(9) 176-735B-89R-2 (Piece 1, 4.0-8.0 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Leucocratic troctolitic gabbro
GRAIN SIZE: Medium-grained

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	16.0	1.6-5.2		anhedral
Plagioclase	76.7	1.0-7.0		subhedral to anhedral
Clinopyroxene	6.9	1.2-5.6		anhedral
Opaque Minerals	0.2	<0.3	sulfides > magnetite	
Amphibole	0.1			

Accessories: Magnetite and ilmenite rare, present as inclusions in primary plagioclase and olivine.

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	3	Talc 5%; Magnetite 5%; Amphibole 88%; Smectite 2%
Clinopyroxene	1	Actinolite 90%; Brown Amphibole 10%
Plagioclase	1	Actinolite 100%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
Large format thin section.
Structural description: Fabric intensity 1b.
Plagioclase: Some rare deformation twins, undulose extinction and weak zoning. Contains spinel inclusions, symplectite intergrowths, and isolated small augite crystals along plagioclase-plagioclase grain boundaries.
Olivine: Rare undulose extinction with no subgrain boundaries. Contains spinel inclusions. Rimmed by orthopyroxene and augite.
Augite: No deformation microstructures. Rimmed by amphibole.
Sulfides: Along grain boundaries, in stringers, and along cleavage traces. Pyrite, marcasite, and chalcopyrite present.
Mode = 2500 points.

(10) 176-735B-90R-1 (Piece 1C, 56.0-60.0 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Felsic Vein
GRAIN SIZE: n/a
TEXTURE: n/a

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	n/a	n/a		n/a
Plagioclase	n/a	n/a		n/a
Clinopyroxene	n/a	n/a		n/a
Opaque Minerals	n/a	n/a		n/a

Accessaries: Magnetite present as alteration product.

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS	COMMENTS
		Amphibole 5% Plagioclase 73% Diopside 15% Chlorite 1% Zeolite(?) 1% Carbonate 5%	

TOTAL ROCK ALTERATION: 100%

COMMENTS:
A felsic vein with abundant plagioclase and diopside.
Amphibole rims diopside whereas chlorite, carbonate, and zeolite occur in the matrix.
Vein boundary lies in upper left hand corner of thin section.
Pyroxene has strong oscillatory zoning.
Structural description: No fabric intensity.
Metamorphic assemblage, relatively undeformed. No lattice preferred orientation of fibrous phases.
Relict plagioclase shows deformation twins but little recrystallization.

(11) 176-735B-90R-1 (Piece 2, 121.0-126.0 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Leucocratic Troctolite
GRAIN SIZE: Medium to coarse - grained
TEXTURE: Intergranular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	20.2	1.0-10.0		anhedral
Plagioclase	77.8	3.2-12.8		anhedral
Clinopyroxene	1.6	0.5-8.4		anhedral
Opaque Minerals	0.3	0.2-0.6	50% magnetite/50% ilmenite	
Amphibole	0.1			

Accessories: Trace amounts of zircon and apatite present. Trace magnetite as tiny (< 100 µm) anhedral grains/aggregates in primary plagioclase. Sulfides include pyrite, pyrrhotite, and chalcopyrite in aggregates.

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	2	Talc 5%; Smectite 55%; Amphibole 40%
Clinopyroxene	1	Actinolite 100%
Plagioclase	<1	Actinolite 100%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
Large format thin section.
Structural description: Fabric intensity 1a.
Plagioclase: Deformation twins common, minor grain boundary migration but no recrystallization. Symplectite intergrowths with augite weak zoning.
Olivine: Large amoeboidal crystals with rare undulose extinction and rare subgrain boundaries, rimmed by orthopyroxene and augite. Some grains have inner rim of augite and outer rim of amphibole.
Ilmenite and sulfides associated with grain-boundary brown amphibole.
Augite: Poikilitic textures.
Mode = 2500 points.

(12) 176-735B-90R-3 (Piece 2C, 95.0-97.0 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Leucocratic troctolitic gabbro
GRAIN SIZE: Medium-grained
TEXTURE: Remnant intergranular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	15.6	0.6-3.8		
Plagioclase	71.8	2.4-9.2		
Clinopyroxene	12.6	2.0-4.0		
Orthopyroxene	Tr.			
Opaque Minerals	Tr.	<0.3		

Accessories: Trace pyrite (<200 µm) and pyrrhotite (<200 µm) occurs in alteration patches.

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	70	Talc 10%; Magnetite 2%; Amphibole 88%
Clinopyroxene	70	Amphibole 100%
Plagioclase	20	Amphibole 100%

TOTAL ROCK ALTERATION: 35%

COMMENTS:
Circular thin section from minicore.
Structural description: Fabric intensity 1a.
Plagioclase: Common microcracks and brittle shear bands. Deformation twins common, with minor grain boundary migration, no recrystallization, and weak zoning.
Olivine: Undulose extinction and subgrain boundaries. Coronas replace outer rims.
Augite: Rimmed by amphibole.
Orthopyroxene: Exsolution-free core rimmed by exsolution-rich rim suggesting that the initial crystal was orthopyroxene rimmed by pigeonite.
Mode = 1329 points.

(13) 176-735B-90R-4 (Piece 1B, 41.0-43.0 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Leucocratic troctolitic gabbro
GRAIN SIZE: Medium-grained
TEXTURE: Intergranular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	14.7	0.5-5.2		anhedral
Plagioclase	77.8	2.0-6.0		anhedral
Clinopyroxene	6.9	1.2-8.0		anhedral
Orthopyroxene	0.6	0.1-0.3		anhedral
Opaque Minerals		<0.2		

Accessories: Secondary sulfides (pyrrhotite, chalcopyrite, and pentlandite) associated with bladed, clear amphibole. Trace ilmenite. Rare spinel (<05 mm) as inclusions in plagioclase.

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS	COMMENTS
Olivine	45	Talc 20%; Magnetite 1%; Amphibole 79%	
Clinopyroxene	30	Amphibole 100%	
Plagioclase`	15	Amphibole 100%	Plagioclase is commonly cloudy.

TOTAL ROCK ALTERATION: 20%

COMMENTS:
There is a narrow vein in the upper left-hand corner of the thin section filled with 30% amphibole, 15% plagioclase, 50% diopside, and 5% oxide.
Structural description: Fabric intensity 1a.
Plagioclase: Deformation twins common, with minor grain boundary migration recrystallization and weak zoning.
Olivine: Undulose extinction with subgrain boundaries present. Spatially associated with primary augite crystals. Rimmed by augite, augite and amphibole, or alteration coronas.
Augite: Exhibits no plastic deformation. Weakly zoned. Outer rim altered to amphibole. Subophitic texture in one patch.
Orthopyroxene: Both original orthopyroxene and inverted pigeonite present.
Mode = 1700 points.

(14) 176-735B-90R-4 (Piece 4B, 112.0-116.0 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Troctolitic gabbro cut by Oxide Gabbronorite
GRAIN SIZE: Coarse porphyroclasts in medium-grained matrix
TEXTURE: Sheared

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	n/a	1.2-2.4		
Plagioclase	n/a	1.2-14.0		
Clinopyroxene	n/a	~4.4		
Opaque Minerals	n/a	<8.0		

Accessories: Magmatic globules of pyrite, pyrrhotite, and chalcopyrite are concentrated in oxides in the shear zones. Abundant zircon in oxide-rich zones.

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	50	Talc 20%; Amphibole 70%; Hematite 10%
Clinopyroxene	40	Amphibole 100%
Orthopyroxene	5	Amphibole 100%
Plagioclase	55	Secondary Feldspar 89%; Chlorite 1%; Amphibole 10%

TOTAL ROCK ALTERATION: 65%

COMMENTS:
The rock is strongly sheared and recrystallized and contains traces of oxide, titanite(?) and zircon, but no veins
Structural description: Fabric intensity 3 overprinted by 5.
Comments: Plagioclase is flattened and shows strong lattice preferred orientation in recrystallized matrix. The rock was later deformed cataclastically or in the semi-brittle regime. Some of the finest grained regions are cataclastic material. Ilmenite in the shear zone is recrystallized where silicate clasts are most abundant. Magnetite is concentrated in the portions of the shear zone without silicates and recrystallized ilmenite. Plagioclase is angular and has random lattice preferred orientation, in some places, “clasts” of recrystallized plagioclase are interior to the cataclasite. Olivine rimmed by orthopyroxene and talc; orthopyroxene is rimmed by talc. Some hydrothermal pyrite altered to magnetite or hematite.

(15) 176-735B-90R-6 (Piece 2, 4.0-7.0 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Altered Olivine Gabbro(?)
GRAIN SIZE: Coarse-grained
TEXTURE: Intergranular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	n/a	0.7-6.8		
Plagioclase	n/a	3.4-16.0		
Clinopyroxene	n/a			
Opaque Minerals	n/a	0.1-1.0		

Accessories: Trace ilmenite present along foliation. Trace pyrite (Py, _200 µm) and pyrrhotite (Po, _200 µm) aggregates coexist(Po/Py >1) and occur between plagioclase grain contacts or in big patches. Titanite, zircon, and apatite present.

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	20	Talc 2%; Magnetite 10%; Amphibole 84%, Smectite 2%; Hematite 2%
Clinopyroxene	50	Actinolite 80%; Oxide 20%
Plagioclase	20	Secondary Feldspar 97%; Chlorite 2%; Epidote <1%

TOTAL ROCK ALTERATION: 35%

COMMENTS:
Traces of secondary diopside. No veins present.
Structural description: Fabric intensity 2a. Sample has a late minor brittle overprint.
Plagioclase: Undulose extinction with deformation twins and subgrains locally present. Also minor grain boundary migration recrystallization. Smaller crystals are zoned. Contains inclusions of black spinel.
Olivine: No crystal plastic deformation and has amphibole alteration rims.
Augite: No crystal plastic deformation and has amphibole alteration rims.
Ilmenite exsolution rods in green amphibole.

(16) 176-735B-90R-8 (Piece 1A,13.0-15.0 cm)

OBSERVERS:Shipboard Party Leg 176

ROCK NAME: Leucocratic Troctolite/Leucocratic Troctolite
GRAIN SIZE: Medium-grained/Fine grained
TEXTURE: Intergranular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	23.5	1.2-6.0/0.4-1.6		amoeboidal
Plagioclase	76.2	2.4-7.0/0.8-3.2		anhedral
Clinopyroxene	Tr.	~3.4/---		
Amphibole	0.2			anhedral
Opaque Minerals		<0.2/<0.2		

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	4	Talc 10%; Amphibole 90%; Magnetite tr.
Clinopyroxene	100	Amphibole 100%
Plagioclase	7	Amphibole 100%

TOTAL ROCK ALTERATION: 6%

COMMENTS:
Contact between medium and fine-grained Troctolite. No veins present.
Structural description: Fabric intensity 1a.
Plagioclase: Common deformation twins and undulose extinction present.
Olivine: Common subgrain boundaries and possible recrystallization. Rimmed by augite, amphibole, or both.
Augite: No crystal plastic deformation. Pyroxene is late and rimmed by amphibole.
Grain boundary ilmenite with brown amphibole next to olivines.
Secondary sulfides are pyrite and marcasite. Some pyrrhotite and chalcopyrite along grain boundaries.
Mode = 1500 points.

(17) 176-735B-90R-8 (Piece 1A, 53.0-55.0 cm)

OBSERVERS:Shipboard Party Leg 176

ROCK NAME: Altered felsic Vein in Troctolite
GRAIN SIZE: Medium-grained
TEXTURE: n/a

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	approx. 50	0.8-6.0		amoeboidal
Plagioclase	approx. 50	2.0-7.2		anhedral
Clinopyroxene	Tr.	1.6-2.4		n/a
Opaque Minerals	<1 (mostly secondary)	<0.7	40% ilmenite/60% magnetite	

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS	COMMENTS
Olivine	12	Talc 10%; Magnetite 1%; Amphibole 84%; Hematite 5%	
Clinopyroxene	15	Amphibole 100%	
Plagioclase	20	Amphibole 100%	Most plagioclase is cloudy.

TOTAL ROCK ALTERATION: 15%

COMMENTS:
Troctolite cut by oxide-gabbro and then cut by felsic vein.
Felsic vein with cloudy feldspar (microcline and plagioclase) 78%, amphibole 12%, quartz 7%, oxide 2%, titanite 1% and traces of zircon. Patches of granophyric texture present, and some brown fibrous material in the vein associated with quartz. Feldspar in vein = 0.8-5.6 mm, opaque minerals <0.4 mm; vein chilled against country rock(?).
Structural description: Fabric intensity 1a.
Plagioclase: Common deformation twins and undulose extinction.
Olivine: Common subgrain boundaries and possible recrystallization. Rimmed by augite, amphibole, and chlorite with iddingsite along cracks.
Augite: No crystal plastic deformation and pyroxene is late.

(18) 176-735B-91R-1 (Piece 2A, 13.0-15.0 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Foliated Leucocratic Troctolitic Gabbro
GRAIN SIZE: Medium-grained
TEXTURE: Intergranular (recrystallized) to cataclastic

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	13.4	1.2-7.6		anhedral
Plagioclase	76.8	2.0-6.0		anhedral
Clinopyroxene	9.6	1.8-4.8		anhedral
Amphibole	0.2			anhedral
Opaque Minerals		<0.2	sulfides>chromite	

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	12	Talc 10%; Amphibole 85%; Hematite 5%
Clinopyroxene	15	Amphibole 100%
Plagioclase	8	Amphibole 70%; Secondary feldspar 30%

TOTAL ROCK ALTERATION: 9%

COMMENTS:
The rock is slightly sheared. Minor shears have plagioclase 90%, amphibole 5%, oxide 4% and smectite 1%.
Structural description: Fabric intensity 3>5.
Plagioclase: Flattened and shows strong lattice preferred orientation with local subgrain rotation recrystallization. Contains flattened and rounded spinel inclusions with hematite exsolution.
Olivine: Common subgrain boundaries and local recrystallization. Rimmed by augite and talc.
Augite: Exhibits undulose extinction and kinking. Rimmed by amphibole.
Ilmenite: Traces in partly deformed silicate grain boundaries. Traces of primary sulfide inclusions.
Sulfides: Scattered secondary pyrite, marcasite, and chalcopyrite.
Mode = 1700 points.

(19) 176-735B-91R-1 (Piece 3B, 105.0-107.0 cm)

OBSERVERS:Shipboard Party Leg 176

ROCK NAME: Troctolite
GRAIN SIZE: Medium-grained
TEXTURE: Cumulate

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	51.0	0.4-1.4		chadacrystic, subhedral
Plagioclase	44.9	2.0-4.6		poikilitic, anhedral
Clinopyroxene	3.7	1.6-4.8		anhedral
Opaque Minerals	0.3	<0.2	chromite	

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	5	Talc 10%; Amphibole 90%
Clinopyroxene	15	Amphibole 100%
Plagioclase	5	Amphibole 100%

TOTAL ROCK ALTERATION: 6%

COMMENTS:
Traces of sulfide and no veins.
Structural description: Fabric intensity 1b.
Plagioclase: Deformation twins and undulose extinction present. Contains inclusions of euhedral spinel with hematite exsolution.
Olivine: Polygonal boundaries in olivine clusters and some rare undulose extinction with no sub-grain boundaries.
Augite: No crystal plastic deformation. Pyroxene is late and exhibits ophitic to poikilitic texture.
Sulfides and ilmenite included in grain boundary amphibole.
Mode = 1500 points.

(20) 176-735B-91R-3 (Piece 1D, 92.0-95.0 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Oxidized Cataclasite.
GRAIN SIZE: Medium-grained.
TEXTURE: Brecciated.

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	n/a	0.8-2.4		
Plagioclase	n/a	1.2-4.0		
Clinopyroxene	n/a	1.2-1.6		
Opaque Minerals	n/a			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	100	Talc 10%; Amphibole 10%; Hematite 75%; Carbonate 5%
Clinopyroxene	10	Amphibole 100%
Plagioclase	5	Actinolite 100%

TOTAL ROCK ALTERATION: 40%

COMMENTS:
Highly granulated and recrystallized or brecciated. Some carbonate in the matrix. No veins.
Structural description: Sample is a cataclasite with fabric intensity 1>6.
Plagioclase: Angular fragments with power-law grain size distribution. Fragments show deformation twins and no recrystallization.
Olivine: Polygonal boundaries in olivine clusters with some rare undulose extinction and no subgrain boundaries.
Augite: No crystal plastic deformation and pyroxene is late.

(21) 176-735B-92R-1 (Piece 3A, 12.0-15.0 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Foliated and Metamorphosed Disseminated Oxide Gabbro
GRAIN SIZE: Medium to Coarse porphyroclasts in fine grained matrix
TEXTURE: Porphyroclastic

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	n/a	n/a		
Plagioclase	n/a	~ 1.6		
Clinopyroxene	n/a	4.0-10.0		
Opaque Minerals	n/a	<0.2	15% ilmenite/85% magnetite	

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	100	Talc 10%; Amphibole 75%; Hematite 15%, Carbonate <1%
Clinopyroxene	20	Diopside 20%; Actinolite 80%
Plagioclase	90	Secondary Feldspar 80%; Actinolite 20%
Ilmenite	30	Titanite

TOTAL ROCK ALTERATION: 92%

COMMENTS:
Highly sheared gneiss with porphyroclastic texture. One grain of zircon(?). A few hairline cracks filled with amphibole and titanite. Streaked out and disseminated ilmenite between plagioclase and augite neoblasts.
Structural description: Fabric intensity 4. Shear bands defined by amphibole overprinting recrystallized plagioclase display normal sense of shear.
Plagioclase: Completely recrystallized, with relatively strong lattice preferred orientation. Rare relict grains are strongly flattened.
Olivine: Trace amounts of unaltered olivine and contains magnetite inclusions.
Augite: Relict grains partially recrystallized and deformed.

(22) 176-735B-92R-1 (Piece 6B, 60.0-62.0 cm)

OBSERVERS: No thin section made

ROCK NAME:
GRAIN SIZE:
TEXTURE:

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine				
Plagioclase				
Clinopyroxene				
Opaque Minerals				

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS	COMMENTS

TOTAL ROCK ALTERATION:

COMMENTS:

(23) 176-735B-90R-7 (Piece 1B, 53.0-55.0 cm)

OBSERVERS:Shipboard Party Leg 176

ROCK NAME: Leucocratic Troctolite
GRAIN SIZE: Coarse-grained
TEXTURE: Intergranular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	17.1	2.0-4.8		anhedral, amoeboidal
Plagioclase	77.5	4.0-11.6		anhedral to subhedral
Clinopyroxene	4.9	3.2-8.0		anhedral, amoeboidal
Opaque Minerals	0.5	<0.8	ilmenite	

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	5	Talc 10%; Amphibole 90%
Clinopyroxene	3	Actinolite 100%
Plagioclase	5	Secondary feldspar 10%; Actinolite 90%

TOTAL ROCK ALTERATION: 5%

COMMENTS:
Very fresh rock with slight alteration and granulation along grain boundaries. No veins.
Structural description: Fabric intensity 1a>2.
Plagioclase: Grain boundary migration recrystallization, deformation twins, and undulose extinction present. Weak zoning and symplectite intergrowths of pyroxene also present.
Olivine: Large amoeboidal crystals with undulose extinction and common subgrains.
Augite: No crystal plastic deformation.
Mode = 1500 points.

(24) 176-735B-93R-2 (Piece 3, 91.0-93.0 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Foliated Olivine Gabbro
GRAIN SIZE: Medium-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	9.3	0.4-1.6		anhedral
Plagioclase	60.7	0.8-3.8		anhedral
Clinopyroxene	28.6	0.4-2.2		anhedral
Opaque Minerals	0.4	0.4-0.8		
Amphibole	1.0			anhedral
Accessories: zircon.				

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS	COMMENTS
Olivine	15	Talc 10%; Magnetite 3%; Amphibole 86%; Chlorite 1%	
Clinopyroxene	5	Actinolite 100%	Clinopyroxene rimmed with brown
Orthopyroxene	100	Hematite 100%	amphibole.
Plagioclase	2	Actinolite 100%	

TOTAL ROCK ALTERATION: 4%

COMMENTS:
No veins.
Structure Description: Fabric intensity 2b. Weak mineral alignment defined by elongate, anhedral (strain free) olivine crystals and pyroxene crystals.
Plagioclase: Deformation twins and undulose extinction present with minor polygonal grain boundaries and minor grain boundary migration.
Olivine: Weak subgrain development. Contains tiny spinel inclusions.
Augite: No crystal plastic deformation. Rimmed by brown amphibole with ilmenite and sulfide inclusions. Green amphibole with magnetite along cleavage traces.
Sulfides: Pyrite, pyrrhotite, and chalcopyrite intergrowths.
Mode = 1500 points.

(25) 176-735B-93R-3 (Piece 1E, 82.0-84.0 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: OPX-Bearing Gabbro
GRAIN SIZE: Medium-grained
TEXTURE: Granular to subophitic

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	0.1	1.0-4.4		anhedral
Plagioclase	64.0	2.0-7.4		anhedral-subhedral
Clinopyroxene	31.0	1.2-6.8		anhedral
Orthopyroxene	3.1	0.4-3.2		anhedral
Opaque Minerals	0.7	0.1-1.4		
Amphibole	0.6			anhedral
Other	0.4			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS	COMMENTS
Olivine	100	Talc 30%; Magnetite 10%; Amphibole 60%	Olivine rimmed with talc, amphibole, and magnetite.
Clinopyroxene	5	Brown Hornblende 10%; Actinolite 90%	
Orthopyroxene	100	Oxide 100%	
Plagioclase	2	Actinolite 100%	

TOTAL ROCK ALTERATION: 6%

COMMENTS:
One 0.5 mm crack filled with carbonate and minor smectite.
Structure Description: Fabric intensity 2a.
Plagioclase: Undulose extinction and deformation twins present, with local grain boundary migration recrystallization and some polygonal crystal boundaries.
Olivine: Altered to iddingsite.
Augite: No crystal plastic deformation and poikilitic in places.
Ilmenite: Rimmed by brown amphibole with inclusions of sulfides.
Sulfides: Altered to hematite? and chalcocite?
Mode = 1500 points.

(26) 176-735B-94R-1 (Piece 1B, 36.0-38.0 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Gabbro
GRAIN SIZE: Medium-grained
TEXTURE: Porphyroclastic-Mosaic

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	1.4	1.3-3.2		polygonal-recrystallized
Plagioclase	61.7	1.2-9.2		polygonal-recrystallized
Clinopyroxene	34.1	2.1-8.8		anhedral to subhedral
Opaque Minerals	0.7	0.3-1.8	85% ilmenite/15% magnetite	
Orthopyroxene	Tr.	1.4-4.0		anhedral
Amphibole	0.2			anhedral

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS	COMMENTS
Olivine	60	Talc 10%; Magnetite 2%; Amphibole 27%; Chlorite 1%; Smectite 60%	
Clinopyroxene Plagioclase	10 2	Diopside 65%; Brown Amphibole 5%; Actinolite 30%; Actinolite 100%	Brown amphibole and diopside after augite.

TOTAL ROCK ALTERATION: 6%

COMMENTS:
No veins.
Structure Description: Fabric intensity 2a
Plagioclase: Deformation twins, undulose extinction, and subgrain rotation recrystallization present, with polygonal boundaries.
Olivine : Subgrains, polygonal boundaries, and recrystallized grains.
Augite: Recrystallized relict grains.
Ilmenite-magnetite intergrowths have well developed oxidation exsolution.
Mode = 1500 points.

(27) 176-735B-94R-1 (Piece 1F, 81.0-85.0 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro / Disseminated Oxide Olivine Microgabbro
GRAIN SIZE: Coarse-grained/Medium-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	5.4 /11.2	3.0-5.7/0.2-1.2		anhedral
Plagioclase	56.1/62.7	1.3-9.2/0.3-2.6		polygonal/anhedral
Clinopyroxene	37.1/24.8	2.5-9.2/0.9-1.9		anhedral
Opaque Minerals	0.6 /1.1	0.6-2.2/0.1-0.3	ilmenite	
Amphibole	0.8 /0.2			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	50	Talc 10%; Magnetite 2%; Amphibole 63%; Smectite 10%; Hematite 15%
Clinopyroxene	8	Brown Amphibole 30%; Actinolite 70%
Plagioclase	2	Actinolite 100%

TOTAL ROCK ALTERATION: 7%

COMMENTS:
No veins.
Structural Description: Fabric intensity 2a.
Plagioclase: Deformation twins, undulose extinction, and some grain boundary migration evident, with subgrain rotation recrystallization**.**
Olivine: Altered to iddingsite, with no crystal plastic deformation. Has amphibole-oxide coronas.
Augite: No crystal plastic deformation.
Mode = 610/886 points.

(28) 176-735B-94R-2 (Piece 1A, 18.0-20.0 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Altered Disseminated Oxide Olivine Gabbro
GRAIN SIZE: Medium-grained
TEXTURE: Porphyroclastic to granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	n/a	1.1-3.8		
Plagioclase	n/a	2.0-11.0		polygonal
Clinopyroxene	n/a	0.8-4.5		anhedral
Opaque Minerals	n/a	0.1-0.7	ilmenite	

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS	COMMENTS
Olivine	100	Talc 20%; Magnetite 5%; Amphibole 60%; Smectite 10%; Hematite 5%	
Clinopyroxene	20	Brown Amphibole 10%; Actinolite 90%	Augite rimmed with brown
Orthopyroxene	100	Hematite 100%	amphibole.
Plagioclase	5	Actinolite 100%	

TOTAL ROCK ALTERATION: 17%

COMMENTS:
Two small veins filled mostly with diopside and feldspar with minor amphibole, titanite, carbonate, and smectite.
Structure Description: Fabric intensity 2a.
Plagioclase: Deformation twins, undulose extinction, and some grain boundary migration evident, with subgrain rotation recrystallization**.**
Olivine: Altered to iddingsite and rimmed with amphibole magnetite coronas.
Pyroxene: Abundant exsolution lamellae in some crystals.
Sulfides: Chalcopyrite altered to bornite; pyrite altered to hematite.
Ilmenite and magnetite oxidized.

(29) 176-735B-94R-3 (Piece 12, 119.0-121.0 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Medium-grained
TEXTURE: Intergranular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	6.1	0.4-3.2		anhedral to subhedral
Plagioclase	53.1	0.6-4.8		anhedral
Clinopyroxene	38.9	0.4-5.2		anhedral to subhedral
Orthopyroxene				
Opaque Minerals	0.2	<0.5		
Amphibole	0.7			anhedral

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	5	Talc 18%; Magnetite 2%; Amphibole 80%
Clinopyroxene	7	Brown Amphibole 10%; Actinolite 90%
Plagioclase	2	Amphibole 100%

TOTAL ROCK ALTERATION: 4%

COMMENTS:
A few cracks filled with green amphibole.
Structure Description: Fabric intensity 3.
Plagioclase: Deformation twins, undulose extinction, subgrains, and grain boundary migration.
Olivine: Subgrains and recrystallized with coronas of amphibole and magnetite.
Augite: Large relict grains with recrystallized neoblasts. Two types of augite crystals, large uniform crystals with very fine scale exsolution, and smaller recrystallized clusters with abundant coarse exsolution. Amphibole and ilmenite intergrowths along grain boundaries.
Sulfides: Magmatic pyrite-pyrrhotite-chalcopyrite along grain edges in amphibole. Locally dispersed around fibers of secondary amphibole.
Mode = 3000 points.

(30 Large section) 176-735B-94R-3 (Piece 4, 37.0-42.0 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: OPX-Bearing Gabbro
GRAIN SIZE: Coarse-grained to Pegmatitic
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	Tr.			
Plagioclase	63.1	10.0-22.8		polygonal-anhedral
Clinopyroxene	32.4	9.2-20.0		anhedral-poikilitic
Orthopyroxene	4.1	4.0-10.8		anhedral-chadocrystic
Opaque Minerals	0.3	0.4-1.2	95% ilmenite/5% magnetite	

Accessories: apatite, titanite.

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Plagioclase	17	Secondary Plagioclase 90%, Carbonate 5%, Actinolite 5%
Clinopyroxene	5	Actinolite 90%, Brown Amphibole 5%, Oxide 5%.
Orthopyroxene	75	Smectite 40%, Amphibole 30%, Hematite 30%.

TOTAL ROCK ALTERATION: 15%

COMMENTS:
Large format thin section.
Structure Description: Fabric intensity 3.
Plagioclase: Deformation twins, undulose extinction, subgrain rotation recrystallization; some weakly zoned crystals.
Augite: Altered with minor recrystallized neoblasts.
Secondary magnetite in amphibole after augite and orthopyroxene.
Trace of ilmenite along grain boundaries.
Mode = 2300 points.

(31) 176-735B-95R-1 (Piece 8, 123.0-125.0 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Medium to Coarse-grained
TEXTURE: Porphyroclastic to Mylonitic

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	7.1	1.0-4.5		porphyroclast
Plagioclase	65.8	1.2-4.4		porphyroclast
Clinopyroxene	24.9	2-0-10.0		porphyroclast
Opaque Minerals	0.1		ilmenite	
Amphibole	2.0			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	30	Talc 20%; Magnetite 5%; Amphibole 75%; Pyrite Trace
Clinopyroxene	30	Diopside 10%; Actinolite 90%; Pyrite Trace
Plagioclase	85	Secondary feldspar 100%

TOTAL ROCK ALTERATION: 65%

COMMENTS:
Rock is sheared and recrystallized. No veins.
Structure Description: Fabric intensity 4. S-C fabrics and asymmetric porphyroclasts indicate dextral (normal) shear.
Plagioclase: Contains deformation twins, undulose extinction, ribbons, moderate grain shape preferred orientation, and bimodal grain size.
Olivine: Elongated porphyroclasts with recrystallized tails and subgrain boundaries.
Augite: Elongated porphyroclasts with recrystallized tails, rimmed by brown amphibole. Well developed fine-scale exsolution of low-Ca pyroxene and opaque minerals.
Has traces of magmatic sulfides (pyrite and chalcopyrite) associated with ilmenite and amphibole in neoblastic plagioclase and augite bands.
Mode = 1500 points.

(32) 176-735B-95R-2 (Piece 1A, 20.0-25.0 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Coarse-grained / Medium-grained
TEXTURE: Porphyroclastic to Mylonitic

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	n/a	1.0-6.4 / 0.5-1.6		porphyroclast
Plagioclase	n/a	3.4-10.4 / 1.2-1.6		porphyroclast
Clinopyroxene	n/a	4.0-8.8 / 0.4-2.0		porphyroclast
Opaque Minerals	n/a	0.6-1.2 / <0.6	ilmenite	

SECONDARY MINERALOGY	PERCENT ALTERED	SECONDARY MINERALS
Olivine	12	Talc 10%; Magnetite 5%; Amphibole 75%; Smectite 10%
Clinopyroxene	15	Diopside 10%; Brown amphibole 10%; Actinolite 80%
Plagioclase	85	Secondary feldspar 95%; Actinolite 5%

TOTAL ROCK ALTERATION: 65%

COMMENTS:
Large format thin section. Contact between medium- and coarse-grained sheared olivine gabbro. Contact has ~2 mm wide ilmenite seam with globular sulfides (pyrite, pyrrhotite, and chalcopyrite) with some magnetite and brown amphibole. Minor amounts of ilmenite and sulfides occur in foliation parallel to the contact. A few hairline cracks contain amphibole.
Structure Description: Fabric intensity 4.
Plagioclase: Deformation twins, undulose extinction, ribbons, bimodal grain-size, moderate to strong grain-shape preferred orientation, and subgrain rotation with recrystallization.
Olivine: Finely recrystallized neoblasts with multiple subgrains.
Augite: Finely recrystallized neoblasts with bimodal grain size, and fine-scale exsolution.

(33) 176-735B-95R-2 (Piece 1D, 86.0-88.0 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Medium-grained/Fine Grained
TEXTURE: Granular to Mylonitic

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	8.6	0.8-2.8/0.4-1.2		porphyroclast
Plagioclase	59.2	2.8-6.8/0.5-1.6		porphyroclast
Clinopyroxene	29.4	1.2-5.2/0.1-0.4		subhedral porphyroclast
Opaque Minerals	0.3	0.1-0.5/0.1-0.4	ilmenite 90%/magnetite 10%	
Amphibole	2.4			intergranular

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	5	Talc 20%; Magnetite 5%; Amphibole 75%
Clinopyroxene	8	Diopside 10%; Brown amphibole 75%; Actinolite 15%
Plagioclase	75	Secondary feldspar 100%

TOTAL ROCK ALTERATION: 47%

COMMENTS:
No shearing. No veins. Fine-grained olivine gabbro with a narrow coarse-grained seam in the middle.
Structural Description: Fabric intensity 3.
Plagioclase: Granular and recrystallized with deformation twins, undulose extinction, and grain boundary migration.
Olivine: Subgrains present, partly recrystallized.
Augite: Relict grains show minor recrystallization. Some grains rimmed by orthopyroxene. Abundant exsolution lamellae of low Ca-pyroxene and small dark brown exsolution rods (chromite?).
Amphibole: Intergranular brown amphibole with intergrown ilmenite and sulfides.
Mode = 1500 points.

(34) 176-735B-95R-3 (Piece 1C, 24.0-29.0 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Leucocratic Troctolitic Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Intergranular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	16.2	2.8-5.6		anhedral pseudomorph
Plagioclase	68.4	1.8-8.0		
Clinopyroxene	14.4	2.4-10.0		
Orthopyroxene	0.1			
Opaque Minerals	0.3	0.1-10.0	ilmenite	
Amphibole	0.5			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	100	Talc 40%; Magnetite 5%; Amphibole 55%
Clinopyroxene	10	Actinolite 100%
Plagioclase	10	Secondary feldspar 90%; Actinolite 10%

TOTAL ROCK ALTERATION: 25%

COMMENTS:
A few 1 mm veins containing amphibole (30%), diopside (10%), and chlorite (60%).
Structure Description: Fabric intensity 2a. Cross-cut by minor late brittle deformation and by late amphibole veins. No igneous textures preserved.
Plagioclase: Granulated and recrystallized with undulose extinction, deformation twins, grain boundary migration, polygonal grains, and minor intracrystalline fracturing.
Olivine: Altered with fine-grained dendritic magnetite in cracks and around edges.
Augite: No crystal-plastic deformation. Abundant exsolution of low-Ca pyroxene. Rimmed by brown and green amphibole.
Ilmenite, partly altered to titanite, is associated with brown to green amphibole.
Mode = 1500 points.

(35) 176-735B-96R-1 (Piece 4, 23.0-25.0 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Fine Grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	7.4	0.2-0.7		anhedral
Plagioclase	61.0	0.2-1.5		anhedral
Clinopyroxene	29.4	0.2-1.4		subhedral to anhedral
Opaque Minerals	0.5	<.02	ilmenite	
Amphibole	1.7			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	5	Smectite 100%
Clinopyroxene	7	Brown amphibole 100%
Plagioclase	0	Very fresh

TOTAL ROCK ALTERATION: 2%

COMMENTS:
No veins.
Structure Description: Fabric intensity 1a >2. Fine-grained protolith, showing only minor deformation.
Plagioclase: Interlocking grain boundaries with deformation twins, subgrain development and minor recrystallization.
Olivine: Poorly developed subgrains with minor undulatory extinction.
Augite: Undeformed. Exsolution of low-Ca pyroxene and an opaque mineral.
Ilmenite and sulfides associated with brown amphibole along grain boundaries.
Mode = 1478 points.

(36) 176-735B-97R-1 (Piece 1A, 3.0-7.0 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: OPX-bearing Leucocratic Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Porphyroclastic

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	n/a	n/a		
Plagioclase	66.2	3.6-12.0		porphyroclast
Clinopyroxene	30.5	2.4-9.2		porphyroclast
Orthopyroxene(?)	1.1	1.8-4.0		porphyroclast
Opaque Minerals	0.5	0.3-1.7		
Amphibole	0.6			

Accessories: Zircon = 0.4%; Apatite = 0.3%; Titanite = Trace

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Clinopyroxene	50	Diopside 20%; Brown amphibole 10%; Actinolite 67%; Oxide 3%
Orthopyroxene	100	Amphibole 85%; Hematite 15%
Plagioclase	70	Secondary feldspar 85%; Epidote 3%; Chlorite 2%; Actinolite 10%

TOTAL ROCK ALTERATION: 63%

COMMENTS:
Large format thin section.
A few hairline cracks with amphibole (48%), diopside (20%), epidote (30%), and chlorite (2%).
Ilmenite altered to titanite.
Structure Description: Fabric intensity 4 (with strongly bimodal grain size -amphibolite mylonite). Reverse shear sense. No igneous textures preserved.
Plagioclase: Deformation twins, undulose extinction, minor subgrain rotation recrystallization, and a bimodal distribution with fine-grained neoblasts and moderate preferred orientation. Large plagioclase crystals are net veined with plagioclase of lower(?) anorthite content.
Augite: Local recrystallization. Fine scale exsolution of low-Ca pyroxene and opaque minerals.
Mode = 2500 points.

(37) 176-735B-97R-1 (Piece 2C, 120.0-125.0 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: OPX-bearing Oxide Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Porphyroclastic to Mylonitic

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	0.4	n/a		
Plagioclase	47.2	4.4-10.0		porphyroclast
Clinopyroxene	36.6	2.0-11.2		
Orthopyroxene	4.6			
Opaque Minerals	9.3	1.6-3.6	ilmenite 60%/magnetite 40%	
Amphibole	1.5			

Accessories: Apatite = Trace; Zircon = Trace; Titanite = Trace

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	10	Talc 10%; Magnetite 5%; Amphibole 85%
Clinopyroxene	60	Diopside 10%; Brown amphibole 8%; Actinolite 77%; Smectite 5%
Orthopyroxene	60	Amphibole 85%; Hematite 15%
Plagioclase	50	Secondary feldspar 85%; Epidote 5%; Actinolite 10%

TOTAL ROCK ALTERATION: 48%

COMMENTS:
Large format thin section.
Rock is strongly recrystallized. Ilmenite and magnetite occur in foliation bands, in some cases with brown amphibole, but no associated sulfides. Some hairline cracks with amphibole (50%), epidote (10%), oxide (20%), and smectite (20%).
Structure Description: Fabric intensity 3/4 >6, with reverse shear sense. Igneous textures not preserved.
Plagioclase: Deformation twins, undulose extinction, subgrain rotation recrystallization, polygonal neoblasts with strong preferred orientation, and a bimodal grain size distribution. Cut by late brittle microcracks.
Olivine: Local recrystallization into polygonal neoblasts.
Augite: Flattened, local recrystallization on tails of relict grains. Exsolution of low-Ca pyroxene.
Orthopyroxene: Contains symplectic intergrowths with oxides.
Mode = 2500 points.

(38) 176-735B-97R-3 (Piece 2C, 75.0-77.0 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Disseminated Oxide Gabbro
GRAIN SIZE: Medium-grained
TEXTURE: Mylonitic

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	3.0	n/a		recrystallized porphyroclast
Plagioclase	60.1	1.2-2.2		porphyroclast
Clinopyroxene	33.3	0.8-5.6		porphyroclast
Opaque Minerals	1.5	<0.2	ilmenite	
Amphibole	2.1			

Accessories: Sulfides = Trace; Apatite = Trace; Zircon = Trace; and Titanite = Trace

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	100	Serpentine and Magnetite.
Clinopyroxene	75	Diopside 15%; Brown amphibole 10%; Actinolite 75%
Plagioclase	95	Secondary feldspar 95%; Actinolite 5%

TOTAL ROCK ALTERATION: 85%

COMMENTS:
Rock is sheared and recrystallized. A few hairline cracks with amphibole.
Structure Description: Fabric intensity 4 (amphibolite mylonite). Sense of shear based on asymmetry is ambiguous. Igneous textures not preserved.
Plagioclase: Dynamically recrystallized with deformation twins, undulose extinction, subgrain rotation recrystallization, polygonal neoblasts with strong preferred orientation, and a bimodal grain size distribution.
Olivine: Locally recrystallized into polygonal neoblasts.
Augite: Flattened with localized recrystallization on the tails of relict grains. Rimmed by green amphibole. Abundant exsolution of low-Ca pyroxene.
Ilmenite: Distributed along planes of foliation and partly altered to titanite.
Sulfides: Pyrite, Pyrrhotite, and chalcopyrite associated with brown amphibole.
Mode = 1500 points.

(39) 176-735B-97R-4 (Piece 3A, 48.0-52.0 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Fine to Medium-grained
TEXTURE: Porphyroclastic

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	n/a	0.2-0.3		porphyroclast
Plagioclase	n/a	0.4-1.2		porphyroclast
Clinopyroxene	n/a	0.4-5.6		porphyroclast
Opaque Minerals	n/a	<0.1	ilmenite	

Accessories: Zircon and Apatite

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	100	Talc 10%; Magnetite 5%; Amphibole 85%
Clinopyroxene	50	Diopside 10%; Brown amphibole 10%; Actinolite 80%
Plagioclase	95	Secondary feldspar 95%; Actinolite 5%

TOTAL ROCK ALTERATION: 80%

COMMENTS:
Rock is strongly sheared and recrystallized . No veins.
Trace amounts of secondary carbonate, sulfides, and magnetite.
Structure Description: Fabric intensity 4 (retrograde amphibolite mylonite). Sense of shear based on asymmetry is dextral (normal) based on S-C fabrics and asymmetric porphyroclasts, although ambiguous.
Plagioclase: Deformation twins, undulose extinction, subgrain rotation recrystallization, polygonal neoblasts with strong preferred orientation, and a bimodal grain size distribution.
Olivine: Locally recrystallized into polygonal neoblasts.
Augite: Local recrystallization on tails of relict grains. Rimmed by brown amphibole.
Ilmenite: Distributed in foliation.
Sulfides: Rare primary sulfides associated with ilmenite.

(40) 176-735B-98R-1 (Piece 9, 82.0-84.0 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Disseminated Oxide Gabbro
GRAIN SIZE: Medium-grained.
TEXTURE: Porphyroclastic to Mylonitic

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	n/a	0.8-1.4		porphyroclast
Plagioclase	n/a	2.8-7.2		porphyroclast
Clinopyroxene	n/a	1.2-5.6		porphyroclast
Opaque Minerals	n/a	<0.2	ilmenite 85%/magnetite 15%	

Accessories: Zircon = Trace

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	100	Talc 5%; Magnetite 5%; Amphibole 85%; Chlorite 5%
Clinopyroxene	85	Diopside 5%; Brown amphibole 10%; Actinolite 85%
Plagioclase	75	Secondary feldspar 90%; Actinolite 10%

TOTAL ROCK ALTERATION: 85%

COMMENTS:
Rock is an ultramylonite with a cataclastic overprint. It is strongly recrystallized and contains oxides along foliation planes. One large zircon grain. No veins. Carbonate cemented breccia in places.
Structure Description: Fabric intensity 4 (retrograde amphibolite mylonite), with severe 6 overprint. Sense of shear based on asymmetry is normal, although ambiguous. Igneous textures not preserved.
Plagioclase: Deformation twins, undulose extinction, subgrain rotation recrystallization, polygonal neoblasts with strong preferred orientation, and a bimodal grain size distribution. Cut by numerous microfractures.
Olivine: Locally recrystallized into polygonal neoblasts.
Augite: Local recrystallization on tails of relict grains. Exsolution lamellae common.
Sulfides: Secondary pyrite and rare chalcopyrite.

(41) 176-735B-98R-1 (Piece 18, 138.0-142.0 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Oxide and Disseminated Oxide Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Mylonitic

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	n/a	n/a		
Plagioclase	n/a	4.0-7.0		porphyroclast
Clinopyroxene	n/a	3.6-12.0		porphyroclast
Opaque Minerals	n/a	0.2-1.6	ilmenite 45%/magnetite 55%	

Accessories: Titanite.

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Clinopyroxene	25	Diopside 10%; Hornblende 15%; Actinolite 75%
Plagioclase	60	Secondary Plagioclase 90%; Actinolite 10%

TOTAL ROCK ALTERATION: 60%

COMMENTS:
Section divided into two zones A (top -oxide gabbro) and B (bottom -disseminated oxide gabbro).
Structure Description: Fabric intensity 3, with semi-brittle overprint. No igneous textures preserved.
Plagioclase: Zone A contains undulose extinction, deformation twins, subgrain rotation recrystallization with included oxides, and minor grain boundary migration. Zone B contains undulose extinction, deformation twins, recrystallization, and intracrystalline microcracks.
Olivine: Subgrain boundaries in both zones, but no recrystallization.
Augite: Kinked and recrystallized in both zones A and B. Cracks in augite filled with amphibole, and crystals are rimmed with amphibole. Abundant exsolution.
Titanite: Abundant euhedral grains in ilmenite bands, elsewhere as rims around ilmenite.

(42) 176-735B-99R-3 (Piece 5, 78.0-80.0 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Intergranular to Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	6.4	1.4-3.6		amoeboidal
Plagioclase	63.7	3.2-10.8		subhedral to anhedral
Clinopyroxene	28.9	2.8-8.0		anhedral, interstitial
Opaque Minerals	0.3	<0.2	ilmenite 85%/magnetite 15%	
Amphibole	0.7			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	5	Talc 5%; Magnetite 5%; Amphibole 90%
Clinopyroxene	5	Diopside 2%; Hornblende 8%; Actinolite 90%
Plagioclase	2	Actinolite 100%

TOTAL ROCK ALTERATION: 3%

COMMENTS:
No veins.
Structure Description: Fabric intensity 1a.
Plagioclase: No recrystallization, but some undulose extinction, common deformation twins, and minor grain boundary migration. Myrmekite present.
Olivine: Subgrain boundaries, but no recrystallization. Rimmed by augite in some places and brown amphibole in others.
Augite: Complex exsolution, not deformed. Rimmed by brown amphibole.
Sulfides: Isolated pyrite, pyrrhotite, and chalcopyrite blebs in silicates. Some secondary pyrite associated with alteration.
Intergrowths of ilmenite, magnetite, brown amphibole, and sulfides adjacent to olivine.
Mode = 1500 points.

(43) 176-735B-99R-4 (Piece 6, 108.0-114.0 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Oxide Gabbro with Crosscutting Felsic Vein
GRAIN SIZE: Coarse-grained / Fine-grained
TEXTURE: Intergranular / Granophyric

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	n/a	n/a		
Plagioclase	n/a	4.4-10.8		euhedral to subhedral
Clinopyroxene	n/a	4.0-9.2		anhedral, intergranular
Opaque Minerals	n/a		ilmenite 75%/magnetite 25%	

Accessories: Titanite.

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Clinopyroxene	50	Hornblende 2%; Actinolite 98%
Plagioclase	5	Secondary plagioclase 100%

TOTAL ROCK ALTERATION: 9%

COMMENTS:
Contact between gabbro and felsic vein.
Felsic vein with plagioclase = 2.0-8.0 mm, micrographic intergrowths of quartz and k-feldspar, and zircon.
Crack containing amphibole.
Structure Description: Fabric intensity 1a.
Plagioclase: Zoned with only minor recrystallization.
Augite: Fine scale exsolution of low-Ca pyroxene and opaque minerals. Rimmed with brown amphibole.
Ilmenite and magnetite patch now altered to amphibole titanite and native copper.

(44) 176-735B-101R-1 (Piece 7B, 63.0-66.0 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Leucocratic Olivine Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Intergranular to Cataclastic

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	7.5	1.8-4.0		porphyroclast
Plagioclase	72.8	1.6-8.0		porphyroclast
Clinopyroxene	16.6	4.8-10.0		porphyroclast
Orthopyroxene	0.6	0.8-1.6		porphyroclast
Opaque Minerals	0.1	<0.1	ilmenite 30%/magnetite 70%	
Amphibole	2.4			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	15	Talc 2%; Magnetite 3%; Amphibole 90%; Smectite 5%
Clinopyroxene	8	Hornblende 2%; Actinolite 98%
Plagioclase	20	Secondary plagioclase 95%; Actinolite 5%

TOTAL ROCK ALTERATION: 17%

COMMENTS:
Foliated gabbro with small islands of unrecrystallized rock.
Structure Description: Fabric intensity 3, with localized zones of 4.
Hairline crack contains amphibole and titanite.
Plagioclase: Undulose extinction, deformation twins, and preserved high-temperature recrystallization, in places overprinted by fine-grained low-temperature recrystallization. Bimodal grain-size distribution.
Olivine: Subgrain boundaries developed.
Augite: Not deformed. Fine-scale exsolution.
Amphibole: Large primary brown amphibole.
Sulfides: Secondary pyrite and chalcopyrite associated with green amphibole and secondary magnetite.
Oxides: Traces of ilmenite along grain boundaries are somewhat disrupted by amphibole alteration. Elsewhere coarse ilmenite crystals are associated with well crystallized brown amphibole.
Mode = 1100 points.

(45) 176-735B-101R-3 (Piece 1D, 37.0-39.0 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Disseminated Oxide Olivine Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Intergranular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	18.5	1.6-8.4		anhedral
Plagioclase	54.9	6.4-9.6		porphyroclast
Clinopyroxene	25.4	6.0-17.2		anhedral, intergranular
Opaque Minerals	1.2	0.2-0.4	ilmenite 95%/magnetite 5%	

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	15	Talc 5%; Magnetite 2%; Amphibole 92%; Pyrite 1%
Clinopyroxene	7	Hornblende 2%; Actinolite 98%
Plagioclase	4	Secondary plagioclase 90%; Actinolite 10%

TOTAL ROCK ALTERATION: 7%

COMMENTS:
No veins.
Structure Description: Fabric intensity 2.
Plagioclase: Minor recrystallization with undulose extinction and deformation twins.
Olivine: A few subgrain boundaries. Contains curvilinear inclusion trails. Veins of magnetite and pyrite.
Augite: Not deformed. Fine scale exsolution.
Sulfides: Pyrite, pyrrhotite, and pentlandite, some partly altered to magnetite.
Relict ilmenite, sulfides, and brown amphibole along grain boundaries.
Mode = 1500 points.

(46) 176-735B-101R-4 (Piece 1B, 24.0-26.0 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Medium-grained
TEXTURE: Granular to intergranular.

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	8.4	0.4-1.8		anhedral to amoeboidal.
Plagioclase	54.4	1.8-6.0		anhedral to subhedral
Clinopyroxene	36.1	1.2-3.6		anhedral
Opaque Minerals	0.1	<0.2	sulfides	
Amphibole	0.9			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	5	Talc 10%; Magnetite 5%; Amphibole 85%
Clinopyroxene	3	Hornblende 80%; Actinolite 19%; Oxide 1%
Plagioclase	1	Actinolite 100%

TOTAL ROCK ALTERATION: 2%

COMMENTS:
No veins.
Structure Description: Fabric intensity 1a.
Plagioclase: Some elongate crystals enclosing augite. Minor undulose extinction and deformation twins.
Olivine: Some rounded, cumulus(?) grains. A few subgrain boundaries. Trace secondary magnetite in fractures and along grain boundaries.
Augite: Not deformed. Fine scale exsolution. Trace ilmenite with brown amphibole along cleavages and at grain boundaries.
Opaque minerals: Most opaque minerals are primary pyrite, pyrrhotite, chalcopyrite, and rare pentlandite associated with brown amphibole at grain edges.
Mode = 1400 points.

(47) 176-735B-102R-1 (Piece 3, 17.0-21.0 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Oxide Olivine Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Cataclastic

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	n/a	n/a		
Plagioclase	n/a	2.8-8.2		porphyroclastic
Clinopyroxene	n/a	1.6-20.0		subhedral to amoeboidal
Orthopyroxene(?)	n/a	0.2-1.4		
Opaque Minerals	n/a	1.2-7.6	ilmenite 40%/magnetite 60%	

Accessories: Apatite (abundant).

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Clinopyroxene	15	Diopside 5%; Brown Amphibole 15%; Actinolite 75%; Smectite 5%.
Orthopyroxene(?)	96	Smectite 50%; Hematite 50%.
Plagioclase	85	Secondary Plagioclase 95%; Actinolite 5%.

TOTAL ROCK ALTERATION: 50%

COMMENTS:
Structure Description: Fabric intensity 4 with local 5. The 4 consists of a mixture of recrystallized plagioclase and abundant oxide.
Plagioclase: Extensive recrystallization, with undulose extinction and deformation twins. Very fine symplectic intergrowths in some areas.
Augite: Recrystallized regions altered to amphibole. Amphibole appears to have deformed plastically, along with plagioclase and oxide. Fine scale exsolution.
Cataclastic deformation indicated by deformation bands in plagioclase.
Hairline crack contains amphibole and titanite.
A seam contains an oxide matrix supporting a fragmental silicate breccia. Largest fragments are elongate pieces with coarse porphyroclasts of plagioclase and augite with small neoblasts. Some oxides predate the cataclastic deformation.

(48) 176-735B-103R-1 (Piece 6A, 72-80 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Oxide Gabbronorite
GRAIN SIZE: Coarse-grained
TEXTURE: Poikilitic to Cataclastic

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	n/a	n/a		
Plagioclase	50.9	3.2-20.8		subhedral to porphyroclastic
Clinopyroxene	30.5	4.8-8.8		subhedral to anhedral
Orthopyroxene	5.6	5.0-3.4		subhedral
Opaque Minerals	10.1	0.8-3.4	ilmenite 25%/magnetite 75%	
Amphibole	0.4			
Apatite	2.5			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	2	Talc 1%; Amphibole 98%; Smectite 1%
Clinopyroxene	2	Hornblende 30%; Actinolite 70%
Plagioclase	0	

TOTAL ROCK ALTERATION: 1%

COMMENTS:
Large format thin section.
No veins.
Structure Description: Fabric intensity 3 with local 4. The local 4 consists of a mixture of recrystallized plagioclase and abundant oxide.
Plagioclase: Extensive recrystallization, with undulose extinction and deformation twins.
Olivine: Subgrain boundaries developed.
Augite: Locally recrystallized. Discrete cores with coarse exsolution surrounded by darker augite with fine grained exsolution.
Sulfides: Mostly pyrite, probably primary, but redistributed by deformation.
The oxides form a matrix that in places poikilitically encloses coarse subhedral crystals and elsewhere encloses a fine grained cataclastic breccia.
Mode = 1700 points.

(49) 176-735B-103R-2 (Piece 3E, 86-91 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Cumulate

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	7.4	1.2-6.8		subhedral to anhedral
Plagioclase	52.2	4.0-38.0		subhedral to anhedral
Clinopyroxene	39.9	3.2-9.6		subhedral to anhedral
Opaque Minerals	0.2	0.2-1.3	sulfides > ilmenite	
Amphibole	0.3			

Accessories: Apatite (Trace)

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	15	Talc 10%; Magnetite 5%; Amphibole 72%; Chlorite 3%; Smectite 10%
Clinopyroxene	2	Hornblende 50%; Actinolite 50%
Plagioclase	0	

TOTAL ROCK ALTERATION: 2%

COMMENTS:
Large format thin section.
No veins.
Structure Description: Fabric intensity 1a.
Plagioclase: Very minor undulose extinction and deformation twins, but no recrystallization or grain boundary migration. Weak zoning in smaller crystals.
Olivine: Rare subgrain boundaries. Fine exsolution of opaque needles. Rimmed with brown amphibole.
Augite: Undeformed. Two types of intergrown augite, a lighter crystal with coarse exsolution lamellae, and a darker crystal with fine exsolution.
Minor ilmenite, sulfide, brown amphibole intergrowths along grain boundaries and at grain intersections.
Sulfides: Relatively large (~1 mm) crystals of pyrite, pyrrhotite, chalcopyrite, and pentlandite.
Mode = 2000 points.

(50) 176-735B-103R-3 (Piece 2, 9-12 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Oxide Olivine Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Intergranular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	n/a	n/a		
Plagioclase	n/a	10.0-16.0		subhedral to anhedral
Clinopyroxene	n/a	n/a		anhedral to ophitic
Opaque Minerals	n/a	0.4-0.7	ilmenite	

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	100	Magnetite 5%; Smectite 60%; Oxide 5%; Calcite 30%
Clinopyroxene	20	Actinolite 100%
Plagioclase	3	Actinolite 100%

TOTAL ROCK ALTERATION: 28%

COMMENTS:
Large part (40%) of thin section plucked during preparation. This may effect the amount of alteration preserved in the slide.
Structure Description: Fabric intensity 1a. Retrograde assemblage appears undeformed.
Vein network containing carbonate (60%) and smectite (40%).
Plagioclase: Very minor undulose extinction and deformation twins, but no recrystallization or grain boundary migration.
Augite: Undeformed. Fine scale exsolution.
A few small patches of intergrown ilmenite and brown amphibole.
Secondary carbonate present.

(51) 176-735B-104R-2 (Piece 6B, 45-47 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Medium-grained
TEXTURE: Cataclastic

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	11.1	1.0-3.2		porphyroclastic
Plagioclase	64.9	2.4-10.8		porphyroclastic
Clinopyroxene	23.3	1.0-4.0		porphyroclastic
Opaque Minerals	0.3	0.2-1.4	ilmenite	anhedral
Amphibole	0.4			

ALTERATION	PERCENT	SECONDARY
Olivine	8	Talc 10%; Magnetite 5%; Amphibole 82%; Smectite 3%
Clinopyroxene	20	Diopside 15%; Hornblende 15%; Actinolite 70%
Plagioclase	60	Secondary Plagioclase 95%; Actinolite 5%

TOTAL ROCK ALTERATION: 44%

COMMENTS:
No veins.
Structure Description: Fabric intensity 3.
Plagioclase: Undulose extinction, deformation twins, and subgrain rotation recrystallization or grain boundary migration.
Olivine: Flattened and recrystallized with subgrain boundaries. Rimmed with amphibole.
Augite: Locally deformed and recrystallized. Fine scale exsolution in unrecrystallized areas.
Sulfides: Trace of grain boundary ilmenite, magnetite, and sulfides. Some secondary pyrite and chalcopyrite associated with alteration.
Mode = 1200 points.

(52) 176-735B-104R-3 (Piece 1A, 0-5 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Gabbro
GRAIN SIZE: Medium-grained
TEXTURE: Cataclastic

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine		1.2-2.4		porphyroclastic
Plagioclase		3.2-8.0		porphyroclastic
Clinopyroxene		2.6-8.0		porphyroclastic
Opaque Minerals		0.1-0.6	25% ilmenite / 75% magnetite	
Accessories: Zircon	(Tr.)			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	100	Talc 20%; Magnetite 15%; Amphibole 45%; Smectite 20%
Clinopyroxene	50	Diopside 15%; Hornblende 55%; Actinolite 30%
Plagioclase	0	

TOTAL ROCK ALTERATION: 60%

COMMENTS:
Large format thin section.
Irregular patches of brecciated material (65% plagioclase, 10% amphibole, 10% epidote, 5% clinopyroxene, 5% titanite, 5% smectite) surrounding clasts of host olivine gabbro.
Olivine Gabbro Clasts:
Structure Description: Fabric intensity 3.
Plagioclase: Undulose extinction, deformation twins, and subgrain rotation recrystallization or grain boundary migration. Smaller crystals are zoned. Grain size is larger in clasts than in the matrix.
Augite: Flattened and recrystallized. Some crystals have granular texture without exsolution, others have well developed exsolution lamellae.
Felsic Matrix:
Structure Description: Fabric intensity 3.
Plagioclase: Strong bimodal size distribution, with undulose extinction and deformation twins in the larger crystals. Recrystallized at low temperature.
Augite: Generally undeformed, but may have some semi-brittle deformation.

(53) 176-735B-105R-1 (Piece 9B, 78-81 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Medium-grained
TEXTURE: Cumulate to recrystallized.

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	7.1	0.6-1.6		subhedral to anhedral
Plagioclase	64.3	1.0-2.8		anhedral
Clinopyroxene	28.4	1.8-4.0		subhedral to anhedral
Opaque Minerals	0.1	<0.2	90% ilmenite / 10% magnetite	
Amphibole	0.2			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	30	Talc 30%; Magnetite 15%; Amphibole 55%
Clinopyroxene	10	Hornblende 10%; Actinolite 88%; Oxide 2%
Plagioclase	3	Actinolite 100%

TOTAL ROCK ALTERATION: 7%

COMMENTS:
No veins.
Structure Description: Fabric intensity 2-3;
Plagioclase: Minor recrystallization with undulose extinction, deformation twins, and grain boundary migration.
Olivine: Flattened and recrystallized.
Sulfides: Most are secondary pyrite and chalcopyrite dispersed along grain boundaries with secondary green-white amphibole.
Oxides: Trace of primary ilmenite and magnetite along silicate grain boundaries, generally associated with brown amphibole.
Augite: Flattened and recrystallized. Fine scale exsolution common.
Mode: 2930 points.

(54) 176-735B-105R-3 (Piece 7, 99-103 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Leucocratic Troctolitic Gabbro
GRAIN SIZE: Medium-grained
TEXTURE: Cumulate (partly recrystallized)

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	8.0	1.6-5.6		anhedral to poikilitic
Plagioclase	78.8	2.0-10.2		subhedral to anhedral
Clinopyroxene	12.9	2.4-5.0		anhedral to poikilitic
Opaque Minerals	0.3	<0.5	90% ilmenite / 10% magnetite	

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	20	Talc 30%; Magnetite 15%; Amphibole 55%
Clinopyroxene	40	Hornblende 5%; Actinolite 93%; Oxide 2%
Plagioclase	2	Actinolite 100%

TOTAL ROCK ALTERATION: 8%

COMMENTS:
Hairline cracks with amphibole.
Structure Description: Fabric intensity 2a.
Plagioclase: Minor recrystallization with undulose extinction and deformation twins.
Olivine: Some crystals with subgrain boundaries. Abundant exsolution(?) along 3 crystallographic directions.
Augite: No deformation. Fine scale exsolution common.
Sulfides: Some primary pyrite and chalcopyrite associated with ilmenite and brown amphibole along grain boundaries. Scattered secondary pyrite.
Mode = 1500 points.

(55) 176-735B-107R-1 (Piece 2B, 21-25 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Gabbro-Mylonite-Cataclasite
GRAIN SIZE: Coarse to fine-grained.
TEXTURE: Poikilitic-Mylonitic-Cataclastic

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine		1.0-6.0		poikilitic to cataclastic
Plagioclase		2.8-8.0		anhedral to cataclastic
Clinopyroxene		2.0-3.6		poikilitic to cataclastic
Opaque Minerals		<0.3	95% ilmenite / 5% magnetite	

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	10	Talc 10%; Magnetite 5%; Amphibole 75%; Smectite 10%
Clinopyroxene	5	Hornblende 50%; Actinolite 50%
Plagioclase	0	

TOTAL ROCK ALTERATION: 7% (ZONE 1)

COMMENTS:
ZONE 1: top of section:
Structure Description: Fabric intensity 1a.
Plagioclase: Undulose extinction, deformation twins, and minor grain boundary migration.
Olivine: Subgrains. Augite: No deformation microstructures. Fine scale exsolution.
Fairly large ilmenite-amphibole pods. Primary sulfides (pyrite, chalcopyrite, and pentlandite).
ZONE 2: middle of section: Mylonitic zone with 80% amphibole and 20% recrystallized plagioclase.
Structure Description: Fabric intensity 5.
Olivine: Flattened and recrystallized. Augite: Flattened and recrystallized.
Green amphibole with trace of finely disseminated ilmenite and rare secondary pyrite and chalcopyrite.
Boundary between ZONE 1 and 2 contains microcracks in the coarse plagioclase with a normal (dextral) shear sense.
ZONE 3: bottom of section:
Structure Description: Fabric intensity 5. Semi-brittle component, plastic deformation of retrograde amphibole.
Plagioclase: Strong bimodal distribution. Recrystallized with undulose extinction, deformation twins, and grain boundary migration.
Olivine: Flattened and recrystallized. Augite: Flattened and recrystallized.
Ilmenite strewn along foliation with many subgrains. Minor secondary pyrite and chalcopyrite along grain edges and disseminated.

(56) 176-735B-107R-3 (Piece 1A, 27-29 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Medium-grained
TEXTURE: Cataclastic

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine		1.0-2.0		pseudomorph
Plagioclase		2.0-4.8		porphyroclast
Clinopyroxene		1.6-6.0		pseudomorph-porphyroclast
Opaque Minerals		<0.3	ilmenite	

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	100	Talc 10%; Magnetite 5%; Amphibole 65%; Smectite 20%
Clinopyroxene	75	Hornblende 5%; Actinolite 95%
Plagioclase	35	Secondary plagioclase 100%

TOTAL ROCK ALTERATION: 65%

COMMENTS:
Structure Description: Fabric intensity 2. Semi-brittle, normal (sinistral) shear with plastic flow in amphibole-rich retrogressive shear zone.
Plagioclase: Pervasive recrystallization with undulose extinction and deformation twins.
Olivine: Subgrains.
Augite: Intracrystalline cracks.
One 0.5 mm ilmenite, magnetite, amphibole patch. Fine dendritic magnetite in altered olivine. Fine disseminated ilmenite.
Hairline crack with sodic plagioclase.

(57) 176-735B-108R-2 (Piece 2, 50-54 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Leucocratic Olivine Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Poikilitic

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	6.2	1.2-8.4		poikilitic
Plagioclase	73.6	3.2-15.4		subhedral to anhedral
Clinopyroxene	19.8	6.8-13.2		poikilitic
Orthopyroxene	0.2			
Opaque Minerals	0.2	<0.6	ilmenite	
Amphibole	Tr.			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	5	Talc 5%; Magnetite 5%; Amphibole 40%; Smectite 50%
Clinopyroxene	2	Hornblende 45%; Actinolite 50%; Oxide 5%
Plagioclase	1	Actinolite 100%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
Large format thin section. No veins.
Structure Description: Fabric intensity 2.
Plagioclase: Deformation twins, undulose extinction, minor subgrains, and minor and local recrystallization.
Olivine: Subgrains. Exsolution(?) parallel to 3 crystallographic directions.
Augite: Undeformed. Two types of augite: clear with coarse, bleby to planar exsolution, and very light tan with fine scale planar exsolution.
Trace of ilmenite, magnetite, brown amphibole, and sulfide along grain boundaries.
Mode = 2000 points.

(58) 176-735B-110R-2 (Piece 3B, 35-37 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Altered Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Pervasive Alteration and Brecciation.

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine		n/a		
Plagioclase		0.8-7.0		net veined to brecciated
Clinopyroxene		n/a		
Opaque Minerals		0.4-6.4	98% ilmenite / 2% magnetite	

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	100	Amphibole 80%; Chlorite 20%
Clinopyroxene	85	Smectite 100%
Plagioclase	50	Secondary Plagioclase 50%; Smectite 50%

TOTAL ROCK ALTERATION: 65%

COMMENTS:
Structure Description: Fabric intensity 5. Semi-brittle to cataclastic deformation.
Plagioclase: Pervasive undulose extinction, deformation twins,and abundant microcracks.
Hairline crack with 50% carbonate and 50% chlorite.
Fragments of ilmenite altering to titanite at rims.

(59) 176-735B-110R-2 (Piece 8C, 101-104 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Granular to Recrystallized

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine		4.0-5.0		pseudomorph
Plagioclase		2.8-7.0		anhedral
Clinopyroxene		4.0-6.4		anhedral to ophitic
Opaque Minerals		<0.6	95% ilmenite / 5% magnetite	

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	100	Talc 20%; Magnetite 15%; Amphibole 30%; Chlorite 35%
Clinopyroxene	30	Actinolite 100%
Orthopyroxene	5	Amphibole 100%
Plagioclase	3	Secondary plagioclase 90%; Actinolite 10%

TOTAL ROCK ALTERATION: 13%

COMMENTS:
Two discontinuous veins with 60% clinopyroxene, 25% plagioclase, 10% chlorite, and 5% euhedral titanite.
Structure Description: Fabric intensity 2, overprinted by a minor 6. Metamorphic assemblage is undeformed.
Plagioclase: Recrystallized with undulose extinction, deformation twins, and microcracks. Altered along net-veined microcracks to lower An(?) plagioclase.
Augite: No deformation microstructures. Fine scale exsolution.
Some primary ilmenite. Secondary dendritic magnetite with symplectitic texture in altered olivine.
Secondary pyrite in altered olivine.

(60) 176-735B-110R-4 (Piece 1, 0-3 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Medium-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine		0.8-2.8		anhedral to ophitic pseudomorphs
Plagioclase		1.2-4.0		anhedral
Clinopyroxene		2.4-8.0		anhedral to ophitic
Orthopyroxene		0.2-0.4		recrystallized rim(?)
Opaque Minerals		<0.2		

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	100	Talc 20%; Magnetite 5%; Amphibole 40%; Chlorite 5%; Smectite 30%
Clinopyroxene	12	Hornblende 7%; Actinolite 90%; Smectite 1%; Oxide 2%
Orthopyroxene	10	Amphibole 95%; Smectite 5%
Plagioclase	3	Secondary plagioclase 90%; Smectite 5%; Actinolite 5%

TOTAL ROCK ALTERATION: 20%

COMMENTS:
Contact between felsic vein and gabbro host rock.
15 mm wide vein contains 85% plagioclase, 5% clinopyroxene, 5% chlorite, 3% amphibole, 1% epidote, and 1% titanite. Plagioclase 4.8-6.4 mm in felsic vein.
Structure Description: Fabric intensity 2 overprinting 1a. Undeformed felsic matrix in vein.
Plagioclase: Extensively recrystallized, with undulose extinction, and deformation twins.
Augite: Kinks. Fine scale exsolution dominant; rare patches of clear augite with coarse exsolution. Rimmed with brown amphibole.
Ilmenite partly altered to titanite.
Sulfides: Trace secondary pyrite. One pyrrhotite-chalcopyrite globule in augite.

(61) 176-735B-110R-4 (Piece 2B, 54-56 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	7.1	1.0-6.0		anhedral to recrystallized
Plagioclase	64.6	2.2-13.6		anhedral
Clinopyroxene	27.6	2.4-10.4		subhedral to poikilitic
Opaque Minerals	0.1	<0.3	ilmenite	
Amphibole	0.4			
Accessories: Apatite	(0.1%)			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	4	Talc 10%; Magnetite 4%; Amphibole 66%; Chlorite 10%; Smectite 10%
Clinopyroxene	4	Hornblende 30%; Actinolite 70%
Plagioclase	0	

TOTAL ROCK ALTERATION: 1%

COMMENTS:
No veins.
Structure Description: Fabric intensity 2, overprinting 1b.
Plagioclase: Recrystallized with undulose extinction, deformation twins, and subgrains.
Olivine: Subgrains, recrystallized.
Augite: Minor subgrains. Predominantly fine scale exsolution; some patches of clear augite with coarse exsolution.
Minor amounts of ilmenite, sulfide (pyrrhotite, chalcopyrite), and amphibole along grain boundaries.
Abundant secondary pyrite.
Mode = 1550 points.

(62) 176-735B-111R-2 (Piece 3, 101-105 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	11.5	0.8-3.6		anhedral to ophitic
Plagioclase	62.7	2.4-10.0		subhedral to anhedral
Clinopyroxene	24.0	1.6-6.8		subhedral to ophitic
Orthopyroxene	Tr.	0.4-0.6		recrystallized rim(?)
Opaque Minerals	0.2	<0.6	ilmenite	
Amphibole	1.5			

Accessories: Titanite (abundant)

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	10	Magnetite 2%; Amphibole 98%
Clinopyroxene	2	Diopside 10%; Actinolite 90%
Plagioclase	2	Secondary Plagioclase 100%

TOTAL ROCK ALTERATION: 3%

COMMENTS:
Crack containing amphibole and zircon.
Structure Description: Fabric intensity 2. No shape fabric due to equant, recrystallized plagioclase.
Plagioclase: Recrystallized with undulose extinction, and deformation twins.
Olivine: Subgrains, recrystallized, rimmed with brown amphibole and talc(?).
Augite: No deformation. Fine scale exsolution. Rimmed with brown amphibole.
Ilmenite, sulfide (pyrite, pyrrhotite, chalcopyrite), and brown amphibole grain boundary intergrowths are common.
Trace secondary pyrite.
Mode = 1500 points.

(63) 176-735B-113R-1 (Piece 4B, 100-105 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Poikilitic

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	7.8	1.6-6.8		poikilitic
Plagioclase	56.1	2.4-9.0		subhedral to anhedral
Clinopyroxene	35.3	2.0-12.8		poikilitic
Opaque Minerals	0.3	0.1-1.0	ilmenite	
Amphibole	0.5			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	3	Talc 5%; Magnetite 1%; Amphibole 89%; Smectite 5%
Clinopyroxene	4	Hornblende 20%; Actinolite 78%; Smectite 2%
Plagioclase	1	Actinolite 100%

TOTAL ROCK ALTERATION: 2%

COMMENTS:
Large format thin section. No veins.
Structure Description: Fabric intensity 1a. There is a 2 overprint and more recrystallization where plagioclase is more abundant.
Plagioclase: Pervasive undulose extinction, and deformation twins with local recrystallization.
Olivine: Subgrains, locally recrystallized. Rimmed in places with amphibole and pyroxene.
Augite: No deformation. Abundant exsolution.
Sulfides: Primary pyrite, pyrrhotite, and chalcopyrite.
Oxides: Tiny amount of grain boundary ilmenite and magnetite. Fine secondary dendritic magnetite on rims of olivine.
Mode = 2500 points.

(64) 176-735B-114R-1 (Piece 6C, 92-96 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: OPX-Bearing Oxide Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Cumulate to Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	1.0	1.8-3.6		anhedral
Plagioclase	34.0	4.0-16.0		porphyroclast
Clinopyroxene	57.2	2.8-25.2		subhedral
Orthopyroxene	2.7	3.6-4.8		subhedral
Opaque Minerals	4.9	0.8-5.6	10% ilmenite/90% magnetite	anhedral
Amphibole	0.2			

Accessories: Apatite (Tr.), Sulfides (abundant).

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	40	Magnetite 10%; Amphibole 10%; Smectite 80%
Clinopyroxene	15	Hornblende 10%; Actinolite 80%; Oxide 10%
Orthopyroxene	40	Amphibole 100%
Plagioclase	7	Secondary plagioclase 90%; Actinolite 10%

TOTAL ROCK ALTERATION: 12%

COMMENTS:
Large format thin section.
Hairline crack with 70% amphibole, 20% plagioclase, and 10% smectite.
Structure Description: Fabric intensity 2. Very fine-grained plagioclase in narrow cracks suggests localized semi-brittle to brittle deformation.
Plagioclase: Recrystallized with undulose extinction, and deformation twins.
Olivine: Subgrains.
Augite: No deformation. Coarse bleby exsolution.
Coarse ilmenite, magnetite intergrowths with globular sulfides (pyrite, pyrrhotite, chalcopyrite) associated with brown amphibole.
Some secondary sulfides in zones of alteration.
Mode = 2000 points.

(65) 176-735B-114R-4 (Piece 3C, 145-148 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Oxide Olivine Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Cataclastic

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine		n/a		porphyroclast
Plagioclase		4.8-10.4		porphyroclast
Clinopyroxene		4.0-7.6		porphyroclast
Orthopyroxene		0.4-2.2		porphyroclast
Opaque Minerals		0.4-6.4	20% ilmenite / 80% magnetite	

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	80	Magnetite 2%; Amphibole 98%;
Clinopyroxene	30	Hornblende 10%; Actinolite 84%; Smectite 1%; Oxide 5%
Orthopyroxene	80	Amphibole 90%; Oxide 10%
Plagioclase	15	Secondary plagioclase 85%; Actinolite 15%

TOTAL ROCK ALTERATION: 27%

COMMENTS:
ZONE 1: top of section
Structure Description: Fabric intensity 3 (with a cataclastic 5 overprint).
Plagioclase: Recrystallized with pervasive undulose extinction, deformation twins, and microcracks.
Augite: Recrystallized. Herringbone exsolution, 001 dominant over 100.
Abundant (15%) ilmenite, magnetite, sulfide (pyrite-chalcopyrite) intergrowths.
ZONE 2: bottom of section. Altered mylonite with 65% plagioclase, 15% amphibole, 6% clinopyroxene, 12% oxides, 2% epidote.
Structure Description: Fabric intensity 4 (overprinted by 5).
Plagioclase: Altered, fine grains with a few large relict or recrystallized grains.
Olivine: Subgrains.
Augite: Locally recrystallized. Herringbone exsolution, 001 dominant over 100.
Metamorphic green amphibole overprinting ilmenite-bearing, highly deformed cataclasite with globular sulfide (pyrrhotite).
Bimodal grain size is interpreted as superplastic; cataclastic deformation occurs at boundary of fault zone; plastic deformation occurs inward.

(66) 176-735B-114R-5 (Piece 1B, 26-29 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Leucocratic OPX-bearing Oxide Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Cataclastic

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	n/a	n/a		
Plagioclase	69.8	5.0-10.8		porphyroclasts
Clinopyroxene	18.2	0.8-5.6		subhedral to porphyroclasts
Orthopyroxene	3.8	0.8-6.0		subhedral to porphyroclasts
Opaque Minerals	8.2	0.4-6.8	45% ilmenite/55% magnetite	poikilitic

Accessories: Apatite (Tr.)

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	50	Amphibole 100%
Clinopyroxene	25	Diopside 10%; Actinolite 75%; Smectite 10%; Oxide 5%
Orthopyroxene	50	Amphibole 90%; Oxide 10%
Plagioclase	60	Secondary plagioclase 90%; Actinolite 10%

TOTAL ROCK ALTERATION: 48%

COMMENTS:
Structure Description: Fabric intensity 3-4. Oxide selvages are involved in crystal-plastic deformation. High temperature mylonite.
Plagioclase: Recrystallized with ribbons of pervasive undulose extinction, deformation twins, and well developed subgrains.
Augite: Recrystallized. Fine scale exsolution.
Orthopyroxene: Fine scale exsolution. Deformed in places.
Hairline crack with amphibole.
Abundant (8%) ilmenite, magnetite, and globular sulfide (pyrite-pyrrhotite-chalcopyrite) intergrowths in silicate breccia.
Trace of secondary vein pyrite.
Mode = 1410 points.

(67) 176-735B-115R-3 (Piece 2C, 75-79 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Medium-grained
TEXTURE: Cumulate to Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	10.3	1.2-2.4		anhedral to ophitic
Plagioclase	65.3	1.4-6.8		subhedral to anhedral
Clinopyroxene	23.7	1.2-3.6		subhedral to anhedral
Opaque Minerals	0.5	0.1-1.1	70% ilmenite/30% magnetite	
Amphibole	0.2			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	3	Magnetite 10%; Amphibole 70%; Smectite 20%
Clinopyroxene	2	Hornblende 85%; Actinolite 15%
Plagioclase	<1	Actinolite 100%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
No veins.
Structure Description: Fabric intensity 1b with a 2 overprint.
Plagioclase: Recrystallized, with pervasive undulose extinction, and deformation twins.
Olivine: Flattened and recrystallized, with subgrains. In places rimmed with pyroxene.
Augite: Recrystallized. In places rimmed with brown amphibole.
Ilmenite, magnetite, brown amphibole, and sulfide intergrowths along grain boundaries.
Mode = 1318 points.

(68) 176-735B-116R-1 (Piece 10A, 109-114 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Disseminated Oxide Olivine Gabbro
GRAIN SIZE: Medium to Coarse-grained
TEXTURE: Granular to Recrystallized

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	n/a	4.4-5.6		subhedral pseudomorphs
Plagioclase	n/a	2.4-8.4		subhedral to anhedral
Clinopyroxene	n/a	2.0-5.6		subhedral
Opaque Minerals	n/a	0.2-0.9	ilmenite	

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	100	Opaque minerals (Pyrite and Magnetite) 10%; Amphibole 50%; Smectite 25%; Calcite 15%
Clinopyroxene	18	Diopside 10%; Hornblende 2%; Actinolite 83%; Oxide 5%;
Plagioclase	5	Secondary plagioclase 90%; Smectite 5%; Actinolite 5%

TOTAL ROCK ALTERATION: 27%

COMMENTS:
Hairline crack filled with 95% amphibole and 5% smectite.
Structure Description: Fabric intensity = 3.
Plagioclase: Recrystallized with subgrains and deformation twins.
Augite: Recrystallized. Fine scale exsolution.
Coarse ilmenite, brown amphibole intergrowths.
Sulfides: Abundant secondary pyrite in altered olivine. Trace of primary sulfides.

(69) 176-735B-116R-4 (Piece 4A, 67-69 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Poikilitic to Cataclastic

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	9.4	2.4-10.0		poikilitic
Plagioclase	58.5	4.8-11.6		porphyroclasts
Clinopyroxene	31.8	6.8-9.6		subhedral to poikilitic
Opaque Minerals	0.1	0.2-0.8	ilmenite	
Amphibole	0.2			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	5	Magnetite 2%; Amphibole 98%
Clinopyroxene	2	Hornblende 3%; Actinolite 95%; Oxide 2%
Plagioclase	2	Actinolite 100%

TOTAL ROCK ALTERATION: 2%

COMMENTS:
1 mm wide shear zone (50% clinopyroxene, 30% amphibole, 20% plagioclase).
Structure Description: Fabric intensity 3 overprinted by a local 4 shear zone, all cut by a late 5. Strong recrystallization of pyroxene and plagioclase in high temperature shear zone. Semibrittle/brittle overprint normal (sinistral).
Plagioclase: Recrystallized with pervasive undulose extinction, and deformation twins. Small crystals weakly zoned.
Olivine: Subgrains.
Augite: Recrystallized. Some areas clear with coarse exsolution, others light tan with fine scale exsolution.
Ilmenite, magnetite, sulfide (pyrite and pyrrhotite in at least one case), and brown amphibole grain boundary intergrowths.
Mode = 1400 points.

(70) 176-735B-116R-6 (Piece 7A, 99-103 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Disseminated oxide Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Poikilitic

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	4.6	0.7-5.2		subhedral
Plagioclase	53.1	4.4-9.2		porphyroclasts
Clinopyroxene	40.7	2.8-24.0		subhedral to poikilitic
Orthopyroxene	Tr.	0.6-1.2		subhedral
Opaque Minerals	1.4	0.4-1.0	30% ilmenite/70% magnetite	subhedral to ophitic
Amphibole	0.2			
Accessories: Spinel	(rare).			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	12	Talc 10%; Magnetite 5%; Amphibole 55%; Smectite 30%
Clinopyroxene	8	Diopside 20%; Hornblende 10%; Actinolite 60%; Smectite 5%; Oxide 5%
Orthopyroxene	15	Amphibole 100%
Plagioclase	7	Secondary plagioclase 95%; Actinolite 5%

TOTAL ROCK ALTERATION: 8%

COMMENTS:
Large format thin section.
Structure Description: Fabric intensity 2.
Plagioclase: Recrystallized with pervasive undulose extinction, and deformation twins.
Olivine: Recrystallization, with subgrains and undulatory extinction. Fine exsolved rods.
Augite: Recrystallized, minor kinks. Fine scale planar exsolution.
Contains ilmenite-brown amphibole and sulfide-brown amphibole grain boundary intergrowths. Sulfides are pyrrhotite, pyrite, chalcopyrite, and +/- pentlandite.
Sulfides more common than oxides for grain sizes <0.5 mm.
Hairline cracks with amphibole.
Mode = 1500 points.

(71) 176-735B-117R-1 (Piece 3A, 45-49 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Oxide Olivine Gabbro
GRAIN SIZE: Coarse-grained (originally)
TEXTURE: Cataclastic

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	n/a	0.3-1.0/1.0-8.4		porphyroclast
Plagioclase	n/a	1.6-4.4/5.6-11.6		porphyroclast
Clinopyroxene	n/a	0.3-1.0/3.6-11.2		subhedral, poikilitic, porphyroclast
Orthopyroxene	n/a	0.2-0.8/1.2-4.0		porphyroclast
Opaque Minerals	n/a	<0.1/0.6-2.6		anhedral to amoeboidal
Brown Amphibole	n/a	---/1.2-4.4		subhedral to porphyroclast
Accessories: Titanite	(Tr.)			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	40	Talc 10%; Magnetite 5%; Amphibole 75%; Smectite 10%
Clinopyroxene	20	Diopside 10%; Hornblende 15%; Actinolite 65%; Oxide 10%
Orthopyroxene	25	Talc 5%; Amphibole 80%; Smectite 5%; Oxide 10%
Plagioclase	10	Secondary plagioclase 90%; Actinolite 10%

TOTAL ROCK ALTERATION: 25%

COMMENTS:
Large format thin section with a sheared contact.
Contains one 5-6 mm wide vein (60% plagioclase, 20% clinopyroxene, 18% amphibole, 2% titanite).
Structure Description: Fabric intensity 2 at top of section, fabric intensity 4 in middle of section, fabric intensity 3, at bottom of section.
Plagioclase: Pervasive undulose extinction, deformation twins, recrystallized.
Olivine: Subgrains, with exsolved opaque rods in larger crystals.
Augite: Recrystallized with abundant exsolution.
Large oxide seams associated with coarse subhedral, igneous(?) amphibole. Oxides disseminated in foliation. Oxide-supported breccia in center.

(72) 176-735B-117R-2 (Piece 3, 46-48 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Cataclastic

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	n/a	1.6-9.6		porphyroclast
Plagioclase	n/a	5.6-17.2		porphyroclast
Clinopyroxene	n/a	2.0-10.4		porphyroclast
Orthopyroxene	n/a	<0.2		recrystallized rim(?)
Opaque Minerals	n/a	0.2-1.2		

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	4	Magnetite 5%; Amphibole 92%; Smectite 3%
Clinopyroxene	5	Diopside 15%; Hornblende 15%; Actinolite 60%; Smectite 5%; Oxide 5%
Plagioclase	70	Secondary plagioclase 90%; Actinolite 10%

TOTAL ROCK ALTERATION: 55%

COMMENTS:
No veins, but cracks with oxides and amphibole.
Structure Description: Fabric intensity 3. Kinematic indicators are normal (sinistral).
Plagioclase: Recrystallized, with pervasive undulose extinction, and deformation twins. Contains abundant tiny opaque inclusions.
Olivine: Recrystallized, with subgrains. Fine exsolution in three crystallographic direction. Rimmed with granular orthopyroxene.
Augite: Recrystallized, with fine scale exsolution. Rimmed by amphibole in places..
Brown amphibole (1%) with associated ilmenite, magnetite, pyrite, pyrrhotite, and chalcopyrite intergrowths concentrated in the foliation.

(73) 176-735B-118R-1 (Piece 7E, 144-148 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Medium-grained
TEXTURE: Cataclastic

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	21.2	0.8-3.6		subhedral to anhedral, subophitic
Plagioclase	61.4	1.8-3.8		porphyroclast
Clinopyroxene	16.5	0.9-5.2		subhedral to anhedral
Orthopyroxene	Tr.	<0.4		recrystallized rim(?)
Opaque Minerals	0.2	0.1-0.6		
Amphibole	0.7			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	10	Talc 5%; Magnetite 10%; Amphibole 75%; Smectite 10%
Clinopyroxene	15	Diopside 25%; Hornblende 20%; Actinolite 40%; Smectite 5%; Oxide 10%
Plagioclase	60	Secondary plagioclase 90%; Actinolite 10%

TOTAL ROCK ALTERATION: 41%

COMMENTS:
No veins.
Structure Description: Fabric intensity 3-4.
Plagioclase: Recrystallized, with pervasive undulose extinction, and deformation twins.
Olivine: Subgrains, locally recrystallized. Fine exsolved opaque rods. In places rimmed by orthopyroxene.
Pyroxene: Locally recrystallized and kinked. The majority are light tan with fine-scale planer exsolution; some clear patches with coarse exsolution.
Brown amphibole (1 to 2%) with associated ilmenite, pyrite, pyrrhotite, and chalcopyrite intergrowths. Minor pentlandite in some.
Mode=1400 points.

(74) 176-735B-118R-6 (Piece 9, 105-109 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: OPX-bearing Gabbro
GRAIN SIZE: Medium-grained
TEXTURE: Mylonite

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Plagioclase	n/a	1.2-1.5		porphyroclast
Clinopyroxene	n/a	0.9-6.2		porphyroclast
Orthopyroxene	n/a	0.2-1.1		subhedral to porphyroclast
Opaque Minerals	n/a	0.1-0.6		anhedral to ophitic

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Clinopyroxene	20	Diopside 50%; Hornblende 15%; Actinolite 30%; Oxide 5%
Orthopyroxene	5	Amphibole 100%
Plagioclase	100	Secondary plagioclase 90%; Actinolite 10%

TOTAL ROCK ALTERATION: 50%

COMMENTS:
A 4-5 mm wide vein (65% plagioclase, 18% clinopyroxene, 10% amphibole, 7% oxides and sulfides) with an ilmenite and magnetite band at its core cuts through a corner of the section.
Structure Description: Fabric intensity 4 (or fine-grained protolith); upper part is mylonitic.
Plagioclase: Recrystallized, with pervasive undulose extinction, and deformation twins.
Olivine: Undeformed.
Augite: Recrystallized, with fine scale planar exsolution.
Ilmenite and magnetite in foliation with some pyrite, pyrrhotite, and chalcopyrite.
Tiny (<0.07 mm), abundant, clear, high relief, elongate crystals (aspect ratio 1:3 to 1:10).

(75) 176-735B-119R-1 (Piece 6, 61-64 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Gabbro
GRAIN SIZE: Medium-grained (coarse pre-shear)
TEXTURE: Mylonitic

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Plagioclase	n/a	1.1-4.6		porphyroclast
Clinopyroxene	n/a	3.6-7.6		porphyroclast
Opaque Minerals	n/a	0.1-0.5		anhedral
Accessories: Zircon	(Tr.)			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Clinopyroxene	50	Hornblende 10%; Actinolite 73%; Smectite 15%; Oxide 2%
Plagioclase	85	Secondary plagioclase 90%; Actinolite 10%

TOTAL ROCK ALTERATION: 70%

COMMENTS:
No veins.
Structure Description: Fabric intensity 5; retrograde green amphibole defines a moderate foliation.
Plagioclase: Recrystallized with pervasive undulose extinction and deformation twins.
Augite: No deformation. Contains fine scale exsolution, and is rimmed by amphibole.
Amphibole: Occurs as alteration of augite and as discrete crystals.
Very minor amounts of ilmenite and magnetite strung out along foliation. Trace of secondary pyrite.

(76) 176-735B-119R-2 (Piece 8B, 93-97 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: OPX-bearing Olivine Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Granular to intergranular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	5.4	1.6-4.0		anhedral
Plagioclase	71.7	2.0-12.8		subhedral to anhedral
Clinopyroxene	22.8	2.6-8.4		anhedral
Opaque Minerals	Tr.	<0.4		
Amphibole	0.1			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	50	Talc 10%; Magnetite (dendritic) 5%; Amphibole 60%; Chlorite 20%; Smectite 5%
Clinopyroxene	12	Hornblende 10%; Actinolite 75%; Smectite 10%; Oxide 5%
Plagioclase	3	Smectite 40%; Actinolite 60%

TOTAL ROCK ALTERATION: 8%

COMMENTS:
Large format thin section.
Cracks with amphibole.
Structure Description: Fabric intensity 1b.
Plagioclase: Undulose extinction, and deformation twins, with minor recrystallization. Weak zoning in some crystals.
Olivine: Minor polygonal boundaries, with subgrains. Fine scale exsolution in three crystallographic directions.
Augite: No deformation. Darker areas with fine scale planer exsolution, and clear patches with coarse bleby exsolution.
Minor amounts of ilmenite, magnetite, and brown amphibole intergrowths along grain boundaries.
Trace of secondary pyrite.
Mode=2000 points.

(77) 176-735B-119R-4 (Piece 1, 7-10 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: FeTi Oxide Gabbronorite
GRAIN SIZE: Coarse-grained
TEXTURE: Cumulate to granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Plagioclase	54.3	0.8-10.8		anhedral
Clinopyroxene	25.9	1.2-8.0		subhedral to anhedral
Orthopyroxene	2.9	0.8-3.0		anhedral to poikilitic
Opaque Minerals	16.1	0.8-9.6		amoeboidal
Amphibole	0.6			

Accessories: Apatite (0.2%).

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Clinopyroxene	17	Hornblende 10%; Actinolite 80%; Oxide 10%
Orthopyroxene	10	Amphibole 60%; Smectite 30%; Oxide 10%
Plagioclase	9	Oxide 20%; Actinolite 80%

TOTAL ROCK ALTERATION: 10%

COMMENTS:
No veins. Rock contains abundant late oxide along grain boundaries.
Structure Description: Fabric intensity 2.
Plagioclase: Pervasive undulose extinction, and deformation twins. Locally recrystallized.
Augite: No deformation. Contains fine scale exsolution.
Orthopyroxene: No deformation, no exsolution.
Contains a single large seam of ilmenite and magnetite with slight oxy-exsolution and round blebs of sulfide (pyrite, pyrrhotite, and chalcopyrite). Some secondary pyrite.
Opaque minerals rimmed with fine amphibole.
Mode=1323 points.

(78) 176-735B-120R-4 (Piece 6, 63-65 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Felsic Vein
GRAIN SIZE: Medium-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Plagioclase	n/a	2.8-16.0		anhedral
Clinopyroxene	n/a	1.0-4.0		subhedral to anhedral
Opaque Minerals	n/a	1.4-2.4		anhedral
Amphibole	n/a	1.2-3.8		anhedral
Titanite	n/a	1.6-5.6		subhedral to poikilitic

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Clinopyroxene	90	Diopside 65%; Smectite 15%; Oxide 20%
Plagioclase	75	Epidote 40%; Smectite 35%; Actinolite 25%

TOTAL ROCK ALTERATION: 60%

COMMENTS:
No veins.
Structure Description: Fabric intensity 1.
Plagioclase: Undulose extinction, deformation twins, and subgrains. Zoned crystals.
Augite: No deformation. Mottled at extinction due to incipient alteration to amphibole.
Trace of secondary sulfide.
Titanite: Abundant large zoned crystals.

(79) 176-735B-120R-6 (Piece 1B, 37-41 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Medium-grained
TEXTURE: Cumulate to granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	8.6	0.9-1.8		anhedral to ophitic
Plagioclase	61.9	0.9-4.3		subhedral to anhedral
Clinopyroxene	28.7	1.4-4.0		anhedral to ophitic
Opaque Minerals	0.2	<0.2		anhedral
Amphibole	0.5			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	4	Talc 5%; Magnetite 2%; Amphibole 93%
Clinopyroxene	5	Hornblende 80%; Actinolite 18%; Oxide 2%
Plagioclase	1	Actinolite 100%

TOTAL ROCK ALTERATION: 2%

COMMENTS:
No veins.
Structure Description: Fabric intensity 1.
Plagioclase: Undulose extinction, deformation twins, and good polygonal grain boundaries.
Olivine: Subgrains.
Augite: No deformation. Contains fine scale exsolution.
Textures are strongly equilibrated with polygonal grain boundaries in plagioclase and local elongate ribbons of olivine. All microstructures are interpreted to have formed in the magmatic state.
Minor amounts of grain boundary intergrowths of brown amphibole, ilmenite, and sulfide (pyrite, pyrrhotite, chalcopyrite, and a trace of pentlandite).
Mode=1500 points.

(80) 176-735B-121R-2 (Piece 2B, 40-43 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Fine-grained
TEXTURE: Equigranular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	19.5	0.2-0.9		subhedral to anhedral
Plagioclase	60.8	0.5-1.4		anhedral
Clinopyroxene	18.9	0.7-1.6		subhedral to ophitic
Opaque Minerals	0.3	<0.1		subhedral
Amphibole	0.5			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	2	Magnetite 10%; Amphibole 50%; Smectite 40%
Clinopyroxene	1	Hornblende 100%
Plagioclase	1	Actinolite 100%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
One crack with amphibole.
Structure Description: Fabric intensity 1, equilibrated texture.
Plagioclase: Minor deformation twins and undulose extinction. Recrystallized to 120-120-120 degree grain intersections in places.
Olivine: No deformation.
Augite: No deformation.
Trace amounts of grain boundary intergrowths of brown amphibole, pyrite, pyrrhotite, chalcopyrite, and pentlandite.
Mode=1500 points.

(81) 176-735B-121R-5 (Piece 1G, 108-111 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Medium-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	9.7	1.0-5.6		anhedral to subophitic
Plagioclase	62.9	1.8-12.0		anhedral
Clinopyroxene	26.9	1.2-7.2		anhedral to subophitic
Opaque Minerals	0.3	0.1-0.9	ilmenite	
Amphibole	0.1			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	2	Magnetite 10%; Amphibole 90%
Clinopyroxene	1	Hornblende 98%; Actinolite 2%
Plagioclase	1	Actinolite 100%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
No veins.
Structure Description: Fabric intensity 1a.
Plagioclase: Undulose extinction, deformation twins, and good polygonal grain boundaries. Weak zoning.
Olivine: Weak subgrain development.
Augite: No deformation. Contains fine scale exsolution.
Some fairly large ilmenite, magnetite, amphibole, and sulfide grain boundary patches.
Mode=1500 points.

(82) 176-735B-121R-8 (Piece 2B, 68-72 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Variable Medium to Coarse-grained
TEXTURE: Poikilitic

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	6.0	0.8-2.4/1.6-5.2		anhedral to poikilitic
Plagioclase	51.2	1.2-3.6/3.0-16.0		euhedral to subhedral
Clinopyroxene	42.2	2.0-5.6/6.8-12.8		poikilitic
Orthopyroxene	0.1	none /1.0-3.0		anhedral
Opaque Minerals	0.3	<0.3/1.0-3.0	ilmenite	subhedral to anhedral
Amphibole	0.2			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	3	Smectite 90%; Amphibole 10%
Clinopyroxene	1	Hornblende 90%; Actinolite 10%
Plagioclase	<1	Actinolite 100%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
Large format thin section. No veins. Coarser and Medium-grained parts.
Structure Description: Fabric intensity 1b.
Plagioclase: Undulose extinction, deformation twins, and good polygonal grain boundaries. Weak zoning.
Olivine: Subgrains.
Augite: No deformation. Dominantly fine scale planar exsolution; some patches with coarse bleby exsolution.
Rare but large ilmenite, magnetite, brown amphibole, and sulfide intergrowths.
Mode=2000 points.

(83) 176-735B-122R-2 (Piece 1A, 0-4 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Gabbro
GRAIN SIZE: Medium-grained
TEXTURE: Cumulate to granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	2.7	0.6-2.4		anhedral
Plagioclase	49.4	1.2-5.2		anhedral
Clinopyroxene	46.5	1.0-7.6		anhedral to ophitic
Orthopyroxene	0.1	0.6-0.8		
Opaque Minerals	1.0	0.2-1.0	95% ilmenite/ 5% magnetite	anhedral
Amphibole	0.3			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	20	Magnetite 2%; Amphibole 20%; Smectite 78%
Clinopyroxene	1	Hornblende 98%; Actinolite 2%
Plagioclase	1	Actinolite 100%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
No veins.
Structure Description: Fabric intensity 1a.
Plagioclase: Undulose extinction, deformation twins, minor recrystallization, and annealed grain boundaries.
Olivine: Minor subgrains. Fine exsolved opaque rods.
Augite: No deformation. Weakly zoned. Fine scale exsolution in places, not abundant.
Minor amounts of grain boundary intergrowths of ilmenite, magnetite, brown amphibole, and sulfides (pyrite, pyrrhotite, and chalcopyrite).
Mode=1500 points.

(84) 176-735B-122R-6 (Piece 1, 9-13 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	2.9	1.1-4.2		anhedral
Plagioclase	61.9	3.2-10.4		subhedral to anhedral
Clinopyroxene	34.6	1.4-11.2		ophitic to poikilitic
Opaque Minerals	0.3	0.3-1.0	ilmenite	anhedral
Amphibole	0.3			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	3	Magnetite 5%; Amphibole 49%; Chlorite 1%; Smectite 45%
Clinopyroxene	1	Diopside 1%; Hornblende 10%; Actinolite 87%; Oxide 2%
Plagioclase	1	Actinolite 100%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
Hairline cracks with chlorite.
Structure Description: Fabric intensity 1a.
Plagioclase: Undulose extinction, deformation twins, and polygonal grain boundaries. Some subgrains are locally recrystallized. Weak zoning.
Olivine: Weak subgrain development.
Augite: No deformation. Predominately fine scale exsolution; some clear patches with coarse exsolution.
Minor amounts of grain boundary intergrowths of ilmenite, magnetite, amphibole, and sulfide (pyrite, pyrrhotite, chalcopyrite, and pentlandite).
Mode=1500 points.

(85) 176-735B-122R-7 (Piece 1, 16-19 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	8.6	1.2-4.4		anhedral
Plagioclase	66.6	3.0-14.0		subhedral to anhedral
Clinopyroxene	24.3	1.6-5.4		ophitic to poikilitic
Opaque Minerals	0.3	0.2-0.9	ilmenite	
Amphibole	0.2			

Accessories: Apatite.

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	2	Magnetite 1%; Amphibole 79%; Smectite 20%
Clinopyroxene	1	Hornblende 50%; Actinolite 50%
Plagioclase	1	Actinolite 100%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
No veins.
Structure Description: Fabric intensity 1a.
Plagioclase: Undulose extinction, and deformation twins, with good polygonal grain boundaries. Weak zoning.
Olivine: Subgrains.
Augite: No deformation. Predominately fine scale exsolution; some patches with coarser exsolution.
Trace amounts of grain boundary intergrowths of ilmenite, magnetite, brown amphibole, and sulfide (pyrite, pyrrhotite, chalcopyrite, and pentlandite?).
Mode=1500 points.

(86) 176-735B-123R-4 (Piece 2B, 86-89 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Fine-grained
TEXTURE: Equigranular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	19.2	0.3-1.5		anhedral
Plagioclase	63.1	0.4-2.6		subhedral to anhedral
Clinopyroxene	16.1	1.0-11.6		oikocryst
Opaque Minerals	0.2	<0.1	sulfide	subhedral to anhedral
Amphibole	1.3			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	2	Magnetite 1%; Amphibole 39%; Smectite 60%
Clinopyroxene	2	Hornblende 90%; Actinolite 10%
Plagioclase	0	

TOTAL ROCK ALTERATION: 1%

COMMENTS:
No veins.
Structure Description: Fabric intensity 1b.
Plagioclase: Undulose extinction, and deformation twins, with good polygonal grain boundaries.
Olivine: Very weak subgrain development. Rimmed by augite in places.
Augite: No deformation. A large pyroxene oikocryst contains weakly aligned plagioclase, whereas the surrounding plagioclase displays no alignment. Weak exsolution developed in some crystals.
Trace of brown amphibole and sulfide intergrowths at grain boundaries. Rare (<0.1%) tiny ilmenite, and one spinel grain.
Mode=1262 points.

(87) 176-735B-124R-1 (Piece 2A, 32-35 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Medium to coarse-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	5.1	1.4-4.0		anhedral
Plagioclase	48.4	2.2-6.4		subhedral to anhedral
Clinopyroxene	45.8	0.8-8.0		subhedral to ophitic
Orthopyroxene	0.3	0.2-0.5		
Opaque Minerals	0.3		ilmenite	anhedral
Amphibole	0.1			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	2	Magnetite 2%; Amphibole 38%; Smectite 60%
Clinopyroxene	2	Hornblende 60%; Actinolite 40%
Orthopyroxene	10	Amphibole 100%
Plagioclase	1	Smectite 20%; Actinolite 80%

TOTAL ROCK ALTERATION: 2%

COMMENTS:
No veins.
Structure Description: Fabric intensity 1a.
Plagioclase: Undulose extinction, deformation twins, with good polygonal grain boundaries. Weak zoning.
Olivine: Weak subgrain development.
Augite: No deformation. Abundant fine scale exsolution; some patches with coarse exsolution.
Minor amounts of grain boundary intergrowths of ilmenite, magnetite, amphibole, and sulfide (pyrite, pyrrhotite, and chalcopyrite).
Mode=1500 points.

(88) 176-735B-126R-3 (Piece 2B, 85-88 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	2.5	1.0-3.6		subhedral to anhedral
Plagioclase	62.3	2.4-10.4		anhedral
Clinopyroxene	34.7	1.7-10.8		subhedral to ophitic
Opaque Minerals	0.1	0.1-0.4	ilmenite	
Amphibole	0.4			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	3	Magnetite 2%; Amphibole 38%; Smectite 60%
Clinopyroxene	1	Hornblende 60%; Actinolite 40%
Plagioclase	1	Actinolite 100%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
No veins.
Structure Description: Fabric intensity 1a.
Plagioclase: Undulose extinction, deformation twins, subgrain development, and minor recrystallization. Weak zoning.
Olivine: No deformation.
Augite: No deformation. Coarse exsolution in some places, fine exsolution in others.
Minor amounts of grain boundary intergrowths of ilmenite, magnetite, brown amphibole, and sulfide (pyrite, pyrrhotite, and chalcopyrite). Some secondary sulfides.
Mode=1339 points.

(89) 176-735B-126R-5 (Piece 2B, 85-89 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro with Felsic Vein
GRAIN SIZE: Medium-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	n/a	1.0-4.0		anhedral to ophitic
Plagioclase	n/a	2.6-14.4		subhedral to anhedral
Clinopyroxene	n/a	2.2-7.4		poikilitic
Opaque Minerals	n/a	<0.2	ilmenite	

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	50	Magnetite 1%; Amphibole 19%; Smectite 80%
Clinopyroxene	10	Actinolite 100%
Plagioclase	4	Secondary plagioclase 15%; Actinolite 85%

TOTAL ROCK ALTERATION: 8%

COMMENTS:
Structure Description: Section divided into two zones:
Zone A, top = olivine gabbro. Fabric intensity zone A =1a.
Plagioclase: Undulose extinction, deformation twins, subgrain development, minor recrystallization.
Olivine: Subgrain development.
Augite: No deformation.
Relict primary pyrite, pyrrhotite, and chalcopyrite. Trace amounts of secondary pyrite.
Zone B, bottom = Felsic vein: Fabric intensity zone B = 6.
Mode in vein: 82% plagioclase, 10% clinopyroxene, 3% amphibole, 3% titanite, 1% oxides, and traces of sulfides and carbonate. Grain sizes in vein: plagioclase = 1.2-8.2 mm, titanite = 1.4 mm, opaque < 0.45.
Plagioclase: Altered and cracked, undulose extinction.
Olivine: No deformation.
Augite: Altered to amphibole.

(90) 176-735B-126R-6 (Piece 15, 123-125 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Cataclastic

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	1.6	0.6-1.4		porphyroclast
Plagioclase	70.4	3.2-15.2		porphyroclast
Clinopyroxene	21.6	1.0-4.4		poikilitic to porphyroclast
Orthopyroxene	1.3			
Opaque Minerals	0.4	0.3-2.3	80% ilmenite/ 20% magnetite	anhedral
Amphibole	4.6	0.2-1.2		

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	20	Talc 2%; Magnetite 5%; Amphibole 78%; Smectite 15%
Clinopyroxene	40	Diopside 20%; Hornblende 70%; Actinolite 10%; Smectite tr.
Orthopyroxene	10	Amphibole 10%; Smectite 90%
Plagioclase	25	Secondary plagioclase 90%; Actinolite 10%

TOTAL ROCK ALTERATION: 27%

COMMENTS:
Hairline crack with amphibole.
Structure Description: Fabric intensity 3.
Plagioclase: Recrystallization with deformation twins, and subgrain development. Weak zoning. Abundant tiny opaque inclusions.
Olivine: Recrystallization, with subgrain development.
Augite: Recrystallized. Symplectite intergrowths with brown amphibole(?). Rimmed by amphibole that postdates plagioclase recrystallization.
Amphibole: Recrystallized.
Abundant coarse brown amphibole enclosing ilmenite, magnetite, and sulfides (pyrite, pyrrhotite, and chalcopyrite).
Mode=1419 points.

(91) 176-735B-127R-3 (Piece 1, 0-4 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Cumulate

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	8.8	0.5-4.2		subhedral to anhedral
Plagioclase	39.0	1.6-18.8		anhedral
Clinopyroxene	51.7	1.6-11.6		poikilitic
Orthopyroxene	0.2			
Opaque Minerals	0.1	0.1-0.4	sulfide > ilmenite	subhedral to anhedral
Amphibole	0.2			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	4	Talc 3%; Magnetite 2%; Amphibole 18%; Smectite 77%
Clinopyroxene	1	Hornblende 100%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
No veins.
Structure Description: Fabric intensity 1a.
Plagioclase: Deformation twins, subgrain development associated with kinking.
Olivine: Weak subgrain development.
Augite: No deformation. Coarse bleby exsolution in some crystals, fine scale planar exsolution in others.
Tiny amount of grain boundary intergrowths of ilmenite, magnetite, amphibole, and sulfide (pyrite, pyrrhotite, chalcopyrite, and pentlandite).
Mode=1301 points.

(92) 176-735B-128R-2 (Piece 13b, 133-136 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Medium-grained
TEXTURE: poikilitic to cumulate

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	8.1	0.9-4.8		subhedral to anhedral
Plagioclase	55.3	1.8-11.6		anhedral to poikilitic
Clinopyroxene	36.5	1.0-3.6		poikilitic
Opaque Minerals Tr.	<0.1		sulfide	subhedral
Amphibole	0.1			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	10	Smectite 100%; Magnetite (trace)
Clinopyroxene	2	Hornblende 100%

TOTAL ROCK ALTERATION: 2%

COMMENTS:
Vari-textured. Thin green amphibole vein in middle.
Structure Description: Fabric intensity 1a.
Plagioclase: Deformation twins. Poikilitic, encloses olivine.
Olivine: Weak subgrain development.
Augite: No deformation. Fine scale exsolution. Poikilitic, encloses olivine and plagioclase.
Trace of grain boundary amphibole. Blebs of pyrite, pyrrhotite, chalcopyrite, and good crystalline pentlandite. Ilmenite rare.
Mode=1020 points.

(93) 176-735B-128R-2 (Piece 2, 29-31 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Gabbro cut by Felsic Vein
GRAIN SIZE: Coarse-grained
TEXTURE: Altered granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	n/a	1.0-6.2		pseudomorphs
Plagioclase	n/a	1.4-4.8		anhedral
Clinopyroxene	n/a	1.2-9.6		anhedral to ophitic
Opaque Minerals	n/a	0.1-0.9	sulfide > ilmenite	

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	100	Talc 5%; Magnetite 5%; Amphibole 20% Smectite 60%
Clinopyroxene	50	Amphibole 96%; Smectite 2%; Oxide 2%
Orthopyroxene	80	Amphibole 100%
Plagioclase	20	Smectite 80%; Actinolite 20%

TOTAL ROCK ALTERATION: 35%

COMMENTS:
A >10 mm wide felsic vein at the edge of the thin section. Numerous veinlets with smectite. A crack with carbonate, chlorite and a trace of titanite. Along the plagioclase vein, a 1 mm wide halo with 100% amphibole is developed.
Structure Description: Fabric intensity 1a, overprinted by 6; deformation after alteration is minor-pervasive cracking.
Plagioclase: Deformation twins, subgrain development. Plagioclase intergrown with K-spar (now altered) in vein.
Augite: No deformation. Abundant exsolution.
Small intergrowths of ilmenite, magnetite, brown amphibole, and sulfide (pyrite, pyrrhotite, and chalcopyrite). Lots of secondary pyrite in veins, some as cubic crystals.

(94) 176-735B-128R-4 (Piece 7, 67-70 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Granular to cataclastic

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	11.4	1.0-6.2		anhedral to poikilitic
Plagioclase	55.1	1.4-4.8		subhedral to anhedral
Clinopyroxene	33.3	1.2-9.6		anhedral to poikilitic
Opaque Minerals	Tr.	0.1-0.9	sulfide	
Amphibole	0.2			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	1	Amphibole 30%; Smectite 70%; Magnetite (trace).
Clinopyroxene	2	Diopside 20%; Hornblende 80%
Orthopyroxene	10	Amphibole 100%
Plagioclase	10	Secondary plagioclase 90%; Actinolite 10%

TOTAL ROCK ALTERATION: 6%

COMMENTS:
No veins.
Structure Description: Fabric intensity, weak 2.
Plagioclase: Undulose extinction, deformation twins, subgrain development, kinking.
Olivine: Subgrain development, recrystallized with 120-120-120 degree intersection..
Augite: Undulatory extinction. Fine scale exsolution dominant; some patches with coarse bleby exsolution.
Trace amounts of grain boundary brown amphibole. Grains of sulfide (pyrite, pyrrhotite, and chalcopyrite) with brown amphibole.
Mode=1400 points.

(95) 176-735B-129R-1 (Piece 8, 78-84 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Variable - medium to coarse-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	6.6	0.5-2.4/1.1-3.6		subhedral to anhedral
Plagioclase	60.8	1.0-5.6/3.6-8.8		anhedral
Clinopyroxene	32.2	1.0-2.2/1.8-10.8		anhedral to ophitic
Orthopyroxene	0.2			
Opaque Minerals	0.2	<0.3/<0.3	ilmenite	anhedral
Amphibole	Tr.			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	2	Magnetite 2%; Amphibole 48%; Smectite 50%
Clinopyroxene	1	Hornblende 50%; Actinolite 50%
Plagioclase	1	Actinolite 100%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
Large format thin section. No veins. Contact between medium and Coarse-grained olivine gabbro.
Structure Description: Fabric intensity: 1a.
Plagioclase: Undulose extinction, deformation twins, subgrain development, minor grain boundary rotation, comb texture exhibited by elongate plagioclase. Dissolution/reprecipitation of plagioclase against plagioclase. Some crystals zoned.
Olivine: No deformation.
Augite: No deformation. Inclusions of brown amphibole. Exsolution is fine scale in some crystals, and coarse in others.
Trace amounts of grain boundary intergrowths of ilmenite and brown amphibole. Minor amounts of grain boundary intergrowths of brown amphibole and sulfides (pyrite, pyrrhotite, and chalcopyrite). Some secondary pyrite.
Mode=2000 points.

(96) 176-735B-130R-2 (Piece 3, 37-40 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	10.2	0.8-6.0		anhedral-recrystallized
Plagioclase	57.4	2.8-10.4		anhedral
Clinopyroxene	32.1	2.6-11.0		anhedral to poikilitic
Orthopyroxene	0.2			
Opaque Minerals	Tr.	<0.3	sulfide > ilmenite	
Amphibole	0.1			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	4	Magnetite 1%; Amphibole 14%; Smectite 85%
Clinopyroxene	1	Hornblende 60%; Actinolite 40%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
No veins.
Structure Description: Fabric intensity: 2/3, reverse shear sense.
Plagioclase: Recrystallized, with undulose extinction, deformation twins, and subgrain rotation.
Olivine: Recrystallized into ribbons, with subgrain development. Recrystallized into 120-120-120 degree intersections.
Augite: Fine scale exsolution.
Minor amounts of grain boundary intergrowths of ilmenite, magnetite, brown amphibole, and sulfide (pyrite, pyrrhotite, chalcopyrite, and pentlandite); more sulfides than oxides. Some secondary pyrite.
Mode=1400 points.

(97) 176-735B-130R-3 (Piece 1, 4-8 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Coarse-grained cut by fine-grained dikelet.
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	n/a	0.2-1.0/1.2-4.8		subhedral to anhedral
Plagioclase	n/a	0.6-1.5/2.0-10.4		anhedral
Clinopyroxene	n/a	0.3-0.7/2.2-16.8		anhedral to poikilitic
Orthopyroxene	n/a	0.3-0.6/0.6-1.8		anhedral pseudomorphs
Opaque Minerals	n/a	<0.2/<0.3	ilmenite	

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	9	Magnetite (dendritic) 2%; Amphibole 28%; Smectite 70%
Clinopyroxene	2	Hornblende 80%; Actinolite 20%
Orthopyroxene	20	Smectite 95%; Oxide 5%
Plagioclase	1	Secondary plagioclase 95%; Actinolite 5%

TOTAL ROCK ALTERATION: 6%

COMMENTS:
Cut by microgabbro dike which has a primary igneous fine grain size.
Hairline cracks with amphibole, oxides and sulfides.
Structure Description: Fabric intensity: weak 2 in host gabbro, 1 in cross cutting dikelet..
Plagioclase: Recrystallized with undulose extinction, and deformation twins. Encloses olivine in cross cutting dikelet.
Olivine: Subgrain development.
Augite: Abundant exsolution.
Contains 1 to 3 % intergrowths of ilmenite, magnetite, brown amphibole, and sulfide (pyrite, pyrrhotite, and chalcopyrite). Lots of secondary pyrite.

(98) 176-735B-130R-4 (Piece 8b, 123-127 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Gabbro with FeTi Oxide Gabbro Seam
GRAIN SIZE: Medium-grained
TEXTURE: Cumulate to granular.

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	4.7	0.5-3.0		subhedral
Plagioclase	54.3	1.4-5.6		anhedral
Clinopyroxene	34.7	0.6-3.2		subhedral to anhedral
Orthopyroxene	0.4	0.8-2.6		
Opaque Minerals	5.7	0.4-4.8	60% ilmenite/ 40% magnetite	
Amphibole	0.2			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	3	Magnetite 5%; Amphibole 35%; Smectite 60%
Clinopyroxene	10	Hornblende 15%; Actinolite 83%; Oxide 2%
Orthopyroxene	10	Amphibole 100%
Plagioclase	10	Actinolite 5%

TOTAL ROCK ALTERATION: 9%

COMMENTS:
No veins. Fine-grained gabbro cut by seam of fine-grained oxide gabbro.
Structure Description: Fabric intensity: 1a.
Plagioclase: Recrystallized with deformation twins, undulose extinction, and kinking. Igneous lattice preferred orientation.
Olivine: Subgrain development.
Augite: No deformation. Herringbone exsolution.
Opaque minerals: <0.2 mm in host rock, 0.4-4.8 mm in seam. Opaque minerals in gabbro host dominantly sulfides, opaque minerals in seam are ilmenite, magnetite, and sulfides with brown amphibole. Sulfides include pyrite, pyrrhotite, and chalcopyrite.
Mode=1260 points.

(99) 176-735B-131R-2 (Piece 3, 27-30 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Medium-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	9.5	0.4-1.8		recrystallized
Plagioclase	58.1	0.8-3.4		anhedral
Clinopyroxene	30.2	0.8-6.8		anhedral
Opaque Minerals	1.3	0.1-1.2	ilmenite	
Amphibole	0.9			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	4	Magnetite 8%; Amphibole 12%; Smectite 10%
Clinopyroxene	10	Hornblende 20%; Actinolite 78%; Oxide 2%
Orthopyroxene	20	Amphibole 100%
Plagioclase	1	Actinolite 100%

TOTAL ROCK ALTERATION: 4%

COMMENTS:
No veins.
Structure Description: Fabric intensity: 1b/2.
Plagioclase: Recrystallized with deformation twins and undulose extinction. Igneous lamination(?).
Olivine: Recrystallized (ribbons of polygonized grains, 4.0 to 9.6 mm in length) with subgrain development, and 120-120-120 degree intersections.
Augite: Recrystallized in places. Abundant exsolution.
Several seams of ilmenite, magnetite, brown amphibole, and sulfide (pyrite, pyrrhotite, and chalcopyrite). Spectacular ilmenite, magnetite, amphibole symplectites in one seam. Trace of secondary pyrite.
Mode=1415 points.

(100) 176-735B-133R-1 (Piece 5B, 100-104 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Oxide Gabbro
GRAIN SIZE: Medium-grained
TEXTURE: Mylonitic

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	n/a	0.3-0.9		subhedral
Plagioclase	n/a	1.2-3.4		recrystallized
Clinopyroxene	n/a	1.0-8.0		subhedral porphyroclasts
Orthopyroxene	n/a	0.6-1.0		
Opaque Minerals	n/a	0.2-6.0	80% ilmenite/ 20% magnetite	anhedral to amoeboidal

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	8	Smectite 100%
Clinopyroxene	7	Diopside 10%; Hornblende 5%; Actinolite 70%; Oxide 15%
Orthopyroxene	20	Amphibole 100%
Plagioclase	60	Secondary plagioclase 90%; Actinolite 10%

TOTAL ROCK ALTERATION: 37%

COMMENTS:
No veins.
Structure Description: Fabric intensity: 3, with a component of lower temperature overprint.
Plagioclase: Recrystallized with deformation twins and undulose extinction.
Olivine: Recrystallization with subgrain development .
Augite: Recrystallized in places; abundant exsolution in unrecrystallized areas.
Oxides are abundant in seams.
Sulfides include pyrite, pyrrhotite, and minor chalcopyrite.

(101) 176-735B-133R-2 (Piece 5, 117-120 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Medium-grained
TEXTURE: Cataclastic

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	8.8	0.6-3.6		recrystallized granular porphyroclasts.
Plagioclase	53.6	0.8-2.8		recrystallized granular
Clinopyroxene	36.8	1.2-8.6		ophitic
Opaque Minerals	0.7	0.1-1.2	ilmenite	anhedral to amoeboidal
Amphibole	0.1			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	4	60% Smectite; 25% Amphibole; 10% Talc; 5% Magnetite
Plagioclase	3	60% Actinolite; 40% Secondary Plagioclase
Clinopyroxene	7	70% Actinolite; 30% Hornblende

TOTAL ROCK ALTERATION: 5%

COMMENTS:
Structure Description: Fabric intensity: 2-3 overprinted by 6. Overprinted by hydrothermal cracks.
Plagioclase: Recrystallized with strong lattice preferred orientation, subgrains, undulose extinction, and a few deformation twins.
Olivine: Recrystallized ribbons, with numerous subgrains. Polygonal 120-120-120 degree intersections.
Augite: Mostly undeformed, with minor recrystallization. Abundant fine-scale, planer exsolution; some patches with coarse exsolution.
Sulfides present.
Mode = 1200 points.

(102) 176-735B-133R-3 (Piece 1B, 41-45 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Medium-grained
TEXTURE: Cataclastic

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	6.8	0.4-2.2		recrystallized porphyroclasts
Plagioclase	62.4	0.6-2.0		recrystallized granular
Clinopyroxene	30.2	0.8-4.4		subhedral
Orthopyroxene	0.1			
Opaque Minerals	0.2	<0.3	ilmenite	anhedral to amoeboidal
Amphibole	0.3			
Accessories: Apatite	(Tr.)			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	15	Talc 10%; Magnetite 5%; Amphibole 55%; Smectite 30%
Clinopyroxene	5	Hornblende 20%; Actinolite 75%; Oxide 5%
Orthopyroxene	5	Amphibole 100%
Plagioclase	1	Actinolite 100%

TOTAL ROCK ALTERATION: 3%

COMMENTS:
Structure Description: Fabric intensity: 1a overprinted by 3.
Plagioclase: Deformation twins, undulose extinction, recrystallization.
Olivine: Recrystallized ribbons (2.4 to 8.4 mm in length), subgrain development, pyrite-magnetite intergrowths in altered areas.
Augite: Recrystallized. A few crystals with abundant, high relief, elongate inclusions (exsolved orthopyroxene?). Abundant fine-scale, planer exsolution; some crystals with two sets of planar exsolution 10 degrees apart.
A few hairline cracks with amphibole.
Minor amounts of ilmenite, magnetite, amphibole, sulfide (pyrite, pyrrhotite, and chalcopyrite) intergranular material.
Mode = 1200 points.

(103) 176-735B-133R-5 (Piece 3, 113-116 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Leucocratic Olivine Gabbro
GRAIN SIZE: Medium-grained
TEXTURE: Intergranular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	5.2	1.0-4.4		anhedral amoeboidal
Plagioclase	66.4	1.2-9.6		anhedral granular
Clinopyroxene	27.6	1.6-7.0		anhedral to ophitic
Orthopyroxene	0.5			
Opaque Minerals	0.1	0.1-0.6	sulfide>ilmenite	anhedral
Amphibole	0.2			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	1	Amphibole 50%; Smectite 50%; Magnetite (trace)
Clinopyroxene	1	Hornblende 50%; Actinolite 50%

TOTAL ROCK ALTERATION: <1%

COMMENTS:
Structure Description: Fabric intensity: 1a.
Plagioclase: Minor recrystallization, with deformation twins, and undulose extinction. Weak zoning in some crystals.
Olivine: Minor subgrain development. Pyroxene reaction rims around some crystals.
Augite: No deformation. Fine-scale planar exsolution.
Very minor amount of intergranular brown amphibole, ilmenite, and magnetite, with a trace of sulfides (pyrrhotite, chalcopyrite, and pentlandite).
Mode = 1200 points.

(104) 176-735B-134R-2 (Piece 3, 106-109 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Leucocratic Olivine Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Intergranular to Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	9.4	1.0-5.4		anhedral to amoeboidal
Plagioclase	73.0	1.4-9.8		subhedral to recrystallized granular
Clinopyroxene	17.2	4.8-8.0		ophitic to poikilitic
Opaque Minerals	0.2	<0.3	sulfide > ilmenite	anhedral
Amphibole	0.2			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	1	Amphibole 50%; Smectite 50%; Magnetite (trace).
Clinopyroxene	35	Hornblende 50%; Actinolite 50%

TOTAL ROCK ALTERATION: 6%

COMMENTS:
Structure Description: Fabric intensity: 1/2.
Plagioclase: Deformation twins, undulose extinction, recrystallized.
Olivine: Subgrain development, undulose extinction. Pyroxene reaction rims around some crystals.
Augite: No deformation. Fine-scale, planar exsolution in some crystals; coarse bleby exsolution in others.
Very minor amounts of ilmenite, magnetite, and amphibole along grain boundaries with trace amounts of sulfides (pyrrhotite and chalcopyrite).
Mode = 1210 points.

(105) 176-735B-132R-1 (Piece 11A, 66-70 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Gabbro
GRAIN SIZE: Medium-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	n/a	0.8-3.6		anhedral pseudomorphs
Plagioclase	n/a	2.0-5.2		subhedral to recrystallized granular
Clinopyroxene	n/a	1.8-6.4		anhedral to ophitic
Opaque Minerals	n/a	0.2-1.0	sulfide > ilmenite	anhedral

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	100	Talc 10%; Magnetite 20%; Amphibole 65%; Calcite 5%
Clinopyroxene	12	Hornblende 10%; Actinolite 80%; Smectite 5%; Sulfide 5%
Plagioclase	20	Calcite 60%; Smectite 30%; Actinolite 10%

TOTAL ROCK ALTERATION: 35%

COMMENTS:
Several 1-2 mm wide veins with sharp contacts (65% calcite, 20% smectite, 15% sulfide).
Structure Description: Fabric intensity: 1a overprinted by 6 with calcite veins. The metamorphic assemblage shows little deformation.
Plagioclase: Deformation twins, undulose extinction. Weak zoning in some crystals.
Olivine: No deformation.
Augite: No deformation. Fine-scale exsolution.
Abundant secondary pyrite in amphibole-calcite veins.
Trace of grain boundary amphibole, ilmenite, and magnetite intergrowths.

(106) 176-735B-132R-3 (Piece 2, 36-39 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Leucocratic Troctolitic Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Intergranular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	22.0	4.8-15.2		anhedral to ophitic
Plagioclase	65.3	2.6-8.0		subhedral to anhedral
Clinopyroxene	12.0	4.8-11.2		anhedral
Opaque Minerals	0.5	0.2-2.4	ilmenite	anhedral
Amphibole	0.2			
Accessories: Apatite	(Tr.).			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	5	Magnetite 2%; Amphibole 58%; Smectite 40%
Clinopyroxene	3	Hornblende 10%; Actinolite 87%; Oxide 3%
Plagioclase	2	Actinolite 100%

TOTAL ROCK ALTERATION: 3%

COMMENTS:
A few hairline cracks with amphibole.
Structure Description: Fabric intensity: 1a overprinted by 6. Cut by microcracks.
Plagioclase: Recrystallized with deformation twins, and undulose extinction. Some crystals strongly zoned. Exsolved high-birefringent needles in some crystals.
Olivine: Subgrain development, thin alteration rinds around most crystals. Two exsolution phases: transparent brown rods (0.01 x 0.20 mm) and flattened opaque dendritic patches up to 0.1 mm across.
Augite: No deformation. Abundant fine-scale, planar exsolution.
Contains abundant (~1%) ilmenite-amphibole grain boundary intergrowths associated with pyrrhotite-chalcopyrite blebs. One large patch of secondary pyrite-chalcopyrite in green amphibole replacing brown amphibole.
Mode = 1425 points.

(107) 176-735B-133R-5 (Piece 2G, 81-84 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Cumulate

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	23.9	1.1-6.8		subhedral to anhedral
Plagioclase	17.4	4.4-7.8		interstitial
Clinopyroxene	58.3	2.0-8.6		subhedral to anhedral
Orthopyroxene	0.2			
Opaque Minerals	0.2	0.1-0.5	sulfide	anhedral

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	10	Magnetite tr; Smectite 100%
Clinopyroxene	5	Hornblende 15%; Actinolite 85%
Plagioclase	<1	Actinolite 100%

TOTAL ROCK ALTERATION: 5%

COMMENTS:
Structure Description: Fabric intensity: 1a.
Plagioclase: Deformation twins, undulose extinction.
Olivine: Subgrain development. Pyroxene reaction rims around some crystals.
Augite: No deformation. Fine-scale, planar exsolution dominant; some patches of coarse, bleby exsolution. Some crystals weakly zoned.
Some grain boundary Clinopyroxene, orthopyroxene, and amphibole intergrowths. Sulfides (pyrite and chalcopyrite) are most likely secondary and associated with grain boundary alteration. One primary pyrrhotite, chalcopyrite, and pentlandite patch.
Mode = 1250 points.

(108) 176-735B-132R-5 (Piece 2, 95-100 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: OPX-bearing Oxide Gabbronorite / Olivine Gabbro
GRAIN SIZE: Coarse-grained / Medium-grained
TEXTURE: Cataclastic to Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	0.1/8.5	1.6-6.4/0.8-3.2		anhedral
Plagioclase	46.5/60.4	1.6-7.2/1.4-5.4		subhedral to anhedral
Clinopyroxene	32.9/30.4	1.8-8.6/1.2-6.2		subhedral to anhedral
Orthopyroxene	2.0/0.0	0.8-4.4/0.6-1.9		
Opaque Minerals	18.2/0.1	1.0-6.8/<0.2	60% magnetite/40% ilmenite	amoeboidal matrix
Amphibole	0.3/0.6			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	75	Magnetite 2%; Amphibole 38%; Smectite 60%
Clinopyroxene	2	Diopside 5%; Hornblende 25%; Actinolite 60%; Oxide 10%
Orthopyroxene	5	Amphibole 100%
Plagioclase	10	Secondary Plagioclase 60%; Oxide 30%; Actinolite 10%

TOTAL ROCK ALTERATION: 5%

COMMENTS:
Large format thin section.
Modes are determined for the oxide-rich gabbro in the center of the section and the host gabbro; the grain sizes are determined for the area below the oxide gabbro (Medium-grained) and the area within and above the oxide gabbro (coarse-grained).
Structure Description: Fabric intensity: 1a overprinted by 4.
Plagioclase: Deformation twins, undulose extinction. Fine-grained recrystallized matrix. Very abundant tiny (<0.001 mm) included or exsolved blebs. Some exsolved opaque needles.
Olivine: Undulose extinction. Fine-grained recrystallization, subgrain development in shear zone. Abundant exsolved dark brown to opaque rods.
Augite: No deformation except in shear zone which has fine-grained recrystallized augite. Fine-scale, planar exsolution dominant; some patches of coarse exsolution.
Amphibole: No deformation.
Sulfides include pyrite, pyrrhotite, and chalcopyrite.
Mode = 1500 / 1400 points.

(109) 176-735B-132R-6 (Piece 2, 81-84 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Gabbro
GRAIN SIZE: Medium-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	4.7	1.4-3.8		anhedral
Plagioclase	52.3	1.8-7.0		subhedral to anhedral
Clinopyroxene	42.6	1.2-6.4		subhedral to ophitic
Opaque Minerals	0.1	<0.3	sulfide > ilmenite	anhedral
Amphibole	0.3			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	4	Magnetite 2%; Amphibole 23%; Smectite 75%
Clinopyroxene	5	Hornblende 80%; Actinolite 20%
Plagioclase	<1	Actinolite 100%

TOTAL ROCK ALTERATION: 3%

COMMENTS:
A few hairline cracks with smectite.
Structure Description: Fabric intensity: 1a.
Plagioclase: Deformation twins, undulose extinction, and subgrain development. Weak zoning in some crystals.
Olivine: Undulose extinction, and subgrain development. Magnetite and needle-like pyrite grains in altered olivine. Pyroxene reaction rims around some crystals.
Augite: Rare subgrain development. Some ilmenite and primary sulfides in twin spaces. Fine-scale, planar exsolution dominant; some patches of coarse, bleby exsolution.
Very minor ilmenite, magnetite, and brown amphibole grain boundary intergrowths with dispersed sulfides (pyrite, pyrrhotite, and chalcopyrite).
Symplectic intergrowths of ilmenite and brown amphibole.
Mode = 1412 points.

(110) 176-735B-134R-5 (Piece 2, 105-110 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Leucocratic Olivine Gabbro
GRAIN SIZE: Medium to Coarse-grained (Coarse-grained before deformation)
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	9.7	1.4-6.8		anhedral to amoeboidal
Plagioclase	75.7	2.0-9.0		recrystallized granular
Clinopyroxene	13.9	1.2-10.4		anhedral to ophitic
Orthopyroxene	0.1			
Opaque Minerals	0.3	0.1-1.0	ilmenite	anhedral
Amphibole	0.3			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	5	Smectite 100%;
Clinopyroxene	3	Diopside 5%; Hornblende 90%; Actinolite 5%
Plagioclase	<1	Actinolite 100%

TOTAL ROCK ALTERATION: 2%

COMMENTS:
Large format thin section.
Structure Description: Fabric intensity: 1b overprinted by 2/3. Igneous texture preserved locally.
Plagioclase: Deformation twins, undulose extinction, subgrain development, recrystallization.
Olivine: Recrystallized with undulose extinction, and subgrain development. Exsolved opaque rods. Some crystals rimmed with pyroxene.
Augite: Recrystallized with undulose extinction. Fine-scale, planar exsolution dominant; some patches of coarse exsolution.
Small amounts of grain boundary intergrowths of brown amphibole, ilmenite, magnetite, and sulfides (pyrite, pyrrhotite, chalcopyrite, and pentlandite).
Mode = 2580 points.

(111) 176-735B-134R-7 (Piece 1B, 73-76 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Medium-grained (may have been coarse-grained before recrystallization).
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	9.8	0.6-4.0		recrystallized granular
Plagioclase	61.9	2.4-8.8		recrystallized granular
Clinopyroxene	27.8	1.3-7.6		subhedral to anhedral
Orthopyroxene	0.1	0.2-1.3		
Opaque Minerals	0.1	<0.3	ilmenite	anhedral
Amphibole	0.3			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	5	Amphibole 5%; Smectite 95%; Magnetite (trace)
Clinopyroxene	5	Hornblende 80%; Actinolite 20%
Plagioclase	<1	Smectite 50%; Actinolite 50%

TOTAL ROCK ALTERATION: 2%

COMMENTS:
Structure Description: Fabric intensity: 2-3.
Plagioclase: Recrystallized into granular plagioclase grains 0.6 to 1.1 mm across. Some relict grains contain subgrains and deformation twins.
Olivine: Recrystallized, with polygonal grain boundaries in aggregates 0.6 to 6.4 mm in length. Pyroxene reaction rims around some crystals.
Augite: Recrystallized. Fine-scale, planar exsolution in some crystals; coarse bleby exsolution in others.
Very small amounts of ilmenite, magnetite, and amphibole intergrowths. Interstitial sulfides (pyrite, pyrrhotite, and chalcopyrite). Traces of secondary vein pyrite.
Mode = 1335 points.

(112) 176-735B-135R-1 (Piece 2E, 98-102 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Medium-grained
TEXTURE: Cataclastic

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	n/a	0.5-2.4		recrystallized porphyroclasts
Plagioclase	n/a	2.0-3.0		recrystallized granular
Clinopyroxene	n/a	0.9-4.0		porphyroclasts
Orthopyroxene	n/a	0.4-0.9		
Opaque Minerals	n/a	<0.5	ilmenite	anhedral

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	3	Magnetite 2%; Amphibole 18%; Smectite 80%
Clinopyroxene	30	Diopside 5%; Hornblende 60%; Actinolite 30%; Oxide 5%
Plagioclase	95	Secondary Plagioclase 96%; Oxide 2%; Actinolite 2%

TOTAL ROCK ALTERATION: 70%

COMMENTS:
One narrow amphibole veinlet.
Structure Description: Fabric intensity: 3, brittle overprint of fine cracks.
Plagioclase: Recrystallized, relict grains contain subgrains and deformation twins, recrystallized to granular grains 0.2 to 0.6 across.
Olivine: Recrystallized, polygonal grain boundaries, in aggregates 2.2 - 4.8 mm in length.
Augite: Extensively recrystallized. Abundant exsolution. Weak zoning(?) in some crystals.
Fine ilmenite, magnetite, amphibole, and sulfide (pyrite and chalcopyrite) segregations intertwined with foliation.

(113) 176-735B-135R-1 (Piece 2F, 110-115 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Contact between Olivine Gabbro and Oxide-rich Clinopyroxenite.
GRAIN SIZE: Coarse-grained
TEXTURE: Cataclastic

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	n/a	0.6-2.4/none		recrystallized porphyroclasts
Plagioclase	n/a	2.2-6.2/<1.2		recrystallized granular to porphyroclasts
Clinopyroxene	n/a	3.2-10.8/1.8-14.0		subhedral to anhedral
Orthopyroxene	n/a	0.1-0.5/0.8-4.8		
Opaque Minerals	n/a	0.3-1.4/0.1-4.8	55% ilmenite/45% magnetite	anhedral to amoeboidal

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	100	Talc 10%; Magnetite 2%; Amphibole 50%; Smectite 38%
Clinopyroxene	10	Diopside 20%; Hornblende 40%; Actinolite 25%; Smectite 10%; Oxide 5%
Orthopyroxene	30	Amphibole 90%; Smectite 5%; Oxide 5%
Plagioclase	80	Secondary Plagioclase 95%; Oxide 1%; Actinolite 4%

TOTAL ROCK ALTERATION: 55%

COMMENTS:
Large format thin section.
Structure Description: Fabric intensity: 3. Local fine-grained recrystallized plagioclase neoblasts may indicate high stress/low temperature deformation in oxide-rich zone. Cataclastic deformation overprints oxide zone.
Plagioclase: Relict grains with deformation twins in a recrystallized matrix.
Olivine: Recrystallized, with subgrains, in aggregates 1.4-4.4 mm in length.
Augite: Recrystallized, with slight undulose extinction associated with cracks. Fine-scale, planar exsolution dominant; some patches of coarse exsolution.
Abundant sulfides (pyrite, pyrrhotite, and chalcopyrite) associated with ilmenite and magnetite, in large amoeboidal patches.

(114) 176-735B-135R-3 (Piece 1, 13-17 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Gabbro
GRAIN SIZE: Medium-grained (may have been coarse-grained before recrystallization).
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	3.6	1.0-4.0		anhedral
Plagioclase	60.9	2.2-11.8		recrystallized granular
Clinopyroxene	34.9	1.6-8.0		anhedral to ophitic
Orthopyroxene	0.1			
Opaque Minerals	0.1	0.1-1.0	ilmenite	subhedral to anhedral
Amphibole	0.4			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	5	Magnetite 1%; Amphibole 19%; Smectite 80%
Clinopyroxene	1	Hornblende 70%; Actinolite 25%; Oxide 5%
Plagioclase	1	Actinolite 100%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
Hairline crack with amphibole.
Structure Description: Fabric intensity: 2.
Plagioclase: Recrystallized locally into granular crystals 0.8-2.0 mm across, with subgrains, and deformation twins. Some crystals weakly zoned.
Olivine: Subgrains. Trace secondary magnetite and pyrite in altered areas. Pyroxene reaction rims around some crystals. Two exsolved phases: transparent brown rods, and opaque, dendritic, planar patches.
Augite: Minor recrystallization. Pyrite in cleavage. Both fine-scale, planar exsolution and patches of coarse exsolution.
Intergrowths of brown amphibole, ilmenite, magnetite, and sulfides (pyrite, pyrrhotite, chalcopyrite, and pentlandite).
Mode = 1340 points.

(115) 176-735B-135R-3 (Piece 6, 96-99 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Leucocratic Gabbro
GRAIN SIZE: Medium-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	n/a	0.8-2.0		anhedral to ophitic
Plagioclase	n/a	1.6-6.8		subhedral to recrystallized granular
Clinopyroxene	n/a	1.6-4.8		anhedral to ophitic
Opaque Minerals	n/a	<0.5	50% ilmenite/50% magnetite	euhedral to anhedral

Accessories: Biotite (abundant anhedral crystals up to 2.0 mm); Titanite (Tr.).

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	35	Talc 10%; Magnetite 10%; Amphibole 75%; Smectite 5%
Clinopyroxene	55	Hornblende 20%; Actinolite 75%; Oxide 5%
Plagioclase	45	Secondary Plagioclase 90%; Actinolite 10%

TOTAL ROCK ALTERATION: 50%

COMMENTS:
1 mm wide irregular veinlets with sodic plagioclase (3.6-5.2 mm), quartz (0.7-1.2 mm), amphibole (1.3-4.4 mm), and biotite (0.6-2.0).
Structure Description: Fabric intensity: 2.
Plagioclase: Recrystallized locally, with deformation twins and subgrains. Some crystals strongly zoned. altered patches with more albite-rich(?) plagioclase.
Olivine: Subgrains. Fibrous amphibole(?) reaction rims.
Augite: No deformation
Titanite after magnetite in oxide intergrowths. No sulfides.

(116) 176-735B-136R-2 (Piece 1B, 63-67 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	18.1	1.6-8.0		anhedral to amoeboidal
Plagioclase	52.9	2.6-9.8		subhedral to anhedral
Clinopyroxene	28.8	2.4-10.2		anhedral
Orthopyroxene	0.1			
Opaque Minerals	0.1	<0.5	ilmenite	anhedral

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	5	Magnetite 1%; Amphibole 5%; Smectite 94%
Clinopyroxene	1	Hornblende 70%; Actinolite 10%; Oxide 20%
Plagioclase	1	Actinolite 100%

TOTAL ROCK ALTERATION: 2%

COMMENTS:
Structure Description: Fabric intensity: 1b.
Plagioclase: Deformation twins, minor subgrains, and some grain boundary migration not clearly due to crystal-plastic processes. Abundant fine (0.001 x 0.03 mm) exsolved(?) fibers.
Olivine: Minor recrystallization with subgrain development. Two exsolution phases: transparent brown rods and dendritic opaque patches. Pyroxene reaction rims around some crystals.
Augite: Some crystal with fine-scale, planar exsolution, some patches with coarse, bleby exsolution.
Trace of grain boundary intergrowths of ilmenite, magnetite, and brown amphibole. Intergrowths pyrite, pyrrhotite, chalcopyrite, and pentlandite with associated brown amphibole.
Mode = 1400 points.

(117) 176-735B-137R-3 (Piece 2A, 34-38 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Leucocratic Troctolitic Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Intergranular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	16.6	2.8-14.0		ophitic
Plagioclase	76.0	2.2-12.8		subhedral to anhedral
Clinopyroxene	7.2	1.2-14.0		ophitic
Opaque Minerals	0.1	0.1-0.8	ilmenite	anhedral
Amphibole	0.1			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	3	Magnetite 5%; Amphibole 20%; Smectite 75%
Clinopyroxene	6	Hornblende 70%; Actinolite 30%
Plagioclase	<1	Actinolite 100%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
Structure Description: Fabric intensity: 2.
Plagioclase: Polygonal recrystallization, with deformation twins, subgrains, and grain boundary migration. Weak zoning in some crystals. Abundant exsolved opaque needles.
Olivine: Subgrains, recrystallized into polygonal grains 1.2-1.8 mm across. Fine exsolved opaque rods.
Augite: May have minor subgrain development. Fine-scale, planar exsolution dominant.
Trace of grain boundary intergrowths of ilmenite, magnetite, and brown amphibole. Intergrowths pyrite, pyrrhotite, chalcopyrite, and pentlandite with associated brown amphibole.
Mode = 1500 points.

(118) 176-735B-137R-3 (Piece 4A, 125-128 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Medium-grained
TEXTURE: Recrystallized Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	16.1	0.6-3.3		recrystallized granular
Plagioclase	63.0	0.8-3.2		recrystallized granular
Clinopyroxene	18.8	1.6-9.2		anhedral to ophitic
Orthopyroxene	0.1			
Opaque Minerals	0.1	<0.3	sulfide > ilmenite	anhedral
Amphibole	1.9			
Accessories: Apatite	(Tr.)			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	3	Magnetite 5%; Amphibole 35%; Smectite 60%
Clinopyroxene	7	Diopside 5%; Hornblende 85%; Actinolite 5%; Oxide 5%
Plagioclase	1	Actinolite 100%

TOTAL ROCK ALTERATION: 2%

COMMENTS:
Structure Description: Fabric intensity: 2.
Plagioclase: Deformation twins, subgrains, and moderate lattice preferred orientation in recrystallized grains.
Olivine: Polygonal recrystallization into ribbons, with subgrains. Pyroxene reaction rims around some crystals; amphibole rims around some.
Augite: Minor undulose extinction. Some crystals with fine-scale, planar exsolution; some patches with coarse exsolution. Some crystals rimmed by amphibole.
Abundant grain boundary amphibole with minor ilmenite, magnetite, and sulfides (pyrite, pyrrhotite, chalcopyrite, and pentlandite).
Mode = 1200 points.

(119) 176-735B-137R-5 (Piece 1B, 34-38 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbronorite
GRAIN SIZE: Coarse-grained
TEXTURE: Cataclastic to Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	5.0	1.4-5.0		anhedral
Plagioclase	48.5	3.8-6.6		porphyroclasts
Clinopyroxene	31.7	2.8-8.0		subhedral to anhedral
Orthopyroxene	9.5	1.2-4.4		subhedral to anhedral
Opaque Minerals	4.8	0.2-3.6	75% magnetite/25% ilmenite	anhedral, amoeboidal
Amphibole	0.1			
Accessories: Apatite	(0.4)			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	3	Magnetite 5%; Amphibole 5%; Smectite 90%
Clinopyroxene	3	Diopside 10%; Hornblende 10%; Actinolite 50%; Oxide 30%
Orthopyroxene	3	Amphibole 100%
Plagioclase	15	Secondary Plagioclase 95%; Actinolite 5%

TOTAL ROCK ALTERATION: 9%

COMMENTS:
Structure Description: Fabric intensity: 1a (upper half), 3 (lower half).
Plagioclase: Deformation twins. Abundant tiny exsolved rods. Recrystallized with subgrains, and a strong lattice preferred orientation in the lower half.
Olivine: Subgrains. Exsolved transparent, dark brown rods.
Augite: No deformation in upper half. Recrystallized and locally overprinted by cataclastic deformation in lower half.
Orthopyroxene: Bent crystals with abundant fine-scale augite exsolution and exsolved opaque rods.
Oxide appears to be interstitial.
Abundant pyrite, pyrrhotite, and chalcopyrite with a trace of pentlandite. Abundant immiscible sulfide spheres included in augite.
Mode = 1100 points.

(120) 176-735B-137R-6 (Piece 6A, 122-126 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Oxide Olivine Gabbro / Oxide Olivine Gabbronorite
GRAIN SIZE: Fine-grained / Medium-grained
TEXTURE: Granular / Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	9.8	0.2-1.0/2.6-3.2		anhedral / anhedral
Plagioclase	59.4	0.3-0.8/1.6-3.6		anhedral / anhedral
Clinopyroxene	22.5	0.2-0.9/1.8-3.6		anhedral / subhedral
Orthopyroxene	tr	0.1-0.5/1.0-6.0		anhedral / subhedral
Opaque Minerals	3.0	0.1-0.5/<0.2	75% ilmenite/25% magnetite	anhedral / amoeboidal
Amphibole	4.9			
Accessories: Apatite	(0.4)			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	1	Amphibole 100%
Clinopyroxene	12	Hornblende 100%
Orthopyroxene	3	Amphibole 100%
Plagioclase	4	Actinolite 100%

TOTAL ROCK ALTERATION: 5%

COMMENTS:
Large format thin section. Fine-grained olivine gabbro with a small corner of medium-grained olivine gabbronorite.
Structure Description: Fabric intensity: fine-grained 1a, medium-grained 1a.
Plagioclase: Recrystallized locally, with deformation twins and subgrains.
Olivine: Subgrains.
Augite: No deformation. Abundant fine-scale, planar exsolution.
Opaque minerals (0.1-2.6 mm diameter) fill spaces between rounded plagioclase and orthopyroxene in an oxide-rich band separating fine-grained gabbro from coarse-grained gabbro. Adjacent to the oxide-rich band, plagioclase and pyroxene in the fine-grained gabbro are recrystallized. Plagioclase is recrystallized in the oxide-rich band. The oxide-rich band is overprinted by cataclastic deformation.
Abundant pyrite, pyrrhotite, and chalcopyrite in the fine-grained gabbro.
Mode = 1048 points.

(121) 176-735B-138R-3 (Piece 2A, 65-68 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Medium-grained
TEXTURE: Cataclastic

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	11.6	1.2-6.4		recrystallized porphyroclasts
Plagioclase	54.1	1.4-4.8		recrystallized granular
Clinopyroxene	33.4	1.2-9.6		anhedral to ophitic
Opaque Minerals	0.6	0.1-2.2	ilmenite	anhedral
Amphibole	0.3			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	4	Talc 5%; Magnetite 5%; Amphibole 55%; Smectite 35%
Clinopyroxene	3	Diopside 3%; Hornblende 15%; Actinolite 77%; Oxide 5%
Plagioclase	4	Secondary Plagioclase 95%; Actinolite 5%

TOTAL ROCK ALTERATION: 3%

COMMENTS:
Structure Description: Fabric intensity: 2.
Plagioclase: Recrystallized, with deformation twins. Abundant tiny (0.001 mm diameter) exsolved opaque rods.
Olivine: Subgrains recrystallized into ribbons with polygonal grains. Exsolved stubby opaque rods, exsolved needles, and exsolved dendritic patches.
Augite: Locally recrystallized, with minor undulose extinction. Fine-scale, planar exsolution dominant; some patches of coarse exsolution.
Large interstitial patches of brown amphibole, ilmenite, magnetite, and sulfides (pyrite, pyrrhotite, chalcopyrite, and pentlandite).
Mode = 1400 points.

(122) 176-735B-138R-7 (Piece 1, 0-4 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Gabbro
GRAIN SIZE: Medium to Coarse-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	4.5	1.2-3.4		anhedral to amoeboidal
Plagioclase	58.0	1.0-7.2		subhedral to anhedral
Clinopyroxene	37.0	1.0-7.8		ophitic to poikilitic
Opaque Minerals	0.2	0.1-1.2	ilmenite	anhedral
Amphibole	0.3			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	2	Talc 5%; Magnetite 1%; Amphibole 79%; Smectite 15%
Clinopyroxene	3	Hornblende 85%; Actinolite 15%
Plagioclase	<1	Actinolite 100%

TOTAL ROCK ALTERATION: 1%

Structure Description: Fabric intensity: 2 (weak 1b). Contains a weak preferred orientation of plagioclase and pyroxene grains.
Plagioclase: Recrystallized with deformation twins and subgrains. Weak zoning in some crystals. Abundant exsolved tiny opaque rods.
Olivine: Subgrains. Exsolved dark brown rods. Pyroxene reaction rims around some crystals.
Augite: No deformation. Fine-scale, planar exsolution dominant; some patches of coarse exsolution.
Ilmenite, amphibole, magnetite, and sulfide (pyrrhotite, chalcopyrite, pentlandite) intergrowths.
Mode = 1800 points.

(123) 176-735B-138R-7 (Piece 1, 14-18 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Granular to Ophitic

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	10.4	3.0-8.4		ophitic
Plagioclase	51.7	1.0-9.2		subhedral to anhedral
Clinopyroxene	36.8	2.2-10.0		ophitic
Orthopyroxene	0.1	0.6-0.9		rims around olivine(?)
Opaque Minerals	0.3	0.1-0.9	ilmenite	anhedral
Amphibole	0.6			
Accessories: Apatite	(0.1)			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	2	Magnetite 1%; Amphibole 14%; Smectite 85%
Clinopyroxene	1	Diopside 1%; Hornblende 50%; Actinolite 49%
Plagioclase	<1	Actinolite 100%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
Structure Description: Fabric intensity: 1b.
Plagioclase: Deformation twins, and minor subgrains. Abundant exsolved high birefringent needles. Weak zoning in some crystals.
Olivine: Minor recrystallization, with subgrains. Exsolved opaque needles up to 0.001 x 0.3 mm. Pyroxene reaction rims around some crystals; amphibole rims around some.
Augite: No deformation. Fine-scale, planar exsolution dominant; some patches of coarse exsolution.
Trace of grain boundary intergrowths of ilmenite, magnetite, amphibole, and sulfide (pyrite, pyrrhotite, chalcopyrite, and pentlandite).
Mode = 1800 points.

(124) 176-735B-139R-4 (Piece 3, 74-77 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Gabbro
GRAIN SIZE: Medium-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	2.3	0.6-1.6		anhedral
Plagioclase	53.5	0.8-4.0		anhedral
Clinopyroxene	43.3	0.8-4.0		subhedral to ophitic
Orthopyroxene	0.1	0.2-0.8		rims around olivine(?)
Opaque Minerals	0.1	<0.1	sulfide > ilmenite	anhedral
Amphibole	0.7			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	1	Smectite 100%
Clinopyroxene	1	Hornblende 80%; Actinolite 20%
Plagioclase	<1	Actinolite 100%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
Structure Description: Fabric intensity: 1b.
Plagioclase: Deformation twins, with subgrains, and undulose extinction. Weak zoning in some crystals.
Olivine: Subgrains. Brown transparent exsolved rods. Pyroxene reaction rims around some crystals.
Augite: No deformation. Abundant exsolution.
Minor but pervasive amounts of grain boundary intergrowths of ilmenite, magnetite, amphibole, and sulfide (pyrite, pyrrhotite, chalcopyrite, and pentlandite).
Mode = 1500 points.

Note: The progression from sections 124-127 illustrates a good variety of deformation microstructures illustrating the transition from “magmatic” to “crystal-plastic” deformation fabrics.

(125) 176-735B-139R-4 (Piece 4, 116-120 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Medium-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	14.4	1.2-4.6		recrystallized porphyroclasts
Plagioclase	61.8	0.8-9.0		recrystallized granular
Clinopyroxene	23.2	1.0-4.0		anhedral
Orthopyroxene	0.1			
Opaque Minerals	0.4	0.1-0.8	95% ilmenite/5% magnetite	anhedral
Amphibole	0.1			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	2	Magnetite 2%; Amphibole 10%; Smectite 88%
Clinopyroxene	1	Hornblende 20%; Actinolite 80%
Plagioclase	<1	Actinolite 100%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
Structure Description: Fabric intensity: 1a, perhaps a weak magmatic foliation overprinted by 2.
Plagioclase: Some recrystallization, with deformation twins, subgrains, and undulose extinction. Weak zoning in some crystals.
Olivine: Subgrains and recrystallized grains, with polygonal 120-120-120 degree intersections. Some crystals exsolve abundant dendritic, opaque patches, and less abundant transparent, brown rods. Pyroxene reaction rims around some crystals.
Augite: Some minor undulatory extinction. Abundant fine-grained planar exsolution.
Minor amounts of grain boundary intergrowths of ilmenite, magnetite, amphibole, and sulfide (pyrite, pyrrhotite, chalcopyrite, and rare pentlandite).
Mode = 1576 points.

(126) 176-735B-140R-1 (Piece 3A, 24-28 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Medium-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	10.3	1.0-4.4		anhedral to recrystallized
Plagioclase	63.1	1.4-5.2		recrystallized granular
Clinopyroxene	26.0	1.4-5.4		anhedral
Orthopyroxene	0.2			
Opaque Minerals	0.4	0.1-0.8	90% ilmenite/10% magnetite	anhedral

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	3	Magnetite 10%; Amphibole 20%; Smectite 70%
Clinopyroxene	1	Hornblende 70%; Actinolite 30%
Plagioclase	<1	Actinolite 100%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
Structure Description: Fabric intensity: 1b overprinted by 2.
Plagioclase: Deformation twins, subgrains, and undulose extinction. Weak zoning in some crystals.
Olivine: Subgrains, with some crystals drawn into ribbons. Minor amounts of exsolved opaque rods and dendrites. Some secondary pyrite in altered areas. Pyroxene reaction rims around some crystals.
Augite: No deformation. Fine-scale planar exsolution.
Trace of grain boundary intergrowths of ilmenite, magnetite, brown amphibole, and sulfide (pyrite, pyrrhotite, chalcopyrite, and pentlandite).
Mode = 1420 points.

(127) 176-735B-140R-5 (Piece 2, 28-31 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	8.6	1.6-5.2		anhedral to recrystallized
Plagioclase	40.8	0.8-7.0		subhedral to anhedral to recrystallized
Clinopyroxene	50.6	1.8-20.4		subhedral to anhedral
Opaque Minerals	Tr.	<0.4	97% ilmenite/3% magnetite	anhedral

ALTERATION	PERCENT ALTERED	SECONDARY MINERALs
Olivine	2	Magnetite 2%; Amphibole 5%; Smectite 93%
Clinopyroxene	1	Hornblende 70%; Actinolite 30%
Plagioclase	<1	Actinolite 100%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
Structure Description: Fabric intensity: 2.
Plagioclase: Recrystallized, with deformation twins, subgrains, and undulose extinction. Abundant tiny (0.001 diameter) exsolved opaque needles. Weak zoning in some crystals.
Olivine: Recrystallized, with polygonal subgrains (0.4-1.2 mm). Minor amounts of exsolved dendritic opaque minerals. Pyroxene reaction rims around some crystals.
Augite: Recrystallized, with undulatory extinction. Fine-scale, planar exsolution dominant; some patches of coarse exsolution.
Trace of grain boundary intergrowths of ilmenite, magnetite, amphibole, and sulfides. In the more deformed areas sulfides are partly replaced by secondary pyrite needles.
Mode = 1600 points.

(128) 176-735B-140R-5 (Piece 2, 35-39 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Medium-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	12.4	0.8-4.0		anhedral
Plagioclase	54.1	1.2-7.2		subhedral to anhedral
Clinopyroxene	33.4	2.2-6.4		anhedral
Opaque Minerals	Tr.	0.1-0.6	ilmenite	anhedral
Amphibole	0.1			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	2	Magnetite 2%; Amphibole 5%; Smectite 93%
Clinopyroxene	1	Hornblende 70%; Actinolite 30%
Plagioclase	<1	Actinolite 100%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
Structure Description: Fabric intensity: 1b with a 2 overprint.
Plagioclase: Deformation twins, subgrains, and undulose extinction. Weak zoning in some crystals.
Olivine: Subgrains. Pyroxene reaction rims around some crystals.
Augite: No deformation. Fine-scale, planar exsolution dominant; some patches of coarse exsolution.
Minor amounts of grain boundary intergrowths of ilmenite, magnetite, and brown amphibole. Abundant sulfides (pyrite, pyrrhotite, chalcopyrite, and pentlandite).
Mode = 1500 points.

(129) 176-735B-142R-7 (Piece 1, 15-18 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Disseminated oxide Olivine Gabbro
GRAIN SIZE: Medium-grained (may have been coarse-grained before deformation).
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	5.2	1.2-7.6		recrystallized granular
Plagioclase	61.2	0.8-6.4		subhedral to recrystallized granular
Clinopyroxene	32.2	2.0-9.6		anhedral to subophitic
Orthopyroxene	0.3			
Opaque Minerals	1.0	0.1-0.9	60% ilmenite/40% magnetite	anhedral
Amphibole	0.1			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	2	Magnetite 2%; Amphibole 5%; Smectite 93%
Clinopyroxene	2	Hornblende 25%; Actinolite 60%; Oxide 15%
Orthopyroxene	1	Oxide 100%
Plagioclase	<1	Actinolite 100%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
Structure Description: Fabric intensity: 2-3.
Plagioclase: Recrystallization, with deformation twins, subgrains, and undulose extinction. Abundant tiny (0.001 x 0.015 mm) exsolved opaque rods. Weak zoning in some crystals.
Olivine: Recrystallized with polygonal subgrains. Secondary magnetite and pyrite in altered areas. Two exsolution types: light brown, transparent, rods and plates, and patches of dendritic dark brown material; these two forms may be different habits of the same exsolved phase. An ilmenite-augite symplectite occurs at the margin of one olivine crystal.
Augite: Recrystallized. Fine-scale, planar exsolution dominant; some patches of coarse exsolution. A few crystals with abundant, high relief, elongate inclusions (exsolved orthopyroxene?).
Grain boundary intergrowths of ilmenite, magnetite, and amphibole. Sulfides (pyrite, pyrrhotite, chalcopyrite, and pentlandite) intergrown with ilmenite. Minor amounts of sulfide and amphibole intergrowths.
Mode = 1445 points.

(130) 176-735B-142R-3 (Piece 4B, 94-97 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Leucocratic Olivine Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Intergranular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	7.8	2.0-6.6		anhedral to amoeboidal
Plagioclase	65.6	1.2-11.2		subhedral to anhedral
Clinopyroxene	26.1	3.6-12.4		anhedral to subophitic
Orthopyroxene	0.1			
Opaque Minerals	0.2	0.1-3.2	sulfide > ilmenite	anhedral
Amphibole	0.2			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	2	Smectite 100%
Clinopyroxene	1	Diopside 2%; Hornblende 90%; Actinolite 8%
Orthopyroxene	15	Amphibole 100%
Plagioclase	<1	Actinolite 100%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
Structure Description: Fabric intensity: 1b overprinted by 2.
Plagioclase: Deformation twins, subgrains, and undulose extinction. Abundant exsolved opaque needles (0.0005 to 0.001 mm in diameter).
Olivine: Minor subgrains. Abundant exsolved dark brown to opaque rods and dendrites.
Augite: Minor recrystallization. Fine-scale, planar exsolution dominant; some patches of coarse exsolution.
Minor amounts of grain boundary intergrowths of ilmenite, magnetite, amphibole, and sulfide (pyrite, pyrrhotite, chalcopyrite, and pentlandite).
Mode = 1600 points.

(131) 176-735B-143R-5 (Piece 2A, 40-44 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Granular to Ophitic

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	14.0	2.2-10.0		anhedral to ophitic
Plagioclase	62.2	1.2-13.2		subhedral to anhedral
Clinopyroxene	22.9	1.2-7.6		anhedral to ophitic
Orthopyroxene	0.3	0.5-1.0		rims around olivine
Opaque Minerals	0.1	0.1-0.7	ilmenite	anhedral
Amphibole	0.5			

Accessories: Titanite (Tr.)

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	2	Talc 5%; Magnetite 5%; Amphibole 20%; Smectite 70%
Clinopyroxene	2	Hornblende 70%; Actinolite 30%
Orthopyroxene	<1	Amphibole 100%
Plagioclase	1	Actinolite 100%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
One hairline crack with amphibole.
Structure Description: Fabric intensity: 1b, overprinted by 2.
Plagioclase: Deformation twins, with undulose extinction, and polygonal subgrains (0.4-1.2 mm).Weak zoning. Exsolved opaque needles (0.15 x 0.001 mm).
Olivine: Recrystallized, with polygonal subgrains (0.4-0.8 mm). Spinel inclusions. Exsolved dark brown transparent rods, and opaque dendritic patches in planes parallel to extinction. Rims of pyroxene and alteration (smectite?).
Augite: No deformation. Fine-scale planar exsolution dominant. Amphibole occurs in altered cores, as exsolution or alteration parallel to cleavage, and as rims.
Trace of ilmenite, magnetite, brown amphibole, and sulfide (pyrite, pyrrhotite, chalcopyrite, trace pentlandite) grain boundary intergrowths. Secondary pyrrhotite and magnetite around edges of altered olivine.
Mode = 1500 points.

(132) 176-735B-144R-1 (Piece 3E, 142-147 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: OPX-Bearing Oxide Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	0.2	n/a		
Plagioclase	36.9	0.8-8.8		anhedral
Clinopyroxene	52.5	1.6-13.8		subhedral to anhedral
Orthopyroxene	2.6	2.6-7.2		subhedral
Opaque Minerals	7.2	0.2-1.8	65% ilmenite/35% magnetite	anhedral to amoeboidal
Amphibole	0.5			subhedral to anhedral

Accessories: Apatite (0.1).

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Clinopyroxene	13	Diopside 2%; Hornblende 13%; Actinolite 75%; Smectite tr.; Oxide 10%
Orthopyroxene	9	Amphibole 80%; Oxide 20%
Plagioclase	3	Oxide 90%; Actinolite 10%

TOTAL ROCK ALTERATION: 8%

COMMENTS:
Large format thin section.
Structure Description: Fabric intensity: 1b, overprinted by 2; contains undeformed oxide patches.
Plagioclase: Recrystallization, with deformation twins, subgrains, and undulose extinction. Abundant exsolved opaque needles.
Olivine: Subgrains.
Augite: Recrystallized in places. Abundant exsolution of low-Ca pyroxene. Abundant opaque inclusions, and exsolved opaque needles.
Orthopyroxene: Fine-scale planar exsolution.
Amphibole: Zoned with brown, pleochroic cores and clear rims.
Sulfides: Pyrite, pyrrhotite, chalcopyrite, ± pentlandite. Very large (up to 1 mm) sulfide globules in oxide and pyroxene. Ilmenite, amphibole, and sulfides along pyroxene cleavage. Trace of secondary magnetite and pyrrhotite in amphibole.
Mode = 2000 points.

(133) 176-735B-144R-4 (Piece 2B, 98-103 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Leucocratic Disseminated Oxide Olivine Gabbro
GRAIN SIZE: Medium-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	7.0	2.0-6.2		anhedral
Plagioclase	65.7	1.2-4.8		anhedral
Clinopyroxene	25.5	1.1-11.2		subhedral to anhedral
Orthopyroxene	0.3	0.3-1.0		rims around olivine
Opaque Minerals	1.4	0.1-3.0	70% ilmenite/30% magnetite	anhedral to amoeboidal
Amphibole	0.1			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	3	Magnetite 10%; Amphibole 30%; Smectite 60%
Clinopyroxene	4	Diopside 5%; Hornblende 10%; Actinolite 80%; Oxide 5%
Orthopyroxene	5	Amphibole 85%; Oxide 15%
Plagioclase	2	Oxide 20%; Actinolite 80%

TOTAL ROCK ALTERATION: 3%

COMMENTS:
Large format thin section.
Structure Description: Fabric intensity: 1b overprinted by 2.
Plagioclase: Deformation twins, subgrains, and undulose extinction. Abundant exsolved opaque needles in the cores of some crystals.
Weak plagioclase alignment.
Olivine: Polygonal subgrains (0.9-1.4 mm), with 120-120-120 degree grain intersections. Exsolved opaque rods, needles, and dendritic patches. Some crystals rimmed by pyroxene.
Augite: No deformation. Abundant exsolution. Rare euhedral to subhedral plagioclase inclusions.
Opaque minerals: Rimmed with pyroxene.
Sulfides usually isolated. Fairly coarse ilmenite, magnetite, sulfide, and amphibole patches and grain boundary intergrowths. Trace of secondary pyrrhotite in altered olivine.
Ilmenite - pyroxene symplectites.
Mode = 2700 points.

(134) 176-735B-144R-5 (Piece 1, 4-10 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Leucocratic OPX-Bearing Oxide Gabbro
GRAIN SIZE: Medium to Coarse-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	0.4	0.8-3.0		
Plagioclase	74.5	1.2-4.8		anhedral
Clinopyroxene	18.9	2.0-11.2		subhedral to anhedral
Orthopyroxene	1.1	0.3-1.4		subhedral
Opaque Minerals	4.6	0.1-3.2	ilmenite	anhedral to amoeboidal
Amphibole	0.5			

Accessories: Apatite (Tr.).

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	20	Talc 5%; Magnetite 10%; Amphibole 35%; Smectite 50%
Clinopyroxene	5	Hornblende 10%; Actinolite 75%; Oxide 15%
Orthopyroxene	10	Amphibole 70%; Smectite 15%; Oxide 15%
Plagioclase	10	Oxide 80%; Actinolite 20%

TOTAL ROCK ALTERATION: 9%

COMMENTS:
Large format thin section.
Structure Description: Fabric intensity: 1a. Excellent preservation of local igneous texture yet displays polygonal plagioclase crystals suggesting equilibration at high temperatures. Interstitial oxide phase is also polygonal.
Plagioclase: Recrystallized, with deformation twins, and minor undulose extinction. Weakly zoned, with abundant exsolved opaque needles in cores.
Olivine: Subgrains, recrystallized in aggregates 2.8-5.2 mm.
Augite: Very local recrystallization. Abundant exsolution. Ilmenite (?) along cleavage.
Opaque minerals rimmed with amphibole. Oxides in seams around porphyroclasts.
Sulfides: pyrite, pyrrhotite, chalcopyrite.
Mode = 2200 points.

(135) 176-735B-144R-5 (Piece 4B, 109-112 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Leucocratic Disseminated Oxide Gabbro
GRAIN SIZE: Medium-grained (coarse before recrystallization).
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY	
Plagioclase	67.6	0.6-4.4			anhedral
Clinopyroxene	30.4	2.0-8.8			subhedral to anhedral
Orthopyroxene	0.7	0.6-1.2			subhedral
Opaque Minerals	1.0	0.1-0.7	60% magnetite/40% ilmenite	anhedral	
Amphibole	0.3	0.4-1.0			anhedral

Accessories:Titanite (Tr.)

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Clinopyroxene	15	Diopside 15%; Hornblende 55%; Actinolite 25%; Oxide 5%
Orthopyroxene	5	Amphibole 100%
Plagioclase	1	Actinolite 100%

TOTAL ROCK ALTERATION: 5%

COMMENTS:
Structure Description: Fabric intensity: 2-3;
Plagioclase: recrystallized with strong alignment, local igneous textures preserved. Abundant exsolved opaque needles (0.35 x 0.001 mm) in cores of some crystals.
Augite: Recrystallized subgrains (0.2-0.8 mm) with local relict porphyroclasts. Abundant exsolution.
Orthopyroxene: Occurs as tabular (0.1 x 0.2 mm) inclusions or exsolved crystals in augite, and as discrete subhedral laths with exsolved opaque needles.
Amphibole: Alteration of pyroxene, and as an interstitial magmatic (?) phase.
Oxides: Abundant ilmenite exsolution in magnetite.
Sulfides: Pyrite, pyrrhotite, chalcopyrite, ± pentlandite. Ilmenite, magnetite, brown amphibole, intergrown with sulfides. Train of sulfide globules in plagioclase neoblasts, generally near grain boundaries associated with ilmenite and brown amphibole.
Mode = 1515 points.

(136) 176-735B-144R-6 (Piece 5B, 89-92 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Felsic Vein
GRAIN SIZE: Coarse-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY	
Plagioclase	76.8	1.4-14.0			euhedral to subhedral
Clinopyroxene	11.0	n.a			subhedral to anhedral
Opaque Minerals	1.3	0.1-1.2	80% ilmenite/20% hematite	anhedral	
Amphibole poikilitic	9.1	0.6-7.0			subhedral to anhedral to
Quartz	1.8	0.4-1.6			anhedral
Accessories: Titanite (abundant)		0.1-1.0			subhedral

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Clinopyroxene	90	Hornblende 5%; Actinolite 80%; Smectite 5%; Oxide 10%
Plagioclase	75	Secondary Plagioclase 82%; Epidote 5%; Smectite 3%; Actinolite 10%

TOTAL ROCK ALTERATION: 68%

COMMENTS:
Secondary plagioclase along cracks. Some quartz and titanite between plagioclase grains.
Structure Description: Fabric intensity: 1a overprinted by 2; minor cataclastic overprint; fine-grained recrystallized neoblasts of plagioclase may be result of high stress/low temperature deformation.
Plagioclase: Large crystals with deformation twins, subgrains, and undulose extinction, in a matrix of fine-grained recrystallized neoblasts. Strongly zoned. Exsolved opaque needles.
Augite: No deformation.
Secondary sulfides in vein traces.
Mode = 1186 points.

(137) 176-735B-145R-4 (Piece 1, 38-44 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Intergranular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	14.5	2.2-14.4		ophitic
Plagioclase	63.8	1.6-11.8		subhedral to anhedral
Clinopyroxene	21.4	2.8-12.8		ophitic
Orthopyroxene	Tr.			
Opaque Minerals	0.2	0.1-2.4	ilmenite	anhedral
Amphibole	0.1			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	3	Amphibole 20%; Smectite 80%
Clinopyroxene	1	Hornblende 2%; Actinolite 98%
Plagioclase	<1	Actinolite 100%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
Large format thin section.
One 0.5 mm wide crack with amphibole and minor diopside.
Structure Description: Fabric intensity: 1a.
Plagioclase: Deformation twins. Strongly zoned. Exsolved opaque needles, and high birefringence needles in some crystals.
Olivine: Subgrains. Exsolved brown transparent rods and opaque needles.
Augite: No deformation. Fine-scale, planar exsolution dominant; some patches with coarse bleby exsolution.
A few sulfides up to 1 mm include pyrite, pyrrhotite, and chalcopyrite. Trace of secondary pyrrhotite. Minor amounts of ilmenite, magnetite, and amphibole intergrowths along grain boundaries.
Mode = 2300 points.

(138) 176-735B-145R-5 (Piece 4B, 53-57 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: OPX-Bearing Oxide Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY	
Olivine	3.0	1.4-5.0			anhedral
Plagioclase	52.6	1.6-8.0			recrystallized granular
Clinopyroxene	39.9	4.4-18.4			anhedral
Orthopyroxene	2.0	1.6-5.6			anhedral to poikilitic
Opaque Minerals	2.0	0.1-4.4	60% ilmenite/40% magnetite	anhedral	
Amphibole	0.5				

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	5	Magnetite 15%; Amphibole 35%; Smectite 50%
Clinopyroxene	15	Hornblende 15%; Actinolite 70%; Oxide 15%
Orthopyroxene	25	Amphibole 85%; Oxide 15%
Plagioclase	5	Secondary Plagioclase 85%; Actinolite 15%

TOTAL ROCK ALTERATION: 9%

COMMENTS:
Large format thin section.
Structure Description: Fabric intensity: 3.
Plagioclase: Deformation twins, subgrains, undulose extinction, and recrystallization with strong preferred alignment. Abundant opaque needles, opaque blebs, and brown transparent plates in cores.
Olivine: Recrystallized with local ribbons. Round sulfide/ilmenite globule inclusion. Exsolved opaque dendritic patches and transparent brown plates. Rimmed by pyroxene.
Augite: Some recrystallization. Abundant exsolved opaque needles.
Orthopyroxene: Fine-scale exsolution. Symplectic intergrowths with ilmenite, commonly along olivine grain boundaries.
Augite, orthopyroxene, amphibole, and ilmenite intergrowths.
Minor sulfides include pyrite, pyrrhotite, and chalcopyrite.
Mode = 2200 points.

(139) 176-735B-146R-4 (Piece 3, 118-122 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: OPX-Bearing Olivine Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Ophitic

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	11.9	1.0-10.4		ophitic
Plagioclase	51.7	3.2-10.0		recrystallized granular
Clinopyroxene	34.6	3.0-20.8		ophitic
Orthopyroxene	1.3			
Opaque Minerals	0.2	0.1-1.2	ilmenite	anhedral
Amphibole	0.3			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	2	Magnetite 5%; Amphibole 33%; Smectite 60%; Pyrite 2%
Clinopyroxene	2	Hornblende 80%; Actinolite 15%; Oxide 5%
Orthopyroxene	2	Amphibole 100%
Plagioclase	10	Secondary Plagioclase 90%; Actinolite 10%

TOTAL ROCK ALTERATION: 6%

COMMENTS:
Large format thin section.
Structure Description: Fabric intensity: 3 overprinting 1b.
Plagioclase: Deformation twins, some recrystallized into 0.4-1.2 mm grains. Abundant exsolved opaque blebs. High birefringent needles in some crystals.
Olivine: Recrystallized, with polygonal subgrains (0.2-0.8 mm). Exsolved opaque needles and dendritic patches. Some crystals rimmed by pyroxene.
Augite: Recrystallized. Euhedral to subhedral plagioclase inclusions.
Minor amounts of ilmenite, magnetite, amphibole, and sulfide intergrowths along grain boundaries. Traces of secondary magnetite, pyrite, and pyrrhotite in altered olivine.
Mode = 2300 points.

(140) 176-735B-147R-6 (Piece 2A, 45-51 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Medium-grained
TEXTURE: Cataclastic

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	7.5	1.2-4.8		porphyroclasts
Plagioclase	63.6	0.8-6.0		recrystallized granular; porphyroclasts
Clinopyroxene	27.2	1.8-5.0		ophitic to porphyroclasts
Orthopyroxene	0.6			
Opaque Minerals	0.8	0.1-0.6	ilmenite	anhedral
Amphibole	0.2			

Accessories: Apatite (0.1).

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	2	Magnetite 5%; Smectite 95%
Clinopyroxene	3	Diopside 10%; Hornblende 50%; Actinolite 30%; Oxide 10%
Orthopyroxene	5	Amphibole 100%
Plagioclase	85	Secondary Plagioclase 98%; Actinolite 2%

TOTAL ROCK ALTERATION: 55%

COMMENTS:
Large format thin section.
Structure Description: Fabric intensity: 3>4; kinematic indicators (S-C, asymmetric porphyroclasts) indicate normal displacement.
Plagioclase: Recrystallized to 0.1-0.2 mm grains, with subgrain rotation, deformation twins, and undulose extinction. Abundant exsolved blebs and needles in cores.
Olivine: Recrystallization, with subgrains 0.2-0.8 mm, and ribbons.
Augite: Recrystallization with relict porphyroclasts. Abundant low-Ca pyroxene exsolution. Exsolved opaque needles and blebs.
Well developed amphibole, ilmenite, and magnetite intergrowths with rare sulfides (pyrite, pyrrhotite, chalcopyrite).
Mode = 2400 points.

(141) 176-735B-148R-1 (Piece 2G, 101-103 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Microgabbro
GRAIN SIZE: Fine-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	3.3	0.4-0.9		subhedral to anhedral
Plagioclase	58.3	0.3-1.3		anhedral
Clinopyroxene	36.9	0.2-1.7		euhedral to anhedral
Orthopyroxene	0.3			
Opaque Minerals	0.2	<0.1	sulfide	anhedral
Amphibole	1.0			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	1	Amphibole 20%; Smectite 80%
Clinopyroxene	1	Hornblende 100%
Plagioclase	<1	Actinolite 100%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
Mini-core, 2.5 cm diameter.
Structure Description: Fabric intensity: 1b.
Plagioclase: Deformation twins, subgrains, and undulose extinction, with evidence for grain boundary migration. A strong alignment, probably of magmatic origin, is present
Olivine: Weak subgrain development.
Augite: Very minor undulose extinction. Rare euhedral to subhedral plagioclase inclusions.
Abundant grain boundary brown amphibole intergrown with sulfides (pyrite, pyrrhotite, and chalcopyrite).
Mode = 1000 points.

(142) 176-735B-148R-1 (Piece 3B, 127-132 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: OPX-Bearing Oxide Gabbro
GRAIN SIZE: Medium-grained
TEXTURE:

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Plagioclase	48.9	1.6-4.2		porphyroclasts
Clinopyroxene	38.0	1.6-6.8		porphyroclasts
Orthopyroxene	1.2	1.4-6.4		subhedral
Opaque Minerals	11.4	0.1-2.8	65% ilmenite/35% magnetite	anhedral to amoeboidal
Amphibole	0.5			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Clinopyroxene	10	Diopside 15%; Hornblende 10%; Actinolite 70%; Oxide 5%
Orthopyroxene	5	Amphibole 90%; Oxide 10%
Plagioclase	95	Secondary Plagioclase 97%; Actinolite 3%

TOTAL ROCK ALTERATION: 50%

COMMENTS:
Large format thin section.
Structure Description: Fabric intensity: 4>3.
Plagioclase: Recrystallized as a fine-grained matrix (<.03 mm), with deformation twins, and subgrain rotation. Abundant exsolved opaque blebs.
Augite: Recrystallized, with relict grains. Abundant exsolution of low-Ca pyroxene. Contains dark brown and opaque needles.
Oxide occurs interstitially, and as inclusions in pyroxene porphyroclasts; interstitial oxide has polygonal crystal shapes implying recrystallization.
Abundant ilmenite, magnetite, amphibole, and sulfide (pyrite, pyrrhotite, chalcopyrite) intergrowths.
Mode = 2000 points.

(143) 176-735B-148R-7 (Piece 4, 114-118 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Medium-grained (Probably coarse before recrystallization).
TEXTURE: Recrystallized

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY	
Olivine	13.6	1.1-4.4			anhedral to granular
Plagioclase	64.6	2.0-6.8			recrystallized granular
Clinopyroxene	20.2	1.8-7.2			subhedral to anhedral
Orthopyroxene	0.2				
Opaque Minerals	0.2	<0.4	95% ilmenite/5% magnetite	anhedral	
Amphibole	1.2				

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	2	Magnetite 2%; Amphibole 20%; Smectite 78%
Clinopyroxene	2	Hornblende 90%; Actinolite 10%
Orthopyroxene	5	Amphibole 100%
Plagioclase	1	Actinolite 100%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
Structure Description: Fabric intensity: 3.
Plagioclase: Recrystallization, with deformation twins, subgrains, undulose extinction, and polygonal grains (0.6-1.8 mm). Abundant exsolved opaque needles.
Olivine: Recrystallized, with subgrains (1.1-4.4 mm) containing 120°-120°-120° grain intersections, and anhedral aggregates (3.4-7.6 mm). Rare exsolved dark brown to opaque dendritic patches.
Augite: Recrystallized (0.4-0.8 mm), with a few relict grains. Both fine-scale and coarse exsolution. Rimmed with amphibole.
Trace of ilmenite, magnetite, amphibole grain boundary intergrowths. Abundant sulfides (pyrite, pyrrhotite, chalcopyrite, and pentlandite) intergrown with amphibole.
Mode = 1400 points.

(144) 176-735B-149R-2 (Piece 2, 55-58 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Microgabbro
GRAIN SIZE: Fine-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	5.3	0.3-0.8		anhedral
Plagioclase	59.0	0.3-1.2		anhedral
Clinopyroxene	34.2	0.3-1.2		anhedral
Opaque Minerals	0.1	<0.1	sulfide > oxide	anhedral
Amphibole	1.4			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	2	Smectite 100%
Clinopyroxene	3	Hornblende 100%
Plagioclase	<1	Actinolite 100%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
Structure Description: Fabric intensity: 1b, overprinted by 2.
Plagioclase: Deformation twins, with subgrains, and undulose extinction.
Olivine: Undulose extinction, and subgrains in aggregates (1.2-2.0 mm).
Augite: Fine-scale planar exsolution dominant, with inclusions or exsolved rods of orthopyroxene in some crystals. Contains abundant small exsolved opaque needles. No deformation.
Trace of ilmenite, magnetite, amphibole, and sulfide grain boundary intergrowths.
Mode = 1400 points.

(145) 176-735B-149R-7 (Piece 2, 123-126 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Medium-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY	
Olivine	9.6	1.0-4.2			anhedral to amoeboidal
Plagioclase	56.3	1.4-10.0			subhedral to anhedral
Clinopyroxene	33.6	1.2-4.4			anhedral
Orthopyroxene	0.2				
Opaque Minerals	0.2	0.1-0.4	70% ilmenite/30% magnetite	anhedral	
Amphibole	0.1				

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	2	Magnetite 1%; Smectite 99%
Clinopyroxene	<1	Hornblende 95%; Actinolite 5%
Orthopyroxene	<1	Amphibole 100%
Plagioclase	<1	Actinolite 100%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
Structure Description: Fabric intensity: 1b.
Plagioclase: Minor recrystallization, with deformation twins, and subgrains. Abundant exsolved opaque needles. Weakly zoned.
Olivine: Subgrains. Exsolved dark brown transparent rods. Rimmed with pyroxene.
Augite: No deformation. Fine-grained, planar exsolution dominant with some patches containing coarse exsolution.
Trace of ilmenite, magnetite, amphibole, and sulfide (pyrite, pyrrhotite, chalcopyrite,± pentlandite) grain boundary intergrowths. Minor secondary pyrite.
Mode = 1190 points.

(146) 176-735B-150R-4 (Piece 2, 102-105 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Medium-grained
TEXTURE: Cataclastic

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY	
Olivine	6.8	0.8-5.5			porphyroclasts
Plagioclase	63.6	1.2-6.8			porphyroclasts
Clinopyroxene	28.7	0.8-4.6			porphyroclasts
Orthopyroxene	0.3				
Opaque Minerals	0.3	0.1-0.4	50% ilmenite/50% magnetite	anhedral	
Amphibole	0.3				

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	3	Magnetite 2%; Amphibole 23%; Smectite 75%
Clinopyroxene	10	Diopside 25%; Hornblende 40%; Actinolite 30%; Oxide 5%
Orthopyroxene	2	Amphibole 95%; Oxide 5%
Plagioclase	50	Secondary Plagioclase 95%; Actinolite 5%

TOTAL ROCK ALTERATION: 35%

COMMENTS:
Structure Description: Fabric intensity: 4.
Plagioclase: Recrystallized into a bimodal distribution. Abundant exsolved blebs in some crystals.
Olivine: Recrystallized with subgrains. Exsolved opaque rods.
Augite: Recrystallized with relict grains. Both fine-scale planar and coarse bleby exsolved low-Ca pyroxene. Fine-scale exsolved opaque rods and needles.
Trace of ilmenite, magnetite, amphibole, and sulfide grain boundary intergrowths.
Mode = 1235 points.

(147) 176-735B-150R-7 (Piece 1, 11-14 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Medium-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY	
Olivine	9.7	0.7-5.2			anhedral to amoeboidal
Plagioclase	61.3	0.7-3.4			anhedral
Clinopyroxene	28.4	1.0-4.3			anhedral
Orthopyroxene	0.2				
Opaque Minerals	0.2	<0.2	sulfide > ilmenite	anhedral	
Amphibole	0.2				

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	2	Magnetite 5%; Amphibole 15%; Smectite 80%
Clinopyroxene	1	Hornblende 2%; Actinolite 93%; Oxide 5%
Orthopyroxene	<1	Amphibole 60%; Oxide 40%
Plagioclase	<1	Actinolite 100%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
Structure Description: Fabric intensity: 2/3.
Plagioclase: Recrystallization, with deformation twins, subgrains, and undulose extinction.
Olivine: Recrystallization, with subgrains. Some crystals rimmed with pyroxene.
Augite: Minor recrystallization, with undulose extinction, and subgrains. Fine-scale, planar exsolution dominant; coarse exsolution in recrystallized patches. Some crystals rimmed with olivine.
Trace of ilmenite, magnetite, amphibole, and sulfide (pyrite, pyrrhotite, chalcopyrite, ± pentlandite) grain boundary intergrowths, some of which penetrate augite cleavage. Sulfides generally small.
Mode = 1135 points.

(148) 176-735B-151R-4 (Piece 5, 82-85 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Medium-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY	
Olivine	6.7	0.6-3.4			anhedral to ophitic
Plagioclase	53.9	0.8-7.8			anhedral
Clinopyroxene	39.0	0.6-3.0			anhedral to ophitic
Orthopyroxene	0.1				
Opaque Minerals	0.3	0.1-0.4	sulfide > ilmenite	anhedral	

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	2	Smectite 100%;
Clinopyroxene	2	Hornblende 90%; Oxide 10%
Orthopyroxene	<1	Amphibole 100%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
Structure Description: Fabric intensity: 2 (overprinting 1b).
Plagioclase: Deformation twins, subgrains, and undulose extinction. Abundant exsolved opaque needles in the cores of larger crystals.
Olivine: Subgrains. Rimmed by pyroxene.
Augite: Undulose extinction, with minor subgrains. Rare euhedral to subhedral plagioclase inclusions. Some crystals with fine-scale planar exsolution; some with coarse exsolution.
Abundant ilmenite, magnetite, amphibole, and sulfide (pyrite, pyrrhotite, chalcopyrite) grain boundary intergrowths.
Mode = 1300 points.

(149) 176-735B-152R-3 (Piece 1, 69-72 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Gabbro
GRAIN SIZE: Medium-grained (coarse before recrystallization).
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY	
Olivine	4.6	1.1-4.4			anhedral
Plagioclase	57.8	1.0-3.7			subhedral to anhedral
Clinopyroxene	36.7	1.1-7.8			anhedral to ophitic
Orthopyroxene	0.3				
Opaque Minerals	0.6	0.1-0.5	sulfides > oxides	anhedral	

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	1	Magnetite 5%; Amphibole 5%; Smectite 90%
Clinopyroxene	7	Diopside 30%; Hornblende 50%; Actinolite 20%
Orthopyroxene	<1	Amphibole 100%
Plagioclase	10	Secondary Plagioclase 97%; Actinolite 3%

TOTAL ROCK ALTERATION: 9%

COMMENTS:
Structure Description: Fabric intensity: 2 (overprinting 1a).
Plagioclase: Deformation twins, subgrains, undulose extinction, and recrystallized relict grains with fine-grained neoblasts. Some crystals weakly zoned. Abundant exsolved opaque needles in some crystals.
Olivine: Recrystallized, with subgrains. Exsolved opaque lamellae. Some crystals rimmed with pyroxene.
Augite: Local recrystallization. Rare inclusions of euhedral plagioclase. Fine-scale planar exsolution is dominant, some patches with coarse bleby exsolution.
Minor amounts of ilmenite, magnetite, amphibole, and sulfide (pyrite, pyrrhotite, chalcopyrite) grain boundary intergrowths.
Mode = 1210 points.

(150) 176-735B-152R-4 (Piece 2, 60-64 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Coarse-grained porphyroclasts in a fine-grained matrix.
TEXTURE: Cataclastic

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	8.1	1.8-8.4		porphyroclasts
Plagioclase	41.6	3.6-12.0		porphyroclasts
Clinopyroxene	49.2	1.8-13.2		porphyroclasts
Orthopyroxene	0.4	0.8-2.8		porphyroclasts
Opaque Minerals	0.6	<0.4	80% ilmenite/20% magnetite	anhedral stringers
Amphibole	0.1			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	1	Magnetite 2%; Amphibole 15%; Smectite 83%
Clinopyroxene	15	Diopside 45%; Hornblende 40%; Actinolite 5%; Oxide 10%
Orthopyroxene	5	Amphibole 100%
Plagioclase	65	Secondary Plagioclase 95%; Actinolite 5%

TOTAL ROCK ALTERATION: 35%

COMMENTS:
Large format thin section.
Structure Description: Fabric intensity: 4; kinematic indicators (S-C fabrics, asymmetric olivine extinction angles, asymmetric porphyroclasts) display reverse displacement. Sample overprinted by cataclastic deformation which localized amphibole-bearing veins.
Plagioclase: Recrystallized via grain boundary migration,with deformation twins, subgrains, and undulose extinction. Exsolved opaque blebs and needles.
Olivine: Recrystallized, with subgrains, and ribbons. Exsolved opaque needles and dendritic patches.
Augite: Recrystallized relict grains, with undulose extinction. Subhedral plagioclase inclusions. Abundant exsolved low-Ca pyroxene and opaque needles.
Orthopyroxene: Fine-scale exsolution of low-Ca pyroxene. Abundant exsolved opaque rods.
Abundant ilmenite, magnetite, brown amphibole, and sulfide (pyrite, pyrrhotite, chalcopyrite) intergrowths along grain boundaries and in tails of porphyroclasts.
Mode = 2000 points.

(151) 176-735B-153R-2 (Piece 1, 24-28 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Medium-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY	
Olivine	6.2	0.7-3.0			anhedral
Plagioclase	59.4	1.1-4.0			anhedral
Clinopyroxene	32.8	1.1-3.4			anhedral
Orthopyroxene	Tr.				
Opaque Minerals	0.9	<0.4	98% ilmenite/2% magnetite	anhedral	
Amphibole	0.7				

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	3	Magnetite 10%; Amphibole 40%; Smectite 50%
Clinopyroxene	2	Hornblende 45%; Actinolite 50%; Oxide 5%
Orthopyroxene	1	Amphibole 100%
Plagioclase	1	Actinolite 100%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
A few hairline cracks.
Structure Description: Fabric intensity: 1b.
Plagioclase: Minor deformation twins, with subgrain boundaries. Abundant exsolved opaque needles and rods in cores of large crystals.
Olivine: Subgrain boundaries. Rimmed by pyroxene and amphibole.
Augite: No deformation microstructures. Fine and coarse low-Ca pyroxene exsolution. Exsolved opaque rods. Orthopyroxene rims.
Ilmenite, magnetite, amphibole, and sulfide (pyrite, pyrrhotite, chalcopyrite, pentlandite) intergrowths along grain boundary. Secondary pyrrhotite needles, and minor secondary chalcopyrite in amphibole veins. Ilmenite-amphibole symplectites.
Mode = 1103 points.

(152) 176-735B-153R-7 (Piece 1C, 102-108 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	7.5	0.8-5.0		anhedral to porphyroclasts
Plagioclase	60.5	1.2-11.0		euhedral to anhedral
Clinopyroxene	30.6	1.2-7.2		anhedral to ophitic
Orthopyroxene	0.8	3.0		
Opaque Minerals	0.4	0.1-1.7		anhedral
Amphibole	0.2			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	4	Magnetite 10%; Amphibole 60%; Smectite 30%
Clinopyroxene	1	Hornblende 3%; Actinolite 95%; Oxide 2%
Orthopyroxene	2	Amphibole 90%; Oxide 10%
Plagioclase	1	Actinolite 100%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
Large format thin section.
Structure Description: Fabric intensity: 1b.
Plagioclase: Very minor recrystallization, with subgrains, deformation twins, and undulose extinction. Abundant exsolved opaque needles and blebs. Igneous lamination (?).
Olivine: Subgrain boundaries. Exsolved opaque rods and dendritic patches.
Augite: No deformation microstructures. Inclusions of euhedral plagioclase. Abundant exsolved low-Ca pyroxene and opaque needles.
Trace of ilmenite, magnetite, brown amphibole, and sulfide (pyrite, pyrrhotite, chalcopyrite) grain boundary intergrowths.
Mode = 2100 points.

(153) 176-735B-154R-2 (Piece 3, 123-126 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: OPX-Bearing Gabbro
GRAIN SIZE: Medium-grained
TEXTURE:

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY	
Olivine	0.6	0.6-0.8			anhedral
Plagioclase	60.7	1.0-5.2			euhedral to anhedral
Clinopyroxene	33.8	1.2-6.4			subhedral to anhedral
Orthopyroxene	2.0	0.4-1.2			subhedral
Opaque Minerals	0.9	01.-0.7	85% ilmenite/15% magnetite	anhedral	
Amphibole	2.0	2.0-6.0			anhedral to poikilitic

Accessories: Apatite (Tr.).

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	8	Amphibole 10%; Smectite 90%
Clinopyroxene	4	Hornblende 70%; Actinolite 25%; Oxide 5%
Orthopyroxene	2	Amphibole 85%; Smectite 10%; Oxide 5%
Plagioclase	5	Secondary Plagioclase 95%; Actinolite 5%

TOTAL ROCK ALTERATION: 5%

COMMENTS:
No veins, but a 1 mm wide slightly sheared zone with brown hornblende and green actinolite.
Structure Description: Fabric intensity: 2 overprinting 1b.
Plagioclase: Recrystallized to <0.2 mm grains, with deformation twins, and undulose extinction. Has a strong lattice preferred orientation. Weak zoning. Abundant exsolved opaque needles.
Olivine: No deformation microstructures.
Augite: No deformation microstructures. Abundant exsolved low-Ca pyroxene lamellae and opaque rods.
Orthopyroxene: Fine-scale planar exsolved augite, and exsolved opaque rods.
Minor amounts of ilmenite, magnetite, and amphibole intergrowths along grain boundaries. Minor secondary magnetite and pyrrhotite in altered olivines. Ilmenite-amphibole and ilmenite-augite symplectites.
Mode = 1170 points.

(154) 176-735B-154R-3 (Piece 4, 67-70 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Leucocratic OPX-Bearing Disseminated Oxide Gabbro
GRAIN SIZE: Medium-grained (coarse before recrystallization).
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	1.3	3.6		anhedral
Plagioclase	72.3	1.0-5.2		subhedral to anhedral
Clinopyroxene	19.1	1.0-7.4		subhedral to anhedral
Orthopyroxene	2.9	0.4-4.0		subhedral
Opaque Minerals	1.2	0.4-1.4	ilmenite	euhedral to poikilitic
Amphibole	3.2	1.2-4.0		

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	4	Magnetite 10%; Amphibole 20%; Smectite 70%
Clinopyroxene	15	Hornblende 80%; Actinolite 18%; Oxide 2%
Orthopyroxene	3	Amphibole 90%; Oxide 10%
Plagioclase	4	Secondary Plagioclase 90%; Actinolite 10%

TOTAL ROCK ALTERATION: 6%

COMMENTS:
Structure Description: Fabric intensity: 2;
Plagioclase: Recrystallized to sub grains (<0.4 mm), with deformation twins, and undulose extinction. Strongly zoned. Abundant exsolved opaque rods and needles up to 0.25 x 0.001 mm.
Olivine: Exsolved opaque rods. Rimmed by pyroxene. Symplectic ilmenite-pyroxene intergrowths along grain boundaries.
Augite: Minor recrystallization. Abundant anhedral opaque inclusions, and very fine exsolved opaque rods.
Amphibole: Poikilitic to interstitial; probably of igneous origin.
Trace sulfides.
Mode = 1400 points.

(155) 176-735B-154R-5 (Piece 1, 37-40 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Leucocratic Gabbro
GRAIN SIZE: Medium-grained (coarse before recrystallization).
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY	
Olivine	2.3	1.2-3.2			anhedral
Plagioclase	67.6	1.0-2.8			recrystallized anhedral
Clinopyroxene	29.0	0.8-8.8			anhedral
Orthopyroxene	0.6				
Opaque Minerals	0.3	0.1-0.9	85% ilmenite/15% magnetite	anhedral	
Amphibole	0.2				

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	12	Magnetite 5%; Amphibole 55%; Smectite 40%
Clinopyroxene	2	Actinolite 95%; Smectite 2%; Oxide 3%
Orthopyroxene	1	Amphibole 95%; Oxide 5%
Plagioclase	<1	Actinolite 100%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
A few hairline cracks with amphibole.
Structure Description: Fabric intensity: 1b.
Plagioclase: Deformation twins, undulose extinction, and minor subgrains. A strong lattice preferred orientation. Fine exsolved opaque needles.
Olivine: No deformation. Exsolved fine opaque needles. Polygonal recrystallization with 120-120-120 degree grain intersections.
Augite: No deformation. Fine-scale planar exsolution is dominant, some patches with coarse exsolution. Rare euhedral plagioclase inclusions.
Minor amounts of ilmenite, amphibole, and sulfide intergrowths along grain boundaries and pyroxene cleavage traces.
Mode = 1193 points.

(156) 176-735B-155R-1 (Piece 2A, 10-13 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Medium-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY	
Olivine	9.3	0.5-2.0			anhedral
Plagioclase	54.7	0.6-4.8			subhedral to anhedral
Clinopyroxene	35.0	0.4-4.2			anhedral to ophitic
Orthopyroxene	0.1	1.2-2.0			subhedral to anhedral
Opaque Minerals	0.5	<0.2	67% ilmenite/33% magnetite	anhedral	
Amphibole	0.4				

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	1	Magnetite 5%; Smectite 95%
Clinopyroxene	<1	Hornblende 55%; Actinolite 45%
Orthopyroxene	<1	Amphibole 100%

TOTAL ROCK ALTERATION: <1%

COMMENTS:
Structure Description: Fabric intensity: 1b.
Plagioclase: Deformation twins, undulose extinction, and minor sub-grain rotation. A moderate lattice preferred orientation.
Olivine: Subgrains. Exsolved opaque rods.
Augite: No deformation. Fine-scale planar exsolution is dominant; some patches with coarse planar exsolution. Fine exsolved opaque rods. Subhedral plagioclase inclusions.
Well developed ilmenite, amphibole, and sulfide (pyrite, pyrrhotite, chalcopyrite, ± trace pentlandite) intergrowths along grain boundaries and pyroxene cleavage traces. Trace secondary pyrite and pyrrhotite.
Mode = 1300 points.

(157) 176-735B-155R-4 (Piece 1, 1-4 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Leucocratic Olivine Gabbro
GRAIN SIZE: Medium-grained (probably coarse before recrystallization).
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY	
Olivine	18.2	2.0-4.8			anhedral to ophitic
Plagioclase	70.6	0.8-4.2			subhedral to anhedral
Clinopyroxene	10.4	1.2-5.6			anhedral to ophitic
Orthopyroxene	0.4				
Opaque Minerals	0.3	<0.3	75% ilmenite/25% magnetite	anhedral	
Amphibole	0.1				

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	3	Magnetite 2%; Amphibole 10%; Smectite 88%
Clinopyroxene	1	Hornblende 90%; Actinolite 10%
Orthopyroxene	<1	Amphibole 100%
Plagioclase	<1	Actinolite 100%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
Structure Description: Fabric intensity: 1a with a 2 overprint.
Plagioclase: Deformation twins, undulose extinction, and minor sub-grain rotation recrystallization. Abundant exsolved opaque blebs (<0.001 mm) and needles (0.15 x 0.001 mm).
Olivine: Subgrains. Exsolved opaque rods, and dark brown transparent dendritic patches. Ilmenite inclusions. Rimmed with pyroxene.
Augite: Undulose extinction. Fine-scale planar exsolution is dominant, some patches with coarse bleby exsolution.
Trace amounts of ilmenite, amphibole, and sulfide (pyrite, pyrrhotite, chalcopyrite) intergrowths along grain boundaries.
Mode = 1400 points.

(158) 176-735B-155R-6 (Piece 5B, 118-122 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Medium-grained (coarse-grained before deformation)
TEXTURE: Cataclastic

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY	
Olivine	9.7	0.8-6.4			porphyroclasts
Plagioclase	63.4	1.6-4.9			porphyroclasts
Clinopyroxene	25.4	1.1-5.6			porphyroclasts
Orthopyroxene	0.4	0.4-2.2			
Opaque Minerals	0.7	0.2-2.8	75% ilmenite/25% magnetite	anhedral	
Amphibole	0.4				

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	3	Magnetite 2%; Amphibole 18%; Smectite 80%
Clinopyroxene	15	Diopside 30%; Hornblende 15%; Actinolite 55%
Orthopyroxene	1	Amphibole 100%
Plagioclase	40	Secondary Plagioclase 90%; Actinolite 10%

TOTAL ROCK ALTERATION: 29%

COMMENTS:
Large format thin section.
Structure Description: Fabric intensity: 4 (of cross cutting 10 mm-thick mylonite); mylonite cuts across a moderately deformed rock (scale 2-3); abundant kinematic indicators display reverse displacement.
Plagioclase: Recrystallized, with polygonal grains to < 0.4 mm, deformation twins, and undulose extinction. Weakly zoned. Exsolved opaque blebs and needles.
Olivine: Polygonally recrystallized to 0.3-0.5 mm.
Augite: Recrystallized into relict porphyroclasts with extreme axial ratios. Abundant exsolution.
Minor amounts of ilmenite, magnetite, and sulfide (pyrite, pyrrhotite, chalcopyrite, trace pentlandite) intergrowths.
Mode = 2000 points.

(159) 176-735B-156R-2 (Piece 4, 136-142 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY	
Olivine	7.6	5.6-8.0			anhedral
Plagioclase	54.0	2.2-10.6			euhedral to anhedral
Clinopyroxene	37.4	4.6-11.6			ophitic
Orthopyroxene	0.4	1.3-2.2			anhedral
Opaque Minerals	0.3	0.1-1.5	sulfide > ilmenite	anhedral	
Amphibole	0.3				

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	1	Magnetite 3%; Amphibole 77%; Smectite 20%
Clinopyroxene	1	Hornblende 10%; Actinolite 88%; Oxide 2%
Orthopyroxene	1	Amphibole 100%
Plagioclase	<1	Actinolite 100%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
Large format thin section.
Structure Description: Fabric intensity: 2.
Plagioclase: Recrystallized, with deformation twins, and undulose extinction. Zoned with abundant opaque needles in cores.
Olivine: Recrystallized, with subgrains. Abundant exsolved transparent brown rods, opaque needles, and opaque dendritic patches.
Augite: Minor recrystallization. Fine-scale planar exsolution of low-Ca pyroxene is dominant, some patches with coarse exsolution. Exsolved opaque needles.
Trace amounts of ilmenite, magnetite, amphibole, and sulfide (pyrite, pyrrhotite, chalcopyrite, pentlandite) intergrowths along grain boundaries. Trace of pyrite, pentlandite, and ± magnetite in altered olivine.
Mode = 2000 points.

(160) 176-735B-157R-3 (Piece 3, 97-103 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Cumulate to Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	6.3	3.2-9.6		anhedral
Plagioclase	38.1	2.6-12.2		euhedral to anhedral
Clinopyroxene	54.9	3.4-16.4		subhedral to ophitic
Orthopyroxene	0.1	2.4		
Opaque Minerals	0.6	0.2-1.8		anhedral

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	4	Magnetite 3%; Amphibole 40%; Smectite 56%; Oxide 1%
Clinopyroxene	2	Hornblende 55%; Actinolite 40%; Oxide 5%
Orthopyroxene	30	Amphibole 100%
Plagioclase	1	Actinolite 100%

TOTAL ROCK ALTERATION: 2%

COMMENTS:
Large format thin section.
Structure Description: Fabric intensity: 1.
Plagioclase: Deformation twins, with subgrains, and undulose extinction. Exsolved opaque needles, and high birefringent needles.
Olivine: Subgrains, minor recrystallization. Exsolved opaque rods, needles, and plates.
Augite: No deformation. Abundant exsolution.
Abundant well developed ilmenite, magnetite, amphibole, and sulfide intergrowths along grain boundaries.
Mode = 2000 points.

(161) 176-735B-157R-4 (Piece 3, 67-71 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Leucocratic Oxide Gabbronorite
GRAIN SIZE: Coarse-grained
TEXTURE: Cataclastic

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	0.2	n/a		
Plagioclase	65.4	0.8-6.0		porphyroclasts
Clinopyroxene	20.0	1.2-10.0		subhedral to anhedral
Orthopyroxene	6.5	1.0-5.6		subhedral
Opaque Minerals	6.9	1.0-5.6	80% ilmenite/20% magnetite	anhedral to amoeboidal
Amphibole	0.3			

Accessories: Apatite (0.7%)

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Clinopyroxene	4	Hornblende 55%; Actinolite 40%; Oxide 5%
Orthopyroxene	12	Amphibole 57%; Smectite 25%; Oxide 10%
Plagioclase	8	Secondary Plagioclase 90%; Actinolite 10%

TOTAL ROCK ALTERATION: 6%

COMMENTS:
Rare cracks with amphibole.
Structure Description: Fabric intensity: 2.
Plagioclase: Recrystallized, with deformation twins, and undulose extinction. Weakly zoned. Abundant transparent dark brown plates and needles in cores of larger crystals.
Augite: Fine-scale, planar exsolution and coarse tabular exsolution.
Mode = 1270 points

(162) 176-735B-157R-5 (Piece 8, 134-140 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Felsic Vein
GRAIN SIZE: Coarse-grained
TEXTURE: Cumulate to Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Plagioclase	84.8	1.0-24.0		euhedral to anhedral
Clinopyroxene	2.3	1.2-6.8		anhedral
Opaque Minerals	7.4	0.2-3.6	ilmenite	anhedral to poikilitic
Amphibole	3.6	0.8-2.0		euhedral to anhedral
Biotite	1.1	0.4-2.2		
Quartz	Tr	<0.8		

Accessories: Zircon (0.2%); Biotite (1.1%); microcline (0.6%); apatite (Tr.)

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Clinopyroxene	90	Hornblende 10%; Actinolite 60%; Smectite 20%, Oxide 10%
Plagioclase	25	Secondary Plagioclase 58%; Epidote 2%; Smectite 1%; Quartz 2%; Biotite 1%; Oxide 20%; Actinolite 17%

TOTAL ROCK ALTERATION: 23%

COMMENTS:
Large format thin section.
Structure Description: Fabric intensity: 2.
Plagioclase: Recrystallization; with deformation twins, and undulose extinction. Strongly zoned.
Augite: Largely undeformed.
Oxides: Interstitial.
Biotite: Interstitial to poikilitic.
Mode = 1400 points.

(163) 176-735B-157R-6 (Piece 6, 132-136 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: OPX-Bearing Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Cataclastic

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	0.4	~2.0		anhedral
Plagioclase	54.5	1.4-6.8		porphyroclasts
Clinopyroxene	43.2	0.7		subhedral to anhedral
Orthopyroxene	1.2	0.8-7.0		subhedral to anhedral
Opaque Minerals	0.4	0.1-1.5	75% ilmenite/25% magnetite	anhedral
Amphibole	0.1			

Accessories: Apatite (0.2%)

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	60	Magnetite 10%; Smectite 90%
Clinopyroxene	4	Diopside 10%; Hornblende 10%; Actinolite 80%
Orthopyroxene	30	Amphibole 100%
Plagioclase	30	Secondary Plagioclase 90%; Actinolite 10%

TOTAL ROCK ALTERATION: 19%

COMMENTS:
A tiny vein in olivine filled with amphibole.
Structure Description: Fabric intensity: 3.
Plagioclase: Recrystallization, with deformation twins, undulose extinction, and subgrain rotation. A strong lattice preferred orientation is present. Contains dark brown to opaque needles and plates.
Olivine: Recrystallization, with subgrains.
Augite: Recrystallization. Abundant exsolution.
Orthopyroxene: Abundant fine-scale planar exsolution. One crystal has a core of orthopyroxene overgrown by augite.
Mode = 1200 points.

(164) 176-735B-158R-4 (Piece 3, 74-78 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	5.3	1.0-3.2		anhedral
Plagioclase	59.5	1.0-7.0		anhedral
Clinopyroxene	34.3	1.6-8.0		anhedral to ophitic
Orthopyroxene	0.3			
Opaque Minerals	0.3	0.1-0.5		anhedral
Amphibole	0.3			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	2	Magnetite 2%; Amphibole 80%; Smectite 18%
Clinopyroxene	2	Diopside tr.; Hornblende 20%; Actinolite 80%
Orthopyroxene	10	Amphibole 90%; Oxide 10%
Plagioclase	1	Actinolite 100%

TOTAL ROCK ALTERATION: 2%

COMMENTS:
Structure Description: Fabric intensity: 2.
Plagioclase: Deformation twins, undulose extinction, and subgrain rotation recrystallization. Weakly zoned, with cores that contain abundant opaque needles.
Olivine: Subgrain boundaries, and minor recrystallization. Some crystals with pyroxene rims. Abundant opaque needles.
Augite: Mostly undeformed. Dominantly fine-scale, planar exsolution, with some patches of coarse tabular exsolution. Subhedral plagioclase inclusions.
Mode = 1200 points.

(165) 176-735B-158R-5 (Piece 4, 135-141 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Pegmatitic
TEXTURE: Cumulate

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	9.7	1.2-11.6		subhedral to anhedral
Plagioclase	62.2	1.4-24.0		subhedral to anhedral
Clinopyroxene	27.7	3.4-24.0		subhedral to anhedral
Orthopyroxene	0.1	1.2-2.4		
Opaque Minerals	0.2	0.4-2.0	ilmenite	anhedral
Amphibole	0.1			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	2	Magnetite 2%; Amphibole 80%; Smectite 18%
Clinopyroxene	2	Diopside 2%; Hornblende 48%; Actinolite 48%; Oxide 2%
Orthopyroxene	1	Amphibole 100%
Plagioclase	1	Actinolite 100%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
Large format thin section.
Structure Description: Fabric intensity: 1a overprinted by 2.
Plagioclase: Deformation twins, undulose extinction, and minor recrystallization. Some crystals zoned. Contains abundant dark brown to opaque rods and needles.
Olivine: Subgrain boundaries, recrystallization. Contains opaque dendritic patches and dark brown plates.
Augite: Locally recrystallized. Abundant exsolution.
Mode = 2270 points.

(166) 176-735B-159R-2 (Piece 1A, 0-7 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	5.9	0.8-4.4		anhedral
Plagioclase	53.8	1.2-6.6		subhedral to anhedral
Clinopyroxene	39.4	1.2-12.4		subhedral to anhedral to ophitic
Orthopyroxene	0.1	0.7-1.2		
Opaque Minerals	0.3	0.1-0.8		anhedral
Amphibole	0.5			

Accessories: Zircon (Tr.), Titanite (Tr.).

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	5	Talc 1%; Magnetite 5%; Amphibole 90%; Smectite 4%
Clinopyroxene	4	Hornblende 80%; Actinolite 15%; Oxide 5%
Orthopyroxene	2	Amphibole 100%
Plagioclase	1	Actinolite 100%

TOTAL ROCK ALTERATION: 3%

COMMENTS:
Large format thin section.
A few hairline cracks with amphibole.
Structure Description: Fabric intensity: 1a overprinted locally by 6 (hydrothermal).
Plagioclase: Deformation twins, and undulose extinction. Contains dark brown to opaque rods and needles.
Olivine: Subgrain boundaries, some equilibrated (i.e., annealed) into 120-120-120 degree polygonal grain boundaries. Contains tiny dark brown rods. Some crystals rimmed by amphibole.
Augite: No deformation microstructures. Dominantly fine-scale, planar exsolution, with some patches of coarse tabular exsolution.
Mode = 2000 points.

(167) 176-735B-159R-2 (Piece 2, 44-47 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Felsic Vein
GRAIN SIZE: Medium-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Plagioclase	72.0	0.9-20.0		subhedral to anhedral
Clinopyroxene	11.7	0.9-3.6		anhedral
Orthopyroxene	Tr.			
Opaque Minerals	4.6	0.6-4.0	70% ilmenite/30% magnetite	anhedral
Amphibole	7.6	1.8-3.8		

Accessories: Apatite (2.4%), Quartz (1.7%)

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine (?)	100	Talc 5%; Magnetite 10%; Amphibole 85%
Clinopyroxene	40	Hornblende 5%; Actinolite 90%; Oxide 5%
Orthopyroxene	70	Amphibole 40%; Smectite 55%; Oxide 5%
Plagioclase	8	Secondary Plagioclase 90%; Actinolite 10%

TOTAL ROCK ALTERATION: 10%

COMMENTS:
Mode and grain size data are for both gabbro and felsic vein. A few hairline cracks with amphibole.
Structure Description: Fabric intensity: 1a overprinted locally by 6 (hydrothermal).
Plagioclase: Locally deformed in zones with oxide (recrystallization, undulose extinction), otherwise, contains deformation twins, and subgrain boundaries. Strongly zoned. Contains dark brown to opaque needles.
Augite: No deformation microstructures. Exsolution not well developed.
Mode = 937 points.

(168) 176-735B-159R-4 (Piece 3A, 84-87 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	3.1	0.5-2.0		anhedral to amoeboidal
Plagioclase	55.4	1.0-8.8		subhedral to anhedral
Clinopyroxene	41.1	1.0-12.0		anhedral to poikilitic
Orthopyroxene	0.1			
Opaque Minerals	0.1	0.2-0.6		anhedral
Amphibole	0.2			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	3	Talc 2%; Magnetite 3%; Amphibole 85%; Smectite 10%
Clinopyroxene	2	Hornblende 7%; Actinolite 91%; Oxide 2%
Orthopyroxene	2	Amphibole 100%
Plagioclase	1	Secondary Plagioclase 1%; Actinolite 99%

TOTAL ROCK ALTERATION: 2%

COMMENTS:
One small vein and many cracks with amphibole.
Structure Description: Fabric intensity: 1a overprinted locally by 6 (hydrothermal).
Plagioclase: Deformation twins, with undulose extinction. Weakly zoned crystals. Contains opaque needles.
Olivine: Subgrain boundaries. Some crystals rimmed by pyroxene.
Augite: No deformation microstructures. Fine-scale, planar exsolution and coarse exsolution.
Mode = 1100 points.

(169) 176-735B-159R-4 (Piece 3B, 111-116 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Felsic Vein / Olivine Gabbro
GRAIN SIZE: Coarse-grained / Coarse-grained
TEXTURE: Granular / Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	n/a	0.8-4.4/none		amoeboidal
Plagioclase	n/a	0.8-10.0/1.3-9.6		subhedral to anhedral
Clinopyroxene	n/a	1.8-3.6/none		anhedral to ophitic
Orthopyroxene	n/a	n/a/n/a		anhedral
Opaque Minerals	n/a	0.1-2.0/0.4-3.2	75% ilmenite/25% magnetite	anhedral
Amphibole	n/a			
Quartz	(abundant)			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	3	Magnetite 1%; Amphibole 64%; Smectite 35%
Clinopyroxene	5	Hornblende 60%; Actinolite 38%; Oxide 2%
Plagioclase	2	Secondary Plagioclase 10%; Actinolite 90%

TOTAL ROCK ALTERATION: 2%

COMMENTS:
Structure Description: Fabric intensity: 1a overprinted by vein and possibly 6 (hydrothermal).
Gabbro:
Plagioclase: Deformation twins, undulose extinction, and subgrains. Contains dark brown to opaque needles and plates.
Olivine: Subgrains with minor recrystallization (suggests transition to fabric intensity 2). Rimmed by pyroxene.
Augite: No deformation microstructures. Fine-scale exsolution.
Felsic vein:
Quartz: Some subgrains.
Plagioclase: Zoned. Contains abundant cracks.

(170) 176-735B-159R-7 (Piece 4, 76-80 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Felsic Vein / Leucocratic OPX-Bearing Gabbro
GRAIN SIZE: Coarse-grained / Coarse-grained
TEXTURE: Granular / Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	tr	none/1.4-4.6 (?)		anhedral
Plagioclase	65.5	1.2-9.0/0.4-2.8		anhedral to porphyroclasts
Clinopyroxene	20.9	n/a/1.6-7.2		anhedral
Orthopyroxene	4.5	0.8-1.8/n/a		anhedral
Opaque Minerals	1.1	n/a/0.1-0.6	85% hematite/15% ilmenite	subhedral to anhedral
Amphibole	5.0	n/a/1.0-4.4		

Accessories: Quartz (2.7%), Zircon (0.2%), Apatite (0.1%), Titanite (Abundant).

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	50	Talc 5%; Magnetite 1%; Amphibole 34%; Smectite 60%
Clinopyroxene	30	Hornblende 2%; Actinolite 88%; Oxide 10%
Orthopyroxene	20	Amphibole 90%; Oxide 10%
Plagioclase	27	Secondary Plagioclase 87%; Actinolite 5%; Oxide 8%

TOTAL ROCK ALTERATION: 25%

COMMENTS:
Structure Description: Fabric intensity: 2 overprinted by vein assemblage.
Plagioclase: Subgrain boundaries, partly recrystallized. Weakly zoned.
Augite: Mostly undeformed. Alteration may obscure recrystallization in some grains.
Orthopyroxene: Rimmed by augite.
Vein: Quartz and plagioclase are largely undeformed, but have an hydrothermal overprint (fabric intensity 6).
Mode = 1000 points.

(171) 176-735B-160R-2 (Piece 1B, 24-27 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Leucocratic Olivine Gabbro
GRAIN SIZE: Medium to Coarse-grained
TEXTURE: Granular to Intergranular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	5.1	1.0-5.6		anhedral to amoeboidal
Plagioclase	66.2	0.6-4.4		euhedral to anhedral
Clinopyroxene	28.0	0.6-10.0		anhedral to poikilitic
Orthopyroxene	0.1			
Opaque Minerals	0.2	0.1-1.3		anhedral
Amphibole	0.4			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	2	Talc 1%; Magnetite 2%; Amphibole 92%; Smectite 5%
Clinopyroxene	2	Diopside tr.; Hornblende 5%; Actinolite 95%
Orthopyroxene	2	Amphibole 95%; Oxide 5%
Plagioclase	<1	Actinolite 100%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
Structure Description: Fabric intensity: 1a-2.
Plagioclase: Deformation twins, and subgrains, with very minor recrystallization. Contains opaque needles and blebs.
Olivine: Subgrain boundaries. Contains opaque blebs and needles. Some crystals rimmed by pyroxene.
Augite: No deformation microstructures. Dominantly fine-scale, planar exsolution, with some patches of coarse exsolution.
Mode = 1250 points.

(172) 176-735B-161R-4 (Piece 1C, 27-33 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Cumulate to Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	14.0	1.4-6.8		subhedral to anhedral recrystallized
Plagioclase	54.7	0.3-10.8		subhedral to anhedral
Clinopyroxene	30.2	2.6-16.0		subhedral
Orthopyroxene	0.4	0.5-0.6		
Opaque Minerals	0.2	0.1-1.1	ilmenite	anhedral
Amphibole	0.4			

Accessories: Apatite (0.1%)

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	3	Talc 1%; Magnetite 2%; Amphibole 92%; Smectite 5%
Clinopyroxene	2	Diopside, tr.; Hornblende 10%; Actinolite 90%
Orthopyroxene	1	Amphibole 100%
Plagioclase	<1	Actinolite 100%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
Large format thin section.
Structure Description: Fabric intensity: 1b-2.
Plagioclase: Deformation twins, and subgrains, with minor recrystallization. Contains abundant dark brown to opaque needles.
Olivine: Abundant subgrain boundaries, some large recrystallized grains and 120-120-120 degree grain intersections. Contains opaque rods. Some crystals rimmed by pyroxene; some by amphibole.
Augite: Mostly undeformed. Dominantly fine-scale, planar exsolution, with some patches of coarse exsolution.
Mode = 2000 points.

(173) 176-735B-161R-6 (Piece 3A, 59-62 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	9.2	1.6-5.8		anhedral to amoeboidal
Plagioclase	58.5	0.8-6.4		subhedral to anhedral
Clinopyroxene	31.7	1.0-11.6		anhedral to ophitic
Orthopyroxene	0.3	0.5-1.5		
Opaque Minerals	0.1	0.1-0.6		anhedral
Amphibole	0.2			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	2	Talc 1%; Magnetite 2%; Amphibole 87%; Smectite 10%
Clinopyroxene	<1	Hornblende 10%; Actinolite 90%
Orthopyroxene	1	Amphibole 100%
Plagioclase	<1	Actinolite 100%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
Structure Description: Fabric intensity: 1a (perhaps weak 1b).
Plagioclase: Undulose extinction, with rare deformation twins. Some crystals strongly zoned. Contains opaque needles, transparent brown plates, and high birefringent needles.
Olivine: Subgrain boundaries. Contains opaque needles. Some crystals rimmed by pyroxene.
Augite: Mostly undeformed. Dominantly fine-scale, planar exsolution, with some patches of coarse tabular exsolution. Contains opaque rods.
Mode = 1300 points.

(174) 176-735B-162R-2 (Piece 1C, 65-68 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	10.9	1.4-7.6		anhedral
Plagioclase	56.4	0.6-8.0		subhedral to anhedral
Clinopyroxene	32.4	1.4-8.2		anhedral to ophitic
Orthopyroxene	0.2			
Opaque Minerals	0.1	0.1-0.4		anhedral

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	2	Talc 1%; Magnetite 2%; Amphibole 87%; Smectite 10%
Clinopyroxene	<1	Hornblende 10%; Actinolite 90%
Orthopyroxene	1	Amphibole 100%
Plagioclase	<1	Actinolite 100%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
Structure Description: Fabric intensity: 1a.
Plagioclase: Deformation twins. Contains abundant opaque needles. Weakly zoned.
Olivine: Abundant subgrain boundaries. Contains transparent brown rods, and opaque, planar, dendritic patches. Some crystals rimmed by pyroxene.
Augite: Mostly undeformed. Dominantly fine-scale, planar exsolution, with some patches of coarse exsolution. Abundant ilmenite inclusions.
Mode = 1000 points.

(175) 176-735B-162R-8 (Piece 1, 26-29 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Leucocratic Olivine Gabbro
GRAIN SIZE: Medium-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	9.7	0.6-2.9		anhedral
Plagioclase	72.0	0.5-7.4		subhedral to anhedral
Clinopyroxene	17.6	0.7-8.0		anhedral to ophitic
Orthopyroxene	0.3			
Opaque Minerals	0.2	0.1-0.5		anhedral
Amphibole	0.2			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	1	Magnetite 1%; Amphibole 89%; Smectite 10%
Clinopyroxene	<1	Hornblende 10%; Actinolite 90%
Orthopyroxene	1	Amphibole 100%
Plagioclase	<1	Actinolite 100%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
Structure Description: Fabric intensity: 1b.
Plagioclase: Deformation twins, subgrains, and perhaps some minor recrystallization. Equilibrated texture (i.e., numerous triple junctions). Some crystals weakly zoned. Contains abundant opaque needles.
Olivine: Abundant subgrain boundaries. Some crystals rimmed by augite.
Augite: Mostly undeformed. Dominantly fine-scale, planar exsolution. Euhedral to subhedral plagioclase inclusions. Contains dark brown to opaque rods.
Mode = 1300 points.

(176) 176-735B-162R-8 (Piece 1, 47-50 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Intergranular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	12.5	2.2-10.0		anhedral to poikilitic
Plagioclase	61.2	0.6-6.4		euhedral to anhedral
Clinopyroxene	25.8	2.2-10.4		anhedral to poikilitic
Orthopyroxene	0.2			
Opaque Minerals	0.2	0.1-0.5		subhedral to anhedral
Amphibole	0.1			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	2	Magnetite 2%; Amphibole 78%; Smectite 20%
Clinopyroxene	<1	Hornblende 10%; Actinolite 90%
Orthopyroxene	1	Amphibole 100%
Plagioclase	<1	Actinolite 100%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
Structure Description: Fabric intensity: 1a.
Plagioclase: Deformation twins, and subgrain boundaries. Abundant opaque needles.
Olivine: Subgrain boundaries. Contains opaque to dark brown rods. Some crystals rimmed by amphibole.
Augite: Undeformed. Dominantly fine-scale, planar exsolution. Some crystals rimmed with amphibole.
Mode = 1200 points.

(177) 176-735B-164R-3 (Piece 1A, 26-29 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Medium-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	5.9	0.8-4.4		anhedral
Plagioclase	59.4	0.6-7.4		anhedral
Clinopyroxene	33.9	0.6-3.0		anhedral
Orthopyroxene	0.3			
Opaque Minerals	0.4	0.1-1.3		anhedral
Amphibole	0.1			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	1	Amphibole 30%; Smectite 70%
Clinopyroxene	<1	Hornblende 70%; Actinolite 30%
Orthopyroxene	1	Amphibole 100%
Plagioclase	<1	Actinolite 100%

TOTAL ROCK ALTERATION: <1%

COMMENTS:
Structure Description: Fabric intensity: weak 1b.
Plagioclase: Deformation twins, and subgrains, with minor subgrain rotation recrystallization. Abundant opaque needles.
Olivine: Subgrain boundaries. Contains transparent brown rods. Some crystals rimmed by pyroxene.
Augite: No deformation microstructures. Dominantly fine-scale, planar exsolution, with some patches of coarse exsolution. Contains opaque rods and needles in patches. Some crystals rimmed by olivine.
Mode = 1400 points.

(178) 176-735B-165R-3 (Piece 2A, 104-106 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Microgabbro
GRAIN SIZE: Fine-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	9.7	0.2-1.2		anhedral
Plagioclase	32.9	0.3-1.6		anhedral
Clinopyroxene	57.4	0.3-1.2		anhedral
Opaque Minerals	Tr.	<0.1		anhedral

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	1	Magnetite 1%; Amphibole 29%; Smectite 70%
Clinopyroxene	<1	Hornblende 80%; Actinolite 20%
Plagioclase	<1	Actinolite 100%

TOTAL ROCK ALTERATION: <1%

COMMENTS:
2.5 cm mini core.
Structure Description: Fabric intensity: 1b.
Plagioclase: Strong lattice preferred orientation, weak shape-preferred orientation, rare subgrains, and very few twins.
Olivine: A few subgrain boundaries.
Augite: No deformation microstructures. Pyroxene (pigeonite?) rims around some crystals.
Mode = 1000 points.

(179) 176-735B-166R-5 (Piece 3, 70-73 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Gabbro
GRAIN SIZE: Medium-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	4.1	0.8-4.4		anhedral
Plagioclase	56.0	0.5-3.7		anhedral
Clinopyroxene	38.8	0.4-6.8		anhedral
Orthopyroxene	0.5	0.8-1.0		
Opaque Minerals	0.5	0.1-0.6	sulfide > ilmenite	anhedral
Amphibole	0.1			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	1	Amphibole 10%; Smectite 90%
Clinopyroxene	<1	Hornblende 90%; Actinolite 10%
Orthopyroxene	1	Amphibole 100%
Plagioclase	<1	Actinolite 100%

TOTAL ROCK ALTERATION: <1%

COMMENTS:
Structure Description: Fabric intensity: 1a.
Plagioclase: A few deformation twins, undulose extinction. Abundant dark brown to opaque rods and needles in some crystals.
Olivine: Abundant subgrain boundaries. Contains transparent brown rods.
Augite: Mostly undeformed. Dominantly fine-scale, planar exsolution, with some patches of coarse tabular exsolution. Contains abundant opaque needles. Some crystals rimmed by olivine.
Mode = 1256 points.

(180) 176-735B-167R-6 (Piece 1, 0-4 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Medium-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	5.0	0.4-3.0		anhedral
Plagioclase	60.8	0.5-4.4		anhedral
Clinopyroxene	33.7	0.2-4.2		anhedral
Orthopyroxene	0.3			
Opaque Minerals	0.1	<0.1		anhedral
Amphibole	0.1			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	1	Amphibole 10%; Smectite 90%
Clinopyroxene	<1	Hornblende 80%; Actinolite 20%
Orthopyroxene	1	Amphibole 100%
Plagioclase	<1	Actinolite 100%

TOTAL ROCK ALTERATION: <1%

COMMENTS:
Structure Description: Fabric intensity: 1a (perhaps very weak 1b) overprinted by a weak 2.
Plagioclase: Subgrains, deformation twins, undulose extinction, and minor recrystallization. Contains abundant dark brown to opaque needles.
Olivine: A few subgrain boundaries. Some crystals rimmed by pyroxene.
Augite: Mostly undeformed. Dominantly fine-scale, planar exsolution, with some patches of coarse tabular exsolution. Abundant dark brown rods concentrated along fracture planes.
Mode = 1453 points.

(181) 176-735B-167R-6 (Piece 3, 48-51 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Leucocratic Olivine Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	5.9	1.2-5.6		anhedral to amoeboidal
Plagioclase	73.2	0.6-8.4		subhedral to anhedral
Clinopyroxene	20.5	1.6-10.0		anhedral to ophitic
Orthopyroxene	0.3			
Opaque Minerals	0.1	0.1-0.8		anhedral

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	1	Amphibole 35%; Smectite 65%
Clinopyroxene	<1	Actinolite 95%; Smectite 5%
Orthopyroxene	<1	Amphibole 100%
Plagioclase	<1	Smectite 20%; Actinolite 80%

TOTAL ROCK ALTERATION: <1%

COMMENTS:
One crack with chlorite.
Structure Description: Fabric intensity: 1a overprinted by a weak 2.
Plagioclase: Deformation twins, and subgrain rotation recrystallization. Abundant opaque needles.
Olivine: Subgrain boundaries. Some rimmed by pyroxene. Contains opaque rods and rare dark brown dendritic patches.
Augite: Slight undulose extinction. Dominantly fine-scale, planar exsolution, with some patches of coarse bleby exsolution.
Mode = 1210 points.

(182) 176-735B-168R-2 (Piece 1, 0-4 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Intergranular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	7.6	0.5-3.6		anhedral to ophitic
Plagioclase	60.2	0.4-6.4		euhedral to anhedral
Clinopyroxene	31.7	0.4-7.0		anhedral to ophitic
Orthopyroxene	0.2			
Opaque Minerals	0.3	0.1-0.5		anhedral

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	2	Amphibole tr.; Smectite 98%; Sulfide 2%
Clinopyroxene	<1	Actinolite 100%
Orthopyroxene	<1	Amphibole 100%
Plagioclase	<1	Actinolite 100%

TOTAL ROCK ALTERATION: <1%

COMMENTS:
Structure Description: Fabric intensity: weak 1b.
Plagioclase: Deformation twins, subgrains. Contains abundant opaque needles.
Olivine: Subgrains. Contains opaque needles. Rimmed by pyroxene.
Augite: Undeformed. Dominantly fine-scale, planar exsolution.
Mode = 1186 points.

(183) 176-735B-168R-3 (Piece 6, 48-50 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Altered Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Fractured granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	n/a	n/a		pseudomorphs
Plagioclase	n/a	n/a		anhedral
Clinopyroxene	n/a	n/a		anhedral
Opaque Minerals	n/a	n/a	sulfide > ilmenite	anhedral

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	100	Smectite 80%; Calcite 15%; Pyrite 5%
Clinopyroxene	20	Smectite (?) 100%. Augite is incipiently altered to very fine-grained smectite (?), but the crystals are dark and retain the original characteristics.
Plagioclase	<1	Calcite 5%; Actinolite 95%

TOTAL ROCK ALTERATION: 25%

COMMENTS:
Numerous veinlets of smectite (75%), pyrite (5%), and calcite (20%).
Structure Description: Fabric intensity: 1a overprinted by hydrothermal 6; the metamorphic assemblage is not strongly deformed.
Opaque minerals fill fractures and veins.
Augite: Contains abundant, fine-scale planar exsolution.

(184) 176-735B-169R-4 (Piece 2A, 34-38 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Gabbro
GRAIN SIZE: Medium-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	4.8	0.2-4.4		anhedral
Plagioclase	63.9	0.4-13.6		anhedral
Clinopyroxene	31.2	0.2-5.2		anhedral
Opaque Minerals	0.1	<0.2		anhedral

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	2	Magnetite 5%; Amphibole 5%; Smectite 90%
Clinopyroxene	<1	Hornblende 90%; Actinolite 10%
Orthopyroxene	<1	Amphibole 100%
Plagioclase	<1	Actinolite 100%

TOTAL ROCK ALTERATION: <1%

COMMENTS:
Structure Description: Fabric intensity: 1b.
Plagioclase: Little shape-preferred orientation, strong lattice-preferred orientation; subgrains, and deformation twins. Contains abundant dark brown needles.
Olivine: A few subgrains. Contains dark brown needles in some crystals. Some crystals rimmed by pyroxene.
Augite: No deformation microstructures. Dominantly fine-scale, planar exsolution, with some patches of coarse tabular exsolution. Contains transparent light brown plates. Small ilmenite inclusions.
Mode = 1300 points.

(185) 176-735B-170R-2 (Piece 3A, 65-69 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Medium-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	10.5	1.1-4.2		anhedral to ophitic
Plagioclase	66.9	0.6-4.2		euhedral to anhedral
Clinopyroxene	22.1	0.4-5.6		anhedral to ophitic
Opaque Minerals	0.3	0.1-1.2		anhedral
Amphibole	0.2			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	1	Amphibole 10; Smectite 90%
Clinopyroxene	<1	Hornblende 90%; Actinolite 10%
Orthopyroxene	<1	Amphibole 100%
Plagioclase	<1	Actinolite 100%

TOTAL ROCK ALTERATION: <1%

COMMENTS:
Structure Description: Fabric intensity: 1a.
Plagioclase: Minor subgrain boundaries, and deformation twins. Weak zoning is present in some crystals. Contains abundant opaque needles.
Olivine: Subgrain boundaries. Contains opaque needles.
Augite: Undeformed. Dominantly fine-scale, planar exsolution, with some patches of coarse tabular exsolution. Some crystals rimmed by orthopyroxene.
Mode = 1206 points.

(186) 176-735B-170R-7 (Piece 7, 49-54 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Microgabbro
GRAIN SIZE: Fine-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	11.0	0.2-2.0		anhedral
Plagioclase	58.4	0.3-2.2		anhedral
Clinopyroxene	30.0	0.2-2.0		anhedral
Opaque Minerals	0.2	<0.2		anhedral
Amphibole	0.4			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	2	Magnetite 1%; Amphibole 89%; Smectite 10%
Clinopyroxene	2	Actinolite 20%; Hornblende 80%
Plagioclase	<1	Actinolite 100%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
Large format thin section.
One hairline crack with amphibole.
Structure Description: Fabric intensity: 1b.
Plagioclase: Strong lattice-preferred orientation, weak shape-preferred orientation; rare deformation twins.
Olivine: No deformation microstructures. Some polygonal (120-120-120 degree) recrystallization.
Augite: No deformation microstructures. Abundant exsolution.
Mode = 1600 points.

(187) 176-735B-171R-2 (Piece 3, 57-60 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: OPX-.Bearing, Disseminated Oxide Gabbro
GRAIN SIZE: Medium-grained (coarse before recrystallization)
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	1.9	1.2-3.0		anhedral
Plagioclase	59.2	0.3-4.0		subhedral to anhedral
Clinopyroxene	34.3	0.5-6.6		anhedral
Orthopyroxene	3.5	0.6-2.6		anhedral
Opaque Minerals	1.1	0.3-2.0	45% ilmenite/55% magnetite	anhedral

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	3	Amphibole 32%; Smectite 65%; Sulfide 3%
Clinopyroxene	5	Hornblende 5%; Actinolite 93%; Oxide 2%
Orthopyroxene	8	Amphibole 95%; Smectite 5%
Plagioclase	1	Actinolite 100%

TOTAL ROCK ALTERATION: 2%

COMMENTS:
Structure Description: Fabric intensity: 1a overprinted by a weak 2?
Plagioclase: Deformation twins, undulose extinction, and potential recrystallization.There are numerous small plagioclase grains, but it is not clear that they formed by dynamic recrystallization, in that, there are not clear relationships between the recrystallized grains and the “porphyroclasts”. Contains dark brown needles and plates in some crystals.
Olivine: Subgrains. Contains dark brown to opaque rods.
Augite: Undeformed. Abundant exsolution. Rimmed by amphibole.
Oxide: Appears largely undeformed. Ilmenite-pyroxene symplectites present.
Mode = 1300 points.

(188) 176-735B-171R-5 (Piece 3, 96-99 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	6.4	0.6-4.0		anhedral
Plagioclase	51.9	0.5-8.4		euhedral to anhedral
Clinopyroxene	40.5	1.4-6.4		anhedral to ophitic
Orthopyroxene	0.2			
Opaque Minerals	0.8	0.2-0.8	ilmenite > sulfide	anhedral
Amphibole	0.2			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	3	Talc 2%; Magnetite 1%; Amphibole 60%; Smectite 32%; Pyrite 5%
Clinopyroxene	<1	Hornblende 70%; Actinolite 30%
Orthopyroxene	<1	Amphibole 100%
Plagioclase	<1	Actinolite 100%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
Structure Description: Fabric intensity: 1a.
Plagioclase: A few deformation twins and subgrains, undulose extinction. Some crystals weakly zoned. Abundant opaque rods and needles.
Olivine: Subgrains. Contains abundant dark brown to opaque needles and blebs.
Augite: No deformation microstructures. Olivine and plagioclase inclusions. Abundant exsolution. Rimmed by olivine.
Mode = 1200 points.

(189) 176-735B-172R-3 (Piece 2A, 70-76 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro / Vein
GRAIN SIZE: Coarse-grained
TEXTURE: Ophitic

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	5.9	1.4-9.8		anhedral
Plagioclase	55.3	0.7-8.2		subhedral to anhedral
Clinopyroxene	37.4	1.4-13.6		anhedral to ophitic
Orthopyroxene	0.1			
Opaque Minerals	0.7	0.2-1.4	ilmenite	anhedral
Amphibole	0.6			

Accessories: Apatite (Tr.)

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	3	Talc 5%; Magnetite 5%; Amphibole 67%; Smectite 23%
Clinopyroxene	3	Hornblende 90%; Actinolite 10%
Plagioclase	<1	Actinolite 100%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
Large format thin section.
Two narrow amphibole + plagioclase veins with 1 cm wide halos in which olivine is completely altered and plagioclase and clinopyroxene are 30 to 40% altered.
Total alteration in halo is around 50%.
Structure Description: Fabric intensity: 1a.
Plagioclase: Deformation twins, minor undulose extinction. Weakly zoned. Contains abundant dark brown to opaque needles.
Olivine: Subgrains. Contains dark brown rods. Rimmed by pyroxene.
Augite: Undeformed. Dominantly fine-scale, planar exsolution, with some patches of coarse exsolution. Plagioclase and olivine inclusions.
In the felsic veins there is no deformation. Plagioclase grains are euhedral or subhedral, and strongly zoned.
Mode = 1800 points.

(190) 176-735B-172R-6 (Piece 2, 46-50 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Felsic Vein
GRAIN SIZE: Coarse-grained
TEXTURE:

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Plagioclase	n/a	7.8-11.2		subhedral to anhedral
Clinopyroxene	n/a	3.8-8.4		subhedral to anhedral
Opaque Minerals	n/a	n/a	99% ilmenite/1% magnetite	subhedral to anhedral
Titanite	(abundant)			euhedral to subhedral

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Clinopyroxene	90	Hornblende 5%; Actinolite 90%; Titanite 3%; Quartz 2%
Plagioclase	30	Secondary Plagioclase 70%; Actinolite 15%; Quartz 10%; Smectite 5%

TOTAL ROCK ALTERATION: 55%

COMMENTS:
No veins, but there are cracks along which plagioclase is replaced by secondary plagioclase.
Structure Description: Fabric intensity: 1a; secondary minerals are undeformed.
Plagioclase: A few deformation twins, minor high temperature recrystallization, and undulose extinction. Contains abundant dark brown needles and plates.
Augite: Undeformed.
Amphibole: Zoned.

(191) 176-735B-173R-1 (Piece 8, 102-108 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Cumulate to Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	16.8	1.3-9.8		subhedral to amoeboidal
Plagioclase	62.2	1.2-18.2		subhedral to anhedral
Clinopyroxene	20.4	1.6-12.8		subhedral to anhedral
Orthopyroxene	0.1			
Opaque Minerals	0.4	0.3-2.2	ilmenite	anhedral
Amphibole	0.1			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	6	Magnetite 5%; Amphibole 5%; Smectite 90%
Clinopyroxene	1	Hornblende 5%; Actinolite 90%; Oxides 5%
Orthopyroxene	<1	Amphibole 100%
Plagioclase	<1	Actinolite 100%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
Large format thin section.
One discontinuous hairline crack with smectite.
Structure Description: Fabric intensity: 1a.
Plagioclase: Minor undulose extinction, deformation twins; equilibrated texture with 120° triple points and curviplanar grain boundaries. Weakly zoned. Contains abundant transparent brown to opaque rods and needles.
Olivine: Subgrains. Rimmed by pyroxene. Contains transparent brown rods, and opaque rods, dendrites, and plates.
Augite: Undeformed. Dominantly fine-scale, planar exsolution; some patches with coarse tabular exsolution.
Mode = 2100 points.

(192) 176-735B-175R-1 (Piece 4, 87-89 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Intergranular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	10.6	0.8-4.8		anhedral to amoeboidal
Plagioclase	60.5	1.1-8.4		subhedral to anhedral
Clinopyroxene	28.7	2.8-14.0		poikilitic
Opaque Minerals	0.2	0.1-0.5		anhedral

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	2	Magnetite 1%; Amphibole 5%; Smectite 90%; Pyrite 4%
Clinopyroxene	<1	Hornblende 90%; Actinolite 10%
Orthopyroxene	1	Amphibole 100%
Plagioclase	<1	Actinolite 100%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
Structure Description: Fabric intensity: 1a; very weak crystal-plastic deformation; equilibrated texture with 120° triple points and curviplanar grain boundaries.
Plagioclase: Minor undulose extinction, deformation twins, and subgrains. Weakly zoned. Contains abundant high-birefringent and opaque needles.
Olivine: Subgrains, recrystallization. Contains opaque rods.
Augite: Undeformed. Abundant fine-scale, planar, exsolution. Euhedral plagioclase inclusions.
Mode = 1250 points.

(193) 176-735B-175R-4 (Piece 2D, 99-105 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Disseminated Oxide Olivine Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Cumulate

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	20.2	4.2-9.8		subhedral
Plagioclase	58.6	1.5-17.0		subhedral to anhedral
Clinopyroxene	20.2	3.2-12.8		subhedral
Opaque Minerals	1.0	0.2-2.3	ilmenite	subhedral to anhedral

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	2	Magnetite 5%; Amphibole 25%; Smectite 60%; Pyrite 10%
Clinopyroxene	1	Hornblende 80%; Actinolite 20%
Orthopyroxene	<1	Amphibole 100%
Plagioclase	1	Smectite 60%; Actinolite 40%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
Large format thin section.
Structure Description: Fabric intensity: 1a.
Plagioclase: Undulose extinction, minor deformation twins. Weakly zoned. Contains opaque needles and transparent brown plates.
Olivine: Subgrains, minor recrystallization. Contains dark brown needles and dendritic patches, and light brown plates. Some crystals rimmed by pyroxene.
Augite: Undeformed. Abundant low-Ca pyroxene exsolution. Euhedral olivine inclusions.
Mode = 2000 points.

(194) 176-735B-176R-3 (Piece 2A, 79-83 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	8.4	1.5-6.4		anhedral
Plagioclase	62.8	0.9-14.0		subhedral to anhedral
Clinopyroxene	28.4	1.6-14.0		subhedral to ophitic
Orthopyroxene	0.2			
Opaque Minerals	0.2	0.1-1.1		anhedral

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	2	Magnetite 2%; Amphibole 20%; Smectite 77%; Pyrite 1%
Clinopyroxene	1	Hornblende 5%; Actinolite 93%; Oxides 2%
Orthopyroxene	<1	Amphibole 100%
Plagioclase	<1	Actinolite 100%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
A few hairline cracks with amphibole in plagioclase.
Structure Description: Fabric intensity: 1a.
Plagioclase: Deformation twins, undulose extinction, and subgrains; smaller grains may be either recrystallized neoblasts or equilibrated primary small grains. Weakly zoned. Abundant opaque needles and pale brown plates.
Olivine: Subgrains. Contains pale brown rods.
Augite: Undeformed. Dominantly fine-scale, planar exsolution; some patches with coarse tabular exsolution.
Mode = 1465 points.

(195) 176-735B-177R-6 (Piece 4B, 112-118 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Cumulate to Intergranular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	17.0	2.6-12.8		ophitic
Plagioclase	57.3	3.2-16.2		euhedral to subhedral
Clinopyroxene	25.3	2.2-14.4		poikilitic
Orthopyroxene	0.2			
Opaque Minerals	0.2	0.2-0.9	ilmenite	anhedral

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	15	Amphibole 18%; Smectite 80%; Pyrite 2%
Clinopyroxene	<1	Hornblende 2%; Actinolite 98%
Orthopyroxene	<1	Amphibole 100%
Plagioclase	<1	Actinolite 100%

TOTAL ROCK ALTERATION: 3%

COMMENTS:
Large format thin section.
Structure Description: Fabric intensity: 1a.
Plagioclase: Deformation twins, minor undulose extinction. Weak zoning. Contains opaque needles up to 0.6 x 0.001 mm.
Olivine: Subgrains (minor). Contains opaque dendritic patches and dark brown plates.
Augite: Undeformed. Abundant exsolution.
Mode = 2500 points.

(196) 176-735B-177R-7 (Piece 1D, 50-54 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Intergranular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	10.7	2.0-7.4		anhedral to ophitic
Plagioclase	66.0	0.8-10.4		subhedral to anhedral
Clinopyroxene	22.6	1.2-6.4		anhedral to ophitic
Orthopyroxene	0.1			
Opaque Minerals	0.5	0.1-0.8		anhedral
Amphibole	0.1			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	2	Magnetite 1%; Amphibole 55%; Smectite 39%; Pyrite 5%
Clinopyroxene	<1	Hornblende 50%; Actinolite 50%
Orthopyroxene	<1	Amphibole 100%
Plagioclase	<1	Actinolite 100%

TOTAL ROCK ALTERATION: <1%

COMMENTS:
Structure Description: Fabric intensity: 1a.
Plagioclase: A few deformation twins and subgrains; locally, very equilibrated texture with 120° triple points and curviplanar grain boundaries. Weakly zoned. Abundant opaque needles and pale brown plates.
Olivine: Subgrains, minor recrystallization. Contains opaque needles and dendritic patches, and pale brown plates. Some crystals rimmed by pyroxene.
Augite: Undeformed. Abundant fine-scale, planar, exsolution.Euhedral plagioclase inclusions.
Mode = 1225 points.

(197) 176-735B-178R-6 (Piece 5B, 135-136 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Microgabbro
GRAIN SIZE: Fine-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	8.6	0.2-0.5		anhedral
Plagioclase	63.0	0.2-3.0		anhedral
Clinopyroxene	27.7	0.2-0.7		anhedral
Orthopyroxene	0.1			
Opaque Minerals	0.2	<0.1		anhedral
Amphibole	0.4			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	1	Amphibole 100%
Clinopyroxene	2	Hornblende 70%; Actinolite 30%
Orthopyroxene	<1	Amphibole 100%
Plagioclase	<1	Actinolite 100%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
2.5 cm mini-core.
Structure Description: Fabric intensity: 1a.
Plagioclase: Very little deformation twins
Olivine: Undeformed
Augite: Undeformed. Contains opaque rods.
Comments: Equilibrated fine-grained texture. All grains are anhedral.
Mode = 814 points.

(198) 176-735B-179R-5 (Piece 3, 100-103 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Intergranular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	17.8	1.1-9.4		anhedral to amoeboidal
Plagioclase	63.3	1.1-10.8		euhedral to anhedral
Clinopyroxene	18.4	1.6-8.8		anhedral to ophitic
Orthopyroxene	0.1			
Opaque Minerals	0.2	0.1-0.8		anhedral
Amphibole	0.2			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	1	Amphibole 20%; Smectite 80%
Clinopyroxene	<1	Actinolite 100%
Orthopyroxene	<1	Amphibole 100%
Plagioclase	<1	Actinolite 100%

TOTAL ROCK ALTERATION: <1%

COMMENTS:
Structure Description: Fabric intensity: 1a.
Plagioclase: Deformation twins, minor undulose extinction. Weakly zoned. Abundant opaque needles and pale brown plates.
Olivine: Subgrains. Contains pale brown rods. Some crystals rimmed by pyroxene.
Augite: Minor undulose extinction, mostly undeformed. Abundant fine-scale, planar, exsolution.
Amphibole rims opaque minerals and some pyroxene crystals.
Mode = 1230 points.

(199) 176-735B-180R-5 (Piece 1, 0-4 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Leucocratic Troctolitic Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	16.6	3.8-8.8		anhedral to ophitic
Plagioclase	76.6	2.2-12.8		subhedral to anhedral
Clinopyroxene	6.6	1.8-6.6		anhedral to ophitic
Orthopyroxene	0.1			
Opaque Minerals	0.1	0.1-0.8		anhedral

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	2	Amphibole 80%; Smectite 20%
Clinopyroxene	1	Hornblende 5%; Actinolite 95%
Orthopyroxene	1	Amphibole 100%
Plagioclase	1	Actinolite 100%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
Structure Description: Fabric intensity: 1a.
Plagioclase: Deformation twins, undulose extinction, minor subgrains and recrystallization. Abundant opaque needles and pale brown plates.
Olivine: Subgrains. Contains pale brown and opaque rods, needles, and dendritic patches.
Augite: Undeformed. Abundant fine-scale, planar, exsolution.
Mode = 1308 points.

(200) 176-735B-181R-2 (Piece 9A, 85-88 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Altered

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	n/a	n/a		n/a
Plagioclase	n/a	n/a		n/a
Clinopyroxene	n/a	n/a		n/a
Opaque Minerals	n/a	n/a		n/a

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	90	Amphibole 15%; Smectite 85%
Clinopyroxene	80	Hornblende 3%; Actinolite 27%; Smectite 70%
Plagioclase	70	Secondary plagioclase 5%, Zeolite 10%; Calcite 5%; Smectite 75%; Actinolite 5%

TOTAL ROCK ALTERATION: 80%

COMMENTS:
Several 1 mm wide veins of smectite. Some cracks with green chlorite and zeolite.
Structure Description: Fabric intensity: 1a overprinted by a 5-6; strong alteration associated with cracks; possibly semi-brittle deformation.
Plagioclase: Undulose extinction, deformation twins. Zoned.
Augite: Kinked. Undulose extinction.

(201) 176-735B-182R-2 (Piece 7, 88-94 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Troctolite
GRAIN SIZE: Course-grained to Pegmatitic
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	50.7	1.2-34.0		anhedral
Plagioclase	45.2	2.2-11.0		subhedral to anhedral
Clinopyroxene	4.0	~10.4		interstitial
Orthopyroxene	0.1			
Opaque Minerals	tr.	0.4-2.2	ilmenite	anhedral

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	10	Talc 5%; Magnetite 5%; Amphibole 60%; Smectite 30%
Clinopyroxene	1	Actinolite 100%
Plagioclase	<1	Actinolite 100%

TOTAL ROCK ALTERATION: 5%

COMMENTS:
Large format thin section.
A hairline crack filled with amphibole. Near the veinlet, olivine is almost completely altered. Amphibole replacing olivine is mostly green, but brown hornblende is also observed in one example.
Structure Description: Fabric intensity: 1a: smaller grains are equilibrated, with 120° triple points and curviplanar boundaries; they may be either recrystallized neoblasts or equilibrated primary small grains.
Plagioclase: Undulose extinction, some deformation twins. Zoned crystals. Contains clear high-birefringent needles, and tiny opaque rods and needles.
Olivine: Subgrains. Contains opaque rods and dendritic patches.
Augite: Undeformed. Abundant fine-scale, planar, exsolution.
Mode = 2400 points.

(202) 176-735B-183R-2 (Piece 1B, 16-19 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Microgabbro
GRAIN SIZE: Fine-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	7.1	0.2-1.5		anhedral
Plagioclase	53.7	0.3-2.1		anhedral
Clinopyroxene	38.7	0.2-1.4		anhedral
Orthopyroxene	0.1			
Opaque Minerals	tr.	<0.2		anhedral
Amphibole	0.4			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	1	Amphibole 80%; Smectite 20%
Clinopyroxene	<1	Actinolite 100%
Orthopyroxene	<1	Amphibole 100%

TOTAL ROCK ALTERATION: <1%

COMMENTS:
Plagioclase is completely fresh.
Structure Description: Fabric intensity: 1a;
Plagioclase: Rare twins, slight undulose extinction in a few grains. Weakly zoned.
Olivine: Rare twins.
Augite: Undeformed. Abundant exsolution.
Mode = 1300 points.

(203) 176-735B-184R-5 (Piece 3A, 55-58 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Intergranular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	9.9	1.6-6.8		anhedral
Plagioclase	73.3	0.6-14.4		subhedral to anhedral
Clinopyroxene	16.5	2.2-6.0		anhedral
Orthopyroxene	0.3			
Opaque Minerals	tr.	0.1-0.7	sulfide > ilmenite	anhedral

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	1	Amphibole 90%; Smectite 10%
Clinopyroxene	<1	Actinolite 100%
Orthopyroxene	<1	Amphibole 100%
Plagioclase	<1	Actinolite 100%

TOTAL ROCK ALTERATION: <1%

COMMENTS:
Structure Description: Fabric intensity: 1a overprinted by a weak 2.
Plagioclase: Abundant twins, undulose extinction, recrystallization, and a few subgrains. Contains opaque rods.
Olivine: Subgrains. Some crystals rimmed by pyroxene.
Augite: Undulose extinction in a few grains. Abundant fine-scale, planar, exsolution.
Mode = 1207 points.

(204) 176-735B-189R-5 (Piece 1A, 1-4 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Microgabbro
GRAIN SIZE: Fine-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	6.3	0.3-2.2		anhedral
Plagioclase	55.0	0.6-8.6		subhedral to anhedral
Clinopyroxene	38.4	0.4-3.8		anhedral to ophitic
Orthopyroxene	0.3			
Opaque Minerals	tr.	<0.2		anhedral

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	1	Amphibole 20%; Smectite 80%
Clinopyroxene	<1	Actinolite 100%; Oxide tr.
Orthopyroxene	<1	Amphibole 100%
Plagioclase	<1	Actinolite 100%

TOTAL ROCK ALTERATION: <1%

COMMENTS:
Structure Description: Fabric intensity: 1a, perhaps a weak 1b.
Plagioclase: Twins, undulose extinction, rare subgrains and very rare recrystallized grains; weak lattice-preferred orientation, likely a result of magmatic deformation.
Olivine: Rare subgrains.
Augite: Undeformed. Fine-scale, planar, exsolution. Euhedral to subhedral plagioclase inclusions.
Mode = 1396 points.

(205) 176-735B-185R-5 (Piece 1, 2-6 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	3.2	2.0-5.0		anhedral
Plagioclase	54.6	1.2-10.4		subhedral to anhedral
Clinopyroxene	41.7	2.0-9.6		subhedral to anhedral
Orthopyroxene	0.3			subhedral
Opaque Minerals	0.2	<0.1	ilmenite	anhedral

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	10	Amphibole 80%; Smectite 20%; Pyrite tr.
Clinopyroxene	1	Hornblende 3%; Actinolite 47%; Smectite 50%
Orthopyroxene	<1	Amphibole 100%
Plagioclase	1	Actinolite 20%; Smectite 80%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
Hairline cracks with smectite and amphibole.
Structure Description: Fabric intensity: 1a.
Plagioclase: Subgrains, undulose extinction, and some deformation twins. Weakly zoned. Abundant opaque needles and pale brown plates.
Olivine: Subgrains
Augite: Undeformed. Dominantly fine-scale, planar exsolution; some patches with coarse tabular exsolution.
Mode = 1300 points.

(206) 176-735B-186R-6 (Piece 1, 42-46 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	6.5	2.0-6.4		anhedral
Plagioclase	63.1	0.8-13.2		subhedral to anhedral
Clinopyroxene	30.0	1.6-10.0		anhedral to poikilitic
Orthopyroxene	0.2			
Opaque Minerals	0.2	0.8-1.8		anhedral

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	5	Magnetite 5%; Amphibole 75%; Smectite 20%; Pyrite tr.
Clinopyroxene	1	Hornblende 10%; Actinolite 85%; Oxide 5%
Orthopyroxene	<1	Amphibole 100%
Plagioclase	1	Actinolite 100%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
Rare cracks with amphibole.
Structure Description: Fabric intensity: 1a; the texture is equilibrated, with numerous 120° triple junctions and curviplanar grain boundaries in plagioclase.
Plagioclase: Subgrains, undulose extinction, and a few deformation twins. Weakly zoned. Abundant opaque needles and pale brown plates.
Olivine: Subgrains, minor recrystallization. Euhedral plagioclase inclusions. Contains opaque needles.
Augite: Undeformed. Abundant fine-scale, planar, exsolution. Euhedral plagioclase inclusions.
Mode = 1300 points.

(207) 176-735B-187R-5 (Piece 2B, 54-57 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Medium-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	10.0	1.6-5.6		anhedral
Plagioclase	59.1	1.0-7.4		subhedral to anhedral
Clinopyroxene	30.8	1.0-8.0		anhedral to ophitic
Orthopyroxene	0.1			
Opaque Minerals	tr.	<0.2		anhedral

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	5	Magnetite 2%; Amphibole 78%; Smectite 20%; Pyrite tr.
Clinopyroxene	1	Actinolite 100%
Orthopyroxene	<1	Amphibole 100%
Plagioclase	<1	Actinolite 20%; Smectite 80%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
Structure Description: Fabric intensity: 1a.
Plagioclase: Rare subgrains, twins and undulose extinction. Weakly zoned. Abundant opaque needles.
Olivine: Subgrains. Contains transparent brown rods. Some crystals rimmed by pyroxene.
Augite: Undeformed. Dominantly fine-scale, planar exsolution; some patches with coarse tabular exsolution.
Mode = 1310 points.

(208) 176-735B-188R-4 (Piece 2C, 104-107 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Medium-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	5.6	0.8-4.0		anhedral
Plagioclase	55.1	0.6-6.0		subhedral to anhedral
Clinopyroxene	38.9	1.2-6.4		subhedral to anhedral
Orthopyroxene	0.4			
Opaque Minerals	tr.	<0.2		anhedral

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	4	Magnetite 2%; Amphibole 60%; Smectite 38%
Clinopyroxene	1	Actinolite 100%
Orthopyroxene	<1	Amphibole 100%
Plagioclase	<1	Actinolite 100%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
Structure Description: Fabric intensity: 1a; the texture is equilibrated, with 120° triple junctions and curviplanar grain boundaries.
Plagioclase: Undulose extinction, subgrains, deformation twins. Abundant opaque needles.
Olivine: Subgrains. Some rimmed by pyroxene.
Augite: Undeformed. Dominantly fine-scale, planar exsolution; some patches with coarse tabular exsolution. Euhedral to subhedral plagioclase inclusions.
Mode = 1248 points.

(209) 176-735B-189R-7 (Piece 1B, 64-67 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Fine-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	7.1	0.2-1.8		anhedral
Plagioclase	59.7	0.2-1.4		anhedral
Clinopyroxene	32.1	0.3-1.7		anhedral
Orthopyroxene	0.2			
Opaque Minerals	0.3	<0.1		anhedral
Amphibole	0.6			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	5	Magnetite 2%; Amphibole 86%; Smectite 10%; Pyrite 2%
Clinopyroxene	1	Hornblende 90%; Actinolite 10%
Orthopyroxene	<1	Amphibole 100%
Plagioclase	<1	Actinolite 100%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
Structure Description: Fabric intensity: 1b overprinted by a weak 2.
Plagioclase: Strong lattice preferred orientation, and subgrain rotation recrystallization.
Olivine: Subgrains, recrystallized ribbons.
Augite: Undeformed. Abundant fine-scale, planar, exsolution.
Mode = 1233 points.

(210) 176-735B-189R-3 (Piece 2, 87-91 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro / Microgabbro
GRAIN SIZE: Coarse-grained / Fine-grained
TEXTURE: Granular / Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	10.5/4.5	2.8-12.8/0.3-0.6		anhedral / anhedral
Plagioclase	50.7/51.5	1.6-14.8/0.6-2.8		subhedral / anhedral
Clinopyroxene	38.8/43.9	2.8-14.4/0.1-1.8		anhedral / ophitic
Opaque Minerals	tr./tr.	0.1-0.3/<0.1		anhedral / anhedral
Amphibole	0/0.1			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	2	Magnetite 2%; Amphibole 28%; Smectite 70%; Pyrite tr.
Clinopyroxene	<1	Hornblende 10%; Actinolite 90%
Orthopyroxene	<1	Amphibole 100%
Plagioclase	<1	Actinolite 100%

TOTAL ROCK ALTERATION: <1%

COMMENTS:
Large format thin section.
Structure Description: Fabric intensity: 1a (coarse-grained), 1b (fine-grained); good lattice preferred orientation in the fine-grained material; the shape-preferred orientation is still visible, in spite of the equilibrated texture. The grains are too large in the coarse-grained texture to observe a fabric.
Plagioclase: Undulose extinction, deformation twins, subgrains (more developed in coarse-grained texture). Weakly zoned in both. Abundant opaque rods in coarser grained.
Olivine: Subgrains in coarse-grained texture, undeformed in fine-grained texture. Contains opaque rods in coarse grained area.
Augite: Undeformed. Abundant fine-scale, planar, exsolution in both rock types.
Mode = 1700 points / 843 points.

(211) 176-735B-190R-4 (Piece 3, 70-73 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Medium-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	7.6	0.6-4.0		anhedral
Plagioclase	55.3	0.4-5.8		anhedral
Clinopyroxene	36.4	0.6-5.8		subhedral to anhedral
Orthopyroxene	0.1			
Opaque Minerals	0.4	0.1-1.0		anhedral
Amphibole	0.2			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	1	Magnetite tr.; Amphibole 70%; Smectite 30%; Pyrite tr.
Clinopyroxene	<1	Hornblende 90%; Actinolite 10%
Orthopyroxene	<1	Amphibole 100%
Plagioclase	<1	Actinolite 100%

TOTAL ROCK ALTERATION: <1%

COMMENTS:
Structure Description: Fabric intensity: 1b-2; good lattice and shape preferred orientations.
Plagioclase: very few deformation twins, subgrains, undulose extinctions. Numerous 120° triple junctions and curviplanar grain boundaries.
Olivine: Subgrains, recrystallization. Some crystals rimmed by pyroxene.
Augite: Slightly kinked. Weakly zoned. Abundant fine-scale, planar, exsolution.
Mode = 1350 points.

(212) 176-735B-191R-3 (Piece 2B, 33-39 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Disseminated Oxide Gabbronorite/ OPX-Bearing Disseminated Oxide Olivine Gabbro
GRAIN SIZE: Medium-grained / Fine-grained
TEXTURE: Cumulate / Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	2.9 / 9.0	0.8-4.2 /0.8-2.6		anhedral
Plagioclase	67.7 / 56.8	0.7-8.4 / 0.8-5.2		subhedral to anhedral
Clinopyroxene	23.1 / 28.3	0.6-5.2 / 0.4-5.1		subhedral to anhedral
Orthopyroxene	5.1 / 4.2	0.3-0.5 / 0.4-6.0		euhedral to subhedral
Opaque Minerals	1.2 / 1.7	<0.2 / 0.4-6.0	75% ilmenite/25% magnetite	euhedral to anhedral

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	1	Magnetite 2%; Amphibole 28%; Smectite 70%; Pyrite tr.
Clinopyroxene	1	Hornblende 40%; Actinolite 60%
Orthopyroxene	2	Amphibole 98%; Oxide 2%
Plagioclase	1	Actinolite 100%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
Large format thin section.
An Oxide Olivine Microgabbro occurs along one edge of the thin section with grain sizes: olivine 0.2-0.7, plagioclase 0.2-1.2, augite 0.1-0.8, and oxide 0.3-0.5.
Structure Description: Fabric intensity: weak 1b in finer-grained portion (defined by strong lattice-preferred orientation and a weak shape-preferred orientation; 1a in coarse-grained portion, overprinted by a weak 2. A stronger 2 overprint at the boundary between the two areas; in addition, there appears to be a magmatic foliation defined by aligned augite grains.
Plagioclase: Twins and subgrains in coarser-grained region.
Olivine: Subgrains, minor recrystallization. Contains abundant pale brown rods, plates, and needles.
Augite: Undeformed. Abundant exsolution. Contains dark brown to opaque rods and plates.
Orthopyroxene: Abundant augite exsolution. Contains abundant opaque needles.
Oxide: Appears undeformed in coarse-grained portion, elongate ribbons at the boundary between the two areas
Mode: coarse = 1500 points / fine = 876 points.

(213) 176-735B-190R-3 (Piece 5b, 69-73 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: OPX-bearing Gabbro / Oxide Pyroxenite
GRAIN SIZE: Medium-grained with coarse pyroxene / Fine-grained with medium pyroxene
TEXTURE: Granular / Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	7.8	0.6-7.4 / none		recrystallized
Plagioclase	44.9	0.4-9.6 /		recrystallized
Clinopyroxene	39.8	0.7-12.0 / 0.6-1.8		ophitic
Orthopyroxene	4.2	none / 0.4-4.0		subhedral
Opaque Minerals	2.4	0.1-0.6 / 0.1-2.0	95% ilmenite/5% magnetite	anhedral
Amphibole	0.9			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	2	Magnetite 5%; Amphibole 55%; Smectite 40%
Clinopyroxene	2	Hornblende 25%; Actinolite 60%; Oxide 15%
Orthopyroxene	3	Amphibole 90%; Oxide 10%
Plagioclase	2	Actinolite 100%

TOTAL ROCK ALTERATION: 2%

COMMENTS:
Structure Description: Fabric intensity: 2.
Plagioclase: Subgrains, twins, and recrystallized grains. Opaque needles and pale brown plates.
Olivine: Recrystallized ribbons, subgrains with 120-120-120 degree grain intersections.
Augite: Recrystallized grains. Abundant exsolution.
Orthopyroxene: Abundant planar augite exsolution. Contains abundant brown plates.
Mode = 1300 points.

(214) 176-735B-191R-3 (Piece 3C, 83-85 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: OPX-Bearing, Disseminated Oxide Olivine Microgabbronorite
GRAIN SIZE: Fine-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	13.7	0.2-1.5		anhedral
Plagioclase	61.5	0.2-1.1		anhedral
Clinopyroxene	21.1	0.2-2.4		anhedral
Orthopyroxene	1.7	0.1-1.0		anhedral
Opaque Minerals	1.8	<0.5	30% ilmenite/70% magnetite	subhedral to anhedral
Amphibole	0.2			subhedral

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	1	Magnetite 5%; Amphibole 25%; Smectite 70%; Pyrite tr.
Clinopyroxene	1	Hornblende 70%; Actinolite 30%; Oxide tr.
Orthopyroxene	1	Amphibole 95%; Oxide 5%
Plagioclase	<1	Actinolite 100%

TOTAL ROCK ALTERATION: <1%

COMMENTS:
2.5 cm mini-core.
Structure Description: Fabric intensity: weak 1b (defined by good lattice-preferred orientation and a weak shape-preferred orientation).
Plagioclase: Subgrains and mechanical twins.
Olivine: Rare subgrains.
Augite: Undeformed. Abundant pale brown rods and needles. Abundant opaque inclusions.
Mode = 1229 points.

(215) 176-735B-191R-4 (Piece 3, 111-115 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Leucocratic Gabbronorite
GRAIN SIZE: Coarse-grained
TEXTURE: Cumulate to Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	1.0	0.2-0.6		anhedral
Plagioclase	68.9	0.7-8.8		recrystallized
Clinopyroxene	12.7	0.9-9.8		subhedral
Orthopyroxene	16.8	0.7-8.4		subhedral
Opaque Minerals	0.5	0.1-0.9		anhedral
Amphibole	0.1			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Clinopyroxene	1	Hornblende 70%; Actinolite 25%; Oxide 5%
Orthopyroxene	1	Amphibole 95%; Oxide 5%
Plagioclase	1	Actinolite 100%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
Structure Description: Fabric intensity: 1b-2; strong lattice-preferred orientation, good shape-preferred orientation. The texture is equilibrated (120° triple junctions, curviplanar grain boundaries) in areas with small plagioclase crystals.
Plagioclase: Subgrains, deformation twins, minor recrystallization. Weakly zoned. Abundant opaque rods and needles.
Olivine: Subgrains.
Augite: Undeformed.
Orthopyroxene: Crystals bent. Contains abundant pale brown plates.
Mode = 1320 points.

(216) 176-735B-191R-7 (Piece 2, 91-93 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro with Plagioclase - Amphibole Vein
GRAIN SIZE: Medium-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	n/a	0.7-6.8		recrystallized
Plagioclase	n/a	0.6-8.0		recrystallized
Clinopyroxene	n/a	0.5-10.0		anhedral
Opaque Minerals	n/a	<0.4		anhedral

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	7	Magnetite 5%; Amphibole 73%; Smectite 20%; Pyrite 2%
Clinopyroxene	3	Hornblende 20%; Actinolite 80%
Orthopyroxene	1	Amphibole 100%
Plagioclase	2	Secondary plagioclase 70%; Actinolite 30%

TOTAL ROCK ALTERATION: 3% (away from amphibole vein)

COMMENTS:
One irregular crack with amphibole, with ~20% alteration along this veinlet.
Structure Description: Fabric intensity: 1a; some of the finer plagioclase areas are equilibrated and display a strong lattice-preferred orientation (recrystallization by subgrain rotation?).
Plagioclase: A few deformation twins, undulose extinction. Strongly zoned. Abundant opaque needles and blebs (<0.001 mm).
Olivine: Recrystallized.
Augite: Undeformed. Abundant fine-scale, planar, exsolution.

(217) 176-735B-191R-8 (Piece 2, 31-34 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Medium-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	6.0	1.7-5.2		subhedral to anhedral
Plagioclase	67.4	0.6-5.8		subhedral to anhedral
Clinopyroxene	25.4	1.4-12.6		subhedral to poikilitic
Orthopyroxene	0.7	~3.4		anhedral
Opaque Minerals	0.2	0.2-1.8	ilmenite	anhedral
Amphibole	0.3			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	1	Magnetite tr.; Amphibole 70%; Smectite 30%; Pyrite tr.
Clinopyroxene	<1	Hornblende 80%; Actinolite 20%
Orthopyroxene	<1	Amphibole 100%
Plagioclase	<1	Actinolite 100%

TOTAL ROCK ALTERATION: <1%

COMMENTS:
Structure Description: Fabric intensity: 1a; equilibrated texture, weak lattice-preferred orientation.
Plagioclase: A few deformation twins, undulose extinction. Contains scattered opaque rods.
Olivine: Subgrains. Contains dark brown to opaque rods and needles.
Augite: Undeformed. Abundant fine-scale, planar, exsolution. Euhedral plagioclase inclusions.
Mode = 1333 points.

(218) 176-735B-106R-2 (Piece 1, 17-20 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Gabbro
GRAIN SIZE: Medium-grained
TEXTURE: Cumulate to Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	3.8	1.1-4.2		subhedral to anhedral
Plagioclase	58.9	0.8-6.4		subhedral
Clinopyroxene	36.8	1.2-8.8		subhedral to poikilitic
Opaque Minerals	0.1	0.1-0.6		anhedral
Amphibole	0.4			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	70	Magnetite 5%; Amphibole 65%; Smectite 30%
Clinopyroxene	10	Hornblende 10%; Actinolite 88%; Oxide 2%
Plagioclase	2	Actinolite 100%

TOTAL ROCK ALTERATION: 8%

COMMENTS:
Structure Description: Fabric intensity: 1a; onset of low-temperature crystal-plastic deformation. No significant lattice-preferred orientation, but the smaller domains display very strong lattice-preferred orientation; they appear to be primary larger grains, slightly deformed at high temperature by subgrain rotation, and deformed again at lower temperature (weakly serrated grain boundaries).
Plagioclase: Deformation twins, subgrains, undulose extinction. Onset of grain boundary bulging. Zoned crystals. Abundant tiny blebs (<0.0005 mm) give a dusty appearance.
Olivine: Subgrains. Contains opaque rods.
Augite: Undeformed. Euhedral plagioclase inclusions. Rimmed with amphibole.
Mode = 1200 points.

(219) 176-735B-115R-6 (Piece 2, 30-34 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Medium-grained
TEXTURE: Recrystallized Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	9.8	0.6-7.0		recrystallized
Plagioclase	53.5	0.4-3.2		recrystallized
Clinopyroxene	35.7	1.2-10.2		anhedral to ophitic
Orthopyroxene	0.2			
Opaque Minerals	0.4	0.1-1.4	ilmenite with some hematite	anhedral
Amphibole	0.4			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	12	Magnetite 5%; Amphibole 45%; Smectite 48%; Pyrite 2%
Clinopyroxene	15	Hornblende 35%; Actinolite 65%
Orthopyroxene	3	Amphibole 100%
Plagioclase	3	Actinolite 100%

TOTAL ROCK ALTERATION: 8%

COMMENTS:
Structure Description: Fabric intensity: 2-3; strong lattice-preferred orientation.
Plagioclase: Abundant deformation twins, undulose extinction, recrystallization. Contains opaque rods, needles, and blebs.
Olivine: Recrystallized, subgrains. Contains opaque dendritic patches. Some crystals rimmed by pyroxene.
Augite: A few kinked grains, minor recrystallization. Abundant exsolution. Inclusions of euhedral olivine and plagioclase. Contains abundant dark brown plates, opaque rods, and blebs.
Mode = 1330 points.

(220) 176-735B-192R-4 (Piece 2, 54-57 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Medium-grained
TEXTURE: Intergranular to Cumulate

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	5.0	0.6-5.2		anhedral to ophitic
Plagioclase	63.1	0.8-5.6		euhedral to anhedral
Clinopyroxene	31.3	1.2-14.4		anhedral to ophitic
Orthopyroxene	0.4			
Opaque Minerals	0.1	0.1-0.8		anhedral
Amphibole	0.1			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	2	Magnetite 2%; Amphibole 28%; Smectite 70%; Pyrite tr.
Clinopyroxene	<1	Hornblende 10%; Actinolite 90%
Orthopyroxene	<1	Amphibole 100%
Plagioclase	<1	Actinolite 100%

TOTAL ROCK ALTERATION: <1%

COMMENTS:
Structure Description: Fabric intensity: 1A.
Plagioclase: Deformation twins, undulose extinction, minor recrystallization. Weakly zoned. Contains opaque needles.
Olivine: Subgrains, undulose extinction, minor recrystallization. Some crystals rimmed by amphibole.
Augite: Undulose extinction. Dominantly fine-scale, planar exsolution; some patches with coarse tabular exsolution.
Oxides: Rimmed by amphibole.
Mode = 1300 points.

(221) 176-735B-193R-1 (Piece 3B, 89-93 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Medium-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	7.1	1.4-4.2		anhedral to amoeboidal
Plagioclase	56.6	0.8-4.0		subhedral to anhedral
Clinopyroxene	35.7	1.3-6.2		subhedral to ophitic
Orthopyroxene	0.1			
Opaque Minerals	0.4	0.1-2.6		anhedral
Amphibole	0.1			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	1	Magnetite tr.; Amphibole 10%; Smectite 90%
Clinopyroxene	<1	Hornblende 90%; Actinolite 10%
Orthopyroxene	<1	Amphibole 100%
Plagioclase	<1	Actinolite 95%; Smectite 3%; Sulfide 2%

TOTAL ROCK ALTERATION: <1%

COMMENTS:
Structure Description: Fabric intensity: 1b.
Plagioclase: Deformation twins, undulose extinction, subgrains, and minor recrystallization. Contains opaque needles.
Olivine: Undulose extinction, subgrains, and minor recrystallization. Contains scattered pale brown rods.
Augite: Undeformed. Euhedral plagioclase inclusions. Dominantly fine-scale, planar exsolution; some patches with coarse tabular exsolution.
Opaque minerals: Rimmed by amphibole.
Mode = 1300 points.

(222) 176-735B-195R-2 (Piece 1, 9-13 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	1.5	0.8-8.0		anhedral
Plagioclase	63.0	0.9-13.2		
Clinopyroxene	34.3	0.6-8.8		anhedral
Orthopyroxene	0.7	0.9-1.8		subhedral to anhedral
Opaque Minerals	tr	<0.2		anhedral
Amphibole	0.5			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	1	Magnetite 1%; Amphibole 59%; Smectite 40%; Pyrite tr.
Clinopyroxene	2	Hornblende 80%; Actinolite 20%
Orthopyroxene	1	Amphibole 100%
Plagioclase	<1	Actinolite 100%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
Structure Description: Fabric intensity: 1a.
Plagioclase: Deformation twins, and subgrains. Moderately zoned. Contains abundant opaque needles.
Olivine: Subgrains. Contains abundant pale brown rods. Some crystals rimmed by pyroxene.
Augite: Undeformed. Abundant exsolution; some crystals with two sets of lamellae at a shallow angle to each other.
Mode = 1500 points.

(223) 176-735B-195R-4 (Piece 4, 75-79 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Leucocratic Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Intergranular to Cumulate

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	1.6	0.8-3.2		subhedral to anhedral
Plagioclase	78.0	0.6-10.6		euhedral to anhedral
Clinopyroxene	19.9	0.6-21.2		subhedral to ophitic
Orthopyroxene	Tr.			rims
Opaque Minerals	0.3	0.1-0.6		anhedral
Amphibole	0.2			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	2	Magnetite 2%; Amphibole 70%; Smectite 27%; Pyrite 1%
Clinopyroxene	1	Hornblende 40%; Actinolite 60%
Orthopyroxene	1	Amphibole 100%
Plagioclase	<1	Actinolite 100%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
Structure Description: Fabric intensity: 1a.
Plagioclase: Deformation twins, undulose extinction, subgrains, and minor recrystallization. Zoned crystals. Contains scattered opaque needles and blebs; abundant in the cores of some crystals.
Olivine: Undulose extinction, subgrains, and minor recrystallization. Some crystals rimmed by amphibole, some by pyroxene.
Augite: Undulose extinction. Abundant exsolution. Contains pale brown plates.
Mode = 1500 points.

(224) 176-735B-196R-4 (Piece 7A, 99-102 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Leucocratic Troctolitic Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	9.8	0.8-5.4		anhedral to ophitic
Plagioclase	79.5	0.8-12.6		subhedral to anhedral
Clinopyroxene	10.5	3.4-9.6		anhedral to ophitic
Orthopyroxene	Tr.			rims
Opaque Minerals	0.1	0.1-0.8		anhedral
Amphibole	0.1			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	1	Magnetite tr.; Amphibole 20%; Smectite 79%; Calcite 1%; Pyrite tr.
Clinopyroxene	1	Hornblende 60%; Actinolite 40%
Orthopyroxene	<1	Amphibole 100%
Plagioclase	<1	Actinolite 100%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
Structure Description: Fabric intensity: 1a; equilibrated texture, with 120° triple junctions.
Plagioclase: Deformation twins, and subgrains. Zoned crystals. Contains opaque needles and pale brown plates.
Olivine: Subgrains. Contains pale brown rods. Some crystals rimmed by pyroxene.
Augite: Undeformed. Abundant exsolution.
Mode = 1262 points.

(225) 176-735B-197R-2 (Piece 5A, 27-32 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Gabbro
GRAIN SIZE: Medium-grained
TEXTURE: Cataclastic

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	n/a	0.3-0.6		anhedral
Plagioclase	n/a	0.4-1.8		porphyroclasts
Clinopyroxene	n/a	0.4-1.6		porphyroclasts
Opaque Minerals	n/a	n/a		

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	25	Magnetite 1%; Amphibole 4%; Smectite 95%
Clinopyroxene	35	Actinolite 10%; Smectite 90%
Plagioclase	25	Epidote 5%; Smectite 90%; Actinolite 5%

TOTAL ROCK ALTERATION: 27%

COMMENTS:
There are five subparallel veins of smectite (80%), prehnite (14%), amphibole (5%), and calcite (1%) with partial alteration of all magmatic phases to smectite in the halos.
Structure Description: Fabric intensity: 1a, overprinted by 6; the texture is strongly equilibrated and relatively fine-grained (recrystallized?). A smectite vein displays a comb-like structure, with fibers parallel to the walls; it is overprinted in its center by a fault or a semi-brittle shear zone (with a strong lattice-preferred orientation).
Plagioclase: Minor undulose extinction.
Olivine: Not deformed. Recrystallized rims on pyroxene (?).
Augite: Mostly undeformed, a few kinked grains.

(226) 176-735B-197R-3 (Piece 5a, 87-89 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: OPX-Bearing Olivine Microgabbro
GRAIN SIZE: Fine-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	5.9	0.1-0.3		anhedral
Plagioclase	55.9	0.3-1.1		anhedral
Clinopyroxene	36.3	0.1-1.1		anhedral
Orthopyroxene	1.2	0.1-1.2		anhedral
Opaque Minerals	0.2	<0.1		subhedral to anhedral
Amphibole	0.5			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	2	Magnetite 1%; Amphibole 10%; Smectite 89%
Clinopyroxene	1	Hornblende 80%; Actinolite 20%
Plagioclase	<1	Actinolite 100%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
2.5 cm mini-core. Section contains one narrow crack with smectite.
Structure Description: Fabric intensity: 3/4 ; plagioclase displays an equilibrated texture; strong preferred orientation and recrystallization of all minerals indicates probable 3/4 fabric overprinting original 1b magmatic fabric.
Plagioclase: Deformation twins, undulose extinction, considerable recrystallization, very strong lattice-preferred orientation.
Olivine: Subgrains, considerable recrystallization into ribbons.
Augite: Undulose extinction and some recrystallization.
Mode = 1103 points.

(227) 176-735B-198R-1 (Piece 9B, 126-129 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Gabbro
GRAIN SIZE: Medium-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	4.0	0.6-4.4		anhedral
Plagioclase	48.2	0.4-4.6		subhedral to anhedral
Clinopyroxene	47.3	0.4-6.0		subhedral to anhedral
Orthopyroxene	0.1			
Opaque Minerals	0.1	0.1-0.4		anhedral

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	12	Magnetite 1%; Amphibole 18%; Smectite 80%; Pyrite 1%
Clinopyroxene	1	Actinolite 30%; Smectite 70%
Orthopyroxene	<1	Amphibole 100%
Plagioclase	1	Actinolite 10%; Smectite 90%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
Structure Description: Fabric intensity: 1b overprinted by 2; no significant lattice-preferred orientation. A few microcracks overprint the igneous texture.
Plagioclase: Deformation twins, subgrains, and grain-boundary migration. Possibly a lot of the small grains are recrystallized grains (equilibrated texture).
Olivine: Recrystallized. Some elongate stringers.
Augite: Undeformed, some serrated grain boundaries. Poorly developed exsolution.
Mode = 1500 points.

(228) 176-735B-198R-2 (Piece 3A, 36-40 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Medium-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	9.5	0.2-6.3		subhedral to anhedral
Plagioclase	59.8	0.3-15.0		subhedral to anhedral
Clinopyroxene	29.6	0.2-5.8		subhedral to anhedral
Orthopyroxene	0.5	1.6-2.5		subhedral
Opaque Minerals	0.5	<0.3		anhedral
Amphibole	0.1			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	4	Amphibole 20%; Smectite 80%
Clinopyroxene	1	Hornblende 2%; Actinolite 68%; Smectite 30%
Orthopyroxene	<1	Amphibole 100%
Plagioclase	1	Epidote 5%; Smectite 90%; Actinolite 5%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
Narrow vein with smectite (75%) and prehnite (25%) and smectite in alteration halo.
Structure Description: Fabric intensity: 1b overprinted by 3, locally overprinted by 6.
Plagioclase: Large porphyroclasts have deformation twins, undulose extinction, and subgrains; considerable recrystallization. Weakly zoned crystals. Contains opaque needles in cores.
Olivine: Undulose extinction, subgrains, and significant recrystallization. Some crystals rimmed by orthopyroxene.
Augite: Undulose extinction, and minor recrystallization. Dominantly fine-scale, planar exsolution; some patches with coarse exsolution.
Orthopyroxene: Zoned with fine-scale planar exsolution. Some crystals rimmed by olivine.
Mode = 1504 points.

(229) 176-735B-199R-2 (Piece 2A, 84-87 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Granular (altered)

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	3.8	0.7-3.6		subhedral
Plagioclase	45.3	0.5-5.2		subhedral to anhedral
Clinopyroxene	50.2	1.0-9.2		subhedral to anhedral
Orthopyroxene	0.6			
Opaque Minerals	0.1		sulfides > ilmenite	

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	30	Magnetite 2%; Amphibole 10%; Smectite 86%; Pyrite 2%
Clinopyroxene	1	Hornblende 2%; Actinolite 88%; Smectite 7%; Oxide 3%
Orthopyroxene	<1	Amphibole 100%
Plagioclase	<1	Smectite 30%; Actinolite 70%

TOTAL ROCK ALTERATION: 2%

COMMENTS:
Structure Description: Fabric intensity: 1a, w/ minor 6 overprint (microcracking).
Plagioclase: Deformation twins, undulose extinction, subgrains and minor recrystallization. Zoned crystals. Contains opaque needles in a few grains.
Olivine: Undulose extinction, subgrains, and minor recrystallization.
Augite: Undulose extinction locally. Abundant exsolution.
Mode = 1286 points.

(230) 176-735B-199R-2 (Piece 5, 129-133 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Leucocratic Olivine Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	8.7	0.8-5.8		anhedral
Plagioclase	65.2	0.6-12.0		subhedral to anhedral
Clinopyroxene	25.3	0.8-8.1		anhedral to ophitic
Orthopyroxene	0.5			
Opaque Minerals	0.2	0.3-1.2		anhedral
Amphibole	0.1			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	8	Magnetite 2%; Amphibole 16%; Smectite 80%; Pyrite 2%
Clinopyroxene	<1	Hornblende 20%; Actinolite 80%
Orthopyroxene	<1	Amphibole 100%
Plagioclase	<1	Actinolite 100%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
Structure Description: Fabric intensity: 1a.
Plagioclase: Deformation twins, undulose extinction, subgrains and minor recrystallization along fractures. Zoned crystals. Contains brown to opaque needles.
Olivine: Undulose extinction, subgrains. Contains abundant light brown rods, plates, and dendrites. Some crystals rimmed by pyroxene.
Augite: Undulose extinction. Euhedral plagioclase inclusions. Dominantly fine-scale, planar exsolution; some patches with coarse bleby exsolution. Some crystals rimmed by orthopyroxene.
Mode = 1310 points.

(231) 176-735B-199R-6 (Piece 3, 56-59 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Troctolitic Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	28.4	1.0-10.6		ophitic
Plagioclase	56.5	0.6-10.4		subhedral to anhedral
Clinopyroxene	14.5	1.0-8.5		ophitic
Orthopyroxene	0.3			
Opaque Minerals	0.1	0.1-0.8		anhedral
Amphibole	0.2			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	5	Magnetite 1%; Amphibole 18%; Smectite 80%; Pyrite 1%
Clinopyroxene	1	Hornblende 20%; Actinolite 80%
Orthopyroxene	<1	Amphibole 100%
Plagioclase	<1	Actinolite 100%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
Structure Description: Fabric intensity: 1a.
Plagioclase: Deformation twins, undulose extinction, subgrains, and very minor recrystallization. Contains scattered opaque needles in some crystals.
Olivine: Undulose extinction with subgrains. Contains pale brown rods and plates. Some crystals rimmed by pyroxene.
Augite: Not deformed. Euhedral plagioclase inclusions. Dominantly fine-scale, planar exsolution.
Mode = 1531 points.

(232) 176-735B-200R-4 (Piece 2a, 48-52 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	5.2	1.6-14.3		subhedral to anhedral
Plagioclase	50.7	0.6-10.6		subhedral to anhedral
Clinopyroxene	43.8	2.8-16.8		subhedral to anhedral
Orthopyroxene	0.1			
Opaque Minerals	0.2	0.1-1.1		anhedral

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	4	Magnetite 1%; Amphibole 68%; Smectite 30%; Pyrite 1%
Clinopyroxene	2	Hornblende 20%; Actinolite 80%
Orthopyroxene	1	Amphibole 100%
Plagioclase	<1	Actinolite 100%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
Large format thin section.
Structure Description: Fabric intensity: 1a, possibly 2; rare occurrence of subgrain formation in clinopyroxene.
Plagioclase: Deformation twins, undulose extinction, subgrains, and minor recrystallization. Contains opaque needles in some crystals.
Olivine: Undulose extinction, subgrains, and minor recrystallization. Contains opaque rods in some crystals. Some crystals rimmed by pyroxene.
Augite: Undulose extinction, and rare subgrains. Dominantly fine-scale, planar exsolution; some patches with coarse tabular exsolution.
Mode = 3010 points.

(233) 176-735B-202R-5 (Piece 2C, 116-119 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Leucocratic Gabbro
GRAIN SIZE: Medium-grained
TEXTURE: Intergranular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	0.9	0.3-3.2		anhedral
Plagioclase	75.6	0.4-6.8		subhedral to anhedral
Clinopyroxene	23.0	0.3-6.8		anhedral to ophitic
Orthopyroxene	0.2			
Opaque Minerals	0.2	<0.4		anhedral
Amphibole	0.1			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	5	Magnetite 2%; Amphibole 15%; Smectite 81%; Pyrite 2%
Clinopyroxene	1	Hornblende 20%; Actinolite 80%
Orthopyroxene	1	Amphibole 100%
Plagioclase	<1	Actinolite 100%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
Structure Description: Fabric intensity: 1b.
Plagioclase: Deformation twins, undulose extinction, subgrains, and minor recrystallization. Contains abundant opaque needles and dark brown rods.
Olivine: Interstitial. Undulose extinction with subgrain development. Some crystals rimmed by pyroxene.
Augite: Undulose extinction. Euhedral plagioclase inclusions. Dominantly fine-scale, planar exsolution; some patches with coarse exsolution.
Mode = 1450 points.

(234) 176-735B-202R-8 (Piece 2, 72-74 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Troctolitic Microgabbro
GRAIN SIZE: Fine-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	25.1	0.2-2.5		anhedral
Plagioclase	63.9	0.3-2.0		anhedral
Clinopyroxene	9.4	0.2-1.3		anhedral
Opaque Minerals	0.7	<0.5	15% ilmenite/85% magnetite	anhedral

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	2	Magnetite 1%; Amphibole 68%; Smectite 30%; Pyrite 1%
Clinopyroxene	2	Hornblende 80%; Actinolite 20%
Orthopyroxene	1	Amphibole 100%
Plagioclase	<1	Actinolite 100%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
2.5 cm mini-core.
Structure Description: Fabric intensity: 1a; rare occurrence of subgrain formation in clinopyroxene.
Plagioclase: Deformation twins, undulose extinction, subgrains, minor recrystallization.
Olivine: Undulose extinction with subgrains. Some crystals rimmed by pyroxene.
Augite: Undulose extinction with subgrains. Contains abundant opaque needles.
Opaque minerals: Rimmed by amphibole.
Mode = 1028 points.

(235) 176-735B-201R-6 (Piece 1A, 23-26 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	3.5			pseudomorph
Plagioclase	52.5	0.4-8.8		subhedral to anhedral
Clinopyroxene	44.0	2.0-14.0		anhedral to ophitic
Opaque Minerals	tr	<0.3	90% ilmenite/10% magnetite	anhedral

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	95	Amphibole 20%; Smectite 80%
Clinopyroxene	4	Smectite 100%
Plagioclase	5	Actinolite 100%

TOTAL ROCK ALTERATION: 8%

COMMENTS:
Some cracks with smectite.
Structure Description: Fabric intensity: 1a.
Plagioclase: Deformation twins, undulose extinction, subgrains, and minor recrystallization. Weakly zoned crystals. Contains dark brown to opaque rods and plates.
Olivine: Some crystals rimmed by pyroxene.
Augite: Undulose extinction, minor subgrain development. Abundant exsolution.
Mode = 1186 points.

(236) 176-735B-201R-7 (Piece 4, 109-112 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	10.8	2.8-8.2		anhedral to ophitic
Plagioclase	53.0	0.4->12.0		subhedral to anhedral
Clinopyroxene	35.5	4.4->10.4		anhedral to ophitic
Orthopyroxene	0.3			
Opaque Minerals	0.4	0.1-2.3	99% ilmenite/1% magnetite	anhedral

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	2	Magnetite 2%; Amphibole 30%; Smectite 66%; Pyrite 2%
Clinopyroxene	1	Hornblende 50%; Actinolite 50%
Orthopyroxene	<1	Amphibole 100%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
Maximum grain sizes for plagioclase and pyroxene can not be determined owing to limits of thin section size.
Structure Description: Fabric intensity: 1a (2?).
Plagioclase: Large grains have deformation twins and undulose extinction; domains with small grains are undeformed and display equilibrated texture (recrystallization?). Zoned crystals. Contains abundant opaque needles in some crystals. Euhedral plagioclase inclusions.
Olivine: Undulose extinction and subgrains. Contains opaque rods and needles. Some crystals rimmed by pyroxene.
Augite: Mostly undeformed, weak undulose extinction in one grain. Weakly zoned. Euhedral plagioclase inclusions. Dominantly fine-scale, planar exsolution; some patches with coarse exsolution.
Mode = 1336 points.

(237) 176-735B-203R-1 (Piece 1, 0-4 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Oxide Olivine Microgabbro / Oxide Pyroxenite & Gabbronorite
GRAIN SIZE: Fine-grained / Coarse-grained
TEXTURE: Granular / Cumulate

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	16.3 / 0	0.3-2.1 / none		anhedral / none
Plagioclase	59.0 / 9.0	0.4-2.0 / 1.0-11.6		subhedral to anhedral / interstitial
Clinopyroxene	21.0 / 76.4	0.2-1.7 / 0.4-14.0		anhedral / subhedral
Orthopyroxene	0.2 / 6.9	none / 0.5-6.4		none / subhedral
Opaque Minerals	2.3 / 5.8	<0.3 / 0.1-2.4	37% ilmenite/63% magnetite	subhedral to anhedral / subhedral to anhedral
Amphibole	1.2 / 1.1			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	4/no olivine	Magnetite tr.; Amphibole 10%; Smectite 90%; Pyrite tr.
Clinopyroxene	1/10	Hornblende 10/40%; Actinolite 80/30%; Oxide 10/30%
Orthopyroxene	1/2	Amphibole 100%
Plagioclase	<1	Actinolite 100%

TOTAL ROCK ALTERATION: 2/4%

COMMENTS:
Large format thin section.
This section is a contact between a fine-grained oxide olivine gabbro and a coarse-grained oxide pyroxenite / gabbronorite.
Structure Description: Fabric intensity: 1a.
Plagioclase: A few deformation twins, minor undulose extinction in both the fine-grained material and the larger plagioclase crystals at the border of the coarse-grained pyroxene layer.
Olivine: Undeformed (fine-grained).
Augite: Undeformed in both fine- and coarse-grained. Abundant exsolution in coarser-grained part.
Orthopyroxene: Abundant fine-scale, planar exsolution in the coarse-grained part.
Opaque minerals: Rimmed by amphibole in fine-grained part. In the coarse-grained part, oxides appear mostly as interstitial grains, in triple junction or along large pyroxene grain boundaries.
Mode: fine = 861 points / coarse = 961 points.

(238) 176-735B-203R-5 (Piece 4, 122-126 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	8.9	4.4-14.8		anhedral
Plagioclase	65.6	0.8-14.4		euhedral to anhedral
Clinopyroxene	25.1	4.8-18.4		anhedral to ophitic
Orthopyroxene	0.3			
Opaque Minerals	0.1	0.2-0.5		anhedral

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	2	Magnetite tr.; Amphibole 40%; Smectite 60%; Pyrite tr.
Clinopyroxene	<1	Hornblende 80%; Actinolite 18%; Oxide 2%
Orthopyroxene	<1	Amphibole 100%
Plagioclase	<1	Actinolite 100%

TOTAL ROCK ALTERATION: <1%

COMMENTS:
Structure Description: Fabric intensity: 1a.
Plagioclase: Deformation twins, undulose extinction, and a few subgrains in large plagioclase crystals; domains with smaller grains display an equilibrated texture. Opaque needles and pale brown rods occur in some plagioclase crystals.
Olivine: Subgrains, with minor recrystallization at the tip of one large grain. Contains abundant rods, needles, and dendritic patches. Some crystals rimmed by pyroxene.
Augite: Undeformed. Euhedral plagioclase inclusions. Dominantly fine-scale, planar exsolution; some patches with coarse tabular exsolution.
Mode = 1472 points.

(239) 176-735B-204R-7 (Piece 2, 39-42 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	18.9	3.0-14.0		anhedral to amoeboidal
Plagioclase	58.2	0.6-9.2		subhedral to anhedral
Clinopyroxene	22.5	0.8-15.2		anhedral to ophitic
Orthopyroxene	0.3			
Opaque Minerals	0.1	0.1-0.5		anhedral

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	4	Talc 2%; Magnetite 1%; Amphibole 61%; Smectite 35%; Pyrite 1%
Clinopyroxene	1	Hornblende 15%; Actinolite 83%; Oxide 2%
Orthopyroxene	1	Amphibole 100%
Plagioclase	1	Actinolite 70%; Smectite 30%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
A few hairline cracks with amphibole.
Structure Description: Fabric intensity: 1a.
Plagioclase: Deformation twins, undulose extinction, and a few subgrains in large plagioclase crystals; domains with smaller grains display an equilibrated texture. Weakly zoned.
Olivine: Subgrains, minor recrystallization; one large grain is undeformed. Contains pale brown to opaque rods, needles, and dendritic patches. Some crystals rimmed by pyroxene.
Augite: Mostly undeformed, weak undulose extinction in one very large grain. Euhedral plagioclase inclusions. Fine-scale, planar exsolution.
Mode = 1300 points.

(240) 176-735B-205R-2 (Piece 1a, 1-4 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Leucocratic Gabbro
GRAIN SIZE: Medium-grained (coarse before recrystallization)
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	0.7	N/A		pseudomorph
Plagioclase	68.6	N/A		subhedral to anhedral
Clinopyroxene	30.2	2.3-11.9		ophitic
Opaque Minerals	0.5	0.1-1.9		anhedral

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	100	Magnetite 1%; Amphibole 47%; Smectite 50%; Pyrite 2%
Clinopyroxene	40	Actinolite 10%; Smectite 90%
Plagioclase	30	Secondary plagioclase 10%; Smectite 78%; Prehnite 10%; Actinolite 2%

TOTAL ROCK ALTERATION: 33%

COMMENTS:
Numerous veins up to 2 mm wide and filled with smectite (50%), prehnite (30%), chlorite 10%, and calcite (10%).
Structure Description: Fabric intensity: 1a overprinted by 6; prehnite in one vein is strongly plastically deformed (subgrains, undulose extinction, recrystallization).
Plagioclase: A few deformation twins and subgrains. Zoned crystals. Contains scattered opaque needles in some crystals.
Augite: Some grains are kinked, in association with brittle deformation. Dominantly fine-scale, planar exsolution.
Mode = 960 points.

(241) 176-735B-205R-2 (Piece 3, 136-140 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Granular (Altered)

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	n/a	n/a		pseudomorph
Plagioclase	n/a	n/a		subhedral to anhedral
Clinopyroxene	n/a	n/a		ophitic
Opaque Minerals	n/a	n/a		

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	100	Magnetite 1%; Amphibole 97%; Pyrite 2%
Clinopyroxene	40	Actinolite 88%; Smectite 10%; Oxide 2%
Plagioclase	40	Actinolite 40%; Smectite 50%; Prehnite 10%

TOTAL ROCK ALTERATION: 60%

COMMENTS:
A few minute cracks with zeolite 60%, amphibole 30%, and smectite 10%.
Structure Description: Fabric intensity: 1a overprinted by 6 (one main vein with associated alteration).
Plagioclase: Minor undulose extinction.
Augite: Kinked, associated with brittle deformation.

(242) 176-735B-205R-4 (Piece 3B, 108-112 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Leucocratic Olivine Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	7.6	0.6-6.2		anhedral
Plagioclase	74.3	0.5-18.0		euhedral to anhedral
Clinopyroxene	17.7	7.2-14.0		ophitic
Orthopyroxene	0.2			
Opaque Minerals	0.2	0.1-1.0		anhedral

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	4	Talc 68%; Magnetite 2%; Amphibole 20%; Smectite 10%; Pyrite tr.
Clinopyroxene	1	Hornblende 5%; Actinolite 95%
Orthopyroxene	<1	Amphibole 100%
Plagioclase	1	Actinolite 90%; Smectite 10%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
A few hairline cracks with amphibole.
Structure Description: Fabric intensity: 1a.
Plagioclase: Deformation twins, undulose extinction, subgrains, minor recrystallization. Some evidence for the re-equilibration of plagioclase. Weakly zoned crystals. Contains pale brown to opaque needles and plates.
Olivine: Undulose extinction, lovely subgrains. Contains pale brown rods, needles, and dendrites.
Augite: Undeformed. Euhedral plagioclase inclusions. Abundant fine-scale, planar exsolution.
Mode = 1480 points.

(243) 176-735B-206R-4 (Piece 2, 51-54 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Intergranular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	4.2	2.4-8.0		ophitic
Plagioclase	57.0	0.6-8.8		subhedral to anhedral
Clinopyroxene	38.2	2.8-14.0		ophitic
Orthopyroxene	0.4			
Opaque Minerals	0.2	0.1-1.4		anhedral

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	2	Talc 2%; Magnetite 2%; Amphibole 25%; Smectite 70%; Pyrite 1%
Clinopyroxene	<1	Actinolite 100%
Orthopyroxene	<1	Amphibole 100%
Plagioclase	<1	Actinolite 100%

TOTAL ROCK ALTERATION: <1%

COMMENTS:
Structure Description: Fabric intensity: 1a; fine grained clinopyroxene clusters interpreted as a primary igneous feature.
Plagioclase: Deformation twins, undulose extinction, and subgrains. Weakly zoned crystals. Contains pale brown to opaque rods and needles.
Olivine: Undulose extinction with subgrains. Contains pale brown rods. Some crystals rimmed by pyroxene.
Augite: Undulose extinction. Dominantly fine-scale, planar exsolution.
Mode = 1300 points.

(244) 176-735B-206R-6 (Piece 2B, 133-137 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Leucocratic Troctolitic Gabbro / Olivine Gabbro
GRAIN SIZE: Coarse-grained / Fine-grained
TEXTURE: Granular / Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	16.5 / 6.9	1.4->14.4/0.2-1.1		ophitic / anhedral
Plagioclase	72.6 / 56.9	0.6->11.4/0.3-1.7		subhedral to anhedral / subhedral to anhedral
Clinopyroxene	10.7 / 35.6	1.8->11.2/0.3-3.0		ophitic / subhedral to anhedral
Orthopyroxene	0.1 / 0.1			
Opaque Minerals	0.1 / 0.1	<0.5/<0.1		anhedral / anhedral
Amphibole	0.0 / 0.4			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	12	Talc 1%; Magnetite 1%; Amphibole 17%; Smectite 80%; Pyrite 1%
Clinopyroxene	<1	Actinolite 100%
Orthopyroxene	1	Amphibole 100%
Plagioclase	<1	Actinolite 100%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
Large format thin section.
Maximum grain sizes for olivine, plagioclase and pyroxene can not be determined owing to limits of thin section size.
One tiny orthopyroxene and feldspar vein in olivine.
Structure Description: Fabric intensity: 1a-2; lattice-preferred orientation is very weak in the fine-grained material, shape-preferred orientation is defined by pyroxenes.
Plagioclase: Deformation twins, undulose extinction and subgrains in both the fine- and coarse-grained. Coarser crystals contain opaque needles.
Olivine: Subgrains and recrystallization in both the fine- and coarse-grained. Contains dark brown to opaque rods in coarse crystals. Some crystals rimmed by pyroxene.
Augite: Undeformed. Fine-scale, planar exsolution in both coarse- and fine-grained parts.
Mode: coarse-grained part = 1560 points / fine to medium-grained part = 800 points.

(245) 176-735B-207R-4 (Piece 1b, 60-62 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Fine-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	6.0	0.2-1.0		anhedral
Plagioclase	58.8	0.4-3.4		anhedral
Clinopyroxene	35.0	0.5-2.4		anhedral
Opaque Minerals	tr	<0.1		
Amphibole	0.2			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	20	Talc 4%; Magnetite 1%; Amphibole 25%; Smectite 69%; Pyrite 1%
Clinopyroxene	1	Hornblende 5%; Actinolite 95%
Orthopyroxene	1	Amphibole 100%
Plagioclase	<1	Actinolite 100%

TOTAL ROCK ALTERATION: 2%

COMMENTS:
2.5 cm mini-core. One 1 mm wide vein with 75% smectite, 20% prehnite, and 5% calcite cuts the thin section.
Structure Description: Fabric intensity: 1b/2 locally overprinted by 6; weak to moderate lattice-preferred orientation, some re-equilibration possibly overprinting original magmatic fabric, vein purely extensional.
Plagioclase: Deformation twins, undulose extinction, subgrains and possible moderate recrystallization.
Olivine: Undulose extinction, subgrains. Some crystals rimmed by pyroxene.
Augite: Undulose extinction. Fine-scale, planar exsolution.
Mode = 1111 points.

(246) 176-735B-207R-7 (Piece 2B, 120-123 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Anorthositic Gabbro
GRAIN SIZE: Medium-grained
TEXTURE: Intergranular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	2.7	0.8-5.6		anhedral
Plagioclase	87.2	0.6-8.4		subhedral to anhedral
Clinopyroxene	9.8	0.8-5.2		anhedral
Orthopyroxene	0.2			
Opaque Minerals	0.1	0.1-1.2		anhedral

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	2	Magnetite 1%; Amphibole 35%; Smectite 63%; Pyrite 1%
Clinopyroxene	1	Hornblende 80%; Actinolite 20%
Orthopyroxene	1	Amphibole 100%
Plagioclase	<1	Actinolite 50%; Smectite 50%; Prehnite tr.

TOTAL ROCK ALTERATION: 1%

COMMENTS:
Structure Description: Fabric intensity: 1a; clear subgrain development in one clinopyroxene grain.
Plagioclase: Deformation twins, undulose extinction, subgrains, minor recrystallization. Some crystals weakly zoned. Contains opaque needles in some crystals.
Olivine: Undulose extinction, superb subgrains. Contains pale brown needles. Some crystals rimmed by pyroxene.
Augite: Undulose extinction, rare subgrains. Euhedral plagioclase inclusions. Fine-scale, planar exsolution.
Mode = 1250 points.

(247) 176-735B-208R-4 (Piece 1, 4-8 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	9.7	0.8-7.6		ophitic
Plagioclase	57.9	1.3-12.0		euhedral to anhedral
Clinopyroxene	31.1	2.6-17.2		ophitic
Orthopyroxene	Tr.			rims
Opaque Minerals	0.1	0.1-0.5	sulfide > ilmenite anhedral	

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	2	Talc 1%; Magnetite 2%; Amphibole 27%; Smectite 70%; Pyrite tr.
Clinopyroxene	1	Hornblende 70%; Actinolite 30%
Orthopyroxene	1	Amphibole 100%
Plagioclase	<1	Actinolite 100%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
Rare cracks with smectite.
Structure Description: Fabric intensity: 1a.
Plagioclase: Subgrains and deformation twins, equilibrated texture, with minor recrystallization (1 small domain with small grains and a strong lattice-preferred orientation). Weakly zoned crystals. Contains scattered pale brown plates, rods, and needles.
Olivine: Subgrains. Contains transparent brown rods and needles. Some crystals rimmed by pyroxene.
Augite: Undeformed. Euhedral plagioclase inclusions. Abundant fine-scale, planar exsolution.
Mode = 1292 points.

(248) 176-735B-208R-5 (Piece 3B, 92-96 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	15.6	9.0-15.6		anhedral
Plagioclase	60.9	1.1->16.8		subhedral to anhedral
Clinopyroxene	23.2	6.4->24.4		subhedral to anhedral
Orthopyroxene	0.1			
Opaque Minerals	0.1	< 0.8	ilmenite	anhedral
Amphibole	0.1			

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	2	Talc 1%; Amphibole 10%; Smectite 88%; Pyrite 1%
Clinopyroxene	<1	Actinolite 100%
Orthopyroxene	1	Amphibole 100%
Plagioclase	<1	Actinolite 100%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
Large format thin section.
Maximum grain sizes for plagioclase and pyroxene can not be determined owing to limits of thin section size.
Structure Description: Fabric intensity: 1a.
Plagioclase: Deformation twins and undulose extinction. Contains abundant opaque needles.
Olivine: Subgrains with minor recrystallization. Contains dark brown to opaque rods and dendritic patches. Some crystals rimmed by pyroxene. Opaque inclusions.
Augite: Undeformed. Abundant fine-scale planar exsolution.
Mode = 2500 points.

(249) 176-735B-209R-2 (Piece 1E, 75-77 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Leucocratic Olivine Microgabbro
GRAIN SIZE: Fine to Medium-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	6.3	0.5-3.0		anhedral
Plagioclase	67.4	0.8-6.8		anhedral
Clinopyroxene	26.0	0.6-4.4		anhedral
Orthopyroxene	0.2			
Opaque Minerals	0.1	<0.1		subhedral to anhedral

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	3	Magnetite 1%; Amphibole 30%; Smectite 68%; Pyrite 1%
Clinopyroxene	<1	Hornblende 70%; Actinolite 30%
Orthopyroxene	<1	Amphibole 100%
Plagioclase	<1	Actinolite 100%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
Structure Description: Fabric intensity: 1a; plagioclase shows evidence of considerable re-equilibration.
Plagioclase: Deformation twins, undulose extinction, subgrains, and minor recrystallization. Zoned crystals.
Olivine: Subgrains and minor recrystallization. Some crystals rimmed by pyroxene.
Augite: Undulose extinction. Fine-scale, planar exsolution.
Mode = 1000 points.

(250) 176-735B-209R-8 (Piece 4, 113-117 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Leucocratic Olivine Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Intergranular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	12.8	2.4-6.4		ophitic
Plagioclase	69.2	1.2-7.8		subhedral to anhedral
Clinopyroxene	17.9	3.0-12.4		ophitic
Orthopyroxene	0.1			
Opaque Minerals	tr	<0.3	ilmenite	subhedral to anhedral

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	7	Magnetite 1%; Amphibole 18%; Smectite 80%; Pyrite 1%
Clinopyroxene	1	Hornblende 5%; Actinolite 95%
Orthopyroxene	<1	Amphibole 100%
Plagioclase	<1	Actinolite 100%

TOTAL ROCK ALTERATION: 1%

COMMENTS:
Structure Description: Fabric intensity: 1a;
Plagioclase: Deformation twins, with undulose extinction, and rare subgrains. Rarely kinked. Weakly zoned crystals. Contains dark brown to opaque rods and needles.
Olivine: Subgrains. Fractures with alteration are common. Contains pale brown rods and dendritic patches. Some crystals rimmed by pyroxene.
Augite: No deformation. Euhedral plagioclase inclusions. Abundant fine-scale, planar exsolution.
Mode = 1300 points.

(251) 176-735B-210R-4 (Piece 1, 1-4 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Gabbro
GRAIN SIZE: Medium-grained
TEXTURE: Granular to Intergranular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	3.6	0.4-3.2		ophitic
Plagioclase	59.3	1.0-4.8		euhedral to anhedral
Clinopyroxene	36.8	0.6-6.9		ophitic to poikilitic
Orthopyroxene	0.2			
Opaque Minerals	0.1	<0.4		subhedral to anhedral

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	100	Amphibole 50%; Smectite 50%
Clinopyroxene	50	Actinolite 100%
Plagioclase	50	Secondary plagioclase 70%; Actinolite 20%; Smectite 10%; Prehnite tr.

TOTAL ROCK ALTERATION: 52%

COMMENTS:
Several veins, up to 1 mm wide, of prehnite (70%), smectite (20%), and amphibole (10%). The whole thin section is either veins or vein halos.
Structure Description: Fabric intensity: 1a.
Plagioclase: Deformation twins, undulose extinction, subgrains, minor recrystallization. Weakly zoned crystals.
Olivine: excellent subgrains, fractured and altered locally. Some crystals rimmed by pyroxene.
Augite: No deformation. Weakly zoned. Euhedral plagioclase inclusions. Abundant fine-scale, planar exsolution
Mode = 1601 points.

(252) 176-735B-210R-4 (Piece 1, 61-65 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Olivine Gabbro
GRAIN SIZE: Coarse-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	13.7	3.0-9.6		anhedral to amoeboidal
Plagioclase	38.1	0.9-8.0		subhedral to anhedral
Clinopyroxene	47.8	5.2-10.8		ophitic
Orthopyroxene	0.3			
Opaque Minerals	0.1	<0.2		anhedral

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	10	Magnetite 1%; Amphibole 13%; Smectite 85%; Pyrite 1%
Clinopyroxene	5	Hornblende 75%; Actinolite 25%
Orthopyroxene	<1	Amphibole 100%
Plagioclase	<1	Smectite 100%

TOTAL ROCK ALTERATION: 4%

COMMENTS:
Structure Description: Fabric intensity: 1a.
Plagioclase: Deformation twins, undulose extinction, subgrains, minor recrystallization. Zoned crystals. Contains opaque needles in some crystals.
Olivine: Subgrains. Contains abundant dark brown rods and dendrites.
Augite: Minor undulose extinction. Dominantly fine-scale, planar exsolution; some patches with coarse exsolution.
Mode = 1411 points.

(253) 176-735B-133R-7 (Piece 1H, 130-132 cm)

OBSERVERS: Shipboard Party Leg 176

ROCK NAME: Gabbro with Vein
GRAIN SIZE: Coarse-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE PERCENT	SIZE (mm)	COMPOSITION	MORPHOLOGY
Olivine	n/a	5.6		pseudomorph
Plagioclase	n/a	1.2-14.4		euhedral to anhedral
Clinopyroxene	n/a	3.4-9.2		ophitic
Opaque Minerals	n/a	<0.2		anhedral

ALTERATION	PERCENT ALTERED	SECONDARY MINERALS
Olivine	100	Talc 95%; Magnetite 5%
Clinopyroxene	18	Hornblende 5%; Smectite 95%
Plagioclase	8	Smectite 100%

TOTAL ROCK ALTERATION: 15%

COMMENTS:1 vein 4-5 mm wide with 20% zeolites and 80% smectite. A few hairline cracks.
Structure Description: Fabric intensity: 1a w/ minor 6 overprint (microcracking and veining).
Plagioclase: Deformation twins, undulose extinction, subgrains, and minor recrystallization. Weakly zoned crystals.
Olivine: Undulose extinction with subgrains.
Augite: No deformation. Euhedral plagioclase inclusions. Dominantly fine-scale, planar exsolution; some patches with coarse tabular exsolution.