

118-735A-1D-1

UNIT 1: FOLIATED METAGABBRO

Pieces 1 and 2

Foliated Metagabbro

Pieces 1 and 2

COLOR: Variegated dark grayish green to grayish white.

LAYERING: None.

DEFORMATION: Samples are crudely foliated, but core is unoriented. Defined by elongation of plagioclase and clinopyroxene.

PRIMARY MINERALOGY:

Plagioclase—Mode: 30%.

Crystal size: Up to 1 cm.

Crystal shape: Elongate in plane of foliation.

Preferred orientation: In plane of foliation.

Percent replacement: 75% by albite and actinolite.

Clinopyroxene—Mode: 30%.

Crystal size: Up to 4 mm.

Crystal shape: Most equant and anhedral, some slightly elongate in plane of foliation.

Preferred orientation: In plane of foliation.

Percent replacement: 20%.

Olivine—Mode: 5%.

Crystal size: Size difficult to estimate because of total alteration.

Crystal shape: Anhedral.

Preferred orientation: < 2 mm.

Percent replacement: 100% with orange-brown mineral (Fe-oxide?).

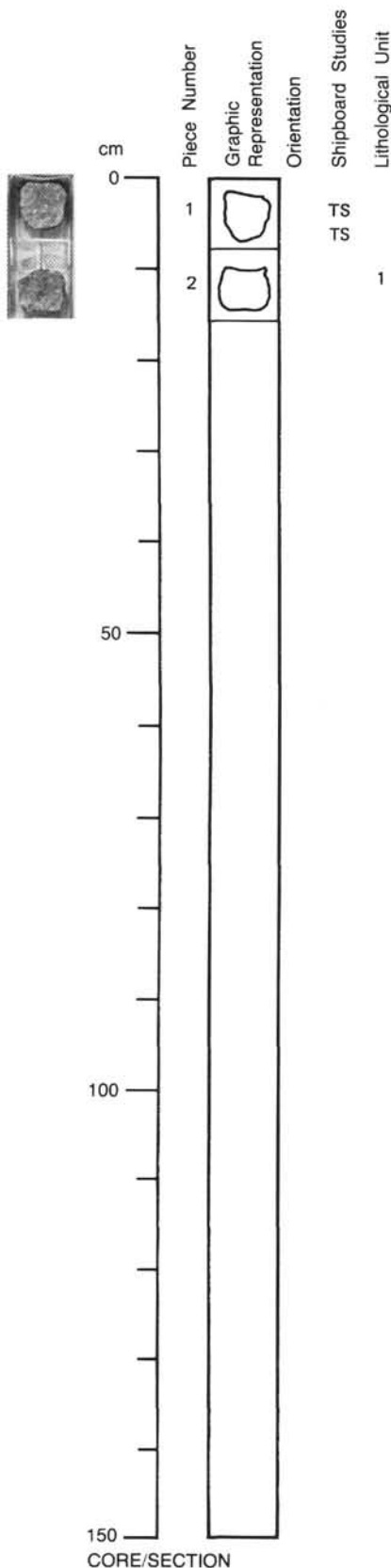
SECONDARY MINERALOGY:

Total percent: 20%.

Texture: Amphibole replaces clinopyroxene and forms elongate masses that along with plagioclase define the foliation. Olivine altered to iron-oxides, and plagioclase recrystallized and replaced by albite and actinolite.

Percent vein material: No veins.

Vein material: none.



UNIT 1: FOLIATED METAGABBRO

Pieces 1-24

Foliated Metagabbro

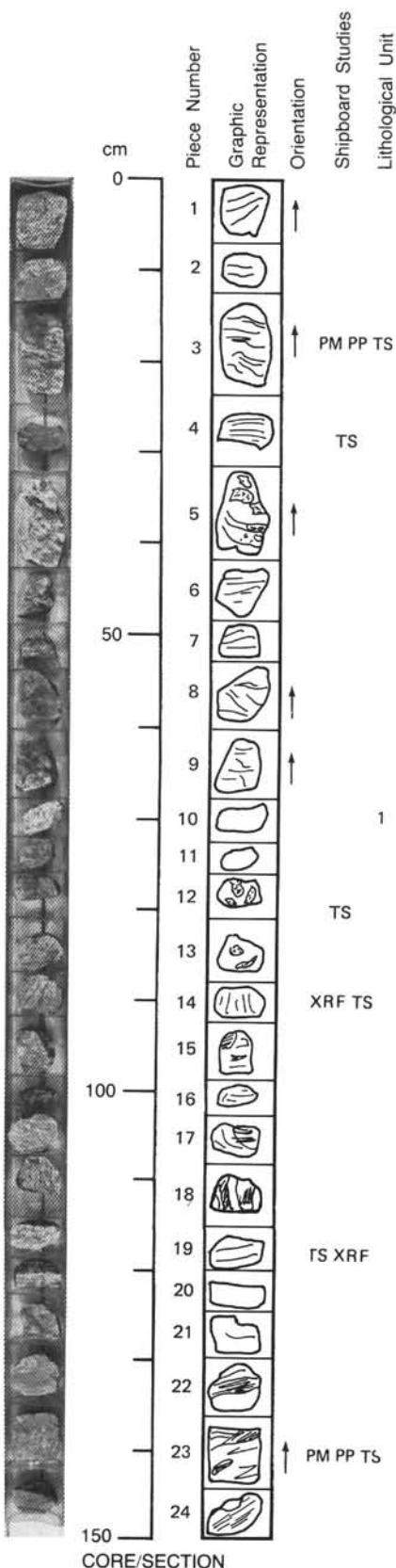
Pieces 1-24

COLOR: Variegated greenish-dark gray to white.
LAYERING: No primary layering apparent.
DEFORMATION: Mylonitic zones in Piece 4 (25-30 cm) and Piece 22 (130-135 cm). Foliation defined by granulated pyroxene lenses and by deformed and recrystallized plagioclase; lenses may define a lineation in foliation, but unclear. Dipping 14°-45°.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 50% (originally), 5% (now).
 Crystal size: <0.5 mm.
 Crystal shape: Anhedral porphyroclasts.
 Preferred orientation: In foliation.
 Percent replacement: 90%, recrystallized—albite.

 Clinopyroxene—Mode: 37% (originally), 10%-20% (now).
 Crystal size: Up to 1 cm.
 Crystal shape: Anhedral porphyroclasts.
 Preferred orientation: In foliation.
 Percent replacement: 60%, neoblasts, amphibole.

 Orthopyroxene—Mode: 10% (originally), 5% (now).
 Crystal size: Up to 0.5 mm.
 Crystal shape: Anhedral porphyroclasts.
 Preferred orientation: In foliation.
 Percent replacement: 90%, oxidized red clay minerals, amphibole.

 Olivine—Mode: 3% (originally), 0% (now).
 Crystal size: 1-2 mm.
 Crystal shape: Anhedral porphyroclasts.
 Preferred orientation: In foliation.
 Percent replacement: Soft red clay minerals, 100% replaced.
SECONDARY MINERALOGY:
 Total percent: 40%-95%.
 Texture: Includes plagioclase and pyroxene neoblasts. First replacement—orthopyroxene or olivine replaced by red clayey pseudomorphs with thin S-shapes in foliation. There are white/green zones cutting the foliation at various angles. There appear to be alteration fronts where a green amphibole has pseudomorphed the pyroxene porphyroclasts and albitic plagioclase has replaced the plagioclase neoblasts (e.g., Pieces 2 and 3).
 Percent vein material: 2%.
 Vein material: Most as amphibole-filled veins cutting fractured pyroxene grains.
COMMENTS: Deformation intensity varies greatly, Pieces 10-12 are coarse-grained and show the least well-developed foliation. The foliation is more marked and the layers finer grained as the rocks are more deformed—section includes mylonitic zones as noted.
 The amphibolitized zones vary along the core; some clearly post-date deformation, while in other areas the amphibole looks to be deformed as well and may be syndeformational.



118-735B-1D-2

UNIT 1: FOLIATED METAGABBRO

Pieces 1-14

Foliated Metagabbro

Pieces 1-14

COLOR: Variegated greenish-dark gray to white.

LAYERING: No primary layering apparent.

DEFORMATION: Well-developed gneissic foliation dipping close to 30° in all four oriented samples.

Ranges from coarse-grained augen gneiss (Pieces 9-13) at bottom of section to medium-grained gneiss containing 1-4 mm augen of oxidized pyroxene (Pieces 1-8).

Pieces 7, 11, and 13: Mylonitic zones.

PRIMARY MINERALOGY:

Plagioclase—Mode: 60%.

Crystal size: 1-5 mm.

Crystal shape: Anhedral.

Preferred orientation: none determined.

Percent replacement: 50-90% to sodic plagioclase.

Clinopyroxene—Mode: 33%-35%.

Crystal size: 1-5 mm.

Crystal shape: Anhedral.

Preferred orientation: none observed.

Percent replacement: 50-90% by amphibole.

Hypersthene—Mode: 3%-5%.

Crystal size: 0.5-2 mm.

Crystal shape: Anhedral.

Preferred orientation: none observed.

Percent replacement: 60%. Extensively oxidized to a rust-red or yellow clay mineral and carbonate.

Ilmenite—Mode: 2%.

Crystal size: Not determined.

Crystal shape: Anhedral.

Preferred orientation: Occurs as bands and schlieren along foliation.

Percent replacement: Not determined.

SECONDARY MINERALOGY:

Total percent: 10%-25%.

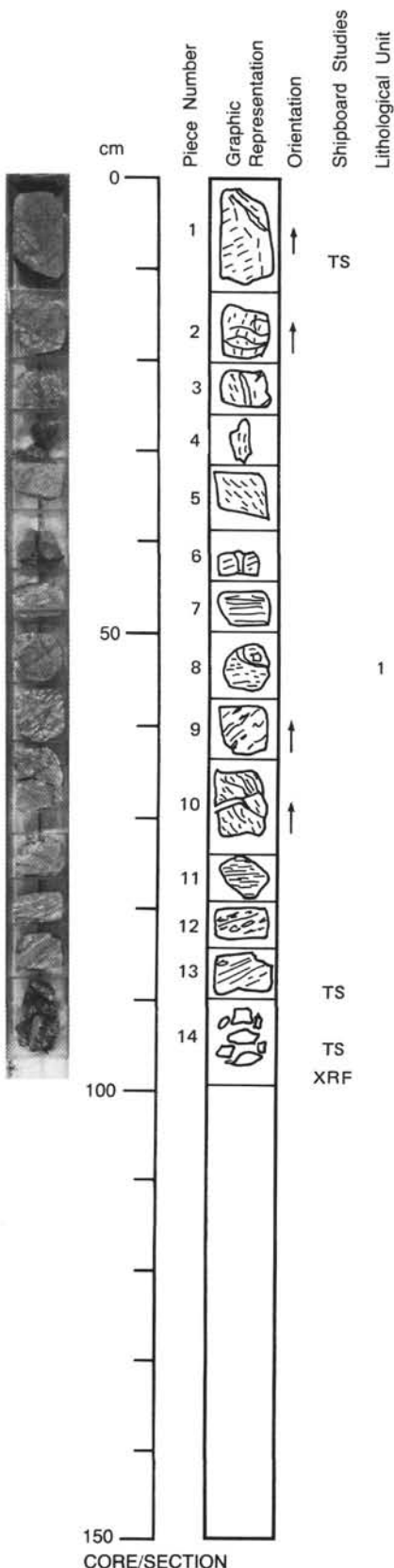
Texture: Extensive zones of albitization occurring concentrically about crosscutting amphibole veins. Sharp contacts between albitized zones and less altered rock.

Piece 1: Spectacular plumose texture. Adjacent to amphibole vein (2-5 mm thick), primary pyroxene is altered to amphibole and plagioclase to milky albite in a wedge-shaped zone up to 4 cm wide. Many of the pyroxene are rimmed or pseudomorphed by amphibole.

Many of the amphibole veins crosscut and crisscross the foliated gneiss, while others appear to have been deformed with the primary minerals and are stretched out along the plane of foliation.

Percent vein material: 1%

Vein material: Amphibole.

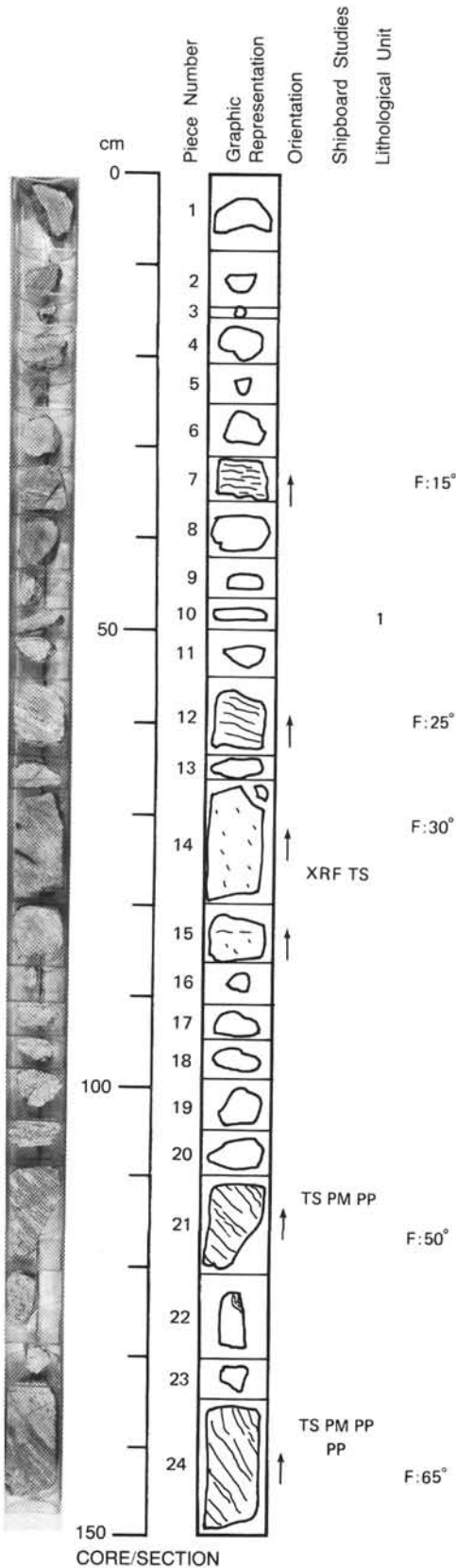


UNIT 1: FOLIATED METAGABBRO

Pieces 1-24

Foliated Metagabbro

Pieces 1-24



COLOR: Gray with brownish oxidized orthopyroxene.
LAYERING: Some phase layering with mafic-rich (not Pieces 7, 8, and 20-22) and mafic-poor portions. Possible modal layering. Layer contacts unclear.
DEFORMATION: Foliation is variable, 15° at the top and 65° at the bottom, partly mylonitic. Gneissic layering of plagioclase-rich and pyroxene-rich layers. Lineation is clear and is almost parallel to dips of foliation. Grain size: Porphyroclastic clinopyroxene ~ 1-7 mm across; neoblastic clinopyroxene < 1 mm; orthopyroxene or olivine pseudomorphs ~ 1 mm; and plagioclase (neoblast) < 1 mm. Porphyroclast/neoblast ratio varies widely (50%-95%) showing various degrees of deformation. Pieces 14 and 15: Have weak, vague foliation. Pieces 8 and 10: Are mylonitic with ~95% neoblasts.

PRIMARY MINERALOGY:
 Plagioclase—Mode: ~50%.
 Crystal size: Unknown, now <1mm (neoblast).
 Crystal shape: Unknown, now anhedral.
 Preferred orientation: Not evident.
 Percent replacement: Replaced with sodic plagioclase, ~70%.

Clinopyroxene—Mode: ~40%.
 Crystal size: 1.8 cm.
 Crystal shape: Anhedral.
 Preferred orientation: Not evident.
 Percent replacement: Variable (50%-95%). Replaced with amphibole.

Orthopyroxene—Mode: ~25%.
 Crystal size: <1mm.
 Crystal shape: Anhedral.
 Preferred orientation: Not evident.
 Percent replacement: Variable (50%-100%). Replaced by hematite + smectite + calcite aggregate.

Olivine—Mode: >1%.
 Crystal size: <1mm.
 Crystal shape: Unknown (now anhedral due to deformation)
 Preferred orientation: Not evident.
 Percent replacement: 100%. Replaced by hematite + smectite + calcite aggregate.

SECONDARY MINERALOGY:
 Total percent: 50%-95% neoblast, and up to 20% amphibole.
 Texture: Secondary phases appear as neoblast in mylonite matrix.
 Plagioclase recrystallized into neoblast.
 Percent vein material: Not determined.
 Vein material: Amphibole veins ~0.7 mm wide, inclined at ~30°—perpendicular to the foliation and the lineation.

COMMENTS: Pieces are classified into four types by textural characteristics:
 (1) Mylonitic gabbro (Pieces 2, 5, 8, 10, and part of 24).
 (2) Porphyroclastic gabbro (Pieces 3, 4, 6, 7, 9, 11, and part of 24).
 (3) Well-foliated gabbro (Pieces 1, and 13-17).
 (4) Gneissic to augen gneissic metagabbro (Pieces 12, and 18-23).

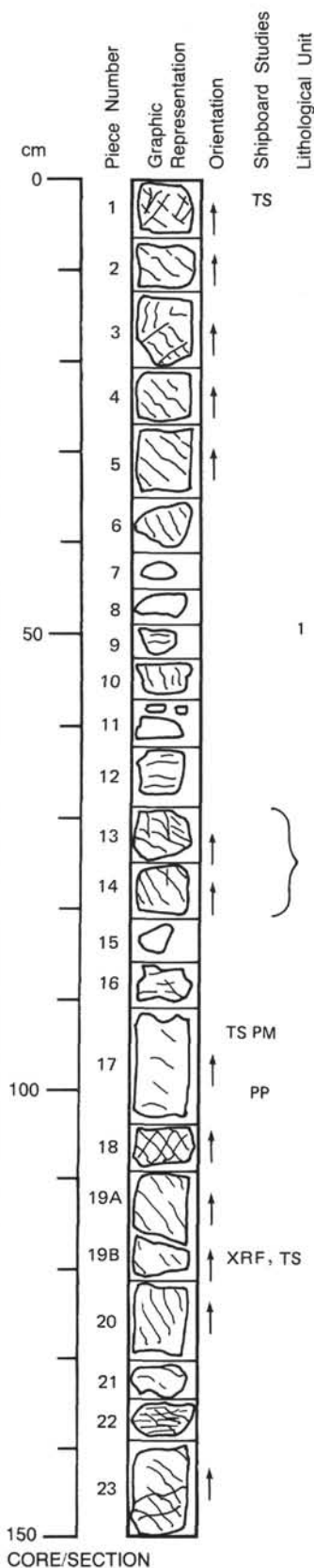
118-735B-2D-2

UNIT 1: FOLIATED METAGABBRO

Pieces 1-23

Porphyroclastic Metagabbro

Pieces 1, 6, 10, 12, and 16



F:40°

COLOR: Greenish gray
LAYERING: Faint magmatic layering, normal to foliation.
DEFORMATION: Foliation defined by flattening of plagioclase and pyroxene to poorly defined gneissic bands.

PRIMARY MINERALOGY:

Plagioclase—Mode: 55%-60%.
 Crystal size: 1-20 mm.
 Crystal shape: Elongated and recrystallized in plane of foliation.
 Preferred orientation: Plane of foliation.
 Percent replacement: 40%. Replaced by secondary plagioclase.

Orthopyroxene—Mode: 5%-25%.
 Crystal size: 1-20 mm.
 Crystal shape: Elongated and recrystallized in plane of foliation.
 Preferred orientation: Plane of foliation.
 Percent replacement: 100%. Iron oxides.

Clinopyroxene—Mode: 15% up to 38%.
 Crystal size: 1-20 mm.
 Crystal shape: Elongated and recrystallized in plane of foliation.
 Preferred orientation: Plane of foliation.
 Percent replacement: 25%. Green amphibole.

Ilmenite—Mode: <1%.
 Crystal size: 1-20 mm.
 Crystal shape: Elongated and recrystallized in plane of foliation.
 Preferred orientation: Plane of foliation.
 Percent replacement: 100% recrystallized into foliation plane.

SECONDARY MINERALOGY:

Total percent: 70% to 20%.
 Texture: Pseudomorphitic.
 Percent vein material: 5%.
 Vein material: Green amphibole.

F:10-50°

Well-Foliated Metagabbro

Pieces 2, 3, 7, 9, 11, 13, 22, and 23

COLOR: Greenish gray
LAYERING: Faint magmatic layering, normal to foliation.
DEFORMATION: Foliation more distinct. Strongly foliated pyroxene porphyroclasts.

PRIMARY MINERALOGY:

Plagioclase—Mode: 68%.
 Crystal size: 2-12 mm.
 Crystal shape: Anhedral.
 Preferred orientation: none remains.
 Percent replacement: 90% with secondary plagioclase.

Clinopyroxene—Mode: 20%.
 Crystal size: 2-15 mm.
 Crystal shape: Anhedral.
 Preferred orientation: none remains.
 Percent replacement: 80%. Largely replaced by green amphibole.

SECONDARY MINERALOGY:

Total percent: 70%.
 Texture: Pseudomorphitic, coronitic.
 Percent vein material: 25%.
 Vein material: Amphibole.

F:20°

F:50°

F:40°

F:40°

F:40°

CORE/SECTION

Poorly Foliated Metagabbro**Pieces 17-21****COLOR:** Greenish gray**LAYERING:** Faint magmatic layering, normal to foliation.**DEFORMATION:** Poorly foliated.**PRIMARY MINERALOGY:**

Plagioclase—Mode: 65%.

Crystal size: 1-20 mm.

Crystal shape: Idiomorphic.

Preferred orientation: none observed.

Percent replacement: 80%.

Orthopyroxene—Mode: 10%.

Crystal size: < 1 mm.

Crystal shape: Idiomorphic.

Preferred orientation: none observed.

Percent replacement: 20%. Partially replaced by iron oxides.

Clinopyroxene—Mode: 22%.

Crystal size: 1-4 mm.

Crystal shape: Idiomorphic.

Preferred orientation: none observed.

Percent replacement: 50%. Green rims.

SECONDARY MINERALOGY:

Total percent: 36%.

Texture: Coronas around clinopyroxene.

Percent vein material: No vein.

Vein material: None.

Mylonitic Metagabbro**Pieces 4, 5, and 14****COLOR:** Greenish gray**LAYERING:** Faint magmatic layering, normal to foliation.**DEFORMATION:** Foliation more distinct with discrete mylonitic zones, 1-2 cm thick.**PRIMARY MINERALOGY:** Same as well-foliated gabbro. Very elongated in the plane of foliation. Crystal size is < 1 mm in mylonitic zones.**SECONDARY MINERALOGY:**

Total percent: 20%.

Texture: Pseudomorphic, coronitic. Carbonate-hematite pseudomorphs of olivine with talc and tremolite. Clays and iron-oxides in fractures.

Percent vein material: 5%.

Vein material: Clays and iron-oxides.

118-735B-2D-3

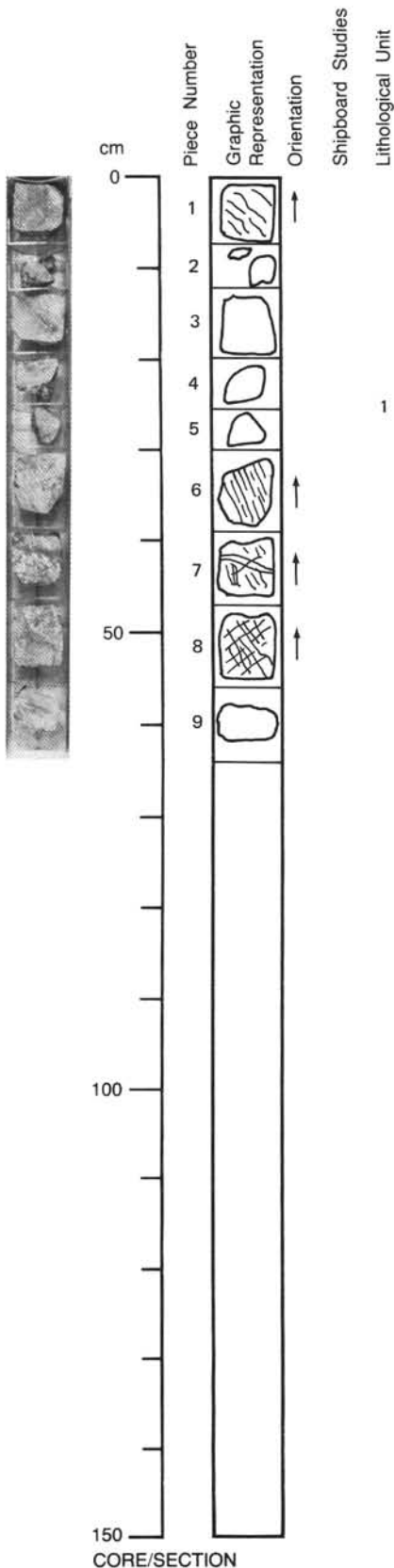
UNIT 1: FOLIATED METAGABBRO

Pieces 1-9

Foliated Metagabbro

Pieces 1-9

COLOR: Greenish gray
LAYERING: None
DEFORMATION: Foliation variable, 40%-70%, defined by stretched plagioclase and clinopyroxene.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 50%.
 Crystal size: < 1-7 mm.
 Crystal shape: Anhedral, porphyroclasts and neoblasts.
 Preferred orientation: In plane of foliation.
 Percent replacement: Partly recrystallized.
 Clinopyroxene—Mode: 40%.
 Crystal size: < 1-7 mm.
 Crystal shape: Anhedral, porphyroclasts and neoblasts.
 Preferred orientation: In plane of foliation.
 Percent replacement: Partly replaced by amphibole.
 Olivine—Mode: 10%.
 Crystal size: Not determined.
 Crystal shape: Not determined.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.
SECONDARY MINERALOGY:
 Total percent: 30%-50%.
 Texture: Plagioclase and pyroxenes partly recrystallized. Pyroxenes partly replaced by amphibole.
 Percent vein material: Not determined.
 Vein material: Not determined.



F:45°

F:60°

F:70°

F:40°

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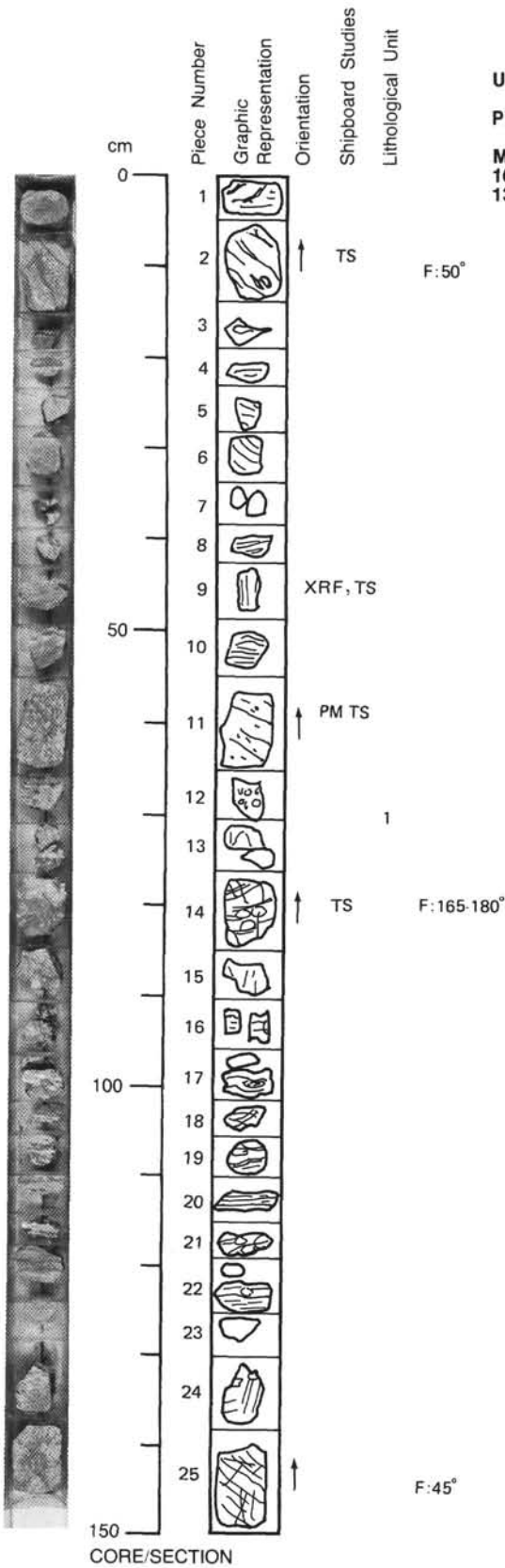
CORE/SECTION

118-735B-3D-1

UNIT 1: FOLIATED METAGABBRO

Pieces 1-25

Mylonitic Metagabbro (Pieces 1-6 and 8), Augen Gneissic Metagabbro (Pieces 7, 9, and 10), Well-Foliated Metagabbro (Pieces 22-25), and Porphyroclastic Metagabbro (Pieces 13, 14 and 17-21)



COLOR: All types variably dark gray-green to white.

LAYERING: No primary layering apparent.

DEFORMATION:

Mylonitic metagabbro: Pieces 1-6 and 8. Fine-scale alternating layers of pyroxene and plagioclase. Piece 2 has a few lenses of pyroxene and plagioclase augen. Inclination of foliation about 50° in Piece 2; amphibolite lenses is same piece slightly S-shaped and slightly offset from main foliation.

Augen gneissic metagabbro: Pieces 7, 9, and 10. No oriented pieces, but similar to first group with small pyroxene augen.

Well-foliated metagabbro: Pieces 22-25. Inclination of foliation about 45° in Piece 25. Has stretched lens of amphibole with rounder cores of oxidized pyroxene.

Porphyroclastic metagabbro: Pieces 13, 14, and 17-21. Foliation near horizontal in Piece 14. Defined by stretched augen of clinopyroxene.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50% (originally).

Crystal size: 0.5-2.0 mm.

Crystal shape: Anhedral.

Preferred orientation: In plane of foliation.

Percent alteration: 30%-80%. Replaced by more Na-rich plagioclase.

Pyroxene—Mode: 45% (originally). Proportions of clinopyroxene/orthopyroxene are difficult to estimate because of replacement by amphibole, but orthopyroxene probably greater than clinopyroxene.

Crystal size: 1-4 mm.

Crystal shape: Anhedral.

Preferred orientation: Elongate in plane of foliation.

Percent replacement: 50%-90%. Clinopyroxene replaced by amphibole; orthopyroxene by amphibole and orangish iron-oxide.

Olivine—Mode: 5%(?).

Crystal size: Difficult to estimate because of total alteration.

Crystal shape: Not apparent due to alteration.

Preferred orientation: Not apparent due to alteration.

Percent replacement: 100%. Replaced by dark orange-brown iron-oxide.

SECONDARY MINERALOGY:

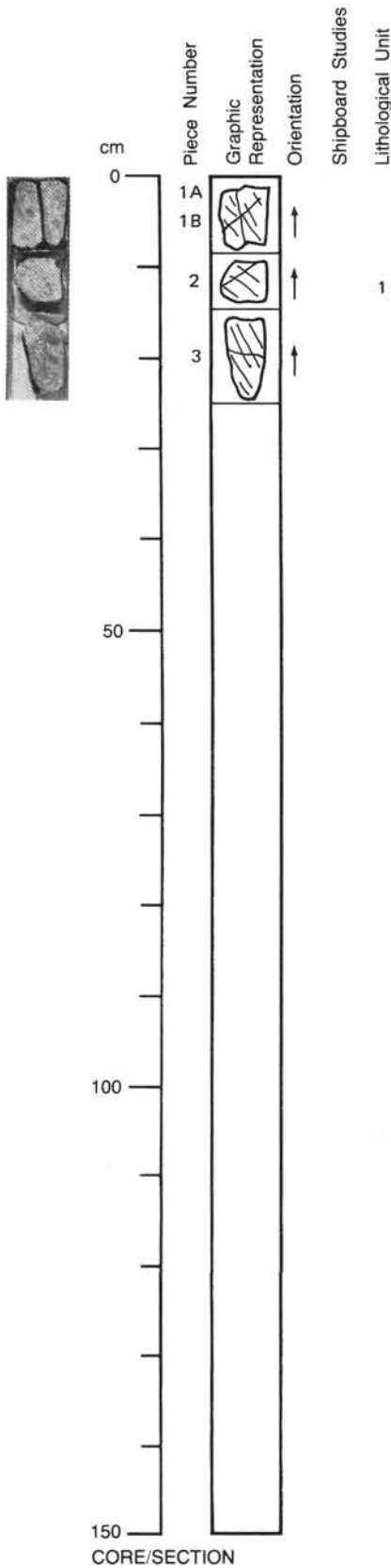
Total percent: 50%-95%.

Texture: Plagioclase replaced by more Na-rich plagioclase, clinopyroxene replaced by amphibole, orthopyroxene replaced by amphibole and orangish iron-oxides, and olivine replaced by orange-brown iron-oxide.

Percent vein material: 1%-2%.

Vein material: Pieces 1, 2, 5, 11, 14-16, 19, 21, and 23-25 contain crosscutting fractures filled by amphibole. Fractures fairly random in orientation and very thin.

118-735B-3D-2



UNIT 1: FOLIATED METAGABBRO

Pieces 1A-3

Foliated Metagabbro (Medium- to coarse-grained)

Pieces 1A-3

COLOR: Gray.

LAYERING: No primary layering apparent.

DEFORMATION: Foliation defined by stretched and elongated lensoidal pyroxene and plagioclase dipping at 30° in all three oriented pieces.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%.

Crystal size: Not determined.

Crystal shape: Anhedral.

Preferred orientation: Elongated in plane of foliation.

Percent replacement: Extensive albitization.

Clinopyroxene—Mode: 40%.

Crystal size: Not determined.

Crystal shape: Anhedral.

Preferred orientation: Elongate in plane of foliation.

Percent replacement: Extensively altered to amphibole.

Orthopyroxene—Mode: 7%.

Crystal size: Not determined.

Crystal shape: Anhedral.

Preferred orientation: Elongate in plane of foliation.

Percent replacement: 80% altered to rust-red clay mineral.

Olivine(?)—Mode: 3%.

Crystal size: Not determined.

Crystal shape: Anhedral.

Preferred orientation: Elongate Parallel Foliation.

Percent replacement: 100% altered to rust-red clay mineral.

SECONDARY MINERALOGY:

Total percent: Not determined.

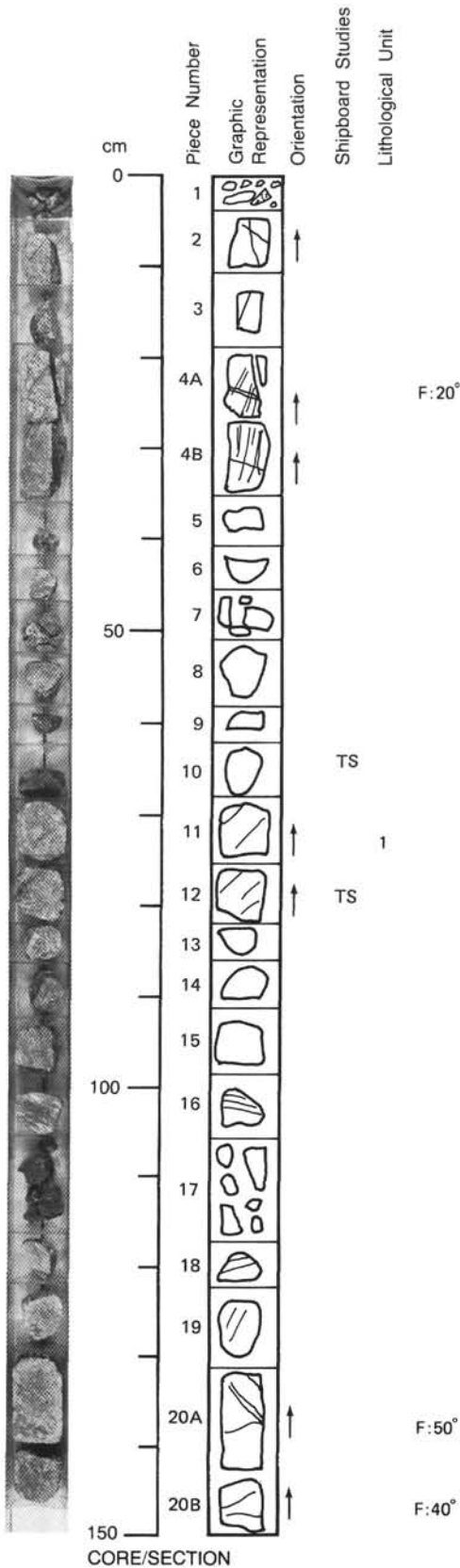
Texture: Extensive albitization of feldspar (milky) and alteration of pyroxene to amphibole, which forms rims or pseudomorphs around primary pyroxene. All olivine(?) appears to be totally altered to rust-red clay mineral, along with much of the orthopyroxene.

Percent vein material: 1%

Vein material: Pieces 1 and 2 contain 1-mm-thick amphibole vein nearly at right angles to foliation (inclined 53° from horizontal).

Piece 3: Contains single, 0.5-mm-thick white carbonate(?) vein lying horizontal.

118-735B-4D-1



UNIT 1: FOLIATED METAGABBRO

Pieces 1-20B

Foliated to Mylonitized Metagabbro

Pieces 1-20B

COLOR: Dark gray to white.

LAYERING: No primary layering apparent.

DEFORMATION:

Piece 17—Mylonitic metagabbro.

Pieces 9, 10, 15, and 16: Intensely deformed but not mylonitic. Consist of small round orthopyroxene, 1-3 mm in size, often rounded in appearance, in very fine-grained matrix of amphibole(?).

Pieces 11-13: Poorly foliated, coarse-grained.

Remaining pieces: Foliated metagabbro, medium- to fine-grained.

PRIMARY MINERALOGY: (original)

Plagioclase—Mode: 40%-50%.

Crystal size: 0.5-3 mm.

Crystal shape: Anhedral.

Preferred orientation: none evident.

Percent replacement: 50%-100% by milky white plagioclase (albite).

Orthopyroxene—Mode: 25%-30%(?). (Identification not definitive.)

Crystal size: 1-4 mm.

Crystal shape: Anhedral.

Preferred orientation: none evident.

Percent replacement: 100% by amphibole and light orange-brown iron-oxide.

Clinopyroxene—Mode: 25%-30%.

Crystal size: 1-7 mm.

Crystal shape: Anhedral.

Preferred orientation: none evident.

Percent replacement: 75%-80% by amphibole.

SECONDARY MINERALOGY:

Total percent: > 75%.

Texture: Amphibole replaces clinopyroxene and partially replaces orthopyroxene.

Orthopyroxene also replaced by light orange-brown iron-oxide. Plagioclase replaced by milky white plagioclase (albite).

Percent vein material: 2%-5%.

Vein material: Pieces 2-6 and 18-20 have fractures filled by amphibole oblique to foliation.

118-735B-4D-2

UNIT 1: FOLIATED METAGABBRO

Pieces 1-9

Foliated and Mylonitized Metagabbro

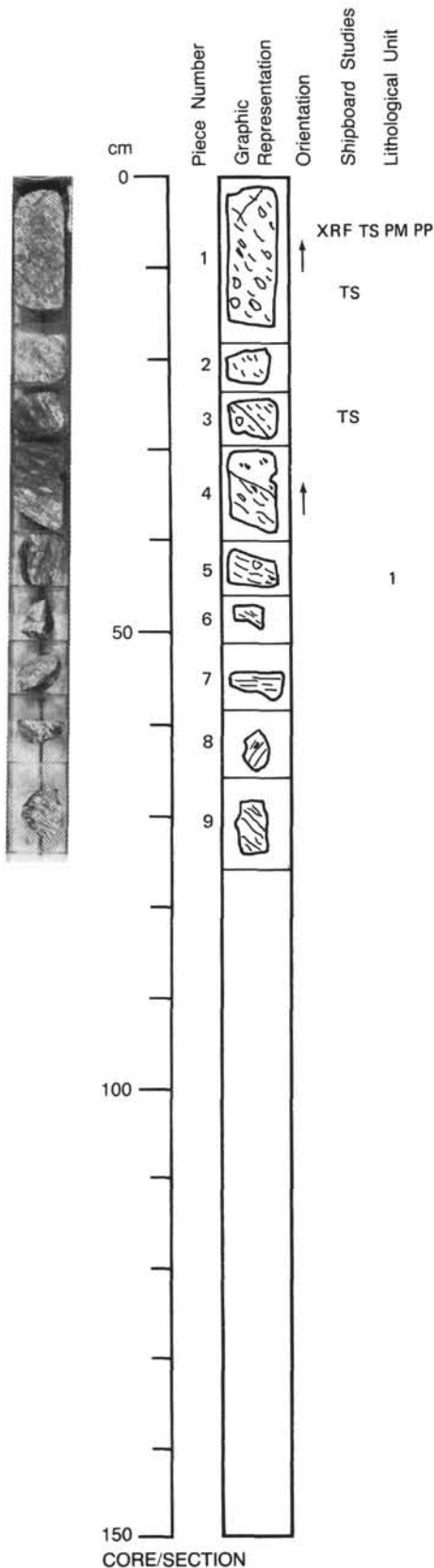
Pieces 1-9

COLOR: Gray, some black.
LAYERING: No primary igneous layering.
DEFORMATION: Foliation defined by elongated and stretched pyroxene and plagioclase with orthopyroxene augen often prominent.
 Pieces 3-9: Heavily mylonitized.
 Pieces 3 and 9: Have zones of dense black glassy-appearing material containing coarse orthopyroxene augen, which is mylonitized ilmenite gabbro.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 50%.
 Crystal size: < 1-4 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Often elongate parallel to foliation.
 Percent replacement: Replaced by milky albite (sodic plagioclase).

 Clinopyroxene—Mode: 40%.
 Crystal size: 0.5-4 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Often elongate parallel to foliation.
 Percent replacement: 62% by amphibole.

 Orthopyroxene—Mode: 7%.
 Crystal size: 0.5-5 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Often elongate parallel to foliation.
 Percent replacement: 66% oxidized to rust-red clay minerals.

 Iron oxide(?)—Mode: 3%.
 Crystal size: Not determined.
 Crystal shape: Interstitial, anhedral.
 Preferred orientation: none observed.
 Percent alteration: 0%.
SECONDARY MINERALOGY:
 Total percent: 29%.
 Texture: Plagioclase extensively altered to milky albite. Pyroxene altered to or rimmed by amphibole. Orthopyroxene oxidized to rust-red clay minerals.
 Percent vein material: Not determined.
 Vein material: Amphibole, occurring in veins up to 3 mm thick.
COMMENTS: Pieces 1 and 2: Gneissic gabbro.
 Pieces 3-9: Mylonitized metagabbro.
 Pieces 3 and 4: Contain mylonitic oxide-rich zones.



118-735B-5D-1

UNIT 1: FOLIATED METAGABBRO

Pieces 1-7

Mylonitic Metagabbro

Pieces 1-7

COLOR: Gray, dark gray, speckled rust brown.

LAYERING: None remaining, if ever present.

DEFORMATION: All pieces profoundly foliated on a very fine scale.

Pieces 1-3 and 6: Foliation is more distinct because of mafic/felsic alternation, also easier to see on rounded rather than cut surfaces.

Pieces 4 and 7: Especially finely foliated.

Pieces 1 and 7: Founded by upper and lower foliation surfaces; all other pieces show foliation inclined to flat surfaces on pieces.

PRIMARY MINERALOGY:

Plagioclase—Mode: 40%-50%.

Crystal size: < 2 mm.

Crystal shape: Porphyroclasts and neoblasts.

Preferred orientation: Marks foliation.

Percent replacement: 50% with milky feldspar (probably albite).

Clinopyroxene—Mode: Total pyroxenes, about 40% (difference between orthopyroxene and clinopyroxene; see thin section description).

Crystal size: < 2 mm.

Crystal shape: Porphyroclasts and neoblasts.

Preferred orientation: Marks foliation.

Percent replacement: 75% by amphibole.

Orthopyroxene—Mode: See clinopyroxene. Pieces 1 and 6: Small relict orthopyroxene (altered) porphyroclasts (5% of each piece).

Crystal size: < 2 mm.

Crystal shape: Porphyroclasts and neoblasts.

Preferred orientation: Marks foliation.

Percent replacement: 100% by orange-brown secondary minerals (obviously partly iron-oxides).

SECONDARY MINERALOGY:

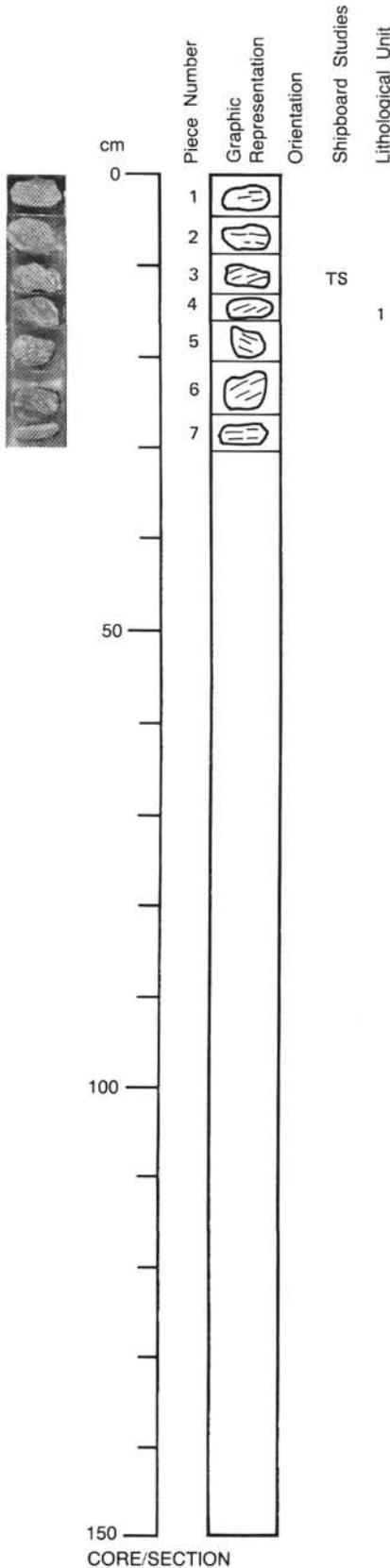
Total percent: >30%.

Texture: Mostly green amphibole after clinopyroxene, and milky feldspar (probably albite) after plagioclase. Orthopyroxene (minor) replaced by orange-brown secondary minerals (obviously partly iron-oxides).

Percent vein material: Not determined.

Vein material: Small (<< 1 mm) veins filled with amphibole cut mylonite and fill cracks in plagioclase.

COMMENT: The primary igneous mineralogy is recrystallized during deformation.



118-735B-6D-1

UNIT 1: FOLIATED METAGABBRO

Pieces 1-21

Foliated Metagabbro (Partly Mylonitic)

Pieces 1-16, and 18 (bottom)-21

COLOR: Gray to dark gray with reddish brown dots.
LAYERING: No primary layering apparent.
DEFORMATION: Foliation defined by fine-grained mylonitic bands and less deformed foliated porphyroclastic bands. Porphyroclasts are clinopyroxene, orthopyroxene, and plagioclase.
 Pieces 4 and 13: Mylonitic gabbro.
 Pieces 1-3, 5-12, 14-16, most of 18, 19 (with mylonitic band), 20, and 21: Gneissic to augen gneissic gabbro.
 Pieces 6, 9, 12, and 14: Have amphibole vein parallel/subparallel to the foliation.
 Pieces 17 and 18: Have a dark gray part (metabasalt?). The contacts with foliated gabbro are present at the top of Piece 17 and ~1 cm from the top of Piece 18. The contact in Piece 17 is probably the upper and that in Piece 18 is the lower contact of basalt(?) and gabbro.
 Piece 3: Contains an isoclinal fold.

PRIMARY MINERALOGY:
 Plagioclase—Mode: 55%.
 Crystal size: Mostly neoblast, porphyroclast <3 mm.
 Crystal shape: Anhedral.
 Preferred orientation: No clear preferred orientation.
 Percent replacement: Moderate by sodic plagioclase(?).

 Clinopyroxene—Mode: 40%.
 Crystal size: Porphyroclast <1 cm.
 Crystal shape: Anhedral.
 Preferred orientation: No clear preferred orientation.
 Percent replacement: 50%-80% by amphibole.

 Orthopyroxene—Mode: ~5%.
 Crystal size: Porphyroclast <1 cm.
 Crystal shape: Anhedral.
 Preferred orientation: No clear preferred orientation.
 Percent replacement: 100%-90% oxidized to reddish mineral (iron oxide).

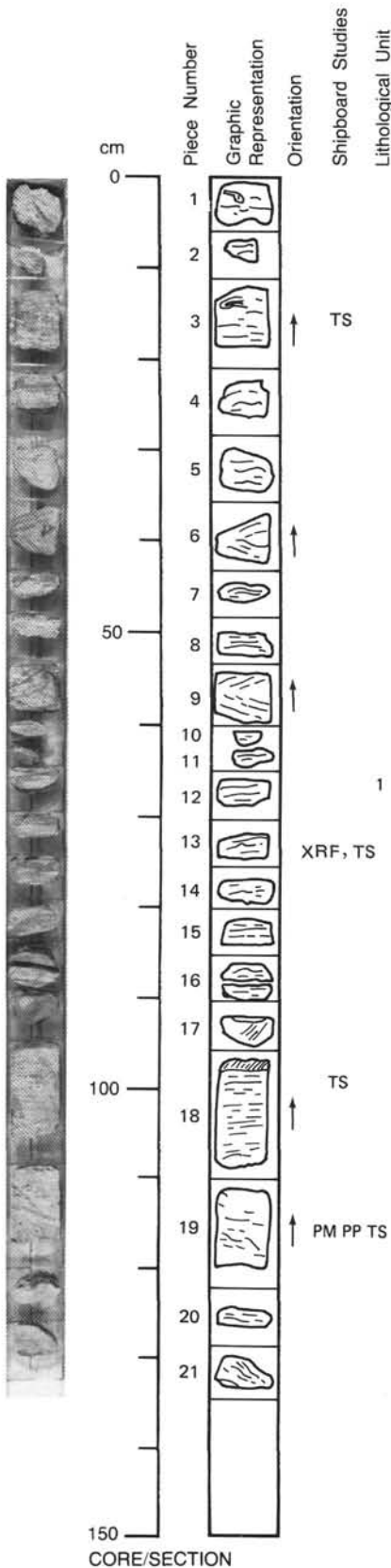
SECONDARY MINERALOGY:
 Total percent: Not determined.
 Texture: Plagioclase is altered into white sodic plagioclase, especially in Pieces 3 and 7-9.
 Clinopyroxene is altered to amphibole. Clinopyroxene porphyroclasts are surrounded by amphibole aggregates. Orthopyroxene is oxidized to reddish mineral, probably ferric oxyhydroxide + hematite.
 Percent vein material: 2%.
 Vein material: Pieces 6, 9, 12 and 14 contain common amphibole veins (or layers).
 Piece 7: Veins are up to 4 mm thick, cutting foliation at 30°

Mylonite

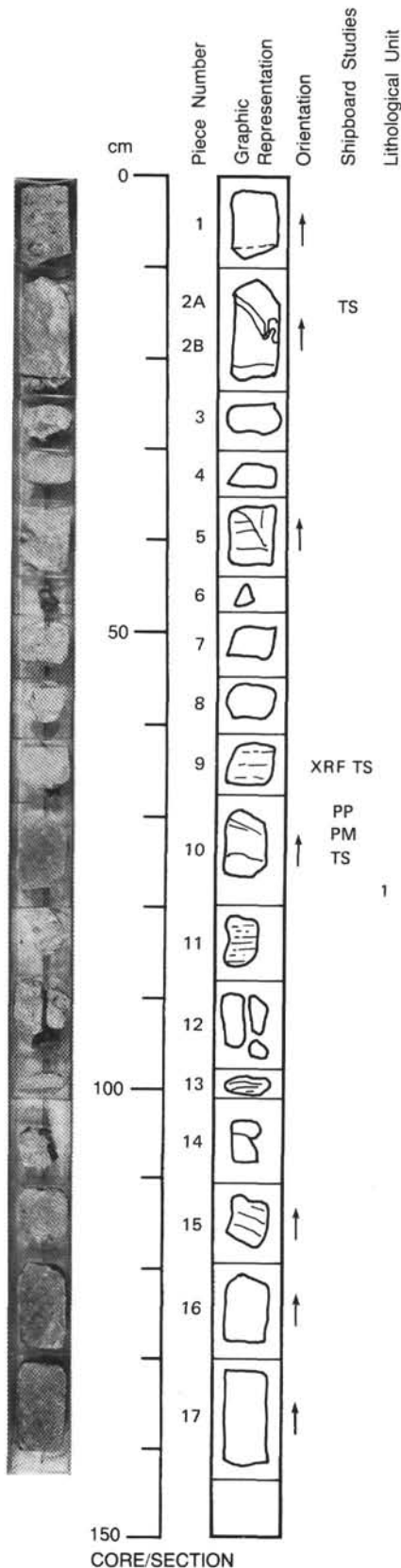
Pieces 17 and 18 (top)

COLOR: Dark gray.
LAYERING: No layering.
DEFORMATION: Foliation is apparent by parallel arrangement of 1 mm long laths (plagioclase(?) or amphibole(?)) and is horizontal at ~20°.
PRIMARY MINERALOGY: Too altered to determine.
SECONDARY MINERALOGY:
 Total percent: Extensive.
 Texture: Not determined.
 Percent vein material: None.
 Vein material: None.

NOTES: Because of extensive metamorphism, the protolith is hard to determine. It is probably microgabbro. Contact of mylonite with adjacent metagabbro is subparallel to foliation.



CORE/SECTION



UNIT 1: FOLIATED METAGABBRO

Pieces 1-17

Gabbro

Piece 1, 16, and 17

COLOR: Dark gray.
LAYERING: Massive.
DEFORMATION: Minor.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 55%.
 Crystal size: 1-10 mm.
 Crystal shape: Subhedral-euhedral.
 Preferred orientation: None.
 Percent replacement: Fresh.
 Clinopyroxene—Mode: 39%.
 Crystal size: 1-20 mm.
 Crystal shape: Anhedral, incipient oikocrysts.
 Preferred orientation: None.
 Percent replacement: ~5% by amphibole.
 Olivine—Mode: 5%.
 Crystal size: 0.5-10 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: ~10% by tremolite + chlorite.
 Orthopyroxene—Mode: 1%.
 Crystal size: ~1 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: 5% by amphibole.
SECONDARY MINERALOGY:
 Total percent: 5%-10%.
 Texture: Amphibole replacing olivine and pyroxene.
 Percent vein material: 1%.
 Vein material: Amphibole.

F:35° Foliated Metagabbro

Pieces 2-15

COLOR: Gray to dark gray with reddish brown dots.
LAYERING: No primary layering.
DEFORMATION: Foliation defined by fine-grained mylonitic bands and less deformed foliated porphyroclastic bands. Porphyroclasts are clinopyroxene, orthopyroxene, and plagioclase. Pieces 2A and 2B: Gneissic metagabbro containing isoclinal holds. Pieces 3, 12, 14, and 15: Porphyroclastic Metagabbro. Pieces 4, 5, 9, and 10: Well-foliated metagabbro. Pieces 7 and 8: Poorly-foliated metagabbros.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 55%.
 Crystal size: Mostly neoblast, porphyroclast <3 mm.
 Crystal shape: Anhedral.
 Preferred orientation: No clear preferred orientation.
 Percent replacement: Moderate by sodic plagioclase(?).
 Clinopyroxene—Mode: 40%.
 Crystal size: Porphyroclast <1 cm.
 Crystal shape: Anhedral.
 Preferred orientation: No clear preferred orientation.
 Percent replacement: 50%-80% by amphibole.
 Orthopyroxene—Mode: ~5%.
 Crystal size: Porphyroclast <1 cm.
 Crystal shape: Anhedral.
 Preferred orientation: No clear preferred orientation.
 Percent replacement: 100%-90% oxidized to reddish mineral (iron oxide).
SECONDARY MINERALOGY:
 Total percent: Not determined.
 Texture: Plagioclase is altered into white sodic plagioclase. Clinopyroxene is altered to amphibole. Orthopyroxene is oxidized to reddish mineral.
 Percent vein material: Not determined.
 Vein material: Not determined.

118-735B-7D-2

UNIT 1: FOLIATED METAGABBRO

Pieces 1-4

Gabbro

Piece 1

COLOR: Dark gray.
LAYERING: Massive.
DEFORMATION: Minor.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 55%.
 Crystal size: 1-10 mm.
 Crystal shape: Subhedral-euhedral.
 Preferred orientation: None.
 Percent replacement: Fresh.

 Clinopyroxene—Mode: 39%.
 Crystal size: 1-20 mm.
 Crystal shape: Anhedral, incipient oikocrysts.
 Preferred orientation: None.
 Percent replacement: ~5% by amphibole.

 Olivine—Mode: 5%.
 Crystal size: 0.5-10 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: ~10% by tremolite + chlorite.

 Orthopyroxene—Mode: 1%.
 Crystal size: ~1 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: 5% by amphibole.
SECONDARY MINERALOGY:
 Total percent: 5%-10%.
 Texture: Amphibole replacing olivine and pyroxene.
 Percent vein material: 1%.
 Vein material: Amphibole.

COMMENTS: Gabbro continued from Section 118-735B-7D-1.

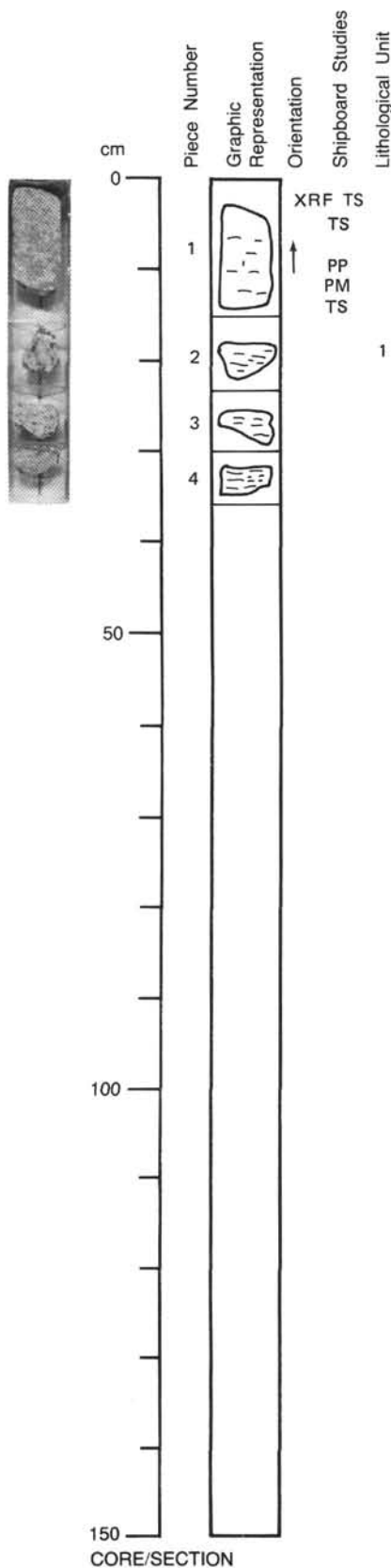
Porphyroclastic Metagabbro

Pieces 2-4

COLOR: Gray to dark gray with reddish brown dots.
LAYERING: No primary layering.
DEFORMATION: Piece 4: Has mylonitic band.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 55%.
 Crystal size: Mostly neoblast, porphyroclast <3 mm.
 Crystal shape: Anhedral.
 Preferred orientation: No clear preferred orientation.
 Percent replacement: Moderate by sodic plagioclase(?).

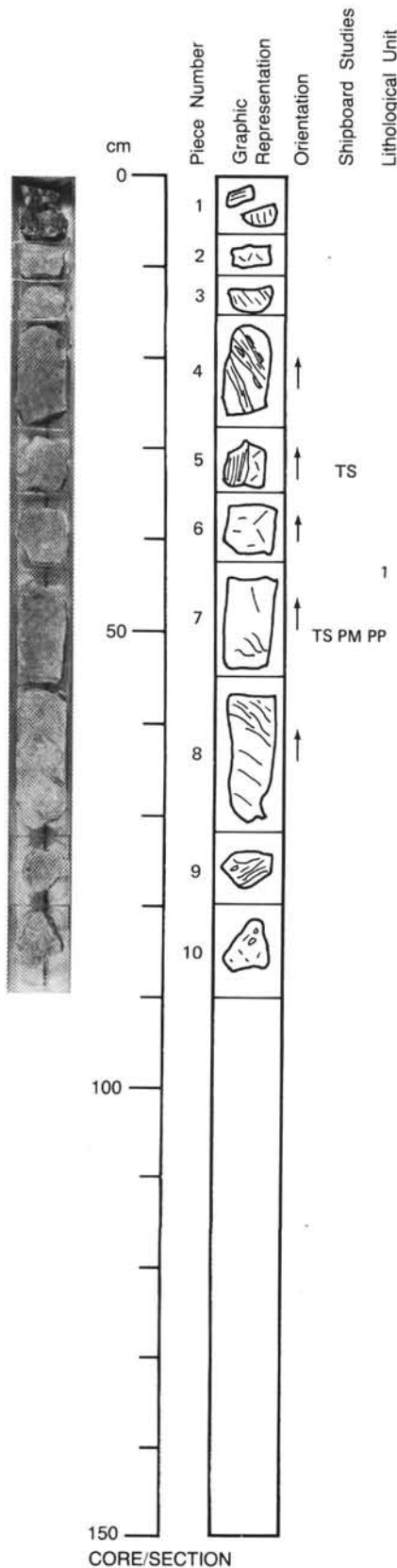
 Clinopyroxene—Mode: 40%.
 Crystal size: Porphyroclast <1 cm.
 Crystal shape: Anhedral.
 Preferred orientation: No clear preferred orientation.
 Percent replacement: 50%-80% by amphibole.

 Orthopyroxene—Mode: ~5%.
 Crystal size: Porphyroclast <1 cm.
 Crystal shape: Anhedral.
 Preferred orientation: No clear preferred orientation.
 Percent replacement: 100%-90% oxidized to reddish mineral (iron oxide).
SECONDARY MINERALOGY:
 Total percent: Not determined.
 Texture: Plagioclase is altered into white sodic plagioclase. Clinopyroxene is altered to amphibole. Orthopyroxene is oxidized to reddish mineral.
 Percent vein material: Not determined.
 Vein material: Not determined.



CORE/SECTION

118-735B-8D-1



UNIT 1: FOLIATED METAGABBRO

Pieces 1-10

Porphyroclastic Metagabbro (see Unit 1)

Pieces 1, 4, 8, and 9

COLOR: Gray.
LAYERING: None.
DEFORMATION: Extensive, porphyroclastic textures.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 60%.
 Crystal size: 0.1-5 mm.
 Crystal shape: Anhedral porphyroclasts.
 Preferred orientation: Porphyroclasts aligned in foliation.
 Percent replacement: Not determined.

Pyroxene—Mode: 40%
 Crystal size: 0.5-5 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Porphyroclasts aligned in foliation.
 Percent replacement: Not determined.

Olivine/orthopyroxene—Mode: 8%.
 Crystal size: 1 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.

SECONDARY MINERALOGY:

Total percent: 90%.
 Texture: 10% pyroxene porphyroclasts, rest is amphibolitized. Plagioclase is albitized.
 Percent vein material: 0%.
 Vein material: None.

F:46-76°

F:56-80°

F:15-30°

F:35°

Massive Gabbro

Pieces 2, and 5-7

COLOR: Gray.
LAYERING: None.
DEFORMATION: Piece 5—half of piece is strongly foliated metagabbro. Deformation increases downward; grain size decreases in bottom half of piece to poorly foliated gabbro.

PRIMARY MINERALOGY:

Clinopyroxene—Mode: 55%.
 Crystal size: Up to 0.5 cm.
 Crystal shape: Anhedral.
 Preferred orientation: Weak foliation.
 Percent replacement: Minor.

Plagioclase—Mode: 40%.
 Crystal size: Up to 0.5 cm.
 Crystal shape: Anhedral.
 Preferred orientation: none observed.
 Percent replacement: Minor.

Olivine or orthopyroxene—Mode: 5%.
 Crystal size: 0.5-2 mm.
 Crystal shape: Anhedral.
 Preferred orientation: none observed.
 Percent replacement: Extensively pseudomorphed by clay minerals.

SECONDARY MINERALOGY:

Total percent: 8%.
 Texture: Orthopyroxene and olivine altered to clay minerals. Some amphibole after clinopyroxene.
 Percent vein material: 3%.
 Vein material: White, prehnite(?) and albite(?). Size not determined, <3 mm certainly.

COMMENTS: Piece 4: Is massive in one corner. Contact in piece is probably continuous with contact in Piece 5, though pieces are flipped around core axis.

118-735B-8D-1 (continued)

Massive Altered Gabbro

Piece 10

COLOR: Gray.

LAYERING: None.

DEFORMATION: Weak, if any, foliation.

PRIMARY MINERALOGY:

Plagioclase—Mode: 52%.

Crystal size: 2-5 mm.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: 10%-20% albitized(?).

Clinopyroxene—Mode: 40%.

Crystal size: 1-5 mm.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: Extensively altered to amphibole, many have dark chloritic rims.

Olivine or orthopyroxene(?)—Mode: 8%.

Crystal size: 2-4 mm.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: 100% by clay minerals/hematite.

SECONDARY MINERALOGY:

Total percent: 35%.

Texture: Chlorite rims on pyroxene. Oxidative pseudomorphs of olivine or orthopyroxene. Some albitization of plagioclase.

Percent vein material: 5%.

Vein material: < 1 mm, no consistent orientation. Filled by plagioclase and prehnite.

COMMENTS: The orange pseudomorphs in Cores 118-735B-7D and -8D are smaller, more anhedral, with no cleavage, compared to earlier samples—possibly a transition to olivine gabbro. Seem to be fewer of the green amphibole-white albite alteration zones.

118-735B-9D-1

UNIT 1: FOLIATED METAGABBRO

Pieces 1-24

Mylonitic Metagabbro to Well-Foliated Metagabbro (Pieces 1, 2, 6, 8-15, and 21-24) and Porphyroclastic Metagabbro (Pieces 5 and 7)

COLOR: Gray-green.
LAYERING: None.
DEFORMATION: Porphyroclastic with clinopyroxene, plagioclase clasts, and some mylonitic zones 0.5-1 mm thick (Pieces 6, 21, 23, and 24). Pieces 5 and 7 contain 10%-15% pyroxene porphyroclasts.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 50%.
 Crystal size: <1-6 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Augen parallel to foliation.
 Percent replacement: 20% to <1 mm neoblasts.

 Clinopyroxene—Mode: 45%.
 Crystal size: <1-4 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Lenses parallel to foliation.
 Percent replacement: 40% to amphibole, 40% to <1 mm neoblasts.

 Olivine—Mode: <5%.
 Crystal size: 0.5-2 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: 80% to clay, hematite.
SECONDARY MINERALOGY:
 Total percent: 50%.
 Texture: Hematite/smectite after olivine, green amphibole after clinopyroxene. Piece 7: Very oxidized with orthopyroxene altered to orange clayey pseudomorphs.
 Percent vein material: No prominent veins noted.
 Vein Material: Not determined.

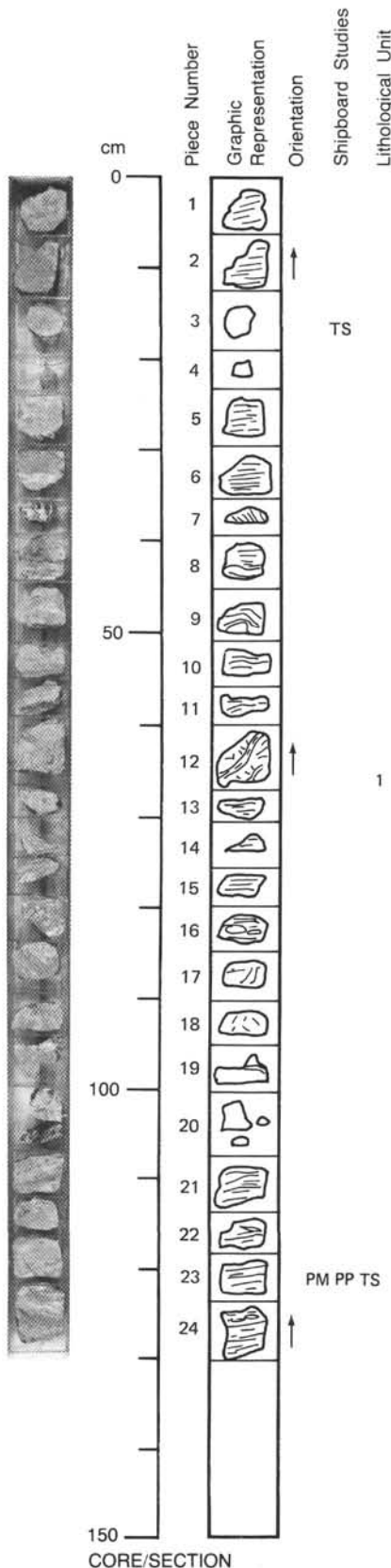
Equigranular Amphibolitized Gabbro

Piece 3

COLOR: Gray.
LAYERING: None.
DEFORMATION: No clearly defined deformation.
PRIMARY MINERALOGY:
 Clinopyroxene—Mode: 60%.
 Crystal size: 1-2 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: ≤5% in places replaced by amphibole.

 Plagioclase—Mode: 35%.
 Crystal size: 1-2 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: 5% replaced in part by amphibole.

 Olivine or orthopyroxene—Mode: 5%.
 Crystal size: 1-2 mm, one to 4 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: 90% to clay minerals.
SECONDARY MINERALOGY:
 Total percent: Variable, on one side, 80%, on the other, 15%.
 Texture: On the more heavily altered side, there is a lot of amphibole and perhaps chlorite after clinopyroxene and maybe plagioclase. On the less altered side, the rock contains more igneous minerals.
 Percent vein material: No prominent veins noted.
 Vein material: Not determined.



118-735B-10D-1

UNIT 1: FOLIATED METAGABBRO

Pieces 1-23B

Foliated and Porphyroclastic Metagabbro

Pieces 1-23B

COLOR: Generally darker than in first few cores due to less albitization of plagioclase. Dark gray, mottled by orangish streaks of oxidation.

LAYERING: None.

DEFORMATION: Defined by stretched and elongated plagioclase and orangish oxidation streaks along with layers of amphibole. Porphyroclasts range from 2-3 mm up to 1 cm in Pieces 6A-C. Pieces 11, 14, and 15: Well-foliated (very fine layers) metagabbro. Similar compositionally to above group, but no porphyroclasts.

Pieces 7, 9, and 10: Foliated, but foliation is less distinct than usual because of less alteration. Foliation is defined by elongate masses of small crystals of plagioclase and pyroxene. Texture is overall very fine-grained.

Piece 8: Contains a contact between this very fine-grained foliated texture and a massive gabbro.

Pieces 16 and 20: Poorly foliated massive gabbro.

PRIMARY MINERALOGY:

Clinopyroxene—Mode: 40%.

Crystal size: Few mm to 1 cm.

Crystal shape: Anhedral—elongate in plane of foliation.

Preferred orientation: Plane of foliation.

Percent replacement: Partially replaced by amphibole 80%-20%.

Plagioclase—Mode: 35%.

Crystal size: Few mm to 1 cm.

Crystal shape: Anhedral—elongate in plane of foliation.

Preferred orientation: Plane of foliation.

Percent replacement: 80%-20%.

Olivine—Mode: 25% (may include some opx).

Crystal size: > 1 mm.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: 60%-100% replaced by orange brown alteration phase.

SECONDARY MINERALOGY:

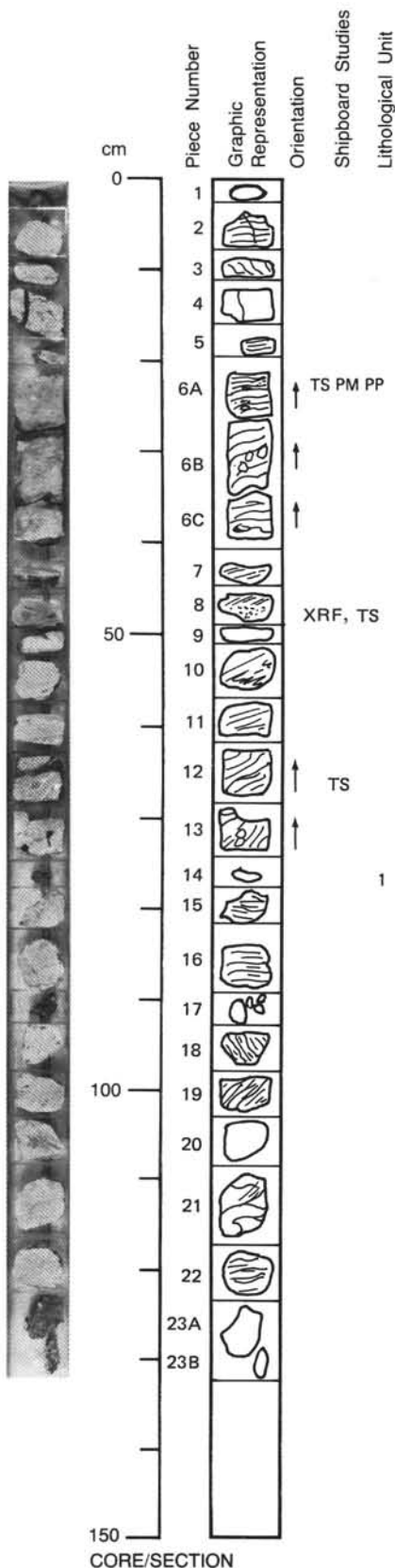
Total percent: 20-30%. Locally up to 80%.

Texture: Consists mostly of replacement of pyroxene by amphibole.

Orthopyroxene is replaced by orange brown oxidation minerals (probably clay minerals + iron-oxides). Pieces 12, 22, and 23: Minor replacement of plagioclase by sodic plagioclase.

Percent vein material: Not determined.

Vein material: No amphibole veins.



CORE/SECTION

118-735B-10D-1 (continued)

Poorly Foliated to Massive Gabbro

Pieces 4 and 16-20

COLOR: Gray with orange pseudomorphs.

LAYERING: None.

DEFORMATION: Very slight. Piece 16: Rounded plagioclase-clinopyroxene porphyroclasts. Piece 17: More foliated with a distinct orange oxidized zone.

PRIMARY MINERALOGY:

Plagioclase—Mode: 40%-50%.

Crystal size: 2-8 mm.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: 0%, fresh.

Clinopyroxene—Mode: 40%-50%.

Crystal size: 2-8 mm.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: 0%, fresh.

Orthopyroxene—Mode: 5%-8%, 0% in Piece 16.

Crystal size: 1-5 mm.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: 100% to clayey pseudomorphs.

SECONDARY MINERALOGY:

Total percent: 20%.

Texture: Orthopyroxene completely replaced by clayey/hematite clots. Probably some amphibole on clinopyroxene.

Pieces 17 and 19: Some albitization of plagioclase.

Percent vein material: 1%-2%.

Vein material: White of undetermined composition. <3 mm thick.

118-735B-10D-2

UNIT 1: FOLIATED METAGABBRO

Pieces 1-3

Poorly Foliated Metagabbro to Foliated Metagabbro

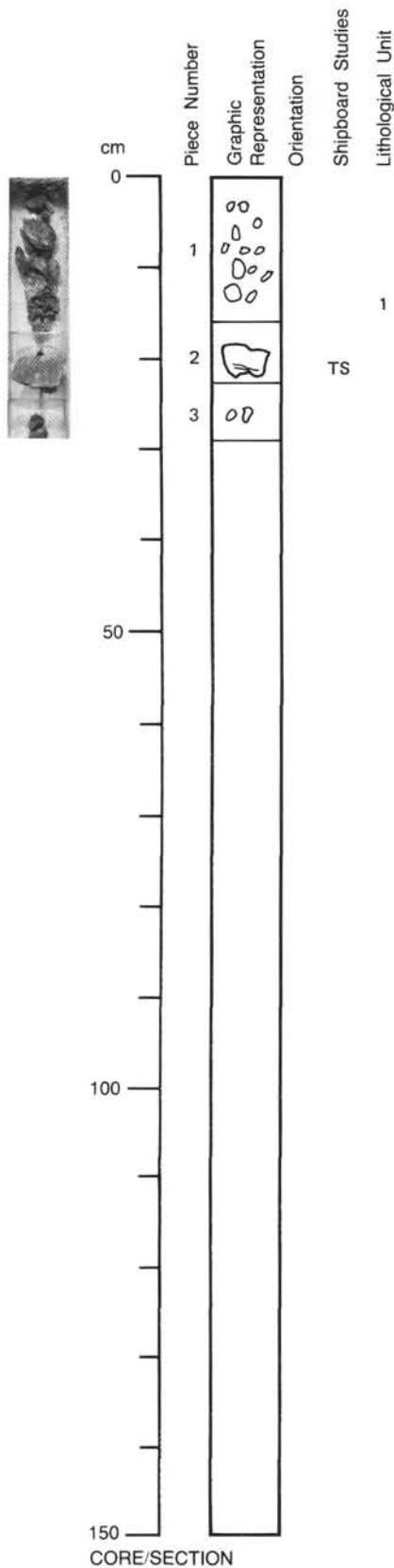
Pieces 1-3

COLOR: Gray.
LAYERING: None.
DEFORMATION: Poorly foliated to foliated metagabbro on bottom. Porphyroclastic—localized mylonitic zones and plagioclase and olivine augen.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 50%.
 Crystal size: 1-5 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Lenses parallel to foliation.
 Percent replacement: 25% recrystallized neoblasts.

 Clinopyroxene—Mode: 40%.
 Crystal size: 3-15 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: 10%-15% by amphibole.

 Olivine—Mode: 10%.
 Crystal size: 1-4 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Lenses parallel to foliation.
 Percent replacement: 50% by tremolite, magnetite, and iron-oxide.

 Orthopyroxene: Mode: <1%.
 Crystal size: 1-4 mm.
 Crystal shape: Anhedral.
 Preferred Orientation: None.
 Percent replacement: 70% by tremolite(?), only fragments remain.
SECONDARY MINERALOGY:
 Total percent: 15%.
 Texture: Tremolite and hematite after olivine, amphibole after clinopyroxene—some magnetite after clinopyroxene. Small anhedral pseudomorphs (<1%) that are orange to greenish may be olivine replacements.
 Percent vein material: Not determined.
 Vein material: Not determined.



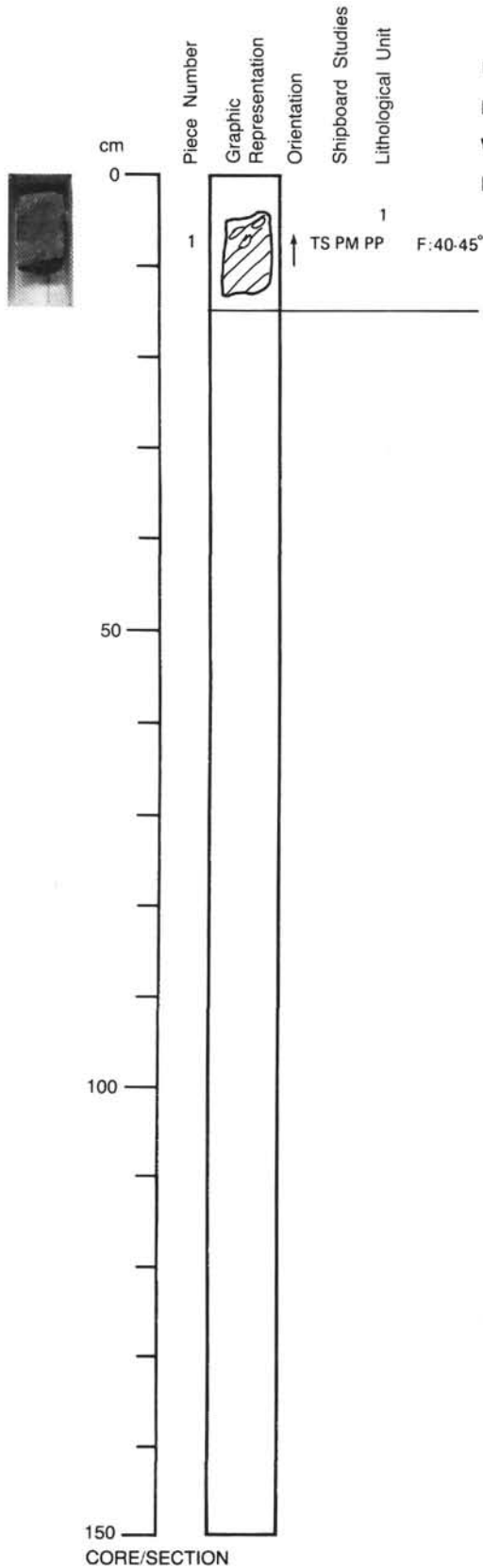
118-735B-11D-1

UNIT 1: FOLIATED METAGABBRO

Piece 1

Well-Foliated Metagabbro

Piece 1



COLOR: Dark gray.

LAYERING: None.

DEFORMATION: Well-defined foliation, dipping 40-45°.

Foliation defined by flattened porphyroclasts and fine-grained bands. Deformation gradient present in the sample, with grain size decreasing from top to bottom. Porphyroclastic metagabbro in the part (pyroxene porphyroclasts up to 1 cm); well-foliated, very fine-grained metagabbro with mylonitic bands in the lower part (pyroxene porphyroclasts <1 mm).

PRIMARY MINERALOGY:

Plagioclase—Mode: 60%.

Crystal size: 1 cm.

Crystal shape: Porphyroclasts and neoblasts.

Preferred orientation: Marks foliation.

Percent replacement: 30% by sodic plagioclase.

Clinopyroxene—Mode: 40%.

Crystal size: <1 mm (lower part), <1 cm (upper part).

Crystal shape: Flattened porphyroclasts.

Preferred orientation: Marks foliation.

Percent replacement: 5% by amphibole.

SECONDARY MINERALOGY:

Total percent: About 5%.

Texture: Pseudomorphic amphibole replacing pyroxene.

Percent vein material: No visible veins.

Vein material: none.

118-735B-12R-1

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1-15

Mylonitic Gabbro

Pieces 1 and 2

COLOR: Gray.
LAYERING: Massive.
DEFORMATION: Very fine-grained bands of recrystallized clinopyroxene and lesser amounts of recrystallized plagioclase.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 65%.
 Crystal size: 0.1 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Not determined.
 Percent replacement: <5% locally by prehnite.

Clinopyroxene—Mode: 35%.
 Crystal size: Clinopyroxene porphyroclasts up to 7 mm but generally 0.1 mm.
 Crystal shape: Anhedral, stretched.
 Preferred orientation: Not determined.
 Percent replacement: <5% locally by amphibole.
SECONDARY MINERALOGY:
 Total percent: < 10%.
 Texture: Prehnite locally replaces plagioclase (<5%). Amphibole partially replaces clinopyroxene (<5%).
 Percent vein material: Not determined.
 Vein material: Not determined.

Porphyroclastic Pegmatoidal Gabbro

Pieces 3-5C, and 8

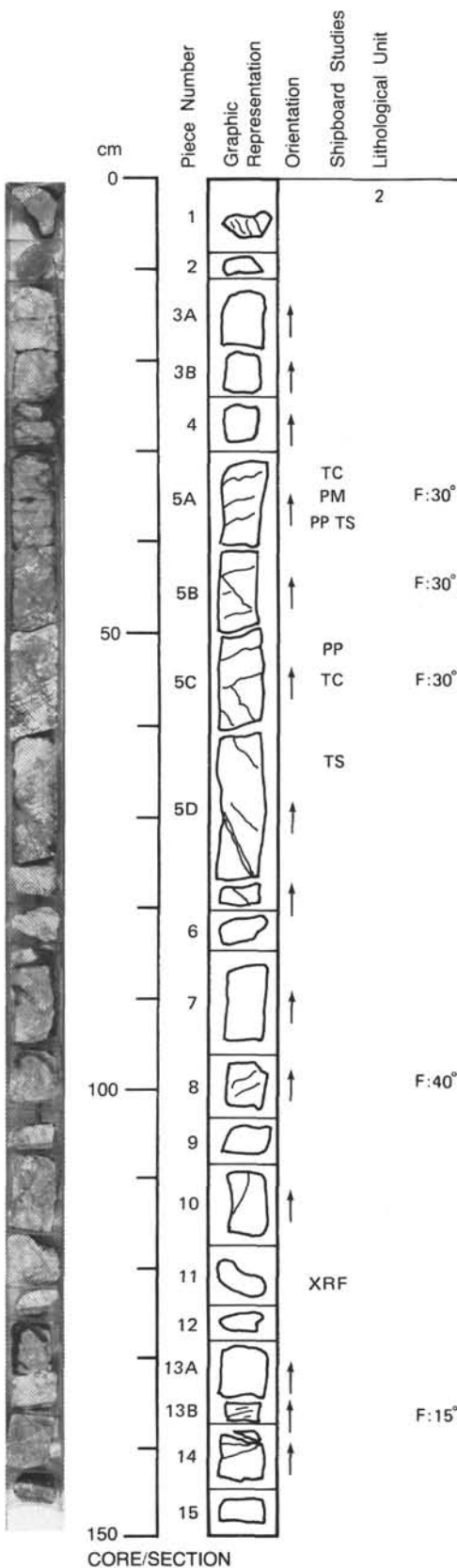
COLOR: Gray.
LAYERING: Massive.
DEFORMATION: Stretched clinopyroxene and plagioclase define foliation. Inclination of foliation varies from 15°-40°. Clinopyroxene and plagioclase are recrystallized.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 65%.
 Crystal size: Porphyroclasts up to 2.5 cm.
 Crystal shape: Anhedral, stretched.
 Preferred orientation: Not determined.
 Percent replacement: Replaced by prehnite.

Clinopyroxene—Mode: 35%.
 Crystal size: Porphyroclasts up to 2.5 cm.
 Crystal shape: Anhedral.
 Preferred orientation: Not determined.
 Percent replacement: 15% by amphibole.

Olivine—Mode: Trace.
 Crystal size: < 1 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

SECONDARY MINERALOGY:
 Total percent: 15%-20%.
 Texture: 15% green amphibole replacing clinopyroxene and in veins perpendicular to foliation. Prehnite replacing plagioclase and filling some late fractures.
 Percent vein material: Not determined.
 Vein material: Amphibole in veins perpendicular to foliation. Prehnite in late fractures.

COMMENTS: Plagioclase-rich zone (approximately 75% plagioclase) occurs at the bottom of Piece 5B and at the top of Piece 5C.



CORE/SECTION

Olivine-Bearing Gabbro**Pieces 6, 7, and 9-15**

COLOR: Gray.

LAYERING: None, massive.

DEFORMATION: Local mylonitic bands.

PRIMARY MINERALOGY:

Plagioclase—Mode: 60%.

Crystal size: 2-12 mm.

Crystal shape: Subhedral-euhedral.

Preferred orientation: Not determined.

Percent replacement: 1% by prehnite.

Clinopyroxene—Mode: 32%-40%.

Crystal size: 2-7 mm. Up to 3 cm in Piece 6.

Crystal shape: Subhedral.

Preferred orientation: Not determined.

Percent replacement: 2%-5% by amphibole.

Olivine—Mode: Trace-8% (Piece 15).

Crystal size: 2-11 mm.

Crystal shape: Anhedral.

Preferred orientation: Not determined.

Percent replacement: Not determined.

SECONDARY MINERALOGY:

Total percent: 3%-6%.

Texture: Prehnite 1% replaces plagioclase. Amphibole 2%-5% replaces clinopyroxene, and fills late stage veins.

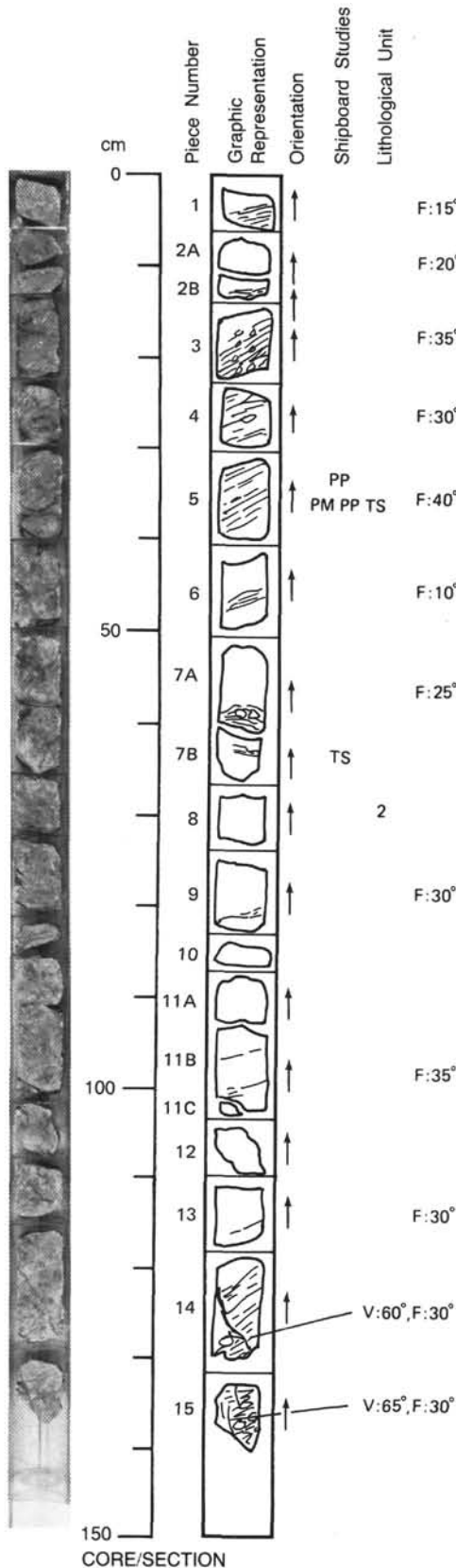
Percent vein material: Not determined.

Vein material: Amphibole.

COMMENTS: Pieces 7 and 9: Sheared zones with sharp contacts to massive undeformed gabbro.

Piece 12: Massive gabbro with contact to porphyroclastic gabbro.

Piece 14: Contact between coarse-grained massive gabbro and medium-grained gabbro.



118-735B-12R-2

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1-15

Weakly Foliated Metagabbro (Pieces 1-2B (top), 6, and 11B) and Porphyroclastic Metagabbro (Pieces 2B (bottom), 3-5, 14, 15)

COLOR: Gray with brown patches (altered olivine crystals) and/or white layer (altered plagioclase).
LAYERING: None, massive.
DEFORMATION: Distinct foliation defined by stretched plagioclase, olivine, and pyroxene crystals. Large clinopyroxene porphyroclasts are dominant. Recrystallized plagioclase shows discontinuous layering with less than a few mm thickness. The foliation inclines 10°-40°.

PRIMARY MINERALOGY:

Plagioclase—Mode: 70%.
Crystal size: < 0.8 cm (porphyroclastic grains).
Crystal shape: Anhedra.
Preferred orientation: None.
Percent replacement: Slight-moderate, replaced by sodic plagioclase.

Clinopyroxene—Mode: 10%.
Crystal size: < 2 cm (porphyroclastic grains).
Crystal shape: Anhedra.
Preferred orientation: None.
Percent replacement: 50%. Amphibole replaces grain margins.

Olivine—Mode: 15%.
Crystal size: < 0.5 cm.
Crystal shape: Anhedra.
Preferred orientation: None.
Percent replacement: Almost 60%-100%. Amphibole replaces grain margins. Most olivine is oxidized.

Orthopyroxene—Mode: 5%.
Crystal size: < 1 mm.
Crystal shape: Anhedra.
Preferred Orientation: None.
Percent replacement: 50%-100% oxidized.

SECONDARY MINERALOGY:

Total percent: Moderate.
Texture: Green amphibole replaces olivine and clinopyroxene crystal margins. Most olivine crystals are oxidized. Piece 1: Secondary sulfides present.
Percent vein material: Variable.
Vein material: Pieces 14 and 15—Amphibole vein runs almost perpendicular to the foliation (60°-65° inclination). The vein is 0.5 to 4 mm wide. Piece 11B: Thin white albite vein inclined at 10°.

118-735B-12R-2 (continued)

Olivine-Bearing Gabbro**Pieces 7A-11A, and 11C-13****COLOR:** Gray to dark gray.**LAYERING:** None, massive.**DEFORMATION:** Partly foliated (Pieces 9 and 13). Inclination 30°. The foliation is defined by stretched plagioclase, orthopyroxene, and olivine.**PRIMARY MINERALOGY:**

Plagioclase—Mode: 50%.

Crystal size: 0.2-1.5 cm.

Crystal shape: Euhedral to subhedral.

Preferred orientation: None.

Percent replacement: Not determined.

Clinopyroxene—Mode: 45%.

Crystal size: 0.2-2.0 cm.

Crystal shape: Euhedral to subhedral.

Preferred orientation: None.

Percent replacement: Replaced by green amphibole, percentage not measured.

Olivine—Mode: 5%.

Crystal size: 0.3-1.0 cm.

Crystal shape: Subhedral to anhedral.

Preferred orientation: None.

Percent replacement: Replaced by serpentinite or chlorite, percentage not measured.

SECONDARY MINERALOGY:

Total percent: 5%-10%.

Texture: Amphibole replaces clinopyroxene from the margins. Olivine is replaced by serpentine or chlorite along mesh of cracks.

Percent vein material: Not determined.

Vein material: Amphibole along microfault (every piece). Pieces 8-10: 0.5-mm-thick, white prehnite or albite vein inclines at less than 10°.

118-735B-12R-3

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1-5

Foliated Gabbro

F:30°

Pieces 1-2C (top), 4, and 5

COLOR: Greenish gray.
LAYERING: None.

DEFORMATION: Foliated gabbro cut green by amphibole veins that are perpendicular to the foliation (Piece 1). Foliated gabbro with gneissic banding on top and bottom (Pieces 2A-2C). Pieces 4 and 5: Foliated metagabbro crosscut by amphibole veins.

PRIMARY MINERALOGY: Probably same as fresh gabbro below.

SECONDARY MINERALOGY:

Total percent: Not determined.
Texture: Albite replaces plagioclase; green amphibole replaces pyroxene. 20% green amphibole.
Percent vein material: Not determined.
Vein material: Amphibole.

Olivine-Bearing Gabbro

Pieces 2C (bottom)-3

COLOR: Medium gray, mottled.
LAYERING: Massive.

DEFORMATION: Undeformed.

Piece 3: Discrete mylonite bands

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%.
Crystal size: Up to 3 cm.
Crystal shape: Anhedral.
Preferred orientation: None.
Percent replacement: None.

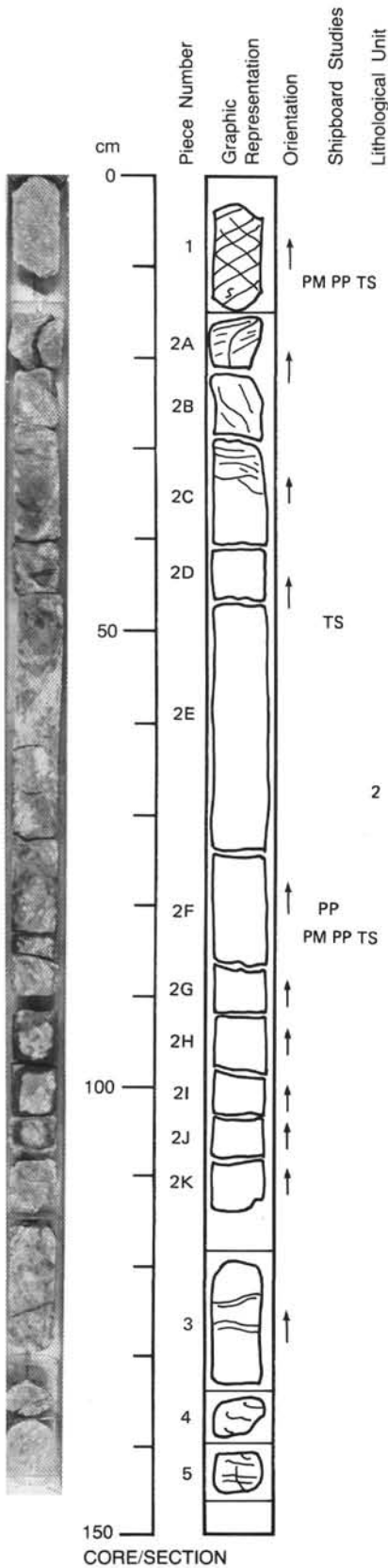
Clinopyroxene—Mode: 43%.
Crystal size: Up to 3 cm.
Crystal shape: Subhedral.
Preferred orientation: None.
Percent replacement: Not determined.

Olivine—Mode: 2% (enriched in Piece 2C).
Crystal size: 3-4 cm.
Crystal shape: Subhedral.
Preferred orientation: None.
Percent replacement: Not determined.

SECONDARY MINERALOGY:

Total percent: Not determined.
Texture: Green amphibole (about 5%) dispersed and filling veins.
Percent vein material: Not determined.
Vein material: Green amphibole.

COMMENTS: Coarse-grained.



118-735B-12R-3 (continued)

Olivine-Bearing Gabbro**Pieces 7-11A, 12, and 13**

COLOR: Gray to dark gray.

LAYERING: None, massive.

DEFORMATION: Partly foliated (Pieces 9 and 13).

Inclination 30°. The foliation is defined by stretched plagioclase, orthopyroxene, and olivine.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%.

Crystal size: 0.2-1.5 cm.

Crystal shape: Euhedral to subhedral.

Preferred orientation: None.

Percent replacement: Not measured.

Clinopyroxene—Mode: 45%.

Crystal size: 0.2-2.0 cm.

Crystal shape: Euhedral to subhedral.

Preferred orientation: None.

Percent replacement: Replaced by green amphibole, percentage not measured.

Olivine—Mode: 5%.

Crystal size: 0.3-1.0 cm.

Crystal shape: Subhedral to anhedral.

Preferred orientation: None.

Percent replacement: Replaced by serpentinite or chlorite, percentage not measured.

SECONDARY MINERALOGY:

Total percent: 5%-10%.

Texture: Amphibole replaces clinopyroxene from the margins. Olivine is replaced by serpentine or chlorite along mesh of cracks.

Vein material: Amphibole present along microfault (every piece). Pieces 8-10: 0.5-mm-thick, white prehnite or albite vein inclines at less than 10°.

118-735B-13R-1

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1-17

Olivine-Bearing Metagabbro (with Gneissic and Mylonitic Bands)

Pieces 1-10, and 17

COLOR: Pale to medium greenish gray.

LAYERING: None.

DEFORMATION: Pieces 1A-B, 3, and 5: discrete gneissic bands.
 Pieces 1B (bottom), 1C, and 4: Brecciated.
 Pieces 3, 6, and 8: Large clinopyroxene porphyroclasts.
 Piece 17: Foliated, crosscut by five white veins.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%.
 Crystal size: Up to 2 cm.
 Crystal shape: Anhedral to subhedral.
 Preferred orientation: None.
 Percent replacement: 50% by secondary plagioclase.

Clinopyroxene—Mode: 45%.
 Crystal size: Up to 1.5 cm.
 Crystal shape: Anhedral to subhedral.
 Preferred orientation: None.
 Percent replacement: Less than 15%.

Olivine—Mode: 5%.
 Crystal size: Up to 1 cm.
 Crystal shape: Subhedral.
 Preferred orientation: None.
 Percent replacement: Partly oxidized to brownish material.

SECONDARY MINERALOGY:

Total percent: Less than 20%.
 Texture: Green amphibole forms about 15% of the rock.
 Olivine is oxidized to brownish material. Some sulfides.
 Percent vein material: Not determined.
 Vein material: Few white veinlets that could be carbonate. Hornblende veins at 55°, also vertical veins.

Olivine-Bearing Gabbro (Weakly Foliated, Coarse-Grained)

Pieces 11-16

COLOR: Pale to medium gray.

LAYERING: None.

DEFORMATION: Weak foliation defined by elongate pyroxenes dipping 42°.

PRIMARY MINERALOGY:

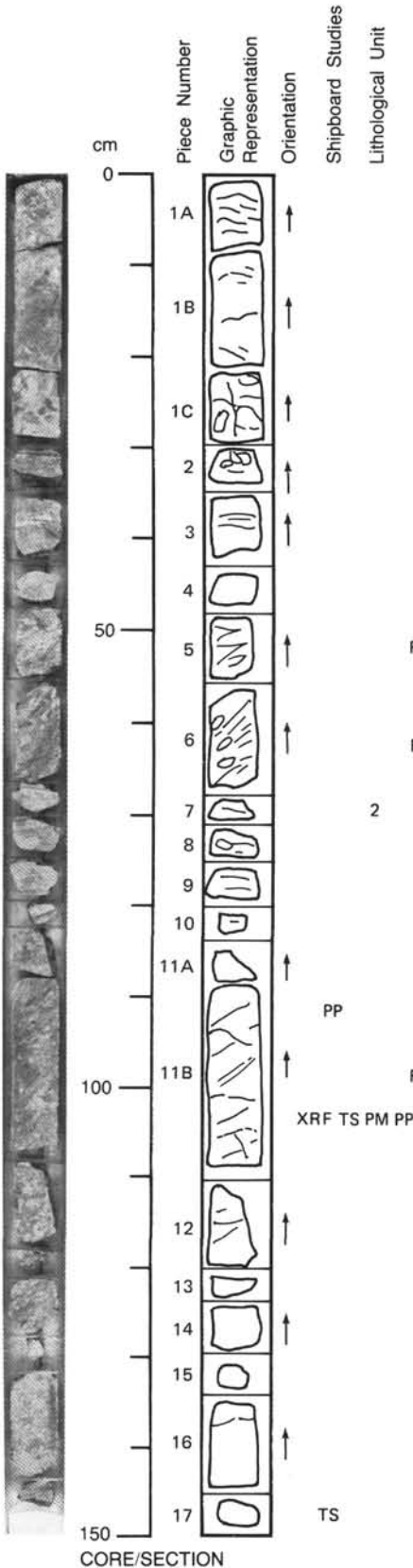
Plagioclase—Mode: 50%.
 Crystal size: Up to 2.5 cm.
 Crystal shape: Anhedral to subhedral.
 Preferred orientation: None.
 Percent replacement: 50% by secondary plagioclase.

Clinopyroxene—Mode: 48%.
 Crystal size: Up to 2.5 cm.
 Crystal shape: Subhedral to anhedral.
 Preferred orientation: Elongate crystals.
 Percent replacement: 10%.

Olivine—Mode: 2%.
 Crystal size: Up to 2 cm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: 10%.

SECONDARY MINERALOGY:

Total percent: 5%-10%.
 Texture: Green amphibole forms 5%-10% of the rock.
 Percent vein material: 3%.
 Vein material: White mineral filling horizontal veinlets. A few irregularly dipping veinlets.



118-735B-13R-2

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1-12B

Olivine Gabbro

Pieces 1 and 2

COLOR: Gray.
LAYERING: None.
DEFORMATION: Almost none.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 50%.
 Crystal size: Up to 15 mm.
 Crystal shape: Subhedral-euhedral.
 Preferred orientation: None.
 Percent replacement: Not determined.

Clinopyroxene—Mode: 35%-45%.
 Crystal size: Up to 20 mm.
 Crystal shape: Subhedral.
 Preferred orientation: None.
 Percent replacement: 15%-20% by amphibole.

Olivine—Mode: 5%-15%.
 Crystal size: 3-18 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: >50% by amphibole and mica (phlogopite?) or talc(?) and opaque mineral.

SECONDARY MINERALOGY:
 Total percent: 10%-15%.
 Texture: Amphibole replacing clinopyroxene. Trace of pyrite.
 Percent vein material: None (not observed).
 Vein material: None.

Gabbro

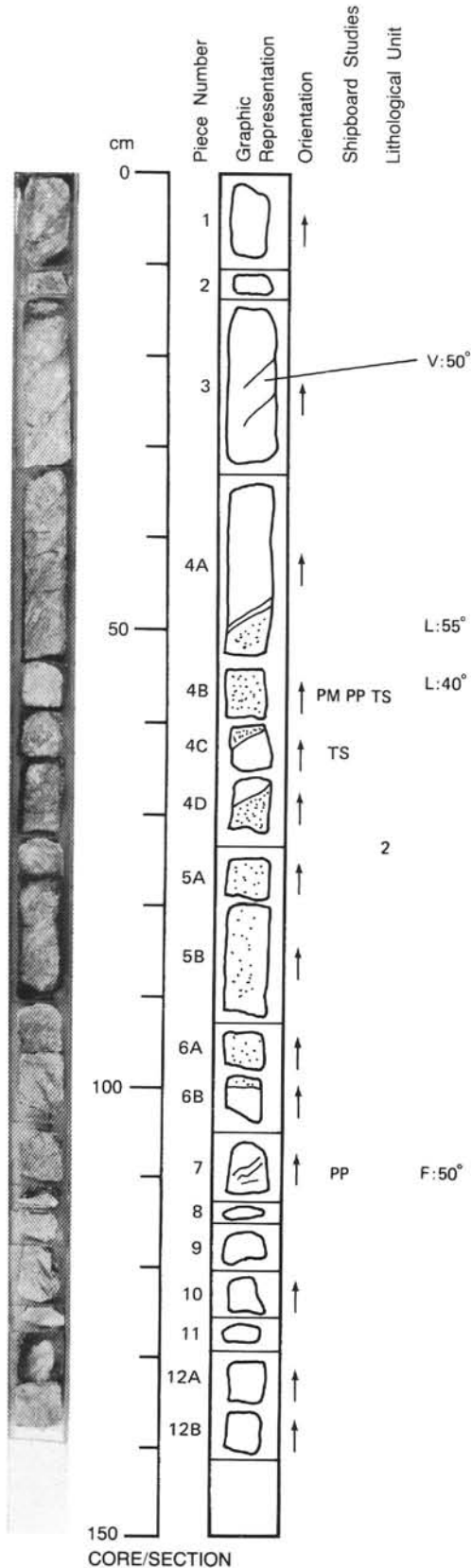
Pieces 3-6B, and 10-12B

COLOR: Gray.
LAYERING: None.
DEFORMATION: Almost none.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 60%.
 Crystal size: 2-10 mm.
 Crystal shape: Subhedral-euhedral.
 Preferred orientation: None.
 Percent replacement: Not determined.

Clinopyroxene—Mode: 40%.
 Crystal size: Up to 20 mm.
 Crystal shape: Subhedral.
 Preferred orientation: None.
 Percent replacement: 15%-20% by amphibole.

Olivine—Mode: <5%.
 Crystal size: None.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: >50% by tremolite and mica and opaque mineral.

SECONDARY MINERALOGY:
 Total percent: 5%-10%.
 Texture: Amphibole replacing clinopyroxene.
 Percent vein material: None.
 Vein material: None.



118-735B-13R-2 (continued)

Porphyroclastic Metagabbro**Pieces 7-9**

COLOR: Gray.

LAYERING: None.

DEFORMATION: Foliation defined by stretched plagioclase and clinopyroxene, and bands of recrystallized plagioclase and pyroxene. Inclination of foliation 15°-25°.

PRIMARY MINERALOGY:

Plagioclase—Mode: 58%.

Crystal size: 2-15 mm.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: Trace, prehnite(?).

Clinopyroxene—Mode: 40%.

Crystal size: 2-20 mm.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: > 10% by amphibole.

Olivine—Mode: Trace to 2%

Crystal size: 2-6 mm.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: Extensively by tremolite and mica and opaque mineral.

SECONDARY MINERALOGY:

Total percent: > 10%.

Texture: Amphibole replacing clinopyroxene. Trace prehnite replacing plagioclase.

Percent vein material: None.

Vein material: None.

118-735B-13R-3

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1A-12

Gabbro

F: 15°

Pieces 1A, 2B-3E

COLOR: Gray.

LAYERING: Piece 3E: Plagioclase-rich layers (0.8-1.2 cm thick).

DEFORMATION: Almost none.

PRIMARY MINERALOGY:

Plagioclase—Mode: 60%.

Crystal size: 2-10 mm.

Crystal shape: Subhedral-euhedral.

Preferred orientation: None.

Percent replacement: Not determined.

Clinopyroxene—Mode: 40%.

Crystal size: Up to 20 mm.

Crystal shape: Subhedral.

Preferred orientation: None.

Percent replacement: 15%-20% by amphibole.

Olivine—Mode: <5%.

Crystal size: None.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: >50% by tremolite and mica and opaque mineral.

SECONDARY MINERALOGY:

Total percent: 5%-10%.

Texture: Amphibole replacing clinopyroxene.

Percent vein material: None.

Vein material: None.

Porphyroclastic Metagabbro

Pieces 1B, 2A, 4A-7, and 9C (bottom)-12

F: 0-50°

COLOR: Gray.

LAYERING: None.

DEFORMATION: Foliation defined by stretched plagioclase and clinopyroxene, and bands of recrystallized plagioclase and pyroxene. Inclination of foliation 15°-25°.

Pieces 1B-2A: Have mylonitic bands.

PRIMARY MINERALOGY:

Plagioclase—Mode: 58%.

Crystal size: 2-15 mm.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: Trace, prehnite(?).

Clinopyroxene—Mode: 40%.

Crystal size: 2-20 mm.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: >10% by amphibole.

Olivine—Mode: Trace to 2%

Crystal size: 2-6 mm.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: Extensively by tremolite and mica and opaque mineral.

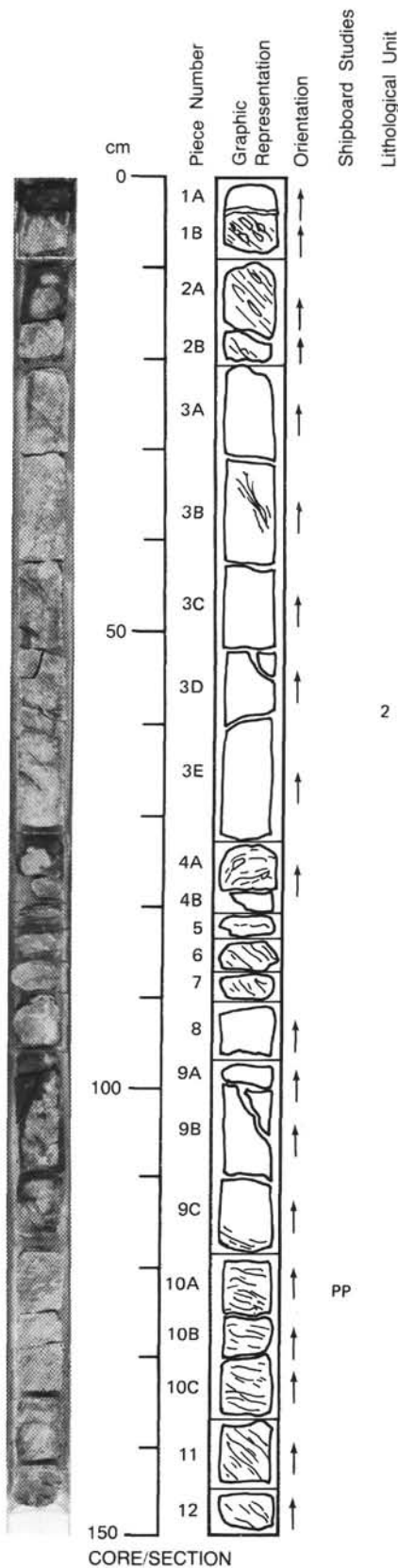
SECONDARY MINERALOGY:

Total percent: >10%.

Texture: Amphibole replacing clinopyroxene. Trace prehnite replacing plagioclase.

Percent vein material: None.

Vein material: None.



CORE/SECTION

118-735B-13R-3 (continued)

Olivine Gabbro**Pieces 8-9C (115 cm)****COLOR:** Gray.**LAYERING:** None.**DEFORMATION:** Almost none.**PRIMARY MINERALOGY:**

Plagioclase—Mode: 50%.

Crystal size: Up to 15 mm.

Crystal shape: Subhedral-euhedral.

Preferred orientation: None.

Percent replacement: Not determined.

Clinopyroxene—Mode: 35%-45%.

Crystal size: Up to 20 mm.

Crystal shape: Subhedral.

Preferred orientation: None.

Percent replacement: 15%-20% by amphibole.

Olivine—Mode: 5%-15%.

Crystal size: 3-18 mm.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: >50% by amphibole and mica (phlogopite?) or talc(?) and opaque mineral.

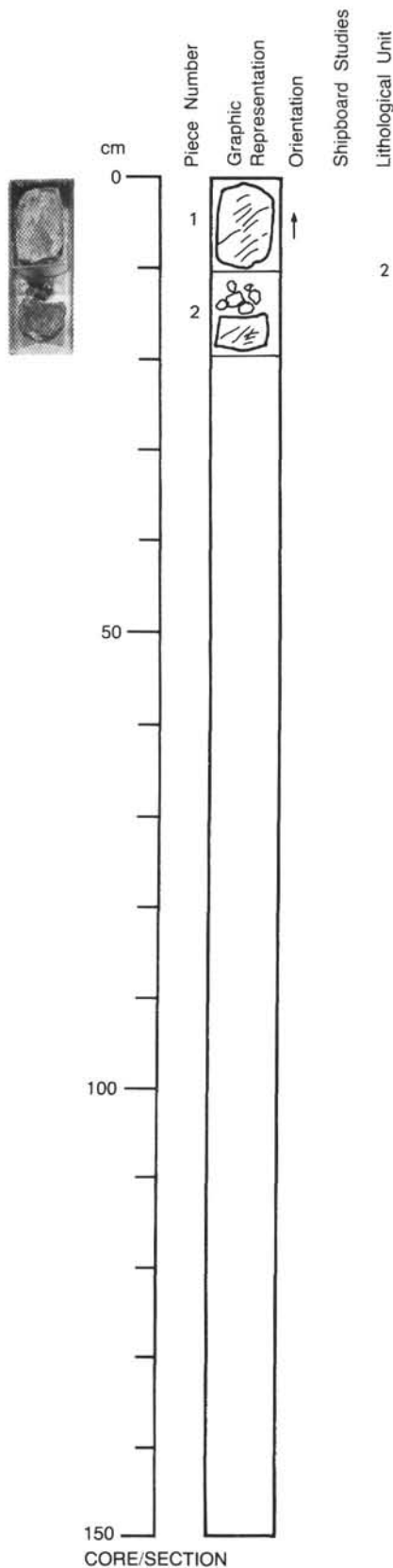
SECONDARY MINERALOGY:

Total percent: 10%-15%

Texture: Amphibole replacing clinopyroxene. Trace of pyrite.

Percent vein material: None (not observed).

Vein material: None.



118-735B-13R-4

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1 and 2

Poorly Foliated Olivine Gabbro

Piece 1

COLOR: Gray.
LAYERING: None.
DEFORMATION: Foliation defined by pyroxene and plagioclase porphyroclasts. Inclination of foliation varies between 15° and 45°.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 60%.
 Crystal size: 2-10 mm.
 Crystal shape: Subhedral-euhedral.
 Preferred orientation: Weak.
 Percent replacement: Trace of prehnite.

 Clinopyroxene—Mode: 32%.
 Crystal size: 3-28 mm.
 Crystal shape: Subhedral.
 Preferred orientation: Weak.
 Percent replacement: > 10% by amphibole.

 Olivine—Mode: 8%.
 Crystal size: 2-12 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: Moderately oxidized and replaced by serpentine(?).
SECONDARY MINERALOGY:
 Total percent: > 15%.
 Texture: Amphibole replaces clinopyroxene. Olivine is slightly oxidized and replaced by serpentine (?). Limited replacement of plagioclase by prehnite.
 Percent vein material: Not determined.
 Vein material: Not determined.

Porphyroclastic Metagabbro

Piece 2

COLOR: Gray.
LAYERING: None.
DEFORMATION: Foliation defined by stretched plagioclase and clinopyroxene, and bands of recrystallized plagioclase and pyroxene. Inclination of foliation 15°-25°.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 58%.
 Crystal size: 2-15 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: Trace, prehnite(?).

 Clinopyroxene—Mode: 40%.
 Crystal size: 2-20 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: > 10% by amphibole.

 Olivine—Mode: Trace to 2%.
 Crystal size: 2-6 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: Extensively by tremolite and mica and opaque mineral.
SECONDARY MINERALOGY:
 Total percent: > 10%.
 Texture: Amphibole replacing clinopyroxene. Trace prehnite replacing plagioclase.
 Percent vein material: None.
 Vein material: None.

118-735B-14R-1

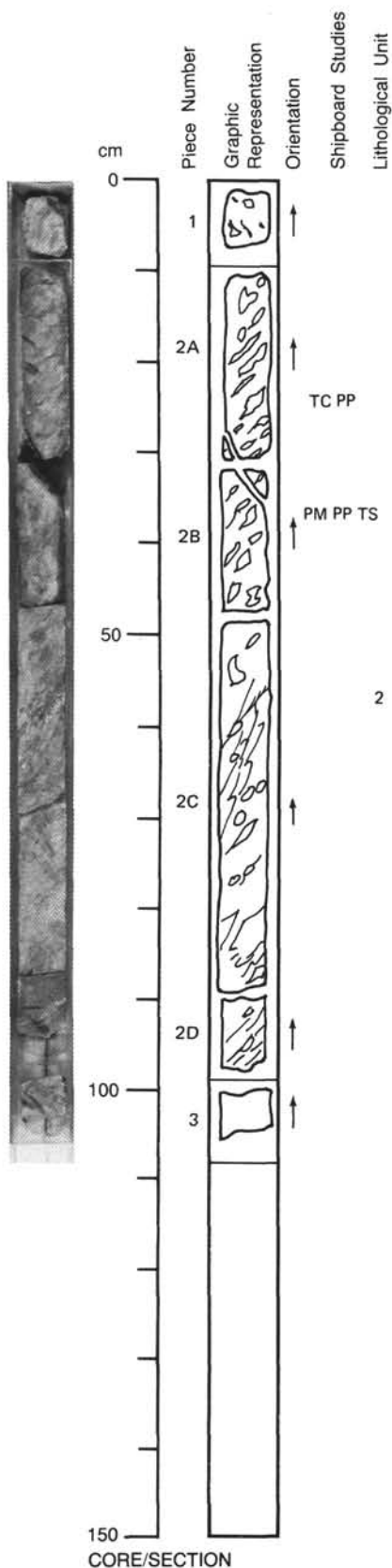
UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1-3

Augen Gneiss to Mylonitic Augen Gneiss Gabbro

Pieces 1-3

COLOR: Dark gray.
LAYERING: No primary igneous layering.
DEFORMATION: Coarse- to medium-grained clinopyroxene augen, 2 to 50 mm in a matrix of stretched recrystallized clinopyroxene and plagioclase defining a well-developed foliation.
 Piece 2D: Locally mylonitic.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 65%.
 Crystal size: 0.4-1.6 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Elongated parallel to foliation.
 Percent replacement: trace by chlorite.
 Clinopyroxene—Mode: 35%.
 Crystal size: 0.8-5 cm.
 Crystal shape: Anhedral, rounded or elongate.
 Preferred orientation: In plane of foliation.
 Percent replacement: 70% green amphibole rims pyroxene.
 Olivine—Mode: <1% as 1.5 x 3.0 cm patch at approximately 51 cm. Recrystallized.
 Crystal size: Not determined.
 Crystal shape: Anhedral.
 Preferred orientation: Elongate parallel to foliation.
 Percent replacement: 100% by talc + tremolite + anthophyllite.
 Iron-titanium oxides—Mode: Locally abundant (5%) at 61-68 cm.
 Crystal size: Not determined.
 Crystal shape: Anhedral.
 Preferred Orientation: Not determined.
 Percent replacement: 0%.
SECONDARY MINERALOGY:
 Total percent: 5%-10%.
 Texture: Green amphibole locally rims pyroxene and occurs as lenses along foliation in addition to filling late crosscutting fractures.
 Percent vein material: Up to 25% of rock.
 Vein material: Green amphibole. White veins (sodic plagioclase?) 0.1-0.5 mm cut the foliation subhorizontally in four or five places. Piece 2C (53-64 cm): Contains a zone rich in crosscutting, 0.5- to 2-mm-thick amphibole veins dipping steeply subparallel to foliation. Contains a trace of sulfides and phlogopite.



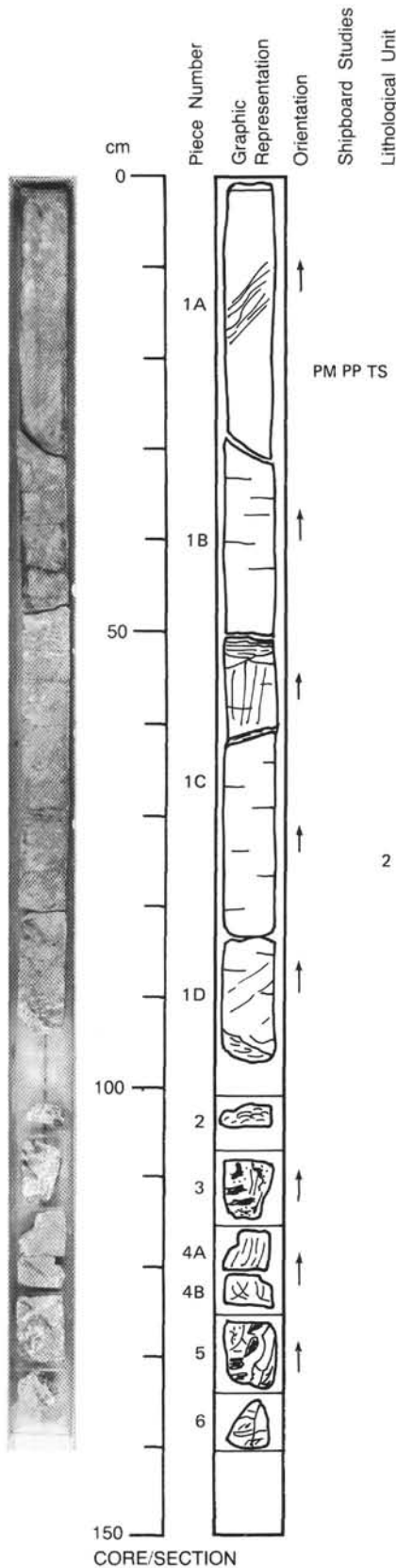
118-735B-14R-2

UNIT 1 : OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1A-6

Foliated Metagabbro

Pieces 1A-6



F:45°

PM PP TS

F:0°

F:10°

2

F:30°

COLOR: Varies from dark gray to white.
LAYERING: No obvious primary layering.
DEFORMATION: Defined by elongation of pyroxene and plagioclase.
 Pieces 1A-1D: Dip varies from 45° at 14-28 cm, to 0° to 48-56 cm, to 10° at 63 cm, to 30° between 83-93 cm. Intervening areas are more massive, poorly foliated gabbro. More foliated areas are finer-grained, nearly mylonitic at 55 and 63 cm, but only well-foliated to augen gneissic elsewhere.

PRIMARY MINERALOGY:
 Plagioclase—Mode: 55%-60%.
 Crystal size: 5-15 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Elongate in foliation plane.
 Percent replacement: Variable, 10%-100%.
 Clinopyroxene—Mode: 40%.
 Crystal size: 5-15 mm. Up to 3 cm in Piece 5.
 Crystal shape: Anhedral.
 Preferred orientation: Elongate in foliation plane.
 Percent replacement: 2%-3% by amphibole to 100% by amphibole + albite.
 Olivine—Mode: 0%-5% in first 5 cm of section.
 Crystal size: 1-2 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: 95%-100%.

SECONDARY MINERALOGY:
 Total percent: 20%-100%.
 Texture: 0-47 and 62-94 cm clinopyroxene is partially (2%-3%) replaced at rims by amphibole.
 Plagioclase is crosscut by veins filled by amphibole.
 30-93 cm: Fractures <<1 mm are filled by white mineral (abite?) and nearly horizontal.
 50-64 cm: Crosscut by amphibole-filled veins that are nearly vertical.
 48-63 and 92-140 cm: Gabbro is strongly albitized and crosscut by amphibole veins. Foliation is no longer apparent, and gabbro is 70%-100% replaced by amphibole and abite.
 Piece 5: Large crystals up to 3 cm have cores of clinopyroxene.
 60 cm: Pistachio green mineral replacing plagioclase, probably epidote.
 Percent vein material: 2%
 Vein material: White mineral, probably abite or sodic plagioclase.

150
CORE/SECTION

118-735B-14R-3

UNIT 2 : OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1-10

Mylonitized Gabbro

Pieces 1 (0-6 cm) and 2C (62-65 cm)

F:30-40°

COLOR: Gray.
LAYERING: No primary igneous layering.
DEFORMATION: Pyroxene and plagioclase dipping in well-foliated layers at 30-40. Piece 2C (62-65 cm): 1-cm-thick band of fine-grained mylonite dipping at 20°, with sharp contacts with more steeply dipping foliated gneiss above.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 64%.
 Crystal size: <1 mm.
 Crystal shape: Anhedral.
 Preferred orientation: In plane of foliation.
 Percent replacement:

Clinopyroxene—Mode: 34%.
 Crystal size: <1 mm.
 Crystal shape: Anhedral.
 Preferred orientation: In plane of foliation.
 Percent replacement:

Olivine—Mode: 2%.
 Crystal size: <1 mm.
 Crystal shape: Anhedral.
 Preferred orientation: In plane of foliation.
 Percent replacement: Replaced by talc.

SECONDARY MINERALOGY:
 Total percent: Not determined.
 Texture: Olivine replaced by talc.
 Percent vein material: Not determined.
 Vein material: Piece 1: Foliation crosscut by subhorizontal vein of albite or prehnite (1 mm).

Olivine-Bearing Gabbro

Pieces 1 (5-28 cm), 9, and 10 (101-104 cm)

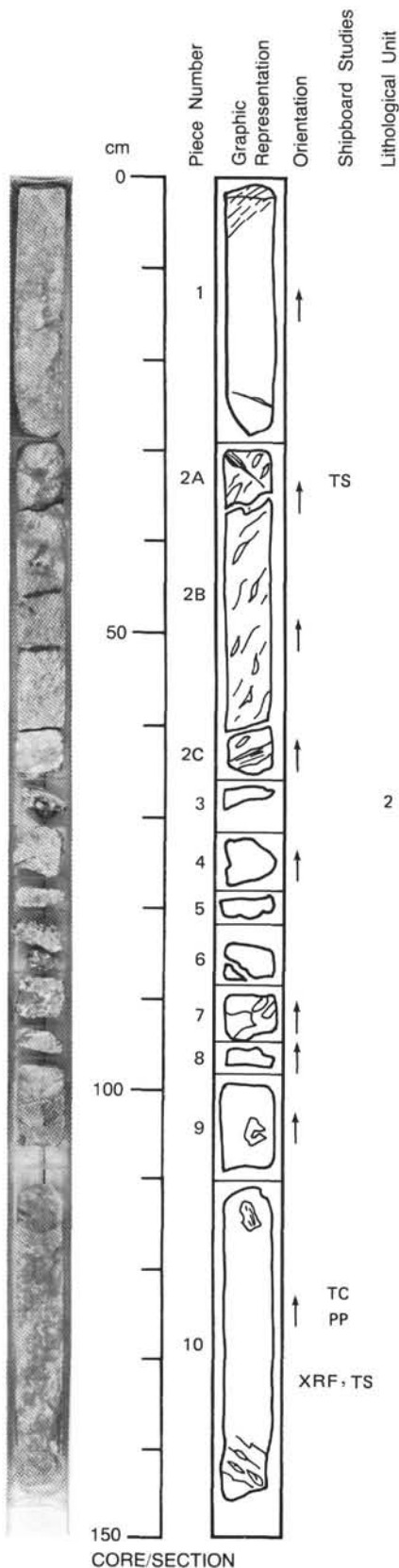
COLOR: Dark gray.
LAYERING: No primary layering.
DEFORMATION: No apparent deformation.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 64%.
 Crystal size: 2-17 mm locally, generally 1-3 mm.
 Crystal shape: Anhedral to subhedral granular.
 Preferred orientation: None.
 Percent replacement: >50%.

Clinopyroxene—Mode: 34%.
 Crystal size: 2-17 mm.
 Crystal shape: Anhedral to locally subhedral granular.
 Preferred orientation: None evident.
 Percent replacement: 30%.

Olivine—Mode: 2%, occurs locally.
 Crystal size: 3 mm.
 Crystal shape: Anhedral granular.
 Preferred orientation: None.
 Percent replacement: 100%.

SECONDARY MINERALOGY:
 Total percent: 40%.
 Texture: Amphibole common in 0.1- to 2-mm-thick crosscutting veins and rimming clinopyroxene (8%). Olivine locally pseudomorphed by talc except for olivine-rich zone at 25-29 cm, where it is also oxidized.
 Percent vein material: 1%.
 Vein material: Amphibole.

COMMENTS: Texture is anhedral granular, locally subhedral, granular, coarse-grained (2-17 mm) pyroxene and plagioclase. Pieces 9 and 10 (101-141 cm): Pegmatoidal zone average grain size is 40 mm. Texture varies from subhedral granular to anhedral granular. Coarse-grained (101-122 cm) and pegmatoidal (122-141 cm).



118-735B-14R-3 (continued)

Olivine-Bearing Metagabbro Augen Gneiss**Pieces 2A-2C (29-62 cm), 2C-8 (65-101 cm), and 10 (141-148 cm)**

COLOR: Dark greenish gray.

LAYERING: No primary igneous layering.

DEFORMATION: Well-developed gneissic foliation that becomes less well-developed toward base of this section, where some relict granular gabbroic texture is preserved. Foliation dips at 68°.

PRIMARY MINERALOGY:

Plagioclase—Mode: 64%.

Crystal size: 2-17 mm locally, generally 1-3 mm.

Crystal shape: Anhedral to subhedral granular.

Preferred orientation: In plane of foliation.

Percent replacement: Not determined. Pieces 2C-8 (65-101 cm), feldspar is milky white.

Clinopyroxene—Mode: 34%.

Crystal size: 2-17 mm.

Crystal shape: Anhedral to locally subhedral granular.

Preferred orientation: In plane of foliation.

Percent replacement: Not determined.

Olivine—Mode: 1%. No olivine in Piece 10 (141-148 cm).

Crystal size: 3 mm.

Crystal shape: Anhedral granular.

Preferred orientation: In plane of foliation.

Percent replacement: 100% by rust-stained talc.

SECONDARY MINERALOGY:

Total percent: Not determined.

Texture: 29-31 cm: Coarse olivine patch (6 × 15 mm) is partly (wholly ?) replaced by rust-stained talc. 29-40 cm: Extensive albitization in the vicinity of a 2- to 7-mm-thick vein of green amphibole. 55-58 cm: Greenish talc patches.

Percent vein material: Not determined.

Vein material: 2- to 7-mm-thick amphibole veins. Fracture system at 30-41 cm. Edges look like plagioclase replaced by epidote.

118-735B-14R-4

UNIT 2 : OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1-16

Massive to Poorly Foliated Gabbro

Pieces 2-12

COLOR: Gray with white to white-brown plagioclase, where altered.

LAYERING: None.

DEFORMATION: Pieces 5, 8, 9, and 12: Some weak foliation defined by elongation of plagioclase-rich zones. Plagioclase is probably cataclased—some fracturing of pyroxene in some pieces.
 Piece 4: Contains fracture at 62° with brown alterations zone around it. No offset.

PRIMARY MINERALOGY:

Plagioclase—Mode: 40%-60%.

Crystal size: 0.2-1.0 cm.

Crystal shape: Anhedral.

Preferred orientation: Sometimes elongated in the foliation.

Percent replacement: Fresh to altered—brownish to greenish cast, epidote + clay minerals in the more deformed plagioclase between 53-109 cm.

Clinopyroxene—Mode: 40%-60%.

Crystal size: 3-35 mm.

Crystal shape: Subhedral to anhedral.

Preferred orientation: None.

Percent replacement: Quite fresh, except near veins where there is some amphibole development.

Olivine—Mode: Variable, 0%-5%.

Crystal size: 2-20 mm.

Crystal shape: Anhedral, interstitial.

Preferred orientation: None.

Percent replacement: All variously serpentinized. More deformed sections have clayey orange pseudomorphs. Percent replacement high at 36-40 cm.

SECONDARY MINERALOGY:

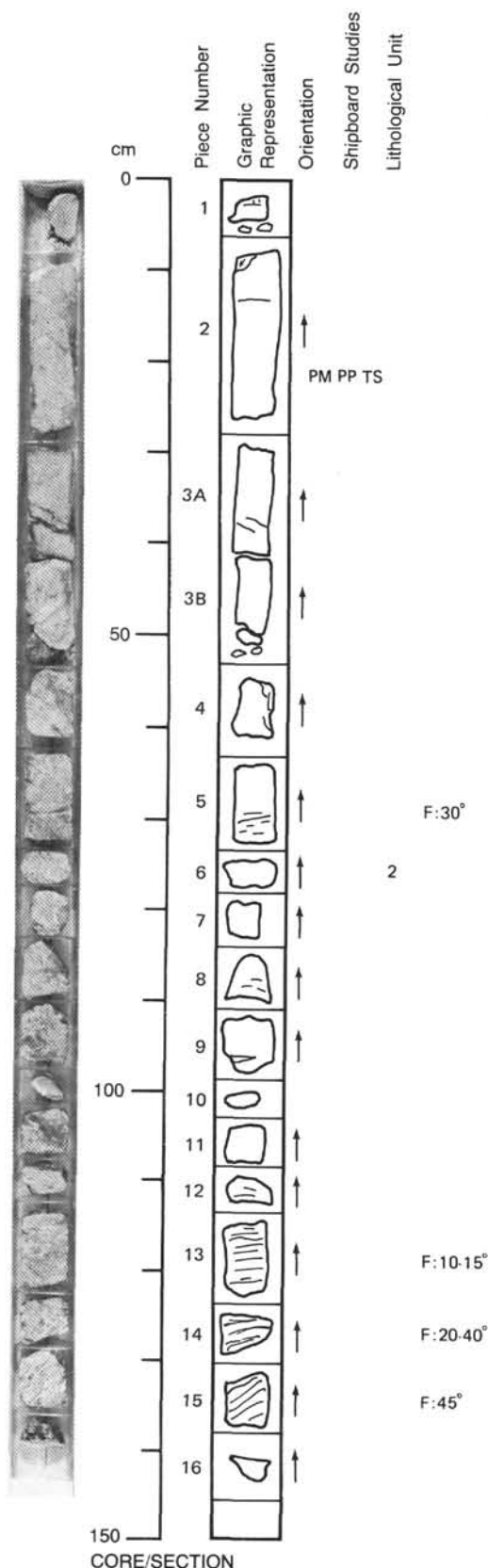
Total percent: <2% to 20% (high in lower half of interval).

Texture: Secondary phases are clay minerals, tremolite(?), serpentine after olivine, some plagioclase alteration giving a brownish cast.

Percent vein material: 1%-2%.

Vein material: White to brown filling, albite/prehnite(?), some clay minerals.

COMMENTS: Piece 2: There is a feldspathic vein on the upper corner with amphibole alteration on the margin—probably late stage, maybe deuteric. The igneous grain size changes dramatically from 2-3 mm to 2-3 cm in <1 cm—such transitions occur at 26, 32, and 36 cm. Pieces 3, 4, and 9 have clinopyroxene up to 3 cm long.



118-735B-14R-4 (continued)

Gneissic Metagabbro**Pieces 1, and 13-16****COLOR:** Green-white.**LAYERING:** None.**DEFORMATION:** Porphyroclastic, clinopyroxene and plagioclase augen with a foliation defined by lenses of plagioclase and amphibole and amphibole (after clinopyroxene) alignment.**PRIMARY MINERALOGY:**

Plagioclase—Mode: 45%.

Crystal size: < 1-3 mm.

Crystal shape: Anhedral.

Preferred orientation: Lensoid in foliation.

Percent replacement: 70% to plagioclase neoblasts.

Clinopyroxene—Mode: 50%.

Crystal size: 1-3 mm.

Crystal shape: Anhedral.

Preferred orientation: Flattened in foliation.

Percent replacement: 80% to amphibole, some neoblasts.

Olivine—Mode: 5%.

Crystal size: 3 mm.

Crystal shape: Anhedral.

Preferred orientation: Elongate in foliation.

Percent replacement: 100% to calcite/hematite.

SECONDARY MINERALOGY:

Total percent: 40%.

Texture: Largely green amphibole after clinopyroxene—some hematite after olivine, calcite replacing olivine.

Percent vein material: Not determined.

Vein material: Minor amphibole veining in veins up to 1 cm wide.

COMMENTS: Piece 1 has a feldspathic veinlet on one side, along which there is amphibole and epidote development.

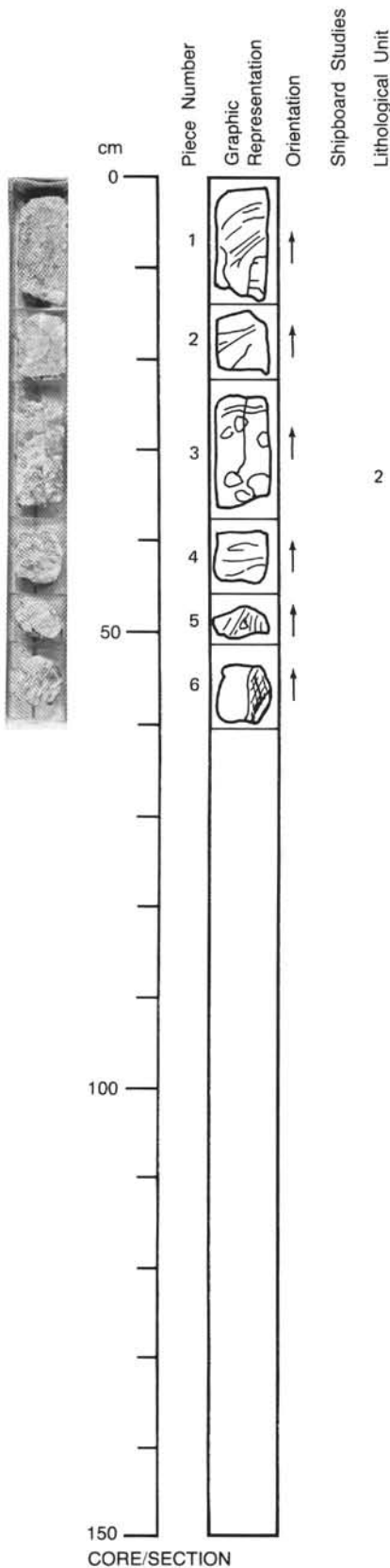
118-735B-14R-5

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1-6

Foliated Porphyroclastic Metagabbro

Pieces 1-6



F:40°
F:20-45°
F:Variable
F:0-10°
F:70-80°
F:80°

COLOR: Gray.
LAYERING: None.
DEFORMATION: Foliation defined by stretching of plagioclase and clinopyroxene.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 45%.
 Crystal size: < 1-3 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Lensoid in foliation.
 Percent replacement: 70% to plagioclase neoblasts.
 Clinopyroxene—Mode: 50%.
 Crystal size: 1-3 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Flattened in foliation.
 Percent replacement: 80% to amphibole, some neoblasts.
 Olivine—Mode: 5%.
 Crystal size: 3 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Elongate in foliation.
 Percent replacement: 100% to calcite/hematite.
SECONDARY MINERALOGY:
 Total percent: 40%. Alteration more intense in Pieces 4-6.
 Texture: Largely green amphibole after clinopyroxene. Some hematite after olivine. Calcite replacing olivine.
 Percent vein material: Not determined.
 Vein material: Minor amphibole veining. Pieces 1 and 3: Fracturing nearly vertical.

118-735B-15R-1

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1-12

Porphyroclastic Gabbro (Olivine-bearing)

Pieces 1-3A (top)

COLOR: Gray.
LAYERING: None.
DEFORMATION: Stretched clinopyroxene and plagioclase (+ olivine) define foliation. Foliation inclined about 40°. Clinopyroxene porphyroclasts.

PRIMARY MINERALOGY:
 Plagioclase—Mode: 58%.
 Crystal size: Not determined.
 Crystal shape: Xenomorphic.
 Preferred orientation: Stretched.
 Percent replacement: Not determined.

Clinopyroxene—Mode: 40%.
 Crystal size: Not determined.
 Crystal shape: Xenomorphic.
 Preferred orientation: Stretched.
 Percent replacement: 15% by amphibole.

Olivine—Mode: 2%.
 Crystal size: Not determined.
 Crystal shape: Xenomorphic.
 Preferred orientation: Stretched.
 Percent replacement: Not determined.

SECONDARY MINERALOGY:
 Total percent: 5%.
 Texture: Amphibole (<5%) replaces clinopyroxene.
 Percent vein material: Not determined.
 Vein material: Amphibole(?) veinlets running perpendicular to foliation.

Porphyroclastic Pegmatoidal Metagabbro

Pieces 3A (bottom)-12

COLOR: Light gray to medium greenish gray.
LAYERING: No primary igneous layering.
DEFORMATION: Foliation defined by elongated clinopyroxene. Cataclastic deformation healed by amphibole veins that run vertical and perpendicular to the foliation.

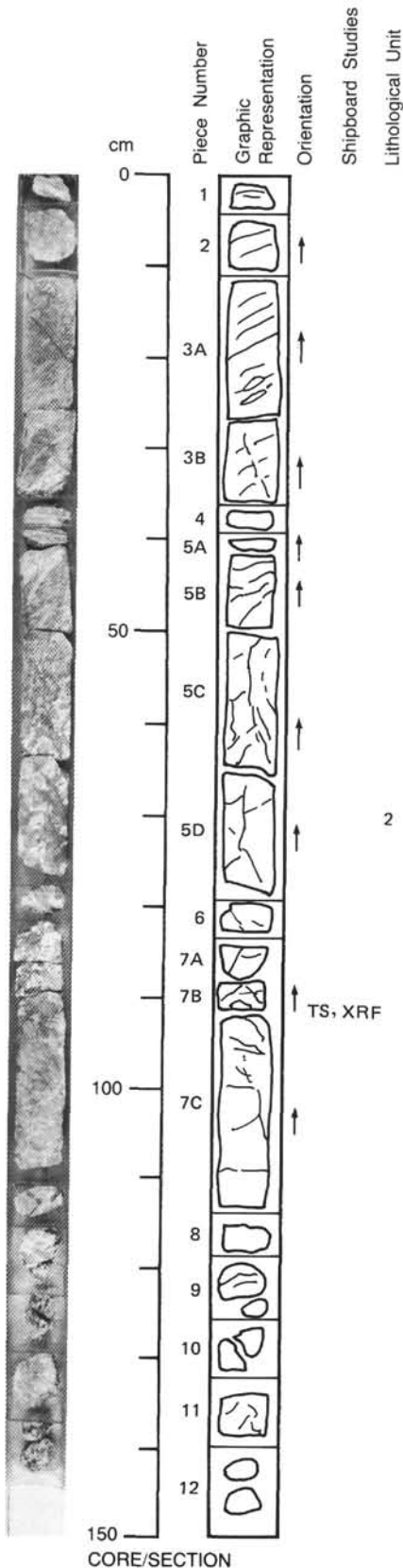
PRIMARY MINERALOGY:
 Plagioclase—Mode: 50%.
 Crystal size: Up to 3 cm.
 Crystal shape: Anhedral.
 Preferred orientation: Elongated.
 Percent replacement: Not determined.

Clinopyroxene—Mode: 40%.
 Crystal size: Up to 5 cm.
 Crystal shape: Anhedral.
 Preferred orientation: Elongated.
 Percent replacement: 15% by amphibole.

Olivine—Mode: 2%.
 Crystal size: Up to 2 cm.
 Crystal shape: Anhedral.
 Preferred orientation: Elongated.
 Percent replacement: Not determined.

SECONDARY MINERALOGY:
 Total percent: 15%.
 Texture: Amphibole replaces clinopyroxene and occurs in veins. Albite and/or prehnite occurring in veins and partially replacing plagioclase.
 Vein material: Amphibole, albite and/or prehnite.

COMMENTS: Sample has several 0.5-in.-wide, amphibole-filled veins running perpendicular to the foliation. Some horizontal amphibole-filled veinlets.
 Pieces 3A and 3B: Clinopyroxene measures up to 5 cm long. Gradational boundary between Pieces 3A and 3B; Pieces 3A and 2B being finer-grained.



CORE/SECTION

118-735B-15R-2

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1A-17B

Porphyroclastic Metagabbro

Pieces 1A-17B

COLOR: Dark greenish gray with white bands.

LAYERING: None.

DEFORMATION: Foliation is defined by stretched plagioclase and pyroxene crystals. Foliation is also defined by amphibole-rich bands, probably after clinopyroxene. Foliation inclined approximately 40°.

PRIMARY MINERALOGY:

Plagioclase—Mode: 60%.

Crystal size: 10 mm.

Crystal shape: Anhedral.

Preferred orientation: Stretched and elongate parallel to foliation.

Percent replacement: Various (moderate to extensive) replaced by sodic plagioclase and minor prehnite(?).

Clinopyroxene—Mode: 40%.

Crystal size: 15 mm.

Crystal shape: Anhedral.

Preferred orientation: Elongated parallel to foliation.

Percent replacement: Extensive (>70%) replacement by amphibole.

Orthopyroxene—Mode: Trace.

Crystal size: <5mm.

Crystal shape: Anhedral.

Preferred orientation: Not determined.

Percent replacement: Extensively replaced by tremolite and magnetite.

SECONDARY MINERALOGY:

Total percent: >70% (extensive).

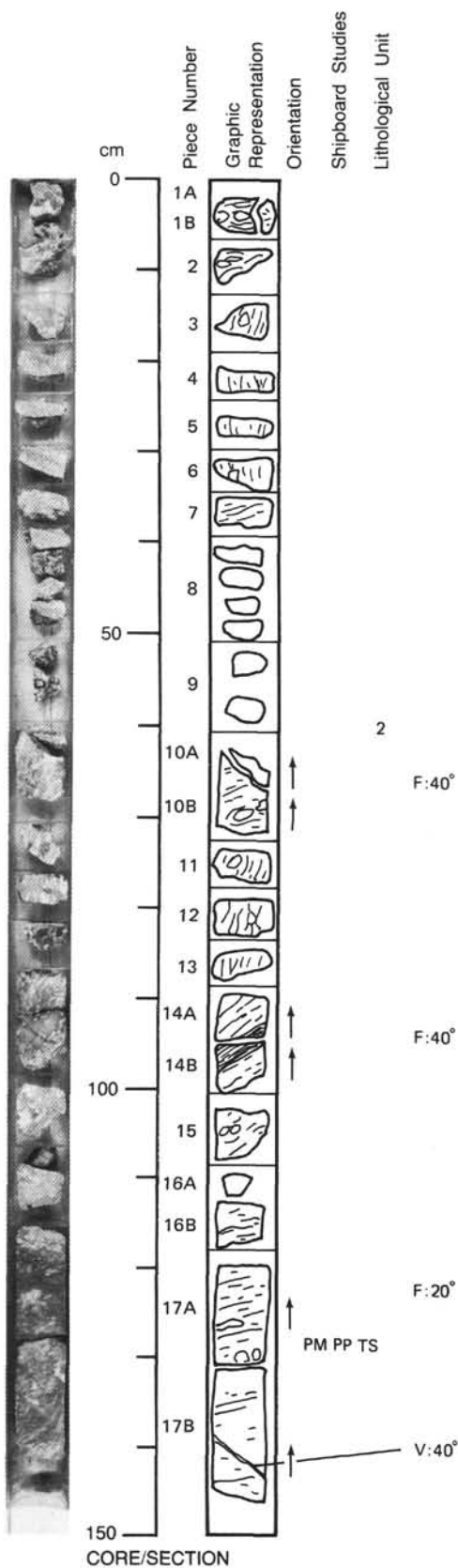
Texture: Amphibole (>70%) replaces clinopyroxene.

Sodic plagioclase + prehnite(?) replaces approximately 20% of the original sample.

Percent vein material: Variable (<2%).

Vein material: Piece 17B: Amphibole vein approximately 5 mm thick.

COMMENTS: Pieces 1, 3, 10, 11, and 17A: Pegmatitic. Contains >1.0 cm clinopyroxene crystals.



118-735B-15R-3

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1-8

Porphyroclastic Metagabbro

Pieces 1-7

COLOR: Dark greenish gray with white bands.
LAYERING: None.
DEFORMATION: Foliation is defined by stretched plagioclase and pyroxene crystals. Foliation is also defined by amphibole-rich bands, probably after clinopyroxene. Foliation inclined approximately 40°.

PRIMARY MINERALOGY:
 Plagioclase—Mode: 60%.
 Crystal size: 10 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Stretched and elongate parallel to foliation.
 Percent replacement: Various (moderate to extensive) replaced by sodic plagioclase and minor prehnite(?).

Clinopyroxene—Mode: 40%.
 Crystal size: 15 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Elongated parallel to foliation.
 Percent replacement: Extensive (>70%) replacement by amphibole.

Orthopyroxene—Mode: Trace.
 Crystal size: <5mm.
 Crystal shape: Anhedral.
 Preferred orientation: Not determined.
 Percent replacement: Extensively replaced by tremolite and magnetite.

SECONDARY MINERALOGY:
 Total percent: >70% (extensive).
 Texture: Amphibole (>70%) replaces clinopyroxene.
 Sodic plagioclase + prehnite(?) replaces approximately 20% of the original sample.
 Percent vein material: <2%.
 Vein material: Pieces 1 and 3: Amphibole veins, 2-10 mm wide.

NOTES: Piece 6: Pegmatitic. Contains clinopyroxene porphyroclasts up to 1.5 cm. Also contains oxidized olivine near the bottom of the piece. Piece 4: Half of piece is fine-grained.

Gabbro

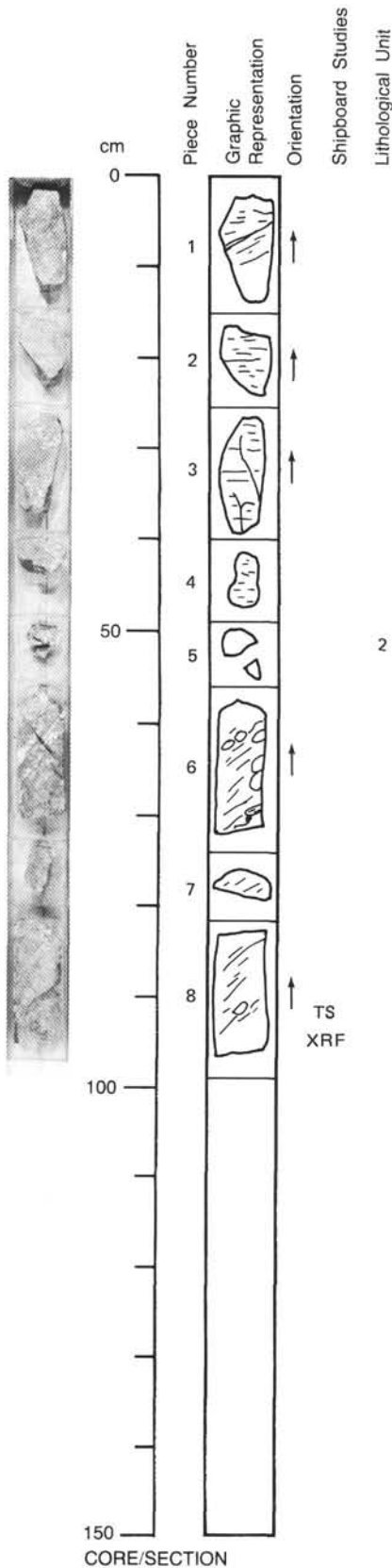
Piece 8

COLOR: Greenish gray.
LAYERING: None.
DEFORMATION: Minor.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 50%.
 Crystal size: 2-10 mm.
 Crystal shape: Subhedral to euhedral.
 Preferred orientation: None.
 Percent replacement: Trace by sodic plagioclase and mica.

Clinopyroxene—Mode: 45%.
 Crystal size: 2-6 mm.
 Crystal shape: Subhedral.
 Preferred orientation: None.
 Percent replacement: 10% by amphibole.

Olivine—Mode: 5%.
 Crystal size: 1-5 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: Almost 90% by tremolite + mica or talc + opaque.

SECONDARY MINERALOGY:
 Total percent: 5%-10%.
 Texture: Green amphibole replacing clinopyroxene and filling late-stage veins.
 Percent vein material: Trace.
 Vein material: Amphibole.



118-735B-16R-1

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1-3H

Massive Metagabbro

Pieces 1-2B (top)

COLOR: Dark gray.
LAYERING: None.
DEFORMATION: Foliation very weak.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 35-40%.
 Crystal size: < 1-5 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Lenses aligned in foliation.
 Percent replacement: Not determined.

Clinopyroxene—Mode: 35-40%.
 Crystal size: < 1-5 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Grains and clasts subparallel to foliation.
 Percent replacement: Amphibole replacement.

SECONDARY MINERALOGY:
 Total percent: 30%.
 Texture: Amphibole after clinopyroxene, some albitic plagioclase.
 Percent vein material: Not determined.
 Vein material: Very dark to black fracture filling amphibole.

COMMENTS: Piece 2A: Slightly more altered than Pieces 1 or 2B.
 Piece 2B: Porphyroclastic texture at bottom and top of the piece.
 Pieces 1 and 2A-2B: Albitized zones at 8-20 and 39-46 cm.

Porphyroclastic Metagabbro

Pieces 2B (bottom)-3H

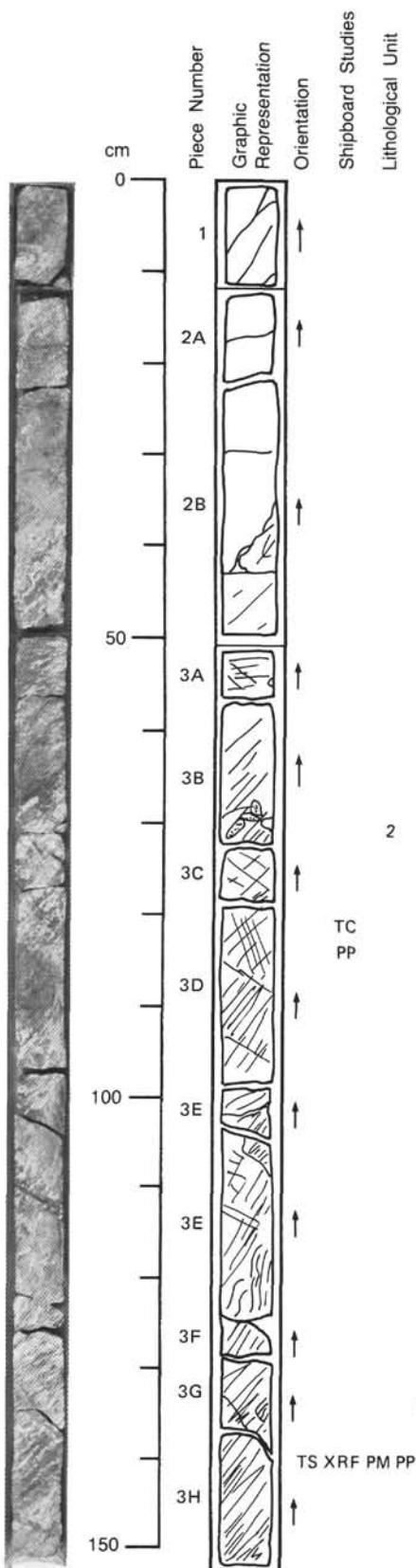
COLOR: Dark gray to green gray.
LAYERING: None.
DEFORMATION: Porphyroclastic, moderate to well-developed foliation defined by amphibole alignment and porphyroclasts—gneissic in lower part.

PRIMARY MINERALOGY:
 Plagioclase—Mode: 40%-50%.
 Crystal size: < 1-5 mm.
 Crystal shape: Anhedral, elongate.
 Preferred orientation: Aligned foliation.
 Percent replacement: Various, neoblasts of plagioclase.

Clinopyroxene—Mode: 40%-50%.
 Crystal size: 1.5 cm porphyroclasts at 67 cm (bronze hue).
 Crystal shape: Anhedral, elongate.
 Preferred orientation: Elongate in foliation.
 Percent replacement: Amphibole after clinopyroxene variously; freshest intervals at 62-64, 85-92, and 101-108 cm.

SECONDARY MINERALOGY:
 Total percent: 10%-90%.
 Texture: Greenish amphibole after clinopyroxene. White albitic plagioclase after calcic plagioclase.
 Late-stage amphibole veins perpendicular to foliation. Also fractures perpendicular to foliation with a little offset and drag along them.
 Percent vein material: Not determined.
 Vein material: Dark amphibole veins, almost perpendicular to foliation.

COMMENTS: 62-64, 85-92, and 101-108 cm—Fresh intervals.
 Piece 3D: Dark layer with reduced albitization.
 Pieces 3G-3H have a similar mineralogy but are more gneissic in texture with bands of plagioclase neoblasts and porphyroclasts alternating with bands of clinopyroxene porphyroclasts and amphibole after clinopyroxene.



CORE/SECTION

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1-11B

Poorly Foliated Metagabbros

Pieces 1, 4, 9, 11A, and 11B

COLOR: Greenish gray.
LAYERING: None.
DEFORMATION: Pyroxene crystals are flattened into foliation planes that vary from weakly to well defined. Grain size variation 1 cm and in some places granulated to 2-3 mm.
 Pieces 11A (top and middle), 9 (base), and 11B: Well-foliated.

PRIMARY MINERALOGY:
 Clinopyroxene—Mode: 60%.
 Crystal size: 2-10 mm.
 Crystal shape: Subhedral.
 Preferred orientation: Weak.
 Percent replacement: 20%.

Plagioclase—Mode: 40%.
 Crystal size: 5-10 mm.
 Crystal shape: Subhedral.
 Preferred orientation: Weak.
 Percent replacement: 50%.

Opagues—Mode: Trace.
 Crystal size: <1 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: 50%.

SECONDARY MINERALOGY:
 Total percent: 50%.
 Texture: Green hornblende pseudomorphs clinopyroxene, magnetite.
 Percent vein material: 2%-3%.
 Vein material: Late-stage veins cut the foliation at a high angle. Undeformed.

F: 10-50°

F: 10°

F: 30°

F: 0°

2

Porphyroclastic Metagabbro

Pieces 2, 3, 6A-7, 10A, and 10B

COLOR: Dark green to grayish white.
LAYERING: Not observed.
DEFORMATION: Flattening of plagioclase and pyroxene into foliation planes. Grain size varies from 3 mm to 2 cm. Piece 10A: Local thin bands, 3 mm, of plagioclase are developed.

PRIMARY MINERALOGY:
 Plagioclase—Mode: 60%.
 Crystal size: 3-20 mm.
 Crystal shape: Lens.
 Preferred orientation: Yes.
 Percent replacement: 50%.

Clinopyroxene—Mode: 40%.
 Crystal size: Not determined.
 Crystal shape: Anhedral.
 Preferred orientation: Yes.
 Percent replacement: 20% replaced by amphibole.

Opagues—Mode: Trace.
 Crystal size: <1 mm.
 Crystal shape: Granular.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

SECONDARY MINERALOGY:
 Total percent: 30%-50%.
 Texture: Green amphibole pseudomorphs clinopyroxene.
 Iron hydroxides replace ilmenite.
 Percent vein material: 5%.
 Vein material: Veins filled by green amphibole.
 Piece 7: Local veins filled by pyrite.

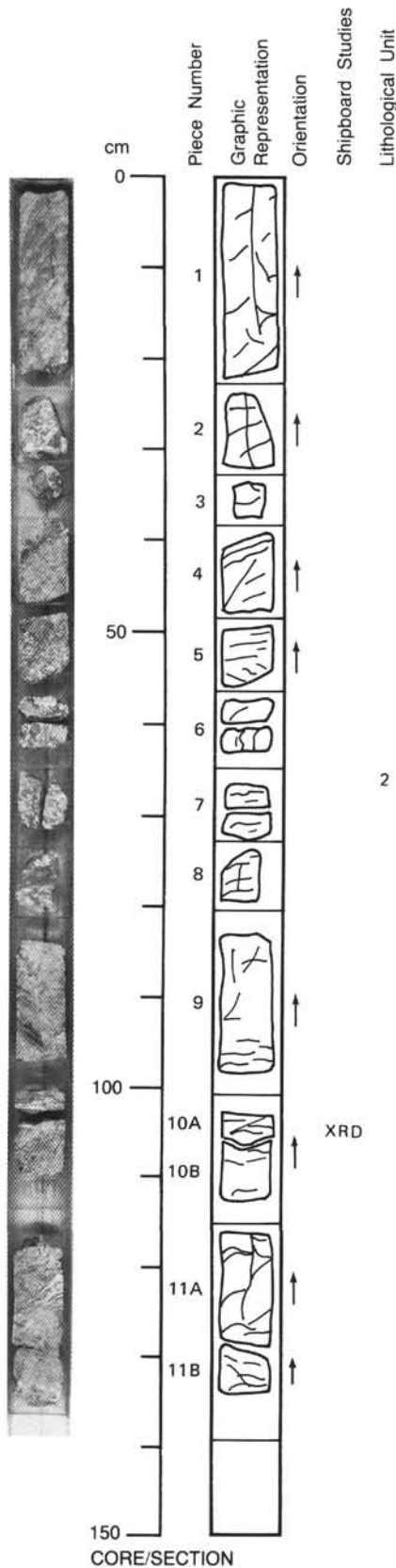
F: 0°

F: 10°

F: 0°

F: 0-35°

COMMENTS: Part of Piece 10A is gneissic.



150
CORE/SECTION

118-735B-16R-2 (continued)

Well-Foliated Metagabbro**Pieces 5 and 8**

COLOR: Dark green.

LAYERING: No.

DEFORMATION: Pyroxene and plagioclase are strongly aligned into foliation planes.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%.

Crystal size: 2-20 mm.

Crystal shape: Lens.

Preferred orientation: Yes.

Percent replacement: Not determined.

Clinopyroxene—Mode: 50%.

Crystal size: <2 cm.

Crystal shape: Lens.

Preferred orientation: Yes.

Percent replacement: Not determined.

Opaques—Mode: Trace.

Crystal size: <1 mm.

Crystal shape: Granular.

Preferred orientation: Yes.

Percent replacement: Not determined.

SECONDARY MINERALOGY:

Total percent: 30-50%.

Texture: Green amphibole replaces clinopyroxene.

Iron hydroxides replace opaques.

Percent vein material: 3%.

Vein material: Amphibole veins cut the foliation plane at a high angle.

118-735B-16R-3

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1A-17

Poorly Foliated Olivine-Bearing Metagabbro

Pieces 1A and 1B

F:28°

COLOR: Gray.
LAYERING: None.
DEFORMATION: Slight foliation. Elongation of pyroxene and plagioclase. Prominent foliation in top 3 cm. Moderate foliation in bottom.

PRIMARY MINERALOGY:
 Plagioclase—Mode: 40%-50%.
 Crystal size: 2-3 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Weakly aligned in foliation.
 Percent replacement: Replacement by albite.

Clinopyroxene—Mode: 40%-50%.
 Crystal size: 2-3 mm.
 Crystal shape: Anhedral, elongate.
 Preferred orientation: In foliation.
 Percent replacement: Replacement by amphibole.

Olivine—Mode: 8%.
 Crystal size: 1-5 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Not determined.
 Percent replacement: 80%-100% replacement by talc, hematitic pseudomorphs.

SECONDARY MINERALOGY:
 Total percent: 10% (central portion)—80% (upper end).
 Texture: Amphibole replacing pyroxene and albitic plagioclase replacing plagioclase.
 Percent vein material: Not determined.
 Vein material: Not determined.

F:40°

Foliated to Poorly Foliated Amphibolitized Metagabbro

Pieces 2-17

COLOR: Grayish white to greenish gray.
LAYERING: None.
DEFORMATION: Slight to well-developed foliation, especially pronounced in Pieces 4B-6; foliation defined by aligned amphibole crystals.

PRIMARY MINERALOGY:
 Plagioclase—Mode: Up to 30% relict, 40%-50% original.
 Crystal size: 1-5 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Elongate in foliation.
 Percent replacement: Extensive albitization—20%-30% total.

Clinopyroxene—Mode: up to 10% fresh—40%-50% original.
 Crystal size: 1-5 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Aligned in foliation.
 Percent replacement: Extensively amphibolitized.

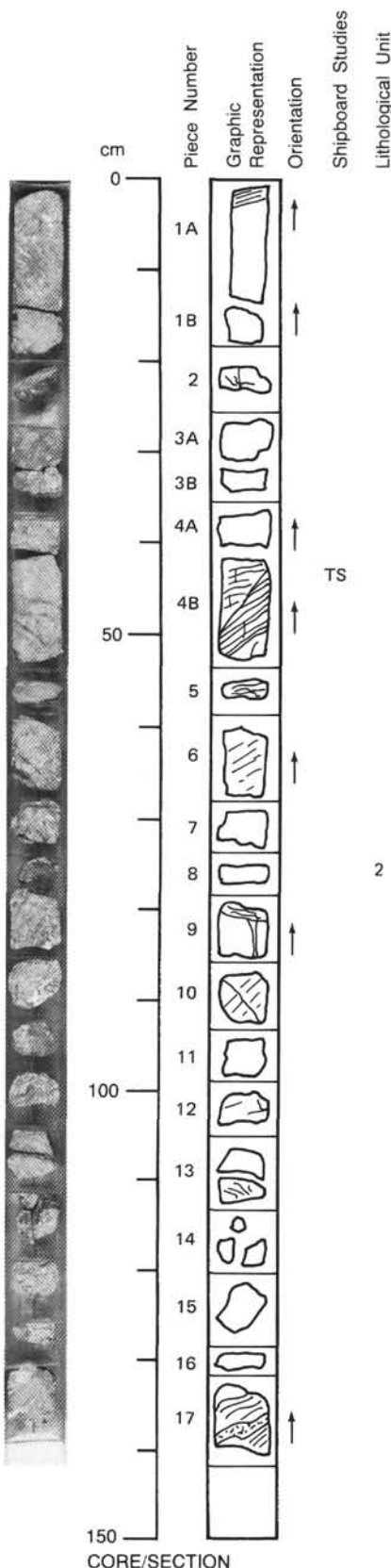
SECONDARY MINERALOGY:
 Total percent: In parts, almost 100%.
 Texture: Green to green-black, massive to foliated amphibole replacing clinopyroxene—grains up to 4 mm, anhedral. Piece 13: Minor altered olivine. 20%-30% white, anhedral albitic plagioclase fills a near-vertical vein in Piece 9.
 Percent vein material: Not determined.
 Vein material: Piece 4B: Yellowish epidote(?) in near-vertical late fractures.
 Piece 7: 20%-30% anhedral (sometimes elongate) albitic plagioclase crystals fill vertical vein. 3% late veins, near-vertical, filled with chlorite, amphibole, and pyrite.

COMMENTS: Piece 4B: Has a 15° foliation in its least altered upper section cut by a steeply dipping amphibolitized zone with a strong 63° foliation.

Piece 16: Small mylonitic zone.
 Piece 17: Most of piece is mylonitized with extensive amphibolization—the upper corner includes a massive albite-amphibole metagabbro.

Pieces 9 and 10: Contain an aplite pod with a hornblende rich margin.

F:36°



118-735B-16R-4

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1-8

Mylonitized Metagabbro

Pieces 1-C (0-40 cm)

COLOR: Gray.
LAYERING: No igneous layering present.
DEFORMATION: Fine-grained foliated mylonite with occasional rolled augen of clinopyroxene 2-10 mm and coherent bands of stretched and recrystallized feldspar alternating with bands of green-gray recrystallized clinopyroxene and amphibole. Dips at 30° on average.

PRIMARY MINERALOGY:
 Plagioclase—Mode 60%.
 Crystal size: < 1 mm.
 Crystal shape: Anhedral.
 Preferred orientation: In plane of foliation.
 Percent replacement: 20% by secondary plagioclase.

Clinopyroxene—Mode: 38%.
 Crystal size: < 1 mm.
 Crystal shape: Anhedral.
 Preferred orientation: In plane of foliation.
 Percent replacement: 55% by amphibole.

Olivine—Mode: 1%.
 Crystal size: < 1 mm.
 Crystal shape: Anhedral.
 Preferred orientation: In plane of foliation.
 Percent replacement: 100% by talc and clay minerals.

Iron-titanium-oxides—Mode: < 1%.
 Crystal size: Not determined.
 Crystal shape: Anhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

SECONDARY MINERALOGY:
 Total percent: Not determined.
 Texture: Amphibole along foliation and rimming clinopyroxene.
 Olivine altered to talc + clay minerals.
 Percent vein material: 0%.
 Vein material: Not present.

F:30°

PP

2

TS PM PP

F:35°

Olivine Gabbro

Pieces 2C-3 (40-54 cm)

COLOR: Gray.
LAYERING: No primary layering.
DEFORMATION: Weakly shaped fabric locally developed.

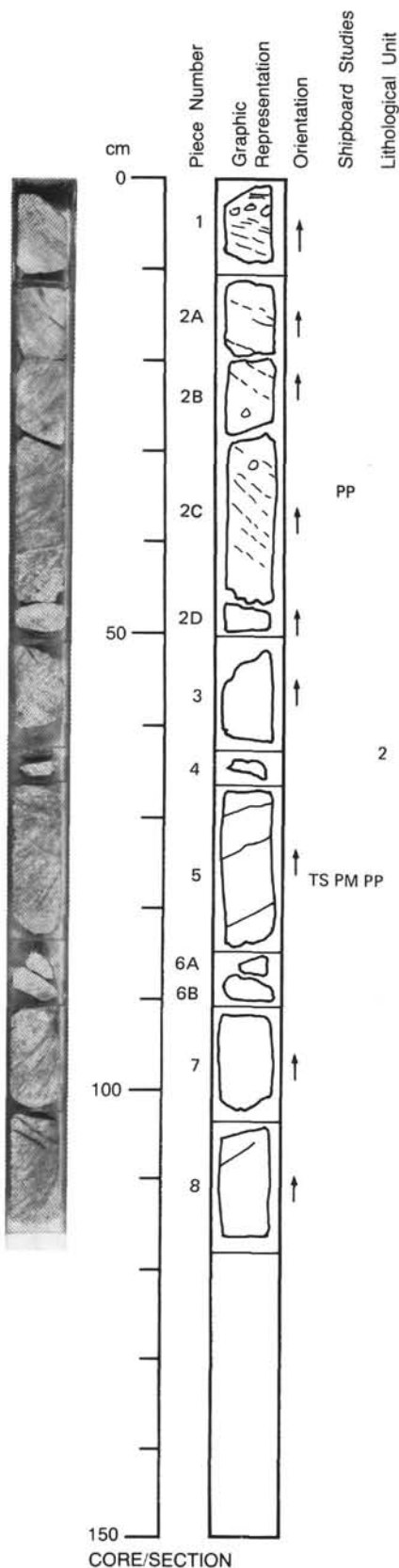
PRIMARY MINERALOGY:
 Plagioclase—Mode: 65%.
 Crystal size: 5-10 mm.
 Crystal shape: Subhedral granular.
 Preferred orientation: Usually absent, weak elongation locally present.
 Percent replacement: Not determined.

Clinopyroxene—Mode: 33%.
 Crystal size: 5-10 mm.
 Crystal shape: Subhedral granular.
 Preferred orientation: Usually absent, weak elongation locally present.
 Percent replacement: Not determined.

Olivine—Mode: 2%.
 Crystal size: 5-10 mm.
 Crystal shape: Subhedral granular.
 Preferred orientation: Usually absent.
 Percent replacement: Not determined.

SECONDARY MINERALOGY:
 Total percent: 30%.
 Texture: Amphibole rimming and replacing pyroxene.
 Talc replacing olivine and occurring as pale green irregular vein in groundmass up to 2 mm thick. Piece 2D: Plagioclase locally stained orange and altered milky white.
 Percent vein material: < 1%.
 Vein material: Talc or smectite.

COMMENTS: Gabbro/mylonite contact dips 32°.



CORE/SECTION

Feebly Foliated Metagabbro**Pieces 3-8 (54-117 cm)**

COLOR: Gray.

LAYERING: No primary layering.

DEFORMATION: Weak foliation dipping 35°.

PRIMARY MINERALOGY:

Plagioclase—Mode: 60%.

Crystal size: Less than 4 mm.

Crystal shape: Subhedral to euhedral.

Preferred orientation: Weak elongation in foliation plane.

Percent replacement: 0%.

Clinopyroxene—Mode: 36%.

Crystal size: Less than 8 mm.

Crystal shape: Interstitial anhedral forming oikocrysts locally.

Preferred orientation: None evident except for locally weak elongation in plane of foliation.

Percent replacement: 70%.

Olivine—Mode: 4%.

Crystal size: Not determined.

Crystal shape: Not determined.

Preferred orientation: Not determined.

Percent replacement: Not determined.

SECONDARY MINERALOGY:

Total percent: Not determined.

Texture: Amphibole rimming and replacing pyroxene. Talc replacing olivine.

Percent vein material: Not determined.

Vein material: Not determined.

COMMENTS: Individual grains of plagioclase and pyroxene show a weakly shaped anisotropy parallel to foliation with occasional zones of finer-grained mylonitic to gneissic (weak) material intervening. Clinopyroxene encloses euhedral plagioclase.

18-735B-16R-5

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1A-2B

Porphyroclastic Metagabbro with Mylonitic Bands

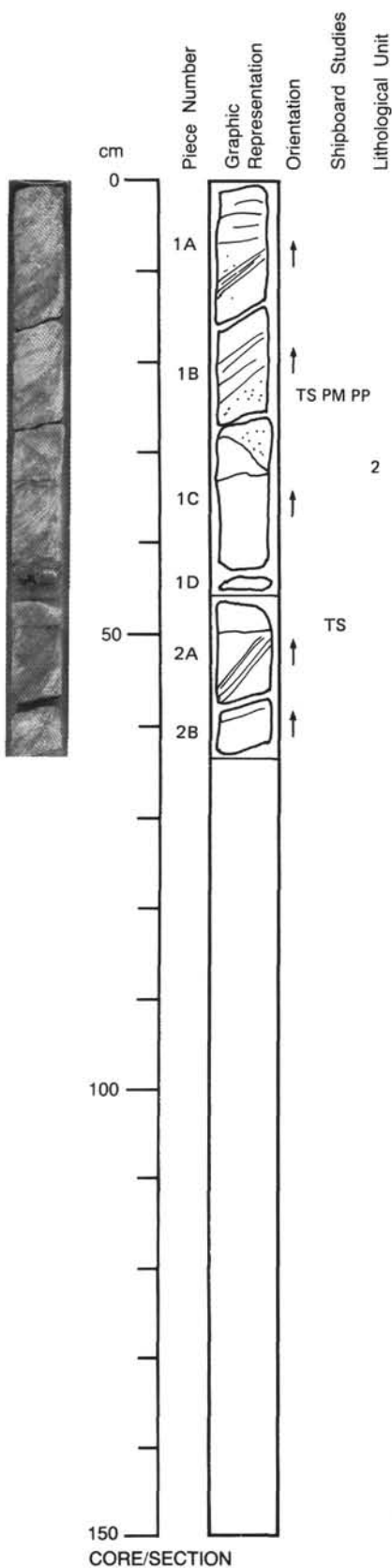
Pieces 1A-2B

COLOR: Dark gray.
LAYERING: None.
DEFORMATION: Foliation weakly developed, especially in Piece 1C.
 Pieces 1A, 1B, and 2A: Well-foliated metagabbro—porphyroclastic to mylonitic.
 Lower part of Piece 1B and upper part of Piece 1C are finer-grained.

PRIMARY MINERALOGY:
 Plagioclase—Mode: 50%-60%.
 Crystal size: 1-4 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Not determined.
 Percent replacement: Slight.

Clinopyroxene—Mode: 45%.
 Crystal size: 1-4 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Not determined.
 Percent replacement: Slight.

SECONDARY MINERALOGY:
 Percent replacement: Not determined.
 Texture: Amphibole and albite replacement.
 Percent vein material: Not determined.
 Vein material: Not determined.



118-735B-17R-1

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1-6

Massive Olivine-Bearing Gabbro

Pieces 1-6

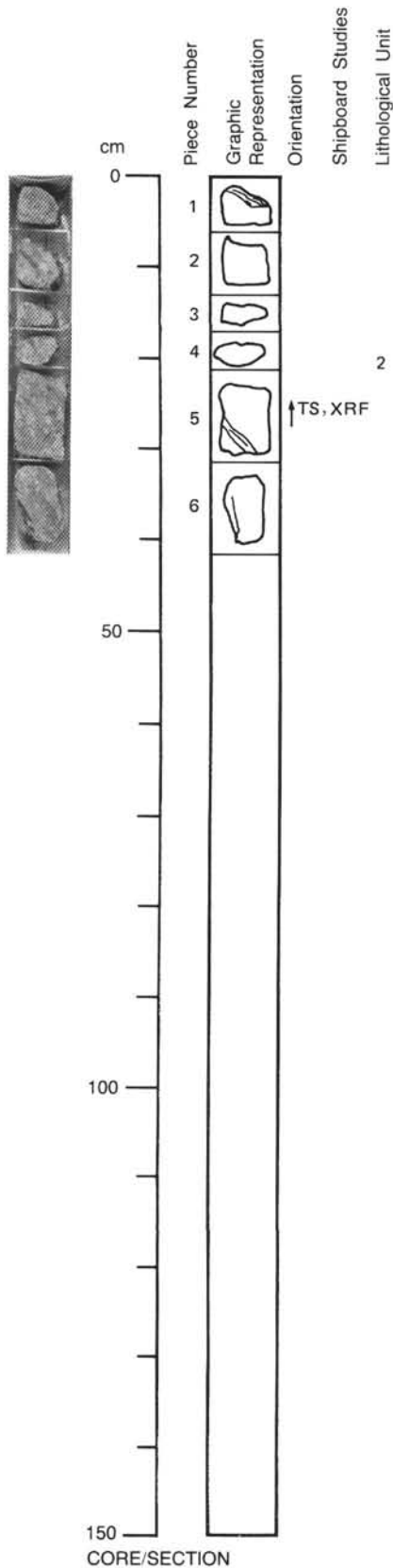
COLOR: Gray.
LAYERING: None.
DEFORMATION: 30°-60° from vertical, although not oriented—elongation of pyroxene and plagioclase—relatively little alteration to amphibole and albite. Looks like some cataclasis of plagioclase in places in more massive samples.
 Pieces 1 and 5: 1-2 cm shear zones.

PRIMARY MINERALOGY:
 Clinopyroxene—Mode: 50%.
 Crystal size: 3-10 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: Some replacement by amphibole.

Plagioclase—Mode: 45%-50%.
 Crystal size: 3-10 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: A few with whitish bands or cores—fractures, perhaps albitized.

Olivine—Mode: 2%.
 Crystal size: 1-4 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: Altered and veined by dark green assemblages—serpentine, amphibole(?).

SECONDARY MINERALOGY:
 Total percent: 10%-20%.
 Texture: Talc + tremolite + chlorite after olivine in meshwork.
 Dark green amphibole after clinopyroxene.
 Percent vein material: <1%.
 Vein material: Piece 6: Amphibole fills near vertical vein, <1 mm wide.



118-735B-18R-1

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1-19

Mylonitic Metagabbro

Pieces 1 and 3

F:30°

COLOR: Medium greenish gray.
LAYERING: None.
DEFORMATION: Piece 1: Strong mylonitic deformation (30°).
PRIMARY MINERALOGY:
 Plagioclase—Mode: 60%.
 Crystal size: Up to 4 cm.
 Crystal shape: Not determined.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

Clinopyroxene—Mode: 40%.
 Crystal size: Porphyroclasts up to 1 cm.
 Crystal shape: Not determined.
 Preferred orientation: Not determined.
 Percent replacement: Replaced by amphibole.

SECONDARY MINERALOGY:
 Total percent: Not determined.
 Texture: Amphibole replacing clinopyroxene and occurring in veinlets in plagioclase-rich portions. Relatively high content of amphibole (up to 20%).
 Percent vein material: Not determined.
 Vein material: Amphibole.

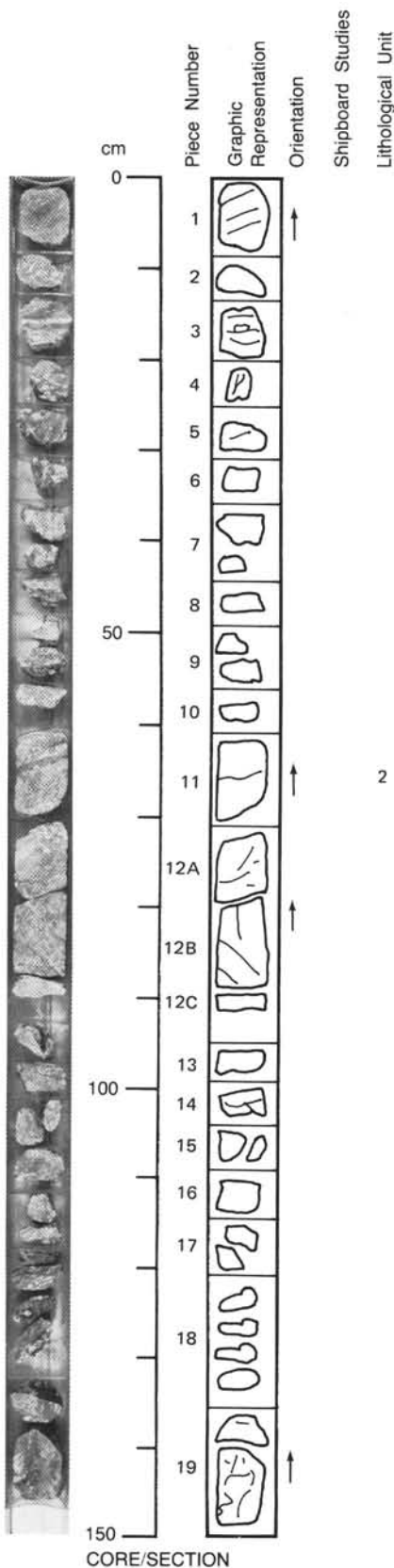
Porphyroclastic Metagabbro

Pieces 2, 4, and 5

COLOR: Medium greenish gray.
LAYERING: No primary layering.
DEFORMATION: Foliation defined by plagioclase and amphibole stretching.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 50%.
 Crystal size: Up to 1.5 cm.
 Crystal shape: Anhedral.
 Preferred orientation: Stretched.
 Percent replacement: Not determined.

Clinopyroxene—Mode: 50%.
 Crystal size: Up to 1.5 cm.
 Crystal shape: Anhedral.
 Preferred orientation: Stretched.
 Percent replacement: Up to 100%.

SECONDARY MINERALOGY:
 Total percent: 20%.
 Texture: Clinopyroxene almost completely replaced by amphibole.
 Percent vein material: Not determined.
 Vein material: Not determined.



CORE/SECTION

118-735B-18R-1 (continued)

Weakly Follated Metagabbro (with Minor Porphyroclastic Bands)

Pieces 6-19

COLOR: Medium greenish gray.

LAYERING: No primary layering.

DEFORMATION: Foliation defined by stretched plagioclase and clinopyroxene (partially replaced by amphibole).

PRIMARY MINERALOGY:

Plagioclase—Mode: 55%.

Crystal size: Up to 1 cm.

Crystal shape: Anhedra.

Preferred orientation: Stretched.

Percent replacement: Not determined.

Clinopyroxene—Mode: 45%.

Crystal size: Up to 1 cm.

Crystal shape: Anhedra.

Preferred orientation: Stretched.

Percent replacement: 10% by amphibole.

Olivine—Mode: Trace.

Crystal size: Up to 1 cm.

Crystal shape: Anhedra.

Preferred orientation: Stretched.

Percent replacement: Completely replaced.

SECONDARY MINERALOGY:

Total percent: 15%.

Texture: Clinopyroxene partially to almost completely replaced by amphibole (Pieces 17 through 19 most altered).

Olivine replaced by serpentine or chlorite(?).

Percent vein material: Veining ubiquitous.

Vein material: Amphibole, inclination about 40° on Pieces 1 through 3.

118-735B-18R-2

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1-17

Mylonitic to Porphyroclastic Metagabbro

Pieces 4, 5, 6B, 8, 9A, and 10-13

COLOR: Greenish gray to white.
LAYERING: No igneous layering.
DEFORMATION: Porphyroclasts of clinopyroxene (amphibolitized) and plagioclase. Foliation 10° to 40°. Pieces 4, 7, 8, and 11. Strongly mylonitized.

PRIMARY MINERALOGY:
 Plagioclase—Mode: 40%-60%.
 Crystal size: Up to 2 cm.
 Crystal shape: Anhedral.
 Preferred orientation: Stretched.
 Percent replacement: Not determined.

Clinopyroxene—Mode: 60%-40%.
 Crystal size: Up to 2 cm.
 Crystal shape: Anhedral.
 Preferred orientation: Stretched.
 Percent replacement: Up to 100%.

SECONDARY MINERALOGY:
 Total percent: 15%.
 Texture: Clinopyroxene partially to almost completely replaced by amphibole. Plagioclase partially replaced by albite.
 Percent vein material: Not determined.
 Vein material: Minor amphibole veinlets inclining (60°-80°).

COMMENTS: Ratio of plagioclase to clinopyroxene varies. Pieces 4 and 10: Fine-grained amphibolitic layers.

F: 50°

2

Weakly Foliated Metagabbro

Pieces 1-3, 6A, 9B, 14, and 17

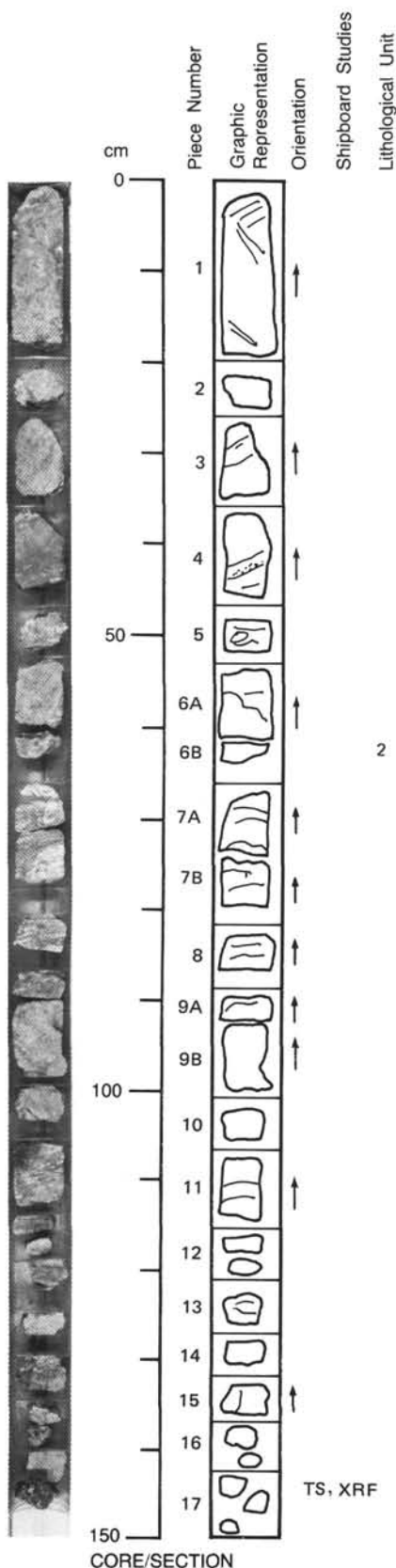
COLOR: Greenish gray.
LAYERING: No primary layering.
DEFORMATION: Shear bands in almost undeformed rock. Width of shear band, 0.5-1 cm, 5° inclination.

PRIMARY MINERALOGY:
 Plagioclase—Mode: 55%.
 Crystal size: Up to 2 cm.
 Crystal shape: Euhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

Clinopyroxene—Mode: 43%.
 Crystal size: Up to 1 cm.
 Crystal shape: Subhedral to anhedral.
 Preferred orientation: Not determined.
 Percent replacement: < 10%.

Olivine—Mode: 2%.
 Crystal size: Up to 1 cm.
 Crystal shape: Subhedral to anhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

SECONDARY MINERALOGY:
 Total percent: 10%.
 Texture: Clinopyroxene replaced by amphibole (< 10%).
 Olivine partially serpentinized. Plagioclase partially albitized.
 Percent vein material: Not determined.
 Vein material: Some amphibole containing veins.



CORE/SECTION

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1-13

Coarse-Grained Gabbro

Pieces 1 and 2

COLOR: Medium greenish gray.
LAYERING: No primary layering.
DEFORMATION: Shear bands at 70°.
PRIMARY MINERALOGY:
 Clinopyroxene—Mode: 50%.
 Crystal size: Up to 5 cm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: 5%-10% by amphibole.

Plagioclase—Mode: 48%.
 Crystal size: Up to 2 cm.
 Crystal shape: Subhedral.
 Preferred orientation: None.
 Percent replacement: Trace by albite(?).

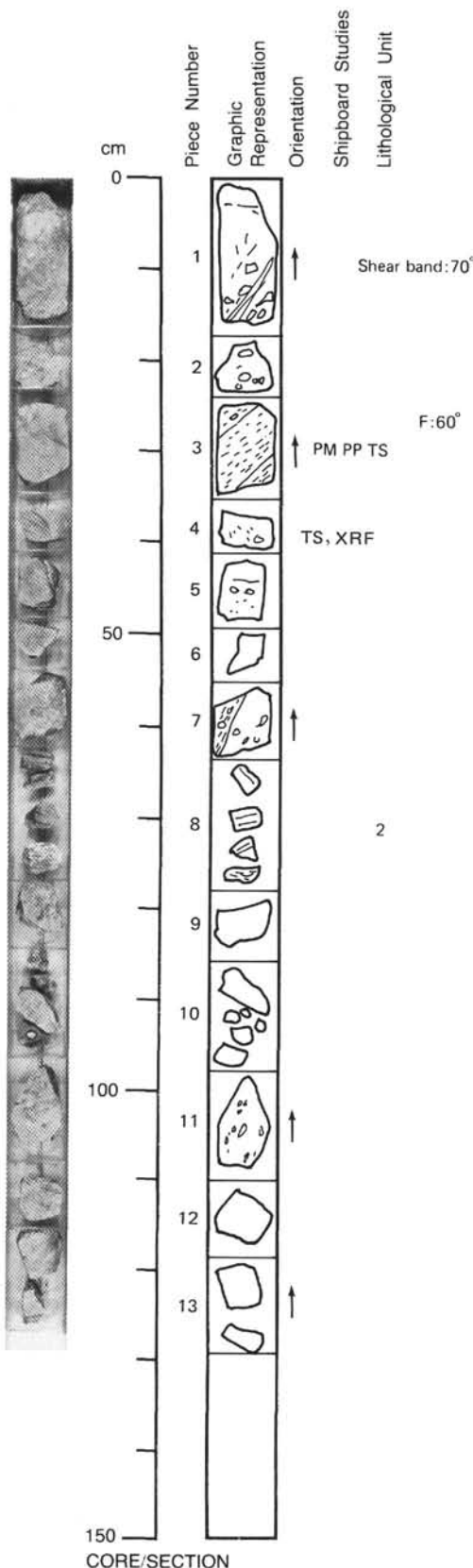
Olivine—Mode: 2%.
 Crystal size: Up to 1 cm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: (Not measured) by iron oxides and clay minerals.

SECONDARY MINERALOGY:
 Total percent: <10%.
 Texture: Clinopyroxene replaced by amphibole. Plagioclase replaced by albite. Olivine replaced by iron oxides and clay minerals.
 Percent vein material: None.
 Vein material: None.

Fine-Grained Amphibolite (Metamorphosed Microgabbro, Intrusive Body?)

Pieces 3-6, and part of 7

COLOR: Medium greenish gray.
LAYERING: None.
DEFORMATION: Pieces 3 and 7: Weakly foliated, boundaries inclined at 60° as shown.
PRIMARY MINERALOGY:
 Not to be determined confidently. Grain size generally <0.5 mm; partially up to 2 mm.
SECONDARY MINERALOGY:
 Total percent: >60%.
 Texture: Amphibole probably replacing clinopyroxene and olivine.
 Percent vein material: 0%.
 Vein material: None.



150
CORE/SECTION

118-735B-18R-3 (continued)

Porphyroclastic Metagabbro**Piece 8****COLOR:** Medium greenish gray.**LAYERING:** No primary layering.**DEFORMATION:** Porphyroclastic. Foliation is defined by stretched plagioclase and amphibole.**PRIMARY MINERALOGY:**

Plagioclase—Mode: 60%.

Crystal size: Up to 2 cm.

Crystal shape: Anhedra.

Preferred orientation: Elongated parallel to foliation.

Percent replacement: Trace by chlorite.

Clinopyroxene—Mode: 39%.

Crystal size: Up to 0.8 cm.

Crystal shape: Anhedra.

Preferred orientation: Elongated parallel to foliation.

Percent replacement: Completely replaced by amphibole.

Olivine—Mode: 1%.

Crystal size: Up to 1 cm.

Crystal shape: Anhedra.

Preferred orientation: Elongated parallel to foliation.

Percent replacement: Replaced extensively by iron oxides and clay minerals.

SECONDARY MINERALOGY:

Total percent: Not determined.

Texture: Clinopyroxene almost completely replaced by amphibole.

Olivine replaced by iron oxides and clay minerals.

Percent vein material: None.

Vein material: None.

Coarse-Grained Metagabbro**Pieces 7 (part) and 9-13****COLOR:** Medium gray.**LAYERING:** No primary layering.**DEFORMATION:** Weak, partly feebly foliated.**PRIMARY MINERALOGY:**

Plagioclase—Mode: 50%.

Crystal size: Up to 1.5 cm.

Crystal shape: Subhedra.

Preferred orientation: None.

Percent replacement: Trace.

Clinopyroxene—Mode: 46%.

Crystal size: Up to 0.8 cm.

Crystal shape: Anhedra.

Preferred orientation: None.

Percent replacement: 5%-15% by amphibole.

Olivine—Mode: Up to 4%.

Crystal size: Up to 0.8 cm.

Crystal shape: Anhedra.

Preferred orientation: None.

Percent replacement: Replaced extensively by iron oxides and clay minerals.

SECONDARY MINERALOGY:

Total percent: <20%.

Texture: Amphibole (5%-15%), olivine replaced by iron oxides and clay minerals.

Percent vein material: Not determined.

Vein material: Not determined.

118-735B-19R-1

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1-15C

Foliated to Porphyroclastic Metagabbro

Pieces 1-15C

COLOR: White-greenish gray, with brownish pseudomorphs of olivine.

LAYERING: None.

DEFORMATION: Foliation, defined by stretched minerals. Piece 1 and 2 porphyroclastic.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%.

Crystal size: Up to 2 cm.

Crystal shape: Anhedral.

Preferred orientation: Elongated parallel to foliation.

Percent replacement: Not determined.

Clinopyroxene—Mode: 40%-45%.

Crystal size: Up to 2 cm.

Crystal shape: Anhedral.

Preferred orientation: Elongated parallel to foliation.

Percent replacement: Partly replaced by amphibole.

Olivine—Mode: 2%-8%.

Crystal size: Up to 1 cm.

Crystal shape: Anhedral.

Preferred orientation: Elongated parallel to foliation.

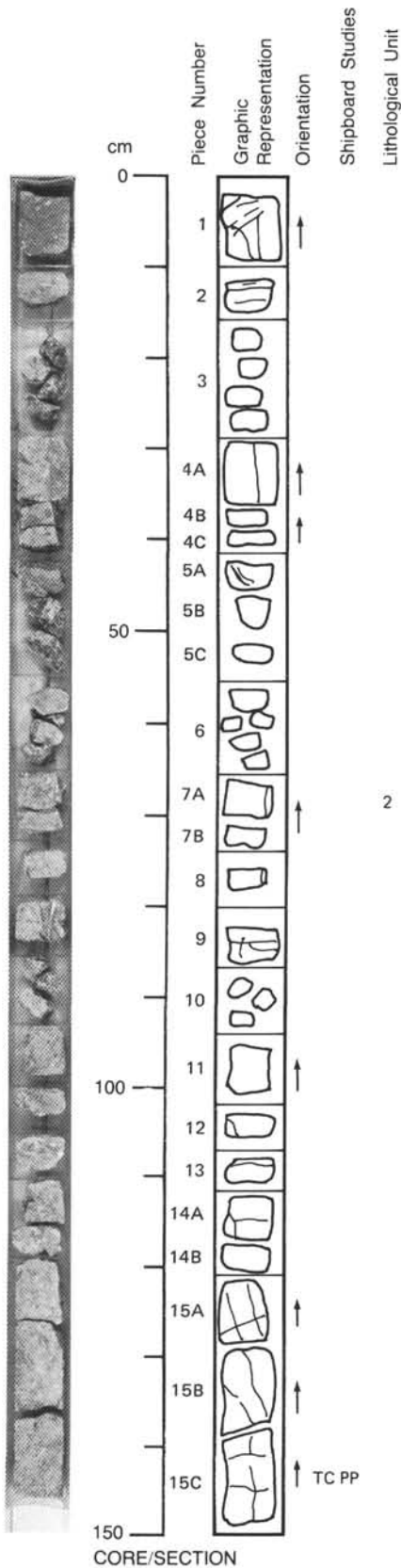
Percent replacement: Oxidized.

SECONDARY MINERALOGY:

Total percent: Not determined.

Texture: Moderate alteration. Olivine is oxidized, clinopyroxene is partly replaced by amphibole. Pieces 1 and 5A-5C show moderate low-temperature alteration, with clay minerals, iddingsite, epidote (?), and possibly prehnite.

Preferred orientation: Not determined.



118-735B-19R-2

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1-15

Weakly to Well-Foliated Metagabbro

Pieces 1-13

COLOR: Greenish gray with yellowish green part.
LAYERING: No layering except for local concentration of olivine.
DEFORMATION: Weakly foliated. Foliation is defined by stretched plagioclase and pyroxene grains, and inclines 30°.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%.
 Crystal size: Up to 2 cm.
 Crystal shape: Subhedral.
 Preferred orientation: Elongated parallel to foliation.
 Percent replacement: Trace (mostly recrystallized into tiny grains).

Clinopyroxene—Mode: 40%.
 Crystal size: Up to 2 cm.
 Crystal shape: Subhedral to anhedral.
 Preferred orientation: Elongated parallel to foliation.
 Percent replacement: 50%-90% by amphibole.

Olivine—Mode: 2%-7%.
 Crystal size: 1.5 cm.
 Crystal shape: Subhedral to anhedral.
 Preferred orientation: Not determined.
 Percent replacement: 100% oxidized and replaced by tremolite + mica + opaque mineral.

SECONDARY MINERALOGY:

Total percent: 70%-90%.
 Texture: Clinopyroxene is replaced by amphibole (amphibole 10%-15%). Olivine is oxidized.
 Pieces 1-3A and 5-13: Low-temperature alteration zone.
 Plagioclase is altered to sodic plagioclase. Olivine is altered into tremolite + mica + opaque mineral or is oxidized.
 Percent vein material: Trace.
 Vein material: Amphibole, 2-3 mm wide.

NOTES: Piece 7—Upper left is altered, but the lower right is relatively fresh and contains 1.5 cm olivine (7 vol%). The boundary is veined by amphibole.

Olivine-Bearing Gabbro

Pieces 14 and 15

COLOR: Gray.
LAYERING: None.
DEFORMATION: Upper portion is very slightly foliated. No penetrative deformation except for near-vertical, very thin (<0.2 mm) amphibole veins.

PRIMARY MINERALOGY:

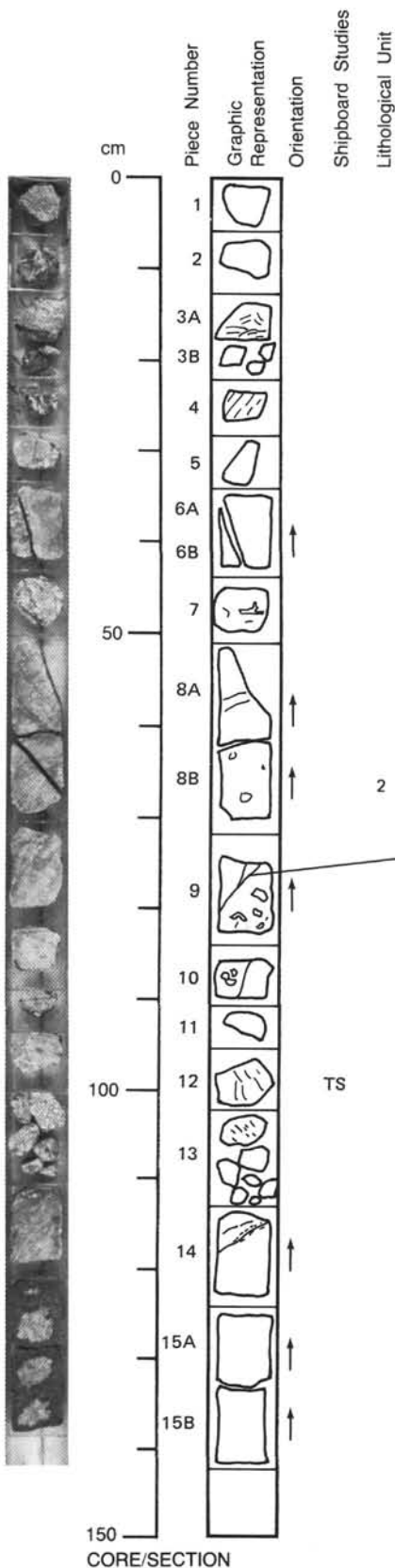
Plagioclase—Mode: 55%.
 Crystal size: Up to 2 cm.
 Crystal shape: Subhedral.
 Preferred orientation: None.
 Percent replacement: Not determined.

Clinopyroxene—Mode: 40%.
 Crystal size: Up to 1 cm.
 Crystal shape: Subhedral—anhedral.
 Preferred orientation: None.
 Percent replacement: Partly altered to amphibole.

Olivine—Mode: 3%.
 Crystal size: Up to 5 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: ?? to tremolite + mica + opaque aggregate.

SECONDARY MINERALOGY:

Total percent: Not determined.
 Texture: Olivine is altered.
 Percent vein material: Trace.
 Vein material: <0.2 mm near vertical veins filled with amphibole.



CORE/SECTION

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1-12

Gabbro

Piece 1

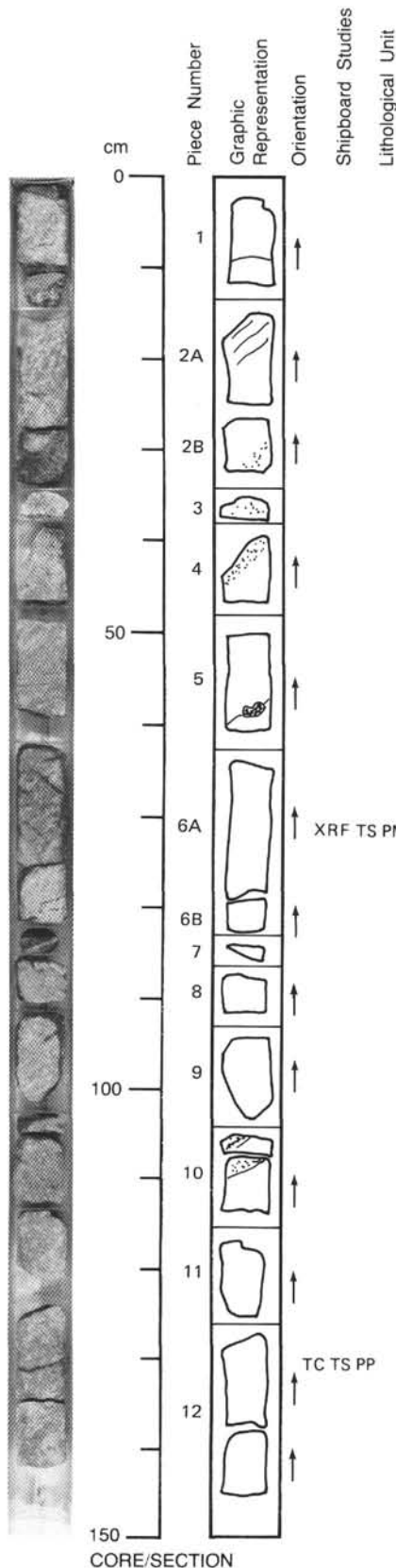
COLOR: Gray.
LAYERING: None.
DEFORMATION: Weak.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 60%.
 Crystal size: 2-6 mm.
 Crystal shape: Subhedral-euhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.
 Clinopyroxene—Mode: 40%.
 Crystal size: 2-6 mm.
 Crystal shape: Subhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

SECONDARY MINERALOGY:
 Total percent: 10%-20%.
 Texture: 10% amphibole replacing clinopyroxene and in veins.
 Percent vein material: Not determined.
 Vein material: Amphibole.

Porphyroclastic Gabbro

Pieces 2A-3, 5 (bottom), 10A, and 10B (top)

COLOR: Medium greenish gray.
LAYERING: No primary layering.
DEFORMATION: Porphyroclastic. Foliation is defined by stretched plagioclase and amphibole.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 60%.
 Crystal size: Up to 2 cm.
 Crystal shape: Anhedral.
 Preferred orientation: Elongated parallel to foliation.
 Percent replacement: Trace by chlorite.
 Clinopyroxene—Mode: 39%.
 Crystal size: Up to 0.8 cm.
 Crystal shape: Anhedral.
 Preferred orientation: Elongated parallel to foliation.
 Percent replacement: Completely replaced by amphibole.
 Olivine—Mode: 1%.
 Crystal size: Up to 1 cm.
 Crystal shape: Anhedral.
 Preferred orientation: Elongated parallel to foliation.
 Percent replacement: Replaced extensively by iron oxides and clay minerals.
SECONDARY MINERALOGY:
 Total percent: Not determined.
 Texture: Clinopyroxene almost completely replaced by amphibole. Olivine replaced by iron oxides and clay minerals.
 Percent vein material: None.
 Vein material: None.
COMMENTS: Piece 5: Opaque-rich zone (ilmenite?).



118-735B-19R-3 (continued)

Olivine-Bearing Gabbro**Pieces 4-9****COLOR:** Gray.**LAYERING:** None.**DEFORMATION:** Weak.**PRIMARY MINERALOGY:**

Plagioclase—Mode: 60%.

Crystal size: 2-32 mm.

Crystal shape: Subhedral-euhedral.

Preferred orientation: Not determined.

Percent replacement: Not determined.

Clinopyroxene—Mode: 38%.

Crystal size: 3-20 mm.

Crystal shape: Subhedral.

Preferred orientation: Not determined.

Percent replacement: 25% by amphibole.

Olivine—Mode: 2%.

Crystal size: 2-5 mm.

Crystal shape: Anhedral.

Preferred orientation: Not determined.

Percent replacement: 5% by talc, tremolite, and opaques.

SECONDARY MINERALOGY:

Total percent: 20%-30%.

Texture: Clinopyroxene altered to amphibole (25%). Olivine altered by talc + tremolite + opaques (5%).

Percent vein material: Not determined.

Vein material: Not determined.

Olivine Gabbro**Pieces 10B (bottom)-12****COLOR:** Gray.**LAYERING:** None.**DEFORMATION:** Weak.**PRIMARY MINERALOGY:**

Plagioclase—Mode: 60%.

Crystal size: 2-10 mm.

Crystal shape: Subhedral.

Preferred orientation: Not determined.

Percent replacement: Not determined.

Clinopyroxene—Mode: 25%-35%.

Crystal size: 2-12 mm.

Crystal shape: Subhedral.

Preferred orientation: Not determined.

Percent replacement: 15% by amphibole.

Olivine—Mode: 5%-15%.

Crystal size: 2-8 mm.

Crystal shape: Anhedral.

Preferred orientation: Not determined.

Percent replacement: 5% by talc, tremolite, and opaques.

SECONDARY MINERALOGY:

Total percent: 10%-20%.

Texture: Clinopyroxene replaced by amphibole (15%). Olivine altered to talc + tremolite + opaques (5%).

Percent vein material: Not determined.

Vein material: Not determined.

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1-16

Olivine Gabbro

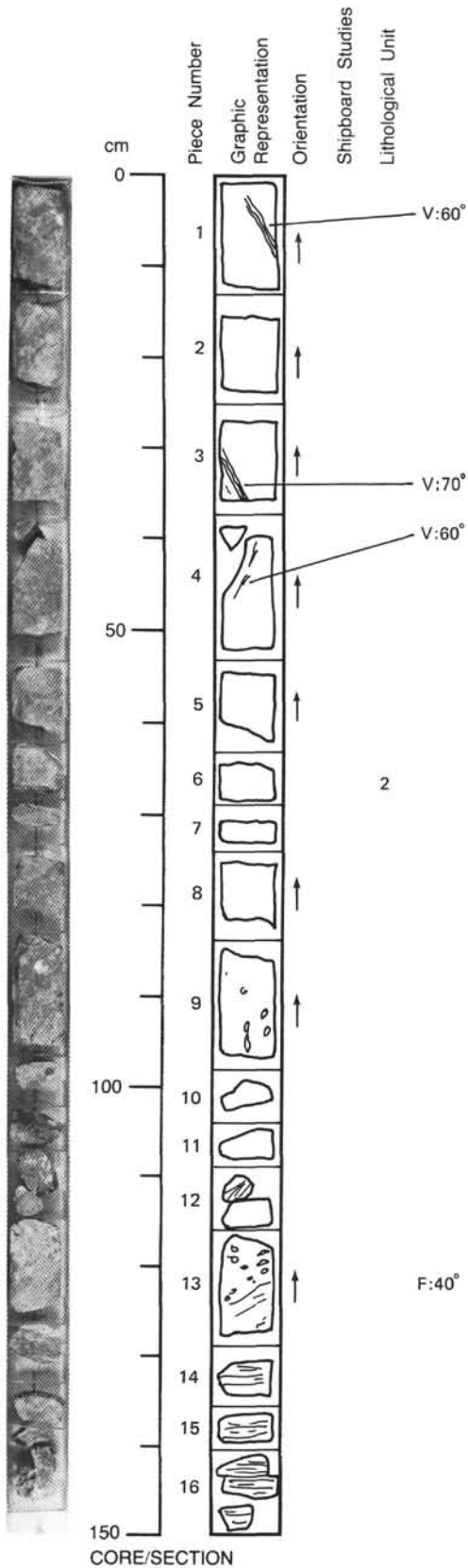
Pieces 1-10

COLOR: Gray, partly mottled with brown.
LAYERING: Not clear, but olivine concentrated (irregularly) locally.
DEFORMATION: Weak, slightly sheared along amphibole vein.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 50%.
 Crystal size: Up to 2.5 cm.
 Crystal shape: Euhedral-subhedral.
 Preferred orientation: None.
 Percent replacement: Trace.
 Clinopyroxene—Mode: 40%.
 Crystal size: Up to 2 cm.
 Crystal shape: Subhedral.
 Preferred orientation: None.
 Percent replacement: 30% with amphibole.
 Olivine—Mode: 5%-10%.
 Crystal size: Up to 1.5 cm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: 1% with tremolite + mica + opaque mineral.
SECONDARY MINERALOGY:
 Total percent: 30%.
 Texture: Clinopyroxene is partly replaced by amphibole.
 Olivine is replaced by tremolite + mica + opaque mineral from the margins.
 Pieces 1, 3, and 4: Amphibole-rich shear zones.
 Percent vein material: <3%.
 Vein material: Amphibole.

Weakly to Well-Foliated Porphyroclastic Metagabbro

Pieces 11-16

COLOR: Greenish gray.
LAYERING: None, except for oxide lenses.
DEFORMATION: Foliation is defined by stretched plagioclase and amphibole. Piece 12: Well foliated.
 Piece 13: Deformation weak. Piece 16: Mylonitic (one piece).
PRIMARY MINERALOGY:
 Plagioclase—Mode: 50%.
 Crystal size: Up to 2.5 cm.
 Crystal shape: Euhedral-subhedral.
 Preferred orientation: Elongated in plane of foliation.
 Percent replacement: Trace.
 Clinopyroxene—Mode: 40%.
 Crystal size: Up to 2 cm.
 Crystal shape: Subhedral.
 Preferred orientation: Elongated in plane of foliation.
 Percent replacement: Strongly altered to amphibole.
 Olivine—Mode: 5%-10% (7% in top of Piece 13).
 Crystal size: Up to 1.5 cm.
 Crystal shape: Anhedral.
 Preferred orientation: Elongated in plane of foliation.
 Percent replacement: Not determined.
SECONDARY MINERALOGY:
 Total percent: >20%-30%.
 Texture: Clinopyroxene is intensely replaced by amphibole.
 Grain size of amphibole is up to 1.5 cm. Magnetite-rich lenses parallel to foliation and in cracks.
 Percent vein material: Not determined.
 Vein material: Not determined.



CORE/SECTION

118-735B-19R-5

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1-17

Porphyroclastic Metagabbro

Pieces 1, 2, 6, and 7

COLOR: Greenish gray, mottled by brown.
LAYERING: None.
DEFORMATION: Not determined.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 65%.
 Crystal size: Up to 1 cm.
 Crystal shape: Subhedral.
 Preferred orientation: Not determined.
 Percent replacement: Altered to sodic plagioclase, epidote, and prehnite(?).

 Clinopyroxene—Mode: 40%.
 Crystal size: Up to 2 cm.
 Crystal shape: Subhedral.
 Preferred orientation: Not determined.
 Percent replacement: 10% to 20% by amphibole. Oxidized.

 Orthopyroxene—Mode: 5%.
 Crystal size: Up to 1 cm.
 Crystal shape: Anhedral-subhedral.
 Preferred orientation: Not determined.
 Percent replacement: Oxidized.
SECONDARY MINERALOGY:
 Total percent: > 20%-30%.
 Texture: Clinopyroxene is replaced by amphibole. Plagioclase is altered into albite and epidote and prehnite(?). Orthopyroxene is partly oxidized.
 Percent vein material: 4%.
 Vein material: Amphibole 1- to 7-mm-thick, inclining 30°-40°.
COMMENTS: Piece 1: opaque-rich part is present.

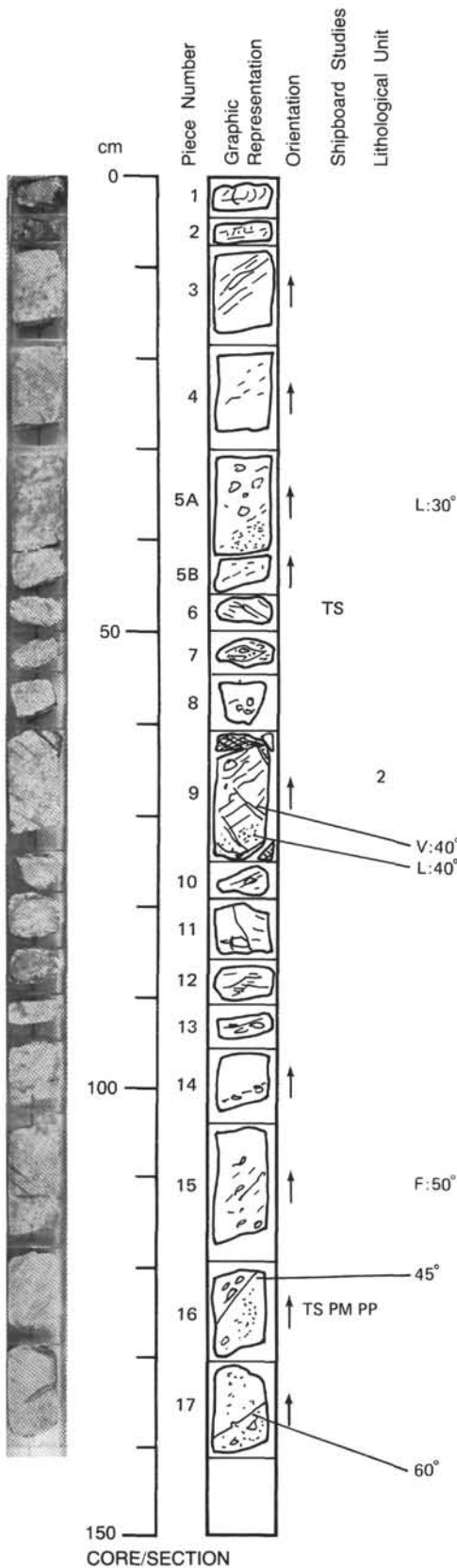
Olivine Gabbro: Weakly Foliated Gabbro

Pieces 3-5B, 8-16 (top), and 17 (bottom).

COLOR: Greenish gray mottled by brown.
LAYERING: In pieces 5 and 9, the layer boundaries defined by difference in grain size are present. The boundary inclines 30°-40° almost parallel to the foliation (magmatic?).
DEFORMATION: Faint foliation. Foliation is defined by elongate olivine and pyroxene grains.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 65%.
 Crystal size: Up to 1 cm.
 Crystal shape: Subhedral.
 Preferred orientation: Elongate parallel to layering.
 Percent replacement: Not measured; by sodic plagioclase, epidote, and prehnite(?).

 Clinopyroxene—Mode: 30%.
 Crystal size: Up to 2 cm.
 Crystal shape: Subhedral.
 Preferred orientation: Elongate parallel to layering.
 Percent replacement: Up to 50% by amphibole.

 Orthopyroxene—Mode: 5%.
 Crystal size: Up to 1 cm.
 Crystal shape: Anhedral-subhedral.
 Preferred orientation: Elongate parallel to layering.
 Percent replacement: >40% oxidized.
SECONDARY MINERALOGY:
 Total percent: Variable 10%-70%.
 Texture: Clinopyroxene is replaced by amphibole especially in altered zone (40-90 cm). Plagioclase is altered into albite and epidote and prehnite(?) in strongly altered part. Orthopyroxene is partly oxidized.
 Vein Material: Amphibole 1- to 7-mm-thick, inclining 30°-40°.
 Percent vein material: 4%.



118-735B-19R-5 (continued)

Metamorphosed Troctolite

Pieces 16 (bottom) and 17 (top)

COLOR: Greenish gray.

LAYERING: None. Sharply cuts the surrounding coarse-grained gabbro. The boundaries incline 40-45°.

DEFORMATION: No clear foliation.

PRIMARY MINERALOGY: Aphyric. Olivine phenocryst. 4 mm, ophitic intergrowth with plagioclase.

Replaced by talc + tremolite. Intergrown plagioclase (partially replaced by prehnite) and olivine (completely replaced by talc + tremolite).

SECONDARY MINERALOGY:

Total percent: Not determined.

Texture: See above.

Percent vein material: None.

Vein Material: None.

118-735B-20R-1

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1-3

Wehrlitic gabbro

Pieces 1-3

COLOR: Dark Gray.

LAYERING: None well-defined. One olivine-rich zone at 100-120 cm; 2-4 cm elongate lenses, with interstitial plagioclase and clinopyroxene.

DEFORMATION: Weak foliation defined by elongate pyroxene and plagioclase grains in pieces 2A, 2B, 2F, 2G, and 2H. Olivine lenses elongate in foliation. Foliation dips 30°-35°. Some deformation concentrated at boundaries of olivine-rich lenses. Piece 2F contains an oxide-rich horizon just above the olivine-rich horizon.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50% (10%-15% in olivine-rich lenses).

Crystal size: Up to 5 mm.

Crystal shape: Anhedral.

Preferred orientation: Not determined.

Percent replacement: Not determined.

Clinopyroxene—Mode: 40% (50%-60% in olivine-rich lenses).

Crystal size: Up to 4 mm.

Crystal shape: Anhedral.

Preferred orientation: Not determined.

Percent replacement: Some clayey alteration on rims.

Olivine—Mode: 10% (30%-35% in olivine-rich lenses)

Crystal size: Up to 3 mm.

Crystal shape: Anhedral.

Preferred orientation: Not determined.

Percent replacement: Some alteration to serpentine/clay.

SECONDARY MINERALOGY:

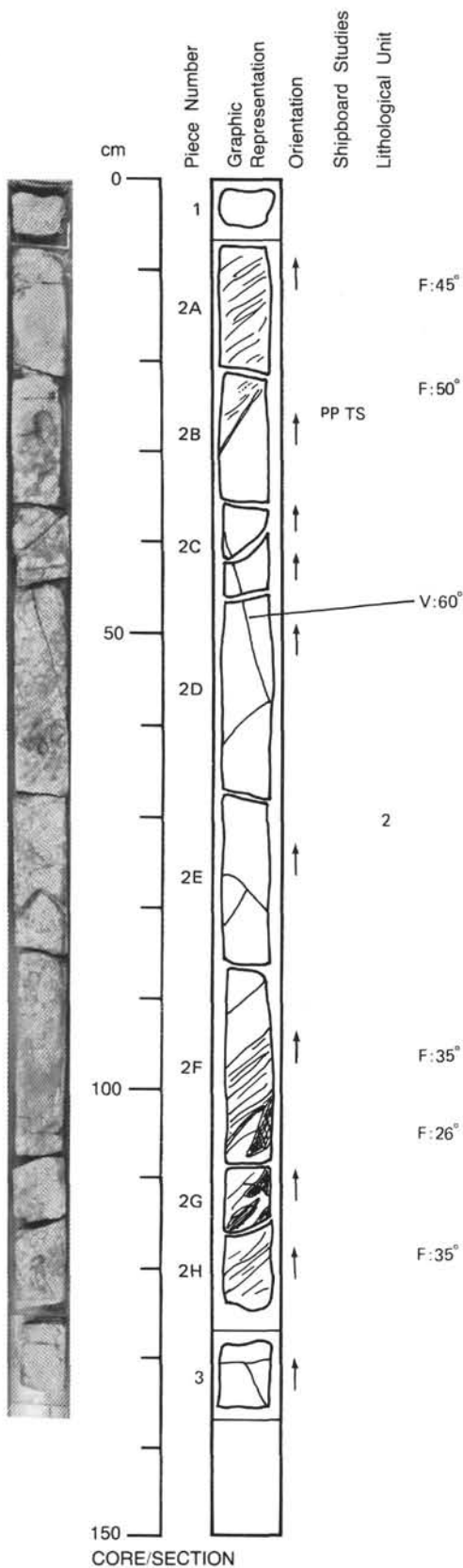
Total percent: 10%.

Texture: Clay after clinopyroxene. Some albitization and granulation of plagioclase; Mylonitic zones (on olivine-lens boundaries) are amphibolitized. Some hematitic veined fractures.

Percent vein material: 3%.

Vein material: Some 2-mm-wide veins parallel to amphibole foliation. Mostly amphibole in veins, also some albite and epidote.

COMMENTS: Similar to olivine-rich zone in upper part of Core 118-735-20R-2.



UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1A-6E

Foliated Olivine-Rich Gabbro

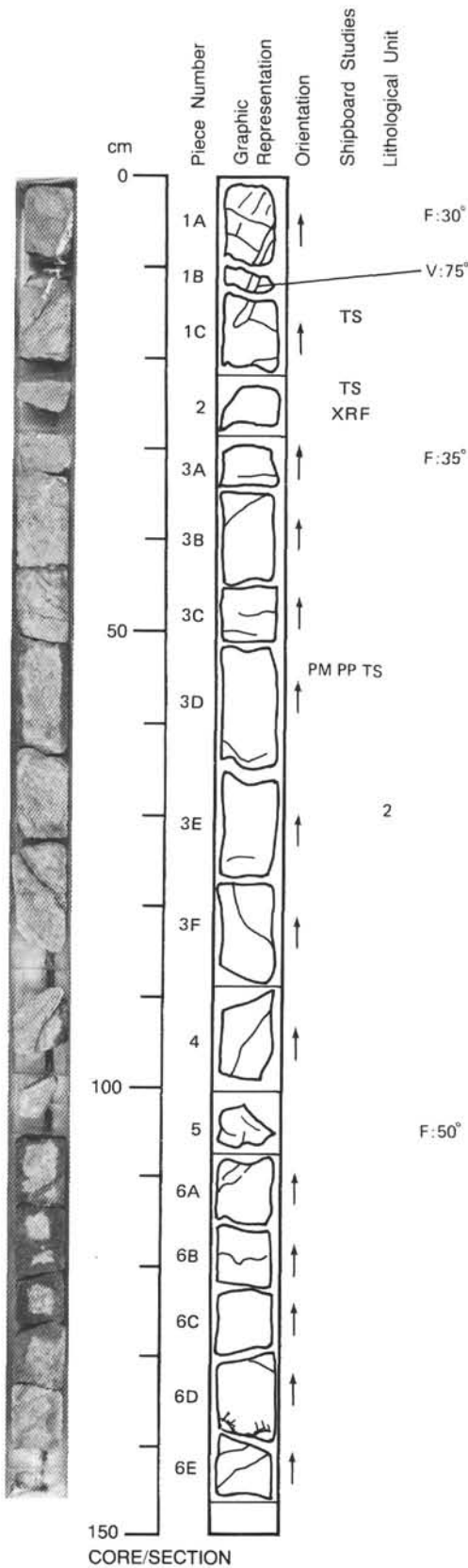
Pieces 1-3B (top)

COLOR: Yellow-green to dark green.
LAYERING: Present in Piece 3B, grain size and phase contact: 2-4 mm, olivine-rich vs. olivine-poor content is parallel to the foliation, dipping at 30°-35°, the whole olivine-rich gabbro layer is not totally recovered but is at least 20 cm thick. The contact is parallel to the foliation.
DEFORMATION: There is a clear foliation caused by flattening of olivine, plagioclase, and clinopyroxene grains. There is a fault plane in Piece 1C separating dark olivine gabbro and yellow-green olivine gabbro (coarser-grained).
PRIMARY MINERALOGY:
 Plagioclase—Mode: 40%-50%.
 Crystal size: 2-4 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Present.
 Percent replacement: Slight.
 Clinopyroxene—Mode: 30%-40%.
 Crystal size: 2-4 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Present.
 Percent replacement: Slight to moderate.
 Olivine—Mode: 10%-20%.
 Crystal size: <4 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Present.
 Percent replacement: Slight to moderate.
SECONDARY MINERALOGY:
 Total percent: Not determined.
 Texture: Black amphibole replacing clinopyroxene. Iron hydroxide and clay replacing olivine. Vein is filled by plagioclase (80%) and amphibole (20%).
 Percent vein material: Not determined.
 Vein material: Plagioclase (80%) and amphibole (20%).

Undeformed Olivine-Poor Gabbro

Pieces 3B (bottom)-6E

COLOR: Greenish gray.
LAYERING: No layering except in Piece 3A where a contact between olivine-rich and olivine-poor gabbro (downhole) is observed. (See description of Pieces 1-3B.)
DEFORMATION: Very faint foliation seen in Pieces 5 and 6A, flattening of pyroxene and plagioclase. Otherwise, the gabbro is undeformed.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 55%-58%.
 Crystal size: 1-3 mm.
 Crystal shape: Anhedral, recrystallized.
 Preferred orientation: Variable.
 Percent replacement: 50%.
 Clinopyroxene—Mode: 40%.
 Crystal size: 1-4 mm.
 Crystal shape: Euhedral.
 Preferred orientation: Variable.
 Percent replacement: Moderate to complete.
 Olivine—Mode: 2%-5%.
 Crystal size: Not recorded.
 Crystal shape: Anhedral.
 Preferred orientation: Variable.
 Percent replacement: Complete.
SECONDARY MINERALOGY:
 Total percent: Not determined.
 Texture: Amphibole replaces partially clinopyroxene, especially in deformed gabbros (Pieces 5 and 6A).
 Veins filled by green amphibole in Pieces 3B-3E, 4, 6A, and 6D and along fault plane in Piece 1C.
 Percent vein material: Not determined.
 Vein material: Fractures are filled by chlorite, carbonate, iron hydroxides (Pieces 3F and 4).



CORE/SECTION

118-735B-20R-3

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1A-4

Gabbro

Pieces 1A-3 (0-42 cm)

COLOR: Dark gray.

LAYERING: No primary igneous layering.

DEFORMATION: None in hand specimen.

PRIMARY MINERALOGY:

Plagioclase—Mode: 65%.
 Crystal size: 7 mm average
 Crystal shape: Anhedral granular.
 Preferred orientation: None.
 Percent replacement: Not determined.

Clinopyroxene—Mode: 33%.
 Crystal size: 7 mm average
 Crystal shape: Anhedral granular.
 Preferred orientation: None.
 Percent replacement: Extensive amphibole alteration.

Olivine—Mode: (2%) badly altered and difficult to positively identify.
 Crystal size: Not determined.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: Nearly 100%.

Iron-titanium Oxides—Mode: Trace.

SECONDARY MINERALOGY:

Total percent: Not determined.
 Texture: Amphibole is abundant, pseudomorphing and rimming primary clinopyroxene. It also occurs in several veins 0.1 to 1 mm thick. One vein, 4-mm-thick, contains a mixture of plagioclase and green amphibole.
 Percent vein material: Not determined.
 Vein material: Plagioclase and amphibole.

Gneissic and Mylonitized Metagabbro

Pieces 3 (bottom) and 4 (42-54 cm)

COLOR: Gray.

LAYERING: No primary layering.

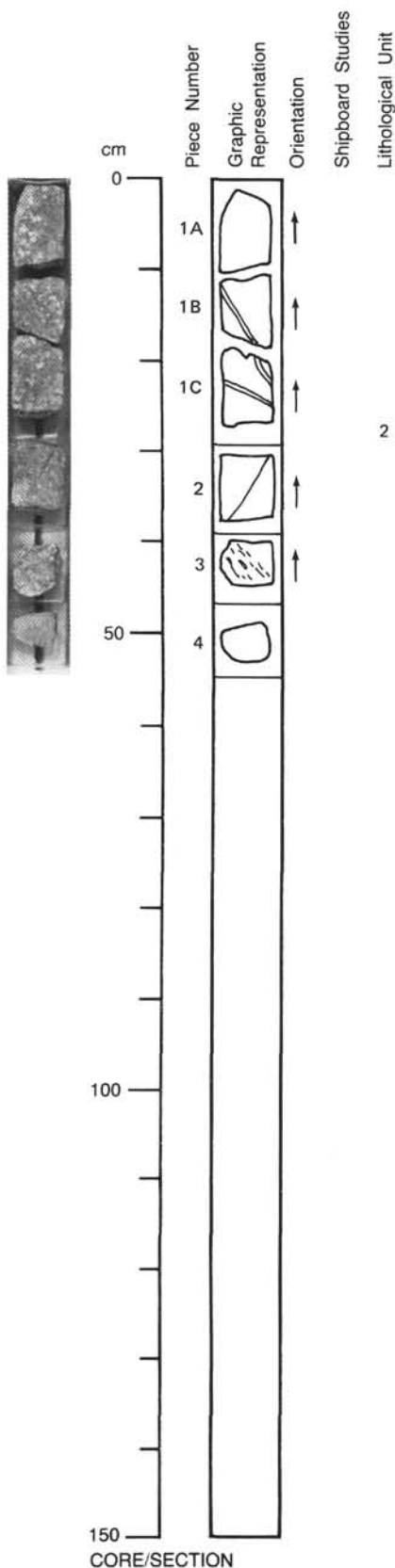
DEFORMATION: Gneissic (41-445 cm) with plagioclase extensively recrystallized and elongated into schlieren defining the foliation. A few coarse pyroxene augen (0.5-1 cm) remain. Piece 4: Faint foliation.

PRIMARY MINERALOGY: Similar to olivine gabbro (above).

SECONDARY MINERALOGY: Clinopyroxene extensively pseudomorphed by amphibole. 1% Iron-titanium oxides interstitial to plagioclase, pyroxene, and amphibole. Plagioclase vein 1-mm-thick along contact between gneiss and gabbro in Piece 3. Plagioclase-rich vein (contacts not sharply defined), 1-2 mm wide. Crosscuts foliation in Piece 4.
 Percent vein material: Not determined.

Vein material: Plagioclase.

COMMENTS: Piece 4: Fine- to medium-grained rock with a very faint foliation. Mineralogy includes mostly plagioclase and amphibole, but the rock also contains 1% Iron-sulfides (pyrite) and a few stringers of recrystallized clinopyroxene.



118-735B-21R-1

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1-14

Gabbro

Pieces 1-6, and 13

COLOR: Dark green.
LAYERING: Massive.
DEFORMATION: Undeformed.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 60%.
 Crystal size: 1-7 mm.
 Crystal shape: Anhedral.
 Preferred orientation: No.
 Percent replacement: Not determined.

Clinopyroxene—Mode: 40%.
 Crystal size: 1-6 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Not determined.
 Percent replacement: By amphibole. Percent not determined.

SECONDARY MINERALOGY:
 Total percent: 7%.
 Texture: Amphibole replaces clinopyroxene and fills fractures. Iron-hydroxides and yellow-brown clay minerals.
 Percent vein material: Not determined.
 Vein material: Amphibole.

Foliated Metagabbro

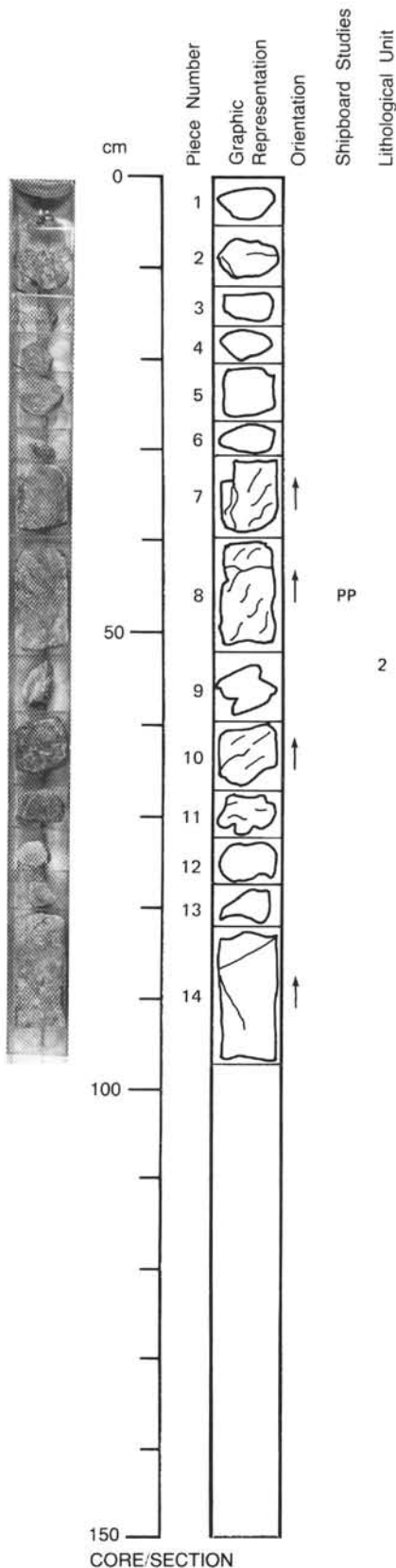
Pieces 7-12, and 14 (top)

COLOR: Medium green to yellow green.
LAYERING: None.
DEFORMATION: Foliation plane defined by flattening of plagioclase and clinopyroxene. Grain size decreases from 5 to 2 mm.
PRIMARY MINERALOGY:
 Clinopyroxene—Mode: 60%.
 Crystal size: 2 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Yes.
 Percent replacement: Largely replaced by amphibole.

Plagioclase—Mode: 40%.
 Crystal size: 1-2 mm.
 Crystal shape: Euhedral to anhedral.
 Preferred orientation: Yes.
 Percent replacement: Not determined.

SECONDARY MINERALOGY:
 Total percent: About 40%.
 Texture: Green amphiboles replacing clinopyroxene. Iron-hydroxides in fracture. Clay minerals in dissolution voids.
 Percent vein material: Not determined.
 Vein material: Iron-hydroxides.

COMMENTS: Piece 10: Porphyroclastic.



118-735B-21R-1 (continued)

Foliated Ilmenite Gabbro/Poorly Foliated Olivine-Poor Gabbro**Piece 14 (bottom)**

COLOR: Greenish gray.

LAYERING: Contact between foliated ilmenite gabbro and olivine-poor gabbro. Foliation is parallel to the contact. Grain size is 2-3 mm and 2-10 mm, respectively. Contact is sharp and straight.

DEFORMATION: Foliation is marked by preferred orientation of pyroxene (1.5 cm long).

PRIMARY MINERALOGY:

Ilmenite gabbro: Plagioclase—Mode: 45%-50%.

Crystal size: 1-4 mm.

Crystal shape: Anhedral to subhedral.

Preferred orientation: Yes.

Percent replacement: Not determined.

Clinopyroxene—Mode: 45%.

Crystal size: 3-10 mm.

Crystal shape: Anhedral.

Preferred orientation: Yes.

Percent replacement: Not determined.

Ilmenite (magnetite)—Mode: 5%-10%, interstitial.

Crystal size: 1-4 mm.

Crystal shape: Granular.

Preferred orientation: Not seen.

Percent replacement: Not determined.

Olivine-poor gabbro: Plagioclase—Mode: 50%.

Crystal size: 2-7 mm.

Crystal shape: Anhedral.

Preferred orientation: Weak.

Percent replacement: Not determined.

Clinopyroxene—Mode 45%.

Crystal size: 3-5 mm.

Crystal shape: Anhedral.

Preferred orientation: Weak.

Percent replacement: Not determined.

Orthopyroxene—Mode: 3%.

Crystal size: 5 mm.

Crystal shape: Anhedral.

Preferred orientation: Weak.

Percent replacement: 30% oxidized, clay minerals.

Olivine—Mode: 2%.

Crystal size: 1-3 mm.

Crystal shape: Anhedral.

Preferred orientation: Not seen.

Percent replacement: Almost total by magnetite, amphibole, and iron-hydroxide.

SECONDARY MINERALOGY:

Total percent: At least 45% in ilmenite gabbro; at least 50% in olivine-poor gabbro.

Texture: Hematite in plagioclase, green amphibole replaces pyroxene in ilmenite gabbro. Green to blue green amphibole replaces pyroxene, olivine replaced by magnetite, amphibole, and iron-hydroxide in olivine-poor gabbro.

Percent vein material: Not determined.

Vein material: 1- to 3-mm-thick, filled with green amphibole.

118-735B-21R-2

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1A-1G

Massive Olivine Gabbro

Pieces 1A-1G

COLOR: Dark Gray.

LAYERING: None.

DEFORMATION: No apparent foliation.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%.

Crystal size: 0.5-4 cm.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: 0%-20% albitization.

Clinopyroxene—Mode: 45%.

Crystal size: 0.5-4 cm.

Crystal shape: Anhedral, some subhedral.

Preferred orientation: None.

Percent replacement: 10%-20% by amphibole.

Olivine—Mode: 5%, locally more abundant (20%) in upper part of section.

Crystal size: 2-10 mm.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: 30%-50% by orange-red oxides.

From 133 to 137 cm, olivine looks fairly fresh.

SECONDARY MINERALOGY:

Total percent: <5%-10%.

Texture: Amphibole replaces clinopyroxene partially, most plagioclase is fresh—small zone of albitization from 139 to 147 cm.

Percent vein material: <1%.

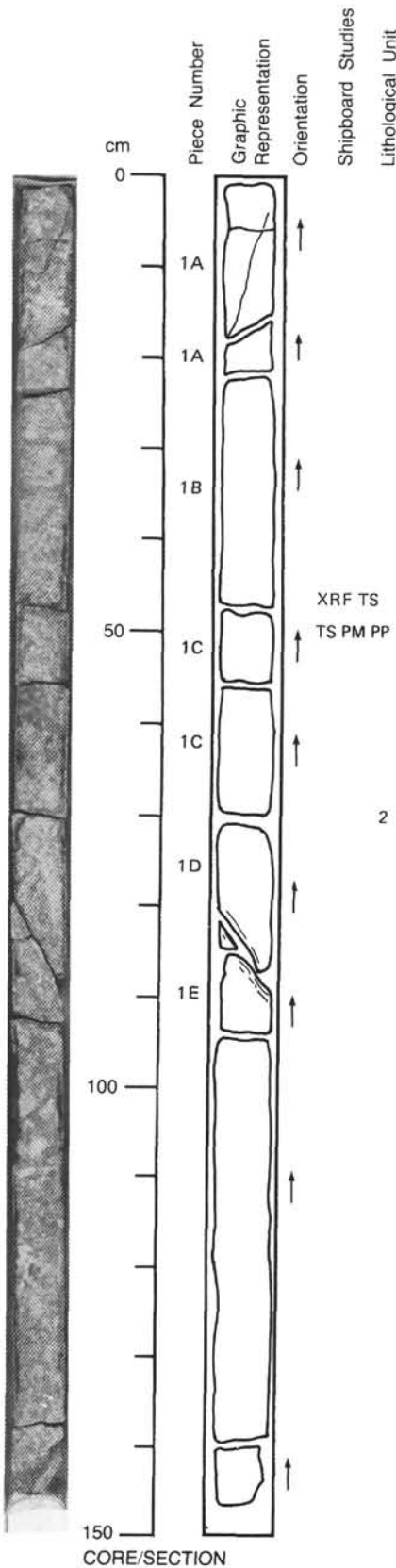
Vein material: Chlorite + actinolite along fractures, particularly between 80-90 cm.

COMMENTS: Plagioclase, clinopyroxene, and olivine modal proportions vary along the section.

Textures are igneous—interlocking crystals etc., not metamorphic.

29-33 and 129-132 cm: Concentrations of ilmenite(?).

Coarse grain-size intervals from 0-37, 56-62, and 90-130 cm.



CORE/SECTION

118-735B-21R-3

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1-2C

Olivine to Olivine-Bearing Gabbro

Pieces 1-2C

COLOR: Gray.

LAYERING: Defined only by grain size, and then only approximately.

12-46 and 70-77 cm: Medium- to coarse-grained (2-10 mm).

47-64 cm: Very coarse-grained (5-25 mm).

34-36 and 65-66 cm: Fine- to medium-grained patches (1-3 mm).

In the case of 65-66 cm, diagonally across Pieces 2B and 2C.

DEFORMATION: No foliation.

Piece 2B (62 cm): Small (3 mm) offset on fracture, dipping at 28°.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%.

Crystal size: 1-20 mm.

Crystal shape: Anhedral.

Preferred orientation: Not determined.

Percent replacement: Minor albitization.

Clinopyroxene—Mode: 45%.

Crystal size: 1-25 mm.

Crystal shape: Anhedral.

Preferred orientation: Not determined.

Percent replacement: Sporadic alteration to amphibole.

Olivine—Mode: 2%-5%.

Crystal size: 2-5 mm.

Crystal shape: Anhedral.

Preferred orientation: Not determined.

Percent replacement: 30%-100% by chlorite, talc, and tremolite.

SECONDARY MINERALOGY:

Total percent: 70%.

Texture: Mostly along near-vertical veins from 65-70 cm. Amphibolitized clinopyroxene near

vein, large, whitish, talc-tremolite olivine pseudomorphs at 20 cm. Vein filling looks like fine

amphibole-plagioclase mix, perhaps with some epidote. Plagioclase has a whitish cast on left

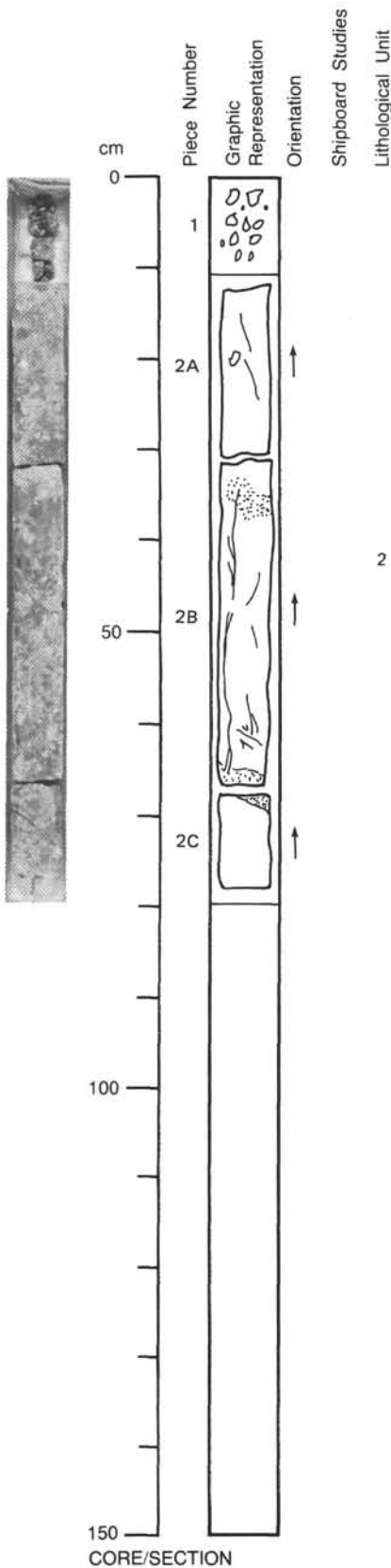
side of vein (looking at core); is probably partially albitized. Amphibolitization is common on

other steeply dipping shorter veins throughout the core.

Percent vein material: Not determined.

Vein material: Fine amphibole-plagioclase mix.

COMMENTS: 0-10 cm: Altered gabbroic fragments. No orange pseudomorphs of olivine. Coarse- to fine-grained transitions appear igneous—intergrown crystals and gradational (though rapid) change.



118-735B-22R-1

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1-17

Foliated Metagabbro/Mylonitic Metagabbro

Pieces 1-6

COLOR: Gray with white streaks, some orange brown porphyroclasts.
LAYERING: None.
DEFORMATION: Pieces 1 and 3: Mylonitic. Pieces 2 and 4-6: Porphyroclastic to augen gneissic. Piece 1: Foliation 90° and somewhat bent.
PRIMARY MINERALOGY:
 Clinopyroxene—Mode: 50%-60%.
 Crystal size: Variable, up to 2 cm.
 Crystal shape: Porphyroclasts and neoblasts.
 Preferred orientation: Crystal shape marks foliation.
 Percent replacement: Extensive replacement by amphibole.

 Plagioclase—Mode: 40%-50%.
 Crystal size: Variable.
 Crystal shape: Porphyroclasts and neoblasts.
 Preferred orientation: Crystal shape marks foliation.
 Percent replacement: Moderate.

 Olivine—Mode: 0%-10%.
 Crystal size: Not determined.
 Crystal shape: Porphyroclasts and neoblasts.
 Preferred orientation: Crystal shape marks foliation.
 Percent replacement: Extensive.
SECONDARY MINERALOGY:
 Total percent: Moderate.
 Texture: Amphibole replaces clinopyroxene.
 Percent vein material: Not determined.
 Vein material: Not determined.
COMMENTS: Ilmenite accentuating banding. Iron-oxyhydroxides in cores of some porphyroclasts.

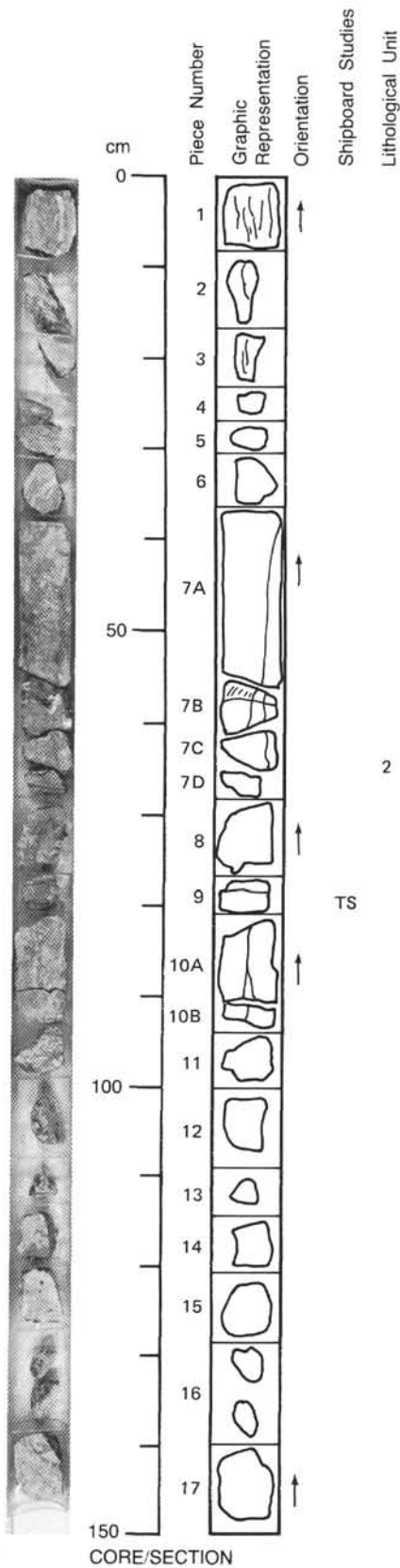
Massive Gabbro

Pieces 7A-17

COLOR: Mainly gray, but green near and in amphibole veins. Pegmatite has white plagioclase, dark to black amphibole. Pieces 10 and 17: Orange altered porphyroclasts (oxidized).
LAYERING: None observed.
DEFORMATION: Slight. Granulated in amphibole-rich fractures.
PRIMARY MINERALOGY:
 Clinopyroxene—Mode: 40%-50%.
 Crystal size: 2 cm.
 Crystal shape: Large oikocrysts, anhedral.
 Preferred orientation: None.
 Percent replacement: Moderate.

 Plagioclase—Mode: 50%-55%.
 Crystal size: Variable.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: Extensive.

 Olivine—Mode: 0%-5%.
 Crystal size: Not determined.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: Extensive.
SECONDARY MINERALOGY:
 Total percent: Not determined.
 Texture: Pieces 8-12: Green amphibole near fractures replacing clinopyroxene; especially amphibole and chlorite(?) on fracture surfaces.
 Percent vein material: Not determined.
 Vein Material: Pieces 7, 10, 11, 14, and 15 locally cut by fractures of green amphibole plus a soft white mineral. One vein, or zone of amphibole. Plagioclase "pegmatite" in Piece 7B.
COMMENTS: Piece 7: Primary grain size variation well shown. Piece 7B: Coarse-grained. Piece 7A: Finer-grained toward bottom.



118-735B-22R-2

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1A-5

Partly Sheared Metagabbro (Olivine-Bearing)

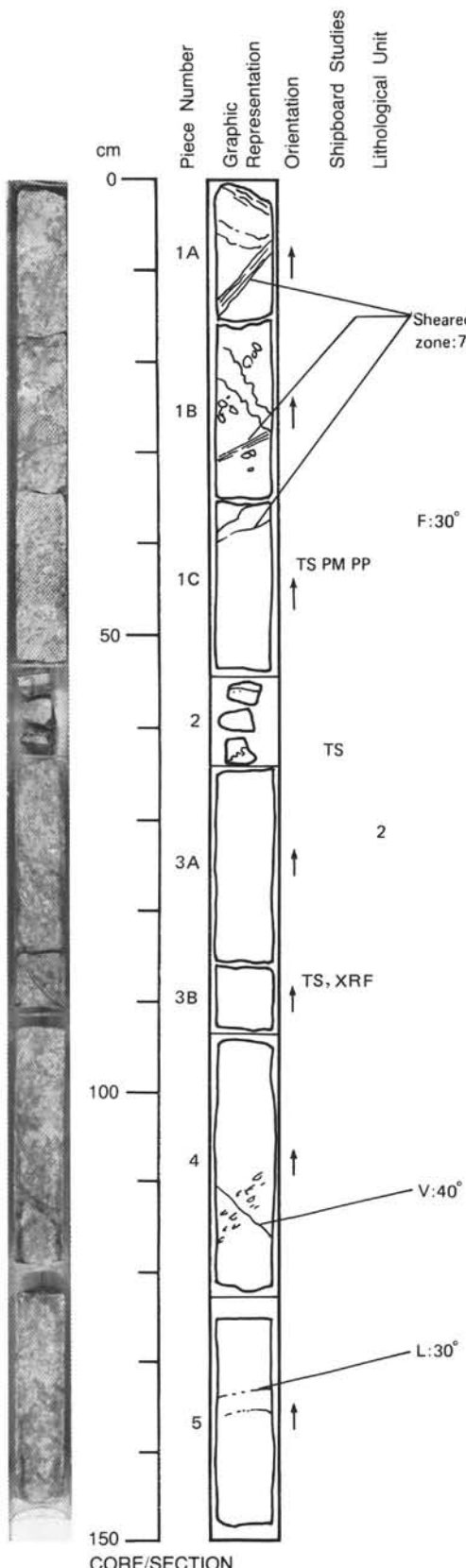
Pieces 1 and 2 (top)

COLOR: Greenish gray.
LAYERING: None.
DEFORMATION: Weak except along a few 0.2- to 2-cm-thick, 30°-70° inclining shear zones.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 55%.
 Crystal size: 2 cm.
 Crystal shape: Euhedral-subhedral.
 Preferred orientation: None.
 Percent replacement: 5% by sodic plagioclase.
 Clinopyroxene—Mode: 40%.
 Crystal size: 0.2-1.5 cm.
 Crystal shape: Subhedral-anhedral.
 Preferred orientation: None.
 Percent replacement: 15% by amphibole.
 Olivine—Mode: 1%-3%.
 Crystal size: 0.2-7 cm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: 2% by tremolite + mica or talc + opaque grains.
SECONDARY MINERALOGY:
 Total percent: <20%.
 Texture: Amphibole especially abundant in sheared zones. Clinopyroxene more extensively replaced by amphibole in upper part of this section. Sheared zone contains abundant opaque mineral.
 Percent vein material: None except for thin shear zone.
 Vein material: None.

Pieces 2 (middle)-5

Olivine Gabbro

COLOR: Gray, mottled.
LAYERING: Vague layering dipping at ~30°. Locally weak magnetic foliation in Piece 4.
DEFORMATION: None.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 55%.
 Crystal size: 2 cm.
 Crystal shape: Subhedral.
 Preferred orientation: None except for Piece 4.
 Percent replacement: None.
 Clinopyroxene—Mode: 40%.
 Crystal size: 3 cm.
 Crystal shape: Subhedral.
 Preferred orientation: None.
 Percent replacement: 2%-5% by amphibole.
 Olivine—Mode: 3%-10%.
 Crystal size: Up to 1.5 cm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: 10% rimmed by thin tremolite + mica or talc aggregate.
SECONDARY MINERALOGY:
 Total percent: <5%.
 Texture: Amphibole replaces clinopyroxene. Olivine is rimmed by white aggregates of tremolite + mica (or talc).
 Percent vein material: None.
 Vein material: None.
COMMENTS: Grain size and modal variation shows layering dipping 30°, nearly parallel to weak magmatic foliation.



CORE/SECTION

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1-5C

Massive Olivine Gabbro

Pieces 1-5A (top), 5B (bottom), and 5C

COLOR: Gray.

LAYERING: Bottom of Piece 3 to middle of Piece 4: Possible modal layering; upper part richer in plagioclase. Shows size grading, clinopyroxene varies from average of 3-5 mm to 15 mm. Dip of layering similar to foliation.

DEFORMATION: Pieces 2B and 3: Weak foliation apparent.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%-65%.

Crystal size: 2-10 mm.

Crystal shape: Subhedral.

Preferred Orientation: Not determined.

Percent replacement: Not determined.

Clinopyroxene—Mode: 25%-40%.

Crystal size: 3-25 mm.

Crystal shape: Subhedral.

Preferred orientation: Not determined.

Percent replacement: 20% by amphibole.

Olivine—Mode: 5%-10%.

Crystal size: 2-6 mm.

Crystal shape: Amoeboidal, anhedral.

Preferred orientation: Not determined.

Percent replacement: 5% by talc and tremolite.

SECONDARY MINERALOGY:

Total percent: 20%-30%.

Texture: Amphibole replacing clinopyroxene (20%), talc + tremolite replacing olivine (5%).

Piece 3: White veins subparallel to foliation. Piece 5C: Possible sulfide in middle of amphibole vein.

Percent vein material: 0%-2%.

Vein material: Green amphibole.

F:40°

F:50°

2

Microgabbro

Pieces 5A (bottom) and 5B (top)

COLOR: Greenish gray.

LAYERING: None.

DEFORMATION: Weakly foliated.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%.

Crystal size: 1-3 mm.

Crystal shape: Euhedral.

Preferred orientation: Not determined.

Percent replacement: Not determined.

Clinopyroxene—Mode: 46%.

Crystal size: 0.5-2 mm.

Crystal shape: Subhedral.

Preferred orientation: Not determined.

Percent replacement: 10% by amphibole.

Olivine—Mode: 4%.

Crystal size: 0.5 mm.

Crystal shape: Anhedral.

Preferred orientation: Not determined.

Percent replacement: 2% by tremolite and talc.

SECONDARY MINERALOGY:

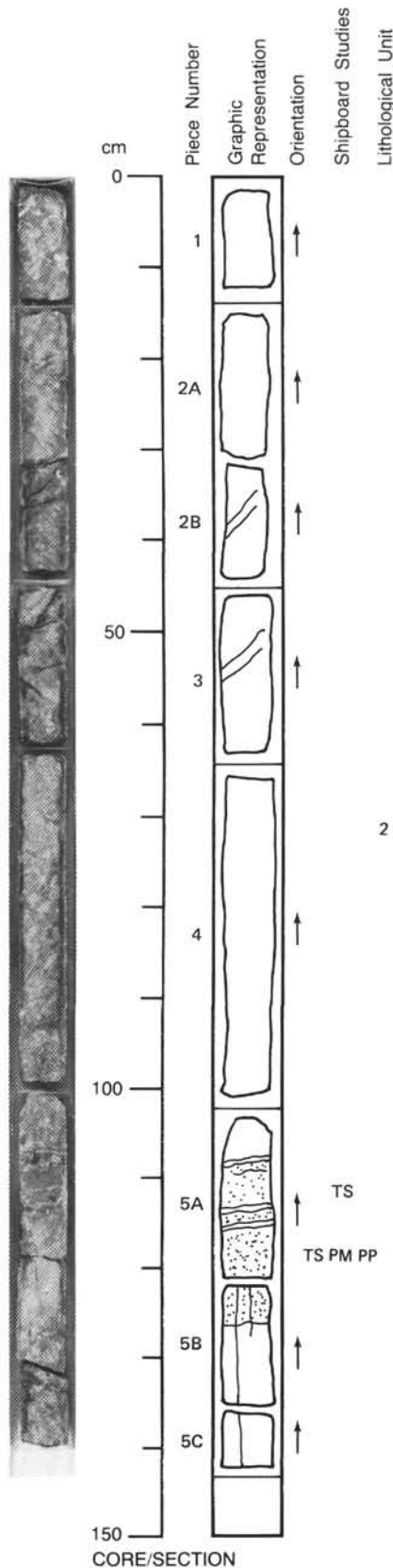
Total percent: 10%-20%.

Texture: Olivine replaced by tremolite + talc (2%), clinopyroxene replaced by amphibole (10%).

Percent vein material: 2%.

Vein material: Two types: (1) green amphibole and (2) pegmatite veins with amphibole + white mineral.

COMMENTS: Location of metagabbro shown by dotted area on column.



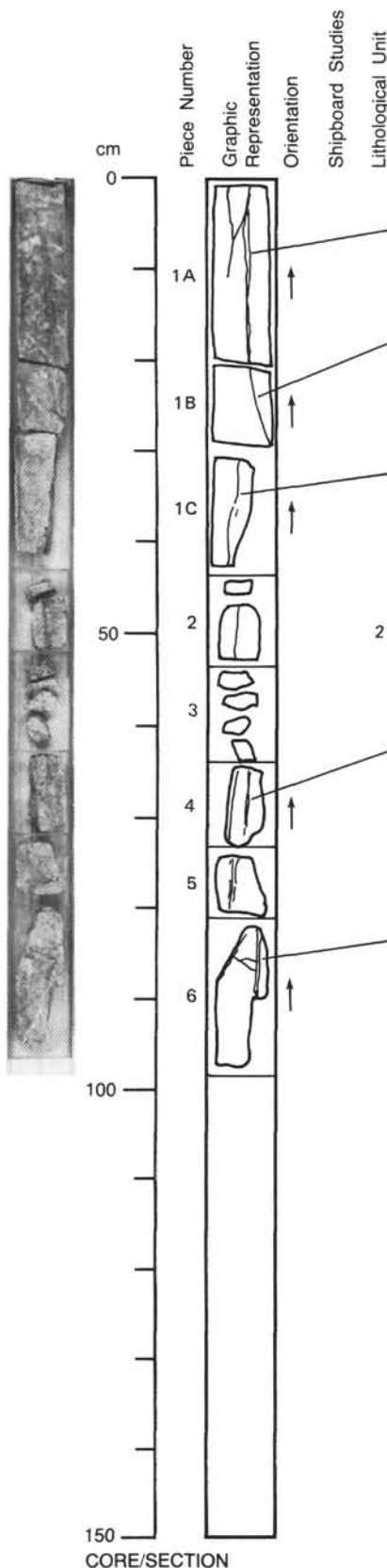
118-735B-22R-4

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1A-6

Amphibole-Veined Metagabbro

Pieces 1A-6



COLOR: Gray to greenish gray.
LAYERING: Grain-size variation suggests layering.
DEFORMATION: Weak except along amphibole veins having slight slip component.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 65%.
 Crystal size: Up to 20 mm.
 Crystal shape: Euhedral-subhedral.
 Preferred orientation: None.
 Percent replacement: 5% by sodic plagioclase.

 Clinopyroxene—Mode: 35%.
 Crystal size: up to 20 mm.
 Crystal shape: Subhedral.
 Preferred orientation: None.
 Percent replacement: 5%-15% by amphibole. Piece 1: minor replacement. Pieces 2-6: Extensive replacement.

 Olivine—Mode: 1%-4%.
 Crystal size: Up to 10 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: >20% by tremolite + talc or mica.
SECONDARY MINERALOGY:
 Total percent: 10%-20%.
 Texture: Not determined.
 Percent vein material: Abundant.
 Vein material: Nearly vertical, 0.2- to 3-mm-thick amphibole veins with abundant slip components.

118-735B-23R-1

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1-6

Massive Olivine-Bearing Gabbro

Pieces 1-5, and 6 (lower two-thirds)

COLOR: Medium gray.
LAYERING: Not determined.
DEFORMATION:
 Pieces 1, 3, and lower half of Piece 6: No foliation.
 Pieces 2, 4, and 5: Weak foliation.
 Piece 4 (upper left): Mylonitic band.
 Pieces 1 and 6 (lower part): Coarse fraction.
 Pieces 2-5: Less coarse-grained.

PRIMARY MINERALOGY:
 Plagioclase—Mode: 55%.
 Crystal size: Up to 2.5 cm.
 Crystal shape: Subhedral.
 Preferred orientation: None.
 Percent replacement: Not determined.

Clinopyroxene—Mode: 43%.
 Crystal size: Up to 2 cm.
 Crystal shape: Subhedral.
 Preferred orientation: None.
 Percent replacement: <70% by green amphibole.

Olivine—Mode: 2%.
 Crystal size: Up to 2 cm.
 Crystal shape: Subhedral-anhedral.
 Preferred orientation: None.
 Percent replacement: Not determined.

SECONDARY MINERALOGY:
 Total percent: <10%.
 Texture:
 Piece 4: Olivine replaced by iron oxides and clays.
 Piece 2: Some greenish-white minerals (talca?).
 Piece 5: Clinopyroxene partially replaced by brownish mineral.
 Pieces 5 and 6 (adjacent to microgabbro): Sulfides, + albite.
 Piece 6: Mylonitic small band (inclining 45°), with white secondary mineral.
 Percent vein material: Few veinlets.
 Vein material: Amphibole + sulfides.

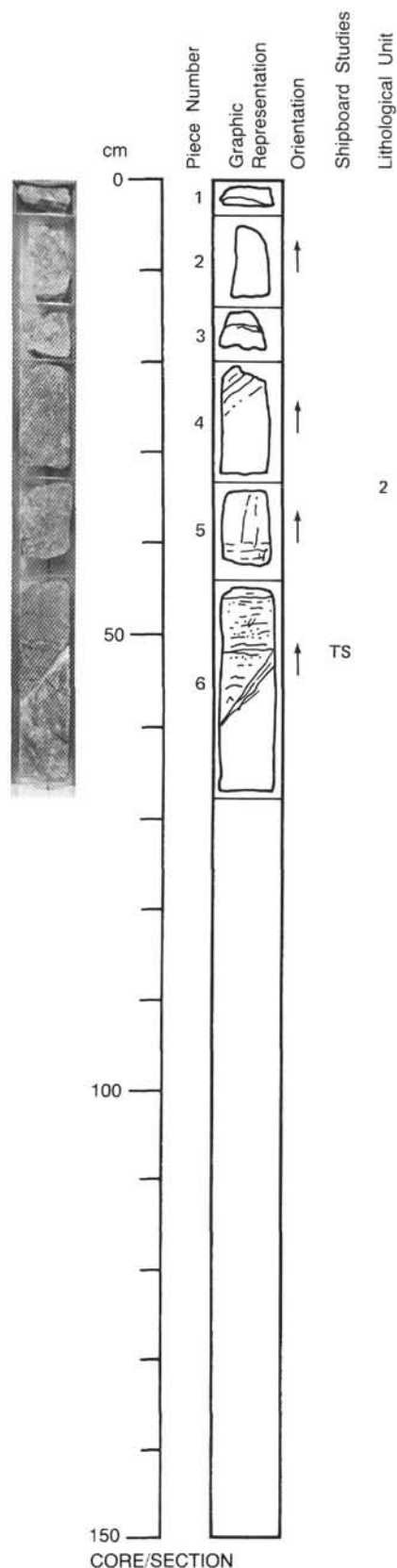
Microgabbro

Piece 6 (upper one-third)

COLOR: Gray.
LAYERING: None.
DEFORMATION: None.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 55%-60%.
 Crystal size: 0.2-0.9 cm.
 Crystal shape: Subhedral.
 Preferred orientation: None.
 Percent replacement: Not determined.

Clinopyroxene—Mode: 40%-45%.
 Crystal size: 0.3-1.0 cm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: Up to 50% by amphibole.

SECONDARY MINERALOGY:
 Total percent: <10%
 Texture: Sulfides dispersed throughout. Contacts with massive coarse-grained gabbro relatively sharp and horizontal.
 Percent vein material: Not determined.
 Vein material: Not determined.



118-735B-23R-3

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1A-11

Porphyroclastic Metagabbro

Pieces 1A-1B (top), 6-7B (top)

COLOR: Gray to black.
LAYERING: Not determined.
DEFORMATION: Pieces 1A and 1B: Slightly enriched in opaque minerals (magnetite and ilmenite) that show foliation, probably represents sheared part (5 cm thick) of pegmatitic and olivine gabbro. Pieces 7A and 7B show foliation with 50° dip.

PRIMARY MINERALOGY:
 Plagioclase—Mode: 50%.
 Crystal size: Up to 50 mm.
 Crystal shape: Subhedral.
 Preferred orientation: Parallel to the foliation.
 Percent replacement: Trace.

Clinopyroxene—Mode: 40%.
 Crystal size: Up to 30 mm.
 Crystal shape: Euhedral to subhedral.
 Preferred orientation: Parallel to the foliation.
 Percent replacement: 10%-20% by amphibole.

Opaque mineral(?), magnetite or ilmenite—Mode: 5%-10%. Enriched in Pieces 1A and 1B.
 Crystal size: Up to 30 mm.
 Crystal shape: Anhedral aggregate(?).
 Preferred orientation: Shows foliation.
 Percent replacement: Almost none.

SECONDARY MINERALOGY:
 Total percent: < 30%.
 Texture: Amphibole replaces clinopyroxene.
 Percent vein material: Not determined.
 Vein material: Not determined.

Pegmatitic Coarse-Grained Gabbro

Pieces 1B (bottom)-4 (top)

COLOR: Gray to black.
LAYERING: Interstitial magnetite and ilmenite show weak foliation.
DEFORMATION: Almost none except for weakly foliated and fractured.

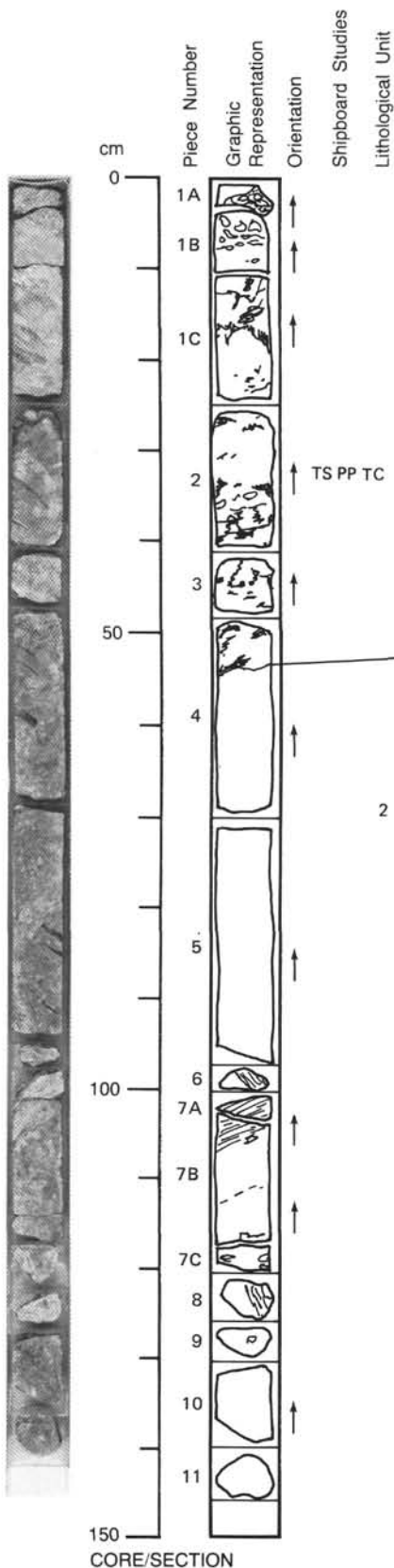
PRIMARY MINERALOGY:
 Plagioclase—Mode: 50%.
 Crystal size: Up to 50 mm.
 Crystal shape: Subhedral.
 Preferred orientation: Slight orientation parallel to the foliation of porphyroclastic gabbro.
 Percent replacement: Trace. Fractures filled with white minerals (prehnite, albite or talc?).

Clinopyroxene—Mode: 40%.
 Crystal size: Up to 30 mm.
 Crystal shape: Euhedral to subhedral.
 Preferred orientation: Slight orientation parallel to the foliation of porphyroclastic gabbro.
 Percent replacement: 10%-20% by amphibole, particularly at bottom of the unit.

Opaque mineral(?), magnetite or ilmenite—Mode: 5%-10%.
 Crystal size: Up to 30 mm.
 Crystal shape: Anhedral aggregate(?).
 Preferred orientation: Shows weak foliation.
 Percent replacement: Almost none.

SECONDARY MINERALOGY:
 Total percent: < 10%.
 Texture: Amphibole replaces clinopyroxene.
 Percent vein material: Trace.
 Vein material: Not determined.

COMMENTS: In magnetite and ilmenite aggregate, sulfide mineral is present. Contact with underlying olivine gabbro (finer-grained) is sharp and dips at 30°.



CORE/SECTION

118-735B-23R-2

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1A-3

Massive Olivine Gabbro

Pieces 1A-2 (except between 35-50 mm)

COLOR: Medium gray.
LAYERING: None.
DEFORMATION: None.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 55%.
 Crystal size: Up to 20 mm.
 Crystal shape: Anhedral-subhedral.
 Preferred orientation: None.
 Percent replacement: Not determined.

 Clinopyroxene—Mode: 40%.
 Crystal size: Up to 20 mm.
 Crystal shape: Subhedral.
 Preferred orientation: None.
 Percent replacement: < 10% by green amphibole on rims.

 Olivine—Mode: 5%.
 Crystal size: Up to 10 mm.
 Crystal shape: Subhedral.
 Preferred orientation: None.
 Percent replacement: Sometimes replaced by yellowish-brownish minerals.
SECONDARY MINERALOGY:
 Total percent: < 10%.
 Texture: Dispersed sulfide grains. Olivine relatively fresh looking, sometimes replaced by yellowish-brownish minerals.
 Percent vein material: Not determined.
 Vein material: Veinlets with green amphibole and/or sulfides. Talc and tremolite(?).

Microgabbro (Olivine-Bearing)

Pieces 1B and 1C (between 35-50 mm)

COLOR: Medium gray.
LAYERING: Increase in grain size toward bottom.
DEFORMATION: Generally none, however, some shearing in Piece 1C.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 55%.
 Crystal size: 0.3 cm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: Not determined.

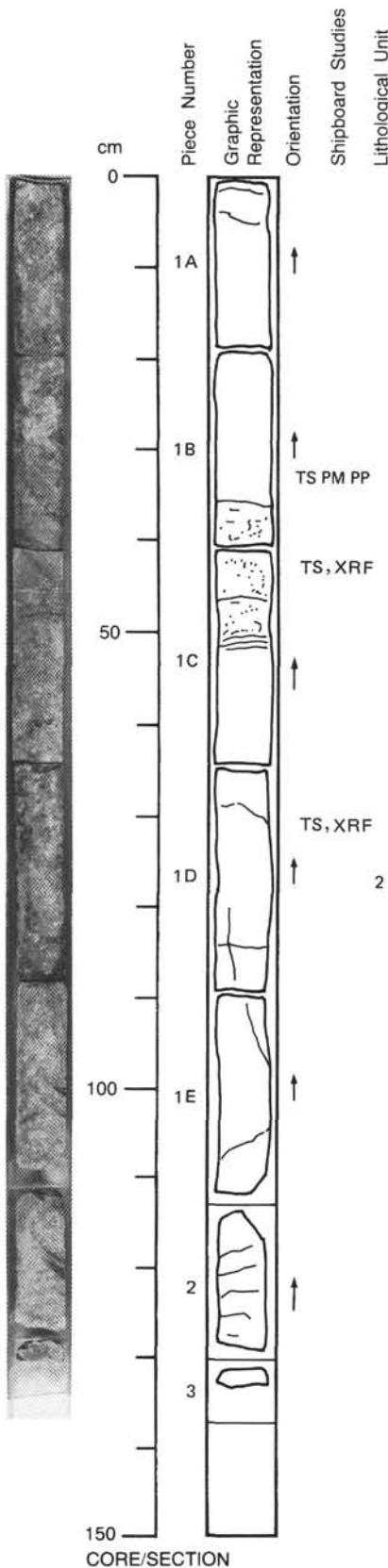
 Clinopyroxene—Mode: 44%.
 Crystal size: 0.3 cm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: Up to 100% by amphibole.

 Olivine—Mode: 1%.
 Crystal size: 0.3 cm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: Not determined.
SECONDARY MINERALOGY:
 Total percent: Up to 30%.
 Texture: Sulfides dispersed in rock and in veinlets.
 Lower boundary of microgabbro marked by small mylonitic band. Microgabbro might contain considerable amounts of amphibole(?).
 Percent vein material: Not determined.
 Vein material: Amphibole + sulfides.
COMMENTS: Lower boundary of microgabbro marked by a small mylonitic band.

Foliated Olivine Gabbro

Piece 3

No description.



150
CORE/SECTION

118-735B-23R-3 (continued)

Olivine Gabbro**Pieces 4 (bottom)-5, and 7B (bottom)-11**

COLOR: Gray.

LAYERING: No clear layering.

DEFORMATION: Piece 8: Weak foliation.

Pieces 9-11: Partly sheared and foliated.

PRIMARY MINERALOGY:

Plagioclase—Mode: 55%.

Crystal size: Up to 10 mm.

Crystal shape: Euhedral to subhedral.

Preferred orientation: None.

Percent replacement: Almost none.

Clinopyroxene—Mode: 40%.

Crystal size: Up to 20 mm.

Crystal shape: Subhedral.

Preferred orientation: None.

Percent replacement: <5% by amphibole.

Olivine—Mode: 5-7%.

Crystal size: Up to 20 mm.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: 10%-30% by tremolite + mica, or by talc aggregate from the margins; locally oxidized.

SECONDARY MINERALOGY:

Total percent: 10%.

Texture: Between olivine and plagioclase, white alteration zone is present, which may be due to olivine-plagioclase reaction with introduction of water. Pieces 9-11: Strongly altered. Olivine perfectly replaced by tremolite + mica or talc.

Percent vein material: Trace.

Vein material: Not determined.

118-735B-23R-4

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1A-9B

Massive Olivine Gabbro

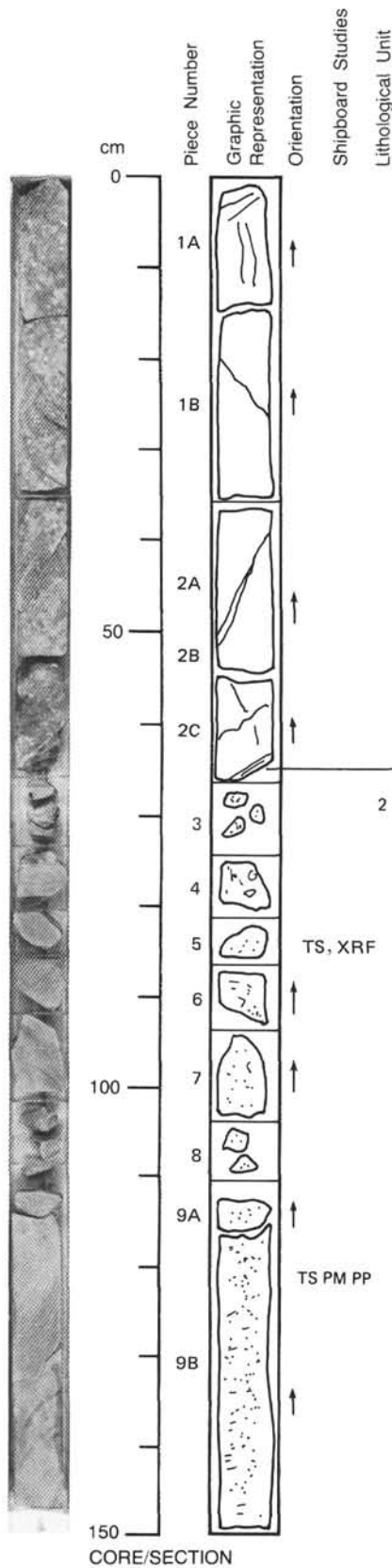
Pieces 1A-2C

COLOR: Medium gray.
LAYERING: None.
DEFORMATION: No deformation except a weak foliation at the top of Piece 1A.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 45%.
 Crystal size: Up to 15 mm.
 Crystal shape: Subhedral.
 Preferred orientation: None.
 Percent replacement: Not determined.
 Clinopyroxene—Mode: 45%.
 Crystal size: Up to 15 mm.
 Crystal shape: Subhedral.
 Preferred orientation: Not determined.
 Percent replacement: <5% by green amphibole on margins. Concentrations of alteration in Piece 1A.
 Olivine—Mode: 5%-10%.
 Crystal size: Up to 5 mm.
 Crystal shape: Euhedral to subhedral.
 Preferred orientation: None.
 Replacement: Pervasively replaced by talc and tremolite.
SECONDARY MINERALOGY:
 Total percent: <5%.
 Texture: Clinopyroxene altered to amphibole on margins. Olivine pervasively replaced by talc and tremolite.
 Percent vein material: Not determined.
 Vein material: Veinlets of talc and tremolite in Piece 1.

Fine-Grained Aphyric Basalt Dike

Pieces 2C-9B

CONTACTS: Contact well-developed at bottom of Piece 2C (5 mm) dipping at 40°.
PHENOCRYSTS: <1% microphenocrysts, homogeneous distribution of plagioclase and olivine.
GROUNDMASS: Microcrystalline at contacts, fine-grained in center.
 Plagioclase—50%, <0.3 mm, lath-shaped to subhedral, fresh(?).
 Clinopyroxene—45%, <0.3 mm, anhedral, fresh(?).
 Olivine—<5%, <0.3 mm, skeletal, totally replaced by talc(?).
COLOR: Medium gray.
VESICLES: Nonvesicular.
STRUCTURE: Dike.
ALTERATION: Slightly altered to clay minerals and talc(?).
VEINS/FRACTURES: Not determined.



118-735B-23R-5

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1-5

Fine-Grained Aphyric Basalt Dike

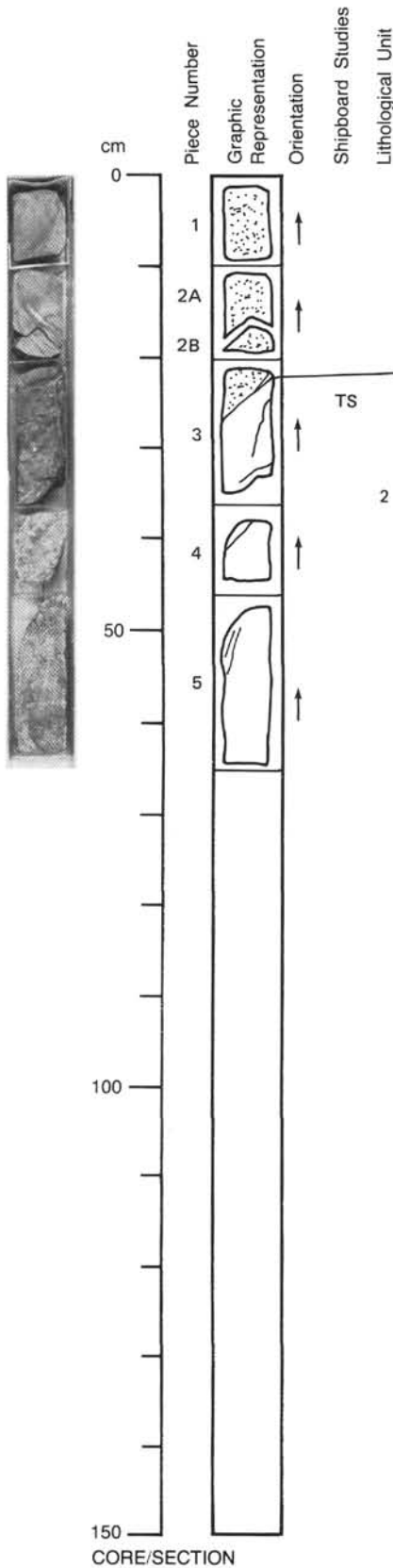
Pieces 1-3 (top)

CONTACTS: Contact well-developed at top of Piece 3 (5 mm) dipping at 40°.
PHENOCRYSTS: <1% microphenocrysts, homogeneously distributed of plagioclase and olivine.
GROUNDMASS: Aphanitic near contact in Piece 3, fine-grained in center.
 Plagioclase—50%, <0.2 mm, subhedral, fresh.
 Clinopyroxene—45%, <0.2 mm, anhedral, fresh.
 Olivine—<5%, <0.2 mm, euhedral, totally replaced by smectites.
COLOR: Gray.
VESICLES: Nonvesicular.
STRUCTURE: Dike.
ALTERATION: Slightly altered to smectites.
VEINS/FRACTURES: Not determined.

Olivine-Bearing Gabbro

Pieces 3 (bottom)-5

COLOR: Greenish gray.
LAYERING: None.
DEFORMATION: Weakly foliated in places.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 60%.
 Crystal size: 2-6 mm.
 Crystal shape: Subhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.
 Clinopyroxene—Mode: 36%.
 Crystal size: 2-10 mm.
 Crystal shape: Subhedral.
 Preferred orientation: Not determined.
 Percent replacement: 15% by amphibole.
 Olivine—Mode: 4%.
 Crystal size: 2-8 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Not determined.
 Percent replacement: 5% by talc + tremolite.
SECONDARY MINERALOGY:
 Total percent: 20%.
 Texture: Amphibole replacing clinopyroxene, talc + tremolite replacing olivine.
 Percent vein material: Not determined.
 Vein material: Not determined.



CORE/SECTION

118-735B-24R-1

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1A-5B

Amphibolitized Olivine Metagabbro

Pieces 1-3C, and 3E (bottom)-5A

COLOR: Gray (pale green overtone).

LAYERING: None.

DEFORMATION: Not determined.

PRIMARY MINERALOGY:

Plagioclase—Mode: 55%-65%.

Crystal size: 3-30 mm.

Crystal shape: Subhedral to anhedral granular.

Preferred orientation: None.

Percent replacement: Not determined.

Clinopyroxene—Mode: 35%-45%.

Crystal size: 3-30 mm.

Crystal shape: Subhedral to anhedral granular.

Preferred orientation: None.

Percent replacement: Not determined.

Olivine—Mode: 0%-5%.

Crystal size: Not determined.

Crystal shape: Anhedral interstitial.

Preferred orientation: None.

Percent replacement: Not determined.

SECONDARY MINERALOGY:

Total percent: Not determined, but generally extensive although variable, pervasive alteration.

Texture: Green amphibole rimming and pseudomorphing pyroxene. Amphibole also occurs as laths in plagioclase grains. Locally, where large clinopyroxene grains are replaced, the rock is vuggy with hollows lined with actinolite needles and filled with a white claylike material that expands when acid is added. Patches of interstitial ilmenite occur locally—with the appearance of a hydrothermal replacement.

Percent vein material: 1%.

Vein material: Amphibole.

COMMENTS: Subhedral to anhedral granular, grain size varies along core from coarse- to very coarse-grained, where there are patches of crystals exceeding 3 cm. Olivine appears distinctly interstitial.

Feebly Foliated Metagabbro

Pieces 3D-3E (top), and 5B

COLOR: Gray.

LAYERING: None.

DEFORMATION: Locally, a clear foliation is present defined by medium-grained amphibole and plagioclase elongated or stretched out along the plane of foliation. However, most of this zone is undeformed.

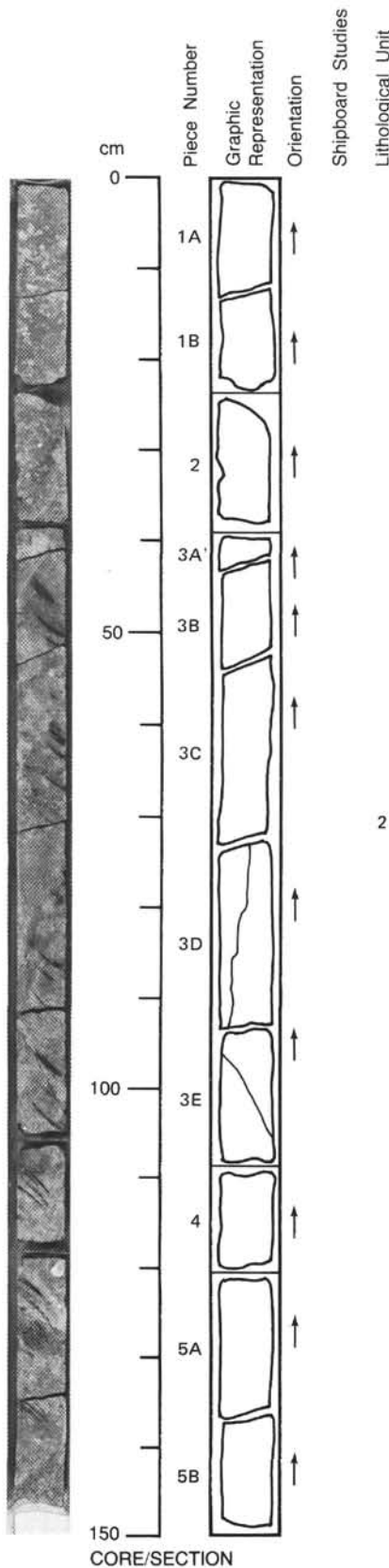
PRIMARY MINERALOGY:

Similar to amphibolitized olivine gabbro described above.

SECONDARY MINERALOGY:

Similar to amphibolitized olivine gabbro described above, except for the presence of accessory (<1%) pyrite, which occurs locally.

COMMENTS: Grain size ranges downward from coarse- to medium-grained and then back to coarse-grained. Piece 5B contains a wedge-shaped zone 1 to 15 mm thick and 80 mm long, inclined at 45°, rich in ilmenite (30%), intergrown with green amphibole.



118-735B-24R-2

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1-9B

Porphyroclastic Metagabbro

Pieces 1-5A (top), 7, and 8

COLOR: Grayish green.
LAYERING: None.
DEFORMATION: Foliation defined by the flattening and deformation of plagioclase and pyroxene porphyroclasts, and by grain-size variations forming fine-grained matrix. Grain sizes: porphyroclasts—3-15 mm; Neoclasts: < 3mm.

PRIMARY MINERALOGY:
 Plagioclase—Mode: 40%.
 Crystal size: 3-15 mm.
 Crystal shape: Anhedral to subhedral.
 Preferred orientation: Not determined.
 Percent replacement: Partly replaced by prehnite.

Clinopyroxene—Mode: 60%.
 Crystal size: 3-15 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Not determined.
 Percent replacement: Replaced by amphibole.

Ilmenite—Mode: 3%-10% in Pieces 3, 4, and 8; spaces around silicate minerals.

SECONDARY MINERALOGY:
 Total percent: At least 25%.
 Texture: Green amphibole pseudomorphs after pyroxenes or rimming amphibole pseudomorphs.
 Plagioclase is partly prehnitized in Piece 7.
 Percent vein material: Not determined.
 Vein material: Amphibole + plagioclase. Subvertical veins filled by amphibole in Piece 7.

Poorly Foliated Ilmenite Metagabbro

Pieces 5A (bottom)-6, 9A and 9B

COLOR: Dark gray green.
LAYERING: None.
DEFORMATION: Weak foliation defined by preferred orientation of pyroxene and plagioclase. Secondary amphibole veinlets enhance the foliation. Original grain size is preserved, except for some granoblasts of plagioclase, olivine, and pyroxene.

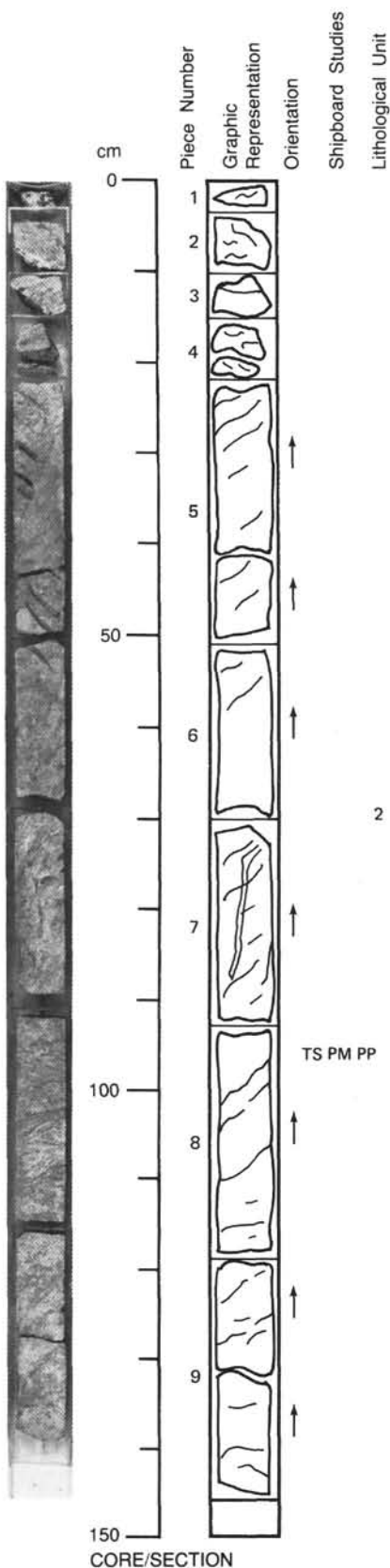
PRIMARY MINERALOGY:
 Plagioclase—Mode: 45%-50% (including granoblasts).
 Crystal size: 1-4 mm.
 Crystal shape: Anhedral to subhedral.
 Preferred orientation: Weak.
 Percent replacement: 50%.

Clinopyroxene—Mode: 40%-50%.
 Crystal size: 2-4 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Weak.
 Percent replacement: 30% by amphibole.

Olivine—Mode: Trace.
 Crystal size: 2-4 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Not seen.
 Percent replacement: 10%.

Ilmenite—5%-10%.
 Crystal size: <1 mm.
 Crystal shape: Granular.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

SECONDARY MINERALOGY:
 Total percent: 50%.
 Texture: Pseudomorphous. Green amphibole pseudomorphs after clinopyroxene. Green amphibole replaced by lighter green amphibole. Scattered sulfides throughout core.
 Percent vein material: Not determined.
 Vein Material: In Pieces 9A and 9B, veins of dark amphibole, 2- to 4-mm-thick, injected parallel to the foliation. Some thin plagioclase veins, few millimeters long and 1-mm-thick, one injected along the foliation plane.



CORE/SECTION

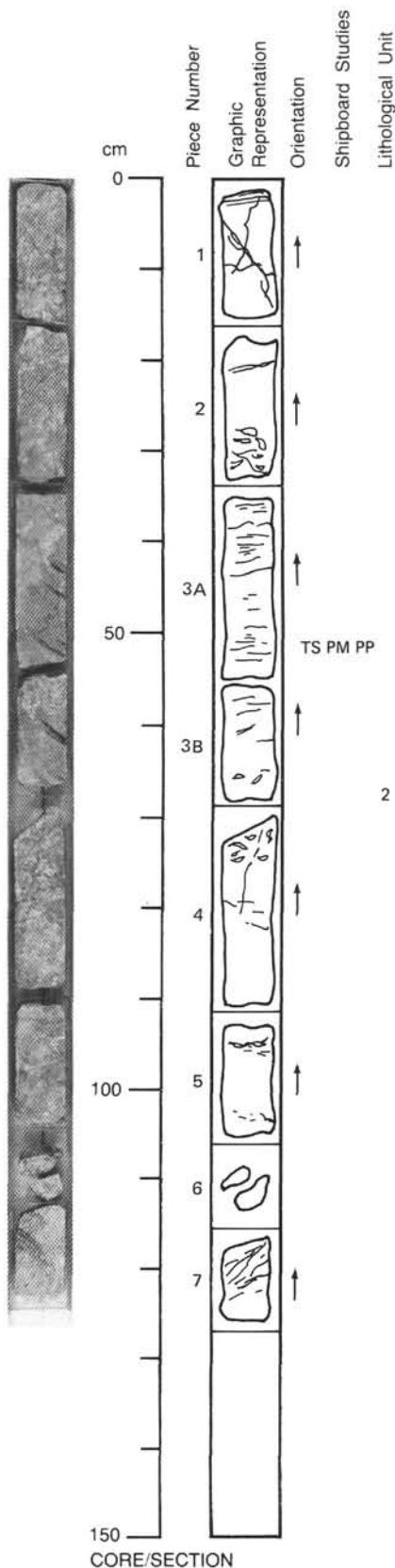
118-735B-24R-3

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1-7

Amphibolitized Olivine-Bearing Metagabbro

Pieces 1-7



F:0°

COLOR: Gray.

LAYERING: None.

DEFORMATION: Alternating zones of deformation and nondeformation. Slight lamination of coarse-grained section between 25-35 cm.

Horizontal mylonitic zone at 0-1 cm.

Foliation between 38-64 cm defined by elongated plagioclase and amphibole in finer-grained section at 38-60 cm, and porphyroclastic textures at 56-68 cm. A well-foliated to mylonitic band between altered, coarser-grained gabbro in Piece 7.

PRIMARY MINERALOGY:

Plagioclase—Mode: Up to 40%.

Crystal size: 3-30 mm.

Crystal shape: Anhedral. Fractured, veined with amphibole in many places.

Preferred orientation: Aligned in foliation, where developed.

Percent replacement: Not determined.

Clinopyroxene—Mode: Up to 40%.

Crystal size: 2-30 mm.

Crystal shape: Anhedral.

Preferred orientation: Aligned in foliation, where developed.

Percent replacement: Extensive amphibole replacement.

Olivine—Mode: 1%-4%.

Crystal size: 1-4 mm.

Crystal shape: Anhedral.

Preferred orientation: Not determined.

Percent replacement: Extensive replacement by serpentine and talc.

Ilmenite(?)—Mode: 5%.

Crystal size: 0.1-0.5 mm.

Crystal shape: Anhedral in Piece 2B.

Preferred orientation: Not determined.

Percent replacement: Not determined.

SECONDARY MINERALOGY:

Total percent: Up to 80%.

Texture: Dark green, green-gray amphibole replaces clinopyroxene. Piece 6: nearly completely replaced. Somewhat more extensively altered in sheared zones. There are zones of abundant opaques associated with fine pyrite (1-2 mm). Opaques are probably ilmenite, are anhedral, 2-5 mm in size, and are interstitial to the other phases. Opaques are most common (10%-15%) in the lower parts of Pieces 2B and 3B, and in the top part of Piece 4B. These are zones with moderate to extensive amphibolitization and slight to moderate deformation.

Percent vein material: Not determined.

Vein material: Veins and fractures are common. Most commonly filled with prismatic green amphibole needles at 24, 52, and 94 cm, or a mixture of amphibole and a greenish-white mineral—probably albite with mixed amphibole or epidote.

COMMENTS: This section appears to have been an olivine gabbro, perhaps with a primary grain-size variation, which has been variously deformed and amphibolitized. Percent of primary minerals varies along core from average of 2% to 70%, depending on degree of alteration. Where core is freshest (2-33 cm), 80%-89% of primary minerals remain.

F:0-15°

2

F:36-50°

118-735B-24R-4

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1A-5

Massive Gabbro

Pieces 1A-5

COLOR: Dark gray.

LAYERING: None.

DEFORMATION: Piece 4 poorly foliated, approximately horizontal, defined by flattened plagioclase, clinopyroxene, and amphibole. Also flattening of crystals in fragment of rubble from Piece 3; other pieces are massive.

PRIMARY MINERALOGY:

Plagioclase—Mode: 55%.

Crystal size: ~ 1 to 20 mm. Mostly coarse-grained.

Fine-grained interval between 18 to 24 cm.

Crystal shape: Anhedral.

Preferred orientation: Elongate in plane of foliation.

Percent replacement: Variable, 5%-70% by sodic plagioclase.

Clinopyroxene—Mode: 45%.

Crystal size: 1-20 mm.

Crystal shape: Subhedral to euhedral, some subophitic.

Preferred orientation: Elongate in plane of foliation.

Percent replacement: 0%-75% by amphibole.

SECONDARY MINERALOGY:

Total percent: 5%-70%.

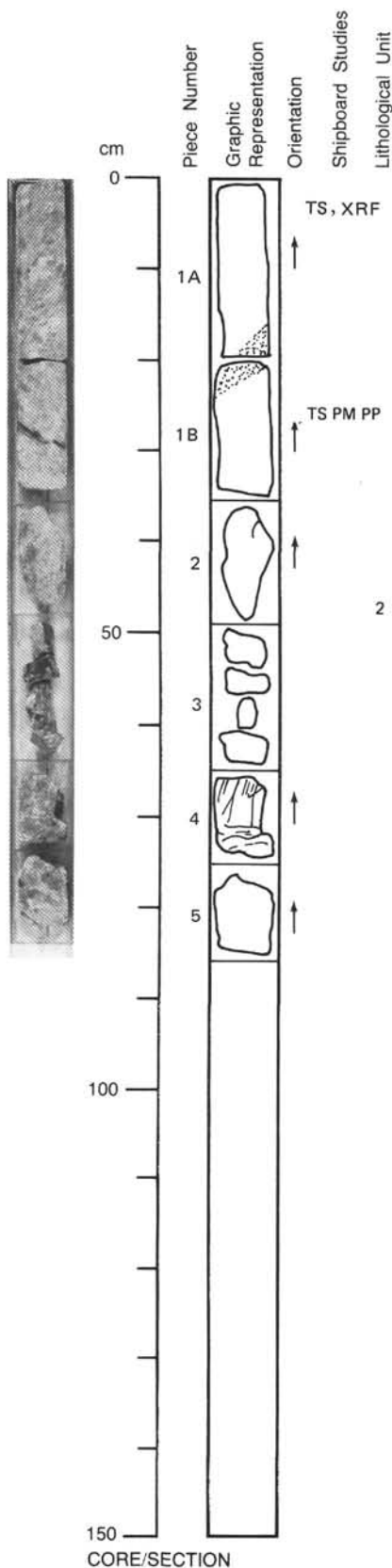
Texture: For interval between 0-48 cm, clinopyroxene is partially replaced along grain edges by green amphibole. Thin fractures also filled by green amphibole. Plagioclase relatively fresh.

Below 48 cm, alteration increases. Plagioclase 60%-70% albitized, clinopyroxene 75%

replaced by amphibole. Piece 4 is cut by numerous thin veins of green amphibole.

Accumulations of ilmenite and pyrite in Piece 5.

Percent vein material: <5%.



118-735B-25R-1

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1-22

Amphibolite/Amphibolitized Metagabbro

Pieces 1-18

COLOR: Dark green-black.

LAYERING: None.

DEFORMATION: Foliation weak to nonexistent. Deformation appears slight. Amphibole is not strongly oriented and is growing into vuggy cavities as needlelike aggregates. Piece 10 may have a small brecciated zone in it. Plagioclase in Piece 1 is broken and granulated.

PRIMARY MINERALOGY:

Plagioclase—Mode: 10%-40%.

Crystal size: 2-6 mm.

Crystal shape: Anhedral.

Preferred orientation: Not determined.

Percent replacement: Appears somewhat broken and albitized. Grains have a granular whitish/clear appearance. 80% recrystallized.

No remnant of clinopyroxene or olivine.

SECONDARY MINERALOGY:

Total percent: Up to 90%

Texture: Largely dark green amphibole 1-5 mm in size. Granular aggregates replacing pyroxene and plagioclase. Highly porous with numerous small cavities. Some albite after plagioclase. Percent vein material: Not determined.

Vein material: Veins and open fractures in Pieces 3 and 17: Amphibole needles and albite (white mineral) in Piece 17. Piece 17 has needles of a white mineral filling a cavity.

Medium-Grained Amphibolitized Metagabbro

Pieces 19-22

COLOR: Not determined.

LAYERING: None.

DEFORMATION: Small offset on fracture in Piece 19. Weak foliation in parts of Piece 22 parallel to a steeply dipping fracture.

PRIMARY MINERALOGY:

Plagioclase—Mode: 40%.

Crystal size: 2-4 mm (equigranular).

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: Moderate to extensive replacement by albite.

Clinopyroxene—Mode: 60%.

Crystal size: 5-10 mm.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: 60%-80% by amphibole.

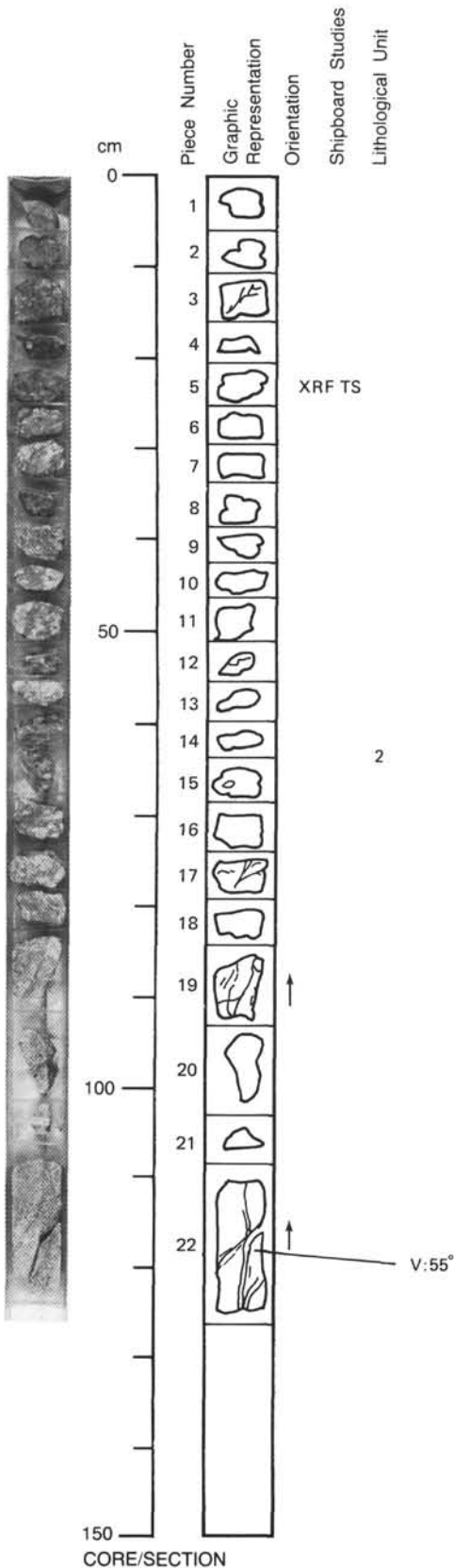
SECONDARY MINERALOGY:

Total percent: Up to 50%-60%.

Texture: Green amphibole after clinopyroxene; amphibole is a lighter green than the amphibole in the upper one-half of the core.

Percent vein material: <10%.

Vein material: Soft greenish-white material fills veins and covers fracture surfaces in Pieces 19 and 22.



118-735B-25R-2

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1A-1H

Massive Olivine Gabbro

Pieces 1A-1H

COLOR: Dark gray.
LAYERING: None.
DEFORMATION: No foliation.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 50%.
 Crystal size: 5-20 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: 20%-40% by albite.

Clinopyroxene—Mode: 45%.
 Crystal size: 5-15 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: 50%-80% by amphibole on rims.

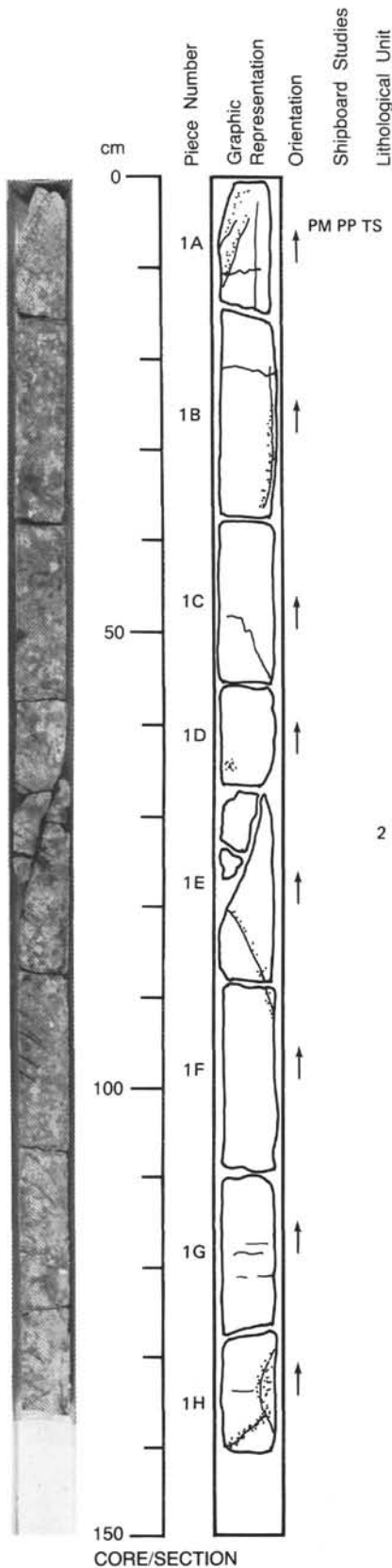
Olivine—Mode: 0%-5%.
 Crystal size: 5-15 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: 75% by oxides.

SECONDARY MINERALOGY:

Total percent: 15%-25%.
 Texture: Not determined.
 Percent vein material: 3%-4%.

Vein material: Core contains thin veins of chlorite(?) + actinolite in most pieces, but particularly at the top of Piece 1A, along the side of Piece 1B, and along the side and bottom of Piece 1H. These veins are generally oriented near-vertically. Plagioclase is more altered to albite(?) adjacent to these veins for a distance of 1 cm or more on either side. A few concentrations of ilmenite are present between 69-80 cm, where grain size is coarsest. Thin (<< 1 mm) veins of white minerals, nearly horizontal in Pieces 1B, 1G, and 1H.

COMMENTS: Grain size varies along length of core; pieces are all very coarse-grained, but particularly large between 70-79 cm. Grains show interlocking igneous textures, not deformed in general.



CORE/SECTION

118-735B-25R-3

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1-3B

Olivine Gabbro

Pieces 1-3B

COLOR: Gray to greenish gray.

LAYERING: None, but Piece 3B (126-150 cm) is finer-grained, sharp granulometric contact.

DEFORMATION: None.

PRIMARY MINERALOGY:

Plagioclase—Mode: 55%-58%.

Crystal size: 1-5 mm; 1-3 mm in Piece 3B.

Crystal shape: Euhedral.

Preferred orientation: None.

Percent replacement: 0%.

Clinopyroxene—Mode: 40%.

Crystal size: 2-14 mm; 2-4 mm in Piece 3B.

Crystal shape: Subhedral.

Preferred orientation: None.

Percent replacement: 0%.

Olivine—Mode: 2%-5%.

Crystal size: 1-4 mm; 1 mm in Piece 3B.

Crystal shape: Irregular (rounded).

Preferred orientation: None.

Percent replacement: 0%.

SECONDARY MINERALOGY:

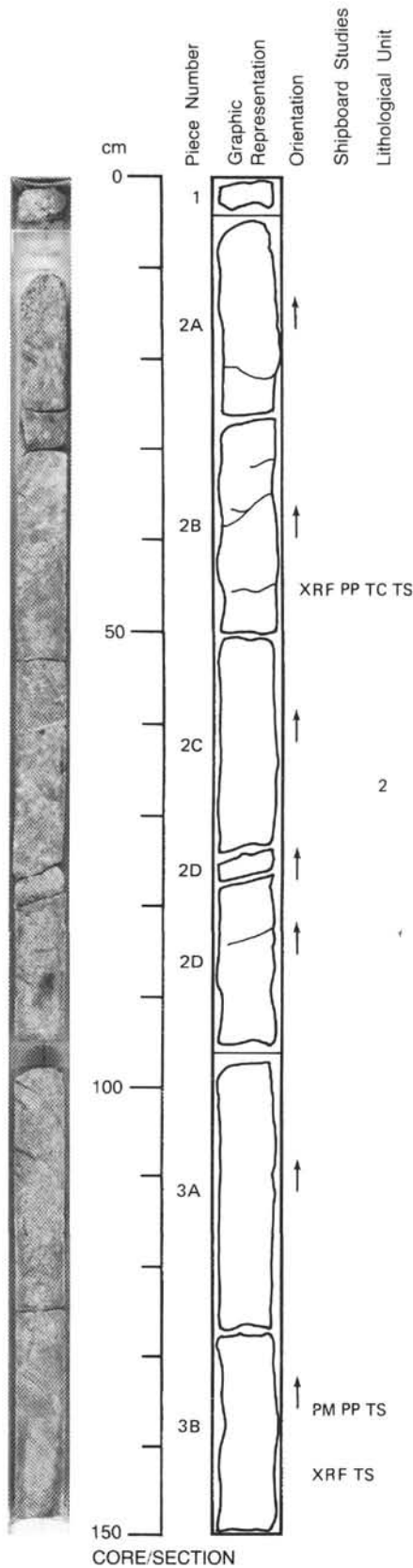
Total percent: <10%.

Texture: Pseudomorphic. Green amphibole: Pseudomorph after clinopyroxene, in pockets related to late-stage veins. Veins are 1 mm to 1 cm thick in Pieces 2A, 2B, 2C. Serpentine: Light blue to green, replaces olivine in a web texture where very fine-grained magnetite is intermixed. Talc: May be present. Chalcocopyrite: Spot 2 x 4 mm in Piece 1, related to large green amphibole.

Percent vein material: <5%

Vein material: Veins are filled by green amphibole and plagioclase. Gabbro is more altered in area cut by these veins. Cracks are filled by chlorite or serpentine (amorphous material, blue green color).

COMMENTS: Very fresh rock. Olivine and plagioclase are found in inclusions in large oikocrystic clinopyroxene, and in clinopyroxene and plagioclase of the groundmass minerals.



118-735B-26R-1

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1-6B

Massive Gabbro

Pieces 1-6B

COLOR: Dark gray.

LAYERING: Piece 6B: Possible primary layering represented by transition to microgabbro.

DEFORMATION: Not apparent.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%.

Crystal size: <1 mm-1 cm.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent alteration: 0%-5% by albite.

Clinopyroxene—Mode: 50%.

Crystal size: <1 mm-1 cm.

Crystal shape: Anhedral, subophitically encloses plagioclase.

Preferred orientation: None.

Percent alteration: 50%-75% replaced by green amphibole.

SECONDARY MINERALOGY:

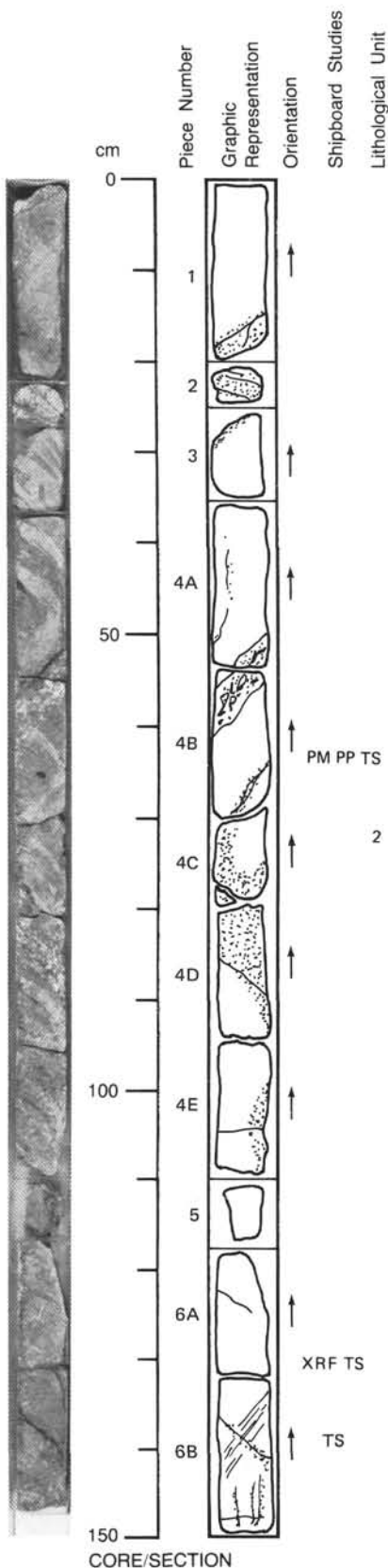
Total percent: 25%-38%.

Texture: Partial replacement (50%-75%) of clinopyroxene by green amphibole. Total replacement in areas of veins and amphibolite zones. Plagioclase partially albitized around rims. Albitization more extensive in three intervals: 18-28 cm, 15-62 cm, and 77-90 cm.

Percent vein material: 20%.

Vein material: Vertical to steeply inclined veins typically filled by green amphibole. Thinner veins, near horizontal, filled by greenish-white mineral, possibly some chlorite or talc + tremolite.

COMMENTS: Grain size varies along the length of the core from fine-grained microgabbro (Piece 6B) to coarse-grained (all other pieces). Alteration of primary phases is also variable, greatest adjacent to albite + amphibole veins (Pieces 1, 2, and 3). Subophitic texture.



CORE/SECTION

118-735B-26R-2

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1-9C

Amphibolitized Olivine Gabbro

Pieces 1-4B, and 9C

COLOR: Gray to greenish gray.
LAYERING: No primary layering.
DEFORMATION: Some granulation of plagioclase.
 Piece 2C (52-54 cm): Weakly foliated amphibole-albite zone.
 Piece 4A (75-77 cm): Small cataclastized zone associated with amphibole vein on lower side.

PRIMARY MINERALOGY:
 Plagioclase—Mode: 40%-60%.
 Crystal size: 2-20 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent alteration: Moderate replacement by albite.

Clinopyroxene—Mode: 60%-40%.
 Crystal size: 2-28 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent alteration: Moderate replacement by amphibole.

SECONDARY MINERALOGY:
 Total percent: 40%-60%.
 Texture: Replacement of clinopyroxene and plagioclase by amphibole and albite, respectively.
 Percent vein material: <5%.
 Vein material: Pieces 2A (10-15 cm), 4B (90 cm), and 9C (140-150 cm): Veins and vuggy cavities filled with fibrous amphibole.

COMMENTS: Medium- to coarse-grained. Similar protolith to massive gabbro in Section 117-735B-25R-4. Pieces 2C and 3A (55-60 cm): Fine-grained igneous zone.

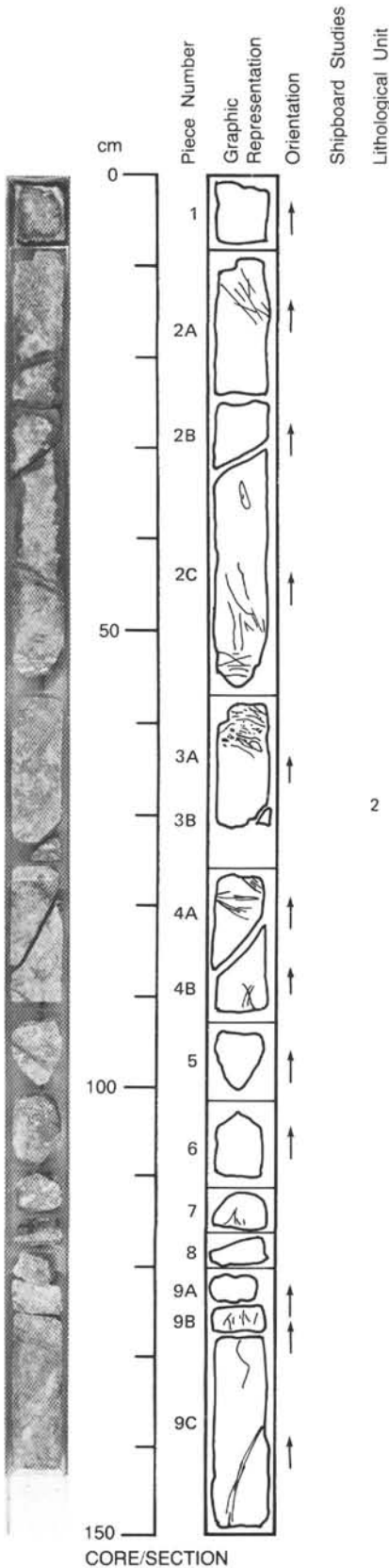
Amphibolitized Gabbro

Pieces 5-9B

COLOR: Green gray to white.
LAYERING: None.
DEFORMATION: Weak to no foliation.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 60%-40%.
 Crystal size: <1 cm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent alteration: Extensive alteration. Albitized with translucent relict calcic zones.

Clinopyroxene—Mode: 40%-60%.
 Crystal size: <1 cm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent alteration: 100%, replaced by dark amphibole.

SECONDARY MINERALOGY:
 Total percent: Extensive to complete.
 Texture: Not determined.
 Percent vein material: 1%.
 Vein material: Sodic plagioclase + actinolite.



118-735B-26R-3

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1A-1I

Gabbro

Pieces 1A-1I

COLOR: Gray.
LAYERING: Size grading present.
DEFORMATION: 2-cm-thick gneissic zone at 138-146 cm, remainder undeformed.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 55%-65%.
 Crystal size: 0.5-1.0, locally up to 20 mm.
 Crystal shape: Euhedral to subhedral.
 Preferred orientation: None.
 Percent replacement: 4% by amphibole, albite, and chlorite.

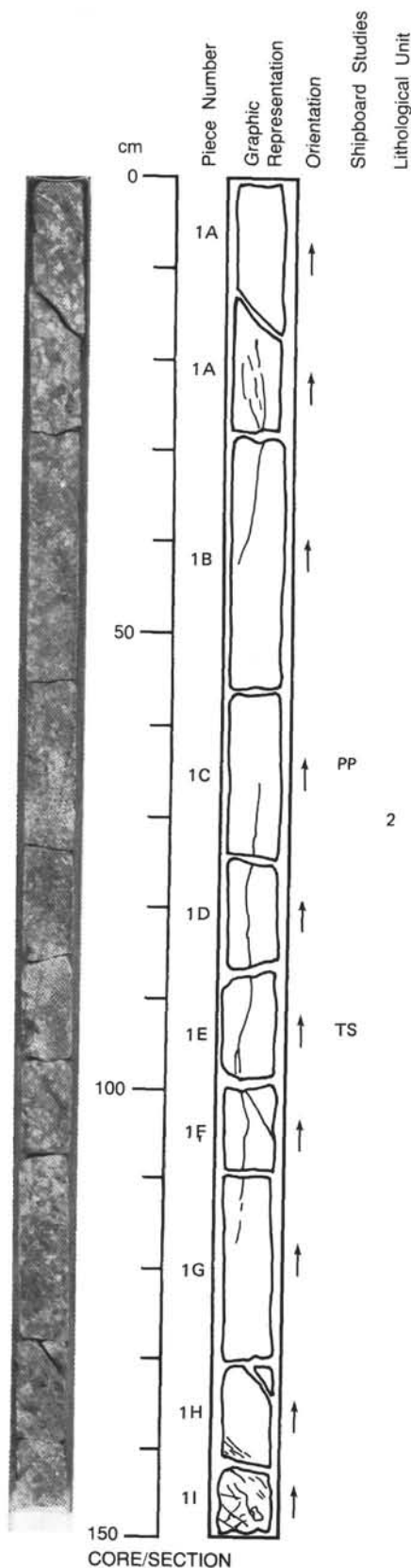
 Clinopyroxene—Mode: 35%-45%.
 Crystal size: 3 to 20 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: 20% by amphibole.

 Olivine—Mode: <1%.
 Crystal size: 0.5-2 mm.
 Crystal shape: Euhedral.
 Preferred orientation: None.
 Percent replacement: 100% by calcite, chlorite, and tremolite.
SECONDARY MINERALOGY:
 Total percent: 15%.
 Texture: Locally amphibolitized and albitized around long subvertical amphibolite veins (20-40 cm and 66-115 cm).
 Percent vein material: 1%.
 Vein material: Amphibole. Fracture in Piece 1A at 15 cm has amphibole lineation in vein inclined at 58°. **COMMENT:** Grain size varies greatly along the section, ranging from patches of microgabbro (63-101 cm) to coarse gabbro (0-63 cm and 101-138 cm). Large clinopyroxene oikocrysts enclose 0.5 to 1.0 cm euhedral to subhedral plagioclase laths.

Autoclastic Gabbro Breccia

Piece 1I (142-150 cm)

COLOR: Gray.
LAYERING: None.
DEFORMATION: Coarse brecciated gabbro (in-situ).
PRIMARY MINERALOGY: See gabbro above.
SECONDARY MINERALOGY: Angular gabbro clasts in a matrix of plagioclase. Gabbro clasts more altered with interstitial amphibole and small 3 × 1 mm patches of pyrite.



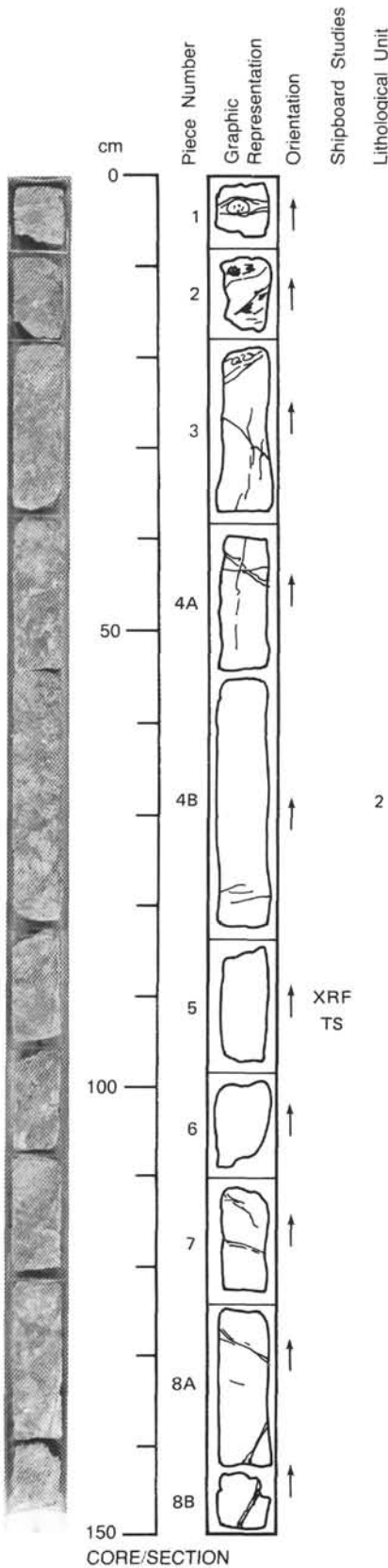
118-735B-26R-4

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1-8B

Olivine Gabbro

Pieces 1-8B



F:0°

COLOR: Gray.

LAYERING: None, though olivine is distributed in irregular intervals at 24-27, 34-40, 48-50, 76-81, 112-114, and 139-146 cm.

F:40°

DEFORMATION: Porphyroclastic to well-foliated gabbro in Pieces 1, 2, and top of 3. Bottom of Piece 2 and top of Piece 3 has amphibole-rich zone with ilmenite concentrations and common pyrite. Rest of core is not foliated and has only some sugary, granulated large plagioclase.

F:40°

PRIMARY MINERALOGY:

Plagioclase—Mode: 40%-60%.
Crystal size: 2-20 mm.

Crystal shape: Subhedral to euhedral.

Preferred orientation: Not determined.

Percent replacement: Some granulation.

Clinopyroxene—Mode: 20%-40%.

Crystal size: 2-28 mm.

Crystal shape: Anhedral, well-developed oikocrysts, up to 7 cm enclosing euhedral to subhedral plagioclase.

Preferred orientation: Not determined.

Percent replacement: Some amphibole replacement.

Olivine—Mode: 5%-10%.

Crystal size: 2-6 mm.

Crystal shape: Anhedral, slightly elongate.

Preferred orientation: Not determined.

Percent replacement: Serpentine alteration common; talc pseudomorph at 51 cm.

SECONDARY MINERALOGY:

Total percent: 5%-15%.

Texture: Amphibole developed along veins and fractures (dark blue green amphibole).

Percent vein material: Not determined.

Vein material: One large vein of soft white green mineral cutting Pieces 8A and 8B, 2-mm-wide.

Same material as that coating fractures in Core 117-735B-26R.

COMMENTS: Gradational grain-size changes are again common in the gabbro. It is particularly coarse-grained in Pieces 4B and 8A.

118-735B-27R-1

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1-11

Weakly Foliated Metagabbro

Piece 1-5 (top), and 8C (bottom)-11

COLOR: Grayish green-light gray.
LAYERING: Not apparent except for vague size layering.
DEFORMATION: Weak foliation is present.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 60%.
 Crystal size: 0.3 cm.
 Crystal shape: Euhedral.
 Preferred orientation: Not clear.
 Percent replacement: Not determined.

 Clinopyroxene—Mode: 60%.
 Crystal size: 1-0.3 cm.
 Crystal shape: Subhedral.
 Preferred orientation: Not clear.
 Percent replacement: Almost 100% by amphibole.
SECONDARY MINERALOGY:
 Total percent: 55%.
 Texture: Clinopyroxene is almost perfectly replaced by amphibole; plagioclase is altered to albite + prehnite.
 Percent vein material: Trace.
 Vein material: Amphibole in Piece 2.
COMMENTS: Piece 11 is deformed and foliated.

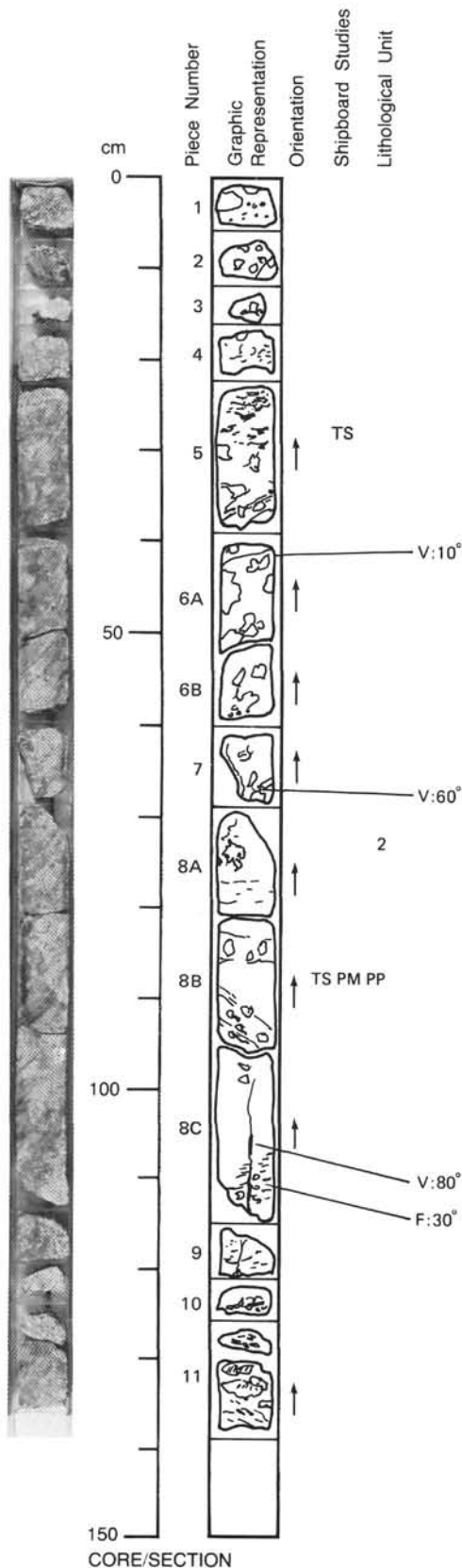
Olivine-Bearing Metagabbro

Piece 5 (bottom)-8C (top)

COLOR: Gray, partly greenish.
LAYERING: Olivine-rich zone (Pieces 8B and 5-6A) defines layering. The zone is 1 to 2.5 cm thick.
DEFORMATION: Weak deformation near amphibole + plagioclase veins (Pieces 7 and 6A)
PRIMARY MINERALOGY:
 Plagioclase—Mode: 50%.
 Crystal size: 2 cm.
 Crystal shape: Euhedral-subhedral.
 Preferred orientation: None—not clear.
 Percent replacement: Not determined.

 Clinopyroxene—Mode: 20%-60%.
 Crystal size: 2-4 cm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: 5%-10% by amphibole.

 Olivine—Mode: 20%-25%, variable.
 Crystal size: 1-3 cm.
 Crystal shape: Subhedral.
 Preferred orientation: None.
 Percent replacement: Slightly replaced by tremolite + talc or mica.
SECONDARY MINERALOGY:
 Total percent: 10%-15%.
 Texture: Not determined.
 Percent vein material: Not determined.
 Vein material: Albite in Piece 6A, 7 to 3 mm thick, inclined at 10°.
 Amphibole in Pieces 8C and 7, 0.5-5 mm thick, inclined at 60°-80°.



CORE/SECTION

118-735B-27R-1 (continued)

METAMORPHOSED IRON-TITANIUM OXIDE GABBRO

Piece 5 (top) and 8C (bottom)

COLOR: Greenish gray, with a black part.

LAYERING: Opaque-rich zones are 2 to 3 cm thick. These zones could be magnetic layers.

DEFORMATION: Almost no deformation.

PRIMARY MINERALOGY: Similar to olivine-bearing metagabbro (see above), except that opaque mineral content is up to 10%; no olivine was observed. Grain size is smaller than the olivine-bearing metagabbro.

SECONDARY MINERALOGY:

Total percent: 30%.

Texture: Clinopyroxene is replaced by amphibole.

Percent vein material: None.

Vein material: None.

COMMENTS: Iron-titanium oxide gabbros are present in between coarse-grained olivine gabbro and weakly foliated medium- to coarse-grained metagabbro.

118-735B-27R-2

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1A-3C

Foliated Olivine-Bearing Gabbro

Pieces 1A-1D

COLOR: Medium greenish-gray.
LAYERING: None.
DEFORMATION: Stretching of plagioclase and clinopyroxene crystals is intense and is accompanied by amphibolitization in the upper part of Piece 1A.

PRIMARY MINERALOGY:
 Plagioclase—Mode: 55%-60%.
 Crystal size: Up to 3 cm.
 Crystal shape: Subhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

Clinopyroxene—Mode: 35%-40%.
 Crystal size: Up to 2 cm.
 Crystal shape: Subhedral.
 Preferred orientation: Not determined.
 Percent replacement: Up to 50% by amphibole.

Olivine—Mode: 3%-5%.
 Crystal size: Up to 2 cm.
 Crystal shape: Subhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

SECOND MINERALOGY:
 Total percent: Slight to moderate alteration.
 Texture: Intense amphibole replacement of clinopyroxene (up to 50%) in upper portion of Piece 1A.
 Percent vein material: Not determined.
 Vein material: Green amphibole containing veins.
 Veinlets with sulfides.

COMMENTS: Sulfide dissemination throughout the rock.

Olivine-Bearing Gabbro

Pieces 1E-3C

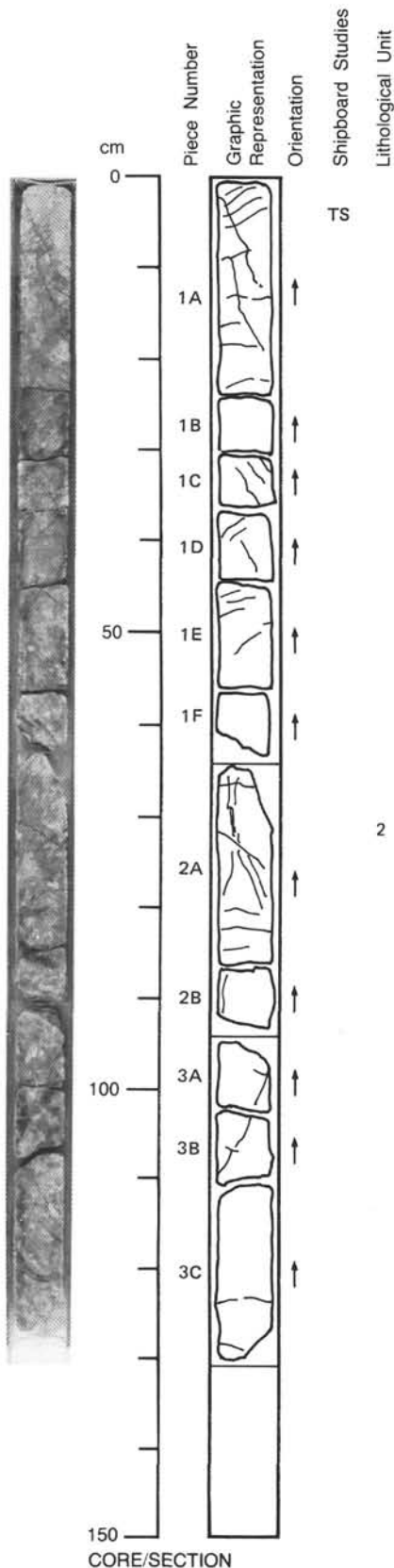
COLOR: Medium gray, greenish staining along amphibole-bearing veins.
LAYERING: None apparent. However, small decrease in grain size from top to bottom of section.
DEFORMATION: None.

PRIMARY MINERALOGY:
 Plagioclase—Mode: 55%-60%.
 Crystal size: Up to 3 cm.
 Crystal shape: Subhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

Clinopyroxene: Mode: 35%-40%.
 Crystal size: Up to 2 cm.
 Crystal shape: Subhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

Olivine—Mode: 3%-5%.
 Crystal size: Up to 2 cm.
 Crystal shape: Subhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

SECONDARY MINERALOGY:
 Total percent: Slight alteration.
 Texture: Green amphibole veins around clinopyroxene (<10%). Olivine appears to be relatively fresh. Percent vein material: Not determined.
 Vein material: Amphibole veins, especially in Piece 2A. Sulfides in veinlets and disseminated throughout rock.



CORE/SECTION

118-735B-27R-3

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1A-1H

Olivine-Bearing Gabbro

Pieces 1A-1H

COLOR: Greenish gray.

LAYERING: Size grading of clinopyroxene, increasing downward from bottom of Piece 1E to Piece 1H.

DEFORMATION: Weakly foliated. Localized zones of recrystallized plagioclase (Piece 1H).

PRIMARY MINERALOGY:

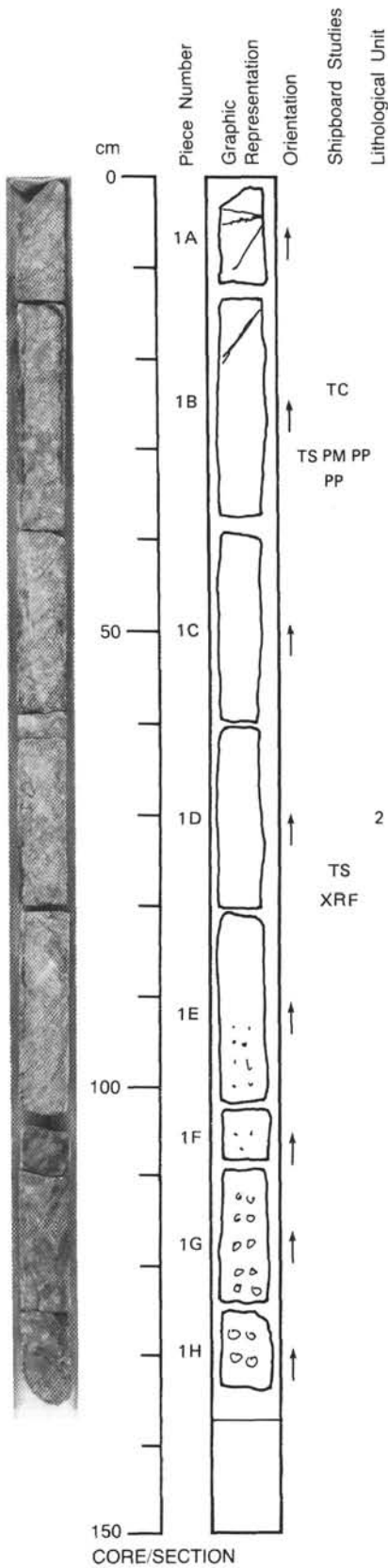
Plagioclase—Mode: 65%.
 Crystal size: 2-15 mm.
 Crystal shape: Subhedral-euhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

Clinopyroxene—Mode: 35%.
 Crystal size: 2-25 mm.
 Crystal shape: Subhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

Olivine—Mode: 5%.
 Crystal size: 2-5 mm.
 Crystal shape: Anhedral, interstitial.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

SECONDARY MINERALOGY:

Total percent: 10%-15%.
 Texture: Amphibole replacing clinopyroxene.
 Percent vein material: Not determined.
 Vein material: Amphibole.



118-735B-27R-4

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1A-2

Massive Olivine-Bearing Gabbro

Pieces 1A-2

COLOR: Medium gray.

LAYERING: Grain-size gradation and phase layering. Two "Grain-size units" can be distinguished: Unit 1 from 0-37 cm (clinopyroxene grain size increases from 0.8 to 3 cm); Unit 2 from 37-92 cm (size of clinopyroxene increases from 0.5 to 2 cm). In Unit 1, phase layering is also apparent: olivine gets enriched toward bottom of Piece 1C.

DEFORMATION: None.

PRIMARY MINERALOGY:

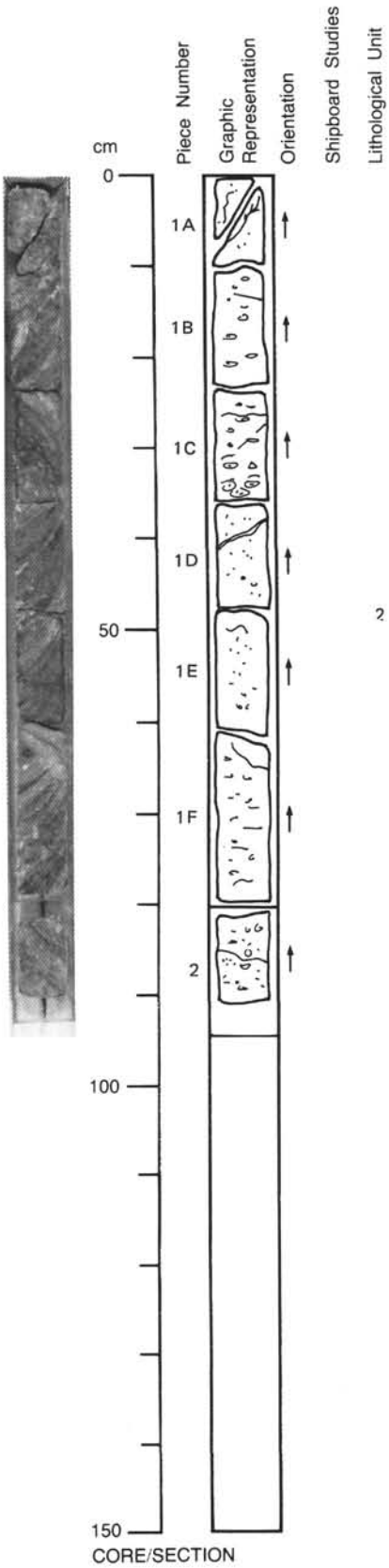
Plagioclase—Mode: 55%-65%.
 Crystal size: Up to 3 cm.
 Crystal shape: Subhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

Clinopyroxene—Mode: 35%-40%.
 Crystal size: Up to 3 cm.
 Crystal shape: Subhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

Olivine—Mode: <2% to 10%.
 Crystal size: Up to 2 cm.
 Crystal shape: Anhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

SECONDARY MINERALOGY:

Total percent: Slight alteration.
 Texture: Olivine is almost completely preserved.
 Clinopyroxene is replaced by amphibole subordinately (<5%). Few sulfides.
 Percent vein material: Not determined.
 Vein material: Amphibole.



118-735B-28R-1

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1A-8B

Foliated to Porphyroclastic Olivine-Bearing Metagabbro

Pieces 1A-8B

COLOR: Medium gray to greenish gray.

LAYERING: No apparent igneous layering.

DEFORMATION: Type and intensity of deformation highly variable throughout section.

Pieces 1-3: Strongly foliated.

Piece 2: Contains a porphyroclastic, augen gneissic band about 3 cm wide. Deformation plane is subhorizontal.

Piece 3: Contains mylonitic band.

Piece 4: Porphyroclastic.

Piece 5A: Only weakly foliated.

Piece 5B: Strongly foliated and grades into a porphyroclastic, augen gneissic zone that is also developed in Piece 6.

Upper one-half of Piece 7A: Weakly foliated, lower one-half strongly foliated with large porphyroclastic clinopyroxene augen (augen gneissic), up to 3 cm.

Pieces 7B and 7C: Feebly foliated, downward decrease in grain size from about 1.5 to <0.5 cm.

Pieces 8A and 8B: Coarse-grained, porphyroclastic, brecciated.

PRIMARY MINERALOGY:

Proportions of major phases difficult to estimate. Overall composition about 55% plagioclase, 43% clinopyroxene, 2% olivine. Olivine enrichment in Piece 2.

Plagioclase—Mode: 55%.

Crystal size: Up to 10 mm.

Crystal shape: Not determined.

Preferred orientation: Stretched.

Percent replacement: Not determined.

Clinopyroxene—Mode: 43%.

Crystal size: Up to 20 mm.

Crystal shape: Not determined.

Preferred orientation: Stretched.

Percent replacement: Up to 25% by green amphibole.

Olivine—Mode: 2%.

Crystal size: Up to 10 mm.

Crystal shape: Not determined.

Preferred orientation: Stretched.

Percent replacement: Not determined.

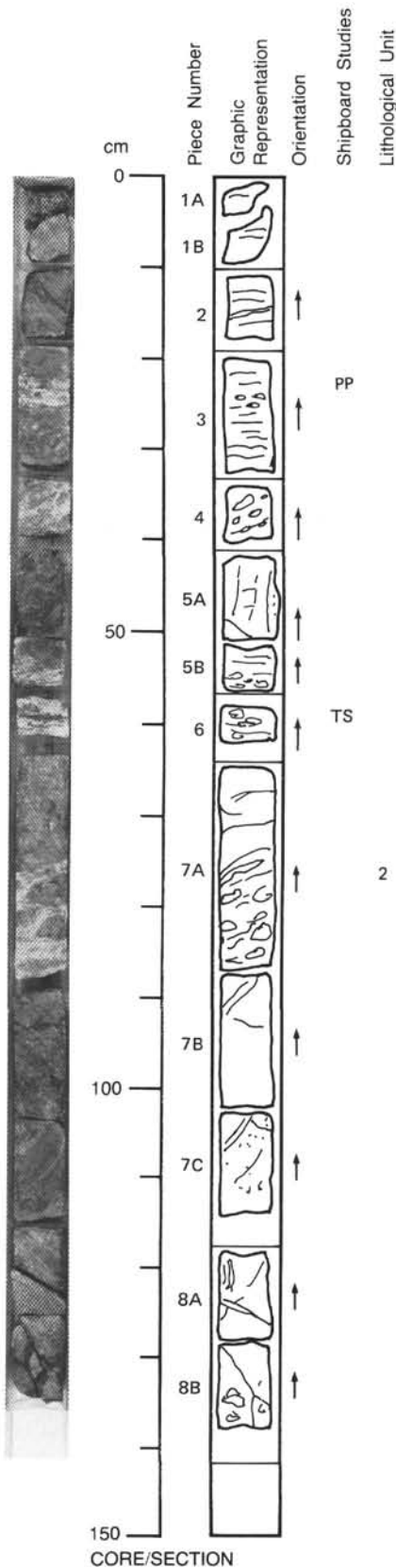
SECONDARY MINERALOGY:

Total Percent: Not determined.

Texture: Green amphibole replacing clinopyroxene (up to 25%). Albite plus amphibole replacement in augen gneissic bands. Disseminated sulfides.

Percent vein material: Not determined.

Vein material: Amphibole. Some veinlets with white mineral filling and some with sulfide.



118-735B-28R-2

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1A-7

Foliated Olivine-Bearing Metagabbro

Pieces 1A-2

COLOR: Greenish dark gray.
LAYERING: None.
DEFORMATION: Foliation defined by elongate amphibole and clinopyroxene (mostly replaced by amphibole) grains. Pieces 1B and 2: Fine-grained, well-foliated amphibolitic zones are present that dip at 60°-70° to 90°.

PRIMARY MINERALOGY:
 Plagioclase—Mode: 60%.
 Crystal size: 10 mm.
 Crystal shape: Euhedral.
 Preferred orientation: Partly elongate parallel to foliation.
 Percent replacement: Trace or none.

Clinopyroxene—Mode: 35%.
 Crystal size: 5-20 mm.
 Crystal shape: Euhedral to subhedral.
 Preferred orientation: Partly elongate parallel to foliation.
 Percent replacement: 20% by amphibole.

Olivine—Mode 2%-6%.
 Crystal size: 3-10 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: 2% by tremolite + mica or talc.

SECONDARY MINERALOGY:
 Total percent: 10%.
 Texture: Clinopyroxene is replaced by amphibole along rims and cracks.
 Olivine is replaced by tremolite + mica or talc.
 Amphibole is more abundant in Pieces 1A and 1B, than in Pieces 1C and 2.
 Percent vein material: Trace.
 Vein material: Amphibole.

Olivine Gabbro

Pieces 4-7

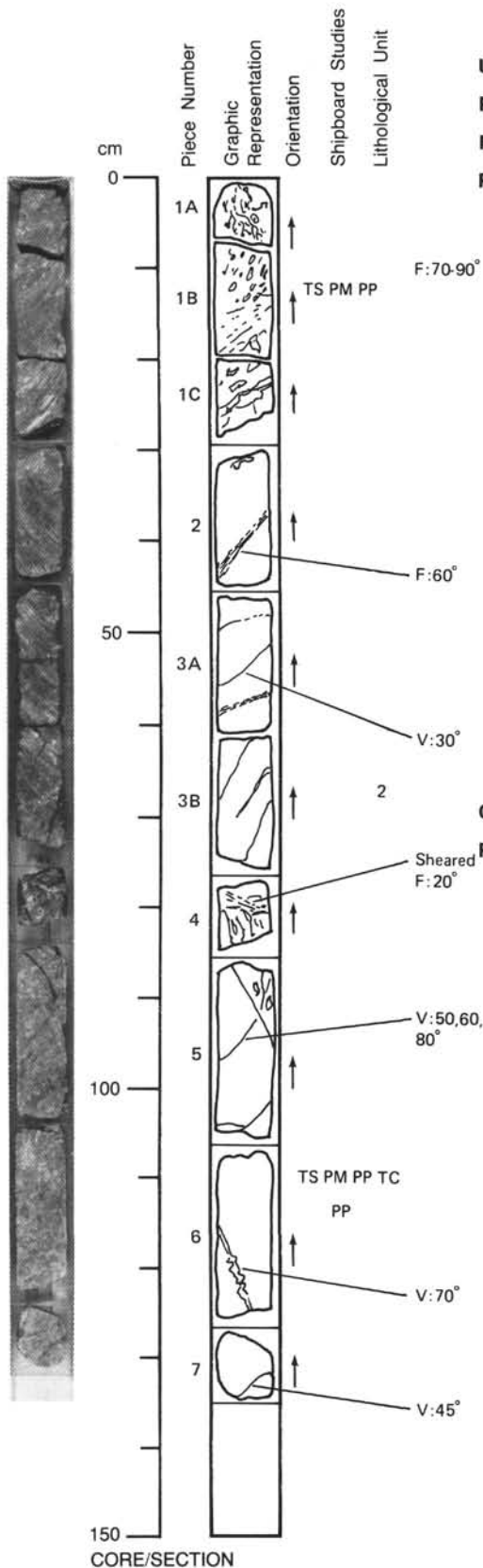
COLOR: Gray.
LAYERING: None.
DEFORMATION: Feeble, except in Piece 4, where plagioclase-rich sheared zone is present (similar to augen gneissic part of Section 118-735B-28R-1) and in Piece 7, which is slightly cataclastic.

PRIMARY MINERALOGY:
 Plagioclase—Mode: 60%.
 Crystal size: 3-10 mm.
 Crystal shape: Euhedral.
 Preferred orientation: None.
 Percent replacement: Trace or none.

Clinopyroxene—Mode: 35%.
 Crystal size: 3-15 mm.
 Crystal shape: Euhedral to subhedral.
 Preferred orientation: None.
 Percent replacement: 20% by amphibole.

Olivine—Mode: 7%.
 Crystal size: 5-10 mm.
 Crystal shape: Some are euhedral.
 Preferred orientation: Not determined.
 Percent replacement: 50%-100% by tremolite + mica or talc.

SECONDARY MINERALOGY:
 Total percent: 15%.
 Texture: Clinopyroxene is replaced by amphibole, locally extensive where amphibole veins are 1 to 3 mm thick. Serpentine (2-3 vol%) replaces olivine. The rim of olivine is replaced by pale green tremolite + talc(?).
 Percent vein material: Abundant.
 Vein material: Amphibole.



118-735B-28R-3

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1A-9

Massive Olivine Gabbro

Pieces 1A-1C, and 7A-9

COLOR: Gray.
LAYERING: Possible modal layering. Irregular distribution of plagioclase, clinopyroxene, and olivine.
DEFORMATION: Undeformed.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 65%.
 Crystal size: 2-25 mm.
 Crystal shape: Subhedral to euhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

 Clinopyroxene—Mode: 25%.
 Crystal size: 2-25 mm.
 Crystal shape: Subhedral, oikocrystic.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

 Olivine—Mode: 10%.
 Crystal size: 2-10 mm.
 Crystal shape: Subhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.
SECONDARY MINERALOGY:
 Total percent: 5%-10%.
 Texture: Amphibole replacing clinopyroxene and filling fractures. Sodic plagioclase filling 1 mm wide veins. Chlorite + amphibole replacing olivine forming well-developed coronas.
 Percent vein material: Not determined.
 Vein material: Sodic plagioclase and amphibole.
COMMENTS: Finer-grained (microgabbro) segments in Pieces 7B and 8.

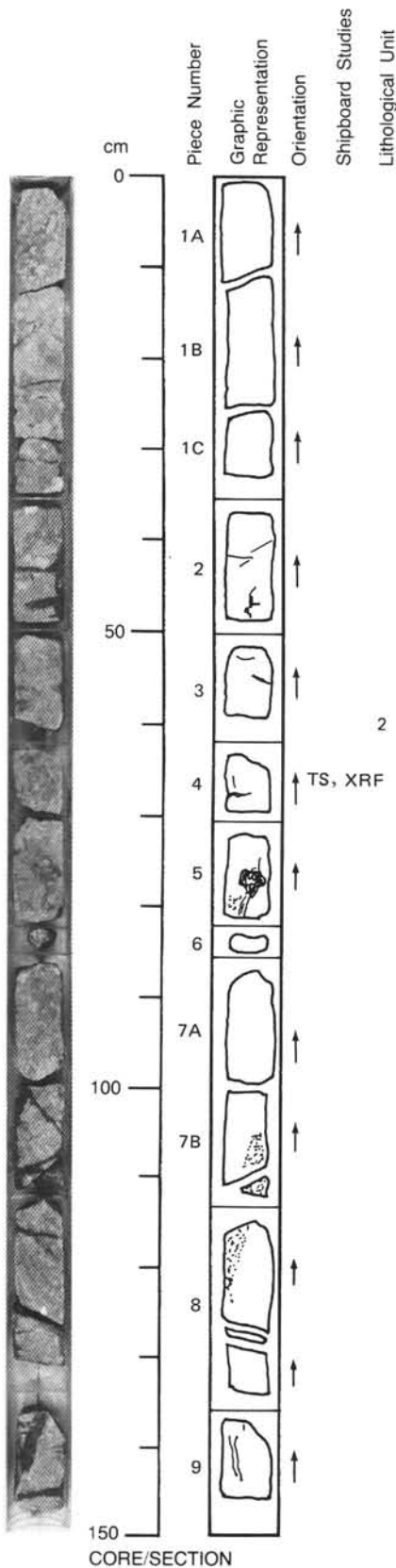
Porphyroclastic Metagabbro

Pieces 2, 3, 5, and 6

COLOR: Gray.
LAYERING: None apparent.
DEFORMATION: Weakly foliated. Porphyroclasts of clinopyroxene. Likely recrystallization of clinopyroxene and plagioclase.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 65%.
 Crystal size: < 1-10 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

 Clinopyroxene—Mode: 30%.
 Crystal size: < 1-10 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

 Olivine—Mode: 5%.
 Crystal size: 1 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.
SECONDARY MINERALOGY:
 Total percent: 20%.
 Texture: Green amphibole replaces clinopyroxene and fills veins. Opaque-rich zones in Pieces 2 and 5 (20% of Piece 5), often with small amount of sulfide.
 Percent vein material: Not determined.
 Vein material: Amphibole.
COMMENTS: Finer-grained interval in Piece 5, cored surface of Piece 3.



118-735B-28R-3 (continued)

Norite

Piece 4 (sawed surface)

COLOR: Greenish gray; locally, purplish gray.

LAYERING: None apparent, but local concentrations of low-calcium pyroxene.

DEFORMATION: None.

PRIMARY MINERALOGY:

Plagioclase—Mode: 70%.

Crystal size: 4-12 mm.

Crystal shape: Subhedral to euhedral.

Preferred orientation: Not determined.

Percent replacement: Partly replaced by epidote mineral.

Low calcium pyroxene—Mole: 35%.

Crystal size: 2-15 mm.

Crystal shape: Anhedral to subhedral with herringbone exsolution lamellae.

Preferred orientation: Not determined.

Percent replacement: Coronas of tremolite + chlorite + talc.

Clinopyroxene—Mode: 5%.

Crystal size: 5 mm.

Crystal shape: Anhedral.

Preferred orientation: Not determined.

Percent replacement: Replaced by amphibole.

SECONDARY MINERALOGY:

Total percent: 5%-10%.

Texture: Orthopyroxene with well-developed coronas of tremolite + chlorite + talc. Plagioclase partly altered to epidote mineral. Clinopyroxene altered to amphibole.

Percent vein material: Not determined.

Vein material: Not determined.

COMMENTS: Sharp contact with finer-grained segment on cored surface of Piece 4. Microgabbro composed primarily of plagioclase + clinopyroxene (now amphibole).

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1-18

Nonfoliated Metagabbro

Pieces 1-3

COLOR: Greenish-gray.
LAYERING: No layering.
DEFORMATION: No deformation.
PRIMARY MINERALOGY:
 Plagioclase—Mode: Not determined.
 Crystal size: < 10 mm.
 Crystal shape: Not determined.
 Preferred orientation: None.
 Percent replacement: Replaced by albite.

 Clinopyroxene—Mode: Not determined.
 Crystal size: < 10 mm.
 Crystal shape: Not determined.
 Preferred orientation: None.
 Percent replacement: Replaced by amphibole.

Olivine—Mode: Not determined.
 Crystal size: < 10 mm.
 Crystal shape: Not determined.
 Preferred orientation: None.
 Percent replacement: Not determined.

SECONDARY MINERALOGY:
 Total percent: Not determined.
 Texture: Pseudomorphic.
 Percent vein material: < 5%.
 Vein material: Amphibole.

??? Olivine-Bearing Gabbro

Pieces 4-6A, and 11-14

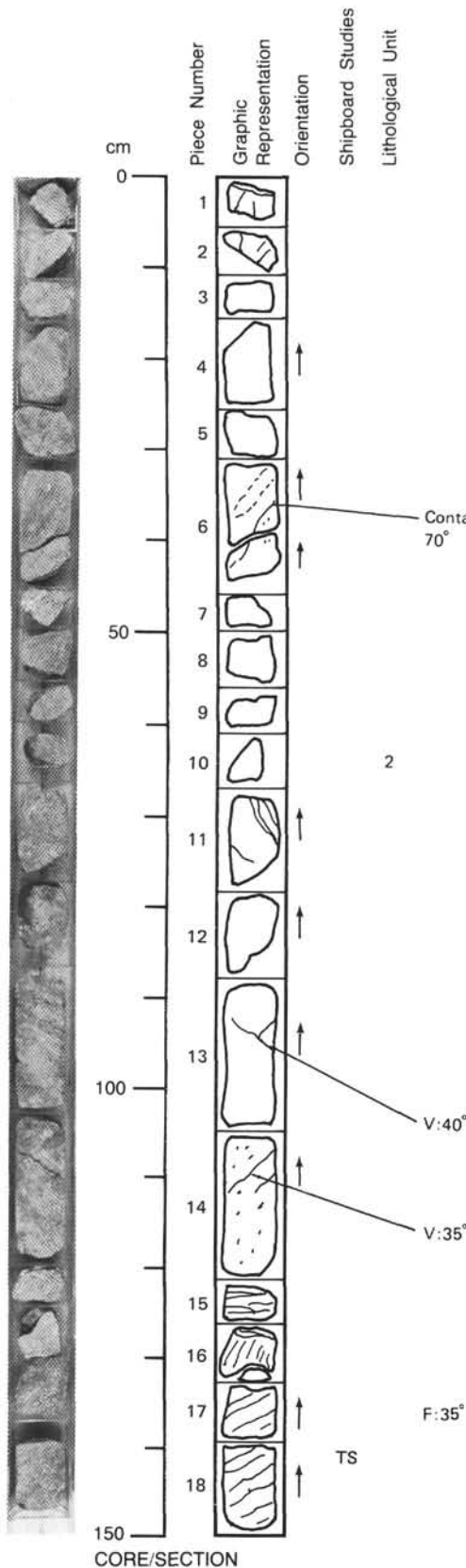
COLOR: Gray.
LAYERING: Fine-grained bands in Pieces 6 and 14 (grain size < 1 cm); grain size in coarse-grained pieces < 3 to 5 cm. Olivine-rich layer dipping at 70° in Piece 6A.

DEFORMATION: Not determined.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 55%.
 Crystal size: See layering above.
 Crystal shape: Not determined.
 Preferred orientation: None.
 Percent replacement: Replaced by albite.

Clinopyroxene—Mode: 40%.
 Crystal size: See layering above.
 Crystal shape: Not determined.
 Preferred orientation: None.
 Percent replacement: Replaced by amphibole.

Olivine—Mode: < 2-10%.
 Crystal size: Not determined.
 Crystal shape: Not determined.
 Preferred orientation: None.
 Percent replacement: Replaced by amphibole and talc.

SECONDARY MINERALOGY:
 Total percent: Not determined.
 Texture: Pseudomorphic.
 Percent vein material: < 1%.
 Vein material: Amphibole.



CORE/SECTION

118-735B-28R-4 (continued)

Amphibolitized Gabbro**Piece 6B**

Weakly cataclastic, mineralogy identical to foliated metagabbros (Pieces 7-11 and 15-18).

Foliated Metagabbro**Pieces 7-10, and 15-18**

COLOR: Green gray.

LAYERING: No layering.

DEFORMATION: Foliation dips 35° and lineation defined by aligned amphiboles.

PRIMARY MINERALOGY:

Plagioclase—Mode: 60%.

Crystal size: < 10 mm.

Crystal shape: Porphyroclasts flattened in the foliation.

Preferred orientation: Marks foliation.

Percent replacement: 5% by more sodic plagioclase.

Clinopyroxene—Mode: 60%.

Crystal size: < 10 mm.

Crystal shape: Porphyroclasts flattened in the foliation.

Preferred orientation: Marks foliation.

Percent replacement: 100% by amphibole.

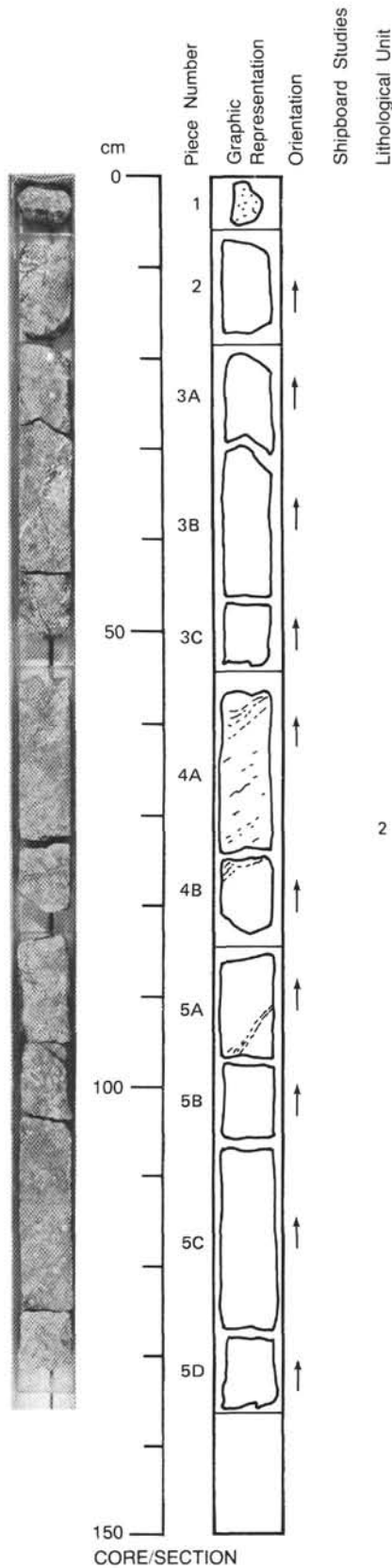
SECONDARY MINERALOGY:

Total percent: 50%-100%.

Texture: Pseudomorphic to granoblastic.

Percent vein material: < 1%.

Vein material: Amphibole vein in Pieces 15 and 16.



UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1-5D

Amphibolitized Metagabbro

Pieces 1 and 2

COLOR: Gray.
LAYERING: Not determined.
DEFORMATION: Weakly foliated.
PRIMARY MINERALOGY: Similar to brecciated metagabbro described below.
SECONDARY MINERALOGY:
 Total percent: Not determined.
 Texture: Not determined.
 Percent vein material: Not determined.
 Vein material: Not determined.
COMMENTS: Medium-grained metagabbro consisting of pale green amphibole and milky white plagioclase (albitized) and minor interstitial ilmenite.

Brecciated Metagabbro

Pieces 2-3C

COLOR: Not determined.
LAYERING: Not determined.
DEFORMATION: Not determined.
PRIMARY MINERALOGY:
 Plagioclase—Mode: Not determined.
 Crystal size: 3 mm to greater than 1 cm.
 Crystal shape: Subhedral granular.
 Preferred orientation: None.
 Percent replacement: Not determined.
 Clinopyroxene—Mode: Not determined.
 Crystal size: 3 mm to greater than 1 cm.
 Crystal shape: Subhedral to intergranular, locally oikocrystic, often broken into angular fragments 3 mm to more than 1 cm wide.
 Preferred orientation: None.
 Percent replacement: Not determined.
 Olivine—Mode: Not determined.
 Crystal size: Not determined.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: 100% by clay minerals(?).
SECONDARY MINERALOGY:
 Total percent: Not determined.
 Texture: Not determined.
 Percent vein material: Not determined.
 Vein material: Amphibolite ± plagioclase.
COMMENTS: Coarse- to very coarse-grained subhedral granular gabbro with occasional oikocrysts of clinopyroxene enclosing subhedral plagioclase laths crisscrossed by a network of amphibole and amphibole-plagioclase veins. Pyroxenes generally appear fragmented into coarse to very coarse angular feldspar. Many of the pyroxene clasts appear rotated. The matrix consists of both recrystallized primary feldspar and hydrothermal plagioclase and amphibole. Rare clay-filled anhedral grains could be olivine pseudomorphs.

118-735B-29R-1 (continued)

Amphibolitized Metagabbro Gneiss**Pieces 4A and 4B****COLOR:** Green to greenish gray.**LAYERING:** Not determined.**DEFORMATION:** Medium-grained gneissic texture with occasional coarse pyroxene augen.**PRIMARY MINERALOGY:**

Plagioclase—Mode: Not determined.

Crystal size: 1-3 mm.

Crystal shape: Anhedral.

Preferred orientation: In plane of foliation.

Percent replacement: Not determined.

Clinopyroxene—Mode: Not determined.

Crystal size: 1-3 mm, a few have coarser augen.

Crystal shape: Anhedral.

Preferred orientation: In plane of foliation.

Percent replacement: 90%-100% by amphibole.

SECONDARY MINERALOGY:

Total percent: Not determined.

Texture: Amphibole and plagioclase (milky). Lower half of zone contains paler green amphibole and abundant ilmenite (5%-10% locally). A few rare coarse pyroxene augen are present that appear amphibolitized in hand sample.

Percent vein material: 5%-10%.

Vein material: Amphibole and plagioclase.

Olivine-Bearing Gabbro**Pieces 4B-5D****COLOR:** Greenish gray.**LAYERING:** No primary igneous layering.**DEFORMATION:** Gneissic band cutting gabbro at 45° at 91-99 cm.**PRIMARY MINERALOGY:**

Plagioclase—Mode: 60%.

Crystal size: 0.5-1.5 cm in clinopyroxene oikocrysts, > 1 cm elsewhere.

Crystal shape: Subhedral to euhedral.

Preferred orientation: None.

Percent replacement: Replaced by albite.

Clinopyroxene—Mode: 40%.

Crystal size: 5-15 mm.

Crystal shape: Anhedral intergranular.

Preferred orientation: None.

Percent replacement: Locally replaced and rimmed by amphibole.

Olivine—Mode: <1%.

Crystal size: Not determined.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: 100%. Replacement mineral not determined.

SECONDARY MINERALOGY:

Total percent: Not determined.

Texture: Clinopyroxene locally rimmed and replaced by amphibole; plagioclase locally altered to milky white mineral (albitized), particularly around a small gneissic band cutting gabbro at 45° at 91-99 cm. Patches of ilmenite locally present.

Percent vein material: None.

Vein material: None.

COMMENTS: Coarse-grained anhedral to subhedral granular, with occasional clinopyroxene oikocrysts enclosing 0.5- to 1.5-cm plagioclase laths.

118-735B-29R-2

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1A-1L

Massive Olivine Gabbro

Pieces 1A-1L

COLOR: Variable white to gray; dominantly gray.

LAYERING: None.

DEFORMATION: Only that associated with veining.

PRIMARY MINERALOGY:

Plagioclase—Mode: 55%.

Crystal size: 3-20 mm; augen 10 mm.

Crystal shape: Andedral to subhedral.

Preferred orientation: None.

Percent replacement: 15%-30% by sodic plagioclase.

Clinopyroxene—Mode: 40%.

Crystal size: 3-40 mm; augen 10 mm; large clinopyroxene oikocryst (4-5 cm wide) in Piece 1E at 55-60 cm.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: 25%-75% by amphibole.

Olivine—Mode: 0%-5%.

Crystal size: 3-5 mm.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: 20%-100% by talc and smectite.

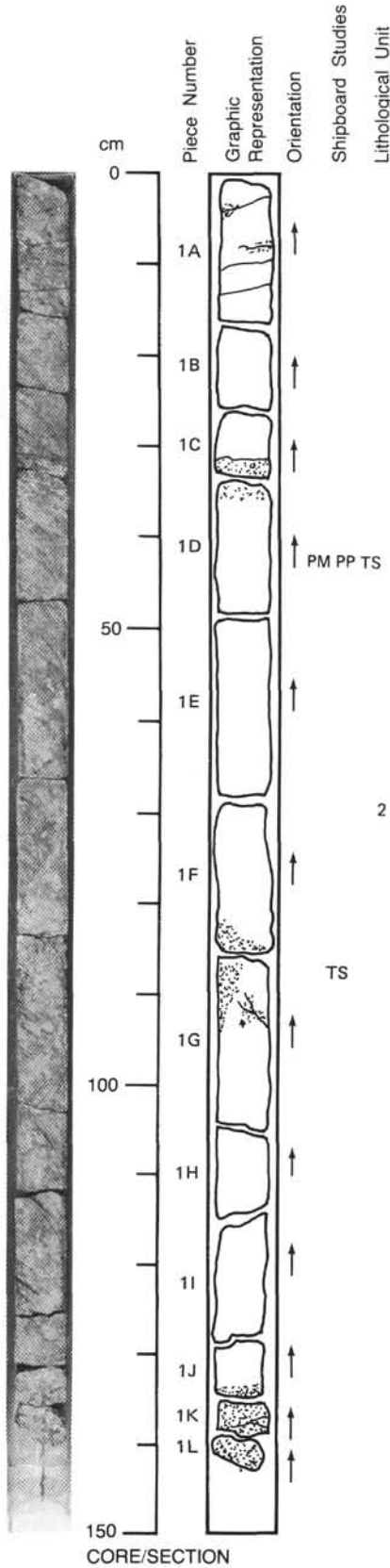
SECONDARY MINERALOGY:

Total percent: 25%-100%.

Texture: Amount of alteration varies over length of section from 25%-100%. Alteration is greatest at 5-15, 29-39, 80-94, and 130-142 cm. In these intervals, intense replacement of clinopyroxene by amphibole and of plagioclase by albite occurs. Lower in the section, olivine is replaced by talc and smectite. Secondary ilmenite (10 modal%) is concentrated into layers and around clinopyroxene from 0-32 cm. Trace of sulfides in Piece 1B.

Percent vein material: 1%-2%.

Vein material: Green amphibole. Veins are very thin.



CORE/SECTION

118-735B-29R-3

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1-14D

Amphibolitized Gabbro

Pieces 1, 2, and 4-11

COLOR: Green-white to green.
LAYERING: No layering.
DEFORMATION: Degree of foliation varies.
 Piece 1: A strong foliation defined by aligned amphiboles.
 Piece 8: A more weakly defined foliation.

PRIMARY MINERALOGY:
 Plagioclase—Mode: Only some plagioclase left.
 Original mineralogy probably like that in olivine gabbro below.
 Crystal size: 1-10 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: Moderate to extensive albitization.

Clinopyroxene—Mode: Not determined.
 Crystal size: 1-10 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: Nearly 100% by amphibole.

Olivine—Mode: 10%.
 Crystal size: Not determined.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: 100% by amphibole, clay(?), and calcite(?).

SECONDARY MINERALOGY:
 Total percent: Up to 100% in some pieces.
 Texture: Dark green amphibole after clinopyroxene, which also fills veins and fractures. Some albitization of plagioclase. No opaque zones in this interval.
 Percent vein material: Minor.
 Vein material: Amphibole.

COMMENTS: Pieces 5-7 are fine-grained; Piece 7 has a contact between coarse and fine amphibolite that may record an igneous grain-size contrast.

Olivine Gabbro

Pieces 3 and 12-14D

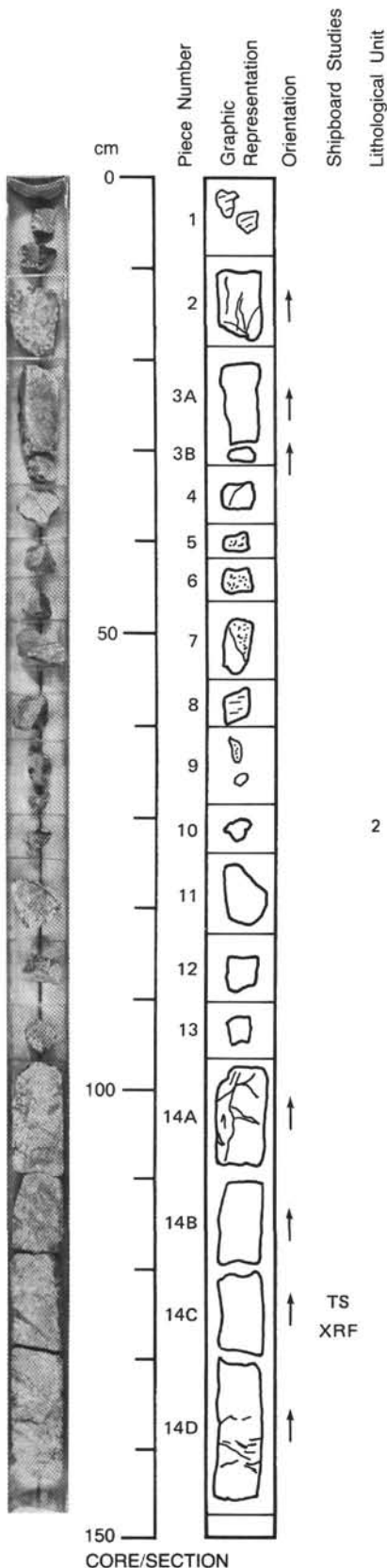
COLOR: Gray.
LAYERING: No layering. Medium- to coarse-grained (2-10 mm) throughout.
DEFORMATION: Not determined.

PRIMARY MINERALOGY:
 Plagioclase—Mode: 40%-60%.
 Crystal size: 3-10 mm.
 Crystal shape: Euhedral to anhedral.
 Preferred orientation: None.
 Percent replacement: Not determined.

Clinopyroxene—Mode: 25%-40%.
 Crystal size: 2-11 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: Extensive replacement by amphibole along veins and fractures.

Olivine—Mode: 2%-4%.
 Crystal size: Sporadically developed.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: Almost completely replaced by clay minerals and serpentine.

SECONDARY MINERALOGY:
 Total percent: 10%-30%.
 Texture: Most olivine partially altered to clay minerals and serpentine. Extensive amphibolitization along veins and fractures. Left side of Piece 14A and bottom of Piece 14D strongly amphibolitized and little deformed. Granulation of plagioclase and bending of amphibole present.
 Percent vein material: 3%.
 Vein material: Amphibole. Vein in Piece 14A looks like a small vertical offset. Pieces 3-8: Veined with a black alteration phase. 1-3 mm wide.



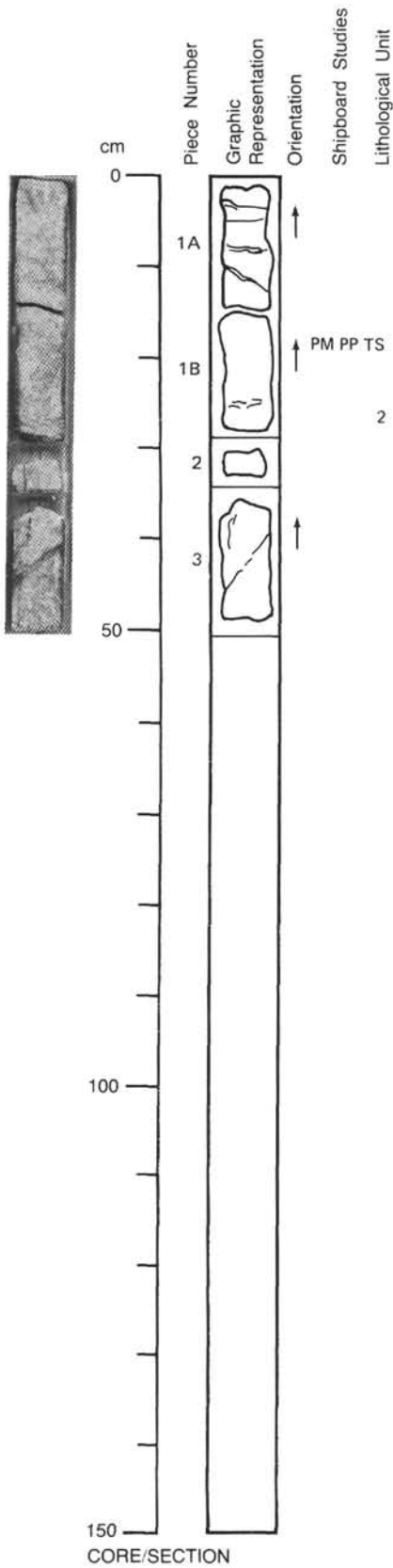
118-735B-29R-4

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1A-3

Amphibolitized Olivine Gabbro

Pieces 1A-3



COLOR: Gray to greenish-white.
LAYERING: Grain-size variations, parallel to a very faint subhorizontal foliation, probably magmatic in origin.
DEFORMATION: Small fracture crosscutting Piece 3. May be a little offset; deformation along amphibolitized zones at 6-12 cm.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 40%-60%.
 Crystal size: 3-10 mm.
 Crystal shape: Anhedral to euhedral.
 Preferred orientation: Weak igneous lamination.
 Percent replacement: Some albitization and plagioclase granulation.

 Clinopyroxene—Mode: 20%-40%.
 Crystal size: 2-11 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Igneous lamination weakly developed.
 Percent replacement: Extensively replaced by green amphibole.

 Olivine—Mode: 5%.
 Crystal size: 3-8 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Not determined.
 Percent replacement: 80%-100% by clay minerals and serpentine.
SECONDARY MINERALOGY:
 Total percent: 40%-60%.
 Texture: Green amphibole after clinopyroxene. Some plagioclase granulation. A whitish slightly albitized zone at 25 cm. Amphibolitization in this section is largely static. No prominent foliation.
 Percent vein material: Not determined.
 Vein material: Not determined.
COMMENTS: 0-5 and 45-50 cm, moderately fresh, medium-grained olivine gabbro as in Section 118-735B-29R-3.

118-735B-30R-1

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1-19

Massive Olivine Gabbro

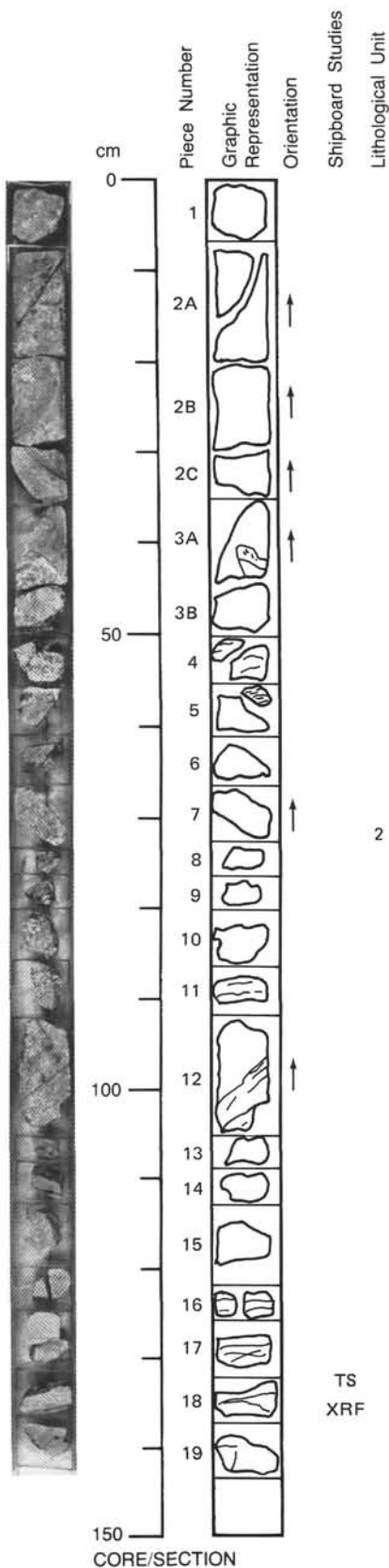
Pieces 1-3, 5, and 16

COLOR: Gray.
LAYERING: None.
DEFORMATION: Absent.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 55%.
 Crystal size: 1-6 mm.
 Crystal shape: Anhedral to subhedral.
 Preferred orientation: None.
 Percent replacement: 1%.
 Clinopyroxene—Mode: 41%.
 Crystal size: 1-5 mm.
 Crystal shape: Subhedral.
 Preferred orientation: None.
 Percent replacement: 50% by green amphibole.
 Olivine—Mode: 4%.
 Crystal size: 1-4 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: 100%, replacement; mineral undetermined.
SECONDARY MINERALOGY:
 Total percent: 20%.
 Texture: Green amphibole replaces clinopyroxene.
 Percent vein material: <5%.
 Vein material: Piece 2A: Veins filled with green amphibole and traces of plagioclase. Piece 3A: Plagioclase-rich vein (3 mm thick).

Porphyroclastic Metagabbro

Pieces 4 and 8-10

COLOR: Greenish gray.
LAYERING: None.
DEFORMATION: Foliation defined by flattening of plagioclase and clinopyroxene. Large porphyroclasts of pyroxene are fractionated and granulated.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 60%.
 Crystal size: 1-10 mm.
 Crystal shape: Lens.
 Preferred orientation: Yes.
 Percent replacement: Not determined.
 Clinopyroxene—Mode: 37%-39%.
 Crystal size: 2-12 mm.
 Crystal shape: Lens.
 Preferred orientation: Yes.
 Percent replacement: Not determined.
 Ilmenite—Mode: 1%-3%.
 Crystal size: 3 mm.
 Crystal shape: Granular.
 Preferred orientation: Yes.
 Percent replacement: Not determined.
SECONDARY MINERALOGY:
 Total percent: 20%.
 Texture: Green amphibole pseudomorphs after clinopyroxene. Plagioclase granoblasts derived from primary plagioclase. Ilmenite is probably partly transformed into magnetite.
 Percent vein material: Not determined.
 Vein material: Not determined.



Foliated Metagabbro**Pieces 7 and 11-19**

COLOR: Dark green.

LAYERING: None.

DEFORMATION: Foliation is defined by preferred orientation of pyroxene (now amphibole) and plagioclase that is recrystallized into fine bands parallel to the foliation plane. In Piece 12, a small fault parallel to the foliation is more intensely amphibolitized.

PRIMARY MINERALOGY:

Plagioclase—Mode: 60%.

Crystal size: 1-3 mm.

Crystal shape: Lens.

Preferred orientation: Yes.

Percent replacement: 50% by undetermined mineral.

Clinopyroxene—Mode: 35%.

Crystal size: 2-4 mm.

Crystal shape: Lens.

Preferred orientation: Yes.

Percent replacement: 100% by amphibole.

Orthopyroxene—Mode: 5%.

Crystal size: 2-3 mm.

Crystal shape: Lens.

Preferred orientation: Yes.

Percent replacement: 100% by amphibole.

SECONDARY MINERALOGY:

Total percent: 90%.

Texture: Green amphibole replaces almost all the clinopyroxene and orthopyroxene(?) (brown oxidized core).

Percent vein material: <5%.

Vein material: Veins of amphibole cut the foliation; the wall-rock is more intensely altered in their vicinity. Slickensides are present in the plane of veining. Chlorite can be present in association with green amphibole.

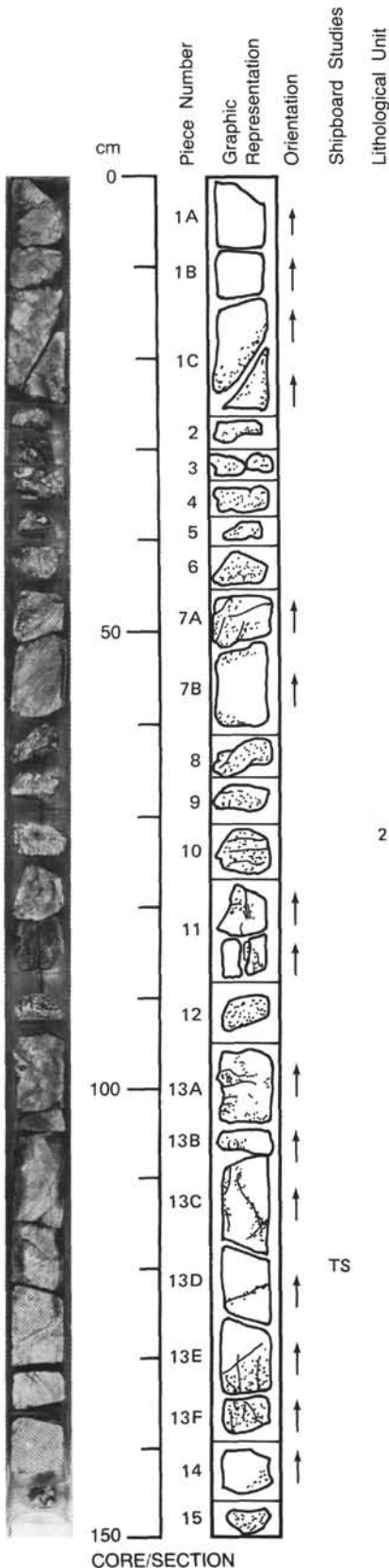
118-735B-30R-2

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1A-15

Olivine Gabbro

Pieces 1A-15



COLOR: Dark gray, mottled gray-white near altered zones.

LAYERING: None.

DEFORMATION: Brecciation/granulation of plagioclase in larger amphibole and albite veins—no foliation.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%.

Crystal size: 2 mm-2 cm.

Crystal shape: Anhedra.

Preferred orientation: None.

Percent replacement: 50% by albite(?).

Clinopyroxene—Mode: 40%.

Crystal size: 2 mm-2 cm.

Crystal shape: Anhedra.

Preferred orientation: None.

Percent replacement: 75% by amphibole.

Olivine—Mode: 0%-10%.

Crystal size: 4 mm-2 cm.

Crystal shape: Anhedra.

Preferred orientation: None.

Percent replacement: 95% by black mineral and green-white fibrous mineral.

SECONDARY MINERALOGY:

Total percent: 50%-65%.

Texture: Olivine altered to a black mineral that forms a network around olivine grains. This network is often seen with void spaces between where olivine is absent. Piece 13E: these spaces filled by talc. Clinopyroxene 50%-100% altered to green amphibole. Plagioclase altered to whiter feldspar—possibly albite, but may be just granulated calcic plagioclase. Olivine often surrounded by halo of green and white fibrous minerals.

Percent vein material: Not determined.

Vein material: Chlorite, amphibole, and sodic plagioclase. Fractures filled/coated by chlorite and amphibole (?). Some filled by white minerals, probably sodic plagioclase.

COMMENTS: Modal abundances vary over length of section. Olivine abundant at 0-26, 120-145 cm, and in Piece 10. Other intervals are void of olivine. Grain size is also variable. Predominant grain size coarse, but finer units in Pieces 5, 7A and 7B, and from 105-120 cm. These may be either intrusive, or represent areas of recrystallization.

118-735B-30R-3

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1A-6B

Altered Olivine-Bearing Gabbro

Pieces 1-3B

COLOR: Gray.

LAYERING: One coarse to fine gradation.

DEFORMATION: Some fractures or shears in Pieces 3A and 3B.

PRIMARY MINERALOGY:

Plagioclase—Mode: 40%-70%.

Crystal size: 1-12 mm.

Crystal shape: Euhedral (in clinopyroxene) to anhedral.

Preferred orientation: Not determined.

Percent replacement: Various, amphibole after clinopyroxene.

Clinopyroxene—Mode: 30%-60%.

Crystal size: 1-18 mm, in plagioclase up to 35 mm.

Crystal shape: Anhedral, enclosing plagioclase.

Preferred orientation: Not determined.

Percent replacement: Increases from Piece 1A to Piece 3B, replaced by amphibole.

Olivine—Mode: 0%-2%.

Crystal size: 2-8 mm.

Crystal shape: Anhedral.

Preferred orientation: Not determined.

Percent replacement: Commonly with talc/tremolite rims.

SECONDARY MINERALOGY:

Total percent: 5%-70%.

Texture: Green amphibole after clinopyroxene.

Amphibolization increases downcore to Piece 3B.

Percent vein material: 3%-4%.

Vein material: Crosscutting fractures and shear zones with extensive amphibole development along them.

COMMENTS: Similar to Section 118-735B-30R-5 material. Very coarse-grained, crystals up to 3.5 cm at 50 cm, grading to a fine-grained interval at 30 cm. Upper part of section is fine- to medium-grained.

Variably Amphibolitized Olivine-Bearing Gabbro

Pieces 3C-6B

COLOR: Gray-green.

LAYERING: None.

DEFORMATION: Slight elongation of pyroxene and olivine in places. Some granulation of plagioclase. Numerous veins, usually with amphibole development.

PRIMARY MINERALOGY:

Plagioclase—Mode: 30%-70%.

Crystal size: 2-20 mm.

Crystal shape: Euhedral to anhedral.

Preferred orientation: None.

Percent replacement: Not determined.

Clinopyroxene—Mode: 30%-60%.

Crystal size: 2-20 mm.

Crystal shape: Anhedral, poikilitic.

Preferred orientation: None.

Percent replacement: Various by amphibole.

Olivine—Mode: 0%-8% in sporadic intervals.

Crystal size: Up to 20 mm in olivine-rich interval (95-101 cm).

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: Variably altered to talc and tremolite.

SECONDARY MINERALOGY:

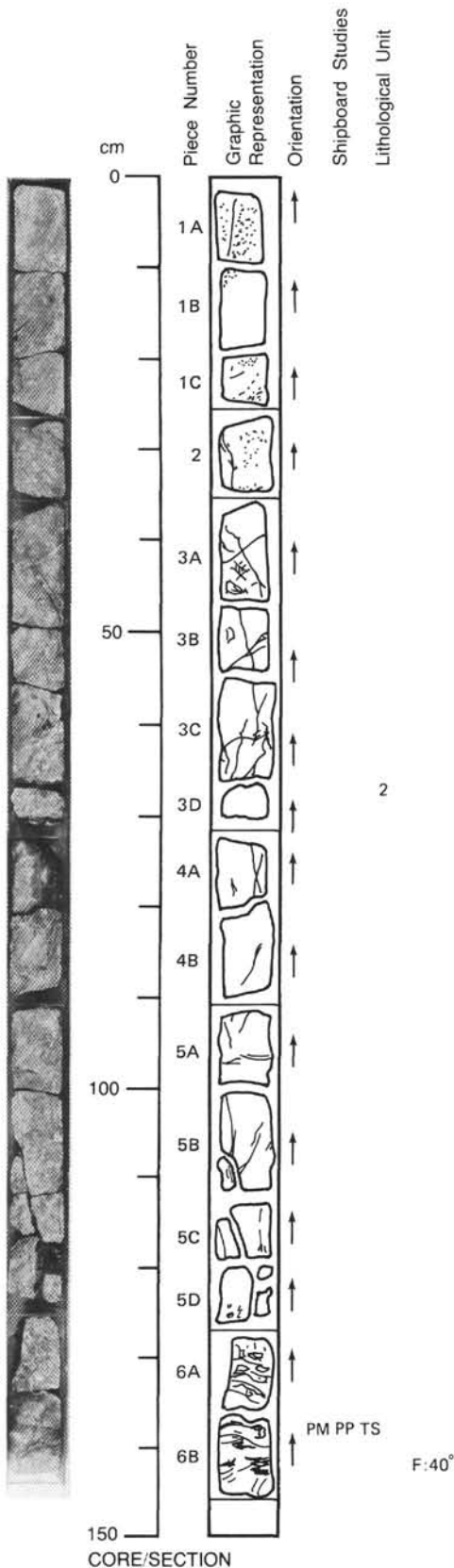
Total percent: Slight to extensive in different parts of the core.

Texture: Abundant actinolitic amphibole. Piece 3D: euhedral, fibrous actinolite (up to 3 mm long) and talc growing in a shallow cavity on back of sample. Several shallow cavities in other pieces. Piece 6A: opaque-rich zone, with a foliation dipping at 40° defined by elongate feldspar zones. Piece 6B: some red (oxidative?) staining between grains and in cleavage of an altered clinopyroxene. Abundant amphibole replacing clinopyroxene, particularly along veins.

Percent vein material: 5%.

Vein material: Amphibole.

COMMENTS: Very similar to Section 118-735B-30R-5.



118-735B-30R-4

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1-7

Fine- to Medium-Grained Olivine-Bearing Gabbro

Pieces 1-3A

COLOR: Gray.
LAYERING: None.
DEFORMATION: Piece 1: sheared white zone. Fine-grained zone at 25 cm. Pieces 2A, 2C, and 3A: amphibole-albite zones. Trace amounts of finely disseminated pyrite throughout.

PRIMARY MINERALOGY:
 Plagioclase—Mode: 60%-70%.
 Crystal size: 1-4 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: 5% by undetermined mineral.

Clinopyroxene—Mode: 25%.
 Crystal size: 1-2 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: 60%-65% by amphibole.

Olivine—Mode: 5%-15%.
 Crystal size: <1 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: 75%-80% by talc and/or amphibole.

SECONDARY MINERALOGY:
 Total percent: 25%.
 Texture: Clinopyroxene replaced by green amphibole, and olivine by talc and/or amphibole.
 Percent vein material: None.
 Vein material: None.

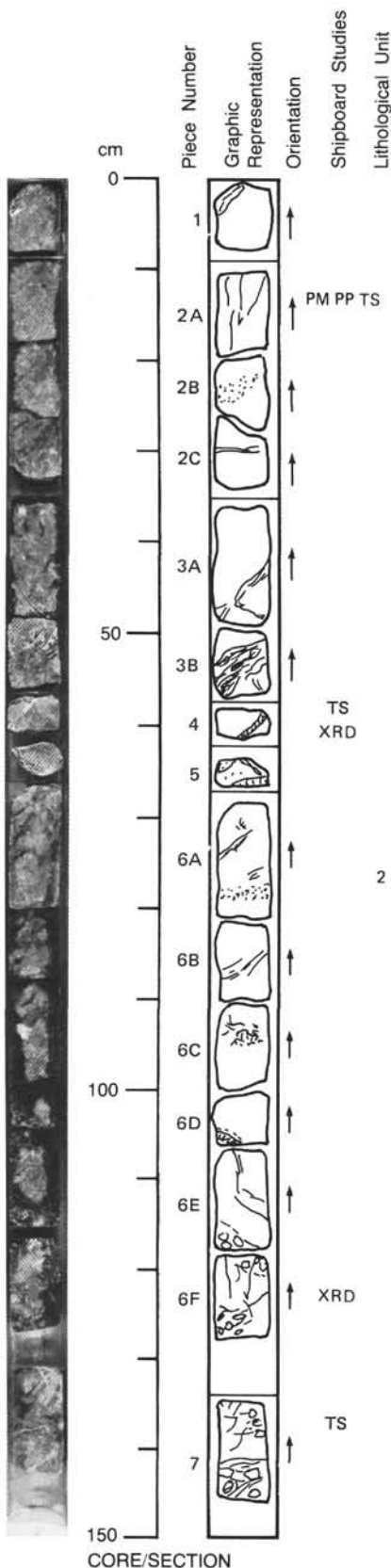
Porphyroclastic Gabbro

Piece 3B

COLOR: Gray.
LAYERING: No primary layering.
DEFORMATION: Not determined.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 60%.
 Crystal size: <1 to 10 mm.
 Crystal shape: Anhedral.
 Preferred orientation: In plane of foliation.
 Percent replacement: Moderate by sodic plagioclase.

Clinopyroxene—Mode: 40%.
 Crystal size: 6-8 mm augen. Fine bands of white plagioclase (granulated or albitized) and amphibole.
 Crystal shape: Anhedral.
 Preferred orientation: In plane of foliation.
 Percent replacement: Moderate by amphibole.

SECONDARY MINERALOGY:
 Total percent: Extensive.
 Texture: Plagioclase and clinopyroxene deformed and replaced by sodic plagioclase and green amphibole, respectively.
 Percent vein material: None.
 Vein material: None.



CORE/SECTION

118-735B-30R-4 (continued)

Brecciated, Partially Amphibolitized, Olivine-Bearing Gabbro**Pieces 4-7**

COLOR: Gray to gray and white.

LAYERING: No layering. Fine-grained zone at 80 cm. Very coarse-grained at 94 cm.

DEFORMATION: Some granulation of feldspar and brecciation near veins.

PRIMARY MINERALOGY:

Plagioclase—Mode: 40%-50%.

Crystal size: 2-20 mm.

Crystal shape: Euhedral to anhedral.

Preferred orientation: None.

Percent replacement: 30% by albite(?).

Clinopyroxene—Mode: 40%-50%.

Crystal size: 2-20 mm.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: 20%-70% by amphibole.

Olivine—Mode: 0%-3%.

Crystal size: 2-5 mm.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: 100% by undetermined mineral.

SECONDARY MINERALOGY:

Total percent: 30%-35%.

Texture: Freshest at 75-86 and 110-115 cm. 20%-70% amphibole after clinopyroxene, particularly along veins and fractures with vuggy spaces (92 cm). At 104-107, 116-118, 123-134, and 140-145 cm, sample is cut by brecciated zones of pyroxene and granulated plagioclase. There is amphibolitization of clinopyroxene and possibly albitization of plagioclase.

Vein percent: 30%.

Vein material: Two large (1-3 mm wide) veins of a very white vein material, probably feldspar.

Same material in smaller veins throughout. Veins cut Pieces 4 and 5.

118-735B-30R-5

UNIT 2: OLIVINE-BEARING AND OLIVINE-GABBRO

Pieces 1-7

Olivine-Bearing Gabbro

Pieces 1-7

COLOR: Gray.

LAYERING: No igneous layering, but coarse to fine transitions.

DEFORMATION: Foliation in pieces 4 and 5, defined by stretching of clinopyroxene. Includes a medium-grained zone in piece 4 and a fine-grained zone in piece 5. Plagioclase extensively albitized (very white) in these zones, maybe in part from granulation.

PRIMARY MINERALOGY:

Plagioclase—Mode: 70%-40%.

Crystal size: 1-12 mm.

Crystal shape: Euhedral (in clinopyroxene) to anhedral. Appears fresh and undeformed, except in shear zones.

Preferred orientation: None.

Percent replacement: Some granulation in shear zones.

Clinopyroxene—Mode: 30%-60%.

Crystal size: 1-18 mm.

Crystal shape: Anhedral. Partially enclosing plagioclase to poikilitic (piece 1B).

Preferred orientation: None.

Percent replacement: Slight to extensive replacement to amphibole along veins and shear zones.

Olivine—Mode: 0%-8%.

Crystal size: 2-10 mm.

Crystal shape: Piece 1A partially encloses plagioclase.

Preferred orientation: None.

Percent replacement: Commonly, light gray talc-tremolite rims.

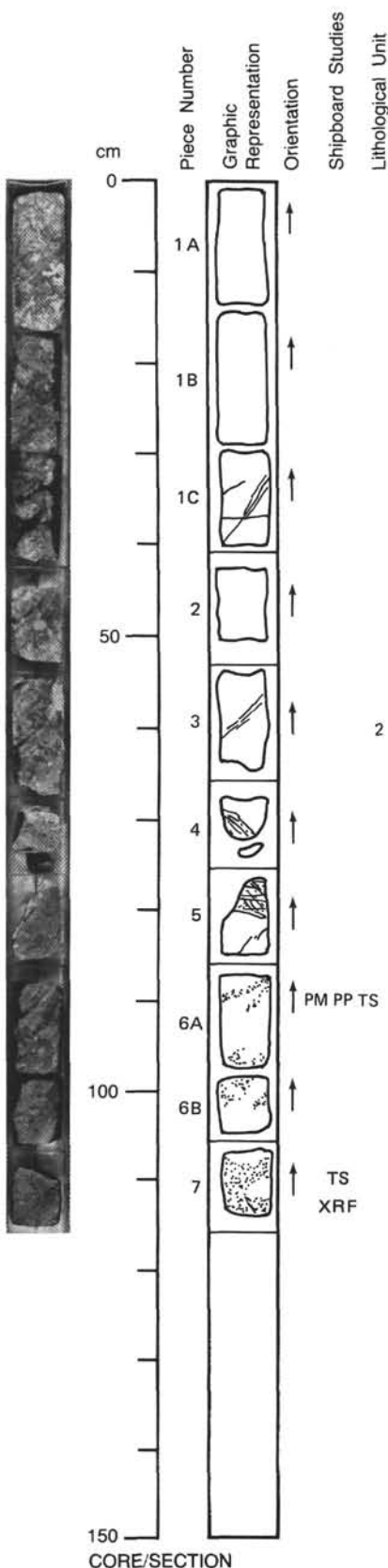
SECONDARY MINERALOGY:

Total percent: 5%-70%.

Texture: Amphibole (dark green after clinopyroxene) most intense in shear zone at 75 cm and in amphibole veins (1-3 mm wide) as at 34 and 60 cm. In shear zone, perhaps some albite after plagioclase. The very white color may be due largely to mechanical diminution of the plagioclase. Percent vein material: Not determined. Vein material: Amphibole.

COMMENTS:

There are several of the coarse- to fine-grained transitions in pieces 6 and 7. In piece 7, there is little sign of deformation, and the fine-grained zone is quite irregular. There is fine (< 1 mm) to finely disseminated pyrite present in piece 4 through 7. Pyrite occurs in both coarse- and fine-grained sections, although it is a little more common in the fine-grained zones.



118-735B-31R-1

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1A-2F

Olivine-Bearing Gabbro

Pieces 1A-2F

COLOR: Medium gray. Greenish gray near veins.
LAYERING: Vague if at all. Small variations in grain size from coarse-grained (clinopyroxene up to 3 cm) to medium-grained (Pieces 1G, 1H, 1I, and 2B).

DEFORMATION: None.

PRIMARY MINERALOGY:

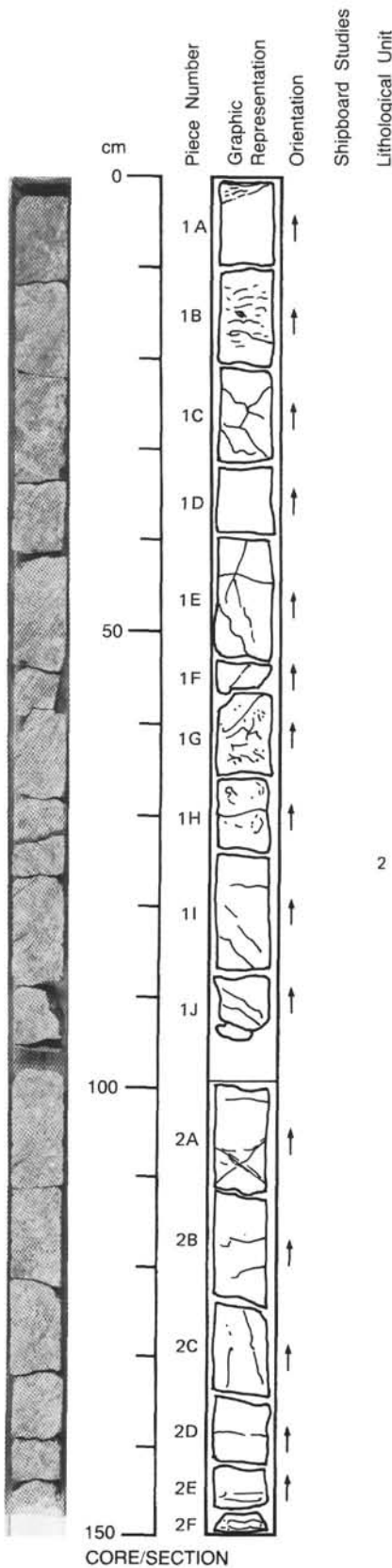
Plagioclase—Mode: 55%.
Crystal size: 0.4-3 cm.
Crystal shape: Subhedral.
Preferred orientation: Not determined.
Percent replacement: Not determined.

Clinopyroxene—Mode: 44%-45%.
Crystal size: 0.4-3 cm.
Crystal shape: Subhedral.
Preferred orientation: Not determined.
Percent alteration: <10% by amphibole.

Olivine—Mode: 0%-2%.
Crystal size: <0.4-2 cm.
Crystal shape: Anhedral.
Preferred orientation: Not determined.
Percent replacement: Not determined.

SECONDARY MINERALOGY:

Total percent: <10%.
Texture: Green amphibole partially replaces clinopyroxene. Stronger replacement (up to 50%) only at very bottom of section (144-150 cm). Sulfides disseminated throughout most of the section.
Percent vein material: Not determined.
Vein material: Veinlets with amphibole.



2

CORE/SECTION

118-735B-31R-2

UNIT 2: OLIVINE-BEARING GABBRO AND OLIVINE GABBRO

Pieces 1A-5A

Olivine-Bearing Gabbro

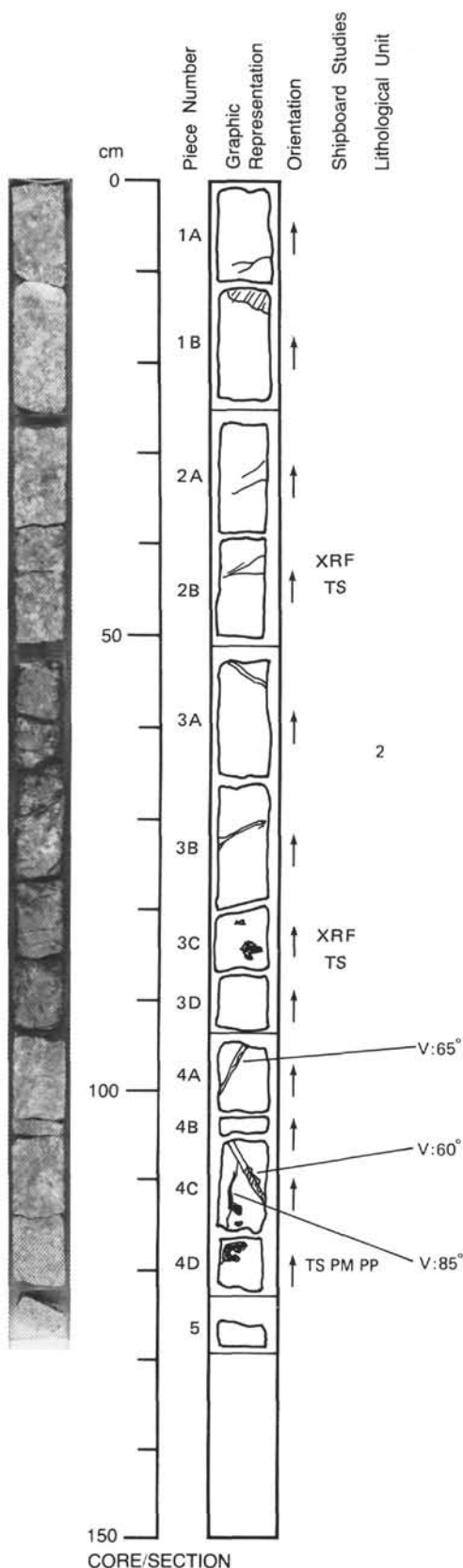
Pieces 1A-3B (top), and 3D-5

COLOR: Gray. Greenish gray near veins.
LAYERING: Possible modal layering, local concentrations of olivine and plagioclase (troctolitic) at top of Piece 3A and middle of Piece 4C.
DEFORMATION: Weakly foliated near fractures.
 Pieces 3A, 3B, 4A, and 4C: Local recrystallization and granulation.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 60%, 70% in troctolitic zones.
 Crystal size: 2-40 mm.
 Crystal shape: Euhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.
 Clinopyroxene—Mode: 38%, 5% in troctolitic zones.
 Crystal size: 4-22 mm.
 Crystal shape: Subhedral to euhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.
 Olivine—Mode: 2%, 25% in troctolitic zones.
 Crystal size: 2-12 mm.
 Crystal shape: Subhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.
SECONDARY MINERALOGY:
 Total percent: 5%-15%.
 Texture: Not determined.
 Percent vein material: 5%.
 Vein material: Pieces 1B-3B and 4C: Green amphibole in veins, often associated with white mineral (granulated plagioclase?).
COMMENTS: Pieces 3 and 4D: Localized concentrations of ilmenite and sulfides.

Porphyroclastic Metagabbro

Pieces 3B (bottom), 3C, and 4A (side)

COLOR: Greenish gray.
LAYERING: Massive.
DEFORMATION: Weakly foliated porphyroclasts of pyroxene, recrystallized pyroxene and plagioclase.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 55%-65%.
 Crystal size: 2-6 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.
 Clinopyroxene—Mode: 35%.
 Crystal size: 2-15 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Not determined.
 Percent replacement: Replaced by amphibole.
 Olivine—10%.
 Crystal size: 2-6 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.
SECONDARY MINERALOGY:
 Total percent: 20%.
 Texture: Green amphibole replacing pyroxenes.
 Percent vein material: Not determined.
 Vein material: Not determined.
COMMENTS: Localized concentrations of ilmenite and sulfides.



118-735B-31R-3

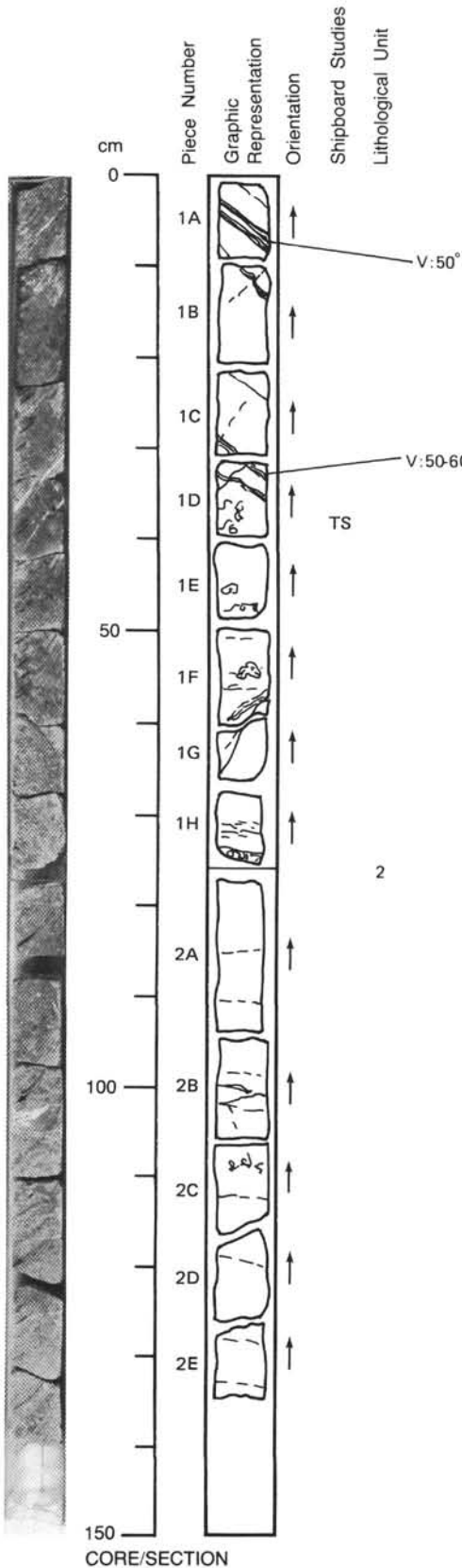
UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1A-2E

Olivine Gabbro

Massive, Locally Foliated, Amphibolitized Gabbro

Pieces 1A-2E



COLOR: Variations on gray, green near veins, white where veins contain sodic plagioclase (Pieces 1A, 1C, and 1D), speckled brown in Piece 1E (olivine pseudomorphs) and white in Piece 1F talc (?) after olivine.

LAYERING: Vague: goes from coarse to very coarse from Piece 1A to 1B, 2A to 2B, fine-grained from Piece 2D to 2E. Fine layering pyroxene/plagioclase in Piece 1D.

DEFORMATION: Small faults offsetting veins in Pieces 1A, 1C, and 1D. Inclined fractures in Pieces 1F and 1G; near horizontal fractures in Pieces 2A-2E. Some near horizontal foliation in Pieces 1H and 2D.

PRIMARY MINERALOGY:

Plagioclase—50-60%.
 Crystal size: Not determined.
 Crystal shape: Subhedral to euhedral.
 Preferred orientation: Locally in plane of foliation.
 Percent replacement: Some replacement by albite.

Clinopyroxene—Mode: Present, may also contain orthopyroxene.
 Crystal size: Not determined.
 Crystal shape: Subophitic, locally euhedral.
 Preferred orientation: Locally in plane of foliation.
 Percent replacement: Some replacement by amphibole.

Olivine—Mode: Not determined but present at base of upper coarsening sequence in Piece 1F.
 Crystal size: Not determined.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: Not determined.

SECONDARY MINERALOGY:

Total percent: Not determined.
 Texture: Green amphibole in most pieces concentrated near veins. Albite in bleached looking pegmatitic material in Piece 2B. Talc on fracture surfaces near amphibole. Ilmenite/magnetite patches in most pieces forming 1%-2%. No sulfides.
 Percent vein material: Not determined.
 Vein material: Fracture surfaces lined with pale green talc and amphibole. The amphibole is well crystallized and is oriented along slip surfaces, slightly oblique from vertical in the plane of the fracture.

COMMENTS: Graphic representation is of the working half of core, not the archive half.

118-735B-31R-4

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1A-9B

Olivine-Bearing Gabbro

Pieces 1A-1D

COLOR: Gray or greenish gray.

LAYERING: Size and modal layering in Pieces 1A-1D, from the top: 6-cm-thick layer, fine-grained; clinopyroxene-rich layer; 1.5 cm thick, medium-grained, plagioclase-rich layer; 1.5 cm thick, fine-grained, clinopyroxene-rich layer; 20 cm thick, plagioclase-rich layer; and 5 cm thick, medium-grained, clinopyroxene/plagioclase (ratio 1:1) layer. Weakly foliated layers dip at 50°.

DEFORMATION: Weakly deformed, locally faulted (e.g., in Piece 1A) and sheared.

PRIMARY MINERALOGY:

Plagioclase—Mode: 55%-70%.
 Crystal size: 0.5-2 cm.
 Crystal shape: Subhedral.
 Preferred orientation: Not clear.
 Percent replacement: Not determined.

Clinopyroxene—Mode: 20%-40%.
 Crystal size: 0.5-2 cm.
 Crystal shape: Subhedral.
 Preferred orientation: Not clear.
 Percent replacement: 10% by amphibole.

Olivine—Mode: 1%-3%.
 Crystal size: 0.3-10 cm.
 Crystal shape: Euhedral-subhedral.
 Preferred orientation: Not clear.
 Percent replacement: < 2% by tremolite and mica or talc.

SECONDARY MINERALOGY:

Total percent: 5%-10%.
 Texture: Not determined.
 Percent vein material: Not determined.
 Vein material: Piece 1A: Amphibole vein with dip component present.

Metamorphosed Olivine Gabbro

Pieces 2-4A (top)

COLOR: Greenish gray.

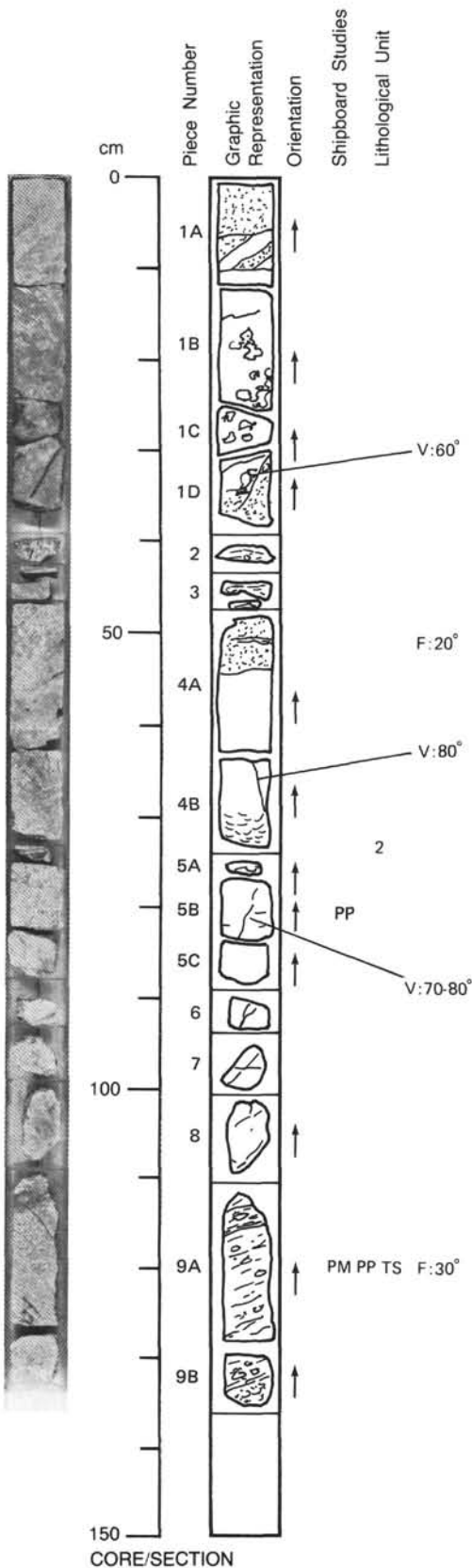
LAYERING: None except for a thin plagioclase-rich band in Piece 4A. Piece 2 and the leucocratic part of Piece 4A contain clinopyroxene, a few millimeters across, as phenocrysts(?) or as porphyroclasts. Remainder of unit is homogeneously fine-grained (<0.5 mm).

DEFORMATION: Well-foliated.

PRIMARY MINERALOGY: Due to the small grain size, primary mineralogy was not determined.

SECONDARY MINERALOGY:

Total percent: >25%.
 Texture: Amphibole replaces clinopyroxene.
 Percent vein material: None.
 Vein material: None.



118-735B-31R-4 (continued)

Olivine-Bearing Metagabbro**Pieces 4A (bottom)-8**

COLOR: Gray or greenish gray.

LAYERING: No layering. Grain size ranges from 0.5 to 7 cm.

DEFORMATION: Pieces 4A-4B: Gray, relatively massive and weakly foliated. Pieces 5A-5C and 6-8: Greenish gray, foliated, deformed, and amphibolitized. These pieces are also pervasively veined by amphibole.

PRIMARY MINERALOGY:

Plagioclase—Mode: 65%.

Crystal size: 0.5-2 cm.

Crystal shape: Euhedral.

Preferred orientation: Not clear.

Percent replacement: Replaced by sodium-rich plagioclase along amphibole veins.

Clinopyroxene—Mode: 30%.

Crystal size: 0.5-1 cm.

Crystal shape: Subhedral-anhedral.

Preferred orientation: Not clear.

Percent replacement: 30%-60% by amphibole.

Olivine—Mode: 3%.

Crystal size: 0.5-1 cm.

Crystal shape: Euhedral-subhedral.

Preferred orientation: Not clear.

Percent replacement: Not determined.

SECONDARY MINERALOGY:

Total percent: 10%-30%.

Texture: Clinopyroxene replaced by various amounts of amphibole.

Percent vein material: Abundant.

Vein material: Amphibole.

Well-Foliated Porphyroclastic Metagabbro**Pieces 9A and 9B**

COLOR: Greenish gray to gray.

LAYERING: Piece 9A: Melanocratic layer (opaque-rich, 2 cm thick) is present. Piece 9B (bottom) is leucocratic, suggesting modal layering.

DEFORMATION: Porphyroclastic-well foliated.

PRIMARY MINERALOGY: Similar to Pieces 4A-8, the olivine-bearing metagabbro described above, except for opaque-rich and leucocratic layers.

SECONDARY MINERALOGY:

Similar to Pieces 4A-8, the olivine-bearing metagabbro described above.

118-735B-32R-1

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1A-1M

Olivine-Bearing Gabbro

Pieces 1A-1M

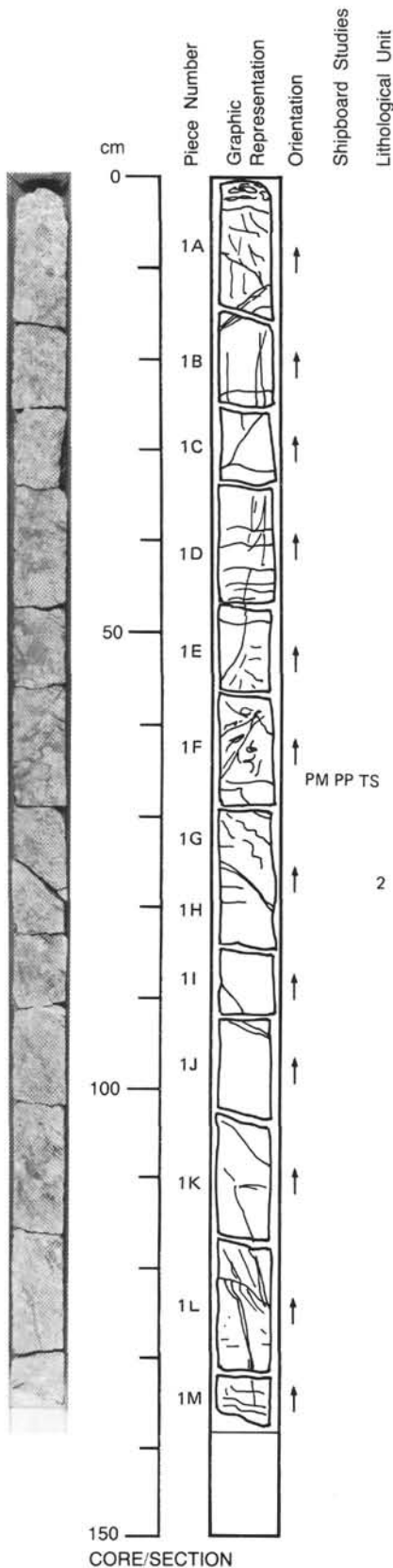
COLOR: Medium gray to dark gray.
LAYERING: None—ilmenite concentrations at 62 cm.
DEFORMATION: Cataclastic textures in Pieces 1A, 1L, and 1M—granulated plagioclase and common amphibole veins in those pieces. Weak foliation in Piece 1M.

PRIMARY MINERALOGY:
 Plagioclase—Mode: 55%.
 Crystal size: 0.5-50 mm.
 Crystal shape: Subhedral-euhedral.
 Preferred orientation: Not determined.
 Percent replacement: Occasionally replaced by albite.

Clinopyroxene—Mode: 40%-50%.
 Crystal size: 0.5-30 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Not determined.
 Percent replacement: Replaced by amphibole.

Olivine—Mode: 0%-2%.
 Crystal size: 0.3-20 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Not determined.
 Percent replacement: Partially replaced by talc-tremolite-serpentine.

SECONDARY MINERALOGY:
 Total percent: Up to 90% (?).
 Texture: In deformed sections green amphibole partially replaces clinopyroxene (<10%). Green amphibole and a white mineral (albite) + sulfides in veins and veinlets. Fine sulfides throughout. Plagioclase is sometimes replaced by albite. Olivine is partially replaced by talc-tremolite-serpentine. Iron-titanium oxides enriched in Piece 1F and at the bottom of Piece 1D, filling interstices and reaching 15%. Olivine is somewhat crushed in Piece 1B. In deformed zones, green amphibole replaces up to 90% of the rock.
 Percent vein material: Not determined.
 Vein material: Veins up to 1 cm across, consisting preferentially of green amphibole, albite, and sulfide. Disseminated sulfides common.



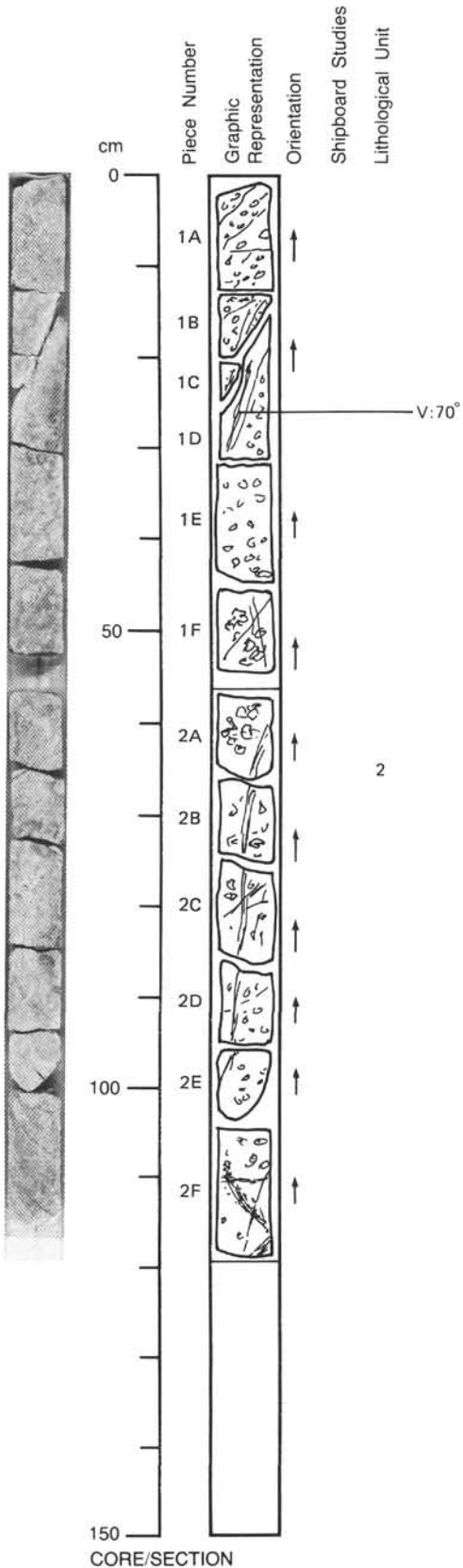
CORE/SECTION

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1A-2F

Partly Amphibolitized Olivine-Bearing Gabbro

Pieces 1A-2F



COLOR: Gray to dark gray.

LAYERING: Size and modal layering—from the top to the bottom: 3 cm thick, clinopyroxene-rich layer, grainsize = 3 mm; 3 cm thick, clinopyroxene/plagioclase (ratio 1:1) layer 5-8 mm; Pieces 1B-2A, gradually increases from 3 mm to >10-20 mm, clinopyroxene/plagioclase (ratio 1:1) nearly constant—Clinopyroxene is oikocrystic; Pieces 2A-2E, grain size decreases gradually from 10-20 mm to >5 mm, clinopyroxene/plagioclase ratio is constant; and Piece 2F, 3 mm sized clinopyroxene-rich layers, 4 cm thick, is sandwiched between 10-15 mm grain-sized, plagioclase-rich layer inclined at 40°. Weakly foliated.

DEFORMATION: Minor, localized: (1) weak deformation along amphibole + chlorite vein. (2) bottom of Piece 2F is sheared.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%-65%.
 Crystal size: Various, up to 25 mm.
 Crystal shape: Euhedral-anhedral.
 Preferred orientation: Weak.
 Percent replacement: Not determined.

Clinopyroxene—Mode: 50%-30%.
 Crystal size: Various, up to 20 mm.
 Crystal shape: Subhedral-euhedral.
 Preferred orientation: Weak.
 Percent replacement: 5%-15% by amphibole.

Olivine—Mode: 2%-3%.
 Crystal size: Various, up to 10 mm.
 Crystal shape: Euhedral-subhedral.
 Preferred orientation: Weak.
 Percent replacement: Rimmed by tremolite + talc or mica aggregates.

SECONDARY MINERALOGY:

Total percent: 5%-10%.
 Texture: Amphibole replacing clinopyroxene is intense near amphibole and chlorite veins.
 Percent vein material: Abundant.
 Vein material: Amphibole + chlorite, dipping at 70°-80° or 10°.

118-735B-32R-3

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1A-3

Olivine-Bearing Gabbro

Pieces 1A-3

COLOR: Dark gray, mottled.
LAYERING: None obvious. Increase in grain size toward bottom of section.
DEFORMATION: No foliation.

PRIMARY MINERALOGY:

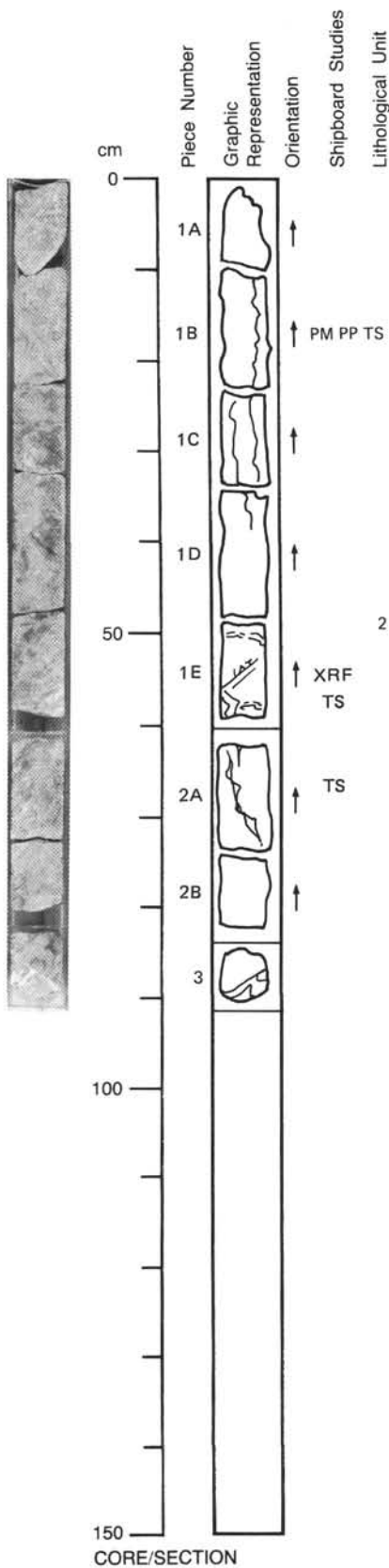
Plagioclase—Mode: 50%.
Crystal size: 5-10 mm.
Crystal shape: Subhedral to anhedral.
Preferred orientation: None.
Percent replacement: < 10% replacement by sodic plagioclase.

Clinopyroxene—Mode: 40%.
Crystal size: 2-10 mm.
Crystal shape: Anhedral.
Preferred orientation: None.
Percent replacement: < 10% replacement by amphibole.

Olivine—Mode: 10%.
Crystal size: 1-4 mm.
Crystal shape: Rounded.
Preferred orientation: None.
Percent replacement: 50% by talc + tremolite.

SECONDARY MINERALOGY:

Total percent: 30%.
Texture: Not determined.
Percent vein material: 10%.
Vein material: Sheared sodic plagioclase + actinolite. Pieces 1B-1D: Vertical amphibole veins.
Pieces 1E-3: Amphibole + sodic plagioclase veins containing euhedral hornblende crystals up to 5 cm long.

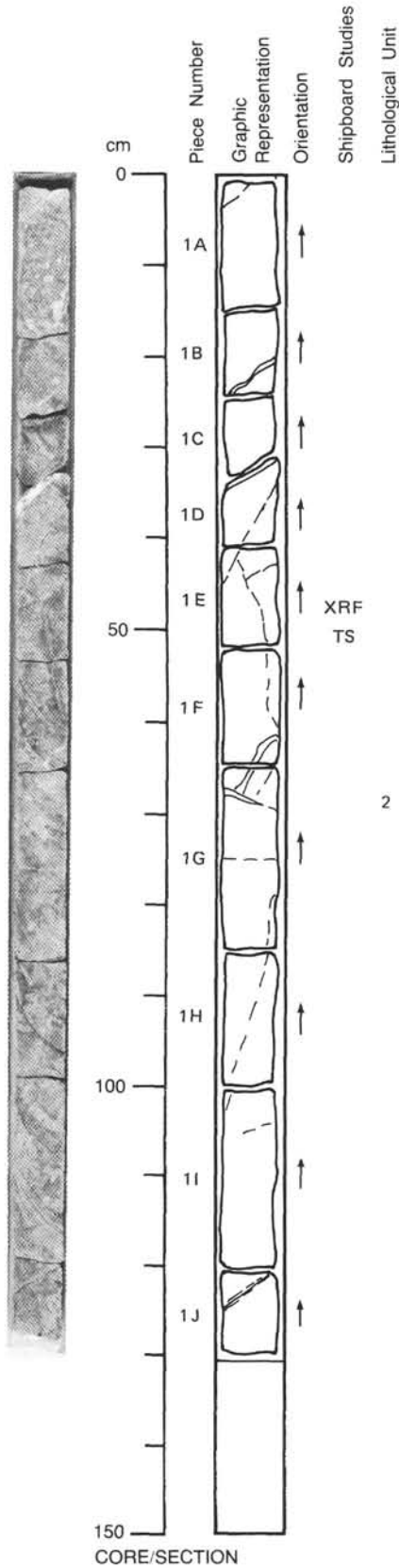


UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1A-1J

Massive Gabbro

Pieces 1A-1J



COLOR: Gray to greenish-gray.

LAYERING: Coarse-grained throughout, except for a medium-grained section in Piece 1A.

DEFORMATION: Fractures as indicated. Piece 1J: Some granulation/foliation next to fracture.

PRIMARY MINERALOGY:

Plagioclase—Mode: 40%-60%.

Crystal size: Not determined.

Crystal shape: Subhedral.

Preferred orientation: None.

Percent replacement: Moderate.

Clinopyroxene—Mode: 40%-60%.

Crystal size: Very large in Pieces 1A, 1F, and 1G.

Crystal shape: Rarely encloses plagioclase subophitically.

Preferred orientation: None.

Percent replacement: Moderate alteration to amphibole.

Olivine—Mode: 5%-10%.

Crystal size: Not determined.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: Extensive—replacing mineral not determined.

SECONDARY MINERALOGY:

Total percent: Moderate.

Texture: Pervasive slight alteration of clinopyroxene to green amphibole. Scattered ilmenite throughout, but no more than 1%-2% of the rock.

Percent vein material: Not determined.

Vein material: Green amphibole and pale sodic plagioclase near some veins. Talc on other fracture surfaces.

COMMENTS: Both clinopyroxene and plagioclase are cumulus and intercumulus minerals.

118-735B-33R-1

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1-5

Olivine-Bearing Gabbro

Pieces 1-5

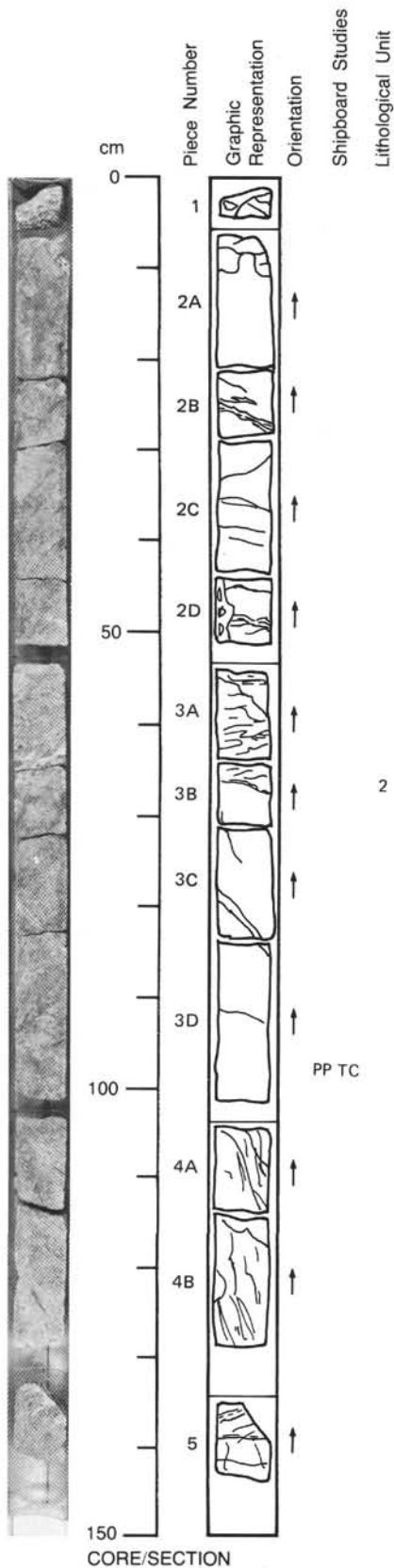
COLOR: Gray to greenish-gray.
LAYERING: None.
DEFORMATION: Shear zone in Pieces 2B-2C; some deformation in Piece 4B. Prominently foliated to porphyroclastic gabbro in Pieces 1, top of 2A, 2D, 3A, top of 3B, and 5. Left part of Piece 2D includes a near vertical shear zone.

PRIMARY MINERALOGY:
 Plagioclase—Mode: 55%.
 Crystal size: Up to 3 cm.
 Crystal shape: Subhedral-anhedral.
 Preferred orientation: Not determined.
 Percent replacement: Partly albitized.

 Clinopyroxene—Mode: 45%.
 Crystal size: Up to 2.5 cm.
 Crystal shape: Subhedral-anhedral.
 Preferred orientation: Not determined.
 Percent replacement: Variably altered to amphibole.

Olivine—Mode: 0%-5%.
 Crystal size: <3 cm.
 Crystal shape: Anhedral.
 Preferred orientation: Not determined.
 Percent replacement: Talc-tremolite rims.

SECONDARY MINERALOGY:
 Total percent: <20% to 40%.
 Texture: Green amphibole replaces clinopyroxene. Amphibole, albitic plagioclase, and sulfides in veins and veinlets—sulfide disseminated throughout. Olivine with talc-tremolite rims. Deformed sections have more extensive amphibolitization. Plagioclase is also partly albitized. Undeformed sections contain similar veins and sulfides although veining may be more common.
 Percent vein material: Not determined.
 Vein material: Amphibole, albitic plagioclase and sulfides.



UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1A-11

Olivine-Bearing Gabbro

Pieces 1A-1D

COLOR: Gray with white bands.
LAYERING: No marked layering.
DEFORMATION: Weak, along veins slightly sheared.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 60%.
 Crystal size: 5-20 mm.
 Crystal shape: Euhedral.
 Preferred orientation: None.
 Percent replacement: Replaced by sodic plagioclase along veins.

Clinopyroxene—Mode: < 35%.
 Crystal size: 5-20 mm.
 Crystal shape: Anhedral, oikocrystic.
 Preferred orientation: None.
 Percent replacement: 5%-10% by amphibole.

Olivine—Mode: Up to 5%, locally concentrated.
 Crystal size: 5-10 mm.
 Crystal shape: Subhedral.
 Preferred orientation: None.
 Percent replacement: Moderately by tremolite + talc or mica.

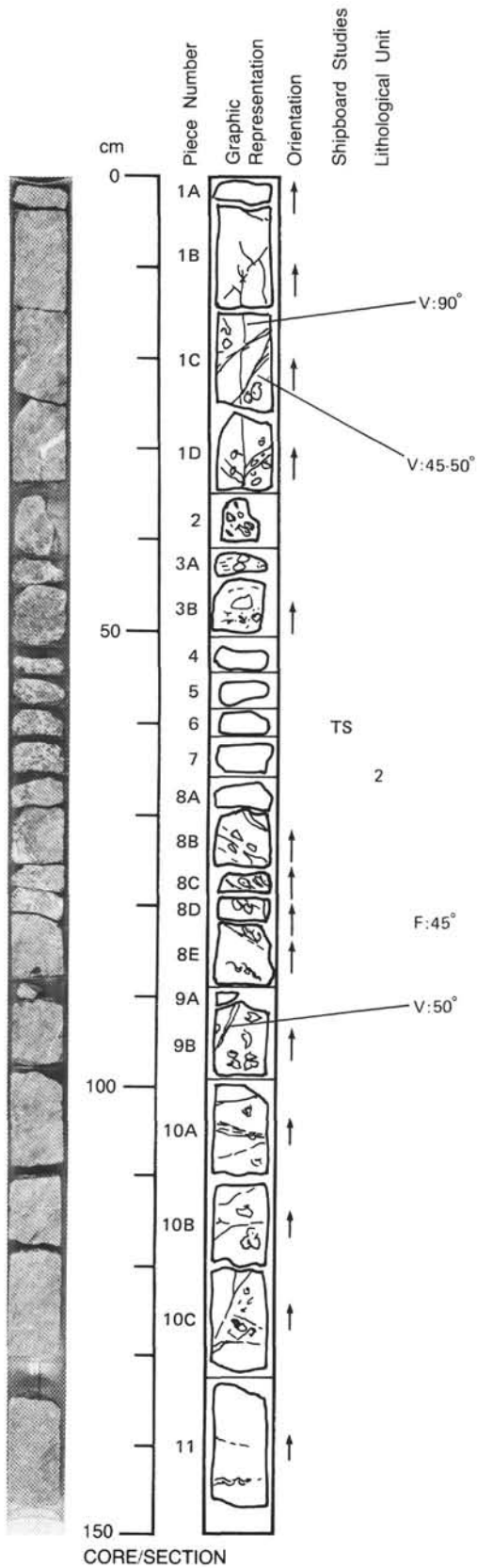
SECONDARY MINERALOGY:
 Total percent: 5%-15%.
 Texture: Not determined.
 Percent vein material: Not determined.
 Vein material: Amphibole and albite veins (2-8 mm thick).

COMMENTS: Clinopyroxene is commonly oikocrysts including euhedral plagioclase.

Extensively Amphibolitized Gabbro

Pieces 2-8E (top)

COLOR: Greenish gray. Pieces 3C-8E are milky white with gray parts.
LAYERING: Weakly foliated, porphyritic appearance is magmatic in origin (?). Grain size variation is apparent, but irregular.
DEFORMATION: Pieces 2-3B: No marked deformation. Pieces 3C-8E (top): Porphyroclastic. Porphyroclasts are clinopyroxene and plagioclase. Foliation due to the deformation dips at 45°.
PRIMARY MINERALOGY: Not clear due to metamorphism.
SECONDARY MINERALOGY:
 Total percent: >40%.
 Texture: Clinopyroxene is replaced by amphibole; 30%-40% in Pieces 2-3B and 10%-15% in Pieces 3C-8E (top). Plagioclase is also altered into sodic plagioclase.
 Percent vein material: Not determined.
 Vein material: Not determined.



118-735B-33R-2 (continued)

Olivine-Bearing Gabbro**Pieces 8E (bottom)-11**

COLOR: Gray.

LAYERING: None.

DEFORMATION: Local. Piece 10A: 1 cm sheared zone inclined at 45°.

PRIMARY MINERALOGY:

Plagioclase—Mode: 60%.

Crystal size: 1-2 cm.

Crystal shape: Euhedral.

Preferred orientation: None.

Percent replacement: Fresh.

Clinopyroxene—Mode: 30%.

Crystal size: Up to 3 cm.

Crystal shape: Anhedral, oikocryst.

Preferred orientation: None.

Percent replacement: Trace, by amphibole.

Olivine—Mode: Up to 7%, locally concentrated in Pieces 8B and 8E.

Crystal size: Not determined.

Crystal shape: Subhedral.

Preferred orientation: None.

Percent replacement: 40%-60% by tremolite + talc or mica.

SECONDARY MINERALOGY:

Total percent: 5%-10%.

Texture: Not determined.

Percent vein material: Trace.

Vein material: Pieces 9B and 10A-10C: Milky albite veins are present, 2-3 mm thick.

118-735B-33R-3

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1-10B

Olivine Gabbro

Pieces 1-10B

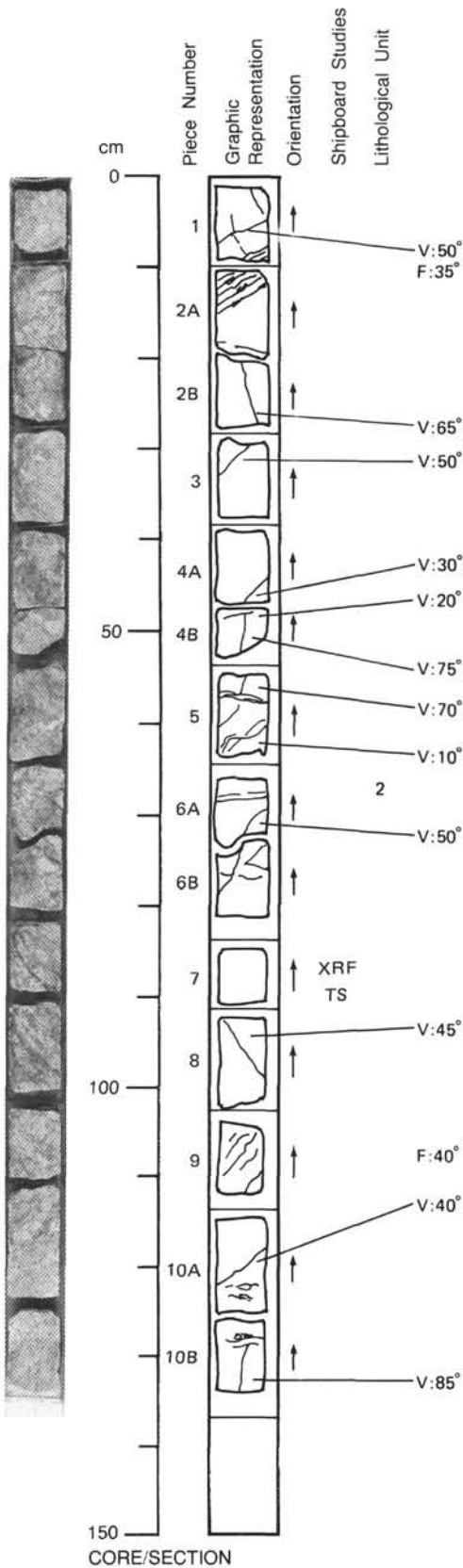
COLOR: Medium gray to greenish gray.
LAYERING: None.
DEFORMATION: Localized to discrete shear zones in Pieces 1, 2A, 10A, and 10B.

PRIMARY MINERALOGY:
 Plagioclase—Mode: 55%.
 Crystal size: Medium to coarse.
 Crystal shape: Anhedral to subhedral.
 Preferred orientation: Not determined.
 Percent replacement: Albitized between 116-132 cm.

Clinopyroxene—Mode: 40%.
 Crystal size: Medium to coarse.
 Crystal shape: Subhedral.
 Preferred orientation: Not determined.
 Percent replacement: Partially replaced by amphibole.

Olivine—Mode: 5%.
 Crystal size: Medium to coarse.
 Crystal shape: Subhedral and anhedral.
 Preferred orientation: Not determined.
 Percent replacement: Rims of talc and tremolite.

SECONDARY MINERALOGY:
 Total percent: < 10%.
 Texture: Green amphibole partially replaced clinopyroxene. Plagioclase is albitized between 116-132 cm. Olivine has rims of talc and tremolite. Sulfide disseminated throughout.
 Percent vein material: Variable.
 Vein material: Green amphibole, + albite + sulfides.



118-735B-33R-4

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1A-11

Foliated Olivine-Bearing Gabbro

Pieces 1A-6B (top), 9, and 11

COLOR: Dark gray.

LAYERING: Size and modal layering as follows from top to bottom.

Pieces 1A-8A:

20 cm thick, 3-7 mm sized, olivine-poor, locally plagioclase-rich layer (Piece 2A, top);

5 cm thick, 0.5 mm sized (locally 2-1 mm), relatively olivine-rich layer;

9 cm thick, 0.7-2 mm sized, olivine-rich layer;

3 cm thick, 0.5-1 mm sized, olivine-poor, clinopyroxene-rich layer;

17 cm thick, 1-3 mm sized, locally plagioclase-rich, olivine-poor layer;

6 cm thick, 1 mm sized, clinopyroxene-rich layer.

8 cm thick, 10 mm sized, coarse-grained, and olivine-rich layer.

Clinopyroxene, plagioclase/olivine shows shape preferred orientation.

Foliation dips at 50° and layering dips at 30° are not parallel in Piece 2A, although they are parallel in Piece 3.

DEFORMATION: No marked deformation except for a few sheared zones, 1-4 mm thick, in Pieces 6A, 2A, and 11. The latter also shows porphyroclastic texture.

PRIMARY MINERALOGY:

Plagioclase—Mode: 45%-65%.

Crystal size: Various, see above.

Crystal shape: Euhedral-anhedral.

Preferred orientation: Marked.

Percent replacement: None.

Clinopyroxene—Mode: 35%-20%.

Crystal size: Various, see above.

Crystal shape: Subhedral.

Preferred orientation: Marked.

Percent replacement: <5% by amphibole.

Olivine—Mode: 2%-10%.

Crystal size: Various, see above.

Crystal shape: Subhedral-anhedral.

Preferred orientation: Marked.

Percent replacement: Trace by tremolite + talc or mica.

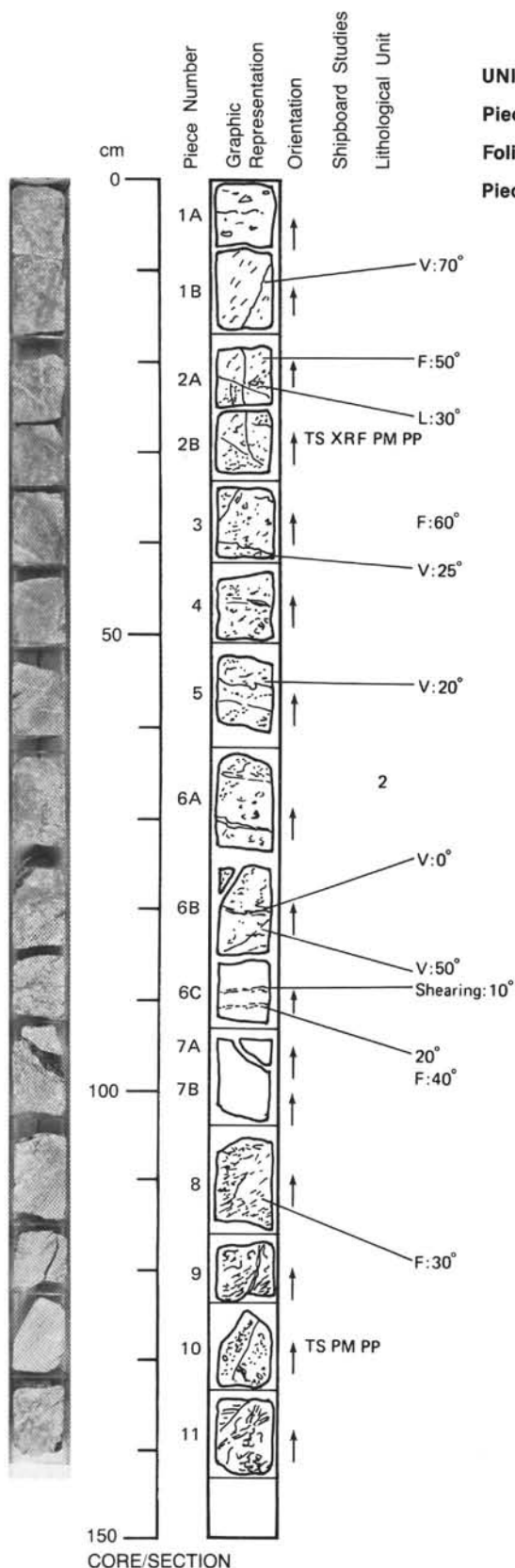
SECONDARY MINERALOGY:

Total percent: <5%.

Texture: Not determined.

Percent vein material: Abundant.

Vein material: Amphibole and albite. 1-3 mm thick, inclined at various angles.



118-735B-34R-1

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1-11B

Olivine-Bearing Gabbro

Pieces 1, 2A (top), 3, and 4

COLOR: Gray.
LAYERING: No layering.
DEFORMATION: No substantial deformation.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 60%-65%.
 Crystal size: 10-20 mm.
 Crystal shape: Euhedral.
 Preferred orientation: None.
 Percent replacement: None.
 Clinopyroxene—Mode: 25%-30%.
 Crystal size: 10 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: 10% by amphibole.
 Olivine—Mode: 4%-7%, locally concentrated.
 Crystal size: 3-15 mm.
 Crystal shape: Subhedral.
 Preferred orientation: None.
 Percent replacement: 50% by tremolite and talc.
SECONDARY MINERALOGY:
 Total percent: 10%.
 Texture: Not determined.
 Percent vein material: Minor.
 Vein material: Amphibole.

Microgabbro with Sheared Part

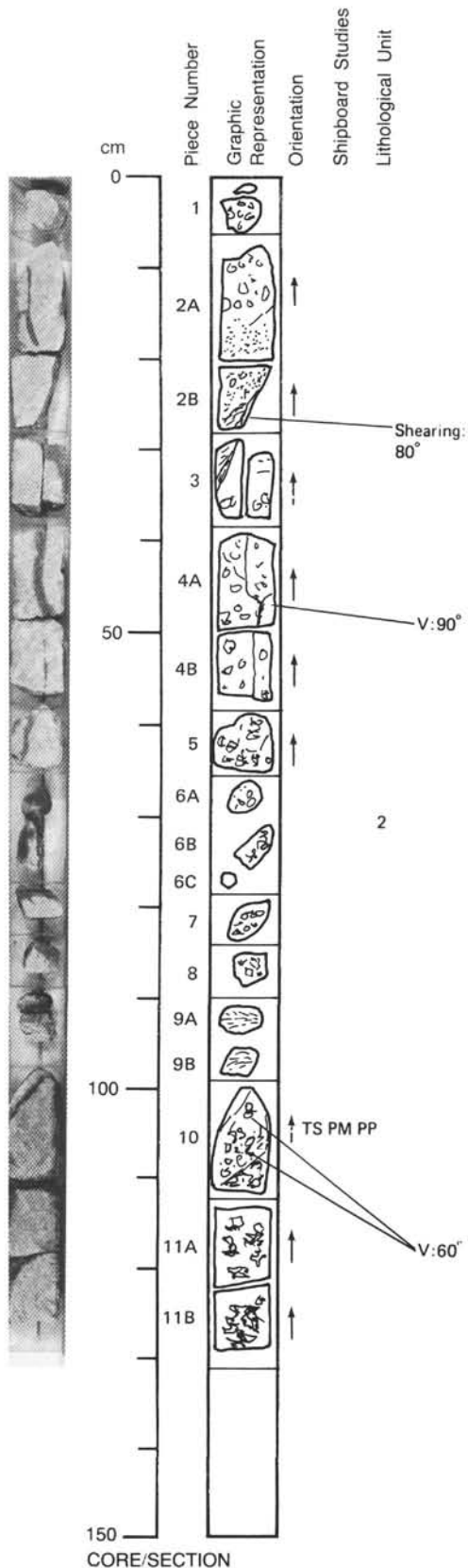
Pieces 2A (bottom) and 2B

COLOR: Greenish gray.
LAYERING: No layering.
DEFORMATION: Strongly foliated near the sheared zone; no other deformation, gradational contact with the upper coarse gabbro. 3 mm clinopyroxene grains present.
PRIMARY MINERALOGY: Because of its small grainsize, the modal ratio, shape, and often texture, cannot be determined.
SECONDARY MINERALOGY:
 Total percent: 20%.
 Texture: Amphibolitized.
 Percent vein material: None.
 Vein material: None.

Fine-Grained Clinopyroxene Oikocrystic Gabbro

Pieces 5-7

COLOR: Grayish green.
LAYERING: No layering.
DEFORMATION: Partly veined and sheared.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 45%-60%.
 Crystal size: < 1 mm (chadacryst).
 Crystal shape: Euhedral-subhedral.
 Preferred orientation: None.
 Percent replacement: None.
 Clinopyroxene—Mode: 15%-35%.
 Crystal size: 10 mm (oikocryst).
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: 5% by amphibole.
 Olivine—Mode: 4%.
 Crystal size: 0.5-1 mm.
 Crystal shape: Subhedral.
 Preferred orientation: None.
 Percent replacement: 50% by tremolite + talc or mica + opaques.



CORE/SECTION

118-735B-34R-1 (continued)

SECONDARY MINERALOGY:

Total percent: 15%.
 Texture: Not determined.
 Percent vein material: Trace.
 Vein material: Amphibole.

Amphibolitized Medium-Grained Gabbro**Piece 8**

No description

Foliated and Amphibolitized Metagabbro**Piece 9**

COLOR: Greenish gray.
LAYERING: Not determined.
DEFORMATION: Strong foliation. Clinopyroxene (olivine) is completely replaced by amphibole.
PRIMARY MINERALOGY: Similar to microgabbro described above.
SECONDARY MINERALOGY: Similar to microgabbro described above.

Medium-Grained Clinopyroxene Oikocrystic Gabbro**Pieces 10 and 11**

COLOR: Gray.
LAYERING: No layering; clinopyroxene modal abundance increases from Pieces 11B to 11A to 10.
DEFORMATION: No deformation.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 45%-60%.
 Crystal size: 2-10 mm.
 Crystal shape: Euhedral.
 Preferred orientation: None.
 Percent replacement: Trace by sodic plagioclase.
 Clinopyroxene—Mode: 15%-35%.
 Crystal size: 20-30 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: <5% by amphibole.
 Olivine—Mode: 10%-20%.
 Crystal size: 3 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: <10% by tremolite + talc or mica.
SECONDARY MINERALOGY:
 Total percent: 15%.
 Texture: Slight replacement (clinopyroxene by amphibole <5%; olivine by tremolite + talc <10%). Piece 10: Along amphibole veins, plagioclase is albitized, and clinopyroxene is strongly replaced by amphibole.
 Percent vein material: Trace.
 Vein material: Amphibole.

118-735B-34R-2

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1A-7

Olivine-Bearing and Olivine Gabbro

Pieces 1A-7

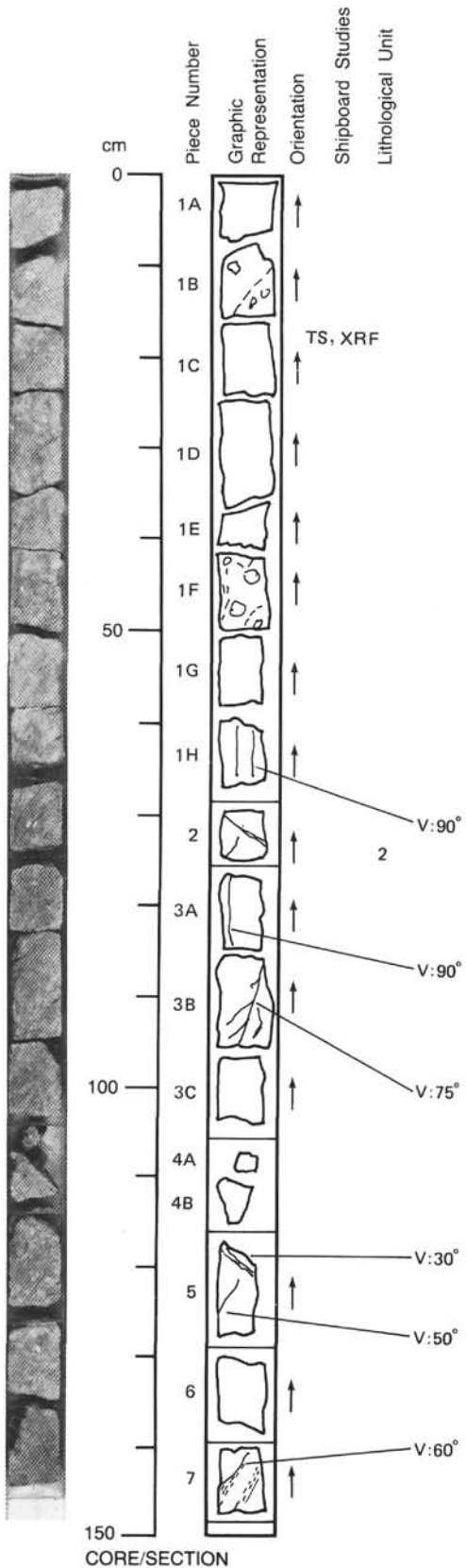
COLOR: Mottled greenish gray.
LAYERING: Grain-size variations: Pieces 1B and 1F: Grain size varies from 1 to 0.4 cm. Piece 7: Grain size varies from 0.7 to 0.2 cm.
DEFORMATION: No deformation except for sheared amphibole vein in Piece 5.

PRIMARY MINERALOGY:
 Plagioclase—Mode: 70%.
 Crystal size: 10 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: 5%-10% by albite, especially near the amphibole veins.

Clinopyroxene—Mode: 29%.
 Crystal size: 5-20 mm.
 Crystal shape: Anhedral and oikocrystic.
 Preferred orientation: None.
 Percent replacement: 25% by green amphibole.

Olivine—Mode: 1%-27%.
 Crystal size: < 10 mm.
 Crystal shape: Rounded.
 Preferred orientation: None.
 Percent replacement: Not determined.

SECONDARY MINERALOGY:
 Total percent: 15%.
 Texture: Pseudomorphic.
 Percent vein material: < 2%.
 Vein material: Amphibole and soft white mineral. Pieces 1H and 3A: Amphibole veins dipping at 90°. Piece 2: Green and white veins (amphibole) dipping at 30° and 50°. Piece 3B: Amphibole vein dips at 75° with albitized plagioclase around. Piece 4: Amphibole vein and albittization of plagioclase. Piece 5: Microshear zone with dark amphibole dipping at 30°; amphibole vein dips at 50°. Piece 7: Amphibole vein dipping at 60°.



118-735B-34R-3

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1A-8

Olivine-Bearing Gabbro

Pieces 1A-8

COLOR: Gray.

LAYERING: Possible modal layering with irregular concentrations of olivine (up to 10%) present in Pieces 4A, 4B, and 6B.

Grain size variations: Piece 1C is pegmatoidal with clinopyroxene up to 30 mm and plagioclase up to 50 mm. Fine-grained band across Piece 1A appears primary.

DEFORMATION: Minor. Granulation of plagioclase near fractures. Recrystallization of plagioclase around fracture at top of Piece 1B.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%-70% (average 63%).

Crystal size: Norm 10-15 mm; range 1-50 mm.

Crystal shape: Subhedral, oikocrystic.

Preferred orientation: Not determined.

Percent replacement: Altered to sodic plagioclase near fractures.

Clinopyroxene—Mode: 25%-45% (average 35%).

Crystal size: Norm 8-15 mm; range 1-30 mm.

Crystal shape: Subhedral, oikocrystic.

Preferred orientation: Not determined.

Percent replacement: Not determined.

Olivine—Mode: 2%-10%.

Crystal size: Norm 3-7 mm; range 1-12 mm.

Crystal shape: Anhedral.

Preferred orientation: Not determined.

Percent replacement: Alteration coronas of tremolite + talc + chlorite.

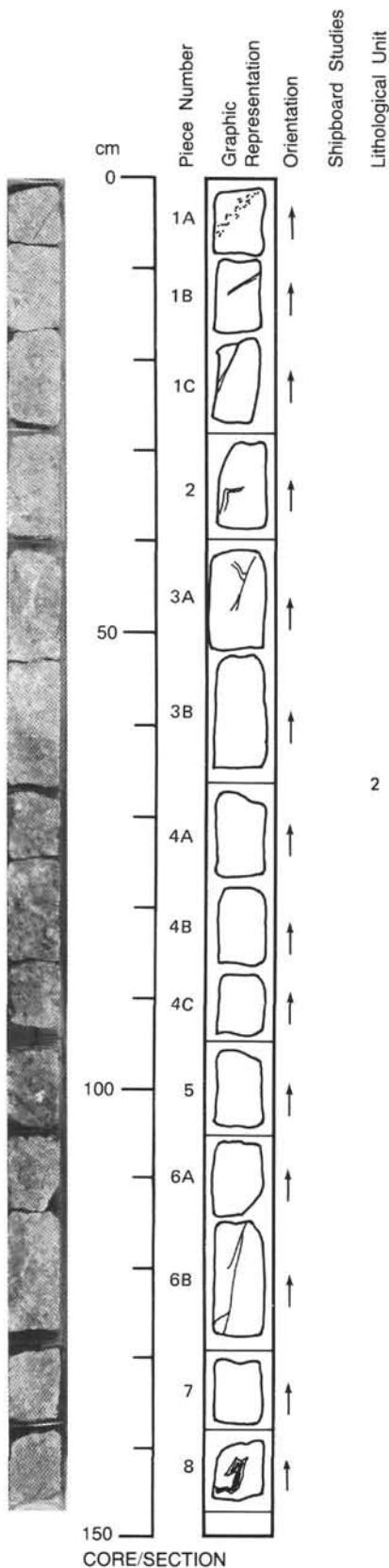
SECONDARY MINERALOGY:

Total percent: <5%.

Texture: Plagioclase may be altered to sodic plagioclase, and may be granulated along fractures. Amphibole fills some fractures. Olivine exhibits alteration coronas, probably tremolite + talc + chlorite. Iron-titanium oxides concentrated in Piece 8 where it has the morphology of a clinopyroxene.

Percent vein material: Not determined.

Vein material: Pieces 1B, 3A, and 6B: Veins of sodic plagioclase and amphibole.



CORE/SECTION

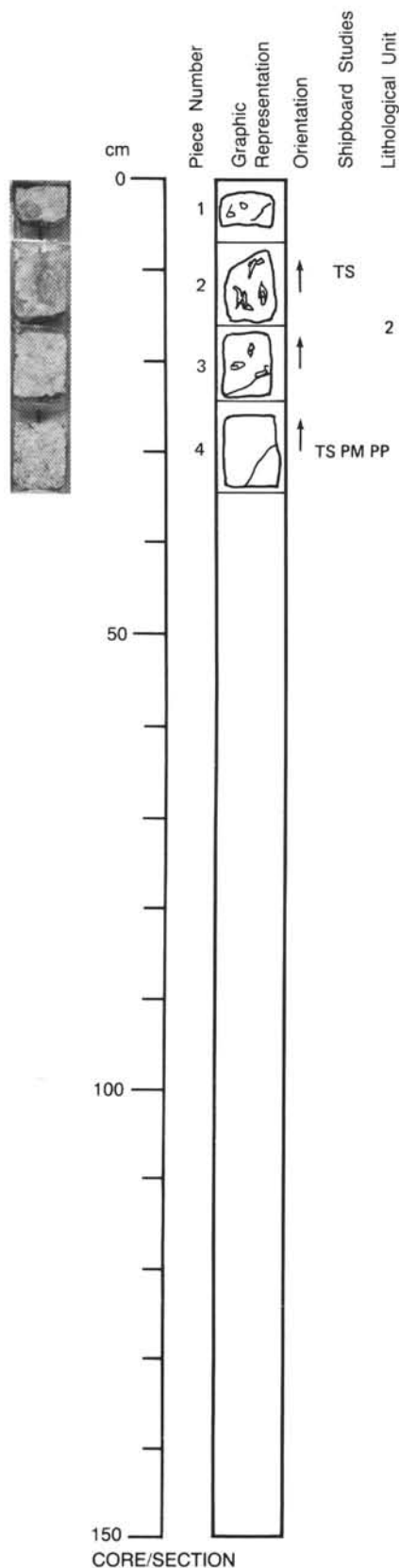
118-735B-34R-4

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1-4

Coarse-Grained Iron-Titanium Oxide-Bearing Gabbro

Pieces 1-4



COLOR: Dark gray.

LAYERING: None.

DEFORMATION: None.

PRIMARY MINERALOGY:

Plagioclase—Mode: 40%-55%.

Crystal size: 10-30 mm.

Crystal shape: Euhedral.

Preferred orientation: None.

Percent replacement: Not determined.

Clinopyroxene—Mode: 25%-35%.

Crystal size: 10-30 mm.

Crystal shape: Euhedral.

Preferred orientation: None.

Percent replacement: 30% by black amphibole in Pieces 1 and 2 and >70% by green amphibole in Pieces 3 and 4.

Olivine—Mode: <5%.

Crystal size: 10-30 mm.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: Not determined.

SECONDARY MINERALOGY:

Total percent: >30%.

Texture: Pseudomorphic.

Percent vein material: <1%.

Vein material: One green amphibole vein in Piece 3.

COMMENTS: Primary or secondary(?) iron-titanium oxide: up to 15%-20%. Euhedral to anhedral in Piece 2.

118-735B-35R-1

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1-7

Olivine Gabbro

Pieces 1-7

COLOR: Gray.

LAYERING: Piece 7: Possible primary layering, i.e., thin layer, or concentration, of olivine.

Piece 2E: Fracture (back surface of archive half) filled with fibrous mineral.

Pieces 4A and 4B: Large vein (1-3 mm) filled with amphibole.

DEFORMATION: No foliation. Very coarse-grained on average, but variable. Extremely coarse-grained (2-4 cm grains) at 37-47 cm. Otherwise, grain size slightly finer at top than at bottom (below 50 cm).

PRIMARY MINERALOGY:

Plagioclase—Mode: 40%.

Crystal size: 5-20 mm.

Crystal shape: Anhedral to euhedral.

Preferred orientation: Not determined.

Percent replacement: Not determined.

Clinopyroxene—Mode: 50%.

Crystal size: 5-40 mm (average 10 mm).

Crystal shape: Anhedral, some oikocrysts up to 40 mm.

Preferred orientation: Not determined.

Percent replacement: Variable, actinolite at rims.

Olivine—Mode: 5%-10%; somewhat greater in bottom of Piece 2.

Crystal size: 5-10 mm.

Crystal shape: Anhedral.

Preferred orientation: Not determined.

Percent replacement: Relatively fresh; some have halos of actinolite.

SECONDARY MINERALOGY:

Total percent: Moderate alteration. Total percentage of alteration at top 30%; decreases to less than 5%-10% at bottom.

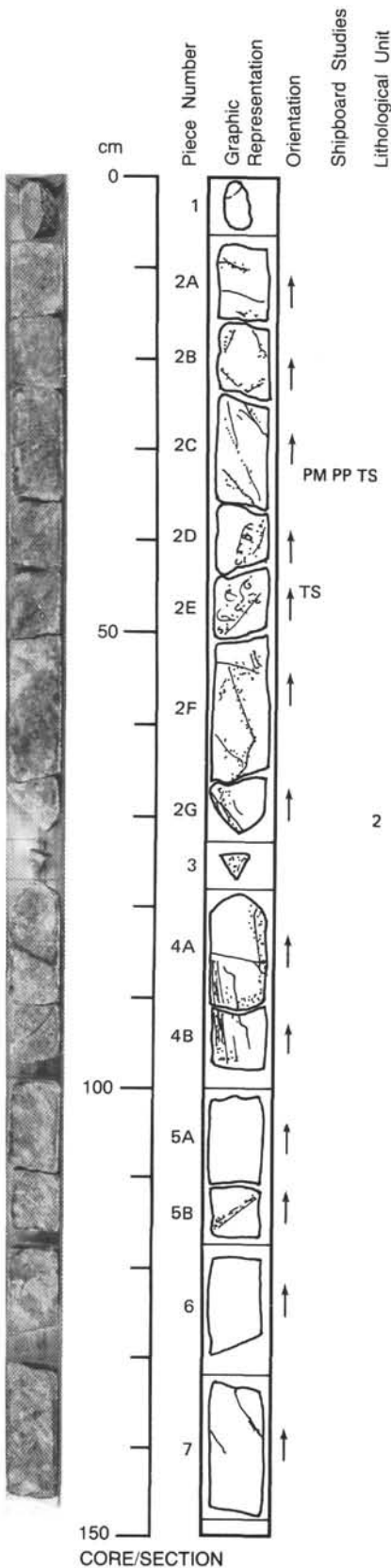
Texture: Clinopyroxene replaced by green actinolite at rims. Plagioclase crosscut by thin actinolite filled fractures and veins. Olivine relatively fresh, but surrounded by halos of actinolite. Degree of alteration determined by abundance and proximity of veins.

Concentration of ilmenite and traces of sulfides in Piece 2E. Olivine has a yellowish alteration coating in Pieces 2D, 2E, and 6.

Percent vein material: Proportion of veins greatest at top of section.

Vein material: Actinolite or actinolite + albite. Pieces 4A and 4B: Green amphibole veins.

Piece 5B: Large (1-2 mm) vein, mainly albite.



118-735B-35R-2

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1A-5

Olivine Gabbro

Pieces 1A-5

COLOR: Dark gray.

LAYERING: None apparent.

DEFORMATION: Foliation (well defined in Piece 1B) seen from flattened plagioclase and pyroxene.

Piece 2B: Same minerals are stretched and elongated into the plane of foliation. Piece 4G: Brecciated-sheared zone, 8 mm thick, filled with plagioclase and little amphibole. Piece 1B: Grain size is reduced from centimeter to few millimeters.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%-60%.

Crystal size: 1-8 mm.

Crystal shape: Prismatic to lath-shaped, almost included in clinopyroxene or in the groundmass.

Preferred orientation: Not apparent.

Percent replacement: Slightly altered.

Clinopyroxene—Mode: 32%-48%.

Crystal size: Up to 40 mm.

Crystal shape: Mostly oikocrysts with irregular outlines.

Preferred orientation: Not apparent.

Percent replacement: Slightly altered to amphibole.

Olivine—Mode: 2%-8% (enriched zones in Pieces 4F and 4G).

Crystal size: 2-7 mm.

Crystal shape: Rounded to irregularly shaped.

Preferred orientation: Not apparent.

Percent replacement: 100% by serpentine + magnetite.

SECONDARY MINERALOGY:

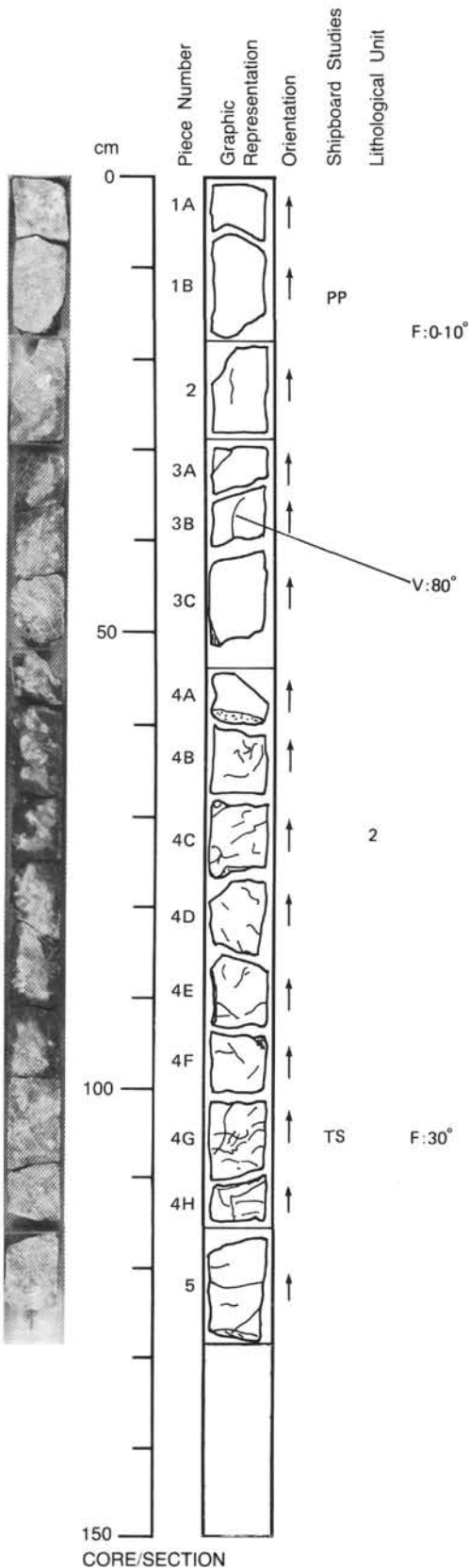
Total percent: 35%.

Texture: Clinopyroxene is partly replaced by amphibole. Olivine is replaced by serpentine + magnetite and rimmed by talc (net texture). Probably amphibole (cummingtonite) is present in the coronitic arrangement. Olivine can also be altered into iron hydroxides and rusty brown clays. Plagioclase is recrystallized into smaller plagioclase grains and cut by green amphibole veins.

Percent vein material: Not determined.

Vein material: Veins are filled by amphibole or plagioclase or both (3-4 mm). Fractures are < 1 mm thick and are responsible for some displacement in the rock. Piece 4G: Shears are filled with plagioclase (80%) and amphibole 20%.

COMMENTS: All pieces are olivine gabbro except for Piece 1B, which is a foliated olivine gabbro, and Piece 2B, which is a porphyroclastic gabbro.



118-735B-35R-3

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1A-2J

Massive Olivine Gabbro

Pieces 1A-2J

COLOR: Gray.

LAYERING: Possible primary layering. Pieces 1E and 1F: Concentrations of olivine in layers between clinopyroxene oikocrysts.

DEFORMATION: None.

PRIMARY MINERALOGY:

Plagioclase—Mode: 45%-50%.

Crystal size: 5-20 mm.

Crystal shape: Anhedral to euhedral.

Preferred orientation: None.

Percent replacement: Slight to moderate albitization.

Clinopyroxene—Mode: 40%-45%.

Crystal size: 5-40 mm.

Crystal shape: Anhedral to subhedral, subophitic. Large oikocrysts in Pieces 1D and 1E.

Preferred orientation: None.

Percent replacement: Slight to moderate replacement by actinolite.

Olivine—Mode: 5%-15%.

Crystal size: 5-10 mm.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: Extensive to complete replacement by actinolite + talc.

SECONDARY MINERALOGY:

Total percent: 20%.

Texture: Pieces 1A-1D: Alteration due to numerous thin, anastomosing, actinolite-filled fractures. Olivine with actinolite halos and crosscut by meshlike, dark alteration mineral.

Some infilling of mesh by talc. Piece 2A: Intense albitization, approximately 1 cm wide at 60

62 cm. Concentration of ilmenite in a layer approximately 5 mm thick at 52-29 cm. Traces of sulfides throughout. Oxidation is associated with the sulfides producing an orange staining.

Below 70 cm: Total alteration much higher and more pervasive, associated with albite + actinolite + epidote(?) veins (50%-60% alteration).

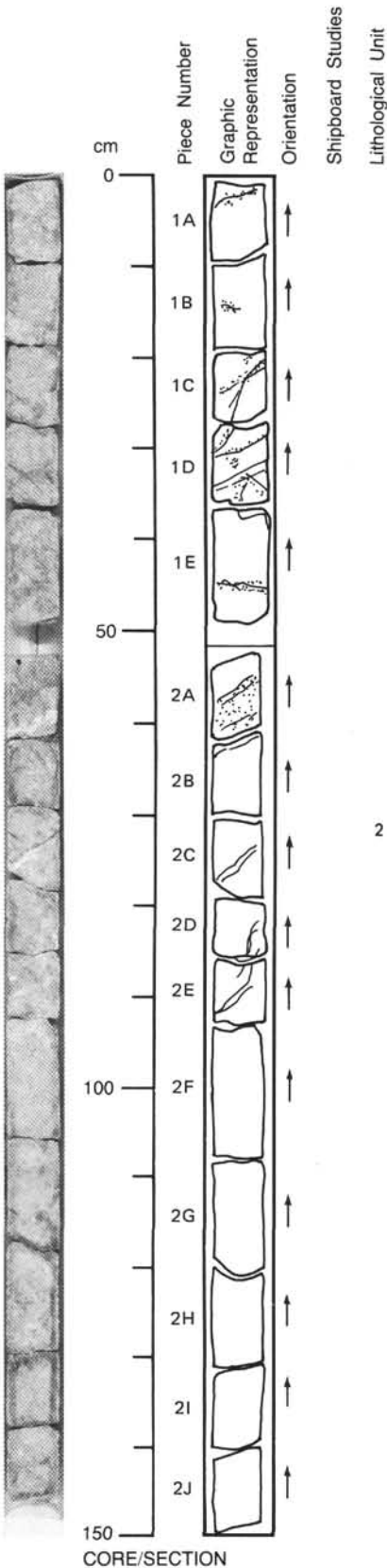
Pieces 2E and 2G: Contains reddish-stained plagioclase.

Below 110 cm: Amount of actinolite less (i.e., clinopyroxene altered only around rims) but plagioclase still has a milky white appearance.

Percent vein material: 5%-15%.

Vein material: Sodium plagioclase + actinolite + epidote (?). Piece 2A: Large vein. Albitic center with ilmenite-rich zone at upper border and oxide staining.

COMMENTS: Coarse-grained primary texture.



118-735B-35R-4

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1A-6

Variously Amphibolitized Olivine Gabbro and Olivine-Bearing Gabbro

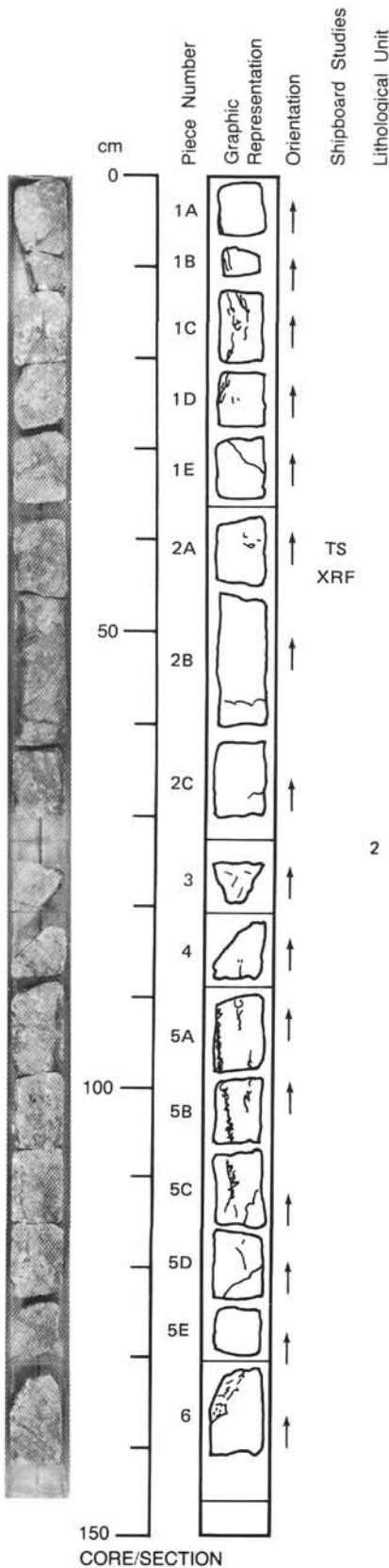
Pieces 1A-6

COLOR: Gray to green white.
LAYERING: No layering; however, spotty distribution of olivine.
DEFORMATION: Pieces 1, 5, and 6: granulation of plagioclase along near-vertical amphibole veins.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 50%-60%.
 Crystal size: 2 mm (euhedral) to 20 mm (anhedral).
 Crystal shape: Euhedral to anhedral.
 Preferred orientation: None.
 Percent replacement: Some albitization (?) near veins

 Clinopyroxene—Mode: 40%.
 Crystal size: Poikilitic to interstitial (5 mm); oikocrysts as large as 30 mm; 3 mm near euhedral clinopyroxene in Piece 3.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: <5% to 50% by dark-green amphibole with granulation of plagioclase.

 Olivine—Mode: 0%-8%.
 Crystal size: 0.5-4 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: Up to 50% by talc and amphibole.
 Distributed irregularly in core; particularly abundant in Pieces 5A and 5C.
SECONDARY MINERALOGY:
 Total percent: Up to 50% replacement along veins.
 Texture: Dark-green amphibole after clinopyroxene with granulation of plagioclase.
 Percent vein material: Veins and altered zones form 5% of section.
 Vein material: Veins are vertical, often with vuggy, incompletely filled spaces.
 Pieces 1, 5, and 6: Amphibole.

COMMENTS: There are grain size variations in this section. A coarse-grained piece occurs at 75-80 cm, and there seems to be an indistinct fining upward to 40 cm, where the section again coarsens. The change is rather subtle.



118-735B-35R-5

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1-5E

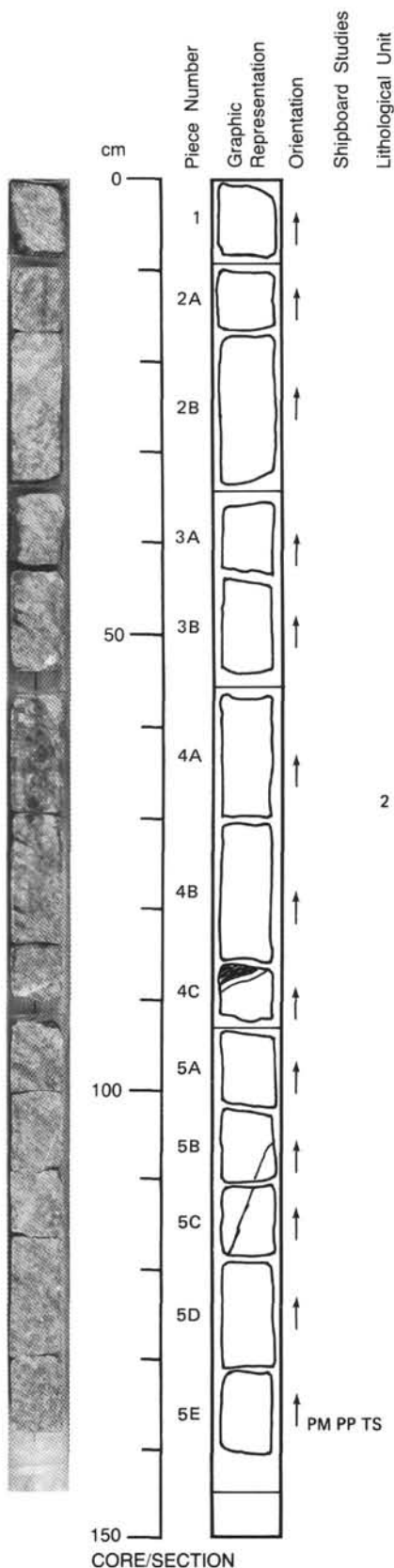
Olivine-Bearing Gabbro

Pieces 1-5E

COLOR: Gray.
LAYERING: Possible igneous layering indicated by gradations in grain size and texture along section (very coarse-grained to microgabbro).
DEFORMATION: Not determined.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 55%-65%.
 Crystal size: Variable, typically 0.5-4 mm.
 Crystal shape: Anhedral to euhedral.
 Preferred orientation: None.
 Percent replacement: Not determined.
 Clinopyroxene—Mode: 30%-40%.
 Crystal size: Variable, but typically 1-4 mm.
 Crystal shape: Anhedral, granular to subophitic.
 Preferred orientation: None.
 Percent replacement: 20% by talc, tremolite, and opaques.
 Olivine—Mode: 1%-3% (pseudomorphs).
 Crystal size: 0.5-2 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: 20% to talc, tremolite, and opaques.

SECONDARY MINERALOGY:
 Total percent: 10%
 Texture: Some local replacement of pyroxene by amphibole present. Olivine altered to talc, tremolite, and opaques.
 Vein material: Amphibole and plagioclase. Green amphibole located in crosscutting veins along with feldspar. At least two generations: one amphibole vein, and a second of mixed plagioclase + amphibole veins (Pieces 5B and 5C) with darker colored amphibole.

COMMENTS: Anhedral granular to subophitic with pyroxene partially enclosing plagioclase laths.
 Piece 4B: Apparent size and modal layering visible.
 Piece 3C: Pyroxene-rich layer 15 mm thick.



CORE/SECTION

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1A-9D

Olivine Gabbro

Pieces 1A-9D

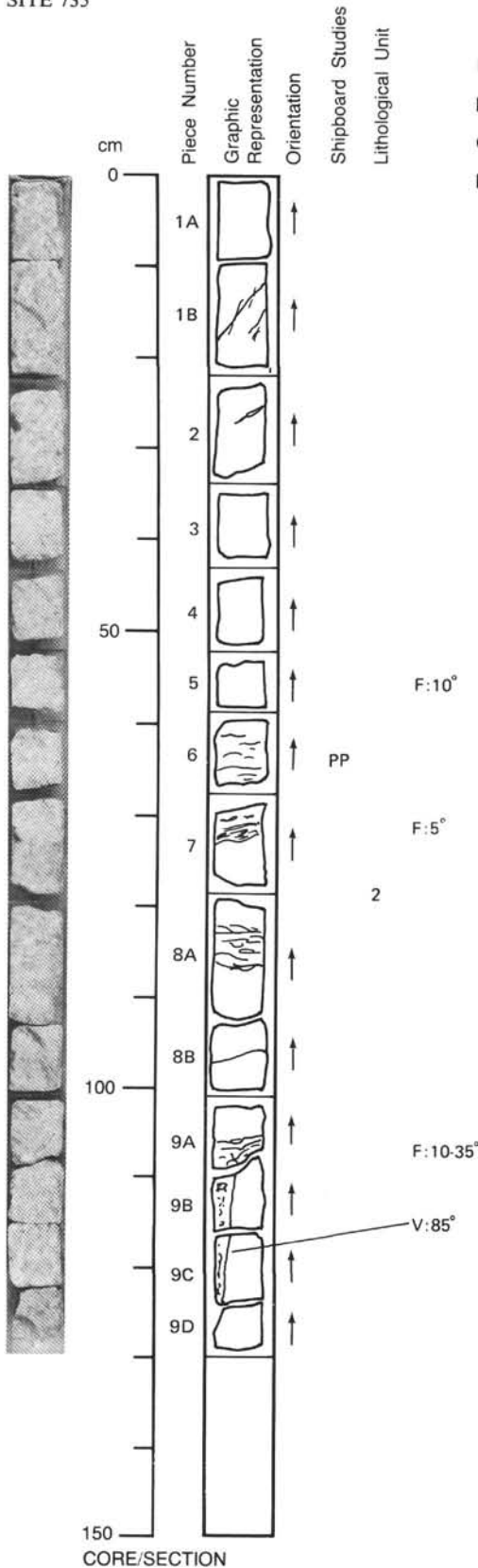
COLOR: Gray.
LAYERING: None.
DEFORMATION: Weak foliation in Pieces 2, 3, 7, and 8, grading into deformed zones.
PRIMARY MINERALOGY:
 As in Sections 118-735B-35R-4 and -5. A very coarse-grained (1-2 mm grains) interval in Pieces 9B-9D.

Plagioclase—Mode: 50%-60%.
Crystal size: 2-20.
Crystal shape: Euhedral to anhedral.
Preferred orientation: Slight, near deformed zones.
Percent replacement: Not determined.

Clinopyroxene—Mode: 40%-50%.
Crystal size: 3-30 mm.
Crystal shape: Anhedral, poikilitic.
Preferred orientation: Slight near deformed zones
Percent replacement: Variously replaced by green amphibole.

Olivine—Mode: 0%-10%.
Crystal size: 0.5-4 mm.
Crystal shape: Anhedral.
Preferred orientation: None.
Percent replacement: Variously replaced by talc/tremolite.

SECONDARY MINERALOGY:
Total percent: 10% (?) **Percent vein material:** <5%.
Vein material: Amphibole and feldspar.
Texture: Minor amphibole, feldspar vein fill.
Pieces 4-7 (top) and top of Piece 9: Slightly porphyroclastic to mylonitic olivine-bearing gabbro.
Pieces 7 and 9A: Mylonitic.
Pieces 9B and 9C: Vertical fracture with some plagioclase granulation and amphibole. Looks as if the fracture cuts the foliation.



118-735B-35R-7

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1-3

Olivine Gabbro

Pieces 1-3

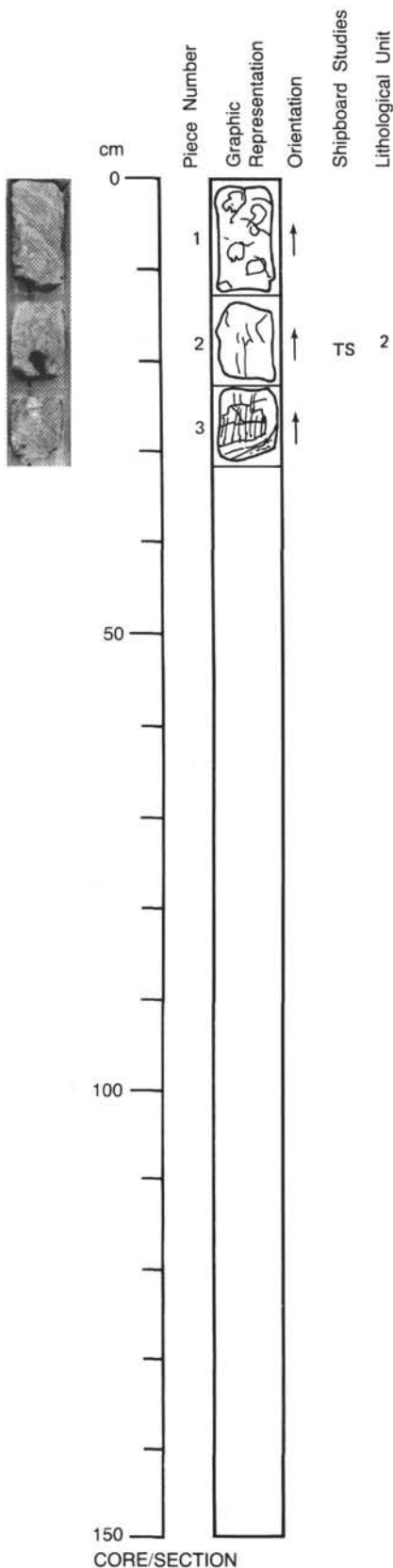
COLOR: Brownish gray.
LAYERING: None apparent.
DEFORMATION: None apparent, but base of Piece 3 is slightly sheared.
PRIMARY MINERALOGY:

Plagioclase—Mode: 65%.
Crystal size: 1-7 mm.
Crystal shape: Euhedral to subhedral.
Preferred orientation: None.
Percent replacement: Slight.

Clinopyroxene—Mode: 30%.
Crystal size: 3-20 mm (wide), 10-50 mm long.
Crystal shape: Irregular oikocryst (can contain plagioclase inclusions).
Preferred orientation: None.
Percent replacement: Slight by dark green amphibole.

Olivine—Mode: 5% (10% in Pieces 2 and 3).
Crystal size: 3-11 mm (Up to 20 mm in Pieces 2 and 3).
Crystal shape: Rounded, irregular.
Preferred orientation: None.
Percent replacement: Slight by clays, iron hydroxides, magnetite, and talc.

SECONDARY MINERALOGY:
Total percent: <25%.
Texture: Plagioclase is strained and partly transformed to granoblasts.
Percent vein material: Not determined.
Vein material: Plagioclase and amphibole. Fractures cut all pieces and show preferential alteration near the walls. Fractures are up to 1 mm thick.



118-735B-36R-1

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1-6E

Strongly Foliated Mylonitized Metagabbro

Piece 1

No description—may have come from higher level in the hole.

Medium- to Coarse-Grained Olivine-Bearing Gabbro

Pieces 2-6E

Locally showing intense veining.

COLOR: Gray to greenish gray.

LAYERING: Not visible except for Piece 6E. This piece shows an inclined fine-grained band dipping at 55° that presumably represents a layer with a finer, primary grain size distribution.

DEFORMATION: None. However, small sheared bands are developed along the contacts of larger veins.

PRIMARY MINERALOGY:

Varies over section. Pieces 2, 3, and 4A are enriched in olivine and ilmenite.

Plagioclase—Mode: 55%-60%.

Crystal size: <0.5-30 mm.

Crystal shape: Subhedral.

Preferred orientation: Not determined.

Percent replacement: Partially replaced by albite in veined areas.

Clinopyroxene—Mode: 40%.

Crystal size: <0.5-30 mm.

Crystal shape: Anhedral-subhedral.

Preferred orientation: Not determined.

Percent replacement: < 10% by amphibole.

Olivine—Mode: Up to 5%.

Crystal size: <0.5-20 mm.

Crystal shape: Anhedral.

Preferred orientation: Not determined.

Percent replacement: Locally <2% by ilmenite.

SECONDARY MINERALOGY:

Total percent: <10%.

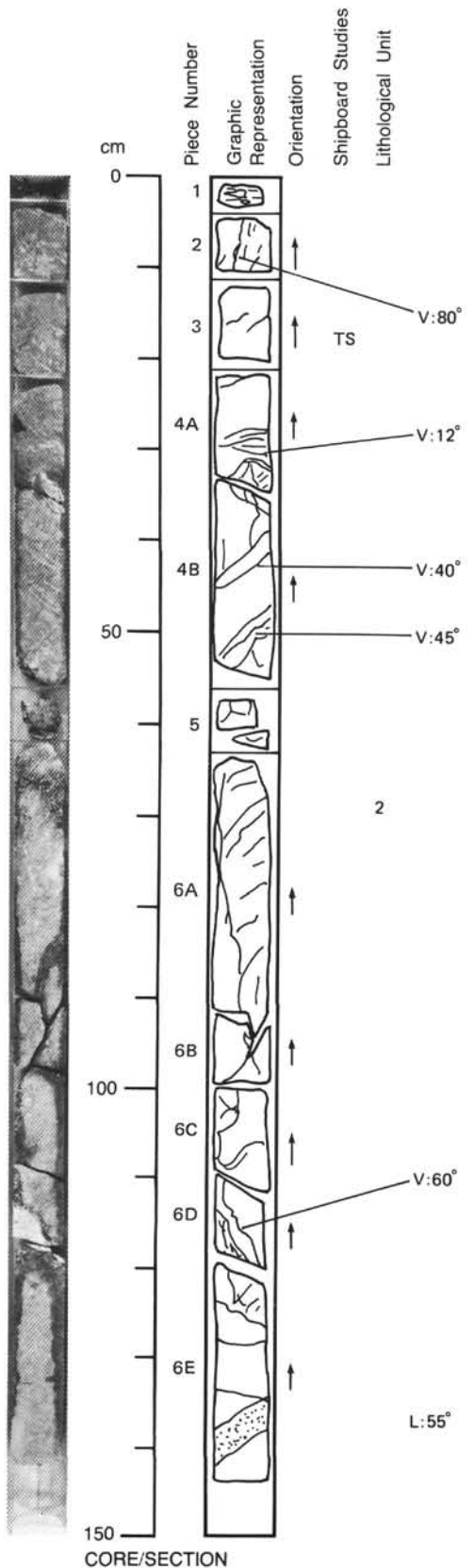
Texture: Green amphibole partially rimming clinopyroxene (<10%). Olivine relatively fresh except for upper third of section, where it is partially replaced by yellowish material.

Plagioclase partially replaced by albite(?) in more strongly veined portions. Some disseminated sulfides.

Percent vein material: Not determined.

Vein material: Green amphibole, albite and ilmenite.

Ilmenite veins only in Pieces 3 and 4A. Albite veins are up to 4 cm thick. Larger veins are along shear bands; green amphibole is always the first vein-filling mineral; white plagioclase fills the centers of the larger veins.



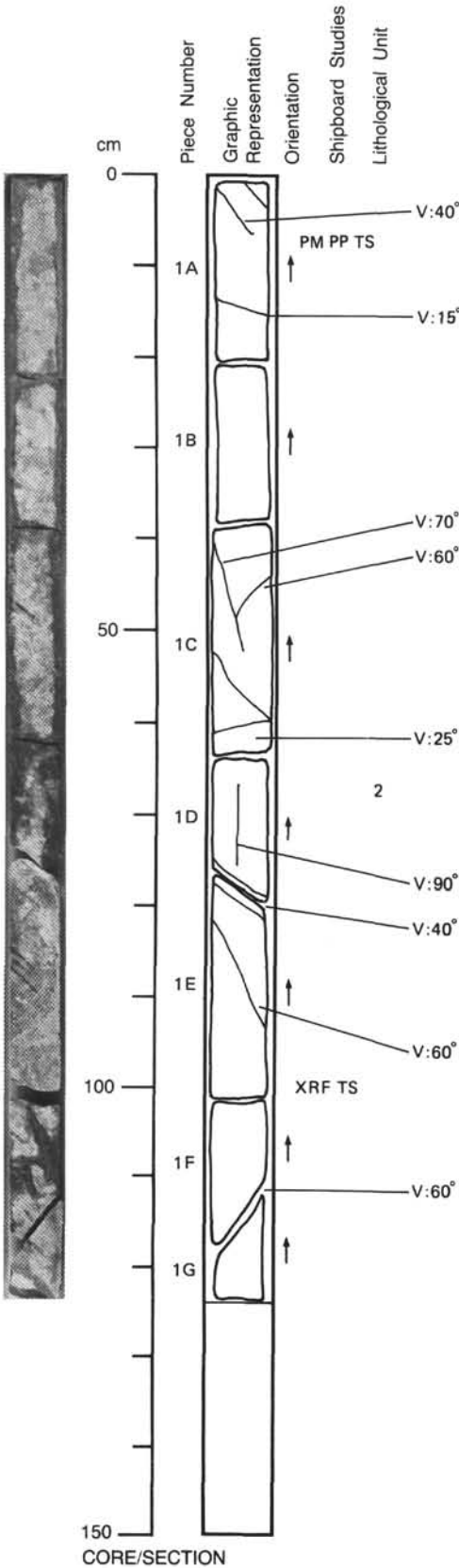
118-735B-36R-2

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1A-1G

Coarse- to Medium-Grained Olivine-Bearing Gabbro

Pieces 1A-1G



COLOR: Dark gray.

LAYERING: No clear layering, but variation in grain size; 3 mm average in top of Piece 1A; 6 mm average in bottom of Piece 1A; 10 mm in Pieces 1C and 1D; 20 mm in Pieces 1B, 1E, and 1F; and up to 40 mm in Piece 1G.

DEFORMATION: No deformation except sheared, amphibole vein in Pieces 1D and 1E.

PRIMARY MINERALOGY:

Plagioclase—Mode: 60%.
 Crystal size: See layering.
 Crystal shape: Not determined.
 Preferred orientation: None.
 Percent replacement: Minor replacement by more sodic plagioclase.

Clinopyroxene—Mode: 35%.
 Crystal size: See layering.
 Crystal shape: Not determined.
 Preferred orientation: None.
 Percent replacement: Replacement by amphibole.

Olivine—Mode: >5%.
 Crystal size: See layering.
 Crystal shape: Not determined.
 Preferred orientation: None.
 Percent replacement: Replacement by amphibole and talc (?).

SECONDARY MINERALOGY:

Total percent: <30%.
 Texture: Minor albitization of plagioclase and amphibolitization of clinopyroxene, especially in Piece 1C.
 Percent vein material: <1%.

Vein material: Amphibole and "albite"-amphibole veins, sheared in Pieces 1D and 1E.

COMMENTS: The sheared amphibole vein in Pieces 1F and 1G bears striations dipping at 90°.

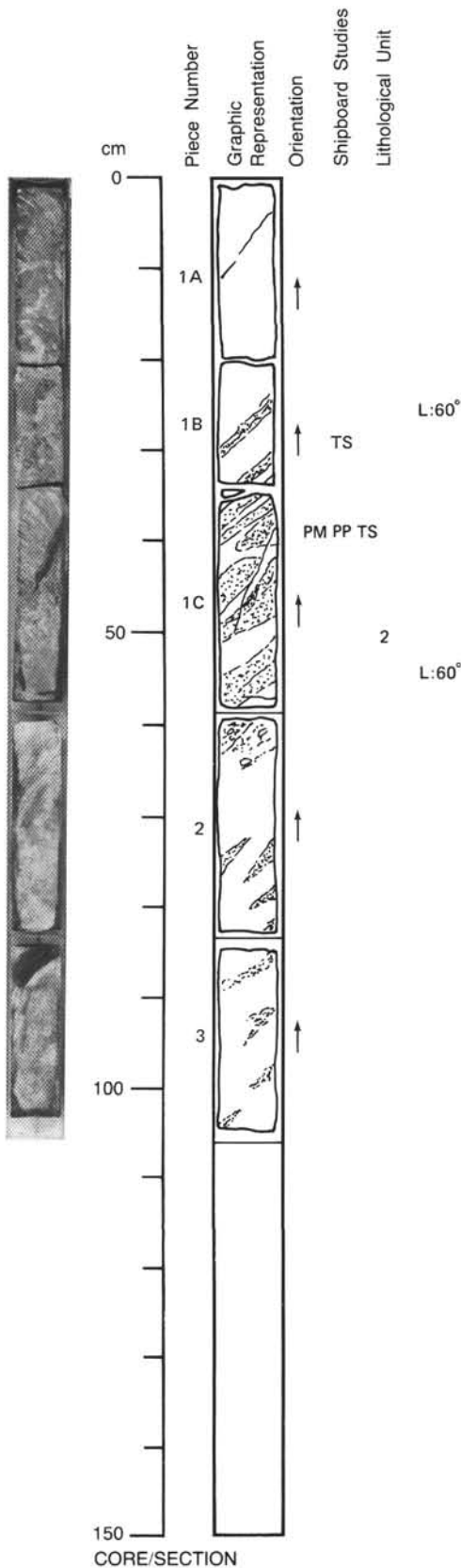
118-735B-36R-3

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1A-3

Layered Olivine-Bearing Gabbro

Pieces 1A-3



COLOR: Dark gray.

LAYERING: Alternating layers of different grain size.

Average grain size of coarse-grained layers 10-20 mm.

Average grain size of fine grained layers 1 mm.

From the top to the bottom of the sections: 20 cm coarse-grained layer, 10-20 mm grain size; 2-1 cm fine-grained layer 1 mm grain size; 2 cm coarse-grained layer, 10-15 mm grain size; 15 cm fine- to medium-grained layer <0.5-3 mm grain size, boundary is irregular; 1-2 cm coarse-grained layer, 5-10 mm grain size; 7 cm fine-grained layer, 0.5-1 mm grain size; 8 cm coarse-grained layer, 5-10 mm grain size; 30 cm alternation of medium-(5 mm) and coarse-grained (5-10 mm) layers.

Piece 3: Layer is not marked. The boundaries are irregular.

DEFORMATION: None.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%-60%.

Crystal size: Variable <0.5-20 mm.

Crystal shape: Subhedral.

Preferred orientation: Shape preferred orientation defining foliation, which is not necessarily parallel to the layering.

Percent replacement: Almost none.

Clinopyroxene—Mode: 30%-40%.

Crystal size: Variable <0.5-20 mm.

Crystal shape: Anhedral.

Preferred orientation: Shape preferred orientation defining foliation, which is not necessarily parallel to the layering.

Percent replacement: 5% by amphibole.

Olivine—Mode: 3%-10%, locally concentrated.

Crystal size: Variable, <0.5-20 mm.

Crystal shape: Subhedral.

Preferred orientation: Shape preferred orientation defining foliation, which is not necessarily parallel to the layering.

Percent replacement: 50%-70% by clay and opaque minerals.

SECONDARY MINERALOGY:

Total percent: <5%.

Texture: Not determined.

Percent vein material: Trace.

Vein material: Albite and amphibole.

COMMENTS: Fine-grained portions are equigranular microgabbro (Piece 1B).

Coarse-grained "layers" or veins are anorthositic in the center and lined with clinopyroxene.

118-735B-36R-4

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1A-4

Layered Gabbro and Olivine Gabbro

Pieces 1A-4

COLOR: Gray to dark gray, blotchy in coarse-grained rock.
LAYERING: Marked size and phase layering steeply inclined at 50°-60° to direction of core.
DEFORMATION: Fractures dip at 50°-60°—orthogonal to layering in Pieces 1B, 1D, and 4—are lined with green amphibole and white feldspar (albite?). Also, a faint internal foliation slightly oblique to primary layering, marked by tiny fractures lined with plagioclase and amphibole in Pieces 1A, 1D, and 4.

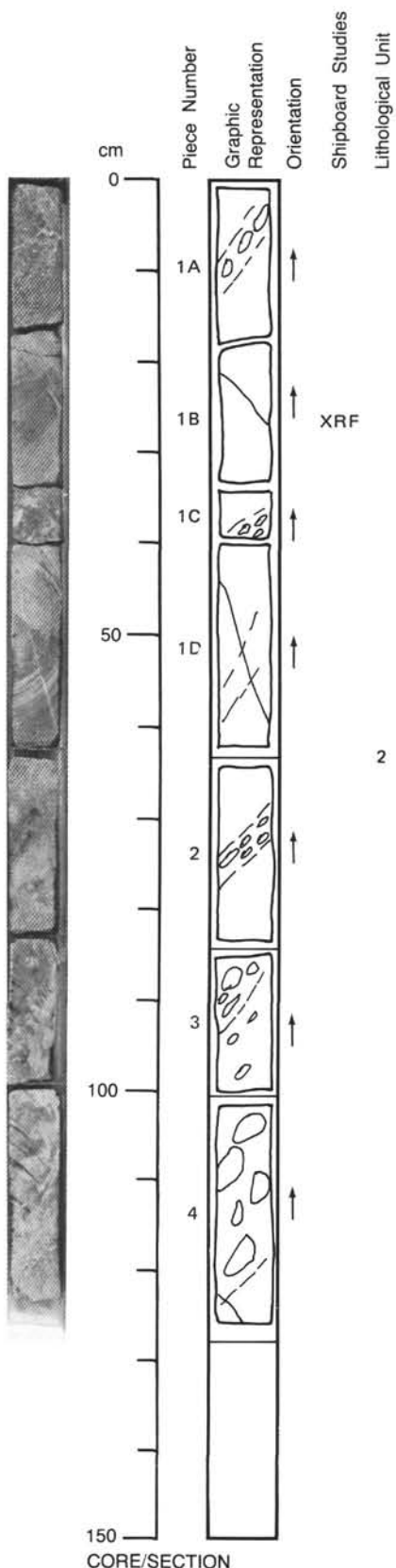
PRIMARY MINERALOGY:
 Plagioclase—Mode: 40%-60%.
 Crystal size: Medium to coarse.
 Crystal shape: Not determined.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

Clinopyroxene—Mode: 40%-60%.
 Crystal size: Medium to coarse.
 Crystal shape: Not determined.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

Olivine—5% in part of Piece 3; trace in Piece 2.
 Crystal size: Not determined.
 Crystal shape: Not determined.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

SECONDARY MINERALOGY:
 Total percent: Not determined.
 Texture: Green amphibole + feldspar in veins. Traces of amphibole + feldspar along minor microfractures + some ilmenite. No sulfide obvious.
 Percent vein material: Not determined.

COMMENTS: Both plagioclase and clinopyroxene are cumulus phases in fine-grained pieces. Finer-grained portions are equigranular microgabbros. Especially coarse-grained pyroxene-rich cumulates in Pieces 1A, 1C, 2, 3, and 4. Piece 3 has abundant, 1 cm olivine crystals. Piece 4: Pyroxenes up to 6 cm.
 Vein material: green amphibole + Na-plagioclase.



L:60°

XRF

2

L:55°

L:50°

CORE/SECTION

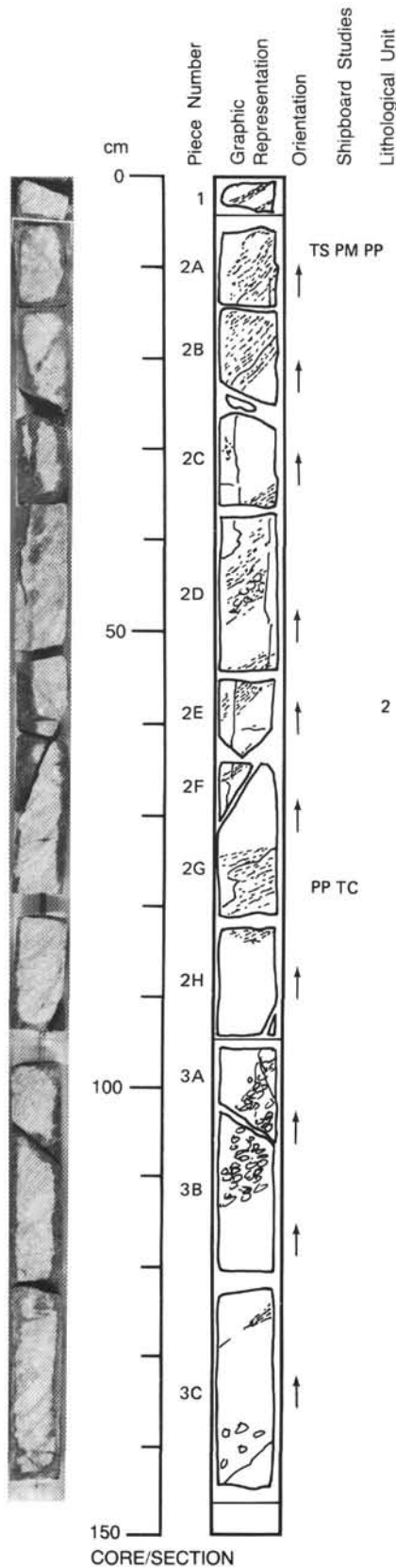
118-735B-37R-1

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1-3C

Layered Olivine-Bearing Gabbro

Pieces 1-3C



COLOR: Gray.

LAYERING: Alternating layers of different grain size.

from the top to the bottom of the section: 7 cm thick, alternation of fine- (1 mm) and coarse-grained (10 mm) (plagioclase-rich) layers;
 9 cm thick, 0.5-2 mm grain size layers;
 19 cm thick, alternation of fine- (1 mm) and coarse-grained (10 mm), irregular or discontinuous layers;
 3 cm thick, clinopyroxene-rich, coarse-grained (10 mm) gabbro layer (almost a clinopyroxenite);
 3 cm thick, coarse-grained (20-30 mm), plagioclase-rich layer;
 3 cm thick, fine-grained (0.5-1 mm) layer;
 15 cm thick, coarse-grained (20-30 mm) interval, rich in plagioclase at the top, irregular fine-grained part, interlayered;
 9 cm thick, fine- to medium-grained (1-3 mm) layer;
 18 cm thick, coarse-grained (10-20 mm) layer with clinopyroxene:plagioclase ratio of approximately 1:1;
 7 cm thick, coarse- to medium-grained (3-10 mm) interval with clinopyroxene:plagioclase ratio of approximately 3:1, clinopyroxene-rich and olivine-rich layers;
 14 cm thick, coarse-grained (10-15 mm) layer with clinopyroxene:plagioclase ratio of approximately 1:1, olivine-rich;
 1 cm thick, fine-grained (0.5-1 mm) layer;
 10 cm thick, coarse-grained (30-50 mm) plagioclase-rich layer with plagioclase:clinopyroxene ratio of 3:1;
 7 cm thick, coarse-grained (20-50 mm) layer with plagioclase:clinopyroxene ratio of 1:1.

Foliation defined by elongate plagioclase, and clinopyroxene is roughly parallel to the layering that dips at 30°-60°, but mostly at 60°.

DEFORMATION: No deformation.

PRIMARY MINERALOGY:

Plagioclase— Mode: Various; see layering above.
 Crystal size: Various; see layering above.
 Crystal shape: Euhedral.
 Preferred orientation: Elongate roughly parallel to the layering.
 Percent replacement: Almost none.

Clinopyroxene—Various; see layering above.
 Crystal size: Various; see layering above.
 Crystal shape: Subhedral-anhedral.
 Preferred orientation: Elongate roughly parallel to the layering.
 Percent replacement: <5% by amphibole.

Olivine—Mode: 3%-10%.
 Crystal size: Various; see layering above.
 Crystal shape: Subhedral.
 Preferred orientation: Elongate parallel to layering.
 Percent replacement: <5% by tremolite.

SECONDARY MINERALOGY:

Total percent: <5%.
 Texture: Clinopyroxene is slightly replaced by amphibole (total vol% <5%). Olivine is replaced by tremolite and is locally oxidized.
 Percent vein material: Trace.
 Vein material: Nearly vertical, 0.5-2 mm thick amphibole veins are present.

118-735B-37R-2

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1A-1H

Massive, Medium- to Coarse-Grained Olivine Gabbro

Pieces 1A-1G

COLOR: Medium gray.
LAYERING: Only weakly expressed, if at all. Two coarse-grained intervals occur at 19-24 and 97-104 cm. Average grain size is 1 cm; increasing to >2 cm at 97-104 cm.

DEFORMATION: None.

PRIMARY MINERALOGY:

Plagioclase—Mode: 55%.
 Crystal size: Up to 30 mm.
 Crystal shape: Anhedral to subhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

Clinopyroxene—Mode: 40%.
 Crystal size: Up to 30 mm.
 Crystal shape: Subhedral to anhedral.
 Preferred orientation: Not determined.
 Percent replacement: <5% by amphibole.

Olivine—Mode: 5%.
 Crystal size: Up to 20 mm.
 Crystal shape: Subhedral.
 Preferred orientation: Not determined.
 Percent replacement: Mostly fresh, but can be replaced.

SECONDARY MINERALOGY:

Total percent: <5%.
 Texture: Rock appears to be very fresh. Amphibole replacement of clinopyroxene <5%; olivine mostly unaltered but sometimes replaced. Minor sulfide dissemination.
 Percent vein material: Not determined.
 Vein material: Few veinlets with green amphibole + white mineral (albite?). Some ilmenite-filled veinlets + sulfides.

Brecciated Olivine-Bearing Gabbro

Piece 1H

COLOR: Greenish-gray.

LAYERING: None.

DEFORMATION: Slight brecciation due to crushing of plagioclase and clinopyroxene.

PRIMARY MINERALOGY:

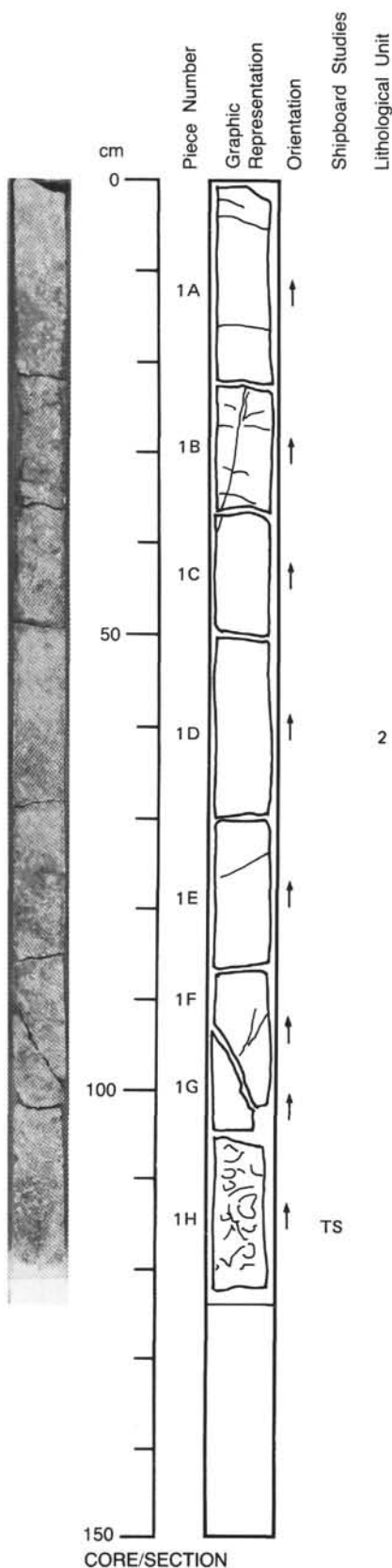
Plagioclase—Mode: 58%.
 Crystal size: Up to 30 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

Clinopyroxene—Mode: 40%.
 Crystal size: Up to 30 mm.
 Crystal shape: Anhedral-subhedral.
 Preferred orientation: Not determined.
 Percent replacement: Up to 10% by green amphibole.

Olivine—Mode: 2%.
 Crystal size: <10 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Not determined.
 Percent replacement: Altered to greenish mineral.

SECONDARY MINERALOGY:

Total percent: <10%.
 Texture: Green amphibole partially replacing clinopyroxene (rims) up to 10%. Some white (albite?) alteration mineral. Olivine altered to greenish product.
 Percent vein material: Not determined.
 Vein material: Green amphibole.



118-735B-37R-3

UNIT 2: OLIVINE-BEARING AND OLIVINE GABBRO

Pieces 1A-8

Coarse-Grained Gabbro

Pieces 1A-1C

COLOR: Gray to dark gray, mottled according to contrast in minerals.
DEFORMATION: Fractures veined with amphibole and albite, vertical in Piece 1A; inclined in Pieces 1B and 1C.
LAYERING: Not determined.
PRIMARY MINERALOGY: Not determined.
SECOND MINERALOGY:
 Total percent: Moderate.
 Texture: Not determined.
 Percent vein material: Moderately fractured.
 Vein material: Amphibole and albite.

Hydrothermally Altered Gabbro

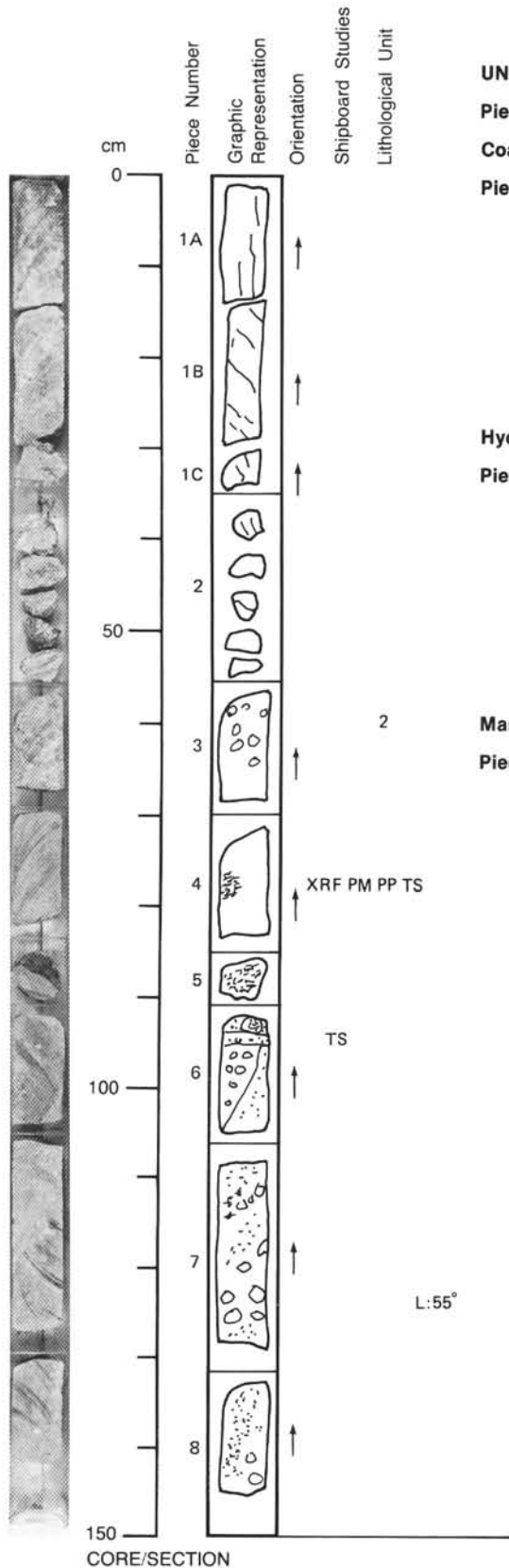
Piece 2

COLOR: Greenish gray, green to white in veins.
DEFORMATION: Fracture/vein surfaces on most chunks of Piece 2.
PRIMARY MINERALOGY: Not determined.
SECONDARY MINERALOGY:
 Total percent: Not determined.
 Texture: Amphibole replaces most clinopyroxene. Cavity filling prismatic amphibole present. The rock has reddish-brown iron-oxyhydroxide stains. Olivine is altered.
 Percent vein material: Not determined.
 Vein material: Hornblende-albite.
COMMENTS: Comprises several chunks of hydrothermally altered gabbro.

Massive to Layered Gabbro

Pieces 3-8

COLOR: Gray to dark gray.
LAYERING: Pieces 3-8: Highly inclined (approximately 60° from horizontal). Piece 7: Very coarse-grained zones. Piece 5: Very fine-grained diabase intrusion(?) with a horizontal contact at the top of Piece 6. May have overturned a layer in a soft crystal mush as it intruded.
DEFORMATION: A network of nearly horizontal fine fractures and two steeply dipping fractures in Piece 6.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 40%-60%.
 Crystal size: Not determined.
 Crystal shape: Not determined.
 Preferred orientation: Not determined.
 Percent replacement: Variable.
 Clinopyroxene—Mode: 40%-60%.
 Crystal size: Not determined.
 Crystal shape: Not determined.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.
 Olivine—Mode: Up to 5%.
 Crystal size: Not determined.
 Crystal shape: Not determined.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.
SECONDARY MINERALOGY:
 Total percent: Not determined.
 Texture: Amphibole and albite in veins, minor amphibole in rocks.
 Percent vein material: Not determined.
 Vein material: Amphibole and albite.



118-735B-38R-1

UNIT 3: OLIVINE GABBRO AND IRON-TITANIUM OXIDE GABBRO

Pieces 1-6

Gabbro and Olivine Gabbro

Pieces 1-6

COLOR: Gray to dark gray. Speckled according to mineralogy. Some yellowish gray where there is olivine. Minor greenish gray where amphibolitized.

LAYERING: Largely a sequence of fine- to coarse-grained layers with olivine concentrated at the base. Layer transitions not sharp, nor are inclinations either obvious or consistent. Dips steeper at top of section. Piece 5: Layering dips at 30°-60°; Three coarse-grained olivine layers alternating with fine-grained plagioclase-rich layers.

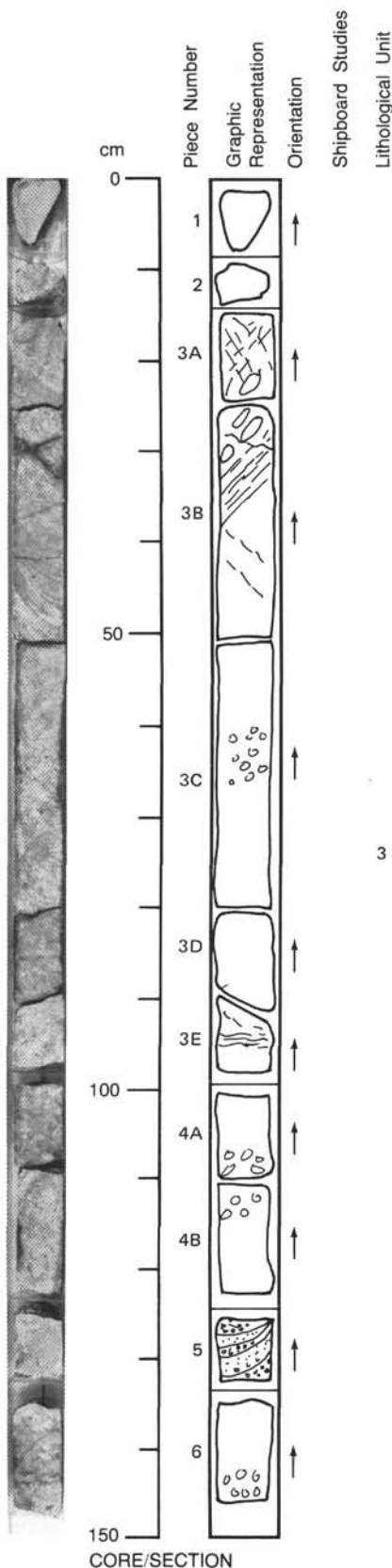
DEFORMATION: Pieces 3A and 3B: Two zones of foliation plus several orthogonal fractures. The zones are mylonitic and amphibolitized. The foliation crudely parallels layering lower in the section. Piece 3E: Narrow zone of horizontal foliation. Pieces 3A and 3B: Coarse mineral alignment parallels zones of foliation.

PRIMARY MINERALOGY:
 Plagioclase—Mode: 40%-60%.
 Crystal size: <1 cm.
 Crystal shape: Not determined.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

Clinopyroxene—Mode: 40%-60%.
 Crystal size: 1-3 cm in part of Pieces 3C, 4A, 4B, 5, and 6. Up to 5 cm in coarse-grained zone of Pieces 3A and 3B, but generally less than 1 cm.
 Crystal shape: Not determined.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

Olivine—Mode: Up to 5% in olivine-bearing zones.
 Crystal size: Mostly 3-10 mm; 1 mm in Pieces 1 and 2.
 Crystal shape: Not determined.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

SECONDARY MINERALOGY:
 Total percent: Not determined.
 Texture: Pieces 1, 2, and 3A: Green amphibole and albite. Traces of amphibole throughout and along minor fractures in the rock.
 Percent vein material: Not determined.
 Vein material: Amphibole.



UNIT 3: OLIVINE GABBRO AND IRON-TITANIUM OXIDE GABBRO

Pieces 1A-4D

Layered Olivine Gabbro

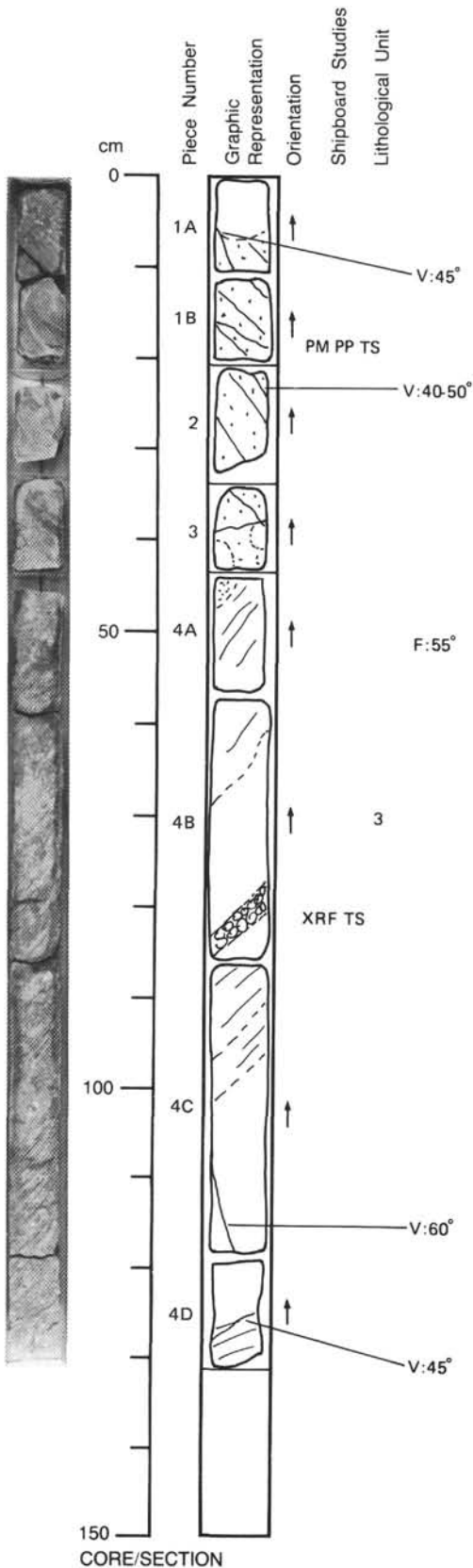
Pieces 1A (top) and 4A (bottom)-4D

COLOR: Dark gray with yellow patches (olivine).
LAYERING: Piece 4B: Compositional layering (olivine, plagioclase, and clinopyroxene enriched layers) dipping at 55°.
DEFORMATION: Piece 4D: Faint foliation. Pieces 4A-C: Foliation marked by olivine and clinopyroxene crystals is parallel to the layering and may be magmatic.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 40%-60%.
 Crystal size: < 20 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Marks faint foliation in Pieces 4A-4D.
 Percent replacement: Not determined.
 Clinopyroxene—Mode: 40%-60%.
 Crystal size: < 20 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Marks faint foliation in Pieces 4A-4D.
 Percent replacement: Replacement by amphibole.
 Olivine—Mode: 2%-10% in olivine-bearing zone.
 Crystal size: < 20 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Marks faint foliation in Pieces 4A-4D.
 Percent replacement: Replacement by amphibole.
SECONDARY MINERALOGY:
 Total percent: < 15%.
 Texture: Pseudomorphous amphibole after clinopyroxene and olivine. Minor albite(?). Piece 4D: Iron oxyhydroxides staining along vein.
 Percent vein material: < 1%.
 Vein material: Amphibole.
COMMENTS: Piece 4B (near bottom): Coarse-grained clinopyroxene and olivine-rich layer 2 cm thick.

Olivine Microgabbro Dike

Pieces 1A (bottom)-4A (top)

COLOR: Gray.
LAYERING: None.
DEFORMATION: None.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 50%.
 Crystal size: < 1 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: Not determined.
 Clinopyroxene—Mode: 20%-40%.
 Crystal size: < 1 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: Replaced by amphibole.
 Olivine—Mode: 10%-20%.
 Crystal size: < 1 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: Replaced by amphibole and talc(?).
SECONDARY MINERALOGY:
 Total percent: < 30%.
 Texture: Pseudomorphous amphiboles and talc(?) after clinopyroxene and olivine.
 Percent vein material: < 1%.
 Vein material: Amphibole.
COMMENTS: Dike has a very marked contact dipping at 45° parallel to layering. Contact is best seen on round (cored) surface of Piece 3. Rock near contact is more altered than elsewhere. Dike texture is fine-grained subophitic. No phenocrysts. No obvious grain size differences across the dike.



118-735B-38R-3

UNIT 3: OLIVINE GABBRO AND IRON-TITANIUM OXIDE GABBRO

Pieces 1A-4

Layered Opaque and Olivine-Bearing Gabbro to Olivine Gabbro

Pieces 1A-4

COLOR: Gray, yellowish where olivine is present.

LAYERING: Size and modal layering.

Pieces 1A-1C: 30 cm thick, the bottom and top are plagioclase-rich (10-30 mm).

Pieces 1C-2: 20 cm thick, alternating fine- (1-3 mm) and coarse-grained (5-20 mm) layers.

Pieces 3A-3D: 30 cm thick, coarse-grained (10-40 mm).

Piece 3A: Includes a plagioclase-rich layer, 5 cm thick. The bottom half is clinopyroxene-rich.

Pieces 3C-3D: Foliation and layering very steep (nearly vertical).

Pieces 3C-4: > 10 cm, fine-grained (3-6 mm), strongly foliated, olivine-rich.

FOLIATION: Clearly defined by elongate plagioclase, clinopyroxene, and olivine crystals, is generally parallel to the layer boundaries. Pieces 3B-4: Foliation in fine-grained part; layers show consistent change in inclination. Pieces 3A and 4: Olivine has the most markedly flattened shape. Pieces 3C, 3D, and 4: Fine-grained part shows remarkable magmatic foliation.

DEFORMATION: None.

PRIMARY MINERALOGY:

Plagioclase—Mode: 40%-70%.

Crystal size: Variable, see above.

Crystal shape: Subhedral.

Preferred orientation: Strong, parallel to the layering.

Percent replacement: Not determined.

Clinopyroxene—Mode: 20%-50%.

Crystal size: Variable, see above.

Crystal shape: Subhedral-anhedral.

Preferred orientation: Strong, parallel to the layering.

Percent replacement: <3% by amphibole.

Olivine—Mode: 3%-8%.

Crystal size: Variable, see above.

Crystal shape: Anhedral.

Preferred orientation: Strong preferred orientation, especially in Piece 3A.

Percent replacement: <5% by tremolite with local oxidization.

SECONDARY MINERALOGY:

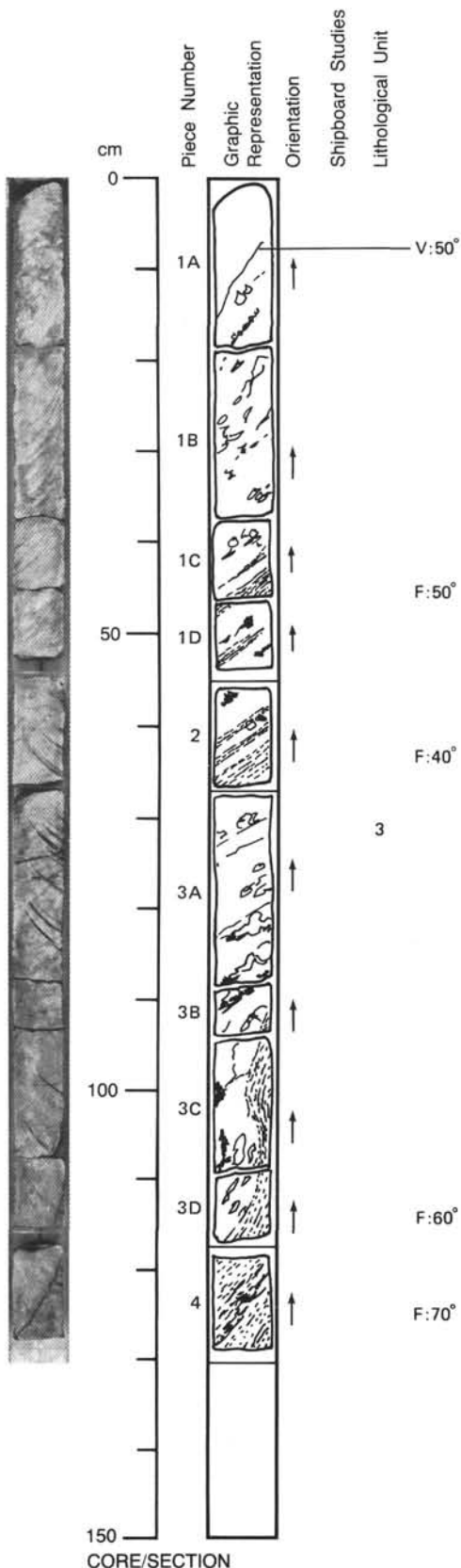
Total percent: <3%.

Texture: Olivine is locally oxidized and is replaced by tremolite from the margins. Amphibole replaces clinopyroxene (<3%).

Percent vein material: Trace.

Vein material: Piece 1A: Thin (1 mm thick) amphibole vein dipping at 50°.

COMMENTS: Opaque mineral (ilmenite and magnetite) enrichment in pyroxene-rich layers (e.g., bottom of Piece 3A, and in Pieces 3B, 3C, and 3D), poor or absent in plagioclase-rich layers.



150
CORE/SECTION

118-735B-38R-4

UNIT 3: OLIVINE GABBRO AND IRON-TITANIUM OXIDE GABBRO

Pieces 1A-7B

Layered Olivine Gabbro

Pieces 1A-7B

COLOR: Gray. Pieces 2 and 3: Greenish gray; Pieces 6 and 7: Green with brownish spots; Pieces 4 and 5: Yellowish gray in olivine enriched zones.

LAYERING: Grain size and phase layering in upper half of section. Grain size increases from fine- to medium-grained in Pieces 1 and 2 to coarse-grained (up to 3 cm) in upper third of Piece 5. Olivine enrichment parallel with grain size increase. Layering dips at 40°-50°.

DEFORMATION: None.

PRIMARY MINERALOGY:

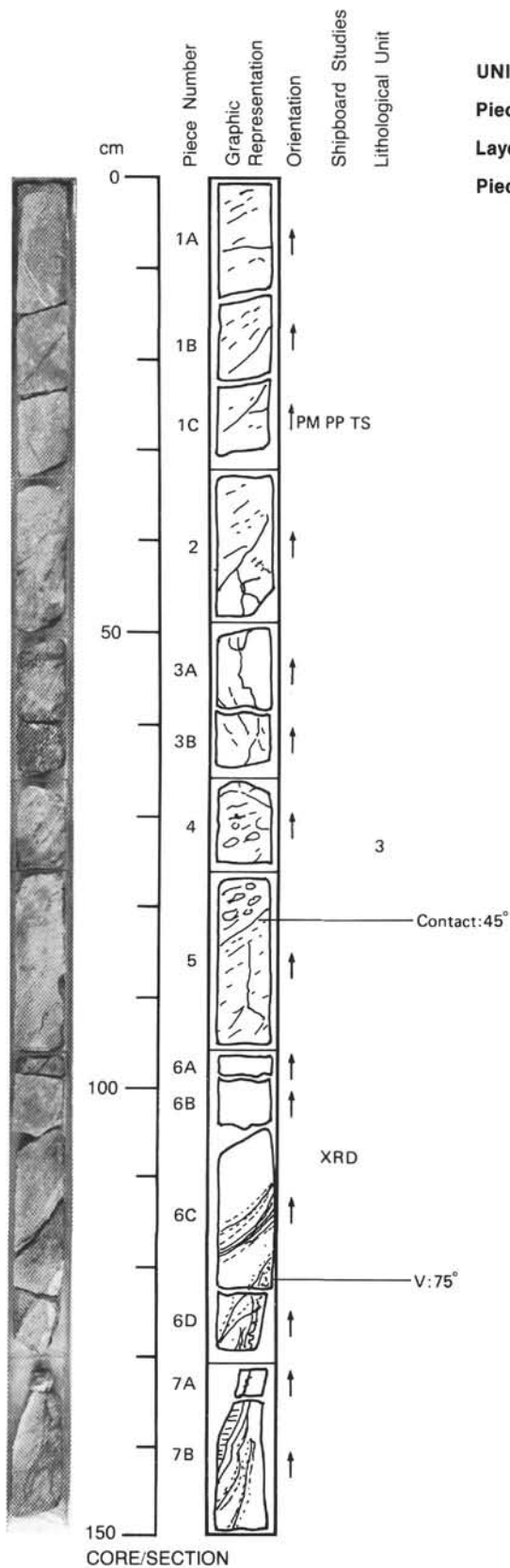
Plagioclase—Mode: 45%-65%.
 Crystal size: Up to 30 mm.
 Crystal shape: Anhedral-subhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

Clinopyroxene—Mode: 30%-40%.
 Crystal size: Up to 30 mm.
 Crystal shape: Subhedral.
 Preferred orientation: Not determined.
 Percent replacement: <5% by amphibole.

Olivine—Mode: <2% to 8%.
 Crystal size: Up to 20 mm.
 Crystal shape: Anhedral-subhedral.
 Preferred orientation: Not determined.
 Percent replacement: Replaced by yellowish to brownish material.

SECONDARY MINERALOGY:

Total percent: <10%.
 Texture: Green amphibole and albite in Pieces 2, 3, and very top of Piece 4. Minor proportions of green amphibole throughout section, mostly along veins. Olivine replaced by yellowish to brownish material.
 Percent vein material: Not determined.
 Vein material: Pieces 6C-7B: up to 1 cm thick white-brownish carbonate vein. Intense oxidation with brown staining along this vein and satellite veins.



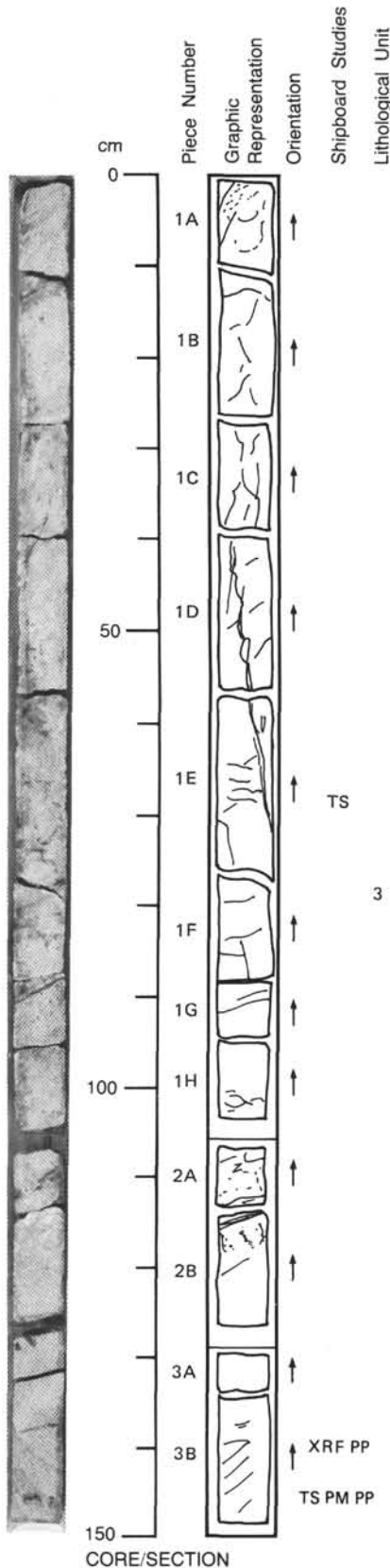
118-735B-39R-1

UNIT 3: OLIVINE GABBRO AND IRON-TITANIUM OXIDE GABBRO

Pieces 1A-3B

Olivine-Bearing to Olivine Gabbro

Pieces 1A-3B



COLOR: Medium gray. Yellow gray where olivine is present (Pieces 1C, 1F, and 1G). Greenish gray along veins in upper half of section.

LAYERING: Phase layering and grain size layering. In general, decrease in grain size (except for the very top of Piece 1A, which is fine-grained) from very coarse-grained (Pieces 1A, 1B, and 1C) with plagioclase up to 5 cm over coarse-grained (Pieces 1D-1G) to medium-grained (Pieces 1H-3B) with average grain size 0.5 cm from the top to the bottom of the section. Olivine enrichment in the interval from 57-94 cm.

DEFORMATION: Weak. Weak foliation visible in Pieces 2B, 3A, and 3B, inclined at 60°-70°.

PRIMARY MINERALOGY:

Plagioclase—Mode: 45%-70%.
 Crystal size: Up to 5 cm.
 Crystal shape: Anhedral-subhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

Clinopyroxene—Mode: 35%-45%.
 Crystal size: Up to 3 cm.
 Crystal shape: Anhedral.
 Preferred orientation: Not determined.
 Percent replacement: < 10% by amphibole.

Olivine—Mode: < 2%-10%.
 Crystal size: Up to 2 cm (in coarse-grained zone).
 Crystal shape: Anhedral.
 Preferred orientation: Not determined.
 Percent replacement: Partially replaced by yellowish-brown mineral.

SECONDARY MINERALOGY:

Total percent: < 5%.
 Texture: Occasional minor clinopyroxene replacement by green amphibole. Some amphibole alteration along veins. Olivine partially replaced by yellowish brown material. Few sulfides.
 Percent vein material: Not determined.
 Vein material: Green amphibole plus white mineral (albite?) in veins and veinlets in upper half of section. Pieces 2A and 2B: Carbonate(?) vein with oxidation rim.

118-735B-39R-2

UNIT 3: OLIVINE GABBRO AND IRON-TITANIUM OXIDE GABBRO

Pieces 1A-8

Olivine-Bearing Gabbro

Pieces 1A-8

COLOR: Dark gray, gray.

LAYERING: Size and modal layering. Foliation parallel to the layering is defined by elongate plagioclase, clinopyroxene, and olivine grains. Inclination is 50°-60°.

Pieces 1A and 1B: 20 cm thick, medium-grained (3-6 mm) layer.

Pieces 1B and 1C: 7 cm thick, coarse-grained (10-30 mm), plagioclase-rich layer.

Pieces 1C-1E: 13 cm thick, medium-grained (5-10 mm) layer.

Piece 1E: 10 cm thick, fine-grained (0.5 mm) to medium-grained (3mm) layer, olivine-rich near the bottom.

Pieces 2-8: Medium-grained (1-3 mm).

DEFORMATION: Almost none.

PRIMARY MINERALOGY:

Plagioclase—Mode: 60%-70%.

Crystal size: Various depending on layers.

Crystal shape: Subhedral.

Preferred orientation: Strong, parallel to the layering.

Percent replacement: None in Piece 1, but moderate in Pieces 2-8 by sodium-rich plagioclase.

Clinopyroxene—Mode: 20%-35%.

Crystal size: Various depending on layers.

Crystal shape: Anhedral.

Preferred orientation: Strong, parallel to the layering.

Percent replacement: <5%-20% by amphibole.

Olivine—Mode: 2%-4%.

Crystal size: Various, depending on layers.

Crystal shape: Anhedral.

Preferred orientation: Strong, parallel to the layering.

Percent replacement: Pieces 2-8 are strongly oxidized.

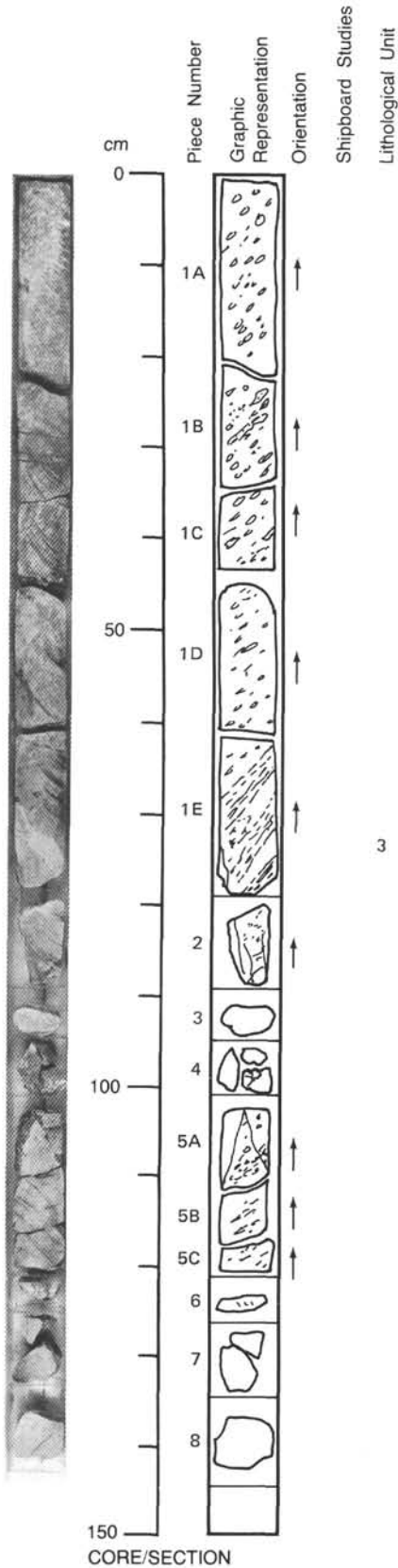
SECONDARY MINERALOGY:

Total percent: Pieces 1A-1E; <5%, Pieces 2-8; >20%.

Texture: Pieces 2-8: Fairly amphibolitized (amphibole 20%) and veined by amphibole. Pieces 1A-1E very fresh (amphibole 5%). Olivine strongly oxidized.

Percent vein material: Not determined.

Vein material: Amphibole.



118-735B-39R-3

UNIT 3: OLIVINE GABBRO AND IRON-TITANIUM OXIDE GABBRO

Pieces 1A-13

Olivine Microgabbro

Pieces 1A-13

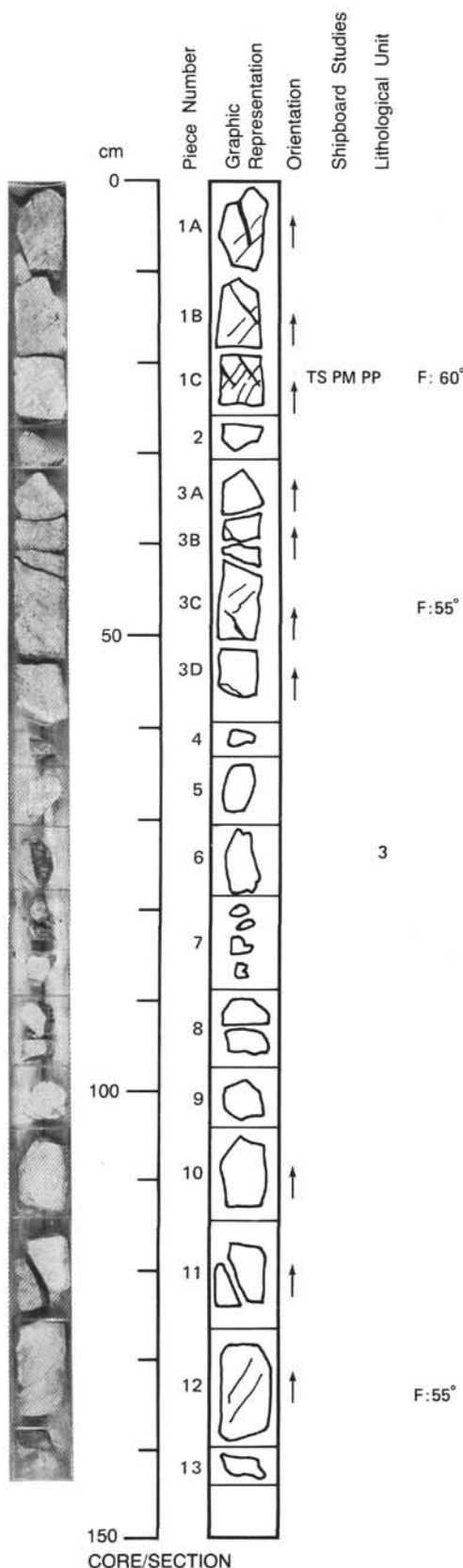
COLOR: Light gray.
LAYERING: Igneous lamination defined by aligned plagioclase and olivine dipping at 55°-60°. Texture is equigranular.
DEFORMATION: Minor granulation near veins. Piece 5 is weakly foliated with stretched pyroxene and plagioclase and is partially recrystallized.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 65%.
 Crystal size: 0.5-1 mm.
 Crystal shape: Subhedral.
 Preferred orientation: Not determined.
 Percent replacement: Possible alteration to sodic plagioclase around fractures.

Clinopyroxene—Mode: 25%.
 Crystal size: 0.5-1 mm.
 Crystal shape: Subhedral.
 Preferred orientation: Not determined.
 Percent replacement: Replaced by green amphibole.

Olivine—Mode: 10%.
 Crystal size: 0.5-1 mm.
 Crystal shape: Subhedral.
 Preferred orientation: Not determined.
 Percent replacement: Partly replaced by tremolite-actinolite.

SECONDARY MINERALOGY:
 Total percent: 15%-30%.
 Texture: Green amphibole replacing clinopyroxene and filling fractures. Olivine is partly replaced by tremolite-actinolite. Plagioclase is milky around fractures due to granulation and possible alteration to sodic plagioclase.
 Percent vein material: Not determined.
 Vein material: Green amphibole.

COMMENTS: Fractures and veins normal to igneous lamination.

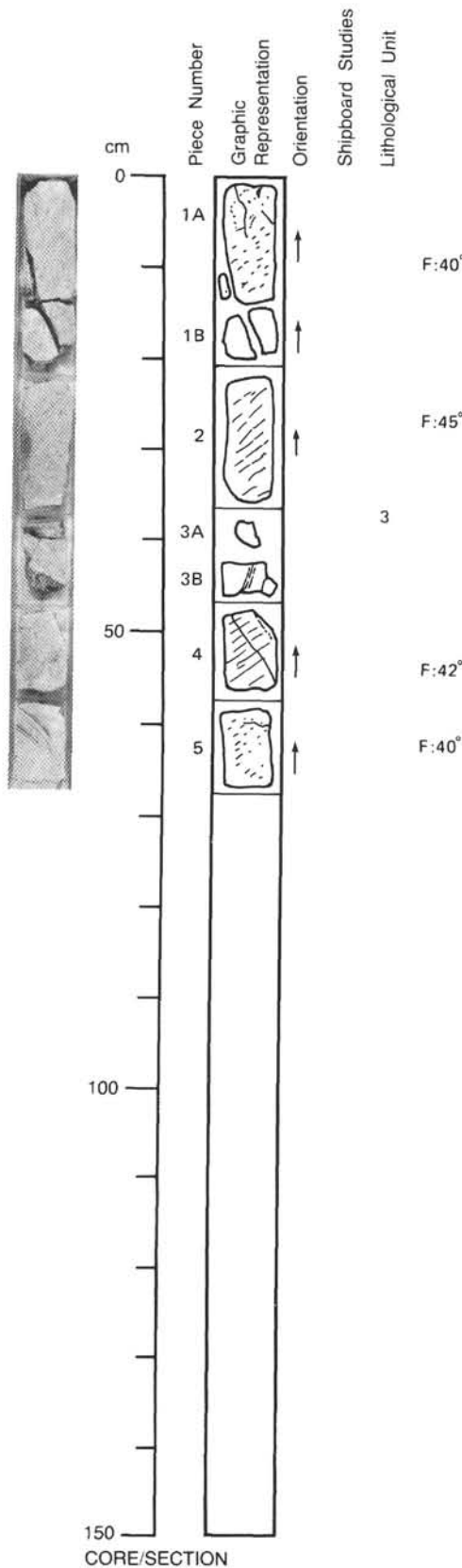


UNIT 3: OLIVINE GABBRO AND IRON-TITANIUM OXIDE GABBRO

Pieces 1A-5

Feebly Foliated Olivine Gabbro

Pieces 1A-5



COLOR: Gray with orange-red alteration areas of olivine.
LAYERING: Obscured by foliation, probably some original coarse-fine grain size variations. Medium- to fine-grained transition in Piece 1A.
DEFORMATION: Weak to moderate foliation. Defined by elongate pyroxene and plagioclase.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 50%-55%.
 Crystal size: 1-5 mm.
 Crystal shape: Anhedral, fractured.
 Preferred orientation: Elongate in foliation.
 Percent replacement: Whitish alteration along veins and fractures (albite/clays?).
 Clinopyroxene—Mode: 40%-50%.
 Crystal size: 2-6 mm.
 Crystal shape: Anhedral, angular to elongate grains.
 Preferred orientation: Elongate in foliation.
 Percent replacement: Locally altered to amphiboles along veins and fractures.
 Olivine—Mode: 2%-7%.
 Crystal size: 2-9 mm.
 Crystal shape: Elongate, anhedral.
 Preferred orientation: Not determined.
 Percent replacement: Variously altered to orange-brown pseudomorphs.
SECONDARY MINERALOGY:
 Total percent: 10%-20%.
 Texture: Partial replacement of olivine Pieces 1, 4, and 5: Actinolitic amphibole along fractures; brownish clay minerals on fracture surfaces. Some whitish alteration of plagioclase(?); Piece 1B: Coarse slickensided surface with clay minerals, chlorite, amphibole, and talc(?) on surfaces.
 Percent vein material: Not determined.
 Vein material: Clay minerals, chlorite, amphibole, and talc(?).

118-735B-40R-1

UNIT 3: OLIVINE GABBRO AND IRON-TITANIUM OXIDE GABBRO

Pieces 1-7

Olivine Gabbro

Pieces 1-7

COLOR: Gray, locally stained orange.

LAYERING: No obvious primary layering—there are zones of concentrated olivine, but difficult to determine if primary layering.

DEFORMATION: Pieces 1-6: Massive, unfoliated. Piece 7: Foliated, defined by elongation of clinopyroxene, probably in a porphyroclastic plagioclase matrix.

PRIMARY MINERALOGY:

Plagioclase—Mode: 55%.

Crystal size: 3-5 mm.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: 50%-100% by predominantly albite(?).

Clinopyroxene—Mode: 42%.

Crystal size: 3-5 mm.

Crystal shape: Anhedral.

Preferred orientation: Pieces 1-6, None. Piece 7: Clinopyroxene elongate in plane of foliation.

Percent replacement: 90%-100% by amphibole.

Olivine—Mode: 0%-30%.

Crystal size: 1-2 mm.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: 90% by oxide mineral.

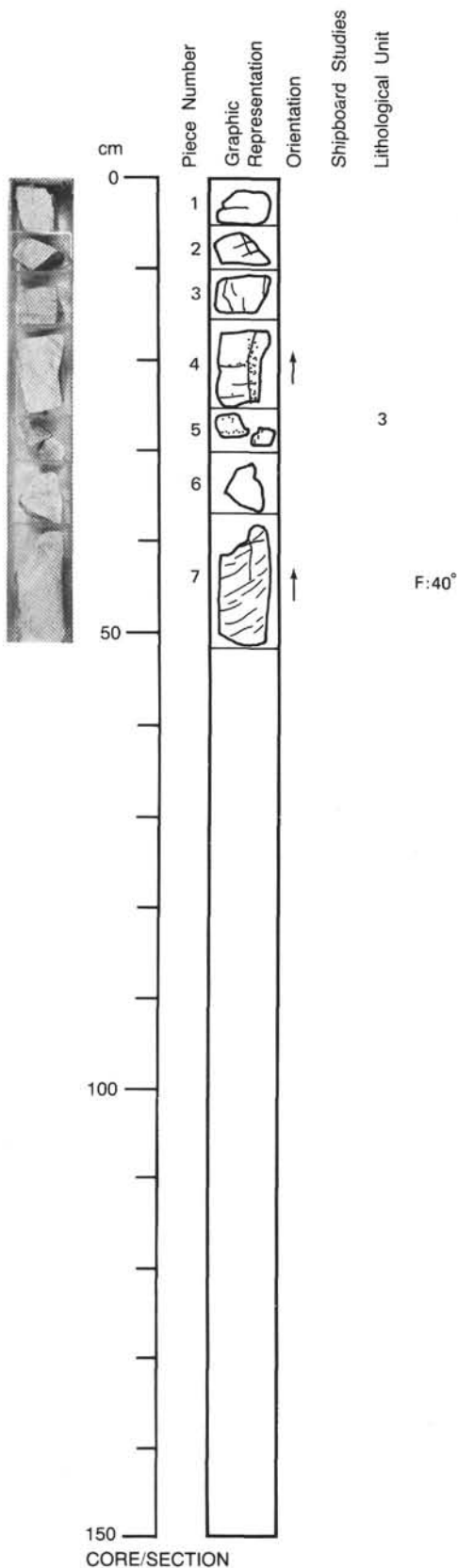
SECONDARY MINERALOGY:

Total percent: Alteration moderate to extensive.

Texture: Clinopyroxene is almost totally replaced by amphibole throughout. Plagioclase is predominantly altered to albite(?), milky white in appearance, and locally stained orangish-brown by iron oxides throughout section. Olivines altered to orangish oxide mineral. No oikocrysts or coarse-grained textures.

Percent vein material: Not determined.

Vein material: Green amphibole and/or sodic plagioclase. Pieces 1-7: Thin veins filled by amphibole. Pieces 4-6: Slightly thicker veins (1-3 mm wide) have concentration of white (+ staining) feldspar.



UNIT 3: OLIVINE GABBRO AND IRON-TITANIUM OXIDE GABBRO

Pieces 1A-2

Mylonitic Metagabbro

Pieces 1A-1D

COLOR: Light gray.
LAYERING: None apparent.
DEFORMATION: Intense. Foliation is defined by preferred orientation of augen and the nearly complete recrystallization of previous grains. Grain size varies from 1 to 7 mm for porphyroclasts and <1 mm for the matrix. Piece 1A has millimeter-thick banding of alternating plagioclase and mafic minerals. The foliation in turn is folded and even refolded into tight isoclinal folds.

PRIMARY MINERALOGY:

Plagioclase—Mode: 68%-69%.
Crystal size: <1-4 mm.
Crystal shape: Elongated as small bands or lens shapes parallel to the foliation.
Preferred orientation: Strong.
Percent replacement: Unaltered.

Clinopyroxene—Mode: 30%.
Crystal size: 1-7 mm.
Crystal shape: Stretched augen that are rotated into the foliation plane.
Preferred orientation: Strong.
Percent replacement: Partly replaced by amphibole and oxidized.

Olivine—Mode: 1%-2% (especially Piece 1D).
Crystal size: Up to 2 mm.
Crystal shape: Irregular to rounded.
Preferred orientation: Not determined.
Percent replacement: Strong to complete replacement by serpentine or chlorite + magnetite with rims of talc.

SECONDARY MINERALOGY:

Total percent: Not determined.
Texture: Late fractures are filled by amphibole and plagioclase.
Percent vein material: Not determined
Vein material: Amphibole and plagioclase.

Porphyroclastic Metagabbro

Pieces 1E-1J, and 1L-2

COLOR: Light greenish gray to yellow brown.
LAYERING: None apparent.
DEFORMATION: Defined by deformation and elongation of clinopyroxene and plagioclase, and by the recrystallization of plagioclase as neoblasts into the foliation planes. Grain size for plagioclase varies from 1 cm to <1 mm and for clinopyroxene from 1.5 cm to 3 mm.

PRIMARY MINERALOGY:

Plagioclase—Mode: 60%.
Crystal size: 1-10 mm.
Crystal shape: Lens.
Preferred orientation: Not determined.
Percent replacement: Can be partly replaced by prehnite and cut by amphibole veinlets.

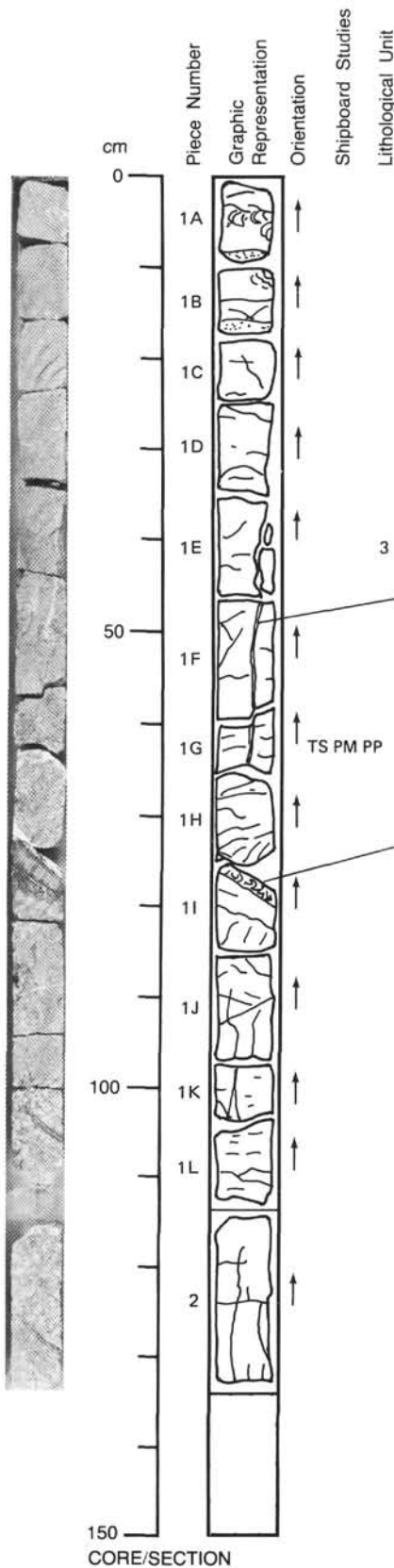
Clinopyroxene—Mode: 38%-39%.
Crystal size: 3-15 mm.
Crystal shape: Lens.
Preferred orientation: Strong.
Percent replacement: 50% by green amphibole with rims of dark green amphibole.

Orthopyroxene—Mode: Trace.
Crystal size: Not determined.
Crystal shape: Blade-lens.
Preferred orientation: Strong.
Percent replacement: Totally replaced by amphibole.

Ilmenite—Mode: 1%-2% (in Piece 2)

SECONDARY MINERALOGY:

Total percent: Not determined.
Texture: Clinopyroxene is largely replaced by green amphibole and rimmed by dark green amphibole. Plagioclase can be partly prehnitized and cut by amphibole veinlets. Trace of sulfides in Piece 2.
Percent vein material: Not determined.
Vein material: Amphibole, talc, and plagioclase. Pieces 1H and 1I: Contain single plagioclase vein, 8 mm across with 10%-20% amphibole and possible prehnite. Some fractures in other pieces (flat to 45° dip) are similar. Subvertical fractures run from Piece 1F to 1K and cut all the structures. They are filled by green amphibole (70%) and plagioclase (30%). One fracture is filled by green talc (slippery, soapy touch).



CORE/SECTION

118-735B-40R-2 (continued)

Massive Gabbro**Piece 1K**

COLOR: Brownish green.

LAYERING: Not apparent.

DEFORMATION: Not apparent.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%.

Crystal size: 1-5 mm.

Crystal shape: Euhedral.

Preferred orientation: None.

Percent replacement: Slight, invaded by amphibole.

Clinopyroxene—Mode: 50%.

Crystal size: 1-7 mm (up to 6-7 cm long).

Crystal shape: Interstitial.

Preferred orientation: None.

Percent replacement: Moderate replacement by amphibole.

Orthopyroxene—Mode: Trace.

Crystal size: 1-3 mm.

Crystal shape: Interstitial.

Preferred orientation: None.

Percent replacement: Complete replacement by amphibole.

SECONDARY MINERALOGY:

Total percent: < 35%.

Texture: Pyroxenes are replaced by light green (pseudomorphs) and dark green (rims) amphiboles. Plagioclase is invaded by amphibole. A fracture 1-2 mm thick is filled by green amphibole and accessory plagioclase.

Percent vein material: Not determined.

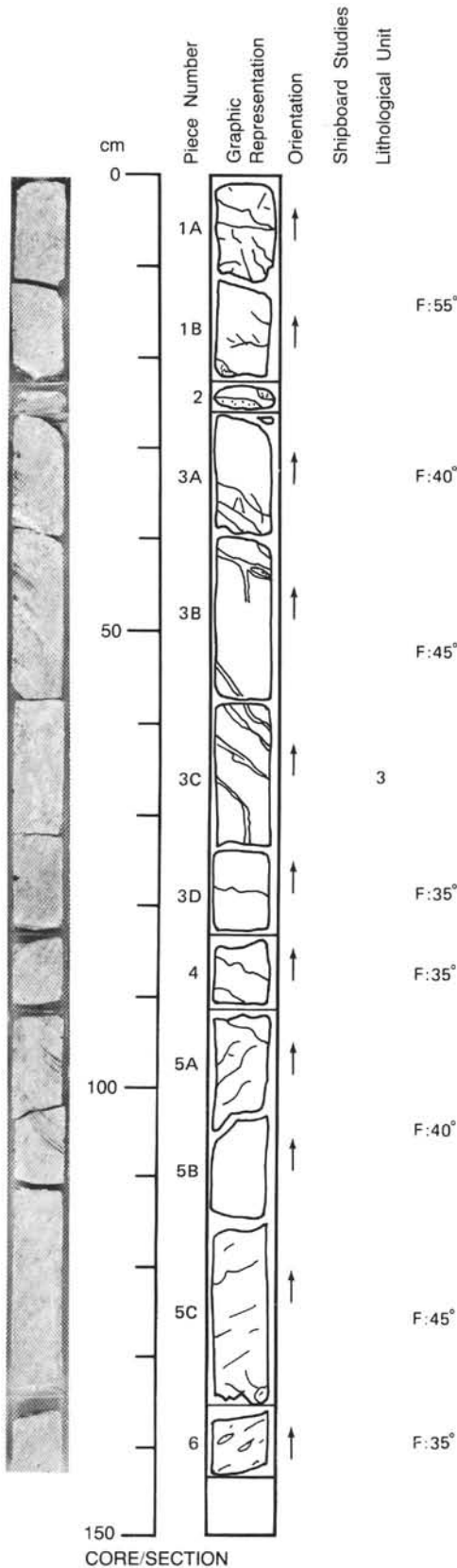
Vein material: Amphibole and plagioclase.

UNIT 3: OLIVINE GABBRO AND IRON-TITANIUM OXIDE GABBRO

Pieces 1A-6

Foliated to Poorly Foliated Metagabbro

Pieces 1A-6



COLOR: Green to grayish green.
LAYERING: None apparent. Grain size variation: Piece 6 could contain a layer contact.
DEFORMATION: Defined by stretching of pyroxene and plagioclase. Pyroxene and plagioclase reach 7 to 15 mm in length.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 60%.
 Crystal size: 7-15 mm.
 Crystal shape: Subhedral.
 Preferred orientation: Not determined.
 Percent replacement: Slight.
 Clinopyroxene—Mode: 40%.
 Crystal size: 7-15 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Not determined.
 Percent replacement: Slight, by green amphibole.
 Orthopyroxene—Mode: <2% (very sporadic).
 Crystal size: <3 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Not determined.
 Percent replacement: Slight, by amphibole.
SECONDARY MINERALOGY:
 Total percent: <5%.
 Texture: Green amphibole replacing pyroxene (pseudomorphs), or dark green amphibole rimming or crystallized along cleavages. Pieces 3A, 3C, 5G, and 6 contain pyrite. In Piece 6, pyrite is widespread, elsewhere it is associated with green amphibole or associated with chlorites in fractures (Pieces 5A and 5B).
 Percent vein material: Not determined.
 Vein material: Pyrite, chlorite, amphibole, and plagioclase. Veins up to 1 cm thick are filled mainly by plagioclase + green amphibole. Fractures of late-stage type are filled by green amphiboles with accessory plagioclase (30%).
 A yellow green mineral could be epidote(?). Pieces 1A, 1B, 2, and 3B: Fractures have sickensided amphiboles and chlorite.

118-735B-40R-4

UNIT 3: OLIVINE GABBRO AND IRON-TITANIUM OXIDE GABBRO

Pieces 1A-5B

Olivine-Bearing Gabbro

Pieces 1A-5B

COLOR: Gray to white-green along deformed zone.

LAYERING: Distinct size variations occur as follows: Pieces 1A to 1C, fine-grained at top, coarse-grained at bottom; Pieces 1E to 2A, fine-grained at top, coarse-grained at bottom; and Pieces 5A to 5B, fine-grained at top, coarse-grained at bottom. These variations are only the most obvious. The changes can be rather sharp, as in Pieces 1E, 1F, and 2A. The changes are not always planar; they can be rather irregular and patchy. Contacts generally dip at 30°-35° to the left. Olivine is irregularly distributed; concentrations occur at 35, 70, 105, and 120 cm. Distribution is even in Piece 5.

DEFORMATION: Piece 1: Distinct foliation dipping at 30°-35° to the left is prominent. This may have been partly an original lamination, as in Section 118-735B-40R-5. Piece 1D: A shear zone cuts the foliation; the rock is brecciated. Numerous brittle fractures, subhorizontal to near-vertical, are common; some are coated with a soft talc-like mineral, although many are empty. A deformed zone contains big milky plagioclase.

PRIMARY MINERALOGY:

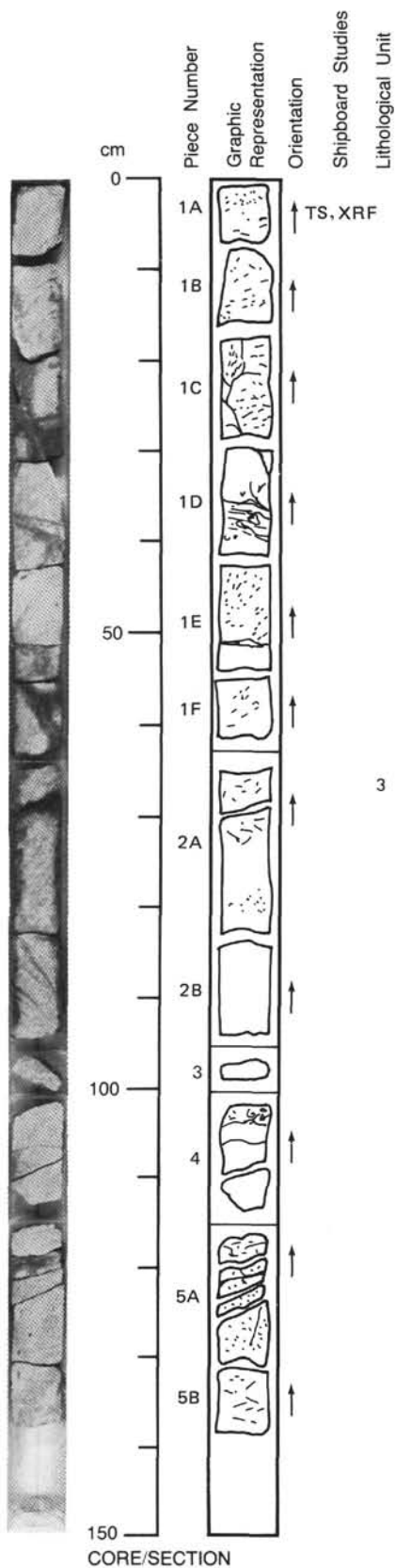
Plagioclase—Mode: 50%-60%.
 Crystal size: 1-9 mm.
 Crystal shape: Anhedral.
 Preferred orientation: May be an igneous lamination.
 Percent replacement: Some sodic plagioclase along shear zones.

Clinopyroxene—Mode: 40%-50%.
 Crystal size: 1-9 mm, particularly coarse at 72 and 138 cm.
 Crystal shape: Anhedral.
 Preferred orientation: May be an igneous lamination.
 Percent replacement: 5%-10% by amphibole.

Olivine—Mode: 0%-5%.
 Crystal size: 0.5-4 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Not determined.
 Percent replacement: 30% by talc-tremolite.

SECONDARY MINERALOGY:

Total percent: 5%-10%.
 Texture: Amphibole after clinopyroxene, particularly in vertical lenses at 15-25 cm associated with vertical fracture. Amphibole and talc/serpentine(?) along some fracture surfaces. Some albitization of plagioclase in shear zones. Pyrite (<1 mm) as a trace throughout the section, not restricted to fractures.
 Percent vein material: 5%.
 Vein material: Amphibole in some areas.



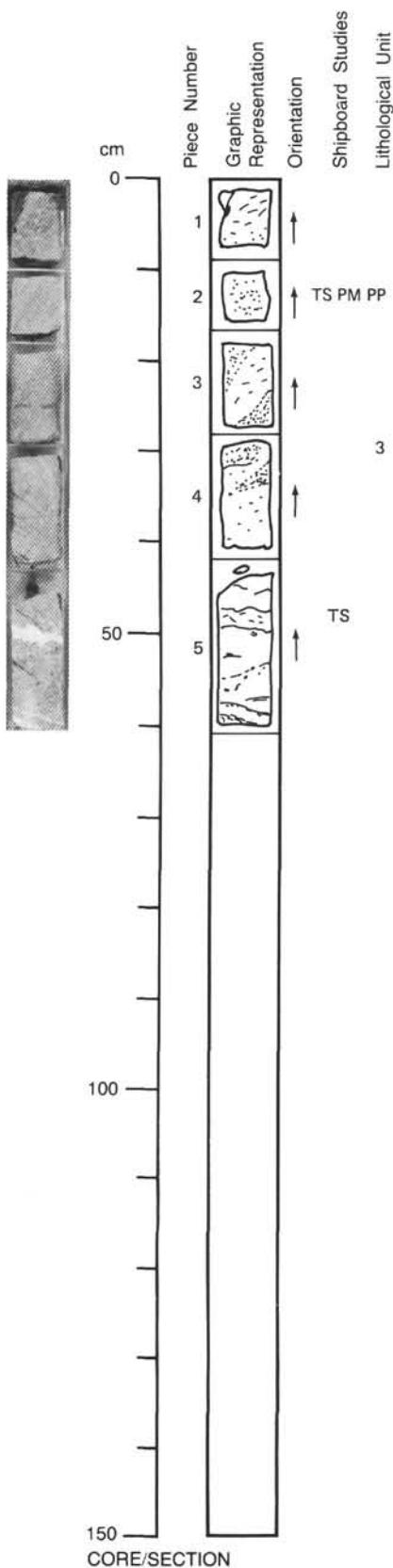
118-735B-40R-5

UNIT 3: OLIVINE GABBRO AND IRON-TITANIUM OXIDE GABBRO

Pieces 1-5

Olivine-Bearing Gabbro

Pieces 1-5



COLOR: Gray.

LAYERING: Defined by medium- to fine-grained transitions. These occur most clearly in Pieces 1, 3, and 4. The medium-grained sections have a distinct lamination that may be igneous. Coarse- to fine-grained transitions dip at 45°. Piece 1: Lamination dips at 25°.

DEFORMATION: Only evidence is the above-mentioned lamination. If the lamination is not igneous, then it results from a slight deformation.

PRIMARY MINERALOGY:

Plagioclase—Mode: 55%-60%.

Crystal size: 0.5-9 mm.

Crystal shape: Anhedral.

Preferred orientation: Define a distinct elongation in Piece 1.

Percent replacement: Fresh.

Clinopyroxene—Mode: 40%.

Crystal size: 0.5-9 mm.

Crystal shape: Anhedral to subhedral; generally interstitial; few ophitic.

Preferred orientation: Aligned along magmatic foliation.

Percent replacement: 2%-3% by amphibole.

Olivine—Mode: 0%-5%; An olivine-rich band occurs at 55 cm.

Crystal size: 2-4 mm.

Crystal shape: Anhedral.

Preferred orientation: Not determined.

Percent replacement: 10%-20% by talc-actinolite.

SECONDARY MINERALOGY:

Total percent: 5%.

Texture: Olivine is replaced by talc-actinolite. Green, soft, talc-serpentine occur on fracture surfaces. Most of the section is fresh. Fine pyrite is disseminated throughout most of the section. Piece 5: Some amphibole after pyroxene along feldspathic vein.

Percent vein material: 5%.

Vein material: Feldspathic, up to 2 cm wide. Piece 5: One large (10-15 mm) and several small (1-2 mm) feldspathic veins cut this piece. The large vein cuts the lamination and dips into the core at 45°, plunging down the centerline of the core. Smaller veins are similar.

118-735B-41R-1

UNIT 3: OLIVINE GABBRO AND IRON-TITANIUM OXIDE GABBRO

Pieces 1A-9C

Gabbro

Pieces 1A-3A, 9B, and 9C

COLOR: Gray.
LAYERING: Not apparent.
DEFORMATION: Weakly penetrative foliation inclined at 45°, defined by stretched pyroxene.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 65%.
 Crystal size: 1-3 mm.
 Crystal shape: Subhedral granular.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

 Clinopyroxene—Mode: 35%.
 Crystal size: 0.5-5 mm.
 Crystal shape: Subhedral granular.
 Preferred orientation: Elongated parallel to foliation.
 Percent replacement: Partially replaced by amphibole.
SECONDARY MINERALOGY:
 Total percent: Not determined.
 Texture: Principle alteration consists of rimming and partial replacement of pyroxene by amphibole and a few late <1 mm thick amphibole veins.
 Percent vein material: 1%.
 Vein material: Amphibole and plagioclase. Pieces 1A-2A: Feldspar-rich veins, containing minor amphibole, are typically 2-3 mm thick.
COMMENTS: Medium-grained, subhedral. Grain size graded from top of section (pyroxene crystals, 1-5 mm) downward to 70 cm (average grain size about 0.5-3.5 mm).

Olivine Gabbro

Pieces 3B-8

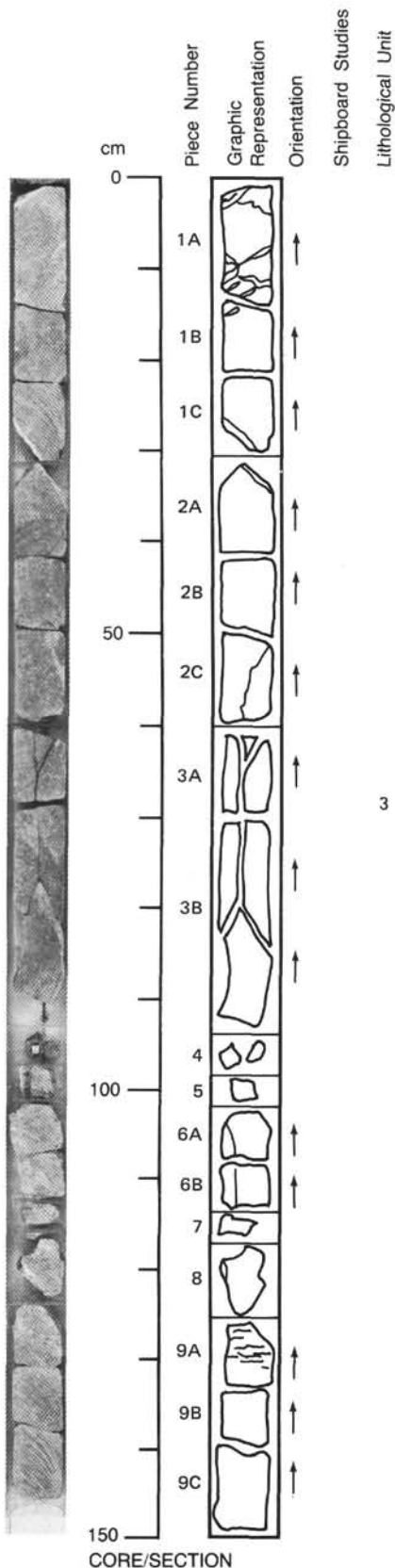
PRIMARY MINERALOGY:
 Similar to gabbro described above except for the presence of olivine.

 Olivine—Mode: 1%-5%.
 Crystal size: Up to 6 mm.
 Crystal shape: Subhedral to euhedral.
 Preferred orientation: None.
 Percent replacement: Not determined.
SECONDARY MINERALOGY:
 Total percent: Not determined.
 Texture: Pieces 4-8: More oxidized.
 Percent vein material: Not determined.
 Vein material: Amphibole and plagioclase. Pieces 5 and 8: Plagioclase-rich vein is stained yellow, suggesting former presence of sulfides.

Amphibolitized Gabbro Gneiss

Piece 9A (126-129 cm)

COLOR: Gray.
LAYERING: No primary igneous layering.
DEFORMATION: Foliation defined by elongation and stretching of medium-grained pyroxene and plagioclase crystals.
PRIMARY MINERALOGY: Similar to gabbro above.
SECONDARY MINERALOGY: Similar to gabbro above.



3

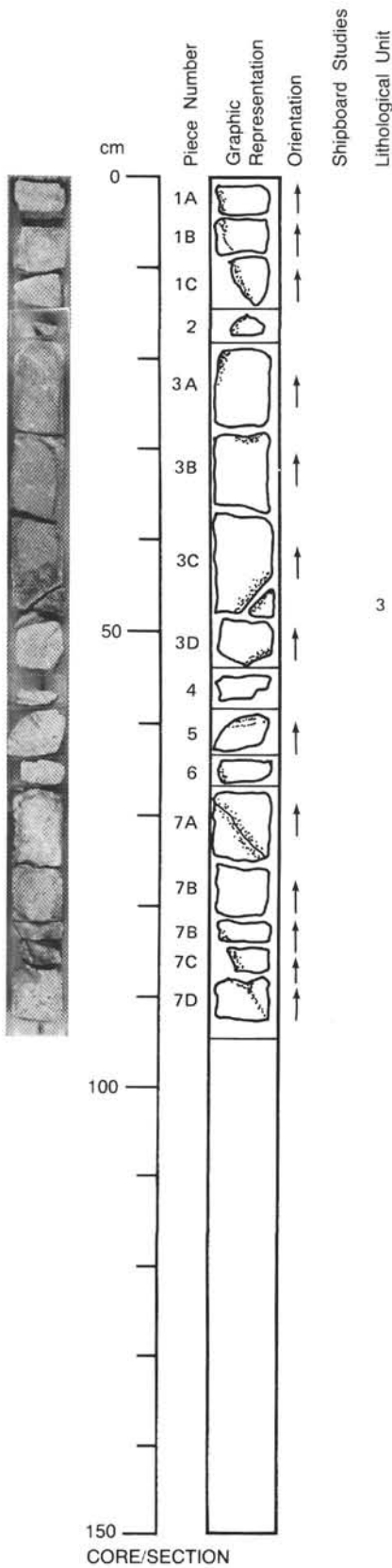
118-735B-41R-2

UNIT 3: OLIVINE GABBRO AND IRON-TITANIUM OXIDE GABBRO

Pieces 1A-7D

Olivine Metagabbro

Pieces 1A-7D



F: 50°

COLOR: Gray.

LAYERING: Some grain-size variation; Pieces 3A-3C and 7A-7B: Alternating medium- to coarse-grained.

DEFORMATION: Possible foliation, but may be due to primary grain-size layering.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%-55%.

Crystal size: 1-10 mm.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: Moderate to slight alteration to milky white feldspar.

Clinopyroxene—Mode: 40%-45%.

Crystal size: 1-10 mm.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: 90% by amphibole.

Olivine—Mode: 0%-10%.

Crystal size: 2-4 mm.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent alteration: 100% by black, white, and iron oxide minerals.

SECONDARY MINERALOGY:

Total percent: Moderate to extensive.

Texture: Plagioclase is partially recrystallized to neoblasts, and partially altered to milky white feldspar, locally stained by iron oxides. Clinopyroxene is 90% altered to amphibole. Olivine is

altered to a black, meshlike mineral and is filled by a whitish mineral, probably talc, or colorless amphibole in Piece 1A. Elsewhere, olivine is altered to orange iron oxides. Piece 7D:

Trace of sulfides and concentrations of ilmenite.

Percent vein material: Not determined.

Vein material: Sodic plagioclase, chlorite, carbonate, actinolite, and iron oxides.

Piece 1: Vein filled by carbonate and green mineral, possibly chlorite. Piece 3A: Vein filled by

albite, actinolite, and carbonate. Piece 3C: Fracture surface coated by chlorite and stained by

iron oxides. Pieces 7A, 7C, and 7D: Veins filled by albite, actinolite, and stained by iron oxides

plus some chlorite.

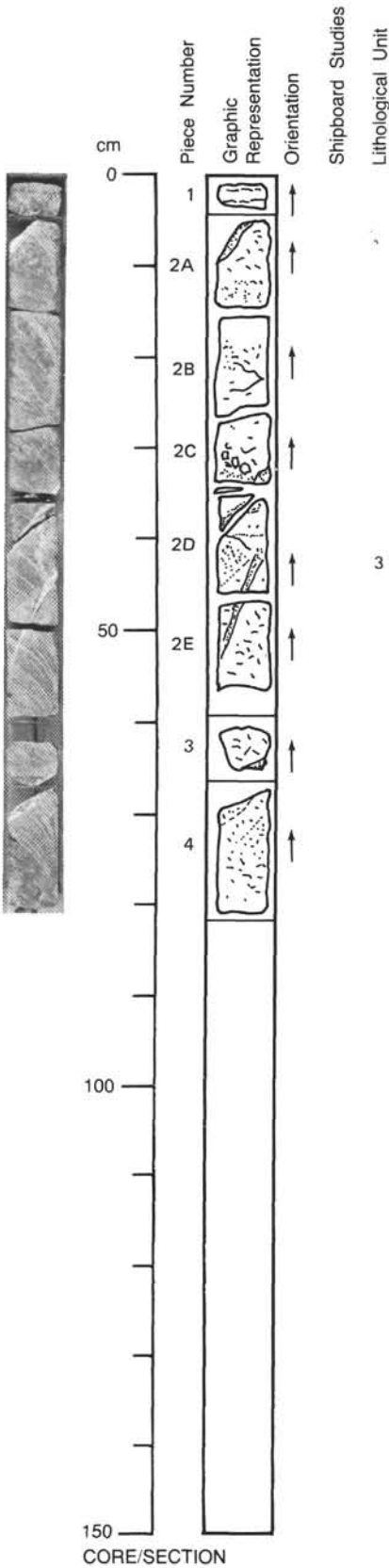
118-735B-41R-3

UNIT 3: OLIVINE GABBRO AND IRON-TITANIUM OXIDE GABBRO

Pieces 1-4

Olivine-Bearing Gabbro and Olivine Gabbro

Pieces 1-4



F: 10°

Contact:
31°

3 Contact:
40°

F: 45°

COLOR: Gray, white to green-white along veins.

LAYERING: Layers defined by grain-size variations on various scales (4-20 cm); Pieces 2A-2C (30 cm), fine-grained top, coarse-grained bottom; Pieces 2C (30 cm) to 2D (40 cm), fine-grained top, coarse-grained bottom; Piece 2D (40-45 cm), fine-grained top, coarse-grained bottom; and Piece 4 (75-82 cm), fine-grained top, coarse-grained bottom. Sharpness of contacts not always well defined. Most layers dip at 30°-40°, although this varies. Distribution of olivine defines modal layering. Layering is not always obvious on cut surfaces; the back of pieces show olivine in relief. Piece 2D: Fine-grained section is bounded by medium-grained zones, and is more triangular than layered.

DEFORMATION: Slight—some brecciation associated with feldspathic veins at 45-55 and 70 cm, but minor. Several brittle fractures.

PRIMARY MINERALOGY:

Plagioclase—Mode: 40%-60%.
Crystal size: 0.5-10 mm.
Crystal shape: Euhedral-anhedral.
Preferred orientation: Concentrated in layers.
Percent replacement: Slight.

Clinopyroxene—Mode: 40%-60%.
Crystal size: 1-14 mm.
Crystal shape: Subhedral to sub-polkilitic. Can sometimes partially enclose small plagioclase grains. In the coarsest grained sections a pyroxene-dominated layer can sometimes occur along coarse- to fine-grained contact, e.g., Piece 2C.
Preferred orientation: Some lamination.
Percent replacement: 2%-10% amphibolitization. More intense along veins.

Olivine—Mode: 0%-5%.
Crystal size: 1-5 mm.
Crystal shape: Anhedral.
Preferred orientation: Not determined.
Percent replacement: Slight alteration by undetermined mineral.

SECONDARY MINERALOGY:

Total percent: Various.
Texture: Amphibole after pyroxene along veins. Bronze-colored alteration of pyroxene along feldspathic zones at 8 and 70 cm.
Percent vein material: Not determined.
Vein material: Piece 2A (8 cms): Feldspar-amphibole vein cuts foliation. Piece 4 (78 cm): Feldspar-amphibole vein dips at 35° and cuts layering.

UNIT 3: OLIVINE GABBRO AND IRON-TITANIUM OXIDE GABBRO

Pieces 1A-2D

Olivine Gabbro

Pieces 1A-2D

COLOR: Gray.

LAYERING: Grain-size layering seen in Pieces 1C through 1D and 1E (apparent thickness of layers 4 cm), and Pieces 2B through 2D (apparent thickness of layer 3.7 cm). The contact is sharp (<3 mm) and although showing different apparent azimuths, dips "constantly" at 50°. There is a foliation that may be magmatic in origin. Grain-size varies from 1-3 mm to 1-6 mm.

DEFORMATION: None apparent except for little shearing at the base of Piece 2D.

PRIMARY MINERALOGY:

Plagioclase—Mode: Not determined.

Crystal size: 1-3 mm.

Crystal shape: Anhedral.

Preferred orientation: Not determined.

Percent replacement: Slight chloritization in Piece 2.

Clinopyroxene—Mode: Not determined.

Crystal size: 1-3 mm.

Crystal shape: Anhedral.

Preferred orientation: Not determined.

Percent replacement: Partial replacement by amphibole.

Olivine—Mode: <1%.

Crystal size: 1-3 mm.

Crystal shape: Rounded.

Preferred orientation: Not apparent.

Percent replacement: Not determined.

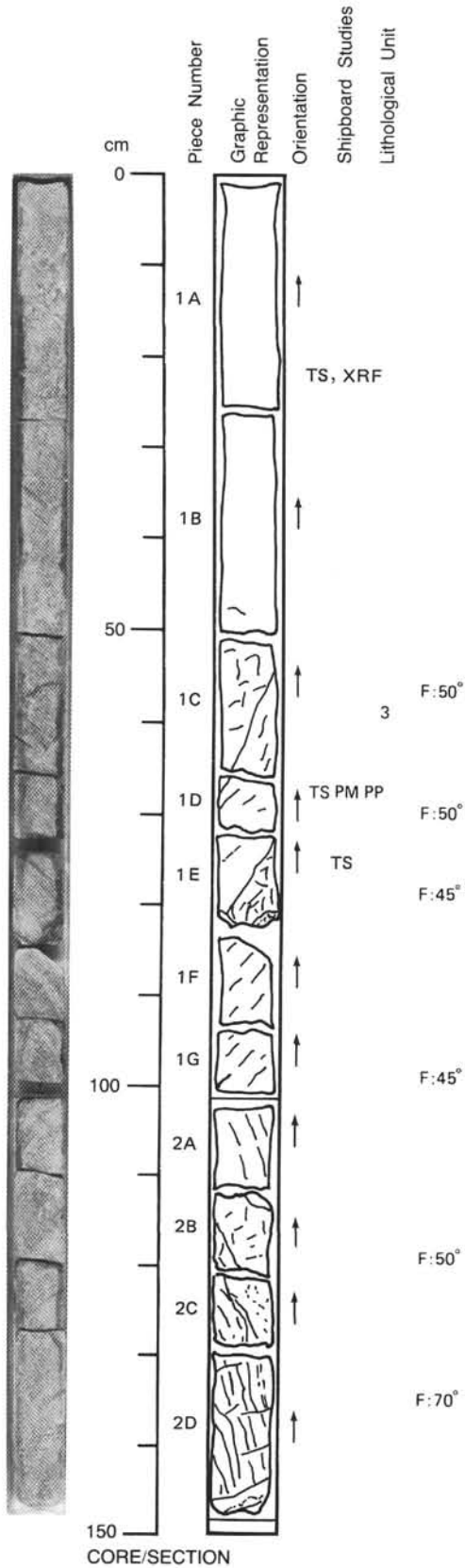
SECONDARY MINERALOGY:

Total percent: <4%.

Texture: Coronitic. Pieces 1E and 1F pronounced oxidation (iron oxides). Green amphibole partially replaces clinopyroxene. Plagioclase is chloritized (Piece 2D in particular). Pieces 1A and 1B: Pyrite up to 1%. Pieces 1C and 2A-2C: Pyrite in amounts.

Percent vein material: Not determined.

Vein material: Not determined.



CORE/SECTION

118-735B-42R-1

UNIT 3: OLIVINE GABBRO AND IRON-TITANIUM OXIDE GABBRO

Pieces 1A-13

Olivine Gabbro

Pieces 1A-13

COLOR: Grayish green to orange, yellowish tinted green.

LAYERING: Piece 8: Grain-size layering. Thickness of layer is 2 cm; grains vary from 1 to 2.5 mm in size. There is a preferred orientation parallel to the contact, which is sharp.

DEFORMATION: Pieces 1A, 5, 8, and 9: Foliated to poorly foliated. Piece 8: Foliation is parallel to grain-size layering, so secondary and primary foliation may coincide. There is a recrystallization of plagioclase from 2-4 mm to <1 mm neoblasts or granoblasts.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%-60%.

Crystal size: 1-5 mm.

Crystal shape: Anhedral.

Preferred orientation: Weak.

Percent replacement: Slight chloritization and replacement by prehnite.

Clinopyroxene—Mode: 40%-50%.

Crystal size: 2-5 mm.

Crystal shape: Anhedral, interstitial.

Preferred orientation: Not determined.

Percent replacement: Slight replacement by amphibole.

Olivine—Mode: 1%-4%.

Crystal size: <1 mm.

Crystal shape: Anhedral to rounded.

Preferred orientation: None.

Percent replacement: Completely replaced by iron hydroxide, magnetite, and smectite(?).

SECONDARY MINERALOGY:

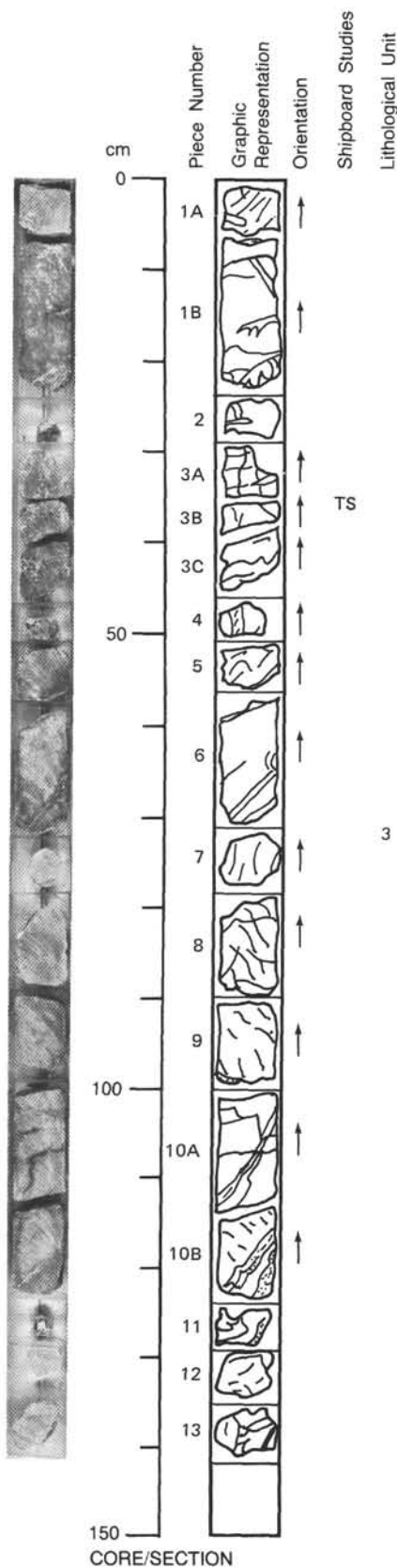
Total percent: <20%.

Texture: Coronitic pseudomorphic. Olivine is mainly altered to iron hydroxide (brown to orange spots) and magnetite (and smectite ?). Clinopyroxene is replaced by amphibole (two types: pseudomorphs and rims) and stained by orange clays. Plagioclase is chloritized and replaced by fibrous prehnite in cavities; yellowish iron hydroxides are also present. Wall rocks are preferentially altered to amphibole.

Percent vein material: Not determined. Veining abundant in Pieces 1B, 2-5, 7, and 10B-13.

Vein material: Amphibole (20%), plagioclase (80%).

COMMENTS: This section comprises a foliated to poorly foliated olivine-poor gabbro.



CORE/SECTION

118-735B-42R-2

UNIT 3: OLIVINE GABBRO AND IRON-TITANIUM OXIDE GABBRO

Pieces 1-3E

Gabbro and Olivine Gabbro

Pieces 1-3E

COLOR: Gray.

LAYERING: Many complex coarse- to fine-grained transitions. Pieces 2D-3B (70-95 cm): Coarse- to fine-grained sequence; at the bottom is a very sharp change to a fine-grained zone. Piece 3D: Uniformly medium-grained. Pieces 2A (16 cm) and 2B (33 and 36 cm): Contain small coarse-grained "lenses" in a fine-grained "matrix." Pieces 2A (20-25 cm), 2D (63-65 cm), 3A (86 cm), 3C (103-108 cm), and 3D (128-132 cm): Contain olivine-rich zones but are difficult to define. Where clear, there is no consistent relationship to the coarse- to fine-grained variation. The dip of the transitions is not constant.

DEFORMATION: Some shearing. Piece 1: Porphyroclastic textures. Pieces 2C and 2D: Steeply dipping to vertical fractures with offsets of up to 10 cm.

PRIMARY MINERALOGY:

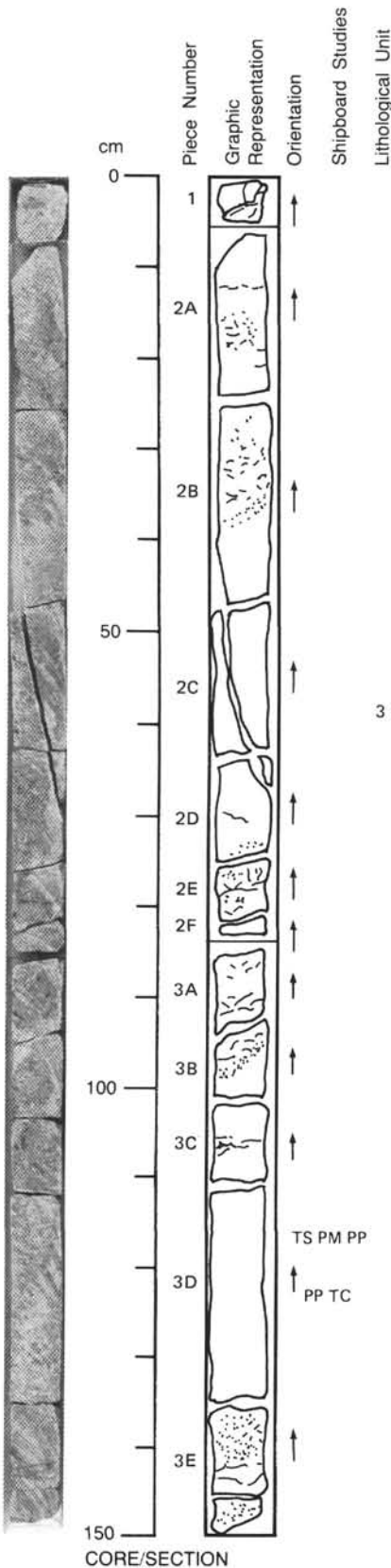
Plagioclase—Mode: 60%.
Crystal size: 1-8 mm.
Crystal shape: Anhedral-subhedral.
Preferred orientation: Slight lamination.
Percent replacement: Not determined.

Clinopyroxene—Mode: 50%.
Crystal size: 1-8 mm, large oikocrysts.
Crystal shape: Anhedral (ophitic to subophitic) to subhedral.
Preferred orientation: Slight lamination.
Percent replacement: 5% by amphibole.

Olivine—Mode: 0%-8%.
Crystal size: 1-8 mm.
Crystal shape: Anhedral.
Preferred orientation: Not determined.
Percent replacement: 10%-20% by talc and amphibole.

SECONDARY MINERALOGY:

Total percent: Slight.
Texture: Pieces 1 and 3C: Amphibole along some fractures. Pieces 2C and 2D: Thin feldspathic veins fill steeply dipping fractures.
Percent vein material: Not determined.
Vein material: Amphibole and feldspar.



118-735B-42R-3

UNIT 3: OLIVINE GABBRO AND IRON-TITANIUM OXIDE GABBRO

Pieces 1A-1H

Olivine Gabbro

Pieces 1A-1D (43 cm)

COLOR: Gray.
LAYERING: Size- and phase-graded layering downsection from medium- to coarse-grained olivine gabbro to olivine-bearing microgabbro, and then back to coarse-grained olivine-bearing gabbro.

DEFORMATION: None.

PRIMARY MINERALOGY:

Plagioclase—Mode: 60%.
 Crystal size: 0.5-10 mm or locally larger.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: None.

Clinopyroxene—Mode: 33%.
 Crystal size: 0.5-5 mm or locally larger.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: 10% by amphibole.

Enstatite—Mode: 5.5%.
 Crystal size: 0.5-4 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: 10% by amphibole.

Olivine—Mode: 4%, but varies from 1% to 7%.
 Crystal size: 0.2-3.0 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: 25% locally by talc, amphibole, and magnetite.

Brown Hornblende—Mode: < 1%.
 Crystal size: < 0.1 mm.
 Crystal shape: Interstitial rim on opaques.
 Preferred orientation: None.
 Percent replacement: None

Opaques—Mode: 1%.

SECONDARY MINERALOGY:

Total percent: 3.5%, (talc 0.3%, amphibole 3.0%, and magnetite 0.2%).
 Texture: Talc, amphibole, and magnetite locally replacing olivine. Amphibole locally replaces and rims clinopyroxene.
 Percent vein material: Not determined.
 Vein material: Plagioclase, amphibole, talc or smectite, and carbonate (0.3%). Pieces 1C and 1D: 4 mm thick plagioclase vein inclined at 45° contains a band of yellow talcose material at its center 1 mm thick. The gabbro on each side of the vein is altered to an amphibole-rich, greenish-gray rock, in a 2-cm-wide zone on the lower side and contains a single 4-cm-wide zone on the upper side of the vein. Piece 1A: Carbonate vein.

Gabbro

Pieces 1D (43 cm)-1H

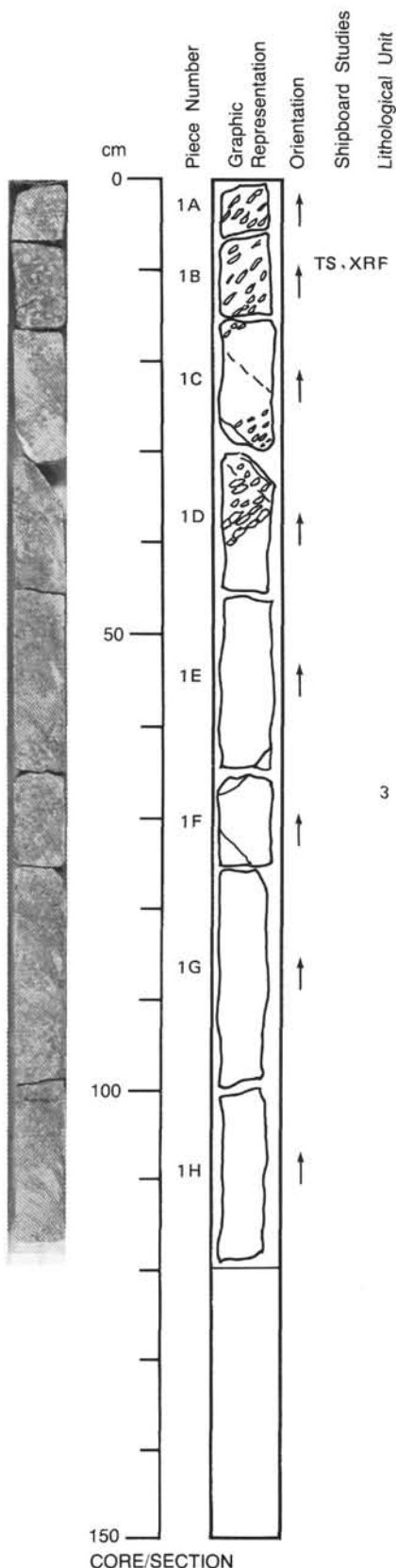
COLOR: Gray.
LAYERING: None.
DEFORMATION: Weak foliation defined by shape parallel to the layering in the olivine gabbro. May be an igneous lamination.

PRIMARY MINERALOGY:

Plagioclase—Mode: 60%.
 Crystal size: 1-15 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Slight elongation parallel to layering.
 Percent replacement: Not determined.

Clinopyroxene—Mode: 40%.
 Crystal size: 1-15 mm or larger.
 Crystal shape: Anhedral, granular.
 Preferred orientation: Slight elongation parallel to layering.
 Percent replacement: Not determined.

SECONDARY MINERALOGY: Similar to olivine gabbro described above.



118-735B-42R-4

UNIT 3: OLIVINE GABBRO AND IRON-TITANIUM OXIDE GABBRO

Pieces 1A-5C

Olivine Gabbro

Pieces 1A-5C

COLOR: Gray.

LAYERING: Possible primary layering shown by slight preferred orientation of pyroxenes in Pieces 1B and 1C, and alternating medium- to coarse-grained textures, as in Pieces 3A and 5C. This layering dips at approximately 50°.

DEFORMATION: No apparent foliation.

PRIMARY MINERALOGY:

Plagioclase—Mode: 45%.
 Crystal size: 1-10 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Not determined.
 Percent replacement: 1% by undetermined mineral.

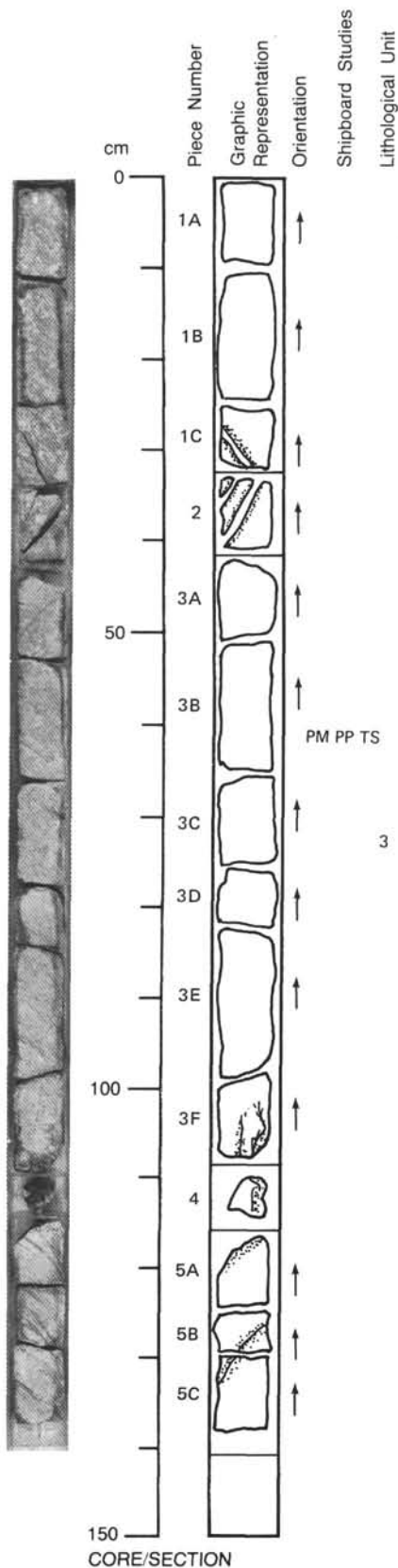
Clinopyroxene—Mode: 45%.
 Crystal size: 1-10 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Not determined.
 Percent replacement: 1% by amphibole.

Olivine—Mode: 10%.
 Crystal size: 1-7 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Not determined.
 Percent replacement: 1%.

SECONDARY MINERALOGY:

Total percent: generally <5%-10%.
 Texture: This section is relatively fresh, except adjacent to veins. Typically, amphibole replaces clinopyroxene. Traces of sulfides throughout.
 Percent vein material: 5%.
 Vein material: Fibrous actinolite and chlorite. Pieces 2, 5B, and 5C: Veins filled and fractures lined by soft, greenish-white mineral, probably chlorite. Pieces 3F, 4, and 5A: Portions of a vein contain fibrous actinolite, a white mineral, probably talc, and possible chlorite. Actinolite is fibrous and grows radially in veins as if into an open fracture.

COMMENTS: Clinopyroxene does not indicate the common textures shown in previous cores.



118-735B-43R-1

UNIT 3: OLIVINE GABBRO AND IRON-TITANIUM OXIDE GABBRO

Pieces: 1A-1K

Gabbro and Olivine Gabbro

Pieces 1A-1K

COLOR: Gray.

LAYERING: Many coarse- to fine-grained variations appear in the section, which appears to be more lensoid than layered in distribution. Patches and pods of medium- to coarse-grained material in a microgabbro matrix are common. Pieces 1A and 1K are good examples. Olivine irregularly distributed and may represent crude layering. Olivine-rich layers occur at 0-25, 40, 45, 70-73, 85-87, 105-107, and 124-125 cm. Pieces 1H-1J: A feeble foliation is defined by clinopyroxene elongation.

DEFORMATION: A few fractures.

PRIMARY MINERALOGY:

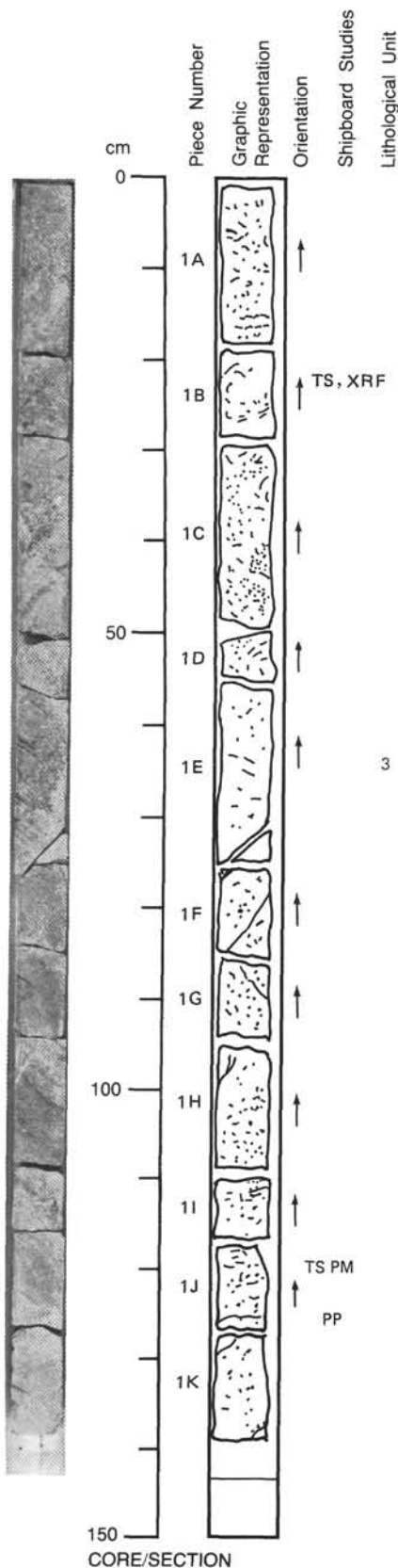
Plagioclase—Mode: 50%-60%.
 Crystal size: 5-7 mm.
 Crystal shape: Subhedral to anhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

Clinopyroxene—Mode: 50%-55%.
 Crystal size: 0.5-10 mm.
 Crystal shape: Subhedral to anhedral, interstitial to granular, no oikocrysts.
 Preferred orientation: Slight lamination in some pieces.
 Percent replacement: Minor amphibole replacement except along veins where replacement is intense.

Olivine—Mode: 15% in parts of Pieces 1A and 1B.
 Crystal size: 0.5-6 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Not determined.
 Percent replacement: Minor replacement by talc and tremolite.

SECONDARY MINERALOGY:

Total percent: Minor.
 Texture: Amphibole replaces clinopyroxene along a few fractures at 80, 125, and 138 cm. Pyrite occurs as <0.5 mm grains at 25 cm and in parts of the top half of the core. The rock is very fresh; pyrite not associated with the veins, may be primary.
 Percent vein material: Not determined.
 Vein material: Amphibole.



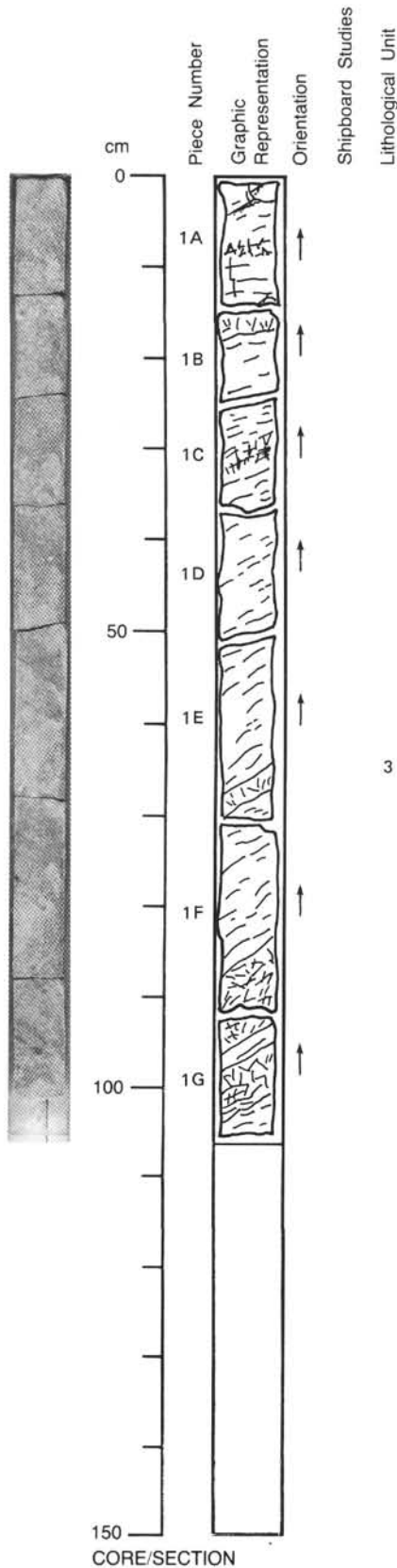
118-735B-43R-2

UNIT 3: OLIVINE GABBRO AND IRON-TITANIUM OXIDE GABBRO

Pieces 1A-1G

Olivine Gabbro

Pieces 1A-1G



COLOR: Gray.

LAYERING: Pieces 1A-1C and 1E-1F: Grain-size variations evident. Layers are 1 to 4 cm thick with a thicker medium- to fine-grained interval at 55 cm. Thick, coarse-grained intervals contain less olivine (2%-3%). Foliation is subparallel to the contacts of probable primary origin. Difference between the contact and foliation dips can be as much as 20°. The pyroxene and plagioclase are preferentially oriented.

DEFORMATION: None apparent.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%-60%.
 Crystal size: 0.5-4 mm.
 Crystal shape: Prismatic.
 Preferred orientation: Yes.
 Percent replacement: Partially chloritized.

Clinopyroxene—Mode: 40%-48%.
 Crystal size: 2-8 mm.
 Crystal shape: Anhedral to subhedral.
 Preferred orientation: Yes.
 Percent replacement: Partially replaced by amphibole.

Olivine—Mode: 2%-10% (20% in Pieces 1C and 1D).
 Crystal size: 1-3 mm.
 Crystal shape: Rounded.
 Preferred orientation: Not determined.
 Percent replacement: Slight to moderate replacement by iddingsite and talc.

SECONDARY MINERALOGY:

Total percent: Not determined.
 Texture: Coronitic. Clinopyroxene is partially replaced by amphibole. Clays and iron hydroxides stain the core of the grains. Olivine is partly altered to iddingsite and talc. Plagioclase is partially chloritized (greenish color). Disseminated pyrite (<0.5 mm) is present in all pieces (up to 1% in Piece 1E).
 Percent vein material: Pieces 1A-1G: <1%.
 Vein material: Amphibole and plagioclase, <1 mm thick.

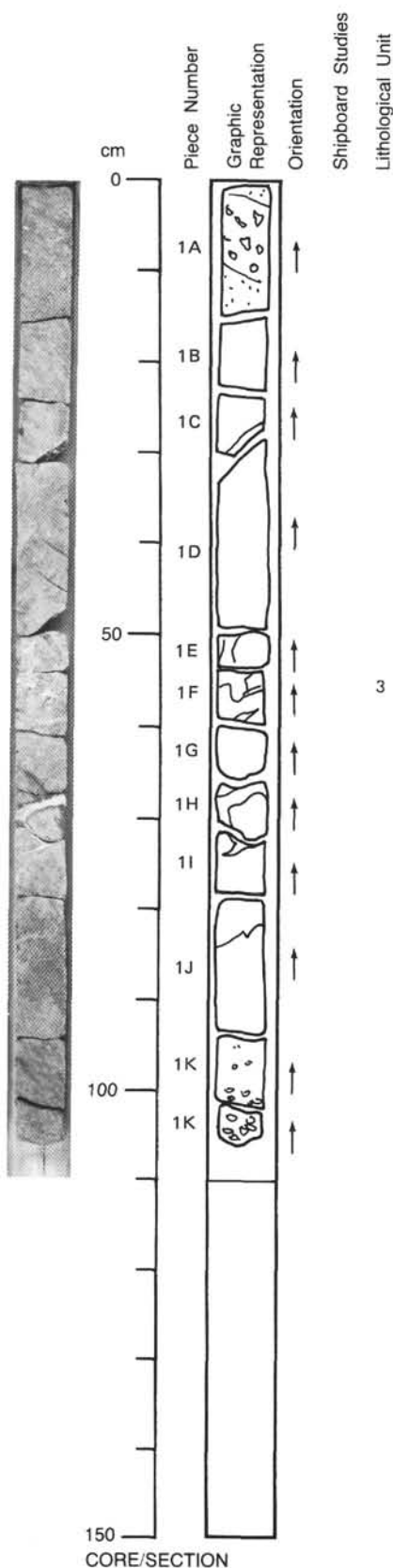
118-735B-43R-3

UNIT 3: OLIVINE GABBRO AND IRON-TITANIUM OXIDE GABBRO

Pieces 1A-1K

Olivine Gabbro and Gabbro

Pieces 1A-1K



COLOR: Gray.

LAYERING: Both phase and size layering present: 0-10 cm—olivine gabbro with 3% olivine, coarse-grained, underlies a small horizon of medium-grained gabbro. 10-76 cm—gabbro containing <1% olivine, medium- to coarse-grained, equigranular with local modal variations defining faint pyroxene-rich layers. 80-92 cm—coarse-grained gabbro (no visible olivine) with 2 cm average grain size and local 2-cm-thick vein of microgabbro. 92-108 cm—olivine gabbro with 5% olivine, size graded downward from medium- to coarse-grained (1 mm to 1 cm).

DEFORMATION: No penetrative deformation noted, although brittle deformation evident from crosscutting, high-temperature, plagioclase- and amphibole-filled veins.

PRIMARY MINERALOGY:

Plagioclase—Mode: 60%-70%.

Crystal size: Not determined.

Crystal shape: Equigranular anhedral.

Preferred orientation: None noted.

Percent replacement: Little evident.

Clinopyroxene—Mode: 30%-35%.

Crystal size: Locally greater in 1 cm thick layers.

Crystal shape: Anhedral granular to subhedral (0-10 cm).

Preferred orientation: Piece 1A: Weak igneous lamination defined by pyroxene lying subhorizontal to layer boundaries.

Percent replacement: 0%-100%, highly variable, depending on interval. Pyroxene is rimmed or pseudomorphed by amphibole.

Olivine—Mode: 0%-5%.

Crystal size: Not determined.

Crystal shape: Granular.

Preferred orientation: None noted.

Percent replacement: Variable, some totally pseudomorphed in gabbro near crosscutting veins.

Sulfides—Mode: Trace-0.5%, most abundant in lower olivine gabbro, where as many as three different disseminated sulphides are seen together—possibly pyrite, chalcocopyrite, and arsenopyrite (?). Small pyrite grains scattered in the coarse-grained gabbro stain the silicate matrix orange-red in their proximity.

SECONDARY MINERALOGY:

Total percent: Highly variable—quite fresh away from veins, extensive near them with amphibole replacing pyroxene.

Texture: Clinopyroxene replaced by amphibole. Pieces 1E-1I (48-74 cm): Alteration is extensive centered on thick (1 cm) veins of feldspar and amphibole crosscutting the gabbro.

Percent vein material: Highly variable, 20% in some pieces, absent in the upper one-third of the section.

Vein material: Pieces 1E-1I: Plagioclase-rich veins up to 1 cm wide crosscut the core and appear to contain some amphibole. Piece 1K: Green smectite (?) or other clay mineral present on fracture surfaces between halves.

118-735B-43R-4

UNIT 3: OLIVINE GABBRO AND IRON-TITANIUM OXIDE GABBRO

Pieces 1-8B

Olivine Gabbro

Pieces 1-8B

COLOR: Gray.

LAYERING: Possible primary layering defined by grain size variation, as in Piece 6.

DEFORMATION: Suggestion of foliation in Pieces 3A-3G. Other pieces in section have a crude horizontality, possibly layering. In Pieces 3A-3G, there is a gradual rotation away from this horizontal to a very steep "foliation" defined by elongation of, and preferred orientation of, pyroxene (approximately 55° from the horizontal). This may be a primary texture of the magma chamber rather than deformation.

PRIMARY MINERALOGY:

Plagioclase—Mode: 45%.

Crystal size: 1-10 mm.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: 0%-20% by undetermined mineral.

Clinopyroxene—Mode: 50%-45%.

Crystal size: 1-10 mm.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: 40% by amphibole.

Olivine—Mode: 0%-5%.

Crystal size: 2-8 mm.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: 80%-100% by orangish-brown iron oxides.

SECONDARY MINERALOGY:

Total percent: 5%-10%.

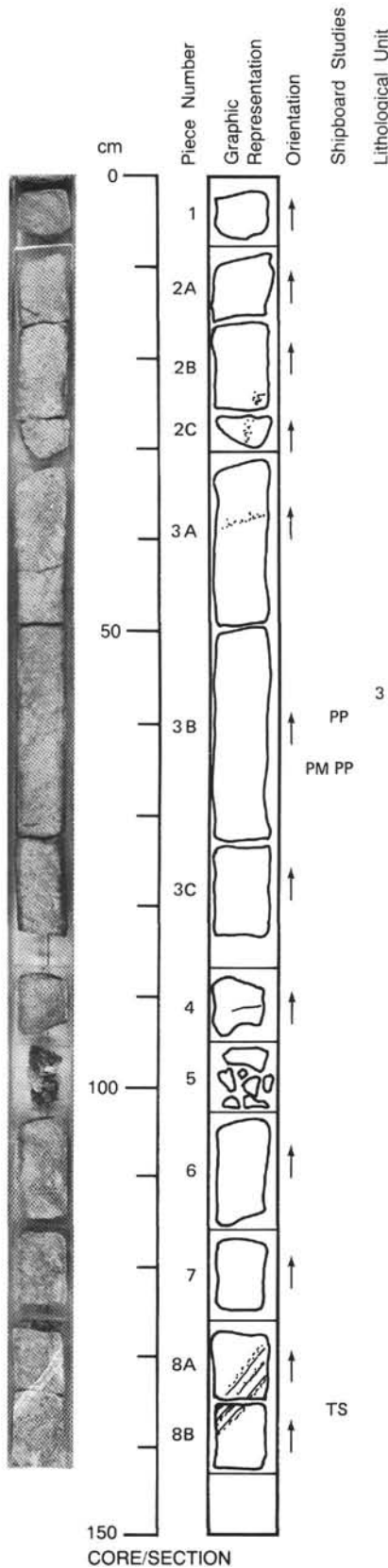
Texture: Alteration variable. Pieces 1, 4-7, and part of 8 are very fresh, alteration less than 5%-10%. Olivine relatively unaltered. In Pieces 2A-C and 3A-C, section is more altered.

Clinopyroxene partially replaced by amphibole, olivine is altered to orangish-brown iron oxides.

Pieces 2 and 3: Scattered concentrations of ilmenite. Traces of sulfides throughout.

Percent vein material: Not determined.

Vein material: Sodic plagioclase, actinolite, and chlorite. Piece 3A: Veins of a white mineral, probably sodic plagioclase. Pieces 8A-8B: Veins are zoned, consisting of white mineral ± chlorite at edges and green minerals in center, probably actinolite. Although vein is approximately 1 cm wide, there seems to be little alteration halo adjacent to it.



118-735B-44R-1

UNIT 3: OLIVINE GABBRO AND IRON-TITANIUM OXIDE GABBRO

Pieces 1-2I

Olivine Gabbro and Coarse- to Medium-Grained Gabbro

Pieces 1-2I

COLOR: Gray.
LAYERING: Weak primary igneous lamination inclined at about 45° in the medium- and moderately coarse-grained sections, reflects slight preferred orientation of pyroxene and plagioclase. Grain size varies from medium- to coarse-grained, while the texture is equigranular anhedral to subhedral. There is a coarser interval between 25 and 50 cm.

DEFORMATION: Not determined.

PRIMARY MINERALOGY:

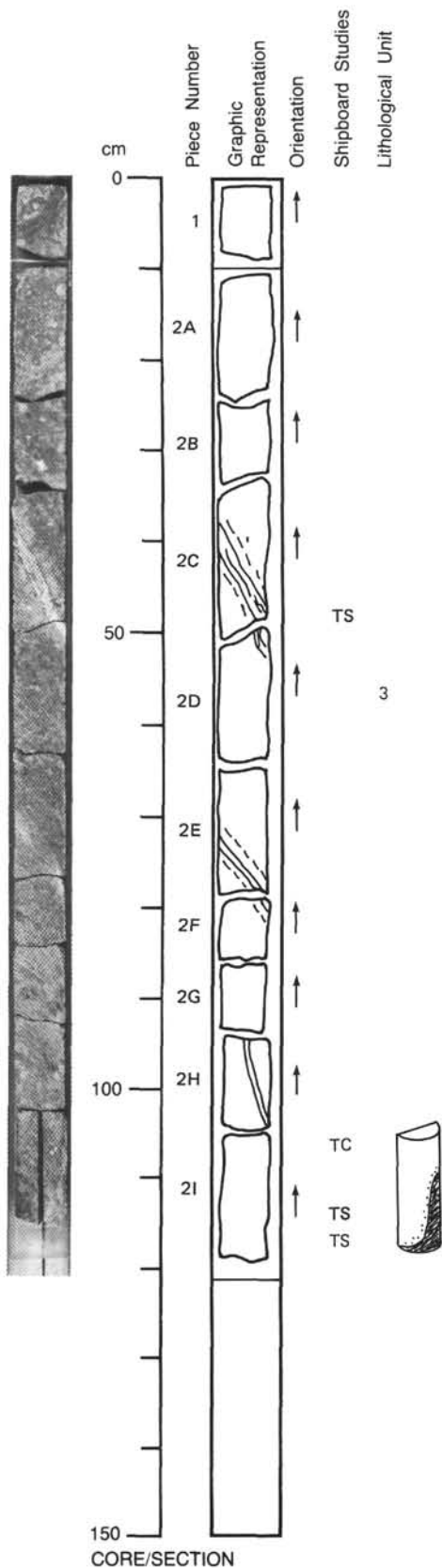
Plagioclase—Mode: 50%-60%.
 Crystal size: 1-20 mm.
 Crystal shape: Equigranular anhedral to subhedral.
 Preferred orientation: Slight shape orientation locally.
 Percent replacement: Locally 0%-100%, highly variable, intense near some veins; plagioclase replaced by albite, epidote, and chlorite.

Clinopyroxene—Mode: 50%-40%.
 Crystal size: 1-20 mm.
 Crystal shape: Equigranular anhedral to subhedral.
 Preferred orientation: Slight shape orientation locally.
 Percent replacement: 0%-100%, highly variable, intense near veins; clinopyroxene replaced by amphibole.

Olivine—Mode: 0%-20%, highly variable, appears absent in large portions. Abundant in the bottom 3 cm of gabbro above the iron-titanium oxide gabbro.
 Crystal size: 0.5-5 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: 60%-100%, locally pseudomorphed by talc, magnetic, and tremolite.

SECONDARY MINERALOGY:

Total percent: Variable.
 Texture: Alteration is generally weak in the upper half of the section with a small vein (1 mm) of amphibole in Piece 1A. In the lower half of the section, a 1.5-cm-thick vein of plagioclase is present. Pale green amphibole rims and replaces primary pyroxene and plagioclase in the gabbro for about 1 cm to either side of the vein. Piece 2C: Several 0.3-mm-thick veins of green amphibole cut the gabbro. Piece 2E: Plagioclase and darker amphibole vein (2 mm) crosscuts through core; the gabbro is subject to amphibole alteration for 1 cm to each side of the vein. Pieces 2F, 2G, and 2H: Cut by a 3-mm-thick vein of green amphibole. These pieces are far more extensively amphibolitized than the remaining gabbro.
 Percent vein material: 3%.
 Vein material: Amphibole and plagioclase.



118-735B-44R-1 (continued)

Olivine Gabbro—Massive Iron-Oxide Gabbro

Piece 2I

COLOR: Not determined.

LAYERING: Not determined.

DEFORMATION: Not determined.

PRIMARY MINERALOGY:

Plagioclase—Mode: 20%.

Crystal size: 1-10 mm.

Crystal shape: Euhedral to anhedral, interstitial to massive ilmenite.

Preferred orientation: None.

Percent replacement: Small.

Clinopyroxene—Mode: 20%.

Crystal size: 2-10 mm.

Crystal shape: Anhedral.

Preferred orientation: Not determined.

Percent replacement: Small.

Olivine—Mode: 2%-5%.

Crystal size: 0.5-3 mm.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: Relatively fresh.

Ilmenite—Mode: 50%.

Crystal size: Not determined.

Crystal shape: Not determined.

Preferred orientation: Not determined.

Percent replacement: Up to 60% by a green mineral.

Iron-copper sulphides—Mode: 8%, disseminated.

SECONDARY MINERALOGY:

Total percent: 15%-40%.

Texture: Plagioclase is interstitial to ilmenite, while clinopyroxene and plagioclase poikilolitically enclose blebs of ilmenite and sulfide. Fresh olivine also occurs in the section. Alteration includes formation of malachite in cracks in the sulfides. Some amphibole may be present in the pyroxene. Ilmenite locally altered (up to 60%) to a green mineral.

Percent vein material: None.

Vein material: None.

COMMENTS: Located on an inclined (70°) zone on the back of Piece 2I.

118-735B-44R-2

UNIT 3: OLIVINE GABBRO AND IRON-TITANIUM OXIDE GABBRO

Pieces 1A-1J

Ilmenite-Rich Gabbro

Pieces 1A-1D

COLOR: Gray to grayish black.

LAYERING: Not apparent, although there are subvertically oriented pyroxene grains in Pieces 1B, 1C, and 1D. This is a primary mineral lineation inclined from subvertical to 70°.

DEFORMATION: Not apparent.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%.
Crystal size: 2-8 mm.
Crystal shape: Anhedral to subhedral.
Preferred orientation: Strong (primary).
Percent replacement: Slight chloritization.

Clinopyroxene—Mode: 30%-35%.
Crystal size: 3-17 mm.
Crystal shape: Euhedral.
Preferred orientation: Not determined.
Percent replacement: Slight replacement by amphibole.

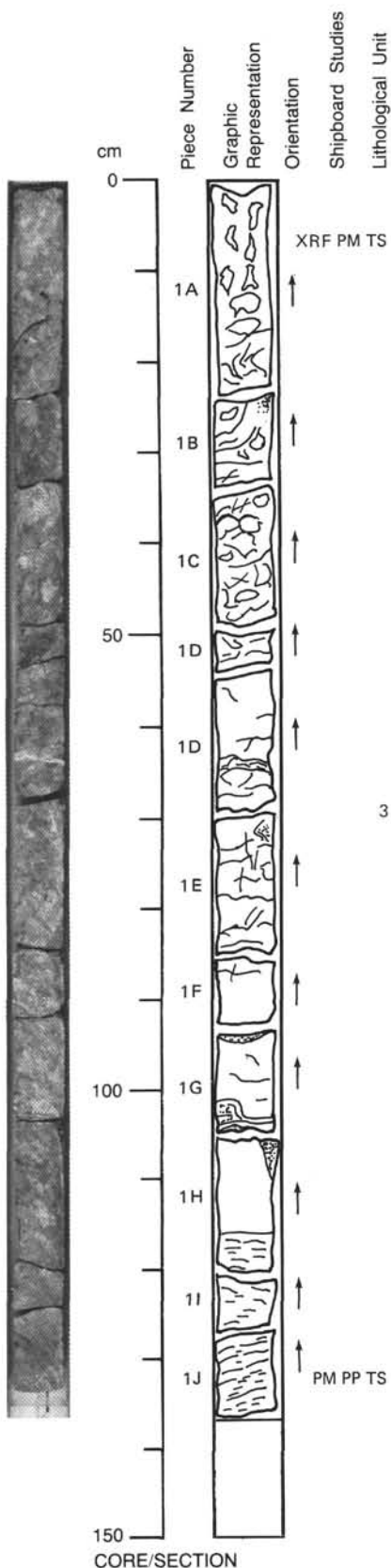
Olivine—Mode: Trace amounts.
Crystal size: 1-2 mm.
Crystal shape: Rounded.
Preferred orientation: None.
Percent replacement: Slight.

Ilmenite—Mode: 15%-30%.
Crystal size: 1-10 mm (veining).
Crystal shape: Ilmenite is granular.
Preferred orientation: Occurs as inclusions in clinopyroxene or fills interstitial spaces between silicates; this veining is subvertical, indicating a primary origin for ilmenite.
Percent replacement: Not determined.

SECONDARY MINERALOGY:

Total percent: < 10%.
Texture: Coronitic. Clinopyroxene is slightly replaced by amphibole and plagioclase is slightly chloritized. Different sulfides are present as disseminated phases in close association with ilmenite. These are chalcopyrite and pyrite. Chalcopyrite is altered to malachite. Sulfides are secondary, as they are often found in cracks.

Percent vein material: Not determined.
Vein material: Plagioclase and amphibole. Piece 1D (bottom): Plagioclase-rim vein, 1 cm across, plagioclase is mixed with chlorite and amphibole(?).



3

F: 0-10°

PM PP TS

CORE/SECTION

118-735B-44R-2 (continued)

Olivine Gabbro**Pieces 1E-1J**

COLOR: Gray to greenish gray.

LAYERING: Piece 1H: Grain-size layering evident. The fine-grained interval is olivine-gabbro, the coarse-grained interval is olivine-poor gabbro. Piece 1E: There is a progressive decrease in ilmenite from 4% to 1% and a complementary increase in modal olivine. This section is texturally and mineralogically zoned. The medium-grained olivine gabbro is foliated, see other descriptions.

DEFORMATION: None apparent.

PRIMARY MINERALOGY:

Plagioclase—Mode: 60% (Piece 1E), 50%-55% (Piece 1J).

Crystal size: 1-4 mm.

Crystal shape: Rounded to anhedral.

Preferred orientation: None.

Percent replacement: Slight.

Clinopyroxene—Mode: 30%-40% (Piece 1E), 45% (Piece 1J).

Crystal size: 1-3 mm.

Crystal shape: Subhedral.

Preferred orientation: None.

Percent replacement: Slight replacement by amphibole.

Olivine—Mode: 2%-5% (Piece 1J).

Crystal size: 1-2 mm.

Crystal shape: Rounded.

Preferred orientation: None.

Percent replacement: Slight replacement by iddingsite, hydroxides, and clay minerals.

Ilmenite—Mode: 1%-4% (Piece 1E).

Crystal size: Not determined.

Crystal shape: Not determined.

Preferred orientation: Not determined.

Percent replacement: Not determined.

SECONDARY MINERALOGY:

Total percent: < 10%.

Texture: Coronitic. Olivine is replaced by iddingsite, hydroxides, and clay minerals.

Clinopyroxene is partly replaced by amphibole. Chalcopyrite and pyrite are disseminated in the gabbro. Chalcopyrite is altered to malachite. The amount of sulfides decreases as ilmenite content decreases.

Percent vein material: < 1%.

Vein material: Pieces 1G and 1H: Veins filled by plagioclase. Pieces 1E and 1F: Cracks, < 1 mm thick, are filled by plagioclase.

COMMENTS: Coarse- to medium-grained gabbro.

118-735B-44R-3

UNIT 3: OLIVINE GABBRO AND IRON-TITANIUM OXIDE GABBRO

Pieces 1A-6C

Olivine Gabbro—Ilmenite and Sulfide-Bearing

Pieces 1A-6C

COLOR: Dark gray.

LAYERING: Pieces 1A and 1B: Possible primary layering defined by alternating medium to coarse grain size. Pieces 5A and 5G: Some mineralogical variation, olivine is concentrated in diffused layers.

DEFORMATION: None apparent.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%.
 Crystal size: 1-10 mm.
 Crystal shape: Anhedral to euhedral.
 Preferred orientation: None.
 Percent replacement: <1% by albite.

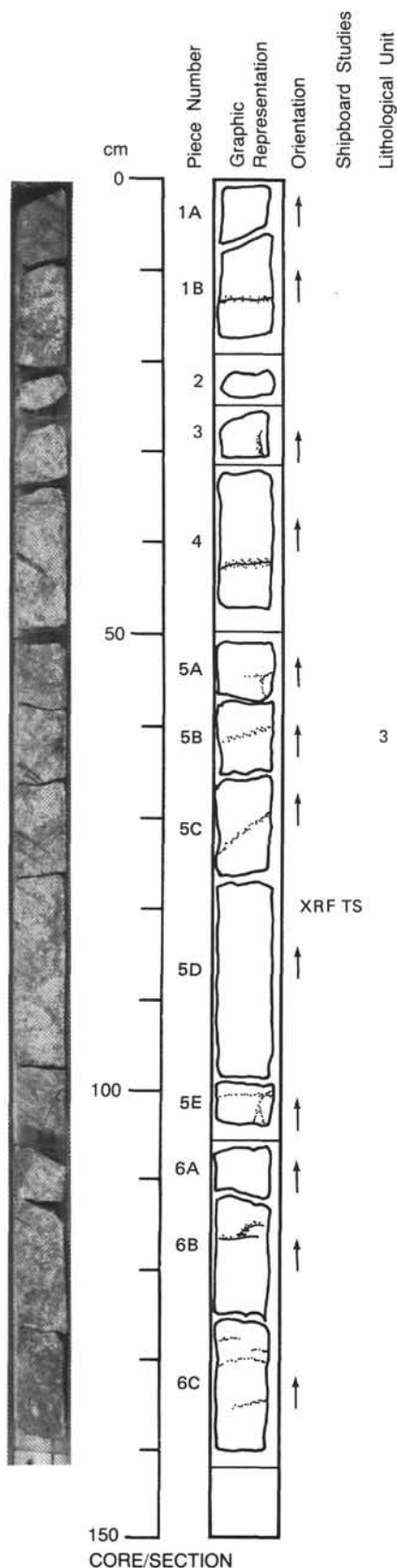
Clinopyroxene—Mode: 40%.
 Crystal size: 1-20 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: <1% by amphibole.

Olivine—Mode: 10%.
 Crystal size: 2-12 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: 5%-100% by orangish minerals.

SECONDARY MINERALOGY:

Total percent: Slight.
 Texture: Alteration variable. Most plagioclase is unaltered. Alteration tends to be associated with proximity to thin veins, rather than to selective replacement of phases. Pieces 3-6C: 15%-20% replacement by green amphibole. Pieces 2 and 5C: Some abtization adjacent to veins. Olivine is generally fresh, but can vary from fresh to totally replaced by orangish minerals over a distance of 0-3 cm.
 Percent vein material: 3%-4%.
 Vein material: green amphibole and sodic plagioclase.

COMMENTS: Plagioclase subophitically enclosed in clinopyroxene in Pieces 5A-E. Concentrations of silver-colored, iron oxides, either ilmenite (or titanium magnetite) and sulfides may be primary.



118-735B-44R-4

UNIT 3: OLIVINE GABBRO AND IRON-TITANIUM OXIDE GABBRO

Pieces: 1A-2I

Olivine Gabbro

Pieces 1A-2I

COLOR: Gray; Gray-white in alteration zones.

LAYERING: No clearly defined layering. Pieces 1A and 1B contain fine-grained pods. Piece 2C: Coarse-grained (up to 2 cm). Pieces 2D-2I: Uniform grain size (1 cm). Olivine throughout section, but particularly abundant at 20-22 cm (2-5 mm grain size).

DEFORMATION: Shear zone at 34 cm. Feldspathic vein at 47 cm. Piece 2B: Most of piece is altered or broken up.

PRIMARY MINERALOGY:

Plagioclase—Mode: 40%-60%.

Crystal size: 5-8 mm.

Crystal shape: Anhedral, euhedral, small euhedral grains in clinopyroxene.

Preferred orientation: None.

Percent replacement: None.

Clinopyroxene—Mode: 50%-40%.

Crystal size: 0.5-2.5 mm.

Crystal shape: Subhedral to poikilitic; rare large oikocrysts in Pieces 1B, 2C, and 2H.

Preferred orientation: None.

Percent replacement: Significant amphibolitization near veins.

Olivine—Mode: 25-8%.

Crystal size: 1-6 mm.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: Webbed by talc-tremolite.

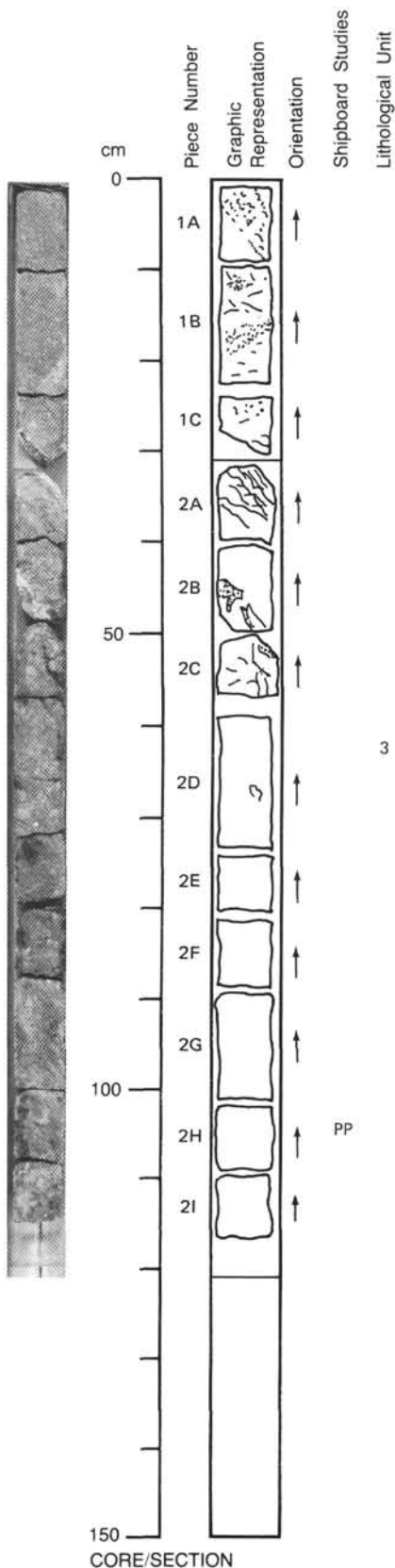
SECONDARY MINERALOGY:

Total percent: Various, concentrated in shear zones and veins.

Texture: Green amphibole after pyroxene in shear zone at 33 cm and near the feldspathic vein at 48 cm. Some ilmenite along feldspathic vein. Piece 2H: Pyrite. Pieces 2A-2I: Anhedral oxide throughout.

Percent vein material: Not determined.

Vein material: Not determined.



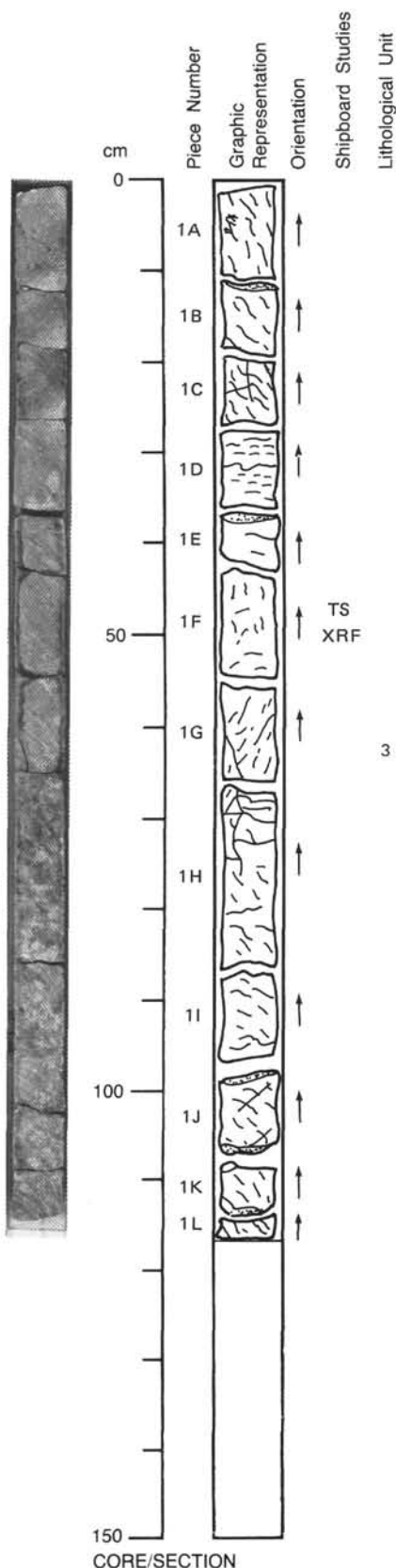
118-735B-45R-1

UNIT 3: OLIVINE GABBRO AND IRON-TITANIUM OXIDE GABBRO

Pieces 1A-1L

Olivine Gabbro

Pieces 1A-1L



F:50°

COLOR: Gray to greenish gray.

LAYERING: None apparent. There is a grain-size change between Pieces 1G (1-5 mm) and 1H (1-10 mm). The contact is not seen. The observed foliation is primary and enhanced by preferred orientation of plagioclase and clinopyroxene.

DEFORMATION: None apparent.

PRIMARY MINERALOGY: There is a modal variation throughout the core.

Plagioclase—Mode: 50%-60%.
 Crystal size: 1-4 mm, 2-4 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Slight.
 Percent replacement: Slight replacement by chlorite.

Clinopyroxene—Mode: 35%-40%, 35%-50%.
 Crystal size: 1-3 mm, 3-5 mm.
 Crystal shape: Oikocrystic irregular, anhedral.
 Preferred orientation: Slight.
 Percent replacement: Slight replacement by amphibole.

Olivine—Mode: 2%-5% (present in Pieces 1H-1L).
 Crystal size: 0.5-4 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Slight.
 Percent replacement: Slight replacement by talc and tremolite.

Ilmenite—Mode: 1%-4% (abundant in Pieces 1A, 1C, and 1D).
 Crystal size: 1-8 mm.
 Crystal shape: Not determined.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

SECONDARY MINERALOGY:
 Total percent: <1%.
 Texture: Coronitic. Oikocrystic-type clinopyroxene starts at Piece 1H and is coronitic to the bottom of the section. There is slight replacement of clinopyroxene by amphibole, olivine by talc and tremolite, and plagioclase by chlorite. Veins are filled by plagioclase and have amphibole-rich walls. Pyrite and chalcopyrite are present in all pieces. A blue sulfide may derive from the alteration of chalcopyrite (bornite or covellite?).
 Percent vein material: Not determined, but inferred as <1%.
 Vein material: Plagioclase and amphibole.

COMMENTS: Massive to foliated (primary) gabbros and olivine gabbros. Very fresh.

F:30°

F:45°

F:0°

TS XRF

F:55°

F:50°

3

F:40°

F:30°

F:30°

F:40°

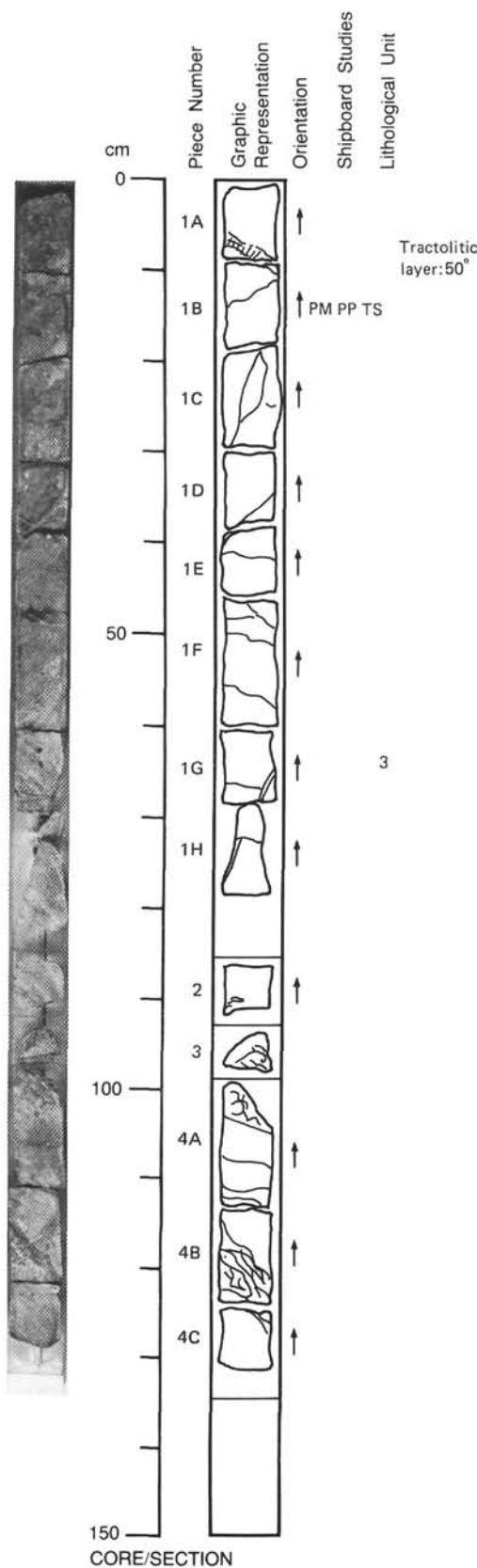
118-735B-45R-2

UNIT 3: OLIVINE GABBRO AND IRON-TITANIUM OXIDE GABBRO

Pieces 1A-4C

Massive Olivine Gabbro and Olivine-Bearing Gabbro

Pieces 1A-4C



COLOR: Medium gray, to greenish-brown gray in some intervals.

LAYERING: There may be some faint primary layering in the top half of the section. Grain size varies from coarse-grained (Pieces 1A-1F) to medium-grained (Pieces 1G-4B) to fine-grained (Piece 4C).

DEFORMATION: None.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%.
 Crystal size: Variable, 1-4 mm.
 Crystal shape: Subhedral.
 Preferred orientation: None.
 Percent replacement: 5% by albite.

Clinopyroxene—Mode: 45%-30%.
 Crystal size: Variable 0.5-3 mm.
 Crystal shape: Anhedral, oikocrysts of clinopyroxene in coarse-grained gabbro.
 Preferred orientation: None.
 Percent replacement: 5%-15% by amphibole.

Olivine—Mode: 5%-20%. Piece 1A: Troctolitic layer, 1 cm thick.
 Crystal size: Variable, 0.5-1 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: <1%; Olivine mostly fresh, especially in the top half of the section.

SECONDARY MINERALOGY:

Total percent: 5% in the top half of the section, 15% in the lower half of the section.
 Texture: Amphibole replacement.
 Percent vein material: 5%.
 Vein material: Amphibole with albitized margins. Pieces 1C and 3: Amphibole veins. Piece 4B: Amphibole vein with analcite(?). Pieces 1A-1C: Amphibole content increases from to 10%-15%. Veins with green amphibole, especially in lower parts of the section. Some albitization along margins. Pieces 1A-1C: Contain small, disseminated sulfides.

118-735B-45R-3

UNIT 3: OLIVINE GABBRO AND IRON-TITANIUM OXIDE GABBRO

Pieces 1A-2I

Olivine Microgabbro

Pieces 1A and 2A-2C (top)

COLOR: Pale greenish gray.
LAYERING: Massive. The microgabbro forms layers within the coarser-grained gabbro. Weak igneous lamination is defined by bands of coarser-grained olivine and clinopyroxene.
DEFORMATION: None.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 70%.
 Crystal size: < 1 mm.
 Crystal shape: Euhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

 Clinopyroxene—Mode: 15%-20%.
 Crystal size: < 1 mm.
 Crystal shape: Euhedral.
 Preferred orientation: Not determined.
 Percent replacement: Altered to amphibole.

 Olivine—Mode: 10%-15% (locally up to 25%).
 Crystal size: < 1 mm.
 Crystal shape: Euhedral.
 Preferred orientation: Not determined.
 Percent replacement: Altered to talc and tremolite.
SECONDARY MINERALOGY:
 Total percent: 5%.
 Texture: Clinopyroxene altered to amphibole, olivine altered to talc and tremolite. Alteration halos around veins.
 Percent vein material: Not determined.
 Vein material: Not determined.
COMMENTS: Equigranular.

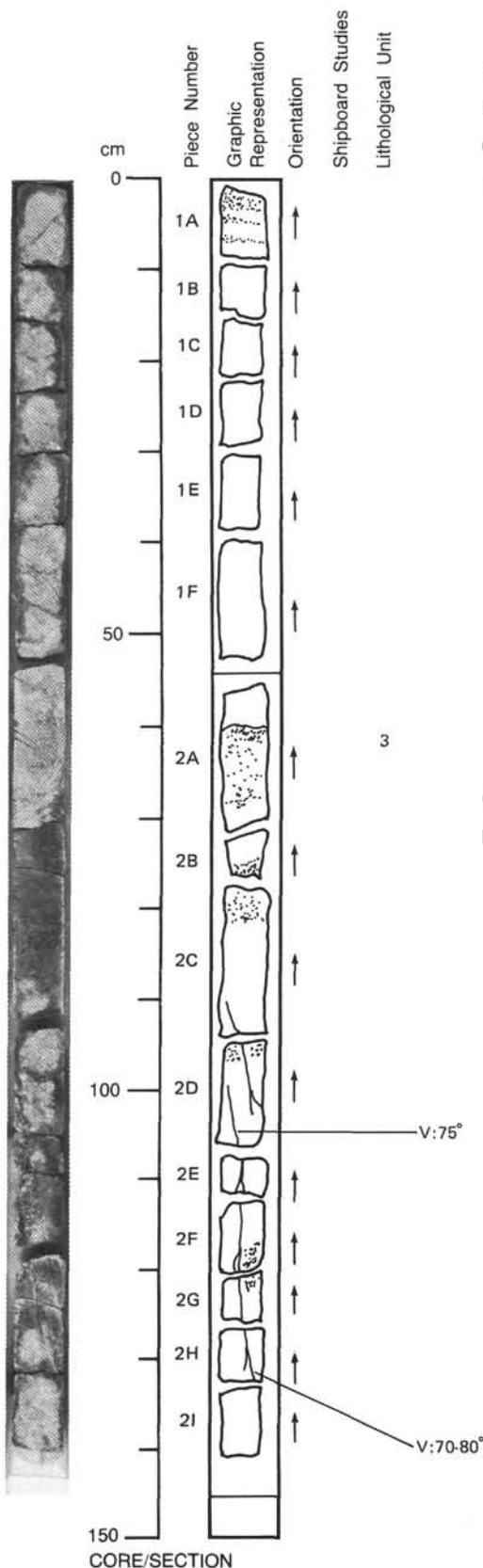
Olivine Gabbro

Pieces 1B-1F, and 2C (bottom)-2I

COLOR: Gray.
LAYERING: None apparent.
DEFORMATION: Granulation near veins.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 60%-70%.
 Crystal size: 3-15 mm.
 Crystal shape: Subhedral to euhedral.
 Preferred orientation: Not determined.
 Percent replacement: Minor recrystallization.

 Clinopyroxene—Mode: 25%.
 Crystal size: 3-15 mm.
 Crystal shape: Subhedral, oikocrystic.
 Preferred orientation: Not determined.
 Percent replacement: Replaced by amphibole.

 Olivine—Mode: 5%-15%.
 Crystal size: 3-12 mm.
 Crystal shape: Subhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.
SECONDARY MINERALOGY:
 Total percent: 5%-10%.
 Texture: Amphibole replaces clinopyroxene. Granulation and minor recrystallization of plagioclase. Veins up to 1 mm wide are filled with amphibole and sodic plagioclase. Alteration halos around veins up to 1 cm wide.
 Percent vein material: Not determined.
 Vein material: Amphibole and sodic plagioclase.



CORE/SECTION

UNIT 3: OLIVINE GABBRO AND IRON-TITANIUM OXIDE GABBRO

Pieces 1-7

Gabbro and Olivine Gabbro

Pieces 1-7

COLOR: Light gray.

LAYERING: Several coarse- or very coarse- (i.e., 90-100 cm) to medium- or fine-grained zones. Changes are more gradual than others have been. Some may not be well defined. Where contacts are discernable, layers seem to dip into the core at about 10°. Olivine concentrations at 23, 65-85, 93-97, 102-115, and 136-140 cm.

DEFORMATION: None

PRIMARY MINERALOGY:

Plagioclase—Mode: 40%-60%.

Crystal size: 1-15 mm.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: Minor along fractures.

Clinopyroxene—Mode: 30%-50%.

Crystal size: 1-13 mm.

Crystal shape: Anhedral, sometimes subophitic.

Preferred orientation: None.

Percent replacement: Extensive amphibole replacement only near fractures.

Olivine—Mode: 0%-20%.

Crystal size: 2-30 mm, coarse-grained olivine occurs in olivine-rich zones at 93-97 and 136-140 cm.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: In whole or partly replaced by talc-tremolite.

SECONDARY MINERALOGY:

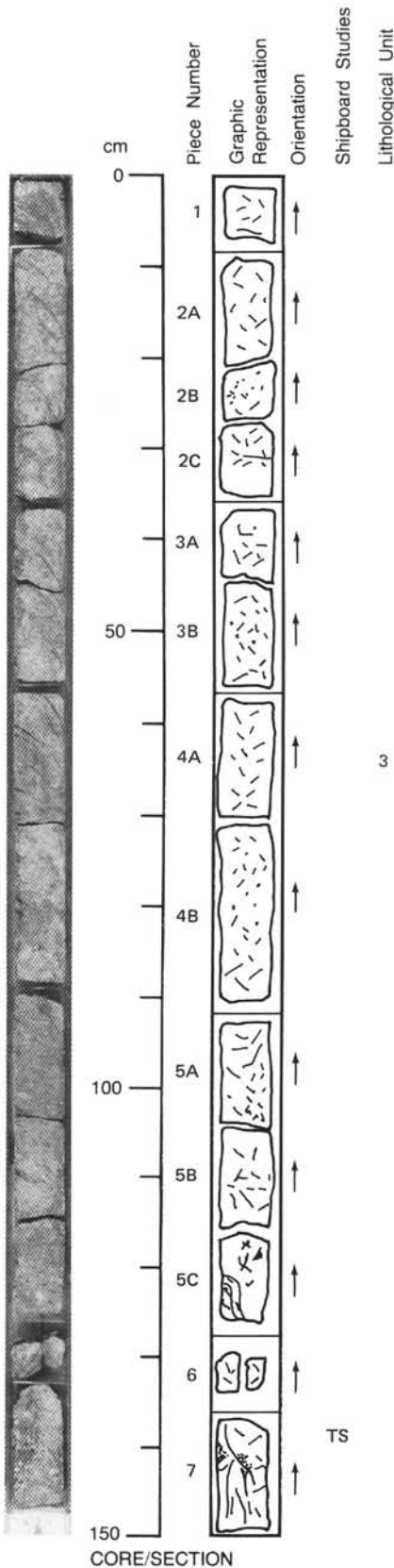
Total percent: Various, concentrated along fractures.

Texture: Talc-tremolite after olivine throughout. Along fractures in Piece 7, complete pseudomorphs of olivine, green amphibole along fractures after clinopyroxene and some albitization of plagioclase.

Opaque-rich zones in Piece 5C and Piece 7—also pyrite here.

Percent vein material: Not determined.

Vein material: Not determined.



118-735B-46R-1

UNIT 3: OLIVINE GABBRO AND IRON-TITANIUM OXIDE GABBRO

Pieces 1A-6B

Layered Olivine Gabbro and Olivine-Bearing Gabbro

Pieces 1A-6B

COLOR: Gray, partly greenish gray.

LAYERING: Size and/or modal layering: Pieces 1A-5A (top), medium- (2-7 mm) and fine-grained (0.3-7 mm) layers alternating. Pieces 1A and 3C have coarse layers (5-20 mm). Thickness of each layer varies from 10 mm to 25 cm. Their boundaries are not sharp. Some layers thin out (Pieces 2A and 1B). Layer inclines 40° and is nearly parallel to the "magmatic" foliation. Pieces 6A and 6B: Coarse layer (20-30 mm) poor in olivine, more than 20 cm thick. Pieces 1A-1B are rich in olivine.

DEFORMATION: Almost none.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%-65%.

Crystal size: Variable, see above.

Crystal shape: Subhedral-anhedral.

Preferred orientation: Marked, parallel to the layering.

Percent replacement: None.

Clinopyroxene—Mode: 50%-30%.

Crystal size: Variable, see above.

Crystal shape: Subhedral.

Preferred orientation: Marked.

Percent replacement: <3% by amphibole.

Olivine—Mode: 1%-8%.

Crystal size: Variable, see above.

Crystal shape: Anhedral.

Preferred orientation: Marked.

Percent replacement: Trace, oxidized partly.

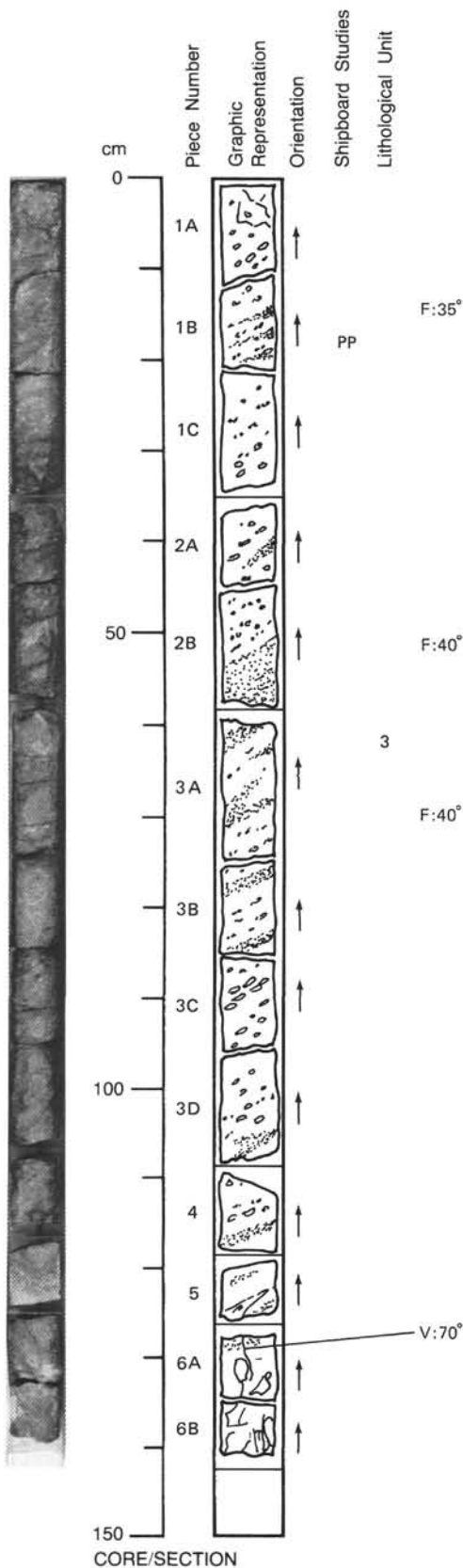
SECONDARY MINERALOGY:

Total percent: <3%.

Texture: In Piece 1A, olivine is oxidated. Clinopyroxene replaced by amphibole (<3%).

Percent vein material: Trace.

Vein material: Amphibole veins (0.5-2 mm thick) are present in Pieces 1A, 6A, and 6B.

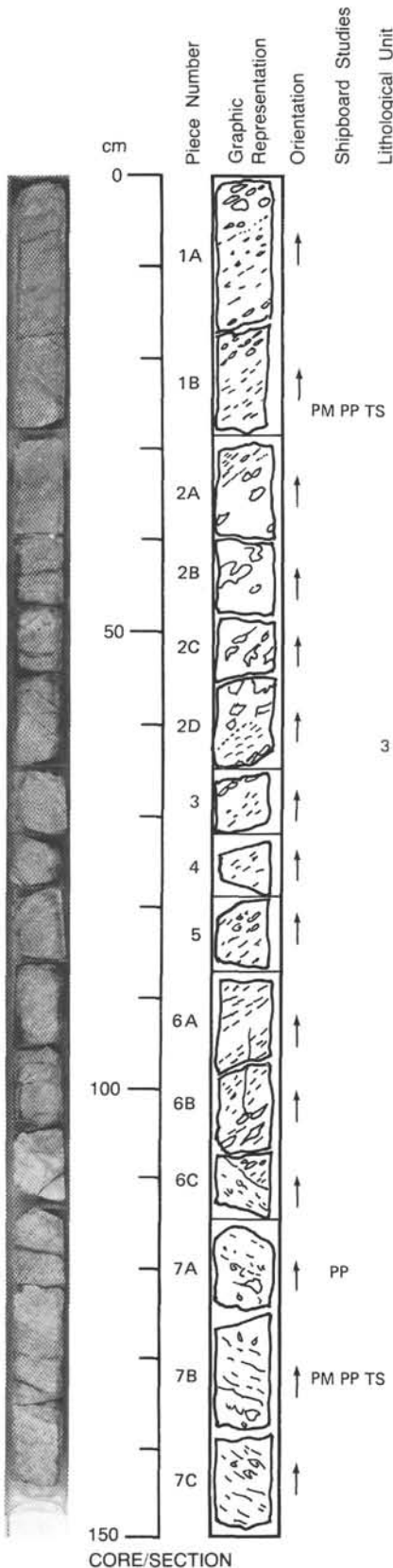


UNIT 3: OLIVINE GABBRO AND IRON-TITANIUM OXIDE GABBRO

Pieces 1A-7C

Layered Olivine-Bearing Gabbro and Olivine Gabbro (+ Anorthosite)

Pieces 1A-7C



COLOR: Gray.

LAYERING: Marked size layering and modal layering. Piece 1A: 4 cm thick, coarse (10-30 mm), olivine: 5%, clinopyroxene: 40%, plagioclase: 55%. Pieces 1A-2A: 23 cm thick, medium (1-3 mm) and medium to coarse (3-10 mm), olivine: 10%, clinopyroxene: 35%, plagioclase: 55%. Pieces 2A-2D: 22 cm thick, coarse (10-40 mm) top: Olivine: 5%, clinopyroxene: 20%, plagioclase: 75%; bottom: olivine: 5%, clinopyroxene 35%, plagioclase: 60%. Pieces 2A-4: 17 cm thick, fine to medium (0.5-3 mm) and medium to coarse (< 10 mm), olivine: 7%, clinopyroxene: 38%, plagioclase: 55%, but there are some olivine-poor portions. Piece 5: 2 cm thick, coarse (10-20 mm), olivine: 2%, clinopyroxene: 38%, plagioclase: 60%. Pieces 5-6H: 8 cm thick, medium (2-5 mm), olivine: 3%, clinopyroxene: 37%, plagioclase: 60%. Piece 6A: 3 cm thick, coarse (> 10 mm), olivine: 5%, clinopyroxene: 3%, plagioclase: 82% anorthosite layer. Pieces 6A-B: 5 cm thick, medium (3-8 mm), olivine: 6%, clinopyroxene: 37%, plagioclase: 55%. Piece 6B-C: > 8 cm thick, coarse (10-30 mm), olivine: 2%, clinopyroxene: 38%, plagioclase: 60%. Layer boundaries are sharp. Inclination is approximately 50° parallel to the foliation, which is indicated by marked shape preferred orientation of olivine, plagioclase, and clinopyroxene.

DEFORMATION: Pieces 1A-6C: None; Pieces 6C-7C: Strongly deformed. Foliation is defined by plagioclase-rich mylonitic bands and stretched clinopyroxene and olivine. Porphyroclasts of clinopyroxene have 5-10 mm grain size.

PRIMARY MINERALOGY:

Plagioclase—Mode: Variable, see above.
 Crystal size: Various, see above.
 Crystal shape: Anhedral-subhedral.
 Preferred orientation: Marked parallel to layering.
 Percent replacement: None.

Clinopyroxene—Mode: Variable, see above.
 Crystal size: Various, see above.
 Crystal shape: Subhedral-anhedral.
 Preferred orientation: Marked parallel to layering.
 Percent replacement: <5% by amphibole.

Olivine—Mode: Variable, see above.
 Crystal size: Various, see above.
 Crystal shape: Anhedral.
 Preferred orientation: Marked parallel to layering.
 Percent replacement: <5% by amphibole + mica or talc.

SECONDARY MINERALOGY:

Total percent: <5%.
 Texture: Not determined.
 Percent vein material: Trace.
 Vein material: Amphibole vein in Pieces 6A and 6B.

COMMENTS: In Piece 6C, foliation due to deformation cut the "magmatic" foliation very sharply, inclining 40°-50°, but in the opposite direction.

118-735B-46R-3

UNIT 3: OLIVINE GABBRO AND IRON-TITANIUM OXIDE GABBRO

Pieces 1-11B

Mylonitic to Porphyroclastic Metagabbro

Pieces 1-2D (27 cm)

F:30-45°

COLOR: Medium gray.
LAYERING: None.
DEFORMATION: Alternating mylonitic and porphyroclastic bands, inclining between 30° and 45°; clinopyroxene porphyroclasts up to 1 cm.
PRIMARY MINERALOGY: Difficult to estimate; probably corresponding to that of olivine-bearing gabbro (see Section 118-735B-46R-2).
SECONDARY MINERALOGY:
 Total percent: Slight alteration.
 Texture: Olivine partially replaced by yellowish-brown mineral. Green amphibole replaces clinopyroxene. Partial sulfide dissemination.
 Percent vein material: Not determined.
 Vein material: Not determined.

UNIT 4: IRON-TITANIUM OXIDE GABBRO

Massive Olivine-Bearing Gabbro

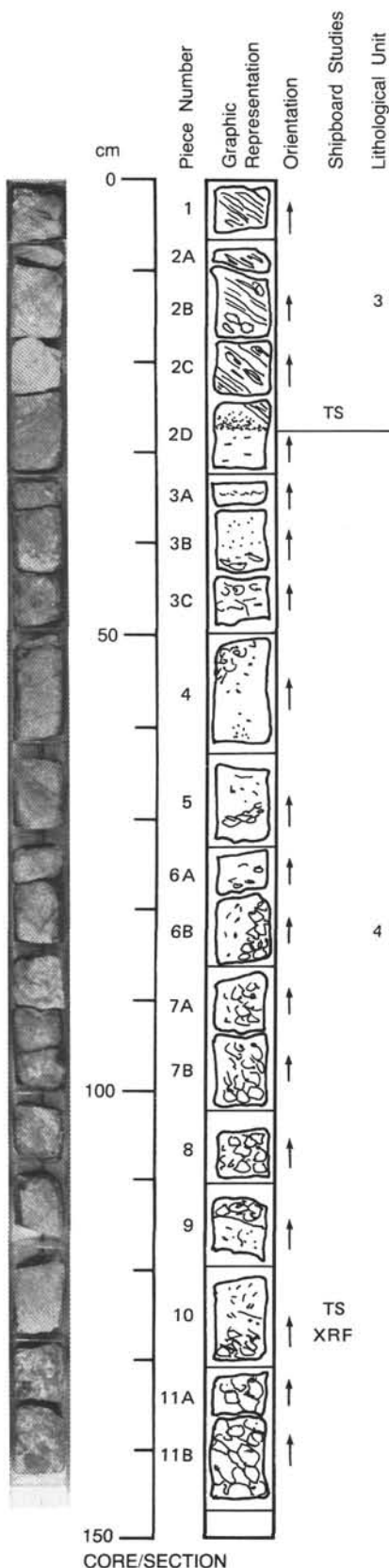
Pieces 2D (27 cm)-11B

COLOR: Medium to dark gray.
LAYERING: Present, marked by grain-size variations throughout section (from fine-grained, <0.2 cm) to coarse-grained (up to 3 cm) and changes in phase proportions.
DEFORMATION: None.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 55%.
 Crystal size: <0.3 to 4 cm.
 Crystal shape: Subhedral.
 Preferred orientation: Not determined.
 Percent replacement: <5% by amphibole.

 Clinopyroxene—Mode: 35%-40%.
 Crystal size: <0.2 to 3 cm.
 Crystal shape: Subhedral.
 Preferred orientation: Not determined.
 Percent replacement: Mostly fresh.

 Olivine—Mode: <2%-10%, enriched in fine-grained portions.
 Crystal size: Up to 2 cm.
 Crystal shape: Anhedral.
 Preferred orientation: Not determined.
 Percent replacement: Mostly fresh.

 Ilmenite/Magnetite—Mode: Up to 8%.
SECONDARY MINERALOGY:
 Total percent: Not determined.
 Texture: Rock only slightly altered. Olivine is mostly fresh. Green amphibole replacement of clinopyroxene, <5%.
 Percent vein material: Not determined.
 Vein material: Not determined.
COMMENTS: Ilmenite/magnetite enrichment in intervals 35-50, 75-115, and 130-145 cm.



CORE/SECTION

118-735B-46R-4

UNIT 4: IRON-TITANIUM OXIDE GABBRO

Pieces 1-11

Massive, Coarse-Grained, Iron-Titanium Oxide Gabbro

Pieces 1-11

COLOR: Medium to dark gray.
LAYERING: There may be some faint primary layering.
DEFORMATION: None.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 55%.
 Crystal size: Up to 5 cm.
 Crystal shape: Subhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

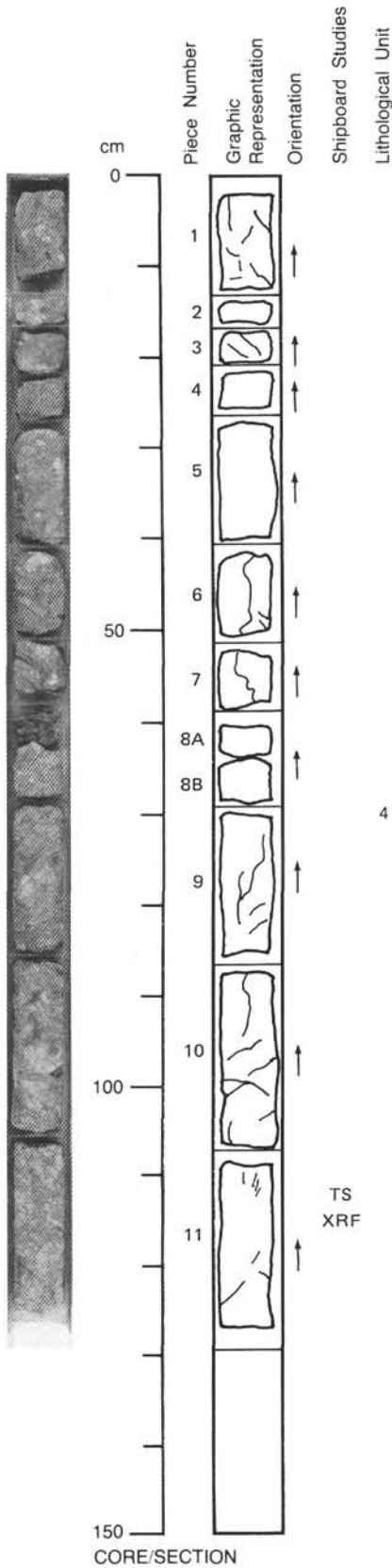
Clinopyroxene—Mode: 40%.
 Crystal size: Up to 5 cm.
 Crystal shape: Subhedral.
 Preferred orientation: Not determined.
 Percent replacement: <5%.

Olivine—Mode: <1%.
 Crystal size: Up to 1 cm.
 Crystal shape: Anhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

Ilmenite/magnetite—Mode: 4%-15%.

Sulfides—Mode: <1%.

SECONDARY MINERALOGY:
 Total percent: Not determined.
 Texture: Rock appears to be fresh throughout section. Replacement of clinopyroxene by amphibole (<5%).
 Percent vein material: Not determined.
 Vein material: Minor veins and veinlets, mostly oxide and sulfide containing. Few veins and veinlets with green amphibole.



118-735B-47R-1

UNIT 4: IRON-TITANIUM OXIDE GABBRO

Pieces 1-7B

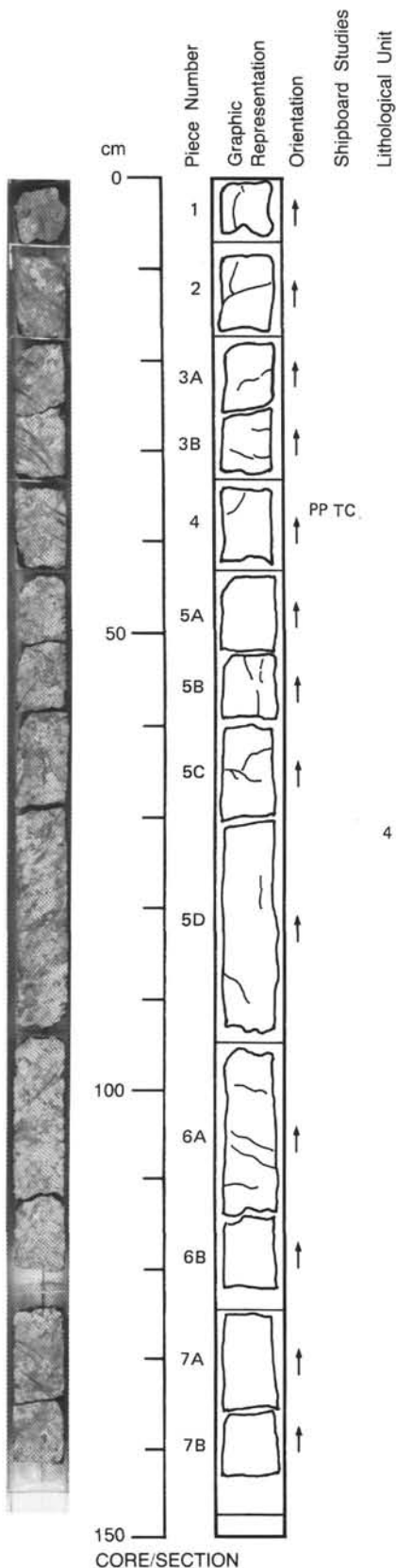
Massive, Coarse-Grained, Iron-Titanium Oxide Gabbro (Olivine-Bearing)

Pieces 1-7B

COLOR: Medium to dark gray, locally greenish gray.
LAYERING: Not observed. Rock is more or less uniformly coarse-grained over entire length of section. Clinopyroxene and plagioclase are up to 5 cm across.
DEFORMATION: None.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 45%-50%.
 Crystal size: Up to 5 cm.
 Crystal shape: Subhedral to anhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

 Clinopyroxene—Mode: 45%.
 Crystal size: Up to 5 cm.
 Crystal shape: Subhedral to anhedral.
 Preferred orientation: Not determined.
 Percent replacement: <5%.

 Olivine—Mode: 2%-5%.
 Crystal size: Up to 2.5 cm.
 Crystal shape: Anhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.
SECONDARY MINERALOGY:
 Total percent: Not determined.
 Texture: In general, rock is relatively fresh. Only minor replacement of clinopyroxene by green amphibole (<5%). Sulfides disseminated throughout section.
 Percent vein material: Not determined.
 Vein material: Some veinlets with green amphibole. Also few veinlets with sulfides and oxides.



UNIT 4: IRON-TITANIUM OXIDE GABBRO

Pieces 1-10

Iron-Titanium Oxide Gabbro

Pieces 1-10

COLOR: Gray to greenish gray, black in ore-rich patch (shown in graphic representation).
LAYERING: Possibly indicated by steeply dipping clinopyroxenes and crude orientation of oxide-rich zones. Rock very coarse-grained. No obvious size or phase segregation.
DEFORMATION: Amphibole/sodic-plagioclase fracturing; veining at approximately 70° from horizontal in Pieces 5-8.

PRIMARY MINERALOGY:

Plagioclase—Mode: 5%-55%.
Crystal size: Generally <1 cm; oikocrysts up to 5 cm in Pieces 1-3.
Crystal shape: Anhedral.
Preferred orientation: None.
Percent replacement: Moderate to extensive.

Clinopyroxene—Mode: 30%-50%.
Crystal size: Generally <1 cm; phenocrysts up to 3 cm in Pieces 1-3, smaller downsection.
Crystal shape: Anhedral.
Preferred orientation: None.
Percent replacement: Moderate to extensive.

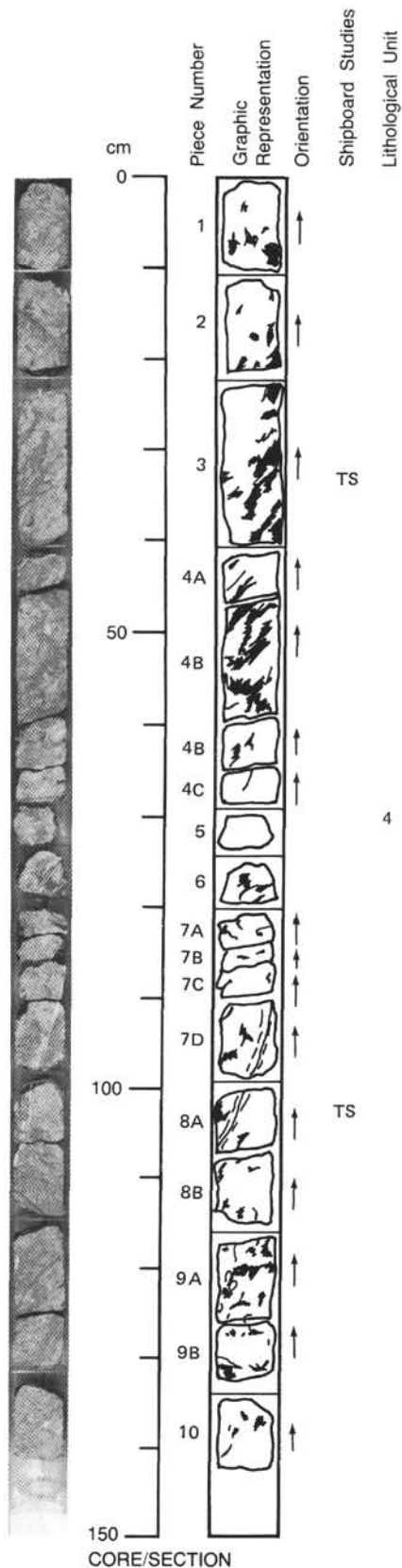
Olivine—Mode: 0%-5%.
Crystal size: Not measured.
Crystal shape: Anhedral.
Preferred orientation: None.
Percent replacement: Extensive to complete.

Ilmenite—Mode: 5%-50%.
Crystal size: <1 cm.
Crystal shape: Anhedral, rounded.
Preferred orientation: None.
Percent replacement: None.

SECONDARY MINERALOGY:

Total percent: Not determined.
Texture: Amphibole and sodic plagioclase in Pieces 5-8. Amphibole alteration approximately 5% pervasive in most rocks, even away from the fracture.
Percent vein material: Not determined.
Vein material: Amphibole, sodic plagioclase.

COMMENTS: Ilmenite-pyrite masses are shown as black on the core log.



118-735B-47R-3

UNIT 4: IRON-TITANIUM OXIDE GABBRO

Pieces 1A-6B

Layered Olivine Gabbro

Pieces 1A-1D

COLOR: Gray.

LAYERING: Modal layering, from the top to bottom. Piece 1A: 4 cm thick, olivine-poor (2%-3%); Pieces 1A-1B: 9 cm thick, olivine- and clinopyroxene-rich; olivine: 10%, clinopyroxene: 20%, plagioclase: 70%; Piece 1B: 5 cm thick, olivine-rich, clinopyroxene-poor, olivine: 25%, clinopyroxene: 15%, plagioclase: 60%; Pieces 1B-1C: 5 cm thick, plagioclase-poor, olivine-poor, olivine: 2%, clinopyroxene: 58%, plagioclase: 40%; Pieces 1C-1D: 20 cm thick, plagioclase- and olivine-rich, olivine: 20%, clinopyroxene: 20%, plagioclase: 60%. Grain size is fairly constant. No clear foliation and preferred orientation. Layers dip 35°. Layer contacts are gradational.

DEFORMATION: None.

PRIMARY MINERALOGY:

Plagioclase—Mode: Variable, see above.

Crystal size: Variable, see above.

Crystal shape: Euhedral.

Preferred orientation: None.

Percent replacement: None.

Clinopyroxene—Mode: Variable, see above.

Crystal size: Variable, see above.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: <5% by amphibole.

Olivine—Mode: Variable, see above.

Crystal size: Variable, see above.

Crystal shape: Subhedral-anhedral.

Preferred orientation: None.

Percent replacement: <5% by amphibole + talc or mica.

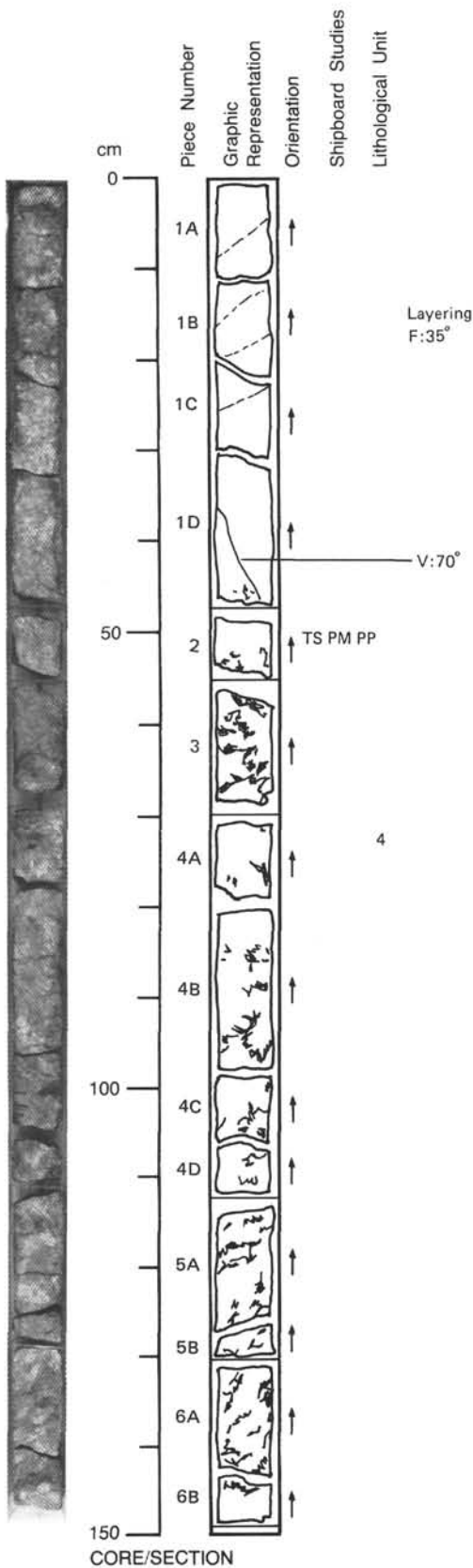
SECONDARY MINERALOGY:

Total percent: <5%.

Texture: Amphibole replaces clinopyroxene and olivine.

Percent vein material: Trace.

Vein material: Amphibole vein, 1 mm thick, inclining 70° present in Piece 1A.



118-735B-47R-3 (continued)

Iron-Titanium Oxide Gabbro

Pieces 2-6B

COLOR: Gray, partly black and grayish.

LAYERING: Modal layering; 15-cm-thick, plagioclase-rich layer (plagioclase >95%, anorthositic) is present in Pieces 4A and 4B. Opaque minerals and mafic minerals are poor. Grain size is constant (10-30 mm).

DEFORMATION: Weak-none.

PRIMARY MINERALOGY:

Plagioclase—Mode: 60%, except for anorthositic layer.

Crystal size: 10-30 mm.

Crystal shape: Subhedral.

Preferred orientation: Weak shape preferred orientation.

Percent replacement: None.

Clinopyroxene—Mode: 20%-30%, except for anorthositic layer.

Crystal size: 10-30 mm.

Crystal shape: Subhedral-anhedral.

Preferred orientation: Weak.

Percent replacement: <30% by amphibole.

Olivine—Mode: <2%.

Crystal size: 10-30 mm.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: Not determined.

Opaque mineral—Mode: 10%-20%.

Crystal size: 10-30 mm.

Crystal shape: Anhedral.

Preferred orientation: Weak.

Percent replacement: None.

SECONDARY MINERALOGY:

Total percent: <15%.

Texture: Clinopyroxene is replaced by amphibole up to 15% in total mode. Olivine is also replaced by amphibole.

Percent vein material: Not determined.

Vein material: Not determined.

COMMENTS: Olivine is poor in the opaque-rich, iron-titanium oxide gabbro.

118-735B-47R-4

UNIT 4: IRON-TITANIUM OXIDE GABBRO

Pieces 1-5

Massive, Coarse- to Medium-Grained, Olivine Gabbro (Enriched in Iron-Titanium Oxides).

Pieces 1-5

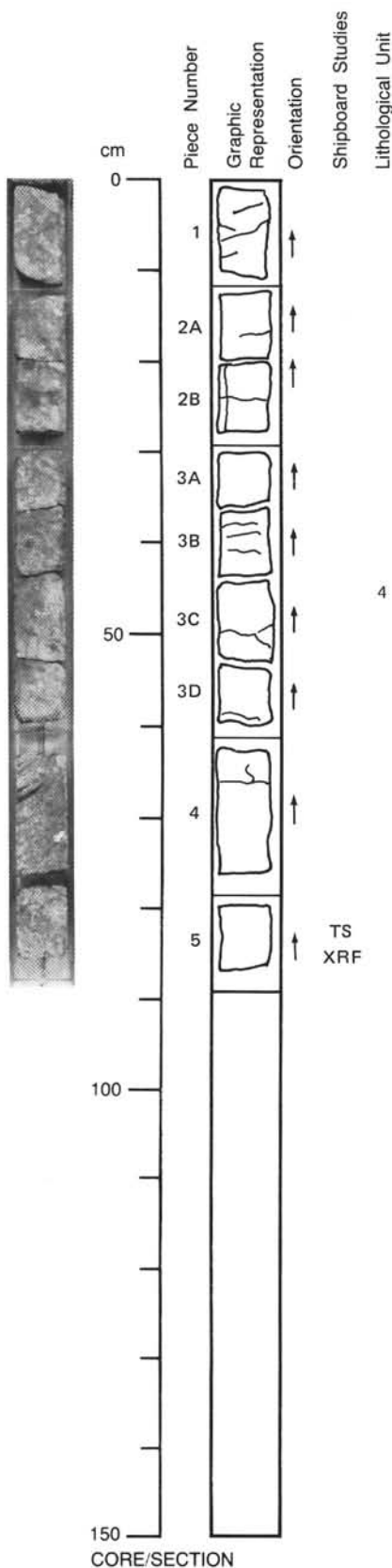
COLOR: Medium gray.
LAYERING: There may be some faint primary layering; slight grain-size variation from coarse-grained (on average 1-2 cm) to medium-grained (<1 cm).
DEFORMATION: None.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 50%.
 Crystal size: Up to 4 cm.
 Crystal shape: Subhedral-anhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

 Clinopyroxene—Mode: 40%.
 Crystal size: Up to 2 cm.
 Crystal shape: Subhedral-anhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

 Olivine—Mode: 2%-8%.
 Crystal size: Up to 1.5 cm.
 Crystal shape: Anhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

 Iron-titanium oxides—Mode: 3%-6%.

 Primary sulfides—Mode: <1%.
SECONDARY MINERALOGY:
 Total percent: <3%.
 Texture: Rock is fresh throughout section. Olivine is almost completely fresh. Clinopyroxene replacement by green amphibole.
 Percent vein material: Few veinlets.
 Vein material: Not determined.



118-735B-48R-1

UNIT 4: IRON-TITANIUM OXIDE GABBRO

Pieces 1-7B

Iron-Titanium Oxide-Rich Gabbro

Pieces 1 and 3-7B

COLOR: Medium to dark gray.
LAYERING: Faint magmatic foliation on some pieces, otherwise none.
DEFORMATION: None.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 50%.
 Crystal size: Up to 2.5 cm.
 Crystal shape: Not determined.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

Clinopyroxene: Mode: 40%.
 Crystal size: Up to 2 cm.
 Crystal shape: Not determined.
 Preferred orientation: Not determined.
 Percent replacement: Partially replaced by green amphibole.

Iron-titanium oxides—Mode: 10%-20%, interstitial.

Olivine—Mode: <2%.

Sulfides—Mode: <1%.
SECONDARY MINERALOGY:
 Total percent: 10%-20%.
 Texture: Green amphibole partially replacing clinopyroxene.
 Percent vein material: Few veins and veinlets.
 Vein material: Green amphibole, veinlets with white mineral.

COMMENTS: Primary mineralogy is difficult to estimate reliably. Ore-rich zone starts at the very bottom of Piece 2B.

Massive, Medium- to Coarse-Grained, Olivine Gabbro

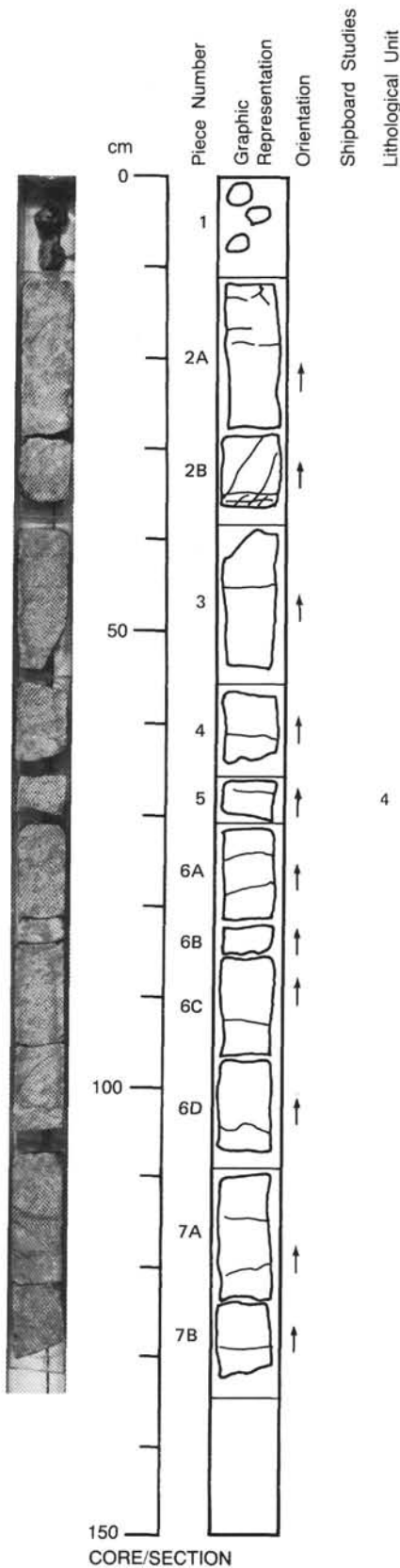
Pieces 2A and 2B

COLOR: Light gray.
LAYERING: None—uniform grain size of about 1 cm.
DEFORMATION: None.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 60%.
 Crystal size: 1 cm.
 Crystal shape: Not determined.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

Clinopyroxene—Mode: 35%.
 Crystal size: 1 cm.
 Crystal shape: Not determined.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

Olivine—Mode: 5%.
 Crystal size: 1 cm.
 Crystal shape: Not determined.
 Preferred orientation: Not determined.
 Percent replacement: Mostly fresh.

SECONDARY MINERALOGY:
 Total percent: <5%.
 Texture: Olivine mostly fresh. Few sulfides.
 Percent vein material: Few veinlets.
 Vein material: Amphibole.



118-735B-48R-2

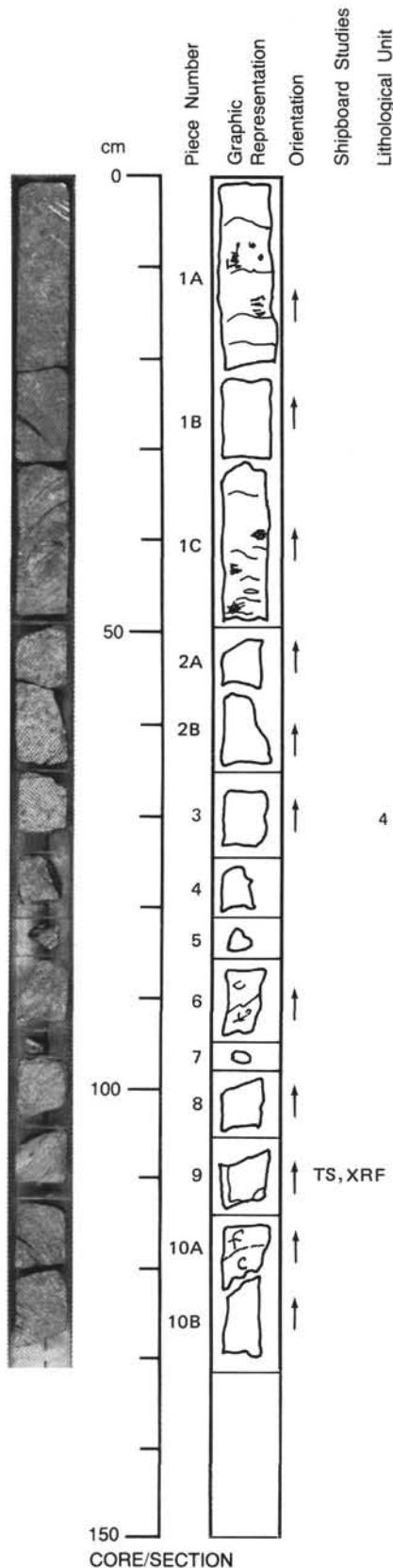
UNIT 4: IRON-TITANIUM OXIDE GABBRO

Pieces 1A-10B

Ilmenite-Bearing Gabbro

Pieces 1A-10B

COLOR: Gray.
LAYERING: None apparent. Gradual change in grain size as noted below. Sharp contacts in Pieces 6 and 10A.
DEFORMATION: None.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 50%-60%.
 Crystal size: 10.5 cm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: 1%-2% by chlorite.
 Clinopyroxene—Mode: 40%-45%.
 Crystal size: 0.5-10 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: <5% by amphibole.
 Olivine—Mode: 2%.
 Crystal size: 2 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: <1% by talc or clay.
 Ilmenite—10%-20%.
 Crystal size: Not determined.
 Crystal shape: Anhedral aggregates, concentrated in interstitial area; fine-grained mixed with 1% disseminated sulfide.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.
SECONDARY MINERALOGY:
 Total percent: 3%.
 Texture: Not determined.
 Percent vein material: 2%.
 Vein material: Amphibole.
COMMENTS: Pieces 1A-1C and 2A-2B are coarse-grained and contain 10%-15% oxides + sulfides. There is a gradual decrease from Piece 1A to Piece 10A in both grain size and ore minerals. Pieces 7-8 are fine-grained and relatively barren.



118-735B-48R-3

UNIT 4: IRON-TITANIUM OXIDE GABBRO

Pieces 1A-5

Massive, Medium- to Coarse-Grained, Iron-Titanium Oxide Gabbro

Pieces 1A-5

COLOR: Medium to dark gray.

LAYERING: None. Grain-size varying between medium- (average 0.8 cm) and coarse-grained (1.5 cm).

DEFORMATION: None.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%.

Crystal size: Up to 3 cm.

Crystal shape: Anhedral.

Preferred orientation: Not determined.

Percent replacement: Not determined.

Clinopyroxene—Mode: 40%.

Crystal size: Up to 3 cm.

Crystal shape: Anhedral.

Preferred orientation: Not determined.

Percent replacement: <10% – by green amphibole.

Olivine—Mode: <2%.

Crystal size: Up to 2 cm.

Crystal shape: Anhedral.

Preferred orientation: Not determined.

Percent replacement: Not determined.

Iron-titanium oxides—Mode: <8%-10%.

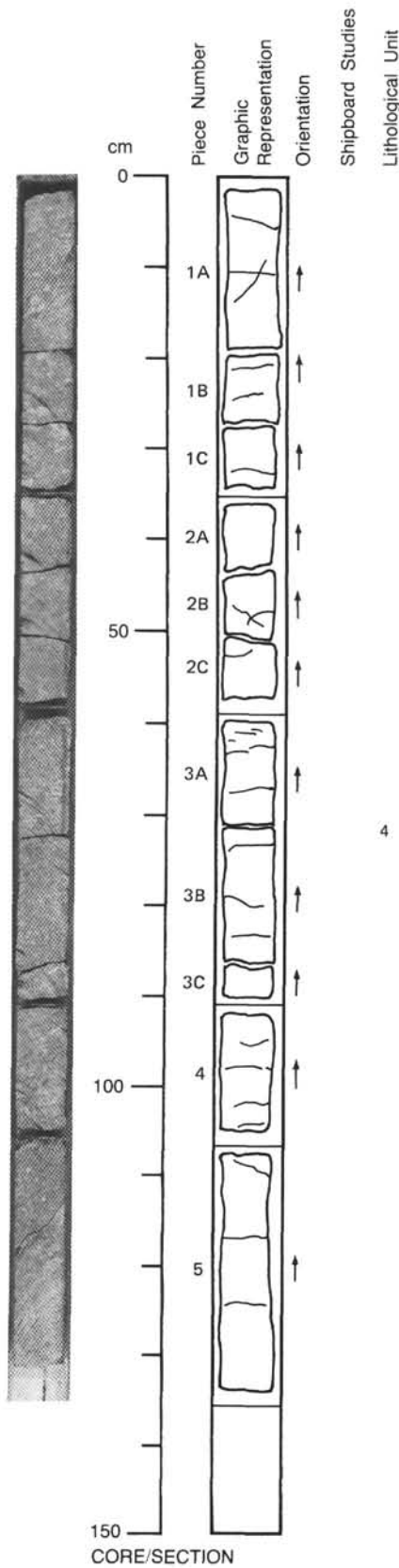
SECONDARY MINERALOGY:

Total percent: <10%.

Texture: Clinopyroxene partially replaced by green amphibole.

Percent vein material: Few veins and veinlets.

Vein material: Not determined.



4

118-735B-48R-4

UNIT 4: IRON-TITANIUM OXIDE GABBRO

Pieces 1-8

Iron-Titanium Oxide-Rich Metagabbro

Pieces 1-8

COLOR: Gray, speckled with black.

LAYERING: Size layering and modal layering. In Pieces 4B and 6, 1.5- and 12-cm-thick, fine- to medium-grained layers are present. Grain-size is 1-3 mm. Other part is coarser than this, ranging 3-8 mm. Opaque minerals are poor in upper part of Piece 5 (5%). Foliation is defined by elongate plagioclase: clinopyroxene is parallel to the layering.

DEFORMATION: Not marked.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%.
 Crystal size: Various, see above.
 Crystal shape: Euhedral.
 Preferred orientation: Marked.
 Percent replacement: None.

Clinopyroxene—Mode: 30%.
 Crystal size: Various, see above.
 Crystal shape: Subhedral.
 Preferred orientation: Marked.
 Percent replacement: 20%-70% by amphibole.

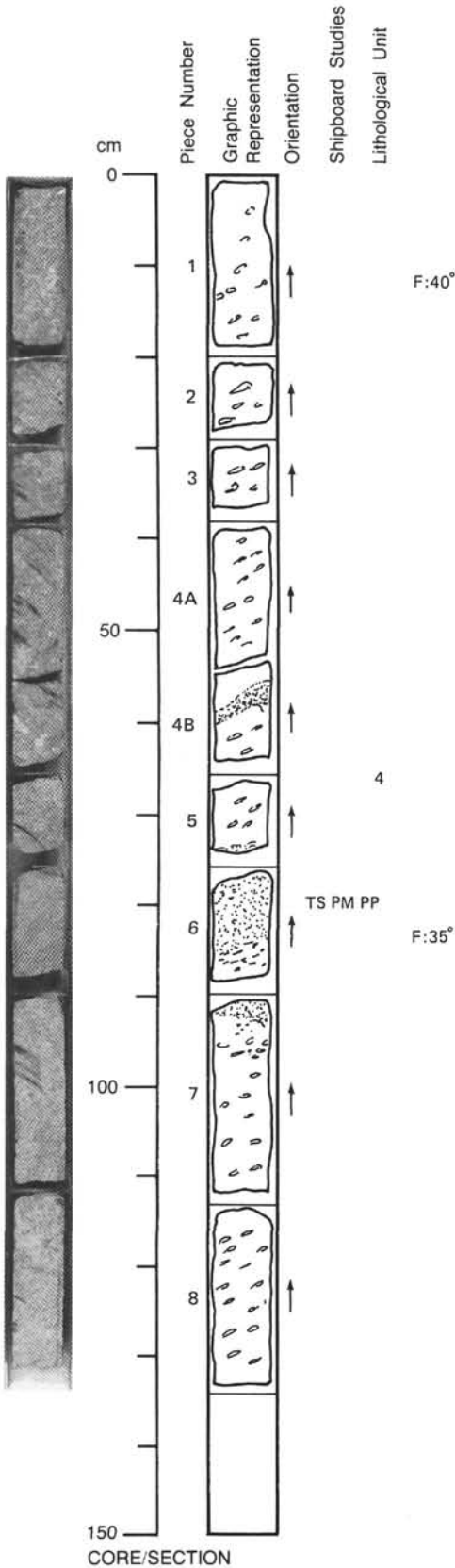
Olivine—Mode: >2%.
 Crystal size: Various, see above.
 Crystal shape: Anhedral.
 Preferred orientation: No observation.
 Percent replacement: Up to 50%, by clay(?)

Opaque—Mode: 10%-20%.
 Crystal size: Various.
 Crystal shape: Anhedral.
 Preferred orientation: Marked.
 Percent replacement: None.

SECONDARY MINERALOGY:

Total percent: 10%-15%.
 Texture: Amphibole replacing clinopyroxene. Olivine is replaced by dark green mineral (clay?).
 Percent vein material: None.
 Vein material: None.

COMMENTS: Many sulfides are present, especially in iron-titanium oxide aggregates.



118-735B-49R-1

UNIT 4: IRON-TITANIUM OXIDE GABBRO

Pieces 1A-3C

Ilmenite-Bearing Gabbro

Pieces 1A-3C

COLOR: Gray.
LAYERING: None.
DEFORMATION: Faint foliation in Pieces 3A-3C, foliated areas have finer grain size.
PRIMARY MINERALOGY:

Plagioclase—Mode: 50%.
 Crystal size: 2-10 mm.
 Crystal shape: Subhedral to euhedral.
 Preferred orientation: None.
 Percent replacement: Not determined.

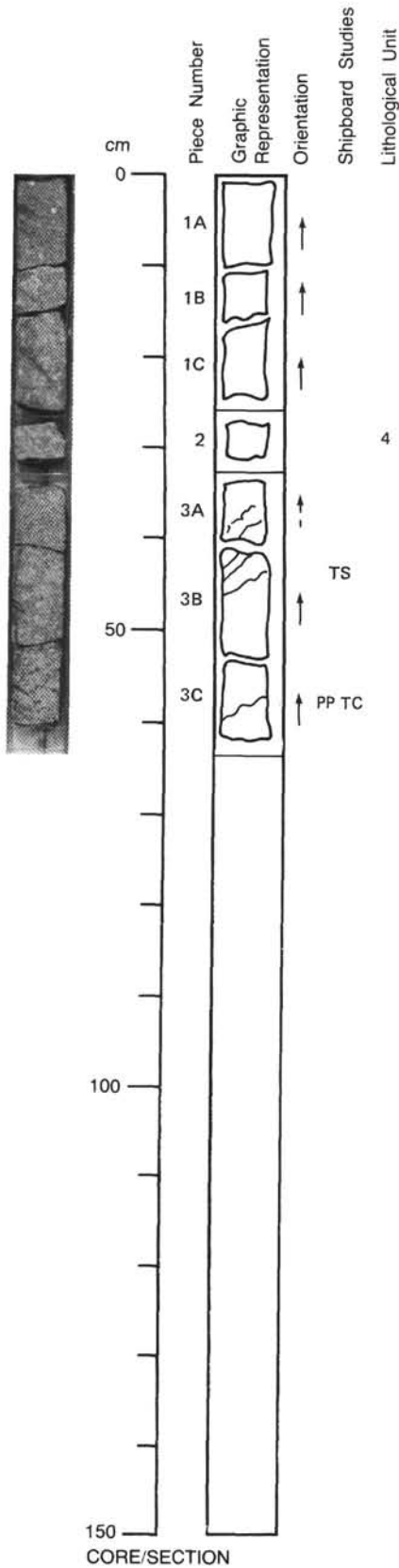
Clinopyroxene—Mode: 35%.
 Crystal size: 2-10 mm.
 Crystal shape: Subhedral (discrete grains, not oikocrysts).
 Preferred orientation: None.
 Percent replacement: 5% by amphibole.

Olivine—Mode: 1%-3%.
 Crystal size: 0.2-1 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Preferred replacement: 90% replaced by clay.

Ilmenite—Mode: 15% (mixed with <1% sulfide).
 Crystal size: Not determined.
 Crystal shape: Interstitial, fine-grained.
 Preferred orientation: None.
 Percent replacement: Not determined.

SECONDARY MINERALOGY:

Total percent: 8%-10%.
 Texture: Green amphibole replacing clinopyroxene (up to 5%).
 Percent vein material: 2%.
 Vein material: Very small white veins, possibly albite.



118-735B-49R-2

UNIT 4: IRON-TITANIUM OXIDE GABBRO

Pieces 1A-1H

Iron-Titanium Oxide-Rich Metagabbro

Pieces 1A-1H

COLOR: Greenish gray; speckled with black.
LAYERING: Slight change in grain-size indicates size layering.
 Pieces 1B, 1E, and 1G contain coarse-grained clinopyroxene (10-25 mm); other part is 5-15 mm.
 No marked foliation. Abundance of opaque minerals varies and shows modal layering.

DEFORMATION: Not marked.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%.
 Crystal size: Various.
 Crystal shape: Subhedral.
 Preferred orientation: Not clear.
 Percent replacement: Partly replaced by sodium-rich plagioclase.

Clinopyroxene—Mode: 30%-40%.
 Crystal size: Various, see above.
 Crystal shape: Euhedral.
 Preferred orientation: Not clear.
 Percent replacement: 10% by amphibole.

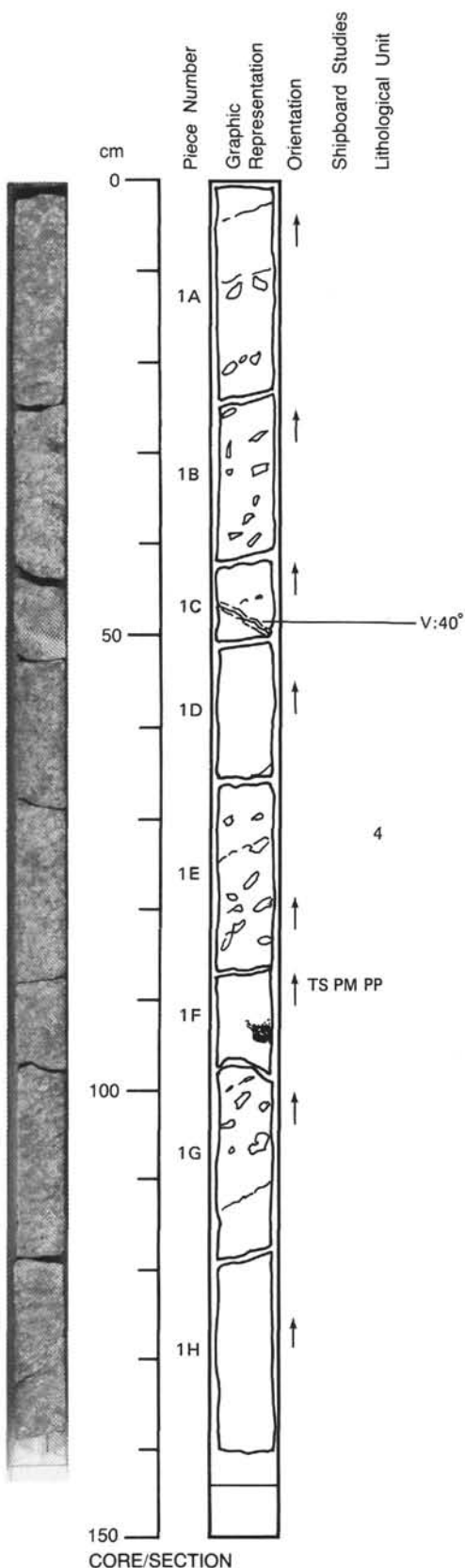
Olivine—Mode: < 2%.
 Crystal size: Various, or absent.
 Crystal shape: Anhedral.
 Preferred orientation: Not clear.
 Percent replacement: Up to 50% by clay.

Iron-titanium oxides—Mode: Various, 1%-15%.
 Crystal size: Various.
 Crystal shape: Anhedral.
 Preferred orientation: Not clear.
 Percent replacement: Not determined.

SECONDARY MINERALOGY:

Total percent: 15%.
 Texture: Clinopyroxene is replaced by amphibole (10%-20%). Olivine is replaced by dark green mineral (clay or chlorite?; 1%). Albitized part in Piece 1C, 1-2 cm thick, 60° inclination.
 Percent vein material: None.
 Vein material: None.

COMMENTS: The abundance of opaque minerals is variable. Pieces 1A, 1B, 1C, 1E, and 1G are opaque-poor, < 2%.



CORE/SECTION

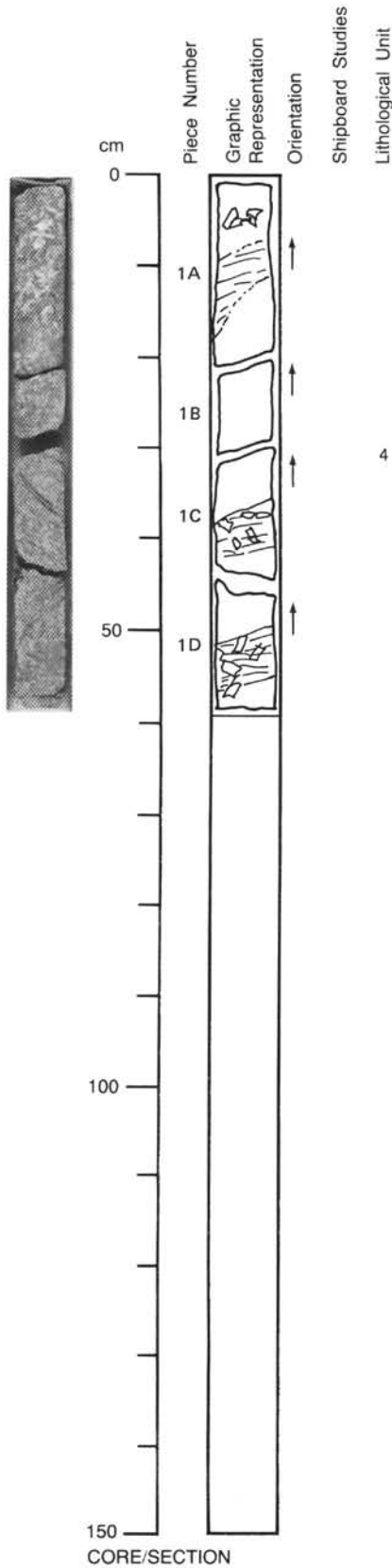
118-735B-49R-3

UNIT 4: IRON-TITANIUM OXIDE GABBRO

Pieces 1A-1D

Iron-Titanium Oxide-Bearing Metagabbro

Pieces 1A-1D



COLOR: Greenish-gray; speckled with black.

LAYERING: Grain size and modal layering. Pyroxene crystal size is bigger in Piece 1A (top) and Piece 1C (middle) than other parts. Iron-titanium oxide is abundant in middle of Piece 1A, middle of Piece 1C, and Piece 1D.

DEFORMATION: Not marked.

PRIMARY MINERALOGY:

Plagioclase—Mode: 60%-75%.

Crystal size: 5-25 mm.

Crystal shape: Subhedral.

Preferred orientation: None.

Percent replacement: None.

Clinopyroxene—Mode: 20%-35%.

Crystal size: 5-25 mm.

Crystal shape: Euhedral-subhedral.

Preferred orientation: None.

Percent replacement: 10%-50% by amphibole.

Olivine—Mode: <2%.

Crystal size: 5-25 mm.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: Replaced by clay.

Iron-titanium oxides: Mode: 2%-15%.

Crystal size: 5-25 mm.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: None.

SECONDARY MINERALOGY:

Total percent: 5%-20%.

Texture: Amphibole replacing clinopyroxene—5%-15% in total modal abundance. Olivine is replaced by dark green mineral (chlorite or clay?).

Percent vein material: None.

Vein material: None.

118-735B-50R-1

UNIT 4: IRON-TITANIUM OXIDE GABBRO

Pieces 1-2E

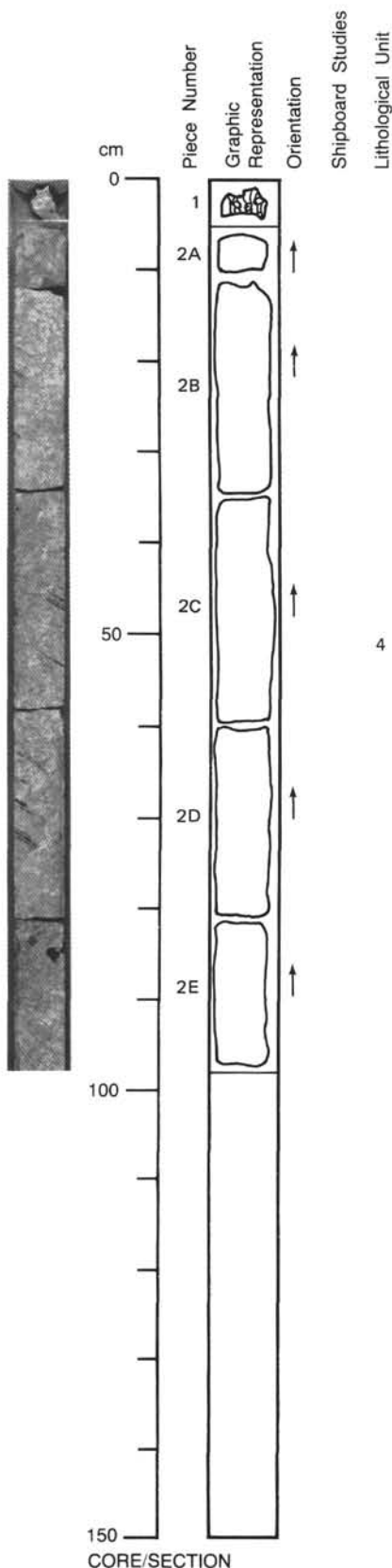
Ilmenite-Bearing Gabbro

Pieces 1A-2E

COLOR: Gray.
LAYERING: No obvious primary layering.
DEFORMATION: None.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 48%.
 Crystal size: 0.5-2 cm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: Not determined.
 Clinopyroxene—Mode: 40%.
 Crystal size: 0.5-2 cm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: Not determined.
 Ilmenite—Mode: 12%.
 Crystal size: 3-4 mm.
 Crystal shape: Anhedral, rounded.
 Preferred orientation: Not determined.
 Percent replacement: 0%.

SECONDARY MINERALOGY:
 Total percent: 30%.
 Texture: Amphibole replacement of clinopyroxene and filling minute fractures, which crosscut clinopyroxene and plagioclase. Concentrations of ilmenite are equivocal as to whether secondary or primary, but in this section appear to be associated with amphibole. Traces of sulfides occur as inclusions in clinopyroxene and plagioclase and in thin veins/fractures of green amphibole.
 Percent vein material: Very thin fractures.
 Vein material: Amphibole.

COMMENTS: Section is very coarse-grained. Clinopyroxene looks like it has intercumulus growth on cumulus crystals, but texture is not subophitic. Piece 1 is a highly oxidized, mylonitized, porphyroclast metagabbro. Feldspar totally albitized. Probably knocked off from somewhere uphole—not consistent with the mineralogy of this section. All identified oxide minerals not ilmenite, some magnetite.

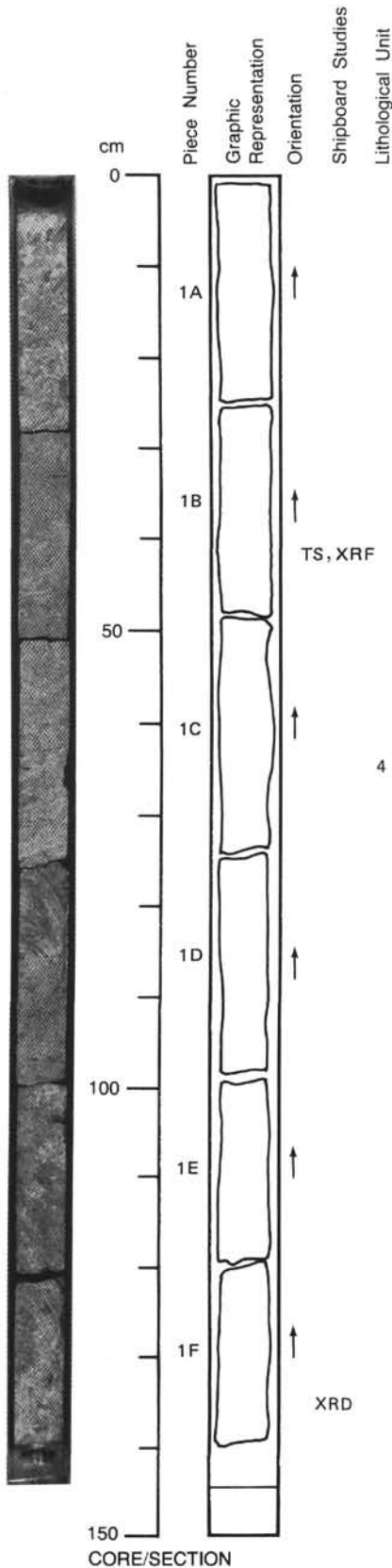


UNIT 4: IRON-TITANIUM OXIDE GABBRO

Pieces 1A-1F

Iron-Titanium Oxide Gabbro

Pieces 1A-1F



COLOR: Gray-black.

LAYERING: Not determined.

DEFORMATION: Not determined.

PRIMARY MINERALOGY:

Plagioclase—Mode: 35%-60%.

Crystal size: 0.4-2 cm.

Crystal shape: Subhedral to anhedral.

Preferred orientation: Not determined.

Percent replacement: Not determined.

Clinopyroxene—Mode: 20%-30%.

Crystal size: 0.2-3 cm.

Crystal shape: Subhedral to anhedral.

Preferred orientation: Not determined.

Percent replacement: 60% by amphibole.

Ilmenite/magnetite*—Mode: 10%-45%.

Crystal size: 0.1-4 mm.

Crystal shape: Anhedral interstitial, often enclosing silicates and as round inclusions in silicates.

Preferred orientation: None determined.

Percent replacement: None or very little.

Olivine—Mode: 0.5%.

Crystal size: 0.2-0.6 cm.

Crystal shape: Not determined.

Preferred orientation: None.

Percent replacement: 80% by talc + tremolite.

Sulfides—Mode: 0.1%-1.0%.

SECONDARY MINERALOGY:

Total percent: 25%.

Texture: Generally, the plagioclase is fresh and clear, while the pyroxene is variously replaced by green amphibole, but is quite fresh locally.

Percent vein material: No macroscopic veins.

Vein material: Not determined.

COMMENTS: Equigranular texture with interstitial magnetite enclosing subhedral to anhedral plagioclase and pyroxene. Both magnetite and sulfides occur as round inclusions in pyroxene and plagioclase. Alteration: The entire section is remarkably free of joints and through-going fractures. There does not appear to be any relationship between alteration and the abundance of the oxides. This, the volume of iron-titanium oxides, the overall low degree of alteration, and the numerous inclusions of magnetite and sulfide in unaltered pyroxene and plagioclase, indicate an igneous, not hydrothermal paragenesis for the oxides.

*The rock will suspend a magnet in the air, supporting the hypothesis that part of the oxides is magnetite.

118-735B-50R-3

UNIT 4: IRON-TITANIUM OXIDE GABBRO

Pieces 1A-4

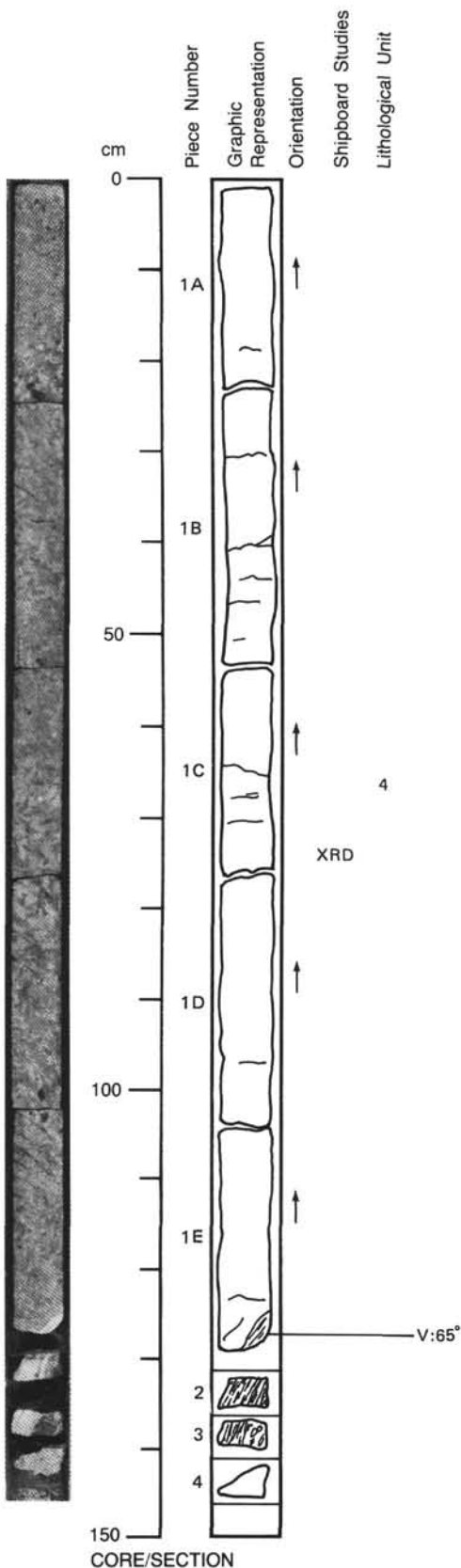
Iron-Titanium Oxide-Bearing Gabbro

Pieces 1A-4

COLOR: Gray.
LAYERING: Very well-defined, coarse- to medium-grained size transitions—at least two full cycles; 50-0 cm, 110-45 cm, relatively sharp transitions coarse-fine, fine-coarse at 17, 45, 63, and 106 cm.
DEFORMATION: Sheared brecciated zone at 120-140 cm. Several subhorizontal brittle fractures cut core.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 50%-40%.
 Crystal size: 2-18 mm.
 Crystal shape: Euhedral (in smaller grains partially enclosed by clinopyroxene) to anhedral.
 Preferred orientation: Weak lamination dipping 30°-40°.
 Percent replacement: Fresh to slightly green with amphibole.

 Clinopyroxene—Mode: 30%-40%.
 Crystal size: 2-30 mm.
 Crystal shape: Near euhedral to anhedral, must be in part primocrysts.
 Preferred orientation: Weak lamination dipping 30°-40°.
 Percent replacement: Replaced by amphibole in increasing degree downward near deformed zone.

 Iron-titanium oxides—Mode: 20%, variable.
 Crystal size: 2-10 mm.
 Crystal shape: Anhedral, with some pyrite interstitial to pyroxene.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.
SECONDARY MINERALOGY:
 Total percent: Various, nearly 100% near shear zone.
 Texture: Amphibole after pyroxene in increasing degree toward the shear zone—some pyrite filling fractures in pyroxene. A 2-cm-wide, feldspathic vein cuts core through shear at 130-140 cm. Sample below that is amphibolitized and broken. Vein has a granular texture.
 Percent vein material: Not determined.
 Vein material: Pieces 2-3: 4-cm-wide albitized vein dips at 65°.
COMMENTS: Opaque phase is strongly magnetic—magnetite at least in part.



118-735B-50R-4

UNIT 4: IRON-TITANIUM OXIDE GABBRO

Pieces: 1A-1D

Iron-Titanium Oxide Gabbro

Pieces 1A-1D

COLOR: Gray.

LAYERING: Defined by coarse-medium size variations. Olivine occurs in thin zones at 100 and 120 cm.

DEFORMATION: A little alteration on top 5 cm—continuous with shear zone in Section 118-735B-50R-3. Thin section shows slight deformation and the development of neoblasts of plagioclase in sample at 84-87 cm.

PRIMARY MINERALOGY:

Plagioclase—Mode: 40%-50%.

Crystal size: 2-18 mm.

Crystal shape: Euhedral to anhedral.

Preferred orientation: Igneous lamination.

Percent replacement: Not determined.

Clinopyroxene—Mode: 30%-40%.

Crystal size: 2-30 mm.

Crystal shape: Euhedral to anhedral.

Preferred orientation: Igneous lamination.

Percent replacement: Various, highest near veins by green amphibole.

Olivine—Mode: Not determined.

Crystal size: 1 cm large crystals cut surface of bottom of Piece 1C.

Crystal shape: Not determined.

Preferred orientation: Not determined.

Percent replacement: Not determined.

Ilmenite/magnetite—Mode: Up to 20%.

Crystal size: 2-10 mm.

Crystal shape: Anhedral.

Preferred orientation: Not determined.

Percent replacement: Not determined.

SECONDARY MINERALOGY:

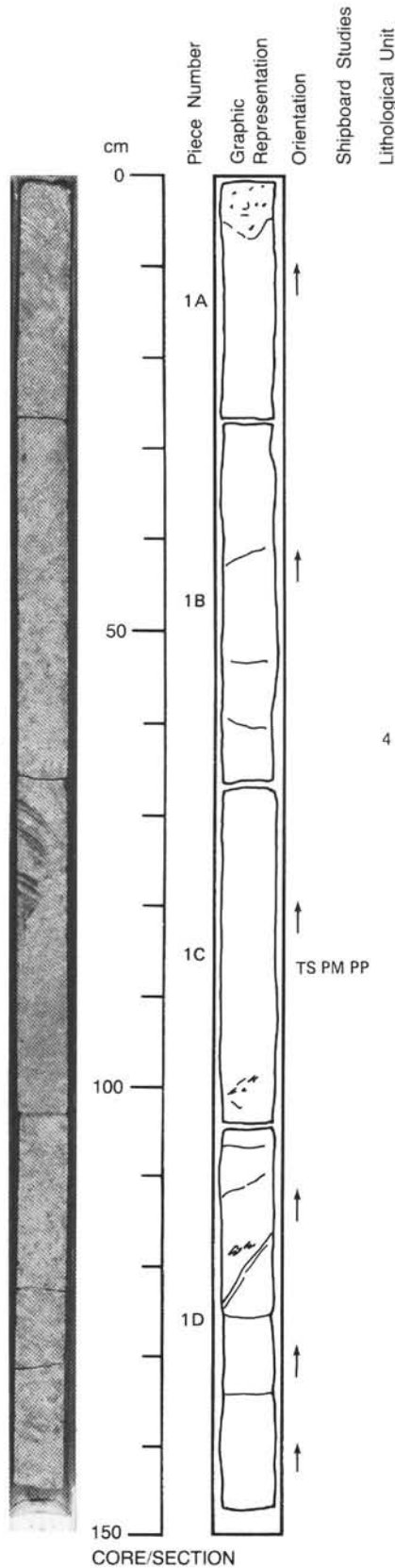
Total percent: 5%-15%.

Texture: A green amphibole commonly replaces clinopyroxene, particularly near veins. There is a patch of albitic plagioclase on the top of Piece 1A.

Percent vein material: Not determined.

Vein material: Amphibole-filled vein at 120 cm.

COMMENTS: Similar to Section 118-735B-50R-3. The entire section shows a distinct parallel orientation of clinopyroxene, particularly the larger ones. This is best shown at 50-60 cm. Thin section shows slight deformation and the development of neoblasts of plagioclase in sample at 84-87 cm.



118-735B-51R-1

UNIT 4: IRON-TITANIUM OXIDE GABBRO

Pieces 1A-1E

Iron-Titanium Oxide-Bearing Gabbro

Pieces 1A-1E

COLOR: Gray.

LAYERING: Possible primary layering defined by alternating coarse to very coarse grain sizes.

DEFORMATION: None apparent.

PRIMARY MINERALOGY:

Plagioclase—Mode: Variable, average 55%-60% estimated original mode.

Crystal size: 5-20 mm.

Crystal shape: Anhedral to subhedral.

Preferred orientation: None.

Percent replacement: 15%-20%.

Clinopyroxene—Mode: Variable, average 40%-45% estimated original mode.

Crystal size: 1-18 mm.

Crystal shape: Anhedral to subhedral.

Preferred orientation: None.

Percent replacement: 40%-50% by amphibole.

Olivine—Mode: Trace (Piece 1E).

Crystal size: Not determined.

Crystal shape: Anhedral.

Preferred orientation: Not determined.

Percent replacement: 100% by amphibole.

Iron oxides—Mode: Presently make up 20% of the rock, but unclear whether secondary or primary.

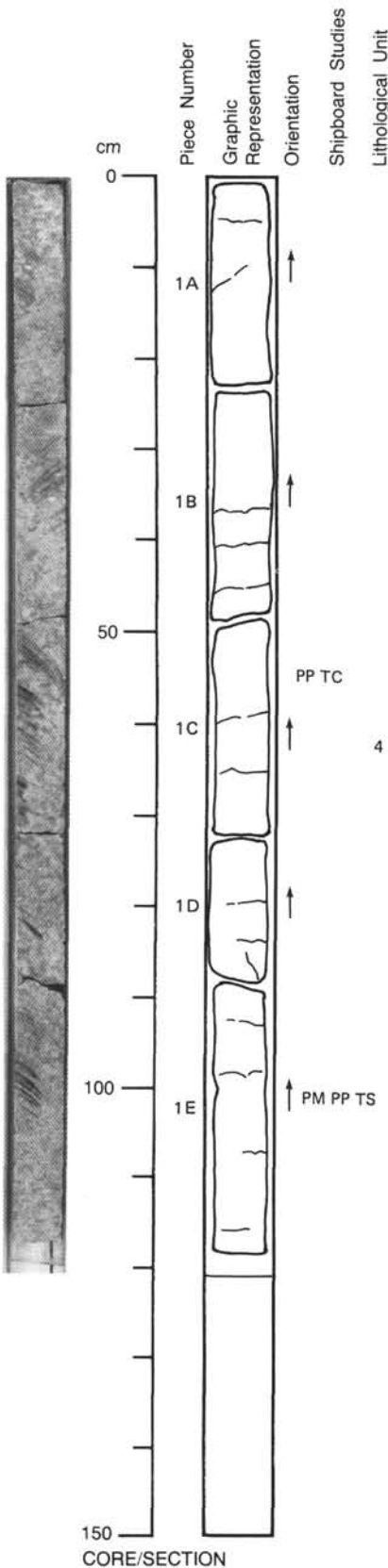
SECONDARY MINERALOGY:

Total percent: 15%-20%.

Texture: Amphibole constitutes 10%-15% of rock, replacing primary phases along grain boundaries and in very thin fractures. Numerous very thin, nearly horizontal fractures are filled by white mineral. Iron oxides are concentrated in masses at grain boundary edges and appear to be associated with some amphibole veinlets. Amphibole generally occurs around the oxides, between them and the primary phases, clinopyroxene and plagioclase. Trace amounts of sulfides throughout.

Percent vein material: Not determined.

Vein material: Green amphibole.



UNIT 4: IRON-TITANIUM OXIDE GABBRO

Pieces 1A-6B

Olivine and Iron-Titanium Oxide-Bearing Gabbros

Pieces 1A-6B

COLOR: Dark gray.

LAYERING: None apparent.

DEFORMATION: Evident in Piece 1B where locally porphyroclastic gabbro develops. The grain size decreases from up to 13 mm in less-deformed gabbro to less than 10 mm and generally less than 5 mm. Many subhorizontal cracks are present; some are filled by white mineral.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%-60%.

Crystal size: 1-4 mm.

Crystal shape: Anhedral.

Preferred orientation: Weak.

Percent replacement: Moderate.

Clinopyroxene—Mode: 40%-50%.

Crystal size: <1-13 mm.

Crystal shape: Anhedral to subhedral.

Preferred orientation: Not determined.

Percent replacement: Moderate.

Olivine—Mode: <1%.

Crystal size: 1-3 mm.

Crystal shape: Anhedral, rounded.

Preferred orientation: Not determined.

Percent replacement: Moderate.

Iron-titanium oxides—Mode: 5%-15%.

Crystal size: 0.5-4 mm.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: Not determined.

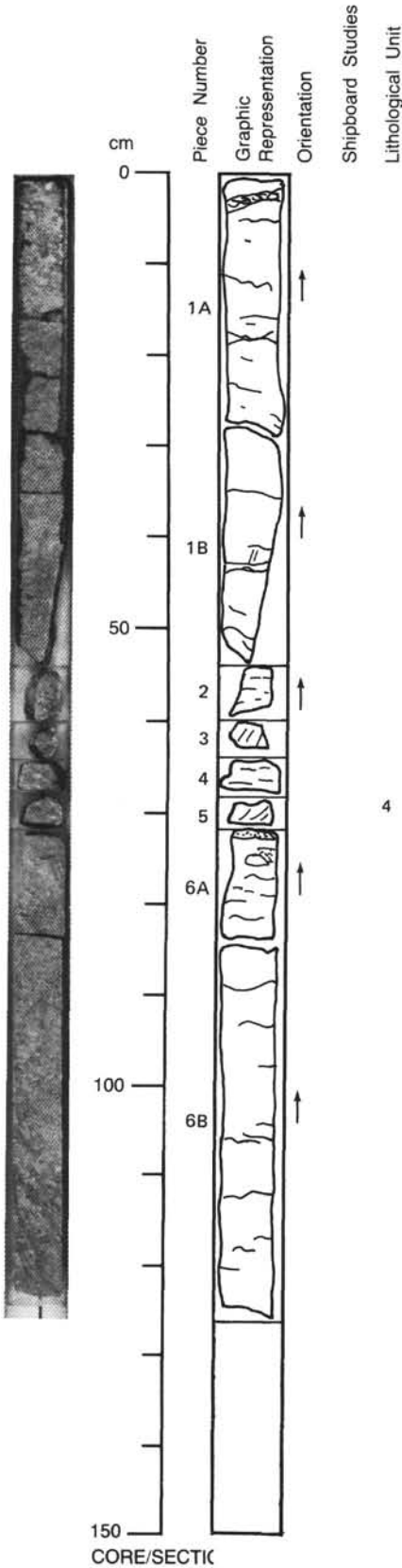
SECONDARY MINERALOGY:

Total percent: <25%.

Texture: Green amphibole partially replaces clinopyroxene or fills less than 1-mm-thick veinlets in plagioclase and pyroxene. Olivine is replaced by magnetite (black), talc (gray green), and chlorite (?), black. Sulfide streaks are present throughout the section associated with black oxides and surrounding silicates.

Percent vein material: Not determined.

Vein material: Sulfides and amphiboles. In Piece 1A (top), a plagioclase (?) and amphibole vein cuts the core. There is amphibolitization of the walls of the vein. Walls of steeply dipping crack are filled with hydroxides and blue soapy, but hard, mineral.



118-735B-51R-3

UNIT 4: IRON-TITANIUM OXIDE GABBRO

Pieces 1A-1D

Iron-Titanium Oxide-Bearing Gabbro

Pieces 1A-1D

COLOR: Dark gray.
LAYERING: Not apparent.
DEFORMATION: There is a flat foliation throughout the section. The black oxides are preferentially found in these structures.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%-60%.
Crystal size: < 1 mm.
Crystal shape: Not determined.
Preferred orientation: Visible.
Percent replacement: Slight.

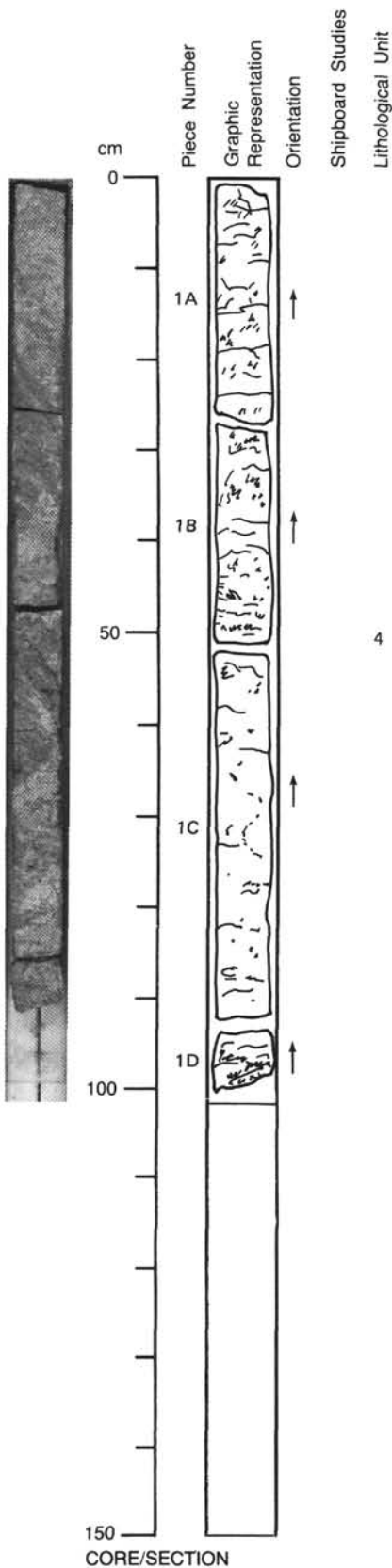
Clinopyroxene—Mode: 40%-50%.
Crystal size: < 1 mm.
Crystal shape: Not determined.
Preferred orientation: Visible.
Percent replacement: Moderate.

Olivine—Mode: Traces.
Crystal size: < 1 mm.
Crystal shape: Anhedral, rounded.
Preferred orientation: Visible.
Percent replacement: Extensive.

Iron-titanium oxides—Mode: 5%-15%.
Crystal size: Not determined.
Crystal shape: Discontinuous layer 13 mm thick.
Preferred orientation: Strong.
Percent replacement: Not determined.

SECONDARY MINERALOGY:

Total percent: < 50%.
Texture: Pseudomorphic. Clinopyroxene is partly replaced by amphiboles. Olivine is replaced by black chlorite. Plagioclase is sometimes milky (replaced by clays or chlorite?). Sulfides are disseminated throughout the section, associated with ilmenite, amphibole veinlets, chalcocopyrite, and pyrite.
Percent vein material: Not determined.
Vein material: Plagioclase and amphibole. Small veinlets are filled by plagioclase and green amphiboles. These have more amphibole-rich walls.



CORE/SECTION

118-735B-51R-4

UNIT 4: IRON-TITANIUM OXIDE GABBRO

Pieces 1A-1E

Iron-Titanium Oxide Gabbro

Pieces 1A-1E

COLOR: Gray.

LAYERING: Some coarse to fine variation—very coarse-grained at 75 cm (2 cm crystals) to medium-grained at 50 cm. Top of core is uniformly medium-grained with a lamination of pyroxene dipping 25°—bottom piece is interfingering fine- and medium-grained material. Olivine-rich layers at 16 and 73 cm.

DEFORMATION: None apparent—unless lamination is not all primary.

PRIMARY MINERALOGY:

Plagioclase—Mode: 40%-60%.

Crystal size: 1-10 mm.

Crystal shape: Subhedral-anhedral.

Preferred orientation: Not determined.

Percent replacement: Not determined.

Clinopyroxene—Mode: 40%-55%.

Crystal size: 1-18 mm.

Crystal shape: Subhedral-anhedral.

Preferred orientation: 25° dipping lamination.

Percent replacement: Minor replacement by amphibole.

Olivine—Mode: Up to 2%; very uncommon.

Crystal size: 6 mm.

Crystal shape: Anhedral.

Preferred orientation: Not determined.

Percent replacement: Various to talc-tremolite.

Ilmenite/magnetite—Mode: Up to 15%, decreasing somewhat downcore, similar in both coarse and fine sections.

Crystal size: 1-2 mm.

Crystal shape: Anhedral.

Preferred orientation: Not determined.

Percent replacement: Not determined.

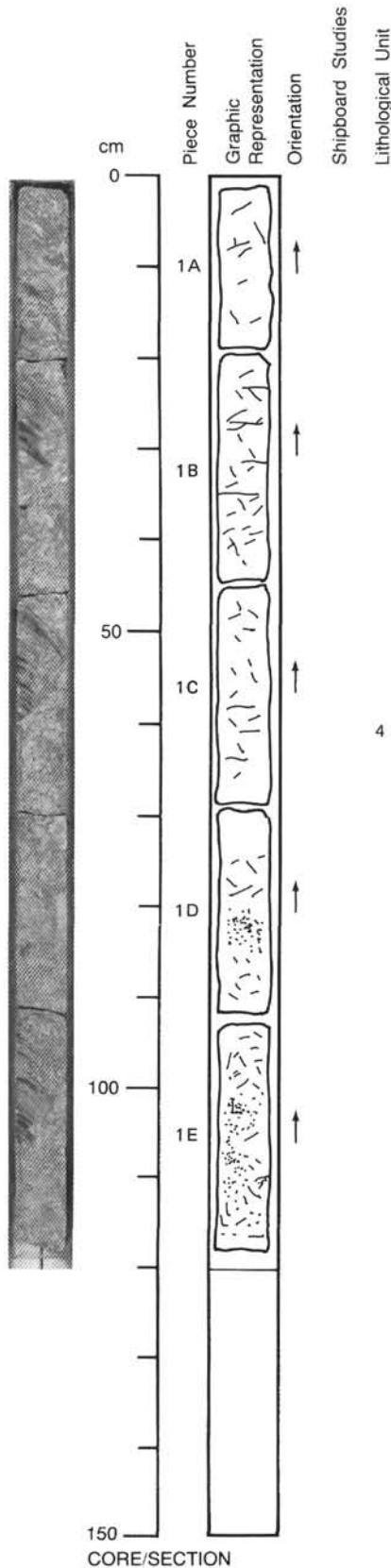
SECONDARY MINERALOGY:

Total percent: Minor.

Texture: Minor amphibolitization of clinopyroxene. Veins are minor, usually subhorizontal, and have feldspathic (?) fill. There is a trace of fine pyrite disseminated in section. Some olivine has been replaced by talc/tremolite.

Percent vein material: Not determined.

Vein material: Feldspar (?).



4

118-735B-52R-1

UNIT 4: IRON-TITANIUM OXIDE GABBRO

Pieces 1A-1F

Iron-Titanium Oxide Gabbro

Pieces 1A-1F

COLOR: Gray.

LAYERING: None clearly defined. Most of core is medium-grained; a coarse-grained section at 0-10 cm; fine-grained patches at 15-25, 80-90, 110-125, and 135-145 cm. Transitions are not as sharply defined as in some other sections. Olivine, if present, occurs only in trace amounts.

DEFORMATION: None apparent; some intervals show a very weakly defined lamination (especially Pieces 1E and 1F), which may in part be igneous. There are a few brittle fractures—subhorizontal. Some larger plagioclases are cut by small vertical fractures.

PRIMARY MINERALOGY:

Plagioclase—Mode: 40%-50%.

Crystal size: 1-10 mm.

Crystal shape: Euhedral to anhedral, smaller ones. Those partially enclosed by clinopyroxene are euhedral.

Preferred orientation: Not determined.

Percent replacement: Not determined.

Clinopyroxene—Mode: 40%-50%.

Crystal size: 1-20 mm.

Crystal shape: Subhedral, anhedral.

Preferred orientation: Not determined.

Percent replacement: Not determined.

Iron-titanium oxides—Mode: 5%-20%, a bit less abundant than some shallower sections.

Crystal size: 1-4 mm.

Crystal shape: Anhedral.

Preferred orientation: Not determined.

Percent replacement: Not determined.

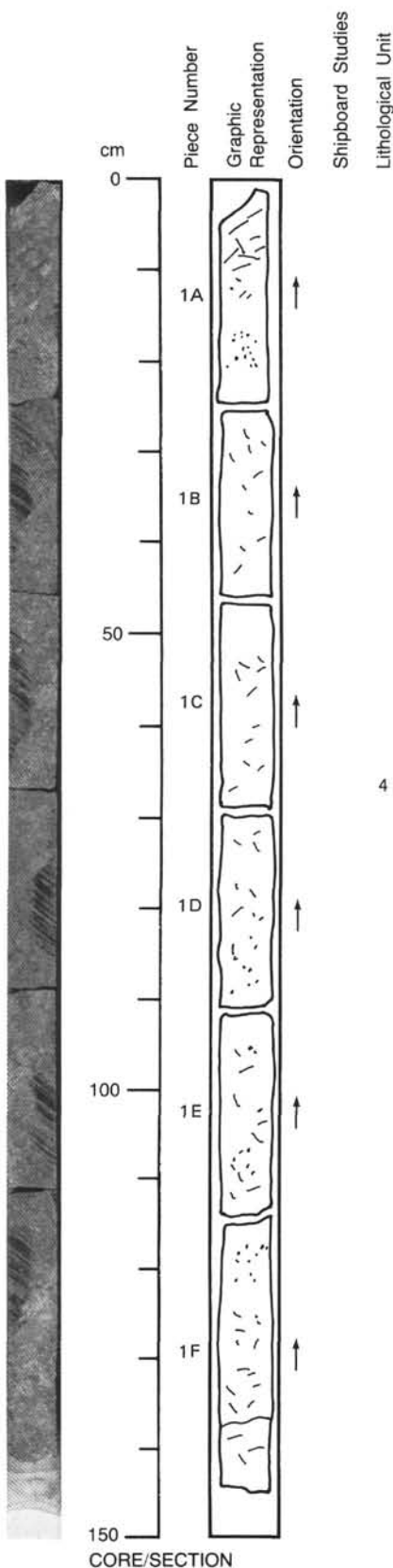
SECONDARY MINERALOGY:

Total percent: Minor.

Texture: Probably some amphibole after clinopyroxene. Disseminated (< 1 mm) pyrite common throughout.

Percent vein material: One subhorizontal vein in Piece 1F.

Vein material: Not determined.



CORE/SECTION

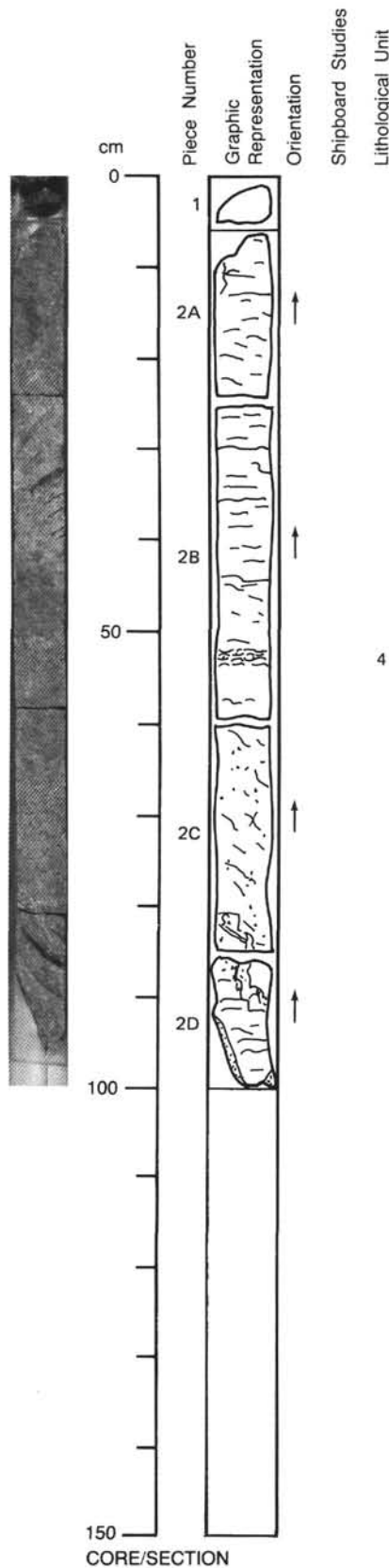
118-735B-52R-2

UNIT 4: IRON-TITANIUM OXIDE GABBRO

Pieces 1-2D

Iron-Titanium Oxide-Bearing Gabbro

Pieces 1-2D



F:0-10°

F:0°

4

F:10°

F:0°

COLOR: Dark gray.

LAYERING: None apparent.

DEFORMATION: Foliation is clearly visible throughout the section. The plagioclase is granular, and pyroxene has a preferred orientation. This foliation is probably a secondary feature overprinting a primary foliation (magnetite) that is evident from the sawn surface.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%-60%.

Crystal size: 1-8 mm.

Crystal shape: Anhedral.

Preferred orientation: Not visible.

Percent replacement: Slight.

Clinopyroxene—Mode: 40%-50%.

Crystal size: 2-10 mm.

Crystal shape: Lensoid.

Preferred orientation: Strong.

Percent replacement: Moderate to extensive.

Olivine—Mode: Traces (Pieces 1C and 1D).

Crystal size: 1-2 mm.

Crystal shape: Rounded.

Preferred orientation: Not observed.

Percent replacement: Extensive.

Iron-titanium oxides, magnetite, and ilmenite—Mode: 5%-10% (secondary in part).

Crystal size: 1-4 mm.

Crystal shape: Granular.

Preferred orientation: Not determined.

Percent replacement: Extensive.

SECONDARY MINERALOGY:

Total percent: Not determined.

Texture: Olivine replaced by chlorite and magnetite. Plagioclase recrystallized into granoblasts during deformation and partly chloritized and veined by amphibole. Sulfides are disseminated in four parts of Piece 2 (not seen in Piece 1). In Pieces 2C and 2D, sulfides are "concentrated" in or close to a plagioclase-amphibole vein (1 cm thick).

Percent vein material: Not determined.

Vein material: Plagioclase and amphibole. Pieces 2A and 2B: plagioclase veinlets <1 mm across.

118-735B-52R-3

UNIT 4: IRON-TITANIUM OXIDE GABBRO

Pieces 1-2G

Iron-Titanium Oxide-Bearing Gabbro

Pieces 1-2G

COLOR: Gray.

LAYERING: Obscured by deformation.

DEFORMATION: Foliation variable. Pieces 2A-D (4-82 cm) dip approximately 30°. At 82-96 cm, obvious foliation disappears. At 96-110 cm, foliation reappears but is more poorly defined and horizontal. Grain size diminishes and/or deformation increases to bottom, where Piece 2G is fine-grained. Foliation defined by preferred orientation of clinopyroxene. Clinopyroxene has a rounded appearance, not sheared. Plagioclase appears to be granulated or recrystallized.

PRIMARY MINERALOGY:

Plagioclase—Mode: 40%.

Crystal size: 0.5-3 cm.

Crystal shape: Anhedral to subhedral where included in clinopyroxene.

Preferred orientation: Locally in plane of foliation.

Percent replacement: Slight to moderate.

Clinopyroxene—Mode: 60%-55%.

Crystal size: 0.5-3 cm.

Crystal shape: Subhedral.

Preferred orientation: Locally in plane of foliation.

Percent replacement: Slight to moderate.

Olivine—Mode: 0%-1%, traces in Pieces 2C-2F.

Crystal size: 1-2 mm.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: Moderate to extensive.

Iron-titanium oxides—Mode: 5% (primary?).

SECONDARY MINERALOGY:

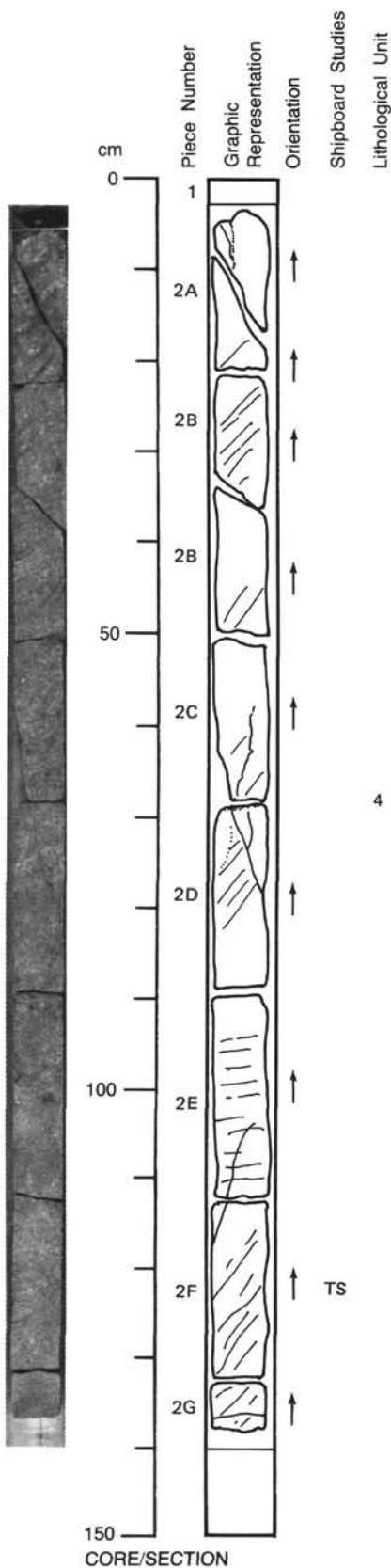
Total percent: Slight to moderate.

Texture: Clinopyroxene partially replaced by amphibole, > 10%-15%. Plagioclase recrystallized and partially replaced by greenish mineral. Concentrations of iron-titanium oxides and sulfides throughout the section.

Percent vein material: Not determined.

Vein material: Sodic plagioclase, green amphibole along very thin fractures.

COMMENTS: Occasional ophitic texture between plagioclase and clinopyroxene; grain size is variable, clinopyroxene 0.5-1 cm between 0-71 cm. Coarser texture 1-3 cm, at 72-94 cm. Medium-grained at 97-130 cm and fine-grained (< 1 mm) at bottom (Piece 2G).



118-735B-52R-4

UNIT 4: IRON-TITANIUM OXIDE GABBRO

Pieces 1-4C

Iron-Titanium Oxide-Rich Gabbro

Pieces 1-4C

COLOR: Gray and black.
LAYERING: Grain size and compositional layering—faint, subhorizontal, and paralleled by a poorly developed magmatic foliation.

DEFORMATION: None.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%-60%.
 Crystal size: < 20 mm.
 Crystal shape: Euhedral to anhedral.
 Preferred orientation: Locally marks faint magmatic foliation.
 Percent replacement: Not determined.

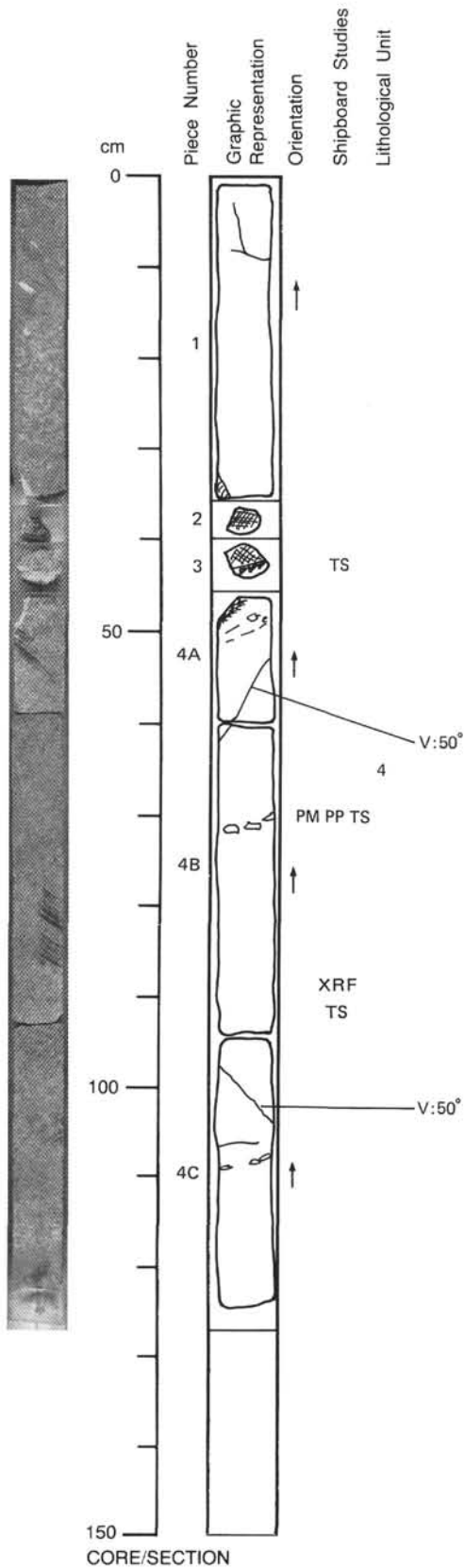
Clinopyroxene—Mode: 30%-40%.
 Crystal size: < 20 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Locally marks faint magmatic foliation.
 Percent replacement: Not determined.

Olivine—Mode: < 5%, not more than 10% in discrete layers.
 Crystal size: < 20 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Locally marks faint magmatic foliation.
 Percent replacement: Not determined.

SECONDARY MINERALOGY:

Total percent: < 30%.
 Texture: Pseudomorphic. Replacement of some clinopyroxene by amphibole through the core.
 Pieces 2 and 3: Albitization of plagioclase and amphibolitization of clinopyroxene.
 Percent vein material: < 1%.
 Vein material: Green amphibole and sodic plagioclase + green amphibole in Pieces 1, 2, and 3; the veins are not sheared and dip 50°. The veins of sodic plagioclase and amphibole are probably an altered silicic intrusion.

COMMENTS: Iron-titanium oxide: primary or secondary?



118-735B-53R-1

UNIT 4: IRON-TITANIUM OXIDE GABBRO

Pieces 1-3

Massive Iron-Titanium Oxide Gabbro

Pieces 1-3

COLOR: Medium gray.

LAYERING: Weak primary layering defined by slightly alternating grain sizes and enrichment bands of iron-titanium oxides (marked in graphic representation). Inclination 20°-25°. Average grain-size variation from >1 to <0.5 cm.

DEFORMATION: None apparent.

PRIMARY MINERALOGY:

Plagioclase—Mode: 55%.
 Crystal size: <0.5 to 2.0 cm.
 Crystal shape: Anhedral to subhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

Clinopyroxene—Mode: 35%.
 Crystal size: <0.5 to 1.5 cm.
 Crystal shape: Anhedral to subhedral.
 Preferred orientation: Not determined.
 Percent replacement: <10% by amphibole.

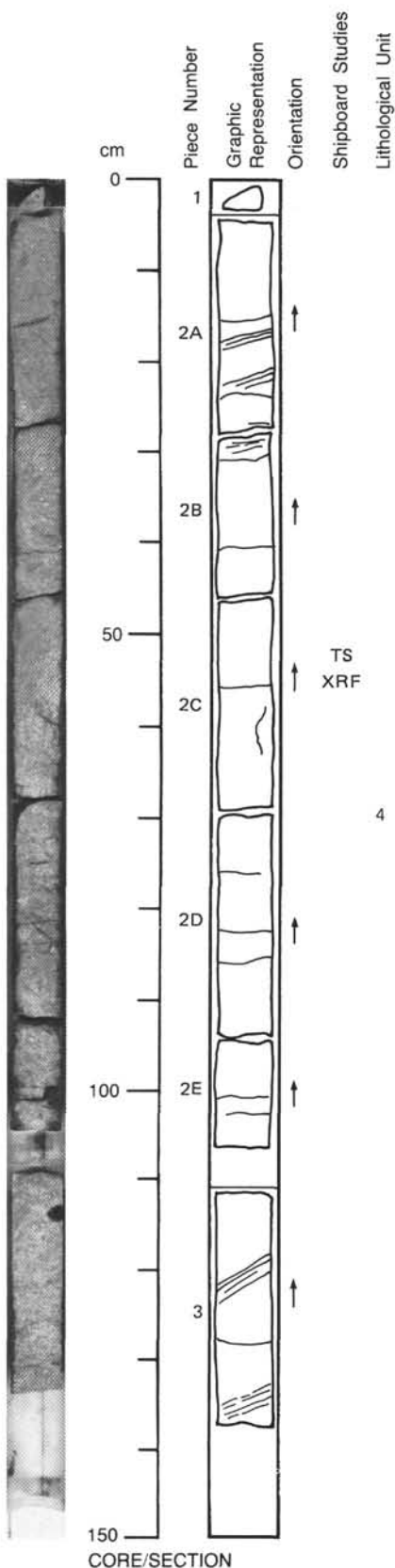
Olivine—Mode: <1% (few grains).
 Crystal size: <1.0 cm.
 Crystal shape: Anhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

Iron-titanium oxides—Mode: 10% (estimated average, variation between <5% and >30%).

SECONDARY MINERALOGY:

Total percent: <5%.
 Texture: Green amphibole replaces primary phases along grain boundaries.
 Percent vein material: Few veinlets.
 Vein material: Not determined.

COMMENTS: Iron-titanium oxides enriched throughout section (highly enriched in bands up to 3 cm across).



118-735B-53R-2

UNIT 4: IRON-TITANIUM OXIDE GABBRO

Pieces 1A-3

Massive Iron-Titanium Oxide Gabbro

Pieces 1A-3

COLOR: Medium gray.

LAYERING: Weak primary layering defined by alternating grain sizes and iron-titanium oxide enrichment bands (marked //). Inclination, <math><5^{\circ}</math>-25°. Average grain size varies from 1.5 to <math><0.5</math> cm; mostly medium-grained.

DEFORMATION: There may be a faint deformation of some small intervals (e.g., 70-75 cm); in general, nonapparent.

PRIMARY MINERALOGY:

Plagioclase—Mode: 55%-60%.

Crystal size: Up to 2.5 cm.

Crystal shape: Anhedral to subhedral.

Preferred orientation: Not determined.

Percent replacement: Not determined.

Clinopyroxene—Mode: 35%.

Crystal size: <math><0.5</math> to 2 cm.

Crystal shape: Subhedral to euhedral.

Preferred orientation: Not determined.

Percent replacement: <math><10\%</math> by green amphibole.

Olivine—Mode: <math><2\%</math>.

Crystal size: <math><1.0</math> cm.

Crystal shape: Anhedral.

Preferred orientation: Not determined.

Percent replacement: Not determined.

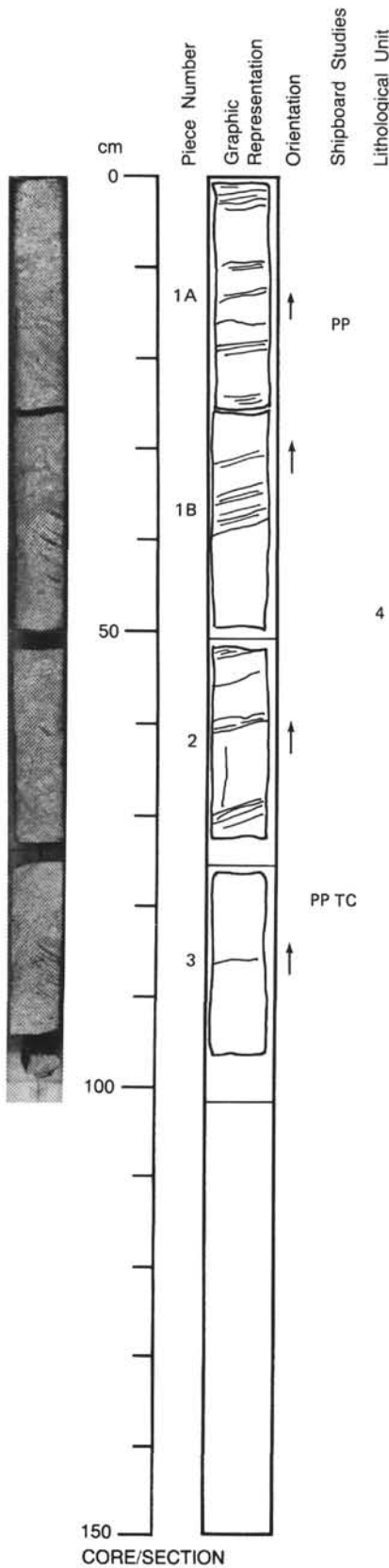
SECONDARY MINERALOGY:

Total percent: <math><10\%</math>.

Texture: Green amphibole replaces clinopyroxene along grain boundaries; also occurs in veinlets. Few sulfides.

Percent vein material: Not determined.

Vein material: Green amphibole.



118-735B-53R-3

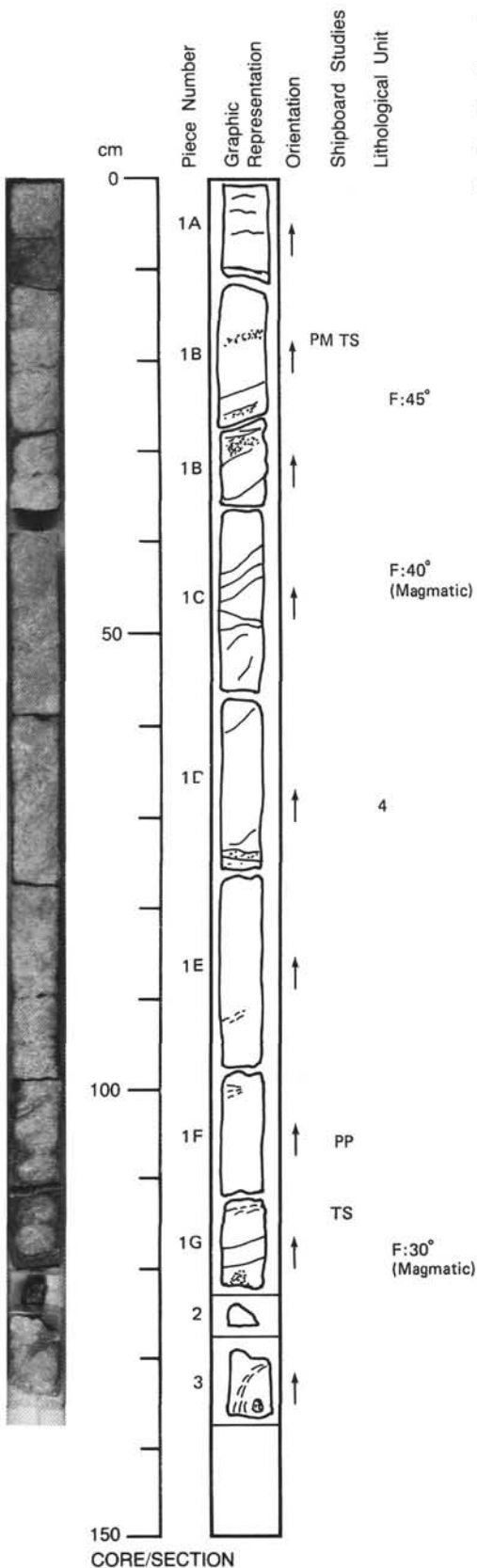
UNIT 4: IRON-TITANIUM OXIDE GABBRO

Pieces 1A-3

Foliated Iron-Titanium Oxide Gabbro (Microgabbro)

Pieces 1A-3

COLOR: Greenish-gray.
LAYERING: Possible igneous lamination but hard to differentiate from metamorphic foliation.
DEFORMATION: Strong foliation defined by elongated plagioclase and clinopyroxene. Localized mylonitic zones (especially Piece 1A). Zones of cross foliation (especially Piece 1C); Pieces 1E (bottom), 1F, and 1G-3 are gneissic.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 55%.
 Crystal size: 3 mm average.
 Crystal shape: Anhedral, filamentous.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.
 Clinopyroxene—Mode: 35%.
 Crystal size: 2 mm average.
 Crystal shape: Fine-grained anhedral aggregates fill interstitial areas.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.
 Iron-titanium oxides—Mode: 10%.
 Crystal size: 2 mm average.
 Crystal shape: Anhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.
SECONDARY MINERALOGY:
 Total percent: Not determined.
 Texture: Pyroxenes and plagioclase recrystallized. Pyroxenes partly replaced by green amphibole. Black chloritic (?) clay in 1-mm spaces in Pieces 1B-1E (possible replacement of olivine or clinopyroxene).
 Percent vein material: Not determined.
 Vein material: Not determined.
COMMENTS: Oxide-rich zone in Piece 3. Plagioclase-rich zones in Pieces 1E, 1F, 1G, and 3. Filamentous clinopyroxene with straight edges may have grown under stress in crystal mush.



CORE/SECTION

118-735B-53R-4

UNIT 4: IRON-TITANIUM OXIDE GABBRO

Pieces 1A-7B

Foliated, Iron-Titanium Oxide-Bearing Metagabbro (Porphyroclastic) Intruded by Felsic Fine-Grained Rock

Pieces 1A-7B

COLOR: Gray with black streak, locally greenish gray.

LAYERING: In Piece 1B, grain size and modal variations show layered structure 2 to 5 cm thick inclining 35°. This 2-cm-thick layer is rich in plagioclase.

DEFORMATION: Foliation defined by opaque streaks and stretched clinopyroxene porphyroclasts. The foliation is parallel to the layering and inclines 40°.

PRIMARY MINERALOGY:

Plagioclase—Mode: 60%.
 Crystal size: Not determined.
 Crystal shape: Not determined.
 Preferred orientation: Not determined.
 Percent replacement: None.

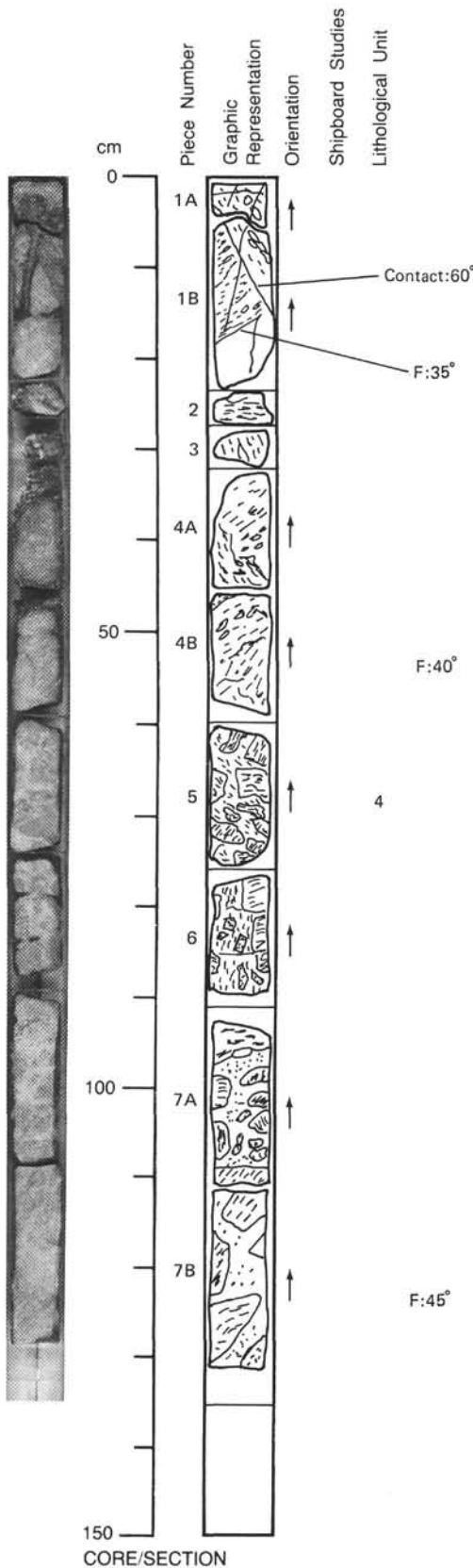
Clinopyroxene—Mode: 30%.
 Crystal size: 1-5 mm.
 Crystal shape: Subhedral.
 Preferred orientation: Marked.
 Percent replacement: Extensively replaced by amphibole.

Olivine—Mode: < 3%.
 Crystal size: Not determined.
 Crystal shape: Not determined.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

Opaque mineral, iron-titanium oxide—Mode: 10%.
 Crystal size: Not determined.
 Crystal shape: Anhedral.
 Preferred orientation: Marked.
 Percent replacement: None.

SECONDARY MINERALOGY:

Total percent: Extensive.
 Texture: Clinopyroxene is replaced by amphibole in Pieces 1A and 1B.
 Percent vein material: Moderate.
 Vein material: Amphibole. <0.5-mm-thick veins occur that incline 30°.



118-735B-53R-4 (continued)

Felsic Intrusion (Trondhjemite)

Pieces 1A-7B

COLOR: White, light gray.

LAYERING: None.

DEFORMATION: None.

PRIMARY MINERALOGY:

Plagioclase—Mode: 75%.

Crystal size: 0.2-1 mm.

Crystal shape: Euhedral.

Preferred orientation: Marked.

Percent replacement: None.

Clinopyroxene—Mode: 4%.

Crystal size: 0.2-1 mm.

Crystal shape: Euhedral.

Preferred orientation: Marked parallel to the contact with the surrounding gabbro (Pieces 1A, 5, and 6).

Percent replacement: 50% replaced by amphibole.

Quartz—Mode: 20%.

Crystal size: 0.2-1 mm.

Crystal shape: Not determined.

Preferred orientation: Not clear.

Percent replacement: None.

Biotite—Mode: 3%-2%.

Crystal size: 0.2-1 mm.

Crystal shape: Euhedral, oikocrystic.

Preferred orientation: Marked.

Percent replacement: None.

Opaque—Mode: 2%.

Crystal size: 0.1 mm.

Crystal shape: Anhedral.

Preferred orientation: Not clear.

Percent replacement: None.

SECONDARY MINERALOGY:

Total percent: < 2%.

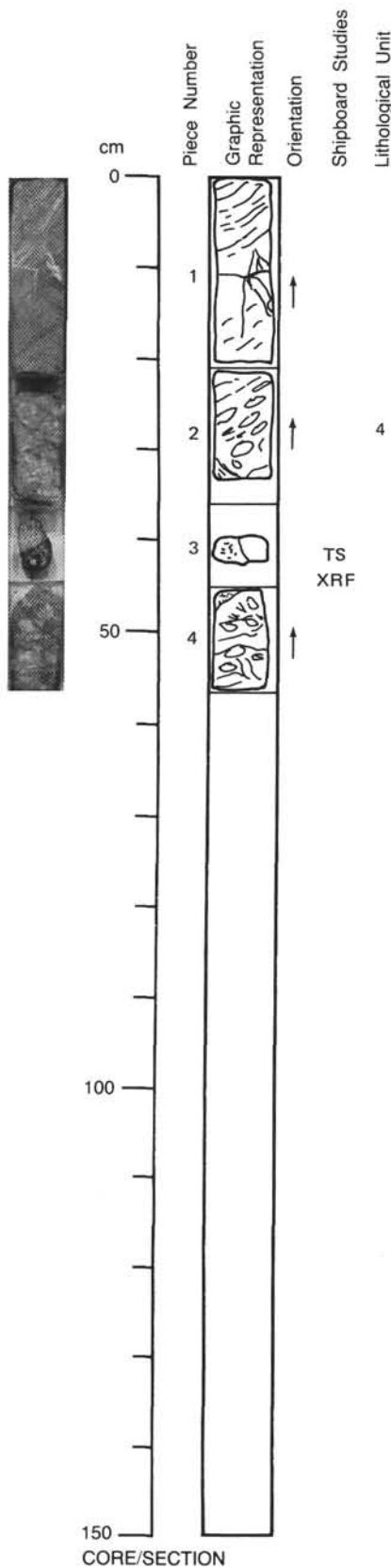
Texture: Clinopyroxene is replaced from the margin by dark green mineral (amphibole?).

Percent vein material: None.

Vein material: None.

COMMENTS: Felsic rocks show wide modal variation. In Pieces 5 and 6, where contacts with gabbro are very sharp, these rocks are richer in plagioclase than in Pieces 1A and 1B, which are richer in clinopyroxene. In Pieces 5 and 6, clinopyroxene is present up to 3%. In Pieces 1A and 1B, felsic rock contains foliated opaque-rich gabbro fragments that seem to be in the process of "digestion." This is probably also the case in Pieces 7A and 7B. In Pieces 4A and 4B, where opaque-rich and opaque-poor portions occur with fairly sharp contact, the foliation in opaque-rich portion abruptly disappears at the contact. The opaque-rich portion is foliated opaque-bearing gabbro, and the opaque-poor portion is probably a mixture of small gabbro fragments and felsic intrusions. In Pieces 5 and 6, foliations of each gabbro fragment show various attitudes, suggesting rotation in felsic magma.

118-735B-53R-5



UNIT 4: IRON-TITANIUM OXIDE GABBRO

Pieces 1-4

Foliated Iron-Titanium Oxide Gabbro

Piece 1

COLOR: Gray to white-gray.
LAYERING: None. Fine-grained rock.
DEFORMATION: Foliation defined by stretching of plagioclase and clinopyroxene. Upper half has a gneissic appearance due to leucocratic bands (~2 mm across).
PRIMARY MINERALOGY:
 Plagioclase—Mode: 55%.
 Crystal size: Not determined.
 Crystal shape: Subhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.
 Clinopyroxene—Mode: 40%.
 Crystal size: Not determined.
 Crystal shape: Subhedral.
 Preferred orientation: Not determined.
 Percent replacement: <20% by amphibole.
 Olivine—Mode: Some.
 Crystal size: Not determined.
 Crystal shape: Anhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.
 Iron-titanium oxides—Mode: 5%.
SECONDARY MINERALOGY:
 Total percent: Up to 20%.
 Texture: Green amphibole replacing clinopyroxene.
 Percent vein material: Not determined.
 Vein material: Not determined.
COMMENTS: Leucocratic bands: either due to albitization or "lit par lit" intrusion of felsic melt (trondhjemitic?).

Porphyroclastic Iron-Titanium Oxide Gabbro

Pieces 2, 3 (right half), and 4

COLOR: Gray (variable from dark gray to greenish-whitish gray).
LAYERING: None.
DEFORMATION: Defined by stretching of clinopyroxene and plagioclase, and development of porphyroclastic structures. Grain size: Coarse-grained (1-2 cm) to medium-grained (0.5-1.0 cm).
PRIMARY MINERALOGY:
 Plagioclase—Mode: 55%.
 Crystal size: Up to 2 cm.
 Crystal shape: Subhedral.
 Preferred orientation: Not determined.
 Percent replacement: Albitization.
 Clinopyroxene—Mode: 35%.
 Crystal size: Up to 2 cm.
 Crystal shape: Subhedral.
 Preferred orientation: Not determined.
 Percent replacement: <15% by green amphibole.
 Olivine—Mode: <2%.
 Crystal size: Up to 1.5 cm.
 Crystal shape: Anhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.
 Iron-titanium oxides—Mode: 10%.
SECONDARY MINERALOGY:
 Total percent: Up to 10% or more.
 Texture: Green amphibole replacement of clinopyroxene. Albitization of plagioclase. Sulfides.
 Percent vein material: Not determined.
 Vein material: Not determined.

118-735B-53R-5 (continued)

Fine-Grained Felsic Dike (Trondhjemite)**Piece 3 (left half)**

COLOR: Grayish-white.

LAYERING: None.

DEFORMATION: None.

PRIMARY MINERALOGY:

Plagioclase—Mode: 70%.

Crystal size: 0.1-1.0 mm.

Crystal shape: Subhedral.

Preferred orientation: Not determined.

Percent replacement: Not determined.

Quartz—Mode: 20%-25%.

Crystal size: 0.3-1.0 mm.

Crystal shape: Anhedral.

Preferred orientation: Not determined.

Percent replacement: Not determined.

Biotite—Mode: 3%-5%.

Crystal size: 0.1-2.0 mm.

Crystal shape: Subhedral.

Preferred orientation: Not determined.

Percent replacement: Not determined.

SECONDARY MINERALOGY: Not determined.

COMMENTS: >95% felsic minerals (plagioclase and quartz), some biotite.

118-735B-54R-1

UNIT 4: IRON-TITANIUM OXIDE GABBRO

Pieces 1-8B

Foliated Iron-Titanium Oxide Gabbro (Olivine-Bearing)

Pieces 1-8B

COLOR: Gray, with yellowish-olive speckles.

LAYERING: None apparent. On average, medium-grained, some coarser-grained (1.0-2.0 cm) intervals.

DEFORMATION: Defined by stretching of clinopyroxene, plagioclase, and olivine. Intensity varies over length of section. There are zones of intense foliation (Pieces 4A (top), 4C, 4E, 5, and 8A) alternating with zones of weak to very weak foliation. Pieces 6, 7, and the very top of 8A are mylonitized.

PRIMARY MINERALOGY:

Plagioclase—Mode: 55%.

Crystal size: Up to 2 cm.

Crystal shape: Subhedral.

Preferred orientation: Not determined.

Percent replacement: Not determined.

Clinopyroxene—Mode: 35%.

Crystal size: Up to 2 cm.

Crystal shape: Subhedral.

Preferred orientation: Not determined.

Percent replacement: < 10% by amphibole.

Olivine—Mode: < 5%.

Crystal size: Not determined.

Crystal shape: Not determined.

Preferred orientation: Not determined.

Percent replacement: Partially replaced.

SECONDARY MINERALOGY:

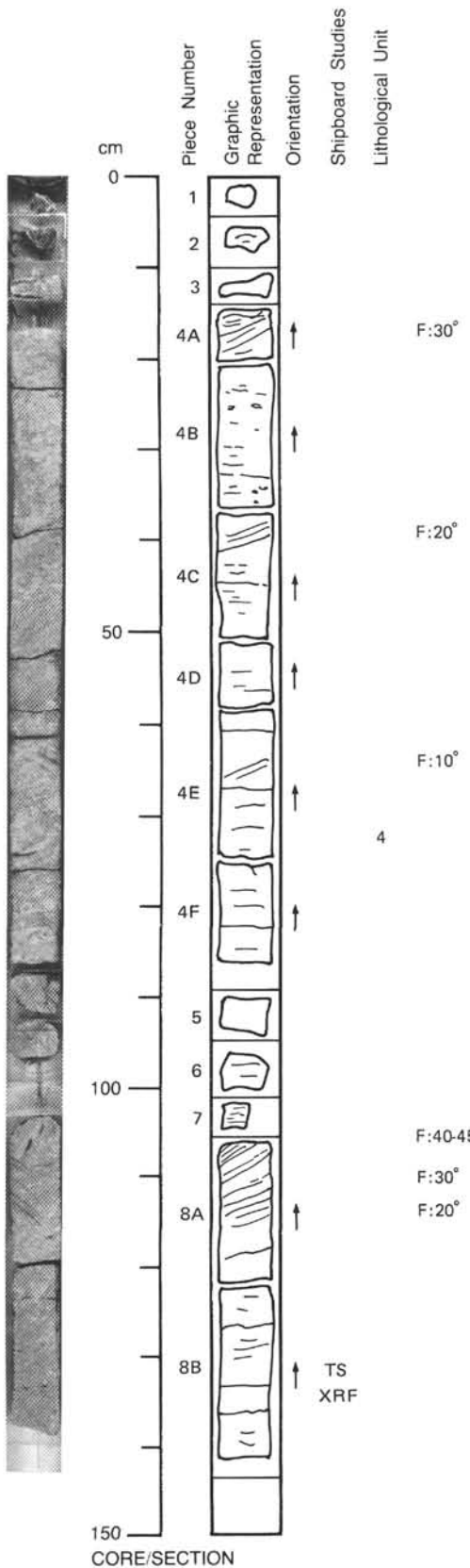
Total percent: < 10%.

Texture: Amphibole partially replaces clinopyroxene. Olivine partially replaced, alteration products could not be determined macroscopically, some black pseudomorphs. Sulfide dissemination—pyrite(?).

Percent vein material: Few veins and veinlets.

Vein material: Mostly filled with white minerals (albite?), especially Pieces 1, 2, 3, and 4A.

COMMENTS: Rock contains considerable amounts of iron-titanium oxides, precise proportion difficult to estimate. 2%-10% iron-titanium oxides (5% on average), occurring in layers and small bands. Olivine content varies over length of section from about 2% in upper third to about 10% in Pieces 8A and 8B. Average content is 5%.



CORE/SECTION

118-735B-54R-2

UNIT 4: IRON-TITANIUM OXIDE GABBRO

Pieces 1A-8

Iron-Titanium Oxide-Bearing Olivine Gabbro

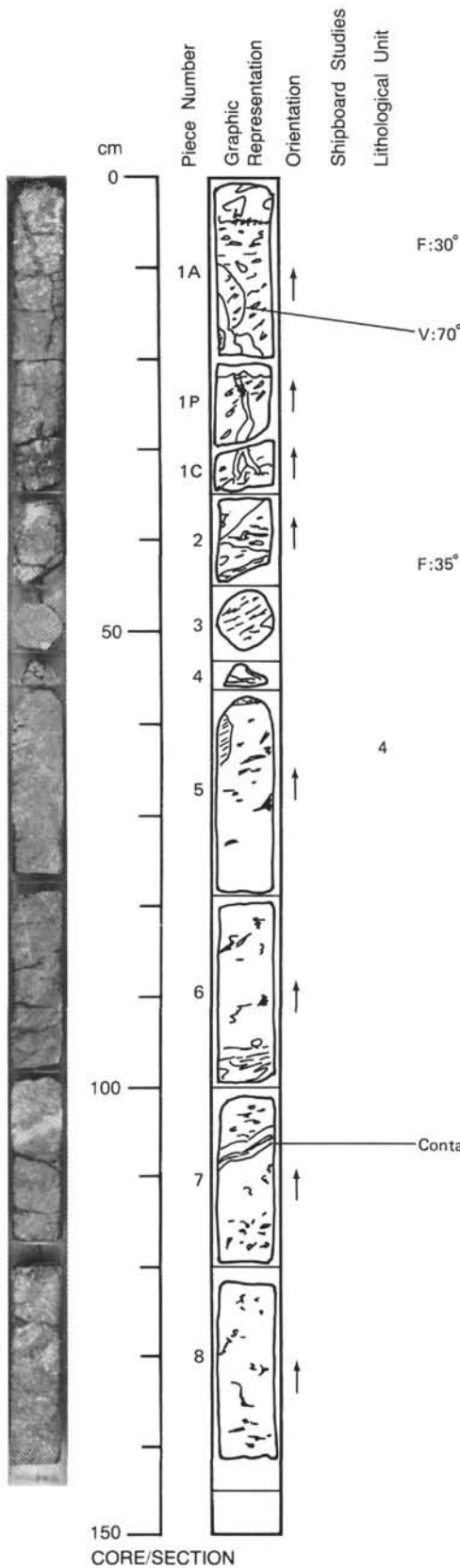
Pieces 1A (bottom)-1C (top), 3, 5 (bottom)-8

COLOR: Gray, olive-speckled.
LAYERING: None apparent.
DEFORMATION: Foliation defined by opaque streaks and elongated clinopyroxene and olivine grains in Pieces 1A, 1B, 2-5, 6 (top), and 7. Pieces 3 and 4 are typically prophyroclastic with mylonitic bands. The foliation is sharply cut by later felsic intrusion in Pieces 1A and 7.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 50%-60%.
 Crystal size: 5-20 mm.
 Crystal shape: Subhedral.
 Preferred orientation: Marked.
 Percent replacement: None apparent.
 Clinopyroxene—Mode: 15%-25%.
 Crystal size: 5-10 mm.
 Crystal shape: Subhedral to euhedral.
 Preferred orientation: Marked.
 Percent replacement: < 10% by amphibole.
 Olivine—Mode: 10%-25%.
 Crystal size: 5-20 mm.
 Crystal shape: Subhedral to euhedral.
 Preferred orientation: Marked.
 Percent replacement: Locally replaced by talc and tremolite or oxidized.
 Iron-titanium oxide—Mode: 5%-10%.
 Crystal size: Aggregates 5-10 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Marked.
 Percent replacement: None.
SECONDARY MINERALOGY:
 Total percent: < 7%.
 Texture: Amphibole after clinopyroxene less than 5%. Olivine is locally altered into chlorite? and oxidized in Pieces 4 and 5. Olivine fragments in felsic rock are altered into talc and tremolite.
 Percent vein material: Not determined.
 Vein material: Not determined.

Foliated Microgabbro

Pieces 4 and 5 (top)

COLOR: Greenish-gray.
LAYERING: Not determined.
DEFORMATION: Well-foliated; Foliation is parallel to the surrounding mylonitic one.
PRIMARY MINERALOGY: Primary mineralogy cannot be determined.
SECONDARY MINERALOGY: Not determined.
COMMENTS: 0.5 mm grainsize. Rich in amphibole (30%).



CORE/SECTION

Felsic Rock

Pieces 1A (top), 1C (bottom), 2, and 7.

COLOR: Light gray-white.

LAYERING: None.

DEFORMATION: None.

PRIMARY MINERALOGY:

Plagioclase—Mode: Not determined.

Crystal size: 0.5-1 mm.

Crystal shape: Euhedral.

Preferred orientation: Not clear.

Percent replacement: None.

Clinopyroxene—Mode: 3%.

Crystal size: 0.1 mm.

Crystal shape: Euhedral.

Preferred orientation: Not clear.

Percent replacement: Not determined.

Magnetite—Mode: 2%.

Crystal size: 0.5 mm.

Crystal shape: Euhedral.

Preferred orientation: Not clear.

Percent replacement: None.

SECONDARY MINERALOGY: Almost none.

COMMENTS: Quartz mode not determined.

118-735B-54R-3

UNIT 4: IRON-TITANIUM OXIDE GABBRO

Pieces 1A-7

Massive Iron-Titanium Oxide-Bearing Olivine Gabbro

Pieces 1A-7

COLOR: Medium gray.
LAYERING: Weak primary layering; indicated by slight grain size variations: Pieces 1, 2 (upper half), 3, and top of 7 are coarse-grained (1-2 cm); the remainder is medium-grained.
DEFORMATION: Very weak, if any. Slight foliation to be observed in Piece 4.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 55%.
 Crystal size: Up to 3 cm.
 Crystal shape: Subhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

 Clinopyroxene—Mode: 35%.
 Crystal size: Up to 3 cm.
 Crystal shape: Subhedral.
 Preferred orientation: Not determined.
 Percent replacement: <10% by amphibole.

 Olivine—Mode: <2%-8%, (5% on average).
 Crystal size: Up to 3 cm.
 Crystal shape: Anhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

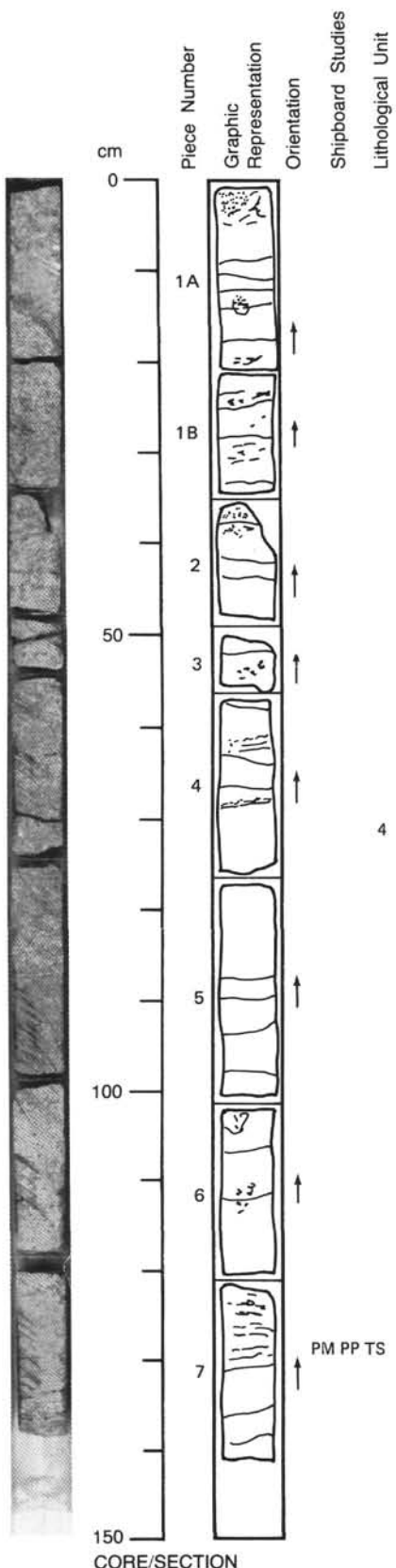
 Iron-titanium oxides—Mode: <1%-5%, (3% on average).
SECONDARY MINERALOGY:
 Total percent: <15%.
 Texture: Amphibole replacement, especially along grain boundaries. Olivine in parts fresh.
 Pyrite.
 Percent vein material: Few veins and veinlets with white mineral(s).
 Vein material: Not determined.
COMMENTS: Iron-titanium oxide enrichment indicated by stippled zones.

F:5°

F:5°

4

PM PP TS



CORE/SECTION

UNIT 4: IRON-TITANIUM OXIDE GABBRO

Pieces 1-6

Olivine Gabbro Rich in Iron-Titanium Oxides

Pieces 1-6

COLOR: Gray-green.

LAYERING: Faint grain-size layering in Piece 1. Magmatic foliation in Pieces 1, 3B, and 4.

DEFORMATION: A zone of deformation in Pieces 2 and 3. The plastic foliation is deformed by discrete shear zones with a normal offset. The iron-titanium oxides tend to concentrate in these shear bands.

PRIMARY MINERALOGY:

Plagioclase—Mode: 55%.
 Crystal size: Medium to coarse.
 Crystal shape: Euhedral to anhedral.
 Preferred orientation: Marks foliation.
 Percent replacement: Not determined.

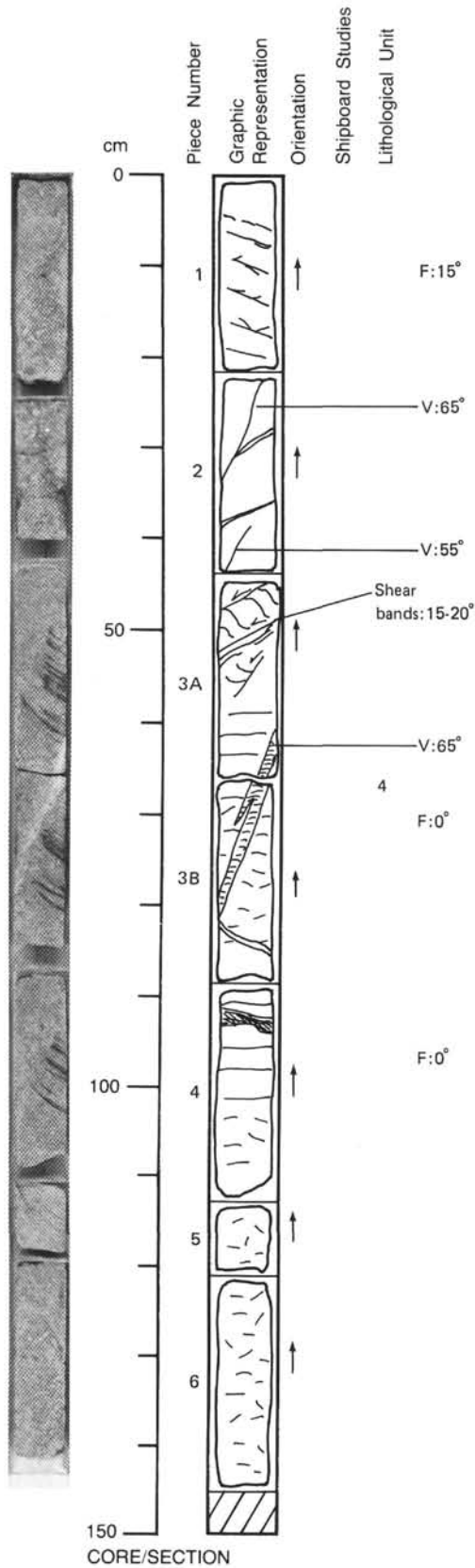
Clinopyroxene—Mode: 30%.
 Crystal size: Medium to coarse.
 Crystal shape: Anhedral.
 Preferred orientation: Marks foliation.
 Percent replacement: Not determined.

Olivine—Mode: 10%-15%.
 Crystal size: Medium to coarse.
 Crystal shape: Anhedral.
 Preferred orientation: Marks foliation.
 Percent replacement: Not determined.

Iron-titanium oxides—Mode: Up to 10%-20% in enriched zones: late primary or secondary?

SECONDARY MINERALOGY:

Total percent: Not determined.
 Texture: Clinopyroxene amphibolitized (green amphibole) and plagioclase albitized, especially in Piece 2. Alteration of a certain amount of clinopyroxene to brown amphibole?
 Percent vein material: Not determined.
 Vein material: Not determined.



118-735B-54R-5

UNIT 4: IRON-TITANIUM OXIDE GABBRO

Pieces 1-6

Iron-Titanium Oxide Gabbro

Pieces 1-6

COLOR: Gray.

LAYERING: Igneous lamination defined by elongated plagioclase and clinopyroxene is subhorizontal in most places, but dips up to 30° in Piece 2C.

DEFORMATION: Weak foliation, best developed in middle of Piece 3B.

PRIMARY MINERALOGY:

Plagioclase—Mode: 40%-45%.

Crystal size: 5-15 mm.

Crystal shape: Subhedral.

Preferred orientation: Not determined.

Percent replacement: Not determined.

Clinopyroxene—Mode: 30%-40%.

Crystal size: 5-10 mm.

Crystal shape: Subhedral.

Preferred orientation: Not determined.

Percent replacement: Not determined.

Olivine—Mode: 5%-10%.

Crystal size: 3-8 mm.

Crystal shape: Subhedral.

Preferred orientation: Not determined.

Percent replacement: Not determined.

Iron-titanium oxide—Mode: 10%-20%, fine-grained aggregates.

SECONDARY MINERALOGY:

Total percent: 10%.

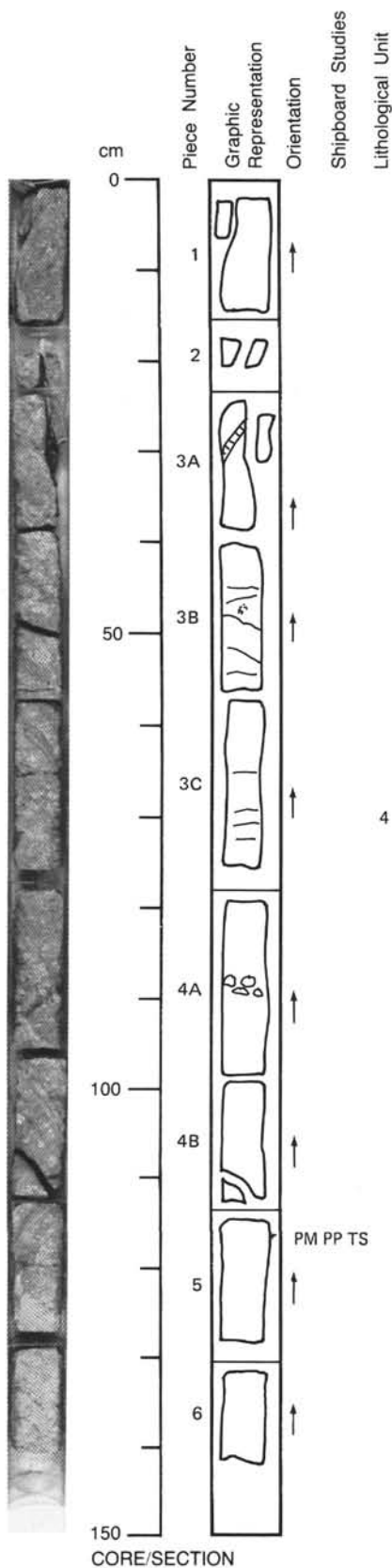
Texture: Black chloritic clay (?) or magnetite (?) replacing olivine. Green amphibole replacing clinopyroxene, but not as extensively as some nearby sections.

Percent vein material: Not determined.

Vein material: White (0.5-1 mm) veins are subhorizontal. Plagioclase-amphibole vein in Piece 3A.

COMMENTS:

Fresh olivine intergrown with primary iron-titanium oxide. Coarse-grained, pyroxene-rich interval in the middle of Piece 4A.



118-735B-54R-6

UNIT 4: IRON-TITANIUM OXIDE GABBRO

Pieces 1-4

Iron-Titanium Oxide Gabbro

Pieces 1-4

COLOR: Gray.

LAYERING: Primary layering defined by variation in grain-size from coarse to very coarse in Pieces 1 and 4 and by preferred orientation of clinopyroxene in Pieces 1 and 2.

DEFORMATION: Very weak foliation (?) parallel to primary layering in Piece 2.

PRIMARY MINERALOGY:

Plagioclase—Mode: 40%-45%.

Crystal size: 5-15 mm.

Crystal shape: Anhedral.

Preferred orientation: Locally in plane of foliation.

Percent replacement: Not determined.

Clinopyroxene—Mode: 30%-40%.

Crystal size: 5-10 mm.

Crystal shape: Anhedral.

Preferred orientation: Locally in plane of foliation.

Percent replacement: Not determined.

Olivine—Mode: 5%.

Crystal size: 3-8 mm.

Crystal shape: Euhedral.

Preferred orientation: None.

Percent replacement: Fresh.

Ilmenite—Mode: 10%-20%.

Crystal size: Fine-grained aggregates.

Crystal shape: Anhedral, rounded.

Preferred orientation: None.

Percent replacement: 0%.

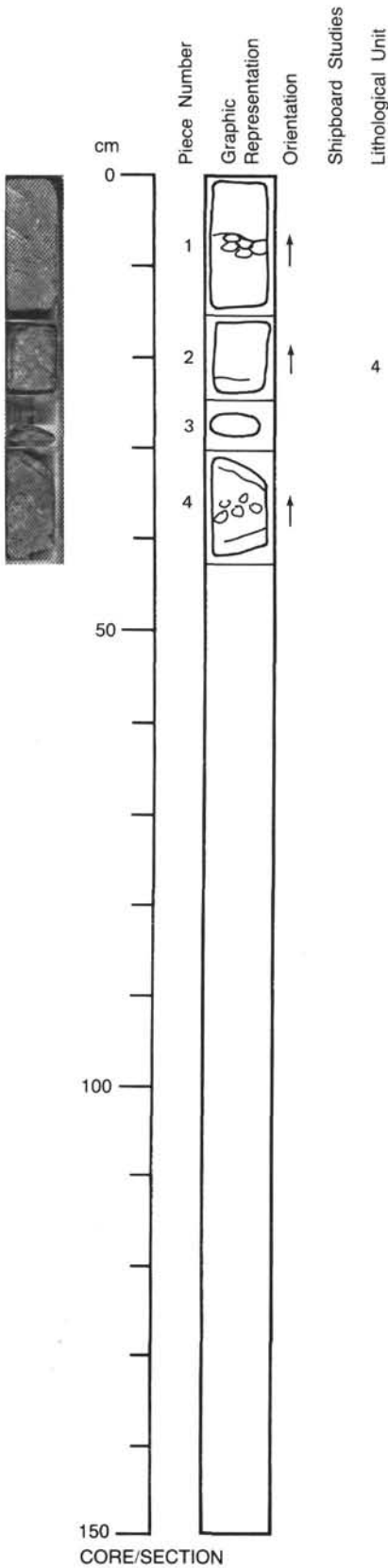
SECONDARY MINERALOGY:

Total percent: 10%.

Texture: Green amphibole replacing clinopyroxene at grain boundaries and plagioclase along fractures. Thin, white vein in Piece 1 is nearly horizontal. Trace of sulfides throughout.

Percent vein material: Not determined.

Vein material: White mineral, probably sodic plagioclase.



118-735B-55R-1

UNIT 4: IRON-TITANIUM OXIDE GABBRO

Pieces 1-8

Iron-Titanium Oxide Gabbro

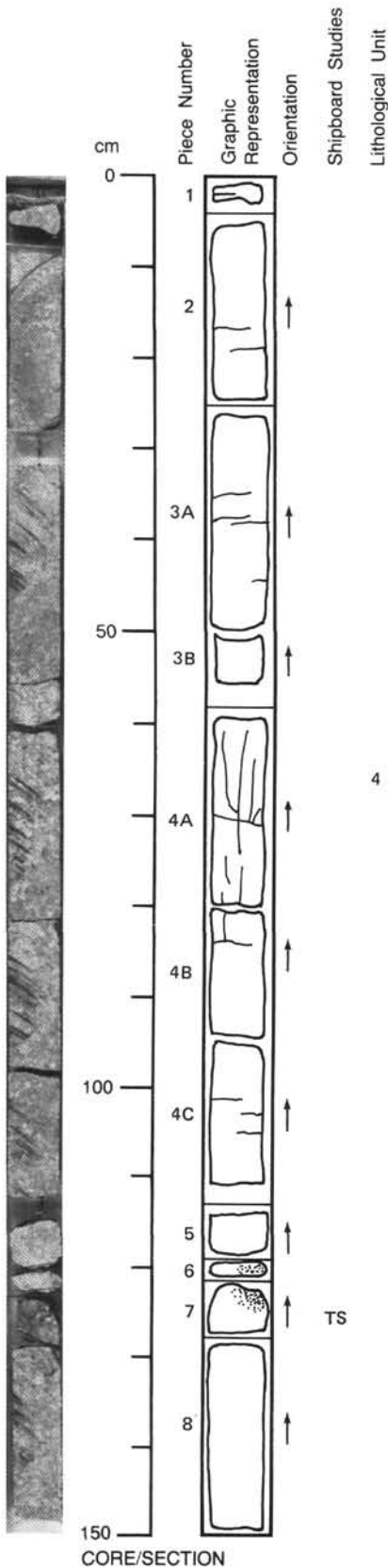
Pieces 1-8

COLOR: Gray.
LAYERING: Subtle layering throughout defined by changes in grain size and preferred orientation of pyroxenes.
DEFORMATION: None apparent.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 40%-45%.
 Crystal size: 5-20 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: 25%-30% albitization.

 Clinopyroxene—Mode: 45%.
 Crystal size: 3-20 mm.
 Crystal shape: Subhedral.
 Preferred orientation: None.
 Percent replacement: 40%-50% by amphibole.

 Olivine—Mode: 0%-5%.
 Crystal size: 3-5 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: 100% by amphibole.

 Iron-titanium oxides—Mode: 10%.
 Crystal size: 1-3 mm.
 Crystal shape: Anhedral, rounded.
 Preferred orientation: None.
 Percent replacement: 0%.
SECONDARY MINERALOGY:
 Total percent: 20%-30%.
 Texture: Clinopyroxene replaced partially by amphibole. Alteration most intense in Piece 4A, where plagioclase is milky white and albitized and portions of Pieces 6 and 7, where alteration includes a white fibrous to platy mineral growing into apparently open voids and green minerals, actinolite and chlorite (?). Trace of sulfides throughout. Numerous tiny amphibole veinlets throughout.
 Percent vein material: Not determined.
 Vein material: Amphibole, chlorite, and a white mineral.
COMMENTS: A few euhedral plagioclases enclosed in clinopyroxene, but not strong subophitic texture as seen in earlier cores.



UNIT 4: IRON-TITANIUM OXIDE GABBRO

Pieces 1A-6

Iron-Titanium Oxide-Bearing Olivine Gabbro

Pieces 1A-6

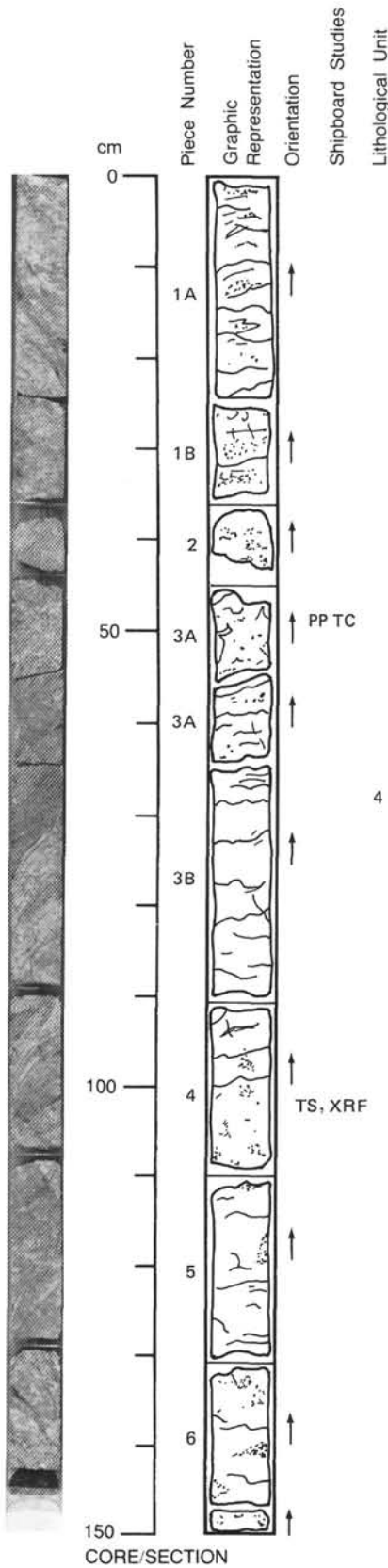
COLOR: Dark gray to gray.
LAYERING: None apparent.
DEFORMATION: Very weak in Pieces 1A, 1B, 2, 3A, and 3B. Pyroxene is aligned in a preferred orientation, and plagioclase has a granular surface. This deformation is in part primary.

PRIMARY MINERALOGY:
 Plagioclase—Mode: 50%-60%.
 Crystal size: 1-6 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Not visible.
 Percent replacement: None.

Clinopyroxene—Mode: 40%-50%.
 Crystal size: 2-12 mm.
 Crystal shape: Anhedral to subhedral.
 Preferred orientation: Weak but measurable.
 Percent replacement: Slight to moderate.

Olivine—Mode: 1%-2%.
 Crystal size: 1-3 mm.
 Crystal shape: Rounded.
 Preferred orientation: Not visible.
 Percent replacement: Severely.

SECONDARY MINERALOGY:
 Total percent: Not determined.
 Texture: Olivine replaced by black chlorite and orangish brown iron hydroxides. Clinopyroxene partly replaced by amphiboles. Cracks and veinlets filled by plagioclase (flat cracks) and irregularly oriented veinlets filled with amphibole (in pyroxene, plagioclase, matrix). Sulfides are relatively abundant (up to 1% in Piece 5), mainly pyrite with granular shape, seen in cracks or disseminated in the rock. There are <1-2 mm thick patches. In Piece 5 sulfides are filling small fractures, cutting amphibole and chlorite.
 Percent vein material: Not determined.
 Vein material: Not determined.



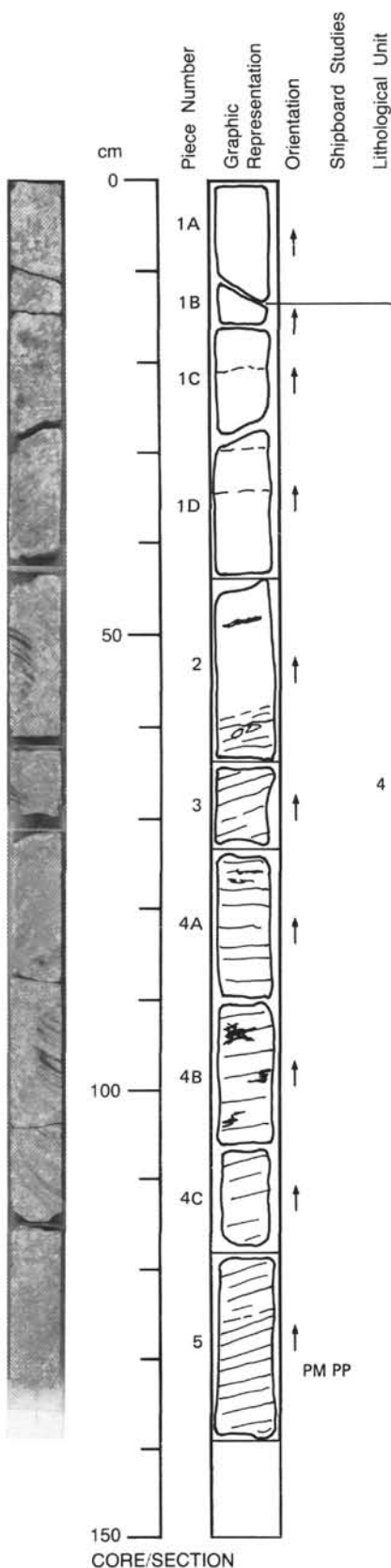
118-735B-55R-3

UNIT 4: IRON-TITANIUM OXIDE GABBRO

Pieces 1A-5

Olivine and Iron-Titanium Oxide-Bearing Gabbro

Pieces 1A-5



COLOR: Grayish black.
LAYERING: Some grain-size layering, subhorizontal. No magmatic lamination, no compositional layering apparent, except for subhorizontal oxide-rich layers.
DEFORMATION: No deformation above 60 cm. Plastic deformation increasing from 60 to 140 cm. Foliation subhorizontal. Texture: poorly foliated to well foliated (porphyroclastic).
PRIMARY MINERALOGY:
 Plagioclase—Mode: 50%-60%.
 Crystal size: 1-15 mm.
 Crystal shape: Euhedral to anhedral.
 Preferred orientation: Marks foliation.
 Percent replacement: Some albitization in Piece 1A.

 Clinopyroxene—Mode: 35%-40%.
 Crystal size: 1-15 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Marks foliation.
 Percent replacement: 30% by amphibole.

 Olivine—Mode: <5%.
 Crystal size: 1-10 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Marks foliation.
 Percent replacement: Replaced by amphibole.

 Iron-titanium oxides—Mode: Up to 20% in places. Late primary and secondary.
SECONDARY MINERALOGY:
 Total percent: >30%.
 Texture: Pseudomorphic amphibole after clinopyroxene and olivine. Not much albitization of plagioclase, except in Piece 1A.
 Percent vein material: <1%.
 Vein material: Amphibole and sulfide vein in Piece 1; also very small subhorizontal white veins.

CORE/SECTION

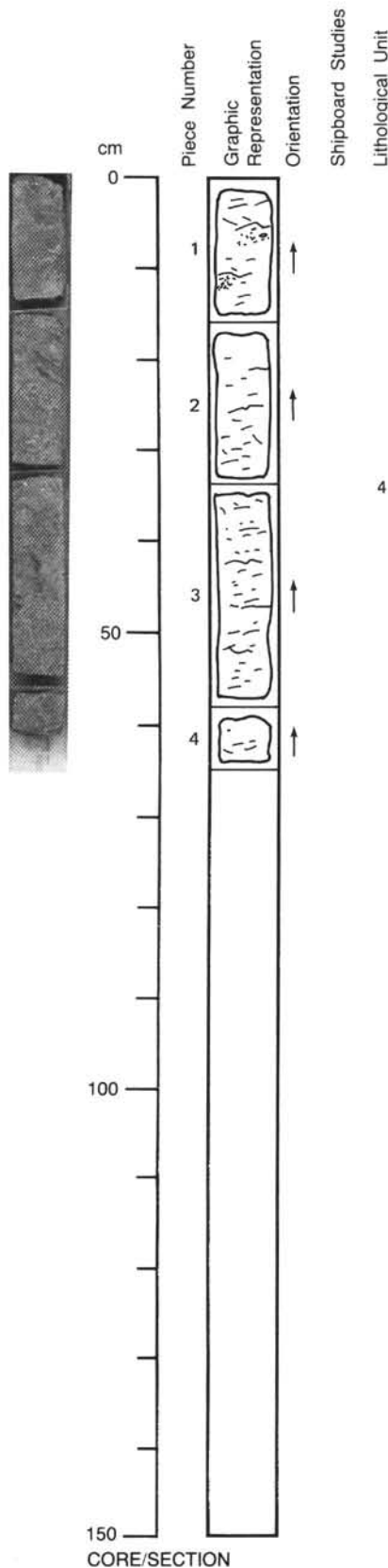
118-735B-55R-4

UNIT 4: IRON-TITANIUM OXIDE GABBRO

Pieces 1-4

Iron-Titanium Oxide and Olivine-Bearing Gabbro

Pieces 1-4



COLOR: Gray to greenish gray.

LAYERING: A distinct lamination to this section. Distinct olivine-rich zones (with grains up to 1 cm) occur at 35 and 58 cm, but olivine occurs throughout—size layering is indistinct; coarse at 65 cm, medium to 36 cm, coarser at 35 cm to mixed fine and medium at 10-15 cm, back to coarse at 0-5 cm.

DEFORMATION: A well-developed lamination may be in part deformational. Several subhorizontal brittle fractures cut core.

PRIMARY MINERALOGY:

Plagioclase—Mode: 30%-70%; some small-scale pyroxene-plagioclase variation.

Crystal size: 1-13 mm.

Crystal shape: Subhedral to anhedral, rarely euhedral in clinopyroxene.

Preferred orientation: Elongate in lamination.

Percent replacement: Not determined.

Clinopyroxene—Mode: 20%-60%.

Crystal size: 1-12 mm.

Crystal shape: Anhedral-subhedral.

Preferred orientation: Very elongate pyroxene in lamination.

Percent replacement: Up to 30% by amphibole.

Olivine—0%-15% locally.

Crystal size: 2-15 mm.

Crystal shape: Anhedral.

Preferred orientation: Elongate in lamination.

Percent replacement: Tremolite/opaque replacements common.

Iron-titanium oxides—Mode: 2%-10%.

Crystal size: < 1-4 mm.

Crystal shape: Anhedral, interstitial.

Preferred orientation: Not determined.

Percent replacement: Not determined.

SECONDARY MINERALOGY:

Total percent: 5%-30%.

Texture: Significant replacement of clinopyroxene by amphibole. Slight greenish cast to a lot of clinopyroxene. Also, a little talc-tremolite after clinopyroxene or olivine.

Percent vein material: Not determined.

Vein material: Not determined.

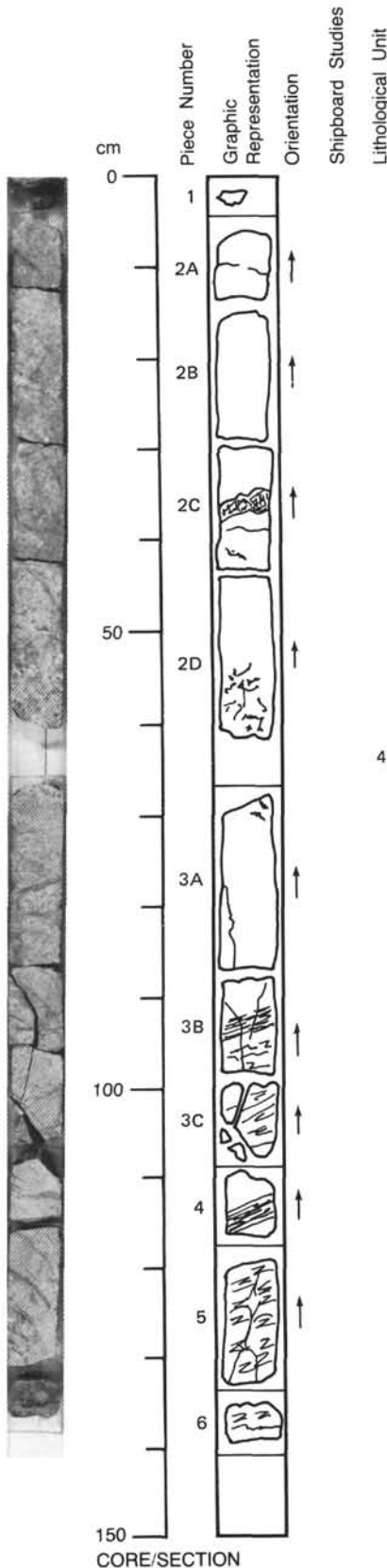
118-735B-56R-1

UNIT 4: IRON-TITANIUM OXIDE GABBRO

Pieces 1-6

Olivine Bearing Iron-Titanium Oxide Gabbro

Pieces 1-6



COLOR: Gray; gray to white where veined.

LAYERING: Two coarse to fine transitions, one long medium-grained interval. Olivine identified in zones at 8, 30-35, 40-50, 82, 100-105, and 129 cm. A pyroxene-ilmenite-rich band at 37 cm dips into core at about 10°.

DEFORMATION: Weak lamination in core, with a rather sharp contact with mylonite zone at 93 cm. There is a lot of brittle fracturing, particularly at 90-140 cm. At 93-95 cm and 114-117 cm there are bands of mylonitized iron-titanium oxide olivine gabbro. There are lenses and grains of gabbro in mylonite. At 95-114 cm and 117-140 cm there are zones of porphyroclastic iron-titanium oxide olivine gabbro.

PRIMARY MINERALOGY:

Plagioclase—Mode: 20%-60%.
 Crystal size: 1-10 mm.
 Crystal shape: Euhedral to anhedral.
 Preferred orientation: Weak magmatic(?) foliation.
 Percent replacement: Not determined

Clinopyroxene—Mode: 40%-60%.
 Crystal size: 1-15 mm.
 Crystal shape: Subhedral-anhedral.
 Preferred orientation: Weak magmatic(?) foliation.
 Percent replacement: Extensively altered to amphibole

Olivine—Mode: 0%-8%.
 Crystal size: 2-4 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Not determined.
 Percent replacement: Commonly altered to talc/tremolite

Iron-titanium oxide—Mode: 2%-15%.
 Crystal size: 0.5-4 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

SECONDARY MINERALOGY:

Total percent: Moderate to extensive (30%?) mostly of ferromagnesians.
 Texture: Pyroxene has a very greenish cast—probably altered in large part to fine-grained amphibole. Plagioclase appears fresh. Minor amphibole growth along veins.
 Percent vein material: Not determined.
 Vein material: Not determined.

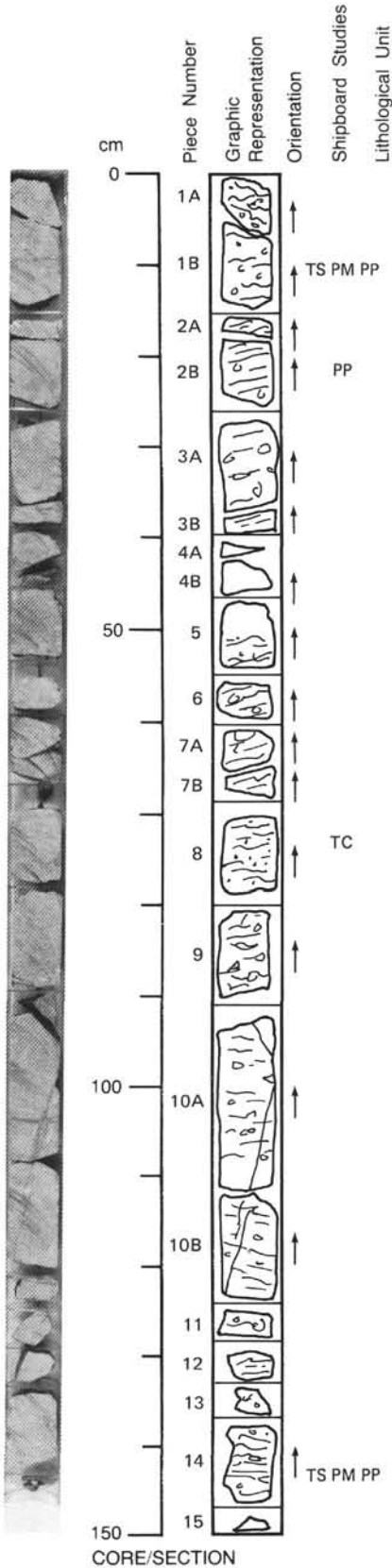
COMMENTS: A feldspathic zone occurs at 55-60 cm; largely coarse, primary plagioclase surrounded by a network of fine, granular textured, white feldspathic material. Hard to tell if there is any quartz. Could be a late stage magmatic-deuteric vein or a brecciated zone with white granulated plagioclase.

UNIT 4: IRON-TITANIUM OXIDE GABBRO

Pieces 1A-15

Mylonitized Magnetite-Olivine Gabbro

Pieces 1A-15



COLOR: Gray.

LAYERING: Olivine-rich zones (Piece 3A) suggest an original primary igneous layering, now obscured by deformation.

DEFORMATION: Mylonitized and finely laminated.

PRIMARY MINERALOGY:

Plagioclase—Mode: 60%(?).

Crystal size: Very fine (< 1 mm), except augen.

Crystal shape: Anhedral.

Preferred orientation: Strained and recrystallized grains define lamination.

Percent replacement: Not determined

Clinopyroxene—Mode: 15%(?).

Crystal size: Very fine (< 1 mm), except augen.

Crystal shape: Anhedral.

Preferred orientation: Strained and recrystallized grains define lamination.

Percent replacement: Not determined

Olivine—Mode: 0%-7%, estimated.

Crystal size: Very fine (< 1 mm), except augen.

Crystal shape: Anhedral.

Preferred orientation: Strained and recrystallized grains define lamination.

Percent replacement: Not determined

Magnetite/Ilmenite—Mode: 10%-13%.

Crystal size: Very fine (< 1 mm).

Crystal shape: Anhedral(?).

Preferred orientation: Not determined.

Percent replacement: Not apparent in hand specimen.

SECONDARY MINERALOGY:

Total percent: Up to 30% amphibole and chlorite seen locally.

Texture: Very fine grained laminated mylonite with numerous rolled clinopyroxene augen.

Olivine-rich zones include coarse augen of olivine with an elongate sigmoidal shape stretched in the plane of foliation. Pyroxene augen tend to be rolled and circular. Alteration: Fresh olivine augen suggest little alteration locally. Under binocular scope some green amphibole can be seen along foliation and replacing pyroxene, which amounts to more than 25% in one thin section.

Percent vein material: < 1%.

Vein material: Not determined.

COMMENTS: Too mylonitized to estimate original proportions in hand specimen.

118-735B-56R-3

UNIT 4: IRON-TITANIUM OXIDE GABBRO

Pieces 1-33

Mylonitic Gabbro

Pieces 1 and 2

COLOR: Light gray.
LAYERING: None.
DEFORMATION: Intense, small rotated augen of pyroxene in very thin plagioclase-amphibole banding. Augen extend up to 3 mm to less than 1 mm.

PRIMARY MINERALOGY:
 Plagioclase—Mode: 60%.
 Crystal size: 1-3 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Strong.
 Percent replacement: Extensive

Clinopyroxene—Mode: 40%.
 Crystal size: 1-3 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Strong.
 Percent replacement: Extensive to 10%

Olivine—Mode: Trace amounts.
 Crystal size: < 1 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Strong.
 Percent replacement: Extensive.

SECONDARY MINERALOGY:
 Total percent: Not determined.
 Texture: Chlorite along fault planes. Amphibole replaces pyroxene. Chalcopyrite-pyrite in Piece 2.
 Percent vein material: Not determined.
 Vein material: Not determined.

COMMENTS: Primary mineralogy is very approximate.

Poorly to Well-Foliated Metagabbro

Pieces 3-33

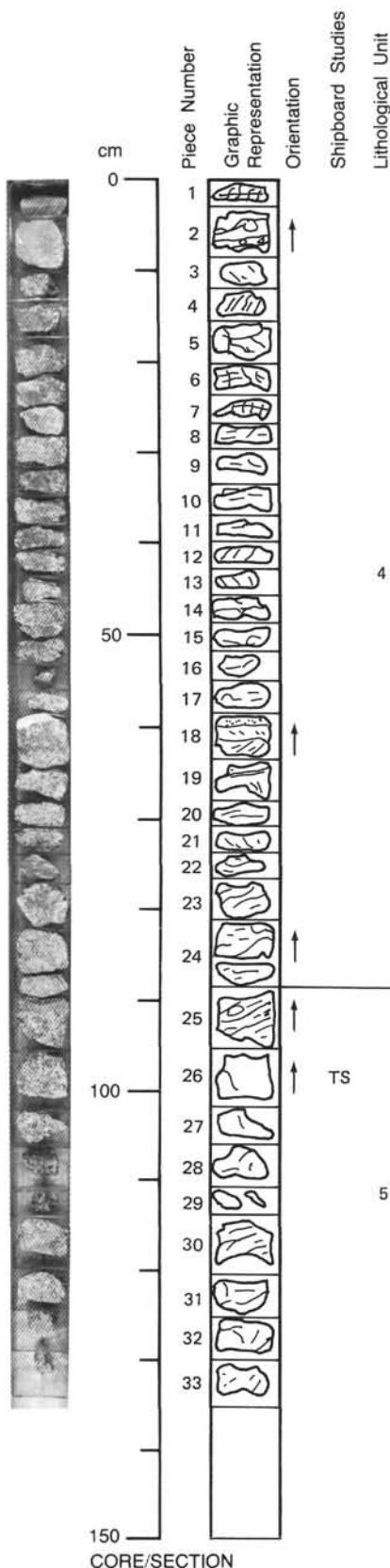
COLOR: Dark to medium green.
LAYERING: None.
DEFORMATION: Variable, from brecciated to poorly developed foliation to well developed foliation. Plagioclase and pyroxene are flattened.

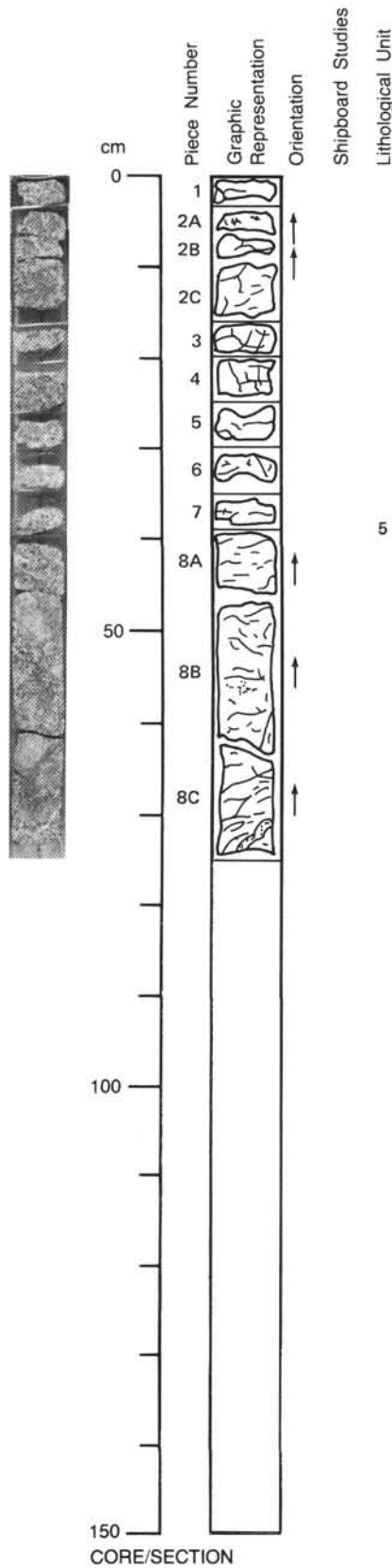
PRIMARY MINERALOGY:
 Plagioclase—Mode: 20%-50%.
 Crystal size: 2-5 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Not evident.
 Percent replacement: Slight. Plagioclase is granulated and partly epidotized

Clinopyroxene—Mode: 50%-60%.
 Crystal size: 2-7 mm.
 Crystal shape: Anhedral, lens.
 Preferred orientation: Weak.
 Percent replacement: 80% by amphibole.

SECONDARY MINERALOGY:
 Total percent: Not determined.
 Texture: Pseudomorphic. Amphiboles replace clinopyroxene. Epidote (yellow-green) replaces plagioclase, about 30%. Iron oxides (black) <5% in all pieces. Sulfides in Pieces 10, 11, 19, 22, 26, 28, and 29 (chalcopyrite).
 Percent vein material: Not determined.
 Vein material: Plagioclase, quartz, epidote, actinolite, and colorless fibrous (hair-like) minerals (tremolite?).

COMMENTS: Piece 33 is porphyroclastic.





UNIT 5: OLIVINE GABBRO

Pieces: 1-8C

Gabbro (brecciated)

Pieces 1-8C

COLOR: Greenish gray.

LAYERING: Not apparent.

DEFORMATION: Not apparent.

PRIMARY MINERALOGY:

Plagioclase—Mode: 60%.

Crystal size: 1-5 mm.

Crystal shape: Anhedral.

Preferred orientation: Not apparent.

Percent replacement: Slight

Clinopyroxene—Mode: 40%.

Crystal size: 2-4 mm.

Crystal shape: Euhedral.

Preferred orientation: Not apparent.

Percent replacement: Moderate.

SECONDARY MINERALOGY:

Total percent: 50%.

Texture: Amphibole replaces pyroxene along cracks, cleavage planes or margins.

Percent vein material: Not determined.

Vein material: Plagioclase, amphibole, and prehnite(?). Veins are filled by plagioclase and amphibole in Pieces 2A, 2B, 2C, and 8B. A light green fibrous mineral in a cavity of Piece 8B could be prehnite. Plagioclase has a green color.

118-735B-57R-1

UNIT 5: OLIVINE GABBRO

Pieces: 1A-4C

Gabbro and Gabbro Breccia

Pieces 1A-4C

COLOR: Gray.

LAYERING: None obvious; a little olivine concentrated at 25-28 cm.

DEFORMATION: Gabbroic blocks are broken up into clasts and grains with a white "veining" between blocks in the intervals 0-15, 44-66, 95-125, and 135-140 cm. Clasts range from 2 mm pyroxene grains to 5 cm blocks of intact gabbro. "Veining" is largely granulated plagioclase. Where the veins are largest, rock is disaggregated into pyroxene grains floating in a plagioclase matrix.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%-60%.

Crystal size: 1-4 mm.

Crystal shape: Subhedral-anhedral.

Preferred orientation: None.

Percent replacement: Not determined

Clinopyroxene—Mode: 40%-50%.

Crystal size: 1-4 mm.

Crystal shape: Subhedral-anhedral.

Preferred orientation: None.

Percent replacement: Some amphibole after clinopyroxene.

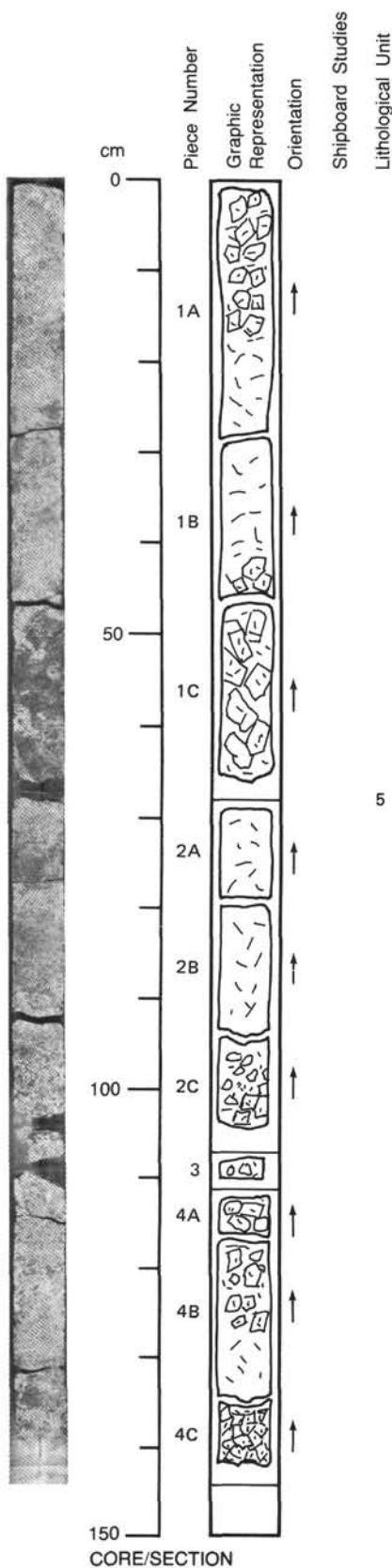
SECONDARY MINERALOGY:

Total percent: Various.

Texture: Some amphibole after clinopyroxene. There is about 2% void space from pyroxene breakup and alteration. Actinolite and feldspar grains occur growing into a void at 3 cm. Some of the plagioclase has been recrystallized. All of the olivine has been pseudomorphed by talc; these pseudomorphs swell out of the core when it is wet.

Percent vein material: Not determined

Vein material: Not determined.



CORE/SECTION

UNIT 5: OLIVINE GABBRO

Pieces 1A-3E

Olivine Gabbro

Pieces 1A-3E

COLOR: Gray (mottled gray to white due to alteration).

LAYERING: None apparent.

DEFORMATION: No apparent foliation.

PRIMARY MINERALOGY:

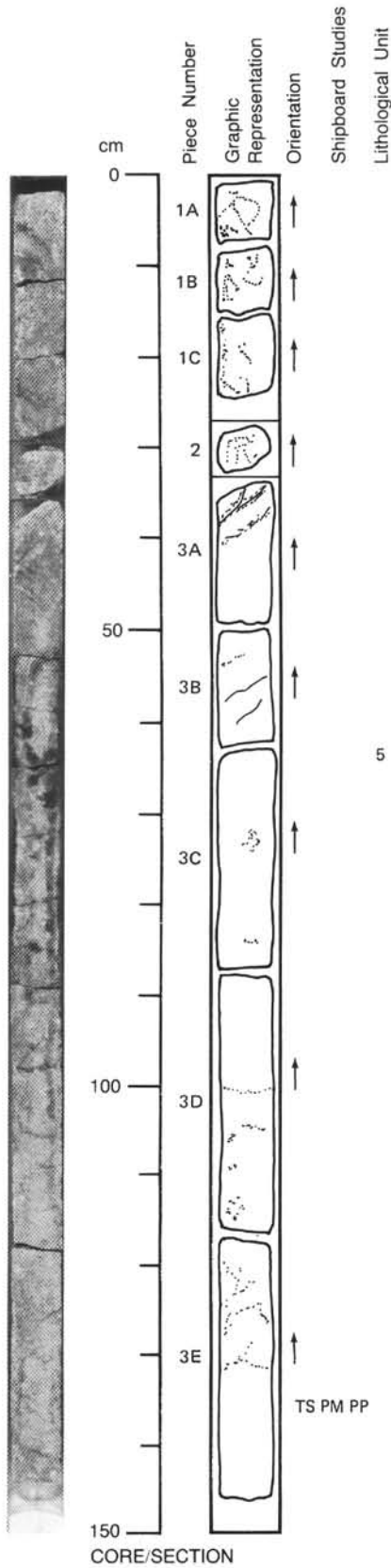
Plagioclase—Mode: 50%.
 Crystal size: <1 mm to 1 cm.
 Crystal shape: Anhedral to euhedral.
 Preferred orientation: None.
 Percent replacement: Slight to moderate

Clinopyroxene—Mode: 45%-50%.
 Crystal size: 1 mm to 1 cm.
 Crystal shape: Subhedral to anhedral.
 Preferred orientation: None.
 Percent replacement: Slight to moderate

Olivine—Mode: 0%-5%. Olivine most abundant in Piece 3C. None observed above 40 cm.
 Crystal size: 3-5 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Not determined.
 Percent replacement: Slight to moderate.

SECONDARY MINERALOGY:

Total percent: Slight to moderate.
 Texture: Amphibole replaces rims of clinopyroxene and forms diffuse network throughout most of section. Plagioclase locally has a milky white appearance particularly in Pieces 1A-C, 2, top of 3A, bottom of 3D, and 3E. Some may be altered plagioclase to Na-plagioclase, but some appears to be mechanical granulation of feldspar. Particularly well-developed around veins at top of Piece 3A. Olivine partially altered to dark mineral, maybe clay or serpentine. Larger veins in Piece 1A-C and Piece 3A include chlorite + plagioclase + epidote(?). Traces of sulfides throughout. Intense granulation in some areas between 0-40 cm yield small, even grain sizes. Mixture of light and dark minerals produces spotty appearance.
 Percent vein material: Not determined.
 Vein material: Na-plagioclase, chlorite, amphibole, and epidote(?).



CORE/SECTION

118-735B-57R-3

UNIT 5: OLIVINE GABBRO

Pieces 1A-5C

Autoclastic Gabbro Breccia

Pieces 1A-5C

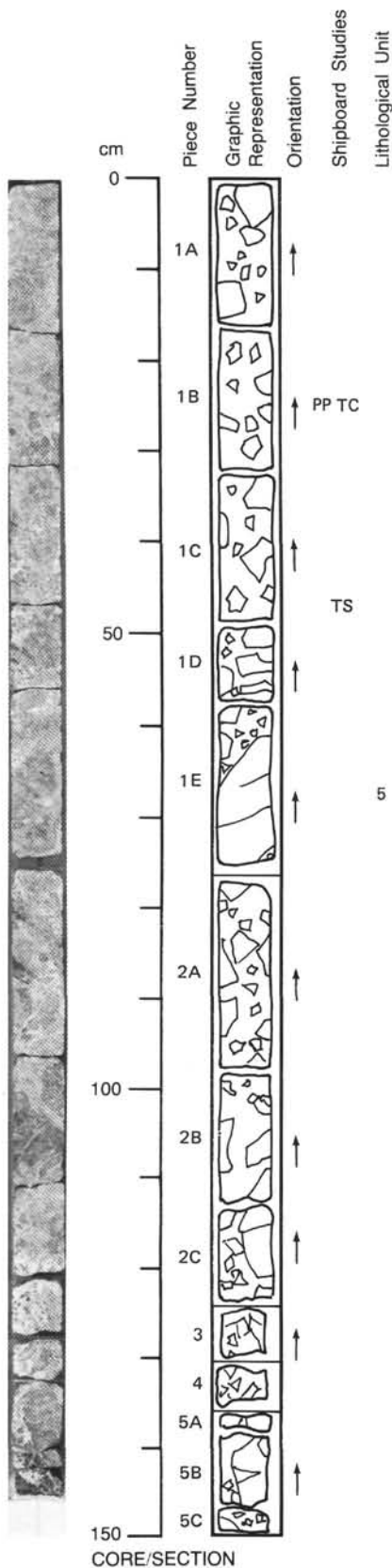
COLOR: Gray-white.
LAYERING: None.
DEFORMATION: Brecciated with albite or sodic plagioclase.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 55%.
 Crystal size: Medium to coarse.
 Crystal shape: Subhedral to anhedral.
 Preferred orientation: None.
 Percent replacement: Not determined

Clinopyroxene—Mode: 44%.
 Crystal size: Medium to coarse.
 Crystal shape: Subophitic.
 Preferred orientation: None.
 Percent replacement: Not determined, but locally extensive to amphibole and chlorite

Olivine—Mode: 1%.
 Crystal size: Not determined.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: 100%.

SECONDARY MINERALOGY:
 Total percent: Not determined.
 Texture: Between 120 and 150 cm the alteration is much more intense with pyroxene fragments altered to dark green-black amphibole and the formation of a vuggy hydrothermal vein containing abundant brown clinozoisite, green actinolite, and chlorite in a matrix of hydrothermal feldspar and gabbro clasts.
 Percent vein material: 20-40%.
 Vein material: Mixture of hydrothermal and recrystallized plagioclase, mineral fragments, and amphibole with small amounts of chlorite and epidote. Possible patch of bright green talc present.

COMMENTS: Primary texture of gabbro clasts consists of subophitic clinopyroxene enclosing and interlocking with subhedral to anhedral plagioclase in an equigranular texture.



UNIT 5: OLIVINE GABBRO

Pieces 1A-5C

Olivine Gabbro

Pieces 1A-5C

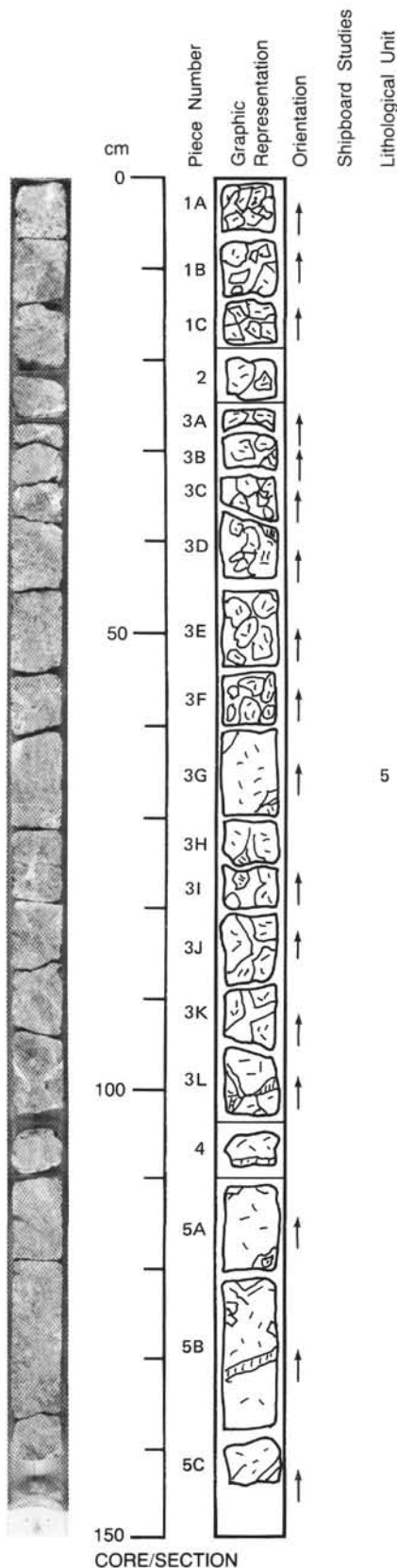
COLOR: Gray with white veins and patches.
LAYERING: None apparent. Coarse grained throughout. Olivine scattered irregularly in 2 intervals at 38-75 cm, and 120-140 cm.
DEFORMATION: Broken into 3-100 mm angular fragments with zones of white-gray deformed plagioclase between them. Some veining.

PRIMARY MINERALOGY:
 Plagioclase—Mode: 40%-60%.
 Crystal size: 3-10 mm.
 Crystal shape: Anhedral-subhedral.
 Preferred orientation: None.
 Percent replacement: Not determined

Clinopyroxene—Mode: 40%-50%.
 Crystal size: 3-15 mm.
 Crystal shape: Subhedral to anhedral, with some oikocrysts.
 Preferred orientation: None.
 Percent replacement: Partially amphibolitized, up to 60% in places

Olivine—Mode: 0%-3%.
 Crystal size: 2-9 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: At 40-70 cm altered to chlorite/amphibole. At 120-140 cm altered to reddish-clayey clots.

SECONDARY MINERALOGY:
 Total percent: Various.
 Texture: Up to 60% of the clinopyroxene may be replaced by fine green amphibole.
 Percent vein material: Concentrated at 100 cm but occur in several intervals.
 Vein material: There are feldspathic veins at 100 cm, some of the thicker feldspathic intervals may be mobilized and reprecipitated feldspar. A coarse patch on the cored side includes coarse plagioclase, epidote, and actinolite in one such 5-6 mm thick segregation.
 The feldspathic "veining" is probably a mix of granulated feldspar and true veins.



118-735B-58R-1

UNIT 5: OLIVINE GABBRO

Pieces 1-23B

Altered Olivine Gabbro

Pieces 1-23B

COLOR: Gray; gray and green-white.

LAYERING: None.

DEFORMATION: Core is breccated in places and altered (Pieces 4-6).

PRIMARY MINERALOGY:

Plagioclase—Mode: 40%-60%.

Crystal size: 1-5 mm.

Crystal shape: Anhedral.

Preferred orientation: Not determined.

Percent replacement: Commonly granulated; probably some albitization

Clinopyroxene—Mode: 40%-50%.

Crystal size: 1-5 mm.

Crystal shape: Subhedral-anhedral.

Preferred orientation: Not determined.

Percent replacement: Partially altered to amphibole

Olivine—Mode: 0%-8%, common in Pieces 19, 21, and 23.

Crystal size: 1-7 mm.

Crystal shape: Anhedral.

Preferred orientation: Not determined.

Percent replacement: In places replaced by oxidative pseudomorphs (red clayey patches).

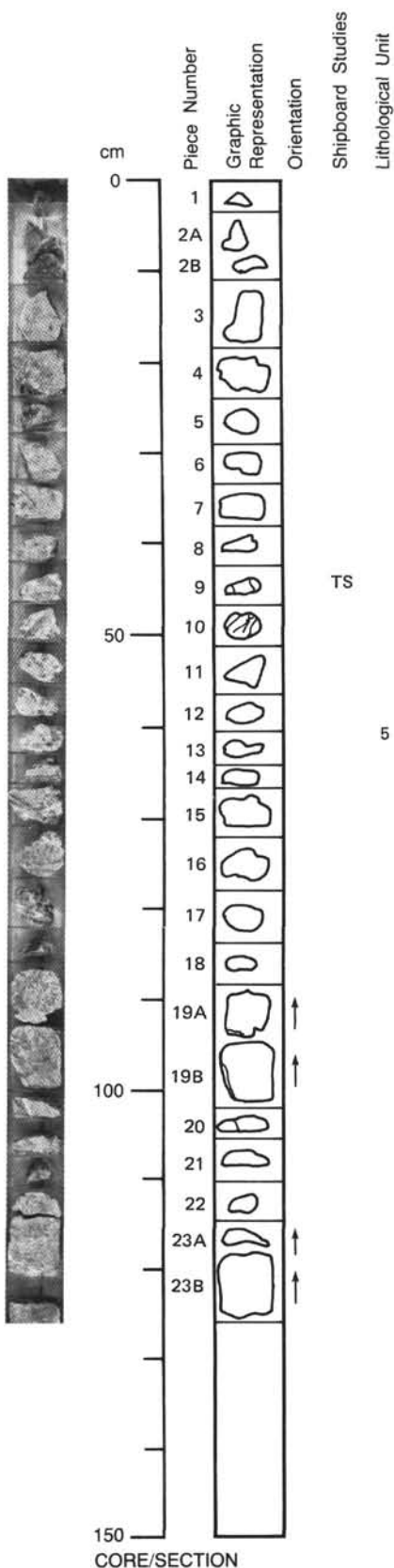
SECONDARY MINERALOGY:

Total percent: Up to 70% in places.

Texture: Clays and amphibole after olivine. Large orange oxidative pseudomorphs probably after olivine.

Percent vein material: Not determined.

Vein material: White feldspathic veins (1-2 mm wide) common throughout. Epidote common in feldspathic veins. Must be some albitization.



UNIT 5: OLIVINE GABBRO

Pieces 1A-1I

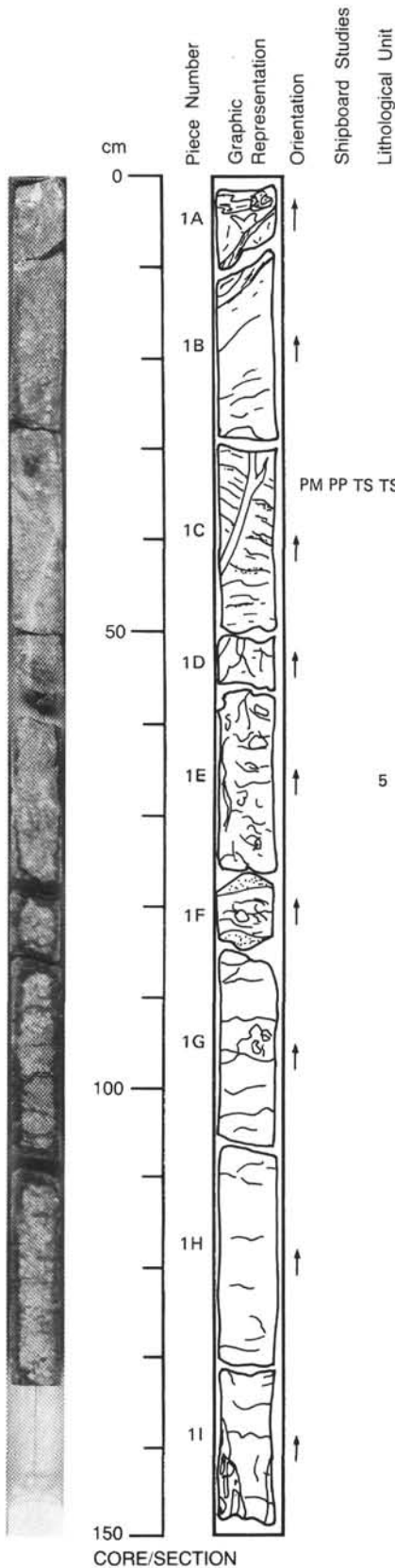
Olivine Gabbro

Pieces 1A-1I

COLOR: Dark gray with orange spots in Piece 1A.
LAYERING: Not apparent.
DEFORMATION: Weak foliation in Pieces 1B, 1C, and 1D; preferred orientation of plagioclase and pyroxene. Grain size is reduced from 4-6 mm to 2-3 mm on average.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 50%-60%.
 Crystal size: 1-4 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Yes.
 Percent replacement: Slight

 Clinopyroxene—Mode: 30%-40%.
 Crystal size: 4-6 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Yes.
 Percent replacement: Slight

 Olivine—Mode: 3%-10%.
 Crystal size: 1-3 mm.
 Crystal shape: Rounded, anhedral.
 Preferred orientation: Not visible.
 Percent replacement: Slight.
SECONDARY MINERALOGY:
 Total percent: Not determined.
 Texture: Pseudomorphic. Olivine is replaced by orange iron hydroxide and brown clays. In other places it is replaced by dark chlorite. Clinopyroxene is partially replaced by amphibole. Plagioclase is partially replaced by epidote and secondary plagioclase (albite).
 Percent vein material: Not determined.
 Vein material: Plagioclase, epidote, and amphibole.
 Veins, 3-4 mm thick, or pickets 1 cm thick are filled with plagioclase and epidote. Cracks are filled with sheared amphiboles. Disseminated sulfides in Pieces 1C, 1E, 1G, 1H, and 1I (pyrite) are mainly in small cracks.



118-735B-58R-3

UNIT 5: OLIVINE GABBRO

Pieces 1A-1G

Olivine Gabbro

Pieces 1A-1G

COLOR: Gray.

LAYERING: Grain size varies along section from moderately coarse to less coarse. Locally there are suggestions of a faint subhorizontal igneous lamination due to oriented plagioclase (particularly in Piece 1A).

DEFORMATION: None.

PRIMARY MINERALOGY:

Plagioclase—Mode: 55%.

Crystal size: 2-20 mm.

Crystal shape: Granular anhedral to subhedral.

Preferred orientation: None.

Percent replacement: <1%.

Clinopyroxene—Mode: 25%-30%.

Crystal size: 2-20 mm.

Crystal shape: Granular anhedral to subhedral.

Preferred orientation: None.

Percent replacement: <1% by magnetite and amphibole.

Olivine—Mode: 10%-20%.

Crystal size: 2 mm.

Crystal shape: Granular anhedral.

Preferred orientation: None.

Percent replacement: 0.5% by tremolite and clay.

Iron oxides and sulfides—Mode: <1%.

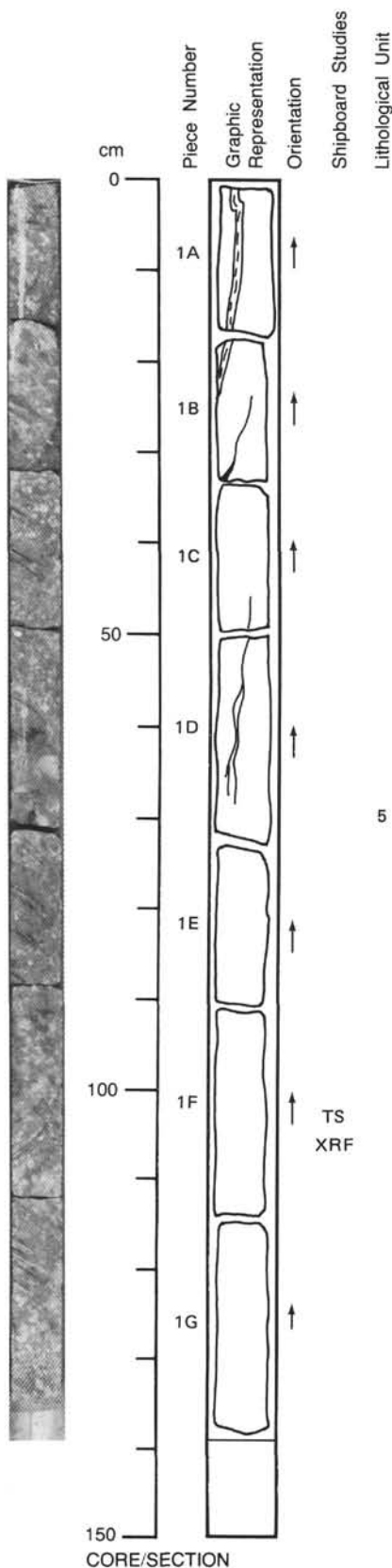
SECONDARY MINERALOGY:

Total percent: 2%.

Texture: Secondary minerals are tremolite, clay, magnetite, and amphibole. Subophitic granular with disseminated sulfides through the rock in minor amounts. Large thick (about 1 cm) subvertical vein running down Pieces 1A-D, containing plagioclase, epidote, actinolite, and clinzoisite. No apparent significant alteration of gabbro around vein.

Percent vein material: 1%.

Vein material: Plagioclase, epidote, actinolite, and clinzoisite.



UNIT 5: OLIVINE GABBRO

Pieces 1A-2

Gabbro and Olivine Gabbro

Pieces 1A-2

COLOR: Gray.

LAYERING: Not apparent.

DEFORMATION: Not apparent.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%-60%.

Crystal size: 1-4 mm.

Crystal shape: Prismatic to anhedral.

Preferred orientation: None.

Percent replacement: Slight.

Clinopyroxene—Mode: 40%-50%.

Crystal size: 2-11 mm.

Crystal shape: Anhedral to euhedral, oikocrystic.

Preferred orientation: None.

Percent replacement: Completely in Pieces 1H and 1I, otherwise slightly altered.

Olivine—Mode: 2%-10% (mostly at the base of section).

Crystal size: Not determined.

Crystal shape: Rounded.

Preferred orientation: Not defined.

Percent replacement: Slight.

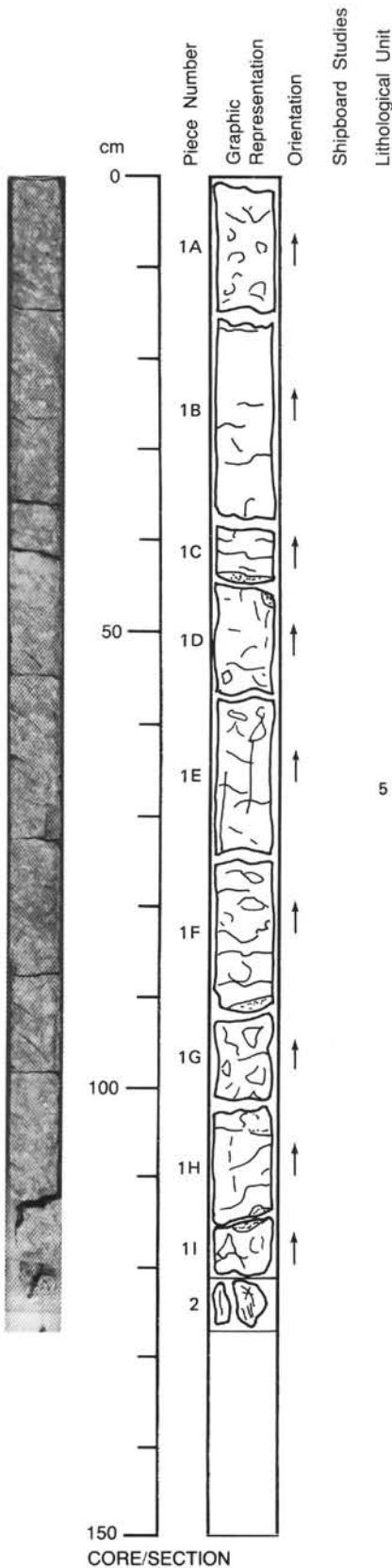
SECONDARY MINERALOGY:

Total percent: < 10%.

Texture: Pseudomorphic. Slight replacement of pyroxene by amphibole; olivine altered (Pieces 1H and 1I) to magnetite and clay (chlorite?). Sulfides (chalcopyrite) disseminated throughout the section are mainly around silicates. Cracks are filled with amphibole(?) and a white mineral.

Percent vein material: Not determined.

Vein material: Sulfides and amphibole.



118-735B-59R-2

UNIT 5: OLIVINE GABBRO

Pieces 1A-2D

Olivine Gabbro

Pieces 1A-2D

COLOR: Gray.

LAYERING: Grain size seems to decrease downward in an 80 cm thick layer from 20 to 104 cm.

DEFORMATION: None.

PRIMARY MINERALOGY:

Plagioclase—Mode: 55%.

Crystal size: 5-15 mm.

Crystal shape: Subhedral.

Preferred orientation: None.

Percent replacement: 0%.

Clinopyroxene—Mode: 30%.

Crystal size: 5-30 mm.

Crystal shape: Subophitic.

Preferred orientation: None.

Percent replacement: 0%.

Olivine—Mode: 10%-15%.

Crystal size: Not determined.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: 0%.

Iron Oxides—Mode: < 1%.

Sulfides—Mode: < 1%.

SECONDARY MINERALOGY:

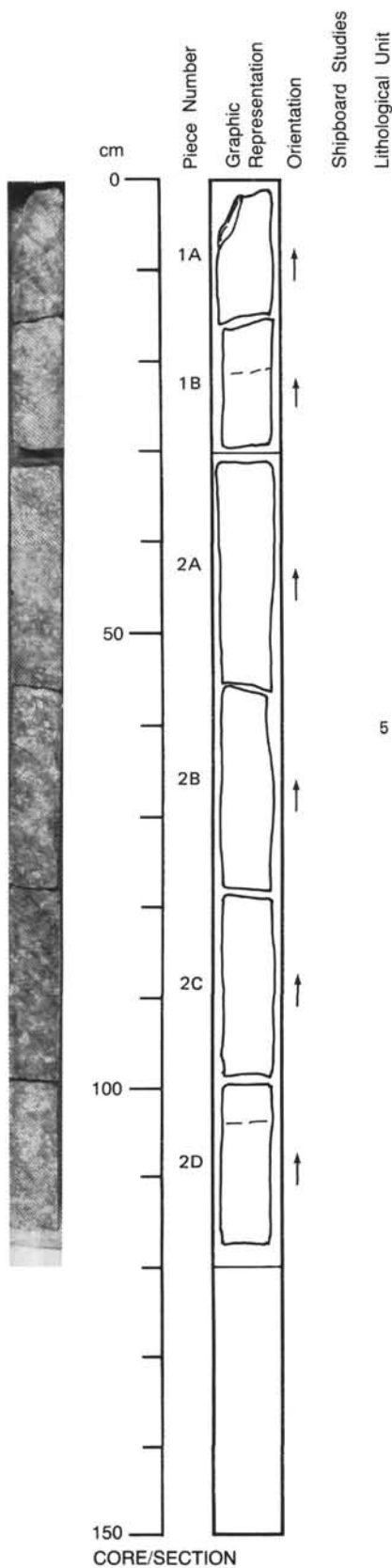
Total percent: 0%.

Texture: Not determined.

Percent vein material: < 1%.

Vein material: Talc(?) and chlorite.

COMMENTS: Subhedral granular texture with subophitic clinopyroxene partially enclosing subhedral plagioclase. Clinopyroxene is intergrown with subordinate olivine.



CORE/SECTION

118-735B-59R-3

UNIT 5: OLIVINE GABBRO

Pieces 1A-2C

Olivine Gabbro

Pieces 1A-2C

COLOR: Gray.

LAYERING: Some grain size variation, mostly coarse grained. One graded interval at 90-65 cm. Some very coarse, fine-, and medium-grained layers. Size changes are not sharply defined. A plagioclase-rich band occurs at 61 cm and some large olivine at 121 cm.

DEFORMATION: None. A few subhorizontal fractures.

PRIMARY MINERALOGY:

Plagioclase—Mode: 60%-30%.

Crystal size: 2-14 mm.

Crystal shape: Euhedral (inside clinopyroxene) to anhedral.

Preferred orientation: None.

Percent replacement: 0%

Clinopyroxene—Mode: 40%-70%.

Crystal size: 3-20 mm.

Crystal shape: Subhedral to anhedral, oikocrysts.

Preferred orientation: None.

Percent replacement: Minor amphibolitization.

Olivine—Mode: 10%.

Crystal size: 2-4 mm.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: Very minor.

SECONDARY MINERALOGY:

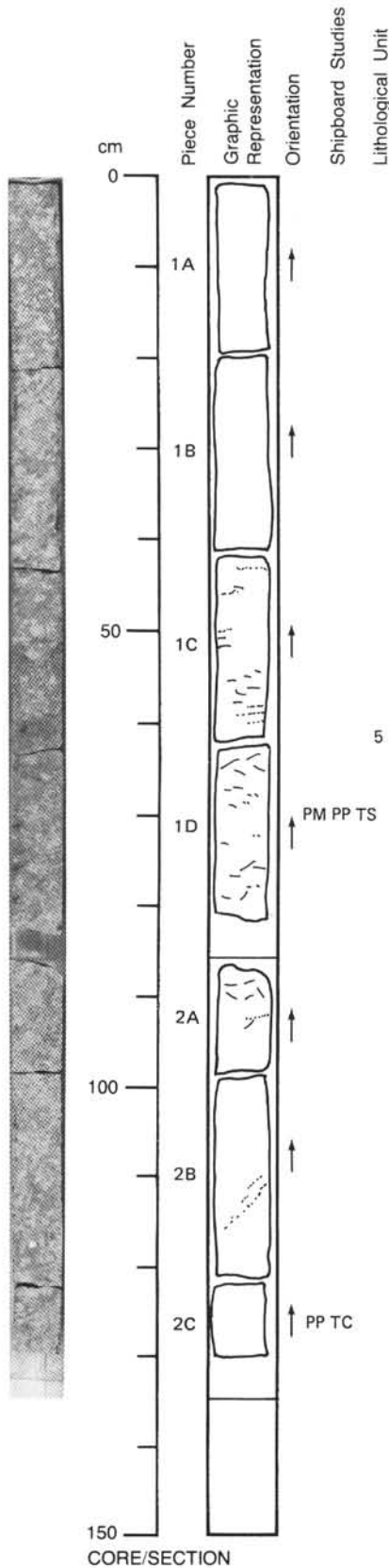
Total percent: <2%.

Texture: Minor amphibolitization.

Percent vein material: Not determined.

Vein material: Not determined.

COMMENTS: Rock is so fresh that olivine is hard to distinguish—likely more common than noted in some sections. Fine (<1 mm) pyrite common (though <1%) at pyroxene interstices.



118-735B-59R-4

UNIT 5: OLIVINE GABBRO

Pieces 1A-2

Olivine Gabbro

Pieces 1A-2

COLOR: Gray.

LAYERING: None apparent.

DEFORMATION: None.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%.

Crystal size: 0.5-2 cm.

Crystal shape: Anhedral to euhedral where enclosed in clinopyroxene.

Preferred orientation: None.

Percent replacement: < 1%.

Clinopyroxene—Mode: 45%-40%.

Crystal size: 0.5-2 cm.

Crystal shape: Anhedral, subophitically encloses plagioclase.

Preferred orientation: None.

Percent replacement: < 1% by amphibole.

Olivine—Mode: 5%-10%.

Crystal size: 0.5-1 cm.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: 1%

SECONDARY MINERALOGY:

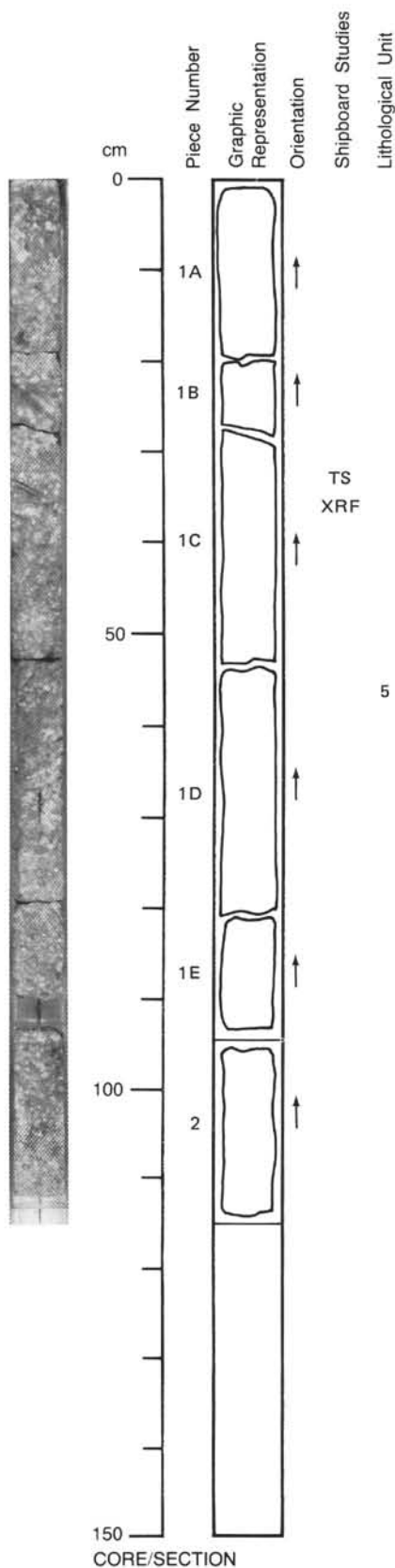
Total percent: < 3%.

Texture: Mainly amphibole replacement of clinopyroxene along grain boundaries.

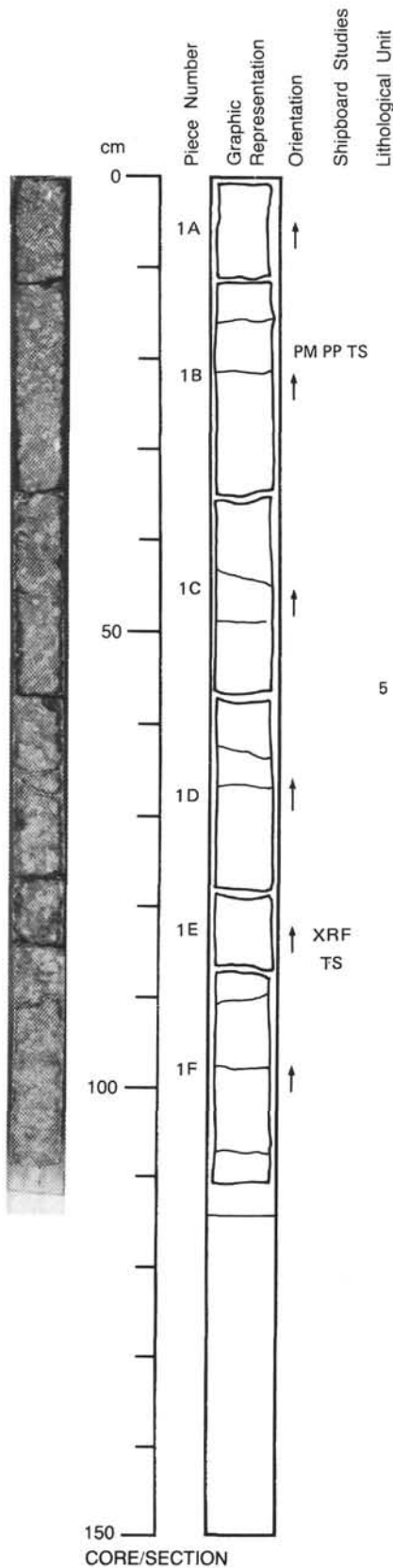
Percent vein material: None.

Vein material: None.

COMMENTS: Coarse grained, fairly uniform. Traces of sulfides throughout. Traces of primary ilmenite throughout.



CORE/SECTION



UNIT 5: OLIVINE GABBRO

Pieces 1A-1F

Olivine Gabbro

Pieces 1A-1F

COLOR: Gray.

LAYERING: Probable modal layering (bands with plagioclase enrichments and intervals with higher olivine proportions), and grain size variations. Rock is in general coarse-grained (average grain size 1.0-1.5 cm) with coarser grained intervals (plagioclase up to 3 cm, clinopyroxene up to 3 cm, olivine up to 2 cm).

DEFORMATION: None apparent.

PRIMARY MINERALOGY:

Plagioclase—Mode: 45%-65%.
 Crystal size: 0.5-3 cm.
 Crystal shape: Anhedral-euhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

Clinopyroxene—Mode: 30%-40%.
 Crystal size: 0.5-3 cm.
 Crystal shape: Subhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

Olivine—Mode: 2% -> 10%.
 Crystal size: 0.5-2 cm.
 Crystal shape: Subhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

Sulfides—Mode: < 1%.

SECONDARY MINERALOGY:

Total percent: Not determined.
 Texture: Very fresh rock. Olivine mostly preserved. Very minor amphibole replacement of clinopyroxene. Few veinlets.
 Percent vein material: Not determined.
 Vein material: Not determined.

118-735B-60R-2

UNIT 5: OLIVINE GABBRO

Pieces 1A-1E

Olivine Gabbro

Pieces 1A-1E

COLOR: Gray-green.

LAYERING: Grain size variation, progressive over Pieces 1C, 1D and 1E, from <10 mm to 20 mm, abrupt in Piece 1E from 20 mm to <10 mm. Possible modal layering (olivine concentration) in Piece 1B. No magmatic lamination: the crystals are not tabular, but slightly oikocrystic.

DEFORMATION: None.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%.
 Crystal size: <10-20 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: Not determined.

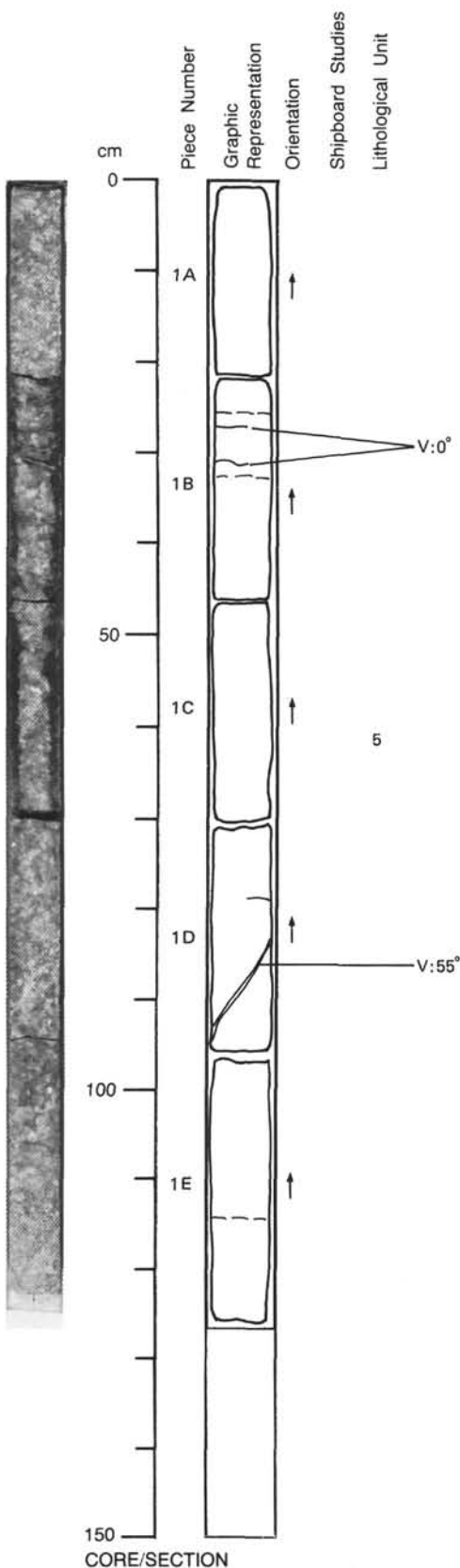
Clinopyroxene—Mode: 30%-40%.
 Crystal size: <10-20 mm.
 Crystal shape: Oikocrystic.
 Preferred orientation: None.
 Percent replacement: <10% by amphibole.

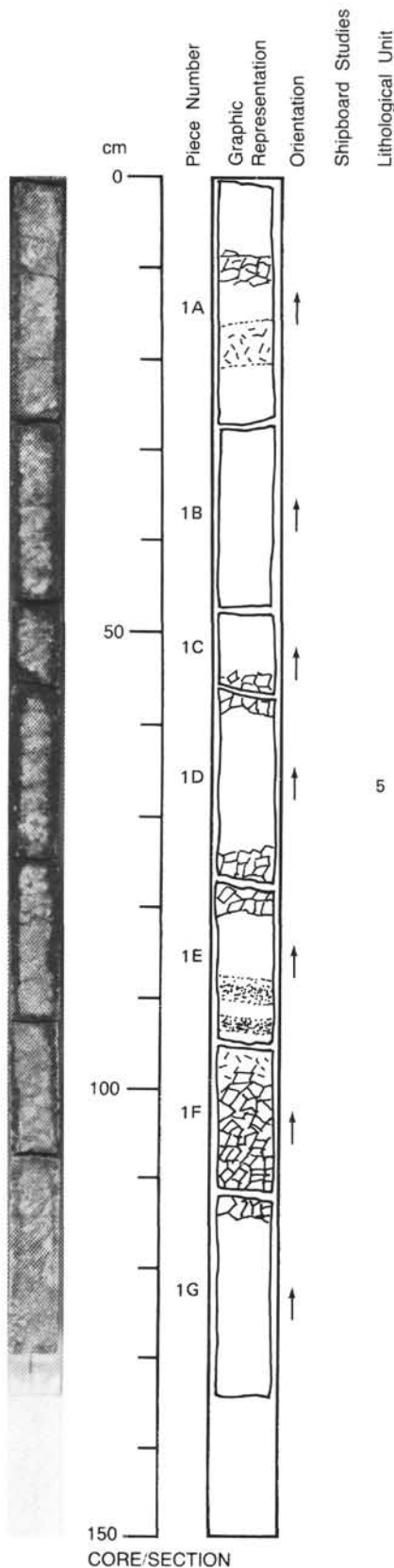
Olivine—Mode: 10%-20%.
 Crystal size: <10 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: Not determined.

SECONDARY MINERALOGY:

Total percent: <10%
 Texture: Minor amphibolitization of clinopyroxene, and alteration of olivine. No albitization of plagioclase, except immediately adjacent to veins.
 Percent vein material: <1%.
 Vein material: Amphibole.

COMMENTS: No significant concentrations of iron-titanium oxide.





UNIT 5: OLIVINE GABBRO

Pieces 1A-1G

Olivine Gabbro

Pieces 1A-1G

COLOR: Gray.

LAYERING: Size and texture variations suggest layering. Coarse-grained ophitic (oikocrystic); (orthocumulate) 10-30 cm thick intervals at 0-8, 12-16, 21-53, 60-73, 81-88, and 115-135 cm; plagioclase: 1-2.5 cm, clinopyroxene: anhedral. Coarse-grained granular (mesocumulate) 20-5 cm thick intervals at 8-12, 53-60, 73-81, and 95-115 cm; plagioclase and clinopyroxene: 1-3 cm, clinopyroxene: subhedral. Medium-grained ophitic, 5-2 cm thick intervals at 16-21 and 88-95 cm; plagioclase: 0.5-1 cm, clinopyroxene: anhedral Layer contacts are gradational. Mostly coarse-grained ophitic. Inclination not clear (horizontal?).

DEFORMATION: None.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%-65%.
 Crystal size: See above.
 Crystal shape: Euhedral-subhedral.
 Preferred orientation: Not clear.
 Percent replacement: None.

Clinopyroxene—Mode: 30%.
 Crystal size: See above.
 Crystal shape: Anhedral.
 Preferred orientation: Not clear.
 Percent replacement: Almost none.

Olivine—Mode: 2%-10%.
 Crystal size: 2-10 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Not clear.
 Percent replacement: Almost none.

SECONDARY MINERALOGY:

Total percent: Trace or none. Very fresh!
 Texture: Not determined.
 Percent vein material: None.
 Vein material: None.

118-735B-60R-4

UNIT 5: OLIVINE GABBRO

Pieces 1A-1K

Olivine Gabbro

Pieces 1A-1K

COLOR: Gray.

LAYERING: Size grading. Clinopyroxene varies from average of 5 mm to average of 15 mm. Plagioclase varies from average of 5 mm to average of 20 mm. Variation occurs over 50-60 cm interval.

DEFORMATION: None apparent.

PRIMARY MINERALOGY:

Plagioclase—Mode: 55%-65%.

Crystal size: 5-25 mm.

Crystal shape: Euhedral.

Preferred orientation: Not determined.

Percent replacement: Not determined.

Clinopyroxene—Mode: 35%-40%.

Crystal size: 5-30 mm.

Crystal shape: Subhedral, granular to oikocrystic.

Preferred orientation: Not determined.

Percent replacement: Not determined.

Olivine—Mode: 5%-10%.

Crystal size: 2-10 mm.

Crystal shape: Subhedral.

Preferred orientation: Not determined.

Percent replacement: Not determined.

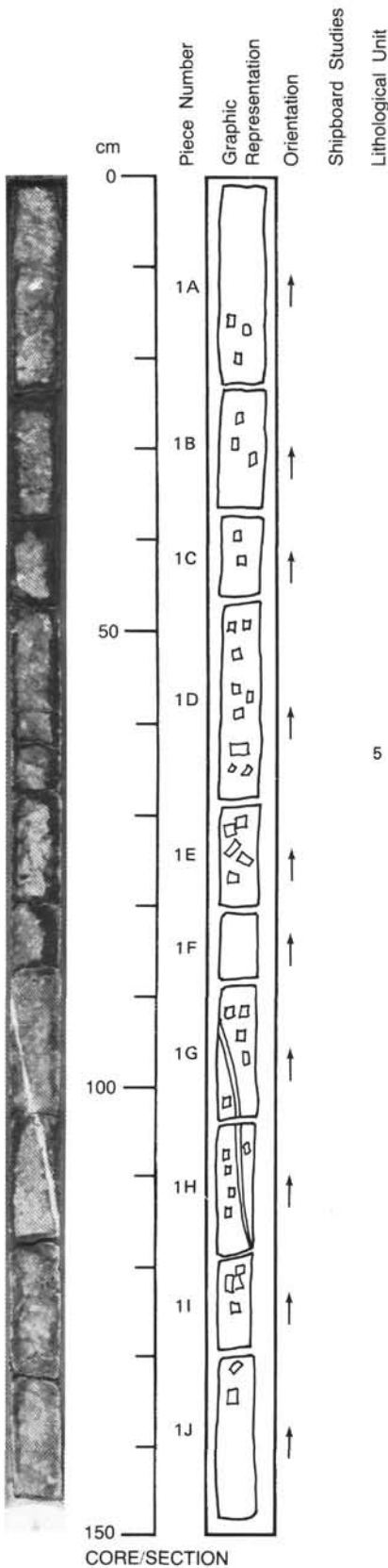
SECONDARY MINERALOGY:

Total percent: 5%.

Texture: Minor replacement of clinopyroxene by amphibole.

Percent vein material: Not determined.

Vein material: 1 cm wide vein through Pieces 1G and 1H lined with amphibole and filled with plagioclase, quartz, and green amphibole (actinolite) in the center.



UNIT 5: OLIVINE GABBRO

Pieces 1A-6

Olivine Gabbro

Pieces 1A-6

COLOR: Gray.

LAYERING: Only faint, if there is any. Rock is, in general, coarse-grained (on average 1.0-1.5 cm) with some coarser intervals. Minor variation in olivine contents.

DEFORMATION: In general undeformed. Weakly brecciated in Pieces 3D and 4.

PRIMARY MINERALOGY:

Plagioclase—Mode: 55%-60%.

Crystal size: Up to 3 cm.

Crystal shape: Anhedral-subhedral.

Preferred orientation: Not determined.

Percent replacement: Not determined.

Clinopyroxene—Mode: 35%-40%.

Crystal size: Up to 3 cm.

Crystal shape: Subhedral-anhedral.

Preferred orientation: Not determined.

Percent replacement: Not determined.

Olivine—Mode: 3%-8%.

Crystal size: Up to 2 cm.

Crystal shape: Subhedral-anhedral.

Preferred orientation: Not determined.

Percent replacement: Not determined.

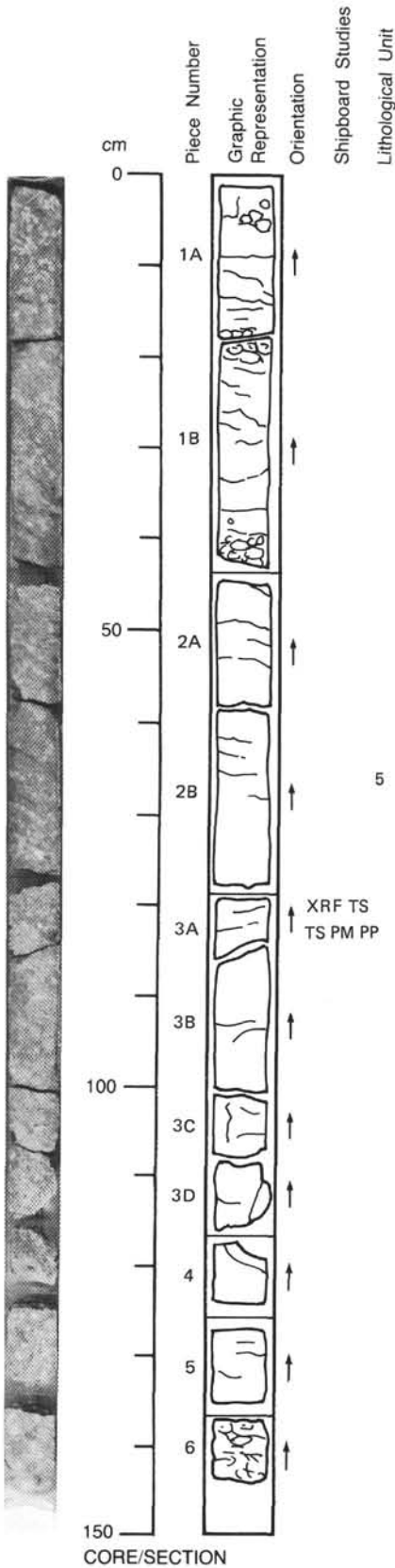
SECONDARY MINERALOGY:

Total percent: Slight alteration.

Texture: Amphibole forms rims around clinopyroxene. Olivine mostly fresh. Moderate alteration in Pieces 3D and 4 along a brecciated zone. Few sulfides.

Percent vein material: Not determined.

Vein material: Some veinlets, filled with white mineral(s).



118-735B-61R-2

UNIT 5: OLIVINE GABBRO

Pieces 1-3

Olivine Gabbro

Pieces 1-3

COLOR: Gray.

LAYERING: None apparent, no igneous lamination. Mean grain size varies from ≤ 20 mm in Piece 1, to ≤ 15 mm in Piece 2A, to ≤ 10 mm in Pieces 2B and 2C, to ≤ 8 mm in Piece 3.

DEFORMATION: None.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%-60%.

Crystal size: $< 8-20$ mm.

Crystal shape: Tabular.

Preferred orientation: None.

Percent replacement: Not determined.

Clinopyroxene—Mode: 40%.

Crystal size: $< 8-20$ mm.

Crystal shape: Semi-ollocrystic with plagioclase tablets included.

Preferred orientation: None.

Percent replacement: Not determined.

Olivine—Mode: 10%.

Crystal size: $< 8-20$ mm.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: Not determined.

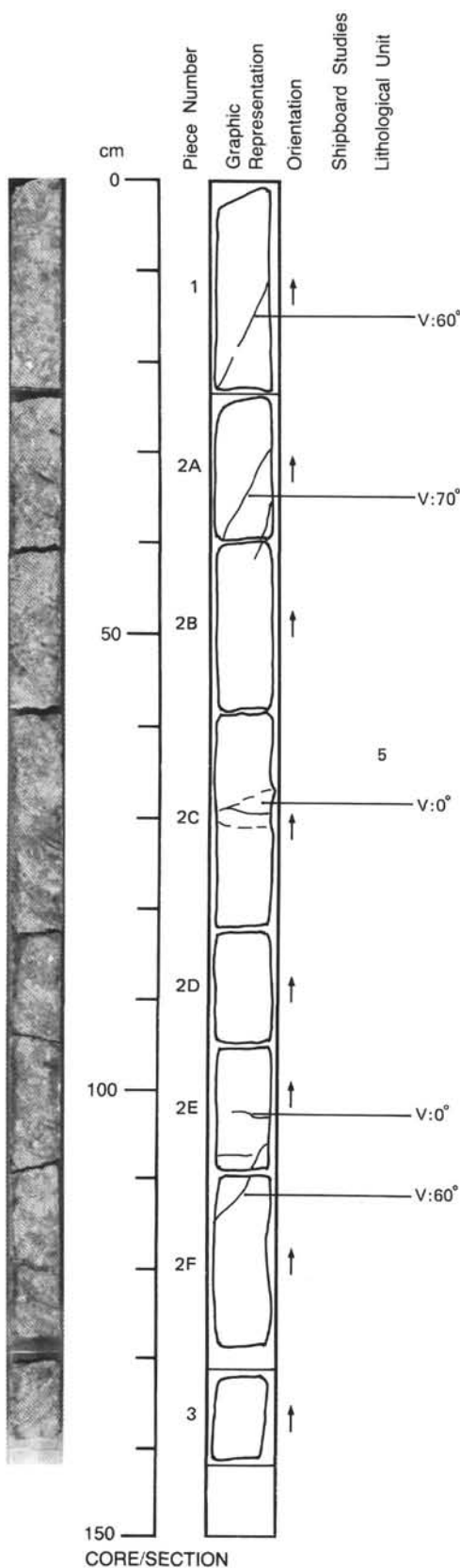
SECONDARY MINERALOGY:

Total percent: $< 10\%$.

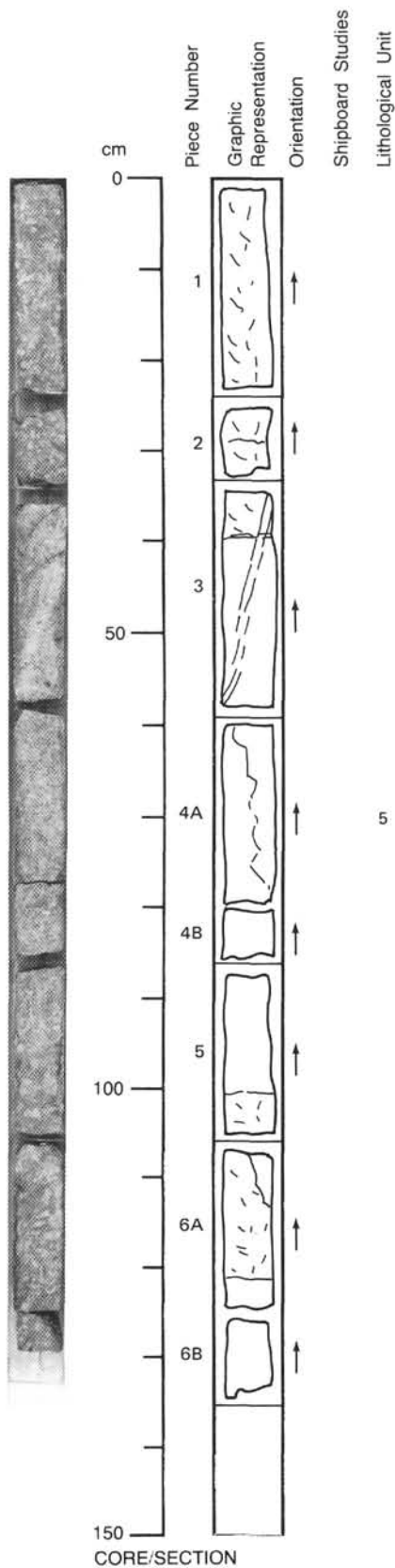
Texture: Pyroxene amphibolitized especially close to veins, and in Piece 3. Olivine altered partially.

Percent vein material: $< 1\%$.

Vein material: Amphibole veins dip $60^{\circ}-70^{\circ}$. Also, thin subhorizontal white veins.



118-735B-61R-3



UNIT 5: OLIVINE GABBRO

Pieces 1-6B

Olivine Gabbro

Pieces 1-6B

COLOR: Gray to greenish-gray.

LAYERING: Grainsize layering: 0-40 cm, coarse-grained (clinopyroxene = 4-10 mm); 40-100 cm, medium-grained, gradually increasing in size toward bottom of interval; 100-120cm, very coarse-grained with poikilitic texture (clinopyroxene = 5-20 mm); 120-135 cm, medium-grained.

DEFORMATION: None.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%-55%.

Crystal size: 2-22 mm.

Crystal shape: Subhedral to poikilitic.

Preferred orientation: None.

Percent replacement: Not determined.

Clinopyroxene—Mode: 45%.

Crystal size: 2-30 mm.

Crystal shape: Subhedral.

Preferred orientation: None.

Percent replacement: 10-15% by amphibole.

Olivine—Mode: 5%.

Crystal size: 1-5 mm.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: 10-15% by talc.

SECONDARY MINERALOGY:

Total percent: 12%.

Texture: Clinopyroxene is replaced by green amphibole around the rims. The alteration halos are broader at the bottom of the core. Olivines are partially replaced by talc.

Percent vein material: 4%.

Vein material: Hornblende and albite.

118-735B-61R-4

UNIT 5: OLIVINE GABBRO

Pieces 1-5

Olivine Gabbro

Pieces 1-5

COLOR: Gray.

LAYERING: Size and textural (+ modal) variations suggest layering.

1) Graded layer in Pieces 1 and 2, where grain size increases and olivine is more abundant downward. Clinopyroxene: 25 mm, average 10 mm; olivine: 3-10 mm, average 6 mm; plagioclase: 5-20 mm, average 10 mm. Olivine = 5%-10%, clinopyroxene = 35%-40%, top; olivine = 15%, clinopyroxene = 20%, bottom.

2) Well-foliated layer in Piece 2. Olivine: 8 mm, 15-20%; clinopyroxene: 8 mm, 15%; plagioclase: 15 mm,

3) Medium-coarse-grained ophitic in Pieces 3A, 3B, and 5. Plagioclase: 15 mm, 60%; clinopyroxene: 10 mm, 35%; olivine: 4-5 mm, 5%.

4) Coarse-grained locally ophitic in Pieces 3B, 3C, 3D, 4, and 5. Plagioclase: 5-50 mm, average 15 mm, 60%; clinopyroxene: 5-30 mm, average 12 mm, 35%; olivine: 5-20 mm, average 10 mm, 5%.

DEFORMATION: None.

PRIMARY MINERALOGY:

Plagioclase—Mode: Variable, see above.

Crystal size: Variable, see above.

Crystal shape: Euhedral-subhedral.

Preferred orientation: None except for Piece 2 (bottom).

Percent replacement: None.

Clinopyroxene—Mode: Variable, see above.

Crystal size: Variable, see above.

Crystal shape: Anhedral.

Preferred orientation: None except for Piece 2 (bottom).

Percent replacement: Trace by amphibole

Olivine—Mode: Variable, see above.

Crystal size: Variable, see above.

Crystal shape: Subhedral-anhedral.

Preferred orientation: None.

Percent replacement: Trace.

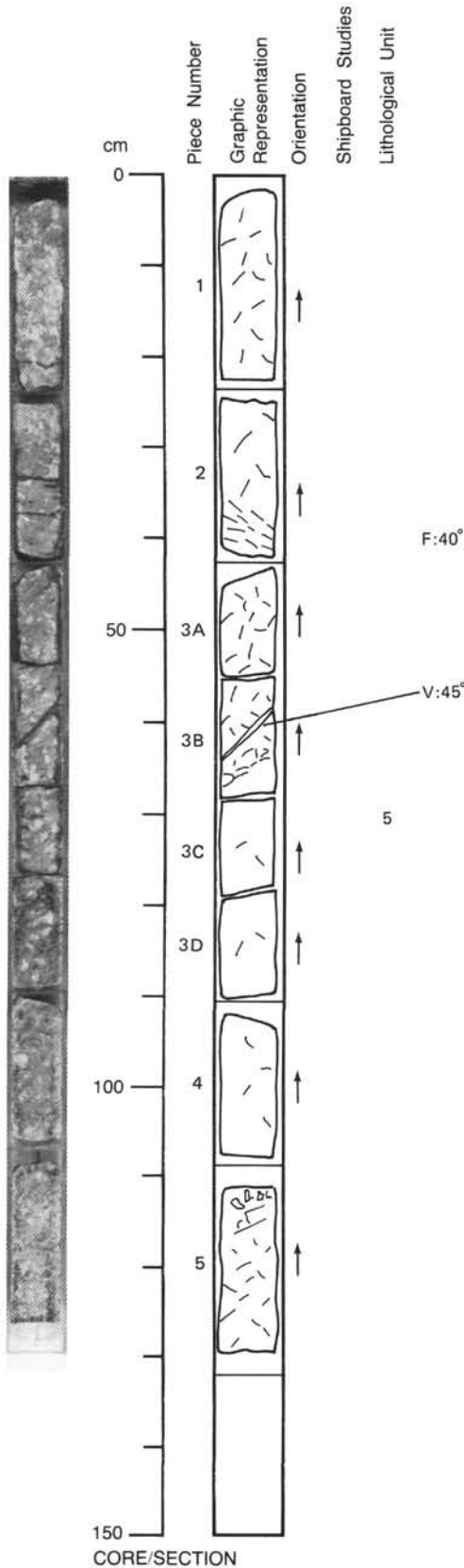
SECONDARY MINERALOGY:

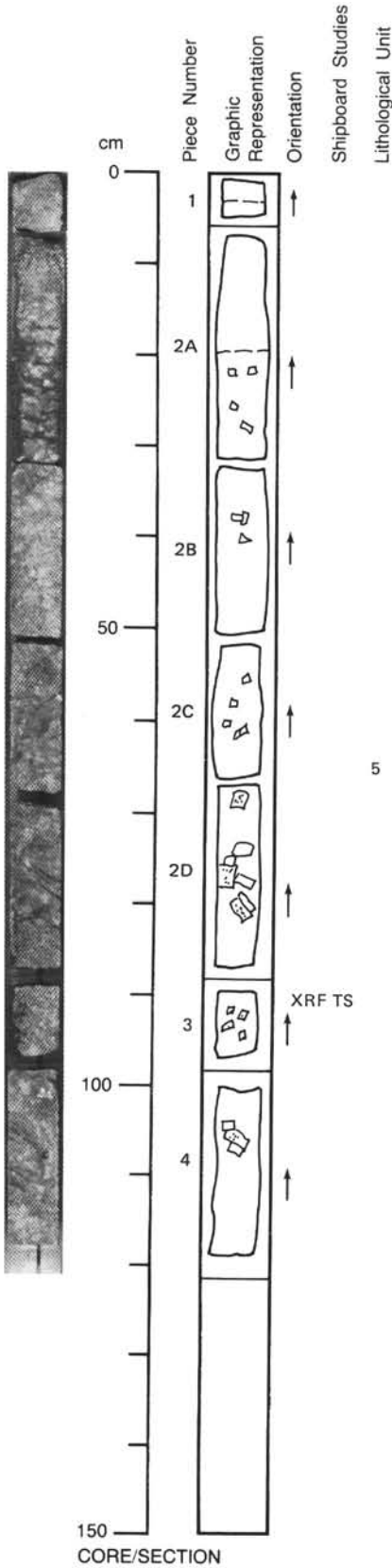
Total percent: <5%.

Texture: Clinopyroxene and olivine are replaced by amphibole (5% or less).

Percent vein material: Trace.

Vein material: Amphibole vein is present in Piece 3B dipping 45°, 1 mm thick.





UNIT 5: OLIVINE GABBRO

Pieces 1-4

Olivine Gabbro

Pieces 1-4

COLOR: Gray on sawn surface, greenish gray on cored surface.

LAYERING: Weak igneous lamination in Piece 2D, increase in grain size from bottom of Piece 2A to 2D and from Piece 3 to 4.

DEFORMATION: None.

PRIMARY MINERALOGY:

Plagioclase—Mode: 45%-65%.

Crystal size: 8-25 mm.

Crystal shape: Subhedral-euhedral.

Preferred orientation: Not determined.

Percent replacement: Not determined.

Clinopyroxene—Mode: 20%-40%.

Crystal size: 8-25 mm (up to 30 mm).

Crystal shape: Subhedral-euhedral, rare oikocrysts.

Preferred orientation: Not determined.

Percent replacement: Not determined.

Olivine—Mode: 5%-15%.

Crystal size: 5-10 mm.

Crystal shape: Anhedral-subhedral.

Preferred orientation: Not determined.

Percent replacement: Not determined; partly replaced by tremolite + talc(?).

SECONDARY MINERALOGY:

Total percent: 15%.

Texture: Trace amounts of sulfide associated with amphibole. Amphibole replacing clinopyroxene.

Percent vein material: Not determined.

Vein material: Common subhorizontal veins (<0.5 mm thick) of sodic plagioclase(?).

118-735B-62R-2

UNIT 5: OLIVINE GABBRO

Pieces 1A-3D

Olivine Gabbro

Pieces 1A-3D

COLOR: Gray.

LAYERING: None, minor variations in grain size.

DEFORMATION: None.

PRIMARY MINERALOGY:

Plagioclase—Mode: 55%.

Crystal size: 2-10 mm.

Crystal shape: Tabular.

Preferred orientation: None.

Percent replacement: 0%.

Clinopyroxene—Mode: 43%.

Crystal size: 2-15 mm.

Crystal shape: Subhedral.

Preferred orientation: None.

Percent replacement: 30% by green amphibole.

Olivine—Mode: 2%-5%.

Crystal size: < 1 mm.

Crystal shape: Interstitial.

Preferred orientation: None.

Percent replacement: > 50% by talc.

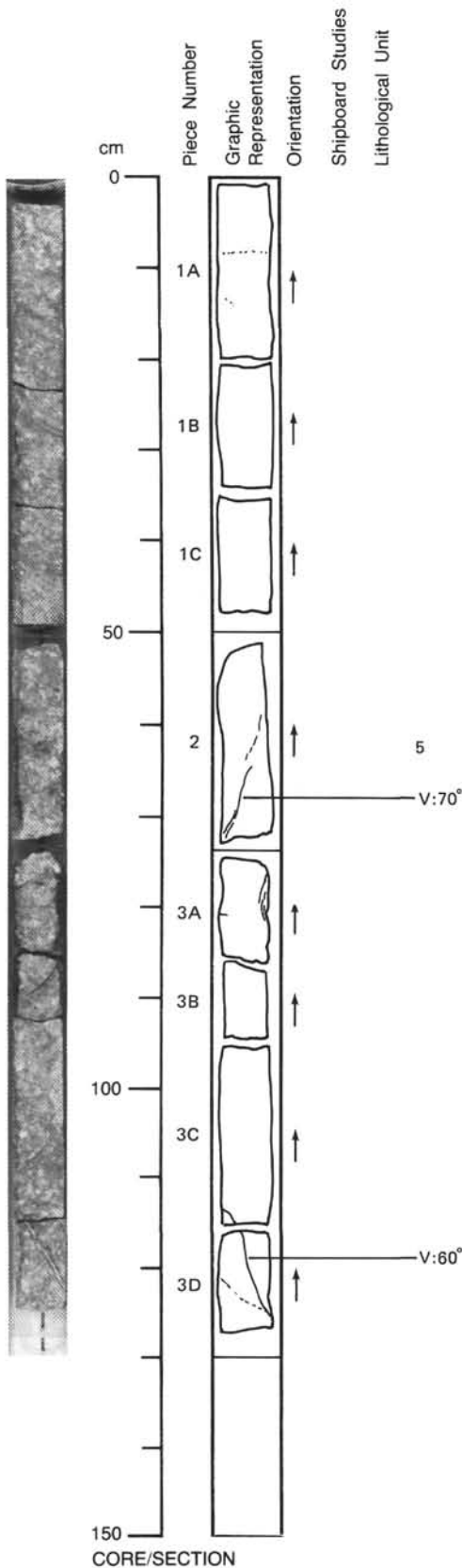
SECONDARY MINERALOGY:

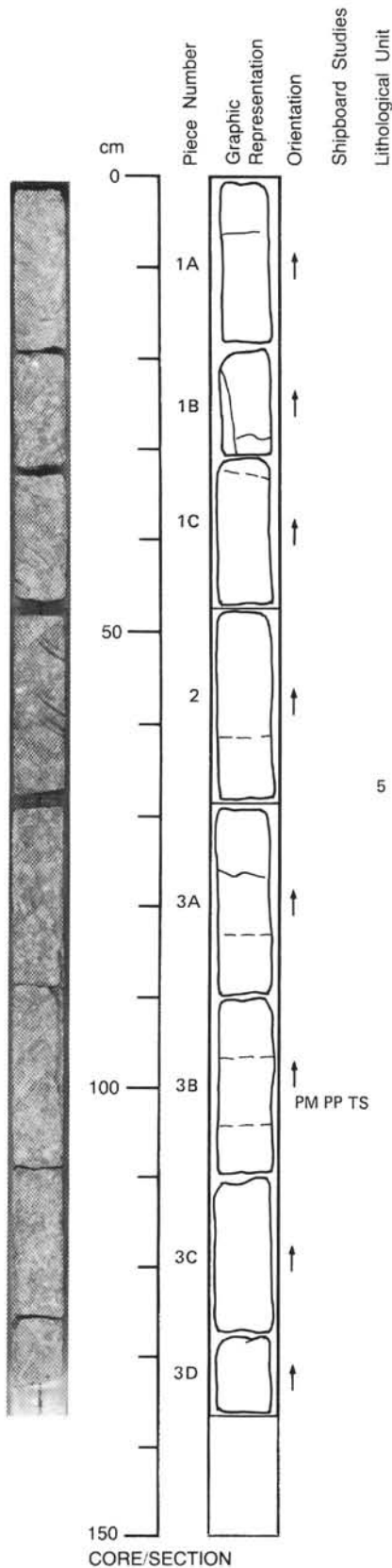
Total percent: 20%.

Texture: Chlorite is present. Disseminated sulfides, often enclosed in amphibole.

Percent vein material: 2%.

Vein material: Hornblende and plagioclase; Veins in Pieces 3C and 3D are filled by a soft white mineral. Vein in Piece 2 is filled by amphibole and a white mineral.





UNIT 5: OLIVINE GABBRO

Pieces 1A-3D

Olivine Gabbro

Pieces 1A-3D

COLOR: Gray-green.

LAYERING: Not clear, faint grain size variations: < 1 cm in Pieces 3C and 3D, 2.5 cm in Piece 2A, 1-2.5 cm elsewhere. Variations in the modal percent of olivine are possible. No magmatic lamination.

DEFORMATION: None.

PRIMARY MINERALOGY:

Plagioclase—Mode: 30%-40%.
 Crystal size: See layering above.
 Crystal shape: Tabular to anhedral.
 Preferred orientation: None.
 Percent replacement: Not determined.

Clinopyroxene—Mode: 50%-60%.
 Crystal size: See layering above.
 Crystal shape: Anhedral, locally oikocrystic.
 Preferred orientation: None.
 Percent replacement: Not determined.

Olivine—Mode: 5%-15%.
 Crystal size: See layering above.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: Not determined.

SECONDARY MINERALOGY:

Total percent: < 10%.
 Texture: Olivine partially altered, plagioclase very fresh, pyroxene a little amphibolitized.
 Percent vein material: < 1%.
 Vein material: Amphibole and also thin sub-horizontal white veins.

118-735B-62R-4

UNIT 5: OLIVINE GABBRO

Pieces 1-11

Olivine Gabbro

Pieces 1-11

COLOR: Gray.

LAYERING: Modal variation shows possible layering, but layer contacts are not marked and gradational. In Piece 1 irregular medium grained patches occur. Piece 5 is olivine-rich (20%). Weak foliation is present.

DEFORMATION: None.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%-65%.

Crystal size: 2-30 mm. < 2 mm plagioclase occur as chadacrysts in oikocrystic clinopyroxene.

Crystal shape: Subhedral.

Preferred orientation: Weak.

Percent replacement: None.

Clinopyroxene—Mode: 20%-35%.

Crystal size: 5-25 mm.

Crystal shape: Anhedral.

Preferred orientation: Weak.

Percent replacement: Trace by amphibole.

Olivine—Mode: 7%-20%.

Crystal size: 5-20 mm.

Crystal shape: Subhedral-anhedral.

Preferred orientation: Weak.

Percent replacement: Trace by amphibole.

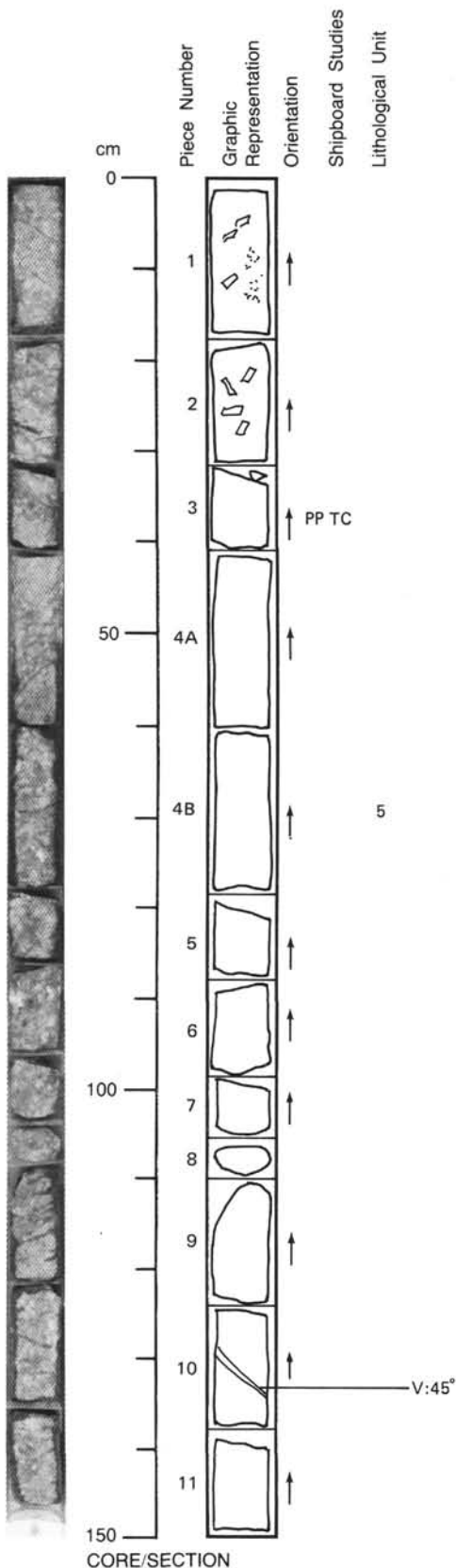
SECONDARY MINERALOGY:

Total percent: < 5%.

Texture: Amphibole replaces clinopyroxene and olivine.

Percent vein material: Trace.

Vein material: Amphibole vein, 1 mm thick and dipping 45° is present in Piece 10.



UNIT 5: OLIVINE GABBRO

Pieces 1-2F

Olivine Gabbro (Troctolitic)

Pieces 1-2F

COLOR: Gray.

LAYERING: Not apparent.

DEFORMATION: None apparent. In Piece 1 foliation is visible.

PRIMARY MINERALOGY:

Plagioclase—Mode: 40%-50%.

Crystal size: 1-4 mm.

Crystal shape: Prismatic (enclosed in clinopyroxene).

Preferred orientation: None.

Percent replacement: None.

Clinopyroxene—Mode: 40%.

Crystal size: Up to 20 mm.

Crystal shape: Oikocrystic.

Preferred orientation: None.

Percent replacement: 20% by amphibole.

Olivine—Mode: 10%-20%.

Crystal size: 1-10 mm.

Crystal shape: Rounded to irregular.

Preferred orientation: None.

Percent replacement: 30% by bluish talc.

SECONDARY MINERALOGY:

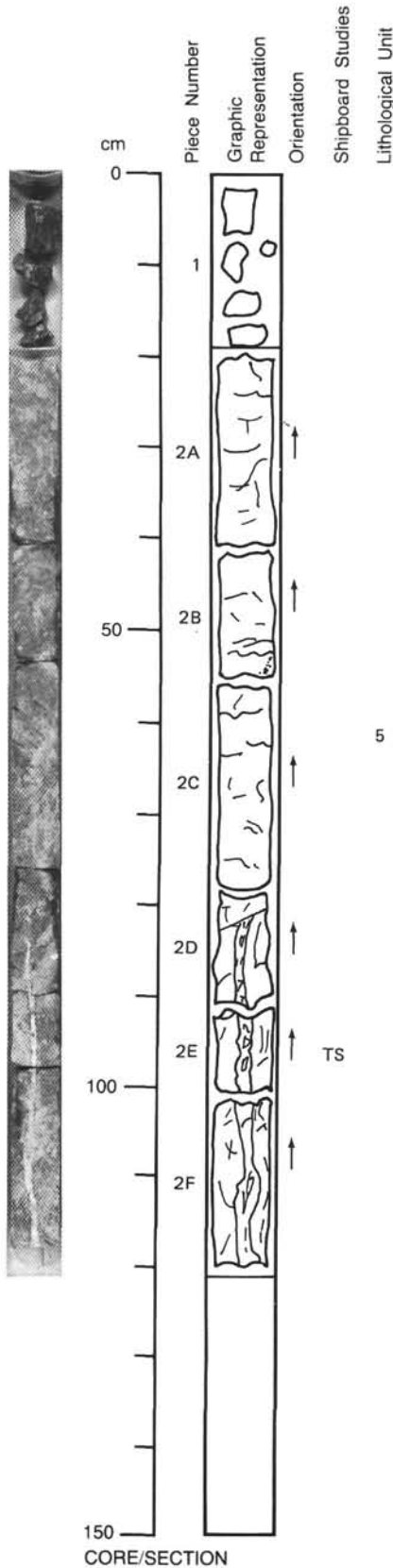
Total percent: Not determined.

Texture: Coronitic, pseudomorphous. Olivine is 30% altered to bluish talc (coronitic reaction).

Clinopyroxene is 20% replaced by amphibole.

Percent vein material: Not determined.

Vein material: Plagioclase, amphibole, and prehnite. Vein filling (4-15 mm thick) in Pieces 2D, 2E, and 2F: Plagioclase, amphibole, bluish green prehnite (botryoidal on walls of a vug), and some yellow brown epidote(?). Some quartz is present near the walls of the veins.



118-735B-63R-2

UNIT 5: OLIVINE GABBRO

Pieces 1A-3G

Olivine Gabbro

Pieces 1A-3G

COLOR: Gray.

LAYERING: None.

DEFORMATION: None except for faint primary foliation developed with pyroxene flattening.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%-60%.

Crystal size: Up to 8 mm.

Crystal shape: Euhedral (included in clinopyroxene).

Preferred orientation: None.

Percent replacement: None.

Clinopyroxene—Mode: 30%-40%.

Crystal size: Up to 1.5 cm.

Crystal shape: Large irregular oikocrysts with subophitic inclusions of plagioclase.

Preferred orientation: Faint.

Percent replacement: 20% by amphibole.

Olivine—Mode: 5%-10%.

Crystal size: Up to 8 mm.

Crystal shape: Euhedral to rounded.

Preferred orientation: None apparent.

Percent replacement: 20% by bluish talc.

SECONDARY MINERALOGY:

Total percent: Not determined.

Texture: Pseudomorphic. Olivine replaced by talc (bluish color). Clinopyroxene partially (20%)

replaced by dark amphibole. Fractures filled with amphiboles Piece 3G: Cracks developed in

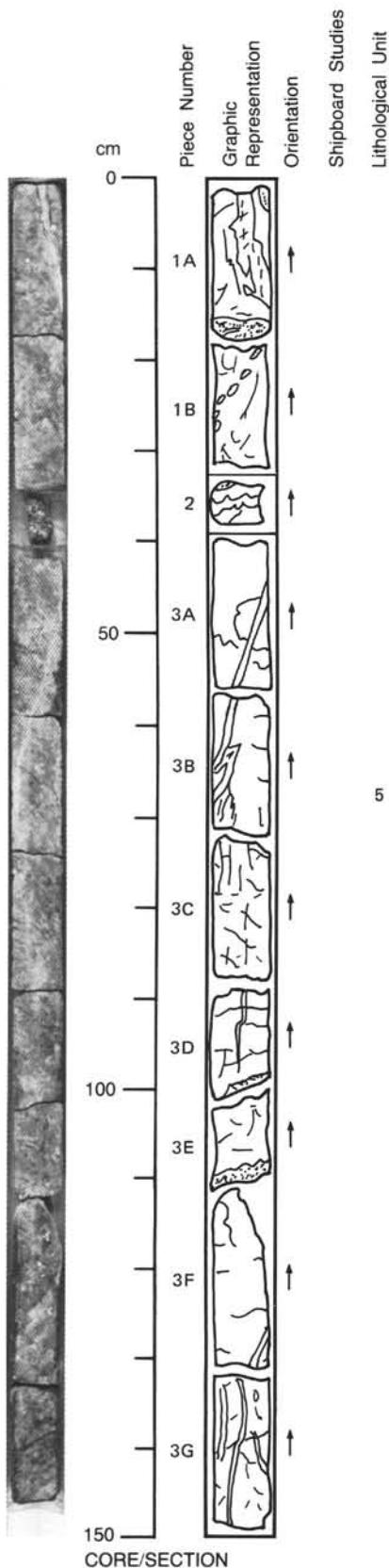
olivine (post-alteration) are filled with sulfides.

Percent vein material: Not determined.

Vein material: Plagioclase, sulfides, and epidote. Veins (3 mm-1.5 cm thick): Piece 2 filled with

plagioclase, sulfides (present in the rock also), and yellow green epidote. Some copper-sulfide

altered to malachite and associated with quartz. Fractures filled with talc and sulfides.



CORE/SECTION

118-735B-63R-3

UNIT 5: OLIVINE GABBRO

Pieces 1A-3E

Olivine Gabbro

Pieces 1A-3E

COLOR: Gray.

LAYERING: No clear layering.

DEFORMATION: None.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%-60%.

Crystal size: 5-10 mm.

Crystal shape: Subhedral laths.

Preferred orientation: None.

Percent replacement: Not determined.

Clinopyroxene—Mode: 30%-35%.

Crystal size: 3-20 mm.

Crystal shape: Anhedral intergranular to ophitic.

Preferred orientation: None.

Percent replacement: Not determined.

Olivine—Mode: 5%-10%.

Crystal size: Not determined.

Crystal shape: Anhedral intergranular.

Preferred orientation: None.

Percent replacement: 10-50% by talc-tremolite, 100% near veins.

Iron-oxides—Mode: <1%.

Iron-sulfides—Mode: <1%.

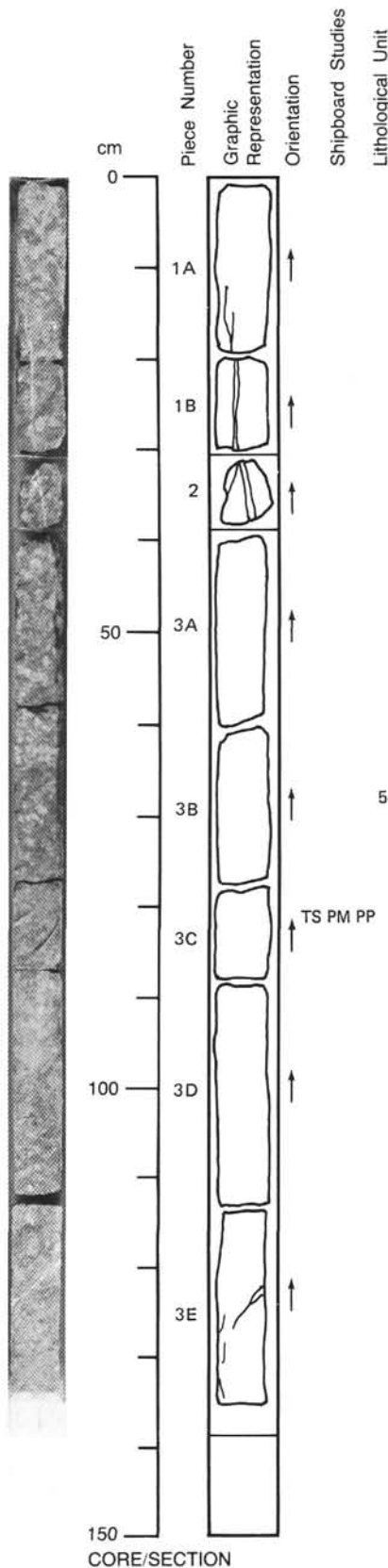
SECONDARY MINERALOGY:

Total percent: Not determined.

Texture: Groundmass alteration appears to be largely the formation of small cross-cutting veins of amphibole which cut all the primary minerals, the alteration of olivine to form talc-tremolite or serpentine, and the rimming of clinopyroxene locally by amphibole. Alteration is most intense near the veins described below, but is generally weak. Olivine is usually 50%-90% fresh, and is totally pseudomorphed only next to the veins. Percent vein material: <1%.

Vein material: There are two generations of veins: the first consists of 1-3 mm subvertical veins of plagioclase with accessory clinozoisite in Pieces 1A, 1B, 2, and 3A. Pyroxene next to these veins is generally altered to dark green amphibole. The second generation of veins cross-cuts the first in Piece 2 and consist of pale green talc. A single large 2 mm vein in Piece 3E seems to be a compound vein with talc and the plagioclase-zoisite-amphibole assemblages occurring locally along it.

COMMENTS: Equigranular olivine gabbro with a subophitic to ophitic texture with intergranular pyroxene and olivine grown around and enclosing 0.5-1.0 cm plagioclase laths. Plagioclase laths are subhedral and may be inclusions with pyroxene in larger olivine grains.



118-735B-63R-4

UNIT 5: OLIVINE GABBRO

Pieces 1-3K

Olivine Gabbro

Pieces 1-3K

COLOR: Gray.

LAYERING: Primary layering defined by alternating grain size and modal proportions. Modal proportions vary throughout section. Interval 35-43 cm is troctolitic with 95% plagioclase and 5% olivine; interval 94-102 cm is also more plagioclase-rich, but still gabbro. Slightly coarser grained intervals between 35-47 cm and 94-103 cm. Clinopyroxene with subophitic texture partially enclosing a plagioclase.

DEFORMATION: None.

PRIMARY MINERALOGY:

Plagioclase—Mode: 95%-50%.

Crystal size: 5-15 mm.

Crystal shape: Subhedral.

Preferred orientation: None.

Percent replacement: < 1%.

Clinopyroxene—Mode: 0%-45%.

Crystal size: 5-15 mm.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: < 1% by amphibole.

Olivine—Mode: 5%.

Crystal size: 2-10 mm.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: 75-100% by clay mineral(?) or serpentine + talc.

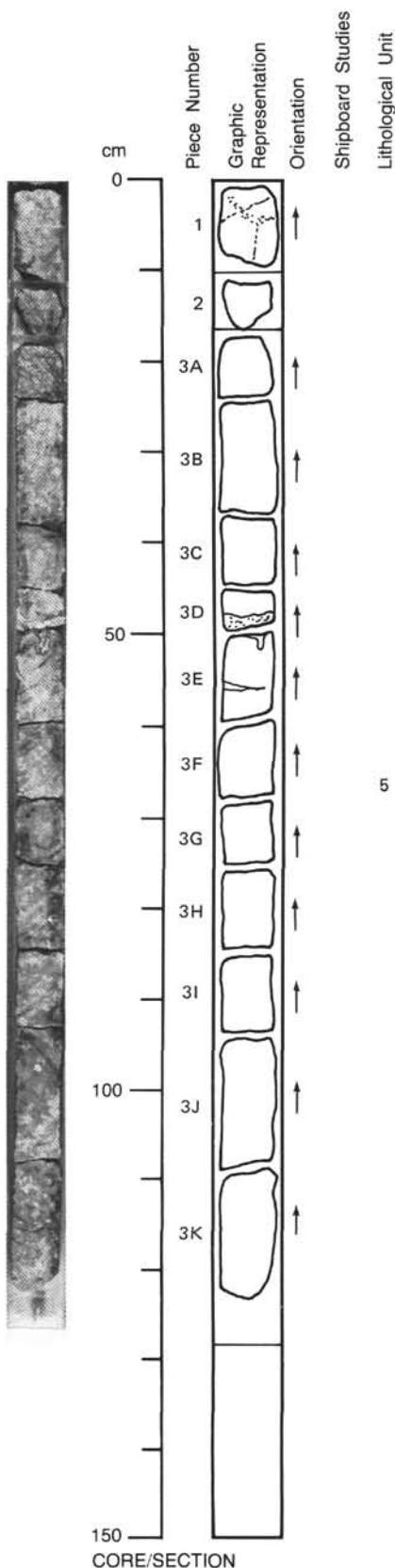
SECONDARY MINERALOGY:

Total percent: Not determined.

Texture: Olivine is totally altered in a mesh-like fashion. Mesh defined by dark mineral, probably clay mineral or serpentine; between mesh filled in by white talc. Away from veins primary plagioclase and clinopyroxene almost totally fresh. Near veins clinopyroxene partially replaced by amphibole.

Percent vein material: Not determined.

Vein material: Hematite, talc(?), actinolite, Na-plagioclase, and epidote(?). A 1 cm-wide vein in Piece 3D contains hematite stained plagioclase, pale-green talc(?), and actinolite + sulfides. Thin veins in Piece 1 contain plagioclase, actinolite and epidote(?); this piece 50% altered.



118-735B-63R-5

UNIT 5: OLIVINE GABBRO

Pieces 1-5B

Olivine Gabbro

Pieces 1-5B

COLOR: Gray.

LAYERING: Grain size varies from coarse (10-15 mm) to very coarse (10-25 mm).

DEFORMATION: None.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%-60%.

Crystal size: Not determined.

Crystal shape: Subhedral to euhedral.

Preferred orientation: None.

Percent replacement: 1% by zoisite, chlorite, and albite.

Clinopyroxene—Mode: 30%-35%.

Crystal size: 3-20 mm.

Crystal shape: Subophitic.

Preferred orientation: None.

Percent replacement: 17% by amphibole.

Olivine—Mode: 3%-10%.

Crystal size: Not determined.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: 40% by talc-tremolite or serpentine.

Iron-oxides—Mode: <1%.

Iron-sulphides—Mode: <1%.

SECONDARY MINERALOGY:

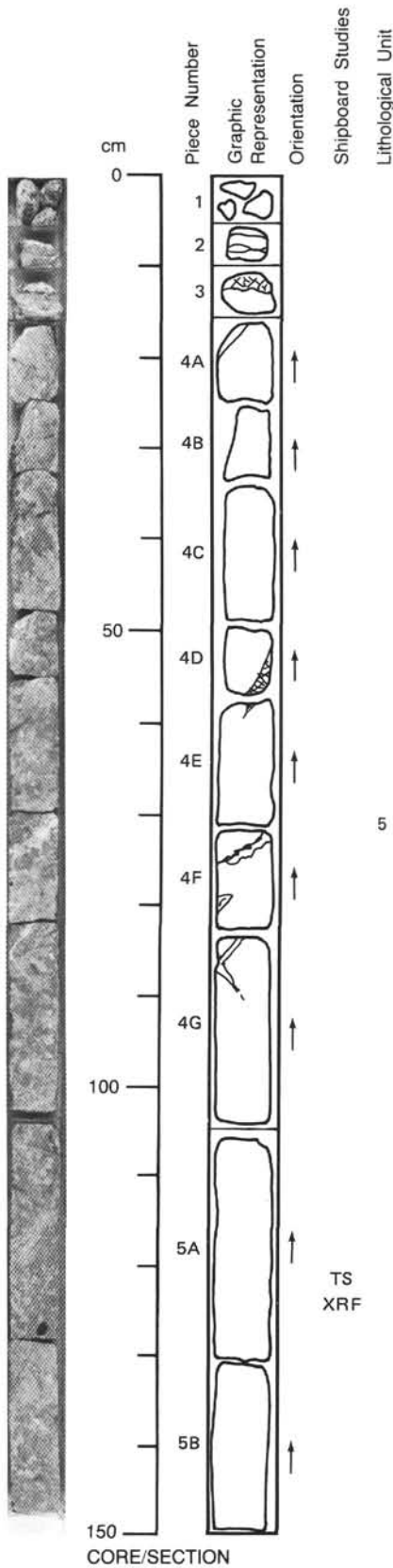
Total percent: Highly variable.

Texture: Alteration of the gabbro is highly variable depending on proximity to hydrothermal veins. Near the veins the pyroxene is heavily altered to green amphibole, which also occurs filling cracks in the plagioclase, and the olivine is partially to completely replaced by talc-tremolite or serpentine. A few centimeters from the veins the gabbro is markedly fresher with olivine only slightly altered, and only a small (5%) amount of amphibole present. An isolated 2X1 cm talc patch occurs in Piece 3C.

Percent vein material: 3%.

Vein material: Plagioclase, epidote, clinozoisite, actinolite, and iron-sulfides. Hydrothermal veins are a major feature of this section, generally containing plagioclase with accessory epidote, clinozoisite, actinolite, and local enrichments in iron-sulfides. These veins often appear pegmatoidal and may be vuggy, ranging in size from 1 mm to 2 cm thick. Adjacent to the veins, the gabbro is heavily amphibolitized along a narrow discontinuous selvage.

COMMENTS: Equigranular olivine gabbro with a subophitic to ophitic texture with intergranular pyroxene and olivine grown around subhedral plagioclase laths. Olivine may enclose the other minerals. Accessory minerals include iron-oxides and sulfides which occur as fine-grained disseminated inclusions in silicates and intergranular minerals.



118-735B-63R-6

UNIT 5: OLIVINE GABBRO

Pieces 1-5B

Olivine Gabbro

Pieces 1-5B

COLOR: Gray.

LAYERING: None well defined. Rather uniformly coarse- to medium-grained, one slightly finer section at 31 cm, one coarse to fine interval at 22-15 cm fining upwards, and a plagioclase-rich layer at 19-20 cm.

DEFORMATION: Small shear zone at 4-7 cm (near mylonitic) with some porphyroclastic gabbro on each side. One small shear at 33 cm.

PRIMARY MINERALOGY:

Plagioclase—Mode: 30%-90% locally.

Crystal size: 1-15 mm.

Crystal shape: Euhedral to anhedral.

Preferred orientation: Not determined.

Percent replacement: Not determined.

Clinopyroxene—Mode: 20%-60%.

Crystal size: 2-7 mm.

Crystal shape: Anhedral, oikocrysts common.

Preferred orientation: Not determined.

Percent replacement: Amphibole after clinopyroxene locally.

Olivine—Mode: 2%-10%.

Crystal size: 2-8 mm.

Crystal shape: Anhedral.

Preferred orientation: Not determined.

Percent replacement: Fresh to altered (iddingsite pseudomorphs).

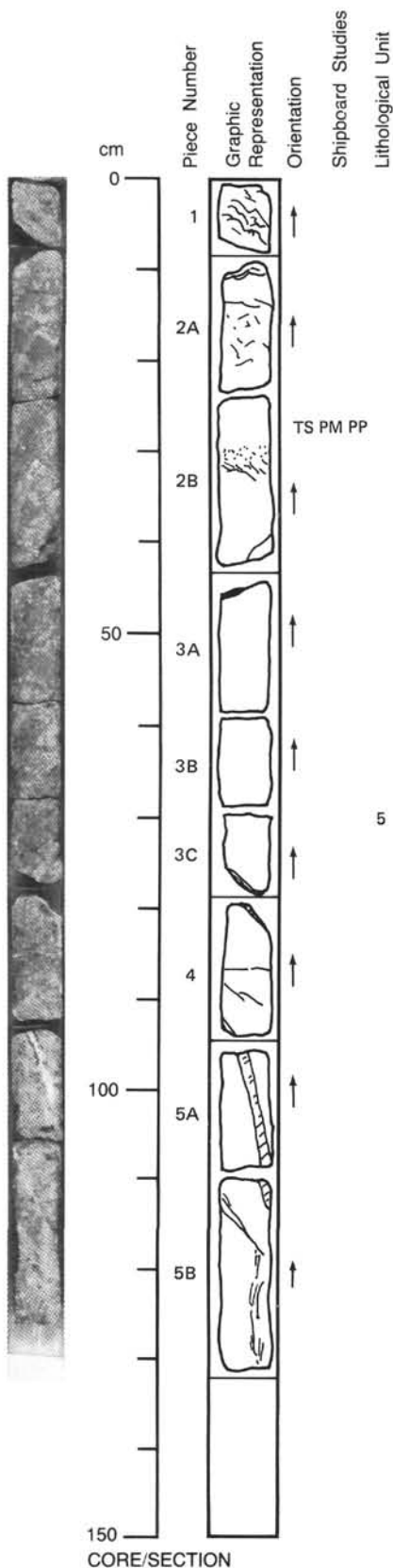
SECONDARY MINERALOGY:

Total percent: Various.

Texture: Clay/hematite after olivine along large veins; pale green amphibole after clinopyroxene in same areas. Thin carbonate rims on top right and bottom left of Piece 4. Rare pyrite. Some amphibolitization is common throughout.

Percent vein material: Not determined.

Vein material: Thick feldspar, epidote, quartz(?) veins (4-10 mm) in Pieces 5A and 5B. Smaller (1 mm) feldspathic veins in Piece 2, amphibole veins in Piece 3A.



118-735B-63R-7

UNIT 5: OLIVINE GABBRO

Pieces 1-14

Olivine Gabbro

Pieces 1-14

COLOR: Gray to gray and white.
LAYERING: None well defined, some coarse-medium variation but no consistency. Olivine throughout.
DEFORMATION: A little brittle deformation (some pyroxene-plagioclase granulation) at 40-75 cm.

PRIMARY MINERALOGY:

Plagioclase—Mode: 30%-90% locally.
Crystal size: 1-15 mm.
Crystal shape: Euhedral to anhedral.
Preferred orientation: Not determined.
Percent replacement: Not determined.

Clinopyroxene—Mode: 20%-60%.
Crystal size: 2-7 mm.
Crystal shape: Anhedral, oikocrysts common.
Preferred orientation: Not determined.
Percent replacement: Amphibole locally.

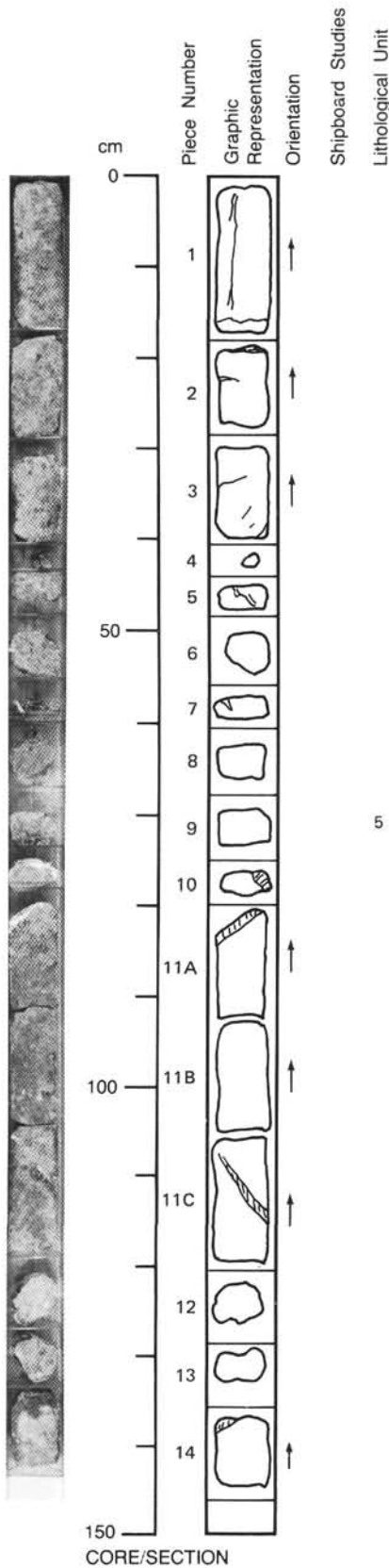
Olivine—Mode: 2%-10%.
Crystal size: 2-8 mm.
Crystal shape: Anhedral.
Preferred orientation: Not determined.
Percent replacement: Fresh to altered (iddingsite pseudomorphs).

SECONDARY MINERALOGY:

Total percent: Various.
Texture: Iddingsite after olivine. Amphibole after clinopyroxene, freshest is Piece 11B, rest are variously altered. No sign of pyrite; amphibolitization and veining may have removed it.
Vein in Piece 10 has a pinkish stain, seems to be associated with small red grains (hematite?).
Percent vein material: Not determined.

Vein material: Large feldspathic epidote-quartz(?) veins at 58, 78, 84, and 112 cm.

COMMENTS: Like section 118-735B-63R-6.



118-735B-64R-1

UNIT 5: OLIVINE GABBRO

Pieces 1-12

Olivine Gabbro

Pieces 1-12

COLOR: Gray to gray-green and white where veined.

LAYERING: Some very coarse-grained layers, a very coarse- to medium-grained gradation from 130 to 85 cm, possibly a coarse- to medium-grained transition at 30 cm. The very coarse-grained layer has plagioclase and clinopyroxene layers each a single crystal thick. Olivine is distributed throughout. The layering may be locally discontinuous. Piece 11C is fine-grained on cored surface, coarse-grained on cut surface.

DEFORMATION: Some brecciation from vein intrusion in Pieces 3A-10B.

PRIMARY MINERALOGY:

Plagioclase—Mode: 80%-40%.

Crystal size: 2-30 mm.

Crystal shape: Euhedral to anhedral.

Preferred orientation: Not determined.

Percent replacement: Some granulation and epidote development.

Clinopyroxene—Mode: 20%-60%.

Crystal size: 2-35 mm.

Crystal shape: Euhedral to anhedral, oikocrysts.

Preferred orientation: Not determined.

Percent replacement: Altered to amphibole, particularly near veins.

Olivine—Mode: 2%-10%.

Crystal size: 2-4 mm.

Crystal shape: Anhedral.

Preferred orientation: Not determined.

Percent replacement: Usually altered to iddingsitic pseudomorphs.

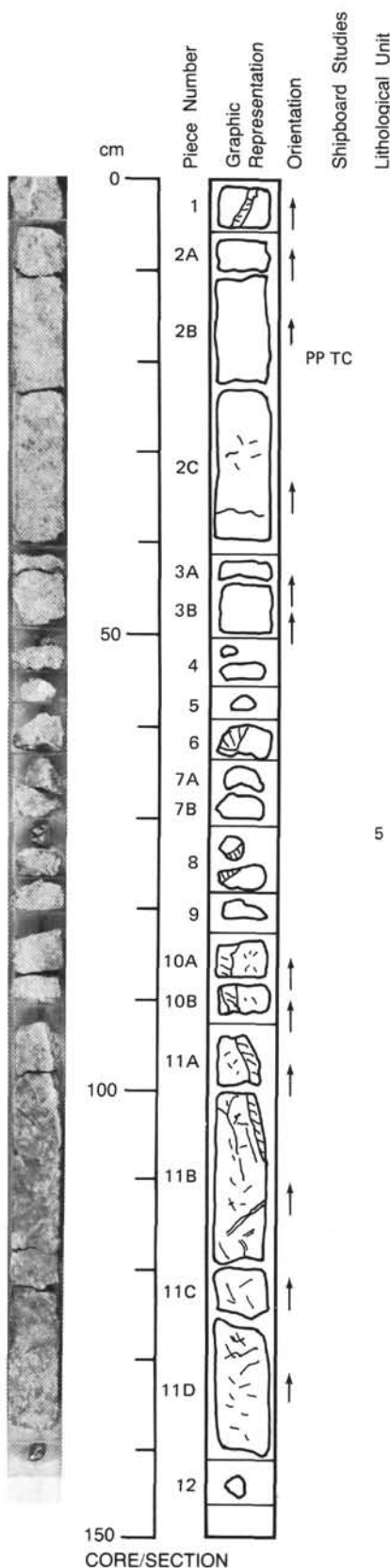
SECONDARY MINERALOGY:

Total percent: Extensive near veins.

Texture: At 40-105 cm the core is cut by a vein network of a feldspar-quartz-actinolite-epidote-hematite assemblage. Piece 5 is a fragment of the vein material. A similar vein cuts Piece 1. Some brecciation and plagioclase granulation in those portions cut by veins. Oxidative alteration of olivine and extensive amphibolitization of clinopyroxene is common near the veins.

Percent vein material: Not determined.

Vein material: Feldspar, quartz, actinolite, epidote, and hematite.



UNIT 5: OLIVINE GABBRO

Pieces 1A-4D

Olivine Gabbro

Pieces 1A-4D

COLOR: Gray with brownish orange spots.

LAYERING: Not apparent: gross grain size decreases from top to bottom (maximum 1.5 to <1 cm at base).

DEFORMATION: Absent.

PRIMARY MINERALOGY:

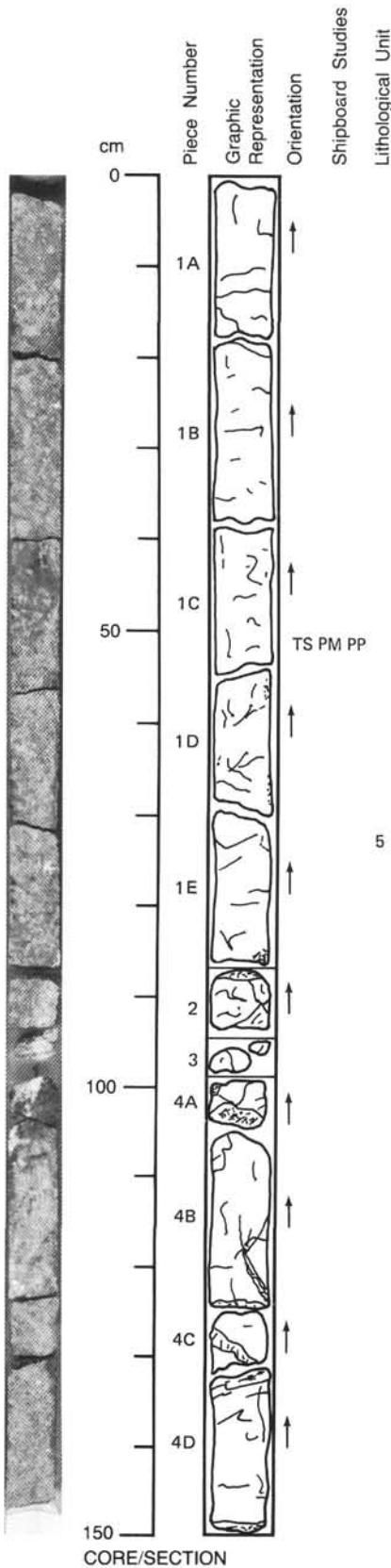
Plagioclase—Mode: 50%-60%.
 Crystal size: 0.5-10 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: Slight.

Clinopyroxene—Mode: 40%-50%.
 Crystal size: 0.3-15 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: 20% by amphibole.

Olivine—Mode: 5%-10%.
 Crystal size: 1-5 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: 10%-40% by talc or by a mixture of iron oxides, clays, and magnetite.

SECONDARY MINERALOGY:

Total percent: 25%.
 Texture: Coronitic. Olivine is replaced by talc (10%-40%) or by mixture of orange iron oxides, clays, and magnetite. Clinopyroxene is partially replaced by amphibole (20%). Plagioclase is recrystallized or deformed into granular sub-grains and then cut by amphibole-filled veinlets. Cracks are filled with light green amphiboles; these cracks run into the feldspars. Late formation of iron hydroxides gives yellow to orangish-brown color to feldspars. Other tiny fibrous amphiboles are present in vugs of the vein in Piece 2. Disseminated sulfides in Pieces 1A-1C. Single sulfide grains up to 0.4 mm in Piece 1C.
 Percent vein material: Not determined.
 Vein material: Plagioclase, epidote, and amphibole in veins 1->2 cm wide.



118-735B-64R-3

UNIT 5: OLIVINE GABBRO

Pieces 1A-5E

Olivine Gabbro

Pieces 1A-5E

COLOR: Gray.

LAYERING: None.

DEFORMATION: None.

PRIMARY MINERALOGY:

Plagioclase—Mode: 45%-50%.

Crystal size: 5-15 mm.

Crystal shape: Anhedral-subhedral.

Preferred orientation: None.

Percent replacement: 10%-100% by milky white feldspar.

Clinopyroxene—Mode: 45%.

Crystal size: 5-15 mm.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: 10%-100% by amphibole.

Olivine—Mode: 5%-10%.

Crystal size: 2-8 mm.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: Not determined.

SECONDARY MINERALOGY:

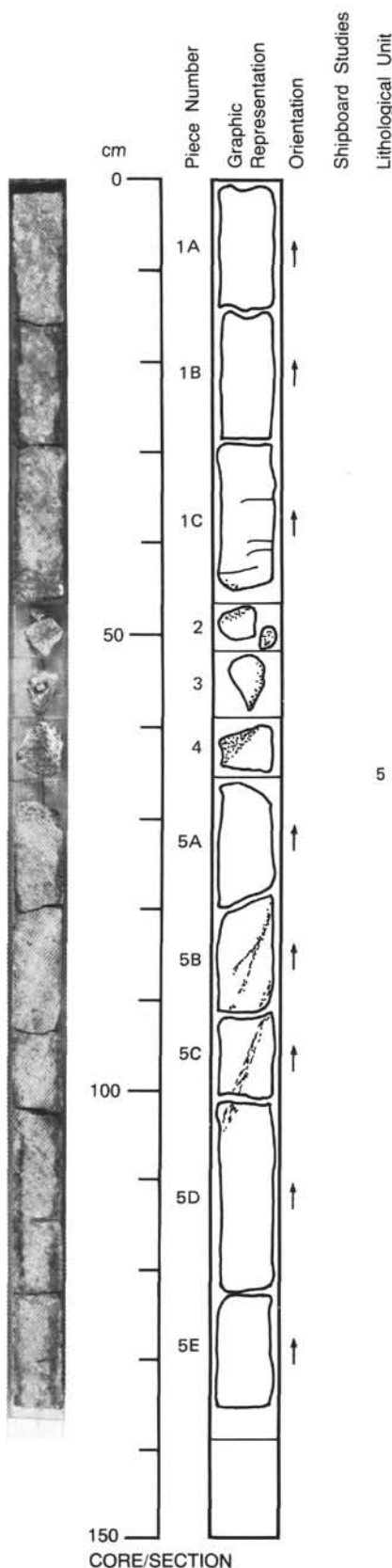
Total percent: 10%-100%.

Texture: Clinopyroxene partially replaced by amphibole. Abundance depends on proximity to veins (i.e., 100% near veins, as little as 10% away from veins). Similarly, plagioclase mostly altered to milky white or hematite-stained feldspar near veins. Olivine altered in mesh-like fashion throughout section, but in intensely veined interval 34-110 cm, olivine is oxidized to orange-brown oxide. Trace of sulfides in Piece 1A.

Percent vein material: Not determined.

Vein material: Plagioclase + actinolite + tremolite + zoisite (rose-colored, prismatic mineral).

COMMENTS: Clinopyroxene subophitically enclosing plagioclase.



CORE/SECTION

UNIT 5: OLIVINE GABBRO

Pieces 1A-4

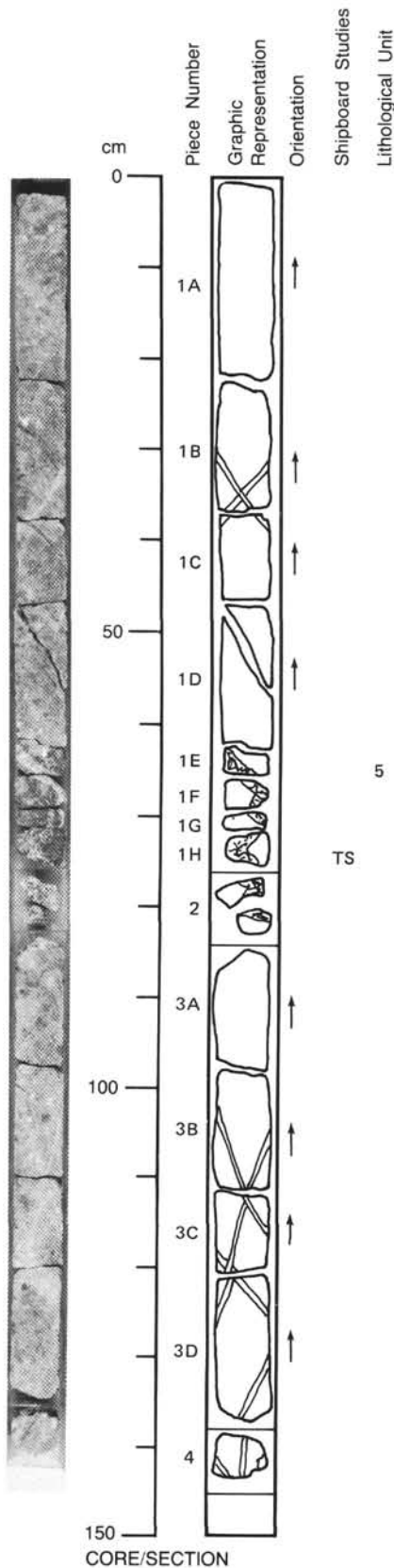
Olivine Gabbro

Pieces 1A-4

COLOR: Gray.
LAYERING: Not determined.
DEFORMATION: Not determined.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 50%-60%.
 Crystal size: 0.5-45 mm.
 Crystal shape: Subhedral laths.
 Preferred orientation: None.
 Percent replacement: Not determined.
 Clinopyroxene—Mode: 30%-35%.
 Crystal size: 0.5-4.5 mm.
 Crystal shape: Subophitic.
 Preferred orientation: None.
 Percent replacement: Partial replacement by amphibole near veins.
 Olivine—Mode: 5%-10%.
 Crystal size: Not determined.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: 100% by talc-tremolite near veins.
 Iron-sulfide—Mode: <1%.

Iron-oxide—Mode: <1%.
SECONDARY MINERALOGY:
 Total percent: Not determined.
 Texture: The alteration of this section of core is complex due to the presence of 3 generations of cross-cutting hydrothermal veins. Near these veins, the alteration of the adjacent gabbro may be extensive; largely consisting of the replacement of olivine by talc-tremolite and the partial replacement of pyroxene by amphibole. The section of the core cut by the last generation of veins, with a yellow-pink carbonate filling, shows extensive oxidative alteration of the olivine, which is converted to or partially replaced by rust red clay or iddingsite.
 Percent vein material: 4%.
 Vein material: The earliest generation consists of talc-actinolite veins, 2 mm thick, which are inclined about 70° and are cut by the next 2 generations (Pieces 1B, 3A, 3B, and 6D). The second generation also dips about 70° and contains plagioclase, epidote, clinzoisite, and actinolite. The second generation also tends to be stained pink, probably by hematitic alteration of iron-sulfides originally in these veins as seen in unaltered veins higher in the core. Locally these veins become relatively massive and irregular (Pieces 1E, 1F, 1G, 1H, and 2), elsewhere they are 2-3 mm thick (Pieces 3A, 3B, 3C, 3D, and 3E).

COMMENTS: Equigranular gabbro with a subophitic texture. Subhedral plagioclase enclosed in intergranular clinopyroxene and olivine with accessory iron-oxides and sulfides. Grain size varies considerably from the typical 0.5-1.5 cm coarse gabbro to patches of very coarse gabbro where the plagioclase laths reach 4.5 cm in length.



118-735B-65R-1

UNIT 5: OLIVINE GABBRO

Pieces 1-2I

Olivine Gabbro

Pieces 1-2I

COLOR: Gray to greenish gray.

LAYERING: None.

DEFORMATION: None.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%-60%.

Crystal size: 2-5 mm.

Crystal shape: Euhedral.

Preferred orientation: None.

Percent replacement: None.

Clinopyroxene—Mode: 30%-40%.

Crystal size: 2-15 mm.

Crystal shape: Oikocrystic type, enclosing both olivine and plagioclase but not all the time.

Preferred orientation: None.

Percent replacement: 30%-60% by amphibole.

Olivine—Mode: 5%-20%.

Crystal size: 1-8 mm.

Crystal shape: Rounded to irregular.

Preferred orientation: None.

Percent replacement: Slight.

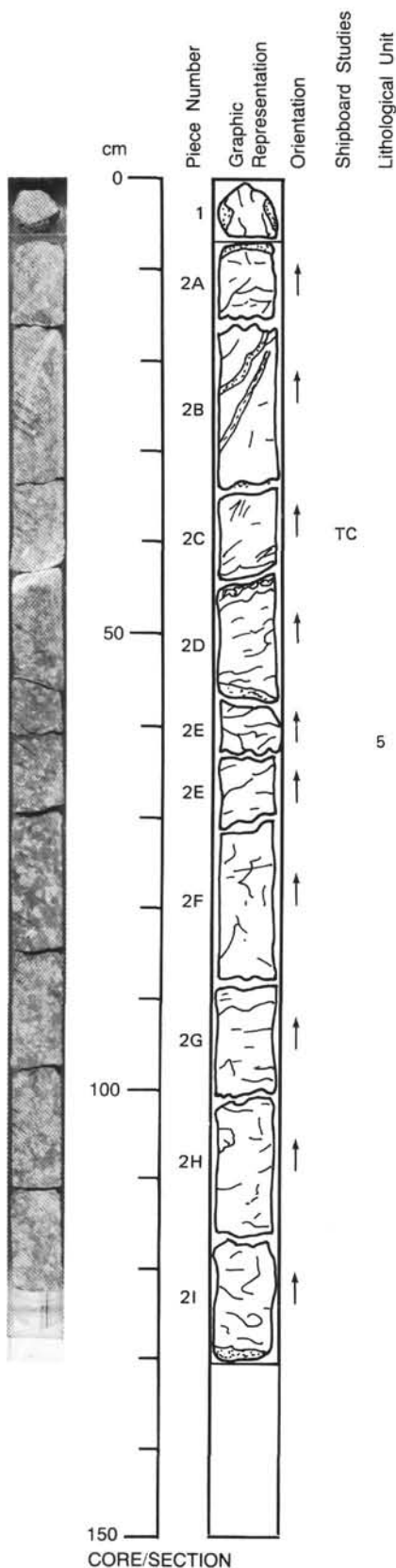
SECONDARY MINERALOGY:

Total percent: Slight.

Texture: Coronitic, pseudomorphic. Olivine is partly replaced by talc (rims) or by a mixture of orangish brown iron hydroxides and clays. Black veining by magnetite and chlorite define web texture. Clinopyroxene is partly replaced by amphibole (pseudomorphic 30%-60%). Plagioclase is granular on the grain surface. Cracks are filled with amphibole and soapy serpentine and columnar aragonite (HCl test worked; Piece 2E) or talc (blue green). Sulfides are present in Pieces 2A, 2C, 2D, and 2I (pyrite and chalcopyrite).

Percent vein material: Not determined.

Vein material: Plagioclase, amphibole, and epidote. Vein (at least 2-3 cm thick) filled with plagioclase, green amphibole (prismatic), and yellow brown epidote (Pieces 2B and 2C, dips 35°. Vein or discontinuous patches of plagioclase and amphibole (dips 70°).



CORE/SECTION

UNIT 5: OLIVINE GABBRO

Pieces 1A-2C

Olivine Gabbro

Pieces 1A-2C

COLOR: Gray to green-gray where altered.

LAYERING: Some coarse to fine variation in top; rest is medium to coarse-grained.

DEFORMATION: Small amphibolitized shear zone at top of Piece 2A.

PRIMARY MINERALOGY:

Plagioclase—Mode: 40%-55%.

Crystal size: 2-20 mm.

Crystal shape: Euhedral (small ones in clinopyroxene) to anhedral.

Preferred orientation: Not determined.

Percent replacement: Some albitization in Pieces 2B and 2C.

Clinopyroxene—Mode: 40%-50%.

Crystal size: 3-20 mm.

Crystal shape: Anhedral to subhedral, some oikocrysts.

Preferred orientation: Not determined.

Percent replacement: Some amphibolitization toward bottom.

Olivine—Mode: 5%-15%.

Crystal size: 2-10 mm.

Crystal shape: Anhedral.

Preferred orientation: Not determined.

Percent replacement: Altered to blackish amphibole, whitish talc alteration in Piece 2C, oxidative pseudomorphs in Pieces 2A and 2B.

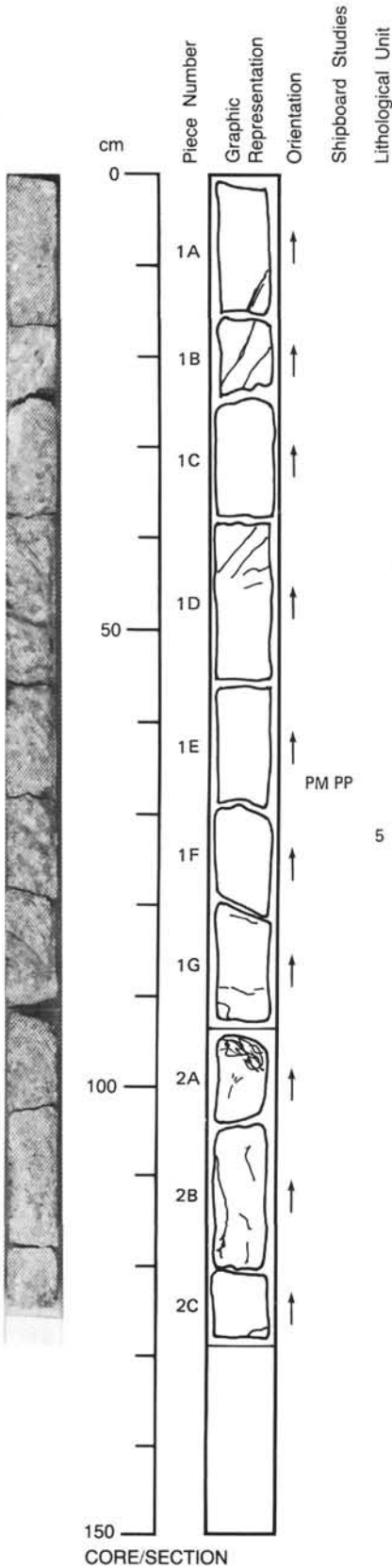
SECONDARY MINERALOGY:

Total percent: Various.

Texture: Olivine pseudomorphed as noted, amphibolitization of clinopyroxene, some albite after plagioclase in Pieces 2B and 2C.

Percent vein material: Not determined.

Vein material: Small (1-2 mm) feldspathic veins in Pieces 1A, 1B, and 2.



118-735B-65R-3

UNIT 5: OLIVINE GABBRO

Pieces 1A-3B

Olivine Gabbro

Pieces 1A-3B

COLOR: Gray.
LAYERING: Possible primary layering defined by variation in grain size between Pieces 3A and 3B.
DEFORMATION: None.

PRIMARY MINERALOGY:

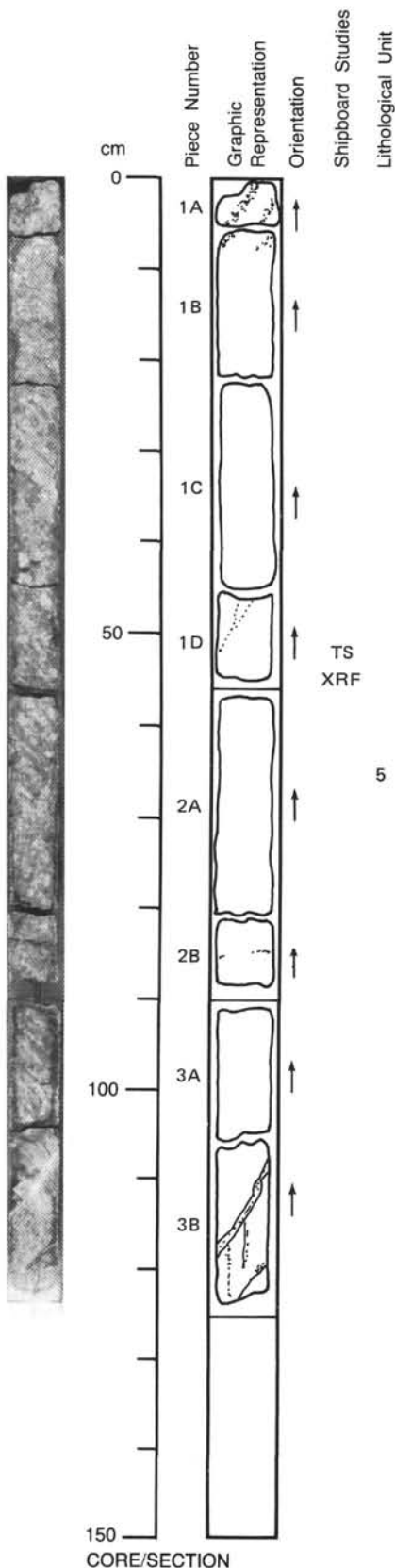
Plagioclase—Mode: 55%.
 Crystal size: 5-15 mm.
 Crystal shape: Anhedral to subhedral.
 Preferred orientation: None.
 Percent replacement: < 1%.

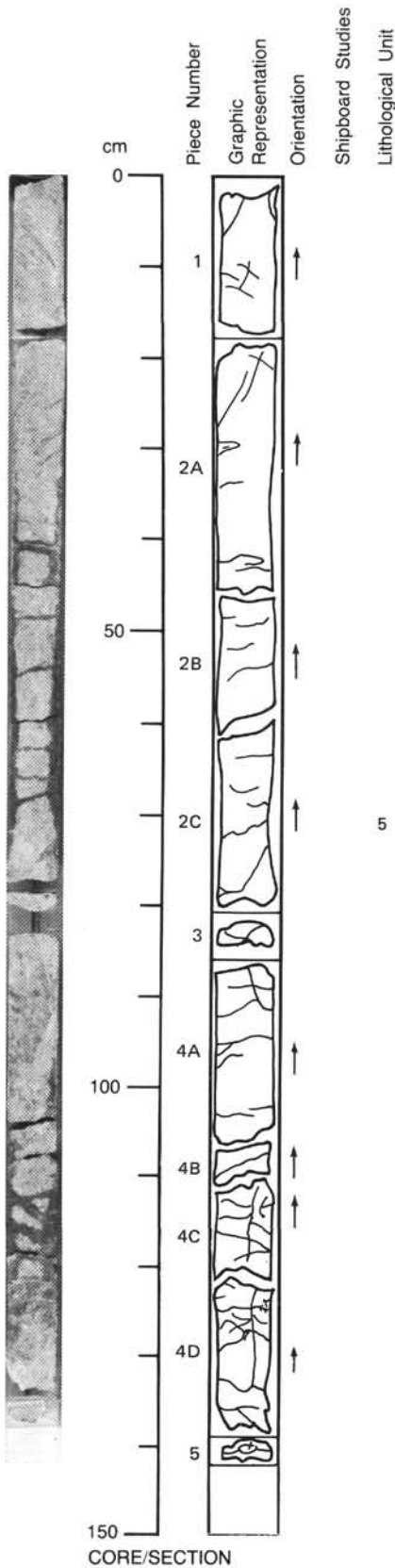
Clinopyroxene—Mode: 40%.
 Crystal size: 5-40 mm.
 Crystal shape: Anhedral to subhedral; subophitically encloses plagioclase.
 Preferred orientation: None.
 Percent replacement: < 1%.

Olivine—Mode: 5%.
 Crystal size: 5-10 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: 5%-10%.

SECONDARY MINERALOGY:

Total percent: 3%-5%.
 Texture: Grain boundaries lined by actinolite, as are very thin fractures in Piece 1D. This is the main form of alteration in this section and constitutes 2%-3% of rock.
 Percent vein material: Not determined.
 Vein material: Major veins 1 mm wide in Piece 1A and 10 mm wide in Piece 3B. Vein in Piece 1A has soft white mineral (probably talc) + actinolite + zoisite at top of piece. Piece 3B veins are plagioclase + very fine-grained green amphibole (actinolite). Orangish oxidation on portion of Piece 1A is separate from plagioclase + actinolite vein.





UNIT 5: OLIVINE GABBRO

Pieces 1-5

Olivine Gabbro

Pieces 1-5

COLOR: Gray with orangish-brown spots.

LAYERING: Not apparent.

DEFORMATION: Not apparent.

PRIMARY MINERALOGY:

Plagioclase—Mode: 40%-60%.

Crystal size: 1-4 mm.

Crystal shape: AnhedraI.

Preferred orientation: None.

Percent replacement: None.

Clinopyroxene—Mode: 40%-45%.

Crystal size: 2-12 mm.

Crystal shape: AnhedraI to subhedraI, of oikocrystaI type enclosing plagioclase (subophitic texture) and rounded olivine.

Preferred orientation: None.

Percent replacement: Slight

Olivine—Mode: 10%-15%.

Crystal size: 2.6 mm.

Crystal shape: Rounded to irregular.

Preferred orientation: None.

Percent replacement: 10%-100% by iron hydroxides and clays, talc and magnetite.

SECONDARY MINERALOGY:

Total percent: Not determined.

Texture: Olivine is altered to a mixture of iron hydroxides and clays or mixture of talc + magnetite. They are fresh in Pieces 1, 2A and 2B (less than 10% replacement). Clinopyroxene partly replaced by green amphibole.

Percent vein material: Not determined.

Vein material: Plagioclase, epidote, and actinolite. Vein (base of Pieces 4D and 5) filled with plagioclase, epidote (green pistacite), yellow-brown zoisite, and fibrous to acicular actinolite. Cracks and veinlets filled with amphibole, plagioclase, clay, and carbonate (Piece 3).

118-735B-66R-2

UNIT 5: OLIVINE GABBRO

Pieces 1-9

Olivine Gabbro

Pieces 1-9

COLOR: Gray; white-green gray where altered.
LAYERING: None clearly defined. A very coarse interval at 24-28 cm.
DEFORMATION: Some brecciation in veined zone 0-26 cm, a lot of cross-cutting brittle fractures from 59 cm downwards.

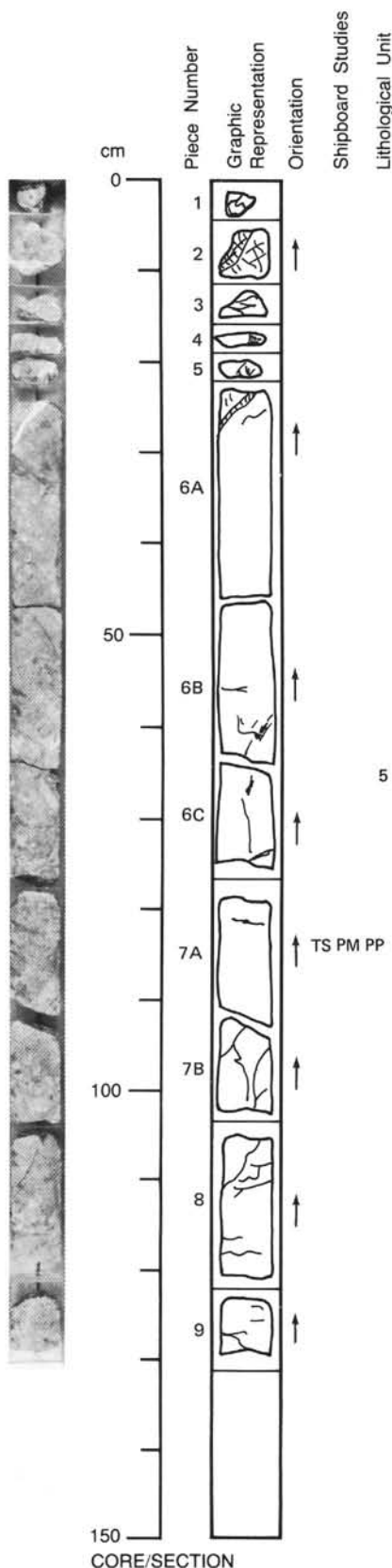
PRIMARY MINERALOGY:
 Plagioclase—Mode: 40%-60%.
 Crystal size: 2-20 mm.
 Crystal shape: Euhedral to anhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

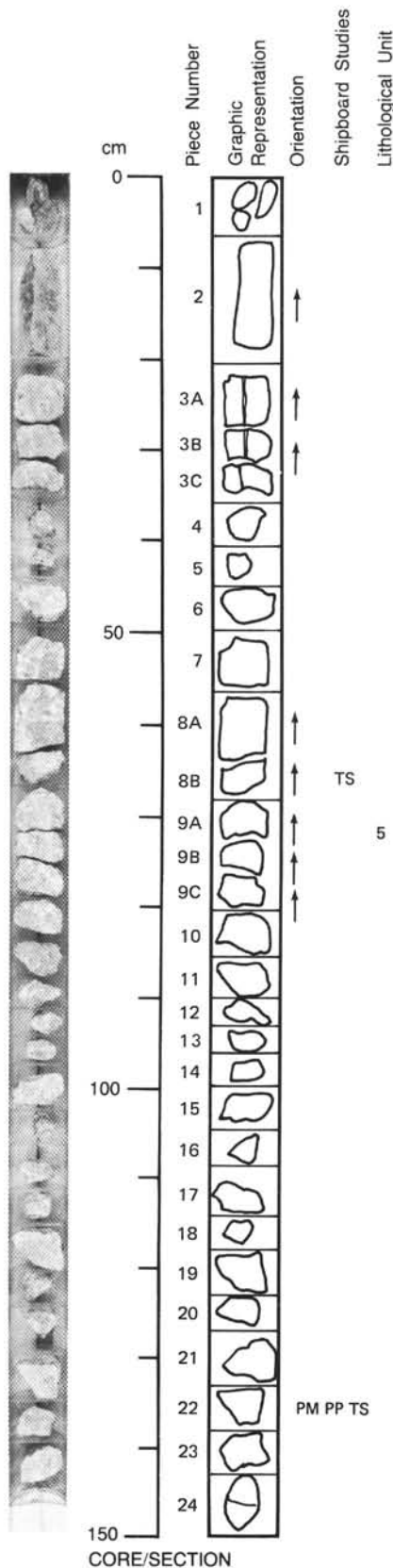
Clinopyroxene—Mode: 40%-50%.
 Crystal size: 4-25 mm.
 Crystal shape: Anhedral, largely interstitial.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

Olivine—Mode: 2%-10%.
 Crystal size: 2-6 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Not determined.
 Percent replacement: Various altered at 30-59 cm, black-green veined alteration patches. In rest of core olivine has undergone an oxidative alteration (iddingsite) usually adjacent to the fractures.

SECONDARY MINERALOGY:
 Total percent: Up to 40% in top 5 pieces.
 Texture: Olivine as noted; in oxidative zones also common amphibolitization of clinopyroxene. Also amphibole along fractures. Sometimes feldspathic veins associated with fractures too.
 Percent vein material: Not determined.
 Vein material: Top 5 pieces are veined (as is top of Piece 6A) by 2-10 mm wide veins of feldspar-actinolite-epidote-quartz; veins are dominated by feldspar + epidote, and lack carbonate. Some smaller such veins occur in lower part of section (21 mm wide).

COMMENTS: No pyrite identified in section.





UNIT 5: OLIVINE GABBRO

Pieces: 1-24

Olivine Gabbro

Pieces 1-3B

COLOR: Gray.
LAYERING: Not determined.
DEFORMATION: Not determined.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 55%.
 Crystal size: Medium to coarse.
 Crystal shape: Anhedral granular.
 Preferred orientation: None.
 Percent replacement: Variable.

 Clinopyroxene—Mode: 35%.
 Crystal size: Medium to coarse.
 Crystal shape: Subophitic.
 Preferred orientation: None.
 Percent replacement: Variable.

 Olivine—Mode: 10%.
 Crystal size: Not determined.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: Variable.

Opaques—Mode: <1%.
SECONDARY MINERALOGY:
 Total percent: Variable.
 Texture: Near the vein the alteration is extensive, giving the rock a distinct greenish cast. Nonetheless, much of the gabbro appears relatively fresh with the principle sign of alteration being patches of prehnite(?) replacing plagioclase and rust brown oxidation of primary olivine. A large fracture surface on Piece 2 may have chlorite on it.
 Percent vein material: Not determined.
 Vein material: Epidote, actinolite, and prehnite(?).

Epidosized Gabbro Breccia

Pieces 3C-24

COLOR: White with green cast and gray.
LAYERING: None.
DEFORMATION: Autoclastic breccia.
PRIMARY MINERALOGY: Similar to olivine gabbro above.
SECONDARY MINERALOGY:
 Total percent: 80%-90%.
 Texture: Angular clasts of altered gabbro criss-crossed by epidote-rich (pistacite) veins with prehnite and/or tremolite. Plagioclase in gabbro clasts appears altered to prehnite locally while olivine is oxidized. Pyroxene appears partially replaced or pseudomorphed by actinolite.
 Percent vein material: Not determined.
 Vein material: Locally the veins contain carbonate, which can occur as aragonite(?) crystals in small vugs. Matrix in veins other than epidote and actinolite is likely to be a mixture of plagioclase (albite?) and other calc-silicates (talc-tremolite, etc.).
COMMENTS: This whole section looks like a hydrothermal stockwork cross-cutting and working its way up through the gabbro.

118-735B-66R-4

UNIT 5: OLIVINE GABBRO

Pieces 1-11

Hydrothermally Deformed Olivine Gabbro

Pieces 1-8 and 10

COLOR: Yellow green.
LAYERING: Not present.
DEFORMATION: Folliation developed in Pieces 4 and 8 and brecciation in other pieces.
PRIMARY MINERALOGY: The rock was a gabbro composed of plagioclase, clinopyroxene, and maybe olivine. No primary phases are preserved.
SECONDARY MINERALOGY:
 Total percent: 100%.
 Texture: Plagioclase (albite?), rhombohedral calcite, epidote (green: pistacite, rose: zoisite), amphibole (after clinopyroxene), white fibrous tremolite, and some vitreous grains that are probably quartz.
 Percent vein material: Not determined.
 Vein material: Not determined.

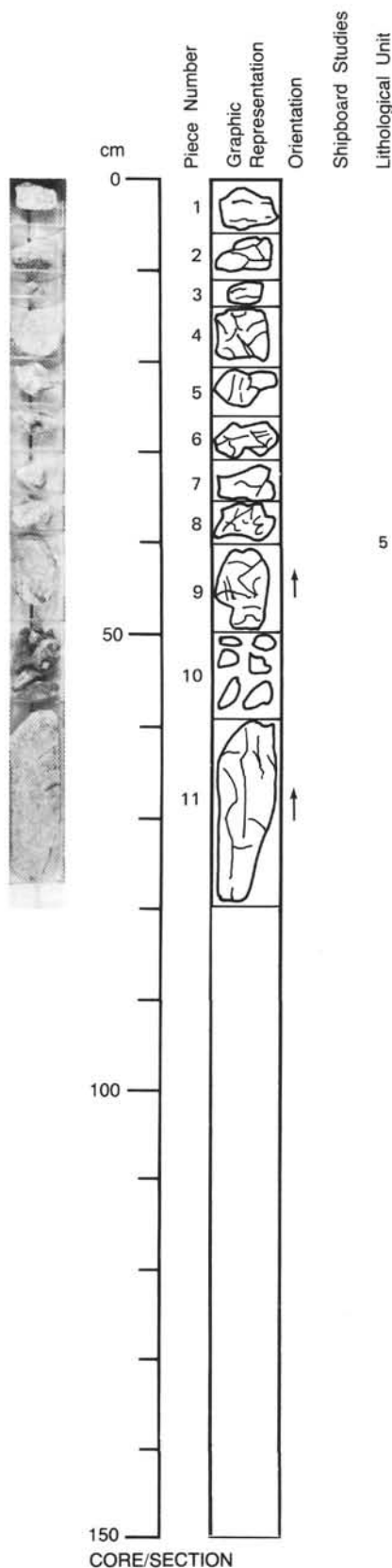
Olivine Gabbro

Pieces 9, 11, and fragments of Piece 10

COLOR: Greenish gray.
LAYERING: None.
DEFORMATION: Not apparent.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 35%.
 Crystal size: 1-3 mm.
 Crystal shape: Euhedral to anhedral.
 Preferred orientation: None.
 Percent replacement: 40% by epidote.

 Clinopyroxene—Mode: 60%.
 Crystal size: 2-7 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: 40% by amphibole.

 Olivine—Mode: 5%.
 Crystal size: 1-5 mm.
 Crystal shape: Irregular, lense-shaped.
 Preferred orientation: None.
 Percent replacement: 60-70% by iron hydroxides, clays, and talc.
SECONDARY MINERALOGY:
 Total percent: Approximately 40%.
 Texture: Pseudomorphic. Olivine replaced by mixture of orange-brown iron hydroxides and clays (+ magnetite) and by dark talc (60-70%). Clinopyroxene is replaced by amphibole (40%). Plagioclase is cut by amphibole veinlets and partly replaced by epidote (yellow color; 40%).
 Percent vein material: Not determined.
 Vein material: Veins filled by yellow-green amphibole + epidote.



118-735B-67R-1

UNIT 5: OLIVINE GABBRO

Pieces 1-12B

Hydrothermally Altered Gabbro

Pieces 1-12B

COLOR: Irregular patches of dark green to yellow green and white colors.

LAYERING: None.

DEFORMATION: None.

PRIMARY MINERALOGY:

Plagioclase—Mode: 35%.

Crystal size: 1-3 mm.

Crystal shape: Euhedral to anhedral.

Preferred orientation: None.

Percent replacement: Slight.

Clinopyroxene—Mode: 60%.

Crystal size: 2-7 mm.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: 40% by amphibole.

Olivine—Mode: 5%.

Crystal size: 1-5 mm.

Crystal shape: Rounded.

Preferred orientation: None.

Percent replacement: 60%-70% by iron hydroxides, clays, and talc.

SECONDARY MINERALOGY:

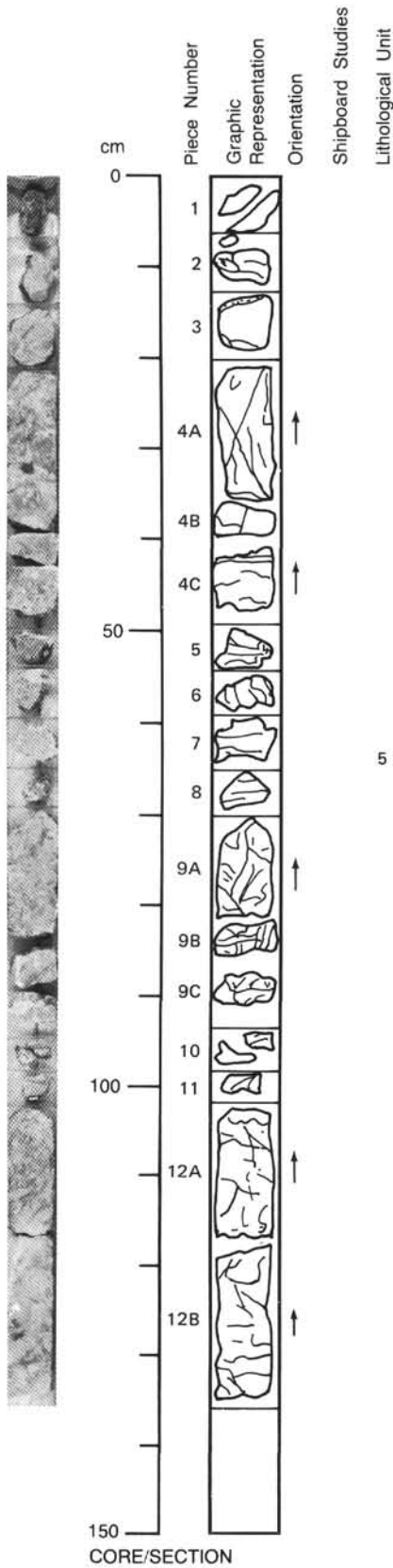
Total percent: Not determined.

Texture: Coronitic.

Percent vein material: Not determined.

Vein material: Amphibole and epidote.

COMMENTS: For comments see Section 118-735B-66R-4.



118-735B-67R-2

UNIT 5: OLIVINE GABBRO

Pieces 1A-5

Olivine Gabbro

Pieces 1A-5

COLOR: Gray.

LAYERING: No clear graded layers but two very coarse-grained layers 3 cm thick at 79-83 cm; and 9.5 cm thick at 121-130 cm containing clinopyroxene oikocrysts with included 2 cm euhedral plagioclase. Most of core is coarse-grained. Olivine distributed throughout. A plagioclase rich zone below large clinopyroxene.

DEFORMATION: None.

PRIMARY MINERALOGY:

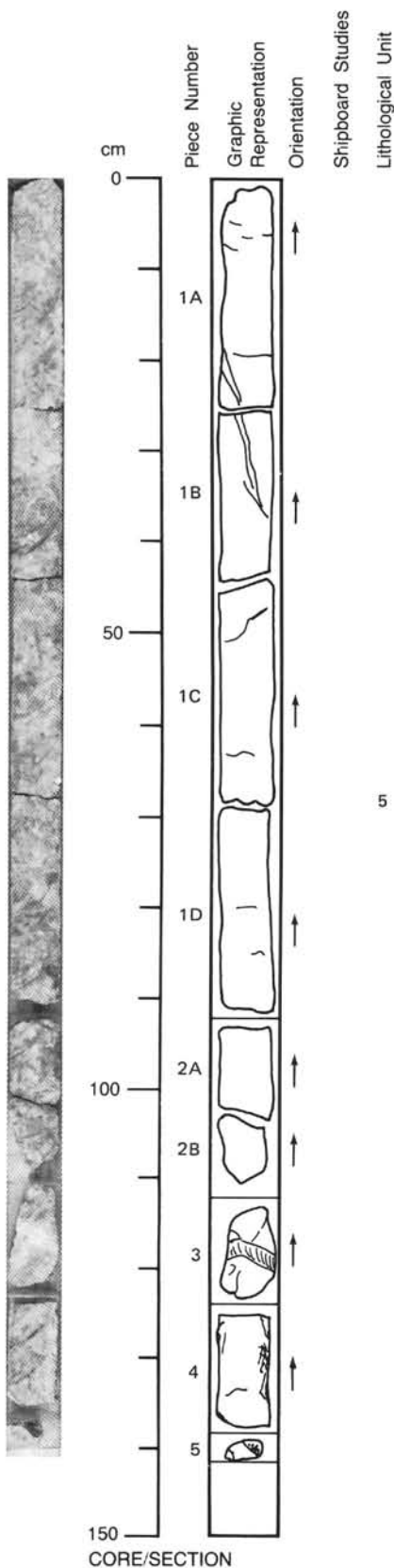
Plagioclase—Mode: 40%-60%, commonly partially enclosed in clinopyroxene.
Crystal size: 2-20 mm.
Crystal shape: Euhedral in clinopyroxene to subhedral.
Preferred orientation: Not determined.
Percent replacement: Not determined.

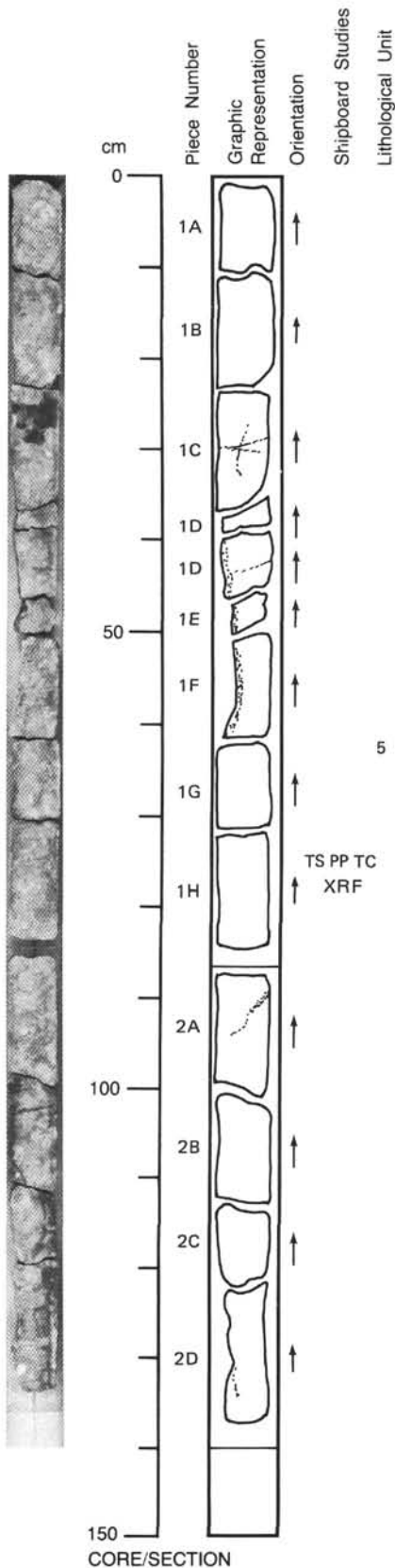
Clinopyroxene—Mode: 40%-50%.
Crystal size: 5-20 mm, rarely to 90 mm.
Crystal shape: Anhedral, interstitial to poikilitic; rarely subhedral.
Preferred orientation: Not determined.
Percent replacement: Rare.

Olivine—Mode: 2%-10%.
Crystal size: 2-12 mm.
Crystal shape: Anhedral.
Preferred orientation: Not determined.
Percent replacement: Altered to talc, tremolite and chlorite(?).

SECONDARY MINERALOGY:

Total percent: Up to 5%.
Texture: Olivine replaced by talc, tremolite, and chlorite(?). Talc pseudomorphs by vein in Piece 3.
Clinopyroxene rarely amphibolitized, usually adjacent to veins.
Percent vein material: 5%.
Vein material: Large feldspathic-actinolite-epidote vein in Piece 3, similar veining on right side of Pieces 4 and 5. Most of green in these veins is actinolite.





UNIT 5: OLIVINE GABBRO

Pieces 1A-2D

Olivine Gabbro

Pieces 1A-2D

COLOR: Gray.

LAYERING: None apparent.

DEFORMATION: None.

PRIMARY MINERALOGY:

Plagioclase—Mode: 55%.

Crystal size: 8-25 mm.

Crystal shape: Subhedral to euhedral.

Preferred orientation: None.

Percent replacement: <1%.

Clinopyroxene—Mode: 40%.

Crystal size: 5-25 mm.

Crystal shape: Subhedral, subophitically encloses plagioclase.

Preferred orientation: None.

Percent replacement: 10-25% by amphibole.

Olivine—Mode: 5%.

Crystal size: 5-15 mm.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: 100% from 0-66 cm, <1%-2% from 66 cm to bottom.

SECONDARY MINERALOGY:

Total percent: <5%. This section extremely fresh in general.

Texture: Olivine is totally altered to black mineral in mesh-work fashion from 0-66 cm. Below, olivine is very fresh; <1-2% alteration by amphibole along grain boundaries. Plagioclase unaltered.

Percent vein material: Not determined.

Vein material: Most veins are thin and filled by white minerals, (plagioclase or prehnite). Outer surface of Pieces 1C, 1D, 1E, and 1F coated by a bluish green mineral plus a coating of orange-brown oxidation, i.e., probably a greenish talc + iron-oxyhydroxides.

118-735B-67R-4

UNIT 5: OLIVINE GABBRO

Pieces 1A-8

Olivine-Bearing and Olivine Gabbro

Pieces 1A-8

COLOR: Gray with white veins and red patches.
LAYERING: Pieces 4, 5, 6, and 7 have more olivine (about >5%). No magmatic lamination.
DEFORMATION: No plastic deformation; slight brecciation due to veining in Pieces 7 and 8.

PRIMARY MINERALOGY:

Plagioclase—Mode: 55%.
 Crystal size: 1-4 cm.
 Crystal shape: Subhedral.
 Preferred orientation: None.
 Percent replacement: Not determined.

Clinopyroxene—Mode: 40%-45%.
 Crystal size: 1-4 cm.
 Crystal shape: Subhedral.
 Preferred orientation: None.
 Percent replacement: Not determined.

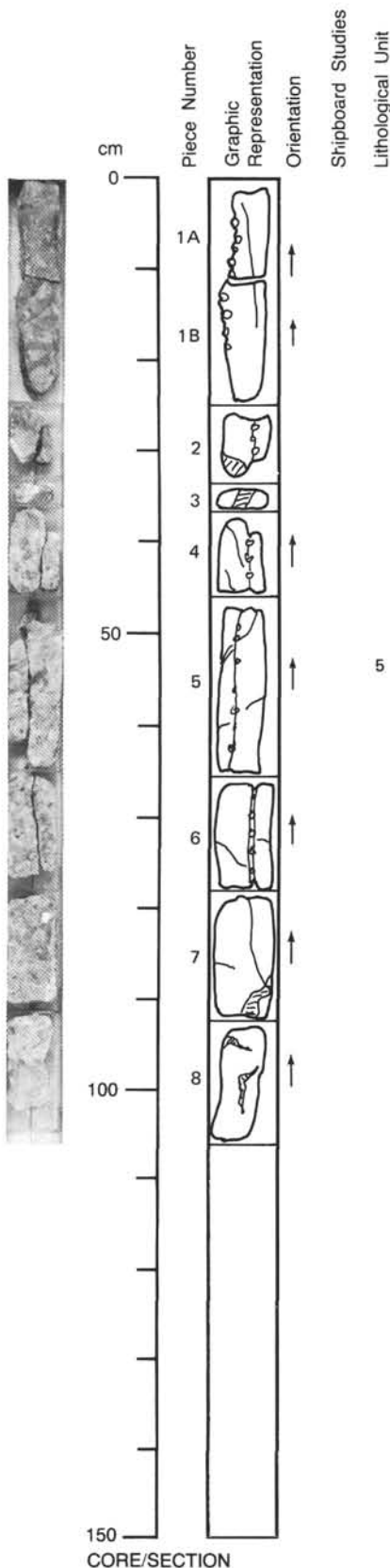
Olivine—Mode: 2%-5%.
 Crystal size: 1-2 cm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: Not determined.

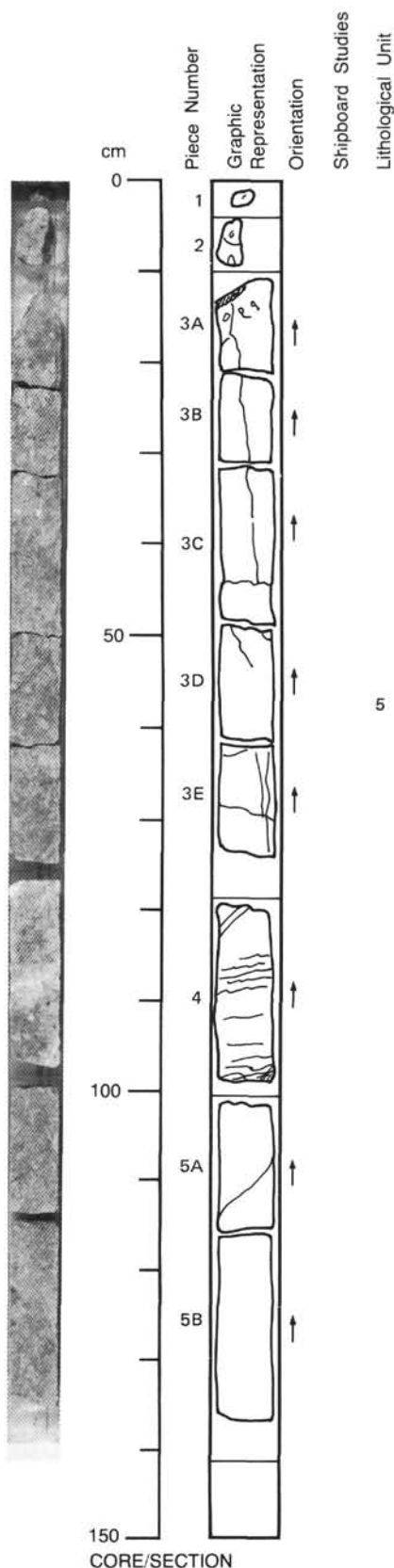
SECONDARY MINERALOGY:

Total percent: 15% - >70% close to the amphibole veins.
 Texture: The olivine is 60%-70% oxidized, the clinopyroxene is amphibolitized. The extent of this amphibolitization is maximum close to the amphibole veins, and reaches 100% in parts of Piece 8.
 Percent vein material: 1%-5%.

Vein material: There are 3 types of veins (1) 1-10 mm-thick amphibole ± epidote ± quartz veins (hatched pattern), (2) thin white veins (thin lines), and (3) carbonate-coated open fracture (open dots). The cross-cutting relationships indicate the following chronology: (1), (2), and (3).

COMMENTS: Grain size: 1-2 cm, up to 4 cm in Piece 8.





UNIT 5: OLIVINE-GABBRO

Pieces 1-4B

Olivine-Bearing Gabbro

Pieces 1-4B

COLOR: Gray.

LAYERING: None apparent; minor grain size variations, in general, coarse-grained (1-2 cm). Olivine is slightly enriched in Piece 5B.

DEFORMATION: None.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%-55%.
 Crystal size: Up to 3 cm.
 Crystal shape: Subhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

Clinopyroxene—Mode: 40%-45%.
 Crystal size: 0.5-3 cm.
 Crystal shape: Subhedral, oikocrystic.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

Olivine—Mode: <2%-10%, average 3%.
 Crystal size: 0.4-2 cm.
 Crystal shape: Anhedral-subhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

Sulfides—Mode: <1%.

SECONDARY MINERALOGY:

Total percent: Slight alteration.
 Texture: Olivine in certain intervals completely altered to brownish, sometimes black alteration products. Amphibole replaces clinopyroxene along grain boundaries. Sulfide dissemination.
 Percent vein material: Not determined.
 Vein material: Carbonate vein on very top of Piece 3A. Thick vein (up to 3 cm across) with greenish and white minerals in Piece 4 (at about 85-90 cm). Two "white" veins on top and bottom of Piece 4.

118-735B-68R-2

UNIT 5: OLIVINE GABBRO

Pieces 1A-3D

Olivine Gabbro

Pieces 1A-3D

COLOR: Gray to greenish near veins.
LAYERING: None apparent.
DEFORMATION: None apparent.
PRIMARY MINERALOGY:

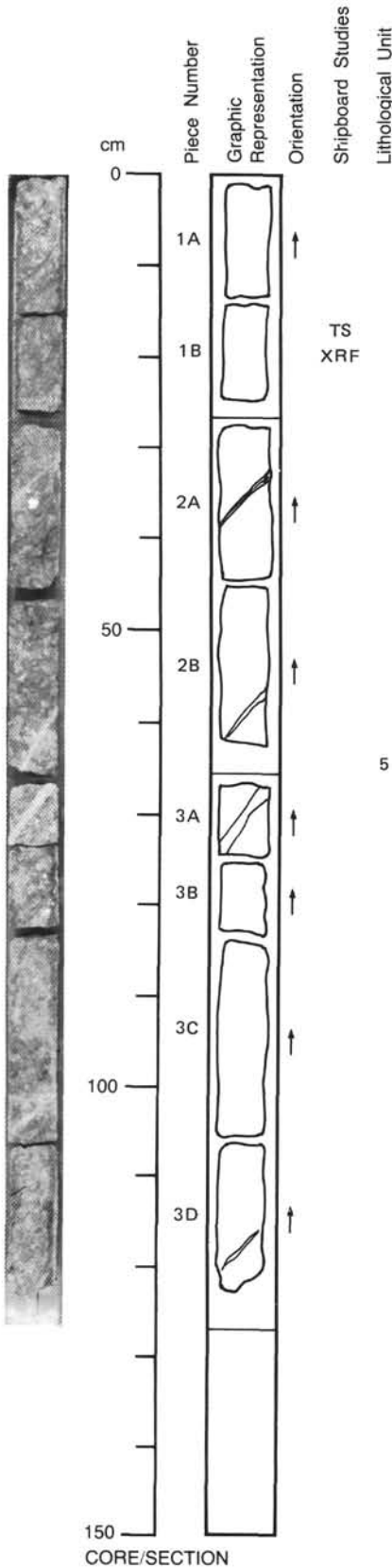
Plagioclase—Mode: 50%-55%.
 Crystal size: 5-10 mm.
 Crystal shape: Subhedral-euhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

Clinopyroxene—Mode: 35%-45%.
 Crystal size: 3-15 mm.
 Crystal shape: Anhedral, oikocrystic.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

Olivine—Mode: 2%-10%.
 Crystal size: 2-7 mm.
 Crystal shape: Anhedral-subhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

SECONDARY MINERALOGY:

Total percent: Not determined.
 Texture: Clinopyroxene partly replaced by green amphibole. Olivine partly replaced by magnetite + tremolite + talc (chlorite rims when bordering plagioclase).
 Percent vein material: Not determined.
 Vein material: Veins, 0.5-12 mm thick, filled with plagioclase + epidote + sphene (rare) + green amphibole. Alteration halo around 12-mm-wide vein in Piece 3A extends 30 mm into host gabbro.



V:50°

V:60°

5

V:55°

V:40°

CORE/SECTION

UNIT 5: OLIVINE GABBRO

Pieces 1-6

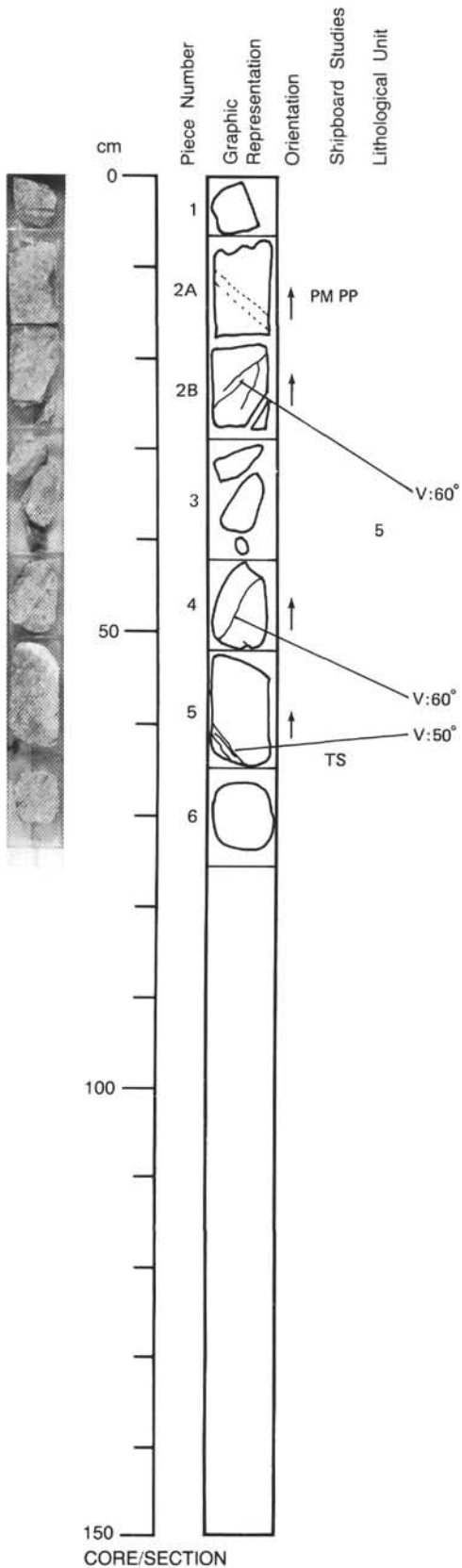
Olivine-Bearing Gabbro

Pieces 1-6

COLOR: Greenish gray.
LAYERING: None apparent.
DEFORMATION: None apparent.
PRIMARY MINERALOGY:
 Plagioclase—Mode: Pieces 1-2B: 65%, Pieces 3-6: 50%-60%.
 Crystal size: 5-10 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: None.

 Clinopyroxene—Mode: Pieces 1-2B: 20%-30%, Pieces 3-6: 30%-25%.
 Crystal size: 4-8 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: 15-20% by amphibole.

 Olivine—Mode: Pieces 1-2B: 5%-10%, Pieces 3-6: 3%-5%.
 Crystal shape: Subhedral.
 Preferred orientation: None.
 Percent replacement: 4% by amphibole or clay, replacement pervasive.
SECONDARY MINERALOGY:
 Total percent: 10%-20%.
 Texture: Amphibole replaces clinopyroxene up to 15%-20%. Olivine is replaced by chlorite or by clay or by amphibole (4%).
 Percent vein material: Abundant.
 Vein material: Prehnite, amphibole, and albite veins. Thickness ranges 1-15 mm inclining 50-60° in Pieces 2B, 4, and 5.
COMMENTS: Fine-grained ophitic band in Piece 2A.



118-735B-69R-1

UNIT 5: OLIVINE GABBRO

Pieces 1A-1G

Olivine Gabbro

Pieces 1A-1G

COLOR: Gray.

LAYERING: Size grading, coarsening downwards from Piece 1B (average sizes of plagioclase and clinopyroxene: 10 mm), to Pieces 1E-G (average sizes of plagioclase and clinopyroxene: 35 mm). Bottom of Piece 1G is finer-grained than top of Piece 1G. Size grading occurs over approximately 80 cm interval.

DEFORMATION: None apparent.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%-60% (medium-grained interval), 50%-55% (coarse-grained interval).
Crystal size: 7-15 mm (medium-grained interval), 10-40 mm (coarse-grained interval).

Crystal shape: Subhedral-euhedral.

Preferred orientation: Not determined.

Percent replacement: Not determined.

Clinopyroxene—Mode: 30%-40% (medium-grained interval), 40%-45% (coarse-grained interval).
Crystal size: 5-15 mm (medium-grained interval), 15-50 mm (coarse-grained interval).

Crystal shape: Subhedral, oikocrystic (Piece 1G).

Preferred orientation: Not determined.

Percent replacement: Not determined.

Olivine—Mode: 5%-10% (medium-grained interval), 5% (coarse-grained interval).

Crystal size: 3-6 mm (medium-grained interval), 5-15 mm (coarse-grained interval).

Crystal shape: Anhedral.

Preferred orientation: Not determined.

Percent replacement: Not determined.

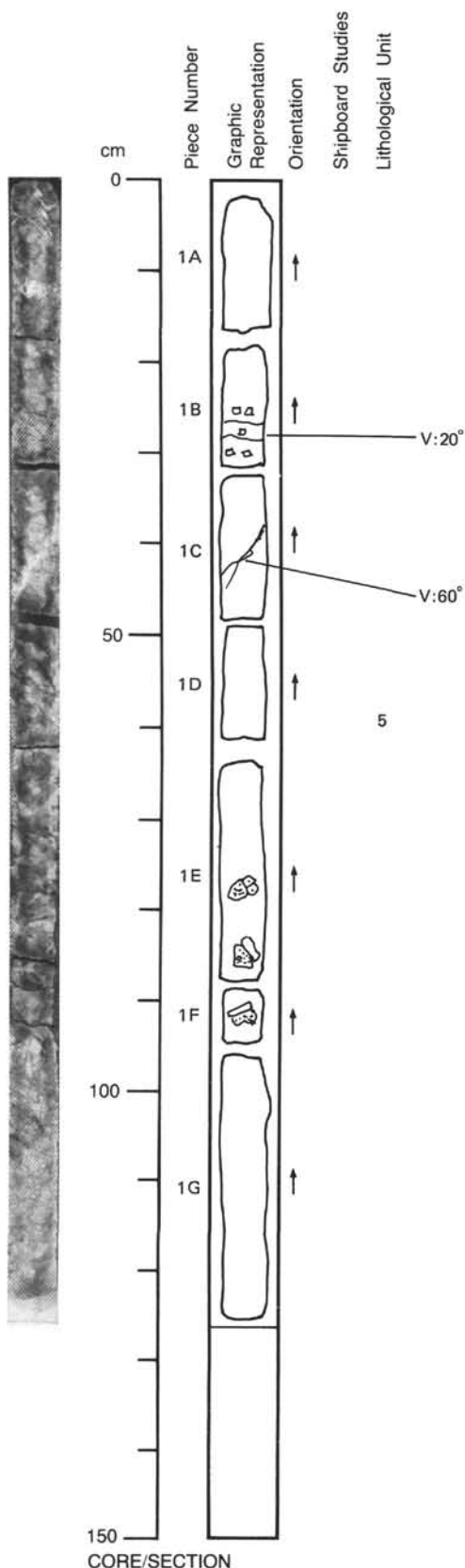
SECONDARY MINERALOGY:

Total percent: 5%-10%.

Texture: Green amphibole replacing clinopyroxene, olivine partly replaced by tremolite with chloritic rims near plagioclase.

Percent vein material: Not determined.

Vein material: Veins in Pieces 1B and 1C are 1-3 mm thick, filled with plagioclase + epidote + amphibole with minor amounts of sphene and pyrite. Veins in Piece 1B dip at 20° in opposite direction to those in Piece 1C which dip at 60°.



UNIT 5: OLIVINE GABBRO

Pieces 1-4B

Olivine Gabbro

Pieces 1-4B

COLOR: Gray.

LAYERING: Grain size variation suggests layering. Pieces 1-3 are coarse-grained and locally ophitic, Pieces 3-4 are fine-grained ophitic. The most characteristic difference is grain size of plagioclase; 10-30 mm vs. 5-20 mm. Olivine is rich in Piece 2B. Layer contact is gradational.

DEFORMATION: None apparent.

PRIMARY MINERALOGY:

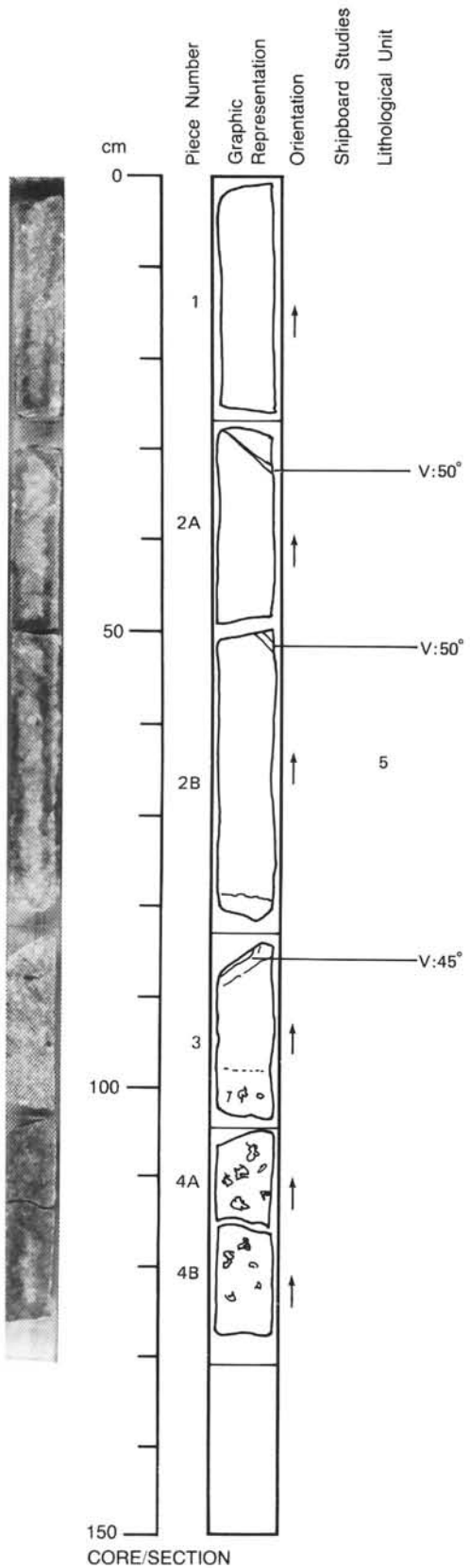
Plagioclase—Mode: 50%-65%.
 Crystal size: 5-20 mm coarse-grained, 10-30 mm fine-grained.
 Crystal shape: Subhedral.
 Preferred orientation: None.
 Percent replacement: None.

Clinopyroxene—Mode: 20%-30%.
 Crystal size: 5-20 mm coarse-grained, 3-20 mm fine-grained.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: 0%-20% by amphibole.

Olivine—Mode: 5%-20%.
 Crystal size: 5-15 mm coarse-grained, 5 mm fine-grained.
 Crystal shape: Subhedral-anhedral.
 Preferred orientation: None.
 Percent replacement: Various, none-extensive by amphibole.

SECONDARY MINERALOGY:

Total percent: Almost none, 20% locally.
 Texture: Amphibole replacing clinopyroxene is less than a few percent excepting altered portion in Pieces 2B and 3, where its mode is up to 20%. In this altered zone olivine is also severely altered to tremolite or chlorite(?).
 Percent vein material: Abundant.
 Vein material: In vein present in Piece 2A, epidote occupies the center of the vein and is jacketed by white albite.



118-735B-69R-3

UNIT 5: OLIVINE GABBRO

Pieces 1-6

Olivine Gabbro

Pieces 1-6

COLOR: Gray.

LAYERING: Faint grain size variation: fine-grained from 0 to 30 cm, medium-grained from 30 to 70 cm, fine-grained below 70 cm. Faint modal variations: olivine-rich band in Piece 5B. No magmatic lamination.

DEFORMATION: None.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%-60%.

Crystal size: 2-15 mm.

Crystal shape: Subhedral.

Preferred orientation: None.

Percent replacement: Fresh.

Clinopyroxene—Mode: 25%-40%.

Crystal size: 2-20 mm.

Crystal shape: Semi-ollocrysts or anhedral.

Preferred orientation: None.

Percent replacement: Not determined.

Olivine—Mode: 5%-15%.

Crystal size: 1-8 mm.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: Not determined.

SECONDARY MINERALOGY:

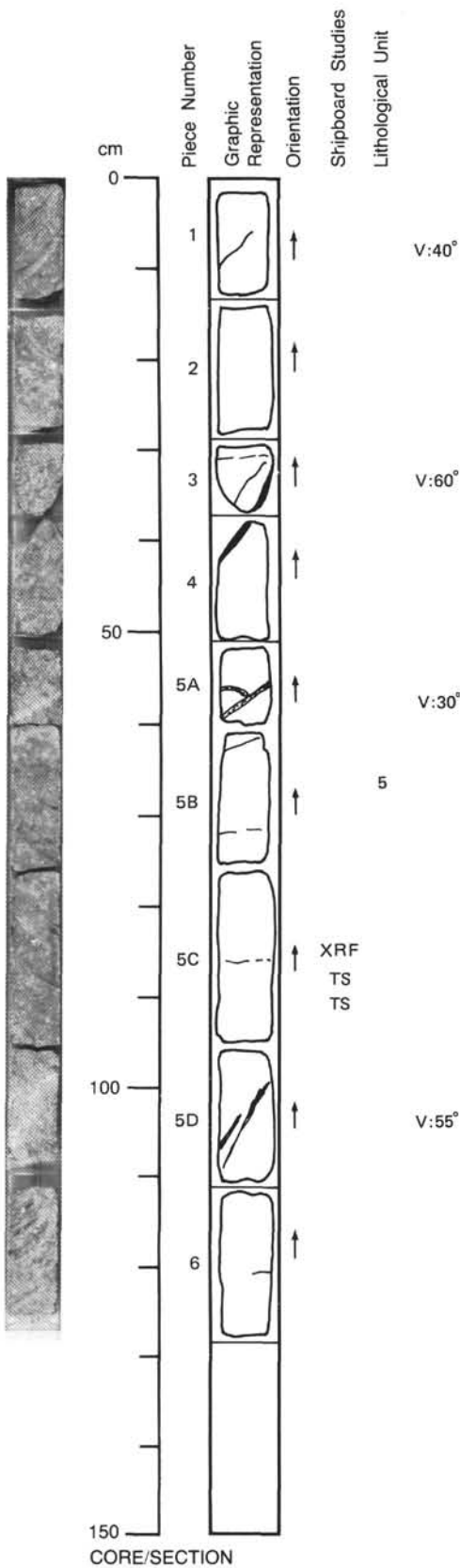
Total percent: < 10%.

Texture: Replacement of some olivine and clinopyroxene by amphibole, probably not much.

Plagioclase appears fresh.

Percent vein material: < 1%.

Vein material: Pale green veins of amphibole ± epidote ± sodic plagioclase(?).



CORE/SECTION

UNIT 5: OLIVINE GABBRO

Pieces 1-4C

Olivine Gabbro

Pieces 1-4C

COLOR: Gray speckled with grayish white

LAYERING: Size and modal layering apparent, layer contact gradational.

- 1) Coarse-grained clinopyroxene-rich (Pieces 1, 2, and 3). Olivine 8%, average 10 mm. Clinopyroxene 25%-30%, average 10 mm. Plagioclase 60%, average 15 mm.
 - 2) Coarse-medium-grained (Pieces 1 and 2). Olivine 10%, average 7 mm. Clinopyroxene 25%, average 10 mm. Plagioclase 65%-70%, average 12 mm.
 - 3) Coarse-grained clinopyroxene-poor (Piece 2). Olivine 15%, average 7 mm. Clinopyroxene 10%, average 5 mm. Plagioclase 75%, average 15 mm.
 - 4) Medium-grained (Pieces 3 and 4A). Olivine 7%, average 4-3 mm. Clinopyroxene 30%, average 5 mm. Plagioclase 65%, average 10 mm.
 - 5) Medium-grained subophitic. Olivine 5%, average 3 mm. Clinopyroxene 35%, average 7 mm. Plagioclase 60%, average 8 mm, 5 mm where subophitic.
- In Piece 4A, fairly subophitic portion present. Discontinuous layering in Pieces 4A and 4B inclining 45°.

DEFORMATION: None apparent.

PRIMARY MINERALOGY:

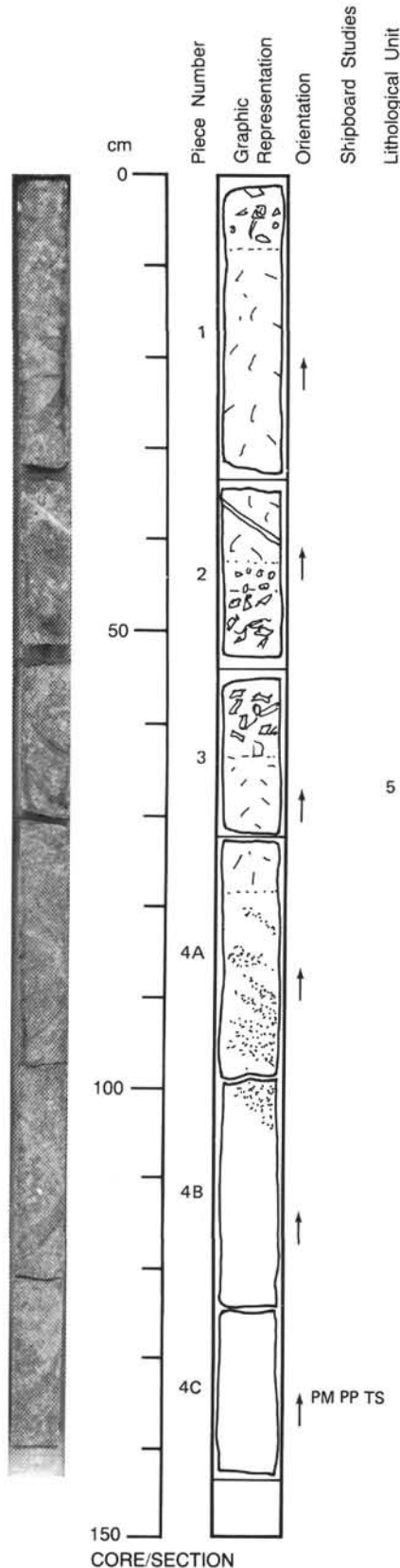
Plagioclase—Mode: See above.
 Crystal size: See above.
 Crystal shape: Anhedral-subhedral.
 Preferred orientation: Not clear.
 Percent replacement: None.

Clinopyroxene—Mode: See above.
 Crystal size: See above.
 Crystal shape: Anhedral.
 Preferred orientation: Not clear.
 Percent replacement: <5% by amphibole.

Olivine—Mode: See above.
 Crystal size: See above.
 Crystal shape: Subhedral-euhedral.
 Preferred orientation: Not clear.
 Percent replacement: None.

SECONDARY MINERALOGY:

Total percent: <2%.
 Texture: Amphibole replacing clinopyroxene, less than 5%. The rock is very fresh.
 Percent vein material: Trace.
 Vein material: Piece 2: Albite + prehnite(?) vein, 7 mm thick, dipping 65°.



118-735B-69R-5

UNIT 5: OLIVINE GABBRO

Pieces 1A-1D

Olivine Gabbro (cut by veins)

Pieces 1A-1D

COLOR: Pinkish gray.
LAYERING: Massive.
DEFORMATION: None apparent except fractures with vein minerals.

PRIMARY MINERALOGY:

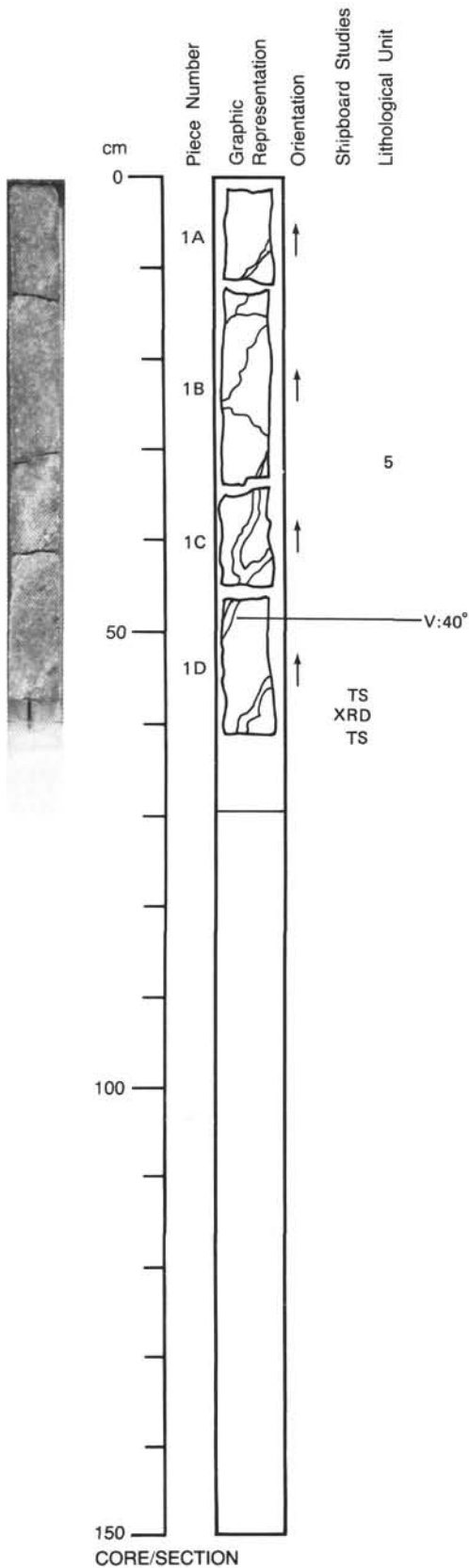
Plagioclase—Mode: 55%-60%.
 Crystal size: 1-4 mm.
 Crystal shape: Tabular to anhedral.
 Preferred orientation: None.
 Percent replacement: 15% by chlorite and sodic plagioclase.

Clinopyroxene—Mode: 37%-38%.
 Crystal size: 2.5 mm.
 Crystal shape: Subhedral.
 Preferred orientation: None.
 Percent replacement: 15% by amphibole; more extensive near veins.

Olivine—Mode: 2%-3%.
 Crystal size: 1 mm.
 Crystal shape: Rounded.
 Preferred orientation: None.
 Percent replacement: 50% by chlorite.

SECONDARY MINERALOGY:

Total percent: 30%.
 Texture: Not determined.
 Percent vein material: 20%.
 Vein material: Amphibole + epidote + sphene + albite; hornblende. Veins 1-1.25 cm wide contain coarse green epidote, large euhedral pink sphene + soft white bladed mineral (albite or analcite). Edges of veins are albitized plagioclase. There is substantial replacement of pyroxene by amphibole adjacent to veins.

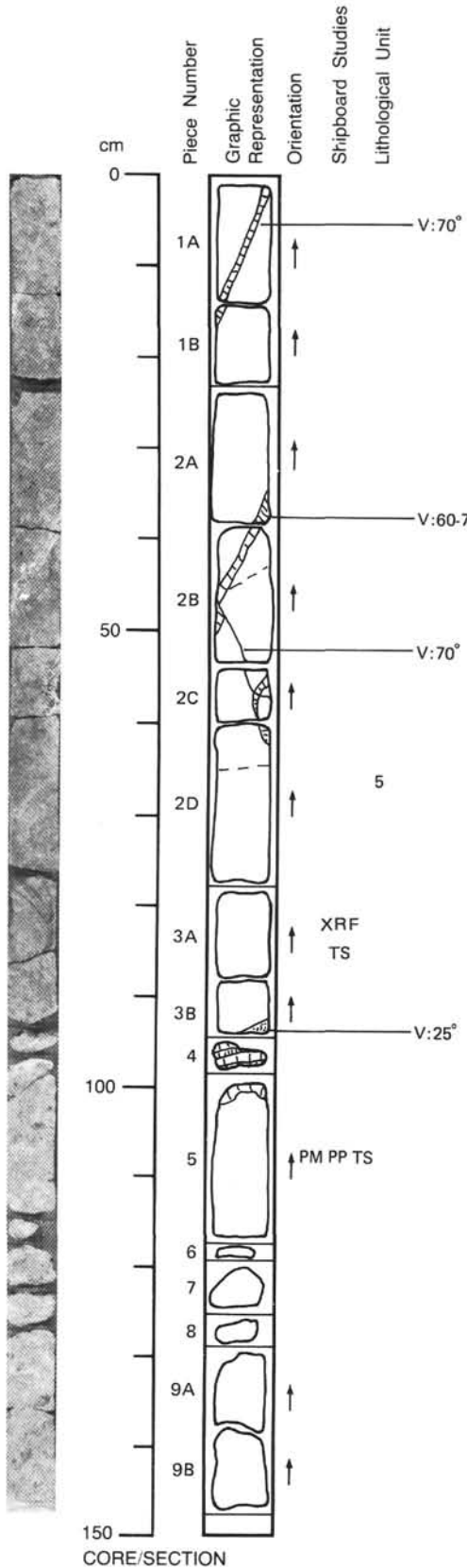


UNIT 5: OLIVINE GABBRO

Pieces 1A-9B

Olivine Gabbro and Hydrothermally Altered Olivine Gabbro

Pieces 1A-9B



COLOR: Gray to white.

LAYERING: Grain size variation: Pieces 1-2C are medium-grained, Pieces 2D and 3 are fine-grained. Some modal variations visible in Pieces 1, 2, and 3: olivine-rich intervals in Piece 2A and 2C. No magmatic lamination.

DEFORMATION: None.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%-60%.
Crystal size: 0.3-1.5 cm.
Crystal shape: Euhedral-subhedral.
Preferred orientation: None.
Percent replacement: Not determined.

Clinopyroxene—Mode: 20%-35%.
Crystal size: 0.2 to 1.5 cm.
Crystal shape: Semi-ollocryst.
Preferred orientation: None.
Percent replacement: Not determined.

Olivine—Mode: 5%-20%.
Crystal size: 0.3-1.5 cm.
Crystal shape: Anhedral.
Preferred orientation: None.
Percent replacement: Not determined.

SECONDARY MINERALOGY:

Total percent: <15% in Pieces 1, 2, and 3, >30% in Pieces 4-9.
Texture: Amphibole partly replacing clinopyroxene and olivine, albitization of plagioclase especially along veins, the olivine is also partly oxidized.
Percent vein material: 1%-5%.
Vein material: Amphibole + epidote ± sodic plagioclase ± quartz. The veins are 1 mm to 4 cm thick. In Pieces 4-9, they form an anastomosed network and partly brecciate the gabbro.

118-735B-70R-2

UNIT 5: OLIVINE GABBRO

Pieces 1-7

Olivine Gabbro

Pieces 1-7

COLOR: Gray; Yellowish-green along veins in Pieces 1 and 4A-C.

LAYERING: None; coarse-grained with only minor variations.

DEFORMATION: None.

PRIMARY MINERALOGY:

Plagioclase—Mode: 55%-60%.

Crystal size: 0.5-3 cm.

Crystal shape: Anhedral to subhedral.

Preferred orientation: Not determined.

Percent replacement: Not determined.

Clinopyroxene—Mode: 35%-40%.

Crystal size: < 0.5-3 cm.

Crystal shape: Subhedral to euhedral.

Preferred orientation: Not determined.

Percent replacement: < 10% by amphibole.

Olivine—Mode: < 5%-15%.

Crystal size: 0.3 to 2 cm.

Crystal shape: Anhedral to subhedral.

Preferred orientation: Not determined.

Percent replacement: Not determined.

Sulfides—Mode: < 1%.

SECONDARY MINERALOGY:

Total percent: Slight alteration.

Texture: Olivine rimmed by alteration products (talc?), completely altered near major veins

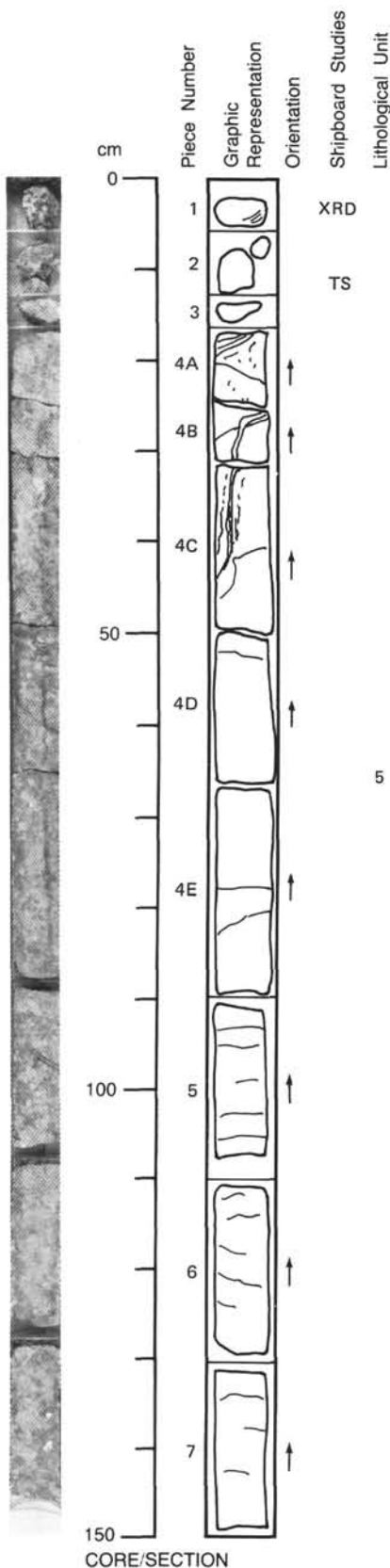
(Pieces 1, 4A, 4B, and upper 2/3 of Piece 4C) to yellowish-brown material. Clinopyroxene

replacement by amphibole (< 10%). Pieces 4A, 4B, and 4C are cut by thicker (up to 1 cm) vein,

probably containing epidote, amphibole, feldspar(?), and some other secondary minerals. Only

few veinlets with white minerals on other pieces of section.

COMMENTS: Pieces 2 and 3 constitute vein material: amphibole, epidote, plagioclase, carbonate(?), and opaques.



CORE/SECTION

UNIT 5: OLIVINE GABBRO

Pieces 1-4

Olivine Gabbro

Pieces 1-4

COLOR: Gray-dark gray.

LAYERING: Size layering is apparent. The contact between medium- and coarse-grained layers is vague and transitional.

- 1) Medium- to coarse-grained ophitic-subophitic (Pieces 1-3). Plagioclase 60%, 5-15 mm, euhedral-subhedral. Olivine 10%, 3-10 mm, subhedral. Clinopyroxene 20%, 5-15 mm, anhedral
- 2) Coarse-grained (Piece 4). Plagioclase 60%, 20-30 mm, subhedral-anhedral. Olivine 5%-7%, 10 mm, subhedral. Clinopyroxene 33%, 5-25 mm, anhedral.

DEFORMATION: None apparent.

PRIMARY MINERALOGY:

Plagioclase—Mode: See above.

Crystal size: See above.

Crystal shape: See above.

Preferred orientation: None.

Percent replacement: None.

Clinopyroxene—Mode: See above.

Crystal size: See above.

Crystal shape: See above.

Preferred orientation: None.

Percent replacement: Trace by amphibole.

Olivine—Mode: See above.

Crystal size: See above.

Crystal shape: See above.

Preferred orientation: None.

Percent replacement: Trace by amphibole.

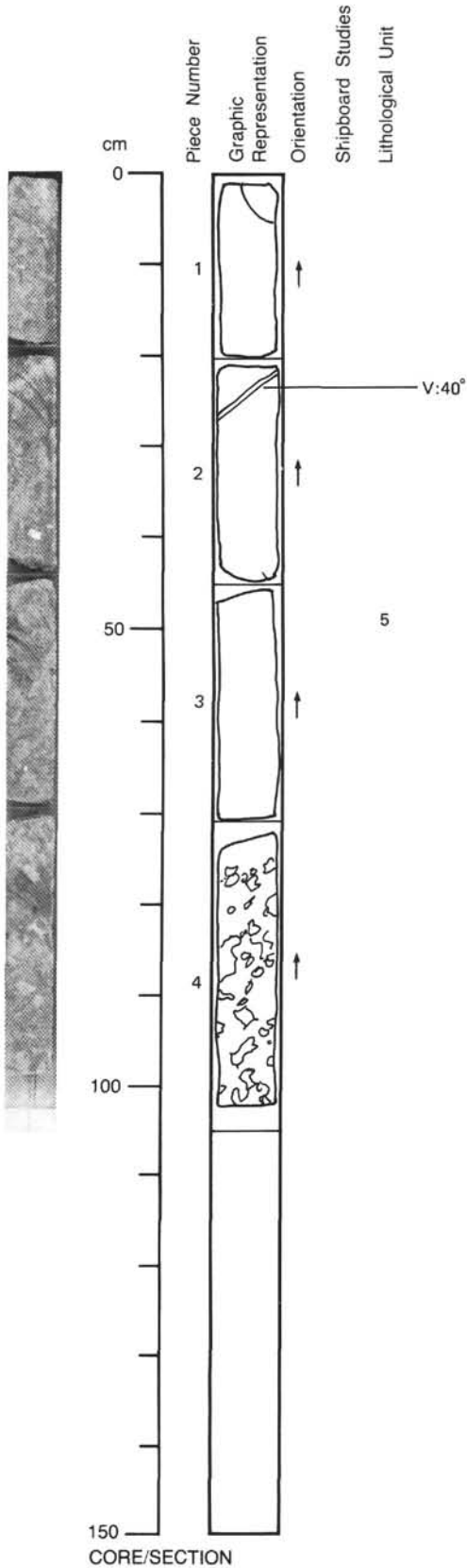
SECONDARY MINERALOGY:

Total percent: <1%.

Texture: Amphibole replacing clinopyroxene and olivine, <3%.

Percent vein material: Trace.

Vein material: Epidote vein, 4 mm thick, dipping 40°, present in Piece 2. Albite vein is present in Piece 1.



118-735B-70R-4

UNIT 5: OLIVINE GABBRO

Pieces 1A-2C

Olivine Gabbro

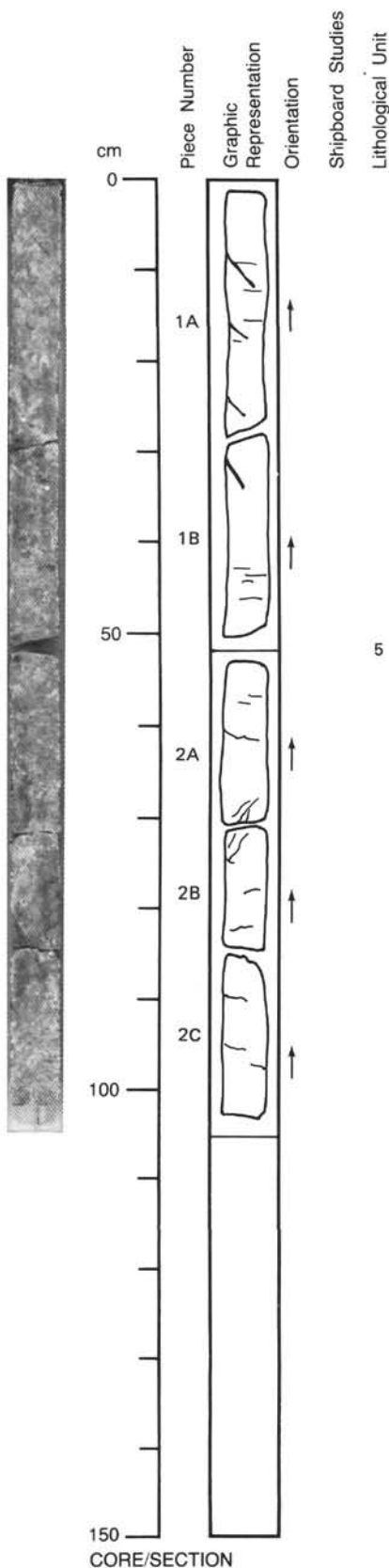
Pieces 1A-2C

COLOR: Gray.
LAYERING: No distinct layering.
DEFORMATION: None apparent.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 50%-55%.
 Crystal size: 10-30 mm.
 Crystal shape: Subhedral-euhedral.
 Preferred orientation: Not determined.
 Percent replacements: Not determined.

Clinopyroxene—Mode: 30%-35%.
 Crystal size: 10-25 mm.
 Crystal shape: Subhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

Olivine—Mode: 10%-20%.
 Crystal size: 3-12 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

SECONDARY MINERALOGY:
 Total percent: 5%-10%.
 Texture: Green amphibole replacing clinopyroxene. Tremolite + magnetite replacing olivine.
 Percent vein material: Not determined.
 Vein material: Veins and halo in Pieces 2A and 2B contain green amphibole + epidote + sodic plagioclase(?) + minor sulfide (pyrite).



UNIT 5: OLIVINE GABBRO

Pieces 1-7

Olivine Gabbro

Pieces 1-7

COLOR: Medium gray.
LAYERING: None. Average grain size around 1 cm (<0.5 to locally 3 cm).
DEFORMATION: None.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%-55%.
 Crystal size: 0.5-3 cm.
 Crystal shape: Anhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

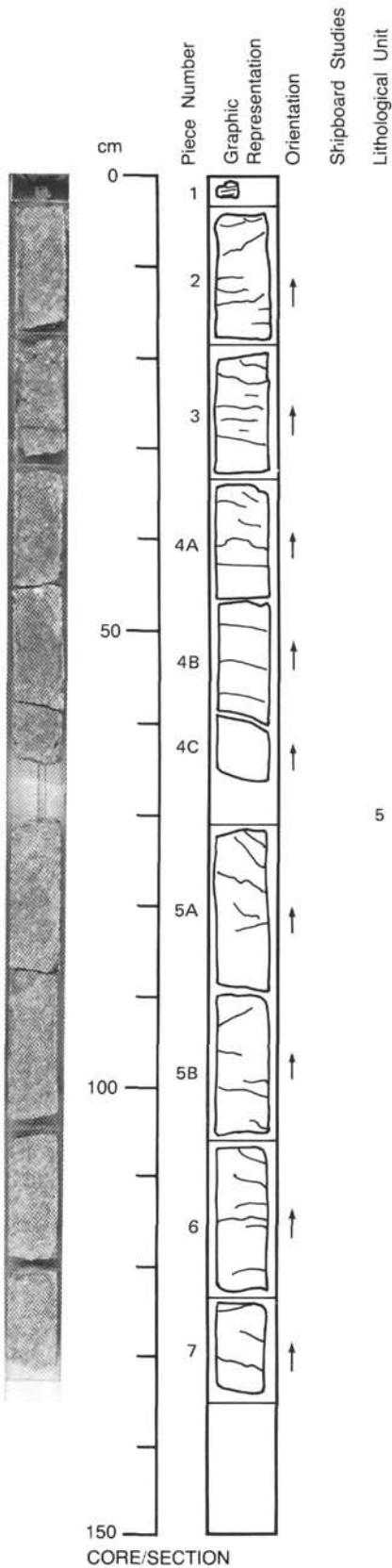
Clinopyroxene—Mode: 30%-40%.
 Crystal size: 0.4-3 cm.
 Crystal shape: Anhedral to subhedral.
 Preferred orientation: Not determined.
 Percent replacement: <5% by amphibole.

Olivine—Mode: 5%-20% (probably > 10% on average).
 Crystal size: 0.3-2 cm.
 Crystal shape: Anhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

SECONDARY MINERALOGY:

Total percent: Slight alteration.
 Texture: Amphibole occasionally replacing clinopyroxene rims (<5%). Olivine mostly fresh. A few sulfides.
 Percent vein material: Not determined.
 Vein material: Few veinlets with white mineral(s).

COMMENTS: Piece 1: Tiny piece of rubble from somewhere higher up in the hole. Foliated metagabbro, (definitely does not belong in this sequence).



118-735B-71R-2

UNIT 5: OLIVINE GABBRO

Pieces 1A-3C

Olivine Gabbro

Pieces 1A-3C

COLOR: Gray, white where veined by epidote vein.

LAYERING: Apparent by variation in grain size and mode.

- 1) Medium-grained (Pieces 1A-1D and 2A-2C). Clinopyroxene: 5-10 mm, plagioclase: 5-10 mm, olivine: 2-6 mm.
- 2) Fine-grained (Piece 1C). Clinopyroxene: 1-3 mm, plagioclase: 2-5 mm, olivine: 1-2 mm.
- 3) Coarse-grained (Pieces 1E, 2B, and 3A). Clinopyroxene: 5-20 mm, plagioclase: 20-25, olivine: 5-10 mm. Layer contact is gradational.

DEFORMATION: None.

PRIMARY MINERALOGY:

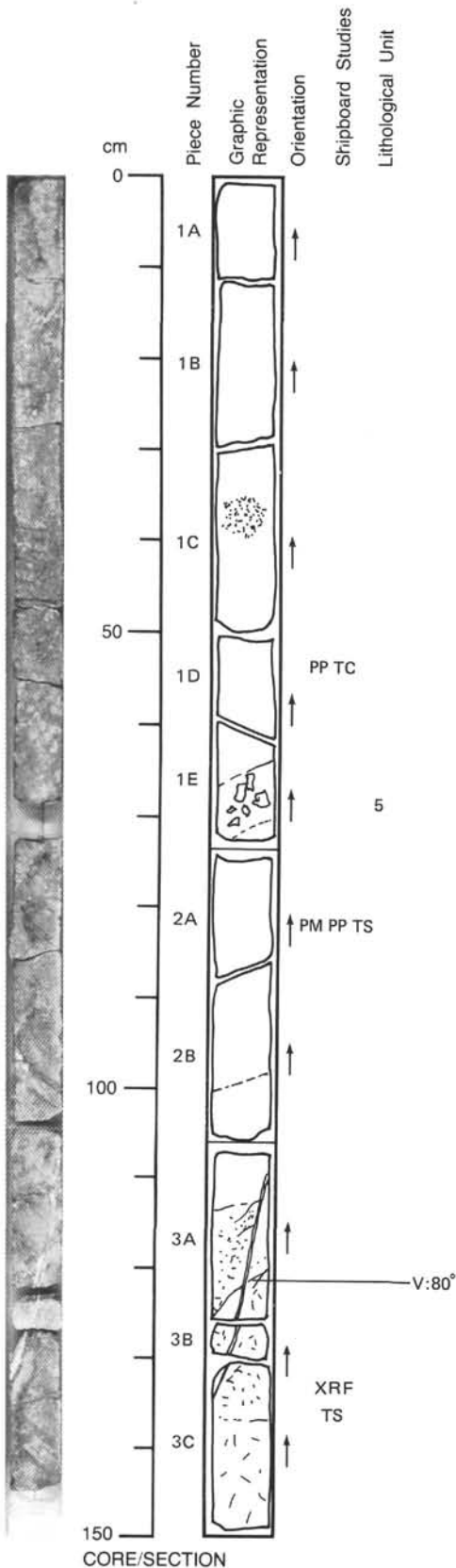
Plagioclase—Mode: 50%-70%.
 Crystal size: Variable, see above.
 Crystal shape: Euhedral-subhedral.
 Preferred orientation: None.
 Percent replacement: Not determined.

Clinopyroxene—Mode: 15%-30%.
 Crystal size: Variable, see above.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: Trace by amphibole except near epidote(?) vein.

Olivine—Mode: 3%-10%.
 Crystal size: Variable, see above.
 Crystal shape: Subhedral-anhedral.
 Preferred orientation: None.
 Percent replacement: Trace by amphibole except near epidote(?) vein.

SECONDARY MINERALOGY:

Total percent: <3%.
 Texture: Amphibole replacing clinopyroxene and olivine less than 5% except near epidote vein, which is 2-5 mm thick, jacketed by albite and prehnite(?). Near the vein amphibole abundance reaches 20%.
 Percent vein material: Trace.
 Vein material: Epidote(?).



118-735B-71R-3

UNIT 5: OLIVINE GABBRO

Pieces 1A-6

Olivine Gabbro

Pieces 1A-6

COLOR: Gray.

LAYERING: One coarse plagioclase-rich interval in Piece 3.

DEFORMATION: None apparent.

PRIMARY MINERALOGY:

Plagioclase—Mode: 55% (medium-grained interval), 75% (coarse-grained interval).
 Crystal size: 5-10 mm (medium-grained interval), 10-20 mm (coarse-grained interval).
 Crystal shape: Subhedral-euhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

Clinopyroxene—Mode: 35%-40% (medium-grained interval), 20% (coarse-grained interval).
 Crystal size: 5-10 mm (medium-grained interval), 10-20 mm (coarse-grained interval).
 Crystal shape: Subhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

Olivine—Mode: 5%-10% (medium-grained interval), 5% (coarse-grained interval).
 Crystal size: 5 mm (medium-grained interval), 10 mm (coarse-grained interval).
 Crystal shape: Anhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

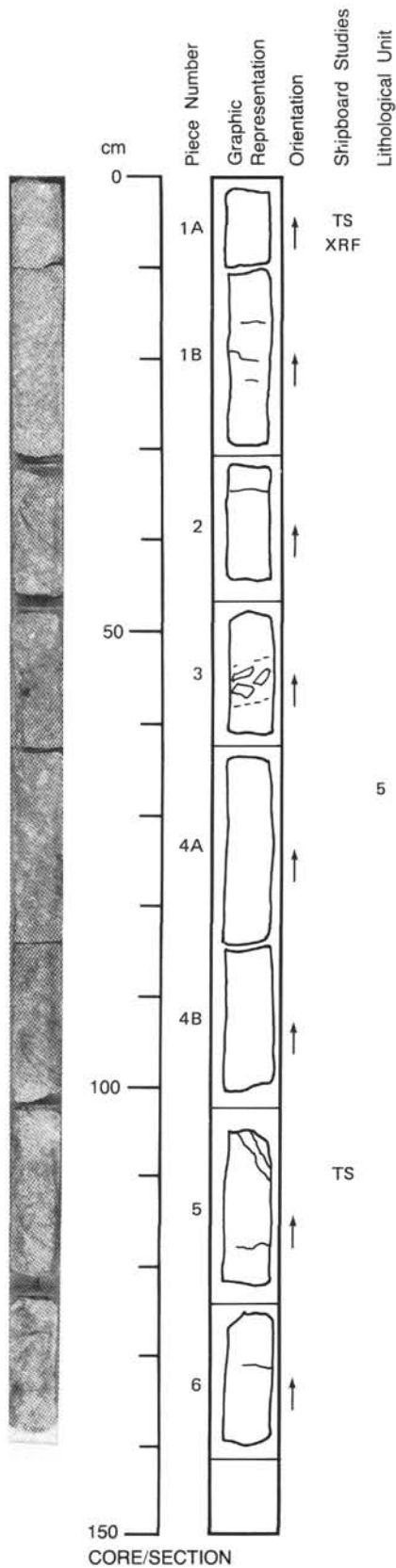
SECONDARY MINERALOGY:

Total percent: 5%-10%.

Texture: Clinopyroxene partly altered to amphibole. Pyrite commonly associated with amphibole. Quartz(?) vein in Piece 5 lined with green amphibole and epidote. Interior of vein has greasy appearance of quartz. Numerous white streaks that are subhorizontal may be granulated plagioclase.

Percent vein material: Not determined.

Vein material: Quartz(?), amphibole, and epidote.



118-735B-71R-4

UNIT 5: OLIVINE GABBRO

Pieces 1-4

Olivine Gabbro

Pieces 1-4

COLOR: Gray.

LAYERING: One plagioclase-rich zone in Piece 4

DEFORMATION: None apparent.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%-60% (up to 80% in plagioclase-rich interval).

Crystal size: 10-20 mm (up to 30 mm in plagioclase-rich interval).

Crystal shape: Subhedral-euhedral.

Preferred orientation: Not determined.

Percent replacement: Not determined.

Clinopyroxene—Mode: 30%.

Crystal size: 5-20 mm.

Crystal shape: Subhedral.

Preferred orientation: Not determined.

Percent replacement: Partly replaced by amphibole.

Olivine—Mode: 10%-20%.

Crystal size: 3-15 mm.

Crystal shape: Anhedral.

Preferred orientation: Not determined.

Percent replacement: Partly replaced by tremolite + magnetite with chloritic rim.

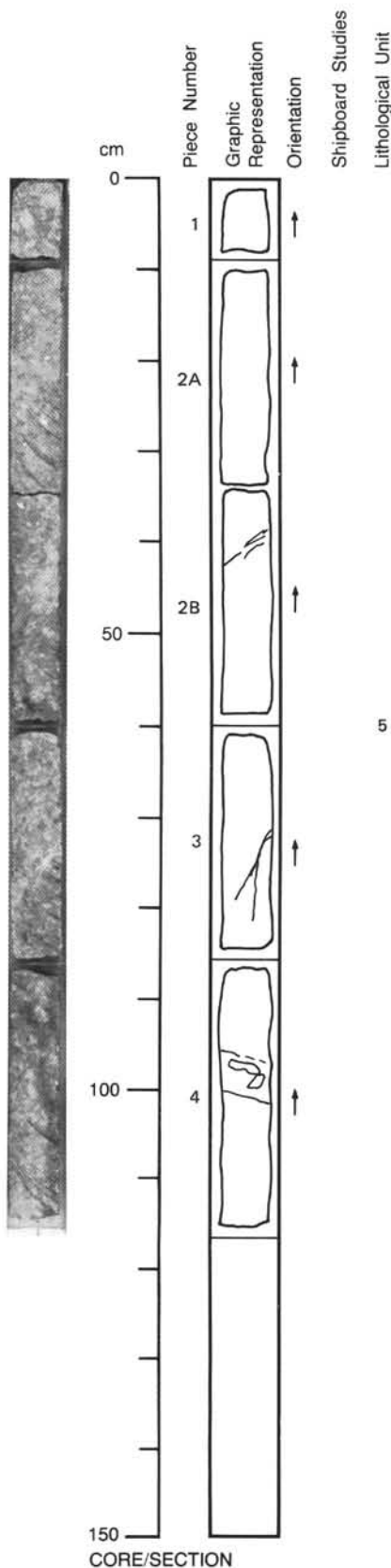
SECONDARY MINERALOGY:

Total percent: 5%-10%.

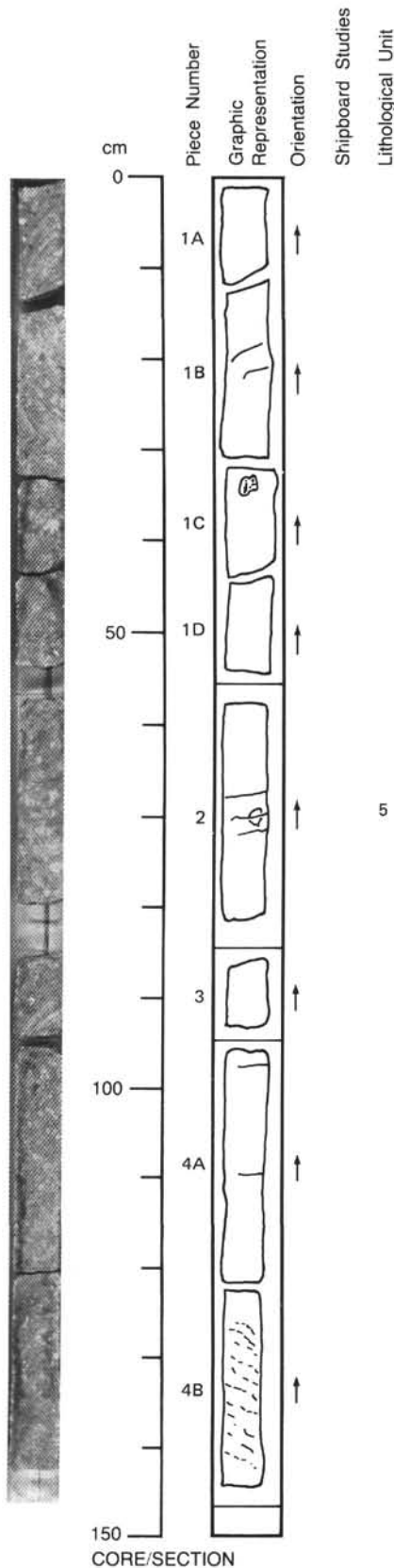
Texture: Olivine partly replaced by tremolite + magnetite with chloritic rim. Clinopyroxene partly replaced by amphibole. Minor pyrite associated with green amphibole. 1-3-mm-wide vein in Piece 3 contains epidote + actinolite + plagioclase.

Percent vein material: Not determined.

Vein material: Epidote, actinolite, and plagioclase.



CORE/SECTION



UNIT 5: OLIVINE GABBRO

Pieces 1A-4B

Olivine Gabbro

Pieces 1A-4B

COLOR: Gray.

LAYERING: Igneous lamination apparent in Piece 4B. Interval from Piece 1C to 4B exhibits reverse size grading.

DEFORMATION: None apparent.

PRIMARY MINERALOGY:

Plagioclase—Mode: 55%-65%.

Crystal size: 1-5 mm in fine-grained intervals, 20 mm in coarse-grained intervals.

Crystal shape: Euhedral-subhedral.

Preferred orientation: Not determined.

Percent replacement: Not determined.

Clinopyroxene—Mode: 20%-35%.

Crystal size: 1-5 mm in fine-grained intervals, 20 mm in coarse-grained intervals.

Crystal shape: Anhedral-subhedral.

Preferred orientation: Not determined.

Percent replacement: Partly altered to amphibole.

Olivine—Mode: 5%-25%.

Crystal size: 0.5-2 mm in fine-grained intervals, 5 mm in coarse-grained intervals.

Crystal shape: Anhedral.

Preferred orientation: Not determined.

Percent replacement: Partly altered to tremolite + magnetite. Chloritic rims.

SECONDARY MINERALOGY:

Total percent: 5%-10%.

Texture: Clinopyroxene partly altered to amphibole. Olivine partly altered to tremolite + magnetite. Sulfides occasionally occur on clinopyroxene rims, probably in association with amphibole replacement of clinopyroxene. Chloritic rims around olivine pseudomorphs and relicts.

Percent vein material: Not determined.

Vein material: Not determined.

F:30° (Magmatic)

118-735B-72R-2

UNIT 5: OLIVINE GABBRO

Pieces 1A-1F

Olivine Gabbro

Pieces 1A-1F

COLOR: Gray.

LAYERING: Weak layering defined by size grading. Alternating medium- (average 0.3-0.8 cm) and coarse-grained (average 1.0-1.5 cm) bands. Inclination about 20°-30°.

DEFORMATION: None.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%-60%.

Crystal size: 0.4-2.5 cm.

Crystal shape: Anhedral-subhedral.

Preferred orientation: Not determined.

Percent replacement: Not determined.

Clinopyroxene—Mode: 30%-40%.

Crystal size: < 0.4-3 cm.

Crystal shape: Subhedral-anhedral.

Preferred orientation: Not determined.

Percent replacement: < 10% by amphibole.

Olivine—Mode: 5%-20%.

Crystal size: 0.3-2 cm

Crystal shape: Anhedral.

Preferred orientation: Not determined.

Percent replacement: Partly altered.

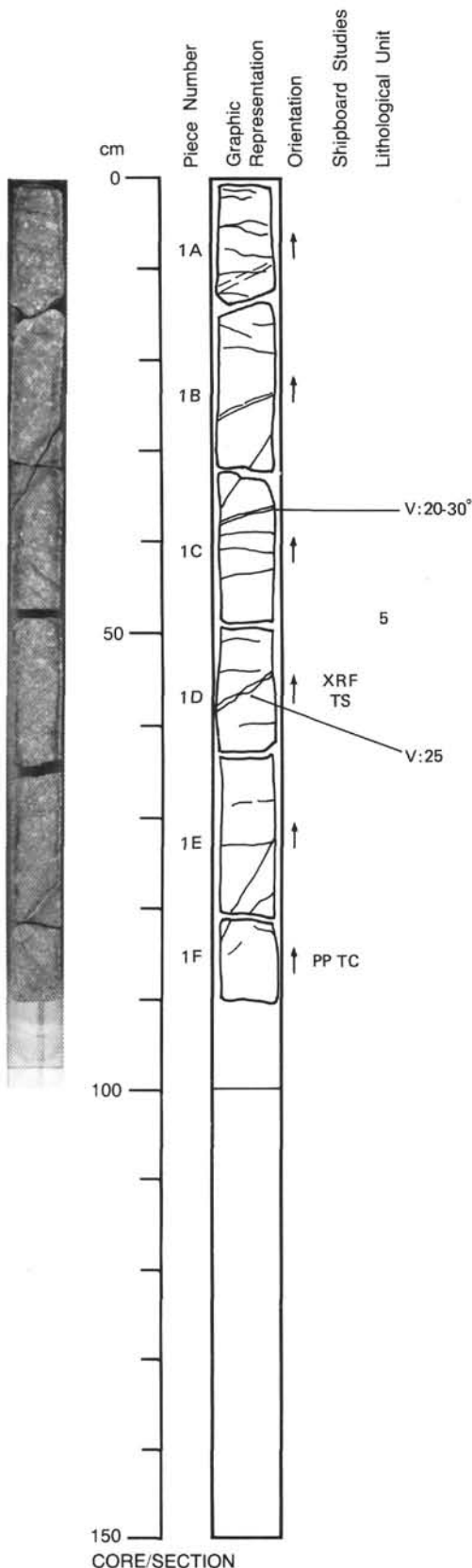
SECONDARY MINERALOGY:

Total percent: Not determined.

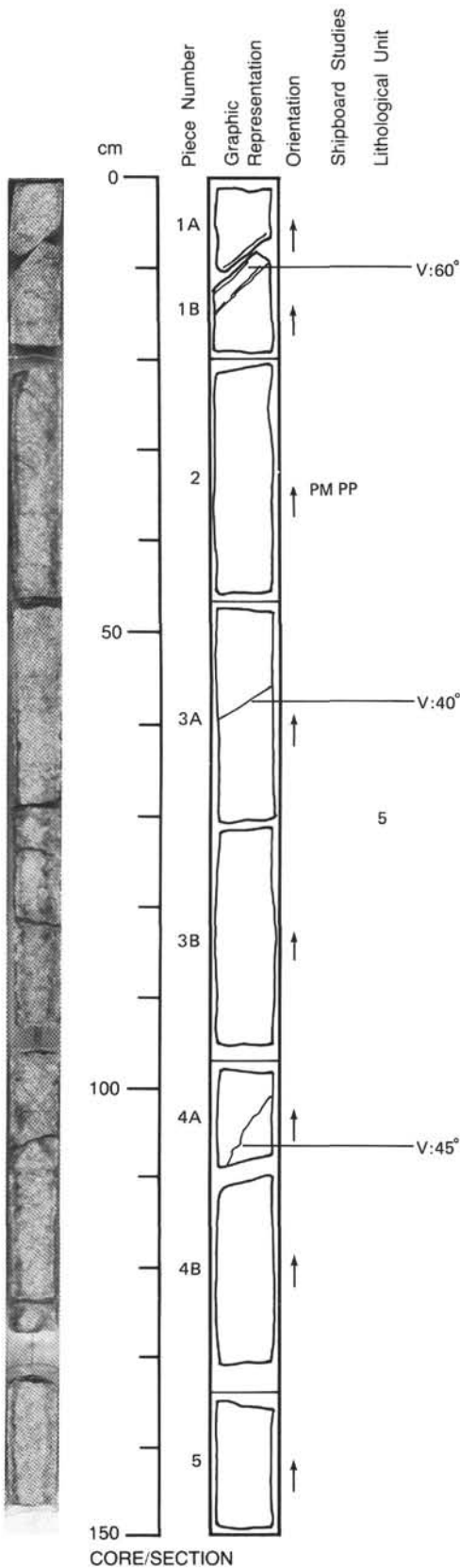
Texture: Olivine partly altered (especially along the rims), some amphibole replacement of clinopyroxene (< 10%). Oxidation (brown olivine pseudomorphs), along veins in Piece 1E. Few sulfides.

Percent vein material: Not determined.

Vein material: Minor veins and veinlets, filled with amphibole, feldspar(?) + some light bluish mineral (Piece 1A).



CORE/SECTION



UNIT 5: OLIVINE GABBRO

Pieces 1A-5

Olivine Gabbro

Pieces 1A-5

COLOR: Gray.

LAYERING: Grain size changes from medium, to coarse, from Piece 1A to Piece 3B and decreases to Piece 5. Grading is almost a meter-scale. Olivine is rich in Pieces 4B and 5. Inclination of layering not clear.

DEFORMATION: None apparent.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%-60%.

Crystal size: 2-5 mm (in medium-grained interval, Pieces 1A and 1B), 4-12 mm (in coarse-grained interval, Piece 3B).

Crystal shape: Euhedral-subhedral.

Preferred orientation: None.

Percent replacement: None.

Clinopyroxene—Mode: 20%-30%.

Crystal size: 2-5 mm (in medium-grained interval, Pieces 1A and 1B), 3-7 mm (in coarse-grained interval, Piece 3B).

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: <5% by amphibole.

Olivine—Mode: 5%-20%.

Crystal size: 2-4 mm (in medium-grained interval, Pieces 1A and 1B), 3-8 mm (in coarse-grained interval, Piece 3B).

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: <5% by amphibole.

SECONDARY MINERALOGY:

Total percent: <5%.

Texture: Amphibole after clinopyroxene and olivine. Near calcite veins oxidation of olivine and clinopyroxene is apparent.

Percent vein material: Trace.

Vein material: The calcite veins are 1 mm thick, and are inclined at 60° (Pieces 1A, 3A, and 4A).

COMMENTS: Locally subophitic.

118-735B-72R-4

UNIT 5: OLIVINE GABBRO

Pieces 1-9

Olivine Gabbro

Pieces 1-9

COLOR: Dark gray.
LAYERING: Grainsize variations: Piece 1 (top) is coarse (≤ 1.5 cm); Piece 1 (bottom) to Piece 2A (top) is fine-grained (< 0.5 cm); Piece 2A (bottom) to Piece 2B (top) is coarse-grained (< 2.5 cm); Piece 2B (bottom) to Piece 7 (bottom) is fine-grained (0.3-0.9 cm); Piece 7 (bottom) to Piece 9 (top) is coarse-grained (≤ 3 cm) and Piece 9 (bottom) is < 0.9 cm. No modal variation.

DEFORMATION: Deformed zone with porphyroclastic texture and brittle crushing, Pieces 4 and 5A.

PRIMARY MINERALOGY:

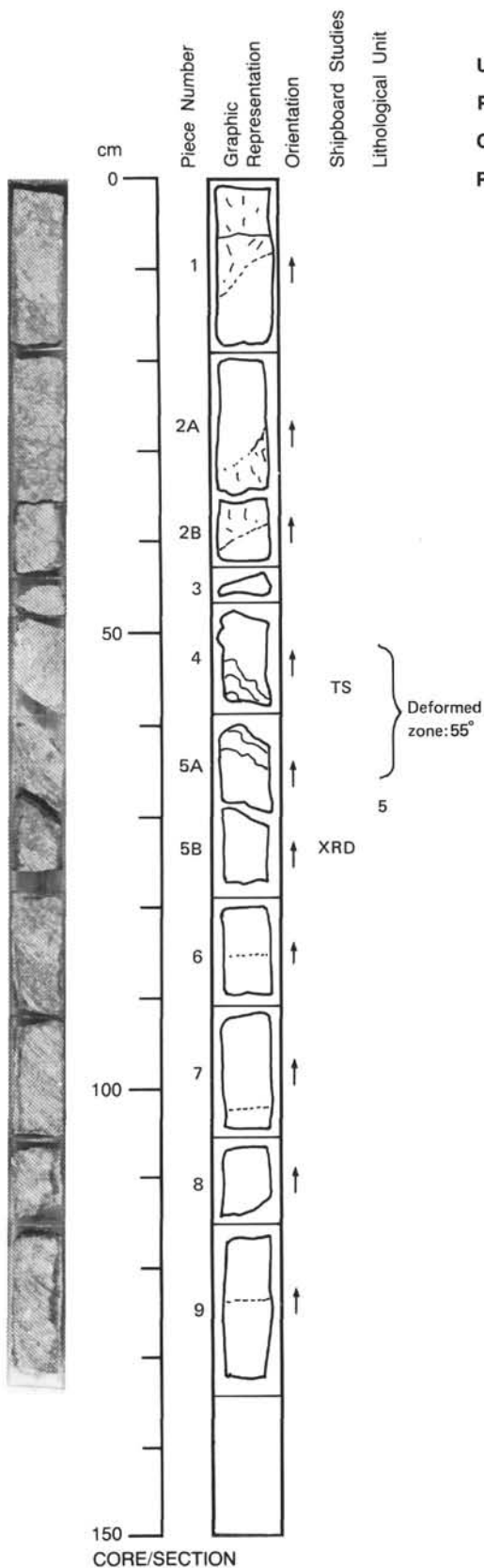
Plagioclase—Mode: 50%-60%.
 Crystal size: See above.
 Crystal shape: Subhedral.
 Preferred orientation: None apparent.
 Percent replacement: In deformed zones only, by sodic plagioclase.

Clinopyroxene—Mode: 35%-45%.
 Crystal size: See above.
 Crystal shape: Subhedral.
 Preferred orientation: None apparent.
 Percent replacement: 100% in deformed zone by amphibole.

Olivine—Mode: $< 10\%$.
 Crystal size: See above.
 Crystal shape: Anhedral.
 Preferred orientation: None apparent.
 Percent replacement: 2%-5% by chlorite or hematite.

SECONDARY MINERALOGY:

Total percent: 10%.
 Texture: Large deformed zone with hydrothermal alteration. Crushed clinopyroxene mixed with epidote, large red hematite pseudomorphs. Much iron-staining and albitized plagioclase. Porphyroclastic. Intense oxidative alteration.
 Percent vein material: 2%.
 Vein material: Hornblende + sodic plagioclase. Pieces 1, 2A, and 2B: Small white veins, some with amphibole, dip 10° - 15° .



UNIT 5: OLIVINE GABBRO

Pieces 1-6

Olivine Gabbro

Pieces 1-6

COLOR: Gray.

LAYERING: Weak layering, defined by gradation in grain size, medium- to coarse-grained bands (0.5-1.0 cm) are alternating with coarse-grained bands (1.5-2 cm).

DEFORMATION: In general, none; slight deformation along vein in Piece 5.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%-60%.

Crystal size: 0.4-3 cm.

Crystal shape: Anhedral.

Preferred orientation: Not determined.

Percent replacement: Not determined.

Clinopyroxene—Mode: 30%-40%.

Crystal size: 0.3-3 cm.

Crystal shape: Anhedral.

Preferred orientation: Not determined.

Percent replacement: <10% by amphibole.

Olivine—Mode: 5%-15%.

Crystal size: <0.4-2.5 cm.

Crystal shape: Anhedral-subhedral.

Preferred orientation: Not determined.

Percent replacement: Partially altered.

Sulfides—Mode: <1%.

SECONDARY MINERALOGY:

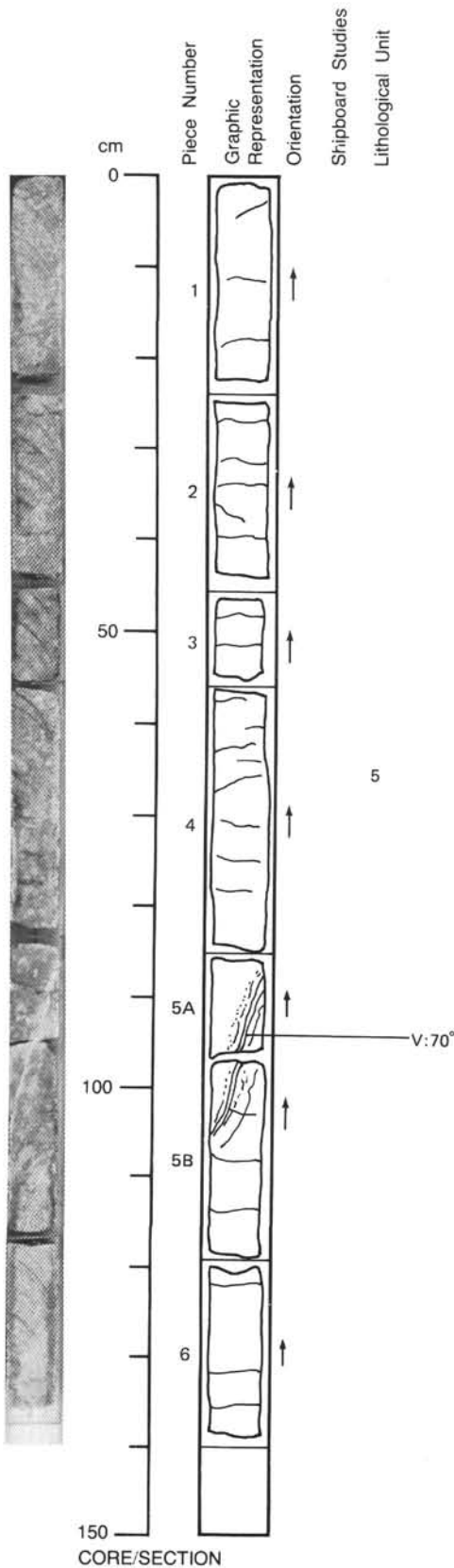
Total percent: Slight alteration.

Texture: Some amphibole replacement of clinopyroxene (<10%); olivine partially altered.

Stronger alteration along veins, especially on Pieces 5A and 5B.

Percent vein material: Not determined.

Vein material: One major vein through Pieces 5A and 5B, filled with white and green minerals, dips 70°.



118-735B-72R-6

UNIT 5: OLIVINE GABBRO

Pieces 1-6

Olivine Gabbro

Pieces 1-6

COLOR: Gray.

LAYERING: Grain size variations: ≤ 1 cm from 0 to 35 cm; ≤ 1.5 cm from 35 to 65 cm; ≤ 0.5 cm from 65 to 75 cm; ≤ 1 cm from 75 to 90 cm; and ≤ 0.5 cm below 90 cm. Modal variation: olivine-rich intervals in Pieces 1, 2, 4, and 6. No magmatic layering.

DEFORMATION: None.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%-60%.

Crystal size: See layering.

Crystal shape: Euhedral to subhedral, often partially included in clinopyroxene.

Preferred orientation: None.

Percent replacement: Not determined.

Clinopyroxene—Mode: 25%-35%.

Crystal size: See layering.

Crystal shape: Oikocrysts.

Preferred orientation: None.

Percent replacement: Not determined.

Olivine—Mode: 5%-20%.

Crystal size: See layering.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: Not determined.

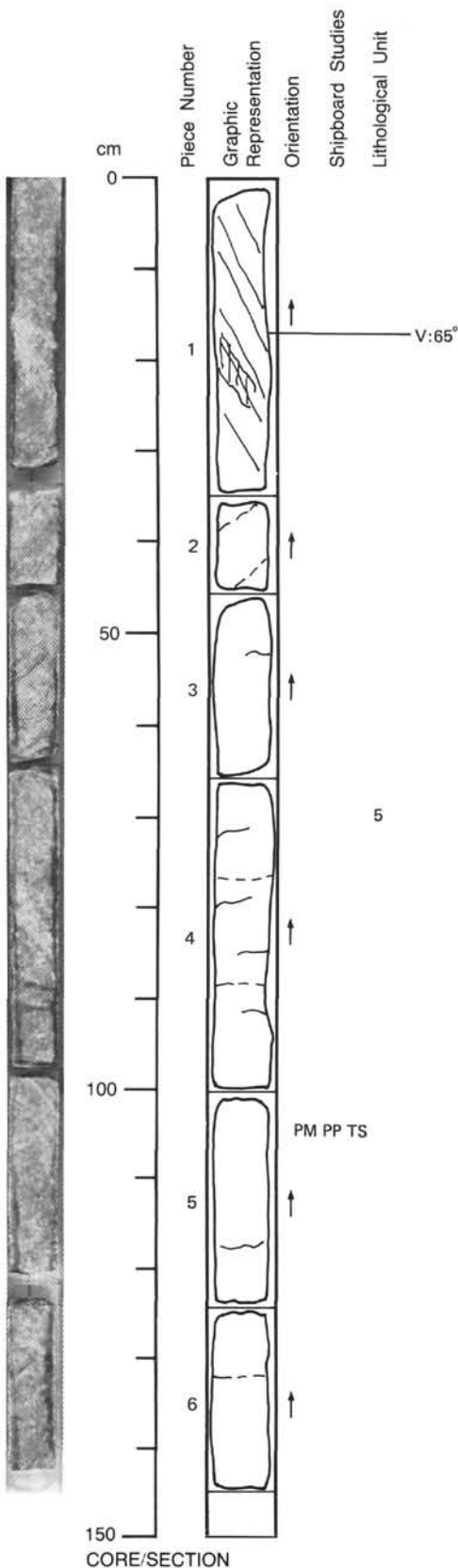
SECONDARY MINERALOGY:

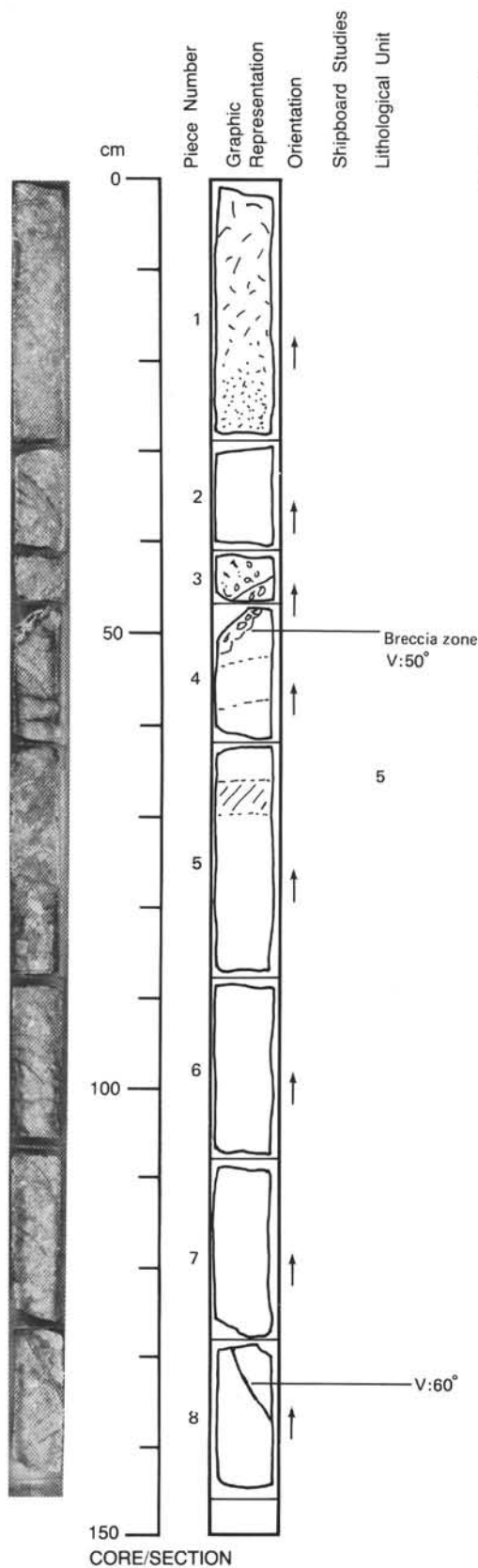
Total percent: Slight.

Texture: Slight replacement of clinopyroxene and olivine by amphibole and albitization of plagioclase—particularly visible along veins in Piece 1.

Percent vein material: $< 1\%$.

Vein material: Thin amphibole veins and also very thin subhorizontal white veins.





UNIT 5: OLIVINE GABBRO

Pieces 1-8

Olivine Gabbro

Pieces 1-8

COLOR: Gray.

LAYERING: Defined by grain size variation and modal variation. Piece 1 shows reverse grading: the top is 6-15 mm and the bottom is 2-3 mm in grain size. Olivine is richer in the bottom (20%) than in the top (7%). Piece 3 shows apparent foliation defined by clinopyroxene shape orientation. In Pieces 4 and 5 olivine-rich zones appear.

DEFORMATION: In Piece 3 and 4, brecciated zone 2 cm thick is present. Plagioclase is albitized and clinopyroxene is amphibolitized in the zone.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%-65%.

Crystal size: 10 mm (in medium-grained interval, Pieces 4 and 5), 15 mm (in coarse-grained interval, Piece 6).

Crystal shape: Subhedral.

Preferred orientation: None.

Percent replacement: None.

Clinopyroxene—Mode: 15%-30%.

Crystal size: 7 mm (in medium-grained interval, Pieces 4 and 5), 10 mm (in coarse-grained interval, Piece 6).

Crystal shape: Anhedral, rarely subhedral.

Preferred orientation: None.

Percent replacement: <5% by amphibole.

Olivine—Mode: 7%-20%.

Crystal size: 7 mm (in medium-grained interval, Pieces 4 and 5), 7 mm (in coarse-grained interval, Piece 6).

Crystal shape: Subhedral-anhedral.

Preferred orientation: None.

Percent replacement: Almost none.

SECONDARY MINERALOGY:

Total percent: <5%.

Texture: Amphibole after clinopyroxene. In brecciated zone in Piece 4, amphibolitization is strong.

Percent Vein material: Trace.

Vein material: Albite vein 0.5 mm thick, inclining 60° appears in Piece 8.

118-735B-72R-8

UNIT 5: OLIVINE GABBRO

Pieces 1-3

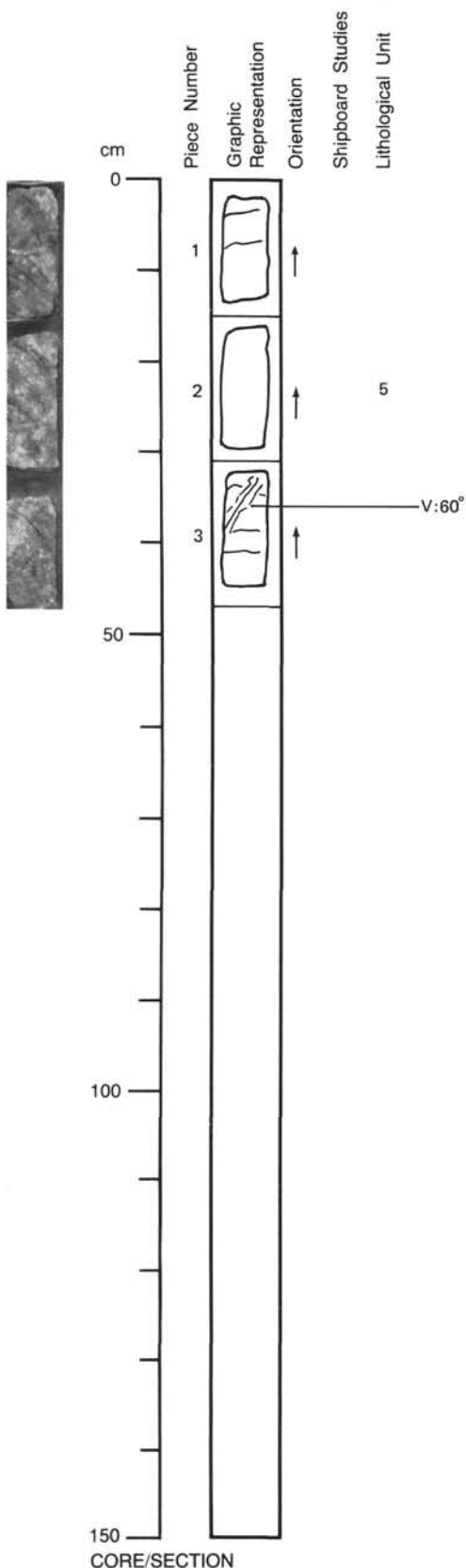
Olivine Gabbro

Pieces 1-3

COLOR: Gray.
LAYERING: None apparent.
DEFORMATION: None.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 55%.
 Crystal size: 8-25 mm.
 Crystal shape: Subhedral-euhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

 Clinopyroxene—Mode: 35%-40%.
 Crystal size: 8-15 mm.
 Crystal shape: Subhedral.
 Preferred orientation: Not determined.
 Percent replacement: Partly replaced by amphibole.

 Olivine—Mode: 5%-10%.
 Crystal size: 3-10 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Not determined.
 Percent replacement: Partly replaced by tremolite + magnetite. Chloritic rims.
SECONDARY MINERALOGY:
 Total percent: 5%.
 Texture: Olivine partly replaced by tremolite + magnetite. Chloritic rims around olivine pseudomorphs and relicts. Clinopyroxene partly replaced by green amphibole.
 Percent vein material: Not determined.
 Vein material: Thin (0.5 mm) veins in Piece 3 with green amphibole.



UNIT 5: OLIVINE GABBRO

Pieces 1-4

Olivine Gabbro

Pieces 1-4

COLOR: Gray.

LAYERING: No grain size layering; intervals with higher modal percent of olivine in Pieces 2 and 3B. No magmatic lamination.

DEFORMATION: None.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%-60%.

Crystal size: 2-15 mm.

Crystal shape: Subhedral.

Preferred orientation: None.

Percent replacement: Partly albitized.

Clinopyroxene—Mode: 25%-35%.

Crystal size: 2-15 mm.

Crystal shape: Subhedral.

Preferred orientation: None.

Percent replacement: Partly replaced by amphibole.

Olivine—Mode: 5%-15%.

Crystal size: 2-15 mm.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: Partly replaced by amphibole.

SECONDARY MINERALOGY:

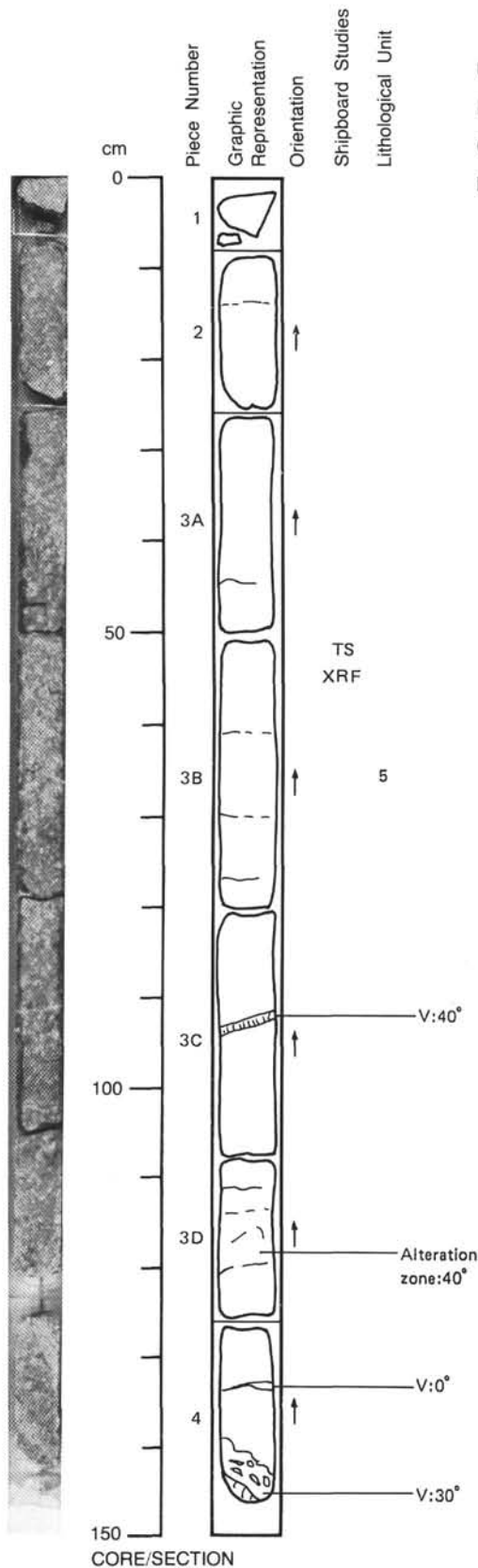
Total percent: Slight (in Pieces 1, 2, and 3A-C) to extensive (in Pieces 3D and 4).

Texture: Amphibole replaces clinopyroxene and olivine. Plagioclase is partly albitized, especially in Pieces 3D and 4.

Percent vein material: 1%-2%.

Vein material: Amphibole ± epidote ± sodic plagioclase.

COMMENTS: The amphibole ± epidote veinlet in Piece 4 is rich in iron-titanium oxides. The altered zones of Pieces 3D and 4 contain up to 10% iron-titanium oxides.



CORE/SECTION

118-735B-73R-2

UNIT 5: OLIVINE GABBRO

Pieces 1A-2B

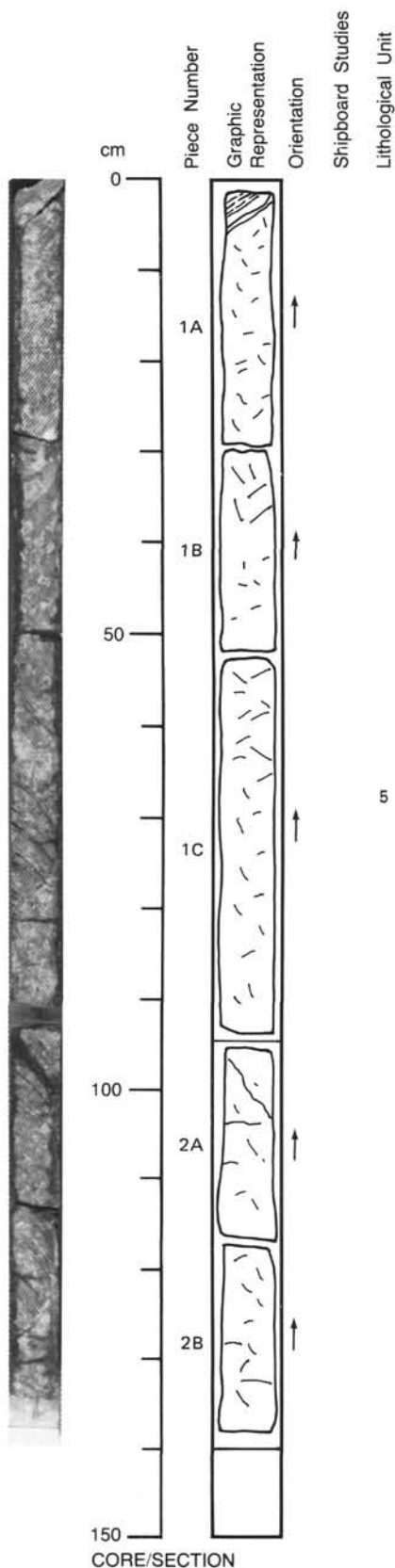
Olivine Gabbro

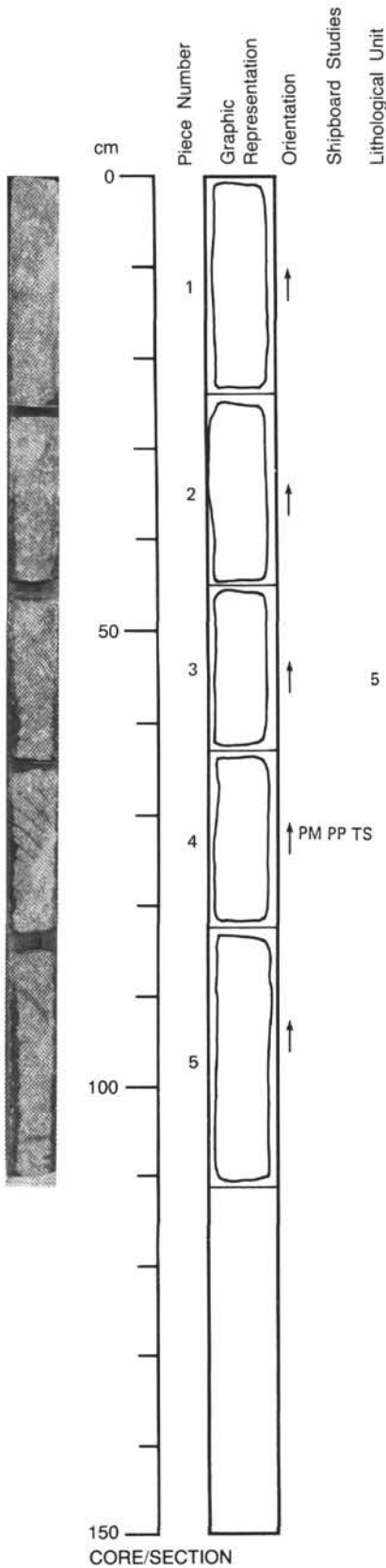
Pieces 1A-2B

COLOR: Gray.
LAYERING: Some grain size variation. Most of core is medium grained with two intervals of coarser to fine gradations (35-10 cm, and 63-45 cm).
DEFORMATION: A few fractures, and epidotized shear zone at top of Piece 1A.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 40%-60%.
 Crystal size: 1-22 mm.
 Crystal shape: Euhedral where small and enclosed, subhedral to anhedral elsewhere.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

 Clinopyroxene—Mode: 40%-60%.
 Crystal size: 3-30 mm.
 Crystal shape: Anhedral, interstitial to poikilitic, subhedral in coarser section.
 Preferred orientation: Not determined.
 Percent replacement: Partially amphibolitized.

 Olivine—Mode: 2%-5%.
 Crystal size: 2-5 mm.
 Crystal shape: Anhedral to subrounded.
 Preferred orientation: Not determined.
 Percent replacement: Altered to dark vein network of amphibole and talc
SECONDARY MINERALOGY:
 Total percent: Not determined.
 Texture: Olivine partly altered to amphibole, talc, and opaques, clinopyroxene partially amphibolitized near veins. Trace of pyrite.
 Percent vein material: Not determined.
 Vein material: There are some very fine fractures and veins throughout sample. One large vein cutting top of Piece 1A looks like replacement of a shear zone. It includes a strong foliation and has epidote, albite, and carbonate, and hematite(?) stain. There is a red-pink color to the vein.





UNIT 5: OLIVINE GABBRO

Pieces 1-5

Olivine Gabbro

Pieces 1-5

COLOR: Gray.

LAYERING: None.

DEFORMATION: None.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%.

Crystal size: 3-10 mm.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: < 1% by amphibole.

Clinopyroxene—Mode: 45%.

Crystal size: 5-10 mm.

Crystal shape: Subhedral.

Preferred orientation: None.

Percent replacement: < 1% by amphibole.

Olivine—Mode: 5%.

Crystal size: 2-5 mm.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: 20% by clay or serpentine.

SECONDARY MINERALOGY:

Total percent: 1%-2%.

Texture: Olivine altered in mesh-like fashion to black mineral, maybe clay or serpentine. Very minor replacement of clinopyroxene and plagioclase by amphibole.

Percent vein material: 0%.

Vein material: None.

118-735B-73R-4

UNIT 5: OLIVINE GABBRO

Pieces 1A-3

Olivine Gabbro

Pieces 1A-3

COLOR: Gray.

LAYERING: None apparent.

DEFORMATION: None.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%.

Crystal size: 5-15 mm.

Crystal shape: Subhedral to euhedral.

Preferred orientation: None.

Percent replacement: < 1%.

Clinopyroxene—Mode: 45%.

Crystal size: 3-15 mm.

Crystal shape: Subhedral, subophitically encloses plagioclase.

Preferred orientation: None.

Percent replacement: Not determined.

Olivine—Mode: 5%.

Crystal size: 3-10 mm.

Crystal shape: Subhedral.

Preferred orientation: None.

Percent replacement: 10-20% oxidized to an orange-brown color.

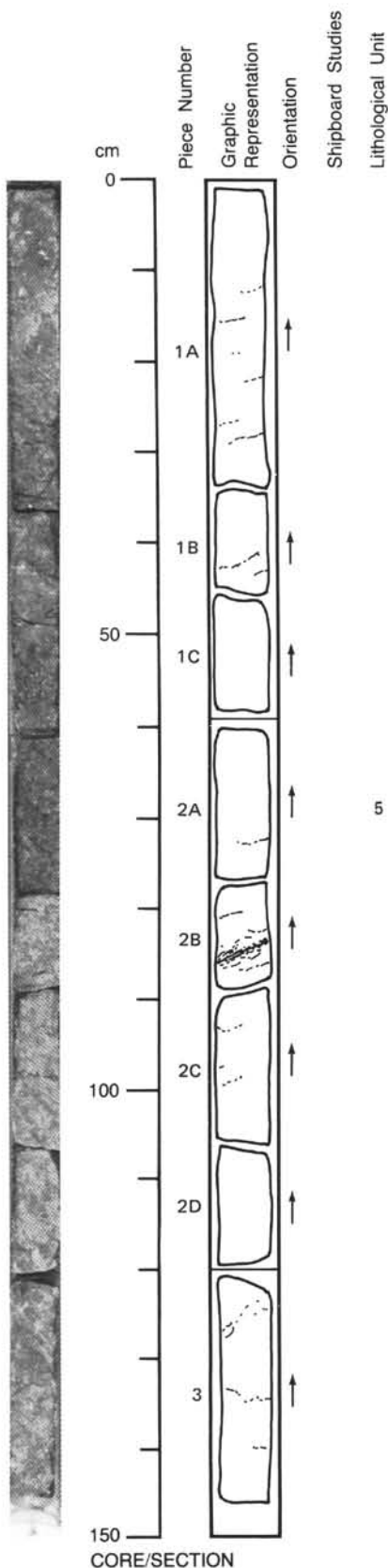
SECONDARY MINERALOGY:

Total percent: < 1%.

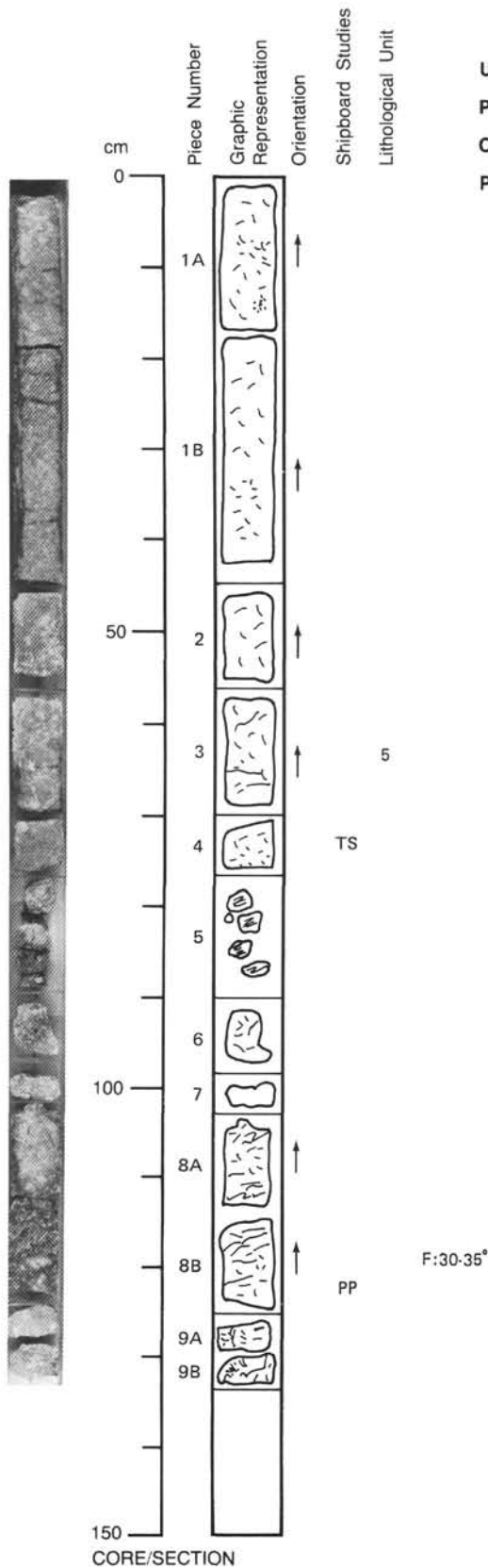
Texture: Most of the section is extremely fresh. Numerous very thin, nearly horizontal white veins, maybe plagioclase; almost no amphibole. Piece 2B has a 1 cm wide zone of opaques, probably ilmenite. For about 4 cm to either side of this vein, olivine is oxidized to an orange-brown color, but only along crack surfaces; much of core is still fresh. Slightly more total amphibole, also adjacent to this vein, but still only about 1-2% of total. Trace of sulfides throughout.

Percent vein material: Not determined.

Vein Material: Sodic plagioclase.



CORE/SECTION



UNIT 5: OLIVINE GABBRO

Pieces 1A-9B

Olivine Gabbro

Pieces 1A-9B

COLOR: Gray.

LAYERING: Some coarse to fine variation.

DEFORMATION: Slight in top 75 cm. Mylonitic and poorly foliated gabbro in Piece 5. Bottom of core is a sheared and brecciated metagabbro with a variously developed foliation dipping 30°. Bands and pods of whitish, granulated feldspar common on brecciated sections. May be some feldspathic vein material as well.

PRIMARY MINERALOGY:

Plagioclase—Mode: 40%-60%.

Crystal size: 3-10 mm.

Crystal shape: Euhedral when in clinopyroxene, subhedral to anhedral elsewhere.

Preferred orientation: None.

Percent replacement: Minor albitization.

Clinopyroxene—Mode: 40%-50%.

Crystal size: 2-10 mm.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: Up to 50% replacement by amphibole in deformed zones.

Olivine—Mode: 2%-5%.

Crystal size: 2-3 mm.

Crystal shape: Anhedral.

Preferred orientation: Not determined.

Percent replacement: Commonly to magnetite-tremolite-talc.

SECONDARY MINERALOGY:

Total percent: Up to 50%-60%.

Texture: Amphibolitization of clinopyroxene extensive in deformed part of core. A concentration of opaques (up to 10% modally) at top of deformed zone. The occurrence suggests a secondary origin for the opaques. Olivine commonly altered to talc-tremolite-magnetite. There is likely some albitization of plagioclase in deformed zone. There is minor pyrite in the undeformed gabbro and a secondary sulfide occurs on fracture surfaces in Piece 5.

Percent vein material: Not determined.

Vein material: Not determined.

118-735B-73R-6

UNIT 5: OLIVINE GABBRO

Pieces 1A-9B

Olivine Gabbro

Pieces 1A-9B

COLOR: Gray to greenish gray.

LAYERING: Not apparent.

DEFORMATION: Visible in Pieces 1A, 1B, 1C, 6C, and 9A. Small shear 2 cm thick or foliation defined by preferred orientation of pyroxene and plagioclase. Grain size 2-3 mm in deformed zones, 4-7 mm in undeformed gabbro.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%-60%.

Crystal size: 1-6 mm.

Crystal shape: Euhedral, included in clinopyroxene.

Preferred orientation: Locally present.

Percent replacement: None.

Clinopyroxene—Mode: 40%-50%.

Crystal size: 3-20 mm.

Crystal shape: Oikocrystic type with numerous inclusions (chadacrysts) of plagioclase.

Preferred orientation: Locally present.

Percent replacement: Severely altered to amphibole.

Olivine—Mode: 2%-5%.

Crystal size: 1-5 mm.

Crystal shape: Irregular, interstitial.

Preferred orientation: Locally present.

Percent replacement: 50% by serpentine or chlorite and talc.

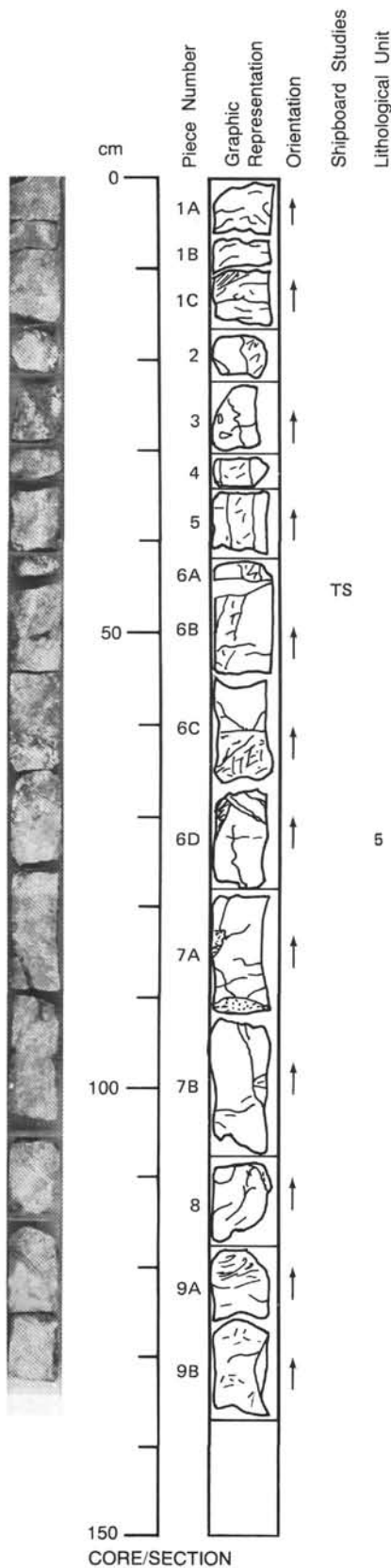
SECONDARY MINERALOGY:

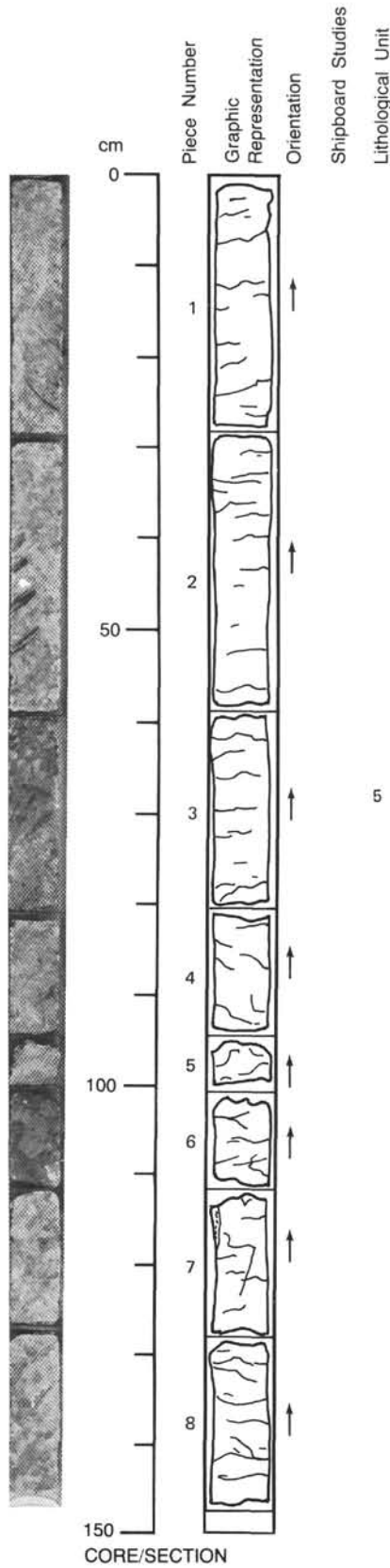
Total percent: Not determined.

Texture: Pseudomorphic, coronitic. Olivine is partly (50%) replaced by dark serpentine or chlorite and bluish-gray talc. Clinopyroxene is largely replaced by green amphibole in veined areas (Pieces 2 to 6D), and where the rock is affected by deformation (Pieces 1A-C, 6C, and 9A). Sulfides are observed in Pieces 3 and 9B.

Percent vein material: Not determined.

Vein material: Plagioclase and amphibole. Vein (1.5 cm thick) filled by plagioclase and amphibole. Coronitic reaction around pyroxene indicate these veins are preferred injection of plagioclase into former gabbro. Late cracks and veinlets filled with amphibole and plagioclase.





UNIT 5: OLIVINE GABBRO

Pieces 1-8

Olivine Gabbro

Pieces 1-8

COLOR: Gray.

LAYERING: Not apparent.

DEFORMATION: Not apparent.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%-60%.

Crystal size: 1-6 mm.

Crystal shape: Euhedral when enclosed in clinopyroxene, to subhedral in matrix.

Preferred orientation: None.

Percent replacement: None.

Clinopyroxene—Mode: 30%-40%.

Crystal size: 4-30 mm.

Crystal shape: Subhedral of oikocrystic type.

Preferred orientation: Not determined.

Percent replacement: 40% by amphibole.

Olivine—Mode: 10%-15%.

Crystal size: 2-10 mm.

Crystal shape: Anhedral to rounded.

Preferred orientation: Not determined.

Percent replacement: 30% by serpentine or chlorite + magnetite.

SECONDARY MINERALOGY:

Total percent: Not determined.

Texture: Pseudomorphic, coronitic. Olivine is replaced (30%) by dark serpentine or chlorite + magnetite. Plagioclase is invaded by amphibole veinlets. Clinopyroxene partially (40%)

replaced by amphibole along cleavage or cracks. Sulfides disseminated through the rock.

Larger sulfide spots (up to 1.5 mm) in Pieces 1, 2, 5, 7, and 8.

Percent vein material: 20%.

Vein material: Late white cracks filled by amphibole (<1 mm).

118-735B-74R-1

UNIT 5: OLIVINE GABBRO

Pieces 1A-3B

Olivine Gabbro

Pieces 1A-3B

COLOR: Gray.

LAYERING: Not present. Coarse-grained gabbro.

DEFORMATION: Not apparent.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%-60%.

Crystal size: 1-30 mm.

Crystal shape: Euhedral and enclosed in clinopyroxene.

Preferred orientation: None.

Percent replacement: None.

Clinopyroxene—Mode: 30%-40%.

Crystal size: 5-50 mm enclosing other major silicate phases.

Crystal shape: Oikocrystic, euhedral to anhedral.

Preferred orientation: None.

Percent replacement: 20% by amphibole.

Olivine—Mode: 10%.

Crystal size: 1-8 mm.

Crystal shape: Rounded, interstitial or included in clinopyroxene.

Preferred orientation: None.

Percent replacement: 30% by serpentine or chlorite and talc.

SECONDARY MINERALOGY:

Total percent: 15%.

Texture: Coronitic, pseudomorphic. Olivine is altered (near 30%) to dark yellow green

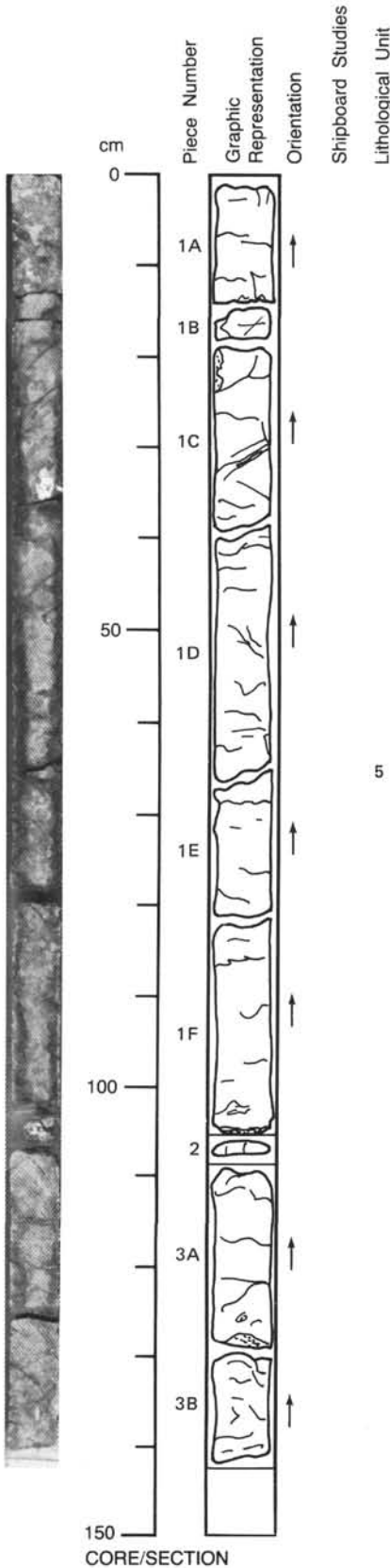
serpentine or chlorite and talc. Clinopyroxene is slightly (20%) replaced by amphibole.

Sulfides (pyrite) up to 1.5 mm across are present in Pieces 1A, 1E, 1F, 3A, and 3B.

Percent vein material: 1%.

Vein material: Amphibole. Cracks and veinlets are filled with blue green amphibole (small

shear zones). Cracks in plagioclase are filled with green amphiboles.



CORE/SECTION

118-735B-74R-2

UNIT 5: OLIVINE GABBRO

Pieces 1A-3C

Olivine Gabbro

Pieces 1A-3C

COLOR: Gray.

LAYERING: Isotropic with no obvious igneous layering due to size grading or lamination, but clearly phase layered with the proportions of all 3 phases varying.

0-28 cm, olivine-gabbro: 5%-10% olivine, 55% plagioclase, 30% clinopyroxene.

62-96 cm, gabbro: 0%-5% olivine, 55%-75% plagioclase, 25%-40% clinopyroxene.

96-135 cm, olivine-gabbro: 5%-10% olivine, 55% plagioclase, 25%-40% clinopyroxene.

DEFORMATION: Not determined.

PRIMARY MINERALOGY:

Plagioclase—Mode: 55%-75%.

Crystal size: 0.7-8 mm.

Crystal shape: Euhedral to subhedral.

Preferred orientation: None.

Percent replacement: Not determined.

Clinopyroxene—Mode: 25%-40%.

Crystal size: 0.2-30 mm.

Crystal shape: Subophitic to oikocrystic.

Preferred orientation: None.

Percent replacement: Not determined.

Olivine—Mode: 0%-20%.

Crystal size: 1-12 mm.

Crystal shape: Subophitic to oikocrystic.

Preferred orientation: None.

Percent replacement: Not determined.

Iron-oxides—Mode: 1%.

SECONDARY MINERALOGY:

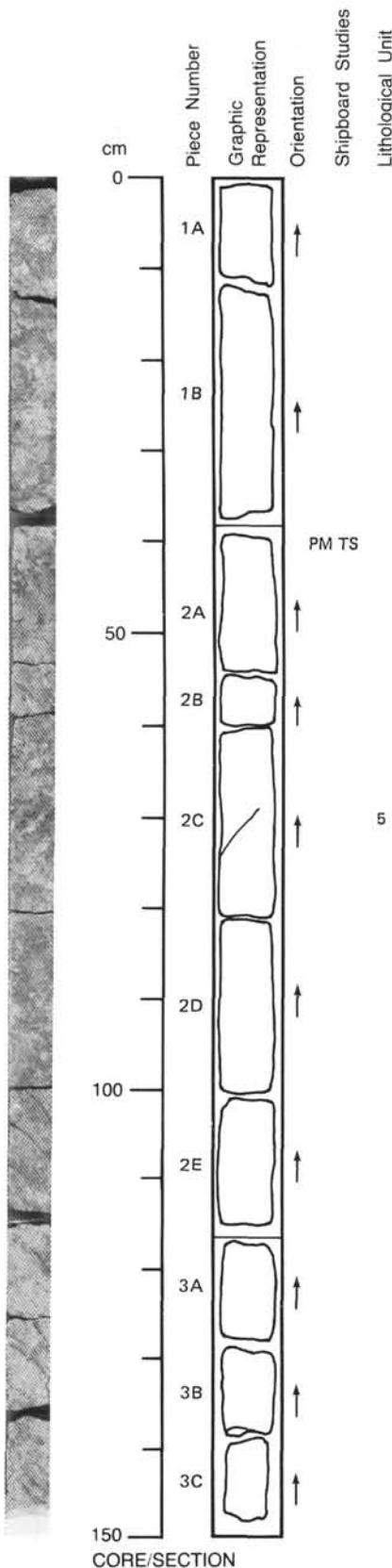
Total percent: Variable, 3%.

Texture: Alteration is weak with local partial replacement and rimming of clinopyroxene and formation of some interstitial actinolite and chlorite(?). Olivine frequently appears to have a mesh network of iron-oxide (magnetite?) running through it.

Percent vein material: < 1%.

Vein material: Actinolite, plagioclase, and green talc or chlorite. One alteration vein occurs in Piece 1C and contains actinolite, plagioclase, and green talc or chlorite.

COMMENTS: Equigranular gabbro with ophitic to subophitic texture. 1 cm euhedral to subhedral plagioclase laths are enclosed in oikocrysts of intergranular clinopyroxene and olivine. Disseminated sulfides and oxides occur as inclusions in the olivine and pyroxene and interstitially between grains. Pyroxene oikocrysts 2.5 cm.



118-735B-74R-3

UNIT 5: OLIVINE-GABBRO

Pieces 1A-3F

Olivine Gabbro

Pieces 1A-3F

COLOR: Gray.

LAYERING: None discernable. Most of core is coarse grained. A slightly medium-grained interval at 64-74 cm. Olivine is abundant throughout. It is difficult to discern any olivine-layered structure from the patchy, heterogeneous distribution of olivine.

DEFORMATION: None. A few brittle fractures.

PRIMARY MINERALOGY:

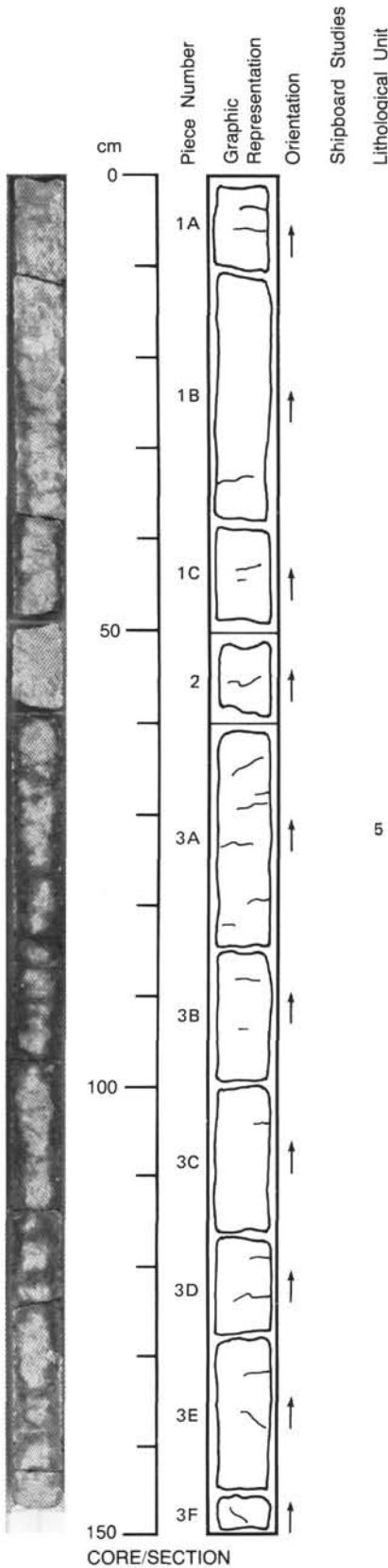
Plagioclase—Mode: 60%-40%.
 Crystal size: 2-10 mm.
 Crystal shape: Euhedral to anhedral.
 Preferred orientation: None.
 Percent replacement: Not determined.

Clinopyroxene—Mode: 20%-40%.
 Crystal size: 4-10 mm.
 Crystal shape: Anhedral ophitic to poikilitic.
 Preferred orientation: None.
 Percent replacement: Minor amphibolitization.

Olivine—Mode: 5%-20%.
 Crystal size: 3-12 mm.
 Crystal shape: Anhedral, intergrown with plagioclase, rarely near subhedral.
 Preferred orientation: None.
 Percent replacement: Not determined.

SECONDARY MINERALOGY:

Total percent: Minor.
 Texture: Olivine altered to a mesh of tremolite-talc-magnetite. Minor amphibolitization of clinopyroxene. A trace of sulfide.
 Percent vein material: Not determined.
 Vein material: A few small feldspathic veinlets, subhorizontal throughout.



UNIT 5: OLIVINE GABBRO

Pieces 1A-3B

Olivine Gabbro

Pieces 1A-3B

COLOR: Greenish gray with bronze luster for the huge oikocrysts.

LAYERING: Not apparent.

DEFORMATION: Not apparent.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%-60%.

Crystal size: 1-8 mm.

Crystal shape: Euhedral when included in clinopyroxene to anhedral interstitial.

Preferred orientation: None.

Percent replacement: None.

Clinopyroxene—Mode: 40%-50%.

Crystal size: 3-16 mm.

Crystal shape: Oikocrystic, enclosing euhedral plagioclase.

Preferred orientation: None.

Percent replacement: Slight replacement by amphibole.

Olivine—Mode: 5%-15%.

Crystal size: 1-11 mm.

Crystal shape: Subhedral to rounded interstitial.

Preferred orientation: None.

Percent replacement: 30% replaced by talc, tremolite, magnetite, and clays.

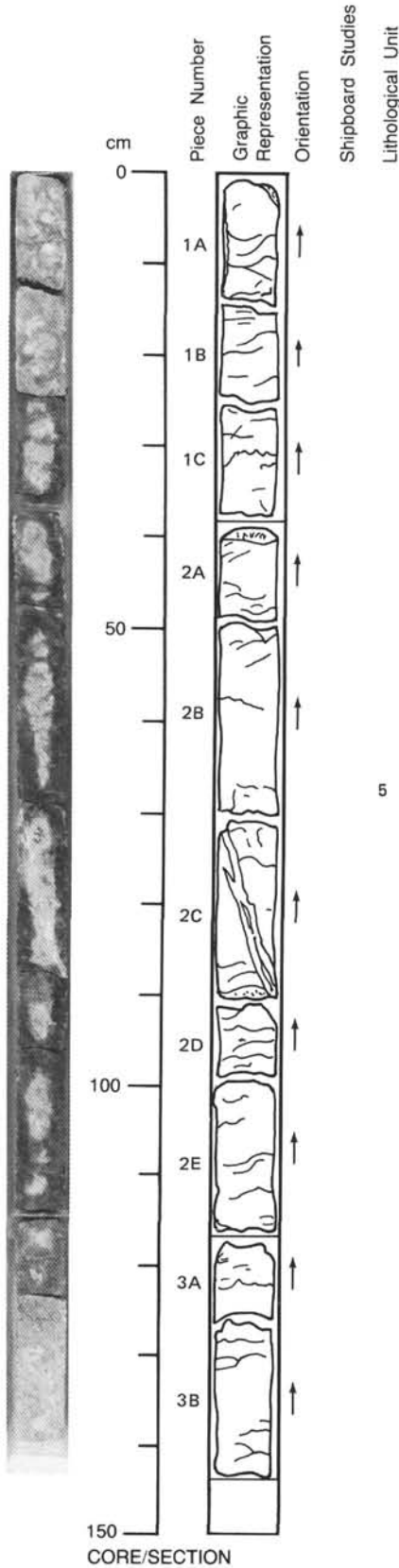
SECONDARY MINERALOGY:

Total percent: 5% or less.

Texture: Coronitic. Olivine is partly altered into a mixture of talc, tremolite, magnetite, and brown clays (30% replacement). Clinopyroxene is partly replaced by green amphibole (pseudomorphs) particularly close to a vein in Piece 2C. Sulfides are present (<0.5 mm) in Pieces 1A, 2A, 2B, 2C, and 2E.

Percent vein material: Not determined.

Vein material: Amphibole. Vein in Piece 2C, 7-11 mm thick, plagioclase close to the walls (2-4 mm) and green amphibole in the center. Cracks are filled with light green amphibole.



118-735B-74R-5

UNIT 5: OLIVINE GABBRO

Pieces 1A-7B

Olivine Gabbro (with Large Clinopyroxene Oikocrysts).

Pieces 1A-7B

COLOR: Gray to grayish green.

LAYERING: Not present.

DEFORMATION: Not present.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%-60%.

Crystal size: 1-8 mm.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: None.

Clinopyroxene—Mode: 40%-50%.

Crystal size: 1-80 mm.

Crystal shape: Oikocrystic, subhedral.

Preferred orientation: Oikocryst is subvertical.

Percent replacement: <20% altered to green amphibole (more severely altered in Pieces 4, 5, 6, and top of Piece 7A).

Olivine—Mode: 10%-15%.

Crystal size: 3-5 mm.

Crystal shape: Anhedral.

Preferred orientation: Not determined.

Percent replacement: 10%-20% replaced by a mixture of tremolite-magnetite-talc-clays.

Amphibole needles can be seen within olivine grains.

Ilmenite—Mode: Trace-2%.

Crystal size: (Piece 5) 2-4 mm.

Crystal shape: Granular.

Preferred orientation: None.

Percent replacement: Not determined.

SECONDARY MINERALOGY:

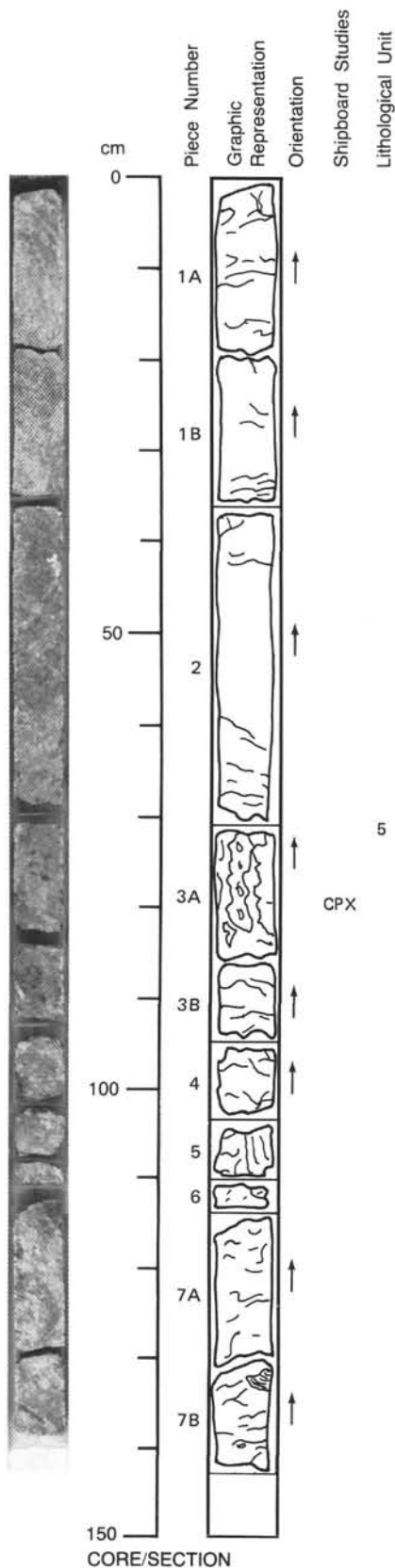
Total percent: About 25%.

Texture: Coronitic, pseudomorphic.

Percent vein material: Not determined.

Vein material: Amphibole and clays. Late subhorizontal cracks (<1 mm) are filled with pale green amphiboles and gray clays.

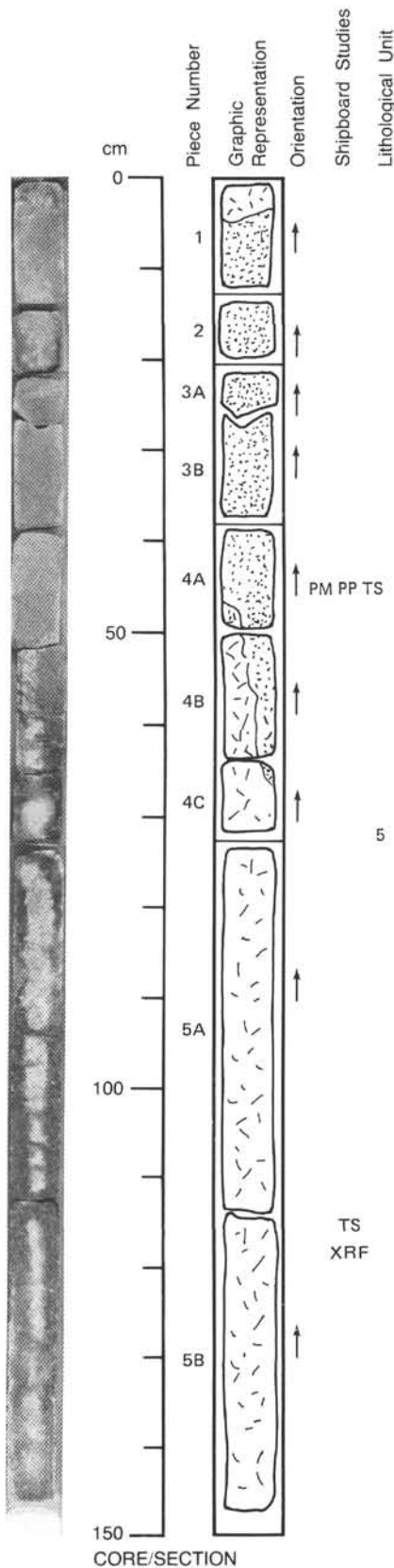
COMMENTS: Sulfides: There are large intergrowths (up to 5 mm across) or isolated pentlandite (pinkish color) and chalcopyrite. They are 0.1-5 mm, irregular or molted, and are interstitial to silicate grains. Sometimes they are included in olivine or clinopyroxene (see Piece 3A).



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CORE/SECTION



UNIT 5: OLIVINE GABBRO

Pieces 1-5B

Olivine-Bearing Diabase

Pieces 1 (bottom)-4C

COLOR: Gray with light brown spots.
LAYERING: None. Equigranular texture, medium-grained.
DEFORMATION: None.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 50%.
 Crystal size: <0.5 mm.
 Crystal shape: Anhedral; orthopyroxene and opaques appear to be subophitically enclosing plagioclase.
 Preferred orientation: None.
 Percent replacement: 0%.
 Clinopyroxene—Mode: 34%.
 Crystal size: <0.5 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: 0%.
 Orthopyroxene—Mode: 10%.
 Crystal shape: Anhedral.
 Crystal size: Individual grains <0.5 mm but brown spots 5 mm.
 Preferred orientation: None.
 Percent replacement: 0%.
 Ilmenite—Mode: Near 1%.
 Crystal size: <0.5 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: 0%.
 Sulfides: Mode: Near 1%.
 Crystal size: <0.5 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: 0%.
SECONDARY MINERALOGY:
 Total percent: <1%.
 Texture: Almost totally fresh.
 Percent vein material: 0%.
 Vein material: None.
COMMENTS: Contacts between diabase (microgabbro) and gabbro preserved in Piece 1, where it is nearly horizontal, and in Pieces 4A-C where it is nearly vertical.

Olivine Gabbro

Pieces 1 (top) and 4A-5B

COLOR: Gray.
LAYERING: None.
DEFORMATION: None.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 50%-55%.
 Crystal size: 5-25 mm.
 Crystal shape: Subhedral to euhedral.
 Preferred orientation: None.
 Percent replacement: Not determined.
 Clinopyroxene—Mode: 45%-40%.
 Crystal size: 5-80 mm oikocrysts; clinopyroxene forms very large oikocrysts enclosing subhedral to euhedral plagioclase.
 Crystal shape: Subhedral.
 Preferred orientation: None.
 Percent replacement: Not determined.
 Olivine—Mode: 5%-10%.
 Crystal size: 5-10 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: Not determined.
SECONDARY MINERALOGY:
 Total percent: <1%.
 Texture: Secondary green amphibole.
 Percent vein material: 0%.
 Vein material: None.

118-735B-74R-7

UNIT 5: OLIVINE GABBRO

Pieces 1A-1F

Olivine Gabbro

Pieces 1A-1F

COLOR: Gray.

LAYERING: None well-defined. Most of core is coarse-grained. Two very coarse intervals at 65-70 cm (also plagioclase-rich) and 95-105 cm.

DEFORMATION: None.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%-80%.

Crystal size: 2-20 mm.

Crystal shape: Euhedral to subhedral.

Preferred orientation: Not determined.

Percent replacement: Not determined.

Clinopyroxene—Mode: 20%-40%.

Crystal size: 5-30 mm.

Crystal shape: Largely ophitic to poikilitic.

Preferred orientation: Not determined.

Percent replacement: Extensively amphibolitized in Piece 1F.

Olivine—Mode: 5%-20%.

Crystal size: 2-8 mm.

Crystal shape: Largely anhedral.

Preferred orientation: Not determined.

Percent replacement: Partly replaced by magnetite-talc-tremolite.

SECONDARY MINERALOGY:

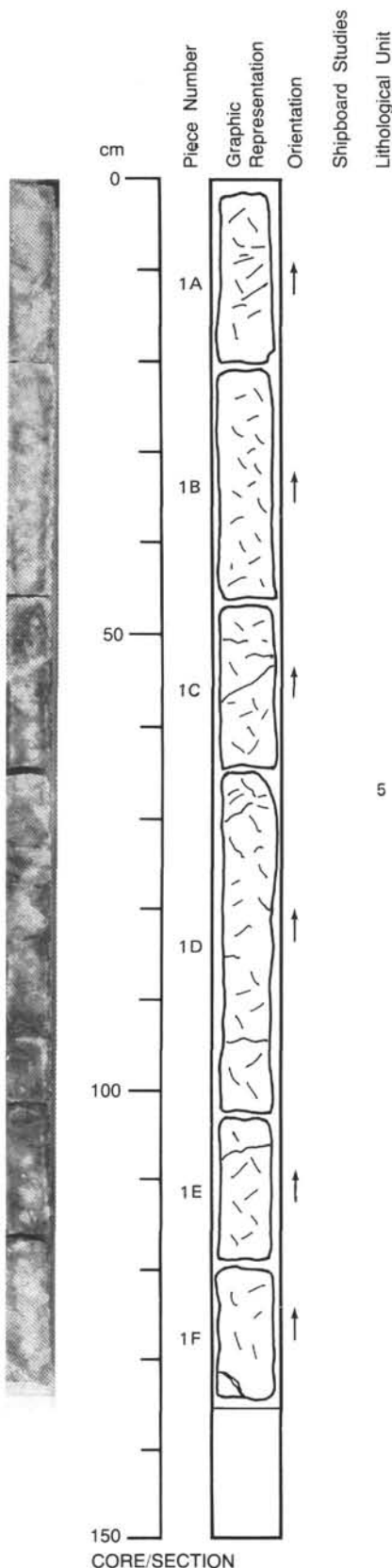
Total percent: Slight. Core is quite fresh.

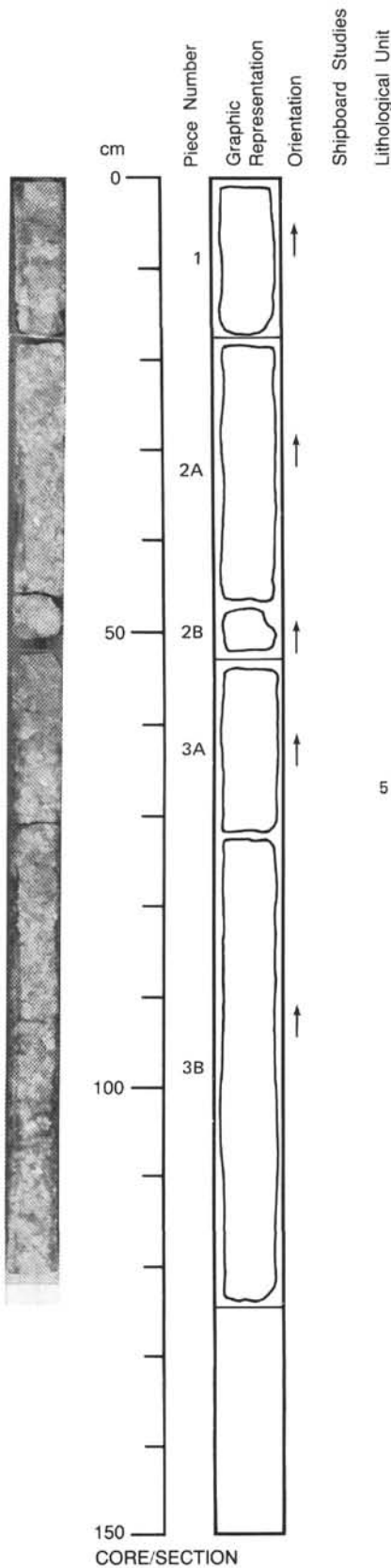
Texture: Clinopyroxene is extensively amphibolitized in Piece 1F. Olivine replaced in part by magnetite-talc-tremolite vein network.

Percent vein material: Not determined.

Vein material: One feldspathic vein cuts lower part of Piece 1F.

COMMENTS: Mineral distribution in coarse grained sections is irregular. There are 3-5 cm pods or sections of near troctolite and anorthositic gabbro, as well as olivine-poor and olivine-rich gabbro.





UNIT 5: OLIVINE GABBRO

Pieces 1-3B

Olivine Gabbro

Pieces 1-3B

COLOR: Gray.

LAYERING: Primary layering defined by variations in grain size. Grain size varies over length of core. From 0-17 cm, very coarse-grained; from 17-42 cm, coarse-grained; from 42-74 cm, very coarse-grained; and from 74 cm to bottom back to coarse-grained.

DEFORMATION: None.

PRIMARY MINERALOGY:

Plagioclase—Mode: 45%.

Crystal size: 1-3 cm.

Crystal shape: Subhedral to euhedral.

Preferred orientation: None.

Percent replacement: 1%.

Clinopyroxene—Mode: 35%-40%.

Crystal size: 1-3 cm.

Crystal shape: Subhedral, subophitically encloses plagioclase.

Preferred orientation: None.

Percent replacement: 1% by amphibole.

Olivine—Mode: 15%-20%.

Crystal size: 0.7-1.8 cm.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: 15% by clay minerals or serpentine and iron-oxides.

SECONDARY MINERALOGY:

Total percent: 5%.

Texture: Amphibole partially replaces clinopyroxene. Traces of sulfides throughout. Olivine partially altered in meshlike fashion; mesh made of black mineral, maybe mixture of clay minerals or serpentine and iron-oxides.

Percent vein material: Not determined.

Vein material: Not determined.

118-735B-75R-2

UNIT 5: OLIVINE GABBRO

Pieces 1A-1E

Olivine Gabbro

Pieces 1A-1E

COLOR: Gray.

LAYERING: Not present.

DEFORMATION: Not apparent.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%-60%.

Crystal size: 1-15 mm.

Crystal shape: Prismatic up to 2 cm long and included in large clinopyroxene oikocrysts that enclose both silicate phases. Arrangement is subophitic.

Preferred orientation: None.

Percent replacement: None.

Clinopyroxene—Mode: 40%-50%.

Crystal size: 5-20 mm.

Crystal shape: Oikocrystic, anhedral.

Preferred orientation: None.

Percent replacement: < 30% by green amphibole.

Olivine—Mode: 5%-10%.

Crystal size: 1-5 mm.

Crystal shape: Rounded to irregular interstitial.

Preferred orientation: None.

Percent replacement: 20%-40% by actinolite, talc, and magnetite.

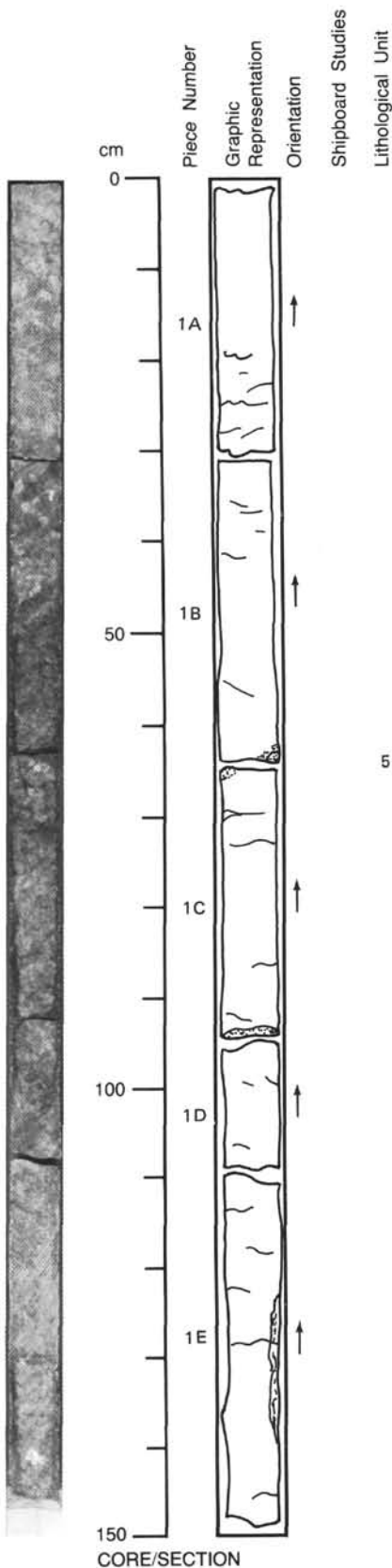
SECONDARY MINERALOGY:

Total percent: <20%.

Texture: Coronitic, pseudomorphic. Olivine is partly replaced by actinolite needles and talc with seams of magnetite. Clinopyroxene is partly transformed into green amphibole. Sulfides disseminated as small blebs <1.5 mm in interstitial spaces.

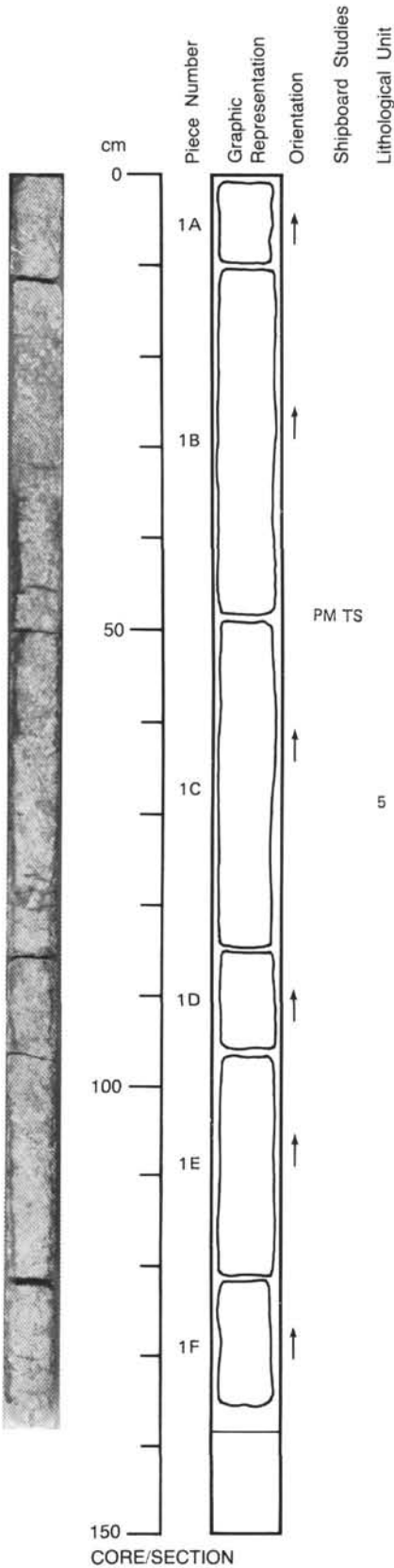
Percent vein material: Not determined.

Vein material: Late white cracks are filled with amphibole and clays (slightly sheared).



5

CORE/SECTION



UNIT 5: OLIVINE GABBRO

Pieces 1A-1F

Olivine Gabbro

Pieces 1A-1F

COLOR: Gray.

LAYERING: None.

DEFORMATION: None.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%.

Crystal size: 5-20 mm.

Crystal shape: Subhedral. Clinopyroxene subophitically encloses plagioclase, but plagioclase has a radiate arrangement as do the portions of clinopyroxene that partially enclose it, forming a flower or starburst pattern.

Preferred orientation: None.

Percent replacement: <1%.

Clinopyroxene—Mode: 40%.

Crystal size: 5-20 mm.

Crystal shape: Subhedral.

Preferred orientation: None.

Percent replacement: 1-2% by amphibole.

Olivine—Mode: 10%.

Crystal size: 5-10 mm.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: 50% in mesh-like pattern.

SECONDARY MINERALOGY:

Total percent: 5-10%.

Texture: Olivine is altered in typical mesh-like fashion, but mesh seems to be more iron-oxide-rich than some previous sections. Minor alteration by amphibole (<5%-10%). Traces of sulfides.

Percent vein material: None.

Vein material: None.

118-735B-75R-4

UNIT 5: OLIVINE GABBRO

Pieces 1A-1G

Olivine Gabbro

Pieces 1A-1G

COLOR: Gray, green-gray where altered.

LAYERING: Olivine common throughout. Local concentrations of plagioclase and olivine, but no clear phase layering. Mostly coarse-grained, some coarse- to medium-grained intervals at 70-50 cm and 120-100 cm.

DEFORMATION: None.

PRIMARY MINERALOGY:

Plagioclase—Mode: 40%-55%.

Crystal size: 2-13 mm.

Crystal shape: Euhedral-anhedral.

Preferred orientation: Not determined.

Percent replacement: Not determined.

Clinopyroxene—Mode: 45%-50%.

Crystal size: 2-20 mm.

Crystal shape: Subhedral-anhedral, ophitic. Complex intergrowths with plagioclase in finer-grained section at 115-120 cm.

Preferred orientation: Not determined.

Percent replacement: Locally 5%-10% by amphibole.

Olivine—Mode: 5%-20%.

Crystal size: 1-3 mm.

Crystal shape: Anhedral. In places intergrown with plagioclase.

Preferred orientation: Not determined.

Percent replacement: Up to 20% by magnetite-talc-tremolite.

SECONDARY MINERALOGY:

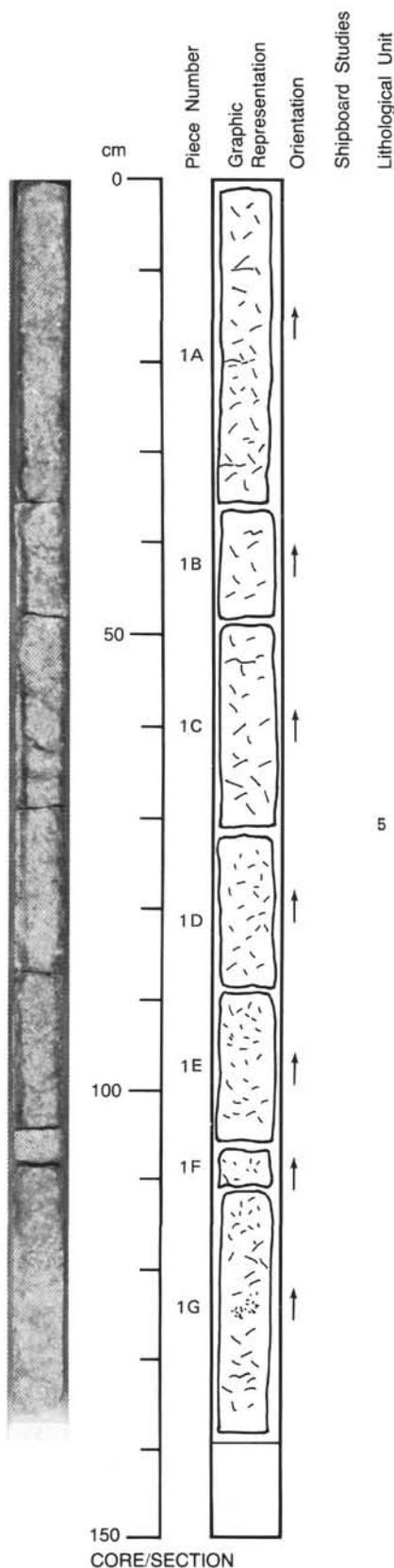
Total percent: Locally 5%-10%.

Texture: Olivine veined with dark mesh of magnetite-talc-tremolite. Much of section has a slight greenish cast, probably from amphibolitization of clinopyroxene.

Percent vein material: Not determined.

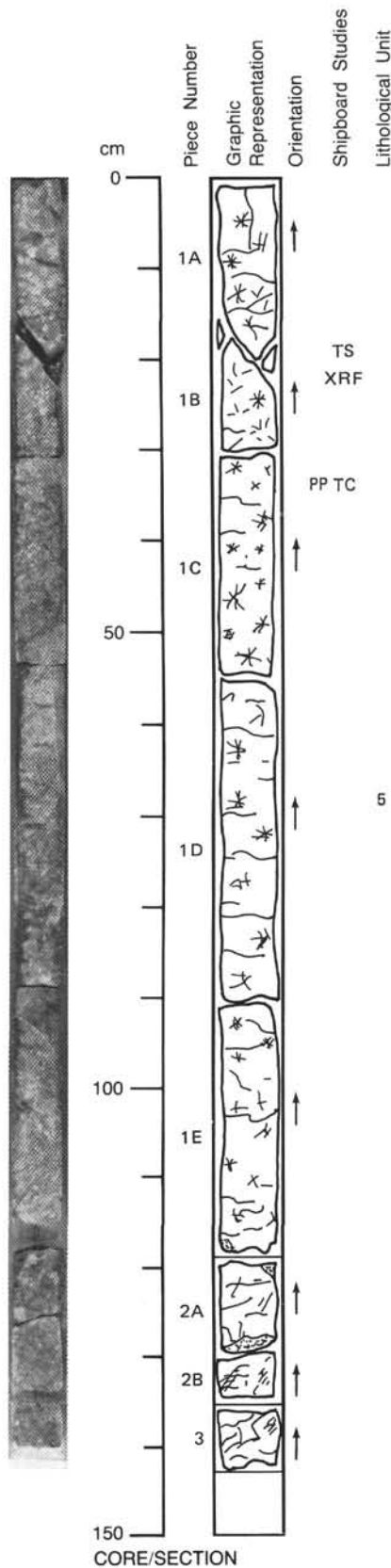
Vein material: Magnetite-talc-tremolite.

COMMENTS: There is a common (though <1%) apparently primary sulfide in 1-2 mm, anhedral (in rare cases spherical) grains. Tentatively identified as pentlandite/chalcocopyrite mixture.



5

CORE/SECTION



UNIT 5: OLIVINE GABBRO

Pieces 1A-3

Olivine Gabbro

Pieces 1A-3

COLOR: Gray.

LAYERING: Not apparent.

DEFORMATION: Not apparent.

PRIMARY MINERALOGY:

Plagioclase—Mode: 55%-65%.

Crystal size: 1-4 mm.

Crystal shape: Radially included in clinopyroxene ("daisy" texture). Some plagioclase occurs also in the groundmass.

Preferred orientation: None.

Percent replacement: None.

Clinopyroxene—Mode: 35%-45%.

Crystal size: 1-2 cm.

Crystal shape: Oikocrysts that are on average 8 mm across are actually floating in plagioclase-rich groundmass.

Preferred orientation: None.

Percent replacement: <20%-30% by amphibole.

Olivine—Mode: 5%-10%.

Crystal size: 1-3 mm.

Crystal shape: Euhedral to anhedral.

Preferred orientation: None.

Percent replacement: None, except in Pieces 1A and 3 where olivine is replaced by clays, talc, and magnetite.

SECONDARY MINERALOGY:

Total percent: <10%.

Texture: Pseudomorphic. Olivine is very fresh except in Pieces 3 and 1A where it is altered to a mixture of brown clays, talc, and magnetite. Clinopyroxene is also fresh; it is replaced partially (20-30%) by amphiboles close to subhorizontal cracks filled with amphiboles. Sulfides are widespread throughout the section as accessory phases. Identified phases are pentlandite and chalcopyrite.

Percent vein material: Not determined.

Vein material: Amphibole.

118-735B-75R-6

UNIT 5: OLIVINE GABBRO

Pieces 1A-4B

Olivine Gabbro

Pieces 1A-4B

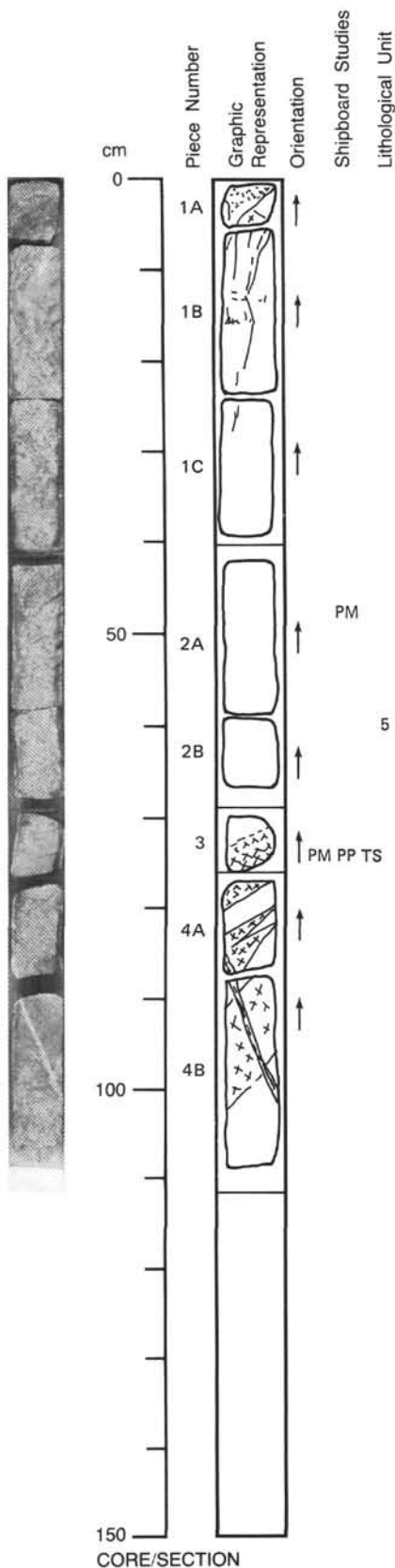
COLOR: Gray.
LAYERING: None.
DEFORMATION: None.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 55%-60%.
 Crystal size: 4-9 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: Slight.

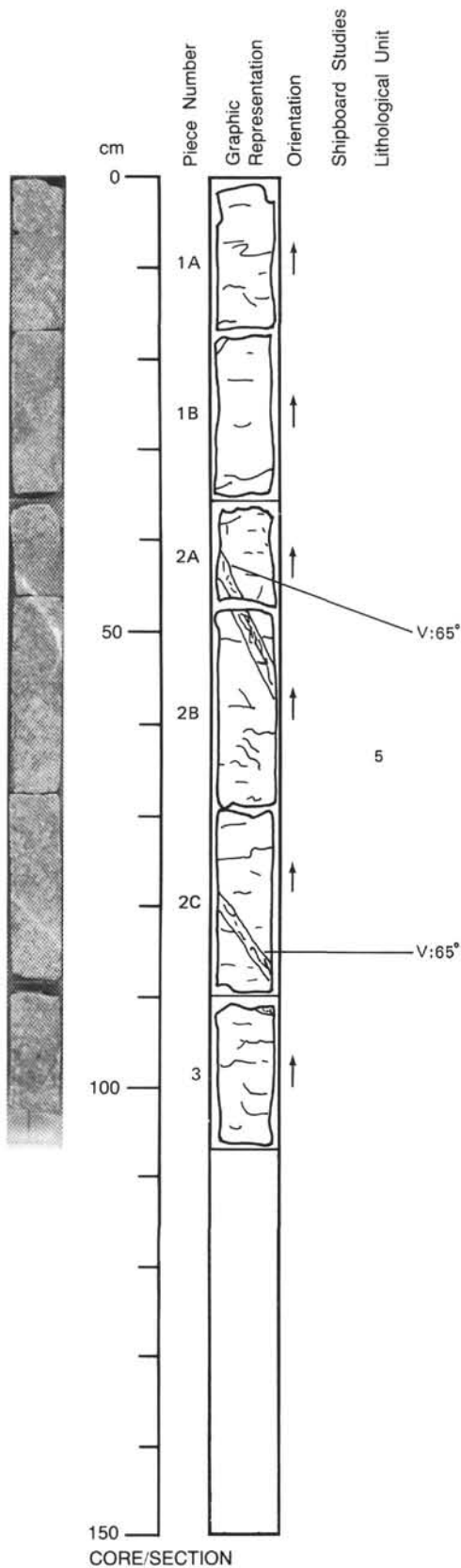
 Clinopyroxene—Mode: 40%-45%.
 Crystal size: 5-15 mm.
 Crystal shape: Anhedral, subophitically encloses plagioclase.
 Preferred orientation: None.
 Percent replacement: 30% by amphibole.

 Olivine—Mode: 5%.
 Crystal size: 3-8 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: Moderate replacement by talc and magnetite.

SECONDARY MINERALOGY:
 Total percent: Moderate to slight.
 Texture: Olivine is partly replaced by talc + magnetite. Clinopyroxene is partially altered to amphibole (30%) (20%-60% in Pieces 1A and 1B). The alteration is related to vein injection. Rare subhorizontal cracks are filled by amphibole (with little shearing). Traces of sulfides throughout the section; they fill intergranular spaces and some are related to vein injection.
 Percent vein material: Not determined.
 Vein material: In Pieces 1A and B, veins consist of plagioclase, (occasionally stained pinkish, apparently by iron-oxides) and green amphibole with acicular habit.

COMMENTS: Pieces 3, 4A, and 4B are diabase, i.e., medium-grained, but similar mineralogically to the surrounding olivine gabbro.





UNIT 5: OLIVINE GABBRO

Pieces 1A-3

Olivine Gabbro

Pieces 1A-3

COLOR: Gray

LAYERING: Not apparent.

DEFORMATION: Not apparent.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%-60%.

Crystal size: 1-3 mm.

Crystal shape: Prismatic and included in clinopyroxene.

Preferred orientation: None.

Percent replacement: None.

Clinopyroxene—Mode: 40%-50%.

Crystal size: 3-15 mm.

Crystal shape: Oikocrystic type but of smaller grain size than the upper sections.

Preferred orientation: None.

Percent replacement: Slight replacement by amphibole.

Olivine—Mode: 10%.

Crystal size: 1-5 mm.

Crystal shape: Rounded.

Preferred orientation: None.

Percent replacement: 3% by talc and magnetite.

SECONDARY MINERALOGY:

Total percent: <1%.

Texture: Coronitic. Olivine is partly (3%) altered to talc + magnetite. Clinopyroxene is replaced by amphibole particularly where subhorizontal amphibole veinlets and subvertical plagioclase + amphibole veins cut the gabbro. Sulfides are widespread throughout the section as accessory interstitial phase (up to 1.5 mm across).

Percent vein material: Not determined.

Vein material: Amphibole and plagioclase. Steeply dipping veins (5-9 mm thick) are filled by plagioclase against the walls and amphibole in the center (Pieces 2A, 2B, and 2C).

118-735B-75R-8

UNIT 5: OLIVINE GABBRO

Pieces 1A-3

Olivine Gabbro

Pieces 1A-3

COLOR: Gray.

LAYERING: Coarse- to medium-grain transitions at 80-60 cm and 50-25 cm.

DEFORMATION: None.

PRIMARY MINERALOGY:

Plagioclase—Mode: 40%-60%.
 Crystal size: 3-20 mm.
 Crystal shape: Euhedral-anhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

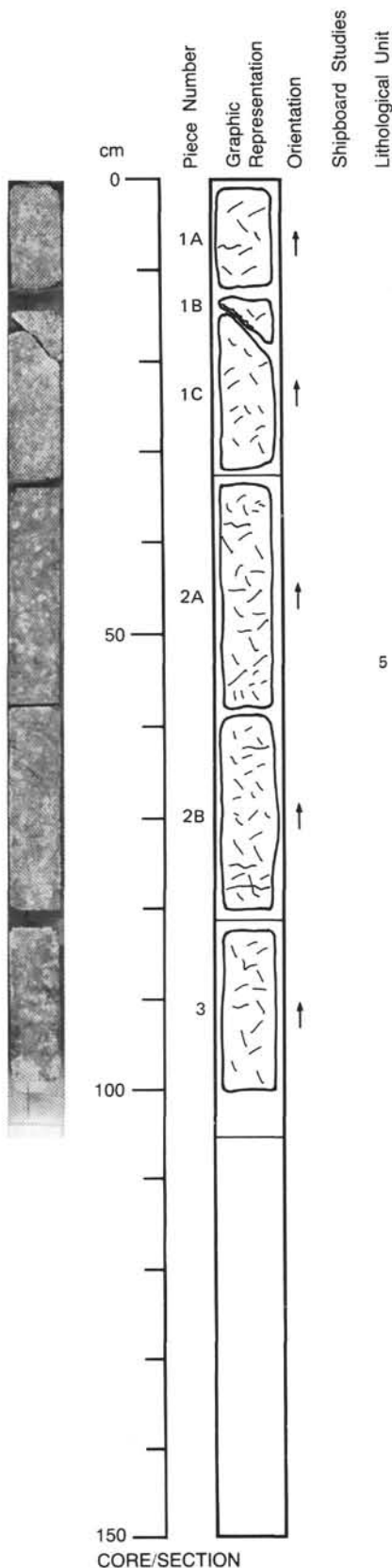
Clinopyroxene—Mode: 20%-50%.
 Crystal size: 2-13 mm.
 Crystal shape: Subhedral-anhedral; ophitic at 0-11 cm and 80-100 cm; subhedral at 13-80 cm.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

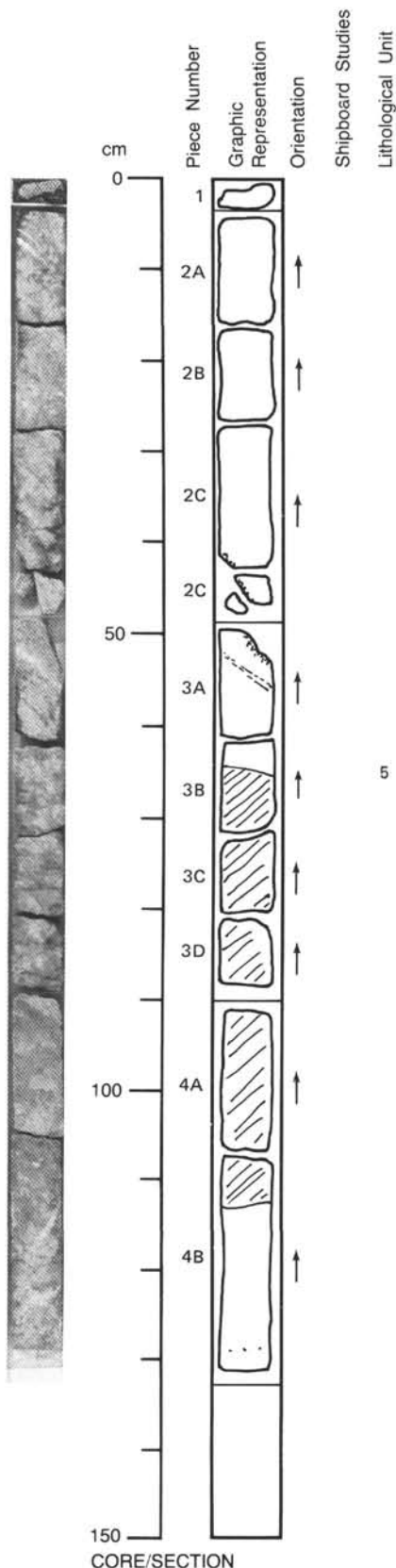
Olivine—Mode: 10%-20%.
 Crystal size: 2-10 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

SECONDARY MINERALOGY:

Total percent: Slight.
 Texture: Some mesh alteration (opaque/tremolite) in olivine. Plagioclase is pretty fresh as is clinopyroxene.
 Percent vein material: Not determined.
 Vein material: 1-2 mm thick feldspathic vein at 15 cm along a fracture. Several small subhorizontal feldspathic veins (<1 mm wide, 2-3 cm long) throughout.

COMMENTS: Trace sulfides.





UNIT 5: OLIVINE GABBRO

Pieces 1-4B

Olivine Gabbro

Pieces 1-3B and 4B

COLOR: Gray.
LAYERING: Primary layering defined by change in mineral assemblage between olivine and ilmenite gabbro.
DEFORMATION: None.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 50%.
 Crystal size: 7-15 mm.
 Crystal shape: Subhedral to euhedral.
 Preferred orientation: None.
 Percent replacement: <1%.

 Clinopyroxene—Mode: 49%-45%.
 Crystal size: 5-30 mm.
 Crystal shape: Anhedral, subophitically encloses plagioclase.
 Preferred orientation: None.
 Percent replacement: <1%.

 Olivine—Mode: 1%-5%.
 Crystal size: 5-6 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: 5%.

SECONDARY MINERALOGY:
 Total percent: <3%.
 Texture: Fracture surface on outside of Pieces 2C and 3A coated with chlorite. Grain boundaries and thin veins filled by actinolite. Larger vein in Piece 3A filled by plagioclase, actinolite, and zoisite (pink). Numerous, nearly horizontal veinlets filled by white minerals.
 Percent vein material: Not determined.
 Vein material: Actinolite, Na-plagioclase, and zoisite.

Ilmenite Gabbro

Pieces 3B-4B

COLOR: Gray.
LAYERING: See above.
DEFORMATION: None.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 95%-30%.
 Crystal size: 1.5->5 cm.
 Crystal shape: Subhedral to euhedral.
 Preferred orientation: None.
 Percent replacement: <1% by amphibole.

 Clinopyroxene—Mode: 5%-70%.
 Crystal size: 1->4.5 cm.
 Crystal shape: Subhedral.
 Preferred orientation: None.
 Percent replacement: <5% by amphibole.

 Ilmenite—Mode: 1%.
 Crystal size: Not determined.
 Crystal shape: Anhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.
SECONDARY MINERALOGY:
 Total percent: <3%.
 Texture: Green amphibole replaces along grain boundaries and thin veinlets. Trace of altered olivine.
 Percent vein material: Not determined.
 Vein material: Green amphibole.
COMMENTS: Texture is obviously cumulus with cumulus plagioclase crystals touching and intercumulus clinopyroxene at the bottom of the ilmenite gabbro unit. Modal proportions extremely variable, but may be a function of large grain size relative to size of core.

118-735B-76R-2

UNIT 6: OLIVINE GABBRO

Pieces 1A-5

Olivine Gabbro (Alternating Fine- to Coarse-Grained Sub-Types).

Pieces 1A-5

COLOR: Gray

LAYERING: Grain size contact in Pieces 1B, 1C, 2A, 2D, and 3F.

No inference is here made on the origin of the layers. There is an abrupt grain size change: coarse-grained gabbro, 1.5-2 cm; fine-grained gabbro, 1-3 mm. Layers are 5 mm to 9 cm thick in fine-grained gabbro. Some pyroxene crystals are nearly perpendicular to the contacts.

DEFORMATION: Not present.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50% (coarse-grained gabbro), 60%-70% (fine-grained gabbro).

Crystal size: 1-5 mm (coarse-grained gabbro), 1 mm (fine-grained gabbro).

Crystal shape: Euhedral (coarse-grained gabbro).

Preferred orientation: None.

Percent replacement: None.

Clinopyroxene—Mode: 40% (coarse-grained gabbro), 20%-30% (fine-grained gabbro).

Crystal size: 2-7 mm (coarse-grained gabbro), 1 mm (fine-grained gabbro).

Crystal shape: Oikocrystic and prismatic (coarse-grained gabbro, rarely Piece 1).

Preferred orientation: Not clear.

Percent replacement: 10%-20% by amphibole.

Olivine—Mode: 5%-10% (coarse-grained gabbro), 5%-10% (fine-grained gabbro).

Crystal size: 1-3 mm (coarse-grained gabbro), 1 mm (fine-grained gabbro).

Crystal shape: Anhedral, rounded.

Preferred orientation: None.

Percent replacement: 20% by chlorite or serpentine and magnetite.

Ilmenite—(present in Piece 5) Mode: 3%-5%.

Crystal size: Not determined.

Crystal shape: Granular.

Preferred orientation: None.

Percent replacement: Not determined.

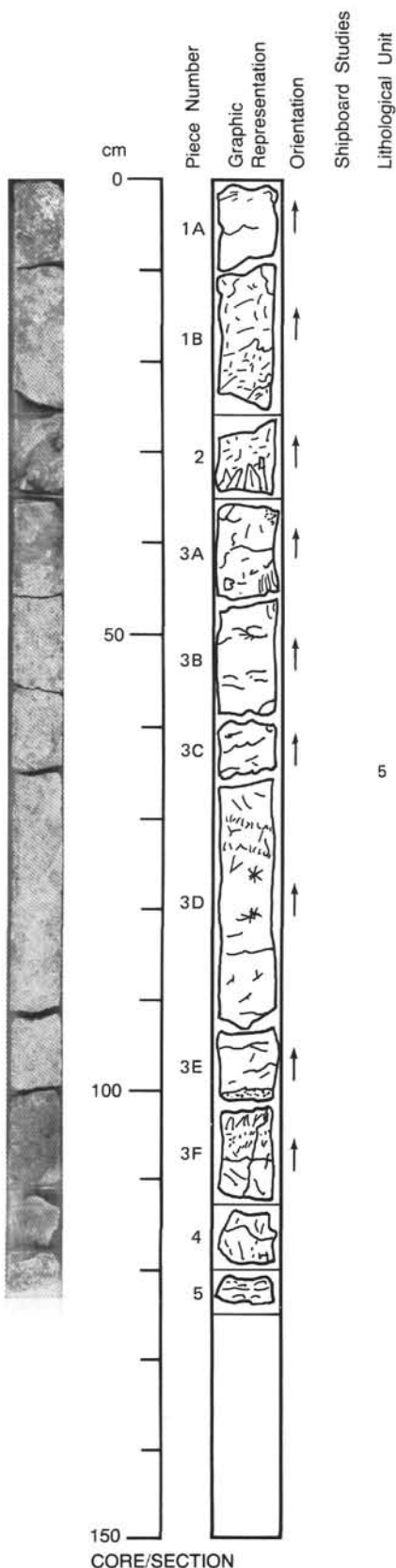
SECONDARY MINERALOGY:

Total percent: <5%.

Texture: Coronitic. Olivine is partly replaced by dark chlorite or serpentine with magnetite making a web texture. Some brown clays are present. Clinopyroxene is only partly recrystallized to amphibole. Sulfides are mainly pinkish pentlandite and yellow green chalcocopyrite as blebs up to 1.5 mm; chalcocopyrite is found filling small cracks in altered olivine. Piece 5 is particularly rich in chalcocopyrite (strings) around amphibolitized clinopyroxene.

Percent vein material: Not determined.

Vein material: Not determined.



CORE/SECTION

UNIT 6: OLIVINE GABBRO

Pieces 1A-4B

Diabase-Microgabbro

18-40, 50-55, 60-67, and 115-127 cm.

COLOR: Gray.
LAYERING: No layering.
DEFORMATION: Small shear zone at 55-60 cm.

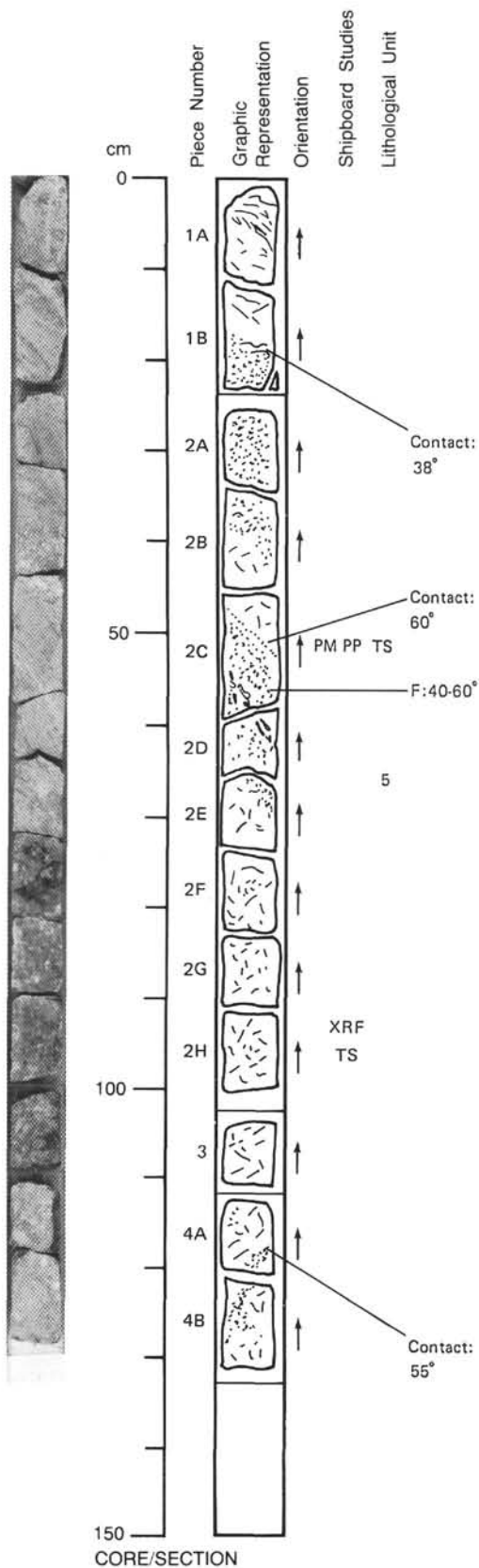
PRIMARY MINERALOGY:
 Plagioclase—Mode: 40%-50%.
 Crystal size: < 1 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

Clinopyroxene—Mode: 40%-50%.
 Crystal size: < 1 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

Olivine—Mode: 0%, but may not have been identified.
 Crystal size: Not determined.
 Crystal shape: Not determined.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

Oxide—Mode: 0%-10%. Highest in fine-grained portions above 70 cm. Fine grained portion in Piece 4 has little oxide.
 Crystal size: < 1 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

SECONDARY MINERALOGY:
 Total percent: Extensive.
 Texture: Extensive amphibolitization of upper fine grained portion.
 Percent vein material: Not determined.
 Vein material: Not determined.



118-735B-76R-3 (continued)

Olivine Gabbro

0-18, 40-50, 50-60, 67-114, and 127-132 cm

COLOR: Gray.**LAYERING:** 1 small coarse to fine zone in Piece 1.**DEFORMATION:** Weak foliation in top of Piece 1.**PRIMARY MINERALOGY:**

Plagioclase—Mode: 50%.

Crystal size: 5-10 mm.

Crystal shape: Anhedral.

Preferred orientation: Not determined.

Percent replacement: Locally by epidote in top.

Clinopyroxene—Mode: 40%-50%.

Crystal size: 5-10 mm.

Crystal shape: Anhedral.

Preferred orientation: Not determined.

Percent replacement: Up to 40% by amphibole in Piece 1.

Olivine—Mode: 10% below 15 cm only.

Crystal size: 2-5 mm.

Crystal shape: Anhedral.

Preferred orientation: Not determined.

Percent replacement: 20% altered to talc/magnetite.

Oxide—Mode: 5%-10% in top 15 cm only.

Crystal size: 5-10 mm.

Crystal shape: Anhedral.

Preferred orientation: Not determined.

Percent replacement: Not determined.

SECONDARY MINERALOGY:

Total percent: Up to 40%.

Texture: Piece 1A: epidote replacing plagioclase in part; Pieces 1A and 1B: extensive amphibolitization of clinopyroxene

Percent vein material: Not determined.

Vein material: Not determined.

COMMENTS: The section is mixed gabbro with microgabbro lenses and layers. The oxides are described only in the top and may be associated with the deformation. The thin section description of Piece 2C, 50-52 cm, describes orthopyroxene oikocrysts associated with both the coarse and fine portions near the contact.

UNIT 5: OLIVINE GABBRO

Pieces 1A-4B.

Olivine Gabbro

Pieces 1A-4B.

COLOR: Gray to greenish gray.

LAYERING: Planar or irregular contacts between coarse-grained and fine-grained gabbros. The grain size contrast is 1-2 cm to 1 mm. Fine-grained gabbro has subophitic texture coarse-grained gabbro has a more oikocrystic-type texture to interlocking texture. Plagioclase and clinopyroxene are elongated and up to 2.4 cm in length.

DEFORMATION: Shearing and porphyroclastic-type textures in Pieces 1E, 1I, 2, 3A, and 3B. The deformed bands at least 1 cm thick are locus of preferred replacement of clinopyroxene by green amphibole (on sawn surface) and injection of ilmenite blebs and lenses. Amphiboles are present also away (1-2 cm) from the main shear.

PRIMARY MINERALOGY:

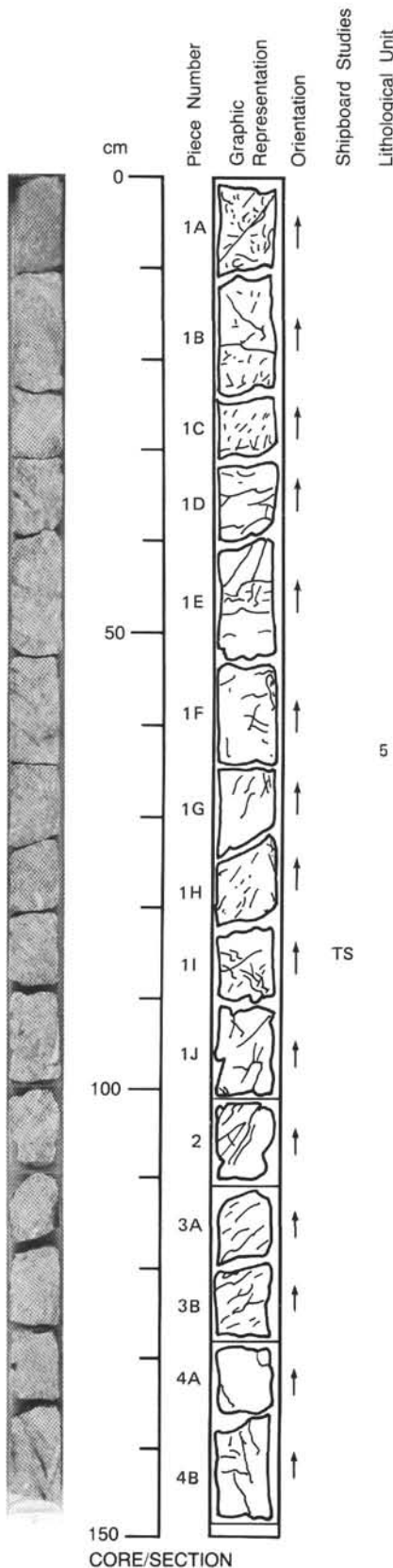
Plagioclase—Mode: 50%-60%.
Crystal size: 1-15 mm.
Crystal shape: Anhedral.
Preferred orientation: Yes.
Percent replacement: Not determined.

Clinopyroxene—Mode: 35%-50%.
Crystal size: 5-24 mm.
Crystal shape: Lens.
Preferred orientation: Not determined.
Percent replacement: 30% by amphibole.

Olivine—Mode: 5%.
Crystal size: 1-5 mm.
Crystal shape: Anhedral.
Preferred orientation: Not determined.
Percent replacement: Severely altered to clays, chlorite, and magnetite.

SECONDARY MINERALOGY:

Total percent: Not determined.
Texture: Coronitic. Ilmenite bands are seen in Pieces 1E and 1I associated with amphibolitized clinopyroxene. Elsewhere clinopyroxene is slightly (30%) replaced by amphibole. Olivine is replaced by clays and chlorite mixture plus magnetite giving a web texture. Some iron hydroxides are also present. Sulfides are present in all coarse-grained gabbro. Individual blebs (up to 2 mm) and are composed of chalcopyrite and pentlandite. In the deformed gabbros calcite is present as 3 mm thick yellow brown to pink veins.
Percent vein material: Not determined.
Vein material: Calcite and sulfide.



118-735B-76R-5

UNIT 5: OLIVINE GABBRO

Pieces 1A-1K

Olivine-Bearing Gabbro

Pieces 1A-1K

COLOR: Gray.

LAYERING: Grainsize changes as follows: Pieces 1A-1B = coarse-grained; Pieces 1B-1C (top) = very coarse-grained (>4 cm); Piece 1C (bottom) = coarse-grained (1-1.5 cm); Pieces 1D-1F = medium-grained; Pieces 1G-1I = coarse-grained; Pieces 1J-1K = medium-grained (0.5-1 cm). Contacts are sharp between grainsize boundaries.

DEFORMATION: None.

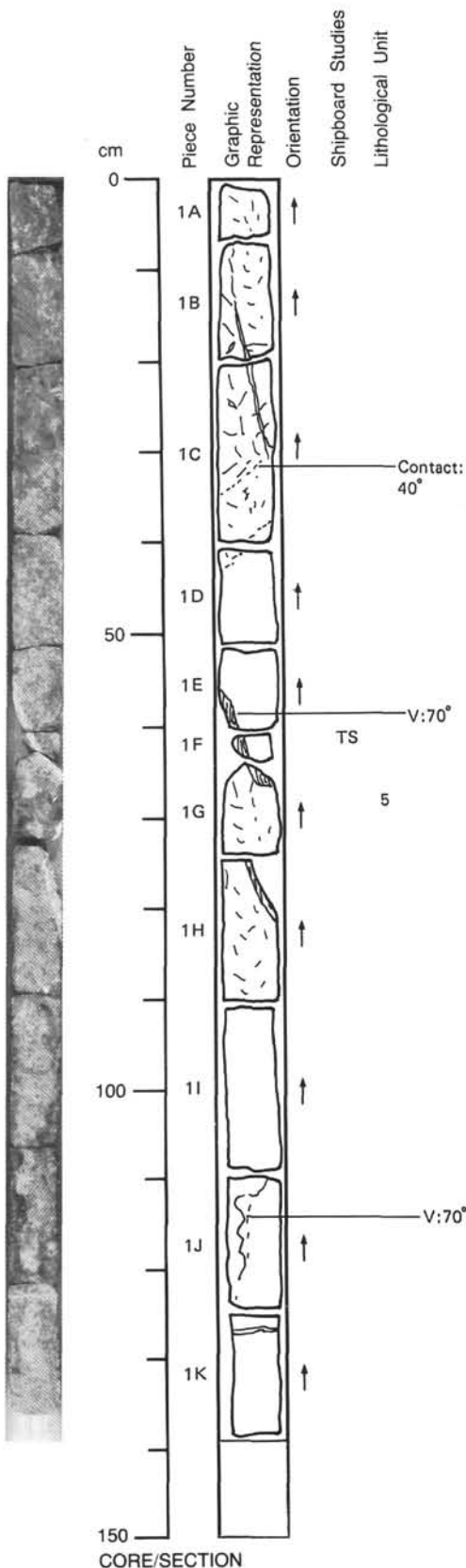
PRIMARY MINERALOGY:

Plagioclase—Mode: 50%-60%.
 Crystal size: 0.3-1 cm.
 Crystal shape: Subhedral.
 Preferred orientation: None apparent.
 Percent replacement: 10% by sodic plagioclase.

Clinopyroxene—Mode: 35%-40%.
 Crystal size: 0.3-4 cm.
 Crystal shape: Subhedral to poikilitic.
 Preferred orientation: None apparent.
 Percent replacement: > 10% by amphibole.

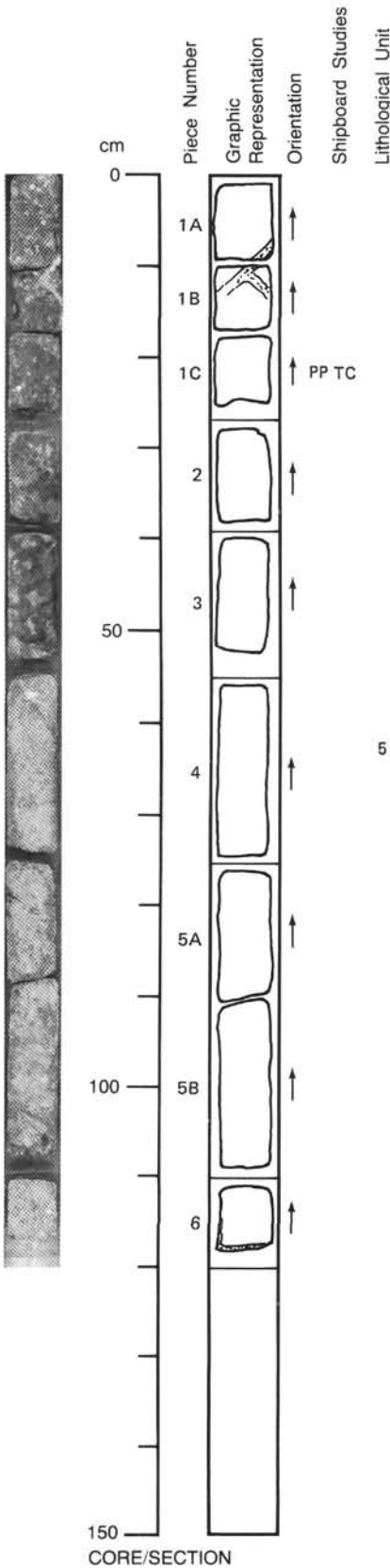
Olivine—Mode: 5%.
 Crystal size: 0.3-3 cm.
 Crystal shape: Anhedral.
 Preferred orientation: None apparent.
 Percent replacement: 1%-2% by clay and iron-oxide.

SECONDARY MINERALOGY:
 Total percent: > 10%.
 Texture: Piece 1D: oxidation of olivine. Pieces 1E-1H Vein > 1 cm wide with amphibole on margin and pinkish silicate with white spherules on interior. Olivine near vein altered to clay stained with oxide. Vein of albite in Pieces 1B, 1C, and 1K (oriented 70°). Vein in 1J is parallel to core and is filled with amphibole. Few grains of sulfide present.
 Percent vein material: Not determined.
 Vein material: 10% albite; hornblende; albite-chlorite-actinolite-epidote-sphene.



CORE/SECTION

118-735B-76R-6



UNIT 5: OLIVINE GABBRO

Pieces 1A-6

Olivine Gabbro

Pieces 1A-6

COLOR: Gray.

LAYERING: Difficult to tell. Between 28-54 cm grain shapes are more blocky and an obvious cumulus texture is produced.

DEFORMATION: None.

PRIMARY MINERALOGY:

Plagioclase—Mode: 60%.
 Crystal size: 5-40 mm.
 Crystal shape: Subhedral to euhedral.
 Preferred orientation: None.
 Percent replacement: 10%-15%.

Clinopyroxene—Mode: 37%.
 Crystal size: 5-20 mm.
 Crystal shape: Subhedral. Between 0-27 cm and 60-120 cm clinopyroxene subophitically encloses plagioclase.
 Preferred orientation: None.
 Percent replacement: 10%-15%

Olivine—Mode: 2%-3%.
 Crystal size: 2-7 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: 60%-70%.

SECONDARY MINERALOGY:

Total percent: <5-10%.
 Texture: Amphibole occurs along grain margins and thin fractures throughout section. Veins in Pieces 1A and 1B are filled by plagioclase, epidote(?), and actinolite. Olivine altered along a mesh of fractures. Mesh is defined by black minerals(?) with a metallic luster, may be iron-oxides. In piece 5A, thin fractures filled by greenish-white minerals cross cut olivine. Where they cross cut, the greenish minerals disappear, and olivine is altered to pyrite or rather pyrite has crystallized locally along the fractures.
 Percent vein material: Not determined.
 Vein material: Plagioclase, epidote(?), actinolite, and pyrite.

118-735B-76R-7

UNIT 5: OLIVINE GABBRO

Pieces 1-7

Olivine Gabbro

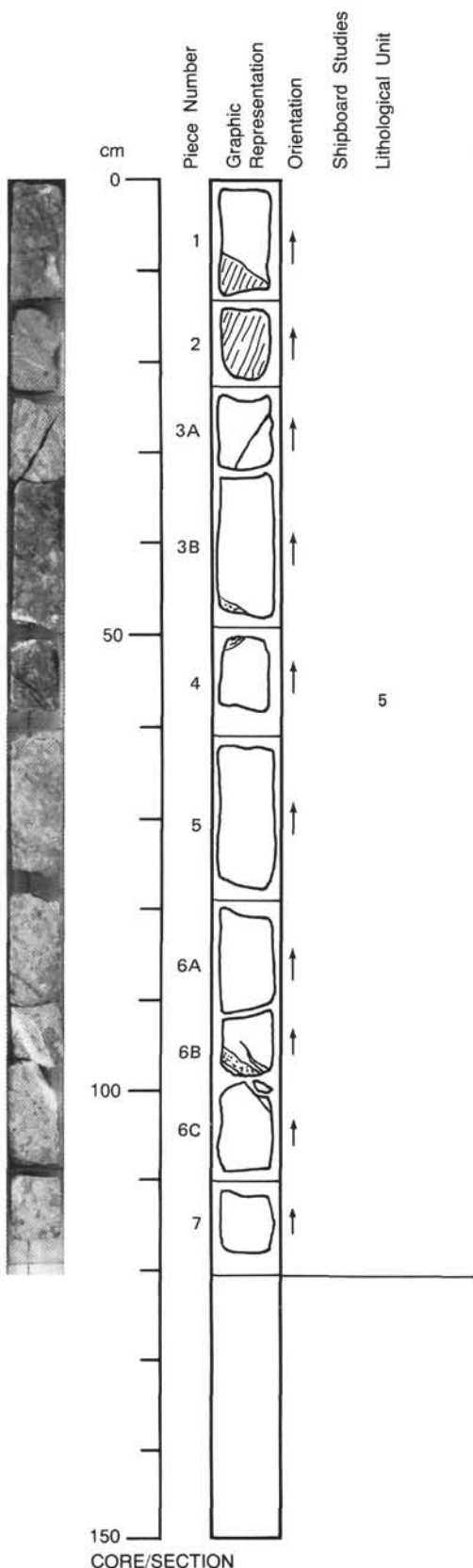
Pieces 1 (top) and 3A-7

COLOR: Gray.
LAYERING: None.
DEFORMATION: None.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 60%.
 Crystal size: 5-13 mm.
 Crystal shape: Subhedral.
 Preferred orientation: None.
 Percent replacement: 10-15%.
 Clinopyroxene—Mode: 30%-35%.
 Crystal size: 7-13 mm.
 Crystal shape: Subhedral. Single clinopyroxene oikocryst 4 cm long in Piece 7. Subophitically encloses plagioclase.
 Preferred orientation: None.
 Percent replacement: 10-15%.
 Olivine—Mode: 10%-5%.
 Crystal size: 3-8 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: 60-70%.
SECONDARY MINERALOGY:
 Total percent: Approximately 10%.
 Texture: Alteration in Pieces 6A, 6B, and 7 consists of green amphibole along thin veins and wide alteration haloes of talc and tremolite and actinolite around olivine. Pieces 3A-3B, and 4: no alteration haloes around olivine and almost no secondary amphibole. Fragment of vein on Pieces 3B and 4 are plagioclase and actinolite as are veins in Pieces 6B and 6C.
 Percent vein material: Not determined.
 Vein material: Plagioclase and actinolite.

Diabase

Pieces 1 (bottom) and 2

COLOR: Gray.
LAYERING: None.
DEFORMATION: None.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 60%-65%.
 Crystal size: <0.5 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: Slight.
 Clinopyroxene—Mode: 35%-30%.
 Crystal size: <0.5 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: Slight alteration to amphibole.
 Olivine—Mode: 5%.
 Crystal size: <0.5 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: Slight to moderate.
SECONDARY MINERALOGY:
 Total percent: Slight.
 Texture: Clinopyroxene partially altered to amphibole. Olivine has same metallic coating on grains as gabbro.
 Percent vein material: None.
 Vein material: None.



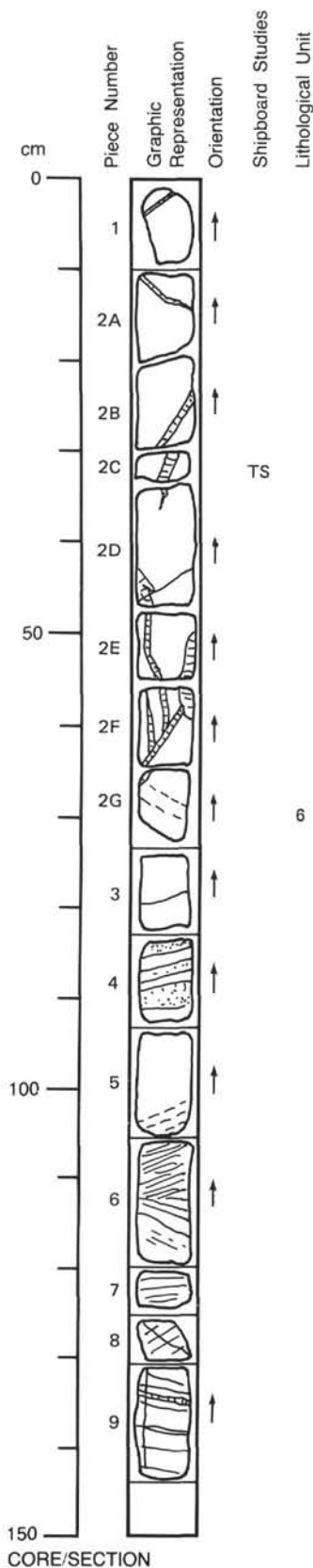
CORE/SECTION

UNIT 6: OLIVINE-RICH GABBRO AND TROCTOLITE

Pieces 1-9

Olivine Gabbro

Pieces 1-3 (top)



V: 50°

COLOR: Gray with green-white veins.
LAYERING: Grain size variations: ≤0.8 cm in Piece 1; ≤1.5 cm in Piece 2A; ≤1 cm in Piece 2D; ≤0.5 cm in Piece 2F; ≤0.3 cm in Piece 2G; no obvious modal layering. No magmatic lamination.

V: 35°

DEFORMATION: None to very little in top of Piece 3. Slight cataclasis close to the veins.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%-60%.
Crystal size: See layering.
Crystal shape: Anhedral.
Preferred orientation: None.
Percent replacement: Not determined.

V: 70°

Clinopyroxene—Mode: 20%-35%.
Crystal size: See layering.
Crystal shape: Anhedral.
Preferred orientation: None.
Percent replacement: Not determined.

V: 90°

Olivine—Mode: 10%-20%.
Crystal size: See layering.
Crystal shape: Anhedral.
Preferred orientation: None.
Percent replacement: Not determined.

SECONDARY MINERALOGY:

Total percent: Slight except close to the veins.
Texture: Amphibole replaces clinopyroxene and olivine. Plagioclase is slightly albitized.
Percent vein material: 1%-5%.
Vein material: Amphibole ± sodic plagioclase ± sulfides.

Deformed Olivine Gabbro

Pieces 3 (bottom) -9

COLOR: Gray.
LAYERING: Transposed by the plastic deformation but still visible in Piece 4: Original thickness of troctolitic layers cannot be evaluated.

V: 30°

DEFORMATION: The deformation textures range from poorly foliated in Pieces 3 and 5, to porphyroclastic in Pieces 4, 6, 7, and 8, and mylonitic in the top of Piece 6. This reflects a gradient of strain toward a mylonitic band in top of Piece 6; the mylonitic foliation lies at an angle to the porphyroclastic foliation at the bottom of Piece 6.

F: 10°

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%-60%.
Crystal size: <0.5 cm.
Crystal shape: Porphyroclastic.
Preferred orientation: Marks the foliation.
Percent replacement: Not determined.

F: 10°

Clinopyroxene—Mode: 5%-35%.
Crystal size: <0.5 cm.
Crystal shape: Porphyroclastic.
Preferred orientation: Marks the foliation.
Percent replacement: Not determined.

F: 15°

Olivine—Mode: 10%-40%.
Crystal size: <0.5 cm.
Crystal shape: Porphyroclastic.
Preferred orientation: Marks the foliation.
Percent replacement: Not determined.

SECONDARY MINERALOGY:

Total percent: Slight except close to amphibole veins in Pieces 3, 7, and 8.
Texture: Amphibole replaces clinopyroxene and olivine, plagioclase is slightly albitized.
Percent vein material: <1%.
Vein material: Amphibole ± sodic plagioclase.

F: 10°

118-735B-77R-2

UNIT 6: OLIVINE-RICH GABBRO AND TROCTOLITE

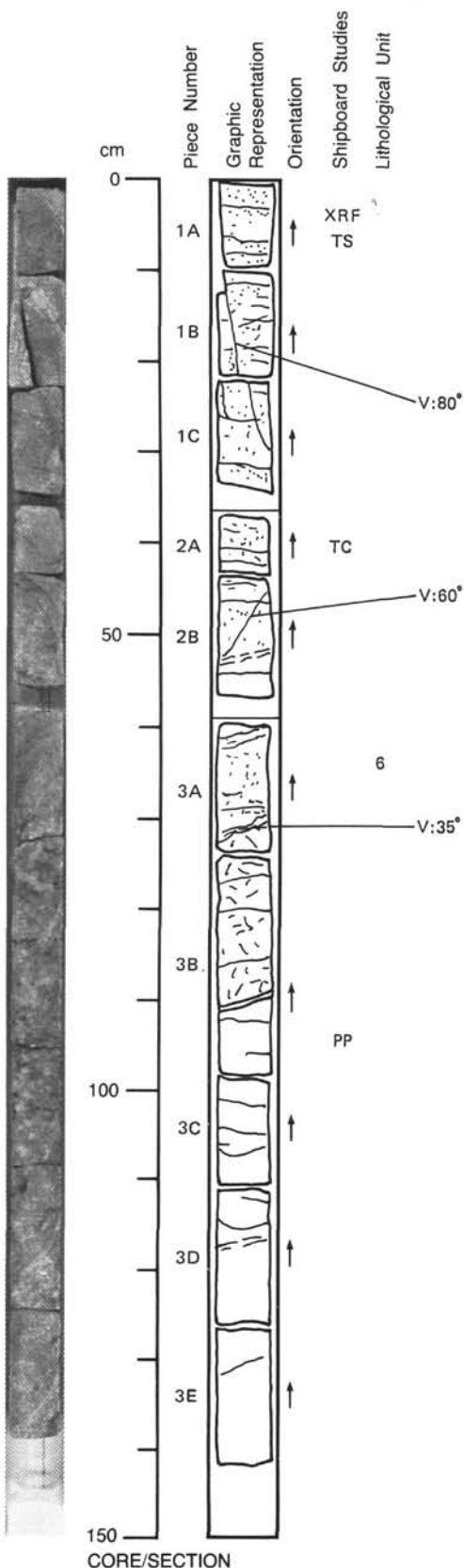
Pieces 1A-3E

Olivine Gabbro

Pieces 1A-3E

COLOR: Dark to medium gray.
LAYERING: Defined by gradation in grain size and possibly by some variations in mineral proportions. Grain size variation as follows: 0-50 cm, fine-grained (<0.5 cm); 50-60 cm, medium-grained (0.5-1 cm); 60-70 cm, fine-grained (<0.5 cm); 70-90 cm, coarse-grained (2-3 cm); 90-115 cm, coarse-grained (1-2.5 cm); and 115-145 cm, coarse- to medium-grained (0.5-2 cm).
DEFORMATION: Slight deformation (foliation) in Pieces 1A, 1B, 1C, 2, and 3A, defined by mineral stretching. Pieces 3B-3E undeformed.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 50%-60%.
 Crystal size: 0.4-3.0 cm.
 Crystal shape: Subhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.
 Clinopyroxene—Mode: 30%-40%.
 Crystal size: <0.4-3 cm.
 Crystal shape: Subhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.
 Olivine—Mode: 5%-20%.
 Crystal size: <0.2-2.5 cm.
 Crystal shape: Anhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.
 Iron-titanium oxides—Mode: 3%. Sulfides—Mode: <1%.

SECONDARY MINERALOGY:
 Total percent: Slight alteration.
 Texture: Olivine relatively fresh. Some amphibole replacement of clinopyroxene (<10%), few sulfides(?).
 Percent vein material: Not determined.
 Vein material: Veinlets with amphibole + white mineral, mostly subhorizontal.
COMMENTS: Stippled portions fine-grained (<0.5 cm). White portions coarse- to medium-grained (1.0-2.5 cm).



CORE/SECTION

118-735B-77R-3

UNIT 6: OLIVINE-RICH GABBRO AND TROCTOLITE

Pieces 1A-10F

Olivine Gabbro

Pieces 1A-2

COLOR: Gray.

LAYERING: Igneous lamination defined by elongated plagioclase, olivine, and clinopyroxene.

DEFORMATION: Weak. Minerals have retained their primary igneous shapes.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%-65%.

Crystal size: 2-10 mm.

Crystal shape: Subhedral-euhedral.

Preferred orientation: Not determined.

Percent replacement: Not determined.

Clinopyroxene—Mode: 30%-40%.

Crystal size: 2-10 mm.

Crystal shape: Subhedral.

Preferred orientation: Not determined.

Percent replacement: Not determined.

Olivine—Mode: 5%-10%.

Crystal size: 1-10 mm.

Crystal shape: Anhedral.

Preferred orientation: Not determined.

Percent replacement: Not determined.

SECONDARY MINERALOGY:

Total percent: 5%-10%.

Texture: Clinopyroxene and olivine partly replaced by amphibole.

Percent vein material: Not determined.

Vein material: Not determined.

Olivine Microgabbro

Pieces 3-10F

COLOR: Gray.

LAYERING: Well-defined igneous lamination.

DEFORMATION: Arguably moderate as it accentuates igneous lamination. Clinopyroxene appears to retain igneous shape. Plagioclase likely has been recrystallized. Deformation of fine-grained crystal mush? Crystal growth under stress?

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%.

Crystal size: 0.5-2 mm.

Crystal shape: Subhedral.

Preferred orientation: Not determined.

Percent replacement: Not determined.

Clinopyroxene—Mode: 30%.

Crystal size: 0.5-2 mm.

Crystal shape: Anhedral.

Preferred orientation: Not determined.

Percent replacement: Not determined.

Olivine—Mode: 20%.

Crystal size: 0.5-1 mm.

Crystal shape: Anhedral.

Preferred orientation: Not determined.

Percent replacement: Not determined.

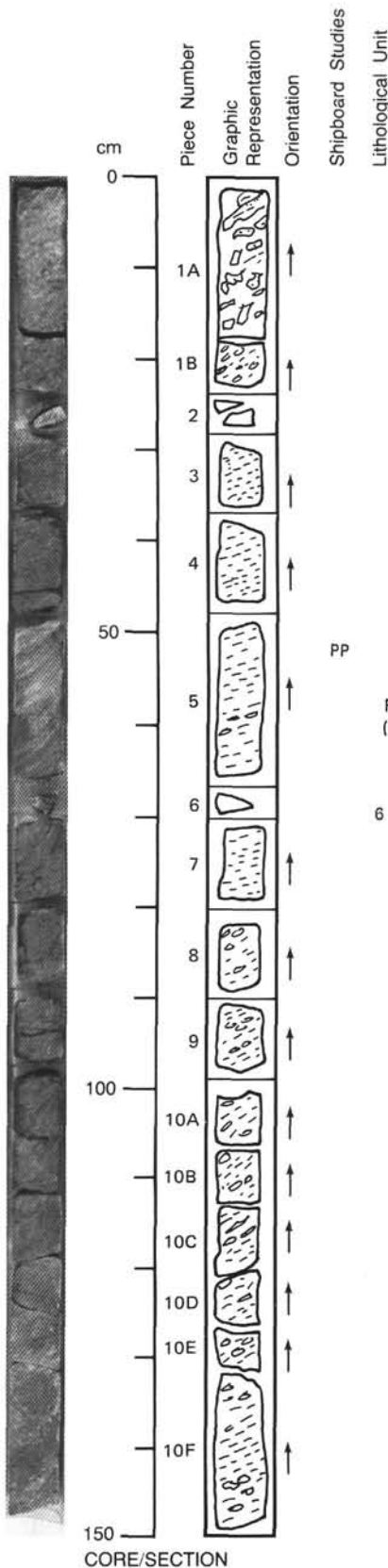
SECONDARY MINERALOGY:

Total percent: 5%.

Texture: Minor amphibole replacing clinopyroxene and olivine.

Percent vein material: Not determined.

Vein material: Not determined.



118-735B-77R-4

UNIT 6: OLIVINE-RICH GABBRO AND TROCTOLITE

Pieces 1A-2

Alternating Massive Gabbro and Foliated Metagabbro

Pieces 1A-2

COLOR: Gray to very dark gray; speckled white/dark where coarse grained. Locally veined with green epidote.

LAYERING: Coarse/fine grain size variations where not foliated (Pieces 1B and 1C especially).

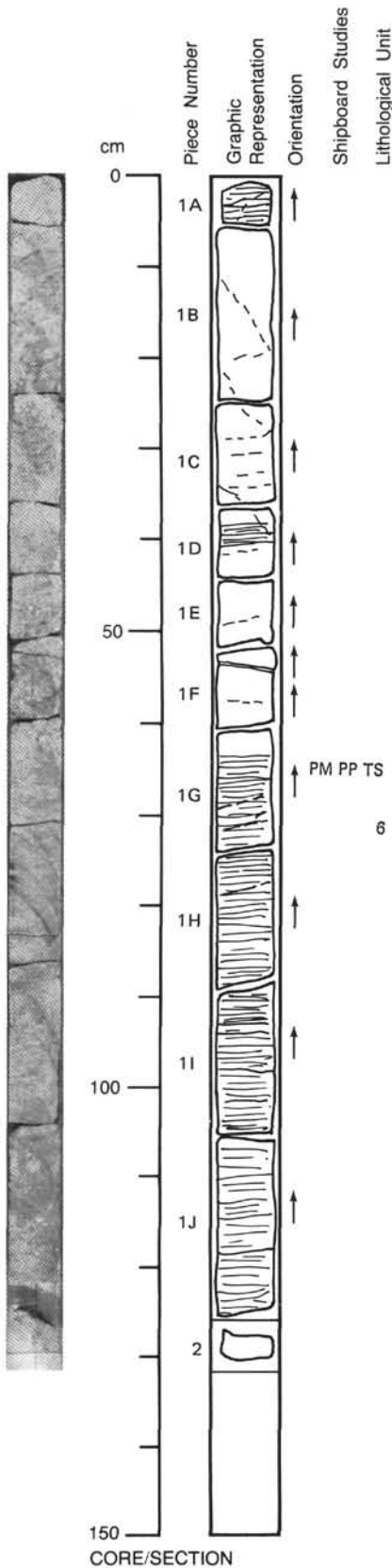
DEFORMATION: Intensely foliated, even mylonitized where shown by lined sections on column. Fractured parallel to foliation and roughly orthogonal to it (dashed lines). A vertical fracture runs parallel to the sawn surface through Pieces 1D-1H. Portions described as massive gabbro have much mineral orientation parallel to foliation. Foliation dip approximately 20° in Pieces 1G-1J. Locally porphyroclastic.

PRIMARY MINERALOGY:
 Plagioclase—Mode: 50%-60%.
 Crystal size: Not determined.
 Crystal shape: Not determined.
 Preferred orientation: Parallel to foliation.
 Percent replacement: Not determined.

Clinopyroxene—Mode: 40%-50%.
 Crystal size: Very coarse clinopyroxene in Piece 1B (10-15 cm), Piece 1C (29-31 cm), and Piece 1F (55-60 cm).
 Crystal shape: Not determined.
 Preferred orientation: Parallel to foliation.
 Percent replacement: Not determined.

Olivine—Mode: Up to 3% in Pieces 1D-1F.
 Crystal size: Not determined.
 Crystal shape: Not determined.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

SECONDARY MINERALOGY:
 Total percent: Slight.
 Texture: Slight amount of green amphibole in most pieces. Epidote in fracture in Piece 1B.
 Amphibole more pervasive at top of Pieces 1I and 1J.
 Percent vein material: Not determined.
 Vein material: Amphibole and epidote.



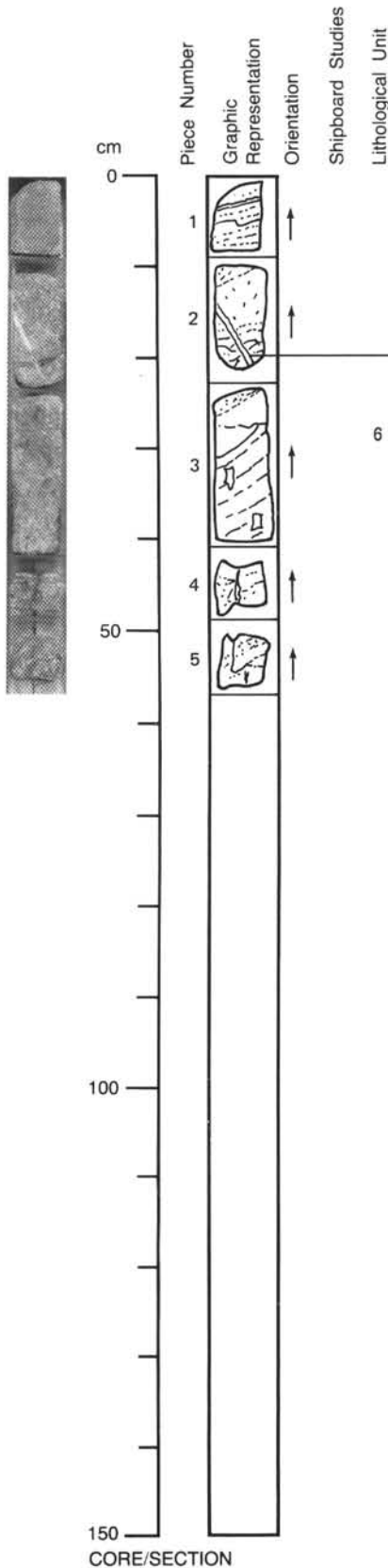
118-735B-77R-5

UNIT 6: OLIVINE-RICH GABBRO AND TROCTOLITE

Pieces 1-5

Olivine Gabbro

Pieces 1-5



COLOR: Greenish-gray.

LAYERING: No magmatic, phase or size layering. Piece 1 has more olivine than others.

DEFORMATION: Foliation defined by flattened clinopyroxene crystals; elongate concentrations of opaques (Pieces 2 and 3) or bands and layers of recrystallized pyroxene and amphibole (Pieces 1, 4, and 5). Large porphyroclasts of pyroxene (2.5 cm) in Piece 3. Pieces 4 and 5 are finer grained (≤ 0.3 cm) and contain mylonitic to gneissic layers.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%-55%.
 Crystal size: 0.2-0.5 cm.
 Crystal shape: Subhedral to elongate.
 Preferred orientation: None.
 Percent replacement: 5%-10% by sodic plagioclase.

Clinopyroxene—Mode: 20%-30%.
 Crystal size: 0.3-2.5 cm.
 Crystal shape: Anhedral to elongate.
 Preferred orientation: None.
 Percent replacement: $\geq 50\%$ by amphibole.

Olivine—Mode: 10%.
 Crystal size: ≤ 1 cm.
 Crystal shape: Anhedral to elongate.
 Preferred orientation: None.
 Percent replacement: 1-2%.

SECONDARY MINERALOGY:

Total percent: 25%.
 Texture: Over half of clinopyroxene is replaced by green amphibole. Most extensive replacement is near large albite + amphibole vein (Piece 2) and in highly sheared rocks (Pieces 4 and 5). Veins all contain amphibole. Clinopyroxene or plagioclase near veins are replaced by dark chlorite.
 Percent vein material: Not determined.
 Vein material: Hornblende \pm plagioclase.

118-735B-78R-1

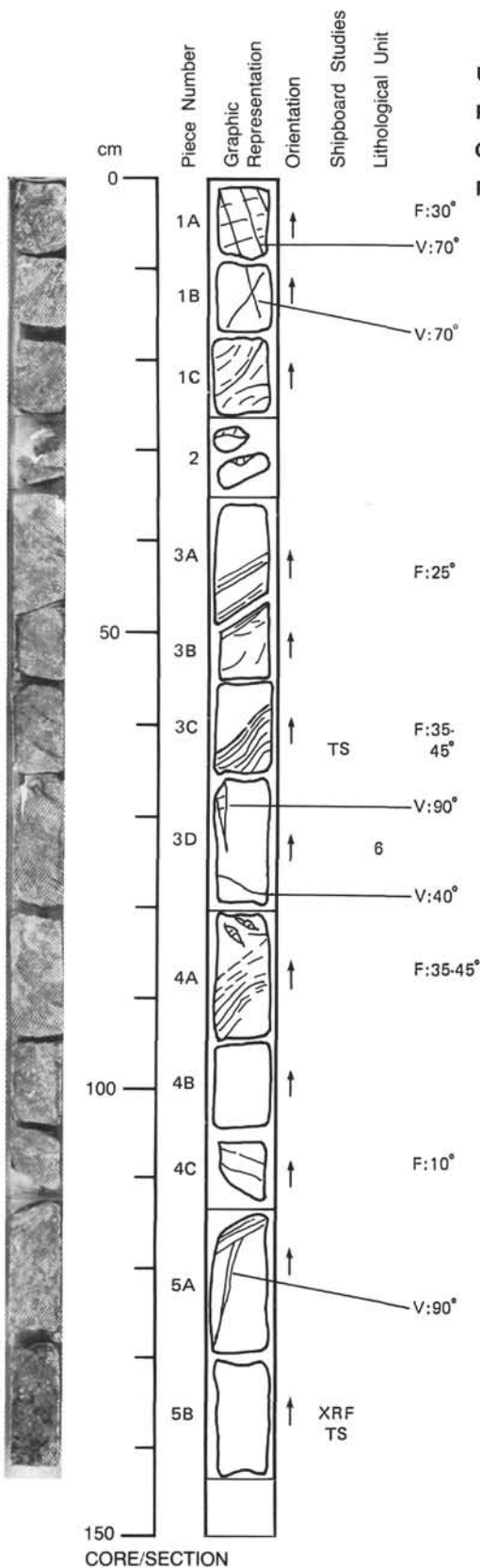
UNIT 6: OLIVINE-RICH GABBRO AND TROCTOLITE.

Pieces 1A-5B

Olivine-Rich Gabbro with Local Shear Bands

Pieces 1A-5B

COLOR: Gray.
LAYERING: No visible layering, but the olivine and plagioclase modal percents are not uniform. No magmatic foliation.
DEFORMATION: Constrained to 1.5 to 5 cm thick shear bands with augen gneissic or porphyroclastic textures. These bands develop preferentially in olivine-rich zones. Piece 1A: porphyroclastic texture; Piece 1C: porphyroclastic texture; bottom of Piece 3A and top of Piece 3B: porphyroclastic and augen gneissic textures; bottom of Piece 3C: porphyroclastic and augen gneissic textures; Piece 4A: porphyroclastic and augen gneissic textures.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 50%-60%.
 Crystal size: <0.5-1.5 cm.
 Crystal shape: Euhedral to anhedral.
 Preferred orientation: Marks foliation in shear zones.
 Percent replacement: Not determined.
 Clinopyroxene—Mode: Not determined.
 Crystal size: <0.5-1.5 cm.
 Crystal shape: Euhedral-subhedral. Tends to enclose euhedral plagioclase crystals.
 Preferred orientation: Marks foliation in shear zones.
 Percent replacement: Not determined.
 Olivine—Mode: 10%-25%.
 Crystal size: <0.5-1.5 cm.
 Crystal shape: Anhedral.
 Preferred orientation: Marks foliation in shear zones.
 Percent replacement: Not determined.
SECONDARY MINERALOGY:
 Total percent: Slight except close to the amphibole veins.
 Texture: Amphibole replaces clinopyroxene and olivine; talc also replaces olivine. The plagioclase is albitized in Pieces 1A and 1B. In Pieces 4C and 5A, the amphibolitized zone is also very rich in iron-titanium oxides.
 Percent vein material: <1%.
 Vein material: Amphibole + sodic plagioclase.



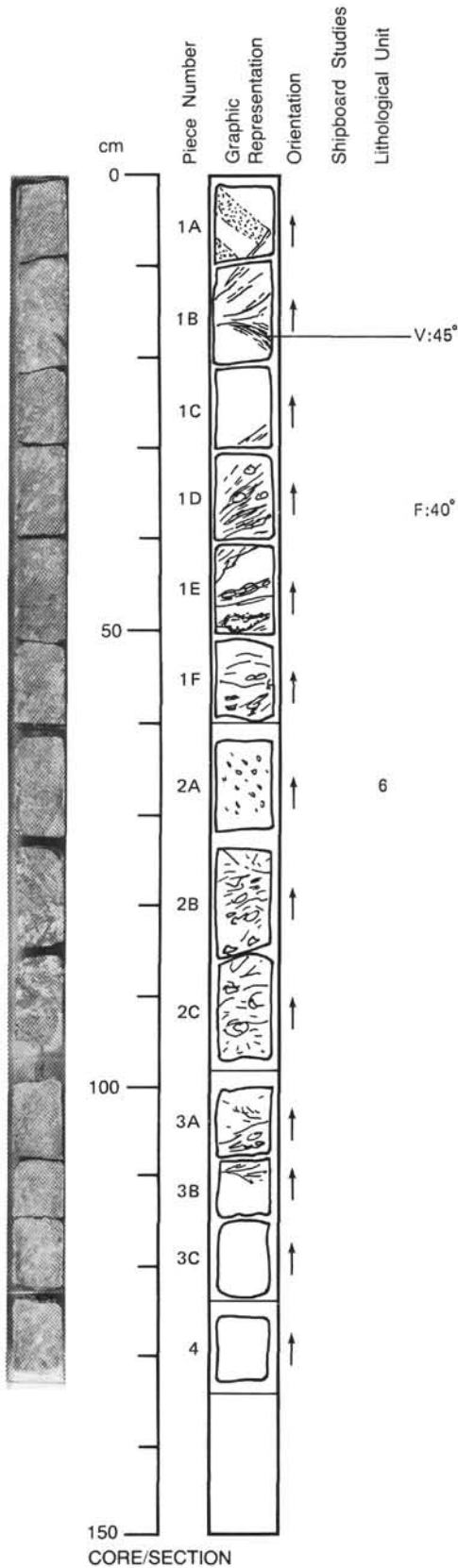
118-735B-78R-2

UNIT 6: OLIVINE-RICH GABBRO AND TROCTOLITE

Pieces 1A-4

Olivine Gabbro Partly Deformed and Metamorphosed

Pieces 1A-4



COLOR: Gray, grayish green where amphibolitized.

LAYERING: Size variation shows layering. In Piece 1A, 2 cm thick alternation of fine-, (average 1-2 mm), and medium-grained (average 3-7 mm) layers are present. Grain size of other undeformed portions shows wide variation from coarse- (average 10-15 mm) to medium-grained (average 5-10 mm).

DEFORMATION: Prophyroclastic-mylonitic zones occur in Pieces 1B, 1C-1D, 1E-1F, 2B-2C, and 3A-3B. In Pieces 2B-2C, amphibolitization is extensive. Foliation varies from horizontal to 45°, but is generally 40°.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%-60%.

Crystal size: See above.

Crystal shape: Subhedral.

Preferred orientation: None.

Percent replacement: None.

Clinopyroxene—Mode: 25%-35%.

Crystal size: See above.

Crystal shape: Anhedral.

Preferred orientation: None in undeformed portion.

Percent replacement: <10% by amphibole.

Olivine—Mode: 5%-15%.

Crystal size: See above.

Crystal shape: Anhedral.

Preferred orientation: None apparent.

Percent replacement: Not determined.

Fe-Ti oxide—Mode: 1%-5%, locally concentrated.

Crystal size: Not determined.

Crystal shape: Anhedral in porphyroclastic zone.

Preferred orientation: None.

Percent replacement: None.

SECONDARY MINERALOGY:

Total percent: <5%.

Texture: Amphibole replacing clinopyroxene generally less than 10% except in Pieces 2B and 2C where it is more than 20%.

Percent vein material: Trace.

Vein material: Amphibole vein appears in Piece 1B, 7 mm thick, inclining 40°.

118-735B-78R-3

UNIT 6: OLIVINE-RICH GABBRO AND TROCTOLITE

Pieces 1A-6B

Olivine Gabbro

Pieces 1A-6B

COLOR: Gray-dark gray.

LAYERING: Possible modal and size grading but somewhat obscured by deformation. Coarse grained interval between Pieces 5C and 6A. This interval is also rich in olivine.

DEFORMATION: Porphyroclastic in localized shear bands (Pieces 1A, 3A, 4B, 4C, 5A, 5B, and 6B). Clinopyroxene and plagioclase grains are stretched in these bands.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%-60%.

Crystal size: 3-6 mm (in medium-grained intervals), up to 25 mm (in coarse-grained intervals), 0.5-20 mm (in porphyroclastic intervals).

Crystal shape: Subhedral-euhedral.

Preferred orientation: Not determined.

Percent replacement: Not determined.

Clinopyroxene—Mode: 30%-40%.

Crystal size: 2-5 mm (in medium-grained intervals), up to 40 mm (in coarse-grained intervals), 0.5-20 mm (in porphyroclastic intervals).

Crystal shape: Anhedral-subhedral.

Preferred orientation: Not determined.

Percent replacement: Not determined.

Olivine—Mode: 5%-10% (in medium-grained intervals), 15% (in coarse-grained intervals), 10% (in porphyroclastic intervals).

Crystal size: 2-5 mm (in medium-grained intervals), up to 25 mm (in coarse-grained intervals), 0.5-1 mm (in porphyroclastic intervals).

Crystal shape: Anhedral, poikilolithically encloses plagioclase in places.

Preferred orientation: Not determined.

Percent replacement: Not determined.

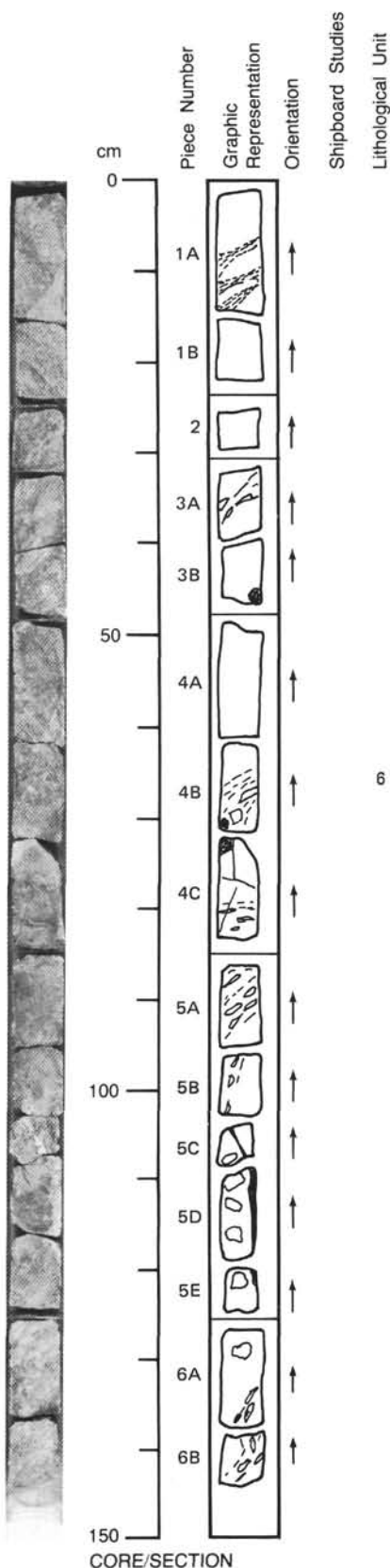
SECONDARY MINERALOGY:

Total percent: 20%.

Texture: Olivine largely replaced by mesh of magnetite + tremolite. Clinopyroxene replaced by amphibole.

Percent vein material: Not determined.

Vein material: Veins in Pieces 5C and 5D contain plagioclase and amphibole.



CORE/SECTION

UNIT 6: OLIVINE-RICH GABBRO AND TROCTOLITE

Pieces 1-11B

Olivine Gabbro (Locally Foliated)

Pieces 1-11B

COLOR: Gray.

LAYERING: Defined by size grading.

DEFORMATION: Mylonitic and porphyroclastic bands developed in Pieces 1, 6, 8, and 9. Other pieces might be weakly deformed.

PRIMARY MINERALOGY:

Plagioclase—Mode: 55%-60%.

Crystal size: Up to 2 cm.

Crystal shape: Subhedral.

Preferred orientation: Not determined.

Percent replacement: Not determined.

Clinopyroxene—Mode: 20%-30%.

Crystal size: Up to 2 cm.

Crystal shape: Anhedral.

Preferred orientation: Not determined.

Percent replacement: < 15% by amphibole.

Olivine—Mode: 5%-20%.

Crystal size: Up to 2 cm.

Crystal shape: Anhedral.

Preferred orientation: Not determined.

Percent replacement: Not determined.

SECONDARY MINERALOGY:

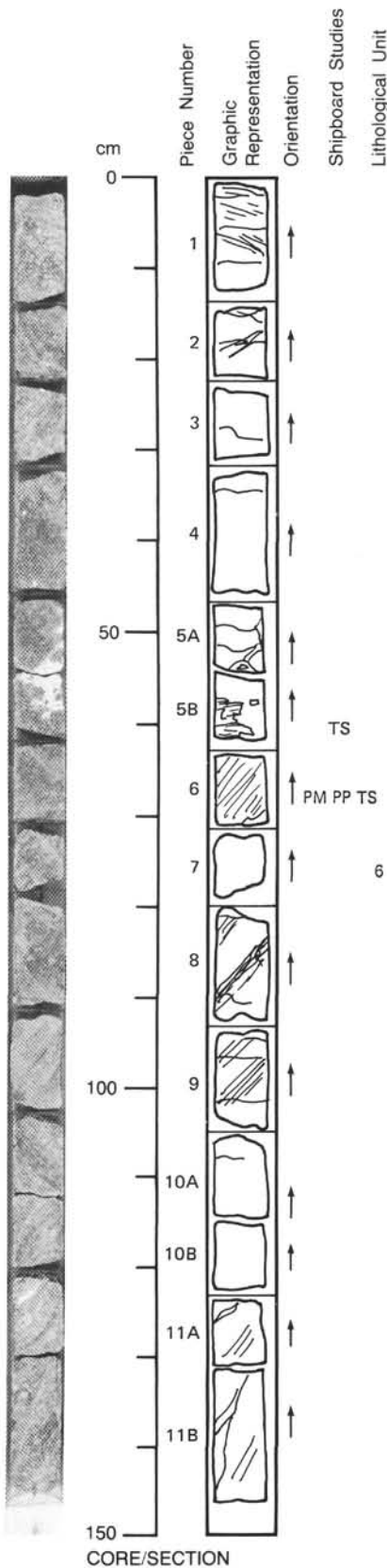
Total percent: Slight alteration.

Texture: Amphibole replaces clinopyroxene (< 15%), olivine shows small rims of tremolite(?).

Few veinlets. One major vein in Pieces 5A and 5B: plagioclase and amphibole plus some other minerals. Few sulfides.

Percent vein material: Few veinlets. One major vein in Pieces 5A and 5B.

Vein material: Plagioclase and amphibole plus some other minerals.



118-735B-79R-1

UNIT 6: OLIVINE-RICH GABBRO AND TROCTOLITE

Pieces 1-11B

Weathered Porphyroclastic Mylonite

Piece 1

Identical to material in Core 118-735B-1D, and appears to be rubble from top of hole knocked down the hole during the re-entry preceding this core.

Olivine Gabbro

Pieces 2-3B (top), 6-9A (top), and 9B (bottom) -11B

COLOR: Gray.
LAYERING: Not determined.
DEFORMATION: Not determined.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 55%.
 Crystal size: 3-20 mm.
 Crystal shape: Anhedral to subhedral.
 Preferred orientation: None.
 Percent replacement: Not determined.

Clinopyroxene—Mode: 30%.
 Crystal size: 3-20 mm.
 Crystal shape: Intergranular to sub-ophitic.
 Preferred orientation: None.
 Percent replacement: Not determined.

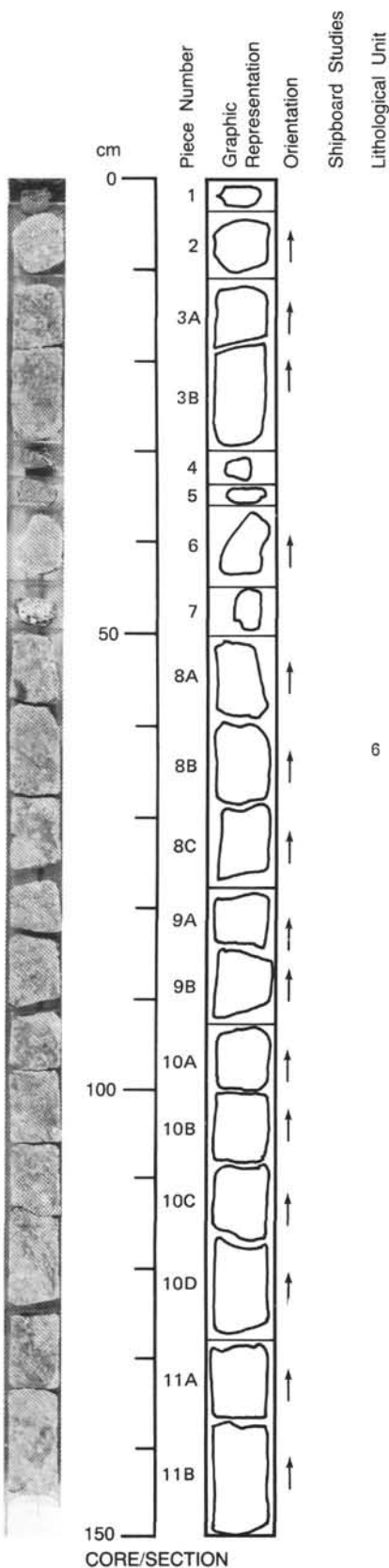
Olivine—Mode: 10%-15%.
 Crystal size: Not determined.
 Crystal shape: Anhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

Oxides—Mode: <1%.
 Crystal size: <1 mm.
 Crystal shape: Not determined.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

Sulfides—Mode: <1%.
 Crystal size: <1 mm.
 Crystal shape: Not determined.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

SECONDARY MINERALOGY:
 Total percent: Not determined.
 Texture: Amphibole rims and partially replaces pyroxene while olivine contains a mesh network of black iron-oxide veins.
 Percent vein material: Not determined.
 Vein material: Not determined.

COMMENTS: Medium grained intergranular to sub-ophitic olivine gabbro containing numerous disseminated sulfides.



118-735B-79R-1 (continued)

Gneissic Mylonite

Pieces 3B (bottom) -5, and 9A (bottom) - 9B (top)

COLOR: Gray.

LAYERING: None.

DEFORMATION: Poorly foliated gneiss and mylonite.

PRIMARY MINERALOGY: Olivine gabbro described above is protolith. Clinopyroxene porphyroclasts locally replaced by amphibole.

SECONDARY MINERALOGY: Not determined.

Trondhjemite

Piece 11A

COLOR: Grayish-white

LAYERING: None.

DEFORMATION: None.

PRIMARY MINERALOGY:

Plagioclase—Mode: Not determined

Crystal size: Not determined.

Crystal shape: Not determined.

Preferred orientation: Not determined.

Percent replacement: Not determined.

Quartz—Mode: Not determined.

Crystal size: Not determined.

Crystal shape: Not determined.

Preferred orientation: Not determined.

Percent replacement: Not determined.

COMMENTS: Aplitic sugary vein of intergrown plagioclase and quartz on back of Piece 11A associated with an ilmenite-sulfide enrichment vein seen running vertically on the face of this sample of altered gabbro.

118-735B-79R-2

UNIT 6: OLIVINE-RICH GABBRO AND TROCTOLITE

Pieces 1A-7C

Olivine Gabbro

Pieces 1A-7C

COLOR: Gray.

LAYERING: None.

DEFORMATION: Between 55-125 cm, gabbro is well foliated, porphyroclastic to nearly mylonitic. Foliation defined by elongate clinopyroxene and plagioclase porphyroclasts. In detail, between 56-66 cm the section is porphyroclastic metagabbro; between 66-74 cm, augen gneiss; between 74-80 cm, mylonite; between 80-82 cm, massive (underformed) gabbro; between 82-95 cm, porphyroclastic metagabbro; between 95-100 cm, mylonitic; and between 100-120 cm, porphyroclastic metagabbro.

PRIMARY MINERALOGY:

Plagioclase—Mode: 55% (in coarse-grained interval, 0-55 cm), 58% (in very coarse-grained interval, 120-150 cm).

Crystal size: 5-12 mm (in coarse-grained interval, 0-55 cm), 10-20 mm (in very coarse-grained interval, 120-150 cm).

Crystal shape: Anhedral to subhedral in very coarse-grained interval.

Preferred orientation: None.

Percent replacement: Slight

Clinopyroxene—Mode: 40% in coarse- and very coarse-grained intervals.

Crystal size: 3-12 mm (in coarse-grained interval, 0-55 cm) 10-15 mm (in very coarse-grained interval, 120-150 cm).

Crystal shape: Anhedral in coarse-grained interval. Subhedral. Encloses plagioclase subophitically and completely encloses some small olivines in very coarse-grained interval.

Preferred orientation: None.

Percent replacement: Slight

Olivine—Mode: 5% (in coarse-grained interval, 0-55 cm), 2% (in very coarse-grained interval, 120-150 cm).

Crystal size: 3-4 mm (in coarse-grained interval, 0-55 cm), 5-15 mm (in very coarse-grained interval, 120-150 cm).

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: Slight.

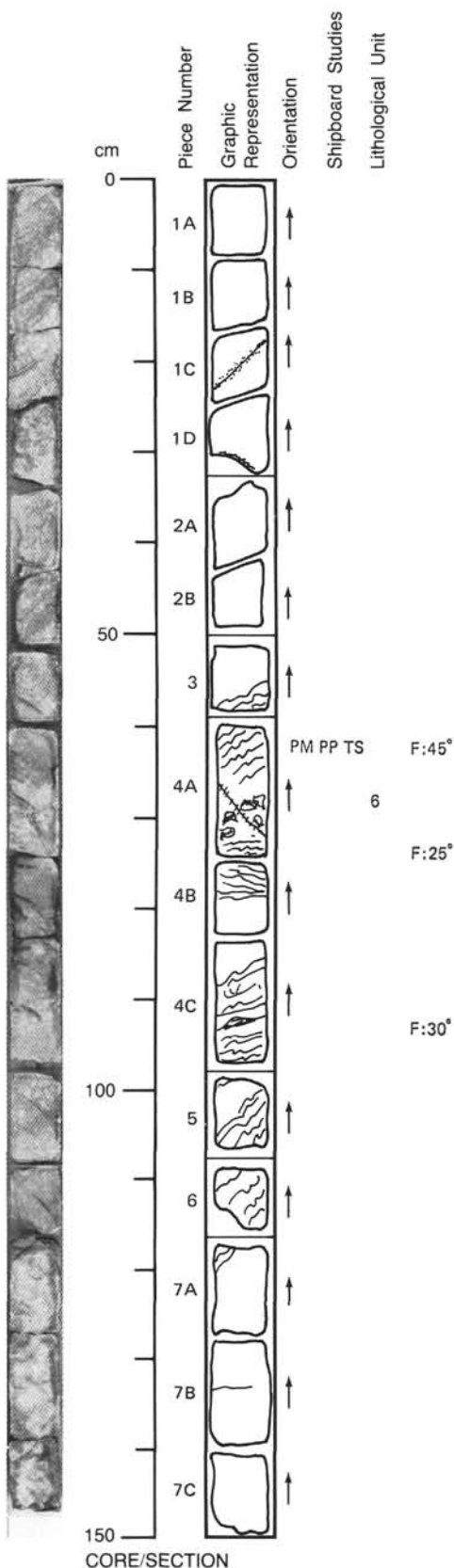
SECONDARY MINERALOGY:

Total percent: <5% total for undeformed areas.

Texture: Amphibole along vein in Piece 1C and in thin veins elsewhere. Traces of sulfides in upper part of section. Below 120 cm, olivine altered in mesh-like texture. Mesh defined by black, metallic-looking mineral, but olivine fresh in between mesh. A few thin, nearly horizontal white veins.

Percent vein material: Not determined.

Vein material: Amphibole plus an unidentified white material.



UNIT 6: OLIVINE-RICH GABBRO AND TROCTOLITE

Pieces 1A-4

Olivine Gabbro

Pieces 1A-4

COLOR: Gray.

LAYERING: Layering defined by coarse and fine zones. One apparently graded layer from 110-70 cm. A very coarse layer with 3 cm pyroxenes and 2 cm plagioclase at 23-49 cm.

DEFORMATION: Porphyroclastic texture with interspersed mylonite in the upper 61 cm. Elongate porphyroclasts to 3 cm. Mylonite zones at 20, 54, and 60 cm; dips of mylonite highly variable from 10°-40° within single intervals.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%-60%.

Crystal size: 2-10 mm.

Crystal shape: Euhedral (small grains in clinopyroxene) to anhedral.

Preferred orientation: Not determined.

Percent replacement: Various.

Clinopyroxene—Mode: 20%-40%.

Crystal size: 2-22 mm.

Crystal shape: Anhedral, ophitic to poikilitic.

Preferred orientation: Not determined.

Percent replacement: Various, altered to amphibole.

Olivine—Mode: 5%-15%.

Crystal size: 2-8 mm.

Crystal shape: Anhedral.

Preferred orientation: Not determined.

Percent replacement: Various, altered to opaques and amphibole(?).

SECONDARY MINERALOGY:

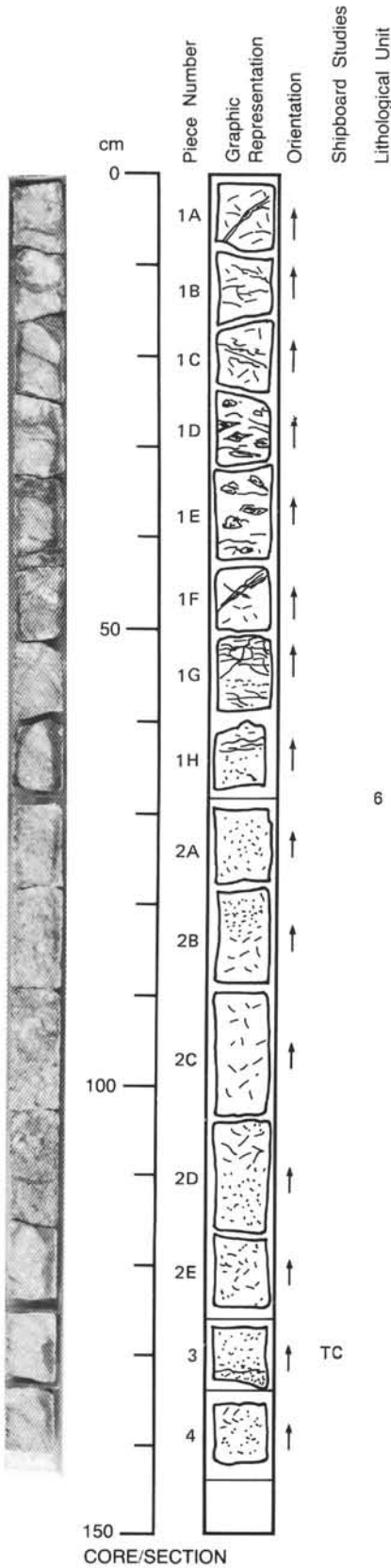
Total percent: 30%-40% in deformed zone. Slight in lower part of core.

Texture: In upper, deformed section, extensive replacement of olivine by magnetite/amphibole, and clinopyroxene to fibrous green amphibole. A 2 mm thick amphibole vein crosscuts the foliation in Piece 1F. There are numerous subhorizontal fractures, some filled with feldspathic mineral. The finer shear zones are more extensively altered. There is a zone of fine, disseminated sulfides at the top of a mylonite band in Piece 3, as well as scattered sulfide throughout the top 60 cm. In the lower, undeformed part of the core, there is minor alteration of olivine and clinopyroxene. <2% subhorizontal (<1 mm wide) feldspathic veins throughout. One horizontal 1 mm wide amphibole vein in Piece 3. The pyroxenes here have a greenish cast on the cored surface which may reflect primary compositional differences rather than secondary alteration.

Percent vein material: 2%-5%.

Vein material: Amphibole and feldspathic mineral.

COMMENTS: Olivine may be as common as 30% in parts of the finer-grained sections.



118-735B-79R-4

UNIT 6: OLIVINE-RICH GABBRO AND TROCTOLITE

Pieces 1-2M

Mylonitic Gabbro (Pieces 1 and 2H), Foliated Olivine Gabbro (Pieces 2A, 2G, 2H, and 2M), Olivine Gabbro (Pieces 2B-2F, and 2K-2M), and Porphyroclastic Gabbro (Pieces 2A and 2H-2J).

COLOR: Greenish gray.

LAYERING: There are grain size contacts in Pieces 2A, 2B, 2D, 2K, 2L, and 2M. The coarse-grained gabbro has grains up to 2 cm long, the fine-grained gabbro has average grain size of 1-2 mm.

DEFORMATION: Irregular to folded deformation planes. The foliation is defined in porphyroclastic types and is well developed in fine-grained gabbros. The foliation is defined by stretching and elongation of plagioclase and pyroxene. The grain size can change from 2.5 cm to a few millimeters.

PRIMARY MINERALOGY:

Plagioclase—Mode: 40%-50%.

Crystal size: 10-20 mm.

Crystal shape: Anhedral.

Preferred orientation: Variable.

Percent replacement: Slight.

Clinopyroxene—Mode: 50%-60%.

Crystal size: 2-25 mm.

Crystal shape: Oikocrystic, containing plagioclase idiomorphic inclusions.

Preferred orientation: Variable.

Percent replacement: Slightly to moderately replaced by amphibole.

Olivine—Mode: 1%-5%.

Crystal size: 0.5-5 mm.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: Moderately replaced by magnetite, talc, and chlorite(?).

SECONDARY MINERALOGY:

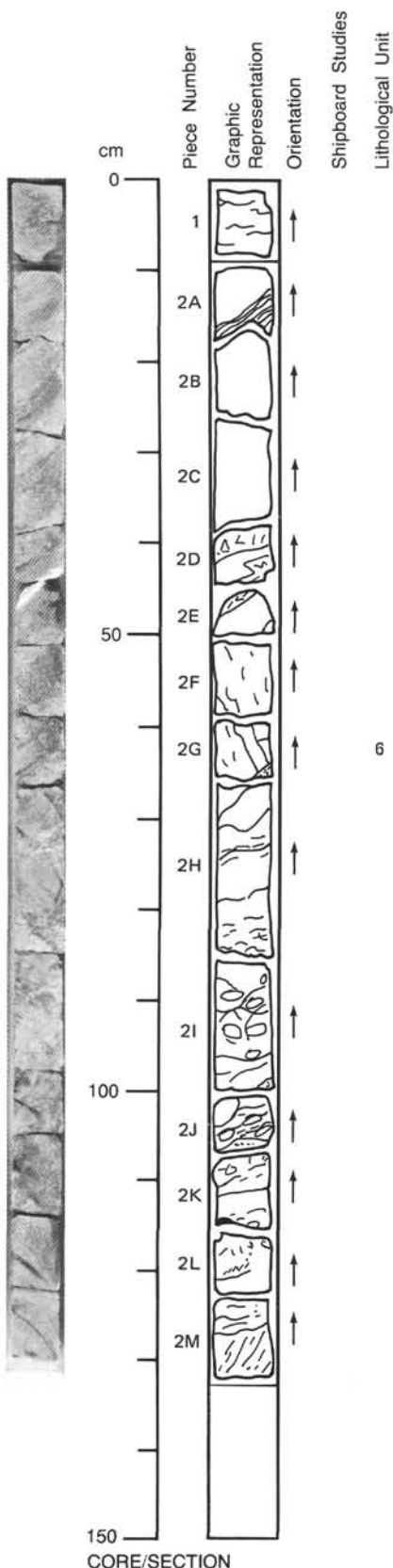
Total percent: Not determined.

Texture: Coronitic. Olivine is replaced by magnetite + talc + chlorite(?). Clinopyroxene is replaced by green amphibole particularly in deformed zones. Sulfides are rare and disseminated in intergranular spaces (see Piece 2K) and are fractured.

Percent vein material: Not determined.

Vein material: Veins are filled with a mixture of plagioclase, carbonates, and epidote (green color).

Cracks are filled with amphiboles.



6

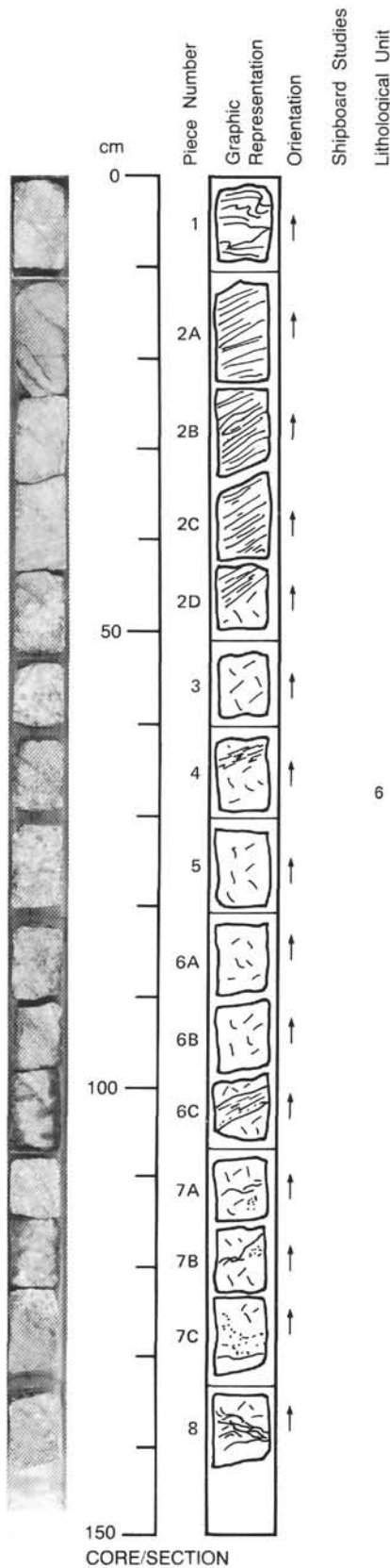
118-735B-79R-5

UNIT 6: OLIVINE-RICH GABBRO AND TROCTOLITE

Pieces 1-8

Olivine Gabbro

Pieces 1-8



F:10°

F:25°

6

COLOR: Gray.

LAYERING: None. A near troctolitic layer at 63-98 cm with 2%-8% clinopyroxene. There are some fine grained pods in the otherwise coarse-grained section.

DEFORMATION: The upper part (0-45 cm) is mylonitic with 1-4 mm pyroxene and olivine porphyroclasts. Foliation dips 10°-25° except in Piece 1 where it is subhorizontal in part and folded. Mylonitic bands occur at 64, 104, 120, 132, and 137 cm. They often seem associated with finer grained parts of the core.

PRIMARY MINERALOGY:

Plagioclase—Mode: 40%-55% (70%-60% in troctolitic layer).

Crystal size: 2-6 mm.

Crystal shape: Euhedral to anhedral.

Preferred orientation: Not determined.

Percent replacement: Not determined.

Clinopyroxene—Mode: 30%-35% (2%-8% in troctolitic zone).

Crystal size: 4-40 mm.

Crystal shape: Anhedral, oikocrystic in places.

Preferred orientation: Clasts define foliation at 0-60 cm.

Percent replacement: Extensively amphibolized in mylonitic zone.

Olivine—Mode: 15%-20% (20%-40% in troctolitic zone).

Crystal size: 3-8 mm.

Crystal shape: Anhedral, intergrown with plagioclase.

Preferred orientation: Not determined.

Percent replacement: 30%-50%.

SECONDARY MINERALOGY:

Total percent: 30%-40% in deformed zone.

Texture: Clinopyroxene is extensively amphibolized in deformed zones; there are often secondary opaques associated with the mylonitic zones, particularly at boundary near 45 cm.

Much of the clinopyroxene has a dull emerald-green color in many places on the cored surface.

Percent vein material: Not determined.

Vein material: Not determined.

118-735B-79R-6

UNIT 6: OLIVINE-RICH GABBRO AND TROCTOLITE

Pieces 1A-5B

Olivine Gabbro

Pieces 1A-2B (top)

COLOR: Gray.
LAYERING: None.
DEFORMATION: From 0-10 cm, no deformation. From 10-45 cm, rocks are highly deformed plastically, and range from porphyroclastic metagabbro to mylonitic. Foliation defined by stretched pyroxenes and plagioclase. This interval has approximately 15%-20% iron-oxides in thin layers.

PRIMARY MINERALOGY:
 Plagioclase—Mode: 55%.
 Crystal size: 5-10 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: Slight.

Clinopyroxene—Mode: 42%.
 Crystal size: 5-10 mm.
 Crystal shape: Anhedral. Clinopyroxene is brownish in color.
 Preferred orientation: None.
 Percent replacement: Slight.

Olivine—Mode: 2%-3%.
 Crystal size: 1-2 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: Slight.

SECONDARY MINERALOGY:
 Total percent: Slight.
 Texture: Thin vein has amphibole, plagioclase and epidote(?). Traces of sulfides.
 Percent vein material: Not determined.
 Vein material: Plagioclase, amphibole, and epidote(?).

COMMENTS: Primary mineralogy from 0-10 cm interval.

Olivine-Rich Gabbro

Pieces 2B (bottom) -5B

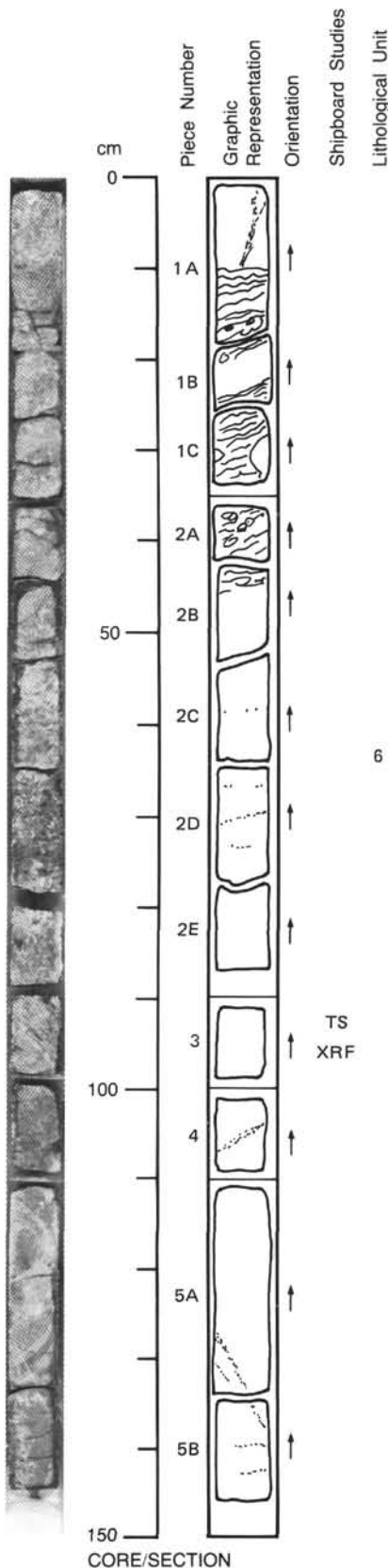
COLOR: Gray.
LAYERING: None.
DEFORMATION: None.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 55%-50%.
 Crystal size: 10-15 mm.
 Crystal shape: Subhedral.
 Preferred orientation: None.
 Percent replacement: Not determined.

Clinopyroxene—Mode: 15%-20%.
 Crystal size: 10-20 mm.
 Crystal shape: Subhedral. Clinopyroxene is a dark green color as opposed to brown like other clinopyroxene in all other earlier cores.
 Preferred orientation: None.
 Percent replacement: Not determined.

Olivine—Mode: 30%.
 Crystal size: 5-15 mm.
 Crystal shape: Subhedral.
 Preferred orientation: None.
 Percent replacement: Not determined.

SECONDARY MINERALOGY:
 Total percent: <1%.
 Texture: Alteration of this interval is extremely low and shows no apparent connection with veins, even thin ones. Surrounding the clinopyroxene and olivine, and filling interstitial areas, is a small, translucent, pale pinkish-brown mineral, probably amphibole.
 Percent vein material: Not determined.
 Vein material: None.

COMMENTS: Primary mineralogy from 45-100 cm interval. The interval from 100-150 cm is similar mineralogically and modally to that between 45-100 cm, but texture is equigranular and is a diabase in grain size (<0.5 mm).



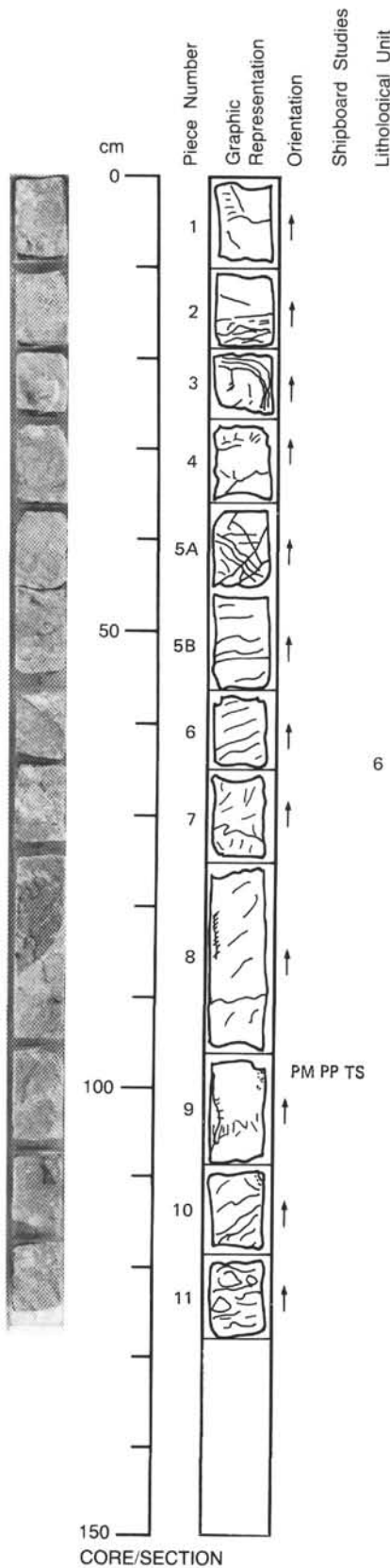
CORE/SECTION

118-735B-79R-7

UNIT 6: OLIVINE-RICH GABBRO AND TROCTOLITE

Pieces 1-11

Foliated Gabbro, (Pieces 1-4), Mylonitic Gabbro (Pieces 5A and 5B), Prophyroclastic Olivine-Rich Gabbro (Pieces 6 and 11), and Undeformed Olivine Gabbro (Pieces 7, 8, 9 and 10).



COLOR: Greenish gray.

LAYERING: There are grain-size and compositional contacts in Pieces 1, 2, 3, 4, 5A, 5B, 7, 9, and 10. The foliation and sealed fault planes may cause part of these contacts. Grain size variation ranges from 1-2 cm to 1-2 mm. The composition varies from troctolite to olivine gabbro to light brown olivine-bearing gabbro.

DEFORMATION: Varies from intense (see list of rock names) with mylonitic zones to prophyroclastic gabbros and undeformed gabbros. Deformation is very irregular and foliation dips can vary from one piece to another. This is high-temperature deformation under relatively anhydrous conditions (see previous sections).

PRIMARY MINERALOGY:

Plagioclase—Mode: 60% (in troctolite).

Crystal size: 1-20 mm.

Crystal shape: Elongated.

Preferred orientation: Variable.

Percent replacement: Slight.

Clinopyroxene—Mode: 5% (in troctolite), 40% (in gabbro).

Crystal size: 1-20 mm.

Crystal shape: Anhedral.

Preferred orientation: Variable.

Percent replacement: Slight to moderate replacement by amphibole.

Olivine—Mode: 40% (in troctolite), 10% (in gabbro).

Crystal size: 1-10 mm.

Crystal shape: Anhedral.

Preferred orientation: Not visible.

Percent replacement: Slight to moderate replacement by talc, magnetite, and chlorite(?).

SECONDARY MINERALOGY:

Total percent: <1% in undeformed gabbro.

Texture: Coronitic. Olivine is replaced by a mixture of talc + magnetite + chlorite(?).

Clinopyroxene is partly replaced by dark green amphibole(?). Sulfides and iron oxides are observed in Pieces 3-11 and lesser amounts in Pieces 1 and 2. Veins (6 mm thick) are filled with plagioclase, carbonate, and acicular actinolite.

Percent vein material: Not determined.

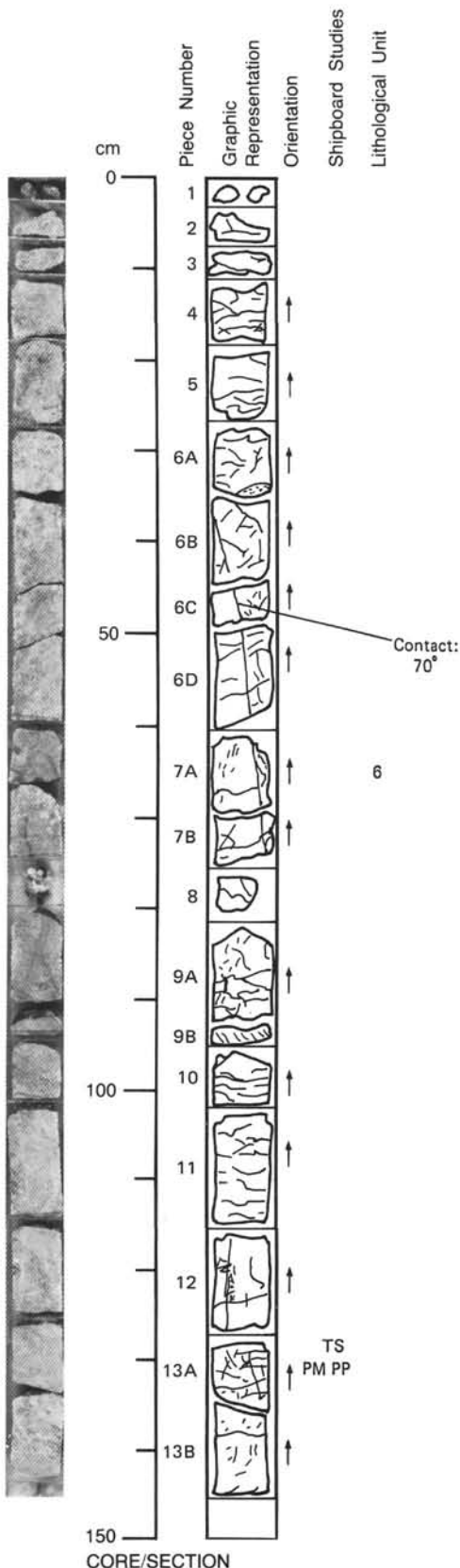
Vein material: Plagioclase, carbonate, and actinolite.

118-735B-80R-1

UNIT 6: OLIVINE-RICH GABBRO AND TROCTOLITE

Piece 1-13B

Massive Gabbro (Pieces 5-7B, and 13B), Foliated Olivine Gabbro (Pieces 1-4, 9A, 9B, and 13A), and Porphyroclastic Gabbro (Pieces 10-12)



COLOR: Grass green to pinkish gray.

LAYERING: There is a succession from coarse-grained gabbro in Pieces 5 to 6B and to fine-grained gabbro in Pieces 6C, 6D, and 7A. In Piece 7B a fine-grained gabbro is transformed into a mylonite before returning to coarse-grained gabbro in Pieces 10 and 11. The grain size is respectively 1 cm, 2-5 mm, and 1 mm. The contact between coarse-grained gabbro and the fine-grained gabbro is 70° dipping. There is an increase of plagioclase content as the grain size decreases. The very fine-grained gabbro is a highly deformed rock or alternatively a real primary fine-grained olivine- and plagioclase-rich gabbro. There is another contact in Piece 13B.

DEFORMATION: The section is heterogeneously deformed. (See rock names for piece numbers). The deformation goes from mylonitic (with augen) to porphyroclastic to undisturbed gabbro. The foliation is parallel to the layering and can have transposed the original layering but the mineral foliation in the gabbro is oblique to the mylonitic zone (1-3 cm thick). The foliation in the porphyroclastic gabbro is defined by stretching of pyroxene and plagioclase.

PRIMARY MINERALOGY:

Plagioclase—Mode: 55%-70%.
 Crystal size: Up to 5 mm.
 Crystal shape: Euhedral.
 Preferred orientation: Visible in deformed samples.
 Percent replacement: None.

Clinopyroxene—Mode: 10%-25%.
 Crystal size: Up to 1 cm.
 Crystal shape: Oikocrysts.
 Preferred orientation: Visible in deformed samples.
 Percent replacement: Slight replacement by amphibole(?).

Olivine—Mode: 10%-20%.
 Crystal size: Up to 5 mm.
 Crystal shape: Euhedral to rounded.
 Preferred orientation: Not visible.
 Percent replacement: Slight replacement by magnetite, talc, and chlorite(?).

SECONDARY MINERALOGY:

Total percent: < 1%.
 Texture: Coronitic. Olivine is replaced locally by a mixture of magnetite + talc + chlorite(?). Clinopyroxene (brown when fresh) is altered to grass green amphibole(?). There is an outer rim of dark amphibole. Sulfides are abundant (1%) in Pieces 6B, 6C, 6D, and 7A and less than 1% elsewhere. They are chalcopyrite, pentlandite, and pyrite.
 Percent vein material: None.
 Vein material: None.

118-735B-80R-2

UNIT 6: OLIVINE-RICH GABBRO AND TROCTOLITE

Pieces 1A-10

Olivine Gabbro

Pieces 1A-10

COLOR: Gray.

LAYERING: Banded orthocumulates and mesocumulates. 0-11 cm: Troctolitic olivine gabbro (30% olivine, 5%-10% clinopyroxene, 65% plagioclase) mesocumulate. 11-59 cm: Ophitic olivine gabbro (medium-grained), olivine crystals enclosed in 1-2 cm plagioclase oikocrysts (19% olivine, 62% plagioclase, 15% clinopyroxene). 60-145 cm: Subophitic plagioclase orthocumulate (65% plagioclase, 20%-25% clinopyroxene, 10%-15% olivine). Sequence grades downward from 1 cm plagioclase laths at 73 cm to 2 cm laths at 110 cm and then remains coarse to bottom of section.

DEFORMATION: Mylonitic zones are dense and black. Contain great enrichment of iron-titanium oxides at 115 cm (3 cm thick mylonite zone) and at 145 cm (0.8 cm thick mylonite zone). Zones are also enriched in sulfides.

PRIMARY MINERALOGY:

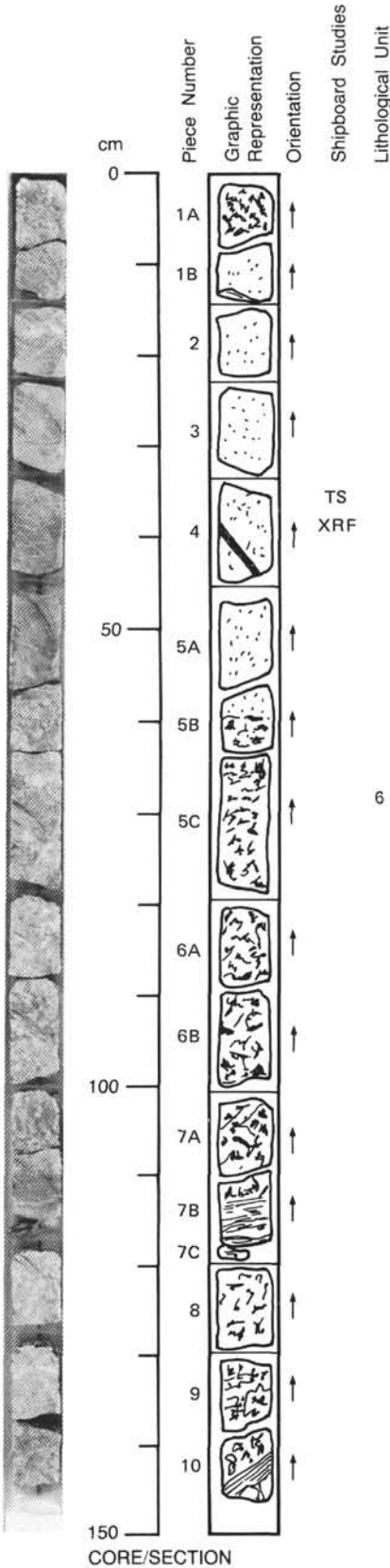
Plagioclase—Mode: 62%-65%.
 Crystal size: 1-20 mm.
 Crystal shape: Anhedral oikocrysts and intergranular.
 Preferred orientation: None.
 Percent replacement: Slight except near mylonites.

Clinopyroxene—Mode: 5%-25%.
 Crystal size: 0.2 mm.
 Crystal shape: Anhedral intergranular to subophitic.
 Preferred orientation: None.
 Percent replacement: Slight except near mylonites.

Olivine—Mode: 10%-30%.
 Crystal size: 0.3-1 mm.
 Crystal shape: Anhedral to subhedral.
 Preferred orientation: None.
 Percent replacement: Slight except near mylonites.

SECONDARY MINERALOGY:

Total percent: Not determined.
 Texture: Difficult to assess in hand specimen, but olivine meshed by iron oxides. Piece 4 cut by felsic vein 1.5 mm across. A separate generation is represented by an oxide-sulfide-rich 2 mm thick vein in Piece 4.
 Percent vein material: Not determined.
 Vein material: Plagioclase, oxides, and sulfides.



CORE/SECTION

118-735B-80R-3

UNIT 6: OLIVINE-RICH GABBRO AND TROCTOLITE

Pieces 1A-12C

Olivine Gabbro

Pieces 1A-12C

COLOR: Gray.

LAYERING: None apparent. May be some olivine-rich zones. It is difficult to tell with deformation.

DEFORMATION: Porphyroclastic to mylonitic bands throughout: 8, 10, 15-43, 58, 63-72, 85, 108, 114, and 125 cm, often irregular dip, wavy contacts. Often foliation climbs and bends (Pieces 1A and 1B), porphyroclasts 3-14 mm in size.

PRIMARY MINERALOGY:

Plagioclase—Mode: 40%-60%.

Crystal size: 1-11 mm.

Crystal shape: Euhedral, anhedral.

Preferred orientation: Not determined.

Percent replacement: Various, freshest Pieces are 12B and 12C.

Clinopyroxene—Mode: 20%-30%.

Crystal size: 2-10 mm.

Crystal shape: Anhedral, commonly oikocrysts.

Preferred orientation: Not determined.

Percent replacement: Various by amphibolitized.

Olivine—Mode: 10%-20%.

Crystal size: 1-8 mm.

Crystal shape: Anhedral.

Preferred orientation: Not determined.

Percent replacement: Meshwork alteration, two large (15 mm) pseudomorphs at 42 and 50 cm.

SECONDARY MINERALOGY:

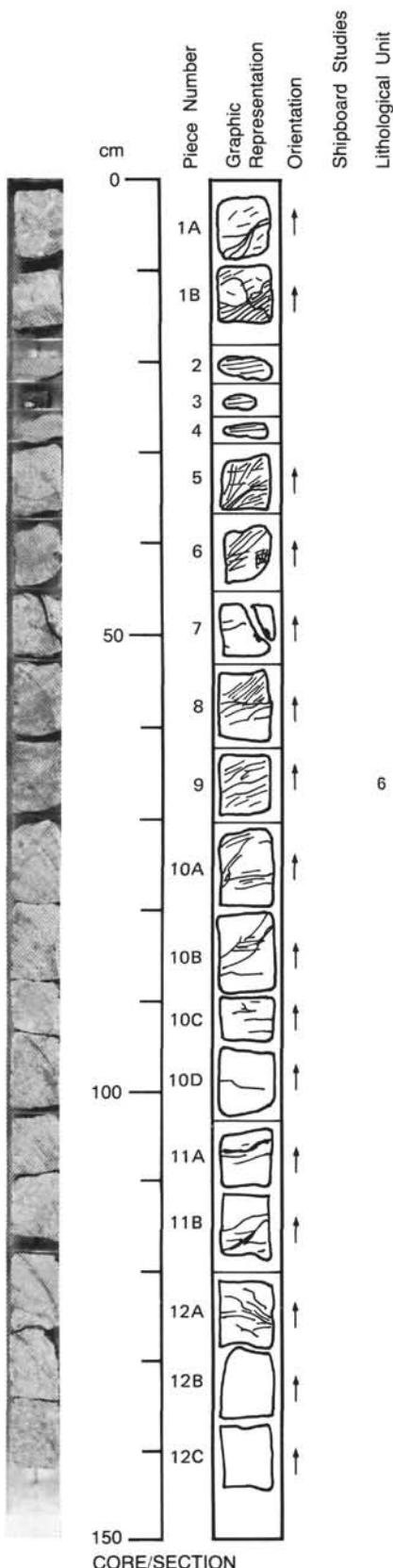
Total percent: 30%-50% in deformed zones.

Texture: Olivine commonly replaced by magnetite/talc/ tremolite mesh particularly in deformed zones. In mylonite zones a lot of clay in olivine pseudomorphs, at least in large ones.

Mylonitized zone has a greenish-gray cast indicating extensive amphibolitization of clinopyroxene (30-40%). There is a zone of opaques in a mylonitic zone at 55-65 cm (up to 30% of an aggregate of fine (< 1 mm) opaques with disseminated sulfide). Note: Clinopyroxenes have a very brownish cast. They appear replaced or rimmed by a dull-emerald green clinopyroxene (amphibole?) in places. Similar emerald-green pyroxene have been described in other sections.

Percent vein material: Not determined.

Vein material: Not determined.



CORE/SECTION

118-735B-80R-4

UNIT 6: OLIVINE-RICH GABBRO AND TROCTOLITE

Pieces 1-9B

Olivine Gabbro to Porphyroclastic Metagabbro, Locally Mylonitic

Pieces 1-3, and 5-6A (top)

COLOR: Gray.

LAYERING: None.

DEFORMATION: Deformed layers are complexly intermixed with totally undeformed sections over a scale of centimeters. Foliation varies in orientation dramatically as well—from nearly vertical to horizontal, even within a single piece (See Piece 3).

PRIMARY MINERALOGY:

Plagioclase— Mode: 45%.

Crystal size: 10-15 mm.

Crystal shape: Anhedral.

Preferred orientation: Locally in plane of foliation.

Percent replacement: Not determined.

Clinopyroxene— Mode: 45%.

Crystal size: 5-20 mm.

Crystal shape: Anhedral. Clinopyroxene is green in color with brownish rims; it subophitically to ophitically encloses plagioclase.

Preferred orientation: Locally in plane of foliation.

Percent replacement: Not determined.

Olivine— Mode: 10%.

Crystal size: 4-8 mm.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: Not determined.

SECONDARY MINERALOGY:

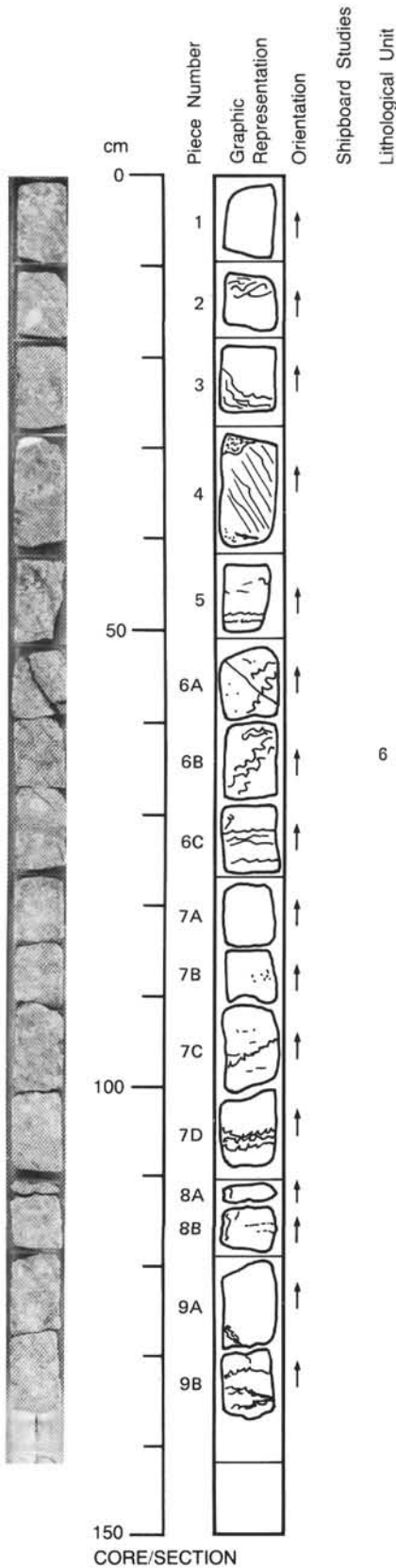
Total percent: <5%.

Texture: Contains some layers stained by iron-oxides. Actinolite on grain boundaries. Oxides appear to be associated with amphibole. Trace of sulfides. Olivine altered in mesh-like fashion by black metallic mineral.

Percent vein material: None.

Vein material: None.

COMMENTS: Olivine has a yellowish color (iron-rich) while clinopyroxene is pale brown.



6

118-735B-80R-4 (continued)

Diabase**Piece 4****COLOR:** Gray.**LAYERING:** None.**DEFORMATION:** None.**PRIMARY MINERALOGY:**

Plagioclase—Mode: 53%.

Crystal size: < 0.5 mm.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: Slight.

Clinopyroxene—Mode: 23%.

Crystal size: < 0.5 mm.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: Slight.

Olivine—Mode: 22%.

Crystal size: < 0.5 mm.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: Slight.

SECONDARY MINERALOGY:

Total percent: 2%.

Texture: Very fresh. Only cross-cut by a few thin, nearly horizontal white veins. Large vein in upper corner of Piece 4 composed of plagioclase and trace of actinolite.

Percent vein material: 1%-2%.

Vein material: Sodic plagioclase and actinolite.

Olivine Gabbro**Pieces 6A (bottom) -9B****COLOR:** Gray.**LAYERING:** None.**DEFORMATION:** Most strongly deformed intervals (Pieces 7D, 9A, and B) throughout section contain secondary iron-oxides in layers parallel to foliation.**PRIMARY MINERALOGY:**

Plagioclase—Mode: 60%.

Crystal size: 5-20 mm.

Crystal shape: Andedral to euhedral.

Preferred orientation: None.

Percent replacement: Slight.

Clinopyroxene—Mode: 35%.

Crystal size: 8-15 mm.

Crystal shape: Subhedral.

Preferred orientation: None.

Percent replacement: Slight.

Olivine—Mode: 5%.

Crystal size: 5-10 mm.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: Slight.

SECONDARY MINERALOGY:

Total percent: < 3%.

Texture: Numerous thin nearly horizontal white veins. Thin amphibole vein in Piece 7C. Olivine altered in mesh-like fashion by black, metallic mineral.

Percent vein material: 2%-3%.

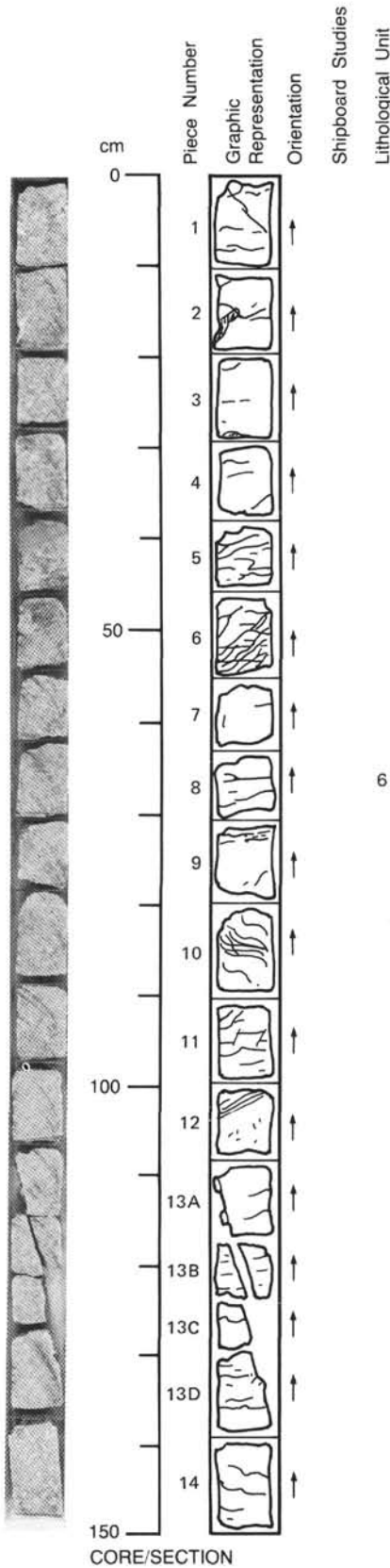
Vein material: Sodic plagioclase and amphibole.

118-735B-80R-5

UNIT 6: OLIVINE-RICH GABBRO AND TROCTOLITE

Pieces 1-14

Olivine-Rich Gabbro, Some Foliated to Mylonitic Gabbro



COLOR: Pink-brownish gray.

LAYERING: There is a contact between coarse-grained gabbro and fine-grained gabbro in Piece 5. This may be due to intense deformation of fine grained part (<1 mm in diameter versus 3-10 mm).

DEFORMATION: Foliation is visible in Pieces 1, 2, 6, 10. Piece 6 is a porphyroclastic gabbro. Piece 10 is a mylonitic gabbro. The pyroxene and plagioclase are deformed and recrystallized into neoblasts (grain size reduction from 5-10 mm to <3 mm).

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%-65%.

Crystal size: 1-3 mm.

Crystal shape: Euhedral and enclosed in larger clinopyroxene oikocrysts (subophitic texture).

Preferred orientation: Variable.

Percent replacement: Slight.

Clinopyroxene—Mode: 40%-50%.

Crystal size: 2-20 mm.

Crystal shape: Oikocrystic with chadacrysts of plagioclase.

Preferred orientation: Variable.

Percent replacement: 30% by amphibole.

Olivine—Mode: 5%-20%.

Crystal size: 1-4 mm.

Crystal shape: Rounded.

Preferred orientation: Not determined.

Percent replacement: 20%-30% replaced by talc and magnetite.

SECONDARY MINERALOGY:

Total percent: 20%.

Texture: Coronitic. Plagioclase is in part albitized (Pieces 1 and 11). Olivine is partly (20-30%) replaced by talc and magnetite. Clinopyroxene is partly (30%) replaced by amphibole only in deformation zones. There is an oxide-rich zone associated with disseminated sulfides in Piece 10. Sulfides are disseminated throughout the section.

Percent vein material: Not determined.

Vein material: Pieces 13A to 13D: Talc-rich vein (2 mm thick) cutting the rock at 70°. Piece 2: Contains a vug partially filled with plagioclase (sodic plagioclase), actinolite, and quartz. Late-subhorizontal cracks are filled with amphibole.

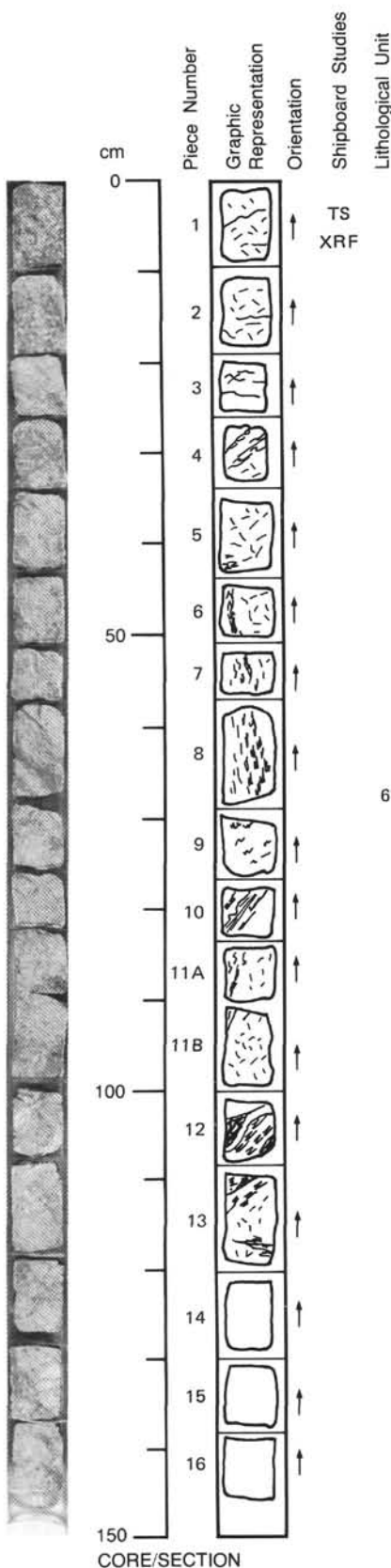
118-735B-80R-6

UNIT 6: OLIVINE-RICH GABBRO AND TROCTOLITE

Pieces 1-16

Olivine Gabbro

Pieces 1-16



COLOR: Gray to gray-green.

LAYERING: Some coarse to fine grain size variation. There is a coarse-grained olivine-rich layer at 126-133 cm. Some of this is original layering but is largely obscured by deformation. There is an oxide-rich layer at 115-140 cm.

DEFORMATION: A number of mylonitic-porphroclastic bands—many steeply dipping—are present in Pieces 5-8 and 10 and 11. Small plagioclase-actinolite segregations on outside of shear band at 108 cm. Gabbro is least deformed in Pieces 1, 2 and 11B.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%-60%.
Crystal size: 3-8 mm, rarely to 10 mm.
Crystal shape: Euhedral, subhedral.
Preferred orientation: Not determined.
Percent replacement: Not determined.

Clinopyroxene—Mode: 30%-40%.
Crystal size: 3-7 mm.
Crystal shape: Subophitic to granular.
Preferred orientation: Not determined.
Percent replacement: Extensive along shears to actinolite.

Olivine—Mode: 10%-15%.
Crystal size: 2-4 mm, rarely to 14 mm (at 132 cm).
Crystal shape: Anhedral.
Preferred orientation: Not determined.
Percent replacement: Common replacement to talc, tremolite, and magnetite.

SECONDARY MINERALOGY:

Total percent: Various, most extensive along shear zones.
Texture: Usual olivine alteration (talc/tremolite/magnetite). Extensive actinolite developed along shear zones after clinopyroxene particularly well-developed on shear in Pieces 6-8.
Percent vein material: Not determined.
Vein material: Not determined.

COMMENTS: Trace sulfides (<1 mm) throughout. Olivine- and oxide-rich zone at 120-140 cm is very coarse-grained—it appears to have been somewhat deformed, judging from the plagioclase shapes—the plagioclase has a very greenish cast from fine-grained amphibole in veins. There is up to 30% oxide in this zone; most likely of secondary origin, though olivine here is still rather fresh. Rock may have been a troctolite. The clinopyroxene, particularly in Pieces 1 and 2, has a very pink-brown color.

118-735B-80R-7

UNIT 6: OLIVINE-RICH GABBRO AND TROCTOLITE

Pieces 1A-11C

Olivine Gabbro

Pieces 1A-11C

COLOR: Gray, gray-green.

LAYERING: None. At least 2 coarse to fine bands dipping out of the core at a steep angle (about 60°).

There is an oxide-rich zone at 80-97 cm and a feldspathic clot at 138 cm.

DEFORMATION: Upper 75 cm of core are mylonitized gabbro. Foliation defined by elongation of pyroxene, does not appear well-developed enough to account for grain size reduction—also no porphyroclasts. A fine-grained gabbroic protolith is inferred.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%.

Crystal size: 2-10 mm.

Crystal shape: Euhedral to anhedral.

Preferred orientation: Not determined.

Percent replacement: Not determined.

Clinopyroxene—Mode: 40%.

Crystal size: 3-13 mm.

Crystal shape: Subhedral to oikocrystic.

Preferred orientation: Not determined.

Percent replacement: Variously by amphibolitized.

Olivine—Mode: 10%.

Crystal size: 3-5 mm.

Crystal shape: Anhedral.

Preferred orientation: Not determined.

Percent replacement: Commonly altered to mesh of talc, tremolite, and magnetite.

SECONDARY MINERALOGY:

Total percent: Extensive in shear zones.

Texture: Extensive amphibolitization of clinopyroxene in shear zones. Large amphibole veins in Pieces 5 and 8. Olivine is commonly altered in whole or part to magnetite/talc/tremolite mesh.

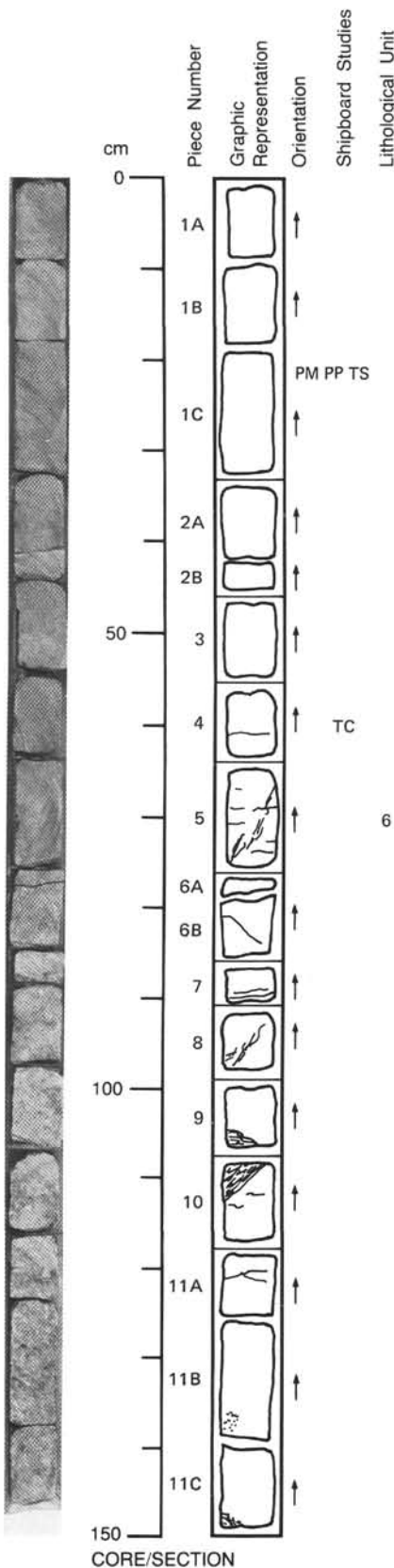
There are abundant oxides (probably secondary) associated with the shear zones. They are concentrated along the bottom of a mylonitic zone in Piece 10. The oxide development in these sections is associated with deformation and amphibolitization.

Percent vein material: Not determined.

Vein material: Amphibole.

COMMENTS: Grain sizes are less than 1 mm in mylonitic zones.

Modes of deformed rock are hard to determine. In addition to the plagioclase, altered olivine and clinopyroxene, there is about 20% oxides throughout the upper 75 cm. As noted this deformed zone may have had a microgabbro, rather than gabbro, protolith.



118-735B-81R-1

UNIT 6: OLIVINE-RICH GABBRO AND TROCTOLITE

Pieces 1A-3B

Olivine and Iron-Titanium Oxide-Rich Metagabbro (Pieces 1A and 1B), Medium-Grained Olivine Gabbro (Pieces 1B-1D, and 1G-3B), Coarse-Grained Olivine Gabbro (Pieces 1F and 1G), and Plagioclase- and Olivine-Rich Coarse-Grained Gabbro (Pieces 1D-1F)

COLOR: Gray.

LAYERING: Modal (see above). Also grain size variations: <0.4 cm (0-28 cm); <1 cm (28-40 cm); <2 cm (40-70 cm); <1.5 cm (70-83 cm); <1 cm (below 83 cm). No magmatic foliation.

DEFORMATION: Discrete shear zones in Pieces 1F, 1G, 1H, 2A, 2B, and 2C. These shear zones have a porphyroclastic to augen gneissic foliation and are rich in iron-titanium oxides.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%-70%.

Crystal size: See layering.

Crystal shape: Not determined.

Preferred orientation: None.

Percent replacement: Not determined.

Clinopyroxene—Mode: 5%-35%.

Crystal size: See layering.

Crystal shape: Not determined.

Preferred orientation: None.

Percent replacement: Not determined.

Olivine—Mode: 5%-25%.

Crystal size: See layering.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: Not determined.

Ilmenite—Mode: 0%-15%.

SECONDARY MINERALOGY:

Total percent: Moderate to extensive in Pieces 1H, 2A, and 2B.

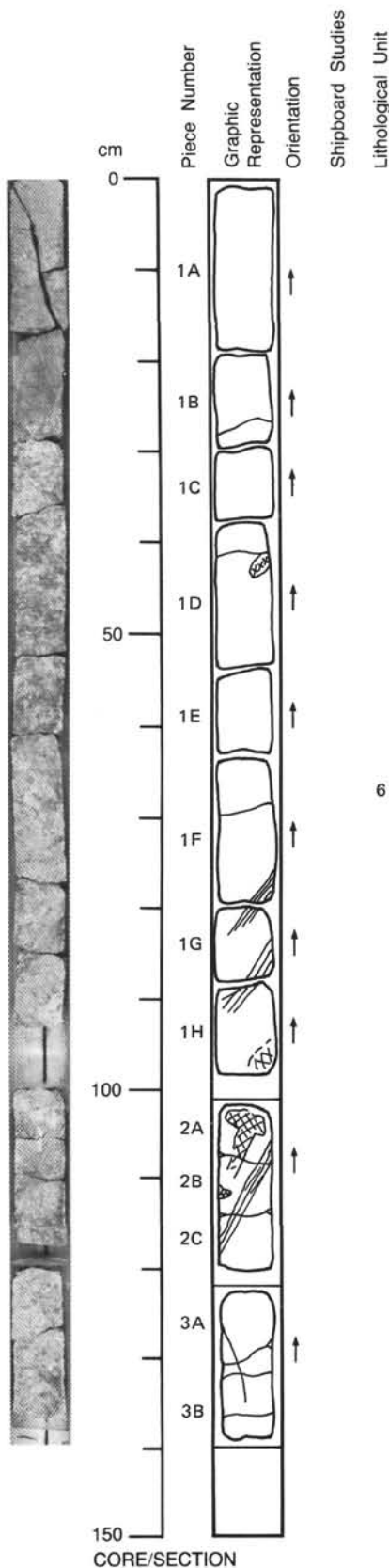
Texture: Two types of transformations: albitization along veins in Pieces 1D, 1H, 2A, and 2B;

amphibolitization in all pieces, often more extensive in the iron-titanium oxide-rich intervals.

Percent vein material: <1%.

Vein material: amphibole in thin veins.

COMMENTS: The pyroxene is very brown—it could be orthopyroxene or altered clinopyroxene.



6

F:70°

F:70°

F:70°

CORE/SECTION

118-735B-81R-2

UNIT 6: OLIVINE-RICH GABBRO AND TROCTOLITE

Pieces 1A-5D

Olivine Gabbro

Pieces 1A-5D

COLOR: Medium gray.

LAYERING: Weak layering, essentially defined by grain size gradations. Average grain size groups: fine-grained (0.2-0.5 cm), medium- to fine-grained (0.3-0.8 cm), medium-grained (0.5-1.0 cm), and coarse-grained (1.5-2.0 cm).

DEFORMATION: Mylonitic bands on Pieces 4, 5A, and 5B (inclination as indicated), otherwise undeformed.

PRIMARY MINERALOGY:

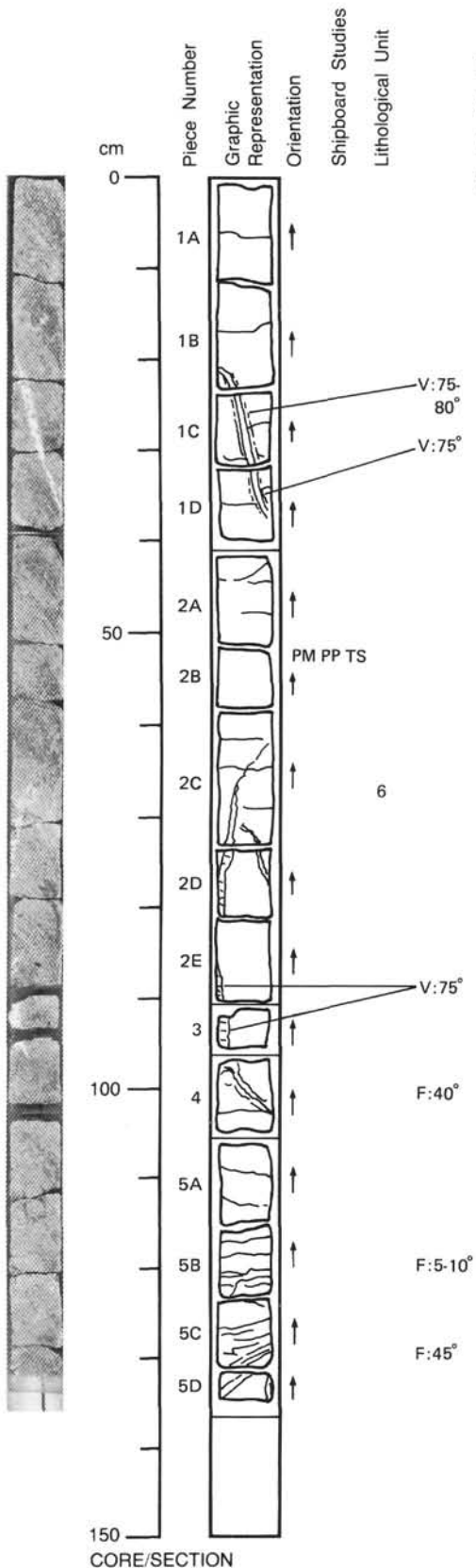
Plagioclase—Mode: 50%-60%.
 Crystal size: Up to 2 cm.
 Crystal shape: Anhedral to subhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

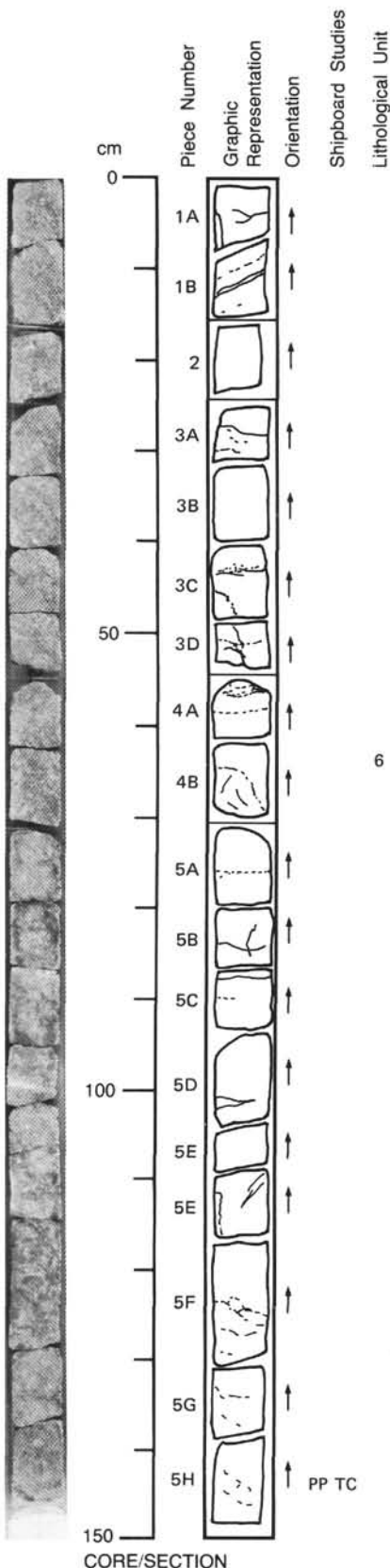
Clinopyroxene—Mode: 30%-40%.
 Crystal size: Up to 2.5 cm.
 Crystal shape: Anhedral-subhedral.
 Preferred orientation: Not determined.
 Percent replacement: <10% by amphibole.

Olivine—Mode: 5%-15%.
 Crystal size: Up to 2 cm.
 Crystal shape: Anhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

SECONDARY MINERALOGY:

Total percent: Slight alteration.
 Texture: Amphibole replacement of clinopyroxene (<10%). One or two major veins (as indicated) in Pieces 1B, 1C, 2A, 2B, 2C, 2D, 3, and 4 (may be one vein) consisting of plagioclase plus green amphibole. Secondary sulfides abundant in Piece 5.
 Percent vein material: Not determined.
 Vein Material: One or two major veins (as indicated) in Pieces 1B, 1C, 2A, 2B, 2C, 2D, 3, and 4 (may be one vein) consisting of plagioclase plus green amphibole.





118-735B-81R-3

UNIT 6: OLIVINE-RICH GABBRO AND TROCTOLITE

Pieces 1A-5H

Metagabbro

Pieces 1A-5F (top)

COLOR: Greenish gray.
LAYERING: None. Variations in grain size: Piece 4B is coarse-grained (> 1.5 cm).
DEFORMATION: Foliation apparent in Pieces 1A, 1B, 3A, 3C, 3D, and 4A. Discrete mylonitic zones with crushed pyroxenes and albitized plagioclase in Pieces 1B and 3A-3D.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%.
 Crystal size: 0.5-1.0 cm.
 Crystal shape: Subhedral.
 Preferred orientation: None observed.
 Percent replacement: 0%-10% by sodic plagioclase.

Clinopyroxene—Mode: 48%.
 Crystal size: 1-2 cm.
 Crystal shape: Poikilitic.
 Preferred orientation: None observed.
 Percent replacement: Up to 15% by amphibole.

Olivine—Mode: 2%.
 Crystal size: Variable, 0.5-1.5 cm (increases toward Piece 5).
 Crystal shape: Anhedral.
 Preferred orientation: None observed.
 Percent replacement: < 1% by chlorite.

SECONDARY MINERALOGY:

Total percent: Up to 15%.
 Texture: Distinct amphibole halos around clinopyroxene, white albitized zones at 5, 80, 87, and 110 cm. Small fractures filled with green amphibole. Black chlorite pseudomorphs alter olivine and clinopyroxene. Vein with albite (+ quartz) in Piece 5D.
 Percent vein material: 5%.
 Vein material: Amphibole albite, and quartz.

COMMENTS: Disseminated sulfides throughout core.

Leucotroctolite

Pieces 5F (bottom) -5H

COLOR: Pale gray.
LAYERING: Weak magmatic foliation suggested by elongation of the olivine.
DEFORMATION: None apparent.

PRIMARY MINERALOGY:

Plagioclase—Mode: 70%.
 Crystal size: 2-3 cm.
 Crystal shape: Subhedral.
 Preferred orientation: Not determined.
 Percent replacement: Plagioclase is albitized.

Olivine—Mode: 30%.
 Crystal size: 0.5-1.5 cm.
 Crystal shape: Subhedral.
 Preferred orientation: Elongation, subparallel.
 Percent replacement: < 5% by amphibole.

SECONDARY MINERALOGY:

Total percent: 5%.
 Texture: Olivine replaced by amphibole.
 Percent vein material: None.
 Vein material: None.

UNIT 6: OLIVINE-RICH GABBRO AND TROCTOLITE

Pieces 1-10B

Olivine Gabbro

Pieces 1, 3, 4A, 5, and 6D-10B

COLOR: Gray.
LAYERING: None apparent.
DEFORMATION: Weak except when in contact with oxide gabbro.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 55%.
 Crystal size: 3-10 mm.
 Crystal shape: Subhedral-euhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

 Clinopyroxene—Mode: 35%.
 Crystal size: 2-10 mm.
 Crystal shape: Subhedral-euhedral. Subophitically encloses plagioclase.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

 Olivine—Mode: 10%.
 Crystal size: 2-8 mm.
 Crystal shape: Subhedral-euhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.
SECONDARY MINERALOGY:
 Total percent: 25%.
 Texture: Olivine veined with magnetite. Clinopyroxene is greenish when fresh and pinkish when altered. Pinkish clinopyroxene rims around greenish cores. Pinkish areas are sometimes surrounded by black or dark green amphibole.
 Percent vein material: Not determined.
 Vein material: Not determined.

Oxide-Rich Olivine Gabbro

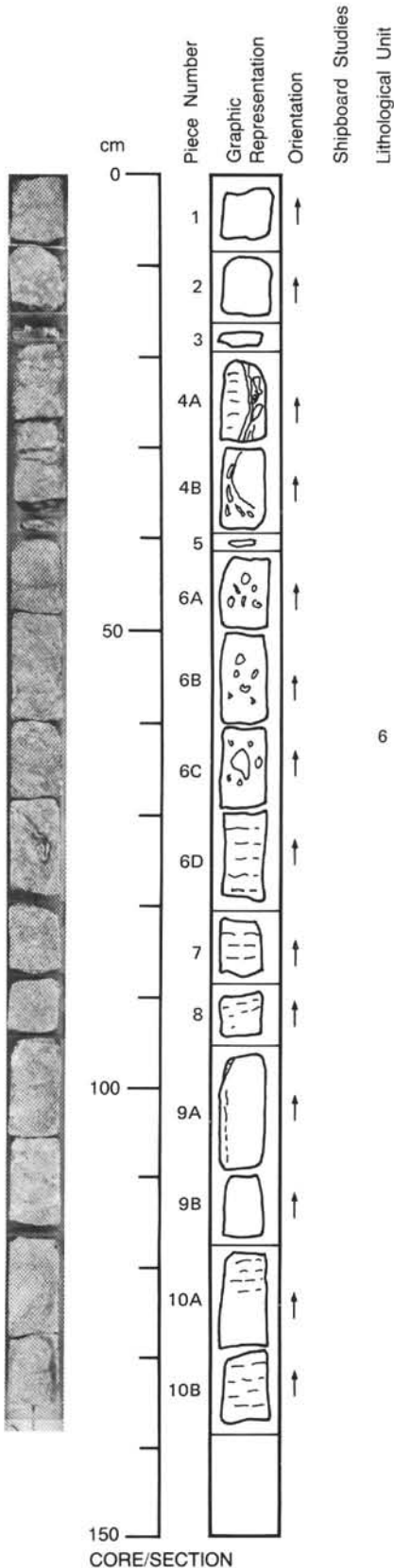
Pieces 2, 4A, 4B, and 6A-6C

COLOR: Greenish gray.
LAYERING: None.
DEFORMATION: Strongly foliated in places and porphyroclastic with stretched olivine, pyroxene, and plagioclase.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 50%.
 Crystal size: 5-15 mm.
 Crystal shape: Subhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

 Clinopyroxene—Mode: 15%.
 Crystal size: 5-15 mm.
 Crystal shape: Subhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

 Olivine—Mode: 25%.
 Crystal size: 3-10 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

 Iron-titanium Oxide—Mode: 10% as fine-grained aggregates.
 Sulfides—Mode: Trace as blebs and fine grained intergrowths with oxide.
SECONDARY MINERALOGY:
 Total percent: 10%.
 Texture: Amphibole replacing clinopyroxene, oxide replacing olivine, but much olivine is fresh.
 Percent vein material: Not determined.
 Vein material: Not determined.



CORE/SECTION

118-735B-81R-5

UNIT 6: OLIVINE-RICH GABBRO AND TROCTOLITE

Pieces 1-6C

Olivine Gabbro

Pieces 1-6C

COLOR: Gray.

LAYERING: Weak layering defined by grading in grain size. In general, the section is medium-grained (0.5-1.5 cm).

DEFORMATION: Foliation grading into mylonitic bands to be seen in Pieces 4D, 4E, 5, and 6A. Inclination 40°-60°. In other pieces, no apparent deformation.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%-60%.
Crystal size: Up to 2.5 cm.
Crystal shape: Anhedral-subhedral.
Preferred orientation: Not determined.
Percent replacement: Not determined.

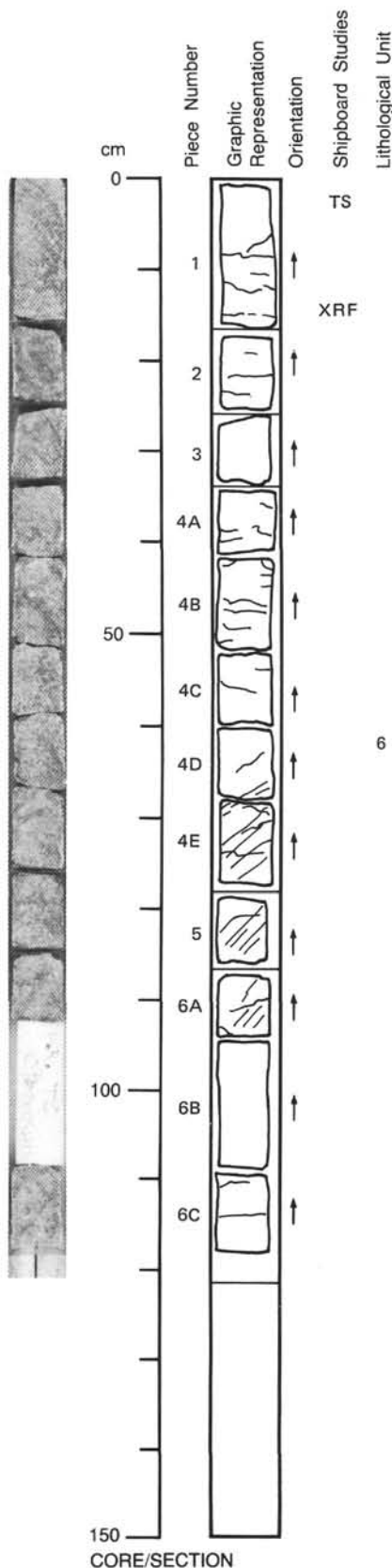
Pyroxene—Mode: 30%-40%.
Crystal size: Up to 2.5 cm.
Crystal shape: Anhedral-subhedral.
Preferred orientation: Not determined.
Percent replacement: < 10% by amphibole.

Olivine—Mode: 5%-15%.
Crystal size: Up to 2 cm.
Crystal shape: Anhedral.
Preferred orientation: Not determined.
Percent replacement: Not determined.

SECONDARY MINERALOGY:

Total percent: Slight alteration.
Texture: Amphibole replacement of pyroxene (< 10%), olivine partially replaced by talc(?).
Percent vein material: Few subhorizontal veinlets with white minerals.
Vein material: Not determined.

COMMENTS: Sulfides disseminated throughout section.



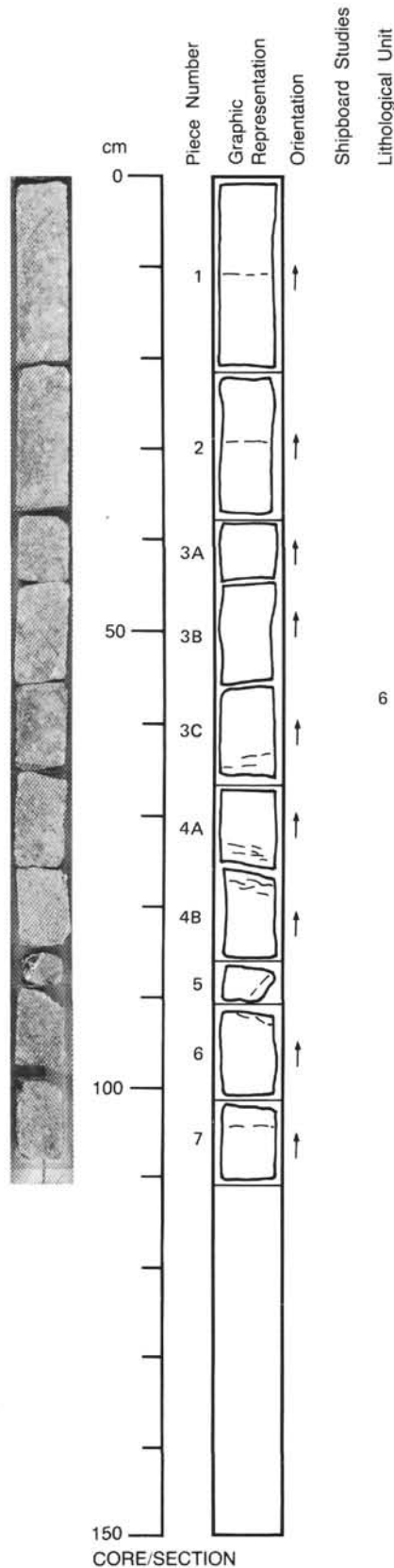
118-735B-81R-6

UNIT 6: OLIVINE-RICH GABBRO AND TROCTOLITE

Pieces 1-7

Olivine Two-Pyroxene Gabbro

Pieces 1-7



COLOR: Gray on cut surface, speckled green and pinkish brown or white on cored surface. Slightly green with amphibole near veins.

LAYERING: Two sequences of fine to coarse grain size variation with slight increase in proportion of mafic phases in coarse zones (coarse = up to 1 cm in Pieces 1, 6, and 7; 1.5 cm in Piece 3C; fine = 0.25-0.5 cm in rest). Some approximately flat orientation of pyroxenes in Piece 1.

DEFORMATION: Some thin horizontal fractures shown by dashed lines. Piece 5 has a plagioclase + amphibole vein on one edge with collection quality green amphibole crystals. The top of Piece 4B is slightly granulated and veined with a fine white mineral (amphibole?). Bottom of Piece 4A has many nearly horizontal fractures.

PRIMARY MINERALOGY:

Plagioclase—Mode: 45%-60%.
 Crystal size: Up to 1.5 cm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: Not determined.

Clinopyroxene—Mode: 15%-30%.
 Crystal size: 0.2-0.5 cm with some up to 1.5 cm.
 Crystal shape: Euhedral, subhedral.
 Preferred orientation: None.
 Percent replacement: Not determined.

Olivine—Mode: Trace-2%.
 Crystal size: Not determined.
 Crystal shape: Euhedral.
 Preferred orientation: None.
 Percent replacement: Not determined.

SECONDARY MINERALOGY:

Total percent: Slight.
 Texture: Green amphibole in fracture, Piece 5; pervasive in slight amounts. Fairly abundant (5-10%) in Pieces 3C-4B. Sodic plagioclase zones in Piece 5 and at top of Piece 6. Patchy ilmenite/magnetite zone in Pieces 3C-4B along zones of shearing or fracturing; present in trace amounts in Piece 1. Portions of Pieces 2 and 3 are quite fresh. Minor pyrite and chalcopyrite associated with ilmenite.
 Percent vein material: Not determined.
 Vein material: Amphibole and plagioclase.

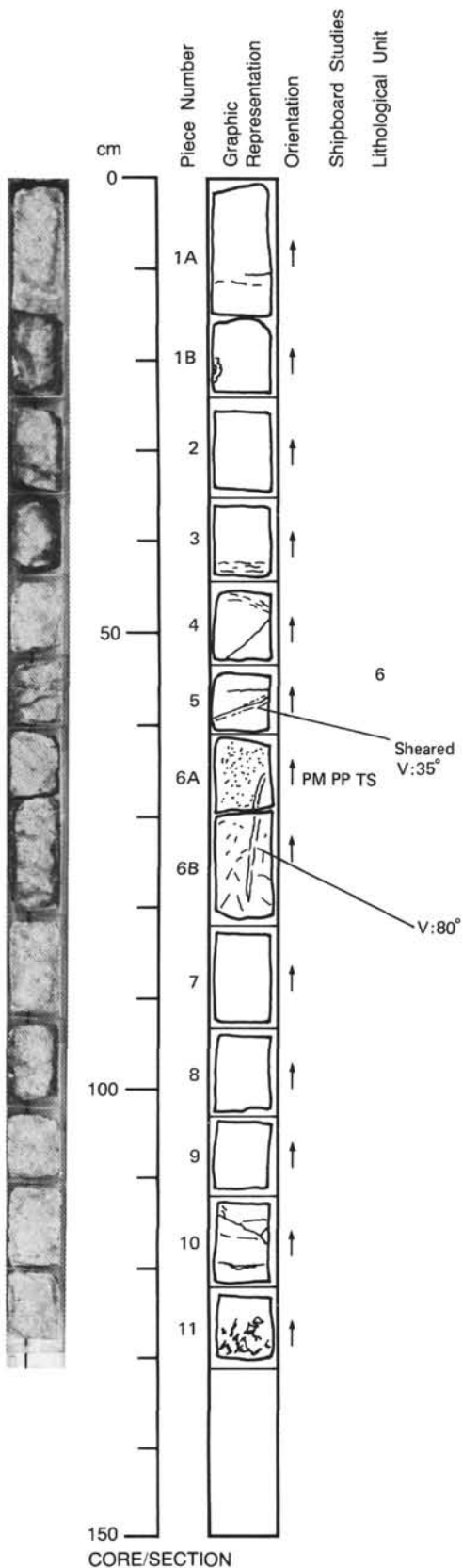
118-735B-81R-7

UNIT 6: OLIVINE-RICH GABBRO AND TROCTOLITE

Pieces 1A-11

Olivine Gabbro with Iron-Titanium Oxide-Rich Gabbro

Pieces 1A-11



COLOR: Gray, greenish gray where amphibole is present.

LAYERING: Size and modal layering. Pieces 1A-5: medium-grained, subophitic; olivine: 10%, 1-2 mm, average 5 mm; clinopyroxene: 30%, 2-15 mm, average 7 mm; plagioclase: 60%, 3-20 mm, average 10 mm. Pieces 6A-6B: graded layer; olivine: 5%-7%, top average 0.5 mm, bottom average 5 mm; clinopyroxene: 30%-25%; top average 1 mm, bottom average 10 mm; plagioclase: 60%, top average 3 mm, bottom average 15 mm. Pieces 7-10: medium-grained, subophitic, similar to Pieces 1A-5. Piece 11: Iron-titanium oxide gabbro, olivine: 1%, average 7 mm; clinopyroxene: 20%, average 10 mm; plagioclase: 60%, average 12 mm; opaque: 15%, average 7 mm.

DEFORMATION: Sheared zones, 1-2 cm thick are present in Pieces 2, 3, 5, 6A, and 6B. The zone in Piece 5 is mylonitic. They incline variously from 30°-80°.

PRIMARY MINERALOGY:

Plagioclase—Mode: 60%.
Crystal size: 3-20 mm.
Crystal shape: Euhedral to subhedral.
Preferred orientation: Not clear.
Percent replacement: None.

Clinopyroxene—Mode: 30%.
Crystal size: 2-11 mm.
Crystal shape: Anhedral.
Preferred orientation: Not clear.
Percent replacement: 5-10%, locally >15% by amphibole.

Olivine—Mode: 10%.
Crystal size: 2-7 mm.
Crystal shape: Subhedral to anhedral.
Preferred orientation: Not clear.
Percent replacement: Trace.

SECONDARY MINERALOGY:

Total percent: 10%.
Texture: Amphibole after clinopyroxene, 5%-10% generally, it is more than 15% locally as in Piece 11. Albitized and amphibolitized pockets are present in Pieces 1B-10.
Percent vein material: Trace, local.
Vein material: Amphibole vein in Piece 10.

COMMENTS: Grading in Pieces 6A-6B shows horizontal variation. The cored surface of Piece 6A is locally coarse-grained.

118-735B-82R-1

UNIT 6: OLIVINE-RICH GABBRO AND TROCTOLITE

Pieces 1-8

Poorly Foliated Olivine Gabbro with Iron-Titanium Oxide Concentrations

Pieces 1-2B

COLOR: Gray green.
LAYERING: 3 cm-thick iron-titanium oxide-rich layer (5%), parallel to foliation, marks the base of the deformed zone.

DEFORMATION: Poorly defined foliation, with 70° dip.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%-70%.
 Crystal size: <1-3 cm.
 Crystal shape: Anhedral.
 Preferred orientation: None except in poorly foliated pieces.
 Percent replacement: Not determined.

Clinopyroxene—Mode: 5%-20%.
 Crystal size: <1-3 cm.
 Crystal shape: Anhedral.
 Preferred orientation: None except in poorly foliated pieces.
 Percent replacement: Not determined.

Olivine—Mode: 5%-15%.
 Crystal size: <1-3 cm.
 Crystal shape: Anhedral.
 Preferred orientation: None except in poorly foliated pieces.
 Percent replacement: Not determined.

Iron-titanium oxide—Mode: Up to 6% in poorly foliated Pieces 2A and 2B.

SECONDARY MINERALOGY:

Total percent: <20%.
 Texture: Amphibole replaces clinopyroxene and olivine. Plagioclase is slightly albitized.
 Percent vein material: <1%.
 Vein material: Not determined.

Olivine Gabbro with Iron-Titanium Oxide Concentrations

Pieces 2B-8

COLOR: Gray green.
LAYERING: Grain size variations: <2 cm in Piece 2B; <3 cm in Piece 2C; <1 cm in Pieces 3-8. The contact between the coarse grained gabbro of Piece 2C and the fine-grained gabbro below is subhorizontal. Modal variations: not clear. Pyroxene is brown in Pieces 2B and 2C, and green in Pieces 3-8.

DEFORMATION: None.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%-70%.
 Crystal size: <1-3 cm.
 Crystal shape: Anhedral.
 Preferred orientation: None except in poorly foliated pieces.
 Percent replacement: Not determined.

Clinopyroxene—Mode: 5%-20%.
 Crystal size: <1-3 cm.
 Crystal shape: Anhedral.
 Preferred orientation: None except in poorly foliated pieces.
 Percent replacement: Not determined.

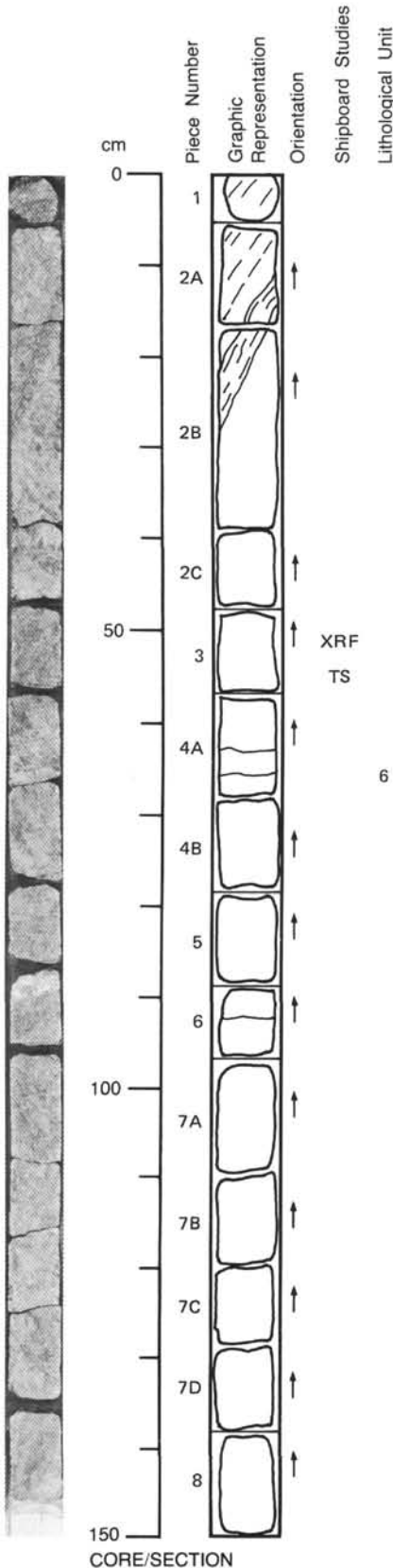
Olivine—Mode: 5%-15%.
 Crystal size: <1-3 cm.
 Crystal shape: Anhedral.
 Preferred orientation: None except in poorly foliated pieces.
 Percent replacement: Not determined.

Iron-titanium oxide—Mode: Up to 6% in poorly foliated Pieces 2A and 2B.

SECONDARY MINERALOGY:

Total percent: Slight except in Pieces 4A and 6 where it is >20%.
 Texture: Amphibole replaces the clinopyroxene and olivine. Plagioclase is slightly albitized.
 Percent vein material: <1%.
 Vein material: No visible veins.

COMMENTS: Clear-cut transition at 48 cm between brown pyroxene-bearing and green pyroxene-bearing gabbro. Color change may be primary or due to alteration.



118-735B-82R-2

UNIT 6: OLIVINE-RICH GABBRO AND TROCTOLITE

Pieces 1A-7C

Olivine Gabbro

Pieces 1A-7C

COLOR: Gray.

LAYERING: Grain size variations: Pieces 1A-2 are fine-grained (average <0.5 cm). Pieces 2-6B are pegmatoidal (average >3 cm) hornblende + plagioclase. Pieces 6C-7B are coarse-grained (average >1.5 cm). Pieces 7B-7C are coarse-grained (average >2 cm). Abrupt changes appear hydrothermal in origin.

DEFORMATION: None.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%-60%.

Crystal size: Variable; see above.

Crystal shape: Subhedral.

Preferred orientation: None observed.

Percent replacement: 0%-20% by sodic plagioclase.

Clinopyroxene—Mode: 40%-50%.

Crystal size: Variable; see above.

Crystal shape: Polkilitic.

Preferred orientation: None observed.

Percent replacement: 0%-20% by amphibole; more replacement in coarse-grained portions.

Olivine—2%-5% greater near bottom of section.

Crystal size: Variable; see above.

Crystal shape: Rounded.

Preferred orientation: None observed.

Percent replacement: None.

SECONDARY MINERALOGY:

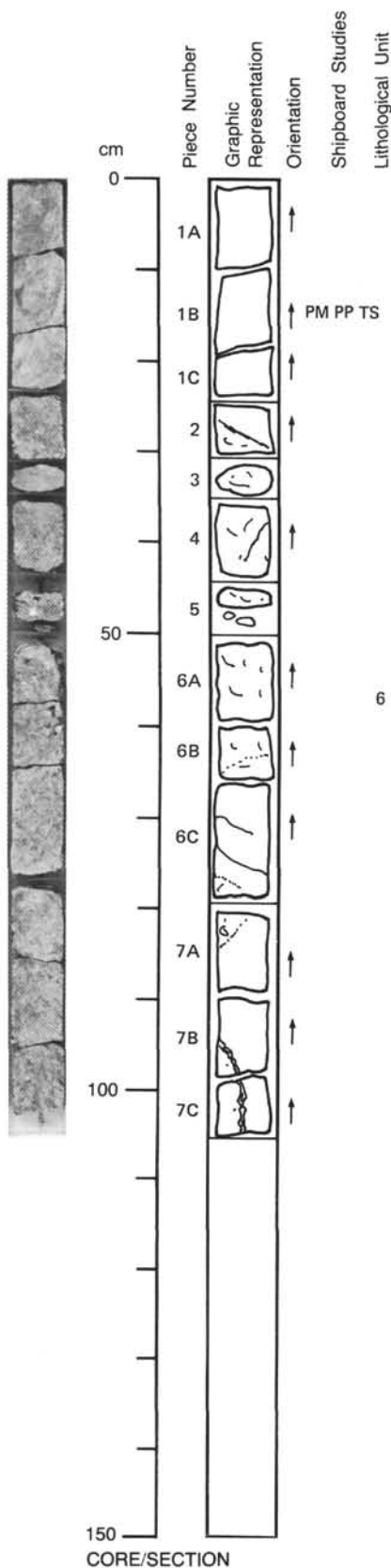
Total percent: 0%-20%.

Texture: Abundant (up to 20%) amphiboles, replacing clinopyroxene. Pyroxene altered to pinkish color. Plagioclase is albitized. Pegmatoidal gabbro appears to be large hornblende-plagioclase vein with large euhedral plagioclase (2 cm) and hornblendes (2 cm) growing perpendicular to sides.

Percent vein material: 5%.

Vein material: Amphibole and plagioclase.

COMMENTS: Disseminated sulfides.



UNIT 6: OLIVINE-RICH GABBRO AND TROCTOLITE

Pieces 1A-7

Olivine Gabbro

Pieces 1A-7

COLOR: Gray to greenish gray.

LAYERING: Not very pronounced, if any. Rock is predominantly coarse grained (average grain size between 1.0 and 2.0 cm) with some less coarse intervals.

DEFORMATION: Pieces 3E-7F appear to be undeformed. Pieces 1A-3D exhibit deformation along major vein, i.e. almost vertical.

PRIMARY MINERALOGY:

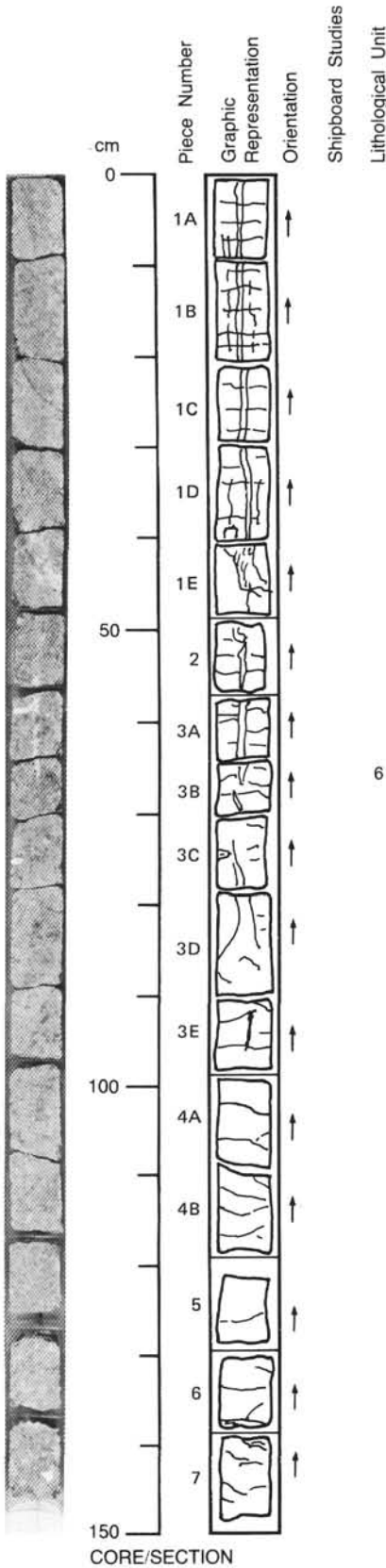
Plagioclase—Mode: 50%-60%.
 Crystal size: 1-2 cm.
 Crystal shape: Anhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

Clinopyroxene—Mode: 30%-40%.
 Crystal size: 0.5-2.5 cm.
 Crystal shape: Anhedral to subhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

Olivine—Mode: 10%.
 Crystal size: Up to 2.5 cm.
 Crystal shape: Anhedral to subhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.

SECONDARY MINERALOGY:

Total percent: Moderately altered.
 Texture: Section is moderately altered and intensely veined (Pieces 1A-3E). There is one major, almost vertical vein from Pieces 1A-3B, up to 1 cm across, and filled with Iron-titanium oxides (Pieces 1A-1D). This vein is older than the numerous subhorizontal veinlets (filled with white minerals) and also older than the albite and amphibole vein continuing on Pieces 1D-3D. Satellite veins with sulfides, especially well developed on Piece 1D.
 Percent vein material: Not determined.
 Vein material: Iron-titanium oxides, white minerals, albite, amphibole, and sulfides.



6

118-735B-82R-4

UNIT 6: OLIVINE-RICH GABBRO AND TROCTOLITE

Pieces 1A-8D

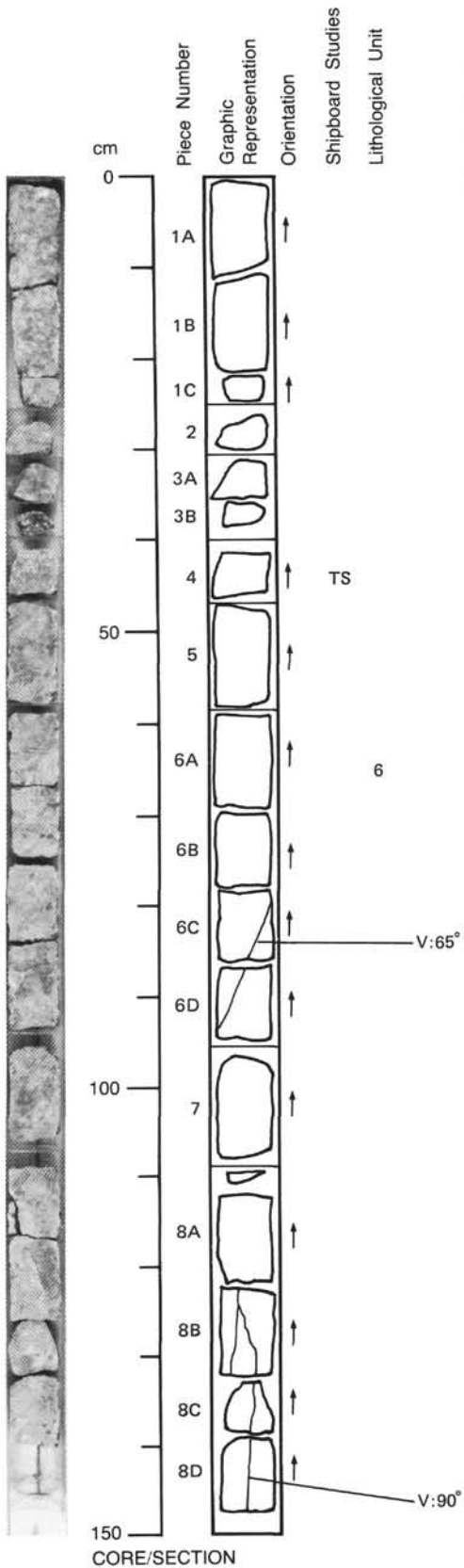
Olivine Gabbro

Pieces 1A-8D

COLOR: Gray.
LAYERING: No apparent layering.
DEFORMATION: No deformation except in Pieces 8B-8D where sheared amphibole vein is present.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 60%.
 Crystal size: 3-40 mm.
 Crystal shape: Anhedral to subhedral.
 Preferred orientation: None.
 Percent replacement: None.

 Clinopyroxene—Mode: 25%-30%.
 Crystal size: 2-30 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: <5% generally by amphibole, but up to 20% where veined.

 Olivine—Mode: 15%.
 Crystal size: 2-15 mm.
 Crystal shape: Subhedral to anhedral.
 Preferred orientation: None.
 Percent replacement: None or trace by amphibole.
SECONDARY MINERALOGY:
 Total percent: <3%, locally up to 10%.
 Texture: Amphibole replacing clinopyroxene approximately 5% generally, but the amount increases up to 20% in veined or sheared portions such as Pieces 8B-8D. In these portions olivine is altered into pale green mineral (tremolite?).
 Percent vein material: Trace.
 Vein material: Amphibole and albite filled cracks occur in Pieces 6C and 6D.
COMMENTS: Coarse grained subophitic.



UNIT 6: OLIVINE-RICH GABBRO AND TROCTOLITE

Pieces 1-11C

Olivine Gabbro

Pieces 1-4

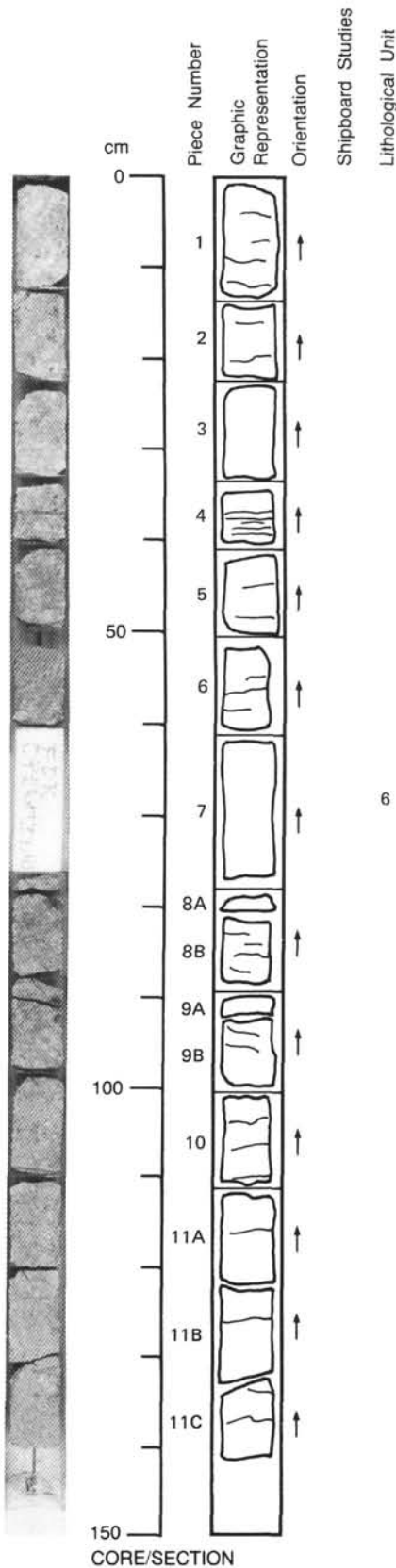
COLOR: Gray.
LAYERING: None.
DEFORMATION: None.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 50%-60%.
 Crystal size: Up to 3 cm.
 Crystal shape: Subhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.
 Clinopyroxene—Mode: 30%-40%.
 Crystal size: Up to 2.5 cm.
 Crystal shape: Anhedral-subhedral
 Percent replacement: Not determined.
 Percent replacement: Not determined.
 Olivine—Mode: 10%.
 Crystal size: Up to 2 cm.
 Crystal shape: Anhedral.
 Percent replacement: Not determined.
 Percent replacement: Not determined.

SECONDARY MINERALOGY:
 Total percent: Moderate alteration.
 Texture: Intense amphibole replacement (up to 50%), olivine sometimes with preserved fresh core. Few subhorizontal white veinlets. Pieces 2 and 4 are extensively altered. Lower half of Piece 4 strongly mylonitized (subhorizontal deformation bands).
 Percent vein material: Not determined.
 Vein material: Not determined.

Foliated Iron-Titanium Oxide-Rich Olivine Gabbro

Pieces 5-11C

COLOR: Medium to dark gray.
LAYERING: None apparent. Medium- to coarse-grained (1 cm).
DEFORMATION: Strong foliation, defined by stretched plagioclase, olivine, and clinopyroxene. Iron-titanium oxides form layers (deformation layers?).
PRIMARY MINERALOGY:
 Plagioclase—Mode: 30%-50%.
 Crystal size: Up to 2 cm.
 Crystal shape: Anhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.
 Clinopyroxene—Mode: 30%.
 Crystal size: Up to 2 cm.
 Crystal shape: Anhedral-subhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.
 Olivine—Mode: 10%-20%.
 Crystal size: Up to 1.5 cm.
 Crystal shape: Anhedral.
 Preferred orientation: Not determined.
 Percent replacement: Not determined.
 Iron-titanium oxides—Mode: 10%-25%
 Sulfides—Mode: <1%.
SECONDARY MINERALOGY:
 Total percent: Moderately altered.
 Texture: Rocks are moderately altered. Amphibole replacement (50% and more).
 Percent vein material: Not determined.
 Vein material: Not determined.



118-735B-82R-6

UNIT 6: OLIVINE-RICH GABBRO AND TROCTOLITE

Pieces 1-7

Iron-Titanium Oxide Gabbro

Pieces 2 and 4A-5F

COLOR: Greenish gray with black streaks.
LAYERING: None apparent. Foliation defined by elongated clinopyroxene and oxide minerals is marked. It dips 40°.
DEFORMATION: Locally porphyroclastic. Plagioclase is recrystallized into smaller grains. Locally undeformed portion remains.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 55%-60%.
 Crystal size: Not determined.
 Crystal shape: Anhedral.
 Preferred orientation: Apparent.
 Percent replacement: None.

 Clinopyroxene—Mode: 30%-35%.
 Crystal size: 5-20 mm.
 Crystal shape: Subhedral, anhedral.
 Preferred orientation: Apparent.
 Percent replacement: 10%-20% by amphibole.

 Olivine—Mode: <3%.
 Crystal size: 5 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Not apparent.
 Percent replacement: Not clear.

 Iron-titanium oxide—Mode: 5%-15%.
 Crystal size: 2-20 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Marked.
 Percent replacement: None.
SECONDARY MINERALOGY:
 Total percent: 10%.
 Texture: Amphibole replacing clinopyroxene, 10-20%.
 Percent vein material: None.
 Vein material: None.

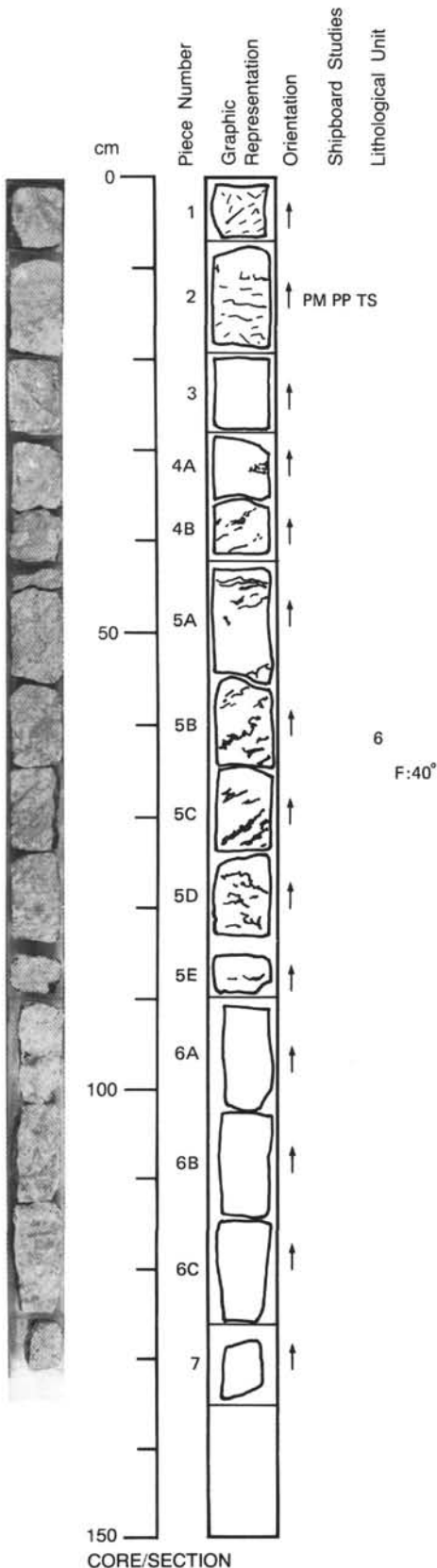
Olivine Gabbro

Pieces 1, 3, and 6A-7

COLOR: Gray.
LAYERING: No layering.
DEFORMATION: None apparent.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 60%.
 Crystal size: 10-20 mm.
 Crystal shape: Euhedral-subhedral.
 Preferred orientation: None.
 Percent replacement: None.

 Clinopyroxene—Mode: 25%.
 Crystal size: 3-20 mm. Most clinopyroxene is oikocrystic up to 10-20 mm across.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: Trace by amphibole.

 Olivine—Mode: 15%.
 Crystal size: 3-13 mm.
 Crystal shape: Subhedral-anhedral.
 Preferred orientation: None.
 Percent replacement: Trace by amphibole.
SECONDARY MINERALOGY:
 Total percent: <3%.
 Texture: Amphibole replacing clinopyroxene and olivine approximately 5%.
 Percent vein material: None.
 Vein material: None.



118-735B-82R-7

UNIT 6: OLIVINE-RICH GABBRO AND TROCTOLITE

Pieces 1A-6

Olivine Gabbro

Pieces 1A-6

COLOR: Gray.

LAYERING: None apparent.

DEFORMATION: None apparent.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%-55%.

Crystal size: 3-20 mm.

Crystal shape: Subhedral-euhedral.

Preferred orientation: Not determined.

Percent replacement: Not determined.

Clinopyroxene—Mode: 40%.

Crystal size: 3-15 mm.

Crystal shape: Subhedral, oikocrystic.

Preferred orientation: Not determined.

Percent replacement: Not determined.

Olivine—Mode: 5%-10%.

Crystal size: 3-10 mm.

Crystal shape: Anhedral.

Preferred orientation: Not determined.

Percent replacement: Not determined.

SECONDARY MINERALOGY:

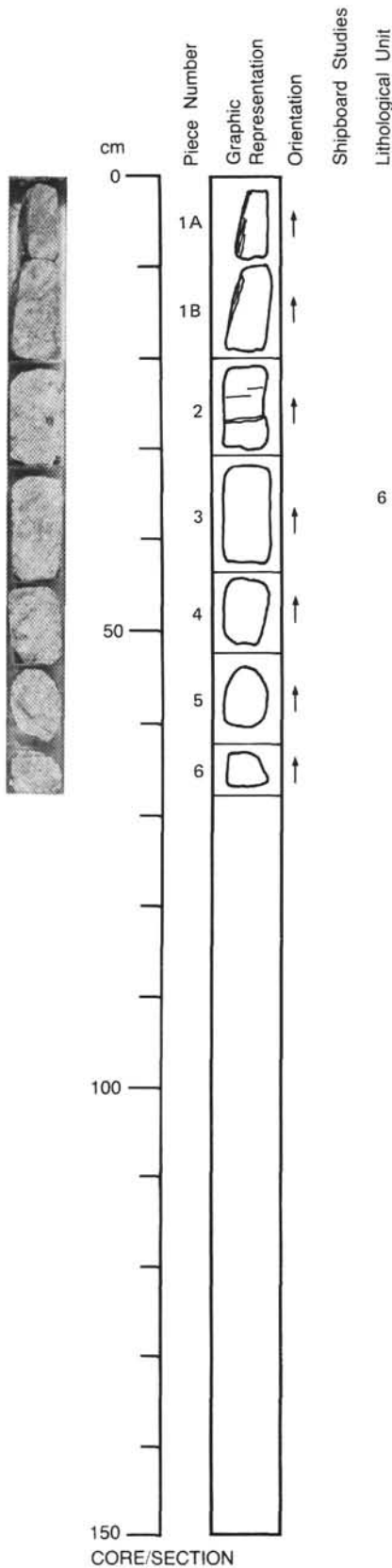
Total percent: 10%-15%.

Texture: Clinopyroxene partly altered to amphibole. Olivine altered to magnetite (mesh texture) plus tremolite(?). Narrow rims around olivine pseudomorphs (chloritic?).

Percent vein material: Not determined.

Vein material: White streaks (< 1.5 mm veins) common. Vein on surface Pieces 1A and 1B contains tremolite-actinolite + talc(?).

COMMENTS: Pyroxene is often green with pinkish rim or entirely pinkish.



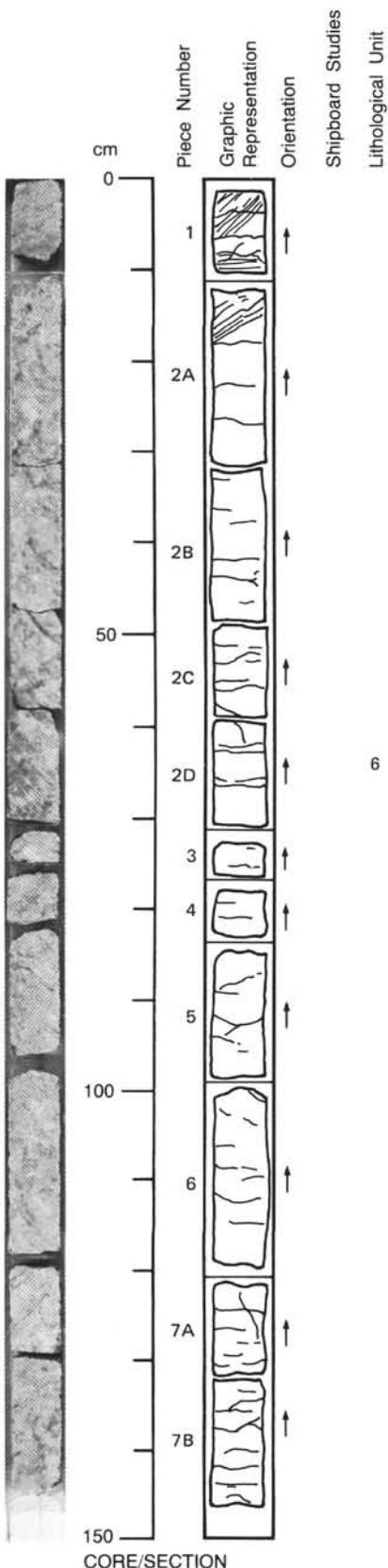
118-735B-83R-1

UNIT 6: OLIVINE-RICH GABBRO AND TROCTOLITE

Pieces 1-7B

Olivine Gabbro

Pieces 1-7B



F:25-30°

COLOR: Gray.

F:30-35°

LAYERING: Weak layering indicated by grading in grain size. Possibly two "cycles" each from medium- to coarse-grained to very coarse-grained. Interval 20-62 cm: Increase in size from 1-2 cm on average to 1.5-2.5 cm on average; interval 62-147 cm: increase in average grain size from 1.0 cm to 1.5-2.5 cm (Piece 7).

DEFORMATION: Poorly defined foliation in Piece 1. No deformation in other pieces.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%-60%.
 Crystal size: Up to 3 cm.
 Crystal shape: Not determined.
 Preferred orientation: None except in Piece 1.
 Percent replacement: None apparent.

Clinopyroxene—Mode: 30%-40%.
 Crystal size: Up to 3 cm.
 Crystal shape: Not determined.
 Preferred orientation: None except in Piece 1.
 Percent replacement: < 10% by amphibole.

Olivine—Mode: < 10%-20%.
 Crystal size: Up to 2.5 cm.
 Crystal shape: Anhedra.
 Preferred orientation: None except in Piece 1.
 Percent replacement: Not determined.

SECONDARY MINERALOGY:

Total percent: < 15%.
 Texture: Amphibole replaces clinopyroxene and olivine, some talc also replaces olivine. The plagioclase is not visibly albitized.
 Percent vein material: < 1%.
 Vein material: Very thin subhorizontal white veins.

COMMENTS: The clinopyroxene is brownish.

118-735B-83R-2

UNIT 6: OLIVINE-RICH GABBRO AND TROCTOLITE

Pieces 1-7E

Olivine Gabbro

Pieces 1-7E

COLOR: Gray.

LAYERING: There are modal variations, suggesting layering. Piece 6 has an olivine-rich layer. No apparent size variation.

DEFORMATION: None apparent.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%-60%.

Crystal size: 5-20 mm, (average 10 mm).

Crystal shape: Euhedral.

Preferred orientation: Slight, 10°-20° inclining.

Percent replacement: None.

Clinopyroxene—Mode: 10%-30%.

Crystal size: 5-30 mm (average 15 mm).

Crystal shape: Anhedral, oikocrystic (e.g., Piece 6).

Preferred orientation: Not clear.

Percent replacement: 5% by amphibole.

Olivine—Mode: 10%-25%.

Crystal size: 5-20 mm, (average 10 mm).

Crystal shape: Anhedral, oikocrystic (e.g., Piece 6).

Preferred orientation: Not clear.

Percent replacement: 5% by tremolite.

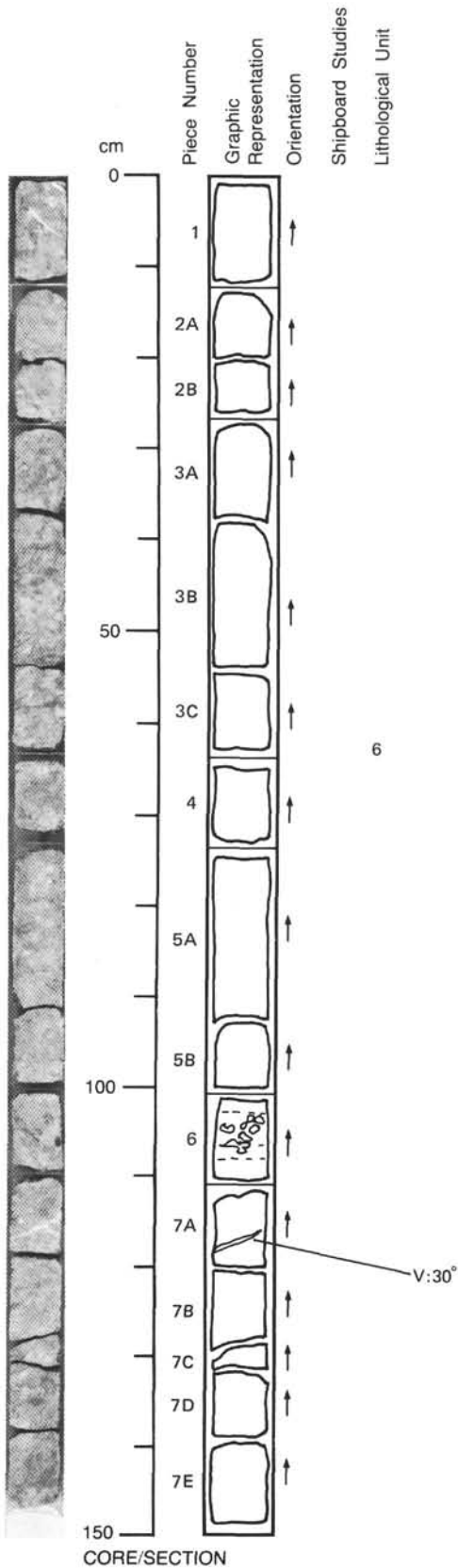
SECONDARY MINERALOGY:

Total percent: 5%.

Texture: Amphibole replacing clinopyroxene and olivine 5%. Olivine has white veins of tremolite and mica or talc.

Percent vein material: Trace.

Vein material: Plagioclase.



118-735B-83R-3

UNIT 6: OLIVINE-RICH GABBRO AND TROCTOLITE

Pieces 1-7

Olivine Gabbro

Pieces 1-7

COLOR: Gray.

LAYERING: Only faintly developed. Small changes in grain size, from medium-grained (very top Piece 1, 0.5-1.0 cm), over coarse-grained (1.5-2.5 cm, most pieces) to very coarse-grained (2.5 cm). Probably some phase layering, olivine enrichment between 48 and 72 cm.

DEFORMATION: None apparent.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%-60%.

Crystal size: Up to 3 cm.

Crystal shape: Anhedral.

Preferred orientation: Not determined.

Percent replacement: Not determined.

Clinopyroxene—Mode: 30%-40%.

Crystal size: Up to 3 cm.

Crystal shape: Anhedral.

Preferred orientation: Not determined.

Percent replacement: Not determined.

Olivine—Mode: 5%-20%.

Crystal size: Up to 2.5 cm.

Crystal shape: Anhedral.

Preferred orientation: Not determined.

Percent replacement: Not determined.

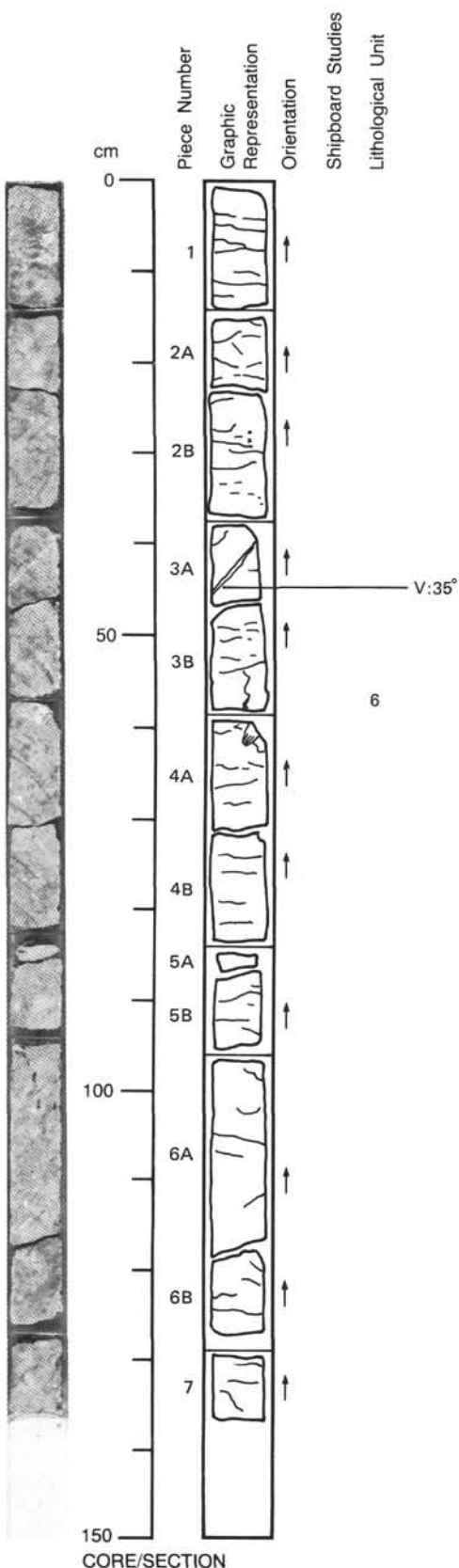
SECONDARY MINERALOGY:

Total percent: Slight.

Texture: Amphibole replacement of clinopyroxene (<10%). Olivine shows rims of talc + tremolite(?). Few sulfides.

Percent vein material: 3%-4%.

Vein material: Veins with plagioclase and amphibole (Pieces 3A and 4A).



118-735B-83R-4

UNIT 6: OLIVINE-RICH GABBRO AND TROCTOLITE

Pieces 1A-5F

Olivine Gabbro

Pieces 1A-5F

COLOR: Light gray.

LAYERING: Size grading, coarsening from Piece 1A to Piece 3. Average pyroxene size increases from 5 to 15 mm.

DEFORMATION: Localized shear zones (Pieces 5A and 5B) and mylonite zones (Piece 4). Gradient in deformation from mylonitized gabbro to undeformed gabbro in Pieces 4-5B.

PRIMARY MINERALOGY:

Plagioclase—Mode: 55%-65%.
 Crystal size: 3-20 mm.
 Crystal shape: Subhedral-euhedral.
 Preferred orientation: None apparent.
 Percent replacement: 30%-50% by secondary plagioclase.

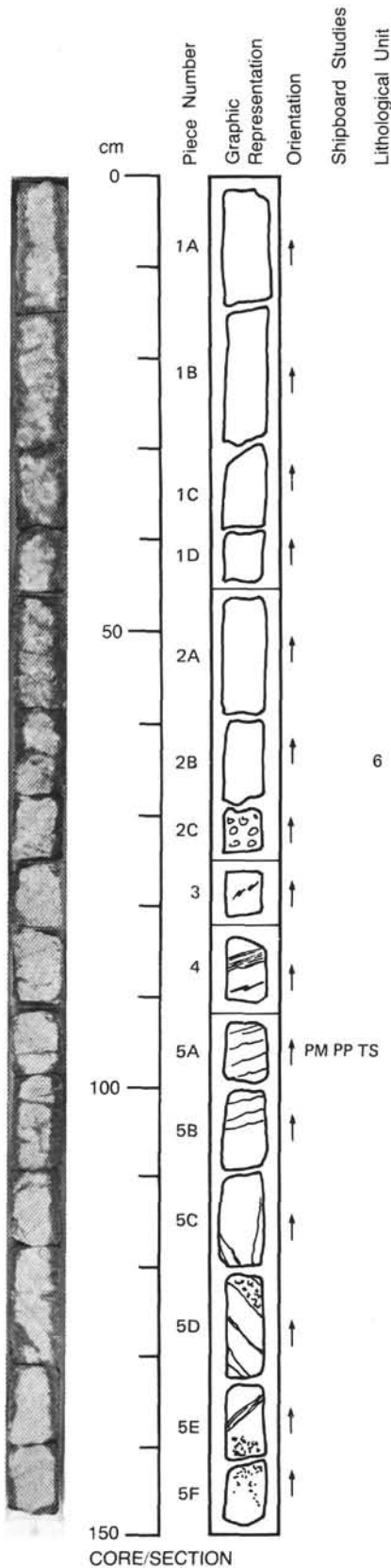
Clinopyroxene—Mode: 35%.
 Crystal size: 3-20 mm.
 Crystal shape: Subophitic.
 Preferred orientation: None apparent.
 Percent replacement: 30% by amphibole.

Olivine—Mode: 5%-10%.
 Crystal size: 2-10 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None apparent.
 Percent replacement: 30% by magnetite and tremolite with rims of chlorite(?).

Iron-titanium oxide—Mode: Trace.
 Crystal size: Not determined.
 Crystal shape: Fine-grained interstitial aggregate.
 Preferred orientation: None apparent.
 Percent replacement: Not determined.

SECONDARY MINERALOGY:

Total percent: 20%.
 Texture: Olivine replaced by meshwork of magnetite + tremolite. Rim of chloritic(?) material around relicts and pseudomorphs. Clinopyroxene partly replaced by amphibole. Iron-titanium oxide most common in coarse-grained Piece 3.
 Percent vein material: 1%-2%.
 Vein material: Veins of amphibole in Pieces 5C-5E.



CORE/SECTION

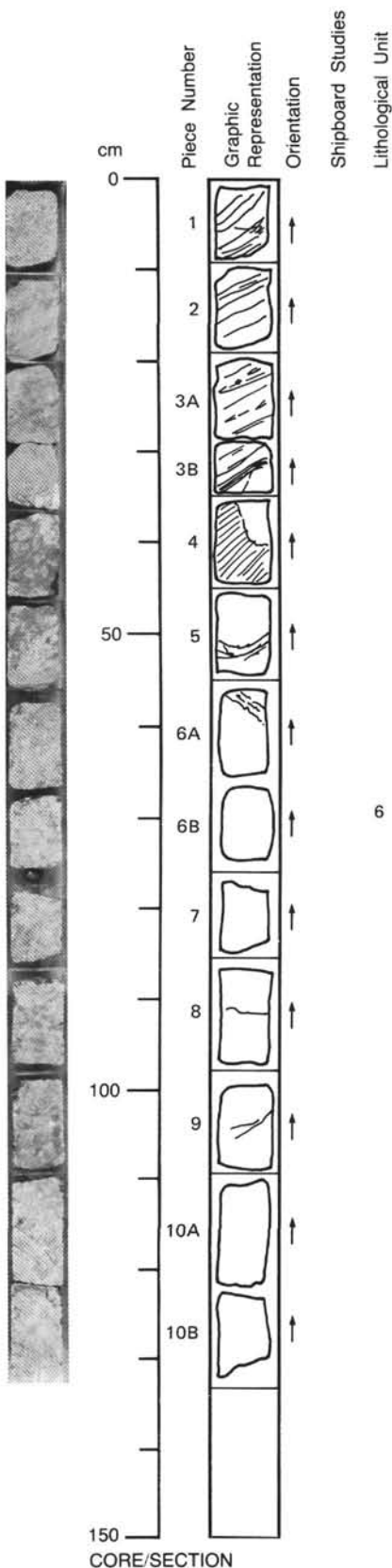
118-735B-83R-5

UNIT 6: OLIVINE-RICH GABBRO AND TROCTOLITE

Pieces 1-10B

Olivine Gabbro

Pieces 1-10B



F:45°

COLOR: Brownish gray.
LAYERING: Some modal variations: felsic-rich regions in Pieces 3B, 4, and 7A.
DEFORMATION: Mylonite bands rich in opaques in Pieces 2, 3A, 3B, 5, and 6A. Piece 1 is porphyroclastic, but lacks ore enrichment.

PRIMARY MINERALOGY:

F:20°

Plagioclase—Mode: 50%-70%.
 Crystal size: 0.5-1 cm.
 Crystal shape: Subhedral to poikilitic.
 Preferred orientation: None observed.
 Percent replacement: 10%-15% by sodic plagioclase.

F:30°

Clinopyroxene—Mode: 15%-20%.

F:20°

Crystal size: 0.5-2 cm.
 Crystal shape: Large oikocrysts.
 Preferred orientation: None observed.
 Percent replacement: 15% by amphibole.

Olivine—Mode: 15%-30%.
 Crystal size: < 1 cm.
 Crystal shape: Rounded.
 Preferred orientation: None observed.
 Percent replacement: Minor.

SECONDARY MINERALOGY:

Total percent: 15%-30%.
 Texture: Plagioclase is altered to sodic plagioclase. Up to 15% of clinopyroxene is altered to green amphibole.
 Percent vein material: <5%.
 Vein material: Amphibole.

COMMENTS: Pieces 1-6A are foliated. Magnetite/Ilmenite in foliation plane in Pieces 2, 3A and 3B and in deformed lenses in Piece 5. Disseminated sulfide, some intergrown with opaques. Massive ore enrichment zone with sheared contact against felsic gabbro in Piece 4.

UNIT 6: OLIVINE-RICH GABBRO AND TROCTOLITE

Pieces 1A-11

Undeformed-Deformed Olivine Gabbro and Troctolite

Pieces 1A-2, and 4-8

COLOR: Greenish gray.
LAYERING: None apparent.
DEFORMATION: 5- to 15-mm-sized clinopyroxene and plagioclase porphyroclasts are remarkably visible, especially in Pieces 1A-1C. Opaque- and plagioclase-rich mylonitic layer defines foliation, which inclines 10°. There is undeformed olivine gabbro in between porphyroclastic ones. Porphyroclast size is small in Pieces 7A and 7B, which are just above troctolite layer.

PRIMARY MINERALOGY:
 Plagioclase—Mode: 60%.
 Crystal size: 5-15 mm (porphyroclast).
 Crystal shape: Anhedral.
 Preferred orientation: Apparent.
 Percent replacement: None.

Clinopyroxene—Mode: 30%.
 Crystal size: 5-15 mm (porphyroclast).
 Crystal shape: Anhedral.
 Preferred orientation: Apparent.
 Percent replacement: 15% by amphibole.

Olivine—Mode: 5%-10%.
 Crystal size: <5 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Not observed.
 Percent replacement: Replaced by amphibole.

SECONDARY MINERALOGY:
 Total percent: 5%-10%.
 Texture: Abundant amphibole replaces clinopyroxene (15%). Olivine is also altered into amphibole(?)
 Percent vein material: None.
 Vein material: None.

Olivine Gabbro (Undeformed)

Piece 3

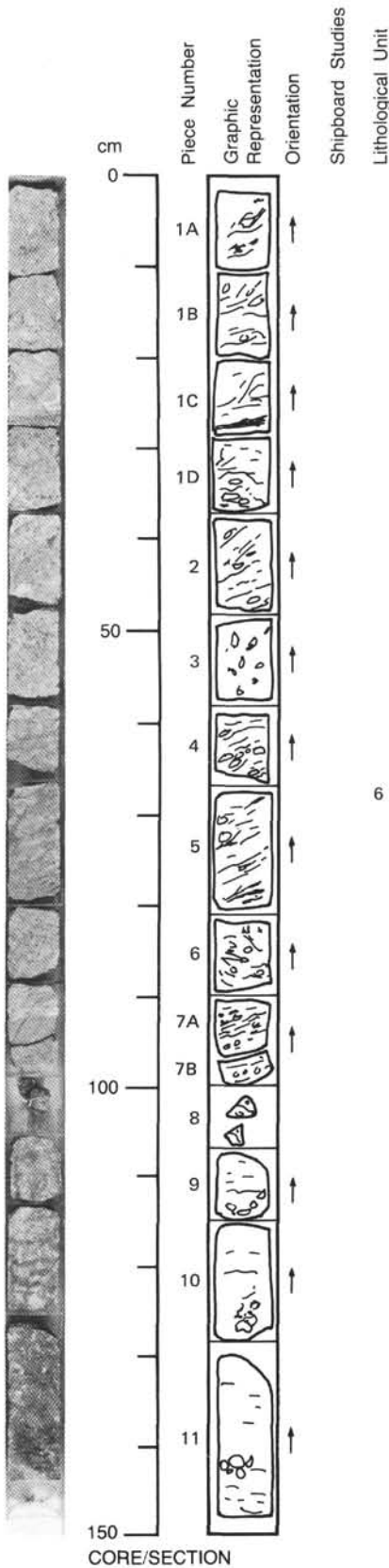
COLOR: Gray, black-speckled (olivine).
LAYERING: Not clear.
DEFORMATION: Slight deformation of clinopyroxene and plagioclase can be seen. Slight foliation defined by the elongate clinopyroxene and plagioclase.

PRIMARY MINERALOGY:
 Plagioclase—Mode: 65%.
 Crystal size: 5 mm.
 Crystal shape: Subhedral.
 Preferred orientation: Apparent.
 Percent replacement: None.

Clinopyroxene—Mode: 25%.
 Crystal size: 7 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Apparent.
 Percent replacement: 10% by amphibole.

Olivine—Mode: 20%.
 Crystal size: 5 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: Replaced by amphibole.

SECONDARY MINERALOGY:
 Total percent: <5%.
 Texture: Clinopyroxene and olivine replaced by amphibole (10%).
 Percent vein material: None.
 Vein material: None.



CORE/SECTION

118-735B-83-7

UNIT 6: OLIVINE-RICH GABBRO AND TROCTOLITE

Pieces 1-7C

Olivine Gabbro

Pieces 1-7C

COLOR: Greenish gray, locally spotted where plagioclase is altered.
LAYERING: Size grading. In one graded unit, olivine varies from an average size of 2 mm in Piece 2 to an average size of 3 mm in Piece 4B. In another graded unit, olivine varies from an average size of 1 mm in Piece 5 to an average of 5 mm in Piece 7C.

DEFORMATION: Localized shear zone in Piece 4A.

PRIMARY MINERALOGY:

Plagioclase—Mode: 35%-60%.
Crystal size: 1-8 mm.
Crystal shape: Euhedral in plagioclase-rich zones, anhedral-interstitial in olivine-rich zones.
Preferred orientation: Not determined.
Percent replacement: 10-20%.

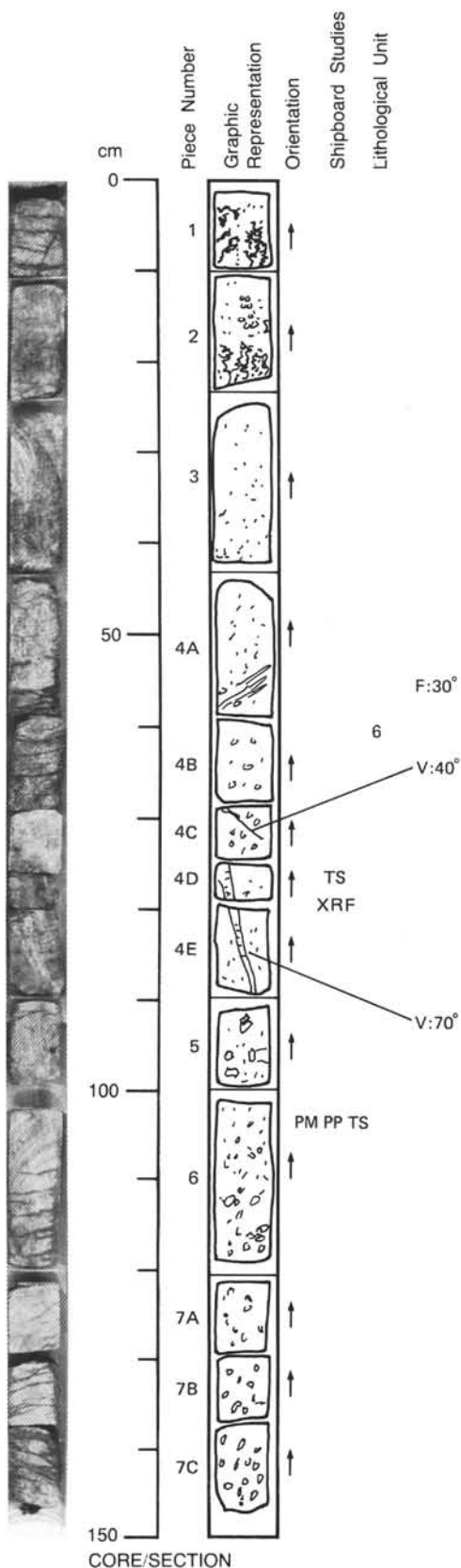
Clinopyroxene—Mode: 5%.
Crystal size: 25 mm.
Crystal shape: Oikocrystic.
Preferred orientation: Not determined.
Percent replacement: 10-20% by amphibole.

Olivine—Mode: 35%-60%.
Crystal size: 1-10 mm.
Crystal shape: Subhedral-anhedral in plagioclase-rich zones, euhedral in olivine-rich zones.
Preferred orientation: Not determined.
Percent replacement: 20% by magnetite, tremolite, and talc.

Spinel—Mode: Trace.
Crystal size: 0.5 mm.
Crystal shape: Euhedral.
Preferred orientation: Not determined.
Percent replacement: Not determined.

SECONDARY MINERALOGY:

Total percent: 20%.
Texture: Olivine veined with magnetite + tremolite + talc. Clinopyroxene partly replaced by amphibole.
Percent vein material: Not determined.
Vein material: Veins in Pieces 4C-4E contain tremolite and talc.



118-735B-83R-6 (continued)

Troctolite

Pieces 9-11

COLOR: Black, speckled with white (plagioclase), green where clinopyroxene is present.

LAYERING: None apparent.

DEFORMATION: None apparent.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%.

Crystal size: 2-10 mm.

Crystal shape: Subhedral and anhedral.

Preferred orientation: Not clear.

Percent replacement: 10% by amphibole.

Clinopyroxene—Mode: 5%-7%.

Crystal size: 20-30 mm.

Crystal shape: Anhedral, oikocrystic.

Preferred orientation: None.

Percent replacement: 10% by amphibole.

Olivine—Mode: 45%.

Crystal size: 2-10 mm.

Crystal shape: Euhedral-subhedral.

Preferred orientation: Not clear.

Percent replacement: 20% by tremolite.

SECONDARY MINERALOGY:

Total percent: 10%-20%.

Texture: Olivine replaced by tremolite near vein. The cracks in olivine are filled by iron-titanium oxide. The cracks always incline 25°. Partly rich in amphibole. In Piece 11 (bottom), plagioclase is altered into milky, sodium-rich plagioclase.

Percent vein material: None.

Vein material: None.

118-735B-83R-8

UNIT 6: OLIVINE-RICH GABBRO AND TROCTOLITE

Pieces 1-6

Troctolite

Pieces 1-4

COLOR: Greenish dark gray.
LAYERING: Not seen.
DEFORMATION: None.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 65%.
 Crystal size: < 1 cm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: Not determined.

Clinopyroxene—Mode: < 1%.
 Crystal size: 1-5 cm.
 Crystal shape: Poikilitic.
 Preferred orientation: None.
 Percent replacement: Not determined.

Olivine—Mode: 35%.
 Crystal size: < 1 cm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: Not determined.

SECONDARY MINERALOGY:
 Total percent: Not determined.
 Texture: Relatively important alteration of olivine (rims of greenish minerals) especially developed in Piece 4 near the amphibole vein.
 Percent vein material: < 1%.
 Vein material: Amphibole.

Olivine Gabbro

Pieces 5-6

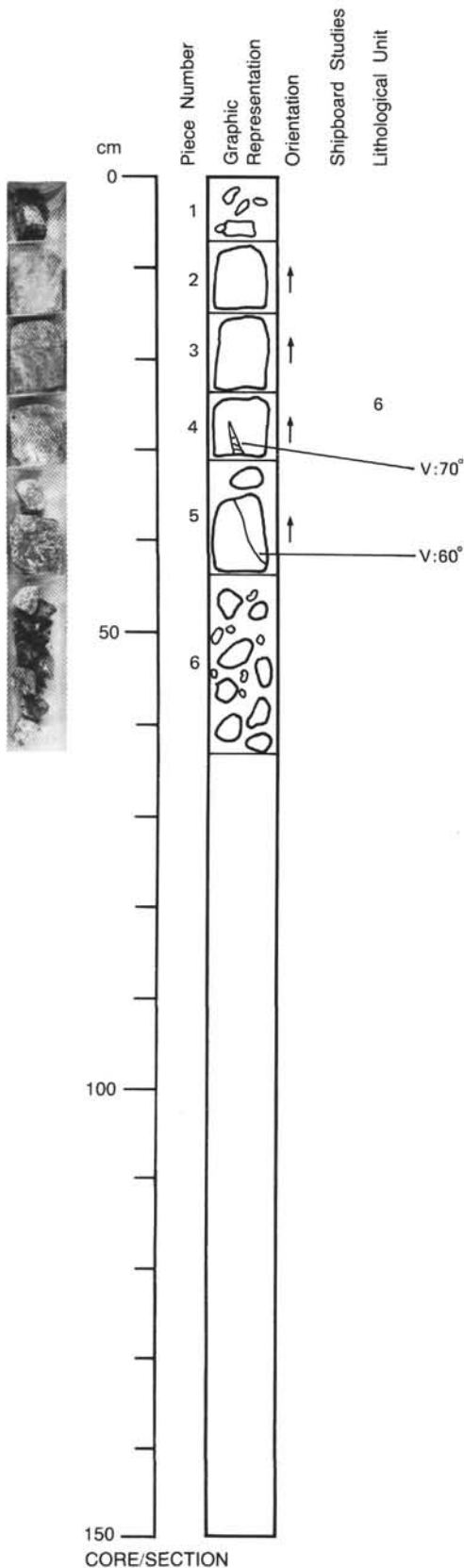
COLOR: Dark green.
LAYERING: Not seen.
DEFORMATION: Thin amphibole vein slightly sheared in Piece 5. Nothing else.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 50%-60%.
 Crystal size: Up to 1.5 cm.
 Crystal shape: Not determined.
 Preferred orientation: None.
 Percent replacement: Not determined.

Clinopyroxene—Mode: 30%-40%.
 Crystal size: Up to 1.5 cm.
 Crystal shape: Not determined.
 Preferred orientation: None.
 Percent replacement: Not determined.

Olivine—Mode: 10%-20%.
 Crystal size: Up to 1.5 cm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: Not determined.

SECONDARY MINERALOGY:
 Total percent: > 25%
 Texture: Amphibole replaces olivine and clinopyroxene. Talc also replaces olivine.
 Percent vein material: < 1%
 Vein material: Amphibole + epidote + sodic plagioclase.

COMMENTS: The contact between the troctolite and the olivine gabbro is sharp: it contrasts with the progressive contact observed in Section 118-735B-83R-6.



118-735B-84R-1

UNIT 6: OLIVINE-RICH GABBRO AND TROCTOLITE

Pieces 1-4F

Olivine Gabbro

Pieces 1-4F

COLOR: Gray.

LAYERING: Pieces 1, 2, and 3A are slightly more rich in olivine (>5%), grain size is coarse and does not vary significantly.

DEFORMATION: None except minute shearing along vein in Piece 4B.

PRIMARY MINERALOGY:

Plagioclase—Mode: 65%.

Crystal size: 1-4 cm.

Crystal shape: Euhedral-subhedral.

Preferred orientation: None.

Percent replacement: Not determined.

Clinopyroxene—Mode: 30%.

Crystal size: 1-4 cm.

Crystal shape: Euhedral-subhedral.

Preferred orientation: None.

Percent replacement: Not determined.

Olivine—Mode: <15%.

Crystal size: 1-4 cm.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: Not determined.

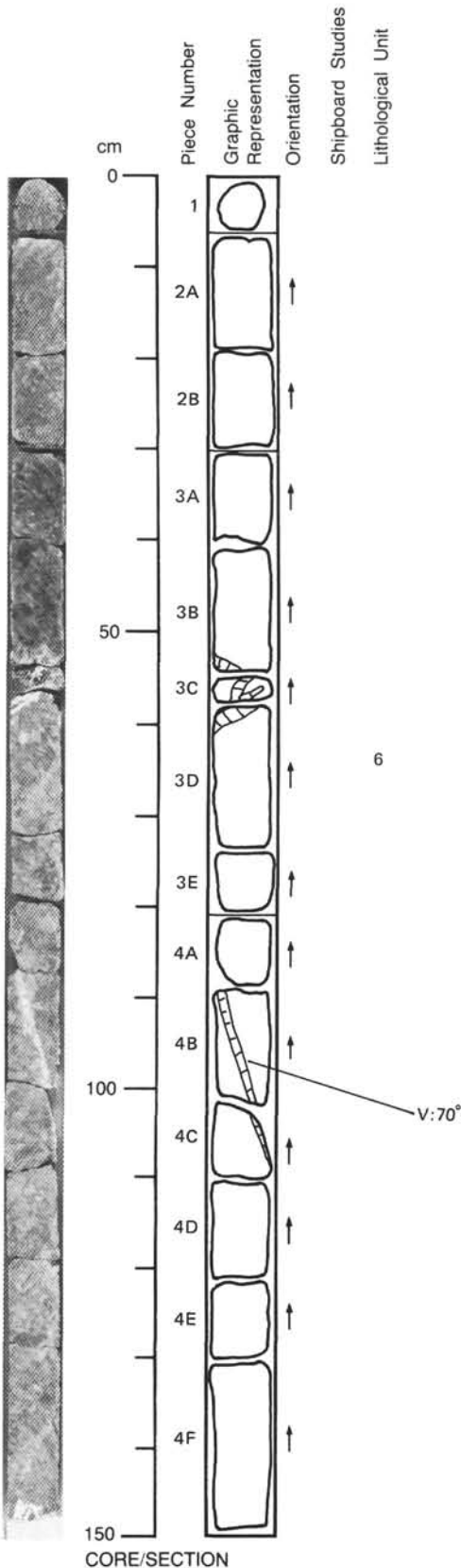
SECONDARY MINERALOGY:

Total percent: 25%.

Texture: Significant replacement of clinopyroxene by green amphibole and replacement aureoles around olivines; this replacement occurs through most pieces due to very thin microfractures filled with green amphibole.

Percent vein material: <1%.

Vein material: Very thin veins filled with amphibole and thicker veins filled with amphibole + sodic plagioclase.



118-735B-84R-2

UNIT 6: OLIVINE-RICH GABBRO AND TROCTOLITE

Pieces 1A-12

Olivine Gabbro with Porphyroclastic Metagabbro Intervals

Pieces 1A-12

COLOR: Gray.

LAYERING: None.

DEFORMATION: Lower one-half of Pieces 6 and 11, all of Pieces 7 and 12 are porphyroclastic; foliation defined by layers of plagioclase and stretched clinopyroxene. Clinopyroxene forms small augen.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%.

Crystal size: 1-2 cm.

Crystal shape: Anhedral to euhedral

Preferred orientation: Locally in plane of foliation.

Percent replacement: Slight to moderate.

Clinopyroxene—Mode: 40%.

Crystal size: 1-2.5 cm.

Crystal shape: Subhedral. Subophitically encloses plagioclase. It is brown in color.

Preferred orientation: Locally in plane of foliation.

Percent replacement: Slight to moderate.

Olivine—Mode: 10%.

Crystal size: 0.5-1.0 cm.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: Moderate.

Primary ilmenite—Mode: Trace.

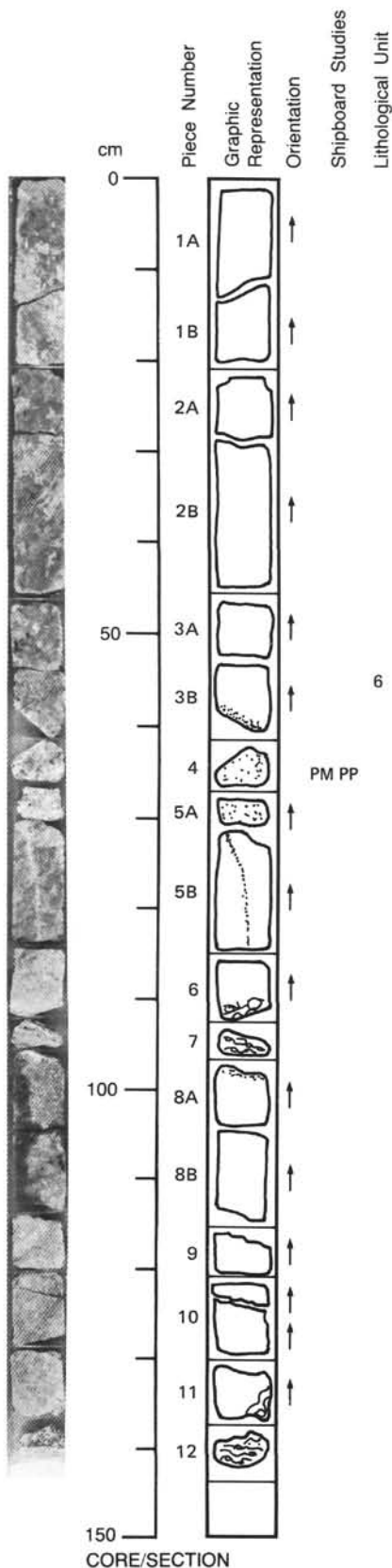
SECONDARY MINERALOGY:

Total percent: <1% away from deformed zones.

Texture: Amphibole occurs in very thin veins. Traces of sulfides. In porphyroclastic zones there appears to be an excess of iron oxides in layers parallel to foliation.

Percent vein material: Not determined.

Vein material: Vein in Piece 5B filled by amphibole (actinolite), as are thin veins on the back of Piece 11. Vein/autobrecciation in Pieces 4 and 5A composed of white plagioclase and nearly total replacement of primary clinopyroxene by amphibole.



118-735B-84R-3

UNIT 6: OLIVINE-RICH GABBRO AND TROCTOLITE

Pieces 1A-6

Olivine Gabbro

Pieces 1A-6

COLOR: Gray.

LAYERING: None clear. Some patchy coarse-fine grain transitions but no clear size or phase layering.

DEFORMATION: Minor, 0-3 cm—porphyroclastic gabbro.

PRIMARY MINERALOGY:

Plagioclase—Mode: 55%-65%.

Crystal size: 1-10 mm.

Crystal shape: Euhedral to anhedral.

Preferred orientation: Not observed.

Percent replacement: Not determined.

Clinopyroxene—Mode: 30%-35%.

Crystal size: 2-20 mm.

Crystal shape: Anhedral, subophitic to poikilitic, some in delicate flower-like intergrowths with plagioclase.

Preferred orientation: Not observed.

Percent replacement: Not determined.

Olivine—Mode: Not determined.

Crystal size: 2-6 mm.

Crystal shape: Anhedral, partially encloses plagioclase.

Preferred orientation: Not observed.

Percent replacement: In places moderately altered.

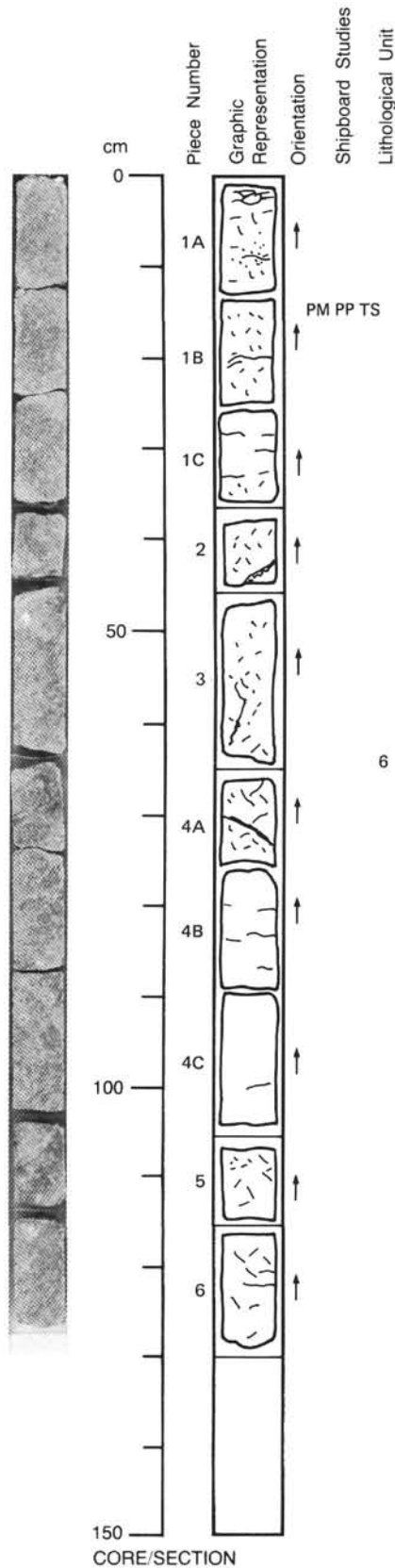
SECONDARY MINERALOGY:

Total percent: Not determined.

Texture: Magnetite-tremolite mesh replacing olivine (20%-40%); some amphibolitization of clinopyroxene, particularly around mylonite zone.

Percent vein material: Not determined.

Vein material: 1- to 2-mm-wide amphibole veins at 44, 60, and 72 cm. Numerous, <1-mm, subhorizontal feldspathic veins throughout.



118-735B-84R-4

UNIT 6: OLIVINE-RICH GABBRO AND TROCTOLITE

Pieces 1A-8B

Olivine Gabbro

Pieces 1A-8B

COLOR: Gray to white, green-white where veined and altered.

LAYERING: Some coarse to fine transitions definable in Pieces 3B (coarse-grained) and 3A (medium-grained), and in Piece 4A (coarse- to medium-grained from bottom to top). Rest of core is medium- to coarse-grained with a fine patch at 7 cm. Veining disrupts some of the size variations.

DEFORMATION: Small shear zone associated with veins at 72, 34, and 25 cm. The first has a shallow dip, the second dips steeply—may be a surface inclined at a shallow angle to the cut surface.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%-70%.

Crystal size: 2-10 mm.

Crystal shape: Anhedral.

Preferred orientation: Not determined.

Percent replacement: Not determined.

Clinopyroxene—Mode: 30%-40%.

Crystal size: 3-7 mm.

Crystal shape: Subhedral in coarser portions, anhedral, ophitic in finer portions, 3-7-mm clinopyroxene, have a brownish hue on cored surface.

Preferred orientation: Not determined.

Percent replacement: Not determined.

Olivine—Mode: 5%-10%.

Crystal size: 2-5 mm.

Crystal shape: Anhedral.

Preferred orientation: Not determined.

Percent replacement: Not determined.

SECONDARY MINERALOGY:

Total percent: 10%.

Texture: Mesh alteration of olivine. Amphibolization of clinopyroxene intense along veins. No quartz obvious. Often some shear along the margins and extensive alteration of the adjacent pyroxene.

Percent vein material: 8%.

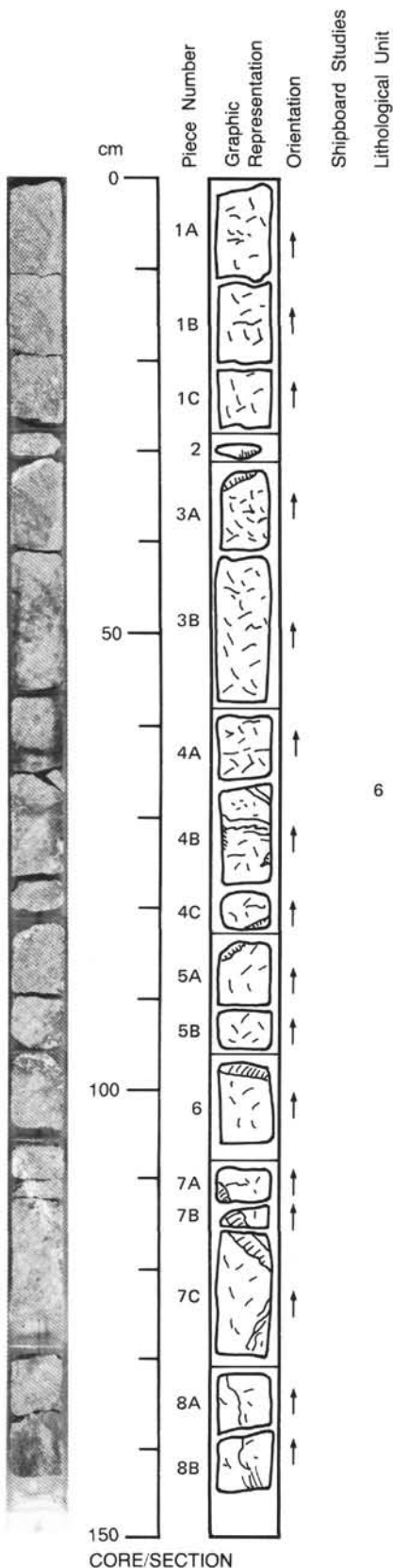
Vein material: 4- to 10-mm-wide veins of plagioclase + actinolite + brown epidote. Numerous subhorizontal fractures, some with feldspathic veins (<1 mm wide).

F: 25°

6

F: 20°

F: 60°



118-735B-84R-5

UNIT 6: OLIVINE-RICH GABBRO AND TROCTOLITE

Pieces 1-10

Olivine Gabbro

Pieces 1-10

COLOR: Greenish gray.
LAYERING: Not present.

DEFORMATION: Visible in Pieces 2 and 9. The foliation is defined by the stretching and preferred orientation of plagioclase and clinopyroxene. In Piece 2 the deformation affects all pieces and pyroxenes are more intensively amphibolitized. Massive magnetite and ilmenite zone present in interstitial spaces.

PRIMARY MINERALOGY:

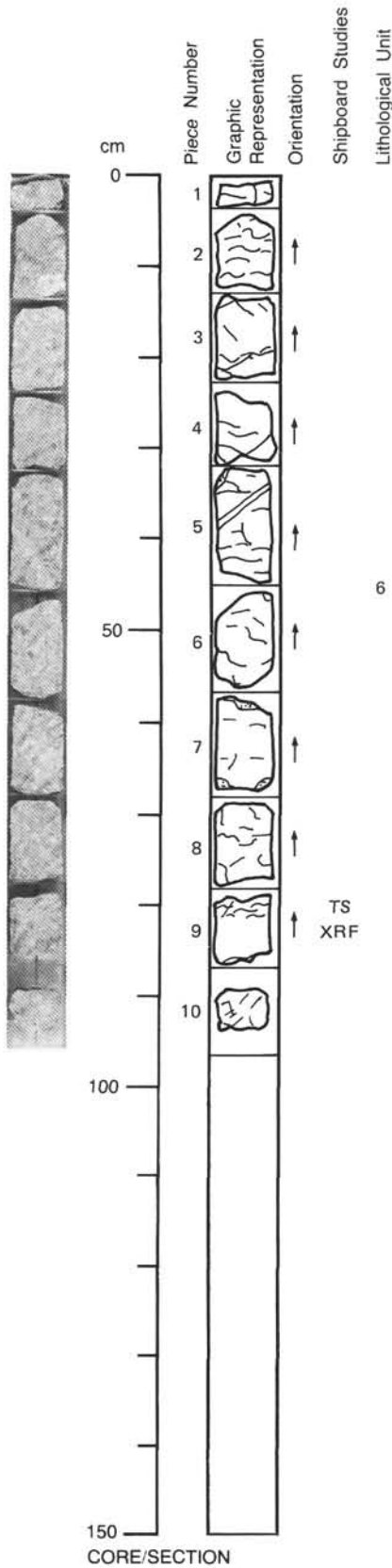
Plagioclase—Mode: 50%-60%.
Crystal size: 1-3 mm.
Crystal shape: Euhedral (chadacrysts).
Preferred orientation: Weak.
Percent replacement: Slight.

Clinopyroxene—Mode: 40%-50%.
Crystal size: 3-12 mm.
Crystal shape: Oikocrystic to anhedral.
Preferred orientation: Weak.
Percent replacement: Slight.

Olivine—Mode: 5%-10%.
Crystal size: 1-5 mm.
Crystal shape: Irregular, anhedral.
Preferred orientation: Not visible.
Percent replacement: Slight.

SECONDARY MINERALOGY:

Total percent: > 25%.
Textures: Olivine is altered to dark talc and magnetite with some proportions of brown clays. Plagioclase is replaced by milky sodic plagioclase (in Pieces 1, 2, 3, and 10). This plagioclase is cut by green amphibole veinlets. Clinopyroxene is altered to amphibole close to veins and cracks. Piece 2 is injected by secondary magnetite and sulfides along the plane of foliation. The oxides content reaches 20%. The sulfides are mainly chalcopyrite, pyrite, and pentlandite. *Ilmenite-magnetite intergrowth* is present in Piece 7 but could be primary.
Percent vein material: 2%.
Vein material: Green amphibole.



118-735B-84R-6

UNIT 6: OLIVINE-RICH GABBRO AND TROCTOLITE

Pieces 1A-8

Olivine Gabbro

Pieces 1A-8

COLOR: Gray.

LAYERING: Size-grading and phase-layering present. Grain size coarsens downsection from 0-92 cm from an average plagioclase lath size of 1 to 1.5 cm. Plagioclase-rich layer present in Piece 1D (26-28 cm) where it composes 80% of a 3 cm interval.

DEFORMATION: None.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%-75%.
 Crystal size: Averages 1-1.5 cm.
 Crystal shape: Euhedral to subhedral laths.
 Preferred orientation: None.
 Percent replacement: < 10%.

Clinopyroxene—Mode: 15%-35%.
 Crystal size: 3-20 mm.
 Crystal shape: Subophitic to intergranular anhedral.
 Preferred orientation: None.
 Percent replacement: < 10%.

Olivine—Mode: 5%-20%.
 Crystal size: Not determined.
 Crystal shape: Intergranular anhedral.
 Preferred orientation: None.
 Percent replacement: < 10%.

Oxides and Sulfides—Mode: < 1%.

SECONDARY MINERALOGY:

Total percent: Not determined.
 Texture: A large felsic vein tapering from 3 to 1 cm wide downsection through Pieces 1A-1H contains secondary salite (clinopyroxene) and has a plagioclase with a milky white color. Altered plagioclase in the gabbro adjacent to the vein also is milky white.
 Percent vein material: 5%.
 Vein material: Plagioclase and diopside.

COMMENTS: Equigranular gray subophitic to intergranular olivine gabbro. Euhedral to subhedral plagioclase partially enclosed by subophitic pyroxene and intergranular green olivine. Pyroxene is probably augite, but has a peculiar reddish brown cast to it.

Porphyroclastic Augen Gneiss

Piece 4 (90-95 cm)

COLOR: Gray.

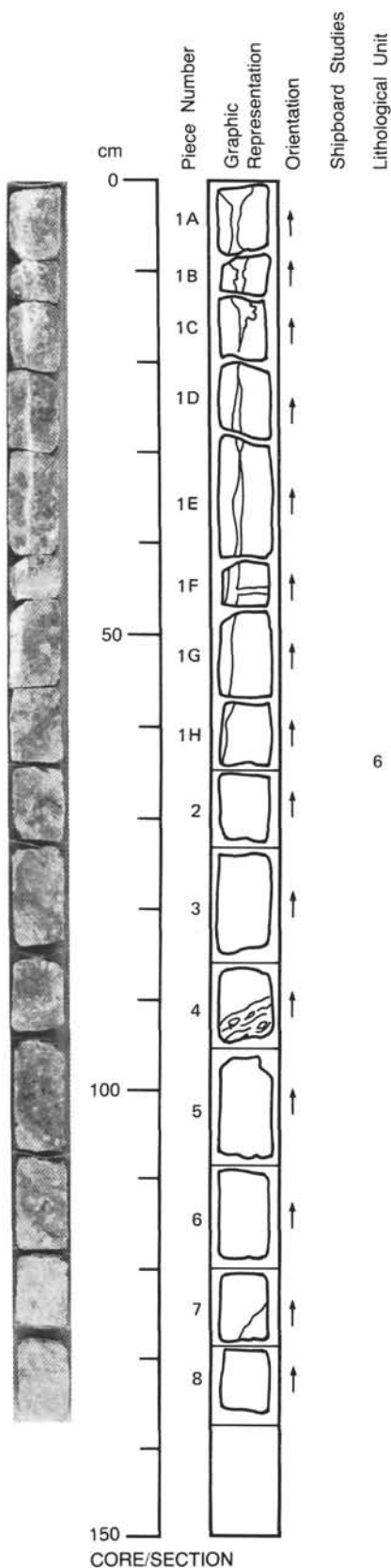
LAYERING: None.

DEFORMATION: Poorly foliated augen gneiss, deformed zone of olivine gabbro.

PRIMARY MINERALOGY: As in olivine gabbro.

SECONDARY MINERALOGY: As in olivine gabbro but with additional replacement and rimming of clinopyroxene by amphibole.

COMMENTS: Local enrichment of oxides.



118-735B-84R-7

UNIT 6: OLIVINE-RICH GABBRO AND TROCTOLITE

Pieces 1A-11

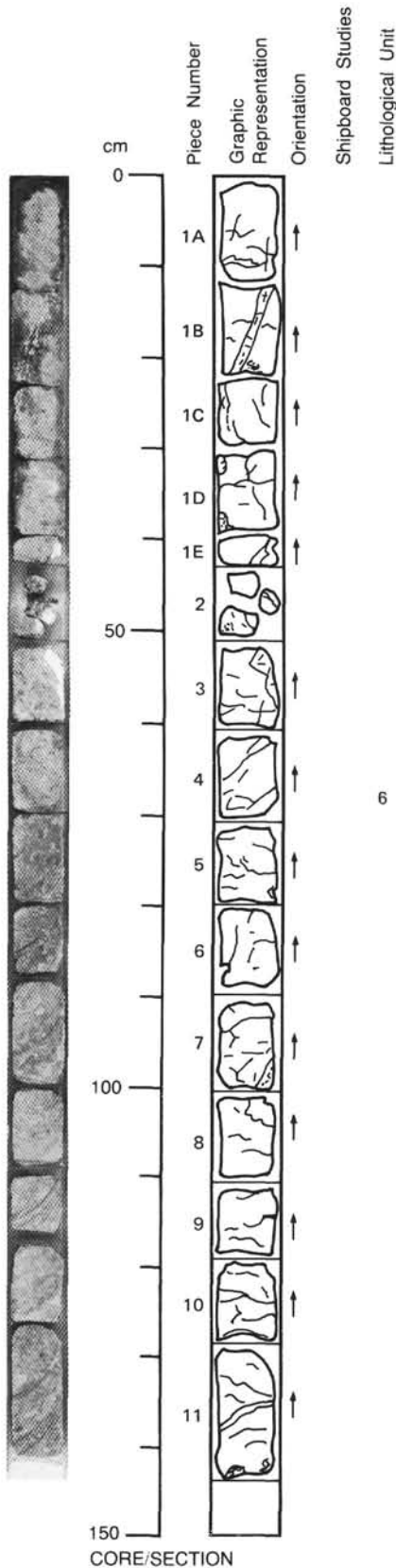
Massive to Slightly Foliated Olivine Gabbro

Pieces 1A-11

COLOR: Gray to brownish gray.
LAYERING: Not present.
DEFORMATION: Preferred orientation of plagioclase and pyroxene in Pieces 1C, 4, and 11. This foliation is probably magmatic.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 50%-60%.
 Crystal size: 1-4 mm.
 Crystal shape: Euhedral (chadacrysts in clinopyroxene).
 Preferred orientation: Not visible.
 Percent replacement: Slight.

 Clinopyroxene—Mode: 40%-50%.
 Crystal size: 2-15 mm.
 Crystal shape: Oikocrysts.
 Preferred orientation: Variable.
 Percent replacement: 30% by brown amphibole.

 Olivine—Mode: 5%-15%.
 Crystal size: 1-3 mm.
 Crystal shape: Anhedral, rounded.
 Preferred orientation: Not visible.
 Percent replacement: 20% by clays or chlorite, talc and magnetite.
SECONDARY MINERALOGY:
 Total percent: 5%-10%.
 Texture: Olivine is replaced by dark clays or chlorite and rimmed by talc and magnetite.
 Clinopyroxene is partly replaced (30%) by brown amphibole.
 Percent vein material: 3%-4%.
 Vein material: Veins are filled with plagioclase, epidote, and actinolite (Pieces 1E, 7, and 8).
 Clinopyroxene is slightly amphibolitized near the vein. Other types of vein are filled by grass-green amphibole (dipping 70°). Clinopyroxene is amphibolitized and plagioclase is albitized in less than 1 cm away from the vein walls. In flat, dipping cracks, there are amphibole and chlorite. Sulfides are disseminated throughout the section.



F:20°

F:30°

6

F:30°

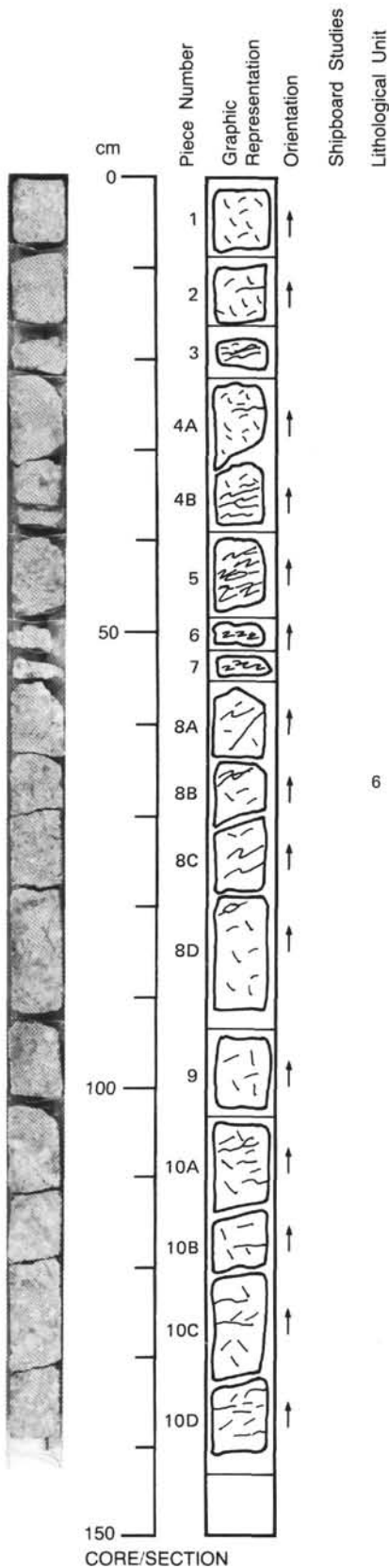
118-735B-85R-1

UNIT 6: OLIVINE-RICH GABBRO AND TROCTOLITE

Pieces 1-10D

Olivine Gabbro

Pieces 1-10D



COLOR: Gray to green-gray, and white where altered.

LAYERING: None well-defined. Deformation obscures grain size changes. A medium- to coarse-grained interval at 14-0 cm; 20-30 cm is medium- to coarse-grained; 80-140 cm is uniformly coarse-grained. Some lamination may be igneous.

DEFORMATION: Porphyroclastic gabbro from 35 to 80 cm, also a small deformation zone at 20 cm. Texture is interspersed porphyroclastic zones (clasts up to 10 mm) with less-deformed, igneous-textured pieces; the latter are probably blocks within the deformed zone. Lower boundary of zone is marked by a 7-mm-wide, oxide-rich zone.

PRIMARY MINERALOGY:

Plagioclase—Mode: 45%-65%.
Crystal size: 4-12 mm.
Crystal shape: Euhedral to anhedral.
Preferred orientation: None observed.
Percent replacement: Not determined.

Clinopyroxene—Mode: 30%-45%.
Crystal size: 5-15 mm.
Crystal shape: Subhedral to anhedral, granular to ophitic. Clinopyroxenes are brownish.
Preferred orientation: None observed.
Percent replacement: 30%-80% amphibolitization in shear zones.

Olivine—Mode: 5%-20% in coarser sections.
Crystal size: 3-13 mm.
Crystal shape: Anhedral to subhedral, sometimes enclosing plagioclase.
Preferred orientation: None observed.
Percent replacement: Extensively altered in deformed zone.

SECONDARY MINERALOGY:

Total percent: Not determined.
Texture: Olivine and clinopyroxene commonly altered, particularly in deformation zone. Olivine altered to dark magnetite/amphibole pseudomorphs, also to dark clayey aggregates in more deformed zones. 30%-80% amphibolitization of clinopyroxene in sheared zones.
Percent vein material: Not determined.

Vein material: Minor late stage epidote veins cutting foliation (Piece 8A). Thin, streaky, white, subhorizontal veins common (Piece 10C). Some subhorizontal brittle fractures throughout.

CORE/SECTION

118-735B-85R-2

UNIT 6: OLIVINE-RICH GABBRO AND TROCTOLITE

Pieces 1A-5

Porphyroclastic Augen Gneiss

Pieces 1A-3A, and 5

COLOR: Gray.
LAYERING: None.
DEFORMATION: Porphyroclastic texture. Foliation defined by layers of plagioclase and stretched porphyroclasts of clinopyroxene. Over most of the section deformation is not too intense and consists mostly of granulation of feldspar. Areas of apparently undeformed gabbro are mixed in with areas of deformation.

PRIMARY MINERALOGY:
 Plagioclase—Mode: 50%.
 Crystal size: 5-10 mm.
 Crystal shape: Subhedral.
 Preferred orientation: Locally in plane of foliation.
 Percent replacement: Extensive.

Clinopyroxene—Mode: 45%.
 Crystal size: 8-15 mm.
 Crystal shape: Subhedral.
 Preferred orientation: Locally in plane of foliation.
 Percent replacement: Extensive.

Olivine—Mode: 5%.
 Crystal size: 2-5 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: Extensive.

SECONDARY MINERALOGY:
 Total percent: Approximately 75%.
 Texture: Plagioclase recrystallized to neoblasts. Actinolite replaces clinopyroxene along grain boundaries and plagioclase adjacent to fractures. Abundant iron oxides and traces of sulfides in Pieces 1A-E. These are much less abundant in top of Piece 2A and absent below.
 Percent vein material: ~5%.
 Vein material: Amphibole on thin fractures.

Olivine Gabbro

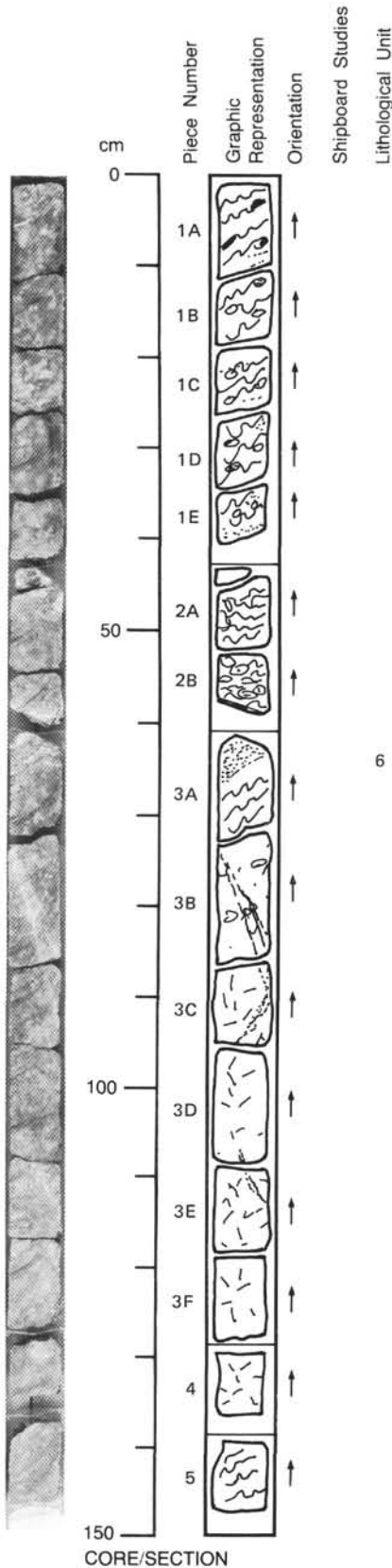
Pieces 3B-F, and 4

COLOR: Gray.
LAYERING: None.
DEFORMATION: Very slight.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 50%.
 Crystal size: 5-10 mm.
 Crystal shape: Subhedral.
 Preferred orientation: None.
 Percent replacement: 2%-5%.

Clinopyroxene—Mode: 45%.
 Crystal size: 8-15 mm.
 Crystal shape: Subhedral. Clinopyroxene subophitically encloses plagioclase.
 Preferred orientation: None.
 Percent replacement: 2%-5%.

Olivine—Mode: 5%.
 Crystal size: 2-5 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: 30%.

SECONDARY MINERALOGY:
 Total percent: Slight.
 Texture: Plagioclase is milky white in Pieces 2A, top of 2B, bottom of 2C, and top of 3A, also adjacent to vein that crosscuts Pieces 3B and 3C. May be intense granulation or albitization. These veins have pale green centers that are probably a fine-grained mixture of plagioclase and actinolite. This green material is also found at the bottom of Piece 2C and top of Piece 3A.
 Percent vein material: < 1%.
 Vein material: Sodic plagioclase and actinolite.



CORE/SECTION

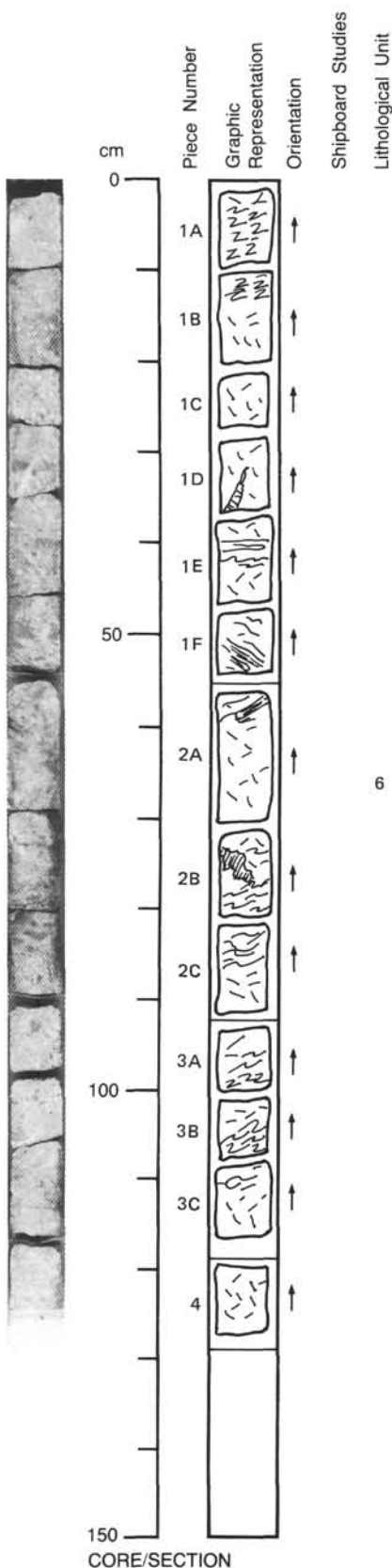
118-735B-85R-3

UNIT 6: OLIVINE-RICH GABBRO AND TROCTOLITE

Pieces 1A-4

Olivine Gabbro to Porphyroclastic Olivine Gabbro

Pieces 1A-4



F:5°

F:0-10°

6

COLOR: Gray to green-gray and white.

LAYERING: Some size gradations, although deformation has obscured most of the changes. Coarse to very coarse layers at 50-55, 81-85, and 110-111 cm. These are often somewhat sheared and elongate.

DEFORMATION: Porphyroclastic zones common throughout core: 5-12, 40-45, 78-85, and 95-105 cm. Commonly some evidence of brecciation or deformation in the intervening gabbroic sections. Zones of oxide commonly associated with deformation zones or their margins.

PRIMARY MINERALOGY:

Plagioclase—Mode: 40%-50%.

Crystal size: 3-8 mm.

Crystal shape: Euhedral, subhedral, enclosed partially by clinopyroxene.

Preferred orientation: None observed.

Percent replacement: 10%-20%.

Clinopyroxene—Mode: 25%-40%.

Crystal size: 3-30 mm.

Crystal shape: Largest grains subhedral, smaller subhedral to anhedral and ophitic.

Preferred orientation: None observed.

Percent replacement: 10%-50%.

Olivine—Mode: 5%-10%.

Crystal size: 2-10 mm.

Crystal shape: Subhedral.

Preferred orientation: None observed.

Percent replacement: 10%-50%.

SECONDARY MINERALOGY:

Total percent: Up to 30%.

Texture: Olivine altered to dark magnetite-tremolite-talc; completely altered to dark clayey pseudomorphs in deformed zones. Clinopyroxene variously amphibolitized, particularly in deformed zones. Secondary oxides up to 20% or 30% in margins of shear zones. Minor sulfide. Freshest pieces are Pieces 2A, 3C, and 4.

Percent vein material: 5%.

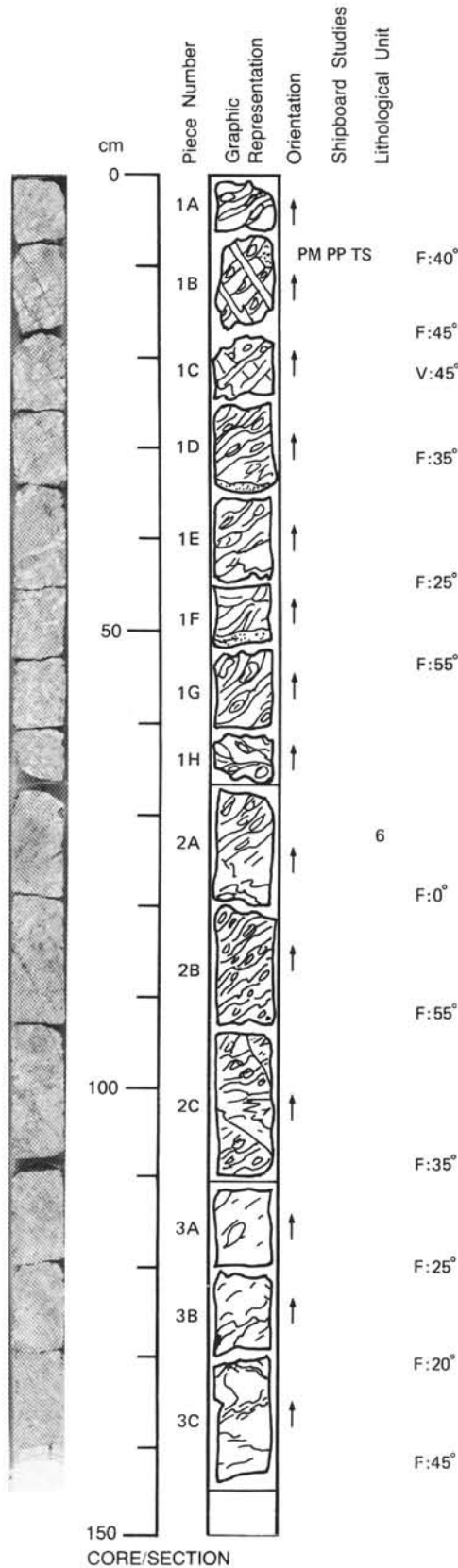
Vein material: Two veins (3 and 10 mm) of actinolite + epidote + plagioclase at 35 and 75 cm. Amphibole-rich veins at 88 cm. Thin, streaky, white, subhorizontal veins throughout.

UNIT 6: OLIVINE-RICH GABBRO AND TROCTOLITE

Pieces 1A-3C

Porphyroclastic Olivine Gabbro

Pieces 1A-3C



COLOR: Grayish green.
LAYERING: Not apparent.
DEFORMATION: Yes, all sections. The foliation is developed when plagioclase is stretched and granulated and clinopyroxene elongated into the foliation plane. There is a discontinuous plagioclase banding, developed in Pieces 1B, 1E, and 1F. The foliation is cut at right angles by green amphibole.
PRIMARY MINERALOGY:
 Plagioclase— Mode: 55%.
 Crystal size: 1-10 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Strong.
 Percent replacement: Slightly altered to sodic plagioclase.
 Clinopyroxene— Mode: 40%.
 Crystal size: 1-15 mm.
 Crystal shape: Elongated, lensoid.
 Preferred orientation: Strong.
 Percent replacement: 90% by green and brown amphibole.
 Olivine— Mode: 5%.
 Crystal size: 1-3 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Not seen.
 Percent replacement: Slightly altered to chlorite, magnetite, and clays.

SECONDARY MINERALOGY:
 Total percent: 30%-100%.
 Texture: Olivine is replaced by black chlorite and magnetite with brown clays. Clinopyroxene is largely (90%?) replaced by green amphibole, brown amphibole, and dark rims (blue-green amphibole type). The replacement is total near late stage veins. Plagioclase is deformed and recrystallized into neoblasts and transposed into the foliation plane. It is probably transformed into sodic plagioclase.
 Percent vein material: 6%.
 Vein material: Veins are filled with dark amphibole on the walls and lighter green actinolite and plagioclase in the center. Secondary magnetite and ilmenite are abundant in Pieces 1E and 1F. Disseminated sulfides are present.

118-735B-85R-5

UNIT 6: OLIVINE-RICH GABBRO AND TROCTOLITE

Pieces 1A-4G

Porphyroclastic Olivine and Oxide-Bearing Gabbros

Pieces 1A-4G

COLOR: Grayish green.

LAYERING: Not present.

DEFORMATION: All samples are foliated showing clinopyroxene porphyroclasts up to 2 cm thick surrounded by neoblastic plagioclase. The foliation is deflected by the porphyroclasts. Olivine is also elongated into lenses.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%-65%.

Crystal size: 1-5 mm.

Crystal shape: Anhedral.

Preferred orientation: Variable, moderate.

Percent replacement: 10% by sodic plagioclase.

Clinopyroxene— Mode: 40%-45%.

Crystal size: 3-20 mm.

Crystal shape: Anhedral. Fresh clinopyroxene is pinkish brown.

Preferred orientation: Variable, moderate.

Percent replacement: 40%-100% by amphibole.

Olivine—Mode: 2%-5%.

Crystal size: 1-5 mm.

Crystal shape: Elongated, lenses.

Preferred orientation: None.

Percent replacement: Slightly altered to clays and talc.

SECONDARY MINERALOGY:

Total percent: <20%.

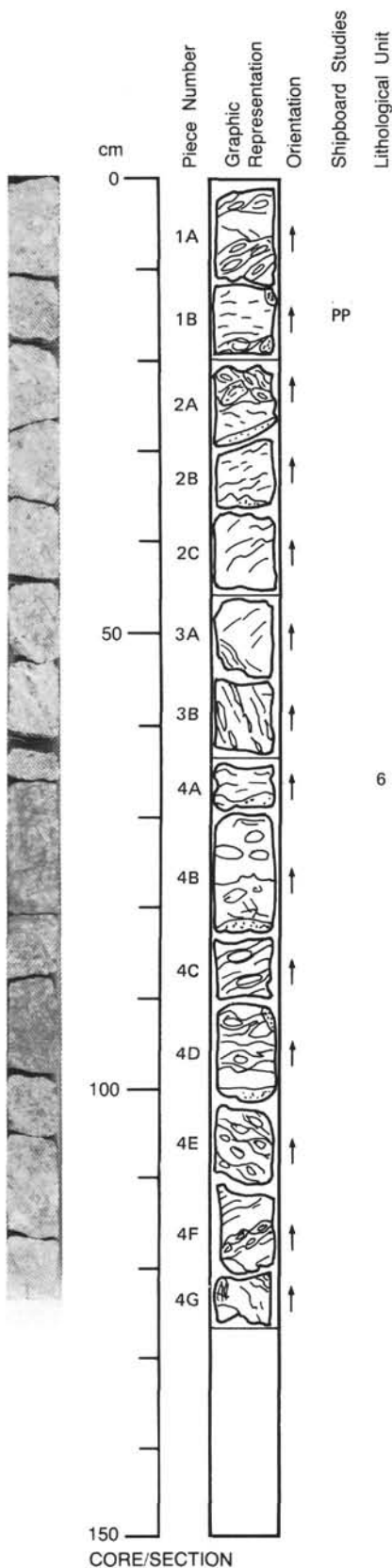
Texture: Ilmenite and magnetite invade the pore spaces of largely amphibolitized gabbros.

Chalcopyrite and pyrite are widespread in the interstices (Pieces 4B to 4G). Clinopyroxene is replaced by green and light green amphibole, especially near late-stage veins and ilmenite-rich zones.

Olivine is replaced by clays in the center and surrounded by talc. Plagioclase is replaced by milky sodic plagioclase in same shear zones.

Percent vein material: 3%.

Vein material: Veins filled with green amphibole, plagioclase, and oxides.



UNIT 6: OLIVINE-RICH GABBRO AND TROCTOLITE

Pieces 1A-4E

Olivine Gabbro to Porphyroclastic Olivine Gabbro

Pieces 1A-2C (top)

COLOR: Gray.
LAYERING: None.
DEFORMATION: Some foliation apparent in Piece 2A. Foliation defined by recrystallized plagioclase and stretched augen of pyroxene and olivine.

PRIMARY MINERALOGY:
 Plagioclase— Mode: 45%.
 Crystal size: 8-12 mm.
 Crystal shape: Subhedral.
 Preferred orientation: In plane of foliation.
 Percent replacement: Moderate.

Clinopyroxene—Mode: 45%.
 Crystal size: 10-20 mm.
 Crystal shape: Subhedral; clinopyroxene brown and poikilitically encloses plagioclase.
 Preferred orientation: In plane of foliation.
 Percent replacement: Moderate.

Olivine—Mode: 10%.
 Crystal size: 3-7 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: Extensive.

SECONDARY MINERALOGY:
 Total percent: Approximately 30%-40%.
 Texture: Discontinuous vein through Pieces 1A-C composed of sodic plagioclase, some actinolite, and epidote. Adjacent plagioclase in gabbro appears to be more sodic as well. Actinolite along numerous thin fractures having a nearly vertical orientation. Thin, nearly horizontal white veins, probably plagioclase. Olivine altered in meshlike fashion by black metallic mineral. Traces of sulfides. Piece 2C contains a contact between olivine gabbro and fine-grained troctolite.
 Vein material: Sodic plagioclase, actinolite, and epidote.

COMMENTS: Contact with underlying troctolitic diabase in Piece 2C, approximately 41 cm.

Troctolite

Pieces 2C (bottom)-4E

COLOR: Gray.
LAYERING: Possible primary layering defined in Piece 4D, where a 1-cm-wide olivine layer is enclosed poikilitically by a single clinopyroxene. Orientation of this layer approximately 45°.

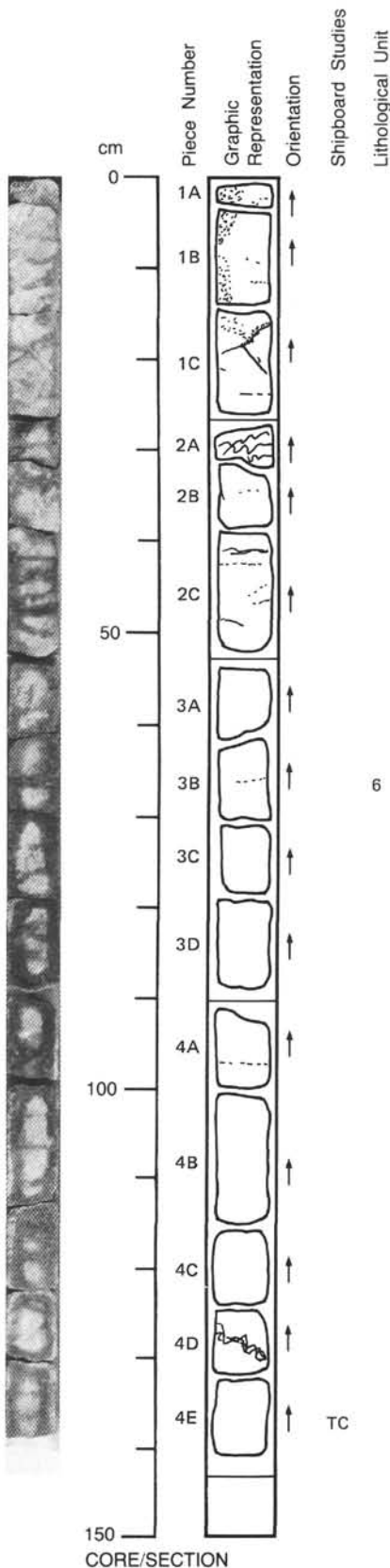
DEFORMATION: None.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 50%-60%.
 Crystal shape: Anhedral.
 Crystal size: Variable (0.5 mm to 1 cm).
 Preferred orientation: None.
 Percent alteration: Slight to moderate.

Clinopyroxene—Mode: <5%.
 Crystal shape: Skeletal oikocrysts.
 Crystal size: Variable (0.5 mm to 1 cm).
 Preferred orientation: None.
 Percent alteration: Moderate.

Olivine—Mode: 35%-50%.
 Crystal shape: Anhedral.
 Crystal size: Variable (0.5 mm to 1 cm).
 Preferred orientation: None.
 Percent alteration: Slight to moderate.

SECONDARY MINERALOGY:
 Total percent: 30%-40%.
 Texture: Abundant amphibole filling thin, nearly vertical fractures/veins.
 Percent vein material: <1%.
 Vein material: Amphibole.

COMMENTS: Granular texture. Grain size slightly more variable in Section 118-735B-85R-6 than in Section 118-735B-85R-7. Grain sizes are less than 0.5 mm in diabase zones, but up to 1 cm in coarser-grained areas. Note that grain size decreases gradually from troctolitic gabbro at 52 cm to troctolitic diabase at 141 cm. Diabase also occurs between 41 and 52 cm.



118-735B-85R-7

UNIT 6: OLIVINE-RICH GABBRO AND TROCTOLITE

Pieces 1A-7

Troctolite

Pieces 1A-2

COLOR: Light gray.
LAYERING: None.
DEFORMATION: Lower contact with a porphyroclastic zone.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 50%-60%.
 Crystal size: 1-2 mm.
 Crystal shape: AnhedraI.
 Preferred orientation: None observed.
 Percent replacement: Not determined.

Clinopyroxene—Mode: <5%.
 Crystal size: 1-2 mm.
 Crystal shape: Skeletal oikocrysts.
 Preferred orientation: None observed.
 Percent replacement: Not determined.

Olivine—Mode: 35%-50%.
 Crystal size: 1-2 mm.
 Crystal shape: AnhedraI.
 Preferred orientation: None observed.
 Percent replacement: Slightly altered.

SECONDARY MINERALOGY:
 Total percent: 30%-75%.
 Texture: Not determined.
 Percent vein material: 1%.
 Vein Material: A few streaky, subhorizontal white veins <1 mm wide.

Olivine Gabbro

Pieces 3A-7

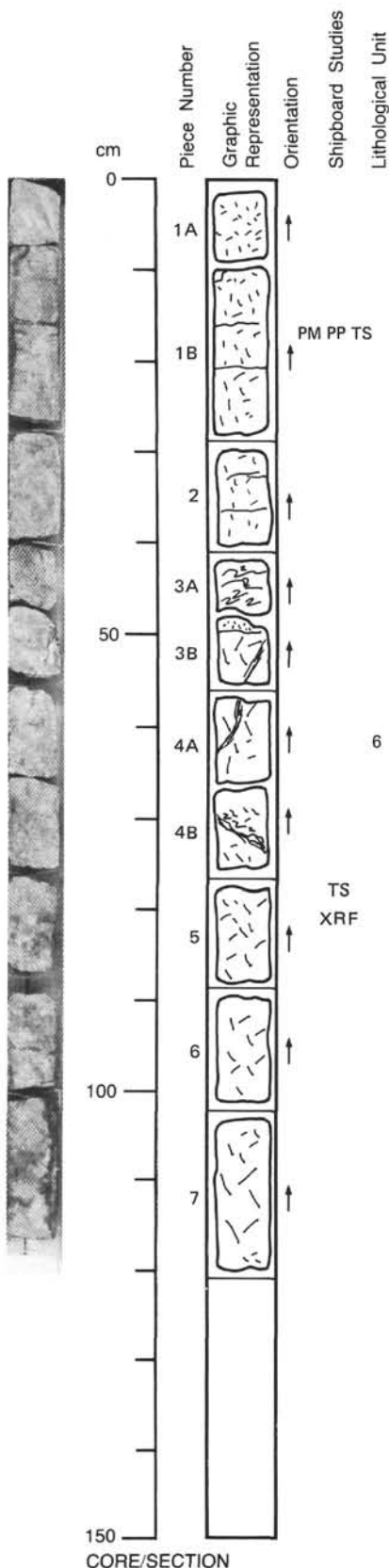
COLOR: Gray to gray-green and white where altered.
LAYERING: Nice, coarse- to fine-sized variations. A very coarse (2 cm) layer at 58 cm, with a sharp contact having a fine-grained section at 50 cm. A very coarse through medium to medium-fine section at 120-70 cm.
DEFORMATION: Porphyroclastic gabbro at 42-48 cm at transition of troctolite to olivine gabbro. A little shear along vein in Piece 4B.

PRIMARY MINERALOGY:
 Plagioclase—Mode: 45%-50%.
 Crystal size: 2-40 mm.
 Crystal shape: AnhedraI, subhedraI.
 Preferred orientation: None observed.
 Percent replacement: 30%.

Clinopyroxene—Mode: 30%-40%.
 Crystal size: 3-30 mm.
 Crystal shape: SubhedraI in coarse sections to large oikocrysts in finer sections.
 Preferred orientation: None.
 Percent replacement: On cored surface they are brown and dull emerald-green. In some cores, the green appears to be replacing the brown clinopyroxene.

Olivine—Mode: Up to 10%.
 Crystal size: 2-5 mm.
 Crystal shape: AnhedraI to subhedraI, partially enclosing plagioclase.
 Preferred orientation: None.
 Percent replacement: Partial alteration common.

SECONDARY MINERALOGY:
 Total percent: 30%.
 Texture: Large (2-3 mm) actinolite-plagioclase vein cutting Pieces 3B and 4A; smaller amphibole vein in Piece 4B. Extensive amphibolitization of clinopyroxene in deformation zone.
 Olivine usually partly altered to dark meshlike structure.
 Percent vein material: 2%.
 Vein material: Actinolite, plagioclase, and amphibole.



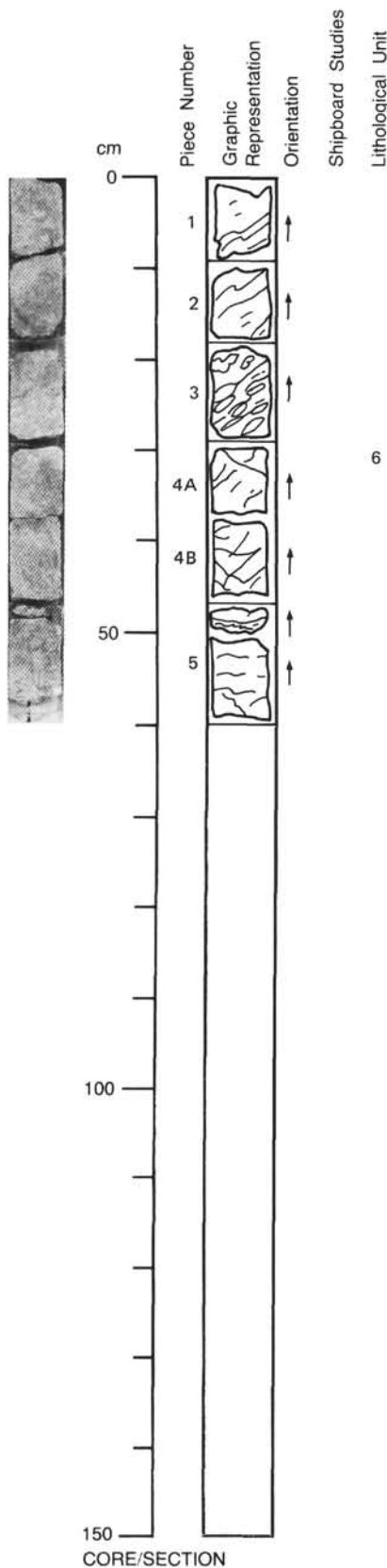
118-735B-85R-8

UNIT 6: OLIVINE-RICH GABBRO AND TROCTOLITE

Pieces 1-5

Porphyroclastic to Slightly Foliated Olivine Gabbro and Troctolite

Pieces 1-5



COLOR: Gray to greenish gray.

LAYERING: Modal layering; Piece 2 is impoverished in clinopyroxene oikocrysts, while other pieces show various amounts of clinopyroxene. Contacts are transposed into the foliation.

DEFORMATION: Present in all samples, less important in Piece 2. The foliation is defined by preferred orientation of plagioclase. In Pieces 4A and 4B, this foliation is probably primary. Grain size is reduced to 1 mm or less when compared to 2-3 mm average of undeformed part of the samples.

PRIMARY MINERALOGY:

Plagioclase—Mode: 65% (in Piece 2); 10%-15% (in other pieces).

Crystal size: 1-10 mm.

Crystal shape: Euhedral when chadocrysts.

Preferred orientation: Weak.

Percent replacement: Slightly altered in shear zones to sodic plagioclase.

Clinopyroxene—Mode: 5% (in Piece 2); 30%-40% (in other pieces).

Crystal size: Up to 3 cm.

Crystal shape: Oikocrystic to anhedral. Oikocrysts have subophitic plagioclase inclusions.

Fresh clinopyroxene is pinkish brown.

Preferred orientation: Weak.

Percent replacement: 40% by amphibole.

Olivine—30% (in Piece 2); 10%-15% (in other pieces).

Crystal size: 1-10 mm.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: 20% by talc, magnetite, and tremolite.

SECONDARY MINERALOGY:

Total percent: Not determined.

Texture: Olivine is replaced by talc and magnetite and tremolite fibers. Clinopyroxene (pinkish brown when fresh) is replaced by grass-green amphibole. Plagioclase is milky sodic plagioclase in the shear zones.

Percent vein material: 5%.

Vein Materials: Veins (in the plane of foliation) or cutting the foliation at right angle are filled with amphibole and plagioclase.

118-735B-86R-1

UNIT 6: OLIVINE-RICH GABBRO AND TROCTOLITE

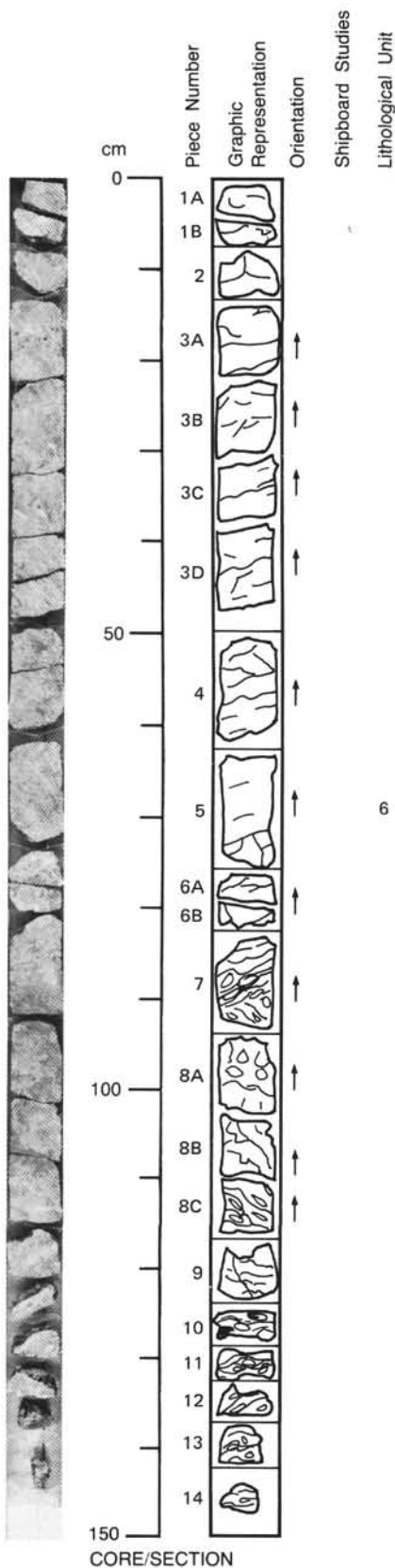
Pieces 1A-14

Massive Gabbro (Pieces 1A-5), Porphyroclastic Gabbro (Pieces 5-12, and 14), and Augen Gneissic Gabbro (Piece 13)

COLOR: Greenish gray.
LAYERING: Not apparent.
DEFORMATION: Foliation is visible from base of Pieces 5 to 14. Elongated clinopyroxene porphyroclasts and discontinuous bands of neoblastic plagioclase define foliation planes. In Piece 14, the plagioclase and pyroxene (now amphibole) are regular. Augen of 1-2 mm in diameter are present. Grain-size reduction is from 1 cm (average) to 3-5 mm, with deformation increasing (>2 mm in gneissic gabbro).
PRIMARY MINERALOGY:
 Plagioclase—Mode: 50%-60%.
 Crystal size: 1-4 mm.
 Crystal shape: Euhedral to anhedral.
 Preferred orientation: None.
 Percent replacement: Slight.

 Clinopyroxene—Mode: 40%-50%.
 Crystal size: 3-15 mm.
 Crystal shape: Oikocrystic, anhedral.
 Preferred orientation: Weak.
 Percent replacement: Severely altered to amphibole.

 Olivine—Mode: 5%-10%.
 Crystal size: 1-6 mm.
 Crystal shape: Anhedral, rounded.
 Preferred orientation: None observed.
 Percent replacement: Slightly altered to talc, magnetite, and clays.
SECONDARY MINERALOGY:
 Total percent: 10%-30%.
 Texture: Olivine is partly replaced by talc and magnetite and by brown clays. Clinopyroxene is almost totally replaced by green amphibole in deformed gabbro, but only slightly in massive gabbros (20%). Plagioclase is slightly albitized in Pieces 1B, 2, 6A, 6B, 7, 12, and 14. Abundant magnetite, ilmenite, and sulfides are present in Pieces 7, 8A, 8B, 8C, and 9. Sulfides are mainly chalcocopyrite, which are interstitial or infiltrated in silicate grains.
 Percent vein material: <1%.
 Vein material: Subhorizontal fractures are filled with calcite, actinolite, talc, and chlorite.



CORE/SECTION

UNIT 6: OLIVINE GABBRO AND TROCOLITE

Pieces 1A-6F

Mylonitic to Porphyroclastic Gabbro

COLOR: Gray-green to gray-white.

LAYERING: Obscured by deformation. Upper part of core is very coarse-grained (to 3 cm; 0-75 cm), lower part (85-145 cm) is medium-grained, where igneous textures are discernable. Oxide-rich zones at 24-26 cm and 125-127 cm.

DEFORMATION: Mylonitic zones at 0-5 and 105-120 cm; porphyroclastic zones at 15-20, 35, 75-85, 120-130 cm, interspersed with less deformed gabbro. Also some brecciation and elongation in those sections. Pieces 6E and 6F are little deformed medium-grained gabbro.

PRIMARY MINERALOGY:

Plagioclase—Mode: 40%-60%.

Crystal size: 2-12 mm.

Crystal shape: Subhedral.

Preferred orientation: Aligned in foliation.

Percent replacement: 10-40%.

Clinopyroxene—Mode: 35%-60%.

Crystal size: 2-30 mm.

Crystal shape: Anhedral to subrounded.

Preferred orientation: Aligned in foliation.

Percent replacement: Extensively amphibolitized in deformation zones.

Olivine—Mode: 5%.

Crystal size: 2-8 mm.

Crystal shape: Anhedral.

Preferred orientation: Not determined.

Percent replacement: Very altered.

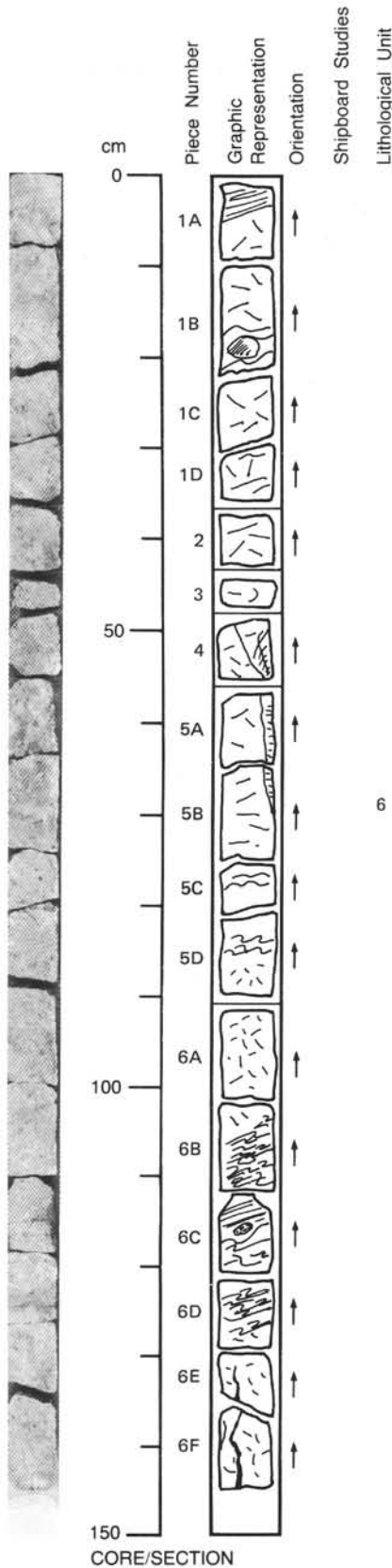
SECONDARY MINERALOGY:

Total percent: Not determined.

Texture: Olivine to clay, magnetite, tremolite, particularly dark pseudomorphs along shear zones. Clinopyroxene extensively amphibolitized in deformed zones. Deformation is pervasive in the section, except for the bottom two pieces.

Percent vein material: 5%.

Vein material: 1-2 mm amphibole vein in Pieces 6E, 6F. Feldspar, epidote, and actinolite vein fill on side of Piece 5A.



CORE/SECTION

118-735B-86R-3

UNIT 6: OLIVINE-RICH GABBRO AND TROCTOLITE

Pieces 1A-3D

Amphibolitized Olivine Gabbro

Pieces 1A-3D

COLOR: Green-gray to green and white where veined.

LAYERING: None apparent. Most of core is medium- to coarse-grained. One very coarse-grained layer at 65-70 cm, dipping into core at about 30°, plunge in axis of core.

DEFORMATION: Porphyroclastic zones at 110-130 cm. Piece 3A has a contact with undeformed gabbro, indicates the shear zone cuts the core at a shallow angle. Some elongation and incipient foliation in Pieces 3C and 3D. A brittle fracture in Piece 1G. Several fractures now filled with green amphibole in upper part of core.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%-60%.

Crystal size: 3-9 mm.

Crystal shape: Usually anhedral, also subhedral granular.

Preferred orientation: None apparent.

Percent replacement: Not determined.

Clinopyroxene—Mode: 30%-40%.

Crystal size: 2-10 mm, rarely to 20 mm.

Crystal shape: Subhedral to anhedral.

Preferred orientation: None apparent.

Percent replacement: Extensively altered in upper part of core to amphibole.

Olivine—Mode: 5%-10%.

Crystal size: 2-6 mm.

Crystal shape: Anhedral, subrounded.

Preferred orientation: None apparent.

Percent replacement: Extensively altered to clay, magnetite, and amphibole.

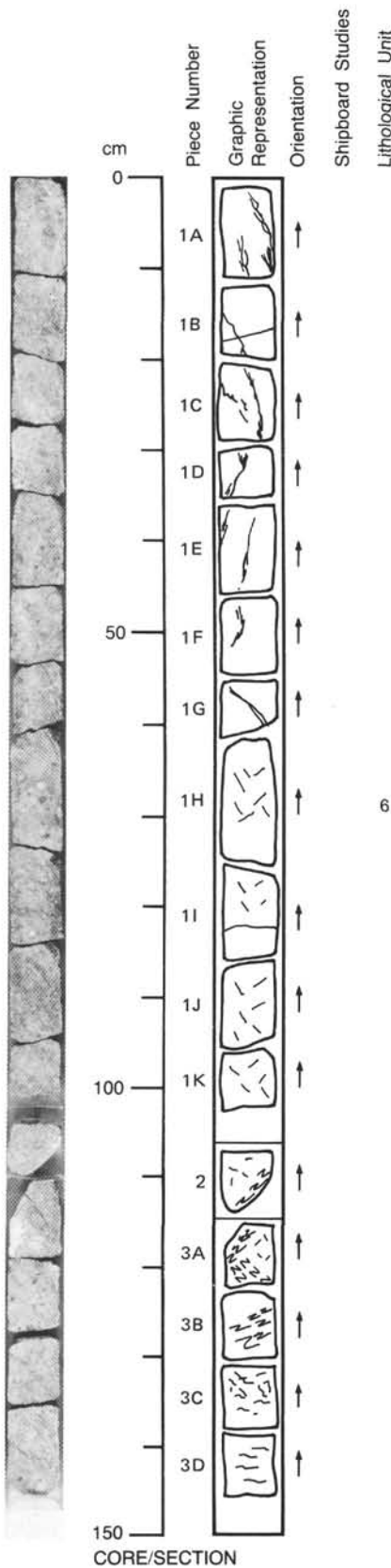
SECONDARY MINERALOGY:

Total percent: Up to 30%.

Texture: Olivine pseudomorphed, particularly in top 100 cm, by clay, magnetite, and amphibole. Clinopyroxene partially to completely replaced by pale green amphibole, particularly in upper part of section. Large epidote feldspar patch on the back of Piece 3C.

Percent vein material: 5%-7%.

Vein material: Several amphibole, epidote veins, often associated with white albitized or granulated plagioclase, particularly at 25-35 cm and 120 cm. Numerous subhorizontal, streaky, white feldspathic veins (<1 mm wide).



CORE/SECTION

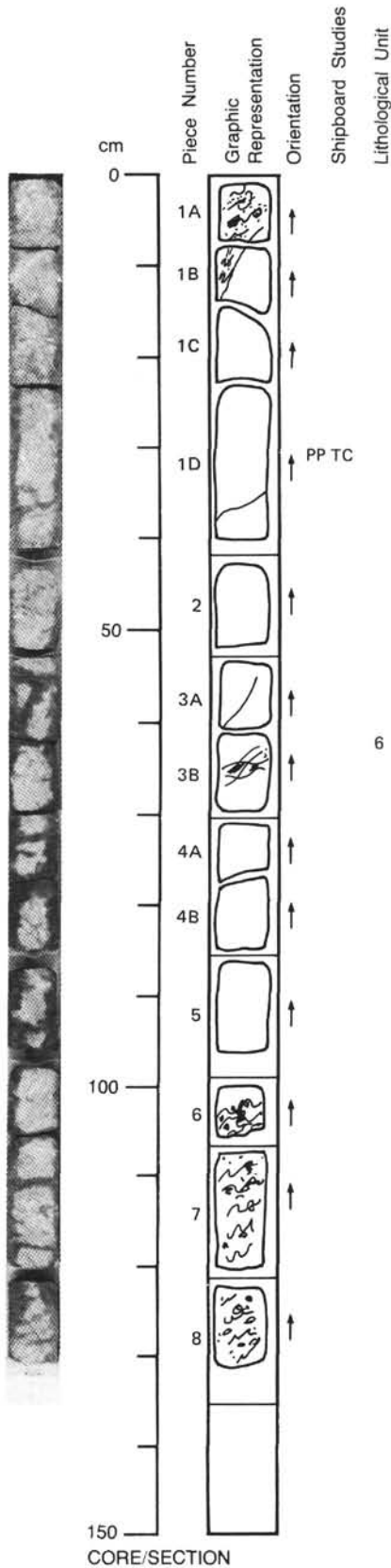
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UNIT 6: OLIVINE-RICH GABBRO AND TROCTOLITE

Pieces 1A-8

Olivine Gabbro to Porphyroclastic Metagabbro

Pieces 1A-8



COLOR: Gray.

LAYERING: None.

DEFORMATION: Between 0-12, 64-68, and 100-131 cm, olivine gabbro is deformed to a porphyroclastic metagabbro. Foliation defined by plastically deformed and recrystallized plagioclase, stretched augen of clinopyroxene.

PRIMARY MINERALOGY:

Plagioclase—Mode: 55%.

Crystal size: 5-15 mm.

Crystal shape: Anhedral-subhedral.

Preferred orientation: Locally in plane of foliation.

Percent replacement: Moderate to extensive.

Clinopyroxene—Mode: 40%.

Crystal size: 5-15 mm.

Crystal shape: Subhedral. Clinopyroxene brown and subophitically encloses plagioclase.

Preferred orientation: Locally in plane of foliation.

Percent replacement: Moderate to extensive.

Olivine—Mode: 4%-5%.

Crystal size: 3-4 mm.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: Moderate to extensive.

SECONDARY MINERALOGY:

Total percent: 25% average, locally 90%.

Texture: Actinolite occurs in veins and occupies grain boundaries in undeformed areas.

Alteration more extensive in deformed regions approximately 50%-90% of total. Plagioclase is recrystallized to neoblasts or albitized. Actinolite occurs along veins steeply inclined relative to foliation, particularly in Pieces 1D and 3A. Clinopyroxene is largely replaced by amphibole.

Traces of sulfides and iron oxides (ilmenite?). Patches of talc(?) probably replace olivine.

Elsewhere, olivine altered in typical meshlike fashion by black metallic mineral. Below 105 cm, iron oxides (ilmenite?) and sulfides are abundant and occur as layers parallel to foliation.

Percent vein material: 1%-2%.

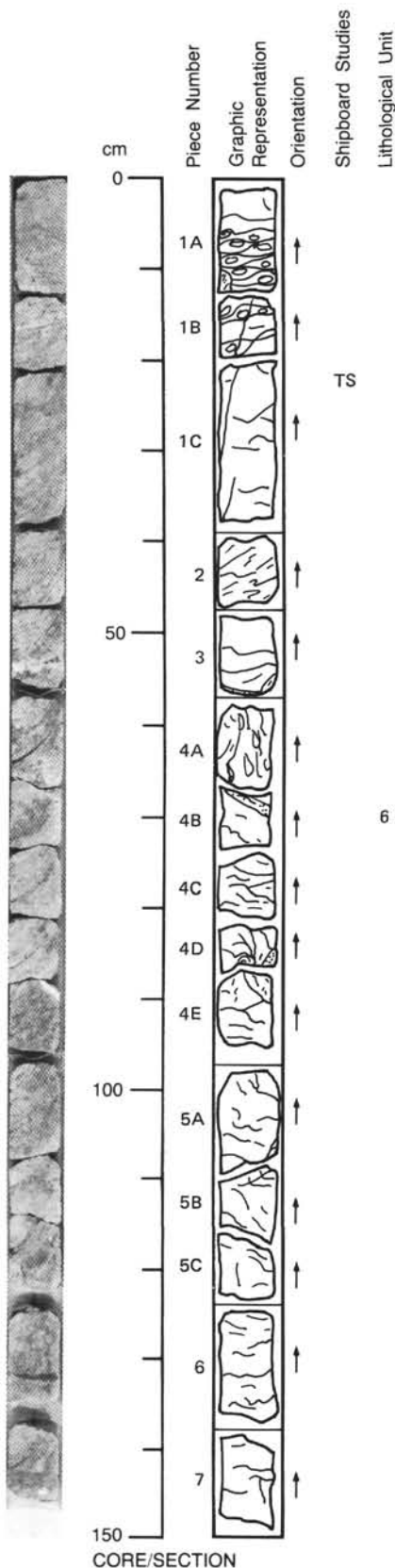
Vein material: Actinolite.

118-735B-86R-5

UNIT 6: OLIVINE-RICH GABBRO AND TROCTOLITE

Pieces 1A-7

Porphyroclastic Gabbro (Pieces 1-4A) and Massive Olivine Gabbro (Pieces 4B-7)



F:10°

F:20°

F:25°

F:30°

F:60°

F:50°

F:50°(Magatic)

F:60°(Magatic)

COLOR: Greenish gray.

LAYERING: Not apparent.

DEFORMATION: Foliation is clearly visible in the upper part of the section. Porphyroclastics of clinopyroxene and plagioclase are stretched and elongated. Grain size varies from <1 mm to 1.5 cm; decreased from original by a factor of 2. (Average diameter of grain in massive gabbro 7 mm.)

PRIMARY MINERALOGY:

Plagioclase—Mode: 40%-60%.
 Crystal size: <1-4 mm.
 Crystal shape: Euhedral.
 Preferred orientation: Visible.
 Percent replacement: None.

Clinopyroxene—Mode: 30%-50%.
 Crystal size: 1-17 mm.
 Crystal shape: Oikocrystic, anhedral.
 Preferred orientation: Strong to none.
 Percent replacement: <90% by brown and green amphibole.

Olivine—Mode: 1%-5%.
 Crystal size: 1-3 mm.
 Crystal shape: Anhedral, lenses.
 Preferred orientation: Not seen.
 Percent replacement: Slight.

SECONDARY MINERALOGY:

Total percent: 30%.
 Texture: Clinopyroxene is severely replaced (90%) by brown and green amphibole in porphyroclastic gabbros. Ilmenite-magnetite impregnation is abundant in Pieces 1C and 2 and is accompanied by sulfides (chalcopyrite mostly). Late cracks are filled with chlorite, carbonate, and amphiboles. Olivine is surrounded by bluish talc; magnetite makes a web pattern in the grains. Plagioclase is albitized in Pieces 3, 4A and 4B.
 Percent vein material: 3%.
 Vein material: Veins are filled with plagioclase, actinolite, and sparse pale yellow brown epidote.

118-735B-86R-6

UNIT 6: OLIVINE-RICH GABBRO AND TROCTOLITE

Pieces 1A-19

Clinopyroxene-Poor Olivine Gabbro to Troctolite

Pieces 1A-19

COLOR: Gray to gray and white.

LAYERING: None.

DEFORMATION: Slight deformation and some granulation of plagioclase in upper 50 cm. 50-95 cm is fractured and veined. Some shear and offset on the fractures which are filled by feldspathic material. In Piece 9 a troctolite and coarser olivine gabbro are juxtaposed along a fracture. 130-150 cm: gabbro is porphyroclastic, with 0.5-2 cm clinopyroxene porphyroclasts, 2-3 mm elongate olivine clasts. "Tails" of oxides from porphyroclasts and oxide-rich zone in Pieces 18 and 19—mylonitic matrix.

PRIMARY MINERALOGY:

Plagioclase—Mode: 40%-60%.

Crystal size: 3-8 mm.

Crystal shape: Euhedral to subhedral, enclosed partially by clinopyroxene.

Preferred orientation: Not determined.

Percent replacement: Not determined.

Clinopyroxene—Mode: 25%-40%.

Crystal size: 3-30 mm.

Crystal shape: Large subhedral grains, smaller anhedral and ophitic grains.

Preferred orientation: Not determined.

Percent replacement: Not determined.

Olivine—Mode: 5%-10%.

Crystal size: 2-10 mm.

Crystal shape: Subhedral.

Preferred orientation: Not determined.

Percent replacement: Not determined.

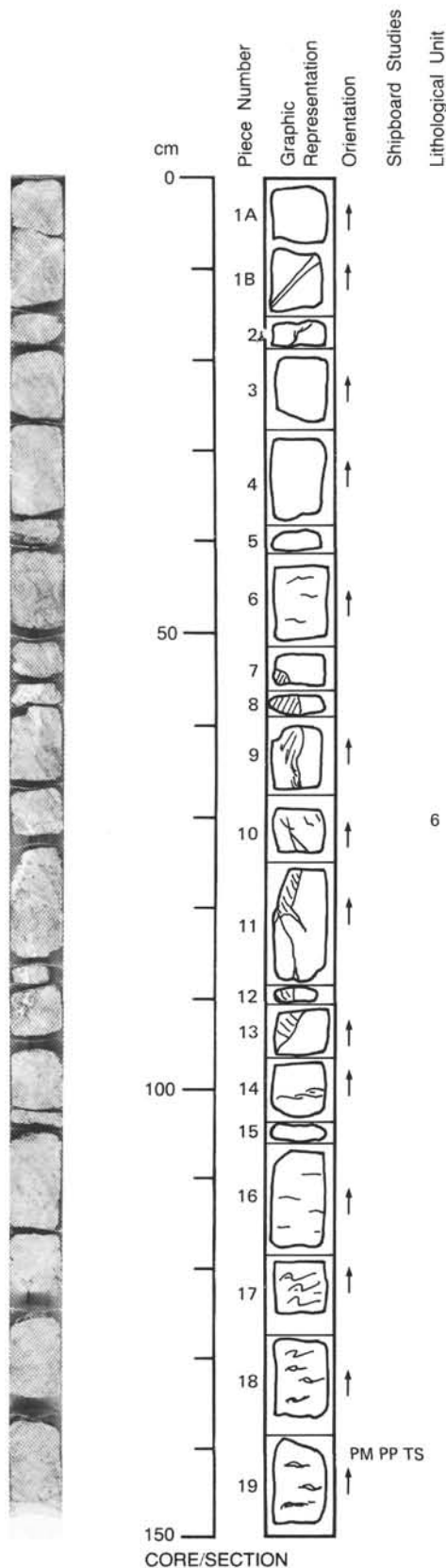
SECONDARY MINERALOGY:

Total percent: 40%.

Texture: Small crystalline aggregates on surface in Pieces 11 suggest growth into void. Some of the crystals are quite delicate and the aggregates are friable. These occur in Pieces 7-13. In Piece 12, clinopyroxene is often replaced by a granular green aggregate of epidote or amphibole. The olivine are replaced by dark mesh aggregates (talc-tremolite-magnetite). Piece 2 is extensively amphibolitized with dark, clayey, olivine pseudomorphs. A feldspathic vein cuts Piece 1B at a high angle. Some of the clinopyroxene in the upper part is quite green. Percent vein material: 5%.

Vein material: Up to 3 cm wide veins of feldspar, diopside, sphene, actinolite, and both green and pinkish-brown epidote.

COMMENTS: Where undeformed, similar to Core 118-735B-85R.



118-735B-86R-7

UNIT 6: OLIVINE-RICH GABBRO AND TROCTOLITE

Pieces 1A-5C

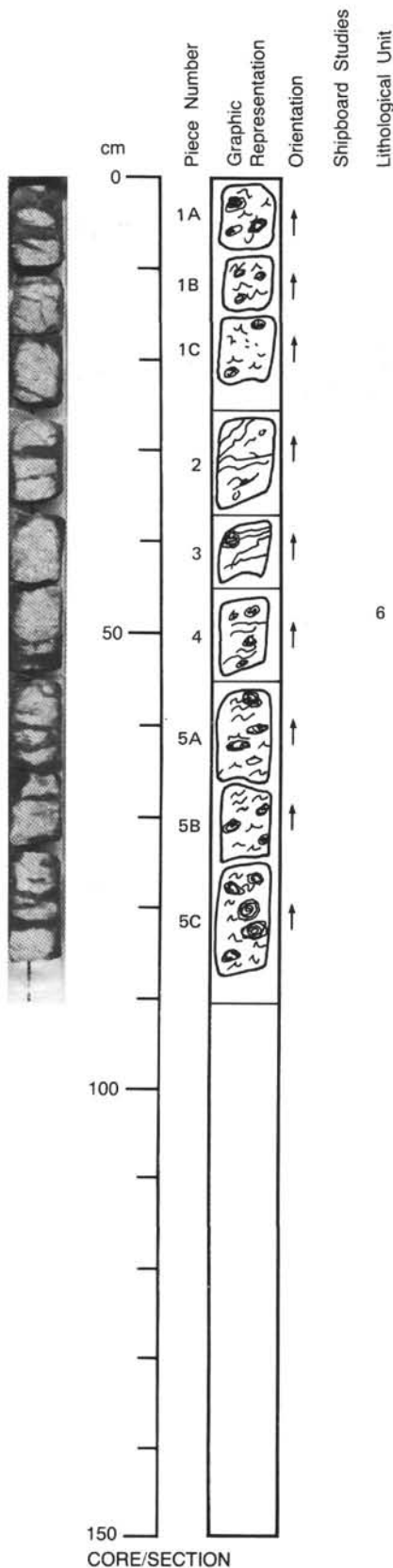
Porphyroclastic Metagabbro

COLOR: Gray.
LAYERING: None.
DEFORMATION: Porphyroclastic texture. Foliation defined by stretched and partially recrystallized plagioclase. Large augen of clinopyroxene throughout, 1-4 cm. A few similarly large augen of plagioclase. Original grain sizes difficult to estimate but sizes of pyroxene augen suggest coarse-grained.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 50%-60%.
 Crystal size: Variable, augen up to 1-4 cm.
 Crystal shape: Anhedral.
 Preferred orientation: In plane of foliation.
 Percent replacement: Moderate to extensive.

Clinopyroxene—Mode: 38%-47%.
 Crystal size: Variable, augen up to 1-4 cm.
 Crystal shape: Anhedral.
 Preferred orientation: In plane of foliation.
 Percent replacement: Moderate to extensive.

Olivine—Mode: 2%-3%.
 Crystal size: Variable.
 Crystal shape: Anhedral.
 Preferred orientation: None.
 Percent replacement: Extensive to complete.

SECONDARY MINERALOGY:
 Total percent: Moderate to extensive.
 Texture: Olivine partially to totally altered to dark clay minerals. Actinolite occupies grain boundaries and fractures. Ilmenite common to abundant throughout, forming layers parallel to foliation. Traces of sulfides throughout.
 Percent vein material: None.
 Vein material: None.



CORE/SECTION

118-735B-87R-1

UNIT 6: OLIVINE-RICH GABBRO AND TROCTOLITE

Pieces 1-9

Porphyroclastic Metagabbro

Pieces 1-9

COLOR: Gray.

LAYERING: None.

DEFORMATION: Porphyroclastic texture. Foliation defined by stretched and partially recrystallized plagioclase and clinopyroxene. Foliation in Pieces 2, 3A, and 3B difficult to assess because of exceedingly large grain size: clinopyroxene > 8 cm long. Orientation of these pyroxenes is steep (65°-70°) and may actually represent a primary growth feature since crystals still have a subhedral to euhedral outline. Remainder of section is finer-grained and foliation more apparent. Dips range from 0° to 160°. Because of deformation, original grain sizes and shapes difficult to estimate. Aspect ratio of plagioclase near 1:4.

PRIMARY MINERALOGY:

Plagioclase—Mode: 45%.

Crystal size: < 0.5-4 cm.

Crystal shape: Anhedral.

Preferred orientation: In plane of foliation.

Percent replacement: Moderate.

Clinopyroxene—Mode: 51%-52%.

Crystal size: < 0.5-4 cm.

Crystal shape: Anhedral to euhedral.

Preferred orientation: In plane of foliation, locally steeply inclined to foliation.

Percent replacement: Moderate.

Olivine—Mode: 3%-4%.

Crystal size: 3-6 mm.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: Extensive.

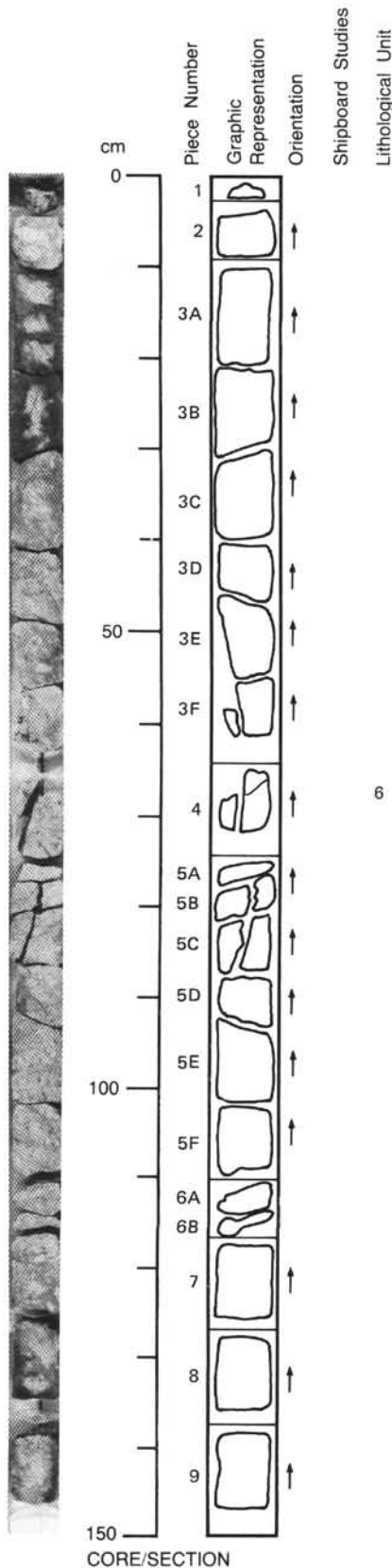
SECONDARY MINERALOGY:

Total percent: 50%-75%.

Texture: Iron oxides, probably ilmenite, common in layers parallel to foliation. Actinolite common along grain boundaries and fractures. Olivine partially to totally replaced by dark clay mineral.

Percent vein material: < 1%.

Vein material: Amphibole on thin fractures.



F: 25°

F: 0°

F: 155°

6

F: 140°

F: 160°

F: 25°

F: 25°

F: 15°

F: 10°

F: 10°

CORE/SECTION

118-735B-87R-2

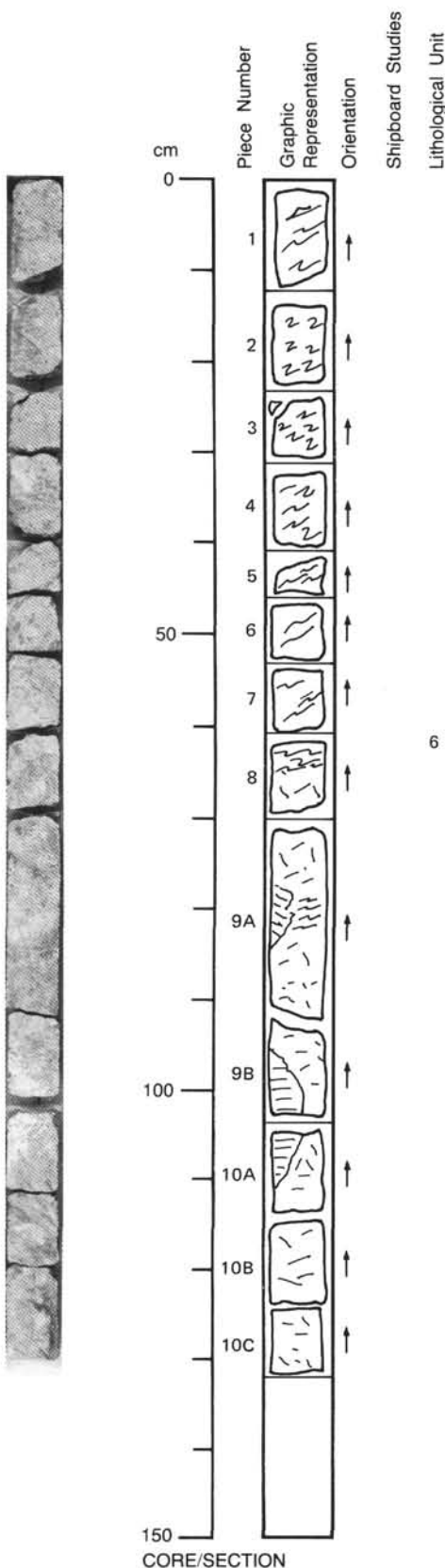
UNIT 6: OLIVINE-RICH GABBRO AND TROCTOLITE

Pieces 1-10C

Olivine Gabbro

Pieces 1-10C

COLOR: Gray to green-white where veined.
LAYERING: At least two coarse to fine transitions, partially obscured by alteration. Pieces 10B to 9A (bottom), very coarse-grained to fine-grained. Pieces 9A (top) to 8, coarse-grained to medium-grained.
DEFORMATION: Small shear zones at top of Piece 8, and at 80 cm in Piece 9A. Probably some *plagioclase granulation* near deformed zones. The top 60 cm is porphyroclastic mylonite to porphyroclastic gabbro with oxides throughout and extensive amphibolitization. Foliation dips about 10°-20°, and there are pyroxene augen to 1.5 cm.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 50%-70%.
 Crystal size: 2-15 mm.
 Crystal shape: Subhedral, euhedral.
 Preferred orientation: None observed.
 Percent replacement: 30%-50%.
 Clinopyroxene—Mode: 25%-40%.
 Crystal size: 2-15 mm.
 Crystal shape: Subhedral, cumulus(?) grains in coarse sections, ophitic to poikilitic in finer-grained sections.
 Preferred orientation: None observed.
 Percent replacement: 30%-50%.
 Olivine—Mode: 2%-8%.
 Crystal size: 3-6 mm.
 Crystal shape: Anhedral.
 Preferred orientation: None observed.
 Percent replacement: 30%-50%.
SECONDARY MINERALOGY:
 Total percent: Various.
 Texture: Two large-veined, feldspathic zones (78-85 cm and 90-110 cm). Contacts on cut plus cored surfaces suggest the upper zone is a horizontal layer, the lower zone a lens or pod. Minerals in them include a white milky feldspar, actinolite, and minor epidote; oxides associated with both zones, particularly near margins of lower one. Some amphibolitized clinopyroxene from original rock also present in veined zones. Plagioclase may be in large part original and is granulated and possibly albitized in place, rather than being a magmatic vein.
 Percent vein material: 5%-7%.
 Vein material: See above.

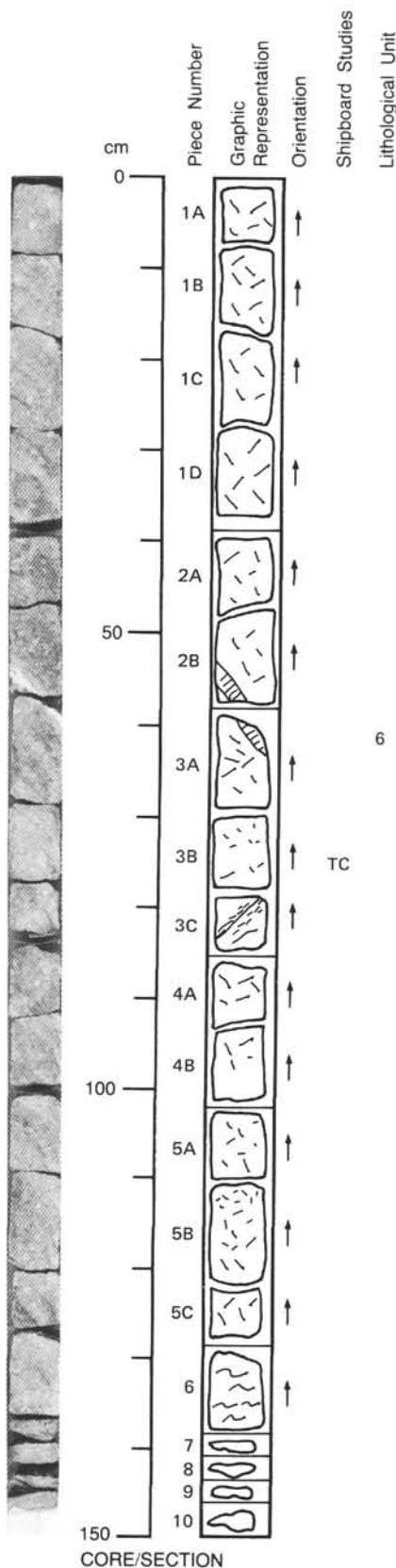


CORE/SECTION

UNIT 6: OLIVINE-RICH GABBRO AND TROCTOLITE

Pieces 1A-10

Olivine Gabbro



COLOR: Light gray, white-gray in vein.

LAYERING: Several grain-size variations, coarse- or very coarse-grained to medium- and fine-grained sections. Coarse-grained sections usually have subhedral, cumulus appearing pyroxene; in the finer-grained sections the pyroxenes are usually ophitic to poikilitic. Pieces 5C to 5A, coarse-grained to fine-grained. Pieces 4A to 3A (bottom), coarse-grained to fine-grained. Pieces 3A (top) to 2A, coarse-grained to medium-grained. Pieces 1D to 1A, very coarse-grained to medium- to coarse-grained.

DEFORMATION: Porphyroclastic texture developing in Piece 6. Pieces 7-10 are porphyroclastic mylonite.

PRIMARY MINERALOGY:

Plagioclase—Mode: 50%-70%.

Crystal size: 2-15 mm.

Crystal shape: Subhedral, euhedral.

Preferred orientation: None observed.

Percent replacement: 10%-30%.

Clinopyroxene—Mode: 25%-40%.

Crystal size: 2-15 mm.

Crystal shape: Textures as noted above.

Preferred orientation: None observed.

Percent replacement: Variously amphibolitized.

Olivine—Mode: 2%-8%.

Crystal size: 3-6 mm.

Crystal shape: Anhedral.

Preferred orientation: None observed.

Percent replacement: Usually altered in part.

SECONDARY MINERALOGY:

Total percent: Various.

Texture: Magnetite-talc-amphibole(?) mesh after olivine common. Extensive amphibolitization of clinopyroxene in Pieces 3B and 3C, associated with crosscutting amphibole vein.

Percent vein material: Not determined.

Vein material: 14-mm-wide feldspathic vein at 55-64 cm, largely feldspar with actinolite and minor epidote.

118-735B-87R-4

UNIT 6: OLIVINE-RICH GABBRO AND TROCTOLITE

Pieces 1-15

Porphyroclastic Olivine-Poor Gabbro

Pieces 1-15

COLOR: Grayish green.
LAYERING: Not apparent.
DEFORMATION: Present in every piece. The foliation plane is sometimes diffuse or deflected by pyroxene porphyroclasts. The plagioclase is deformed and recrystallized into neoblasts that are transposed into the foliation planes. Oxides are also injected along the foliation planes. Tensional cracks oblique to the foliation are observed in pyroxene and plagioclase.

PRIMARY MINERALOGY:

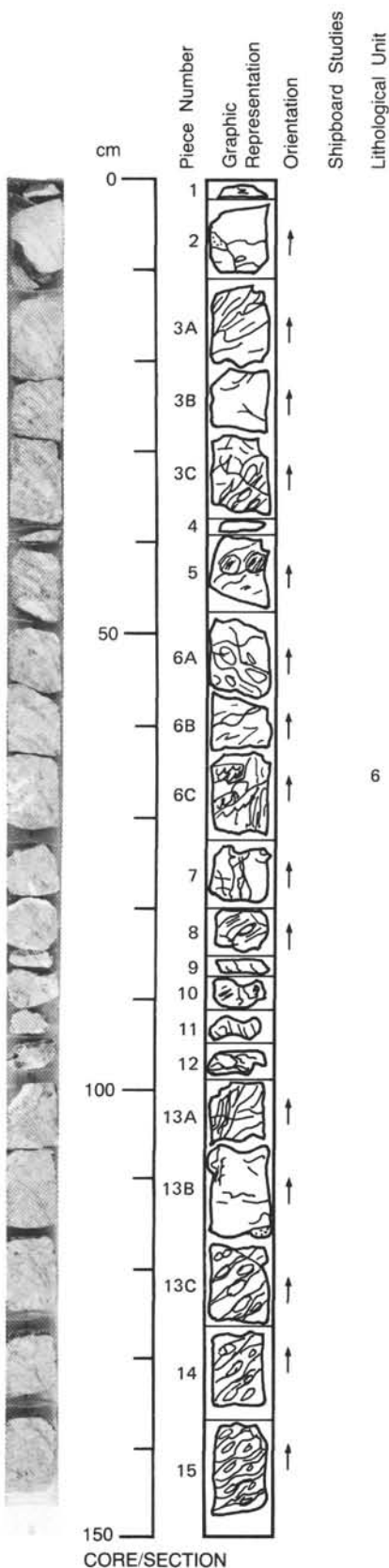
Plagioclase—Mode: 50%-60%.
Crystal size: 2-5 mm.
Crystal shape: Anhedral.
Preferred orientation: Visible.
Percent replacement: Slight.

Clinopyroxene—Mode: 40%-50%.
Crystal size: 3-15 mm.
Crystal shape: Anhedral.
Preferred orientation: Visible.
Percent replacement: 50%-80% by amphibole.

Olivine—Mode: 1%-5%.
Crystal size: < 2 mm.
Crystal shape: Anhedral.
Preferred orientation: Visible.
Percent replacement: Slight.

SECONDARY MINERALOGY:

Total percent: Variable, 10%-45%.
Texture: Coronitic, pseudomorphic. Olivine is replaced by brown clays and green chlorite. Pyroxene is largely replaced by amphibole of different colors: brown in center, dark green at rims, and grass green near veins or cracks. Oxides (ilmenite + magnetite) are massively injected in Pieces 3B, 3C, 5, 6A, 13A, 13B, and 14. Chalcopyrite is associated with these zones (5%-20% oxides) as is grass green amphibole. Veins are filled with a mixture of sodic plagioclase and actinolite. Veinlets filled with green amphibole and white clays(?).
Percent vein material: 8%.
Vein material: Plagioclase, actinolite, amphibole, and white clays(?).



F:55°

F:20°

F:45°

F:40°

F:35°

F:40°

F:50°

F:50°

CORE/SECTION

118-735B-87R-5

UNIT 6: OLIVINE-RICH GABBRO AND TROCTOLITE

Pieces 1-15

Porphyroclastic Mylonite

Pieces 1-15

COLOR: Green-gray.

LAYERING: Some coarse to fine grain-size variations are preserved (Piece 8, for example).

DEFORMATION: Intensely mylonitized, porphyroclasts up to 6 mm.

PRIMARY MINERALOGY: Rock was an olivine gabbro, no reasonable mode can be estimated. Relict olivine and olivine pseudomorphs apparent in hand sample.

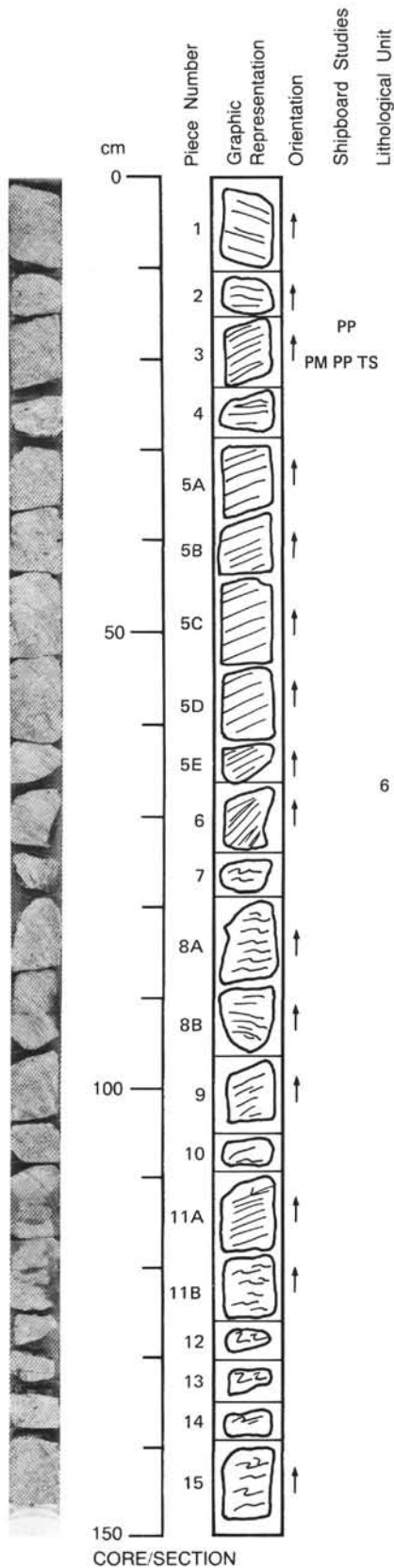
SECONDARY MINERALOGY:

Total percent: Up to 70%.

Texture: Extensive amphibolitization of clinopyroxene. Olivine replaced by dark magnetite clay and amphibole pseudomorphs. Oxides common throughout, >5% at 10-15, 33-48, and 56-57 cm. Clinopyroxene porphyroclasts common but almost no plagioclase porphyroclasts (all recrystallized).

Percent vein material: 3%-5%.

Vein material: Subhorizontal white, streaky, veins (<1 mm wide) common, hornblende ± plagioclase.



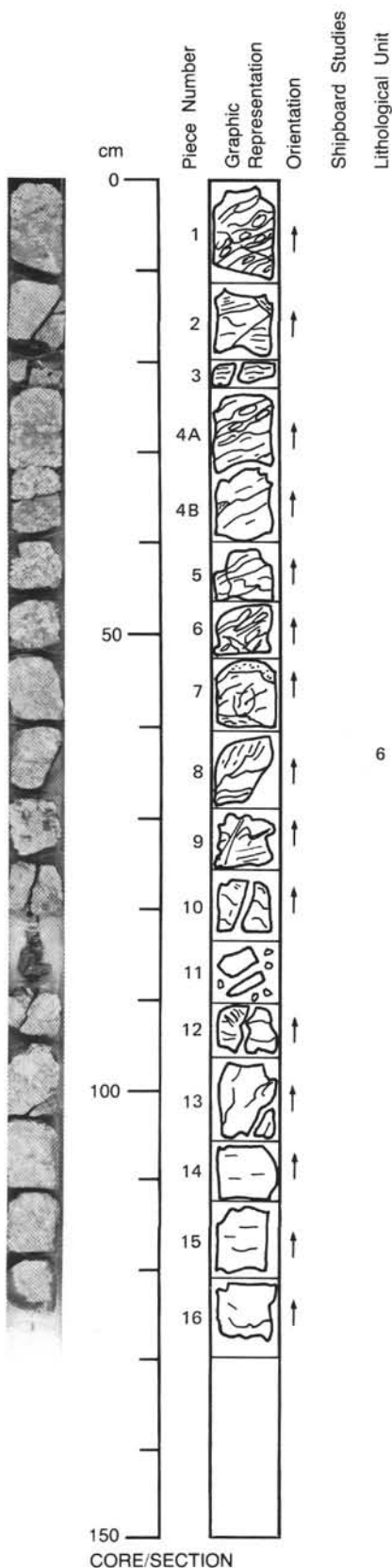
CORE/SECTION

118-735B-87R-6

UNIT 6: OLIVINE-RICH GABBRO AND TROCTOLITE

Pieces 1-16

Porphyroclastic Olivine Gabbro (Pieces 1-6), Poorly Foliated Olivine Gabbro (Pieces 7-12) and Undeformed Troctolite (Pieces 13-16)



COLOR: Grayish green with some orangish brown spots from place to place.
LAYERING: Not present.
DEFORMATION: Limited to the upper part of the section (Pieces 1-6); other pieces affected little by plastic deformation. Plastic deformation is well defined by flattened pyroxene and plagioclase. Oxides injected along the foliation and neoblastic plagioclase, forming bands up to 5 mm thick. Plagioclase and amphibole veins and cracks are oblique to the foliation. Grain size varies from 1.5 cm (large porphyroclasts of pyroxene) to tenths of millimeter for plagioclase neoblasts.
PRIMARY MINERALOGY:
 Plagioclase—Mode: 50%-60% (foliated olivine gabbro); 50%-60% (porphyroclastic olivine gabbro); 20%-80% (troctolite).
 Crystal size: 1-5 mm.
 Crystal shape: Euhedral.
 Preferred orientation: Variable.
 Percent replacement: Variable, slight to moderate.
 Clinopyroxene—Mode: 35%-45% (foliated olivine gabbro); 40%-45% (porphyroclastic olivine gabbro); <5% (troctolite).
 Crystal size: Up to 20 mm.
 Crystal shape: Oikocrystic to anhedral.
 Preferred orientation: Variable.
 Percent replacement: 60% by brown and green amphibole.
 Olivine—Mode: 5%-10% (foliated olivine gabbro); 1%-2% (porphyroclastic olivine gabbro); 20%-3% (troctolite).
 Crystal size: 0.5-1.5 mm.
 Crystal shape: Anhedral.
 Preferred orientation: Not seen.
 Percent replacement: Slight replacement by talc, magnetite, and clays.
SECONDARY MINERALOGY:
 Total percent: Up to 50%.
 Texture: Pseudomorphic. Porphyroclastic gabbros: Pyroxene is almost totally replaced by brown (center) to green amphibole (60%). Plagioclase is albitized in Pieces 4A, 4B, 5, and 6. Late veins are oblique to the foliation and are composed of amphibole or plagioclase and chlorite. Iron hydroxides are deposited in these veins. Ilmenite-magnetite are injected into the porphyroclastic gabbros. The oxides are associated with chalcopyrite and pyrite. They are present in Piece 10 (olivine-gabbro). Pentlandite is observed in intergrowths with oxides. Olivine in olivine gabbro and troctolite are replaced by talc and magnetite assemblages. Orangish brown clays are present in Pieces 6, 7, 8, 13, and 14. These are mixed with iron hydroxides. White streaks are filled with calcite and talc (in troctolite) and amphibole elsewhere.
 Percent vein material: 2%-5%.
 Vein material: Amphibole, plagioclase, and chlorite.

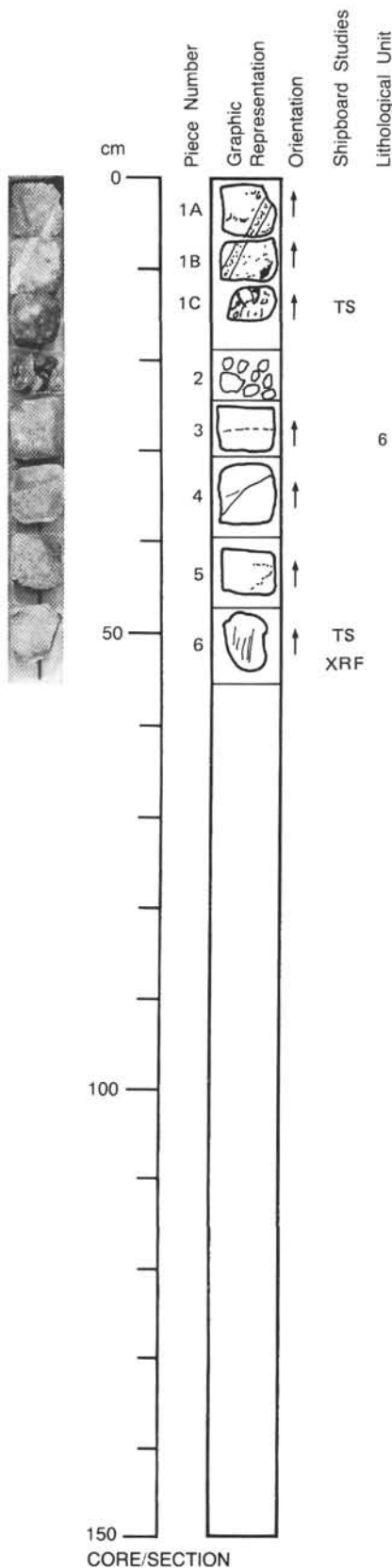
118-735B-87R-7

UNIT 6: OLIVINE-RICH GABBRO AND TROCTOLITE

Pieces 1A-6

Troctolite

Pieces 1A-6



COLOR: Gray with orange spots.

LAYERING: None.

DEFORMATION: Possible auto-brecciation in Piece 1C.

PRIMARY MINERALOGY:

Plagioclase—Mode: 55%.

Crystal size: 5-10 mm.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: Moderate.

Clinopyroxene—Mode: 2%-8%.

Crystal size: 1-10 mm.

Crystal shape: Anhedral (interstitial) to subhedral (poikilitic).

Preferred orientation: None.

Percent replacement: Moderate to extensive.

Olivine—Mode: 37%-43%.

Crystal size: 5-8 mm.

Crystal shape: Anhedral.

Preferred orientation: None.

Percent replacement: Moderate to extensive.

SECONDARY MINERALOGY:

Total percent: 30%-75%.

Texture: Amphibole occurs on all grain boundaries partially replacing plagioclase and olivine; also on numerous thin, nearly vertical fractures. Piece 6 is particularly intensely altered.

Olivine is generally altered to an orange to yellow-brown oxide. In most pieces it is totally replaced. Some fresh olivine remains in partially altered areas of Pieces 3, 4, and 5. One large vein in Pieces 1A and 1B is composed of plagioclase and actinolite. Some iron staining on feldspar. Piece 1C has vugs filled by carbonate. Vein in Piece 4 is feldspar heavily stained by iron. Some ilmenite in this piece. Trace of sulfides in Piece 5.

Percent vein material: 5%-8%.

Vein material: Amphibole, sodic plagioclase, carbonate, and chlorite.

118-735B-88N-1

UNIT 6: OLIVINE-RICH GABBRO AND TROCTOLITE**Pieces 1 and 2****Coarse Pyroxenite Intensely Veined with Amphibole and Plagioclase—Some Coarse Gabbro.****Piece 1****COLOR:** Green and white; very dark green.**LAYERING:** None.**DEFORMATION:** None.**PRIMARY MINERALOGY:**

Plagioclase—Mode: Only in veins and gabbro.

Crystal size: Up to 2 cm in coarse gabbroic material.

Crystal shape: Not determined.

Preferred orientation: None apparent.

Percent replacement: Not determined.

Clinopyroxene—Mode: Not determined.

Crystal size: Up to 3 cm.

Crystal shape: Not determined.

Preferred orientation: None apparent.

Percent replacement: Not determined.

SECONDARY MINERALOGY:

Total percent: Not determined.

Texture: Colorless amphibole(?) associated with green amphibole. Talc—green coating on some surfaces.

Percent vein material: Not determined.

Vein material: Amphibole and plagioclase.

Olivine Gabbro**Piece 2****COLOR:** Dark gray with greenish gray or dark gray patches, locally dull orange (after olivine).**LAYERING:** Both size and crude-phase layering observed.**DEFORMATION:** Minor. Tiny vertical and oblique fractures at 20-25 and 30-35 cm.**PRIMARY MINERALOGY:**

Plagioclase—Mode: 20%-60%.

Crystal size: Not determined.

Crystal shape: Not determined.

Preferred orientation: Not determined.

Percent replacement: Not determined.

Clinopyroxene—Mode: 40%-70%.

Crystal size: Not determined.

Crystal shape: Not determined.

Preferred orientation: Not determined.

Percent replacement: Not determined.

Olivine—Mode: 0%-15% (approximately 15% between 25-35 cm).

Crystal size: Not determined.

Crystal shape: Not determined.

Preferred orientation: Not determined.

Percent replacement: Not determined.

SECONDARY MINERALOGY:

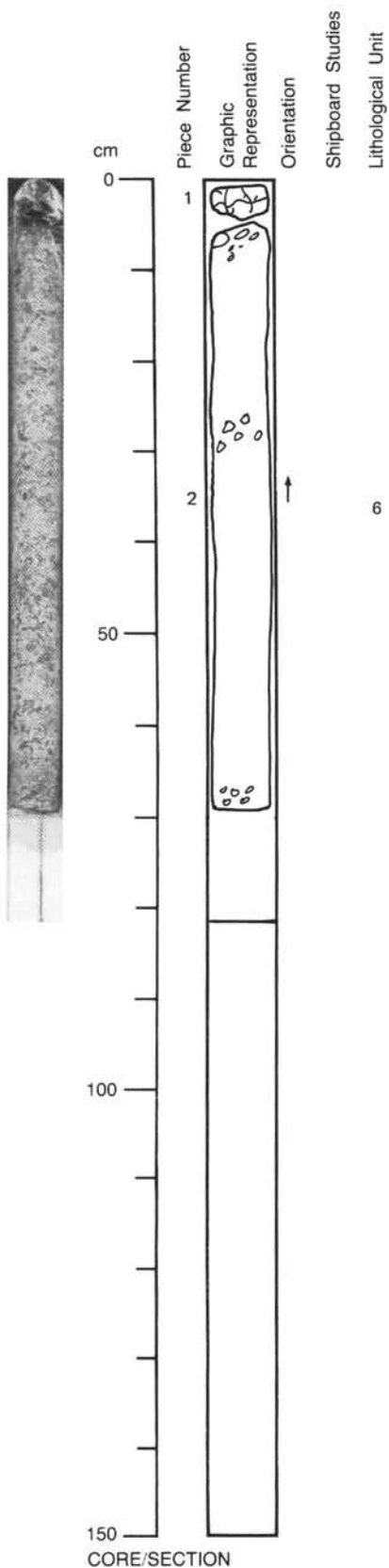
Total percent: Not determined.

Texture: Amphibole widely distributed. Local albitized zones (near 29-30 cm), red oxides after olivine in pyroxenite and at base of core.

COMMENTS: Primary mineralogy ranges modally from nearly pyroxenitic to almost leucogabbro. This core was drilled using the Navi-drill and is unsplit.

Percent vein material: Not determined.

Vein material: Not determined.



THIN SECTION DESCRIPTION

118-735A-1D-1 (Piece 1, 1-3 cm)

ROCK NAME: Foliated metagabbro

WHERE SAMPLED:

TEXTURE: Porphyroclastic

GRAIN SIZE: Coarse

OBSERVER: CAN

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine(?)	—	5			Anhedral	Entirely replaced by talc, clay minerals, carbonate, and opaques.
Plagioclase	22	60	10			Fractured and recrystallized into small grains, porphyroclasts.
Clinopyroxene	22	35	4			Partially recrystallized and replaced by green hbd.
Hornblende	<1	<1				Patches in cpx. Uncertain if igneous or metamorphic origin.
SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING				COMMENTS
Clays	3	Ol(?)				Cores of replacement of mafic mineral thought to be ol.
Carbonate	<1	Ol(?), veins				As veins in the plag.
Albite	1	Plag				Fills sealed, pre-deformation fractures in the plag.
Actinolite	3	Plag, hbd				Post-deformation replacement.
Hornblende	25	Cpx, veins				Occurs as replacement of cpx porphyroclasts, and in veins which cut the porphyroclasts.
Plagioclase	20	Plag				Green hornblende is also recrystallized during deformation.
Talc	1	Ol(?)				In the most deformed zones, plag is recrystallized in grains <0.07 mm, often with straight grain boundaries.
Opaques	1					Replacing mafic mineral (ol?).
						Cores replacing ol(?) and intergrown with cpx, rutile(?). Trace of ilmenite with hematite exsolution lamellae in cpx unevenly cut by amphibole. Also minor Fe-oxyhydroxides.

COMMENTS: 1) The deformation occurred with recrystallization of green hornblende and plag. High temperature and/or strain rate (highly deformed zones with very small grain sizes). The total strain is not very high.
 2) Two types of cpx are observed: one with cleavage and extensive replacement by green hornblende; one clear with reddish brown inclusions, worm-like or straight, and patches of brownish hornblende—not replaced by green hornblende.

THIN SECTION DESCRIPTION

118-735B-1D-1 (Piece 4, 26-30 cm)

ROCK NAME: Foliated metagabbro

WHERE SAMPLED:

TEXTURE: Porphyroclastic, mylonitic

GRAIN SIZE: Medium

OBSERVER: STA/CAN/OZA

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	59	59	<1-2		Anhedral	Present as porphyroclasts in matrix.
Clinopyroxene	20	35	0.1-~4		Anhedral	Present as distorted porphyroclasts, replaced by amphibole and clay.
Ilmenite	—	1	<0.1		Anhedral	Stretched and flattened showing foliation. Polycrystalline.
Hornblende	3	3			Anhedral	Inclusions in cpx.
Orthopyroxene	—	2	1.5		Anhedral	Replaced by tremolite ± talc(?) aggregate.
SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING				COMMENTS
Clays	2	Cpx:				Smectite mixed with Fe oxide.
Carbonate	1	(?)				Present with smectite + Fe oxide. Anhedral.
Tremolite	2	???				White to pale green. Large euhedral crystal.
Hornblende	9	Cpx				Green-brown to pale brown. Replaces cpx. Recrystallized.
Opaques	1	Cpx				Ilmenite, magnetite. Replaces cpx. Bands in mylonite. Ilmenite concentrated toward center of section, near porphyroclasts.
Amphibole	3	??				Blue.

COMMENTS: 1) Two amphiboles. Pale brown replaces cpx porphyroclasts. Green to green-brown as recrystallized mosaic.
 2) 1% bright blue amphibole.
 3) Tremolite ± talc replaces ol(?), opx(?).
 4) Plagioclase is recrystallized.
 5) Two different zones are recognized. One is fine-grained (0.1-0.4 mm cpx and plag porphyroclasts) mylonitic zone. The other is coarse-grained (~5 mm cpx, plag, brown hbd after cpx(?) porphyroclasts and <0.5 mm neoblasts of plag, cpx and amphibole) porphyroclastic zone.

THIN SECTION DESCRIPTION

118-735B-1D-1 (Piece 3, 19-21 cm)

ROCK NAME: Porphyroclastic metagabbro

WHERE SAMPLED:

TEXTURE: Porphyroclastic

GRAIN SIZE: Variable, fine to medium (0.04-4.00 mm)

OBSERVER: HEB

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	10	56	1-4		Elongated	Deformed porphyroclasts.
Clinopyroxene	—	40	1.5-3.0			
Ilmenite	Tr	Tr	1			Partially altered to magnetite.
						Pleochroic anhedral interstitial grains. Late magmatic and rapidly destabilized into secondary brown amphiboles.
Amphibole	Tr	3(?)	0.5			
SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING				COMMENTS
Clays	Tr	Cpx				Yellow to yellow-brown. Replaces cores of altered cpx.
Hornblende	7	Fractures, cpx				Replaces brown hornblende. Pale green to blue-green. Restricted to grain boundaries and fractures.
Plagioclase	46	Plag				Replaces plag phenocrysts. Granoblasts (0.4-0.8 mm) formed by crushing and neoblasts (< 0.05 mm) formed by recrystallization. In the groundmass or as inclusions in large plag crystals.
Ilmenite, magnetite	2	Ilmenite, cpx				Small grains (0.04-0.15 mm) included in replaced cpx along cleavage planes.
Amphibole	8	Amphibole				Outlines talc polygons in altered cpx.
Clinopyroxene	27	Cpx				Brown amphibole. In shear planes in ancient cpx, at grain outer margins, or as pockets in groundmass (or altered cpx).
						Small granoblasts (= 0.4 mm) forming a mosaic near large, now altered cpx. Magnetite outlines the shapes of the granoblasts. These granoblasts are in turn replaced by actinolite or pale brown amphibole.

COMMENTS: Plastically deformed metagabbro; deformation of phenocrysts and development of neoblasts and granoblasts. Metamorphism under static hydrous conditions (hornblende, brown amphibole). Open fractures filled by amphibole.

THIN SECTION DESCRIPTION

118-735B-1D-1 (Piece 12, 78-82 cm)

ROCK NAME: Foliated metagabbro

WHERE SAMPLED:

TEXTURE: Gabbroic with minor cataclasis at edges

GRAIN SIZE: Very coarse

OBSERVER: KEM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	30.9	50	10-15			Fractures in plag filled by amphibole and minor clay minerals.
Clinopyroxene	13.0	40	10-13			Partially replaced by brown amphibole. Opx exsolution in cpx replaced by orange-brown material, similar to replacement of primary opx. Also cross cut by veins of colorless amphibole.
Orthopyroxene	—	10				Replaced by orange-brown material.
SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING				COMMENTS
Clays	10.1	Opx(?)				Dark orange-brown, cryptocrystalline masses mixed with magnetite.
Carbonate	Tr	Opx				In area of opx alteration.
Hornblende	15.6	Cpx, groundmass				Occurs mainly replacing cpx and in masses between plag. Brown.
Plagioclase	8.5	Plag				Neoblasts.
Ilmenite, magnetite	4.4	Opx, plag				In areas of opx alteration and as small inclusions in plag.
Hornblende	5.9	Hbd, fractures				Green. Replaces brown hornblende along edges of cpx and fills fractures in plag.
Amphibole	11.3	Opx				Colorless. Occurs in masses adjacent to altered areas that were originally opx. In some cases, forms acicular crystals growing perpendicular to edges of opx alteration area.

COMMENTS: Percentages based on >500 point counts.

THIN SECTION DESCRIPTION

118-735B-1D-1 (Piece 14, 90-92 cm)

ROCK NAME: Porphyroclastic metagabbro

WHERE SAMPLED:

TEXTURE: Porphyroclastic

GRAIN SIZE: Medium to coarse

OBSERVER: BLM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	17	55	0.2-2.0		Anhedral	Porphyroclasts. Deformation twins.
Clinopyroxene	6	39	< 6			Crystals often bent. Replaced by amphibole.
Orthopyroxene	Tr	6	4	Bronzite	Subhedral	Altered to clay, hematite, aragonite, and tremolite.

SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING	COMMENTS
Clays	2	Opx	Replacing opx pseudomorphs.
Carbonate	Tr	Opx	In opx pseudomorphs.
Actinolite	2(?)	Veins	Possibly some in veins and around grain boundaries.
Hornblende	19	Cpx	Green, well crystallized hornblende. Often cutting cpx. Post deformation.
Plagioclase	36	Plag	Recrystallized neoblasts, < 0.1 mm in size.
Tremolite	4	Opx	Fine-grained clear needles.
Hematite	Tr	Opx	In pseudomorphs. Blood red.
Magnetite	1	Px	In both opx and cpx pseudomorphs.
Clinopyroxene	2	Cpx	Neoblasts.
Ilmenite(?)	Tr	?	Tails on augen.

COMMENTS: Opaques: some patchy ilmenite; much finer magnetite mainly in alteration amphibole. Trace of Fe oxyhydroxides.

Percentages based on 1000 point counts:

Plag porphyroclasts 16.8; plag neoblasts 36.4; cpx 6.3; alteration products of cpx 10.9; cpx neoblasts 2.3; opx 1.2; opx alteration products 5.4; opaques 0.8; hematite 0.1; other (veins) 1.0.

THIN SECTION DESCRIPTION

118-735B-1D-1 (Piece 19, 117-120 cm)

ROCK NAME: Foliated metagabbro

WHERE SAMPLED:

TEXTURE: Porphyroclastic

GRAIN SIZE: Fine to coarse

OBSERVER: KEM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	23.1	64	0.4-1.2		Anhedral	Deformation twinning. Elongate in the plane of foliation.
Clinopyroxene	2.2	33	0.1-0.4		Anhedral	Replaced by brown and green amphibole. Some granulation along grain boundaries of some porphyroclasts.
Ilmenite	3.3	3	0.3-0.5		Equant	Occurs as clusters of equant crystals in layers parallel to foliation.

SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING	COMMENTS
Plagioclase	41.2	Plag	Neoblasts.
Brown hornblende	21.6	Cpx	
Green hornblende	8.6	Hbd, cpx	Replaces brown amphibole and cpx.

COMMENTS: Percentages based on 530 point counts.

Original igneous texture destroyed by deformation and amphibole replacement. Brown amphibole appears to have replaced cpx first along grain boundaries and in patches associated with oxide inclusions. Brown amphibole was later partially replaced by green amphibole. In one area of granulated cpx, there are traces of a low to medium relief, low birefringent, colorless mineral which is associated with amphibole (probably tremolite).

THIN SECTION DESCRIPTION

118-735B-1D-1 (Piece 23, 141-143 cm)

ROCK NAME: Porphyroclastic metagabbro

WHERE SAMPLED:

TEXTURE: Porphyroclastic

GRAIN SIZE: Fine to coarse

OBSERVER: BLM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	30	60	0.2-2.0		Anhedral	Porphyroclasts.
Clinopyroxene	15	40				
Orthopyroxene	< 1	5(?)				
SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING				COMMENTS
Actinolite	15	Cpx				Light green to green fibrous grains or rims around cpx clasts. Also with finer-grained cpx clots.
Hornblende	5	Cpx				Green and brown. Small scattered bits in cpx.
Plagioclase	30	Plag				< 0.1 mm neoblasts.
Hematite	1	Opx				In cores of opx pseudomorphs.
Ilmenite/magnetite	1	Opx				In cores of opx pseudomorphs. Also in cpx clots.
Clinopyroxene	3	Cpx				Recrystallized neoblasts.

COMMENTS: Foliation defined by cpx-plag lenses.
Oriented thin section, cut from the end of a minicore.

THIN SECTION DESCRIPTION

118-735B-1D-2 (Piece 1, 2-9 cm)

ROCK NAME: Metagabbro augen gneiss

WHERE SAMPLED:

TEXTURE: Augen gneissic

GRAIN SIZE: Medium

OBSERVER: DCK

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	1	60	1-3		Augen	Surrounded by recrystallized plag.
Clinopyroxene	4	37	1-3		Augen	
Orthopyroxene	< 1	3		Hypersthene		Occasional relict augen in schlieren.
Oxides	Tr	Tr		Fe-Ti		Occasional small grains in groundmass.
SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING				COMMENTS
Clays	1	Opx				
Hornblende	15	Cpx				Brownish green to green.
Plagioclase	59	Plag				Flattened neoblasts of recrystallized primary plag.
Orthopyroxene	1	Opx				Schlieren of hypersthene neoblasts replacing primary hypersthene along foliation.
Amphibole	9	Cpx				Green and clear amphiboles. At least three generations.
Clinopyroxene	9	Cpx				Neoblasts of recrystallized primary cpx.
Hematite	< 1	Oxides, opx				Stains altered silicates. Occasional grains in groundmass.

COMMENTS: Well developed foliation defined by flattened plag neoblasts, aligned secondary hbd, hypersthene schlieren and stretched pods of recrystallized cpx. One third of the thin section is heavily altered to hbd in proximity to hydrothermal veins cross cutting the foliation at a steep angle. Concentration of relatively coarse hbd occurs along and near veins.

THIN SECTION DESCRIPTION

118-735B-1D-2 (Piece 13, 86-90 cm)

ROCK NAME: Foliated metagabbro

WHERE SAMPLED:

TEXTURE: Porphyroclastic

GRAIN SIZE: Fine to medium

OBSERVER: DCK

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	14	56	2-5			Porphyroclasts. Often very flattened.
Clinopyroxene	26	37	2-5			Porphyroclasts with mortar texture.
Orthopyroxene	2	5	0.5-2.0	Hypersthene		Occurs often as flattened porphyroclasts.
Ilmenite	2	2				Occurs as irregular lenses and bands (1 mm thick) along the foliation.
SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING				COMMENTS
Clays	2	Opx				Reddish brown clay. Replaces opx lamellae in cpx.
Carbonate	< 1	Opx				Clots in opx pseudomorphs.
Hornblende	1	Cpx				Brown hbd blebs in cpx.
Plagioclase	42	Plag				Neoblasts formed by recrystallization of primary plag.
Phlogopite	< 1	Opx				Occurs as small books in opx schlieren along foliation.
Clinopyroxene	4	Cpx				Recrystallized syndeformational neoblasts.
Amphibole	7	Cpx, veins				Replacing and rimming cpx. Also in veins which cross cut plag, and sometimes the foliation.

COMMENTS: Cpx and brown to green hbd are intergrown in recrystallized mosaic and in layers. Mylonitic bands are very fine grained.

THIN SECTION DESCRIPTION

118-735B-2D-1 (Piece 14, 76-80 cm)

ROCK NAME: Well foliated metagabbro

WHERE SAMPLED:

TEXTURE: Granoblastic

GRAIN SIZE: Variable, fine to medium (0.2-2.0)

OBSERVER: HEB

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	50	60	0.5		Polygonal	
Clinopyroxene	2	38	0.5-2.0		Subhedral	Largely replaced by green-brown amphiboles. Some crystals were porphyroclasts before replacement.
Amphibole	Tr	1(?)	0.2-0.5		Irregular	Brown. Patches in or at the margins of altered cpx. Associated with ilmenite.
Ilmenite	Tr	1	< 0.3		Irregular	Opaques included in cpx. Associated with brown amphiboles.
SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING				COMMENTS
Clays	Tr	Cpx, amphibole				Yellow-brown. Associated with mixture of poorly crystallized hematite and Fe hydroxides.
Tremolite/actinolite	5	Cpx				Possibly replacing opx. Well-developed thin (0.1 mm) needles in reaction zone. Intergrown with magnetite.
Hornblende	27	Cpx				Green-brown pseudomorphs after cpx.
Plagioclase	10	Plag				Neoblasts, 0.01-0.06 mm.
Amphibole	4	Amphibole				Blue-green rims (0.04 mm thick) around green-brown hbd. Fibrous. Also replacing a number of grains.
Magnetite	1	Cpx				Possibly replacing opx. Minute grains or irregular grains in reaction zone with actinolite-tremolite.
Amphibole	1	Cpx, amphibole				Brown. Small pale brown patches enclosed in green-brown amphiboles, 0.02-0.20 mm.
Hematite	TR	Ilmenite				Fe hydroxide. See clays.

COMMENTS: Distribution of plag is irregular and one area of the thin section is leucocratic. Some plastic deformation and foliation developed. Amphibolitization of cpx (possibly opx was present with actinolite + magnetite). Brown to green-brown. Blue-green amphibole developed as rims and fillings of late fractures.

THIN SECTION DESCRIPTION

118-735B-2D-1 (Piece 21, 113-115 cm)

ROCK NAME: Foliated metagabbro

WHERE SAMPLED:

TEXTURE: Porphyroclastic to mylonitic

GRAIN SIZE: Fine to medium

OBSERVER: STA

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine(?)	—	(?)				Talc-tremolite pseudomorphs. Possibly after opx(?).
Plagioclase	5	37	0.25-1.00		Anhedral	Porphyroclasts.
Clinopyroxene	5	60	1-4		Flattened	Porphyroclasts.
Orthopyroxene(?)	—	2(?)	= 1		Rounded	Talc-tremolite pseudomorphs. Possibly ol(?).
Ilmenite	1(?)	1(?)			Anhedral	Cannot distinguish primary from secondary ilmenite.
SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING				COMMENTS
Clays	10	Cpx, opx(?), ol(?)				Smectite mixed with Fe oxide.
Carbonate	< 1	Opx(?), ol(?)				Late replacement of opx (ol?).
Tremolite	(?)	Opx(?), ol(?)				
Hornblende	15	Cpx				Brown. Replacing cpx and in mosaic.
Plagioclase	31	Plag				Fine grained mosaic of recrystallized grains.
Hornblende	1	Plag, hbd				Green. Along boundaries between plag + hbd or cpx.
Clinopyroxene	25	Cpx				Recrystallized in mosaic. Neoblasts.
Ilmenite	7	Cpx				Bands with brown hbd. Ilmenite has hematite exsolution lamellae, locally intergrown with Fe oxyhydroxides.
Talc	1	Opx(?), ol(?)				Opx (ol?) pseudomorphs with tremolite.

COMMENTS: 1) Neoblasts of brown hbd and px are mixed with ilmenite in bands.

2) Rounded pseudomorphs of talc + tremolite or hematite, calcite and smectite may be opx.

THIN SECTION DESCRIPTION

118-735B-2D-1 (Piece 24, 135-149 cm)

ROCK NAME: Mylonite to porphyroclastic gabbro

WHERE SAMPLED:

TEXTURE: Mylonitic to porphyroclastic

GRAIN SIZE: Fine to medium

OBSERVER: BLM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	5	45(?)	0.1-0.2		Anhedral	Nearly all recrystallized.
Clinopyroxene	8	45(?)	0.2-4.0		Anhedral-subhedral	Partially recrystallized, also replaced by amphibole.
Ilmenite	—	5(?)	< 0.5			Aggregates of small grains. Associated with opx.
Orthopyroxene	2	5	0.2-0.5		Elongate, anhedral	Replaced by dark orange-brown to brown clay hematite clots.
SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING				COMMENTS
Actinolite	15	Cpx, opx, veins				Estimate may be high. Replacing cpx or fine layers. Also filling veins. Zones of replacement often cross cut the foliation.
Hornblende	5	Cpx				Small pieces in larger cpx and in mafic layers after cpx.
Plagioclase	40	Plag				< 0.01 mm mosaics of neoblasts, lenses and discontinuous layers.
Clinopyroxene	15	Cpx				Neoblasts. Cpx is just broken or replaced. Recrystallized grains are very fine.
Hornblende	2	Cpx, opx				Green. In fine-grained mafic layers after cpx.
Opaques	8	Spinel, cpx				Fine-grained and patchy aggregates.

COMMENTS: The opaques are all secondary: mainly ilmenite, rare magnetite, and some Fe oxyhydroxides. Hematite exsolution in ilmenite. No sulfides present.

Prominent foliation defined by discontinuous layers 0.1-0.6 mm thick of plag neoblasts alternating with cpx-amphibole-magnetite layers. The opaques (mainly ilmenite) are very abundant. Large (> 1 mm) porphyroclasts are concentrated in one layer.

Oriented thin section cut from the end of a minicore.

THIN SECTION DESCRIPTION

118-735B-2D-2 (Piece 1, 0-4 cm)

ROCK NAME: Porphyroclastic metagabbro

WHERE SAMPLED:

TEXTURE: Porphyroclastic

GRAIN SIZE: Fine to medium

OBSERVER: BLM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	20	55	1-8		Anhedral	Porphyroclasts. Undulose extinction. Fractured. Bent and fractured porphyroclasts. Large exsolution(?) in deformed cpx. Possibly primary, but uncertain.
Clinopyroxene	10	45	1-4		Anhedral	
Orthopyroxene	<1					
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Actinolite	2	Cpx, amphibole				Some rims and clots on edges of cpx and other amphiboles. Green. Some green to blue-green. Patches and blades replacing cpx and in veins cross cutting foliation.
Hornblende	23	Cpx, veins				
Plagioclase	35	Plag				< 0.1 mm mosaic of neoblasts. Some actinolite on boundaries. Neoblasts(?). Probably recrystallized from porphyroclasts.
Clinopyroxene	5	Cpx				
Magnetite	2	Opx, cpx				In altered px cores and schlieren.
Hornblende	3	Cpx				Brown. Small patches in cpx.

COMMENTS: Note: ilmenite and magnetite are both present. Some albitized plag also present. Well defined foliation defined by plag-cpx lenses. Cpx commonly fractured and rotated. Most of the amphibole appears to be post deformational since this mineral occurs in veins which cut the foliation and in grain boundaries with parallel orientations.

THIN SECTION DESCRIPTION

118-735B-2D-2 (Piece 17, 99-101 cm)

ROCK NAME: Poorly foliated metagabbro

WHERE SAMPLED:

TEXTURE:

GRAIN SIZE: Coarse

OBSERVER: STA

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	—	2				Anhedral Twinned. Orthocumulate. Blebs in px. Lamellae in cpx.
Plagioclase	50	65				
Clinopyroxene	10	22				
Hornblende	1	1				
Orthopyroxene	2	10				
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	<1	Fractures				Mixed with Fe oxide in microfractures. Mixed with hematite.
Carbonate	1	Opx				
Actinolite	2	Plag, cpx, opx				Grain boundaries with plag.
Hornblende	10	Cpx				Green-brown to red-brown. Syndeformational and in late veins, recrystallized. Neoblasts.
Plagioclase	13	Plag				
Clinopyroxene	2	Cpx				Neoblasts with hbd.
Fe oxide	1	Opx				Mixed with clay.
Tremolite	5	Opx				Around opx pseudomorphs.
Talc	>1	Opx				Mixed with tremolite around opx pseudomorphs.
Opauques	1	Cpx				Rods. Probably magnetite in altered cpx lamellae. Some Fe oxyhydroxides after ol. Trace patches of ilmenite. Grain boundary magnetite; some in flaky brown amphibole with exsolution lamellae.

COMMENTS: 1) Calcite-Fe oxide pseudomorphs with high temperature reaction coronas of tremolite and actinolite. Probably replacing ol (possibly opx; assumed ol for percent static replacement). Ol was later altered to oxides.
2) Only a few poorly defined deformed recrystallized zones.

THIN SECTION DESCRIPTION

118-735B-2D-2 (Piece 19B, 116-120 cm)

ROCK NAME: Foliated olivine gabbro

WHERE SAMPLED:

TEXTURE: Layered(?)

GRAIN SIZE: Coarse

OBSERVER: MEY

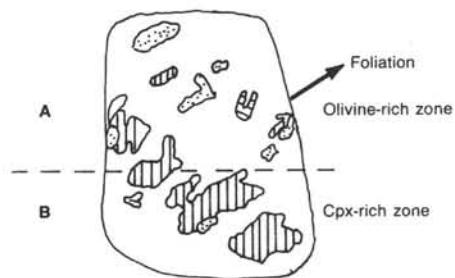
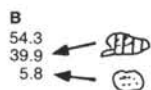
PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	3.7	12.3	2-7		Anhedral	Irregularly distributed in thin section. Possibly layered (see diagram).
Plagioclase	55.1	68.1	2-12		Subhedral-anhedral	Irregularly distributed in thin section. Possibly layered (see diagram).
Clinopyroxene	10.7	19.6	2-15		Anhedral	Irregularly distributed in thin section. Possibly layered (see diagram).

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Chlorite(?)	1.4	Plag	Forms low birefringent mineral next to plag. Around tremolite which jackets or completely replaces ol.
Plagioclase	13		Neoblasts, < 2 mm in size.
Clinopyroxene	0.4		Neoblasts, < 1 mm in size.
Tremolite	3.2	Ol	
Hornblende	8.6	Cpx	Some may be primary.
Hematite	0.8	Ol	
Talc	1.7	Ol	
Magnetite(?)	0.8	Ol	
Amphibole	0.6	Plag	

COMMENTS: Percentages based on 3000 point counts.
Normalized percentages for parts A and B of the thin section:

	A	B
Plagioclase	70.8	54.3
Clinopyroxene	15.5	39.9
Olivine	13.7	5.8

Igneous layering is normal to the foliation.



THIN SECTION DESCRIPTION

118-735B-3D-1 (Piece 2, 7-11 cm)

ROCK NAME: Foliated metagabbro

WHERE SAMPLED:

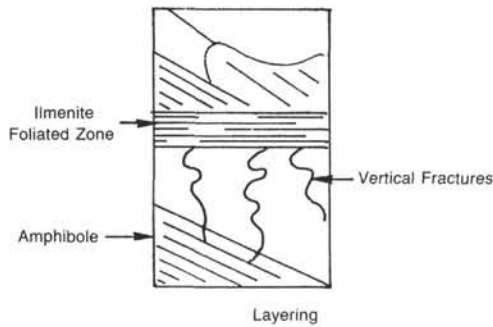
TEXTURE: Porphyroclastic

GRAIN SIZE: Fine to medium

OBSERVER: BLM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	20	45	0.1-1.0		Anhedral	Small, very elongate fragments of original grains. Unaltered patches in amphibolitized porphyroclasts.
Clinopyroxene	8	55	<0.1			
SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING				COMMENTS
Clays	2	Plag				Pale green. Fine dusting in plag and in between some amphibole crystals. Green to brown. Replacing cpx and in veins. In places, completely replaces cpx in lenses and veins with parallel grains.
Hornblende	30	Cpx, veins				
Actinolite	12	Cpx, veins				Fine fibrous aggregates and some cpx replacements. In some veins, in part replacing an early amphibole. Mosaic of <0.1 mm neoblasts.
Plagioclase	23	Plag				
Opauques	5	Cpx				Anhedral grains near cpx replacements. Fine-grained aggregates in a mafic layer in central part of the slide. Mainly patchy ilmenite. Traces of magnetite in finer grained amphibole. Traces of Fe oxyhydroxides.

COMMENTS: This rock is extensively replaced. Most of the cpx is replaced by amphibole. Parts of the rock have interlocking, semi-parallel amphibole aggregates. The amphibole appears to be late syndeformational to post-deformational. This rock is intermediate, with respect to percent alteration, between the fresh porphyroclastic gabbros of 735B and the amphibolites of site 733.



THIN SECTION DESCRIPTION

118-735B-3D-1 (Piece 9, 46-49 cm)

ROCK NAME: Mylonitic gabbro

WHERE SAMPLED:

TEXTURE: Mylonitic

GRAIN SIZE: Fine, with augen up to 3.5 mm

OBSERVER: HEB

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	5	40	0.5-2.4		Elongated, rounded	Porphyroclasts, rotated during deformation. Strained, recrystallized.
Clinopyroxene	8	60	1-2		Elongated, deformed	
SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING				COMMENTS
Clays	Tr	Amphibole				Reddish brown patches in amphiboles. Very fine needles localized in thin bands replacing amphibole. Intergrown sometimes with plag neoblasts.
Actinolite	10	Cpx				
Hornblende	7	Amphibole				Brown. In pressure shadows or in green amphibole. Neoblasts, 0.02-0.08 mm. Intergrown with actinolite or in monomineralic bands, 0.1-0.4 mm wide, parallel to the foliation plane.
Plagioclase	35	Plag				
Green hornblende	30	Cpx				Porphyroclasts, 1.0-3.5 mm. Replaced by brown amphibole. Slight brown color, euhedral to augen-shaped. Neoblasts, 0.1-0.3 mm. Disseminated in mylonitic bands. Partially amphibolitized. Ilmenite and magnetite. Grains <0.04 mm, in foliation planes.
Clinopyroxene	5	Cpx				
Opauques	Tr	??				

COMMENTS: Strong deformation of gabbroic protolith. Composition uncertain. For example, opx may have been present, now replaced by actinolite. Brown amphibole replaces cpx. Green-grown amphibole replaces cpx (blue-green in plag). Actinolite replaces green-brown amphibole.

THIN SECTION DESCRIPTION

118-735B-3D-1 (Piece 11, 58-60 cm)

ROCK NAME: Porphyroclastic to poorly foliated metagabbro

WHERE SAMPLED:

TEXTURE: Porphyroclastic, granular

GRAIN SIZE: Fine to coarse

OBSERVER: BLM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	40	55	0.2-2.0		Anhedral	Porphyroclasts. Most small, slightly stretched crystals with sutured boundaries. Average size 0.4-0.5 mm.
Clinopyroxene	8	45	< 4		Anhedral	One crystal only slightly altered. Other fragments are in larger altered cpx clots.
SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING				COMMENTS
Clays	5	Plag, cpx				Along grain boundaries and fractures. Rarely replacing cpx.
Actinolite	10	Cpx				Pale green fibrous aggregates in cpx pseudomorphs. Also in veins.
Sphene	Tr	Ilmenite				Reaction after ilmenite.
Hornblende	19	Cpx				Green fibrous aggregates of <0.1-0.2 mm, after cpx and in veins.
Plagioclase	12	Plag				Recrystallized neoblasts <0.1 mm.
Opauques	1	Cpx				Anhedral, 0.01-0.10 mm crystals. Usually ilmenite after cpx.
Hornblende	5	Cpx				Small, <0.1 mm, strings in cpx. Also rimming cpx.

COMMENTS: End of minicore. Thin section possibly cut in the plane of foliation.

THIN SECTION DESCRIPTION

118-735B-3D-1 (Piece 14, 82-85 cm)

ROCK NAME: Gabbro

WHERE SAMPLED:

TEXTURE: Holocrystalline, hypidiomorphic-granular

GRAIN SIZE: Very coarse

OBSERVER: KEM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	20	45				Deformed and partially recrystallized to subgrains, 0.4-0.8 mm in size, and to neoblasts, <0.05 mm in size. Partially replaced by amphibole, clay minerals, and minor hematite along exsolution lamellae. Some granulation at grain boundaries.
Clinopyroxene	30	50				
Orthopyroxene	—	5				
SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING				COMMENTS
Clays, hematite	8	Cpx, opx				Replacing opx along exsolution lamellae in cpx, and replacing opx.
Plagioclase	25	Plag				Occurs as rod-like inclusions along exsolution lamellae, in veins with clays(?), and in patches of opx replacement minerals.
Magnetite	1	Opx, cpx, veins				
Brown amphibole	4	Cpx				Patchy replacement of cpx.
Green amphibole	9	Amphibole, veins				Replacing brown amphibole, and in fractures/veins.
Hematite	1	Opx, cpx				Replacing opx, in veins, and in cpx.
Colorless amphibole	2	Opx				Occurs in patches around edges of opx replacement, and as overgrowths on brown amphiboles.

COMMENTS: Opx is possibly an ol pseudomorph.

THIN SECTION DESCRIPTION

118-735B-4D-1 (Piece 10, 64-68 cm)

ROCK NAME: Mylonite

WHERE SAMPLED:

TEXTURE: Mylonitic

GRAIN SIZE: Fine to medium

OBSERVER: KEM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	—	35	>3		Anhedral	Porphyroclastic.
Clinopyroxene	3.2	35	2-3		Anhedral	Completely replaced by green amphibole in half of the thin section. Partially replaced by hematite + clay minerals in the other half.
Ilmenite	23.2	30	0.1-1.6		Equant	Occurs as inclusions in primary cpx. Predominately as small crystal aggregates/layers.
SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING				COMMENTS
Sphene	1	Ilmenite				Sphene after ilmenite.
Plagioclase	8.4	Plag				Neoblasts.
Plagioclase	19.0	Plag				Porphyroclasts composed of neoblasts, surrounded by oxides.
Hematite	6.4	Cpx				Interstitial. Partially replacing cpx.
Hematite, clays	7.4	Ilmenite				Hematite exsolution lamellae in ilmenite.
Green amphibole	7.8	Cpx				Interstitial.
Green amphibole	24.6	Cpx				Replacing cpx.
Magnetite	Tr	Cpx				Traces of fine magnetite in altered cpx.

COMMENTS: Although texture is apparently mylonitic, cpx is not strongly deformed. Cpx occurs as equant to slightly elongate, rounded crystals set in a fine matrix of oxides + plag neoblasts. Plag porphyroclasts are also rounded, but consist of fine aggregates of plag neoblasts rather than large, deformed solitary crystals.

Ilmenite predominates in the section of the slide where amphibole completely replaces cpx. In this part of the slide, the assemblage is dominated by ilmenite + amphibole (after cpx). In the other end of the slide, abundance of plag increases, occurring as porphyroclasts composed of neoblasts. Here, the cpx is only partially replaced by a mixture of hematite + clay(?) and the abundance of opaque minerals with exsolution (i.e. magnetite with hematite exsolution) increases.

Percentages based on 500 point counts.

THIN SECTION DESCRIPTION

118-735B-4D-1 (Piece 12, 78-82 cm)

ROCK NAME: Poorly foliated metagabbro

WHERE SAMPLED:

TEXTURE: Orthocumulus modified into granoblastic

GRAIN SIZE: Coarse, up to 7 mm

OBSERVER: HEB

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	20	42	0.5-2.5		Euhedral	Enclosed in px or in the matrix. Strongly recrystallized into granoblasts.
Clinopyroxene	10	55	0.2-7.0		Subhedral	Also cumulus phase and in pore space of the cumulate. Almost completely replaced by amphibole.
Brown amphibole	1	3(?)	<0.3		Irregular	Clear, strongly pleochroic. Irregularly distributed in cpx.
SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING				COMMENTS
Clays	3	Amphibole, cpx				Yellow brown to dark brown. Occupies the center of cpx crystals.
Tremolitic actinolite	12	Cpx				Well developed, fine-grained needles of radiating bundles, especially at the margin of cpx (some entire grains replaced). Possibly intermixed with talc(?).
Hornblende	24	Cpx, fracture				Green-brown pseudomorphs after cpx. Idioblastic in late-stage vein.
Plagioclase	22	Plag				Granoblasts. Straight edges, triple junctions, recrystallized large primary plag crystals.
Clinopyroxene	5	Cpx				Granoblasts (0.5 mm) recrystallized large primary cpx crystals.
Amphibole	2	Cpx, amphibole				Blue-green. Rimming green-brown amphibole and filling late-stage open fractures.
Magnetite	1	Cpx				By-product replacement with tremolitic actinolite.

COMMENTS: Polygonal recrystallization of larger plag grains and cpx. Cpx is replaced by green-brown amphibole and tremolitic actinolite pale magnetite(ancient opx(?) if talc is present).

Green-brown amphibole and tremolite actinolite are replaced by blue-green amphibole.

Veins filled by green-brown amphibole (idioblastic). Dark color. 1-6 mm in size

Clay alteration of amphibole.

THIN SECTION DESCRIPTION

118-735B-4D-2 (Piece 4, 7-9 cm)

ROCK NAME: Foliated metagabbro

WHERE SAMPLED:

TEXTURE: Foliated

GRAIN SIZE: Coarse

OBSERVER: STA

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	40	65	0.5-2.0		Flattened	Porphyroclasts.
Clinopyroxene	2	29	1-2		Flattened	Porphyroclasts with blebs of cpx.
Ilmenite	1	1	0.5		Anhedral	Large grains.
Hornblende	1	1	<1		Anhedral	Inclusions in cpx. Some could be secondary.
Orthopyroxene	—	4	1		Flattened	Could have been replaced by cummingtonite.
SECONDARY MINERALOGY	PERCENT	REPLACING/FILLING				COMMENTS
Chlorite	Tr					In lense with earlier formed opaques surrounded by tremolite. Post deformation. Chlorite follows a fracture oblique to foliation.
Epidote	Tr					Fine-grained.
Actinolite	11	Cpx, opx				Actinolite + cummingtonite(?). Colorless to green. Post deformation.
Hornblende	17	Cpx				Brown-green. Syndeformational. Also in vertical cracks in plag.
Opaques	1	Opx				Probably magnetite after opx. Traces of patchy ilmenite. Fine magnetite in white amphibole patches (probably after opx).
Plagioclase	25	Plag				Crushed and recrystallized.

COMMENTS: 1) Brown to green hbd is syndeformational. Occurs as neoblasts and in vertical fractures in plag and cpx. (N.B. Formation of vertical fractures followed formation of mylonitic zones.)

2) Pale actinolite-tremolite is later, static replacement of px. Cogenetic with chlorite and bluish amphibole.

3) Bluish amphibole fills late veins and forms outer corona on pseudomorphs.

THIN SECTION DESCRIPTION

118-735B-4D-2 (Piece 1, 10-16 cm)

ROCK NAME: Foliated gabbro-norite

WHERE SAMPLED:

TEXTURE: Porphyroclastic

GRAIN SIZE: Variable. Original grains coarse (5 mm). Recrystallized fine to medium (0.01-4 mm).

OBSERVER: HEB

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	—	3	0.3		Elongated	Highly deformed and altered ol. Mixture of tremolite + abundant magnetite.
Plagioclase	20	60	1-4		Elongated, deformed	Strained and elongated. Largely deformed and recrystallized.
Clinopyroxene	6	29	0.5-4.0		Prismatic, deformed	Large phenocrysts deformed and altered into tremolitic actinolite and magnetite.
Orthopyroxene	4	8	<5		Prismatic	Large phenocrysts deformed and recrystallized. Obscured by clays and tremolite needles.
Brown amphibole	Tr	Tr	0.04		Irregular	Patches, blebs in cpx.
SECONDARY MINERALOGY	PERCENT	REPLACING/FILLING				COMMENTS
Clays	3	Opx				Dark brown, pseudomorphs after opx.
Chlorite	1	Opx				In coronas around opx pseudomorphs, next to plag.
Tremolitic actinolite	8	Opx, cpx				Pseudomorphs after px, associated with irregular to idiomorphic magnetite.
Hornblende	15	Cpx, fracture				Green-brown. Pseudomorphs of small idiomorphic grains in late stage open fractures.
Plagioclase	40	Plag				Granoblasts (up to 1 mm) and neoblasts (0.01-0.6 mm) derived from recrystallization of primary, large plag crystals.
Amphibole	2	Amphibole, fractures				Blue-green. Fibrous to prismatic. Distinctive pleochroic colors. Late stage alteration product.
Magnetite	1	Px, ol				Reaction product of replacement of px, 0.02-0.08 mm.

COMMENTS: 1) Plastic deformation: kinking and recrystallization/deformation of plag, ol, and px.

2) Hydrothermal metamorphism: green-brown amphiboles replacing px, tremolitic actinolite replacing opx (+ magnetite).

3) Open fractures filled with green amphibole or blue-green amphibole.

4) Late stage: coronitic reaction after green-brown amphibole (rims) and filling fractures. Some green to brown amphibole also cuts blue-green amphibole.

THIN SECTION DESCRIPTION

118-735B-4D-2 (Piece 3, 24-29 cm)

ROCK NAME: Mylonite/metagabbro

WHERE SAMPLED: At sharp contact between mylonite and mylonitic metagabbro

TEXTURE: Mylonitic, porphyroclastic

GRAIN SIZE: Very fine to coarse

OBSERVER: BLM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
METTAGABBRO						
Olivine	—	(?)				
Plagioclase	10	64	0.1-5		Anhedral	Mostly in the half of the thin section away from the mylonitic contact.
Clinopyroxene	5	34	1-2		Anhedral	Relicts remaining in amphibolitized pseudomorphs.
Orthopyroxene	1	2	2		Anhedral	Elongate layers altering to opaques.
SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING				COMMENTS
METAGABBRO						
Clays	3	Opx, cpx				Hematite-stained smectite in cores of some cpx crystals and possible opx pseudomorphs.
Clays	4	Plag				Pale tan. Coating grains in fine patches and filling fractures in large plag grains. More intense along boundary with mylonite and opaque-rich stringers.
Actinolite	8	Cpx				Pale green. Aggregates of needles after cpx.
Hornblende	11	Cpx				Green. After cpx in elongate layers. Also filling cross cutting veins.
Plagioclase	50	Plag				In lensoid aggregates of fine, <0.1 mm, neoblasts and as granular fragments.
Opaques	8	Cpx				Associated with amphibole clots and layers in both mylonite and metagabbro. Opaques in reflected light are white-gray with bright white lamellae; probably largely ilmenite with exsolution lamellae.
MYLONITE						
Plagioclase	26	Plag				Anhedral crystals, 0.01 mm in size. Granular aggregates with plag + amphibole.
Amphibole(?)	24	Cpx				Needles after cpx grains. Also equigranular pieces in groundmass. May include cpx neoblasts.
Clinopyroxene	8	Cpx				Subrounded crystals. Cpx fragments partially replaced by smectite.
Plagioclase clasts	3	Plag				Subrounded crystals, 0.1-2.0 mm. Parallel to foliation. Often recrystallized to fine aggregates.
Hematite	5					Staining smectite. Filling fractures which cross cut foliation.
Opaques	26					Anhedral crystals, 0.02 mm. Granular texture with plag and amphibole.
Smectite	8					Replacing cpx porphyroclasts.

COMMENTS: Section includes sharp contact between a dark opaque-rich mylonite and a mylonitic metagabbro. The contact is very sharp. The metagabbro grades from mylonitic/porphyroclastic to coarse foliated metagabbro away from the contact. It appears to show increasing deformation across the slide through the transition to the very fine-grained opaque-rich mylonite. Mylonite is so fine-grained, foliation is only weakly defined. It is most noticeable where uncommon plag clasts are pulled out like taffy. Euhedral to subhedral plag occurs as inclusions in cpx porphyroclasts in mylonitic portion of the slide. Hematite veins in mylonitic portion taper out in metagabbro. Trace of carbonate in cores of hematite, replacing opx inclusions in cpx (mylonitic portion of slide).

THIN SECTION DESCRIPTION

118-735B-5D-1 (Piece 3, 10-13 cm)

ROCK NAME: Mylonitic metagabbro

WHERE SAMPLED:

TEXTURE: Mylonitic

GRAIN SIZE:

OBSERVER: OZA

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	15	58	<2		Anhedral	Porphyroclasts. Undulose extinction. Fractured and filled by amphibole. Extensively replaced by green to brown amphibole and oxides.
Clinopyroxene	10	40	<2		Anhedral	Possibly ol. Replaced by tremolite + opaques.
Orthopyroxene	—	2			Anhedral	
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Chlorite	1	Plag				Filling cracks in plag. Pale green to colorless. Radial aggregates.
Epidote	Tr	Plag				Filling cracks in plag.
Zoisite	Tr	Plag				Filling fractures in plag.
Actinolite	12	Cpx				Replacing cpx, rimming tremolite aggregates. Also occurs as thin layers which alternate with fine-grained plag mylonite layers.
Hornblende	10	Cpx				Brown-green. Replacing cpx. Brown hbd occurs as blebs in cpx.
Plagioclase	43	Plag				Neoblasts.
Tremolite	5	Opx (ol?), cpx				Flattened aggregates. Accompanied by opaques.
Ilmenite	3	Cpx				Occurs as inclusions in cpx, in thin mylonitic bands, and with tremolite aggregates.
Fe hydroxides	1	Veins				Filling cracks in amphibole and plag.
Hematite	Tr	Plag				Anhedral. In plag neoblastic matrix.
Apatite(?)	Tr	Plag				Clear, low birefringence, and fairly high relief. Possibly epidote(?). Forming a layer in fine-grained plag matrix.

COMMENTS: Tremolite + opaques probably replacing opx or ol. Amphibole is extensively stretched and elongated to a 10:1 ratio.

Amphibole locally fills cracks perpendicular to foliation.

Ilmenite constitutes 2-3% and is concentrated in bands parallel to foliation. Minor fine-grained magnetite occurs in white/green amphibole patches.

THIN SECTION DESCRIPTION

118-735B-6D-1 (Piece 3, 12-14 cm)

ROCK NAME: Augen gneissic metagabbro

WHERE SAMPLED:

TEXTURE: Mylonitic

GRAIN SIZE: Fine to medium

OBSERVER: STA

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	15	53	0.5-2.0		Lenoid	Porphyroclasts.
Clinopyroxene	20	42	0.3-1.0		Flattened	Porphyroclasts.
Hornblende	1	1			Anhedral	Brown. Blebs in cpx. Possibly secondary.
Orthopyroxene	1(?)	4				Completely replaced by actinolite.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	<1	Cpx				Replacing exsolution lamellae.
Carbonate	<1	Fractures				Filling late fractures. Same generation as very pleochroic hbd.
Actinolite	4	Opx, cpx, hbd				Green to colorless. Forming pseudomorphs after px.
Hornblende	10	Cpx				Green to brown. Syndeformational.
Plagioclase	38	Plag				Neoblasts, 0.1-0.5 mm.
Clinopyroxene	8	Cpx				Neoblasts, ≈ 0.2 mm.
Ilmenite	2	Cpx				Bands define foliation.
Hornblende	<1	Veins				Filling cracks perpendicular to foliation. Very pleochroic. Post deformation.

COMMENTS: 1) Few thin, late veins perpendicular to foliation have very pleochroic hbd. May be different composition. Also subparallel carbonate veins.

2) Archive half of core has isoclinal fold not evident in this thin section from the working half of the core.

3) Some of the tremolite pseudomorphs could have been opx and could include cummingtonite.

4) Brown amphibole in cpx occurs as small patches which are optically continuous.

THIN SECTION DESCRIPTION

118-735B-6D-1 (Piece 13, 71-74 cm)

ROCK NAME: Mylonitic metagabbro

WHERE SAMPLED:

TEXTURE: Mylonitic

GRAIN SIZE: Various, porphyroclasts 0.3-8.0 mm to neoblasts <0.1 mm OBSERVER: OZA

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	—	2	≈ 5		Anhedral	Possibly cpx. Replaced by tremolite + Fe oxide (hematite?) which are further replaced by pale green actinolite.
Plagioclase	10	50	<0.1-1.0		Anhedral	Porphyroclasts 0.3-1.0 mm, neoblasts <0.1 mm. Commonly veined by Fe oxides. Some amphibole veining. Porphyroclasts have amphibole pressure shadow.
Clinopyroxene	21	48	<0.1-8.0		Anhedral-subhedral	Replaced by greenish brown to brown hornblende. One grain has opx exsolution lamellae. Porphyroclasts have amphibole pressure shadow.
Orthopyroxene	Tr	<0.5	≈ 0.02		Anhedral	Exsolution lamellae in cpx.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Chlorite	Tr	Cpx				Replacing cpx from the rim.
Actinolite	5	Cpx, ol				Euhedral laths, 0.05-0.10 mm. Ol is replaced by tremolite + Fe oxide at the cores which are surrounded by pale green actinolite. Smaller cpx grains are replaced by actinolite in opaque-rich zone.
Hornblende	22	Cpx				Color is variable: brown, green-brown, brownish green, green. Brown hbd usually occurs in the pressure shadow of cpx and inside the grain. Some px are completely replaced by brown hbd. Average size 0.1-0.4 mm. Crystals are generally tabular, granular.
Plagioclase	40	Plag				Neoblasts, <0.1 mm.
Opaques	2	Cpx				Ilmenite, hematite, Fe hydroxides, magnetite(?). Fine-grained, <0.02 mm hematite + magnetite(?) in cpx-rich zone. Probably derived from cpx by oxidation. Hematite or Fe hydroxides are also present with brown hbd. Crystals measure 0.1-0.2 mm. Euhedral magnetite is present in cpx.

COMMENTS: 1) The replacement of cpx by hbd is fairly extensive except for some grains, one of which has opx exsolution lamellae.

2) Cpx and plag are commonly distorted and show wavy extinction. They have amphibole pressure shadows.

3) Ol pseudomorphs are extremely stretched. Aspect ratio = 1:10.

THIN SECTION DESCRIPTION

118-735B-6D-1 (Piece 1B, 97-100 cm)

ROCK NAME: Augen-gneissic metagabbro

WHERE SAMPLED:

TEXTURE: Mylonitic, porphyroclastic

GRAIN SIZE: Fine, with porphyroclasts

OBSERVER: STA

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	—	6	0.5		Anhedral	Talc-tremolite-hematite pseudomorphs.
Plagioclase	25	50	1-3		Flattened	Porphyroclasts. Some twinning.
Clinopyroxene	10	44	0.2-1.0		Flattened	Porphyroclasts. Originally oikocrysts. Dark inclusions.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Actinolite	2	Ol				Colorless to pale green. Static replacement of opx. Green on margins of plag.
Hornblende	19	Cpx				Brown amphibole occurs in patchy replacement of cpx; patches are optically continuous. Syndeformational. Green brown in mosaic with secondary cpx.
Plagioclase	25	Plag				Neoblasts. Some plag crystals are crushed.
Clinopyroxene	15	Cpx				Neoblasts, 0.2-0.4 mm.
Hematite	4	Ol				Cores of opx pseudomorphs.

COMMENTS: 1) Some large crystals, in a fracture which runs through plag, are very pleochroic (colorless to green) hbd. Crystals are parallel to foliation and undeformed. Could be a static replacement of plag.

2) Some large, bent amphibole crystals look like cummingtonite after ol or opx.

3) Top 20% of slide is very fine-grained mylonite. No porphyroclasts in mylonite.

THIN SECTION DESCRIPTION

118-735B-6D-1 (Piece 19, 111-113 cm)

ROCK NAME: Poorly foliated metagabbro

WHERE SAMPLED:

TEXTURE: Porphyroclastic, granular

GRAIN SIZE: Fine to medium

OBSERVER: BLM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	28	53	0.2-2.0		Euhedral	Porphyroclasts. Undulose extinction. Fractured crystals.
Clinopyroxene	3	39	0.5-2.0		Anhedral	Largely replaced by amphibole.
Orthopyroxene	<1	8	0.1		Anhedral	Fragments replaced by tremolite, opaques. Original grains range up to 3 mm in size.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Chlorite	<1	Cpx				In cpx pseudomorphs.
Actinolite	19	Cpx, veins				Pale part of cpx pseudomorphs. Also in veins.
Hornblende	17	Cpx, vein				Darker green than actinolite. After cpx and in vein.
Plagioclase	25	Plag				Neoblasts. Equigranular mosaic. Some nearly mylonitic zones.
Tremolite(?)	5	Opx				Clear pale green needles after opx.
Hematite(?)	2	Opx				Replacements in cores of opx pseudomorphs.

COMMENTS: Percentages based on 100 point counts. Tremolite/talc, hematite clots assumed to be primary opx. Green amphibole after cpx. Interstitial amphibole is not assignable to a protolith.

Modal percentages:

Plag clasts 28.1; plag neoblasts 25.3; opx 0.1; tremolite after opx 5.0; hematite after opx 2.0; cpx 2.9; amphibole after cpx 30.7; brown amphibole 0.1; interstitial amphibole 5.7; chlorite 0.1.

Some coarse granular cpx/plag aggregates between porphyroclastic sections.

THIN SECTION DESCRIPTION

118-735B-7D-1 (Piece 2A, 10-16 cm)

ROCK NAME: Foliated metagabbro

WHERE SAMPLED:

TEXTURE: Porphyroclastic

GRAIN SIZE: Medium

OBSERVER: STA

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	15	55	1-4		Anhedral	Irregular extinction.
Clinopyroxene	5	40	2-4		Rounded	Relict cores with rims of hbd and neoblasts.
Orthopyroxene	<1	5	1-4		Flattened	Replaced by tremolite-magnetite-talc.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Carbonate	Tr	Opx				In opx pseudomorphs. Mixed with hematite.
Zircon	<1					Euhedral crystals with high birefringence.
Actinolite/ tremolite	22	Cpx, opx				Pale green to white. High relief in opx pseudomorphs.
Hornblende	12	Cpx				Green-brown. Blocky, pale crystals.
Plagioclase	40	Plag				Neoblasts.
Clinopyroxene	3	Cpx				Neoblasts.
Talc	1	Opx				
Hematite	1	Opx				
Magnetite	1	Opx				In pseudomorphs.
Ilmenite	Tr					In foliation planes with brown hbd.

COMMENTS: 1) Late veins are filled with green hbd.

2) The replacement by green actinolite, tremolite + talc, and hematite are static replacements.

3) Magnetite is concentrated in hematite pseudomorphs.

4) The zircon-bearing gabbro is only slightly deformed and intruded into highly deformed foliated gabbro.

THIN SECTION DESCRIPTION

118-735B-7D-1 (Piece 9, 63-67 cm)

ROCK NAME: Foliated metagabbro

WHERE SAMPLED:

TEXTURE: Porphyroclastic

GRAIN SIZE: Coarse

OBSERVER: STA

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	30	45	0.5-1.0			Porphyroclasts. Twinned crystals.
Clinopyroxene	17	50				Porphyroclasts.
Orthopyroxene	3	5/				
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Actinolite	5	Opx, cpx				High relief. Rimming px. Post deformational. Also colorless replacement of opx.
Hornblende	10	Cpx				Brown to green. Neoblasts in mosaic. Syndeformational.
Plagioclase	15	Plag				Neoblasts.
Amphibole	10	Cpx, hbd				Green. Syn- to post-deformational.
Clinopyroxene	10	Cpx				Neoblasts.

COMMENTS: 1) Strongly amphibolitized. Both syn- and post-deformational.
 2) Small, high relief grains, possibly epidote.
 3) Some primary igneous textures preserved between cpx and plag.

THIN SECTION DESCRIPTION

118-735B-7D-1 (Piece 10, 74-76 cm)

ROCK NAME: Mylonitic to well foliated metagabbro

WHERE SAMPLED:

TEXTURE: Mylonitic, porphyroclastic

GRAIN SIZE: Fine to coarse

OBSERVER: KEM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	—	11	1.0-1.5			Possibly opx.
Plagioclase	8.4	48	1-4		Anhedral	Elongate crystals in the plane of foliation. Plastically deformed.
Clinopyroxene	15	41	0.5-2.5		Anhedral	Equant to elongate crystals in the plane of foliation. Inclusions of Fe hydroxides and replacement by a mixture of hematite and clay along opx exsolution lamellae.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	< 1	Ol				Clays + hematite replacing ol(?).
Carbonate	1	Ol				Carbonate + hematite replacing ol(?).
Plagioclase	38.5	Plag				Neoblasts.
Green amphibole	21.8	Cpx, amphibole				Replacing cpx along grain boundaries, in veins, and replacing brown amphibole.
Brown amphibole	4	Cpx				Replacing cpx.
Colorless amphibole	10.4	Ol, opx				Replacing ol (opx?), usually lining edges of replacement.
Opaques	0.5	Ol				Ilmenite, magnetite. Patches in areas replacing ol(?).
Hematite	0.2	Ol				Occurs with magnetite, colorless amphibole, and carbonate replacing ol(?).

COMMENTS: Ilmenite near relict porphyroclasts. Magnetite associated with clear amphibole. A few porphyroclasts preserve an igneous subophitic relationship between plag and cpx. Modal percentages based on 591 point counts.

THIN SECTION DESCRIPTION

118-735B-7D-2 (Piece 1, 1-5 cm)

ROCK NAME: Poorly foliated metagabbro

WHERE SAMPLED:

TEXTURE: Porphyroclastic

GRAIN SIZE: Fine to coarse

OBSERVER: BLM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	1	8	1-5		Anhedral	Altered to talc/tremolite, smectite. Kinked, elongate crystals.
Plagioclase	25	46	0.5-6.0		Anhedral	Partially altered to clay. Undulose extinction. Twinned crystals.
Clinopyroxene	10	46	2-9		Anhedral	Interstitial between ol and plag crystals. Altered to amphibole + fine opaques.
SECONDARY MINERALOGY	PERCENT	REPLACING/FILLING				COMMENTS
Clays	2	Plag				Dusty brown alteration of plag. Concentrated in zones.
Clays	1	Ol				Hematite stained smectite(?) after ol.
Chlorite	1					Small interstitial patches in and around amphibole clots.
Actinolite	35	Cpx				Most of the amphibole is pale green to bluish green. Possibly actinolite/actinolitic hornblende. Completely replaces cpx on one half of the slide. This side of the slide is more intensely deformed, with a higher percentage of plag neoblasts.
Plagioclase	19	Plag				Neoblasts. Concentrated in amphibole-rich zones.
Talc	2	Ol				Clear fibrous aggregates on outside of ol pseudomorphs.
Tremolite	3	Ol				Clear, needle-like aggregates between ol and talc.
Hornblende	1	Cpx				Small patches of brown amphibole in cpx.

COMMENTS: One half of slide is very amphibolitized. Most of the px is replaced. Ol occurs as large, anhedral grains. Point count predominately in less altered half of slide. Percentages based on 1665 point counts on the least altered section. Estimates above are for whole section. Modal percentages: plagioclase 33.6; plagioclase neoblasts 10.8; cpx 14.1; ol 1.8; amphibole + spinel after cpx 28.5; talc/amphibole after ol 6.3; spinel after ol 0.1; vein-interstitial amphibole 3.6; other (mostly chlorite) 0.9. Many px crystals have low birefringence. Probably optic axis orientation of cpx (not opx) crystals.

THIN SECTION DESCRIPTION

118-735B-8D-1 (Piece 5, 29-32 cm)

ROCK NAME: Olivine metagabbro

WHERE SAMPLED:

TEXTURE: Porphyroclastic

GRAIN SIZE: Variable, 5 mm to 0.01 mm

OBSERVER: HEB

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	2	4	4.0-0.5		Irregular to slightly square	Porphyroclasts, 4 to 0.5 mm, fresh or partly smectized.
Plagioclase	25	72	5.0-1.0		Idiomorphic to elongate	Porphyroclasts.
Clinopyroxene	7	18	0.5-4.0		Irregular, interstitial	Porphyroclasts, reaction rims with prehnite and tremolite.
Amphibole	Tr	1	0.7-0.3		Irregular	Limpid, strongly pleochroic and replaced by colorless amphibole (mantled).
Orthopyroxene		5	0.5		Hexagonal, recrystallized	See secondary mineralogy.
SECONDARY MINERALOGY	PERCENT	REPLACING/FILLING				COMMENTS
Clays	2	Ol, opx				Smectite, pseudomorphs of cpx and partial replacement of olivine.
Actinolite	5	Px				Blue-green to light green, coronas around px.
Hornblende	2	Hbd, cpx				Brown to yellow brown. Replaces primary brown hbd and cpx
Plagioclase	46	Plag				Neoblasts, 0.01-0.08 mm, in matrix.
Clinopyroxene	3	Cpx				Neoblasts, 0.5 mm, mosaic with triple junctions.
Hematite	1	Cpx, ol, opx				Pseudomorphs of px mixed with clays, reaction product of ol. Other iron hydroxides replace opx.
Prehnite	1	Plag				Colorless to light green rim around plag.
Tremolite	1					Fine needles in proximity of ol where plag reacted to prehnite.
Orthopyroxene	5	Opx?				Granoblasts forming mosaic, triple junctions. Highly stained by iron hydroxides.

COMMENTS: One part of the thin section is undeformed and shows resorbed ol, hypidiomorphic and post-cumulus cpx. The deformed part of the thin section has porphyroclastic to mylonitic texture. Hydrous, low to medium grade metamorphism. Late replacement by smectite.

THIN SECTION DESCRIPTION

118-735B-8D-1 (Piece 7, 45-48 cm)

ROCK NAME: Poorly foliated gabbro

WHERE SAMPLED:

TEXTURE: Subhedral, granular

GRAIN SIZE: Coarse

OBSERVER: BLM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	60	70	2.0-9.0		Subhedral-anhedral	Kinked, fractured, deformation twins. Interstitial to plag, undulose, fractured. Orange patches. Up to 5% may have been opx.
Clinopyroxene	10	25	2.0-8.0		Anhedral	
Olivine?		5				
SECONDARY MINERALOGY	PERCENT	REPLACING/FILLING				COMMENTS
Clays	4	Ol, opx				Fe-oxide stained smectite (?) at cores of ol/opx pseudomorphs.
Chlorite	2					Along edges of amphibole patches.
Actinolite	8	Cpx, veins				Occurs as patches and as replacement on rims of cpx. Also in veins along fractures through plag and cpx.
Hornblende	2	Cpx				Brown to green patches in cpx.
Plagioclase	3	Plag				Neoblasts, 0.1mm, along grain boundaries.
Opacues	3	Ol, opx				Hematite/magnetite usually mixed with smectite in ol/opx pseudomorphs.
Talc	3	Ol, opx				Around ol/opx pseudomorphs.
Tremolite	5	Ol, px				Needle-like aggregates around ol/opx pseudomorphs. Structure is usually clay-opaque core, then actinolite, then talc zone which is sometimes patchy and sometimes continuous.

COMMENTS: Large, Fe oxyhydroxides with dull reflectivity, associated with talc and tremolite. No foliation, only fracturing of cpx and plag and grain boundary recrystallization. Cpx with primary inclusions of plag and possibly ol.

THIN SECTION DESCRIPTION

118-735B-9D-1 (Piece 3, 14-17 cm)

ROCK NAME: Porphyritic foliated metagabbro

WHERE SAMPLED:

TEXTURE: Hypidiomorphic, slightly porphyroclastic

GRAIN SIZE:

OBSERVER: HEB

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	-	Tr	0.2		Irregular	Replaced by mixture of carbonate, Fe hydroxide, and tremolite.
Plagioclase	35	40	0.5-1.5		Prismatic	Generally well-preserved with marginal replacement by prehnite and deformation into granoblasts.
Clinopyroxene	-	58	0.08-1.3		Rounded to hypidiomorphic	All replaced by green amphiboles (post-cumulus phase). Replaced by a mixture of tremolite and Fe hydroxide.
Orthopyroxene?	-	2	0.4		Irregular	
SECONDARY MINERALOGY	PERCENT	REPLACING/FILLING				COMMENTS
Clays	Tr	Ol, opx				Replacing ol and opx.
Tremolite	2	Px				Intimately associated as replacement products of opx along with iron hydroxides.
Hornblende	57	Cpx veinlets				Pale yellow to pale green pseudomorphs of cpx. Same grain size.
Plagioclase	4	Plag				Neoblasts, 0.02-0.06 mm.
Amphibole	Tr	Plag				Replacing cpx and initial brown amphibole.
Prehnite	1	Plag				Light green. Replaces rims of plag.
Iron hydroxides	1	Opx, ol				Replacement product of opx and/or ol. Both magnetite and Fe oxyhydroxides present in smectites.

COMMENTS: Suggested crystallization order ol-plag-cpx-opx? Slight high temperature deformation and recrystallization. Medium grade hydrous metamorphism (no chlorite), late vein filling (green amphibole).

THIN SECTION DESCRIPTION

118-735B-9D-1 (Piece 23, 120-122 cm)

ROCK NAME: Mylonitic metagabbro

WHERE SAMPLED:

TEXTURE: Porphyroclastic

GRAIN SIZE: Coarse

OBSERVER: STA

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	30	48	1.0-6.0		Flattened	Porphyroclasts; bent and twinned.
Clinopyroxene	14	45	1.0-4.0		Anhedral	Porphyroclasts, brown hornblende and neoblast margins.
Olivine	1	7	0.5-2.0		Elongate	Porphyroclasts replaced by hematite, calcite and smectite.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	2	Ol	Smectite mixed with hematite after opx(?).
Carbonate	Tr	Ol	In opx pseudomorphs.
Actinolite	Tr	Fills veins, replaces neoblasts	
Hornblende	Tr	Cpx	Pale green, post-deformational.
Plagioclase	18	Plag	Red-brown lamellae and margins of cpx, also neoblasts.
Clinopyroxene	14	Plag	Neoblasts and crushed grains.
Olivine	2	Cpx	Neoblasts.
Hornblende	15	Ol	Neoblasts(?) or crushed grains.
Opaques	2	Cpx(?) fractures	Green-brown, fills fractures in plag, syn-deformational?
Hematite	2	Ol	Bands in mylonitic zones. Ol pseudomorphs.

COMMENTS: Abundant intergrowths of reddish brown hornblende and secondary pyroxene. Little post-deformational alteration. Contains primary ol but no primary opx.

THIN SECTION DESCRIPTION

118-735B-10D-1 (Piece 6A, 24-26 cm)

ROCK NAME: Mylonitic metagabbro

WHERE SAMPLED:

TEXTURE: Mylonitic

GRAIN SIZE: Very fine to coarse

OBSERVER: BLM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	4	10	0.2-0.3		Anhedral	Kinked fragments in elongate aggregates.
Plagioclase	8	45	0.4-3.0		Anhedral	Elongate, undulose porphyroclasts.
Clinopyroxene	8	45	0.4-2.0		Anhedral	Kinked, undulose - in aggregates with smaller fragments and neoblasts, partially altered to amphibole.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	2	Ol	Orange tint in ol fractures and surfaces.
Actinolite	2	Cpx	At edges of very thin cpx-amph zones.
Hornblende	15	Cpx, veins	Green to brown, replacing cpx in deformed clasts and veins cutting foliation.
Plagioclase	37	Plag	Mosaic, sutured neoblasts 0.1-0.5 mm.
Opaques	1	Cpx	In cpx altered clasts; black, very fine, probably magnetite or ilmenite.
Opaques	5	Ol, cpx	Dark red to red-black, in granular aggregates after ol. Commonly very elongate in plane of foliation.
Clinopyroxene	1	Cpx	Small, subrounded neoblasts and clasts, 0.05-0.2 mm. Some are individual grains in matrix, others in cpx porphyroclasts. Larger grains may be undulose and kinked; likely to be fragments rather than neoblasts.

COMMENTS: Foliation defined by elongate plag and stringers of altered and fragmented mafic minerals. These stringers can have aspect ratios of 1:30 to 1:40 (width to length).

THIN SECTION DESCRIPTION

118-735B-10D-1 (Piece 8, 46-49 cm)

ROCK NAME: Mylonitic metagabbro

WHERE SAMPLED:

TEXTURE: Mylonitic to porphyroclastic

GRAIN SIZE: Very fine to medium

OBSERVER: BLM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	2	5	—			Small disaggregated remnant of fragments.
Plagioclase	2	55	0.05		Elongate, anhedral	Very rare unrecrystallized grains.
Clinopyroxene	10	40	0.5-0.7		Anhedral	Partially altered porphyroclasts, bent and kinked in some places.
SECONDARY MINERALOGY	PERCENT	REPLACING/FILLING				COMMENTS
Clays	2	Ol, cpx				Clay-tremolite clots with hematite staining in ol pseudomorphs(?)
Actinolite	1	Amph				Late stage on rims of cpx-amph clots.
Hornblende	10	Cpx				Green, between cpx clasts and neoblasts. Gradation from brown amph.
Plagioclase	50	Plag				Neoblasts, mostly less than 0.03 mm.
Opaques	1	Cpx				Magnetite around cpx neoblasts and in grain boundaries on cpx clots.
Hematite	2	Ol				In ol pseudomorphs as large grains and disseminated in magnetite-hematite-cpx clumps.
Hornblende	1	Cpx				Brown; rims and patches in cpx.
Clinopyroxene	19	Cpx				0.05 to 0.2 mm grains. Broken aggregates and recrystallized grains.

COMMENTS: Protolith was an ol-bearing gabbro; no evidence opx in mylonitic zones. Cpx and ol string out in long bands or completely disaggregated. Foliation defined by these stringers and by elongate plag. Foliation is bent or folded in section.

THIN SECTION DESCRIPTION

118-735B-10D-1 (Piece 12A, 64-68 cm)

ROCK NAME: Altered mylonitic metagabbro

WHERE SAMPLED:

TEXTURE: Mylonitic, porphyroclastic

GRAIN SIZE: Fine to rare coarse grains

OBSERVER: BLM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	Tr	1	0.2		Subrounded	Identification uncertain.
Plagioclase	3	43	0.2-1.0		Anhedral	Undulose shards.
Clinopyroxene	5	54	0.5-1.0		Anhedral	Subhedral, largely altered to clays, amph.
Orthopyroxene	1	2	1.0		Anhedral	Elongate, parallel to foliation. Some cpx exsolution. Largely altered to opaque assemblage.
SECONDARY MINERALOGY	PERCENT	REPLACING/FILLING				COMMENTS
Clays	10	Cpx, plag				Fine brown to green patches in cpx cores. A little on plag boundaries and fractures.
Carbonate	1	Vein, ol?				0.2 mm wide vein, parallel foliation, needles growing parallel to wall of vein, probably aragonite.
Actinolite	2(?)	Cpx, veins				Some pale green, fibrous vein-fill exists, possibly actinolite.
Hornblende	5	Cpx				Green to brown. After cpx, particularly along veins.
Plagioclase	35	Plag				0.02 to 0.3 mm sutured, mosaic neoblasts.
Opaques	15	Cpx, opx				Anhedral network between cpx grains.
Hematite	5	Cpx				Mixed with cpx clots and intergranular opaques.
Clinopyroxene	18	Cpx				Small grains. Neoblasts around larger cpx, 0.1-0.2 mm. Both recrystallized and granulated fragments.

COMMENTS: Well-developed foliation defined by mylonitic plag lenses, 4-6 mm long, with interlayered mafic lenses and stringers of cpx fragments, amph and opaques. White veins are carbonate, probably aragonite. Opaques mostly between mafic grains—relatively rare in plag sections and fill vertical fractures.

THIN SECTION DESCRIPTION

118-735B-10D-2 (Piece 2, 18-20 cm)

ROCK NAME: Porphyroclastic olivine gabbro

WHERE SAMPLED:

TEXTURE: Porphyroclastic

GRAIN SIZE: Medium to coarse

OBSERVER: MEY

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	45	9	2.0-4.0		Anhedral	Kink bands.
Plagioclase	19.8	45	1.0-5.0		Anhedral	
Clinopyroxene	27.9	46	3.0-15.0		Anhedral	Some oikocrysts enclosing plag.
Orthopyroxene	0.4	0.4				

SECONDARY MINERALOGY	PERCENT	REPLACING/FILLING	COMMENTS
Orthopyroxene	Tr	OI	
Olivine	0.5	OI	Neoblasts, <0.2 mm in size.
Plagioclase	24.6	Plag	Neoblasts, <0.2 mm in size.
Clinopyroxene	7.8	Cpx	Neoblasts, <0.2 mm in size.
Chlorite	Tr?		
Tremolite	2.1	OI	Colorless to pale green.
Hornblende	10.3	Cpx	Brown to green amphibole replacing cpx.
Opagues	1.3	OI, cpx	
Hematite	0.8	OI	

COMMENTS: Poorly foliated with localized mylonitic zones and augens of plag and ol. Some relict ophitic/subophitic textures. Percentages based on 1500 point counts.

THIN SECTION DESCRIPTION

118-735B-11D-1 (Piece 1, 6-8 cm)

ROCK NAME: Mylonitic to porphyroclastic metagabbro

WHERE SAMPLED:

TEXTURE: Porphyroclastic with mylonitic zones

GRAIN SIZE: Very fine to medium

OBSERVER: BLM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	Tr	?	0.3		Subrounded	Disaggregated grains in mylonitic matrix.
Plagioclase	10	40	0.1-5.1		Anhedral	Elongate, undulose grains surrounded by mosaic neoblasts.
Clinopyroxene	25	50	0.1-2.0		Anhedral	Large porphyroclasts with smaller cpx around them. Fine recrystallized zones at boundaries.

SECONDARY MINERALOGY	PERCENT	REPLACING/FILLING	COMMENTS
Clays	Tr		In fractures and boundaries. Perhaps minor actinolite as well.
Hornblende	51	Cpx, veins	Brown to dark green. Small patches in cpx and in veins parallel to foliation.
Plagioclase	25	Plag	Anhedral sutured aggregates, 0.01 to 0.1mm.
Opagues	15	Grain boundaries	Anhedral network at grain boundaries, consisting mostly of cpx clots. Also in veins, but largely absent from plag-rich lenses.
Clinopyroxene	20	Cpx	0.02 to 0.2mm, angular to subrounded. Small grains in aggregates are clearly recrystallized, larger ones occur around porphyroclasts and singly in matrix.

COMMENTS: Protolith definitely ol-bearing. Hard to estimate proportions and whether opaques may have been primary. Foliation defined by plag lenses. Opaques mostly grey-white in reflected light; probably ilmenite with exsolution of magnetite.

THIN SECTION DESCRIPTION

118-735B-12R-1 (Piece 5A, 32-43 cm)

ROCK NAME: Foliated metagabbro

WHERE SAMPLED:

TEXTURE: Porphyroclastic

GRAIN SIZE: Medium

OBSERVER: STA

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	15	50				
Clinopyroxene	20	50				Few bent pieces, crushed.
Ilmenite	?	?				Mostly secondary.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Actinolite	3	Cpx, hbd				Late, static (?).
Hornblende	3	Cpx				Neoblasts.
Plagioclase	35	Plag				Some neoblasts, others crushed.
Clinopyroxene	21	Cpx				Neoblasts.
Ilmenite	3	Cpx				Appears as exsolved rods in cpx partially replaced by hematite, intergrown with cpx neoblasts and in massive clots on tails of cpx augen. Cannot distinguish primary from secondary ilmenite.

THIN SECTION DESCRIPTION

118-735B-12R-1 (Piece 1, 65-68 cm)

ROCK NAME: Mylonitic metagabbro

WHERE SAMPLED:

TEXTURE: Porphyroclastic

GRAIN SIZE: Coarse

OBSERVER: STA

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	10	50	—	—	Ovoid	Porphyroclasts.
Clinopyroxene	8	50	—	—	Flattened	Porphyroclasts.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Hornblende	31	Cpx				Brown and green. Sector-zoned. Also in vein.
Plagioclase	59	Plag				Neoblasts.
Clinopyroxene	10	Cpx				Neoblasts.
Hematite	1	Cpx				In hbd vein.

COMMENTS: Section is crosscut by hbd vein which is 0.5-0.2 cm wide. Vein hbd is coarse, 1-2 mm across. Porphyroclasts of cpx are replaced by some hbd. Veins postdate deformation.

THIN SECTION DESCRIPTION

118-735B-12R-2 (Piece 5, 36-38 cm)

ROCK NAME: Porphyroclastic olivine metagabbro

WHERE SAMPLED:

TEXTURE: Porphyroclastic

GRAIN SIZE: Fine to coarse

OBSERVER: BLM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	8	15	0.1-3		Anhedral	Elongate eyes and grains in matrix.
Plagioclase	10	70	0.1-1		Anhedral	Elongate, undulose porphyroclasts
Clinopyroxene	5	12	0.2-1		Anhedral	Single small grains off large clasts, sheared, elongate grains
Orthopyroxene	2	3	0.2-1		Subhedral	A few small grains in sheared zones.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	2	Ol, plag				Dusty in plag, a little smectite after ol pseudomorphs.
Epidote	3					Euhedral laths in plag mosaic, second to third order colors. Odd clinzoisite.
Actinolite	4	Cpx				Pale green veins. May include an actinolitic hbd.
Hornblende	43	Cpx				Brown patches in primary cpx.
Plagioclase	58	Plag				0.03-0.20 mm mosaic of neoblasts.
Opauques	2	Ol				Mostly after ol, some in groundmass, some in cpx.
Talc	2	Ol				Replacing ol lenses.
Tremolite	2	Ol				Replacing ol lenses, aggregates of needle-like grains.

THIN SECTION DESCRIPTION

118-735B-12R-3 (Piece 1A, 8-10 cm)

ROCK NAME: Troctolite

WHERE SAMPLED:

TEXTURE: Pophyroclastic

GRAIN SIZE: —

OBSERVER: OZA

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	18	29	1-4		Euhedral-subhedral	Altered into tremolite (or actinolite) + talk + opaque locally rimmed by brown hbd whow wavy extinction, kink bands recrystallization.
Plagioclase	41	65	1-5		Anhedral	Porphyroclasts.
Clinopyroxene	3	6	0.5-2		Anhedral	Replaced by green and brown amphibole.
SECONDARY MINERALOGY						
PRIMARY MINERALOGY	PERCENT	REPLACING / FILLING				COMMENTS
Chlorite	Tr	Ol				Replacing ol along veins, color brown along amphibole vein between talc and plag. Colorless and pale green.
Actinolite	5	Ol, cpx				Replacing ol and cpx from the rim.
Hornblende	< 1	Ol, cpx				Replacing ol and cpx.
Plagioclase	24	Plag				Neoblasts, 0.5 mm to a few mm, irregular grain shape
Talc	5	Ol				Replacing ol, surrounding tremolite replacing ol.
Hornblende	3	Cpx				Vein cutting nearly perpendicular and filling cracks in plag; also replacing cpx.
Fe-Ti oxide	Tr	Ol				Accompanying actionolite-tremolite and replacing ol.

COMMENTS: Primary minerals were obtained by point counting (total 2000 counts). Ol is deformed and poorly recrystallized into smaller grains, but restored shape shows it was euhedral. Ol shows performed orientation which is subparallel to the foliation due to deformation.

THIN SECTION DESCRIPTION

118-735B-12R-2E (Piece 3, 48-55 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE: Subhedral, granular

GRAIN SIZE: very coarse

OBSERVER: BLM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	10.5	16.0	4.20		Anhedral	Some what fractured. Talc/tremolite alteration.
Plagioclase	46	55	8.22		Anhedral	Extensive alteration to brown green cpx.
Clinopyroxene	13.9	28	6.20		Anhedral	Some brittle fracture deformations twins - grain boundary, recrystallization of some clay.
Orthopyroxene	Tr	1	0.2		Anhedral	Small rims around a couple, altered ol.
SECONDARY MINERALOGY						
PRIMARY MINERALOGY	PERCENT	REPLACING / FILLING	COMMENTS			
Clay	2	Plag				Fine dusting in plagioclase, particularly around ol replacements and in fractures crosscutting 1 cpx, and some ol.
Chlorite	0.3	Ol, cpx				Mixed with ol rims.
Actinolite	13.5	Cpx				Light green to green amphibole, patches and needles after cpx. Also filling fractures in plag and some intergranular spaces.
Hornblende	0.5	Cpx				Patches of brown amphibole replacing cpx and in alteration areas of ol.
Plagioclase	7.8	Plag				Small grains (< 0.1 mm), both primary and neoblasts.
Tremolite	3.1	Ol				Alteration needles around weathered ol.
Talc	1	Ol				Patchy alteration usually around outside of ol pseudomorphs.
Opagues	1	Ol, cpx				Magnetite in ol pseudos, rarely in and along margins of cpx ol counted as ol.

COMMENTS: Percentages based on 3375 point counts. Altered (?) fractures in ol counted as ol. Rock is heterogenous because of size. Rarely some 0.2-0.5 mm "graphic" type amphibole-plag intergrowths probably after interstitial cpx-plag intergrowths.

THIN SECTION DESCRIPTION

118-735B-12R3-2F (Piece 2F, 83-85 cm)

ROCK NAME: Gabbro

WHERE SAMPLED:

TEXTURE: Allotriomorphic granular

GRAIN SIZE: Very coarse grained

OBSERVER: KEM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	75	80	3-20		Anhedral	
Clinopyroxene	17	20	7-8		Anhedral	
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				
Plagioclase	4	Plag		Neoblasts.		
Amphibole	4	Cpx, amphibole		Partial replacement of cpx by green and brown amphibole along rims, green amphibole in fractures across plag.		

COMMENTS: Primary igneous texture of interlocking crystals is well preserved. Oriented thin section, cut from the end of a minicore.

THIN SECTION DESCRIPTION

118-735B-13R-1 (Piece 11B, 102-105 cm)

ROCK NAME: Porphyroclastic olivine gabbro

WHERE SAMPLED:

TEXTURE: Porphyroclastic to mylonitic

GRAIN SIZE: Coarse to very fine

OBSERVER: BLM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	10	14	0.5-3		Anhedral	Elongate fractured eyes.
Plagioclase	20	50	0.5-4		Anhedral	Undulose, fractured, elongate porphyroclasts.
Clinopyroxene	15	36	1-8		Anhedral	Large, slightly bent grains with some amphibole replacement, and smaller fragments of large grains.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clay	<1	Plag		Light dusting in clear plag.		
Clays	2	Ol		Dark green smectite fractures in ol.		
Chlorite	2			Small patches in amphibole clots around cpx and ol.		
Actinolite	10			Clear patches in and rims on cpx. Fine fibrous aggregates in sheared zones. Also filling fractures.		
Hornblende	2	Cpx		Brown patches in cpx = 0.1 mm.		
Plagioclase	31	Plag		Very fine grains to neoblasts in mylonitic bands.		
Opaque	1	Ol		Fine aggregates with tremolite-talc zones around ol.		
Tremolite	4	Ol, cpx		Fibrous aggregates around mafic phases, usually ol.		
Talc	3	Ol		Patchy replacement near ol.		

COMMENTS: Oriented thin section, cut from the end of a minicore.

THIN SECTION DESCRIPTION

118-735B-13R-1 (Piece 17, 148-158 cm)

ROCK NAME: Gabbro

WHERE SAMPLED:

TEXTURE: Cataclastic

GRAIN SIZE: Fine to very coarse

OBSERVER: KEM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	—	3	1-2		Anhedral	Totally replaced by Fe oxide + clay and colorless amphibole.
Plagioclase	45	90	2-12		Anhedral	Intense mechanical twins.
Clinopyroxene	5	7	4-6		Anhedral	Replaced by amphibole along rims.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clay	1	Ol		Mixed, with Fe oxide replacing ol.		
Chlorite	<1	Ol				
Plagioclase	40	Plag		Neoblasts.		
Brown amphibole	1					
Colorless amphibole	2					
Green amphibole	6	Cpx, plag		Replaces cpx at rims and filling fractures crosscutting plag.		

COMMENTS: Small thin section of coarse grained unit. i.e., model estimate unrealistic.

THIN SECTION DESCRIPTION

118-735B-13R-2 (Piece 4B, 55-58 cm)

ROCK NAME: Porphyroclastic olivine metagabbro

WHERE SAMPLED:

TEXTURE: Porphyroclastic

GRAIN SIZE: Fine to coarse

OBSERVER: KEM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	2	6.2	2-5			Kink banding and recrystallization of large ol crystal. Porphyroclasts, stretched in places. Porphyroclasts. Blebs in cpx and in interstitial areas.
Plagioclase	41.0	69.9				
Clinopyroxene	18.9	23.7	2- 10			
Hornblende	0.2	0.2	0.5			
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Chlorite	2.4	Ol, plag				In coronas around tremolite, replacing ol.
Tremolite	2.6	Ol				In coronas around ol.
Hornblende	4.4	Cpx, veins				Veins oblique to foliation
Plagioclase	27.3	Plag				Neoblasts. Recrystallization at grain boundaries.
Clinopyroxene	0.6	Cpx				Neoblasts. Recrystallization at grain boundaries.
Talc	0.3	Ol				In coronas with tremolite.
Opagues	0.1	Ol				
Amphibole	0.1	Plag				

COMMENTS: Percentages based on 2000 point counts. Cpx shows recrystallization of primary grains. Showing exsolution to homogeneous cpx. Brown amphibole typically associated with this recrystallization. Reaction rims around ol show that tremolite grows radially from contact into the ol while chlorite forms outer rings on the tremolite and grows outward away from the ol. Magnetite lines the inner boundary between the unaltered ol and the tremolite.

THIN SECTION DESCRIPTION

118-735B-13R-2 (Piece 4c, 60-63 cm)

ROCK NAME: Metagabbro

WHERE SAMPLED:

TEXTURE: Porphyroclastic

GRAIN SIZE: Fine to medium

OBSERVER: BLM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	3	7	0.2-2.0		Anhedral	Elongate, granular aggregates with kink bands.
Plagioclase	15	55	0.2-4.0		Anhedral	Elongate, very subrounded undulose porphyroclasts.
Clinopyroxene	15	38	0.5-2.0		Anhedral	Enclose plag. 20-80% replaced by amphibole.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	2	Plag				Dusty grains on plag grain boundaries.
Chlorite	2	Cpx, ol				With fibrous amphibole patches.
Actinolite	18	Cpx, ol				Fibrous, pale green amphibole surrounding outside of cpx and ol pseudomorphs, probably includes actinolitic hbd. Also fills veins and fractures in plag.
Hornblende	2	Cpx				Brown and dark green amphibole patches in cpx.
Plagioclase	38	Plag				Neoblasts, most 0.05-0.10 mm. Clots of smaller grains.
Opaque	1	Ol				Fine aggregates in ol pseudomorphs.
Tremolite	3	Ol				Clear amphibole in ol pseudomorphs.
Talc	1	Ol				Clear patches in ol pseudomorphs.

COMMENTS: Foliation more neatly developed in many other samples. No mylonite zones at all. Intense deformation.

THIN SECTION DESCRIPTION

118-735B-14R-1 (Piece 2B, 35-38 cm)

ROCK NAME: Mylonitic gabbro

WHERE SAMPLED:

TEXTURE: Mylonitic

GRAIN SIZE: Fine, heterogranular 0.1 mm to 1 cm

OBSERVER: HEB

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	Tr	Tr			Lensoid	Interpreted from intergrowths of magnetite, tremolite and clays.
Plagioclase	4	58	0.4-1.6		Elongated	Porphyroclast rarely observed; transformed into neoblasts.
Clinopyroxene	10	35	0.8-10		Rounded, elongated	Large porphyroclasts with pressure shadows of neoblasts and amphiboles.
Ilmenite	1	2			Irregular	Along foliation planes, intergrown with tremolite, brown amphibole.
Orthopyroxene	3	5?	0.1-0.4			Small porphyroclasts, rotated in foliation planes. Replaced by green amphibole.
SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING				COMMENTS
Clays	Tr	Ol				See ol interpretation.
Tremolitic actinolite	5					Fibrous, as veins or rims amphibole pseudomorphs after cpx, opx. Cleavages not preserved.
Hornblende	13	Cpx				Green to very light brown. Pseudomorphs after cpx.
Plagioclase	54					Neoblasts, 0.02-0.50 mm. Form bands up to 5 mm thick around porphyroclasts.
Clinopyroxene	5	Cpx				Neoblasts, 0.02-0.30 mm distributed around cpx porphyroclasts.
Brown amphibole	2	Cpx				Associated with intergrown ilmenite and magnetite. in foliation planes and cpx neoblasts and fractures which cut the foliation.
Blue-green amphibole	2					
Magnetite	1	Tremolite, opx				Very fine grains, <0.05 mm. Reaction products associated with amphiboles.
Chlorite	Tr					Bluish interference colors. intergrown with plag neoblasts.

COMMENTS: This rock was intensely plastically deformed. Cpx is strained and recrystallized. Almost all plag is recrystallized. Three stages of amphibole formation: brown → green, green-brown → blue green. Mysterious phase is present in trace amounts, probably epidote-type mineral.

THIN SECTION DESCRIPTION

118-735B-14R-3 (Piece 2A, 31-35 cm)

ROCK NAME: Foliated metagabbro

WHERE SAMPLED:

TEXTURE: Foliated, cut by vein

GRAIN SIZE: Coarse

OBSERVER: STA

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	—	5	3.0		Elongate	Pseudomorphed by calcite, hematite.
Plagioclase	12	50	1.0-3.0		Flattened	Porphyroclasts.
Clinopyroxene	5	45	5.0-20.0		Lensoid	Replaced by green and brown hbd, mechanical twins.
SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING				COMMENTS
Carbonate	Tr	Ol				In ol pseudomorphs.
Chlorite	1	Cpx, plag				Lenses.
Actinolite	5	Ol, cpx				Static replacement of ol and cpx porphyroclasts.
Hornblende	30	Cpx				Green-brown in large vein, replacement, syn- and post-deformational.
Plagioclase	37	Plag				Neoblasts.
Hematite	Tr	Ol				In ol pseudomorphs.
Clinopyroxene	10	Cpx				Neoblasts.

COMMENTS: Gabbro was deformed in amphibolite facies; syndeformational green and brown hbd intergrown with cpx neoblasts. Coarse euhedral crystals in hbd vein appear to resorb(?) adjacent amphiboles. Vein is approximately 1 cm wide.

THIN SECTION DESCRIPTION

118-735B-14R-3 (Piece 10, 136-141 cm)

ROCK NAME:

WHERE SAMPLED:

TEXTURE: Porphyroclastic

GRAIN SIZE: Originally coarse

OBSERVER: HEB

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	—	1	0.5			
Plagioclase	40		≤ 1.2 cm			Large porphyroclasts, strained, recrystallized.
Clinopyroxene	15		≤ 2.0 cm			Kinked, bent crystals.
Orthopyroxene	5		≤ 1.0 cm			
Amphibole	Tr	1	0.1		Irregular	Blebs, limpid, clear along cpx cleavages.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	1	Opx				Pale yellow green, replacing along cleavages.
Clays	Tr	Ol				Brown to yellow, forming mesh-like texture in lense-shaped pseudomorphs with magnetite. Forming 0.4 mm px crystals.
Tremolite	8	Opx, cpx				Fibrous, colorless, up to 0.4 mm in width. Cutting px crystals. Fringe pseudomorphs after ol.
Hornblende	5	Fractures				In fractures cutting plag and rimming or pseudomorphing px crystals.
Plagioclase	20	Plag				Very small neoblasts, 0.01-0.30 mm.
Clinopyroxene	5	Primary cpx				Granoblasts around cpx up to 0.4 mm in size. Twins still present.
Amphibole	1	Cpx				Intimately associated with granoblasts.
Magnetite	Tr	Ol?				See clays, granules less than 0.02 mm.
Talc	Tr	Veinlet				Width 0.03-0.05 mm, cutting opx.

COMMENTS: High temperature plastic deformation of silicates (anhydrous); neoblasts, amphiboles and tremolite/actinolite. Restoration of primary proportions complicated by deformation and recrystallization.

THIN SECTION DESCRIPTION

118-735B-14R-4 (Piece 2, 22-25 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE: Orthocumulus, recrystallized into granoblastic

GRAIN SIZE:

OBSERVER: HEB

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	5	6	≤ 3.0		Irregular	Ameboidal interstitial grains, kinks. Margins replaced by talc and magnetite.
Plagioclase	20	78	1.0-3.5			Porphyroclasts, strained (deformed twin planes), recrystallized into neoblasts.
Clinopyroxene	7	15	0.5-3.5			Rimmed by green amphibole. Exsolution lamellae of opx.
Spinel	Tr	Tr	0.05	Chromite	Euhedral	Included in or attached to ol. Possibly secondary.
Brown amphibole	1	1	0.02-0.3		Blebs	Brown, limpid, crystals included in cpx.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Hornblende	2	Cpx fractures				Green, replace cpx and open fractures and primary amphiboles. Some brown and some colorless amphibole.
Plagioclase	56	Plag				Granoblasts, polygonal, abundant triple junctions, 0.04-0.40 mm.
Talc	1	Ol				Blades (< 0.1 mm) rimming ol, associated with ol.
Prehnite	2	Plag				Light green. Fibrous, thin rims (0.02-0.25 mm).
Clinopyroxene	5	Cpx				Granoblasts (0.03-0.2 mm), polygonal, grains intergrown with colorless amphiboles.

COMMENTS: Ol rimmed by alteration phases: oxides, talc, and green fibrous amphibole. Cpx is replaced by greenish (late) amphibole rims and by brown amphibole in patches, particularly concentrated at rims and in areas of recrystallization. Primary cpx contains exsolution of opx and amphibole replacement along lamellae. Cpx is partially recrystallized to a homogeneous cpx with inclusions of opx and amphibole which still maintain a roughly parallel orientation to original exsolution. Amphibole is very early (not associated with deformation), syn- to post-exsolution in cpx.

THIN SECTION DESCRIPTION

118-735B-14R-2 (Piece 1A, 22-25 cm)

ROCK NAME: Foliated metagabbro

WHERE SAMPLED:

TEXTURE: Gneissic

GRAIN SIZE: Medium

OBSERVER: STA

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	3	5	0.2-0.4		Anhedral	Relict inside cpx neoblasts(?). Completely recrystallized.
Plagioclase	—	50				Porphyroclasts.
Clinopyroxene	15	43	1.0-2.0		Rounded	Difficult to determine if primary or secondary; probably mostly secondary.
Ilmenite	2	2				
SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING				COMMENTS
Actinolite	2	Ol				Tremolite, also in late veins.
Hornblende	15	Cpx				Brown to red, some could be primary.
Plagioclase	50	Plag				Neoblasts.
Clinopyroxene	13	Cpx				Neoblasts.

COMMENTS: Very high temperature crystallization. Smaller neoblasts may be ol. Other ol-rich areas are statically replaced by tremolite. Plag appears to have been crushed, then recrystallized.

THIN SECTION DESCRIPTION

118-735B-15R-1 (Piece 7B, 90-93 cm)

ROCK NAME: Porphyroclastic metagabbro

WHERE SAMPLED:

TEXTURE: Granoporphyroclastic

GRAIN SIZE: Coarse

OBSERVER: HEB

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	25	80	1.0-6.0			Highly strained and recrystallized into granoblasts.
Clinopyroxene	—	19	0.5-7.0			All recrystallized.
Ilmenite	—	1	0.2			Included in brown amphibole.
SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING				COMMENTS
Chlorite	1	Plag, amph				Blue to gray interference colors, lamellae, replaces light green-brown amphibole.
Tremolite	1	Amph				Locally replaces light green-brown amph, but pre-dates blue-green amph rimming, fibrous.
Hornblende	9	Pyroxene				Light green-brown pseudomorphs after cpx. Kinking post-dates amphibole formation. Replaces brown amphibole.
Plagioclase	55	Plag				Granoblasts, crushing of larger plag, 0.02-0.2 mm, then partially chloritized.
Amphibole	8	Pyroxene				Dark brown to yellow brown (strong pleochroism), idioblastic.
Magnetite	1	Ilmenite?				Idioblastic, 0.02-0.2 mm, closely associated with brown amphibole (Ti-bearing opaque?).
Zoisite(?)	Tr					High relief mineral, second order birefringence. Contains rounded inclusion of chlorite and amphibole.

COMMENTS: Deformation of plagioclase.

Amphibole history:

- 1) Cpx replaced by brown amphibole.
- 2) Green amphibole.
- 3) Amphiboles are deformed (kinked).
- 4) Tremolite (chlorite?).
- 5) Blue-green amphibole.

THIN SECTION DESCRIPTION

118-735B-15R-2 (Piece 17A, 128-130 cm)

ROCK NAME: Mylonitic metagabbro

WHERE SAMPLED:

TEXTURE: Mylonitic

GRAIN SIZE: Less than 1.7 mm

OBSERVER: HEB

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	5	73	<0.4			Porphyroclasts, highly strained and surrounded by neoblasts.
Clinopyroxene	Tr	25	<3.0			Porphyroclasts, almost completely replaced by green amphiboles. Completely replaced by assemblage of tremolite and magnetite.
Orthopyroxene	Tr	2	<1.5			
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Tremolite	2	Opx, ol(?)				Lenses, intergrowth of magnetite.
Hornblende	23	Cpx				Green hornblende pseudomorphs after pyroxenes or in lenses parallel to the foliation, fibers 0.03 mm thick.
Plagioclase	68	Plag				Neoblasts, <0.2 mm in size.
Magnetite	2	Opx, cpx				Disseminated as minute grains along deformation planes.

COMMENTS: Plag is highly recrystallized. Px is recrystallized under medium grade conditions (post-mylonitization).

THIN SECTION DESCRIPTION

118-735B-15R-3 (Piece 8, 92-96 cm)

ROCK NAME: Gabbro

WHERE SAMPLED:

TEXTURE: Allotriomorphic, granular

GRAIN SIZE: Coarse

OBSERVER: KEM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	0.6	6	1.0-4.0		Anhedral	Altered to a network of crosscutting clay-filled fractures or patches of colorless amphibole or talc and magnetite. Rimmed by green amphibole.
Plagioclase	23.5	50	5.0-10.0		Anhedral	Near veins altered to albite.
Clinopyroxene	19.8	44	2.0-10.0		Anhedral	Replaced by brown and green amphibole. Some plastic deformation.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	1.3	OI, vein				Replacing ol, in vein and fractures cross-cutting plag.
Chlorite	0.1	OI				
Plagioclase	22.9	Plag				Neoblasts, near green amphibole veins plag probably albite.
Magnetite	2.4	OI				
Amphibole	6.5	Cpx				Brown. Occurs as patchy replacement in cpx.
Amphibole	19.2	Cpx				Green. In veins with albite.
Amphibole	2.1	OI				Colorless. Probably tremolite.
Talc	1.1	OI				

COMMENTS: Modal proportions vary as a function of proximity to veins: away from veins cpx approx 25% of total and green amphibole = 11%, near veins cpx drops to approximately 12% and green amphibole increases to approximately 32%. Primary igneous textures relatively well preserved. OI often wrapped around or partially included in cpx.

THIN SECTION DESCRIPTION

118-735B-16R-3 (Piece 4B, 44-46 cm)

ROCK NAME: Foliated metagabbro

WHERE SAMPLED:

TEXTURE: Porphyroclastic

GRAIN SIZE: Medium

OBSERVER: HEB

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	10	40	0.7-1.6			Porphyroclasts highly strained, kinked and recrystallized. Porphyroclasts largely replaced by pale green to light brown amphibole. Porphyroclasts largely replaced by green amphibole.
Clinopyroxene	20	50	0.4-3.0			
Orthopyroxene	2	10	0.5-1.0			
SECONDARY MINERALOGY	PERCENT	REPLACING/FILLING				COMMENTS
Tremolite	8	Px				Very minute interlocking needles, but general outline of px still preserved. Green to light green-yellow, more colored when replacing opx, some pale brown amphibole replaces cpx.
Hornblende	24	Px				
Plagioclase	30	Plag				Neoblasts, <0.7 mm, in size, in the matrix. Blue-green, late-stage fibrous amphibole fringing other amphiboles. Fine-grained, associated with green amphiboles and marginal brown amphibole.
Amphibole	5	Amphibole				
Magnetite	1					

COMMENTS: This rock more is relatively more mafic. Protolith of gabbro-noritic composition (according to secondary mineral assemblages), but without significant ilmenite content. Intermediate stage of amphibole replacement since relicts of all phases are observed.

THIN SECTION DESCRIPTION

118-735B-16R-4 (Piece 5, 77-79 cm)

ROCK NAME: Gabbro

WHERE SAMPLED:

TEXTURE: Orthocumulus

GRAIN SIZE:

OBSERVER: HEB

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	35	45	<3.6		Euhedral, deformed	First cumulus phase enclosed in cpx where rock undisturbed. Large poikilitic phenocrysts. Inclusion in cpx.
Clinopyroxene	15	55	<8.0			
Spinel	Tr	Tr			Euhedral	
SECONDARY MINERALOGY	PERCENT	REPLACING/FILLING				COMMENTS
Hornblende	36	Cpx				Pale yellow brown pseudomorphs after cpx. Locally form symplectite-like intergrowths. Granoblasts, <1.0 mm, formed by crushing of larger plag. Light green, rims around amphibole pseudomorphs and open fractures in plag. Found at outer margins of cpx but inside light green amphibole where it is present. This relationship is clearly visible in undeformed, large cpx.
Plagioclase	10	Plag				
Amphibole	1	Cpx				
Amphibole	3	Cpx				

COMMENTS: Inhomogeneously formed gabbro, recrystallized into medium grade metamorphism. Formation of green amphibole postdates the formation of pale brown and pale yellow-brown amphibole. Originally cumulate gabbro with crystallization order plag to cpx.

THIN SECTION DESCRIPTION

118-735B-16R-5 (Piece 1B, 24-26 cm)

ROCK NAME: Meta-microgabbro

WHERE SAMPLED:

TEXTURE: Weakly foliated

GRAIN SIZE: Fine to medium

OBSERVER: MEY

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	2	16	0.2-1.0		Anhedral	Relicts concentrated on one end of the slide show kink banding.
Plagioclase	40	50	0.02-1.0		Anhedral	
Clinopyroxene	25	34	0.2-1.0		Anhedral	Crystals pinch out. Cross hatch twins. Recrystallized. Indicates minor deformation.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Chlorite	Tr	Ol, plag	In reaction coronas around ol pseudomorphs which are filled with tremolite and/or talc (both occur).
Tremolite/ actinolite	4	Ol, veins	Veins are oblique to weak foliation.
Hornblende	2	Cpx, veins	Green.
Hornblende	2	Cpx	Brown. At grain boundaries, intergrown with cpx neoblasts.
Plagioclase	10	Plag	Neoblasts.
Talc	10	Ol	
Clinopyroxene	5	Cpx	Neoblasts.

COMMENTS: Replacements are largely static with deformation limited to grain boundaries.

THIN SECTION DESCRIPTION

118-735B-16R-5 (Piece 2A, 47-51 cm)

ROCK NAME: Olivine microgabbro

WHERE SAMPLED:

TEXTURE: Granular

GRAIN SIZE: Fine to medium

OBSERVER: OZA

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	11	19	0.2-3.0		Euhedral-subhedral	Euhedral grains occur as inclusions in cpx and plag. Partially replaced by talc, tremolite, and opaques.
Plagioclase	53	53	0.4-4.0		Anhedral	Some subhedral crystals. Most large grains are anhedral. Small grains in cpx are euhedral.
Clinopyroxene	25	28	1-10		Subhedral-euhedral	Anhedral grains are oikocrysts with, most commonly, plag chadacrysts. Rare ol pseudomorphs (now brown and/or pale green amphibole) chadacrysts.
Orthopyroxene(?)	Tr	Tr				
Opaques	Tr	Tr	50.5	Fe-Ti	Subhedral	Inclusions in cpx.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	2	Ol	Replacing ol along cracks. Dirty yellow clay with high birefringence. Partial replacement of cpx.
Carbonate	Tr	Ol	
Actinolite	2	Ol, cpx, veins	Pale green replacing ol. Along cracks in plag and rimming cpx. Acicular, anhedral crystals, = 0.5 mm in size. Colorless tremolite crystals, up to 1 mm in size.
Hornblende	3	Cpx, ol	Occurs along the margins of cpx and ol crystals. Also occurs as intergrowths with cpx (symplectitic structure).
Talc	4	Ol	< 0.5 mm crystals occurring between ol and plag crystals, or plag and tremolite (replacing ol) crystals.
Opaques	Tr	Ol	Occurs with tremolite which replaces ol. In cpx along cleavage planes.

COMMENTS: Deformation is negligible. Ol show slightly wavy extinction. Plag is partially recrystallized. One ol crystals is markedly elongate, W:L = 0.4:4.0 mm. The long axis of this crystal lies parallel to the foliation. One cpx oikocryst is 8 mm long. Systematic (????) grain size variation is present in the thin section. Percentages based on 2000 point counts.

THIN SECTION DESCRIPTION

118-735B-17R-1 (Piece 5, 22-27 cm)

ROCK NAME: Olivine gabbro / porphyroclastic olivine gabbro

WHERE SAMPLED: Sharp contact between undeformed and porphyroclastic olivine gabbro

TEXTURE: Orthocumulus to mesocumulus / porphyroclastic

GRAIN SIZE: Fine to coarse (0.3-10 mm) / fine to medium (0.01-4.00 mm) OBSERVER: HEB

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	2	4	0.5-1.0		Rounded, irregular	Interstitial. Altered to talc, tremolite, chlorite. Kinked crystals. Granoblasts.
Plagioclase	30	60	510		Euhedral, rounded	Large crystals included in cpx. Other crystals severely deformed.
Clinopyroxene	6	32	1-10		Anhedra-subhedral, rounded	Very large phenocrysts. Interstitial phase.
Orthopyroxene	2	5	54		subhedral, irregular	Interstitial phase. Extremely altered to complex intergrowths of tremolite + magnetite. Green amphibole more abundant in the deformed part of the slide.
Ilmenite	Tr	Tr	<0.5		Anhedra	Associated with opx.
SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING				COMMENTS
Clays	Tr	Ol				Olive green, replacing ol along cracks.
Chlorite	Tr	Ol, plag				Gray birefringence. Occurs between plag and altered ol crystals.
Tremolite/actinolite	4	Ol, opx				Interlocking fibers, 0.02-0.20 mm thick. Forms pseudomorphs after magnesian phases.
Hornblende	20	Cpx				Green to green-brown pseudomorphs after cpx.
Plagioclase	30	Plag				Neoblasts. Some neoblasts in strained plag. Most common in porphyroclastic gabbro.
Brown amphibole	3	Cpx				Occurs in patches around large cpx crystals. Sometimes associated with plag veins.
Blue-green amphibole	2	Amphibole,				Blue-green to pale yellow-brown pleochroism. Rims cpx and in veins in plag crystals.
Magnetite	1	plag Ol, opx				Reaction products associated with tremolite. Crystals 0.02-0.20 mm in size.

COMMENTS: The undeformed and porphyroclastic sections of the thin section correspond to ol gabbro. It is possible that the porphyroclastic gabbro contained more original opx than the undeformed ol gabbro, based on the metamorphic assemblages.

Well defined zonations in opx replacement:

core: coarse tremolite, magnetite, or fresh opx
margin: fibrous tremolite, blue-green amphibole

Well defined olivine replacement:

core: fresh ol or ol + tremolite + magnetite
intermediate: coarse tremolite + magnetite
margin: fibrous tremolite ± talc ± chlorite or brown or blue-green amphibole.
Myrmekitic intergrowth of brown amphibole + cpx.

THIN SECTION DESCRIPTION

118-735B-18R-2 (Piece 17, 143-146 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE: Mesocumulate

GRAIN SIZE: Medium to coarse

OBSERVER: MEY

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	1.2	14	2-7		Amoeboid, anhedra	No evidence of strain (probably due to extensive alteration).
Plagioclase	52.2	56	2-6	An 62	Subhedral-euhedral	Twin lamellae in plag are rarely bent, but some crystals pinch out. Occasional cross-hatch twins suggestive of minor strain.
Clinopyroxene	25.2	30	2-10		Subhedral-euhedral	Exsolution lamellae and parting planes in cpx are straight. Cpx oikocrysts enclose plag crystals.
SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING				COMMENTS
Carbonate	0.2	Ol				Carbonate (aragonite?) + opaque clay (hematite?) replace ol cores.
Chlorite	4.6	Plag, ol				
Tremolite	6.2	Ol				
Hornblende	4.8	Cpx, veins				
Talc	1.6	Ol				
Amphibole	1.4	Plag				
Opagues	2.6	Ol				

COMMENTS: Percentages based on 2000 point counts.

Sample is remarkably undeformed. No recrystallization and only minor evidence of strain. Plag composition determined by Michel-Levy method.

THIN SECTION DESCRIPTION

118-735B-18R-3 (Piece 3, 29-31 cm)

ROCK NAME: Meta-microgabbro

WHERE SAMPLED: Fine-grained thick layer in coarse-grained gabbro

TEXTURE: Tabular, granular

GRAIN SIZE: 1.0-0.5 mm, fine

OBSERVER: OZA

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine		?	0.5		Subhedral	Replaced by actinolite, talc and chlorite. No ol left.
Plagioclase	40	45	0.2-0.6		Anhedral	Showing wavy extinction, locally recrystallized, replaced by albite, epidote and chlorite.
Clinopyroxene	1	?	0.5-1.0			Replaced by actinolite, bluish-green and brown hbd. At the core, a few amphibole and cpx aggregates are preserved.
SECONDARY MINERALOGY	PERCENT	REPLACING/FILLING				COMMENTS
Chlorite	5	Ol?				Replacing part of olivine (and cpx?) present between plag and actinolite aggregate, radial aggregate.
Epidote	2	Plag				Replacing plag, euhedral or dusty aggregate.
Actinolite	20	Opx, ol?				At the core of aggregates replacing ol(?) - cpx 0.1-0.2 mm aggregate.
Hornblende	2	Opx, ol				Brown, anhedral. In actinolite aggregate replacing opx ? Replaced by bluish-green amphibole.
Plagioclase	3	Plag				Albite, replacing plag by vein network.
Hornblende	24	Cpx vein				Bluish-green, euhedral, replacing cpx, locally filling vein.
Mica	2	Ol ?				Between actinolite aggregate and plag, probably replacing ol. 0.1mm present as aggregate. Talc?

COMMENTS: Because of severe replacement of cpx and ol, it is difficult to determine original mineral abundance. It could be a fine-grained, ol-rich gabbro (troctolite) or opx-rich gabbro. Rough grain boundary geometry is preserved, indicating weak deformation. Plag and mafic pseudomorph show foliation.

THIN SECTION DESCRIPTION

118-735B-18R -3 (Piece 4, 37-40 cm)

ROCK NAME: (Olivine?) microgabbro

WHERE SAMPLED: Fine-grained zone between coarse-grained gabbro

TEXTURE: Tabular, granular

GRAIN SIZE: 1.0-1.5 mm

OBSERVER: OZA

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	—	?	1.0-4.0			No relict preserved, aggregate of tremolite at the core and chlorite at the margin.
Plagioclase	45	50	0.3-1.2		Anhedra	Veined by albite, amphibole and chlorite locally granulated, wavy extinction common.
Clinopyroxene	7	15	1.0-2.0		Subhedral-anhedra	Replaced by various amphiboles, some are pale green.
SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING				COMMENTS
Carbonate	1	Vein				In crack cutting other structures, 0.1mm thick, also occurs replacing plag as irregular veinlets.
Chlorite	7	Ol, plag, vein				Replacing ol margin, 0.1-0.2 mm in size, occurs as aggregate locally, relict and replacing plag.
Actinolite	25	Cpx, vein				Replacing cpx, in veins up to 0.5 mm thick, euhedral laths and irregular anhedra shapes forming aggregate.
Hornblende	3	Cpx, ol				Brown, along the margin of cpx and ol pseudomorph. Ol pseudomorph replaced by actinolitic amphibole.
Albite	2	Plag (vein)				0.1-0.4 mm thick veinlets in plag.
Tremolite	5	Ol ?				Replacing ol core, up to 8.0 mm long, radial aggregate common.
Hornblende	5	Cpx ?				Euhedral lath replacing cpx(?), up to 0.4 mm long.

COMMENTS: It is difficult to determine the original modal abundance because of almost complete replacement of mafic minerals. The amount of amphibole pseudomorphs of cpx shows that the cpx mode was originally at least 15%. One large pseudomorph composed of tremolite and chlorite can easily be identified as ol. Weak foliation is present.

Point count based on 1500 points:

Plag:	Primary	11.4
	Metamorphic	18.5
	Replacement	3.9
Cpx:		0.4
Amphibole:	Brown	2.0
	After cpx	27.2
	Actinolite	14.9
	After first generation of amphibole	14.9

THIN SECTION DESCRIPTION

118-735B-19R-2 (Piece 12, 98-100 cm)

ROCK NAME: Amphibolitized metagabbro

WHERE SAMPLED: Shallow ridge—east wall

TEXTURE: Granular

GRAIN SIZE: Fine to coarse

OBSERVER: BLM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	—	5				Pseudomorphed by talc-tremolite.
Plagioclase	18	50				Replaced by amphiboles/clays on boundaries.
Clinopyroxene	5	45				Nearly completely replaced by amphibole, only small fragments left in cpx.
SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING				COMMENTS
Clays	4	Plag				Replacing of plag and on grain boundaries with a fine amphibole.
Chlorite	1?	Cpx				In some fibrous amphibole clots.
Actinolite	10					Fibrous amphibole filling fractures in analcime
Hornblende	2	Cpx				Brown, blebs and rims on some cpx replacements.
Plagioclase	17	Plag				0.2 mm, broken and partially recrystallized.
Opacues	1	Ol/cpx				Fine, disseminated around mafic pseudomorphs.
Talc	2	Ol				
Tremolite	3	Ol				Clear amphibole.
Amphibole	32	Cpx				Light green to green amphibole in blotchy to fibrous patches after cpx.
Analcime	5	Veins				Occurs with actinolite fibers.

COMMENTS: Sample has no foliation but has undergone brittle deformation. Plag is extensively granulated and recrystallized, but there is no evidence of extensive albitization. There are numerous fractures which clearly have some offset between them; these fractures are filled with fibrous amphibole and analcime. The larger veins are roughly subparallel, although they do cross.

THIN SECTION DESCRIPTION

118-735B-19R-3 (Piece 6A, 73-75 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE: Granular

GRAIN SIZE: Fine to coarse

OBSERVER: BLM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	2.8	6	0.2-4.0		Anhedral	Fractured aggregates with tremolite and talc alteration.
Plagioclase	40.3	55	0.1-6.0		Anhedral	Bent porphyroclasts with undulose extinction.
Clinopyroxene	8.0	39	1-6		Anhedral	Extensively amphibolitized.
SECONDARY MINERALOGY	PERCENT	REPLACING/FILLING				COMMENTS
Clays	3.0	Cpx, plag				Brownish aggregates after cpx, in plag.
Chlorite	0.2	Cpx				In actinolite clots.
Actinolite	27.2	Cpx, Ol				Mixture of tremolite, actinolite, actinolitic hbd. Aggregates of needless. Pale to light green pleochroism.
Hornblende	0.5	Cpx				Brown. Small patches in cpx.
Plagioclase	14.6	Plag				Crystals < 0.1 mm. Many crystals have sutured boundaries.
Opaques	1.0	Ol				Fine-grained opaques in ol pseudomorphs.
Tremolite	2.0	Ol				After ol.
Talc	0.4	Ol				After ol.

COMMENTS: Percentages based on 1450 point counts.

No well-developed foliation but extensive plag granulation and recrystallization.

THIN SECTION DESCRIPTION

118-735B-19R-3 (Piece 12A, 128-132 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE: Allotriomorphic-granular, cataclastic

GRAIN SIZE: Coarse (fine where granulated)

OBSERVER: KEM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	10	15	5-10		Anhedral	
Plagioclase	40	60	5-15		Anhedral	
Clinopyroxene	13	25	5-15		Anhedral	
SECONDARY MINERALOGY	PERCENT	REPLACING/FILLING				COMMENTS
Clays	Tr	Ol				Replacing ol along fractures.
Chlorite	Tr	Ol				
Tremolite/ actinolite	5	Ol				
Actinolite	9	Veins, cpx				Partially replacing cpx.
Plagioclase	20	Plag				Neoblasts.
Brown amphibole	3	Cpx				Patchy replacement of cpx and interstitial between cpx neoblasts. Also lining grain boundaries between cpx and plag crystals.
Talc	< 1	Ol				
Magnetite	< 1	Ol				

COMMENTS: Plag shows some plastic deformation and granulation along grain boundaries. Cpx shows some plastic deformation, but less than plag. Recrystallized areas associated with brown amphibole are granulated (forming neoblasts) in some areas.

THIN SECTION DESCRIPTION

118-735B-19R-5 (Piece 6, 47-50 cm)

ROCK NAME: Porphyroclastic metagabbro

WHERE SAMPLED:

TEXTURE: Porphyroclastic

GRAIN SIZE: Fine to coarse

OBSERVER: BLM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	10.0	65	1-3		Anhedral	Porphyroclasts with undulose extinction.
Clinopyroxene	9.1	30	1-3		Anhedral	Bent, partially replaced crystals.
Orthopyroxene	4.4	5	2-6		Subhedral	Some granulation. Partial replacement at crystal margins.
SECONDARY MINERALOGY	PERCENT	REPLACING/FILLING				COMMENTS
Clays	3.0	Plag				Fine, dusty alteration in cores and boundaries of some plag crystals.
Actinolite	15.2	Cpx, opx, veins				Green to colorless, fibrous amphibole replacing px and filling veins.
Hornblende	1.1	Cpx				Brown. A few patches in cpx and in opaque intergrowths.
Plagioclase	52.0	Plag				<0.1 mm neoblasts with sutured boundaries.
Opagues	0.8	Cpx				0.02-0.10 mm crystals in cpx.
Opagues	1.0	Cpx(?)				1-2 mm, anhedral crystals on one side of the slide (Fe-stained). Probably ilmenite. Possibly primary.
Clinopyroxene	3.4	Cpx				Neoblasts, 0.1 mm in size. Colorless to pale green.

COMMENTS: Percentages based on 1600 point counts.

Opx definitely occurs in slide: high 2Vx. Most abundant in one corner of the slide.

Intergrowth of ilmenite(?) (gray-white in reflected light, anhedral, 0.1-3.0 mm in size) with green-brown amphibole (0.05-0.10 mm in size) is possibly primary.

THIN SECTION DESCRIPTION

118-735B-19R-5 (Piece 16, 126-129 cm)

ROCK NAME: Metagabbro (metatroctolite?)

WHERE SAMPLED:

TEXTURE: Granular

GRAIN SIZE: Fine to medium grained

OBSERVER: BLM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	1	?	0.1		Anhedral	Fragments left on one corner
Plagioclase	40	45	0.1-2.0		Subhedral	Granular aggregates with recrystallized boundaries.
Clinopyroxene	3	?	4.0		Poikilitic	Large poikilitic grain on one side.
SECONDARY MINERALOGY	PERCENT	REPLACING/FILLING				COMMENTS
Clays	2	Plag				A little around talc-tremolite aggregates.
Carbonate	1	Ol				Rarely in core of ol pseudomorphs.
Actinolite	26	Ol, cpx				Probably tremolite/actinolite mix. Clear to light green aggregates of amphibole needles after mafics, with coronas of talc.
Hornblende	1					Rarely in some talc-tremolite clots.
Opagues	1	Ol				Usually in clots with carbonate, probably after ol.
Talc	26	Ol, cpx				As light brown aggregates between amphibole clots and plag, often overlapping edges of plag.

COMMENTS: From minicore in a fine-grained section with a sharp contact to coarse-grained section. Original ol-cpx proportions difficult to determine. Core is taken at what should be across the foliation, but shows mostly a static recrystallization. Some bending of plag and deformation twins. Plag originally a neoblast, but distinction difficult to make—appears to have been very ol-rich, possibly troctolite.

THIN SECTION DESCRIPTION

118-735B-20R-1 (Piece 2B, 29-33 cm)

ROCK NAME: Contact, coarse olivine-gabbro

WHERE SAMPLED: Fine-grained troctolitic gabbro

TEXTURE: Ortho- to mesocumulus

GRAIN SIZE: Coarse- to fine-grained

OBSERVER: HEB

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	1	2	0.04-3.0		Rounded ?	Strained and kinked, preferred orientation.
Plagioclase	45	65	1.0-3.0		Irregular, replaced	Strained and recrystallized into smaller granoblasts replaced by talc and prehnite.
Clinopyroxene	25	33	2.0-7.0		Anhedra-subhedral	Always filling space between ol and plag. In coarse-grained part they are oikocystic.
SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING				COMMENTS
Clays	Tr	Ol				Dark green-brown in cracks.
Chlorite	Tr	Ol				Grey birefringence associated with actinolite.
Actinolite/tremolite	1	Ol				Mixed with talc around ol grains, fibers of prismatic crystals 0.5 mm.
Hornblende	6	Cpx				Green-brown pseudomorphs after cpx.
Plagioclase	14	Plag				Granoblasts more abundant in the coarse gabbro.
Amphibole	1	Tr				Brown, included in replaced cpx, more abundant in coarse-grained gabbro.
Talc	1					Fibrous, radiating from ol to plag mixed with light-green amphibole.
Magnetite	Tr	Ol				Very minute grains, 0.05 mm spread around ol.
Clinopyroxene	5	Cpx				Granoblasts around larger primary cpx.
Prehnite	1	Plag				Light green, fibrous, form embayment in plag.

COMMENTS: Estimation of ol difficult because talc invades plag and may lead to an overestimation of ol and underestimation of plag. There is, however, a modal change in proportion of phases; the fine-grained gabbro being troctolitic and the coarse-grained, ol-rich. Talc is the major replacement phase with tremolite/actinolite. Presence of brown amphibole is related to change in composition of the rock, but is subordinate.

THIN SECTION DESCRIPTION

118-735B-20R-2 (Piece 1C, 10-13 cm)

ROCK NAME: Amphibolite

WHERE SAMPLED:

TEXTURE: Weakly foliated

GRAIN SIZE: Coarse

OBSERVER: STA

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	20	40	1.0-3.0			Porphyroclasts.
Clinopyroxene	-	60	1.0-4.0		Anhedra	Porphyroclasts replaced by amphibole.
SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING				COMMENTS
Albite	14	Plag				Also in vein, replaces large crystals and neoblasts.
Epidote	1	Plag				Also in vein; zoisite, blue interference colors.
Tremolite	Tr					Clot in corner of slide.
Hornblende	55	Cpx, vein				Brown.
Plagioclase	5	Plag				Neoblasts around plag.
Hornblende	5	Veins				Green to blue pleochroism, coarse, euhedral, rims on brown hbd.

COMMENTS: Rock was deformed and cpx replaced by green-brown amphibole. Probably at the same time since green-brown hbd has mosaic texture with no cpx neoblasts. Late fracturing created vein in which hbd neoblasts recrystallized to large euhedral crystals. Plagioclase porphyroblasts and neoblasts are albited.

THIN SECTION DESCRIPTION

118-735B-20R-2 (Piece 2, 23-27 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE: Porphyroclastic, foliated

GRAIN SIZE: Very coarse

OBSERVER: STA

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	30		2.0-10.0			Porphyroclast replaced by tremolite. Recrystallized relicts only. Mostly replaced by amphibole.
Plagioclase	-	?				
Clinopyroxene	10	?				
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Actinolite	15					Replacing green neoblasts and porphyroclasts of cpx and plag. Brown, replacing pyroxene and recrystallized neoblasts. Neoblasts. Colorless.
Hornblende	2	Cpx				
Plagioclase	15					
Magnetite	6					
Talc	2					
Tremolite	20	Ol or ol and plag				

COMMENTS: Neoblasts of plag, pyroxene and ol are extensively replaced by tremolite-talc-magnetite (ol) or actinolite (plag-ol or plag-cpx). Opaques are concentrated in interstices.

THIN SECTION DESCRIPTION

118-735B-20R-2 (Piece 2, 23-27 cm)

ROCK NAME: Troctolite or plagioclase-bearing dunite

WHERE SAMPLED: Olivine-rich portion in gabbro

TEXTURE: Porphyroclastic, foliated

GRAIN SIZE: Coarse to medium

OBSERVER: OZA

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	50	78	0.5-6.0		Subhedral—anhedral	Containing significant opaques (magnetite and chromium spinel) and anthophyllite.
Plagioclase	-	15	0.2-1.0		Anhedral, polygonal	Polygonized, always as aggregate.
Clinopyroxene	3	5	0.5-2.0		Anhedral	Replaced by brown to pale green amphibole.
Spinel	1	2	0.2-1.0	Fe ³⁺ - rich	Euhedral—subhedral	Some are replaced magnetite.
Brown hornblende			0.1-0.5		Anhedral	Rimming cpx and ol and replacing cpx. Possibly secondary.
Phlogopite	Tr	Tr	0.1		Anhedral	Between ol and cpx inclusion in ol. Brown, strong pleochroism. Possibly secondary.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	2	Ol				Replacing ol along its margins and cracks.
Actinolite	11	Cpx, brown hbd				Rimming tremolite, replacing cpx and brown hbd.
Hornblende	4	Cpx, ol				Brown, rimming cpx and ol, commonly accompanying spinel, also replacing cpx.
Plagioclase	10	Plag				Polygonal aggregate after primary large plag.
Anthophyllite	2	Ol				As inclusions in ol, euhedral, long laths, 0.1-0.7 mm long.
Tremolite	7	Ol				replacing ol from the margins.
Talc	8	Ol, plag				Between plag and tremolite, actinolite aggregate after ol.
Fe-Ti oxide	2	Ol, spinel				Accompanying tremolite after ol, 0.2 mm sized inclusions in ol, it also replaces chromium (?) spinel, altered cpx.
Hematite	Tr					Exsolution in cpx and ol. Also has opaque lamellae.

COMMENTS: Difficult to estimate abundance of plag because it is also replaced by amphibole, as well as cpx and ol. At the boundary of coarse-grained (approximately 5 mm) and fine-grained (approximately 2mm) layers, plag is more than 20%. Ol contains many magnetite grains, fluid inclusions and euhedral anthophyllite, suggesting it is metamorphic. Ol sub-grain boundaries indicate deformation.

THIN SECTION DESCRIPTION

118-735B-21R-2 (Piece 1B, 53-56 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE:

GRAIN SIZE: Medium to coarse

OBSERVER: MEY

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	3.0	5.7	2.0-5.0		Anhedral	Kink bands in ol.
Plagioclase	51.9	60.5	2.0-8.0		Anhedral	Highly strained, partly recrystallized.
Clinopyroxene	29.6	33.8	3.0-5.0		Anhedral	
SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING				COMMENTS
Chlorite	0.4	Ol, plag				In reaction coronas around tremolite pockets (ol pseudomorphs).
Tremolite	1.5	Ol				Reaction coronas around ol, together with talc.
Hornblende	3.9	Cpx, veins				
Plagioclase	8.6					Neoblasts (wide range in size).
Clinopyroxene	0.3					Neoblasts intergrown with hbd in interstitial areas.
Opagues	0.1					
Talc	0.7	Ol				In reaction coronas with tremolite replacing ol.

COMMENTS: Plag has been recrystallized but not transported. Few igneous twins remain. Cumulate texture largely retained. Percentages based on 2000 point counts.

THIN SECTION DESCRIPTION

118-735B-21R-2 (Piece 1B, 49-51 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE: Mesocumulus

GRAIN SIZE: Medium to coarse

OBSERVER: MEY

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	5	7				Minor kink banding, ol partially surrounds cpx.
Plagioclase	40	50				Porphyroclasts of plag.
Clinopyroxene	35	43				Porphyroclasts of plag.
SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING				COMMENTS
Tremolite	2	Ol				In coronas around ol relicts.
Hornblende	1	Cpx				Brown.
Plagioclase	10	Plag				Neoblasts.
Talc	2	Ol				Intergrown with tremolite in reaction coronas, around ol.
Amphibole	2	Cpx				Blue-green, replacing cpx and filling veins.
Clinopyroxene	3	Cpx				Neoblasts.

COMMENTS: Plag is highly strained and partially recrystallized, but not noticeably stretched. One set of amphibole veins are parallel to the length of this oriented slide, i.e. they are vertical. Second set of veins dip at a 45° angle. This set is characterized by amphibole in addition to narrow zones of recrystallization. The two sets may be contemporaneous.

THIN SECTION DESCRIPTION

118-735B-20R-2 (Piece 3D, 54-56 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE:

GRAIN SIZE:

OBSERVER: OZA

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	6	7	2.0-6.0		Anhedral	Rimmed by tremolite (or actinolite), opaques and talc, less than 0.3 mm thick. Locally brown hbd and cpx are present at the rim.
Plagioclase	61	61	0.5-10.0		Subhedral-anhedral	Veined by pale green amphibole. Grain size shows wide variation.
Clinopyroxene	31	32	5.0-12.0		Anhedral	Replaced by brown hbd and actinolitic pale-green amphibole.
Opaque	Tr	Tr	0.1-0.2		Subhedral-anhedral	In the margins of ol and cpx commonly accompanied by brown amphibole.
Orthopyroxene	Tr	Tr	0.1		Subhedral-	As blebs in cpx.
SECONDARY MINERALOGY	PERCENT	REPLACING/FILLING				COMMENTS
Clays		Ol				Brown, filling cracks in ol.
Chlorite	0.1	Cpx, plag				In crack? In cpx, radial aggregate.
Actinolite	0.1	Cpx, veins				Replacing cpx/brown hbd, veining plag.
Hornblende	0.7	Cpx, ol				Rimming cpx and ol and replacing cpx.
Talc	0.7	Ol				Rimming ol, up to 0.3 mm long.
Tremolite	0.2	Ol				Rimming ol, grading into actinolite outward from ol.
Fe-Ti oxide	0.1	Ol, cpx				Accompanied by tremolite. Actinolite which replaces ol is also present along cracks and in cpx.

COMMENTS: Cpx grains extend to the ol and plag grain boundary as a thin film or plate (0.1-2.0 mm thick). Ol has many kink bands showing a deformation event.

THIN SECTION DESCRIPTION

118-735B-21R-2 (Piece 1C, 57-63 cm)

ROCK NAME: Gabbro

WHERE SAMPLED:

TEXTURE: Allotriomorphic granular

GRAIN SIZE: Very coarse

OBSERVER: KEM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	1.6	5	5.0-8.0		Anhedral	Strain lamellae.
Plagioclase	64.8	65	10.0-25.0		Anhedral	
Clinopyroxene	25.7	30	8.0-38.0		Anhedral	Thin exsolution lamellae, probably opx.
SECONDARY MINERALOGY	PERCENT	REPLACING/FILLING				COMMENTS
Magnetite	0.1	Ol				
Amphibole	4.6	Cpx				Green. Actinolite, green to blue-green, filling thin fractures.
Amphibole	1.8	Ol				Colorless. Tremolite.
Talc	0.9	Ol				
Amphibole	0.5	Cpx				Interstitial.

COMMENTS: Alteration of ol includes colorless amphibole in the core, rimmed by a ring of oxides and an overgrowth of fibrous green amphibole and talc. Radial growth being away from the ol. Cpx encloses euhedral feldspars. Also shows some static recrystallization to a homogeneous cpx and rod-like inclusions of opx.

THIN SECTION DESCRIPTION

118-735B-22R-1 (Piece 9, 78-80 cm)

ROCK NAME: Foliated metagabbro with vein

WHERE SAMPLED:

TEXTURE: Foliated, veined

GRAIN SIZE:

OBSERVER: STA

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Clinopyroxene	0	50	2.0-10.0		Anhedral	Replaced by brown hbd (pale), slightly recrystallized.
Plagioclase	43	50	1.0-3.0			Recrystallized along edges, broken.
SECONDARY MINERALOGY	PERCENT	REPLACING/FILLING				COMMENTS
Carbonate	Tr				In albite vein.	
Albite	5	Plag			Edges of plag near vein.	
Actinolite	Tr				In vein, euhedral crystals.	
Hornblende	50	Cpx			Blue-green, in vein and matrix.	
Plagioclase	2	Plag			Neoblasts.	

COMMENTS: Cut by vein. Edges of vein appear to be broken fragments, suggesting a shear zone. Plag is cut by anastomosing network of albite. Rock possibly altered to amphibolite mineralogy prior to deformation. Final event was shearing along which highly pleochroic blue-green amphibole is forming.

THIN SECTION DESCRIPTION

118-735B-22R-2 (Piece 1C, 44-46 cm)

ROCK NAME: Metagabbro

WHERE SAMPLED:

TEXTURE: Mesocumulus

GRAIN SIZE: Medium to coarse

OBSERVER: HEB

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	55	65	0.1-4.0		Euhedral	As very small grains or broken into sub-grains in the matrix. Recrystallized.
Clinopyroxene	5	25	0.3-3.0		Irregular,	Nearly completely replaced by amphibole. Interstitial.
SECONDARY MINERALOGY	PERCENT	REPLACING/FILLING				COMMENTS
Clays	5	Plag				Straining in dark brown plag (nearly opaque).
Tremolite	5	Cpx				Fibrous, replacing irregular grains of unknown composition. Found at edges on inside of plag.
Hornblende	28	Cpx				Green-brown pseudomorphs.
Amphibole	2	Amphibole				Blue-green. Lining the outer margins of amphibole pseudomorphs, or totally replacing it (or tremolite).
Amphibole	Tr	Cpx				Mostly at outer margins of amphibole grains. Some included in amphibole along cleavages.

COMMENTS: Pseudomorphs replaced by tremolite and blue-green amphibole are of unknown original composition: could be ol or opx. Rock severely altered at medium and low temperatures (formation of clays, difficult to estimate volumetrically), obscuring some of the primary features.

THIN SECTION DESCRIPTION

118-735B-22R-2 (Piece 1C, 61-63 cm)

ROCK NAME: Amphibolitized olivine gabbro

WHERE SAMPLED:

TEXTURE: Hypidiomorphic (crushed)

GRAIN SIZE: Medium

OBSERVER: CAN

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	—	5-10	4.0			Replaced by tremolite, actinolite and clays.
Plagioclase	Tr?	65	5.0			Albitized and fractured. Difficult to evaluate percentage.
Clinopyroxene	—	30	4.0			Replaced by green hornblende.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	1	Ol				Cores of some tremolite-actinolite alteration zones.
Albite	65?	Plag				Difficult to evaluate percentage; plag is very white in sample.
Actinolite and tremolite	5-10	Ol				
Hornblende	5	Cpx, veins				

COMMENTS: Unfoliated rock. Secondary minerals developed during static alteration of primary minerals and in fractures. Deformation was cataclastic. No recrystallization of plag.

THIN SECTION DESCRIPTION

118-735B-22R-2 (Piece 3B, 86-91 cm)

ROCK NAME: Gabbro

WHERE SAMPLED:

TEXTURE: Allotriomorphic granular

GRAIN SIZE: Coarse

OBSERVER: KEM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	17.8	20	5.0-10.0			Strain lamellae, highly fractured but fresh.
Plagioclase	32.6	35	5.0-10.0			
Clinopyroxene	38	45	5.0-12.0			Exsolution lamellae of opx.
Orthopyroxene	Tr					Rimming some ol and exsolved from cpx.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	0.3	Ol				
Chlorite	Tr	Ol				
Talc	1.2	Ol				
Amphibole	1.2					Brown. Replacing cpx and in alteration patch adjacent to ol.
Magnetite	1.5	Ol				
Amphibole	0.5	Ol				Colorless.
Amphibole	3.5	Cpx				Green. Replacing cpx and in thin fractures.
Clinopyroxene	2.7					Recrystallized from primary cpx.

COMMENTS: Cpx shows some static recrystallization to homogeneous cpx with rod-like inclusions of opaques and blebs or rods of opx. Brown amphibole present.

THIN SECTION DESCRIPTION

118-735B-22R-3 (Piece 5A, 110-115 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE: Allotriomorphic granular

GRAIN SIZE: Medium to coarse

OBSERVER: KEM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	0.3	7	0.2-5.0		Anhedral	Almost completely altered. Fresher in coarse-grained areas.
Plagioclase	53.0	55	0.3-0.8		Anhedral	
Clinopyroxene	10.9	38	1-8		Anhedral	
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	1.7	Ol				
Chlorite	1.7	Veins, ol				In veins and in alteration products of ol.
Amphibole	29.3	Cpx, plag				Green. Replacing cpx and filling fractures in plag.
Amphibole	Tr	Cpx				Brown.
Amphibole	2.4	Ol				Colorless.
Talc	0.1	Ol				
Sphene	0.1	Magnetite, cpx				Replacing Ti-magnetite in highly altered areas of cpx.
Magnetite	0.5	Ol				

COMMENTS: Grain size varies over the length of the slide. The top 2 cm of the slide are coarse-grained (4-8 mm); the lower 2 cm are medium-grained. Minor static recrystallization of cpx. Note: one vein has euhedral amphibole growing into a void. This void was ultimately filled by clay minerals.

THIN SECTION DESCRIPTION

118-735B-22R-3 (Piece 5A, 118-120 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE: Anhedral, granular

GRAIN SIZE: Medium

OBSERVER: BLM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	0.9	7	0.5-0.8		Anhedral	Rounded to elongate, often in cpx or on cpx edges.
Plagioclase	40	40	1.0-3.0		Anhedral	
Clinopyroxene	18.7	53	1.5-4.0		Anhedral	Enclose small ol and plag.
Opauques	Tr	Tr	0.1		Subhedral	Present at the rim of cpx and ol crystals.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	3	Ol				In center of pseudomorphs mixed with talc.
Chlorite	2	Cpx				In actinolitic clots.
Actinolite	33.9	Cpx, ol				Light green fibrous to patchy replacement. Also in vein; includes some brown amphibole crystals.
Hornblende	Tr	Cpx				Brown.
Talc-tremolite	0.5	Ol				Lenses around ol.
Magnetite	1	Ol				Fine grains in ol and cpx replacements.

THIN SECTION DESCRIPTION

118-735B-23R-1 (Piece 6, 46-52 cm)

ROCK NAME: Partly amphibolitized gabbro

WHERE SAMPLED:

TEXTURE: Hypidiomorphic granular

GRAIN SIZE: Fine to medium and coarse

OBSERVER: HEB

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	72	72	0.2-0.4		Anhedra-subhedral	Slightly strained, little recrystallization into polygonal grain.
Clinopyroxene	16	23	0.5-5.0		Anhedra-subhedral	
Opaques	4	5	0-4.0		Anhedra-subhedral	
SECONDARY MINERALOGY						
SECONDARY MINERALOGY	PERCENT	REPLACING/FILLING				COMMENTS
Actinolite	5	Cpx				Thin fibers growing throughout the grains.
Brown hornblende	2	Cpx				Rims around cpx, or in small cracks or fractures (cut everything).
Magnetite	1	Cpx				Associated with brown amphibole, 0.01-0.3 mm.

COMMENTS: Very fresh, small amount of opaques appear to be primary. Coarse-grained (>3 mm) part of the sample contains 83% plag, 15% cpx (7% altered to amphibole), 2% opaques (1% altered to magnetite).

THIN SECTION DESCRIPTION

118-735B-23R-2 (Piece 1B, 34-36 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE: Mesocumulus to orthocumulus

GRAIN SIZE: Medium

OBSERVER: MEY

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	3.7	5.5	2.0-5.0		Subhedral	Kink banding in ol.
Plagioclase	53.2	54.4	1.0-6.0		Anhedra-subhedral	Large grains recrystallized to smaller polygonal grains, but not stretched or displaced.
Clinopyroxene	33.8	40.1	2.0-7.0		Subhedral	Minor recrystallization of cpx.
SECONDARY MINERALOGY						
SECONDARY MINERALOGY	PERCENT	REPLACING/FILLING				COMMENTS
Carbonate	Tr	Ol				
Chlorite	1.2	Ol, plag				Possibly clay veining ol.
Actinolite/tremolite	1.4	Ol, plag				In reaction coronas around ol.
Hornblende	6.3	Replacing cpx and filling veins				
Talc	0.2	Ol				Veins dip at 40° in oriented thin section.
Opaques	0.2	Ol, cpx				Intergrown with tremolite. Intergrown with hornblende in reaction zone between ol and cpx.

COMMENTS: Original cumulus texture mostly preserved. Igneous lamination dipping at about 45° defined by subparallel alignment of cpx and ol and original plag grains. Alignment of plag now obscured by recrystallization to smaller grains. Subparallel amphibole grains oriented normal to igneous lamination.

THIN SECTION DESCRIPTION

118-735B-23R-2 (Piece 1C, 42-48 cm)

ROCK NAME: Microgabbro

WHERE SAMPLED:

TEXTURE: Foliated

GRAIN SIZE: Coarse

OBSERVER: STA

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	2	2	0.3			Adjacent gabbro has ol. Proportions from adjacent microgabbro.
Plagioclase	20	45	0.3			
Clinopyroxene	5	52	0.3			
SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING				COMMENTS
Epidote	1	Plag, zoisite				Within amphibole vein, late low temperature replacement.
Actinolite	Tr					
Sphene	1	Ilmenite				Olive-green-brown, green on edges. Neoblasts on margin syn-deformational. Neoblasts recrystallize albitized zones.
Hornblende	46	Cpx				
Plagioclase	22	Plag				
Ilmenite	4					

COMMENTS: Foliated zone in an ol-bearing microgabbro. This microgabbro is present in only one corner of the slide. Ilmenite is parallel to the foliation and concentrated within the coarsest part of the slide. Veins of coarse amphibole oblique to the foliation crosscut the ilmenite and are not deformed. Plag is more recrystallized than deformed.

THIN SECTION DESCRIPTION

118-735B-23R-2 (Piece 1A, -73 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE: Orthocumulate

GRAIN SIZE: Coarse

OBSERVER: CAN

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	10	15	8.0			Altered into tremolite and talc, faint deformation sub-grain boundaries. Fresh, some deformation kinks. Altered into brown and green amphibole, not deformed.
Plagioclase	70	70	8.0			
Clinopyroxene	7	15	8.0			
SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING				COMMENTS
Tremolite	2	Ol				Green and brown.
Hornblende	9	Cpx, veins				
Talc	2	Ol				

COMMENTS: Relatively fresh gabbro, almost undeformed (just some kinks, no recrystallization).

THIN SECTION DESCRIPTION

118-735B-23R-3 (Piece 2, 34-37 cm)

ROCK NAME: Ilmenite gabbro

WHERE SAMPLED:

TEXTURE: Allotriomorphic granular/symplectite

GRAIN SIZE: Coarse

OBSERVER: OZA

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine		?				Due to deformation and metamorphism it is not clear whether ol is present or not.
Plagioclase	20.0	20.7	1.0-2.0		Subhedral	Wavy extinction, recrystallized into small neoblast.
Clinopyroxene	45.7	54.0	0.5-2.0		Subhedral-anhedral	Replaced by amphibole.
Spinel Fe-Ti oxide	15.0	15.3	0.5-1.5		Anhedral	Having highly irregular shape.
Pyroxene	6.4	9.7	1.0-4.0		Subhedral-anhedral	Inverted pigeonite or opx, low Ca. Opx having exsolved blebs of cpx. It intergrows with opaque mineral. Also occurs as patches in cpx.
Brown amphibole	0.3	0.3	0.1-0.2		Anhedral	Replacing cpx, commonly accompanied by opx.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Chlorite	Tr					Filling crack in cpx.
Actinolite	6.3	Cpx				Replacing cpx from rim and along cracks
Hornblende	6.3	Cpx				Brown-green. Replacing cpx, veining plag.

COMMENTS: If present, ol is less than 1%. Some opaques in cpx are euhedral to subhedral. "Primary amphibole" is reddish-brown. Low Ca pyroxene and opaque show symplectitic intergrowth.

Percentages based on 1500 points:

Plagioclase	Primary	17.3
	Metamorphic	2.8
Zoisite		0.2
Clinopyroxene		22.2
	Replaced by amphibole	18.8
Orthopyroxene		4.3
	Replaced by amphibole	0.3
Blue-green amphibole		2.4
Brown amphibole		1.9
Actinolite		8.1
Opaques, sulfides		20.4
Sphene		0.8

THIN SECTION DESCRIPTION

118-735B-23R-4 (Piece 5, 83-86 cm)

ROCK NAME: Aphyric basalt

WHERE SAMPLED:

TEXTURE: Aphyric, intersertal

GRAIN SIZE: Fine

OBSERVER: KEM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	50	50	0.01-0.8		Lath-shaped, subhedral	
Clinopyroxene	27	42	0.05-0.3		Anhedral	
Olivine	0	5	0.15-0.2		Skeletal	Totally replaced by talc.
Magnetite	3	3	0.02-0.07		Equant to elongate, skeletal	
Cr-Spinel	Tr		0.2		Anhedral	Xenocryst has black rims.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	15	Cpx and mesostasis				Smectite (?) replacing cpx, possibly mesostasis and rimming replaced ol.
Talc	5	Ol				May be smectite rather than talc.

THIN SECTION DESCRIPTION

118-735B-23R-4 (Piece 9B, 120-122 cm)

ROCK NAME: Aphyric basalt

WHERE SAMPLED:

TEXTURE: Aphyric, intersertal

GRAIN SIZE: Fine

OBSERVER: KEM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	51.0	50	0.05-0.95		Subhedral	Lath-shaped, one microphenocryst observed.
Clinopyroxene	24.4	41	0.1-0.3		Anhedral	Slightly replaced by clays and/or chlorite.
Olivine	—	5	0.1-0.3		Anhedral	Totally replaced.
Magnetite	3.3	4	0.01-0.13		Equant to elongate and skeletal	Partially altered(?). Grainy texture (sphene?).

SECONDARY MINERALOGY	PERCENT	REPLACING/FILLING	COMMENTS
Clays	16.0	Cpx and mesostasis	Some may be chlorite, up to 50% of material identified as clay.
Talc	5.3	Ol	Some may be clays.

COMMENTS: Possibly actinolite overgrowths on cpx in more altered areas.

THIN SECTION DESCRIPTION

118-735B-23R-5 (Piece 3, 21-24 cm)

ROCK NAME: Aphyric basalt

WHERE SAMPLED: Contact between gabbro and basalt

TEXTURE: Aphyric, glassy

GRAIN SIZE:

OBSERVER: OZA

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	1	4	0.1-0.5		Euhedral, hopper	Microphenocryst. Partially replaced by chlorite or clay. Ol is preserved in glassy chilled margin.
Plagioclase	12	12	0.1-1.0		Euhedral, hollow	Microphenocryst, commonly intergrown with ol and cpx.
Spinel	Tr	Tr	0.15	Chromian	Subhedral	Brown, chromian spinel rimmed by magnetite. Rounded.
GROUNDMASS						
Glass	7	7				Devitrified. In chilled zone, 1-2 mm thick. Dark brown.
Plagioclase	77	77	<0.1		Anhedral	Too fine to distinguish.
Olivine			<0.1		Anhedral	
Opaques			5 μ m		Anhedral	
Clinopyroxene			<20 μ m		Anhedral	

SECONDARY MINERALOGY	PERCENT	REPLACING/FILLING	COMMENTS
Clays	<3	Ol	Pale green.
Chlorite	<1	Ol	Colorless.

COMMENTS: Ol commonly shows hollow or hopper shapes, indicating rapid cooling. This implies that the gabbro was not so hot when the basalt was intruded into it.

No reaction is observed between minerals of the gabbro, such as amphibole, plag, and cpx.

THIN SECTION DESCRIPTION

118-735B-23R-5 (Piece 3, 21-24 cm)

ROCK NAME: Olivine-bearing gabbro intruded by basalt

WHERE SAMPLED: Contact between gabbro and basalt

TEXTURE: Subhedral granular

GRAIN SIZE: 0.5-5.0 mm

OBSERVER: OZA

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	0.5	4	0.5-6.0		Anhedral	Core is altered into tremolite and magnetite, rim is altered into actinolite and talc or chlorite. Core is also replaced by clay.
Plagioclase	65	70	0.5-5.0		Anhedral	Partly recrystallized, veined by albite, amphibole and chlorite.
Clinopyroxene	18	25	1.0-7.0		Anhedral	Replaced by brown hbd and further by actinolite.
Opauques	1	1	0.3-1.0		Subhedral	Accompanied by brown hbd, present at the rim of cpx.
Orthopyroxene	Tr	Tr	0.1			Exsolution lamellae in cpx.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	1.5	Ol				Yellowish-brown.
Chlorite	1	Ol, plag				Replacing rim of ol and veined plag.
Albite	2	Plag				Veined plag.
Actinolite	5	Ol vein in plag				
Brown Hornblende	2	Cpx				Occurs at rim of cpx.
Talc	1	Ol				
Tremolite	2	Ol				Replacing core of ol, accompanied by opaque.
Fe-Ti Oxide	1	Ol				Accompanying tremolite replacing ol core, in cpx as small blebs.

COMMENTS: Plagioclase shows wavy extinction and is partly granulated, indicating weak deformation.

THIN SECTION DESCRIPTION

118-735B-24R-2 (Piece 8, 95-97 cm)

ROCK NAME: Ilmenite metagabbro

WHERE SAMPLED:

TEXTURE: Allotriomorphic granular, porphyroclastic

GRAIN SIZE: Coarse

OBSERVER: KEM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	1	10	2.0-4.0		Anhedral	Partially replaced by colorless amphibole and magnetite.
Plagioclase	10	25	1.0-4.0		Anhedral	
Clinopyroxene	15	40	2.0-4.0		Anhedral	Contains rods and roundish inclusions of opaques.
Ilmenite	22	20	0.2-0.6		Anhedral	Unknown if primary or secondary. Size difficult to estimate because it occurs in granular masses.
Orthopyroxene	2	5	0.2-0.7		Anhedral	As isolated grains replaced by tremolite. Also as inclusions in cpx.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS			
Plagioclase	15					Neoblasts.
Green amphibole	15	Cpx, opx				Actinolite-tremolite.
Brown amphibole	10	Cpx				Patchy in cpx, some larger crystals possibly associated with ilmenite.
Colorless amphibole	9	Ol				Tremolite.
Sulphides	3					Two sulphide intergrowths, pyrrhotite/pyrite.

COMMENTS: Ilmenite occurs as ilmenite-magnetite intergrowths in secondary patches, intergrowths.

THIN SECTION DESCRIPTION

118-735B-24R-3 (Piece 3A, 50-52 cm)

ROCK NAME: Foliated metagabbro

WHERE SAMPLED:

TEXTURE: Porphyro-granoblastic

GRAIN SIZE: Heterogranular

OBSERVER: HEB

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	10	45	0.01-2.0		Euhedral to deformed	Recrystallized into granoblasts with triple junctions.
Clinopyroxene	10	50	< 5.0		Anhedral	Almost replaced by green amphibole, may contain plag inclusions.
Spinel/Magnetite	3	5?	0.1-0.5		Anhedral	Mixture with magnetite, often associated with brown amphibole molded around green amphibole, preferred orientation.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Actinolite/Tremolite	5	Cpx, brown amphibole	Very thin fibers mainly at outer margin of large replaced cpx, colorless to light yellow-green.
Hornblende	32	Cpx	Green to yellow-brown, pseudomorphs after cpx or filling small veinlets in plag.
Plagioclase	35	Plag	Granoblasts 0.03-0.5 mm, polygonal-mosaic vein filled with granoblastic plag.
Brown amphibole	1	Cpx	Often at margins of cpx but not clear if they pre-date or post-date green amphibole.
Blue-green amphibole	2	Amphibole	Late-stage, replaces green amphibole and blue-green amphibole.
Magnetite	2	Ilmenite, cpx	Small granules, 0.3 mm, related to cpx and ilmenite.

COMMENTS: In thin section, brown amphibole appears to replace, at many locations, amphibole pseudomorphs after cpx. The foliation is relatively strong without deformation of the grains except for transformation of plag into granoblasts and straining of larger preserved grains.

THIN SECTION DESCRIPTION

118-735B-24R-4 (Piece 1A, 1-6 cm)

ROCK NAME: Gabbro

WHERE SAMPLED:

TEXTURE: Massive, orthocumulate

GRAIN SIZE: Coarse

OBSERVER: STA

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	2	5	0.5-4.0		Anhedral	Possibly recrystallized.
Plagioclase	53	61	2-10		Subhedral	Slightly crushed and deformed.
Clinopyroxene	25	34	1-5			

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	1	Ol	Mixed with carbonate in fractures in ol.
Carbonate	Tr	Ol	Mixed with clay along cracks in ol.
Actinolite	9	Plag, ol	Actinolite + tremolite. Occurs along grain boundaries.
Hornblende	4	Cpx	Brown-green and colorless. Occurs in patches in cpx.
Hornblende	5	Veins, cpx	Veins of green amphibole.
Plagioclase	1	Plag	Neoblasts.
Clinopyroxene	Tr	Cpx	Occurs as patches of neoblasts and in one area, associated with brown hbd.

COMMENTS: Faint metamorphic foliation in alignment of plag neoblasts. Px and ol are recrystallized in one corner of the slide. Most alteration is static replacement of plag + ol along grain boundaries.

THIN SECTION DESCRIPTION

118-735B-24R-4 (Piece 1B, 26-28 cm)

ROCK NAME: Olivine bearing gabbro

WHERE SAMPLED:

TEXTURE: Granular

GRAIN SIZE: Medium

OBSERVER: BLM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	1.1	3	1-2		Anhedral	Extensively altered.
Plagioclase	51.1	53	1-4		Anhedral	
Clinopyroxene	18.9	44	1-4		Subhedral	
SECONDARY MINERALOGY	PERCENT	REPLACING/FILLING				COMMENTS
Clays	3	Ol, plag				Occurs along fractures in ol crystals, mixed with talc(?). Also in fractures in plag crystals.
Chlorite	Tr	Cpx				Occurs in amphibole clots.
Actinolite	23.9	Cpx				Aggregates after cpx, along cleavage planes. 4% occurs in veins and in interstices between plag crystals. Possibly overestimated; some dark brown alteration in cpx may be clays, not amphibole.
Hornblende	Tr	Cpx				Brown. Rare, in cpx.
Opaques	0.5	Ol, cpx				Most small grains in cpx pseudomorphs. A few grains 0.1-0.3 mm in size in cpx.
Talc	0.3	Ol				After ol.
Tremolite	0.6	Ol				After ol.

COMMENTS: Percentages based on 2000 points.

THIN SECTION DESCRIPTION

118-735B-25R-1 (Piece 5, 21-25 cm)

ROCK NAME: Amphibolitized gabbro

WHERE SAMPLED:

TEXTURE: Granoblastic

GRAIN SIZE: Medium to coarse (<1-4 mm)

OBSERVER: HEB

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	11	57	0.5-2.0		Anhedral, polygonal	Strained.
Clinopyroxene	—	43	0.5-4.0		Anhedral	Completely replaced by amphibole.
Ilmenite	Tr	Tr	<0.5		Anhedral	Associated with brown amphibole.
SECONDARY MINERALOGY	PERCENT	REPLACING/FILLING				COMMENTS
Hornblende	30	Cpx				Green to yellowish brown. Pseudomorphs after cpx fibers, 54 mm in size.
Plagioclase	46	Plag				Polygonal pattern, recrystallized from larger, primary plag crystals. <0.5 mm in size.
Brown amphibole	11	Cpx				Strong brown to yellow-brown pleochroism. Crystals up to 2.5 mm. Replaced by green amphibole.
Blue-green amphibole	2	Amphibole				Fibrous intergrowths, 0.2-0.4 mm in size. Replace both green and brown amphiboles.
Magnetite	Tr	Ilmenite, cpx				Associated with ilmenite and green amphibole.

COMMENTS: Gabbro was metamorphosed at relatively high temperatures (brown amphibole stage); some brown amphiboles are possibly primary. Retrograde metamorphism to medium grade (green amphibole). Plag composition is probably related to metamorphic grade (more sodic than primary calcic plag).

THIN SECTION DESCRIPTION

118-735B-25R-2 (Piece 1A, 5-7 cm)

ROCK NAME: Amphibolitized gabbro

WHERE SAMPLED:

TEXTURE: Granoblastic after mesocumulus texture

GRAIN SIZE: Medium to coarse (1-5 mm)

OBSERVER: HEB

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	30	50	0.5-2.0		Anhedral	Fractures filled with green amphibole. Some granoblasts. Completely replaced by green and blue-green amphibole. Possibly secondary.
Clinopyroxene	5	50	1-3		Euhedral	
Opaques	Tr	Tr	<1	Ti	Anhedral-euhedral	
SECONDARY MINERALOGY	PERCENT	REPLACING/FILLING				COMMENTS
Hornblende	28	Cpx				Blue-green to pale brown. Pseudomorphs after cpx. Fibrous variety present in irregular pseudomorphs (after ol?). Granoblasts with polygonal or irregular outlines.
Plagioclase	20	Plag				
Brown amphibole	2	Cpx				Occurs along cracks produced by shear which cut cpx crystals. Dust in amphibole pseudomorphs.
Blue-green amphibole	15	Cpx				
Magnetite	Tr	Amphibole				

COMMENTS: Some cpx relicts.
Brown amphibole rimmed by blue-green amphibole.
Generation of blue-green amphibole related to late cracks.
Percentages based on 1522 points.

Plagioclase	Primary	24.5
	Metamorphic	15.9
Zoisite		0.1
Clinopyroxene	Primary	1.5
	Amphibolitized	42.2
Amphibole	Brown	2.3
	Blue-green	7.0
	Actinolite	5.3
Opaques		0.7

THIN SECTION DESCRIPTION

118-735B-25R-3 (Piece 2B, 43-48 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE: Hypidiomorphic granular

GRAIN SIZE: Very coarse

OBSERVER: KEM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	18	18	5-10		Anhedral	Ophitically to subophitically enclosing plag and rarely of Exsolution in cpx.
Plagioclase	65	65	5-15		Subhedral-euhedral	
Clinopyroxene	17	17	3-10		Anhedral	
Orthopyroxene	Tr	Tr				
Opaques	Tr					
SECONDARY MINERALOGY	PERCENT	REPLACING/FILLING				COMMENTS
Clays	Tr	Ol				Replacing ol along fractures.
Carbonate	Tr	Ol				
Tremolite/actinolite	Tr	Ol				Alteration halo around most crystals.
Actinolite	Tr	Plag				In thin cracks in plag.
Magnetite	Tr	Ol				
Brown amphibole	Tr	Cpx				

COMMENTS: Slide has poor polish and is plucked. Many features of alteration are difficult to determine.

THIN SECTION DESCRIPTION

118-735B-25R-3 (Piece 3B, 137-139 cm)

ROCK NAME: Troctolitic gabbro

WHERE SAMPLED:

TEXTURE: Orthocumulus

GRAIN SIZE: Medium (2-4 mm)

OBSERVER: HEB

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	4	8	52		Rounded	Kinked. Partially replaced by talc, tremolite, and magnetite. Strained, deformed twins.
Plagioclase	79	87	53.5		Rounded, subhedral	
Clinopyroxene	3	5	54		Anhedral, interstitial	Poikilitically enclosing ol or plag.
Spinel	Tr(?)	Tr(?)	< < 1		Euhedral	Hexagonal crystals close to ol in cpx.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Actinolite	2	Fractures, cpx				Light blue-green. In late fractures cutting all phases. Also rimming cpx. Coronas around fresh ol or tremolite.
Talc	10	Ol, plag				
Tremolite	2	Ol				Prismatic. Intergrowths close to fresh ol cores. Attached to ol or cpx.
Brown amphibole	Tr	Ol, cpx				
Magnetite	Tr	Ol				Generally <0.01 mm. related to talc replacement.

THIN SECTION DESCRIPTION

118-735B-25R-3 (Piece 3B, 144-146 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE: Poikilitic

GRAIN SIZE: Medium to coarse

OBSERVER: MEY

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	9.4	16	1-2		Globular	Elongated. Rare kink bands. Igneous twins preserved.
Plagioclase	49.7	52	1.0-4.5	An 64	Subhedral	
Clinopyroxene	26.4	32	1-8			Oikocrysts enclosing plag and ol crystals. Opaques. Enclosed in plag and cpx.
Spinel	Tr	Tr			Anhedral	
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Chlorite/clay	0.5	Ol				Greenish clay veins occurring with opaques in ol. Forms pseudomorphs after ol.
Tremolite/ actinolite	5.1	Ol, plag, cpx				
Hornblende	3.3	Cpx				Two types, brown and blue-green. Invades cpx along cleavage traces. Forms reaction coronas around pockets of tremolite (ol pseudomorphs).
Talc	5.6	Ol, plag(?)				
Opaques	0.2	Ol				

COMMENTS: Percentages based on 2000 point counts.

Replacements are static and most of the alteration is concentrated on one end of the thin section.

Distinct fracture set dipping at 25°.

Gabbro is relatively undeformed with many primary twins in plag still preserved and only rare kink bands in ol.

Plag composition determined by Michel-Levy method.

THIN SECTION DESCRIPTION

118-735B-26R-1 (Piece 4B, 62-64 cm)

ROCK NAME: Altered olivine gabbro

WHERE SAMPLED:

TEXTURE: Granular

GRAIN SIZE: Medium

OBSERVER: BLM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	2	10	0.1-6.0		Anhedral	Fragments in pseudomorphs.
Plagioclase	45	55			Anhedral	Undulose fragments.
Clinopyroxene	5	35			Anhedral	Fragments in amphibole.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	3	Ol	Dark aggregates associated with ol pseudomorphs.
Chlorite	2	Cpx	With actinolite.
Actinolite	20	Cpx	Pale green to green amphibole in fibrous clots after cpx and in veins.
Hornblende	1	Cpx	Brown patches.
Plagioclase	5	Plag	Neoblasts.
Tremolite	10	Ol?	Circular aggregates rimmed by talc.
Talc	5	Ol	With tremolite.
Opaque	2	Ol	Small, 0.1mm grains, with ol and cpx pseudomorphs in places.
Mica	Tr	Cpx?	Clear to pale tan-yellow, rarely with amphibole.

COMMENTS: High percentage of tremolite-amphibole clots, perhaps after ol; the sample may have been very ol-rich. A 0.5 mm wide granulated zone consisting of fine-grained green amphibole, cuts the sample.

THIN SECTION DESCRIPTION

118-735B-26R-1 (Piece 6B, 135-138 cm)

ROCK NAME: Olivine microgabbro

WHERE SAMPLED:

TEXTURE: Contact between fine-grained and medium-grained gabbros

GRAIN SIZE: Fine to medium

OBSERVER: MEY

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	7.4	16.4	1.0-2.0		Globular, anhedral	Sometimes elongated.
Plagioclase	48.5	50.6	1.0-2.5	An 63-68	Subhedral	Rarely up to 4.0 mm.
Clinopyroxene	26.8	32.9	1.0-2.5		Subhedral	Rarely up to 4.0 mm, not oikocrystic.
Orthopyroxene	0.1	0.1			Anhedral	Interstitial, rimming ol.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Chlorite/Clay	0.8	Ol	Deep brownish-green clay veining and replacing ol (more common in coarser portion).
Actinolite/Tremolite	6.8	Ol, plag	Intergrown with talc in reaction halos around relict ol.
Hornblende	4.4	Cpx, veins	Brown and blue-green.
Talc	4.0	Ol	
Opagues	1.2	Ol	Blebs and rims around relict ol.

COMMENTS: Contact between medium- and fine-grained gabbro dips at approximately 50°. Both parts are equigranular. Fine-grained part near interface is more highly altered. Three subparallel veins slightly oblique to contact. Igneous lamination defined by mafics is parallel to contact between the two parts.

THIN SECTION DESCRIPTION

118-735B-26R-1 (Piece 6B, 135-138 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE: Allotriomorphic granular

GRAIN SIZE: Coarse to medium

OBSERVER: KEM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	8.0	20	1.0-3.0		Anhedral	Partially replaced by tremolite, talc, actinolite and magnetite.
Plagioclase	34.5	35	2.0-5.0		Anhedral	Subhedral where included in cpx.
Clinopyroxene	31.0	45	2.0-5.0		Anhedral	Partially replaced by brown amphibole and actinolite.
SECONDARY MINERALOGY	PERCENT	REPLACING/FILLING	COMMENTS			
Clays	0.8	Fractures		Replacing ol along fractures.		
Talc	6.3	Ol				
Brown amphibole	0.8	Cpx, ol		Replacing cpx, often in alteration haloes around ol.		
Green amphibole	12.7	Cpx, ol		Actinolite, replacing cpx and in ol alteration haloes.		
Colorless amphibole	3.6	Ol		Tremolite replacing ol.		
Magnetite	2.3	Ol				

COMMENTS: Transition between gabbro and microgabbro represents primary layering defined by grain size variation. The microgabbro consists of ol, plag and cpx with grain size ranges of 0.2-1.0 mm, 0.2-1.0 mm and 0.2-1.2 mm, respectively.

THIN SECTION DESCRIPTION

118-735B-26R-3 (Piece 1E, 94-96 cm)

ROCK NAME: Olivine-bearing gabbro cut by amphibole vein

WHERE SAMPLED:

TEXTURE: Subhedral granular

GRAIN SIZE: Medium

OBSERVER: OZA

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	—	2	0.5-2.0		Euhedral	Totally replaced by calcite, chlorite and tremolite.
Plagioclase	56	60	0.5-4.0		Anhedral	Veined by amphibole, chlorite and albite, showing no granulation or extensive deformation.
Clinopyroxene	30	38	0.5-3.0		Subhedral	Far away from amphibole vein. Replaced by small amount of brown hbd and actinolitic hbd. Actinolite near the vein is totally replaced by green amphibole.
SECONDARY MINERALOGY	PERCENT	REPLACING/FILLING	COMMENTS			
Carbonate	1	Ol		Replacing core of ol.		
Chlorite	4	Ol, plag		Replacing core of ol, veining plag.		
Albite	1	Plag		Veining plag.		
Actinolite	4	Cpx, plag		Veining plag, replacing cpx.		
Green hornblende	1	Vein, cpx		Slightly brownish. Mainly filling veins where it has 0.5-3.0 mm grain size, subhedral to anhedral. It also totally replaces cpx near vein within 3.0 mm of the vein wall.		
Tremolite	1	Ol		Replacing ol.		
Brown hornblende	2	Cpx		Replacing cpx and replaced by actinolitic amphibole.		
Fe-Ti oxide	Tr	Ol		Accompanying tremolite.		

THIN SECTION DESCRIPTION

118-735B-26R-3 (Piece 1E, 94-96 cm)

ROCK NAME: Partly amphibolitized gabbro

WHERE SAMPLED:

TEXTURE: Hypidiomorphic granular to granoblastic

GRAIN SIZE: Medium to coarse

OBSERVER: HEB

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	60	65	0.5-1.0		Idiomorphic	Main cumulus phase.
Clinopyroxene	25	35	0.2-3.0		Sub-idiomorphic	Partially to completely replaced by amphibole.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	Tr					In late-stage 1.0 mm thick vein, replacing plag.
Chlorite	3	Plag, mafics				Grey colors, pseudomorphs after cpx or ol by actinolite.
Actinolite/Tremolite	4	Chlorite, plag				Fibers replacing chlorite, plag and late-stage veinlet. (small idioblastic cpx prisms).
Hornblende	8	Cpx				Green, restricted to highly amphibolitized area. Some have a strong bluish tint. This should be compared to other blue-green rims seen elsewhere.
Magnetite	Tr	Cpx				Included in amphiboles.
Carbonate	Tr	Plag				Intermixed with tremolite.

COMMENTS: Gabbroic section: relatively fresh but px replaced by amphibole, chlorite and tremolite in later stage "upper greenschist facies" (brown). amphibole virtually absent). Amphibolitized area: sheared(?), near equilibrium assemblage, idioblastic grains with straight contacts and triple junctions, plag is fractured and fractures infilled with amphibole.

THIN SECTION DESCRIPTION

118-735B-26R-4 (Piece 5, 91-96 cm)

ROCK NAME: Metagabbro

WHERE SAMPLED:

TEXTURE: Foliated, orthocumulate

GRAIN SIZE: Coarse

OBSERVER: STA

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	3	10	1.0-5.0		Anhedral	Altered to either talc or smectite.
Plagioclase	65	70	2.0-10.0		Subhedral	Some recrystallized.
Clinopyroxene	3	14	2.0-10.0		Anhedral	Partially altered to amphibole.
Orthopyroxene	1	1				Rims on ol.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clays		Ol				Brown, mixed with smectite.
Carbonate	Tr					Replacement of ol.
Chlorite	1	Cpx, hbd				Pale green, dark with crossed nicols.
Albite	5	Plag				Clear veins in plag in crushed zone.
Sodic plagioclase	1	Cpx				High relief, fine-grained inclusions in amphibole replacements of cpx. Possibly rutile?
Actinolite	10	Cpx, hbd				Pale green, bladed, associated with chlorite.
Hornblende	5	Cpx, vein				Pale green-brown, in fractures and replacement. Mixture.
Magnetite	1	Ol				Tremolite-talc(?) replacement.
Talc	1					Replacing ol.
Tremolite	4	Ol				Bladed.

COMMENTS: Some plag is crushed, altered ol or actinolite, may be slightly deformed. Igneous foliation, numerous amphibole veins. Rock may be slightly deformed with recrystallized plag.

THIN SECTION DESCRIPTION

118-735B-27R-1 (Piece 5, 23-25 cm)

ROCK NAME: Amphibolitized gabbro

WHERE SAMPLED:

TEXTURE: Granoblastic

GRAIN SIZE: Medium

OBSERVER: HEB

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	-	38	2.0		Recrystallized polygonal	All recrystallized into smaller granoblasts, twins still present.
Clinopyroxene	Tr	35	5.0		Euhedral	Relicts of medium relief, parallel extinction, low birefringence px.
Orthopyroxene	Tr	1-2	4.0		Anhedral	Partly recrystallized as lamellae or needles surrounded by red-pink clay or chlorite, related to brown amphibole. Preferred orientation.
Opaques	3	5	4.0-0.3		Anhedral	

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	2	Opaques	Alteration products of opaques?
Carbonate	1		Isolated grains related to cracks and opaques.
Chlorite	5	Plag, opaques	Blue birefringence color, around ilmenite mixed with red to pink (chlorite and hematite?), probably different compositions.
Epidote	2	Plag	Colorless, abnormal polarizing colors, anhedral grains.
Actinolite/Tremolite	8	Amphibole	Coronal reaction around amphibole pseudomorphs, some overgrowths on chlorite.
Sphene	1		More or less idioblastic, grains altered to ilmenite and chlorite.
Hornblende	35	Pxroxene	Pseudomorphs after px, green to medium brown.
Plagioclase	35	Plag	Granoblasts.
Brown amphibole	5	Pxroxene	As pseudomorphs after px or corona around green-brown amphibole.
Blue-green amphibole	3	Amphibole	As more or less continuous rims around green-brown amphibole, acicular overgrowth or isolated interstitial patches.

COMMENTS: Complete gradation from middle to high temperature metamorphism to greenschist. Mixture of Fe hydroxides and clay-type mineral surround opaques, typically pink-red in color.

THIN SECTION DESCRIPTION

118-735B-27R-1 (Piece 8B, 84-88 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE: Mesocomulate

GRAIN SIZE: Coarse

OBSERVER: BLM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	4	5	4		Anhedral	Some alteration.
Plagioclase	60	65	.5-5		Anhedral	
Clinopyroxene	25	30	2-8		Anhedral	Some alteration to amphibole.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Actinolite	11	Cpx	Veins in plag. Rimming cpx. Quite extensive in cpx on a fine scale.
Hornblende	Tr	Cpx	Brown amphibole in cpx.
Opaque	Tr	OI	Small opaques in ol alteration.

COMMENTS: Thin section cut from the end of a minicore.

THIN SECTION DESCRIPTION

118-735B-27R-2 (Piece 1A, 4-6 cm)

ROCK NAME: Amphibolitized gabbro

WHERE SAMPLED:

TEXTURE: Granoblastic

GRAIN SIZE: Fine to medium

OBSERVER: HEB

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	5	40	0.02-1.00		Polygonal	Recrystallized into smaller granoblasts; not equilibrated.
Clinopyroxene	—	57	0.3-2.0		Anhedral	Completely recrystallized.
Ilmenite	Tr(?)	3			Irregular	Possibly secondary.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Sphene	1	Opaques				Idioblastic. Red staining by hematite. Sometimes amphibole + hematite.
Hornblende	10	Cpx, amphibole				Idioblastic. Strongly pleochroic. Concentrated along cracks or small shear zones. Crystallization extends no more than 4 mm from crack.
Plagioclase	35	Plag				Granoblasts with irregular shapes and contacts.
Hematite	Tr	Amphibole				Rose-red color. Close to opaque grains in the brown amphibole zone.
Amphibole	46	Cpx				Blue-green. Light yellowish to brown-green pleochroism. Pseudomorphs. Clearly pre-dates brown amphibole in this section.
Opaques	3	Oxides				Irregular. Associated with amphiboles. Possibly of hydrothermal origin.

COMMENTS: Recrystallization of plagioclase and amphibolization of cpx show that the rock was not equilibrated.

Sphene-opaque-hematite-amphibole assemblage shows breakdown of small existing opaques. Cracks provided access to circulation fluids which generated the brown amphiboles after blue-green amphibole (which earlier replaced cpx).

THIN SECTION DESCRIPTION

118-735B-27R-3 (Piece 1B, 32-34 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE: Mesocumulate, granular

GRAIN SIZE: Medium to coarse

OBSERVER: BLM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	3	5	2-4		Anhedral	Kink-banded. Replaced by talc/tremolite.
Plagioclase	60	60	0.1-4.0		Anhedral	Undulose extinction. Minor deformation.
Clinopyroxene	15	35	1.5-6.0		Anhedral	Interstitial to cpx. Some fine-grained cpx-cpx intergrowths at grain boundaries.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Actinolite	20	Cpx				Patchy to well-crystallized. 0.1-3.0 mm grains after cpx. Also in veins through plagioclase.
Hornblende	Tr	Cpx				Brown amphibole in cpx.
Tremolite	1	Ol				
Talc	Tr	Ol				
Oxides	1	Ol				

COMMENTS: Thin section is from the end of a minicore. Slightly deformed. Granular cpx "intergrowths" possibly initial stages of grain boundary granulation.

THIN SECTION DESCRIPTION

118-735B-27R-3 (Piece 10, 73-81 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED: Coarse portion above graded layer

TEXTURE: Poikilitic to anhedral granular

GRAIN SIZE: Coarse

OBSERVER: OZA

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	8	10	0.4-5.0		Anhedral-euhedral	Having sub-grain boundaries (recrystallized and polygonized). Altered to tremolite/actinolite and reacted with plag.
Plagioclase	35	50	0.4-10.0		Anhedral-subhedral	Most crystals are anhedral.
Clinopyroxene	34	37	1-40		Anhedral	The largest oikocryst is more than 40 mm across.
Oxide	1	1	0.1-0.5	Fe-Ti	Anhedral-euhedral	Inclusions in cpx, locally rimming ol.
Hornblende	1	1	0.1-0.5		Anhedral	Brown. Locally rimming and replacing cpx replaced by actinolite.
Orthopyroxene	Tr	1	0.1-0.3		Anhedral	Inclusions or exsolution lamellae in cpx. Also rarely rimming ol. Locally rimming cpx.
SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING				COMMENTS
Clays	Tr	Ol				Brownish green. Filling cracks in ol.
Chlorite	1	Plag, ol				Reaction product occurring between plag and tremolite + oxide, after ol.
Actinolite/ tremolite	2	Ol, cpx, opx				Replacing ol, brown amphibole, and cpx at plag-plag grain boundaries. Also in veins in plag.
Hornblende	1	Cpx				Brown-green. Replacement rims around cpx.
Mica	3	Plag				Replacing plag (not ol). Always occurs between tremolite/actinolite, after ol and plag.
Oxides	1	Ol				Fe-Ti oxides. Occurs with tremolite/actinolite.

COMMENTS: Cpx oikocrysts up to 4 cm.

THIN SECTION DESCRIPTION

118-735B-28R-1 (Piece 6, 57-60 cm)

ROCK NAME: Mylonitized gabbro

WHERE SAMPLED:

TEXTURE: Mylonitic, porphyroclastic

GRAIN SIZE: Fine to medium

OBSERVER: HEB

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	10	83	0.5-4.2			Strained and recrystallized.
Clinopyroxene	5	15	1.0-4.0			Strongly replaced by amphibole or crushed before replacement.
Fe-Ti	2	2	1.0-4.0			Streaks elongated in foliation. Partially replaced by sphene.
Brown hornblende	Tr	Tr	0.5			Magmatic? Rims around oxides or close to cpx.
SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING				COMMENTS
Epidote	5	Plag				Hexagonal or tail-shaped, rotated into foliation planes in plagioclase-rich area of section.
Sphene	2	Opagues				Irregular, around opaques, associated with epidote.
Hornblende		Px				Colorless to light brown, pseudomorphs after cpx.
Plagioclase	68	Plag				Grano-neoblasts. 0.5mm.
Brown amphibole	8	Px, amphibole				Dark brown to yellow brown, coronitic replacement of pyroxene or hornblende pseudomorphs, also associated with opaques.
Zirion	Tr					Euhedral.
Blue-green amphibole	2	Amphibole				Lining the brown amph or the amph pseudomorphs.
Hematite	Tr	Opagues				Rose-red associated with amph (?).

COMMENTS: Visual pattern of deformation, recrystallization, high temperature. Brown amph post-dating light brown amph and hematite. Late-stage, blue-green amph. Epidote development. Oxides can be remobilized at high temperature stage.

THIN SECTION DESCRIPTION

118-735B-28R-2 (Piece 1B, 12-14 cm)

ROCK NAME: Weakly deformed olivine-bearing gabbro

WHERE SAMPLED:

TEXTURE:

GRAIN SIZE: Fine to medium

OBSERVER: CAN

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	2	3-5	0.4-1.5		Polygonal-anhedral	Partly replaced.
Plagioclase	50	60	0.8-5.0		Subhedral-anhedral	Well-marked subgrain boundaries, locally recrystallized (micro-shears and often kinked).
Clinopyroxene	25	30	0.8-6.0		Anhedral	Replaced by brown- and then green amphibole.
Fe-Ti oxides	3	3	0.2-1.2		Anhedral-subhedral	

SECONDARY MINERALOGY	PERCENT	REPLACING FILLING	COMMENTS	COMMENTS
Clays	< 1	Ol		Unstrained clay in core of ol, associated with oxides.
Actinolite	1	Plag, ol		
Green hornblende	7	Brown hbd, cpx		
Plagioclase	10	Plag		Recrystallized grains in micro-shears.
Oxides	1	Ol		Associated with clays.
Talc	< 1	Ol		
Tremolite	1	Ol		
Orthopyroxene	Tr	Ol?		Filling vein cross-cutting ol.

COMMENTS: Deformation extremely ? , seems to occur prior to hydrate replacement. A vein of what appears to be hydrothermal opx crosscuts the ol.

THIN SECTION DESCRIPTION

118-735B-28R-2 (Piece 6, 114-116 cm)

ROCK NAME: Gabbro

WHERE SAMPLED:

TEXTURE: Subhedral granular

GRAIN SIZE: Medium to coarse

OBSERVER: BLM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	0	5	5.0		Anhedral	Pseudomorphed by talc/tremolite.
Plagioclase	60	70	1.0-4.0		Anhedral	Undulose, some recrystallization.
Clinopyroxene	12	25	2.0-5.0		Anhedral	Interstitial to plag.

SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING	COMMENTS
Clays	1	Ol	Small dark brown aggregates after ol.
Actinolite	18	Cpx	Light green, fibrous and patchy amphibole after cpx, also filling veins in plag.
Plagioclase	4	Plag	Small neoblasts on grain margins.
Talc	1	Ol	
Tremolite	4	Ol	
Opaque	Tr	Ol	Small grains in ol pseudomorphs (sulphides?).
Carbonate	< 1	Ol	Associated with dark clay minerals.

COMMENTS:

THIN SECTION DESCRIPTION

118-735B-28R-3 (Piece 4, 63-69 cm)

ROCK NAME: Norite

WHERE SAMPLED:

TEXTURE: Subhedral granular

GRAIN SIZE: Coarse

OBSERVER: MEY

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	0.1	0.1				Relict of intergrown with pigeonite, exhibiting magmatic reaction relationship.
Plagioclase	58.4	59.2				
Clinopyroxene	2.0	2.5				
Brown hornblende	0.2	0.2				
Inverted pigeonite	29.9	37.5	5.0-15.0			Now hypersthene with cpx exsolution blebs and lamellae of cpx. Some grains exhibit well-known herringbone texture.
Fe-Ti oxide	0.4	0.5				
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	0.4					
Epidote	0.8	Plag				Both zoisite (with birds-eye blue interference color) and epidote are present. Associated with colorless amphibole at grain boundary between pigeonite and plag. Also occurs in veins and blebs in plag.
Actinolite/Tremolite	5.1					
Sphene	0.1	Fe-Ti oxide				Forms mesh with Fe-Ti oxide that it replaces.
Brown hornblende	2.6	Pigeonite, cpx				Some brown hbd appears to be primary (reported above) but most is secondary.

COMMENTS: Alteration products of pigeonite and cpx not easily differentiated, so estimated original pigeonite/cpx ratio is the same as the present ratio. Original proportion of brown hbd is also poorly known. Percentages based on 2000 points.

THIN SECTION DESCRIPTION

118-735B-28R-4 (Piece 18,141-144 cm)

ROCK NAME: Amphibolitized gabbro

WHERE SAMPLED:

TEXTURE: Granoblastic

GRAIN SIZE: Medium

OBSERVER: HEB

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	5	40	0.02-1.5		Polygonal, irregular	Possibly all recrystallized and reequilibrated plag even if twins are present.
Clinopyroxene	10	55	1.0-4.0		Anhedral-subhedral	
Spinel	Tr	5	0.1		Anhedral	
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Carbonate	Tr					In cracks with blue-green amphibole.
Hornblende	33	Pyroxene				Green to light brown, pseudomorphs after pyroxene.
Plagioclase	35	Plag				Polygonal neoblasts.
Brown amphibole	10	Pyroxene, amphibole				Filling cracks, also associated with opaques.
Blue-green amphibole	2	Pyroxene, cracks				Small amounts. Filled cracks are cut by dark brown amphibole-filled cracks. Nearly continuous rim around pyroxene.
Opaques	5	Intergrown in spaces, fractures				Seem introduced along some fractures, then brown amphibole, magnetite and sulphide.
Prehnite	Tr	Plag				Fibro-radiated crystals, light green, replacing edge of plag.

COMMENTS: Some pattern of deformation and metamorphism. Opaques appear to be secondary.

THIN SECTION DESCRIPTION

118-735B-29R-1 (Piece 1G, 88-92 cm)

ROCK NAME: Amphibolitized gabbro

WHERE SAMPLED:

TEXTURE: Sheared

GRAIN SIZE: Fine to medium

OBSERVER: CAN

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	—	3(?)	(?)			
Plagioclase	44	64	2-6			Replaced by tremolite/actinolite, clays, and opaques. Porphyroclasts. Fractured, kinked, and recrystallized into very small grains.
Clinopyroxene	1	33	5		Anhedral	Extensively replaced by green amphibole.
SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING				COMMENTS
Clays	<1	Ol(?)				Occurs with opaques.
Albite	2	Plag				
Actinolite	42	Ol(?), plag				Occurs with tremolite and in plag grains.
Hornblende	32	Cpx				Large, green porphyroclasts and recrystallized grains. Kinked and fractured.
Plagioclase	16	Plag				Very small (540 μm) polygonal grains.
Tremolite	1	Ol(?)				Occurs with actinolite.
Opaques	<1	Ol(?)				Occurs with clay. Patchy ilmenite. Tiny magnetite crystals in clear amphibole at one side of the thin section.

COMMENTS: The deformation produced shear zones and a rough foliation (both visible in sample), both affecting the green amphibole (hydrothermal material?).

THIN SECTION DESCRIPTION

118-735B-29R-2 (Piece 1D, 46-48 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE: Subhedral granular

GRAIN SIZE: Medium

OBSERVER: BLM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	4	5	0.8-2.0		Anhedral	Rimmed by tremolite.
Plagioclase	55	60	0.5-4.0		Subhedral-anhedral	Undulose extinction. Slightly deformed.
Clinopyroxene	22	35	1-4		Anhedral	Interstitial to subophitic.
SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING				COMMENTS
Clays	Tr	Ol				In ol pseudomorphs near vein.
Actinolite	13	Cpx				Patchy to granular aggregates after cpx and in veins. Pale green to blue-green.
Plagioclase	5	Plag				Neoblasts, granules <0.1 mm, in veined zone.
Tremolite	1	Ol				Aggregates rimming ol.
Talc	Tr	Ol				
Oxides	Tr	Ol				Magnetite in amphibole reaction zone next to ol.

COMMENTS: Thin section cut from the end of a minicore.

Sample cut by an amphibole vein, 2-3 mm wide. Ol, cpx replacement is most complete there. Plag granulation is confined to this region.

THIN SECTION DESCRIPTION

118-735B-29R-3 (Piece 14C, 129-131 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE: Mesocumulus

GRAIN SIZE: Medium to coarse

OBSERVER: CAN

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	3	8	10		Anhedral	Some sub-grain boundaries. Replacement corona with talc, mica and tremolite.
Plagioclase	58	69	10-20		Anhedral-euhedral	Locally kinked crystals, crushed and albitized.
Clinopyroxene	13	23	10		Anhedral subhedral	Partially replaced by green amphibole.
Hornblende	<1					Brown. Rims of cpx, replaced by green hbd.
Orthopyroxene	<1	<1				Occurs in inner rim of replacement corona of ol. Euhedral small grains. No distinct grain boundaries.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	2	Ol				Occurs in the core of ol grains.
Carbonate	<1	Ol				
Chlorite	<1	Plag				Occurs along the contact between plag and ol replacement corona.
Albite	10	Plag				Crushed crystals.
Actinolite	1	Ol, plag				In outer rim of replacement corona of ol.
Hornblende	10	Cpx, veins, Brown hbd				Green. Sheared.
Mica	Tr	Ol				In replacement corona, frequently with opx as inner rim.
Talc	Tr	Ol				In replacement corona, frequently with opx as inner rim.
Tremolite	1	Ol				In replacement corona, frequently with opx as inner rim.

COMMENTS: Question: is the opx rimming the ol a replacement product (secondary), or a late magmatic phase?
Large oriented thin section.

THIN SECTION DESCRIPTION

118-735B-29R-4 (Piece 1B, 19-24 cm)

ROCK NAME: Amphibolitized gabbro

WHERE SAMPLED:

TEXTURE: Subhedral granular

GRAIN SIZE: Fine to coarse

OBSERVER: BLM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	48	59	0.2-4.0		Anhedral-euhedral	Partially in cpx. Very undulose extinction.
Clinopyroxene	14	41	1-4		Anhedral	Interstitial. Rarely poikilitic.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	1(?)	Plag				Dusty fractures and boundaries.
Actinolite	27	Cpx				Also in veins and fractures throughout. Good pale green to green amphibole. Well crystallized. Probably actinolitic hornblende.
Hornblende	5	Cpx				Brown amphibole.
Plagioclase	5	Plag				< 0.2 mm neoblasts.
Spinel	Tr	Cpx				In cpx replacements.

COMMENTS: Some deformation. Plag is bent with undulose extinction, and in part, granulated and recrystallized. Amphibole in fractures cut the plag crystals, but in places in fine recrystallized aggregates. Syn-to post-deformational. Very undulose amphibole fragments in places.

THIN SECTION DESCRIPTION

118-735B-30R-1 (Piece 18, 135-138 cm)

ROCK NAME: Olivine-bearing metagabbro

WHERE SAMPLED:

TEXTURE: Granular

GRAIN SIZE: Fine to medium

OBSERVER: OZA

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	—	3(?)	0.5-4.0		Euhedral	Completely replaced by chlorite + tremolite/actinolite. Rimmed by actinolite.
Plagioclase	52	58	0.3-4.0		Subhedral-euhedral	Cut by many small veins of amphibole and replaced by chlorite.
Clinopyroxene	27	37	0.2-4.0		Subhedral	Replaced by brown-green amphibole + actinolite. Some crystals are perfectly replaced by amphibole.
Oxides	2	2	0.2-0.4	Fe-Ti	Anhedral	Occur at the margins of or as inclusions in cpx.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Carbonate	Tr	Vein				Veins in plag.
Chlorite	5	Ol, plag				Replacing ol and plag.
Albite	1	Plag				Veins in plag.
Actinolite/ tremolite	10	Ol, cpx				0.1-0.4 mm long lath of tremolite replacing ol. Accompanied by chlorite. Pale green actinolite rimming tremolite after ol and cpx.
Hornblende	3	Cpx, vein				Brown-green. Replacing cpx. Brown hbd locally rims and replaces cores of cpx. Green hbd (actinolitic) replaces cpx rims commonly, but rarely replaces entire grain. Green hbd also occurs in veins in plag.

COMMENTS: Foliation possibly magmatic in origin. Some grain size variation showing layering.

THIN SECTION DESCRIPTION

118-735B-30R-2 (Piece 13D, 120-122 cm)

ROCK NAME: Plagioclase-rich portion of amphibolitized gabbro

WHERE SAMPLED:

TEXTURE: Granoblastic

GRAIN SIZE: Originally coarse

OBSERVER: HEB

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	—	90	0.01-0.80		Irregular	Recrystallized. Originally large crystals recrystallized into granoblasts.
Clinopyroxene	Tr	10	1-6		Subhedral	Almost completely replaced by amphibole.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	Tr	Plag				Near cracks. Brown dust in plag.
Epidote	Tr	Plag				Blue birefringence colors close to a crack. Replacing plag in strained areas.
Actinolite	2	Cpx				Fibers associated with epidote. Also replacing cpx and filling veinlets, and as amphibole pseudomorphs.
Hornblende	7	Cpx, plag				Blue-green to pale yellow-brown. Pseudomorphs after cpx and filling veinlets in plag.
Plagioclase	90	Plag				Granoblasts with irregular contacts. Represents nonequilibrium.
Amphibole	1	Cpx				Brown. Related to cracks. Replacing pseudomorphs.
Magnetite	Tr	Cpx				Minute grains, <0.07 mm, in amphibole.

COMMENTS: Possibly from a vein in the gabbro itself.
There is some lining of blue amphibole around actinolite pseudomorphs after cpx.

THIN SECTION DESCRIPTION

118-735B-30R-3 (Piece 6B, 137-139 cm)

ROCK NAME: Amphibolitized gabbro

WHERE SAMPLED:

TEXTURE: Hypidioblastic

GRAIN SIZE: Coarse (average 5 mm)

OBSERVER: HEB

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	—	10	<1		Polygonal	Highly strained and recrystallized. Slightly deformed. Largely replaced by several types of amphiboles.
Clinopyroxene	10	85	0.4-5.0			
Oxides	—	5			Anhedra-subhedral	
SECONDARY MINERALOGY	PERCENT	REPLACING/FILLING				COMMENTS
Carbonate	<1	Cpx				Associated with opaques. Contain needles of green amphibole (actinolite).
Epidote	<1	Plag, veins				Blue-yellow birefringence color. Idioblastic crystals replacing plag and filling cracks.
Hornblende	60	Cpx				Green to pale brown pseudomorphs after cpx. Darker green at the rims or in cracks.
Plagioclase	10	Plag				Granoblasts recrystallized into polygons.
Amphibole	15	Amphibole				Brown. As rims around amphibole pseudomorphs or near cracks.
Clinopyroxene	Tr	Cpx				Granoblasts or neoblasts around large cpx phenocrysts.
Hematite	2	Oxides				Deposited along cpx cleavages. Also replacing amphibole.
Magnetite/ilmenite	3	Oxides				Lamellae of ilmenite or magnetite in silicate or in cracks.
Sulfides	<1					Pyrite in cleavage and cracks of cpx, magnetite, ilmenite, and plag.

COMMENTS: Late cracks are filled with secondary carbonate + opaques + actinolite. Brown amphibole is late since it is found in or near cracks and as rims around amphibole pseudomorphs.

THIN SECTION DESCRIPTION

118-735B-30R-4 (Piece 2D, 14-16 cm)

ROCK NAME: Amphibolitized olivine gabbro

WHERE SAMPLED:

TEXTURE: Anhedra granular

GRAIN SIZE: Medium

OBSERVER: BLM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	3	15(?)			Anhedra	Original grains up to 4 mm.
Plagioclase	58	58	0.2-4.0		Anhedra	Slight deformation: undulose extinction, spindle twins.
Clinopyroxene	9	27	1-2		Anhedra	Extensive amphibolitization.
SECONDARY MINERALOGY	PERCENT	REPLACING/FILLING				COMMENTS
Clays	2	OI				In ol pseudomorphs. Dark brown.
Chlorite	4	OI, cpx				Outside of tremolite and actinolite aggregates.
Actinolite	14	Cpx, veins				Patchy and fibrous aggregates after cpx. Also in veins.
Hornblende	Tr	Cpx				Brown.
Tremolite	7	OI				Fibrous aggregates.
Talc	2	OI				Mixed with tremolite or outside tremolite zone.
Oxides	1	OI				Magnetite in reaction zones replacing ol.
Sulfides	Tr					Disseminated pyrite, partially attacked by solutions inducing alteration.

COMMENTS: Thin section taken from the end of a minicore. Amphibole in one large vein (1 mm) is quite blue-green. OI pseudomorphs are tremolite to talc, tremolite to chlorite zoned; clays at center and along fractures of remnant ol.

THIN SECTION DESCRIPTION

118-735B-30R-4 (Piece 4, 58-64 cm)

ROCK NAME: Olivine meta gabbro

WHERE SAMPLED:

TEXTURE: Heteradcumulate

GRAIN SIZE: Coarse

OBSERVER: HEB

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	—	4	1-3		Rounded	Included in plag, rarely in cpx.
Plagioclase	15	66	1-10		Rounded	Included in large cpx oikocrysts. Recrystallized into neoblasts.
Clinopyroxene	20	30	2-12		Anhedra	Large oikocrysts.
Amphibole	Tr(?)	Tr	<0.2		Anhedra	Brown. Very small patches at the edge of large cpx crystals.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	Tr	Ol				Yellow-green smectite. Sometimes developing mesh texture in altered ol.
Carbonate	Tr	Ol				Associated with smectite.
Chlorite	1	Ol				Chlorite + magnetite. Brown interference colors, colorless. Replaced by actinolite. Occurs at outer rim of ol, close to plag.
Hornblende	8	Cpx				Green to green-brown. Pseudomorphs after cpx.
Plagioclase	51	Plag				Granoblasts with irregular grain boundaries.
Tremolite	2	Ol				Center of ancient ol; replaces all grains.
Talc	Tr	Ol				Outer part of replaced ol, close to plag crystals.
Amphibole	2	Amphibole				Blue-green. Diffuse rimming amphibole pseudomorphs. Also along cracks cutting large cpx in fractures.
Magnetite	1	Ol				Occurs with chlorite. Small granules in association with alteration products of ol.

COMMENTS: Deformation concentrated in small shear zones.

Cpx replaced by brown amphibole, green amphibole, blue-green amphibole, from core to rim.

Ol replaced by tremolite + talc + chlorite + magnetite.

THIN SECTION DESCRIPTION

118-735B -30R-4 (Piece 7, 131-138 cm)

ROCK NAME: Metagabbro

WHERE SAMPLED:

TEXTURE: Cataclastic

GRAIN SIZE: Coarse

OBSERVER: STA

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	—	(?)				
Plagioclase	43	62	1-3			Pervasively albitized.
Clinopyroxene	—	33	1-5			Amphibolitized.
Orthopyroxene	—	5	(?)			Possibly ol.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	Tr	Plag				Replacing plag. Colorless. Possibly fine-grained amphibole.
Chlorite	Tr	Opx(?)				Dark patches in cores of pseudomorphs.
Albite	15	Plag				In vein with epidote. Rims on plag.
Epidote	7	Veins				Blue interference colors. Twinned euhedral crystals in vein.
Actinolite	5	Opx(?), plag				Tremolite pseudomorphs after opx(?). Also pale green crystals replacing plag.
Hornblende	20	Veins, cpx				Green pleochroic rims on cpx. Also in vein.
Hornblende	10	Cpx				Pale cores of cpx pseudomorphs.
Sulfides	Tr	Plag, opx(?)				Pyrite. In tremolite/magnetite reaction.
Oxides	Tr	Ol				Zones after ol.

COMMENTS: Pseudomorphs of a mafic phase are dark chlorite surrounded by tremolite. Assume this to be opx or ol.

THIN SECTION DESCRIPTION

118-735B-30R-5 (Piece 6A, 91-93 cm)

ROCK NAME: Partially amphibolitized gabbro

WHERE SAMPLED:

TEXTURE: Porphyroclastic

GRAIN SIZE: Fine to coarse

OBSERVER: HEB

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	10	70	<0.1-6.0		Anhedral	Porphyroclasts highly strained. Former grains were coarse coarser.
Clinopyroxene	15	30	0.2-3.0		Anhedral	Small grains.
Ilmenite	Tr	Tr	1		Anhedral	Interstitial phases, partially secondary.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	Tr	Ol(?)				Yellow-brown smectite.
Plagioclase	60	Plag				Neoblasts and granoblasts.
Amphibole	2	Cpx				Brown. Strongly pleochroic. Granoblasts at the edge of cpx or in cracks in plag.
Tremolite	7	Cpx				Partially replacing the rim of cpx grain. Radially crystallized.
Clinopyroxene	5	Cpx				Small, recrystallized neoblasts close to phenocrysts.
Ilmenite	Tr	Cracks				Straight, open fissure also filled in parallel structures by strongly pleochroic brown amphibole.
Amphibole	1	Amphibole				Grass-green. As rims around cpx and related tremolite.
Magnetite	Tr	Ol				Occurs with smectite.

COMMENTS: Deformed and strained gabbro; foliation well developed and plag is recrystallized. Possibly ol originally present, but as accessory phase (lense of smectite). Modal estimation does take into account the plag-rich coarse-grained part of the thin section.

THIN SECTION DESCRIPTION

118-735B-30R-5 (Piece 7,110-115 cm)

ROCK NAME: Olivine gabbro cut by apegmatitic olivine gabbro

WHERE SAMPLED:

GRAIN SIZE: Coarse to fine

OBSERVER: HEB

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	7	10	1.0-3.0		Rounded	Subgrain boundaries, polygons with straight edges, deformation lamellae.
Plagioclase	52	60	0.2-5.0		Anhedral-euhedral	Irregular grain-sized mosaic.
Clinopyroxene	25	30	1.0-5.0		Anhedral	Fresh islets, surrounded by dirty brown amphibole.
Spinel (chromite?)	<1	<1	0.1		Idiomorphic	Possibly magnetite, surrounded by brown amphibole.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	1	Ol, cracks				Yellow green.
Hornblende	4	Cpx				Dirty brown, pseudomorphs.
Plagioclase	5	Primary plag				Recrystallized, non-equilibrated mosaic (irregular edges).
Tremolite	2	Ol				Colorless, needle-like grains in every direction.
Blue-green amphibole	1	Ol, cpx				As rims around mafic minerals or in late-stage open cracks.
Brown amphibole	2	Ol, opx				Associated with opaques, strongly pleochroic patches.
Magnetite	1	Ol				Seam around or filling cracks in ol.

COMMENTS: Pegmatoid ol-poor gabbro invading ol gabbro (islets of former gabbro). High temperature grademetamorphism present and late-stage, low grade assemblage.

THIN SECTION DESCRIPTION

118-735B-31R-2 (Piece 2B, 40-45 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE: Mesocumulate

GRAIN SIZE: Coarse

OBSERVER: MEY

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	1.8	5.3	1.0-8.0		Subhedral	
Plagioclase	53.3	54.0	1.0-10.0		Subhedral— anhedral	
Clinopyroxene	36.4	40.6	1.0-15.0		Subhedral	Preferred subvertical orientation.
Sulphide	Tr	Tr			Anhedral	Found at margins of primary cpx.
SECONDARY MINERALOGY	PERCENT	REPLACING FILLING				COMMENTS
Clays	0.2	Ol				Veining ol.
Chlorite	0.3	Plag				Occurs as outer rim of reaction corona around ol pseudomorph.
Actinolite/Tremolite	3.2	Ol				
Hornblende	4.2	Cpx				Forms rims around cpx up to 2.0 mm wide. Also found in veins.
Magnetite	0.1	Ol, cpx				Occurs as blebs in cpx, late stage exsolution and/or alteration. In association with tremolite replacing ol.
Carbonate	Tr	Ol				One carbonate pseudomorph after ol, partly enclosed in cpx.
Micaceous mineral	0.4	Plag				Possibly margarite; highly birefringent like talc. Occurs in association with tremolite, pseudomorphs after ol where ol borders plag, clearly replacing plag.

COMMENTS: 1-2 mm wide cataclastic zone dipping at approximately 55°, filled with granular plag and cpx; clearly provided conduit for fluids. Subhorizontal amphibole veins branch out from this zone.

THIN SECTION DESCRIPTION

118-735B-31R-2 (Piece 3C, 77-81 cm)

ROCK NAME: Fe-Ti oxide gabbro

WHERE SAMPLED:

TEXTURE: Cataclastic to porphyroclastic

GRAIN SIZE: Coarse to fine where granulated

OBSERVER: KEM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	20	50	0.4-4.0		Anhedral	Porphyroclasts.
Clinopyroxene	5	42	3.0-7.0		Anhedral	Almost totally replaced by light brown amphibole.
Fe-Ti oxide	8	8	< 1.0		Anhedral	Occurs as large equant grains and as thin strings lining grain boundaries.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Plagioclase	30	Plag				Neoblasts.
Brown amphibole	21	Cpx, veins				Replaces cpx and surrounds Fe-Ti oxides, fills veins.
Green amphibole	15	Cpx				Actinolite.
Colorless amphibole	1	Cpx				

COMMENTS: One side of the slide is more deformed than the other and contains more opaque minerals. This side, with abundant Fe-Ti oxides, has cpx porphyroclasts which are rounded, while on the less deformed side lacking Fe-Ti oxides, the cpx replaced by amphibole tends to be connected to numerous amphibole veins creating a network appearance with the original cpx as "nodes" along the network. Cpx is replaced about equally by amphibole on both sides. Rock may originally have contained small amounts of ol, but this is difficult to determine because of total replacement by amphibole and deformation.

THIN SECTION DESCRIPTION

118-735B-31R-2 (Piece 4D, 120-122 cm)

ROCK NAME: Metagabbro

WHERE SAMPLED:

TEXTURE: Anhedral granular

GRAIN SIZE: Coarse

OBSERVER: STA

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	1	3	1.0-5.0		Anhedral	
Plagioclase	44	47	0.5-2.0		Anhedral	Partially recrystallized.
Clinopyroxene	25	50	5.0-12.0		Anhedral	Patchy replacement by pale hbd.
Opaque	Tr	Tr	0.1-0.5		Subhedral-anhedral	At rim of cpx.
Orthopyroxene	Tr	Tr	0.2		Anhedral	Inclusion in cpx.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Plagioclase	2	Vein			With hbd.	
Actinolite	1	Ol			Tremolite.	
Hornblende	25	Cpx			Green, in vein with plag; also brown, replacing cpx.	
Mica	1	Plag				
Prehnite	<1	Plag, ol			Reaction corona between plag and ol.	
Talc	<1	Ol			Mixed with magnetite.	
Magnetite	<1	Ol			Mixed with talc.	

COMMENTS: Cut by two parallel green hbd veins. Cpx and hbd are recrystallized along shears through cpx.

THIN SECTION DESCRIPTION

118-735B-31R-3 (Piece 10, 33-35 cm)

ROCK NAME: Olivine-bearing gabbro

WHERE SAMPLED:

TEXTURE: Allotriomorphic granular

GRAIN SIZE: Very coarse

OBSERVER: KEM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	0	1	3.0-4.0		Anhedral	
Plagioclase	69	70	10.0-15.0		Anhedral	
Clinopyroxene	26	29	5.0-10.0		Anhedral	Subophitic to ophitic (encloses plag ophitically).
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	Tr	Ol				
Green amphibole	4	Cpx			Replaces cpx on grain boundaries, rimming tremolite after ol and along fractures.	
Brown amphibole	<1					
Tremolite	1	Ol				
Magnetite	Tr					

COMMENTS: Slide is really too small to adequately characterize such a coarse-grained rock modally or texturally. Appears to have cumulus plag and cpx. Most replacement of cpx by amphibole occurs where veins are crosscut by amphibole-filled fractures.

THIN SECTION DESCRIPTION

118-735B-31R-4 (Piece 9A, 118-120 cm)

ROCK NAME: Foliated amphibolitized gabbro

WHERE SAMPLED:

TEXTURE: Porphyroclastic

GRAIN SIZE: Medium to coarse

OBSERVER: HEB

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	—	1				
Plagioclase	10	59			Irregular	Almost completely recrystallized.
Clinopyroxene	10	40			Anhedral	
SECONDARY MINERALOGY	PERCENT	REPLACING/FILLING				COMMENTS
Clays	Tr	Plag				Brown. In cracks of plag crystals. Blue interference color. Pale yellow, colorless. Associated with actinolitic hbd. Also brown interference color replaced by actinolite.
Chlorite	1	Amphibole				
Actinolitic hornblende	20	Cpx				Green to dark green to colorless. Granoblastic. Occurs at outer margins of cpx grains, proceeding inside phenocrysts. Neoblasts and granoblasts.
Plagioclase	49	Plag				
Brown amphibole	6	Cpx				Brown. Medium brown as rims around cpx. Blue-green. Idioblastic prisms. Penetrating into cpx pseudomorphs or filling space between plag and cpx crystals. Deformed into reactivated planes (foliation).
Blue-green amphibole	3	Amphibole				
Talc	1	Ol				Very fine lamellae at outer margin of assemblages of actinolite + chlorite. Seems to replace chlorite.
Magnetite	Tr	Ol(?)				Associated with chlorite + tremolite ± talc.

COMMENTS: Nice zonation in cracks in cpx; brown amphibole lining green amphibole center. Single rimmed amphibole grains, same scenario. Again assemblages of chlorite + tremolite ± talc ± magnetite could have been ol. Initial form is highly modified (lenses to schistose).

THIN SECTION DESCRIPTION

118-735B-32R-1 (Piece 1F, 64-66 cm)

ROCK NAME: Ilmenite gabbro

WHERE SAMPLED:

TEXTURE: Allotriomorphic granular

GRAIN SIZE: Coarse

OBSERVER: HEB

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	5	8	<4		Rounded	Allotriomorphic texture. Sometimes surrounded by opaques.
Clinopyroxene	63	79	<15		Subhedral	Large grains. Exsolution lamellae pattern replaced by amphibole along cleavages and fractures.
Ilmenite/magnetite	8	10	<7		Anhedral	Large grains outlined by colorless tremolite and minute magnetite grains. Ilmenite/magnetite intergrowths.
Amphibole	3	3	<0.3		Anhedral	Strongly pleochroic patches.
SECONDARY MINERALOGY	PERCENT	REPLACING/FILLING				COMMENTS
Chlorite	5	Cpx				Colorless. Replaced by actinolite close to cpx. Locally replacing cpx. Colorless patches replacing cpx.
Hornblende	5	Cpx				
Magnetite	Tr	Ilmenite				Very fine (<0.04 mm). Distributed around large ilmenite grains. Colorless. Fine needle-like crystals. Associated with chlorite, blue-green amphibole, and partially replacing plag.
Tremolite	9	Cpx, plag				
Sulfides	Tr					Pyrite in altered zones.
Oxides	2					Magnetite associated with alteration of cpx.

COMMENTS: Cpx + plag + fluid produced blue-green amphibole + chlorite. Low grade static metamorphism.

THIN SECTION DESCRIPTION

118-735B-32R-3 (Piece 1B, 14-16 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE: Allotriomorphic granular

GRAIN SIZE: Coarse

OBSERVER: KEM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	—	6	2-4		Anhedral	
Plagioclase	64	64	1-10		Anhedral	
Clinopyroxene	29	30	1-6		Anhedral	Grains mostly equant, not ophitic or subophitic.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	1	Ol				
Amphibole	4	Ol				Colorless.
Amphibole	Tr	Cpx				Brown. Patchy replacement in cpx and interstitial between plag crystals.
Amphibole	2	Ol, cpx				Green. Rims altered ol and in fractures. Also replacing cpx on grain boundaries.

THIN SECTION DESCRIPTION

118-735B-32R-3 (Piece 1E, 54-60 cm)

ROCK NAME: Olivine-bearing gabbro

WHERE SAMPLED:

TEXTURE: Mesocumulate

GRAIN SIZE: Coarse

OBSERVER: STA

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	12	20	4-30			Recrystallized; tremolite pseudomorphs after ol.
Plagioclase	40	50	1-5			Bent, recrystallized, crushed.
Clinopyroxene	20	30	2-8			Recrystallized to hbd.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	1	Ol				Brown. In fractures cutting plag.
Chlorite	Tr	Plag				Pale. Replacing plag.
Albite	10	Plag				Veins in plag. In felsic veins (see below).
Epidote	Tr	Plag				Zoisite. In crushed zones.
Actinolite	5	Cpx, plag				Green to pale brown, in fine aggregates.
Hornblende	5	Cpx, plag, ol				Bright green in fractures in plag and recrystallized cpx. Brown, occurring with albite in veins; replacing ol + plag, cpx + plag.
Talc	1	Ol				Occurs with magnetite.
Tremolite	5	Ol				Bladed aggregates; fibrous bundles. Some could be prehnite.
Magnetite	1	Ol				In ol pseudomorphs.

COMMENTS: Shear zones contain albitized fragments of plag, and small fibers of actinolite.

THIN SECTION DESCRIPTION

118-735B-32R-4 (Piece 1E, 43-49 cm)

ROCK NAME: Gabbro

WHERE SAMPLED:

TEXTURE: Subhedral granular

GRAIN SIZE: Coarse

OBSERVER: STA

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	5	10				Pseudomorphs of talc, tremolite and carbonate.
Plagioclase	35	45				Cut by numerous veins.
Clinopyroxene	30	45				Replaced by hbd and actinolite.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	1	Ol				
Carbonate	1	Ol				
Chlorite	2	Plag				
Albite	8	Plag				Fractures in plag, also in sheared vein.
Actinolite	10	Cpx				Fibrous.
Hornblende	5	Cpx				Green, veins in plag, margins of cpx (brown symplectite with cpx).
Talc	1	Ol				With magnetite.
Mica	Tr	Plag, ol				Higher relief than talc.
Tremolite	2	Ol				Replacing ol.

COMMENTS: Vein cutting gabbro is green hbd. Where it is sheared, it is mixed with sodic plag.

THIN SECTION DESCRIPTION

118-735B-33R-2 (Piece 6, 60-62 cm)

ROCK NAME: Metagabbro (amphibolitized)

WHERE SAMPLED:

TEXTURE: Brecciated

GRAIN SIZE: Coarse

OBSERVER: STA

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	56	60				Concentrically zoned.
Clinopyroxene	5	38				
Ilmenite	1	2				
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Albite	1	Plag				Rims of plag and along small fractures.
Epidote	3	Plag				Anomalous blue interference color, small grains.
Actinolite	8	Cpx				Acicular, replaces cpx in aggregate patches.
Sphene	1	Ilmenite				Pinkish.
Hornblende	25	Cpx				Green-yellow or green-blue pleochroism.

COMMENTS: Cpx is replaced by green amphibole and recrystallized along S-shaped microshears. Displacement of relict cpx cleavages suggests that cpx was deformed prior to (or synchronous with?) replacement by amphibole. Neoblasts of cpx in shear are not replaced by amphibole. The plag is broken and veined but not very crushed. Brecciated appearance is due to albite veining and replacement by epidote.

THIN SECTION DESCRIPTION

118-735B-33R-3 (Piece 7, 85-89 cm)

ROCK NAME: Gabbro

WHERE SAMPLED:

TEXTURE: Poikilitic

GRAIN SIZE: Coarse

OBSERVER: MEY

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	0.7	2.2	2.0-4.0		Subhedral	Minor kink banding in ol.
Plagioclase	67.0	68.4	2.0-12.		Subhedral-euhedral	Large grains aligned, minor recrystallization of plag.
Clinopyroxene	24.9	29.3	2.0-10.0		Oikocrystic	Oikocrysts enclosing plag.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Chlorite	1.4	Plag				Commonly occurs around ol pseudomorphs where it replaces plag. Intergrown with tremolite.
Actinolite/Tremolite	1.4	Ol				Both brown and green varieties occur as rims around cpx and in veins and patches. Occurs in association with tremolite around ol relicts and as ol pseudomorphs.
Hornblende	4.5	Cpx				
Magnetite	0.1	Ol				

COMMENTS: Dislocation in plag along fractures causes offsets of twin lamellae. Large plag grains give sample layered appearance with plag layers separating regions with abundant cpx oikocrysts. Percentages based on 200 points. Plag composition determined by Michel-Levy method.

THIN SECTION DESCRIPTION

118-735B-33R-4 (Piece 2B, 27-29 cm)

ROCK NAME: Foliated metagabbro

WHERE SAMPLED:

TEXTURE:

GRAIN SIZE: 0.1-1.0cm

OBSERVER: NAT

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	0	5				Granulated plag. Neoblasts approximately 10%. Cpx partially transformed to brown/green amphiboles; twisted cleavage.
Plagioclase	60	60				
Clinopyroxene	25	35				
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS			COMMENTS
Magnetite	1					Associated with white-green amphibole (tremolite/actinolite).
Ilmenite	Tr					1% brown, 5% white, remainder green. White and green amphibole together replace ol.
Amphibole	14					

COMMENTS: Rock was formerly an ol gabbro, now it is moderately foliated and granulated but nowhere mylonitized.

THIN SECTION DESCRIPTION

118-735B-33R-4 (Piece 10, 129-131 cm)

ROCK NAME: Altered olivine microgabbro

WHERE SAMPLED:

TEXTURE: Altered cumulate

GRAIN SIZE: Fine

OBSERVER: CAN

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	—	15-20				Patches of talc, opaques and tremolite probably replacing ol.
Plagioclase	40	60-80	0.4			Partially altered to green actinolite.
Clinopyroxene	0	5-20				No relicts, may be replaced by patches of coarse-grained green amphibole.
Orthopyroxene	—	?				No relicts; some of the talc and tremolite may replace it.
Brown hornblende	Tr	Tr				Patches in green hbd. Late primary or early secondary.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Albite	3	Plag				Along cracks in the plag.
Talc/Tremolite/Opaques	17	Ol(?)				Occurs as patches with actinolitic rims. ¹
Actinolite	40	Plag, cpx, veins				

COMMENTS: Rock is not significantly deformed. There are however thin shears with deformed green amphibole and highly crushed plag. Thin section is cut from the end of a minicore.

THIN SECTION DESCRIPTION

118-735B-34R-1 (Piece 10, 103-105 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE: Poikilitic

GRAIN SIZE: Medium to coarse

OBSERVER: OZA

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	11.7	20.3	0.5		Anhedra-subhedral	Oikocryst encloses plag. Some are included in cpx; subhedral, altered to tremolite and opaques.
Plagioclase	47.6	49.3	1.0-8.0		Euhedral-subhedral	Chadacryst in cpx, rarely in ol, veined by amphibole.
Clinopyroxene	25.7	30.0	10.0-20.0		Anhedra	Oikocrysts encloses plag. In this section only two grains are recognized.
Spinel/Fe-Ti oxide	Tr	Tr	0.1-0.3		Euhedral-subhedral	Inclusion in ol, cpx near their rims. Inclusion in plag.
Hornblende	0.1	0.2	0.1-0.2		Anhedra	Pale brown, rimming ol and cpx. Also replacing cpx and accompanying Fe-Ti oxide.
Orthopyroxene	0.2	0.2	0.1-0.2		Anhedra	Exsolution lamellae in cpx.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	1.6	Ol				Yellowish green, filling irregular cracks in ol, no pleochroism.
Carbonate	0.1	Ol				Replacing ol.
Chlorite	0.3	Plag				
Actinolite	2.8	Tremolite, cpx, hbd, vein				Replacing cpx and brown hbd. Occurs at the outer margin of tremolite corona replacing ol, veins in plag and cpx.
Tremolite	3.8	Ol				Rimming ol with Fe-Ti oxide.
Mica	5.1	Ol				Reaction corona between tremolite after ol and plag. Some replaces ol as large single grain 1.0 mm across.
Magnetite	1.0	Ol				Accompanied by tremolite replacing ol, in reaction zones.

COMMENTS: No evidence of deformation except for kink bands in ol. Plag is not affected by deformation; no recrystallization, no wavy extinction. Cpx is a large (2cm) cpx oikocryst. Oikocryst ol contains many minute opaque inclusions. One half of the thin section is ol-rich; the other half is cpx-rich. Percentages based on 1500 point counts.

THIN SECTION DESCRIPTION

118-735B-34R-2 (Piece 1C, 18-22 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED: Below the portion of the core showing grain size variation.

TEXTURE: Allotriomorphic granular

GRAIN SIZE: Medium

OBSERVER: OZA

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	10	14	0.5-5.0		Anhedral	Replaced by tremolite + opaques. These pseudomorphs are further rimmed by chlorite and mica.
Plagioclase	61.7	64	0.5-8.0		Subhedral-anhedral	Veined by actinolite.
Clinopyroxene	21.4	22	1-8		Anhedral	Mostly oikocrystic. Replaced by amphibole.
Opaque	Tr	Tr	0.03-0.30	Sulfide	Subhedral-anhedral	Inclusion in cpx, plag. Rimming cpx and ol. Commonly accompanied by brown hbd.
Hornblende	Tr	Tr	0.1-0.2		Anhedral	Pale brown, rimming cpx, ol, opaques, replacing cpx.
Orthopyroxene	Tr	Tr	≈ 0.2		Anhedral	Inclusions or exsolution lamellae in cpx.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	0.5	Ol				Greenish brown, filling cracks in ol.
Chlorite	0.9	Ol				Reaction corona between tremolite after ol and plag.
Actinolite	0.5	Cpx, plag, hbd				Veins in plag, and replacing cpx and hbd.
Tremolite	2.4	Ol				
Mica(?)	2.3	Ol, plag				Rims around tremolite + opaques aggregate. Replacing ol rim. Reaction corona between plag and altered ol.

COMMENTS: Ol has many kink bands, but plag in almost undeformed.

No preferred orientation.

Percentages based on 2000 point counts.

THIN SECTION DESCRIPTION

118-735B-34R-4 (Piece 2, 8-12 cm)

ROCK NAME: Ilmenite gabbro

WHERE SAMPLED:

TEXTURE: Mesocumulus

GRAIN SIZE: Very coarse

OBSERVER: MEY

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	0.7	2.5	1.0-2.0		Anhedral	Relicts and pseudomorphs occur as thin films around Fe-Ti oxides. Partially encloses cpx.
Plagioclase	42.3	42.4	10.0-17.0	An 38	Subhedral	Partially recrystallized.
Clinopyroxene	32.2	32.9	5.0-15.0		Subhedral-anhedral	Intergrowths between large grains of cpx, occasionally with plag.
Fe-Ti oxide	20.8	20.8	3.0-15.0		Anhedral	Sometimes encloses ol which encloses cpx.
Orthopyroxene	1.2	1.2	3.0		Anhedral	May have been pigeonite, enclosed in Cpx; may also represent exsolution from subcalcic augite.
Hornblende	0.2	0.2	0.5		Anhedral	Brown, occurs as blebs in cpx, often associated with Fe-Ti oxides. Also occurs in interstices between grains, most noticeably between large plag grains.
Sulphide	Tr	Tr			Anhedral	Interstitial between cpx grains.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	1.6	Ol				Deep brownish yellow clay veining and replacing ol.
Chlorite	0.1	Plag				Pale green, pleochroic, anomalous blue interference color. Occurs interstitially between cpx and plag.
Actinolite/Tremolite		Ol, plag				Occurs along grain boundaries and in veins through plag.
Hornblende	0.6	Cpx				Green and brown varieties most commonly found along margins of cpx but also as patches in plag.

COMMENTS: Pyroxenes and ol exhibit reaction relationships: Ca-poor pyroxene + liquid to ol + Ca-rich pyroxene.

Plag composition determined by Michel-Levy method.

THIN SECTION DESCRIPTION

118-735B-34R-4 (Piece 4, 30-32 cm)

ROCK NAME: Porphyroclastic gabbro

WHERE SAMPLED:

TEXTURE: Porphyroclastic

GRAIN SIZE: Variable

OBSERVER: HEB

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	30	75	5.0-7.0		Anhedral	Porphyroclasts with subgrain boundaries, granoblasts and neoblasts. Open microfractures filled with green amphibole.
Clinopyroxene	5	25	<5.0		Anhedral	Almost completely replaced by green, brown and blue-green amphiboles.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Chlorite	<1	Green amphibole				Blue interference colors.
Hornblende	20					Green pseudomorphs after cpx, recrystallized into small granoblasts in a mylonitic band.
Plagioclase	36	Plag				Granoblasts and neoblasts, less than 0.5 mm, partly chloritized.
Blue-green amphibole	5	Green amphibole				Replacing amphibole pseudomorphs, particularly in deformed area.
Brown amphibole	3	Green amphibole				In association with green amphibole in recrystallized areas lined by blue-green amphibole.
Ilmenite	1					Anhedral grain at plag and cpx boundaries locally altering to sphene.

COMMENTS: Dynamic metamorphism of medium grade, post-dating formation of brown amphibole and synformation of blue-green amphibole.

THIN SECTION DESCRIPTION

118-735B-35R-1 (Piece 2C, 29-31 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE: Subhedral granular

GRAIN SIZE: Coarse

OBSERVER: BLM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	5.7	11.9	0.5-5.0		Anhedral	Rounded in plag to very irregular between plag and cpx.
Plagioclase	56.0	56.0	0.5-6.0		Euhedral to anhedral	
Clinopyroxene	21.8	32.1	1.0-6.0		Anhedral	Oikocrysts around plag, rarely around ol.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Chlorite	0.8					In cpx replacements.
Actinolite	9.2	Cpx				Approximately 2% in veins, 1% in aggregates not identifiable as cpx or ol pseudomorphs.
Hornblende	<0.1	Cpx				Rare brown amphibole in cpx.
Spinel	0.1	Ol				Small grains in ol pseudomorphs.
Talc/Tremolite	6.2	Ol				Mixed granular/fibrous aggregates.

COMMENTS: Very fresh; plag are all quite undulose, some with thin spindle-shaped twins indicating slight deformation.

THIN SECTION DESCRIPTION

118-735B-35R-1 (Piece 2E, 45-47 cm)

ROCK NAME: Olivine gabbro with pyroxenite layer

WHERE SAMPLED: Contact between olivine gabbro and pyroxenite layer

TEXTURE: Anhedral to equigranular

GRAIN SIZE: Medium to coarse

OBSERVER: OZA

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	5	17	0.5-3.0		Euhedral-subhedral	Unaltered grains have many kink bands. Alteration into tremolite and opaque, talc, actinolite and chlorite, brown clay.
Plagioclase	50	55	0.5-4.0		Subhedral-anhedral	Wavy extinction common, veined bt albite, amphibole and chlorite.
Clinopyroxene	22	26	1.0-5.0		Anhedral	Partly rimmed by brown amphibole, the margin is slightly replaced by amphibole.
Fe-Ti oxide	1	1	0.1-0.5		Subhedral	As inclusion in cpx, at the rim of cpx accompanied by brown hbd.
Brown hornblende	1	1	0.3-0.6		Anhedral	Rimming cpx, replaced by greenish hbd and actinolite.

SECONDARY MINERALOGY	PERCENT	REPLACING/FILLING	COMMENTS
Clays	3	Ol	Replacing ol at the latest stage of alteration. Brown to greenish-brown.
Chlorite	4	Ol, vein	Replacing ol and occurs as vein in plag.
Albite	2	Plag	As vein in plag.
Actinolite	4	Cpx, hbd	Replacing cpx and brown hbd.
Green hornblende	3	Cpx, vein	Veining plag, rimming cpx.
Tremolite	3	Ol	Replacing core of ol.
Talc	3	Ol	Replacing margin of ol.
Fe-Ti oxide	1	Ol	Accompanying tremolite and replaces ol.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
PYROXENITE LAYER						
Clinopyroxene	52	56	2.0-10.0		Anhedral	Opx and pigeonite exsolution bleb, partly replaced by brown hbd. Also replaced by actinolite.
Inverted pigeonite	25	35	6.0-12.0		Anhedral	Opx host is partially replaced by tremolite, but exsolved cpx is well preserved.
Olivine	0	2	1.0-2.0		Euhedral	Inclusion in cpx, altered into greenish to yellowish-brown clay.
Orthopyroxene	1	1	0.5-1.0		Anhedral	Primary? Rimming ol in cpx.
Plagioclase	5	5	0.4-5.0		Anhedral	Filling interstitial space.
Fe-Ti oxide	2	3	0.2-2.0		Anhedral-euhedral	Small grains as inclusion in pyroxene. Cracked and filled by carbonate.

SECONDARY MINERALOGY	PERCENT	REPLACING/FILLING	COMMENTS
Clays	1	Ol	Replacing ol at the latest stage of alteration. Brownish to greenish-brown.
Carbonate	1	Fe-Ti oxide vein	Filling cracks in opaque.
Actinolite	5	Cpx, hbd	Replacing cpx and brown hbd.
Tremolite	10	Ol	Replacing core of ol.

COMMENTS: Ol is commonly rimmed by cpx in gabbro.

THIN SECTION DESCRIPTION

118-735B-35R-2 (Piece 4G, 105-108 cm)

ROCK NAME: Gabbro

WHERE SAMPLED:

TEXTURE: Mesocumulate to granular

GRAIN SIZE: Coarse to medium

OBSERVER: BLM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	53	70	1.0-4.0		Subhedral—anhedral	Undulose, partly deformed.
Clinopyroxene	10	30	≤ 2.0		Anhedral	Large oikocrysts in some cases, now largely amphibolitized.
Orthopyroxene	1	2	2.0-3.0		Euhedral	Altered, deformation twins; identification uncertain.
Oxides	Tr					Ilmenite/magnetite, intercumulus(?)
SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING				COMMENTS
Clays	2	Plag				On fractures through plag.
Epidote	2	Plag?				High relief, moderate birefringence near deformed zones, 0.1-0.2 mm grains.
Actinolite	20	Cpx				Pale green masses and crystal aggregates after cpx, also in veins.
Hornblende	1	Cpx				Brown amph in altered cpx patches.
Plagioclase	10	Plag				Neoblasts on grain margins.
Magnetite	1	Cpx				Anhedral, associated with actinolitic patches; magnetite reaction zone.
Sulphide	Tr					Pyrite, possibly primary.
Phlogopite	Tr	Plag				On margins with opx.

COMMENTS: Sample is cut by 1cm wide deformation zone with large rounded porphyroclasts surrounded by fine, granulated plag (description is for sample outside deformation zone), 0.5-1.5 mm subrounded clots of greenish-brown mineral. Fine-grained aggregates, clay-like, appear milky green-white in thin section. By eye, deformation is localized but has effected entire rock to some degree. Minerals in deformed zone include sodic plag, quartz, actinolite, and diopside.

THIN SECTION DESCRIPTION

118-735B-35R-4 (Piece 2A, 43-46 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE: Subhedral granular

GRAIN SIZE: Coarse

OBSERVER: BLM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	8.6	16	0.5-4.0		Anhedral	Granular aggregates, measuring up to 6 mm.
Plagioclase	49.0	50	0.2-6.0		Euhedral—anhedral	Undulose extinction. Some granulation, recrystallization.
Clinopyroxene	24.8	34	2-8		Anhedral	Ophitic to poikilitic.
Opaque	Tr	Tr				Probably a sulphide.
SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING				COMMENTS
Clays	0.1	Plag				Filling cracks in plag.
Chlorite	0.5	Ol, cpx				Occurs with actinolite + tremolite on the outside rim of pseudomorphs.
Albite	0.4	Plag				Occurs along a fracture on one side of the slide.
Epidote	Tr	Plag				Occurs along a fracture on one side of the slide.
Actinolite	9.0	Cpx, veins				7% replacing cpx, 2% in veins.
Talc/tremolite	6.7	Ol				
Opauques	0.7	Ol				In pseudomorphs.

THIN SECTION DESCRIPTION

118-735B-35R-5 (Piece 5E, 131-135 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE: Anhedra granular

GRAIN SIZE: Medium

OBSERVER: BLM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	8	10	0.5-2.0		Anhedra	Irregular. Partially altered to opaques, talc. Slightly undulose extinction. Partially enclosing some plag crystals, and rare ol crystals.
Plagioclase	50	54	0.5-4.0		Anhedra	
Clinopyroxene	30	36	1-4		Anhedra	
SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING				COMMENTS
Clays	3	Plag				Dusty brown crystals along fractures in plag and cleavage planes in cpx. Actinolitic hornblende, green to pale green. After ol. Also 0.05 mm anhedra grains in groundmass.
Actinolite	7	Cpx, vein				
Talc	2	Ol				
Opaques	Tr	Ol				

COMMENTS: Relatively fresh ol gabbro with minor oxides.

THIN SECTION DESCRIPTION

118-735B-35R-7 (Piece 2, 14-17 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE:

GRAIN SIZE: Coarse

OBSERVER: CAN/STA

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	5	13	10-20		Anhedra	Not very well marked meta-grain boundaries. Locally crushed and recrystallized. Occasional kinked crystals. Small crystals along the edges of ol. Brown. Primary or early secondary phase. Primary or early secondary phase.
Plagioclase	75	85			Anhedra	
Clinopyroxene	2	2	10		Subhedra	
Orthopyroxene	<1	<1	1		Subhedra	
Hornblende	<1	<1				
Opaque	<<1	<<1				
SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING				COMMENTS
Clays	4	Ol				Center of ol is altered to clay + disseminated opaques. Occurs in rims of plag along ol replacement zones.
Chlorite	1	Plag				
Plagioclase	<10	Plag				Recrystallized grains in crushed zones.
Actinolite	1	Ol, cpx, plag				Green. Also filling cross-cutting veinlets. Occurs with actinolite in ol rims. Occurs with actinolite in ol rims. Occurs with actinolite in ol rims, phlogopite. Disseminated opaque occurring with clay.
Hornblende	Tr	Cpx, hbd				
Tremolite	<1	Ol				
Talc	<1	Ol				
Mica	<1	Ol				
Opaques	2	Ol				

COMMENTS: In the ol replacement zones, two phyllosilicates are locally present (excluding talc). One is brown, very pleochroic, phlogopite. The other is colorless, high relief and low birefringence, possibly clintonite. The crushing and recrystallization of plag appears to predate the hydrous replacement described. Very green hbd in veins shows sector zoning, characteristic of growing into a void. Ol is extensively oxidized.

THIN SECTION DESCRIPTION

118-735B-36R-1 (Piece 3, 17-20 cm)

ROCK NAME: Altered olivine gabbro

WHERE SAMPLED:

TEXTURE: Granular

GRAIN SIZE: Fine to very coarse

OBSERVER: BLM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	15	21	0.1-3.0		Anhedral	Fragments of original grains which measured up to 1.5 cm.
Plagioclase	25	30	0.1-12		Anhedral	Broken grains with sutured boundaries.
Clinopyroxene	8	49	0.1-4.0		Anhedral	Shreds of original cpx in some pseudomorphs.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	5	Ol, cpx				In dark, hematite-stained clots at cores of some ol pseudomorphs.
Clays	Tr	Voids				Green. Filling void spaces.
Fe-Mg amphibole	16	Cpx, ol				Pale green to colorless aggregates after cpx, ol. Also in some veins or fractures (probably anthophyllite).
Plagioclase	5	Plag				0.1-0.2 mm neoblasts or granules with sutured boundaries.
Oxides	4	Ol				Granular aggregates around ol pseudomorphs.
Hematite(?)	1	Ol				
Amphibole	18	Cpx				Brown to green, well crystallized crystals. Some in veins.
Talc	1	Ol				Colorless, occurring with magnetite.
Diopside	2	Cpx				Pale inclusions in hbd.

COMMENTS: Extensive deformation. Plag neoblasts, undulose-deformation twins in plag. No well developed foliation.

THIN SECTION DESCRIPTION

118-735B-36R-2 (Piece 1A, 11-13 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE:

GRAIN SIZE: Coarse

OBSERVER: CAN

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	4	7	10		Anhedral	Altered to talc, oxides and tremolite. Faint deformation kinks.
Plagioclase	78	84	>20		Anhedral	Some albitization. Also some alteration to actinolite.
Clinopyroxene	6	9	10		Anhedral	Partially altered to brownish green amphibole.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Albite	3	Plag				Zones in the big plag porphyroclast.
Tremolite/ actinolite	3	Plag, ol				Around ol and in sealed fractures in plag.
Hornblende	3	Cpx				In and around cpx crystals.
Talc	3	Ol				Replacing ol.

COMMENTS: Note: oriented thin section from the end of a minicore. Due to large grain size and to the small thin section size, the modal proportion given here are far from representative.

THIN SECTION DESCRIPTION

118-735B-36R-2 (Piece 1E, 98-102 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE:

GRAIN SIZE: Medium

OBSERVER: CAN

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	9	14	0.4-6.0		Anhedral	Replacement aureole of talc + tremolite. Microfractures sealed with albite.
Plagioclase	66	75	0.4-10.0		Anhedral-subhedral	
Clinopyroxene	8	10	0.5-10.0			Oikocrysts. Slight replacement by green-brown amphibole. Kinked, veined crystals.
Amphibole	≈ 1	≈ 1	50.4		Euhedral-anhedral	Forms thin aureole around cpx, ol, and opaques. Interstitial. Surrounded by brown amphibole.
Opaques	< 1	< 1	50.4			
SECONDARY MINERALOGY	PERCENT	REPLACING/FILLING				COMMENTS
Albite	9	Plag				Occurs in microfractures, linked with veining of sample.
Tremolite	≈ 2	Ol				Associated with talc in replacement aureole.
Hornblende	2	Cpx, veins				Green to greenish brown. Replaced the edges of cpx, and fills thin veins which dip 90° into the plane of the thin section.
Talc	3	Ol				Associated with tremolite.

COMMENTS: The ol and plag have kink bands and deformation sub-grain boundaries, but show no preferred fabric. This slight deformation is prior to the injection of the amphibole veins and the hydration of the sample. This hydration event was accompanied with very slight cataclastic shearing of the sample.

THIN SECTION DESCRIPTION

118-735B-36R-3 (Piece 1B, 28-34 cm)

ROCK NAME: Olivine gabbro gabbro

WHERE SAMPLED:

TEXTURE: Allotriomorphic granular

GRAIN SIZE: Medium to very coarse

OBSERVER: KEM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
COARSE-GRAINED LAYER						
Plagioclase	52	52	1-2		Subhedral	Subophitic to ophitic. Contains inclusions of ilmenite or magnetite.
Clinopyroxene	41	48	0.5-1.5		Anhedral	
SECONDARY MINERALOGY	PERCENT	REPLACING/FILLING				COMMENTS
COARSE-GRAINED LAYER						
Amphibole	2	Cpx			Brown. Patchy.	
Amphibole	5	Cpx			Green.	
PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	
MEDIUM-GRAINED LAYER						
Olivine	1	5	1.0-1.5		Anhedral	
Plagioclase	59	59	1-3		Anhedral	
Clinopyroxene	25	36	1.0-2.5		Anhedral	
SECONDARY MINERALOGY	PERCENT	REPLACING/FILLING				COMMENTS
MEDIUM-GRAINED LAYER						
Clays	< 1	Ol				
Magnetite	3	Ol				
Amphibole	3	Cpx			Brown. Patchy.	
Amphibole	8	Cpx			Green.	
Amphibole	< 1	Ol			Colorless.	

COMMENTS: This slide contains evidence for primary layering in grain size and modal proportions. The medium-grained layers are less cpx-rich and more ol-rich than the coarse-grained layers. Some recrystallization of plag into neoblasts in medium-grained layers. Some recrystallization of plag into neoblasts in medium-grained layers.

THIN SECTION DESCRIPTION

118-735B-36R-3 (Piece 1C, 36-38 cm)

ROCK NAME: Olivine microgabbro

WHERE SAMPLED:

TEXTURE:

GRAIN SIZE: Fine

OBSERVER: CAN

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	4	<7	0.1-0.8		Anhedral	Altered to tremolite + talc + opaques. Slightly kinked.
Plagioclase	60	65	0.4-4.0		Anhedral	Slightly crushed, recrystallized and albitized.
Clinopyroxene	20	25	0.1-2.0		Anhedral	Altered into green amphibole near veins.
Orthopyroxene(?)	Tr	Tr				
Amphibole	—	3	0.2			Brown interstitial crystals. Associated with cpx. Uncertain if primary or secondary.
Opaques	>1	>1				Uncertain if primary or secondary. Associated with cpx and brown hornblende.
SECONDARY MINERALOGY	PERCENT	REPLACING/FILLING				COMMENTS
Albite	5(?)	Plag				Bands along the green amphibole veins.
Tremolite	<1	Ol				Replacement aureole.
Hornblende	8	Cpx, amphibole				Possibly actinolitic amphibole. Also in network of veins, dipping 90° into the plane of the thin section.
Talc	1	Ol				
Opaques	1	Ol				

COMMENTS: A slight plastic deformation enhances the mineral shape fabric (magmatic lamination), parallel to the grain size layering observed in the sample. The deformation is expressed by small shears underlined by crushed and recrystallized plag, and by the distribution of opaques in the ol-cpx zones.

A monomineralic, 3 mm wide plag band cuts across the middle of the thin section, parallel to shears and layering in the sample.

THIN SECTION DESCRIPTION

118-735B-37R-1 (Piece 2A, 11-15 cm)

ROCK NAME: Olivine-bearing gabbro

WHERE SAMPLED:

TEXTURE: Granular

GRAIN SIZE: Fine to medium

OBSERVER: BLM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	0.9	2	0.2-1.5		Anhedral	Occurs on one side of the slide only.
Plagioclase	44.0	71	0.02-0.20		Anhedral	Undulose extinction. Elongate grains.
Clinopyroxene	23.4	27	0.2-1.5		Anhedral	Some granulation and recrystallization. A few crystals partially enclose plag crystals.
SECONDARY MINERALOGY	PERCENT	REPLACING/FILLING				COMMENTS
Clays	0.1	Ol, cpx				Small dark brown/green crystals filling oval clots.
Chlorite	0.8	Cpx				Patches in cpx replacement.
Actinolite	18.2	Veins, plag				5% occurring in veins which cut plag and grain boundaries.
Hornblende	1.7	Cpx				Brown amphibole. Patches in cpx and rimming oxides.
Plagioclase	10.0	Plag				0.4 mm and smaller neoblasts.
Oxides	0.7	Cpx, ol				0.2 mm primarily around cpx. 0.5 mm crystals in ol pseudomorphs.
Tremolite(?)	0.2	Ol				

COMMENTS: Some deformation: bent undulose plag with some granulation and recrystallization. Cpx is also partially recrystallized, and larger grains have bent twins. The deformation is somewhat localized, as is subsequent amphibolitization. Amphibolitization is concentrated along late fractures. There is a weak lamination of cpx + plag which is possibly partially igneous.

THIN SECTION DESCRIPTION

118-735B-37R-2 (Piece 1H, 113-117 cm)

ROCK NAME: Metagabbro (hydrothermally altered)

WHERE SAMPLED:

TEXTURE: Cataclastic, partially recrystallized

GRAIN SIZE: Coarse

OBSERVER: STA

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	—	2				
Plagioclase	43	63	3-8			Discrete recrystallized bands. Highly fractured.
Clinopyroxene	6	30				Flattened in one part of the slide.
Apatite	<1	<1	5			One grain, W:L = 2:5.
Ilmenite	2	5				Replaced by sphene.
SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING				COMMENTS
Carbonate	Tr	Plag				
Chlorite	2	Plag				Coronas with tremolite/actinolite and blue hornblende.
Albite	5	Plag				Along microfractures in plag.
Epidote	10	Plag				Very blue birefringence. Some euhedral crystals. Also in fractures.
Actinolite	3	Cpx, Plag				Corona with chlorite.
Sphene	3	Ilmenite				Pale yellow, euhedral crystals.
Hornblende	19	Cpx				Green to blue-green pleochroic, prismatic crystals associated with epidote at margins of cpx pseudomorphs.
Plagioclase	3	Plag				Neoblasts.
Talc	1	Ol				Occurs with magnetite in pseudomorphs.
Magnetite	<1	Ol				Occurs in pseudomorphs with talc.
Anthophyllite	2	Ol				Pseudomorphs with talc.
Analcite	Tr	Plag				Intergrown with sphene.

COMMENTS: Fractures in plag are filled with a yellowish mineral in fine-grained aggregates. Associated with epidote. Probably it is an amphibole. Some ere cracks also have the bright green hornblende. Plag-hornblende symplectite. Could have two epidotes. Window-pane texture of chlorite and magnetite rods. epidotes.

THIN SECTION DESCRIPTION

118-735B-37R-3 (Piece 4, 80-82 cm)

ROCK NAME: Gabbro

WHERE SAMPLED: At level of fine-grained microgabbro

TEXTURE: Allotriomorphic granular

GRAIN SIZE: Medium to coarse

OBSERVER: OZA

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	—	2(?)	1-2		Euhedral-anhedral	Replaced by dirty brownish clay + opaque. Euhedral inclusions in cpx.
Plagioclase	57	59	0.3-4.0		Anhedral	Partially granulated, wavy extinction apparent. Veined by chlorite and amphibole.
Clinopyroxene	20	25	0.5-8.0		Anhedral	(100) exsolution lamellae abundant. Rare (001) exsolution lamellae.
Oxide	4	4	0.1-1.5	Fe-Ti	Anhedral	Interstitial to opx. Also as inclusions in cpx.
Orthopyroxene	5	6	1-4	Pigeonite	Anhedral	Inverted pigeonite. Opx host is commonly altered into tremolite/actinolite + Fe-Ti oxide. (001) lamellae are 0.02 mm thick, irregular blebs.
Orthopyroxene	1	2	0.5-1.0		Anhedral	In cpx as exsolution bleb(?) or primary crystals. Also occurring in an isolated grain.
Hornblende	1	2	0.1-0.2		Anhedral	Brown. Altered into green amphibole (actinolite). Occuring at the rims of or as inclusions in cpx + Fe-Ti oxides.
SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING				COMMENTS
Clays	2	Ol(?)				Brown to green. Replacing ol with Fe-Ti oxide.
Chlorite	2	Plag				Veins in plag and along grain boundaries of plag.
Actinolite	3	Cpx, vein, hornblende				Replacing cpx and brown hornblende from their margins. Also occurring in vein in plag.
Tremolite	4	Opx, cpx				Replacing opx (pigeonite host), accompanied by Fe-Ti oxide, tremolite. Aggregate is further veined by actinolite.
Oxides	1	Ol, opx, cpx				Fe-Ti oxides. Anhedral grains of various size.

COMMENTS: Cpx shape and mode of arrangement shows weak foliation.

THIN SECTION DESCRIPTION

118-735B-37R-3 (Piece 6, 95-101 cm)

ROCK NAME: Ilmenite olivine microgabbro

WHERE SAMPLED: Contacts between ilmenite olivine microgabbro, ilmenite gabbro, and undeformed olivine gabbro (see following two descriptions)

TEXTURE: Allotriomorphic granular

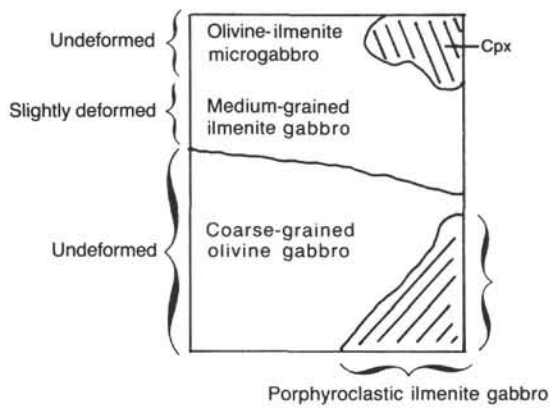
GRAIN SIZE: Medium

OBSERVER: KEM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY
Olivine	11	17	0.1-0.5		Anhedral
Plagioclase	59	59	0.2-1.0		Anhedral
Clinopyroxene	16	22	0.2-0.6		Anhedral
Oxides	-	2		Fe-Ti	

SECONDARY MINERALOGY	PERCENT	REPLACING/FILLING	COMMENTS
Clays	Tr	OI	
Amphibole	2	Oxides	Brown. Surrounds primary Fe-Ti oxides.
Amphibole	6	Amphibole, cpx, veins	Green. Replaces brown amphibole and some cpx. Also occurs along fractures.
Magnetite	4	OI	
Talc-tremolite	2	OI	
Fe oxyhydroxides	Tr	OI	

COMMENTS: This is a structurally complex sample including portions of microgabbro, ol gabbro, and porphyroclastic gabbro (see sketch). Upper right corner of microgabbro contains a single large cpx grain, = 13 mm long. The microgabbro is undeformed.



THIN SECTION DESCRIPTION

118-735B-37R-3 (Piece 6, 95-101 cm)

ROCK NAME: Porphyroclastic ilmenite gabbro

WHERE SAMPLED: See previous and following forms

TEXTURE: Porphyroclastic

GRAIN SIZE: Medium

OBSERVER: KEM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	Tr	2-3	1		Anhedral	
Plagioclase	25	45	1-3		Anhedral	
Clinopyroxene	34	42	1-3		Anhedral	Locally has a rounded shape, else where more stretched and elongated. The round shape occurs where there is more ilmenite.
Opaques	10	10				

SECONDARY MINERALOGY	PERCENT	REPLACING/FILLING	COMMENTS
Clays	<1	OI	
Plagioclase	20	Plag	Neoblasts.
Amphibole	3	Cpx	Brown. Patchy replacement of cpx and in pressure shadows of porphyroclasts.
Amphibole	3	Cpx	Green.
Magnetite	<1	OI	Includes some Fe-oxyhydroxides and hematite.
Clinopyroxene	2	Cpx	Neoblasts.
Talc-tremolite	1	OI	

COMMENTS: A zone of deformed ilmenite gabbro (sub-horizontal layer) separates the microgabbro described in the previous form from the ol gabbro described in the following form. It also forms one subvertical boundary of the gabbro. In one portion of the subhorizontal layer between gabbro and microgabbro, the mineralogy is very cpx-rich, almost a clinopyroxenite.

THIN SECTION DESCRIPTION

118-735B-37R-3 (Piece 6, 95-101 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED: Contacts between ilmenite olivine microgabbro, ilmenite gabbro, and undeformed olivine gabbro (see previous two descriptions).

TEXTURE: Hypidiomorphic granular

GRAIN SIZE: Very coarse

OBSERVER: KEM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	15	20	1.0-6.0		Anhedral	
Plagioclase	59	60	3.0-14.0		Subhedral	
Clinopyroxene	14	20	2.0-12.0		Anhedral	Ophitically to subophitically enclosing plag.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	Tr	Ol				Along with some Fe-oxyhydroxides.
Actinolite/Tremolite	3	Ol				
Brown amphibole	2	Cpx				Patchy replacement and some concentration on grain boundaries; occurs surrounding primary ilmenite and rarely in veins.
Actinolite	6					Replaces brown amphibole, cpx and in thin veins cross-cutting plag.
Magnetite	1	Ol				

COMMENTS: Relatively undeformed. A few plag crystals are fractured where crosscut by an amphibole vein. Cumulus plag, cpx and ol.

THIN SECTION DESCRIPTION

118-735B-38R-2 (Piece 1B, 15-17 cm)

ROCK NAME: Metamorphosed microgabbro

WHERE SAMPLED:

TEXTURE:

GRAIN SIZE: Fine

OBSERVER: CAN

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	<1	<5	0.4		Anhedral	Replaced by opaques and tremolite.
Plagioclase	55	55	0.5-1.0		Euhedral-subhedral	
Clinopyroxene	10	35	0.5		Subhedral	Replaced by green amphibole (actinolite?).
Opaques	2	?	<0.4		Subhedral	Scattered, associated with brown amphibole.
Brown hornblende	Tr	?	<0.4		Anhedral	Rims around opaques.
Sulphides	<0.5				Rounded	Much primary ilmenite. Poikilitically encloses silicates, makes embayments into silicates. Rare primary magnetite associated with primary sulphides (pyrite, pyrrhotite, etc.).
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Carbonate	<1	Vein				The carbonate coated vein looks like an open crack, dips at 45° in the section and crosscuts all the green amphibole veins.
Actinolite/Tremolite	30	Cpx, ol, veins				Regular network dipping at 70° in the plane of the section and spaced by less than 1.0 mm.
Magnetite	Tr					In alteration reaction zones.
Pyrite						In alteration zones.

COMMENTS: No plastic deformation. The amphibolitization is static and related to the very regular network of fine, green amphibole veins; these are extensional veins.

Oriented thin section, cut from the end of a micore. Section is perpendicular to the fine amphibole veins.

THIN SECTION DESCRIPTION

118-735B-38R-2 (Piece 1B, 15-17 cm)

ROCK NAME: Olivine metamicrogabbro

WHERE SAMPLED: Fine-grained part in contact with coarser gabbro

TEXTURE: AnhedraI granular

GRAIN SIZE: Fine

OBSERVER: OZA

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	2	20	0.1-0.5		AnhedraI	Altered into tremolite, chlorite, Fe-Ti oxide and talc(?). Locally preserved.
Plagioclase	40	44	0.1-2.0		SubhedraI-euhedraI	Some show concentric zoning. Generally, zoning pattern vague.
Clinopyroxene	15	30	0.1-0.5		AnhedraI	Altered into pale green to bluish-green amphibole, commonly rimmed by brown hbd.
Spinel/Fe-Ti oxide	3	3	0.05-0.4		AnhedraI	Often rimmed by brown hbd.
Brown hornblende	2	3	0.1-0.4		AnhedraI	Rimming cpx or opaque mineral.
SECONDARY MINERALOGY	PERCENT	REPLACING/FILLING				COMMENTS
Carbonate	1	Plag				Replacing plagioclase.
Actinolite/Green hornblende	28	Vein				Filling cracks cutting magmatic foliation near vertically. Replacing cpx, brown amphibole and tremolite
Tremolite	5	Ol				Replacing core of ol, 0.1-0.2 mm long, gradationally changes into actinolite at the margin.
Mica	3	Ol				Rimming ol pseudomorph; rich in slightly altered part. Talc?
Fe-Ti oxide	1					Along cracks and margins of ol and cpx.

COMMENTS: Remarkable streaks seen in thin section are amphibole veins which extensively replace cpx into amphibole. The vein is nearly vertical to the magmatic foliation indicated by plag laths.

THIN SECTION DESCRIPTION

118-735B-38R-2 (Piece 4B, 78-84 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE: Layered mesocumulate

GRAIN SIZE: Coarse

OBSERVER: MEY

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	22.6		1.0-15.0		AnhedraI-subhedraI	Kink banding, some recrystallization.
Plagioclase	30.8		1.0-6.0		AnhedraI-subhedraI	Large plag grains recrystallized to smaller grains.
Clinopyroxene	37.2		1.0-15.0		AnhedraI, poikilitic	Poikilitically encloses both ol and plag. Recrystallization at grain boundaries, particularly between large cpx grains.
Opaque	0.2					Blebs in cpx and in interstitial areas and possibly primary opaques associated with ol.
Orthopyroxene	Tr		< 1.0			Rimming ol and occasionally cpx. A late stage magmatic product.
SECONDARY MINERALOGY	PERCENT	REPLACING/FILLING				COMMENTS
Chlorite	1.0	Plag				Rims around ol pseudomorphs that are enclosed in plag.
Actinolite/Tremolite	3.3	Ol				Rims around and pseudomorphs after ol.
Hornblende	2.3	Cpx				Rims around cpx.
Magnetite	1.0	Ol				Occurs with tremolite pseudomorphing ol.
Micaceous mineral	1.6	Plag				Looks like talc in thin section but clearly replaces plag. Occurs at outer rim in reaction coronas around ol relicts and pseudomorphs.

COMMENTS: Ol, plag and cpx are all partly recrystallized but the outlines of the primary grains are still evident. Layering is manifested by bands rich in ol and cpx separated by plag-rich band. Grains also exhibit subparallel alignment, parallel to layering. Layering dips at approximately 50° in vertically oriented thin section.

THIN SECTION DESCRIPTION

118-735B-39R-1 (Piece 1E, 60-68 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE: Allotriomorphic granular

GRAIN SIZE: Very coarse

OBSERVER: KEM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	10	17	2.0-11.0		Anhedral	
Plagioclase	61	65	5.0-20.0		Anhedral	Some granulation at grain boundaries.
Clinopyroxene	14	18	4.0-12.0		Anhedral	
Opaques		Tr				
Orthopyroxene		Tr				Exsolution lamellae and patches in cpx.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	1	OI				Occurs with Fe-oxyhydroxides and hematite after ol, often with an outer rim of talc/tremolite and magnetite.
Plagioclase	4	Plag				Neoblasts.
Brown amphibole	< 1	Cpx				Surrounds primary Fe-Ti oxides, patchy replacement in cpx.
Green amphibole	4	Cpx				Some blue-green; replaces along grain boundaries and in fractures across plag.
Talc/Tremolite	3	OI				
Magnetite	1	OI				
Fe-oxides	2	OI				Orange-brown Fe-oxyhydroxides and hematite.

THIN SECTION DESCRIPTION

118-735B-39R-1 (Piece 3, 145-147 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE: Granular

GRAIN SIZE: Fine to medium

OBSERVER: BLM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	11	15	0.1-2.0		Anhedral	Granular, elongate aggregates up to 6.0 mm.
Plagioclase	54	70	0.1-4.0		Anhedral	Undulose, sutured porphyroclasts.
Clinopyroxene	11	15	0.5-4.0		Anhedral	Enclosing euhedral plag in places, elongate, undulose.
Oxide	0.5		0.1		Anhedral	Associated with cpx.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	1	Plag				Thin dusting along fractures in plag.
Actinolite	3	Cpx				Replacing cpx.
Hornblende	1	Cpx				Brown amphibole, blebs in cpx, rimming primary oxide.
Plagioclase	15	Plag				Sutured neoblasts < 0.1mm.
Oxide	0.5					Exsolution? in cpx.
Clinopyroxene	2	Cpx				Neoblasts.
Talc	1					

COMMENTS: Weak foliation defined by elongation of cpx and plag (moderate deformation); may have been an original layering. Ol is concentrated at opposite ends of slide and cpx across the middle.

THIN SECTION DESCRIPTION

118-735B-39R-3 (Piece 1C, 21-23 cm)

ROCK NAME: Metamorphosed olivine gabbro

WHERE SAMPLED:

TEXTURE:

GRAIN SIZE: Fine

OBSERVER: CAN

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	—	0-5	2.0			No relicts, but could be replaced by some tremolite + opaque + calcite zones. Albitized and fractured, deformation twins. Occasional kink in relict, replaced by green amphibole linked to veins. One remnant in aureole of opaques and tremolite. Interstitial, close to cpx. Possibly secondary.
Plagioclase	60	60	2.0			
Clinopyroxene	8	30	2.0			
Orthopyroxene?	Tr	0-7	1.0			
Brown hornblende	Tr	Tr	0.1			
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	3	Cpx, ol, plag		Unstrained.		
Carbonate	< 1	Ol or cpx		Replacement of mafic mineral.		
Albite	5	Ca-plag		Fills sealed microfractures.		
Actinolite/Tremolite	3	Ol or cpx		Replacement of mafic mineral.		
Green hornblende	20	Cpx, veins		Crosscutting foliation with 75° dip in face of thin section.		
Opaques	1	Ol or opx		Magnetite replacing mafic minerals, hematite from oxidation of magnetite.		

COMMENTS: The amphibolitization is accompanied by fractures and crushing of the plag, ie. cataclastic deformation. It is not clear what amount of plastic deformation the sample underwent before this hydration event. The well-defined foliation could be partly a magmatic inheritance. Thin section is from the end of a minicore, and is oriented perpendicular to foliation.

THIN SECTION DESCRIPTION

118-735B-40R-2 (Piece 1H, 62-64 cm)

ROCK NAME: Metagabbro

WHERE SAMPLED:

TEXTURE: Cataclastic, poorly foliated

GRAIN SIZE: medium

OBSERVER: STA

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	—	(?)	(?)			Possibly opx. Tremolite-talc pseudomorphs. Porphyroclasts. Porphyroclasts. Interstitial. Jackets ilmenite.
Plagioclase	40	60	2-4			
Clinopyroxene	18	37	3-5			
Magnetite	1	2(?)				
Hornblende	1	1				
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Chlorite	1	Cpx(?)		Dark with blue interference colors. Late, interstitial.		
Albite	Tr	Plag		Along crack and grain margins.		
Epidote	1	Cpx		Blue interference colors. Late.		
Actinolite	6	Plag, cpx		Small needles in plag. Also green fringe on cpx; postdeformational.		
Hornblende	5	Cpx		Green-brown. Syndeformational.		
Plagioclase	20	Plag		Neoblasts. Syndeformational.		
Clinopyroxene	3	Cpx		Neoblasts. Syndeformational.		
Tremolite	3	Ol, opx		Colorless, bladed mineral mixed with talc + magnetite. Postdeformational.		
Ilmenite/magnetite	1	Ilmenite(?)		Patchy. Possibly primary. Sphene around some ilmenite.		

COMMENTS: Mineral elongation of cpx. Some trails of hbd + cpx neoblasts at sides of augen in developing foliation. Alteration of plag along grain | grain boundaries appears to be a fine-grained mixture of epidote(?) + fibrous amphibole. Plag is also cut by thin lines of albitized zones.

THIN SECTION DESCRIPTION

118-735B-40R-4 (Piece 1A, 1-5 cm)

ROCK NAME: Olivine microgabbro

WHERE SAMPLED:

TEXTURE: Foliated

GRAIN SIZE: Fine

OBSERVER: CAN

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	8	12	0.4-3.0		Anhedral	Altered to talc + tremolite + opaque. Kinked crystals.
Plagioclase	61	61	1-3		Anhedral	Fresh. Kinked crystals and good preferred orientation.
Clinopyroxene	18	21	0.4-3.0		Anhedral	Replaced by green amphibole near veins.
Orthopyroxene	3	3	0.4-1.0		Anhedral	Between the ol and cpx grains (reaction product?).
Hornblende	1	1	0.2			Brown. Interstitial around cpx.
Opagues	2	2	0.1-0.4		Euhedral-anhedral	Associated with hbd around cpx. Also replacing ol. Difficult to distinguish.

SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING	COMMENTS
Tremolite	2	Ol, opx(?)	In zones close to amphibole veins which dip = 80° into the plane of the thin section (crosscutting the foliation).
actinolite			Blue-green in veins.
Hornblende	3	Cpx, veins	
Talc	2	Ol	In zone close to amphibole veins.

COMMENTS: The plastic deformation is slight. However, sub-grain boundaries and probably a rough fabric in ol, and a good fabric in plag (possibly formed partially magmatically) were produced.

THIN SECTION DESCRIPTION

118-735B-40R-5 (Piece 2, 13-15 cm)

ROCK NAME: Gabbro

WHERE SAMPLED:

TEXTURE: Allotriomorphic granular

GRAIN SIZE: Medium

OBSERVER: KEM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	3	6	0.1-1.0		Anhedral	
Plagioclase	58	58	0.5-2.5		Anhedral	
Clinopyroxene	35	35	0.1-2.0		Anhedral	Partially enclosing ol and often totally enclosing ilmenite.
Ilmenite	1	1	0.05-0.25		Anhedral	

SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING	COMMENTS
Clays	1	Ol	Replacing ol along fractures.
Amphibole	1	Ol, ilmenite	Brown. Occurs surrounding primary ilmenite and sometimes ol.
Magnetite	1	Ol	
Amphibole	Tr	Cpx	Green.

COMMENTS: Primary layering apparent as preferred orientation of cpx.

THIN SECTION DESCRIPTION

118-735B-40R-5 (Piece 2, 13-15 cm)

ROCK NAME: Olivine-rich gabbro

WHERE SAMPLED:

TEXTURE: Adcumulate

GRAIN SIZE: Fine

OBSERVER: STA

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	14	15				
Plagioclase	60	60				Extremely fresh.
Clinopyroxene	24	24				
Hornblende	1	1				Brown. Interstitial. Possibly secondary.

SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING	COMMENTS
Actinolite	Tr	Cpx	Forms along edges of crystals.
Talc	1	Ol	

COMMENTS: Rock is extremely fresh. Square opaques are partially oxidized.

THIN SECTION DESCRIPTION

118-735B-40R-5 (Piece 5, 49-52 cm)

ROCK NAME: Feldspathic vein in gabbro

WHERE SAMPLED:

TEXTURE: Adcumulate (host)

GRAIN SIZE:

OBSERVER: STA

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
HOST						
Plagioclase	60	68				Some albitization.
Clinopyroxene	10	27				Replaced by amphibole.
Olivine	1	3				Tremolite pseudomorphs. Talc(?).
Ilmenite	1	2				Replaced by sphene.
SECONDARY MINERALOGY						
SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING				COMMENTS
Albite	5	Plag			Also in vein.	
Epidote	3	Plag			Blue interference colors. Also in vein.	
Actinolite	2	Ol, plag, cpx			Spherulitic bundles. Late stage replacement.	
Sphene	1	Ilmenite				
Hornblende	17	Cpx			Blue-green pleochroism.	

COMMENTS: Cpx is replaced by amphibole along microshears in host. Vein assemblage is blue-green amphibole, sodic plag, sphene, epidote, and quarte (?). Amphibole along microshears in host.

THIN SECTION DESCRIPTION

118-735B-41R-4 (Piece 1A, 20-27 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE: Allotriomorphic granular, orthocumulate to mesocumulate

GRAIN SIZE: Medium

OBSERVER: OZA

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	3.9	5.7	0.2-2.0		Anhedral	Rare kink band showing weak deformation, veined by black mineral (magnetite and clay?).
Plagioclase	56.0	57.3	0.3-5.0		Anhedral	Some have concentric zoning.
Clinopyroxene	27.8	33.6	0.2-4.0		Anhedral	Tiny opaque lamellae (ilmenite?) present. Vein between amphibole and plag replaced by amphibole.
Oxide	0.4	0.4	0.02-1.0	Fe-Ti	Anhedral	Inclusion in cpx, isolated large grains. It also intergrows with opx or brown hbd.
Orthopyroxene	1.9	2.5	0.1-1.0		Anhedral	Rimming ol and cpx, locally enclosing cpx with complex intergrowth. Isolated grains including cpx also occur.
Brown hornblende	0.5	0.5	0.1-0.3		Anhedral	Rimming cpx, ol and Fe-Ti oxide. In cpx with opx.
SECONDARY MINERALOGY						
SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING				COMMENTS
Clays	1.0	Ol			Brown, replacing ol from rim or along cracks.	
Chlorite	0.6	Plag			Replacing plag as radial aggregate.	
Actinolite	0.9	Cpx, ol			Replacing cpx near amphibole vein, rimming altered ol.	
Brown-green hornblende	6.0	Vein			In vein, cutting primary structure, replacing cpx near the vein.	
Mica	0.8	Ol			Replacing ol core with Fe-Ti oxide.	
Fe-Ti oxide	0.2					

COMMENTS: Grain size variation defines 1-2cm thick layering. In coarser layer, cpx has average grain size of 2.5 mm, in finer layer, approximately 1.0 mm. Magmatic foliation is roughly perpendicular to the size-defined layering. Percentages based on 2000 point counts.

THIN SECTION DESCRIPTION

118-735B-41R-4 (Piece 1D, 68-70 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE: Allotriomorphic granular

GRAIN SIZE: Medium to coarse

OBSERVER: KEM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	8	10	1.0-3.0		Anhedral	
Plagioclase	64	65			Anhedral	
Clinopyroxene	24	25	1.0-3.5		Anhedral	Contains exsolution of opx and rod-like inclusions of opaques.
Opaques	Tr	Tr				
Orthopyroxene	Tr	—				Exsolution lamellae and small patches.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	0.5	Ol				Along fractures.
Magnetite	1	Ol				
Talc/Tremolite	0.5	Ol				
Brown amphibole	Tr	Cpx				Patchy replacement of cpx, encloses primary opaques, occurs along grain boundaries.
Green amphibole	2	Cpx				Fills small veins crosscutting plag, partially replacing Cpx.

COMMENTS: Slide has a definite grain or foliation defined by elongate ol and cpx crystals which are preferentially aligned. Rock does not appear to be deformed; lacks granulation of crystals or apparent plastic deformation.

THIN SECTION DESCRIPTION

118-735B-41R-4 (Piece 1E, 78-82 cm)

ROCK NAME: Gabbro

WHERE SAMPLED:

TEXTURE: Mesocumulate

GRAIN SIZE: Medium

OBSERVER: STA

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	44	50				
Clinopyroxene	36	49				
Spinel	—	<1			Ilmenite/ magnetite	
Orthopyroxene	<1	1				
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Chlorite	10	Cpx, plag				Dark blue interference, lines cracks in plag.
Epidote	1					Mixed with sphene? or carbonate in one area.
Actinolite	4	Plag, cpx				Fibrous, pale.
Hornblende	2					Green, replaces cpx in one area.
Talc	<1	Opx				
Magnetite	<1	Opx				Reaction zone.

COMMENTS: Pyroxene pseudomorphs have a fringed edge of actinolite and a core of spherulitic chlorite. Opx has half the lamellae replaced by chlorite. Cpx has opx lamellae similarly replaced. Other late opx is replaced by talc and magnetite. All the alteration is static; there is no deformation. Calcite? in ol pseudomorphs.

THIN SECTION DESCRIPTION

118-735B-42R-1 (Piece 3B, 35-38 cm)

ROCK NAME: Metagabbro

WHERE SAMPLED:

TEXTURE: Orthocumulate

GRAIN SIZE: Medium

OBSERVER: STA

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	43	65				
Clinopyroxene	16	33				
Orthopyroxene	1	2				
SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING				
Carbonate	1	Plag				Grains in plag, mixed with carbonate. Also in veins.
Chlorite	4	Plag				Spherulitic clumps, mixed with carbonate, also veins.
Albite	20	Plag				Along fractures in plag.
Epidote	2	Plag				Zoisite in plag, difficult to estimate.
Actinolite	10	Cpx, hbd				Green to colorless.
Sphene	Tr					After ilmenite? Small grains.
Hornblende	2	Cpx				Brown-green.
Hornblende	1	Filling vugs				Blue-green euhedral laths.
Ilmenite	Tr					Altering to sphene.
Magnetite	Tr					In white-green amphibole replacing ol/opx.

COMMENTS: Rock is pervasively broken along small cracks. Alteration is somewhat controlled by distribution of fractures. Not deformed.

THIN SECTION DESCRIPTION

118-735B-42R-2 (Piece 3D, 119-121 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE: Allotriomorphic granular

GRAIN SIZE: Coarse

OBSERVER: KEM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	8.1	10	0.5-1.5		Anhedral	Partially replaced by colorless amphibole, talc and magnetite.
Plagioclase	77.7	78	0.5-5.0		Anhedral	
Clinopyroxene	8.5	11	0.5-2.5		Anhedral	Contains patchy exsolution of opx.
Ilmenite	1.0	1	0.1-0.2		Equant, anhedral	
Orthopyroxene	Tr					Exsolution from cpx.
SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING				COMMENTS
Chlorite	1.1					In thin veins.
Magnetite	0.9	Ol				
Talc	0.4	Ol				
Green amphibole	1.9	Cpx				In thin veins and replacing cpx near veins.
Colorless amphibole	0.4	Ol				
Brown amphibole	Tr	Cpx				

COMMENTS: Cpx shows some subophitic to ophitic texture enclosing plag, but more generally associated with ol. Percentages based on 1144 point counts.

THIN SECTION DESCRIPTION

118-735B-42R-3 (Piece 1B, 9-14 cm)

ROCK NAME: Gabbro norite

WHERE SAMPLED:

TEXTURE: AnhedraI granular

GRAIN SIZE: 0.5-10.0mm

OBSERVER: DCK

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	60	60	0.5-10.0		AnhedraI	
Clinopyroxene	27	30	0.5-5.0		AnhedraI	
Enstatite	5	6	0.5-4.0		AnhedraI	
Olivine	3	4	0.2-3.0		AnhedraI	
Opaques	1	1			AnhedraI	
Brown hornblende	Tr	Tr	<0.1		AnhedraI	Grown around Fe-oxide.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	0.5	OI				
Talc	0.3	OI				
Amphibole	0.2	OI				
Amphibole	3	Px				
Carbonate	0.3	Crack				Vein mineral.
Magnetite	0.2	OI				

COMMENTS: Several different amphiboles present, including clear, blue-green and brown varieties. Sample is size-graded from 3-4mm grain size to 1cm average, across the section.

THIN SECTION DESCRIPTION

118-735B-42R-4 (Piece 3B, 62-65 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE: Allotriomorphic granular

GRAIN SIZE: Medium to coarse

OBSERVER: KEM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	16	17	0.5-2.5		AnhedraI	
Plagioclase	53	55	0.5-2.0		AnhedraI	
Clinopyroxene	25	28	0.5-2.5		AnhedraI	Has opaque, rod-like inclusions.
Opaques	Tr	Tr				
Orthopyroxene	Tr					Exsolution and small patches in cpx.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	Tr	OI				
Actinolite	2					On most grain boundaries, particularly cpx.
Plagioclase	2	Plag				Neoblasts.
Magnetite	0.5	OI				
Talc/Tremolite	0.5	OI				
Brown amphibole	1					Surrounding primary Fe-Ti oxides.

COMMENTS: Thin zone of granulation, approximately 0.2 mm wide cross-cuts the thin section, but elsewhere crystals are relatively free of deformation.

THIN SECTION DESCRIPTION

118-735B-43R-1 (Piece 1B, 22-29 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE: Allotriomorphic granular

GRAIN SIZE: Coarse

OBSERVER: KEM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	4	4	1.0-3.0		Anhedral	
Plagioclase	64	65	2.0-11.0		Anhedral	
Clinopyroxene	29	30	1.0-8.0		Anhedral	Contains inclusions of opaques.
Opaques	1	1				Ilmenite and magnetite?
Orthopyroxene	Tr					Exsolution from cpx.
SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING				COMMENTS
Clays	Tr	Ol				Replacing along fractures.
Brown hornblende	Tr	Cpx				Patchy replacement of cpx, surrounds primary ilmenite.
Green amphibole	2	Cpx				In thin vein, replacing cpx and rimming tremolite after ol.
Colorless amphibole	<1	Ol				
Magnetite	<1					

COMMENTS: Slide contains a contact between two slightly different average grain sizes ie. 2.0-5.0 mm and 5.0-10.0 mm. Cpx has a roughly equant or ovoid shape rather than being subophitic or ophitic. Thin amphibole vein crosscuts sample in coarser-grained area, replacing cpx and altering ol to tremolite, actinolite and magnetite. Elsewhere alteration is negligible.

THIN SECTION DESCRIPTION

118-735B-43R-1 (Piece 1J, 126-128 cm)

ROCK NAME: Altered gabbro cut by vein

WHERE SAMPLED:

TEXTURE: Mesocumulate

GRAIN SIZE: Fine to medium

OBSERVER: STA

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	—	3	1-2		Anhedral	Completely replaced.
Plagioclase	48	56	0.3-3.0		Anhedral	Numerous filled cracks.
Clinopyroxene	5	40	0.5-3.0		Anhedral	Replaced by green to brown hbd.
Ilmenite	1	1	0.2-0.3			
SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING				COMMENTS
Clays	Tr					Replacement of ol pseudomorphs.
Chlorite	1	Plag. vein				Pale.
Albite	5	Plag. vein				Few round crystals in vein, most in situ replacement.
Tremolite/Actinolite	2					Bladed minerals in groundmass with talc.
Sphene	<1	Vein				
Hornblende	20	Vein				Green to yellow pleochroism, euhedral prisms.
Clinopyroxene	5	Vein				High relief, colorless; could be an amphibole.
Talc	2	Ol				With magnetite.
Magnetite	1	Ol				With talc.
Hornblende	10	Cpx				Green to brown; on margins with plag.

COMMENTS: Cut by hydrothermal vein. Note primary grain size varies, being medium-grained above hydrothermal and fine-grained below.

THIN SECTION DESCRIPTION

118-735B-43R-4 (Piece 3B, 64-66 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE: Anhedral granular

GRAIN SIZE: Medium

OBSERVER: BLM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	4	5	0.3-1.5		Anhedral	Sometimes in cpx.
Plagioclase	60	61	0.2-2.0		Anhedral	
Clinopyroxene	20	32	0.4-9.0			Sometimes in clumps of 6-10 grains.
Spinel	2	2	0.2-2.0			All on one side of sample, large ones common in cpx.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	1	Plag				Dusting, fine fractures in plag.
Actinolite	9	Cpx				Pale green, rimming cpx, mostly on one side of sample.
Hornblende	2	Cpx				Brown-green to brown, as patches on cpx, particularly rimming some oxides in cpx.
Talc/Tremolite	1	Ol				Aggregates replacing ol.
Opaque/Clay	1	Ol				Along fractures and replacing ol.

COMMENTS: Opaques concentrated on one side; ol included in some of the opaques. Seems to be a weakly developed igneous lamination defined by plag orientation; undulose plag, minor deformation, spindle twins. Possibly a little opx in larger opx clumps; none positively identified.

THIN SECTION DESCRIPTION

118-735B-43R-4 (Piece 8B, 135-139 cm)

ROCK NAME: Altered olivine-bearing gabbro

WHERE SAMPLED:

TEXTURE: Granular to anhedral granular

GRAIN SIZE: Medium to coarse

OBSERVER: BLM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	—	5				Originally 0.2 mm grains.
Plagioclase	57	65	1.0-7.0		Euhedral-anhedral	Altered to clays, some epidote.
Clinopyroxene	15	25	1.0-5.0		Anhedral	Extensively altered to actinolite.
Oxide	1	2	2.0		Anhedral	May be after ol.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	8	Plag				Dusting, along fractures and grain boundaries.
Epidote	5	Plag				In granular zone.
Actinolite	10	Cpx				Also in veins and minor replacement of ol.
Sphene	Tr					In granular zone.
Hornblende	Tr	Cpx				Brown.
Oxide	1	Ol				
Pyrite	Tr					Between cpx, may be in part primary.
Talc/Tremolite	3	Ol				

COMMENTS: A 1 cm, plag-rich granular zone cuts sample; fine-grained, granulated by deformation. Epidote contains rare sphene developed along zone. Remainder of rock statically altered.

THIN SECTION DESCRIPTION

118-735B-44R-1 (Piece 2C, 47-49 cm)

ROCK NAME: Gabbro

WHERE SAMPLED:

TEXTURE: Porphyroclastic

GRAIN SIZE: Medium to coarse

OBSERVER: PTR

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	40	63	.5-5		Subhedral	
Clinopyroxene	20	35	1-3		Subhedral	
Orthopyroxene	0	2?	2-3		Subhedral	Completely replaced.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	5	Plag, chlorite				Light brown.
Chlorite	15	Plag				Colorless, anomalous interference colors, patchy.
Epidote	5	Plag				Irregular to prismatic, yellow-blue colors.
Actinolite	10	Cpx				Colorless prisms
Hornblende	5	Cpx				Green to brown

THIN SECTION DESCRIPTION

118-735B-43R-4 (Piece 8B, 135-139 cm)

ROCK NAME: Vein cutting metagabbro

WHERE SAMPLED:

TEXTURE:

GRAIN SIZE: Coarse

OBSERVER: STA

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	30	50				Partially altered to albite + epidote + chlorite.
Clinopyroxene	15	30				Partially altered to amphibole.
Olivine	—	20				Altered to talc + magnetite.
SECONDARY MINERALOGY	PERCENT	REPLACING/FILLING				COMMENTS
Clays		Cpx				Bright green smectite(?).
Clays	< 1	Plag				First order birefringence, spherules.
Chlorite	1	Plag				Replaces plag in groundmass.
Albite	20	Plag				Along fractures in groundmass and 1% in vein.
Epidote	1	Plag				Blue interference colors, on composition boundary between clinozoisite and epidote.
Actinolite	3	Cpx				With tremolite, edges on cpx and little fractures.
Sphene	1					Pink to yellow pleochroism, in vein.
Hornblende	5	Cpx				Deep green; vein margins and replacement.
Talc	8	Ol				Replaces ol; mixed with magnetite; in groundmass.
Clinopyroxene	14	Vein				Diopside.
Magnetite	2					

COMMENTS: Vein assemblage: fresh cpx, epidote, sphene (pink mineral), sodic plag, opaques and green-blue amphiboles along the margin. Includes plag-cpx symplectites. Amphibole is restricted to margins of veins and the groundmass.

THIN SECTION DESCRIPTION

118-735B-44R-1 (Piece 2L, 113-120 cm)

ROCK NAME: Contact between olivine gabbro and ilmenite gabbro

WHERE SAMPLED:

TEXTURE: Anhedral granular

GRAIN SIZE: Coarse

OBSERVER: OZA

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	5	12	0.5-5.0		Anhedral	Many kink bands, locally recrystallized into smaller grains, altered into opaques and tremolite.
Plagioclase	35	60	1.0-7.0		Subhedral	Veined by amphibole.
Clinopyroxene	10	28	2.0-10.0		Anhedral	No (001) lamellae, commonly rimming ol.
Opaque	35	75	1.0-10.0		Euhedral-anhedral	Fe-Ti oxide and sulphide replaced by green mineral (? or chlorite).
Reddish-brown hornblende	Tr	Tr	0.1		Anhedral	Replacing cpx.
SECONDARY MINERALOGY	PERCENT	REPLACING/FILLING				COMMENTS
Clays	1	Opaque				Green, replacing opaque.
Clays	1	Ol				Yellowish green, filling ol cracks with opaque.
Chlorite	1	Opaque, plag				Pale green, replacing Fe-Ti oxide, veining plag.
Actinolite/Tremolite	3	Ol, cpx				Replacing ol and cpx.
Brown hornblende	7	Cpx				Replacing cpx, in places perfectly.
Fe-Ti oxide	1	Ol				Rimming ol with tremolite, also filling cracks in ol.
Mica (talc?)	1	Ol, plag				Rimming tremolite/actinolite aggregate after ol.

COMMENTS: Contact between opaque-rich (Fe-Ti oxide and minor sulphide) gabbro and ol gabbro is fairly sharp.

THIN SECTION DESCRIPTION

118-735B-44R-2 (Piece 1A, 6-8 cm)

ROCK NAME: Ilmenite- and magnetite-rich gabbro

WHERE SAMPLED:

TEXTURE: Hypidiomorphic granular

GRAIN SIZE:

OBSERVER: HEB

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	<1	1	0.2-0.4		Rounded	In pore spaces between opx and plag.
Plagioclase	40	58	0.2-2.0		Rounded— anhedral	Included in ilmenite.
Clinopyroxene	11	15	1.0-2.0		Anhedra	Interstitial type cpx, exsolution lamellae.
Orthopyroxene	15	17	1.0-2.0		Anhedra	Oikocrystic.
Ilmenite	10	11	0.05		Irregular	Symplectite intergrowths with opx containing exsolution lamellae of cpx.
Brown amphibole	1	4			Anhedra	Clear, strongly pleochroic intimately related to ilmenite.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	1	Ol				Brownish yellow.
Chlorite	2	Talc				Blue interference colors replacing talc close to opaque filling.
Hornblende	3					Pale green to yellow-green replacing cpx.
Plagioclase	11	Plag				Neoblasts surrounding crushed larger plag.
Talc	1	Ol, opx				Intergrown with magnetite surrounding ol.
Magnetite	1	Ol				Minute grains; reaction products from ol and ilmenite replacement.
Tremolite	Tr	Talc				Needle growing on talc.
Leucoxene	<1	Ilmenite				Cryptocrystalline.
Blue-green amphibole	Tr	Brown amphibole				Related to cracks.
Brown amphibole	4	Primary brown amphibole				Related to cracks, replacing px.

COMMENTS: Symplectite of ilmenite with opx. Part of brown amphibole is primary. High temperature metamorphism followed by low temperature seawater hydrothermal circulation and alteration (clays). Two sets of exsolution lamellae: symplectites have magnetite and ilmenite alternating along distinct rods, some are tipped with pyrite, others have ilmenite spines surrounded by magnetite, some break down into nearly myrmekitic intergrowths.

THIN SECTION DESCRIPTION

118-735B-44R-2 (Piece 1J, 131-133 cm)

ROCK NAME: Partially amphibolitized gabbro

WHERE SAMPLED:

TEXTURE: Allotriomorphic granular (mesocumulate)

GRAIN SIZE: Fine to medium (0.5-2.0mm)

OBSERVER: NAT

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	1	5				
Plagioclase	50	55				
Clinopyroxene	25	40				
Ilmenite/Magnetite	Tr	Tr				
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	2	Ol				
Hornblende	20	Cpx, plag				Pale green-white on least altered side.
Magnetite	2	Ol, cpx				Associated with green-white amphibole.
Pyrite/Chalcopyrite	Tr	Ol, cpx				Reaction zones, largely replacing ol and portions of cpx.

COMMENTS: Rock has a main fracture on one side of the slide, and many subordinate fractures lined with green amphibole. Two stages of green amphibole formation: reaction zone type (blue-green and white) and vein (dull green).

THIN SECTION DESCRIPTION

118-735B-44R-3 (Piece 5D, 78-81 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE: Subhedral granular

GRAIN SIZE: Coarse

OBSERVER: MEY

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	12.5	15	2-10	An 68	Subhedral	Kink banding in some grains.
Plagioclase	54.5	56	2-10		Subhedral-euhedral	Composition determined by Michel-Levy.
Clinopyroxene	29.2	29	2-20		Subhedral	Oikocrysts enclosing plag and ol.
Orthopyroxene	0.1	Tr	2		Anhedral	Rimming ol. Rare.
SECONDARY MINERALOGY	PERCENT	REPLACING/FILLING				COMMENTS
Chlorite	0.2	Plag				Fibrous intergrowths with margarite(?) and tremolite.
Tremolite/actinolite	1.9	Ol				Forms reaction corona around ol.
Hornblende	0.1	Cpx				Rims cpx.
Margarite(?)	1.5	Plag				Micaceous mineral with talc-like appearance found on outer rims of reaction coronas around ol when ol is enclosed in plag.

COMMENTS: Fresh, undeformed ol gabbro.
Percentages based on 2000 point counts.

THIN SECTION DESCRIPTION

118-735B-45R-1 (Piece 1F, 48-51 cm)

ROCK NAME: Ferrogabbro, olivine gabbro

WHERE SAMPLED: Contact between ferrogabbro and olivine gabbro

TEXTURE: Allotriomorphic granular

GRAIN SIZE: Medium

OBSERVER: KEM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
FERROGABBRO						
Orthopyroxene	9.2	41			Anhedral	Inverted pigeonite.
Clinopyroxene	28.2					
Plagioclase	39.6	50			Anhedral	Ilmenite/magnetite intergrowths. This percentage includes pyrite/pyrrhotite/chalcocopyrite intergrowths.
Ilmenite	9.0	9				
SECONDARY MINERALOGY	PERCENT	REPLACING/FILLING				COMMENTS
FERROGABBRO						
Plagioclase	10.2	Plag				
Amphibole	1.3	Cpx		Brown.		
Amphibole	2.5	Cpx		Green.		
PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
OLIVINE GABBRO						
Olivine	2.5	3	0.5-4.0		Anhedral	
Plagioclase	60.8	61	1-6		Anhedral	
Clinopyroxene	34.5	35	0.5-4.0		Anhedral	Exhibits a complex exsolution/intergrowth relationship between cpx and opx.
Orthopyroxene	1.1	1			Anhedral	Exsolution from cpx.
Ilmenite	0.3	Tr				
SECONDARY MINERALOGY	PERCENT	REPLACING/FILLING				COMMENTS
OLIVINE GABBRO						
Clays	Tr	Ol				
Magnetite	0.3	Ol				
Amphibole	0.2	Cpx		Brown.		
Amphibole	0.3	Cpx		Green.		

COMMENTS: Some granulation of feldspar at contact.
Cpx exsolving Fe-oxide (ilmenite?).
Percentages based on 1673 point counts in the ol gabbro, and 1034 point counts in the ferrogabbro.

THIN SECTION DESCRIPTION

118-735B-45R-2 (Piece 1B, 15-17 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE: Allotriomorphic granular

GRAIN SIZE: Medium

OBSERVER: KEM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	22	22	0.5-1.0		Anhedral	
Plagioclase	50	50	1-4		Subhedral	
Clinopyroxene	27	27	0.5-3.0		Anhedral	Subophitically enclosed plag, ol. Wraps around the margins of cpx (not a subophitic texture).
Ilmenite	1	1				
SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING				COMMENTS
Amphibole	Tr	Ilmenite, cpx				Around ilmenite and along grain boundaries of some cpx crystals.

COMMENTS: This rock is extremely fresh.
There may be a crude primary layering defined by concentrations of ol.

THIN SECTION DESCRIPTION

118-735B-45R-4 (Piece 7, 136-140 cm)

ROCK NAME: Hydrothermal vein through gabbro

WHERE SAMPLED:

TEXTURE:

GRAIN SIZE:

OBSERVER: STA

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	2	5(?)				Almost completely altered to talc and anthophyllite pseudomorphs.
Plagioclase	10	(?)				
Clinopyroxene	15	(?)				
Hornblende	1	1			Blebs	Inclusions in cpx.
Ilmenite	4	6			Anhedral	
SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING				COMMENTS
Clays	Tr	Chlorite				Pinkish, with sphene in vein. High relief. Also occurs with carbonate.
Carbonate	1	Vein				Occurs with clay.
Chlorite	5	Plag				Radial aggregates. Mirolitic? Also in coronas with actinolite.
Analcite	Tr	Plag				Rims on plag. Also in vein.
Epidote	20	Plag, cpx				Two varieties.
Actinolite/ Fe-Mg amphibole	20	Cpx, plag, ol				Needles, bladed, pale green to colorless. Fe-Mg amphibole is intergrown with actinolite.
Sphene	2	Ilmenite				Pink, euhedral crystals, intergrown with ilmenite.
Hornblende	15	Veins, cpx				Dark green to brown pleochroism. Rims on cpx.
Talc	3	Ol				Ol pseudomorphs.
Sulfides	2					Large euhedral crystals.
Apatite	Tr					
Diopside	Tr	Cpx				Intergrown with sphene.

COMMENTS: Sphene-opaque in windowpane texture; also ilmenite-Fe sulfide-chlorite in trellis texture.
Opaques in vein with amphibole.
Diopside is intergrown with sphene.

THIN SECTION DESCRIPTION

118-735B-46 x -2 (Piece 7B, 128-130 cm)

ROCK NAME: Porphyroclastic gabbro

WHERE SAMPLED:

TEXTURE: Porphyroclastic

GRAIN SIZE: Fine to medium

OBSERVER: CAN

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	35	74	1-1.0		Subhedral-anhedral	Recrystallized and slightly altered to epidote.
Clinopyroxene	20	25	1-5		Anhedral	Slightly recrystallized and altered to green-brown hbd.
Oxide	1	1	0.1-2		Anhedral	Streaks, elongated in the foliation.
Brown hornblende	Tr	Tr	0.1		Anhedral	Irregular patches in cpx.
Quartz	Tr	(?)				Primary? Subhedral grains, 0.2 mm. Unstrained. in fracture of cpx and in small clusters throughout the rock.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Plagioclase	39	Plag	Recrystallized neoblasts, 0.1-0.5 mm.
Clinopyroxene	2	Cpx	Recrystallized neoblasts, 0.1-0.5 mm.
Green-brown hornblende	13	Cpx, brown hbd	Rims around cpx and euhedral crystals aligned in the foliation planes.
Epidote	Tr	Plag	Small needles in plag.

THIN SECTION DESCRIPTION

118-735B-46R-3 (Piece 2D, 24-26 cm)

ROCK NAME: Olivine bearing gabbro with mylaritic

WHERE SAMPLED:

TEXTURE:

GRAIN SIZE: Fine to medium

OBSERVER: CAN

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	3	(5-10)	1.2-4		Anhedral	Faint sub-grain boundaries rarely altered to mica, tremolite, mica, talc, and clays
Plagioclase	30-45	(50-60)	1.2-4		Anhedral-euhedral	Partially recrystallized.
Clinopyroxene	20-25	25-30	1.5-4		Anhedral	Some recrystallization of cpx. Partially altered to green hbd.
Oxthopyroxene	2-4	(5)	1.2-4		Anhedral	Some recrystallization of cpx. Partially altered to green hbd.
Fe-Ti oxide	0-3	(0-3)	1.2		Anhedral	Rims around cpx and oxides.
Brown amphibole	0-1	(0-1)	0.2			

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	Tr	Ol	
Green hornblende	7	Opx, cpx, brown hbd	
Mica Tremolite Talc	2.7	Ol	In replacement aureoles.
Plagioclase	5-30	Plag	Recrystallized neoblasts.
Clinopyroxene	Tr	Cpx	Recrystallized neoblasts.

COMMENTS: A mylonitic band separates two slightly different gabbros; one fine-grained, one medium-grained. The percent recrystallization increases in both directions towards the band.

THIN SECTION DESCRIPTION

118-735B-46R-3 (Piece 10, 121-128 cm)

ROCK NAME: Fe-Ti bearing gabbro

WHERE SAMPLED:

TEXTURE: Anhedral granular

GRAIN SIZE: Fine to medium, locally coarse

OBSERVER: OZA

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	4	>5	0.1-0.3		Anhedral	Commonly accompanied by opaques. Forming a few ol-rich layers. Slight replacement by clay + magnetite.
Plagioclase	58	<59	0.1-0.3		Anhedral-subhedral	Rare crystals measure up to = 10 mm.
Clinopyroxene	27	31	0.1-2.0		Anhedral-subhedral	(001) and (100) exsolution lamellae are common.
Oxides	5	5	0.05-3.00	Fe-Ti	Anhedral	Locally rimmed by ol.
Orthopyroxene	Tr	Tr	0.1-0.3		Anhedral	Patchy inclusions in cpx. Exsolution lamellae and rimming cpx.

SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING	COMMENTS
Clays	<1	Ol	Dark yellowish brown. Replacing ol.
Chlorite	<1	Plag	Green. Veins in plag. Also rimming actinolite aggregate and replacing cpx.
Actinolite	2	Cpx	Replacing cpx and brown-green hbd.
Hornblende	2	Cpx, opaques	Brown-green. Rimming cpx and opaques.
Mica	<1	Ol	Talc(?). Replacing ol.
Fe-Ti oxide	<1	Ol	Replacing ol with talc or with clays.

COMMENTS: Opaque-rich and ol-rich layers (= 5 mm wide) are present parallel to foliation which is defined by elongated plag and cpx crystals. Opaques form a lense-shaped aggregate which is also parallel to the foliation. A coarse-grained area is present in the sample, perpendicular to the foliation. Deformation is weak: kink bands in ol, and minor recrystallization of plag.

THIN SECTION DESCRIPTION

118-735B-46R-4 (Piece 11, 109-113 cm)

ROCK NAME: Opaque gabbro

WHERE SAMPLED:

TEXTURE: Subhedral-anhedral granular

GRAIN SIZE: Very coarse

OBSERVER: BLM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	56	58	9-20		Subhedral	Undulose extinction. Some grain boundary deformation.
Clinopyroxene	19	29	7-27		Anhedral	Containing patches of brown hbd and opx.
Opaques	13	13	2-10		Anhedral	Interstitial between plag and cpx; intergrown with cpx.
Sulfides	Tr	Tr	<1			In opaques.

SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING	COMMENTS
Clays	Tr	Plag	In some fractures.
Chlorite	Tr	Cpx	Occurs around actinolite clots. Also in some veins.
Actinolite	7	Cpx	Replacing cpx. In veins cutting plag.
Hornblende	3	Cpx	Small patches in cpx.
Plagioclase	2	Plag	<0.1 mm neoblasts.

COMMENTS: Some deformation. Distinct lamination may be in part igneous. Some grain boundary recrystallization. Percentages based on 1600 point counts.

THIN SECTION DESCRIPTION

118-735B-47R-2 (Piece 3, 31-36 cm)

ROCK NAME: Ilmenite gabbro

WHERE SAMPLED:

TEXTURE: Allotriomorphic granular

GRAIN SIZE: Coarse

OBSERVER: HEB

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	5	12				Largely invaded by chlorite, tremolite.
Clinopyroxene	10	26	< 5.0			With inverted pigeonite.
Pigeonite	8	2	< 4.0			With worm-like exsolution of cpx.
Ilmenite	45	58			Anhedral	Enriched zone of ferro-gabbro.
Brown amphibole	3	2				Strongly pleochroic, related to ilmenite.
SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING				COMMENTS
Clays	Tr	Px				Brown dusting.
Chlorite	6	Plag				Grey birefringence color, replaced by tremolite/actinolite.
Actinolite	18	Px, plag				Colorless, pseudomorph after px, replaces chlorite after plag.
Brown amphibole	3	Px				Patches in partly amphibolitized intergrowth of opx and cpx.
Magnetite	2	Ilmenite				As streaks.

COMMENTS: Tendency for opaque to develop symplectite with px. Plag + px + fluid reacted to produce chlorite + tremolite/actinolite.

THIN SECTION DESCRIPTION

118-735B-47R-2 (Piece 8A, 102-104 cm)

ROCK NAME: Hydrothermally altered Fe-Ti oxide gabbro

WHERE SAMPLED:

TEXTURE: Altered, slightly sheared

GRAIN SIZE: Medium

OBSERVER: CAN

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	30	70	1.0-10.0			Locally recrystallized, widely albitized.
Clinopyroxene	12	30	1.0-10.0			Widely replaced by green amphibole.
Fe-Ti oxide	5	6	1.0-5.0			Rimmed by sphene.
SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING				COMMENTS
Albite	16	Plag				Along cracks in the plag, quite pervasive replacement.
Epidote	4	Plag,				Zoisite and clinozoisite; same might replace plag. Hydrothermal.
Sphene	3	Fe-Ti oxide				Rims around oxide and euhedral hydrothermal crystals in epidote-rich zones.
Green amphibole	20	Cpx				Hydrothermal.
Plagioclase	10	Plag				Recrystallized and crushed close to shear zone.
Blood red mineral	< 1					Associated with sphene and rods of opaque mineral (rutile?).

COMMENTS: A sub-vertical sheared zone approximately 1-2mm across, with crushing and some recrystallization of the plag. Epidote and sphene are preferentially recrystallized and appear undeformed in this crushed zone. The green amphibole is locally kinked.

THIN SECTION DESCRIPTION

118-735B-47R-3 (Piece 2, 50-52 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED: Near a contact between Fe-Ti oxide and olivine gabbro

TEXTURE: Cumulate

GRAIN SIZE: Medium

OBSERVER: CAN

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	6	7	1.0-6.0		Anhedral	Sometimes rims px.
Plagioclase	65	65	1.0-10.0		Anhedral	Sometimes intergrown with ol.
Clinopyroxene	27	28	1.0-10.0		Anhedral	Sometimes as rims around ol.
Orthopyroxene	<1	?	0.2			Found in one talc alteration zone.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	<1	Ol				
Actinolite	<1	Plag				
Brown-green hornblende	1	Cpx			Rims around cpx.	
Talc, opaque, mica	1	Ol				

COMMENTS: Thin section was taken from a minicore, in which a contact between Fe-Ti gabbro and ol gabbro is present. Unfortunately, no contact present in the thin section. A bizarre intergrowth of ol and plag is present close to the contact (present in the thin section).

THIN SECTION DESCRIPTION

118-735B-47R-4 (Piece 5, 80-86 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE: Mesocumulate

GRAIN SIZE: Coarse

OBSERVER: BLM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	6	8	0.2-4.0		Anhedral	Enclosed in cpx and intergranular.
Plagioclase	46	47	0.2-5.0		Subhedral	Partially enclosed in cpx.
Clinopyroxene	35.5	43	0.8-8.0		Anhedral	Subophitic-coarse, intergranular.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	1	Plag				In fractures and veins.
Chlorite	1	Ol, cpx				Fine-grained aggregates around actinolite, tremolite, in veins.
Actinolite	8	Cpx				
Hornblende	0.5	Cpx				Minor brown patches.
Opagues	1	Ol				On fractures, probably a mixture of clays and opaques.
Talc/Tremolite	1	Ol				Fine-grained aggregates around olivines.

COMMENTS:

Percentages based on 1910 point counts:

Plagioclase	47.1	(total)
Clinopyroxene	33.8	
Olivine	10.3	
Brown amphibole	0.4	
Tremolite	1.0	
Smectite	0.4	
Talc	1.5	
Chlorite	2.4	
Actinolite	0.8	
White mica	0.7	
Opagues	1.0	

THIN SECTION DESCRIPTION

118-735B-68R-2 (Piece 9, 109-113 cm)

ROCK NAME: Fe-Ti oxide gabbro

WHERE SAMPLED:

TEXTURE: Anhedral granular

GRAIN SIZE: Fine

OBSERVER: OZA

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	8	10	0.5 - 0.5		Anhedral	Rimming opaque mineral in a coarse part.
Plagioclase	44	45	0.1 - 2		Anhedral	Veined by amphibole.
Clinopyroxene	29	40	0.1 - 2		Anhedral	(100), (001) Lamellae common.
Oxide	5	5	0.1 - 1	Fe-Ti	Anhedral	Accompanied by ol.
SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING				COMMENTS
Green hornblende	10	Cpx, plag				Replacing cpx and filling veins in plag.
Brown hornblende	1	Ol				Primary? Rimming cpx.
Mica	1	Ol				Tale? Accompanied by opaque (Magretite)
Clay	1	Cpx				Brown, along crack in ol.

COMMENTS: Size layering present. A fine (=0.5 mm), 2 cm-thick layer is sandwiched by medium-grained (=2 mm), foliated layers. Thick thin section.

THIN SECTION DESCRIPTION

118-735B-48R-4 (Piece 6, 82-84 cm)

ROCK NAME: Ilmenite gabbro

WHERE SAMPLED:

TEXTURE: Porphyroclastic

GRAIN SIZE: Medium

OBSERVER: OZA

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	1	2	0.1-0.5		Anhedral	Enclosed by or rimming opaque, altered into brownish clay.
Plagioclase	48	51	0.5-5.0		Anhedral	Recrystallized into smaller neoblast.
Clinopyroxene	30	35	0.3-5.0		Subhedral-anhedral	Rarely enclose opx patches, comonly shows (001) exsolution.
Spinel/Fe-Ti oxide	12	12	0.05-2.0		Euhedral-anhedral	Plag or cpx inclusions are euhedral (including sulphides).
Orthopyroxene	1	2	0.1-0.5		Anhedral	Patches in cpx. Some are probably inverted pigeonite, which occurs in px aggregate.
SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING				COMMENTS
Clays	1	Ol				Brown.
Chlorite	2	Plag				Green, veining and rimming plag.
Actinolite/Tremolite	3	Cpx, opx				Replacing cpx rim, also replaces cpx.
Brown-green hornblende	2	Cpx				Replacing cpx rim.
Biotite	Tr					Reddish brown, occurs near opaque mineral.

COMMENTS: Slightly deformed and shows porphyroclastic appearance. Opaque mineral, cpx and plag show preferred orientation, which is parallel to the deformation foliation.

THIN SECTION DESCRIPTION

118-735B-49R-1 (Piece 3B, 42-46 cm)

ROCK NAME: Fe-Ti oxide

WHERE SAMPLED:

TEXTURE: Anhedral granular

GRAIN SIZE: Medium

OBSERVER: OZA

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	0.1	1.3	0.2-1.0		Anhedral	Mostly altered into yellowish-brown clay, always in contact with opaque.
Plagioclase	49.5	51.5	0.4-10.0		Anhedral	Wavy extinction, locally recrystallized.
Clinopyroxene	26.6	31.0	0.3-5.0		Subhedral-anhedral	Rarely containing opx clots, exsolution lamellae parallel to (001) and (100), showing complex intergrowth.
Fe-Ti oxide	15.0	15.6	0.1-5.0		Anhedral-euhedral	Anhedral: encloses round cpx crystals. Euhedral: small inclusion in plag, cpx.
Orthopyrene (?)	0.1	0.1	0.1-0.5		Anhedral	Enclosed by cpx. Some have (001) cpx lamellae.
Brown hornblende	0.5	0.5	0.1-1.0		Anhedral	Inverted pigeonite? In cpx or rimming cpx.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	0.8	Ol				Yellowish dark brown, replacing ol along cracks.
Carbonate	0.4	Ol				Replacing core of ol.
Green hornblende/ actinolite	6.4	Cpx				Replacing cpx rim, also as clots or veinlets in plag. Some recrystallized neoblasts.
Plagioclase	0.6	Plag				Rimming cpx.
Mica or talc	Tr	Cpx				

COMMENTS: Cpx has low-Ca pyroxene clots which show the same C-axis orientation as the host cpx. They commonly occur at the core of cpx, but rarely as isolated grains. Cpx has hematite or ilmenite exsolution lamellae. Weak shape orientation of plag, opaque and cpx is apparent. Percentages based on 2000 point counts.

THIN SECTION DESCRIPTION

118-735B-49R-2 (Piece 1A, 89-91 cm)

ROCK NAME: Ilmenite gabbro

WHERE SAMPLED:

TEXTURE: Anhedral granular

GRAIN SIZE: Medium

OBSERVER: OZA

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	—	1	0.1-0.3		Anhedral	Rimming opaque, commonly between cpx and opaque, mostly replaced.
Plagioclase	47	60	0.5-15.0		Subhedral-anhedral	Locally granulated, veined by carbonate and amphibole.
Clinopyroxene	25	35	0.5-8.0		Subhedral-euhedral	(001) exsolution common, some have opx patches.
Fe-Ti oxide	10	10	0.1-4.0		Anhedral	Some inclusions in cpx are euhedral.
Orthopyroxene	1.5	3	0.1-4.0		Anhedral	Patches in cpx, also large isolated grains among cpx, some grains show varying exsolution.
Inverted pigeonite						
Reddish brown hornblende	0.5	1	0.1-0.5		Anhedral	Primary? Commonly in contact with opaque or replacing cpx.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	1	Cpx, ol				Green when replacing cpx, brown when replacing ol.
Carbonate	3	Opx, ol				Replacing opx and ol.
Actinolite	7	Cpx, vein				Replacing cpx, in places perfectly, veining plag.
Hornblende	5	Cpx				Brown to green, replacing cpx.

COMMENTS: Slightly deformed. Complex cpx intergrowths.

THIN SECTION DESCRIPTION

118-735B-50R-2 (Piece 1B, 43-47 cm)

ROCK NAME: Fe-Ti oxide gabbro

WHERE SAMPLED:

TEXTURE: Anhedral granular

GRAIN SIZE: Medium to coarse

OBSERVER: BLM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	0.1	0.5	0.2-0.6		Anhedral	Usually in or near oxide.
Plagioclase	36.6	37	0.4-1.5		Subhedral-anhedral	Undulose, broken sutured margins.
Clinopyroxene	15.8	38	0.2-5.0		Anhedral	Bent, broken, sutured boundaries with plag.
Oxide	21.9	22.5	0.1-4.0		Anhedral	Poikilitically encloses ol. Cpx on large grains, interstitial or smaller.
Orthopyroxene	1.0	2	1-3		Anhedral	Present at the core of cpx, (001) lamellae apparent. Inverted pigeonite?

SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING	COMMENTS
Clays	0.4		Veins, fractures, small clots around oxides, ol.
Actinolite	23	Cpx	21.7% after cpx, pale green patches and needles, 1.3% in veins and patches.
Hornblende	1	Cpx	Dark green, brown amphibole, well-crystallized, replacing cpx.
Talc	0.1	Ol	Around ol.
Tremolite	0.1	Ol	Needle-like aggregates replacing ol.

COMMENTS: Slight deformation.

THIN SECTION DESCRIPTION

118-735B-50R-4 (Piece 1C, 87-89 cm)

ROCK NAME: Ilmenite gabbro

WHERE SAMPLED:

TEXTURE: Allotriomorphic granular

GRAIN SIZE: Coarse

OBSERVER: KEM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	59.0	73	1.5-8.0		Anhedral-euhedral	Some inclusion in cpx.
Clinopyroxene	15.2	21	1.0-4.0		Anhedral	Contains exsolution of opx.
Ilmenite	6.0	6	0.1-1.5		Anhedral, equant	Ilmenite-magnetite intergrowths, include some pyrite, pyrrhotite, chalcocopyrite (approximately 0.5%).
Orthopyroxene	0.1	(?)				Exsolution from low-Ca pyroxene? as well as thin exsolution in cpx.

SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING	COMMENTS
Chlorite	0.5	Plag	Replaces plag generally around Fe-oxides.
Plagioclase	14.2	Plag	Neoblasts.
Brown amphibole	1.5	Cpx	Replaces along grain boundaries.
Green amphibole	3.5	Cpx, brown amphibole	Replaces brown amphibole and cpx, often around Fe-oxides.

COMMENTS: Two px crystals show a complex exsolution relation probably reflecting a low-Ca pyroxene precursor (pigeonite?). This exsolution relationship includes a bleb-like inclusion of cpx and opx. The opx then has a wormy exsolution of cpx(?). Magnetite in ilmenite-magnetite intergrowths has ilmenite exsolution lamellae. Primary ilmenite is surrounded by later magnetite. Percentages based on 591 point counts.

THIN SECTION DESCRIPTION

118-735B-51R-1 (Piece 1E, 102-104 cm)

ROCK NAME: Ilmenite gabbro

WHERE SAMPLED:

TEXTURE: Allotriomorphic granular

GRAIN SIZE: Coarse

OBSERVER: KEM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	58.5	70	0.5-8.0		Anhedral	Partially recrystallized to neoblasts, some plastic deformation.
Clinopyroxene	12.0	23	2.0-6.0		Anhedral	Partially replaced by amphibole.
Ilmenite	7.5	7	1.0-2.0		Anhedral	Ilmenite-magnetite intergrowths; includes pyrrhotite, pyrite, chalcopyrite, although pyrrhotite is rare.

SECONDARY MINERALOGY	PERCENT	REPLACING/FILLING	COMMENTS
Chlorite	0.5	Plag	Partially replacing plag and filling some veins.
Plagioclase	12.0	Plag	Neoblasts.
Green amphibole	7.0	Cpx	Rimming brown amphibole, replacing cpx and in veins.
Brown amphibole	2.0	Cpx	This is not the same sort of amphibole associated with late stage magmatic processes and/or ilmenite ie. hbd zoned to green amphibole (actinolite) at rims. Occurs in veins.
Colorless amphibole	0.5	Cpx	May be very pale green amphibole.
Opaques	Tr	Cpx	In cracks and along cleavage.

COMMENTS: Percentages based on 1014 point counts.

THIN SECTION DESCRIPTION

118-735B-52R-3 (Piece 2F, 121-123 cm)

ROCK NAME: Meta-FeTi gabbro

WHERE SAMPLED:

TEXTURE: Orthocumulate, cataclastic

GRAIN SIZE: Medium

OBSERVER: STA

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	1	3				
Plagioclase	50	60	0.5-3.0			
Clinopyroxene	25	37	2.0-5.0			
Sulphides	<0.5					Pyrite, chalcopyrite, pyrrhotite.
Oxides	<1					Ilmenite-magnetite intergrowths.

SECONDARY MINERALOGY	PERCENT	REPLACING/FILLING	COMMENTS
Chlorite	1	Plag	
Albite	9	Plag	Anastomosing along fractures.
Actinolite	2	Ol	Green to colorless, tremolite.
Hornblende	10	Cpx	Green to brown.
Talc	1		Bright green, speckled extinction.
Clinopyroxene	1	Cpx	Neoblasts; along grain boundaries with brown hbd.

COMMENTS: Relicts of ol are coated by dark oxide. Margins of pseudomorphs are a skirt of green to colorless amphibole, other oxide patches contain a colorless mica. The latter may be primary ilmenite and have a skirt of green to brown pleochroic hbd similar to replacement phase for cpx. Some grains may be an altered ol enclosed by ilmenite. Part of the slide shows cataclastic deformation and recrystallization.

THIN SECTION DESCRIPTION

118-735B-52R-4 (Piece 3, 42-45 cm)

ROCK NAME: Ilmenite gabbro

WHERE SAMPLED: Contact between leuco-microgabbro and ilmenite gabbro (see previous description)

TEXTURE: Allotriomorphic granular

GRAIN SIZE: Coarse

OBSERVER: KEM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	40	45	5.0-10.0		Anhedral	
Clinopyroxene	20	40	5.0-10.0		Anhedral	
Ilmenite	15	15	2.0-4.0		Anhedral	Ilmenite-magnetite/sulphide intergrowths with rounded pyrite.
SECONDARY MINERALOGY	PERCENT	REPLACING/FILLING				COMMENTS
Chlorite	1	Plag				
Epidote	< 1					clinzoisite. Fills veins and some interstitial spaces
Plagioclase	5	Plag				Neoblasts and some replacement by another plag.
Green amphibole	18					Actinolite fibres overgrown by blue-green amphibole
Brown amphibole	1					

COMMENTS: Gabbro adjacent to dike has reacted mineralogically. Plag near the vein is altering along anastomosing zones, presumably to the dike plag composition. Cpx has an overgrowth of pyroxene of the vein composition on the vein side. Cpx adjacent to the vein is most extensively altered, as is plag. Possibly pyrite in cpx exsolution lamellae

THIN SECTION DESCRIPTION

118-735B-52R-4 (Piece 3, 42-45 cm)

ROCK NAME: Contact between leuco-microgabbro and ilmenite gabbro

WHERE SAMPLED:

TEXTURE: Allotriomorphic granular

GRAIN SIZE: Medium

OBSERVER: KEM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	75	75	1-2		Subhedral	
Clinopyroxene	20	25	1-2		Anhedral	Very pale green color, probably Fe-rich composition.
SECONDARY MINERALOGY	PERCENT	REPLACING/FILLING				COMMENTS
Epidote	1	Veins				Clinzoisite rather than epidote; veins and interstitial.
Green amphibole	4					Replaces cpx along grain boundaries.

THIN SECTION DESCRIPTION

118-735B-52R-4 (Piece 4B, 88-94 cm)

ROCK NAME: Fe-Ti oxide gabbro

WHERE SAMPLED:

TEXTURE: Anhedral granular

GRAIN SIZE: Medium

OBSERVER: BLM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine						Completely altered to carbonate + opaque.
Plagioclase	38.4	44	0.2-4.0		Subhedral	Undulose, granulated on margins.
Clinopyroxene	24.9	42	0.5-4.0		Subhedral	Undulose, ragged edged. Opx patches present.
Oxide	11.2	12	1.0-6.0	Fe-Ti	Anhedral	Anhedral elongate grains, interstitial and enclosing cpx and plag.
SECONDARY MINERALOGY	PERCENT	REPLACING/FILLING				COMMENTS
Clays	0.2					Cpx, veins.
Carbonate	Tr					In pseudomorphs of cpx or ol, in and by oxide.
Chlorite	Tr					With actinolite.
Actinolite	15	Cpx				2-3% in veins through rock, remainder as patches and aggregates after cpx.
Hornblende	5.6	Cpx				Dark green and brown, well-crystallized, cpx rims and in veins.
Plagioclase	4.2	Plag				< 0.1 mm neoblasts along margins of larger veins.
Talc/Tremolite	0.5	Ol				Largely talc aggregates after ol; very irregular patches.

COMMENTS: Moderately deformed. Distinct foliation defined by elongation of pyroxene, amphibole, oxide. Extensive fine, grain boundary granulation and recrystallization; may be some opx, but not much. Amphibole is very dark green to brown, a high temperature vein-fill and cpx replacement. Percentages based on 1400 point counts.

THIN SECTION DESCRIPTION

118-735B-53R-1 (Piece 2L, 47-54 cm)

ROCK NAME: Oxide-rich gabbro

WHERE SAMPLED:

TEXTURE: Foliated

GRAIN SIZE: Medium

OBSERVER: STA

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	1	3				
Plagioclase	40	50				Deformed and recrystallized.
Clinopyroxene	24	32				Recrystallized.
Ilmenite	14	15				

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	1	Ilmenite	Dark brown.
Chlorite	Tr	Plag	Intense bright green.
Albite	1	Plag	Occurs along anastomosing fractures.
Tremolite	1	Ol	Possibly mixed with an orthoamphibole.
Hornblende	5	Cpx, plag	Highly pleochroic. Brown cores and green rims.
Plagioclase	9	Plag	Neoblasts.
Cpx	3	Cpx	Neoblasts.
Talc	1	Ol	

COMMENTS: Recrystallized zones of plag and cpx define a metamorphic foliation which is not really pervasive. The alteration is very heterogeneous across the slide.

THIN SECTION DESCRIPTION

118-735B-53R-3 (Piece 1G, 113-117 cm)

ROCK NAME: Fe-Ti oxide-bearing gabbro

WHERE SAMPLED:

TEXTURE: Porphyroclastic

GRAIN SIZE: Variable, very fine to medium

OBSERVER: HEB

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	10	45	<5			Recrystallized. Porphyroclasts highly strained. Late cracks filled with ilmenite and green amphibole.
Clinopyroxene	30	50	<6			Recrystallized. Porphyroclasts. Only partially replaced by green to brown amphibole.
Ilmenite	3	5	<3		Anhedral	Largely in intergranular space. Deformed along with the brown amphibole.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Epidote	Tr	Plag	Anomalous birefringence, pinkish in plane light. Partially recrystallized in actinolite. Dirty crystals as granoblasts and very small neoblasts in a vein, epidote + actinolite + magnetite.
Plagioclase	35	Plag	Neoblasts, <0.5 mm in size.
Clinopyroxene	1	Cpx	Neoblasts, <0.3 mm in size.
Amphibole	14	Cpx	Brown. Abundant, idioblastic. Occur with ilmenite crystals in intergranular spaces.
Amphibole	5	Amphibole	Blue-green. Clearly rim the brown amphibole.
Ilmenite/magnetite	2	Oxides	Mostly ilmenite with lesser magnetite. Associated with interstitial ilmenite and brown amphibole.

COMMENTS: Veins bearing a deformation: greenschist assemblage: albite-epidote-actinolite-magnetite-sulfides. See following description. Here, Ti-amphibole is largely derived from Ti diffusion from "abundant" oxides and from cpx.

THIN SECTION DESCRIPTION

118-735B-53R-5 (Piece 3, 40-43 cm)

ROCK NAME: Gabbro, trondhjemite

WHERE SAMPLED: Contact between gabbro and trondhjemite

TEXTURE: Allotriomorphic granular

GRAIN SIZE: Gabbro: coarse; trondhjemite: medium

OBSERVER: KEM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
GABBRO						
Olivine	2	10	5		Anhedral	
Plagioclase	40	60	5-10		Anhedral	
Clinopyroxene	10	15	3-8		Anhedral	Partially replaced by brown and green amphibole. Percentage includes both ilmenite and magnetite, intergrowths with sulfides (pyrite-pyrrhotite-chalcopyrite).
Ilmenite	13	15	1-3		Anhedral	
Pyrite	Tr	Tr			Anhedral	
SECONDARY MINERALOGY						
		REPLACING/ FILLING				COMMENTS
GABBRO						
Mica	2	Ilmenite/ magnetite		Phlogopite(?) and unidentified green mica (green phlogopite?).		
Plagioclase	20	Plag		Neoblasts.		
Amphibole	5	Ol		Colorless.		
Amphibole	5	Cpx, amphibole		Green. Replaces brown amphibole. Also occurs in veins.		
Amphibole	Tr	Cpx		Brown.		
Magnetite	3	Ol		"Reaction zone" magnetite.		
TRONDHJEMITE						
		REPLACING/ FILLING	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	75	75	0.1-1.0		Euhedral-subhedral	Zoned. Blocky crystals with ≈0.02 mm wide overgrowths.
Quartz	20	20	0.3-1.0		Anhedral	Largely appears interstitial to plag.
Biotite	2	2	0.1-2.0		Anhedral	Encloses euhedral plag or appears interstitial.
Magnetite	1	1	0.05-0.10			
Clinopyroxene	1	2	0.2-0.5			Completely replaced by amphibole. Probably xenocrysts from gabbro.
SECONDARY MINERALOGY						
		REPLACING/ FILLING				COMMENTS
TRONDHJEMITE						
Chlorite	Tr	Biotite		Partially replaces biotite.		
Amphibole	1	Cpx		Colorless. Replaces xenocrystic cpx.		
Amphibole	Tr	Cpx		Green. Interstitial and replacing some cpx.		

COMMENTS: No primary ol in gabbro, but inferring from the concentrated masses of colorless amphibole + magnetite, it probably was originally present. Some cpx in trondhjemite may actually be primary. Subsequent to description above, a single cpx grain enclosed in euhedral plag crystal was observed. Adjacent to contact, ilmenite is surrounded by secondary mica, possibly phlogopite. This brown mica is replaced or is zoned to a greenish mica with low second order interference colors, 2Vx = 5°. Some secondary pyrite occurs in alteration zones.

THIN SECTION DESCRIPTION

118-735B-54R-1 (Piece 8B, 131-136 cm)

ROCK NAME: Fe-Ti oxide-bearing olivine gabbro

WHERE SAMPLED:

TEXTURE: Porphyroclastic

GRAIN SIZE: Medium to coarse

OBSERVER: CAN

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	10	15	1-/3		Subhedral-anhedral	Locally recrystallized.
Plagioclase	34	54	2-10		Anhedral-subhedral	Locally recrystallized.
Clinopyroxene	18	23	2-4		Subhedral-anhedral	Relatively fresh and undeformed.
Fe-Ti oxide	5	5	1		Anhedral-subhedral	Occurs in rims of brown amphibole and mica.
Orthopyroxene	Tr	1(?)	1-2(?)		Anhedral	Rimming ol.
Apatite	2	2	0.1-0.5		Euhedral-subhedral	Commonly accompanied by opaques.
SECONDARY MINERALOGY	PERCENT	REPLACING/FILLING				COMMENTS
Actinolite	2	Plag, ol, opx				Small flakes in plag and in replacement rims of ol and opx.
Olivine	2	Ol				Recrystallized, 0.1 mm in size.
Hornblende	2	Cpx				Brown. Completely replaced by blue-green amphibole.
Plagioclase	16	Plag				Recrystallized, 0.1 mm in size.
Biotite rock.	3					Hydrothermal (?) Brown. Occurs throughout the rock.
Amphibole	3	Hydrothermal(?)				Hydrothermal (?) Blue-green. Occurs throughout the rock, especially around ol and cpx.
Tremolite, opaques	3	Ol, opx				Replacement rims.

COMMENTS: Moderate to extensive plastic deformation.

THIN SECTION DESCRIPTION

118-735B-54R-5 (Piece 5, 117-119 cm)

ROCK NAME: Fe-Ti oxide

WHERE SAMPLED:

TEXTURE: Allotriomorphic granular

GRAIN SIZE: Coarse

OBSERVER: KEM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	0.5	3	0.2-0.8		Anhedral	Partially enclosed in cpx or wrapped around grain boundaries.
Plagioclase	25	37	3-10		Anhedral	Partially recrystallized.
Clinopyroxene	44.9	49	4-10		Anhedral	
Oxides	9.7	10	1-3	Fe-Ti	Equant	Percentage includes magnetite and ilmenite and pyrrhotite/pyrite/chalcopyrite intergrowths.
Orthopyroxene	0.5	<1				Exsolution from cpx.
SECONDARY MINERALOGY	PERCENT	REPLACING/FILLING				COMMENTS
Clays	1.8	Ol				Brown.
Clays	Tr	Cpx				Bright green, in cpx.
Plagioclase	10.3	Plag				Neoblasts.
Amphibole	1.8	Cpx				Brown. Patchy replacement of cpx.
Amphibole	5.4	Veins				Green. In veinlets. Some blue-green amphibole.

COMMENTS: Ol occurs along cpx grain boundaries in chains of small crystals, often sandwiched inbetween cpx and Fe-Ti oxides.

THIN SECTION DESCRIPTION

118-735B-54R-3 (Piece 7, 125-127 cm)

ROCK NAME: Fe-Ti oxide-rich olivine gabbro

WHERE SAMPLED:

TEXTURE: Weakly foliated

GRAIN SIZE: Medium to coarse

OBSERVER: CAN

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	15	20	1-4		Anhedral	Kinked, slightly recrystallized. Replacement rims (see below).
Plagioclase	22	45	1-4		Subhedral	Recrystallized, kinked.
Clinopyroxene	12	25	1-4		Subhedral-anhedral	Partially replaced by brown amphibole.
Fe-Ti oxide	10	10		Fe-Ti	Anhedral	Occurs in rims of brown amphibole and brown mica.
SECONDARY MINERALOGY	PERCENT	REPLACING/FILLING				COMMENTS
Clays	Tr	Ol				Brown, occurs along cracks in the ol.
Amphibole	10	Cpx, hbd				Brown-green to green.
Plagioclase	23	Plag				Recrystallized, 0.1-0.2 mm crystals.
Olivine	3	Ol				Recrystallized, 0.1-0.2 mm crystals.
Mica	Tr	Fe-Ti oxide(?)				Occurs in rims of Fe-Ti oxides.
Tremolite, opaques	2	Ol				Rims ol.

COMMENTS: Ol grains are rimmed by cpx and/or opx. Plastic deformation imprint is clear: kinked and recrystallized plag and ol. But original magmatic character of the foliation is apparent in the preferred shape fabric of euhedral primary plag and cpx crystals.

THIN SECTION DESCRIPTION

118-735B-55R-1 (Piece 7, 124-128 cm)

ROCK NAME: Amphibolitized Fe-Ti oxide gabbro

WHERE SAMPLED:

TEXTURE: Slightly crushed

GRAIN SIZE: Medium

OBSERVER: CAN

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	—	5(?)				Tremolite + opaque replacement alter ol(?).
Plagioclase	35	50(?)	1-6		Anhedral-subhedral	Crushed and replaced by actinolite.
Clinopyroxene	25	40	1-5		Anhedral	Replaced by amphibole.
Orthopyroxene	1	3(?)				Replaced by amphibole.
Fe-Ti oxide	2	2	1-3		Anhedral	Replaced by sphene.
SECONDARY MINERALOGY	PERCENT	REPLACING/FILLING				COMMENTS
Clays	1	Mafics				Oxidized mafic minerals (ol?).
Actinolite	10	Plag, mafics				Mafics (cpx).
Sphene	1	Fe-Ti oxide				Rims.
Hornblende	1	Cpx, oxides				Brown. Replaced by blue-green amphibole.
Amphibole	20	Plag, mafics				Blue-green. Replacing cpx, etc.
Tremolite, opaques	4	Mafics				Replacing ol(?).

COMMENTS: No significant plastic deformation but the rock was a bit crushed during replacement by hydrous phases.

THIN SECTION DESCRIPTION

118-735B-55R-2 (Piece 4, 101-105 cm)

ROCK NAME: Fe-Ti oxide gabbro

WHERE SAMPLED:

TEXTURE: Anhedra granular

GRAIN SIZE: Coarse

OBSERVER: CAN

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	1	<3	0.1-1.0		Anhedra, polygonal	Often as rims around Fe-Ti oxides.
Plagioclase	40	60	4		Euhedral	Partially recrystallized.
Clinopyroxene	23	25	0.2-4.0		Anhedra	Partially replaced by amphibole and px.
Oxides	7	7	0.2-4.0	Fe-Ti	Anhedra-subhedra	
Orthopyroxene	5	45	2-3		Anhedra	In cpx as patches.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	1	Ol	
Actinolite	5	Plag	
Hornblende	2	Cpx	Green.
Plagioclase	15	Plag	Recrystallized in small, <0.2 mm polygons.
Mica	Tr	Oxide	Brown. Occurs around Fe-Ti oxides.
Talc, tremolite, opaques	1	Ol	Rims ol and occurs in clusters.

COMMENTS: The deformation is very limited to some recrystallization of plag. No pervasive foliation, and the magmatic, euhedral shape of plag is often preserved.

THIN SECTION DESCRIPTION

118-735B-55R-3 (Piece 5, 130-133 cm)

ROCK NAME: Foliated gabbro

WHERE SAMPLED:

TEXTURE: Porphyroclastic

GRAIN SIZE: Medium

OBSERVER: CAN

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	55	510				In clusters of small grains.
Plagioclase	9	56				Almost completely recrystallized into polygons.
Clinopyroxene	23	24(?)	1-4			Little grains replaced by actinolitic amphibole.
Orthopyroxene	1	1(?)				Small, rounded grains.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Actinolite	5	Plag, cpx	Small flakes around cpx and in plag mosaic.
Hornblende	<1	Oxides	Brown. Occurs around Fe-Ti oxides.
Plagioclase	43	Plag	Recrystallized grains, 0.1 mm in size.
Olivine	<5	Ol	Recrystallized grains, 0.1 mm in size.
Mica	Tr	Oxides	Brown. Replacing trace amounts of Fe-Ti oxides.

COMMENTS: Moderate deformation. Recrystallized and kinked plag and ol crystals indicate that the foliation corresponds to plastic deformation. Deformation could be mistaken for a magmatic lamination. Possibly weakly deformed magmatic lamination.

THIN SECTION DESCRIPTION

118-735B-56R-2 (Piece 1B, 11-14 cm)

ROCK NAME: Mylonitic Fe-Ti oxide gabbro

WHERE SAMPLED:

TEXTURE: Mylonitic

GRAIN SIZE: Very fine

OBSERVER: CAN

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	—	3			Anhedral	Primary ol is completely recrystallized.
Plagioclase	—	64			Anhedral	Primary plag is recrystallized with the exception of a few grains.
Clinopyroxene	22	22			Augen	A few recrystallized grains.
Orthopyroxene	1	1			Anhedral	Trails of cpx augens. Also disseminated in plag mosaic.
Fe-Ti oxides	10	10			Anhedral	Possibly primary ilmenite + magnetite + pyrite widely dispersed.
SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING				COMMENTS
Actinolite	3	Plag, ol, opx(?)				Small flakes in the mosaic.
Hornblende	Tr	Fe-Ti oxide				Brown. Rimming Fe-Ti oxides.
Plagioclase	57	Plag				Recrystallized grains, 50-200 μ m.
Mica	Tr	Fe-Ti oxides				Brown. Occasional flakes around Fe-Ti oxides.
Olivine	7	Ol				Recrystallized grains, 50-200 μ m.
Magnetite	Tr	Ol				Near ol in amphibole alteration rims.

COMMENTS: Intense deformation with recrystallization of ol, plag, and opx. Virtually no replacement of cpx by amphiboles.

THIN SECTION DESCRIPTION

118-735B-56R-2 (Piece 14, 144-146 cm)

ROCK NAME: Amphibolitized mylonitic gabbro

WHERE SAMPLED:

TEXTURE: Mylonitic

GRAIN SIZE: Fine

OBSERVER: CAN

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	—					None left. Possibly replaced by actinolite.
Plagioclase	—	60				Entirely recrystallized.
Clinopyroxene	15					Rounded augen.
Orthopyroxene	6					Rounded augen.
Fe-Ti oxides	10			Fe-Ti		Ilmenite and magnetite + traces of pyrite. Disseminated grains in rims of brown or green amphibole. Widely dispersed in granulated matrix.
SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING				COMMENTS
Chlorite	3	Plag				In mesh with actinolite. Replacement of plag neoblasts and ol(?).
Actinolite	24	Cpx, plag, ol(?), opx				
Hornblende	3	Cpx, oxides, opx(?)				Brown. Replaced by actinolitic amphibole.
Plagioclase	39	Plag				Recrystallized grains, 0.05-1.00 mm in size.
Clinopyroxene	Tr	Cpx				Recrystallized grains, = 0.05 mm in size.

COMMENTS: Oriented thin section. Intense plastic deformation was followed by static replacement of primary mineral by hydrous phases, actinolite and chlorite.

THIN SECTION DESCRIPTION

118-735B-56R-3 (Piece 26, 101-103 cm)

ROCK NAME: Amphibolitized gabbro

WHERE SAMPLED:

TEXTURE: Granular

GRAIN SIZE: Medium to coarse

OBSERVER: PTR

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	40	63	.1-2			Partially recrystallized neoblasts. Replaced by brown hbd.
Clinopyroxene	15	35	1-9			
Fe-Ti oxide	2	2?	1-5			
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Chlorite	Tr	Plag				Replacing plag with zoisite. Replacint plag.
Epidote/zoisite	2	Plag				
Actinolite	Tr	Hbd				Brown with minor green, replaces cpx. Small neoblasts between larger crystals. Along small veins.
Sphene	Tr	Hbd?				
Hornblende	20	Cpx				
Plagioclase	20	Plag				
Albite	1	Plag				

COMMENTS: Fe-Ti gabbro. Slight granulation of plag. Cpx extensively rimmed and replaced by brown to dark green amphibole. High temperature replacement?

THIN SECTION DESCRIPTION

118-735B-57R-2 (Piece 3E, 135-138 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE: Subhedral granular

GRAIN SIZE: Medium to coarse

OBSERVER: BLM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	2	5	= 1		Anhedral	
Plagioclase	52	57			Anhedral	
Clinopyroxene	15	38	< 2 cm		Anhedral	
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	2	Plag				Some along fractures in ol. Possibly after ol. Minor. Occurs along fractures in plag.
Chlorite	8	Cpx				
Albite	3	Plag				
Actinolite	15	Cpx				
Talc/tremolite	2	Ol				
Oxides	1	Ol				

COMMENTS: Slight deformation: undulose extinction in plag, spindle twins, and slight annealing and suturing of boundaries.

THIN SECTION DESCRIPTION

118-735B-57R-3 (Piece 10, 44-48 cm)

ROCK NAME: Albitized gabbro

WHERE SAMPLED:

TEXTURE:

GRAIN SIZE: Coarse

OBSERVER: CAN

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	—	3(?)				Replacement zones with the usual replacement products of ol.
Plagioclase	30	80				Slightly crushed. The crushed fragments are classified with the secondary mineralogy.
Clinopyroxene	5	15-20				
SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING				COMMENTS
Clays	< 1	OI(?)				Cores of replacement zones.
Chlorite	< 1	Plag				Patches close to replacement zones.
Albite	30	Plag				Replaces plag along the microfractures.
Epidote	< 1	Plag				Epidote, zoisite, and clinozoisite. In veins and in crushed zones in plag. Hydrothermal(?).
Hornblende	15	Cpx				Brownish green. Hydrothermal(?).
Plagioclase	10	Plag				Crushed grains.
Mica	< 1					Brown. Two or three 1 mm grains in the crushed plag. Hydrothermal(?)
Mica, tremolite, opaques	≤ 2	OI(?)				Clays + opaques and tremolite + white mica + actinolite are likely replacement products of ol.

COMMENTS: Protolith probably ol-bearing gabbro. Intense albitization of plag and amphibolitization of cpx. Very little crushing.

THIN SECTION DESCRIPTION

118-735B-58R-1 (Piece 9, 44-46 cm)

ROCK NAME: Altered gabbro

WHERE SAMPLED:

TEXTURE: Altered, highly crushed

GRAIN SIZE: Medium

OBSERVER: CAN

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	40					Crushed, patches of carbonate.
Clinopyroxene	17					Replaced by amphibole.
SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING				COMMENTS
Carbonate	15	Plag				Patches especially in plag.
Epidote (zoisite)	8	Plag				In plag crushed area.
Brown-green amphibole	20	Cpx				

COMMENTS: Carbonate, epidote, etc., are probably more hydrothermal than in situ replacement. Highly crushed. Section contains huge hole, therefore modal percentages are probably inaccurate.

THIN SECTION DESCRIPTION

118-735B-58R-2 (Piece 1C, 33-35 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE: Faint magmatic lamination

GRAIN SIZE: Medium to fine

OBSERVER: CAN

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	10	15	1.0-4.0		Anhedral	Replaced by tremolite and opaques.
Plagioclase	77	78	1.0-2.0		Euhedral-subhedral	
Clinopyroxene	5	7	1.0-3.0		Anhedral	Fresh, undeformed. Replaced by some amphibole.
SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING				
Brown hornblende	1					
Tremolite	3	OI				
Opaque	2	OI				
Green amphibole	2	Cpx, plag, brown amphibole				

COMMENTS: No plastic deformation; the observed foliation is a magmatic lamination. Oriented thin section.

THIN SECTION DESCRIPTION

118-735B-58R-3 (Piece 1F, 107-114 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE: Subhedral granular

GRAIN SIZE: Coarse

OBSERVER: MEY

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	9.8	10.4	2.0-12.0		Anhedral	Kink bands.
Plagioclase	57.8	58	2.0-15.0		Subhedral	
Clinopyroxene	30.6	30.8	2.0-12.0		Subhedral	Cpx-cpx intergrowths, bleb-like exsolution in some grains, curved twin lamellae.
Fe-Ti oxide	0.2	0.2	0.1-1.5		Anhedral	Interstitial, forms symplectic intergrowth with opx.
Orthopyroxene	0.5	0.5	1.0		Anhedral	Rims around ol and interstitial.
Sulphide	Tr	Tr	<0.1		Anhedral, blebs	Near grain boundaries.
SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING				COMMENTS
Clays	0.1	Ol				Deep green clay veining ol.
Actinolite/tremolite	0.5	Ol				Rims around ol and filling veins.
Magnetite	0.2	Cpx, ol				Blebs in cpx and associated with tremolite replacing ol.
Margarite?	0.2	Plag				Associated with tremolite reaction rim around ol.

COMMENTS: Primary Fe-Ti oxide, opx and hbd are late-stage crystallization products of trapped liquid. Percentages based on 2000 point counts.

THIN SECTION DESCRIPTION

118-735B-59R-4 (Piece 1C, 29-35 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE: Allotriomorphic granular

GRAIN SIZE: Very coarse

OBSERVER: KEM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	7	7	1.0-3.0		Anhedral	
Plagioclase	52.5	53	1.0-10.0		Anhedral	Subhedral where enclosed in cpx.
Clinopyroxene	40	40	2.0-8.0		Anhedral	Subophitically encloses plag. Locally rimming ol.
Opaque	0.1	Tr	0.1-0.5	Ilmenite, sulfides	Anhedral	Inclusions in plag, and rimming ol, cpx.
Orthopyroxene	Tr	Tr			Anhedral	Exsolution from cpx, and rimming ol.
SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING				COMMENTS
Clays	0.1	Ol				
Magnetite	0.1	Ol				Veining ol.
Green amphibole	0.2	Cpx				
Brown amphibole	Tr	Cpx				

COMMENTS: Mesocumulate. Very fresh. Percentages based on 2003 point counts.

THIN SECTION DESCRIPTION

118-735B-59R-3 (Piece 1D, 70-72 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE: Cumulate

GRAIN SIZE: Medium

OBSERVER: CAN

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	6	6	0.5-2.0		Anhedral	Very slightly altered.
Plagioclase	74	74	2.0-6.0		Subhedral-euhedral	Almost unaltered.
Clinopyroxene	20	20	2.0-6.0		Anhedral	Almost unaltered.
Opauques	Tr	Tr	0.1-0.3		Subhedral-anhedral	Inclusions in plag and interstitial to plag and cpx.
Hornblende	Tr	Tr	0.05-0.10		Anhedral	Brown, patches in cpx.
Orthopyroxene	Tr	Tr	0.2		Anhedral	Rimming ol and cpx.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				
Actinolite	<1	Plag, cpx				
Tremolite	<1	Ol				
Opauques	<1	Ol				

COMMENTS: Cpx(?) rims along the ol-plag grain boundaries. No deformation.

THIN SECTION DESCRIPTION

118-735B-59R-3 (Piece 1D, 70-72 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE: Anhedral equigranular

GRAIN SIZE: 0.5-10.0 mm

OBSERVER: DCK

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	7	7	1.0-3.0		Anhedral	
Plagioclase	55	55	0.5-10.0		Anhedral-subhedral	
Clinopyroxene	38	38	1.0-10.0		Intergranular-subophitic	Granular to subophitic.
Sulphides	<1	<1	<0.1		Blebs	Interstitial and in cpx.
Orthopyroxene	Tr	Tr			Anhedral	Interstitial lenses on grain boundaries.
Amphibole	Tr	Tr			Anhedral	Interstitial lenses on grain boundaries.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				
Actinolite	<1	Plag				
Tremolite	<1	Ol				
Magnetite	<1	Ol				

THIN SECTION DESCRIPTION

118-735B-60R-1 (Piece 1B, 18-20 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE: Anhedral equigranular

GRAIN SIZE: 0.5-10.0mm

OBSERVER: DCK

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	15	15	1.0-3.0		Anhedral	
Plagioclase	55	55	1.0-7.0		Anhedral-subhedral	
Clinopyroxene	30	30	0.5-10.0		Subophitic	Subophitic.
Sulphides	<1	<1	<0.1		Blebs	Interstitial to plag, ol and cpx and as inclusions in cpx.
Orthopyroxene	Tr	Tr	0.1-0.3		Anhedral	Rimming cpx and ol.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Talc	Tr	Ol				
Magnetite	Tr	Ol				

COMMENTS: Very fresh olivine gabbro.

THIN SECTION DESCRIPTION

118-735B-60R-1 (Piece 1E, 80-83 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE: Hypidiomorphic granular

GRAIN SIZE: Coarse

OBSERVER: KEM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	5	5	5.0-12.0		Anhedral	
Plagioclase	65	65	1.0-15.0		Subhedral-euhedral	
Clinopyroxene	30	30	4.0-15.0		Anhedral	Subophitically to ophitically encloses plag.
Orthopyroxene	Tr					Occurs as thin lamellae and small patches in cpx.
Opauques	Tr				Anhedral	
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	Tr	Ol				Replaces along fractures.
Chlorite	Tr					In patch of actinolite replacing cpx.
Actinolite/ tremolite	Tr	Ol				Alteration at crystal boundaries.
Magnetite	Tr	Ol				
Brown amphibole	Tr	Cpx				
Actinolite	Tr	Cpx, plag				

COMMENTS: Mesocumulate.

THIN SECTION DESCRIPTION

118-735B-61R-1 (Piece 3A, 81-83 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE: Hypidiomorphic granular

GRAIN SIZE: Very coarse

OBSERVER: KEM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	5	5	1.0-3.0		Anhedral	Occasionally surrounds plag subophitically.
Plagioclase	75	75	1.0-8.0		Subhedral	
Clinopyroxene	20	20	2.0-8.0		Anhedral	Ophitically encloses plag.
Ilmenite	<1					
Orthopyroxene	<1					Exsolution from cpx.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	Tr					Replacing of along crosscutting fractures.
Magnetite	<1	Ol				In alteration haloes around crystal.
Talc	<1	Ol				In alteration haloes around crystal.
Brown amphibole	<1	Cpx				Replaces patches in cpx and surrounds primary ilmenite.

COMMENTS: Cpx shows complex intergrowth/exsolution texture.
Percentages based on 1467 point counts:

Plagioclase	63.5	
Clinopyroxene	17.3	
Olivine	14.1	
Brown amphibole	0.4	
Smectite	0.4	
Opauques	1.0	In the following proportions:
		60% Pentlandite
		37% Chalcopyrite
		2% Pyrite
		1% Magnetite
Talc	1.7	
Chlorite	1.2	

THIN SECTION DESCRIPTION

118-735B-61R-1 (Piece 3A, 85-87 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE: Hypidiomorphic granular

GRAIN SIZE: Coarse

OBSERVER: KEM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	5.7	6	1.0-3.0		Anhedral	Partially altered to talc and magnetite.
Plagioclase	53.7	54	1.0-8.0		Subhedral	
Clinopyroxene	37.6	40	2.0-8.0		Anhedral	
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				
Clays	0.2	Ol				
Talc	0.1	Ol				
Magnetite	0.6	Ol				
Brown amphibole	0.7	Cpx				
Green amphibole	1.3	Cpx				

COMMENTS: Cpx exhibits a complex texture of exsolution of opx and intergrowth between adjacent crystals. Brown amphibole in trace amounts replacing cpx appears to associated with the exsolution texture in some way. Ol often has a thin layer of cpx around it, separating the ol from plag. Percentages based on 1035 point counts.

THIN SECTION DESCRIPTION

118-735B-62R-1 (Piece 3A, 91-94 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE: Anhedral granular

GRAIN SIZE: Coarse

OBSERVER: BLM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	7.9	8	2-8		Anhedral	Interstitial. Sometimes rimming cpx. Some adcumulus growth. Subophitic to ophitic. Inclusions of plag and rare ol.
Plagioclase	58.6	59	0.2-18.0		Anhedral	
Clinopyroxene	31.7	33	2-12		Anhedral	
Oxides	Tr	Tr				
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	Tr	Ol, cpx				In fractures.
Actinolite	1.2	Cpx				Rims along cleavage.
Talc/tremolite	0.3	Ol				Replacing ol, occurring with disseminated oxides.
Amphibole	0.3	Cpx				Clear blebs, intergrowths. Possibly part of a primary cpx intergrowth.

COMMENTS: Percentages based on 1800 point counts. No granulation, but plag has undulose extinction and some spindle twins. Ol is kinked.

THIN SECTION DESCRIPTION

118-735B-62R-3 (Piece 3B, 104-106 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE: Anhedral granular

GRAIN SIZE: Coarse

OBSERVER: BLM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	3	5	0.2-2.0		Anhedral	Intergranular.
Plagioclase	43	44	0.2-5.0		Anhedral	
Clinopyroxene	37	50	0.5-5.0		Anhedral	Intergranular to subophitic, rarely subhedral.
Spinel	1	1	1.0		Anhedral	Associated with an ol pseudomorph, but probably primary.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	1					Veins, fractures in cpx and ol pseudomorphs. With talc and tremolite.
Chlorite	<1	Ol				
Actinolite	8	Cpx				Fibrous rims on cpx, filling 0.1-0.2mm wide veins.
Talc/tremolite	2	Ol				Clear patches with blebby exsolution intergrown with cpx; could be a primary intergrowth. These patches have extinction angles less than 20°, suggesting they are an amphibole.
Amphibole	5	Cpx				

COMMENTS: Minicore end: undulose plag with a few tapering twins.

THIN SECTION DESCRIPTION

118-735B-63R-3 (Piece 3C, 80-82 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE: Anhedral granular

GRAIN SIZE: Coarse

OBSERVER: BLM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	10	11	0.5-10.0		Anhedral	Intergrown between plag-kinks.
Plagioclase	66	66	1.0-12.0		Anhedral	
Clinopyroxene	15	23	2.0-8.0		Anhedral	Intergranular, rarely ophitic, enclosing only plag.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	1					Along fractures in ol, dusting plag.
Actinolite	7	Cpx				Patchy replacement on rims. Fibrous, fine replacement along cleavages.
Talc/tremolite	1	Ol				
Opaques	Tr	Ol				

COMMENTS: Weak lamination defined by plag orientation.

THIN SECTION DESCRIPTION

118-735B-63R-5 (Piece 5A, 126-130 cm)

ROCK NAME: Olivine metagabbro

WHERE SAMPLED:

TEXTURE:

GRAIN SIZE: Coarse

OBSERVER: MEY

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	5.9	10.0			Anhedral	
Plagioclase	59.0	61.2			Subhedral-euhedral	Recrystallized at grain boundaries and in narrow shear zones.
Clinopyroxene	24.9	28.8			Subophitic	Numerous opaque and amphibole inclusions in cpx.
Opaque	Tr	Tr			Anhedral	
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	0.3	Ol				Dark green clay.
Carbonate	Tr	Vein				Filling fracture around which plag is albitized.
Chlorite	0.6	Plag				
Albite	1.6	Plag				Associated with veins running through plag.
Zoisite	Tr	Plag				
Actinolite/Tremolite	3.3	Ol				Forms reaction coronas around ol.
Hornblende	3.9	Cpx				Forms rims around cpx and symplectically intergrown with cpx margins.
Magnetite	0.5	Ol				In association with tremolite.

COMMENTS: Most significant feature is the common symplectite (wormy) intergrowth between amphibole and cpx at the margins of cpx.

THIN SECTION DESCRIPTION

118-735B-63R-6 (Piece 2B, 28-30 cm)

ROCK NAME: Amphibolitized olivine gabbro

WHERE SAMPLED:

TEXTURE: Slightly crushed

GRAIN SIZE: Medium

OBSERVER: CAN

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	3	10	2.0-4.0		Anhedral	Extensively replaced.
Plagioclase	40	60	2.0-4.0		Subhedral	Locally crushed with very small grains.
Clinopyroxene	10	30	2.0-4.0		Anhedral	Replaced by actinolite and chlorite and extensively replaced by amphibole.
Orthopyroxene	<1		0.1-1.0		Subhedral	Small grains in alteration rims of ol.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	<1	Ol				Unstrained, cores of ol crystals.
Chlorite	<1	Plag				Patches on plag.
Actinolite	10	Plag, ol				In alteration rims of ol and around plag.
Green hornblende	22	Cpx				Replaces cpx and in little crosscutting veins.
Plagioclase	10	Plag				Very small (<0.05mm) grains in crushed zones.
Tremolite	5	Ol				In alteration rim of ol.
Talc	<1	Ol				In alteration rim of ol.
Opagues	<1	Ol				In alteration rim of ol.

COMMENTS: The rock is crushed; crushing produces kinks and fractures in the plag and in the amphibole. It does not produce a pervasive foliation.

THIN SECTION DESCRIPTION

118-735B-64R-2 (Piece 1C, 54-56 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE: Mesocumulate

GRAIN SIZE:

OBSERVER: BLM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	6	8	0.8-3.0		Anhedral	Intergranular or intergrown with plag.
Plagioclase	58	60	0.8-4.0		Subhedral	Some adcumulus growth.
Clinopyroxene	30	32	1.0-4.0		Anhedral	Intergranular to subophitic.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	1					On cleavages and fractures in cpx and ol, in some veins through plag.
Chlorite	1	Ol				Rim on ol alteration.
Actinolite	2					Minor cpx alteration, filling veins.
Talc/tremolite	2	Ol				
Opagues	Tr	Ol				Associated with talc and tremolite.

COMMENTS: Ol is altered with rims of talc/tremolite, with fine associated opaques, then rimmed by chlorite, often growing radially out from the pseudomorph. Both plag and cpx are somewhat undulose; plag often euhedral when included in cpx. Thin section is cut from the end of a micore.

THIN SECTION DESCRIPTION

118735B-64R-4 (Piece 1H, 73-76 cm)

ROCK NAME: Altered gabbro

WHERE SAMPLED:

TEXTURE: Subhedral granular

GRAIN SIZE: Coarse

OBSERVER: STA

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	30	60	.5-3	An 65		
Clinopyroxene	10	40	1-3	Augite		Twinned. Oikocrysts surround plag.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Chlorite	5	Plag				Associated with epidote and diopside.
Sodic, plagioclase	3					Clear rims on twinned primary plag (An 20).
Epidote	1	Plag?				Clinzoisite; blue birefringence.
Actinolite	15	Plag, cpx				
Plagioclase	20	Plag				Extensive replacement; An 40, untwinned.
Pyroxene	15	Vein, cpx				Diopside in veins and replacing primary augite euhedral grains.

COMMENTS: Extensive medium temperature alteration and fracturing. One of the few rather extensive "skarn" assemblages in these rocks: clinzoisite-chlorite-diopside-sphene-plag.

THIN SECTION DESCRIPTION

118-735B-65R-3 (Piece 1D, 54-58 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE: Poikilitic to subhedral granular

GRAIN SIZE: Coarse

OBSERVER: MEY

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	9.0	10.0	2.0-5.0			Some kink bands in ol.
Plagioclase	54.6	55.0	2.0-10.0			Zoned concentrically.
Clinopyroxene	34.5	34.5	2.0-10.0			Cpx-cpx intergrowths. Oikocrysts enclose plag and ol, some grains exhibit blebby exsolution.
Fe-Ti oxide	0.2	0.2	0.5-2.0			Rim around cpx.
Hornblende	Tr	Tr	<1			
Orthopyroxene	0.2	0.2	<1			
Apatite	Tr	Tr	<1.0		Rounded	One grain seen next to an opaque.
High relief mineral	Tr	Tr	<1.0		Euhedral	One grain near apatite, inclined extinction.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	0.1	Ol				Deep green clay.
Chlorite	0.2	Plag				
Actinolite/Tremolite	0.8	Ol				Reaction coronas around ol.
Hornblende	Tr	Cpx				Blebs in cpx.
Margarite(?)	0.2	Plag				Most commonly forms rim around ol reaction coronas.
Magnetite	0.1	Ol				Associated with tremolite.

COMMENTS: Zoned plag, intercumulus oxides, hbd, opx and rare apatite suggest a moderate (15%) amount of trapped liquid. Percentages based on 2000 point counts.

THIN SECTION DESCRIPTION

118-735B-66R-2 (Piece 7A, 86-88 cm)

ROCK NAME: Altered gabbro

WHERE SAMPLED:

TEXTURE: Granular

GRAIN SIZE:

OBSERVER: BLM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	—	2	1.5			None left.
Plagioclase	50	58	4.0		Anhedral—subhedral	
Clinopyroxene	15	40	—			Fragments in originally 4.0 mm grains.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	10	Cpx, plag				Replacing cpx in ol(?) pseudomorphs, fractures in plag.
Chlorite	5	Ol, cpx				Commonly in clear amphibole, opaque clots.
Albite	5	Plag				Developing along fractures through plag.
Epidote	<1					Small grains 0.2 mm.
Amphibole	15	Cpx				Clear amphibole, in one case with blebby exsolution.
Oxides	<1					Scattered, <0.1 mm, associated with possible of pseudomorphs.

COMMENTS: Extensive low temperature alteration.

THIN SECTION DESCRIPTION

118-735B-66R-3 (Piece 8B, 66-68 cm)

ROCK NAME: Metagabbro

WHERE SAMPLED:

TEXTURE: Granular

GRAIN SIZE: Fine to medium

OBSERVER: BLM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	48	70	4.0			Lined with albite.
Clinopyroxene	3	30				Small fragments in amphibole, clots after cpx.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	10	Plag, cpx				After cpx in fractures.
Carbonate	1					
Chlorite	3	Cpx				Associated with actinolite.
Albite	10	Plag				
Epidote	10					Along shear zones.
Actinolite	15	Cpx				Clear, patchy and fibrous aggregates after cpx.

COMMENTS: 0.5-1.0 mm wide shear zones cut sample, with granulated plag along them. Epidote developed primarily along these little shears and in veins.

THIN SECTION DESCRIPTION

118-735B-66R-3 (Piece 2L, 134-138 cm)

ROCK NAME: Porphyroclastic gabbro

WHERE SAMPLED:

TEXTURE: Porphyroclastic

GRAIN SIZE: Fine to medium

OBSERVER: BLM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	15		1.0-3.0		Anhedral	Anhedral fragments.
Clinopyroxene	10		1.0-3.0		Anhedral	Anhedral fragments.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	5					Dusting plag, mixed in groundmass.
Albite	10	Plag				Replacing large plag on veins and as neoblasts.
Epidote	3					In mosaic groundmass?
Actinolite	3	Cpx				Incipient replacement of cpx.
Plagioclase	35	Plag				Neoblasts, small granulated grains.
Clinopyroxene	19	Cpx				Neoblasts, small granulated grains.

COMMENTS: No good foliation developed. May be quite a bit more epidote than noted. Proportions very approximate.

THIN SECTION DESCRIPTION

118-735B-67R-3 (Piece 1H, 74-78 cm)

ROCK NAME: Olivine-bearing gabbro

WHERE SAMPLED:

TEXTURE: Subophitic

GRAIN SIZE: Coarse

OBSERVER: BLM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	2.0	4.1	3.0-4.0		Anhedral	Intergranular.
Plagioclase	65.3	67	1.0-11.0		Euhedral-anhedral	
Clinopyroxene	19.5	28.9	2.0-8.0		Anhedral	Intergranular to subophitic.
SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING				COMMENTS
Clays	0.7	Ol, cpx				On fractures and cleavages.
Chlorite	0.6	Ol				Outside of alteration halos.
Actinolite	9.0	Cpx				1.4% in veins.
Hornblende	Tr	Cpx				Brown, on cpx margins, probably a primary phase.
Talc/tremolite	2.0	Ol				
Opques	0.2	Ol				With talc/tremolite.
Clear amphibole	0.7	Cpx				Blebbly, clear patches intergrown with cpx.

COMMENTS: Percentages based on 1700 point counts.

THIN SECTION DESCRIPTION

118-735B-68R-2 (Piece 1B, 16-21 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE: Mesocumulate

GRAIN SIZE: Coarse

OBSERVER: MEY

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	13.4	14.1				1cm plag-ol intergrowths.
Plagioclase	64.0	65.0				Normally zoned rim (0.1mm), intercumulus plag strongly zoned.
Clinopyroxene	20.7	20.7				Multiple cpx-cpx intergrowths, cpx oikocrysts enclose both ol and plag, some cpx has wormy exsolution (?) blebs.
Orthopyroxene	0.2	0.2				
Sulphide	Tr	Tr				Primary intercumulus phase.
SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING				COMMENTS
Chlorite	1.0	Plag				Found on margins of plag.
Hornblende	Tr	Cpx				
Tremolite	0.4	Ol				Reaction rims around ol.
Magnetite	0.3	Ol				Associated with tremolite.

COMMENTS: From textural relationships ol and plag crystallized together before cpx.
Percentages based on 1048 point counts.

THIN SECTION DESCRIPTION

118-735B-68R-3 (Piece 5, 62-64 cm)

ROCK NAME: Hydrothermal vein in gabbro

WHERE SAMPLED:

TEXTURE:

GRAIN SIZE: Coarse

OBSERVER: STA

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	0	?			Euhedral-subhedral	Round pseudomorphs.
Plagioclase	30	?			Anhedral	Cross by numerous micro fractures filled with amphibore.
Clinopyroxene	5	20				Partially altered to amphibole.
SECONDARY MINERALOGY	PERCENT	REPLACING/FILLING				COMMENTS
Carbonate						Small vein that cuts lagre vein.
Chlorite	4	Plag				Radial bundles.
Epidote	5	Vein				Clinzoisite.
Hornblende	5					Green to brown rims on cpx and cracks in plag.
Sphene	1	Ilmenite				
Tremolite?	10	Ol, cpx, plag				Bladed amphibole, pale to colorless in radial bundles.
Plagioclase	15	Vein, plag				Anastomozing network adjacent to vein and in vein. Sodic.
Diopside	10	Vein, cpx				Euhedral to barrel-shaped.
Oxide	5	Ol?				Fine-grained masses with amphibole.

THIN SECTION DESCRIPTION

118-735B-69R-3 (Piece 5C, 86-92 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE: Subhedral granular

GRAIN SIZE: Coarse

OBSERVER: BLM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	3.5	7	2.0-3.0		Anhedral	
Plagioclase	55	55	2.0-12.0		Anhedral	
Clinopyroxene	30.5	38	4.0-12.0		Anhedral	Ophitic.
Oxide	Tr	Tr				Primary.
SECONDARY MINERALOGY	PERCENT	REPLACING/FILLING				COMMENTS
Clays	Tr	Cpx, ol				
Chlorite	0.2	Ol				Some in veins.
Actinolite	3.0	Cpx				A little in veins.
Hornblende	0.2	Cpx				Primary interstitial liquid.
Talc/tremolite	2.5	Ol				
Oxides	0.5	Ol				With talc, tremolite.
Clear amphibole	4.6	Cpx				Blebbly, clear patches intergrown with cpx.

COMMENTS: Percentages based on 2000 point counts.

THIN SECTION DESCRIPTION

118-735B-69R-3 (Piece 5C, 86-92 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE: Mesocumulate

GRAIN SIZE: Coarse

OBSERVER: BLM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	3.5	7	1.0-8.0		Anhedral	Interstitial, subrounded.
Plagioclase	53.5	54	1.0-10.0		Subhedral-anhedral	Some adcumulus growth.
Clinopyroxene	31.5	39	2.0-16.0		Anhedral	Subophitic to intergranular.
SECONDARY MINERALOGY	PERCENT	REPLACING/FILLING				COMMENTS
Clays		Plag				Filling small fractures.
Actinolite	3.9	Cpx				Rimming cpx, small amount in veins.
Talc/tremolite	2.5	Ol				
Opaque	0.5	Ol				Occurs along fractures with clay.
Clinopyroxene	4.6	Cpx				Large clear patches with complex blebby exsolution, amphibole (?) after cpx. Could be primary cpx.

COMMENTS: The clear patches with exsolution may be a primary px intergrowth.

THIN SECTION DESCRIPTION

118-735B-69R-4 (Piece 4C, 138-140 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE: Anhedral granular

GRAIN SIZE: Medium to coarse

OBSERVER: BLM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	8	10	0.6-8.0		Anhedral	Partially encloses plag, some kinked.
Plagioclase	55	55	0.7-10.0		Anhedral	Euhedral inside cpx.
Clinopyroxene	25	35	3.0-9.0		Anhedral	Subophitic, encloses plag only and not ol.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	Tr	Plag				Along fractures, probably with actinolite.
Clinopyroxene amphibole	10	Cpx				Could be primary.
Talc/Tremolite	2	Ol				
Opaques	<1	Ol				Fine oxides in ol alteration.

COMMENTS: The cpx has intergrown patches, both within single grains and growing between grains, clear cpx or amphibole with dense wormy exsolution of opx or an amphibole. Looks like a secondary texture, but could be primary or deuteric.

THIN SECTION DESCRIPTION

118-735B-69R-5 (Piece 1D, 42-45 cm)

ROCK NAME: Altered gabbro

WHERE SAMPLED:

TEXTURE: Hypidiomorphic granular

GRAIN SIZE: Coarse

OBSERVER: 287 KEM—

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	10	30	3-10		Anhedral-subhedral	
Clinopyroxene	60	70	5-10		Anhedral-subhedral	Some of the cpx may be secondary, associated with the hydrothermal vein.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clay	Tr	Plag				
Chlorite	Tr	Plag, cpx				Also in thin veins.
Plagioclase	18	Plag				Sodic.
Green amphibole	1	Cpx, plag				In thin veins.
Brown amphibole	1	Cpx				
Colorless amphibole	<1	plag				
Sphene	Tr					In hydrothermally altered area.

COMMENTS: Gabbro with extensive low temperature alteration. No evidence of primary ol or opx. Sample appears to have a cpx-rich, plag-rich layering on a small scale, but hard to tell through the alteration. Alteration is locally very extensive (75-80%), but elsewhere as little as 10%. Cpx shows unusual exsolution/intergrowth texture.

THIN SECTION DESCRIPTION

118-735B-70R-1 (Piece 3A, 80-84 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE: Mesocumulate

GRAIN SIZE: Coarse

OBSERVER: BLM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	2.0	4	1.0-8.0		Anhedral	Intergranular.
Plagioclase	57.0	58	1.0-10.0		Subhedral — anhedral	
Clinopyroxene	33.0	38	2.0-12.0		Anhedral	Subophitic to poikilitic.
SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING				COMMENTS
Clays	0.7	Plag. cpx				Along fractures in plag and cpx.
Actinolite	5.5	Cpx				Rimming cpx, along cleavage.
Hornblende	0.1					Brown amphibole.
Talc/tremolite	1.6	Ol				After ol.
Opaque	0.1	Ol				
Amphibole		Cpx				Clear patches with blebby exsolution, cpx or amphibole after cpx? Could be a primary texture. Probably accounts for ~5% of the total cpx.

COMMENTS: Percentages based on 1700 point counts.

THIN SECTION DESCRIPTION

118-735B-70R-1 (Piece 5B, 105-107 cm)

ROCK NAME: Metagabbro

WHERE SAMPLED:

TEXTURE: Granular

GRAIN SIZE: Fine to medium

OBSERVER: BLM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	35	65	2.0-12.0		Anhedral	Altered porphyroclasts.
Clinopyroxene	15	35	2.0-16.0		Anhedral	Ubicuously altered along cleavages.
SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING				COMMENTS
Clays	8	Cpx, plag				Along fractures and cleavages.
Albite	5	Plag				Clear rim on large porphyroclasts.
Actinolite	10	Cpx				Fine, dense aggregates after cpx, along fractures, rims.
Hornblende	2	Cpx				Some dark green-brown amphibole after cpx.
Plagioclase	25	Plag				< 0.2 mm neoblasts, may be in part albite.

COMMENTS: Moderate deformation, plag and cpx in a matrix of fine recrystallized plag with extensive low temperature alteration. No strong foliation. This is probably a fragment of one of the gabbroic breccias.

THIN SECTION DESCRIPTION

118-735B-70R-2 (Piece 2, 8-10 cm)

ROCK NAME: Metagabbro

WHERE SAMPLED:

TEXTURE: Granular

GRAIN SIZE: Fine to medium

OBSERVER: BLM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	20	55(?)	54		Anhedral	Shards of primary plag. Relict.
Clinopyroxene	2(?)	(?)				
SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING				COMMENTS
Chlorite	5					
Sodic plagioclase	35	Plag				Recrystallization along fractures and cleavages.
Diopside	18	Cpx				Clear, subhedral grains and cpx margins.
Sphene	15					Grains measure up to 1 mm. Dark red rutile(?), hematite(?) clots in interior of some crystals.
Opagues	5					Small dark red to opaque clots in sphene. Rutile(?), hematite(?), clay(?).
Rutile	5	Cpx				Yellow aggregates.

COMMENTS: Skarn assemblage: diopside-rutile. Section is plucked, up to 40% void space with dirty glue spots. No way to make reasonable modal estimates.

THIN SECTION DESCRIPTION

118-735B-71R-2 (Piece 2A, 82-84 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE: Mesocumulate

GRAIN SIZE: Medium

OBSERVER: CAN

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	7	7	1-4		Anhedral	Fresh. Small rims of tremolite and opaque.
Plagioclase	63	63	1-5		Subhedral	Fresh. Very little alteration to actinolite.
Clinopyroxene	28	28	1-4		Anhedral	Fresh. Very little alteration to brown amphibole. Also occurs as rims around ol.
Orthopyroxene	< 1	< 1	0.1		Anhedral	Rimming of and cpx.
Hornblende	< 1	< 1	0.1		Anhedral	Pale brown rimming ol, cpx, and opaque.
Opaque	Tr	Tr	0.1		Subhedral-anhedral	
SECONDARY MINERALOGY	PERCENT	REPLACING FILLING				
Actinolite	Tr	Cpx, plag				
Tremolite	Tr	Ol				
Opagues	Tr	Ol				

COMMENTS: Oriented thin section.
Very fresh, undeformed.

THIN SECTION DESCRIPTION

118-735B-71R-2 (Piece 3C, 129-131 cm)

ROCK NAME: Pyroxene gabbro with hydrothermal vein

WHERE SAMPLED:

TEXTURE:

GRAIN SIZE: Coarse

OBSERVER: CAN

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	—	(?)				
Plagioclase	20	60	1-4		Subhedral-euhedral	
Clinopyroxene	15	35	1-6			Oikocrysts.
Oxides	< 1	(?)		Ti-Fe, sulfides?		Primary or associated with hydrothermal vein.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Epidote	2	Vein				Epidote + zoisite + clinozoisite.
Actinolite	24	Vein, cpx, plag				Acicular amphibole in vein, possibly actinolite.
Amphibole	39	Vein				Colorless, very low birefringence. Forms large flowers.
Mystery mineral	Tr	Vein				Possibly sphene. Very high birefringence, high relief. Long, 2 mm grain.

COMMENTS: The vein is at least 1 cm thick. No trace of deformation.

THIN SECTION DESCRIPTION

118-735B-71R-3 (Piece 1A, 0-5 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE: Anhedral granular, mesocumulate

GRAIN SIZE: Coarse

OBSERVER: BLM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	6.1	8	1-8		Anhedral	Enclosing plag. Kinked crystals. Undulose extinction.
Plagioclase	54.2	55	1-10		Euhedral-anhedral	
Clinopyroxene	30.6	37	< 12			Large oikocrysts with chadacrysts of plag.
Spinel	< 0.2	0.2			Subhedral	
SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING				COMMENTS
Clays	Tr	Veins				In veins and fractures. Veins through plag. On rims, lining cleavages. Brown. Occurs with some fine oxides. Clear patches with exsolution, intergrown with cpx. Possibly primary intergrowth.
Chlorite	< 0.2	Plag				
Actinolite	2.0	Cpx				
Hornblende	Tr	Cpx				
Talc/tremolite	2.5	Ol				
Clinopyroxene(?)	4.2	Cpx				

COMMENTS: Percentages based on 1815 point counts. Plag crystals are euhedral, where as chadacrysts are anhedral with some cumulus growth.

THIN SECTION DESCRIPTION

118-735B-71R-3 (Piece 5, 104-107 cm)

ROCK NAME: Olivine-bearing gabbro with hydrothermal vein

WHERE SAMPLED:

TEXTURE:

GRAIN SIZE: Coarse

OBSERVER: CAN

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	2	5	3		Anhedral	Rimmed by tremolite ± talc and mica. Replaced by actinolite. Replaced by green-brown hbd. Looks primary.
Plagioclase	30	60	4		Subhedral	
Clinopyroxene	15	35	4		Anhedral	
Fe-Ti oxides	Tr	Tr	1.5		Subhedral	
SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING				COMMENTS
Chlorite	Tr	Plag				Small patches. Epidote-clinozoisite. Acicular amphibole. Seems to grow in altered plag, rendered isotropic somehow?
Epidote	3	Veins				
Actinolite	25	Ol, plag, veins				
Sphene	Tr	Veins				Brown-green. Replaces cpx and fills in main vein and small veinlets through the rock. Replacement rims.
Hornblende	22	Cpx, veins				
Tremolite, talc, colorless mica	3	Ol				

COMMENTS: This rock is not deformed.

THIN SECTION DESCRIPTION

118-735B-72R-2 (Piece 1D, 56-62 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE: Subhedral granular

GRAIN SIZE: Medium to coarse

OBSERVER: MEY

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	8.2	9	1-5	An 68-72		Some kink bands in ol.
Plagioclase	65.2	65	2-10			
Clinopyroxene	26.1	26	1-10			Cpx-c px intergrowths. Pinkish exsolution blebs in sections cut parallel to (001).
Hornblende	Tr	Tr	< 1			As blebs in cpx and rims around cpx.
Orthopyroxene	Tr	Tr	< 1		Anhedral	Rare rims around ol.
Opauques	0.2	0.2	< 0.1-1.0		Anhedral	Interstitial and cpx, ol margins.
Sulfides	Tr	Tr	< 0.1		Anhedral	At margins of cpx, ol. Sometimes associated with oxide, but generally isolated.

SECONDARY MINERALOGY	PERCENT	REPLACING FILLING	COMMENTS
Tremolite/actinolite	0.4	Ol	Forms rare pseudomorphs after ol.
Magnetite	Tr	Ol	In association with tremolite.
Margarite(?)	0.1	Plag	Highly birefringent mineral found at grain margins next to ol relicts.

COMMENTS: Percentages based on 2000 point counts, on a large thin section.

Plag composition estimated by Michel-Levy method.

Opauques, hbd, and opx, in addition to cpx and plag, are crystallization products of intercumulus liquid. The amount of trapped liquid is possibly as low as 10-15%.

THIN SECTION DESCRIPTION

118-735B-72R-4 (Piece 4, 57-59 cm)

ROCK NAME: Foliated metagabbro

WHERE SAMPLED:

TEXTURE: Porphyroclastic to mylonitic

GRAIN SIZE: Medium

OBSERVER: STA

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	25	44	2-6		Flattened	Porphyroclasts.
Clinopyroxene	33	55	4-8		Ovoid	Porphyroclasts.
Spinel	1	1	0.5			Large grains.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	Tr	Ilmenite	Hematite-stained.
Carbonate	Tr	Veins	In veins with diopside.
Chlorite	Tr	Cpx	Mixed with actinolite, parallel to foliation.
Plagioclase	Tr	Plag	Sed. Anastomosing vein.
Epidote	Tr	Plag	Pistacite; associated with sphene, veins, plag.
Actionolite	14	Plag, cpx	Green to colorless; fibrous or lath-like.
Sphene	1	Ilmenite	Very coarse-grained.
Hornblende	8	Cpx	Green to brown pleochroic. Rims and pseudomorphs.
Plagioclase	15	Plag	Neoblasts in mosaic; recrystallized.
Sulfides	Tr		Partially oxidized; with chlorite and sphene.
Diopside	1	Veins	
Ilmenite, magnetite	2		Concentrations with plag neoblasts; rods in cpx.

COMMENTS: Diopside veins are parallel to foliation. Looks like plastic deformation is followed by movement of lower temperature fluids (epidote-chlorite-sphene) into mylonite zone.

THIN SECTION DESCRIPTION

118-735B-72R-6 (Piece 5, 106-108 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE: Hypidiomorphic granular

GRAIN SIZE: Coarse

OBSERVER: KEM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	5	5	2-5		Anhedral	
Plagioclase	60	60			Subhedral	Cumulus crystals.
Clinopyroxene	35	35	1-7		Anhedral	Oikocrysts, probably larger than 7 mm.
Opagues	Tr	Tr				Probably ilmenite.
SECONDARY MINERALOGY	PERCENT	REPLACING FILLING				COMMENTS
Clays	Tr	Ol				
Magnetite	Tr	Ol				
Amphibole	Tr	Cpx				Brown. Patchy and along grain boundaries.

COMMENTS: Contains examples of complex recrystallization/exsolution/intergrowth textures between adjacent cpx crystals.

THIN SECTION DESCRIPTION

118-735B-73R-1 (Piece 3B, 54-57 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE: Anhedral granular

GRAIN SIZE: Coarse

OBSERVER: BLM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	4.0	5	0.3-1.0		Anhedral	
Plagioclase	41.2	42	0.6-6.0		Anhedral	
Clinopyroxene	39.7	53	2-8		Anhedral	
Spinel	Tr	Tr	0.1-0.2		Anhedral	
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	0.6	Cpx, plag				Fine veins in cpx and plag.
Actinolite	1.9	Cpx				Rimming cpx. Also in veins.
Talc/tremolite	1.2	Ol				Occurs with opaques, and some clay. Rimming ol and along ol fractures.
Amphibole	11.4	Cpx				1-8 mm patches. Very clear grains, either new cpx or amphibole with colorless to pale brown lamellae and wormy blebs of another amphibole in it. These complicated patches replace the original cpx.

COMMENTS: Coarser-grained than 118-735B-73R-3 (Piece 4A, 73-75 cm). No big oikocrysts—more ophitic to subophitic cpx including both ol and plag chadacrysts, and intergrown with cpx. A complex replacement of cpx by large clear patches of another cpx or amphibole with exsolution or intergrowths of a pale colored amphibole (both as regular lamellae and blebs). Ol is a little more abundant in the portion of the thin section which was not point counted. Ol occasionally occurs as thin rims between cpx and plag. Percentages based on 1200 point counts.

THIN SECTION DESCRIPTION

118-735B-73R-3 (Piece 4A, 73-75 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE: Meso-accumulate

GRAIN SIZE: Medium to coarse

OBSERVER: BLM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	3	5	0.5-2.0		Anhedral	Locally intergrown with cpx.
Plagioclase	45	45	0.3-4.0		Subhedral - anhedral	Intergrown with cpx and ol.
Clinopyroxene	49	50	0.3-4.0		Anhedral-subhedral	Often in clumps of grains.
SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING				COMMENTS
Clays	2	Ol				Occurs along fractures with oxides. Also in veins. Rimming ol. In fractures in cpx.
Chlorite	Tr	Ol				
Actinolite	1	Cpx				

COMMENTS: Thin section is from the end of a minicore.

Sample was quite torn up in manufacture. Ol crystals are kinked. Some cpx crystals are bent. Plag has somewhat undulose extinction.

Probably one third to one half of the cpx crystals have complex exsolution blebs of opx + trace amounts of hbd. Cpx with exsolution blebs is intergrown with cpx without blebs. There are twinned grains: one side has complex exsolution blebs and the other side is free of them.

THIN SECTION DESCRIPTION

118-735B-73R-5 (Piece 4, 74-78 cm)

ROCK NAME: Oxide-bearing gabbro

WHERE SAMPLED:

TEXTURE: Anhedral granular

GRAIN SIZE: Medium to coarse

OBSERVER: BLM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	—	1(?)				Completely altered to tremolite. Interlocking.
Plagioclase	35	35	0.5-1.0		Anhedral-subhedral	
Clinopyroxene	20	40	0.5-8.0		Anhedral	Subophitic, enclosing plag + oxide.
Oxides	20	20	1-8		Anhedral	Intergrown with cpx.
Amphibole	2	2	0.2-0.8		Anhedral	Small brown amphibole rimming cpx and oxides.
Orthopyroxene	2	2(?)	0.2-0.5		Subhedral	Small grains and lamellae in cpx.
SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING				COMMENTS
Actinolite	19	Cpx				Pale green, after cpx. 1-2% filling pervasive fracture network. Dark green to brown patches around cpx. Small tremolite aggregates that are possibly ol or opx replacements.
Hornblende	1	Cpx				
Tremolite	1	Ol(?)				

COMMENTS: There may be an opx here (not pigeonite). The brown amphibole is common, often as small grains or rims between cpx and oxides, and at their junctures.

THIN SECTION DESCRIPTION

118-735B-74R-2 (Piece 2A, 38-40 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE: Subhedral granular to poikilitic

GRAIN SIZE: Coarse

OBSERVER: BLM/MEY

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	22	23	1-12		Anhedral	Enclosing plag. Symplectite texture. Cumulus.
Plagioclase	70	71	0.7-8.0	An 47	Euhedral-anhedral	
Clinopyroxene	5	6	0.2-1.5		Anhedral	Thin interstitial stringers.
SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING				COMMENTS
Clays	<1	Ol, plag, veins				Replacing margins of ol, filling veins, and in fractures in plag. Interstitial to plag, partially rimming cpx. Occurs with tremolite. Aggregates after ol. Small grains in ol pseudomorphs.
Actinolite	1	Cpx				
Talc	<1	Ol				
Tremolite	1	Ol				
Oxides	<1	Ol				

COMMENTS: Two large ol grains enclosing or partially enclosing plag. Smaller interstitial ol is largely altered.

Thin section is from the end of a minicore. Plag composition determined by Michel-Levy method.

THIN SECTION DESCRIPTION

118-735B-74R-6 (Piece 4A, 41-43 cm)

ROCK NAME: Microgabbro

WHERE SAMPLED:

TEXTURE: Granular to oikocrystic

GRAIN SIZE: Fine

OBSERVER: BLM/MEY

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	57.0	57.0	0.2-2.0		Anhedra- euhedral	Chadacrysts.
Clinopyroxene	23.5	24.7	0.1-0.6		Anhedra- granular	Oikocrysts up to 12 mm.
Oxide	5.8	5.8	0.1-0.5		Euhedral- anhedral	Largely anhedra- intergrown with cpx and plag.
Orthopyroxene	11.5	12.0				
Apatite	0.5	0.5				
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	Tr	Plag				Along fractures.
Actinolite	1.2	Cpx				Rimming some cpx.
Tremolite	0.5	Opx				Small clots after cpx.

COMMENTS: Fresh. Opaque-bearing microgabbro has a largely granular texture with occasional large oikocrysts containing both plag and opaque chadacrysts. The oikocrysts are opx while the smaller discrete grains are cpx. Percentages based on 1000 point counts.

THIN SECTION DESCRIPTION

118-735B-74R-6 (Piece 5B, 115-119 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE: Subhedral granular

GRAIN SIZE: Coarse to medium

OBSERVER: BLM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	8	10	0.5-2.0		Anhedra- euhedral	Intergranular, grown around plag.
Plagioclase	55	60	0.5-5.0		Anhedra- euhedral	Some adcumulus growth.
Clinopyroxene	28	30	0.1-4.0		Anhedra- euhedral	Intergranular, rarely as oikocrysts enclosing only plag.
Oxide	Tr					
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	1					Fractures in cpx and plag.
Chlorite	1					Veins through plag, with oxides sometimes.
Actinolite	5	Cpx				On rims, also in veins through rock.
Opauques	0.5	OI				On fractures, with clays.
Talc/Tremolite	1.5	OI				

COMMENTS: A small proportion of the cpx have the clear, blebby cpx or amphibole intergrowths common in the last few cores. Moderately dense fracture network through the sample; actinolite/chlorite/clay(?) in the fractures.

THIN SECTION DESCRIPTION

118-735B-75R-5 (Piece 1A, 27-30 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE: Mesocumulate

GRAIN SIZE: Coarse

OBSERVER: BLM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	2.2	3	0.4-2.0		Anhedra- euhedral	Intergranular.
Plagioclase	57.7	58	0.4-6.0		Subhedral- anhedral	In large aggregates.
Clinopyroxene	37.2	39	0.3-8.0			Intergranular to poikilitic.
Spinel	0.1	0.1	0.1-0.2			
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Actinolite	0.9	Cpx				
Opauque	0.9	OI				< 0.05 mm grains along fractures, with clays(?)
Amphibole	1.0	Cpx				Colorless, patchy replacement of cpx.

COMMENTS: Only plag is included in cpx, not ol. Percentages based on 1200 point counts.

THIN SECTION DESCRIPTION

118-735B-75R-6 (Piece 3, 75-77 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE: Mesocumulate

GRAIN SIZE: Coarse

OBSERVER: BLM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	14				Kinked.	
Plagioclase	60					
Clinopyroxene	23				Intergranular-subophitic.	
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	Tr	Plag				
Clays	Tr	OI		Fractures in ol.		
Actinolite	2.5	Cpx				
Oxide	0.5	OI		In fractures.		

COMMENTS: Fresh gabbro; slight alteration, no deformation.

THIN SECTION DESCRIPTION

118-735B-76R-3 (Piece 2C, 50-52 cm)

ROCK NAME: Gabbronorite

WHERE SAMPLED:

TEXTURE: Granular

GRAIN SIZE: Coarse to medium

OBSERVER: BLM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	45				Granular.	
Clinopyroxene	29				Granular.	
Fe-Ti oxide	2					
Orthopyroxene	8				Oikocrysts.	
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Actinolite	8					
Hornblende	8					

COMMENTS: Coarse to medium gabbronorite with opx oikocrysts in both medium and coarse-grained parts. Grain boundary contact is rather sharp. A zone of extensive amphibolitization cuts across one side of the slide.

THIN SECTION DESCRIPTION

118-735B-76R-3 (Piece 2H, 93-97 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE: Hypidiomorphic granular

GRAIN SIZE: Medium to coarse

OBSERVER: KEM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	8.0	10	2.0-5.0		Anhedral	
Plagioclase	64.0	64	5.0-10.0		Subhedral	
Clinopyroxene	25.2	26	2.0-5.0		Anhedral	Exhibits ophitic to subophitic texture, some oikocrystic.
Ilmenite	0.1		0.1		Anhedral	
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	0.1	OI				
Chlorite	0.1			Interstitial, replacing plag in fractures.		
Talc	0.6	OI				
Magnetite	1.1	OI				
Brown amphibole	Tr	Cpx		Brown.		
Green amphibole	0.8	Cpx		Green. Fills thin veins, replaces or rims ol, alteration halos.		

COMMENTS: Percentages based on 1500 point counts.

THIN SECTION DESCRIPTION

118-735B-76R-4 (Piece 1I, 86-90 cm)

ROCK NAME: Fe-Ti oxide gabbro

WHERE SAMPLED:

TEXTURE: Porphyroclastic

GRAIN SIZE: Coarse

OBSERVER: PTR

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	30	55	0.1-9.0		Subhedral-Anhedral	Recrystallized in shear zone
Clinopyroxene	20	44	0.1-9.0		Euhedral-Anhedral	Replaced extensively by amphibole.
Fe-Ti oxide	1	1	0.5-3			Concentrated in shear zone
SECONDARY MINERALOGY	PERCENT	REPLACING/FILLING				COMMENTS
Chlorite	Tr	Plag				
Epidote	1	plag				
Actinolite	10	CPX		Colorless prismatic grains.		
Hornblende	14	CPX		Brown and green varieties.		
Plagioclase	20	Plag		Neoblasts in shear zone.		
Fe-Ti oxide	4	Pl/CPX		In shear zone.		

COMMENTS: A coarse-grained porphyroclastic gabbro composed of plag, cpx and minor oxides cut by a shear zone in which plag and cpx have been granulated and replaced, plag is replaced by small neoblasts and cpx by actinolite and hbd. Irregular grains of Fe-Ti oxide are concentrated in the shear zone.

THIN SECTION DESCRIPTION

118-735B-76R-5 (Piece 1F, 62-64 cm)

ROCK NAME: Olivine gabbro cut by a "vein"

WHERE SAMPLED:

TEXTURE: Orthocumulate

GRAIN SIZE: Coarse

OBSERVER: STA

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	10	15	1-5		Rounded	
Plagioclase	54	65	2-8		Euhedral	
Clinopyroxene	16	18	2-8		Anhedral	
Orthopyroxene	1	2			Anhedral	Late interstitial.
SECONDARY MINERALOGY	PERCENT	REPLACING/FILLING				COMMENTS
Carbonate	Tr	Vein, plag				
Chlorite	2	Vein		Dark spherulitic mass.		
Albite	7	Plag, vein		Colorless rims and blocks.		
Epidote	1	Plag, vein		Clinzoisite.		
Actinolite	1	Cpx, vein, cpx		Colorless, radial.		
Sphene	<1	Vein		Pink, euhedral.		
Hornblende	3	Cpx/vein		Brown to green.		
Talc	4	OI		Mixed with magnetite.		
Magnetite	1	OI		Mixed with talc.		
Hematite	Tr	OI		Red stain.		

COMMENTS: The vein appears to be an intense in situ replacement of plag and cpx to a fine-grained mesh of secondary minerals. Could involve some cataclasis.

THIN SECTION DESCRIPTION

118-735B-77R-1 (Piece 2C, 33-35 cm)

ROCK NAME: Olivine gabbro cut by white vein

WHERE SAMPLED:

TEXTURE: Orthocumulate

GRAIN SIZE: Coarse

OBSERVER: STA

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	10		1.0-2.0			
Plagioclase	25		1.0-4.0			
Clinopyroxene	10		1.0-4.0			Symplectites with 2% cpx and brown hbd near vein.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	3	Vein	Brown, spherulitic, adjacent to carbonate.
Carbonate	5	Vein	Large crystals, could replace px or epidote.
Albite	22	Vein/plag	Spongy masses and veins.
Epidote	1	Vein	Zoned clinzoisite.
Actinolite	13		Colorless spherules replacing cpx and ol cores near vein.
Hornblende	10	Vein	Small euhedral grains.
Prehnite	1	Ol cores	Near vein.
Talc	<1	Ol	

COMMENTS: Above primary mineralogy is for vein only; inadequate gabbro in section to describe or estimate primary modal abundance.

THIN SECTION DESCRIPTION

118-735B-78R-1 (Piece 5B, 132-136 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE: Hypidiomorphic granular

GRAIN SIZE: Medium to coarse

OBSERVER: KEM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	9.5	11				
Plagioclase	51.5	52				
Clinopyroxene	35.0	37				
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				
Clays	0.8	Ol				
Chlorite	0.6	Plag			In thin fractures.	
Talc	0.2	Ol				
Magnetite	0.6	Ol				
Brown amphibole	1.5	Cpx				
Green amphibole	0.2	Cpx			Actinolite.	
Colorless amphibole	0.1	Ol			Tremolite.	

COMMENTS: Slide contains contact between two different textures. In one half the cpx is extensively subophitic (oikocrystic), in the other half the cpx is more equant in shape, although still partially enclosing plag. Where the cpx is blocky in shape, it exhibits complex intergrowth relationships between adjacent crystals. Percentages based on 1000 point counts.

THIN SECTION DESCRIPTION

118-735B-78R-4 (Piece 5B, 54-59 cm)

ROCK NAME: Amphibolitized gabbro

WHERE SAMPLED:

TEXTURE: Subhedral granular

GRAIN SIZE: Coarse

OBSERVER: STA 317

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	Tr	2	71			Three grains; looks late
Plagioclase	50	60	1-5		Tabular	Many now have sodic rims and inclusions.
Clinopyroxene	10	35	2-5			
Spinel	2	3	61			Ti-magnetite or ilmenite replaced by sphene
SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING				COMMENTS
Sodic plagioclase	5	Plag				Rims on plag and patchy alteration.
Epidote	Tr	Plag				Two small euhedral grains.
Hornblende	15	Cpx				Dark green, well crystallized after cpx, tabular to plumose.
Plagioclase	5					Noeblasts in mosaic. Turbid with amphibole inclusions.
Mica	2					Core of cpx grains; also constitutes the rim of alteration coronas with anthophyllite + green mica. Very red pleochroic. Phlogopite?
Sphene	1	spinel				Large grains in one corner of slide.
Hornblende	5	Qx				Brown, interstitial and blebs in cpx.
Amphibole	5	?px or hb				Fe-Mg; fibrous; colorless to pale brown, rimmed by phlogopite.
Talc	Tr	of				

COMMENTS: Very altered gabbro. No primary ol remaining. Slight plastic deformation is shown by bent plag crystals and mosaic intergrowths.

THIN SECTION DESCRIPTION

118-735B-78R-4 (Piece 6, 65-67 cm)

ROCK NAME: Porphyroclastic olivine gabbro

WHERE SAMPLED:

TEXTURE: Porphyroclastic

GRAIN SIZE: fine-medium

OBSERVER: 318

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	3	5	1			Porphyroclasts, to ≤ 4 mm.
Plagioclase	60	80	1-10			Porphyroclasts, to ≤ 4 mm.
Clinopyroxene	10	15	1-4			Porphyroclasts.
Orthopyroxene	Tr	Tr				Exsolution cpx.
Brown amphibole	Tr	Tr				Magmatic?
SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING				COMMENTS
Actinolite	1	Cpx, plag				
Plagioclase	19	Plag				Neoblasts ≤ 0.2 mm.
Clinopyroxene	5	Cpx				Neoblasts ≤ 0.2 mm.
Olivine	2	Oi				Neoblasts ≤ 0.2 mm.

COMMENTS: Oriented thin section, cut from the end of a minicore. Fresh porphyroclastic gabbro. Very elongate and undulose ol and plag clasts. Rare in that the matrix is half granulated cpx + ol. Largely recrystallized. Plag still common as porphyroclasts. Some cpx clasts have clear, wormy intergrowth like those in some of the igneous cpx.

THIN SECTION DESCRIPTION

118-735B-79R-6 (Piece 3, 90-95 cm)

ROCK NAME: Troctolite/olivine gabbro

WHERE SAMPLED: At contact between troctolite and olivine gabbro

TEXTURE: Allotriomorphic granular

GRAIN SIZE: Medium to coarse

OBSERVER: KEM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	
Olivine	28.0		2.0-6.0		Anhedral	
Plagioclase	68.0		3.0-10.0		Subhedral	
Clinopyroxene	3.0		1.0-4.0		Anhedral	
Ilmenite	Tr					
SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING				COMMENTS
Clays	0.2	Ol				
Magnetite	0.2	Ol				
Brown amphibole	0.6	Cpx				Replaces cpx and surrounds ol and cpx in grain boundaries.

COMMENTS: Mode is determined for troctolite-side of thin section. The other part of the slide is composed almost entirely of one green subophitic cpx; cpx approximately 2.5 cm long. Percentages based on 1500 point counts.

THIN SECTION DESCRIPTION

118-735B-79R-7 (Piece 9, 99-102 cm)

ROCK NAME: Troctolitic microgabbro

WHERE SAMPLED:

TEXTURE: Equigranular

GRAIN SIZE: Fine to medium

OBSERVER: MEY

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	19.8	19.8	0.3-1.0		Subhedral-euhedral	Sometimes enclosed in cpx.
Plagioclase	72.6	72.6	0.5-1.5	An 65	Subhedral-euhedral	Exhibits concentric normal zoning. Oikocrysts enclose ol and plag.
Clinopyroxene	5.7	5.7	0.5-2.0			
Opaque	0.2	0.2	<0.1			
Hornblende	1.7	1.7	<0.1			Rims around cpx.
Sulphide	Tr	Tr	<0.1		Subhedral	Partially enclosed in ol.

COMMENTS: Fresh, undeformed. Hbd and opaque phases are primary and represent late stage crystallization products of intercumulus liquid. Percentages based on 1170 point counts. Plag composition determined by Michel-Levy method.

THIN SECTION DESCRIPTION

118-735B-80R-2 (Piece 4, 35-40 cm)

ROCK NAME: Troctolitic gabbro

WHERE SAMPLED:

TEXTURE: Allotriomorphic granular

GRAIN SIZE: Medium

OBSERVER: KEM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	
Olivine	19.7	19.8	0.2-0.3		Anhedral	
Plagioclase	64.1	64.1	1.0-2.0		Anhedral	
Clinopyroxene	15.8	16.1	0.2-1.0		Anhedral	
SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING				COMMENTS
Clays	0.1	Ol				
Brown amphibole	0.3	Cpx				Replaces cpx and occurs surrounding cpx, ol and ilmenite.

COMMENTS: Cpx generally occurs wrapped around ol. Brown amphibole then either rims cpx or partially replaces it.

THIN SECTION DESCRIPTION

118-735B-80R-6 (Piece 1, 6-9 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE: Hypidiomorphic granular

GRAIN SIZE: Coarse

OBSERVER: KEM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	11.5	12	1.0-4.0		Anhedral	
Plagioclase	50.5	51	3.0-10.0		Subhedral	
Clinopyroxene	35.3	37	3.0-10.0		Anhedral	
Orthopyroxene	0.1				Anhedral	Exsolution from cpx.
Ilmenite	Tr					
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	0.5	OI				
Magnetite	0.3					
Brown amphibole	1.8	Cpx				Replaces cpx in patches and lines grain boundaries between cpx and plag and of plag.

COMMENTS: Brown amphibole invades cpx in a pervasive manner creating a symplectite-like texture. Adjacent grains of cpx often have very complex grain boundary relationships in which two crystals are intergrown. Percentages based on 1000 point counts.

THIN SECTION DESCRIPTION

118-735B-80R-7 (Piece 1C, 23-25 cm)

ROCK NAME: Ilmenite-olivine gabbro

WHERE SAMPLED:

TEXTURE: Allotriomorphic granular

GRAIN SIZE: Fine to medium

OBSERVER: KEM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	9	10	0.1-0.3		Anhedral	
Plagioclase	35	35	0.1-2.0		Anhedral	
Clinopyroxene	32	40	0.2-2.0		Anhedral	
Opacues	15	15	0.05-0.6		Anhedral	
Orthopyroxene	Tr					Exsolution form cpx.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	1	OI				
Green amphibole	7	Amphibole, plag				Some blue-green amphibole replacing brown amphibole, cpx, and some plag along fractures.
Brown amphibole	1	Cpx				Surrounding oxides and replacing cpx.

COMMENTS: Very faintly foliated.

THIN SECTION DESCRIPTION

118-735B-81R-2 (Piece 2B, 54-56 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE: Hypidiomorphic granular

GRAIN SIZE: Coarse

OBSERVER: KEM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	12	12	1.0-3.0		Anhedral	
Plagioclase	50	50	1.0-10.0		Subhedral- euhedral	
Clinopyroxene	37	38	1.0-9.0		Anhedral	Subophitically to ophitically encloses plag.
Opacues	Tr	Tr				
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	Tr	OI				
Opacues	Tr	OI				Replacing ol along fractures.
Brown amphibole	1	Cpx				Patchy replacement of cpx and as thin film on grain boundaries.
Green amphibole	Tr	Vein				

THIN SECTION DESCRIPTION

118-735B-81R-5 (Piece 1, 1-7 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE: Subophitic Opaques

GRAIN SIZE: Medium

OBSERVER: BLM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	7.4	8	1-2		Anhedral	Rimmed by filmy opx, cpx, or amphibole.
Plagioclase	59.5	61	2-4		Subhedral-anhedral	
Clinopyroxene	16.5	31	1-3		Anhedral	Subophitic. Complex intergrowth with opx and brown hbd (exsolution?) is common.
Spinel	Tr	Tr	0.1-0.5			
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	0.1	Ol				Filling in fractures.
Chlorite	Tr	Ol				
Albite	0.5	Plag				Along fractures on one side of the thin section.
Actinolite	0.3	Cpx				
Hornblende	0.2	Cpx				Brown amphibole after cpx. Possibly primary.
Talc/tremolite	0.5	Ol				Occurs with opaques.
Amphibole	15.0	Cpx				Clear blebby patches after cpx. Possibly some kind of a primary intergrowth.

COMMENTS: Percentages based on 2000 point counts.

THIN SECTION DESCRIPTION

118-735B-81R-7 (Piece 6A, 64-66 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE: Allotriomorphic granular

GRAIN SIZE: Medium to coarse

OBSERVER: KEM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	9	10	0.5-2.0		Anhedral	Altered to clay + opaques in fractures.
Plagioclase	50	55	0.5-5.0		Anhedral	
Clinopyroxene	27	35	0.8-4.0		Anhedral	Exsolution from cpx, also rimming ol and cpx.
Orthopyroxene	Tr	Tr	0.1-0.2		Anhedral	
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	1	Ol				Olive-green.
Plagioclase	5	Plag				Neoblasts.
Amphibole	3	Cpx				Patchy replacement of cpx and along grain boundaries.
Clinopyroxene	5	Cpx				Neoblasts.

COMMENTS: Weakly foliated. Some granulation along plag grain boundaries. Contains complex replacement/recrystallization textures of cpx involving brown amphibole. Ol often enclosed in cpx, or occurring with a thin layer of cpx around it.

THIN SECTION DESCRIPTION

118-735B-82R-1 (Piece 3, 49-54 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE: Mesocumulate

GRAIN SIZE: Medium to coarse

OBSERVER: STA

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	27	31	1-2		Anhedral	
Plagioclase	46	51	1-3		Tabular	
Clinopyroxene	15	<17	2-5			Poikilitic oikocrysts.
Magnetite	<1	<1			Euhedral	
Hornblende	1	1				Interstitial. Brown. Blebs in cpx. Surrounds ilmenite and cpx.

SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING	COMMENTS
Serpentine	1	OI	Along cracks.
Actinolite	1	OI	
Hornblende	2	Vein	In vein.
Plagioclase	3	Plag	In vein. Euhedral crystals.
Clinopyroxene	2	Vein	Green. In hydrothermal vein and in symplectites.
Talc	1	OI	Occurs with magnetite in pseudomorphs.
Magnetite	<1	OI	
Mica(?)	<1	Plag	Fibrous aggregates.

COMMENTS: According to the core description, this sample is at the boundary between green and brown cpx. Large cpx in coarse half of thin section are slightly altered to amphibole and contain large regions of "exsolved" px symplectites, cut by interstitial vein of euhedral plag+ green cpx(?) + brown hbd. Vein also cuts ol. Same mineralogy occurs as clots in other parts of the section.

THIN SECTION DESCRIPTION

118-735B-82R-2 (Piece 1B, 13-15 cm)

ROCK NAME: Troctolitic microgabbro

WHERE SAMPLED:

TEXTURE: Allotriomorphic granular

GRAIN SIZE: Medium

OBSERVER: KEM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	15	15	0.4-2.5		Anhedral	
Plagioclase	70	70	0.5-4.0		Anhedral	
Clinopyroxene	14	15	0.5-8.0		Anhedral	Very skeletal, oikocrystic texture. Oikocrysts up to 8 mm in size.

SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING	COMMENTS
Clays	Tr	OI	
Opacues	Tr	OI	
Amphibole	1	Cpx	Brown. Patchy replacement of cpx and along grain boundaries.

THIN SECTION DESCRIPTION

118-735B-82R-4 (Piece 4A, 41-46 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE: Mesocumulate

GRAIN SIZE: Coarse

OBSERVER: STA

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	14	15	0.5-1.0		Anhedral	
Plagioclase	50	50	1-3		Subhedral	
Clinopyroxene	35	35	2-6			Poikilitic.

SECONDARY MINERALOGY	PERCENT	REPLACING / FILLING	COMMENTS
Tremolite	<1	OI	Possibly an orthoamphibole.
Talc	<1	OI	

COMMENTS: Much of the slide has been plucked or polished off.

THIN SECTION DESCRIPTION

118-735B-82R-6 (Piece 2, 11-13 cm)

ROCK NAME: Ilmenite-orthopyroxene-bearing gabbro

WHERE SAMPLED:

TEXTURE: Porphyroclastic

GRAIN SIZE: Variable, fine to medium (<1-5 mm)

OBSERVER: HEB

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	5	40	< 0.5		Anhedral	Included in cpx or recrystallized as neoblasts. Large crystals which contain inclusions of brown amphibole, euhedral ilmenite, small exsolution lamellae of opx(?).
Clinopyroxene	44	48	= 1-4		Euhedral	
Ilmenite	3	6	0.1		Anhedral	Large grains with magmatic contact with cpx.
Orthopyroxene	3	6	2-3		Anhedral	Recrystallized, intergrowth, or wrapped by ilmenite/magnetite.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Hornblende	3	Opx, cpx				Green, mantling the brown amphibole and cpx.
Plagioclase	35	Plag				Neoblasts, <0.5 mm. Mosaic of equilibrated polygonal grains.
Amphibole	4	Cpx				Brown. Patches in cpx or at outer margins of grains.
Magnetite	3	Ilmenite				Small granules associated with ilmenite in the intergranular spaces surrounding cpx.

COMMENTS: Partially remobilized ilmenite.
High temperature type of remobilization without important fluid phase: cpx + opx are almost fresh.
Deformation plays an important role here.

THIN SECTION DESCRIPTION

118-735B-83R-4 (Piece 5A, 95-97 cm)

ROCK NAME: Porphyroclastic metagabbro

WHERE SAMPLED:

TEXTURE: Porphyroclastic

GRAIN SIZE: Fine to coarse

OBSERVER: KEM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	10	15			Anhedral	Altered to clay and opaques on fractures.
Plagioclase	15	50			Euhedral-anhedral	
Clinopyroxene	22	35			Anhedral	Augen optically encloses euhedral plag.
Orthopyroxene	1	0				Blebbly exsolution from cpx.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	Tr	OI				Replacing ol along fractures.
Plagioclase	35	Plag				Neoblasts.
Clinopyroxene	10	Cpx				Neoblasts.
Brown amphibole	2	Cpx				Interstitial between cpx neoblasts.
Olivine	5	OI				Neoblasts.
Opaques	Tr	OI				

THIN SECTION DESCRIPTION

118-735B-83R-7 (Piece 4D, 77-81 cm)

ROCK NAME: Troctolite

WHERE SAMPLED:

TEXTURE: Sub-poikilitic

GRAIN SIZE: Fine to coarse, 1-2 mm average

OBSERVER: DCK

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	50	55	0.5-2.0		Subhedral— anhedral	Enclosed in plag and cpx.
Plagioclase	20	38	0.2-10.0		Intergranular— ophitic	Occasionally enclosed in ol.
Clinopyroxene	3	4	10.0-20.0		Interstitial	Large discontinuous oikocrysts.
Spinel	3	3	0.1-0.3		Euhedral— subhedral	Enclosed in ol, plag and cpx. Often has round inclusions of ol or plag up to half the diameter of the grain. Rust-red, slightly translucent in plain light. Commonly accompanied by amphibole.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Chlorite	6	Plag	Clots and books of white-grey, with anomalous parallel extinction.
Actinolite	1	Plag	Fibrous mats in altered plag.
Talc	8	Ol	
Tremolite	8	Ol, plag	
Magnetite	1	Ol	
Cummingtonite?	< 1	Ol, plag	High relief, fibrous, moderately high birefringence.
Hornblende	< 1	Ol, spinel	Clear, yellow to pale orange-brown rimming spinel.

COMMENTS: Weakly deformed, plag shows undulose extinction and the formation of some subgrain boundaries and neoblasts. Ol has numerous kink bands and is frequently elongated and stretched to form a weak foliation. Spinel is often rimmed with an orange-brown amphibole indicating either late deuteric or other metamorphic reaction with a fluid.

THIN SECTION DESCRIPTION

118-735B-83R-7 (Piece 6, 104-106 cm)

ROCK NAME: Troctolite

WHERE SAMPLED:

TEXTURE: Poikilitic

GRAIN SIZE: 0.5-2.0 mm

OBSERVER: DCK

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	40	55	0.5-1.0		Euhedral— anhedral	Some have plag inclusions.
Plagioclase	20	44	0.5-3.0		Subophitic— ophitic	
Sulphides	Tr	Tr	0.1			

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Actinolite	5	Plag	
Tremolite	20	Ol, plag	
Brown amphibole	Tr		
Talc	5	Ol	
Albite	10	Plag	

COMMENTS: Ol grains rimmed by tremolite, actinolite and talc replacing and enclosing plag and a portion of the ol.

THIN SECTION DESCRIPTION

118-735B-84R-3 (Piece 1B, 14-16 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE: Anhedral granular

GRAIN SIZE: Medium

OBSERVER: BLM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	7	10	0.5-1.5		Anhedral	Partially enclosing plag.
Plagioclase	58	65	1.0-3.0		Anhedral	
Clinopyroxene	19	25	0.5-2.0		Anhedral	Intergranular.
SECONDARY MINERALOGY	PERCENT	REPLACING/FILLING				COMMENTS
Clays	1					On fractures in cpx and ol.
Actinolite	2	Cpx, ol				Thin greenish rims on ol, a little on cpx? Fibrous aggregates in shear zone.
Hornblende	1	Cpx				Brown rims on some cpx.
Plagioclase	5	Plag				<0.2 mm neoblasts; largely on grain margins.
Talc/tremolite	2	Ol				Occurs with talc/tremolite.
Opauques	1	Ol				
Amphibole	4	Cpx				Clear patches, sometimes with small exsolution-like features.

COMMENTS: Moderate deformation. Most plag-plag contacts are lined with a mosaic of 0.1-0.2 mm recrystallized plag. Larger grains are undulose; ol is kinked. A 0.6 mm-wide vein of mosaic plag and actinolite cuts one side of sample; this was probably a shear zone that was subsequently altered.

THIN SECTION DESCRIPTION

118-735B-84R-5 (Piece 9, 80-82 cm)

ROCK NAME: Olivine gabbro

WHERE SAMPLED:

TEXTURE:

GRAIN SIZE: Fine to medium.

OBSERVER: BLM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	10.4	12	1.0-4.0		Anhedral	Intergranular.
Plagioclase	51.0	52	1.0-6.0		Anhedral	
Clinopyroxene	30.0	36.8	2.0-4.0		Anhedral	Subophitic.
Oxide	0.4	0.4	<1.5		Anhedral	
Amphibole	0.8	0.8				Brown. Occurs as patches in cpx.
SECONDARY MINERALOGY	PERCENT	REPLACING/FILLING				COMMENTS
Actinolite	1.4	Cpx				A small amount in veins.
Talc/Tremolite	1.5	Ol				
Oxide	0.3	Ol				
Clear amphibole	4.2	Cpx				Clear, blebby intergrowths with cpx.

COMMENTS: Percentages based on 1400 point counts.

THIN SECTION DESCRIPTION

118-735B-85R-4 (Piece 1B, 9-11 cm)

ROCK NAME: Foliated metagabbro

WHERE SAMPLED:

TEXTURE: Gneissic

GRAIN SIZE: Medium

OBSERVER: STA

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	10	63	0.2-2.0			Porphyroclasts.
Clinopyroxene	10	35	1.0-3.0			Porphyroclasts.
Ilmenite	2	2	<0.1			Inclusions in cpx and mixed with neoblasts.
Hornblende		1?	<0.1			Red-brown; pre-deformational and syndeformational.
SECONDARY MINERALOGY	PERCENT	REPLACING/FILLING				COMMENTS
Hornblende	15	Cpx				Green aggregates; post-deformational; also one late vein.
Plagioclase	53					Neoblasts in mosaic texture.
Clinopyroxene	10					Neoblasts in layers and tails on tips of cpx augen.
Rutile?	Tr	Ilmenite				Highly birefringent rods in hbd pseudomorph.

COMMENTS: One late hbd vein is perpendicular to foliation. Optically similar hbd is observed on edge of recrystallized cpx porphyroclast oblique to foliation.

THIN SECTION DESCRIPTION

118-735B-85R-7 (Piece 1B, 17-19 cm)

ROCK NAME: Troctolite

WHERE SAMPLED:

TEXTURE: Granular

GRAIN SIZE: Medium

OBSERVER: BLM

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	16.0	25.5	1.0-2.0		Anhedral	
Plagioclase	65.0	65.0	1.0-2.0		Anhedral	
Clinopyroxene	3.9	7.0	1.0-2.0		Anhedral	Rims on ol, interstitial grains.
Spinel	Tr	Tr				
Orthopyroxene	1.3	1.3	<1.0			Rims on ol.
Brown amphibole	1.2	1.2	<1.0			Rims on ol.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Chlorite	1.6	Ol				
Actinolite	6.4	Ol				Green in veins, rest clear as rims on ol and after cpx.
Talc/Tremolite	4.6	Ol				With fine opaques.

THIN SECTION DESCRIPTION

118-735B-85R-7 (Piece 5, 79-85 cm)

ROCK NAME: Poorly foliated metagabbro

WHERE SAMPLED:

TEXTURE: Cataclastic

GRAIN SIZE: Coarse

OBSERVER: STA

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	2	5	0.5-3.0			Recrystallized and flattened.
Plagioclase	49	55	2.0-4.0			Recrystallized (partially).
Clinopyroxene	30	40	1.0-4.0			Partially recrystallized.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Chlorite	1	Plag				Radial; also lenses with tremolite.
Tremolite	1	Ol				Also ol-plag boundaries in corona structure.
Hornblende						Green-brown; in recrystallized zones in plag. Also euhedral grains along crack.
Plagioclase	5	Plag				Neoblasts.
Talc	2	Ol				Occurs with tremolite.
Hornblende	1					Red-brown; syndeformational.
Clinopyroxene	9	Cpx				Neoblasts.

COMMENTS: Texture is developed by crushed grains or recrystallized along grain boundaries and recrystallization within px and plag grains. Plag is kinked.

THIN SECTION DESCRIPTION

118-735B-86R-6 (Piece 19, 143-145 cm)

ROCK NAME: Augen gneissic gabbro

WHERE SAMPLED:

TEXTURE: Porphyroclastic

GRAIN SIZE: Fine to coarse

OBSERVER: CAN

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	Tr	2	0.3			Kinked, marginally recrystallized, altered.
Plagioclase	10	80	< 10			Recrystallized.
Clinopyroxene	8	12	< 10			Marginally recrystallized.
Fe-Ti oxides	2	2(?)	0.1-4.0	Fe-Ti	Subhedral	Large subhedral grains and anhedral smaller grains in tails of cpx.
Orthopyroxene	2	5(?)	1-4		Subhedral	Elongated fragments of original bigger grains, marginally recrystallized.
Hornblende	—	(?)	(?)			Brown. Recrystallized. Either partially or entirely secondary.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	Tr	Ol				
Opaques	Tr	Ol, opx				
Chlorite	Tr	Plag				
Actinolite	< 1	Plag, ol, opx		Static.		
Talc/tremolite	< 1	Ol, opx		Static.		
Hornblende	2	Cpx, hbd				Replacing primary brown hbd? Brown. Euhedral crystals, 0.1 mm.
Plagioclase	70	Plag				0.05-0.20 mm in size.
Orthopyroxene	< 1	Opx				0.05-0.10 mm in size.
Clinopyroxene	2	Cpx				
Olivine	Tr	Ol				0.1-0.2 mm in size.
Amphibole	3	Px				Greenish brown. Static.

COMMENTS: Intense high temperature plastic deformation. Late static replacement by hydrous phases.

THIN SECTION DESCRIPTION

118-735B-87R-7 (Piece 1C, 15-17 cm)

ROCK NAME: Hydrothermal vein

WHERE SAMPLED:

TEXTURE:

GRAIN SIZE: Medium to fine

OBSERVER: STA

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	—	50(?)				Cracked and albitized.
Clinopyroxene	7	10(?)				Amphibolitized relict.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	3	Chlorite				Fe-stained, on edge of chlorite masses. Iddingsite, on cracks and edge of chlorite.
Carbonate	10	Vein(?), plag, cpx				Replaces plag.
Chlorite	40	Vein, plag				Spherulitic bundles, partially oxidized in vein. Also replacing plag.
Epidote	Tr	Chlorite, carbonate				Angular grains in chlorite and carbonate.
Sphene	1					Large euhedral grain.
Plagioclase + albite	35	Vein				Lantern-shaped to anhedral.
Hematite	2					

COMMENTS: In one part of the slide, calcite and chlorite have a scalloped, concave margin. This suggests that the calcite is replacing calcic plag subsequent to its partial replacement by chlorite. Euhedral cpx is intergrown with calcite (possibly replacing a symplectite). Calcite is also the groundmass for numerous small euhedral grains of albite (or sodic plag) and cpx. Too much of the texture is destroyed to determine whether all of the calcite is late.

THIN SECTION DESCRIPTION

118-735B-87R-5 (Piece 3, 20-22 cm)

ROCK NAME: Amphibolitized mylonitic gabbro

WHERE SAMPLED:

TEXTURE: Mylonitic

GRAIN SIZE: Fine with augens

OBSERVER: CAN

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	—	55				Completely recrystallized.
Clinopyroxene	20	40			Augite	Some cpx is recrystallized.
Hornblende	(?)	(?)				Brown. All of the brown hbd is included in the secondary mineralogy percentages, but may be primary.
Fe-Ti oxides	4	(?)	<0.01-0.04	Fe-Ti		Aggregates or disseminated. All of the Fe-Ti oxides are included in the primary mineralogy percentages, but some crystals are obviously remobilized during deformation.
Orthopyroxene	1	(?)	0.1-0.4			Augens. Probably (but not absolutely certainly) recrystallized.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Actinolite	15	Plag				Very green. Static replacement of large areas of plag.
Hornblende	15	Cpx, veins				Brown to dark green. Locally dynamic, but mostly static replacement of cpx. Hbd in veins is not deformed.
Plagioclase	40	Plag				Recrystallized grains, 0.1 mm in size.
Clinopyroxene	5	Cpx				Recrystallized grains, 0.1 mm in size.

COMMENTS: Thin section is from the end of a minicore.

A first plastic event produced the plag and cpx recrystallization, and the foliation. The amphiboles seem mostly undeformed, however there is some brownish amphibole in the tails of rotated cpx augens in discrete mylonitic shears (grain size 20 μ m). The Fe-Ti oxides are distinctly distributed (stretched or crystallized?) along these shears. The amphibole veins are not deformed but locally appear as filling gaps in the plag between two discrete shears.

THIN SECTION DESCRIPTION

118-735B-87R-7 (Piece 6, 51-56 cm)

ROCK NAME: Troctolite

WHERE SAMPLED:

TEXTURE: Poikilitic

GRAIN SIZE: Fine to coarse

OBSERVER: DCK

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE RANGE (mm)	APPROX. COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	28	35	0.5-1.5		Subhedral-anhedral	
Plagioclase	49	60	1-5			Ophitic to poikilitic.
Clinopyroxene	5	5	20			Oikocryst. Discontinuous 2 cm mesh.
Sulfides	Tr	Tr	<0.1			
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Albite	1	Plag				Locally rimming plag grain boundaries.
Tremolite	15	Plag, ol				Reaction coronas around ol, between ol and plag.
Magnetite	1	Plag, ol				
Amphibole	1	Plag, ol				Locally rimming ol where tremolite is absent. Pale pink pleochroism. Possibly interstitial deuteritic amphibole.

COMMENTS: Cpx oikocrysts are discontinuous but large, and enclose both ol and occasional euhedral plag laths. Late interstitial amphibole locally present, locally enclosing ol; possibly deuteritic. Interstitial cpx coarsens to form discontinuous, large oikocrysts.