioritic intrusion, but both intrusion and gabbro appear to have experienced the semibrittle deformation as well as subsequent alteration. Matted amphibole veins cutting gabbro are similar to the matrix of the "diorite" intrusion - genetic link, but is it an alteration or magmatic process?? Could the abundant trails of solid inclusions in the plagioclase also be related to the "diorite"?

PHOTOMICROGRAPHS:

1309D_29R_2_26_28_1
1309D_29R_2_26_28_2
1309D_29R_2_26_28_3
1309D_29R_2_26_28_4
1309D_29R_2_26_28_5

THIN SECTION:	U1309D 29R-2, 131-133 cm	**Piece No.** 14	**Unit**: 73	**TS#: 163**	**OBSERVER: ABR, GH, DC**
ROCK NAME:	Mylonitic gabbro				
GRAIN SIZE:					
TEXTURE:					

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	5	50						Completely dynamically recrystalllized. Mode based on overall current amount.
Clinopyroxene	5	50						Mode based on current overall mafic content
Oxides								

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite/tremolite	5						Pyroxene, hornblende	
Talc	15						In veins/ shear bands	
Secondary plagioclase	45						Plagioclase	High temperature recrystallization
Secondary pyroxene	23						Pyroxene	High temperature recrystallization
Brown hornblende	2						Pyroxene	
Ilmenite	1		100	500			Interstitial	Embayed, patchy.
Carbonate	<<1						In veins	

TOTAL ALTERATION: 90% High temperature alteration

STRUCTURE : Mylonitic gabbro with thin section intensity of 4 overprinted by a semibrittle greenschist or possibly amphibolite grade shear zone with intensity 5. Recrystallized plagioclase in the mylonitic gabbro exhibits a strong LPO; there is evidence for both recrystallized pyroxene and crystallization of brown hornblende within the mylonite. The semibrittle deformation is accommodated on anastomosing bands of amphibole within brecciated plagioclase. The amphibole is brownish in regions suggesting brecciation may have initiated at amphibolite grade conditions.

PHOTOMICROGRAPHS:

1309D_29R_2_131_133_1

1309D_29R_2_131_133_2

THIN SECTION:	U1309D-30R-1, 25-28 cm	**Piece No.** 5		**Unit**:73	**TS#: 165**		**OBSERVER: VDH, GH, DC**	
ROCK NAME:	Mylonitic Gabbro							
GRAIN SIZE:								
TEXTURE:								

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	1	40	2					Almost competely recrystallized. Single grain remains.
Clinopyroxene	<5	60	2					Almost completely dynamically recrystallized.

Vermicular growth of spinel could indicate former presence of orthopyroxene as this is a typical texture in mantle rocks (for example Leg 209)

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Plagioclase	40						Original Plagioclase has recrystallized. Only one large grain remains.	
Clinopyroxene	25						Fine grained recrystallized pyroxene may include some Orthopyroxene as well as augite.	
Cummingtonite	*							Total colorless amphibole = 25%
Actinolite	28							
Hornblende	2							
Chlorite	2							
ilmenite	1							Ilmenite >> magnetite. Total oxide content of rock =
magnetite	*							* = Total oxide content of rock = 2%, Central band has up to 5% Fe-Ti oxides, rest of the rock has very few.

TOTAL ALTERATION: Granulite facies=98%, amphibolite facies overprint = 30%

STRUCTURE : Thin section intensity of 4. There is a strong LPO of both dynamically recrystallized plagioclase and augite. Exsolution in the dynamically recrystallized augite indicates granulite deformation. Some of the clinopyroxene is statically replaced by actinolite. Static alteration appears to overprint network of vertical actinolite veins.

PHOTOMICROGRAPHS:

1309D_30R_1_25_28_1

1309D_30R_1_25_28_2

THIN SECTION:	U1309D 30R-1 55-58	Piece No. 9	Unit: 75	TS#: 164	OBSERVER: MD, GH, DC
ROCK NAME:	Olivine gabbro-troctolitic gabbro				
GRAIN SIZE:					
TEXTURE:					

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	20/0*	50/60	5	15	10**		Subhedral intergranular	* Undeformed/deformed part of slide.
Clinpyroxene	5/0*	40/10*	5	15	10**		Subhedral intergranular	** Rough estimates. Too coarse/deformed for accurate mode.
Olivine	0	10/30*			5		Anhedral	Completely altered. More abundant in deformed zone

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Actinolite/tremolite	15						Pyroxene, olivine	Forms pseudomorphis patches with chlorite after olivine.
Secondary plagioclase	40							High temperature dynamic recrystallization.
Recrystallized pyroxene	40/0*							High temperature clinopyroxene --> clinopyroxene+orthopyroxene+hornblende
Chlorite	10						Olivine,plagioclase	Forms rims around plagioclase (reaction with olivine).
Brown hornblende	5						Pyroxene	Relics

TOTAL ALTERATION: 80%

STRUCTURE : Thin section intensity 1b overprinted by 3. Relict magmatic fabric is well defined by SPO of plagioclase. Clinopyroxene is partially recrystallized and there are small amounts of brown hornblende within the recrystallized augite. The assemblage is overprinted by brittle deformation associated with greenschist grade alteration. The coarser-grained region at the top of the section is not as deformed. Coarse-grained gabbro at top of slide grades to deformed and altered troctoloite or troctolitic gabbro downhole. Plagioclase is partially dynamically recrystallized at top to completely recrystallized lower down. In upper part, clinopyroxene has partially recrystallized to large interfingering clear grains with little or no cleavage but abundant prismatic inclusions of original clinpyroxene +/- orthopyroxene +/- brown hornblende. Lower down, climopyroxene is completely recrystallized to actinolite with minor brown and blue=green hornblende.

PHOTOMICROGRAPHS:

1309D_30R_1_55_58_1

1309D_30R_1_55_58_2

THIN SECTION:	U1309D-31R-1, 16-19 cm	**Piece No.** 5	**Unit**: 79	**TS#: 166**	**OBSERVER: VDH, CG, BRF**
ROCK NAME:	Dunite				
GRAIN SIZE:	too altered				
TEXTURE:	too altered				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Olivine	trace	98					Too altered	Fresh olivine has survived as inclusion in the big spinel grain
Spinel	2	2	0.5	8			Equant-interstitial	One huge grain with inclusions (fresh olivine), and many small in all kinds of shapes

Vermicular growth of spinel could indicate former presence of orthopyroxene as this is a typical texture in mantle rocks (for example Leg 209)

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Serpentine	93							
Magnetite	1							
Carbonate	3						Vein and replacement of serpentine	Probably at least two carbonates, magnesite in serpentine and calcite or aragonite in the veins.
Tremolite	1						In veins	

TOTAL ALTERATION: 98%

STRUCTURE : Rock has undergone almost complete alteration leaving almost no relict igneous textures. Spinel is preserved showing relict magmatic texture, but serpentine forms a pervasive mesh texture throughout the rest of the thin section. Small fractures cut the serpentine foliation and contain carbonate and minor tremolite.

PHOTOMICROGRAPHS:

1309D_31R_1_16_19_1
1309D_31R_1_16_19_2
1309D_31R_1_16_19_3
1309D_31R_1_16_19_4
1309D_31R_1_16_19_5

THIN SECTION: U1309D 31R1 114-118 cm **Piece No.**: 19 **Unit**: 79 **TS#:** 167 **OBSERVER:** MA, JM

ROCK NAME: Dunite

GRAIN SIZE: Unknown due to serpentinization

TEXTURE: Unknown due to serpentinization

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Olivine	0	95		8?			Unknown due to alteration	Completely altered
Clinopyroxene (and orthopyroxene?)	trace	5		4			Anhedral	Almost completely altered
Spinel	trace	trace		1			Euhedral to subhedral, equant	Brown grains with or without opaque margain

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Talc	40						Pyroxene, olivine, serpentine	Talc is dominant in the oblique vein and in the upper part of the section, especially in the shear zone
Tremolite	20						Pyroxenes	Also as big grains in shear zone
Serpentine	5						Olivine, pyroxene	
Chlorite	25						Pyroxene, serpentine	
Carbonate	2						In tiny veins and locally after olivine or serpentine.	
Magnetite	5						Olivine, chromite	

TOTAL ALTERATION: 97%

STRUCTURE : Highly altered pyroxene and olivine appear to be fairly undeformed, but are strongly overprinted by replacement textures. Some less altered pyroxenes show no preferred orientation and straight extinction, and spinel is undeformed with serate grain boundaries. Initial alteration appears to have been very static. A 1.5 mm subhorizontal talc shear zone is oserved at the top of the thin section, and indicates sinistral shear. Serpentine filled fracture, 2 mm thick, is observed cutting across the thin section.

PHOTOMICROGRAPHS:

1309D_31R_1_114_118_1
1309D_31R_1_114_118_2
1309D_31R_1_114_118_4
1309D_31R_1_114_118_5
1309D_31R_1_114_118_6
1309D_31R_1_114_118_7
1309D_31R_1_114_118_8

THIN SECTION:	U1309D 31R-2 46-48 cm	**Piece No.** 1C	**Unit**: 79	**TS#:** 184			**OBSERVER:** AM, JM, GH	
ROCK NAME:	Serpentinized plagioclase-bearing harzburgite							
GRAIN SIZE:	Medium							
TEXTURE:	Granular							

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Olivine	30	80		6			Anhedral	Serpentinized
Orthopyroxene	Trace	20		4			Anhedral	Fresh grains show clinopyroxene lamellae. Completely altered clinopyroxene may be included.
Plagioclase	0	Trace		1	1		Anhedral	Completely altered
Chromite	Trace	Trace		1	0.5		Equant	Dark brown equant grains. In some cases surrounded by opaque margin.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Serpentine	30						Olivine, some orthopyroxene	In mesh textures and in veins, commonly with carbonate and oxide
Talc	15						Orthopyroxene, olivine	Pseudomorphs after pyroxene, cross-fiber and oblique fiber veins
Tremolite	5						Olivine, pyroxene	Replaces olivine or serpentine adjacent to chloritized feldspar. Seems to be pseudomorphing some pyroxene (maybe cummingtonite if originally orthopyroxene)
Chlorite	5						Plagioclase	Interstitial areas, sometimes zoned anomalous blue/brown. One vein with tremolite is present
Carbonate	5							Abundant in crosscutting diffuse zones in serpentinized areas as part of ribbon/mesh texture, and in serpentine veins, and rimming chloritized plagioclase. Absent in some parts of the serpentinite
Sulfide	1							As stringers and substituting for oxide in parts of mesh texture. Appears to be two generations of pyrite with possibly some marcasite (JayM)
Oxide	1							In mesh textures and pyroxene pseudomorphs, rims chromite

TOTAL ALTERATION: 62%

STRUCTURE : Olivine exhibits subgrain boundaries and cursory analysis indicates that there is an LPO (based on gypsum plate effect). There is also a strong LPO of serpentine in the vein structure, with two diifferent orientations having different LPO. The serpentine veins are crosscut by talc veins.

PHOTOMICROGRAPHS:

1309D_31R_2_46_48_1
1309D_31R_2_46_48_2
1309D_31R_2_46_48_3
1309D_31R_2_46_48_4
1309D_31R_2_46_48_5

THIN SECTION:	U1309D 31R-2 73-76	**Piece No.** 4	**Unit**: 80	**TS#: 168**	**OBSERVER: BRF, JM, GH**
ROCK NAME:	Breccia (Protolith: gabbro?)				
GRAIN SIZE:	Medium?				
TEXTURE:	?				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	30	?		3			Much of the plagioclase appears [illegible]	Brecciated
Clinopyroxene	1	?		5				Brecciated

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Tremolite/Actinolite	35						Clinopyroxene, orthopyroxene, olivine, and hornblende	
Cummingtonite	*						Pyroxene	* Total amphibole = 60%
Hornblende	*						Clinopyroxene	* Total amphibole = 60%
Chlorite	19							
Plagioclase	5						Some plagioclase is ridden with inclusions and probably altered	
Plucked areas and dark patches	5						Much of the section is plucked or consists of dark stuff that may be clay.	

TOTAL ALTERATION: 69% is most plagioclase fragments are fresh

STRUCTURE : Brecciated gabbro with thin section intensity of 6. Brecciation is associated with greenschist alteration. There are several deformation bands defined by aligned tremolite/actinolite. One of the gabbro clasts exhibits evidence for recrystallization during semi-brittle deformation. The fault rock crosscuts previously altered gabbro.

PHOTOMICROGRAPHS:

1309D_31R_2_73_76_1

1309D_31R_2_73_76_2

THIN SECTION:	U1309D 32R-1 103-106 cm	**Piece No.** 13	**Unit**: 86	**TS#: 169**	**OBSERVER: ABR, JM, GH**
ROCK NAME:	Gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Equigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	65	70		10	6		Anhedral	Fracture and beinding of twin lamellae due to deformation
Clinopyroxene	25	30		14	6		Anhedral, oikocrystic	Replacement of clear secondary clinopyroxene along cleavage of primary clinopyroxne
Brown amphibole	Trace	Trace						Bleb-like tiny crystals replacing clinopyroxene

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite	7						In veins and rims on pyroxene	
Chlorite	3						In veins cutting Plagioclase	

TOTAL ALTERATION: 10%

STRUCTURE : Thin section intensity of 1a overprinted by brittle deformation associated with greenschist grade alteration.

PHOTOMICROGRAPHS:

1309D_32R_1_103_106_1

1309D_32R_1_103_106_2

THIN SECTION:	U1309D 32R-2-30-33 cm	**Piece No.** 2	**Unit**: 82	**TS#: 170**	**OBSERVER: BRF, JM, GH**
ROCK NAME:	Gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Equigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	60	65		4	2			Almost fresh. Bending of twin lamellae due to deformation
Clinopyroxene	30	35		3	2			Altered to amphibole
Orthopyroxene	Trace	Trace		2	1.5			Although the grains which were altered to talc are assumed to be as orthopyroxene because of subtle trace of cleavage, presence of olivine can not be denied.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Chlorite	4						After plagioclase and in veins	
Tremolite/actinolite	5						After olivine and pyroxene	
Talc	1						After pyroxene	

TOTAL ALTERATION: Host rock = 10%,

STRUCTURE : Thin section intensity of 1b overprinted by brittle deformation associated with greenschist grade alteration. Magmatic fabric is defined by compositional banding (pyroxene rich bands).

PHOTOMICROGRAPHS:

1309D_32R_2_30_33_1

1309D_32R_2_30_33_2

THIN SECTION:	U1309D 33R-1 120-123 cm	**Piece No.** 8	**Unit**: 86	**TS#: 171**	**OBSERVER: MD, JM, GH**
ROCK NAME:	Troctolite and olivine gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Equigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Troctolite								
Plagioclase	60	70		4	3		Anhedral to subhedral	Almost fresh, reaction between olivine grains
Olivine	0	30		3	2		Anhedral	Completely altered by reaction with plagioclase
Olivine gabbro								
Plagioclase	55	70		4	3		Anhedral to subhedral	Almost fresh, reaction between olivine grains
Olivine	0	5		3	2		Anhedral	Completely altered by reaction with plagioclase
Clinopyroxene	15	25		5	3		Anhedral	Compositional zoning?

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite/tremolite	25						Olivine, pyroxene	Forms patches with talc and chlorite after olivine.
Chlorite	15						Olivine,plagioclase	Forms rim around olivine completely altered to tremolite+chlorite+talc.
Talc	5						Olivine	

TOTAL ALTERATION: 45% photo: 1309d_33r_1_120_123_1.tif, 1309d_33r_1_120_123_2.tif, 1309d_33r_1_120_123_3.tif, 1309d_33r_1_120_123_4.tif

STRUCTURE : Thin section intensity of 1b overprinted by brittle deformation associated with greenschist grade alteration. The magmatic foliation is defined by SPO of plagioclase and bands rich in pyroxene and olivine. The foliation is parallel to the boundary between troctolite and gabbro.

PHOTOMICROGRAPHS:

1309D_33R_1_120_123_1
1309D_33R_1_120_123_2
1309D_33R_1_120_123_3
1309D_33R_1_120_123_4

THIN SECTION:	U1309D 33R-2 41-43 cm	**Piece No.** 2A	**Unit**: 87	**TS#: 172**	**OBSERVER: MD, JM, GH**
ROCK NAME:	Olivine gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Equigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	55	55		13			Anhedral-subhedral	Almost fresh, but fractured by deformation
Olivine	0	10		12			Anhedral	Completely altered
Clinopyroxene	30	35		13			Anhedral	Replaced by bleb-like tiny amphibole (almost colorless) along cleavages

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite/tremolite	8						Olivine, pyroxene	Forms thin rims around pyroxene. Forms patches with chlorite and talc after olivine.
Chlorite	10						Olivine,plagioclase	Forms rims around patches after olivine.
Talc	8						Olivine	
Carbonate	3						Olivine	Replaces olivine in the center of the patches formed by tremolite+chlorite+talc
Brown hornblende	1						Pyroxene	Relics
Magnetite	5						Olivine	Rims around olivine with serpentine.
Serpentine	1						Olivine	

TOTAL ALTERATION: 36% photo: 1309d_33r_2_41_43_1.tif, 1309d_33r_2_41_43_2.tif

STRUCTURE : Thin section intensity of 1a overprinted by brittle deformation associated with greenschist grade alteration.

PHOTOMICROGRAPHS:

1309D_33R_2_41_43_1
1309D_33R_2_41_43_2
1309D_33R_2_41_43_3
1309D_33R_2_41_43_4
1309D_33R_2_41_43_5
1309D_33R_2_41_43_6

THIN SECTION:	U1309D 33R-3 26-29 cm	**Piece No.** 3	**Unit**: 87	**TS#:173**	**OBSERVER:BRF, JM, GH**
ROCK NAME:	Olivine-bearing gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	E' uigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	45	67		3	2		Anhedral to subhedral	Almost fresh, bending of twin lamellae due to deformation
Clinopyroxene	30	30		2	1.5		Anhedral, e' uant to short-prismatic	Magmatic alignment of long-axis, altered to amphibole
Olivine	0	3		3	2		Anhedral	Completely altered, so some grains of orthopyroxene may be included
Brown amphibole	Trace							Tiny and thin rim around clinopyroxene

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Chlorite	5						After plagioclase	
Actinolite/Tremolite	15						After olivine, augite	
Cummingtonite	*							Total amphibole = 15%
Dark patches	500%						Dark patches in pyroxene and amphibole may be clay	

TOTAL ALTERATION: 25%

STRUCTURE : Thin section intensity of 1b overprinted by brittle deformation associated with greenschist grade alteration. The magmatic foliation is defined by alignment of clinopyroxene grains. There does not appear to be any crystal plastic deformation of the plagioclase.

PHOTOMICROGRAPHS:

1309D_33R_3_26_29_1

1309D_33R_3_26_29_2

THIN SECTION:	U1309D 35R-1 43-45 cm	**Piece No.** 7	**Unit**: 88	**TS#:** 174	**OBSERVER:BRF, DC**
ROCK NAME:	Oxide Gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Granular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	40	40	0.5	10	10		Subhedral prisms	
Clinopyroxene	40	50					Subhedral, intergranular	Well developed close-spaced exsolution lamellae. Altered-turbid throughout. Alteration to actinolite etc. mostly at grain boundaries.
Magnetite		10					Interstitial	Original Ti-magnetite has exsolved both ilmenite and hercynite
Ilmenite								Both as primary grain and exsolution from Ti-magnetite
Sulfides								Multi-phase pyrite + pyrrhotite?
Apatite								

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Hornblende	1						Around Fe-Ti oxides and pyroxene	
Actinolite	3						Around pyroxene and oxides	

TOTAL ALTERATION: 4%

STRUCTURE : Well preserved igneous texture (TS intensity 1a). Weak to no crystal plastic deformation is observed. Actinolite (+chlorite?) rims are observed between spinel (oxide?) and other phases, especially plagioclase. Static alteration (also minor) to chlorite is observed in patches.

PHOTOMICROGRAPHS:

1309D_35R_1_43_45_1

1309D_35R_1_43_45_2

THIN SECTION:	U1309D 35R-3 50-53 cm	**Piece No.** 5	**Unit**: 88	**TS#:185**	**OBSERVER:MA, AM, CBG, JM**
ROCK NAME:	Oxide gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Unknown				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Clinopyroxene	0	65		> 25			Subhedral	Cleavage/parting possibly with thin exsolution of oxide. Almost completely altered to amphibole
Plagioclase	10	30		> 8			Subhedral to anhedral	Deformed and altered.
Oxide	5	5		4			Irregular	
Zircon	Trace	Trace		0.1			Angular	
Tension gash								Tension gash, composed of plagioclase and hornblende?, may be a late magmatic intrusion. Oxide layer may also be a melt infiltration

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Brown hornblende	10						Pyroxene	As small grains in the pyroxene and close to the oxides.
Actinolite/Tremolite	50						Pyroxene	
Chlorite	10						Plagioclase	
Titanite	Trace							In oxide-rich zones
Tension gash								
Actinolite tremolite	30							
Secondary plagioclase	10							
Brown fine grained mats	20							Probably amphibole and chlorite. Overgrown by tremolite laths

TOTAL ALTERATION: 75%

STRUCTURE : Thin section intensity 1a (sample is very coarse grained, and it is difficult to recognize the presence of a magmatic fabric). This thin section shows a largely undeformed oxide gabbro intruded by a late magmatic zircon bearing intrusion overprinted by a relatively pervasive amphibolite alteration event (as indicated by the presence of brown hornblende). Subse' uent brecciation and fracturing is observed in pyroxene and oxide grains.

PHOTOMICROGRAPHS:

1309D_35R_3_50_53_1
1309D_35R_3_50_53_2
1309D_35R_3_50_53_3
1309D_35R_3_50_53_4

THIN SECTION:	U1309D 36R-1 76-78	**Piece No.** 4		**Unit**: 88/89	**TS#: 175**		**OBSERVER: CG, DC**	
ROCK NAME:	Oxide gabbro (Unit 88), Olivine gabbro (Unit 89)							
GRAIN SIZE:	Coarse/medium							
TEXTURE:	Intergranular							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**			**Composition**	**MORPHOLOGY**	**COMMENTS**
			min.	**max.**	**av.**			
Olivine gabbro**								
Olivine	0	32	1	2	2		Anhedral intergranular	Completely altered to actinolite plus chlorite
Plagioclase	60	60	1	5	2-3		Subhedral intergranular	Actinolite and blue-green hornblende eilets on grain boundaries
Clinopyroxene	10	20	1	3	1-2		Subhedral intergranular	Narrow exsolution lamellae common. Partially altered to turbid appearance or fully altered to actinolite, blue-green hornblende etc..
Spinel	1	1	<0.1	0.5			Irregular embayed	
Medium oxide gabbro**								
Olivine		0						
Plagioclase	30	30	0.5	1	1		Subhedral intergranular	
Clinopyroxene	10	50	1	2	2		Subhedral intergranular	Altered to green and brown amphiboles plus bright blue-green chlorite
Oxide	20	20	0.2	1	0.5		Irregular embayed	
Coarse oxide gabbro**								
Olivine		0						* Too coarse for accurate mode
Plagioclase	30	30*	2	10			Subhedral intergranular	
Clinopyroxene	10	50*	2	10			Subhedral intergranular	
Oxide	10	10	2	5			Interstitial	Mostly ilmenite?, minor pyrrhotite, minor darker gray with white internal reflections (goethite?)

SECONDARY Olivine Gabbro	**PERCENT**		**SIZE (micron)**				**REPLACING / FILLING**	**COMMENTS**
			min.	**max.**	**av.**			
Chlorite	9						After plagioclase	
Actinolite/tremolite	20						After olivine and pyroxene	
Medium grained Oxide Gabbro								
Brown Hornblende	1						Clinopyroxene	
Actinolite	39						Clinopyroxene	
Coarse Oxide Gabbro								
Brown Hornblende	5						After pyroxene	
Actinolite	45							

TOTAL ALTERATION: Olivine gabbro = 29% Medium grained oxide gabbro = 40%, Coarse grained oxide gabbro = 50%

STRUCTURE : Well preserved igenous textures (TS intensity 1a). Static alteration of pyroxenes to actinolite/tremolite and chlorite is common. Thin chlorite and tremolite filled fractures occur throughout the thin section.

** **OVERVIEW**: Well developed magmatic foliation ~ 45 degrees to section. From lower left to upper right, there are three domains: coarse oxide gabbro of Unit 88, medium oxide gabbro (marginal phase or possibly a vein), medium olivine gabbro (Unit 89) with internal foliation expressed as changes in olivine/plagioclase ratio.

PHOTOMICROGRAPHS:
1309D_36R_1_76_78_1
1309D_36R_1_76_78_2

THIN SECTION:	U1309D 36R-2 4-6 cm	**Piece No.** 1	**Unit**: 89	**TS#:** 176	**OBSERVER:** MD, GH, JM
ROCK NAME:	Olivine-bearing gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Equigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	75	75		4	2		Anhedral to subhedral	Alignment of long-axis showing igneous foliation, weak bending of twin lamella
Clinopyroxene	15	23		4	2		Anhedral	Alignment of long-axis showing igneous foliation, altered.
Olivine	0	2		2	1		Anhedral	Completely altered

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite/tremolite	6						Olivine, pyroxene	Forms thin rim around pyroxene and replaces completely olivine as patches.
Chlorite	9						Olivine, plagioclase	Forms patches with tremolite after olivine.

TOTAL ALTERATION: 15%

STRUCTURE : Thin section intensity of 1b overprinted by brittle deformation associated with greenschist grade alteration. The strong magmatic fabric is defined by SPO of both plagioclase and clinopyroxene. There is no evidence for crystal plastic deformation.

PHOTOMICROGRAPHS:

1309D_36R_2_4_6_1

1309D_36R_2_4_6_2

THIN SECTION:	U1309D 36R-3 89-92 cm	**Piece No.** 8	**Unit**: 89	**TS#:** 177	**OBSERVER:** MD, CG, JM
ROCK NAME:	Gabbro and "diorite" vein				
GRAIN SIZE:	Medium (gabbro), seriate ("diorite" vein)				
TEXTURE:	E' uigranular (gabbro), seriate? ("diorite" vein)				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Gabbro								
Plagioclase	65	70		3	1.5		Anhedral	Almost fresh
Clinopyroxene	10	30		4	2		Anhedral	Altered to amphibole
Orthopyroxene or olivine	Trace	Trace		4	2		Anhedral	Completely altered, so it is difficult to determine whether orthopyroxene or olivine.
"Diorite" vein								
Plagioclase	55	75		10	5		Anhedral to subhedral	Large, deformed grains (up to 10 mm in size) with compositional zoning, and smaller grains (0.2 to 0.3 mm in size) associated with small clinopyroxene grains. Large grains are also replaced by very thin veinlet-like sodic plagioclase.
Clinopyroxene	0	25		4	3		Anhedral, interstitial	Larger and smaller grains associated with larger and smaller plagioclase grains, respectively. Almost completely altered to amphibole
zircon	Trace	Trace		0.2			Euhedral e' uant	Although almost concentrated in finer-grained parts, one crystal is in large plagioclase grain.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite/tremolite	25						Olivine,pyroxene	In vein. Forms a kind of mesh after olivine.
Chlorite	8						Olivine,plagioclase	In vein.
Carbonate	5						Olivine	Replace completely olivine.
Brown hornblende	Trace						Pyroxene	Relics.
Ilmenite	2						Olivine	
Secondary plagioclase	10							
Titanite	1						Magnetite?/ilmentite	Some ilmenite exsolution lamellae remain adjacent to the titanite

TOTAL ALTERATION: 50%

STRUCTURE : Thin section intensity of 1b overprinted by brittle deformation associated with greenschist grade alteration. The weak magmatic fabric is defined by SPO of plagioclase. There is no evidence for crystal plastic deformation.

PHOTOMICROGRAPHS:

1309D_36R_3_89_92_1

1309D_36R_3_89_92_2

THIN SECTION:	U1309D 37R-1 20-22 cm	**Piece No.**: 4	**Unit**: 89	**TS#: 178**	**OBSERVER: MA, JM, GH**
ROCK NAME:	Gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	E' uigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	60	65		4	2		Subhedral to anhedral	Strong compositional zoning near the alteration vein
Clinopyroxene	20	35		4	2		Anhedral, e' uant	Altered to amphibole
Zircon								Near the alteration vein

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Matrix rock								
Brown hornblende	5						Clinopyroxene	Localized around the dike
Actinolite	15						Clinoyroxene, Brown hornblende	Also in veins, sometimes with chlorite.
Secondary plagioclase	5						Plagioclase	Localized within and around the dike
Chlorite	5						In veins	
Dike								
Actinolite	70							
Secondary plagioclase	30							

TOTAL ALTERATION: 100% in the dike, 30% in the matrix localized around the dike.

STRUCTURE : Thin section intensity of 1a overprinted by both brittle deformation associated with greenschist grade alteration and a brecciated band containing aligned actinolite indicated some shear. There is also titanite and zircon in the band, suggesting a initial "late magmatic" origin for the band.

PHOTOMICROGRAPHS:

1309D_37R_1_20_22_1

1309D_37R_1_20_22_2

THIN SECTION:	U1309D 37R-2 30-33 cm	**Piece No.** 1	**Unit**: 89	**TS#:** 179			**OBSERVER:** BRF, JM, GH	
ROCK NAME:	Contact between gabbro (above) and microgabbro (below)							
GRAIN SIZE:	Medium (gabbro) and fine (microgabbro)							
TEXTURE:	Seriate or originally equigranular (gabbro), equigranular (microgabbro)							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**			**Composition**	**MORPHOLOGY**	**COMMENTS**
			min.	**max.**	**av.**			
Gabbro								
Plagioclase	65	65		4	1.5		Anhedral	Coarser (4 mm in size, porphyroclastic?) and finer (about 1 mm in average size, recrystallized?) grains are observed, suggesting that plagioclase has recrystallized.
Clinopyroxene	5	35		6	2		Anhedral	Although almost completely altered to amphibole
Microgabbro								
Plagioclase	50	50		1	0.5		Anhedral	Almost fresh
Clinopyroxene	35	50		1	0.5		Anhedral, granular	Moderately altered to amphibole
Orthopyroxene	Trace	Trace		0.8	0.5		Anhedral	Altered to talc

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron)**				**REPLACING / FILLING**	**COMMENTS**
			min.	**max.**	**av.**			
Gabbro								
Actinolite	30							
Brown hornblende	Trace							
Cummingtonite	*						Clinopyroxene	Some amphibolites are twinned and are probably cummingtonite
Troctolite								
Actinolite/hornblende	13						Replacting augite near amphibole vein	
Talc	2							

TOTAL ALTERATION: Gabbro = 30%, Microgabbro = 15%

STRUCTURE : Thin section intensity of 1b (micrograbbro) and 1a (gabbro). The gabbro may also have experienced a small crystal plastic deformation event (thin sectin intensity 2), resulting in some recrystallization of plagioclase. However, there is evidence of post-magmatic reequilibration of plagioclase texture in the gabbro. The magmatic fabric in the microgabbro is defined by SPO of pyroxene and plagioclase; at the boundary between the two units, there is also an SPO of plagioclase and augite in the coarser-grained gabbro. There is also a weak LPO of plagioclase in the microgabbro. In contrast, there does not appear to be an LPO in the apparently recrystallized regions of the gabbro, indicating the any deformation involved relatively small strains under solid state conditions. In addition, there is not evidence for significant deformation of the clinopyroxene in the gabbro. Both assemblages are crosscut by veins and microcracks associated with greenschist grade alteration. The relative ages of the two units are difficult to determine based on these textures.

PHOTOMICROGRAPHS:

1309D_37R_2_30_33_1

1309D_37R_2_30_33_2

THIN SECTION:	U1309D 38R-1 38-41 cm	**Piece No.** 2	**Unit**: 89	**TS#: 180**	**OBSERVER: MD, DC, GH**
ROCK NAME:	Gabbro				
GRAIN SIZE:	Coarse-grained				
TEXTURE:	Intergranular				

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	60**	60						**Pervasively fractured and >60% dynamically recrystallized.
Clinopyroxene	<5	40						Primary grains show close-spaced exsolution lamellae. All clinopyroxene has (dynamically?) recrystallized. Remainder altered to actinolite etc.
Olivine	0	trace						Completely altered. Rare recognizable pseudomorphs (see "titanite" below).

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Secondary plagioclase	25							High temperature dynamic recrystallization
Pyroxene recrystallization	10							High temperature dynamic recrystallization
Chlorite	5						Plagioclase, olivine	In vein.
Actinolite/tremolite	20						Pyroxene, olivine	In cracks and pervasive small veins within plagioclase. Forms rims around oilvine in reaction with plagioclase.
Talc	5						Olivine	Replace completely olivine.
Carbonate	Trace						Olivine	
Titanite	1						Olivine	Forms a kind of mesh after olivine with talc and tremolite.
Brown hornblende	2						Pyroxene	Relics.

TOTAL ALTERATION: Alteration due to hydration = 33%, alteration due to recrystallization = 35%

STRUCTURE: Thin section intensity of 1a overprinted by 2 and finally overprinted by brittle deformation associated with greenschist grade alteration. While there is significant recrystallization of plagioclase and some of augite, there are other aspects of the fabric that suggest the deformation was relatively low strain. For example, several pyroxene grains appear to preserve outlines of cumulate crystal shapes, rather than elongate pyroxene bands. In addition, within the apparantly recrystallized plagioclase matrix, there is not a strong LPO and some grains are elongate perpendicular to the "foliation" defined by the recrystallized plagioclase. The brittle deformation event resulted in anastomosing networks of subparallel tremolite veins with very little shear offset.
**NOTE : On cut surfaces in hand specimen, plagioclase from this unit (and others) has an unusual "salt and pepper" appearance. This appears to be due to a combination of dynamic recrystallization and pervasive, actinolite-filled cracks within the plagioclase.

PHOTOMICROGRAPHS:
1309D_38R_1_38_41_1
1309D_38R_1_38_41_2

THIN SECTION:	U1309D 39R-2 19-22 cm	**Piece No.** 3	**Unit**: 92	**TS#: 181**	**OBSERVER: MD, DC, GH**
ROCK NAME:	Olivine Gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Intergranular, inequigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Olivine	0	10	2	5	3		Interstitial, original morphology unknown	Completely altered to actinolitic amphibole plus unknown high-relief, low birefringent mineral.
Clinopyroxene	20	30	2	10	5		Subhedral intergranular	Mostly internally altered along cleavage, darkened and turbid. Actiolite along graim boundaries. Close-spaced exsolution lamellae common
Plagioclase	60	60	0.5	4	2		Anhedral intergranular	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite/tremolite	10						Pyroxene, olivine	Forms patches with chlorite after olivine. Alteration of pyroxene edges.
Chlorite	10						Olivine, plagioclase	

TOTAL ALTERATION: 20%

STRUCTURE : Thin section intensity of 1b overprinted by brittle deformation associated with greenschist grade alteration. The magmatic fabric is defined by an SPO of plagioclase. A cataclastic texture indicative of radial cracking associated with alteration of olivine is well developed.

PHOTOMICROGRAPHS:

1309D_39R_2_19_22_1

1309D_39R_2_19_22_2

THIN SECTION:	U1309D 39R-2 65-68 cm	**Piece No.** 8	**Unit**:	**TS#:182**	**OBSERVER:BRF, JM, GH**
ROCK NAME:	Troctolite				
GRAIN SIZE:	Coarse				
TEXTURE:	Equigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	50	60		7			Anhedral to subhedral	Reaction between olivine grains. In some places small recrystallized grains of about 0.2 mm in size.
Olivine	0	40		8			Anhedral	Completely altered by reaction with plagioclase

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Serpentine	5						After olivine	
Chlorite	10						After plagioclase	
Tremolite/Actinolite	30						After olivine	
Talc	5						Olivine	

TOTAL ALTERATION: 50%

STRUCTURE : Thin section intensity of 1b; the magmatic fabric is defined by a strong plagioclase SPO. The plagioclase exhibits deformation twins an undulatory extinction and minor recrystallization where plagioclase grains are in contact. The plagioclase are pervasively cracked, but there is not a well developed radial crack pattern around altered olivine grains. The numerous microcracks in the plagioclase grains do not extend into surrounding chlorite.

PHOTOMICROGRAPHS:

1309D_39R_2_65_68_1

1309D_39R_2_65_68_2

THIN SECTION:	U1309D 39R-4 124-127 cm	**Piece No.** 6	**Unit**: 94	**TS#:183**			**OBSERVER:BRF, DC, GH**	
ROCK NAME:	Contact between troctolite (above) and gabbro (below) (Arrow is backwards on thin section)							
GRAIN SIZE:	Medium							
TEXTURE:	Intergranular							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Troctolite								
Plagioclase	40	50					Not determinable	Complete dynamic recrystallization
Olivine	0	50					Interconnecting domains	Original size and morphology not determinable
Orthopyroxene-bearing Gabbro								
Plagioclase	48	60	1	5			Anhedral intergranular seriate	Overall fresh. > 50% strained or dynamically recrystallized.
Clinopyroxene	20	40	3	10	5		Subhedral intergranular	
Orthopyroxene	3	5			1		Anhedral?	Altered at edges to fine actinolite rimmed by chlorite

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Troctolite								
Chlorite	20						Plagioclase	
Actinolite/tremolite	40						Olivine	
Cummingtonite	*						Olivine	Some of the amphibole needles are twinned, suggesting cummingtonite. Total amphibole alteration = 40%
Gabbro								
Actinolite/tremolite	12							
Hornblende	2						Both brown and green hornblende replace clinopyroxene	
Chlorite	2						Chlorite veins in plagioclase	
Talc	3							

TOTAL ALTERATION: Troctolite = 60%, Gabbro = 19%

STRUCTURE: Thin section 1a overprinted by 2 in troctolite, by a 3 in the gabbro. The high temperature fabric is overprinted by brittle deformation associated with greenschist grade alteration. NOTE: The igneous plagioclase is not "completely recrystallized" in the troctolite. The amount of plagioclase recrystallization is actually greater in the gabbro.

PHOTOMICROGRAPHS:

1309D_39R_4_124_127_1

1309D_39R_4_124_127_2

THIN SECTION:	U1309D 40R-1 21-24 cm	**Piece No.** 5	**Unit**: 95	**TS#:186**	**OBSERVER:BRF, GH, DC**
ROCK NAME:	Trondhjemite				
GRAIN SIZE:	Fine-medium.				
TEXTURE:	Intergranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Quartz		40					Anhedral intergranular and as graphic intergrowth. Also as vein along one edge of slide	Abundant fluid inclusions
Microcline?		5?					Subhedral? Prism	Microcline twins?, Index of refraction < albite.
Albite		55					Anhedral intergranular and as graphic intergrowth	Lower index of refraction than quartz. Altered-cloudy
Zircon		Trace			0.2		Subhedral, equidimensional	In albite

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Tremolite	Trace						After hornblende?	Also along edges of graphic intergrowths.
Titanite	Trace							

TOTAL ALTERATION: Trace

STRUCTURE : "Granite" (late magmatic leucocratic dike) with igneous texture is crosscut by a quartz vein, quartz filled fractures and tremolite veins.

NOTES; Occurs as small fragment at core top - most likely local small dike, but position in hole uncertain

PHOTOMICROGRAPHS:

1309D_40R_1_21_24_1
1309D_40R_1_21_24_2
1309D_40R_1_21_24_3
1309D_40R_1_21_24_4
1309D_40R_1_21_24_5
1309D_40R_1_21_24_6

THIN SECTION:	U1309D 40R-1 52-55 cm	**Piece No.** 7		**Unit**: 96		**TS#:** 187		**OBSERVER:** BRF, JM, GH	
ROCK NAME:	Troctolite with olivine gabbro domain								
GRAIN SIZE:	Medium for troctolite and olivine gabbro								
TEXTURE:	Equigranular for troctolite and gabbro								

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Troctolite								
Plagioclase	40	65		4	3		Anhedral	Almost colorless and fresh. Bending of twin lamella.
Olivine	0	32		4	3		Anhedral	Completely altered to chlorite and amphibole with corona structure
Clinopyroxene	trace	3		2	1.5		Anhedral	Altered to amphibole
Olivine gabbro								
Plagioclase	40	65		3	2		Anhedral	Almost colorless and fresh. Bending of twin lamella.
Olivine	0	15		2	1.5		Anhedral	Completely altered to chlorite and amphibole with corona structure
Clinopyroxene	10	20		2	1.5		Anhedral	Altered to amphibole

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Chlorite	15						Plagioclase	
Tremolite/Actinolite	25						Olivine and clinopyroxene	
Cummingtonite	*						Pyroxene, olivine	* Total tremolite + actinolite + cummingtonite = 25%
Brown Hornblende	Trace						Pyroxene	
Talc	5						Olivine	

TOTAL ALTERATION: 50%

STRUCTURE : Thin section intesity of 1b overprinted by 2 and then brittle deformation associated with greenschist grade alteration. The magmatic fabric is defined by SPO of relict plagioclase grains.

PHOTOMICROGRAPHS:

1309D_40R_1_52_55_1

1309D_40R_1_52_55_2

THIN SECTION:	U1309D 41R-1 74-76 cm	**Piece No.** 7B	**Unit**: 97	**TS#:** 188	**OBSERVER:** ABR, GH, JM
ROCK NAME:	Troctolite				
GRAIN SIZE:	Medium				
TEXTURE:	Equigranular?				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	40	66		5			Anhedral to subhedral	Almost fresh
Olivine	0	30		3			Anhedral?	Completely altered and it is difficult to know shape and size
Clinopyroxene	trace	4		3			Anhedral	Almost completely altered

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite/tremolite	30				500		Olivine + pyroxene?	Also concentrated in major vein
Brown hornblende	10				150		Olivine + pyroxene?	Also concentrated in major vein
Chlorite	20				20		Plagioclase	Mostly concentrated along plagioclase rims

TOTAL ALTERATION: 60%

STRUCTURE : Thin section intensity of 1b overprinted by a 2, then overprinted by at least three stages of brittle deforamation associated with the (1-oldest) the intrusion of a late magmatic vein, (2) alteration of olivine and plagioclase to form chlorite/tremolite and (3) tremolite veins. The magamatic fabric is defined by SPO of plagioclase.

PHOTOMICROGRAPHS:

1309D_41R_1_74_76_1

1309D_41R_1_74_76_2

THIN SECTION:	U1309D 41R-1 129-131 cm	**Piece No.** 10B	**Unit**: 97	**TS#: 189**	**OBSERVER: MD, DC, GH**
ROCK NAME:	Olivine Gabbro/Troctolite				
GRAIN SIZE:	Medium				
TEXTURE:	Intergranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Clinopyroxene	40/1	40/5	1	5			Subhedral	
Olivine	0/0	5/30			2-3		Unknown	Completely altered, original size and morphology not clear
Plagioclase	50/70	50/70	1	2			Unknown	Completely dynamically recrystallized.
Spinel	trace	trace					Anhedral grains	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite/tremolite	15						Pyroxene, olivine	Form patches with talc and chlorite after olivine.
Brown hornblende	1						Pyroxene	Relics
Chlorite	10						Olivine	
Secondary plagioclase	30							High temperature dynamic recrystallization.
Recrystallized pyroxene	5							High temperature dynamic recrystallization. Also in troctolite with no apparent primary precursor.
Talc	5						Olivine	

TOTAL ALTERATION: 66%

STRUCTURE : Thin section intensity of 1a overprinted by 2 for troctolite and olivine gabbro sections, overprinted by feldspar rich vein containing relict brown hornblende. Note: the plagioclase is not completely dynamically recrystallized. The entire assemblage is overprinted by brittle deformation associated with greenschist grade alteration, in the gabbroic sections of the rock, plagioclase becomes "turbid" adjacent to tremolite/actinolite veins. The plagioclase in the vein exhibits patchy extinction and localized "turbidity" associated with greenschist alteration. This texture suggests that a semibrittle deformation event was localized within this vein.
NOTES : Olivine gabbro to right, troctolite to left - boundary close to a narrow actinolitic vein. Note that several large plagioclase grains are continuous across the boundary.
"Feldspar" vein noted in barrel sheets appears to be dominated by weakly altered (turbid) and dynamically (?) recrystallized original plagioclase.

PHOTOMICROGRAPHS:

1309D_41R_1_129_131_1 **1309D_41R_1_129_131_2**

THIN SECTION: U1309D 41R-2 45-47 cm **Piece No.**: 6 **Unit**: 97 **TS#:** 190 **OBSERVER:** MD, JM, GH
ROCK NAME: Olivine gabbro with late magmatic leucocratic vein
GRAIN SIZE: Medium (olivine gabbro), coarse to medium (late magmatic leucocratic vein)
TEXTURE: Equigranular (olivine gabbro), equigranular with small amount of interstitial material

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Olivine gabbro								
Plagioclase	55	65		4	2		Anhedral	Weak magmatic foliation overprinted by deformation?
Clinopyroxene	10	25		4	2		Anhedral	Altered to amphibole
Olivine	0	10		2	1.5		Anhedral	Completely altered
Late magmatic leucocratic vein								
Plagioclase	80	90		8			Subhedral to anhedral	Strong compositional zoning. Brittley fractured by deformation resulting in fine-grained plagioclase (0.2 mm in size)
Clinopyroxene	0	8		?			Anhedral, interstitial	Interstitial shape against large grains of plagioclase. Almost completely altered.
Brown amphibole	2	2		0.5			Anhedral, interstitial	Interstitial against large grains of plagioclase
Apatite	Trace	Trace		0.3			Subhedral to euhedral	
Zircon	Trace	Trace		0.3			Euhedral, equant	

SECONDARY MINERALOGY	PERCENT	SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.	REPLACING / FILLING	COMMENTS
Olivine-gabbro						
Actinolite/tremolite	15				Pyroxene, olivine	
Chlorite	5				Olivine, plagioclase	
Sphene	1				Olivine	
Brown hornblende	Trace				Pyroxene	Relicts.
Carbonate	1				Olivine	
Magnetite	1				Olivine	
Secondary plagioclase	2					
Dike						
Actinolite/tremolite	10					In cracks and vein.
Secondary plagioclase	60					
Recristallized plagioclase	10					Beginning of the recrystallization.

TOTAL ALTERATION: Olivine-gabbro: 25% dike: 80% plagioclase are generally altered : zonation

STRUCTURE : Thin section intensity of 1b crosscut by late-magmatic vein. The magmatic foliation is defined by SPO of augite and plagioclase. The entire assemblage is overprinted by brittle deformation associated with greenschist grade alteration. In addition, patchy extinction and initial stages of recrystallization exhibited by the plagioclase in the late-magmatic vein indicates a semibrittle deformation event was more localized in this region.

PHOTOMICROGRAPHS:
1309D_41R_2_45_47_1
1309D_41R_2_45_47_2

THIN SECTION:	U1309D 42R-1, 7-9 cm	**Piece No.** 1	**Unit**: 98	**TS#:** 191	**OBSERVER:** ABR, JM, GH
ROCK NAME:	Wehrlite				
GRAIN SIZE:	Medium				
TEXTURE:	Granular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Olivine	15	85		6			Large anhedral grains and small subhedral rounded grains	Almpost altered to serpentine. Large anhedral irregrular-shaped grains have kink band due to deformation. Small subhedral rounded grains look like "cumulus" phase accompanied with "intercumulus"-like pyroxene grains.
Clinopyroxene and orthopyroxene	0	15		4			Anhedral, interstitial or intercumulus	Completely altered material with cleavage
Spinel	Trace	Trace		0.1			Euhedral, equant	Dark brown grains surrounded by opaque margin
Plagioclase?	Trace	Trace					Anhedral, interstitial	Completely altered, with no cleavage

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Serpentine	40				20		Olivine	Mesh texture
Magnetite	7				10		Olivine, pyroxene	Dispersed and mesh texture
Talc	12				100		In veins	
Tremolite	8				120		Pyroxene	Around margins of pyroxene
Clay	2				<5		Olivine	
Carbonate	1				1200		In vein	Within center of large vein

TOTAL ALTERATION: 70%

STRUCTURE : While the olivine grain exhibit some subgrain boundaries, there does not appear to be a strong LPO of olivine based on cursory gypsum plate analysis. The talc-rich veins crosscut the serpentine mesh texture. The serpentine in the mesh texture veins has a strong LPO.

PHOTOMICROGRAPHS:

1309D_42R_1_7_9_1
1309D_42R_1_7_9_2
1309D_42R_1_7_9_3
1309D_42R_1_7_9_4
1309D_42R_1_7_9_5
1309D_42R_1_7_9_6

THIN SECTION:	U1309D 44R-1 29-32 cm	**Piece No.** 1	**Unit**: 100	**TS#:** 192	**OBSERVER:** MD, JM, GH
ROCK NAME:	Olivine gabbro with microgabbro dike				
GRAIN SIZE:	Medium (olivine gabbro), fine (microgabbro)				
TEXTURE:	Equigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Olivine gabbro								
Plagioclase	65	65		4	2		Anhedral	Although almost fresh, deformed and fractured
Clinopyroxene	10	25		5	3		Anhedral	Altered to amphibole
Olivine	0	10		3	2		Anhedral	Completely altered to chlorite and amphibole with corona structure
Olivine-bearing microgabbro								
Plagioclase	80	80		0.5	0.3		Anhedral, granular or polygonal, suggesting that origin of the microgabbro dike is not a simple magmatic?	Although amost all plagioclase grains are fine-grained, large deformed crystal up to 0.25 mm is included, "xenocryst" from host olivine gabbro or "porphyroclast"
Clinopyroxene	5	20		0.5	0.3		Anhedral, granular	Almost completely altered to amphibole.
Olivine	trace	trace		2	1.5		Anhedral, granular	Compared to plagioclase and clinopyroxene, grain size of olivine is too large, suggesting xenocrystic origin from the host olivine gabbro?

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite/tremolite	15						Olivine, pyroxene	Form patches with chlorite and talc after olivine.
Chlorite	7						Olivine, plagioclase	
Talc	2						Olivine	
Secondary plagioclase	5							High temperature dynamic recrystallization.
Brown hornblende	1						Pyroxene	Relicts around pyroxene.

TOTAL ALTERATION: 30%

STRUCTURE : Thin section intensity of 1a in the olivine gabbro, more difficult to determine in the microgabbro. The fine-gained plagioclase in the micrograbbro exhibits a strong LPO, but no evidence for a strong SPO. At face value, this suggests a crystal plastic deformation event. Dynamic recrystallization of the coaser-grained plagioclase and augite at the boundaries of the microgabbro support this hypothesis, however, there are large "xenocrysts" of plagioclase in the microgabbro with long axes that are almost perpendicular to the boundary. It is hard to imagine how such a grain could maintain this geometry after a relatively large strain crystal plastic event. An alternate possibility is that the LPO in the plagioclase originated from a magmatic flow and the texture was subsequently annealed. The entire assemblage is overprinted by brittle deformation associated with greenschist grade alteration.

PHOTOMICROGRAPHS:

1309D_44R_1_29_32_1
1309D_44R_1_29_32_2
1309D_44R_1_29_32_3
1309D_44R_1_29_32_4
1309D_44R_1_29_32_5
1309D_44R_1_29_32_6

THIN SECTION:	U1309D 44R-2 106-109 cm	**Piece No.** 4	**Unit**: 101	**TS#:193**	**OBSERVER:BRF, DC, GH**
ROCK NAME:	Oxide gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:					

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	25	30			>10		Current: anhedral granular Original, probably subhedral large prisms	Completely recrystallized, to uniform 0.5 mm anhedral grains, retaining strong twinning and possibly original composition.
Pyroxene	20	60			>10		Subhedral prisms	Partially altered in turbid relict grain centers, to completely at edges.
Ti-magnetite	10	10	0.5	10			Irregular, interstitial	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Hornblende	5							
Actinolite	40							
Titanite	Trace							

TOTAL ALTERATION: 45% alteration involving hydration. Alteration in granulite facies is 70%

STRUCTURE : Thin section intensity of 4 overprinted by mostly static greenschist alteration event. The recrystallized plagioclase exhibits a strong LPO. The "foam texture" grain boundary morphologies indicate annealing occurred after the crystal-plastic deformation event. There is a large pyroxene grain that is cut by an oxide/brown amphibole vein. This texture suggests that there was some brittle deformation assoicated with the presence of melt during the deformation of this rock. While the pyroxene is mostly altered, there is evidence for dynamic recrystallization consistent with ductile deformation in granulite facies.

PHOTOMICROGRAPHS:

1309D_44R_2_106_109_1

1309D_44R_2_106_109_2

THIN SECTION:	U1309D 44R-3 32-34 cm	**Piece No.** 2	**Unit**: 101	**TS#:194**	**OBSERVER: BRF, DC**
ROCK NAME:	Oxide-bearing gabbro				
GRAIN SIZE:	Medium grained				
TEXTURE:	Granular, cataclastic				

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	50	50						Mostly dynamically recrystallized to uniform anhedral ~0.1 mm
Clinopyroxene	10	48						Mostly dynamically recrystallized and completly altered
Titanomagneitte	0	1						
Ilmenite	1	1						

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Hornblende	33						Pyroxene	
Actinolite	5						Pyroxene and hornblende	
Titanite	Trace						Ilmenite	Exsolved magnetite host has been consumed by metamorphic reactions

TOTAL ALTERATION: 38%

STRUCTURE : Original igneous fabric difficult to identify because of large intrusive feature. TS intensity 3 overprinted by late magmatic intrusion. The intrusion retains subhedral plagioclase grains with well developed alteration rims. Evidence for magmatic brown hornblende within the intrusion. The entire assemblage is overprinted by greenschist grade brecciation event that is particularly strong in the late magmatic intrusion.

PHOTOMICROGRAPHS:

1309D_44R_3_32_34_1

1309D_44R_3_32_34_2

THIN SECTION:	U1309D 44R-3 47-49 cm	**Piece No.** 3	**Unit**: 101	**TS#:195**			**OBSERVER:BRF, DC**		
ROCK NAME:	Troctolite separated from Oxide-bearing gabbro by a vertical ductile deformation zone								
GRAIN SIZE:	Medium-coarse								
TEXTURE:									

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Troctolite								
Plagioclase	50	60	1	5			Subhedral prisms	> 50% dynamically recrystallized. Freshest example is in shear zone
Olivine	0	49			< 3			Size and mode indeterminate
Clinopyroxene	0	1						
Oxide Gabbro								
Plagioclase	40	40			< 5		Subhedral prisms	Plagioclase is > 50% dynamically recrystallized but may preserve original composition
Clinopyroxene	20	57	2	5			Subhedral prisms	
Ti-magnetite	3	3			~0.2		Interstitial, some interconnected	

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Troctolite								
Chlorite	20						Plagioclase	
Actinolite/tremolite	30						Olivine	
Cummingtonite	*						Olivine	Some of the amphibole needles are twinned, suggesting cummingtonite. Total amphibole alteration = 30%
Oxide Gabbro								
Actinolite	12						Clinopyroxene and hornblende	
Hornblende	25						Clinopyroxene	Most amphibole is strongly pleochroic with a touch of brown, indicating that it is hornblende rather than actinolite
Deformation zone								
Dark amphibole	20						After clinopyroxene	Amphibole is after deformed pyroxene
Plagioclase	80							

TOTAL ALTERATION: Troctolite = 50%, Oxide Gabbro = 37%, Deformation zone 100%

STRUCTURE : Mylonite with TS intensity 4 cutting a troctolite with thin section intensity 1b overprinted by 2. Recrystallized plagioclase in the mylonite has a strong LPO. Augen of pyroxene remain largely unrecrystallized at the boundary between troctolite and mylonite. Recrystallized pyroxene is statically replaced by green amphibole. Both regions of the thin section are overprinted by brittle deformation and greenschist alteration. Actinolite veins are observed crosscutting mylonitic foliation. No clear relationship is observed between crosscutting veins and brittle deformation associated with alteration of olivine.

NOTE : Oxide (-bearing) gabbro not apparent in core hand specimen -- may be a local concentration in shear zone.

PHOTOMICROGRAPHS:

1309D_44R_3_47_49_1

1309D_44R_3_47_49_2

THIN SECTION:	U1309D 44R-4 16-18 cm	**Piece No.** 2	**Unit**: 102	**TS#:** 196	**OBSERVER:** BRF, JM
ROCK NAME:	Mylonitized olivine gabbro				
GRAIN SIZE:	Unknown				
TEXTURE:	Unknown				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	40	60		4			Original morphology is unknown due to mylonitization and recrystallization	Plagioclase has completely recrystallized (0.3 mm in size), but may not have changed composition.
Clinopyroxene	5	30		?			Original morphology is unknown due to mylonitization and recrystallization, and also alteration	Fresh clinopyroxene grains are almost completely recrystallized (0.2 mm in size).
Olivine	0	10		?			Original morphology is unknown due to perfect alteration and mylonitization	Completely altered

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Brown Hornblende	5						Rimming pyroxene and olivine	
Actinolite/ tremolite	30						After pyroxene and olivine	
Pyroxene neoblasts	20							
Chlorite	5						In pseudomorphs after olivine	
Titanite	Trace							In hornblende vein

TOTAL ALTERATION: Rock has totally recrystallized in granulite facies and has about 40% sub-granulite alteration.

STRUCTURE : Mylonite with thin section intensity 4 with a LPO in both dynamically recrystallized plagioclase and pyroxene. Mylonitic texture has experienced some annealing as illustrated by well developed 120 degree grain boundaries in single phase regions. One brown hornblende vein is observed cutting the myonitic foliation. Crystal plastic deformation is overprinted by some greenschist grade alteration including veins. Some veins appear to crosscut the main alteration vein.

PHOTOMICROGRAPHS:

1309D_44R_4_16_18_1

1309D_44R_4_16_18_2

THIN SECTION:	U1309D 45R-3 20-22 cm	**Piece No.** 2	**Unit**: 102	**TS#:197**	**OBSERVER: BRF, JM**
ROCK NAME:	Oxide Gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Unknown due to deformation and alteration				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	20	20		> 8			Unknown due to deformation	Deformed and altered
Clinopyroxene	30	65		> 10			Unknown due to deformation	Cleavage/parting possibly with thin exsolution of oxide. Deformed and altered.
Oxide	15	15		10			Irregular, interstitial	Ilmenite>magnetite
Zircon	Trace	Trace		0.7			Euhedral	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Brown Hornblende	2							
Actinolite	31						Pyroxene, also in veins cutting oxides and plagioclase	
Titanite	2							

TOTAL ALTERATION: 31%

STRUCTURE : Thin section intensity 1a overprinted by 2, subsequently overprinted by two brittle deformation events associated with greenschist grade ateration. The second brittle deformation/alteration event resulted in brecciation of previously altered pyroxene and microcracking of oxide.

PHOTOMICROGRAPHS:

1309D_45R_3_20_22_1

1309D_45R_3_20_22_2

THIN SECTION:	U1309D 47R-2, 86-89 cm	**Piece No.** 7	**Unit**: 104/103	**TS#: 198**			**OBSERVER: ABR, DC**	
ROCK NAME:	Oxide gabbronite / olivine gabbro with olivine-rich band along contact							
GRAIN SIZE:	Medium/medium							
TEXTURE:	Granular/intergranular							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Oxide Gabbronorite (Unit 104)								
Plagioclase	42	50	2	5			Anhedral intergranular	Very minor dynamic recrystallization
Clinopyroxene	20	27	3	5			Subhedral	Strong exsolution. Commonly altered to semi-opaque appearance.
Orthopyroxene	5	10		2			Anhedral	Contains 10-20% oxide. Altered turbid.
Magnetite/ilmenite	3	3	0.2	2				Ilmenite exsolved from magnetite in plagioclase. Anhedral ilmenite in pyroxene, perhaps concentrated in orthopyroxene
Pyrrhotite	Trace	Trace			0.2			
Chalcopyrite	Trace	Trace						
Olivine Gabbro (Unit 103)								
Plagioclase	50	60	2	3			Subhedral intergranular	Generally fresh, invaded by actinolite on fractures <20% recrystallized
Clinopyroxene	15	20	2	3			Subhedral intergranular	
Olivine	0	20	2	3			Anhedral intergranular	Altered to actinolite with chlorite-rich coronas,

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Actinolite/tremolite	20				200		Pyroxene, olivine	Actinolite forms rim around pyroxenes, tremolite is abundant in patches after olivine
Brown hornblende	Trace				80		Pyroxene	More common and larger in oxide gabbro part
Chlorite	15				25		Plagioclase	Forms distinct rim around alteration patches after olivine

TOTAL ALTERATION: 35%

STRUCTURE : Thin section intensity 1b overprinted by brittle deformation associated greenschist alteration of olivine. The magmatic foliation is defined by an SPO of plagioclase and pyroxene.

NOTES: Olivine-rich band in olivine gabbro at contact. Pervasive fine fractures, some filled by amphibole.

PHOTOMICROGRAPHS:

1309D_47R_2_86_89_1

1309D_47R_2_86_89_2

THIN SECTION:	U1309D 48R-1 44-46 cm	**Piece No.** 6	**Unit**: 107	**TS#:** 199	**OBSERVER:** MD, JM
ROCK NAME:	Olivine-bearing gabbro				
GRAIN SIZE:	Medium to coarse				
TEXTURE:	Equigranular and poikilitic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	44	40		6	3		Subhedral	Almost fresh
Clinopyroxene		55		12	3			Large oikocrysts (~12 mm in size) and smaller grains (4 mm maximum).
Olivine	trace	5		2	1.5		Subhedral, rounded	Olivine is rich within clinopyroxene oikocryst compared to outside.
Orthopyroxene	trace	trace		1			Anhedral	Tiny crystals associated with clinopyroxene (usually partly surrounding clinopyroxene). Almost no exsolution lamella of clinopyroxene.
Brown amphibole	trace	trace		0.2			Anhedral	Tiny rim on clinopyroxene and replacing clinopyroxene

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite/tremolite	5						Olivine,pyroxene	Pyroxene edges are slightly altered to actinolite.Tremolite completely replaced olivine as pseudomorphic patches with chlorite.
Chlorite	5						Olivine, plagioclase	Form rims around plagioclase.
Talc	8						Olivine	Replace completely olivine with serpentine, magnetite and in places carbonate. This alteration is characterized by a coronitic texture.
Carbonate	2						Olivine	
Magnetite	3						Olivine	
Serpentine	3						Olivine	
Brown hornblende	2						Pyroxene	Relics.

TOTAL ALTERATION: 28% due to olivine alteration.

STRUCTURE : Thin section intensity 1a. There may be a weak magmatic foliation defined by compositional banding of pyroxene and SPO of plagioclase. While the rock is relatively fresh, there are a number of greenschist veins and alteration of olivine- even the chadacrysts within augute are partly altered. No real evidence of subgrains in the plagioclase.

PHOTOMICROGRAPHS:

1309D_48R_1_44_46_1

1309D_48R_1_44_46_2

THIN SECTION:	U1309D 48R-1 119-122 cm	**Piece No.** 15	**Unit**: 108	**TS#:** 200	**OBSERVER:** BRF, JM
ROCK NAME:	Anorthositic troctolite				
GRAIN SIZE:	Medium				
TEXTURE:	Originally equigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	80	85		6			Anhedral	Coarser (6 mm in size, porphyroclastic?) and finer (about 1 mm in average size, recrystallized?) grains are observed, suggesting that plagioclase has recrystallized at high-temperature. Weak igneous lamination/foliation overprinted by deformation is shown by alignment of plagioclase grains.
Olivine	0	12		3	2.5		Anhedral	Completely altered
Clinopyroxene	Trace	3		2	1.5		Anhedral	Almost completely altered

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Chlorite	10						Plagioclase	
Tremolite/actinolite	15						Olivine	
Cummingtonite	*						Olivine	*=Total amphibole = 15%

TOTAL ALTERATION: 25%

STRUCTURE : Thin section intensity 1b overprinted by a 2.5 (percentage recrystallized near the boundary between 2 and 3). Magmatic fabric defined by an SPO of plagioclase. The fabric is overprinted by a greenshist brittle deformation event associated with the alteration of olivine, including the formation of radial cracks around altered olivine. Relict plagioclase grains exhibit sweeping undulatory extinction, deformation twins, and subgrain boundaries.

PHOTOMICROGRAPHS:

1309D_48R_1_119_122_1

1309D_48R_1_119_122_2

THIN SECTION:	U1309D 48R-2 20-23 cm	**Piece No.** 4	**Unit**: 108	**TS#:** 201	**OBSERVER:** MD, JM, NH
ROCK NAME:	Anorthosite				
GRAIN SIZE:	Medium and coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	93	93		12	4		Anhedral	Medium-grained plagioclase with sutured boundary and large plagioclase are distinguished. The former consists of medium-grained anorthositic troctolite, and the latter is "anorthositic domain".
Olivine	0	4		4	3		Anhedral	Completely altered
Clinopyroxene	0	3		3	2		Anhedral	Almost completely altered

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite/tremolite	10						Olivine	Forms patches with chlorite after olivine.
Chlorite	10						Olivine, plagioclase	Forms rims around plagioclase (reaction between plagioclase and olivine).
Secondary plagioclase	5							High temperature recrystallization?

TOTAL ALTERATION: 25%

STRUCTURE : Thin-section intensity of 2; recrystallized grain boundaries of some plagioclase; some undulose extinction, but twin lamellae are intact to slightly strained. Alteration/replacement of olivine-clinopyroxene surrounded by thin, (50 micron), subparallel veins. Replaced grains are possibly flattened.

PHOTOMICROGRAPHS:

1309D_48R_2_20_23_1

1309D_48R_2_20_23_2

THIN SECTION: U1309D 48R-2 96-98 cm **Piece No.**: 11 **Unit**: 109 **TS#: 202** **OBSERVER: MD, ESA, NH**
ROCK NAME: Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Seriate

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	70	70		12.8	4.3		Anhedral	Plagioclase has a range of grain size from 1-2 mm up to as large as 12.2 mm. Recrystallized plagioclase (<0.1 mm) is especially abundant along the shear zone cutting the thin section into two halves.
Pyroxene	25	30	3.6	5.4	8.8		Anhedral	Coarse-grained primary pyroxene are moderately altered.They also occur along the shear zone as smaller fragment broken off from larger ones, and as recrystallized grains.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Secondary plagioclase	25							High temperature dynamic recrystallization.
Recrystallized pyroxene	5							High temperature dynamic recrystallization.
Actinolite/tremolite	20						Pyroxene	
Brown hornblende	Trace						Pyroxene	Relics.
Chlorite	2						Olivine, plagioclase	Forms patches with tremolite and talc after olivine.
Carbonate	1						Olivine	
Magnetite	5						Ilmenite	
Talc	3						Olivine	

TOTAL ALTERATION: 61%

STRUCTURE : Thin section intensity of 2 (recrystallization of plagioclase grain boundaries) with a 4 mm wide zone of intense recrystallization (thin section intensity of 3.5). Shear zone contains recrystallized plagioclase and pyroxene. Tentative assignment of sinstral shear sense (in the microscope-view). Recrystallized textures include those suggestive of annealing of brittle structures. Some areas show little-to-no evidence of recrystallization. Some late veins and fractures (potentially conjugate sets) and small amounts of grain-boundary alteration of pyroxene are also present.

PHOTOMICROGRAPHS:
1309D_48R_2_96_98_1
1309D_48R_2_96_98_2

THIN SECTION: U1309D 49R-1, 137-139 cm **Piece No.**: 18 **Unit**: 112 **TS#: 203** **OBSERVER: ABR, ESA, NH**
ROCK NAME: Oxide gabbro - troctolite contact
GRAIN SIZE: Coarse-grained
TEXTURE: Seriate

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Oxide Gabbro								
Plagioclase	10	30	?	3.7	?		Anhedral	Plagioclase grains are altered and are broken into fragments by fractures filled by secindary minerals.
Pyroxene	30 (?)	70		9.8	3.5		Anhedral	Altered grains. Exsolutions are commonly observed.
Oxide	5	2	1.75	2.7	1.6		Anhedral	Mostly ilmenite, minor titanite and magnetite. Occurs as interstitial minerals to the coarser minerals. They are also observed along crystal cleavages.
Troctolite								
Plagioclase	30	60	?	5.3	3.3		Anhedral	Original primary crystals surrounded by recrystallized plagioclase (0.14-0.4 mm). Twinning planes are bent and shows undulatory extinction. Chlorite rims the plagioclase where it is in contact with the serpentine.
Olivine	0	40	?	?	3		Anhedral	Completely replaced by alteration minerals.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Oxide Gabbro								
Actinolite	20						Pyroxene, hornblende	
Brown hornblende	50						Pyroxene	
Chlorite	10						Plagioclase near olivine	
Sphene	1							
Troctolite								
Tremolite	45						Olivine	
Chlorite	25						Plagioclase near olivine	
Secondaryplagioclase	10						Plagioclase	High temperature deformation, not counted in greenschist facies total

TOTAL ALTERATION: Oxide gabbro: 80%; troctolite: 70%;

STRUCTURE : Thin section intensity of 3 in the troctolite; mostly recrystallized and stretched plagioclase (some twin lamellae remain) and flattening of (completely altered) pyroxene and olivine. Thin section intensity of 2 in the oxide gabbro; generally small recrystallization of pyroxene; locally intense shear strain in the oxide gabbros (e.g. flattening/stretching) is less pronounced. Alteration is intense at the contact between the oxide gabbro and troctolite, but the oxide gabbro does seem to partly cut the mylonite in some places, and be affected by the same shear strain in others. Tentative assignment of the oxide gabbro to syn-tectonic intrusion with the crystal plastic deformation.

PHOTOMICROGRAPHS:
1309D_49R_1_137_139_1
1309D_49R_1_137_139_2

THIN SECTION:	U1309D 49R-2 2-5 cm	**Piece No.** 1	**Unit**: 112	**TS#:** 204	**OBSERVER:** MD, JM, NH
ROCK NAME:	Deformed, veined and altered olivine gabbro?				
GRAIN SIZE:	No details of protolith are preserved.				
TEXTURE:	No details of protolith are preserved.				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase				10				Very coarse (~10 mm in size) and recrystallized fine grained plagioclase (0.2 mm in size) are disthinguished
Clinopyroxene				5				Aggregates of recrystallized small grains (0.1 to 0.2 mm in size).
Olivine				5?				Completely altered

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite/tremolite	15						Olivine, pyroxene	Replace partially pyroxene.
Chlorite	35						Olivine, plagioclase	In vein and replaced completely with tremolite and talc as pseudomorphic patches.
Brown hornblende	2						Pyroxene	Relics.
Secondary plagioclase	5							High temperature dynamic recrystallization.
Recrystallized pyroxene	5							High temperature dynamic recrystallization.
Talc	5						Olivine	

TOTAL ALTERATION: 67%

STRUCTURE : Thin section intensity of 3: pervasive recrystallization with some larger (mm-scale) grains with recrystallization only along the grain boundaries, and twin lamellae of plagioclase present in many grains. Recrystallization of pyroxene and plagioclase is pervasive; some secondary hornblende (replacing pyroxene) appears undeformed. Pervasive greenschist alteration is mostly static, although there is a weak "schistosity" to some of the talc-rich alteration minerals. A large vein sharply cuts the crystal plastic textures. Alteration minerals within the vein have long axes parallel to well-defined vein walls and median wall. The interpretation is that (crack-seal?) veins take up some (later?) slip (a very weak 5 in the thin section intensity scale).

PHOTOMICROGRAPHS:

1309D_49R_2_2_5_1

1309D_49R_2_2_5_2

THIN SECTION:	U1309D 49R-2 26-29 cm	**Piece No.** 4	**Unit**: 112	**TS#:** 205	**OBSERVER:** BRF, DC, NH
ROCK NAME:	Mylonite (olivine gabbro?)				
GRAIN SIZE:	No details of protolith are preserved.				
TEXTURE:	No details of protolith are preserved.				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	60	60						No details of protolith are preserved.
Clinopyroxene	5	20						No details of protolith are preserved.
Olivine	0	20						No details of protolith are preserved.
Pyrrhotite	Trace	Trace						

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Talc	5						Olivine	
Tremolite/actinolite	15						Olivine, augite	
Hornblende	Trace						Clinopyroxene	
Secondary pyroxene	20							
Secondary plagioclase	50							
Chlorite	5						Plagioclase	

TOTAL ALTERATION: 100% recrystallized in granulite facies, 30% hydrated in greenschist and amphibolite facies

STRUCTURE : Thin section intensity scale of 4; plagioclase twin lamellae (possibly from post-deformational annealing) are preserved although grain sizes are relatively uniform along recrystallized grain boundaries. Pyroxene is also extensively recrystallized. The amount of stretch during dynamic recrystallization is large. Kinematic indicators (a very crude SC fabric is perhaps manifest indicating sinstral displacement - in the microscope view). Relict olivine (now completely altered) are very flattened. Alteration minerals are static and veins cut all crystal plastic fabric.

PHOTOMICROGRAPHS:
1309D_49R_2_26_29_1
1309D_49R_2_26_29_2

THIN SECTION:	U1309D 50R-1, 52-55 cm	**Piece No.** 5	**Unit**: 114	**TS#: 206**	**OBSERVER:ESA, BRF, NH**
ROCK NAME:	Orthopyroxene-bearing gabbro				
GRAIN SIZE:	Coarse-grained				
TEXTURE:	Infiltrated, brecciated				

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Primar Minerals								
Plagioclase	40	40		6.1	2.5-3.2		Anhedral	Moderate degree of alteration and shows resorbed boundaries. Some crystals also show exsolution lamellaes.
Clinopyroxene	45	58		6.12	3.5		Anhedral	
Orthopyroxene	1	2		4.9				
	Comment: Coarse-grained individual and clustered primary crystals are separated by channels of secondary plagioclase and clinopyroxene. Gabbroic melt must have infiltrated the intergrain boundaries of the original coarse-grained gabbro.							

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Talc	2						Pyroxene	
Actinolite	3						Pyroxene	
Hornblende	Trace							
Recrystallized pyroxene	10							Coarse-grained primary crystals are separated by channels of secondary plagioclase and clinopyroxene. These are clearly zones of recrystal--lization and probably outline horizon of high-temperature fluid flow.
Recrystallized Plagioclase	10							

TOTAL ALTERATION: Hydration = 5 % Granulite-grade recrystallization = 20%

STRUCTURE : Thin section intensity of 2, and locally 3, showing dynamic recrystallization of augite and plagioclase likely at granulite grade conditions. In addition, there is a small region in the thin section exhibiting an igneous texture indicative of a microgabbro intrusion (upper left corner). Fabric is overprinted by microcracks and veins resulting in brecciation of large orthopyrxene porphyroclasts. The only clear evidence of a late magmatic event in this thin section is the small microgabbro in the upper lefthand corner. The plagioclase ribbons look to be recrystallized primary grains, rather than evidence for melt intrusion.

PHOTOMICROGRAPHS:

1309D_50R_1_52_55_1

1309D_50R_1_52_55_2

THIN SECTION:	U1309D 51R-1 82-85 cm	**Piece No.** 5	**Unit**: 117	**TS#: 207**			**OBSERVER: AM, ESA, NH**	
ROCK NAME:	Gabbro, Fine-grained gabbro and Troctolitic gabbro layers							
GRAIN SIZE:	Fine-grained to coarse-grained							
TEXTURE:	Seriate							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Gabbro (Upper-most portion)								
Plagioclase	55	55	0.2	4.9	1.8		Anhedral granular	Recrystallized plagioclase surrounds coarse-grained primary plagioclase. Stress is observed on both primary and secondary plagioclase through their bend twinning lamellae.
Pyroxene	0	45			1-1.8		Anhedral	Completely altered to fibrous amphibole. Grain size estimation is based on the pseudomorphs. Estimation of the largest grain size might be meaningless due to the intense alteration and fracturing of the crystals.
Fine-grained Gabbro (Lower-most portion)								
Plagioclase	40	60		1.3	0.5-1		Anhedral	Relatively fresh crystals. Some of the larger crystals have bent twinning planes.
Pyroxene	10	40		2.1	0.3-1		Anhedral	Moderately altered. Many grain survived alteration and contains fresh sections.
Olivine	0	<1		0.5	0.2		Anhedral	Completely altered to chlorite and actinolite.
Troctolitic gabbro (Middle part)								
Plagioclase	50	50	0.07	5.6	0.7-1.8		Anhedral	Relatively fresh.
Pyroxene	0	12	?		1		Anhedral	Altered to amphiboles.
Olivine	0	38	?	1.8	?		Anhedral	Completely altered to chlorite and actinolite.

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Tremolite/actinolite	25						Pyroxene, olivine	Pseudomorphs after pyroxene, and randomly oriented elongate patches with chlorite after olivine all occur in the microgabbro. A sheared zone of matted amphibole occurs at the contact between gabbro and microgabbro (similar to the matrix in late magmatic leucocratic intrusions). Also occurs in veins with chlorite.
Brown hornblende	5						Pyroxene	Locally present but replaced by actinolite. Unclear how much amphibole is hornblende.
Chlorite	5						Plagioclase	In veins and locally rims with amphibole.
Secondary plagioclase	?							Uncertain whether small plagioclases mantling larger ones represent metamorphic/dynamic recrystallization or not.

TOTAL ALTERATION: 40

STRUCTURE : Thin section intensity of 1b in the microgabbro (a strong magmatic fabric). The gabbro has a 1b overprinted by a 2 (some recrystallization of plagioclase - locally intense). The microgabbro intrudes the gabbro; both have SPO of plagioclase (stronger in the microgabbro); the intrusion is tentatively assigned pre- to syntectonic timing. Parallel low-temperature fractures and veins cut the crystal plastic fabrics.

PHOTOMICROGRAPHS:

1309D_51R_1_82_85_1

1309D_51R_1_82_85_2

THIN SECTION:	U1309D 51R-2 77-80 cm	**Piece No.** 1B	**Unit**: 119	**TS#:** 208			**OBSERVER:** BRF, JM, NH	
ROCK NAME:	Olivine-bearing gabbro cut by olivine microgabbro							
GRAIN SIZE:	Coarse (olivine gabbro), fine (olivine microgabbro)							
TEXTURE:	Equigranular (olivine-bearing gabbro), equigranular (olivine microgabbro)							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Olivine-bearing gabbro								
Plagioclase	70	80		6			Subhedral to anhedral	Almost fresh
Olivine	0	4		4			Anhedral	Completely altered to chlorite and amphibole with corona texture
Clinopyroxene	10	16		6			Anhedral	Altered to amphibole
Olivine microgabbro								
Plagioclase	45	60		0.6	0.4		Anhedral	Magmatic foliation is observed along contact. Small grains of the olivine microgabbro surrounds coarser plagioclase from olivine-bearing gabbro, suggesting that the latter was not completely solid when the olivine microgabbo magma intruded.
Olivine	0	20		1	0.6		Anhedral	Completely altered to chlorite and amphibole with corona texture
Clinopyroxene	15	20		1	0.6		Anhedral	Altered to amphibole

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Gabbro								
Chlorite	5						Plagioclase	
Actinolite/tremolite	15						Olivine, hornblende, clinopyroxene	
Troctolite								
Hornblende	T						Around relict olivine and also around clinopyroxene	
Actinolite/tremolite	35							
Chlorite	5							

TOTAL ALTERATION: Olivine-bearing gabbro = 20%, olivine microgabbro = 40%

STRUCTURE : Microgabbro (thin section intensity 1b) intrudes a gabbro (thin section intensity 2); noteworthy is the magmatic fabric and interesting (alteration-controlled) grain shapes of the igneous plagioclase in the microgabbro, and some dynamic recrystallization of the gabbro (absent from the microgabbro). The microgabbro is tentatively assigned syn- to post-tectonic relative to the crystal plastic texture of the gabbro. Brittle deformation (veins, fractures) crosscut pervasive static alteration and cuts and alters the plagioclase.

PHOTOMICROGRAPHS:

1309D_51R_2_77_80_1
1309D_51R_2_77_80_2
1309D_51R_2_77_80_3
1309D_51R_2_77_80_4
1309D_51R_2_77_80_5
1309D_51R_2_77_80_6

THIN SECTION:	U1309D 51R-4 13-16 cm	**Piece No.** 1	**Unit**: 120	**TS#:** 209	**OBSERVER:** BRF, JM, NH
ROCK NAME:	Orthopyroxene-bearing gabbro				
GRAIN SIZE:	Medium to coarse				
TEXTURE:	Equigranular or seriate?				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	60	70	0.5	13	3		Anhedral to subhedral	Presence of large and small grains, suggesting mingling of two kinds of mush or recrystallization due to deformation?
Clinopyroxene	20	27		10	4		Anhedral, oikocrystic	Altered to amphibole.
Orthopyroxene	Trace	3		> 5			Anhedral, oikocrystic	Altered to colorless amphibole and talc. Except for altered part, orthopyroxene crystals are very fresh and show exsolution lamella of clinopyroxene, parallel to (100).

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite/tremolite	15						Clinopyroxene	
Hornblende	Trace						Clinopyroxene	
Talc	5						Clinopyroxene	
Cummingtonite	*						Clinopyroxene	* = Total colorless amphibole = 15%

TOTAL ALTERATION: 20%

STRUCTURE : Thin section intensity of 1a overprinted by a weak 2; subgrains preserved in plagioclase. Overprinted by brittle deformation and veins associated with greenschist grade alteration.

PHOTOMICROGRAPHS:

1309D_51R_4_13_16_1

1309D_51R_4_13_16_2

THIN SECTION:	U1309D 52R-1 88-90 cm	**Piece No.** 11A	**Unit**: 120	**TS#: 211**	**OBSERVER: BRF, NH, GH, ESA**
ROCK NAME:	Olivine Gabbro				
GRAIN SIZE:	Coarse-grained				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	60	60	0.4	22.2			Subhedral to anhedral	Large fresh crystals
Olivine	0	20	0.8	5			Anhedral	Completely replaced by chlorite and actinolite.
Clinopyroxene	10	20		15			Anhedral	Some clinopyroxene has recrystallized into mosaic. Some pyroxene occurs interstitial along narrow gaps between plagioclase crystals.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Chlorite	6						Plagioclase	
Tremolite	5						Olivine, minor growth after clinopyroxene	
Talc	13						Olivine, minor growth after clinopyroxene	
Sulfides	1							At least three phases pyrite?, pyrrhotite? millerite?
Brown Hornblende	Trace						With recrystallized zone in the augite	

TOTAL ALTERATION: 25%

STRUCTURE : Thin section intensity of 1a overprinted by a 2; subgrains preserved in plagioclase and olivine. Overprinted by brittle deformation and veins associated with greenschist grade alteration. Strong preferred orientation of amphibole-and chlorite-filled microcracks.

PHOTOMICROGRAPHS:

1309D_52R_1_88_90_1

1309D_52R_1_88_90_2

THIN SECTION:	U1309D 52R-2 59-62 cm	**Piece No.** 2	**Unit**: 120	**TS#:** 210	**OBSERVER:** BRF, JM, NH
ROCK NAME:	Olivine gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Equigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	65	65		14			Anhedral to subhedral	Smaller grains (< 2 mm in size) are recrystallized grains. Zonal structure is observed in large plagioclase grains.
Olivine	5	10		10			Anhedral	Kink band is observed.
Clinopyroxene	20	25		16			Anhedral	Tiny grains of orthopyroxene and brown amphibole are observed in clinopyroxene grains, suggesting primary clinopyroxene to secondary clinopyroxene + orthopyroxene + brown amphibole.
Ilmenite	Trace	Trace						
Sulfide	Trace	Trace						Probably pyrrhotite
Orthopyroxene	Trace	Trace		0.4				Bleb-like grains associated with brown amphibole within clinopyroxene grain
Brown amphibole	Trace	Trace						Tiny grains replacing clinopyroxene with bleb-like orthopyroxene within clinopyroxene grains, and also thin rim on clinopyroxene.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Chlorite	2						Plagioclase	Reaction rim around olivine is about 0.5 mm wide
Actinolite	5						Olivine	
Talc	3						Olivine	

TOTAL ALTERATION: 10%

STRUCTURE: Thin section intensity of 1a overprinted by a 2; subgrains preserved in plagioclase and olivine. Overprinted by brittle deformation and veins associated with greenschist grade alteration.

PHOTOMICROGRAPHS:

1309D_52R_2_59_62_1

1309D_52R_2_59_62_2

THIN SECTION:	U1309D 53R-1, 50-52 cm	**Piece No.** 7	**Unit**: 122	**TS#: 212**	**OBSERVER: ABR, ESA, GH**
ROCK NAME:	Orthopyroxene-bearing Gabbro				
GRAIN SIZE:	Medium-grained				
TEXTURE:	Equigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	50	59		4.2	1.8		Subhedral to anhedral	Realtively fresh and shows bent lamellae. Smaller interstitial plagioclase grains must have been recrystallized. Intergranular boundaries show initiation of alteration.
Clinopyroxene		40		5.3	3		Subhedral to anhedral	Altered but still retains fresh areas.
Orthopyroxene	1	1		3			Anhedral	Moderately altered. Occasional occurrence.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite/tremolite	9						Pyroxene	Only thin rims around pyroxene
Brown hornblende	Trace			100	50		Pyroxene	
Chlorite	1						Vein filling	
Talc	Trace						Vein filling	

TOTAL ALTERATION: 10%

Structure: Thin section intensity of 1a overprinted by brittle deformation associated with greenschist grade to amphibolite alteration. Vein orientations show a strong preferred orientation, and the style of microcracking results in more brecciation of orthopyroxene than in clinopyroxene.

PHOTOMICROGRAPHS:

1309D_53R_1_50_52_1

1309D_53R_1_50_52_2

THIN SECTION:	U1309D 54R-1, 34-36 cm	**Piece No.** 4B	**Unit**: 126	**TS#: 213**	**OBSERVER: ABR, ESA**
ROCK NAME:	Oxide gabbro				
GRAIN SIZE:	Medium-grained				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	30	30	?	15.5	5		Anhedral	Plagioclase range in size from coarse-grained to medium grained.
Clinopyroxene	20	40		10.5	3.5		Anhedral	Moderately altered
Orthopyroxene	1	1		3.15			Anhedral	Moderately altered.
Oxides	20	20		3.5	1.5		Subhedral to anhedral	Ilmenite> magnetite. Magnetite has locally been consumed by actinolite-forming reaction
Hornblende	1	1	0.35		0.5			
Sulfide	Trace						Spherical blobs in ilmenite and pyroxene = sulfide melts?	Pyrhotite + chalcopyrite

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite	20						Pyroxene	
Brown hornblende	5				400		Pyroxene, hornblende	
Cummingtonite	1				1400		Pyroxene	
Titanite	Trace				180			Associated with ore

TOTAL ALTERATION: ca 25%

STRUCTURE : Thin section intensity of 1a, overprinted by greenschist grade brittle deformation. Numerous secondary fluid inclusion trails associated with microcracking.

PHOTOMICROGRAPHS:

1309D_54R_1_34_36_1
1309D_54R_1_34_36_2
1309D_54R_1_34_36_3
1309D_54R_1_34_36_4

THIN SECTION:	U1309D 54R-1, 106-109 cm	**Piece No.** 9		**Unit**: 126	**TS#: 214**		**OBSERVER: BRF, NH, GH, ESA**	
ROCK NAME:	Oxide gabbro							
GRAIN SIZE:	Coarse-grained							
TEXTURE:	Deformed							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Rock is too altered (and tectonically mixed) to determine abundances of phases in the protolith								
Clinopyroxene	25		?	11.5			Anhedral	Highly altered to amphiboles
Plagioclase			?	7			Anhedral	Show strong deformation and alteration. Twinning planes are usually bent or the crystals are broken. Cloudy appearance and undulatory extincion is common.
Oxide			0.2	3			Anhedral	Concentrated along grain boundaries

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Actinolite	40						Pyroxene	
Brown hornblende	1						Pyroxene, hornblende	
Cummingtonite	1						Pyroxene	
Titanite	12						Ilmenite	
Plagioclase	20							Considering the abundance of titanite it is unreasonable to assume that plagioclase retains original composition
Ilmenite	1							

TOTAL ALTERATION: 75%

STRUCTURE : Thin section intensity 5 (semibrittle texture). Undulatory extinction and microcracking in the plagioclase. Alteration of the plagioclase (albitization) associated with the brittle deformation. At least two brittle deformation events - early deformation associated with alteration and later crosscutting fractures. Local shear bands cut across the early brittle texture as well.

PHOTOMICROGRAPHS:

1309D_54R_1_106_109_1

1309D_54R_1_106_109_2

THIN SECTION:	U1309D 54R-2 57-59 cm	**Piece No.** 3b	**Unit**: 127	**TS#:215**			**OBSERVER:MA, ESA, GH**	
ROCK NAME:	Gabbro in contact with Troctolite, then intruded by Late magmatic-leucocratic vein							
GRAIN SIZE:	Medium-grained							
TEXTURE:	Difficult to assess due to intense alteration							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Troctolite section								
Plagioclase	15	40		2.5			Anhedral	The rim of the crystals are altered to chlorite and only the cores remain.
Olivine	0	56		2.8			Anhedral	Completely altered to tremolite and chlorite.
Pyroxene	2	3		0.7			Anhedral, intergranular	Occurs as small interstitial minerals and in places as inclusions in plagioclase
Spinel	1	1		0.5	0.4		Subhedral	Usually occurs as inclusions.
Gabbro	Note: Contact between the gabbro and troctolite is interfingering and is marked in some areas by a chlorite band. It might be difficult to tell the crosscutting relationship between the troctolite and the gabbro section based on this thin section							
Plagioclase	65	70	?	4.9	3		Anhedral	Moderately altered and cross cut by microfractures.
Pyroxene	25	30	?	4.5			Anhedral	

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Troctolite unit								
Talc	15						Olivine	It is observed in the core of the coronitic alteration texture of olivine.
Tremolite	25						Olivine, pyroxene	It forms the core of the coronitic alteration texture of olivine.
Chlorite	40						Olivine, plagioclase and in veins.	It forms the outer rim of the coronitic alteration texture of olivine, in contact with plagioclase. It is also in the center of the core.
Sulfides	3							In the core of the coronitic alteration texture of olivine.
Gabbro								
Actinolite/tremolite	7						Olivine	In vein and at the contact with troctolite. Replaces completely olivine with chlorite.
Chlorite	3						Olivine	Forms a rim around olivine due to reaction with plagioclase.

TOTAL ALTERATION: troctolite: 83% , gabbro: 10%

STRUCTURE : Thin section intensity 1a overprinted by a band of brecciation. At the thin section scale, and with the degree of alteration it is difficult to determine the presence of any pre-existing magmatic fabric. The zone of brecciation continues away from the main band. A small normal sense offset occurred on one shear band emanating from the primary brecciation.

THIN SECTION:	U1309D 54R-3 55-58 cm	**Piece No.** 3	**Unit**: 128	**TS#:** 216	**OBSERVER:** MA, JM, NH, GH
ROCK NAME:	Troctolite				
GRAIN SIZE:	Medium				
TEXTURE:	E' uigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Olivine	trace	70		4	3		Subhedral to euhedral, rounded, cumulus	Almost completely serpentinized
Plagioclase	10	30		5	2.5		Anhedral, interstitial	Almost completely altered
Clinopyroxene	trace	trace		3			Anhedral	Only one grain is observed
Chromian spinel	trace	trace		0.6			Subhedral, e' uant	Almost opa' ue

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Serpentine	30						Olivine	It forms a mesh texture after olivine. It can also be observed in the core of coronitic alteration texture of olivine with a rim of chlorite and tremolite.
Magnetite	10						Olivine, Chromite	It belongs to the mesh texture after olivine.
Tremolite	5						Olivine	It grows from the rim towards the core of the altered olivine (coronitic texture).
Chlorite	15						Olivine, Plagioclase, in veins	It forms the rim and part of the center of the altered olivine (coronitic texture).
Carbonate	1						In veins	
Prehnite	25						Plagioclase	

TOTAL ALTERATION: 85%

STRUCTURE : A magmatic foliation defined by preferred orientation of relict olivine is present within a pervasive alteration texture. There are no obvious subgrains in the trace amounts of unaltered olivine. Prehnite veins overprint chlorite alteration rims and cut across surrounding serpentine. Prehnite vein relationships include both blunted veins against microcracks in serpentine, and prehnite veins that die out in serpentinitic textures.

PHOTOMICROGRAPHS:

1309D_54R_3_55_58_1

1309D_54R_3_55_58_2

THIN SECTION:	U1309D 55R-3 88-90 cm	**Piece No.** 11		**Unit**: 131	**TS#: 217**		**OBSERVER: MD,nh, ESA**	
ROCK NAME:	Olivine Gabbro							
GRAIN SIZE:	Coarse-grained							
TEXTURE:	Seriate to nearly Equigranular							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**			**Composition**	**MORPHOLOGY**	**COMMENTS**
			min.	**max.**	**av.**			
Plagioclase	60	60		7.7	5		Subhedral to anhedral	Relatively fresh but shows bent lamellae
Pyroxene	20	25		5.6	3.5		Anhedral	Slightly altered. Occurs both as individual crystals and as interstitial mineral between coarse-grained plagioclase
Olivine	0	15	2	9.8			Anhedral	Completely replaced by talc and rimmed by chlorite

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron)**				**REPLACING / FILLING**	**COMMENTS**
			min.	**max.**	**av.**			
Actinolite/tremolite	15						Olivine, pyroxene	
Chlorite	5						Olivine, plagioclase	Form rims around olivine due to reaction with plagioclase
Talc	5						Olivine	Replaced completely olivine with tremolite.
Brown hornblende	2						Pyroxene	Relics.
Sulfides	1							
Magnetite	2						Olivine	

TOTAL ALTERATION: 30%

STRUCTURE : Thin section intensity of 1b, with a weak SPO of plagioclase. Brittle deformation overprint results in networks of anastomosing amphibole filled cracks. However, the surrounding plagioclase is not as pervasively microcracked as other samples.

PHOTOMICROGRAPHS:

1309D_55R_3_88_90_1

1309D_55R_3_88_90_2

THIN SECTION:	U1309D-56R-1 20-23 cm	**Piece No.** 3	**Unit**: 132/133	**TS#: 233**	**OBSERVER: BRF, JM, NH**
ROCK NAME:	Dunite				
GRAIN SIZE:	Unknown due to alteration				
TEXTURE:	Unknown due to alteration				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Olivine	0	90					Subhedral	Completely altered.
Clinopyroxene	1	4		5			Anhedral, interstitial to oikocrysttic	Almost completely altered. Because of the interstitial shape, size noted here is not very meaningful.
Plagioclase	0	5					Anhedral, interstitial	Completely altered. Because of the interstitial shape, size noted here is not very meaningful.
Chromian spinel	1	1		1.2			Subhedral, e' uant	Almost opa' ue
								This thin section consists of two parts: upper-right-sided half and lower-left side. The lower-left half is composed of completely serpentinized dunite with very samll amount of altered clinopyroxene. The upper-right half, plagiolcase-bearing dunite, is composed of completely altered olivine and plagioclase. The latter is rich in chromian spinel content compared to the former. Along the arbitrarily assumed boundary between these two areas, anhedral clinopyroxene grains of oikocrystic form are aligned.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Tremolite alteration								Typical tremolite-chlorite alteration
Talc	10							
Tremolite	69							
Chlorite	20							
Talc-Carbonate Rock								Typical talc-carbonate alteration produced by CO2 metasomatism
Carbonate	39						In matrix and in vein	
Talc	50						In matrix and in veins	
Sulfide	1						In matrix and in vein	
Tremolite	5						Diopside	
Chlorite	5						After Plagioclase	

TOTAL ALTERATION: 100%

STRUCTURE : The primary texture (1a) include pyroxene oikocrysts and <<1% olivine within talc-rich alteration. Opa' ue (magnetite?) enrichment cuts across pyroxene grains and veins, following twinning in cleavage planes and crenulation of talc across veins. Talc vein network has a systematic orientation, albeit branching, and may form shear bands. Tremolite is mixed in with the talc alteration, occasionally as single large grains.

PHOTOMICROGRAPHS:
1309D_56R_1_20_23_1
1309D_56R_1_20_23_2

THIN SECTION:	U1309D 56R-2, 104-106 cm	**Piece No.** 4B	**Unit**: 134	**TS#: 218**	**OBSERVER: ABR,nh, ESA**
ROCK NAME:	Troctolite				
GRAIN SIZE:	Coarse-grained				
TEXTURE:	Equigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	60	65		7	5		Subhedral to anhedral	Equigranular with olivine inclusions of various sizes.
Olivine	<20	34		6.9			Anhedral	Central part of olivine crystals are partly serpentinized, along the crystal boundaries, they develop corona texture.
Clinopyroxene	1	1		3.9			Anhedral and interstitial	Occurs as interstitial crystals.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Serpentine	6						Olivine	Forming mesh texture; seems to be late stage alteration
Talc	3						Olivine	Replacing some olivine in interior
Tremolite	3						Olivine	Replacing most ol around margins
Chlorite	5						Plagioclase	Distinct coronas around plagioclase
Magnetite	3						Olivine	Trains in the mesh

TOTAL ALTERATION: 20%

STRUCTURE : Primary texture of olivine and plagioclase preserved with no obvious LPO or subgrain boundaries to olivine (Thin section intensity 1a). Strong alteration overprint creates weak mesh-texture olivine (altered to magnetite and serpentine along mesh) and coronas around some olivine grains, and even, dark, continuous grain boundary alteration (chlorite mantled by needle-shaped talc-tremolite) around plagioclase. Microcrack density varies, but brittle deformation appears to have been alteration-related, and not an overprinting vein/fracture set.

PHOTOMICROGRAPHS:

1309D_56R_2_104_106_1
1309D_56R_2_104_106_2
1309D_56R_2_104_106_3
1309D_56R_2_104_106_4

THIN SECTION:	U1309D 56R-3 92-94 cm	**Piece No.** 9	**Unit**: 136	**TS#:** 219	**OBSERVER:** MA, JM, NH
ROCK NAME:	Dunite				
GRAIN SIZE:	Medium				
TEXTURE:	E' uigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Olivine	15	90		4			Subhedral to euhedral	Serpentinized.
Plagioclase	3	10		3			Anhedral	Altered, but still fresh plagioclase is observed.
Chromian spinel	1	1		1			Subhedral, e' uant	Almost opa' ue

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Serpentine	35						Olivine	Mesh texture.
Prehnite	25						Plagioclase	
Chlorite	5						Plagioclase, and in veins.	It forms a rim around the altered plagioclase at the contact with the altered olivine.
Magnetite	15						Olivine, Chromite	
Tremolite	Trace							

TOTAL ALTERATION: 80%

STRUCTURE : Minor amounts of fresh olivine only preserved at the center of mesh texture serpentine (+magnetite). No obvious LPO in the olivine (e.g. thin section intensity is 1a). The dominant texture is the alteration texture of serpentinized olivine and altered plagioclase (both thin, chlorite alteration on grain boundaries, and pervasive brown alteration in plane light. On one edge of the thin section, prehnite veins are apparent where they cut chlorite veins and other alteration; some prehnite veins are contiguous with seams of magnetite though.

PHOTOMICROGRAPHS:

1309D_56R_3_92_94_1
1309D_56R_3_92_94_2
1309D_56R_3_92_94_3
1309D_56R_3_92_94_4

THIN SECTION:	U1309D 56R-3 112-115 cm	**Piece No.** 11	**Unit**: 136	**TS#: 220**			**OBSERVER: ABR,nh, ESA**	
ROCK NAME:	Contact Olivine-bearing Gabbro - Troctolite							
GRAIN SIZE:	Coarse to Medium-grained							
TEXTURE:	Seriate							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Olivine-bearing Gabbro								
Olivine	0	1	?	?	0.7		Subhedral	Occasional occurrence in the gabbro part.
Plagioclase	69	69	?	8			Anhedral	Plagioclase grain size has a wide range. Small (0.7 mm ave) plagioclase crystals in the lower left portion of the slide are recrystallized.
Pyroxene	30	30	?	18			Anhedral	Occasional occurrence of interstitial clinopyroxene with the gabbro. Clinopyroxene occurs as very coarse-grained crystals
Troctolite	Note: The thin section shows that the troctolite melt intruded the olivine-bearing gabbro. The melt managed to push through intergranular spaces, incorporating some of the plagioclase from the gabbro.							
Olivine				1.7 - 3.3			Anhedral	Serpentized in some sections, but other sections remain fresh. Corona-texture, defined by chlorite band marks the contact between olivine and troctolite-plagioclase and gabbro derived plagioclase.
Plagioclase		?			1		Anhedral	Plagioclase crystallized from troctilte melt may be identified by their inter-cumulus form, as against the well-formed plagioclase dreived from the gabbro.
Pyroxene		?		1.75			Anhedral	Occurs as small intergranular crystals
	Note: The section is not representative of the rock due to large crystals of olivine.							

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Serpentine	30						Olivine	Forming mesh textures
Tremolite	7						Olivine	Rim around olivine; high concentration along contact zone
Chlorite	10						Plagioclase	Rim around plagioclase and in cracks
Prehnite	<1						Plagioclase	Only on some crystals
Magnetite	8						Olivine	In mesh
Carbonate	<1						Vein fillings	
Talc	5						Olivine	Concentrated along the contact zone

TOTAL ALTERATION: 60% for Troctolite; Gabbro almost unaltered

STRUCTURE : The gabbro has a thin section intensity scale of 2 with recrystallized plagioclase (many large grains are not recrystallized), and very minor recrystallization of pyroxene along grain boundaries. Within the troctolite there is a hint of an LPO to the olivine. The contact between the two is at a high angle to bands of recrystallized plagioclase (in the gabbro). However, alteration of the ultramafic, and localization of alteration at the contact, obscure the detailed structure of the contact.

PHOTOMICROGRAPHS:

1309D_56R_3_112_115_1

1309D_56R_3_112_115_2

THIN SECTION:	U1309D 57R-3 45-47 cm	**Piece No.** 3a	**Unit**: 137	**TS#:221**	**OBSERVER:MA, NH, ESA**
ROCK NAME:	Olivine-bearing Gabbro				
GRAIN SIZE:	Coarse-grained				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	72	72		6	1.7 - 3.3		Anhedral	Variable sizes but has interlocking grains in the unaltered part. Concentration of recrystallized plagioclase in observed in the shear band cutting the rock into two sections.
Pyroxene	20	25		7	3.3		Anhedral	Moderately altered
Olivine	0	3		4.2			Anhedral	Completely replaced by actinolite and chlorite.
Shear Zone								
	A shear zone occurs in the midsection of the slide and is composed of ground/recrystallized(?) pyroxene and plagioclase crystals.							

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Main rock								
Chlorite	15						Olivine	It forms the rim and part of the center of the coronitic alteration texture of olivine.
Tremolite/Actinolite	15						Olivine, Pyroxene and in veins.	It grows perpendicularly to the external chlorite rim and toward the center of the coronitic alteration texture of olivine.
3	5						Olivine	It is locally observed in the center of the coronitic alteration texture of olivine.
Magnetite	1						Olivine	In the core of the coronitic alteration texture of olivine.
Sulfides	Trace							In the core of the coronitic alteration texture of olivine.
Recrystallized plagioclase								Locally at edges of large plagioclase grains.
Shear zone								
Tremolite/Actinolite	40						Pyroxene	
Recrystallized plagioclase								Along the edges of the shear zone.

TOTAL ALTERATION: 35% in the host rock under the greenschist facoies.

STRUCTURE : Thin section intensity of (a weak) 3 or (strong) 2, and within a shear band at the center of the slide, intensity of 4. The more olivine rich side of the shear zone (west) preserves coronitic textures around olivine, but less so around recrystallized (dynamically) plagioclase. Plagioclase has overprinting subparallel fractures and veins. The pyroxene rich side (east) contains a green-brown vein (containing chlorite). The shear band comprises recrystallized pyroxene and plagioclase and relatively sharp shear zone boundaries. There may be a crude SC fabric indicating sinstral shear strain.

PHOTOMICROGRAPHS:

1309D_57R_3_45_47_1

1309D_57R_3_45_47_2

THIN SECTION:	U1309D 59R-3 96-99 cm	**Piece No.** 1A		**Unit**: 146	**TS#: 222**		**OBSERVER: MD, NH**	
ROCK NAME:	Olivine Gabbro							
GRAIN SIZE:	Coarse-grained							
TEXTURE:	Seriate and corona texture around the olivines.							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**			**Composition**	**MORPHOLOGY**	**COMMENTS**
			min.	**max.**	**av.**			
Plagioclase	60	60	0.53	6.8	4		Subhedral to anhedral	Relatively fresh. Many crystals show evidence of stress deformation. Some plagioclase crystals occur as inclusions in pyroxene.
Clinopyroxene	15-20	25		7.2	4.8		Anhedral,	Shows exsolution lamellae that are slightly bent.
Olivine	0	15		7.4	5.6		Anhedral	Completely altered to actinolite, chlorite and serpentine (2 forms of alteration process). Grains have well-developed corona texture. Some smaller olivines could have been present along grain boundaries of plagioclase, as suggested by the presence of alteration mineras identical to olivine pseudomorphs.

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron)**				**REPLACING / FILLING**	**COMMENTS**
			min.	**max.**	**av.**			
Actinolite/tremolite	15						Olivine, pyroxene	Pyroxene edges alteration, replaced completely olivine as pseudomorphic patches with chlorite, talc, magnetite and serpentine.
Chlorite	10						Olivine, plagioclase	
Serpentine	2						Olivine	In the center of coronitic textures after olivine.
Brown hornblende	2						Pyroxene	Relics
Magnetite	5						Olivine	
Talc	3						Olivine	

TOTAL ALTERATION: 37% due to olivine alteration.

STRUCTURE : Thin section intensity of 1a, with minor recrystallization of plagioclase and pyroxene (a very weak 2) and coronitic textures of irregularly shaped, but possibly flattened relict olivine (now completely altered).

PHOTOMICROGRAPHS:

1309D_59R_3_96_99_1

1309D_59R_3_96_99_2

THIN SECTION:	U1309D 60R-2 34-37 cm	**Piece No.** 3	**Unit**: 146/147	**TS#:** 223			**OBSERVER:** BRF, JM, NH	
ROCK NAME:	Contact between wehrlite (Unit 147) and gabbro (Unit 146)							
GRAIN SIZE:	Medium and corse (wehrlite), coarse? (gabbro)							
TEXTURE:	Poikilitic (wehrlite), equigranular ? (gabbro)							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Wehrlite								
Olivine	15	65		4	2		Subhedral, rounded	In the contact zone against the gabbro, olivine is completely altered.
Clinopyroxene	15	30		20			Anhedral, oikocryst	Size and modal percent are not very meaningful due to large oikocrysts of pyroxene
Plagioclase	0	5					Anhedral	Completely altered
Chromian spinel	1	1		0.6			Subhedral, equant	Very dark brown to opaque
Sulfide	Trace	Trace						
Gabbro								
Clinopyroxene				> 10			Anhedral, oikocryst?	The edge of the gabbro is visible only as a large partly altered clinopyroxene grain

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Wehrlite								
Serpentine	34							
Chlorite	10						Plagioclase	
Carbonate	Trace							
Sulfide	Trace							Occurs in veins cutting serpentine
Carbonate								
Magnetite	1						As dust and also repalcing sulfides	
Altered zone								
Tremolite	35						Olivine, pyroxene	
Talc	35						Olivine	After olivine
Chlorite	15						After plagiocalse	
Sulfide	1							Mainly close to altered pyroxene
Serpentine?								Some relicts in talc zones ?
Carbonate	15							Mainly in veins, aragonite or calcite

TOTAL ALTERATION: Wehrlite = 45%, Altered zone= 100%

STRUCTURE : Intense alteration on the margins of wehrlite with one domain completely replaced by talc and the other serpentinized (mesh texture) with pyroxene oikocrysts. Carbonate veins inclined just oblique to the serpentine texture cut all other features, including the corona and other static alteration.

PHOTOMICROGRAPHS:

1309D_60R_2_34_37_1
1309D_60R_2_34_37_2
1309D_60R_2_34_37_3
1309D_60R_2_34_37_4
1309D_60R_2_34_37_5
1309D_60R_2_34_37_6
1309D_60R_2_34_37_7

THIN SECTION:	U1309D 60R-3 55-58 cm	**Piece No.** 5	**Unit**: 147	**TS#:** 224	**OBSERVER:** BRF, JM, NH
ROCK NAME:	Olivine troctolite				
GRAIN SIZE:	Medium and coarse				
TEXTURE:	Equigranular and poikilitic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Olivine	20	72		5	3.5		Subhedral to euhedral, rounded	Almost serpentinized
Clinopyroxene	10	12		10			Anhedral, large oikocryst containing olivine grains	Rather fresh compared to other dominant phases. Because clinopyroxene is oikocryst, size noted here is not very meaningful.
Plagioclase	1	15		?			Anhedral intercumulus	Almost completely altered
Chromian spinel	1	1		0.5			Euhedral to subhedral, equant, cumulus	Very dark brown to opaque

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Serpentine	40						Olivine	
Chlorite	5						Rimming plagioclase pseudomorphs	
Prehnite + clay(?)	20						After Plagioclase	

TOTAL ALTERATION: 65%

Structure: Serpentinite texture with large scale alteration variation because of variable pyroxene content. Relict olivine has irregular shapes and could have been flattened somewhat.

PHOTOMICROGRAPHS:

1309D_60R_3_55_58_1
1309D_60R_3_55_58_2
1309D_60R_3_55_58_3
1309D_60R_3_55_58_4

THIN SECTION:	U1309D 61R-1 140-142 cm	**Piece No.** 21	**Unit**: 147/148	**TS#:225**			**OBSERVER:MA, NH, JM**	
ROCK NAME:	Contact between olivine-rich troctolite (Unit 147) and gabbro (Unit 148)							
GRAIN SIZE:	Unknnown (troctolite), coarse (gabbro)							
TEXTURE:	Unknown (troctolite), Unknown (gabbro)							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Olivine-rich troctolite								
Olivine	0	86		?			?	Due to complete serpentinization, primary characters are not fully estimated.
Plagioclase	0	8		< 1?			Anhedral, interstitial	Due to complete serpentinization, primary characters are not fully estimated.
Clinopyroxene	0	3		?			Anhedral, interstitial	Due to complete serpentinization, primary characters are not fully estimated.
Chromian spinel	2	3		0.5				
Gabbro								
Plagioclase	30	60		10			Anhedral to subhedral?	Due to large grain size, alteration and deformation, primary characters are not fully estimated.
Clinopyroxene	20	40		> 10			Anhedral, e' uant and interstitial	Due to large grain size, alteration and deformation, primary characters are not fully estimated.

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Gabbro								
Carbonate	30						In veins	
Prehnite	20						Plagioclase and in veins	
Chlorite	10							
Actinolite/Tremolite	5							
Olivine-rich troctolite								
Serpentine	60						Olivine	Mesh texture after olivine.
Chlorite	20						Plagioclase	It forms a rim around plagioclase
Tremolite	5						Plagioclase	It grows towards the core of the coronitic texture of the altered olivine.
Magnetite	15						Olivine, Chromite	Within the mesh texture after olivine.

TOTAL ALTERATION: 100% in the troctolite, 65% in the gabbro, decreasing with distance to the contact.

STRUCTURE : Serpentinite texture in the troctolite against coarse grained gabbro with no dynamic recrystallization (thin section intensity of 1a). Intense static alateration at the contact. Regularly spaced carbonate veins (two sets perpendicular to one another) cut across the contact, although the gabbro expresses the vein sets and related dense microcracking more prominently.

PHOTOMICROGRAPHS:

1309D_61R_1_140_142_1

1309D_61R_1_140_142_2

THIN SECTION:	U1309D 62R-1 85-88 cm	**Piece No.** 10A	**Unit**: 155	**TS#: 226**			**OBSERVER: MD, nh, ESA**	
ROCK NAME:	Gabbro protolith							
GRAIN SIZE:	Coarse-grained							
TEXTURE:	Brecciated							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**			**Composition**	**MORPHOLOGY**	**COMMENTS**
			min.	**max.**	**av.**			
Clinoyroxene		>50		11.2	?		Anhedral	Coarse grained crystals are preserved but has resorbed and very irregular boundaries.
Plagioclase				9.5	?		Anhedral(?)	Coarse-grained crystals are partly recrystallized, the rest may have been ground and recrystallization by brecciation process.
Mylonite matrix					0.3			Composed of recrystallized plagioclase and pyroxene with chlorite. Plagioclase forms thin narrow with preferred orientation.
Gabbroic Band	Note: The contact is marked by a sudden change in grainsize from fine-grianed recrystallized pyroxene and plagioclase in the brecciated matrix to the slightly larger-grained gabbroic band/intrusion(?).							
Plagioclase	70	70		2	1		Subhedral to Euhedral	Well-formed crystals with some showing faces but have cloudy appearance and blurred twinning probably due to recrystallization.
Pyroxene	0	15(??			0.5-0.7		Anhedral	Completely altered to amphibole
Olivine	0	15(?)		0.5	0.4		Anhedral	Completely replaced by actinolite

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron)**				**REPLACING / FILLING**	**COMMENTS**
			min.	**max.**	**av.**			
Actinolite/tremolite	30						Pyroxene, olivine	In vein, and replaced completely olivine with chlorite.
Brown hornblende	6						Pyroxene	Relics and in vein.
Secondary plagioclase	25							High temperature dynamic recrystallization?
Recristallized pyroxene	15							High temperature dynamic recrystallization?
Chlorite	4						Olivine, plagioclase	

TOTAL ALTERATION: 80%

STRUCTURE : Recrystallized plagioclase and pyroxene both along narrow bands within and along large grains, and within mylonitic zones (thin section intensity of 4). A coarse grained intrusion cuts the crystal plastic fabric with euhedral plagioclases around aggregates of fine grained actinolite. In some places relict green-brown hornblende is present at the margins of the actinolitic aggregate.

PHOTOMICROGRAPHS:

1309D_62R_1_85_88_1
1309D_62R_1_85_88_2
1309D_62R_1_85_88_3
1309D_62R_1_85_88_4
1309D_62R_1_85_88_5
1309D_62R_1_85_88_6
1309D_62R_1_85_88_7

THIN SECTION:	U1309D 63R-3 54-57 cm	**Piece No.** 6	**Unit**: 163	**TS#:227**	**OBSERVER:BRF, ESA, NH**
ROCK NAME:	Troctolitic gabbro				
GRAIN SIZE:	Coarse-grained				
TEXTURE:	E' uigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Olivine	20	64	85	5.6	3.8		Anhedral, nearly e' uigranular	Approximately 80% serpentinized, however some fresh grains are still present. Relict texture clearly shows cumulate protolith.
Plagioclase	4	30	10	5.2	2.8		Anhedral	Some fresh olivine in vein and also in matrix. Plagioclase grains show intercumulus morphology, growing interstitial to olivine crystals.
Clinopyroxene	6	6	5	6.6			Anhedral	Large (6.6 mm) clinopyroxene crystal occurs and is in contact with the plagioclase train. This large clinpyroxene has an olivine inclusion.
Spinel	<1	<1			0.2-0.4		Subhedral to anhedral	Occurs as inclusions in olivine and plagioclase.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Serpentine	60						After olivine	Form a mesh texture.
Chlorite	10						Rimming Plagioclase pseudomorphs	

TOTAL ALTERATION: 70%

STRUCTURE : Serpentinite surrounds round, fresh olivine grains, in places surrounded by pyroxene (thin section intensity 1a). A feldspar rich band in the center of the slide contains internal bands (cut by the margins of the feldspar rich domain) of prehnite, chlorite, and hydrogrossular. The banding of plagioclase alteration is roughly parallel to the trace of cross-hatched serpentinite.

PHOTOMICROGRAPHS:

1309D_63R_3_54_57_1
1309D_63R_3_54_57_2
1309D_63R_3_54_57_3
1309D_63R_3_54_57_4
1309D_63R_3_54_57_5

THIN SECTION:	U1309D-64R-2 11-14 cm	**Piece No.** 1B	**Unit**: 164/165	**TS#: 228**			**OBSERVER: AM, JM, NH**	
ROCK NAME:	Contact between dunite (Unit 163?) and gabbro (Unit 164)							
GRAIN SIZE:	Medium (dunite), coarse (gabbro)							
TEXTURE:	Equigranular, poikilitic (dunite)							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Dunite								
Olivine	40	90		4	2		Subhedral to euhedral, rounded	Kink band observed.
Plagioclase	3	10		2			Anhedral, interstitial to poikilitic	Due to interstitial shape, size data are not meaningful.
Chromian spinel	Trace	Trace		0.5			Subhedral to euhedral, equant	Almost opaque
Clinopyroxene	Trace	Trace		> 4			Anheral, interstitial	Including olivine grains. Due to interstitial shape, size data are not meaningful.
Gabbro								
Clinopyroxene	Too small area to estimate modal proportions			> 20			Anhedral to subhedral	Small bleb-like orthopyroxene grains in clinopyroxene grains are observed. Kinking of cleavage.
Plagioclase	Too small area to estimate modal proportions			> 8			Anhedral	Altered

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Serpentine	25						Olivine	Very variable intensity
Chlorite	5						Plagioclase	Thin rims in contact with olivine
Tremolite	<5						Olivine, pyroxene	Locally developed and probably overprinted by serpentine
Prehnite	<5						Plagioclase	Partial to complete replacement of some plagioclase, especially in serpentinized areas. Could be other Ca-rich phases present too

TOTAL ALTERATION: 35%

STRUCTURE : Preserved olivine grains between serpentinite and very minor (static) grain boundary alteration (in talc-chlorite field). Mostly a thin section scale 1a, although there might be a weak olivine LPO and olivine subgrain boundaries. Microcracking across relict pyroxene. Also noteworthy are well-developed kink bands across pyroxene grains.

PHOTOMICROGRAPHS:

1309D_64R_2_11_14_1
1309D_64R_2_11_14_2
1309D_64R_2_11_14_3
1309D_64R_2_11_14_4

THIN SECTION:	U1309D-64R-2, 24-27 cm	**Piece No.** 1B	**Unit**: 165	**TS#:** 229	**OBSERVER:** JM,NH
ROCK NAME:	Dunite				
GRAIN SIZE:	Medium				
TEXTURE:	Equigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Olivine	1	96		4	3		Subhedral to euhedral, rounded, cumulus	Almost completly serpentinized
Plagioclase	0	2		1			Anhedral, intercumulus	Completely altered
Clinopyroxene	1	1		4			Anhedral, intercumulus	Only one grain observed
Chromian spinel	1	1		1			Euhedral to subhedral, equant, cumulus	Almost opaque

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Serpentine	75						Olivine, and in veins	Mesh texture.
Chlorite	9						Plagioclase and in veins	In the transparent oblique vein that cut perpendicularly the black oblique vein.
Carbonate	Trace							Locally in the mesh texture.
Magnetite	15						Olivine, Chromite	
Biotite (?)	Trace						In vein	In the transparent oblique vein that cut perpendicularly the black oblique vein.
Apatite	Trace						In vein	In the transparent oblique vein that cut perpendicularly the black oblique vein.
Talc	Trace						In vein	In the transparent oblique vein that cut perpendicularly the black oblique vein.

TOTAL ALTERATION: 99%

STRUCTURE : Almost completely serpentinized peridotite. There is a second vein set of serpentine that cuts across (and locally recrystallizes) the mesh texture. One such vein is a local, brittle, shear band. This second vein set is locally cut by yet a third set of restricted extent.

PHOTOMICROGRAPHS:

1309D_64R_2_24_27_1

1309D_64R_2_24_27_2

THIN SECTION:	U1309D-64R-2 42-45 cm	**Piece No.** 2	**Unit**: 166	**TS#: 230**	**OBSERVER: BRF, JM**
ROCK NAME:	Mylonite (protolith gabbro?)				
GRAIN SIZE:					
TEXTURE:					

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase								Due to complete deformation, primary mineralogy not preserved
Clinopyroxene				5				Due to complete deformation, primary mineralogy not preserved
Orthopyroxene	Trace	Trace		5				Due to complete deformation, primary mineralogy not preserved

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Gabbro								
Prehnite	20						Replacing plagioclase	
Brown hornblende	Trace							
Actinolite	20						Clinopyroxene	
Breccia								
Clinopyroxene	20						Brecciated at high temperature	
Plagioclase	20							
Brown Hornblende	5						One band contains brown hornblende around pyroxene	
Actinolite	13							
Chlorite	15						Some chlorite-actinolie pseudomorphs after olivine	
Serpentine	2							Narrow serpentine band adjacent to gabbro
Prehnite	25						In veins and matrix	

TOTAL ALTERATION: Gabbro = 40%, Breccia = 100%

STRUCTURE : Thin section intensity 4; a well-developed mylonite zone in a relatively mafic rock (in comparison with other plagioclase-rich mylonites). Dominated by recrystallized pyroxene. Talc-, plagioclase-, and pyroxene- enriched bands parallel to the strain fabric. Cutting the mylonite are veins of prehnite and talc. The veins vary in composition along their trace; the birefringence of the prehnite changing within pyroxene rich domains. Plagioclase rich domains are intensely brecciated in the brittle field. Milky-white feldspar veins are possibly syntectonic with some of the brittle deformation.

PHOTOMICROGRAPHS:

1309D_64R_2_42_45_1

1309D_64R_2_42_45_2

THIN SECTION:	U1309D 65R-1 25-28 cm	**Piece No.** 5	**Unit**: 167	**TS#:** 231	**OBSERVER:** MD, JM, NH
ROCK NAME:	Olivine gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Poikilitic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Olivine	10	65		6	4		Suhedral	
Clinopyroxene	5	22		13			Anhedral, oikocryst	Clinopyroxene is an oikocryst so size described here is not very meaningful.
Plagioclase	2	12					Anhedral, intercumulus	Highly altered. Size and shape are unknown.
Chromian spinel	1	1		1			Subhedral, equant	Very dark brown to opaque. Contained in olivine, plagioclase, and clinopyroxene.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Serpentine	40						Olivine	Form a mesh texture after olivine with magnetite.
Chlorite	5						Plagioclase	Form rims around plagioclase due to reaction with olivine.
Prehnite	30						Plagioclase	Replace completely plagioclase.
Hydrogarnet	Trace						Plagioclase and prehnite	High relief isotropic mineral that gives a brownish color to prehnite.

TOTAL ALTERATION: 75%

STRUCTURE : Serpentinite with some unaltered olivine (no obvious LPO or subgrain boundaries) preserved within pyroxene oikocrysts. Mesh texture defines a serpentinite foliation generally not cut by later serpentine veins or veins of other composition. Some of the pyroxenes are altered to slightly brown amphibole, and are cut by serpentine veins and other microcracks.

PHOTOMICROGRAPHS:

1309D_65R_1_25_28_1
1309D_65R_1_25_28_2
1309D_65R_1_25_28_3
1309D_65R_1_25_28_4
1309D_65R_1_25_28_5
1309D_65R_1_25_28_6

THIN SECTION:	U1309D 65R-1 104-106 cm	**Piece No.**17	**Unit**: 167	**TS#:**232	**OBSERVER:** BRF, JM, NH
ROCK NAME:	Olivine-rich troctolite				
GRAIN SIZE:	Medium				
TEXTURE:	Poikilitic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Olivine	1	82		4	2		Euhedral to subhedral, rounded	Almost completely altered
Clinopyroxene	7	10		6			Anhedral, oikocrystic	Large oikocryst, so grains size mentioned here is not very meaningful. Highly altered.
Plagioclase	0	3		1			Anhedral	Completely altered
Sulfide	2	3		2			Anhedral	
Chromite	2	2		0.4			Euhedral to subhedral, e' uant	Very dark brown

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Serpentine	64						Olivine, pyroxene	
Chlorite	20						After plagioclase	
Magnetite	1						After sulfides and in matrix	

TOTAL ALTERATION: 85%

STRUCTURE : Serpentinite with trace olivine and trace pyroxene. Serpentine foliation is irregular and patchy, and large subrounded oxides are present in addition to the fine, disseminated oxides in the mesh texture. Very short and irregular "clean" serpentine veins cut the oxide rich mesh texture. Vuggy alteration textures involving chlorite are present, as are well-defined and continuous veins (possibly carbonate?) cutting all other textures.

PHOTOMICROGRAPHS:

1309D_65R_1_104_106_1
1309D_65R_1_104_106_2
1309D_65R_1_104_106_3

THIN SECTION:	U1309D 66R-1 35-38 cm	**Piece No.** 1D	**Unit**: 168/169	**TS#: 234**				**OBSERVER: MD, JM**	
ROCK NAME:	Olivine-rich troctolite hybridized with olivine-bearing gabbro								
GRAIN SIZE:	Medium (troctolite), medium (olivine-bearing gabbro)								
TEXTURE:									

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**			**Composition**	**MORPHOLOGY**	**COMMENTS**
			min.	**max.**	**av.**			
Troctolite								
Olivine	trace	85		8	5		Subhedral, rounded	Almost completely altered. Very large in grain size.
Plagioclase	8	15		2			Anhedral, interstitial	Almost fresh. Because of interstitial occurrence, size and modal proportion is not so meaningful.
Chromian spinel	trace	trace		0.3			Subhedral, equant	Very dark brown to opaque
Olivine-bearing gabbro								
Plagioclase				2	1		Anhedral to subhedral	Granular. In some case strong zonal structure observed.
Clinopyroxene				2	0.5		Anhedral	
Olivine				1			Anhedral	Altered. Difficult to distinguish olivines from the troctolite and from the gabbro. Smaller grains associated with clinopyroxene grains is assumed to be derived from the gabbro.

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron)**				**REPLACING / FILLING**	**COMMENTS**
			min.	**max.**	**av.**			
Serpentine	20						Olivine	Form mesh after olivine.
Secondary plagioclase	15							High temperature recrystallization?
Recrystallized pyroxene	10							High temperature recrystallization?
Chlorite	30						Olivine, Plagioclase	Form rims around plagioclase.
Actinolite/tremolite	5						Olivine, pyroxene	
Talc	5						Olivine	Replaced completely olivine.

TOTAL ALTERATION: 85%

STRUCTURE : Intensely recrystallized plagioclase and pyroxene (thin section intensity of 3), within completely altered ultramafic clasts (now serpentinite, chlorite, and amphibole). Interestingly, the grain shapes of the altered ultramafic clasts follows the crystal plastic texture although the internal serpentinite foliation is discordant with the strain-induced fabric. Any brittle overprint (including late veins) is small.

PHOTOMICROGRAPHS:

1309D_66R_1_35_38_1

1309D_66R_1_35_38_2

THIN SECTION:	U1309D-66R-1 126-128 cm	**Piece No.** 18	**Unit**: 172/173	**TS#: 235**				**OBSERVER: MD, JM, NH**	
ROCK NAME:	Troctolite (Unit 173) and gabbro? (Unite 172)								
GRAIN SIZE:	Medium (troctolite)								
TEXTURE:	Equigranular (troctolite)								

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Troctolite								
Olivine	10	70		3	2		Subhedral to anhedral	Highly altered
Plagioclase	10	30		2	1		Anhedral, interstitial	Altered to chlorite
Clinopyroxene	Trace	Trace		3	2		Anhedral, interstitial	
Chromian spinel	Trace	Trace					Anhedral, equant	Dark brown
o?	**Completely altered gabbro?**							
Olivine?								Completely altered.
Plagioclase?								Completely altered.
Zircon				0.3				Three grains of cfresh zircon are observed.

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Chlorite	30						Olivine, plagioclase	Form rims around altered olivine and in vein.
Serpentine	20						Olivine	Form a mesh texture after olivine.
Talc	15						Olivine	In vein and replaced completely olivine with chlorite + tremolite
Actinolite/tremolite	15						Olivine	

TOTAL ALTERATION: 80%

STRUCTURE : This thin section is proposed Unit 172, a 1cm-wide "leucocratic" dike in an otherwise troctolitic unit. The boundaries of the vein are large euhedral feldspar grains, now completely replaced by alteration minerals. The central mafic portion of the vein is talc, tremolite, and other amphiboles. The central portion of the vein possibly takes up some slip. Statically grown actinolite forms the outer margins of the magmatic vein grading into a troctolitic unit with patchy static amphibole and talc alteration and serpentinization. The mesh texture is poorly defined and all textures are cut by a late stage serpentine vein population (short, thin veins). Any additional brittle overprint is pretty minor.

PHOTOMICROGRAPHS:

1309D_66R_1_126_128_1

1309D_66R_1_126_128_2

THIN SECTION:	U1309D-66R-2 10-13 cm	**Piece No.** 3	**Unit**: 173	**TS#:** 236	**OBSERVER:** MA, JM, NH
ROCK NAME:	Troctolite				
GRAIN SIZE:	Medium				
TEXTURE:	Equigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Olivine		87		5	3		Subhedral, cumulus shape	Almost serpentinized. Alignment of olivine long axis almost vertical.
Plagioclase		10		3			Anhedral, interstitial	Long axis direction of interstitial space occupied by plagioclase aligned almost vertically
Clinopyroxene		2		7			Anhedral, interstitial/oikocrystic	
Chromian spinel		1		< 0.5			Subhedral, equant	Almost opaque

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Serpentine	35						Olivine	Mesh texture.
Chlorite	25						Plagioclase	It forms a rim around the plagioclase at the contact with olivine.
Tremolite	5						Olivine	In the core of the coronitic alteration texture of olivine, next to the chlorite rim.
Prehnite	5						Plagioclase	
Carbonate	Trace							
Magnetite							Olivine	In the mesh texture

TOTAL ALTERATION: 70%

STRUCTURE : Serpentinized ultramafic with some relict olivine showing undulatory extinction but no obvious LPO. The serpentinite texture is a oxide-defined mesh texture crosscut by a later population of serpentine veins.Vuggy alteration includes chlorite, prehnite, and hydrogrossular forming interesting banded alteration textures.

PHOTOMICROGRAPHS:

1309D_66R_2_10_13_1
1309D_66R_2_10_13_2
1309D_66R_2_10_13_3

THIN SECTION:	U1309D 68R-1 126-128 cm	**Piece No.** 9		**Unit**: 178	**TS#: 237**			**OBSERVER: MD, ESA**	
ROCK NAME:	Orthopyroxene-bearing oxide gabbro								
GRAIN SIZE:	Medium to coarse-grained								
TEXTURE:	Seriate								

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	45	45		5.6	2.4-3.1		Subhedral to anhedral	Shows resorbed boundaries, especially those that are in contact with actinolite/tremolite. Some crystals are split into sections by tremolite.chlorite veins and veinlets.
Clinopyroxene	~25	42		7	2.5		Anhedral	Crystals near the chlorite/tremolite vein are completely altered to hornblende. Other crystals are moderately altered but still have some fresh parts.
Orthopyroxene	1	3		~3.5			Anhedral(?)	Altered to talc and tremolite/actinolite but still have some fresh crystal core sections and small grains left.
Oxide	10	10	0.1	1.8	0.7		Subhedral to anhedral	Ilmenite/Ti-magnetite. Some crystals have skeletal form.

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Actinolite/tremolite	35						Pyroxene, olivine	Partially replaces orthopyroxene.
Chlorite	2						Olivine	
Talc	15						Pyroxene	Replaces orthopyroxene.
Brown hornblende	5						Pyroxene	Relics
Sulfides	5							

TOTAL ALTERATION: 62%

STRUCTURE : Thin section intensity of 1b in gabbro, overprinted by a band of oxide gabbro with a thin section intensity of 1a. The magmatic assemblage is overprinted by high temperature amphibole veins that do not contain magmatic oxide. Brittle deformation associated with greenschist alteration overprints the entire assemblage. Microcracks associated with greenschist alteration do not show a preferred orientation.

PHOTOMICROGRAPHS:

1309D_68R_1_126_128_2

THIN SECTION:	U1309D 69R-1 6-8 cm	**Piece No.** 1	**Unit**: 179	**TS#: 238**	**OBSERVER: MD, JM, GH**
ROCK NAME:	Oxide Gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Equigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	40	45		4	1.5		Originally subhedral to anhedral	Deformed and recrystallized.
Clinopyroxene	25	45		4	1.5		Anhedral	Cleavage/parting possibly with thin exsolution of oxide. Containing tiny rounded oxide. Replaced by brown amphibole. Altered to greenish amphibole.
Oxide		10		4			Interstitial	
Orthopyroxene?	0	Trace					Anhedral?	One completely altered grain replaced by talc-bearing assemblages

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite/tremolite	35						Pyroxene	Replaces partially to completely pyroxene.
Brown hornblende	5						Pyroxene	Relics.
Secondary plagioclase	10							High temperature dynamic recrystallization?
Recrystallized pyroxene	2							High temperature dynamic recrystallization?
Chlorite	2						Olivine.	Replaces completely olivine.
Talc	5						Pyroxene	Replaces completely pyroxene.

TOTAL ALTERATION: 59%

STRUCTURE : Thin section intensity 1a overprinted by 2. The rock was subsequently overprinted by microcracking (which show a weak preferred orientation) associated with greenschist grade alteration. While there is not a strong magmatic foliation defined by plagioclase or pyroxene, pockets of oxide in the central region of the thin section display a SPO.

PHOTOMICROGRAPHS:

1309D_69R_1_6_8_1
1309D_69R_1_6_8_2
1309D_69R_1_6_8_3
1309D_69R_1_6_8_4

THIN SECTION:	U1309D-69R-2, 16-18 cm	**Piece No.** 1	**Unit**: 182	**TS#:** 239	**OBSERVER:** MD, JM
ROCK NAME:	Gabbro and olivine gabbro				
GRAIN SIZE:	Medium (gabbro), medium (olivine gabbro)				
TEXTURE:					

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Gabbro								
Plagioclase	55	65		4	1.5		Anhedral to subhedral	
Clinopyroxene	10	35		2	1.5		Subhedral	Partings (or exsolution lamella) parallel to (001) and (110)/(100) are very common, which are also observed in other oxide gabbros. Altered to amphibole.
Orthopyroxene	Trace	Trace		0.5			Anhedral	Associated with clinopyroxene grains
Opaque	Trace	Trace		<0.05			Equant	
Olivine gabbro								
Olivine	5<	35		3	2		Subhedral	Chadacrysts in clinopyroxene oikocryst. Almost serpentinized.
Plagioclase	15	20		5			Subhedral to anhedral	Interstitial and also as chadacryst in clinopyroxene oikocryst
Clinopyroxene	10	45		20			Anhedral	Large oikocryst. Because a large clinopyroxene oikocryst is contained, modal proportion and grain size data noted here are not very meaningful.
Opaque	Trace	Trace					Equant	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Talc	15						Olivine	Replace completely or partially olivine with magnetite, tremolite and serpentine.
Chlorite	10						Olivine, plagioclase	Form rims around olivine due to reaction with plagioclase.
Actinolite/tremolite	15						Olivine	Replace partially pyroxene.
Serpentine	10						Olivine	
Magnetite	5						Olivine	

TOTAL ALTERATION: 55%

STRUCTURE : Some minor recrystallization in plagioclase and pyroxene gabbroic domain, but overall a 1a on the thin section intensity scale overprinted by talc-tremolite and chlorite-actinolite alteration (chlorite around plagioclase grain boundaries, talc-actinolite pervasive in vugs and interstices). Penetrative microcracking, much chlorite veining, forms parallel sets, microcracking the feldspar-rich portions of the rock. A poorly defined and intensely altered contact with a more ultramafic portion of the slide coincides with increased abundance of opaque minerals.

PHOTOMICROGRAPHS:

1309D_69R_2_16_18_1

1309D_69R_2_16_18_2

THIN SECTION:	U1309D 69R-2 128-131 cm	**Piece No.** 4G	**Unit**: 183	**TS#: 240**	**OBSERVER: MD, JM, GH**
ROCK NAME:	Troctolitic gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Equigranular, poikilitic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	40	55		5	3		Subhedral to anhedral	
Olivine	15	30		5	3		Subhedral to anhedral	Kink-band is observed.
Clinopyroxene	15	15		15			Anhedral, oikocrystic	Due to oikocrystic morphology, grain size is not very meaningful. "Interfingering" texture is observed.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Talc	15						Olivine	
Chlorite	5						Olivine	
Serpentine	20						Olivine	Forms mesh texture with magnetite after olivine.
Magnetite	5						Olivine	
Actinolite/tremolite	5						Olivine	
Prehnite	5						Plagioclase	Replaces partially plagioclase.
Carbonate	10						Olivine	Replaces completely olivine with tremolite and +/- talc.

TOTAL ALTERATION: 65%

STRUCTURE : Thin section intensity 1b overprinted by brittle deformation associated with greenschist grade alteration. Olivine can be quite fresh, and is slightly deformed with subgrains boundaries. Following talc formation in olivine, a late vein with well develped cross fibers (when cutting plagioclase and clinopyroxene) crosscuts the entire assembalge. Where the vein crosscuts altered olivine grains, it consists of carbonate; where it cuts plagioclase, there is reaction rim forming a mineral with low birefringence.

PHOTOMICROGRAPHS:

1309D_69R_2_128_131_1

1309D_69R_2_128_131_2

THIN SECTION:	U1309D 70R-1 19-21 cm	**Piece No.** 2	**Unit**: 183	**TS#: 241**	**OBSERVER: MD, JM, GH**
ROCK NAME:	Troctolitic gabbro with vein				
GRAIN SIZE:	Medium				
TEXTURE:	Equigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	35	55		4	2.5		Anhedral to subhedral	Except for the veining area, almost fresh
Olivine	30	45		5	2.5		Anhedral to subhedral	Except for the veining area, almost fresh. Kink-band is observed.
Clinopyroxene	5	10		15			Anhedral, oikocrystic	Due to oikocrystic shape, grain size is not meaningful.
Zircon	Trace	Trace		< 0.1			Euhedral	Near the vein, possible related to veining

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Serpentine	25						Olivine	Forms a mesh texture with magnetite after olivine. In vein.
Magnetite	5						Olivine	
Actinolite/tremolite	10						Olivine	Replace completely olivine with chlorite. In vein.
Chlorite	15						Olivine, plagioclase	Forms a rim around olivine due to reaction with plagioclase.
Prehnite	10						Plagioclse	Replaces partially plagioclase.
Brown hornblende	2						Pyroxene	Relics.

TOTAL ALTERATION: 57%

STRUCTURE : Thin section intensity of 1b overprinted by brittle deformation associated with greenschist alteration. There is a relatively strong preferred orientation of microcracks associated with the initial brecciation event. These are overprinted by at least two sets of veins with different orientations.

PHOTOMICROGRAPHS:

1309D_70R_1_19_21_1

1309D_70R_1_19_21_2

THIN SECTION:	U1309D 70R-2 39-42 cm	**Piece No.** 1B	**Unit**: 183	**TS#:** 242	**OBSERVER:** MD, JM, NH
ROCK NAME:	Troctolite				
GRAIN SIZE:	Medium				
TEXTURE:	Equigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Olivine	10	60		8	5		Subhedral to anhedral	Serpentinized
Plagioclase	25	40		6	4		Subhedral to anhedral	Weak alignment with almost vertical direction
Chromian spinel	Trace	Trace		1			Subhedral, equant	Almost opaque

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Serpentine	40						Olivine	Mesh texture after olivine with magnetite.
Chlorite	5						Olivine, plagioclase	Form rim around olivine due to reaction with plagioclase.
Magnetite	10						Olivine	
Prehnite	15						Plagioclase	Replaced partially plagioclase.

TOTAL ALTERATION: 70%

STRUCTURE : Serpentinite with relict olivine (possibly exhibiting an LPO and poorly defined subgrain boundaries). The two populations of serpentinite veins defining the mesh texture are at a high angle to one another, the steeply dipping set is more oxide rich and apparently cut by the shallowly dipping set. Microcracking is localized within the plagioclase and the cracks (veins) are filled with amphibole (not chlorite, although prehnite or carbonate have not been ruled out).Plagioclase rich areas are modestly recrystallized (2).

PHOTOMICROGRAPHS:

1309D_70R_2_39_42_1

1309D_70R_2_39_42_2

THIN SECTION:	U1309D-70R-3 86-88 cm	**Piece No.** 1B	**Unit**: 183	**TS#:243**	**OBSERVER:NH, MD, JM**
ROCK NAME:	Troctolite				
GRAIN SIZE:	Medium				
TEXTURE:	Equigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	65	65		5	3		Subhedral	Almost fresh
Olivine	35	35		5	3		Subhedral to anhedral, rounded	Almost completely fresh except for serpentine filling cracks within grains. Kink-band due to deformation is observed.
Clinopyroxene	trace	trace		3			Anhedral, interstitial	Grain size noted here is not meaningful because of interstitial occurrence of clinopyroxene.
Chromian spinel	trace	trace		0.2			Euhedral, equant	Very dark brown to opaque

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Serpentine	3							Forms a thin mesh after olivine

TOTAL ALTERATION: 3%

STRUCTURE : Nearly unaltered troctolite with a dynamic recrystallization texture around the grain boundaries of large plagioclase. Olivine shows subgrain boundaries, in places essentially twin lamellae. There is no obvious olivine LPO however. Imposed microcrack network is densest in the olivine, but serpentinization and veining is virtually non-existent.

PHOTOMICROGRAPHS:

1309D_70R_3_86_88_1
1309D_70R_3_86_88_2
1309D_70R_3_86_88_4

THIN SECTION:	U1309D 71R-3 61-63 cm	**Piece No.** 6	**Unit**: 184	**TS#:244**	**OBSERVER:MA, NH, JM**
ROCK NAME:	Troctolite				
GRAIN SIZE:	Medium to coarse				
TEXTURE:	E' uigranular to seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	65	75		> 6	3		Subhedral to anhedral	Almost fresh,
Olivine	0	20		3	2		Subhedral to anhedral	Completely altered
Clinopyroxene	2	4		?			Anhedral, interstitial	Due to interstitial morphology, grain size data not available.
Opa' ue	1	1		0.5			E' uant	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Tremolite	30						Olivine, Pyroxene	It forms the core of the coronitic alteration texture of olivine.
Chlorite	40						Olivine, Plagioclase and in veins cutting plagioclase.	It forms the outer rim of the coronitic alteration texture of olivine, in contact with plagioclase. It is also in the center of the core.

TOTAL ALTERATION: 60%

STRUCTURE : Static alteration has completely replaced olivine grains with fibrous talc-tremolite aggregates within chlorite rims. Plagioclase is relatively well preserved with recrystallized grain boundaries Microcracking of plagioclase is modest, and there is no vein population; microcracks do not cut (but may radiate outward from) alteration textures. Some intersections of plagioclase grain boundaries preserve an earlier green-brown, hornblende-like amphibole.

PHOTOMICROGRAPHS:

1309D_71R_3_61_63_1

1309D_71R_3_61_63_2

THIN SECTION:	U1309D 72R-1 81-83 cm	**Piece No.** 1C	**Unit**: 185	**TS#: 245**	**OBSERVER: MD, NH, JM**
ROCK NAME:	Olivine gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Equigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	65	65		6	4		Subhedral to anhedral	Almost fresh and very weak deformation
Olivine	3	10		2.5	2		Subhedral to anhedral	Olivine grains are usually contained in/surrounded by clinopyroxene oikocryst.
Clinopyroxene	10	25		?			Anhedral, interstitial/oikocrystic	Size is unknown due to interstitial/oikocrystic morphology
Opaque	Trace	Trace		0.3			Equant	Oxide

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Chlorite	10						Olivine, plagioclase	Forms rim around olivine due to reaction with plagioclase.
Actinolite/tremolite	15						Olivine, pyroxene	Replaces completely olivine with chlorite +/- talc +/- carbonate (coronitic texture)and alteration of pyroxene edges.
Talc	5						Olivine	
Carbonate	5						Olivine	
Serpentine	2						Olivine	Forms a thin mesh after olivine.
Prehnite	trace						Plagioclase	

TOTAL ALTERATION: 37% due to olivine alteration

STRUCTURE : Plagioclase-pyroxene-olivine gabbroic texture with very modest recrystallization of plagioclase, and partial Talc-tremolite alteration of olivine. Olivine does not show evidence for strain. The noteworthy property of this slide is that the pyroxene is altered to a green-brown amphibole at its centers, but the unaltered mantles of the pyroxene grains are unaltered at the contacts with the plagioclase. Microcracking and some thin chlorite veining of the plagioclase is evident.

PHOTOMICROGRAPHS:

1309D_72R_1_81_83_1

1309D_72R_1_81_83_2

THIN SECTION:	U1309D 73R-2 72-75 cm	**Piece No.** 6		**Unit**: 193		**TS#:246**		**OBSERVER:MA, JM**
ROCK NAME:	Olivine gabbro							
GRAIN SIZE:	Medium to coarse							
TEXTURE:	E' uigranular to seriate							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**			**Composition**	**MORPHOLOGY**	**COMMENTS**
			min.	**max.**	**av.**			
Plagioclase	65	70		8	3		Anhedral to subhedral	Almost fresh, very weak deformation
Olivine	3	15		4	3		Anhedral to subhedral	
Clinopyroxene	10	15		5			Anhedral, interstitial	

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron)**				**REPLACING / FILLING**	**COMMENTS**
			min.	**max.**	**av.**			
Brown hornblende	Trace						Pyroxene	It locally forms a thin rims around the pyroxene.
Tremolite	15						Olivine, Pyroxene	It forms the core of the coronitic alteration texture of olivine.
Chlorite	20						Olivine, Plagioclase and in veins cutting plagioclase.	It forms the outer rim of the coronitic alteration texture of olivine, in contact with plagioclase. It is also in the center of the core.

TOTAL ALTERATION: 35%

STRUCTURE : Thin section intensity1a overprinted by brittle deformation assoicated with greenschist alteration. Microcracks do not show a preferred orientation in this thin section. The chlorite formed from reaction between olivine and plagioclase is overprinted by chlorite actinolite veins.

PHOTOMICROGRAPHS:

1309D_73R_2_72_75_1
1309D_73R_2_72_75_2
1309D_73R_2_72_75_3

THIN SECTION:	U1309D-74R-1 102-105 cm	**Piece No.** 7		**Unit**: 196		**TS#: 247**		**OBSERVER: MD, NH, JM**	
ROCK NAME:	Orthopyroxene-bearing anorthositic gabbro								
GRAIN SIZE:	Medium								
TEXTURE:	Equigranular to seriate								

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**			**Composition**	**MORPHOLOGY**	**COMMENTS**
			min.	**max.**	**av.**			
Plagioclase	86	86		8	4		Anhedral to subhedral	Almost fresh and slightly deformed.
Clinopyroxene	7	10		5	2.5		Anhedral to subhedral	Altered to amphibole
Orthopyroxene	3	4		> 6	2.5		Anhedral to subhedral	Very thin exsolution lamella of clinopyroxene parallel to (100). Altered to talc

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron)**				**REPLACING / FILLING**	**COMMENTS**
			min.	**max.**	**av.**			
Actinolite/tremolite	5						Pyroxene	
Talc	10						Pyroxene (orthopyroxene)	Form a mesh texture after pyroxene.

TOTAL ALTERATION: 15%

STRUCTURE : Plagioclase rich, pyroxene present, olivine-absent gabbroic-textured rock. Recrystallization and internal strain of the plagioclase is a thin section intensity of 2. Microcracks, veining, and alteration are minor. Pyroxene alteration to hornblende is patchy, but alteration is more central to the grains (as opposed to toward the grain boundaries).

PHOTOMICROGRAPHS:

1309D_74R_1_102_105_1
1309D_74R_1_102_105_2
1309D_74R_1_102_105_3
1309D_74R_1_102_105_4

THIN SECTION:	U1309D-74R-3 84-87 cm	**Piece No.** 6	**Unit**: 197/198	**TS#: 248**			**OBSERVER: MD, NH, JM**	
ROCK NAME:	Contact between olivine gabbro (Unit 198) and gabbro dike (Unit 197)							
GRAIN SIZE:	Medium (olivine gabbro), coarse (gabbro)							
TEXTURE:	Equigranular (olivine gabbro), equigranular (gabbro)							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Olivine gabbro								
Plagioclase	60	65		5	2		Anhedral	
Olivine	10	15		4	2		Anhedral to subhedral	
Clinopyroxene	10	20		> 5	3		Anhedral, rquant to subequant	
Gabbro								
Plagioclase				> 6			Anhedral	Too coarse grain size to estimate primary characteristics.
Clinopyroxene				> 23			Anhedral	Large clinpyroxene grain extends into the medium-grained olivine gabbro, possibly suggesting that the olivine gabbro was not completely solidified when the coarse-grained gabbro intruded. "Interfingering" texture is observed.

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Carbonate	10						Olivine	Replaces completely olivine.
Serpentine	5						Olivine	Forms a thin mesh after olivine
Chlorite	20						Olivine, plagioclase	Forms a rim around olivine due to reaction with plagioclase.
Actinolite/tremolite	10						Olivine, pyroxene	Replaces completely olivine witrh talc or forms rim with magnetite and talc around olivine.
Talc	5						Olivine	
magnetite	5						Olivine	

TOTAL ALTERATION: 55%

STRUCTURE : Intrusive contact of coarse-grained gabbro (Unit 197) into medium-grained olivine gabbro (Unit 198) is observed in this thin section. Large clinpyroxene grain of the coarse-grained gabbro extends into the medium-grained olivine gabbro, possibly suggesting that the olivine gabbro was not completely solidified when the coarse-grained gabbro intruded. Olivine grains are well-preserved within dominantly talc-tremolite alteration. The olivine exhibits no obvious LPO or subgrains. Pyroxenes are fractured and a bit altered, but not to a large extent (I.e. not to amphibole). Plagioclase exhibits some internal strain near twin lamellae. The low temperature alteration is most prominent with prehnite and hydrogrossular. The brittle deformation, however, is minor.

PHOTOMICROGRAPHS:

1309D_74R_3_84_87_1

1309D_74R_3_84_87_2

THIN SECTION:	U1309D 75R-2 77-80 cm	**Piece No.** 2A	**Unit**: 200	**TS#: 249**			**OBSERVER: MD, JM**	
ROCK NAME:	Gabbro cut by epidote-bearing vein							
GRAIN SIZE:	Coarse							
TEXTURE:	Equigranular?							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Gabbro								
Plagioclase				> 12				Due to veining and resultant high alteration, primary information is very limited.
Olivine or orthopyroxene	0			> 4				Due to veining and resultant high alteration, primary information is very limited.
Clinopyroxene				> 8				Due to veining and resultant high alteration, primary information is very limited.
Zircon	Trace	Trace		0.4				Maybe related to epidote-bearing vein

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Carbonate	5						In veins.	
Actinolite/tremolite	20						Pyroxene, brown hornblende.	
Chlorite	3						Plagioclase	
Secondary plagioclase	10						Plagioclase	
Epidote	30						Pyroxene	
Brown hornblende	2							
Titanite	10							

ALTERATION: 75%

STRUCTURE : Thin section intensity 1a overprinted by a brecciation event that results in extreme undulatory extinction and possibly semibrittle flow of plagioclase. Epidote within the breccia zone also exhibits undulose extinction. The brecciation also results in alteration of the plagioclase (probably albite), resulting in a nice "image" of the microcrack network. The brecciation event is subsequenty overprinted by carbonate veins.

PHOTOMICROGRAPHS:

1309D_75R_2_77_80_1

1309D_75R_2_77_80_2

THIN SECTION:	U1309D -76R-1 98-101 cm	**Piece No.** 4	**Unit**: 204	**TS#:250**	**OBSERVER:NH, JM, MA**
ROCK NAME:	Olivine gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Equigranular to seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	62	65		5	3		Anhedral to subhedral	Almost no deformation
Olivine	13	15		4	3		Anhedral to subhedral	Irregular-shaped, in general.
Clinopyroxene	18	20		5	4		Anhedral to subhedral	Tiny bleb-like orthopyroxene grains are contained along the cleavage of clinopyroxene.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Chlorite	6						Olivine, Plagioclase, and in veins	It forms a rim around plagioclase in contact with olivine. It is also in the center of the coronitic alteration texture of olivine.
Tremolite	6						Olivine	It forms the center of the coronitic alteration texture of olivine.
Serpentine	1						Olivine	Mesh texture.
Talc	Trace						Olivine	
Magnetite	2						Olivine	Mesh texture.

TOTAL ALTERATION: 15

STRUCTURE : Olivine grains are well-preserved within dominantly talc-tremolite alteration. The olivine exhibits no obvious LPO or subgrains. Pyroxenes are fractured and altered (partly a problem with incomplete polish as was a previous mention of mantle-core alteration). Plagioclase exhibits very little internal strain near twin lamellae. Brittle deformation and low-temperature alteration is significant.

PHOTOMICROGRAPHS:

1309D_76R_1_98_101_1

1309D_76R_1_98_101_2

THIN SECTION:	U1309D-77R-1 8-11 cm	**Piece No.** 2	**Unit**: 204	**TS#: 251**	**OBSERVER: MD, JM**
ROCK NAME:	Olivine gabbro				
GRAIN SIZE:	Medium to coarse				
TEXTURE:	Equigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	40	50		> 6	4		Subhedral to anhedral	Almost fresh
Olivine	20	30		5	3		Subhedral to anhedral	Almost fresh. Kink-band is observed.
Clinopyroxene	15	20		8	3		Subhedral to anhedral, poikilitic	Tiny, bleb-like and lamellae-like orthopyroxene crystals are observed along clinopyroxene cleavage.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Serpentine	25						Olivine	Forms mesh texture with magnetite after olivine.
Magnetite	5						Olivine	
Prehnite	10						Plagioclase	Replaces partially plagioclase.
Chlorite	2						Olivine, plagioclase	Forms few thin rims around olivine.
Actinolite/tremolite	5						Olivine	Replaces completely olivine with chlorite in a small zone of the thin section.

TOTAL ALTERATION: 47%

STRUCTURE : Thin section intensity 1b overprinted brittle deformation associated with greenschist grade alteration. There is a strong preferred orientation of closely spaced microcracks in regions where serpentine ribbons within olivine extend into plagioclase.

PHOTOMICROGRAPHS:

1309D_77R_1_8_11_1

1309D_77R_1_8_11_2

THIN SECTION:	U1309D-77R-3 61-63 cm	**Piece No.** 1	**Unit**: 204	**TS#: 252**	**OBSERVER: MD, JM**
ROCK NAME:	Olivine gabbro				
GRAIN SIZE:	Medium to coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	70	65		> 10	3		Anhedral to subhedral	Slightly altered
Olivine	15	20		6	3		Anhedral	Almost fresh. Kink-band is observed. Serpentinized from peripheral.
Clinopyroxene	10	15		> 7	3		Anhedral, equant to subequant prismatic	
Orthopyroxene	Trace	Trace		3			Anhedral	Altered to talc-bearing assemblage. Very thin exsolution lamella of clinopyroxene parallel to (100)

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Serpentine	5						Olivine	Forms a thin mesh texture after olivine.
Magnetite	5						Olivine	
Chlorite	10						Olivine, plagioclase	Forms a rim around olivine due to reaction with plagioclase.
Actinolite/tremolite	5						Olivine, pyroxene	
Talc	20						Olivine	Forms rims around olivine with magnetite and tremolite.
Prehnite	10						Plagioclase	Replaces partially plagioclase.

TOTAL ALTERATION: 55%

STRUCTURE : Thin section intensity of 1b overprinted by brittle deformation associated with greenschist grade alteration. The magmatic fabric is defined by SPO of plagioclase and augite. Some olivine grains exhibit subgrain boundaries. There appear to be three stages of brittle deformation: Closely spaced microcracks with a strong preferred orientation are overprinted by radial chlorite filled cracks (which actually overprint a chlorite reaction rim between olivine and plagioclase), and finally cracks associated with the formation of late narrow veins with high birefringence (likely prehnite).

PHOTOMICROGRAPHS:

1309D_77R_3_61_63_1

1309D_77R_3_61_63_2

THIN SECTION:	U1309D 77R-4 56-59 cm	**Piece No.** 2A	**Unit**: 206	**TS#: 253**	**OBSERVER: MD, JM**
ROCK NAME:	Olivine gabbro				
GRAIN SIZE:	Coarse to medium				
TEXTURE:	Seriate to equigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	50	50		6			Anhedral to subhedral	
Olivine	20	25		5			Anhedral to subhedral	
Clinopyroxene	25	25		8	4		Anhedral to subhedral. Equant	Tiny bleb-like/lamellae-like orthopyroxene grains along cleavages are contained.
Opaque	Trace	Trace		0.3			Equant	Oxide and sulfide

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Serpentine	25						Olivine	Forms mesh texture with magnetite after olivine. In cracks.
Magnetite	5						Olivine	
Prehnite	10						Plagioclase	Replaces partially plagioclase.
Chlorite	5						Olivine, plagioclase	Forms rim around olivine due to reaction with plagioclase.

TOTAL ALTERATION: 45%

STRUCTURE : Thin section intensity 1b overprinted by brittle deformation associated with greenschist grade alteration. Magmatic foliation is defined by SPO of plagioclase and augite. Olivine grains exhibit subgrain boundaries. There are closely spaced microcracks thouhgout the sample, however their is not a dominant preferred orientation at the thin section scale.

PHOTOMICROGRAPHS:

1309D_77R_4_56_59_1

1309D_77R_4_56_59_2

THIN SECTION:	U1309D-78R-1 66-68 cm	**Piece No.** 3	**Unit**: 208	**TS#:254**	**OBSERVER:MD, JM**
ROCK NAME:	Troctolite and olivine gabbro				
GRAIN SIZE:	Medium (troctolite), medium (olivine gabbro)				
TEXTURE:	Equigranular (troctolite), equigranular (olivine gabbro)				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Troctolite								
Plagioclase	60	65		> 5	3		Anhedral to subhedral	
Olivine	25	35		5	4		Anhedral, irregular-shaped to rounded	
Clinopyroxene	Trace	Trace		2			Anhedral, interstitial	
Opaque	Trace	Trace		0.3			Equant	
Olivine gabbro								
Plagioclase	45	50		4	2		Anhedral to subhedral	
Olivine	15	20		4	3		Anhedral, irregular-shaped to rounded	
Clinopyroxene	25	30		5	3		Anhedral, subequant prismatic	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Serpentine	15						Olivine	Forms a mesh texture with magnetite after olivine.
Actinolite/tremolite	5						Olivine	Forms rims around olivine.
Chlorite	10						Olivine, plagioclase	Forms a rim around olivine due to reaction with plagioclase.
Magnetite	5						Olivine	
Brown hornblende	Trace						Pyroxene	Relics.
Talc	5						Olivine	Replaces completely olivine.
Prehnite	5						Plagioclase	Can completely replace plagioclase.

TOTAL ALTERATION: 45%

STRUCTURE : This thin section contains two domains: right side is troctolite and left side is olivine gabbro. The boundary between two domains is marked by presence/absence of clinopyroxene.

PHOTOMICROGRAPHS:

1309D_78R_1_66_68_1

1309D_78R_1_66_68_2

THIN SECTION:	U1309D 78R-4 73-75 cm	**Piece No.** 5	**Unit**: 211	**TS#: 255**			**OBSERVER: MD, JM**		
ROCK NAME:	Contact between troctolite and anorthositic olivine gabbro								
GRAIN SIZE:	Medium (troctolite), medium (anothositic olivine gabbro)								
TEXTURE:	Equigranular (troctolite), seriate (anorthositic olivine gabbro)								

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**			**Composition**	**MORPHOLOGY**	**COMMENTS**
			min.	**max.**	**av.**			
Troctolite								
Plagioclase	70	75		6	3		Subhedral to anhedral,	Almost fresh
Olivine	15	25		6	4		Anhedral, irregular	Irregular-shaped olivine aggregates
Clinopyroxene	3	3		3			Anhedral, interstitial	Due to interstitial shape, size measured here is not meaningful.
Opaque	trace	trace		0.2			Anhedral, interstitial	
Anorthositic olivine gabb								
Plagioclase	80	85		6	3		Subhedral to anhedral,	Due to interstitial shape, size measured here is not meaningful.
Olivine	4	8		2	1.5		Anhedral	Rounded irregular-shape
Clinopyroxene	2	7		6			Anhedral, interstitial	

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron)**				**REPLACING / FILLING**	**COMMENTS**
			min.	**max.**	**av.**			
Talc	5						Olivine	Forms a rim around olivine.
Serpentine	10						Olivine	Forms a mesh texture with magnetite after olivine
Prehnite	15						Plagioclase	Replaces partially plagioclase.
Magnetite	5						Olivine	

TOTAL ALTERATION: 35%

STRUCTURE : This thin section is composed of two parts. Left side is troctolite with irregular-shaped coarse-grained olivine. Right side is olivine- and clinopyroxene-bearing anorthosite. Although sizes of plagioclase grains from these two parts are similar, differences in shape, size and modal proportion of olivine are noted. Gradational decrease in size of olivine from left side to right side and high plagioclase proportion in the anorthosite along the contact against the troctolite are also interesting.

PHOTOMICROGRAPHS:

1309D_78R_4_73_75_1
1309D_78R_4_73_75_2
1309D_78R_4_73_75_3

THIN SECTION:	U1309D-80R-1, 39-41 cm	Piece No. 4B	Unit: 213	TS#: 257	**OBSERVER: AH, EH, GS, JB**
ROCK NAME:	Troctolite/anorthosite contact				
GRAIN SIZE:	Medium				
TEXTURE:	Inequigranular				

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Troctolitic								
Olivine	5	30	1	4	7		Anhedral	Only kernels preserved; some display kink bands.
Clinopyroxene	1	1	0.1	1	0.5		Interstitial	
Plagioclase	80	59	0.4	10	4		Subhedral	
Anorthosite								
Olivine	0	10	1	4	7		Anhedral	Entirely replaced by serpentine mesh.
Clinopyroxene	<1	<1	0.1	1	0.5		Interstitial	
Plagioclase	70	90	0.4	10	4		Anhedral	

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Serpentine	15						Olivine	Alteration not coronitic, serpentine-dominated, ribbon texture
Prehnite	2						Plagioclase	
Chlorite	1						Plagioclase	Relatively minor
Oxidized serpentine	3						Olivine	
Chrysotile	5							Cross-fiber vein
Magnetite	1						Olivine	Associated with serpentine
Sulfide	Trace							Very small; trace amount

TOTAL ALTERATION: 30%

STRUCTURE: Good alignment of plagioclase laths and twinning parallel to contact between troctolite and anorthosite. In troctolite, several plagioclase inclusions in olivine. Olivine tilt walls roughly normal to trace of foliation, suggesting plastic strain in olivine at high temperature. No plastic strain in plagioclase. Abundant interstitial, completely undeformed clinopyroxnene, both between plagioclase grains and between olivine and clinopyroxene.

PHOTOMICROGRAPHS:

1309D_80R_1_39_41_1
1309D_80R_1_39_41_2
1309D_80R_1_39_41_3
1309D_80R_1_39_41_4
1309D_80R_1_39_41_5

THIN SECTION:	U1309D-80R-1, 110-113 cm	Piece No. 8B	Unit: 213	TS#: 258	**OBSERVER: TN, DB, PF, JB, AH**
ROCK NAME:	Olivine Gabbro				
GRAIN SIZE:	Medium to coarse				
TEXTURE:	Inequigranular seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Olivine	10	20	0.8	4.3	2		Anhedral	Interstitial olivine forms a continuous network, trains of fluid inclusions
Clinopyroxene	20	20	0.5	6			Anhedral pokilitic to interstitial	Include rounded grain of plagioclase.
Orthopyroxene		Trace	0.2				Interstitial	Between olivine and plagioclase
Plagioclase	50	57	0.5	8			Subhedral	
Spinel	Trace	Trace	0.2				Rounded	One altered grain included in plagioclase
								Note: Late melt percolation marked by interstitial clinopyroxene

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Tremolite	15						Olivine, Pyroxene, Plagioclase	Forms coronas around olivine or pseudomorphs after olivine.
Chlorite	5						Olivine, Plagioclase	Forms coronas around plagioclase.
Serpentine	3						Olivine	Forms veins along fractures in grains.
Prehnite	2						Plagioclase	
Magnetite	<1						Olivine	Thin veins associated with serpentine in olivine.
Green amphibole	<1						Clinopyroxene	
Magnetite	1						Olivine	Occurs in trains in olivine alteration halos
Pyrrhotite	<1							
Chalcopyrite	<1							

TOTAL ALTERATION: 25%

STRUCTURE : Igneous texture with little evidence of plastic deformation. Plagioclase crystals exhibit extremely weak undulatory extinction. No preferred alignment of minerals. Small infilled fractures and fairly extensive microcracking throughout.

PHOTOMICROGRAPHS:

1309D_80R_1_110_113_1
1309D_80R_1_110_113_2
1309D_80R_1_110_113_3
1309D_80R_1_110_113_4
1309D_80R_1_110_113_5
1309D_80R_1_110_113_6
1309D_80R_1_110_113_7
1309D_80R_1_110_113_8

THIN SECTION:	U1309D-80R-2, 16-19 cm	Piece No. 1B	Unit:	TS#: 259	**OBSERVER: PF, TN, AD,NA, DB, JB**
ROCK NAME:	OLIVINE GABBRO				
GRAIN SIZE:	Medium				
TEXTURE:	Inequigranular				

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Olivine	20	30	1	12	4		Anhedral sometimes poikilitic	Abundant trails of fluid inclusions; poikilitic grains include rounded plagioclase.
Clinopyroxene	12	15	1	6	4		Anhedral poklitic to interstitial	Include rounded plagioclase.
Plagioclase	35	55	0.5	15	4		Subhedral to euhedral	Abundant trails of fluid inclusions.
Spinel	<1	<1	<0.1	0.15	0.1		Subhedral to anhedral	

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Tremolite	8						After pyroxene and after olivine	
Serpentine	2						After olivine	
Magnetite	<1							
Chlorite	5						Rim around plagioclase	
Magnetite	1						Olivine	Common in olivine reaction rims.
Pyrrhotite	<1							
Chalcopyrite	<1							

TOTAL ALTERATION: 15%

STRUCTURE : Weak magmatic fabric with slight alignment of elongated plagioclase and and apparently weak CPO of olivine. Clinopyroxene with no preferred elongation and interlocking grain boundaries demonstrating lack of strain. Only traces of plastic strain in plagioclase (bending of twins). Local occurrence of plagioclase in olivine demonstrates at least simultaneous crystallization of olivine and plagioclase. Irregular microcracking of olivine (locally associated with serpentinization) grains and microfractures crossing grain boundaries, no brittle strain. Also have plagioclase inside clinopyroxene.

PHOTOMICROGRAPHS:

1309D_80R_2_16_19_1
1309D_80R_2_16_19_2
1309D_80R_2_16_19_13
1309D_80R_2_16_19_4
1309D_80R_2_16_19_5

THIN SECTION:	U1309D-80R-2, 67-70 cm	Piece No. 3	Unit: 213	TS#: 260	**OBSERVER: PF, AD, DB, JB, AH**
ROCK NAME:	Troctolite				
GRAIN SIZE:	Medium to coarse				
TEXTURE:	Equigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Olivine	15	20	0.5	3.5			Anhedral (rarely oikocrystic)	Include rounded plagioclase grains.
Clinopyroxene		Trace					Interstitial	Clinopyroxene appear as thin (50 micron) film rimming olivine.
Plagioclase	70	80	0.3	7			Subhedral	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Tremoliite	30						Olivine	Forms acicular to bladed and radiating clusters of crystals at boundaries of former olivine grains in contact with plagioclase.
Serpentine	<1						Olivine	Rare in veins in relict cores of olivine and is associated with fine secondary magnetite.
Oxidized serpentine (?)	1						Olivine	Oxidation of serpentine to a brown, more highly birefringent variety.
Magnetite	<1						Olivine	Associated with serpentine and with tremolite.
Prehnite/clinozoisite (?)	2						Plagioclase	Saussuritization of plagioclase (?) mainly along fractures.
Chlorite	25						Plagioclase	Occurs in two habits, fibrous and granular, and forms coronas around plagioclase, but also occurs in patches.
Brown amphibole	2						Olivine	Brown amphibole in centers of some former olivine grains.
Hydrogarnet	<1						Olivine	Thin veins of brown hydrogarnet (hydroandradite?) cut across several former olivine grains.
Talc	<1						Vein	Vein filling.
Pyrite	<1							
Pyrrhotite	<1						Pyrite	Also occurs in stringers with magnetite.

COMMENTS: Hydrogarnet veins replacing olivine/tremolite located preferentially in olivine especially at bottom of slide.

TOTAL ALTERATION: 60%

STRUCTURE : Troctolite without preferred elongation of plagioclase and olivine (no magmatic strain). Static amphibole rims between plagioclase and olivine. Vein set crosscutting grains with static talc alteration around veins. No brittle strain nor shear along veins. There is a contact between fresher, less altered crystals and extremely altered crystals.

PHOTOMICROGRAPHS:

1309D_80R_2_67_70_1
1309D_80R_2_67_70_2
1309D_80R_2_67_70_3
1309D_80R_2_67_70_4
1309D_80R_2_67_70_5
1309D_80R_2_67_70_6
1309D_80R_2_67_70_7
1309D_80R_2_67_70_8
1309D_80R_2_67_70_9
1309D_80R_2_67_70_10
1309D_80R_2_67_70_11
1309D_80R_2_67_70_12
1309D_80R_2_67_70_13
1309D_80R_2_67_70_14

THIN SECTION:	U1309D-80R-2, 115-117 cm	Piece No. 6	Unit: 213	TS#: 261	**OBSERVER:DB, JB**
ROCK NAME:	OLIVINE GABBRO				
GRAIN SIZE:	Medium				
TEXTURE:	Inequigranular seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Olivine	10	15	0.3	2.5	1.6		Anhedral	Kink band
Clinopyroxene	35	35	0.3	5	2		Anhedral; frequently oikocrystic rarely interstitial between olivine and plagioclase.	Exolution lamellae, includes rounded plagioclase.
Plagioclase	50	55	0.4	3	2		Anhedral	Several fluid inlusion trails

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Tremolite	15						Olivine	Corona texturre
Chlorite	15						Plagioclase	Corona texture
Oxidized serpentine	3						Olivine	
Actinolite	<1						Clinopyroxene	
Pyrite	<1							
Chalcopyrite	<1							
Magnetite	<1							
Pyrrhotite	<1							Probably

TOTAL ALTERATION: 35%

STRUCTURE : Weak magmatic strain with no trace of plastic strain. Plagioclase crystals are weakly aligned and clearly predate the overall equant clinopyroxene. Olivine fabric not discernable due to alteration. Local orthopyroxene rim between olivine and plagioclase obviously predates later reaction along these phases.

PHOTOMICROGRAPHS:

1309D_80R_2_115_117_1
1309D_80R_2_115_117_2
1309D_80R_2_115_117_3

THIN SECTION:	U1309D-80R-2, 136-138 cm	Piece No. 7	Unit: 213	TS#: 262			**OBSERVER: YO, KJ, DB, EH, PF, JB**	
ROCK NAME:	Olivine Gabbro cut by gabbronoritic dikelet							
GRAIN SIZE:	Olivine Gabbro: medium to coarse; gabbronorite: fine							
TEXTURE:	Inequigranular seriate							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Host rock								
Olivine Gabbro	10	20	0.8	4	1		Anhedral	
Plagioclase	35	50	0.5	5	1		Anhedral	Also shows recrystallized textures.
Clinopyroxene	20	30	0.2	2	0.6		Anhedral, interstitial	Occurs as primary and interstitial between plagioclases.
Gabbronorite								
Plagioclase							Anhedral	
Clinopyroxene							Anhedral, interstitial	
Orthopyroxene							Anhedral	
SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Chlorite	20						Plagioclase	Occurs in two habits, fibrous and granular, and forms coronas around plagioclase, but also occurs in patches and as a cross-fiber vein filling.
Tremolite	30						Olivine	Forms acicular to bladed and radiating clusters of crystals at boundaries of former olivine grains in contact with plagioclase.
Serpentine	3						Olivine	Rare in veins in relict cores of olivine and is associated with fine secondary magnetite.
Magnetite	1						Olivine	Associated with secondary tremolite
Talc	<1						Olivine	In the cores of some olivine grains, surrounded by tremolite and also in the center of a chlorite vein that cuts diagonally across the section (mostly ground out by polishing).
Brown amphibole	5						Olivine	Brown amphibole in centers of some former olivine grains.
Magnetite	<1							
Pyrrhotite	<1							
Chalcopyrite	<1							

TOTAL ALTERATION: 60 %

STRUCTURE: A 2 to 3 mm thick gabbronoritic vein cuts the section diagonally, alteration paths are subparallel to the vein. Open fracture with fiberous infillings of chlorite, tremolite, and sepentine. There is a zone of alteration which is crosscut by the later fracture. No preferred orientation exhibited by the minerals. Olivine is surrounded by reaction rims of tremolite and chlorite. The plagioclase crystals show slight bending of the twins and very weak undulatory extinction.

PHOTOMICROGRAPHS:

1309D_80R_2_136_138_1
1309D_80R_2_136_138_2
1309D_80R_2_136_138_3
1309D_80R_2_136_138_4

THIN SECTION:	U1309D-81R-2, 30-33 cm	Piece No. 3	Unit: 217	TS#: 263	**OBSERVER: SI, DB, JB**
ROCK NAME:	Olivine gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Equigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Olivine	5						Anhedral	Deeply altered, no modal estimation
Piagioclase	5						Subhedral	
Clinopyroxene	10						Anhedral oikocrystic to interstitial	Clinopyroxene-clinopyroxene interlocked contact

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Tremolite	40						Olivine	Corona texture
Chlorite	20						Plagioclase	Corona texture
Oxidized serpentine	1						Olivine	
Actinolite	<1						Clinopyroxene	
Carbonate	<1							Monomineralic vein
Prehnite	5						Plagioclase	
Talc	1							
Magnetite	<1							Commonly associated with sulfides, common in tremolite.
Pyrrhotite	<1							
Chalcopyrite	<1							Sulfides generally occur together.

Total alteration: 67 %

STRUCTURE: Few open cracks across the entire this section infilled with fibrous chlorite. Around the open cracks a zone of alteration have developed with olivine being replaced by talc and tremolite with chlorite reaction rims. The minerals show no preferred orientation and no plastic strain.

PHOTOMICROGRAPHS:

1309D_81R_2_30_33_1
1309D_81R_2_30_33_2
1309D_81R_2_30_33_3

THIN SECTION:	U1309D-81R-3, 12-14 cm	Piece No. 1	Unit: 217	TS#: 264	**OBSERVER: DB, PF, JB**
ROCK NAME:	Olivine gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Inequigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Olivine	5	10	1	7			Anhedral	
Clinopyroxene	15	15	0.2	14			Anhedral, interstitial	Myrmekitic in plagioclase
Plagioclase	60	70	1	17			Subhedral	Few subequant recrystallized grains. Undulatory plagioclase contact with interstitial clinopyroxene is observed

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Chlorite	10						Plagioclase	Coronitic halos around plagioclase where it is in contact with olivine as much as 0.7 mm thick. Occurs most frequently in fibrous habit with fibers oriented perpendicular to the grain boundary.
Tremolite	2						Olivine and pyroxene	Forms acicular to bladed and radiating clusters of crystals at boundaries of former olivine grains only in a thin fringe at contact with former palgioclase and after pyroxene.
Serpentine	<1						Olivine	In cores of former olivine grains.
Magnetite							Olivine	Small irregular patches of fine grains associated with tremolite and talc
Talc	30						Olivine	Fills interior of former olivine grains and varies from very fine-grained to patches of better crystallized patches.
Prehnite/Clinozoisite (?)	<1						Plagioclase	Saussuritization of plagioclase is minor.
Oxidized serpentine (?)	1						Olivine	At the edges of relict olivine cores
Magnetite	<1							
Chalcopyrite	<1							
Pyrrhotite	<1							

TOTAL ALTERATION: 45%

STRUCTURE: Large plagioclase grains show local recrystallization and serrated grain boundaries. The plagioclase crystals show very weak undulatory extinction. Microcracking is particularly well developed inside plagioclase crystals. No preferred orientations shown.

PHOTOMICROGRAPHS:

1309D_81R_3_12_14_1
1309D_81R_3_12_14_2
1309D_81R_3_12_14_3
1309D_81R_3_12_14_4
1309D_81R_3_12_14_5
1309D_81R_3_12_14_6
1309D_81R_3_12_14_7
1309D_81R_3_12_14_8

THIN SECTION:	U1309D-82R-1, 72-75 cm	Piece No. 4A	Unit: 217	TS#: 265	**OBSERVER: YO, EH, DB, JB**
ROCK NAME:	Olivine gabbro				
GRAIN SIZE:	Medium to coarse				
TEXTURE:	Ine' uigranular seriate				

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Olivine	15	20	0.2	8			Anhedral	Some grains include fluid inclusions
Plagioclase	55	60	0.5	12			Subhedral	Weak alteration rim around some plagioclase grains; some grains incude clinopyroxene
Clinopyroxene	20	20	0.5	8			Anhedral pokilitic to interstitial	Several interlocked grains, some grains include plagioclase. Very thin vermicular clinopyroxene films precipitated along plagioclase-plagioclase boundaries.
Orthopyroxene	Trace	Trace	0.1	2			Interstitial	Reactive film at some plagioclase-olivine grain boundaries.

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Chlorite	4						Plagioclase	Corona texture
Talc	4						Olivine	Corona texture, note talc not tremolite
Tremolite	1							
Serpentine	2						Olivine	In fractures in olivine
Oxidized serpentine	2						Olivine	
Magnetite	<1							Occurs with sulfides in olivine reaction rims
Pyrrhotite	<1							

TOTAL ALTERATION:

STRUCTURE: Olivine crystals exhibit kinking and plagioclase crystals show serrated grain boundaries and slight bending of twin planes. Microcracking penetrates all crystals independent of mineralogy.

PHOTOMICROGRAPHS:

1309D_82R_1_72_75_1

1309D_82R_1_72_75_2

THIN SECTION:	U1309D-82R-2, 110-112 cm	Piece No. 6	Unit: 218	TS#: 266	**OBSERVER: DB, EH, PF, JB**
ROCK NAME:	Olivine Gabbro				
GRAIN SIZE:	Medium to coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Olivine	15	20	0.2	5			Anhedral	Equant recrystallized subgrains, kink bands, abundant fluid inclusion
Clinopyroxene	40	40	0.1	12			Anhedral, anhedral oikocrystic, interstitial	Interlocked clinopyroxene contacts.
Plagioclase	35	40	0.3	6			Anhedral	Abundant fluid inclusion. Rounded (rotated?) chadacrysts in clinopyroxene
Spinel		Trace		0.2			Rounded	Included in clinopyroxene
Sulfides		Trace		0.2				
Orthopyroxene	Trace	Trace	0.1	1			Interstitial	Abundant at olivine-plagioclase boundaries

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Serpentine	2						Olivine	Occurs as veins along fractures in olivine grains
Magnetite	<1						Olivine	Associated with serpentine in olivine
Chlorite	4						Plagioclase	Fibrous rims on plagioclase where it contacts former olivine grains. Fibers are perpendicular to edges of grains.
Amphibole	1						Olivine	Small accicular crystals (tremolite?) at edges of olivine grains where they contact plagioclase
Prehnite/clinozoisite?	1						Plagioclase	Saussuritization is scattered as minute grains in some plagioclase grains commonly following fractures in plagioclase caused by expansion of adjacent serpentinized olivine grains
Talc	1							In cores of former olivine grains surrounded by amphibole.
Magnetite	<1							
Chalcopyrite	<1							
Pyrrhotite	<1							

TOTAL ALTERATION: 9%

STRUCTURE : Weak plastic deformation is visible in tapering plagioclase twins and olivine kink bands. Stronger plastic strain is ruled out by presence of interlocking grain boundaries and magmatic clinopyroxene twins. Weak magmatic fabric/layering may be present.

PHOTOMICROGRAPHS:

1309D_82R_2_110_112_1
1309D_82R_2_110_112_2
1309D_82R_2_110_112_3
1309D_82R_2_110_112_4
1309D_82R_2_110_112_5
1309D_82R_2_110_112_6
1309D_82R_2_110_112_7
1309D_82R_2_110_112_8
1309D_82R_2_110_112_9
1309D_82R_2_110_112_10
1309D_82R_2_110_112_11

THIN SECTION:	U1309D-82R-3, 125-127 cm	Piece No. 9	Unit: 219	TS#: 267	**OBSERVER: EH, DB, JB, AH**
ROCK NAME:	Gabbro/mylonite contact				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate/equigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Gabbro (Seriate)								
Plagioclase		50		5			Anhedral	
Clinopyroxene		50		10			Anhedral	Interlocked clinopyroxene contacts
Gabbro (Equigranular)								
Plagioclase		70	0.1	0.5			Equant to anhedral	Fluid inclusions. Recrystallized grains
Clinopyroxene		30	0.1	0.5			Equant to anhedral	Clinopyroxene and plagioclase are enriched in bands
Ilmenite								

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Tremolite/actinolite	20						Clinopyroxene	Rock appears to have undergone high-temperature recrystallization prior to alteration
Carbonate	1							Vein
Chlorite	5						Plagioclase	In mats, also fills fractures in large plagioclase grains
Pyrrhotite	<1							Associated with altered clinopyroxene, also occurs in carbonate vein
Magnetite	Trace?							Most Fe-oxides are ilmenite

TOTAL ALTERATION: 25 %

STRUCTURE: Intense grain size reduction of plagioclase, clinopyroxene and olivine: grain sizes vary between 100 and 200 µm. Later open cracks cut across the whole thin section.

PHOTOMICROGRAPHS:

1309D_82R_3_125_127_1
1309D_82R_3_125_127_2
1309D_82R_3_125_127_3
1309D_82R_3_125_127_4
1309D_82R_3_125_127_5

THIN SECTION:	U1309D-83R-1, 95-97 cm	Piece No. 3B	Unit: 222	TS#: 268	**OBSERVER: HH, DB, EH, PF, JB**
ROCK NAME:	Olivine gabbro				
GRAIN SIZE:	Medium to coarse				
TEXTURE:	Inequigranular seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	30	> 60					Subhedral to anhedral	Also as rounded chadacryst in clinopyroxene.
Clinopyroxene	10	10	0.2	12			Anhedral, oikocrystic, interstitial	Interlocked clinopyroxene-clinopyroxene contacts.
Olivine	2	> 5					Anhedral	
Orthopyroxene		Trace					Interstitial	
Spinel		Trace	0.2				Rounded	Included in clinopyroxene

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Chlorinte	30						Plagioclase	Fibrous rims on plagioclase where it contacts former olivine grains. Fibers are perpendicular to edges of grains, can also be granular.
Amphibole	14						Olivine	Small accicular crystals (tremolite?) at edges of olivine grains where they contact plagioclase
Magnetite	1						Olivine	Small disseminated irregular grains in talc after olivine
Talc	25						Olivine	In cores of former olivine grains surrounded by amphibole
Pyrrhotite	< 1							Sulfides associated with magnetite.
Chalcopyrite	< 1							

TOTAL ALTERATION: 70 %

STRUCTURE : Igneous texture with microfracturing and intense alteration. No magmatic fabrics. Subtle subgrains in clinopyroxene indicate very minor plastic strain.

PHOTOMICROGRAPHS:

1309D_83R_1_95_97_1
1309D_83R_1_95_97_2
1309D_83R_1_95_97_3
1309D_83R_1_95_97_4
1309D_83R_1_95_97_5

THIN SECTION:	U1309D-83R-2, 42-45 CM	Piece No. 1a	Unit: 222	TS#: 269	**OBSERVER: YO, EH, DB, JB**
ROCK NAME:	Olivine gabbro				
GRAIN SIZE:	Medium to coarse				
TEXTURE:	Inequigranular seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Olivine	15	30	0.2	8			Anhedral	Fluid inclusions
Plagioclase	40	50	0.5	8			Subhedral	
Clinopyroxene	20	20	0.5	8			Anhedral oikocrystic, interstitial	Clinopyroxene rims around plagioclase and olivine, interlocked clinopyroxene contacts

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Tremolite	10						Olivine	Corona texture
Chlorite	5						Plagioclase	Corona texture
Actinolite	<1						Clinopyroxene	
Talc	3						Olivine	
Oxidized serpentine	1						Olivine	
Magnetite	<1							In reaction rims about olivine, associated with sulfides
Pyrrhotite	<1							
Chalcopyrite	<<1							

TOTAL ALTERATION: 20 %

STRUCTURE : Igneous texture with intense microfracturing. Also, open fractures with mineral infillings. No clear magmatic and plastic fabrics. Plagioclase in olivine shows undulatory extinction while plagioclase around the same olivine is strain free.

PHOTOMICROGRAPHS:

1309D_83R_2_42_45_1

1309D_83R_2_42_45_2

THIN SECTION:	U1309D-84R-1, 96-98 cm	Piece No. 5H	Unit: 223	TS#: 270	**OBSERVER: YO, DB, PF, JB**
ROCK NAME:	Disseminated oxide gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Inequigranular seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	50	70	0.5	25			Subhedral	Some recrystallized plagioclase exists. Some show kinkbands.
Clinopyroxene	0	30	0.5	3			Anhedral	
								Note: this section is highly altered.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Epidote	45						Wide vein	In vein that makes up lower half of thin section.
Ttitanite	1						Vein filling	Associated with epidote in vein
Green Amphibole	15						Pyroxene and vein	Clear to green pleochroism in vein, yellow-green to blue-green replacing pyroxene in top of thin section.
Chlorite	2						Vein filling	
Saussurite	1						Plagioclase	Finely disseminated in plagioclase grains.
Magnetite	<1							Oxides broken down to magnetite and illmenite.
Ilmenite	1							
Pyrrhotite	<1							Occurs as veins along fractures.

TOTAL ALTERATION: 65

STRUCTURE : Semibrittle textures: coarse plagioclase grains were bent and have intense undulatory extinction, along which microfractures developed. Dynamic recrystallization occurs along the grain boundaries between plagioclase grains (Cross polar: 1309d_84r_1_96_98_7.tif). Clinopyroxene grains appear to be reduced in grain sizes due to microfracturing with moderate undulatory extinctions.

PHOTOMICROGRAPHS:

1309D_84R_1_96_98_1
1309D_84R_1_96_98_2
1309D_84R_1_96_98_3
1309D_84R_1_96_98_4
1309D_84R_1_96_98_5
1309D_84R_1_96_98_6
1309D_84R_1_96_98_7
1309D_84R_1_96_98_8

THIN SECTION:	U1309D-84R-3, 77-80 cm	Piece No. 2	Unit: 224	TS#: 271	**OBSERVER: YO, DB, JB**
ROCK NAME:	Gabbro				
GRAIN SIZE:	Fine to coarse				
TEXTURE:	Inequigranular seriate				

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	40	60	0.3	8			Subhedral; subequant	Recrystallized plagioclase, kinkbands. Tapered twin lamellae with undulatory extinction
Clinopyroxene	5	40	0.5	4			Anhedral	
Oxide	1	1						
Olivine	?	?						

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Green amphibole	25						Clinopyroxene	Partially replaces clinopyroxene on a very fine scale - both are present in most grains. Also rims brown amphibole
Actinolite	10							Intergranular, also with carbonate in alteration zones/veins
Brown amphibole	1							Igneous?
Carbonate	3							Associated with intensive alteration
Chlorite	3							Patchy in zones of strong alteration
Ilmenite	<1							Some may be primary, some associated with carbonate

TOTAL ALTERATION: 45 %

STRUCTURE : Coarse grained part: primary igneous textures were moderately cataclasized with intense alteration. Both plagioclase and clinopyroxene were bent and/or fractured, along where intense alteration occurs. Locally plagioclase grains with serrated grain boudaries were dynamically recrystallized into finer grains. Fine grained part: the region is a part of cataclastic band, where both plagioclase and clinopyroxene have polygonal shapes, presumably resulting from dynamic recrystallization.

PHOTOMICROGRAPHS:

1309D_84R_3_77_80_1
1309D_84R_3_77_80_2
1309D_84R_3_77_80_3
1309D_84R_3_77_80_4
1309D_84R_3_77_80_5
1309D_84R_3_77_80_6
1309D_84R_3_77_80_7
1309D_84R_3_77_80_8
1309D_84R_3_77_80_9
1309D_84R_3_77_80_10

THIN SECTION:	U1309D-85R-2, 111-113 cm	Piece No. 1	Unit: 226	TS#: 272	**OBSERVER: YO, DB, PF,JB, JE,**
ROCK NAME:	Olivine gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Inequigranular seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Olivine	2	7		2.5			Anhedral	
Plagioclase	50	63	0.5	8			Subhedral, small equant, oikocrystic	Large oikocryst include subhedral clinopyroxene
Clinopyroxene	10	30	1	6			Anhedral, interstitial, oikocrystic	Include rounded plagioclase
Spinel	Trace	Trace		0.2			Rounded	Included in plagioclase

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Chlorite	2						Plagioclase	Occurs in two habits, fibrous and granular, and forms coronas around plagioclase, but also occurs in patches.
Tremolite	1						Olivine	Forms acicular to bladed and radiating clusters of crystals at boundaries of former olivine grains in contact with plagioclase.
Talc	15						Olivine	
Magnetite	1						Olivine	Associated with talc and tremolite.
Prehnite/clinozoisite (?)	1						Plagioclase	Saussuritization of plagioclase (?) mainly along fractures.
Green Amphibole	5							Associated with cataclastic zone in bottom of thin section and as replacement of talc in core of former olivine grain near cataclastic zone, elsewhere olivine cores are only slightly serpentinized along fractures.
Magnetite	1						Olivine	Associated with alteration zones around olivine.
Pyrrhotite	<1						Olivine?	Associated with alteration zones around olivine.

TOTAL ALTERATION: 25 %

STRUCTURE : Primary igneous texture was cut by a zone of cataclasite, where both plagioclase and clinopyroxene were intensely fractured.(JE).

PHOTOMICROGRAPHS:

1309D_85R_2_111_113_1
1309D_85R_2_111_113_2
1309D_85R_2_111_113_3
1309D_85R_2_111_113_4

THIN SECTION:	U1309D-85R-3, 21-23 cm	Piece No. 3	Unit: 226	TS#: 273	**OBSERVER: DB,JB**
ROCK NAME:	Olivine gabbro				
GRAIN SIZE:	Fine to coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Clinopyroxene	35	35	0.5	7			Anhedral, oikocrystic	Oikocrysts host round plagioclase grains, interlocked clinopyroxene-clinopyroxene contact.
Plagioclase	10	?						
Olivine	0	>5						

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Tremolite	25						Olivine	Corona texture
Chlorite	20						Plagioclase	Corona texture
Talc	5						Olivine	In cores of wholly altered olivine
Magnetite	<1							Visible magnetite very scarce despite high degree of alteration
Pyrite	<1							

TOTAL ALTERATION: 50 %

STRUCTURE : Very altered. No plastic foliation.Thin cracks crosscutting basal planes of pyroxene, some of them with vein infill.

PHOTOMICROGRAPHS:

1309D_85R_3_21_23_1

1309D_85R_3_21_23_2

THIN SECTION:	U1309D-86R-1, 56-59 cm	Piece No. 4A	Unit: 227	TS#: 274	**OBSERVER: YO, EH, DB, PF, JB**
ROCK NAME:	Gabbro				
GRAIN SIZE:	Fine to coarse				
TEXTURE:	Cataclastic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Olivine	1	1	0.5 <	2			Equant, euhedral	Small olivines enclosed by plagioclase
Plagioclase	48	50	0.5 <	8			Subequant, subhedral	Brittly deformed with clinopyroxene-filled fractures
Clinopyroxene	10	47	0.5	6			Subequant, euhedral, interstitial	Large oikocryst includes plagioclase chadacryst.
Oxide	1	1	0.5	2.5			Elongate	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Chlorite	20						Pyroxene and veins	
Talc	2						Plagioclase	Occurs in fractures in plagioclase
Magnetite	<1						Pyroxene, oxides	Small grains in chloritized areas
Amphibole	16						Pyroxene	Pseudomorphic after pyroxene
Titanite	<1						Oxides	Probably formed by breakdown of primary oxide mineral
Ilmenite	1						Oxides	Probably formed by breakdown of primary oxide mineral

TOTAL ALTERATION: 40%

STRUCTURE : Zones of crushing and irregular cataclastic deformation. Cracks displacing twinning of plagioclase.

PHOTOMICROGRAPHS:

1309D_86R_1_56_59_1
1309D_86R_1_56_59_2
1309D_86R_1_56_59_3
1309D_86R_1_56_59_4
1309D_86R_1_56_59_5
1309D_86R_1_56_59_6
1309D_86R_1_56_59_7

THIN SECTION:	U1309D-86R-3, 46-48 cm	Piece No. 4A	Unit: 229	TS#: 275	**OBSERVER: DB, JB, EH**
ROCK NAME:	Olivine Gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	40	60	0.5	9			Anhedral, subequant along deformation zone	
Clinopyroxene	5	15	1	5			Anhedral, interstitial	
Olivine	5	25						
Spinel		Trace	0.2				Rounded in plagioclase	
Note: not representative, at alteration and deformation contact								

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Chlorite	15						Plagioclase	Corona texture
Tremolite	25						Olivine	Corona texture
Green amphibole	5						Clinopyroxene	
Brown amphibole	1						Clinopyroxene	
Pyrrhotite	<1							Lamellae in pyroxene
Ilmenite	<1						Oxides?	
Titanite	<1						Ilmenite	

TOTAL ALTERATION: 40%

STRUCTURE: Highly deformed. Band of reduced olivine crystals (mylonitic), and oriented plagioclase with undulatory extinction and olivine with preferred LPO.

PHOTOMICROGRAPHS:

1309D_86R_3_46_48_1

1309D_86R_3_46_48_2

THIN SECTION:	U1309D-86R-3, 106-109 cm	Piece No. 7	Unit: 231	TS#: 276	**OBSERVER: DB, EH, PF, JB**
ROCK NAME:	Disseminated oxide gabbro				
GRAIN SIZE:	Medium to Coarse				
TEXTURE:	Inequigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	50	60					Anhedral, subequant	
Clinopyroxene	10	20					Anhedral, interstitial	Exsolved, interlocking contacts with clinopyroxene
Olivine	0	20						Possibly no primary olivine
Oxides		Trace					Anhedral	Exsolution patterns, included in plagioclase
Sphene		Trace					Euhedral	Included in plagioclase

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Tremoliite	3						Olivine	Rare in veins in relict cores of olivine and is associated with fine secondary magnetite
Magnetite	<1						Oxides	Occurs in breakdown of former primary oxides
Prehnite / Clinozoisite (?)							Plagioclase	Saussuritization of plagioclase (?) very minor
Talc	20						Olivine	In centers of former olivine grains associated with tremolite
Brown amphibole	1						Olivine	Brown amphibole in centers of some former olivine grains
Chlorite	11						Plagioclase	Occurs in two habits, fibrous and granular, and forms coronas around plagioclase, but also occurs in patches, also as thin veins through plagioclase associated with talc
Sphene	<1						Oxide	
Pyrrhotite	<1						Olivine?	Late, irregular, almost veinlike in cores of former olivine
Ilmenite	1							Probably somewhat altered after primary ilmenite, also in altered oxides

TOTAL ALTERATION: 40 %

STRUCTURE: Subtle plastic strain discernible in plagioclase by tapered twin and in clinopyroxene by weak misorientation of subgrains. No clear evidence for magmatic strain. Plagioclase postdates the now altered clinopyroxene . Oxides (exsolved titanomagnetite?) seem to predate plagioclase.

PHOTOMICROGRAPHS:

1309D_86R_3_106_109_1
1309D_86R_3_106_109_2
1309D_86R_3_106_109_3
1309D_86R_3_106_109_4
1309D_86R_3_106_109_5
1309D_86R_3_106_109_6
1309D_86R_3_106_109_7
1309D_86R_3_106_109_8
1309D_86R_3_106_109_9
1309D_86R_3_106_109_10
1309D_86R_3_106_109_11
1309D_86R_3_106_109_12
1309D_86R_3_106_109_13
1309D_86R_3_106_109_14
1309D_86R_3_106_109_15
1309D_86R_3_106_109_16

THIN SECTION:	U1309D-87R-2, 15-18 cm	Piece No. 2A	Unit: 234	TS#: 277				**OBSERVER: DB, KM, JB, EH**
ROCK NAME:	Oxide gabbro crosscut by diabase							
GRAIN SIZE:	Coarse							
TEXTURE:								

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	50	60	1	7			Anhedral, subequant	
Clinopyroxene	10	40	0.5	5			Anhedral	
Oxide		3						only at contact to diabase
Diabase								
all groundmass, ophitic texture preserved, apparently eudedral crystallographically continuous plagioclase crystallized at the wall (EH)								

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Brown amphi bole	3							May be primary
Green amphibole	25						Clinopyroxene, brown amphibole	Also veins and fills fractures in plagioclase
Albite	3						Plagioclase	Also in veins
Titanite	1						Ilmenite	
Ilmenite	2							Primary
Pyrite	<1							In veins and along cleavage planes in clinopyroxene

TOTAL ALTERATION: 35%

STRUCTURE : Primary igneous texture with irregular fracturing. Open cracks in plagioclase with mineral infillings, locally plagioclase itself. Alteration occurs in particular where intense cracks occur. (KM) Brittle fractures infilled with clinopyroxene (magmatic).

PHOTOMICROGRAPHS:

1309D_87R_2_15_18_1
1309D_87R_2_15_18_2
1309D_87R_2_15_18_3
1309D_87R_2_15_18_4
1309D_87R_2_15_18_5
1309D_87R_2_15_18_6

THIN SECTION:	U1309D-87R-2, 87-89 cm	Piece No. 3	Unit: 234	TS#: 278	**OBSERVER: YO, PF, JB, EH**
ROCK NAME:	Oxide gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	13	15	0.5 <	5			Subhedral	Some grains show weak kink bands. Some show undulatory extinction. Aggregate of small plagioclase grains exists.
Clinopyroxene	10 <	70	1 <	8			Subhedral	Almost no primary phase remains.
Ilmenite	15	15	< 0.5	2			Anhedral	
Apatite	trace	trace						

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Green amphibole	12						Pyroxiene	After pyroxene at edges of grains
Chlorite	8						Pyroxene	As small patches in the pyroxene
Calcite	<1						Vein	Vein filling
Brown amphibole	30						Pyroxene	As thin rims or patches on green amphibole
Carbonate?	10							Occurs in patches in lower middle part of thn section
Pyrite	<1							
Titanite	<1						Ilmenite	

TOTAL ALTERATION: 60 %

STRUCTURE : Carbonate-filled crack, locally en echelon and controlled by crystal structure of pyroxene. Veins with oblique fibers indicating crack opening with small amounts of displacement.

PHOTOMICROGRAPHS:
1309D_87R_2_87_89_1
1309D_87R_2_87_89_2

THIN SECTION:	U1309D-88R-2, 100-103 cm	Piece No. 1	Unit: 235	TS#: 279	**OBSERVER:DB, GS, TN, EH**
ROCK NAME:	Olivine gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	55	60	0.5	15			Anhedral, subhedral, equant in deformation zone	
Clinopyroxene	20	30					Anhedral, oikocrystic, interstitial	Symplectitic interlocked contacts. Includes rounded plagioclase chadacrysts.
Olivine	0	8						corona textured
Spinel		Trace					Rounded	Included in clinopyroxene

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Tremolite	10						Olivine and plagioclase	Forms corona texture
Chlorite	5						Olivine and plagioclase	Forms corona texture
Actinolite	5						Clinopyroxene and chlorite	Later stage alteration
Pale brown amphibole	2						Clinopyroxene	Earlier stage alteration
Pyrite	<1							
Chalcopyrite	<1							

TOTAL ALTERATION: 22%

STRUCTURE: Coarse grained gabbro with zone of plastic strain indicated by bent plagioclase twins, 50% plagioclase recrystallization and tapered twins. Also clinopyroxene shows recrystallization, statically weakly altered to amphibole. In rest of slide also minor plastic strain. Probably early magmatic strain indicated by weak alignment of shape of clinopyroxene and plagioclase, including orientation of twins. Clinopyroxene with magmatic twins indicating lack of high total strain in one part of slide. Core of large amphibole shows myrmekite-type texture in what is probably the relict pyroxene core. The wormy parts of the myrmekite are probably amphibole since the color is brownish.

PHOTOMICROGRAPHS:

1309D_88R_2_100_103_1
1309D_88R_2_100_103_2
1309D_88R_2_100_103_3
1309D_88R_2_100_103_4
1309D_88R_2_100_103_5
1309D_88R_2_100_103_6
1309D_88R_2_100_103_7
1309D_88R_2_100_103_8
1309D_88R_2_100_103_9
1309D_88R_2_100_103_10
1309D_88R_2_100_103_11
1309D_88R_2_100_103_12
1309D_88R_2_100_103_13
1309D_88R_2_100_103_14
1309D_88R_2_100_103_15
1309D_88R_2_100_103_16

THIN SECTION:	U1309D-88R-4, 27-29 cm	**Piece No.** 1	**Unit**: 235	**TS#: 280**	**OBSERVER: PF, DB, NA, AH,JB, EH**
ROCK NAME:	ORTHOPYROXENE-BEARING OLIVINE GABBRO				
GRAIN SIZE:	Medium				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Clinopyroxene	35	40	1	7	4		Anhedral to interstital	Pale green color brownish color around (hydrothermal?) vein under plane light. Some replaced by amphibole.
Plagioclase	30	35	0.2	6	3		Anhedral to euhedral	Same included in pyroxene. Fluid inclusions.
Olivine	15	20	0.1	4	5		Anhedral	Kink band. abundant trails of fluid inclusions.
Spinel	<1	<1	<0.1	0.5	0.2		Subhedral	Small inclusions inorthopyroxene and olivine.
Orthopyroxene	2	3						Three medium-coarse grains, confirmed by EDX

Comments: small plagioclase grains in olivine and small olivine grains in clinopyroxene, and clinopyroxene grains and olivine grains in plagioclase precipitate at the center of thin vein.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Tremolite	<1						Olivine	Forms acicular to bladed and radiating clusters of crystals at boundaries of former olivine grains in contact with plagioclase. It also accompanies chlorite in veins
Talc	6						Olivine and pyroxene and in veins	
Serpentine	1						Olivine and filling veins	In fractures in olivine grains accompanied by magnetite, but also as very thin veins
Magnetite	<1						Olivine	Occurs in the center of ribbons of serpentine in fractures in former olivine grains
Brown amphibole	1						Pyroxene and olivine	Brown amphibole in centers of some former olivine grains and adjacent to serpentine vein cutting through lower right corner of thin section
Chlorite	4						Plagioclase	Forms coronas around plagioclase, but also occurs in patches, corona occurrence is much less abundant in this rock because of lower olivine content. It also occurs in veins with tremolite
Pyrrhotite	<1							

TOTAL ALTERATION: 13%

STRUCTURE : Undulatory extinction in pyroxene, kink bands in olivine, and a distributed, irregular microcracking network. Some fractures filled with serpentinite, and showing no displacement.

PHOTOMICROGRAPHS:

1309D_88R_4_27_29_1
1309D_88R_4_27_29_2
1309D_88R_4_27_29_3
1309D_88R_4_27_29_4

THIN SECTION:	U1309D-88R-4, 132-135 cm	**Piece No.** 1		**Unit**: 235	**TS#:** 281		**OBSERVER: YO, AH, TN, EH**	
ROCK NAME:	Orthopyroxene-bearing olivine gabbro							
GRAIN SIZE:	Coarse							
TEXTURE:	Inequigranular seriate							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**			**Composition**	**MORPHOLOGY**	**COMMENTS**
			min.	**max.**	**av.**			
Olivine	15	25	< 0.5	4			Euhedral, equant	
Clinopyroxene	10	20	0.5	5			Anhedral, interstitial	Clinopyroxene oikocryst encloses plagioclase chadacryst. One grain shows distinct lamellae.
Plagioclase	60	55	< 0.5	15			Subhedral, subequant	Some grains show initial stage of alteration along grain boundaries (corona texture).
Oxide	Trace	None						Probably products of serpentinization.
Orthopyroxene	2	2						Three grains, medium-coarse, associtaed with plagciolase

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron)**				**REPLACING / FILLING**	**COMMENTS**
			min.	**max.**	**av.**			
Tremolite	10						Olivine and plagioclase	Forms coronas
Chlorite	5						Olivine and plagioclase	Forms coronas
Talc	10						Olivine	Pseudomorphic, colorless or pleochroic (brown-green)
Serpentine	2						Olivine	
Brown amphibole	<1						Clinopyroxene	
Magnetite	<1							
Pyrrhotite	<1							
Chalcopyrite	<1							

TOTAL ALTERATION: 28 %

STRUCTURE: Undulatory extinction in pyroxene. Fractures following crystal planes with associated alteration locally (talc). Variations in fracturing and associated alteration due to crosscutting vein. No displacement visible.

PHOTOMICROGRAPHS:

1309D_88R_4_132_135_1
1309D_88R_4_132_135_2
1309D_88R_4_132_135_3
1309D_88R_4_132_135_4
1309D_88R_4_132_135_5
1309D_88R_4_132_135_6

THIN SECTION:	U1309D-88R-6, 52-56 cm	Piece No. 6	Unit: 235	TS#: 282	**OBSERVER:AH, PF, DB, JB**
ROCK NAME:	Olivine gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	30	40	1	3			Anhedral	
Clinopyroxene	25	30	0.1	5			Anhedral, Interstitial, Oikocrystic, Symplectitic	Encloses rounded plagioclsase chadacrysts, interlocked contacts.
Olivine	10	30	1	5			Anhedral, oikocrystic	Encloses rounded deformed plagioclase chadacrysts.
Spinel			0.2				Rounded	Enclosed in clinopyroxene.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Tremoliite	35						Olivine and clinopyroxene	Forms acicular to bladed and radiating clusters of crystals at boundaries of former olivine grains in contact with plagioclase in the olivine gabbro part of the thin section. Has essentially the same habit in the gabbroic part of the thin section, but also partially replaces clinopyroxene.
Serpentine	2						Olivine	Occurs in veins in relict cores of olivine in olivine gabbro and is associated with fine-grained secondary magnetite. Also forms in a network of very fine (~ 50 µm) veins in the upper left of the thin section
Chlorite	20						Plagioclase	Occurs in two habits, fibrous and granular, and forms coronas around plagioclase, but also occurs in patches in the olivine gabbro part of the thin section. Occurs as patches in the gabbro.
Talc							Olivine	Forms in the centers of former olivine grains in the gabbro, generally surrounded by thin aureoles of tremolite needles.
Magnetite	<1						Olivine	
Pyrrhotite	<1						Pyrite?	
Pyrite	<1							
	_							

Total alteration: 55%

STRUCTURE : Static replacement of olivine, no strain associated with microfracturing. Largest plagioclase develop subgrains. Fractures cutting along grains filled with chlorite. No preferred orientation of crystals.

PHOTOMICROGRAPHS:

1309D_88R_6_52_56_1

1309D_88R_6_52_56_2

THIN SECTION:	U1309D-89R-1, 29-31 cm	Piece No. 2B	Unit: 235	TS#: 284	**OBSERVER: TN, YO, DB, KM, EH**
ROCK NAME:	Olivine gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	45	30	0.5	5	4		Anhedral	Clear contact with clinopyroxene.
Clinopyroxene	45	30	0.8	3.5	2		Anhedral to subhedral	Encloses rounded spinel and plagioclase, interlocked contacts.
Olivine	10	40	0.5	6	2		Anhedral, oikocrystic	Encloses rounded plagioclase chadacrysts
Spinel		Trace	0.3				Rounded	
								no indication for orthopyroxene
Magmatic vein								
Apatite	1	1					subhedral	in vein, inclusion-rich
Zircon		trace						2 grains
other primary minerals are not preserved								

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Tremolite	15						Olivine and plagiolase	Forms coronas
Chlorite	5						Olivine and plagiolase	Forms coronas
Talc	5						Pyroxene and olivine?	Pseudomorphic
Serpentine	2						Olivine	Partially oxidized
Magnetite	<1						Olivine	
Pyrite	<1						Olivine	
Green amphibole								Forms an alteration band (8 mm wide)
Epidote								Forms an alteration band (8 mm wide)

TOTAL ALTERATION: 30 %

STRUCTURE : Primary igneous texture is cut by a zone of veins where thin fracture networks with chlorite infills occur with intense alteration halo. No clear evidence of plastic deformation within the vein. (KM)

PHOTOMICROGRAPHS:

1309D_89R_1_29_31_1
1309D_89R_1_29_31_2
1309D_89R_1_29_31_3
1309D_89R_1_29_31_4
1309D_89R_1_29_31_5
1309D_89R_1_29_31_6

THIN SECTION:	U1309D-89R-2, 130-133 cm	Piece No. 5	Unit: 236	TS#: 285			**OBSERVER: TN, YO, DB, KM, JB, EH**	
ROCK NAME:	Olivine-bearing gabbro/trondhjemite dikelet							
GRAIN SIZE:	Coarse							
TEXTURE:	Seriate							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Olivine-bearing gabbro								
Clinopyroxene	55	55	0.5	15			Anhedral, oikocrystic	Encloses rounded to subhedral plagioclase chadacrysts.
Plagioclase	35	40	0.5	10			Anhedral, oikocrystic	Encloses rounded to subhedral clinopyroxene chadacrysts.
Olivine	0	4						completely replace by corona texture alteration
Trondhjemite (<2 mm wide)								
Amphibole								Brown-green
Quartz								
Feldspar								
Apatite								
Zircon								

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Tremolite/Actinolite	5						Clinopyroxene, olivine & plagioclase	Locally green colored
Chlorite	2						Plagioclase & olivine?	Fringe or crack filling of plagioclase
Brown amphibole	<1						Clinopyroxene	
Ilmenite	<1							Probably primary
Plagioclase								Forms a vein (3 mm wide)
Actinolite								Forms a vein (3 mm wide)
Ilmenite								Forms a vein (3 mm wide)
Chlorite								Forms a vein (3 mm wide)
Epidote								Forms a vein (3 mm wide)

TOTAL ALTERATION: 9 %

STRUCTURE : Primary igneous texture cut by a zone of alteration. Plagioclase grains were locally dynamically recrystallized into fine to moderate grain sizes. Some evidence of microfracturing within the alteration zone. (KM)

PHOTOMICROGRAPHS:

1309D_89R_2_130_133_1
1309D_89R_2_130_133_2
1309D_89R_2_130_133_3
1309D_89R_2_130_133_4

THIN SECTION:	U1309D-89R-3, 42-44 cm	Piece No. 6	Unit: 236	TS#: 286			**OBSERVER: PF, DB, EH**	
ROCK NAME:	Disseminated oxide gabbro/trondhjemite dikelet							
GRAIN SIZE:	Fine to coarse							
TEXTURE:	Inequigranular seriate							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**			**Composition**	**MORPHOLOGY**	**COMMENTS**
			min.	**max.**	**av.**			
Gabbro								
Plagioclase	50	60		20			Anhedral	
Clinopyroxene	20	40		15			Anhedral	
Spinel			0.1					Enclosed in palgioclase
Trondhjemite								
Feldspar								
Quartz								
Apatite								
Amphibole								
Zircon								

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron)**				**REPLACING / FILLING**	**COMMENTS**
			min.	**max.**	**av.**			
Green amphibole	35						Clinopyroxene	Pleochroic to brown
Talc	1						Clinopyroxene	Occurs mainly in the cores of the altered grains
Saussurite	<1						Plagioclase	Occurs along cleavage planes and fractures
Titanite	2						Vein	
Chlorite	<1						Vein	In small patches within a vein
Ilmenite	1						Primary oxide	
Magnetite	<1						Primary oxide	Also occurs in cores of secondary amphiboles along fractures and cleavage planes
Pyrite	<1						Vein	

TOTAL ALTERATION: 40%

STRUCTURE : Primary igneous texture crosscut by a zone of altered trondhjemite dikelet. Pervasive microfracturing occur with alteration in the whole thin section . Coarse plagioclase grains were intensely bended and cracked. A small amount of strain accumulated along the altered dikelet. (KM)

PHOTOMICROGRAPHS:

1309D_89R_3_42_44_1
1309D_89R_3_42_44_2
1309D_89R_3_42_44_3
1309D_89R_3_42_44_4
1309D_89R_3_42_44_5
1309D_89R_3_42_44_6

THIN SECTION:	U1309D-89R-3, 82-84 cm	Piece No. 10	Unit: 236	TS#: 287	**OBSERVER: PF, YO, KM, JB**
ROCK NAME:	Olivine gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	30	40	0.8	10			Anhedral	Corona texture is prominent.
Clinopyroxene	10	20	0.5	6			Anhedral	
Olivine	0	40	?	?			?	No primary phase remains.
Oxide	Trace						Anhedral	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Tremoliite	5						Olivine and pyroxene	Forms acicular to bladed and radiating clusters of crystals at boundaries of former olivine grains in contact with plagioclase.
Talc	34						Olivine, pyroxene, plagioclase	Fills interior of former olivine grains and varies from very fine-grained to patches of better crystallized grains. There is no extant olivine in this thin section.
Chlorite	5						Plagioclase and pyroxene	Occurs in two habits, fibrous and granular, and forms coronas around plagioclase, but also occurs in patches. It also probably occurs as fine sheets along cleavage surfaces in pyroxene grains giving the grains a cloudy surface It also occurs as veins through plagioclase grains.
Magnetite	<1						Olivine	Associated with serpentine and with tremolite also forms along lineaments in grains of amphibole(?) that occurs in the ccenter of former olivine grains.
Ilmenite	<1							Associated with talc and tremolite in the centers of former olivine grains.
Amphibole	5						Pyroxene	Pale green to pale brown pleochroism
Pyrite	1							Much more common than ilmenite in cores of former olvine and along cleavage planes in clinopyroxene

TOTAL ALTERATION: 50 %

STRUCTURE : Intensely altered texture with pervasive microcracks. No plastic strain except very weak undulatory extinction in plagioclase. (KM)

PHOTOMICROGRAPHS:

1309D_89R_3_82_84_1
1309D_89R_3_82_84_2
1309D_89R_3_82_84_3
1309D_89R_3_82_84_4

THIN SECTION:	U1309D-90R-3, 6-8 cm	Piece No. 1B	Unit: 238	TS#: 288	**OBSERVER: TN, AH, EH**
ROCK NAME:	Troctolitic gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Inequigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Olivine	50	55		5	3		Anhedral	Few weak kink bands, widely spaced
Plagioclase	30	35	2	6	3		Anhedral	
Clinopyroxene	10	10	0.5	4	3		Anhedral, grading to interstitial	
Orthopyroxene	Trace	Trace	0.2	3			Interstitial	Thin films at a few olivine-plagioclase grain boundaries

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Tremolite	5						Olivine and plagioclase	Forms coronas
Chlorite	3						Olivine and plagioclase	Forms coronas
Serpentine	2						Olivine	Partially oxidized
Brown amphibole	<1						Clinopyroxene	
Magnetite	<1						Olivine	
Pyrrhotite	<1						Olivine	
Chrcopyrite	<1							

TOTAL ALTERATION: 10 %

STRUCTURE : Serpentinization foliation restricted to olivine grains, leaving broken up olivine subgrains without deformation (homogeneous extinction of pre-existing olivine grains). Serpentinization crack system tends to follow the c-axis of the olivine grains.

PHOTOMICROGRAPHS:

1309D_90R_3_6_8_1

1309D_90R_3_6_8_2

THIN SECTION:	U1309D-90R-3, 54-56 cm	Piece No. 1F	Unit: 237	TS#: 289	**OBSERVER: EH, DB, PF, KM,JB**
ROCK NAME:	Gabbro/epidote bearing leucocratic dikelet				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Gabbro								
Clinopyroxene	35	40	1	12	8		Anhedral, rarely interstitial	Amphibole replacement along exolution lamellae.
Plagioclase	40	60	1	4	5		Anhedral	
Apatite		Trace						Enclosed in clinopyroxene at the contact with dikelet.
Cr-Spinel		Trace		0.3			Rounded	Enclosed in plagioclase.
								Note: no indication of presence of olivine.
Dikelet								
Epidote								
Garnet								? (EH)
Plagioclase								
Clinopyroxene							Euhedral	Enclosed in clinopyroxene
Zircon	0.5	.5						
Apatite	1	1		1				At least three grains identified by EDX

SECONDARY MINERALOGY	PERCENT	SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.	Composition	REPLACING / FILLING	COMMENTS
Chlorite	18					Plagioclase	Occurs in two habits, fibrous and granular, and forms coronas around plagioclase, but also occurs in patches and as sheafs in plagioclase near the vein.
Tremoliite	2					Olivine	Forms acicular to bladed and radiating clusters of crystals at boundaries of former olivine grains in contact with plagioclase.
Talc	2					Olivine and pyroxene	Forms in the centers of former olivine grains inside tremolite aureoles and as fringes on edges of proxene and near the vein where is a network of talc in some of the cataclastically deformed plagioclase grains at the edge pf the vein.
Amphibole	3						Pale green and sometimes pale brown slightly pleochroic amphibole forms after pyroxene. Also there is a small (~1) amount of pale green to brown amphibole in the vein (interstitial).
Ilmenite	<1						May be primary

TOTAL ALTERATION: 25% Alteration associated with the dikelet includes a fine network of veinlets for about 1 cm from the contact with the dikelet and thin (50 µm) that penetrate several cm from the edge of the dikelet.

STRUCTURE: Primary igneous texture with little evidence of deformation except weak undulatory extinction and pervasive microcracks cut by the dikelet. A narrow zone of cataclasis at the boundary between the host and the dikelet. (KM)

PHOTOMICROGRAPHS:

1309D_90R_3_54_56_1
1309D_90R_3_54_56_2
1309D_90R_3_54_56_3
1309D_90R_3_54_56_4
1309D_90R_3_54_56_5
1309D_90R_3_54_56_6

THIN SECTION:	U1309D-91R-1, 25-28 cm	Piece No. 2A	Unit: 239	TS#: 290	**OBSERVER: EH, PF, KM, JB**
ROCK NAME:	Olivine gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	50	70	0.5	8	6		Anhedral	Deeply resorbed and substituted by clinopyroxene.
Clinopyroxene	15	20	0.1	5			Interstitial	All clinopyroxene grains are interconnected showing coherent extinction.
Olivine	3	10	0.1	3			Anhedral	Locally enriched in two patches.
Orthopyroxene				10			Anhedral, interstitial	One very coarse oikocryst which includes amoeboidal clinopyroxenes.
Spinel		Trace						In the matrix.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Tremoliite	4						Olivine	Forms acicular to bladed and radiating clusters of crystals at boundaries of former olivine grains in contact with plagioclase.
Serpentine	<1						Olivine	Thin veins through the cores of remnant olivine grains.
Magnetite	<1						Olivine	In the centers of serpentine veins.
Talc	3						Olivine	In the cores of former olivine grains and surrounding remnant olivine cores.
Green amphibole	12						Clinopyroxene	Primarily around the margins of grains but also in a vein and more pervasive thorugh pyroxene grains cut by the vein.
Chlorite	4						Plagioclase	Occurs in two habits, fibrous and granular, and forms coronas around plagioclase, but also occurs in patches . Also occurs in veinlets along fractures in plagioclase with or without tremolite.
Ilmenite	<1							In clinopyroxene
Magnetite	<1						olivine	
Chalcopyrite	<1							
?							Olivine	Occurs as blades and irregular grains mainly associated with tremolite rims of former olivine grains.
Pyrrhotite	<1							

TOTAL ALTERATION: 24 %

STRUCTURE : Primary igneous texture with minor microfracturing and alteration. Plagioclase grains locally show serrated grain boundaries. (KM)

PHOTOMICROGRAPHS:

1309D_91R_1_25_28_1

1309D_91R_1_25_28_2

THIN SECTION:	U1309D-91R-2, 72-75 cm	Piece No. 9	Unit: 240	TS#: 291	**OBSERVER: EH, DB, KM, GS, JB**
ROCK NAME:	Troctolite				
GRAIN SIZE:	Medium				
TEXTURE:	Equigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Olivine	5	20	1	3	2		Anhedral	Few kink bands
Plagioclase	70	80	1	7	5		Anhedral	Occasionally enclosed in olivine
Clinopyroxene	1	2					Interstitial	Interconnected with same extinction, therefore poikilitic. 0.2 mm thick clinopyroxene film around olivine. Undeformed
								Note: alteration front, abrupt change from quite fresh olivine to talc and tremolite.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Tremolite	4						Olivine	Forms acicular to bladed and radiating clusters of crystals at boundaries of former olivine grains in contact with plagioclase.
Talc	9						Olivine	Forms in the centers of former olivine, usually fine-grained, or surrounding relict cores of olivine
Brown amphibole	<1						Olivine	Occurs at the edges of some former olivine grains.
Chlorite	10						Plagioclase	
Magnetite	<1						Olivine	Forms as irregular grains in the cores of former olivine grains and is associated with tremolite and talc.
Pyrrhotite	<1							Abundant in some former olivine grains

TOTAL ALTERATION: 24 %

STRUCTURE: Primary igneous texture with minor microfracturing. Magmatic foliation defined by plagioclase crystal preferred orientation. Plagioclase grains locally show bending with undulatory extinction. Dynamically recrystallized grains of plagioclase occur locally along grain boundaries. Interstitial - poikilitic clinopyroxene is not deformed, postdates plastic strain apparently (KM & GS)

PHOTOMICROGRAPHS:

1309D_91R_2_72_75_1
1309D_91R_2_72_75_2
1309D_91R_2_72_75_3
1309D_91R_2_72_75_4

THIN SECTION:	U1309D-92R-1, 96-99 cm	Piece No. 6C	Unit: 241	TS#: 292	**OBSERVER: PF, EH, DB, KM, GS,JB**
ROCK NAME:	Gabbro crosscut by leucocratic zircon-bearing dikelet				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Gabbro:								
Plagioclase	20	25						
Clinopyroxene	40	75						Interlocked-myrmekitic contacts.
Leucocratic dikelet								
Plagioclase	40	100?						Strongly chloritized. Possibly other primary minerals.
Zircon	Trace	Trace					Subhedral	One grain, elongate, partially preserved prisms.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Amphibole	50						Clinopyroxene	Occurs pervasively replacing clinopyroxene. Also makes up a vein filling along the left side of the thin section and affects adjacent plagioclase.
Tremolite	2						Olivine	Forms acicular to bladed and radiating clusters of crystals at boundaries of former olivine grains in contact with plagioclase
Talc	3						Olivine	In the cores of some former olivine grains and as thin veins in amphibole
Greeen amphibole	2						Pyroxene	Amphibole adjacent to the vein on the left side of the thin section is green. Amphibole filling the vein at the bottom of the thin section is also green with pleochroism to light brown.
Chlorite	2						Plagioclase	Occurs in two habits, fibrous and granular, and forms coronas around plagioclase, but also occurs in patches and as thin veins along fractures in plagioclase
Ilmenite	<1						Olivine	In blades or as irregular grains associated with tremolite and talc in the cores of former olivine grains
Pyrrhotite	<1							
Chalcopyrite	<1							

TOTAL ALTERATION: 60 %

STRUCTURE : Relict primary clinopyroxene preserved in core of dusty secondary (?) clinopyroxene. Large amphibole grains. Interpret as strongly modified igneous texture by secondary clinopyroxene/amphibole. (GS) A thin zone of plastic deformation where both plagioclase and clinopyroxene were dynamically recrystallized into finer polygonal grains. Coarse plagioclase grains along the zone show internal plastic strains such as bending, moderate recrystallization and undulatory extinction. (KM)

PHOTOMICROGRAPHS:

1309D_92R_1_96_99_1
1309D_92R_1_96_99_2
1309D_92R_1_96_99_3
1309D_92R_1_96_99_4
1309D_92R_1_96_99_5
1309D_92R_1_96_99_6
1309D_92R_1_96_99_7

THIN SECTION:	U1309D-93R-1, 16-18 cm	Piece No. 4	Unit: 241	TS#: 293	**OBSERVER: EH, PF, JB**
ROCK NAME:	Trondhjemite				
GRAIN SIZE:	Fine to medium				
TEXTURE:	Cataclastic				

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Feldspar	60	65					Anhedral	Possibly microcline.
Clinopyroxene	4	5					Anhedral	
Quartz	30	30					Anhedral	Inclusion rich.
Sphene	0.5	0.5					Euhedral	
Ti-oxides	0.5	0.5					Anhedral	
Zircon	0.2	0.2					Anhedral	
Muscovite	Trace	Trace					Anhedral	Possibly paragonite (no K peak) in EDS measurement.
Apatite	Trace	Trace					Subhedral	
SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Saussurite	6						Plagioclase	Fine scattered alteration of plagioclase, also alteration following cleavage or fracture surfaces.
Plagioclase (albite?)	5						Plagioclase	Also in veins and patches, some chessboard twinning.
Epidote	5						Plagioclase	Some large grains, also a major component of sausserite.
Titanite	2						Original oxides?	Major component of interstitial grundge.
Green amphibole	2						Clinopyroxene	
Ilmenite	1							Remnants in titanite.

TOTAL ALTERATION: 15 %

STRUCTURE: Cataclastic grain reduction, with heterogeneous distribution. Very variable grain size and alteration of fine-grained matrix. Aligment of plagioclase grains with foliation. Later brittle fracturing crosscuts the cataclastic fabric.

PHOTOMICROGRAPHS:

1309D_93R_1_16_18_1
1309D_93R_1_16_18_2
1309D_93R_1_16_18_3
1309D_93R_1_16_18_4
1309D_93R_1_16_18_5
1309D_93R_1_16_18_6
1309D_93R_1_16_18_7

THIN SECTION:	U1309D-93R-2, 15-18 cm	Piece No. 1A	Unit: 241	TS#: 294	**OBSERVER: PF, EH, JB**
ROCK NAME:	Olivine/gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	40	50	0.1	15	10		Anhedral	
Clinopyroxene	30	35	0.2	15	10		Anhedral	
Olivine	0	15						Big corona, possibly olivine, many disseminated opaques. However, neighboring clinpyroxene and plagioclase strongly replaced as well.
Fe-Ti-oxides	Trace	Trace					Anhedral	Included in coarse clinopyroxene.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Tremoliite	5						Olivine	Forms acicular to bladed and radiating clusters of crystals at boundaries of former olivine grains in contact with plagioclase.
Talc	12						Olivine	
Chlorite	5						Plagioclase	Occurs in two habits, fibrous and granular, and forms coronas around plagioclase, but also occurs in patches. As thin veins in plagioclase.
Amphibole	4						Clinopyroxene	Pleochroism to green.
Ilmenite	<1						Olivine	As irregular grains or bladed.
Green amphibole	3						Vein	In bottom of thin section (note arrow for orientation) also partially replacing clinopyroxene and along a thin (50 µm) vein through one of the large clinopyroxene grains.
Pyrrhotite	<1						Olivine?	Occurs as veins and filigree crystals in corres of former olivine

TOTAL ALTERATION: 30 %

STRUCTURE: Dark green vein crosscutting crystals and with associated alteration (tremolite/talc). This vein crosscuts an earlier, pervasive fracture network with serpentine infill, that locally displaces the plagioclase lamellae (small amount of strain).This network is also overprinted by alteration of olivine to talc. Twinning and slight undulatory extinction in plagioclase.

PHOTOMICROGRAPHS:

1309D_93R_2_15_18_1
1309D_93R_2_15_18_2
1309D_93R_2_15_18_3
1309D_93R_2_15_18_4
1309D_93R_2_15_18_5

THIN SECTION:	U1309D-93R-2, 135-137 cm	Piece No. 7	Unit: 241	TS#: 295	**OBSERVER: EH, PF, KM, GS,JB**
ROCK NAME:	Olivine Gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Clinopyroxene	10	30	0.2	13			Anhedral, interstitital	Strongly replaced by acicular colorless amphiboles.
Plagioclase	25	40	0.1	16			Anhedral	Bent, tapered and displaced twins.
Olivine	0	30	0.8	18			Anhedral	Completely replaced by tremolite and talc.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Tremolite	25						Olivine	There is no extant olivine present, but we think the patches of tremolite surrounded by chlorite coronas indicate the presence of olivine in the original rock. About 1/2 of the section has lifted off the slide and the part that has lifted is mostly tremolite and talc (with one plagioclase crystal) so this probably represents a significant percentabge of the rock.
Talc	15						Olivine	
Chlorite	5						Plagiocalse	Occurs in two habits, fibrous and granular, and forms coronas around plagioclase, but also occurs in patches and as veins with or without tremolite along fracture surfaces in plagioclase.
Amphibole	19						Clinopyroxene	
Magnetite	<1							Associated with tremolite and talc in the interior of a former olivine grain.
Ilmenite	<1							Primary?
Pyrrhotite	<1							

TOTAL ALTERATION: 65%

STRUCTURE: Primary igneous texture overprinted by weak plastic strain in one corner of the thin section. Vein-type plagioclase in opposite corner has magmatic appearance again with weak plastic deformation. Microfractures abundant in plagioclase, partially offsetting grains on micron-scale.

PHOTOMICROGRAPHS:

1309D_93R_2_135_137_1

1309D_93R_2_135_137_2

THIN SECTION:	U1309D-94R-1, 95-97 cm	**Piece No.** 6C	**Unit**: 240	**TS#: 296**	**OBSERVER:YO, GS, TN, EH**
ROCK NAME:	Olivine-bearing Gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	32	40	3	15			Anhedral, partly interstitial	
Clinopyroxene	50	55	2	18			Anhedral, poikilitic	Sometimes include plagioclase chadacrysts. Some chadacryst plagioclase include small fragment of the "host" oikocryst clinopyroxene, being confirmed by the same extinction angle between the oikocryst clinopyroxene and the "fragmented" clinopyroxene.
Olivine	0	4	2	4			Anhedral	Totally altered, forming corona texture.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Talc	3						Olivine	Pseudomorphic.
Chrolite	5						Olivine-plagioclase	Forms coronas or fills cracks of plagioclase.
Tremolite/actinolite	2						Clinopyroxene, olivine	
Magnetite	<1							
Pyrrhotite	<1							

TOTAL ALTERATION: 10%

STRUCTURE : Igneous microstructure now modified by growth of clinopyroxene. Plagioclase shows bending and tapering of twins, indicating weak plastic strain, clinopyroxene is partly showing recrystallization into strongly misoriented subgrains. Very coarse microstructure of clinopyroxene. (GS)

PHOTOMICROGRAPHS:

1309D_94R_1_95_97_1

1309D_94R_1_95_97_2

THIN SECTION:	U1309D-94R-2, 27-30 cm	Piece No. 4	Unit: 240	TS#: 297	**OBSERVER: PF, TN, GS, AH, JE**
ROCK NAME:	Olivine-bearing Gabbro				
GRAIN SIZE:	Medium to coarse				
TEXTURE:	Poikilitic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	63	65		15			Anhedral to subhedral	
Clinopyroxene	27	30		15			Anhedral	Oikocryst
Olivine	0	2	20	50	35		Anhedral	Completely replaced by tremolite and talc.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Tremolite	2						Olivine	Replacing olivine at the grain boundary adjacent to plagioclase.
Talc	<1						Olivine	As patches in the center of larger former olivine grains
Chlorite	5						Plagioclase	Prrimarily occurs in fibrous corona around plagioclase, in contact with the single former olivine grain in the thin section, but also forms very thin veins across plagioclase grains.
Green amphibole	3						Clinopyroxene	20µm alteration rims (locally up to 0.2 mm) around clinopyroxene and as patches within clinopyroxene grains apparently following fractures. Also clinopyroxene appears partiallya ltered to amphibole especially along lamellae. Actinolite (?) partially replaces pyroxene, but also forms blades pentrating the tremolitic rims of former olivine grains suggesting late alteration event.
Magnetite	<1						Olivine	In the cores of former olivine grains associated with tremolite and talc.
Calcite	<1						Vein filling	

TOTAL ALTERATION: 16 %

STRUCTURE: Twinning and slight undulatory extinction of plagioclase. Traces of healed cracks in pyroxene. Network of brittle fractures with locally small displacement in plagioclase grains. Some cracks are open and infilled. (JE). Plagioclase extremely embayed suggesting resorption. One large dusty clinopyroxene oikocryst encloses all. Plagioclase microstructure conceivably primary igneous with magmatic strain. Clinopyroxene literally squeezes open plagioclase along twin lamellae.

PHOTOMICROGRAPHS:

1309D_94R_2_27_30_1
1309D_94R_2_27_30_2
1309D_94R_2_27_30_3
1309D_94R_2_27_30_4
1309D_94R_2_27_30_5
1309D_94R_2_27_30_6
1309D_94R_2_27_30_7
1309D_94R_2_27_30_8

THIN SECTION:	U1309D-94R-3, 34-36 cm	Piece No. 6	Unit: 241	TS#: 298	**OBSERVER: EH, DB, PF, AD, JB, JE**
ROCK NAME:	Diabase				
GRAIN SIZE:	Fine				
TEXTURE:	Ophitic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	40	50	0.05	1	0.3		Euhedral	Typical radiating laths, some blocky phenocrysts.
Olivine	10	10		0.2	0.1		Anhedral	Subrounded crystals, contain only few melt inclusions suggesting rapid cooling.
Oxide	1	1		0.1				
Groundmass	19	40						Now transformed into fine-grained clay minerals and green amphibole.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Green amphibole	30						Pyroxene	
Titanite	1							
Chlorite								
Serpentine							Olivine	
Ilmenite	1						Magnetite	Mixture of ilmenite and magnetie replacing the primary magnetite
Magnetite	<1							
Pyrrhotite	<1							

TOTAL ALTERATION: 30 %

STRUCTURE: No deformation. (JE)

PHOTOMICROGRAPHS:

1309D_94R_3_34_36_1

1309D_94R_3_34_36_2

THIN SECTION:	U1309D-96R-1, 121-123 cm	**Piece No.** 11	**Unit**: 245	**TS#: 299**	**OBSERVER: AD, AH, DB, GS**
ROCK NAME:	Gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Inequigranular, seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	80	80	0.3	14	4		Anhedral to subhedral	
Clinopyroxene	10	20	0.4	6	0.4		Subhedral, interstitial	Rare oikocryst.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Tremolite	3						Olivine	
Green amphibole (actinolite?)	3						Olivine/pyroxene	As corona and replacement of olivine and pyroxene, and occur also as veinlets in the plagioclase.
Chlorite	1						Plagioclase/pyroxene	Rim around plagioclase.
Ilmenite								
Magnetite								
Sulfides								

TOTAL ALTERATION: 10%

STRUCTURE: High degree of plagioclase recrystallization indicating moderate to high plastic strain. One larger clinopyroxene grain is poikilitic and shows only subtle subgrain formation, suggesting in a simple scenario that clinopyroxene formed after plastic deformation. (GS)

PHOTOMICROGRAPHS:

1309D_96R_1_121_123_1
1309D_96R_1_121_123_2
1309D_96R_1_121_123_3

THIN SECTION:	U1309D-96R-2, 23-25 cm	**Piece No.** 2	**Unit**: 246	**TS#: 300**	**OBSERVER: AD, DB, KM, GS, EH**
ROCK NAME:	Possible magmatic dikelet in gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Clinopyroxene	40	60	1	30			Anhedral, oikocrystic	
Plagioclase	30	40	1	8			Anhedral, equant when recrystallized	Rounded chadacrysts in clinopyroxene
Olivine	0	2						all transformed into corona texture
zircon								in plagioclase 30µm from vein: vein is magmatic?
Other than zircon, there is no indication for magmatic origin of this vein								

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Green amphibole	2						Plagioclase	Veinlets cutting the plagioclase
Chlorite	2						Plagioclase	
Talc	2						Olivine	Replacement in the coronas
Serpentine	1						Olivine	Replacement in the coronas
Tremolite	3						Pyroxene/olivine	
Pyrite								Associated with the alteration corona
Magnetite								

TOTAL ALTERATION: 15 %

STRUCTURE : An alteration zone cut across the whole section. Intense microfracture networks occur dominantly in plagioclase grains with moderate undulatory extinction. Primary textures are preserved, but grain boundaries are serrated due to weak plastic strain. (KM). Neoblast formation in plagioclase seems not to have affected clinopyroxene (GS)

PHOTOMICROGRAPHS:

1309D_96R_2_23_25_1
1309D_96R_2_23_25_2
1309D_96R_2_23_25_3
1309D_96R_2_23_25_4
1309D_96R_2_23_25_5
1309D_96R_2_23_25_6

THIN SECTION:	U1309D-97R-1, 52-54 cm	**Piece No.** 5	**Unit**: 246	**TS#: 301**	**OBSERVER: EH, AD, KM, YO**
ROCK NAME:	Olivine gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	20	45	0.3	8	5			
Olivine	3	8	0.5	3	1			Three grains display weak kink bands
Clinopyroxene	20	45	1	14	3			Four grains, very coarse oikocrysts, strongly amphibolitized along exsolution lamellae. Chadacrysts include olivine and plagioclase.
Fe-Ti-oxide	Trace	Trace	0.1	0.9	0.8		Interstitial	Three interstitial grains.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Serpentine	1						Olivine	Replacing olivine
Tremolite	2						Olivine	Rim around the olivine
Talc	3						Olivine	Replacing olivine
Chlorite	2						Plagioclase	Rim around the plagioclase
Prehnite	1							
Magnetite								
Sulfides								

TOTAL ALTERATION: 20 %

STRUCTURE : Coarse oikocrystic clinopyroxene. Primary igneous texture with some evidence of plastic strain such as undulatory extinction and kinking. Weak recrystallization in plagioclase in one corner of the thin section. Minor pervasive microcracks with alteration. (KM)

PHOTOMICROGRAPHS:

1309D_97R_1_52_54_1

1309D_97R_1_52_54_2

THIN SECTION:	U1309D-97R-1, 77-79 cm	**Piece No.** 7	**Unit**: 246	**TS#:** 302	**OBSERVER:DB, GS**
ROCK NAME:	Gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Clinopyroxene	60	80	3	30			Subhedral	
Plagioclase	30	30	0.5	5			Anhedral, subequant	
Olivine	0	1?						

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Amphibole	10						Pyroxene	As scattered blebs in pyroxene and has green to brown pleochroism.
Green amphibole	2						Pyroxene	Within and adjacent to cataclastic zone and as narrow fringes on pyroxene grains and following fractures in plagioclase.
Tremolite	1						Olivine	As a total replacement of a small grain of former olivine and as irregular patches and solitary veinlets within pyroxene.
Talc	<1						Olivine	In the center of the grain

TOTAL ALTERATION: 15 %

STRUCTURE : Plagioclase is either embayed or highly small and equant. This mortar textured plagioclase is without clear preferred orientation, therefore probably of magmatic origin. See only huge clinopyroxene with no trace of deformation therefore poikiloblastic? Other view (GS): plagioclase is highly recrystallized, shows good CPO using gypsum plate, moderate plastic strain, clinopyroxene must be late, not affected by deformation

PHOTOMICROGRAPHS:

1309D_97R_1_77_79_1

1309D_97R_1_77_79_2

THIN SECTION:	U1309D-97R-3, 21-23 cm	**Piece No.** 3	**Unit**: 246	**TS#: 303**	**OBSERVER: GS, DB, JB**
ROCK NAME:	Olivine Gabbro				
GRAIN SIZE:	Medium to coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	40	60	0.2	4			Anhedral, subequant	
Clinopyroxene	20	40	1	7			Oikocrystic, interstitial	
Olivine	0	<5?						
Oxide								See comments for secondary mineralogy.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Tremolite	30						Clinopyroxene, olivine	Olivine no longer present in thin section
Chlorite	5						Plagioclase, clinopyroxene	
Green amphibole	2						Clinopyroxene	
Magnetite	<1							Probably primary
Ilmenite	<1							
Pyrite	<1							

TOTAL ALTERATION: 40%

STRUCTURE : Very altered rock. Poikylitic clinopyroxene largely statically altered to amphibole. Plagioclase mainly igneous structure. Olivine altered.

PHOTOMICROGRAPHS:

1309D_97R_3_21_23_1

1309D_97R_3_21_23_2

THIN SECTION:	U1309D-98R-1, 11-14 cm	**Piece No.** 3A	**Unit**: 246	**TS#: 304**	**OBSERVER: DB, JB, JE**
ROCK NAME:	Cataclastic vein in gabbro				
GRAIN SIZE:	Medium to coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	50	60	0.2	5			Anhedral, subequant	
Clinopyroxene	10	40	1	7			Anhedral, oikocrystic	Encloses rounded plagioclase chadacrysts.
Olivine	0	1?						

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite	30						Clinopyroxene	Replacement complete at margins, less so in cores.
Chlorite	10						Plagioclase	
Talc	2							
Albite	3						Plagioclase	
Carbonate	<1							
Prehnite	2						Plagioclase	
Titanite	<1							Stringers and equant grains, Fe-Tri oxides rare or absent.
Pyrrhotite	<1							
Pyrite	<1							Concentrated in shear zone.

TOTAL ALTERATION: 45%

STRUCTURE: Host rock with weak plastic strain - neoblast formation locally both in clinopyroxene and plagioclase grains. Overprinted by a cataclastic shear zone. Highly variable grain size along discrete shear zone, very angular, and no distinct foliation - poorly developed and relatively low strain. Irregular late microcracking of grains (JE).

PHOTOMICROGRAPHS:

1309D_98R_1_11_14_1
1309D_98R_1_11_14_2
1309D_98R_1_11_14_3
1309D_98R_1_11_14_4

THIN SECTION:	U1309D-98R-3, 28-30 cm	**Piece No.** 2B	**Unit**: 246	**TS#: 305**	**OBSERVER: DB, KM, JB**
ROCK NAME:	Vein in gabbro				
GRAIN SIZE:	Medium to coarse				
TEXTURE:	Inequigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	45	60	0.2	4			Anhedral, subequant where recrystallized	
Clinopyroxene	10	40	1	7			Anhedral, oikocrystic	Encloses rounded plagioclase chadacrysts.
Olivine	0	1?						

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Chlorite	10						Plagioclase	
Tremolite	30						Clinopyroxene	
Albite	10						Plagioclase	
Ilmenite	<1							Possibly primary
Titanite	<1						Ilmenite	
Rutile	<1						Ilmenite	Very dark brown, highly reflecftive, assoc iated with ilmenite and titanite.
Pyrrhotite?	<<1							Very scarce, small grains
Carbonate							In vein	
Albite							In vein	
Amphibole							In vein	
Titanite							In vein	
Apatite							In vein	
Pyrite							In vein	

TOTAL ALTERATION: 50%

STRUCTURE: Primary igneous texture were moderately modified by plastic strain. Plagioclase grains were locally dynamically recrystallized into moderate grain sizes, whereas coarse grains are bent with undulatory extinction. These earlier textures were cut by several set of intense cataclasitic zones with high alteration. (KM)

PHOTOMICROGRAPHS:

1309D_98R_3_28_30_1
1309D_98R_3_28_30_2
1309D_98R_3_28_30_3
1309D_98R_3_28_30_4
1309D_98R_3_28_30_5
1309D_98R_3_28_30_6

THIN SECTION:	U1309D-99R-3, 13-16 cm	**Piece No.** 2	**Unit**: 248	**TS#: 306**	**OBSERVER: PF, NA, KM, JB**
ROCK NAME:	Anorthosite/Microgabbro				
GRAIN SIZE:	Coarse/Medium				
TEXTURE:	Seriate/Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Anorthosite								
Plagioclase	85	95	1	5	2			
Clinopyroxene	0	5						
Microgabbro								
Plagioclase	65	77	0.2	3	1			
Clinopyroxene	5	20	0.1	0.5	0.3			
Olivine	2	3	0.1	0.5	0			

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Epidote	15						Vein/alteration zone	Numerous grains in vein
Titanite	1						Vein/alteration zone	
Albite	10						Plagioclase	Mostly in vein/alteration zone
Amphibole	2						Clinopyroxene	
Rutile?	<1							Very dark grains in alteration zone
Ilmenite	<1							Partially replaced by titanite
Pyrite	<1						Vein/alteration zone	

TOTAL ALTERATION: 25%, inhomogeneous, thin veins contain albite, epidote

STRUCTURE : Anorthosite: serrated grain boundaries with weak undulatory extinction. Dynamically recrystallized gains occur very locally. Microgabbro: pervasive undulatory extinction in plagioclase. (KM)

PHOTOMICROGRAPHS:

1309D_99R_3_13_16_1
1309D_99R_3_13_16_2
1309D_99R_3_13_16_3
1309D_99R_3_13_16_4

THIN SECTION:	U1309D-100R-1, 10-13 cm	**Piece No.** 1A	**Unit**: 249	**TS#: 307**			**OBSERVER:NA, DB, JB, YO**	
ROCK NAME:	Plagioclase bearing olivine-clinopyroxenite							
GRAIN SIZE:	Coarse							
TEXTURE:	Poikilitic							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**			**Composition**	**MORPHOLOGY**	**COMMENTS**
			min.	**max.**	**av.**			
Clinopyroxene	25	60	3	>25	-		Anhedral, oikocrystic	Large oikocryst. Undulatory extinction.
Olivine	20	30	1	6	2.5		Anhedral	Subhedral chadacrysts in clinopyroxene, some showing undulatory extinction.
Plagioclase	1	5	3	20			Anhedral	
Spinel	-	<1		2.5			Subhedral, interstitial	One large (~2.5 mm) interstitial grain in olivine
								Note: Melt inclusions in olivine???

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron)**				**REPLACING / FILLING**	**COMMENTS**
			min.	**max.**	**av.**			
Tremolite	5						Olivine, veins	
Serpentine	10						Olivine, veins	
Chlorite	1						Plagioclase	
Prehnite	<1						Plagioclase	
Talc	<1						In veins	
Magnetite	<1						Olivine	
Pyrrhotite	<1							Probably primary
Chalcopyrite	<1							

TOTAL ALTERATION: 15%

STRUCTURE : Rounded olivine grains enclosed by pyroxene, and crosscut by set of brittle veins with talc alterations. Olivines crosscut by veins are altered, rest are fresh.

PHOTOMICROGRAPHS:

1309D_100R_1_10_13_1
1309D_100R_1_10_13_2
1309D_100R_1_10_13_3
1309D_100R_1_10_13_4
1309D_100R_1_10_13_5

THIN SECTION:	U1309D-100R-1, 26-28 cm	**Piece No.** 1A	**Unit**: 249	**TS#: 308**	**OBSERVER: EH, DB, JB, YO**
ROCK NAME:	Dunite olivine clinopyroxenite contact				
GRAIN SIZE:	Medium				
TEXTURE:	Cumulate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Dunite								
Olivine	85	94	0.4	6	3		Anhedral	Kink bands, locally small spacing
Clinopyroxene	4	4	1	10	1		Interstitial	Interstitial and poikilitic
Plagioclase	1	1		1			Anhedral	In two occasions as inclusion in olivine
Spinel	0	1	0.3				Subhedral	Completely altered.
Olivine-clinopyroxenite								
Clinopyroxene	50	60		20			Large oikocrysts	
Olivine	30	40	0.5	4			Subhedral chadacrysts	
Spinel		Trace					Anhedral	
Plagioclase	1<	1<					Anhedral	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Serpentine	20						Olivine	Abundant in dunite, less so in olivine-clinopyroxenite
Chlorite	<1						Plagioclase	
Amphibole	<1						Olivine, clinopyroxene?	Rare at olivine-plagioclase contacts, may locally replace clinopyroxene.
Magnetite	1						Olivine	
Pyrrhotite	<1							
Chalcopyrite	<1							
Ilmenite	<1							

TOTAL ALTERATION: 20% inhomogeneous

STRUCTURE: Dunite impregnated with clinopyroxene and plagioclase (poikilitic). No preferred orientation of olivine. Fractured olivine grains and a band of serpentinization controlled by fractures. Serpentinite associated with oxides (magnetite?) along cracks. No displacement along cracks.

PHOTOMICROGRAPHS:

1309D_100R_1_26_28_1
1309D_100R_1_26_28_2
1309D_100R_1_26_28_3

THIN SECTION:	U1309D-100R-1, 48-50 cm	**Piece No.** 1B	**Unit**: 250	**TS#: 309**	**OBSERVER: NA, DB, AH, JB**
ROCK NAME:	Troctolite				
GRAIN SIZE:	Medium				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Olivine	25	50	0.1	5	2		Anhedral, subhedral, oikocrystic	Kink bands. Rarely as chadacrysts in plagioclase.
Plagioclase	25	42	0.5	4	2.5		Anhedral to subhedral	Rarely as rounded chadacrysts in olivine.
Clinopyroxene	2	3					Oikocrystic to interstitial	Thin film between olivine and plagioclase evolving toward oikocrystic textures.
Spinel	Trace	<1	<0.1	0.2	0.1		Euhedral to subhedral	Included in olivine and plagioclase.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Serpentine	20						Olivine	Main olivine alteration phase.
Chlorite	3						Plagioclase	Thin bands along olivine-plagioclase contacts.
Tremolite	3						Olivine, clinopyroxene	Thin bands along olivine-plagioclase contacts, also in rare clinopyroxene.
Magnetite	1						Olivine	
Pyrite	<1							
Chalcopyrite	<1							

TOTAL ALTERATION: 25%, inhomogeneous

STRUCTURE : Small inclusions of olivine contained within the plagioclase crystals. Also find occasional inclusions of plagioclase inside the olivine crystals. The olivine crystals are being replaced by serpentine beginning by intruding along fractures. Plagioclase crystals show weak undulatory extinction and a few subgrains have developed. These features show the rock has experienced a weak plastic strain. The crytals do not show any preferred orientation. Microcracking is exhibited throughout the crystals.

PHOTOMICROGRAPHS:

1309D_100R_1_48_50_1
1309D_100R_1_48_50_2
1309D_100R_1_48_50_3
1309D_100R_1_48_50_4
1309D_100R_1_48_50_5

THIN SECTION:	U1309D-101R-3, 6-8 cm	Piece No. 1A	Unit: 258	TS#: 310	**OBSERVER: DB, AH, JB**
ROCK NAME:	Gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Poikilitic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Clinopyroxene	50	55		30			Oikocryst	
Plagioclase	40	45	1	7			Chadacrysts, anhedral	Rounded resorbed chadacrysts.
Olivine	0	<1?						

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Chlorite	3						Plagioclase, veins	Some in relict corona texture
Green amphibole	1						Clinopyroxene, veins	
Tremolite	2						Olivine?	Likely relict corona texture
Albite	3						Plagioclase	Mostly along veins and fractures
Ilmenite	<1							
Pyrrhotite	<1							

TOTAL ALTERATION: 10%

STRUCTURE: Magmatic structure. Formation of pyroxene subgrains locally, with subparallel extinction. Plagioclase crystals exhibit undulatory extinction and the formation of subgrain boundaries. Some brittle fractures with mineral infill crosscutting the minerals. No brittle strain.

PHOTOMICROGRAPHS:

1309D_101R_3_6_8_1

1309D_101R_3_6_8_2

THIN SECTION:	U1309D-101R-5, 59-62 cm	Piece No. 3	Unit: 260	TS#: 311	**OBSERVER: DB, AH,JB**
ROCK NAME:	Olivine gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	50	65	0.5	14			Anhedral, oikocrystic	Encloses few completely altered olivine grains
Clinopyroxene	18	20	0.3	8			Oikocrystic, interstitial	Small interstitial grains are optically continuous forming large oikocrysts
Olivine	0	15		3?				
Spinel		<1					Interstitial	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Chlorite	5						Plagioclase	
Tremolite	15						Olivine	Ring texture probably after olivine (JB)
Talc	5						Olivine	
Green amphibole	1						Clinopyroxene	
Prehnite	1						Plagioclase	
Pyrite	<1						Olivine	Opaque phase in several olivine pseudomorphs
Ilmenite	<1							

TOTAL ALTERATION: 25%

STRUCTURE: No preferred orientation of the minerals, indicating no magmatic strain. Plagioclase crystals exhibit undulatory extinction and recrystallization at grain boundaries between two plagioclase crystals. The grain boundaries of the plagioclase are serrated. Concentric ring texture of oxides with serpentine exhibited between plagioclase and clinopyroxene crystals. Microcracking crosscuts minerals and cracks are infilled with chlorite.

PHOTOMICROGRAPHS:

1309D_101R_5_59_62_1
1309D_101R_5_59_62_2
1309D_101R_5_59_62_3
1309D_101R_5_59_62_4

THIN SECTION:	U1309D-102R-2, 113-116 cm	Piece No. 9B	Unit: 261	TS#: 312	**OBSERVER: DB, AH, JB**
ROCK NAME:	Olivine gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Poikilitic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Clinopyroxene	55	55					Oikocryst	One large oikocryst covers the whole section, thin interstial tips are in optical continuity with the large grain. The clinopyroxene do not show high-temperature strain.
Plagioclase	25	30					Anhedral	Anhedral strained plagioclase grains appear optically continuous with the rounded chadacrysts in clinopyroxene.
Olivine	10	15					Anhedral	Anhedral kinked olivine in primary (reactive) contact with plagioclase also appear as rounded chadacrysts in clinopyroxene.
Spinel		<1						

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Tremolite	3						Olivine	Incipient corona texture
Chlorite	6						Plagioclase	Incipient corona texture, also in veins
Serpentine	1						Olivine	
Magnetite	<1						Olivine	
Pyrrhotite	<1							Probably primary
Chalcopyrite	<1							

TOTAL ALTERATION: 10 %

STRUCTURE: Typical random igneous texture with minerals showing no preferred alignment. Plagioclase crystals show weak undulatory extinction and few subgrain boundaries. Olivine crystals exhibit kink bands, showing that the grains have experienced a weak plastic strain. There are a few small fractures which crosscut all the minerals and have been infilled with chlorite.

PHOTOMICROGRAPHS:

1309D_102R_2_113_116_1
1309D_102R_2_113_116_2
1309D_102R_2_113_116_3
1309D_102R_2_113_116_4
1309D_102R_2_113_116_5
1309D_102R_2_113_116_6
1309D_102R_2_113_116_7
1309D_102R_2_113_116_8
1309D_102R_2_113_116_9

THIN SECTION:	U1309D-103R-1, 11-14 cm	Piece No. 1A	Unit: 263/264	TS#: 313			**OBSERVER: DB, AH, JB, YO**	
ROCK NAME:	Orthopyroxene-bearing gabbro/microgabbronorite contact							
GRAIN SIZE:	medium/fine							
TEXTURE:	Seriate/equigranular							

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Orthopyroxene-bearing gabbro								
Plagioclase	55	60	0.6	8			Anhedral	
Clinopyroxene	25	37	0.4	6			Anhedral, interstitial	
Orthopyroxene	2	3	1	3			Anhedral	
Microgabbronorite								
Plagioclase	55	55	0.1	0.6			Anhedral, subequant	
Clinopyroxene	35	40	0.1	0.6			Anhedral	
Orthopyroxene	3	5	0.5	2			Oikocrystic	Includes plagioclase chadacryst.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Green amphibole	7						Orthopyroxene, clinopyroxene	Orthopyroxene preferentially replaced
Pale amphibole	5						Orthopyroxene	May locally completely replace orthopyroxene
Chlorite	2						Mostly in veins	
Talc	2						Orthopyroxene, also along some orthopyroxene-clinopyroxene contacts	
Pyrrhotite	<1							
Chalcopyrite	<1							

TOTAL ALTERATION: Inhomogeneous. Fine grained rock <5 %, coarse-grained rock 20 %

STRUCTURE: Contact between a medium grained gabbro and a fine grained microgabbronorite which exhibits a preferred alignment of the minerals. The coarse grained section exhibits a very weak alignment of plagioclase crystals which show undulatory extinction and small amounts of recrystallization. The large plagioclase crystals show slightly lobate grain boundaries. The microgabbronorite exhibits grains of aproximately 200 µm which show lobate grain boundaries. There is one fracture which crosscuts the boundary between the two units and has been infilled with chlorite.

PHOTOMICROGRAPHS:

1309D_103R_1_11_14_1
1309D_103R_1_11_14_2
1309D_103R_1_11_14_3
1309D_103R_1_11_14_4

THIN SECTION:	U1309D-103R-1, 18-21 cm	Piece No. 1A	Unit: 264	TS#: 314			**OBSERVER: DB, AH, JB**	
ROCK NAME:	Orthopyroxene-bearing microgabbro							
GRAIN SIZE:	Fine with medium grain band							
TEXTURE:	Equigranular							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	60	60			0.4		Anhedral, subhedral	
Clinopyroxene	37	37			0.4		Anhedral	
Orthopyroxene	3	3			0.4		Anhedral	

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Talc	3						Locally replaces orthopyroxene	
Green amphibole	2						Clinopyroxene, orhtopyroxene	
Ilmenite	<1						Exsolutions in orthopyroxene	
Chlorite	<1						Veins in plagioclase	
Chalcopyrite	<1							
Pyrite	<1							
Pyrrhotite	<1						Pyrite	

TOTAL ALTERATION: 5%

STRUCTURE: Contact between a medium grained gabbro and a fine grained orthopyroxene-bearing microgabbro which exhibits a preferred alignment of the minerals. The coarse grained section exhibits a very weak alignment of plagioclase crystals which show undulatory extinction and small amounts of recrystallization. The large plagioclase crystals show slightly lobate grain boundaries. The orthopyroxene-bearing microgabbro exhibits grains of aproximately 400 µm which show lobate grain boundaries. There is a fracture network which crosscuts the boundary and is infilled by chlorite.

PHOTOMICROGRAPHS:
1309D_103R_1_18_21_1
1309D_103R_1_18_21_2

THIN SECTION:	U1309D-103R-4, 5-7 cm	Piece No. 1	Unit: 266	TS#: 315	**OBSERVER: KM, DB, JB**
ROCK NAME:	Gabbronorite				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	45	55	0.8	20			Subhedral, anhedral, equant	
Orthopyroxene	5	15	1	6			Subhedral	
Clinopyroxene	20	30	0.2	16			Subhedral, anhedral, interstitial	
Ilmenite		1		0.4			Interstitial	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Talc	15						Orthopyroxene, olivine	Dominant alteration phase for orthopyroxene and former olivine
Green amphibole	2						Clinopyroxene	
Pale amphibole	10						Orthopyroxene, clinopyroxene	Less common than talc in orthopyroxene
Chlorite	2						Plagioclase, veins in plagioclase	Relatively scarce
Carbonate	1						In veins, olivine?	
Oxidized serpentine	<1						Olivine	Rare
Chalcopyrite	<1							
Pyrite	<1						Magnetite	Locally seen replacing magnetite in altrered orthopyroxene
Magnetite	<1						Orthopyroxene	

TOTAL ALTERATION: 30%

STRUCTURE: Primary igneous texture with a few signs of plastic strain such as kinking and undulatory extinction in plagioclase. Pervasive microfractures with intense alteration. (KM)

PHOTOMICROGRAPHS:

1309D_103R_4_5_7_1

1309D_103R_4_5_7_2

THIN SECTION:	U1309D-104R-2, 40-43 cm	Piece No.	Unit: 1A	TS#: 316	**OBSERVER: AD, KJ, KM**
ROCK NAME:	Troctolitic gabbro				
GRAIN SIZE:	Medium to coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Olivine	28	35	0.8	8	4		Anhedral	
Plagioclase	53	55	0.8	6	4		Anhedral	
Clinopyroxene	10	10	0.8	10	8		Anhedral to interstitial	Oikocrystic, occurs as late-stage interstitial growth; infiltration and crystallization along grain boundaries of plagioclase and olivine.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Tremolite	5						Olivine	
Oxidized serpentine							Olivine	
Talc	1						Olivine	
Green amphibole (actinolite ?)	2						Plagioclase	Green amphibole is found as veinlets in the plagioclase and also associated with chlorite rim around plagioclase.
Chlorite	2						Plagioclase	Chlorite rim around the plagioclase.
Magnetite								
Pyrite								
Pyrrhotite								
Chalcopyrite								

TOTAL ALTERATION: 10%

STRUCTURE: Primary igneous texture with weak undulatory extinction, bending and kinking. (KM)

PHOTOMICROGRAPHS:

1309D_104R_2_40_43_1
1309D_104R_2_40_43_2
1309D_104R_2_40_43_3
1309D_104R_2_40_43_4
1309D_104R_2_40_43_5
1309D_104R_2_40_43_6

THIN SECTION:	U1309D-104R-3, 33-36 cm	Piece No. 3B	Unit: 268	TS#:317	**OBSERVER: KM, DB, JB**
ROCK NAME:	Olivine bearing gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	70	78	0.4	8			Subhedral, anhedral	Resorbed grain boundaries, rounded chadacrysts in clinopyroxene.
Clinopyroxene	15	20	1	12			Oikocrystic, interstitial	Plagioclase and olivine as chadacrysts.
Olivine	1	2	0.4	1.5			Rounded	
Ilmenite		<1					Interstitial	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Talc	2						Olivine	
Serpentine	5						Olivine, also fills cracks in other minerals (e.g. plagioclase) near vein.	
Tremolite	2						Pyroxene, olivine	
Chlorite	4						Plagioclase	In veins and at olivine contacts
Prehnite	1						Plagioclase	
Albite	1						Plagioclase	In association with prehnite
Chalcopyrite	<1							
Pyrite	<1						Olivine	Dominant opaque phase in altered olivine
Magnetite	<1						Olivine	
Epidote							In vein 1	
Chlorite							In vein 1	
Tremolite							In vein 1	Slip fiber?
Carbonate							In vein 2	Vein 2 cuts vein 1
Chrysotile							In vein 2	Cross-fiber
Tremolite							In vein 2	
Prehnite							In vein 2	

TOTAL ALTERATION: 15%

STRUCTURE: Primary igneous texture with weak plastic strain (weak bending and undulatory extinction). Subvertical open fracture cut by later suhorinzonal open cracks with fibrous mineral subparallel to the direction of opening. (KM)

PHOTOMICROGRAPHS:

1309D_104R_3_33_36_1
1309D_104R_3_33_36_2
1309D_104R_3_33_36_3
1309D_104R_3_33_36_4
1309D_104R_3_33_36_5
1309D_104R_3_33_36_6

THIN SECTION:	U1309D-105R-3, 28-31 cm	**Piece No.** 2	**Unit**: 271	**TS#:318**	**OBSERVER: DB, JB, KM**
ROCK NAME:	Troctolite				
GRAIN SIZE:	Medium to coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	60	70	1	25			Subhedral	
Olivine	0	28	0.2	10			Anhedral	No fresh olivine relics.
Clinopyroxene	2	2	0.1	3			Anhedral, interstitial	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Chlorite	15						Plagioclase, also in filled fractures	Fractures connect corona textured areas.
Tremolite	25						Olivine, clinopyroxene, also in filled fractures	Fractures connect corona textured areas.
Green amphibole	2						Clinopyroxene, also in filled fractures	
Chalcopyrite	<1							Fairly abundant in some former olivine cores.
Pyrite	<1							
Magnetite	<1						Olivine	Sulfides more common in former olivine.

TOTAL ALTERATION: 40%

STRUCTURE : Primary igneous texture with weak undulatory extinction. Pervasive microfractures showing weak preferred orientations with mineral infills. (KM)

PHOTOMICROGRAPHS:

1309D_105R_3_28_31_1

1309D_105R_3_28_31_2

THIN SECTION:	U1309D-106R-2, 127-130 cm	**Piece No.** 6B		**Unit**: 274	**TS#: 319**		**OBSERVER: DB, AD, KM**	
ROCK NAME:	Possible olivine-bearing gabbro							
GRAIN SIZE:	Medium to coarse							
TEXTURE:	Inequigranular							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**			**Composition**	**MORPHOLOGY**	**COMMENTS**
			min.	**max.**	**av.**			
Plagioclase	55	60	1	10			Anhedral, subhedral	Undulatory extinction.
Clinopyroxene	30	40	0.6	10			Anhedral, subhedral	
Olivine	0	<5						No fresh olivine relics.
								Note: plagioclase-clinopyroxene contacts are frequently in equilibrium. Several triple junctions at 120 deg. indicate long residence time for annealing and chemical equilibration of a former percolative texture.

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron)**				**REPLACING / FILLING**	**COMMENTS**
			min.	**max.**	**av.**			
Tremolite	3						Olivine	
Actinolite	2						Olivine/pyroxene	Rim around the pyroxene and take part of the corona after olivine. Some actinolite are associted with the chlorite and form veins into plagioclase.
Chlorite	1						Plagioclase	Rim around plagioclase when contact with olivine.
Calcite	<1							As vein
Ilmenite								
Sulfides								

TOTAL ALTERATION:

STRUCTURE : Igneous texture with weak undulatory extinction. A thin cataclasite zone occurs along one side of thin section, where minerals were deformed brittlely with alteration. Weak plasticity such as kinking in clinopyroxene and undulatory extinction in fragmented plagioclase along the cataclasite zone. (KM)

PHOTOMICROGRAPHS:

1309D_106R_2_127_130_1
1309D_106R_2_127_130_2
1309D_106R_2_127_130_3
1309D_106R_2_127_130_4
1309D_106R_2_127_130_5
1309D_106R_2_127_130_6

THIN SECTION:	U1309D-107R-2, 38-41 cm	Piece No. 1	Unit: 274	TS#:320	**OBSERVER: KM, DB, JB**
ROCK NAME:	Olivine bearing gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	50	56	0.6	6			Anhedral, subhedral	
Clinopyroxene	35	40	0.4	12			Oikocrystic, interstitial	Several generations of replacive clinopyroxene.
Olivine	0	4		6			Anhedral	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Talc	8						Dominant olivine replacement mineral	Corona texture, especially olivine cores
Tremolite	5						Olivine	Mostly olivine rims in corona texture
Chlorite	7						Plagioclase	Corona texture
Green amphibole	3						Clinopyroxene	
Serpentine	<1						Olivine	
Magnetite	1						Olivine	
Pyrrhotite	<1							
Chalcopyrite	<1							

TOTAL ALTERATION: 25%

STRUCTURE: Primary igneous texture with a few signs of plastic strain such as weak undulatory extinction and serrated grain boundaies. Minor microfracturing associated with alteration. (KM)

PHOTOMICROGRAPHS:

1309D_107R_2_38_41_1

1309D_107R_2_38_41_2

THIN SECTION:	U1309D-109R-2, 85-88 cm	Piece No. 3	Unit: 282	TS#: 321	**OBSERVER: DB, YO, KM, JB**
ROCK NAME:	Olivine-bearing Gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	55	60	0.2	6			Subequant, anhedral	
Clinopyroxene	20	40	0.4	12			Oikocrystic, anhedral	Two pyroxenes?
Olivine	0	2?		3			Anhedral	Olivine is totally altered.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Tremolite	7						Olivine	Coronas
Chlorite	10						Plagioclase	Coronas and cracks in plagioclase
Green amphibole	10						Clinopyroxene	In places in apparent corona relationship with olivine
Talc	1						Olivine	Scarce
Ilmenite	<1						Clinopyroxene	Exsolved out of altered clinopyroxene
Pyrrhotite	<1							
Chalcopyrite	<1							

TOTAL ALTERATION: 30%

STRUCTURE : Primary igneous texture modified slightly by weak plastic strain. Recrystallized grains of plagioclase (~1-1.5 mm in grain size). Weak undulatory extinction in plagioclase. (KM)

PHOTOMICROGRAPHS:

1309D_109R_2_85_88_1

1309D_109R_2_85_88_2

THIN SECTION:	U1309D-110R-1, 109-112	Piece No. 3	Unit: 284/285	TS#: 322			**OBSERVER: DB, YO, KM, AD**	
ROCK NAME:	Troctolite (note thin section is mislabeled wth incorrect interval)							
GRAIN SIZE:	Coarse							
TEXTURE:	Seriate							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Olivine	40	60	1	20			Anhedral	Olivine possibly replaces early plagioclase.
Plagioclase	40	40	0.5	5			Subhedral, anhedral	
Clinopyroxene	1	1	0.2	1			Interstitial	

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Serpentine	2						Olivine	
Tremolite	1						Olivine	
Chlorite	1						Plagioclase	Rim between plagioclase and olivine
Actinolite	<1							Around the olivine and associated with serpentine veins
Talc	<1							
Pyrite								
Chaclopyrite								

TOTAL ALTERATION: 5 %

STRUCTURE : Serpentine foliations in coarse grained leucocratic region. Few signs of plastic or magmatic strain. (KM)

PHOTOMICROGRAPHS:

1309D_110R_1_109_112_1

1309D_110R_1_109_112_2

THIN SECTION:	U1309D-110R-3, 46-49 cm	Piece No. 1G	Unit: 290	TS#: 323	**OBSERVER: DB, KM, JB, GS**
ROCK NAME:	Oxide gabbro				
GRAIN SIZE:	Fine to medium				
TEXTURE:					

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase		55	0.1	6			Anhedral, equant	Plagioclase records high-temperature recrystallization as kinks and subgrain chains, together with clinopyroxene. Small resorbed rounded grains are present as chadacrysts in clinopyroxene.
Clinopyroxene		25	0.1	6			Anhedral, equant	Clinopyroxene shows the same structure as plagioclase.
Oxide		15	0.1	8			Oikocrystic, interstitial	Oxides are replacive after melt percolation, they are undeformed and cut deformation patterns.
Sulfide		Trace						

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Green amphibole	15						Clinopyroxene, also along contacts between oxides and plagioclase and along fractures in plagioclase	No apparent reaction between clinopyroxene and plagioclase.
Other amphibole	5						Clinopyroxene	Grayish and brownish
Titanite	1						Fe-Ti oxides	Scarce, oxides relatively fresh
Ilmneite	<1						Fe-Ti oxides	Totals reflect metamorphic oxides only, total oxides much higher
Magnetite	<1						Fe-Ti oxides	Totals reflect metamorphic oxides only, total oxides much higher
Chalcopyrite	<1							
Pyrrhotite	<1							
Pyrite	<1						Pyrrhotite	

TOTAL ALTERATION: 20%

STRUCTURE : Magmatic foliation defined by alignment of plagioclase and clinopyroxene crystal preferred orientations overprinted by plastic deformation. Amount of plastic strain is low, although intense dynamic recrystallization of minerals occurs at the left side of the thin section, since magmatic fabrics were yet preserved. Grain size of neoblast in plagioclase are hundreds of microns. (KM). Oxides infiltrates grain boundaries and are associated with apatite (euhedral). Oxide infiltration into clinopyroxene seems in places to trace old, now recovered subgrain boundaries which means that plastic strain at least partially preceded oxide infiltration. (GS)

PHOTOMICROGRAPHS:

1309D_110R_3_46_49_1	1309D_110R_3_46_49_4	1309D_110R_3_46_49_7	1309D_110R_3_46_49_10	1309D_110R_3_46_49_13
1309D_110R_3_46_49_2	1309D_110R_3_46_49_5	1309D_110R_3_46_49_8	1309D_110R_3_46_49_11	1309D_110R_3_46_49_14
1309D_110R_3_46_49_3	1309D_110R_3_46_49_6	1309D_110R_3_46_49_9	1309D_110R_3_46_49_12	1309D_110R_3_46_49_15

THIN SECTION:	U1309D-110R-3, 89-91 cm	Piece No. 4A	Unit: 291	TS#: 324	**OBSERVER: DB, AD, KM, GS, YO**
ROCK NAME:	Troctolite				
GRAIN SIZE:	Medium				
TEXTURE:	Inequigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Olivine	55	65	1	4			Subhedral, subequant	
Plagioclase	30	33	1	4			Anhedral	Plagioclase texture suggests possible resorption.
Clinopyroxene		<2	0.2	1			Interstitial	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Serpentine	6						Olivine	
Tremolite	1						Olivine	Also associated with serpentine veins.
Chlorite	1						Plagioclase	Rim around plagioclase
Green amphibole	1							
Talc	1							
Calcite	<1							As vein
Magnetite								
Sulfides (at least 2 kinds)								

TOTAL ALTERATION: 15%

STRUCTURE : Zones of relatively coarse grains of both olivine and plagioclase occur, where olivine grains more commonly show undulatory extinction with kinking. Weak serpentine foliations in olivine with associated intense microfractures in plagioclase. (KM) Plagioclase grains are recrystallized in half of slide (GS)

PHOTOMICROGRAPHS:

1309D_110R_3_89_91_1
1309D_110R_3_89_91_2
1309D_110R_3_89_91_3
1309D_110R_3_89_91_4

THIN SECTION:	U1309D-111R-1, 70-73 cm	**Piece No.** 7		**Unit**: 291	**TS#: 325**		**OBSERVER: DB, JB, JE, YO**	
ROCK NAME:	Oxide metagabbro							
GRAIN SIZE:								
TEXTURE:								

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	1?	60		5			Subhedral?	Almost all plagioclase grains are altered.
Clinopyroxene	30?	40		5			Subhedral	
Oxide	5	5		4			Unhedral	

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Prehnite	40						Plagioclase	Percentages refer to non-vein part of section
Green amphibole	15						Clinopyroxene	
Serpentine	10						Olivine	
Other amphibole	15						Clinopyroxene	Grayish to brownish
Titanite	1						Fe-Ti oxides	Unmixed and altered original titanomagnetite
Magnetite	<1						Fe-Ti oxides	Unmixed and altered original titanomagnetite
Ilmenirte	<1						Fe-Ti oxides	Unmixed and altered original titanomagnetite
Epidote							Vein	Vein is about 20% of section
Carbonate							Vein	
Chlorite							Vein	
Prehnite							Vein	

TOTAL ALTERATION: 85%

STRUCTURE : Vein with well-defined boundaries (sharp), no cataclasis or deformation associated with them. Serpentinite and chlorite along cracks in altered olivine crystal. Slight undulatory extinction of some crystals, but no apparent magmatic/plastic foliation. Brittle network of fractures, irregular, postdating veining and alteration. (JE)

PHOTOMICROGRAPHS:
1309D_111R_1_70_73_1
1309D_111R_1_70_73_2

THIN SECTION:	U1309D-111R-3, 18-21 cm	Piece No. 3A	Unit: 291	TS#: 327	**GS, AD, DB**
ROCK NAME:	Troctolite				
GRAIN SIZE:	Medium				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Olivine	20	80	0.4	6			Subhedral	
Plagioclase	5	20	0.2	3			Anhedral, interstitial	
Clinopyroxene		<1		0.2			Interstitial	

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Tremolite	10						Olivine	
Serpentine	10						Olivine	
Talc	1						Olivine	
Chlorite	5						Plagioclase	
Prenhite	2						Plagioclase	
Magnetite								
Sulfides								
								Serpentine + chlorite + tremolite + talc vein

TOTAL ALTERATION: 30%

STRUCTURE: Troctolite with good foliation and moderate plastic strain. Strain localiizes at grain boundaries and affects both plagioclase and pyroxene. Texturally, oxide phase is latest. Its relation to plastic strain is not quite clear.

PHOTOMICROGRAPHS:

1309D_111R_3_18_21_1

1309D_111R_3_18_21_2

THIN SECTION:	U1309D-111R-4, 22-25 cm	**Piece No. 1**	**Unit**: 292	**TS#:** 328	**OBSERVER: GS, EH, JB**
ROCK NAME:	Troctolite cut by gabbro dikelet				
GRAIN SIZE:	Fine/medium				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Troctolite								
Olivine	15	89		3	1		Anhedral	
Plagioclase	1	10		1	0.5		Interstitial	
Clinopyroxene	Trace	Trace		0.1			Interstitial	
Cr-spinel	1	1			0.1		Blocky to subrounded	
Gabbro dikelet								
Plagioclase	5	40			1		Subhedral	Partly strongly recrystallized
Clinopyroxene	10	60			1		Subhedral	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Serpentine	70						Olivine, also in veins	Incipient kernel texture
Prehnite	1						Plagioclase	Plagioclase in troctolite essentially unaltered
Chlorite	1						Plagioclase, also in vein that apears to originate in troctolite	Rare in troctolite outside of vein
Magnetite	1						Olivine	
Chalcopyrite	<1							
								Brucite in nearby XRD, but unable to locate here

TOTAL ALTERATION: 70%

STRUCTURE : A structurally difficult to interpret troctolite. Relative homogeneous grain size of plagioclase and olivine suggests high degree of recrystallization, but shape fabric of plagioclase is weak and CPO of olivine appears weak and spinel elongation is weak. Best indicator of a weak foliation is plagioclase SPO. Sample is cut by a gabbroic dikelet with granular texture and a narrow high strain zone oblique to the foliation trace. It has much smaller grain size. Shear zone tapers out along strike. I would suggest moderate strain at high temperatures and no igneous microstructures preserved.

PHOTOMICROGRAPHS:

1309D_111R_4_22_25_1
1309D_111R_4_22_25_2
1309D_111R_4_22_25_3

THIN SECTION:	U1309D-112R-2, 67-70 cm	Piece No. 3	Unit: 295	TS#: 329	**OBSERVER: DB, EH, YO, GS, AD**
ROCK NAME:	Clinopyroxene-bearing troctolite				
GRAIN SIZE:	Medium				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Olivine	30	85	0.4	3			Subhedral, subequant	
Plagioclase	2	10	0.2	2			Interstitial	Most grains are altered to hydrogrossular.
Clinopyroxene	4	5	0.1	3			Interstitial, (poikilitic)	Large clinopyroxene oikocryst includes olivine chadacryst.
Spinel	1	1		0.4			Interstitial	Black, apparently fresh. Mainly associated with plagioclase, less clinopyroxene. Mostly oxidized, although some relict portions exist.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Serpentine	55						Olivine	
Amphibole	2						Pyroxene	Grayish to brownish
Actinolite	<1						Pyroxene	Rim around the pyroxene
Calcite	<1						Olivine	Replacing the olivine
Prehnite	<1						Plagioclase	
Magnetite								
Sulfides								

TOTAL ALTERATION: 65 %

STRUCTURE : Clinopyroxene-bearing troctolite with weak expression of a mineral foliation by plagioclase, but not by spinel. Olivine without signs of a CPO (tilt wall test). While plagioclase is largely altered to hydrogrossular, the remaining fresh grains show that they are actually composed of several, commonly mosaic shaped grains. On the other hand, oikocrystic clinopyroxene shows no internal grain structure. Note a lack of plastic strain in plagioclase. Spinel typically enclosed in plagioclase, clinopyroxene is typically interstitial. Inferred order of formation is olivine, spinel -> plagioclase -> clinopyroxene, regime is weak magmatic strain (GS)

PHOTOMICROGRAPHS:

1309D_112R_2_67_70_1
1309D_112R_2_67_70_2
1309D_112R_2_67_70_3
1309D_112R_2_67_70_4
1309D_112R_2_67_70_5
1309D_112R_2_67_70_6

THIN SECTION:	U1309D-113R-2, 15-17 cm	Piece No. 1A	Unit: 297	TS#: 330	**OBSERVER: AD, DB, JE**
ROCK NAME:	Oxide meta gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Equigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase		60	0.5	10			Subhedral	
Clinopyroxene		30		7			Subhedral	
Oxide		10		7			Anhedral interstitial	Oxide postdates deformation

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Green amphibole	20						Pyroxene	
Green-brown amphibole	20						Pyroxene	
Magnetite								
Ilmenite								
Chlorite								As alteration halo around a vein

TOTAL ALTERATION: 40%

STRUCTURE : Twinned plagioclase, locally with subgrains and rotation of lamellae, and undulatory extinction. Later brittle fractures associated witth alteration, and brittle fractures, irregular with no alteration. Fracture veins do not show an displacement (no strain). (JE)

PHOTOMICROGRAPHS:

1309D_113R_2_15_17_1
1309D_113R_2_15_17_2
1309D_113R_2_15_17_3

THIN SECTION:	U1309D-113R-3, 9-12 cm	Piece No. 2A	Unit: 300/301	TS#: 331	**OBSERVER: EH, GS, AD**
ROCK NAME:	Anorthosite/microgabbro				
GRAIN SIZE:	Medium/fine				
TEXTURE:	Foliated				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Anorthosite								
Plagioclase	90	95	<0.01	6	1		Anhedral to equant	Recrystallized, deformed.
Clinopyroxene	2	5	<0.01	2	0.1		Interstitial	Mainly at (tectonic) contact.
Microgabbro								
Plagioclase	40	50		1	0.2		Subequant	Strongly recrystallized.
Clinopyroxene	20	48?		1	0.2		Anhedral to interstitial	Fine-grained, partly replaced by amphibole and chlorite/talc?
Olivine	Trace?	2?			0.1		Subequant	Few fresh grains identified, possibly more now as tremolite/talc.
Oxide	Trace	Trace?			0.2		Interstitial	Possibly amphibole breakdown product.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Tremolite	10						Olivine	
Serpentine	1						Olivine	
Talc	1						Olivine	
Chlorite	2						Plagioclase	
Prehnite	1						Plagioclase	
Actinolite	1						Pyroxene	
Brown amphibole	<1						Pyroxene	
Sulfides								

TOTAL ALTERATION: 10%

STRUCTURE : Plagioclase in anorthosite is 35% recrystallized to neoblasts, suggesting moderate plastic strain. Interstitial green hornblende and a bit of calcite in anorthosite. Near contact to micrograbbro clinopyroxene occurs with porphyroclast - neoblast formation. Contact to microgabbro is parallel to plastic strain foliation in anorthosite, suggesting that strain postdated igneous contact. Microgabbro is also recrystallized during deformation, showing neoblast formation in clinopyroxene and elongate trains of largely equant neoblasts of plagioclase. Olivine both fresh and probably altered to iddingsite. Overall moderate plastic strain. (GS)

PHOTOMICROGRAPHS:

1309D_113R_3_9_12_1
1309D_113R_3_9_12_2
1309D_113R_3_9_12_3

THIN SECTION:	U1309D-114R-3, 7-10 cm	Piece No. 1A	Unit: 305	TS#: 332	**OBSERVER: EH, GS, JB**
ROCK NAME:	Gabbro				
GRAIN SIZE:	Medium to coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	50	70		5	3		Anhedral	Deformed, recrystallized.
Clinopyroxene	3	30		5	3		Anhedral	Only few coarse exsolution lamellae are not amphibolized.
Oxides	<1	<1			0.1		Interstitial	Only in fine-grained amphibole-rich zone at thin section edge.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Chlorite	10							Fracture-filling, actively replacing plagioclase near tremolite masses. Relict olivine corona?
Tremolite	10						Olivine?	Relict corona
Green amphibole	20						Clinpyroxene	
Brown mineral	3						In sheared vein and fractures, also replaces some nearby clinopyroxene	Possibly a fine-grained amphibole
Brown amphibole	<1						May be primary	
Titanite	<1							
Ilmenite	<1							
Pyrite	<1							

TOTAL ALTERATION: 45%

STRUCTURE : Set of brittle veins (brown) crosscut slide. Plagioclase has largely a magmatic texture, but local patches show plastic strain. Magmatic foliation is not clearly discernible. Local tremolitic (??) rim between clinopyroxene and plagioclase. Clinopyroxene encloses plagioclase grains. Clinopyroxene is largely amphibolitized, outlines are lobate and rounded, i.e. are probably modified during later growth. (GS)

PHOTOMICROGRAPHS:

1309D_114R_3_7_10_1
1309D_114R_3_7_10_2
1309D_114R_3_7_10_3
1309D_114R_3_7_10_4
1309D_114R_3_7_10_5

THIN SECTION:	U1309D-115R-2, 57-59 cm	**Piece No.** 1	**Unit**: 306	**TS#: 333**	**OBSERVER:GS, NA, AD**
ROCK NAME:	Leucocratic gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Cataclastic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	70	79	0.1	5	1		Anhedral to subhedral	
Clinopyroxene	2	20	0.1	15	5		Anhedral	Replaced by amphibole
Ilmenite	1	1	<0.1	0.5	0.2		Anhedral to subhedral	
Apatite	1	1		0.8			Euhedral (partly)	At least 3 euhedral grains, probably more abundant (Identified with EDS).

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Green amphibole	10						Pyroxene	
Brown amphibole	10						Pyroxene	
Prehnite	2						Plagioclase	
Chlorite	1						Plagioclase	
Ilmenite								

TOTAL ALTERATION: 30%

STRUCTURE : Coarse grained former gabbro, with pyroxenes now largely altered to amphibole. Plagioclase grains have been drastically reduced in size by recrystallization during plastic strain in one half of slide. Local epidote and chlorite. Local cataclastic shear band which offsets clinopyroxene by 1 mm. Overall heterogeneous plastic strain, low in one corner, high in other corner. Note that altered clinopyroxene grains do not seem to reflect any more a primary igneous microstructure, the shape has been modified by metamrophic growth. Some subgrain formation in what is now amphibole indicates that plastic strain has at least locally also affected clinopyroxene (GS)

PHOTOMICROGRAPHS:

1309D_115R_2_57_59_1
1309D_115R_2_57_59_2
1309D_115R_2_57_59_3
1309D_115R_2_57_59_4
1309D_115R_2_57_59_5
1309D_115R_2_57_59_6
1309D_115R_2_57_59_7
1309D_115R_2_57_59_8

THIN SECTION:	U1309D-115R-2, 89-91 cm	**Piece No.** 3A	**Unit**: 306	**TS#: 334**	**OBSERVER:GS,NA, AD**
ROCK NAME:	Troctolite				
GRAIN SIZE:	Pegmatitic				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	60	60	3	15	9		Subhedral	Corona texture along with the boundary between olivine.
Olivine	10	40	15	20	18		Anhedral	Corona texture around the grain boundary.
Clinopyroxene	0	Tr?	-	-	-		-	Completely altered.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Tremolite	10						Olivine	Big corona with different types of alteration from the center to the rim. The center is made of serpentine + calcite, rimmed by talc and finally by tremolite. When contact with plagioclase, rim of chlorite between the two crystals.
Serpentine	10						Olivine	
Talc	10						Olivine	
Calcite	2						Olivine	
Chlorite	5						Plagioclase	
Prehnite	1						Plagioclase	
Green amphibole (actinolite)	1							
Pyrrhotite								
Ilmenite ?								
Magnetite								

TOTAL ALTERATION: > 60%

STRUCTURE : Very coarse grained troctolite. Olivine largely altered, where preserved, is also coarse grained and shows good subgrain formation (tilt walls). Plagioclase shows weak plastic strain (bending) but primary magmatic texture is generally preserved. (GS)

PHOTOMICROGRAPHS:

1309D_115R_2_89_91_1

1309D_115R_2_89_91_2

THIN SECTION:	U1309D-116R-3, 67-70 cm	**Piece No.** 1D	**Unit**: 310	**TS#: 335**	**OBSERVER: NA, EH, YO, GS, AD**
ROCK NAME:	Gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Inequigralunar, seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	20	60		12	4		Subhedral tabular	Strongly corroded and partly replaced by epidote.
Clinopyroxene?	1	20?					Subhedral blocky-bladed	Almost completely replaced. Rare 120 cleavage ghosts.
Apatite	2	2					Euhedral prismatic	Very abundant, mainly associated with former amphiboles.
Titanite	Trace	Trace		1				Not necessarily primary, mainly near apatite.
Clinopyroxene?	0	20?						Possibly pseudomorph, different from long braded amphibole (?).
								No zircon found, yet very evolved rock.

COMMENT: It is highly metamorphosed part. It is hard to define the primary minerals.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Epidote	3							
Green amphibole	5						Pyroxene	
Calcite	<1							

TOTAL ALTERATION: 8% (for low temperature alteration)

STRUCTURE : Some lower temperature plastic deformation in plagioclase as seen in subgrain formation and bending of crystal lattice. As a matter of fact, plagioclase laths seem to completely bent around a larger, apparently stiff plagioclase grain. Clinopyroxene is now largely altered to amphibole, the latter also showing plastic strain in form of weakly misoriented neoblasts. Epidote seems static. Calcite veins in plagioclase. Interpretation is that primary magmatic structure now partly overprinted by weak plastic strain and amphibole formation after clinopyroxene (GS)

PHOTOMICROGRAPHS:

1309D_116R_3_67_70_1

1309D_116R_3_67_70_2

THIN SECTION:	U1309D-117R-1, 17-20 cm	**Piece No.** 3B		**Unit**: 313	**TS#: 336**		**OBSERVER: NA, YO, GS, AD**	
ROCK NAME:	Oxide gabbro/olivine gabbro contact							
GRAIN SIZE:	Coarse/medium							
TEXTURE:	Inequigranular/seriate							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	COMMENTS
Oxide gabbro								
Plagioclase	55	60	<0.1	15	4		Anhedral	Mostly recrystallized small grains.
Clinopyroxene	0	30	1	12	5		Anhedral	Completely altered.
Oxide	10	10	<0.1	1	0.7		Interstitial	Some grains ilmenite and magnetite intergrowth.
Olivine gabbro								
Plagioclase	50	60	0.1	8	4		Anhedral	Corona texture along with grain boundary between olivine.
Ollivine	0	20	0.1	6	4		Anhedral	Completely altered. Corona texture around grains.
Clinopyroxene	0	20	0.1	6	4		Anhedral	Completely altered.

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	COMMENTS
Tremolite	4						Olivine	
Talc	1						Olivine	
Chlorite	5						Plagioclase	
Green amphibole	6						Pyroxene	Actinolite
Magnetite	1							
Ilmenite	<1							
Sulfides	<1							

TOTAL ALTERATION: 18 %

STRUCTURE : High plastic strain affecting half of slide whereas other half largely igneous microstructure. Plastic strain only in oxide-rich areas, seen by plagioclase porphroclasts with subgrain formation, large proportions of neoblasts with respect to porphyroclasts. Altered clinopyroxene also shows subgrain formation and recrystallization. Amphibole shows dynamic recrystallization as well. Plagioclase grains are smallest when included in oxides, suggesting perhaps corrosion of plagioclase. Small grains in the oxides show optical LPO (gypsum plate).(GS)

PHOTOMICROGRAPHS:

1309D_117R_1_17_20_1
1309D_117R_1_17_20_2
1309D_117R_1_17_20_3
1309D_117R_1_17_20_4

THIN SECTION:	U1309D-117R-1, 38-41 cm	**Piece No.** 3D	**Unit**: 314	**TS#: 337**	**OBSERVER: NA, DB, GS, AD**
ROCK NAME:	Olivine gabbro				
GRAIN SIZE:	Medium to coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	70	72		4	4		Euhedral to anhedral	
Clinopyroxene	15	20	1	10	4		Anhedral, interstitial	Micrographic texture and intergrowth of two pyroxenes, interlocking contacts. Thin clinopyroxene films rim former symplectitic clinopyroxenes.
Olivine	4	8	0.5	2	5		Anhedral	
Magmatic dikelet								Note: thin magmatic dikelets crosscut all mineral phases, one very clear is in the corner of the section close to the number.
Orthopyroxene								
Clinopyroxene								
Amphibole?								

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Tremolite	<1						Olivine	
Serpentine	<1						Olivine	
Chlorite	<1						Plagioclase	
Magnetite								
Ilmenite								
Pyrrhotite								

TOTAL ALTERATION: 3%

STRUCTURE : Igneous microstructure, weak sign of magmatic or plastic strain (by olivine). Clinopyroxene growth twins. Most grain boundaries somewhat rounded. Rim of secondary clinopyroxene (typically without myrmecite) around primary clinopyroxene where in contact both with olivine and plagioclase. Olivine shows randomly oriented tilt walls. Core clinopyroxenes commonly myrmecitic. Olivine without SPO, but local subgrain-formation is common. Very fresh. (GS)

PHOTOMICROGRAPHS:

1309D_117R_1_38_41_1
1309D_117R_1_38_41_2
1309D_117R_1_38_41_3
1309D_117R_1_38_41_4

THIN SECTION:	U1309D-117R-2, 25-28 cm	**Piece No.** 1B	**Unit**: 315	**TS#: 338**	**OBSERVER: DB, GS, AD**
ROCK NAME:	Olivine gabbro				
GRAIN SIZE:	Medium to coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	40	55	0.4	7			Anhedral	
Olivine	20	30	1	6			Anhedral, oikocrystic	
Clinopyroxene	15	15	0.2	6			Anhedral, oikocrystic, rarely interstitial	
								Note: Magmatic texture records early percolation events (olivine and clinopyroxene oikocrysts). Successive annealing has partially re-equilibrated the mineral boundaries to more "intrusive" relationships.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Tremolite	10						Olivine	Rim around pyroxene when close to contact with olivine
Talc	3						Olivine	
Serpentine	2						Plagioclase	With high birefringence
Chlorite	3						Plagioclase	
Green amphibole	1						Pyroxene	Thin actinolite rim around pyroxene
Magnetite								
Sulfides								Chalcopyrite, pyrrhotite?

TOTAL ALTERATION: 20 %

STRUCTURE : Weak SPO of plagioclase laths suggest magmatic strain. Misoriented subgrains of olivine suggest minor plastic strain, but no clear preferred orientation of tilt walls. Equally, subgrain formation in plagioclase indicate plastic strain at high temperatures. Order of crystallization is olivine-> plagioclase -> clinopyroxene. (GS)

PHOTOMICROGRAPHS:

1309D_117R_2_25_28_1
1309D_117R_2_25_28_2
1309D_117R_2_25_28_3
1309D_117R_2_25_28_4
1309D_117R_2_25_28_5
1309D_117R_2_25_28_6

THIN SECTION:	U1309D-117R-2, 28-31 cm	**Piece No.** 1B	**Unit**: 315	**TS#: 339**	**OBSERVER: DB, AD,GS, YO**
ROCK NAME:	Olivine gabbro cut by diabasic dikelet				
GRAIN SIZE:	Medium to coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Olivine gabbro								
Plagioclase	40	60		1.4			Anhedral	
Olivine	5	20		4			Anhedral	
Clinopyroxene	15	20		1.4			Anhedral, oikocrystic	
Diabasic dikelet								In the corner of the thin section near the label.
								Note: large grain size plagioclase and clinopyroxene exist near the daibasic vein. The origin of those large grains awaits further studies.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Chlorite	3						Plagioclase	
Epidote	1						Plagioclase	
Green-brown amphibole	6						Pyroxene	
Tremolite	15						Olivine	
Talc	5						Olivine	
Serpentine	1						Olivine	
Calcite	<1							Vein
Sulfides								Pyrite, chaclopyrite, pyrrhotite
Magnetite								

TOTAL ALTERATION: 30 %

STRUCTURE : No significant magmatic or ductile strain. Abundant apatite in slide, not restricted to the dikelet.

PHOTOMICROGRAPHS:

1309D_117R_2_28_31_1
1309D_117R_2_28_31_2
1309D_117R_2_28_31_3
1309D_117R_2_28_31_4
1309D_117R_2_28_31_5
1309D_117R_2_28_31_6
1309D_117R_2_28_31_7
1309D_117R_2_28_31_8

THIN SECTION:	U1309D-117R-4, 24-27 cm	**Piece No.** 1	**Unit**: 316	**TS#: 340**				**OBSERVER: GS, DB, KJ, AD**	
ROCK NAME:	Orthopyroxene bearing microgabbro								
GRAIN SIZE:	Medium								
TEXTURE:	Equigranular, seriate								

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	55	55	0.2	2			Anhedral	
Clinopyroxene	25	25	0.4	2			Anhedral, oikocrystic	
Olivine	17	17	0.2	1			Anhedral	
Orthopyroxene	3	3	1	3			Anhedral, oikocrystic	
								Very fresh rock

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Tremolite	1						Olivine	
Chlorite	<1						Plagioclase	
Green amphibole	<1						Pyroxene	
Ilmenite								
Sulfides								

TOTAL ALTERATION: 2 %

STRUCTURE : Oikocrystic clinopyroxene with undulatory extinction. The few larger plagioclase laths seem to have a preferred SPO, which is parallel to an elongation of the olivine grains, suggesting moderate magmatic strain. Optically related neoblasts are present for plagioclase and orthopyroxene (e.g. at top edge of slide, opposite side to label). Olivine shows some tilt walls. All this suggests weak magmatic strain followed by weak plastic strain. Very fresh (GS)

PHOTOMICROGRAPHS:

1309D_117R_4_24_27_1
1309D_117R_4_24_27_2
1309D_117R_4_24_27_3
1309D_117R_4_24_27_4
1309D_117R_4_24_27_5
1309D_117R_4_24_27_6

THIN SECTION:	U1309D-119R-1, 14-17 cm	**Piece No.** 1B	**Unit**: 319	**TS#: 341**				**OBSERVER: KJ, TN, GS, YO**	
ROCK NAME:	Tectonic microgabbro/gabbro contact								
GRAIN SIZE:	Fine/medium								
TEXTURE:	Equigranular/seriate								

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Gabbro								
Plagioclase	60	65	0.4	4			Anhedral, subequant	
Clinopyroxene	20	35	0.2	5			Anhedral, interstitial	
Zircon	Trace	Trace	0.1	0.1			Euhedarl	At least one grain in the contact between microgabbro and gabbro.
Microgabbro								
Plagioclase	40	55	0.2	1			Anhedral	
Clinopyroxene	20	45	0.2	1			Anhedral	
SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Tremolite/actinolite	10						Clinopyroxene, olivine(?), plagioclase	Overgrows or forms corona texture or veins
Brown amphibole	5						Clinopyroxene	
Chlorite	2						Plagioclase	Forms coronas
Calcite	<1						Plagioclase	
Magnetie	<1							

TOTAL ALTERATION: 20%

STRUCTURE : No magmatic fabric (preserved) in either microgabo or gabbro. High degree of recrystallization. Magmatic growth twins and small poikilitic grains of clinopyroxene are present in microgabbro. Based on this degree of recrystallization, infer moderate degree of plastic strain.(GS)

PHOTOMICROGRAPHS:

1309D_119R_1_14_17_1

1309D_119R_1_14_17_2

THIN SECTION:	U1309D-119R-3, 111-113 cm	**Piece No.** 6A	**Unit**: 328	**TS#: 342**	**OBSERVER: KJ, PF, JB,GS**
ROCK NAME:	Metagabbro				
GRAIN SIZE:	Fine to coarse				
TEXTURE:	Granular to mylonitic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Clinopyroxene		35	0.1	30			Neoblastic, porphyroclastic	
Plagioclase		65	0.1	3			Neoblastic, porphyroclastic	
								Note: strongly deformed gabbro with mylonitic bands. Significant metamorphic overprint

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Green amphibole	25						Pyroxene	Reaction rims on pyroxene
Tremolite	2						Pyroxene, Amphibole, and Plagioclase	Reaction rims on pyroxene, patches in plagioclase
Chlorite	30						Plagioclase	Along fractures in plagioclase
Talc	<1						Plagioclase	Patches and veins along fracture or in planes
Brown amphibole	<1						Amphibole	Small patches in amphibole and in deformed zones
Albite	5						Plagioclase	
Carbonate	2							
Ilmenite	1							Along cleavage planes in large pyroxene in alteration zones associated with tremoite/chlorite
Pyrite	<1							

TOTAL ALTERATION: 65%

STRUCTURE : Original coarse gabbro now overprinted by high degrees of plastic strain. Clinopyroxene has been partly, plagioclase completely deformed into a fine grained matrix of neoblasts. Clinopyroxene - plagioclase banding develops by this grain size reduction as each single large grain is transformed into a band.

PHOTOMICROGRAPHS:

1309D_119R_3_111_113_1

1309D_119R_3_111_113_2

THIN SECTION:	U1309D-120R-2, 41-43 cm	**Piece No.** 1	**Unit**: 328	**TS#: 343**	**OBSERVER: EH, DB, GS, TN**
ROCK NAME:	Olivine gabbro				
GRAIN SIZE:	Medium to coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	70	72		7	4		Anhedral	
Clinopyroxene	20	20		10	5		Anhedral, oikocrystic, interstital	Encloses resorbed plagioclase chadacrysts, interlocked contacts, symplectitic exsolutions
Olivine	5	8			0.3		Anhedral	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Talc	5						Olivine	Pseudomorphic
Tremolite/actinolite	2						Olivine, plagioclase, clinopyroxene	Forms coronas around olivine, or grows over clinopyroxene
Chlorite	2						Olivine, plagioclase	Forms corona
Brown amphibole	<1						Clinopyroxene	
Magnetite	<1							
Pyrrhotite	<1							

TOTAL ALTERATION: 10%

STRUCTURE : Plagioclase laths with preferred SPO indicate magmatic strain. However, significant plastic strain (neoblast and tapered twins) has subsequently been present. Undeformed clinopyroxene encloses also deformed plastically deformed plagioclase, so probably postdates plastic strain in plagioclase. Plagioclase looks partly corroded. (GS)

PHOTOMICROGRAPHS:

1309D_120R_2_41_43_1
1309D_120R_2_41_43_2
1309D_120R_2_41_43_3
1309D_120R_2_41_43_4
1309D_120R_2_41_43_5
1309D_120R_2_41_43_6
1309D_120R_2_41_43_7
1309D_120R_2_41_43_8
1309D_120R_2_41_43_9
1309D_120R_2_41_43_10
1309D_120R_2_41_43_11

THIN SECTION:	U1309D-120R-3, 42-45 cm	**Piece No.** 3	**Unit**: 330	**TS#: 344**	**OBSERVER: DB, TN, GS**
ROCK NAME:	Olivine bearing gabbro				
GRAIN SIZE:	Medium to coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	55	65	1	6			Anhedral, subherdal	
Clinopyroxene	20	30	1	7			Anhedral, oikocrystic, interstitial	Interlocked contacts
Olivine	0	3-4?		?				

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Tremolite/actinolite	10						Olivine, plagioclase, clinopyroxene	Forms coronas or grows over pyroxene
Chlorite	5						Olivine, plagioclase	Forms coronas
Talc	5						Olivine	Pseudomorphic
Brown amphibole	<1						Clinopyroxene	
Pyrrohtite	<1						Olivine	Associated with talc

TOTAL ALTERATION: 20%

STRUCTURE : One of the better magmatic fabrics preserved - note the subparallel alignment of plagioclase laths on the scale of the thin section. Only minor bending of plagioclase, tapering of plagiclase twins, and neoblast grains suggest small plastic strain. Outlines of the poikilitic pyroxene grains are lobate and suggest reaction with plagioclase.

PHOTOMICROGRAPHS:

1309D_120R_3_42_45_1

1309D_120R_3_42_45_2

THIN SECTION:	U1309D-121R-2, 26-28 cm	**Piece No.** 1		**Unit**: 330		**TS#: 345**		**OBSERVER: NA, DB, PF, JB**
ROCK NAME:	Olivine gabbro							
GRAIN SIZE:	Coarse							
TEXTURE:	Seriate							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**			**Composition**	**MORPHOLOGY**	**COMMENTS**
			min.	**max.**	**av.**			
Plagioclase	35	50	1	6			Subhedral to anhedral	
Clinopyroxene	10	45	1	8			Anhedral, oikocrystic	Large sympletictites.
Olivine	0	5		3?			Anhedral	
Spinel?	0	<1	<1	<1	<1		Subhedral to anhedral	Completely altered

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron)**				**REPLACING / FILLING**	**COMMENTS**
			min.	**max.**	**av.**			
Green amphibole	25						Pyroxene	
Tremolite	3							Replacing pyroxene, along contacts between plagioclase and former olivine, and as patches and within chlorite veinlets in plagioclase
Talc	4							
Chlorite	15							
Biotite	<1						Amphibole	Small patches in amphibole
Oxidized serpentine	<1						Olivine	Dark brown core of replaced olivine
Magnetite	<1						Olivine	
Pyrrhotite	<1							Note: nice symplectite, magmatic?
Chalcopyrite	<1							

TOTAL ALTERATION: 53%

STRUCTURE : No magmatic preferred orientation present. Plastic strain has affected most plagioclase grains by either rerystallization, tapering of twins. Large clinopyroxenes appear to overgrow the plastic fabric because the grain boundaries of the clinopyroxens are in no "rational" relationship to plagioclase.

PHOTOMICROGRAPHS:

1309D_121R_2_26_28_1

1309D_121R_2_26_28_2

1309D_121R_2_26_28_3

THIN SECTION:	U1309D-121R-4, 80-83 cm	**Piece No.** 2	**Unit**: 330	**TS#: 346**	**OBSERVER: DB, GS, TN**
ROCK NAME:	Gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	50	60	0.5	6			Anhedral, subhedral, equant along deformation zones	
Clinopyroxene	30	40	0.5	7			Anhedral, subhedral, oikocrystic	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Tremolite/actinolite	5						Olivine(?), plagioclase, clinopyroxene	Forms corona-like aggregates or grows over clinopyroxene
Chlorite	8						Plagioclase, pyroxene?	Fringe or crack-filling in plagioclase, pseudomorph after pyroxene?
Calcite	2						Olivine or vein	
Brown amphibole	<1						Clinopyroxene	
Magnetite	<1							
Pyrite	<1							
Chalcopyrite	<1							

TOTAL ALTERATION: 20%

STRUCTURE : Significant plastic strain in plagioclase shown by large percentage of neoblasts. Clinopyroxene is only locally showing intense neoblast formation, most grains appear now undeformed but degree of recovery in clinopyroxene remains unresolved. Plagioclase too deformed plastically to argue about magmatic strain. (GS)

PHOTOMICROGRAPHS:

1309D_121R_4_80_83_1
1309D_121R_4_80_83_2
1309D_121R_4_80_83_3
1309D_121R_4_80_83_4

THIN SECTION:	U1309D-124R-2, 45-47 cm	**Piece No.** 1	**Unit**: 330	**TS#: 347**	**OBSERVER: DB, GS**
ROCK NAME:	Basaltic vein in gabbro				
GRAIN SIZE:	Gabbro: coarse to pegmatitic				
TEXTURE:	Sparsely phyric/seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Basaltic vein								
One (weakly skeletal) olivine phenocryst hosted in glassy groundmass spotted by plagioclase microphenocrysts. No chilled margin, flow structures do not permit to estimate the flow direction.								
Gabbro								
Plagioclase	50	50		30			Subhedral	
Clinopyroxene	30	50		16			Subhedral	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Green amphibole	18						Pyroxene	After pyroxene and as veinlets in plagioclase
Talc	2						Olivine	Replacing a phenocryst of olivine in microdiabase vein
Chlorite	<1						Olivine	Forms at the margin of the talc pseudomorph where it interacts with the groundmass of the microdiabase, also forms veinlets that crosscut the microdiabase (filling cooling fractures?)
Ilmenite								

TOTAL ALTERATION: 21%

STRUCTURE : Moderately strained plagioclases (plastic strain) in undeformed (well, bit of subgrain formation present) clinopyroxene largly altered to amphibole. Igneous microstructure of clinopyroxene cannot be confirmed (lack of interlocking grain boundaries). Amphibolitized clinopyroxene clearly poikilitic enclosing plastically strained plagioclases. Early magmatic strain possibly but plagioclase too deformed plastically to confirm.

PHOTOMICROGRAPHS:

1309D_124R_2_45_47_1
1309D_124R_2_45_47_2
1309D_124R_2_45_47_3
1309D_124R_2_45_47_4
1309D_124R_2_45_47_5
1309D_124R_2_45_47_6
1309D_124R_2_45_47_7
1309D_124R_2_45_47_8
1309D_124R_2_45_47_9
1309D_124R_2_45_47_10
1309D_124R_2_45_47_11

THIN SECTION:	U1309D-125R-2, 104-106 cm	**Piece No.** 2		**Unit**: 332/333	**TS#: 348**			**OBSERVER: DB, GS, TN**	
ROCK NAME:	Basalt/gabbro contact								
GRAIN SIZE:	Fine/coarse								
TEXTURE:	Sparsely phyric/seriate								

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Basalt								
Sparlsely olivine and plagioclase phyric basalt. Cryptocrystalline groundmass with several plagioclase microcrysts.								
One olivine skeletal phenocryst. Plagioclase is present as xenocrysts with graphic melt inclusions or anhedral embayed shape.								
Gabbro								
Plagioclase	40	50	0.2	12			Anhedral, subequant	
Clinopyroxene	40	50	0.4	16			Anhedral	

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Actinolite	2						Interstitial	In gabbro
Chlorite	5						Interstitial or fracture-filling	In gabbro
Green-brown amphibole	5						Clinopyroxene	In gabbro

TOTAL ALTERATION: 12%

STRUCTURE : Cataclastic zone between a devitrified basalt (with plagioclase microphenocryst flow fabric) and a plastically deformed gabbro. Cataclasis also throughout the gabbro, probably related genetically to the basalt. Note that clinopyroxene reacts different to this event, i.e. it seems to generate a simple crack whereas plagioclase is broken up. Plagioclase show moderate plastic strain (neoblast...), clinopyroxene is also somewhat plastically deformed as seen in subgrain formation (GS)

PHOTOMICROGRAPHS:

1309D_125R_2_104_106_1
1309D_125R_2_104_106_2
1309D_125R_2_104_106_3
1309D_125R_2_104_106_4
1309D_125R_2_104_106_5
1309D_125R_2_104_106_6
1309D_125R_2_104_106_7
1309D_125R_2_104_106_8

THIN SECTION:	U1309D-126R-1, 90-93 cm	**Piece No.** 3C	**Unit**: 335	**TS#: 349**	**OBSERVER: DB, TN, GS**
ROCK NAME:	Gabbronorite				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	50	58	0.1	15			Anhedral, subhedral, equant	
Clinopyroxene	20	35	0.4	8			Anhedral, oikocrystic, interstitial	
Orthopyroxene	3	7	1	2			Subhedral	High Mg rich orthopyroxene

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite	15						Clinopyroxene, orthopyroxene	
Chlorite	5						Vein	Crack-filling in plagioclase
Brown amphibole	2						Clinopyroxene	
Ilmenite?	<1							

TOTAL ALTERATION: 23%

STRUCTURE : Plagioclase and clinopyroxene laths with variable orientation indicate no magmatic strain. Overall more the appearance of a high level gabbro. Some plastic strain recorded in bent plagioclase twins and neoblast nests.

PHOTOMICROGRAPHS:

1309D_126R_1_90_93_1

1309D_126R_1_90_93_2

THIN SECTION:	U1309D-126R-2, 57-59 cm	**Piece No. 2B**	**Unit**: 337	**TS#: 350**				**OBSERVER: Igneous Team, PF, JB, GS**	
ROCK NAME:	Impregnated gabbro or apatite-ampibole bearing gabbro								
GRAIN SIZE:	Coarse								
TEXTURE:	Seriate								

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**			**Composition**	**MORPHOLOGY**	**COMMENTS**
			min.	**max.**	**av.**			
Plagioclase	58?	60		1.7				
Clinopyroxene	0	?		?			Elongated	
Hornblende	?	?		?			Interstitial between plagioclase grains	
Apatite	2	2		1.5				
Oxide	3	3		3				

Note: strong metamorphic overprint does not permit to recognize the primary lithological relationships. Two population of amphiboles, one appears primary. We can't determine whether the rock is impregnated by a hydrous evolved liquid or crystallized from a primary hydrous-evolved liquid.

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron)**				**REPLACING / FILLING**	**COMMENTS**
			min.	**max.**	**av.**			
Green amphibole	34						Clinopyroxene	
Albite	3						Plagioclase	
Brown amphibole	<1						Amphibole	Patches, especially surrounding oxides
Chlolrite	1						Plagioclase	Associated with albitization
Ilmenite	<1							
Pyrite	<1							

TOTAL ALTERATION: 35%

STRUCTURE : Metamorphic amphibole, plagioclase (and apatite) appear to overgrow an early, plastically deformed oxide gabbro since can locally still see nests of plagioclase neoblasts. Amphibole seems slightly bent.

PHOTOMICROGRAPHS:

1309D_126R_2_57_59_1

1309D_126R_2_57_59_2

THIN SECTION:	U1309D-127R-1, 57-60 cm	**Piece No.** 5	**Unit**: 339	**TS#: 351**	**OBSERVER: DB, TN, JE, YO**
ROCK NAME:	Diabase				
GRAIN SIZE:	Fine				
TEXTURE:	Subophitic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Diabase with plagioclase xenocrysts, partially resorbed and zoned. Melt inclusion layer. Olivine phenocrysts. One spinel grain with remnant fresh kernel.								

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite	10							
Chlorite	10							
Oxides								Secondary mineral?
Sulfides								Secondary mineral?

TOTAL ALTERATION: 20%

STRUCTURE : Vein crosscutting the diabase. No deformation otherwise. (JE)

PHOTOMICROGRAPHS:

1309D_127R_1_57_60_1
1309D_127R_1_57_60_2
1309D_127R_1_57_60_3

THIN SECTION:	U1309D-127R-1, 72-74 cm	**Piece No.** 6B	**Unit**:	**TS#: 352**			**OBSERVER: EH, JB**	
ROCK NAME:	Gabbro, oxide gabbro dike, cataclasite and basalt							
GRAIN SIZE:	Fine to coarse							
TEXTURE:	Cataclastic							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Gabbro								
Plagioclase	50	60?		13				Strongly recrystallized along grain boundaries. Bent, tapered, undulose internally. Clearly high temperature deformation.
Clinopyroxene	5	40?		22				One coarse twin, strongly altered, rare in recrystallized matrix
Oxide Gabbro (intrudes coarse gabbro during or prior to cataclastic deformation)								
Plagioclase	15	20						
Oxide	30	30						
Clinopyroxene	1	20?						
Amphibole		30?						
Apatite	Trace	1						
Titanite	Trace	Trace						
Basalt								
Plagioclase		1						
Groundmass		99						

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Green amphibole							Clinopyroxene	Also in veins cutting plagioclase
Brown amphibole								Probably igneous
Other amphibole							Clinopyroxene	Mostly dark brown, matted texture
Chlorite								"Berlin blue" interference, associated with opaques
Titanite							Fe-Ti oxides	
Calcite							In veins	

TOTAL ALTERATION: 25% (not including diabase)

STRUCTURE : This rock is a mechanical mixture of at least three lithologies, that are --from a magmatic perspective-- not genetically and temporally related. (1) Coarse-grained gabbro, consisting of coarse clinopyroxene and plagioclase. (2) medium-grained oxide-gabbro, with strongly altered pyroxene and/or amphiboles and abundant apatite. (3) basalt, not diabase. there is no ophitic texture, 99% glassy (altered) groundmass, few acicular plagioclase and phenocrysts. The first two are deformed, the basalt postdates the deformation. The contact between the basalt and the host cataclasite is an upt to 3 mm wide zone of pulverized --oxide-free-- gabbro host rock, probably a debris front that could not be assimilated because of the too high viscosity of the injected melt (EH). Weak alignment of microphenocrysts of plagioclase visible in basalt. Plagioclase shows lower temperature plastic strain in the form of 100 micron sized neoblasts and bent twins. Deformation seems higher in the oxide gabbro. Former clinopyroxene of coarse gabbro again seem to overgrow the prior deformation fabric.

PHOTOMICROGRAPHS:

1309D_127R_1_72_74_1

1309D_127R_1_72_74_2

THIN SECTION:	U1309D-127R-1, 132-135 cm	**Piece No.** 12	**Unit**:	**TS#: 353**	**OBSERVER: EH, JB, GS**
ROCK NAME:	Diabase				
GRAIN SIZE:	Fine				
TEXTURE:	Intersertal				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase		1					Subhedral	Phenocrysts, fresh
Groundmass		99						Mostly 50 micron plagioclase needles

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Actinolite							Mafic phenocrysts, also minor in groundmass	

TOTAL ALTERATION: 1%

STRUCTURE : Undeformed diabase with randomly oriented microphenocrysts of plagioclase. One large plagioclase crystals appears xenocrystic because it shows internal deformation features.

PHOTOMICROGRAPHS:

1309D_127R_1_132_135_1

1309D_127R_1_132_135_2

THIN SECTION:	U1309D-128R-2, 122-125 cm	**Piece No.** 9B	**Unit**: 349	**TS#: 354**	**JB JE,GS, EH**
ROCK NAME:	Cataclastic oxide gabbro				
GRAIN SIZE:	Fine to coarse				
TEXTURE:	Inequigranular/cataclastic				

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	50	70		1			Subhedral	
Clinopyroxene/Amphibole	5	25		7			Subhedral (some oikocrystic)	
Oxides		4		2			Unhedral	
Titanite	Trace	Trace						In matrix
Apatite	1	1						In matrix (>20 grains)
Zircon	Trace	Trace						In matrix
								The fine grained matrix is cannot be identified, but the accessories tend to be enriched in the deformed part, suggesting melt-related strain localization

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Epidote	1							
Green and brown amphibc	10						Clinopyroxene, also in slip fiber veins	Slip fiber veins cut cataclasis
Titanite	5						Oxides	
Albite	1						Plagioclase	Plagioclase quite fresh in general
Calcite	3						Vein, mostly plucked	Vein cuts cataclasis
Ilmneite								Probably igneous

TOTAL ALTERATION: 20%

STRUCTURE : Early plastic structure zones, with aligned plagioclase and locally subgrains. Cataclastic deformation band, with highly irregular, angular grains throughout the thin section. Matrix is very fine grained and altered to brown. Poor sorting and textural maturity of cataclastic deformation zone. Late fractures crosscutting the sample (subhorizontal) with associated displacement. (JE). Oxides restriced to cataclastic band (GS)

PHOTOMICROGRAPHS:

1309D_128R_2_122_125_1
1309D_128R_2_122_125_2
1309D_128R_2_122_125_3

THIN SECTION:	U1309D-128R-3, 73-76 cm	**Piece No.** 3	**Unit**: 349	**TS#: 355**	**OBSERVER:JB, GS, EH**
ROCK NAME:	Oxide gabbro				
GRAIN SIZE:	Fine to coarse				
TEXTURE:	Inequigranular/cataclastic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase		80		1.2			Subhedral	
Clinopyroxene?		20		1.2			Subhedral	
Apatite	Trace	Trace						
Oxide				5			Unhedral	
Zircon	Trace	Trace						Near perfect square, growing on plagioclase edge in contact with calcite.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Epidote	3							In patches espescially associated with cataclasis
Green/brown amphibole	15						Clinopyroxene, also in veins, some slip fiber	
Titanite	1						Oxides	
Albite	10						Plagioclase, locally in veins	
Rutile	<1						Alteration of ilmenite	
Ilmenite	1							Igneous
Calcite								

TOTAL ALTERATION: 30%

STRUCTURE : Oxide gabbro associated with epidote veining and strong, lower temperature plasticity. Recrystallization occurs in bands only affecting parts of slide, i.e. those which contain oxide. Coarse grained relict gabbro seems to have had no magmatic fabric. (GS)

PHOTOMICROGRAPHS:

1309D_128R_3_73_76_1
1309D_128R_3_73_76_2
1309D_128R_3_73_76_3
1309D_128R_3_73_76_4
1309D_128R_3_73_76_5
1309D_128R_3_73_76_6
1309D_128R_3_73_76_7
1309D_128R_3_73_76_8
1309D_128R_3_73_76_9
1309D_128R_3_73_76_10

THIN SECTION:	U1309D-130R-1, 55-58 cm	**Piece No.** 2C	**Unit**: 353	**TS#: 356**	**OBSERVER: EH, JB, GS**
ROCK NAME:	Oxide gabbro				
GRAIN SIZE:	Medium to coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	50	58		9	2		Subhedral	
Clinopyroxene?	1	20		6	2		Subhedral	Bladed, partly replaced by green amphibole (Ca-Mg-Fe, no K, low Na)
Ilmenite	10	10		4	1		Euhedral to subhedral	
Apatite	2	2		0.5	0.2		Euhedral to subhedral	
Clinopyroxene	<1	10		0.5				

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Green/brownish amphibole	30						Clinopyroxene	Also fills fractures in plagioclase
Titanite	<1						Oxides	
Albite	1							Very local
Pyrrhotite							Along cleavage planes in altered clinopyroxene	

TOTAL ALTERATION: 35%

STRUCTURE : On scale of slide, no magmatic fabric visible. Plastic strain restricted to minor neoblast formation in plagioclase and bit of bending of crystals. Even given this low strain, primary igneous structure onlly partly preserved since metamorphic growth of amphibole partly consumed plagioclase. Relic primary clinopyroxene appears to be poikilitic with respect to oxides.

PHOTOMICROGRAPHS:

1309D_130R_1_55_58_1

1309D_130R_1_55_58_2

THIN SECTION:	U1309D-130R-2, 13-16 cm	**Piece No.** 1	**Unit**: 353	**TS#: 357**	**OBSERVER: EH, AD JE**
ROCK NAME:	Oxide gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	30	47			8		Unhedral	
Clinopyroxene?	5	47			8		Unhedral	Pervasively altered, shape suggests amphibole
Apatite		1		1.5			Euhedral	Commonly enclosed in plagioclase
Zircon		1		0.6			Euhedral	Abundant (>15 grains) euhedral prismatic
Titanite		1		0.4			Euhedral	Associated with skeletal oxides
Oxide		3					Unhedral	Skeletal aggregates, breakdown from Ti-amphibole?

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Titanite	1							
Green amphibole	20						Pyroxene	
Epidote	2							
Prehnite ?	<1						Plagioclase	
Chlorite	<1						Plagioclase	
Ilmenite	2							

TOTAL ALTERATION: 25%

STRUCTURE : Slight undulatory extinction in larger plagioclase and pyroxenes. Dense fracture network with associated pervasive alteration. No apparent strain. (JE)

PHOTOMICROGRAPHS:
1309D_130R_2_13_16_1
1309D_130R_2_13_16_2

THIN SECTION:	U1309D-131R-1, 119-121 cm	**Piece No.** 5F		**Unit**: 355	**TS#: 358**		**OBSERVER: EH, AD JE**	
ROCK NAME:	Metagabbro							
GRAIN SIZE:								
TEXTURE:								

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**			**Composition**	**MORPHOLOGY**	**COMMENTS**
			min.	**max.**	**av.**			
Plagioclase	20	48					Anhedral	Patchy alteration
Clinopyroxene?	2	48					Anhedral	
Oxide	2	2					Anhedral	Primary or breakdown product of Ti-amphiboles?
Titanite	0.5	0.5					Euhedral	Primary or breakdown product of Ti-amphiboles?
Apatite	1	1		2			Subhedral	Undulatory extinction, subgrain formation
								No zircon

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron)**				**REPLACING / FILLING**	**COMMENTS**
			min.	**max.**	**av.**			
Sphene	3							
Epidote	15							
Green amphibole	15						Pyroxene	
Brown fibrous	5						Plagioclase	Forming small spots in the plagioclase
Ilmenite	2							

TOTAL ALTERATION: 40 %

STRUCTURE : Altered gabbro. Relict plagioclase crystals show slight undulatory extinction. No evidence of recrystallization or other plastic deformation. No brittle deformation apart from brittle fractures.

PHOTOMICROGRAPHS:

1309D_131R_1_119_121_1

1309D_131R_1_119_121_2

THIN SECTION:	U1309D-131R-2, 41-43 cm	**Piece No.** 3A	**Unit**: 355	**TS#:359**			**OBSERVER: DB, AD, JE,GS**	
ROCK NAME:	Microgabbro/gabbro contact							
GRAIN SIZE:	Fine/pegmatitic							
TEXTURE:	Seriate							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Microgabbro								
Plagioclase		60	1	4			Anhedral	
Clinopyroxene		40	0.4	2			Anhedral, oikocrystic	
Gabbro								
In the section we can see only a large plagioclase, bordered by brown hornblende replacing clinopyroxene								
Hydrothermal vein follow the lithologic contact								
Zircon	Trace	Trace					Euhedral	

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Brown fibrous mineral	1						Plagioclase	
Chlorite	1						Plagioclase	
Tremolite	3						Olvine/pyroxene	
Green brown amphibole	3						Pyroxene	
Epidote	2							
Apatite	<<1							
								The vein is made of tremolite (fibrous) with epidote

TOTAL ALTERATION: 11%

STRUCTURE : Gabbro with large plagioclase crystals at one side of vein, with some subgrain formation at boundary and undulatory extinction. Crosscutting vein with penetrating alteration. (JE). Coarse side shows hardly any plastic strain, whereas "microgabbro" side has moderate plastic strain in plagioclase (lots of neoblasts) but clinopyroxene shows mainly subgrain/formation.(GS)

PHOTOMICROGRAPHS:

1309D_131R_2_41_43_1
1309D_131R_2_41_43_2
1309D_131R_2_41_43_3
1309D_131R_2_41_43_4

THIN SECTION:	U1309D-132R-1, 45-48 cm	**Piece No. 3**	**Unit**: 358	**TS#: 360**	**OBSERVER: EH, AD, KJ, GS**
ROCK NAME:	Orthopyroxene-bearing gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase		55					Unhedral	
Clinopyroxene		45					Subhedral, oikocrystic	Plagioclase and olivine as chadacrysts.
Orthopyroxene	2	3					Subhedral, oikocrystic	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Tremolite	4						Olivine/Pyroxene	
Brown/green amphibole	20						Pyroxene	
Magnetite	<1							

TOTAL ALTERATION: 25%

STRUCTURE : Magmatic texture - no apparent foliation. Bending of some of the grains of plagioclase, with bent lamellae. Late network of fractures with vein infill. (JE) High temperature plastic strain caused grain size reduction by neoblast formation in plagioclase. Clinopyroxene is marginally affected by showing subgrain formation. In more recrystallized part, clinopyroxene still with magmatic twin. Later clinoproxene growth goes over the recrystallized grains. (GS)

PHOTOMICROGRAPHS:

1309D_132R_1_45_48_1

1309D_132R_1_45_48_2

THIN SECTION:	U1309D-133R-1, 24-26 cm	**Piece No.** 2A	**Unit**: 360	**TS#: 361**	**OBSERVER: PF, HH,GS**
ROCK NAME:	Olivine-bearing gabbro / oxide gabbro dikelet				
GRAIN SIZE:	Medium				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Gabbro								
Plagioclase	49	50		5	3		Anhedral	Undulatory extinction, well preserved
Clinopyroxene	35	47	6	14			Anhedral	Irregular oikocrysts, interconnected interstitial network, contains plagioclase chadacrysts. Myrmekitic grain exits.
Olivine	2	3			1.5		Anhedral	Initial coronation, small irregular embayed to interstitial shape
Oxide gabbro dikelet								Sharp contact, no oxides in host
Oxide	15	15			1.5			Interstitial, filling pore space,
Clinopyroxene	7	20	0.05	2				
Plagioclase	60	65	0.02	3				
Apatite	1	1			0.05			
Zircon	Trace	Trace			0.05			One prismatic fragment

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Green amphibole	8						Pyroxene	
Actinolite	2						Pyroxene	Forms narrow fringes on grain boundaries and along fractures
Tremolite	<1						Olivine	
Talc	<1						Olivine	
Chlorite	<1						Plagioclase	Reaction rims at contacts with former olivine and plagioclase
Magnetite	<1						Olivine	(Also occurs as a primary phase ~15% of section)
Ilmenite								
Chalcopyrte								
Pyrite								

TOTAL ALTERATION: 10%

STRUCTURE : High temperature recrystallization in gabbro part caused grain size reduction and loss of primary magmatic texture. Oikocrystic clinopyroxene with no strain. Oxide part with lower temperature deformation (bent porphyroclastic plagioclase, variably sizes neoblasts indicating disequilibrium with respect to deformation), clinopyroxene less affected but also local neoblasts (GS)

PHOTOMICROGRAPHS:

1309D_133R_1_24_26_1
1309D_133R_1_24_26_2
1309D_133R_1_24_26_3
1309D_133R_1_24_26_4

THIN SECTION:	U1309D-133R-2, 50-53 cm	**Piece No.** 2A	**Unit**: 365	**TS#: 362**	**OBSERVER: TN, HH, GS, YO**
ROCK NAME:	Microgabbronorite				
GRAIN SIZE:	Fine				
TEXTURE:	Inequigranular				

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	65	70	0.2	4	0.8		Anhedral	Some as chadacrysts in orthopyroxene.
Clinopyroxene	8	12			1		Anhedral	
Orthopyroxene	12	18			2		Anhedral, oikocrystic	Encloses rounded plagioclase chadacrysts and less clinopyroxene.
Oxide	Trace	Trace		0.9	0.1			Always associated with (now-) green amphibole

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Actinolite	5						Clinopyroxene & orthopyroxene	Replace/overgrow
Talc	5						Orthopyroxene	Pseudomorphic
Brown amphibole	<1						Clinopyroxene	
Chlorite	2						Vein-filling	
Ilmenite	<1							

TOTAL ALTERATION: 12%

STRUCTURE : Clear magmatic alignment of plagioclase laths. In addition some neoblast formation in plagioclase. Clino- and orthopyroxene are poikilitic and undeformed. (GS)

PHOTOMICROGRAPHS:

1309D_133R_2_50_53_1
1309D_133R_2_50_53_2
1309D_133R_2_50_53_3
1309D_133R_2_50_53_4

THIN SECTION:	U1309D-134R-2, 17-20 cm	**Piece No.** 1B	**Unit**: 365	**TS#: 363**	**OBSERVER: TN, EH, GS**
ROCK NAME:	Gabbronorite				
GRAIN SIZE:	Medium				
TEXTURE:	Equigranuar				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	58	60		6	2			
Clinopyroxene	5	20	0.5	3	1.5			
Orthopyroxene	10	20			1.5			
Oxide	0.1	0.1						

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite	3						Clinopyroxene & orthopyroxene	Replace/overgrow
Talc	5						Orthopyroxene	Fringe/crack-fill
Chlorite	2						Plagioclase	Crack-fill
Brown amphibole	<1						Clinopyroxene	
Ilmenite?	<1							

TOTAL ALTERATION: 10%

STRUCTURE : Weak foliation which seems to have a magmatic origin. However, most if not all plagioclase grains are affected by plastic strain (neoblasts, undulatory extinction, tapering twins). Ortho- and clinopyroxene are weakly affected by plastic strain as shown by slightly misoriented neoblasts of formerly larger poiklitic grains. Interpretation is that an early magmatic fabric and igneous texture is now largly destroyed by plastic strain, but total plastic strain is low. (GS)

PHOTOMICROGRAPHS:

1309D_134R_2_17_20_1
1309D_134R_2_17_20_2
1309D_134R_2_17_20_3

THIN SECTION:	U1309D-135R-2, 53-55 cm	**Piece No.** 4A	**Unit**: 367	**TS#: 364**	**OBSERVER: TN, EH,GS**
ROCK NAME:	Orthopyroxene-bearing olivine gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	45	45			10		Anhedral	
Clinopyroxene	35	45			12		Anhedral, oikocrystic, interstitial	Rounded plagioclase
Olivine	3	6			0.8		Anhedral	Corona texture
Orthopyroxene?	1	2			8		Anhedral	One very coarse grain with typical cleavage and absence of exsolution lamellae
Oxide	1	1					Interstitial	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Tremolite	2						Olivine and plagioclase	Forming corona
Chlorite	3						Olivine and plagioclase	Forming corona or filling cracks in plagioclase
Talc	3						Olivine	Pseudomorphic
Brown amphibole	<1						Clinopyroxene	
Magnetite	<1							
Pyrite	<1							
Chalcopyrite	<1							

TOTAL ALTERATION: 10%

STRUCTURE : Plagioclase now largely plastically recrystallized, whereas clinopyroxene is undeformed and seems to overgrow any previous deformation texture. Olivine was also involved in the early plastic strain event. Orthopyroxene seems a bit undulose.

PHOTOMICROGRAPHS:

1309D_135R_2_53_55_1

1309D_135R_2_53_55_2

THIN SECTION:	U1309D-136R-1, 45-48 cm	**Piece No.** 4B	**Unit**: 371	**TS#: 365**	**OBSERVER: DB, PF, GS, YO**
ROCK NAME:	Wehrlite				
GRAIN SIZE:	Coarse				
TEXTURE:	Poikilitic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Clinopyroxene	20	50		12			Oikocrystic	
Olivine	10	45	0.4	12			Subhedral, anhedral	Forming corona texture.
Plagioclase	0	5		3			Unhedral, oikocrystic	Forming corona texture. Include olivine as chadacryst. Almost no primary phase remains.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Amphibole	10						Pyroxene	Reaction rims on pyroxene
Tremolite	3						Oivine	Fine acicular needles near outer edges of former olivine in coronas
Talc	10?						Oivine	After olivine in some areas near veins
Serpentine	30						Veins and oliviine	Veins in oliviine and as olivine replacement (some is oxidized to brown?) some replacement of pyroxene
Chlorite	15						Veins	Also minor corona texture around edges of oliving grains adjacent to veins

TOTAL ALTERATION: 70%

STRUCTURE : While olivine shows tilt walls indicating recovery from plastic strain, their orientation appears not orientated. Only traces of plastic strain in plagioclase and clinopyroxene oikorysts. No indication from magmatic strain (GS)

PHOTOMICROGRAPHS:

1309D_136R_1_45_48_1

1309D_136R_1_45_48_2

THIN SECTION:	U1309D-136R-1, 82-85 cm	**Piece No.** 6D	**Unit**: 373	**TS#: 366**	**OBSERVER: YO, KM, AD**
ROCK NAME:	Olivine gabbro				
GRAIN SIZE:	Medium to coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	0	60						No primary phase remains.
Olivine	0	30		1				No primary phase remains.
Clinopyroxne	5	30		5			Subhedral, oikocrystic	Include plagioclase as chadacryst?
								Note: this rock is highly altered. It is very difficult to recognize primary magmatic strucure.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Serpentine	15						Olivine	
Talc	30						Olivine	
Tremolite	30						Olivine/Pyroxene	
Chlorite	20						Plagioclase	
								Comments: Talc/tremolite metasomatism zone related to vein

TOTAL ALTERATION: 95 %

STRUCTURE : Heavily altered olivine gabbro with few evidence of deformation exept for microcracks in clinopyroxene.

PHOTOMICROGRAPHS:
1309D_136R_1_82_85_1
1309D_136R_1_82_85_2

THIN SECTION:	U1309D-136R-2, 57-60 cm	**Piece No.** 3A		**Unit**: 375/376	**TS#: 367**		**OBSERVER: TN,NA,GS, YO**	
ROCK NAME:	Olivine gabbro/leucocratic gabbro							
GRAIN SIZE:	Coarse							
TEXTURE:	Poikilitic							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**			**Composition**	**MORPHOLOGY**	**COMMENTS**
			min.	**max.**	**av.**			
Olivine gabbro								
Olivine	23	47	0.1	7	1		Anhedral, chadacryst	
Clinopyroxene	10	35		15			Oikocryst	Two grains devided by plagioclase vein have same extinction.
Plagioclase		15	1	5	3		Anhedral to interstitial	
Spinel	0.5	2	0.1	1	0.5		Anhedral to subhedral	Rich in the boundary between two lithologies. Some grains looks reddish, indicating these preserve primary compositions.
Sulfide?(opaque)	1	1	0.1	2	0.8		Interstitial	Rich in wehrlite part
Leucocratic Gabbro								
Plagioclase	60	85	0.1	6	2		Anhedral to subhedral	
Clinopyroxene	3	13	0.1	2	4		Interstitial to oikocryst	
Olivine	0	2	0.1	2	1		Anhedral to interstitial	

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron)**				**REPLACING / FILLING**	**COMMENTS**
			min.	**max.**	**av.**			
Tremolite/actinolite	3						Olivine and plagioclase or crack-filling	Forms coronas or vein aggregates
Chlorite	3						Olivine and plagioclase or crack-filling	Forms coronas or vein aggregates
Talc	5						Olivine	Pseudomorphic
Serpentine	2						Olivine or crack-filling	Forms pseudomorph or vein
Prehnite	1						Plagioclase	
Brown amphibole	<1						Clinopyroxene?	
Magnetite	<1							
Pyrrhotite	<1							
Chalcopyrite	<1							

TOTAL ALTERATION: 15%

STRUCTURE : An olivine gabbro part and a leucocratic gabbro part can be distinguished. The boundary is marked by a trail of oxides. Plagioclase microstructure in the leucocratic gabbro is nearly nearly completely modified from a presumed igneous precursor by plastic strain, in the olivine gabbro part plagioclse is poikilitic and just weakly strained. On the other hand, clinopyroxenes in both parts are unstrained. Finally, olivines in the plagioclase wehrlitic part have a preferred orientation of tilt walls, suggesting deformation by flow roughly parallel to the contact. The strain history strongly suggests a two stage formation involving migration of clinopyroxene saturated liquid through a matrix which has undegone an earlier period of plastic strain. (GS)

PHOTOMICROGRAPHS:

1309D_136R_2_57_60_1 **1309D_136R_2_57_60_3**
1309D_136R_2_57_60_2 **1309D_136R_2_57_60_4**

THIN SECTION:	U1309D-137R-1, 45-47 cm	**Piece No.** 2B	**Unit**: 379	**TS#: 368**	**OBSERVER: DB. PF,GS**
ROCK NAME:	Oxide gabbro				
GRAIN SIZE:	Fine to coarse				
TEXTURE:	Porphyroclastic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase		47	0.1	6			Anhedral, equant	
Clinopyroxene		47	0.1	8			Anhedral, equant	
Oxide		6					Anhedral, interstitial	Oxide are possibly impregnating the rock after deformation
Apatite		Trace						

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Green amphibole	2						Pyroxene	Reaction rims on some pyroxene and as veinlets through grains
Chlorite	2						Pyroxene	In veins after pyroxene
Magnetite	3							With ilmenite(?) in deformation zones with chlorite, in pyroxene reaction zones
Ilmenite	3							Exolution lamellae in magnetite and individual grains
Sulfide	<1							(Anisotropic) pyrrhotite

TOTAL ALTERATION: 10%

STRUCTURE : Plastically deformed oxide gabbro. Plastic strain is intense in areas involving oxides. Here, dynamic recrystallization has generated neoblasts in 50 to 100 µm range. Clinopyroxene is fully involved in the deformation history. Strong strain partitioning may argue for lower temperature deformation regime. As in previous slides, the close link between oxide presence and mylonitic deformation is noted. (GS)

PHOTOMICROGRAPHS:

1309D_137R_1_45_47_1

1309D_137R_1_45_47_2

THIN SECTION:	U1309D-137R-2, 96-98 cm	**Piece No.** 2B	**Unit**: 379	**TS#: 369**	**OBSERVER: DB, TN, GS**
ROCK NAME:	Oxide gabbro mylonite				
GRAIN SIZE:	Fine to medium				
TEXTURE:	Mylonitic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase rich domain								
Plagioclase		55					Porphyroclast, neoblast	
Clinopyroxene		40					Porphyroclast, neoblast	
Oxide		5					Interstitial	Oxides are possibly a late stage post deformation impregnation.
Plagioclase poor domain								
Plagioclase		35					Porphyroclast, neoblast	
Clinopyroxene		55					Porphyroclast, neoblast	Sometimes include plagioclase chadacrysts.
Oxide		10					Interstitial	Oxides are possibly a late stage post defromation impregnation.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite	15						Clinopyroxene, brown amphibole	Strain-free
Brown amphibole	2						Clinopyroxene	Strain-free
Chlorite	3						Interstitial, vein	
Oxides	5						Interstitial	
Sulfides	<1						Interstitial	

TOTAL ALTERATION: 25%

STRUCTURE : A plastic strain affecting most of the slide, leaving porphroclasts of plagioclase and clinopyroxene as relics. Note clinopyroxene growth twin in porphyroclast. In dynamically recrystallized matrix, clinopyroxene has coarser neoblast size than plagioclase. Deformation state of oxides remains unclear. (GS). High accumulated strain.

PHOTOMICROGRAPHS:

1309D_137R_2_96_98_1

1309D_137R_2_96_98_2

THIN SECTION:	U1309D-137R-2, 133-135 cm	**Piece No.** 5	**Unit**: 379	**TS#: 370**	**OBSERVER: DB, AD,GS**
ROCK NAME:	Oxide gabbronorite mylonite				
GRAIN SIZE:	Fine to medium				
TEXTURE:	Mylonitic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase		50					Equant, anhedral in the relics	
Clinopyroxene		30					Equant, porphyroclastic, anhedral to oikocrystic in the relics	Encloses plagiocalse chadacrysts
Orthopyroxene		10					Equant, porphyroclastic, anhedral to oikocrystic in the relics	Encloses clinopyroxene chadacrysts
Oxide		10					Interstitial	Oxides possibly impregnate the mylonite after deformation

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Green amphibole	20							Actinolite ?
Green-brown amphibole	10						Pyroxene	
Tremolite	1							
Ilmenite	8							
Sulfides	2							

TOTAL ALTERATION: 30%

STRUCTURE : High ductile strain with few porphyroclasts remaining. Oxide rich matrix between porphyroclasts suggests again a link between high strain and oxides. In part of slide good shear sense indicator with by SC-banding indicating top to left shear sense. Apatite inclusion in clinopyroxene porphyroclast suggests that rock already was an evolved gabbro when deformation occurred. (GS)

PHOTOMICROGRAPHS:

1309D_137R_2_133_135_1
1309D_137R_2_133_135_2
1309D_137R_2_133_135_3
1309D_137R_2_133_135_4
1309D_137R_2_133_135_5
1309D_137R_2_133_135_6
1309D_137R_2_133_135_7

THIN SECTION:	U1309D-138R-2, 81-85 cm	**Piece No.** 1H	**Unit**: 381	**TS#: 371**	**OBSERVER: JE, DB, TN,GS**
ROCK NAME:	Orthopyroxene bearing microgabbro				
GRAIN SIZE:	Fine				
TEXTURE:	Equigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase		70			0.3		Equant	
Clinopyroxene		30			0.6		Equant, Anhedral	
Orthopyroxene		2			0.3		Anhedral	
Olivine		1			0.3		Anhedral	
Oxide		Trace						Note: the original magmatic texture is completely overprinted by plastic deformation

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Actinolite	6						Clinopyroxene, vein	
Colorless amphibole	7						Clinopyroxene	
Brown/green amphibole	2						Clinopyroxene	
Chlorite	2						Pyroxene	Pseudomorphic
Talc	1						Pyroxene	
Oxides	<1							

TOTAL ALTERATION: 20%

STRUCTURE : Fine-grained gabbro with equant plagioclase crystals with marked alignment indicating plastic preferred orientation, and weak, highly dipping foliation marked by pyroxene alignments. Later crosscutting fractures and veins with alteration halos and no apparent displacement. (JE). Relatively homogeneous distrubiton between clinopyroxene and plagioclase suggests that precursor was not coarse grained. (GS)

PHOTOMICROGRAPHS:

1309D_138R_2_81_85_1
1309D_138R_2_81_85_2
1309D_138R_2_81_85_3

THIN SECTION:	U1309D-138R-3, 55-59 cm	**Piece No.** 1D	**Unit**: 383/384	**TS#: 372**				**OBSERVER: JE, DB, AD,GS**	
ROCK NAME:	Gabbronorite								
GRAIN SIZE:	Mylonite/coarse undeformed; fine to coarse (undeformed part)								
TEXTURE:	Porphyroclastic to seriate								

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**			**Composition**	**MORPHOLOGY**	**COMMENTS**
			min.	**max.**	**av.**			
Plagioclase		50	0.4	6			Anhedral	
Orthopyroxene		30	1	4			Anhedral	
Clinopyroxene		20	0.4	4			Anhedral, interstitial	Few clinopyroxene grains show orthopyroxene exsolution
Oxide		Trace					Anhedral	
Note: mode estimated on the undeformed part								

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron)**				**REPLACING / FILLING**	**COMMENTS**
			min.	**max.**	**av.**			
Tremolite	1						Pyroxene	
Green-brown amphibole	2						Pyroxene	
Prehnite	2						Plagioclase	
Magnetite								
Pyrite								

TOTAL ALTERATION: 5%

STRUCTURE : Subvertical plastic shear band, with bands of higher strain than others. Plagioclase has recrystallized and shows a marked LPO, while pyroxenes show a more cataclastic aspect (irregular, angular clasts). Plastic deformation is penetrative over the thickness of the slide, with larger plagioclase and pyroxene grains separated by bands of recrystallized, finer grained plagioclase. Later fractures are concentrated on larger crystals, and show limited penetration into the recrystallized zones (JE). Top to right shear sense suspected by S-C banding (GS)

PHOTOMICROGRAPHS:

1309D_138R_3_55_59_1
1309D_138R_3_55_59_2
1309D_138R_3_55_59_3
1309D_138R_3_55_59_4
1309D_138R_3_55_59_5
1309D_138R_3_55_59_6
1309D_138R_3_55_59_7

THIN SECTION:	U1309D-139R-4, 32-35 cm	**Piece No.** 3	**Unit**: 386	**TS#: 373**			**OBSERVER:JE, DB,GS, TN**	
ROCK NAME:	Olivine gabbro/mylonite contact							
GRAIN SIZE:	Coarse to fine							
TEXTURE:	Seriate to porphyroclastic							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	60	70	1	8			Anhedral	
Clinopyroxene	10	22	1	7			Anhedral	
Olivine	0	8		?			Anhedral	
Note: mode estimated on the undeformed part, the mylonitized zone is also impregnated by oxides. Possibly the deformed zone is also less rich in olivine.								

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Tremolite/actinolite	5						Olivine, plagioclase, clinopyroxene	Forms corona and grows over clinopyroxene in undeformed gabbro.
Chlorite	3						Olivine, plagioclase	Forms corona, and vein-aggregates in plagioclase.
Green amphibole	10						Clinopyroxene, vein	Large amounts in mylonite.
Brown amphibole	2						Clinopyroxene	In mylonite and undeformed gabbro.
Carbonate	2						Olivine? and vein	Pseudomorphs after olivine?
Oxide	3							Large amounts in mylonite.
Sulfite	<1							

TOTAL ALTERATION: 25 %

STRUCTURE : Contact between a plastic (dislocation) shear zone and undeformed gabbro. The shear zone shows aligned, fine-grained plagioclase subgrains, and a sharp contact with the undeformed host rock. Planes of oxide define possible shear bands with different grain sizes on them. Later fracturing and associated amphibole alteration. The gabbro shows mostly undeformed plagioclase, some grains with undulatory extinction, and local zones of subgrain formation. (JE). Note considerably higher degree of amphibolitization of clinopyroxene in mylonite than host.

PHOTOMICROGRAPHS:

1309D_139R_4_32_35_1
1309D_139R_4_32_35_2
1309D_139R_4_32_35_3
1309D_139R_4_32_35_4

THIN SECTION:	U1309D-140R-2, 50-53 cm	Piece No. 1E	Unit: 388	TS#: 374	OBSERVER: DB, TN,JE,GS
ROCK NAME:	Troctolite/oxide gabbro/diabase contact				
GRAIN SIZE:					
TEXTURE:					

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Troctolite								
Olivine	0	80					Subhedral	
Plagioclase	0	20					Interstitial (oikocrystic?)	
Oxide gabbro: seriate gabbro intruding the troctolite, the contact is possibly erosional. The grain size reduction toward the contact is not magmatic and possibly related to localized deformation along the contact.								
Plagioclase	50	70					Subhedral, equant	
Clinopyroxene	15	25					Anhedral	
Oxide	5	5					Anhedral, interstitial	
Diabase: cryptocrystalline diabase intruding and partially resorbing the oxide gabbro								

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Serpentine							Olivine	Pseudomorphs in troctolite
Chlorite							Plagioclase, olivine, vein	Coronitic texture in troctolite, or veinlets in gabbro
Tremolite/actinolite							Olivine, plagioclase	Coronitic texture in troctolite, or overgrowth on larger amphiboles
Talc							Olivine, pyroxene	Pseudomorphs and matrix in reaction zones between troctolite and
Brown/green amphiboles							Clinopyroxene	In gabbro
Calcite							Vein	In reaction zone between troctolite and gabbro
Oxides								
Sulfides								
Actinolite				20			Clinopyroxene?	Pseudomorphic aggregates after large poikilitic (?) clinopyroxene in gabbro?
Chlorite				10			Clinopyroxene?	Pseudomorphic aggregates after large poikilitic (?) clinopyroxene in gabbro?
TOTAL ALTERATION: 70%								

STRUCTURE : Very complex. Early magmatic/plastic deformation with formation of plagioclase and pyroxene subgrains.There is local alignment of plagioclase grains, but not throughout the thin section. Size and intensity of subgrains is also variable. Intrusion of diabase through a sharp contact, locally with clasts of the host rock sorrounded by it. Olivine in corona texture area are all transformed into talc/tremolite but maintain slight undulatory extinction and are crosscut by late vein set. (JE) Note dramatic strain partitioning between host troctolite and oxide gabbro and euhedral plagioclase where in contact with basalt (GS)

PHOTOMICROGRAPHS:

1309D_140R_2_50_53_1

1309D_140R_2_50_53_2

THIN SECTION:	U1309D-140R-2, 111-113 cm	**Piece No.** 1J		**Unit**: 388		**TS#:375**		**OBSERVER: EH, JE, AD,GS**	
ROCK NAME:	Olivine-rich Troctolite (almost dunite)								
GRAIN SIZE:	Medium								
TEXTURE:	Seriate								

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Olivine	65	89	0.02	18			Anhedral	Undeformed and deformed coarse and polygonalized grains
Plagioclase	3	8	0.05	3			Interstitial	
Clinopyroxene	0.5	2	0.05	1.5			Anhedral	
Cr-spinel	1	1					Anhedral	Interstitial train
Sulfide		Trace						Primary pentlandite, now altered?
		Modes are without veined area						

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Tremolite	8						Olivine	Occuring as vein associated with chlorite
Serpentine	5						Olivine	
Talc	4						Olivine	
Chlorite	7						Plagioclase	Occuring as vein associated with tremolite
Green amphibole	1						Olivine/pyroxene	Actinolite

TOTAL ALTERATION: 25 %

STRUCTURE : Olivine shows undulatory extinction on smaller grains - undeformed for larger ones. Crosscut by network of fractures and variable serpentinization associated. Plagioclase shows undulatory extinction and subgrains, particularly in narrow areas between olivine grains and their rim. Crosscut by a tensile netwok of fractures with opening (crack perpendicular fibers) and a second generation of alteration veins with chlorite. Cracking is associated with opening, no shear (JE). Note brown amphibole associated with oxides. Is recrystallized but may be pseudomorphing clinopyoroxene neoblasts. Original poikilitic troctolite seems to have been unstrained (GS)

PHOTOMICROGRAPHS:

1309D_140R_2_111_113_1

1309D_140R_2_111_113_2

THIN SECTION:	U1309D-140R-2, 128-131 cm	**Piece No.** 1K	**Unit**: 388	**TS#: 376**	**OBSERVER: EH, AD,AH**
ROCK NAME:	Metatroctolite cut by gabbro and diabase				
GRAIN SIZE:	Fine to coarse				
TEXTURE:	Inequigranular, varitextured				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Troctolite								
Olivine	0	85						Completely altered
Plagioclase	0	8						Completely altered
Clinopyroxene	0	4						Completely altered
Gabbro								
Plagioclase	20	50						Partly euhedral, partly polygonalized, overall patchy alteration
Clinopyroxene	1	40						Strongly altered, several kinds of amphibole and chlorite
								No clear apatite
Diabase a.k.a. "green stuff"								Ghost ophitic texture preserved

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Serpentine	5						Olivine	
Talc	20						Olivine/pyroxene	
Tremolite	30						Olivine/pyroxene	
Chorite	5						Plagioclase	
Green amphibole	1						Pyroxene	
Calcite	<1						Tiny veins	

TOTAL ALTERATION: 60%

STRUCTURE : Thin section exhibits an increasing gradient of alteration. Olivine crystals have been completely fractured, can still see the ghost edges of the original ophitic texture. Corona alteration is shown between olivine and plagioclase crystals. Coronas are made up of chlorite making the inner rim around the plagioclase and the outer rim is serpentine. There is no preferred orientation of the crystals. Some clinopyroxene crystals show undulatory extinction and a bending of the crystal edges. Plagioclase crystals exhibit weak undulatory extinction. A few cracks crosscut the alteration zone and have been infilled.(AH) Overall seems plagioclase wehrlite in contact with basalt. In host, olivine tilt walls without preferred orientation, brown amphibole in olivine matrix, plagioclase apparently also enclosed in olivine.

PHOTOMICROGRAPHS:

1309D_140R_2_128_131_1
1309D_140R_2_128_131_2
1309D_140R_2_128_131_3
1309D_140R_2_128_131_4

THIN SECTION:	U1309D-140R-3, 97-100 cm	**Piece No.** 1E	**Unit**: 390	**TS#: 377**	**OBSERVER: AD, DB, AH**
ROCK NAME:	Oxide gabbro				
GRAIN SIZE:	Fine to coarse				
TEXTURE:	Inequigranular, seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase		75	0.2	12			Subhedral, anhedral	
Clinopyroxene		20	0.2	7			Anhedral	Some grains show myrmekitic texture.
Oxide		5	0.1	3			Interstitial, anhedral	Oxides postdate the high-temperature deformation

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Green-brown amphibole	6						Pyroxene	
Actinolite	1						Pyroxene	And veins
Chlorite	1							Veins
Prehnite	<1						Plagioclase	

TOTAL ALTERATION: 10%

STRUCTURE : Plagioclase crystals exhibit a lot of crystal-plastic deformation in the forms of subgrains, bent lamellae, undulatory extinction and a high percentage of recrystallized grains around the edges. Clinopyroxene crystals exhibit alteration around the edges. The large crystals contain more microfractures than the recrystallized regions. Plagioclase crystals show a weak preferred orientation.

PHOTOMICROGRAPHS:

1309D_140R_3_97_100_1

1309D_140R_3_97_100_2

THIN SECTION:	U1309D-140R-4, 109-112 cm	**Piece No.** 6C	**Unit**: 391	**TS#: 378**	**OBSERVER: AD, DB, AH**
ROCK NAME:	Gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase		65			3		Anhedral	
Clinopyroxene		34			3		Anhedral	
Oxide		1					Interstitial	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Tremolite	5						Olivine	
Serpentine	3						Olivine	
Chlorite	2						Plagioclase	
Actinolite	1						Pyroxene	
Magnetite	<1							
Sulfides	<1							

TOTAL ALTERATION: 15 %

STRUCTURE : Center of thin section exhibits a zone of unaltered, randomly orientated crystals of mainly plagioclase and clinopyroxene. The plagioclase crystals exhibit undulatory extinction, subgrains and recrystallized grains mainly between two or three plagioclase crystals. The clinopyroxenes also show recrystallization at the grain boundaries. The edges of the thin section show intensive alteration by serpentine fabric. There is one main open fracture which cuts through the unaltered zone and there are other small open fractures throughout the section.

PHOTOMICROGRAPHS:

1309D_140R_4_109_112_1

1309D_140R_4_109_112_2

THIN SECTION:	U1309D-141R-2, 75-78 cm	**Piece No.** 6B	**Unit**: 391	**TS#: 379**	**OBSERVER: TN, DB, KM**
ROCK NAME:	Metagabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase		?						
Clinopyroxene		?						
	Note: this rock is too altered and deformed to allow estimation of primary mineral modes.							

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Brown/green amphibole	20						Clinopyroxene	Undulatory extinction
Tremolite/actinolite	20						Olivine?, plagioclase, clinopyroxene	Undulatory extinction
Chlorite	10						Plagioclase, olivine?	Coronitic, or vein
Epidote	<1						Interstitial	
Oxides	<1							
Sulfides	<1							

TOTAL ALTERATION: 50% (for low temperature alteration)

STRUCTURE : Cataclasite and fault gouge in a fault zone. Top and bottom parts are zones of fault gouge, whereas middle part shows relics of intensely fractured coarse grains that may represent primary occurrence of plagioclase and clinopyroxene. Top part: earlier cataclasite zones showing flow textures were crosscut by later fault gouge with no texture. Bottom part: similar texture to the top part, but later fault gouge occurs by very sharp contact to coarse grains in the middle part. Middle part: coarse plagioclase grains with neoblasts were fractured, whereas coarse altered clinopyroxene grains were broken into pieces. Flow textures in cataclasite zone and fault gouge show apparent dextral sense of shear (i.e. reverse movement) (KM)

PHOTOMICROGRAPHS:

1309D_141R_2_75_78_1
1309D_141R_2_75_78_2
1309D_141R_2_75_78_3
1309D_141R_2_75_78_4
1309D_141R_2_75_78_5
1309D_141R_2_75_78_6

THIN SECTION:	U1309D-142R-2, 123-125 cm	**Piece No.** 6	**Unit**: 391	**TS#: 380**	**OBSERVER: AD, DB, KM**
ROCK NAME:	Olivine gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	50	60	0.5	6			Anhedral, subequant	
Clinopyroxene	30	35	0.5	8			Anhedral, oikocrystic, interstitial	Abundant interlocked symplectitic contacts, rounded plagioclase enclosed in large oikocrysts
Olivine	3	5	0.5	5.5			Anhedral	Forms corona texture.
Oxide		1		1			Anhedral	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Tremolite	3						Olivine/Pyroxene	
Serpentine	2						Olivine	
Talc	1						Olivine	
Green-brown amphibole	1						Pyroxene	
Chlorite	2						Plagioclase and vein	
Prehnite	<1						Plagioclase	
Actinolite	<1							Vein

TOTAL ALTERATION: 10%

STRUCTURE : Primary igneous texture with some evidence of plastic strain. Plagioclase grains are slightly bent with weak undulatory extinction. Their grain boundaries are locally serrated and a few neoblasts occur along them. Olivine shows kinking with undulatory extinction. Later microcracks cut through the whole thin section. (KM)

PHOTOMICROGRAPHS:

1309D_142R_2_123_125_1
1309D_142R_2_123_125_2
1309D_142R_2_123_125_3
1309D_142R_2_123_125_4

THIN SECTION:	U1309D-143R-2, 58-61 cm	**Piece No.** 1E	**Unit**: 391	**TS#: 381**	**OBSERVER: DB, TN, KM,GS**
ROCK NAME:	Oxide gabbronorite				
GRAIN SIZE:	Fine to medium				
TEXTURE:	Porphyroclastic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase		65	0.1<	5			Subhedral	
Clinopyroxene		20	0.1<	8			Subhedral	
Orthopyroxene		8	0.1<					
Oxide		7		15			Anhedral	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Brown amphibole	5							Forms granulitic aggregate with recrystallized clinopyroxene
Actinolite	10						Clinopyroxene	Replaces both porphyroclasts and neoblasts
Chlorite	5						Vein	Mostly in plagioclase
Talc?	2							Forms elongated aggregate with oxide and sulfide.
Magnetite	3							
Pyrrhotite	<1							

TOTAL ALTERATION: 25%

STRUCTURE : Typical mylonitic texture with dextral sense of apparent shear. Both plagioclase and clinopyroxene show old and new textures due to intense dynamic recrystallization. (KM). Seems that brown hornblende is mainly replacive to clinopyroxene, not primary neoblasts formed during deformation because they typically only form part of a neobalst grain (GS) Oxides apparently deformation, strong local enrichment. They consist of medium-grained granular (120 degree contacts) multphase aggregate, partly exsolved, partly homogeneous minerals.

PHOTOMICROGRAPHS:

1309D_143R_2_58_61_1
1309D_143R_2_58_61_2
1309D_143R_2_58_61_3
1309D_143R_2_58_61_4
1309D_143R_2_58_61_5
1309D_143R_2_58_61_6

THIN SECTION:	U1309D-144R-1, 50-52 cm	**Piece No.** 2A	**Unit**: 391	**TS#: 382**	**OBSERVER: DB, TN,GS**
ROCK NAME:	Olivine gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Equigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase		64	0.2	4			Anhedral, smoothed chadacrysts	
Clinopyroxene		30	0.2	4			Anhedral, oikocryst	Abundant interlocked, symplectitic contact
Olivine		6	0.5	3			Anhedral	
Oxide		Trace						

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Tremolite	3						Olivine, plagioclase	Forms coronas
Chlorite	4						Olivine, plagioclase	Forms coronas around olivine or veins in plagioclase
Talc	5						Olivine	Pseudomorphic
Brown amphibole	2						Clinopyroxene	
Magnetite	1						Olivine	
Pyrrhotite	<1						Olivine	

TOTAL ALTERATION: 12%

STRUCTURE : Only in local areas seems original igneous plagioclase microstructure preserved. Most plagioclase is recrystallized by plastic strain into variably sized neoblasts. Olivine also deformed, clinopyroxene seems undeformed and poikilitic. Static brown hornblende starting to replace clinopyroxene (GS)

PHOTOMICROGRAPHS:

1309D_144R_1_50_52_1
1309D_144R_1_50_52_2
1309D_144R_1_50_52_3
1309D_144R_1_50_52_4

THIN SECTION:	U1309D-145R-1, 62-64 cm	**Piece No.** 1E	**Unit**: 391	**TS#: 383**	**OBSERVER:GS, YO, PF**
ROCK NAME:	Gabbro				
GRAIN SIZE:	Fine to coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Clinopyroxene	20	50		8			Subhedral, oikocrystic	Some grains include plagioclase chadacrysts that show undulatory extinction.
Plagioclase	49	50		8			Subhedral, oikocrystic	Some grains include clinopyroxene chadacrysts that don't show undulatory extinction.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Green amphibole	25						Pyroxene	Pyroxene grains are almost entirely relaced by amphibole. Veins of green amphibole crosscut the plagioclase and occasionally also forms fringes around the amphibole pseudomorphs after pyroxene.
Talc	5						Orthopyroxene	As replacement of orthopyroxene and as veinlets and along cleavage planes.
Brown amphibole	<1						Amphibole	As very small patches in amphibole
Ilmenite	<<!							Scattered throughout
Pyrrhotite	<1							Mostly in the amphibole

TOTAL ALTERATION:

STRUCTURE : Strongly recrystallized gabbro with no primary igneous structure preserved. Clinopyroxene was also involved in deformation (neoblasts), but both primary grain relics and neoblasts are now mostly statically replaced by hornblende. Original grain size must have been coarse, judging from some clinopyroxene relict grains. Swarm of green hornblende veins are clearly developed only in plagioclase (GS)

PHOTOMICROGRAPHS:

1309D_145R_1_62_64_1
1309D_145R_1_62_64_2
1309D_145R_1_62_64_3
1309D_145R_1_62_64_4
1309D_145R_1_62_64_5
1309D_145R_1_62_64_6
1309D_145R_1_62_64_8
1309D_145R_1_62_64_9
1309D_145R_1_62_64_10
1309D_145R_1_62_64_11

THIN SECTION:	U1309D-145R-2, 98-101 cm	**Piece No.** 1D	**Unit**: 391	**TS#: 384**	**OBSERVER: EH, TN, GS**
ROCK NAME:	Orthopyroxene-bearing gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	60	70		15	6			
Clinopyroxene	5	29		15	4			
Orthopyroxene	1	1		7				One coarse grain, possibly more in altered zone
Oxide	Trace	Trace			0.3		Interstitial	
								More coarse grained in altered zone, apparently more clinopyroxene as well

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite	15						Clinopyroxene	Overgrowth and pseudomorph
Chlorite	10						Clinopyroxene	Pseudomorph and aggregate with actinolite
Brown amphibole	<1						Clinopyroxene	
Oxides	<1							
Sulfides	<1							

TOTAL ALTERATION: 25%

STRUCTURE : Rock is too coarse to detect any possible magmatic strain. Some weak plastic strain (tapered plagioclase twins, neoblast patches). Clinopyroxene shows no significant strain, as well as orthopyroxene. Static amphibole replacement, irregular microcracks. (GS)

PHOTOMICROGRAPHS:

1309D_145R_2_98_101_1

1309D_145R_2_98_101_2

THIN SECTION:	U1309D-145R-3, 25-28 cm	**Piece No.** 1B	**Unit**: 392	**TS#: 385**	**OBSERVER: EH, TN, GS**
ROCK NAME:	Olivine gabbro				
GRAIN SIZE:	Medium to coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	50	70	0.1	7	5		Anhedral	
Clinopyroxene	10	15	0.2	10	6		Anhedral, interstitial	Very coarse interlocking network, oikocrysts, heterogeneously distributed
Olivine	6	15	0.1	3	1		Anhedral	Partly well preserved grain boundaries, partly complete coronas, with a ghost pseudomorph after pyroxene. Commonly as rounded chadacrysts.
Oxide	Trace	Trace					Interstitial	
								No orthopyroxene films at olivine-plagioclase contacts

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Tremolite/actinolite	10						Olivine, plagioclase, clinopyroxene	Forms coronas and grows over clinopyroxene
Chlorite	10						Olivine, plagioclase	Forms coronas or veins in plagioclase
Talc	5						Olivine	Pseudomorphic
Brown amphibole	<1						Clinopyroxene	
Magnetite	1						Olivine	
Pyrrhotite	<1						Olivine	

TOTAL ALTERATION: 27%

STRUCTURE : Plagioclase is partly recrystallized, but larger grains probably represent original magmatic grains. Weak magmatic foliation (subparallel to short side of slide) seems indicated by alignment of the relict plagioclase grains. Olivine and clinopyroxene are both also deformed, though in clinopyroxene can see only some subgrain formation (GS)

PHOTOMICROGRAPHS:
1309D_145R_3_25_28_1
1309D_145R_3_25_28_2

THIN SECTION:	U1309D-146R-1, 6-9 cm	**Piece No.** 2A	**Unit**: 395	**TS#: 386**	**OBSERVER: EH, TN**
ROCK NAME:	Gabbronorite?				
GRAIN SIZE:	Medium to coarse				
TEXTURE:	Too altered to infer the magmatic texture				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	5							
Clinopyroxene	1							Fresh patches preserved
Orthopyroxene	1							Fresh patches preserved
Oxide	Trace	Trace						

Note. Looks like possible magmatic contact in hand specimen. The brown amphiboles suggest infiltratiton of evolved melt. There is no zircon, apatite or other indication for that. Possibly entirely non-magmatic.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Tremolite/actinolite	40						Olivine(?), plagioclase, clinopyroxene	Forms coronitic texture or overgrows on clinopyroxene
Chlorite	45						Plagioclase, clinopyroxene	Pseudomorphic
Brown amphibole	3						Clinopyroxene	
Calcite	1						Vein	
Ilmenite?	1							
Sulfides	<1							

TOTAL ALTERATION: 90%

STRUCTURE : Only relics of the former gabbronorite preserved. Those show significant plastically strained plagioclase, but little strain in clinopyroxne. Three millimeters wide cataclastic shear zone and actinolitic shear zones. (GS) Syntectonic growth of actinolite/tremolite forming anostomosing shear bands. Late carbonate veins infilling irregular cracks (JE)

PHOTOMICROGRAPHS:

1309D_146R_1_6_9_1
1309D_146R_1_6_9_2
1309D_146R_1_6_9_3
1309D_146R_1_6_9_4
1309D_146R_1_6_9_5
1309D_146R_1_6_9_6
1309D_146R_1_6_9_7

THIN SECTION:	U1309D-146R-1, 20-23 cm	**Piece No.** 2B	**Unit**: 395	**TS#: 387**	**OBSERVER: TN, DB,GS**
ROCK NAME:	Gabbronorite mylonite				
GRAIN SIZE:	Fine to coarse				
TEXTURE:	Porphyroclastic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	65	70	0.1	10			Anhedral, equant	
Orthopyroxene	7	10	6	12			Subhedral	Large high Mg orthopyroxene, few clinopyroxene and brown amphibole enclosed
Clinopyroxene	5	8	0.1	5			Anhedral	
Zircon		Trace	0.6	0.8			Clastic	Clastic in the fine mylonitic bands
Oxide		0.5	0.1	1			Interstitial	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Brown amphibole	2							Granulitic aggregate with clinopyroxene neoblasts
Green amphibole	10						Clinopyroxene	Replaces porphyroclasts and neoblasts
Epidote	5						Clinopyroxene	Replaces neoblasts
Chlorite	10							Vein-like aggregates
Talc	3						Orthopyroxene	
Titanite	<1							Discrete grains set in plagioclase matrix
Oxides	<1							
Sulfides	<1							

TOTAL ALTERATION: 30%

STRUCTURE : Originally coarse grained noritic gabbro, now strongly mylonitized, good SC type shear sense indicator top to right, amphibole replacment of clinopyroxene seems static. Strangely, I could not see any orthopyroxene neoblasts. Was it too stiff to recrystallize? Bit of oxide again in mylonite. (GS)

PHOTOMICROGRAPHS:

1309D_146R_1_20_23_1

1309D_146R_1_20_23_2

THIN SECTION:	U1309D-147R-2, 27-29 cm	**Piece No.** 1C	**Unit**: 395	**TS#: 388**	**OBSERVER: DB, TN**
ROCK NAME:	Olivine bearing gabbronorite				
GRAIN SIZE:	Medium				
TEXTURE:	Equigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	70	77			2		Anhedral	
Clinopyroxene	10	15			2		Anhedral	Interlocked contacts
Orthopyroxene	4	5			2		Anhedral	Orthopyrroxene in contact with olivine. Few orthopyroxene grains enclose plagioclase rounded nuclei
Olivine	2	3			2		Anhedral	
Spinel		0.1			0.1			

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Green/colorless amphibole	10						Clinopyroxene, vein	
Brown amphibole	2						Clinopyroxene	
Chlorite	3						Vein in plagioclase	
Talc	2						Orthopyroxene	
Oxides	<1							
Sulfides	<1							

TOTAL ALTERATION: 17%

STRUCTURE : Only a hint of a foliation visible, but not clear whether it is relict magmatic or plastic. Plagioclase again largely recrystallized, both clino- and orthopyroxene are also forming subgrains but they appear less deformed and they appear to largely represent the original grain size (GS).

PHOTOMICROGRAPHS:

1309D_147R_2_27_29_1
1309D_147R_2_27_29_2
1309D_147R_2_27_29_3

THIN SECTION:	U1309D-148R-1, 109-111 cm	**Piece No.** 1F	**Unit**: 395	**TS#: 389**	**OBSERVER: DB, TN,GS**
ROCK NAME:	Gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	55	60	0.2	2			Anhedral, equant	
Clinopyroxene	5	40	0.2	3			Anhedral	
Oxide		1	0.2	1			Anhedral	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Green amphibole	40						Clinopyroxene, vein	
Chlorite	5						Clinopyroxene, vein	
Calcite	1						Vein	
Oxides	<1							
Sulfides	<1							

TOTAL ALTERATION: 46%

STRUCTURE : Strong plastic strain in one corner with complete plagioclase recrystallization, plastic strain foliation development, and static replacement of clinopyroxene by amphibole. Clinopyroxene had also been plastically deformed. Some oxides again suggest a link to oxide gabbro. Along a poorly understood vein an offset must have occurred. At other side much less deformed oxide bearing gabbro with relict, unreplaced clinopyroxene which is still poikilitic and less plastically deformed plagioclase. Still oxide bearing. No foliation in this coarser grained part. (GS)

PHOTOMICROGRAPHS:

1309D_148R_1_109_111_1
1309D_148R_1_109_111_2
1309D_148R_1_109_111_3

THIN SECTION:	U1309D-148R-2, 45-47 cm	**Piece No.** 1B	**Unit**: 395	**TS#: 390**	**OBSERVER: DB, TN,GS**
ROCK NAME:	Orthopyroxene bearing gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	55	60	0.4	6			Anhedral, oikocrystic	Encloses subhedral clinopyroxene chadacrysts
Clinopyroxene	35	40	0.4	5			Anhedral	
Orthopyroxene	0.5	1	2	6			Anhedral	
Oxide		1	0.1	1			Interstitial	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite	5						Clinopyroxene	
Chlorite	5						Clinopyroxene, vein in plagioclase	
Brown amphibole	1						Clinopyroxene	
Talc	1							

TOTAL ALTERATION: 12%

STRUCTURE : Relcit magmatic foliation probably present. Plagioclase with initial recrystallization, orthopyroxene is not deformed, clinproxene with poorly understood intergrowth textures, appears not deformed (GS)

PHOTOMICROGRAPHS:

1309D_148R_2_45_47_1

1309D_148R_2_45_47_2

THIN SECTION:	U1309D-148R-3, 111-113 cm	**Piece No.** 6B	**Unit**: 395	**TS#: 391**	**OBSERVER: DB, TN,GS**
ROCK NAME:	Gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	75	80		20			Subhedral	
Pyroxene	0	20		12			Anhedral	Pyroxene totally replaced

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Green amphibole	15						Clinopyroxene	
Chlorite	5						Clinopyroxene	
Carbonate	<1						Vein	
Unknown	5						Clinopyroxene, vein	Very fine-grained dusty material

TOTAL ALTERATION: 25%

STRUCTURE : Very minor plastic strain such as bit of neoblasts along grain contacts. Grains too coarse to determine whether a magmatic fabric is present. Static replacement of clinopyroxene by green amphibole (GS)

PHOTOMICROGRAPHS:

1309D_148R_3_111_113_1

1309D_148R_3_111_113_2

THIN SECTION:	U1309D-149R-1, 59-62 cm	**Piece No.** 7	**Unit**: 395	**TS#: 392**	**OBSERVER: DB, TN,GS**
ROCK NAME:	Gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	45	50		13			Subhedral	
Clinopyroxene	0	50		18			Subhedral	
Oxide		1					Unhedral	
Note: mode is not representative because of the grain size								

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Green amphibole	20						Clinopyroxene	
Brown amphibole	2						Clinopyroxene	
Chlorite	18						Clinopyroxene, vein in plagioclase	
Unknown	10						Clinopyroxene	Very fine-grained dusty material

TOTAL ALTERATION: 50%

STRUCTURE : Minor plastic strain in plagioclase, clinopyroxene undeformed, perhaps some primary brown amphibole (GS, TN)

PHOTOMICROGRAPHS:

1309D_149R_1_59_62_1
1309D_149R_1_59_62_2
1309D_149R_1_59_62_3

THIN SECTION:	U1309D-149R-2, 10-12 cm	**Piece No.** 1	**Unit**: 395	**TS#: 393**	**OBSERVER: DB, TN,GS**
ROCK NAME:	Olivine gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	65	73	0.2	6			Anhedral	
Clinopyroxene	20	20	0.1	8			Anhedral, oikocrystic, interstitial	Encloses large plagioclase grains
Olivine	4	7	0.4	4			Anhedral	
Orthopyroxene		0.1					Interstitial	Film between olivine and plagioclase

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Tremolite/actinolite	5						Olivine, plagioclase, clinopyroxene	Forms corona texture, or grows over clinopyroxene
Chlorite	5						Olivine, plagioclase	Forms corona texture or veins in plagioclase
Talc	5						Olivine	Forms pseudomorphs
Oxides	2							
Sulfides	<1							

TOTAL ALTERATION: 17%

STRUCTURE : Minor plastic strain only in plagioclase at lower temperature but probably some coarser grained neoblasts formed at high temperature, clinopyroxene undeformed, orthopyroxene films also static. Weak magmatic strain (parallel to short side of slide).

PHOTOMICROGRAPHS:

1309D_149R_2_10_12_1
1309D_149R_2_10_12_2
1309D_149R_2_10_12_3
1309D_149R_2_10_12_4
1309D_149R_2_10_12_5

THIN SECTION:	U1309D-149R-2, 44-47 cm	**Piece No.** 1	**Unit**: 396	**TS#: 394**	**OBSERVER: DB, TN, GS**
ROCK NAME:	Olivine gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Equigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Olivine	5	40			2		Anhedral, subhedral	
Plagioclase	5	45			2		Anhedral	
Clinopyroxene	10	15			2		Anhedral, interstitial, rarely oikocrystic	Rare interlocked contacts
Spinel		0.5			0.2			

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Tremolite/actinolite	10						Olivine, plagioclase, clinopyroxene	Forms corona textutre
Chlorite	10						Olivine, plagioclase	Forms corona texture
Talc	50						Olivine	Pseudomorph
Carbonate	1						Vein	
Oxide	1							
Sulfide	<1							

TOTAL ALTERATION: 72%

STRUCTURE : Plagioclase largely recrystallized into neoblasts, clinopyroxene undeformed, few orthopyroxene (?) films between plagioclase and olivine also static, olivine records no strain. Rated as overall low strain because of lack of any clear foliation development.

PHOTOMICROGRAPHS:

1309D_149R_2_44_47_1
1309D_149R_2_44_47_2
1309D_149R_2_44_47_3
1309D_149R_2_44_47_4

THIN SECTION:	U1309D-150R-1, 70-72 cm	**Piece No.** 2A	**Unit**: 398	**TS#: 395**	**OBSERVER: DB, TN,GS**
ROCK NAME:	Olivine gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	80	83					Subhedral	
Olivine	2	7					Anhedral	
Clinopyroxene	8	10					Anhedral, interstitial	
Note: mode is not representative because of large grain size								

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Tremolite/actinolite	2						Olivine, plagioclase, clinopyroxene	Forms coronas, and grows over pyroxene
Chlorite	3						Olivine, plagioclase	Forms coronas, and veins in plagioclase
Talc	5						Olivine	Pseudomorphic
Oxides	1							
Sulfides	<1							

TOTAL ALTERATION: 11%

STRUCTURE : Magmatic strain suspected because of plagioclase shape alignment but number of grains not really sufficient. Only minor plastic strain. Clinopyroxene undeformed, penetrates along grain boundaries.

PHOTOMICROGRAPHS:

1309D_150R_1_70_72_1
1309D_150R_1_70_72_2
1309D_150R_1_70_72_3
1309D_150R_1_70_72_4
1309D_150R_1_70_72_5
1309D_150R_1_70_72_6
1309D_150R_1_70_72_7
1309D_150R_1_70_72_8
1309D_150R_1_70_72_9
1309D_150R_1_70_72_10

THIN SECTION:	U1309D-151R-1, 80-82 cm	**Piece No.** 5C	**Unit**: 403	**TS#: 396**	**OBSERVER: DB, TN**
ROCK NAME:	Olivine gabbro				
GRAIN SIZE:	Medium to coarse				
TEXTURE:	Poikilitic to seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	5	40	0.5	8			Anhedral to poikilitic	Enclosed olivine chadacrysts
Clinopyroxene	5	40	0.5	7			Anhedral to poikilitic	Enclosed olivine chadacrysts
Olivine	0.1	20			0.5		Subhedral	
Oxide		1						

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Tremolite/actinolite	10						Olivine, plagioclase, clinopyroxene	Forms coronas, and grows over pyroxene
Chlorite	15						Olivine, plagioclase	
Talc	30						Olivine	
Brown amphibole	<1						Clinopyroxene	
Titanite	5						Ilmenite	
Carbonate	15						Vein	
Oxides	5						Olivine	
Sulfides	<1						Olivine	

TOTAL ALTERATION: 80%

STRUCTURE : Undeformed host with poikilitic original arrangement of plagioclase and clinopyroxene, plagioclase recrystallized but clinopyroxene undeformed. Matrix of oxides too altered too determine strain. Seems oxides must be intrusive.

PHOTOMICROGRAPHS:

1309D_151R_1_80_82_1

1309D_151R_1_80_82_2

THIN SECTION:	U1309D-151R-2, 31-33 cm	**Piece No.** 3	**Unit**: 403	**TS#: 397**	**OBSERVER: DB, TN,GS**
ROCK NAME:	Gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Equigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	55	60	1	5	4		Anhedral	
Clinopyroxene	30	40	1	5	4		Anhedral, interstitial	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite	3						Clinopyroxene	Overgrowth
Chlorite	5						Clinopyroxene, plagioclase, vein	Pseudomorph after clinopyroxene, crack filling in plagioclase, and vein
Brown amphibole	<1						Clinopyroxene	
Unknown	2						Vein	Very fine-grained dusty material

TOTAL ALTERATION: 10%

STRUCTURE : Early magmatic foliation is likely (parallel to long side of slide), even though now most plagioclase is recrystallized (at high temperatures, low stress). Formerly poikilitic clinopyroxene is also subgrained by plastic strain.(GS)

PHOTOMICROGRAPHS:

1309D_151R_2_31_33_1

1309D_151R_2_31_33_2

THIN SECTION:	U1309D-152R-1, 11-13 cm	**Piece No.** 2	**Unit**: 405	**TS#: 398**	**OBSERVER: DB, KM, TN, JB**
ROCK NAME:	Gabbro catalcasite				
GRAIN SIZE:	Medium				
TEXTURE:	Cataclastic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	40	60	0.2	6			Cataclastic	
Clinopyroxene	0	40	0.4	8			Cataclastic	
Oxide								

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Green amphibole	10						Clinopyroxene	
Chlorite	25							Matrix
Epidote	2							Discrete grains set in matrix
Titanite	3						Ilmenite	
								Veins in breccia are fibrous amphibole

TOTAL ALTERATION: 40%

STRUCTURE : Cataclasite in the fault zone. Very heterogeneous texture. Fault gouges, in which plagioclase and the other minerals such as epidote occur in mostly chlorite matrix. Coarse plagioclase grains were intensely fractured, but they show intense undulatory extinction with finer neoblasts (?). (KM)

PHOTOMICROGRAPHS:

1309D_152R_1_11_13_1
1309D_152R_1_11_13_2
1309D_152R_1_11_13_3
1309D_152R_1_11_13_4
1309D_152R_1_11_13_5
1309D_152R_1_11_13_6

THIN SECTION:	U1309D-152R-1, 38-40 cm	**Piece No.** 6	**Unit**: 405	**TS#: 399**	**OBSERVER: DB,GS**
ROCK NAME:	Gabbro cataclasite				
GRAIN SIZE:	Coarse				
TEXTURE:	Cataclastic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	40	60	0.2	6			Cataclastic	
Clinopyroxene	0	40	0.4	8			Cataclastic	
Oxide								

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Green amphibole	25						Clinopyroxene	
Brown amphibole	1						Clinopyroxene	
Chlorite	15						Clinopyroxene	
Epidote	2						Plagioclase?	
Titanite	2						Ilmenite	

TOTAL ALTERATION: 45%

STRUCTURE : Intensely brecciated gabbro. Cataclastic strain partitioned into some high strain bands. Crenulated bands of green amphibole with chlorite is truncated by high strain caaclastic zone. (GS)

PHOTOMICROGRAPHS:

1309D_152R_1_38_40_1
1309D_152R_1_38_40_2
1309D_152R_1_38_40_3
1309D_152R_1_38_40_4
1309D_152R_1_38_40_5
1309D_152R_1_38_40_6
1309D_152R_1_38_40_7
1309D_152R_1_38_40_8

THIN SECTION:	U1309D-153R-3, 6-8 cm	**Piece No.** 2	**Unit**: 409	**TS#: 400**	**OBSERVER: DB, JB,GS**
ROCK NAME:	Metagabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Cataclastic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	40	65	0.5	8			Anhedral	
Clinopyroxene	5	35	0.5	6			Anhedral, interstitial	
Oxide		0.5	0.2	1				

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Green amphibole	20						Clinopyroxene	
Brown amphibole	<1						Clinopyroxene	
Chlorite	10						Clinopyroxene, plagioclase	
Anhydrite	15						Vein	Identified with XRD
Zeolite	10						With anhydrite in vein	Identified with EDS

TOTAL ALTERATION: 55%

STRUCTURE : One side shows gabbro with some early plastic strain but dominated by moderate later cataclastic strain. Other side of slide is a high strain cataclasite. In contact area, the anhydrite vein has formed a sharp contact to the gabbro but a somewhat rugged contact to the cataclasite. Anhydrite and the zeolite postdate the cataclasite. (GS) Cataclasite shows no textural development nor sorting (JE)

PHOTOMICROGRAPHS:

1309D_153R_3_6_8_1
1309D_153R_3_6_8_2
1309D_153R_3_6_8_3
1309D_153R_3_6_8_4
1309D_153R_3_6_8_5
1309D_153R_3_6_8_6
1309D_153R_3_6_8_7
1309D_153R_3_6_8_8
1309D_153R_3_6_8_9
1309D_153R_3_6_8_10
1309D_153R_3_6_8_11

THIN SECTION:	U1309D-154R-1, 64-66 cm	**Piece No.** 12	**Unit**:	**TS#: 401**	**OBSERVER: AD JE**
ROCK NAME:	Cataclasite				
GRAIN SIZE:	Fine to medium				
TEXTURE:	Cataclastic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
No way to estimate a primary mode (DB)								

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite	15						Pyroxene	Forming the central thin vein
Calcite	<1							In the central this vein associated with actinolite
Chlorite	10						Plagioclase	The plagioclase are highly altered and looks broken
Tremolite	10						Clinopyroxene	
Ilmenite	1							
								Comments: All the previous minerals are altered and replaced by green amphibole.

TOTAL ALTERATION: 37%

STRUCTURE : Highly deformed rock crosscut by vein that seems to have offset (cuts a vein that is not observed across it). Rock is composed of fine clasts and a dark brown matrix with filamentous material, defining shear bands. Probably earlier plastic deformation, marked by lens-shaped islands of broken up plagioclase but with consistent extinction angle. Multiphase deformation, as at the scale of thin section several directions of deformation that are not consistent are observed (i.e., deformation zone with anostomosing shear zones) (JE)

PHOTOMICROGRAPHS:

1309D_154R_1_64_66_1
1309D_154R_1_64_66_2
1309D_154R_1_64_66_3
1309D_154R_1_64_66_4
1309D_154R_1_64_66_5
1309D_154R_1_64_66_6

THIN SECTION:	U1309D-155R-2, 38-40 cm	**Piece No.** 1B	**Unit**: 412	**TS#: 402**	**OBSERVER: DB, AD,GS**
ROCK NAME:	Diabase				
GRAIN SIZE:	Fine				
TEXTURE:	Ophitic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	40	46					Subhedral	
Clinopyroxene	40	50					Anhedral	
Oxide		4						
Olivine		0.1						

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Green amphibole	10						Pyroxene	
Prehnite	6						Plagioclase	
Ilmenite	1							
Magnetite	1							

TOTAL ALTERATION: 18 %

STRUCTURE : Undeformed, isotropic (GS)

PHOTOMICROGRAPHS:

1309D_155R_2_38_40_1

1309D_155R_2_38_40_2

THIN SECTION:	U1309D-156R-1, 33-35 cm	**Piece No.** 4B	**Unit**: 413	**TS#: 403**	**OBSERVER: AD, JE**
ROCK NAME:	Metagabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	55	65	0.5	5			Anhedral	
Clinopyroxene	5	35	0.5	5			Anhedral	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Green-brown amphibole	20						Pyroxene	
Chlorite	2						Plagioclase	
Ilmenite	<1							
Serpentine								Vein
Tremollite								Vein
Calcite								Vein associated with tremolite and serpentine

TOTAL ALTERATION: 22%

STRUCTURE : Semibrittle to brittle deformation, pervasive and intense. Plagioclase shows undulatory extinction of relict large grains later cataclasized. Deformation is inhomogeneous, with discrete bands of cataclasized material against undeformed material. Hand speciments do not show macroscopically a clear cataclastic texture or distribution of deformation zones. Poor textural evolution and probably low strain and not efficiently localized deformation. Crosscutting calcite/tremolite filled vein (subhorizontal) (JE).

PHOTOMICROGRAPHS:

1309D_156R_1_33_35_1
1309D_156R_1_33_35_2
1309D_156R_1_33_35_3

THIN SECTION:	U1309D-156R-2, 62-64 cm	**Piece No.** 2A	**Unit**:	**TS#: 404**	**OBSERVER: EH, AD, JE**
ROCK NAME:	Orthopyroxene- and olivine-bearing gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	45	50	0.1		3		Anhedral	Medium-grained recrystallized. Also as subrounded chadacrysts
Clinopyroxene	35	45	0.1	12	5		Anhedral, oikocrystic	Interlocked contacts
Olivine	0	2			1		Anhedral	Mainly as completely altered grains in matrix, to lesser extent as clinopyroxene-hosted chadacrysts
Orthopyroxene	2	3			2		Anhedral	Four medium-sized grains
Oxide	0.1	0.1					Interstitial	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Green amphibole	4						Olivine/pyroxene	Actinolite as rim around the tremolite and talc
Tremolite	8						Olivine/pyroxene	Replacing the olivine and forming the inner part of the alteration corona
Talc	2						Olivine	Around the tremolite alteration
Chlorite	4						Plagioclase	

TOTAL ALTERATION: 18%

STRUCTURE : No magmatic foliation. Plagioclase nearly completely recrystallized into coarse neoblasts at low stress, high temperature conditions. Clino- and orthopyroxene only slightest undulatory extinction.

PHOTOMICROGRAPHS:

1309D_156R_2_62_64_1

1309D_156R_2_62_64_2

THIN SECTION:	U1309D-157R-2, 79-81 cm	**Piece No.** 8A	**Unit**: 414	**TS#: 405**	**OBSERVER: EH, TN, JE, GS**
ROCK NAME:	Olivine-bearing gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	40	50		5	3			
Clinopyroxene	20	45		5	3			Oikocrystic, interlocked symplectitic contacts
Olivine	0	4			1			No olivine preserved, replaced by corona texture
No sign of orthopyroxene								

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Actinolite/tremolite	10						Olivine, plagioclase, clinopyroxene	Forms coronas and veins in plagioclase, and grows over clinopyroxene
Chlorite	5						Olivine, plagioclase	Forms coronas amd veins in plagioclase
Brown amphibole	1						Clinopyroxene	
Talc	5						Olivine	Pseudomorphic
Sulfides	<1							

TOTAL ALTERATION: 21%

STRUCTURE : Very weak plastic deformation, no brittle deformation (except for microcracking). Zones of possible subgrain formation, irregularly distributed and scarce - most plagioclase contacts are magmatic. Some plagioclases show slight undulose extinction (JE). Weak magmatic foliation. Minor subgrain formation also in clinopyroxene.

PHOTOMICROGRAPHS:

1309D_157R_2_79_81_1

1309D_157R_2_79_81_2

THIN SECTION:	U1309D-157R-2, 125-127 cm	**Piece No.** 8D	**Unit**: 415	**TS#: 406**	**OBSERVER: DB, JB, AH**
ROCK NAME:	Gabbronorite				
GRAIN SIZE:	Medium				
TEXTURE:	Equigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	60	70	0.4	2			Anhedral	
Clinopyroxene	8	20	0.1	3			Anhedral, interstitial	
Orthopyroxene	4	10	1	4			Subhedral	Encloses small clinopyroxene grains

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Pale green amphibole	20						Clinopyroxene, orthopyroxene	
Talc	5						Orthopyroxene	
Chlorite	<1							Rare
Albite	<1						Plagioclase	Mostly near vein
Pyrrhotite								
Magnetite								
Calcite							Vein	
Chlorite							Vein	
Fibrous amphibole							Vein	

TOTAL ALTERATION: 25%

STRUCTURE : Crystals exhibit a crystallographic preferred orientation due to crystal-plastic deformation. Plagioclase crystals exhibit lobate grain boundaries, undulatory extinction and the development of very few subgrains. Clinopyroxene and orthopyroxene are being altered at their grain boundaries and down microfractures into talc. There are a few infilled fractures cross cutting the grains. The fractures are infilled with a mixture of chlorite, amphibole, and calcite.

PHOTOMICROGRAPHS:

1309D_157R_2_125_127_1

1309D_157R_2_125_127_2

THIN SECTION:	U1309D-158R-1, 15-18 cm	Piece No. 3	Unit: 419	TS#: 407	OBSERVER: TN, AH, GS, YO
ROCK NAME:	Metagabbro				
GRAIN SIZE:	Fine to coarse				
TEXTURE:					

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase								
Clinopyroxene								
Apatite							Euhedral	
Zircon							Euhedral	
Oxide								

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Epidote	10						Plagioclase, clinopyroxene	
Albite	10						Plagioclase	Network or patchy areas of low refractive index in original plagioclase
Chlorite	3						Clinopyroxene?	
Titanite	5						Ilmenite, clinopyroxene	
Carbonate	2						Vein	

TOTAL ALTERATION: 30%

STRUCTURE : Crystals exhibit no preferred orientation. No magmatic strain observed. There has been weak microcracking of the intact or nonaltered clinopyroxene crystals. Few open fractures are also observed. Clinopyroxene crystals exhibit weak undulatory extinction, but no formation of subgrains.(AH). Cataclastic areas, highly evolved gabbro with brecciation/cataclasis (GS). There are ubiquitous aggregates, possbible breakdown products of (primary?) amphibole (now secondary diopside + ilmenite + magnetite + titanite).

PHOTOMICROGRAPHS:

1309D_158R_1_15_18_1

1309D_158R_1_15_18_2

THIN SECTION:	U1309D-158R-1, 59-62 cm	**Piece No.** 13	**Unit**: 419	**TS#: 408**	**OBSERVER: DB, JB, AH**
ROCK NAME:	Gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	50	60	0.5	12			Anhedral	
Clinopyroxene	5	40	0.5	8			Anhedral	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Green and brownish amphibol	35						Clinopyroxene	
Albite	5						Plagioclase	
Prehnite	2						Plagioclase	
Titanite	1						Ilmenite	
Rutile	<1						Ilmenite	
Epidote							Vein	
Fibrous amphibole							Vein	
Pyrrhotite	<1							

TOTAL ALTERATION: 40%

STRUCTURE : No preferred orientation of crystals. No evidence of magmatic foliation. Plagioclase crystals ehibit weak undulatory extinction and the formation of very few subgrains. Infilled fracture network cutting across grains and causing a zone of alteration around it. Fracture network is infilled with fiberous amphibole and epidote.

PHOTOMICROGRAPHS:

1309D_158R_1_59_62_1

1309D_158R_1_59_62_2

THIN SECTION:	U1309D-158R-2, 16-18 cm	**Piece No.** 2B	**Unit**: 420	**TS#: 409**	**OBSERVER: DB, JE, AD**
ROCK NAME:	Gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Equigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	55	60	1	20			Subhedral, anhedral	
Clinopyroxene	5	40	0.1	15			Anhedal, interstitial	
Note: mode is not representative of the whole rock								

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Tremolite	10						Pyroxene	
Brown amphibole	2						Pyroxene	
Green amphibole	7						Pyroxene	Likely actinolite as rim around the pyroxene grains
Chlorite	1						Plagioclase	Occurs as patches in one big pyroxene but likely replaces old
Pyrite	<1							
Ilmenite	<1							

TOTAL ALTERATION: 22 %

STRUCTURE : Gabbro with large plagioclase crystals that show a slight bending of the lamellae (negligible plastic strain). Trails of neoblasts line some grains. Negligible brittle deformation (apart from microcracking). (JE)

PHOTOMICROGRAPHS:

1309D_158R_2_16_18_1

1309D_158R_2_16_18_2

THIN SECTION:	U1309D-158R-2, 67-69 cm	**Piece No.** 7	**Unit**: 420	**TS#: 410**	**OBSERVER: DB JE AD**
ROCK NAME:	Gabbro cut by magmatic dikelet				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	10	55	0.5	15			Anhedral	
Clinopyroxene	5	45	1	12			Anhedral	
Dikelet								
Titanite		75					Anhedral	
Ilmenite		15					Subhedral	
Apatite		10	0.2	2			Euhedral	
Note: a thin brittle fracture crosscutting plagioclase and apatite is filled by clinopyroxene (??)								

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Chlorite	2						Plagioclase/pyroxene	
Green amphibole	25						Pyroxene	
Brown amphibole	5						Pyroxene	
Titanite ??	5							Pink mineral
Epidote	2							

TOTAL ALTERATION: 40 %

STRUCTURE : Pervasive plastic deformation, with numerous subgrains, deformed and stretched plagioclase crystals. Areas of breccia that appear to be in a calcite matrix. Zones of cataclastic deformation (cataclastic veins) crosscutting the gabbro with dark brown matrix. (JE)

PHOTOMICROGRAPHS:

1309D_158R_2_67_69_1
1309D_158R_2_67_69_2
1309D_158R_2_67_69_3
1309D_158R_2_67_69_4

THIN SECTION:	U1309D-159R-1, 117-119 cm	**Piece No.** 2	**Unit**: 421	**TS#: 411**	**OBSERVER: DB, TN**
ROCK NAME:	Olivine-bearing gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	65	70					Anhedral	
Clinopyroxene	15	15					Anhedral, oikocrystic, interstitial	
Olivine	2	4					Anhedral, oikocrystic	
Orthopyroxene		0.1					Rim	At olivine plagioclase contact
Note: in two cases olivine forms a single oikocryst together with clinopyroxene								

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Tremolite/actinolite	2						Olivine, plagioclase, clinopyroxene	Forms coronas, and grows over clinopyroxene
Chlorite	3						Olivine, plagioclase	Forms coronas
Talc	5						Olivine	Pseudomorphic
Oxides	<1						Olivine	
Sulfides	<1						Olivine	

TOTAL ALTERATION: 10%

STRUCTURE : Gabbro with slight plastic deformation of plagioclase, showing large, equant subgrains. Pyroxenes show a slightly undulatory extinction. No brittle deformation (except for microcracking). (JE)

PHOTOMICROGRAPHS:

1309D_159R_1_117_119_1
1309D_159R_1_117_119_2
1309D_159R_1_117_119_3
1309D_159R_1_117_119_4

THIN SECTION:	U1309D-160R-1, 131-133 cm	**Piece No.** 9	**Unit**: 423	**TS#: 412**	**OBSERVER: DB, JB, JE,GS**
ROCK NAME:	Olivine gabbro				
GRAIN SIZE:	Medium to coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	50	62	0.4	5			Anhedral	
Clinopyroxene	10	30	0.2	8			Anhedral, oikocryst	In the coarser part clinopyroxene oikocryst encloses olivine and plagioclase, interlocked symplectitic contacts
Olivine	0	8		2			Anhedral	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Green amphibole	10						Clinopyroxene	
Pale amphibole	20						Olivine, clinopyroxene	
Chlorite	10						Plagioclase	Also in veins and cracks in plagioclase
Serpentine	1						Olivine	
Prehnite	<1						Plagioclase	
Titanite	<1						Ilmenite	
Pyrite	<1							
Calcite							Vein	
Chlorite							Vein	
Fibrous amphibole							Vein	

TOTAL ALTERATION: 40%

STRUCTURE : Coarse gabbro crosscut by a pale green vein on hand specimen. Plagioclase subgrains of different sizes indicate plastic deformation that is pervasive throughout the sample. Vein contains wall-parallel tremolite/actinolite fibers and chlorite, with no clear evidence of associated cataclasis. Late fracturing and alteration with no apparent strain of the gabbro. (JE) Remarkable grain size change within slide. Attitude of foliation cannot be determined. Plastic strain is higher in fine grained part. (GS)

PHOTOMICROGRAPHS:

1309D_160R_1_131_133_1

1309D_160R_1_131_133_2

THIN SECTION:	U1309D-160R-2, 69-71 cm	**Piece No.** 4A	**Unit**: 423	**TS#: 413**	**OBSERVER: DB, JB, AH**
ROCK NAME:	Olivine-bearing gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Poikilitic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Clinopyroxene	43	48	0.6	25			Oikocrystic, interstitial	One large oikocryst encloses numerous resorbed plagioclase, symplectitic exsolutions.
Plagioclase	40	48	0.4	12			Anhedral	
Olivine	0	4		4			Anhedral	
Oxide		0.1					Interstitial	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Pale amphibole	10						Olivine, clinopyroxene	
Chlorite	5						Plagioclase, olivine	Chlorite alone or with serpentinized olivine, also veins, cracks in plagioclase
Serpentine	2						Olivine	
Pyrite?	<1							Very fine grained
Ilmenite								Primary
Chlorite							Vein 1	
Ffibrous amphibole							Vein 1	
Zeolite							Vein 2	Vein 2 cuts vein 1
Chlorite							Vein 2	
Titanite							Vein 2	
Fibrous amphibole							Vein 2	

TOTAL ALTERATION: 15%

STRUCTURE : Oikocryst of clinopyroxene contains numerous inclusions of plagioclase which exhibit no preferred orientation. Crystals exhibit and ignoeus texture. Plagioclase crystals exhibit weak undulatory extinction and the development of a few small subgrains. A crosscutting relationship between a white and light green vein in hand specimen is seen, the light green vein cuts the white vein.

PHOTOMICROGRAPHS:

1309D_160R_2_69_71_1
1309D_160R_2_69_71_2
1309D_160R_2_69_71_3
1309D_160R_2_69_71_4

THIN SECTION:	U1309D-160R-2, 133-135 cm	**Piece No.** 4C	**Unit**: 423	**TS#: 414**	**OBSERVER: DB, AH, AD**
ROCK NAME:	Olivine-bearing gabbro				
GRAIN SIZE:	Medium to coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	60	70					Anhedral	
Clinopyroxene	18	20					Anhedral, oikocrystic, interstitial	Interlocked large symplectitic contacts, one grain encloses glomeroporphyric plagioclase
Olivine	2	7					Anhedral, oikocrystic, interstitial	Encloses plagioclase rounded chadacrysts
Orthopyroxene		0.5					Anhedral	
Oxide		0.1						

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Tremolite	6						Olivine	
Serpentine	2						Olivine	
Talc	2						Olivine	
Chlorite	3						Plagioclase	At contact between olivine and plagioclase
Green amphibole	2							Actinolite around the corona after olivine
Green-brown amphibole	2						Pyroxene	As rim around the pyroxene
Ilmenite	<1							
Magnetite	<1							
Sulfides	<1							

TOTAL ALTERATION: 20 %

STRUCTURE : Plagioclase crystals exhibit a weak preferred orientation. They also show undulatory extinction, subgrains and recrystallized neoblasts. Olivine crystals exhibit kink bands. Very few clinopyroxene crystals exhibit undulatory extinction. extensive microfracturing throughout all of the crystals. Fractures are infilled with chlorite.

PHOTOMICROGRAPHS:

1309D_160R_2_133_135_1
1309D_160R_2_133_135_2
1309D_160R_2_133_135_3

THIN SECTION:	U1309D-160R-4, 6-9 cm	**Piece No.** 1	**Unit**: 423	**TS#: 415**	**OBSERVER: DB, JB, AH**
ROCK NAME:	Olivine gabbro				
GRAIN SIZE:	Medium to coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	60	70	0.5	7			Anhedral	
Olivine	0	10	0.3	3			Anhedral	
Clinopyroxene	10	20	0.1	8			Anhedral, oikocrysttic	
Ilmenite		0.5	0.1	1.5			Anhedral	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Pale amphibole	20						Olivine, clinopyroxene	
Green amphibole	10						Clinopyroxene	
Chlorite	10						Plagioclase	
Titanite	<1						Ilmenite	
Rutile	<1						Ilmenite	
Fibrous amphibole							Vein	
Chlorite							Vein	

TOTAL ALTERATION: 40%

STRUCTURE : Crystals exhibit no preferred orientation, no magmatic foliation. Plagioclase crystals exhibite weak undulatory, serrated grain boundaries and few subgrains. There is an alteration network which is affecting all minerals. The alteration seems to be following and infilling a pervasive crack network.

PHOTOMICROGRAPHS:

1309D_160R_4_6_9_1

1309D_160R_4_6_9_2

THIN SECTION:	U1309D-161R-1, 84-87 cm	**Piece No.** 10A	**Unit**: 426	**TS#: 416**	**OBSERVER: DB, JB, JE**
ROCK NAME:	Olivine gabbro, cataclastic zone				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Clinopyroxene	30	50	0.4	11			Oikocrystic, anhedral	Interlocked symplectitic contacts
Plagioclase		40	0.4	8			Anhedral	
Olivine		10	0.8	6			Anhedral	
Oxide		0.1						
Amphibole		0.5					Rim	Brown amphibole and clinopyroxene II mark magmatic impregnation
Clinopyroxene II		0.5					Rim	
Note: mode is not representative for the whole rock								

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Talc	5						Olivine	Corona cores
Pale amphibole	10						Olivine	Corona texture
Chlorite	10						Plagioclase	Corona texture
Green amphibole	5						Clinopyroxene	
Titanite	<1						Ilmenite	
Rutile	<1						Ilmenite	
Pyrite	<1							
Albite	2						Plagioclase	Local in fractured grains
Calcite	2							Interstitial in brecciated zone
Calcite							Vein	High temperature associated with cataclasis? Causitive?
Plagioclase							Vein	Euhedral faces into calcite
Clinopyroxene							Vein	Euhedral faces into calcite

TOTAL ALTERATION: 40%

STRUCTURE : Fault gouge in contact with coarse grain gabbro. Gabbro shows weak plastic deformation with local subgrains recrystallized of plagioclase among larger ones. Plagioclase has undulatory extinction. Fault gouge is made of clinopyroxene clasts and finer in general plagioclase ones. Matrix is locally of calcite (replacement?) but the grains are clearly broken up in the brittle regime (no euhedral crystals into calcite). Contact is very sharp in hand specimen, but shows a gradient, with progressive cataclasis of the gabbro along the fault boundary. Late fractures infilled with carbonate. (JE)

PHOTOMICROGRAPHS:

1309D_161R_1_84_87_1
1309D_161R_1_84_87_2
1309D_161R_1_84_87_3
1309D_161R_1_84_87_4
1309D_161R_1_84_87_5
1309D_161R_1_84_87_6
1309D_161R_1_84_87_7
1309D_161R_1_84_87_8
1309D_161R_1_84_87_9
1309D_161R_1_84_87_10

THIN SECTION:	U1309D-161R-2, 19-22 cm	**Piece No.** 2A	**Unit**: 428	**TS#: 417**	**OBSERVER: DB, JB**
ROCK NAME:	Olivine gabbro/cataclastic zone contact				
GRAIN SIZE:	Medium to coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	40	60	0.4	4			Anhedral	
Clinopyroxene	10	20	0.2	5			Anhedral	
Olivine	0	20	1	7			Anhedral	
Oxide								

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Albite	3						Plagioclase	Near vein 1
Zeolite	1						Plagioclase	Especially common near vein 1
Chlorite	15						Plagioclase	Corona and veins in plagioclase
Pale amphibole	20						Olivine	Corona texture
Green amphibole	10						Clinopyroxene	
Rutile	<1						Ilmenite	
Titanite	<1						Ilmenite, clinopyroxene	Along cleavage in clinopyroxene, probabaly after exsolved ilmenite
Pyrite	<1							
Zeolite							Vein 1	Crosscutting ambiguous, 2 x1?
Amphibole							Vein 1	
Calcite							Vein 2	
Amphibole							Vein 2	

TOTAL ALTERATION: 50%, not counting cataclastic zone

STRUCTURE : Olivine gabbro in contact with cataclastic shear zone. Olivine gabbro shows very weak, early plastic deformation, with subgrains along boundaries of large plagioclase grains. Late fracturing and associated veining (tremolite?) crosscuts the sample. Pervasive alteration. There is a sharp, high angle (with respect to core orientation) contact with a cataclastic zone with tremolite in the matrix, and possibly as reworked tremolite pieces. The textural development of the cataclastic zone is low, with no good shear flow textures, and very angular grains of varied grain size.

PHOTOMICROGRAPHS:

1309D_161R_2_19_22_1

1309D_161R_2_19_22_2

THIN SECTION:	U1309D-161R-2, 50-53 cm	**Piece No.** 5	**Unit**: 428	**TS#: 418**	**OBSERVER: SI, JE, PF,GS**
ROCK NAME:	Olivine gabbronorite				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	54	60	0.4	10	2		Subhedral, anhedral	
Clinopyroxene	12	20	0.2	12	2		Anhedral, interstitial, oikocrystic	Encloses plagioclase chadacrysts
Orthopyroxene	10	12		7			Anhedral, oikocrystic	Encloses plagioclase chadacrysts
Olivine	3	7		7			Anhedral	Non reactive contact between olivine and orthopyroxene

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Talc	6						Olivine	Some relict cores with talc reaction rims
Tremolite	2						Olivine	
Chlorite	5						Plagioclase	Forming as part of corona texture around plagioclase in contact with olivine also as veinlets in plagioclase together with tremolite
Green amphibole	4						Proxene	
Brown amphibole	<1						Pyroxene	

TOTAL ALTERATION: 18%

STRUCTURE : Magmatic texture with very weak undulatory extinction of plagioclase grains, and later fracturing associated with serpentinite (?) along fracture network crosscutting the sample, and talc alteration (JE). Grain size boundary in slide. Abundant neoblasts in fine-grained part. (GS)

PHOTOMICROGRAPHS:

1309D_161R_2_50_53_1
1309D_161R_2_50_53_2
1309D_161R_2_50_53_3
1309D_161R_2_50_53_4
1309D_161R_2_50_53_5
1309D_161R_2_50_53_6
1309D_161R_2_50_53_7
1309D_161R_2_50_53_8
1309D_161R_2_50_53_10

THIN SECTION:	U1309D-162R-1, 9-12 cm	**Piece No.** 2	**Unit**: 429	**TS#: 419**				**OBSERVER: DB, AH, AD**	
ROCK NAME:	Apatite-bearing amphibole epidosite								
GRAIN SIZE:	Fine to medium								
TEXTURE:									

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**			**Composition**	**MORPHOLOGY**	**COMMENTS**
			min.	**max.**	**av.**			
Green ammphibole		40						
Epidote		40						
Apatite		5						
Ilmenite		2						
Titanite		1						
Zircon		0.1						
Note: it is impossible to determine the primary mineralogy in this rock.								

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron)**				**REPLACING / FILLING**	**COMMENTS**
			min.	**max.**	**av.**			
Epidote	30							
Chlorite	2							
Green-brown amphibole	30						Pyroxene	
Green-dark green amphibole	10							
Brown anmphibole	1							

TOTAL ALTERATION: 73 %

STRUCTURE : Grains exhibit a random, igneous texture, with no preferred alignment. Epidote crystals show undulatory extinction. Network of fine grained green amphibole crystals showing no preferred alignment. Very few microfractures cutting across the large epidote grains.

PHOTOMICROGRAPHS:

1309D_162R_1_9_12_1

1309D_162R_1_9_12_2

THIN SECTION:	U1309D-162R-3, 68-71 cm	**Piece No.** 3A	**Unit**: 430	**TS#: 420**	**OBSERVER: DB, AH, AD,GS**
ROCK NAME:	Orthopyroxene-bearing gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	80	80	1	25			Anhedral, subequant along deformation	
Clinopyroxene	15	20	0.1	20			Anhedral, interstitial	Interlocked, symplectitic contacts
Orthopyroxene	0.5	1		1.5			Anhedral	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Green-brown amphibole	5						Pyroxene	
Green-blue amphibole	2							
Brown amphibole	1						Pyroxene	
Chlorite								Vein associated with actinolite
Actinolite								Vein associated with chlorite

TOTAL ALTERATION: 8%

STRUCTURE : Crystals exhibit no preferred orientation. No magmatic foliation. Plagioclase crystals show crystal-plastic deformation. At the grain boundaries there has been formation of neoblasts, which show a variety of grain sizes. The large plagioclase grains exhibit undulatory extinction and very serrated grain boundaries. A later phase of microcracking which cuts through the recrystallized neoblasts as well as the origanal grains. The microcracks have been infilled with chlorite.(AH) Also locally clinopyroxene neoblasts. (GS)

PHOTOMICROGRAPHS:

1309D_162R_3_68_71_1

1309D_162R_3_68_71_2

THIN SECTION:	U1309D-163R-2, 75-77 cm	**Piece No.** 6	**Unit**: 432	**TS#: 421**	**JB, SI, JE**
ROCK NAME:	Orthopyroxene-bearing gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	54	65	1.2	14	6		Anhedral, subhedral, interstitial	
Clinopyroxene	15	32	1.2	8	4		Anhedral, interstital	
Orthopyroxene	1	3	0.8	2.5	2		Anhedral	
Oxide		0.5			0.2			

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Chlorite	5						Plagioclase	Mostly in veins and fracxtures in plagioclase, especially near vein
Albite	<1						Plagioclase	
Prehnite	<1						Plagioclase	
Green amphibole	10						Clinopyroxene	
Pale amphibole	15						Clinopyroxene, orthopyroxene	Patchy alteration of orthopyroxene
Talc							Orthopyroxene, olivine?	Patchy alteration of orthopyroxene
Zeolite							Vein	
Albite							Vein	
Fibrous amphibole							Vein	
Pyrite	<1							
Titanite	<1						Ilmenite	
Ilmenite	<1							Exsolved from clinopyroxene

TOTAL ALTERATION: 30%

STRUCTURE : Slight plastic deformation with large plagioclase crystals with undulatory extinction and isolated zones of subgrains. No apparent magmatic foliation/crystal alignment. Some cases of substantial bending of plagioclase lamellae. No brittle deformation. Late veining with zeolite/tremolite infill and no apparent associated cataclasis. (JE)

PHOTOMICROGRAPHS:
1309D_163R_2_75_77_1
1309D_163R_2_75_77_2

THIN SECTION:	U1309D-164R-3, 113-115 cm	**Piece No.** 2C	**Unit**: 438	**TS#: 422**	**OBSERVER: AH, AD, JE**
ROCK NAME:	Gabbronorite				
GRAIN SIZE:	Medium				
TEXTURE:	Inequigranular, seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	55	55	0.2	4	3		Anhedral to interstitial	
Clinopyroxene	37	38	0.5	4	2		Anhedral, oikocrystic to interstitial	Orthopyroxene lamellae well developed
Orthopyroxene	6	7	0.5	3	1.5		Anhedral to suboikocrysttic	No clinopyroxene lamellae developed
Oxide		0.5						

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Tremolite	1						Orthopyroxene	
Actinolite	1						Pyroxene	As rim around the tremolite
Brown amphibole	<1						Pyroxene	
Talc	<1							Veinlets

TOTAL ALTERATION: 3%

STRUCTURE : Magmatic, isotropic texture. Slight undulatory extinction and lamellae both in clinopyroxene and plagioclase. Late fractures and associated vein infill and alteration. (JE) Abundant plagioclase neoblasts but no foliation development (GS)

PHOTOMICROGRAPHS:

1309D_164R_3_113_115_1

1309D_164R_3_113_115_2

THIN SECTION:	U1309D-165R-1, 44-47 cm	**Piece No.** 3B	**Unit**: 440 / 441	**TS#: 423**				**OBSERVER:SI, AD, JE**	
ROCK NAME:	Gabbronorite / microgabbronorite								
GRAIN SIZE:	Coarse / fine								
TEXTURE:	Seriate / Equigranular								

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	48	70	0.4	7	3		Anhedral	
Clinopyroxene	45	25	0.6	6	4		Anhedral, interstitial	
Othopyroxene	5	5	0.5	2			Anhedral	Abundant orthopyroxene exolutions and blebs in clinopyroxene
Olivine		0.1		0.4			Rounded	One altered grain in clinopyroxene
Microgabbronorite								
Plagioclase	50	60			0.3		Anhedral	
Clinopyroxene	35	35			0.2		Anhedral	
Orthopyroxene		5						

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Serpentine	1						Olivine	
Green amphibole	1						Pyroxene	
Tremolite	2						Pyroxene	
Chlorite	1						Plagioclase	

TOTAL ALTERATION: 5%

STRUCTURE : Possible weak magmatic foliation that continued in the plastic regime. Neoblasts with apparent consistent extinction in microgabbro suggest relict plagioclase clasts. Host gabbro shows little deformation. Undulatory extinction of some of the larger plagioclase crystals is visible. No brittle deformation (JE)

PHOTOMICROGRAPHS:

1309D_165R_1_44_47_1
1309D_165R_1_44_47_2
1309D_165R_1_44_47_3

THIN SECTION:	U1309D-165R-1, 90-93 cm	**Piece No.** 3E	**Unit**: 442	**TS#: 424**	**OBSERVER:JB, AH, YO, EH**
ROCK NAME:	Olivine-bearing gabbro/vein				
GRAIN SIZE:	Fine to coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Clinopyroxene	35	40		10			Anhedral	
Plagioclase	40	45		5			Anhedral	
Olivine	<1	5		2			Anhedral	
Note: primary mineral estimation excludes vein.								

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Pale/green amphibole							Orthopyroxene, clinopyroxene, olivine	
Talc							Orthopyroxene, olivine	
Chlorite							Plagioclase	Corona texture with olivine
Albite							Plagioclase	Mostly in vicinity of vein, some may have grown into vein
Zeolite							Plagioclase	Mostly in vicinity of vein
Prehnite							Plagioclase	Mostly in vicinity of vein
Titanite							Ilmenite	
Ilmenite							Vein	Appears to be a primary constituent of the vein
Green amphibole							Vein	Ffibrous to acicular
Prehnite							Vein	Arguably a constituent of the vein
Albite							Vein	Arguably a constituent of the vein
Carbonate							Vein	Scarce

TOTAL ALTERATION: 10% away from vein, almost complete in vicinity of "late magmatic" vein

STRUCTURE : Minerals exhibit no preferred orientation. Clinopyroxene crystals in places show kink bands. Plagioclase crystals exhibit weak undulatory extinction and a few recrystallized grains. Across the center of the thin section is a wide vein which is infilled by green amphibole.

PHOTOMICROGRAPHS:

1309D_165R_1_90_93_1
1309D_165R_1_90_93_2
1309D_165R_1_90_93_3
1309D_165R_1_90_93_4

THIN SECTION:	U1309D-165R-2, 77-79 cm	**Piece No.** 3B	**Unit**: 442	**TS#: 425**	**OBSERVER: DB, AD,GS**
ROCK NAME:	Orthopyroxene-bearing gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	70	72	1	20			Anhedral	
Clinopyroxene	20	25	0.1	18			Oikocrystic, interstitial	Large clinopyroxene oikocrysts enclose rotated plagioclase chadacrysts, one plagioclase chadacryst in optical continuity
Orthopyroxene	2	3	0.6	3			Anhedral, chadacryst	Enclosed in clinopyroxene, pargasitic rim, irregular contact with clinopyroxene suggest dissolution and repalcement by clinopyroxene.
Oxide		0.5					Interstitial	Associated with clinopyroxene.
Brown amphibole		0.1					Rim and bleb	Rims on orthopyroxene, blebs in clinopyroxene

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Green-brown amphibole	2						Pyroxene	
Tremolite	2						Pyroxene	
Talc? Serpentine ?	1						Olivine	Veinlets cutting the olivine grain

TOTAL ALTERATION: 5%

STRUCTURE : Large plagioclase crystals with very slight undulatory extinction. No deformation otherwise (brittle nor plastic). (JE).Orthopyroxene within and rimming clinopyroxene extincts simultaneously, i.e. is related (by exsolution??) (GS)

PHOTOMICROGRAPHS:

1309D_165R_2_77_79_1
1309D_165R_2_77_79_2
1309D_165R_2_77_79_3

THIN SECTION:	U1309D-165R-3, 28-31 cm	**Piece No.** 1C	**Unit**: 442	**TS#: 426**	**OBSERVER: EH, AD, JE, PF, GS**
ROCK NAME:	Gabbronorite				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	50	55		12	8		Anhedral	
Clinopyroxene	15	20		8	6		Anhedral, interstitial	Interlocked contacts
Orthopyroxene	20	25	0.5	13	10		Anhedral	Large orthopyroxene blebs in clinopyroxene
Oxide		0.1						

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Talc	2						Pyroxene	As vein network in the pyroxene
Tremolite	8						Pyroxene	As vein network in the pyroxene
Actinolite	2							

TOTAL ALTERATION: 12% This section was made in part to examine the nature of white borders on many grains in the coarser gabbros of this interval. In hand specimen, the rock appears to have a network of white "veins" surrounding the plagioclase. There are 10 µm reaction rims of actinolite (+/- talc) along contacts between the plagioclase and the orthopyroxene, but the contacts between plagioclase and clinopyroxene are pristine. The "white vein" network may indicate the reaction rims around orthopyroxene.

STRUCTURE : Coarse grained, with slight undulatory extinction of plagioclase. Later brittle fracture network with vein infill. No strain. (JE) Fine-grained part at one side with significant recrystallization. (GS)

PHOTOMICROGRAPHS:

1309D_165R_3_28_31_1
1309D_165R_3_28_31_2
1309D_165R_3_28_31_3
1309D_165R_3_28_31_4
1309D_165R_3_28_31_5
1309D_165R_3_28_31_6

THIN SECTION:	U1309D-166R-3, 55-57 cm	**Piece No.** 2B	**Unit**: 446	**TS#: 427**	**OBSERVER: EH, DB, AD, JE,GS**
ROCK NAME:	Olivine- and orthopyroxene-bearing gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	58	60		6	4		Anhedral	
Clinopyroxene	20	35		5	3		Anhedral	Enclosing plagioclase and vice versa
Olivine	2	4			3		Anhedral	Partly replaced by talc-rich, Fe-oxide corona
Orthopyroxene	0.5	1		4			Anhedral	Interstitial film between olvine and plagioclase, between clinopyroxene and plagioclase and between clinopyroxene and olivine as well as coarse grain in matrix

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Serpentine	2						Olivine	
Talc	3						Olivine/pyroxene	
Tremolite	3						Olivine/pyroxene	
Green amphibole	1						Pyroxene	
Chlorite	2						Plagioclase	
Sulfides	<1							

TOTAL ALTERATION: 12%

STRUCTURE : Crystals of plagioclase show local bending and undulose extinction. No strain. (JE). Reasonable magmatic foliation, plastic strain negligible.

PHOTOMICROGRAPHS:

1309D_166R_3_55_57_1
1309D_166R_3_55_57_2
1309D_166R_3_55_57_3

THIN SECTION:	U1309D-166R-4, 81-84 cm	**Piece No.** 4A	**Unit**: 446	**TS#: 428**			**OBSERVER: EH, AD, JE,GS**	
ROCK NAME:	Anorthosite / microgabbronorite contact							
GRAIN SIZE:	Coarse and fine, respectively							
TEXTURE:	Seriate and equigranular, respectively							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**			**Composition**	**MORPHOLOGY**	**COMMENTS**
			min.	**max.**	**av.**			
Anorthosite								
Plagioclase	90	92	0.1	20			Anhedral	
Clinopyroxene	5	8	0.1	1			Interstitial	
Microgabbronorite								
Plagioclase	55	60	0.05	1.5	0.5		Anhedral	Frequently contains clinopyroxene
Clinopyroxene	20	30	0.05	1	0.5		Anhedral	
Orthopyroxene	2	10			0.3		Anhedral	Strongly replaced by talc-tremolite corona-texture
Olivine	Trace	Trace					Anhedral	

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron)**				**REPLACING / FILLING**	**COMMENTS**
			min.	**max.**	**av.**			
Green amphibole	2							Actinolite as rim around the tremolite and talc
Tremolite	6						Olivine/Pyroxene	
Talc	3						Olivine/Pyroxene	
Serpentine	2						Olivine	
Chlorite	2						Plagioclase	At contact with plagioclase and alteration zone of tremolite and talc
Prehnite	1						Plagioclase	
Sulfides	1							Associated with the coronas

TOTAL ALTERATION: 17%

STRUCTURE : Plagioclase in microgabbronorite with likley magmatic foliation overprinted by plastic strain associated with grain size reduction by dynamic recrystallization. Poor mineral foliation. No brittle deformation. Host essentially no strain.(JE, GS)

PHOTOMICROGRAPHS:

1309D_166R_4_81_84_1

1309D_166R_4_81_84_2

THIN SECTION:	U1309D-167R-2, 109-111 cm	**Piece No.** 2A	**Unit**: 446	**TS#: 429**	**OBSERVER: DB, JE, TN,GS**
ROCK NAME:	Orthopyroxene-bearing gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Equigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	60	62	0.4	11			Anhedral	
Clinopyroxene	30	35	0.1	7			Anhedral, interstitial	Rare plagioclase chadacrysts enclosed, interlocked symplectitic contacts
Orthopyroxene	3	3	1	10			Anhedral	
Oxide		0.5						

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Actinolite/pale-green amphibole	2						Pyroxene	Overgrowth or pseudomorph
Brown amphibole	<1						Clinopyroxene	
Chlorite	3							Crack filling
Talc	2						Pyroxene	

TOTAL ALTERATION: 7%

STRUCTURE : Nest of plagioclase neoblasts and tapering of twins indicate minor plastic strain. Weak magmatic foliation is suggested by plagioclase alingment. Clino- and orthopyroxene without strain. No strain. Late fracturing and associated veining. (JE, GS)

PHOTOMICROGRAPHS:

1309D_167R_2_109_111_1

1309D_167R_2_109_111_2

THIN SECTION:	U1309D-167R-4, 7-10 cm	**Piece No.** 1A	**Unit**: 446	**TS#: 430**	**OBSERVER:JB, DB, EH, JE,GS**
ROCK NAME:	Gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	70	80	0.4	4			Anhedral, subequant	Strongly resorbed by clinopyroxene
Clinopyroxene	5	20	0.1	3			Anhedral	Subgraphic clinopyroxene plagioclase aggregate, non oikocrystic, may suggest mingling. Deep lobate embayments into plagioclase.
Oxide		0.5						

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Albite	2						Plagioclase	In vein halo
Prehnite	1						Plagioclase	In vein halo
Green amphibole	10						Clinopyroxene	Halo effect?
Titanite	<1						Ilmenite	
Ilmenite	<1						Exsolved from clinopyroxene	
Pyrrhotite	<1							
Fibrous amphibole							Vein	

TOTAL ALTERATION: 15%, all related to vein halo?

STRUCTURE : Plastically deformed plagioclase with neoblasts, throughout the whole thin section. Vein of tremolite has a gradient of associated microcracking, with a network of cracks and some vein infill away from it. Open vein with no shear, and some clasts of host rock in it with no significant relative motion to original crystals. (JE) In one corner there seems to be diabase infiltrating into plagioclase, generating euhedral plagioclase at contact. (GS)

PHOTOMICROGRAPHS:

1309D_167R_4_7_10_1
1309D_167R_4_7_10_2
1309D_167R_4_7_10_3
1309D_167R_4_7_10_4
1309D_167R_4_7_10_5
1309D_167R_4_7_10_6
1309D_167R_4_7_10_7
1309D_167R_4_7_10_8
1309D_167R_4_7_10_9

THIN SECTION:	U1309D-168R-1, 33-36 cm	**Piece No.** 4	**Unit**: 446	**TS#: 431**	**OBSERVER: DB, EH, AD, JE, GS**
ROCK NAME:	Orthopyroxene-bearing gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	55	65	0.4	4			Anhedral	
Clinopyroxene	10	30	0.2	4			Anhedral	Few oikocrysts enclosing plagioclase, interlocked symplectitic contacts. Most oikocryst are recrystallized, suggesting that oxide melt injection and deformation is after oikocryst formation
Orthopyroxene	3	3	0.5	1			Anhedral	
Oxide		1						Late impregnation stage
Apatite	1	1						Resembles polygonally recrystallized plagioclase, very abundant near oxides and titanite
Titanite		1						Late impregnation stage
Amphibole								Late impregnation stage

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Green brown amphibole	7						Pyroxene	
Dark green amphibole	7						Pyroxene	
Brown amphibole	3						Pyroxene	Associated with pale-green amphibole (actinolite) in replacement of pyroxene
Tremolite	3						Pyroxene	
Chlorite	3						Plagioclase/orthopyroxene	Observed at contact with tremolite replacing orthopyroxene and plagioclase
Titanite	3							
Epidote	<1							
Ilmenite	1							
Magnetite	1							
Suflides	1							

TOTAL ALTERATION: 30 %

STRUCTURE : High degree of plastic, higher stress deformation in plagioclase. Clinopyroxene oikocrysts range from undeformed to recrystallized. No clear mineral foliation development. Later brittle network of fractures crosscut grains and plastic deformation, with chlorite infill (JE, GS).

PHOTOMICROGRAPHS:

1309D_168R_1_33_36_1
1309D_168R_1_33_36_2
1309D_168R_1_33_36_3
1309D_168R_1_33_36_4

THIN SECTION:	U1309D-168R-2, 22-25 cm	**Piece No.** 4B	**Unit**: 448	**TS#: 432**	**OBSERVER:GS, TN, SI**
ROCK NAME:	Gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	60	75	0.4	4.8	2		Subhedral, euhedral	
Clinopyroxene	10	25	0.2	4	2		Anhedral, interstitial, oikocrystic	Enclose resorbed clinopyroxene chadacrysts

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Green amphibole	20						Clinopyroxene, vein	Replaces or grows over pyroxene, and form vein aggregates
Chlorite	1						Plagioclase	Crack filling of plagioclase
Talc	4						Pyroxene	Pseudomorphic

TOTAL ALTERATION: 25%

STRUCTURE : High degree of recrystallization of plagioclase at high temperature, clinopyroxene not deformed. Very uneven distribution of plagioclase, representing presumably modal layering. Indicating of some relict magmatic strain in felsic layer (GS)

PHOTOMICROGRAPHS:

1309D_168R_2_22_25_1
1309D_168R_2_22_25_2
1309D_168R_2_22_25_3
1309D_168R_2_22_25_4

THIN SECTION:	U1309D-169R-1, 70-73 cm	**Piece No.** 3B	**Unit**: 448	**TS#: 433**	**OBSERVER: EH, JE,GS**
ROCK NAME:	Gabbronorite				
GRAIN SIZE:	Medium to coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	65	70	0.1	9	5		Anhedral	
Clinopyroxene	5	15		7	4		Anhedral	
Orthopyroxene	5	15		6	3		Anhedral	Strong to complete talc-tremolite replacement

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Actinolite	3						Pyroxene, vein	
Chlorite	3							Crack fill
Talc	3						Pyroxene	

TOTAL ALTERATION: 9%

STRUCTURE : Plastically deformed rock with both subgrain formation at some of the larger plagioclase crystals, and neoblasts formation. Several sets of brittle cracks crosscutting each other, some associated with veining and alteration. No brittle strain (JE). Note intense strain associated with bits of oxide in corner of slide. High temperature recrystallization in most of slide (GS)

PHOTOMICROGRAPHS:

1309D_169R_1_70_73_1
1309D_169R_1_70_73_2
1309D_169R_1_70_73_3
1309D_169R_1_70_73_4
1309D_169R_1_70_73_5
1309D_169R_1_70_73_6

THIN SECTION:	U1309D-170R-2, 32-34 cm	**Piece No.** 1A	**Unit**: 448	**TS#: 434**	**OBSERVER: EH, JB**
ROCK NAME:	Gabbronorite				
GRAIN SIZE:	Medium				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	60	60	0.1	4	2		Anhedral	
Clinopyroxene	5	20	0.2	4	1.5		Anhedral	
Orthopyroxene	5	20	0.2	6	2		Anhedral	Strong talc-tremolite replacement, possibly more than 20% originally. Encloses plagioclase and clinopyroxene chadacrysts
Oxides	0.1	0.1		0.2			Anhedral	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Green amphibole	5						Clinopyroxene	
Pale amphibole	5						Clinopyroxene, orthopyroxene	
Talc	2						Orthopyroxene	
Chlorite	<1						Plagioclase	Halo only, in fractures
Ilmenite	<1							
Pyrite	<1							
Chalcopyrite	<1							
Fibrous amphibole							Vein	
Chlorite							Vein (trace)	

TOTAL ALTERATION: <10% outside of halo, 40% in halo

STRUCTURE : Magmatic texture overinted by slight plastic deformation with neoblast formation. Brittle deformation restricted to emplacement of veins filled with tremolite (?) with no apparent movement. (JE) Both clinopyroxene and plagioclase affected by recrystallization. No magmatic foliation (GS)

PHOTOMICROGRAPHS:

1309D_170R_2_32_34_1

1309D_170R_2_32_34_2

THIN SECTION:	U1309D-170R-4, 95-97 cm	**Piece No.** 4B	**Unit**: 448	**TS#: 435**	**OBSERVER: DB, JB ,GS**
ROCK NAME:	Gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	65	75	0.4	5			Anhedral	
Clinopyroxene	0	25	0.6	6			Anhedral	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Zeolite	<1						Plagioclase	Discrete radiating grain-like patches, replaces only one grain, plagioclase otherwise mostly fresh. Very local as a fracture filling in plagioclase
Green to pale amphibole	35						Clinopyroxene, orthopyroxene	Also in fractures in plagioclase
Talc	<1						Orthopyroxene	Rare in cores
Titanite	<1						Ilmenite	
Rutile	<1						Ilmenite	
Pyrite	<1							

TOTAL ALTERATION: 35%

STRUCTURE : No magmatic strain in a weakly plastically strained gabbro. Rare neoblasts of plagioclase.(GS)

PHOTOMICROGRAPHS:

1309D_170R_4_95_97_1

1309D_170R_4_95_97_2

THIN SECTION:	U1309D-171R-3, 75-77 cm	**Piece No.** 5B	**Unit**: 451	**TS#: 436**	**OBSERVER: JB, EH, JE**
ROCK NAME:	Gabbronorite				
GRAIN SIZE:	Medium				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	60	65	0.1	5	2		Anhedral	
Clinopyroxene	5	15		3	1.5		Anhedral	
Orthopyroxene	5	20		6	3		Anhedral	Strong talc-tremolite replacement, possibly more than 20% originally

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Green amphibole	10						Clinopyroxene, orthopyroxene	
Pale amphibole	5						Clinopyroxene, orthopyroxene	
Talc	5						Orthopyroxene	Usually closest to center of grain
Chlorite	2							Fractures in plagioclase
Pyrite	<1							Associated with orthopyroxene alteration
Pyrrhotite	<1							May replace magnetite
Magnetite	<1							Associated with orthopyroxene alteration
Calcite							Vein 1	Vein cuts amphibole vein
Fibrous amphibole							Vein 2	

TOTAL ALTERATION: 25%

STRUCTURE : Weak plastic deformation, with undulatory extinction of plagioclase crystals and some neoblasts. Later brittle deformation by different sets of cracks and associated vein infill, with no apparent displacement (only opening). Crosscutting amphibole + calcite vein > amphibole vein. (JE)

PHOTOMICROGRAPHS:

1309D_171R_3_75_77_1
1309D_171R_3_75_77_2
1309D_171R_3_75_77_3

THIN SECTION:	U1309D-171R-4, 30-32 cm	**Piece No.** 1	**Unit**: 451	**TS#: 437**	**OBSERVER: AD, DB,GS**
ROCK NAME:	Orthopyroxene-bearing gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	67	67	0.4	8			Anhedral	
Clinopyroxene	25	30	0.1	8			Anhedral, interstitial	Embayed contacts between clinopyroxene, large exsolution patters.
Orthopyroxene	1	3	1	2			Anhedral	One grain encloses rounded plagioclases

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Tremolite	3						Orthopyroxene/olivine	
Actinolite	3						Orthopyroxene/olivine	
Talc ?	2						Orthopyroxene/olivine	
Brown green amphibole	3						Pyroxene	

TOTAL ALTERATION: 11%

STRUCTURE : No magmatic strain. Some plastic strain in plagioclase (neoblasts, tapering of twins), orthopyroxene appears unstrained. Abundant interpenetrative clinopyroxene grains (GS)

PHOTOMICROGRAPHS:

1309D_171R_4_30_32_1
1309D_171R_4_30_32_2
1309D_171R_4_30_32_3
1309D_171R_4_30_32_4
1309D_171R_4_30_32_5
1309D_171R_4_30_32_6
1309D_171R_4_30_32_7
1309D_171R_4_30_32_8

THIN SECTION:	U1309D-172R-3, 38-41 cm	**Piece No.** 1	**Unit**: 453	**TS#: 438**	**OBSERVER: TN, DB,GS**
ROCK NAME:	Orthopyroxene-bearing gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	60	75	0.4	12			Anhedral	
Clinopyroxene	5	23	0.1	9			Anhedral	
Orthopyroxene	0.1	2	1	5			Anhedral	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite	10						Pyroxene	
Chlorite	5						Pyroxene, plagioclase	Interstitial, or crack filling in plagioclase
Talc	10						Pyroxene	Veining or pseudomorphic
Oxides	<1							
Sulfides	<1							

TOTAL ALTERATION: 25%

STRUCTURE : Chance of weak magmatic strain since long plagioclase crystals are aligned, some plastic strain in form of plagioclase neoblasts. Clinopyroxene not obviously deformed. (GS)

PHOTOMICROGRAPHS:

1309D_172R_3_38_41_1

1309D_172R_3_38_41_2

THIN SECTION:	U1309D-172R-3, 135-138 cm	**Piece No.** 5	**Unit**: 453	**TS#: 439**	**OBSERVER:JE, DB, AD**
ROCK NAME:	Gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	40	70	1	12			Anhedral	
Clinopyroxene	10	30	0.5	10			Anhedral	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Green amphibole	20						Pyroxene	
Tremolite	6						Pyroxene	
Chlorite	4						Plagioclase	
Pyrite	<1							
Ilmenite	<1							
Vein								
Chlorite	3							
Tremolite	15							

TOTAL ALTERATION: 50 %

STRUCTURE : Edge: Shear zone of tremolite-chlorite (?) with small clasts of twinned plagioclase crystals, tremolite clasts reworked into it, with a transition from wall-perpendicular fibers to anostomosing ones in center enveloping clasts. Spherical zones with chlorite, probably late growth. Host rock shows weak plastic deformation with neoblast formation, and late veining. Two vein networks with tremolite and talc. (JE)

PHOTOMICROGRAPHS:

1309D_172R_3_135_138_1
1309D_172R_3_135_138_2
1309D_172R_3_135_138_3
1309D_172R_3_135_138_4

THIN SECTION:	U1309D-173R-1, 2-6 cm	**Piece No.** 1A	**Unit**: 453	**TS#: 441**	**OBSERVER:JB, DB, GS**
ROCK NAME:	Gabbro				
GRAIN SIZE:	Seriate				
TEXTURE:	Cataclastic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	55	80	0.2	6				
Clinopyroxene	5	20	0.4	4				

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Ffibrous green-pale-brown amphibole	40%						Pyroxene	Also fills fractures in plagioclase
Prehnite	1						Plagioclase	
Titanite	<1						Ilmenite	Ilmenite probably exsolved from pyroxene
Pyrrhotite	<1							
Ffibrous amphibole							Vein 1	
Chlorite							Vein 1	Radiating spheres in vein, dark spots in hand sample
Calcite							Vein 1	Small amount, local
Zeolite							Vein 2	Branching veins in plagioclase, may originate from vein 1

TOTAL ALTERATION: 45%

STRUCTURE : Anastamozing sets of cataclastic fractures, most of which have relatively large clasts left and seem to be fed by local mineralogy, with poor textural development. Cataclasite merges into a large calcite crystal. Gabbro host was a weakly plastically strained gabbro. (GS)

PHOTOMICROGRAPHS:

1309D_173R_1_2_6_1
1309D_173R_1_2_6_2
1309D_173R_1_2_6_3
1309D_173R_1_2_6_4

THIN SECTION:	U1309D-173R-1, 86-89 cm	**Piece No.** 6	**Unit**: 454/455	**TS#: 440**	**OBSERVER: TN, DB, GS**
ROCK NAME:	Gabbro/diabase contact				
GRAIN SIZE:	Coarse/fine				
TEXTURE:	Seriate/aphyric				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Gabbro								
Plagioclase	70	80	0.2	7			Anhedral	
Pyroxene	0	20	0.1	10			Anhedral	
Diabase								
5% Plagioclase microliths in glassy matrix								

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite	15						Pyroxene	Fringe, vein, or pseudomorphic aggregate
Chlorite	15						Plagioclase, pyroxene	Interstitial, along cleavage of pyroxene, or crack-filling in plagioclase
Carbonate	5						Pyroxene	Pseudomorphic

TOTAL ALTERATION: 35%

STRUCTURE : Plastic strain recrystallization both in clinopyroxene and plagioclase. Magmatic fabric only in basalt by microlith alignment. Filled fracture network merges into small cataclasic interval. (GS)

PHOTOMICROGRAPHS:

1309D_173R_1_86_89_1

1309D_173R_1_86_89_2

THIN SECTION:	U1309D-173R-2, 55-58 cm	**Piece No.** 1B	**Unit**: 455	**TS#: 442**	**OBSERVER: TN, DB,GS**
ROCK NAME:	Gabbronorite				
GRAIN SIZE:	Medium				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	65	65	0.2	4			Anhedral	
Orthopyroxene	15	20	0.8	6			Anhedral, oikocrystic	Large grains enclose resorbed plagioclase chadacrysts
Clinopyroxene	10	15	0.2	3			Anhedral	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite	5						Pyroxene, plagioclase	Overgrowth, pseudomorph, or vein-like aggregate
Chlorite	5						Pyroxene, plagioclase	Interstitial, or crack filling of plagioclase
Talc	5						Orthopyroxene	Fringe, or crack filling
Oxides	<1							
Sulfides	<1							

TOTAL ALTERATION: 15%

STRUCTURE : Highly recrystallized orthopyroxene rich gabbronorite. Few relics of plagioclase porphyroclasts left. Neoblast size in 300 micron range for both clinopyroxene and plagioclase. Orthopyroxene is least, but still somewhat deformed by plastic strain. Poor mineral foliation development (GS)

PHOTOMICROGRAPHS:

1309D_173R_2_55_58_1
1309D_173R_2_55_58_2
1309D_173R_2_55_58_3

THIN SECTION:	U1309D-173R-2, 128-131 cm	**Piece No.** 3	**Unit**: 455	**TS#: 443**	**OBSERVER:AH, SI, AD**
ROCK NAME:	Gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	45	65	0.7	10	4		Anhedral, subhedral	
Clinopyroxene	15	35	0.3	5	2		Anhedral	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Green-brown amphibole	10						Pyroxene	
Green amphibole	15						Pyroxene	
Chlorite	3						Plagioclase	
Calcite	<1						Plagioclase	
Ilmenite	<<1							
Pyrite	<<1							
Vein								
Serpentine	3							
Tremolite	3							

TOTAL ALTERATION: 35%

STRUCTURE : Crystals exhibit a random texture with no magmatic foliation. Plagioclase crystals show weak undulatory extinction, bending of the lamallae, the formation of subgrains, serrated grain boundaries and the formation of few recrystallized grains. Pyroxene crystals exhibit weak undulatory extinction and the occasional formation of kink bands. Pyroxene grains are being altered. Zone of complete alteration noted containing few brecciated grains. Microcracks exhibited crosscutting the grain boundaries.

PHOTOMICROGRAPHS:

1309D_173R_2_128_131_1

1309D_173R_2_128_131_2

THIN SECTION:	U1309D-173R-3, 45-48 cm	**Piece No.** 1	**Unit**: 455	**TS#: 444**	**OBSERVER: SI, GS, AD**
ROCK NAME:	Gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	50	55	0.4	6	3		Anhedral, subhedral, interstitial	
Clinopyroxene	20	45	0.4	6	2.5		Anhedral	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Chlorite	2						Plagioclase/pyroxene	
Tremolite	8						Pyroxene	
Green amphibole	15						Pyroxene	
Pyrrhotite	<<1							
Ilmenite	<<1							
Vein								
Tremolite	5							

TOTAL ALTERATION: 50

STRUCTURE : Gabbro with potential magmatic strain as seen in elongation of plagioclase and clinopyroxene. In other parts of slide, however, significant plastic strain shown by plagioclase neoblasts. Also some recrystallization of clinopyroxene. Preferred orientation of filled microcracks. (GS)

PHOTOMICROGRAPHS:

1309D_173R_3_45_48_1

1309D_173R_3_45_48_2

THIN SECTION:	U1309D-174R-1, 60-62 cm	**Piece No.** 2A	**Unit**: 457	**TS#: 445**	**OBSERVER: TN, AH, GS**
ROCK NAME:	Gabbronorite				
GRAIN SIZE:	Medium				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	62	62	1	6	3		Anhedral,oikocrystic	Encloses clinopyroxene chadacrysts
Clinopyroxene	20	20			2		Anhedral to interstitial	
Orthopyroxene	7	8		4	3		Anhedral, oikocryst	Encloses rare plagioclase chadacrysts

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite	2						Clinopyroxene, plagioclase	Overgrowths, interstices, and patchy or vein-like aggregates
Chlorite	1						Plagioclase	Crack filling
Talc	2						Orthopyroxene	Fringe or crack filling

TOTAL ALTERATION: 5%

STRUCTURE : No distinct magmatic foliation. Plagioclase weakly affected by plastic strain, clinopyroxne grains are affected. Orthopyroxnene not deformed. (GS)

PHOTOMICROGRAPHS:

1309D_174R_1_60_62_1

1309D_174R_1_60_62_2

THIN SECTION:	U1309D-174R-3, 26-29 cm	**Piece No.** 1A	**Unit**: 459	**TS#: 446**	**OBSERVER: TN, AH, GS**
ROCK NAME:	Olivine gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	60	60	0.5	5	3		Anhderal	
Clinopyroxene	35	35	1	5	2		Anhedral to interstitial, oikocrystic	Encloses rounded plagioclase chadacrysts, embayed clinopyroxene contacts
Olivine	5	5	0.5	1.5	1		Anhedral to interstitial	
Orhopyroxene	0.1	0.1		0.2			Rim	Along olivine plagioclase contact

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Tremolite/actinolite	<1						Olivine, plagioclase, clinopyroxene	Along grain boundaries
Chlorite	<1						Olivine, plagioclase	Thin films surrounding plagioclase, and crack fill in plagioclase
Talc	1						Olivine	
Oxides	<1						Olivine	
Sulfides	<1						Olivine	

TOTAL ALTERATION: 2%

STRUCTURE : Weak magmatic foliation defined by plagioclase seems present. Olivine in typical rounded cumulate shape. Minor plastic strain in plagioclase (GS)

PHOTOMICROGRAPHS:

1309D_174R_3_26_29_1
1309D_174R_3_26_29_2
1309D_174R_3_26_29_3
1309D_174R_3_26_29_4

THIN SECTION:	U1309D-174R-4, 51-53 cm	**Piece No.** 1A	**Unit**: 463	**TS#: 447**	**OBSERVER: TN,AH, GS**
ROCK NAME:	Olivine gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	75	75	1	6	4		Anhedral	
Olivine	19	20	0.5	4	2		Anhedral to interstitial	
Clinopyroxene	5	5	1	6	4		Anhderal	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Tremolite/actinolite	1						Olivine, plagioclase, clinopyroxene	Along grain boundaries or crack filling, and vein
Brown amphibole	<1						Clinopyroxene	
Chlorite	1						Olivine, plagioclase	Along grain boundaries or crack filling
Talc	1						Olivine	
Serpentine	1						Olivine	
Oxides	1						Olivine	
Sulfides	<1						Olivine	

TOTAL ALTERATION: 5%

STRUCTURE : Clinopyroxene tends to rim olivine, orthopyroxene tends to rim clinopyroxene, olivine with some tilt wall development, Otherwise very little strain, neither magmatic nor plastic. (GS)

PHOTOMICROGRAPHS:

1309D_174R_4_51_53_1
1309D_174R_4_51_53_2
1309D_174R_4_51_53_3
1309D_174R_4_51_53_4
1309D_174R_4_51_53_5

THIN SECTION:	U1309D-175R-4, 80-83 cm	**Piece No.** 1B	**Unit**: 464	**TS#: 448**			**OBSERVER: TN, EH, AH,GS**	
ROCK NAME:	Olivine gabbro							
GRAIN SIZE:	Fine							
TEXTURE:	Seriate							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	50	50	0.5	3	1.5		Anhedral to subhedral	
Olivine	20	20	0.5	3	1		Anhedral to interstitial	
Clinopyroxene	30	30	0.5	3.5	1.5		Anhedral, oikocrystic	Encloses rounded plagioclase
Orthopyroxene		1						Encloses olivine

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Serpentine	1						Olivine	Fringe or along fracture, partially oxidized
Talc	<1						Olivine	
Brown amphibole	<1						Clinopyroxene	
Oxides	<1						Olivine	
Sulfides	<1						Olivine	

TOTAL ALTERATION: 2%

STRUCTURE : Clinopyroxene, olivine, and plagioclase all with some plastic strain. Notable lack of foliation development. (GS)

PHOTOMICROGRAPHS:
1309D_175R_4_80_83_1
1309D_175R_4_80_83_2

THIN SECTION:	U1309D-176R-1, 48-50 cm	**Piece No.** 1B	**Unit**: 464	**TS#: 449**	**OBSERVER:JB, DB, JE**
ROCK NAME:	Gabbronorite				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	48	50	0.4	6			Anhedral	
Clinopyroxene	38	40	0.6	8			Anhedral, oikocrystic	Encloses plagioclase and olivine-pyroxene aggregate chadacrysts, rare interlocked contacts
Clinopyroxene 2	5	5	1	8				Exsolution blebs of clinopyroxene
Orthopyroxene	4	4	1	4			Anhedral, oikocrystic	Encloses olivine and plagioclase chadacrysts
Olivine	0.4	0.5					Anhedral	Olivine is present only as chadacryst in ortho and clinopyroxene
Oxide	1	1	0.4	1				

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Pale amphibole	2						Clinopyroxene, orthopyroxene	
Serpentine	<1						Olivine	
Magnetite	<1						Olivine	Mostly replaced by pyrrhotite
Pyrrhotite	<1						Magnetite	Locally with pentlandite "flames"
Tochilinite	<1						Pyrrhotite	In serpentinized olivine, soft, very high anisotropy
Ilmenite	<1							Exsolutions in pyroxene

TOTAL ALTERATION: 3%

STRUCTURE : Very weak plastic deformation with neblasts, and subgrains associated with larger plagioclase crystals. No apparent magmatic foliation. (JE) Clinopyroxene with local neoblasts, orthoproxene plastic strain not seen (GS)

PHOTOMICROGRAPHS:

1309D_176R_1_48_50_1
1309D_176R_1_48_50_2
1309D_176R_1_48_50_3
1309D_176R_1_48_50_4
1309D_176R_1_48_50_5
1309D_176R_1_48_50_6
1309D_176R_1_48_50_7

THIN SECTION:	U1309D-176R-1, 90-99 cm	**Piece No.** 1E	**Unit**: 465	**TS#: 450**	**OBSERVER: JB, DB, AH, EH**
ROCK NAME:	Gabbronorite/mylonite				
GRAIN SIZE:	Medium				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	60	70	0.1	5			Anhedral	
Clinopyroxene	18	20	0.1	4			Anhedral, oikocrystic, interstitial	Encloses rounded plagioclase and olivine chadacrysts, interlocked symplectitic contacts.
Orthopyroxene	9	10	1	3			Anhedral, oikocrystic, interstitial	Encloses rounded plagioclase and olivine chadacrysts
Olivine		0.5					Anhedral	Mainly enclosed as chadacryst
Oxide		0.5					Anhedral	
Apatite		0.2						Abundant small luminescent grains in Ti-oxide matrix
Zircon		0.1						Rare interstitial grains in deformed matrix
Note: oxide impregnation along the contact, the mylonite has gabbronoritic composition								

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Serpentine	<1						Olivine	
Amphibole	1						Pyroxene	
Pyrrhotite	<1						Olivine	May replace magnetite, also primary, pentlandite lamellae
Tochilinite	<1						Pyrrhotite	In serpentinized olivine
Ilmenite	n/a							Primary, but deformed
Chalcopyrite								Primary

TOTAL ALTERATION: 2%, very fresh, even the mylonite

STRUCTURE : Sharp contact between gabbronorite and a mylonite zone. The gabbronorite does not exhibit a preferred orientation of the minerals. There are plagioclase inclusions inside the clino and orthopyroxene crystals in the gabbronorite and the large plagioclase crystals exhibit undulatory extinction and have lobate grain boundaries. The shear zone contact is marked by a concentration of opaque minerals. This represents the highest shear location. The shear zone exhibits extensive recrystallization of plagioclase. A few relict clinopyroxene grains exist within the shear zone. The recrystallized plagioclase crystals inside the shear zone exhibit undulatory extinction and serrated grain boundaries. There is an increase in the recrystallized grain size from the contact with the gabbronorite. An open fracture crosscuts the shear zone and the gabbronorite. (AH) Mylonitic shear seems again restricted to the oxide bearing part of the gabbro. Top to left sense of shear (GS)

PHOTOMICROGRAPHS:

1309D_176R_1_90_99_1
1309D_176R_1_90_99_2
1309D_176R_1_90_99_3
1309D_176R_1_90_99_4

THIN SECTION:	U1309D-177R-2, 106-109 cm	**Piece No.** 10	**Unit**: 470/471	**TS#: 451**			**OBSERVER: TN, DB, AH**	
ROCK NAME:	Olivine microgabbronorite/orthopyroxene-bearing gabbro							
GRAIN SIZE:	Fine/coarse							
TEXTURE:	Equigranular/seriate							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Orthopyroxene-bearing g	Note: the mode is not representative.							
Plagioclase	70	80			5		Anhedral	
Clinopyroxene	0	20			5		Anhedral	
Orthopyroxene		1			0.2		Anhedral	Enclosed in clinopyroxene
Olivine microgabbronorite								
Plagioclase		70			0.4		Anhedral	
Clinopyroxene		17			0.4		Anhedral	
Olivine		8			0.4		Anhedral	
Orthopyroxene		5			0.4		Anhedral	
SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Green amphibole	2						Clinopyroxene	Replaces or grows over clinopyroxene, and forms vein
Brown amphibole	<1						Clinopyroxene	
Chlorite	<1						Plagioclase	Crack filling
Talc	<1						Olivine	Pseudomorphic
Oxides	<1						Olivine	
Sulfides	<1						Olivine	

TOTAL ALTERATION: 3%

STRUCTURE : Structural contact between a medium-grained gabbro and a fine-grained microgabbronorite. The medium gabbro exhibits no preferred alignment of the minerals. The plagioclase crystals exhibit undulatory extinction and recrystallization along the grain boundaries. The pyroxene crystals exhibit no plastic strain. The microgabbronorite exhibits a crystallographic preferred orientation of the minerals. The plagioclase grains exhibit undulatory extinction, lobate grain boundaries and recrystallization along grain boundaries. The pyroxene crystals exhibit weak undulatory extinction. Few infilled veins cut across grains and the contact.(AH) Shear of plastic nature is most pronounced for host along contact to microgabbro. (GS)

PHOTOMICROGRAPHS:

1309D_177R_2_106_109_1

1309D_177R_2_106_109_2

THIN SECTION:	U1309D-177R-3, 125-127 cm	**Piece No.** 3	**Unit**: 471	**TS#: 452**	**OBSERVER: DB, AH, AD**
ROCK NAME:	Olivine-bearing gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	63	65	0.5	12			Anhedral	Rounded chadacrysts enclosed in clinopyroxene
Clinopyroxene	28	30	0.1	8			Anhedral, oikocrystic, interstitial	Large interlocked symplectitic cnotacts
Olivine	3	5	0.5	4			Anhedral	
Orthopyroxene		0.5	0.2	1			Anhedral	Enclosed in clinopyroxene
Pargasite		0.1			0.2		Rim, bleb	Rims arouns clinopyroxene

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Tremolite	2							
Talc	1							
Chlorite	1							
Green amphibole	1							
Brown amphibole	<1							
Chalcopyrite	<1							
Pyrrhotite	<1							
Ilmenite	<1							

TOTAL ALTERATION: 6%

STRUCTURE : Crystals exhibit a random igneous texture. Plagioclase grains exhibit bending of lamallae, undulatory extinction, serrated grain boundaries and localized recrystallization. Pyroxene grains exhibit weak undulatory extinction and show inclusions of plagioclase. Very weak microcraking is seen.

PHOTOMICROGRAPHS:

1309D_177R_3_125_127_1
1309D_177R_3_125_127_2
1309D_177R_3_125_127_3
1309D_177R_3_125_127_4
1309D_177R_3_125_127_5
1309D_177R_3_125_127_6

THIN SECTION:	U1309D-178R-1, 103-106 cm	**Piece No.** 6A	**Unit**: 471	**TS#: 453**	**OBSERVER:GS, AD, DB**
ROCK NAME:	Gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	30	60	0.5	8			Anhedral	
Clinopyroxene	10	40	1	15			Anhedral	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Brown amphibole	5						Pyroxene	
Green amphibole	15						Pyroxene	
Brown green amphibole	15						Pyroxene	
Chlorite	3						Pyroxene	
Calcite	20						Pyroxene	In hole of plagioclase
Epidote	2						Pyroxene	
Ilmenite	<1							

TOTAL ALTERATION: 60%

STRUCTURE : Highly altered gabbro with no magmatic alignment of plagioclase and only minor neoblasts of plagioclase. High degree of alteration, cores of plagioclase are calcite. Overall coarse texture. (GS)

PHOTOMICROGRAPHS:

1309D_178R_1_103_106_1

1309D_178R_1_103_106_2

THIN SECTION:	U1309D-178R-2, 74-77 cm	**Piece No.** 5	**Unit**: 471	**TS#: 454**			**OBSERVER:JB, EH, AH,GS**	
ROCK NAME:	Gabbro, crosscut by zircon-bearing vein							
GRAIN SIZE:	Medium-coarse							
TEXTURE:	Equigranular							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	40	65		7	5		Tabular	
Clinopyroxene	5	35	0.5	6	4		Long prismatic	
Modes above estimated on vein-distal zones…								
In and near vein/fracture								
Amphibole?								Intergrown with albitic plagioclase
Albite								
Oxide		1						
Zircon	0.1	0.1						Two grains, one enclosed in a 2 mm albite crystal
Vein containing albite, amphibole and accessories. Pore space (low-n, isotropic) contains needles and euhedral albite and amphibole growing into it. Diffuse, pervasive albitization halo into wall gabbro. No apatite.								

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Albite	5						Plagioclase	
Prehnite	1						Plagioclase	
Chlorite	<1						Plagioclase	Very local at clinopyroxene grain boundary
Pale-green amphibole	25						Clinopyroxene	
Zeolite	5							Rims plagioclase, especially in vincinty of fluorite, see below, also veins in plagioclase
Fluorite?	<1							Isotropic, low relief. Poikolitically encloses euhedral amphibole and plagioclase
Titanite	<1							After ilmenite
Ilmenite	<1							Exsolved from pyroxene
Ffibrous amphibole							Vein	May be approximately contemporaneous with fluorite/zeolite

TOTAL ALTERATION: 50%

STRUCTURE : Grains exhibit no preferred orientation. Plagioclase exhibit very weak undulatory extinction and show lobate grain boundaries. Localized zones of recrystallized plagioclase are seen. Grains are broken by extensive microcracking. An infilled vein crosscuts the minerals.(AH) In contrast to previous evolved veins, here no cataclasis. Also note that the long prismatic plagioclase is rounded at tip, indicating disequilibrium. (GS)

PHOTOMICROGRAPHS:

1309D_178R_2_74_77_1
1309D_178R_2_74_77_2
1309D_178R_2_74_77_3
1309D_178R_2_74_77_4

THIN SECTION:	U1309D-178R-3, 11-13 cm	**Piece No.** 1	**Unit**: 471	**TS#: 455**	**OBSERVER: TN, EH, AH**
ROCK NAME:	Orthopyroxene-bearing gabbro				
GRAIN SIZE:	Medium to coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	50	55		15	4			
Clinopyroxene	35	40			3			Interlocked symplectitic contacts
Olivine	0.2?	0.2?		0.1				Possibly a few plagioclase-hosted chadacrysts
Orthopyroxene	3	4		15				Several coarse grains, plagioclase and clinopyroxene hosted chadacrysts

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Actinolite	10						Clinopyroxene, vein	Overgrowth and vein
Brown amphibole	3						Clinopyroxene	
Chlorite	2						Plagioclase	Crack filling and grain boundaries
Talc	4						Orthopyroxene	Crack filling
Oxides	<1							
Sulfides	<1							

TOTAL ALTERATION: 20%

STRUCTURE : Minerals exhibit a weak preferred orientation. Pyroxene crystals exhibit undulatory extinction, bending of the grains, serrated grain boundaries and kink bands. Plagioclase crystals exhibit undulatory extinction, the formation of subgrains, serrated grain boundaries and small proportions of recrystallization. Fairly extensive microcracking crosscuts the grains and are infilled.

PHOTOMICROGRAPHS:

1309D_178R_3_11_13_1

1309D_178R_3_11_13_2

THIN SECTION:	U1309D-179R-1, 48-51 cm	**Piece No.** 7	**Unit**: 472	**TS#: 456**				**OBSERVER: EH, PF, KM**	
ROCK NAME:	Gabbro (this one should not be lumped in along with the regular gabbros though)								
GRAIN SIZE:	Coarse								
TEXTURE:	Seriate								

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Plagioclase		60		20			Anhedral	Strongly albitized and beyond. Porous.
Clinopyroxene		40		20			Anhedral	Replaced by amphibole, possibly primary
Zircon	0.1	0.1		0.1			Euhedral	One prismatic grain, growing (?) into porous albite grain boundary
Apatite	3	5		10			Subhedral	One monstrous crystal, fragmented, full of mineral and fluid inclusions
No oxides								

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Green amphibole	30						Pyroxene	
Brown amphibole	3						Pyroxene	
Zeolite	2						Plagioclase	
Chlorite	1						Plagioclase/void filling	
Epidote	1							
Pyrrhotite	<1							Mainly in amphibole former pyroxene
Ilmenite	<1							Accompanies amphibole as secondary product after pyroxene

TOTAL ALTERATION: 37%

STRUCTURE : Primary very coarse igneous texture with a few sign of plastic strain. Coarse plagioclase grains were slightly bent with weak undulatory extinction and their grain boundaries are locally serrated. (KM)

PHOTOMICROGRAPHS:

1309D_179R_1_48_51_1
1309D_179R_1_48_51_2
1309D_179R_1_48_51_3
1309D_179R_1_48_51_4
1309D_179R_1_48_51_5
1309D_179R_1_48_51_6
1309D_179R_1_48_51_7
1309D_179R_1_48_51_8
1309D_179R_1_48_51_9
1309D_179R_1_48_51_10
1309D_179R_1_48_51_11
1309D_179R_1_48_51_12
1309D_179R_1_48_51_13
1309D_179R_1_48_51_14

THIN SECTION:	U1309D-179R-4, 80-83 cm	**Piece No.** 3	**Unit**: 476	**TS#: 457**	**OBSERVER: TN, EH, AH**
ROCK NAME:	Olivine-bearing gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	70	70	0.1	3	1.5		Anhedral	
Clinopyroxene	25	25	0.2	5	2		Anhedral	Interstitial and oikocrystic
Olivine	4	5	0.1	1	0.5		Anhedral	Dominantly as medium-grained irregular interstitial crystals, commonly as finer grained plagioclase-hosted chadacrysts
Brown amphibole	0.2	0.2					Interstitial	At olivine and clinopyroxene grain boundaries, possibly trapped melt
Note: no orthopyroxene found								

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Actinolite/tremolite	<1						Olivine, plagioclase, clinopyroxene	Along grain boundaries
Chlorite	<1						Plagioclase	Crack filling
Talc	<1						Olivine	
Brown amphibole	1						Clinopyroxene	
Oxides	<1							

TOTAL ALTERATION: 2%

STRUCTURE : Weak alignment of minerals, magmatic foliation. Clinopyroxene minerals contain inclusions of feldspar. Synoptic growth of minerals between olivine and clinopyroxene. Plagioclase crystals exhibit undulatory extinction and serrated grain boundaries. No brittle deformation.

PHOTOMICROGRAPHS:

1309D_179R_4_80_83_1
1309D_179R_4_80_83_2
1309D_179R_4_80_83_3
1309D_179R_4_80_83_4
1309D_179R_4_80_83_5
1309D_179R_4_80_83_6
1309D_179R_4_80_83_7

THIN SECTION:	U1309D-179R-4, 109-112 cm	**Piece No.** 3		**Unit**: 476/477	**TS#: 458**			**OBSERVER: TN, DB, AH**	
ROCK NAME:	Olivine gabbro/diabase								
GRAIN SIZE:	Medium/fine								
TEXTURE:	Seriate/ophitic								

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**			**Composition**	**MORPHOLOGY**	**COMMENTS**
			min.	**max.**	**av.**			
Plagioclase		60	0.2	4			Anhedral	
Olivine		10	0.1	3			Anhedral	
Clinopyroxene		10	0.1	6			Interstitial, oikocrystic	Encloses resorbed plagioclase chadacrysts
Brown amphibole		0.1			0.2		Rim, bleb	
Orthopyroxene		0.1			0.2		Rim	At olivine plagioclase contact
Diabase								
Olivine-plagioclase microphyric basalt, fluidal texture. Melt inclusions in zoned plagioclase and olivine partially crystallized.								
Reactive melt channels in plagioclase								

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron)**				**REPLACING / FILLING**	**COMMENTS**
			min.	**max.**	**av.**			
Actinolite/tremolite	1						Olivine, plagioclase, clinopyroxene	Forms coronas and fills cracks of plagioclase
Chlorite	1						Olivine, plagioclase	Forms coronas and fills cracks of plagioclase
Brown amphibole	<1						Clinopyroxene	
Talc	2						Olivine	
Serpentine	1						Olivine	Partially oxidized
Oxides	<1							
Sulfides	<1							

TOTAL ALTERATION: 5%

STRUCTURE : Contact between an olivine gabbro and a diabase. Diabase exhibits a preferred orientation of plagioclase microphenocrysts. Large phenocryst of olivine and plagioclase are exhibited just inside the boundary in the diabase. These phenocrysts look to have come from the gabbro. The feldspar phenocryst exhibits zoning. The olivine gabbro exhibits a weak preferred orientation. The plagioclase crystals show undulatory extinction and lobate grain boundaries. Weak microcracking throughout the olivine gabbro.

PHOTOMICROGRAPHS:

1309D_179R_4_109_112_1
1309D_179R_4_109_112_2
1309D_179R_4_109_112_3
1309D_179R_4_109_112_4
1309D_179R_4_109_112_5
1309D_179R_4_109_112_6
1309D_179R_4_109_112_7
1309D_179R_4_109_112_8
1309D_179R_4_109_112_9
1309D_179R_4_109_112_10
1309D_179R_4_109_112_11

THIN SECTION:	U1309D-180R-1, 20-23 cm	**Piece No.** 4B	**Unit**: 479	**TS#: 459**	**OBSERVER: TN, DB, AH**
ROCK NAME:	Diabase				
GRAIN SIZE:	Fine				
TEXTURE:	Ophitic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Diabase with euhedral plagioclase mircocrysts in clinopyroxene oikjocrysts, pretty altered.								
Several plagioclase xenocrysts and a troctolitic partially molten xenolith are in the diabasic groundmass								

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Green amphibole	10						Clinopyroxene, brown amphibole	
Epidote	5						Vein	Vein aggregate with actinolitic amphibole
Chlorite	1						Plagioclase	Patchy alteration of plagioclase, and coronas in xenolithic gabbro
Prehnite	1						Plagioclase	
Oxides	1							
Sulfides	<1							

TOTAL ALTERATION: 18%

STRUCTURE : Fine grained diabase exhibiting a random texture which is crosscut by an infilled vein of epidote. From the vein there is a zone of alteration. Occasional plagioclase phenocryst which exhibits zoning and undulatory extinction. Very few microcracks.

PHOTOMICROGRAPHS:

1309D_180R_1_20_23_1

1309D_180R_1_20_23_2

THIN SECTION:	U1309D-180R-4, 94-96 cm	**Piece No.** 1C	**Unit**: 482	**TS#: 460**	**OBSERVER: TN, DB, AH**
ROCK NAME:	Gabbronorite				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	68	70	0.6	15			Anhedral	
Clinopyroxene	18	25	0.1	8			Anhedral	
Orthopyroxene	7	5	0.5	6			Anhedral	Encloses anhedral clinopyroxene + amphibole blebs
Oxide		1					Anhedral	
Amphibole		0.5						

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite	2						Clinopyroxene, plagioclase	
Brown ampibole	<1						Clinopyroxene	
Chlorite	<1						Plagioclase	Crack filling
Talc	1						Orthopyroxene	Crack filling
Oxides	<1						Orthopyroxene	
Sulfides	<1						Orthopyroxene	

TOTAL ALTERATION: 3%

STRUCTURE : Minerals exhibit a weak magmatic foliation. Plagioclase minerals show weak undulatory extinction, serrated grain boundaries and bending of the lamallae. There has been weak phase of recrystallization of plagioclase along the grain boundaries. A few pyroxene crystals show undulatory extinction. Extremly weak microcracking exhibited throughout.

PHOTOMICROGRAPHS:

1309D_180R_4_94_96_1

1309D_180R_4_94_96_2

THIN SECTION:	U1309D-181R-1, 54-58 cm	**Piece No.** 1B	**Unit**: 483	**TS#: 461**	**OBSERVER: TN, DB, AH**
ROCK NAME:	Olivine microgabbro				
GRAIN SIZE:	Fine				
TEXTURE:	Equigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	70	75			0.4		Anhedral	
Clinopyroxene	18	20			0.4		Anhedral	
Olivine	2	5			0.4		Anhedral	
Orthopyroxene		0.1			0.2		Rim	Between plagioclase and olivine

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Tremolite/actinolite	2						Olivine, plagioclase, clinopyroxene, vein	
Chlorite	1						Olivine, plagioclase, vein	
Talc	2						Olivine	
Brown amphibole	<1						Clinopyroxene	
Oxides	<1							
Sulfides	<1							

TOTAL ALTERATION: 5%

STRUCTURE : Microgabbro exhibiting a crystallographic preferred orientation. Grain size variation exhibited. Plagioclase grains exhibit undulatory extinction, formation of subgrains and occansional fromation of recrystallized grains. Kink bands are exhibited in olivine crystals. Occasional infilled cracks.

PHOTOMICROGRAPHS:

1309D_181R_1_54_58_1
1309D_181R_1_54_58_2
1309D_181R_1_54_58_3
1309D_181R_1_54_58_4

THIN SECTION:	U1309D-181R-4, 92-95 cm	**Piece No.** 2B	**Unit**: 489	**TS#: 462**	**OBSERVER: TN, EH, JB, AH**
ROCK NAME:	Gabbronorite				
GRAIN SIZE:	Medium				
TEXTURE:	Equigranular				

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	58	60	0.2	3	1		Anhedral	
Clinopyroxene	15	20		5	3		Anhedral	Interlocked contacts, orthopyroxene exsolutions
Orthopyroxene	15	20		5	3		Anhedral	Encloses clinopyroxene chadacrysts
Sub-mm (amphibole gabbro?) dikelet at bottom:								Width 50-100 microns, albite halo/overgrowth(?) 50-300 microns
Zircon		0.1						50 microns, at wall on plagioclase
Apatite		0.1						At wall on fractured amphibole/clinopyroxene

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Green amphibole	2						Clinopyroxene	
Brown amphibole	<1						Clinopyroxene	
Chlorite	1						Plagioclase	
Talc	2						Orthopyroxene	
Green, blocky amphibole							Vein 1	Some zoned, euhedral crystals growing into matted fibrous amphibole
Pale, fibrous amphibole							Vein 1	
Chlorite							Vein 2	Vein 2 cuts vein 1
Talc							Vein 2	Vein 2 chlorite where it traverses plagioclase, talc where it traverses pyroxene

TOTAL ALTERATION: 5%

STRUCTURE : Grains do not exhibit a preferred orientation. Plagioclase crystals exhibit weak undulatory extinction, the formation of few subgrains, lobate grain boundaries and small amounts of recrystallization along grain boundaries. Pyroxene crystals contain inclusions of plagioclase, have lobate grain boundaries and exhibit undulatory extinction. Crosscutting relationship of veins is noted. Fairly extensive microcracking exhibited throughout.

PHOTOMICROGRAPHS:

1309D_181R_4_92_95_1
1309D_181R_4_92_95_2
1309D_181R_4_92_95_3
1309D_181R_4_92_95_4

THIN SECTION:	U1309D-182R-1, 47-49 cm	**Piece No.** 3B	**Unit**: 490	**TS#: 463**	**OBSERVER: TN, EH,GS**
ROCK NAME:	Orthopyroxene-bearing oxide gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase		40	0.1	3	2		Anhedral	
Clinopyroxene		40	0.3	4	7		Anhedral	
Orthopyroxene		4			4		Anhedral	
Oxide		6		8	2		Anhedral, interstitial	Coarse, irregular, in place subrounded, included in clinopyroxene with "replacive" texture

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Green amphibole	10						Clinopyroxene	
Brown amphibole	2						Clinopyroxene	
Chlorite	3						Interstitial	
Oxides								
Sulfides								

TOTAL ALTERATION: 15%

STRUCTURE : Magmatic and plastic strain very low. Oxides occupy mainly an interstitial position and seem to locally have corroded clinopyroxene. (GS)

PHOTOMICROGRAPHS:

1309D_182R_1_47_49_1
1309D_182R_1_47_49_2
1309D_182R_1_47_49_3
1309D_182R_1_47_49_4

THIN SECTION:	U1309D-183R-1, 101-103 cm	**Piece No.** 5C	**Unit**: 493	**TS#: 464**	**OBSERVER: TN, DB,GS**
ROCK NAME:	Olivine gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	60	72	0.5	7			Anhedral	
Olivine	5	15	0.5	12			Anhedral	
Clinopyroxene	5	10	0.1	5			Anhedral, oikocrystic	Encloses rounded plagioclase
Orthopyroxene	3	3	0.5	3			Anhedral, rim	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Actinolite/tremolite	10						Olivine, plagioclase, clinopyroxene	Forms corona, grows over clinopyroxene
Brown amphibole	<1						Clinopyroxene	
Chlorite	5						Plagioclase, olivine	Forms corona or crack filling in plagioclase
Talc	5						Olivine	Pseudomorphic
Oxides	<1							
Sulfides	<1							

TOTAL ALTERATION: 20%

STRUCTURE : Definitely here now more pronounced plastic strain in clinopyroxene than further up in core. Plagioclase with abundant tapering of twins, bending, and neoblasts. Orthopyroxene without plastic strain. No magmatic fabric (GS)

PHOTOMICROGRAPHS:

1309D_183R_1_101_103_1

1309D_183R_1_101_103_2

THIN SECTION:	U1309D-183R-2, 32-34 cm	**Piece No.** 2	**Unit**: 493	**TS#: 465**	**OBSERVER: PF, JB, EH,GS**
ROCK NAME:	Oxide gabbro				
GRAIN SIZE:	Variable				
TEXTURE:	Shear zone				

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Plagioclase								
Clinopyroxene								
Oxide								
Apatite								>50 rounded grains enclosed by Ti-oxide matrix
COMMENTS								
One fine-grained recrystallized plagioclase aggregate, free of oxide and apatite as a "clast" floating in the high-strain oxide-rich zone								

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Green amphibole	8						Pyroxene	
Chlorite	<1						Plagioclase	Very scarce
Brown amphibole	1						Green amphibole (?)	As scattered grains and patches
Ilmenite	2						Exsolved from magnetite	Occurs as both exsollution lamellae in magnetite also primary
Magnetite	5							Primary magnetite has exsolved ilmenite
Pyrrhotite	<1							Flame structure (pentlandite)
Chalcopyrite	<<1							
Pyrite (?)	<1							

TOTAL ALTERATION: 16% The recrystallization of the plagioclase and pyroxene in the zone of mylonitization suggests granulite facies.

STRUCTURE : Remarkably narrow mylonite zone within an unstrained gabbro host. The mylonitic zone is lithologically distinct, i.e., an oxide gabbro in an oxide free host. In the shear zone, typically isolated neoblasts are floating in the ore matrix. As mentioned by the igneous team, one oxide-free, completely recrystallized "clast" of plagioclase occurs in the shear zone. Neoblast size is 20 to 50 micron meters. Clasts in the shear zone are mainly clinopyroxene, not plagioclase, indicating that clinopyroxene is harder than plagioclase. Clinopyroxene is obviously corroded by ore matrix, see photo by igneous team. Another photo shows what may be corroded, dynamically recrystallized plagioclase which would suggest that deformation preceded oxide infiltration (GS)

PHOTOMICROGRAPHS:

1309D_183R_2_32_34_1	1309D_183R_2_32_34_5	1309D_183R_2_32_34_9	1309D_183R_2_32_34_13	1309D_183R_2_32_34_17	1309D_183R_2_32_34_21
1309D_183R_2_32_34_2	1309D_183R_2_32_34_6	1309D_183R_2_32_34_10	1309D_183R_2_32_34_14	1309D_183R_2_32_34_18	1309D_183R_2_32_34_22
1309D_183R_2_32_34_3	1309D_183R_2_32_34_7	1309D_183R_2_32_34_11	1309D_183R_2_32_34_15	1309D_183R_2_32_34_19	

THIN SECTION:	U1309D-184R-1, 67-69 cm	**Piece No.** 2E	**Unit**: 494	**TS#: 466**	**OBSERVER: TN, DB,GS**
ROCK NAME:	Olivine gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	65	65	0.4	7			Anhedral	
Clinopyroxene	25	27	0.2	7			Anhedral, interstitial	Large orthopyroxene blebs
Olivine	5	8	1	6			Anhedral	
Orthopyroxene		0.5	0.5	2			Rim	Thick rim between olivine and plagioclase
Oxide		0.1						Associated with hydrous vein with brown amphibole and plagioclase
Apatite		0.1						Associated with hydrous vein with brown amphibole and plagioclase

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite/tremolite	1						Olivine, plagioclase, pyroxene	Forms coronas or grows over pyroxene
Brown amphibole	<1						Clinopyroxene	
Chlorite	<1						Plagioclase, olivine	Coronas, or crack fillings of plagioclase
Talc	1						Olivine, orthopyroxene	Pseudomorphic
Serpentine	<1						Olivine	Pseudomorphic
Oxides	<1							
Sulfides	<1							

TOTAL ALTERATION: 3%

STRUCTURE : Weak magmatic strain recorded by plagioclase alignment, plastic strain present in olivine and plagioclase. Also has affected orthopyroxene rims. (GS)

PHOTOMICROGRAPHS:

1309D_184R_1_67_69_1
1309D_184R_1_67_69_2
1309D_184R_1_67_69_3
1309D_184R_1_67_69_4
1309D_184R_1_67_69_5

THIN SECTION:	U1309D-184R-1, 103-106 cm	**Piece No.** 5	**Unit**: 494	**TS#: 467**	**OBSERVER: TN, EH,GS**
ROCK NAME:	Olivine-bearing gabbonorite				
GRAIN SIZE:	Medium to coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	65	75			4		Anhedral	
Clinopyroxene	4	5			2		Anhedral	Suboikocrystic
Olivine	5	15			2		Anhedral	Strongly replaced by corona-textured talc and tremolite
Orthopyroxene	4	5			3		Anhedral	Dominantly medium grains, subordinate selvages between olivine and plagioclase

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Actinolite/tremolite	10						Olivine, plagioclase, clinopyroxene	Forms corona, grows over clinopyroxene
Brown amphibole	<1						Clinopyroxene	
Chlorite	5						Plagioclase, olivine	Forms corona or crack filling in plagioclase
Talc	5						Olivine	Pseudomorphic
Oxides	<1							
Sulfides	<1							

TOTAL ALTERATION: 20%

STRUCTURE : Strongest magmatic foliation so far, expressed by plagioclase and clinopyroxene and even weakly by olivine. Olivine shows some recrystallization, plagioclase and clinopyroxene also have minor neoblasts, orthopyroxene (interstitial) has no plastic strain. (GS)

PHOTOMICROGRAPHS:
1309D_184R_1_103_106_1
1309D_184R_1_103_106_2

THIN SECTION:	U1309D-184R-3, 50-53 cm	**Piece No.** 8	**Unit**: 494	**TS#: 468**	**OBSERVER: TN, DB, KM**
ROCK NAME:	Olivine gabbro/diabase				
GRAIN SIZE:	Coarse/fine				
TEXTURE:	Seriate/subophitic				

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	40	55	0.5	12			Anhedral	
Clinopyroxene	20	40	0.5	20			Anhedral, oikocrystic	
Olivine	0	5	1	5			Anhedral	
COMMENTS								
The diabase shows subophitic texture, plagioclase xenocrysts in the groundmass. Microfractured boundaries of the host gabbro.								

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Actinolite/tremolite	15						Olivine, plagioclase, clinopyroxene	Corona, overgrowth on clinopyroxene
Chlorite	15						Olivine, plagioclase, clinopyroxene	Corona, pseudomorphs of clinopyroxene

TOTAL ALTERATION: 30%

STRUCTURE : Olivine gabbro: primary igneous texture with a weak plastic strain resulting in serrated grain boundaries of plagioclase grains (locallly neoblast grains along them) with slight undulatory extinction. Cataclasis occurs at the contact between olivine gabbro and diabase. Later cracks with mineral infill crosscut both olivine gabbro and diabase. (KM)

PHOTOMICROGRAPHS:

1309D_184R_3_50_53_1
1309D_184R_3_50_53_2
1309D_184R_3_50_53_3
1309D_184R_3_50_53_4
1309D_184R_3_50_53_5
1309D_184R_3_50_53_6
1309D_184R_3_50_53_7

THIN SECTION:	U1309D-185R-1, 105-108 cm	**Piece No.** 8A	**Unit**: 496	**TS#: 469**	**OBSERVER: TN, DB, KM**
ROCK NAME:	Olivine gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	40	55	0.5	6			Anhedral	
Olivine	0	30	0.1	9			Anhedral	
Clinopyroxene	12	15	0.2	4			Anhedral	
Oxide		0.5					Anhedral	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Actinolite/tremolite	10						Olivine, plagioclase, clinopyroxene	Corona, overgrowth, vein
Chlorite	10						Olivine, plagioclase	Corona, pseudomorph, crack-filling
Serpentine	20						Olivine	Pseudomorph
Brown amphibole	<1						Clinopyroxene	

TOTAL ALTERATION: 40%

STRUCTURE : Primary igneous texture preserved as a whole, but strongly modified by plastic strain. Coarse plagioclase grains show intense undulatory extinction and neoblast grains occur along their grain boundaries. These textures are intensely replaced by alteration and associated microfractures. (KM)

PHOTOMICROGRAPHS:

1309D_185R_1_105_108_1
1309D_185R_1_105_108_2
1309D_185R_1_105_108_3
1309D_185R_1_105_108_4

THIN SECTION:	U1309D-185R-1, 133-136 cm	**Piece No.** 10	**Unit**: 496	**TS#: 470**	**OBSERVER:JB, DB, KM**
ROCK NAME:	Gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	40	60	2	10			Anhedral	
Clinopyroxene	20	40	1	12			Anhedral	
Oxide		0.5						

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Fibrous amphibole	20						Pyroxene	Also pervades cataclasis zone
Albite	15						Plagioclase	
Zeolites	10						Plagioclase	
Prehnite	3						Plagioclase	
Titanite							Ilmenite	
Rutile							Ilmenite	
Fibrous amphibole							Vein network	Extensive network, responsible for most alteration in slide
Zeolite							Vein network	Occurs in small quantities in amphibole veins and as separate veins, especially in plagilclase
Serpentine/chlorite							Vein network	Very fine grained, low birefringence

TOTAL ALTERATION: 50%, almost all associated with veining, probably <20% away from vein

STRUCTURE : Coase gabbro texture is heavily fractured associated with veining. Cataclasitic deformation occurs along the wall of veins, where primary pyroxene and plagioclase grains were fragmented in altered secondary mineral matrix. Intense microfracture networks occur pervasively in the whole thin section associated with intense alteration. (KM)

PHOTOMICROGRAPHS:

1309D_185R_1_133_136_1
1309D_185R_1_133_136_2
1309D_185R_1_133_136_3
1309D_185R_1_133_136_4
1309D_185R_1_133_136_5
1309D_185R_1_133_136_6

THIN SECTION:	U1309D-186R-1, 95-97 cm	**Piece No.** 15	**Unit**: 498	**TS#: 471**	**OBSERVER: TN, DB, KM**
ROCK NAME:	Olivine gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	65	70	0.5	4			Anhedral	
Clinopyroxene	20	25	0.1	3			Anhedral, interstitial	Interlocked clinopyroxene contacts
Olivine	3	5	0.5	2			Anhedral, interstitial	Olivine forms intergrown trains and patches together with clinopyroxene

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite/tremolite	2						Olivine, plagioclase, clinopyroxene	Corona, overgrowth
Chlorite	2						Plagioclase, olivine, vein	Corona, crack filling, vein aggregate
Talc	2						Olivine	Pseudomorphic
Brown amphibole	<1						Clinopyroxene	
Oxides	<1							
Sulfides	<1							

TOTAL ALTERATION: 7%

STRUCTURE : Primary igneous texture with weak plastic strain. Olivine grains commonly show kinking with undulatory extinction. Clinopyroxene grains show slight undulatory extinction with very locally subgrain boundaries. Plastic strain in plagioclase grains is more intense among the primary minerals. They show neoblast grains at serrated grain boundaries with clear undulatory extinction. Later open fractures with chlorite infill crosscut the whole thin section. (KM)

PHOTOMICROGRAPHS:

1309D_186R_1_95_97_1

1309D_186R_1_95_97_2

THIN SECTION:	U1309D-186R-3, 87-90 cm	**Piece No.** 8A	**Unit**: 498	**TS#: 472**	**OBSERVER: DB, TN, KM**
ROCK NAME:	Gabbro/magmatic dike				
GRAIN SIZE:	Coarse/medium				
TEXTURE:					

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Gabbro								
Clinopyroxene		52	0.2	6			Anhedral	
Plagioclase		45	0.5	6			Anhedral	
Oxide		3	0.1	3			Anhedral	Enriched close to the contact
Magmatic dike								
Oxide								
Apatite				2				
Zircon				3				
Titanite				3				

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Green amphibole	10						Clinopyroxene	
Brown amphibole	1						Clinopyroxene	
Chlorite	5						Clinopyroxene, plagioclase	
Epidote	20						Plagioclase	
Albite	10						Ilmenite	
Titanite	2						Interstitial	
Carbonate	1						Interstitial	
Zeolite?	1							

TOTAL ALTERATION: 50%

STRUCTURE : Gabbro: igneous texture with weak plastic strain, so that weak undulatory extinction occurs. Diabase: weak plastic strain resulted in undulatory extinction. No clear boundary between gabbro and diabase. (KM). Well equilibrated neoblasts of plagioclase also present (GS)

PHOTOMICROGRAPHS:

1309D_186R_3_87_90_1
1309D_186R_3_87_90_2
1309D_186R_3_87_90_3

THIN SECTION:	U1309D-187R-1, 35-37 cm	Piece No. 4	Unit: 501	TS#: 473	OBSERVER: EH, TN, KM
ROCK NAME:	Oxide gabbro				
GRAIN SIZE:	Fine to coarse				
TEXTURE:					

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	20	75		30				Contains many alteration inclusions
Clinopyroxene	7	20		9				Now partly replaced by amphibole, possibly primary amphibole as well. Encloses oxides
Ti-oxide	5	5		3	1			
Apatite	0.2	0.2						

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Green amphibole	10						Clinopyroxene, brown amphibole	
Brown amphibole	1						Clinopyroxene	Besides this, primary euhedral brown amphibole appears as well.
Epidote	20						Plagioclase	
Titanite	2						Ilmenite	
Albite	10						Plagioclase	Network within original plagioclase
Prehnite?	2						Plagioclase	
Carbonate	5						Plagioclase, vein	

TOTAL ALTERATION: 50%

STRUCTURE : Very coarse grained gabbro with moderate alteration. Crack healing can be observed in this section, which crosscut oxide as well. Fine grained clinopyroxene grains occur in one side of the section, possibly as a result of plastic deformation? (KM)

PHOTOMICROGRAPHS:

1309D_187R_1_35_37_1

1309D_187R_1_35_37_2

THIN SECTION:	U1309D-187R-1, 69-72 cm	**Piece No.** 1	**Unit**: 502	**TS#: 474**	**OBSERVER: TN, JB, DB**
ROCK NAME:	Gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase		45	0.5	14			Anhedral	
Clinopyroxene		54	0.5	14			Anhedral	
Oxide		1	0.1	3			Anhedral	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Green amphibole	10						Clinopyroxene	
Brown amphibole	<1						Clinopyroxene	
Chlorite	5						Clinopyroxene, plagioclase	
Calcite								In zone of cataclasis
Zeolite								In zone of cataclasis
Serpentine?								In zone of cataclasis

TOTAL ALTERATION: 15%

STRUCTURE : Coarse gabbro crosscut by cataclastic vein associated with amphibole alteration. Sinistral sense of shear can be determined from an offset of a coarse brownish clinopyroxene grain. Replaced amphibole grains were also fragmented along the vein, suggesting that cataclastic deformation occurred subsequently after the amphibole alteration. (KM)

PHOTOMICROGRAPHS:

1309D_187R_1_69_72_1
1309D_187R_1_69_72_2
1309D_187R_1_69_72_3
1309D_187R_1_69_72_4
1309D_187R_1_69_72_5
1309D_187R_1_69_72_6
1309D_187R_1_69_72_7
1309D_187R_1_69_72_8

THIN SECTION:	U1309D-187R-3, 118-121 cm	**Piece No.** 7C	**Unit**:	**TS#: 475**	**OBSERVER: JE, JB, AD, NA**			
ROCK NAME:	Oxide gabbro dikelet							
GRAIN SIZE:	Coarse							
TEXTURE:	Seriate							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**			**Composition**	**MORPHOLOGY**	**COMMENTS**
			min.	**max.**	**av.**			
Plagioclase	35	45	0.1	8			Subhedral	Strongly zoned in the center of the vein.
Clinopyroxene	10	35	0.1	8			Anhedral	Partly replaced by brown amphibole.
Ilmenite	15	15	<0.1	5			Anhedral to interstitial	
Clinopyroxene?	0	5	0.1	4			Anhedral	Replaced by green amphibole, especially in the center of the vein.

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron)**				**REPLACING / FILLING**	**COMMENTS**
			min.	**max.**	**av.**			
Pale green/brown amphibole	15%						Pyroxene	
Green-brown amphibole	10%						Clinopyroxene	
Rutile?	<1						Ilmenite?	Dark brown, high relief, index, spherulitic
Talc	3						Orthopyroxene	
Albite	3						Plagioclase	
Zeolite	3						Plagioclase	
Titanite	<1						Ilmenite	
Sulfides	<1							Chalcopyrite, pyrrhotite

TOTAL ALTERATION: 25-35% depending on how much amphibole is primary

STRUCTURE : Weak plastic deformation, with neoblast formation along larger plagioclase grains. Network of cracks that crosscut oxides. Overall, insignificant strain (JE).

PHOTOMICROGRAPHS:

1309D_187R_3_118_121_1
1309D_187R_3_118_121_2
1309D_187R_3_118_121_3

THIN SECTION:	U1309D-188R-1, 6-9 cm	**Piece No.** 1	**Unit**: 502	**TS#: 476**	**OBSERVER: DB, TN, JE**
ROCK NAME:	Olivine and orthopyroxene bearing gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	70	70	0.5	6			Anhedral	
Clinopyroxene	20	23	0.1	6			Anhedral, oikocrystic, interstitial	Enclose plagioclase chadacrysts, interlocked contacts
Olivine	3	4	0.5	5			Anhedral	
Orthopyroxene	3	3	0.5	6			Anhedral, oikocrystic, interstitial	Enclose olivine rounded chadacrysts
Oxide	Tr.	Tr.					Anhedral	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Green amphibole	<1						Clinopyroxene	
Brown amphibole	<1						Clinopyroxene	
Talc	<1						Olivine, orthopyroxene	
Serpentine	<1						Olivine	
Oxides	<1						Olivine	

TOTAL ALTERATION: 2%

PHOTOMICROGRAPHS:

1309D_188R_1_6_9_1
1309D_188R_1_6_9_2
1309D_188R_1_6_9_3
1309D_188R_1_6_9_4
1309D_188R_1_6_9_5

THIN SECTION:	U1309D-188R-2, 34-36 cm	**Piece No.** 1B	**Unit**: 503	**TS#: 477**			**OBSERVER: DB, TN, JE,GS**	
ROCK NAME:	Orthopyroxene and olivine bearing gabbro							
GRAIN SIZE:	Medium							
TEXTURE:	Seriate							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	70	70	0.5	5			Anhedral	
Clinopyroxene	25	25	0.1	4			Anhedral, interstitial	Interlocked contacts, abundant orthopyroxene exsolutions
Orthopyroxene	2	3	1	2			Anhedral	
Olivine	2	2	0.5	2			Anhedral	

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Green amphibole	<1						Clinopyroxene	
Brown amphibole	<1						Clinopyroxene	
Serpentine	<1						Olivine	
Oxides?	<1						Olivine	

TOTAL ALTERATION: 1%

PHOTOMICROGRAPHS:
1309D_188R_2_34_36_1
1309D_188R_2_34_36_2

THIN SECTION:	U1309D-189R-3, 36-38 cm	**Piece No.** 1	**Unit**: 508	**TS#: 478**	**OBSERVER: AD, DB, JE, GS, NA**
ROCK NAME:	Olivine gabbro				
GRAIN SIZE:	Pegmatitic				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Olivine	15	30	1	12			Anhedral	
Plagioclase	30	30	1	10			Anhedral	
Clinopyroxene	30	40		50			Oikocrystic, interstitial	Encloses olivine, plagioclase

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Serpentine	7						Olivine	And as big vein associated with chlorite
Tremollite	1						Olivine	
Green amphibole	8						Pyroxene	

TOTAL ALTERATION: 16 %

STRUCTURE : Magmatic texture with no plastic deformation. Later crack network with alteration of olivine to serpentine locally, with varying intensity. Cracks crosscut both olivine and continue into pyroxene, but serpentinization restricted to the olivine grains. Oxides along center of serpentinite cracks - local mesh-texture associated with larger veins. (JE) Plagioclase shows shape alignment suggesting early magmatic strain. Olivine with clear neoblasts. Note how olivine enclosed in plagioclase (within the clinopyroxene oikocryst) is all optically related.(GS)

PHOTOMICROGRAPHS:

1309D_189R_3_36_38_1
1309D_189R_3_36_38_2
1309D_189R_3_36_38_3

THIN SECTION:	U1309D-189R-3, 103-105 cm	**Piece No.** 1E	**Unit**: 508	**TS#: 479**	**OBSERVER: AD, EH, JE**
ROCK NAME:	Troctolite				
GRAIN SIZE:	Medium to coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	54	55		10	3		Anhedral	
Olivine	43	45	0.2	14	4		Anhedral, oikocrystic	Weak subgrain formation, original very coarse and highly irregular grains dominate, encloses rounded plagioclase
Clinopyroxene	0.1	0.1		0.5			Interstitial	Dominantly fine grains along plagioclase grain boundaries
Orthopyroxene	0.1	0.1		0.5			Interstitial	Fine rims around olivine, as well as medium-grained plagioclase-replacing interstitial grains

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Tremolite	<1						Olivine	
Green amphibole	<1						Olivine	Actinolite ?
Serpentine	<1						Olivine	As vein cutting the olivine grains
Magnetite								
Pentlandite								
Chalcopyrite								

TOTAL ALTERATION: 1-2 %

STRUCTURE : Magmatic foliation given by plagioclase crystal alignment. Very weak plastic overprint with neoblasts (scarce). Late microcrack network, with more intense fracturing of olivine, with very weak serpentinization. (JE) Perhaps best magmatic foliation seen so far. Olivine with tilt walls, but no systematic orientation.(GS)

PHOTOMICROGRAPHS:

1309D_189R_3_103_105_1

1309D_189R_3_103_105_2

THIN SECTION:	U1309D-189R-4, 42-44 cm	**Piece No.** 3	**Unit**: 508	**TS#: 480**	**OBSERVER: PF, JB, EH, JE**
ROCK NAME:	Gabbronorite				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	50	70		15	6		Anhedral	
Clinopyroxene	5	20		12	6		Anhedral	
Orthopyroxene	3	10		20			Anhedral	One very coarse grain
Oxide	0.5	0.5		1			Interstitial	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Green amphibole	5						Vein	
Brown amphibole	<1							Small grains in amphibole
Chlorite	10						Plagioclase	
Tremolite	15						Olivine	And in veinlets in amphibole
Actinolite	1						Vein	
Serpentine	2						Vein	
Zeolite	<1							In veinlets in pyroxene
Ilmenite	<1							May be primary
Chalcopyrite	<<1							In serpentine vein
Chalcocite	<<1							In serpentine vein
Bornite	<<1							In serpentine vein

TOTAL ALTERATION: 35%

STRUCTURE : Primary texture shows very weak plastic deformation with formation of plagioclase neoblasts. Later fracturing with pervasive alteration. Thin section is crosscut by an early serpentinite vein, with associated cataclasis. Opaque minerals concentrate in irregular bands along the edges of the vein, or perpendicular to it, with an irregular distribution. (JE)

PHOTOMICROGRAPHS:

1309D_189R_4_42_44_1
1309D_189R_4_42_44_2
1309D_189R_4_42_44_3
1309D_189R_4_42_44_4
1309D_189R_4_42_44_5
1309D_189R_4_42_44_6
1309D_189R_4_42_44_7
1309D_189R_4_42_44_8
1309D_189R_4_42_44_9
1309D_189R_4_42_44_10
1309D_189R_4_42_44_11
1309D_189R_4_42_44_12
1309D_189R_4_42_44_13

THIN SECTION:	U1309D-190R-1, 86-88 cm	**Piece No.** 11	**Unit**:	**TS#: 481**	**OBSERVER: AD, EH, JB**
ROCK NAME:	Gabbro/troctolite contact				
GRAIN SIZE:	Coarse and medium				
TEXTURE:	Seriate and equigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Gabbro								
Plagioclase	70	80	0.2	8	6		Anhedral	
Clinopyroxene	15	20	0.2	20			Anhedral and interstitial	One very coarse grain growing across contact. Relict or overgrowth? Crosscutting relationships cannot be solved unambiguously from textures alone.
Troctolite								
Plagioclase	45	50					Anhedral	
Clinopyroxene	1	1			0.3		Interstitial	
Olivine	40	50	0.2	3	2		Anhedral	Round-lobate, concave-outward pinching out at two-plagioclase-olivine triple junctions
Orthopyroxene	0.1	0.1	0.05	0.1			Interstitial	Thin selvage at a few olivine-plagioclase grain boundaries
COMMENTS								

Contact is interfingering, deeply lobate, marked by troctolite-hosted concave-outward plagioclase by clinopyroxene. Exact boundary difficult to pinpoint

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Serpentine	2						Olivine	
Talc	1						Olivine	
Tremollite	2						Olivine	
Chlorite	2						Plagioclase	At contact between plagioclase and olivine, and within fractures in the plagioclase grain
Green amphibole	2						Pyroxene	
Prehnite	<1						Plagioclase	
Sulfides	1							Pyrrhotite, pentlandite, chalcopyrite (some pentlandite appears primary)
Magnetite	1							Secondary with tremolite and serpentine in vein crossing most of section

TOTAL ALTERATION: 11 %

STRUCTURE : No plastic nor magmatic deformation. Network of fractures filled with serpentinite. Fibers perpendicular to vein walls indicating vein opening. (JE) Olivine with tilt walls. Plagioclase in troctolite pretty rounded and pretty much formed at same time as olivine (GS)

PHOTOMICROGRAPHS:

1309D_190R_1_86_88_1

1309D_190R_1_86_88_2

THIN SECTION:	U1309D-191R-1, 54-56 cm	**Piece No.** 2C	**Unit**: 514/515	**TS#: 482**	**OBSERVER:AH, TN, DB**
ROCK NAME:	Olivine gabbro / gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Olivine gabbro								
Plagioclase	45	50	1	12			Anhedral	
Olivine	10	20	1	6			Anhedral	
Clinopyroxene	25	30	0.1	4			Anhedral, interstitial	
Gabbro								
Plagioclase	45	50	0.5	12			Anhedral	
Clinopyroxene	40	50	0.2	13			Anhedral	
Clinopyroxene and olivine realtionships do not allow determine the boundary position.								

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite/temolite	5						Olivine, plagioclase, clinopyroxene, vein	Grain boundaries between olivine and plagioclase, crack filling, and vein aggregate
Brown amphibole	<1						Clinopyroxene	
Chlorite	5						Plagioclase, olivine	Crack filling
Talc	5						Olivine	Pseudomorphic
Serpentine	5						Olivine	Pseudomorphic
Prehnite	2						Plagioclase	
Oxides	1							
Sulfides	<1							

TOTAL ALTERATION: 23%

STRUCTURE : Minerals exhibit no preferred orientation, therefore no magmatic foliation. Plagioclase minerals exhibit weak undulatory extinction, lobate grain boundaries and the occasional subgrain boundary. Pyroxene minerals exhibit very weak undulatory extinction and formation of kink bands. Olivine fractures have been infilled by opaques. A network of infilled fractures crosscut the minerals and small microcracks are observed.

PHOTOMICROGRAPHS:

1309D_191R_1_54_56_1

1309D_191R_1_54_56_2

THIN SECTION:	U1309D-191R-2, 85-87 cm	**Piece No.** 4A	**Unit**: 515	**TS#: 483**	**OBSERVER:AH, TN, DB**
ROCK NAME:	Gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	60	64	0.5	5			Anhedral	
Clinopyroxene	30	35	0.1	7			Anhedral, interstitial, oikocrystic	Encloses rounded plagioclase chadacryst
Olivine	0.5	1	0.1	1			Anhedral, interstitial, oikocrystic	Textually associated with clinopyroxene forms a continuous network.
Orthopyroxene		0.5			1		Anhedral	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite/tremolite	1						Olivine?, plagioclase, clinopyroxene	
Brown/green amphibole	2						Clinopyroxene	
Chlorite	2						Plagioclase	
Talc	2						Olivine	
Zeolites?	2						Vein	Two species of zeolites?
Carbonate	1						Vein	
Oxides	<1							
Sulfides	<1							

TOTAL ALTERATION: 10%

STRUCTURE : Minerals do not show a preferred orientation, so no magmatic foliation. Plagioclase crystals exhibit very weak undulatory extinction, bending of the lamellae and slightly lobate grain boundaries. Localized zones of recrystallized plagioclase crystals are observed. Pyroxene crystals exhibits very weak undulatory extinction and occasional kink bands. Wide infilled vein with alteration of the minerals on either side. Pervasive microcracking originating at the vein and pentrating into the minerals.

PHOTOMICROGRAPHS:
1309D_191R_2_85_87_1
1309D_191R_2_85_87_2

THIN SECTION:	U1309D-191R-3, 66-69 cm	**Piece No.** 4A	**Unit**: 515	**TS#: 484**	**OBSERVER: AD, EH, AH,GS**
ROCK NAME:	Gabbronorite				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	58	60		20			Anhedral	
Clinopyroxene	10	22		20			Anhedral	Contains abundant irregular brown amphibole blebs leading to local recrystallization
Orthopyroxene	12	15		15			Anhedral	Incipient replacement by talc along fractures. Encloses clinopyroxene
Oxide	3	3		4			Interstitial	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Green amphibole	2						Pyroxene	Cummingtonite ??
Brown amphibole	2						Pyroxene	
Tremolite	2						Pyroxene	
Magnetite	<1							
Sulfides	<1							

TOTAL ALTERATION: 6%, if clinopyroxene replacement is counted as well, then it's closer to 15%

STRUCTURE : Grains exhibit a weak preferred orientation showing the magmatic fabric. Plagioclase crystals exhibit undulatory extinction, bending of the lamellae, lobate grain boundaries and the formation of recystallized grains along the grain boundaries. Pyroxene crystals exhibit weak undulatory extinction. Weak microcracking is exhibited crosscutting the boundaries between crystals(AH). Note presence of green amphibole against euhedral faces of plagioclase reminiscent of earlier slides showing melt infiltrating into gabbro and corroding minerals.(GS)

PHOTOMICROGRAPHS:
1309D_191R_3_66_69_1
1309D_191R_3_66_69_2

THIN SECTION:	U1309D-192R-1, 80-82 cm	**Piece No.** 5B	**Unit**: 515	**TS#: 485**	**OBSERVER: AD, KM, DB**
ROCK NAME:	Orthopyroxene bearing gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Subpoikilitic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	58	60	0.5	9			Subhedral, anhedral	
Clinopyroxene	36	38	0.1	8			Suboikocrystic, anhedral, interstitial	Interlocked contacts
Orthopyroxene	3	2	0.5	3			Anhedral	
Oxide		0.1	0.1	1			Interstitial	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Green amphibole	<1						Pyroxene	
Brown amphibole	<1						Pyroxene	
Prehnite	1						Plagioclase	The plagioclase close to the vein is altered to prehnite
Ilmenite ?	<1							
Pyrrhotite	<1							
Chalcopyrite	<1							
Pentlandite	<1							
Vein								
Zeolite								Likely two different kinds of zeolite with one fibrous forming radial aggregates
Prehnite								
Serpentine								
Tremolite								

TOTAL ALTERATION: 2% (and the alteration is related to the vein). The minerals occurring into the veins varies from tremolite at one edge, to serpentine, prehnite, and zeolites (likely two kinds of zeolites)

STRUCTURE : Primary igneous texture with open fractured veins. Weak plastic deformation resulted in pervasive undulatory extinction in both plagioclase and clinopyroxene grains as well as local deformation twinning in plagioclase. Alteration is intense along the open fractured vein. (KM)

PHOTOMICROGRAPHS:

1309D_192R_1_80_82_1
1309D_192R_1_80_82_2
1309D_192R_1_80_82_3
1309D_192R_1_80_82_4
1309D_192R_1_80_82_5
1309D_192R_1_80_82_6

THIN SECTION:	U1309D-192R-3, 58-61 cm	**Piece No.** 5A	**Unit**: 515	**TS#: 486**	**OBSERVER: TN, JB, DB, GS**
ROCK NAME:	Gabbronorite				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	60	65	0.5	8			Anhedral	
Clinopyroxene	23	25	0.1	7			Anhedral, interstitial	
Orthopyroxene	8	10	2	7			Anhedral, lobate	Several clinopyroxene bleb exsolution

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite	2						Clinopyroxene, interstitial, vein	
Talc	1						Orthopyroxene	
Chlorite	2						Clinopyroxene, plagiocase	
Prehnite	<1						Vein	
Unknown	<1						Vein	Elongated crystals with high refractive index, parallel extinction, moderate interference color and length-fast features.
Zeolite							Vein	
Carbonate							Vein	

TOTAL ALTERATION: 5%

STRUCTURE : Possibly weak magmatic strain by plagioclase alignment. Minor recrystallization of plagioclase. Infilled microcrack. (GS)

PHOTOMICROGRAPHS:

1309D_192R_3_58_61_1
1309D_192R_3_58_61_2
1309D_192R_3_58_61_3
1309D_192R_3_58_61_4
1309D_192R_3_58_61_5
1309D_192R_3_58_61_6
1309D_192R_3_58_61_7
1309D_192R_3_58_61_8
1309D_192R_3_58_61_9
1309D_192R_3_58_61_10

THIN SECTION:	U1309D-193R-1, 38-40 cm	**Piece No.** 1B	**Unit**: 515	**TS#: 487**	**OBSERVER: TN, EH, AH**
ROCK NAME:	Gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Subequigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	64	65		9	7		Anhedral, subhedral	Subhedral tabular chadacrysts
Clinopyroxene	30	35		10			Anhedral, oikoicrystic, interstitial	Encloses large rounded plagioclase

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite	<1						Interstitial, clinopyroxene	
Chlorite	<1						Interstitial, clinopyroxene	
Talc	<1						Orthopyroxene, olivine?	

TOTAL ALTERATION: 2%

STRUCTURE : Grains show no magmatic foliation due to having no preferred orientation. Pyroxene crystals contain inclusions of plagioclase and exhibit very weak undulatory extinction. The plagioclase crystals exhibit undulatory extinction, bending of lamellae and lobate grain boundaries. Very weak microcracking. (AH) Note a generation of highly prismatic, small plagioclase grains which occurs only as chadacryst within clinopyroxene. Between some of them, orthopyroxene occurs (see photo)(GS).

PHOTOMICROGRAPHS:

1309D_193R_1_38_40_1
1309D_193R_1_38_40_2
1309D_193R_1_38_40_3

THIN SECTION:	U1309D-193R-3, 118-121 cm	**Piece No.** 6C		**Unit**: 517	**TS#: 488**		**OBSERVER: TN, EH, AH**	
ROCK NAME:	Gabbronorite							
GRAIN SIZE:	Medium							
TEXTURE:	Seriate							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**			**Composition**	**MORPHOLOGY**	**COMMENTS**
			min.	**max.**	**av.**			
Plagioclase	55	60	0.2		3		Anhedral	
Clinopyroxene	10	35		4	2		Anhedral	
Orthopyroxene	2	5		5	3		Anhedral	Enclosing irregular subrounded plagioclase chadacrysts
Oxide	0.5	0.5		1			Interstitial	

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron)**				**REPLACING / FILLING**	**COMMENTS**
			min.	**max.**	**av.**			
Green amphibole	20						Pyroxene, plagioclase, vein	Pseudomorph, overgrowth, and crack filling
Chlorite	5						Plagioclase	Crack filling
Talc	10						Orthopyroxene	Pseudomorph or crack filling
Fibrous amphibole							Vein	

TOTAL ALTERATION: 35%

STRUCTURE : Grains exhibit a random texture. Plagioclase grains exhibit undulatory extinction, bending of lamallae and the formation of subgrains. Small amount of recrystalliztion of plagioclase. Pyroxene grains exhibit weak undulatory extinction and the formation of occasional kink bands. Pyroxene grains contain inclusions of plagioclase and patches of alteration. Fairly wide vein which is infilled with fiberous amphibole. Also few microcracks are exhibit crosscutting the grain boundaries.

PHOTOMICROGRAPHS:

1309D_193R_3_118_121_1

1309D_193R_3_118_121_2

THIN SECTION:	U1309D-193R-4, 73-77 cm	**Piece No.** 2F	**Unit**: 517	**TS#: 489**	**OBSERVER:AD, AH, DB**
ROCK NAME:	Gabbronorite				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	60	65	1	16			Anhedral, subhedral	
Clinopyroxene	15	21	1	12			Anhedral, subhedral	
Orthopyroxene	7	14	1	8			Anhedral, subhedral	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Tremolite	2						Pyroxene	
Talc	2						Pyroxene	Intergrowth of talc and tremolite together replacing the pyroxene
Green amphibole	2							Cummingtonite
Chlorite	2						Plagioclase	Replacing the plagioclase close to the vein
Magnetite	<1							
Ilmenite	<1							
Pyrrhotite	<1							
Pyrite	<1							
Vein								
Chlorite								
Tremolite								
Talc								As vein cutting the pyroxene crystals associated with green amphibole

TOTAL ALTERATION: 10 %

STRUCTURE : Grains exhibit no preferred orientation, therefore no magmatic foliation. Plagioclase crystals exhibit weak undulatory extinction and lobate grain boundaries. One large plagioclase crystal is crosscut by a vein but shows no offset of the grain. There is a grain size boundary exhibited. Pyroxene grains have been mostly altered to talc and tremolite. Small microcracks penetrate the crystals and are sourced at the vein. (AH) Note exremely lobate plagioclase in clinopyroxene, suggesting resorption of plagioclase (GS)

PHOTOMICROGRAPHS:

1309D_193R_4_73_77_1
1309D_193R_4_73_77_2
1309D_193R_4_73_77_3

THIN SECTION:	U1309D-194R-2, 61-63 cm	**Piece No.** 1B	**Unit**: 517	**TS#: 490**	**OBSERVER:AD, DB, KM**
ROCK NAME:	Gabbronite				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	65	65	0.5	12			Anhedral, oikocrystic	Contains round clinopyroxene
Clinopyroxene	23	25	0.1	10			Anhedral	Interlocked contacts, abundant orthopyroxene blebs, rounded plagioclase chadacrysts enclosed
Orthopyroxene	8	10	0.5	7			Anhedral	Few rounded plagioclase and rare clinopyroxene enclosed

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Green amphibole	3						Pyroxene	
Talc	1						Pyroxene	
Prehnite	<1						Plagioclase	
Chlorite	<1						Plagioclase	As veins filling the cracks
Pyrrhotite	<1							
Chalcopyrite	<1							
Magnetite	<1							

TOTAL ALTERATION: 6%

STRUCTURE : Primary igneous texture with weak plastic strain. Plagioclase grains preserve clear evidence of plastic strain such as deformation twinning, kinking and small neoblasts with moderate undulatory extinction. Some clinopyroxene grains also show undulatory extinction with local subgrain boundaries. Minor fractures associated alteration. (KM)

PHOTOMICROGRAPHS:

1309D_194R_2_61_63_1

1309D_194R_2_61_63_2

THIN SECTION:	U1309D-194R-3, 98-101 cm	**Piece No.** 2B	**Unit**: 517	**TS#: 491**	**OBSERVER: AD, EH, KM**
ROCK NAME:	Olivine-bearing gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Subequigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	62	65	0.1		2			
Clinopyroxene	25	30	0.1		2			Interlocked contacts
Olivine	1	4			1			Strongly replaced by talc-tremolite corona texture
Orthopyroxene	1	1			0.5			Intergrown selvages between plagioclase and olivine, possibly pigeonitic. Rare chadacrysts in plagioclase

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Tremolite	3						Olivine	
Talc	2						Olivine	
Green amphibole	2						Pyroxene	Actinolite ?
Chlorite	2						Plagioclase	As rim between olivine and plagioclase and also occurs as veinlets
Prehnite	1						Plagioclase	
Pyrhhotite	<1							
Chalcopyrite	<1							

TOTAL ALTERATION: 10%

STRUCTURE : Subequigranular texture with no magmatic fabrics. Low plasticity such as kinking with slight undulatory extinction. Set of subparallel tiny open cracks with alteration mineral infill. (KM)

PHOTOMICROGRAPHS:

1309D_194R_3_98_101_1
1309D_194R_3_98_101_2
1309D_194R_3_98_101_3

THIN SECTION:	U1309D-194R-4, 22-24 cm	**Piece No.** 3	**Unit**: 517	**TS#: 492**	**OBSERVER: TN, EH, KM**
ROCK NAME:	Gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Subequigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	60	65	0.2	3	2		Anhedral	
Clinopyroxene	15	35	0.2	3	2		Anhedral	Clusters of discrete grains extinct simultaneuously: possibly some orthopyroxene, now altered
Olivine	0	1?						Talc-amphibole replacement?
Alteration increases strongly from < 5% 2 cm away to >50% near the the vein								

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Green amphibole	50						Clinopyroxene, interstitial	
Albite	2						Plagioclase	
Epidote	<1							Near or within vein
Titanite	<1						Ilmenite?	
Zeolite	5						Vein	

TOTAL ALTERATION: 57%

STRUCTURE : Subequigranular gabbro crosscut by veins associated with cataclasis. (KM) At least in one part of slide has reasonable magmatic foliatoin. Clinopyroxene and plagioclase are variably recrystallized. (GS)

PHOTOMICROGRAPHS:

1309D_194R_4_22_24_1

1309D_194R_4_22_24_2

THIN SECTION:	U1309D-194R-4, 97-100 cm	**Piece No.** 7B	**Unit**: 517	**TS#: 493**	**OBSERVER: PF, EH,GS**
ROCK NAME:	Olivine-bearing gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase		60	0.2	6	3		Anhedral	
Clinopyroxene		35	0.2	9	3		Anhedral	Interlocking clinopyroxenes, cluster of discrete grains extinct simultaneously
Olivine		4			1		Interstitial	Highly irregular grains, pinching out into two-plagioclase triple junctions
Orthopyroxene		1			0.2		Interstitial	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Talc	<1							
Ilmenite	<<1							With talc
Sulfide	<<1							With talc , also primary(?) chalcopyrite(?) and pyrrhotite
Green amphibole	<1							
Serpentine	<1						Oliviine	As fine veinlets in olivine

Total Alteration: <1%

STRUCTURE : Gabbro with weak alignment of plagioclase in one part of slide. Only small areas of plagioclase have neoblast formation. Olivine with the usual tilt walls, clinopyroxene without significant recrystallization. Again very elongate plagioclase is present within clinopyroxene oikocrysts. (GS)

PHOTOMICROGRAPHS:

1309D_194R_4_97_100_1

1309D_194R_4_97_100_2

THIN SECTION:	U1309D-195R-3, 44-46 cm	**Piece No.** 2	**Unit**: 517	**TS#: 494**	**OBSERVER: PF, EH, KM**
ROCK NAME:	Olivine-bearing gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Subequigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	55	55		4	2			Recrystallized domains
Clinopyroxene	37	40		4	3			Interlocking texture between two clinopyroxenes, abundant orthopyroxene blebs
Olivine	3	3		2	1		Interstitial	Irregular interstitial grains
Orthopyroxene	1	1			1			One medium grain
Sulfide		0.1		0.05			Interstitial	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Green amphibole	<1						Pyroxene	
Talc	<1						Olivine	
Oxides	<1						Olivine	Accompanying talc
Tremolite	<<1						Olivine	
Chlorite	<<1						Plagioclase	
Sulfides	<<1							Very small, occurs with secondary talc after olivine

TOTAL ALTERATION: 2%

STRUCTURE : Primary igneous texture with some weak feature of plastic deformation. Plagioclase grains were bent with moderate undulatory extinction and deformation twinning, and have neoblasts at their grain boundaries. Other minerals have mostly weak features of plastic strain such as slight undulatory extinction with few subgrain boundaries. Later microcracks occur pervasively. (KM)

PHOTOMICROGRAPHS:

1309D_195R_3_44_46_1
1309D_195R_3_44_46_2
1309D_195R_3_44_46_3
1309D_195R_3_44_46_4

THIN SECTION:	U1309D-196R-1, 115-117 cm	**Piece No.** 1F	**Unit**: 518	**TS#: 495**			**OBSERVER: PF, EH,GS**	
ROCK NAME:	Orthopyroxene-bearing olivine gabbro							
GRAIN SIZE:	Coarse							
TEXTURE:	Seriate							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**			**Composition**	**MORPHOLOGY**	**COMMENTS**
			min.	**max.**	**av.**			
Plagioclase	15	15	0.2	3			Anhedral	
Clinopyroxene	47	50		20	8		Anhedral	Coarse oikocrysts enclosing olivine, plagioclase and orthopyroxene
Olivine	33	35	0.1	12	4		Anhedral	Abundant rounded olivine chadacrysts in clinopyroxene
Orthopyroxene	1	1		2			Interstitial	Dominantly as selvages between olivine and plagioclase, also as discrete medium sized grains in equilibrium with olivine
Sulfide	0.1	0.1		0.1				

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron)**				**REPLACING / FILLING**	**COMMENTS**
			min.	**max.**	**av.**			
Serpentine	1						Olivine	Veinlets in olivine (some kink-banding in olivine) and as brown, oxidized serpentine in one olivine grain
Oxides	<1						Olivine	In the center or fine serpentine veinlets in olivine, and in veins in pyroxene (with very fine amphibole?), also primary (ilmenite?)
Tremolite	<1						Olivine	Very sparse
Chlorite	<1						Plagioclase	As fringes on plagioclase grains, but very minor
Brown phyllosilicate?	<1						Pyroxene	Patches in pyroxene
Pyrrhotitte	<<1							
Chalcopyrite	<<1						Pyrrhotite	Fringes on pyrrhotite

TOTAL ALTERATION: ~2%

STRUCTURE : Undeformed, nearly ultramafic rock. Olivine with just about flat extinction. Equally, clinopyroxene is undeformed. Nice interstitial orthopyroxene. (GS)

THIN SECTION:	U1309D-196R-3, 62-64 cm	**Piece No.** 1B	**Unit**: 519	**TS#: 496**	**OBSERVER: PF, EH,GS**
ROCK NAME:	Olivine-bearing gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Equigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	55	55	0.2	5	4			
Clinopyroxene	35	40		5	4			
Olivine	3	4	0.2		3			Dominantly as discrete irregular grains in matrix, rarely as clinopyroxnene- and plagioclase-hosted chadacrysts
Orthopyroxene	1	1						Mainly as selvages at olivine plagioclase grain boundaries

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Tremolite	<1						Olivine	
Green amphibole	1						Pyroxene	

TOTAL ALTERATION: **~1%** nearly fresh gabbro. No, orthopyroxene lamellae in clinopyroxene

STRUCTURE : No magmatic strain, very minor plastic strain, fresh. Olivine with subgrains. Orthopyroxene again with nice rims, not deformed (GS)

PHOTOMICROGRAPHS:

1309D_196R_3_62_64_1
1309D_196R_3_62_64_2
1309D_196R_3_62_64_3
1309D_196R_3_62_64_4
1309D_196R_3_62_64_5
1309D_196R_3_62_64_6

THIN SECTION:	U1309D-196R-4, 66-69 cm	**Piece No.** 2C	**Unit**: 519	**TS#: 497**	**OBSERVER: DB, AD,GS**
ROCK NAME:	Olivine gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Subequigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	68	70	0.5	4			Anhedral	
Clinopyroxene	20	22	0.1	6			Anhedral, oikocrystic	Interlocked clinopyroxene contacts, encloses rounded plagioclase chadacrysts
Olivine	5	7	0.5	7			Anhedral	Texturally associated with clinopyroxene, forms a continuous network
Orthopyroxene		0.5	0.2	1			Anhedral, film	Rare discrete grains, rim between olivine and plagioclase

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Serpentine	2						Olivine	
Tremolite	2						Olivine	
Actinolite	1						Pyroxene	
Chlorite	1						Plagioclase	Filling cracks into plagioclase
Pyrrhotite	<1							
Chalcopyrite	<1							

TOTAL ALTERATION: 7%

STRUCTURE : Clearly visible magmatic strain in even sized olivine gabbro. Olivine has also low angle neoblasts, clinopyroxene seems undeformed, plagioclase has weak plastic strain in form of neoblasts, tapered twins.(GS)

PHOTOMICROGRAPHS:

1309D_196R_4_66_69_1

1309D_196R_4_66_69_2

THIN SECTION:	U1309D-197R-2, 19-21 cm	**Piece No.** 3A	**Unit**: 519	**TS#: 498**	**OBSERVER: DB, AD**
ROCK NAME:	Gabbronorite				
GRAIN SIZE:	Pegmatitic				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Orthopyroxene		50			20		Anhedral	Encloses rounded plagioclase chadacrysts, several blebs of clinopyroxene + pargasite
Clinopyroxene		20			20		Anhedral	
Plagioclase		30			10		Anhedral	
Oxide		1			3		Anhedral	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Tremolite	15						Pyroxene	As vein cutting the pyroxene grain
Actinolite	1						Pyroxene	Thin rim around the pyroxene grain
Brown amphibole	2						Pyroxene	
Green amphibole	2						Pyroxene	
Chlorite	1						Plagioclase	
Calcite	<1						Plagioclase	
Ilmenite	1							
Pyrrhotite	<1							

TOTAL ALTERATION: 22%

STRUCTURE : Too coarse to evaluate possible magmatic strain in this slide. Plastic strain is restricted to minor neoblast trails of plagioclase at grain boundaries. (GS)

PHOTOMICROGRAPHS:

1309D_197R_2_19_21_1

1309D_197R_2_19_21_2

THIN SECTION:	U1309D-197R-3, 37-40 cm	**Piece No.** 2	**Unit**: 519	**TS#: 499**	**OBSERVER: AD,GS, DB**
ROCK NAME:	Gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	55	65	0.5	8			Anhedral	
Clinopyroxene	10	35	0.1	4			Anhedral	
The mylonitic zone has the same gabbroic composition								

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Green amphibole	15						Pyroxene	
Actinolite	2						Pyroxene	As rim around the pyroxene
Chlorite	1						Plagioclase	
Tremolite	1							In the finer grained part with radial shape
Calcite	<1							vein

TOTAL ALTERATION: 30%

STRUCTURE : Gabbro with no magmatic and only minor plastic strain generating plagioclase neoblasts in local patches and tapered plagioclase twins. The leucocratic vein shows strong mineral alignment and a locally what appears to be a highly mylonitic margin with grain size of only 20 microns. Lack of strong LPO in this "mylonite" may indicate that grain size is a primariy feature and after all not strain related. Offshoots from the vein enter the local host as filled fractures. (GS)

PHOTOMICROGRAPHS:

1309D_197R_3_37_40_1

1309D_197R_3_37_40_2

THIN SECTION:	U1309D-197R-3, 103-105 cm	**Piece No.** 5	**Unit**: 519	**TS#: 500**	**OBSERVER: EH, PF, AD, GS**
ROCK NAME:	Gabbro				
GRAIN SIZE:	Variable				
TEXTURE:	Cataclastic				

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Plagioclase								
Clinopyroxene								In the cataclastic part: (sector-) zoning
The cataclastically deformed part of this thin section has undergone static dissolution/(re-)precipitation reactions.								
There are highly porous ex-plagioclase crystals, and there are clean, euhedral overgrowths and matrix-supported euhedral neoblasts.								
Apatites and zircons (as well as calcite) are exceedingly rare								

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Green amphibole	35						Pyroxene	
Zeolite	2						Plagioclase	
Vein								
Zeolite	12							
Pyroxene	17							
Actinolite	4							
Chlorite	2							

TOTAL ALTERATION: 70 %

STRUCTURE : A complex piece for which the following relationships are suggtested: coarse grained gabbro with altered clinopyroxenes is juxtaposed against a mafic vein. The assemblage is cut by a high stress, low temperature plastic strain shear zone with 20 µm sized neoblasts and only two relict porphyrclasts. The gabbro shows no sign of strain. There appears to be no good CPO of the grains in the mylonitic shear zone, perhaps indicating a diffusion creep regime. The mafic vein consists largely of clinopyroxene grains and some plagioclase which is highly altered. The mafic vein has suffered some plastic strain (low angle neoblast fomration) and subsequent brittle strain. Most puzzling is a brownish matrix within the mafic vein. Minerals against the brownish matrix tend to be euhedral, suggesting that the brownish matrix is more than alteration, perhaps representing an infiltrating melt or fluid. (GS)

PHOTOMICROGRAPHS:

1309D_197R_3_103_105_1
1309D_197R_3_103_105_2
1309D_197R_3_103_105_3

THIN SECTION:	U1309D-198R-1, 72-74 cm	**Piece No.** 3A	**Unit**: 521	**TS#: 501**	**OBSERVER: PF, EH,GS**
ROCK NAME:	Gabbronorite				
GRAIN SIZE:	Medium to coarse				
TEXTURE:	Bipoikilitic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	58	60		7	4		Anhedral	Rarely fine clinopyroxene enclosed
Clinopyroxene	28	30		8	6		Anhedral	Interlocked clinopyroxene grains. Oikocrysts with subrounded plagioclase chadacrysts
Orthopyroxene	6	9		7	5		Anhedral	Enclosing both clinopyroxene and plagioclase

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Talc	1						Pyroxene	
Green amphibole	<1						Pyroxene	Interstitial may be primary
Pyrrotite	<1							With pentlandite
Ilmenite	<<1							

TOTAL ALTERATION: ~2%

STRUCTURE : Strong magmatic foliation by alignment of plagioclase laths. No alignment of the poikilitic clinopyroxene. Minor neoblast trails of plagioclase along grain boundaries. Orthopyroxene exsolution blebs in clinopyroxene are most abundant where plagioclase is enclosed in clinopyroxene. They actually penetrate partially into the plagioclase. This could be a potential way to form an orthopyroxene rim on plagioclase? (photo) (GS)

PHOTOMICROGRAPHS:

1309D_198R_1_72_74_1
1309D_198R_1_72_74_2
1309D_198R_1_72_74_3

THIN SECTION:	U1309D-198R-2, 17-20 cm	**Piece No.** 1A	**Unit**: 521	**TS#: 502**				**OBSERVER: PF, EH, GS**	
ROCK NAME:	Contact between orthopyroxene bearing gabbro and olivine- and orthopyroxene-bearing microgabbro								
GRAIN SIZE:	Coarse and fine, respectively								
TEXTURE:	Seriate								

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Coarse Gabbro								
Plagioclase	55	60			12		Subhedral	
Clinopyroxene	30	40			8		Subhedral	
Orthopyroxene	1	2			3			
Microgabbro								
Plagioclase		50			1			
Clinopyroxene		50			1			
Orthopyroxene	2	2		3				One coarse oikocryst near contact, two smaller grains away from contact.
Olivine	1	1			0.1			Small , subrounded plagioclase-hosted grains

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Chlorite	1						Veins	
Talc	<1						Pyroxene	
Green amphibole	5						Pyroxene	
Brown amphibole	<<1						Pyroxene	
Opaques	<<1							In altered pyroxene as dusty fine grains (?)
Pyrrhotite	<1							More abundant in the altered pyroxene (larger grains may be primary)
Ilmenite	<1							Larger grains may be primary

TOTAL ALTERATION: 7%

STRUCTURE : Good magmatic strain in microgabbro, grain size too large in host gabbro to determine potential magmatic strain. Minor plastic strain in both host and microgabbro leading to well equilibrated neoblasts in microgabbro. Clinopyroxene not affected by plastic strain. Note unusually large orthopyroxene at margin of microgabbro, including the aligned microgabbro plagioclase laths. (GS)

PHOTOMICROGRAPHS:

1309D_198R_2_17_20_1
1309D_198R_2_17_20_2
1309D_198R_2_17_20_3
1309D_198R_2_17_20_4
1309D_198R_2_17_20_5
1309D_198R_2_17_20_6
1309D_198R_2_17_20_7

THIN SECTION:	U1309D-198R-4, 19-21 cm	**Piece No.** 1C	**Unit**: 521	**TS#: 503**	**OBSERVER: PF, EH,GS**
ROCK NAME:	Orthopyroxene-bearing gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Equigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	50	55		15				Remarkably fresh
Clinopyroxene	5	40		15				Nearly completely replaced by amphibole and chlorite
Orthopyroxene	0	4		10				Different alteration compared to clinopyroxene. Looks simlar to bastite

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Prehnite	1						Vein	
Green amphibole	5						Pyroxene and veinlets	In veinlets mostly actinoite
Green/brown amphibole	7						Pyroxene	Reaction rims and patches in pyroxene
Zeolite	1						Vein	Cuts across network of fine actinolite veinlets.
Chlorite	1						Plagioclase	Where in contact with proxene
Pyrrhotite	<1							Pyrrhotite with pentlandite(?)
Oxide	<1							

TOTAL ALTERATION: 16%? No… all pyroxenes are zombies, total alteration closer to 50%!

STRUCTURE : No visible magmatic strain. Plastic strain restricted to few plagioclase neoblasts and bit of subgrain formation in clinopyroxene. Oxides are interstitial. As reported by the metamorphic group, nice relationship of actinolite veins cutting zeolite veins. Note that this crosscutting relationship is likely to look like the opposite in hand specimen because the actinolite veins have a significant expression in the gabbro but are reduced to micron scale needles where they cut the zeolite veins. (GS)

PHOTOMICROGRAPHS:

1309D_198R_4_19_21_1
1309D_198R_4_19_21_2
1309D_198R_4_19_21_3
1309D_198R_4_19_21_4
1309D_198R_4_19_21_5
1309D_198R_4_19_21_6
1309D_198R_4_19_21_7
1309D_198R_4_19_21_8

THIN SECTION:	U1309D-199R-2, 35-37 cm	**Piece No.** 3B	**Unit**: 521	**TS#: 504**	**OBSERVER: GS, AD, DB, YO**
ROCK NAME:	Gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	60	70	0.5	6			Anhedral, subhedral	
Clinopyroxene	5	30	0.5	15			Suboikocrystic	

COMMENTS

The gabbro is cut by a vein composed of high Ca pyroxene. Some of the grains appear to be crystallized in a free space or high porosity.

Then filled by zeolite. Abundant polyphase fluid inclusions suggest high fluid activity during pyroxene growth. Relics of altered weathered plagioclase.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Green amphibole	40						Pyroxene	
Tremolite	2						Pyroxene	
Prehnite	1						Plagioclase	
Chlorite	1						Plagioclase	
Ilmenite	3							
Vein								
Zeolite	8							
Clinopyroxene	10							
Plagioclase	1							Altered and replaced to zeolite
Actinolite	2							Needles of actinolite associated with the zeolites

TOTAL ALTERATION: 68%

STRUCTURE : Similar vein to Sample 305-U1309D-197R-3, 37-40 cm. Leucocratic vein (zeolitic??) cuts host with no visible offset. While grain size is extremely small in parts of the vein, the lack of apparent offset precludes a grain size reduction by strain. Small grain size may thus be primary. Host is gabbro with only minor plastic strain. Grain boundaries and shape of plagioclase inclusions in clinopyroxene oikocrysts suggest corrosion of plagioclase. Again note the presence of very prismatic plagioclase laths where plagioclase is included in clinopyroxene.Veining, microcracking and alteration intensity in host increases as the leucocratic vein is approached (GS).

PHOTOMICROGRAPHS:

1309D_199R_2_35_37_1 **1309D_199R_2_35_37_2** **1309D_199R_2_35_37_3** **1309D_199R_2_35_37_4** **1309D_199R_2_35_37_5** **1309D_199R_2_35_37_6** **1309D_199R_2_35_37_7** **1309D_199R_2_35_37_8** **1309D_199R_2_35_37_9** **1309D_199R_2_35_37_10**

THIN SECTION:	U1309D-199R-3, 53-55 cm	**Piece No.** 1B	**Unit**: 521	**TS#: 505**	**OBSERVER: EH, AD,GS**
ROCK NAME:	Orthopyroxene-bearing gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Protopoikilitic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	55	55	0.2	10	6			
Clinopyroxene	36	40		13	8			Most clinopyroxene enclose subrounded plagioclase crystals. Interlocking clinopyroxene.
Orthopyroxene	3	4		3	2			

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Brown amphibole	1							
Green amphibole	3							
Magnetite	1							
Pyrrhotite	<<1							
Chalcopyrite	<<1							

TOTAL ALTERATION: 5%

STRUCTURE : Coarse gabbro with no magmatic strain and only traces of plastic strain. Minor microcracking, (GS)

PHOTOMICROGRAPHS:

1309D_199R_3_53_55_1
1309D_199R_3_53_55_2
1309D_199R_3_53_55_3

THIN SECTION:	U1309D-200R-2, 38-40 cm	**Piece No.** 1A	**Unit**: 521	**TS#: 506**	**OBSERVER: EH, AD,GS**
ROCK NAME:	Olivine- and orthopyroxene-bearing gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	54	55	0.2	6	4		Anhedral to subhedral (tabular)	
Clinopyroxene	35	40			3		Anhedral	Abundant interlocking clinopyroxenes
Orthopyroxene	2	3		2			Anhedral	Few discrete grains
Olivine	2	2	0.2	1			Anhedral	Cluster in one edge of the thin section

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Serpentine	<1						Olivine	
Tremolite	1						Olivine	
Brown amphibole	<1							
Actinolite	1							Thin veinets cutting the minerals associated with chlorite
Chlorite	1							
Pyrrhotite	<1							
Chalcopyrite	<1							

TOTAL ALTERATION: 5%

STRUCTURE : Igneous microstructure with no magmatic strain. Plastic strain is very minor (few neoblasts, tapering twins of plagioclase). Orthopyroxene is late, interstitial, and undeformed. Olivine shows good subgrains. Clinopyroxene is poikilitic and undeformed.(GS)

PHOTOMICROGRAPHS:

1309D_200R_2_38_40_1

1309D_200R_2_38_40_2

THIN SECTION:	U1309D-201R-1, 48-50 cm	**Piece No.** 2B	**Unit**: 521	**TS#: 507**	**OBSERVER: AD, DB,GS**
ROCK NAME:	Oxide gabbronorite mylonite				
GRAIN SIZE:	Variable				
TEXTURE:	Porphyroclastic				

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Plagioclase		75					Porphyroclast, neoblast	
Clinopyroxene		18					Porphyroclast, neoblast	Relics of clinopyroxene oikocrysts
Orthopyroxene		5					Porphyroclast, neoblast	
Oxide		2					Interstitial	

COMMENTS

Relics of tabular protomylonitic texture

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Brown-green amphibole	15						Pyroxene	And veinlets cutting the pyroxene
Magnetite	2							
Ilmenite	1							
Pyrrhotite	<1							
Chaclopyrite	<1							

TOTAL ALTERATION: 20%

STRUCTURE : Another nice mylonitic oxide gabbro, this time involving orthopyroxene. In one part, orthopyroxene neoblasts are tabular equigranular, restricted apparently to a formerly kinked region of the grain. S-C fabrics are developed. Neoblast size of plagiooclase down to 20 micron. Alteration of clinopyroxene to amphibole is static. (GS)

PHOTOMICROGRAPHS:

1309D_201R_1_48_50_1
1309D_201R_1_48_50_2
1309D_201R_1_48_50_3

THIN SECTION:	U1309D-201R-2, 103-105 cm	**Piece No.** 3	**Unit**: 521	**TS#: 508**	**OBSERVER: TN, DB,GS**
ROCK NAME:	Gabbro cut by vein				
GRAIN SIZE:	Coarse				
TEXTURE:	Equigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	35	55			4		Anhedral	
Clinopyroxene	20	45			5		Anhedral	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Actinolite/tremolite	20						Clinopyroxene, olivine(?), vein	
Brown amphibole	<1						Clinopyroxene	
Chlorite	1						Plagioclase	
Albite	2						Plagioclase	Network
Prehnite	3						Vein	Crack filling
Zeolites?	2						Vein	

TOTAL ALTERATION: 50

STRUCTURE : Host gabbro is weakly recrystallized showing clinopyroxne subgrains and coarse plagioclase neoblasts. There seems to be no movement across the vein because certain grains across the vein can be optically linked. However, minor cataclastic deformation is present. (GS)

PHOTOMICROGRAPHS:

1309D_201R_2_103_105_1

1309D_201R_2_103_105_2

THIN SECTION:	U1309D-202R-1, 56-58 cm	**Piece No.** 2A	**Unit**: 521	**TS#: 509**	**OBSERVER: TN, EH,GS**
ROCK NAME:	Orthopyroxene-bearing olivine gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Poikilitic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	49	50	0.2	12				Abundant subrounded to subtabular clinopyroxene-hosted chadacrysts
Clinopyroxene	35	40		18				
Olivine	7	9		10				Corona replacement at plagioclase contacts
Orthopyroxene	1	1		3				

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite/tremolite	2						Olivine, plagioclase, clinopyroxene	Corona, overgrowth, crack filling
Brown amphibole	<1						Clinopyroxene	
Chlorite	1						Olivine, plagioclase	Corona
Talc	1						Olivine	
Oxides	1						Olivine	
Sulfides	<1						Olivine	

TOTAL ALTERATION: 5%

STRUCTURE : Perhaps weak magmatic arrangement of plagioclase, plastic strain also weakly developed in the clinopyroxene and olivine. Orthopyroxene is deformation free. (GS)

PHOTOMICROGRAPHS:

1309D_202R_1_56_58_1

1309D_202R_1_56_58_2

THIN SECTION:	U1309D-202R-1, 105-107 cm	**Piece No.** 2C	**Unit**: 521	**TS#: 510**	**OBSERVER: TN, EH,GS**
ROCK NAME:	Gabbro				
GRAIN SIZE:	Medium to coarse				
TEXTURE:	Poikilitic				

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**			**Composition**	**MORPHOLOGY**	**COMMENTS**
			min.	**max.**	**av.**			
Plagioclase	30	60		5	4			
Clinopyroxene	20	40		8	5			Dominantly interlocking pyroxenes. No indication for presence of orthopyroxene

COMMENTS

Cataclastic subdomains?

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron)**				**REPLACING / FILLING**	**COMMENTS**
			min.	**max.**	**av.**			
Green amphibole	20						Clinopyroxene, vein	
Chlorite	30						Clinopyroxene	
Zeolites	3						Vein	
Carbonate	2						Vein	

TOTAL ALTERATION: 55%

STRUCTURE : No magmatic strain, weak plastic strain in both clinopyroxene (subgrains). Cataclastic shear zone seems to have generated an offset but size of clasts in cataclasite argue for minor total strain. (GS)

PHOTOMICROGRAPHS:

1309D_202R_1_105_107_1

1309D_202R_1_105_107_2

THIN SECTION:	U1309D-202R-3, 102-106 cm	**Piece No.** 2		**Unit**: 521	**TS#: 511**		**OBSERVER: AD, DB,GS**	
ROCK NAME:	Gabbro							
GRAIN SIZE:	Pegmatitic							
TEXTURE:								

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**			**Composition**	**MORPHOLOGY**	**COMMENTS**
			min.	**max.**	**av.**			
Plagioclase								
Clinopyroxene								

COMMENTS
Mode cannot be estimated because of grain size larger than thin section.

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron)**				**REPLACING / FILLING**	**COMMENTS**
			min.	**max.**	**av.**			
Brown-green amphibole	2						Pyroxene	
Brown amphibole	1						Pyroxene	
Green amphibole	10						Pyroxene	Actinolite ? Cummingtonite ? Rim around the pyroxene
Chlorite	<1						Plagioclase	Vein filling the cracks into plagioclase

TOTAL ALTERATION: 13%

STRUCTURE : No magmatic strain, no plastic strain except for minor neoblast formation along grain to grain contacts and bit of bending of grains. (GS)

PHOTOMICROGRAPHS:
1309D_202R_3_102_106_1
1309D_202R_3_102_106_2

THIN SECTION:	U1309D-203R-1, 12-15 cm	**Piece No.** 1	**Unit**: 521	**TS#: 512**	**OBSERVER: TN, DB,GS**
ROCK NAME:	Olivine-bearing gabbro				
GRAIN SIZE:	Medium to coarse				
TEXTURE:	Seriate to poikilitic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase		79	0.5	7			Anhedral	
Clinopyroxene		18	0.1	10			Anhedral, oikocrystic, interstitial	Encloses plagioclase rounded chadacrysts, interlocked contacts
Olivine		3	0.1	2			Anhedral	Texturally associated with clinopyroxene.
Orthopyroxene		0.1			0.2		Film	

COMMENTS

Olivine is more abundant in the finer grain part.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Tremolite/actinolite	1						Olivine, plagioclase, clinopyroxene	Corona, overgrowth
Chlorite	<1						Plagioclase	Corona, crack filling
Talc	1						Olivine	
Oxides	<1						Olivine	
Sulfides	<1						Olivine	

TOTAL ALTERATION: 2%

STRUCTURE : All four phases show some form of plastic strain, i.e. plagioclase (neoblasts), clinopyroxene (subgrains), olivine (neoblasts, subgrains, undulatory extinction) and rare orthopyroxene which occurs as rim between plagioclase and olivine (undulatory extinction). It appears that plastic strain is higher in fine grained part than coarse grained part. (GS)

PHOTOMICROGRAPHS:

1309D_203R_1_12_15_1

1309D_203R_1_12_15_2

THIN SECTION:	U1309D-203R-1, 93-95 cm	**Piece No.** 2	**Unit**: 521	**TS#: 513**	**OBSERVER: TN, DB,GS**
ROCK NAME:	Olivine-bearing gabbronorite				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase		65	0.5	4			Anhedral	
Clinopyroxene		23	0.1	7			Anhedral, oikocrystic	Interlocked contacts, encloses resorbed plagioclase chadacrysts
Orthopyroxene		9	1	9			Anhedral	
Olivine		3	0.4	2			Anhedral	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Tremolite	2						Olivine, plagioclase	Corona
Chlorite	3						Plagioclase, vein	Corona, crack filling
Green amphibole	5						Pyroxene	
Talc	2						Olivine, orthopyroxene	
Oxides	<1						Olivine	
Sulfides	<1						Olivine	

TOTAL ALTERATION: 12%

STRUCTURE : Poikilitic clinopyroxene is preserved but some plastic strain is recorded in plagioclase and weakly misoriented clinopyroxene grains. No magmatic strain.(GS)

PHOTOMICROGRAPHS:

1309D_203R_1_93_95_1
1309D_203R_1_93_95_2
1309D_203R_1_93_95_3
1309D_203R_1_93_95_4

THIN SECTION:	U1309D-204R-3, 136-139 cm	**Piece No.** 1G	**Unit**: 523	**TS#: 514**	**OBSERVER: PF, DB**
ROCK NAME:	Gabbronorite				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	75	80	0.5	8			Anhedral	
Orthopyroxene	5	10	0.5	9			Anhedral	
Clinopyroxene	8	10	0.2	4			Anhedral, oikocrystic	Abundant orthopyroxene blebs, interlocked contacts
Oxide		1			0.5		Anhedral	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Green amphibole	5						Pyroxene	As reaction rims around pyroxene, replacement of small grains, and as veinlets along fractures or along lamellae, as needles in plagioclase, and interstitial (primary?)
Chlorite	<1							As small patches in plagioclase
Ilmenite	<<1							Occurs most commonly in pyroxene
Pyrrhotite	<1							Along lamellae in altered pyroxene, also may be primary
Chalcopyrite	<<!							With pentlandite (?)

TOTAL ALTERATION: 6%

STRUCTURE : No magmatic strain but clear plastic strain seen in neoblast trails at grain boundaries of plagioclase. Orthopyroxene is not deformed. (GS)

PHOTOMICROGRAPHS:

1309D_204R_3_136_139_1
1309D_204R_3_136_139_2
1309D_204R_3_136_139_3
1309D_204R_3_136_139_4
1309D_204R_3_136_139_5

THIN SECTION:	U1309D-204R-4, 64-67 cm	**Piece No.** 3	**Unit**: 523	**TS#: 515**	**OBSERVER: PF, DB,GS**
ROCK NAME:	Orthopyroxene-bearing gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	65	68	1	15			Anhedral	
Clinopyroxene	20	27	0.4	9			Anhedral	Abundant orthopyroxene blebs
Orthopyroxene	4	4	1	8			Anhedral, subhedral	

COMMENT

Abundant amphibole (pargasite?) train and blebs associated with orthopyroxene and clinopyroxene (~1%, ~0.5mm)

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Green amphibole	2						Pyroxene	At the margins of some pyroxene grains, also in patches within areas of plagioclasee (after small pyroxene?)
Talc	<1						Pyroxene	Veinlets through pyroxene grains, contains oxides and sulfides (see below)
Brown amphibole	1						Pyroxene	Small patches/grains of pleochroic (brown to pale brown) (still some argument over what this is) wholly within pyroxene
Chlorite	<1						Plagioclase	Very narrow fringes at contact with some pyroxene, more often as veinlets in grains.
Pyrrhtite								In veins of talc (within pyroxene), with chalcopyrite (?) also along cleavage traces in pyroxene (also may be primary?), with pentlandite
Magnetite								Primary (?) with exsolution of ilmenite
Pentlandite							In pyrrhotite	
Ilmenite							Veins	In veinlets of talc and may be primary

TOTAL ALTERATION: 4%

STRUCTURE : No clear magmatic strain, weak plastic strain seen in partially recovered undulatory extinction in plagioclase and 200 micron sized neoblasts. Can nicely see hardness contrast of plagiclase and clinopyroxene where plagioclase bends around a undeformed clinopyroxene. (GS)

PHOTOMICROGRAPHS:

1309D_204R_4_64_67_1
1309D_204R_4_64_67_2
1309D_204R_4_64_67_3
1309D_204R_4_64_67_4
1309D_204R_4_64_67_5
1309D_204R_4_64_67_6
1309D_204R_4_64_67_7
1309D_204R_4_64_67_8
1309D_204R_4_64_67_9
1309D_204R_4_64_67_10
1309D_204R_4_64_67_11
1309D_204R_4_64_67_12

THIN SECTION:	U1309D-205R-1, 100-103 cm	**Piece No.** 7	**Unit**: 525	**TS#: 516**	**OBSERVER: AD, DB, AH,GS**
ROCK NAME:	Orthopyroxene-bearing olivine gabbro mylonite				
GRAIN SIZE:	Variable				
TEXTURE:	Porphyroclastic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase		65	0.2	3			Porphyroclast, neoblast	
Clinopyroxene		27	0.2	3			Porphyroclast, neoblast	Relics of primary oikocrysts, interlocked contacts
Olivine		6	0.2	3			Porphyroclast, neoblast	
Orthopyroxene		2	0.2	3			Porphyroclast, neoblast	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Chlorite	4						Plagioclase	And as crack filling the plagioclase
Green amphibole	5						Pyroxene	
Brown amphibole	1						Pyroxene	
Tremolite	4						Olivine	Corona around the olivine associated with talc and rim of chlorite around where in contact with plagioclase
Talc	4						Olivine	
Serpentine	<1						Olivine	
Ilmenite	1							
Pyrrhotite	1							
Chalcopyrite	1							
Magnetite	1							

TOTAL ALTERATION: 23%

STRUCTURE : Weak crystal-plastic strain, protomylonitic shear zone. Porphyroblasts of plagioclase exhibit undulatory extinction, bending of lamallae, the formation of subgrains and extensive recrystallization along the grain boundaries. Pyroxene crystals exhibit weak undulatory extinction and recrystallization. Olivine porphyroblasts exhibit weak undulatory extinction, the formation of subgrains and recrystallization. Olivine has also been altered to tremolite and talc. Weak microcracking is exhibited in the minerals. (AH) Shear sense is top to right based on SC relations. Variable neoblast size of plagioclase suggests that steady state conditions have not been reached. (GS)

PHOTOMICROGRAPHS:

1309D_205R_1_100_103_1

1309D_205R_1_100_103_2

THIN SECTION:	U1309D-205R-2, 91-93 cm	**Piece No.** 1B	**Unit**:	**TS#: 517**	**OBSERVER: AD, EH, AH**
ROCK NAME:	Olivine- and orthopyroxene-bearing gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	64	65		14	7		Anhedral	
Clinopyroxene	26	30			7		Anhedral	Coarse interlocking texture
Olivine	2	4			4		Anhedral	Corona texture talc replacement
Orthopyroxene	1	1			2		Anhedral	
Oxide	0.1	0.1					Interstitial	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Brown amphibole	1						Pyroxene	
Green amphibole	1						Pyroxene	As rim around the pyroxene
Actinolite	1							Thin veinlets
Serpentine	1							
Talc	2							
Tremolite	2							
Chlorite	1							
Ilmenite	1							
Pyrrhotite	<1							
Chalcopyrite	<<1							

TOTAL ALTERATION: 10%

STRUCTURE : Minerals exhibit no magmatic strain as there is no crystal alignment. Plagioclase crystals exhibit weak undulatory extinction and the formation of a few subgrains. Olivine exhibits undulatory extinction and alteration to talc. Pyroxene minerals show a few kink bands. There is weak microcracking exhibited which crosscuts the grain boundaries.

PHOTOMICROGRAPHS:

1309D_205R_2_91_93_1

1309D_205R_2_91_93_2

THIN SECTION:	U1309D-205R-4, 24-26 cm	**Piece No.** 1	**Unit**: 526	**TS#: 518**	**OBSERVER: EH, AD, AH**
ROCK NAME:	Gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase		65		10			Anhedral	
Clinopyroxene		35		8			Anhedral	
Oxide		0.1		0.1			Interstitial	
Orthopyroxene	0	?						Some coarse talc pseudomorphs and presence of corona textures suggest that orthopyroxene may have been present in significant amounts

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Chlorite	30						Pyroxene/plagioclase	As rim around the pyroxene when contact with plagioclase and also veins into plagioclase grain
Tremolite	10						Pyroxene	And vein
Talc	3						Pyroxene	Fine grained associated with tremolite and forming corona likely after orthopyroxene
Brown amphibole	5						Pyroxene	Small grains in clinopyroxene
Green amphibole	10						Clinopyroxene	
Calcite	20						Orthopyroxene/plagioclase	Big patches of calcite likely replacing the preexisting pyroxene
Ilmenite	<1							

TOTAL ALTERATION: 78 %. The high alteration of this gabbro is related to a tremolite-chlorite vein

STRUCTURE : No magamtic strain observed as the crystals exhibit a random texture. Plagioclase crystals show undulatory extinction and recrystallization. Pyroxene crystals show undulatory extinction and extensive alteration. Infilled vein crosscuts the slide and extensive microcracking has been generated by the vein.

PHOTOMICROGRAPHS:

1309D_205R_4_24_26_1

1309D_205R_4_24_26_2

THIN SECTION:	U1309D-205R-4, 49-52 cm	**Piece No.** 4	**Unit**: 526	**TS#: 519**	**OBSERVER: AD, AH, DB**
ROCK NAME:	Gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase		75	1	12			Anhedral	
Clinopyroxene		25	0.1	9			Anhedral	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Chlorite	10						Pyroxene/plagioclase	Purple birefringence chlorite replace the inner part of the pyroxene, and chlorite is also found as rim around the pyroxene usual blue birefringence color for chlorite
Green amphibole	5						Pyroxene	
Brown amphibole	3						Pyroxene	
Ilmenite	2							
Vein								
Tremolite	3							
Chlorite	3							

TOTAL ALTERATION: 26 %

STRUCTURE : No preferred orientation of minerals therefore no magmatic strain. Clinopyroxene crystals show undulatory extinction, the formation of a few subgrains, serrated grain boundaries and recrystallization along the grain boundaries. Pyroxene crystals show inclusions of plagioclase, weak undulatory extinction and in a few places the formation of kink bands. There is a fairly wide vein which is infilled with tremolite and chlorite. Weak microcracking crosscuts the grains.

PHOTOMICROGRAPHS:

1309D_205R_4_49_52_1
1309D_205R_4_49_52_2
1309D_205R_4_49_52_3
1309D_205R_4_49_52_4
1309D_205R_4_49_52_5

THIN SECTION:	U1309D-205R-4, 87-89 cm	**Piece No.** 8A	**Unit**: 527	**TS#: 520**	**OBSERVER: AD, AH**
ROCK NAME:	Diabase				
GRAIN SIZE:	Fine				
TEXTURE:	Ophitic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase		85			0.5		Subhedral	
Clinopyroxene		10			0.5		Anhedral	
Oxide		5			0.5		Subhedral	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Chlorite	30						Plagioclase/pyroxene	
Green amphibole	20						Pyroxene	
Ilmenite	2							
Sulfides	<1							
Vein								
Tremolite	10							
Chlorite ?								

TOTAL ALTERATION: 60 %

STRUCTURE : No magmatic strain as crystals show no preferred alignment. Plagioclase grains show undulatory extinction. Vein which crosscuts the slide has opened a void or spenocasium, vein and void are infilled with tremolite and possibly chlorite. Grains inside vein seem to show an alignment with the sense of movement in the vein and void.

PHOTOMICROGRAPHS:

1309D_205R_4_87_89_1

1309D_205R_4_87_89_2

THIN SECTION:	U1309D-205R-4, 114-117 cm	**Piece No.** 10B	**Unit**: 527	**TS#: 521**			**OBSERVER: AD, AH**	
ROCK NAME:	Diabase							
GRAIN SIZE:	Fine							
TEXTURE:	Intergranular							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Plagioclase		60			0.7		Subhedral, skeletal	Partially crystallized melt inclusions in plagioclase.
Clinopyroxene		30			0.7			
Oxide		10			0.5			

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Chlorite	20						Plagioclase/pyroxene	
Green amphibole	20						Pyroxene	
Titanite	2							
Ilmenite	2							
Pyrrhotite	1							
Vein								
Tremolite	10							

TOTAL ALTERATION: 55 %

STRUCTURE : Minerals exhibit no magmatic strain as there is no preferred orientation. Plagioclase crystals show weak undulatory extinction. Wide vein crosscuts the thin section and is infilled with tremolite. Minerals exhibit an oblique alignment to the vein walls indicating an opening vein with a normal movement.

PHOTOMICROGRAPHS:

1309D_205R_4_114_117_1

1309D_205R_4_114_117_2

THIN SECTION:	U1309D-206R-1, 78-80 cm	**Piece No.** 9	**Unit**: 527/528	**TS#: 522**	**OBSERVER: AD, DB, EH, GS**
ROCK NAME:	Gabbro / diabase				
GRAIN SIZE:	Coarse/fine				
TEXTURE:	Seriate cataclastic/aphyric				

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Gabbro							Anhedral	Intensely fragmented, albitized, veined
Plagioclase		60					Anhedral	
Clinopyroxene		40						
Diabase								
Glass		98						One partially molten plagioclase grain
Plagioclase		2					Microcrysts	
Note: within cataclastically deformed gabbro, there are coarse, irregular patches of "ghost-ophitic"-textured amphibole needles								
Does basalt injection simply postdate cataclastic deformation or produce/trigger it?								
Fluid flow in the diabase is marked from microcrysts alignment. Along the contact with the gabbro a 5-6 mm cataclastic defomed zone possibly resulting from hydrofracturing.								

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Brown amphibole	5						Pyroxene	
Green amphibole	40						Pyroxene	
Chlorite	5						Plagioclase	
Prehnite ?? Zeolite ??	20						Plagioclase	Plagioclase are altered to mineral with yellow to orange birefringence color
TOTAL ALTERATION: 70% in the gabbro								

STRUCTURE : Good flow alignment of microliths in the basalt parallel to the contact. Contact is a zone where host is cataclastically deformed. The cataclasite is interleaved with a brownish matrix of unresolved origin. The brownish matrix may well be of overall basaltic origin. Even within the host there are patches which are likely to represent former basalt. Note that within and outside the cataclasite, the relict phases exhibit an unusually large degree of undulatory extinction. This is likely to be related to formation of the cataclasite and thus ulltimately to intrusion of the basalt. Other than that, the host shows very little plastic strain (GS)

PHOTOMICROGRAPHS:

1309D_206R_1_78_80_1

1309D_206R_1_78_80_2

THIN SECTION:	U1309D-207R-2, 12-15 cm	**Piece No.** 2	**Unit**: 528	**TS#: 523**	**OBSERVER: AD, DB,GS**
ROCK NAME:	Gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Equigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase		55	1	12			Anhedral	
Clinopyroxene		45	1	18			Anhedral	Interlocked symplectitic contacts

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Tremolite	20							Forming corona after othopyroxene ???
Green-brown amphibole	20						Pyroxene	
Brown amphibole	3						Pyrroxene	
Chlorite	3						Plagioclase	As vein cutting the plagioclase
Prehnite ??	3						Plagioclase	This alteration of the plagioclase is observed close to the tremolite vein
Ilmenite	<<1							
Sulfides	<<1							
Vein								
Tremolite	4							
Chlorite	1							

TOTAL ALTERATION: 30%

STRUCTURE : Gabbro with some higher temperature plastic strain as seen in the typical 400 micron sized neoblasts. Also strong undulatory extinction in plagioclase. Clinopyroxene is undeformed. Magmatic strain cannot be evaluated because of insufficient number of grains seen. Microcracks occur and are parallel to the vein. Vein has seen considerable movement as suspected from flow fabric in vein and confirmed by non-matching vein walls. Also minor cataclasis next to vein wall., Note that origin of large patch of tremolite remains unresolved.(GS)

PHOTOMICROGRAPHS:

1309D_207R_2_12_15_1

1309D_207R_2_12_15_2

THIN SECTION:	U1309D-207R-2, 100-104 cm	**Piece No.** 9	**Unit**: 528	**TS#: 524**	**OBSERVER: AD, DB, GS**
ROCK NAME:	Gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	50	70	1	12				
Clinopyroxene	10	30	1	5				
COMMENTS								
The gabbro is cut by a vein rich in oxide of possible magmatic origin. Later microintergrowth of oxide and talc(?) overpirnt a former magmatic vein.								

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Brown amphibole	5						Pyroxene	
Green- brown amphibole	15						Pyroxene	
Actinolite	5						Pyroxene	Thin rim around the pyroxene grains
Chlorite	10						Plagioclase	
Calcite	<1						Plagioclase	And thin veinlets
Ilmenite	3							
Pyrite	2							
Vein								
Chlorite	15							
Tremolite	15							
Talc	2							
TOTAL ALTERATION: 50 %								

STRUCTURE : Gabbro with plastic strain. About 25% of plagioclase is recrystallized into neoblassts of high temperature, low stress origin. Clinoyroxene with significantly less recrystallization. Magmatic strain not detected. Vein formation not obviously linked to high strain. (GS)

PHOTOMICROGRAPHS:

1309D_207R_2_100_104_1

1309D_207R_2_100_104_2

THIN SECTION:	U1309D-208R-2, 9-11 cm	**Piece No.** 7A	**Unit**: 529	**TS#: 525**	**OBSERVER: AD,GS, EH**
ROCK NAME:	Olivine- and orthopyroxene-bearing gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	50	53			6		Anhedral	Not remotely affected by crosscutting vein
Clinopyroxene	25	40			7		Anhedral	Abundant interlocked clinopyroxenes, pervasively replaced near vein
Olivine	2	4			5		Anhedral	Enclosing plagioclase
Orthopyroxene	1	3		4			Anhedral	Strongly replaced, yet containing reasonably well preserved clinopyroxene blebs and exsolutions
Ilmenite	0.5	0.5					Interstitial	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Serpentine	3						Olivine	
Tremolite	3						Olivine	
Talc	2						Olivine	
Chlorite	3						Plagioclase	At contact between tremolite after olivine and plagioclase
Actinolite	2						Pyroxene	
Brown amphibole	2						Pyroxene	
Magnetite	1							
Sulfides	1							
Vein								
Tremolite	5							

TOTAL ALTERATION: 23 %

STRUCTURE : Gabbro with some high temperature neoblasts of plagioclase, olivine subgrains, and some subgrains in clinopyroxene. No magmatic strain. (GS)

PHOTOMICROGRAPHS:

1309D_208R_2_9_11_1

1309D_208R_2_9_11_2

THIN SECTION:	U1309D-208R-2, 77-79 cm	**Piece No.** 7A	**Unit**: 530	**TS#: 526**	**OBSERVER: EH, AD,GS**
ROCK NAME:	Olivine- and orthopyroxene-bearing gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	60	60		4	2		Anhedral	Abundant plagioclase inclusions in clinopyroxene and vice versa
Clinopyroxene	33	35		6	2		Anhedral	Interconnected, optically continuous grains that form oikocrysts
Olivine	3	3	0.1	2	1		Anhedral	Most olivine associated with plagioclase
Orthopyroxene	1	2			1		Anhedral	
Ilmenite	0.1	0.1		0.2			Interstitial	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Tremolite	1						Olivine	
Chlorite	0.5						Plagioclase	At contact between olivine and plagioclase and as vein into the plagioclase grains
Prehnite	<<1						Plagioclase	
Green amphibole	1						Pyroxene	
Brown amphibole	0.5						Pyroxene	
Pyrite	<<1							

TOTAL ALTERATION: 3%

STRUCTURE : A texturally somewhat new development: gabbro with poikilitic olivine in one corner of slide and poikilitic orthopyroxene in other corner and poikilitic clinoproxene throughout. Plagioclase is partly recrystallized but a former magmatic alignment seems likely. Most poikilitic grains show some form of subgrain formation but total strain was certainly small. (GS)

PHOTOMICROGRAPHS:

1309D_208R_2_77_79_1
1309D_208R_2_77_79_2
1309D_208R_2_77_79_3

THIN SECTION:	U1309D-208R-3, 55-58 cm	**Piece No. 2B**	**Unit**: 530	**TS#: 527**	**OBSERVER: EH, AD, JE, GS**
ROCK NAME:	Olivine-bearing gabbronorite				
GRAIN SIZE:	Medium				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	65	65		5	3		Anhedral	Commonly enclosed in ortho- and clinopyroxene
Clinopyroxene	14	15		4	2		Anhedral, oikocristic	Interconnected, optically continuous oikocrysts
Olivine	2	2			0.2		Anhedral	Numerous (sub-)rounded chadacrysts in coarse orthopyroxene, and clinopyroxene
Orthopyroxene	16	18		8	6		Anhedral, interstitial, oikocristic	Discrete oikocrysts and to lesser extent as selvage around olivine
Ilmenite	0.1	0.1		0.5			Interstitial	Mainly along clinopyroxene grain boundaries, along with fine-grained brown amphibole

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Green amphibole	1						Pyroxene	
Brown amphibole	0.5						Pyroxene	
Serpentine	0.5						Olivine	Rim around the olivine and in some cases complete replacement of olivine by serpentine
Tremolite	1						Olivine	Rim around the olivine grains
Prehnite	<<1						Plagioclase	
Chlorite	<<1						Plagioclase	
Ilmenite	<<1							
Pyrrhotite	<1							
Chalcopyrite	<1							

TOTAL ALTERATION: 3%

STRUCTURE : Probably relict magmatic foliation by alignment of elongate plagioclase. High degree of high temperature, low stress recrystallization affecting perhaps 50% of plagioclase. No clear arrangement of plagioclase grains within clinopyroxene oikocrysts, but as mentioned by igneous group, these plagioclases look corroded anyway. Note parallelism of suspected magmatic foliation and coarse grained clinopyroxene layer. Clinopyroxene and orthopyroxene only with minor grain misorientation related to plastic strain. (GS) . Slight cracking with associated alteration (JE).

PHOTOMICROGRAPHS:

1309D_208R_3_55_58_1
1309D_208R_3_55_58_2
1309D_208R_3_55_58_3
1309D_208R_3_55_58_4

THIN SECTION:	U1309D-209R-1, 65-68 cm	**Piece No.** 2G	**Unit**: 533	**TS#: 528**	**OBSERVER: DB, AD, JE**
ROCK NAME:	Gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	40	60	1	15			Anhedral	
Clinopyroxene	10	40	0.1	6			Anhedral	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Calcite	5						Plagioclase	
Actinolite	4						Plagioclase	Network of thin actinolite veins cutting the plagioclase
Chlorite	7						Plagioclase	Network of chlorite veins into plagioclase grains, and also observed associated with tremolite aggregates/coronas
Tremolite	8						Orthopyroxene ????	Forming aggregates of needles and replacing likely previous orthopyroxene ??
Green amphibole	20						Pyroxene	
Ilmenite	<1							
Vein								
Tremolite	2							
Calcite	2							
Chlorite	2							

TOTAL ALTERATION: 50 %

STRUCTURE : Cataclastic deformation and associated distributed brittle faults. Gabbro shows magmatic texture overimprinted by intense brittle fracturing, in sets at different angles. Several shear zones with either sharp contacts or cataclastically deformed material are found throughout the thin section. Later veining with chlorite/tremolite. (JE)

PHOTOMICROGRAPHS:

1309D_209R_1_65_68_1
1309D_209R_1_65_68_2
1309D_209R_1_65_68_3

THIN SECTION:	U1309D-209R-2, 81-83 cm	**Piece No.** 3A	**Unit**: 533	**TS#: 529**	**OBSERVER: EH, AD, JE**
ROCK NAME:	Olivine- and orthopyroxene-bearing gabbro				
GRAIN SIZE:	Fine to medium				
TEXTURE:	Equigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	50	50			2			
Clinopyroxene	42	45			1			
Olivine	3	3			0.5			
Orthopyroxene	2	2			0.5			

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Green brown amphibole	0.5						Pyroxene	
Brown amphibole	0.5						Pyroxene	
Chlorite	0.5						Plagioclase	At contact between altered olivine to tremolite and plagioclase, and also as replacement of plagioclase
Serpentine	0.2						Olivine	
Tremolite	1						Olivine	
Calcite	<<1							Likely local replacement of altered olivine
Magnetite	0.1							
Pyrrhotite	0.1							
Chalcopyrite	0.1							
Pentlandite								

TOTAL ALTERATION: 3%

STRUCTURE : Primary magmatic texture with no magmatic, plastic or brittle deformation (JE)

PHOTOMICROGRAPHS:

1309D_209R_2_81_83_1

1309D_209R_2_81_83_2

THIN SECTION:	U1309D-211R-1, 12-14 cm	**Piece No.** 1	**Unit**:	**TS#: 530**	**OBSERVER: EH, AD, JE, GS**			
ROCK NAME:	Orthopyroxene-bearing olivine gabbro with 5 mm wide troctolite band							
GRAIN SIZE:	Medium							
TEXTURE:	Seriate							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	55	55			2			
Clinopyroxene	23	25			3			At edge to olivine-rich band only as selvage around olivine
Olivine	14	16			2			Both enclosing and enclosed by plagioclase
Orthopyroxene	4	4	0.05		3			As discrete medium grains and as abundant selvages between plagioclase and olivine

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Tremolite	1						Olivine	
Serpentine	0.5						Olivine	
Prehnite	0.5						Plagioclase	
Chlorite	0.2						Plagioclase	Not found as rim between plagioclase and olivine but close to the altered olivine, no formation of real corona texture
Green brown amphibole	1						Pyroxene	
Pyrrhotite	0.5							
Chalcopyrite	0.5							

TOTAL ALTERATION: 4%

STRUCTURE : East west alignment of plagioclase by magmatic strain, neoblast of plagioclase indicate some high temperature plastic strain, olivine with subgrains and tilt walls, poikilitic rims of orthopyroxene remain unaffected by this strain. (GS) Microcrack network denser and more irregular than in surrounding plagioclase. (JE)

PHOTOMICROGRAPHS:

1309D_211R_1_12_14_1
1309D_211R_1_12_14_2
1309D_211R_1_12_14_3

THIN SECTION:	U1309D-211R-1, 80-82 cm	**Piece No.** 1	**Unit**: 537	**TS#: 531**	**OBSERVER: AD, JE, DB, GS**
ROCK NAME:	Orthopyroxene-bearing olivine gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Equigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase		68			3		Anhedral	
Olivine		7			1.5		Anhedral, interstitial	
Clinopyroxene		23			2		Anhedral, oikocrystic, interstitial	Encloses plagioclase and rarely olivine chadacrysts
Orthopyroxene		2			1		Anhedral, interstitial	As discrete grains and films around olivine and clinopyroxene

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Tremolite	0.5						Olivine	
Serpentine	0.2						Olivine	
Brown amphibole	0.5						Pyroxene	
Green amphibole	0.5						Pyroxene	
Prehnite	0.3						Plagioclase	In the thin cracks of the plagioclase grain
Chlorite	0.1						Plagioclase	
Pyrrhotite	0.2							
Pyrite	0.2							
Chalcopyrite	0.2							
Magnetite	0.1							

TOTAL ALTERATION: 3%

STRUCTURE : Magmatic strain by elongation of plagioclase, also clinopyroxene and olivine are weakly elongated suggesting that their growth was also affected by magmatic strain. Some high temperature recrystallization is also present in plagioclase. Strain not obvious in orthopyroxene.(GS)

PHOTOMICROGRAPHS:

1309D_211R_1_80_82_1

1309D_211R_1_80_82_2

THIN SECTION:	U1309D-211R-4, 94-97 cm	**Piece No.** 2A	**Unit**: 537	**TS#: 532**	**OBSERVER: EH, AD, JE**
ROCK NAME:	Gabbronorite				
GRAIN SIZE:	Very coarse				
TEXTURE:	Equigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	29	30					Anhedral	Partly recrystallized
Clinopyroxene	30	35		20				One coarse grain
Orthopyroxene	30	35		20				One coarse grain
Ilmenite	1	1		2				Interstitial grains at clinopyroxene grain boundary
Pyrrhotite	1	0.1		0.1				Rounded inclusions in clinopyroxene

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Brown amphibole	3						Pyroxene	As small crystals into the pyroxene grain
Green amphibole	3						Pyroxene	As rim around the pyroxene grain, second rim
Tremolite	2						Pyroxene	As rim around the pyroxene, first rim
Calcite	0.7						Plagioclase	Aournd the plagioclase grain and into the cracks of the grain
Chlorite	0.3						Plagioclase	
Ilmenite	1							
Pyrrhotite	<1							
Chalcopyrite	<1							

TOTAL ALTERATION: 10 %

STRUCTURE : Plastic recrystallization and neoblast formation of plagioclase along clinopyroxene contact and adjacent to green amphibolite or tremolite rimming the clinopyroxene. Fractures associated with alteration. (JE)

PHOTOMICROGRAPHS:

1309D_211R_4_94_97_1
1309D_211R_4_94_97_2
1309D_211R_4_94_97_3

THIN SECTION:	U1309D-212R-1, 111-113 cm	**Piece No.** 2E	**Unit**: 537	**TS#: 533**	**OBSERVER: EH, AD, JE**
ROCK NAME:	Olivine gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	69	70	0.1	4	1		Anhedral	Recrystallized
Clinopyroxene	22	24		5	3		Anhedral	
Olivine	5	6	0.2	3	2		Anhedral	Contains numerous oriented exsolution rods of probably ilmenite
Orthopyroxene	0.3	0.3					Interstitial	Abundant selvages between olivine and plagioclase

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Serpentine	0.2						Olivine	
Tremolite	1						Olivine/pyroxene	Thin rim around the olivine and in places around the pyroxene
Chlorite	0.3						Plagioclase	
Prehnite	0.3						Plagioclase	
Brown amphibole	0.8						Pyroxene	
Green amphibole	0.8						Pyroxene	As veinlets between the plagioclase crystals and also as rims around the pyroxene
Ilmenite	0.2							
Pyrrhotite	0.2							
Chalcopyrite	0.2							
Vein								
Serpentine								

TOTAL ALTERATION: 4%

STRUCTURE : About 50% of plagioclase affected by dynamic recrystallization. Other phases also affected (pyroxenes and olivine) but to much lesser extent and more local (GS) Later serpentinization of olivine along fractures. Olivine serpentinite-filled microfractures propagate intro plagioclase (some cases) or are arrested along grain boundaries without penetrating in surrounding crystals (JE).

PHOTOMICROGRAPHS:

1309D_212R_1_111_113_1
1309D_212R_1_111_113_2
1309D_212R_1_111_113_3

THIN SECTION:	U1309D-212R-2, 50-53 cm	**Piece No.** 1D	**Unit**: 537	**TS#: 534**	**OBSERVER: PF, JE, DB, JB**
ROCK NAME:	Gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	60	75	1	12			Anhedral	Strongly zoned partially recrystallized
Clinopyroxene	0	25	1	12			Anhedral	
Quartz		2			1			
Apatite		2			0.5			
Ilmenite		2			4			
Allanite								Zoned, dark red-brown, identified by EDS (JB)
Zircon								

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Green amphibole	20						Pyroxene	
Brown amphibole	1						Pyroxene	
Actinolite	3						Pyroxene	
Zeolite	3						Veins	
Talc	2						Veins	
Zircon (?)	<<1						In vein	Subhedral
Calcite	<1						Veins	
Sulfides	<1							
Oxides	<1							

TOTAL ALTERATION: 31% Most of the pyroxene is altered to amphibole

STRUCTURE : Weak plastic deformation (subgrains) and later veining and slight cataclasis deformation associated with amphibole. Cataclastically deformed areas show little strain, and clasts are embedded in amphibole (tremolite?), and banding and undulatory extinction along adjacent plagioclase crystals (JE)

PHOTOMICROGRAPHS:

1309D_212R_2_50_53_1
1309D_212R_2_50_53_2
1309D_212R_2_50_53_3
1309D_212R_2_50_53_4
1309D_212R_2_50_53_5

THIN SECTION:	U1309D-212R-4, 69-71 cm	**Piece No.** 1E	**Unit**: 538	**TS#: 535**	**OBSERVER:JE, AD, DB**
ROCK NAME:	Olivine gabbronorite				
GRAIN SIZE:	Medium				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase		73			3		Anhedral	
Clinopyroxene		12			2		Anhhedral, oikocrystic	Encloses rounded plagioclase chadacrysts, interlocked symplectitic contacts.Orthopyroxene exsolutions
Olivine		8			1		Anhedral	
Orthopyroxene		7			2		Anhhedral, oikocrystic	Encloses, plagioclase, olivine and clinopyroxene chadacrysts. It is the last phase to crystallize. Numerous orthopyroxene thick film enclosing olivine and clinopyroxene.
Oxide		0.5						

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Serpentine	1						Olivine	
Tremolite	0.5						Olivine	
Brown amphibole	0.8						Pyroxene	In pyroxene
Green amphibole- actinolit	0.5						Pyroxene	As rim around the pyroxene grains
Chlorite	0.2						Plagioclase	
Calcite	0.3						Plagioclase	
Prehnite	0.5						Plagioclase	
Magnetite	0.1							
Pyrrhotite	0.2							
Chalcopyrite	0.2							

TOTAL ALTERATION: 4%

STRUCTURE : Primary magmatic texture with very slight plastic deformation. Local occurrences of neoblasts of plagioclase, and weakly undulose extinction of some of the larger plagioclase grains. (JE)

PHOTOMICROGRAPHS:

1309D_212R_4_69_71_1

1309D_212R_4_69_71_2

THIN SECTION:	U1309D-213R-4, 55-57 cm	**Piece No.** 2B	**Unit**: 538	**TS#: 536**	**OBSERVER: PF, AD, DB**
ROCK NAME:	Orthopyroxene-bearing olivine gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase		72			4		Anhedral	
Clinopyroxene		20			3		Anhedral, oikocrystic	
Olivine		6			3		Anhedral	
Orthopyroxene		2			1		Anhedral, film	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Serpentine	5						Olivine	Abundant in grains near fine vein network (partially oxidized), in fine veins with oxides in most grains and as fine veins across plagioclase
Tremolite	2						Olivine	
Calcite	0.5						Plagioclase	
Prehnite	0.5						Plagioclase	
Chlorite	0.3						Plagioclase	
Pyrrhotite	0.5							
Chalcopyrite	0.5							
Vein								
Serpentine	1							

TOTAL ALTERATION: 10%

STRUCTURE : Vague indication of magmatic strain, very low amount of plastic strain (some tilt walls in olivine, some neoblast of plagioclase wrapped in undeformed clinopyroxene).

PHOTOMICROGRAPHS:

1309D_213R_4_55_57_1

1309D_213R_4_55_57_2

THIN SECTION:	U1309D-214R-1, 116-118 cm	**Piece No.** 5		**Unit**: 540	**TS#: 537**		**OBSERVER: PF, DB**	
ROCK NAME:	Olivine gabbro / troctolite dike							
GRAIN SIZE:	Medium/coarse							
TEXTURE:	Seriate							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Gabbro								
Plagioclase		75			3		Anhedral	
Clinopyroxene		16			1		Anhedral	
Olivine		9			1		Anhedral	
Orthopyroxene		0.5			1		Anhedral	One discrete grain and rim around olivine
Dike								
Olivine		80			6			
Plagioclase		20			4			

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Talc	12						Olivine	In centers of some olivine grains
Tremolite	5						Olivine	At the outer edge of former olivine grains and in contact with chlorite of former plagioclase
Chlorite	8						Plagioclase	At the contact of plagioclase with former olivine grains, usually fibrous
Actinolite	<1						Plagioclase	Along fracture/veinlets in plagioclase (after chlorite?)
Serpentine	5						Olivine	
Oxides	1							Fine dusty grains in serpentine veinlets in olivine and with tremolite in reaction coronas aroound olivine

TOTAL ALTERATION: 22%

STRUCTURE : Sample appears more recrystallized in one corner than the other since there is a higher degree of recrystallization of plagioclase and smaller olivine neoblast size whereas coarse olivines are present with coarse plagioclase in other corner. Note strong grain size difference in olvine.

PHOTOMICROGRAPHS:

1309D_214R_1_116_118_1

1309D_214R_1_116_118_2

THIN SECTION:	U1309D-214R-2, 88-91 cm	**Piece No.** 1E	**Unit**: 541	**TS#: 538**	**OBSERVER: GS, AD, DB**
ROCK NAME:	Olivine gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase		66	1	8			Anhedral	
Clinopyroxene		22	0.1	5			Anhedral, oikocrystic, interstitial	Interlocked encloses rounded plagioclase
Olivine		9	0.5	7			Anhedral	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Green-brown amphibole	9						Pyroxene	
Green amphibole	10						Pyroxene	
Brown amphibole	3						Pyroxene	
Prehnite	2						Plagioclase	
Zeolite	2						Plagioclase	Alteration of the plagioclase to zeolite close to the chlorite vein
Chlorite	15						Plagioclase	Alteration of the plagioclase, and thick rim of chlorite at contact between altered olivine to serpentine and tremolite and plagioclase
Serpentine	5						Olivine	
Tremolite	5						Olivine	
Magnetite	1							
Pyrrhotite	1							
Chalcopyrite	1							
Vein 1								
Green amphibole	2							
Vein 2								
Tremolite	2							
Chlorite	2							

TOTAL ALTERATION: 60 %

STRUCTURE : Coarse olivine gabbro with no plastic strain, some magmatic strain cannot be ruled out. Very delicate interstitial clinopyroxene preserved. Some cataclastic deformation associated with veining. Has consistent sense of offset and is associated with bending of clinopyroxene which suggests fairly high temperature of formation for the cataclasite!

PHOTOMICROGRAPHS:

1309D_214R_2_88_91_1

1309D_214R_2_88_91_2

1309D_214R_2_88_91_3

THIN SECTION:	U1309D-214R-3, 56-58 cm	**Piece No.** 1B	**Unit**: 541	**TS#: 539**	**OBSERVER: PF, DB,GS**
ROCK NAME:	Olivine gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Subequigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase		78			7		Anhedral	
Clinopyroxene		15			4		Anhedral	
Olivine		7			4		Anhedral	
Orthopyroxene		0.5			0.5		Rim	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Serpentine	1						Olivine	Veinlets in olivine grains
Talc	<1						Olivine	
Tremolite	<<1						Olivine	
Oxide	1						Olivine	In serpentine veinlets within olivine grains
Chlorite	<1						Plagioclase	Only in local patches adjacent to altered olivine, along some fractures and some cleavage planes
Green? amphible	<<1						Pyroxene	As very tiny needles growing into pyroxene grains perpendicular to internal fractures

TOTAL ALTERATION: 3%

STRUCTURE : No plastic strain, probably no magmatic strain but grain size really too large to determine. (GS)

PHOTOMICROGRAPHS:

1309D_214R_3_56_58_1

1309D_214R_3_56_58_2

THIN SECTION:	U1309D-214R-4, 109-112 cm	**Piece No.** 1C	**Unit**: 541	**TS#: 540**	**OBSERVER:PF, DB**
ROCK NAME:	Olivine gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	50	75			4		Anhedral	
Clinopyroxene	10	15			3		Anhedral	Interlocked contacts
Olivine	0	10			6		Anhedral	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Talc	25						Olivine	In the centers of former olivine grains
Tremolite	10						Olivine	Surrounding and scattered throughout the centers of former olivine grains (usually with fine grains of secondary oxides/sulfides.)
Chlorite	10						Plagioclase	In veins in plagioclase (also with talc where veins cross pyroxene), where not grungy it shows berlin blue interference colors.
Actinolite	3						Olivine	
Oxides/sulfides	1						Olivine	
Green amphibole	1						Pyroxene	Also as overgrowths in tremolite and chlorite.

TOTAL ALTERATION: 40%

STRUCTURE : No magmatic strain, weak plastic strain as seen in subgrains of clinopyroxene and undulatory extinction in plagioclase, no neoblasts. Extensive set of veins seems not associated with cataclasis (GS)

PHOTOMICROGRAPHS:

1309D_214R_4_109_112_1

1309D_214R_4_109_112_2

THIN SECTION:	U1309D-214R-4, 127-129 cm	**Piece No.** 1E	**Unit**: 541	**TS#: 541**	**OBSERVER:GS, AD, DB**
ROCK NAME:	Olivine gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase		79	0.5	12			Anhedral	
Clinopyroxene		15	0.1	8			Anhedral, oikocrystic, interstitial	Encloses rounded plagioclase. Interlocked symplectitic contacts
Olivine		5	0.5	9			Anhedral	
Orthopyroxene		0.5	0.2	1			Rim, anhedral	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Serpentine	1						Olivine	
Tremolite	1						Olivine/Pyroxene	
Prehnite	0.5						Plagioclase	
Calcite	0.2						Plagioclase	Related to calcite vein
Chlorite	0.3						Plagioclase	
Pyrrhotite	0.5							
Chalcopyrite	0.5							
Ilmenite	<<1							

TOTAL ALTERATION: 3%

STRUCTURE : Fairly good development of magmatic strain through plagioclase alignment, preservation of delicate interstitial clinopyroxene and orthopyroxene reaction rims, no plastic strain. (GS)

PHOTOMICROGRAPHS:

1309D_214R_4_127_129_1

1309D_214R_4_127_129_2

THIN SECTION:	U1309D-215R-4, 54-57 cm	**Piece No.** 1E	**Unit**: 541	**TS#: 542**	**OBSERVER: PF, DB,GS**
ROCK NAME:	Olivine microgabbro				
GRAIN SIZE:	Fine				
TEXTURE:	Equigranular to poikilophitic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase		68			1		Anhedral	
Clinopyroxene		21			1		Anhedral, suboikocrystic, ophitic	
Olivine		11			1		Anhedral, suboikocrystic, ophitic	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Serpentine	<1						Olivine	Along fractures in olivine grains
Oxides	<<1						Olivine	With serpentine
Chlorite	<1						Plagioclase	In vein
Tremolite	<<1						Olivine	At edges of a few olivine grains accompanied by very minor chlorite in adjacent plagioclase

TOTAL ALTERATION: 1%

STRUCTURE : Good foliation development, perhaps best displayed by olivine arrangement in plane polarized light. Degree of recrystallization in plagioclase (to neoblasts) and subgrains (in clinopyroxenes and olivine) is 70%, i.e. high. Nevertheless, there appear to be sufficient relics of aligned plagioclase laths around to suggest an original magmatic strain. The coarser layer in the center of the slide appears less recrystallized.(GS)

PHOTOMICROGRAPHS:

1309D_215R_4_54_57_1

1309D_215R_4_54_57_2

THIN SECTION:	U1309D-216R-1, 73-76 cm	**Piece No.** 1C	**Unit**: 542	**TS#: 543**	**OBSERVER: PF, DB,GS**
ROCK NAME:	Trondhjemite dikelet in gabbro				
GRAIN SIZE:	Fine/coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Plagioclase		70			1			
Clinopyroxene		25			1			
Orthopyroxene		5			3			The orthopyroxene possibly belongs to a former contact between gabbro and a coarse grain gabbronorite.
Trondhjemite								
Amphibole				18				Along the contact with the gabbro, repalced by low temperature
Albitic plagioclase				20				Intergrowth with quartz
Quartz				3				
Zircon				1				Abundant along the contact, associated with titanite
Titianite				1				
Oxide				4				

Magmatic amphibole grow along the contact with the gabbro, then appear the albite quatrz intergrowth.

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Green Amphibole	15						Pyroxene	
Prehnite	1						Plagioclase	
Chlorite	10						Plagioclase	
Tremolite	7						Pyroxene	
Zeolite?	5						Plagioclase	
Titanite	<1							Pleochroic in pink
Epidote	1						Plagioclase	

TOTAL ALTERATION: 39%

STRUCTURE : Margin of slide shows high temperature plastic strain and recrystallization into neoblasts of clinopyroxene and plagioclase. A relation to the trondhjemite is not clear but cannot be ruled out either. No cataclastic strain which is different to similar intrusions in the 600-700 m level of the hole. Oxides appear to be restricted to the contact trondhjemite - gabbro (as is orthopyroxene?) See comment by igneous group. (GS)

PHOTOMICROGRAPHS:

1309D_216R_1_73_76_1
1309D_216R_1_73_76_2
1309D_216R_1_73_76_3
1309D_216R_1_73_76_4
1309D_216R_1_73_76_5
1309D_216R_1_73_76_6
1309D_216R_1_73_76_7
1309D_216R_1_73_76_8
1309D_216R_1_73_76_9

THIN SECTION:	U1309D-216R-2, 40-43 cm	**Piece No.** 1C	**Unit**: 543	**TS#: 544**	**OBSERVER: AD,GS, YO**
ROCK NAME:	Olivine gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	60	70		25			Subhedral	
Clinopyroxene	23	25			12		Anhedral	Many grains show myrmekitic texture.
Olivine	5	5			15		Subhedral	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Serpentine	4						Olivine	
Tremolite	2						Olivine	
Brown amphibole	1						Pyroxene	
Calcite	0.5						Plagioclase	
Prehnite	2						Plagioclase	The plagioclases located close to the veins are almost entirely replaced by prehnite and chlorite
Chlorite	2						Plagioclase	
Pyrrhotite	1							
Chalcopyrite	1							
Vein								
Chlorite	2							
Prehnite	2							

TOTAL ALTERATION: 15%

STRUCTURE : Good magmatic foliation by plagioclase alignment but clear overprint by plastic strain. Plastic strain seen in plagioclase neoblasts (about 300 micron) and olivines which staddle between subgrains and neoblasts. Clinpyroxene still poikilitic but with some subgrains.

PHOTOMICROGRAPHS:

1309D_216R_2_40_43_1
1309D_216R_2_40_43_2
1309D_216R_2_40_43_3
1309D_216R_2_40_43_4
1309D_216R_2_40_43_5
1309D_216R_2_40_43_6

THIN SECTION:	U1309D-216R-3, 108-111 cm	**Piece No.** 10	**Unit**: 544	**TS#: 545**	**OBSERVER: AD,GS, DB**
ROCK NAME:	Gabbro				
GRAIN SIZE:	Variable				
TEXTURE:	Porphyroclatic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase		80			2		Porphyroclast, neoblast	
Clinopyroxene		20			2		Porphyroclast, neoblast	
Olivine		0.5			1		Porphyroclast, neoblast	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Green-brown amphibole	10						Pyroxene	
Actinolite	5						Pyroxene	As rim around the altered pyroxene, and as veinlets
Serpentine	0.1						Olivine	
Tremolite	3						Olivine/ (ortho?)pyroxene	Around the serpentinized olivine and replacing the pyroxene (ortho?)
Chlorite	0.5						Plagioclase	
Prehnite	0.5						Plagioclase	
Vein								
Tremolite	1							Cut the pyroxene grains

TOTAL ALTERATION: 20 %

STRUCTURE : High degree of lower temperature, high stress deformation. Neoblast size in 100 micron range for plagioclase, both neoblasts and porphyroclasts overprinted by undulatory extinction. Porphyroclasts show significant elongation (ribbon grains) and poor recovery. All this deformation progressed apparently into brittle field as seen in systematically offset (bookshelf type), clinopyroxene grain. The bookshelf clinopyroxene suggest top to right sense of shear for the late strain. In host can still recognize originally poikilitic clinopyroxene on one side of slide.(GS)

PHOTOMICROGRAPHS:

1309D_216R_3_108_111_1

1309D_216R_3_108_111_2

THIN SECTION:	U1309D-217R-1, 120-122 cm	**Piece No.** 13B	**Unit**: 545	**TS#: 546**	**OBSERVER:JE, PF,GS**
ROCK NAME:	Gabbro / olivine gabbro				
GRAIN SIZE:	Coarse / medium				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Gabbro								
Plagioclase		55			6		Anhedral	
Clinopyroxne		45			7		Anhedral, interstitial	
Olivine gabbro								
Plagioclase		70			1		Anhedral	
Olivine		20			1		Anhedral	
Clinopyroxene		10			1		Anhedral	

COMMENTS

Few oxides and evidence of hydrous melting along the contact.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Talc	15						Olivine	In centers of former olivine grains
Tremolite	5						Olivine	In the outer zone of the reaction rim around former olivine grains
Chlorite	8						Plagioclase	Corona reaction rims at the contact between plagioclase and former olivine grains. (some shows berlin blue interference color)
Oxides	1						Olivine	Associated with tremolite

TOTAL ALTERATION: 29% A number of fine veins cross the section along cracks thorugh both the gabbro and the troctolite. They become broader veins in the troctolite. Corona texture is present around olivine where it contacts plagioclase.

STRUCTURE : Coarse gabbro with no obvious strain. At contact to troctolite some well aligned plagioclase grains which could suggest magmatic strain in troctolite. More distant part of olivine gabbro has moderate amount of small (high stress) neoblasts. This strain also affects clinopyroxene locally (GS). Network of chlorite veins, very dense, crosscut by later tremolite/talc alteration of olivine (?). No brittle deformation nor strain. (JE)

PHOTOMICROGRAPHS:

1309D_217R_1_120_122_1
1309D_217R_1_120_122_2
1309D_217R_1_120_122_3
1309D_217R_1_120_122_4
1309D_217R_1_120_122_5
1309D_217R_1_120_122_6
1309D_217R_1_120_122_7

THIN SECTION:	U1309D-218R-1, 48-50 cm	**Piece No.** 2A	**Unit**: 547	**TS#: 547**	**OBSERVER: AD, GS, DB**
ROCK NAME:	Orthopyroxene-bearing olivine microgabbro				
GRAIN SIZE:	Fine				
TEXTURE:	Subequigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase		72			1		Anhedral	
Clinopyroxene		20			1		Anhedral	
Olivine		5			1		Anhedral	
Orthopyroxene		3			1		Anhedral	
Pargasite		0.1			0.1		Anhedral	At pyroxene grain boundaries
Oxide		0.1			0.1		Anhedral	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Brown amphibole	0.5						Pyroxene	
Actinolite	0.2						Pyroxene	As thin rim around the pyroxene grain
Prehnite	0.2						Plagioclase	
Tremolite	0.8						Olivine/pyroxene	
Pyrrhotite	0.3							
Chalcopyrite	0.3							
Pentlandite ??								

TOTAL ALTERATION: 2%

STRUCTURE : Foliation in microgabbro appears to be largely magmatic in origin with weak alignment of clinpyroxene, plagioclase and olivine. Degree of recrystallization is rated low but some neoblasts are certainly present. (GS)

PHOTOMICROGRAPHS:

1309D_218R_1_48_50_1

1309D_218R_1_48_50_2

THIN SECTION:	U1309D-218R-3, 87-89 cm	**Piece No.** 1D	**Unit**: 547	**TS#: 548**				**OBSERVER: AD, GS, DB**	
ROCK NAME:	Olivine- and orthopyroxene-bearing gabbro								
GRAIN SIZE:	Coarse to pegmatitic								
TEXTURE:	Poikilophitic								

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**			**Composition**	**MORPHOLOGY**	**COMMENTS**
			min.	**max.**	**av.**			
Plagioclase		50	0.5	6			Anhedral, subhedral	
Clinopyroxene		46	0.1	20			Oikocrystic	One large grain enclosing strongly resorbed plagioclase.
Orthopyroxene		2	0.1	6			Oikocrystic	
Olivine		2	0		6		Anhedral	

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron)**				**REPLACING / FILLING**	**COMMENTS**
			min.	**max.**	**av.**			
Green-brown amphibole							Pyroxene	
Prehnite							Plagioclase	Plagioclase located close to the vein
Serpentine							Olivine/ Pyroxene	
Tremolite							Olivine/Pyroxene	
Chlorite							Pyroxene	
Vein 1								
Chlorite								
Zeolite								
Tremolite								
Prehnite								
Talc								Perhaps ?
Vein 2								
Chlorite								
Vein 3								
Tremolite								
Chlorite								

TOTAL ALTERATION: 15%

STRUCTURE : No magmatic or plastic strain. Plagioclase appears corroded by huge clinopyoxene oikocryst. Vein offset clinopyroxene a bit. (GS)

PHOTOMICROGRAPHS:

1309D_218R_3_87_89_1
1309D_218R_3_87_89_2
1309D_218R_3_87_89_3
1309D_218R_3_87_89_4
1309D_218R_3_87_89_5
1309D_218R_3_87_89_6

THIN SECTION:	U1309D-218R-4, 52-54 cm	**Piece No.** 1A	**Unit**: 547	**TS#: 549**			**OBSERVER: AD, GS, DB**	
ROCK NAME:	Olivine- and orthopyroxene-bearing gabbro							
GRAIN SIZE:	Fine							
TEXTURE:	Subequigranular							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Plagioclase		72			2		Anhedral	
Clinopyroxene		24			2		Anhedral, oikocrystic	Interlocked symplectitic contacts, encloses rounded plagioclase
Orthopyroxene		2			1		Anhedral, oikocrystic	Encloses rounded plagioclase
Olivine		2			0.8		Anhedral	

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Tremolite	0.5						Olivine/pyroxene	
Pyrrhotite	0.3							
Chalcopyrite	0.3							
Pyrite	0.3							Associated with the olivine grains

TOTAL ALTERATION: 0.5 %

STRUCTURE : Convincing magmatic strain in this gabbro. Some minor recrystallization and subgrain formation in plagioclase, clinopyroxene and olivine but overall weak plastic strain. Delicate orthopyroxene rims are preserved (GS)

PHOTOMICROGRAPHS:

1309D_218R_4_52_54_1
1309D_218R_4_52_54_2
1309D_218R_4_52_54_3

THIN SECTION:	U1309D-218R-4, 108-111 cm	**Piece No.** 1B	**Unit**: 547	**TS#: 550**	**OBSERVER: AD, GS, DB**
ROCK NAME:	Olivine gabbro				
GRAIN SIZE:	Medium to coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase		80			2		Anhedral	
Clinopyroxene		14			2		Anhedral	
Olivine		5			2		Anhedral	
Orthopyroxene		1			1		Anhedral	
Contact with pyroxene rich coarse grain zone.								
Mode are estimated on the finer grained part of the section. In the coarser part clinopyroxene cover more than 80%. Olivine 10%.								
Deeply resorbed plagioclase enclosed in the clinopyroxene oikocrysts.								

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Tremolite	1						Olivine/pyroxene	
Serpentine	1						Olivine	
Chlorite	0.2						Plagioclase	
Prehnite	0.2						Plagioclase	
Pyrrhotite	0.5							
Chalcopyrite	0.5							
Magnetite	0.2							

TOTAL ALTERATION: 2.5 %

STRUCTURE : Gabbro with transition fine to coarse grained. In fine grained part can see what appears to be a magmatic fabric by plagioclase. In coarse gabbro this is not obvious. Foliation trace seems to run oblique to the limit fine to coarse grained. In fine grained gabbro, clinopyroxene and olivine display subgrains. In coarse grained gabbro, cluster of neoblasts of plagioclase is trapped within undeformed clinopyroxene oikocryst. Extensive interstitial orthopyroxene rims showing only weak straining.(GS)

PHOTOMICROGRAPHS:

1309D_218R_4_108_111_1
1309D_218R_4_108_111_2
1309D_218R_4_108_111_3
1309D_218R_4_108_111_4
1309D_218R_4_108_111_5
1309D_218R_4_108_111_6
1309D_218R_4_108_111_7

THIN SECTION:	U1309D-219R-1, 11-14 cm	**Piece No.** 1A	**Unit**: 547	**TS#: 551**	**OBSERVER: AD, JE, EH**
ROCK NAME:	Olivine gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Subequigranular to subpoikilitic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	60	60		6	4			
Clinopyroxene	32	32		9	4			Interfingering neighboring grains, interconnected network of optically continuous interstitial and poikilitic crystals.
Olivine	6	8		4	3			Heterogeneously distributed: concentrated in two olivine-rich clusters.
Orthopyroxene	0.2	0.2		0.5			Interstitial	Olivine-plagioclase selvages

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Serpentine	0.8						Olivine	
Tremolite	0.9						Olivine/pyroxene	
Prehnite	0.2						Plagioclase	
Chlorite	0.1						Plagioclase	
Pyrrhotite	0.3							
Chalcopyrite	0.3							
Pyrite	0.2							
Magnetite	0.1							

TOTAL ALTERATION: 2%

STRUCTURE : Clinopyroxene with numerous chadacrysts of plagioclase. Some of the chadacrysts appear to be previously deformed (neoblasts, undulatory extinction) with no evidence of deformation of the surrounding clinopyroxene. Weak plagioclase alignment marking a weak magmatic foliation. Moderate plastic deformation otherwise of plagioclase with neoblasts. (JE).

PHOTOMICROGRAPHS:

1309D_219R_1_11_14_1
1309D_219R_1_11_14_2
1309D_219R_1_11_14_3
1309D_219R_1_11_14_4
1309D_219R_1_11_14_5
1309D_219R_1_11_14_6
1309D_219R_1_11_14_7

THIN SECTION:	U1309D-220R-1, 68-70 cm	**Piece No.** 2C	**Unit**: 547	**TS#: 552**				**OBSERVER: AD, JE, EH**	
ROCK NAME:	Orthopyroxene-bearing olivine gabbro								
GRAIN SIZE:	Medium								
TEXTURE:	Subequigranular								

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**			**Composition**	**MORPHOLOGY**	**COMMENTS**
			min.	**max.**	**av.**			
Plagioclase	60	60		4	2			
Clinopyroxene	30	30		6	3			Interfingering neighboring grains, interconnected network of optically continuous interstitial and poikilitic crystals
Olivine	6	8		3	2			Highly irregular, deeply embayed grains at both plagioclase and clinopyroxene contacts
Orthopyroxene	2	2			2			

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron)**				**REPLACING / FILLING**	**COMMENTS**
			min.	**max.**	**av.**			
Serpentine	1						Olivine	
Tremolite	0.5						Olivine/pyroxene	
Green-brown amphibole	0.2						Pyroxene	
Prehnite	0.3						Plagioclase	
Pyrite	0.3							
Pyrrhotite	0.5							
Chalcopyrite	0.5							

TOTAL ALTERATION: 2%

STRUCTURE : Weak to moderate plastic deformation with neoblasts of plagioclase. Pyroxene engulfs chadacrysts of twinned plagioclase and possible neoblasts. No brittle deformation. (JE) Weak magmatic fabric cannot be ruled out (GS)

PHOTOMICROGRAPHS:

1309D_220R_1_68_70_1
1309D_220R_1_68_70_2
1309D_220R_1_68_70_3
1309D_220R_1_68_70_4
1309D_220R_1_68_70_5

THIN SECTION:	U1309D-220R-3, 123-125 cm	**Piece No.** 2E	**Unit**: 547	**TS#: 553**				**OBSERVER: AD, JE, EH**	
ROCK NAME:	Orthopyroxene-bearing olivine gabbro								
GRAIN SIZE:	Medium to coarse								
TEXTURE:	Seriate								

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	58	58		6	2			
Clinopyroxene	30	30		8	3			
Olivine	7	8		4	2			Commonly as subrounded inclusions in plagioclase
Orthopyroxene	4	4		2				

COMMENTS

Apparent contact between medium (2 mm) and coarse (7 mm) grained orthopyroxene-bearing olivine gabbro. The modal composition appears to be independent of this sharp contrast in grain size contrast across less than 5 mm.

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Serpentine	0.3						Olivine	
Tremolite	0.5						Olivine/pyroxene	
Prehnite	0.2						Plagioclase	
Pyrrhotite	0.4							
Chalcopyrite	0.4							

TOTAL ALTERATION: 1%

STRUCTURE : Very weak, high temperature plastic deformation (undulatory extinction of plagioclase and some cinopyroxene). Subgrain development in some of the pyroxene. No brittle deformation (JE). Clear foliation in finer grained part which is not visible in coarser grained part. I suspect this foliation is originally magmatic but a very high temperature plastic strain origin is not ruled out. (GS)

PHOTOMICROGRAPHS:

1309D_220R_3_123_125_1
1309D_220R_3_123_125_2
1309D_220R_3_123_125_3
1309D_220R_3_123_125_4
1309D_220R_3_123_125_5
1309D_220R_3_123_125_6
1309D_220R_3_123_125_7
1309D_220R_3_123_125_8
1309D_220R_3_123_125_9

THIN SECTION:	U1309D-221R-3, 10-13 cm	**Piece No.** 1B	**Unit**: 547	**TS#: 554**	**OBSERVER:GS, AD, DB**
ROCK NAME:	Olivine gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Inequigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase		72	0.5	6			Anhedral, subhedral, oikocrystic	Plagioclase show a double generation of grains, first coarse oikocystic enclosing rounded olivine and a second eutectic generation
Clinopyroxene		20	0.1	3			Anhedral	
Olivine		8	0.1	1			Interstitial, anhedral, oikocrystic	Abundant on one side of the section encloses plagioclase
Orthopyroxene		0.5			0.2		Rim	Along grain boundaries

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Serpentine	2						Olivine	
Tremolite	<1						Olivine	
Prehnite	<1						Plagioclase	The plagioclase are altered to prehnite close to the serpentinized olivine
Pyrrhotite	<1							

TOTAL ALTERATION: 3 %

STRUCTURE : Modally heterogeneous oliivine gabbro. Some plagioclase grains stand out by being factor 2 to 3 larger than rest. A weak magmatic fabric is suspected. Locally, mosaic shaped plagioclase grains and subgrains in clinopyroxenes and olivines are present. (GS).

PHOTOMICROGRAPHS:

1309D_221R_3_10_13_1

1309D_221R_3_10_13_2

THIN SECTION:	U1309D-221R-3, 100-102 cm	**Piece No.** 3	**Unit**: 547	**TS#: 555**	**OBSERVER: AD, JE, EH**
ROCK NAME:	Olivine gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Subophitic to poikilitic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	65	65		4	2		Anhedral	Not uncommonly enclosed in olivine (as rounded grains), and clinopyroxene (irregular, corroded)
Clinopyroxene	23	23		12	2		Anhedral	Oikocrysts and interstitial grains, commonly interconnected
Olivine	9	11		2	1		Anhedral	
Orthopyroxene	1	1			0.5		Interstitial	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Prehnite	0.2						Plagioclase	
Chlorite	0.1						Plagioclase	
Calcite	0.1						Plagioclase	
Serpentine	0.5						Olivine	
Tremolite	0.4						Olivine/Pyroxene	
Pyrrhotite	0.5							
Chalcopyrite	0.5							

TOTAL ALTERATION: 1.3 %

STRUCTURE : Gabbro with large clinopyroxenes. Very weak plastic deformation (undulatory extinction), and plagioclase crystals broken up and surrounded by clinopyroxene, with relative solid rotation of crystal portions (JE)

PHOTOMICROGRAPHS:

1309D_221R_3_100_102_1
1309D_221R_3_100_102_2
1309D_221R_3_100_102_3
1309D_221R_3_100_102_4

THIN SECTION:	U1309D-222R-2, 51-53 cm	**Piece No.** 2B	**Unit**: 549	**TS#: 556**	**OBSERVER: AD, JE, EH**
ROCK NAME:	Olivine gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Equigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	50	50		2	1		Subhedral	Not uncommonly enclosed in olivine, and clinopyroxene, otherwise largely recrystallized
Clinopyroxene	40	40		2	1		Subhedral	
Olivine	7	9		2	1		Anhedral to interstitial	Vermicular grains
Orthopyroxene	1	1			1		Subhedral	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Serpentine	0.5							
Tremolite	0.5							
Prehnite	0.2							
Chlorite	0.3							
Magnetite	0.2							
Pyrrhotite	0.5							
Chalcopyrite	0.5							

TOTAL ALTERATION: 1.5 %

STRUCTURE : Plagioclase matrix does not look very neoblast like but has strong CPO suggesting nearly complete recrystallization. Fracture network along olivine grains with black (oxide?) deposits (JE, GS)

PHOTOMICROGRAPHS:

1309D_222R_2_51_53_1
1309D_222R_2_51_53_2
1309D_222R_2_51_53_3
1309D_222R_2_51_53_4
1309D_222R_2_51_53_5
1309D_222R_2_51_53_6
1309D_222R_2_51_53_7

THIN SECTION:	U1309D-222R-2, 84-87 cm	**Piece No.** 2C	**Unit**: 549/550	**TS#: 557**	**OBSERVER:GS, AD, NA**
ROCK NAME:	Leucocratic olivine gabbro				
GRAIN SIZE:	Medium to coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	75	75	0.1	10	4		Subhedral to anhedral	Zoning
Olivine	12	13	0.1	3	0.8		Anhedral to interstital, oikocrystal	Fluid inclusion trails, rod?
Clinopyroxene	11	12	0.1	6	2		Anhedral to interstital and film	
Orthopyroxene	Trace	Trace	<0.1	<0.1	<0.1		Film	Thin film between olivine and plagioclase or clinopyroxene grains
Sulfide	Trace	Trace	<0.1	<0.1	<0.1		Anhedral to interstitial	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Serpentine	0.5						Olivine	
Tremolite	0.5						Olivine	
Prehnite	0.5						Plagioclase	
Chlorite	0.5						Plagioclase	Rim between the olivine (slightl slghtly altered to tremolite) and the plagioclase
Pyrrhotite	0.5							
Chalcopyrite	0.5							
Magnetite	0.2							
Pyrite ?								

TOTAL ALTERATION: 2%

STRUCTURE : Good magmatic foliation by plagioclase. Olivines and clinopyroxenes then commonly just mimic the elongate pore space left by plagiclase (photo). Some high temperature recrystallization is present (plagioclase to coarse neoblasts, olivine to subgrains). Clinopyroxene commonly as delicate interstitial phase preserved. Orthopyroxene again as rim between plagioclase and olivine. (GS)

PHOTOMICROGRAPHS:

1309D_222R_2_84_87_1
1309D_222R_2_84_87_2
1309D_222R_2_84_87_3
1309D_222R_2_84_87_4
1309D_222R_2_84_87_5
1309D_222R_2_84_87_6
1309D_222R_2_84_87_7
1309D_222R_2_84_87_8
1309D_222R_2_84_87_9
1309D_222R_2_84_87_10
1309D_222R_2_84_87_11

THIN SECTION:	U1309D-223R-2, 111-114 cm	**Piece No.** 9A		**Unit**: 553		**TS#: 558**		**OBSERVER:GS, AD, NA**	
ROCK NAME:	Olivine-bearing gabbro								
GRAIN SIZE:	Fine to medium								
TEXTURE:	Seriate								

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	64	65	0.1	5	1		Subhedral to anhedral	
Clinopyroxene	28	29	0.1	5	0.5		Anhedral to oikocrystal	
Olivine	3	5	0.1	3	0.4		Anhedral to interstitial	
Orthopyroxene	1	1	<0.1	<0.1	<0.1		Interstital to film	

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Serpentine	0.5						Olivine	
Tremolite	1						Olivine/pyroxene	
Prehnite	0.2						Plagioclase	
Pyrrhotite	0.5							
Pyrite	0.5							
Chalcopyrite	0.5							

TOTAL ALTERATION: 1.7 %

STRUCTURE : Relict magmatic fabric still present, but strength weakend by subsequent very high temperature (weak plastic) strain, causing recrystallization into low angle new grains of plagioclase, clinopyroxene and olivine. Delicate pyroxene films are preserved. (GS)

PHOTOMICROGRAPHS:

1309D_223R_2_111_114_1
1309D_223R_2_111_114_2
1309D_223R_2_111_114_3
1309D_223R_2_111_114_4
1309D_223R_2_111_114_5
1309D_223R_2_111_114_6

THIN SECTION:	U1309D-225R-1, 85-87 cm	**Piece No.** 2	**Unit**: 557	**TS#: 559**	**OBSERVER:GS, AD, NA**
ROCK NAME:	Olivine-bearing gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	64	65	0.1	7	2		Anherdal	
Clinopyroxene	28	30	0.1	6	1.5		Anhedral to interstital, oikocrystal and film	Some film between olivine and plagioclase grains
Olivine	3	5	0.1	2	0.5		Anhedral to interstitial	
Orthopyroxene	Trace	Trace	<0.1	<0.1	<0.1		Film	Film between olivine and plagioclase or clinopyroxene grains
Sulfide	Trace	Trace	<0.1	<0.1	<0.1		Interstital	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Serpentine	0.3						Olivine	
Tremolite	1						Olivine/pyroxene	
Prehnite	0.2						Plagioclase	
Pyhrrotite	0.5							
Chalcopyrite	0.5							
Pyrite	0.5							

TOTAL ALTERATION: 1.5 %

STRUCTURE : Weak magmatic fabric mainly defined by smaller plagioclase grains. Plastic strain also weak (minor subgrains in olivine, clinopyroxene and plagioclase). A few larger grains (plagioclase and clinopyroxene) stand out (GS)

PHOTOMICROGRAPHS:

1309D_225R_1_85_87_1
1309D_225R_1_85_87_2
1309D_225R_1_85_87_3
1309D_225R_1_85_87_4
1309D_225R_1_85_87_5
1309D_225R_1_85_87_6

THIN SECTION:	U1309D-226R-1, 43-46 cm	**Piece No.** 3B	**Unit**: 560	**TS#: 560**	**OBSERVER:GS, AD, NA**
ROCK NAME:	Gabbronorite				
GRAIN SIZE:	Medium				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	60	65	0.1	9	4		Anhedral to oikocrystal	
Clinopyroxene	17	25	0.1	6	3		Anhedral to oikocrystal	
Orthopyroxene	8	10	0.1	2	0.8		Anhedral	Associated with clinopyroxene
Olivine	0	Tr	<0.1	<0.1	<0.1		Anhedral (chadacryst)	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Serpentine	1						Olivine	
Tremolite	3						Olivine/pyroxene	
Green-brown amphibole	10						Pyroxene	
Chlorite	0.5						Plagioclase	
Prehnite	0.5						Plagioclase	
Pyrrhotite	1							
Chalcopyrite	1							

TOTAL ALTERATION: 15 %

STRUCTURE : Weak magmatic strain suspected but more important plastic strain, also affecting orthopyroxene, has largely destroyed the original magmatic fabric. Note absence of olivine here and presence of more important plastic strain (correlation??) (GS)

PHOTOMICROGRAPHS:

1309D_226R_1_43_46_1
1309D_226R_1_43_46_2
1309D_226R_1_43_46_3
1309D_226R_1_43_46_4
1309D_226R_1_43_46_5
1309D_226R_1_43_46_6
1309D_226R_1_43_46_7
1309D_226R_1_43_46_8
1309D_226R_1_43_46_9

THIN SECTION:	U1309D-226R-3, 10-13 cm	**Piece No.** 1	**Unit**: 560	**TS#: 561**	**OBSERVER: AD, NA, GS**
ROCK NAME:	Gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Clinopyroxene		55	0.2	20	10		Anhedral to interstitial	
Plagioclase		45	0.2	20	10		Anhedral	
Oxide	Trace	Trace	<0.1	<0.1	<0.1		Anhedral	

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Green amphibole	25						Pyroxene	
Brown amphibole	1						Pyroxene	
Prehnite	15						Plagioclase	
Chlorite	15						Plagioclase	
Ilmenite	1							
Vein 1								
Calcite	1							
Vein 2								
Chlorite	2							

TOTAL ALTERATION: 60 %

STRUCTURE : No magmatic or plastic strain. Pervasive microcrack network is cut by calcite vein. (GS)

PHOTOMICROGRAPHS:

1309D_226R_3_10_13_1

1309D_226R_3_10_13_2

THIN SECTION:	U1309D-226R-3, 55-57 cm	**Piece No.** 2B	**Unit**: 560	**TS#: 562**	**OBSERVER: AD,NA**
ROCK NAME:	Orthopyroxene-bearing gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Clinopyroxene		50	1	18	8		Anhedral to oikocrystal	
Plagioclase		45	1	12	4		Subhedral to anhedral	
Orthopyroxene		5	<0.1	4	1		Anhedral to interstitial	Associated with clinopyroxene
Olivine	Trace	Trace	<0.1	<0.1	<0.1		Anhedral	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Green amphibole	7						Pyroxene	
Brown amphibole	2						Pyroxene	
Prehnite	1						Plagioclase	
Pyrite	0.5							
Pyrrhotite	1							
Chalcopyrite	1							

TOTAL ALTERATION: 10 %

STRUCTURE : No magmatic strain, plastic strain obvious in plagioclase by mosaic shaped neoblasts. Optical link between several grains of plagioclase suggests that many smaller plagioclase grains should be considered as neoblasts. One nest with smaller neoblasts of plagioclase and clinopyroxene. Orhopyroxene is large and undeformed.

PHOTOMICROGRAPHS:

1309D_226R_3_55_57_1

1309D_226R_3_55_57_2

THIN SECTION:	U1309D-227R-2, 24-26 cm	**Piece No.** 1C	**Unit**: 561	**TS#: 563**	**OBSERVER: AD,NA,GS**
ROCK NAME:	Olivine gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	60	65					Anhedral to subhedral	
Clinopyroxene	12	20					Anhedral to interstitial, oikocrystal	Some thin film between olivine and plagioclase
Olivine	10	15					Anhedral to subhedral	Some large grain include plagioclase poikilitically
Magnetite	Trace	Trace	<0.1	<0.1	<0.1		Subhedral	
Orthopyroxene	Trace	Trace	<0.1	<0.1	<0.1		Anhedral	Thin film between olivine and plagioclase or clinopyroxene

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Serpentine	3						Olivine	
Tremolite	3						Olivine/pyroxene	
Prehnite	1						Plagioclase	
Chlorite	<<1						Plagioclase	
Pyrite	0.5							
Pyrrhotite	1							
Chalcopyrite	1							
Magnetite	0.5							

TOTAL ALTERATION: 7-8%

STRUCTURE : No clear magmatic strain. Plastic strain obvious in plagioclase by neoblast formation. Olivines are well rounded, no fabric. (GS)

PHOTOMICROGRAPHS:

1309D_227R_2_24_26_1

1309D_227R_2_24_26_2

THIN SECTION:	U1309D-227R-2, 32-34 cm	**Piece No.** 1D	**Unit**: 561/562	**TS#: 564**			**OBSERVER:JB, AD,NA, KJ**	
ROCK NAME:	Olivine-rich troctolite							
GRAIN SIZE:	Medium/fine							
TEXTURE:	Seriate/poikilitic							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Olivine-rich Troctolite								
Olivine	70	85	<0.1	8	0.8		Anhedral to subhedral	Rare melt inclusions (≤2 mm)
Plagioclase	7	10	<0.1	8	0.4		Interstitial to oikocrystal	
Clinopyroxene	4	5	<0.1	5	0.3		Interstitial to oikocrystal	Interstitial films
Spinel	<1	<1	<0.1	<0.1	<0.1		Subhedral to anhedral	Rarely mineral inclusions
Sulfide	Trace	Trace	<0.1	<0.1	<0.1		Interstitial	
Olivine Gabbro								
Olivine	25	35	<0.1	10	0.7		Anhedral	Partly oikocrystic including clinopyroxene and plagioclase grains, slightly kinked
Plagioclase	32	35	<0.1	8	0.5		Anhedral	
Clinopyroxene	28	30	<0.1	10	0.8		Anhedral	Oikocryst include plagioclase and olivine chadacrysts, film between olivine and plagioclase

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Serpentine	8						Olivine	Incipient kernel texture
Magnetite	1						Olivine	
Prehnite	Trace						Plagioclase	Very rare
Talc	Trace						Olivine	Cores of fully serpentinized grains
Vein								
Serpentine								

TOTAL ALTERATION: 10%, minor dusty alteration of plagioclase

STRUCTURE : No magmatic strain, weak plastic strain (some neoblasts). No preferred orientation of olivine or spinel. Olivine with relatively homogeneous grain size except for vein.(GS)

PHOTOMICROGRAPHS:

1309D_227R_2_32_34_1

1309D_227R_2_32_34_2

THIN SECTION:	U1309D-227R-3, 70-72 cm	**Piece No.** 2E	**Unit**: 562	**TS#: 565**	**OBSERVER: TN,NA, GS**
ROCK NAME:	Olivine-rich Troctolite				
GRAIN SIZE:	Fine				
TEXTURE:	Poikilitic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Olivine	<75	75	<0.1	2	0.8		Anhedral to subhedral	
Plagioclase	<23	23	<0.1	15			Oikocrystal	
Spinel/magnetite	1	1	<0.1	0.4	<0.1		Subhedral to euhedral	In places included in olivine or amphibole(?)Inclusion
Clinopyroxene/orthopyroxe	<1	<1	<0.1	<0.1	0.1		Interstitial or film	Grain boundary between olivine and plagioclase
Sulfide	Trace	Trace					Interstitial	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Tremolite	<1						Olivine	At contact with plagioclase
Chlorite	<1						Plagioclase	At contact with olivine
Serpentine	2						Olivine	Crack filling in olivine, oxidized and pleochroic (brown-green)
Magnetite	<1						Olivine, spinel?	Crack filling in olivine, fringe of some spinel grains
Sulfides	<<1						Olivine?	Very tiny grains, in crack of olivine or interstitial.

TOTAL ALTERATION: 2 %

STRUCTURE : Perhaps weak magmatic strain as seen in orientaton of slightly elongated olivines (slightly oblique to short side of slide). No plastic strain. Very impressive poikilitic plagioclase. Spinel with no SPO. Local orthopyroxene film between olivines. Fresh. (GS)

PHOTOMICROGRAPHS:

1309D_227R_3_70_72_1
1309D_227R_3_70_72_2
1309D_227R_3_70_72_3

THIN SECTION:	U1309D-228R-1, 24-27 cm	**Piece No.** 1A	**Unit**: 562	**TS#: 566**	**OBSERVER:GS, TN, EH,GS**
ROCK NAME:	Gabbronorite dikelet in a chromitiferous troctolite				
GRAIN SIZE:	Fine to medium				
TEXTURE:	Poikilitic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Olivine	45	60			1		Subhedral	Undeformed, subhedral to subrounded. Olivine-olivine contacts on average less than 10% of their surface, I.e. high plagioclase "porosity"
Plagioclase	30	35			3		Anhedral	Undeformed oikocrysts
Cr-spinel	1	1			0.2		Subhedral	Most abundant as subrounded to subequant grains in plagioclase, less common in olivine, rarely containing rounded olivine and plagioclase inclusions
Clinopyroxene	4	4	0.1		2		Interstitial	Abundant fine interstitial selvages along olivine plagioclase contacts. Less common as interconnected poikilitic grains enclosing only olivine
Sulfides	0.2	0.2					Interstitial	Abundant rounded interstitial grains, multiphase, possibly pentlandite and (more yellowish) chalcopyrite?
Gabbronorite dikelet (4 mm wide olivine-free central part)								Contact is very diffuse, solely marked by the absence of olivine. Grain size of clinopyroxene and plagioclase similar to troctolite-hosted oikocrysts. Grains grow across olivine-free center into troctolite. At one side of the contact, a coarse olivine suboikocryst is observed
Plagioclase	30	54			3			More strongly altered than elsewhere
Clinopyroxene	35	40			3			Interfingering grains
Orthopyroxene	4	6			3			Two coarse grains, some more may have been replaced by talc

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Serpentine	10						Olivine	Crack filling, partially oxidized and pleochroic (brown-green)
Tremolite	<1						Olivine	At contact with plagioclase
Chlorite	<1						Plagioclase	At contact with olivine
Prehnite	3						Plagioclase	Pseudomorphic
Magnetite	<1						Olivine, spinel	Crack filling in olivine, fringing spinel grains
Sulfides	<<1						Olivine, interstitial	

TOTAL ALTERATION: 15%

STRUCTURE : Undeformed olivines in undeformed poikilitic plagioclase and clinopyroxene. Spinels are small and equant and surprisingly, are nearly always included in plagioclase and clinopyroxene (rarely in oliivine). Olivines have flat extinction, not even tilt walls. Most olivines are rounded, some are somewhat mosaic shaped, a weak preferred elongation cannot be ruled out (GS)

PHOTOMICROGRAPHS:

1309D_228R_1_24_27_1

1309D_228R_1_24_27_2

THIN SECTION:	U1309D-228R-2, 0-3 cm	**Piece No.** 1A	**Unit**: 566	**TS#: 567**	**OBSERVER: AD, GS, DB**
ROCK NAME:	Troctolite cut by gabbro dikelet				
GRAIN SIZE:	Medium				
TEXTURE:	Equigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Olivine		60			1		Subhedral, anhedral	
Plagioclase		40			0.5		Interstitial to oikocrystic	
Spinel		1			0.2		Euhedral	
Clinopyroxene		0.1			0.1		Film	
Gabbro dikelet is too altered for any estimation								

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Serpentine	7						Olivine	
Tremolite	20						Olivine	Thin rim around the olivine grains, and in a thick zone all the previous olivines are replaced to tremolite associated with talc and also calcite
Talc	7						Olivine	
Chlorite	3						Plagioclase	At contact between the olivine with a thin rim of tremolite and the plagioclase
Prehnite	3						Plagioclase	
Green-brown amphibole	3						Pyroxene	
Pyrrhotite	1							In the matrix and also observed in veins associated with calcite
Chalcopyrite	1							
Magnetite	1							
Veins								
Serpentine	3							
Calcite	5							
Chlorite	5							
Pyrrhotite								

TOTAL ALTERATION: 70 %

STRUCTURE : Undeformed poikiltic troctolite. Was apparently cut by coarse grained gabbroic vein. (GS)

PHOTOMICROGRAPHS:

1309D_228R_2_0_3_1
1309D_228R_2_0_3_2
1309D_228R_2_0_3_3
1309D_228R_2_0_3_4
1309D_228R_2_0_3_5
1309D_228R_2_0_3_6

THIN SECTION:	U1309D-230R-1, 58-60 cm	**Piece No.** 5	**Unit**: 573	**TS#: 568**	**OBSERVER: AD, DB**
ROCK NAME:	Olivine-bearing gabbronorite				
GRAIN SIZE:	Medium				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase		72	0.5	3			Anhedral	
Clinopyroxene		18	0.1	7			Anhedral, interstitial, oikocrystic	Encloses rounded plagioclase chadacysts
Orthopyroxene		8	0.5	4			Anhedral	
Olivine		2	0.2	2			Anhedral	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Green-brown amphibole	5						Pyroxene	
Actinolite	2						Pyroxene	Thin rim around the pyroxene and thin veinlets cutting the plagioclase
Tremolite	1						Olivine	
Serpentine	1						Olivine	
Prehnite	<<1						Plagioclase	
Pyrrhotite	1							
Chalcopyrite	1							

TOTAL ALTERATION: 10%

STRUCTURE : Large poikilitic clinopyroxene enclosing resorbed looking plagioclase. No magmatic fabric. Weak plastic fabric seen in subgrains of clino- and orthopyroxene and neoblast of plagioclase (GS)

PHOTOMICROGRAPHS:

1309D_230R_1_58_60_1

1309D_230R_1_58_60_2

1309D_230R_1_58_60_3

THIN SECTION:	U1309D-230R-2, 70-74 cm	**Piece No.** 7A	**Unit**: 575	**TS#:569**	**OBSERVER: AD, DB, GS**
ROCK NAME:	Gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Subequigranular/cataclastic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase		60			6		Anhedral	
Clinopyroxene		40			6		Anhedral	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Chlorite	5						Plagioclase	
Prehnite	15						Plagioclase	
Calcite	15						Plagioclase/pyroxene	Calcite replace sometimes completely the previous plagioclase and pyroxene
Green-brown amphibole	15						Pyroxene	
Brown amphibole	3						Pyroxene	
Talc ??							Pyroxene	May be associated with the amphibole replacing the pyroxene
Ilmenite	1							
Vein								
Calcite	5							

TOTAL ALTERATION: 80 %

STRUCTURE : Coarse gabbro cut by a cataclastic shear zone. Gabbro is essentially unstrained, so all features seen in cataclasite are related to the shearing. Note the bent clinopyroxene grains, suggesting that the cataclastite has had a higher temperature history involving plastic behavior without recovery. Shear sense appears top to left. Also note large calcite and flow alignment of broken pieces in cataclasite. (GS)

PHOTOMICROGRAPHS:

1309D_230R_2_70_74_1
1309D_230R_2_70_74_2
1309D_230R_2_70_74_3
1309D_230R_2_70_74_4
1309D_230R_2_70_74_5
1309D_230R_2_70_74_6
1309D_230R_2_70_74_7
1309D_230R_2_70_74_8

THIN SECTION:	U1309D-231R-1, 108-110 cm	**Piece No.** 6A	**Unit**: 576	**TS#: 570**	**OBSERVER: AD, DB, GS**
ROCK NAME:	Gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Subequigranular/cataclastic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase		60			6		Anhedral	
Clinopyroxene		40			6		Anhedral	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Chlorite	20						Plagioclase	
Prehnite	10						Plagioclase	
Zeolite	1						Plagioclase	Vein replacing the plagioclase close to the missing vein (epidote)
Green-brown amphibole	10						Pyroxene	
Vein								
Actinolite	2							Thin veinlets
Chlorite	5							
Epidote	2							
Tremolite	2							Cutting the pyroxene grains

TOTAL ALTERATION: 70 %

STRUCTURE : Undeformed gabbro cut by cataclasite. As indicated by metamorphic group, cataclasite might be chemically distinct, i.e. be a transformed vein. (GS)

PHOTOMICROGRAPHS:

1309D_231R_1_108_110_1

1309D_231R_1_108_110_2

THIN SECTION:	U1309D-231R-3, 83-86 cm	**Piece No.** 6B	**Unit**: 580/581	**TS#: 571**	**OBSERVER: AD, DB,GS**
ROCK NAME:	Troctolite/gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Troctolite								
Olivine		40			4		Subhedral	
Plagioclase		60			6		Anhedral	
Gabbro								
Clinopyroxene		50			6			
Plagioclase		50			6		Anhedral	
Late magmatic impregnation affected gabbro.								

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Serpentine	3						Olivine	
Tremolite	3						Olivine	Thin rim around olivine
Talc	2						Olivine	
Prehnite	3						Plagioclase	
Hydrogarnet ??	3						Plagioclase	
Chlorite	15						Plagioclase/Amphibole	At contact between tremolite around the olivine and plagioclase
Green-brown amphibole	10						Pyroxene	
Calcite	2						Amphibole	Interstitial
Epidote	2							
Titanite	1						Amphibole	
Ilmenite	2							
Pyrrhotite	1							
Vein								
Tremolite	2							
Sulfides	1							
Chlorite	2							

TOTAL ALTERATION: 52 %

STRUCTURE : Not many deformation features in this slide. Some recrystallization of plagioclase in the troctolite. Late oxide-epidote-titanite vein is not deformed. (GS)

PHOTOMICROGRAPHS:

1309D_231R_3_83_86_1
1309D_231R_3_83_86_2
1309D_231R_3_83_86_3
1309D_231R_3_83_86_4
1309D_231R_3_83_86_5
1309D_231R_3_83_86_6

THIN SECTION:	U1309D-232R-1, 35-38 cm	**Piece No.** 2A	**Unit**: 582	**TS#: 572**	**OBSERVER: AD, DB,GS**
ROCK NAME:	Olivine gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Olivine		75			3		Subhedral	Cumulus
Plagioclase		10			1		Interstitial, oikocrystic	Intercumulus
Clinopyroxene		15			3		Interstitial, oikocrystic	Intercumulus
Spinel		0.5			0.5		Euhedral	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Serpentine	8						Olivine	
Tremolite	2						Olivine	Rim around the olivine grains
Chlorite	4						Plagioclase	Tremolite only occurs when it is close to chlorite
Prehnite	2						Plagioclase	
Hydrogarnet ??	4						Plagioclase	Replacing the plagioclase close to the serpentinized olivine
Magnetite	1							
Pyrrhotite	1							
Vein								
Tremolite	1							
Chlorite	1							

TOTAL ALTERATION: 22 %

STRUCTURE : No magmatic strain and weak plastic strain as seen by locally recrystallized interstitial plagioclase and straightened out grain boundaries. Spinel without shape fabric, occurs both in olivine and plagioclase. Clinopyroxene locally encloses some plagioclase. (GS)

PHOTOMICROGRAPHS:

1309D_232R_1_35_38_1
1309D_232R_1_35_38_2
1309D_232R_1_35_38_3
1309D_232R_1_35_38_4
1309D_232R_1_35_38_5
1309D_232R_1_35_38_6
1309D_232R_1_35_38_7

THIN SECTION:	U1309D-232R-1, 102-105 cm	**Piece No.** 2C	**Unit**: 582	**TS#: 573**			**OBSERVER: AD, DB**	
ROCK NAME:	Olivine gabbro dikelet in trocltolitic gabbro							
GRAIN SIZE:	Coarse/medium							
TEXTURE:	Poikilitic to seriate							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**			**Composition**	**MORPHOLOGY**	**COMMENTS**
			min.	**max.**	**av.**			
Olivine gabbro vein								
Clinopyroxene		70	0.1	13			Oikocrystic	
Olivine		20	0.5	1			Rounded chadacrysts	
Plagioclase		10	1	6			Oikocryts, rounded chadacryst	
Troctolitic gabbro								
Olivine		70			3		Subhedral	
Plagioclase		15			3		Interstitial	
Clinopyroxene		15			3		Oikocrystic, interstitial	Interstitial clinopyroxene seems possibly more abundant close to the gabbroic vein. Oikocrystic clinopyroxene possibly primary in the troctolitic texture.
Spinel		1			0.4		Subhedral, skeletal	

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron)**				**REPLACING / FILLING**	**COMMENTS**
			min.	**max.**	**av.**			
Serpentine	6						Olivine	
Prehnite	3						Plagioclase	
Hydrogarnet ??	1						Plagioclase	Brown mineral replacing the plagioclase.
Magnetite	1							
Pyrite	1							

TOTAL ALTERATION: 10 %

STRUCTURE : (Olivine gabbro dikelet): Olivine and plagioclase relics of the primary troctolitic texture are resorbed and enclosed in lagre clinopyroxene and plagioclase chadacrysts. Some plagioclase/olivine contacts are preserved. Thin termination of the pyroxene are intertitial and cut olivine grains in the middle.

PHOTOMICROGRAPHS:

1309D_232R_1_102_105_2
1309D_232R_1_102_105_3
1309D_232R_1_102_105_4
1309D_232R_1_102_105_5
1309D_232R_1_102_105_6
1309D_232R_1_102_105_7
1309D_232R_1_102_105_8
1309D_232R_1_102_105_9
1309D_232R_1_102_105_10
1309D_232R_1_102_105_11

THIN SECTION:	U1309D-232R-3, 75-77 cm	**Piece No.** 4A		**Unit**: 583	**TS#: 574**		**OBSERVER: AD, DB, GS**	
ROCK NAME:	Olivine-rich troctolite/troctolite							
GRAIN SIZE:	Variable							
TEXTURE:	Seriate							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
In this rock there are two textural domains, the host rock is a coarse grain troctolite enclosing leucocratic domains of olivine poor troctolite (see core close-up photo).								
The leucocratic domains show a central large subhedral plagioclase grain associated with large olivine grains. Both are surrounded by a 5-8 mm large band of fine grained olivine poor troctolite.								
Olivine-rich domain (olivine-rich troctolite)								
Olivine		85			4		Subhedral, anhedral	
Plagioclase		13			2		Interstitial	
Clinopyroxene		2			1		Interstitial	
Olivine poor domain (troctolite)								
Plagioclase		85-90	0.5	12			Oikocrystic, subhedral, anhedral	Plagioclase olivine contact are near equilibrium 120 degrees, plagioclase show weak undulose extinction.
Olivine		10-15	0.5	3			Subhedral, anhedral	
Clinopyroxene		0.1			0.2		Interstitial	Thin films around olivine

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Serpentine	30							
Prehnite	15							
Hydrogarnet ??	5							
Chlorite	1							
Magnetite	1							
Pyrrhotite	1							
Vein								
Serpentine	1							
Tremolite	1							
TOTAL ALTERATION: 55 %								

STRUCTURE : Strongly varying plagioclase content across this slide. The large plagioclse contains a olivine and spinel with good elongation. It is rimmed by magmatically aligned plagioclase grains with unusually small (200 µm) olivines. Some plastic strain to explain plagioclase neoblast is needed (GS)

PHOTOMICROGRAPHS:

1309D_232R_3_75_77_1
1309D_232R_3_75_77_2
1309D_232R_3_75_77_3

THIN SECTION:	U1309D-233R-2, 70-73 cm	**Piece No.** 11A	**Unit**: 586	**TS#: 575**	**OBSERVER: AD, DB, GS**
ROCK NAME:	Olivine-rich troctolite				
GRAIN SIZE:	Medium				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Olivine		70			4		Subhedral, anhedral rarely oikocrystic	Encloses plagioclase
Plagioclase		28			4		Interstitial oikocrysts	
Clinopyroxene		2			1		Interstitial oikocrysts	
Spinel		0.5			0.3		Subhedral	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Serpentine	15						Olivine	And also veins
Tremolite	4						Olivine	Locally rim around the olivine
Chlorite	4						Plagioclase	Rim when contact between olivine replaced by tremolite and plagioclase
Prehnite	10						Plagioclase	Complete replacement of the plagioclase when they are close to serpentinized olivines
Hydrogarnet ??	3							
Magnetite	1							
Pyrrhotite	1							
Vein								
Tremolite	1							
Chlorite	1							

TOTAL ALTERATION: 40 %

STRUCTURE : Weak magmatic foliation suspected (diagonal to slide edges) by olivine and interstitial alignment. Weak plastic strain seen in plagioclase neoblast. Spinel no elongation. (GS)

PHOTOMICROGRAPHS:

1309D_233R_2_70_73_1
1309D_233R_2_70_73_2
1309D_233R_2_70_73_3
1309D_233R_2_70_73_4
1309D_233R_2_70_73_5
1309D_233R_2_70_73_6

THIN SECTION:	U1309D-234R-2, 0-3 cm	**Piece No.** 1	**Unit**: 587	**TS#: 576**			**OBSERVER:GS, DB, TN, YO**	
ROCK NAME:	Olivine-rich troctolite/rodingite							
GRAIN SIZE:	Medium							
TEXTURE:	Seriate subhedral monophase in interstitial poikilitic matrix							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Olivine		75			1.8		Subhedral	
Plagioclase		25			4		Interstitial oikocrysts	

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Serpentine	20						Olivine	Pseudomorphic
Talc	10						Olivine	Pseudomorphic
Tremolite/actinolite	30						Olivine, plagioclase, vein	Forms coronas
Chlorite	20						Olivine, plagioclase	Forms coronas or pseudomorphs after plagioclase
Hydrogarnet	5						Plagioclase	Pseudomorphic
Bowlingite?	5						Olivine	Pseudomorphic
Carbonate	3							Patches near tremolite vein
Diopside	1							Tiny needles near tremolite vein
Magnetite	1						Olivine	Crack-filling
Sulfides	<1						Olivine	

Alteration of plagioclase: the troctolitic part, where relict olivines are abundant, plagioclase is altered into hydrogarnet. On the other hand, in the rodingitic part where appears whitish in the hand sample, plagioclase appears to be altered into serpentine. (YO)

TOTAL ALTERATION: 95 %

STRUCTURE : No magmatic strain, no plastic strain (GS)

PHOTOMICROGRAPHS:

1309D_234R_2_0_3_1

1309D_234R_2_0_3_2

THIN SECTION:	U1309D-234R-2, 9-12 cm	**Piece No.** 2	**Unit**: 587	**TS#: 577**	**OBSERVER: DB, TN**
ROCK NAME:	Metatroctolite				
GRAIN SIZE:	Medium				
TEXTURE:	Seriate subhedral monophase in interstitial poikilitic matrix				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Olivine		85			2		Subhedral	
Plagioclase		15			4		Interstitial poikilitic	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Talc	20						Olivine	Pseudomorphic
Tremolite/actinolite	45						Olivine, clinopyroxene, vein	Pseudomorphic
Chlorite	30						Plagioclase, clinopyroxene, vein	Pseudomorphic
Hydrogarnet?	2						Plagioclase	Pseudomorphic

TOTAL ALTERATION: 97 %

STRUCTURE : No magmatic strain, no plastic strain.

PHOTOMICROGRAPHS:

1309D_234R_2_9_12_1
1309D_234R_2_9_12_2
1309D_234R_2_9_12_3
1309D_234R_2_9_12_4

THIN SECTION:	U1309D-234R-2, 77-80 cm	**Piece No.** 6B	**Unit**: 588	**TS#: 578**	**OBSERVER: AD, DB, GS**
ROCK NAME:	Olivine-rich troctolite/gabbro				
GRAIN SIZE:	Medium/coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Olivine-rich troctolite								
Olivine		90			4		Subhedral, anhedral	Olivine are in contact
Plagioclase		10			4		Interstitial oikocrysts	
Clinopyroxene		0.1			0.5		Interstitial rim	
Spinel		0.1			0.3		Anhedral	
Gabbro								
Clinopyroxene		60			10		Anhedral	
Plagioclase		40			5		Anhedral	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Serpentine	3						Olivine	As vein also
Tremolite	2						Olivine	Rim around the olivines is more present close to the gabbroic vein
Chlorite	1						Plagioclase	Chlorite occur when tremolite rim around the olivine
Prehnite	3						Plagioclase	The plagioclase are more altered to prehnite in the gabbroic intrusion
Hydrogarnet ??	1						Plagioclase	
Green-brown amphibole	2						Pyroxene	
Magnetite	1							
Pyrrhotite	1							
Chalcopyrite	1							
Pyrite ??								

TOTAL ALTERATION: 13 %

STRUCTURE : No magmatic strain, only most minor plastic strain in olivine-rich troctolite. Gabbro vein with some minor strain, at other side of vein, olivines are much smaller and there is actually some subgrain formation in clinopyroxene and plagioclase and olivine, perhaps relating to vein emplacement. (GS).

PHOTOMICROGRAPHS:

1309D_234R_2_77_80_1

1309D_234R_2_77_80_2

THIN SECTION:	U1309D-235R-2, 5-8 cm	**Piece No.** 1A	**Unit**: 589/590	**TS#: 579**	**OBSERVER: TN, DB,GS, YO**
ROCK NAME:	Olivine-rich troctolite/gabbro contact				
GRAIN SIZE:	Medium/coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Olivine-rich troctolite								
Olivine		90			4		Subhedral, anhedral	Olivines are in contact
Plagioclase		10			4		Interstitial oikocrysts	
Clinopyroxene		0.1			0.5		Interstitial rim	
Spinel		0.5			0.3		Subhedral	Mainly distributed in plagioclase.
Gabbro								
Clinopyroxene		60			12		Anhedral	
Plagioclase		40			6		Anhedral	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Tremolite/actinolte	1						Olivine, plagioclase, clinopyroxene	Between olivine and plagioclase in troctolite, growing over clinopyroxene in gabbro
Chlorite	3						Olivine, plagioclase, clinopyroxene	Between olivine and plagioclase in troctolite
Serpentine	10						Olivine	Pseudomorphs in troctolite
Bowlingite?	2						Olivine	Pseudomorphs in troctolite near gabbro
Prehnite	5						Plagioclase	Pseudomorphic
Clay mineral?	3						Plagioclase	Brownish, high-birefringent tiny crystals
Magnetite	1						Olivine, spinel	
Sulfides	<1							
Hydrogarnet							Plagioclase	

TOTAL ALTERATION: 25 %

STRUCTURE : No magmatic strain, minor plastic strain seen in plagioclase recrystallization. Spinel equant, mainly occurs in plagioclase again, is not present in the gabbro vein. (GS)

PHOTOMICROGRAPHS:

1309D_235R_2_5_8_1

1309D_235R_2_5_8_2

THIN SECTION:	U1309D-236R-1, 45-47 cm	**Piece No.** 3	**Unit**: 590	**TS#: 580**	**OBSERVER: AD, DB, GS**
ROCK NAME:	Olivine-rich troctolite				
GRAIN SIZE:	Medium				
TEXTURE:	Subpoikilitic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Olivine		85			4		Subhedral, anhedral	Olivines are in contact
Plagioclase		15			4		Intertitial, interstitial oikocrysts	
Clinpyroxene		0.5			0.2		Film	Between olivine and plagioclase
Spinel		0.5			0.5		Euhedral, subhedral	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Serpentine	8						Oliivine	
Tremolite	2						Olivine	Thin rim around the serpentinized olivine
Prehnite	8						Plagioclase	Some plagioclase are completely replaced by prehnite
Chlorite	2						Plagioclase	At contact between the tremolite around olivine and plagioclase
Hydrogarnet ??	3						Plagioclase	
Green amphibole	1							
Magnetite	1							
Sulfides (pyrite ?)	1							

TOTAL ALTERATION: 24 %

STRUCTURE : Olivines have a weak preferred elongation, i.e. perhaps a magmatic foliation trace. There is only very minor plastic strain, note that olivine grain size much coarser than in the first occurrence of the troctolites further above. Spinel equant. A dominant serpentinizaion direction is obvious in the slide and is roughly normal to see suspected preferred elongation of the olivines (seen best in whole thin section picture).(GS)

PHOTOMICROGRAPHS:

1309D_236R_1_45_47_1
1309D_236R_1_45_47_2
1309D_236R_1_45_47_3
1309D_236R_1_45_47_4
1309D_236R_1_45_47_5
1309D_236R_1_45_47_6
1309D_236R_1_45_47_7

THIN SECTION:	U1309D-236R-2, 10-13 cm	**Piece No.** 1B	**Unit**:	**TS#: 581**	**OBSERVER:GS, YO, PF**
ROCK NAME:	Olivine-rich troctolite				
GRAIN SIZE:	Medium				
TEXTURE:	Subpoikilitic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Olivine		85			4		Subhedral, anhedral	
Plagioclase		15			4		Intertitial, interstitial oikocrysts	In most cases, interstitial. In some cases, oikocrystic.
Clinpyroxene		Trace			0.2		Film	Between olivine and plagioclase.
Orthopyroxene		Trace					Film (if any)	Trace, if any.
Spinel		0.5					Euhedral, subhedral	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Serpentine	12						Olivine	Along fractures in oivine grains
Chlorite	7						Plagiocalse	Along fracture in plagioclase often continuous with serpentine foliation
Talc	<1						Olivine	(in larger vein)
Tremolite?							Olivine	
Garnet	<1							Subhedral crystals and anhedral grains near large vein

TOTAL ALTERATION: 20% A vein of amphibole and chlorite with some serpentine cuts across the center of the thin section and there is an alteration halo extending about 5 mm to either side.

STRUCTURE : Weak elongation of olivine is best seen in whole thin section picture. It is normal to the vein. There are locally very extensive, delicate clino- and orthopyroxene films between olivine and plagioclase. They are entirely undisturbed by plastic strain. Spinel at least in one case encloses brown amphibole. (GS)

PHOTOMICROGRAPHS:

1309D_236R_2_10_13_1
1309D_236R_2_10_13_2
1309D_236R_2_10_13_3
1309D_236R_2_10_13_4
1309D_236R_2_10_13_5
1309D_236R_2_10_13_6
1309D_236R_2_10_13_7
1309D_236R_2_10_13_8
1309D_236R_2_10_13_9
1309D_236R_2_10_13_10
1309D_236R_2_10_13_11
1309D_236R_2_10_13_12

THIN SECTION:	U1309D-236R-2, 144-147 cm	**Piece No.** 9	**Unit**: 592	**TS#: 582**	**OBSERVER: AD, DB, GS**
ROCK NAME:	Olivine gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase		65			4		Anhedral	
Clinopyroxene		29			3		Anhedral	
Olivine		6			3		Anhedral	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Serpentine	4						Olivine	
Tremolite	2						Olivine	Rim around the olivine
Chlorite	2						Plagioclase	At contact between the tremolite around the olivine and the plagioclase
Green-brown amphibole	6						Pyroxene	
Pyrrhotite	0.5							

TOTAL ALTERATION: 14%

STRUCTURE : A weak magmatic strain may once have been there, but was never really strong. Somwhat more extensive recrystallization in this slide than in the ten or so above, as seen in neoblasts of plagioclase and clinopyroxene and olivine. (GS)

PHOTOMICROGRAPHS:

1309D_236R_2_144_147_1

1309D_236R_2_144_147_2

THIN SECTION:	U1309D-237R-1, 74-77 cm	**Piece No.** 8B	**Unit**: 597	**TS#: 583**	**OBSERVER: AD, DB, GS**
ROCK NAME:	Olivine-rich troctolite/gabbronorite dikelet				
GRAIN SIZE:	Medium				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Olivine-rich troctolite								
Olivine		90			2		Subhedral, anhedral	
Plagioclase		10			3		Interstitial, interstitial oikocrysts	
Spinel		0.5			0.5		Subhedral	
Gabbronorite dikelet								
Plagioclase		70			3		Anhedral	
Clinopyroxene		25			3		Anhedral	
Orthopyroxene		5			3		Anhedral	
Clinopyroxene films interstitial seems to percolate the troctolite texture close to the contact								

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Serpentine	8						Olivine	
Tremolite	3						Olivine	
Chlorite	2						Plagioclase	Rim of chlorite when tremolite after olivine is in contact with plagioclase
Prehnite	3						Plagioclase	
Hydrogarnet ??	2						Plagioclase	Alteration of the plagioclase close to serpentinized olivine
Magnetite	1							
Pyrrhotite	1							

TOTAL ALTERATION: 18 %

STRUCTURE : Not much to report from this slide. Some subgrain and minor neoblast formation in clinopyroxene, vein seems relatively undeformed. No magmatic strain. (GS)

PHOTOMICROGRAPHS:

1309D_237R_1_74_77_1

1309D_237R_1_74_77_2

THIN SECTION:	U1309D-238R-1, 21-24 cm	**Piece No.** 4	**Unit**: 597	**TS#: 584**	**OBSERVER: AD, EH, GS**
ROCK NAME:	Troctolite				
GRAIN SIZE:	Medium				
TEXTURE:	Poikilitic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Olivine	55	70		4	1.5			
Plagioclase	25	28		6			Interstitial to oikocrystic	
Clinopyroxene	2	2	0.1	3			Interstitial	Optically continuous interconnected film, between olivine and plagioclase. Rarely filling "pore space" between olivines
Cr-spinel	1	1			0.05			Subequant grains, dominantly as inclusions in olivine. Numerous grains contain mineral (olivine, plagioclase and less commonly brown amphibole) inclusions around which they seem to have nucleated.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Serpentine	10						Olivine	And vein
Prehnite	2						Plagioclase	
Hydrogarnet ??	2						Plagioclase	Replacement of plagioclase to hydrogarnet close to the serpentinized olivine
Magnetite	2							
Pyrite	<<1							

TOTAL ALTERATION: 16 %

STRUCTURE : Weak elongation of olivine grains is indicative of magmatic strain, best seen in whole thin section scan image. Plagioclase and spinel without preferred orientation. Only weakest expression of plastic strain (olivine and plagioclase subgrains). A branching network of somewhat wider serpentine veins is subparallel to the inferred magmatic foliation (GS)

PHOTOMICROGRAPHS:

1309D_238R_1_21_24_1
1309D_238R_1_21_24_2
1309D_238R_1_21_24_3
1309D_238R_1_21_24_4
1309D_238R_1_21_24_5
1309D_238R_1_21_24_6
1309D_238R_1_21_24_7

THIN SECTION:	U1309D-239R-1, 101-103 cm	**Piece No.** 5C	**Unit**: 598	**TS#: 585**	**JB, DB,GS**
ROCK NAME:	Leucocratic gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Granular				

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Plagioclase		84			10		Subhedral	
Clinopyroxene		16			4		Anhedral, interstitial	Clinopyroxene is replacive, starting interstitial, cutting plagioclase. Two clear examples of plagioclase cut and in optical continuity. Very small dihedral angles for clinopyroxene plagioclase.

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Zeolites	10						Plagioclase	
Serpentine	3						Olivine	
Fibrous amphibole	15						Pyroxene	
Talc	3						Olivine	
Sulfides								Pyrite, bornite
Zeolites							Vein	
Serpentine							Vein	
Fibrous amphibole							Vein	
Clay?							Vein	

TOTAL ALTERATION: 30% (not counting vein), mostly associated with vein halo

STRUCTURE : No magmatic strain and only minor plastic strain. Neoblast size varies, suggesting that equilibrium was not reached.(GS)

PHOTOMICROGRAPHS:

1309D_239R_1_101_103_1

1309D_239R_1_101_103_2

THIN SECTION:	U1309D-239R-2, 133-136 cm	**Piece No.** 4B		**Unit**: 600	**TS#: 587**		**OBSERVER: TN, EH**	
ROCK NAME:	Olivine gabbro							
GRAIN SIZE:	Fine to coarse							
TEXTURE:	Varitextured							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Olivine	11	15	0.1	5				"Ilmenite" exsolution rods appear to be restricted to coarse grains.
Plagioclase	54	54	0.2	8				
Clinopyroxene	28	30	0.2	9				Encloses plagioclase chadacrysts. Sometimes film between olivine and plagioclase.
Sulfide	1	1	0.05	0.2				Pyrrhotite, with exsolved blebs of chalcopyrite? No Cr-spinel found.
Apparent contact between coarse-grained troctolite (virtually clinopyroxene-free, but coarse grain size may be misleading) and fine-medium olivine gabbro. The "contact" is lined by								
coarse clinopyroxene. Modal estimate is for entire thin section.								

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Tremolite/actinolit	1						Olivine, plagioclase, clinopyroxene	Between olivine and plagioclase, or growing over clinopyroxene
Chlorite	<1						Olivine, plagioclase	Between olivine and plagioclase
Talc	1						Olivine	Pseudomorphic
Serpentine	1						Olivine	Crack filling
Bowlingite?	2						Olivine	Pseudomorphic (green)
Magnetite	<1						Olivine, spinel	
Sulfides	<<1						Olivine	

TOTAL ALTERATION: 5%

STRUCTURE : As said by igneous group, contact between coarse and fine grained olivine gabbro. No magmatic strain. Plastic strain is obvious in fine grained gabbro, not in coarse grained layer. Accumulated strain appear though insufficient to explain a formation of the fine grained gabbro by deformation of the coarse grained gabbro, since relict interstitial clinopyroxene is still preserved (GS)

PHOTOMICROGRAPHS:

1309D_239R_2_133_136_1

1309D_239R_2_133_136_2

THIN SECTION:	U1309D-239R-4, 25-28 cm	**Piece No.** 3A	**Unit**: 600	**TS#: 586**	**OBSERVER: DB,GS, AD**
ROCK NAME:	Olivine gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Olivine							Anhedral	
Plagioclase							Anhedral	
Clinopyroxene							Anhedaal, oikocrystic	
There is not enough section for modal estimations.								
A thick alteration-metamorphic zone possibly replaces a former diabase dike.								
Zoned plagioclase suggest the presence of a magmatic vein.								

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Serpentine	5						Olivine	
Tremolite	3						Olivine	Thin rims around the olivine grains
Chlorite	5						Plagioclase	At contact bewteen the tremolite around olivine and plagioclase. Chlorite is also observed in a vein-like zone
Hydrogarnet ??	<1						Plagioclase	
Green amphibole	50							Thick zone, where this amphibole replace ???
Calcite	2							The disapperaing mineral at one edge of the thin section was likely calcite replacing plagioclase before
Prehnite	1						Plagioclase	
Pyrrhotite	<<1							
Vein								
Calcite								
Tremolite								

TOTAL ALTERATION: 67 %

STRUCTURE : Undeformed olivine gabbro cut by the diabase with thick alteration zone, mm-scale vein cuts the alteration zone and appears to terminate in olivine gabbro. (GS)

PHOTOMICROGRAPHS:

1309D_239R_4_25_28_1

1309D_239R_4_25_28_2

THIN SECTION:	U1309D-240R-2, 86-88 cm	**Piece No.** 3D	**Unit**: 605	**TS#: 588**	**OBSERVER: AD, EH,GS**
ROCK NAME:	Chromitiferous olivine gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Poikilitic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Olivine	42	55		4	1.5			
Plagioclase	20	25		8			Interstitial to oikocrystic	
Clinopyroxene	17	19		15			Oikocrystic	Optically continuous interconnected network of pore-filling grains.
Cr-spinel	1	1			0.05			Subequant grains, dominantly as inclusions in olivine. Three grains contain a brown amphibole inclusion around which they seem to have nucleated.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Serpentine	4						Olivine	
Prehnite	3						Plagioclase	Close to the serpentinized olivine
Hydrogarnet ??	2						Plagioclase	
Magnetite	2							

TOTAL ALTERATION: 11 %

STRUCTURE : No magmatic or plastic strain in what in the field what always be called a poikilitic plagioclase wehrlite. Olivine grain size appears largely limited by growth of the interstitial plagioclase or clinopyroxene, i.e. large olivines are present where no interstitial phase occurs (GS).

PHOTOMICROGRAPHS:

1309D_240R_2_86_88_1

1309D_240R_2_86_88_2

THIN SECTION:	U1309D-241R-1, 76-78 cm	**Piece No.** 2E	**Unit**:	**TS#: 589**			**OBSERVER: TN, EH,GS, YO**	
ROCK NAME:	Chromitiferous wehrlite cut by gabbro dikelet							
GRAIN SIZE:	Medium to coarse							
TEXTURE:	Seriate/equigranular							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Chromitiferous wehrlite								
Olivine	50	84			1.2		Subhedral	
Plagioclase	1	5			1		Interstitial	Many grains altered to hydrogarnet
Clinopyroxene	5	10			1		Interstitial	
Cr-spinel		1					Subhedral to euhedral	Mainly as inclusions in plagioclase
Gabbro dikelet								
Plagioclase	10	65			10		Subhedral	
Clinopyroxene	5	35			8		Subhedral	

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Tremolite/actinolite	10						Olivine, plagioclase, vein	Forms coronas
Chlorite	10						Olivine, plagioclase	Forms coronas
Talc	3						Olivine	Pseudomorphic
Serpentine	5						Olivine, vein	Pseudomorphic
Bowlingite?	5						Olivine	Pseudomorphic, greenish
Prehnite	2						Plagioclase	Crack filling
Magnetite	<1							
Hydrogarnet								

TOTAL ALTERATION: 35%

STRUCTURE : Host is a poikilitic plagioclase wehrlite or clinopyroxene bearing troctolite with neither magmatic nor plastic strain, apart from a bit of undulatory extinction and some tilt walls in olivine. The crosscutting gabbro is too coarse grained to firmly exclude some magmatic alignment. There is a cataclastic shear zone subparallel to the contact gabbro host (GS)

PHOTOMICROGRAPHS:

1309D_241R_1_76_78_1
1309D_241R_1_76_78_2
1309D_241R_1_76_78_3
1309D_241R_1_76_78_4

THIN SECTION:	U1309D-242R-2, 80-82 cm	**Piece No.** 8B	**Unit**: 617	**TS#: 590**	**OBSERVER: DB, AD, GS**
ROCK NAME:	Olivine-rich troctolite/gabbro				
GRAIN SIZE:	Medium/coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Olivine-rich Troctolite								
Olivine		82			1.5		Subhedral, equant	
Plagioclase		15			3		Interstitial oikocrysts	
Clinopyroxene		3			1		Interstitial oikocrysts	
Spinel		0.5			0.3		Subhedral	
Gabbro								
Clinopyroxene		80			12		Oikocrystic, anhedral	Large symplectitic areas
Plagioclase		20			6		Anhedral	

The gabbro contains a microxenolith of the troctolite in contact, suggesting mechanical erosion and partial resorption of the troctolite by the intruding gabbro.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Serpentine	10						Olivine	Green serpentine close to the contact with the gabbro
Tremolite	3						Olivine	Thin rim around the serpentinized olivine
Chlorite	4						Plagioclase	Rim between the plagioclase and the tremolite around the olivine
Hydrogarnet	3						Plagioclase	
Prehnite	2						Plagioclase	
Colorless amphibole	3						Pyroxene	
Brown amphibole	2						Pyroxene	
Magnetite	1							
Pyrite	<<1							

TOTAL ALTERATION: 27 %

STRUCTURE : Weak elongation of olivine parallel to short side of slide. Some minor neoblast formation in the gabbro dike. Otherwise, no plastic strain. Several olivine grains, separated by plagioclase network, are optically continuous. (GS)

PHOTOMICROGRAPHS:

1309D_242R_2_80_82_1

1309D_242R_2_80_82_2

THIN SECTION:	U1309D-243R-1, 39-42 cm	**Piece No.** 3	**Unit**: 617/618	**TS#: 591**	**OBSERVER: JB, EH, GS**
ROCK NAME:	Orthopyroxene-bearing olivine gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Olivine		30	0.2	2	1			
Plagioclase		40	0.2	2	1			
Clinopyroxene		29		4	2			Abundant interfingiering and symplectitic clinopyroxenes, hosting rounded plagioclase and olivine
Orthopyroxene		1		1				

COMMENTS

The downhole transition across this unit boundary is marked by a slight (10%) increase in clinopyroxene and decrease in modal olivine

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Pale amphibole	3						Pyroxene, olivine	Corona texture in olivine
Chlorite	3						Plagioclase	Corona texture
Serpentine	3						Olivine	
Magnetite	<1						Olivine	
Chlorite							Vein	
Tremolite							Vein	
Pyrrhotite	<1							

TOTAL ALTERATION: 10%

STRUCTURE : Weak magmatic strain by aligned plagioclase laths. Large parts of plagioclase are, however, recrystallized at high temperature. Clinopyroxene is not deformed to any extent and, as a matter of fact, is elongated commonly at high angle to the plagioclase alignment. (GS)

PHOTOMICROGRAPHS:

1309D_243R_1_39_42_1
1309D_243R_1_39_42_2
1309D_243R_1_39_42_3
1309D_243R_1_39_42_4
1309D_243R_1_39_42_5
1309D_243R_1_39_42_6

THIN SECTION:	U1309D-244R-1, 14-16 cm	**Piece No.** 1B	**Unit**: 620	**TS#: 592**	**OBSERVER: TN, EH, GS**
ROCK NAME:	Gabbronorite				
GRAIN SIZE:	Medium-coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	69	70		9	5			
Clinopyroxene	21	23	0.05	7	3			Interfingering clinopyroxenes, abundant rounded plagioclase-hosted chadacrysts
Orthopyroxene	4	7		7	4			Only as blocky grains

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Green amphibole	1						Pyroxene	Overgrowth
Brown amphibole	1						Clinopyroxene	
Chlorite	1						Plagioclase, interstitial	Crack filling, patch
Talc	2						Orthopyroxene	Crack filling, pseudomorphic

TOTAL ALTERATION: 5%

STRUCTURE : Perhaps weak magmatic strain, but else no plastic deformation. Some microcracks (GS)

PHOTOMICROGRAPHS:

1309D_244R_1_14_16_1

1309D_244R_1_14_16_2

THIN SECTION:	U1309D-244R-1, 80-83 cm	**Piece No.** 2A	**Unit**: 620	**TS#: 593**	**OBSERVER: DB, AD, GS**
ROCK NAME:	Gabbronorite				
GRAIN SIZE:	Medium				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Plagioclase		70			4		Anhedral	
Clinopyroxene		23			3		Anhedral, oikocrystic, interstitial	
Orthopyroxene	0	7			3		Anhedral, oikocrystic, interstitial	Selectively replaced by tlac tremolite. No corona texture. No volume expansion induced fracturing.

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Green brown amphibole	30						Pyroxene	Mixture of amphibole and talc
Talc	10						Pyroxene	
Chlorite	3						Plagioclase	Alteration related to thin chlorite veinlets
Vein								
Tremolite	5							
Chlorite	3							
Hydrogarnet	2							
Talc ??								
Plagioclase	1							Cutting the pyroxene and plagioclase

TOTAL ALTERATION: 43 %

STRUCTURE : Seems to have quartz veins and large quartz/plagioclase intergrowth. No significant magmatic or plastic strain. One of the veins could also be magmatic infiltration. (GS)

PHOTOMICROGRAPHS:

1309D_244R_1_80_83_1
1309D_244R_1_80_83_2
1309D_244R_1_80_83_3
1309D_244R_1_80_83_4

THIN SECTION:	U1309D-244R-2, 105-108 cm	**Piece No.** 6A	**Unit**: 263	**TS#: 594**	**OBSERVER: DB, PF, GS**
ROCK NAME:	Gabbro/oxide gabbro dikelet				
GRAIN SIZE:	Medium/coarse				
TEXTURE:	Poikilophitic/seriate				

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Gabbro								
Plagioclase		65			1.5		Subhedral, anhedral	Partially resorbed.
Clinopyroxene		35			3		Oikocrystal, interstitial	Interconnected network forming oikocrystal grain partially enclosing plagioclase.
Oxide gabbro								
Ilmenite		40					Subhedral	Large grains at the core of the dike grow normal to the dike direction.
Plagioclase		50					Anhedral	Large equant grains at the contact with host rock, also interstitial among ilmenite.
Titanite		2					Anhedral	Graphic intergrowth with ilmenite
Apatite		3					Subhedral	At the center of the dike
Sulfide		3					Globular, interstitial	

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Chlorite	7						Plagioclase	
Green amphibole	4						Ptroxene	
Prehnite	<1						Plagioclase	
Hydrogarnet	<1						Plagioclase	
Titanite	1						Plagioclase	
Magnetite	20							(Primary)
Ilmenite	<1						Magnetite	Exsolution lamellae in magnetite
Pyrrhotite	3							
Pentlandite	<<1						Pyrrhotite	Flames in pyrrhotite
Chalcopyrite	<1							

TOTAL ALTERATION: 36%

STRUCTURE : Magmatic texture, no magmatic or plastic strain. (GS)

PHOTOMICROGRAPHS:

1309D_244R_2_105_108_1
1309D_244R_2_105_108_2
1309D_244R_2_105_108_3
1309D_244R_2_105_108_4
1309D_244R_2_105_108_5
1309D_244R_2_105_108_6
1309D_244R_2_105_108_7
1309D_244R_2_105_108_8
1309D_244R_2_105_108_9
1309D_244R_2_105_108_10
1309D_244R_2_105_108_11
1309D_244R_2_105_108_12

THIN SECTION:	U1309D-246R-1, 34-36 cm	**Piece No.** 7	**Unit**: 632	**TS#: 595**	**OBSERVER: TN, EH, GS**
ROCK NAME:	Oxide gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	35	77		10	6		Subhedral to anhedral	
Clinopyroxene	10	15		6	4		Subhedral to anhedral	
Ilmenite		5		1			Subhedral	
Titanite		3		1			Subhedral	Abundant around illmenite.
Zircon		0.1		0.1			Euhedral	
Apatite		0.2		0.1			Euhedral	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Green amphibole	1						Clinopyroxene	
Epidote	1						Plagioclase, clinopyroxene, interstitial,	
Titanite	3						Ilmenite	Extremely pleochroic
Prehnite	1						Plagioclase, vein	
Albite	5						Plagioclase	
Hydrogarnet?	2						Plagioclase	
Zeolite	1						Vein	

TOTAL ALTERATION: 14 %

STRUCTURE : No magmatic fabric, plastic strain restricted to the more alteration part of the slide. Particularly in one corner of slide a strongly recrystallized zone can be recognized. Abundant microcracks. (GS)

PHOTOMICROGRAPHS:

1309D_246R_1_34_36_1

1309D_246R_1_34_36_2

THIN SECTION:	U1309D-246R-1, 64-66 cm	**Piece No.** 12	**Unit**: 633	**TS#: 596**	**OBSERVER:PF, EH,GS**
ROCK NAME:	Oxide gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	25	30			10		Subhedral	
Clinopyroxene	50	60		15	12		Subhedral	Long-prismatic grains, growing into blocky plagioclase
Ilmenite	10	10		5	3		Subhedral	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Green amphibole	6						Pyroxene	
Brown amphibole	1						Pyroxene	Small patches
Titanite	1						Vein, amphibole	
Chlorite?	3						Vein, plagioclase	Small spherules
Calcite	<1						Vein	
Hydrogarnet	<1						Plagioclase	
Prehnite	1						Plagioclase	
Imenite	1							
Pyrrhotite	<1							
Magnetite	1							

TOTAL ALTERATION: 12%

STRUCTURE : Coarse, undeformed oxide gabbro. Brown amphibole as inclusion in oxide is deformed! Shape of oxide is very irregular/loblate and the oxides include clinopyroxene. (GS)

PHOTOMICROGRAPHS:

1309D_246R_1_64_66_1
1309D_246R_1_64_66_2
1309D_246R_1_64_66_3
1309D_246R_1_64_66_4
1309D_246R_1_64_66_5
1309D_246R_1_64_66_6

THIN SECTION:	U1309D-247R-2, 86-88 cm	**Piece No.** 10B	**Unit**: 639	**TS#: 597**	**OBSERVER: AD, DB,GS, YO**
ROCK NAME:	Olivine-rich troctolite				
GRAIN SIZE:	Medium				
TEXTURE:	Medium granular?				

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Olivine		75			2		Subhedral	
Plagioclase		20			3		Interstitial oikocrysts	
Clinopyroxene		5	0.1	3			Interstitial oikocryst, film	Thin films of clinopyroxene rim around olivine.

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Serpentine	18							
Prehnite	4							
Hydrogarnet	3							
Pyrrhotite	<<1							
Magnetite	1							

TOTAL ALTERATION: 25 % Serpentinization process of olivine grains is nicely preserved within a single thin section. (YO)

STRUCTURE : Undeformed poikilitic troctolite with local poikiilitic clinopyroxene grains. The poikilitic clinopyroxene can be seen to be optically continuous to the clinopyroxene films on olivines. No magmatic fabric.(GS)

PHOTOMICROGRAPHS:

1309D_247R_2_86_88_1

1309D_247R_2_86_88_2

THIN SECTION:	U1309D-247R-3, 97-98 cm	**Piece No.** 3	**Unit**: 639	**TS#: 598**	**OBSERVER: PF, EH, GS**
ROCK NAME:	Wehrlite				
GRAIN SIZE:	Medium				
TEXTURE:	Poikilitic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Olivine	45	55		3	1			Hardly an olivine-supported matrix. Grains touch only on < 10% of their surface.
Clinopyroxene	25	41		18				Coarse oikocrysts. Very strongly altered to amphibole along exsolution lamellae.
Plagioclase	1	3		3				Rare and altered to hydrogarnet.
Cr-spinel		<1						Only as spinel-hosted chadacrysts. Probably all resorbed by insatiable clinopyroxene.
								Few titanite needles in amphibolite vein.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Serpentine	20						Olivine	In fracture traces in olivine grains and in veins (green in proximity to veins)
Tremolite	5						Olivine and Pyroxene	After pyroxene
Chlorite	7						Plagioclase and in veins	
Hydrogarnet	<1						In vein	
Pyrrhotite	<1						In vein	
Pentlandite?	<<!						Pyrrhotite	Flames in pyrrhotite
Magnetite	3						Olivine	With serpentine in veinlets and along lamellae in altered pyroxene
Awaruite?	<<1						Olivine	In green serpentine after olivine with magnetite (but only in serpentinized olivine at the edges of the vertical vein)

TOTAL ALTERATION: 35% There are two veins in this section. One rises toward and is truncated by the second. Serpentinization of olivine is greatest within a zone about 3-4 mm on each side of the lower vein (most are completely serpentinized in this area.

STRUCTURE : Olivines in large poikilitic clinopyroxene and plagioclase. Spinels are mostly enclosed in olivine. It is noteable that many neighboring olivine grains, separated by typically clinoyroxene, are in near optical continuity, exactly as if they were subgrains of a former larger grain. Could it be that many olivines were once larger grains, separated into smaller grains by deformation or magmatic corrision? In this slide it seems that the microstructure is not a primary magmatic one but more one where shape and distribution of minerals was goverened by corrosion of olivines by interstitial liquid. Truncation of thick vein by thin vein suggest significant movement along second vein (GS)

PHOTOMICROGRAPHS:

1309D_247R_3_97_98_1	1309D_247R_3_97_98_5	1309D_247R_3_97_98_9	1309D_247R_3_97_98_13	1309D_247R_3_97_98_17
1309D_247R_3_97_98_2	1309D_247R_3_97_98_6	1309D_247R_3_97_98_10	1309D_247R_3_97_98_14	1309D_247R_3_97_98_18
1309D_247R_3_97_98_3	1309D_247R_3_97_98_7	1309D_247R_3_97_98_11	1309D_247R_3_97_98_15	1309D_247R_3_97_98_19
1309D_247R_3_97_98_4	1309D_247R_3_97_98_8	1309D_247R_3_97_98_12	1309D_247R_3_97_98_16	1309D_247R_3_97_98_20

THIN SECTION:	U1309D-248R-2, 7-9 cm	**Piece No.** 1A	**Unit**: 639	**TS#: 599**	**OBSERVER:PF, EH, GS**
ROCK NAME:	Olivine-rich troctolite				
GRAIN SIZE:	Medium				
TEXTURE:	Poikilitic				

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Olivine	70	70	0.1	2	1			
Plagioclase	29	29	0.1	3	1.5			
Cr-spinel	1	1			0.05			As inclusions in both olivine and plagioclase. The ones in the plagioclase commonly contain inclusions (plagioclase, brown amphibole)
No clinopyroxene, not even a selvage								

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Serpentiine	<1						Olivine	Minor along fractures in olivine
Magnetite	<1							With serpentiine in olivine
Pyrrhotite	<<1							

TOTAL ALTERATION: <1%

STRUCTURE : Some recrystallization of plagioclase is obvious to neoblasts of 500 micron. Olivines are again optically related (by very slight misorientation) across several grains, suggesting a more complex history, i.e. the olivine grains as we see them are unlikely to be primary cumulus grains. (GS)

PHOTOMICROGRAPHS:

1309D_248R_2_7_9_1
1309D_248R_2_7_9_2
1309D_248R_2_7_9_3
1309D_248R_2_7_9_4
1309D_248R_2_7_9_5
1309D_248R_2_7_9_6
1309D_248R_2_7_9_7
1309D_248R_2_7_9_8

THIN SECTION:	U1309D-248R-2, 96-99 cm	**Piece No.** 4	**Unit**: 639	**TS#: 600**	**OBSERVER: TN, DB,GS**
ROCK NAME:	Dunite				
GRAIN SIZE:	Medium				
TEXTURE:	Equigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Olivine		92			2		Subhedral, equant	
Plagioclase		4			3		Interstitial oikocrysts	
Clinopyroxene		4			3		Interstitial oikocrysts	
Spinel		0.5			0.2		Equant	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Tremolite/actinolite	1						Olivine, vein	Replaces olivine at contact with plagioclase
Chlorite	<1						Plagioclase, vein	
Serpentine	4						Olivine	Crack filling
Magnetite	<1						Olivine	
Sulfides	<<1						Interstitial	

TOTAL ALTERATION: 5%

STRUCTURE : Weak to moderate foliation by olivine and subtly by spinel. Several adjacent olivine grains are optically related, in places also interfingering olivine are observed. (GS)

PHOTOMICROGRAPHS:

1309D_248R_2_96_99_1
1309D_248R_2_96_99_2
1309D_248R_2_96_99_3
1309D_248R_2_96_99_4
1309D_248R_2_96_99_5
1309D_248R_2_96_99_6

THIN SECTION:	U1309D-248R-2, 107-110 cm	**Piece No.** 5	**Unit**: 639	**TS#: 601**	**OBSERVER: TN, AD, EH, GS, YO**
ROCK NAME:	Olivine gabbro (clinopyroxene-rich troctolite)				
GRAIN SIZE:	Medium-coarse				
TEXTURE:	Poikilitic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Olivine	40	60			1		Subhedral	Olivine density lower when enclosed by clinopyroxene. Grain size does not change.
Plagioclase	15	30			3		Interstitial	
Clinopyroxene	9	9		25			Interstitial, poikilitic	
Cr-spinel	1	1					Euhedral	Enclosed by olivine and plagioclase. Lower abundance in clinopyroxene.

COMMENTS

One very coarse clinopyroxene oikocryst, otherwise pure troctolite.

Magmatic layering is observed. Upper half of the thin section is a troctolite with olivine and plagioclase (no clinopyroxene). On the other hand, the lower half is more wehrlitic (with clinopyroxne and lesser plagioclase).

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Tremolite/actinolite	3						Olivine, vein	Locally replaces olivine in contact with plagioclase
Chlorite	2						Plagioclase, vein	Locally replaces plagioclase in contact with olivine
Serpentine	20						Olivine	Crack filling or pseudomorphic
Prehnite	2						Plagioclase	Pseudomorphic aggregate
Hydrogarnet	5						Plagioclase	
Magnetite	1						Olivine	
Sulfides	<<1						Olivine	

TOTAL ALTERATION: 33% In the wehrlitic part, about half of the plagioclase grains are altered into hydrogarnet. (YO)

STRUCTURE : Moderate foliation by olivine elongation, termed magmatic here. Adjacent olivine grains commonly have joint optical extinction. Plagioclase and clinopyroxene poikilitic and without deformation. (GS)

PHOTOMICROGRAPHS:

1309D_248R_2_107_110_1

1309D_248R_2_107_110_2

THIN SECTION:	U1309D-248R-2, 119-121 cm	**Piece No.** 6B	**Unit**: 639	**TS#: 602**	**OBSERVER: TN, EH, GS**
ROCK NAME:	Troctolite/rodingite				
GRAIN SIZE:	Medium				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	4	39			1		Interstitial	
Olivine	5	60			1		Subhedral	
Cr-spinel	1	1			0.05			Largely unaffected by alteration

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Tremolite/actinolite	20						Olivine, plagioclase	Corona texture
Chlorite	30						Olivine, plagioclase, vein?	Corona, pseudomorph after plagioclase, and vein-like aggregate near rodingite
Serpentine	35						Olivine	Crack filling or pseudomorphic
Diopside	3						Olivine/tremolite	Acicular crystals near or within rodingite
Hydrogarnet?	2						Vein	Rodingitic aggregate with diopside
Magnetite	3						Olivine	
Awaruite?	<1						Olivine	Tiny splinters within serpentine meshes
Sulfides	<1						Olivine	

TOTAL ALTERATION: 94%

STRUCTURE : Weak plastic strain as shown in some recrystallization of plagioclase and subgrains and tilt walls in olvine. At edge of slide actinolite-grade shear zone. (GS)

PHOTOMICROGRAPHS:

1309D_248R_2_119_121_1

1309D_248R_2_119_121_2

THIN SECTION:	U1309D-250R-2, 91-94 cm	**Piece No.** 4	**Unit**: 645	**TS#: 603**	**OBSERVER: PF, DB,GS**
ROCK NAME:	Olivine gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Subequigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase		65			2		Anhedral	
Olivine		18			2		Anhedral	
Clinopyroxene		17			3		Anhedral, oikocrysts, interstitial	Encloses resorbed olivine and plagioclase
Oxide		0.1						

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Serpentine	<1						Olivine	Along fractures
Oxides	<<1						Olivine	Fine, dusty grains in the centers of serpentine veinlets
Brown amphibole	<1							
Talc	<<1							
Tremolite	<<1							

TOTAL ALTERATION: <1

STRUCTURE : Weak magmatic strain suspected by plagioclase alignment. Else only very minor plastic strain. (GS)

PHOTOMICROGRAPHS:

1309D_250R_2_91_94_1 **1309D_250R_2_91_94_4**
1309D_250R_2_91_94_2 **1309D_250R_2_91_94_5**
1309D_250R_2_91_94_3 **1309D_250R_2_91_94_6**

THIN SECTION:	U1309D-250R-4, 17-20 cm	**Piece No.** 4	**Unit**: 648	**TS#: 604**	**OBSERVER: TN, AD, EH,GS**
ROCK NAME:	Olivine gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Poikilitic (sub-harrisitic)				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	33	33		6	4		Anhedral, interstitial	
Olivine	30	33		20				Coarse interconnected grains, pre-harrisitic. Enclosing clinopyroxene and plagioclase
Clinopyroxene	32	33		10			Interstitial	
Orthopyroxene?	1	1		4				Not sure, possibly clinopyroxene

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Brown amphibole	<1						Clinopyroxene	Patches
Serpentine	2						Olivine	Crack filling
Talc	1						Orthopyroxene, olivine	Crack filling or pseudomorphic
Prehnite	1						Plagioclase	Crack filling
Carbonate	<1						Plagioclase	Spots
Magnetite	<1						Olivine	Crack filling
Pyrrhotite	<1							
Pyrite	<1							

TOTAL ALTERATION: 4 %

STRUCTURE : Magmatic fabric? Not sure. No neoblasts. Olivine with tilt walls. As stated by igneous group, "transgranular" olivines. To some extent, these only mimic what had become obvious already in the sections described from futher up the core, i.e. neighboring olivine grains having simultaneous extinction. (GS)

PHOTOMICROGRAPHS:

1309D_250R_4_17_20_1
1309D_250R_4_17_20_2
1309D_250R_4_17_20_3

THIN SECTION:	U1309D-251R-1, 74-77 cm	**Piece No.** 2B	**Unit**: 649	**TS#: 605**	**OBSERVER: TN, AD, EH, GS**
ROCK NAME:	Olivine gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Harrisitic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Olivine	43	45	0.5	30			Coarse fibrous and subrounded subhedral	One pegmatitic olivine grain, consisting of parallel lamellae, undeformed
Plagioclase	30	30		3	1			
Clinopyroxene	25	25		20			Oikocrystic	Norrmal oikocrysts enclosing plagioclase and subrounded olivines

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite?	1						Clinopyroxene	Crack filling and along cleavages
Serpentine	2						Olivine	Crack filling
Prehnite	<1						Plagioclase	Crack filling
Magnetite	<1						Olivine	Crack filling
Carbonate	<1						Plagioclase	Spots
Pyrite	<1							

TOTAL ALTERATION: 3 %

STRUCTURE : The fingers of the poikilitic olivine are subparallel to the elongation of plagioclase laths, suggesting that one (probably plagioclase) controlled the growth of the other. On the other hand, the fingers also exist where there is no plagioclase and instead there is clinopyroxene (also poikilitic). Oxides tend to sit either within olivine or, more commonly, at the margin between olivine and plagioclase. Magmatic strain is possibly reflected in plagioclase elongation, plastic strain is negligible.(GS)

PHOTOMICROGRAPHS:

1309D_251R_1_74_77_1
1309D_251R_1_74_77_2
1309D_251R_1_74_77_3
1309D_251R_1_74_77_4
1309D_251R_1_74_77_5
1309D_251R_1_74_77_6
1309D_251R_1_74_77_7
1309D_251R_1_74_77_8
1309D_251R_1_74_77_9
1309D_251R_1_74_77_10
1309D_251R_1_74_77_11
1309D_251R_1_74_77_12

THIN SECTION:	U1309D-252R-1, 97-99 cm	**Piece No.** 6A	**Unit**: 654	**TS#: 606**	**OBSERVER: PF, DB, GS**
ROCK NAME:	Gabbronorite				
GRAIN SIZE:	Fine/medium				
TEXTURE:	Equigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase		68	0.5	5			Anhedral	
Clinopyroxene		22	0.1	4			Anhedral, oikocryst, interstitial	Encloses rounded plagioclase
Orthopyroxene		10	0.1	7			Anhedral, oikocryst, interstitial	Encloses rounded plagioclase and clinopyroxene

COMMENTS

Two different grain size domains.

Finer grain size domains are clinopyroxene rich. Orthopyroxene is the last phase crystallizing enclosing and dissolving clinopyroxene and plagioclase.

Clear relationships preserved, very fresh rock.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Tremolite	<1						Clinopyroxene	
Prehnite	<1						Vein	

TOTAL ALTERATION: 1%

STRUCTURE : As stated by igneous group, a domainal slide. There are coarse grained parts and fine grained parts with no preferred orientation and another fine grained part with a strong plagioclase preferred orientation. This latter one appears recrystallized judging from clinopyroxene grains. Could it be that the elongated plagioclase grains in this part are neoblasts which are slightly misoriented to each other and derive from a former large plagioclase? Perhaps then grain size domains are not primary but strain related where I would judge strain to be low based on the still visible low angle relation of different clinopyroene grain and overall weak foliation development. (GS)

PHOTOMICROGRAPHS:

1309D_252R_1_97_99_1
1309D_252R_1_97_99_2
1309D_252R_1_97_99_3
1309D_252R_1_97_99_4
1309D_252R_1_97_99_5
1309D_252R_1_97_99_6

THIN SECTION:	U1309D-252R-3, 61-63 cm	**Piece No.** 10	**Unit**: 656	**TS#: 607**	**OBSERVER: TN, AD, EH, GS**
ROCK NAME:	Orthopyroxene- and olivine-bearing gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Subequigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase		45		10	6			Apparent overgrowth/replacement of preexisting plagioclase cores
Clinopyroxene	45	50		13	7			Irregular patchy orthopyroxene exsolution in coarse clinopyroxenes. Interfingering clinopyroxenes
Orthopyroxene	1	4		4				
Olivine	0.5	1		1				

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite	10						Clinopyroxene, vein	Crack filling, along cleavage and pseudomorphic
Chlorite	3						Plagioclase, vein	Crack filling
Talc	3						Olivine, orthopyroxene	Pseudomorphic
Bowlingite?	2						Olivine	Pseudomorphic
Tremolite	<1						Olivine	
Oxides	<1						Olivine	
Pyrrhotite	<<1							
Pyrhite	<<1							
Chalcopyrite	<<1							
Vein								
Tremolite								Cutting the pyroxene grains

TOTAL ALTERATION: 18 %

STRUCTURE : No magmatic strain, no plastic strain (GS)

PHOTOMICROGRAPHS:

1309D_252R_3_61_63_1
1309D_252R_3_61_63_2
1309D_252R_3_61_63_3
1309D_252R_3_61_63_4
1309D_252R_3_61_63_5
1309D_252R_3_61_63_6

THIN SECTION:	U1309D-253R-1, 3-6 cm	**Piece No.** 1	**Unit**: 658	**TS#: 608**	**OBSERVER: TN, PF, EH,GS**
ROCK NAME:	Olivine-rich troctolite				
GRAIN SIZE:	Medium				
TEXTURE:	Poikilitic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	74	75	1	5	3			Strong concentic zoning
Olivine	14	20	0.2	3	1			
Clinopyroxene	3	3		7			Oikocrystic, interstitial	
Orthopyroxene	2	2		6			Oikocrystic, interstitial	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Talc	5						Olivine	Pseudomorphic
Tremolite/actinolite	<1						Olivine	Local replacement
Chlorite	2						Plagioclase, vein	Crack filing in plagioclase
Serpentine	2						Olivine	Crack filling or pseudomorphic
Carbonate	<1						Olivine	
Oxides	<1						Olivine	
Sulfides	<1						Olivine	
Hydrogarnet	<1						Plagioclase	

TOTAL ALTERATION: 10%

STRUCTURE : Grain size change within slide, the coarser troctolite having no certain plagioclase alignment, the fine grained part having a preferred orientation. It seems to me that the finer grained part consists of recrystallized plagioclase and that there was an original alignment of larger plagioclse grains which recrystallized into smaller, slightly misoriented grains. (GS)

PHOTOMICROGRAPHS:

1309D_253R_1_3_6_1
1309D_253R_1_3_6_2
1309D_253R_1_3_6_3
1309D_253R_1_3_6_4
1309D_253R_1_3_6_5
1309D_253R_1_3_6_6
1309D_253R_1_3_6_7

THIN SECTION:	U1309D-253R-1, 36-39 cm	**Piece No.** 3	**Unit**: 660	**TS#: 609**	**OBSERVER:GS, AD**
ROCK NAME:	Microgabbro				
GRAIN SIZE:	Fine				
TEXTURE:	Equigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase		55			0.8		Anhedral	
Clinopyroxene		45			0.8		Anhedral	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Green-brown amphibole	5						Pyroxene	Observed as rim replacing the pyroxene
Talc	2						Pyroxene	Associated with green-brown amphibole or replacing completely the previous pyroxene
Hydrogarnet	4						Plagioclase/pyroxene	
Prehnite	1						Plagioclase	
Chlorite	4						Plagioclase	Complete replacement of the plagioclase associated with prehnite
Pyrite	<<1							
Vein 1								
Chlorite								
Vein 2								
Chlorite								
Zeolite								

TOTAL ALTERATION: 16 %

STRUCTURE : Subtle magmatic fabric by plagioclase alignment is possible. Plastic strain is seen locally by clinopyroxene neoblasts. The typical equant plagioclase neoblasts are absent. There are three zones of pronounced microfractures, one of which has seen displacement. Clinopyroxene is bent along the displacement zone, indicating deformation started in the ductile/britte transition for clinopyroxene (GS)

PHOTOMICROGRAPHS:

1309D_253R_1_36_39_1
1309D_253R_1_36_39_2
1309D_253R_1_36_39_3
1309D_253R_1_36_39_4
1309D_253R_1_36_39_5

THIN SECTION:	U1309D-253R-3, 4-7 cm	**Piece No.** 1A	**Unit**: 662	**TS#: 610**			**OBSERVER: AD, DB**	
ROCK NAME:	Olivine gabbronorite / olivine microgabbro							
GRAIN SIZE:	Medium to coarse / fine							
TEXTURE:	Seriate							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**			**Composition**	**MORPHOLOGY**	**COMMENTS**
			min.	**max.**	**av.**			
Olivine gabbronorite	Grain size is strongly variable, late melt percolation crystallization has left large clinopyroxene and orthopyroxene oikocrysts.							
	A possible olivine gabbro vein is represented by the coarse aggregation at the contact between medium and fine grain size. This contact is only visible at the sample scale.							
Plagioclase		62					Anhedral	
Clinopyroxene		28					Oikocrystic, anhedral	Large pyroxenes do not see the apparent magmatic contact visible at the sample scale.
Olivine		5					Anhedral	
Orthopyroxene		5					Oikocrystic, anhedral	Euhedral, prismatic orthopyroxene exsolution at clinopyroxene rims enter the plagioclase in contact.
Olivine microgabbro								
Plagioclase		68					Anhedral	
Clinopyroxene		25					Anhedral	
Olivine		7					Anhedral	

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron)**				**REPLACING / FILLING**	**COMMENTS**
			min.	**max.**	**av.**			
Serpentine	2						Olivine	Some green serpentine occurs.
Tremolite	1						Olivine	
Talc	<1						Olivine	
Green amphibole	2						Pyroxene	
Brown amphibole	2						Pyroxene	
Prehnite	2						Plagioclase	
Pyrrhotite	1							
Chalcopyrite	<1							

TOTAL ALTERATION: 3%

STRUCTURE : Magmatic foliation visible in the microgabbro part. In addition, microgabbo has suffered plastic deformation as seen in neoblast and subgrains of plagioclase and clinopyroxene. The flow fabric of the plagioclases appear deflected by the coarse grained olivine gabbo suggesting that the coarse gabbro existed at the time when the microgabbro was deforming. The flow fabric of the microgabbro also runs directly into the poikilitic orthopyroxene and actually appears still captured as oikocrystic minerals within the orthopyroxene, suggesting that the orthopyroxene growth postdates the flow, as suggested by the igneous group.The coarse grained olivine gabbro shows no clear magmatic fabric (may also be a matter of scale). Note the near absence of clinopyroxene but common presence of plagioclase oikocrysts within the poikilitic orthopyroxene, suggesting that late growth of orthopyroxene could have consumed clinopyroxene (GS)

PHOTOMICROGRAPHS:

1309D_253R_3_4_7_1
1309D_253R_3_4_7_2
1309D_253R_3_4_7_3
1309D_253R_3_4_7_4
1309D_253R_3_4_7_5
1309D_253R_3_4_7_6

THIN SECTION:	U1309D-254R-1, 34-36 cm	**Piece No.** 6A	**Unit**: 665	**TS#: 611**	**OBSERVER:PF, DB, GS**
ROCK NAME:	Oxide gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase		38			6		Anhedral	
Clinopyroxene		50			6		Anhedral	
Oxide		11			2		Anhedral	Oxide are replacive, cutting clinopyroxene grains in optical continuity.
Sulfide		1	0.5	1			Globular	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Brown Amhibole	<1						Pyroxene	
Green-blue amphibole	2						Pyroxene	
Tremolite	4						Olivine (?)	
Talc	<1						Pyroxene	Occurs in thin bands around some oxide/sulfide grains (also small pseudomorphs after olivine?)
Hydrogarnet	<<1						Plagioclase	
Chlorite	<<1						Plagioclase	
Calcite	<1						Pyroxene/amphibole	With oxides
Magnetite	15							(Primary)
Ilmenite	<1							Exsolution lamellae in magnetite
Pyrrhotite	<1							
Chalcopyrite	<1							

TOTAL ALTERATION: 8%

STRUCTURE : Grain size too large to evaluate presence of magmatic fabric. Plastic strain is absent. Oxides are enclosed in clinopyroxene which may either indicate early crystallization or, as suggested by igneous group, a replacive origin. (GS)

PHOTOMICROGRAPHS:

1309D_254R_1_34_36_1
1309D_254R_1_34_36_2
1309D_254R_1_34_36_3
1309D_254R_1_34_36_4
1309D_254R_1_34_36_5
1309D_254R_1_34_36_6
1309D_254R_1_34_36_7

THIN SECTION:	U1309D-254R-2, 33-35 cm	**Piece No.** 5		**Unit**: 665	**TS#: 612**		**OBSERVER: AD, DB, GS**	
ROCK NAME:	Oxide gabbro intrusion in gabbronorite							
GRAIN SIZE:	Coarse/medium							
TEXTURE:	Seriate							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**			**Composition**	**MORPHOLOGY**	**COMMENTS**
			min.	**max.**	**av.**			
Gabbronorite								
Plagioclase		70	1	7			Interstitial,	Filled by abundant fluid inclusion trains, and possibly secondary melt inclusions.
Inverted pigeonite		20			1.5			Intergrown with clinopyroxene, forms patches of lobate to subhedral grains. Clinopyroxene exsolution double system along (001) and (100) of the original pigenonite.
Clinopyroxene		10			1.5			Strong exsolution patterns
Oxide gabbro								
Clinopyroxene		30			6			
Plagioclase		30			6			Replacive percolative cut the pyroxene-plagioclase primary texture.
Oxide		29			5			
Sulfide		1			0.5			

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron)**				**REPLACING / FILLING**	**COMMENTS**
			min.	**max.**	**av.**			
Green-brown amphibole	25						Pyroxene	
Brown amphibole	4						Pyroxene	
Green-blue amphibole	1						Pyroxene	
Prehnite	1						Plagioclase	
Red thing ??	<1							Observed closed to the oxides and pleochroic colorless to red
Ilmenite	2							
Pyrrhotite	1							
Pyrite	<1							

TOTAL ALTERATION: 31%

STRUCTURE : No clear magmatic strain, weak plastic strain in the gabbronorite and the contact to the oxide gabbro. In the oxide gabbro, weak brittle behavior occurs, perhaps associated with formation of several green amphibole veins (GS).

PHOTOMICROGRAPHS:

1309D_254R_2_33_35_1
1309D_254R_2_33_35_2
1309D_254R_2_33_35_3

THIN SECTION:	U1309D-255R-1, 33-35 cm	**Piece No.** 7	**Unit**: 668	**TS#: 613**	**OBSERVER: DB, AD, GS**
ROCK NAME:	Olivine gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Poikilophitic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase		30			2		Anhedral	
Olivine		30			2		Equant, anhedral	
Clinopyroxene		30			2		Oikocryst, interstitial	Large oikocryst enclose resorbed olivine and plagioclase.
Spinel		0.1					Subhedral	Few grains hosted in clinopyroxene oikocrysts.
Sulfide		0.5					Anhedral, globular	Sulfides form clouds of small grains commonly surrounding a larger one inside plagioclase or clinopyroxene. In places there is no evidence of textural breakouts, they are simply hosted in clean undeformed grains.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Serpentine	1.5						Olivine	
Prehnite	<1						Plagioclase	
Magnetite	<1							
Pyrrhotite	1							
Chalcopyrite	<1							

TOTAL ALTERATION: 2%

STRUCTURE : Weak or absent magmatic fabric, no plastic strain, delicate clinopyroxene films. Relatively large (2- 4 mm) olivine grains are well rounded, a few of them are optically related to each other. Note the large grain size of olivine compared to many of the dunitic troctolites (GS).

PHOTOMICROGRAPHS:

1309D_255R_1_33_35_1

1309D_255R_1_33_35_2

THIN SECTION:	U1309D-255R-1, 107-110 cm	**Piece No.** 16B	**Unit**: 668	**TS#: 614**	**OBSERVER: AD, DB, GS**
ROCK NAME:	Sulfide-bearing olivine gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Inequigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase		78			3		Anhedral	
Clinopyroxene		17			4		Oikocrystic	
Olivine		4			1.5		Anhedral	
Sulfide		1.5	0.1	1.5			Anhedral, interstitial	Polyphasic pyrrhotite, chaclopyrite, pyrite aggregates of magmatic primary sulfides as large interstitial grains and small grain spotting primary phases, concentrated around large aggregates.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Serpentine	2						Olivine	
Prehnite	<1						Plagioclase	
Calcite	<1						Plagioclase	
Green-brown amphibole	<1						Pyroxene	
Pyrrhotite	1							
Chalcopyrite	1							
Pyrite	<1							
Magnetite	<1							

TOTAL ALTERATION: 4%

STRUCTURE : Weak magmatic strain is obvious by plagioclase alignment, weak plastic strain is displayed by subgrained olivine and some recrystallization of plagioclase. Clinopyroxene is poikilitic and unstrained. (GS)

PHOTOMICROGRAPHS:

1309D_255R_1_107_110_1

1309D_255R_1_107_110_2

THIN SECTION:	U1309D-256R-1, 110-112 cm	**Piece No.** 6B		**Unit**: 672/673	**TS#: 615**			**OBSERVER: AD, EH, GS**	
ROCK NAME:	Olivine gabbro-dunite transition								
GRAIN SIZE:	Medium								
TEXTURE:	Seriate / equigranular								

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**			**Composition**	**MORPHOLOGY**	**COMMENTS**
			min.	**max.**	**av.**			
Dunite								
Olivine	70	98	1	4	3			
Plagioclase	0.5	1		1			Interstitial	Altered to hydrogarnet.
Clinopyroxene	1	1		0.5			Interstitial	
Cr-spinel	0.2	0.2		0.1			Interstitial	No olivine-hosted spinel
Olivine gabbro								
Olivine	14	15		6	3		Interstital, subhedral	Looks like "xenolith" fragments from dunite.
Plagioclase	60	70		10	6		Subhedral	
Clinopyroxene	14	15		9	4		Interstital	Clinopyroxene oikocrysts growing across the contact.

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron)**				**REPLACING / FILLING**	**COMMENTS**
			min.	**max.**	**av.**			
Serpentine	5						Olivine	Close to the contact with the gabbros the serpentine has a green color.
Prehnite	2						Plagioclase	
Hydrogarnet	2						Plagioclase	Close to the serpentinized olivines.
Green amphibole	1						Pyroxene	Rim around the pyroxene and thin veinlets extending from the pyroxenes.
Magnetite	<1							
Pyrrhotite	1							
Pyrite	<1							

TOTAL ALTERATION: 10 %

STRUCTURE : No magmatic strain. Minor plastic strain visible as subgrains of olivine in the gabbro. Weak tendency of olivine in gabbro being subparallel to the contact. Spinels are equant. Contact dunite to gabbro is irregular. (GS)

PHOTOMICROGRAPHS:

1309D_256R_1_110_112_1

1309D_256R_1_110_112_2

THIN SECTION:	U1309D-256R-2, 90-92 cm	**Piece No.** 3A	**Unit**: 673	**TS#: 616**	**OBSERVER: AD, EH, GS**
ROCK NAME:	Olivine-rich troctolite				
GRAIN SIZE:	Medium				
TEXTURE:	Poikilitic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Olivine	67	70		6	3			
Plagioclase	22	25		5	2		Interstitial (oikocrystic)	Oikocrystic habit distorted? Minor difference in angle of extinction between individual parts of one "oikocrryst".
Clinopyroxene	3	4		8			Interstitial oikocrystic	Few coarse oikocrysts, abundant interstitial films between plagioclase and olivine.
Cr-spinel	1	1		0.08				Mainly enclosed by olivine, rarely orbicular.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Serpentine	3						Olivine	
Prehnite	2						Plagioclase	
Hydrogarnet ?	2						Plagioclase	
Chlorite	<1						Plagioclase	Around the grain boundaries of the altered plagioclase to prehnite and hydrogarnet.
Magnetite	2							
Pyrrhotite	<1							
Vein								
Chlorite								
Calcite								
Colorless amphibole								Anthophyllite ?

TOTAL ALTERATION: 8 %

STRUCTURE : Not much from structure side. No plastic strain. Perhaps weak flattening of olivine grains with elongation parallel to short side of slide. Noteable is also that tyically is a grain-supported structure. Oikocrysts of plagioclase and clinopyroxene extend over 5 to 10 mm. (GS)

PHOTOMICROGRAPHS:

1309D_256R_2_90_92_1
1309D_256R_2_90_92_2
1309D_256R_2_90_92_3

THIN SECTION:	U1309D-256R-3, 85-88 cm	**Piece No.** 4E		**Unit**: 673	**TS#: 617**		**OBSERVER: DB, AH**	
ROCK NAME:	Olivine-rich troctolite cut by gabbro dikelet							
GRAIN SIZE:	Medium/coarse							
TEXTURE:	Cumulate/graunlar							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Olivine		90			1.5		Subhedral	
Plagioclase		10			2		Interstitial oikocryst	
Gabbro vein								
Clinopyoxene		50			3		Anhedral, oikocrystic	
Plagioclase		50			3		Subhedral	

COMMENTS

Liquid infiltration along the dikelet results in clinopyroxene interstitial crystallization and decompaction of the olivine cumulus close to the dikelet. Large clinopyroxene oikocrysts are continuous from the dikelet to interstitial in the cumulus.

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Serpentine	25						Olivine	
Prehnite	3						Plagioclase	
Hydrogarnet	4						Plagioclase	
Magnetite	2							
Bornite ??	<1							Chalcopyrite pseudomorph associated with pyrrhotite and magnetite into a thick serpentine vein.
Pyrrhotite	1							Replacing the magnetite
Vein 1								
Serpentine								All the minerals are observed in the same vein cutting a pyroxene grain in the gabbroic intrusion.
Prehnite								
Zeolite								
Vein 2								All the minerals are found in the same vein in the gabbroic intrusion and cutting pyroxene.
Serpentine								
Zeolite								
Chlorite								
Calcite								
Prehnite								

TOTAL ALTERATION: 35%

STRUCTURE : Gabbroic vein of large clinopyroxene crystals cuts through serpentinized olivine grains. Clinopyroxene crystals in the gabbroic vein show weak undulatory extinction and the weak formation of a few kink bands. The olivine crystals are cut throught by serpentine with some grains nearly completly replaced. Fairly extensive microcracking is shown throughout.

PHOTOMICROGRAPHS:

1309D_256R_3_85_88_1
1309D_256R_3_85_88_2
1309D_256R_3_85_88_3
1309D_256R_3_85_88_4
1309D_256R_3_85_88_5
1309D_256R_3_85_88_6

THIN SECTION:	U1309D-257R-1, 25-28 cm	**Piece No.** 1C	**Unit**: 673	**TS#: 618**			**OBSERVER: AD, EH, GS**	
ROCK NAME:	"Olivine gabbro" crosscut by oxide gabbro microdikelet and gabbro dikelet							
GRAIN SIZE:	Medium							
TEXTURE:	Poikilitic							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Olivine gabbro (wehrlitic)								Olivine rich cumulate, with typically unpredictably variable and patchy plagioclase/clinopyroxene ratio
Olivine	55	65		7	3		Anhedral	Abundant olivine-olivine contacts ("microdunitic pods", possibly mantle)
Clinopyroxene	20	25		12			Poikilitic	Irregular oikocrysts
Plagioclase	8	10			2		Subhedral, interstitial	Interstitial grains, apparently not connected to form oikocrysts
Cr-spinel	0.5	0.5		0.08			Euhedral	Dominantly olivine hosted
Oxide gabbro dikelet (10-150 microns wide, diffuse, subparallel to coarse gabbro dikelet)								No zircon, no apatite
Plagioclase	60	80						Fine elongated grain. Width dikelet rarely exceeds 1 crystal.
Cr-spinel	20	20						Maybe some spinel incorporated from host "olivine gabbro".
								Maybe some clinopyroxene.
Gabbro dikelet								
Plagioclase	40	50		8	6			
Clinopyroxene	40	50		8	5			

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Serpentine	3						Olivine	
Green amphibole	1							Close to the serpentinized olivines
Hydrogarnet	2						Plagioclase	
Prehnite	1						Plagioclase	Related to the fractures into the plagioclase and coming from the serpentinized olivines.
Magnetite	1							
Pyrrhotite	<1							
Vein								
Serpentine								
Calcite								
Prehnite								
Chlorite								

TOTAL ALTERATION: 7 %

STRUCTURE : Weak elongation of olivine grains parallel to the gabbroic vein inerpreted as magmatic foliation. Weak LPO of olivine suspected. Spinel is equant. Plastic strain is absent. No movement on a set of oblique serpentine micofractures. (GS)

PHOTOMICROGRAPHS:

1309D_257R_1_25_28_1
1309D_257R_1_25_28_2
1309D_257R_1_25_28_3

THIN SECTION:	U1309D-257R-1, 32-34 cm	**Piece No.** 1D		**Unit**: 673	**TS#: 619**		**OBSERVER: AD, EH,GS**	
ROCK NAME:	Wehrlite crosscut by gabbro dikelet							
GRAIN SIZE:	Medium							
TEXTURE:	Poikilitic							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**			**Composition**	**MORPHOLOGY**	**COMMENTS**
			min.	**max.**	**av.**			
Wehrlite								
Olivine	60	70	0.5	5	3		Subhedral	Remarkably fresh
Clinopyroxene	30	30		10			Interstitial, oikocrystic	Interstitial oikocrysts
Plagioclase	0	<1						Possibly rare interstitial grains, now completely altered. Low abundance of spinel oustside of olivine (i.e., not a inclusion of olivine) suggest very low plagioclase abundance though.
Cr-spinel	0.5	0.5		0.05			Euhedral	Olivine-hosted subhedral to euhedral crystals
Gabbro dikelet								
Plagioclase	0	50						All gone
Clinopyroxene	0	50						All gone

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron)**				**REPLACING / FILLING**	**COMMENTS**
			min.	**max.**	**av.**			
Serpentine	2						Olivine	
Calcite	1						Olivine	Replacement of the olivine by calcite close to the vein
Hydrogarnet ??	3						Pyroxene	
Tremolite	2						Pyroxene	Alteration of the pyroxene close to the gabbroic vein
Magnetite	2							
Ilmenite	<1							
Pyrrhotite	1							
Vein 1								
Serpentine								
Calcite								
Vein 2 (gabbro)								
Colorless amphibole								Tremolite ? Anthophyllite ?
Chlorite							Pyroxene	
Prehnite							Plagioclase	
							Plagioclase	

TOTAL ALTERATION: 8%

STRUCTURE : No magmatic strain, no plastic strain. Neighboring olvines grains appear to be optically related. (GS)

PHOTOMICROGRAPHS:

1309D_257R_1_32_34_1 **1309D_257R_1_32_34_4**
1309D_257R_1_32_34_2 **1309D_257R_1_32_34_5**
1309D_257R_1_32_34_3 **1309D_257R_1_32_34_6**

THIN SECTION:	U1309D-258R-1, 40-42 cm	**Piece No.** 7A	**Unit**: 675	**TS#: 620**	**OBSERVER: AD, EH,GS**
ROCK NAME:	Gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Equigranular				

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	49	50			10		Interstitial, subhedral	
Clinopyroxene	40	50			12		Subhedral	Symplectitic and interfingering grains

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Green-brown amphibole	7						Pyroxene	Forming rim around the pyroxene
Brown amphibole	3						Pyroxene	Inside the pyroxene grain
Ilmenite	1							
Pyrrhotite	1							

TOTAL ALTERATION: 10 %

STRUCTURE : Fresh, coarse, and undeformed. In detail, outlines of plagioclase appear corroded (GS)

PHOTOMICROGRAPHS:

1309D_258R_1_40_42_1

1309D_258R_1_40_42_2

THIN SECTION:	U1309D-259R-1, 19-21 cm	**Piece No.** 5	**Unit**: 676	**TS#: 621**	**OBSERVER: DB, AD,GS**
ROCK NAME:	Oxide gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Varitextured				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase		75			20		Subhedral	
Clinopyroxene	0	20	3	15			Anhedral	Myrmekitic
Ilmenite		3	0.1	6			Anhedral	
Titanite		1	0.1	2			Anhedral	Strong pleochroism. Anomalous interference color blue-violet in the less pleochroic grains.
Zircon		0.1			0.5		Euhedral	
Apatite		0.1			0.3		Euhedral	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Green-brown amphibole	50						Pyroxene	Some pyroxene are completely replaced by this green-brown amphibole and some others only have alteration rims.
Brown amphibole	2						Pyroxene	Observed associated with the green-brown amphibole in the previous pyroxene grains.
Green-dark blue amphibol	1						Pyroxene	Observed as rim around the green-brown amphibole.
Pale green amphibole	1						Pyroxene	
Prehnite	1						Plagioclase	
Calcite	<1						Plagioclase	
Chlorite	<1						Plagioclase	
Ilmenite	2							
Vein								
Calcite								
Prehnite								The prehnite is observed associated with green amphibole in veins cutting the replacing green-brown amphibole after pyroxene, and also cutting the plagioclase.
Green amphibole								

TOTAL ALTERATION: 56%

STRUCTURE : No primary magmatic fabric or plastic strain fabric. Clear spatial association of titanite and oxide. (GS)

PHOTOMICROGRAPHS:

1309D_259R_1_19_21_1
1309D_259R_1_19_21_2
1309D_259R_1_19_21_3
1309D_259R_1_19_21_4
1309D_259R_1_19_21_5
1309D_259R_1_19_21_6

THIN SECTION:	U1309D-261R-1, 99-101 cm	**Piece No.** 18B	**Unit**: 682	**TS#: 622**	**OBSERVER: AD, EH, GS**
ROCK NAME:	Oxide gabbronorite				
GRAIN SIZE:	Medium				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	56	57		9	1			
Clinopyroxene	22	25		6	1			
Oxide	3	3		4	1			Localized enrichment in moderately sheared "melt inflitration zone"?
Inverted pigeonite	10	15		6	4			

COMMENTS

One corner of the thin section seems to be cut by an oxide gabbro vein, moderately sheared. The only textural indication for the involvement of melt is the interstitial clinopyroxene.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Green amphibole	25						Pyroxene	
Green-brown amphibole	5						Pyroxene	
Prehnite	2						Plagioclase	
Ilmenite	2							
Magnetite	1							
Pyrrhotite	1							

TOTAL ALTERATION: 32 %

STRUCTURE : First deformation fabrics in many sections. Mineral defined foliation is quite strong, probably representing an original magmatic fabric overprinted by plastic strain. Note elongated clinoproxenes with magmatic twin and inverted pigeonite in foliation plane. (GS)

PHOTOMICROGRAPHS:

1309D_261R_1_99_101_1
1309D_261R_1_99_101_2
1309D_261R_1_99_101_3
1309D_261R_1_99_101_4

THIN SECTION:	U1309D-261R-3, 52-55 cm	**Piece No.** 4C	**Unit**: 686	**TS#: 623**	**OBSERVER: AD, EH**
ROCK NAME:	Oxide gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Porphyroclastic				

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	45	59		4	1			Polygonally recrystallized
Clinopyroxene	15	39		9	3			Medium recrystallized and medium-coarse interfingering crystals, strongly kinked
Oxide	2	2		1	0.5			

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Green-brown amphibole	25						Pyroxene	
Brown amphibole	5						Pyroxene	
Prehnite	4						Plagioclase	
Chlorite	3						Plagioclase	Replacement is related to the thin veins of chlorite cutting the plagioclase.
Zeolite	1						Plagioclase	
Titanite	1							The titatnite and oxide are observed together and the oxides underlined previous cleavage of amphibole.
Ilmenite	2							
Pyrrhotite	1							
Pyrite	<1							
Vein								
Chlorite								Cutting the plagioclase grains and forming rims around the plagioclase (thin veinlets between the grain boundaries)

TOTAL ALTERATION: 42%

STRUCTURE : Nearly all plagioclase plastically recrystallized into mosaic shaped neoblasts, only part of clinopyroxene (i.e. rims) affected. Original magmatic structure obliterated. (GS)

PHOTOMICROGRAPHS:

1309D_261R_3_52_55_1

1309D_261R_3_52_55_2

THIN SECTION:	U1309D-262R-3, 101-104 cm	**Piece No.** 3B	**Unit**: 692	**TS#: 624**	**OBSERVER: AD, DB**
ROCK NAME:	Olivine gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase		73			2		Anhedral	Gray plagioclase with tapered deformation twins
Clinopyroxene		19			2.5		Anhedral, oikocrystic	
Olivine		8			1.5		Anhedral	
Sulfide		0.1					Anhedal, globular	
Oxide		0.2					Interstitial	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Serpentine	0.5						Olivine	Green serpentine replacing the olivine
Talc	0.5						Olivine	
Tremolite	0.5						Olivine	Forming corona around the olivine grains
Chlorite	0.5						Plagioclase	At contact between the altered olivine to tremolite and the plagioclase
Prehnite	<1						Plagioclase	
Green-brown amphibole	0.5						Pyroxene	
Pyrrhotite	<1							
Magnetite	<1						Olivine	
Chalcopyrite	<1							

TOTAL ALTERATION: 2.5%

STRUCTURE : Relict magmatic fabric weakly preserved, but most plagioclase affected by plastic strain a high temperature. Clinopyroxene with subgrain formaton, original poikilitic grains can still be discerned. (GS)

PHOTOMICROGRAPHS:

1309D_262R_3_101_104_1

1309D_262R_3_101_104_2

THIN SECTION:	U1309D-262R-4, 76-79 cm	**Piece No.** 6	**Unit**: 695/696	**TS#: 625**			**OBSERVER: TN, DB, GS**	
ROCK NAME:	Olivine bearing gabbro / oxide gabbro							
GRAIN SIZE:	Medium / coarse							
TEXTURE:	Seriate							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**			**Composition**	**MORPHOLOGY**	**COMMENTS**
			min.	**max.**	**av.**			
Olivine bearing gabbro								
Plagioclase		66			2		Anhedral	
Clinopyroxene		32			2		Anhedral, oikocrystic	Encloses plagioclase
Olivine		2			0.8		Anhedral	
Oxide gabbro								
Clinopyroxene					7		Anhedral, interstitial	
Oxide					4		Anhedral, interstitial	Resorbing and replacing primary clinoyroxene and plagioclase
Plagioclase					2		Anhedral	
Sulfide			0.1	3			Anhedral	Pyrrhotite chalcopyrite intergrowth
Oxide are concentrated along the most deformed part of the coarse grain gabbro, they pass through the contact and start to replace the olivine bearing gabbro texture.								

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron)**				**REPLACING / FILLING**	**COMMENTS**
			min.	**max.**	**av.**			
Actinolite/tremolite	2						Olivine, clinopyroxene	Corona in olivine-bearing gabbro, overgrowth on clinopyroxene
Green-brown amphibole	1						Clinopyroxene	In oxide gabbro
Talc	1						Olivine	In olivine-bearing gabbro
Chlorite	1						Plagioclase	Corona or crack filling
Oxides	<1							
Sulfides	<1							

TOTAL ALTERATION: 5%

STRUCTURE : Seems to be a coarse grained, essentially undeformed oxide gabbro in contact to a finer grained, plastically deformed olivine gabbro. Along the contact, the oxide gabbro picks up relatively high stress deformation expressed in small sized (50-80 micron) neoblasts. Original texture in finer grained gabbro was with poikilitic clinopyroxene, now largely recrystallized. An alternative interpretation is that the oxides intruded along the contact coarse, undeformed gabbro to finer grained, deformed gabbro with concomitant strain (this interpretation suggested by igneous group). In detail, can see very nicely how oxide infiltrates the grain boundaries of the coasre grained gabbro (GS)

PHOTOMICROGRAPHS:

1309D_262R_4_76_79_1

1309D_262R_4_76_79_2

THIN SECTION:	U1309D-262R-4, 84-87 cm	**Piece No.** 7	**Unit**: 696	**TS#: 626**	**OBSERVER: TN, NA, GS**
ROCK NAME:	Gabbro / trondhjemite				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Gabbro								
Plagioclase	58	60	0.2	7	3		Anhedral	Slightly zoned.
Clinopyroxene	32	35	0.5	6	2.5		Anhedral to oikocrystal	The rim especially along leucocratic gabbro replaced by amphibole associated with oxide.
Inverted pigeonite	<1	<1		1.6			Anhedral	In twinned with herring-bone pattern of the lamellae.
Olivine	<1	<1	0.1	1.4	0.3		Interstital	
Oxide	<1	<1	0.1	0.8	0.2		Anhedral	
Orthopyroxene	<1	<1	<0.1	<0.1	0.3		Interstital	
Trondhjemite (non-reactive contact, very bizar)								
Plagioclase	65	70	3	6	4		Anhedral to subhedral	Strongly zoned.
Quartz		15						
Apatite	1	1	0.5	3	1		Anhedral	
Clinopyroxene (Amphibole?)	3	10	0.2	2	0.8		Anhedral	
Oxide	5	5	1	3	0.5			
Orthopyroxene	<1	<1	<1	<1	<1			

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Green amphibole	2						Clinopyroxene	Overgrowth
Brown amphibole	1						Clinopyroxene	
Chlorite	2						Plagioclase	Crack filling or near olivine
Talc	<1						Olivine	Pseudomorphic
Bowlingite?	1						Olivine	Pseudomorphic
Oxides	<1						Olivine	
Sulfides	<1						Oliine	
Titanite	<1						Ti-oxide	

TOTAL ALTERATION: 7%

STRUCTURE : No clear magmatic strain but plastic strain in the gabbro. Plastic strain is weak, only tapering of plagioclase and some neolasts. Plagioclase looks resorbed in clinopyroxene oikocrysts. Leucocratic gabbro not associated with appreciable local strain. (GS)

PHOTOMICROGRAPHS:

1309D_262R_4_84_87_1

1309D_262R_4_84_87_2

THIN SECTION:	U1309D-263R-2, 34-37 cm	**Piece No.** 9	**Unit**: 700	**TS#: 627**	**OBSERVER: TN, DB, GS**
ROCK NAME:	Gabbro				
GRAIN SIZE:	Medium to coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase		73			2		Anhedral	
Clinopyroxene		27			2		Anhedral, oikocrystic	Encloses rounded plagioclase
Orthopyroxene		0.5			0.5		Anhedral	
Oxide		0.3					Anhedral, intersitial	Oxide and less sulfide are aligned along two microshear zones.
Sulfide		0.1					Anhedral	Disseminated

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Actinolite	1						Pyroxene	Overgrowth
Brown/green amphibole	2						Clinopyroxene	Pseudomorphic
Chlorite	2						Plagioclase, vein	Crack filling
Talc	1						Pyroxene	Pseudomorphic

TOTAL ALTERATION: 6%

STRUCTURE : Relict magmatic fabric visible in elongated clinopyroxene and plagioclase but 70% of grains are neoblasts with grain size varying from 100 to 400 microns. Plastic strain clearly associated with foliation development. One of the rare, higher plastic strain, high temperature deformation gabbros. (GS)

PHOTOMICROGRAPHS:

1309D_263R_2_34_37_1

1309D_263R_2_34_37_2

THIN SECTION:	U1309D-264R-1, 65-67 cm	**Piece No.** 9B	**Unit**: 702	**TS#: 628**				**OBSERVER: AD, DB, GS**	
ROCK NAME:	Orthopyroxene and olivine-bearing leucocratic gabbronorite								
GRAIN SIZE:	Coarse								
TEXTURE:	Seriate								

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**			**Composition**	**MORPHOLOGY**	**COMMENTS**
			min.	**max.**	**av.**			
Plagioclase		85	0.5	12			Subhedral, neoblast	
Clinopyroxene		5			1		Anhedral, oikocrystic	Encloses resorbed plagioclase and olivine grains
Olivine		4			1		Anhedral	
Orthopyroxene		2			1		Anhedral	Intregrown with clinopyroxene and olivine
Inverted pigeonite		3			1		Anhedral	
Oxide		0.5			0.8		Anhedral	
Sulfide		0.1					Anhedral	

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron)**				**REPLACING / FILLING**	**COMMENTS**
			min.	**max.**	**av.**			
Serpentine	1						Olivine	
Talc	1						Olivine	
Actinolite	1						Pyroxene	Alteration as rim around the pyroxene
Green-brown amphibole	1						Pyroxene	
Prehnite	<1						Plagioclase	Tiny crystals close to the cracks observed in the plagioclase
Secondary plagioclase	20						Plagioclase	Na content

TOTAL ALTERATION: 24%

STRUCTURE : Original magmatic strain was probably present but largely obliterated by plastic strain with pronounced porphyroclast - neoblast development. Original poikiltiic clinopyroxene can be reconstructed, so total strain was not too high in plastic regime.(GS)

PHOTOMICROGRAPHS:

1309D_264R_1_65_67_1

1309D_264R_1_65_67_2

THIN SECTION:	U1309D-264R-1, 111-114 cm	**Piece No.** 12B	**Unit**: 702	**TS#: 629**	**OBSERVER: TN, DB, GS**
ROCK NAME:	Gabbronorite cut by microgabbronorite				
GRAIN SIZE:	Coarse / fine				
TEXTURE:	Seriate / equigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase		77			0.8		Anhedral	
Clinopyroxene		14			0.8		Anhedral	
Orthopyroxene		9			0.8		Anhedral, oikocrystic	Encloses plagioclase
Plagioclase								
Orthopyroxene								
Clinopyroxene								

COMMENTS

Host rock contains large orthopyroxenes with exsolution pattern aligned (001) only along the perifery.

No modal estimation for the host rock

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Green amphibole	5						Pyroxene, vein	Overgrowing pyroxene, crack filling in plagioclase
Chlorite	3						Plagioclase, vein	Crack filling in plagioclase
Talc	2						Pyroxene	Pseudomorphic
Oxides	<1							
Sulfides	<1							

TOTAL ALTERATION: 10%

STRUCTURE: Microgabbronorite in coarse gabbronorite. Coarse gabbro with likely magmatic fabric, microgabbro nearly certainly had a strong one. Microgabbro is however largely recrystallized to neoblasts, but accumulated strain was likely not high. (GS)

PHOTOMICROGRAPHS:

1309D_264R_1_111_114_1

1309D_264R_1_111_114_2

THIN SECTION:	U1309D-265R-2, 72-74 cm	**Piece No.** 13	**Unit**: 705	**TS#: 630**	**OBSERVER: AD, EH, AH**
ROCK NAME:	Olivine-bearing gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Seriate to poikilophytic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Olivine	2.5	3	0.05	1.5	0.5			Either surrounded by or enclosed in plagioclase
Plagioclase	49	50	0.1	4	3			
Clinopyroxene	43	46	0.1	5	3			Complex irregular intergrowth between partly resorbed plagioclase and surrounding clinopyroxene. Both seem to have recrystallized together. Coarse oikocrysts present as well.
Sulfides	0.1	0.1		0.2			Interstitial	Rare primary magmatic grains, now exsolved.
Oxide	0.2	0.2		1			Interstitial	
Orthopyroxene	1	1		2				Two medium grains, mantling olivine

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Tremolite	1						Olivine/pyroxene	Rim of tremolite around olivine or complete replacement.
Talc	1						Olivine	
Chlorite	1						Plagioclase	Rim around the tremolite and talc replacing the olivine when contact with plagioclase.
Prehnite	<1							
Brown amphibole	<1						Pyroxene	
Actinolite	<1						Pyroxene	As rim around the pyroxene grains and also thin veinlets
Magnetite	<1							
Pyrrhotite	<1							
Chalcopyrite	<<1							
Pyrite ??	<<1							

TOTAL ALTERATION: 4%

STRUCTURE: Crystals exhibit a grain size variation from coarse to medium grained and back to coarse again. Crystals do not show any preferred alignment or magmatic foliation. Plagioclase crystals exhibit a weak undulatory extinction and show lobate grain boundaries. Plagioclase and olivine crystals are contained as inclusions inside pyroxene grains. Weak microcracking is observed and crosscuts the grain boundaries.

PHOTOMICROGRAPHS:

1309D_265R_2_72_74_1

1309D_265R_2_72_74_2

THIN SECTION:	U1309D-267R-2, 112-114 cm	**Piece No.** 8	**Unit**: 710	**TS#: 631**	**OBSERVER:PF, EH, AH**
ROCK NAME:	Olivine-bearing gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Olivine	2	3			2			
Plagioclase	53	55		7	4			Abundant clinopyroxene-hosted plagioclase
Clinopyroxene	39	42		8	5			Complexly interfingering three-clinopyroxene grains. Tiny brown amphibole patches in cores of coarse crystals.
Sulfides	0.1	0.1		0.2				Exsolved into granular part consisting mainly of pyrrhotite, chalcopyrite, with a shotgun spray halo of sulfides and silicate inclusions in the surrounding plagioclase.
Oxide	0.1	0.1		1			Interstitial	Associated with clinopyroxene

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Serpentine	1						Olivine	Some is dark green (oxidized?)
Amphibole	<1							Minute needles along fractures in pyroxene
Oxides	2						Some after olivine	Ilmenite (primary), and dusty magnetite with serpentine
Sulfides	<1							Some may be primary, includes pyrrhotite (wth flames of pentlandite), and some chalcopyrite

TOTAL ALTERATION: 3%

STRUCTURE : A very weak subhorizontal foliation cuts through pyroxene grains and in some cases continues into adjacent plagioclase. Amphibole needles have formed along the fractures formed by this fabric.(AH). For an alternative view, plagioclase grains form magmatic foliation diagonally in slide. Only weakest trace of plastic strain. Not blocky nature of clinopyroxene, still weakly poikilitic but not part of magmatic foliation at all (GS).

PHOTOMICROGRAPHS:

1309D_267R_2_112_114_1
1309D_267R_2_112_114_2
1309D_267R_2_112_114_3
1309D_267R_2_112_114_4

THIN SECTION:	U1309D-268R-1, 75-78 cm	**Piece No.** 6	**Unit**: 711	**TS#: 632**	**OBSERVER: PF, EH, AH**
ROCK NAME:	Troctolitic gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Poikilitic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Olivine	20	25		12	6		Subhedral to anhedral	Two-four olivine grains with tilt walls, enclosed by plagioclase have similar extinction with minor rotations.
Plagioclase	64	65		13	5		Subhedral	
Clinopyroxene	7	10		20			Interstitial, oikocrystic	Interconnected optically continuous interstitial to oikocrystic network

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Talc	2						Olivine	At edges of olivine grians
Tremolite	1						Olivine	Intergrown with talc
Serpentine	1						Olivine	Along olivine fractures with serpentine
Oxides	<1						Olivine	Small grains along olivine fractures with serpentine
Chlorite	<1						Plagioclase	At contact with olivine grains where tremolite/talc forms and in fine veins in plagioclase
Calcite	<<1						Veins	In very thin veins
Green amphibole	1						Pyroxene	Along lamellae as fine needles and as small patches

TOTAL ALTERATION: 6%

STRUCTURE : Crystals exhbit no magmatic foliation as there is no crystallographic preferred orientation. Plagioclase crystals exhibit undulatory extinction and are contained as inclusions inside olivine and pyroxene grains. Olivine grains show the formation of a few tilt boundaries. Weak microcracking has brecciated a few plagioclase grains.(AH) Note that olivine again optically continuous across intervening plagioclase (GS)

PHOTOMICROGRAPHS:

1309D_268R_1_75_78_1
1309D_268R_1_75_78_2
1309D_268R_1_75_78_3
1309D_268R_1_75_78_4

THIN SECTION:	U1309D-268R-2, 66-68 cm	**Piece No.** 2A	**Unit**: 712	**TS#: 633**	**OBSERVER:GS, TN, DB**
ROCK NAME:	Orthopyroxene-bearing olivine gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Subequigraular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase		65			3		Anhedral	
Olivine		17			2		Anhedral, embayed	Large amoeboidal embayed olivines.
Clinopyroxene		15			2		Anhedral, oikophitic	
Orthopyroxene		3			2		Anhedral, oikophitic	
Sulfide		0.5			0.2		anhedral	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Serpentine	3						Olivine	Crack filling
Talc	1						Olivine	Pseudomorphic
Magnetite	1						Olivine	Crack filling
Amphibole?	1						Clinopyroxene	Along cleavage

TOTAL ALTERATION: 6%

STRUCTURE : Another fresh troctolitic gabbro with perhaps a weak flattening of the olivines grains parallel to what might be a weak preferred orientation of elongated plagioclase grains diagonally in the slide. Plastic strain is negligible, the delicate clinopyroxene films extending from larger grains into plagioclase/olivine grain boundaries are perfectly preserved. (GS)

PHOTOMICROGRAPHS:

1309D_268R_2_66_68_1

1309D_268R_2_66_68_2

THIN SECTION:	U1309D-268R-3, 15-18 cm	**Piece No.** 1	**Unit**: 713	**TS#: 634**	**OBSERVER:GS, TN, DB**
ROCK NAME:	Olivine gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase		65	0.5	7			Anhedral	
Clinopyroxene		24	0.1	8			Anhedral, oikocrystic, oikophitic, interstitial	Clinopyroxene textural relationships suggest melt percolation dissolution of a former olivine poor troctolitic assemblage.
Olivine		11	0.5	7			Anhedral	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Actinolite/tremolite	10						Olivine, plagioclase, clinopyroxene	Corona, overgrowth, vein
Chlorite	5						Olivine, plagioclase	Corona, crack filling
Talc	3						Olivine	Pseudomorph
Serpentine	<1						Olivine	Pseudomorph
Bowlingite?	<1						Olivine	Pseudomorph
Oxide	<1						Olivine	
Sulfide	<1						Olivine	

TOTAL ALTERATION: 20%

STRUCTURE : Weak magmatic foliation at 25 degrees to long side of slide (clockwise rotation) suspected. Some recrystallization of plagioclase and clinopyroxene has occurred in patches. Vein cuts through slide, olivine alteration seems to ccur along vein. (GS)

PHOTOMICROGRAPHS:

1309D_268R_3_15_18_1

1309D_268R_3_15_18_2

THIN SECTION:	U1309D-268R-4, 6-9 cm	**Piece No.** 1	**Unit**: 714	**TS#: 635**	**OBSERVER: TN, DB, AH,GS**
ROCK NAME:	Gabbronorite				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase		59	0.5	9			Anhedral	
Clinopyroxene		15	0.1	12			Anhedral, oikocrystic	Encloses resorbed plagioclase, one large clinopyroxene shows abundant prismatic orthopyroxene exsolution. It encloses and resorbs a previous orthopyroxene-free clinopyroxene
Orthopyroxene		25	1	8			Anhedral, oikocrystic	Encloses plagioclase and clinopyroxene
Oxide		1			0.5		Anhedral	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Green amphibole	4						Pyroxene, vein	Overgrowth
Talc	1						Orthopyroxene	Along cleavage or crack filling
Chlorite	2						Clinopyroxene, plagioclae	Along cleavage or crack filling
Ilmenite	<1						Clinopyroxene	
Pyrrhotite	<1						Clinopyroxene	

TOTAL ALTERATION: 7%

STRUCTURE : Boundary between a weakly sheared zone and a relatively undeformed region. The relatively undeformed region shows plagioclase crystals with curved lamellae, undulatory extinction and the formation of subgrains. Along the boundaries of these plagioclase grains there has been recrystallization and the formation of new grains. The weakly sheared zone exhibits porphyroblasts of pyroxene which are surrounded by mainly recrystallized plagioclase grains. A few protolith plagioclase grains still exist.(AH). Note how orthopyroxene successfully resisted dynamic recrystallization in the sheared zone. Top to right sense of shear proposed (GS)

PHOTOMICROGRAPHS:

1309D_268R_4_6_9_1
1309D_268R_4_6_9_2
1309D_268R_4_6_9_3

THIN SECTION:	U1309D-269R-1, 3-5 cm	**Piece No.** 1	**Unit**: 714	**TS#: 636**	**OBSERVER:GS, DB, TN**
ROCK NAME:	Gabbronorite mylonite				
GRAIN SIZE:	Medium				
TEXTURE:	Mylonitic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase		70			0.5		Equant neoblast	
Clinopyroxene		20	0.4	4			Equant neoblast, porphyroclast	
Orthopyroxene		10	0.4	4			Tabular neoblast, porphyroclast	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Green amphibole	10						Pyroxene, vein	Overgrowth, pseudomorph
Talc	2						Orthopyroxene	Crack filling, pseudomorph
Chlorite	3						Plagioclase, interstitial, vein	Crack filling

TOTAL ALTERATION: 15

STRUCTURE : Plagioclase is only found in mosaic shaped neoblasts. Clino- and to more extent orthopyroxene still exist as porphyroclasts. Orthopyroxene neoblasts are actually quite rare and as observed, occur as tabular shaped neoblasts (why tabular?). Shear sense is not clear. Trains of clinopyroxene obviously derive from larger, now completely recrystallized clinopyroxene grains. Orthopyroxene forms partly ribbon grains. Overall high temperatures of deformation (GS)

PHOTOMICROGRAPHS:

1309D_269R_1_3_5_1
1309D_269R_1_3_5_2
1309D_269R_1_3_5_3
1309D_269R_1_3_5_4

THIN SECTION:	U1309D-269R-2, 7-10 cm	**Piece No.** 2	**Unit**: 714	**TS#: 637**	**OBSERVER: TN, DB, AH**
ROCK NAME:	Gabbronorite				
GRAIN SIZE:	Coarse				
TEXTURE:	Porphyroclastic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase		75	0.4	6			Neoblast, porphyroclast	
Orthopyroxene		15	0.4	6			Neoblast, porphyroclast	
Clinopyroxene		10	0.4	6			Neoblast, porphyroclast	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Green amphibole	3						Pyroxene	Overgrowth
Chlorite	3						Clinopyroxene, plagioclase	Along cleavage, crack filling, or interstitial
Talc	2						Orthopyroxene	Crack filling, or pseudomorphic
Magnetite	<1							
Ilmenite	<1							

TOTAL ALTERATION: 8%

STRUCTURE : Shear zone showing porphyroblasts of pyroxene, and plagioclase surrounded by recrystallized plagioclase crystals. Porphyroblasts are aligned with the sense of shear. The plagioclase porphyroblasts exhibit undulatory extinction, bent lamellae and the formation of subgrains which are of a similar size as the recrystallized grains. The pyroxene porphyroblasts show a very weak undulatory extinction and the formation of occasional kink boundaries. Weak microcracking is shown in the porphyroblasts but is not easily traced into the recrystallized domains.

PHOTOMICROGRAPHS:

1309D_269R_2_7_10_1
1309D_269R_2_7_10_2
1309D_269R_2_7_10_3
1309D_269R_2_7_10_4
1309D_269R_2_7_10_5
1309D_269R_2_7_10_6

THIN SECTION:	U1309D-270R-1, 103-105 cm	**Piece No.** 8C		**Unit**: 717		**TS#: 638**		**OBSERVER: TN, DB, AH**
ROCK NAME:	Olivine gabbro							
GRAIN SIZE:	Coarse							
TEXTURE:	Seriate							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Plagioclase		65	0.5	9			Anhedral	
Clinopyroxene		28	0.5	9			Anhedral	Radiating clinopyroxene texture crosscut a large plagioclase grain.
Olivine		7			6		Anhedral	

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Green amphibole/tremolite	5						Olivine, plagioclase, clinopyroxene	Corona, overgrowth, crack filling
Chlorite	2						Olivine, plagioclase	Corona
Talc	1						Olivine	Pseudomorph
Magnetite	<1						Olivine	
Pyrrhotite	<1						Olivine	
Bowlingite?	<1						Olivine	Pseudomorph
Serpentine	<1						Olivine	Crack filling

TOTAL ALTERATION: 8%

STRUCTURE: Minerals show no preferred alignment and therefore no magmatic strain. Plagioclase grains exhibit very weak undulatory extinction and bending of the lamallae. Small areas of recrystallized plagioclase are observed. Olivine and pyroxene crystals exhibit a very weak undulatory extinction. Infilled fractures crosscut the grain boundaries and have caused small amounts of alteration of the minerals (AH). For an alternative view, plagioclase grains are aligned by magmatic flow (nearly parallel to long side of slide). Even olivine is parallel to this, whereas clinopyroxene is poikilitic and forms the rims on olivine (GS)

PHOTOMICROGRAPHS:

1309D_270R_1_103_105_1

1309D_270R_1_103_105_2

THIN SECTION:	U1309D-270R-2, 70-73 cm	**Piece No.** 7A	**Unit**: 718	**TS#: 639**	**OBSERVER: TN, DB, AH**
ROCK NAME:	Orthopyroxene-bearing olivine gabbro / olivine microgabbro				
GRAIN SIZE:	Coarse / fine				
TEXTURE:	Seriate / equigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Orthopyroxene-bearing olivine gabbro								
Plagioclase		65			2		Anhedral	
Clinopyroxene		27			4		Anhedral	
Olivine		6			3		Anhedral	
Orthopyroxene		2			1		Anhedral	
Olivine microgabbro								
Plagioclase		65			0.8		Anhedral	
Clinopyroxene		30			0.8		Anhedral	
Olivine		5			0.8		Anhedral	
Orthopyroxene		0.5			0.8		Anhedral	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Actinolite/tremolite	2						Olivine, clinopyroxene, vein	Corona, overgrowth, vein
Green-brown amphibole	2						Clinopyroxene	Pseudomophic
Chlorite	1						Plagioclase	Corona
Talc	1						Olivine	Pseudomorphic
Serpentine	1						Olivine	Crack filling
Magnetite	<1							
Pyrrhotite	<1							

TOTAL ALTERATION: 7%

STRUCTURE: Contact between coarse grained gabbro and a fine grained olivine microgabbro. Coarse grained gabbro shows no preferred orientation of the minerals whereas the fine grained olivine microgabbro exhibits a magmatic foliation shown by a preferred alignment of crystals, particulary plagioclase grains. The plagioclase grains show weak undulatory extinction, bending of lamellae, lobate grain boundaries and recrystallization. The large olivine crystals show the formation of kink boundaries. An infilled vein crosscuts the boundary between the gabbro and olivine microgabbro. The vein is filled with actinolite and tremolite. Weak microcracking is observed mainly in the gabbro.

PHOTOMICROGRAPHS:

1309D_270R_2_70_73_1

1309D_270R_2_70_73_2

THIN SECTION:	U1309D-270R-3, 93-95 cm	**Piece No.** 3B	**Unit**: 720	**TS#: 640**	**OBSERVER: DB, EH**
ROCK NAME:	Oxide anorthositic gabbro / oxide gabbro mylonite				
GRAIN SIZE:	Coarse / medium				
TEXTURE:	Granular / porphyroclastic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Oxide anorthositic gabbro								
Plagioclase		95		12			Anhedral	
Clinopyroxene		2		3			Anhedral	
Inverted pigeonite		1		1			Anhedral	
Oxide		2		2			Anhedral, interstitial	Oxides percolate from the contact, cut and resorb plagioclase and clinopyroxene
Oxide gabbro mylonite								
Plagioclase		35		4			Neoblast, porphyroclast	
Clinopyroxene		67		2			Neoblast, porphyroclast	
Apatite		1					Interstitial	In the mylonitic part: small fragmented grains, commonly enriched in local clusters (confirmed with cathodo-luminescence scan; CL-scan)
Oxide		8					Interstitial, anhedral	Cut and replace deformed grains, along the contact oxides intrude and decompact the mylonitic texture

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Green amphibole	5						Clinopyroxene	Overgrowth
Brown amphibole	3						Clinopyroxene	Pseudomorphic
Chlorite	2						Plagioclase	Crack filling, interstitial
Ilmenite	?							Primary and secondary
Pyrrhotite	?							Primary and secondary

TOTAL ALTERATION: >10%

STRUCTURE : The oxide gabbro mylonite has very small grain size of plagioclase. Note that plagioclase seems to be less abundant in the direct contact area, Is this a primary feature or is it related to deformation? On a broad scale, deformation scales with oxide presence, on the scale of the slide, a low strain area with oxide is however present between the oxide gabbro mylonite and the oxide free anorthosite. Is all the clinopyroxene in the oxide gabbro related to the oxide gabbro or does the host have also clinopyroxene (simply not seen in slide)? As mentioned by igneous group, clear dissolution features of oxides with respect to coarse anorthsoite.

PHOTOMICROGRAPHS:

1309D_270R_3_93_95_1
1309D_270R_3_93_95_2
1309D_270R_3_93_95_3
1309D_270R_3_93_95_4

THIN SECTION:	U1309D-270R-3, 145-147 cm	**Piece No.** 3F	**Unit**: 720	**TS#: 641**	**OBSERVER: TN, DB, AH**
ROCK NAME:	Oxide gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Porphyroclastic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase		49	0.5	18			Neoblast, porphyroclast	
Clinopyroxne		40	0.5	6			Neoblast, porphyroclast	
Oxide		9	0.1	0.8			Interstitial, anhedral	
Inverted pigeonite		2	0.5	1			Neoblast, porphyroclast	
Sulfide		0.5						

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Green amphibole	5						Clinopyroxene, vein	Overgrowth, pseudomorph, crack filling
Brown-green amphibole	5						Clinopyroxene, vein	Pseudomorphic
Chlorite	2						Interstitial	
Talc	3						Pyroxene	Pseudomorph
Ilmenite	?							Primary and secondary?
Pyrrhotite	?							Primary and secondary?

TOTAL ALTERATION: >15%

STRUCTURE : Preferred alignment of porphyroclasts inside a plastic strain shear zone. Porphyroclasts of clinopyroxene and plagioclase. The plagioclase porphyroclasts exhibit undulatory extinction, formation of subgrains and recrystallization along the grain boundaries. Pyroxene porphyroclasts show the formation of a few kink bands and contain inclusions of plagioclase. The porphyroblasts are mainly surrounded by recrystallized plagioclase crystals and a few clinopyroxene grains. A few small infilled fractures are seen.(AH). Note potential SC relationship indicative of top to right sense of shear. High stress, oxide related shear zone. Plagioclase much more fully recrystallized than clinopyroxene (GS)

PHOTOMICROGRAPHS:

1309D_270R_3_145_147_1

1309D_270R_3_145_147_2

THIN SECTION:	U1309D-271R-1, 16-19 cm	**Piece No.** 3	**Unit**: 722	**TS#: 642**	**OBSERVER: TN, DB, AH**
ROCK NAME:	Gabbronorite / oxide gabbro				
GRAIN SIZE:	Coarse / fine				
TEXTURE:	Granular / porphyroclastic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Gabbronorite								
Plagioclase		65	0.5	12			Anhedral	
Orthopyroxene		23	1	6			Subhedral, anhedral	
Clinopyroxene		12	0.1	5			Anhedral	
Oxide gabbro mylonite								
Plagioclase		70			0.8		Anhedral	
Clinopyroxene		25			0.8		Anhedral	
Oxide		5			0.3		Anhedral	
Apatite		0.5			0.1		Anhedral	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Green amphibole	5						Pyroxene	Overgrowth
Talc	3						Orthopyroxene	Crack filling
Chlorite	2						Plagioclase, interstitial	Crack filling
Magnetite	?						Pyroxene	
Pyrrhotite	?						Pyroxene	

TOTAL ALTERATION: >10%

STRUCTURE : Boundary between a highly strain shear zone and a lower strained area. Lower strain region exhibits large porphyroclasts of plagioclase and pyroxene aligned with strain. Plagioclase porphyroclasts show undulatory extinction, bending of lamellae, formation of subgrains and recrystallization along the grain boundaries. Some pyroxene porphyroblasts have been bent in line with the strain and show weak undulatory extinction. The high strained region which is an oxide gabbro mylonite contains a few larger relict grains of plagioclase and pyroxene surrounded by recrystallized plagioclase and interstitial oxides. Very small amount of microcracking seen and mainly in the large porphyroclasts.(AH) A remarkable slide showing two strain regimes: one with oxides, other without. One with oxides has 50 micron type plagioclase neoblasts and is nearly completely recrystallized, the one which is poor in oxides (but has some) has 150 micron type neoblast size with just 20% recrystallization in what appears to be largely steady state neoblast size. Very sharp boundary between both. Sense of shear is top to right. (GS)

PHOTOMICROGRAPHS:

1309D_271R_1_16_19_1

1309D_271R_1_16_19_2

THIN SECTION:	U1309D-271R-1, 68-70 cm	**Piece No.** 9	**Unit**: 722	**TS#: 643**	**OBSERVER: TN, EH, AH**
ROCK NAME:	Orthopyroxene-bearing disseminated oxide gabbro with oxide-rich shear band				
GRAIN SIZE:	Fine to coarse				
TEXTURE:	Protomylonite				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	54	55	0.05	15				Both very coarse and relatively undeformed grains, as well as fine recrystallized aggregates
Clinopyroxene	35	40	0.1	6				In addition to normal coarse twins, and fine recrystallized grains few symplectites
Orthopyroxene	2	3		4				
Oxide	2	2						Unambiguously enriched in deformed zone
Apatite	1	1		0.05				Strongly enriched in highly deformed are: >100 fine, fragmented, generally elongate grains in oxide rich matrix (identified with cathode luminescence).

COMMENTS

No zircon, no titanite

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Green amphibole	7						Pyroxene	Overgrowth, pseudomorph
Talc	2						Orthopyroxene	Crack filling
Chlorite	1						Plagioclase, interstitial	
Magnetite							Pyroxene	
Pyrrhotite							Pyroxene	

TOTAL ALTERATION: 10%

STRUCTURE : Fairly sharp boundary between a highly strained protomylonitic region and a lower strain zone. Lower strain region exhibits a preferred orientation of the crystals of plagioclase and pyroxene. The large plagiolase crystals exhibit undulatory extinction and small amounts of recrystallization along the grain boundaries. The large pyroxene crystals are in places bent in line with the strain and show kink bands. Also they exhibit undulatory extinction and inclusions of plagioclase. The protomylonitic region shows porphyroblasts of pyroxene which exhibit kink bands, and undulatory extinction. These pophyroblasts are surrounded by recrystallized plagioclase grains, intersititial oxides and a few recrystallized pyroxenes. A few small microcracks are seen crosscutting the larger grains.

PHOTOMICROGRAPHS:

1309D_271R_1_68_70_1
1309D_271R_1_68_70_2
1309D_271R_1_68_70_3

THIN SECTION:	U1309D-271R-1, 80-82 cm	**Piece No.** 10	**Unit**: 722	**TS#: 644**	**OBSERVER: TN, EH, AH**
ROCK NAME:	Oxide gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	20	40		12	5			Porous, albitized, unhappy
Clinopyroxene	5	40		6	3			Strongly altered to secondary amphibole
Clinopyroxene (?) 2	0	16		8				Possibly primary amphibole
Orthopyroxene	2	2		4				One coarse grain, with irregular clinopyroxene blebs. Despite unusual exsolution lamellae, possibly inverted pigeonite.
Oxide		2		3				
Titanite	0.5	?		0.2				Possibly metamorphic, blocky weakly pleochroic grains associated with oxides
Apatite	0.1	0.1		0.05				Very few small interstitial grains (indentified with EDS).

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Green amphibole	35						Clinopyroxene, vein	
Brown amphibole	20						Clinopyroxene, vein	
Chlorite	10						Interstitial	
Prehnite	5						Plagioclase	
Albite	5						Plagioclase	
Titanite	2						Ti-oxides	
Carbonate	2						Plagioclase	
Zeolite?	1						Vein	

TOTAL ALTERATION: 80%

STRUCTURE : No preferred orientation of the minerals and therefore no magmatic foliation. Pyroxene crystals exhibit a few kink boundaries and very weak undulatory extinction. Plagioclase also exhibits a weak undulatory extinction. Dissemenated oxides infill spaces around the minerals. Weak microcracking crosscuts grain boundaries.

PHOTOMICROGRAPHS:

1309D_271R_1_80_82_1

1309D_271R_1_80_82_2

THIN SECTION:	U1309D-271R-3, 52-54 cm	**Piece No.** 2	**Unit**: 722	**TS#: 645**	**OBSERVER: TN, EH, AH**
ROCK NAME:	Gabbronorite				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase		70		11	7			
Clinopyroxene	15	23		9	5			Complex interfingering clinopyroxenes
Orthopyroxene	3	7		5				Strongly replaced by talc

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Green amphibole	7						Clinopyroxene, vein	
Brown-green amphibole	5						Clinopyroxene	
Chlorite	1						Plagioclase, vein	
Talc	3						Pyroxene	
Magnetite	<1						Pyroxene	
Pyrrhotite	<1						Pyroxene	

TOTAL ALTERATION: 16%

STRUCTURE : No real preferred alignment of minerals, no magmatic foliation. Althought plagioclase crystals show bending of the lamellae, undulatory extinction and small amounts of recrystallization along the grain boundaries. Pyroxene crystals show a few kink bands but are heavily altered. Weak microcracking crosscuts the minerals.

PHOTOMICROGRAPHS:

1309D_271R_3_52_54_1

1309D_271R_3_52_54_2

THIN SECTION:	U1309D-272R-3, 10-13 cm	**Piece No.** 2A	**Unit**: 725	**TS#: 646**	**OBSERVER: TN, EH, AH**
ROCK NAME:	Disseminated oxide gabbronorite crosscut by diffuse oxide-rich dikelet				
GRAIN SIZE:	Medium				
TEXTURE:	Inequigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Disseminated oxide gabbro								
Plagioclase	54	55		4	2			
Clinopyroxene	25	35		4	2			Interfingering grains
Orthopyroxene	7	10		4	2			Some contain broad blebby clinopyroxene exsolution lamellae indicative of inverted pigeonite, others don't display exsolution lamellae at all
Oxide	1	1		3				Few oxides occur more than 10 mm away from dikelet
Diffuse oxide-rich dikelet (5-10mm wide)								Not at all clear where is dike and where is wall rock. Could be "only" oxide infiltration (hydrofracture?). Dikelet orientation subvertical, meandering, thickness changes.
Plagioclase	50	60						
Clinopyroxene	8	20						Strongly replaced by amphibole, some of which may be primary.
Oxide	15	20						Highly irregular, partly breaking preexisting wall rock plagioclase. Mainly granular ilmenite with exsolution lamellae, discrete porous (preparation or alteration) magnetite?
Apatite	0.1	0.1						Few interstitital grains
								No zircon, no titanite

COMMENTS

Textural disequilibrium. Looks like an unfinished reaction product

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Green amphibole	15						Clinopyroxene, vein	
Talc	3						Orthopyroxene	Crack filling
Chlorite	2						Plagioclase	Crack filling

TOTAL ALTERATION: 20%

STRUCTURE : Weak plastic strain exhibited localized from the oxide rich band. Plagioclase exhibits a very clear alignment, undulatory extinction and recrystallization along the grain boundaries. The pyroxene grains also show deformation as they have kink bands and undulatory extinction. Weak microcracking crosscuts the oxide zone.

PHOTOMICROGRAPHS:

1309D_272R_3_10_13_1

1309D_272R_3_10_13_2

THIN SECTION:	U1309D-274R-2, 71-73 cm	**Piece No.** 5B	**Unit**: 726	**TS#: 647**	**OBSERVER:EH, TN, AH**
ROCK NAME:	Gabbronorite				
GRAIN SIZE:	Coarse				
TEXTURE:	Granular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	68	70	0.5	12				Almost bimodal size distribution: either coarse or fine polygonally recrystallized
Clinopyroxene	5	14		7	5			
Orthopyroxene	3	16		13				Two very coarse grains, few interstitial
Oxide	0.5	0.5		3				One interstitial grain

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Green amphibole	15						Pyroxene, plagioclase	Pseudomorph, overgrowth, or crack filling
Brown amphibole	<1						Clinopyroxene	
Talc	5						Orthopyroxene	Pseudomorph or crack filling
Chlorite	5						Clinopyroxene, plagioclase	Pseudomorph, along cleavage, or crack filling

TOTAL ALTERATION: 25%

STRUCTURE : No magmatic strain as no strong preferred orientation of minerals. Plagioclase do exhibit weak plastic strain as they show undulatory extinction, bending of the lamallae and small zones of recrystallization along some grain boundaries. Pyroxene crystals do not show any indication of plastic strain but are virtually completly altered. Microcracking is persistent throughout the minerals.

PHOTOMICROGRAPHS:

1309D_274R_2_71_73_1

1309D_274R_2_71_73_2

THIN SECTION:	U1309D-275R-3, 16-19 cm	**Piece No.** 1B	**Unit**: 726	**TS#: 648**			**OBSERVER: TN, DB, AH**	
ROCK NAME:	Orthopyroxene-bearing leucocratic gabbro (Anorthosite)							
GRAIN SIZE:	Coarse							
TEXTURE:	Granular							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**			**Composition**	**MORPHOLOGY**	**COMMENTS**
			min.	**max.**	**av.**			
Plagioclase		91		18	12		Subhedral	
Clinopyroxene		5			5		Anhedral	Contains relics of resorbed clinopyroxene
Orthopyroxene		1			4		Anhedral	One large grain
Amphibole	??	3			3		Anhedral	Completely replaced by green amphibole aggregate
Apatite		0.1			0.8		Interstitial	Possibly a thin veinlet of oxide gabbro
Oxide		0.1			0.8		Interstitial	

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron)**				**REPLACING / FILLING**	**COMMENTS**
			min.	**max.**	**av.**			
Talc	10						Orthopyroxene	Pseudomorph or crack filling
Green amphibole	10						Pyroxene, plagioclase, interstitial	Overgrowth, pseudomorph, crack filling, or interstitial aggregate
Chlorite	10						Clinopyroxene, plagioclase	Crack filling or near contact with orthopyroxene
Zeolite?	<1						Interstitial	Interstices of green amphibole aggregate

TOTAL ALTERATION: 30%

STRUCTURE : Very coarse grains showing no preferred alignment and no magmatic foliation. Plagioclase crystals exhibit bent lamellae and undulatory extinction but no recrystallization. A couple of fairly wide infilled veins crosscut the minerals and cause alteration.

PHOTOMICROGRAPHS:

1309D_275R_3_16_19_1

1309D_275R_3_16_19_2

THIN SECTION:	U1309D-276R-3, 23-26 cm	**Piece No.** 1A	**Unit**: 732	**TS#: 649**	**OBSERVER: AD, DB, AH**
ROCK NAME:	Gabbronorite				
GRAIN SIZE:	Medium				
TEXTURE:	Subequigranular				

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Plagioclase		65			2.5		Anhedral	
Clinopyroxene		25			2		Anhedral	
Orthopyroxene		9			1.5		Anhedral	
Oxide		1			0.4		Anhedral	

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Green-brown amphibole	20							
Green amphibole	20							
Prehnite	1							
Secondary plagioclase	7							
Ilmenite	1							
Pyrrhotite	<1							
Chaclopyrite	<1							

TOTAL ALTERATION: 48 %

STRUCTURE : Minerals exhibit a random texture, so no magmatic foliation, but plagioclase grains are showing undulatory extinction, lobate grain boundaries and small amounts of recrystallization. A few small cracks crosscut the mineral grains.

PHOTOMICROGRAPHS:

1309D_276R_3_23_26_1

1309D_276R_3_23_26_2

THIN SECTION:	U1309D-277R-2, 69-71 cm	**Piece No.** 2	**Unit**: 734	**TS#: 650**	**OBSERVER: AD, DB, AH**
ROCK NAME:	Gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Poikilophitic				

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Plagioclase		55			3		Anhedral	
Clinopyroxene		45			4		Oikocrystal, interstitial, anhedral	Plagioclase chadacrysts partially enclosed in oikocrystal clinopyroxene grains.

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Green-brown amphibole	20						Pyroxene	Replacing the pyroxene and likely associated with talc
Green amphibole (actinolit	3						Pyroxene	As rim around the pyroxene and thin veinlets cutting the plagioclase grains
Talc ??							Pyroxene	Intergrowth with the amphibole replacing the pyroxene
Chlorite	4						Plagioclase	
Prehnite	1						Plagioclase	
Secondary plagioclase	5							
Ilmenite	<1							
Vein 1								
Chlorite								Veinlets of chlorite cutting the pyroxene and plagioclase
Vein 2								
Chlorite								
Amphibole								
Hydrogarnet ??								

TOTAL ALTERATION: 40 %

STRUCTURE : Grains show no magmatic foliation and have a random texture. Some plagioclase grains exhibit small amounts of recrystallization but most show undulatory extinction. Pyroxene grains show kink boundaries. Vein network crosscuts throught the minerals and in places follow along the cleavage planes of pyroxene minerals even if that means that the vein takes a right angle turn.

PHOTOMICROGRAPHS:

1309D_277R_2_69_71_1
1309D_277R_2_69_71_2
1309D_277R_2_69_71_3
1309D_277R_2_69_71_4

THIN SECTION:	U1309D-277R-2, 96-98 cm	**Piece No.** 4A	**Unit**: 734	**TS#: 651**	**OBSERVER: AD, EH, KM**
ROCK NAME:	Disseminated oxide olivine gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	64	65		7	5			
Clinopyroxene	26	28		10	6			Highly irregular oikocrysts, two-pyroxene interfingering
Ti-oxide	1	1			1			At olivine grain boundaries
Olivine	5	6		8				Very tilted, effectively one coarse grain
Orthopyroxene		0.5						

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Serpentine	1						Olivine	Associated with talc and replacing olivine
Talc	3						Olivine	Partial to complete replacement of the olivines
Tremolite	<1						Olivine	
Chlorite	1						Plagioclase	Rim between talc after olivine and plagioclase
Prehnite	<1						Plagioclase	
Green-brown amphibole	2						Pyroxene	
Brown amphibole	<1						Pyroxene	Into the pyroxene grains
Ilmenite	<1							
Pyrrhotite	<1							
Chalcopyrite	<1							

TOTAL ALTERATION: 10%

STRUCTURE : Igneous textures with some evidence of plastic strain. Plagioclase grains commonly show moderate undulatory extinction with neoblast grains along their grain boundaries. Also deformation twinning in coarse plagioclase grains are common. Minor microcracks distributed weakly. (KM)

PHOTOMICROGRAPHS:

1309D_277R_2_96_98_1

1309D_277R_2_96_98_2

THIN SECTION:	U1309D-277R-3, 2-4 cm	**Piece No.** 1	**Unit**: 734	**TS#: 652**	**OBSERVER: PF, EH, YO, KM**
ROCK NAME:	Gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Equigranular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase	55	65			7		Anhedral	
Clinopyroxene	25	35			7		Anhedral	Interfingering clinopyroxenes, harristic?
Ti-oxide		0.2		0.5			Interstitial	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Chlorite	10						Plagioclase/vein	
Green amphibole	8						Pyroxene	Also actinolite occurs as needles across both chlorite and talc/tremolite in coronitic patches (around pseudomoprphed olivine?).
Titanite	<<1						Vein	
Brown amphibole	<<1						Pyroxene	
Talc	4						Olivine?	Appears in patches with tremolite and is usually rimmed by chlorite (may be pseudomorph after olivine?)
Prehnite	<1						Plagioclase/vein	

TOTAL ALTERATION: 23%

STRUCTURE : Igneous texture with intense alteration zone associated with cataclasis. Brittle strain is localized along altered phyllosilicates, some of which show alignment subparallel to veins. Open fracture networks with alteration mineral infilling. (KM)

PHOTOMICROGRAPHS:

1309D_277R_3_2_4_1
1309D_277R_3_2_4_2
1309D_277R_3_2_4_3
1309D_277R_3_2_4_4
1309D_277R_3_2_4_5
1309D_277R_3_2_4_6
1309D_277R_3_2_4_7
1309D_277R_3_2_4_8

THIN SECTION:	U1309D-277R-3, 68-72 cm	**Piece No.** 5	**Unit**: 734	**TS#: 653**				**OBSERVER: AD, EH, KM**	
ROCK NAME:	Orthopyroxene-bearing disseminated oxide olivine gabbro								
GRAIN SIZE:	Medium								
TEXTURE:	Seriate								

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**			**Composition**	**MORPHOLOGY**	**COMMENTS**
			min.	**max.**	**av.**			
Plagioclase		65		7	4			Tabular
Clinopyroxene		27		9	4		Interstitial to oikocrystic	
Olivine		6		5	3			
Ti-oxide		1						
Orthopyroxene		1						

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron)**				**REPLACING / FILLING**	**COMMENTS**
			min.	**max.**	**av.**			
Tremolite	2						Olivine	Forming coronas around the olivine
Talc	3						Olivine	Partial to complete replacement of olivine
Serpentine	1						Olivine	Green serpentine
Prehnite	6						Plagioclase	Replacement of the plagioclase close to the vein
Chlorite	2						Plagioclase	
Green-brown amphibole	1						Pyroxene	
Magnetite	1							
Pyrrhotite	1							
Vein 1								
Chlorite								
Vein 2								
Prehnite								
Zeolite								
Brown fibrous mineral								composition: Si Ca Al

TOTAL ALTERATION: 15%

STRUCTURE : Igneous texture with locally intense alteration. Brittle deformation occurs associated with alteration. Plagioclase grains show deformation twinnning with undulatory extinction. (KM)

PHOTOMICROGRAPHS:

1309D_277R_3_68_72_1
1309D_277R_3_68_72_2
1309D_277R_3_68_72_3
1309D_277R_3_68_72_4
1309D_277R_3_68_72_5
1309D_277R_3_68_72_6

THIN SECTION:	U1309D-278R-3, 2-5 cm	**Piece No.** 1	**Unit**: 738	**TS#: 654**	**OBSERVER: NA, AD, KM**
ROCK NAME:	Olivine-bearing gabbro with diabase dikelet				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT PRIMARY	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase		47	0.1	10	6		Anhedral	
Clinopyroxene		50	0.1	8	5		Anhedral	Strongly altered toward the diabase contact.
Olivine		3	0.1	5	2		Anhedral	

COMMENTS

Small diabase dikelet at the edge.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Serpentine	2							
Talc	2							
Green-brown amphibole	25							
Green amphibole	10							
Brown amphibole	3							
Prehnite	7							
Chlorite	2							
Brown fibrous mineral ??	1							Rosette-shaped and undulating extinction
Pyrrhotite								

TOTAL ALTERATION: 52 %

STRUCTURE : Igneous texture with intense alteration. No deformation structure but intense microcracks associated with alteration. (KM)

PHOTOMICROGRAPHS:

1309D_278R_3_2_5_1
1309D_278R_3_2_5_2
1309D_278R_3_2_5_4
1309D_278R_3_2_5_5
1309D_278R_3_2_5_6
1309D_278R_3_2_5_7
1309D_278R_3_2_5_8
1309D_278R_3_2_5_9
1309D_278R_3_2_5_10
1309D_278R_3_2_5_11

THIN SECTION:	U1309D-279R-2, 14-16 cm	**Piece No.** 1A	**Unit**: 739	**TS#: 655**				**OBSERVER: AD, EH, KM**	
ROCK NAME:	Orthopyroxene-bearing disseminated oxide olivine gabbro								
GRAIN SIZE:	Medium								
TEXTURE:	Seriate								

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**			**Composition**	**MORPHOLOGY**	**COMMENTS**
			min.	**max.**	**av.**			
Olivine		19		5	2			Abundant exsolution rods
Plagioclase		60		6	3			
Clinopyroxene		19		6	2			
Orthopyroxene		1		2				
Sulfide		0.2						
Ti-oxide?		1					Interstitial	At olivine-plagioclase grain boundaries, not in disequilibrium with spinel

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron)**				**REPLACING / FILLING**	**COMMENTS**
			min.	**max.**	**av.**			
Serpentine	1						Olivine	Associated with talc
Talc	3						Olivine	Partial to complete replacement of the olivine by talc
Tremolite	1						Olivine	Thin rims around the olivine
Actinolite	1						Pyroxene	Thin rims around the pyroxene and thin veinlets cutting the plagioclase
Green-brown amphibole	1						Pyroxene	
Chlorite	2						Plagioclase	At contact with altered olivine and plagioclase
Prehnite	1						Plagioclase	
Magnetite	1							Around the altered olivines
Pyrrhotite	<1							
Chalcopyrite	<1							

TOTAL ALTERATION: 10%

STRUCTURE : Igneous texture with a minor evidence of plastic strain such as undulatory extinction and deformation twinning in plagioclase. Minor microcracks slightly distributed. (KM)

PHOTOMICROGRAPHS:

1309D_279R_2_14_16_1

1309D_279R_2_14_16_2

THIN SECTION:	U1309D-279-2, 113-115 cm	**Piece No.** 7	**Unit**: 741	**TS#: 656**				**OBSERVER: AD, EH, KM**	
ROCK NAME:	Diffuse contact between orthopyroxene-bearing disseminated oxide gabbro and dunitic troctolite								
GRAIN SIZE:	Fine to coarse								
TEXTURE:	Variable								

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**Composition**	**MORPHOLOGY**	**COMMENTS**
Olivine gabbro (Dunitic troctolite)								
Plagioclase		45					All anhedral	
Clinopyroxene		15						
Olivine		39						
Cr-spinel		1						Abundant plagioclase and olivine-hosted grains, in places orbicular
COMMENTS								
Injection of evolved gabbro into dunitic troctolite suggested by the presence of Fe-rich ex-olivine.								
Orthopyroxene-bearing disseminated oxide gabbro								
Plagioclase		60						
Clinopyroxene		39						
Orthopyroxene		1						Few grains in transition zones between olivine and clinopyroxene-rich zone
Ti-oxide		1					Interstitial	
Sulfide		0.1						

SECONDARY MINERALOGY	**PERCENT**		**SIZE (micron) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Serpentine	2						Olivine	Green serpentine (possible Fe-rich ex-olivine)
Tremolite	2						Olivine/pyroxene	Thin rim of tremolite around the olivine
Talc	2						Olivine	Partial to complete replacement
Brown amphibole	<1						Pyroxene	Small crystals into the pyroxene grain
Actinolite	<1						Pyroxene	Thin rim of actinolite around the pyroxene and also thin veinlets
Prehnite	1						Plagioclase	
Chlorite	2						Plagioclase	Forming corona between tremolite after olivine and plagioclase
Magnetite	1							
Pyrrhotite	1							

TOTAL ALTERATION: 10%

STRUCTURE : Igneous textures with weak undulatory extinction. Minor oriented microcracks slightly distributed. (KM)

PHOTOMICROGRAPHS:

1309D_279R_2_113_115_1
1309D_279R_2_113_115_2
1309D_279R_2_113_115_3
1309D_279R_2_113_115_4
1309D_279R_2_113_115_5
1309D_279R_2_113_115_6
1309D_279R_2_113_115_7
1309D_279R_2_113_115_8
1309D_279R_2_113_115_9
1309D_279R_2_113_115_10

THIN SECTION:	U1309D-280R-1, 15-17 cm	**Piece No.** 1B	**Unit**: 743	**TS#: 657**	**OBSERVER: TN, DB, KM**
ROCK NAME:	Olivine bearing gabbronorite				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase		64			4		Anhedral	
Clinopyroxene		25			4		Oikocrystic, anhedral	Encloses plagioclase, in places abundant orthopyroxene exsolution
Orthopyroxene		7			4		Oikocrystic, anhedral	
Olivine		3			1		Anhedral	
Oxide		1			0.5		Anhedral, intertitial	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Actinolite/tremolite	2						Olivine, plagioclase, clinopyroxene	Corona, crack filling, overgrowth
Chlorite	1						Olivine, plagioclase	Corona, crack filling
Talc	2						Olivine	Pseudomorph
Serpentine	<1						Olivine	Crack filling
Brown amphibole	<1						Clinopyroxene	
Bowlingite?	<1						Olivine	Pseudomorph
Oxide	<1							
Sulfide	<1							

TOTAL ALTERATION: 5%

STRUCTURE : Igneous texture with some evidence of plastic strain. Plagioclase grains are weak to moderately bent with undulatory extinction and deformation twinning. Relatively coarse neoblast grains occur along serrated grain boundaries in plagioclase. Oriented microcracks distributed. (KM)

PHOTOMICROGRAPHS:

1309D_280R_1_15_17_1
1309D_280R_1_15_17_2
1309D_280R_1_15_17_3
1309D_280R_1_15_17_4
1309D_280R_1_15_17_5
1309D_280R_1_15_17_7
1309D_280R_1_15_17_8
1309D_280R_1_15_17_9
1309D_280R_1_15_17_10
1309D_280R_1_15_17_11
1309D_280R_1_15_17_12

THIN SECTION:	U1309D-281R-1, 6-9 cm	**Piece No.** 1D	**Unit**: 745	**TS#: 658**	**OBSERVER:NA, AD, KM**
ROCK NAME:	Gabbro with cataclastic vein				
GRAIN SIZE:	Coase				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase		60	0.1	15				
Clinopyroxene		40	0.1	16				
Oxide		Trace	<0.1	<0.1				

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Green amphibole	35						Pyroxene	
Green-brown amphibole	10						Pyroxene	Replacing the previous pyroxene associated with talc ?
Brown amphibole	2						Pyroxene	Small cystals in the pyroxene grain
Talc	4						Pyroxene	
Prehnite	10						Plagioclase	
Vein								
Green amphibole								Highly deformed
Plagioclase								Altered to prehnite
Pyroxene								Showing twinnings
Hydrogarnet ???								

TOTAL ALTERATION: 61 %

STRUCTURE : Coarse igneous texture with local cataclastic zone associated with alteration. Intense microcracks occur pervasively with alteration. (KM)

PHOTOMICROGRAPHS:

1309D_281R_1_6_9_1
1309D_281R_1_6_9_2
1309D_281R_1_6_9_3
1309D_281R_1_6_9_4
1309D_281R_1_6_9_5
1309D_281R_1_6_9_6
1309D_281R_1_6_9_7
1309D_281R_1_6_9_8

THIN SECTION:	U1309D-282R-3, 16-19 cm	**Piece No.** 3	**Unit**: 746	**TS#: 659**	**OBSERVER: TN, DB**
ROCK NAME:	Orthopyroxene-olivine-bearing gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Granular				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase		68	0.5	8			Anhedral	
Clinopyroxene		29	0.5	9			Anhedral, oikocrystic	
Orthopyroxene		2	3				Anhedral	
Olivine		1	2				Anhedral	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Green amphibole	15						Pyroxene, olivine, vein	
Brown amphibole	3						Clinopyroxene, vein	
Chlorite	2						Clinopyroxene, plagioclase, vein	Along cleavage of clinopyroxene
Talc	1						Orthopyroxene, olivine	
Albite	2						Plagioclase	Network
Carbonate	<1						Plagioclase	Vein or patch
Zeolite?	2						Vein	Intersticies of amphibole vein

TOTAL ALTERATION: 25%

STRUCTURE : Coarse grained, isotropic igneous texture. No crystal-plastic deformation except for a few tapered twins in plagioclase and a slight undulose extinction in one olivine grain. Microcracking of the plagioclase and pyroxenes near the vein. (BI)

PHOTOMICROGRAPHS:

1309D_282R_3_16_19_1
1309D_282R_3_16_19_2
1309D_282R_3_16_19_3
1309D_282R_3_16_19_4
1309D_282R_3_16_19_5
1309D_282R_3_16_19_6
1309D_282R_3_16_19_7
1309D_282R_3_16_19_8

THIN SECTION:	U1309D-283R-2, 60-63 cm	**Piece No.** 3A	**Unit**: 747	**TS#: 660**	**OBSERVER: TN, DB, KM**
ROCK NAME:	Olivine bearing gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase		65	0.5	6			Anhedral	
Clinopyroxene		31	0.5	6			Anhedral	
Olivine		4			1		Anhedral	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Green amphibole	30						Clinopyroxene, olivine, plagioclase	
Brown amphibole	<1						Clinopyroxene	
Talc	<1						Olivine	
Serpentine	<1						Olivine	
Albite	2						Plagioclase	Network
Prehnite	2						Plagioclase	Crack filling
Zeolite?	1						Vein	Intersticies of amphibole vein
Carbonate	<1						Vein	

TOTAL ALTERATION: 35%

STRUCTURE : Igneous textures locally overprinted by intense alteration. Some open cracks with altered mineral infilling. Brittle deformation locally occurs in the alteration zone. Minor cracks distributed. (KM)

PHOTOMICROGRAPHS:

1309D_283R_2_60_63_1
1309D_283R_2_60_63_2
1309D_283R_2_60_63_3
1309D_283R_2_60_63_4
1309D_283R_2_60_63_5
1309D_283R_2_60_63_6

THIN SECTION:	U1309D-284R-3, 66-69 cm	**Piece No.** 2B	**Unit**: 747	**TS#: 661**	**OBSERVER: TN, DB, KM**
ROCK NAME:	Orthopyroxene olivine bearing gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Poikilophitic				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase		70			3		Anhedral	
Clinopyroxene		26			4		Anhedral, oikophitic	Encloses plagioclase
Orthopyroxene		2	0.1	4			Anhedral, oikocrystic, film	As discrete grains and mantling olivine
Olivine		2			2		Anhedral	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Actinolite?	2						Clinopyroxene	Along cleavage and fracture
Talc	1						Olivine, orthopyroxene	
Brown amphibole	1						Clinopyroxene	
Chlorite	<1						Plagioclase	Crack filling

TOTAL ALTERATION: 4%

STRUCTURE : Igneous texture with a slight evidence of plastic strain. Plagioclase grains show weak undulatory extinction with local deformation twinning or bending. Pyroxene grains also show some bending. Minor cracking distributed. (KM)

PHOTOMICROGRAPHS:

1309D_284R_3_66_69_1
1309D_284R_3_66_69_2
1309D_284R_3_66_69_3
1309D_284R_3_66_69_4
1309D_284R_3_66_69_5
1309D_284R_3_66_69_6
1309D_284R_3_66_69_7
1309D_284R_3_66_69_8

THIN SECTION:	U1309D-286R-1, 14-16 cm	**Piece No.** 4	**Unit**: 750	**TS#: 662**
ROCK NAME:	Cataclatstic gabbro			**OBSERVER: TN, DB, KM**
GRAIN SIZE:	Variable			
TEXTURE:	Cataclastic			

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase								
Clinopyroxene								

COMMENTS

Modal content cannot be estimated

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Green amphibole	25						Clinopyroxene, vein	
Albite	10						Plagioclase	Network
Prehnite?	1						Plagioclase	Patch
Carbonate	1						Plagioclase	Patch
Unknown	3						Plagioclase	Tiny dusty materials

TOTAL ALTERATION: 40%

STRUCTURE : Inhomegeneous textures due to intense alteration associated with brittle deformation. (KM)

PHOTOMICROGRAPHS:

1309D_286R_1_14_16_1
1309D_286R_1_14_16_2
1309D_286R_1_14_16_3
1309D_286R_1_14_16_4
1309D_286R_1_14_16_5
1309D_286R_1_14_16_6

THIN SECTION:	U1309D-286R-3, 109-112 cm	**Piece No.** 10	**Unit**: 753	**TS#: 663**	**OBSERVER: TN, DB, KM**
ROCK NAME:	Olivine bearing gabbro				
GRAIN SIZE:	Medium				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagiolcase		65			3		Anhedral	
Clinopyroxene		33			2		Anhedral	
Olivine		2			1		Anhedral	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Green amphibole	30						Clinopyroxene, olivine, vein	
Talc	2						Olivine	
Albite	3						Plagioclase	Network
Unknown	2						Plagioclase	Tiny dusty materials
Zeolite?	3						Vein	Intersticies of amphibole vein

TOTAL ALTERATION: 40%

STRUCTURE : Igneous textures with weak cataclasis associated with veining. Weak undulatory extinction in plagioclase. Intensity of microfracturing increases toward the vein. (KM)

PHOTOMICROGRAPHS:

1309D_286R_3_109_112_1
1309D_286R_3_109_112_2
1309D_286R_3_109_112_3
1309D_286R_3_109_112_4
1309D_286R_3_109_112_5
1309D_286R_3_109_112_6
1309D_286R_3_109_112_7

THIN SECTION:	U1309D-287R-1, 42-44 cm	**Piece No.** 6	**Unit**: 754	**TS#: 664**	**OBSERVER: TN, NA, KM**
ROCK NAME:	Diabase				
GRAIN SIZE:	Fine				
TEXTURE:	Intersertal				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Groundmass								
Plagioclase		40					Euhedral to subhedral	
Clinopyroxene		50					Oikocrystal	
Olivine		8					Subhedral	
Magnetite (Oxide)		2					Subhedral	

COMMENTS: This diabase includes several aggregates of olivine, plagioclase and amphibole. Those aggregates are possibly xenoliths composed of coarse-grained (up to 15 mm) olivine gabbro and gabbro, possibly some amphibole gabbro. Xenolith size is as large as 18 mm.

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Brown-green amphibole	50						Clinopyroxene, vein	
Tremolite	1						Olivine (xenolith/xenocryst)	
Chlorite	5						Plagioclase (xenocryst), pyroxene?	Fringe of plagioclase near olivine, pseudomorphs of pyroxene?
Talc	1						Olivine (xenolith/xenocryst)	
Zeolite?	1						Vein	Intersticies of amphibole vein

TOTAL ALTERATION: 58%

STRUCTURE : Igneous texture. (KM)

PHOTOMICROGRAPHS:

1309D_287R_1_42_44_1

1309D_287R_1_42_44_2

THIN SECTION:	U1309D-288R-2, 69-72 cm	**Piece No.** 5	**Unit**: 758	**TS#: 665**	**OBSERVER: DB, KM, AD**
ROCK NAME:	Gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase		60	0.5	11			Anhedral	
Clinopyroxene		40	0.5	6			Anhedral	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Green amphibole	30						Pyroxene	Alteration of the pyroxene to green amphibole close to the vein
Brown amphibole	3						Pyroxene	
Prehnite	6						Plagioclase	
Talc	4						Pyroxene	Associated as intergrowths with the amphibole
Vein								
Green amphibole								

TOTAL ALTERATION: 43%

STRUCTURE : Igneous texture with a slight undulatory extinction. Minor fractures are pervasive with alteration. (KM)

PHOTOMICROGRAPHS:

1309D_288R_2_69_72_1
1309D_288R_2_69_72_2
1309D_288R_2_69_72_3
1309D_288R_2_69_72_4
1309D_288R_2_69_72_5
1309D_288R_2_69_72_6
1309D_288R_2_69_72_7
1309D_288R_2_69_72_8
1309D_288R_2_69_72_9
1309D_288R_2_69_72_10
1309D_288R_2_69_72_11
1309D_288R_2_69_72_12

THIN SECTION:	U1309D-289R-2, 6-9 cm	**Piece No.** 1A	**Unit**: 760	**TS#: 666**
ROCK NAME:	Olivine-bearing gabbronorite			**OBSERVER:NA, KM, AD**
GRAIN SIZE:	Medium to coarse			
TEXTURE:	Seriate			

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagiocase		61	0.1	12	3		Anhedral to subhedral	Weakly zoned.
Clinopyroxene		32	0.1	10	3		Anhedral	
Orthopyroxene		5	0.1	6	2		Anhedral	Large discrete grains, oikocrysts. Primary non reactive olivine orthopyroxene contact
Olivine		2	<0.1	2	0.5		Anhedral	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Serpentine	2						Olivine	
Talc	8						Olivine	
Prehnite	8						Plagioclase	Replacement of the plagioclase by chlorite or prehnite or zeolite close to the vein
Chlorite	3						Plagioclase	
Zeolite	1						Plagioclase	
Hydrogarnet	1						Plagioclase	Related to thin veinlets cutting the plagioclase
Green-brown amphibole	4						Pyroxene	
Brown amphibole	5						Pyroxene	
Bown fibrous mineral ?	1							Rosette-shaped with undulose extinction
Pyrrhotite	<1							
Pyrite	<1							
Vein								
Prehnnite								
Zeolite								
Chlorite								

TOTAL ALTERATION: 36%

STRUCTURE : Igneous textures with moderate cataclasis associated with veining. Intense fracturing occurs around the vein at top right corner. Fibrous minerals occur subparallel to the vein wall, which were subsequently weakly recrystallized. (KM)

PHOTOMICROGRAPHS:

1309D_289R_2_6_9_1
1309D_289R_2_6_9_2
1309D_289R_2_6_9_3
1309D_289R_2_6_9_4
1309D_289R_2_6_9_5
1309D_289R_2_6_9_6
1309D_289R_2_6_9_7
1309D_289R_2_6_9_8

THIN SECTION:	U1309D-290R-3, 51-54 cm	**Piece No.** 1C	**Unit**: 760	**TS#: 667**	**OBSERVER:NA, KM, TN**
ROCK NAME:	Gabbro				
GRAIN SIZE:	Medium to coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase		70	1	12	4			
Clinopyroxene?		30	2	8	4			Some altered grains replaced by amphibole. Possibly primary amphibole?
Olivine?		Trace						
Orthopyroxene		0.5					Anhedral	One discrete grain

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Tremolite/actinolite	5						Olivine, clinopyroxene	Coronitic rim of olivine, overgrowing or along cleavage of clinopyroxene
Chlorite	5						Plagioclase, olivine, clinopyroxene	Crack filling in plagioclase, along cleavage or pseudomorph after clinopyroxene, pseudomorph after olivine(?) near carbonate vein.
Talc	3						Olivine	Pseudomorph
Serpentine	5						Olivine	Pseudomorph (greenish)
Carbonate	2						Vein	

TOTAL ALTERATION: 20%

STRUCTURE : Igneous texture crosscut by a later minor fault zone. Weak undulatory extinction in most minerals. Alteration intensity increases toward the minor fault zone, where minerals were intensely fragmented and altered. Open cracks with calcite and chlorite infill occur in a thin zone of fault gouge. (KM)

PHOTOMICROGRAPHS:

1309D_290R_3_51_54_1
1309D_290R_3_51_54_2
1309D_290R_3_51_54_3
1309D_290R_3_51_54_4
1309D_290R_3_51_54_5
1309D_290R_3_51_54_6

THIN SECTION:	U1309D-291R-4, 125-128 cm	**Piece No.** 7	**Unit**: 763	**TS#: 668**	**OBSERVER:NA, TN, KM**
ROCK NAME:	Olivine gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase		60	<0.1	12	5		Subhedral to anhedral	
Clinopyroxene		25	<0.1	8	5		Anhedral	Two clinopyroxene intergrowth.
Olivine		15	<0.1	12	4		Anhedral to interstitial	
Orthopyroxene		<1	<0.1	<1	<0.1		Interstital	Lamellae and bleb in clinopyroxene and thin film in grain boundary

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Green amphibole	3						Clinopyroxene, olivine	Corona around olivine, along cleavage or fracture of clinopyroxene
Brown amphibole	<1						Clinopyroxene	
Talc	2						Olivine	Coronitic or pseudomorphic
Chlorite	1						Plagioclase	Coronitic or crack filling
Serpentine	1						Olivine	Crack filling

TOTAL ALTERATION: 7%

STRUCTURE : Igneous textures with minor evidence of plastic strain. Weak undulatory extinction in most minerals. Plagioclase grains are slightly bent with deformation twinning and also show serrated grain boundaries with a few neoblasts along them. Some olivine grains show kinking. Minor cracks distributed. (KM)

PHOTOMICROGRAPHS:

1309D_291R_4_125_128_1

1309D_291R_4_125_128_2

THIN SECTION:	U1309D-293R-1, 21-23 cm	**Piece No.** 2C	**Unit**: 765	**TS#: 669**	**OBSERVER: DB, KM, AD**
ROCK NAME:	Norite / olivine gabbronorite				
GRAIN SIZE:	Coarse / medium				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Gabbronorite								
Orthopyroxene		45	1	8			Anhedral	
Plagioclase		48	1	8			Anhedral	
Clinopyroxene		4			3		Anhedral	
Oxide		1			1		Anhedral	
Amphibole (?)		0.5					Anhedral	High temperature hydrous melting
Olivine		2			2		Anhedral	
Olivine gabbronorite								
Plagioclase		73			3		Anhedral	
Olivine		15			2		Anhedral	
Clinopyroxene		8			1		Anhedral	
Orthopyroxene		4			1		Anhedral	
Oxide		0.5					Anhedral	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Serpentine	3						Olivine	Green serpentine
Talc	9						Olivine/pyroxene	
Green amphibole	4						Pyroxene	
Brown amphibole	2						Pyroxene	
Chorite	1						Plagioclase	
Prehnite	1						Plagioclase	
Magnetite	<1							
Pyrrhotite	<1							
Pyrite	1							
Chalcopyrite	<1							
Vein								
Fibrous amphibole								
Chlorite								

TOTAL ALTERATION: 20%

STRUCTURE : Igneous textures with minor evidence of plastic strain. Weak undulatory extinction occurs in most minerals. Some olivine grains show kinking with undulatory extinction and locally subgrain boundaries. An open crack with typical crack-seal fibrous mineral infill. (KM)

PHOTOMICROGRAPHS:

1309D_293R_1_21_23_1
1309D_293R_1_21_23_2
1309D_293R_1_21_23_3
1309D_293R_1_21_23_4
1309D_293R_1_21_23_5
1309D_293R_1_21_23_6

THIN SECTION:	U1309D-294R-2, 41-43 cm	**Piece No.** 1E	**Unit**: 768	**TS#: 670**	**OBSERVER: DB, KM, AD**
ROCK NAME:	Olivine bearing gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase		60			6		Anhedral	
Clinopyroxene		39	1	8			Anhedral	
Olivine		1			3		Anhedral	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Serpentine	3						Olivine	Green serpentine
Tremolite	1						Olivine	Rim around the altered olivine
Talc	5						Olivine/pyroxene	Completely replacing olivine in some cases and associated with green-brown amphibole in the replacement of pyroxene
Green-brown amphibole	3						Pyroxene	
Brown amphibole	<1						Pyroxene	
Chlorite	2						Plagioclase	At contact between the altered olivine to talc and the plagioclase
Pyrrhotite	<1							
Chalcopyrite	<<1							
Vein								
Chlorite								
Tremolite								

TOTAL ALTERATION: 15%

STRUCTURE : Igneous textures with a weak evidence of plastic strain such as undulatory extinction. Minor cataclasis occurs along alteration zones. (KM)

PHOTOMICROGRAPHS:

1309D_294R_2_41_43_1
1309D_294R_2_41_43_2
1309D_294R_2_41_43_3
1309D_294R_2_41_43_4
1309D_294R_2_41_43_5
1309D_294R_2_41_43_6
1309D_294R_2_41_43_7

THIN SECTION:	U1309D-295R-2, 79-82 cm	**Piece No.** 3A	**Unit**: 770	**TS#: 671**	**OBSERVER:NA,KM, TN**
ROCK NAME:	Olivine gabbro				
GRAIN SIZE:	Coarse				
TEXTURE:	Seriate				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	Composition	MORPHOLOGY	COMMENTS
Plagioclase		73	0.1	14	4			
Clinopyroxene		20	0.1	11	5		Anhedral	
Olivine		6	0.1	7	4		Anhedral to interstital	
Orthopyroxene		<1	<0.1	<0.1	<0.1		Interstital	Surrounding clinopyroxene grain

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	max.	av.		REPLACING / FILLING	COMMENTS
Talc	1						Olivine	Pseudomorphic
Tremolite/actinolite	2						Olivine, clinopyroxene	At olivine-plagioclase contacts, along cleavage and cracks in clinopyroxene
Chlorite	<1						Plagioclase	Crack filling
Serpentine	2						Olivine, clinopyroxene	Crack filling
Brown amphibole	<1						Clinopyroxene	

TOTAL ALTERATION: 5%

STRUCTURE : Igneous textures with minor evidence of plastic strain such as weak undulatory extinction in most minerals. Some olivine grains show kinking and subgrain boundaries. (KM)

PHOTOMICROGRAPHS:

1309D_295R_2_79_82_1
1309D_295R_2_79_82_2
1309D_295R_2_79_82_3
1309D_295R_2_79_82_4

THIN SECTION:	U1309E 1R-CC 21-23 cm	Piece No. 1	Unit:	TS#:256	OBSERVER:MA, ESA
ROCK NAME:	Breccia				
GRAIN SIZE:					
TEXTURE:					

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	Composition	MORPHOLOGY	COMMENTS
Basalt clasts								
plagioclase	10	10					As microphenocrysts	
Matrix	90	90?					Matrix consists of needles of tremolite in chlorite.	
Pyroxene	0	?					There may have been augite crystals but they have been completely replaced by tremolite	

SECONDARY MINERALOGY	PERCENT		SIZE (micron) min.	SIZE (micron) max.	SIZE (micron) av.		REPLACING / FILLING	COMMENTS
Talc	18							
Tremolite/Actinolite	50							Alter the basaltic clasts.
Chlorite	30						Plagioclase and in veins	

TOTAL ALTERATION: 98%

STRUCTURE : Static alteration of basaltic unit is overprinted by a shear zone (on the side opposite the label) with a strong schistosity, subsequentlyoverprinted by shear bands with locally strong preferred orientations of tremoite/actinolite that crosscut both the shear zone and the statically altered groundmass.

PHOTOMICROGRAPHS:

1309E_1R_CC_21_23_1

1309E_1R_CC_21_23_2