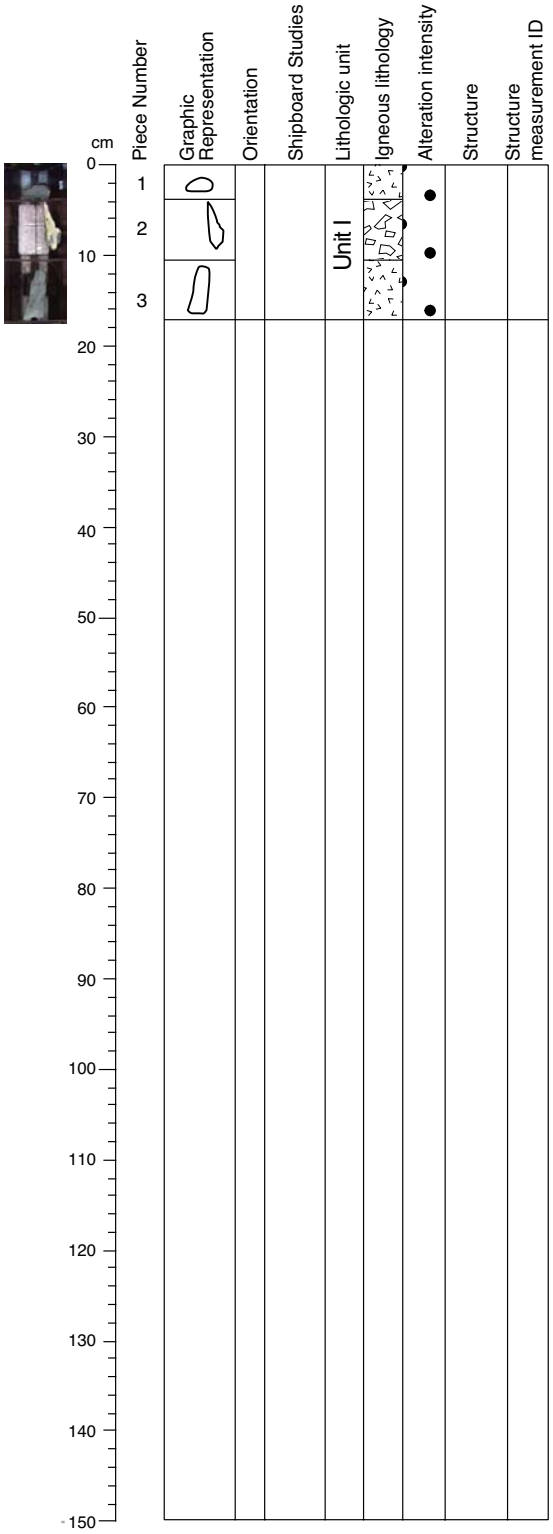
Core Photo



209-1275A-1R-1 (Section top: 0.0 mbsf)

UNIT-I: DIABASE and BRECCIA

Piece 1-3

COLOR: Gray

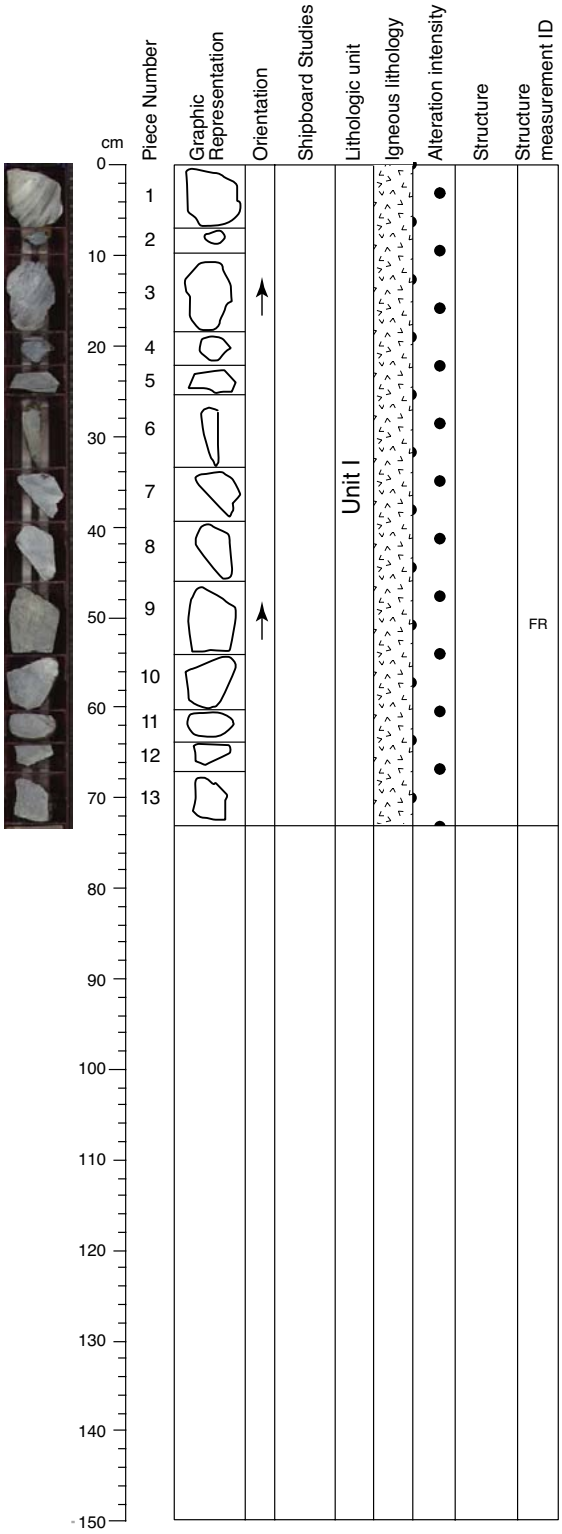
PRIMARY MINERALOGY:

COMMENTS: This section consists mainly of fine-grained mafic rocks. Pieces 1 and 3 are aphyric diabase and likely were formed by quenching of basaltic liquid. Piece 2 is carbonate matrix breccia with diabase clasts.

SECONDARY MINERALOGY:
Pieces 1 and 3 are slightly altered diabase with minor chlorite and amphibole formed in the groundmass. Piece 2 is a matrix-rich breccia with slightly altered diabase hosted in carbonate (aragonite?).

STRUCTURE:
There is no evidence of crystal plastic or brittle shear deformation.

Core Photo



209-1275B-1R-1 (Section top: 0.0 mbsf)

UNIT-I: DIABASE/OXIDE GABBRO

Pieces 1-13

COLOR: Gray

PRIMARY MINERALOGY:

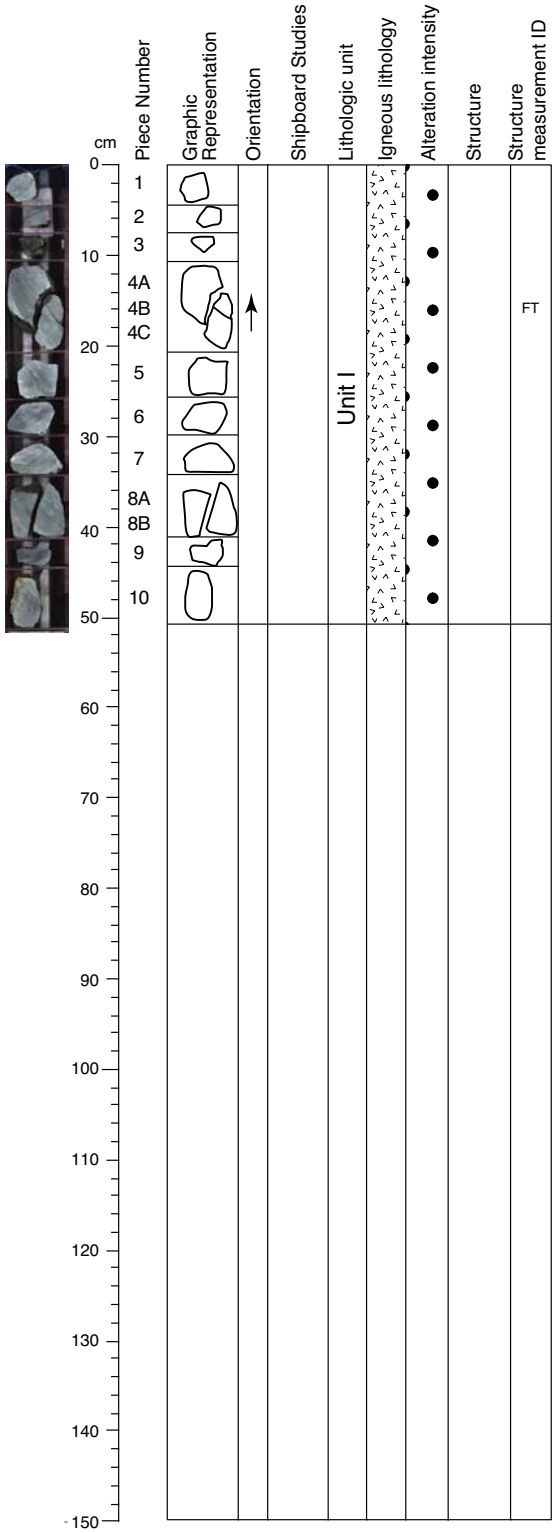
COMMENTS: This section is composed entirely of featureless, aphyric diabase.

SECONDARY MINERALOGY:
The rocks are too grained-fine to allow a reliable estimate of mineral alteration. Based on the presence of chlorite-amphibole veinlets and the fact that the samples can be scratched with a needle, 20% of greenschist-facies alteration was estimated.

METAMORPHIC VEINS:
Narrow, green chlorite-amphibole veinlets in Pieces 1, 3, 6, and 9 make up about 0.1% of the core volume in this section.

STRUCTURE:
The section consists of fine grained diabase. Piece 9 contains two subvertical open fractures. Pieces 1-10 have rare dark (chlorite-amphibole) alteration veins. Pieces 11-13 are coarser grained and have no veins

Core Photo



209-1275B-2R-1 (Section top: 11.0 mbsf)

UNIT-I: DIABASE/OXIDE GABBRO

Pieces 1-10

COLOR: Gray to reddish-gray

PRIMARY MINERALOGY:

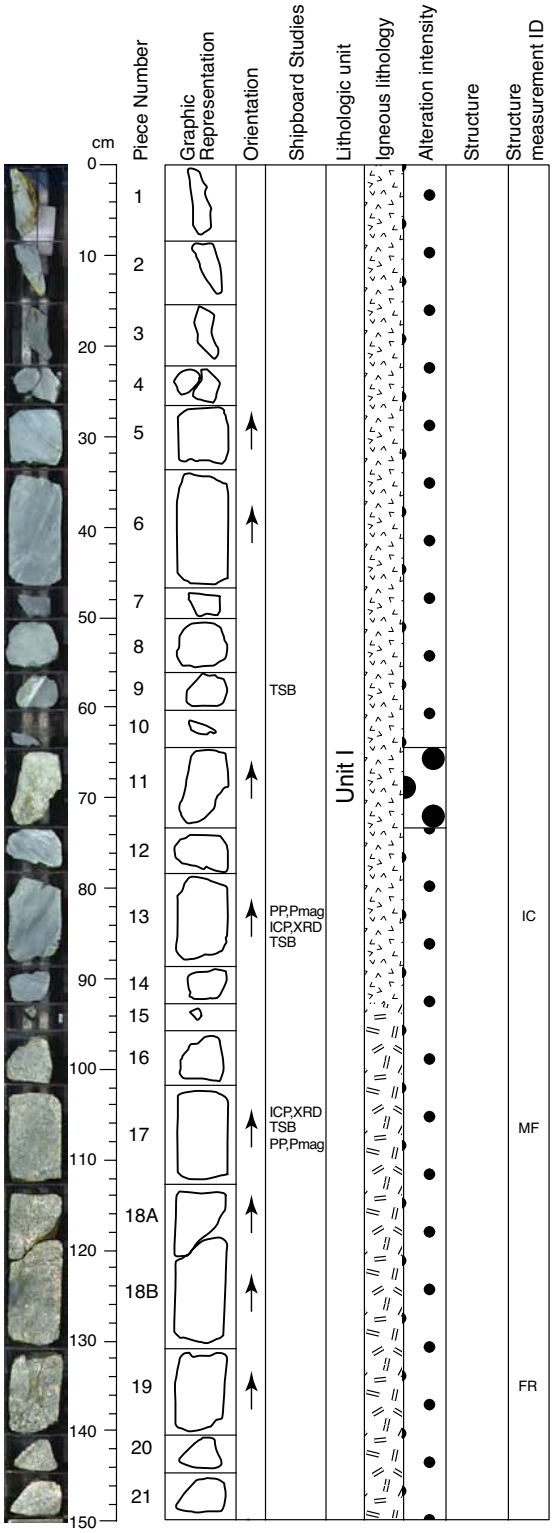
COMMENTS: This section is composed entirely of featureless, aphyric diabase.

SECONDARY MINERALOGY:
The rocks are too fine grained to allow a reliable estimate of mineral alteration. Based on the presence of chlorite-amphibole veinlets and the fact that the samples can be scratched with a needle, 20% of greenschist-facies alteration was estimated. Some pieces have a reddish staining indicating oxidative alteration.

METAMORPHIC VEINS:
Narrow, green chlorite-amphibole veinlets in Pieces 1, 4, 5, and 10 make up about 0.1% of the core volume in this section.

STRUCTURE:
Fine grained aphyric diabase. Pieces 1-9 have rare dark (chlorite-amphibole) alteration veins. The base of Piece 4 contains slickensides that indicate dip slip motion along a fault that dips approximately 60 degrees. Piece 10 has a high density of shear fractures and incipient brecciation along one edge.

Core Photo



209-1275B-3R-1 (Section top: 13.0 mbsf)

UNIT-I: DIABASE/OXIDE GABBRO

Pieces 1-21

COLOR: Greenish-gray

PRIMARY MINERALOGY:

Plagioclase	Mode 55%-60% Size 1.5 mm Shape/Habit Euhedral
Pyroxene	Mode 35%-40% Size 1-3 mm Shape/Habit Subhedral - euhedral
Oxide	Mode 5%

COMMENTS: This section is composed of a mixture of featureless, aphyric diabase (Pieces 1-8, 10, and 12-14) and fine-grained to microgabbro. The gabbro has a pronounced magmatic foliation and is composed primarily of euhedral plagioclase and pyroxenes and interstitial oxides. The pyroxenes are moderately altered and the proportion of clinopyroxene to orthopyroxene is unclear. The grain-size variations in the gabbros can be abrupt or gradational. There are modal inhomogeneities defined by both variations in the oxide mode (from 3-8%) and in the proportion of plagioclase and pyroxene. These modal variations occur on the centimeter scale. Pieces 18b and 19 are cut by two generations of dikes the first being gabbroic and very thin (~ 1.5 mm) and the second diabasic and discontinuous. No chills or reaction zones are noted.

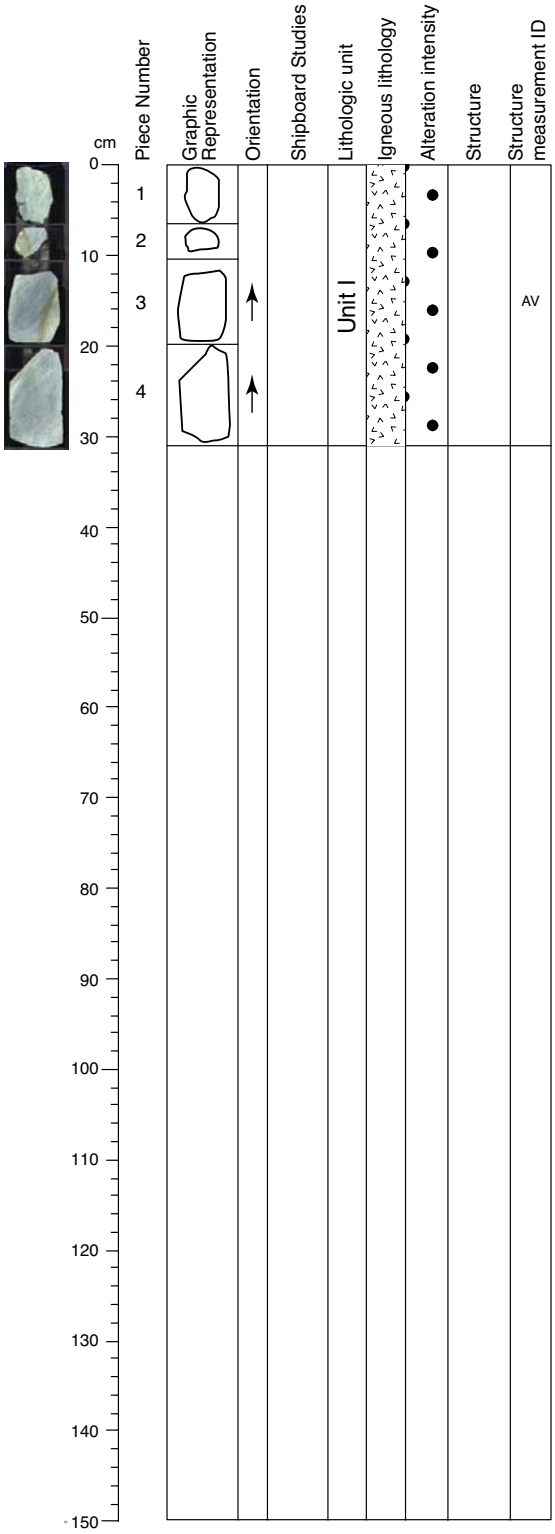
SECONDARY MINERALOGY:
The section is composed of moderately to highly altered diabase and microgabbro. Extent of alteration ranges from 10-40% (diabase) to 40-50% in microgabbro. In the microgabbro, pyroxene is highly to completely replaced by green amphibole and chlorite, while plagioclase is 10% altered to secondary plagioclase and chlorite. Intervals 57-59 cm, 84-87 cm, and 105-107 cm reveal that the mesostasis of the diabase is dominantly altered to amphibole with minor chlorite. Contacts between diabase and gabbro can be sheared and completely altered to very fine-grained chlorite, amphibole, and quartz. Sphene and hematite are breakdown products of FeTi-oxides in the microgabbro.

METAMORPHIC VEINS:
There is only very minor chlorite veining in the diabase of this section (Pieces 1-14). Gabbro (Pieces 15-21) shows green chlorite-amphibole and black amphibole-chlorite veinlets that make up between 0.2 and 1% of the core volume. Green clay veins use the amphibole-chlorite veins in Pieces 18-21.

THIN SECTIONS: Sample 1275B-3R-1, 57-59 cm, 1275B-3R-1, 84-87 cm, and 1275B-3R-1, 105-107 cm

STRUCTURE:
The section consists of diabase (Pieces 1-9, 10, 12-14), varitextured oxide gabbro (Pieces 11, 15-21) or intrusive or xenolithic contacts between diabase and gabbro (Pieces 4, 18, 19). Relationships are complex with gabbro containing diabase xenoliths (Pieces 18 and 19) and diabase containing gabbroic xenoliths (Pieces 13 and 14). Piece 9 contains a contact between gabbro and aphyric diabase (contact appears to be gabbro intruding diabase). Minor chlorite-amphibole veins are in the diabases (Pieces 2, 6, and 11). Planar chlorite-amphibole veins are in the gabbros of Pieces 17, 18 and 19. Piece 9 contains a 1 cm wide zone of fine-grained cohesive cataclastite, and schistose amphibole and chlorite along a contact between basalt and gabbro. The boundary between the basalt and the cataclasite is sharp and planar. The boundary between the gabbro and cataclasite is undulatory and irregular with stringers of green schistose amphibole penetrating along fractures into the gabbro. Piece 11 is partially brecciated with green amphibole forming a matrix between subangular gabbro clasts. Fractures in Pieces 18 and 19 accommodated up to 1 cm of shear offset.

Core Photo



209-1275B-3R-2 (Section top: 14.5 mbsf)

UNIT-I: DIABASE/OXIDE GABBRO

Pieces 1-4

COLOR: Greenish-gray

PRIMARY MINERALOGY:

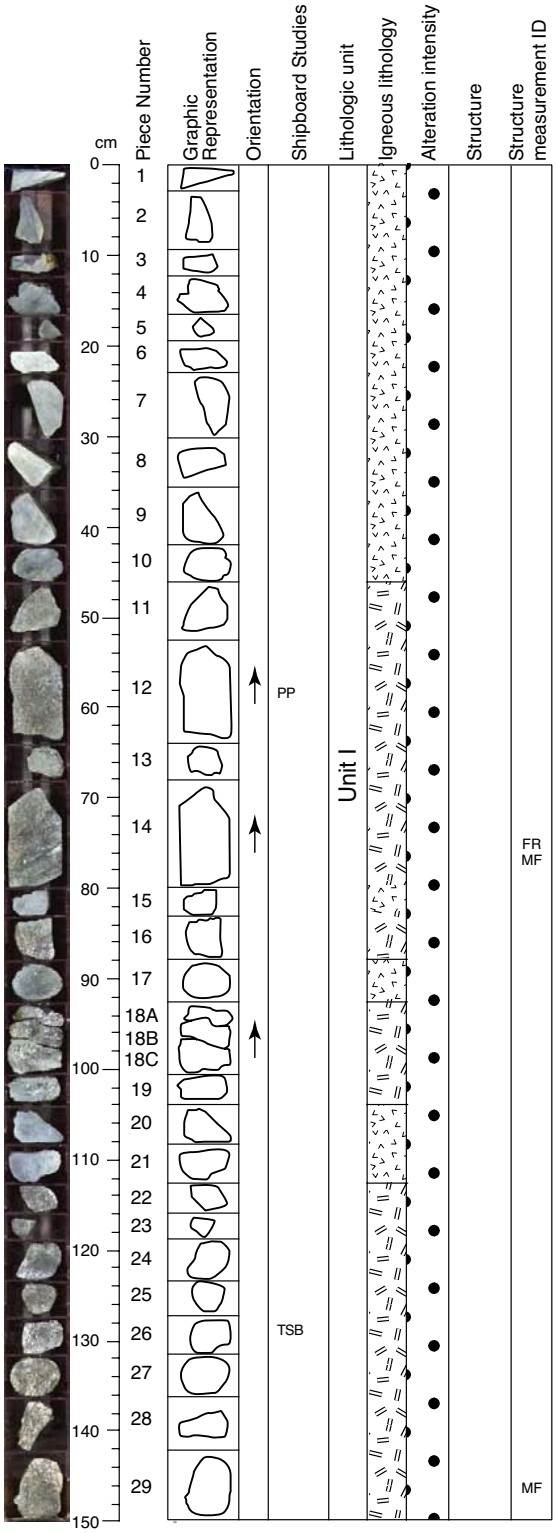
COMMENTS: This section is composed entirely of a mixture of featureless, aphyric diabase.

SECONDARY MINERALOGY:
The diabase of this section is moderately altered (20-30%) to secondary plagioclase, chlorite, and amphibole.

METAMORPHIC VEINS:
Narrow, green chlorite-amphibole veinlets make up less than 0.1% of the core volume in this section.

STRUCTURE:
Fine grained diabase. All pieces have rare white (?) and dark (chlorite-amphibole) alteration veins. Piece 1 has chlorite-filled shear fractures. Piece 4 has one open fracture.

Core Photo



209-1275B-4R-1 (Section top: 18.0 mbsf)

UNIT-I: DIABASE/OXIDE GABBRO

Pieces 1-29

COLOR: Gray to green

PRIMARY MINERALOGY:

Plagioclase	Mode 60-65% Size 1.5 mm Shape/Habit Euhedral
Pyroxene	Mode 33-35% Size 1-3 mm Shape/Habit Subhedral - Euhedral
Oxide	Mode 2-5%

COMMENTS: This section is composed of a mixture of featureless, aphyric diabase (Pieces 1-10, 17 and 20-21) and fine-grained gabbro to microgabbro. The gabbro has a pronounced magmatic foliation that is best developed in coarser-grained intervals, and is composed primarily of euhedral plagioclase and pyroxenes with interstitial oxides. The pyroxenes are moderately altered and the proportion of pyroxenes is unclear. The grain size varies in the gabbros from less than 0.5 mm to ~ 3 mm and these changes are gradational and abrupt even in single pieces. Piece 18 is a gabbro brecciated by diabase. Piece 29 is cut by a granophyric dikelet but it is too small to estimate modal proportions.

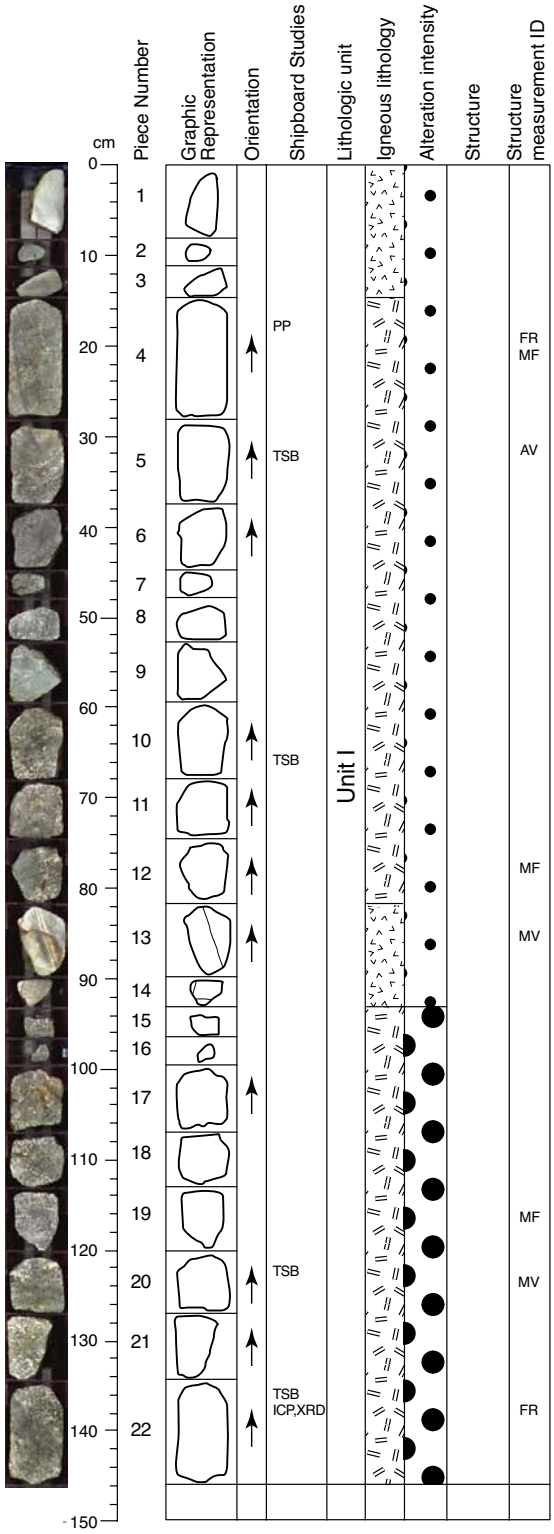
SECONDARY MINERALOGY:
The section is composed of moderately altered diabase and micrograbbro. The estimated extent of alteration ranges from 10-40% for both diabase and gabbro. In the micrograbbro, pyroxene is highly to completely replaced by green amphibole and chlorite, while plagioclase is 10% altered to secondary plagioclase and chlorite. A thin section of interval 124-127 cm shows 8% replacement of plagioclase by secondary plagioclase, chlorite, and green amphibole, while clinopyroxene is 80% altered to green amphibole and minor chlorite. FeTi-oxides are partly replaced by hematite and sphene.

METAMORPHIC VEINS:
Minor chlorite veining is developed throughout this section (0.1% of core volume). In Piece 8, a light green, hard quartz-chlorite-carbonate vein cuts the chlorite veins. In Pieces 28 and 29, mm-wide, black amphibole veins, making up about 2% of the core volume, are cut by chlorite veins.

THIN SECTIONS: Sample 1275B-4R-1, 127-130 cm

STRUCTURE:
The section consists of diabase (Pieces 1-10, 15,17, 20 and 21) and varitextured gabbro (Pieces 11-15,18-19, 22-29). Many of the gabbroic pieces contain diabase xenoliths (Pieces 16, 18, 22-27) and Piece 19 contains a contact between gabbro and diabase in which the gabbro intrudes diabases. Minor chlorite-amphibole veins are in the diabases (Pieces 3-6, 8-10 and 16). Piece 8 has a crosscutting carbonate vein. Planar chlorite-amphibole veins are in gabbro Pieces 12, 14, 17, 19, 28 and 29. Pieces 28 and 29 are cut by thin gabbroic veins. Piece 10-14, 16 and 17 are cut by numerous small faults with incipient brecciation in some locations. Pieces 18 and 19 contain zones of fine-grained cataclasite in which angular gabbro clasts and pyroxene crystals are contained within an altered green (amphibole-chlorite) matrix. Diabase is present with gabbro outside margins of cataclasite and within cataclasite. Diabase is less deformed and brecciated than is gabbro. Pieces 20 and 21 are diabase and contain arrays of shear fractures with minor brecciation. Pieces 22 through 29 are cut by variable densities of shear fractures.

Core Photo



209-1275B-5R-1 (Section top: 22.6 mbsf)

UNIT-I: DIABASE/OXIDE GABBRO

Pieces 1-22

COLOR: Green to gray with red and white spots

PRIMARY MINERALOGY:

Plagioclase	Mode 60% Size 2 mm Shape/Habit Euhedral
Pyroxene	Mode 37-38% Size 1-2 mm Shape/Habit Subhedral - Euhedral
Oxide	Mode 2-3%

COMMENTS: This section is composed of a mixture of featureless, aphyric diabase (Pieces 1-3, and 13-14) and microgabbro to fine-grained gabbro. The gabbro has a pronounced magmatic foliation that is best-developed in coarser grained intervals and is composed primarily of euhedral plagioclase and pyroxenes with interstitial oxides. The pyroxenes are moderately altered and their proportions are unclear. The grain size varies in the gabbros from less than 0.5 mm to ~ 2 mm and these changes can be both gradational and abrupt in single pieces. Piece 20 is deformed with bands of chlorite. Piece 23 is cut by a 0.25 mm amphibole vein.

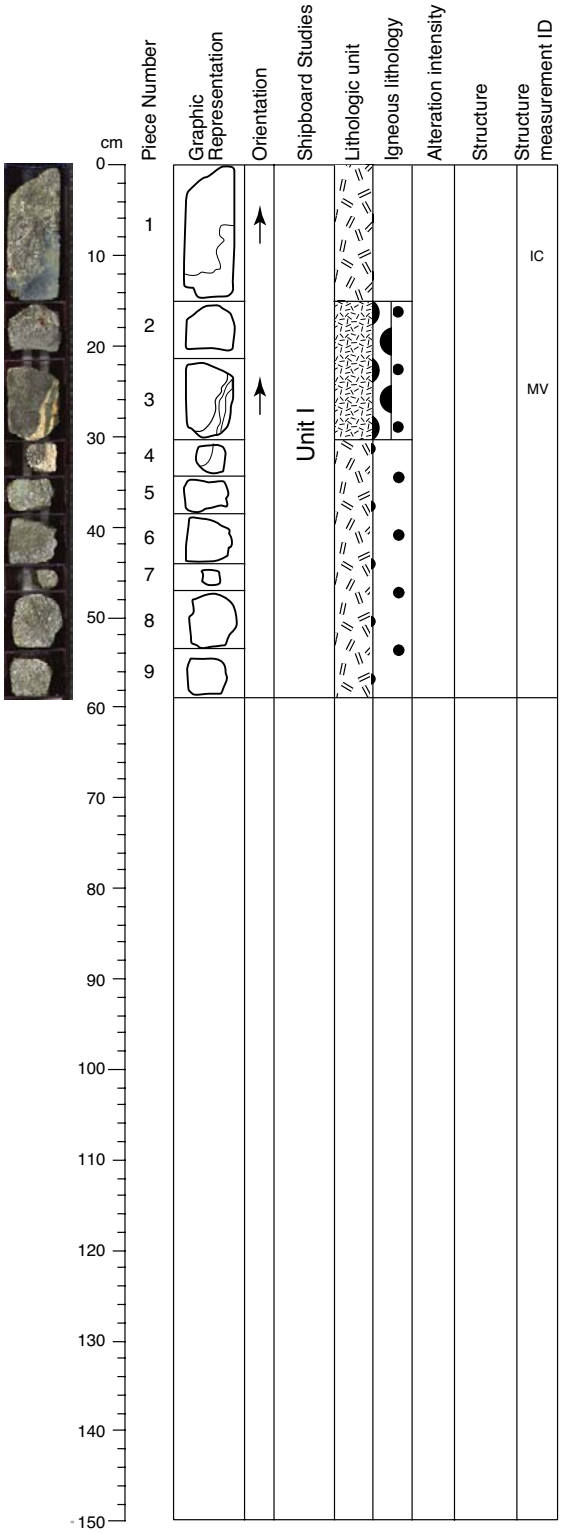
SECONDARY MINERALOGY:
The section is composed of moderately to highly altered diabase and micrograbbro/gabbro. The extent of alteration is about 30% for the diabase and increases from 40 to 70% within the micrograbbro/gabbro in this section. While the intensity of alteration varies, the alteration style does not. Pyroxene is highly to completely replaced by green amphibole and chlorite, while plagioclase is 5-10% altered to secondary plagioclase, green amphibole, and minor chlorite. Sphene and hematite are breakdown products of FeTi-oxides in the micrograbbro and can make up 1-2% of the rock..

METAMORPHIC VEINS:
Pieces 1-3 have no veins. The rest of the section shows small amphibole-chlorite-quartz veins that are cut by rare chlorite/clay veinlets. Amphibole veins with quartz-plagioclase selvages in Pieces 13 and 14 are probably magmatic in origin.

THIN SECTIONS: Sample 1275B-5R-1, 30-33 cm, 1275B-5R-1, 64-67 cm, 1275B-5R-1, 122-125 cm, and 1275B-5R-1, 134-137 cm

STRUCTURE:
The section consists of diabase (Pieces 1-3 and 13) and varitextured gabbro (Pieces 4-12 and 15-22). Pieces 5, 15 and 16 contain weak crystal-plastic foliation and Piece 10 contains evidence of crystal-plastic to ductile-brittle deformation. Piece 13 is cut by a felsic vein that is highly altered. Piece 1 has a small vein. Pieces 5, 6, 11, 12, and 22 have amphibole-chlorite veins. Pieces 13, 14 and 18 have black amphibole veins with quartz that are probably magmatic. Pieces 11, 12, 14 and 22 have oxide/clay fillings to the veins, which have been used as faults. Pieces 4 through 8 and 19 contain minor shear fractures with little or no offset. Pieces 9, 20 and 21 are cut by fine-grained, cohesive cataclasite. Fragments of gabbro, pyroxene crystals and plagioclase crystals are contained within a fine-grained, chlorite-rich matrix. The matrix has a faint subhorizontal foliation. Piece 10 is cut by several randomly oriented faults with 1 to 5 cm offset. Pieces 11 and 12 are cut by dense arrays of planar shear fractures. Pieces 17, 18 and 22 are but by fractures and bands with incipient cataclastic brecciation. These bands contain chlorite mineralization.

Core Photo



209-1275B-5R-2 (Section top: 24.05 mbsf)

UNIT-I: DIABASE/OXIDE GABBRO

Pieces 1-15

COLOR: Greenish-gray to white

PRIMARY MINERALOGY:

Plagioclase	Mode 60-65% Size 2 mm Shape/Habit Euhedral
Pyroxene	Mode 30-35% Size 1-2 mm Shape/Habit Subhedral - Euhedral
Oxide	Mode 0-1%

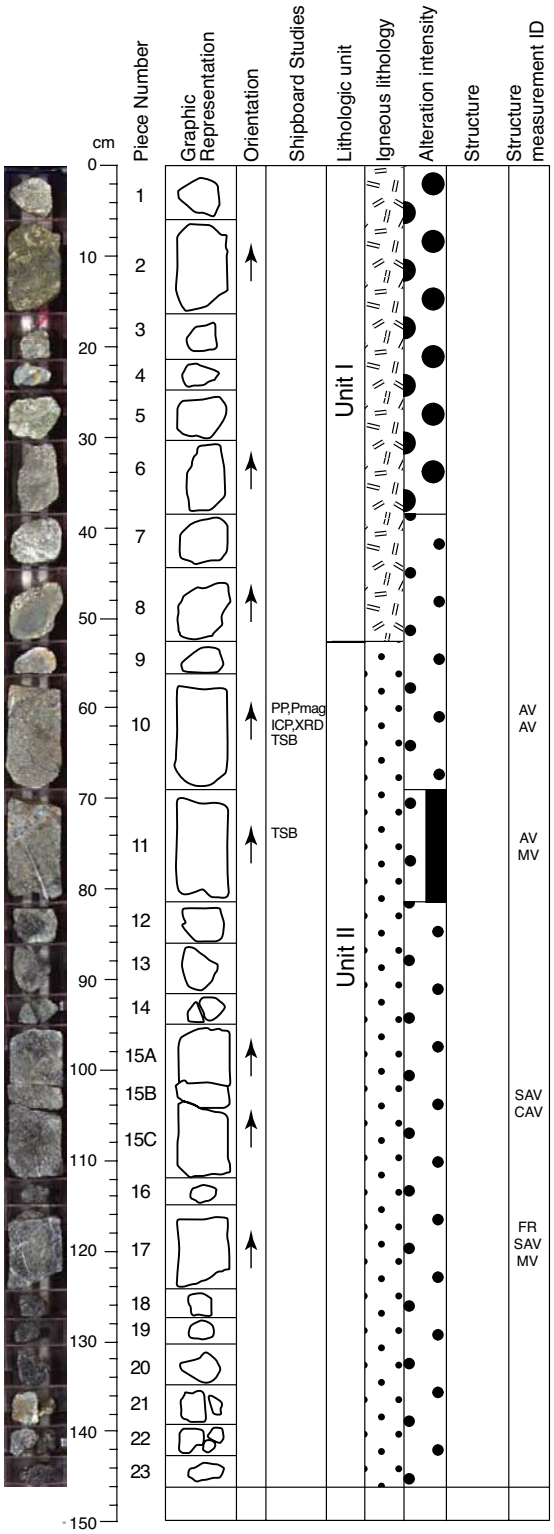
COMMENTS: This section is composed of a mixture of microgabbro to fine-grained gabbro. The gabbro has a pronounced magmatic foliation that is best-developed in coarser grained intervals and is composed primarily of euhedral plagioclase and pyroxenes with interstitial oxides. The pyroxenes are moderately altered and their proportions are unclear. Piece 1 contains diabase from 9 – 14 cm that appears to be partially disaggregated in the gabbro.

SECONDARY MINERALOGY:
The section is composed of moderately to very highly altered diabase and micrograbbro/gabbro. Diabase dike in gabbro appear very highly altered to amphibole and chlorite. The hosting gabbro is moderately altered, similar to the gabbro in Section 1275B-5R-1. Locally there is red staining due to low temperature oxidative alteration.

METAMORPHIC VEINS:
Rare, black amphibole veinlets are cut by green chlorite-amphibole veins in this section.

STRUCTURE:
The section contains gabbro and diabase and many contacts between them. Piece 1 contains a diabase gabbro contact in which gabbro intrudes diabase. Piece 2 is a gabbro containing diabase xenoliths. Piece 3 is cut by a trondhjemitic vein, which is cut by a diabase at its center. Piece 4 is also cut by trondhjemite. Piece 5 is an oxide gabbro that envelopes a diabase xenolith. A dark amphibole vein cuts Piece 8 and chlorite-amphibole veins in Pieces 1, 4, and 5. Pieces 1 and 2 are but by fractures and bands with incipient cataclastic brecciation. These bands contain chlorite. Pieces 5 and 6 are cut by dense arrays of shear fractures with incipient brecciation in some locations. Pieces 3 and 7-9 are cut by rare shear fractures.

Core Photo



209-1275B-6R-1 (Section top: 27.6 mbsf)

UNIT-I: DIABASE/OXIDE GABBRO

Pieces 1-8

COLOR: Grayish-green to white

PRIMARY MINERALOGY:

Plagioclase	Mode 65% Size 2 mm Shape/Habit Euhedral
Pyroxene	Mode 30% Size 1-2 mm Shape/Habit Subhedral - Euhedral
Oxide	Mode 5%

COMMENTS: This section of the core is composed entirely of microgabbro to fine-grained gabbro. Diabase is included in Pieces 2 and 8. In Piece 8 the diabase is surrounded by finer grained gabbro and in places by the coarsest gabbro in the section.

UNIT-II: TROCTOLITE

Pieces 9-23

COLOR: Dark gray to dark green

PRIMARY MINERALOGY:

Olivine	Mode 75% Size 4 mm Shape/Habit Rounded/Equant
Plagioclase	Mode 25% Size 2 mm Shape/Habit Interstitial
Pyroxenes	Mode Tr Shape/Habit Interstitial
Oxide Mode	Tr

COMMENTS: This section of the core is composed entirely of medium-grained troctolite. The olivine is rounded and surrounded by interstitial plagioclase, pyroxenes, and amphibole. Piece 11 is cut by a 1.3 cm thick oxide gabbro dike. Piece 21 is also cut by gabbro but it is too altered to determine its character.

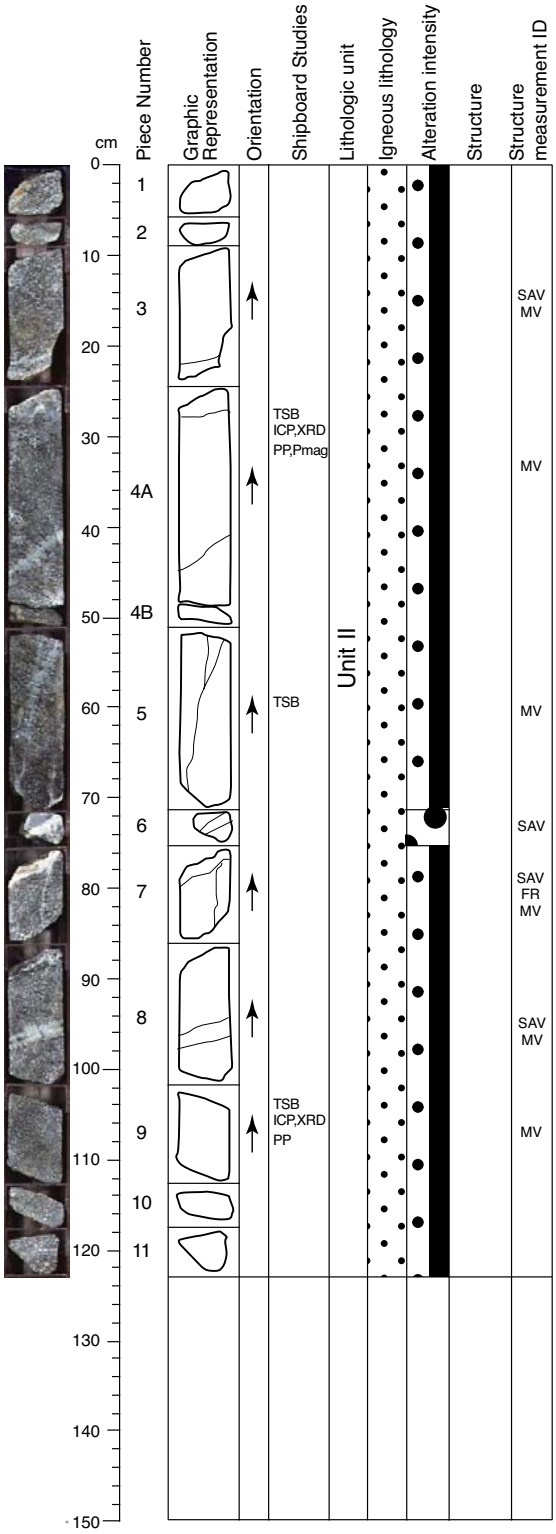
SECONDARY MINERALOGY:
The section is composed of moderately to completely altered diabase, gabbro, gabbroic veins, and troctolite. The gabbro in Pieces 1-8 is similar in alteration style and intensity to that of Core 1275B-5R. Olivine in the troctolite is 20-50% altered to talc, serpentine, and oxide. There is some iddingitization of olivine indicated by the development of red clay+Fe-oxyhydroxide and carbonate. Clinopyroxene is 30-70% altered to chlorite, and plagioclase is 80-90% altered to chlorite and talc. Gabbro veins in troctolite are completely altered to amphibole, chlorite, and sphene.

METAMORPHIC VEINS:
Pieces 1-7 and 21 have rare, wispy, red chlorite-hematite veins. Pieces 8 hosts amphibole veins in the diabase xenolith in gabbro. Veining in the troctolite (Pieces 9-16) is dominated by serpentine-carbonate veins that make up between 0.2 and 0.5% of the core volume. Black, anastomosing serpentine-magnetite veins in Pieces 9 and 10 are cut by these serpentine-carbonate veins. Pieces 9 and 10 also show red clay-carbonate-hematite veins. Piece 11 hosts a prominent black amphibole-chlorite vein (1.5 Vol.% of this piece). Pieces 18-20 and 22-23 have no veins.

THIN SECTIONS: Samples 1275B-6R-1, 61-64 cm and 1275B-6R-1, 70-75 cm

STRUCTURE:
The section consists of diabase (Piece 3), varitextured gabbro (Pieces 1-3, 5-8) and melano-troctolite to, locally, dunite, feldspathic dunites, and feldspathic wehrlites (Pieces 9-23). Mutually intrusive relationships exist for diabase and gabbroic samples. Piece 4 is a diabase intruded by gabbro. Pieces 1 and 8 are gabbro containing diabase xenoliths. There are no crystal-plastic deformation obvious within the section. Gabbroic veins cut Pieces 11 and 1, which are melano-troctolites Pieces 12, 13 and 15 contain lithologic contacts between melanotroctolite and dunite, feldspathic dunite, and feldspathic wehrlites. Each type of rock contains dominantly olivine, with varying proportions of plagiolcase and clinopyroxene as interstitial phases defining contacts. Pieces 1- 5, 7 and 21 have rare chlorite-hematite veins. Piece 8 is cut by amphibole veins in the diabase inclusion. Early black, anastomosing serpentine-magnetite veins in Pieces 9, 10 and 11 are cut white serpentine veins and crosscutting carbonate veins. One anastomosing serpentine vein set cuts an earlier one in Pieces 12-23. The white serpentine veins are crosscut by carbonate veins. Pieces 6, 19 and 23 have no veins. Pieces 2 and 5 are cohesive cataclastic breccia. Angular to subangular fragments of gabbro, pyroxene crystals and diabase (0.1 cm to 2 cm) are supported by a chlorite-rich matrix. Pieces 3 and 4 are cut by chlorite-filled shear fractures with incipient brecciation in some locations. Pieces 1, 11, 15, 16 and 17 are cut by planar to slightly anastomosing shear fractures with little to no offset.

Core Photo



209-1275B-6R-2 (Section top: 29.06 mbsf)

UNIT-II: TROCTOLITE

Pieces 1-11

COLOR: Green to black to red

PRIMARY MINERALOGY:

Olivine	Mode 80-90% Size 4 mm Shape/Habit Rounded/Equant
Plagioclase	Mode 5-10% Size 1-3 mm Shape/Habit Interstitial
Pyroxenes	Mode 0-15% Shape/Habit Interstitial
Oxide	Mode 0-1%

COMMENTS: This section is composed entirely of medium grained troctolite. The olivine is rounded and surrounded by interstitial plagioclase, pyroxenes, and amphibole. The top of Piece 4 (24-32 cm) has abundant poikilitic pyroxene. Gabbroic dikes (now altered) cut the lower part of Piece 4 and along the long dimension of Piece 5. The modal plagioclase in is more variable in Pieces 7-11 defining plagioclase-rich bands in Piece 8 with local contents as high as 20%.

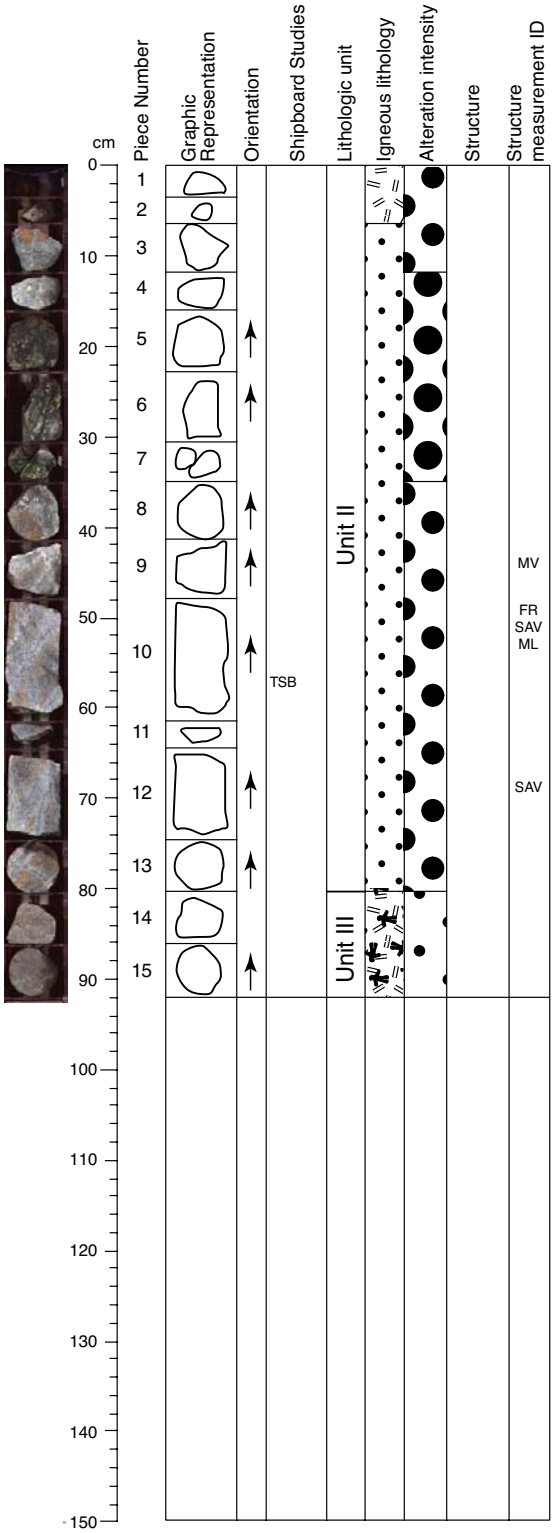
SECONDARY MINERALOGY:
The section is composed of moderately to highly altered troctolite. Olivine is 20-60% altered to serpentine, talc, and oxide. Orthopyroxene oikocrysts are 10-70% altered to talc and chlorite, and plagioclase is 60-80% altered to chlorite and minor amphibole. The partial replacement of olivine and plagioclase produced pronounced, zoned reaction coronas of chlorite (after plagioclase) and talc (after olivine). Magmatic veins in troctolite are completely altered to amphibole, chlorite, talc, and sphene. The presence of zircon suggests they represent late-stage felsic veins.

METAMORPHIC VEINS:
Composite picrolite-chrysotile-carbonate veins are present in Pieces 1-3 and 10. Pieces 4-8 show green to brown picrolite-hematite veins in cross-fractures associated with a prominent gabbroic vein.

THIN SECTIONS: Sample 1275B-6R-2, 27-30 cm and 1275B-6R-2, 57-61, and 1275B-6R-2, 102-105 cm

STRUCTURE:
The section generally consists of feldspathic to wehrlitic dunite and melanotroctolitic pieces. The rocks have an olivine framework and interstitial plagioclase or clinopyroxene. Piece 6 is an exception in that it contains a contact with a diabase dike and a troctolite. Pieces 3-5 and 7-8 are cut by gabbroic veins. Piece 5 is a complex mixture of feldspathic dunite, wehrlite, and troctolite. There is no evidence of high temperature crystal-plastic deformation.
Piece 5 shows two generations of serpentine veins; one follows the trace of a gabbroic vein, the other fills tension cracks in both the serpentine vein and the magmatic vein. Piece 8 shows gently dipping green serpentine veins with shear fibers cut by late dark green serpentine veins. Gabbroic veins in Pieces 3-5, and 7 and 8 associated with green serpentine + clay/oxide filled tension cracks Pieces 1, 2, 10 and 11 contain branching/anastomosing serpentine veins. Pieces 6 and 7 show increased serpentine and carbonate veining associated with contacts. Pieces 1 and 6 contain late thin carbonate veins. Pieces 6 and 7 are cut by anastomosting, mineralized shear fractures near the margins of a diabase dike. Total offset along fractures is unknown.

Core Photo



209-1275B-7R-1 (Section top: 32.3 mbsf)

UNIT-II: TROCTOLITE

Pieces 1-13

COLOR: Green to white with black and red domains

PRIMARY MINERALOGY:

Olivine	Mode 60-75% Size 4 mm Shape/Habit Rounded/Equant
Plagioclase	Mode 25-40% Size 1-3 mm Shape/Habit Interstitial
Pyroxene	Mode Tr Shape/Habit Interstitial
Oxide	Mode 0-1%

COMMENTS: This section of the core contains a short interval of gabbro near its top (Pieces 1-2, 0 – 6 cm) that may represent pebbles fallen from higher in the hole. The rest of the section is composed primarily of medium grained troctolite. The olivine is rounded and surrounded by interstitial plagioclase, pyroxenes and amphibole. Piece 4 is a breccia with clasts of troctolite in a gabbroic matrix.

UNIT-III: OXIDE GABBRO

Pieces 14-15

COLOR: Green

PRIMARY MINERALOGY:

Plagioclase	Mode 50% Size 1.5 mm Shape/Habit Euhedral
Pyroxene	Mode 45% Size 1 mm Shape/Habit Subhedral
Oxide	Mode 5%

COMMENTS: The last two pieces of the core (Pieces 14 and 15) are a fine-grained gabbro. This gabbro has a distinctively higher magnetic susceptibility than the gabbro of Unit-I

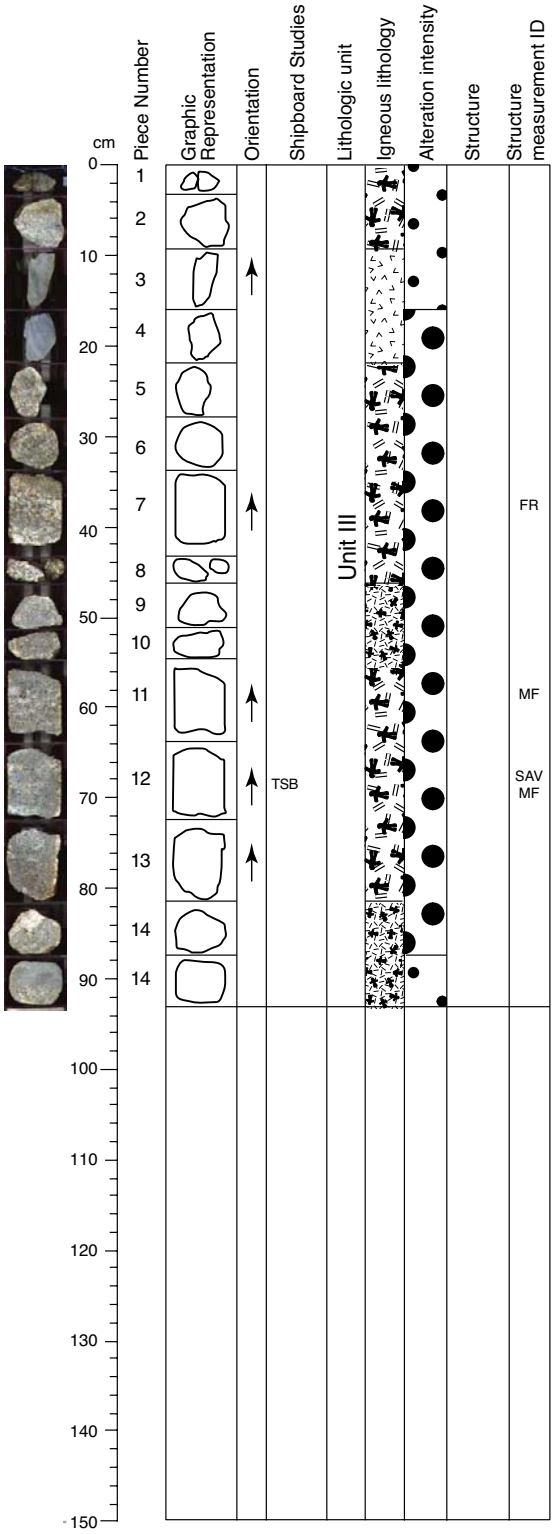
SECONDARY MINERALOGY:
The section is composed of highly to very highly altered troctolite and moderately altered gabbro. Olivine in the troctolite is 20-60% altered, dominantly to talc and oxide with only minor serpentine. Plagioclase is 90-100% altered to chlorite and minor amphibole. The partial replacement of olivine and plagioclase produced pronounced, zoned reaction coronas of chlorite (after plagioclase) and talc (after olivine). Gabbroic dikes in troctolite (Pieces 8-13) are very highly to completely altered to chlorite, talc, and amphibole. The oxide gabbro is 40% altered to amphibole (after clinopyroxene and plagioclase) and chlorite+secondary plagioclase (after plagioclase).

METAMORPHIC VEINS:
Green and greenish-black chlorite-amphibole veins are present in Pieces 3-4 and 8-9, where they account for ~0.5% of the core volume. In addition, Pieces 8-9 have light green chrysotile veinlets that are cut by green composite picrolite-carbonate-hematite veins. Pieces 10-13 have black picrolite-magnetite veins that are cut by green picrolite veins with traces of hematite and sulfide. Both vein types are cut by white to green composite picrolite-carbonate-hematite veins. The gabbro in Pieces 14 and 15 has minor (0.2 vol.%) red clay-hematite veins.

THIN SECTIONS: Sample 1275B-7R-1, 54-59 cm

STRUCTURE:
The section consists of varitextured oxide gabbro (Pieces 1-7) and troctolite (Pieces 8-15), commonly in contact with gabbroic veins which crosscut them and appear to form a net vein breccia. Olivine in the troctolite tends to be rounded with interstitial plagioclase or pyroxene, now highly altered. The grain shapes and textures indicate a lack of crystal-plastic deformation in both the gabbroic and troctolitic rocks. They both preserve igneous textures, although highly altered. Pieces 1, 2, 14 and 15 have rare small chlorite-amphibole veins that cut carbonate oxide veins. Pieces 8-13 have early thin black serpentine veins cut by large gray-green serpentine veins which are in turn cut by composite white serpentine-filled tension gashes and thin carbonate veins. Pieces 4 through 8 contain zones of hydrothermal brecciation in which fractures are filled with chlorite and other alteration minerals. There is some possible shear displacement along fractures. Piece 10 has a low density of open fractures.

Core Photo



209-1275B-8R-1 (Section top: 37.3 mbsf)

UNIT-III: OXIDE GABBRO

Pieces 1-15

COLOR: Dark gray to greenish-gray

PRIMARY MINERALOGY:

Plagioclase	Mode 50% Size 0.5 - 3 mm Shape/Habit Euhedral
Pyroxene	Mode 45% Size 0.25 - 2 mm Shape/Habit Subhedral
Oxide	Mode 5%

COMMENTS: Aside from two small chunks of aphyric diabase (Pieces 3 and 4) that may have fallen in from above, this section is composed of microgabbro (Pieces 1-2, 9-10, and 14-15) and fine- to medium-grained gabbro (Pieces 5-8 and 11-13). The fine- to medium-grained gabbro has modal segregations, especially of oxides, and are modestly foliated. Piece 14 contains a contact with more felsic gabbro (too little of this is present to characterize) and Piece 15 has a gradational contact between fine- and medium-grained gabbro.

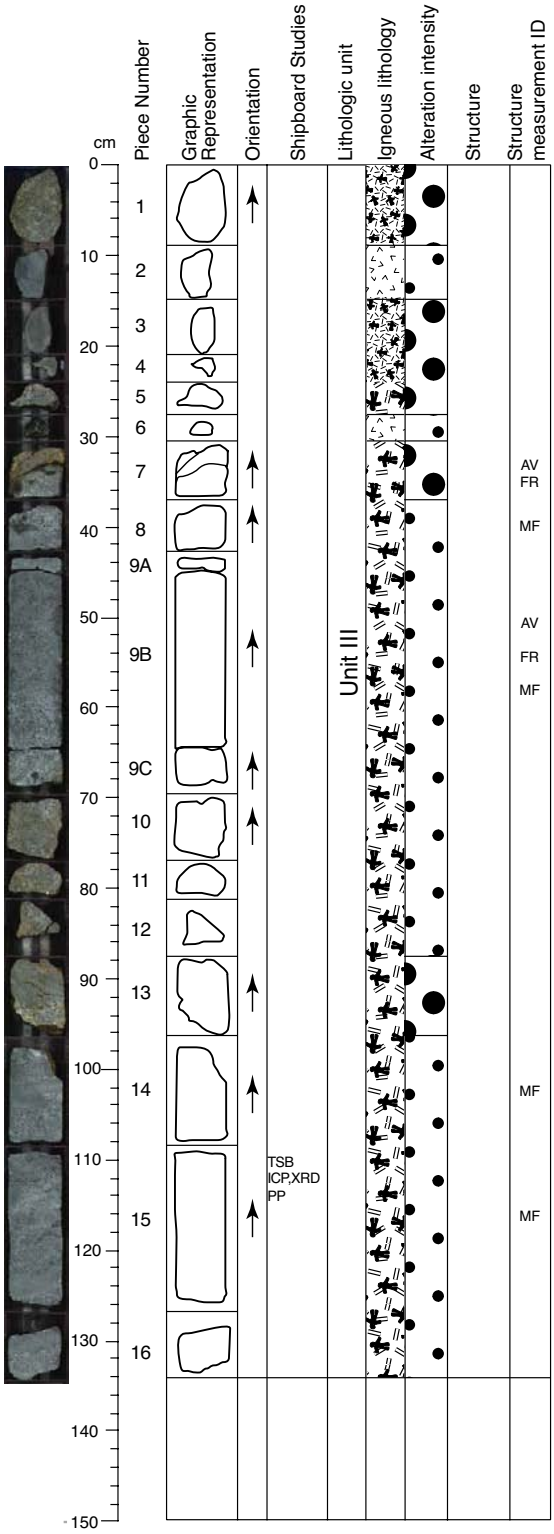
SECONDARY MINERALOGY:
The section consists mainly of dark gray and gray green moderately to highly altered gabbro. Pyroxenes are mainly replaced by amphibole. Plagioclase is only slightly altered to secondary plagioclase and minor green amphibole. In contrast to gabbros from Core 1275B-3R to 6R, chlorite is largely absent. Piece 2 contains a domain of talc alteration on its margin, which may represent a vein halo. Pieces 3 and 4 are extremely hard, gray aphanitic diabase, similar to that in sections higher up in the core.

METAMORPHIC VEINS:
This section hosts only minor (0.1 vol.%) red clay-hematite veins.

THIN SECTIONS: Sample 1275B-8R-1, 67-70 cm

STRUCTURE:
The section consists of oxide gabbro and oxide olivine gabbro that appear interlayered in Pieces 7 and 16 with layer boundaries inclined at 20 degrees in the cut face of the core. Pieces 3 and 4 consist of aphyric diabase and Piece 15 contains an irregular contact between oxide gabbro and a felsic gabbro to dioritic intrusive. There is no evidence of crystal-plastic deformation in the core. Minor amphibole veins cut Pieces 2-4, 5, 12 and 13. Oxidized veins occur in Pieces 7 and 13. Piece 7 contains a low density of open fractures.

Core Photo



209-1275B-9R-1 (Section top: 41.8 mbsf)

UNIT-III: OXIDE GABBRO

Pieces 1-16

COLOR: Greenish to brownish gray

PRIMARY MINERALOGY:

Plagioclase	Mode 60% Size 0.25 - 2 mm Shape/Habit Euhedral
Pyroxene	Mode 35% Size 0.25 – 1.5 mm Shape/Habit Subhedral
Oxide	Mode 5%

COMMENTS: Pieces 1-6 of this section are a jumble of material that appears to have fallen into the hole. Pieces 2 and 6 are aphyric diabase, Pieces 1, 3, and 4 are gabbro similar to that of Unit-I, and Piece 5 has bands of finer grained gabbro mixed with coarser grained gabbro (although still a fine-grained gabbro). Pieces 7 – 16 (30 – 135 cm) comprise the bulk of the section and are similar in character. They have significant variations in grain size within individual pieces from microgabbro (0.2 mm) to fine-grained gabbro (1.5 mm). The transitions between size domains can be either abrupt or gradational. The very fine-grained domains define bands or lenses hosted in the coarser material with elongations that are parallel to the host rock foliation. Oxides are locally concentrated into stringers (lengths of 3 cm) in the coarser gabbro or at the margins of the very fine and fine-grained gabbros.

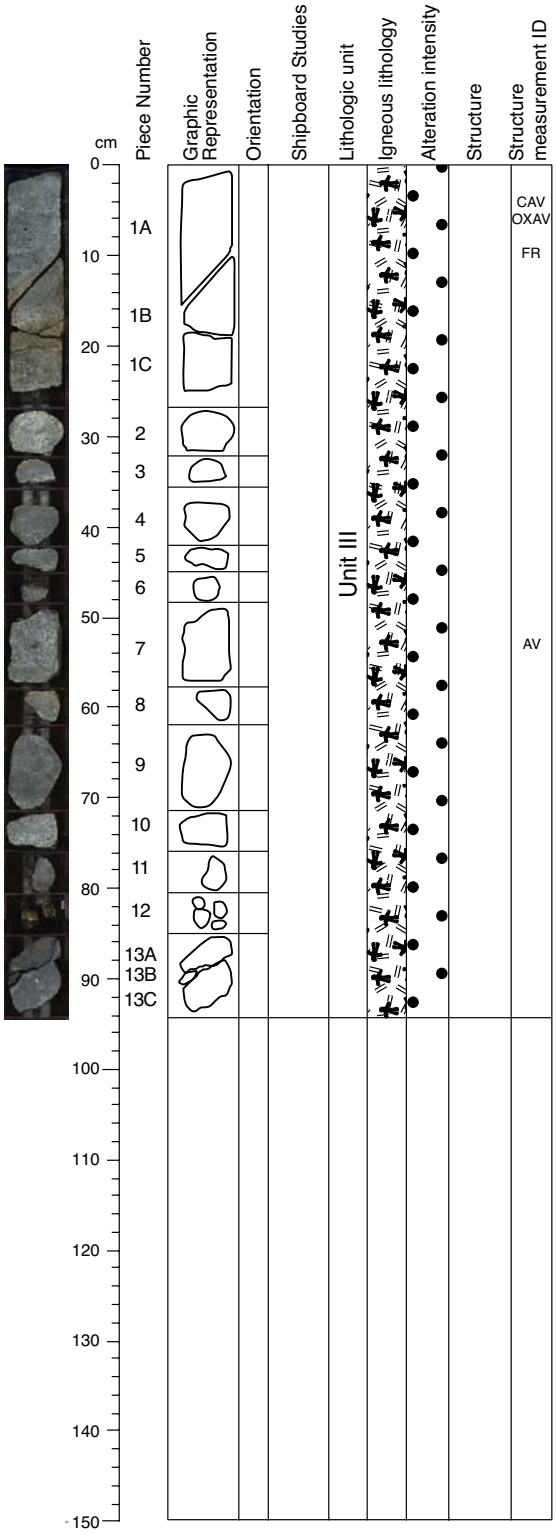
SECONDARY MINERALOGY:
This section consists mainly of moderately altered gabbro and microgabbro. Similar to Core 1275B-8R, alteration is dominantly clinopyroxene to amphibole, with only traces of chlorite. Distinctive orange brown strains due to Fe-oxyhydroxide alteration are developed in Pieces 1, 7, and 10 to 13. The diabase also appears moderately altered.

METAMORPHIC VEINS:
Red clay-hematite veins are developed in Pieces 1-7 and 10-13 and can account for as much as 2 vol.% of individual pieces (e.g., Piece 7). Pieces 8-9 and 14-16 contain black amphibole-chlorite veins (0.2-0.5 vol.%).

THIN SECTIONS: Sample 1275B-9R-1, 109-112 cm

STRUCTURE:
The section consists of largely oxide gabbros that vary in grain size, some oxide olivine gabbros, and aphyric and fine grained diabases (Pieces 2 and 3). The oxide gabbros are layered and contain banding that is inclined variably between 10 and 20 degrees in the cut face of the core. Some layer boundaries are irregular (e.g., Piece 13). Layer contacts occur in Pieces 8 and 13-16. There is no evidence of crystal plastic deformation in the section. Pieces 1, 4, 8, 9, and 14-16 are cut by green chlorite amphibole veins. Piece 2 (fine grained diabase) is also cut by chlorite veins. Red clay oxide veins occur in Pieces 7, 10, and 13. Pieces 4 and 7 contain extensional fibers in veins. Piece 7 contains a moderate density of open fractures. Pieces 9, 12 and 13 have a low density of open fractures.

Core Photo



209-1275B-9R-2 (Section top: 43.14 mbsf)

UNIT-III: OXIDE GABBRO

Pieces 1-13

COLOR: Gray to grayish brown

PRIMARY MINERALOGY:

Plagioclase	Mode 60% Size 0.25 - 2 mm Shape/Habit Euhedral
Pyroxene	Mode 35% Size 0.25 – 1.5 mm Shape/Habit Subhedral
Oxide	Mode 5%

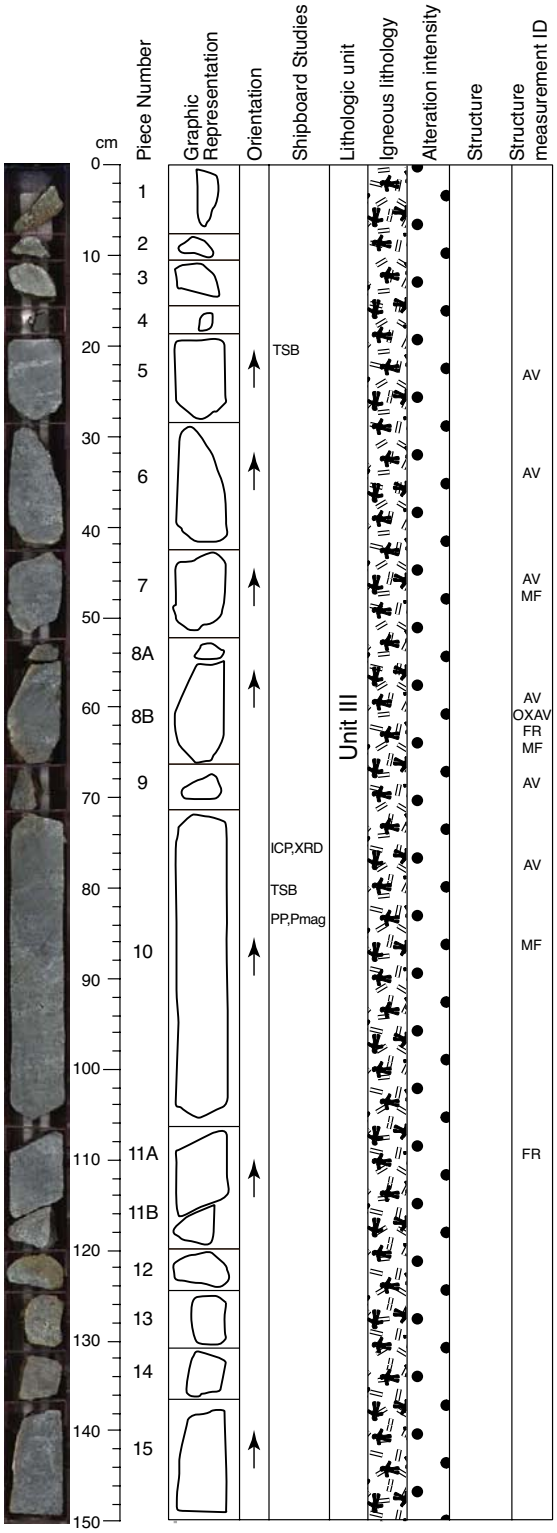
COMMENTS: This section is similar to the lower part of Section 1275B-9R1. It has significant variations in grain size within individual pieces from microgabbro to fine-grained gabbro. The transitions between size domains can be either abrupt or gradational. The very fine-grained domains are completely gradational in Piece 7. The foliations are better developed in this section than in the lower part of Section 1275B-9R1.

SECONDARY MINERALOGY:
This section consists mainly of moderately altered (20-35%) gabbro and microgabbro. Similar to Sections 1275B-8R-1 and 9R-1, alteration is dominantly clinopyroxene to amphibole, with only traces of chlorite. Plagiolcase is less than 5% altered to secondary plagioclase and minor amphibole.

METAMORPHIC VEINS:
Piece 1 shows small, red clay-hematite veins that are cut by white carbonate veins. Pieces 2-13 host minor black amphibole-chlorite veins.

STRUCTURE:
The section consists of interlayered medium and fine grained oxide gabbros to micrograbbro. The layering is generally defined by grain size changes and slight changes in the modal percentage of mineral phases. Layer boudaries occur in Pieces 1, 6, 7, 9 and 12. They are generally horizontal to gently inclined in the cut face of the core. Piece 1 has sparse green chlorite veins cut by clay-oxide veins and a later carbonate vein. Piece 3 shows thin amphibole chlorite veins cut by later chlorite veins. Piece 3 also has late clay-oxide veins. Piece 4, 5, 7, and 9-11 are cut by chlorite veins. Piece 2 contains a moderate density of open fractures. Piece 13 contains a low density of open fractures.

Core Photo



209-1275B-10R-1 (Section top: 46.8 mbsf)

UNIT-III: OXIDE GABBRO

Pieces 1-15

COLOR: Gray to green

PRIMARY MINERALOGY:

Plagioclase	Mode 60% Size 0.25 - 2 mm Shape/Habit Euhedral
Pyroxene	Mode 37% Size 0.25 – 1.5 mm Shape/Habit Subhedral
Oxide	Mode 3%

COMMENTS: This core contains a mixture of microgabbro and fine-grained gabbro. Some pieces (e.g., Piece 5) are predominately microgabbro with lenses of gabbro in them. These lenses are subparallel and foliated. No foliation is apparent in the microgabbro. Where the grain size is more gradational (e.g., Pieces 6 and 8b) the microgabbro and gabbro share common foliation attitudes. In pieces where the microgabbro and gabbro have abrupt contacts (e.g., Pieces 7 and 10) the gabbro is foliated but the microgabbro is granular. Overall the foliation varies from just barely discernable to moderately-well developed.

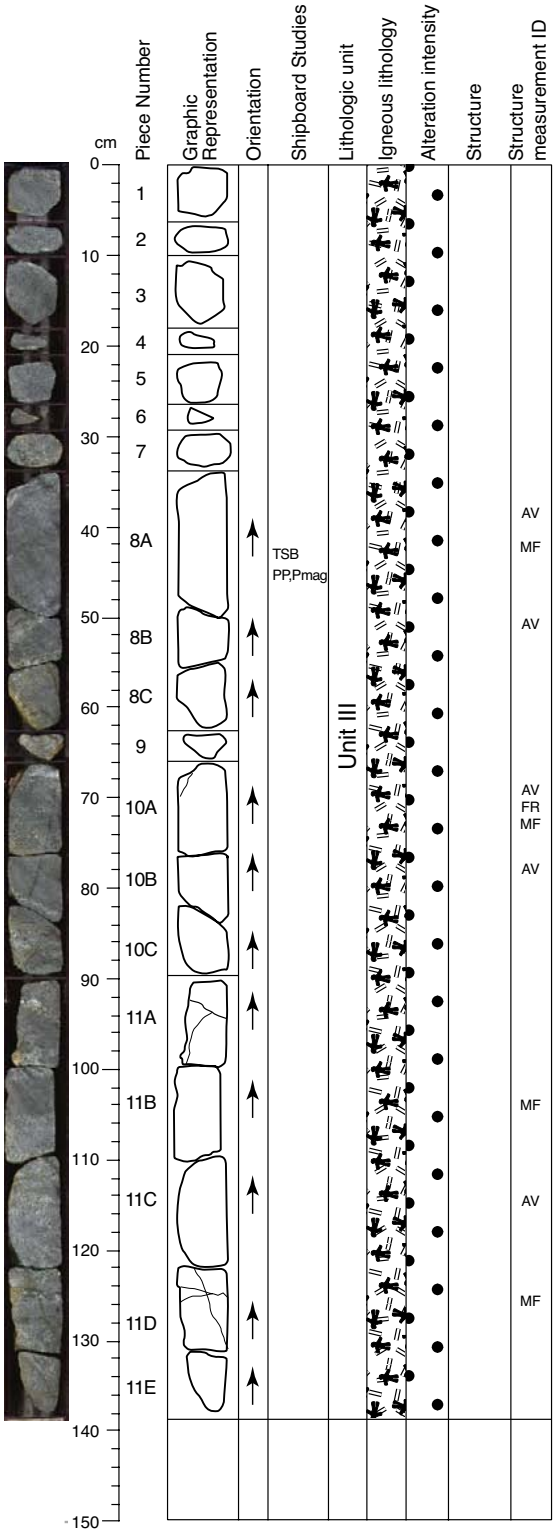
SECONDARY MINERALOGY:
Alteration intensity in this section varies between 20 and 40%. The principal secondary mineral is amphibole with only traces of hematite and secondary plagioclase. Red stains, indicating oxidative alteration, are present throughout the core and are concentrated along boundaries between coarse and fine-grained gabbro domains with the exception of Piece 12A where the red staining is pervasive.

METAMORPHIC VEINS:
Red clay-hematite veins (0.2 vol.% of core) crosscut black amphibole veins (0.2-0.5 vol.%) in Pieces 1-10 of this section. Pieces 11-14 have no veins. Piece 15 shows a small, red to white composite picrolite-carbonate-clay-hematite vein.

THIN SECTIONS: Sample 1275B-10R-1, 20-22 cm and 1275B-10R-1, 78-81 cm

STRUCTURE:
The section consists of interlayered medium and fine grained oxide gabbros to micrograbbro. The layering is generally defined by grain size changes and slight changes in the modal percentage of mineral phases. Layer boundaries occur in Pieces 1, 3, and 5-12 and consists grain size and slight changes in modal proportions. They range in attitudes from horizontal (Piece 10) to gently inclined up to approximately 10 degrees in the cut face of the core. There is no evidence of crystal -plastic deformation in the section and all textures appear igneous. A weak igneous lamination occurs in Piece 5. Pieces 1 and 2 are cut by red clay oxide veins. Pieces 8, 9, and 10 are cut by thin amphibole veins, which are cut by later green chlorite veins. Pieces 3-7, 11 and 12 are also cut by chlorite veins. Piece 15 is cut by amphibole chlorite veins that are in turn cut by late carbonate oxide veins. Pieces 8, 11, 14 and 15 contain a low density of open fractures. A brittle shear fracture cuts Piece 11 and is inclined at 25 degrees in the cut face of the core.

Core Photo



209-1275B-10R-2 (Section top: 48.3 mbsf)

UNIT-III: OXIDE GABBRO

Pieces 1-11

COLOR: Gray to orange-gray

PRIMARY MINERALOGY:

Plagioclase	Mode 55% Size 0.1 - 4 mm Shape/Habit Euhedral
Pyroxene	Mode 35-39% Size 0.1 – 3 mm Shape/Habit Subhedral
Oxide	Mode 6-10%

COMMENTS: This core contains a mixture of microgabbro and fine-grained gabbro. Magmatic foliation is variably developed as in Section 1275B-10R-1. In Piece 8 the foliation is not parallel to the microgabbro-gabbro boundaries. Piece 11 is somewhat finer grained and has a poorly developed foliation.

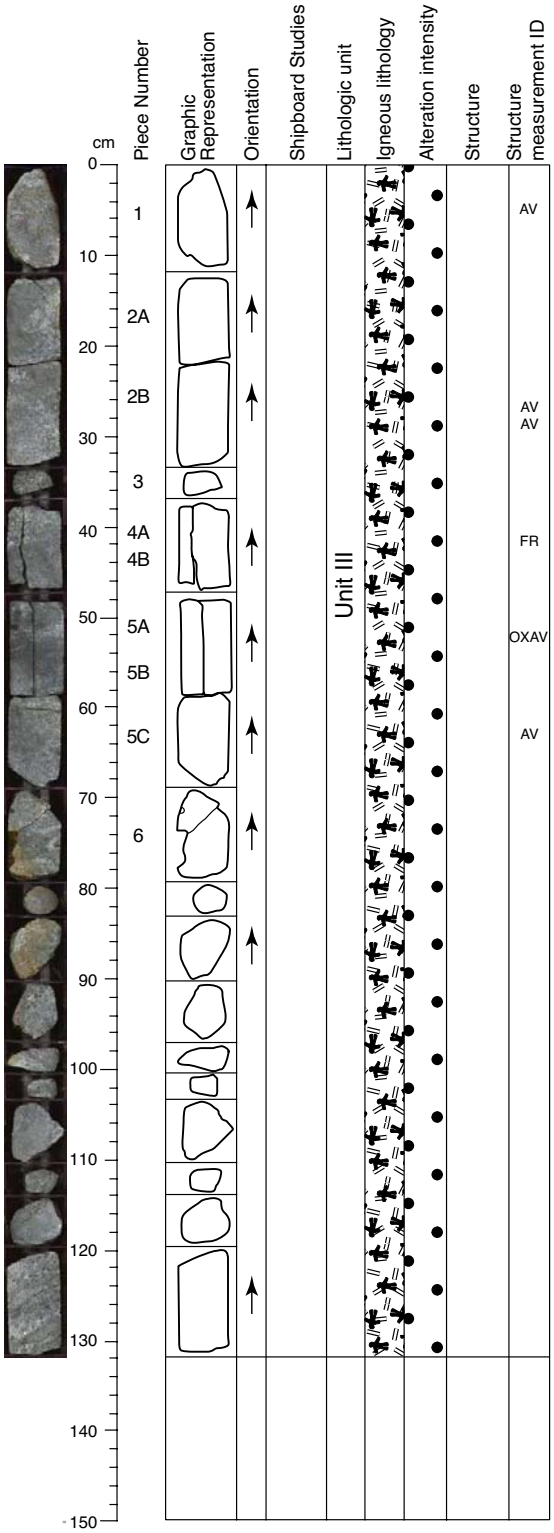
SECONDARY MINERALOGY:
Alteration intensity in this section varies between 20 and 30%. The principal secondary mineral is amphibole with only traces of hematite and secondary plagioclase. Red stains, indicating oxidative alteration, are present locally.

METAMORPHIC VEINS:
Red clay-hematite veins crosscut greenish-black amphibole-chlorite veins in Pieces 1-11C of this section. In Pieces 8C to 10A, mm-wide, red to white composite quartz-clay-hematite-carbonate veins make up 3% of the core volume. Pieces 11D-11E have prominent greenish-black amphibole-chlorite veins that make up 1 vol.% of these pieces.

THIN SECTIONS: Sample 1275B-10R-2, 41-44 cm

STRUCTURE:
The section consists of interlayered coarse, medium and fine grained oxide gabbros. The layering is generally defined by grain size changes and slight changes in the modal percentage of mineral phases. Layer boundaries occur in Pieces 8, 10 and 11and consists grain size and slight changes in modal proportions. They range in attitudes from horizontal (Piece 10) to gently inclined up to approximately 25 degrees in the cut face of the core. There is no evidence of crystal-plastic deformation in the section and all textures appear igneous. A weak igneous lamination occurs in Piece 7 and 8. Pieces 2, 8 and 9 contain thin amphibole veins crosscut by chlorite veins. Pieces 8C to 10A, contain a 1 mm-wide, red to white composite quartz-clay-hematite-carbonate vein that crosscuts earlier veins. Pieces 1, 7, 8 , 9 and 10 contain red clay oxide veins. Pieces 1, 3, 4, 5, 7, 8, 10, 11 contain green chlorite veins. Piece 11 has a chlorite vein following a small shear zone. Piece 3 contains a small, chlorite-filled fault (0.1 cm wide) with approximately 0.3 cm offset. Pieces 8 through 11 contain a low to moderate density of open fractures.

Core Photo



209-1275B-10R-3 (Section top: 49.69 mbsf)

UNIT-III: OXIDE GABBRO

Pieces 1-4

COLOR: Gray to orange gray

PRIMARY MINERALOGY:

Plagioclase	Mode 55% Size 0.1 - 4 mm Shape/Habit Euhedral
Pyroxene	Mode 35-39% Size 0.1 – 3 mm Shape/Habit Subhedral
Oxide	Mode 6-10%

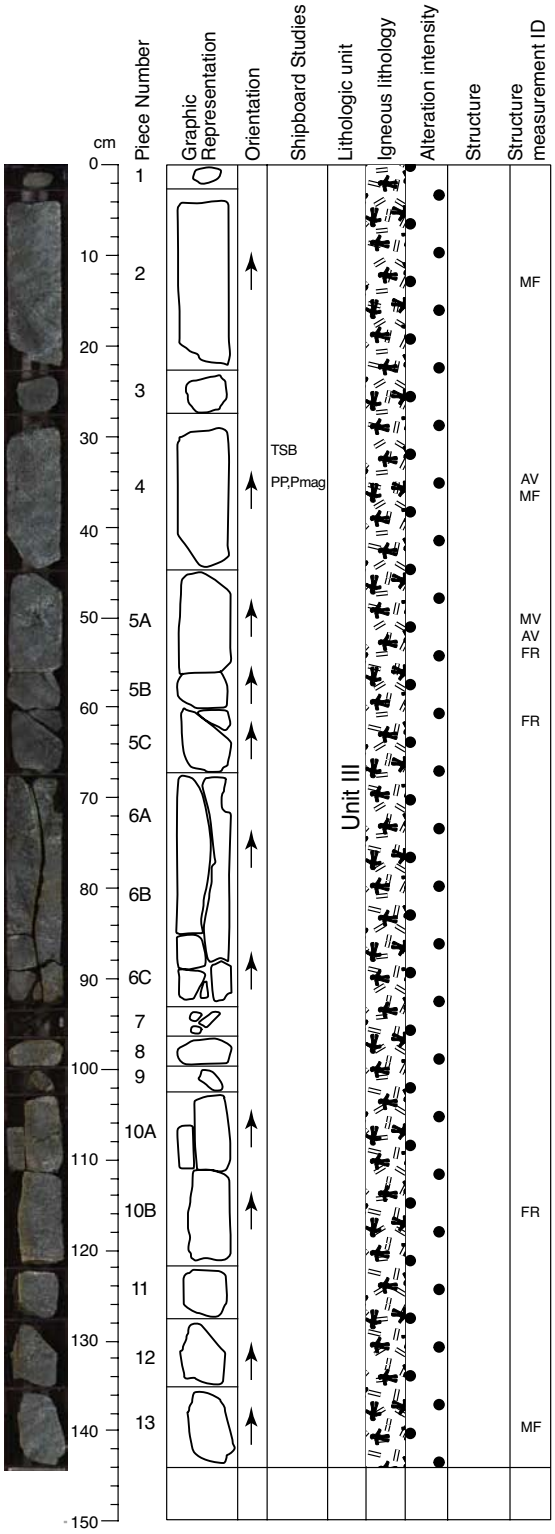
COMMENTS: This core contains a mixture of microgabbro and fine-grained gabbro. The grain-size domains have an irregular patchy distribution and are not lenses or bands as elsewhere. There is no obvious magmatic foliation in Pieces 1 to 4. Starting in Piece 5 and below, a magmatic foliation is present and increases toward the bottom of the core. In Piece 15 the foliation is best developed and modal segregations of oxides into parallel bands are present (also parallel to the foliation).

SECONDARY MINERALOGY:
Alteration intensity in this section varies between 25 and 30%. The principal secondary mineral is amphibole with only traces of hematite and secondary plagioclase. Red stains, indicating oxidative alteration, are present locally.

METAMORPHIC VEINS:
Minor red clay-hematite veins crosscut greenish-black amphibole-chlorite veins.

STRUCTURE:
The section consists of interlayered coarse, medium and fine grained oxide gabbros. Layer boundaries occur in Pieces 4, 5, 6, 14 and 15.and are defined by grain size changes and slight changes in modal proportions. Felsic gabbroic layers occur throughout the section. Layers range in attitudes from horizontal (Piece 10) to gently inclined up to approximately 32 degrees in the cut face of the core (e.g. Piece 15). The layering in Piece 6 is complicated and may be folded based on the layering observed in the cut face and back of the core. The axial plane appears horizontal. If a fold structure, the hinge line of the fold could not be linear and would be non-cylindrical. Furthermore there is no evidence of crystal plastic deformation in the section and all textures appear igneous even in Piece 6. Three generations of veins occur in thin section. Thin dark amphibole veins (in Pieces 2 and 14) are cut by later chlorite veins (in Pieces 1-6, 8, 9 and 12) and later by ed clay oxide veins (in Pieces 1, 5, 6, and 9). Piece 4 contains a low density of open fractures.

Core Photo



209-1275B-11R-1 (Section top: 51.30 mbsf)

UNIT-III: OXIDE GABBRO

Pieces 1-13

COLOR: Greenish gray

PRIMARY MINERALOGY:

Plagioclase	Mode 60% Size 0.2 – 2.5 mm Shape/Habit Euhedral
Pyroxene	Mode 35% Size 0.2 – 2.5 mm Shape/Habit Subhedral
Oxide	Mode 5%

COMMENTS: This core contains a mixture of microgabbro and fine-grained gabbro. The oxides are concentrated in the microgabbro with local concentrations as high as 10-15%. There is a weak foliation developed that is parallel to bands defined by grain-size variations. Piece 5a has a coarse-grained patch that lacks a foliation and has grains as large a 5 mm and less oxide.

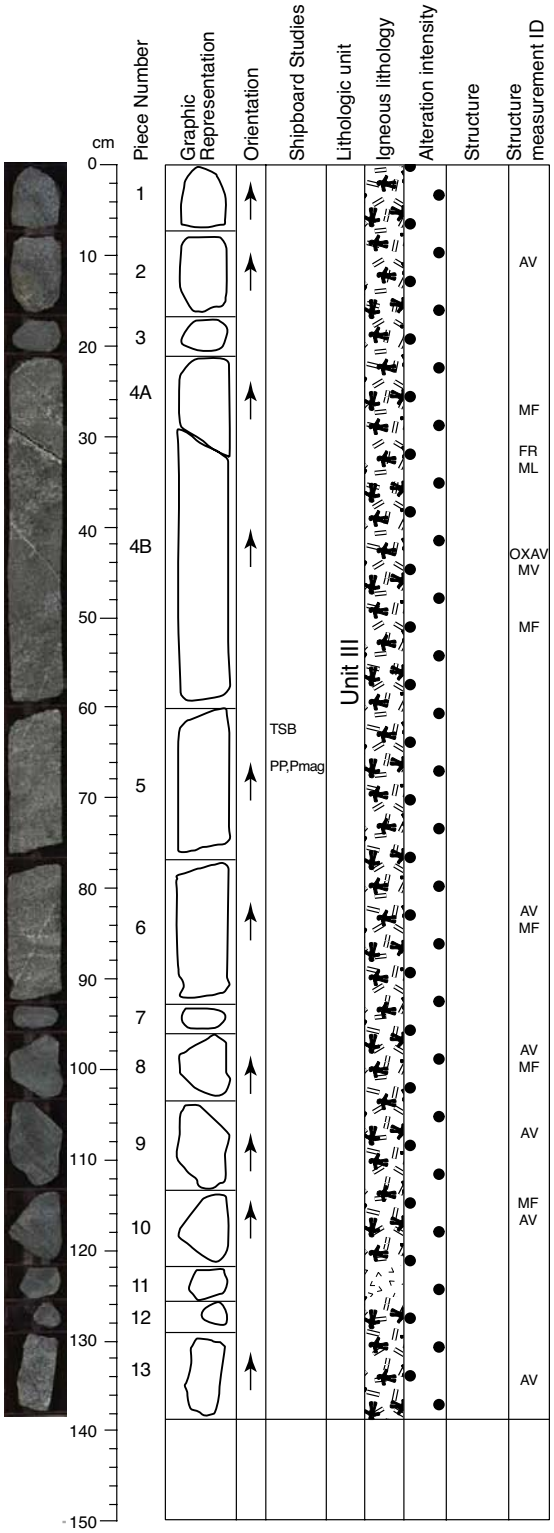
SECONDARY MINERALOGY:
Alteration intensity in this section varies between 15 and 20%. The principal secondary mineral is amphibole with only traces of hematite and secondary plagioclase. Pieces 6 to 13 show distinct red alteration halos with carbonates and Fe-oxyhydroxides along late-stage veins.

METAMORPHIC VEINS:
Black amphibole veins make up 0.1 vol.% of the core throughout this section. These amphibole veins are cut by red clay-hematite veins that make up 0.3 to 0.5 vol.% of the core in Pieces 6-13. Red clay-hematite veins use magmatic veins in Pieces 6-9. Pieces 10-13 contain carbonate veins that make up 1.5 vol.% of the core.

THIN SECTIONS: Sample 1275B-11R-1, 31-34 cm

STRUCTURE:
The section consists of interlayered coarse, medium and fine grained oxide gabbros. The layering is generally defined by grain size changes and changes in the modal percentage of mineral phases with both melanocratic to felsic gabbroic layers present. Layer boundaries occur in Pieces 2, 4, 5, 6 and 10-13. Felsic gabbroic layers occur throughout the section. Layers range in attitudes from horizontal (Piece 10) to gently inclined up to approximately 22 degrees in the cut face of the core (e.g. Piece 4). The section is similar to Core 1275B-10R except for presence of large vertical carbonate veins with associated oxides in Pieces 10-13. Piece 5 is cut by a small amphibole vein. Pieces 3-6, 9 and 12-13 are cut by chlorite veins and Pieces 6-13 have red clay oxide veins. Pieces 5 and 6 contain a moderate density of open fractures.

Core Photo



209-1275B-11R-2 (Section top: 52.74 mbsf)

UNIT-III: OXIDE GABBRO

Pieces 1-13

COLOR: Greenish brown

PRIMARY MINERALOGY:

Plagioclase	Mode 55-60% Size 0.1 – 2.5 mm Shape/Habit Euhedral
Pyroxene	Mode 32-38% Size 0.1 – 2.5 mm Shape/Habit Subhedral
Oxide	Mode 2-13%

COMMENTS: This core contains a mixture of microgabbro and fine-grained gabbro with a single piece of aphyric diabase (Piece 11). Most of the core (85%) is microgabbro and the fine-grained gabbro occurs as small, ill-defined lenses of 2-3 cm length and less than 1 cm thickness. A few through going bands of fine-grained gabbro are present at the bottom of Piece 4b (52-59 cm). This section lacks any obvious foliation.

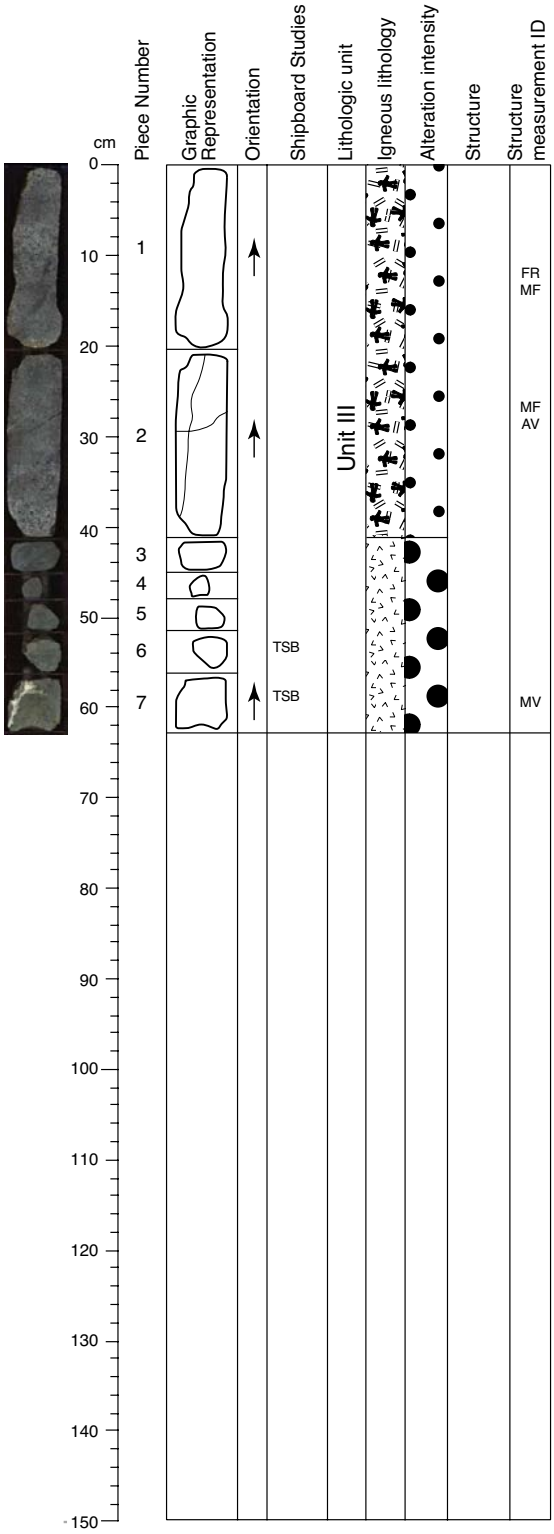
SECONDARY MINERALOGY:
Alteration intensity in this section varies between 15 and 25%. The principal secondary mineral is amphibole with only traces of hematite and secondary plagioclase. Pieces 1 and 2 show traces of oxidative alteration.

METAMORPHIC VEINS:
Rare black amphibole veins (0.1 vol.% of the core) cut green amphibole-plagioclase-chlorite veins that are probably of magmatic origin in Pieces 1-5. The rest of this section has no veins, except Piece 11, which shows 1.5 vol.% of irregular quartz veins.

THIN SECTIONS: Sample 1275B-11R-2, 61-64 cm

STRUCTURE:
The section consists of interlayered or banded coarse, medium and fine grained oxide gabbros and a diabase (Piece 11). The layering is generally defined by grain size changes and changes in the modal percentage of mineral phases, especially oxide content, with both melanocratic to felsic gabbroic layers also present. Layer boundaries occur in Pieces 2, 4, and 6. Felsic gabbroic layers occur throughout the section. Layers range in attitudes from horizontal (Piece 10) to gently inclined up to approximately 10 degrees in the cut face of the core (e.g. Piece 4). Chlorite veins cut Pieces 1-3, 9-10 and 13. Piece 10 also has a black amphibole vein, which is cut by a chlorite vein. Pieces 4, 5 and 6 have faint felsic veins that are also cut by the chlorite veins. Piece 11 is a diabase that has small granopyric veins. Pieces 8, 9, 10 and 13 have oxidized weathered faces, which may have had red clay oxide veins/alteration. Piece 4 contains a low density of open fractures and Piece 13 is affected by brittle-ductile shear at its base.

Core Photo



209-1275B-11R-3 (Section top: 54.13 mbsf)

UNIT-III: OXIDE GABBRO

Pieces 1-7

COLOR: Gray

PRIMARY MINERALOGY:

Plagioclase	Mode 60% Size 0.2 – 3 mm Shape/Habit Euhedral
Pyroxene	Mode 30-38% Size 0.15 – 2.5 mm Shape/Habit Subhedral
Oxide	Mode 2-10%

COMMENTS: This core contains a mixture of microgabbro and fine-grained gabbro in the upper 41 cm (Pieces 1 and 2), and aphyric diabase below this (Pieces 3-7). Most of the core (85%) is microgabbro and the fine-grained gabbro occurs as small, ill-defined lenses of 2-3 cm length and less than 1 cm thickness. The proportion of microgabbro to fine-grained gabbro is about equal and the fine-grained gabbro has a magmatic foliation that parallels the grain-size defined contacts.

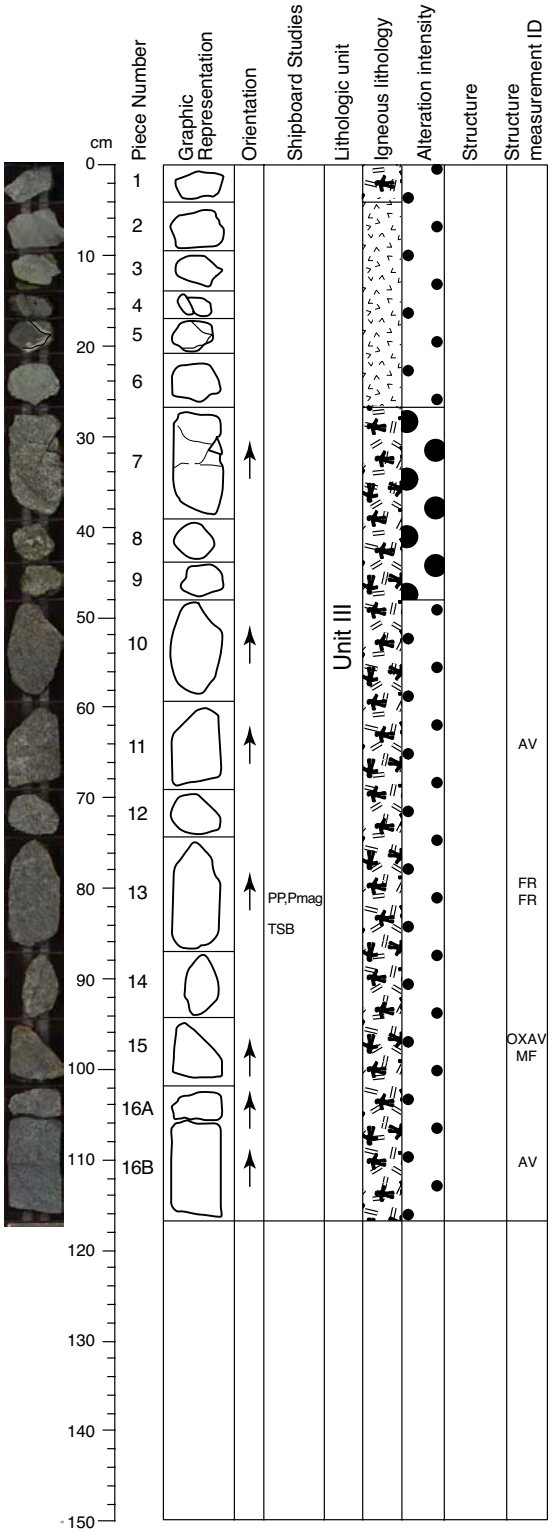
SECONDARY MINERALOGY:
Gabbros in this section are moderately to highly altered (30-50%). High alteration intensities are limited to Pieces 6 and 7 that are fine grained and appear brecciated. The dominant secondary mineral is amphibole with only traces of hematite and secondary plagioclase. A felsic patch in Piece 7 is moderately altered to amphibole and secondary plagioclase.

METAMORPHIC VEINS:
Black amphibole veins (0.2 vol.% of the core) are cut by red clay-hematite veins in Piece 1. The rest of this section has no veins, except Piece 7, which shows 0.5 vol.% of irregular quartz veins.

THIN SECTIONS: Sample 1275B-11R-3, 52-54 cm and 1275B-11R-3, 57-59 cm

STRUCTURE:
The section consists of interlayered medium and fine grained oxide gabbros (Pieces 1 and 2) and aphyric diabase (Pieces 3and 7). The layering is generally defined by grain size changes and slight changes in the modal percentage of mineral phases. Layer boundaries occur in Pieces 1 and 2. They range in attitudes from horizontal from subhorizontal to gently inclined up to approximately 8 degrees in the cut face of the core. There is no evidence of crystal-plastic deformation in the section and all textures appear igneous. A weak igneous lamination occurs in Piece 5. Piece 2 is cut by an amphibole vein and a long vertical chlorite vein. Piece 1 has clay/oxides present on a weathered face. Piece 5 (diabase) has small chlorite veins and Pieces 6-7 have small quartz and chlorite veins (caused by cataclasis). Pieces 6 and 7 are samples of protocataclasite. Gabbro and basalt are cut by numerous shear fractures containing fibrous amphibole and/or chlorite. Fracturing and brecciation are most intense near boundary between gabbro and diabase. Breccias have clasts ranging in size from 0.3 cm to 3 cm. Discrete fractures have up to 2 cm offset. Piece 1 contains a low density of open fractures.

Core Photo



209-1275B-12R-1 (Section top: 56.3 mbsf)

UNIT-III: OXIDE GABBRO

Pieces 1-16

COLOR: Gray to greenish gray and orange-gray

PRIMARY MINERALOGY:

Plagioclase	Mode 60-65% Size 0.2 – 3.5 mm Shape/Habit Euhedral
Pyroxene	Mode 32-35% Size 0.2 – 3 mm Shape/Habit Subhedral
Oxide	Mode 3-5%

COMMENTS: This core contains a mixture of microgabbro and fine-grained gabbro with a small interval of aphyric diabase (Pieces 2-6). The diabase is cut by the gabbro into angular fragments in Pieces 5 and 6. The middle portion of this core, Pieces 7-12, has a modest foliation but Pieces 13-16 lack any obvious foliation.

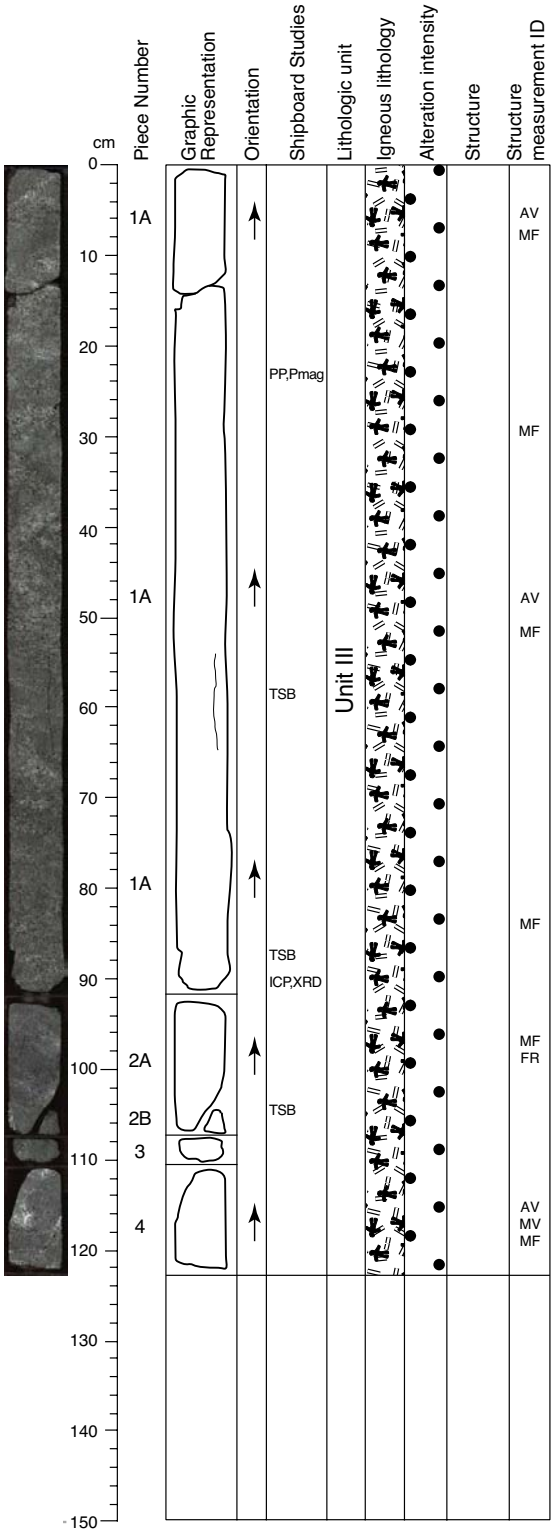
SECONDARY MINERALOGY:
Alteration intensity in this section varies between 20 and 45%. The principal secondary mineral is amphibole (both green and brown) with only traces of hematite and secondary plagioclase. Pieces 7-9 are the most altered rocks in this section. They show 5-10% yellowish-brown clay replacing plagioclase and clinopyroxene. Alteration intensity does not appear to correlate with grain size variations. Pieces 14 and 15 show minor orange-red oxidative alteration.

METAMORPHIC VEINS:
Green chlorite veins are present in Pieces 4-7 (0.2 vol.%). The gabbro (Pieces 7-16) has minor red clay-hematite veins. Piece 11 hosts a composite plagioclase-amphibole vein that is probably of magmatic origin. Pieces 13-15 have small, black amphibole veins. Pieces 1-3, 10, and 12 show no veining.

THIN SECTIONS: Sample 1275B-12R-1, 83-85 cm

STRUCTURE:
The section consists of interlayered or banded coarse, medium and fine grained oxide gabbros (Pieces 1, 7-16) and diabase (Pieces 2-6). Piece 6 contains a contact between oxide gabbro and diabase. The diabase appears to be a xenolith within gabbro. Piece 5 is a diabase cut by a trondhjemitic vein. The layering or oxide banding in the section is generally defined by grain size changes and changes in the modal percentage of mineral phases, especially oxide content, with both melanocratic to felsic gabbroic layers also present. Layer boundaries occur in Pieces 10, 11, 15 and 16. Layers range in attitude from horizontal (Piece 10) to gently inclined up to approximately 12 degrees in the cut face of the core (e.g. Piece 11). There is no crystal-plastic deformation in the section and the textures are igneous. Pieces 1-4, 6, 7, and 10-16 are cut by chlorite veins. Piece 3 is cut by carbonate veins and Pieces 13-15 have chlorite/red clay oxide veins. Piece 11 has a thin felsic magmatic vein with chlorite filling the central part of the vein. Pieces 1 through 16 contain low concentrations of open fractures. Pieces 5 through 9 contain high concentrations of chlorite and/or amphibole filled shear fractures and small faults with up to 3 cm offset in some locations.

Core Photo



209-1275B-12R-2 (Section top: 57.47 mbsf)

UNIT-III: OXIDE GABBRO

Pieces 1-4

COLOR: Gray

PRIMARY MINERALOGY:

Plagioclase	Mode 60% Size 0.2 – 3.5 mm Shape/Habit Euhedral
Pyroxene	Mode 35% Size 0.2 – 3 mm Shape/Habit Subhedral
Oxide	Mode 8%

COMMENTS: This core contains a mixture of microgabbro and fine-grained gabbro. This section has a long initial piece (Piece 1 is ~90 cm) that shows continuous grain size variations from microgabbro to fine-grained gabbro. Microgabbro domains are not well-defined bands as elsewhere, but have more of an irregular patch shape. In some places the grain-size boundaries are sharp but not smooth. A weak foliation is developed that is subparallel to the microgabbro-gabbro boundaries.

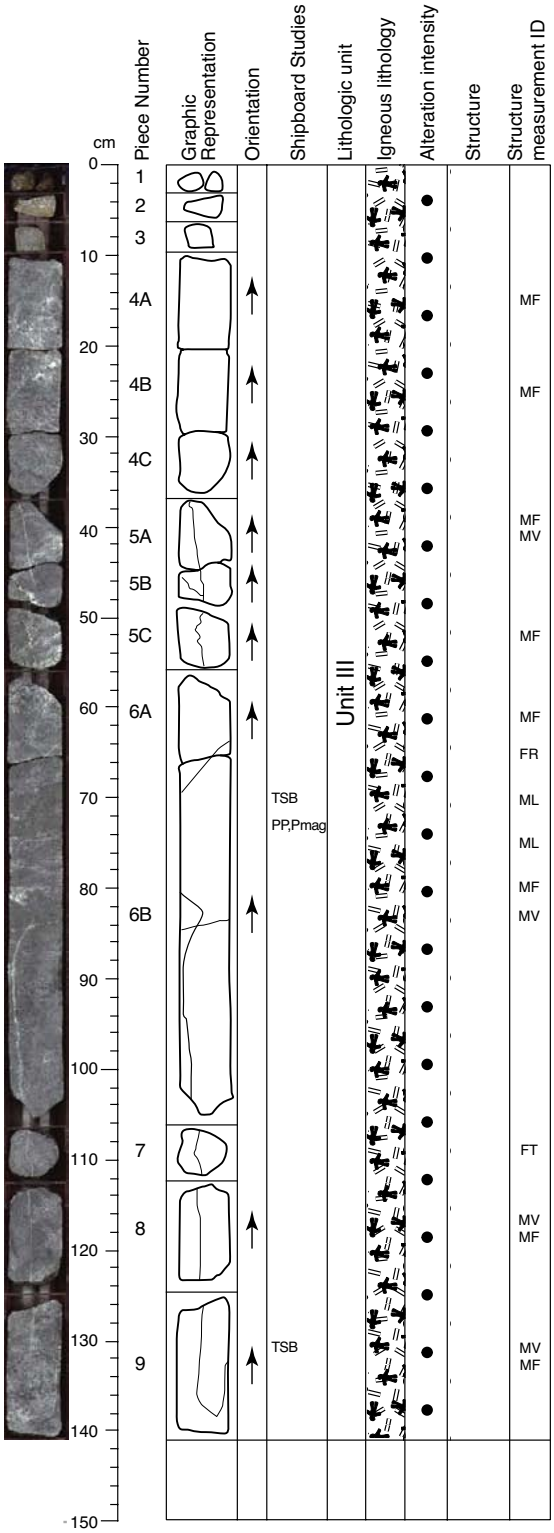
SECONDARY MINERALOGY:
Alteration intensity in this section averages about 25%. The principal secondary mineral is amphibole (both green and brown). Chlorite is limited to rare patches, in which it seems to replace clinopyroxene. Trace amounts of hematite, quartz, and secondary plagioclase are also present.

METAMORPHIC VEINS:
Only small, black amphibole veins are developed in this section.

THIN SECTIONS: Samples 1275B-12R-2, 57-60 cm, 1275B-12R-2, 86-89 cm, and 1275B-12R-2, 104-107

STRUCTURE:
The section consists of interlayered or banded coarse, medium and fine grained oxide gabbros. The top of Piece 1 and Piece 4 are cut by a trondhjemitic veins. The layering or oxide banding in the section is generally defined by grain size changes and changes in the modal percentage of mineral phases, especially oxide content, with both melanocratic to felsic gabbroic layers also present. Layer boundaries occur all pieces and are commonly curviplanar to planar. Layers range in attitude from horizontal (Piece 10) to gently inclined up to approximately 10 degrees in the cut face of the core (e.g. Piece 1). There is no crystal-plastic deformation in the section and the textures are igneous. Piece 1A has a chlorite vein within the felsic magmatic vein and. Piece 1B has thin black amphibole veins and subvertical chlorite veins. Pieces 2-4 show chlorite veins increasing in intensity in Pieces 3 and 4 related to fracture. Piece 4 also has felsic veins. Pieces 3 and 4 are cut by chlorite and/or amphibole-filled shear fractures. Pieces 1 and 2 contain low densities of open fractures.

Core Photo



209-1275B-13R-1 (Section top: 60.8 mbsf)

UNIT-III: OXIDE GABBRO

Pieces 1-9

COLOR: Gray to orange-gray

PRIMARY MINERALOGY:

Plagioclase	Mode 60% Size 0.1 – 1.5 mm Shape/Habit Euhedral
Pyroxene	Mode 35% Size 0.1 – 1.5 mm Shape/Habit Subhedral
Oxide	Mode 5%

COMMENTS: This core contains a mixture of microgabbro (85%) and fine-grained gabbro (15%). There is some modal segregation with coarser material being more felsic. The gabbro occurs in bands as thin as 5 mm that cut the entire width of the core (e.g., in Piece 6b at 85 cm). Nearly the entire core is cut by a 3 mm thick granophyric dikelet. The dikelet begins in Piece 9, terminates in Piece 6b where another begins that terminates in an anastomosing network in Pieces 4a and 4b. In Piece 9 there are modal segregations of oxides that occur at angles to each other and the magmatic fabric in the rock sweeps through the angle defined by these bands.

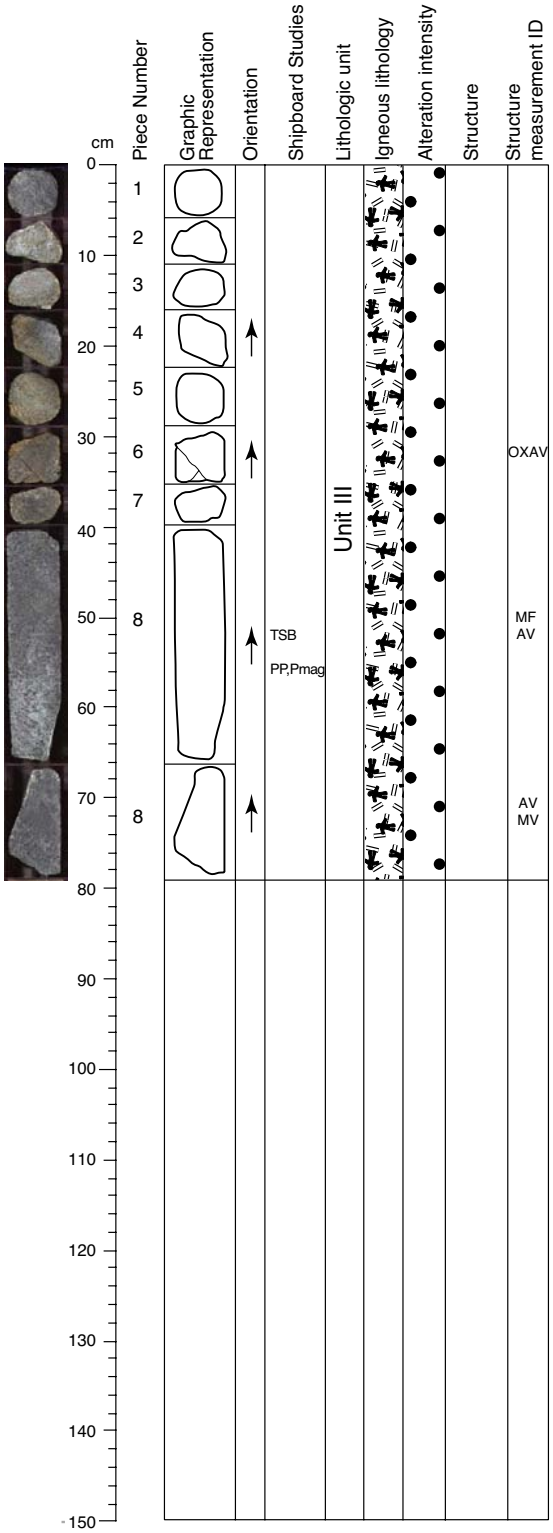
SECONDARY MINERALOGY:
Gabbros in this section are 30-35% altered, predominantly to green and brown amphibole after clinopyroxene. Plagioclase is only 2% altered to secondary plagioclase and green amphibole along cracks.

METAMORPHIC VEINS:
No veins.

THIN SECTIONS: Samples 1275B-13R-1, 68-71 cm and 1275B-13R-1, 128-131 cm

STRUCTURE:
The section consists of interlayered or banded coarse, medium and fine grained oxide gabbros. All pieces in the core are cut by felsic gabbro to granophyric magmatic veins. Pieces 5-8 are cut by a single longitudinal or near vertical vein. Piece 4 is appears permeated by granophyric interstitial clots. The layering or oxide banding in the section is generally defined by grain size changes and changes in the modal percentage of mineral phases, especially oxide content, with both melanocratic to felsic gabbroic layers also present. Layer boundaries occur all pieces and are commonly planar. Layers range in attitude from subhorizontal (e.g., Piece 10) to moderately inclined up to approximately 40 degrees in the cut face of the core (e.g., Pieces 7 and 8). There is no crystal-plastic deformation in the section and the textures are igneous. Very small chlorite veins cut Pieces 4 and 5. Piece 7 is cut by a narrow discrete fault with 2 cm offset. Pieces 1 through 6 contain low densities of open fractures.

Core Photo



209-1275B-13R-2 (Section top: 62.21 mbsf)

UNIT-III: OXIDE GABBRO

Pieces 1-9

COLOR: Gray

PRIMARY MINERALOGY:

Plagioclase	Mode 60% Size 0.1 – 1.5 mm Shape/Habit Euhedral
Pyroxene	Mode 35% Size 0.1 – 1.5 mm Shape/Habit Subhedral
Oxide	Mode 5%

COMMENTS: This core contains a mixture of microgabbro (95%) and fine-grained gabbro (15%). The section is similar to that in Section 1275B-13R-1 but the magmatic foliation is better developed and the boundaries between the different grain-size domains are more diffuse.

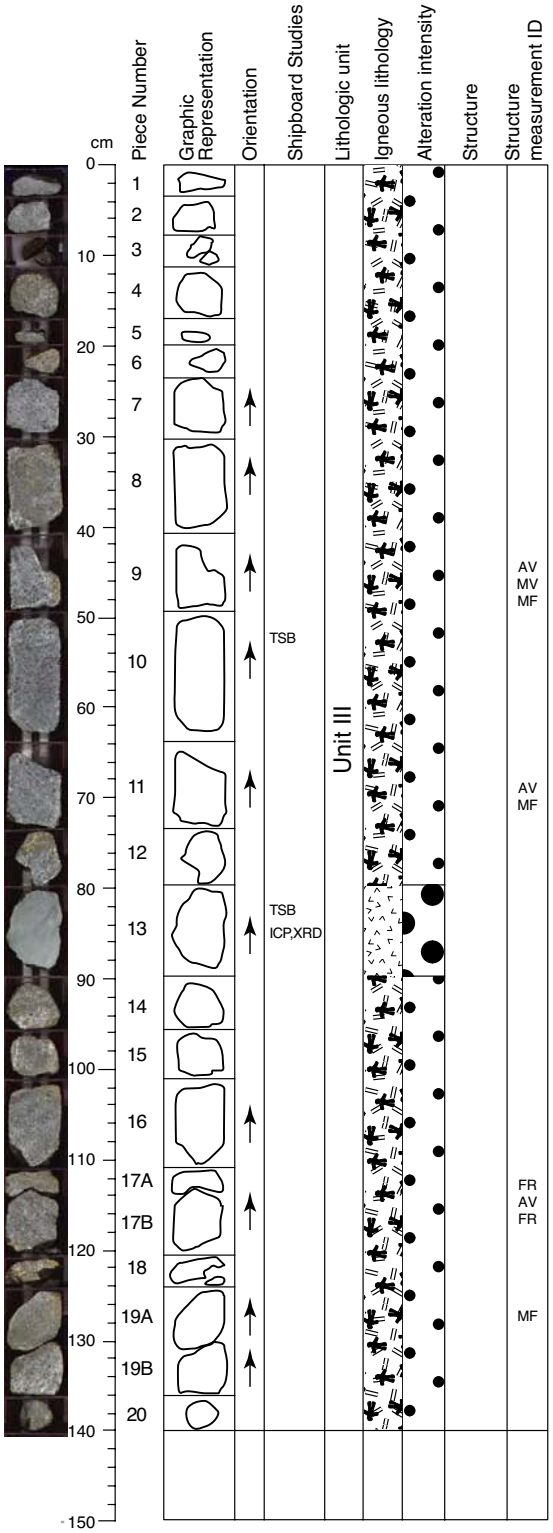
SECONDARY MINERALOGY:
Within Pieces 1 to 7 of this section, the alteration intensity increases from 15 to 40%. Pieces 8 and 9 are the least altered rocks of this section (10%). Similar to previous sections, the alteration is predominantly green and brown amphibole after clinopyroxene. Plagioclase is <2% altered to secondary plagioclase and green amphibole along cracks. Orange-gray colors are largely limited to Pieces 4 –7 and indicate minor low-temperature oxidative alteration.

METAMORPHIC VEINS:
This section shows few black amphibole veinlets in Pieces 4 and 5. Pieces 4-6 have red to dark green clay/chlorite veins that crosscut the amphibole veins and make up as much as 1% of the volume of the core in Piece 6. Pieces 8 and 9 host a steeply dipping magmatic dike with chlorite in the center. This chlorite could be either completely altered pyroxene of a magmatic vein center or it could be metamorphic chlorite vein that used the magmatic vein.

THIN SECTIONS: Sample 1275B-13R-2, 51-53 cm

STRUCTURE:
The section consists of coarse, medium and fine grained oxide gabbros. Layering is poorly defined in the section. An obvious layer boundary is only present in Piece 9. Piece 8 contains a crude grain size layering with grain size decreasing upward and contains a weak igneous lamination defined by the preferred dimensional orientation of plagioclase laths. The lamination is inclined with layering at approximately 35 degrees in the cut face of the core. There is no evidence of crystal-plastic deformation in the section. Piece 1 is cut by a small amphibole vein. Pieces 2, 3 and 5 are cut by chlorite veins and Piece 4 is cut by black amphibole veins. Pieces 5 and 6 has extensive red clay-oxide chlorite veins with shear fibers. Pieces 8 and 9 have a subvertical magmatic vein partially replaced by chlorite. Piece 5 is cut by a discrete fault with 0.3 cm of offset. Piece 6 contains a 0.5 cm wide zone of high fracture density with incipient brecciation along one edge of the sample.

Core Photo



209-1275B-14R-1 (Section top: 65.8 mbsf)

UNIT-III: OXIDE GABBRO

Pieces 1-20

COLOR: Gray to brown

PRIMARY MINERALOGY:

Plagioclase	Mode 60% Size 1.5 – 2 mm Shape/Habit Euhedral
Pyroxene	Mode 31-32% Size 1.5 – 2 mm Shape/Habit Subhedral
Oxide	Mode 3-4%

COMMENTS: This core contains a mixture of microgabbro (10%) and fine-grained gabbro (90%) with a single piece of diabase (Piece 13, 80 – 90 cm). The 12 pieces of the core have a modest igneous foliation and modal segregations of oxides. The most conspicuous of these is found between 54-58 cm (Piece 10) which has oxide grain sizes as large as 3 mm. The lower portion of the core (Pieces 14-20) is more granular, lacks a foliation, and is somewhat more homogeneous.

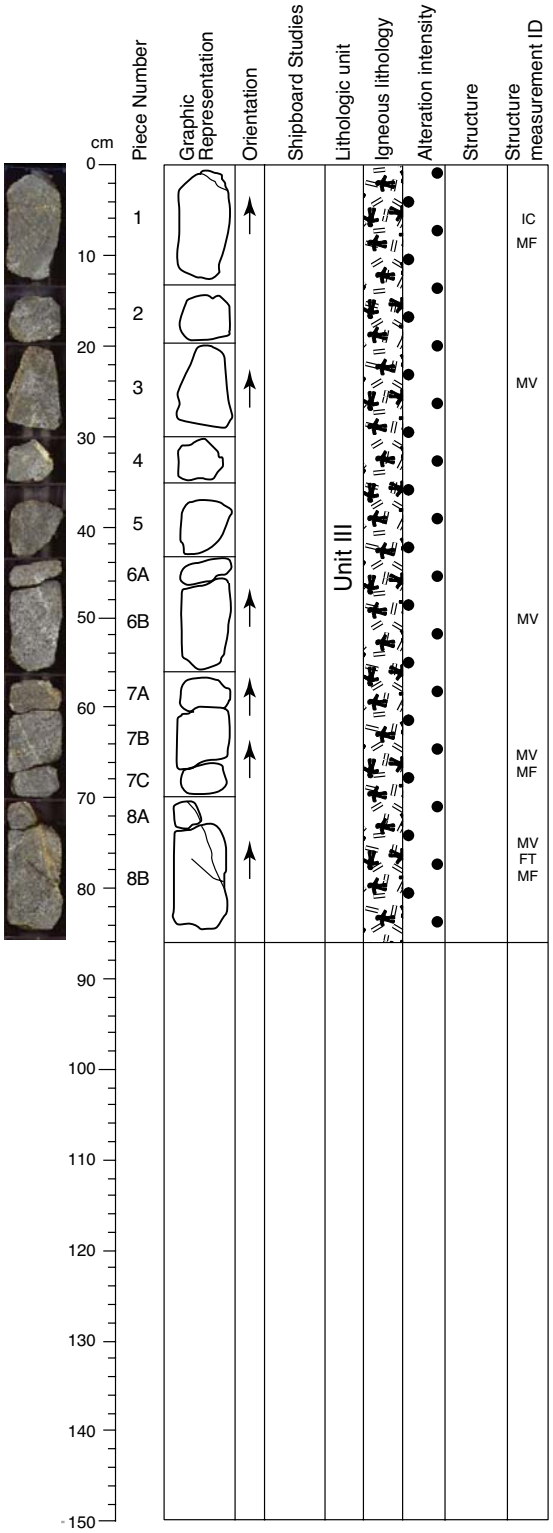
SECONDARY MINERALOGY:
Except for a highly amphibole-chlorite altered diabase (Piece 13), the alteration intensity in this section ranges from 15 to 35%. Similar to previous sections, the alteration of gabbro is predominantly green and brown amphibole after clinopyroxene. Plagioclase is <2% altered to secondary plagioclase and green amphibole along cracks.

METAMORPHIC VEINS:
Pieces 1-7 have no veins. Pieces 8 and 9 host 0.5 vol.% red clay-hematite veins that use magmatic veins. Pieces 10-20 contain two generations of veins: black amphibole veinlets cut by rare, green chlorite-quartz veinlets.

THIN SECTIONS: Samples 1275B-14R-1, 50-53 cm and 1275B-14R-1, 81-83 cm

STRUCTURE:
The section consists largely of interlayered or banded coarse, medium and fine grained oxide gabbros, but contains two pieces of diabase (Pieces 13 and 20). The layering or oxide banding in the gabbroic section is generally defined by grain size changes and changes in the modal percentage of mineral phases, especially oxide content, with both melanocratic to felsic gabbroic layers also present. Layer boundaries range in attitude from subhorizontal (e.g., Piece 10) to moderately inclined up to approximately 20 degrees in the cut face of the core (e.g.. Piece 17 and 19). An igneous lamination defined by the preferred planar dimensional orientation of plagioclase laths is variably present throughout the section and inclined parallel to the local layering. There is no evidence of crystal-plastic deformation in the section and the textures are igneous. Piece 20 exposes a dike gabbro contact in which the dike margin is strongly chilled against gabbro. Piece 4 contains a small black amphibole vein. Pieces 3, 8 and 9 contain chlorite/red clay oxide veins that use felsic veins as a conduit. Pieces 9 and 10 contain thin granophyric veins. Pieces 11, 12, 14 and 19 are cut by black amphibole veins. Pieces 15, 16, 17 and 20 are cut by chlorite veins and Piece 13 (diabase) is cut by chlorite veins. Piece 4 is cut by a discrete, unfilled fault with 0.1 to 0.3 cm offset. Pieces 17 through 20 contain low densities of open fractures.

Core Photo



209-1275B-14R-2 (Section top: 67.2 mbsf)

UNIT-III: OXIDE GABBRO

Pieces 1-8

COLOR: Dark gray and grayish-brown

PRIMARY MINERALOGY:

Plagioclase	Mode 60% Size 2.5 mm Shape/Habit Euhedral
Pyroxene	Mode 35% Size 2 mm Shape/Habit Subhedral
Oxide	Mode 5%

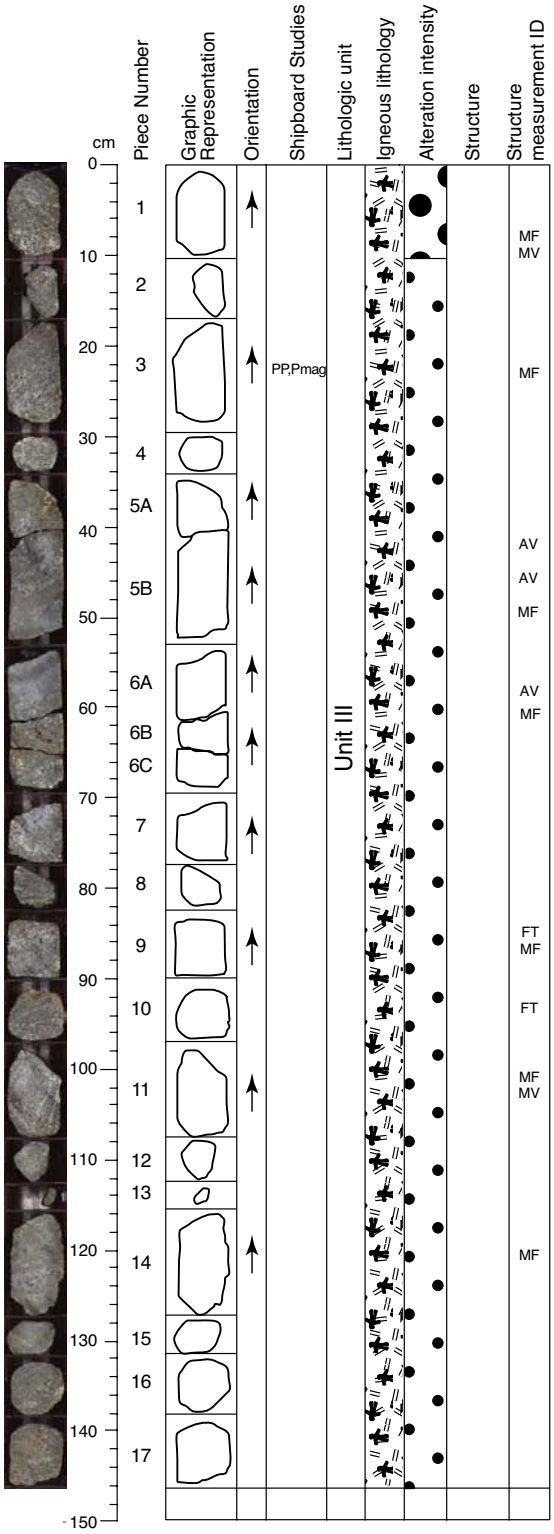
COMMENTS: This core contains a mixture of microgabbro (15%) and fine-grained gabbro (85%). Piece 1 is cut by an aphyric diabase at its very top (0 to 2 cm). The microgabbro in Piece 3 has angular boundaries and appears to be an inclusion, but elsewhere it is more gradational. Piece 8a and 8b are cut by a microgabbro dike that pinches and swells suggesting it intruded into a soft matrix.

SECONDARY MINERALOGY:
Alteration intensity in this section ranges from 15 to 35%. Magmatic veins and diabase dikelets in Pieces 1, 7, and 8 appear highly altered to amphibole and chlorite. Similar to previous sections, the alteration of gabbro is predominantly green and brown amphibole after clinopyroxene. Plagioclase is <2% altered to secondary plagioclase and green amphibole along cracks. Most pieces show a slight orange-brown discoloration due to disseminated traces of Fe-oxyhydroxides.

METAMORPHIC VEINS:
Black amphibole veins (0.1 vol.%) are crosscut by red clay-hematite veins that use magmatic veins, in particular in Piece 8 where they make up 0.5% of the core volume.

STRUCTURE:
The section consists of interlayered medium to fine grained oxide gabbros. Pieces 3, 4 and 7 are cut by felsic gabbro to granophyric magmatic veins. The layering or oxide banding in the section is generally less well defined except in Piece 7. Layering is inclined at approximately 10 degrees in the cut face of the core. Some irregular banding occurs in Piece 1. There is no crystal-plastic deformation in the section and the textures are igneous. Chlorite/red clay oxide veins cut Pieces 1, 3, 4, and 8 commonly exploit the felsic magmatic veins. Piece 6 contains chlorite veinlets and Piece 8 contains a magmatic vein intruded along a fault with several small splays. The total offset on the fault is not determined in hand specimen.

Core Photo



209-1275B-15R-1 (Section top: 70.4 mbsf)

2UNIT-III: OXIDE GABBRO

Pieces 1-17

COLOR: Gray to brown

PRIMARY MINERALOGY:

Plagioclase	Mode 60% Size 1 - 4.5 mm Shape/Habit Euhedral
Pyroxene	Mode 32 - 35% Size 0.5 - 4 mm Shape/Habit Subhedral
Oxide	Mode 5 - 8%

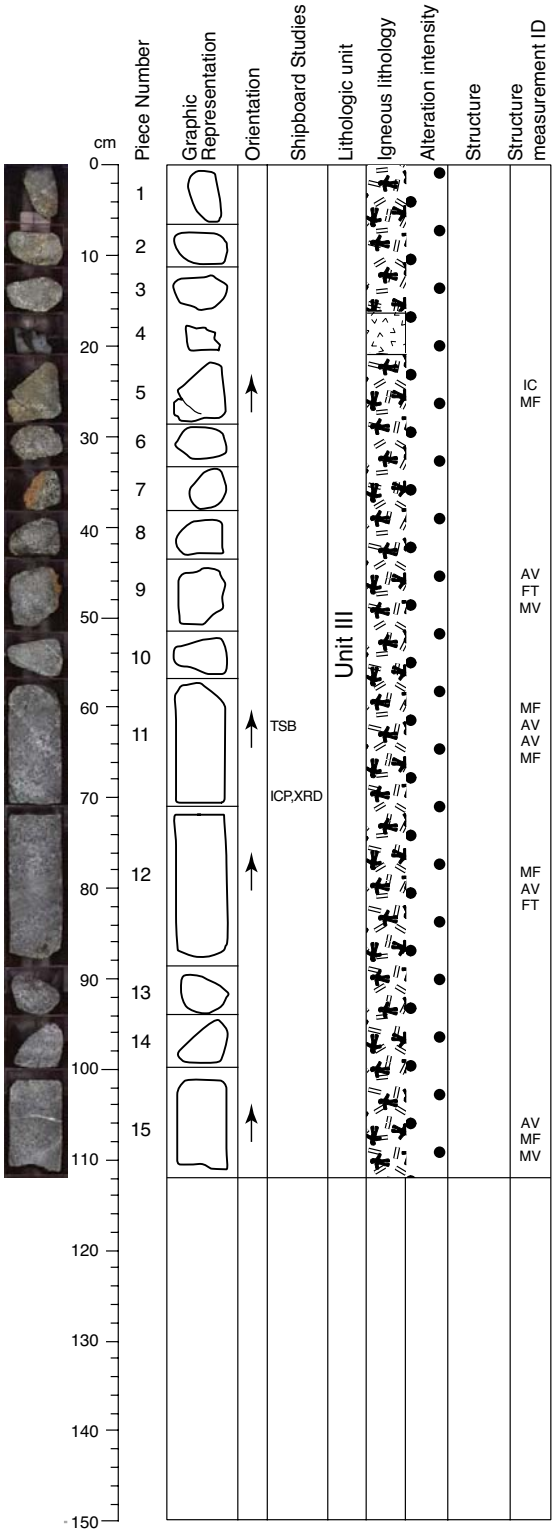
COMMENTS: The first part of this core (Pieces 1-14) contains a mixture of fine-grained gabbro (55%) and medium-grained gabbro (45%). In the medium-grained gabbro the interstitial oxides are as large as 3 mm. Pieces 14 –17 are intermixed microgabbro (40%) and fine-grained gabbro (60%). There is a magmatic foliation developed throughout this section but it is best developed (moderate) in Piece 11.

SECONDARY MINERALOGY:
Alteration intensity ranges from 30 to 50%. Piece 1 is the most altered rock in this section. Similar to previous sections, the alteration of gabbro is predominantly green and brown amphibole after clinopyroxene. Plagioclase is <2% altered to secondary plagioclase and green amphibole along cracks. Piece 11 has two completely altered composite magmatic veins, with chlorite in the centers and secondary plagioclase in the margins.

METAMORPHIC VEINS:
Black amphibole veins (0.2 vol.%) are crosscut by red clay-hematite veins that are prominent in Pieces 5B and 15. Narrow plagioclase-amphibole veins of likely magmatic origin are developed in Pieces 1, 5A, and 11.

STRUCTURE:
The section consists of interlayered or banded coarse, medium and fine grained oxide gabbros. The layering is generally defined by grain size changes and changes in the modal percentage of mineral phases, especially oxide content, with both melanocratic to felsic gabbroic layers also present. Layer boundaries occur in Pieces 1-3, 5-7, 9-11, 14, and 16-17. Layers range in attitude from near horizontal (Piece 10) to moderately inclined up to approximately 35 degrees in the cut face of the core (e.g. Piece 3). There is no evidence of significant crystal plastic deformation in the section and all textures are igneous. Piece 9 contains a narrow amphibole filled fault with 2 cm total offset. Piece 10 contains slickenfibers on its upper face that indicate dip slip motion (not possible to determine slip sense). Black amphibole veins cut Pieces 5 and 15 and chlorite veins cut Pieces 3, 4, 6, and 16. Late red clay-oxide veins cut Pieces 5 and 17. Crosscutting relationships in Piece 5 indicate early green amphibole veins are cut by black amphibole veins, which are in turn cut by red clay oxide veins.

Core Photo



209-1275B-15R-2 (Section top: 71.86 mbsf)

UNIT-III: OXIDE GABBRO

Pieces 1-15

COLOR: Gray and gray to brown

PRIMARY MINERALOGY:

Plagioclase	Mode 60% Size 2.5 mm Shape/Habit Euhedral
Pyroxene	Mode 37% Size 2.5 mm Shape/Habit Subhedral
Oxide	Mode 5%

COMMENTS: This core contains a mixture of microgabbro (10%) and fine-grained gabbro (90%) with a single piece of diabase (Piece 4, 17 –21 cm). Below 52 cm there are well-defined bands of microgabbro in the fine-grained gabbro. The microgabbro in Piece 12 (79 – 82 cm) is so fine-grained as to be almost diabasic. The magmatic foliation is well-developed in this section (more pronounced than the entire portion of 1275B above). This foliation is parallel or subparallel to the microgabbro-gabbro contacts.

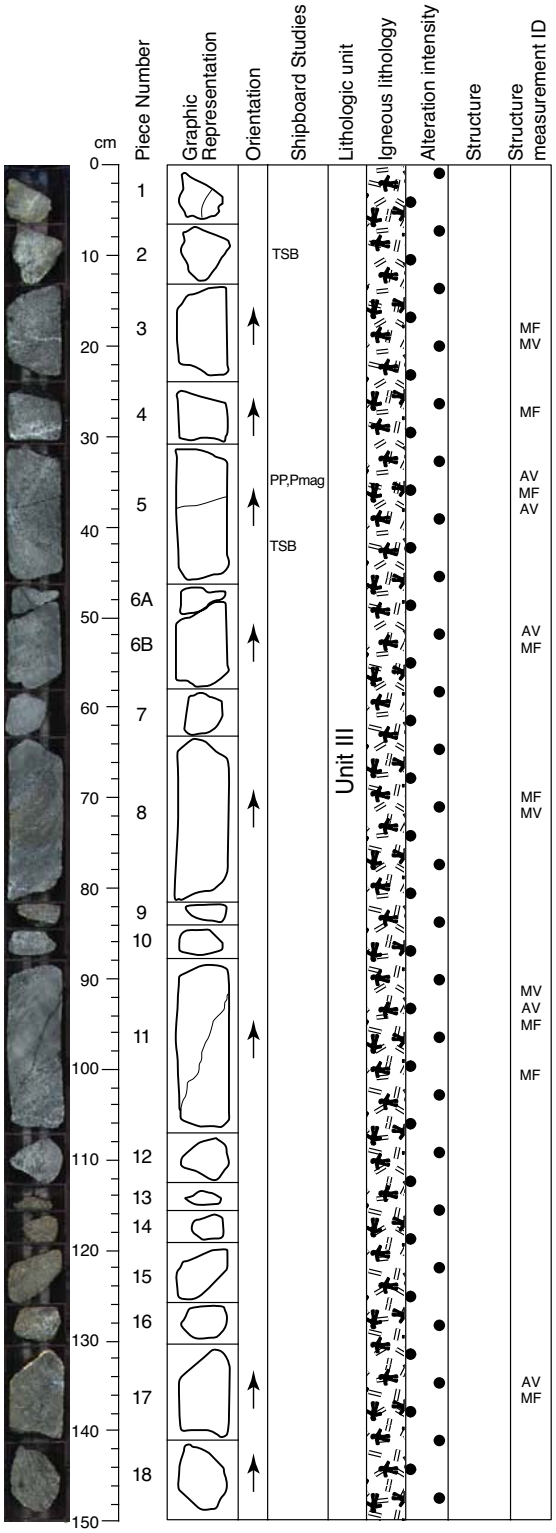
SECONDARY MINERALOGY:
Alteration intensity in this section ranges from 10% in Pieces 10-15 to 35% in Piece 7. Similar to previous sections, the alteration of gabbro is predominantly green and brown amphibole after clinopyroxene. Plagioclase is <2% altered to secondary plagioclase and green amphibole along cracks. Pieces 1 to 3 and 5 show slight orange brown straining due to disseminated Fe- oxyhydroxides. Pieces 7 and 9 show prominent orange brown alteration halos along clay-rich veinlets. Completely altered magmatic veinlets are present in Pieces 1, 11, and 15.

METAMORPHIC VEINS:
Black amphibole veins (0.2 vol.%, up to 1% in Pieces 11 and 12) are crosscut by red clay-hematite veins in Pieces 1-5, 7, and 9.

THIN SECTIONS: Sample 1275B-15R-2, 60-63 cm

STRUCTURE:
The section consists of interlayered fine grained oxide gabbros and oxide microgabbro. The layering or banding is generally defined by grain size changes and changes in the modal percentage of mineral phases. Layer boundaries occur in Pieces 6, 11, 13 and 14. The layering is variably inclined in a single oriented piece from 14 degrees up to approximately 34 degrees in the cut face of the core (Piece 11). There is no evidence of crystal plastic deformation in the section. Piece 9 contains a 0.5 cm wide zone along one edge of the sample that contains a high density of fractures with oxidation staining along them and with incipient brecciation. Shear offset across this zone is not determined. Piece 12 is cut by an amphibole filled fault zone with 0.5 cm offset. Pieces 4 and 5 are cut by irregular shaped open fractures. Granophyric magmatic veins cut Pieces 1, 10, 11, 15. Black amphibole veins cut Pieces 2, 8, 9, 11, 12, 14 and 15 and chlorite veins cut Pieces 4, 7, 9 and 11. Piece 9 shows crosscutting relationships with red clay oxide veins cutting chlorite veins in turn cutting earlier black amphibole veins. Red clay-oxide veins also in Piece 5.

Core Photo



209-1275B-16R-1 (Section top: 75.4 mbsf)

UNIT-III: OXIDE GABBRO

Pieces 1-18

COLOR: Gray

PRIMARY MINERALOGY:

Plagioclase	Mode 60% Size 0.2-4 mm Shape/Habit Euhedral
Pyroxene	Mode 28-37% Size 0.1-3.5 mm Shape/Habit Subhedral
Oxide	Mode 8%

COMMENTS: This core contains a mixture of microgabbro (20%) and fine-grained gabbro (80%). The microgabbro is contained mostly in through-going bands. Small sections of the core are very oxide rich (15%). Piece 2 contains a diabase dike that is discontinuous and includes crystals of the host rock. The fine-grained gabbro is well-foliated in Piece 5.

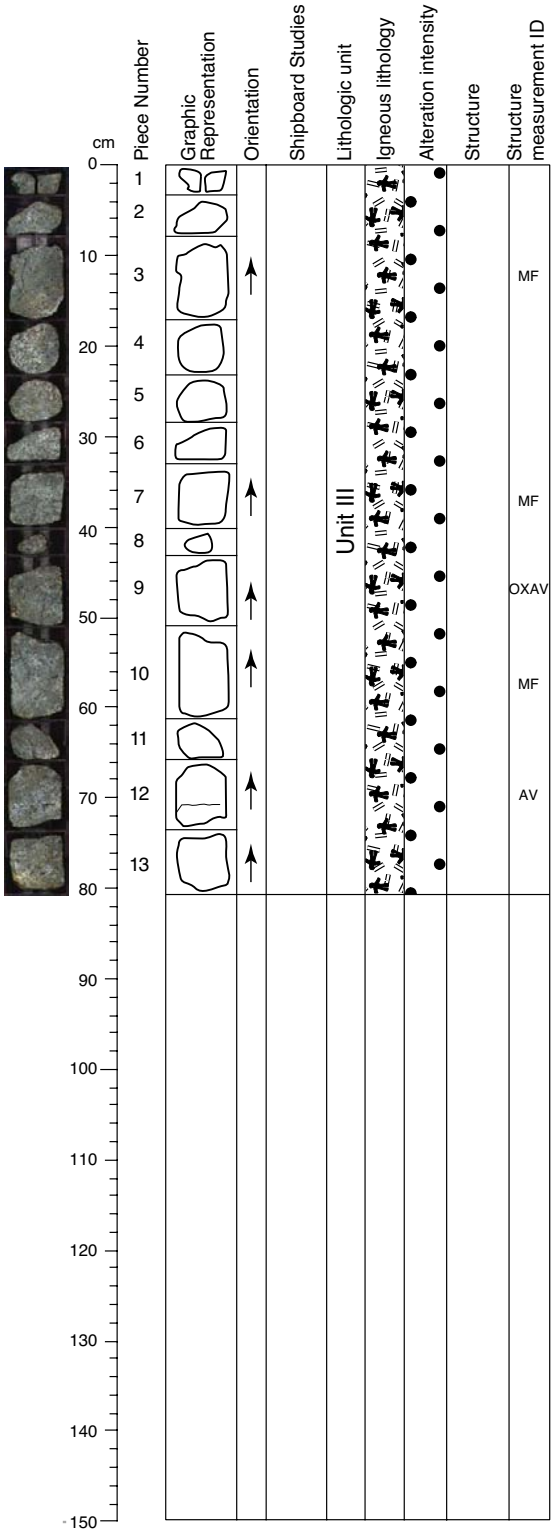
SECONDARY MINERALOGY:
Alteration intensity in this section ranges from 10% in Pieces 3-7 to 35% in Pieces 1-2 and 13-18 Completely altered magmatic veinlets are present in Pieces 1, 11, and 15. There are <0.1-3 mm wide completely altered felsic veins in Pieces 1, 3, 4, 8, 11, and 17. Alteration of the gabbro is predominantly to green amphibole. Along with green amphibole, noticeable amounts of talc and chlorite replace clinopyroxene in proximity to magmatic veins. Brown amphibole and secondary plagioclase are rare. Pieces 1, 2, 8, and 13 to 18 show red staining due to oxidation of primary igneous sulfides

METAMORPHIC VEINS:
Piece 2 has a 4-mm wide black quartz-chlorite-amphibole-oxide vein. Pieces 5 and 8-12 show black amphibole-chlorite veins (1-2% of the core volume). Pieces 13-18 have minor black amphibole veins that are cut by rare red clay-hematite veins. Pieces 1, 3-4, and 6-7 have no veins.

THIN SECTIONS: Samples 1275B-16R-1, 9-12 cm and 1275B-16R-1, 40-43 cm

STRUCTURE:
The section consists of interlayered fine grained oxide gabbros and oxide microgabbro. The layering or banding is generally defined by grain size changes and changes in the modal percentage of mineral phases. Layer boundaries occur in most pieces. The layering is variably inclined up to approximately 34 degrees in the cut face of the core (e.g., Piece 11). Some of the layer boundaries are curviplanar (e.g., Piece 8 and 11). Granophyric magmatic veins cut Pieces 1, 2-4, 7, 8 and 11. Piece 2 contains a 1 cm wide diabase dikelet. There is no evidence of crystal plastic deformation in the section. Piece 17 is cut by a 0.1 cm wide, chlorite filled fault with 0.3 cm offset. Pieces 5, 8, 11, 12, 15 are cut by black amphibole veins. Pieces 1, 5, 6, 17 and 18 are cut by green amphibole chlorite veins and Piece 14 is cut by red-clay-oxide veins.

Core Photo



209-1275B-16R-2 (Section top: 76.9 mbsf)

UNIT-III: OXIDE GABBRO

Pieces 1-13

COLOR: Brown to gray

PRIMARY MINERALOGY:

Plagioclase	Mode 60% Size 0.2-3 mm Shape/Habit Euhedral
Pyroxene	Mode 28-37% Size 0.2-3 mm Shape/Habit Subhedral
Oxide	Mode 10%

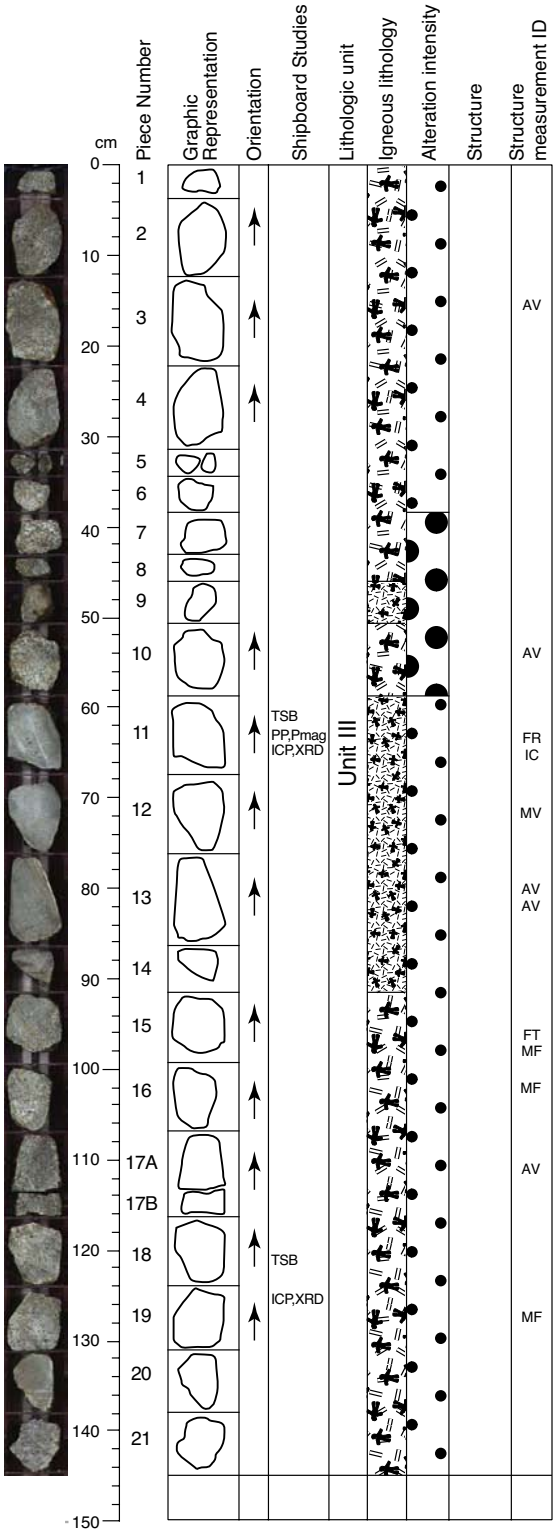
COMMENTS: This core contains a mixture of microgabbro (10%) and fine-grained gabbro (90%). It is very similar to Section 1275B-16R-1 but somewhat more altered.

SECONDARY MINERALOGY:
Alteration intensity in this section is uniformly around 35%. Alteration of the gabbro is predominantly to green and brown amphibole. Hematite and secondary plagioclase are rare. Oxidative alteration is patchy and overall insignificant.

METAMORPHIC VEINS:
This section shows minor black amphibole veins that are cut by rare red clay-hematite veins (combined about 0.2% of the core volume).

STRUCTURE:
The section consists of interlayered fine to medium grained oxide gabbro. The layering or banding is generally defined by grain size changes and changes in the modal percentage of mineral phases, especially oxide minerals. Layer boundaries occur in Pieces 3, 7, and 10-13. The layering is variably inclined from subhorizontal up to approximately 45 degrees in the cut face of the core (e.g. Piece 11). There is no evidence of crystal plastic deformation in the section. Pieces 9 and 12 contain open fractures with irregular, non-planar geometries. Black amphibole veins cut Pieces 1, 6, 9, 10, and 12 and are cut by red clay-oxide veins in Pieces 1, 3 and 9.

Core Photo



209-1275B-17R-1 (Section top: 80.1 mbsf)

UNIT-III: OXIDE GABBRO

Pieces 1-21

COLOR: Gray to brown with red staining

PRIMARY MINERALOGY:

Plagioclase	Mode 60-65% Size 0.1-5 mm Shape/Habit Euhedral
Pyroxene	Mode 28-37% Size 0.1-4 mm Shape/Habit Subhedral
Oxide	Mode 3-12%

COMMENTS: This core contains a mixture of microgabbro (30%) and fine-grained gabbro (70%). The upper 46 cm have a moderately-well developed foliation.

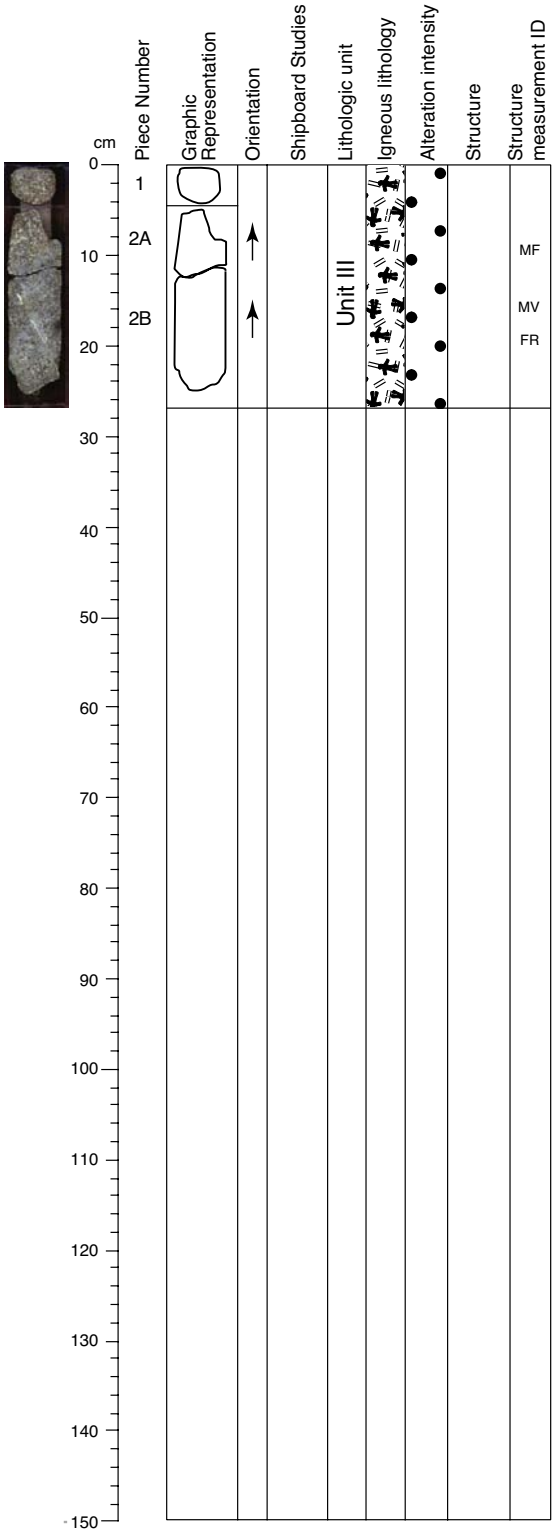
SECONDARY MINERALOGY:
Alteration intensity in this section varies between 25% (Pieces 20 and 21) and 45% (Pieces 7-10). Alteration is predominantly to green and brown amphibole after clinopyroxene. The microgabbro has 5-10% of talc and clay, replacing clinopyroxene and plagioclase. Hematite and secondary plagioclase comprise 2-3%. Clay alteration in gabbro is less significant (2-5%). Oxidative alteration is patchy but present in all pieces of the section.

METAMORPHIC VEINS:
The first 15 pieces of this section show minor black amphibole veins or green to black chlorite-amphibole veins that are cut by rare red clay-hematite veins. Piece 11 hosts a small zeolite veinlet. Pieces 16-21 have no veins. Felsic veins are present in Pieces 13 and 20.

THIN SECTIONS: Samples 1275B-17R-1, 60-62 cm and 1275B-17R-1, 120-122 cm

STRUCTURE:
The section consists of interlayered fine to medium to coarse grained oxide gabbro and oxide microgabbo. The layering or banding is generally defined by grain size changes, but is commonly associated with changes in the modal percentage of mineral phases, especially oxide minerals. Layer boundaries occur in Pieces 2, 3, 10, and 13-19. The layering is variably inclined, but averages 35 degrees in the cut face of the core. There is no evidence of crystal plastic deformation in the section. Pieces 3 through 14 and 17 are cut by planar, amphibole-filled shear fractures with little or no offset. Pieces 15 and 16 are cut by several irregular shaped, undulatory faults with 0.5 to 1.5 cm offset. Thin granophyric magmatic veins cut Pieces 14 and 20. Black amphibole veins cut Pieces 3, 4, 6, 8, 9, and 11 and green amphibole/chlorite veins cut Pieces 7, 10-15 and 17. Crosscutting relationships are seen in Piece 13, with 2 mm thick chlorite veins cutting earlier green amphibole veins.

Core Photo



209-1275B-17R-2 (Section top: 81.55 mbsf)

UNIT-III: OXIDE GABBRO

Pieces 1-2

COLOR: Gray to brown

PRIMARY MINERALOGY:

Plagioclase	Mode 70% Size 5 mm Shape/Habit Euhedral
Pyroxene	Mode 28-37% Size 4 mm Shape/Habit Subhedral
Oxide	Mode 3-12%

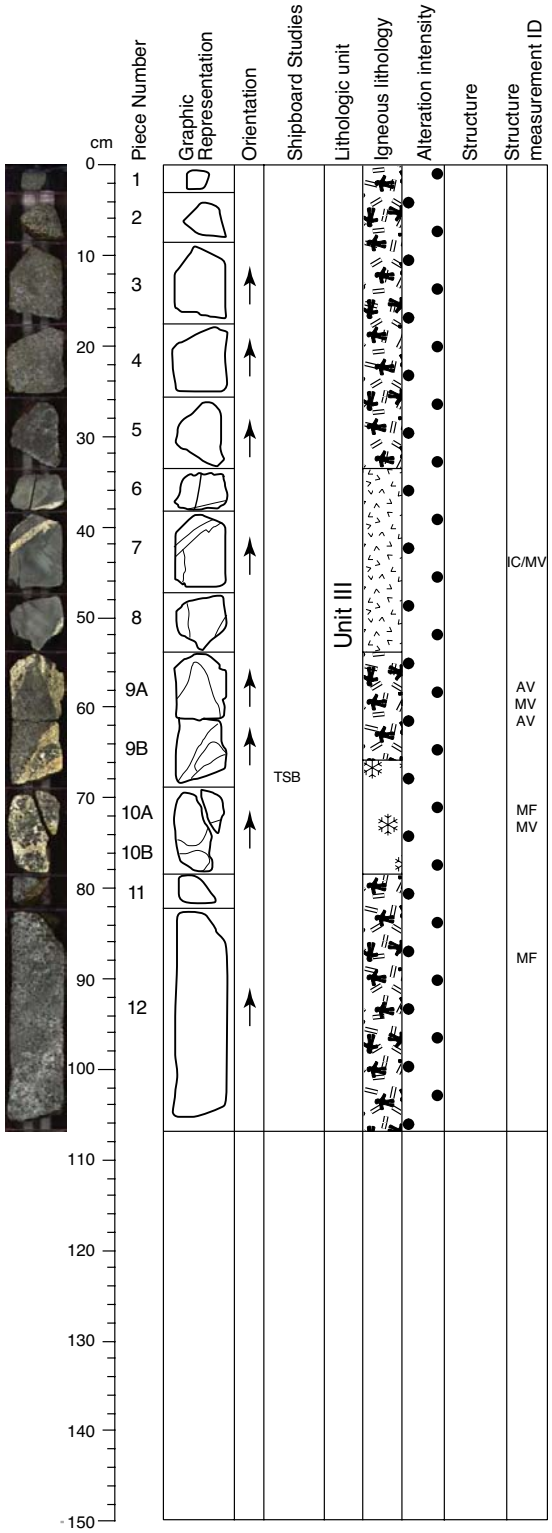
COMMENTS: This short core consists of only fine-grained gabbro that is similar to that described in Section 1275B-17R-1. The gabbro in this section is not as well-foliated as the upper part of Section 1275B-17R-1.

SECONDARY MINERALOGY:
Alteration intensity in this section is about 30%. Similar to the previous section, alteration is predominantly to green and brown amphibole after clinopyroxene with minor clay alteration and Fe-oxyhydroxide staining.

METAMORPHIC VEINS:
No veins.

STRUCTURE:
The section consists of interlayered fine to medium to coarse grained oxide gabbro. The layering or banding is generally defined by grain size changes, but is commonly associated with changes in the modal percentage of mineral phases, especially oxide minerals. Layer boundaries occur in Piece 2. The layering is inclined at 20 degrees in the cut face of the core. There is no evidence of crystal plastic deformation in the section. Piece 2 is cut by several planar shear fractures and thin red-clay-oxide veins.

Core Photo



209-1275B-18R-1 (Section top: 85.1 mbsf)

UNIT-III: OXIDE GABBRO

Pieces 1-12

COLOR: Gray to orange-gray and white

PRIMARY MINERALOGY:

Plagioclase	Mode 60% Size 2-3 mm Shape/Habit Euhedral
Pyroxene	Mode 35% Size 4 mm Shape/Habit Subhedral
Oxide	Mode 5%

COMMENTS: The section contains a mixture of gabbroic materials. Pieces 1-5 (0-34 cm) are foliated, fine-grained gabbro. Pieces 6-8 (34-54 cm) are aphyric diabase. The diabase in Piece 7 is cut by a granophyric dike. Piece 9 has an angular piece of gabbro that is enclosed in granophyre. The lower portion of the piece has been partially reacted changing the original pyroxenes into coarse-grained amphibole. Piece 10 is composed of granophyre with part of it being amphibole-rich – possibly representing a completely reacted piece of gabbro. Pieces 11 and12 are intimately mixed microgabbro and gabbro.

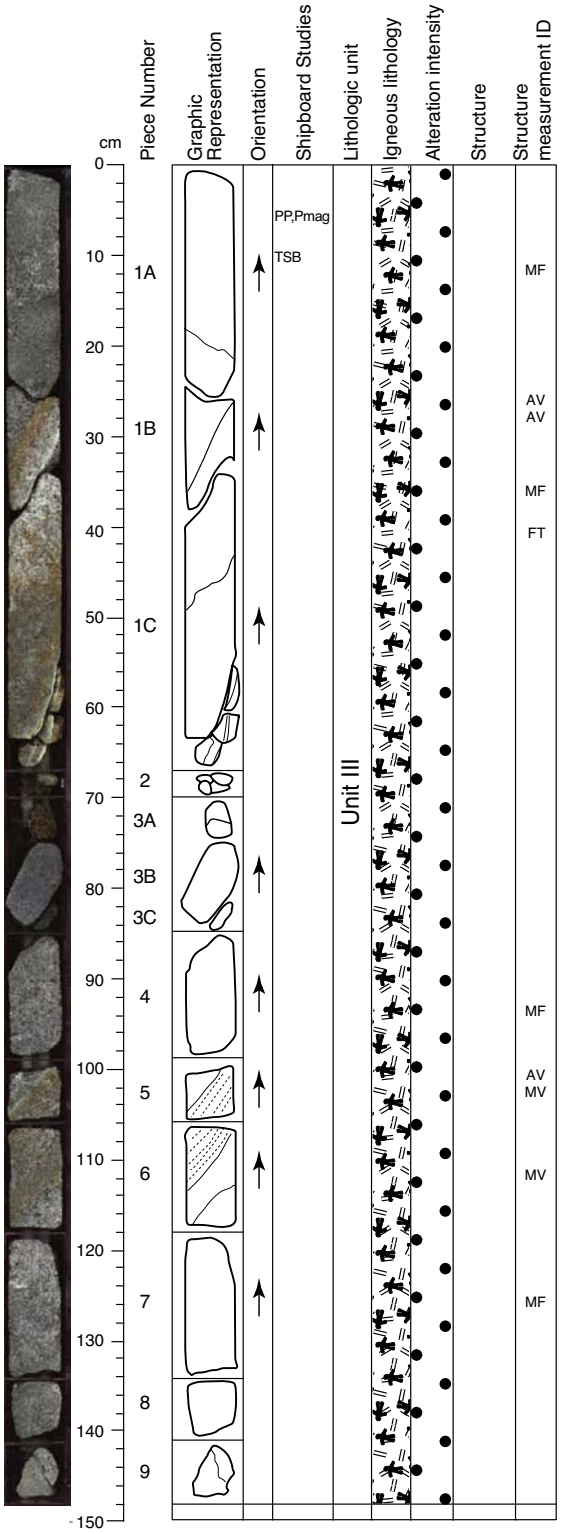
SECONDARY MINERALOGY:
Alteration intensity in this section varies from 10% to 40%. Alteration is highest in Pieces 9 and 10 in proximity to highly amphibole-secondary plagioclase-carbonate altered felsic dikes (granophyres). Similar to the previous sections, alteration is predominantly to green and brown amphibole after clinopyroxene with minor secondary plagioclase, hematite, and sphene. Diabase (Pieces 7 and 8) appears less altered (10%) than gabbro. Pieces 1-5 and 11-12 show variable degrees of oxidative alteration.

METAMORPHIC VEINS:
Pieces 1-3 have rare, red clay-hematite veins. Pieces 9-10 host green, soft chlorite/clay veins that make up about 1 vol.% of the core. Pieces 4-8 have no metamorphic veins.

THIN SECTIONS: Sample 1275B-18R-1, 66-70 cm

STRUCTURE:
The section consists of interlayered fine to medium to coarse-grained oxide gabbro and oxide microgabbo. The layering or banding is generally defined by grain size changes, but is commonly associated with changes in the modal percentage of mineral phases, especially oxide minerals. The layering is variably inclined ranging up to 45 degrees in the cut face of the core (e.g., Piece 12). Pieces 6, 8, 9 and 10 are cut by granophyric veins and Piece 9 is net veined by them. The granophyric contains xenoliths of diabase as well as gabbro. There is no evidence of crystal plastic deformation in the section. Pieces 5, 9 and 10 are cut by planar, amphibole-filled shear fractures. Pieces 6, 7 and 8 are cut by irregular, undulatory open fractures. Pieces 1, 9 and 10 are cut by green chlorite/amphibole veins and Piece 2 is cut by green/black amphibole veins.

Core Photo



209-1275B-18R-2 (Section top: 86.17 mbsf)

UNIT-III: OXIDE GABBRO

Pieces 1-9

COLOR: Gray to orange-gray

PRIMARY MINERALOGY:

Plagioclase	Mode 60% Size 0.2-2.5 mm Shape/Habit Euhedral
Pyroxene	Mode 30-32% Size 0.1-2.5 mm Shape/Habit Subhedral
Oxide	Mode 8-10%

COMMENTS: Microgabbro (20%) and fine- to medium-grained gabbro (80%) are the only lithologies in this section. In the upper part (0-25 cm) they have irregular contacts (not simple planar boundaries). Further down the core (107-115 cm) the microgabbro occurs as discrete bands and the host gabbro is foliated. The lowest section of the core returns to a mixture of microgabbro and gabbro with irregular contacts (115-148 cm).

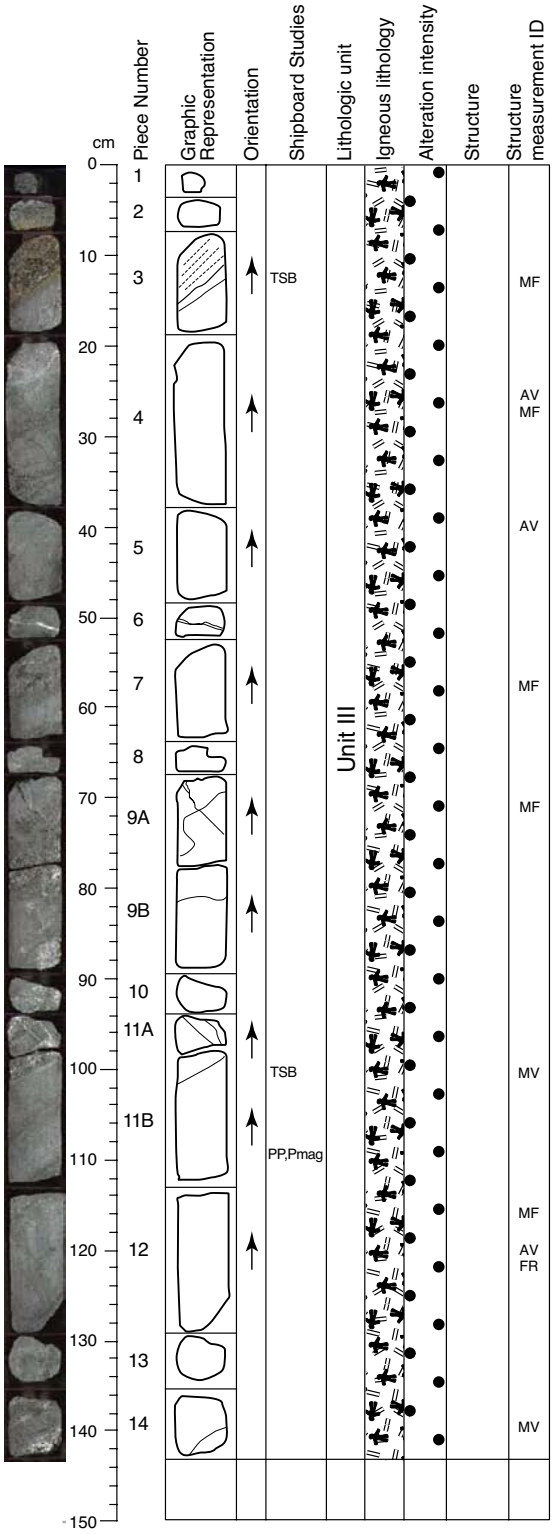
SECONDARY MINERALOGY:
Alteration intensity in this section varies from 20% to 40%. The rocks show alteration of clinopyroxene to green and minor brown amphibole that is characteristic of the lower portion of Hole 1275B. Plagioclase is fresh, except traces of green amphibole along cracks. Pieces 1B, 5, and 6 show variable degrees of oxidative alteration.

METAMORPHIC VEINS:
This section has a green chlorite vein in Piece 1A. Red clay-hematite veins and a 3-mm wide green to white, steeply dipping clay-carbonate-hematite vein are present in Pieces 1B-1C . Pieces 2 to 9 show minor amphibole veining.

THIN SECTIONS: Samples 1275B-18R-2, 9-12 cm

STRUCTURE:
The section consists of interlayered fine to medium to coarse grained oxide gabbro. The layering or banding is generally defined by grain size changes, but is commonly associated with changes in the modal percentage of mineral phases, especially variations in oxide mineral or plagioclase abundance. Layer boundaries occur in Pieces 1, 4 and 6. The layering is variably inclined up to 41 degrees in the cut face of the core. There is no evidence of crystal plastic deformation in the section. Pieces 1 and 2 contain several planar faults with 1-2 cm offset. Faults have dip-slip slickenfibers that may indicate a reverse sense of motion in the present-day reference frame. The faults are 0.2 cm wide and are filled with chlorite. Pieces 1, 2 and 9 contain low densities of open fractures. Piece 1A is cut thin chlorite veins and Piece 1B is cut by a 0.5cm thick carbonate-chlorite-hematite vein. Pieces 3 and 8 are cut by green-black amphibole veins.

Core Photo



209-1275B-18R-3 (Section top: 87.65 mbsf)

UNIT-III: OXIDE GABBRO

Pieces 1-14

COLOR: Gray

PRIMARY MINERALOGY:

Plagioclase	Mode 60% Size 0.2-6 mm Shape/Habit Euhedral
Pyroxene	Mode 28-37% Size 0.1-2.5 mm Shape/Habit Subhedral
Oxide	Mode 3-12%

COMMENTS: Microgabbro (93%) and fine- to medium-grained gabbro (7%) make up this section. The mixture of grain sizes is very irregular in most of the core. In Piece 3 there is a sharp, planar contact between a medium-grained oxide-rich (15%) gabbro and a microgabbro. The microgabbro has a well-developed foliation that becomes coarser away from the contact. In Pieces 11a and 11b there is a band of foliated, medium-grained gabbro that cuts the microgabbro.

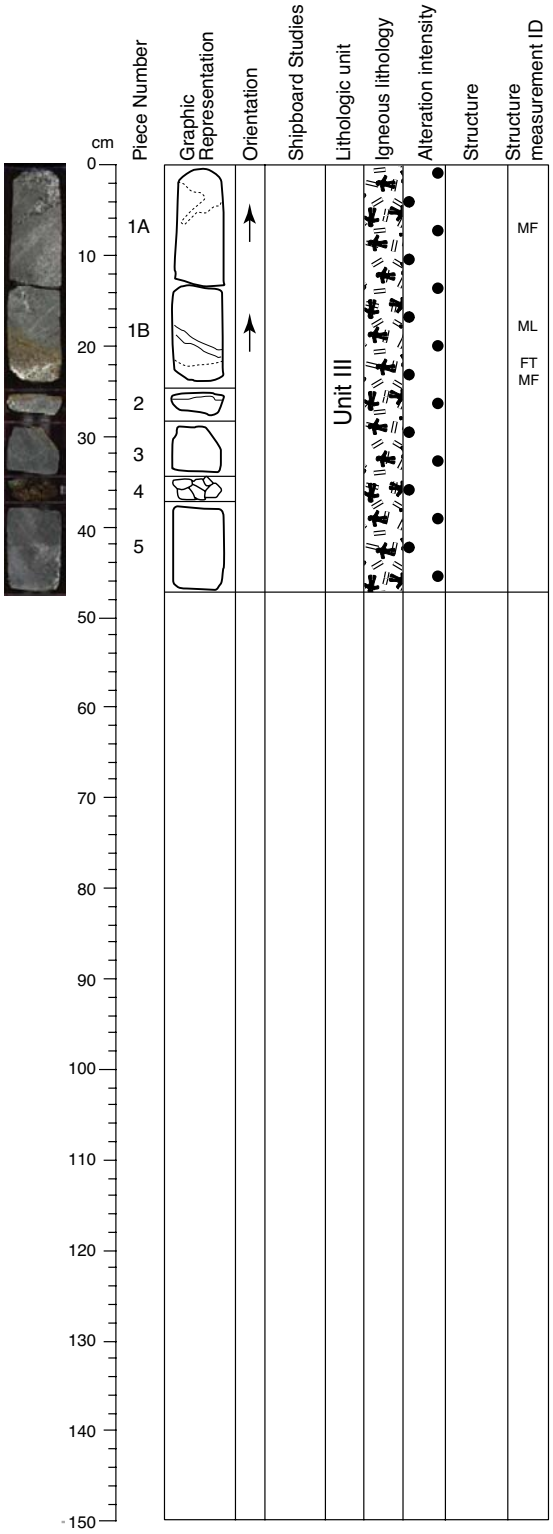
SECONDARY MINERALOGY:
Alteration intensity in this section varies from 20% to 35%. The rocks show alteration of clinopyroxene to green and minor brown amphibole that is characteristic of the lower portion of Hole 1275B. In addition, there are patches of talc after pyroxene (orthopyroxene?). Plagioclase is fresh, except traces of green amphibole along cracks. Piece 3 shows significant oxidative alteration to clay and oxide near the contact between fine-grained and coarse-grained gabbro

METAMORPHIC VEINS:
This section shows minor amphibole veining (<0.1 Vol.%). The amphiboles cut wispy quartz-plagioclase veins that are probably splayed off magmatic veins.

THIN SECTIONS: Samples 1275B-18R-3, 11-17 cm and 1275B-18R-3, 99-101 cm

STRUCTURE:
The section consists of interlayered fine to medium grained oxide gabbro. Granophyric veins and clots intrude gabbro and range in compositions from leucogabbro to diorites to trondhjemites. They cut Pieces 9-11 and 14. The layering or banding is generally defined by grain size changes, but is commonly associated with changes in the modal percentage of mineral phases, especially variations in oxide mineral or plagioclase abundance. Layer boundaries occur in Pieces 3, 4, 9 and 11. The layering is variably inclined, but is typically inclined at approximately 38 degrees in the cut face of the core. There is no evidence of crystal plastic deformation in the section and textures are igneous. Piece 12 contains a low density of open fractures. Thin black amphibole veins cut Pieces 4, 5, 7, 10, 12 and 14.

Core Photo



209-1275B-18R-4 (Section top: 89.08 mbsf)

UNIT-III: OXIDE GABBRO

Pieces 1-5

COLOR: Gray to red

PRIMARY MINERALOGY:

Plagioclase	Mode 60% Size 0.2-6 mm Shape/Habit Euhedral
Pyroxene	Mode 28-37% Size 0.1-2.5 mm Shape/Habit Subhedral
Oxide	Mode 3-12%

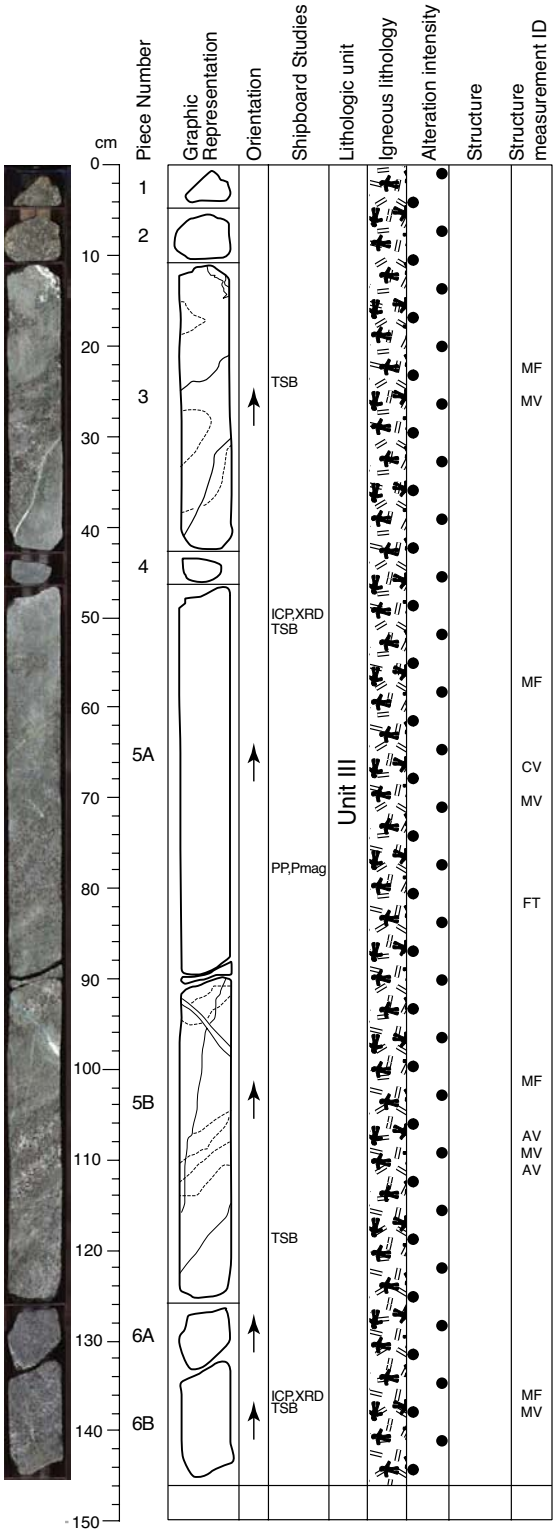
COMMENTS: This section of core is similar to Section 1275B-18R-3 with microgabbro (95%) and fine-grained gabbro (5%) as the main lithologies in this section. Piece 1a has a mixture of microgabbro and gabbro. Pieces 1b and 1c contain granophyric material between 22 and 28 cm and a patch of granophyre is also found in Piece 5.

SECONDARY MINERALOGY:
Alteration intensity in this section is 20%, except for an oxidatively altered domain in Piece 1B where alteration is 40%. The rocks show alteration of clinopyroxene to green and minor brown amphibole that is characteristic of the lower portion of Hole 1275B. Plagioclase is fresh, except for traces of secondary plagioclase and green amphibole along cracks.

METAMORPHIC VEINS:
This section hosts small volume percentages of black amphibole veins that are cut by rare red clay-hematite veins.

STRUCTURE:
The section consists of interlayered fine to medium to coarse grained oxide gabbro. A coarse grained oxide gabbro intrudes the top of Piece 1 and the base of Pieces 5. The layer boundaries are more irregular, but bands of oxides are present in Piece 1. The bands are inclined at approximately 25 degrees in the cut face of the core. There is no evidence of crystal plastic deformation in the section. Pieces 1 and 2 each contain fractures with weak slickensides. Piece 2 is cut by chlorite veins and Piece 3 is cut by red clay-oxide veins. Piece 4 is cut by black amphibole veins.

Core Photo



209-1275B-19R-1 (Section top: 89.4 mbsf)

UNIT-III: OXIDE GABBRO

Pieces 1-6

COLOR: Gray

PRIMARY MINERALOGY:

Plagioclase	Mode 55% Size 0.2 mm Shape/Habit Euhedral
Pyroxene	Mode 37% Size 0.2 mm Shape/Habit Subhedral
Oxide	Mode 8%

COMMENTS: This section of core contains a mixture microgabbro (60%) and fine-grained gabbro (40%) as the main lithologies. Piece 3 has granophyric material between 11 and 15 cm. In the upper part of the core the grain-size domains are swirled together (0-80 cm) but in Pieces 5a – 6a (80-130 cm) they occur in bands and appear sheared (synmagmatic?). The core ends again in swirled boundaries in Piece 6b.

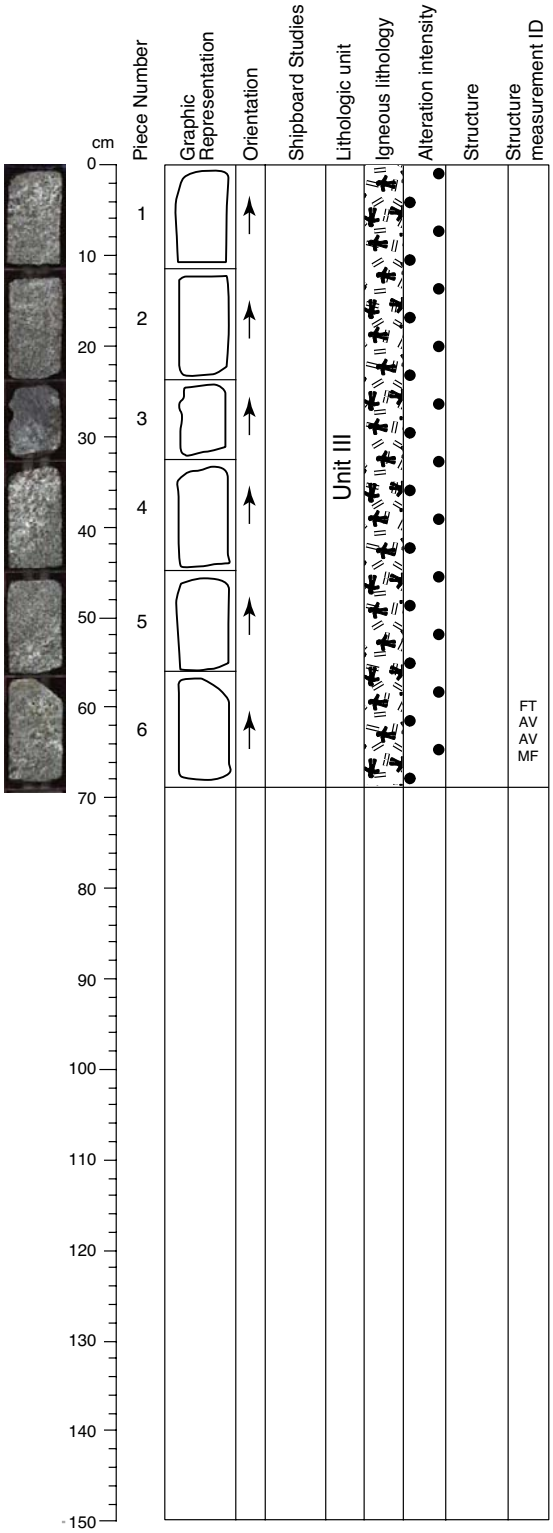
SECONDARY MINERALOGY:
Alteration intensity in this section varies between 15 and 20%. The rocks show alteration of clinopyroxene to green and minor brown amphibole that is characteristic of the lower portion of Hole 1275B. Plagioclase is fresh, except for traces of secondary plagioclase and green amphibole along cracks. There is minor talc, replacing pyroxene (orthopyroxene?). Pieces 1 and 2 show minor orange-brown staining due to disseminated Fe-oxyhydroxides.

METAMORPHIC VEINS:
Pieces 1-5 show black amphibole veins (0.2 vol.% of the core). Piece 5B has a white plagioclase-zeolite vein that may represent an altered magmatic veinlet and a prominent green chlorite vein that makes up about 2 vol.% of the piece. Piece 6 has no metamorphic veins. There are felsic veins in Pieces 3, 5A, 5B, and 6.

THIN SECTIONS: Samples 1275B-19R-1, 23-27 cm, 1275B-19R-1, 49-51 cm, 1275B-19R-1, 116-121 cm, and 1275B-19R-1, 135-137 cm

STRUCTURE:
The section consists of interlayered fine to medium to coarse-grained oxide gabbro. Granophyric veins cut Pieces 3, 5 and 6. The layer boundaries are well defined, but more irregular, lenticular and swirling with steep and gentle inclinations in the same piece in the upper part of the section. This continues until the top of Piece 3. More regular planar layering occurs in the remainder of the section below 75 cm. Planar layering is inclined at approximately 35 degrees in the cut face of the core. There is no evidence of crystal plastic deformation in the section. Piece 5 at 90 cm contains an amphibole-filled normal fault with 1 cm offset and two open fractures. Pieces 1, 2, 4 and 5A are cut green/black amphibole veins. Pieces 3, 5A, 5B and 6 are cut magmatic veins, which the metamorphic (chlorite) alteration veins appear to exploit. Pieces 3, 5 and 6 are cut by chlorite veins.

Core Photo



209-1275B-19R-2 (Section top: 90.86 mbsf)

UNIT-III: OXIDE GABBRO

Pieces 1-6

COLOR: Gray

PRIMARY MINERALOGY:

Plagioclase	Mode 60% Size 4 mm Shape/Habit Euhedral
Pyroxene	Mode 34% Size 3.5 mm Shape/Habit Subhedral
Oxide	Mode 6%

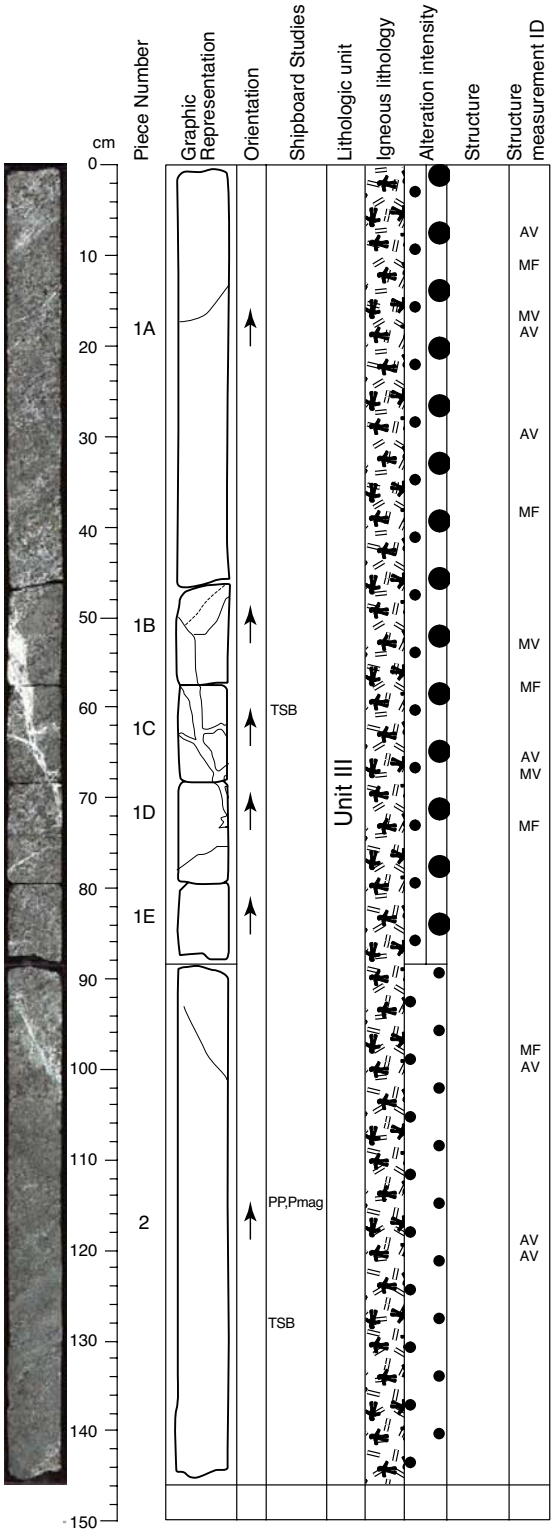
COMMENTS: This section of core contains a mixture microgabbro (4%) and fine-grained gabbro (96%). Mixed fine- and medium-grained gabbro define bands in Pieces 4 and 5. Piece 6 contains microgabbro that has a complex and irregular (swirled) distribution.

SECONDARY MINERALOGY:
Alteration intensity in this section varies between 20 and 30%. The rocks show alteration of clinopyroxene to green and minor brown amphibole that is characteristic of the lower portion of Hole 1275B. Plagioclase is fresh, except for traces of secondary plagioclase and green amphibole along cracks.

METAMORPHIC VEINS:
Pieces 1-5 of this section have no veins. Piece 6 has a small green chlorite vein.

STRUCTURE:
The section consists of interlayered fine to medium grained oxide gabbro and oxide leucogabbro. The layering or banding is generally defined by grain size changes and changes in the modal percentage of mineral phases, especially oxide minerals and plagioclase abundances. Planar layer boundaries occur in Pieces 4 and 5, but Piece 6 contains more irregular and laterally pinching lenticular layers. Planar layers are typically inclined 44 degrees in the cut face of the core. There is no evidence of crystal plastic deformation in the section and textures appear igneous. Piece 6 contains a fracture with slickenfibers of chlorite and/or talc. Fibers indicate oblique slip, but do not provide an unambiguous shear sense. Piece 3 is cut by green amphibole/chlorite veins and later oxide veins on the exposed cut face. Piece 6 is cut by thin black amphibole veins and green chlorite veins exploiting an earlier magmatic vein.

Core Photo



209-1275B-19R-3 (Section top: 91.55 mbsf)

UNIT-III: OXIDE GABBRO

Pieces 1-2

COLOR: Gray and white

PRIMARY MINERALOGY:

Plagioclase	Mode 60% Size 2.5 mm Shape/Habit Euhedral
Pyroxene	Mode 30% Size 2 mm Shape/Habit Subhedral
Oxide	Mode 10%

COMMENTS: This section of core contains a mixture microgabbro (25%) and fine- to medium-grained gabbro (63%) with lesser amounts of coarse-grained gabbro (8%) and granophyre (4%). The granophyre occurs as a thin dikelet extending from 51-72 cm and in local patches at 17 cm and 78 cm. The coarse-grained gabbro is found in two short intervals between 14 and 18 cm and again at 38-42 cm. In Piece 2 the microgabbro and gabbro are segregated into bands but the boundaries are not planar and are more similar to swirled contacts, not sheared, described elsewhere.

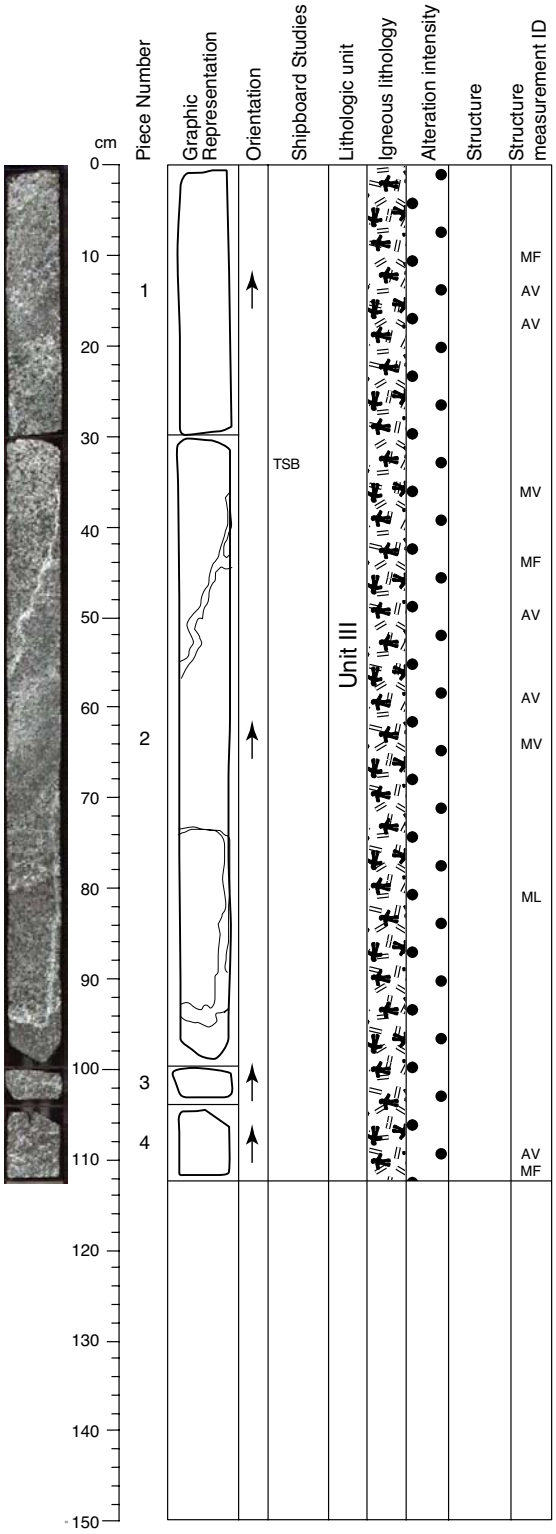
SECONDARY MINERALOGY:
The gabbro in this section is about 20% altered, dominantly to green amphibole after clinopyroxene. Felsic veins in Piece 1 (50-70 cm) are composed mainly of plagioclase and quartz and are slightly altered to amphibole and secondary plagioclase.

METAMORPHIC VEINS:
This section hosts minor black amphibole-chlorite veins and green chlorite veins that use magmatic veins, in particular in the interval from 92 to 104 cm.

THIN SECTIONS: Samples 1275B-19R-3, 58-62 cm and 1275B-19R-3, 125-128 cm

STRUCTURE:
The section consists of interlayered fine to medium to coarse-grained oxide gabbro, cut by leucogabbroic to granophyric veins in Pieces 1 and 2. A granophyric vein in Piece 1 contains xenoliths of gabbro. The layering or banding is generally defined by grain size changes and changes in the modal percentage of mineral phases, especially oxide minerals and plagioclase. Layering is irregular and non-systematic in Piece 1, but becomes more planar and regular at the base of Piece 2. Planar layering is variably inclined, but typically has an inclination of approximately 43 degrees in the cut face of the core (e.g., Piece 2). There is no evidence of crystal plastic deformation in the section and there is no brittle shear deformation in this section. Both black amphibole and green chlorite veins cut Pieces 1 and 2 and thin green chlorite veins are contained within in the granophyric veins seen in interval 53-86 cm.

Core Photo



209-1275B-19R-4 (Section top: 93.01 mbsf)

UNIT-III: OXIDE GABBRO

Pieces 1-4

COLOR: Gray

PRIMARY MINERALOGY:

Plagioclase	Mode 60% Size 1.5-8 mm Shape/Habit Euhedral
Pyroxene	Mode 25-35% Size 1-7 mm Shape/Habit Subhedral
Oxide	Mode 5-15%

COMMENTS: This section of core contains a mixture of fine- to medium-grained gabbro (88%) with lesser amounts of coarse-grained gabbro (9%) and granophyre (3%). The grain size variations in the gabbro occur as bands, but the foliations developed near these bands are weak or indistinguishable.

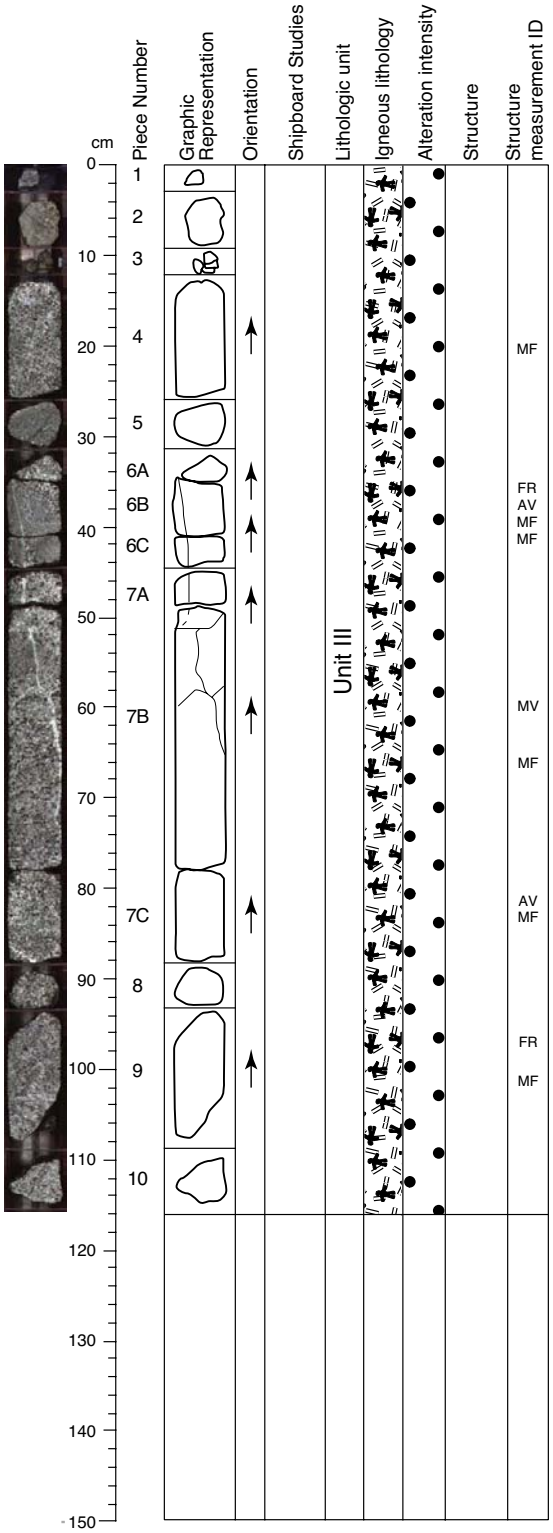
SECONDARY MINERALOGY:
The gabbro in this section is about 35% altered, dominantly to green amphibole after clinopyroxene. Felsic veins in Piece 2 are composed mainly of plagioclase and quartz and are slightly altered to amphibole and secondary plagioclase.

METAMORPHIC VEINS:
This section hosts minor black amphibole-chlorite veins and a steeply dipping green chlorite vein that makes up about 0.3 vol.% of the section.

THIN SECTIONS: Sample 1275B-19R-4, 31-35 cm

STRUCTURE:
The section consists of interlayered fine to medium to coarse-grained oxide gabbro and oxide leucogabbro. The section is cut by several long granophyric to leucocratic gabbro veins in Pieces 1 and 2 that cut across layer contacts. The coarser grained gabbros generally have higher plagioclase content. The layering or banding is generally defined by grain size changes and changes in the modal percentage of mineral phases, especially variation plagioclase and oxide mineral abundance. Layer boundaries occur in Pieces 1 and 2. The layering is moderately inclined from approximately 20 degrees up to 43 degrees in the cut face of the core. There is no evidence of crystal plastic deformation in the section. There is no brittle shear deformation in this section. Black amphibole veins cut Piece 2 and all pieces contain green chlorite veins. Pieces 2 and 3 have clay/oxide deposits on exposed faces.

Core Photo



209-1275B-20R-1 (Section top: 94.4 mbsf)

UNIT-III: OXIDE GABBRO

Pieces 1-10

COLOR: Gray

PRIMARY MINERALOGY:

Plagioclase	Mode 55% Size 0.1-6.5 mm Shape/Habit Euhedral
Pyroxene	Mode 25-35% Size 0.1-7 mm Shape/Habit Subhedral
Oxide	Mode 5-15%

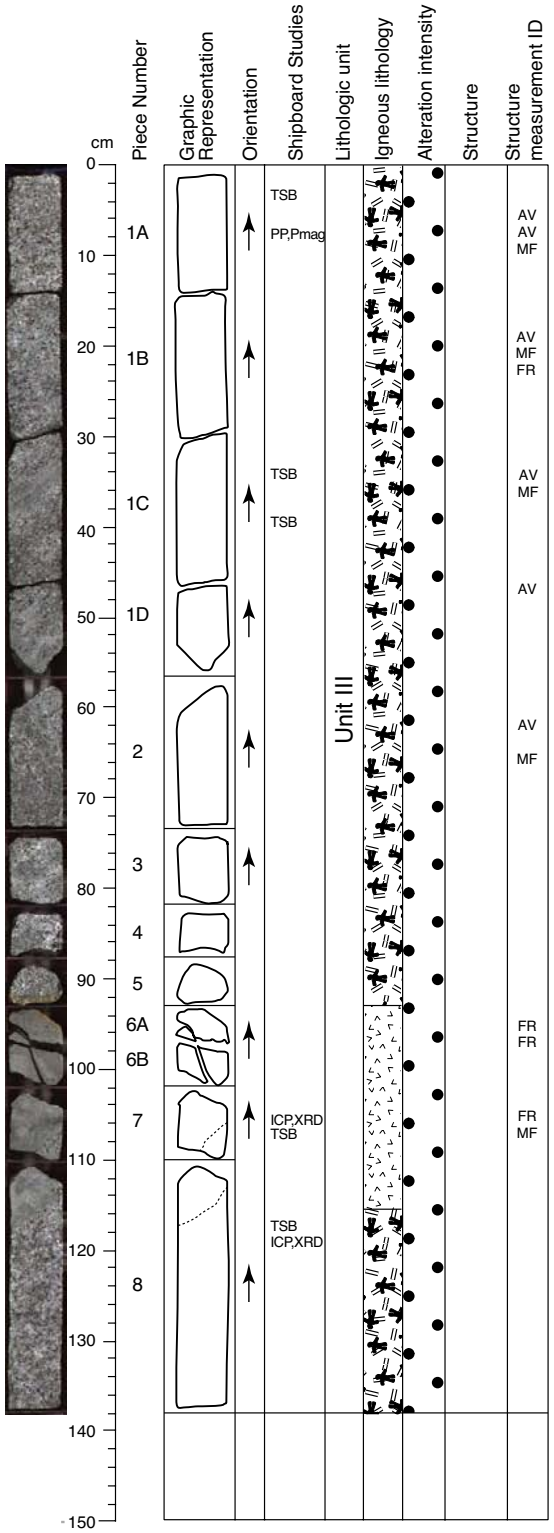
COMMENTS: This section of core contains mostly fine- to medium-grained gabbro (98%) with a small amount of granophyre (2%). The grain size variations in the gabbro occur as bands but in some places they are gradational. Magmatic foliations are moderately well developed in Pieces 9 and 10.

SECONDARY MINERALOGY:
The gabbro in this section is 20-35% altered, dominantly to green amphibole after clinopyroxene. Plagioclase alteration is very minor and limited to secondary plagioclase and green amphibole along cracks. Felsic veins in Pieces 6 and 7 are composed mainly of plagioclase and quartz and are slightly altered to amphibole and secondary plagioclase. Brown staining in Pieces 2, 3, and 5 indicates minor low temperature alteration.

METAMORPHIC VEINS:
This section has only very minor black amphibole veinlets.

STRUCTURE:
The section consists of interlayered fine to medium to coarse-grained oxide gabbro and oxide leucogabbro. The section is cut by a single long granophyric vein in Pieces 6 and 7 that cuts across layer contacts. The veins appear not to be planar and continuous to the back of the pieces, but essentially cuts steeply and diagonally from the base of Piece 7 to the top of Piece 6 by spiraling through the core, either traced on the cut face and or the back of the pieces continuously from base to top. The coarser grained gabbros generally have higher plagioclase content. The layering or banding is generally defined by grain size changes and changes in the modal percentage of mineral phases, especially variation plagioclase and oxide mineral abundance. Layer boundaries occur in Pieces 1 and 2. The layering is gently inclined to subhorizontal in the cut face of the core. There is no evidence of crystal plastic deformation in the section. Pieces 6, 7, 9 and 10 have low concentration of open fractures. Pieces 5 and 10 are cut by black amphibole veins and Pieces 5, 6 and 7 are cut by green chlorite veins.

Core Photo



209-1275B-20R-2 (Section top: 95.56 mbsf)

UNIT-III: OXIDE GABBRO

Pieces 1-8

COLOR: Greenish gray to gray and brown

PRIMARY MINERALOGY:

Plagioclase	Mode 55% Size 0.2-5 mm Shape/Habit Euhedral
Pyroxene	Mode 25-35% Size 0.1-7 mm Shape/Habit Subhedral
Oxide	Mode 5-15%

COMMENTS: This section of core contains a mixture of microgabbro (22%) and fine- to medium-grained gabbro (78%). The grain size variations in the gabbro occur as bands but in some places they are gradational. Piece 1c contains a sheared (synmagmatic?) microgabbro that has a magmatic foliation developed in the fine-grained gabbro around it. Pieces 2-5 are mixed fine- and medium-grained gabbro.

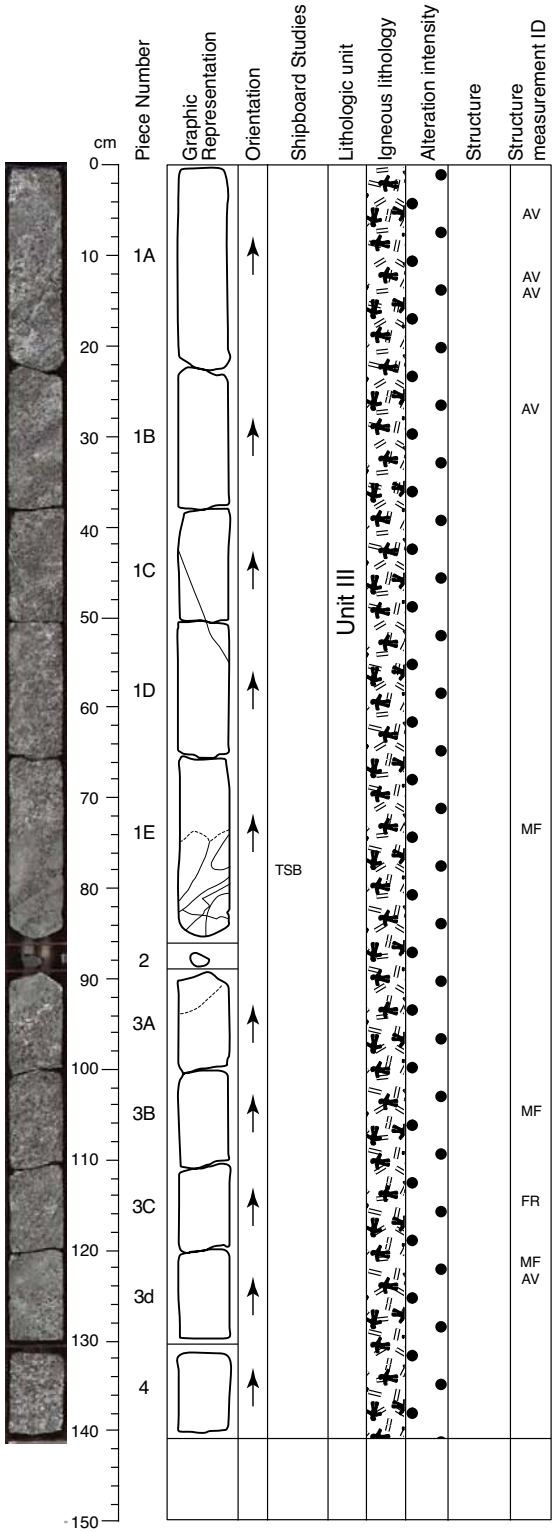
SECONDARY MINERALOGY:
Alteration intensity in this section is 15-20% in the gray gabbro (Pieces 6-8) and 30-40% in the greenish-gray gabbro (Pieces 1-5). Alteration is essentially limited to partial replacement of clinopyroxene by green amphibole. Brown amphibole and secondary plagioclase are rare. An orange-brown alteration halo is developed along the contact of gabbro and microgabbro in Pieces 5 and 6.

METAMORPHIC VEINS:
Pieces 1A and 6-8 have black amphibole-chlorite veins (<0.5 vol.% of piece). Piece 1 hosts a prominent green chlorite vein (2 vol.% of piece). This chlorite veins continues in Piece 2, where is makes up 0.5% of the piece volume. Pieces 1C-1D and 3-5 have no veins.

THIN SECTIONS: Samples 1275B-20R-2, 4-6 cm, 1275B-20R-2, 33-35 cm, 1275B-20R-2, 35-41 cm, 1275B-20R-2, 106-108 cm, and 1275B-20R-2, 116-119 cm

STRUCTURE:
The section consists of interlayered fine to medium to coarse-grained oxide gabbro and oxide leucogabbro and an interval of oxide microgabbro between 94 and 117 cm. The microgabboic contact with a medium grained oxide gabbro in Piece 8 and 9 is irregular and non-planar. It could suggest and intrusive contact. The contact is very sharp with the underlying gabbro where the contact is preserved. The layering or banding in the gabbro section is generally defined by grain size changes and changes in the modal percentage of mineral phases, especially variation plagioclase and oxide mineral abundance. Layer boundaries occur in Piece 1. The layering is inclined 30 degrees in the cut face of the core. An oxide banding is present in Piece 1 and 4 that gives the appearance of an oxide foliation. There is, however, no mesoscopic evidence of crystal plastic deformation in the section and plagioclase and pyroxene crystal habits appear igneous. Pieces 1 and 7 have low concentrations of open fractures. Piece 6 has a high concentration of open fractures. Pieces1, 2 and 8 are cut by green chlorite veins and Pieces 1A and 7 are cut by black amphibole veins. Piece 3 has a low concentration of open fractures. Pieces 1 and 3 are cut by green chlorite veins and Piece 1B shows minor black amphibole veins.

Core Photo



209-1275B-20R-3 (Section top: 96.94 mbsf)

UNIT-III: OXIDE GABBRO

Pieces 1-4

COLOR: Gray

PRIMARY MINERALOGY:

Plagioclase	Mode 55-60% Size 0.3-6.5 mm Shape/Habit Euhedral
Pyroxene	Mode 28-37% Size 0.25-6 mm Shape/Habit Subhedral
Oxide	Mode 5-12%

COMMENTS: This core contains a mixture of fine- to coarse-grained gabbro. There are both sharp and gradational transitions in the grain size. There is a pronounced fabric developed beneath a fine-grained band in Piece 1a and 1b (19 –26 cm). The fabric intensity decreases away from this band and is not discernable at ~ 60 cm. In Piece 1c there are isolated patches of fine-grained gabbro in medium-grained gabbro. Pieces 3c and 3d contain a shear zone marked by fine-grained gabbro with elongated oxides.

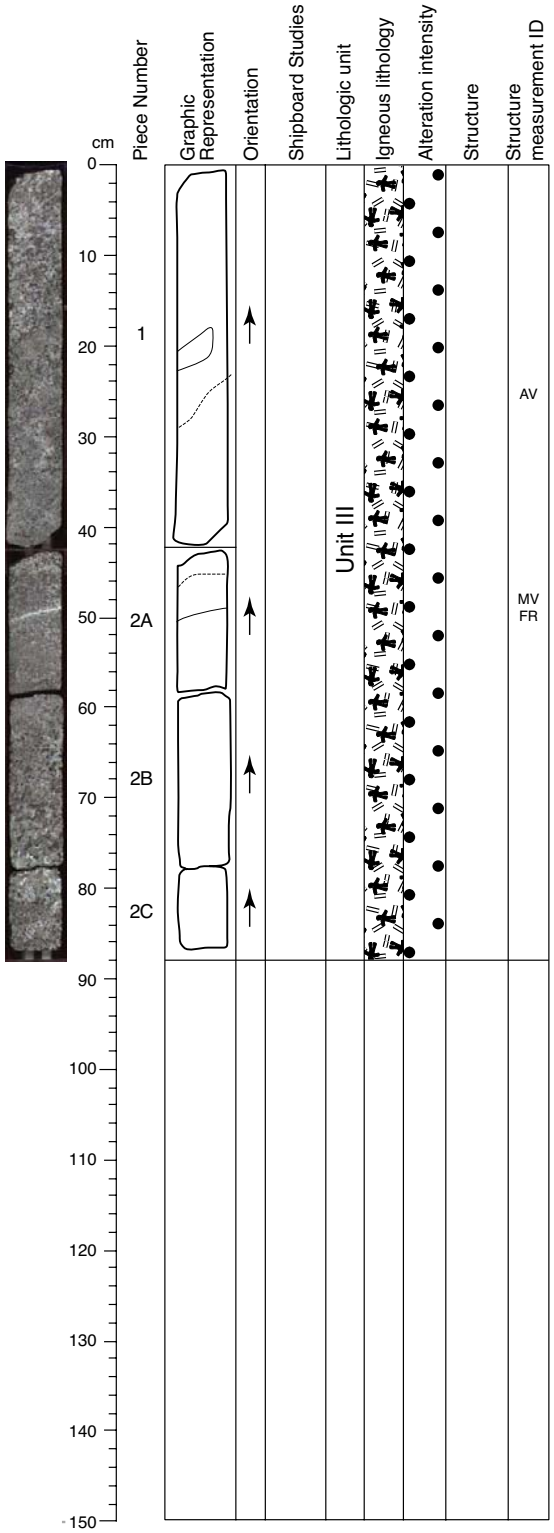
SECONDARY MINERALOGY:
Alteration intensity in this section is 20-25%. Alteration is essentially limited to partial replacement of clinopyroxene by green amphibole. Brown amphibole and secondary plagioclase are rare.

METAMORPHIC VEINS:
Apart from very minor black amphibole veining this section has no veins, with the exception of a green chlorite veins in Piece 3D that makes up 2 vol.% of the piece.

THIN SECTIONS: Sample 1275B-20R-3, 76-78 cm

STRUCTURE:
The section consists of fine to medium to coarse-grained oxide gabbro that is complexly interlayered. The layering or banding in the gabbro section is generally defined by grain size changes and changes in the modal percentage of mineral phases, especially variation plagioclase and oxide mineral abundance. Layer boundaries occur in Pieces 1 and 2. The layering is inclined 35 degrees in the cut face of the core, but layering is often irregular, e.g, in Piece 1 between 75 and 85 cm. There is no mesoscopic evidence of crystal plastic deformation in the section and textures appear igneous. Piece 12 has a low concentration of open fractures. Pieces 5, 7 and 9 have sparse black amphibole veins and Pieces 3 and 4 have chlorite veins utilizing earlier magmatic veins. Pieces 6, 11 and 12 also have chlorite veins.

Core Photo



209-1275B-20R-4 (Section top: 98.35 mbsf)

UNIT-III: OXIDE GABBRO

Pieces 1-4

COLOR: Gray

PRIMARY MINERALOGY:

Plagioclase	Mode 55%-60% Size 0.3-9 mm Shape/Habit Euhedral
Pyroxene	Mode 28%-37% Size 0.25-10 mm Shape/Habit Subhedral
Oxide	Mode 8%-12%

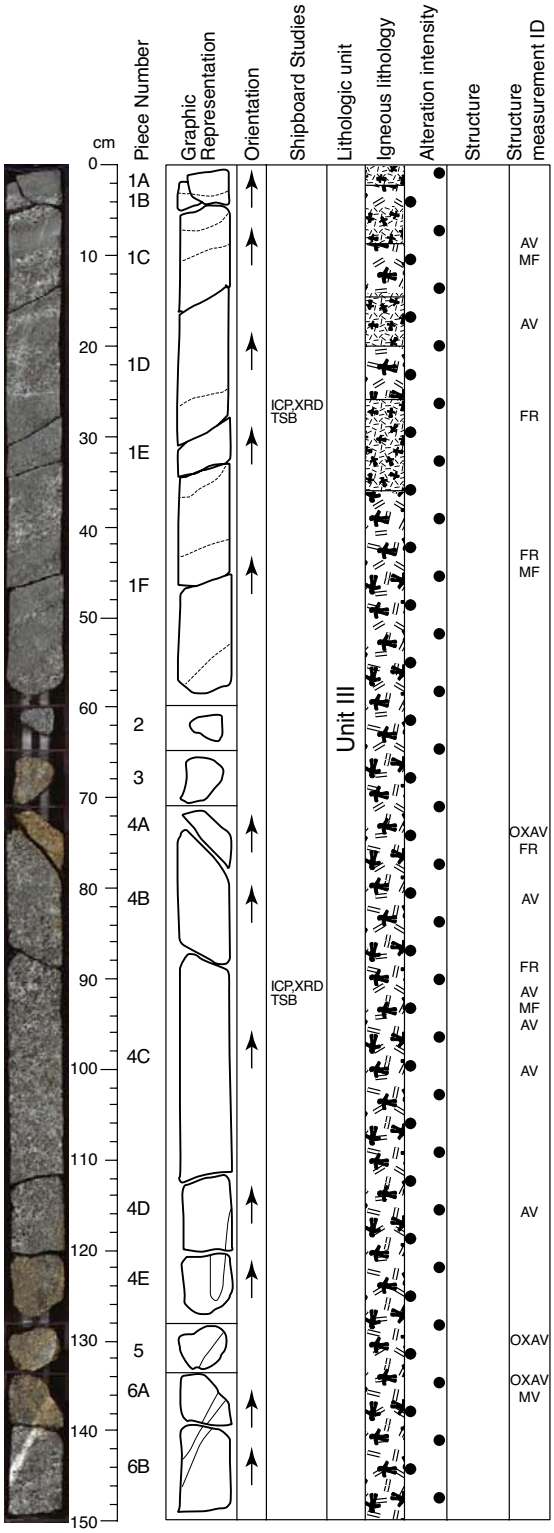
COMMENTS: This core contains a mixture of fine- to coarse-grained gabbro. There are both sharp and gradational transitions in the grain size. Pieces 2b and 2c contain gabbro with maximum grain sizes in excess of 1.5 cm – the largest present in all of Hole 1275B.

SECONDARY MINERALOGY:
Alteration intensity in this section is 20-30%. Alteration is essentially limited to partial replacement of clinopyroxene by green amphibole. Brown amphibole and secondary plagioclase are rare. Alteration seems to be somewhat increased in proximity to a felsic vein in Piece 2A.

METAMORPHIC VEINS:
Apart from very minor black amphibole veining this section has no veins.

STRUCTURE:
The section consists of interlayered fine to medium grained oxide gabbro. The layering or banding is generally defined by grain size changes and changes in the modal percentage of mineral phases, especially oxide minerals. Layer boundaries occur in both Pieces 1 and 2. The layering is irregular in places and commonly curviplanar. The layer contacts are variably inclined from sub-horizontal up to approximately 45 degrees in the cut face of the core. There is no evidence of crystal plastic deformation in the section. Piece 2 is cut by a low concentration of open fractures. Piece 1 is cut by subvertical amphibole veins that are cut by chlorite veins.

Core Photo



209-1275B-21R-1 (Section top: 99.0 mbsf)

UNIT-III: OXIDE GABBRO

Pieces 1-6

COLOR: Gray to brownish-gray

PRIMARY MINERALOGY:

Plagioclase	Mode 55% Size 0.2-6 mm Shape/Habit Euhedral
Pyroxene	Mode 27%-42% Size 0.1-5.5 mm Shape/Habit Subhedral
Oxide	Mode 3%-18%

COMMENTS: This section of core contains a mixture of microgabbro (23%) and fine- to medium-grained gabbro (77%) with a small amount of granophyre cutting Piece 6 (132-148 cm). Pieces 1A-4C (0-75 cm) have alternating grain-size bands with magmatic foliations parallel to the banding.

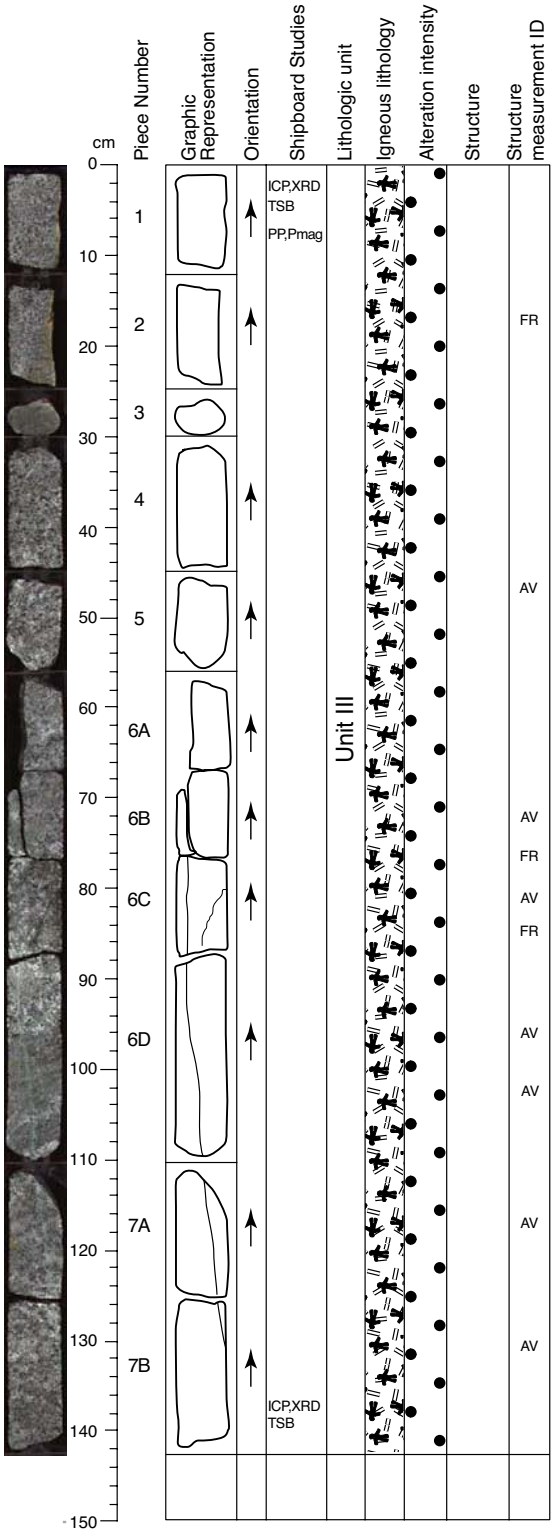
SECONDARY MINERALOGY:
Alteration intensity in this section is 15-30%. Alteration is essentially limited to partial replacement of clinopyroxene by green amphibole. Brown amphibole and secondary plagioclase are rare. Alteration seems to be somewhat increased in proximity to a felsic vein in Piece 6B. The felsic vein itself appears highly altered to amphibole, chlorite, and secondary plagioclase. Brown staining in Pieces 2, 4A, and 4B suggest minor oxidative alteration.

METAMORPHIC VEINS:
This section hosts green chlorite veins that are cut by red clay-hematite veins in Pieces 3-4C. Pieces 1-2 have minor green to black amphibole-chlorite veins. Pieces 4D-6 show traces of black amphibole veinlets that are cut by red clay-hematite veins.

THIN SECTIONS: Samples 1275B-21R-1, 26-28 cm and 1275B-21R-1, 90-92 cm

STRUCTURE:
The section consists of interlayered fine to medium to coarse-grained oxide gabbro. Piece 6 is cut diagonally by a trondhjemitic vein 1-2cm thick. The layering or banding in the gabbro section is generally defined by grain size changes and changes in the modal percentage of mineral phases, especially variation plagioclase and oxide mineral abundance. Layer boundaries are numerous in Pieces 1 and 2. The layering is inclined approximately 25 degrees in the cut face of the core, although minor variability in inclination exists. There is no mesoscopic evidence of crystal plastic deformation in the section and textures appear igneous. Piece 1 has a moderate concentration of open fractures generally inclined 16 degrees in the cut face of the core. Piece 4 has a low concentration of open fractures. Pieces 2, 3 and 4 are cut by black amphibole veins and Pieces 1, 3 and 4 are cut by green chlorite veins. Pieces 4, 7 and 8 are cut by red clay-oxide veins.

Core Photo



209-1275B-21R-2 (Section top: 100.5 mbsf)

UNIT-III: OXIDE GABBRO

Pieces 1-7

COLOR: Gray

PRIMARY MINERALOGY:

Plagioclase	Mode 60% Size 0.2-7 mm Shape/Habit Euhedral
Pyroxene	Mode 25%-35% Size 0.1-6 mm Shape/Habit Subhedral
Oxide	Mode 5%-15%

COMMENTS: This section of core contains a mixture of microgabbro (9%), fine- to medium-grained gabbro (77%), and coarse-grained gabbro (14%). Piece 6 has intimately mixed microgabbro and fine-grained gabbro (56-74 cm), coarse-grained gabbro containing an isolated patch of microgabbro (74-96 cm), and modal bands defined by oxides that parallel mixed coarse-grained layers in a microgabbro (96-110 cm). Piece 7 is characterized by patchy variations in grain size.

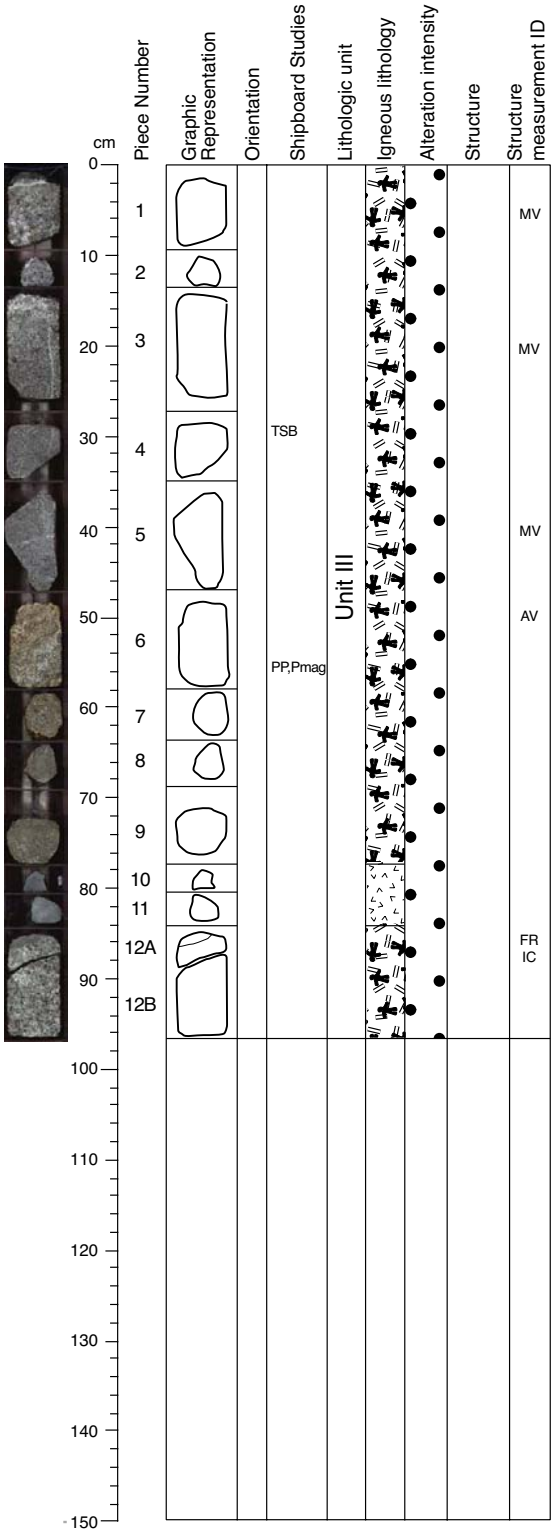
SECONDARY MINERALOGY:
Alteration intensity in this section is 20-30%. Alteration is essentially limited to partial replacement of clinopyroxene by green amphibole. Brown amphibole and secondary plagioclase are rare. Brown staining in Pieces 1-3 suggests minor oxidative alteration.

METAMORPHIC VEINS:
Pieces 1-3 show traces of black amphibole veinlets that are cut by red clay-hematite veins. Pieces 4-6A have no veins. Pieces 6B-7 have green chlorite veins that make up 1% of the piece volume.

THIN SECTIONS: Sample 1275B-21R-2, 3-5 cm

STRUCTURE:
The section consists of interlayered fine to medium-grained oxide gabbro and coarse grained oxide leuco-gabbro. The layering or banding in the gabbro section is generally defined by grain size changes and changes in the modal percentages of mineral phases, especially variation plagiolcase and oxide mineral abundance. Layer boundaries are numerous in Pieces 7 and 8. The attitude of layering is horizontal to inclined approximately 25 degrees in the cut face of the core. In addition to minor variability in inclination, the layer boundaries are commonly curviplanar. There is no mesoscopic evidence of crystal plastic deformation in the section and textures appear igneous. Pieces 2, 6C and 6D are cut by black amphibole veins and Pieces 1, 2, 6B-D and 5-7 are cut by green chlorite veins. Piece 5 shows chlorite vein on the edge of a thin magmatic vein. Piece 6 has a moderate concentration of open fractures and Piece 2 has a low concentration of open fractures.

Core Photo



209-1275B-21R-3 (Section top: 101.93 mbsf)

UNIT-III: OXIDE GABBRO

Pieces 1-12

COLOR: Gray to brownish gray

PRIMARY MINERALOGY:

Plagioclase	Mode 60% Size 0.2-3.5 mm Shape/Habit Euhedral
Pyroxene	Mode 25%-35% Size 0.1-2.5 mm Shape/Habit Subhedral
Oxide	Mode 5%-15%

COMMENTS: This section of core contains a mixture of microgabbro (34%), fine- to medium-grained gabbro (54%), and diabase (11%). Contacts between the different grain-size domains can be either gradational or sharp. Piece 3 has a more felsic upper part and mafic lower part with as much as 25% oxides in the more mafic part (22-27 cm).

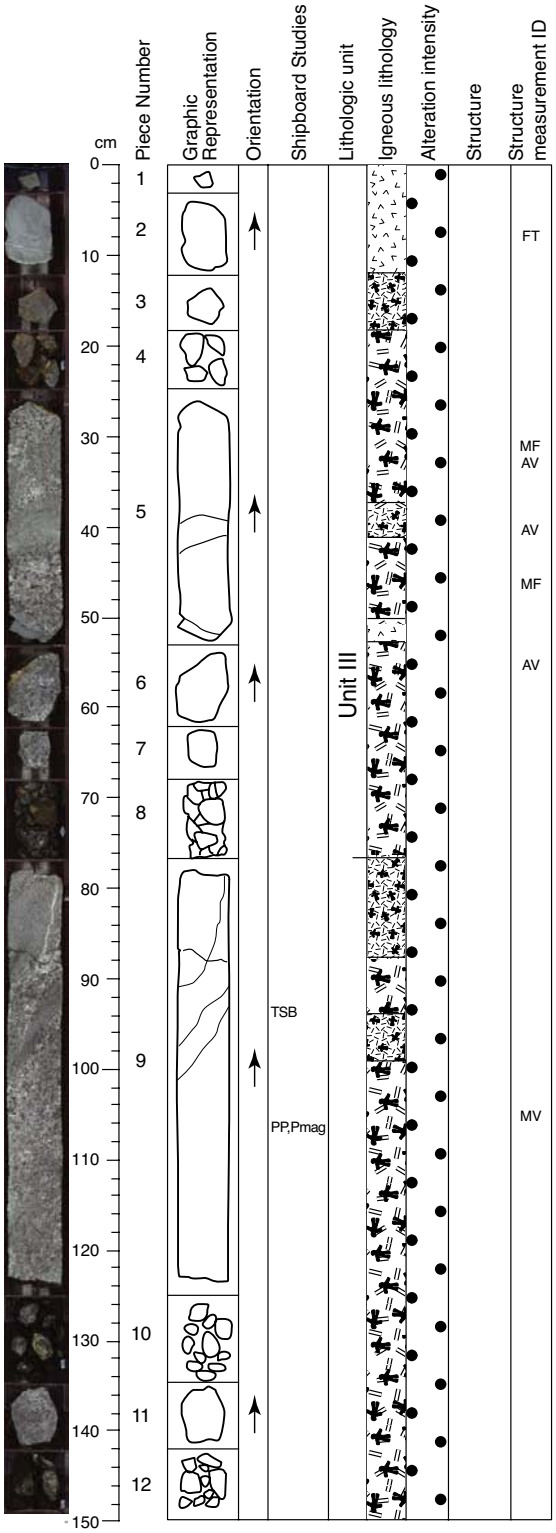
SECONDARY MINERALOGY:
Alteration intensity in this section is 10-30%. Alteration is essentially limited to partial replacement of clinopyroxene by green amphibole. Brown amphibole and secondary plagioclase are rare. Brown staining in Pieces 6-9 suggests minor oxidative alteration. Pieces 10 and 11 are slightly altered diabase. An irregular, sharp contact between diabase and gabbro is present in Piece 12. Here the diabase contains a dislodged gabbro fragment and an irregular shaped chlorite-rich domain resembling a resorbed phenocryst.

METAMORPHIC VEINS:
Pieces 5-12 show red clay-hematite veins (0.2 vol.%). Pieces 1-4 have no veins.

THIN SECTIONS: Sample 1275B-21R-3, 28-30 cm

STRUCTURE:
The section consists of interlayered fine to medium-grained oxide gabbro and coarse grained more leucocratic oxide gabbro. In addition, Pieces 10 and 11are diabases and the top of Piece 12 contains a contact with a diabase, which is strongly chilled. The diabase contact is inclined at 25 degrees in the cut face of the core. Weak layering or banding in the gabbro section is generally defined by grain size changes and changes in the modal percentages of mineral phases, especially variation plagioclase and oxide mineral abundance. There is no mesoscopic evidence of crystal plastic deformation in the section and textures appear igneous. Piece 12 has a low concentration of open fractures. Pieces 5, 7 and 9 are cut by sparse black amphibole veins. Pieces 3 and 4 have chlorite veins utilizing earlier magmatic veins. Pieces 6, 11 and 12 also have chlorite veins.

Core Photo



209-1275B-22R-1 (Section top: 104.0 mbsf)

UNIT-III: OXIDE GABBRO

Pieces 1-12

COLOR: Gray to brownish gray

PRIMARY MINERALOGY:

Plagioclase	Mode 60% Size 0.2-4.5 mm Shape/Habit Euhedral
Pyroxene	Mode 20%-35% Size 0.1-3.5 mm Shape/Habit Subhedral
Oxide	Mode 5%-20%

COMMENTS: This section of core contains a mixture of microgabbro (19%), fine- to medium-grained gabbro (71%), and diabase (10%). Piece 5 has a band of microgabbro but also has microgabbro and fine-grained gabbro mixed into a matrix of medium-grained gabbro. Piece 9 is strongly banded with both abrupt and gradational variations in grain size and a moderately well developed foliation.

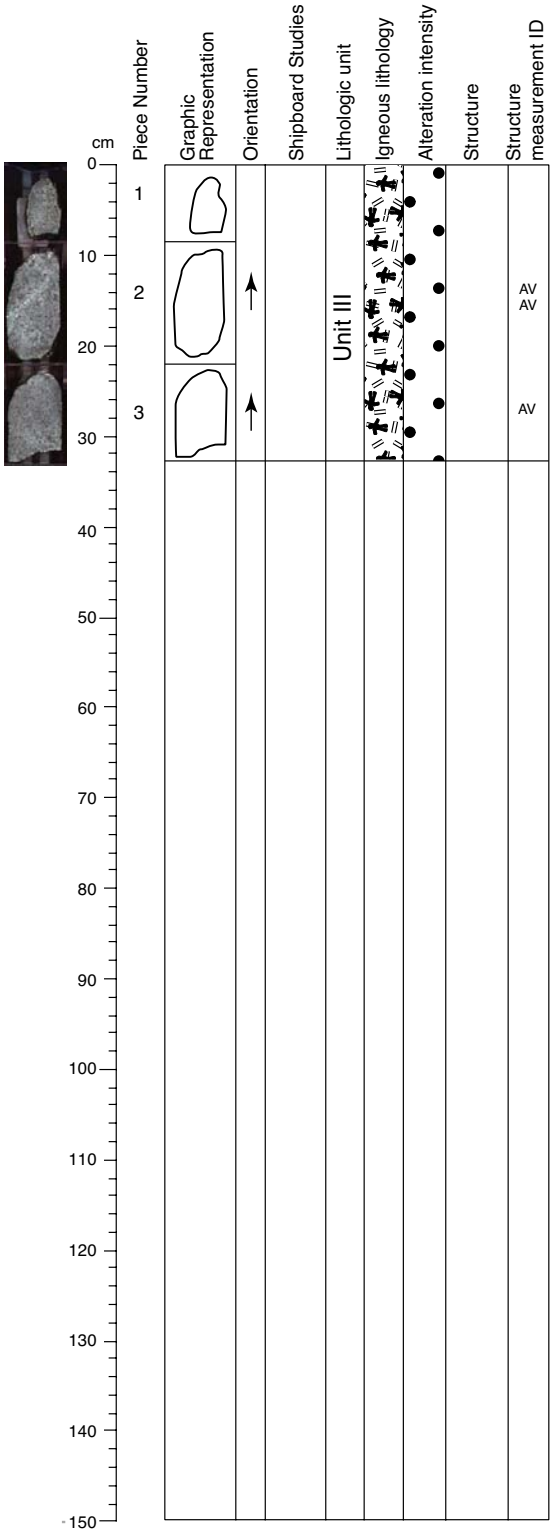
SECONDARY MINERALOGY:
Alteration intensity in this section is 10-35%. Alteration is essentially limited to partial replacement of clinopyroxene by green amphibole. Brown amphibole and secondary plagioclase are rare. Brown staining in Pieces 3, 4, 6, 8, and 10 suggest minor oxidative alteration. Pieces 1 and 2 are slightly to moderately altered (10%) diabase. Piece 9 includes a highly amphibole-chlorite-secondary plagioclase altered felsic vein

METAMORPHIC VEINS:
The diabase in Pieces 1 and 2 has white to green chlorite-zeolite veins. The gabbro in Pieces 3-12 has small amounts of red clay-hematite veins.

THIN SECTIONS: Smaple 1275B-22R-1, 94-100 cm

STRUCTURE:
The section consists of interlayered fine to medium-grained oxide gabbro and coarse grained more leucocratic oxide gabbro. In addition, Pieces 10 and 11are diabases and the top of Piece 12 contains a contact with a diabase, which is strongly chilled. The diabase contact is inclined at 25 degrees in the cut face of the core. Weak layering or banding in the gabbro section is generally defined by grain size changes and changes in the modal percentages of mineral phases, especially variation plagiolcase and oxide mineral abundance. There is no mesoscopic evidence of crystal plastic deformation in the section and textures appear igneous. There is no brittle shear deformation in this section. Pieces 3 and 9 are cut by sparse black amphibole veins and Pieces 2, 5, 6, 8, 10 and 12 are cut by green chlorite Pieces 3 and 9 have sparse black amphibole veins. Pieces 2, 5, 6, 8, 10 and 12 have green chlorite veins. There is no brittle shear deformation in this section.

Core Photo



209-1275B-22R-2 (Section top: 105.5 mbsf)

UNIT-III: OXIDE GABBRO

Pieces 1-3

COLOR: Gray to whitish-green

PRIMARY MINERALOGY:

Plagioclase	Mode 60% Size 0.2-2.5 mm Shape/Habit Euhedral
Pyroxene	Mode 25%-35% Size 0.1-2 mm Shape/Habit Subhedral
Oxide	Mode 5%-10%

COMMENTS: This section of core contains three pieces of gabbro that have no internal contacts. Pieces 1 and 3 are fine-grained and Piece 2 is medium grained.

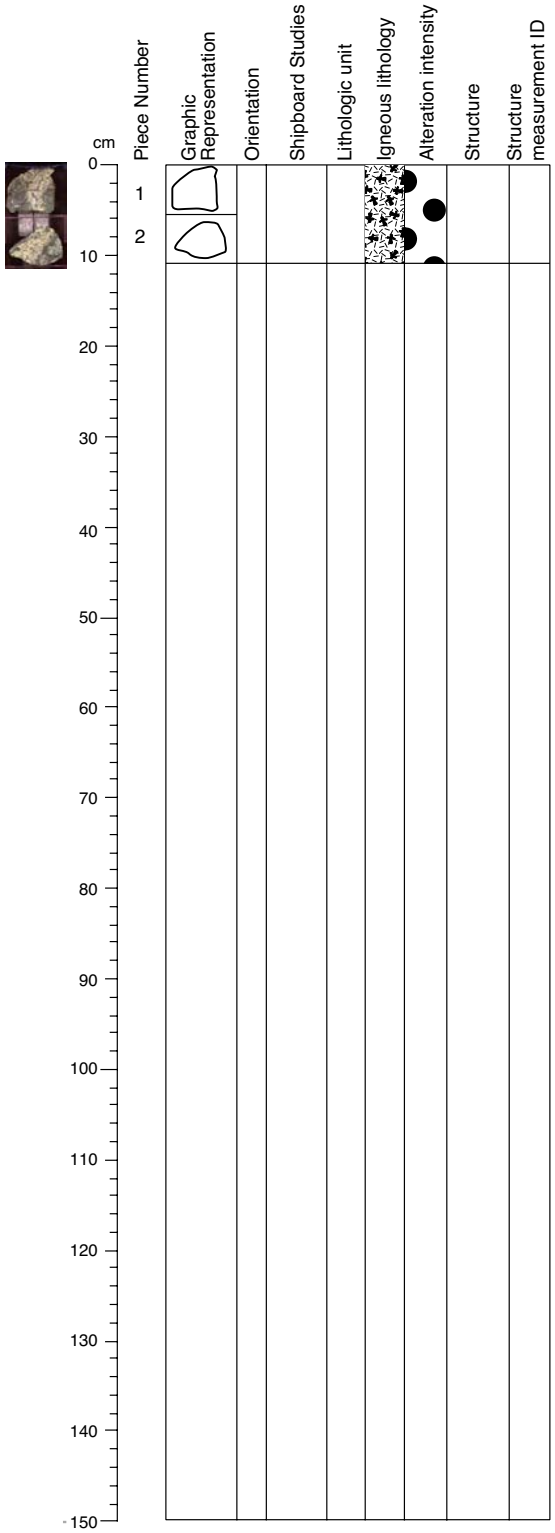
SECONDARY MINERALOGY:
Alteration intensity in this section is 15%, except a highly altered felsic vein in Piece 3. Alteration is essentially limited to partial replacement of clinopyroxene by green amphibole. Brown amphibole and secondary plagioclase are rare.

METAMORPHIC VEINS:
No veins.

STRUCTURE:
The section consists of medium to coarse grained oxide gabbro. There is no evidence of crystal plastic deformation in the section. There is no brittle shear deformation in this section. Piece 1 are cut by small black amphibole veins and Pieces 1-3 are cut by green chlorite veins. The chlorite vein in piece 2 filing an earlier magmatic vein.

1275C-1R No recovery.

Core Photo



209-1275C-2A-1 (Section top: 12.3 mbsf)

UNIT-I: GABBRO/TROCTOLITE

Pieces 1-2

COLOR: Gray

PRIMARY MINERALOGY:

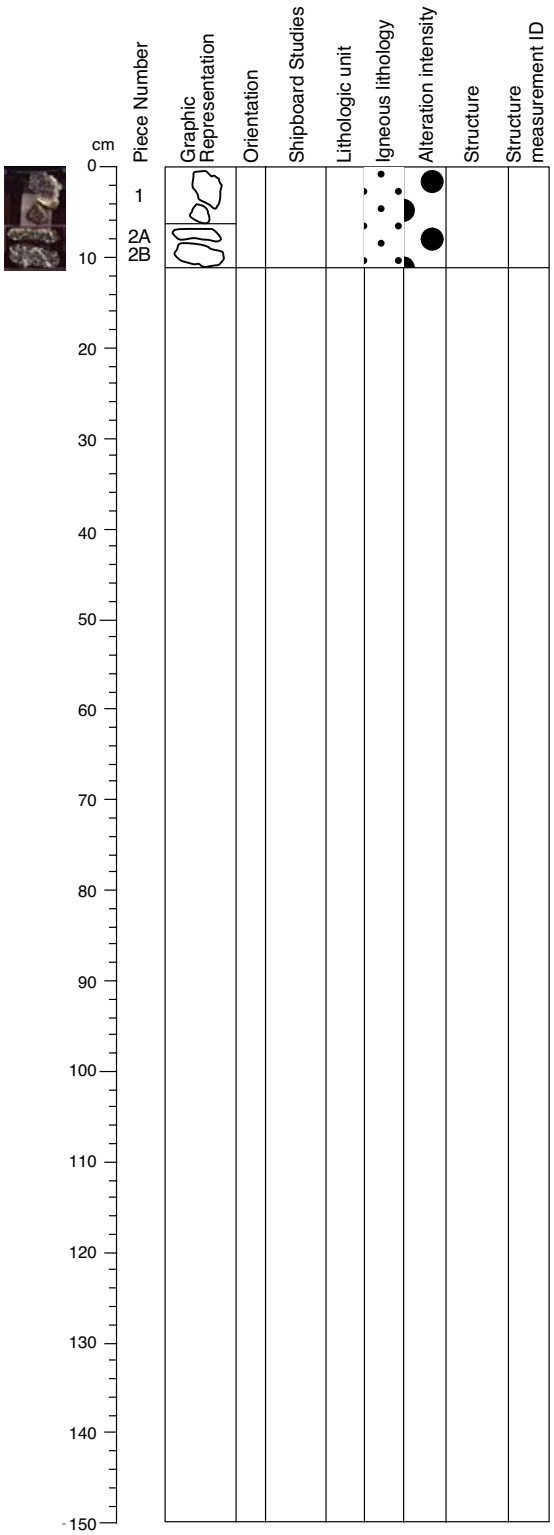
Plagioclase	Mode 60% Size 2-6 mm Shape/Habit Euhedral
Pyroxene	Mode 35% Size 1-2 mm Shape/Habit Subhedral – Euhedral

COMMENTS: This section of the core is composed of altered gabbro and microgabbro. Piece 2 includes completely altered troctolite.

SECONDARY MINERALOGY:
TOTAL ROCK ALTERATION % 80
Highly altered gabbro with amphibole pseudomorphs after pyroxene and fresh plagioclase is surrounded by completely altered (chlorite, amphibole, secondary plagioclase) microgabbro. Piece 2 contains a completely talc-serpentine-amphibole altered troctolite surrounded by microgabbro.

STRUCTURE:
There is no evidence of crystal plastic or brittle shear deformation.

Core Photo



209-1275C-3A-1 (Section top: 16.8 mbsf)

UNIT-I: GABBRO/TROCTOLITE

Pieces 1-2

COLOR: Dark gray

PRIMARY MINERALOGY:

Olivine	Mode 85% Size < 8 mm Shape/Habit Rounded/Equant
Plagioclase	Mode 25% Size 2 mm Shape/Habit Interstitial
Pyroxene	Mode 5 % Size 1-10 mm Shape/Habit Interstitial
Spinel	Mode < 1 Size < 4 mm Shape/Habit anhedral

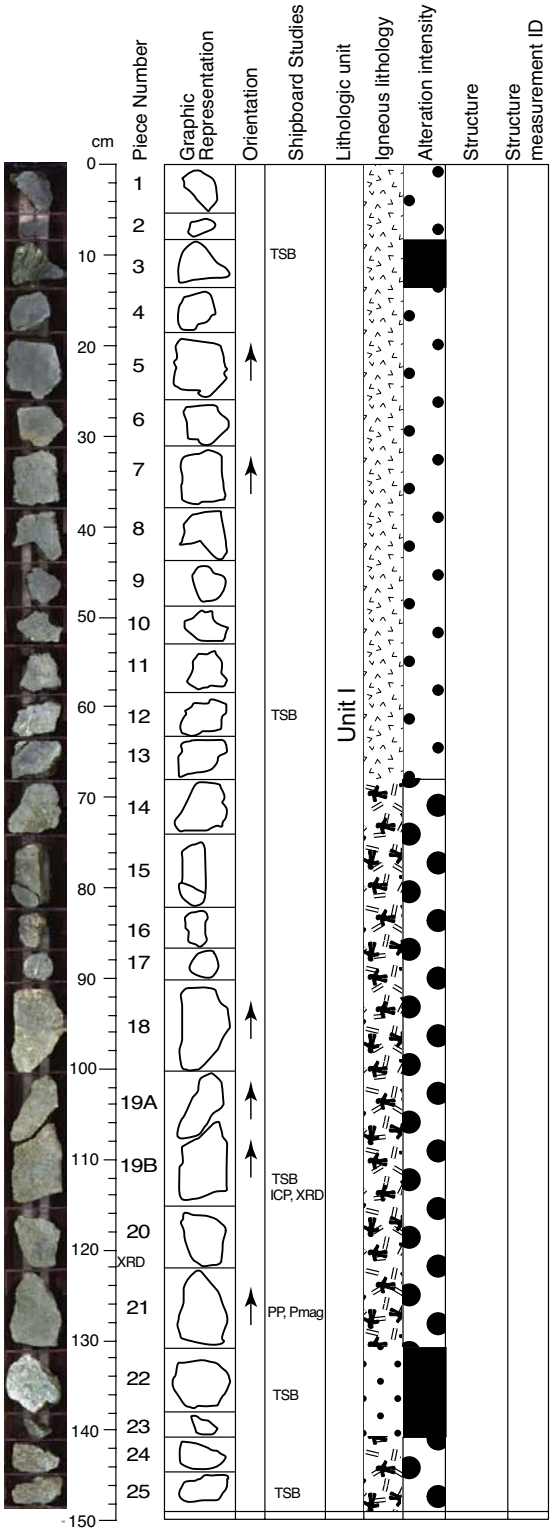
COMMENTS: This section of the core is composed entirely of medium grained troctolite. The olivine is rounded and surrounded by interstitial plagioclase and orthopyroxene.

SECONDARY MINERALOGY:
TOTAL ROCK ALTERATION % 96
Pieces 1 and 2 are serpentinized troctolite with disseminated Fe-oxyhydroxides. Piece 1 contains a domain on one margin consisting of talc, serpentine, amphibole and secondary plagioclase. Piece 2 is intensely veined.

VEINS: Piece 2 contains an irregular network of carbonate veins.

STRUCTURE:
There is no evidence of crystal plastic or brittle shear deformation.

Core Photo



209-1275D-1R-1 (Section top: 0.0 mbsf)

UNIT-I: Troctolite

Pieces 1-21, 24-25

COLOR: Gray to greenish gray

PRIMARY MINERALOGY: DIABASE/GABBRO

Plagioclase	Mode 50% Size < 7 mm Shape/Habit Euhedral
Pyroxene	Mode 50% Size < 6 mm Shape/Habit Subhedral
Oxide	Mode Trace

COMMENTS: This section mainly consists of mafic rocks; aphyric diabase, microgabbro and gabbro. Half of Piece 2 is sheared and altered. Pieces 7-13 are cataclastic diabase. Pieces 14-21 are cataclastic microgabbro and gabbro. Piece 17 consists of a mixture of very fine and midium grained gabbros.

Pieces 22-23

COLOR: Greenish gray

PRIMARY MINERALOGY: TROCTOLITE

Olivine	Mode 60%-75% Size 4 mm Shape/Habit Rounded/Equant
Plagioclase	Mode 25%-40% Size 1-3 mm Shape/Habit Interstitial
Pyroxene	Mode Tr Shape/Habit Interstitial
Oxide	Mode 0%-1%

COMMENTS: These two pieces are highly altered and deformed mixture of troctolite and small amount of gabbro. In the troctolite, there are interstitial orthopyroxene, clinopyroxene, amphibole, and plagioclase.

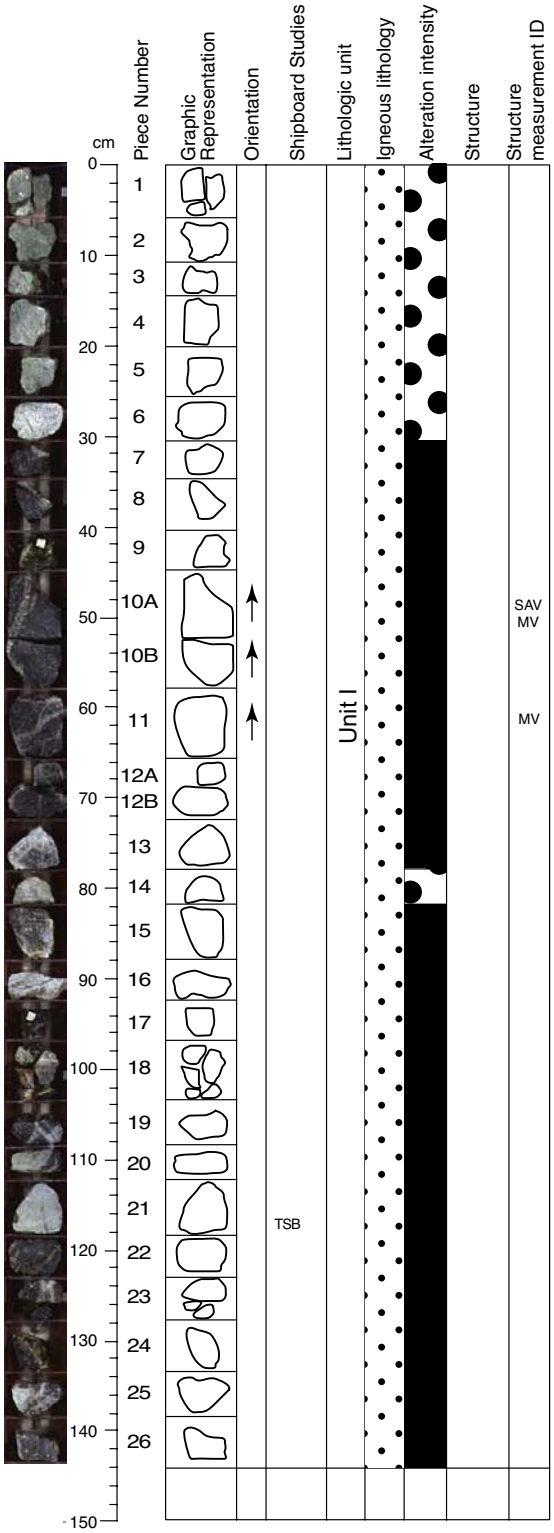
SECONDARY MINERALOGY:
This section consists mainly of moderately altered diabase (Pieces 1-13) and highly altered gabbro (Pieces 14-21 and 24-25). Piece 3 contains a schistous band consisting of talc, amphibole, and chlorite. The diabase shows a increase in alteration from Pieces 6 to 13 which correlates with an increasing proportion of gabbro within the diabase. The highly altered gabbro contains moderately altered fragments of diabase. Pieces 22 and 23 are completely altered troctolites and contain mainly chlorite and minor serpentine.

METAMOPHIC VEINS:
The diabase of this section (Pieces 1-13) has about 3 Vol.% of chlorite veins that form a vein network and are used by later, brown clay-oxide veins. Pieces 11-13 have 5 Vol.% chlorite veins and quartz veins parallel to crosscutting dikelets. Pieces 14-21 have no veins in the micrograbbro, but diabase clasts show minor chlorite veining. Pieces 22-23 host whitish-green talc veins (1 Vol.%). Pieces 24-25 show a network of brown clay-oxide veinlets.

THIN SECTIONS: Samples 1275D-1R-1, 9-11 cm, 1275D-1R-1, 60-62 cm, 1275D-1R-1, 110-113 cm, 1275D-1R-1, 133-136 cm, and, 1275D-1R-1, 146-148 cm

STRUCTURE:
The section consists of dominantly altered diabase (Pieces 1–24 and 25-27) and gabbro (Piece 25) deformed under brittle conditions. There is an unusually high degree of brittle deformation throughout the entire section of core. Pieces 1 and 2 have high concentrations of shear fractures filled with green amphibole and/or chlorite. Pieces 4, 5, 6 and 9 have low concentrations of shear fractures filled with green amphibole and/or chlorite. Pieces 7, 8, 14 and 15 have high concentrations of randomly oriented, green amphibole and/or chlorite-filled shear fractures with incipient brecciation in some locations. Pieces 10-13, 18-20, 21, 24 and 25 are proto-cataclastic breccias in which diabase or plagioclase and green amphibibole within gabbro are strongly fractured within a matrix of green amphibole and/or chlorite. Pieces 22 and 23 contain zones of semi-brittle deformation along schistose chlorite and/or serecite veins. Pieces 16 and 17 have a slight semi-brittle overprint of ductile deformation along chlorite veins. Pieces 1-13 have thin (<0.2mm) chlorite veins in diabase, which have been utilized by later oxide-red clay veins (especially in pieces 4-6). Pieces 14-16 have minor chlorite plus oxide-red clay veining. Pieces 22-23 are cut by green-white talc-serpentine veins. Pieces 24 and 25 are cut by chlorite/red clay-oxide veins. Overall the section records a history of strong cataclastis near the top of the hole.

Core Photo



209-1275D-1R-2 (Section top: 1.49 mbsf)

UNIT-I: Troctolite

Pieces 1-26

COLOR: Greenish-gray to grayish-black and red

PRIMARY MINERALOGY: TROCTOLITE

Olivine	Mode 70%-95%
	Size < 8 mm
	Shape/Habit Subhedral
Plagioclase	Mode 5%-10%
	Size < 7 mm
	Shape/Habit Interstitial
Pyroxene	Mode 5%-10%
	Size < 6 mm
	Shape/Habit Interstitial
Opaque	Mode < 1 %

COMMENTS: This section consists of troctolite or troctolitic dunite with pyroxenes. Pyroxenes and plagioclase are interstitial or poikilitc between subhedral olivine grains. The troctolite is intruded by gabbroic material at the top of the section (0-30 cm). The mineralogy of the gabbroic material cannot be determined because of severe alteration. Pieces 1-5 are mixture of gabbroic matrix and troctolite xenoliths. Euhedral opaque, possibly spinel, is commonly included in olivine.

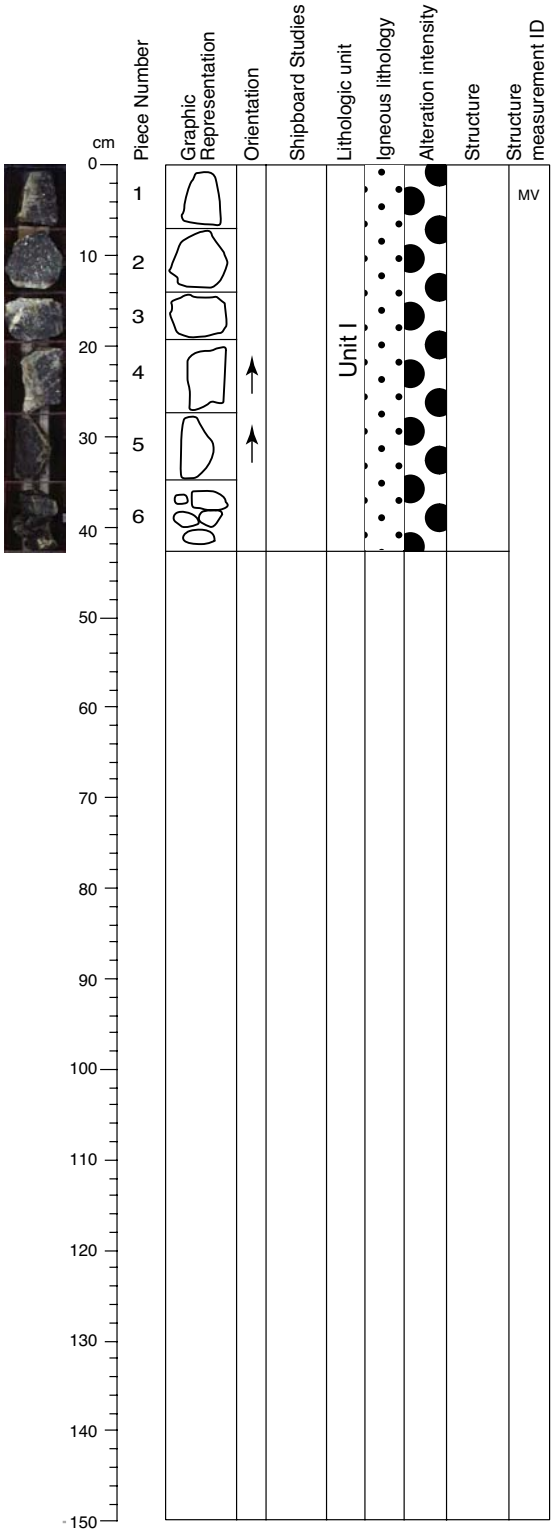
SECONDARY MINERALOGY:
The upper 6 pieces and Piece 14 are green gray, highly talc-altered troctolite. The black to gray troctolites of Pieces 7 to 12 consists of serpentine, talc, and magnetite after olivine and chlorite after plagioclase. Pieces 13,15-20 and 22-26 are intruded by completely talc-chlorite-amphibole altered magmatic veins with rusty red patches of former olivine in the vein halos. Piece 21 is a completely altered gabbro.

METAMORPHIC VEINS:
Pieces 1-6 and 20-21 have 2 vol.% of light green talc-chlorite veins. Pieces 7-9 show minor dark green to black picrolite veins as cross fractures to magmatic veins. Pieces 22-26 host small, green to black picrolite veins and rare carbonate veinlets.

THIN SECTIONS: Sample 1275D-1R-2, 116-118 cm

STRUCTURE:
The section consists of highly altered troctolite, feldspathic dunite, feldspathic wehrlite and locally dunite intruded by multiple veins of gabbroic compositions. The gabbroic veins are highly altered. Olivine accounts for most of the rock and tends to be subrounded to ovoid with no shape-preferred dimensional orientation. There are variable amounts of interstitial phases between olivine resulting in patchy distributions of the rock types listed above even within a single piece. Interstitial areas between olivine contain altered plagioclase and/or pyroxene and the texture appears igneous and sometimes poikilitic, with either plagioclase or pyroxene as the oikocrystic phase. Olivine grain size can reach as large as 1 cm and it has clearly not undergone dynamic recrystallization until statically overprinted by alteration phases. There is no mesoscopic evidence of crystal plastic deformation. The section is, however, affected by brittle deformation. Pieces 1, 2, 19 and 20 are protocataclastic breccias in which plagioclase and green amphibibole are strongly fractured within a matrix of green amphibole and/or chlorite. Pieces 3- 6, 16, and 21-26 contain zones of semi-brittle deformation along schistose chlorite veins. Slickenfibers are present along one exposed vein face at the base of Piece 26. Pieces 1-6 are highly altered with talc-serpentine veins. Piece 5 has folded talc-serpentine veins. Pieces 9 and 12 show orthogonal serpentine-chlorite/oxide veins filling orthogonal fractures to magmatic veins. Pieces 15 and 16 have deformed green chlorite veins cut by later red-clay oxide veins. Chlorite veins cut Pieces 21-24. Pieces 25 and 26 are cut by two generations of picrolite veins.

Core Photo



209-1275D-1R-3 (Section top: 2.93 mbsf)

UNIT-I: Troctolite

Pieces 1-6

COLOR: Black to gray and red

PRIMARY MINERALOGY:

Olivine	Mode 70%-95%
	Size < 8 mm
	Shape/Habit Subhedral
Plagioclase	Mode 5%-10%
	Size < 7 mm
	Shape/Habit Interstitial
Pyroxene	Mode 5%-10%
	Size < 6 mm
	Shape/Habit Interstitial
Opaque	Mode < 1 %

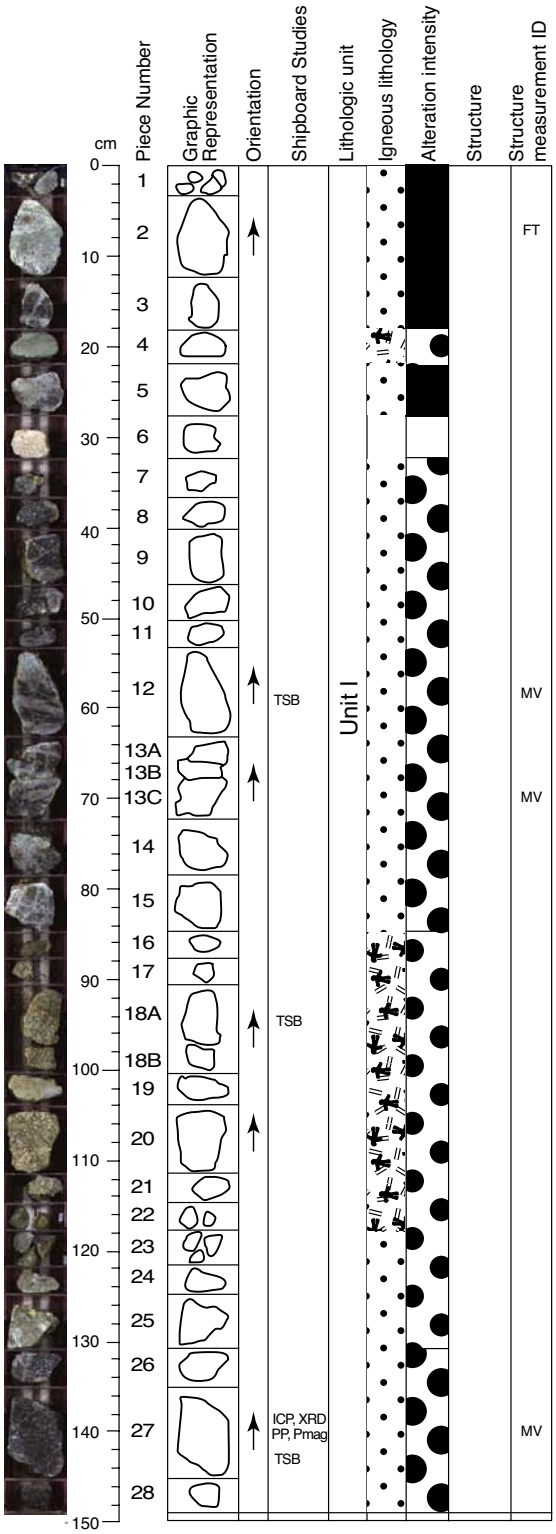
COMMENTS: This section consists of troctolite or troctolitic dunite with pyroxenes. Gabbro dikes intrude the troctolite in Piece 6.

SECONDARY MINERALOGY:
Troctolites in this section are highly altered to talc, serpentine, chlorite, and magnetite and intruded by completely talc-chlorite-amphibole altered magmatic veins with rusty red patches of former olivine in the vein halos.

METAMORPHIC VEINS:
This section shows minor green to black picrolite veining and crosscutting carbonate veins that make up about 0.2 vol.% of the core.

STRUCTURE:
The section consists of highly altered troctolite, feldspathic dunite, feldspathic wehrlite and locally dunite intruded by multiple veins of gabbroic compositions. The gabbroic veins are highly altered. Olivine is abundant and tends to be subrounded to ovoid with no shape-preferred dimensional orientation. There are variable amounts of interstitial phases resulting in patchy distributions of the rock types listed above even within a single piece. Interstitial areas between olivine contain altered plagioclase and/or pyroxene and the texture appears igneous and sometimes poikilitic, with either plagioclase or pyroxene as the oikocrystic phase. Olivine grain size can reach as large as 1 cm and olivine has clearly not undergone grain size reduction by high temperature dynamic recrystallization. Olivine has been statically overprinted by alteration phases. The contribution to the interstitial phases made by the crosscutting gabbroic veins is not clear and some seem to cleanly cut across pieces. There is no mesoscopic evidence of crystal plastic deformation. Pieces 1-6 contain minor green serpentine veins. Slickenfibers are visible on fractured surfaces. Carbonate filled orthogonal fractures cut Pieces 1, 4 and 6.

Core Photo



209-1275D-2R-1 (Section top: 8.00 mbsf)

UNIT-I: Troctolite

Pieces 1-3, 5, 7-15, 23-28

COLOR: Greenish-gray

PRIMARY MINERALOGY: OLIVINE GABBRO AND TROCTOLITE

Olivine	Mode 70%-95%
	Size < 8 mm
	Shape/Habit Subhedral
Plagioclase	Mode 5%-10%
	Size < 7 mm
	Shape/Habit Interstitial
Pyroxene	Mode 5%-10%
	Size < 6 mm
	Shape/Habit Interestitial
Opaque	Mode < 1 %

COMMENTS: This section consists of troctolite or troctolitic dunite with pyroxenes, intruded by gabbro, and by gabbro including troctolite xenoliths. Pieces 2 is deformed and highly altered.

Pieces 4, 16-22

COLOR: Green to gray and beige

PRIMARY MINERALOGY: DIABASE, GABBRO AND MICROGABBRO

Plagioclase	Mode 50%
	Size < 7 mm
	Shape/Habit Euhedral
Pyroxene	Mode 50%
	Size < 6 mm
	Shape/Habit Subhedral
Oxide	Mode tr

COMMENTS: These pieces are mafic rocks: aphyric diabase, microgabbro and gabbro.

Piece 6

COLOR: Beige

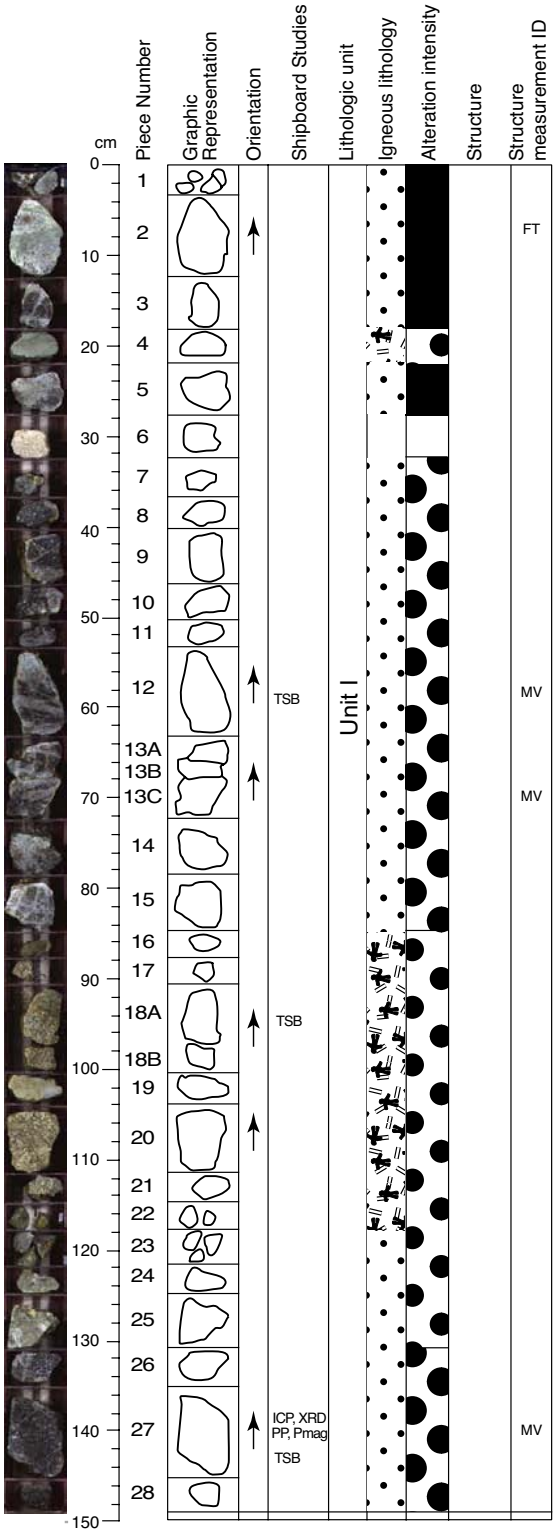
PRIMARY MINERALOGY: LIMESTONE
COMMENTS: Piece 6 is a small piece of fossiliferous limestone and likely is not recovered in place.

SECONDARY MINERALOGY:
This section consists mainly of very highly to completely altered troctolite and a 46 cm wide interval of a gabbro diabase breccia. Pieces 1 and 2 are gray greenish troctolite. Gabbro (Pieces 4 and 16-22) is highly to very highly altered to amphibole, chlorite, and secondary plagioclase. Where cut by magmatic veins troctolite of Pieces 8 to 15 show red rusty olivine alteration which is concentrated especially around the black serpentinized areas in contact to the gray intrusion areas. This is due to the fact that some olivine is usually preserved in proximity to the magmatic veins and is subsequently affected by low-temperature oxidative alteration. The lowest part of the section is troctolite which contains a few percent of fresh olivine and orthopyroxene. The gray domains of the troctolite are strongly talc altered.

METAMORPHIC VEINS:
Pieces 1-2 have about 1 vol.% of light green talc-chlorite veins. Pieces 3-5 host green to black picrolite veins (1 vol.%) and minor brown clay-oxide veinlets. Pieces 7-11 have white picrolite veins with traces of coarse magnetite and composite green and white picrolite-chrysotile veins (1 vol.%). Piece 12 shows greenish-white talc veins and black picrolite-magnetite veins (2 vol.% each). Pieces 13-15 and 23-26 show green to black picrolite veins. Pieces 16-22 have no veins.

THIN SECTIONS: Samples 1275D-2R-1, 59-62 cm, 1275D-2R-1, 93-96 cm, and 1275D-2R-1, 142-144 cm

Core Photo



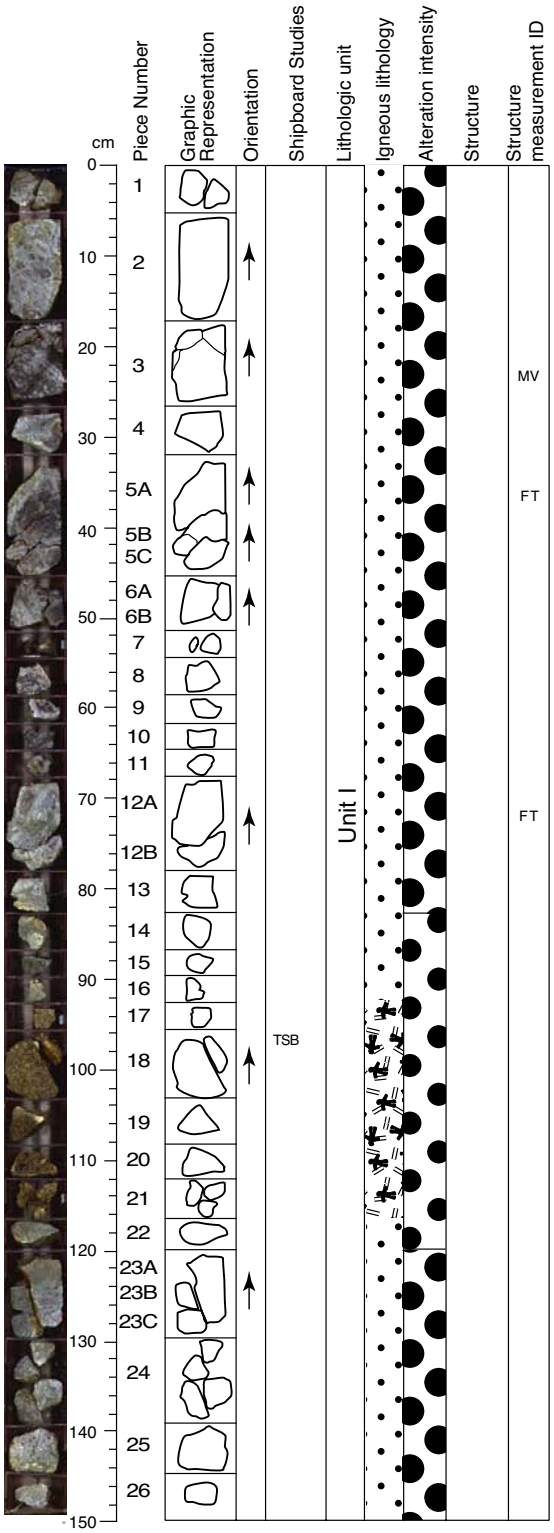
209-1275D-2R-1 (Section top: 8.00 mbsf)

Continued from previous page.

UNIT-I: Troctolite

STRUCTURE:
The section consists of highly altered troctolite, feldspathic dunite, feldspathic wehrlite, and locally dunite intruded by multiple veins of gabbroic composition. It also contains a lithified pelagic limestone (Piece 6), diabase (Piece 5) and pieces of gabbro that are similar to the gabbroic veins within troctolitic and related ultramafic rocks. The gabbroic veins are highly altered. Olivine accounts for most of the rock and tends to be subrounded to ovoid with no shape-preferred dimensional orientation. There are variable amounts of interstitial phases resulting in patchy distributions of the rock types listed above even within a single piece. Interstitial areas between olivine contain altered plagioclase and/or pyroxene and the texture appears igneous and sometimes poikilitic, with either plagioclase or pyroxene as the oikocrystic phase. Olivine grain size can reach as large as 1 cm and it has clearly not undergone dynamic recrystallization. It has been statically overprinted by alteration phases. The contribution to the interstitial phases made by the crosscutting gabbroic veins is not clear and some seem to cleanly cut across pieces. There is no mesoscopic evidence of high temperature crystal plastic deformation of the primary phases. Pieces 1, 2 and 5 are cut by zones of cataclasite with a green amphibole matrix. Pieces 3 and 5 contain semi-brittle shear zones with schistose chlorite. Pieces 7 through 15 contain schistose chlorite semi-brittle shear zones that follow magmatic veins; slickenfibers are visible on some faces. Pieces 16 through 25 contain zones of proto-cataclastic breccia with green amphibole along fracture planes and forming matrix in some locations. Pieces 3, 9, 10 and 15 have serpentine and oxide veins filling fractures that crosscut magmatic veins. Pieces 1-3 are cut by chlorite veins after magmatic veins. Pieces 5, 14 and 15 have serpentine veins. Piece 12 is cut both by serpentine and talc veins replacing the magmatic veins, but the serpentine veins are offset by a brittle fault. Pieces 24-28 are cut by black picolite veins.

Core Photo



209-1275D-2R-2 (Section top: 9.49 mbsf)

UNIT-I: Troctolite

Pieces 1-26

COLOR: Greenish gray and gray to black

PRIMARY MINERALOGY: TROCTOLITE AND OLIVINE GABBRO

Olivine	Mode 70%-95% Size < 8 mm Shape/Habit Subhedral
Plagioclase	Mode 5%-10% Size < 7 mm Shape/Habit Interstitial
Pyroxene	Mode 5%-10% Size < 6 mm Shape/Habit Interstitial
Opaque	Mode < 1 %

COMMENTS: This section consists of troctolite or troctolitic dunite with pyroxenes. Pyroxenes and plagioclase are interstitial between, or poikilitically enclosing, subhedral olivine grains. The troctolite is intruded by gabbroic material. The mineralogy of the gabbroic material cannot be determined because of severe alteration. Piece 28 contains a contact between troctolite and gabbro.

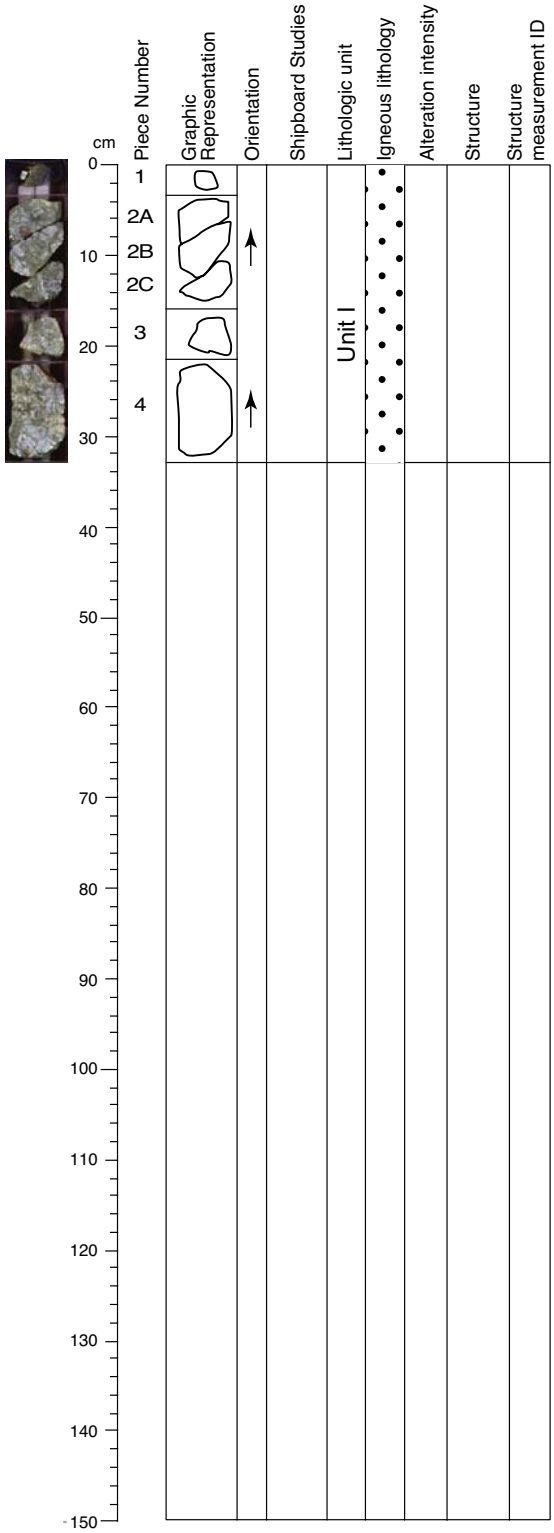
SECONDARY MINERALOGY:
This section is composed of gray black highly to completely altered troctolite which hosts highly chlorite-amphibole altered greenish microgabbro. The center of this gabbro unit is coarser grained and show less intense alteration. The gray domains of the troctolite are highly talc-altered. Piece 3 has noticeable amounts of fresh olivine.

METAMORPHIC VEINS:
Pieces 1-10 have a network of black amphibole-chlorite veins that makes up 2 vol.% of the core. These veins are used by later, brown clay-oxide veins. Pieces 11-22 also show black amphibole-chlorite veins (0.5-1 vol.%) that are cut by cream-colored carbonate-clay veins (0.5 vol.%) in Pieces 11-12. Pieces 23-26 have no veins.

THIN SECTIONS: Sample 1275D-2R-2, 97-100 cm

STRUCTURE:
The section consists of highly altered troctolite, feldspathic dunite, feldspathic wehrlite and locally dunite intruded by multiple veins of gabbroic composition. Pieces of gabbro that are similar to the gabbroic vein material intruding troctolite and related ultramafic rocks are also present and commonly enclose troctolitic or associated ultramafic rocks, e.g. dunite, as xenoliths. The gabbroic veins are highly altered. These gabbroic rocks were probably part of a net vein breccia. Olivine is the most abundant phase in most of the troctolitic and ultramafic rocks and tends to be subrounded to ovoid with no shape-preferred dimensional orientation. There are variable amounts of interstitial phases resulting in patchy distributions of the rock types listed above even within a single piece. Interstitial areas between olivine contain altered plagioclase and/or pyroxene and the texture appears igneous and sometimes poikolitic, with either plagioclase or pyroxene as the oikocrystic phase surrounding olivine. Olivine grain size is well defined by the interstitial material and can reach as large as 1 cm. It has clearly not undergone dynamic recrystallization. It has been overprinted statically by alteration phases. The contribution to the interstitial phases made by the crosscutting gabbroic veins is not clear and some seem to cut cleanly across pieces. Other veins appear to have gradational boundaries with the adjacent troctolitic and ultramafic rocks they invade. There is no mesoscopic evidence of high temperature crystal plastic deformation of the primary phases. Pieces 1 and 2 contain zones of protocataclasite breccia with green amphibole along fracture planes and forming matrix in some locations. Piece 3 contains high concentrations of shear fractures. Pieces 4, 5, 12-15, and 22-26 are cut by branching zones of green amphibole matrix cataclasite. Pieces 16 through 21 are gabbros cut by numerous shear fractures with incipient brecciation. Piece 8 contains a semi-brittle shear zone along a chlorite vein with slickenfibers. Pieces 6 and 9 contain high concentrations of shear fractures filled with green amphibole. Pieces 7, 10 and 11 are cut by minor shear fractures filled with green amphibole. Pieces 1-13 contain green-black amphibole veins and rare late red clay-oxide-carbonate veins. Pieces 18 and 19 are cut by fine black amphibole veins cut by carbonate veins.

Core Photo



209-1275D-2R-3 (Section top: 10.98 mbsf)

UNIT-I: Troctolite

Pieces 1-4

COLOR: Gray to green

PRIMARY MINERALOGY: OLIVINE GABBRO

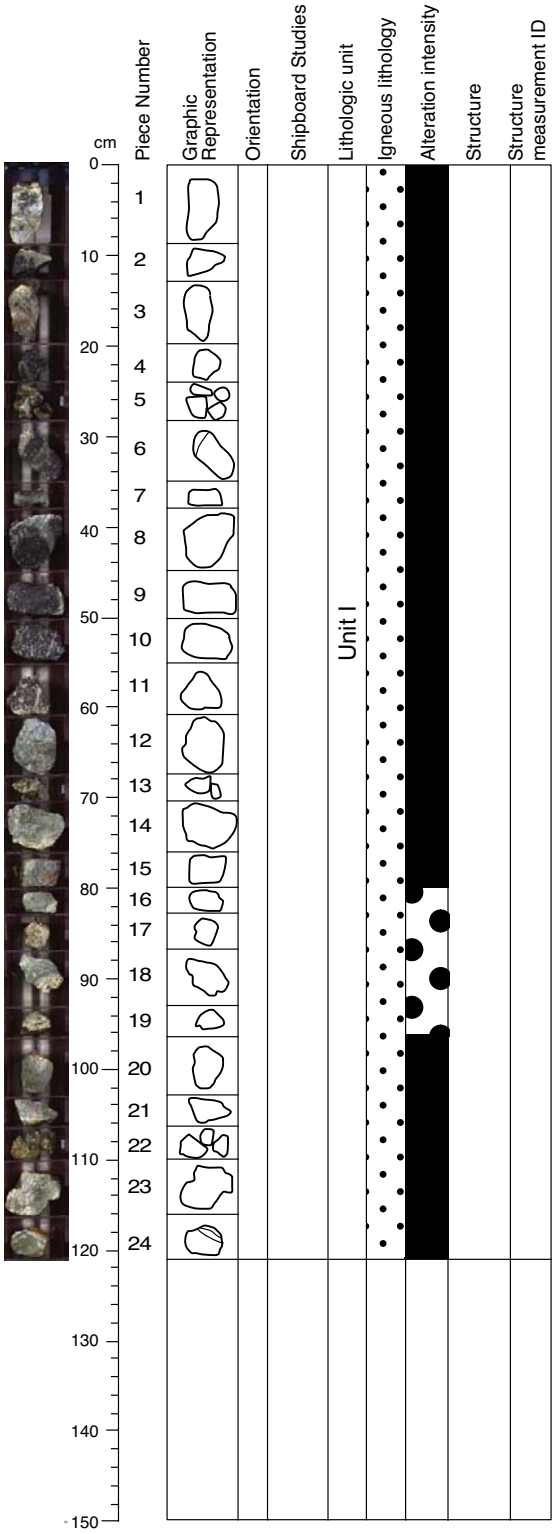
COMMENTS: The samples in this short section have been too highly altered to distinguish primary lithology. On the basis of texture it can be inferred as troctolite (pieces 1, 3, 4) and gabbro in contact with troctolite (Piece 2).

SECONDARY MINERALOGY:
This section consists of an intrusive breccia of completely altered troctolite clasts in a matrix of highly altered gabbro. Troctolite have red oxidation patches, in which olivine is altered to clay, Fe-oxyhydroxide, and carbonate. Plagioclase in the troctolite is completely altered to chlorite. In the gabbro, clinopyroxene is completely replaced by amphibole and plagioclase is moderately altered to secondary plagioclase and chlorite.

METAMORPHIC VEINS:
Black amphibole-chlorite veins make up about 1 vol.% of the core in this section. There are rare, white carbonate veinlets.

STRUCTURE:
The section largely consist of highly altered gabbro which has invaded dunites or troctolitic rocks similar to those in the previous sections. The gabbroic material encloses clasts of these lithologies as xenoliths and xenoliths appear reactive with the melt. Many of the xenoliths within gabbros are dunitic rather than troctolitic (e.g., Piece 4). There is no mesoscopic evidence of high temperature crystal plastic deformation of the primary phases. Pieces 1 through 4 contain branching bands of green amphibole matrix cataclasite. Black amphibole-chlorite veins occur within magmatic veins. Late carbonate red clay-oxide veins cut the earlier amphibole veins.

Core Photo



209-1275D-3R-1 (Section top: 13.0 mbsf)

UNIT-I: Troctolite

Pieces 1-24

COLOR: Gray and green with black and red domains

PRIMARY MINERALOGY: OLIVINE GABBRO AND TROCTOLITE

Olivine	Mode 70%-95%
	Size < 8 mm
	Shape/Habit Subhedral
Plagioclase	Mode 5%-10%
	Size < 7 mm
	Shape/Habit Interstitial
Pyroxene	Mode 5%-10%
	Size < 6 mm
	Shape/Habit Interstitial
Opaque	Mode < 1 %

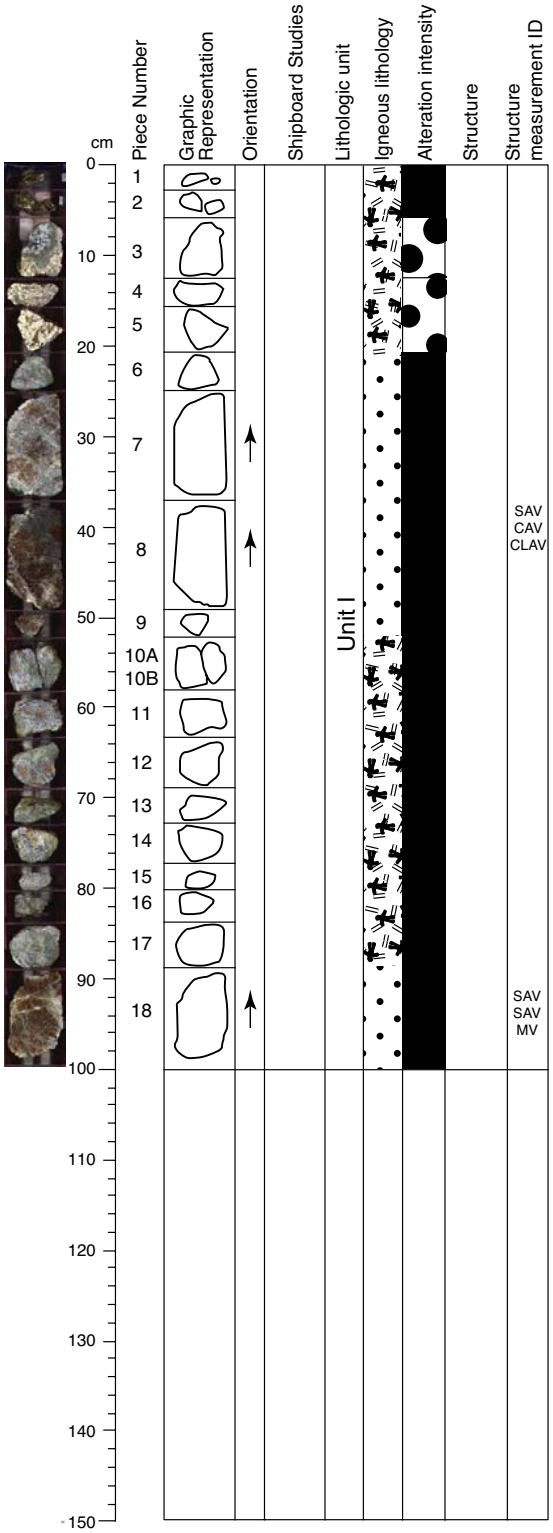
COMMENTS: This section consists of troctolite or troctolitic dunite with pyroxenes (Pieces 1-17). These rocks are intruded by gabbroic material in Pieces 1-3 and 12-24. Pieces 18-24 are gabbro, with medium grained texture. The gabbros are too altered to estimate modal proportions.

SECONDARY MINERALOGY:
Completely altered troctolitic rocks in this section are intruded by highly altered gabbro. Troctolites are altered to serpentine and magnetite (after olivine) and chlorite (after plagioclase). Near the contacts to the gabbro, troctolites are predominantly talc-altered. While this local talc-alteration is most pronounced in Pieces 1-3, Pieces 4-11 show relict fresh olivine near the contact to gabbro. Pieces 12-24 show pervasive and complete talc-alteration.

METAMORPHIC VEINS:
Pieces 1-11 have white to cream picrolite veins (2 vol.%) that are cut by a fine network of gray carbonate-clay veins (1 vol.%). Pieces 12-24 show only very minor veining by tiny black amphibole veins and crosscutting red clay-oxide veinlets.

STRUCTURE:
The section consists of highly altered troctolite, feldspathic dunite, feldspathic wehrlite and locally dunite, all intruded by multiple veins of gabbroic composition. Some pieces consist mostly of the invading gabbro with lesser troctolitic or ultramafic enclaves or xenoltihs (e.g., Piece 15). The gabbroic veins are highly altered. Altered olivine is the most abundant phase in the rock in Pieces 1-12 and tends to be subrounded to ovoid with no shape-preferred dimensional orientation. There are variable amounts of interstitial phases resulting in patchy distributions of the rock types listed above even within a single piece. Interstitial areas between olivine contain altered plagioclase and/or pyroxene and the texture appears igneous and sometimes poikilitic, with either plagioclase or pyroxene as the oikocrystic phase enclosing olivine. Olivine grain size can reach as large as 1 cm and the olivines have clearly not undergone grain size reduction by high temperature dynamic recrystallization. Olivine has been statically overprinted by alteration phases. The contribution to the interstitial phases made by the crosscutting gabbroic veins is not clear and some seem to cleanly cut across pieces. In other cases the vein material is clearly invasive into the more ultramafic parts of the rock and the gabbroic melt appears to have been reactive with the wall rock or the enclosed xenolith. There is no mesoscopic evidence of high temperature crystal plastic deformation. Pieces 1 through 11 contain schistose chlorite veins that have accommodated moderate to minor degrees of semi-brittle strain. Some exposed vein faces contain slickenfibers. Pieces 12-16 and 20-24 contain branching zones of green amphibole matrix cataclasite. Piece 13 contains a moderate degree of shear fracturing. Thin, late carbonate veins cut the chlorite veins in Pieces 1-11. Pieces 12-24 are highly altered with anastomosing amphibole veins and late cross cutting, thin clay-oxide veins.

Core Photo



209-1275D-4R-1 (Section top: 17.6 mbsf)

UNIT-I: Troctolite

Pieces 1-18

COLOR: Gray to light green and red

PRIMARY MINERALOGY: OLIVINE GABBRO AND TROCTOLITE

Olivine	Mode 70%-95%
	Size < 8 mm
	Shape/Habit Subhedral
Plagioclase	Mode 5%-10%
	Size < 7 mm
	Shape/Habit Interstitial
Pyroxene	Mode 5%-10%
	Size < 6 mm
	Shape/Habit Interstitial
Opaque	Mode < 1 %

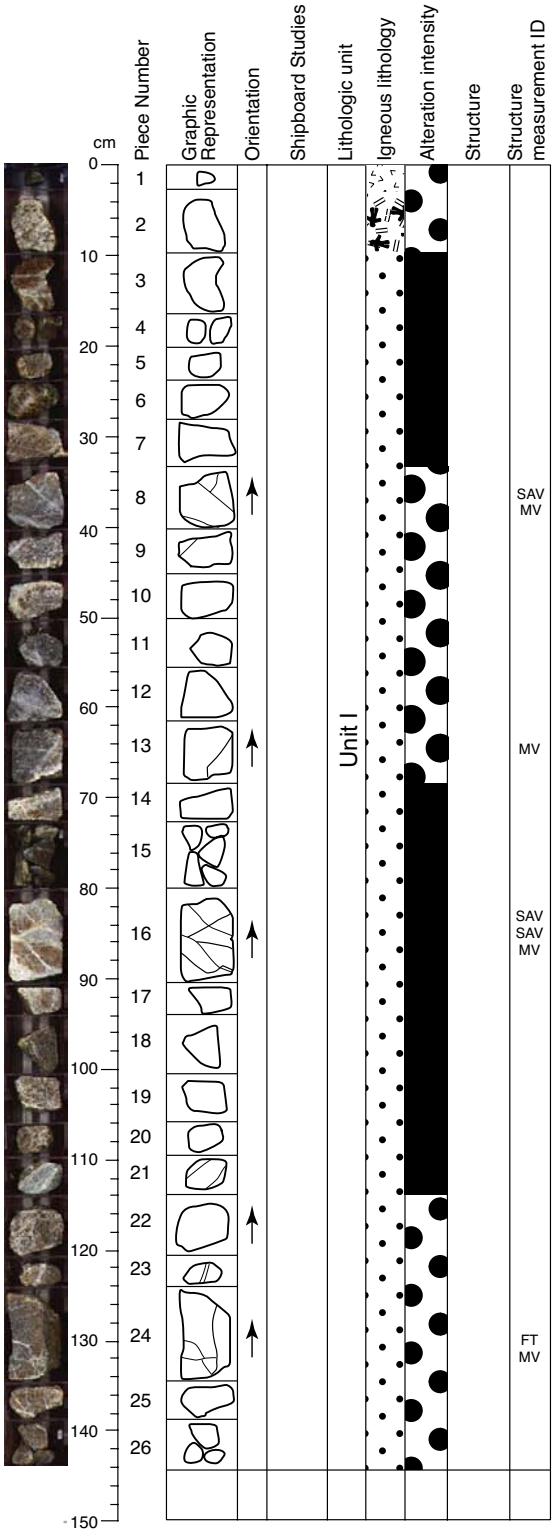
COMMENTS: This section consists of highly altered troctolite or troctolitic dunite with pyroxenes, intruded by gabbroic material. Pieces 3-5 are highly altered, medium grained gabbros, including troctolite xenoliths.

SECONDARY MINERALOGY:
Completely altered troctolitic rocks in this section are intruded by highly altered coarse-grained gabbro and completely altered fine-grained gabbro. Troctolites are variably altered to talc and/or iddingsite. Orthopyroxene in the troctolites is altered to amphibole, plagioclase is altered to chlorite. The fine-grained gabbro is completely amphibolized. The coarse-grained gabbro has abundant fresh plagioclase.

METAMORPHIC VEINS:
Pieces 1-5 have rare red clay-oxide veinlets. Pieces 6-9 and 18 show significant veining by green picrolite-talc veins and a fine network of gray carbonate-clay veins (each about 2 vol.% of the core). Pieces 10-17 have amphibole-chlorite veins.

STRUCTURE:
The section consists of highly altered troctolite, feldspathic dunite, feldspathic wehrlite and locally dunite, all intruded by multiple veins of gabbroic composition. Some pieces consist mostly of the invading gabbro with lesser troctolitic or ultramafic enclaves or xenoliths (e.g., Piece 15). Altered olivine accounts for the bulk of the rock in Pieces 1-12 and tends to be subrounded to ovoid with no shape-preferred dimensional orientation. There are variable amounts of interstitial phases resulting in patchy distributions of the rock types listed above even within a single piece. Interstitial areas between olivine contain altered plagioclase and/or pyroxene and the texture appears igneous and sometimes poikilitic, with either plagioclase or pyroxene as the oikocrystic phase enclosing olivine. In some samples (Pieces 7, 8 and 18) the rock invaded by gabbro is largely dunite with no interstitial phases between olivine grains. Olivine grain size can reach as large as 1 cm and it has clearly not undergone grain size reduction by high temperature dynamic recrystallization. Olivine has been statically overprinted by alteration phases preserving original textures. The contribution to the interstitial phases made by the crosscutting gabbroic veins is not clear and some seem to cleanly cut across pieces. In other cases the vein material is clearly invasive into the more ultramafic parts of the rock and the gabbroic melt appears to have been reactive with the wall rock or the enclosed xenolith. There is no mesoscopic evidence of high temperature crystal plastic deformation of the primary phases. Pieces 3 and 10-17 contain branching zones of green amphibole matrix cataclasite. Pieces 4-9 are cut by thin bands of green amphibole with moderate fracturing. Piece 18 contains high densities of shear fractures with incipient brecciation in some locations. Pieces 1 and 2 are cut by zones of minor shear fracturing. Pieces 1-5 have thin red clay-oxide veinlets. Pieces 6-9 contain green serpentine veins and Pieces 10-18 contain green amphibole/chlorite veins cut by late thin carbonate veins. Occasional serpentine filled orthogonal veins or tension gashes cut gabbroic veins in Pieces 5-9.

Core Photo



209-1275D-5R-1 (Section top: 22.6 mbsf)

UNIT-I: Troctolite

Pieces 1, 2

COLOR: Whitish gray to green

PRIMARY MINERALOGY: DIABASE/GABBRO

Plagioclase	Mode 50% Size < 7 mm Shape/Habit Euhedral
Pyroxene	Mode 50% Size < 6 mm Shape/Habit Subhedral
Oxide	Mode tr

COMMENTS: The top of this section consists of two pieces of mafic rocks, diabase and gabbro. Piece 1 is diabase and Piece 2 is coarse-grained gabbro.

Pieces 3-26

COLOR: Grayish-green to brown and red and black domains

PRIMARY MINERALOGY: TROCTOLITE AND GABBRO DIKE

Olivine	Mode 70%-95% Size < 8 mm Shape/Habit Subhedral
Plagioclase	Mode 5%-10% Size < 7 mm Shape/Habit Interstitial
Pyroxene	Mode 5%-10% Size < 6 mm Shape/Habit Interstitial
Opaque	Mode < 1 %

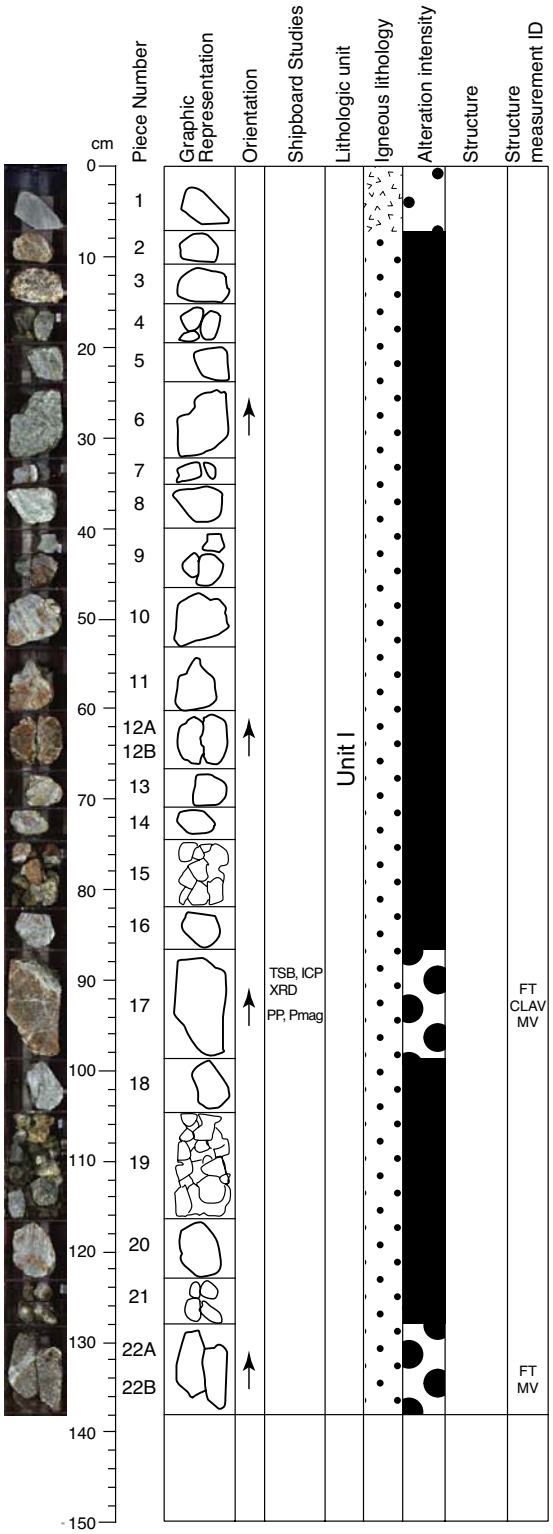
COMMENTS: This section consists of troctolite or troctolitic dunite with pyroxenes. Gabbro dikes intrude the troctolites. They are very altered.

SECONDARY MINERALOGY:
This section is composed of highly altered gabbro (Pieces 1-2) and highly to completely altered troctolite and gabbroic dikes. Olivine in troctolite is commonly serpentinized. Olivine relicts are partially affected by oxidative alteration to clay, Fe-oxyhydroxide, and carbonate. Orthopyroxene in the troctolites is altered to amphibole, plagioclase is altered to chlorite. Alteration in the gabbro is amphibole after clinopyroxene and minor secondary plagioclase and amphibole after plagioclase.

METAMORPHIC VEINS:
Pieces 1-2 have minor brown clay-oxide veinlets. The rest of the section shows a network of gray to white chlorite/clay-carbonate veins that makes up between 1 and 3 vol.% of individual pieces. Pieces 13-23 have massive, light green picrolite veins that use magmatic veins and make up 3 vol.% of the core.

STRUCTURE:
The section consists of highly altered troctolite, feldspathic dunite and feldspathic wehrlite intruded by multiple veins of gabbroic composition.The gabbroic veins are highly altered. Olivine is the most abundant phase in the troctolitic and ultramafic rocks and tends to be subrounded to ovoid with no shape-preferred dimensional orientation. There are variable amounts of interstitial phases resulting in patchy distributions of the rock types listed above even within a single piece. Interstitial areas between olivine contain altered plagioclase and/or pyroxene and the texture appears igneous and commonly poikilitic, with either plagioclase or pyroxene as the oikocrystic phase surrounding olivine. Olivine grain sizes are well defined by the interstitial material and can reach as large as 1 cm. Olivine has clearly not undergone grain size reduction by dynamic recrystallization. It has been overprinted statically by alteration phases that preserve the original igneous texture. The contribution to the interstitial phases made by the crosscutting gabbroic veins is not clear and some seem to cut cleanly across pieces (e.g., Piece 8). Others appear to have gradational boundaries with the adjacent troctolitic and ultramafic rocks they invade (e.g., Piece 16). There is no mesoscopic evidence of high temperature crystal plastic deformation of the primary phases. Pieces 1-2, 22-23 and 25-26 contain minor shear fractures. Pieces 3 and 21 contain a semi-brittle shear zone within a schistose chlorite vein that follows a magmatic vein. Pieces 4 through 15 are cut by minor semi-brittle shear zones along chlorite veins that follow magmatic veins. Piece 16 contains a chlorite fault with 4 cm offset within a schistose chlorite vein. Pieces 17 through 20 are cut by high densities of shear fractures. Piece 24 is cut by a 3 cm wide subvertical chlorite and/or amphibole matrix cohesive fault breccia. Pieces 3-26 are cut by green amphibole-chlorite veins, which often use the earlier magmatic veins as conduits. Later carbonate-clay veins cut these veins.

Core Photo



209-1275D-6R-1 (Section top: 27.1 mbsf)

UNIT-I: Troctolite

Pieces 2-22

COLOR: Green to gray and red

PRIMARY MINERALOGY: TROCTOLITE

Olivine	Mode 70%-95%
	Size < 8 mm
	Shape/Habit Subhedral
Plagioclase	Mode 5%-10%
	Size < 7 mm
	Shape/Habit Interstitial
Pyroxene	Mode 5%-10%
	Size < 6 mm
	Shape/Habit Interstitial
Opaque	Mode < 1 %

COMMENTS: This section consists of highly altered troctolite or troctolitic dunite with pyroxenes, intruded by gabbro in Pieces 2-22 and a pebble of diabase in Piece 1.

Pieces 1

COLOR: Gray

PRIMARY MINERALOGY: DIABASE

COMMENTS: Piece 1 is a pebble of aphyric diabase.

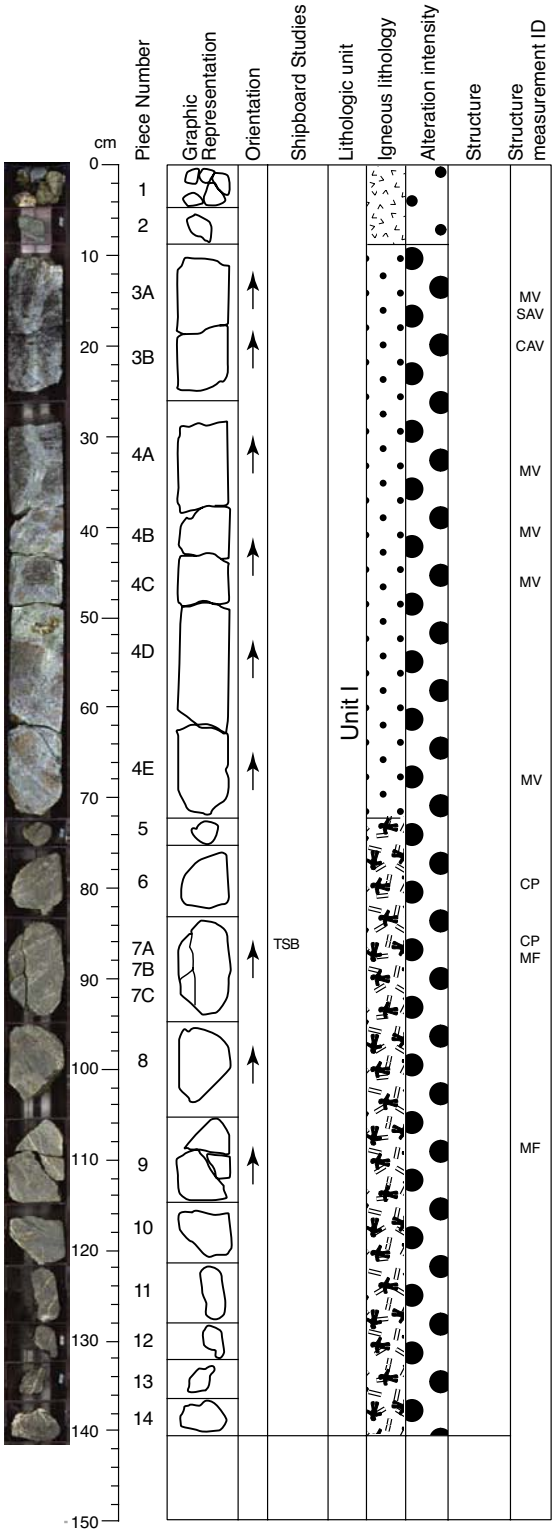
SECONDARY MINERALOGY:
Very highly altered troctolitic rocks in this section are intruded by completely altered gabbro. Troctolites are variably altered to serpentine (forming mesh texture) and iddingsite (affecting olivine cores in mesh texture). Talc-alteration of troctolite is limited to halos along gabbroic dikes. Noticeable amounts of relict olivine are present in Pieces 17 and 22. Orthopyroxene in the troctolites is altered to amphibole, plagioclase is altered to chlorite. The fine-grained gabbro is completely amphibolized. The gabbroic vein is completely altered to chlorite, amphibole, and talc.

METAMORPHIC VEINS:
Pieces 2-17 show a fine network of white chlorite/clay-carbonate veins that makes up about 2 vol.% of the core. Pieces 4-8 have green composite chlorite-picrolite veins. Piece 17 has a prominent chlorite-amphibole vein that could be a completely altered magmatic vein. Pieces 1 and 18-22 have no veins.

THIN SECTIONS: Sample 1275D-6R-1, 89-91 cm

STRUCTURE:
The section consists of highly altered troctolite, feldspathic dunite, feldspathic wehrlite and dunite intruded by multiple veins of gabbroic composition. Piece 1 is a diabase. The gabbroic veins are highly altered and account for most of the piece in some samples and appear to contain olivine-rich xenoliths (e.g., Piece 21). Olivine is abundant in most of the troctolitic and ultramafic rocks and tends to be subrounded to ovoid with no shape-preferred dimensional orientation. There are variable amounts of interstitial phases resulting in patchy distributions of the rock types listed above even within a single piece. Interstitial areas between olivine contain altered plagioclase and/or pyroxene and the texture appears igneous and commonly poikilitic, with either plagioclase or pyroxene as the oikocrystic phase surrounding olivine. In some cases, the original material does not have interstitial phases (dunite zones in Piece 2). Olivine grain sizes are well defined by the interstitial material and can reach as large as ~1 cm. Olivine has clearly not undergone grain size reduction by dynamic recrystallization. It has been overprinted statically by alteration phases that preserve the original igneous texture. The contribution to the interstitial phases made by the crosscutting gabbroic veins is not clear and some seem to cut cleanly across pieces (e.g., Piece 18). Others appear to have gradational boundaries with the adjacent troctolitic and ultramafic rocks they invade (e.g., Piece 11). There is no mesoscopic evidence of high temperature crystal plastic deformation of the primary phases. Pieces 2 and 3 contain low densities of shear fractures. Pieces 4-8 are intensely deformed semi-brittle breccias, in which shattered clasts of gabbro are contained within a schistose, chlorite matrix. Pieces 9-12, 14-17 and 19-22 contain semi-brittle shear zones within schistose chlorite veins that follow and overprint magmatic veins. Piece 13 is a chlorite and/or amphibole matrix cohesive fault breccia. Pieces 2-17 and 21-22 contain green amphibole-chlorite veins, which commonly use the earlier magmatic veins as conduits. Later carbonate-clay veins cut these veins. Serpentine filled fractures, orthogonal to the magmatic veins, are present in Pieces 17 and 22.

Core Photo



209-1275D-7R-1 (Section top: 32.1 mbsf)

UNIT-I: Troctolite

Pieces 1-2

COLOR: Gray

PRIMARY MINERALOGY: DIABASE

COMMENTS: Small pebbles of aphyric diabase.

Pieces 3-4

COLOR: Gray and red

PRIMARY MINERALOGY: TROCTOLITE

Olivine	Mode 90%
	Size < 8 mm
	Shape/Habit Subhedral
Plagioclase	Mode 5%
	Size < 7 mm
	Shape/Habit Interstitial
Pyroxene	Mode 5%
	Size < 6 mm
	Shape/Habit Interstitial
Opaque	Mode <1%

COMMENTS: Highly altered troctolite or troctolitic dunite with pyroxenes, intruded and brecciated by gabbros. A troctolite – gabbro contact is present at 73 cm.

Pieces 5-14

COLOR: Green

PRIMARY MINERALOGY: GABBRO

Plagioclase	Mode 55%
	Size 1-2 mm
	Shape/Habit Subhedral
Clinopyroxene	Mode 42%
	Size 1-2 mm
	Shape/Habit Interstitial
Opaque	Mode 3%

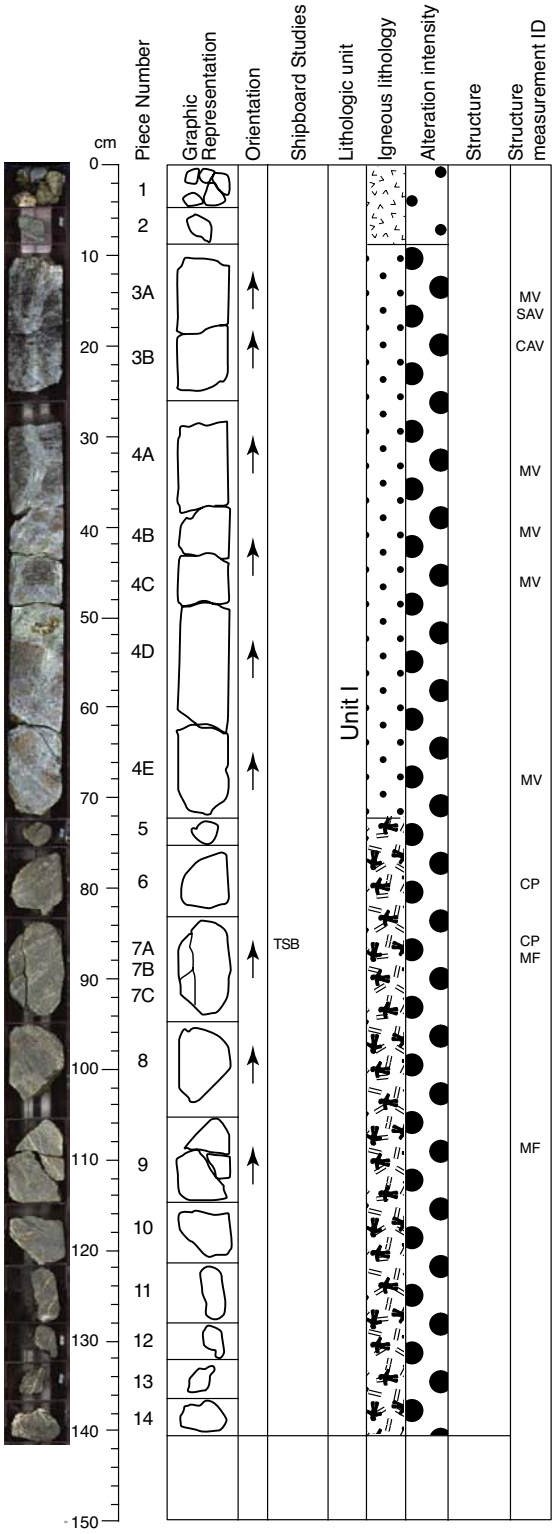
COMMENTS: Fine-grained foliated gabbro with plagioclase-rich bands. 1-2 mm wide granophyre dikes occur in Pieces 9-14.

SECONDARY MINERALOGY:
Pieces 1 and 2 are moderately chlorite-amphibole altered diabase. Pieces 3 and 4 are highly serpentinized troctolitic rocks (85% altered). Relict olivine is partially iddingsitized (rich in carbonate) in reddish domains. Plagioclase is highly altered to chlorite. Talc-alteration is limited to areas adjacent to gabbroic intrusions. The gabbroic veins are completely altered to chlorite, amphibole, and talc. Pieces 5-14 are highly altered gabbro with clinopyroxene altered to amphibole and minor chlorite and slight alteration of plagioclase to secondary plagioclase and chlorite.

METAMORPHIC VEINS:
Pieces 1-2 are rubble with no veins. Pieces 3-4 have green to white, sigmoidal, composite picrolite-carbonate cross-fractures to magmatic veins. There are also late, irregular carbonate veins (0.5 vol.%) and a green chlorite vein in Piece 4E. Pieces 5-7 show minor black amphibole veins. Pieces 8-14 have no macroscopic veins.

THIN SECTIONS: Sample 1275D-7R-1, 85-88 cm

Core Photo

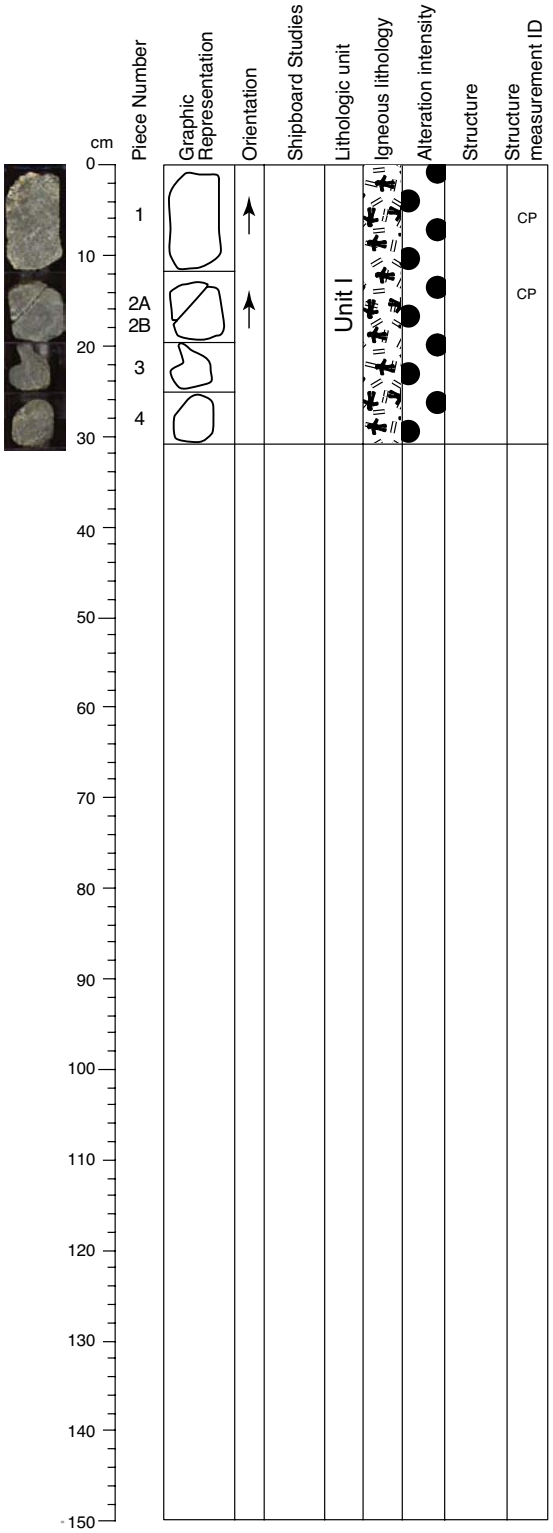


209-1275D-7R-1 (Section top: 32.1 mbsf)

Continued from previous page.

STRUCTURE:
The section consists of highly altered troctolite, feldspathic dunite, feldspathic wehrlite and dunite intruded by multiple veins of gabbroic composition (Pieces 1 and 3-4). In addition, fragments of Piece 1 contain a diabase, Piece 2 is an oxide gabbro, and Pieces 5-14 contain layered oxide gabbros commonly cut by granophyric veins (Pieces 9-11 and 14). The gabbroic veins within troctolites or associated ultramafic rocks are highly altered and account for most of the piece in some samples and appear to contain olivine-rich xenoliths (e.g., Piece 4e). Olivine is abundant in the troctolitic and ultramafic rocks and tends to be subrounded to ovoid with no shape-preferred dimensional orientation. There are variable amounts of interstitial phases resulting in patchy distributions of the rock types listed above even within a single piece (e.g., Piece 4). Interstitial areas between olivine contain altered plagioclase and/or pyroxene and the texture appears igneous and commonly poikilitic, with either plagioclase or pyroxene as the oikocrystic phase surrounding olivine. In some cases, the original material does not have interstitial phases (dunite zones in Piece 4D). Olivine grain size in most cases are well defined by the interstitial material and can reach as large as 0.4 cm. Olivine has clearly not undergone grain size reduction by dynamic recrystallization. It has been overprinted statically by alteration phases that preserve the original igneous texture. The contribution to the interstitial phases made by the crosscutting gabbroic veins is not clear and some seem to cut cleanly across pieces (e.g., Piece 3). Others appear to have gradational boundaries with the adjacent troctolitic and ultramafic rocks they invade (e.g., Piece 4E). The oxide gabbros show layering that is variably inclined even within a single piece (e.g.,Piece 7). The inclination is typically ~22 degrees in the cut face of the core. There is no mesoscopic evidence of high temperature crystal plastic deformation of the primary phases of either rock type. Pieces 1, 2, and 6-14 contain minor shear fractures that are occasionally filled with green amphibole. Pieces 3 and 4 are cut by zones of semi-brittle deformation along schistose, chlorite-filled shear fractures that follow magmatic veins. Several shear zones have up to 3 cm offset. Piece 5 has high fracture concentrations with incipient brecciation in some locations. Pieces 6 through 14 have minor to moderate concentrations of shear fractures, some of which are filled with green amphibole. Pieces 2-5 have serpentine/carbonate filled fractures orthogonal to the magmatic veins. Pieces 6-14 contain rare, thin, red oxide-carbonate veins.

Core Photo



209-1275D-7R-2 (Section top: 33.52 mbsf)

209-1275D-7R-2 (Section top 33.52 mbsf)

UNIT-I: Troctolite

Pieces 1-4

COLOR: Grayish-green

PRIMARY MINERALOGY: GABBRO

Plagioclase	Mode 55%
	Size 1-2 mm
	Shape/Habit Subhedral
Clinopyroxene	Mode 42%
	Size 1-2 mm
	Shape/Habit Interstitial
Opaque	Mode 3%

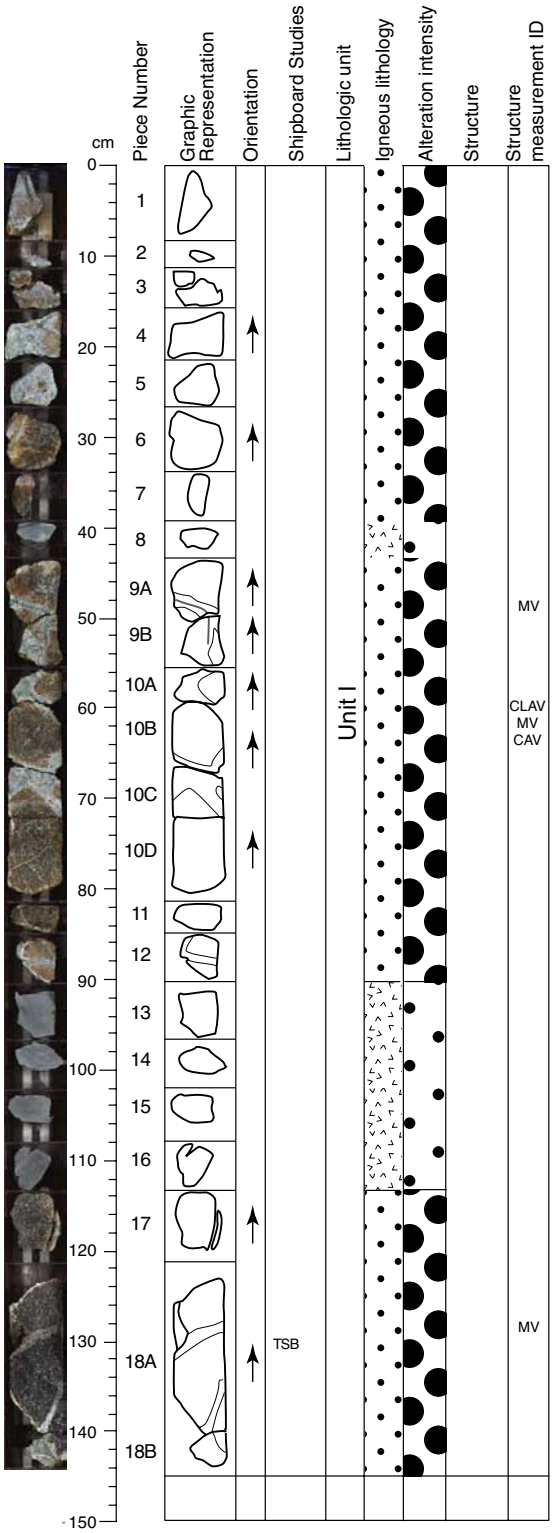
COMMENTS: Medium grained gabbro with no distinct foliation. Piece 2 contains a pillow-shaped, fine-grained domain with a sharp contact with the medium grained gabbro..

SECONDARY MINERALOGY:
This section has highly altered (about 50%) gabbro with clinopyroxene altered to amphibole and minor chlorite and slight alteration of plagioclase to secondary plagioclase and chlorite.

METAMORPHIC VEINS:
This section hosts only very minor brown clay-oxide veinlets.

STRUCTURE:
The section consists of gabbro to oxide gabbro. Rocks have igneous textures and there is no mesoscopic evidence of crystal plastic deformation. Pieces 1 through 4 have minor to moderate concentrations of shear fractures, some of which are filled with green amphibole. All samples have minor late carbonate-red clay veins.

Core Photo



209-1275D-8R-1 (Section top: 36.6 mbsf)

UNIT-I: Troctolite

Pieces 1-7, 9-12, 17-18

COLOR: Green to gray and red

PRIMARY MINERALOGY: TROCTOLITE

Olivine	Mode 85%
	Size < 8 mm
	Shape/Habit Subhedral
Plagioclase	Mode 10%
	Size < 7 mm
	Shape/Habit Interstitial
Pyroxene	Mode 5%
	Size < 6 mm
	Shape/Habit Interstitial
Opaque	Mode <1%

COMMENTS: Highly altered troctolite or troctolitic dunite with oikocrysts of plagioclase and pyroxenes, intruded and brecciated by very fine-grained gabbroic material (diabase). Piece 10 is cut be a 2.5 cm thick gabbro dike.

Pieces 8, 13-16

COLOR: Greenish-gray

PRIMARY MINERALOGY: DIABASE

COMMENTS: Small pebbles of aphyric diabase.

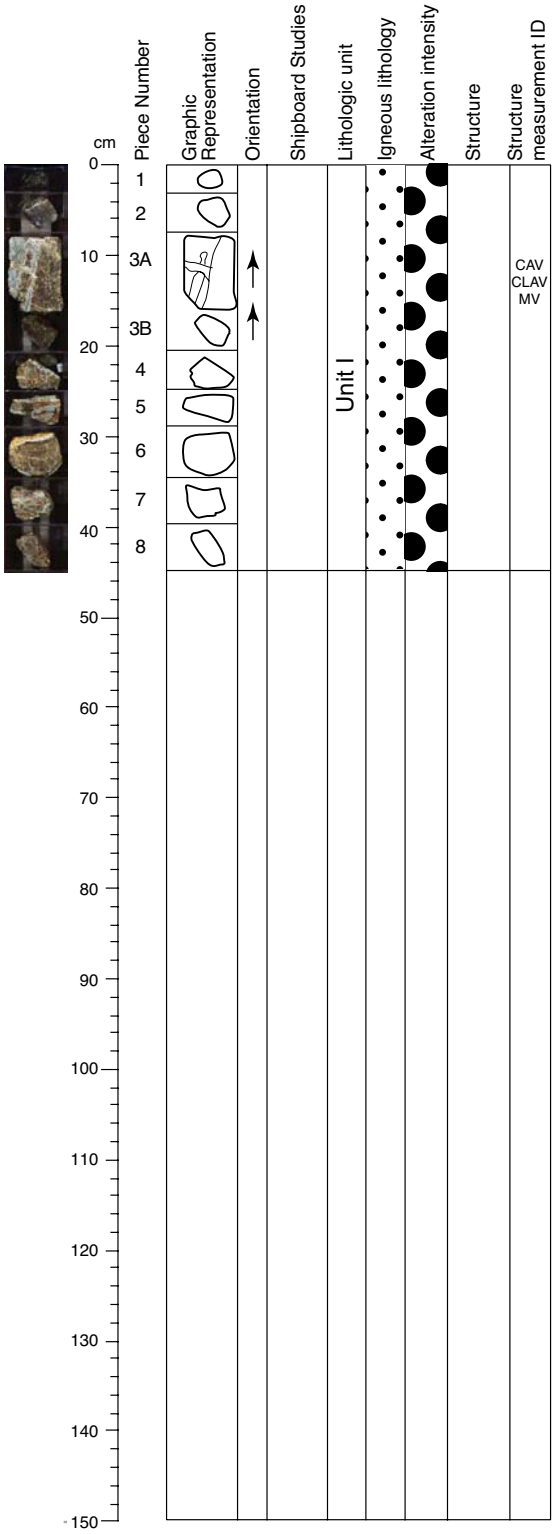
SECONDARY MINERALOGY:
This section shows a succession of moderately to highly altered microgabbro and highly to very highly altered troctolitic rocks. Olivine in the troctolitic rocks is highly serpentinized (70-85% altered). Relict olivine is partially iddingsitized (rich in carbonate) in reddish domains. Plagioclase is highly altered to chlorite. Talc-alteration is limited to contacts to microgabbro intrusions. The microgabbros are partially altered to chlorite, amphibole, and talc. Plagioclase in the microgabbros is <10% altered to secondary plagioclase and chlorite/smectite.

METAMORPHIC VEINS:
Pieces 1-5 host light green picrolite-talc veins with coarse magnetite. Pieces 6-12 have composite grayish-green serpentine-carbonate veins that make up 2 vol.% of the core. Pieces 13-16 show minor amphibole-chlorite veining. Pieces 17-18 have few green picrolite veins that are cut by coarse-grained carbonate veins.

THIN SECTIONS: Sample 1275D-8R-1, 128-133 cm

STRUCTURE:
The section consists of highly altered troctolite, feldspathic dunite and feldspathic wehrlite intruded by multiple veins of gabbroic composition. The gabbroic veins are highly altered. Pieces 8, 14-17 are diabases. Olivine is abundant in the troctolitic and ultramafic rocks and tends to be subrounded to ovoid to somewhat elongate. It, however, has no shape-preferred dimensional orientation. There are variable amounts of interstitial phases resulting in patchy distributions of the rock types listed above even within a single piece. Interstitial areas between olivine contain altered plagioclase and/or pyroxene and the texture appears igneous and commonly poikilitic, with either plagioclase or pyroxene as the oikocrystic phase surrounding olivine. Olivine grain sizes are well defined by the interstitial material and can reach as large as 0.8 cm. Olivine has clearly not undergone grain size reduction by dynamic recrystallization. It has been overprinted statically by alteration phases that preserve the original igneous texture. The contribution to the interstitial phases made by the crosscutting gabbroic veins is not clear and most in this section seem to cut cleanly across pieces (e.g., Pieces 10-13). Others appear to have gradational boundaries with the adjacent troctolitic and ultramafic rocks they invade (e.g., Pieces 3-4). There is no mesoscopic evidence of high temperature crystal plastic deformation of the primary phases in troctolites or ultramafic rocks, however, a gabbroic vein in Piece 19 at 131 cm appears to show some crystal-plastic deformation. Pieces 1-5 and 9-12 contain semi-brittle shear zones along green amphibole and chlorite veins that follow magmatic veins; with some slickenfibers present along exposed vein faces. Pieces 6, 7, 17 and 18 contain 0.5 cm wide fractures filled with carbonate matrix breccias interpreted to be of tectonic origin. Piece 8 has chlorite slickenfibers on two faces. Piece 18 is a chlorite schist. Pieces 1-7 are cut by green chlorite-amphibole veins that are crosscut by late carbonate-clay veins. Pieces 8 and 13-16 are diabase with minor chlorite/amphibole veins. Pieces 17-18 are cut by carbonate filled fractures orthogonal to the magmatic veins

Core Photo



209-1275D-8R-2 (Section top: 38.05 mbsf)

UNIT-I: Troctolite

Pieces 1-4

COLOR: Green, black, and red

PRIMARY MINERALOGY: TROCTOLITE

Olivine	Mode 85%
	Size < 8 mm
	Shape/Habit Subhedral
Plagioclase	Mode 10%
	Size < 7 mm
	Shape/Habit Interstitial
Pyroxene	Mode 5%
	Size < 6 mm
	Shape/Habit Interstitial
Opaque	Mode <1%

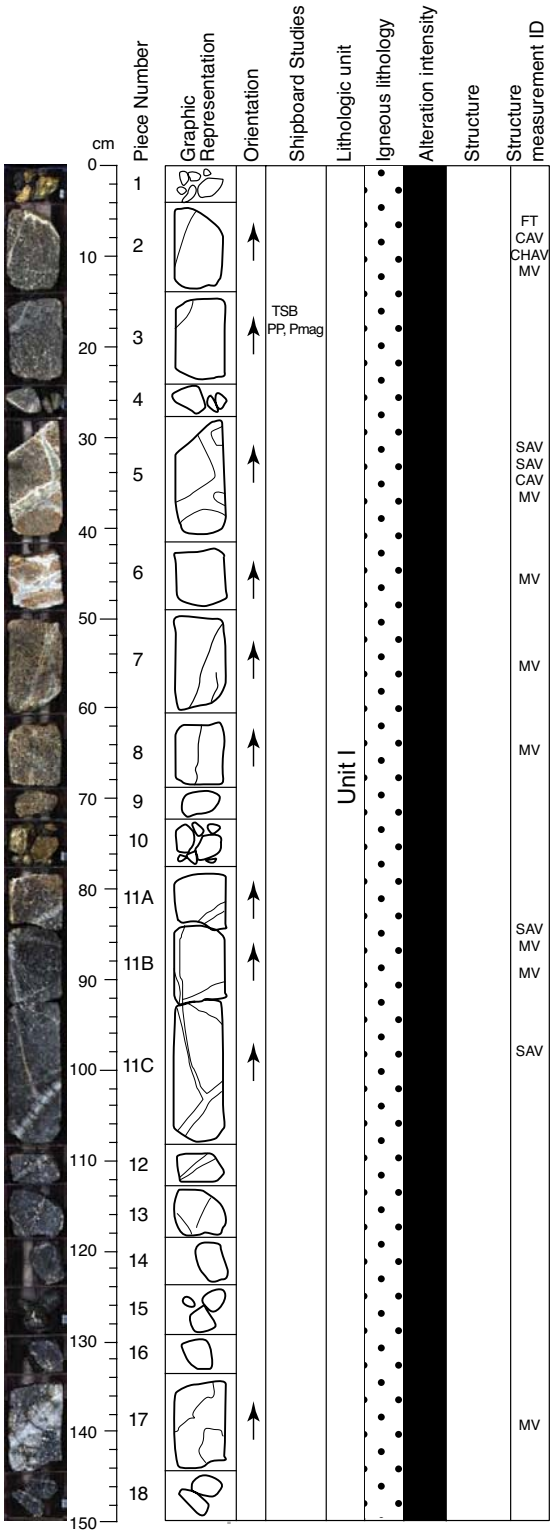
COMMENTS: Highly altered troctolite or troctolitic dunite with oikocrysts of plagioclase and pyroxenes, intruded and brecciated by gabbro. A 2 cm thick gabbro dike cuts Piece 3.

SECONDARY MINERALOGY:
Troctolitic rocks are highly to very highly altered. Olivine in the troctolitic rocks is highly serpentinized (>90% altered). Relict olivine is partially iddingsitized (rich in carbonate) in reddish domains. Plagioclase is highly altered to chlorite. Talc-alteration is limited to contacts to gabbroic veins. The gabbroic veins are completely altered to fine-grained chlorite, amphibole, and talc.

METAMORPHIC VEINS:
This section shows few green picrolite veins that are cut by a carbonate-clay vein network. Volumetrically, these carbonate-clay vein networks make up about 5% of the core.

STRUCTURE:
The section consists of highly altered troctolite, feldspathic dunite and feldspathic wehrlite intruded by multiple veins of gabbroic composition. The gabbroic veins are highly altered. Olivine makes up most of the troctolitic and ultramafic rocks and tends to be subrounded to ovoid to somewhat elongate. It, however, has no shape-preferred dimensional orientation. There are variable amounts of interstitial phases resulting in patchy distributions of the rock types listed above even within a single piece. Interstitial areas between olivine contain altered plagioclase and/or pyroxene and the texture appears igneous and commonly poikilitic, with either plagioclase or pyroxene as the oikocrystic phase surrounding olivine. Olivine grain sizes are well defined by the interstitial material and can reach as large as 0.5 cm. Olivine has clearly not undergone grain size reduction by dynamic recrystallization. It has been overprinted statically by alteration phases that preserve the original igneous texture. The contribution to the interstitial phases made by the crosscutting gabbroic veins is not clear and most in this section seem to cut cleanly across pieces (e.g., Pieces 3 and 6). Others appear to have gradational boundaries with the adjacent troctolitic and ultramafic rocks they invade (e.g., Piece 8). There is no mesoscopic evidence of high temperature crystal plastic deformation of the primary phases in troctolites or ultramafic rocks Pieces 1 and 2 contain minor semibrittle shear zones along chlorite veins and are cut by late carbonate-clay veins. Pieces 3 through 8 contain green amphibole/chlorite veins and semibrittle shear zones along carbonate-clay veins and fractures filled with carbonate matrix breccias that have up to 0.5 cm offset.

Core Photo



209-1275D-9R-1 (Section top: 41.6 mbsf)

UNIT-I: Troctolite

Pieces 1-18

COLOR: Black to red and greenish-gray

PRIMARY MINERALOGY: TROCTOLITE

Olivine	Mode 85%-90%
	Size < 8 mm
	Shape/Habit Subhedral
Plagioclase	Mode 5%-10%
	Size < 7 mm
	Shape/Habit Interstitial
Pyroxene	Mode 5%
	Size < 6 mm
	Shape/Habit Interstitial
Opaque	Mode <1%

COMMENTS: Highly altered troctolite or troctolitic dunite with oikocrysts of plagioclase and pyroxenes. Pieces 5 and 6 are cut by gabbro dikes.

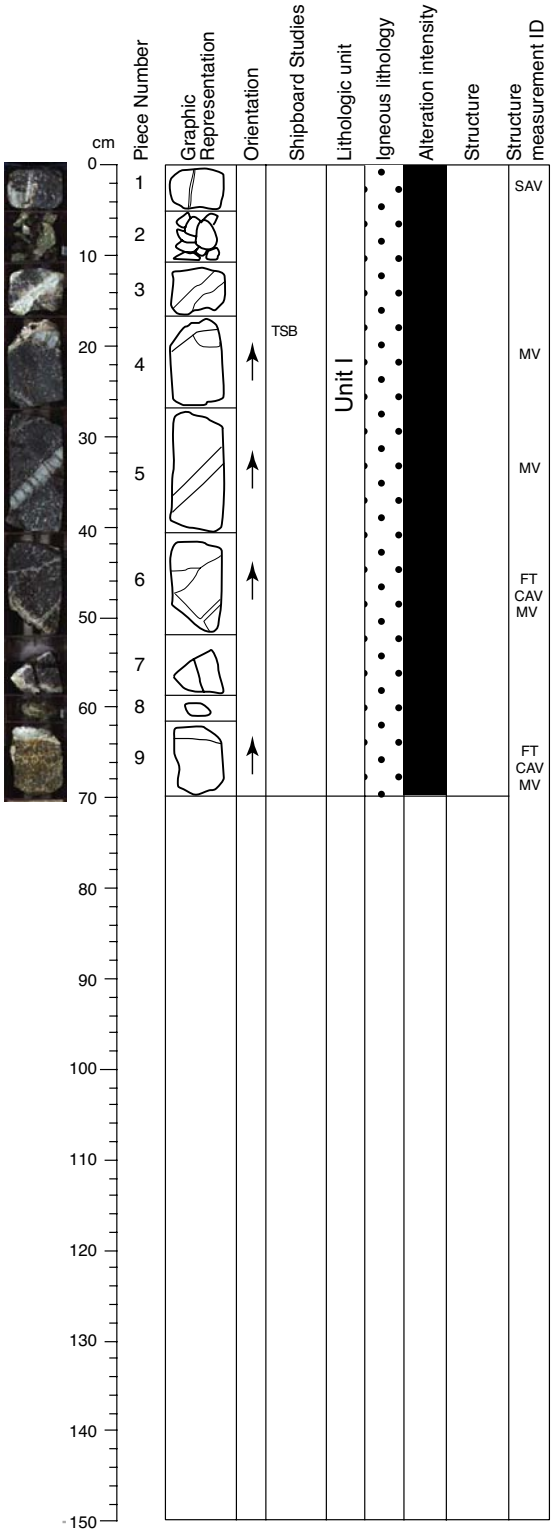
SECONDARY MINERALOGY:
Troctolitic rocks are completely altered. Olivine in the troctolitic rocks is highly serpentinized (>95% altered). Relict olivine is partially iddingsitized (rich in carbonate) in reddish domains. Plagioclase is highly altered to chlorite. Clinopyroxene is highly altered to talc and chlorite. Talc-alteration of olivine is limited to contacts to gabbroic veins. The gabbroic veins are completely altered to fine-grained amphibole with minor chlorite and talc.

METAMORPHIC VEINS:
Piece 1 has no veins. Pieces 2-4 and 11-18 have minor picrolite±magnetite veins. Pieces 5-10 have abundant (5 vol.%) carbonate veins with minor clay). Carbonate veins are also developed in Pieces 11-18 where they are less abundant and have traces of hematite.

THIN SECTIONS: Sample 1275D-9R-1, 15-17 cm

STRUCTURE:
The section consists of highly altered troctolite, feldspathic dunite, feldspathic wehrlite, and locally dunite intruded by multiple veins of gabbroic composition. The gabbroic veins are highly altered. Olivine makes up most of the troctolitic and ultramafic rocks and tends to be subrounded to ovoid to somewhat elongate. It, however, has no shape-preferred dimensional orientation. There are variable amounts of interstitial phases resulting in patchy distributions of the rock types listed above even within a single piece. Interstitial areas between olivine contain altered plagioclase and/or pyroxene and the texture appears igneous and commonly poikilitic, with either plagioclase or pyroxene as the oikocrystic phase surrounding olivine. Olivine grain sizes are well defined by the interstitial material and can reach as large as 1.0 cm. Olivine has clearly not undergone grain size reduction by dynamic recrystallization. It has been overprinted statically by alteration phases that preserve the original igneous texture. The contribution to the interstitial phases made by the crosscutting gabbroic veins is not clear and most in this section seem to cut cleanly across pieces (e.g., Pieces 5, 6, 7 and 11). There is no mesoscopic evidence of high temperature crystal plastic deformation of the primary phases in troctolites or ultramafic rocks, although Piece 17 shows evidence of crystal plastic deformation localized within the gabbroic vein crosscutting troctolite. Pieces 1 through 7 contain semi-brittle shear zones along schistose chlorite veins. Pieces 8-16 are cut by minor shear fractures. Piece 17 contains a ductile shear zone along a magmatic vein that was partially overprinted by sermi-brittle deformation during greenschist alteration. Pieces 2 to 18 are cut by minor chlorite amphibole veins and late crosscutting carbonate-clay veins. Piece 11 and 17 shows serpentine/carbonate filled fractures orthogonal to the magmatic veins

Core Photo



209-1275D-9R-2 (Section top: 43.1 mbsf)

UNIT-I: Troctolite

Pieces 1-9

COLOR: Green to gray with black and red domains

PRIMARY MINERALOGY: TROCTOLITE

Olivine	Mode 85%-90%
	Size < 8 mm
	Shape/Habit Subhedral
Plagioclase	Mode 5%-10%
	Size < 7 mm
	Shape/Habit Interstitial
Pyroxene	Mode 5%
	Size < 6 mm
	Shape/Habit Interstitial
Opaque	Mode <1%

COMMENTS: Moderately altered troctolite or troctolitic dunite with oikocrysts of plagioclase and pyroxenes. Gabbro dikes crosscut troctolite in Pieces 3, 4 and 5. Some fresh olivines are left in Pieces 4-6.

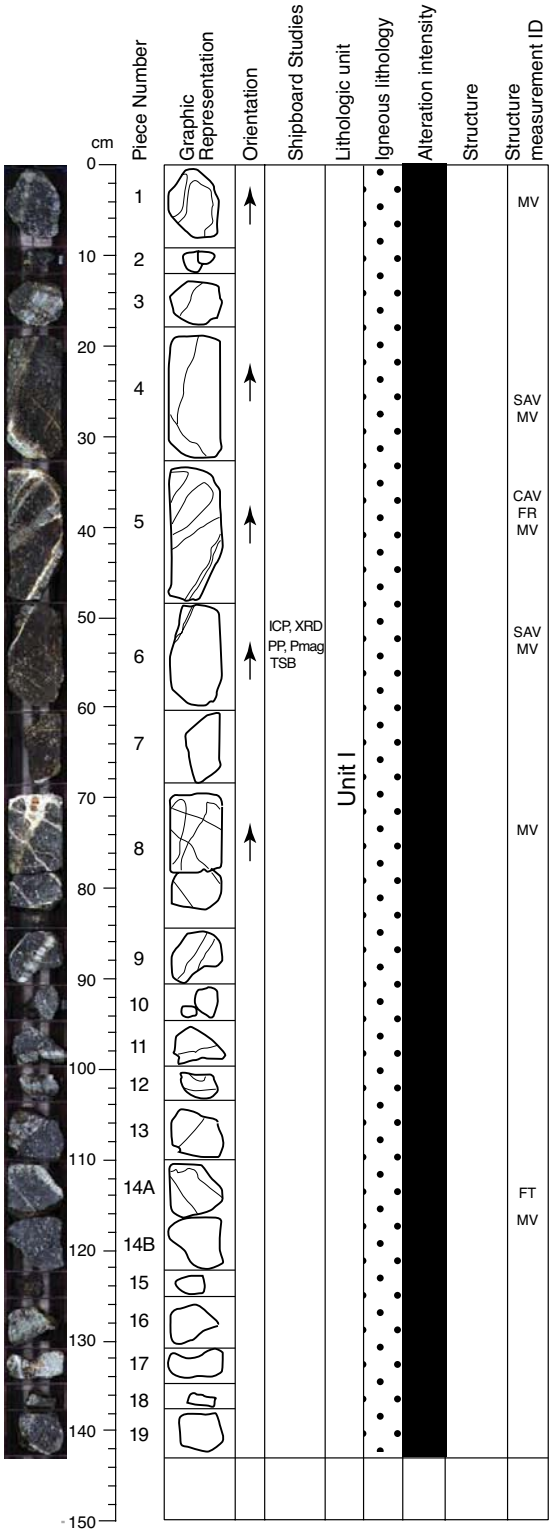
SECONDARY MINERALOGY:
Troctolitic rocks are very highly to completely altered. Olivine in the troctolitic rocks is highly serpentinized (>95% altered). Relict olivine is partially iddingsitized (rich in carbonate) in reddish domains. Plagioclase is highly altered to chlorite. Clinopyroxene is highly altered to talc and chlorite. Talc-alteration of olivine is limited to contacts to gabbroic veins. The gabbroic veins are completely altered to fine-grained amphibole with minor chlorite and talc.

METAMORPHIC VEINS:
Green picrolite veins, white carbonate veins, and cream-colored carbonate serpentine veins are developed in this section.

THIN SECTIONS: Sample 1275D-9R-2, 17-20 cm

STRUCTURE:
The section consists of highly altered troctolite, feldspathic dunite, feldspathic wehrlite, and locally dunite intruded by multiple veins of gabbroic composition. The gabbroic veins are highly altered. Olivine makes up most of the troctolitic and ultramafic rocks and tends to be subrounded to ovoid. It, however, has no shape-preferred dimensional orientation. There are variable amounts of interstitial phases resulting in patchy distributions of the rock types listed above even within a single piece. Interstitial areas between olivine contain altered plagioclase and/or pyroxene and the texture appears igneous and commonly poikilitic, with either plagioclase or pyroxene as the oikocrystic phase surrounding olivine. Olivine grain sizes are well defined by the interstitial material and can reach as large as 1.0 cm (e.g., Piece 5). Olivine has clearly not undergone grain size reduction by dynamic recrystallization. It has been overprinted statically by alteration phases that preserve the original igneous texture. The contribution to the interstitial phases made by the crosscutting gabbroic veins is not clear and most in this section seem to cut cleanly across pieces (e.g., Pieces 3-6). There is no mesoscopic evidence of high temperature crystal plastic deformation of the primary phases in troctolites or ultramafic rocks, although the gabbroic vein cutting Piece 5 appears to have localized some high temperature crystal plastic deformation. Pieces 1 through 3 contain semi-brittle shear zones along schistose chlorite veins. Piece 4, 6 and 9 each contain 1 cm wide zones of cohesive fault breccia with a matrix of green amphibole and carbonate. Pieces 7 and 8 contain thin bands of shear fracturing and incipient brecciation that are filled by green amphibole. Piece 5 shows good serpentine/carbonate filled fractures orthogonal to the magmatic veins. All pieces have late carbonate-clay veins, but those in Pieces 6 and 9 are especially thick.

Core Photo



209-1275D-10R-1 (Section top: 46.1 mbsf)

UNIT-I: Troctolite

Pieces 1-19

COLOR: Greenish-gray and brown

PRIMARY MINERALOGY: TROCTOLITE

Olivine	Mode 85%-90%
	Size < 8 mm
	Shape/Habit Subhedral
Plagioclase	Mode 5%-10%
	Size < 7 mm
	Shape/Habit Interstitial
Pyroxene	Mode 5%
	Size < 6 mm
	Shape/Habit Interstitial
Opaque	Mode <1%

COMMENTS: Altered troctolite or troctolitic dunite with oikocrysts of plagioclase and pyroxenes. Gabbro dikes crosscut the troctolite in Pieces 1, 3-5, 8-9, 11-14, 16-17.

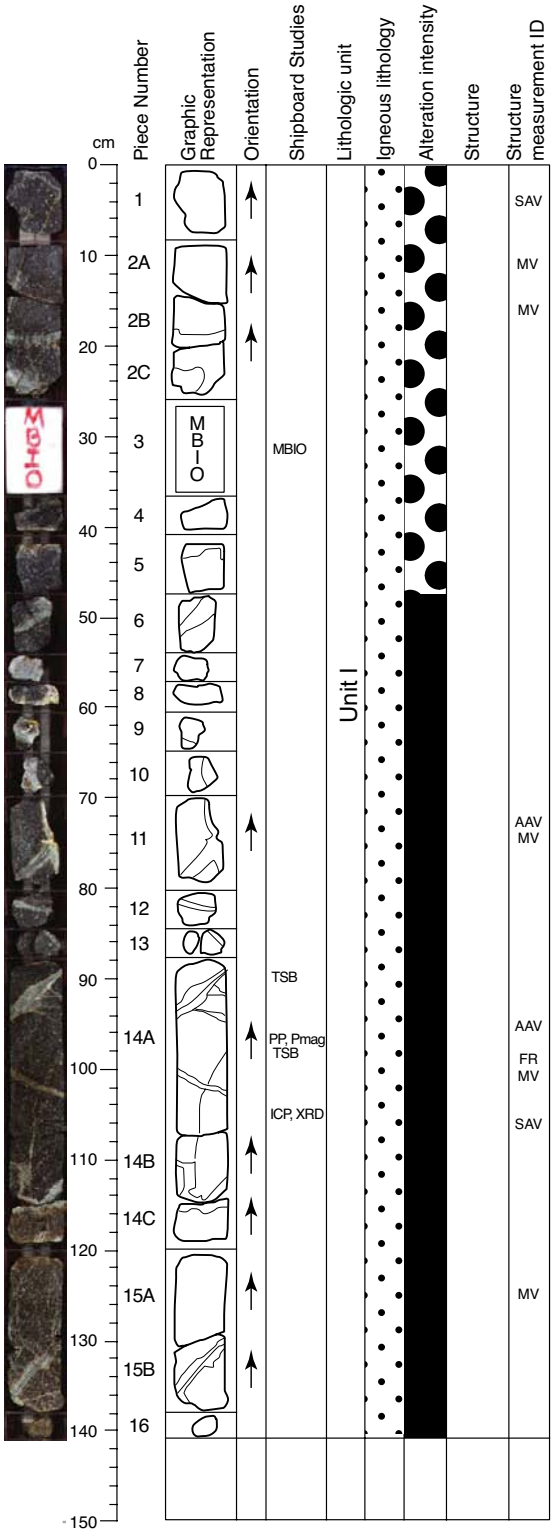
SECONDARY MINERALOGY:
Troctolitic rocks are very highly to completely altered. Olivine in the troctolitic rocks is highly serpentinized (>90% altered) and shows some alteration to brown clay. Relict olivine is partially iddingsitized (rich in carbonate) in Pieces 5 and 8. Plagioclase is highly altered to chlorite. Orthopyroxene is altered to amphibole. Talc-alteration of olivine is limited to contacts to gabbroic veins. The gabbroic veins are completely altered to fine-grained amphibole with minor chlorite and talc.

METAMORPHIC VEINS:
Pieces 1-7 have composite picrolite-carbonate and crosscutting carbonate-clay veins. These carbonate clay veins are also present in Pieces 8-19, where they cut monomineralic green picrolite veins.

THIN SECTIONS: Sample 1275D-10R-1, 54-56 cm

STRUCTURE:
The section consists of highly altered feldspathic dunite, dunite, feldspathic wehrlite, and locally troctolite intruded by multiple veins of gabbroic composition. The gabbroic veins are highly altered. There are higher proportions of ultramafic rocks (<10% plagioclase) in this section. Olivine is abundant in ultramafic or troctoloitic rocks and tends to be subrounded to ovoid. It, however, has no shape-preferred dimensional orientation in the section. There are variable amounts of interstitial phases resulting in patchy distributions of the rock types listed above even within a single piece. Interstitial areas between olivine contain altered plagioclase and/or pyroxene and the texture appears igneous and commonly poikilitic, with either plagioclase or pyroxene as the oikocrystic phase surrounding olivine. Olivine grain sizes are well defined by the interstitial material locally and can reach as large as 1.0 cm. Olivine has clearly not undergone grain size reduction by dynamic recrystallization. It has been overprinted statically by alteration phases that preserve the original igneous texture. The contribution to the interstitial phases made by the crosscutting gabbroic veins is not clear, but most gabbroic veins in this section seem to cut cleanly across pieces (e.g., Pieces 3, 5, 8 and 13). There is no mesoscopic evidence of high temperature crystal plastic deformation of the primary phases in troctolites or ultramafic rocks. Pieces 5 and 8 contain a 0.5 cm wide fracture filled with carbonate-matrix breccia with lithic clasts between 0.2 and 0.5 cm. Piece 14 contains a semi-brittle shear zone within a schistose chlorite veins that overprints magmatic veins; slickenfibers are present on an exposed face. Pieces 6 and 7 have moderate concentrations of shear fractures along magmatic veins. Pieces 1-4, 9-3 and 15-19 contain minor shear fractures. All pieces are cut by late carbonate-clay veins. Piece 5 shows a carbonate vein using one side of a magmatic vein as a conduit. Pieces 1 and 3 show serpentine/carbonate filled fractures orthogonal to the magmatic veins.

Core Photo



209-1275D-10R-2 (Section top: 47.53 mbsf)

UNIT-I: Troctolite

Pieces 1-16

COLOR: Greenish-gray and brown to red

PRIMARY MINERALOGY: TROCTOLITE

Olivine	Mode 85%-90%
	Size < 8 mm
	Shape/Habit Subhedral
Plagioclase	Mode 5%-10%
	Size < 7 mm
	Shape/Habit Interstitial
Pyroxene	Mode 5%
	Size < 6 mm
	Shape/Habit Interstitial
Opaque	Mode <1%

COMMENTS: Altered troctolite or troctolitic dunite with oikocrysts of plagioclase and pyroxenes. Gabbro dikelets crosscut troctolite in Pieces 2, 6, 9-15. Piece 3 = MBIO.

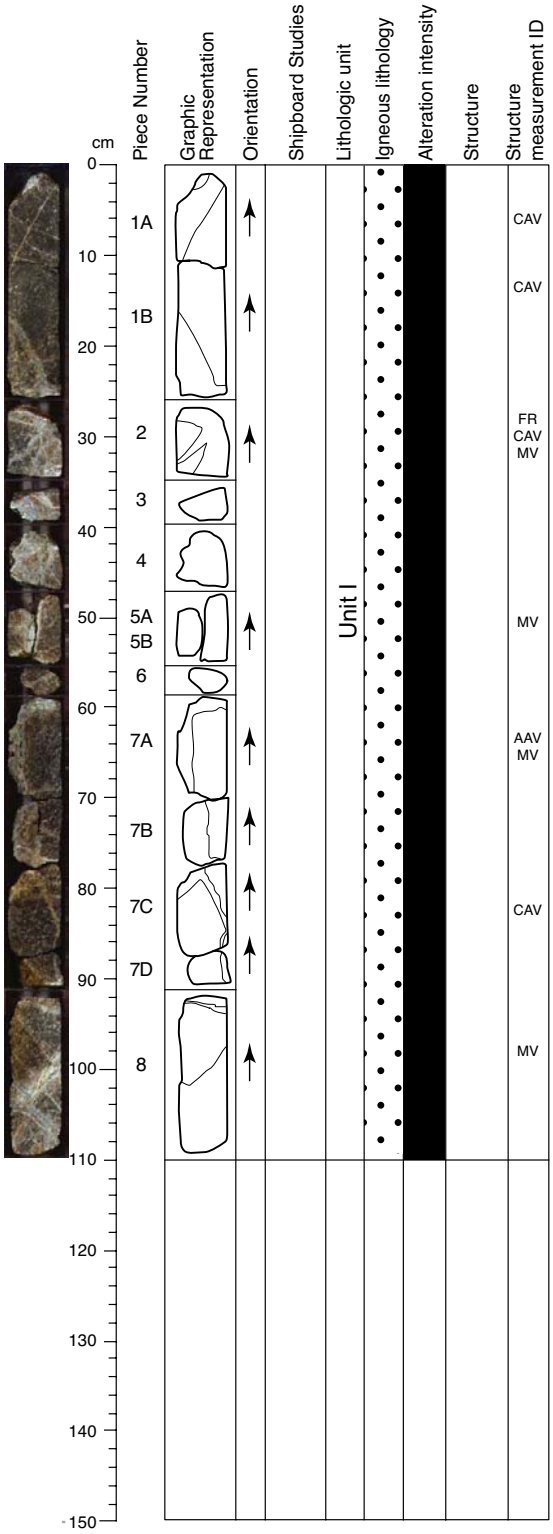
SECONDARY MINERALOGY:
Troctolitic rocks are very highly to completely altered. Olivine in the troctolitic rocks is highly serpentinized (>90% altered) and shows some alteration to green and brown clay. Relict olivine is partially iddingsitized (rich in carbonate). Plagioclase is highly altered to chlorite. Orthopyroxene is altered to talc and amphibole. Talc-alteration of olivine is limited to contacts to gabbroic veins. The gabbroic veins are completely altered to fine-grained amphibole with minor chlorite and talc. Some fresh plagioclase may be left in Piece 8A.

METAMORPHIC VEINS:
Green picrolite veins are developed in Pieces 1-6 and 12-16 where they make up about 0.5 vol.% oft the core. They are cut by white carbonate veinlets (1 vol.%). Pieces 7-11 have minor amphibole-chlorite and serpentine-talc veinlets.

THIN SECTIONS: Samples 1275D-10R-2, 88-91 cm and 1275D-10R-2, 97-99 cm

STRUCTURE: The section consists of highly altered feldspathic dunite, feldspathic wehrlite, dunite and locally troctolite intruded by multiple veins of gabbroic composition. The gabbroic veins are highly altered. There are higher proportions of ultramafic rocks (<10% plagioclase) in the section and less pervasive gabbroic magmatic veins cutting pieces in the section. Olivine accounts for the bulk of the ultramafic or troctoloitic rocks and tends to be subrounded to ovoid. It, however, has no shape-preferred dimensional orientation in the section. There are variable amounts of interstitial phases resulting in patchy distributions of the rock types listed above even within a single piece. Interstitial areas between olivine contain altered plagioclase and/or pyroxene and the texture appears igneous and commonly poikilitic, with either plagioclase or pyroxene as the oikocrystic phase surrounding olivine. Olivine grain sizes are well defined by the interstitial material locally and can reach as large as 0.6 cm. Olivine has clearly not undergone grain size reduction by dynamic recrystallization. It has been overprinted statically by alteration phases that preserve the original igneous texture. The contribution to the interstitial phases made by the crosscutting gabbroic veins is not clear, but most gabbroic veins in this section seem to cut cleanly across pieces (e.g., Pieces 1, 11, 14 and 15). Piece 15 does show some evidence of melt wall rock reaction along a vein wall. There is no mesoscopic evidence of high temperature crystal plastic deformation of the primary phases in troctolites or ultramafic rocks. Pieces 14 contains a semi-brittle shear zone along a schistose chlorite and green amphibole vein within a former magmatic vein; other fractures within Piece 14 are filled with carbonate matrix breccia. Pieces 4, 5, 7-13, and 15 contain minor semi-brittle shear zones along magmatic veins. Pieces 1 and 2 contain minor concentrations of shear fractures. Serpentine/chlorite veins occur within and along the margins of the magmatic veins. Late carbonate-clay veins are also present in the section.

Core Photo



209-1275D-10R-3 (Section top: 48.94 mbsf)

UNIT-I: Troctolite

Pieces 1-16

COLOR: Grayish-black and brown

PRIMARY MINERALOGY: TROCTOLITE

Olivine	Mode 85%-90%
	Size < 8 mm
	Shape/Habit Subhedral
Plagioclase	Mode 5%-10%
	Size < 7 mm
	Shape/Habit Interstitial
Pyroxene	Mode 5%
	Size < 6 mm
	Shape/Habit Interstitial
Opaque	Mode <1%

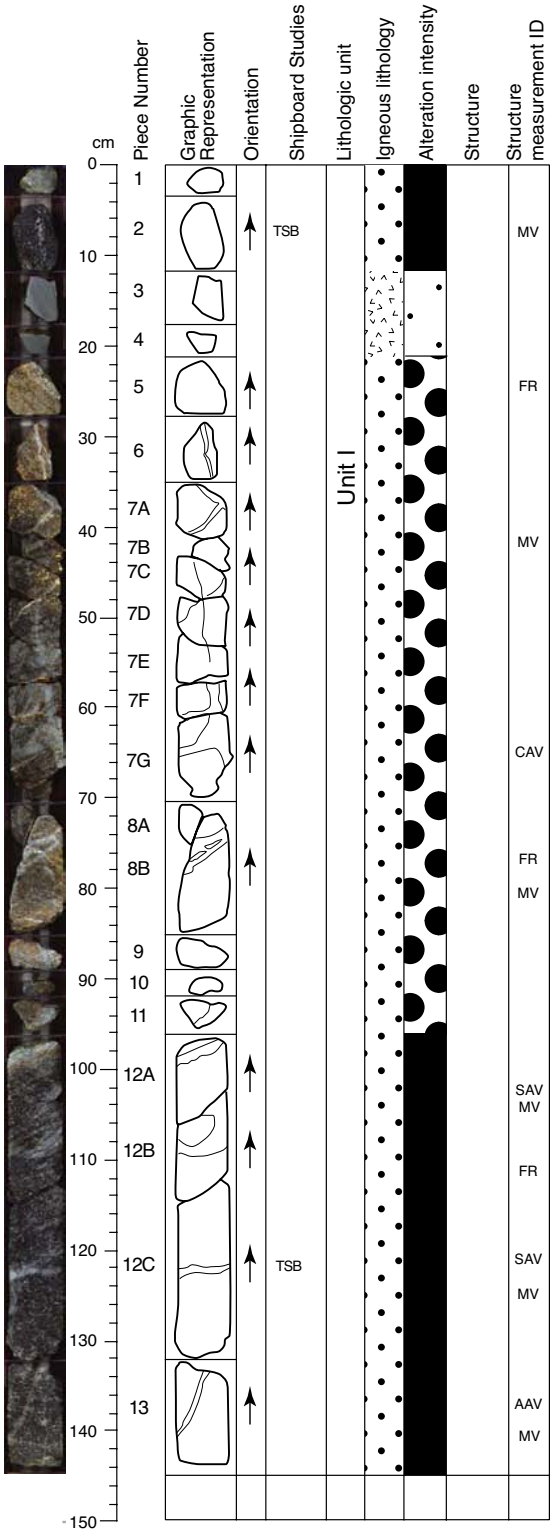
COMMENTS: Highly altered troctolite or troctolitic dunite with oikocrysts of plagioclase and pyroxenes. Gabbro dikelets crosscut and brecciated troctolite in Pieces 1-5 and 7-8.

SECONDARY MINERALOGY:
Troctolitic rocks are very highly to completely altered. Olivine in the troctolitic rocks is highly serpentinized (>90% altered) and shows some alteration to brown clay. Relict olivine is partially iddingsitized (rich in carbonate) in Pieces 5 and 8. Plagioclase is highly altered to chlorite. Orthopyroxene is altered to amphibole. Talc-alteration of olivine is limited to contacts to gabbroic veins. The gabbroic veins are completely altered to fine-grained amphibole with minor chlorite and talc.

METAMORPHIC VEINS:
Veining is dominated by carbonate-clay (± hematite) veins forming irregular networks or straight, non-branched arrays, representing about 2 vol.% of the core. Piece 7 contains a major fractured and veined zone with small, altered troctolite fragments in a carbonate-rich matrix. This zone locally contains clay-rich domains and has prominent vugs lined with aragonite. Discrete dark green amphibole-chlorite veins in Piece 8 (0.2 vol.%) may be completely altered gabbroic dikelets.

STRUCTURE:
The section consists of highly altered feldspathic dunite, feldspathic wehrlite, troctolite and dunite intruded by multiple veins of gabbroic composition. The gabbroic veins are highly altered. There are higher proportions of ultramafic rocks (<10% plagioclase) in the section. Olivine was the most abundant phase the ultramafic or troctoloitic rocks and tends to be subrounded to ovoid. It, however, has no shape-preferred dimensional orientation in the section. There are variable amounts of interstitial phases resulting in patchy distributions of the rock types listed above even within a single piece (e.g, Piece 1). Areas between olivine contain altered plagioclase and/or pyroxene and the texture appears igneous and commonly poikilitic, with either plagioclase or pyroxene as the oikocrystic phase surrounding olivine. Olivine grain sizes are well defined by the interstitial material locally and can reach as large as 1.0 cm. Olivine has clearly not undergone grain size reduction by dynamic recrystallization. It has been overprinted statically by alteration phases that preserve the original igneous texture. The contribution to the interstitial phases made by the crosscutting gabbroic veins is not clear, but most gabbroic veins in this section seem to cut cleanly across pieces (e.g., Pieces 1, 2, and 5). There is no mesoscopic evidence of high temperature crystal plastic deformation of the primary phases in troctolites or ultramafic rocks. Pieces 1 through 8 contain semi-brittle and brittle shear zones along schistose amphibole and chlorite veins within former magmatic veins. Several shear zones have 1-2 cm visible offset in the core. Serpentine/chlorite veins occur within and along the margins of the magmatic veins. Piece 8 is cut be a distinctive green amphibole-chlorite vein, which follows an earlier magmatic vein. Late carbonate-clay veins cut across all earlier features.

Core Photo



209-1275D-11R-1 (Section top: 51.1 mbsf)

UNIT-I: Troctolite

Pieces 1-2, 5-13

COLOR: Light gray/greenish

PRIMARY MINERALOGY: TROCTOLITE

Olivine	Mode 75%-90%
	Size < 8 mm
	Shape/Habit Subhedral
Plagioclase	Mode 5%-20%
	Size < 7 mm
	Shape/Habit Interstitial
Pyroxene	Mode 5%
	Size < 6 mm
	Shape/Habit Interstitial
Opaque	Mode <1%

COMMENTS: Highly altered troctolite or troctolitic dunite with oikocrysts of plagioclase and pyroxenes. Gabbro dikes crosscut troctolite in Pieces 6-13. Troctolite in Piece 12 is enriched in plagioclase as much as 20%.

Pieces 3-4

COLOR: Gray/greenish

PRIMARY MINERALOGY: DIABASE

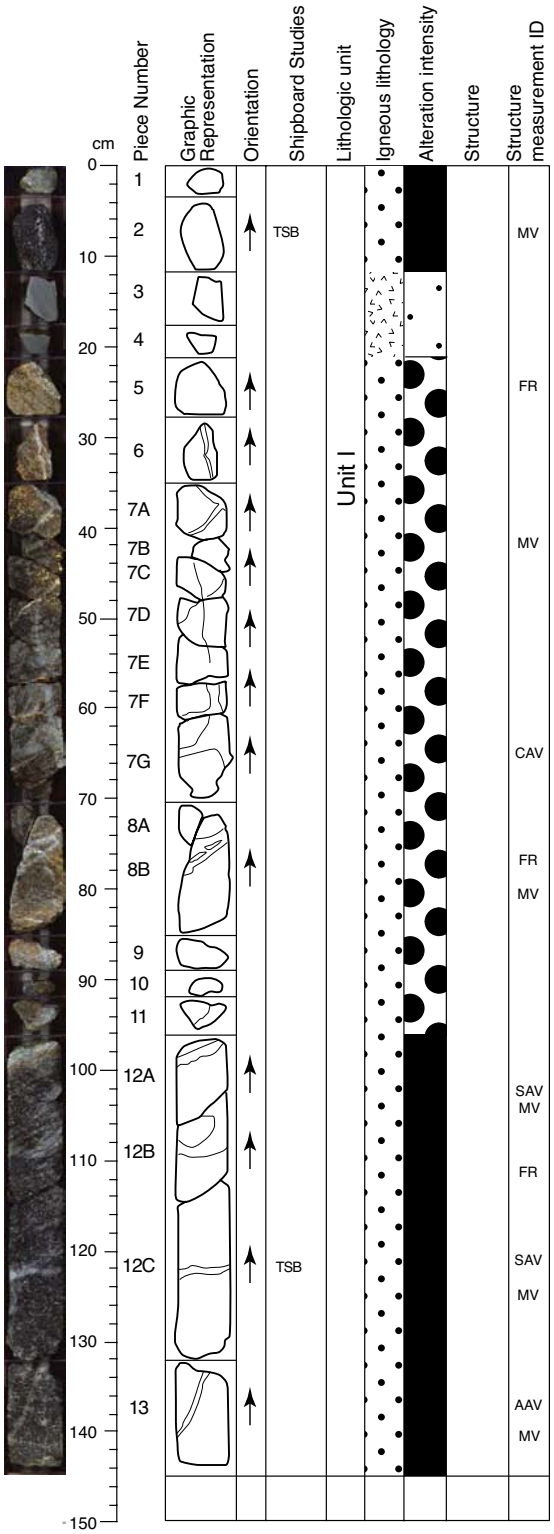
COMMENTS: Two pebbles of aphyric diabase.

SECONDARY MINERALOGY:
This section is composed mainly of troctolite which was intruded by gabbros. Troctolite is commonly very highly altered with olivine being replaced by serpentine and magnetite. Serpentine textures range from mesh texture alteration, where fresh olivine cores remain, to ribbon textures where alteration of olivine is effectively complete. Plagioclase is replaced by chlorite, and orthopyroxene by talc and irregular, vermicular, opaque oxides. Pieces 5 to11, in particular, show abundant talc and Fe-oxide alteration. Some relict fresh olivine cores remain with the very highly altered olivine. Similarly, relict grains of plagioclase, not completely altered to chlorite, still preserve their polysynthetic lamellar twinning. Piece 2 is completely serpentinized troctolite with plagioclase altered mainly to secondary plagioclase. The gabbroic vein that intrudes Section 1275D-11R-1, 120-124 cm has been moderately altered, with clinopyroxene having been replaced by amphibole and talc, and plagioclase by chlorite. Talc alteration exhibits a range of textures ranging from microgranular, through fibrous, to scaly whereas amphibole ranges from anhedral to subhedral lozenge shapes. Pieces 12 and 13 are black gray serpentinized troctolites. Pieces 3 and 4 are slightly altered diabase. Clinopyroxene in the diabase is altered to green amphibole while plagioclase is generally fresh to slightly altered with a little secondary plagioclase at plagioclase/plagioclase interpenetrating contacts.

METAMORPHIC VEINS:
The section is dominated by troctolite which has been intensely intruded by gabbro, forming sharply bounded veins and irregular patches (Piece 2, 5 to 13). Veining in troctolite is dominated by irregular networks or arrays of straight, single, carbonate-clay veins (1 vol.%). Commonly, the gabbroic intrusions contain serpentine (picrolite) veins in their central portion or show sigmoidal cross fractures filled with picrolite (Pieces 2, 8, 9, 10, 11, and 12a). These veins represent up to 1 vol.% of the gabbroic intrusions. Pieces 3 and 4 are diabase with <0.1 vol.% amphibole veinlets.

THIN SECTIONS: Samples 1275D-11R-1, 5-10 cm and 1275D-11R-1, 120-124 cm

Core Photo



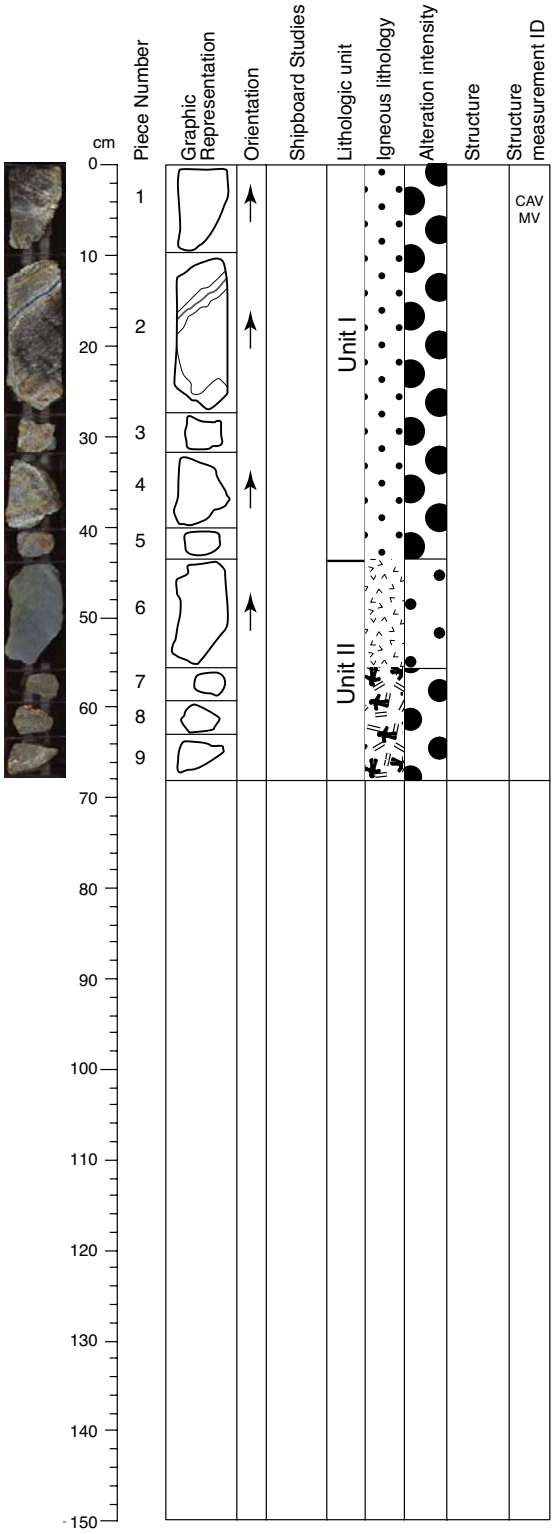
209-1275D-11R-1 (Section top: 51.1 mbsf)

Continued from previous page.

UNIT-I: Troctolite

STRUCTURE:
The section consists of highly altered feldspathic dunite, troctolite, feldspathic wehrlite, and dunite intruded by multiple veins of gabbroic composition. Piece 3 and 4 are diabase. The gabbroic veins are highly altered. There is a high proportion of ultramafic rocks (<10% plagioclase) in this section. Olivine is abundant in the ultramafic and troctoloitic rocks and tends to be subrounded to ovoid. It, however, has no shape-preferred dimensional orientation in the section. There are variable amounts of interstitial phases resulting in patchy distributions of the rock types listed above even within a single piece (e.g, Piece 1). Areas between olivine contain altered plagioclase and/or pyroxene and the texture appears igneous and commonly poikilitic, with either plagioclase or pyroxene as the oikocrystic phase surrounding olivine. Olivine grain sizes are well defined by the interstitial material locally (e.g. Pieces 1 and 13) and can reach up to 0.7 cm. Olivine has clearly not undergone grain size reduction by dynamic recrystallization. It has been overprinted statically by alteration phases that preserve the original igneous texture. The contribution to the interstitial phases made by the crosscutting gabbroic veins is not clear, but most gabbroic veins in this section seem to cut cleanly across pieces (e.g., Pieces 6-9, 12 and 13). There is no mesoscopic evidence of high temperature crystal plastic deformation of the primary phases in troctolites or ultramafic rocks, but schlieren like bands of gabbroic vein material in Piece 12 may be deformed and show localized crystal plastic deformation. Olivine in the areas adjacent to the troctolite show little mesoscopic evidence of deformation. Piece 1 is a cataclastic breccia with a matrix of green amphibole. The upper portion of Piece 12 contains a semi-brittle shear zone along a schistose chlorite filled fracture. Pieces 5-12 contain moderate concentrations of shear fractures along green amphibole veins. Pieces 3 and 4 contain minor chlorite-amphibole veins. Pieces 2 and 5-13 contain green amphibole-chlorite veins which lie within the earlier magmatic veins. Late clay-carbonate veins cut all earlier vein sets.

Core Photo



209-1275D-11R-2 (Section top: 52.55 mbsf)

UNIT-I: Troctolite

Pieces 1-5

COLOR: Brownish green

PRIMARY MINERALOGY: TROCTOLITE

Olivine	Mode 75%-90% Size < 8 mm Shape/Habit Subhedral
Plagioclase	Mode 5%-20% Size < 7 mm Shape/Habit Interstitial
Pyroxene	Mode 5% Size < 6 mm Shape/Habit Interstitial
Opaque	Mode <1%

COMMENTS: Highly altered troctolite or troctolitic dunite with oikocrysts of plagioclase and pyroxenes, crosscut by gabbroic dikes. Some fresh olivines are present in Piece 2.

UNIT-II: Oxide Gabbro(norite)

Pieces 6-9

COLOR: Orange greenish/gray.

PRIMARY MINERALOGY: GABBRO

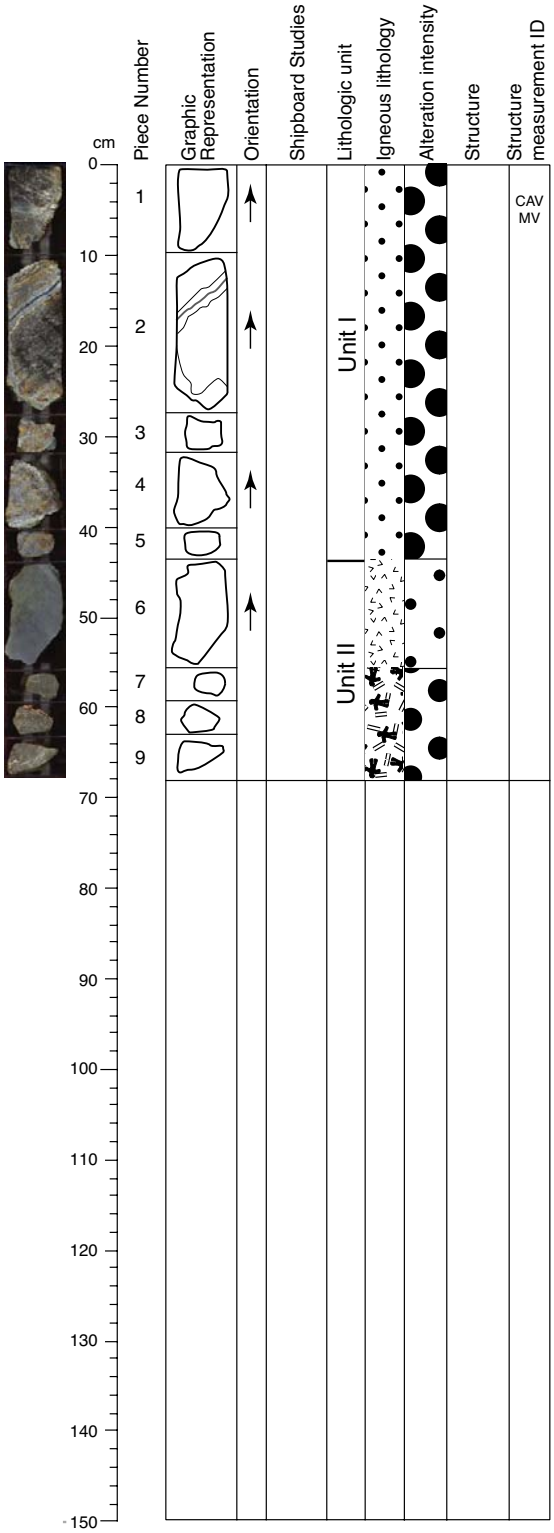
Plagioclase	Mode 50% Size 0.1-3 mm Shape/Habit Subhedral
Pyroxene	Mode 45% Size 0.1-2.5 mm Shape/Habit Subhedral to anhedral
Oxide	Mode 5%

COMMENTS: Highly altered fine to very fine grained gabbroic pebbles. Piece 6 (44-57 cm) is a diabase and marks the top of Unit II. Pieces 7-9 are fine to very-fine grained oxide gabbro.

SECONDARY MINERALOGY:
This section is composed mainly of troctolite which was intruded by gabbros. Troctolite is commonly very highly altered with olivine being replaced by serpentine and magnetite. Serpentine textures range from mesh texture alteration, where fresh olivine cores remain, to ribbon textures where alteration of olivine is effectively complete. Plagioclase is replaced by chlorite, and orthopyroxene by talc and irregular, vermicular, opaque oxides. Some relict fresh olivine cores remain with the very highly altered olivine (Pieces 1 to 5). Similarly, relict grains of plagioclase, not completely altered to chlorite, still preserve their polysynthetic lamellar twinning. Piece 2 is completely serpentinized troctolite with plagioclase altered mainly to secondary plagioclase. Gabbroic veins in the troctolite are completely altered to serpentine and talc. Talc alteration exhibits a range of textures ranging from microgranular, through fibrous, to scaly. Piece 6 is a brownish green moderately altered diabase. Clinopyroxene in the diabase is altered to green amphibole while plagioclase is generally fresh to slightly altered.

METAMORPHIC VEINS:
Carbonate-clay veins (irregular fine networks and single irregular veins) are common in these pieces accounting for 1 vol.% of the rock. Locally, they follow the troctolite-gabbro contacts. A prominent picrolite vein (up to 1 cm wide) is present in the central part of a gabbro dikelet in Piece 2. Piece 6 is diabase with occasional amphibole veins (0.1 vol.%). Pieces 7, 8, and 9 are microgabbro with minor amphibole-chlorite veining (0.1 vol.%). Piece 8 contains an exceptional vuggy quartz vein on its margin with an orange-brown color due to hematite staining. Within the vug rare individual hematite crystals are present.

Core Photo



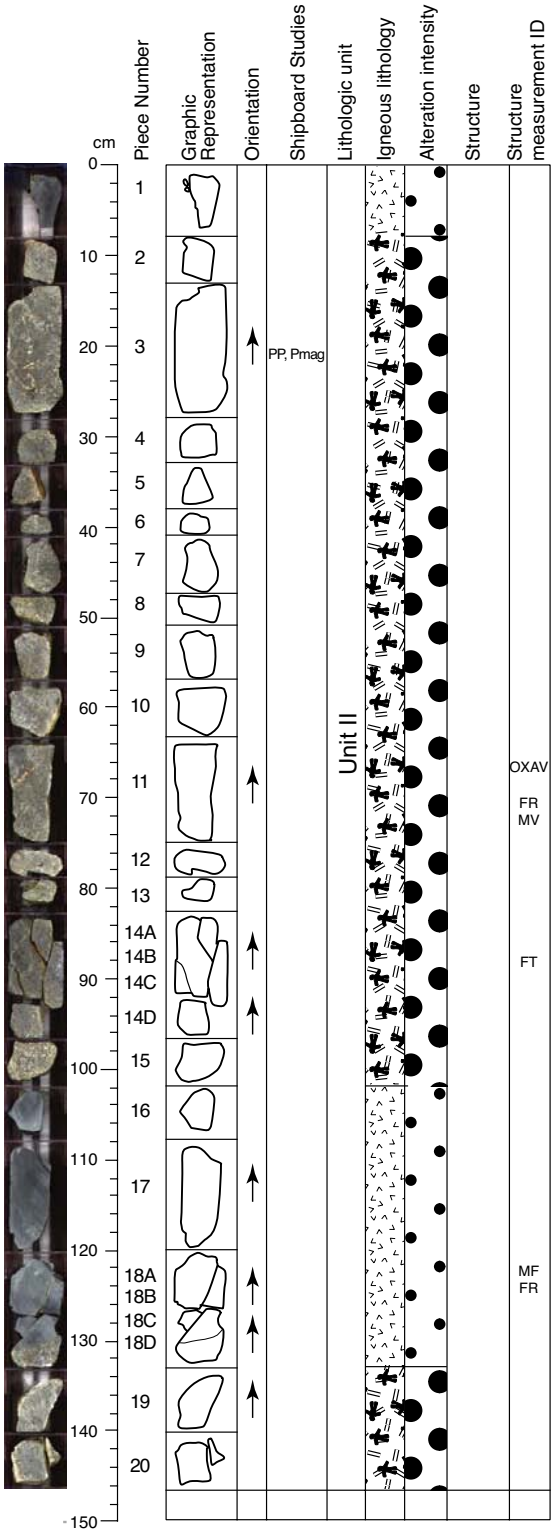
209-1275D-11R-2 (Section top: 52.55 mbsf)

Continued from previous page.

UNIT-I: Troctolite

STRUCTURE:
The section consists of highly altered troctolite, feldspathic dunite, feldspathic wehrlite, and dunite intruded by multiple veins of gabbroic composition (Pieces 1-5). Piece 6 is a diabase and Pieces 7-9 are oxide microgabbros. The gabbroic veins are highly altered. Olivine makes up most of the troctoloitic and ultramafic rocks in Pieces 1-6 and tends to be subrounded to ovoid. It, however, has no shape-preferred dimensional orientation in the section. There are variable amounts of interstitial phases resulting in patchy distributions of troctolitic and ultramafic rock types listed above even within a single piece (e.g, Piece 1). Areas between olivine contain altered plagioclase and/or pyroxene and the texture appears igneous and commonly poikilitic, with either plagioclase or pyroxene as the oikocrystic phase surrounding olivine. Interstitial abundances of each vary on the scale of a piece leading to transitions between rock types because of the generally low abundance represented by interstitial phases. Olivine grain sizes are well defined by the interstitial material locally (e.g. Pieces 1 and 13) and can reach up to 0.7 cm. Olivine has clearly not undergone grain size reduction by dynamic recrystallization. It has been overprinted statically by alteration phases that preserve the original igneous texture. The contribution to the interstitial phases made by the crosscutting gabbroic veins is not clear, but most gabbroic veins in this section seem to cut cleanly across pieces (e.g., Piece 2). There is no mesoscopic evidence of high temperature crystal plastic deformation of the primary phases in troctolites, ultramafic rocks or the oxide microgabbros in the section. Pieces 1 through 4 contain moderate concentrations of shear fractures. Pieces 5 and 7-9 are cut by low concentrations of shear fractures. Piece 2 is cut by a distinctive green chlorite amphibole vein, which lies within the center of an earlier magmatic vein. Pieces 1 and 3-5 contain minor chlorite-amphibole veins and late clay-carbonate veins cut all earlier vein sets. Piece 6 is cut by minor chlorite veins and Pieces 7-9 are cut by minor chlorite amphibole veining and late clay-oxide veins.

Core Photo



209-1275D-12R-1 (Section top: 55.7 mbsf)

UNIT-II: Oxide Gabbro(norite)

Pieces 2-15, 18-20

COLOR: Orange greenish grey

PRIMARY MINERALOGY: GABBRO

Plagioclase	Mode 50%
	Size 0.1-3 mm
	Shape/Habit Subhedral
Pyroxene	Mode 45%
	Size 0.1-2.5 mm
	Shape/Habit Subhedral to anhedral
Oxide	Mode 5%

COMMENTS: Highly altered, fine to medium grained gabbros. Pieces 10-15 and 19-20 are foliated. Piece 3 is a fine grained gabbro brecciated by granophyre.

Piece 1, 16-18

COLOR: Gray

PRIMARY MINERALOGY: DIABASE

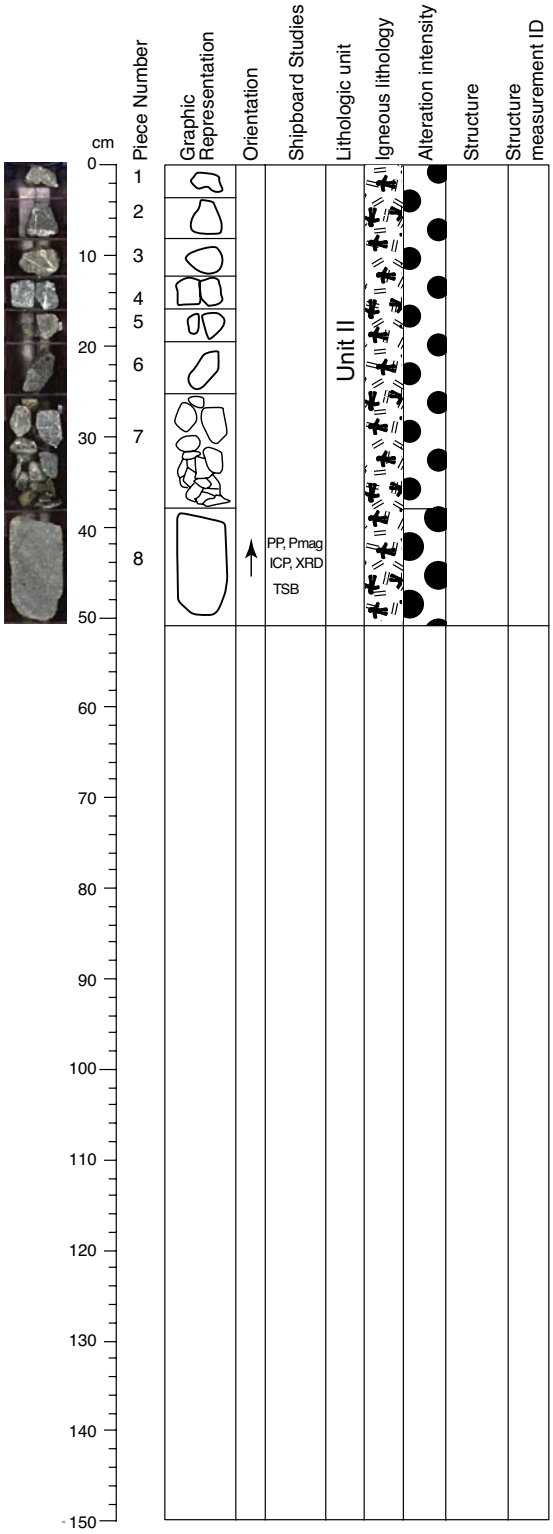
COMMENTS: Piece 1 has a few grains of plagioclase phenocrysts. Pieces 16-18 are aphyric. A contact to medium grained gabbro is present in Piece 18.

SECONDARY MINERALOGY:
This section is composed mainly of orange/greenish-gray highly altered gabbro. Clinopyroxene is very highly altered to mostly green amphibole (locally with a little chlorite) while plagioclase is only highly altered to mainly green amphibole, with subsidiary secondary plagioclase and locally as much as 10% chlorite/smectite. Pieces 1, and 16 to 18, are moderately altered gray diabase with the alteration styles appearing very similar to those present in the gabbro but less intense than in the courser grained lithology. Piece 18D is half gabbro and half diabase with degrees and styles of alteration consistent with Pieces 2-15, and 1, and 16-18 respectively. The contact between these lithologies is sharp with a greenish clay rich rim.

METAMORPHIC VEINS:
The gabbro and diabase of this section contain between 0.1 to 0.5 vol.% of straight, green, fine, amphibole±chlorite veins. The sharp contact of diabase and gabbro in Piece 18 has been crosscut by amphibole±chlorite veins. Pieces 10, 11, and 14 contains prominent carbonate-clay veins (0.1 to 1 vol.%) which crosscut and displace amphibole±chlorite veins in Piece 14.

STRUCTURE:
The section consists of fine to medium to coarse grained oxide gabbro (Pieces 2-15, 18-20) and diabase (Pieces 1, 16-18). Piece 18 contains a contact between gabbro and an aphyric chilled diabase, which may have been oriented subhorizontal in the cut face of the core. However, the piece is poorly oriented because of fracturing. Granophyric veins cut Pieces 3 and 11. There is no evidence of high temperature crystal plastic deformation and all textures appear igneous. Piece 14 is cut by a chlorite-filled shear fracture and a high concentration of open fractures. Piece 18 is cut by a chlorite-filled shear fracture with minor slickenfibers and a moderate concentration of open fractures. Pieces 10-20 contain minor concentrations of shear fractures and Pieces 10 through 13 contain minor concentration of open fractures. Pieces 2-5, 7, 9-14 and 16-20 contain thin, green, chlorite amphibole veins. Piece 18 is a gabbro-diabase contact which is crosscut by the chlorite-amphibole veins. Late oxide-clay-carbonate veins cut the earlier chlorite-amphibole veins in Pieces 10-14. Pieces 2, 4 and 5 also contain clay-oxide veins.

Core Photo



209-1275D-12R-2 (Section top: 57.16 mbsf)

UNIT-II: Oxide Gabbro(norite)

Pieces 1-8

COLOR: Greenish gray to gray brown

PRIMARY MINERALOGY: GABBRO

Plagioclase	Mode 50%
	Size 0.1-3 mm
	Shape/Habit Subhedral
Pyroxene	Mode 40%
	Size 0.1-2.5 mm
	Shape/Habit Subhedral to anhedral
Oxide	Mode 10%

COMMENTS: Small rounded pieces of altered, fine grained gabbros with no distinct foliation. Granophyre cuts through Pieces 1-4.

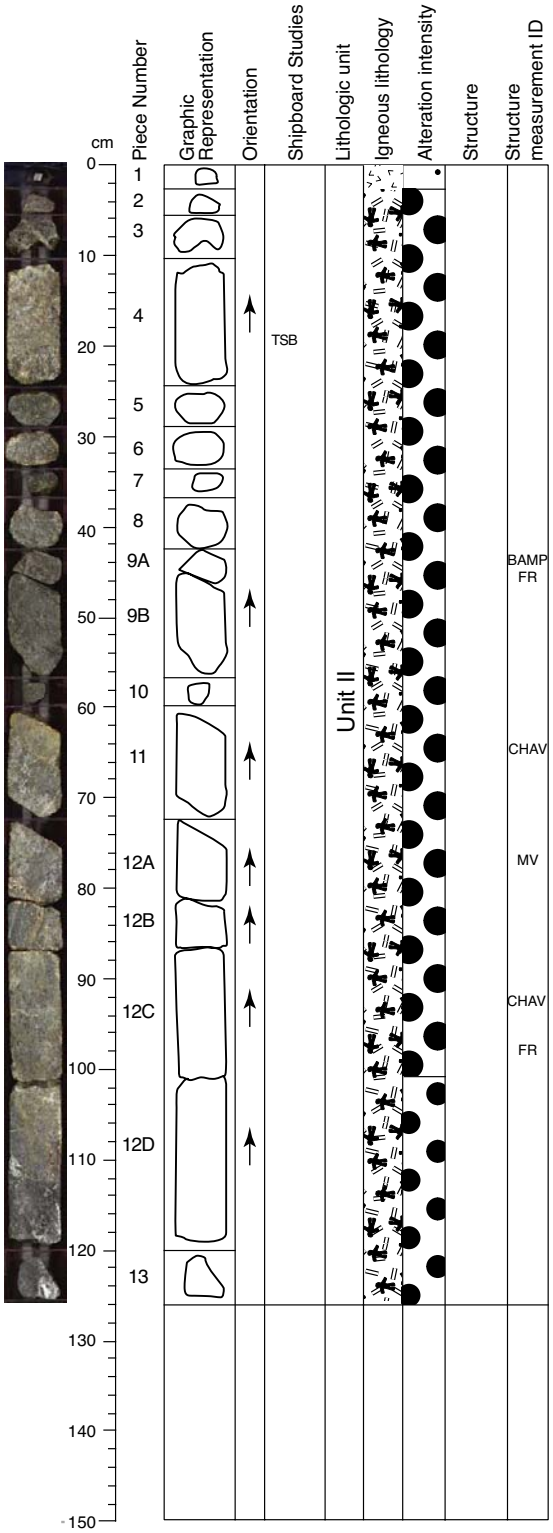
SECONDARY MINERALOGY:
This section is composed of highly to very highly altered gabbro. Clinopyroxene is very highly altered, mostly to green and brown amphibole but with as much as 20% chlorite and locally (Piece 8) iron oxyhydroxide staining. Plagioclase is highly altered throughout this section of core. Plagioclase has been altered mainly to green amphibole but with as much as 20% secondary plagioclase and 10% of chlorite/smectite throughout.

METAMORPHIC VEINS:
This section contains rare (< 0.1 vol.%), fine amphibole±chlorite veinlets.

THIN SECTIONS: Sample 1275D-2R-2, 46-49 cm

STRUCTURE:
The section consists of fine to medium to coarse grained oxide gabbro. Granophyric veins cut Pieces 1, 3, 4, and 7. There is no evidence of high temperature crystal plastic deformation and all textures appear igneous. There is not brittle deformation in this section. Veins are rare in this section, but Pieces 6 and 8 are cut by green chlorite-amphibole veins.

Core Photo



209-1275D-13R-1 (Section top: 60.7 mbsf)

UNIT-II: Oxide Gabbro(norite)

Pieces 2-13

COLOR: Orange greenish gray

PRIMARY MINERALOGY: GABBRO

Plagioclase	Mode 50%
	Size 0.1-3 mm
	Shape/Habit Subhedral
Pyroxene	Mode 40%
	Size 0.1-2.5 mm
	Shape/Habit Subhedral to anhedral
Oxide	Mode 10%

COMMENTS: Altered medium-grained gabbros with a subvertical magmatic foliation in Pieces 9 to 12. The bottom part is relatively fresh. Granophyre crosscuts Pieces 12B and 13. Piece 12D contains large amphiboles in the granophyre.

Piece 1

COLOR: Gray

PRIMARY MINERALOGY: DIABASE

COMMENTS: A pebble of aphyric diabase.

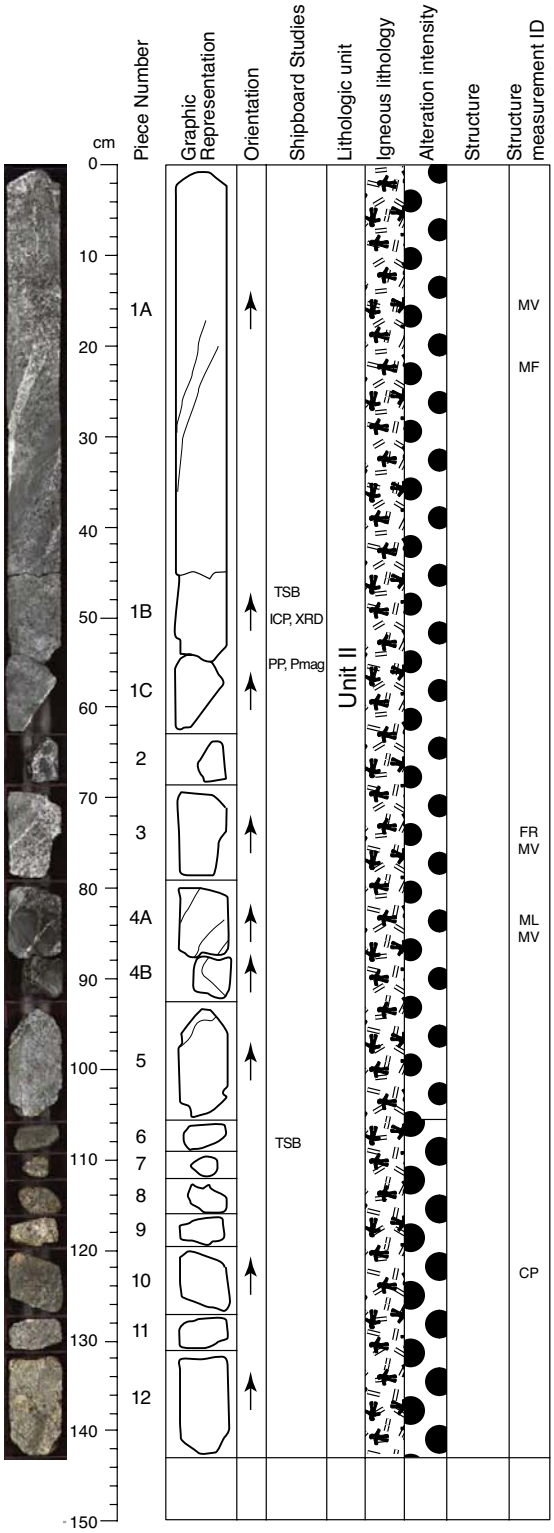
SECONDARY MINERALOGY:
This section is composed mostly of orange/greenish-gray, very highly altered gabbro. Plagioclase, where altered, has been replaced by neoblasts of secondary plagioclase at plagioclase/plagioclase interpenetrating contacts and occasional irregular secondary plagioclase fringes around primary plagioclase grains. Clinopyroxene is very highly to completely altered, mostly to green amphibole but with as much as 20% chlorite. The amphibole is mostly microgranular to fine grained although small patches of acicular amphibole are present. Pieces 12D and 13 are highly altered, gray-white gabbro, which contain white, secondary plagioclase rich veins with coarse grained green amphibole. Orange/brown staining within the section is attributed to very finely disseminated iron oxyhydroxides.

METAMORPHIC VEINS:
This section contains rare (< 0.1 vol.%) fine amphibole±chlorite veinlets.

THIN SECTIONS: Sample 1275D-13R-1, 18-21 cm

STRUCTURE:
The section consists of fine to medium grained oxide gabbro (Pieces 2-13) and diabase (Piece 1). Granophyric veins cut Pieces 3, 12 and 13. There is no evidence of high temperature crystal plastic deformation and all textures appear igneous. Pieces 9 and 12 have low concentrations of open fractures. Pieces 2, 4, 8-9, and 11-12 contain green chlorite-amphibole veins. Pieces 11 and 12 contain late clay-oxide veins.

Core Photo



209-1275D-13R-2 (Section top: 61.96 mbsf)

UNIT-II: Oxide Gabbro(norite)

Pieces 1-12

COLOR: Light greenish-gray

PRIMARY MINERALOGY: GABBRO

Plagioclase	Mode 50%
	Size 0.1-3 mm
	Shape/Habit Subhedral
Pyroxene	Mode 40%
	Size 0.1-2.5 mm
	Shape/Habit Subhedral to anhedral
Oxide	Mode 10%

COMMENTS: Medium to fine-grained gabbros. There is a subvertical magmatic foliation is distinct in Piece 5. Granophyre dikes crosscut gabbros in Pieces 1-4 (2 cm wide in Piece 1).

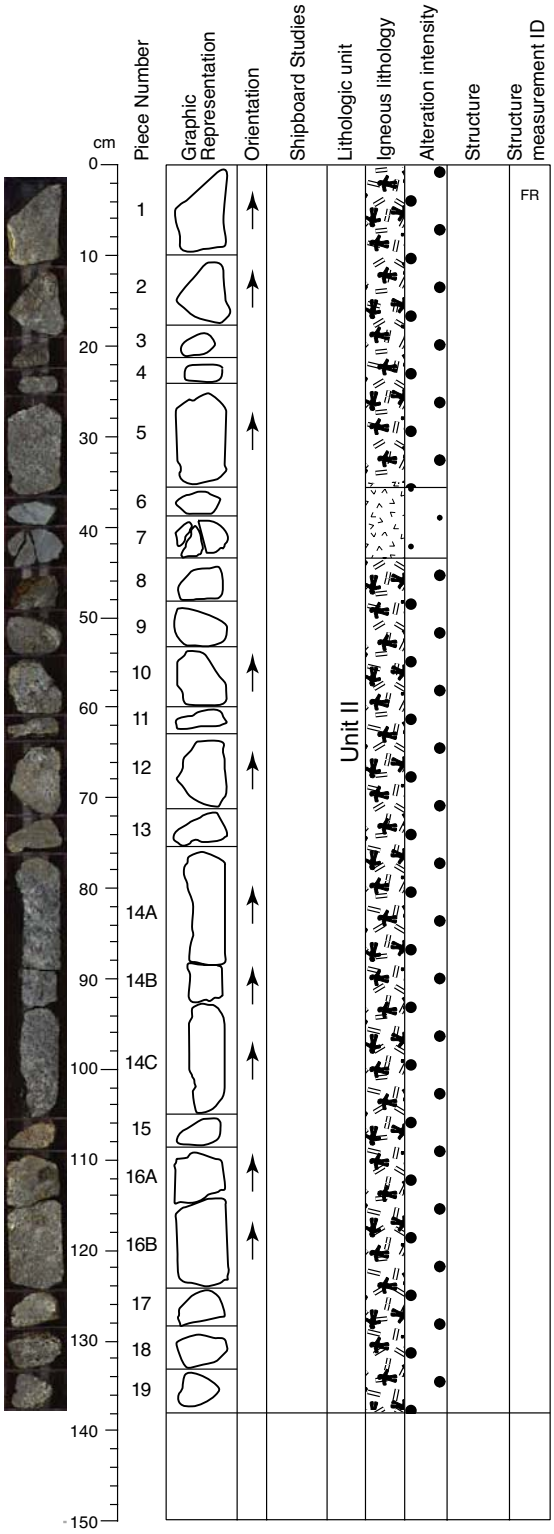
SECONDARY MINERALOGY:
This section is composed of gabbro of various grain sizes. White greenish-gray gabbro (Pieces 1 to 5) is highly altered (60-75%). Pieces 6-12 are very highly altered gabbro. Clinopyroxene has been altered predominantly to green amphibole with as much as 20% subsidiary chlorite. Plagioclase alteration ranges from 25% in Piece 1 to as much as 75% in Pieces 6-12. Plagioclase is mostly altered to amphibole with as much as 15% chlorite/smectite and ca. 5% secondary plagioclase. Plagioclase alteration in Pieces 2 to 4A, however, contains as much as 30% secondary plagioclase. Secondary plagioclase is present as neoblasts at plagioclase/plagioclase interpenetrating boundaries, as secondary fringes around the margins of primary plagioclase grains, and as small irregular patches. The bottom of the section (Pieces 6 to 12) is orange greenish-gray. The orange/brown staining is attributed to finely disseminated iron oxyhydroxides.

METAMORPHIC VEINS:
Single, straight amphibole veins are present throughout the section (0.5 vol.%). In addition, there is a single, 5 mm wide, chlorite-amphibole veins at 44 cm (Piece 1) and an exceptional, 1 cm wide, amphibole-zeolite-sulfide vein in Pieces 4 and 5 (86 to 97 cm). This vein occupies the central part of a felsic dikelet and shows complex zoning. The outer part consists of chlorite and amphibole and the central part contains up to 5 mm long dark green amphibole needles in radiating aggregates. Fine white zeolite needles are associated with these amphiboles. Sulfides (pyrite and/or marcasite?) occupy elongated aggregates mainly at the contact of the outer chlorite-amphibole domains to the enclosing plagioclase-rich felsic intrusion.

THINS ECTIONS: Samples 1275D-13R-2, 45-48 cm, and 1275D-13R-2, 117-119 cm

STRUCTURE:
The section consists of fine to medium grained oxide gabbro. Granophyric veins cut Pieces 1-4. A foliation or lamination is present in unoriented Pieces 6-10, which may be related to high concentrations of oxides. If deformed, the deformation appears weak. There is no other evidence of high temperature crystal plastic deformation and all the remaining textures appear igneous. Pieces 9 and 12 have low concentrations of open fractures. Pieces 2, 4, 8-9, and 11-12 contain green chlorite-amphibole veins. Pieces 11 and 12 contain late clay-oxide veins.

Core Photo



209-1275D-14R-1 (Section top: 65.4 mbsf)

UNIT-II: Oxide Gabbro(norite)

Pieces 1-5, 8-19

COLOR: Greenish-gray to brown greenish-gray.

PRIMARY MINERALOGY: GABBRO

Plagioclase	Mode 50%
	Size 0.1-3 mm
	Shape/Habit Subhedral
Pyroxene	Mode 40%
	Size 0.1-2.5 mm
	Shape/Habit Subhedral to anhedral
Oxide	Mode 10%

COMMENTS: Altered gabbros with grain size varying from coarse to medium to fine-grained. In Pieces 1-5 plagioclase content varies heterogeneously. Magmatic foliation is distinct in some pieces.

Piece 6-7

COLOR:

PRIMARY MINERALOGY: DIABASE

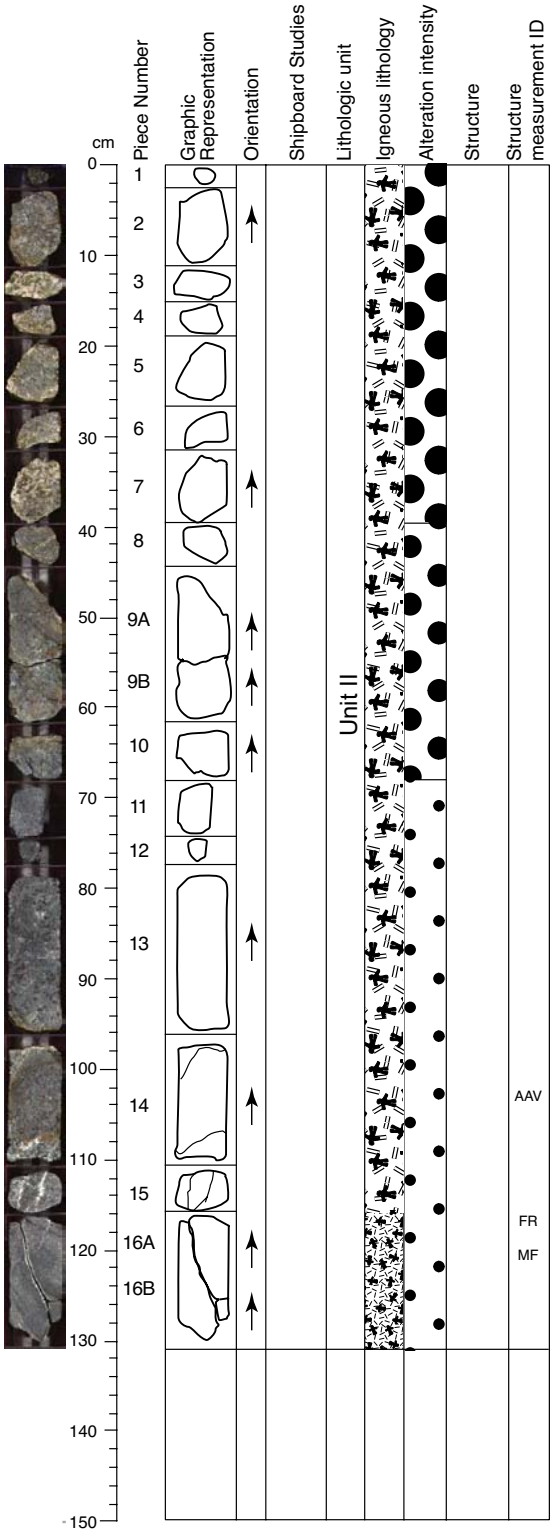
COMMENTS: Aphyric diabase. A contact with medium grained gabbro is present in Piece 7.

SECONDARY MINERALOGY:
This section is composed of moderately altered (40-45%) greenish-gray and brown greenish-gray gabbro. Piece 6 and half of Piece 7 is slightly altered gray diabase (<10% altered). Clinopyroxene is altered predominantly to green amphibole with subsidiary chlorite (as much as 10% throughout the length of the core). Plagioclase is mostly altered to green amphibole with subsidiary secondary plagioclase and as much as 10% of chlorite/smectite.

METAMORPHIC VEINS:
Straight, individual amphibole veins are common in this section and account for ca. 0.5 vol.% of the core. Piece 1 contains a carbonate-clay vein located on its margin.

STRUCTURE:
The section consists of fine to medium to coarse-grained oxide gabbro and diabase (Pieces 7 and 9). There is no evidence of crystal plastic deformation in the section. Textures are all igneous. Pieces 1 and 2 are cut by minor shear fractures with little or no offset. Pieces 1-5, 8, 11, 12, 14 and 16 contain amphibole-chlorite veins. Piece 1 is cut by a carbonate vein on its margin.

Core Photo



209-1275D-15R-1 (Section top: 70.4 mbsf)

UNIT-II: Oxide Gabbro(norite)

Pieces 1-16

COLOR: Pinkish-gray and greenish-gray to gray

PRIMARY MINERALOGY: GABBRO

Plagioclase	Mode 45%-60%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Clinopyroxene	Mode 25%-45%
	Size < 20 mm
	Shape/Habit Eubhedral to anhedral
Oxide	Mode 5%-15%

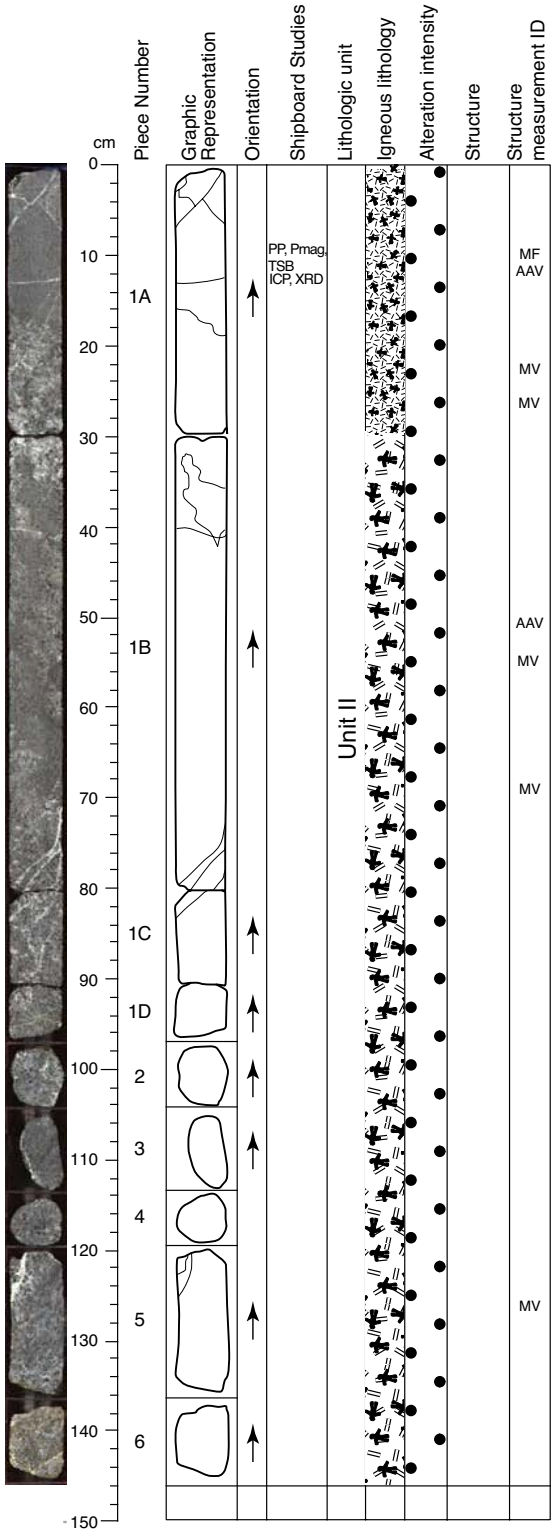
COMMENTS: Altered gabbros with grain size varying from coarse- to medium- to fine-grained. Pieces 1-8 and 9B-10 are coarse-grained with clinopyroxene as large as 20 mm and plagioclase as large as 10 mm. Piece 8 has a distinct foliation. Pieces 9A, 11-1, and 16 are fine-grained oxide gabbro with 15% oxides. Piece 16 is relatively fresh gabbro.

SECONDARY MINERALOGY:
This section is entirely composed of moderately to very highly altered gabbro. Pieces 1 to 7 are pinkish to grayish, very highly altered gabbro. Pieces 8 to 10 are gray greenish highly altered gabbro. Pieces 11 to 16 are moderately altered gray gabbro. The percentage of clinopyroxene replacement by amphibole decreases from 100 to 40% towards the bottom of this section.

METAMORPHIC VEINS:
The section contains minor amphibole±hematite vein (0.1 vol.%). Piece 16 contains an exceptional vuggy quartz-zeolite vein.

STRUCTURE:
The section consists of fine to medium to coarse grained oxide gabbro and diabase. Granophyric veins cut Piece 14, 12, and 16. An oxide concentration in Piece 8 shows a possible weak crystal plastic deformation. Otherwise, there is no evidence of crystal plastic deformation in the section and textures are igneous. Pieces 9 through 16 are cut by minor shear fractures with little or no offset and contain low concentrations of open fractures. Piece 15 has intense trondhjemitic veining. Pieces 3, 13, 14 and 16 contain amphibole-chlorite veins. Pieces 5, 9, 10 and 14 have crosscutting clay oxide veins.

Core Photo



209-1275D-15R-2 (Section top: 71.71 mbsf)

UNIT-II: Oxide Gabbro(norite)

Pieces 1-6

COLOR: Gray to greenish gray

PRIMARY MINERALOGY: OXIDE GABBRO

Plagioclase	Mode 45-60%
	Size < 15 mm
	Shape/Habit Eubhedral to anhedral
Clinopyroxene	Mode 25-35%
	Size < 20 mm
	Shape/Habit Eubhedral to anhedral
Oxide	Mode 15-25%

COMMENTS: Oxide gabbros with grain size varying from coarse to medium grained. Pieces 1A (0-18 cm) and 1B (35-70 cm) are fine grained, same as Section 1275D-15R-1 (Piece 16) while Pieces 1A (18-30 cm), 1B (30-35 and 70-81 cm), 1C, 1D, and 2-6 are medium grained. A 1 cm wide granophyre dike in Piece 5.

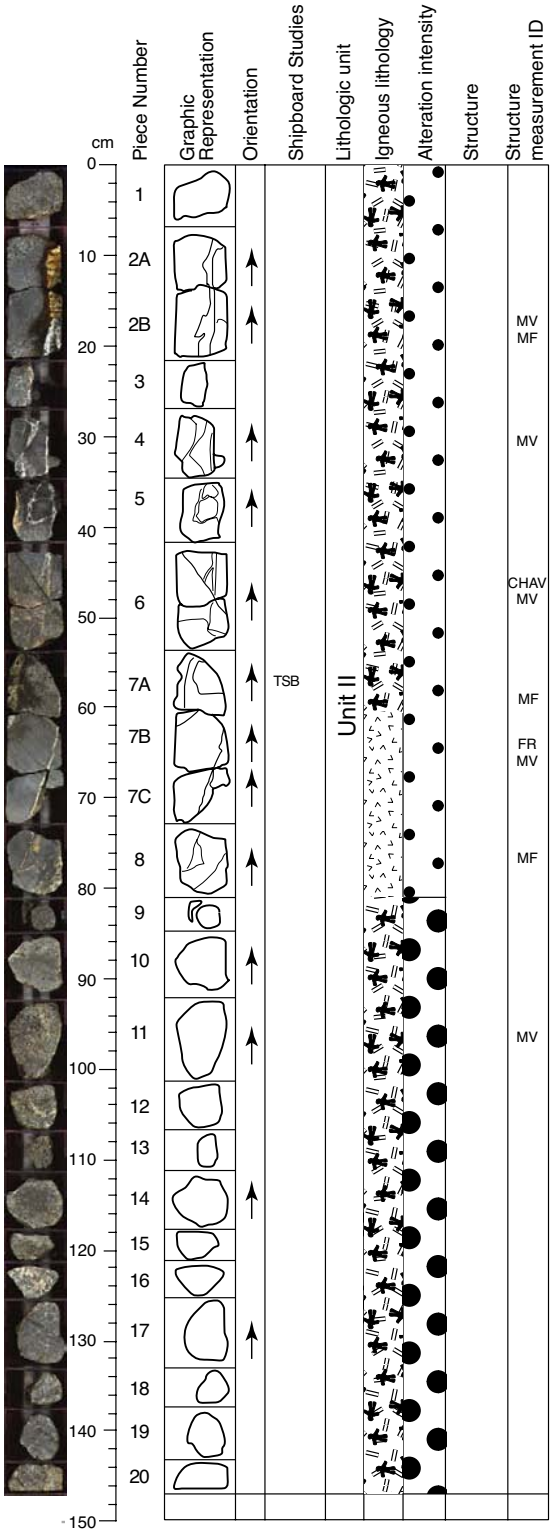
SECONDARY MINERALOGY:
This section is entirely composed of moderately altered gabbro (20-40%). Clinopyroxene is partly replaced by green amphibole. Plagioclase is mainly fresh, with only minor alteration to secondary plagioclase and amphibole. Pieces 4 and 5 are the most altered in this section.

METAMORPHIC VEINS:
This section consists of gabbro with abundant felsic (plagioclase-amphibole) dikelets and irregular domains. Occational straight, single amphibole veins account for approximately 0.1 vol.% of the section.

THIN SECTIONS: Sample 1275D-15R-2, 9-11 cm

STRUCTURE:
The section consists of interlayered fine to medium to coarse grained oxide gabbro. The layering or banding is generally defined by grain size changes, but is commonly associated with changes in the modal percentage of mineral phases, especially variations in oxide mineral or plagioclase abundance. Layer boundaries occur in Piece 1. The layer contacts are variably inclined from sub horizontal up to 21 degrees in the cut face of the core, even within the same piece. Granophyric veins cut Pieces 1, 3, and 5. There is no evidence of crystal plastic deformation in the section and all textures are igneous. There is no brittle deformation in this section. Pieces 1, 2, 3 contain amphibole-chlorite veins. Pieces 5, 9, 10 and 14 have crosscutting clay oxide veins.

Core Photo



209-1275D-16R-1 (Section top: 74.7 mbsf)

UNIT-II: OXIDE GABBRO

Pieces 1-7A, 9-20

COLOR: Gray to greenish-gray and brown

PRIMARY MINERALOGY: OXIDE GABBRO

Plagioclase	Mode 45%-60%
	Size < 15 mm
	Shape/Habit Eubhedral to anhedral
Clinopyroxene	Mode 30%-40%
	Size < 20 mm
	Shape/Habit Eubhedral to anhedral
Oxide	Mode 10%-15%

COMMENTS: Oxide gabbros with grain size varying from medium to fine grained. Pieces 1, 2A, 3-6A, 9-20 are medium grained while Piece 2 is fine grained. Diabase dike in Pieces 7-8. Granophyre dikes in Pieces 4-8.

Piece 7B-8

COLOR: Gray

PRIMARY MINERALOGY: DIABASE

COMMENTS: Aphyric diabase. Contacts to medium grained gabbro are present in Pieces 7A and 8.

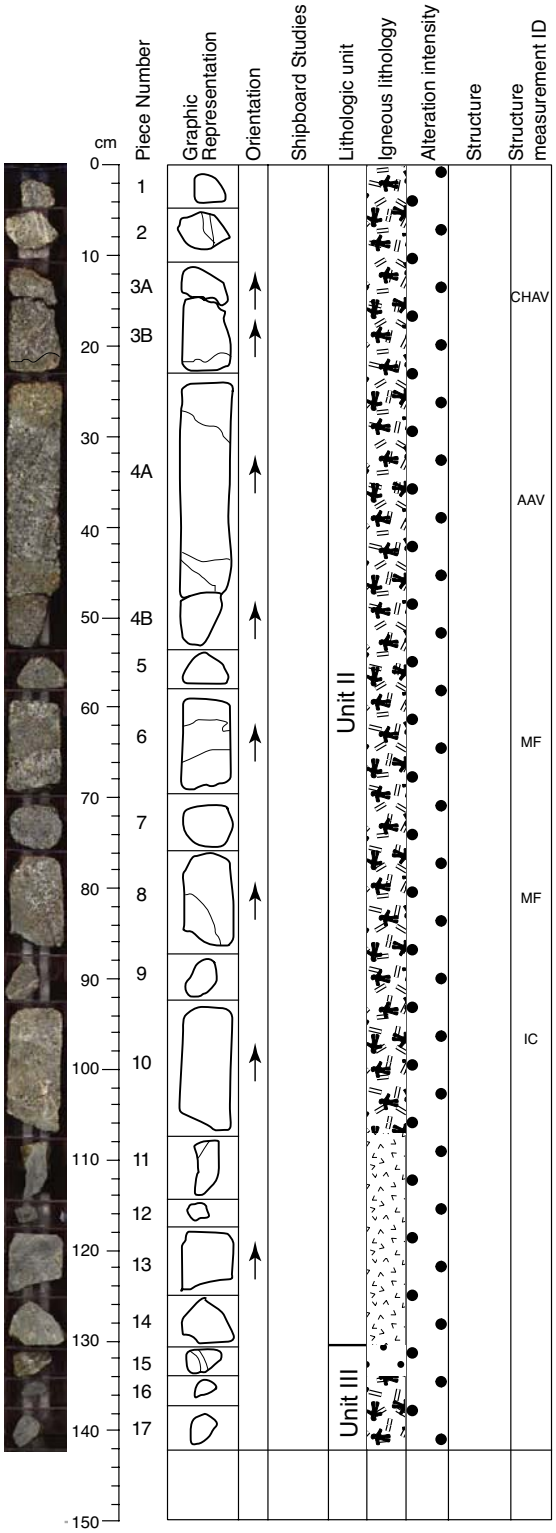
SECONDARY MINERALOGY:
The section is mainly composed of moderately to highly altered gabbro. The gabbro of Pieces 1 to 7A is gray and contains white felsic veinlets and granophyric dikes. At the contact to a felsic vein in Piece 2 a prominent reddish iron oxyhydroxide halo is developed. This halo contains abundant carbonate. Pieces 7B to 7D and the main part of Piece 8 are gray moderately altered diabase. Pieces 9 to 20 are gray to greenish-brown highly altered gabbro. Alteration is dominated by green amphibole after clinopyroxene. Brown amphibole is a minor component (<3%). Alteration of plagioclase to secondary plagioclase and amphibole is minor (<10%). There are noticeable amounts of chlorite/smectite alteration after both clinopyroxene and plagioclase (5-10% in Piece 7A).

METAMORPHIC VEINS:
Dark green amphibole veins are rare in this section (< 0.1 Vol.%). Pieces 1 to 8 are gabbro and diabase with approximately 2 vol.% of white plagioclase-amphibole-zeolite±quartz±sulfide veins which may be of magmatic origin.

THIN SECTIONS: Sample 1275D-16R-1, 56-59 cm

STRUCTURE:
The section consists of interlayered fine to medium to coarse grained oxide gabbro and diabase (Pieces 7 and 8). The layering or banding is generally defined by grain size changes, but is commonly associated with changes in the modal percentage of mineral phases, especially variations in oxide mineral or plagioclase abundance. Layer boundaries occur in Piece 2, 9, and 17. A single oriented layer contact in Piece 1 was inclined 40 degrees in the cut face of the core. Granophyric veins cut Pieces 2-8. A dike gabbro contact is inclined 40 degrees in the cut face of the core in Piece 7, but based on relationships in the next Piece (8), the coarse grained oxide gabbro is intrusive into the diabase. The dike is intruded by the same granophyre that intrudes gabbro. There is no evidence of crystal plastic deformation in the section and all textures are igneous. There is no brittle deformation in this section. Pieces 1, 2, 3 contain amphibole-chlorite veins. Pieces 5, 9, 10 and 14 have crosscutting clay oxide veins.

Core Photo



209-1275D-17R-1 (Section top: 79.7 mbsf)

UNIT-II: OXIDE GABBRO

Pieces 1-14, 16-17

COLOR: Reddish-green

PRIMARY MINERALOGY: OXIDE GABBRO

Plagioclase	Mode 45%-60% Size < 7 mm Shape/Habit Eubhedral to anhedral
Clinopyroxene	Mode 30%-40% Size < 5 mm Shape/Habit Eubhedral to anhedral
Oxide	Mode 5%-15%

COMMENTS: Altered oxide gabbro with various grain sizes. Piece 6 is fine-grained sandwiched by medium-grained domain. Piece 8 is very fine-grained. Pieces 11-14 and 16-17 are very fine-grained gabbro mixed with lesser amount of medium-grained gabbro. Gabbro is mixed into diabase in Piece 13-14.

UNIT-III:

Piece 15

COLOR: Brown

PRIMARY MINERALOGY: TROCTOLITE

Olivine	Mode 85%-90% Size < 8 mm Shape/Habit Subhedral
Plagioclase	Mode 5%-10% Size < 7 mm Shape/Habit Interstitial
Pyroxene	Mode 5% Size < 6 mm Shape/Habit Interstitial
Opaque	Mode <1%

COMMENTS: Highly weathered troctolite with oikocrysts of plagioclase and pyroxenes, intruded by a gabbro dike.

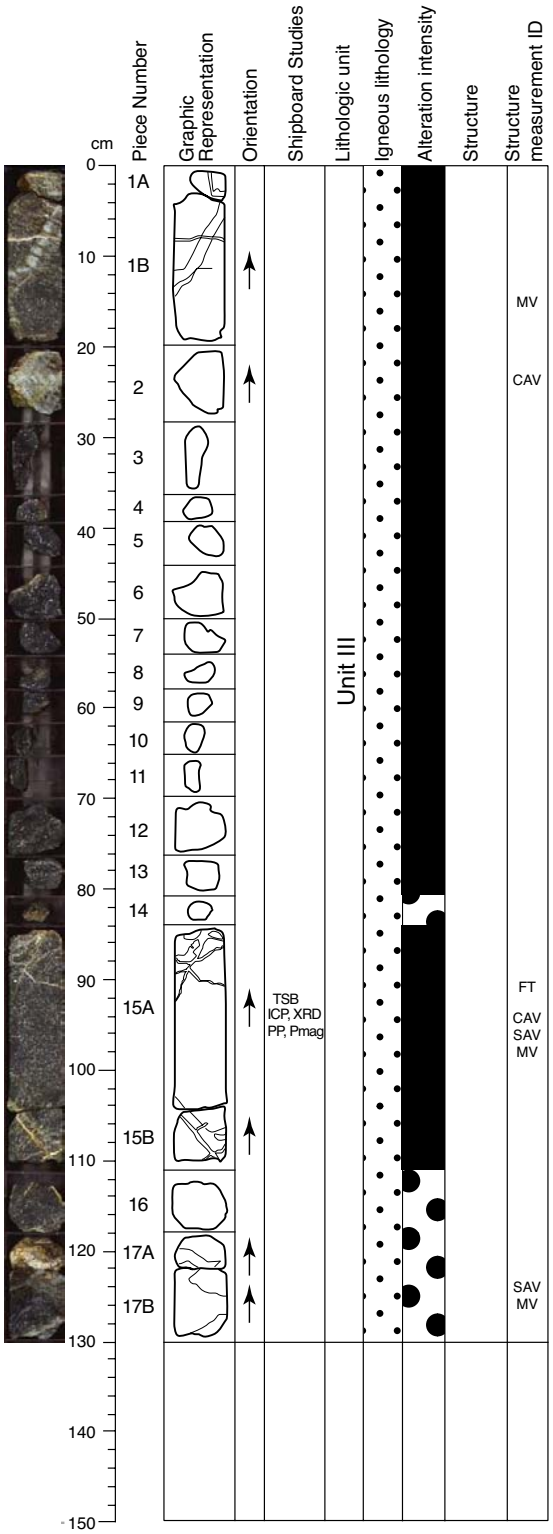
SECONDARY MINERALOGY:
The section is mainly composed of moderately altered microgabbro, gabbro, and troctolite. Alteration of the gabbro and micrograbbro is dominated by green amphibole after clinopyroxene. Brown amphibole is a trace component (<1%). Alteration of plagioclase to secondary plagioclase and amphibole is minor (<5%). The troctolitic rock is cut by a gabbroic dikelet and is moderately altered to talc and magnetite (after olivine), with minor chlorite after plagioclase.

METAMORPHIC VEINS:
Pieces 1 to 10 and 16 to 17 are gabbro with minor (0.1 vol.%) amphibole veins. In addition Piece 2 contains an exceptional yellow-green clay-rich vein. Pieces 11 to 14 are diabase with 0.5 vol.% of amphibole veins. Piece 15 consists of troctolite with a gabbro dikelet. Serpentine filled cross fractures cut this dikelet and account for 2 vol.% of Piece 15.

THIN SECTIONS: Sample 1275D-17R-1, 119-122 cm

STRUCTURE:
The section consists of interlayered fine to medium to coarse grained oxide gabbro and diabase (Pieces 11-16) Layering or banding in gabbroic rocks is generally defined by grain size changes, but is commonly associated with changes in the modal percentage of mineral phases, especially variations in oxide mineral or plagioclase abundance. Layer or lithologic boundaries between gabbros occur in Pieces 3, 5, 7, and 9 and are variably inclined in the cut face of the core between subhorizontal and 60 degrees. The layer boundaries are curviplanar throughout the section.. There is no evidence of crystal plastic deformation in the section. Pieces 13 and 14 contain a magmatic shear zone in which gabbroic xenolithic materials are broken or disaggregated and folded by magma flow within in the diabase dike. Piece 15 contains minor shear fractures. Pieces 2, 13 and 14 contain low concentrations of open fractures. Pieces 2-6 and 8-9 contain green amphibole-chlorite veins. Pieces 3 and 10 contain late crosscutting clay-chlorite veins. Pieces 11, 13 and 14 contain chlorite veins. Piece 15 is a troctolite with a magmatic vein cut by serpentine-chlorite-oxide veins.

Core Photo



209-1275D-17R-2 (Section top: 81.12 mbsf)

UNIT-III: Troctolite

Pieces 1-17

COLOR: Greenish-black with white spots

PRIMARY MINERALOGY: TROCTOLITE

Olivine	Mode 85%-90%
	Size < 8 mm
	Shape/Habit Subhedral
Plagioclase	Mode 5%-10%
	Size < 7 mm
	Shape/Habit Interstitial
Pyroxene	Mode 5%
	Size < 6 mm
	Shape/Habit Interstitial
Opaque	Mode <1%

COMMENTS: Altered troctolite with oikocrysts of plagioclase and pyroxenes. One cm wide gabbro dikes intrude Piece 1-2, 15, and 17.

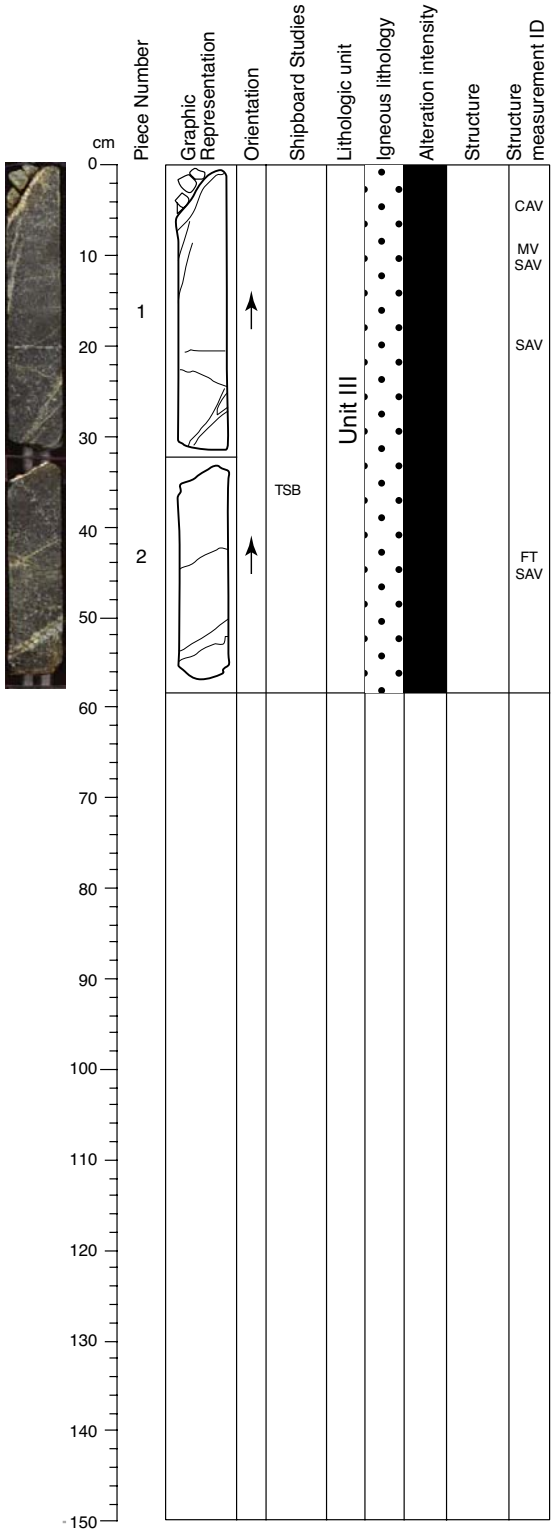
SECONDARY MINERALOGY:
The section is mainly composed of highly to completely altered troctolitic rocks with highly altered gabbro in Pieces 14 and 16. Gabbro dikes in Pieces 1-2, 15, and 17 are completely altered to amphibole, chlorite, and talc. Alteration of the gabbro is dominated by green amphibole and minor brown amphibole after clinopyroxene. Alteration of plagioclase to secondary plagioclase and amphibole is minor (<10%). The troctolitic rock is completely altered to serpentine and oxide after olivine and pyroxene (bastite) and chlorite and carbonate after plagioclase. Talc alteration of the troctolitic rock can be observed along the margins of gabbroic dikelets.

METAMORPHIC VEINS:
The troctolite of this sections shows two generations of veining. Early picrolite veins (0.5 to 1 vol.%) are commonly sigmoidal and locally represent cross fractures of minor gabbroic dikelets. These dikelets and the picrolite veins are crosscut by carbonate-clay veins (Pieces 15 to 17). In Piece 15, a carbonate-clay vein is locally deflected into a picrolite vein occupying its central part for a distance of 1 cm.

THIN SECTIONS: Sample 1275D-17R-2, 91-93 cm

STRUCTURE:
The section consists of highly altered troctolite, feldspathic dunite, feldspathic wehrlite, and locally dunite (e.g., Piece 16) intruded by multiple veins of gabbroic composition in most pieces. The gabbroic veins are highly altered. Olivine makes up most of the troctolitic and ultramafic rocks and tends to be subrounded to ovoid. It, however, has no shape-preferred dimensional orientation. There are variable amounts of interstitial phases resulting in patchy distributions of the rock types listed above even within a single piece (e.g., Piece 16). Interstitial areas between olivine contain altered plagioclase and/or pyroxene and the texture appears igneous and commonly poikilitic, with either plagioclase or pyroxene as the oikocrystic phase surrounding olivine. Olivine grain sizes are well defined by the interstitial material and can reach as large as 0.5 cm. Olivine has clearly not undergone grain size reduction by dynamic recrystallization. The rocks have been overprinted statically by alteration phases that preserve the original igneous texture. Piece 16 appears to have a sharp modal boundary between dunite and feldspathic dunite. The contribution to the interstitial phases made by the crosscutting gabbroic veins is not clear and most in this section seem to cut cleanly across pieces (e.g., Pieces1 and 15). There is no mesoscopic evidence of high temperature crystal plastic deformation of the primary phases in troctolites or ultramafic rocks. Pieces 2 and 7 are cataclastic breccias with fractured clasts of gabbro within a matrix of green amphibole and/or chlorite. Piece 15 is cut by a small fault with unknown total offset. Piece 1 is moderately fractured by shear fractures with little or no offset. Pieces 14-17 are cut by minor shear fractures. The pieces in this section show two generations of veining. Early magmatic veins are crosscut by cream serpentine filled orthogonal tension cracks, which are in turn crosscut by carbonate-clay veins parallel to the original magmatic vein. Piece 15 provides excellent examples of these relationships.

Core Photo



209-1275D-17R-3 (Section top: 82.42 mbsf)

UNIT-III: Troctolite

Pieces 1-2

COLOR: Dark brown and grayish-black

PRIMARY MINERALOGY: TROCTOLITE

Olivine	Mode 85-90%
	Size < 8 mm
	Shape/Habit Subhedral
Plagioclase	Mode 5-10%
	Size < 7 mm
	Shape/Habit Interstitial
Pyroxene	Mode 5%
	Size < 6 mm
	Shape/Habit Interstitial
Opaque	Mode <1%

COMMENTS: Altered troctolite and dunite with oikocrysts of plagioclase and pyroxenes, intruded by 1 cm wide gabbroic dikes.

SECONDARY MINERALOGY:
The section is composed of completely altered troctolitic rocks with small gabbroic dikes that are completely altered to amphibole and chlorite. The troctolitic rock is replaced by serpentine and oxide after olivine and pyroxene (bastite) and chlorite and carbonate after plagioclase. Talc alteration of the troctolitic rock is minor.

METAMORPHIC VEINS:
Straight, single picrolite veins are common throughout this section and account for 1 vol.% of the core.

THINS SECTIONS: Sample 1275D-17R-3. 33-37 cm

STRUCTURE:
The section consists of highly altered troctolite, feldspathic dunite, feldspathic wehrlite, and locally dunite (e.g., Piece 16) intruded by multiple veins of gabbroic composition in both Pieces 1 and 2. The gabbroic veins are highly altered. Olivine makes up most of the troctolitic and ultramafic rocks and tends to be subrounded to ovoid. It, however, has no shape-preferred dimensional orientation. There are variable amounts of interstitial phases resulting in patchy distributions of the rock types listed above even within a single piece (e.g., Pieces 1 and 2). Pieces 1 and 2 are long and display this variation well. Interstitial areas between olivine contain altered plagioclase and/or pyroxene and the texture appears igneous and commonly poikilitic, with either plagioclase or pyroxene as the oikocrystic phase surrounding olivine. Olivine grain sizes are well defined by the interstitial material and can reach as large as 1.0 cm. Olivine has clearly not undergone grain size reduction by dynamic recrystallization. The rocks have been overprinted statically by alteration phases that preserve the original igneous texture. The contribution to the interstitial phases made by the crosscutting gabbroic veins is not clear, but most in this section seem to cut cleanly across pieces (e.g., Pieces 1 and 2). There is no mesoscopic evidence of high temperature crystal plastic deformation of the primary phases in troctolites or ultramafic rocks. Pieces 1 and 2 are cut by shear fractures that have little offset. One small fault in Piece 2 has 0.3 cm offset. Both pieces have white serpentine veins, which are crosscut by later carbonate veins. Piece 2 has a magmatic vein with a green amphibole-chlorite vein that is parallel and cut by later serpentine vein filling sub-orthogonal tension cracks.

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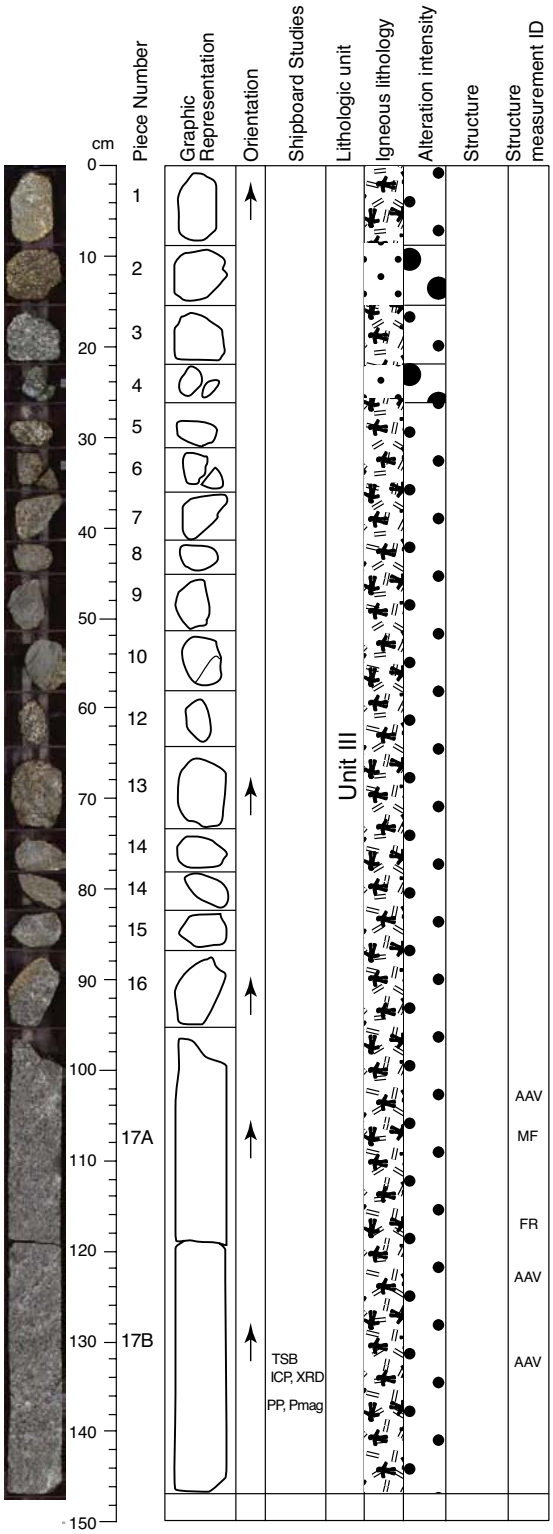
Core Photo



209-1275D-18R-1 (Section top: 84.4 mbsf)

UNIT-III: Troctolite

Pieces 1, 3, 5-17

COLOR: Reddish-green to brownish-gray

PRIMARY MINERALOGY: OXIDE GABBRO

Plagioclase	Mode 45%-60%
	Size < 7 mm
	Shape/Habit Eubhedral to anhedral
Clinopyroxene	Mode 30%-40%
	Size < 5 mm
	Shape/Habit Eubhedral to anhedral
Oxide	Mode 5%-15%

COMMENTS: Medium-grained oxide gabbro with minor amounts of very fine- to fine-grained domains. Piece 10 and 13 is very fine-grained while Pieces 14-15 are fine-grained.

Pieces 2, 4

COLOR: Gray to brown

PRIMARY MINERALOGY: TROCTOLITE

Olivine	Mode 85%-90%
	Size < 8 mm
	Shape/Habit Subhedral
Plagioclase	Mode 5%-10%
	Size < 7 mm
	Shape/Habit Interstitial
Pyroxene	Mode 5%
	Size < 6 mm
	Shape/Habit Interstitial
Opaque	Mode <1%

COMMENTS: Highly altered troctolite with oikocrysts of plagioclase and pyroxenes.

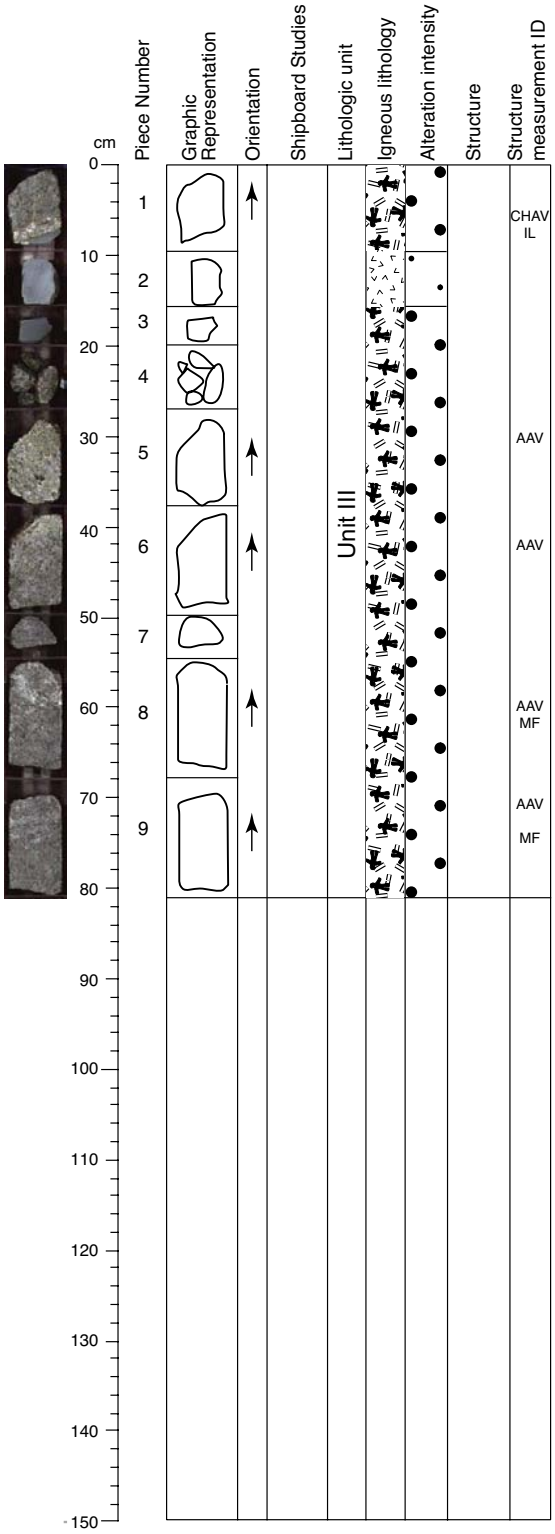
SECONDARY MINERALOGY:
The section is mainly composed of moderately altered gabbro. Alteration is dominated by green amphibole after clinopyroxene. Brown amphibole is a trace component (<3%). Alteration of plagioclase to secondary plagioclase and amphibole is minor (<3%). The troctolitic rock is highly altered to serpentine, talc, and magnetite (after olivine) and chlorite after plagioclase.

METAMORPHIC VEINS:
Pieces 1 and 3 to 17 are gabbro with minor dark green, straight single amphibole veins (0.1 to 0.5 vol.%). Piece 2 is troctolite wit a fine network of carbonate-clay veinlets accounting for 1 vol.%.

THIN SECTIONS: Sample 1275D-18R-1, 131-133 cm

STRUCTURE:
Piece 2 is a composed a feldspathic dunite to troctolite and is similar to the previous core section. The remainder of the section consists of interlayered fine, medium and coarse grained oxide gabbro and diabase (Pieces 11-16) Layering or banding in gabbroic rocks is generally defined by grain size changes, but is commonly associated with changes in the modal percentage of mineral phases, especially variations in oxide mineral or plagioclase abundance. Layer or lithologic boundaries between gabbros occur in Pieces 10, 13 and 17 and are inclined by 50 degrees in the cut face of the core in Piece 17. An oxide-rich zone in Piece 10 has a weak crystal plastic foliation. There is no other mesoscopic evidence of crystal plastic deformation in the section and the textures are igneous, with the exception of Piece 10. Pieces 12 and 17 contain low concentrations of open fractures. Piece 2 is a troctolite showing extensive carbonate veining. Pieces 1, 7, 9, 13, and 17 contain green amphibole-chlorite veins. Pieces 13, 14 and 17 show crosscutting clay-oxide veins and Piece 16 is cut by thin carbonate veins.

Core Photo



209-1275D-18R-2 (Section top: 86.68 mbsf)

UNIT-III:

Pieces 1, 4-9

COLOR: Greenish gray and brown

PRIMARY MINERALOGY: GABBRO

Plagioclase	Mode 45%
	Size < 15 mm
	Shape/Habit Eubhedral to anhedral
Clinopyroxene	Mode 50%
	Size < 20 mm
	Shape/Habit Eubhedral to anhedral
Oxide	Mode 5%

COMMENTS: Medium grained gabbro in Pieces 1, 4, 7-9 while coarse-grained gabbro in Pieces 4-6, and 8. Piece 1 has a 1 cm wide oxide rich band.

Piece 2-3

COLOR: Gray

PRIMARY MINERALOGY: DIABASE

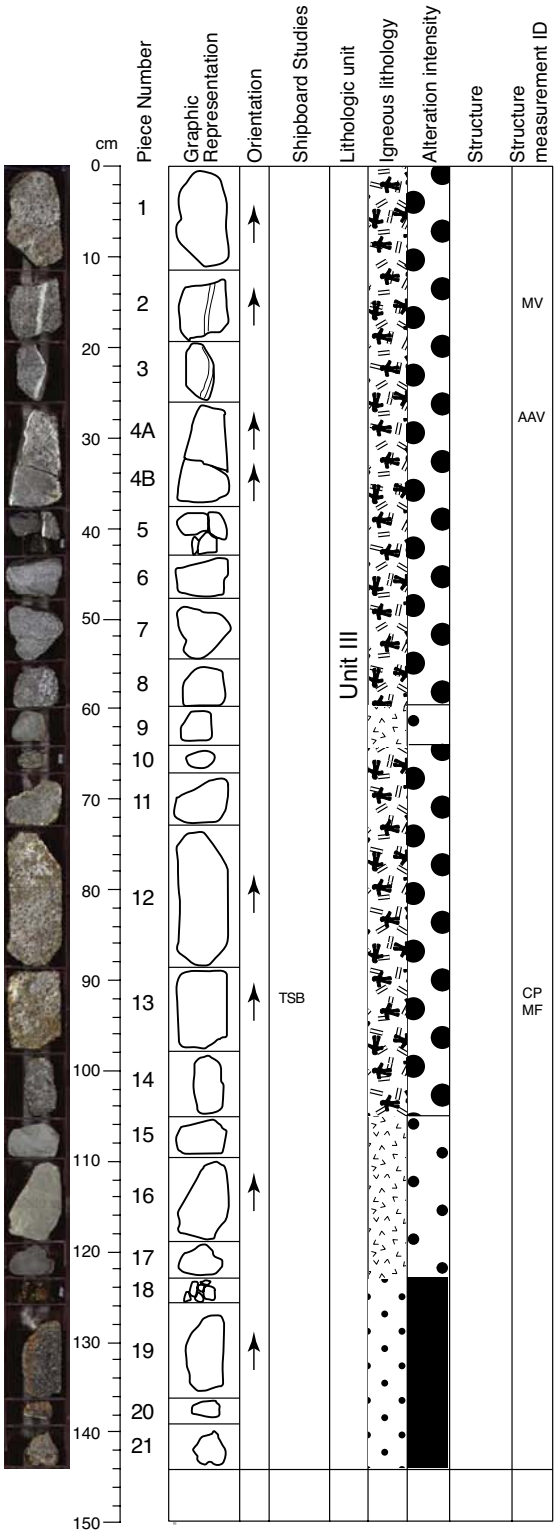
COMMENTS: Aphyric diabase. Piece 2 contains a few plagioclase phenocrysts. Contact to medium grained gabbro is present in Pieces 1.

SECONDARY MINERALOGY:
This section is composed of moderately altered gabbro and gray, slighly altered diabase (Pieces 2 and 3 and edge of Piece 1). The gabbro of Pieces 1 and 4 to 7 has a greenish-gray to brown color and is more intensely altered than the greenish-gray gabbro of Pieces 8 and 9.

METAMORPHIC VEINS:
This section consists of gabbro and minor diabase with minor (0.1 Vol.%), fine, straight, single, dark green amphibole veins.

STRUCTURE:
The section consists of diabase (Pieces 2 and 3) and interlayered fine, medium and coarse grained oxide gabbro (Pieces 1 and 4-9). Piece 1 displays a diabase/gabbro contact that appears to be inclined gently, although the piece is not oriented. Layering or banding in gabbroic rocks is generally defined by grain size changes, but is commonly associated with changes in the modal percentage of mineral phases, especially variations in oxide mineral or plagioclase abundance. Layer or lithologic boundaries between gabbros occur in Pieces 5, 8 and 9 and it is gently inclined at 28 degrees in the cut face of the core. An oxide-rich zone in Piece 9 is undeformed. There is no mesoscopic evidence of crystal plastic deformation in the section and the textures are igneous. There is no brittle deformation in this section. Pieces 1, 4-6, and 8-9 contain green amphibole-chlorite veins. Clay oxide veins are present in Piece 1 along the gabbro-diabase contact.

Core Photo



209-1275D-19R-1 (Section top: 89.4 mbsf)

UNIT-III: Troctolite

Pieces 1-17

COLOR: Gray to greenish-gray and brown

PRIMARY MINERALOGY: OXIDE GABBRO

Plagioclase	Mode 50% Size < 7 mm Shape/Habit Eubhedral to anhedral
Clinopyroxene	Mode 40% Size < 5 mm Shape/Habit Eubhedral to anhedral
Oxide	Mode 12%

COMMENTS: Altered oxide gabbro with various grain sizes. Pieces 1-5, 10-11 are medium-grained, Pieces 6-7 are fine-grained, and Pieces 9, 15-16 are very fine-grained. Pieces 12-14 are coarse grained associated with foliation at 80-88 cm. Piece 8 has medium-grained and fine-grained domains. Granophyre dikes intrude in Pieces 2-3.

Piece 18-21

COLOR: Grayish-black to brown

PRIMARY MINERALOGY: TROCTOLITE

Olivine	Mode 85%-90% Size < 8 mm Shape/Habit Subhedral
Plagioclase	Mode 5%-10% Size < 7 mm Shape/Habit Interstitial
Pyroxene	Mode 5% Size < 6 mm Shape/Habit Interstitial
Opaque	Mode <1%

COMMENTS: Highly altered troctolite with oikocrysts of plagioclase and pyroxenes.

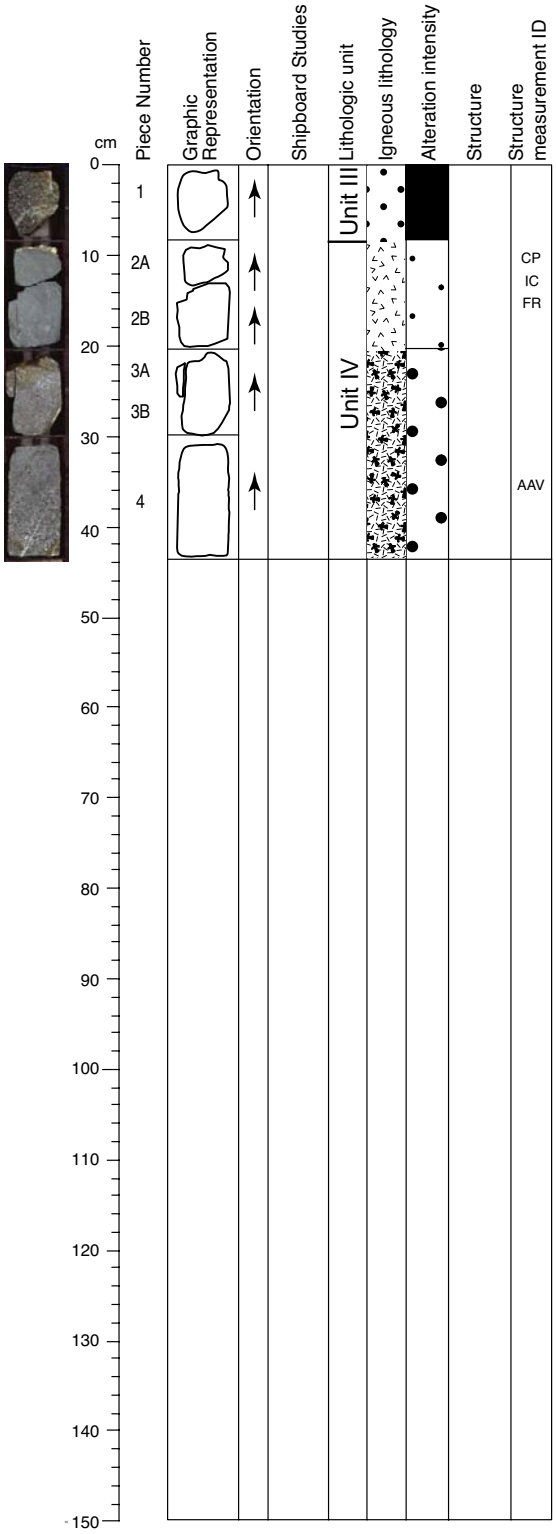
SECONDARY MINERALOGY:
This section is composed mainly of highly altered gabbro. The greenish-gray to brown Pieces (1 and 10 to 14) are more intensely altered than the greenish-gray Pieces (2 to 8). Brown colors are likely due to the presence of a few percent of clay after clinopyroxene and plagioclase. Alteration of the gabbro is dominated by green amphibole and minor brown amphibole after clinopyroxene. Alteration of plagioclase to secondary plagioclase is minor (<3%). Pieces 9 and 15 to 17 are moderately altered gray to greenish-gray microgabbro. The bottom of the section is composed of grayish-black to brown, completely altered troctolite, which contains a few percent of fresh olivine within the black, mainly serpentinized domains.

METAMORPHIC VEINS:
Rare, single, straight amphibole veins account for approximately 0.1 vol.% of the core.

THIN SECTIONS: Sample 1275D-19R-1, 91-93 cm

STRUCTURE:
The section consists of diabase (Pieces 15-18) and interlayered fine, medium and coarse-grained oxide gabbro (Pieces 1-13). Pieces 18-21 are a composed feldspathic wehrlite and troctolite cut by gabbroic veins that are similar to samples in Core 209-1275A-17R. Layering or banding in oxide gabbroic rocks is generally defined by grain size changes, but is commonly associated with changes in the modal percentage of mineral phases, especially variations in oxide mineral or plagioclase abundance. Layer or lithologic boundaries between gabbros occur in Pieces 4 and 8, but they are unoriented. An oxide banding or lamination is inclined 44 degrees in the cut face of the core in Piece 13. Granophyric veins cut Pieces 2-5. There is no mesoscopic evidence of crystal plastic deformation in the section and the textures are igneous in both oxide gabbros and feldspathic wehrlites.There are no contact relationships exposed in the core between the oxide gabbros and feldspathic wehrlites. Pieces 20 and 21 contain minor shear fractures with little or no offset. Pieces 3, 4, 5 and 7 contain low concentrations of open fractures. Pieces 2-4, 6, 7, 11, 12, and 14 contain green amphibole-chlorite veins. Clay-oxide veins cut Pieces 1 and 10. Pieces 18-21 are feldspathic wehrlites to troctolites with magmatic veins cut by orthogonal cream serpentine veins (Piece 21) and later clay-carbonate veins.

Core Photo



209-1275D-19R-2 (Section top: 90.84 mbsf)

UNIT-III: Troctolite

Piece 1

COLOR: Grayish-black and brown

PRIMARY MINERALOGY: TROCTOLITE

Olivine	Mode 85-90%
	Size < 8 mm
	Shape/Habit Subhedral
Plagioclase	Mode 5-10%
	Size < 7 mm
	Shape/Habit Interstitial
Pyroxene	Mode 5%
	Size < 6 mm
	Shape/Habit Interstitial
Opaque	Mode <1%

COMMENTS: Highly altered troctolite with oikocrysts of plagioclase and pyroxenes.

Piece 2

COLOR: Gray

PRIMARY MINERALOGY: DIABASE

COMMENTS: Aphyric diabase with a few plagioclase phenocrysts in Piece 2B.

UNIT-IV: Oxide gabbro

Pieces 3-4

COLOR: Gray to brownish-gray

PRIMARY MINERALOGY: OXIDE GABBRO
Plagioclase Mode 50%
Size < 70 mm
Shape/Habit Eubhedral to anhedral
Clinopyroxene Mode 40%
Size < 50 mm
Shape/Habit Eubhedral to anhedral
Oxide Mode 12%

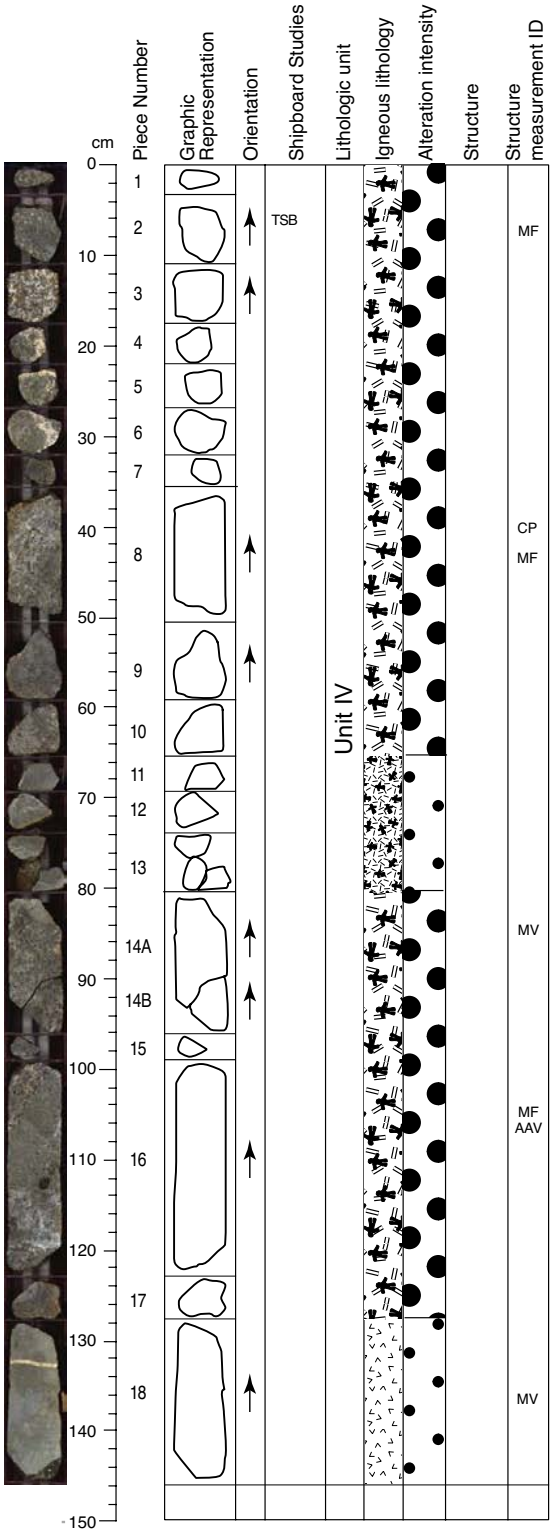
COMMENTS: Fine to medium grained oxide gabbro. Pieces 3-4 are fine-grained while the bottom of Piece 4 is medium-grained A contact between fine-grained and medium-grained is present at 37 cm.

SECONDARY MINERALOGY:
Piece 1 is a grayish-black to brown, completely serpentinized troctolite with a few percent of fresh olivine within the black serpentinized domains and chlorite-altered plagioclase. Piece 2 is a slightly altered light gray diabase, with a 5 mm wide rim of gabbro at the top of the piece. Pieces 3 and 4 are gabbro and show a downward decrease in alteration intensity that follows an increase in grain size.

METAMORPHIC VEINS:
Piece 1 is troctolite with a fine gray-green serpentine vein network (1 vol.%). Piece 2 is diabase with some fine, straight single amphibole veins (0.1 vol.%). Pieces 3 and 4 are gabbro with minor fine, white felsic dikelets; hydrothermal veining is absent.

STRUCTURE:
The section consists of feldspathic wehrlite and troctolite cut by gabbroic veins (Piece 1), diabase (Pieces 2) and interlayered fine, medium and coarse-grained oxide gabbro (Pieces 3-and 4). Piece 1 is similar to pieces in Core 209-1275A-17R. Granophyric veins cut Pieces 3 and 4. Piece 2 is a diabase chilled against a coarse grained gabbro at the top of the piece. There is no mesoscopic evidence of crystal plastic deformation in the section and the textures are igneous in both oxide gabbros and feldspathic wehrlites/troctolites. There are no contact relationships exposed in the core between the oxide gabbros and feldspathic wehrlites. Pieces 2 and 3 contain low concentrations of open fractures. Piece 1 is cut by a gabbroic vein and a crosscutting carbonate-clay vein network. Piece 2 is a diabase with minor chlorite veins.

Core Photo



209-1275D-20R-1 (Section top: 94.0 mbsf)

UNIT-IV: Oxide gabbro

Pieces 1-17

COLOR: Greenish gray to brown

PRIMARY MINERALOGY: GABBRO AND MICROGABBRO

Plagioclase	Mode 50%
	Size 0.1-3 mm
	Shape/Habit Subhedral
Pyroxene	Mode 40%
	Size 0.1-2.5 mm
	Shape/Habit Subhedral to anhedral
Oxide	Mode 10%

COMMENTS: Weakly foliated gabbros with grain size varying from coarse to medium to fine-grained. Piece 1 has a diabese dike parallel to the foliation Pieces 11-13 are very fine-grained microgabbro to diabase. In Piece 14-17 fine-grained to very fine-grained alternate bands. Piece 12 is swelled contact between fine grained gabbro and microgabbro.

Piece 18

COLOR: Brownish-gray

PRIMARY MINERALOGY: DIABASE

COMMENTS: Aphyric diabase cut by a granophyric dike.

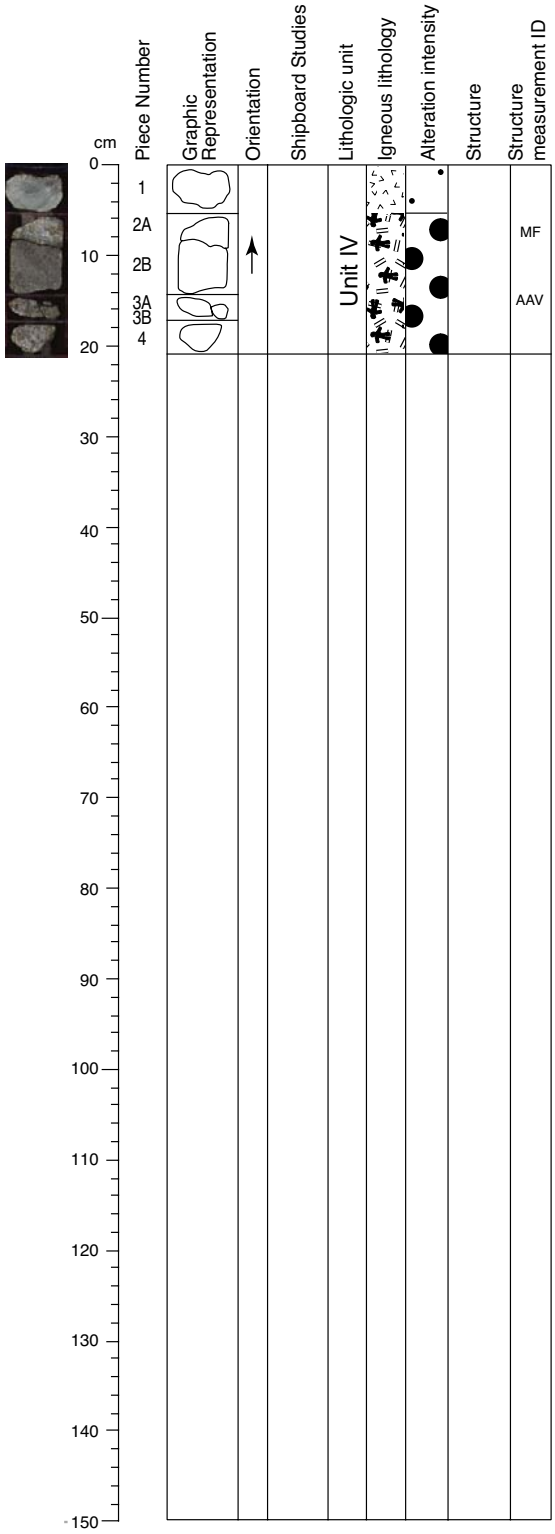
SECONDARY MINERALOGY:
This section is dominantly composed of highly altered gabbro with intercalated moderately altered, gray diabase. The gabbro of Pieces 1 to 3 has a gray to brown color. The gabbro of Pieces 4 to 6 contain abundant secondary plagioclase. The gabbros of Pieces 7 to 10 and 14 to 17 have a gray greenish brownish color. The greenish and browning colors are due to the presence of chlorite or smectite. A thin section of Piece 2 reveals the presence of 10% chlorite/smectite, replacing plagioclase and clinopyroxene. Otherwise, alteration is typical for gabbro at Site 1275, with green and minor brown amphibole after clinopyroxene and a few percent of secondary plagioclase.

METAMORPHIC VEINS:
White felsic dikelets are locally prominent in gabbro (Pieces 4, 5, and 6) and in diabase (Pieces 11 and 14). Rare straight, single amphibole veins are randomly distributed in the section and account for <0.1 vol.% of the core.

THIN SECTIONS: Sample 1275D-20R-1, 5-8 cm

STRUCTURE:
The section consists dominantly interlayered fine, medium and coarse-grained oxide gabbro (Pieces 3-and 4), with diabase (Pieces 12, 13 and 18). Granophyric veins cut Pieces 4-6, 16 and 18. Layering or banding in gabbroic rocks is generally defined by grain size changes, but is commonly associated with changes in the modal percentage of mineral phases, especially variations in oxide mineral or plagioclase abundance. Layer or lithologic boundaries between gabbros occur in Pieces 8 and 16 and contacts are gently inclined to steeply inclined at 54 degrees in the cut face of the core. Piece 10 has a weak lamination defined by oxides. Piece 2 has a microgabbroic band cutting oxide gabbro. There is no mesoscopic evidence of crystal plastic deformation in the section and the textures are igneous. Piece 8 contains low concentrations of open fractures. Sparse green amphibole-chlorite veins and crosscutting clay oxide veins are present throughout the gabbro samples. Thin chlorite veins are present in Pieces 11, 14 and 18 (diabase).

Core Photo



209-1275D-20R-2 (Section top: 95.46 mbsf)

UNIT-IV: Oxide gabbro

Piece 1

COLOR: Gray

PRIMARY MINERALOGY: DIABASE

COMMENTS: Aphyric diabase.

Pieces 2-4

COLOR: Greenish gray and brown

PRIMARY MINERALOGY: GABBRO

Plagioclase	Mode 50% Size 0.1-3 mm Shape/Habit Subhedral
Pyroxene	Mode 40% Size 0.1-2.5 mm Shape/Habit Subhedral to anhedral
Oxide	Mode 10%

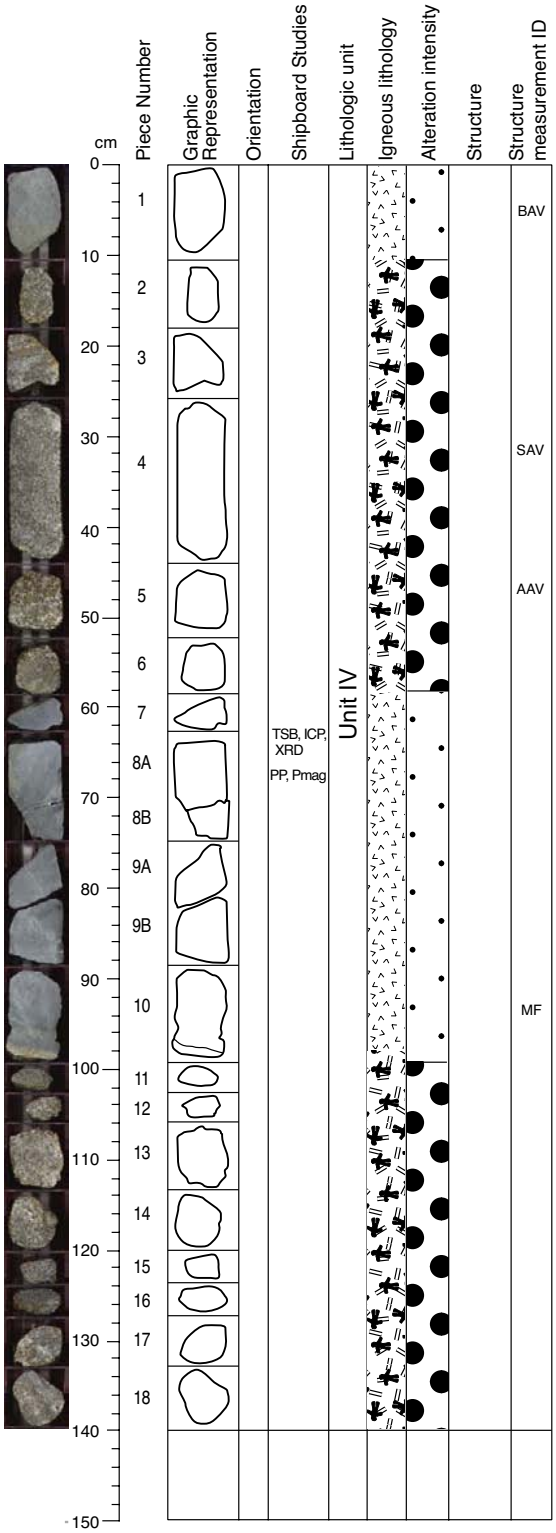
COMMENTS: Slightly altered gabbros with grain size varying from coarse to medium to fine-grained. Foliation is not distinct in all pieces.

SECONDARY MINERALOGY:
The greenish and brownish colors of the gabbro are probably due to the presence of chlorite or smectite replacing plagioclase and clinopyroxene. Otherwise, alteration is typical for gabbro at Site 1275, with green and minor brown amphibole after clinopyroxene and a few percent of secondary plagioclase. Piece 1 appears only slightly altered.

METAMORPHIC VEINS:
Single, straight, dark green amphibole veins are rare in this section (< 0.1 vol.%).

STRUCTURE:
The section consists of diabase (Piece 1) and interlayered fine, medium and coarse-grained oxide gabbro (Pieces 1-4). Layering or banding in oxide gabbroic rocks is generally defined by grain size changes, but is commonly associated with changes in the modal percentage of mineral phases, especially variations in oxide mineral or plagioclase abundance. A gabbroic layer or lithologic contact in Piece 2 is inclined 23 degrees in the cut face of the core. A diabase chilled contact with coarse grained gabbro is exposed in Piece 1. There is no mesoscopic evidence of crystal plastic deformation in the section and the textures are igneous. There is no brittle deformation in this section. Sparse green amphibole-chlorite veins in Pieces 2 and 3 cut earlier black amphibole veins. Thin amphibole-chlorite veins are present in Piece 1 diabase.

Core Photo



209-1275D-21R-1 (Section top: 99.0 mbsf)

UNIT-IV: Oxide gabbro

Pieces 1, 7-10

COLOR: Gray

PRIMARY MINERALOGY: DIABASE

COMMENTS: Aphyric diabase. Piece 10 has a contact with the lower gabbro.

Pieces 2-6, 10-18

COLOR: Greenish gray to brown

PRIMARY MINERALOGY: GABBRO

Plagioclase	Mode 50%
	Size 0.1-3 mm
	Shape/Habit Subhedral
Pyroxene	Mode 40%
	Size 0.1-2.5 mm
	Shape/Habit Subhedral to anhedral
Oxide	Mode 10%

COMMENTS: Altered gabbros with grain size varying from coarse to medium to fine-grained. Foliation is not distinct in all pieces.

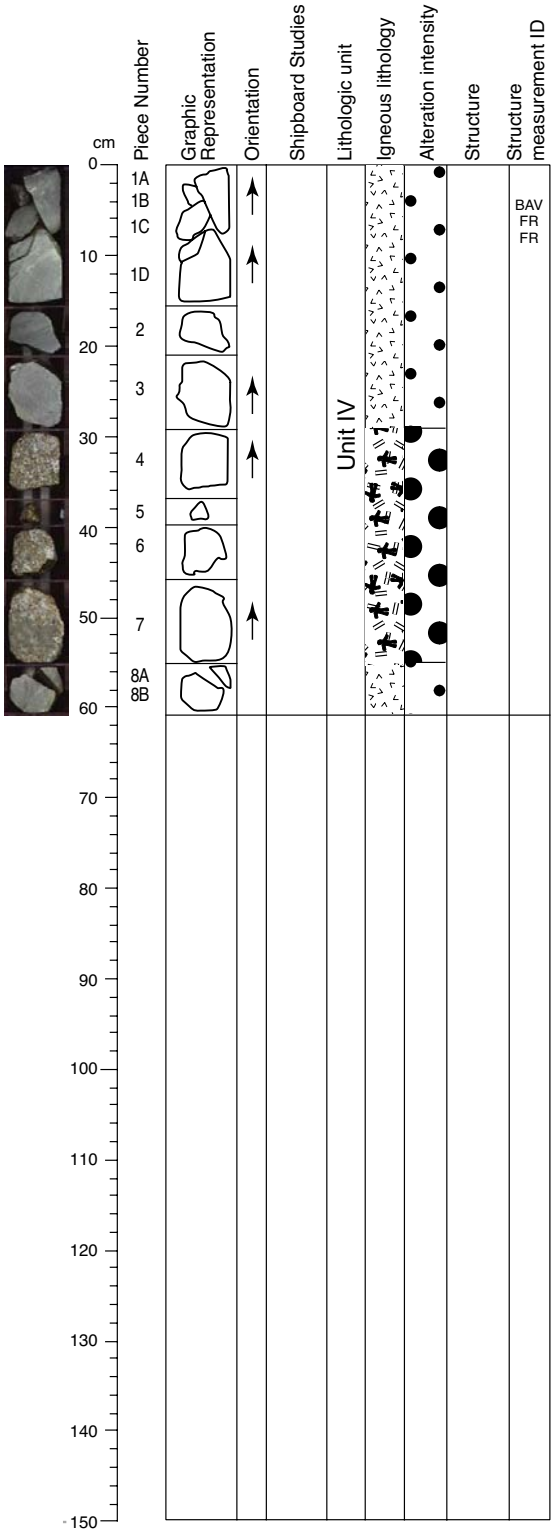
SECONDARY MINERALOGY:
This section is composed of highly altered greenish gray to brown gabbro (Pieces 2 to 6 and 10 to 18) and gray slightly altered diabase (Pieces 1 and 7 to 10). The greenish and brownish colors of the gabbro are probably due to the presence of chlorite or smectite replacing plagioclase and clinopyroxene. Otherwise, alteration is typical for gabbro at Site 1275, with green and minor brown amphibole after clinopyroxene and a few percent of secondary plagioclase. A thin section of Piece 8 indicates about 20% alteration of clinopyroxene and mesostasis to about equal proportions of chlorite and green amphibole.

METAMORPHIC VEINS:
Veining in this section is restricted to minor occurrences of single, straight, dark green amphibole veins (0.1 vol.%) that are somewhat more common in diabase than in gabbro.

THIN SECTIONS: Sample 1275D-21R-1, 63-65 cm

STRUCTURE:
The section consists of diabase (Pieces 1, 7-10) and interlayered fine, medium and coarse grained oxide gabbro. The layering or banding is generally defined by grain size changes, but is commonly associated with changes in the modal percentage of mineral phases, especially variations in oxide mineral or plagioclase abundance. Layer boundaries occur in Pieces 18. A contact between diabase and gabbro is exposed in Piece 10 and its trace is subhorizontal in the cut face of the core.. There is no evidence of crystal plastic deformation in the section and all textures are igneous. There is no brittle deformation in this section. Sparse green amphibole-chlorite veins cut Pieces 2, 4, 5 and 11-18. Distinct green amphibole-chlorite veins are present in diabase Pieces 9-11. A second generation of pale-green white chlorite/amphibole veins are present in diabase Pieces 7, 9, 10 and 11.

Core Photo



209-1275D-21R-2 (Section top: 100.4 mbsf)

UNIT-IV: Oxide gabbro

Pieces 1-3, 8

COLOR: Greenish-gray to brown

PRIMARY MINERALOGY: DIABASE

COMMENTS: Aphyric diabase.

Pieces 4-7

COLOR: Gray

PRIMARY MINERALOGY: GABBRO AND MICROGABBRO

Plagioclase	Mode 50% Size 0.1-3 mm Shape/Habit Subhedral
Pyroxene	Mode 40% Size 0.1-2.5 mm Shape/Habit Subhedral to anhedral
Oxide	Mode 10%

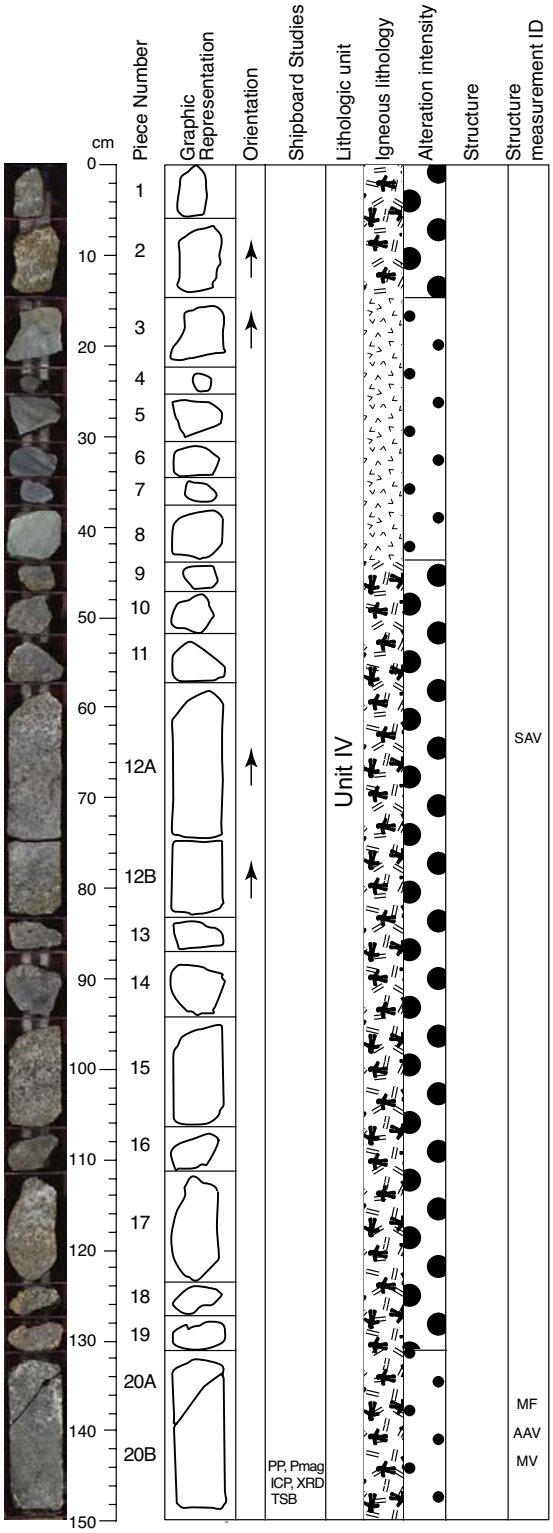
COMMENTS: Altered gabbros with grain size varying from coarse to medium to fine-grained. Piece 7 is weakly foliated and Pieces 4-6 are granular.

SECONDARY MINERALOGY:
This section is composed of highly altered greenish gray to brown gabbro and gray moderately altered diabase. The greenish and brownish colors of the gabbro are probably due to the presence of chlorite or smectite replacing plagioclase and clinopyroxene. Otherwise, alteration is typical for gabbro at Site 1275, with green and minor brown amphibole after clinopyroxene and a minor secondary plagioclase.

METAMORPHIC VEINS:
Veining in this section is largely restricted to minor occurrences of single, straight, dark green amphibole veins (0.1 vol.%) which are somewhat more common in diabase than in gabbro. Diabase in Piece 1 contains green amphibole-chlorite veins that are crosscut by dark green amphibole veins.

STRUCTURE:
The section consists of diabase (Pieces 1-3 and 8) and coarse to medium grained oxide gabbro. A layer contact occurs within Piece 7 and it is inclined 12 degrees in the cut face of the core. No contact relationships are found between diabase and gabbro. There is no evidence of crystal plastic deformation in the section. Piece 1 is cut by minor shear fractures and contains a high concentration of planar open fractures. Sparse green amphibole-chlorite veins cut Pieces 4-7. Distinct green amphibole-chlorite veins are present in diabase Piece 1. It crosscuts earlier pale green-white chlorite-amphibole veins. Pale green-white chlorite-amphibole veins also cut Pieces 2 and 3.

Core Photo



209-1275D-22R-1 (Section top: 103.7 mbsf)

UNIT-IV: Oxide gabbro

Pieces 1-2, 9-19

COLOR: Gray to brownish gray

PRIMARY MINERALOGY: GABBRO AND MICROGABBRO

Plagioclase	Mode 50%
	Size 0.1-3 mm
	Shape/Habit Subhedral
Pyroxene	Mode 40%
	Size 0.1-2.5 mm
	Shape/Habit Subhedral to anhedral
Oxide	Mode 3-10%
	Shape/Habit Interstitial

COMMENTS: Granular to weakly foliated gabbros with grain size varying from coarse to medium to fine-grained. Pieces 9-12 and 15 have 3 to 10 % interstitial oxide.

Piece 3-8

COLOR: Gray

PRIMARY MINERALOGY: DIABASE

COMMENTS: Aphyric diabase cut by a granophyric dike.

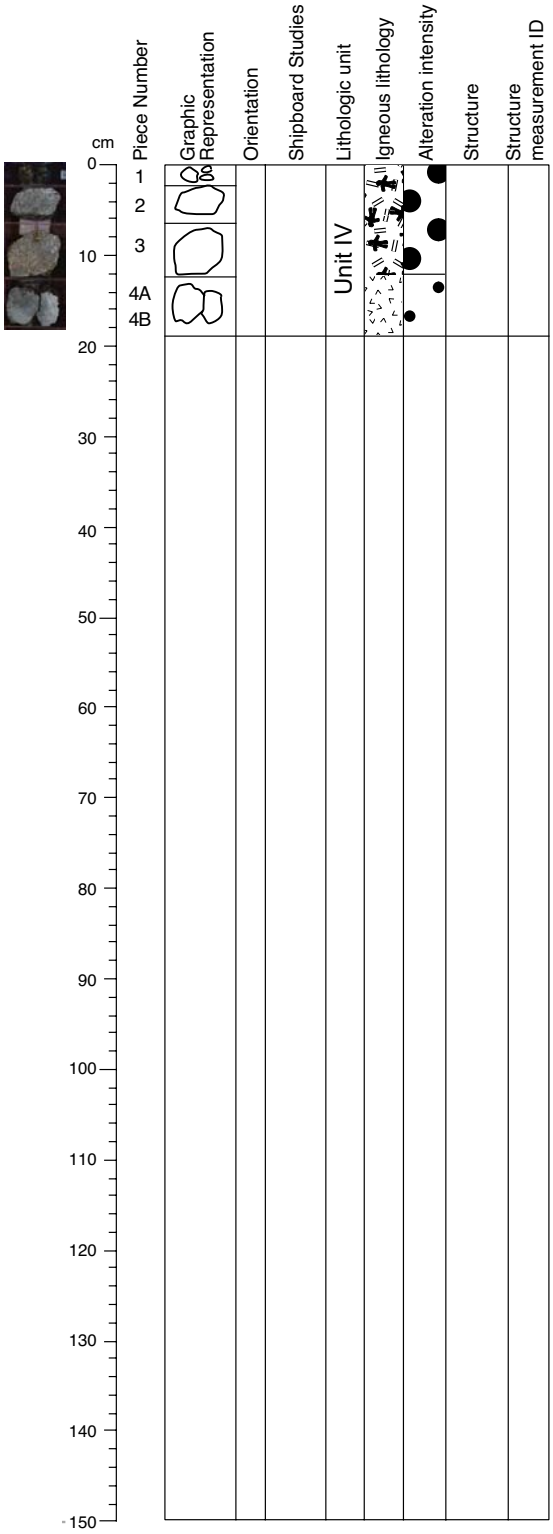
SECONDARY MINERALOGY:
This section is composed of moderately to highly altered greenish gray to brown gabbro and gray moderately altered diabase. The greenish and brownish colors of the gabbro are probably due to the presence of chlorite or smectite replacing plagioclase and clinopyroxene. Otherwise, alteration is typical for gabbro at Site 1275, with green and minor brown amphibole after clinopyroxene and minor secondary plagioclase.

METAMORPHIC VEINS:
Veining in this section is poorly developed and restricted to rare single, straight, dark green amphibole veins (< 0.1 vol.%).

THIN SECTIONS: Sample 1275D-22R-1, 146-148 cm

STRUCTURE:
The section consists of diabase (Pieces 3-8) and coarse to medium grained oxide gabbro (Pieces 1-2, 9-20). No contact relationships are found between diabase and gabbro or within gabbro, except a granophyric vein that cuts Piece 20. There is no evidence of crystal plastic deformation in the section. There is no brittle shear deformation in this section. Sparse green amphibole-chlorite veins and occasional crosscutting clay oxide veins (pieces 17 and 19) are present throughout the gabbro samples. Piece 20 is cut by a green amphibole-chlorite alteration vein within a felsic vein. Thin chlorite veins are also present in diabase (Piece 8).

Core Photo



209-1275D-22R-2 (Section top: 105.2 mbsf)

UNIT-IV: Oxide gabbro

Pieces 1-3

COLOR:

PRIMARY MINERALOGY: GABBRO AND MICROGABBRO

Plagioclase	Mode 50%
	Size 0.1-3 mm
	Shape/Habit Subhedral
Pyroxene	Mode 40%
	Size 0.1-2.5 mm
	Shape/Habit Subhedral to anhedral
Oxide	Mode 10%

COMMENTS: Fine-grained granular gabbro.

Piece 4

COLOR:

PRIMARY MINERALOGY: DIABASE

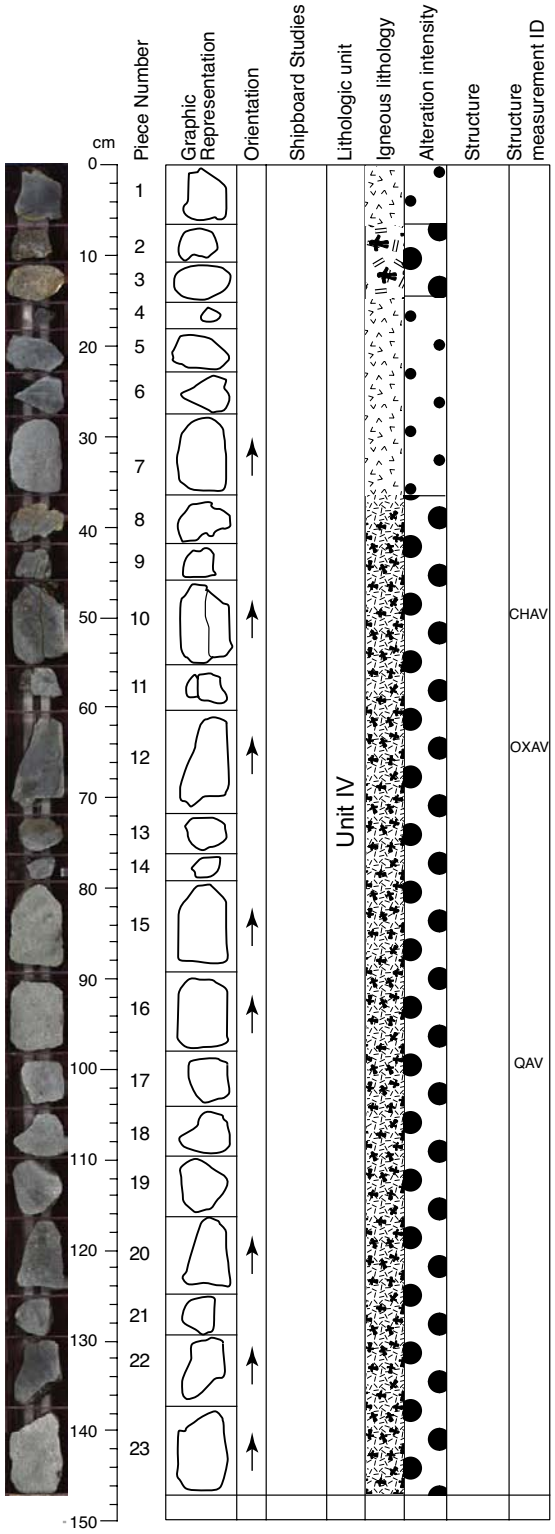
COMMENTS: Aphyric diabase. Diabase and gabbro contact is at the end of the piece.

SECONDARY MINERALOGY:
This section is composed of highly altered greenish gray to brown gabbro and gray moderately altered diabase. The greenish and brownish colors of the gabbro are probably due to the presence of chlorite or smectite replacing plagioclase and clinopyroxene. Otherwise, alteration is typical for gabbro at Site 1275, with green and minor brown amphibole after clinopyroxene and minor secondary plagioclase.

METAMORPHIC VEINS:
Veining in this section is poorly developed and restricted to rare single, straight, dark green amphibole veins (< 0.1 vol.%). In Piece 4 an amphibole vein crosscuts the contact between diabase and gabbro.

STRUCTURE:
The section consists of diabase (Piece 4) and coarse to medium grained oxide gabbro (Pieces 1-4). A contact between diabase and gabbro in Piece 4 shows that the diabase intrudes gabbro. The piece is unoriented. There is no evidence of crystal plastic deformation in the section and textures are igneous. There is no brittle deformation in this section. Oxidized green amphibole veins in diabase of Piece 4 crosscuts the contact with gabbro. Pieces 2 and 3 contain thin green amphibole-chlorite veins.

Core Photo



209-1275D-23R-1 (Section top: 105.5 mbsf)

UNIT-IV: Oxide gabbro

Piece 1, 4-7

COLOR: Gray

PRIMARY MINERALOGY: DIABASE

COMMENTS: Aphyric diabase. Piece 4 has a contact between diabase and gabbro.

Pieces 2-3, 8-23

COLOR: Greenish gray to brown

PRIMARY MINERALOGY: GABBRO AND MICROGABBRO

Plagioclase	Mode 50%
	Size 0.1-3 mm
	Shape/Habit Subhedral
Pyroxene	Mode 40%
	Size 0.1-2.5 mm
	Shape/Habit Subhedral to anhedral
Oxide	Mode 10%

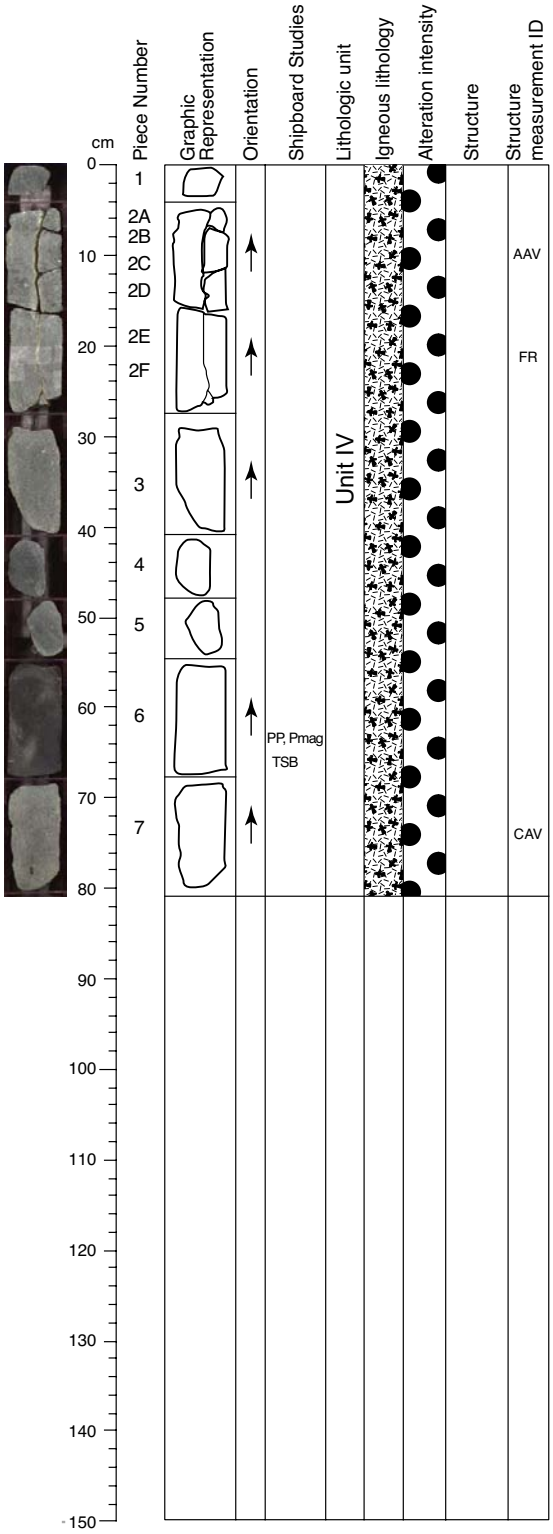
COMMENTS: Pieces 2-3 are altered granular gabbro with fresh plagioclase. Pieces 8-23 are microgabbro. Piece 16 has dispersed xenocrysts up to 0.8 cm.

SECONDARY MINERALOGY:
This section is composed of moderately altered gray micrograbbro (Pieces 1 and 4-7) and brownish-gray highly altered microgabbro (Pieces 2-3). Pieces 12-23 are also moderately altered but contain large olivine crystals that are highly altered to chlorite, amphibole, and late-stage clay/Fe-oxyhydroxide. Pieces 8-11 show brownish domains that are probably due to the presence of chlorite or smectite replacing plagioclase and clinopyroxene. Otherwise, alteration is typical for gabbro at Site 1275, with green and minor brown amphibole after clinopyroxene and minor secondary plagioclase. Olivine xenocrysts in Piece 16 are strongly oxidatively altered to clay and oxide.

METAMORPHIC VEINS:
This section contains minor single, straight amphibole veins (0.1 vol.%). In Pieces 8, 9, and 10 these amphibole veins are partially replaced by chlorite-hematite and clay. An exceptional quartz vein (1 vol. %) is partially preserved on the margin of orange-brown gabbro in Piece 3 which experienced hematite dusting during oxidative alteration.

STRUCTURE:
The section consists of diabase (Pieces 1, 4-23) and coarse to medium grained oxide gabbro (Pieces 2 and 3). The diabase becomes coarser and more porphyritic down the section. No contact relationships are found between diabase and gabbro or within gabbro. There is no evidence of crystal plastic deformation in the section. There is no brittle shear deformation in this section. Oxidized green amphibole vein cuts diabases of Pieces 8-10. Pieces 2 and 3 is cut by a thin green amphibole-chlorite veins and Piece 17 is cut by a white chlorite amphibole vein.

Core Photo



209-1275D-23R-2 (Section top: 106.97 mbsf)

UNIT-IV: Oxide gabbro

Pieces 1-7

COLOR: Gray to white

PRIMARY MINERALOGY: MICROGABBRO

Plagioclase	Mode 50%
	Size 0.1-3 mm
	Shape/Habit Subhedral
Pyroxene	Mode 40%
	Size 0.1-2.5 mm
	Shape/Habit Subhedral to anhedral
Oxide	Mode 10%

COMMENTS:

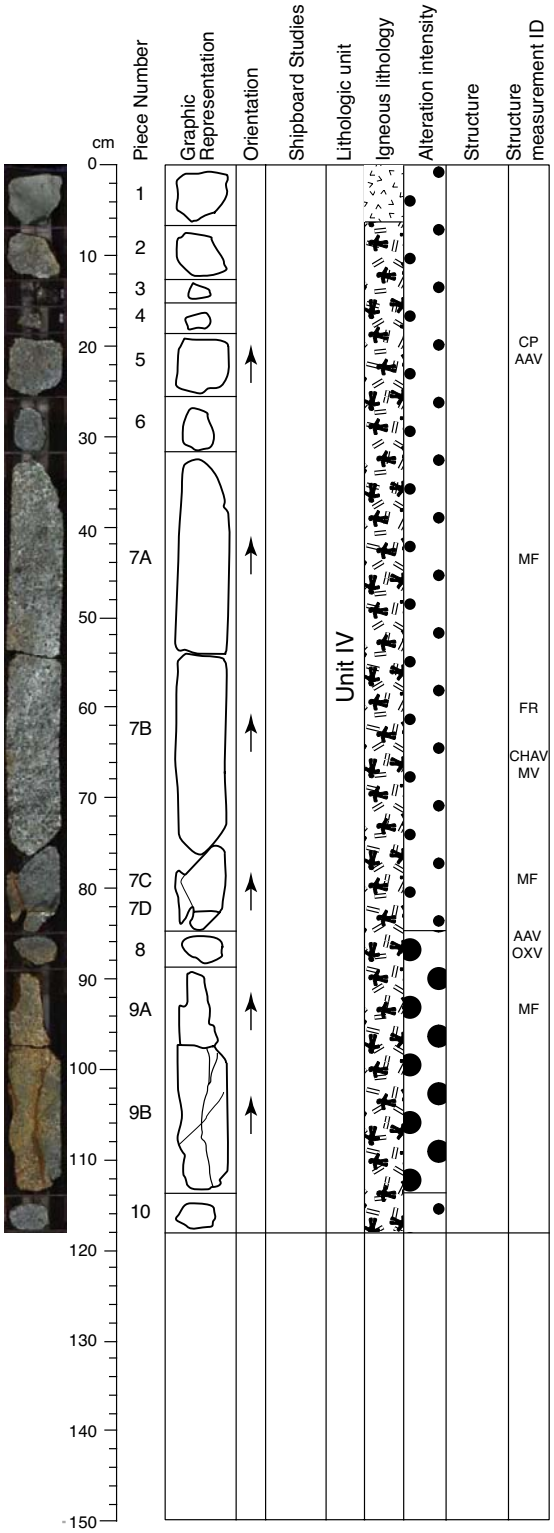
SECONDARY MINERALOGY:
This section is composed of moderately altered (20%) gray to white micrograbbro. Alteration is typical for gabbro at Site 1275, with green and minor brown amphibole after clinopyroxene and minor secondary plagioclase.

METAMORPHIC VEINS:
Veining in this section is restricted to one prominent straight, single chlorite-clay-amphibole vein in Piece 2 (1 vol.%). It may represent an altered amphibole vein that has been altered under oxidative conditions.

THIN SECTIONS: Sample 1275D-23R-2, 65-67 cm

STRUCTURE:
The section consists of porphyritic diabase, which appears continuous from Piece 4 in Core 1275D-22R-2. There is no crystal plastic deformation in the section. Piece 2 is cut by minor shear fractures and contains a moderate concentration of open fractures. Pieces 1 and 2 contain a distinct white chlorite-amphibole vein and Pieces 5 and 7 contain thin light colored chlorite veins.

Core Photo



209-1275D-24R-1 (Section top: 108.7 mbsf)

UNIT-IV: Oxide gabbro

Piece 1

COLOR: Greenish-gray

PRIMARY MINERALOGY: DIABASE

COMMENTS: Aphyric diabase.

Pieces 2-10

COLOR: Greenish-gray and gray

PRIMARY MINERALOGY: GABBRO

Plagioclase	Mode 50%
	Size 0.1-3 mm
	Shape/Habit Subhedral
Pyroxene	Mode 40%
	Size 0.1-2.5 mm
	Shape/Habit Subhedral to anhedral
Oxide	Mode 10%

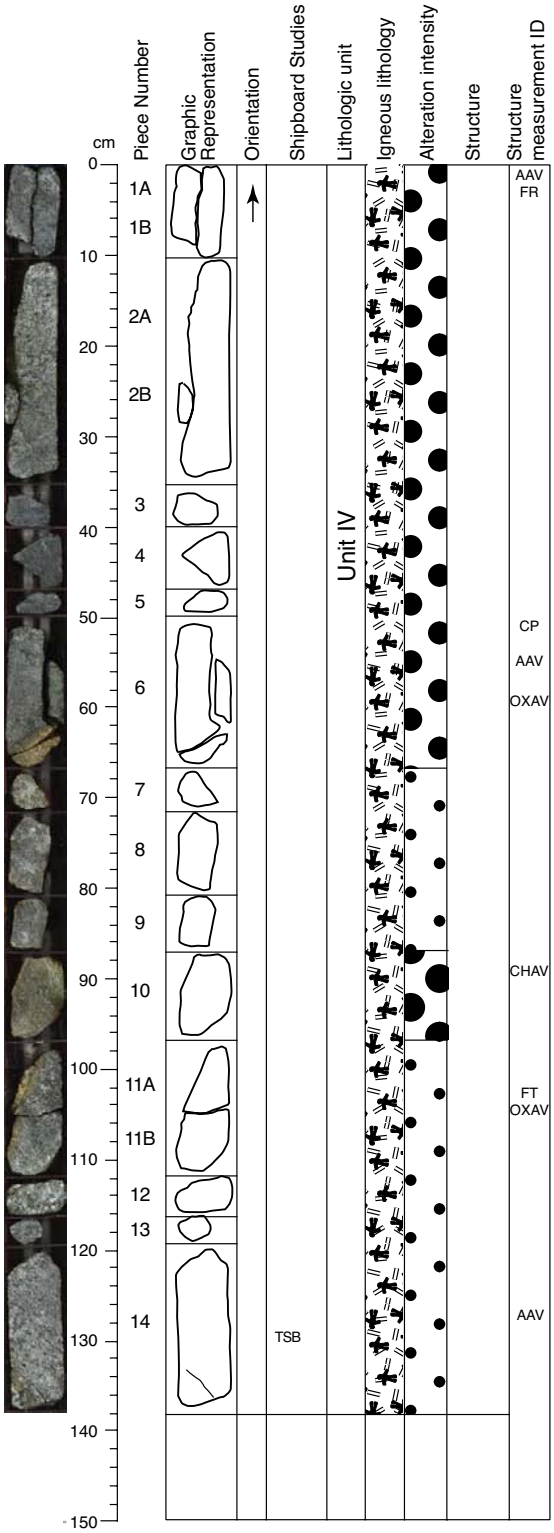
COMMENTS: Fine to medium-grained altered gabbro. Piece 7B contains as much as 12% oxides.

SECONDARY MINERALOGY.:
This section is composed of moderately to highly altered (20-45%) greenish-gray to gray gabbro. Alteration is typical for gabbro at Site 1275, with green and minor brown amphibole after clinopyroxene and minor secondary plagioclase. Alteration to chlorite/smectite is minor. Pieces 8 and 9 are the most altered rocks in this section and show some red staining due to low-temperature oxidative alteration to clay and Fe-oxyhydroxide.

METAMORPHIC VEINS:
This section contains minor, dark green single, straight amphibole veins (0.1 vol.%). In Piece 9 a prominent, branched, up to 1 cm wide carbonate-hematite-clay vein crosscuts an amphibole vein.

STRUCTURE:
The section consists of aphyric diabase (Piece 1) and fine to medium grained oxide gabbro (Pieces 2-10). The diabase may represent the chilled margin of the diabase in the last two sections against the gabbro below. The contact, however, is not exposed in the core. There is no mesoscopic evidence of crystal-plastic deformation in the section. Piece 7 contains a 0.5 cm wide zone of dense fracturing with incipient brecciation. Piece 9 is cut by minor shear fractures with little or no offset. Thin green amphibole veins cut diabase in Piece 1. Pieces 2 and 5-9 contain green amphibole chlorite veins and Pieces 7-9 contain cross cutting red-clay-oxide-carbonate veins which are best developed in Piece 9.

Core Photo



209-1275D-24R-2 (Section top: 109.86 mbsf)

UNIT-IV: Oxide gabbro

Pieces 1-14

COLOR: Greenish-gray

PRIMARY MINERALOGY: GABBRO

Plagioclase	Mode 50%
	Size 0.1-3 mm
	Shape/Habit Subhedral
Pyroxene	Mode 40%
	Size 0.1-2.5 mm
	Shape/Habit Subhedral to anhedral
Oxide	Mode 10%

COMMENTS: Fine to medium grained gabbro. Pieces 1, 12-14 are well foliated. Pieces 2-11 are granular.

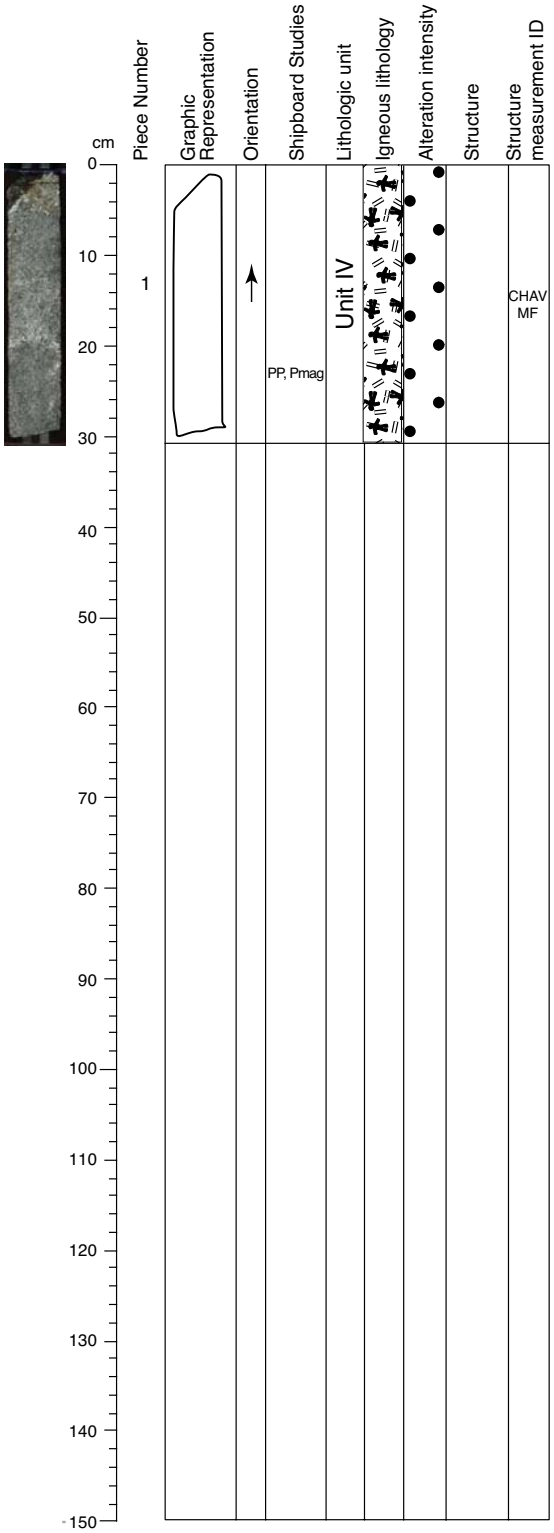
SECONDARY MINERALOGY:
This section is composed of moderately to highly altered (20-60%) greenish-gray grabbro. Alteration is typical for gabbro at Site 1275, with green and minor brown amphibole after clinopyroxene and minor secondary plagioclase. Replacement of clinopyroxene by amphibole ranges from 30% in Pieces 7-9 to 95% in Piece 10. Alteration to chlorite/smectite is minor.

METAMORPHIC VEINS:
Dark green, single, straight amphibole veins are randomly distributed in this section and account for approximately 0.5 vol.% of the core. Gabbro in Piece 6 contains very fine (<1 mm wide) orange brown hematite-rich veinlets with prominent, up to 2 cm wide orange brown halos. A 1 cm thick orange-white, clay-hematite±zeolite±chlorite vein on the margin of Piece 11 may represent a strongly altered felsic dikelet.

THIN SECTIONS: Sample 1275D-24R-2, 128-131 cm

STRUCTURE:
The section consists of fine to medium grained oxide gabbro. Piece 11 contains a 1 cm wide zone of concentrated shear fracturing with incipient brecciation. Pieces 1, 2, 6, 7, 8, 9 and 10 contain low concentrations of open fractures. Pieces 1, 3, 6, 8, 10, 11 and 14 contain green amphibole chlorite veins, sometimes oxidized (Piece 10). Pieces 6 and 7 have clay-oxide veins. Piece 11 has oxide clay alteration along the margins of a granophyric vein. Piece 14 shows a weak oxide lamination or banding inclined at 47 degrees in the cut face of the core. This appears to be a crystal plastic deformation zone, but the strain is low. There is no mesosocopic evidence of crystal plastic deformation in the remainder of the section and the textures appear igneous. There is no brittle deformation in this section. Piece 1 contains green amphibole-chlorite veins crosscut by sparse oxide-clay veins.

Core Photo



209-1275D-24R-3 (Section top: 111.26 mbsf)

UNIT-IV: Oxide gabbro

Pieces 1

COLOR: Greenish-gray

PRIMARY MINERALOGY: GABBRO

Plagioclase	Mode 50%
	Size 0.1-3 mm
	Shape/Habit Subhedral
Pyroxene	Mode 40%
	Size 0.1-2.5 mm
	Shape/Habit Subhedral to anhedral
Oxide	Mode 10%

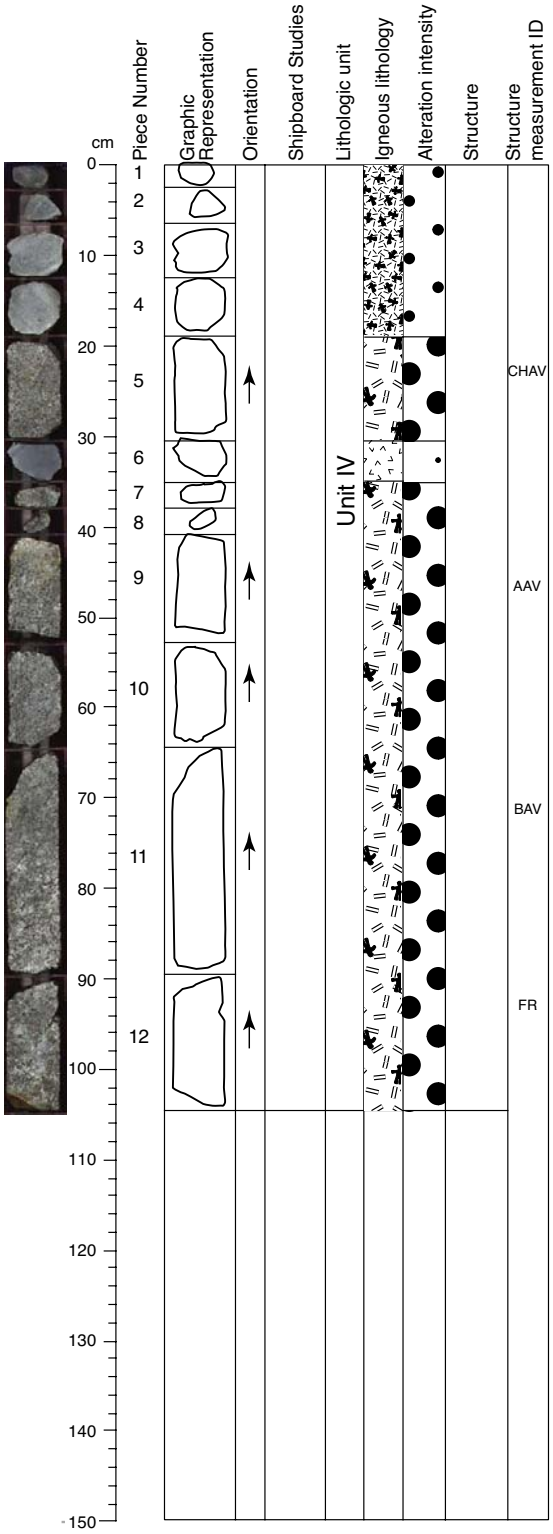
COMMENTS: Weakly foliated fine to medium grained gabbro.

SECONDARY MINERALOGY:
Moderately altered greenish-gray gabbro, similar to that in the previous sections of Core 1275D-24R.

METAMORPHIC VEINS:
Dark green, single, straight amphibole veins are randomly distributed in this section and account for approximately 0.5 vol.% of the core. Locally, these veins show minor orange-brown hematite staining.

STRUCTURE:
The section consists of one piece of oxide gabbro with a layer contact defined by the appearance of a finer grained more mafic or oxide rich unit at 20 cm. The contact is sub-horizontal in the cut face of the core. There is no evidence of crystal plastic deformation. Piece 12 contains minor brittle fractures. Pieces 5, 9, and 11 contain green amphibole chlorite veins, sometimes oxidized. Piece 12 has a carbonate clay vein on its margin.

Core Photo



209-1275D-25R-1 (Section top: 113.2 mbsf)

UNIT-IV: Oxide gabbro

Pieces 1-12

COLOR: Gray to greenish-gray

PRIMARY MINERALOGY: MICROGABBRO AND GABBRO

Plagioclase	Mode 50%
	Size 0.1 mm
	Shape/Habit Subhedral
Pyroxene	Mode 40%
	Size 0.1 mm
	Shape/Habit Subhedral to anhedral
Oxide	Mode 10%

COMMENTS: Pieces 1-4 are microgabbro including altered xenocrysts (size up to 4 mm). Piece 5 is fine-grained granular gabbro. Pieces 7-12 are fine to medium-grained foliated gabbro with up to 10 % oxide.

Piece 6

COLOR: Gray

PRIMARY MINERALOGY: DIABASE

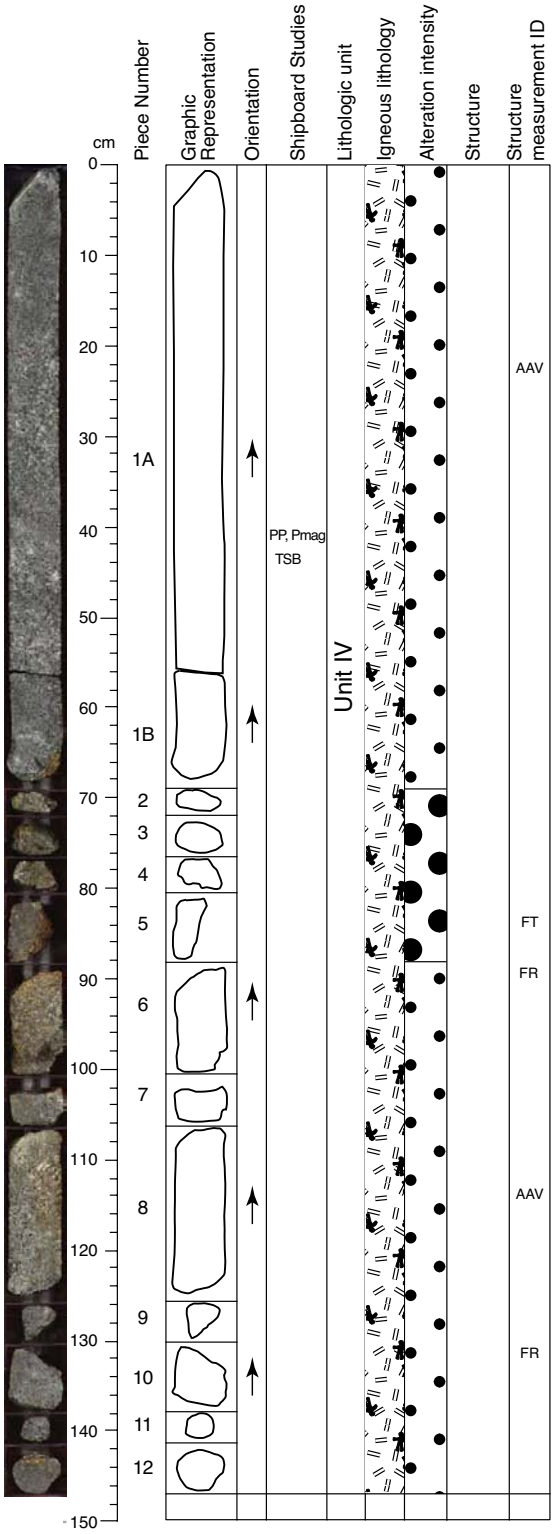
COMMENTS: Aphyric diabase.

SECONDARY MINERALOGY.:
This section has moderately (20%, Piece 1-4) gray gabbro and highly altered (45-55%) greenish-gray gabbro with one piece (Piece 6) of gray, slightly altered (8%) diabase. Alteration style is dominantly green amphibole after clinopyroxene. The greenish-gray gabbro has noticeable amounts of chlorite/smectite after plagioclase and clinopyroxene. Brown amphibole and secondary plagioclase are minor components.

METAMORPHIC VEINS:
This section contains minor, dark green, single, straight amphibole veins (0.1 vol.%). A remnant of a rusty brown carbonate-hematite-clay vein is preserved on the lower margin of Piece 12.

STRUCTURE:
The section consists of diabase (Pieces 1-4 and 6) and interlayered fine to medium grained oxide gabbro (Pieces 5 and 7-14). The diabase in Piece 1-4 is olivine bearing and Piece 6 is a finer grained chilled diabase. There is no mesoscopic evidence of crystal plastic deformation in the section and the textures are igneous. Piece 12 is cut by minor brittle fractures. Pieces 5, 9, and 11 are cut by green amphibole chlorite veins, sometimes oxidized. Piece 12 has a carbonate clay vein on its margin.

Core Photo



209-1275D-25R-2 (Section top: 114.2 mbsf)

UNIT-IV: Oxide gabbro

Pieces 1-11

COLOR: Greenish-gray and brown

PRIMARY MINERALOGY: GABBRO

Plagioclase	Mode 50%
	Size 0.1 mm
	Shape/Habit Subhedral
Pyroxene	Mode 40%
	Size 0.1 mm
	Shape/Habit Subhedral to anhedral
Oxide	Mode 10%

COMMENTS: Fine to very fine alternate bands in Piece 1. Pieces 2-11 are altered gabbro with mixed grain size with up to 15% oxide.

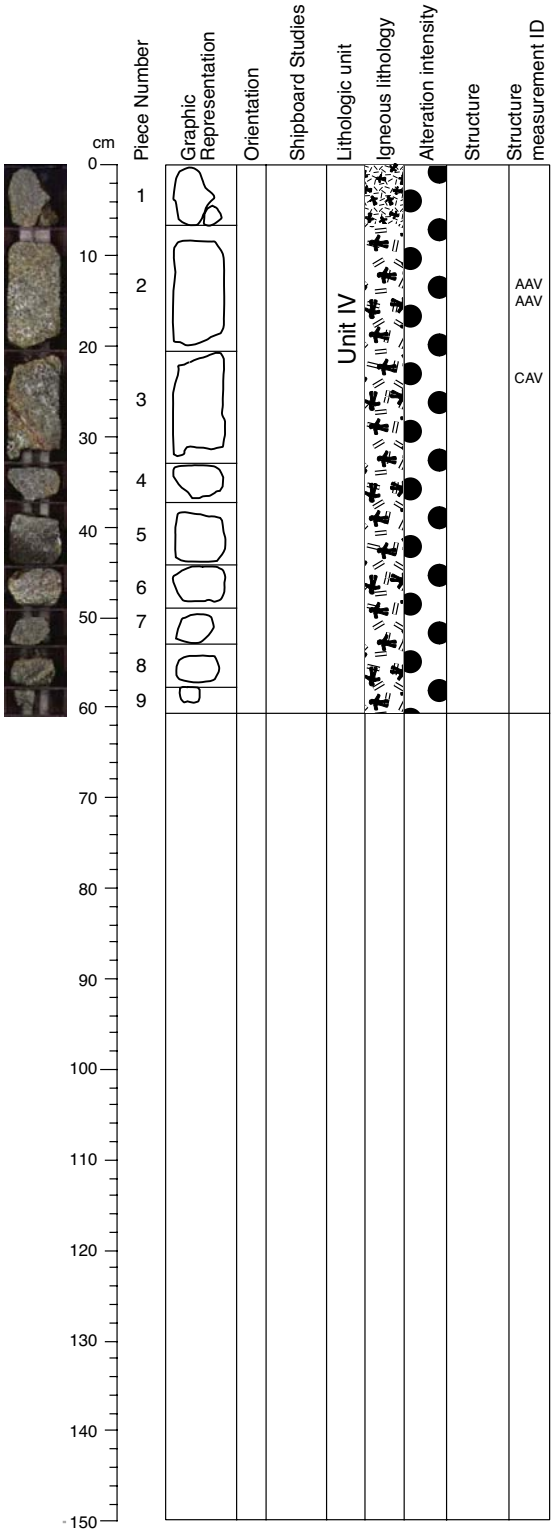
SECONDARY MINERALOGY:
This section has moderately to highly altered greenish-gray and brown gabbro. Alteration style is dominantly green amphibole after clinopyroxene. Noticeable amounts of chlorite/smectite after plagioclase and clinopyroxene are present in the greenish and brownish areas. Brown amphibole and secondary plagioclase are minor components. Piece 1 is the least altered rock in this section and reveals only about 10% of alteration in thin section, mainly green amphibole after clinopyroxene. Pieces 2-5 are the most altered due to brecciation and green chlorite-clay alteration.

METAMORPHIC VEINS:
This section contains minor, dark green, single, straight amphibole veins (0.5 vol.%).

THIN SECTIONS: Sample 1275D-25R-2, 42-45 cm

STRUCTURE:
The section consists of fine to medium gained oxide gabbro. There are no well defined layer contacts in the section and no mesoscopic evidence of crystal plastic deformation. Pieces 3 through 5 comprise cataclastic breccia with 0.2 cm to 0.5 cm subangular clasts of gabbro and diabase in a matrix of green amphibole and/or chlorite. Breccia in some areas contains 1 cm wide bands of carbonate matrix breccia. Pieces 2 and 6 are cut by minor to moderate concentrations of shear fractures with little or no offset. Piece 10 contains very minor shear fractures. Pieces 1, 3-5, 8, 10 and 11 contain green amphibole chlorite veins, sometimes oxidized.

Core Photo



209-1275D-25R-3 (Section top: 115.72 mbsf)

UNIT-IV: Oxide gabbro

Pieces 1-9

COLOR: Greenish-gray to brown

PRIMARY MINERALOGY: MICROGABBRO AND GABBRO

Plagioclase	Mode 50%
	Size 0.1 mm
	Shape/Habit Subhedral
Pyroxene	Mode 40%
	Size 0.1 mm
	Shape/Habit Subhedral to anhedral
Oxide	Mode 10%

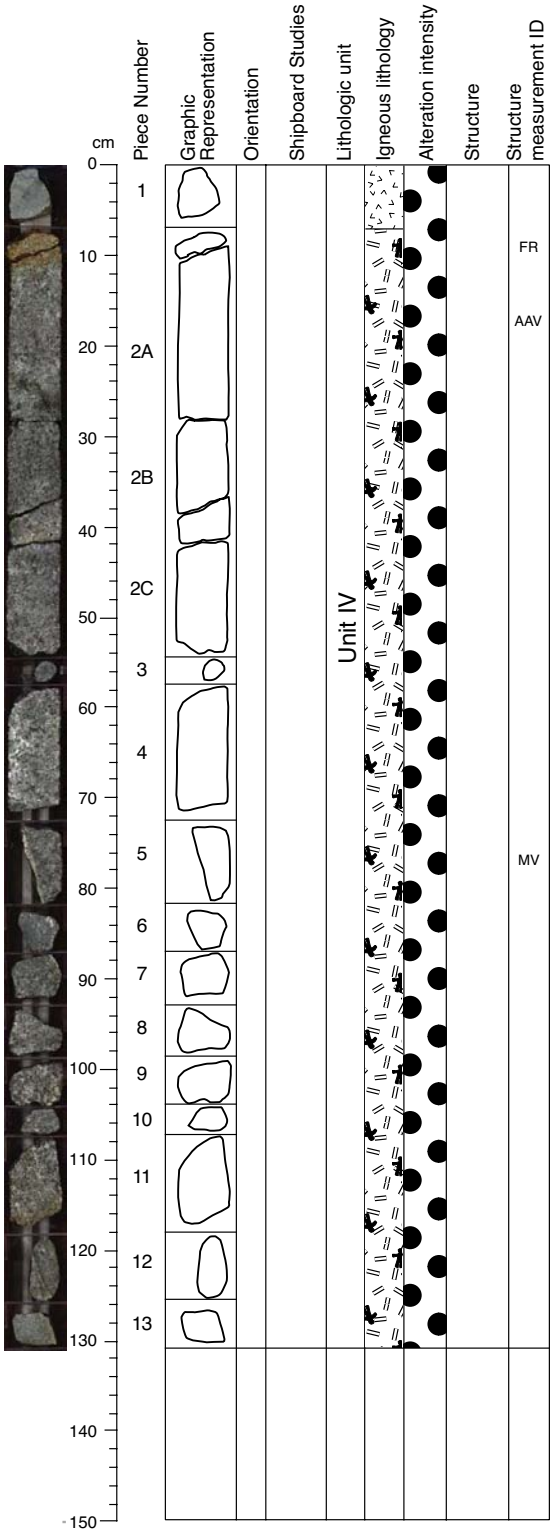
COMMENTS: Piece 1 is microgabbro. Pieces 2-9 are fine to very fine-grained gabbro. Piece 3 is cut by completely altered dike. Pieces 4-9 have large oxides (up to 6 mm).

SECONDARY MINERALOGY:
This section has highly altered greenish-gray and brown gabbro. Alteration style is dominantly green amphibole after clinopyroxene. Noticeable amounts of chlorite/smectite after plagioclase and clinopyroxene are present in the greenish and brownish areas. Brown amphibole and secondary plagioclase are minor components. Piece 2 has a red oxidation halo with clay and Fe-oxyhydroxide along a carbonate veins.

METAMORPHIC VEINS:
This section contains rare, dark green, single, straight amphibole veins (<0.1 vol.%). In addition, a single composite carbonate-hematite-clay vein accounts for 2 vol.% of Piece 2.

STRUCTURE:
The section consists of fine to medium gained oxide gabbro. There are no well-defined layer contacts in the section and no mesoscopic evidence of crystal plastic deformation. There is also no brittle shear deformation in this section. Pieces 1, 2, 4 and 8 are cut by green amphibole chlorite veins, sometimes oxidized. Piece 3 has a 0.3cm thick, late clay-carbonate vein.

Core Photo



209-1275D-26R-1 (Section top: 118.2 mbsf)

UNIT-IV: Oxide gabbro

Piece 1

COLOR: Gray

PRIMARY MINERALOGY: DIABASE

COMMENTS: Aphyric diabase with a few plagioclase phenocrysts.

Pieces 2-13

COLOR: Greenish-gray

PRIMARY MINERALOGY: OXIDE GABBRO

Plagioclase	Mode 50%
	Size < 7 mm
	Shape/Habit Eubhedral to anhedral
Clinopyroxene	Mode 40%
	Size < 5 mm
	Shape/Habit Eubhedral to anhedral
Oxide	Mode 10%

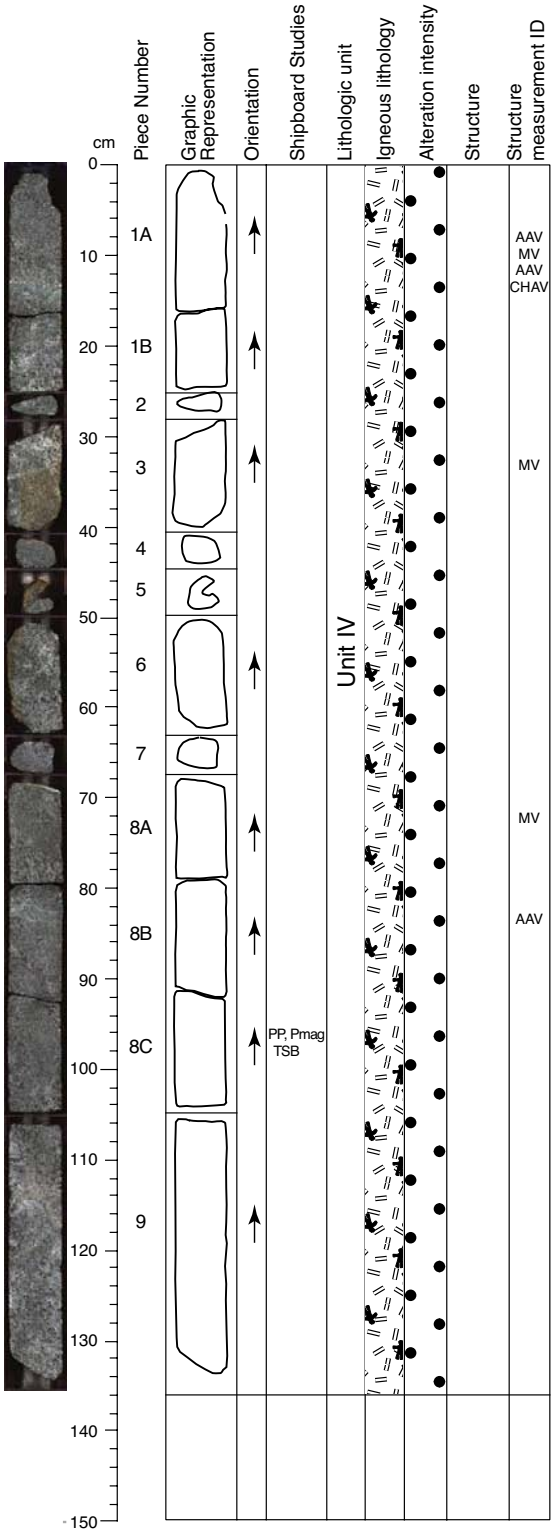
COMMENTS: Medium to fine grained oxide gabbro. Pieces 2-12 are medium-grained while Piece 13 is fine-grained.

SECONDARY MINERALOGY:
This section has highly altered greenish-gray gabbro and a highly altered gray diabase. Alteration style is dominated by nearly complete replacement of clinopyroxene by green amphibole. Noticeable amounts of chlorite/smectite after plagioclase and clinopyroxene are also present. Locally (Pieces 2 and 5), reddish-brown alteration halos with clay and Fe-oxyhydroxide are developed along amphibole veins that were apparently used by recharging seawater.

METAMORPHIC VEINS:
This section contains minor, dark green, single, straight amphibole veins (0.1 vol.%). Red-brown halos are developed along these veins at the top of Piece 2 and in Piece 5.

STRUCTURE:
The section consists of olivine phyric diabase (Piece 1) and oxide gabbro (Pieces 2-13). There are no well-defined layer contacts in the section and no mesoscopic evidence of crystal plastic deformation. Piece 2 has low concentrations of gently inclined open fractures. Pieces 2, 4, 5, 7-9, 12 and 13 contain green amphibole chlorite veins, sometimes oxidized. Piece 2a is cut by clay oxide veins.

Core Photo



209-1275D-26R-2 (Section top: 119.51 mbsf)

UNIT-IV: Oxide gabbro

Pieces 1-9

COLOR: Greenish-gray to brown

PRIMARY MINERALOGY: OXIDE GABBRO

Plagioclase	Mode 50%
	Size < 7 mm
	Shape/Habit Eubhedral to anhedral
Clinopyroxene	Mode 40%
	Size < 5 mm
	Shape/Habit Eubhedral to anhedral
Oxide	Mode 10%

COMMENTS: Medium to fine grained oxide gabbro. Pieces 1-8 are locally foliated and contain patches or bands of oxides rich domains. Piece 9 contains a pegmatoidal patch as large as 1 cm.

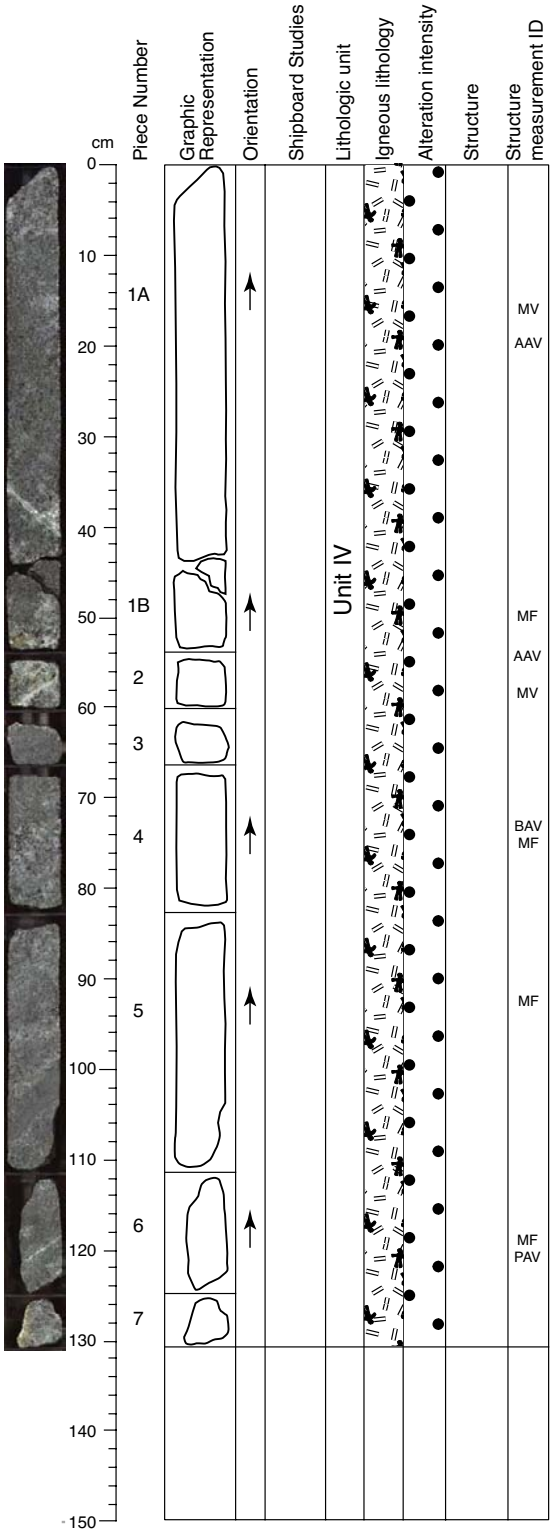
SECONDARY MINERALOGY:
Gabbro in this section is moderately altered (35%). The alteration style is dominated by 50-70% alteration of clinopyroxene to green and minor brown amphibole. Chlorite/smectite after plagioclase and clinopyroxene is present in minor amounts.

METAMORPHIC VEINS:
This section contains minor, dark green, single, straight amphibole veins (0.1 vol.%). A fine (5 mm wide) plagioclase-amphibole magmatic veinlet is present at the top of Piece 8A.

THIN SECTIONS: Sample 1275D-26R-2, 97-99 cm

STRUCTURE:
The section consist of medium to fine grained oxide gabbro. There are no well-defined layer contacts in the section and there is no mesoscopic evidence of crystal plastic deformation. All textures are igneous. There is no brittle shear deformation in this section. Pieces 1-3, 5, 6, 8B and 9 contain green amphibole chlorite veins.

Core Photo



209-1275D-26R-3 (Section top: 120.87 mbsf)

UNIT-IV: Oxide gabbro

Pieces 1-7

COLOR: Greenish-gray

PRIMARY MINERALOGY: OXIDE GABBRO

Plagioclase	Mode 50%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Clinopyroxene	Mode 40%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Oxide	Mode 10%

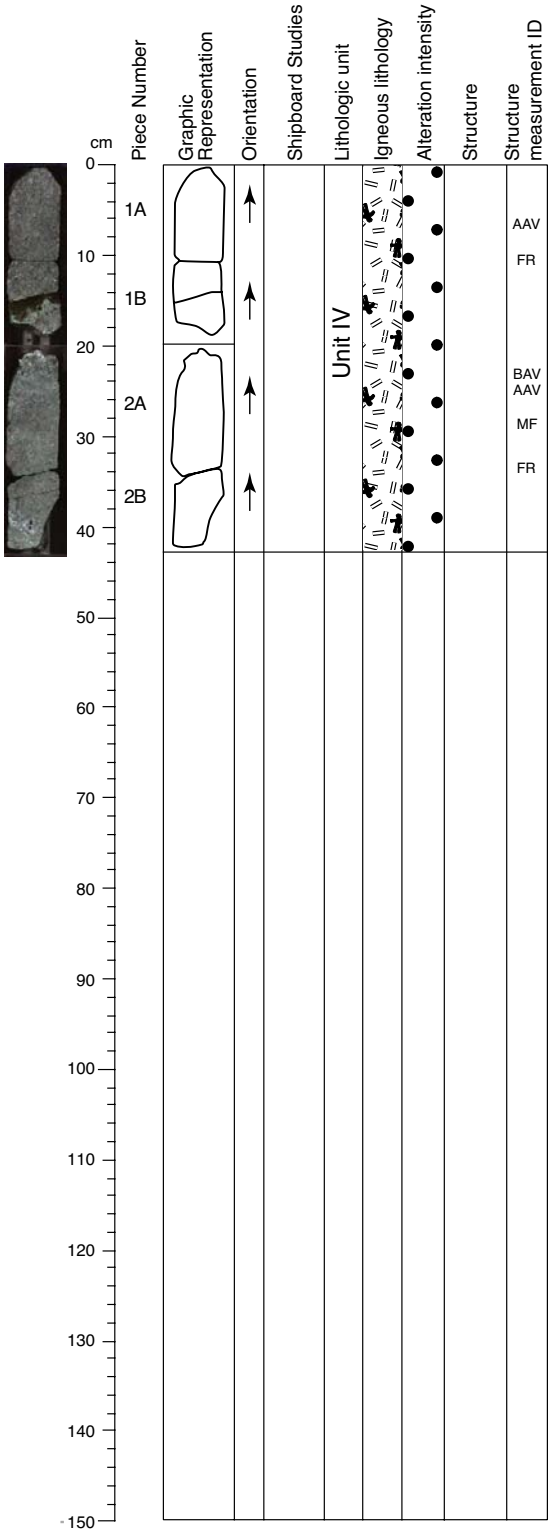
COMMENTS: Oxide gabbro with various grain sizes. Majority of the section consists of fine-grained or medium-grained gabbros. Minor amount of coarse-grained gabbro at 50-61 cm and 73-83 cm, and very fine-grained gabbro in Piece 3 and in Piece 5 (103-107 cm). Piece 4A contains a pegmatoidal patch. Granophyre dikes at 39 cm (now altered) and at 59 and 121 cm.

SECONDARY MINERALOGY:
Gabbro in this section is moderately altered (30%). The alteration style is dominated by 40-70% alteration of clinopyroxene to green and minor brown amphibole. Chlorite/smectite after plagioclase and clinopyroxene is present in minor amounts.

METAMORPHIC VEINS:
This section contains rare, dark green, single, straight amphibole veins (< 0.1 vol.%). Magmatic plagioclase-amphibole veins account for approximately 1 vol.% of the core.

STRUCTURE:
The section consists of interlayered fine, medium, and coarse-grained oxide gabbro, cut by granophyric veins in Pieces 1, 2 and 6. Layering or banding in oxide gabbroic rocks is generally defined by grain size changes, but are commonly associated with changes in the modal percentage of mineral phases, especially variations in oxide mineral or plagioclase abundance. Layer or lithologic boundaries between gabbros that mark changes in grain size are have variable orientation. In Piece 5 they range from subhorizontal to inclined 40 degrees in the cut face of the core. The contacts are commonly curviplanar. There is no mesoscopic evidence of crystal plastic deformation in the section. There is no brittle shear deformation in this section. Pieces 1, 2, and 4-7 contain green amphibole chlorite veins, sometimes oxidized. Pieces 2 and 6 show green amphibole veins following/replacing felsic magmatic veins. Piece 6 shows a green amphibole vein crosscutting an earlier amphibole replaced felsic vein.

Core Photo



209-1275D-26R-4 (Section top: 122.18 mbsf)

UNIT-IV: Oxide gabbro

Pieces 1-2

COLOR: Greenish-gray

PRIMARY MINERALOGY: OXIDE GABBRO

Plagioclase	Mode 50%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Clinopyroxene	Mode 40%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Oxide	Mode 10%

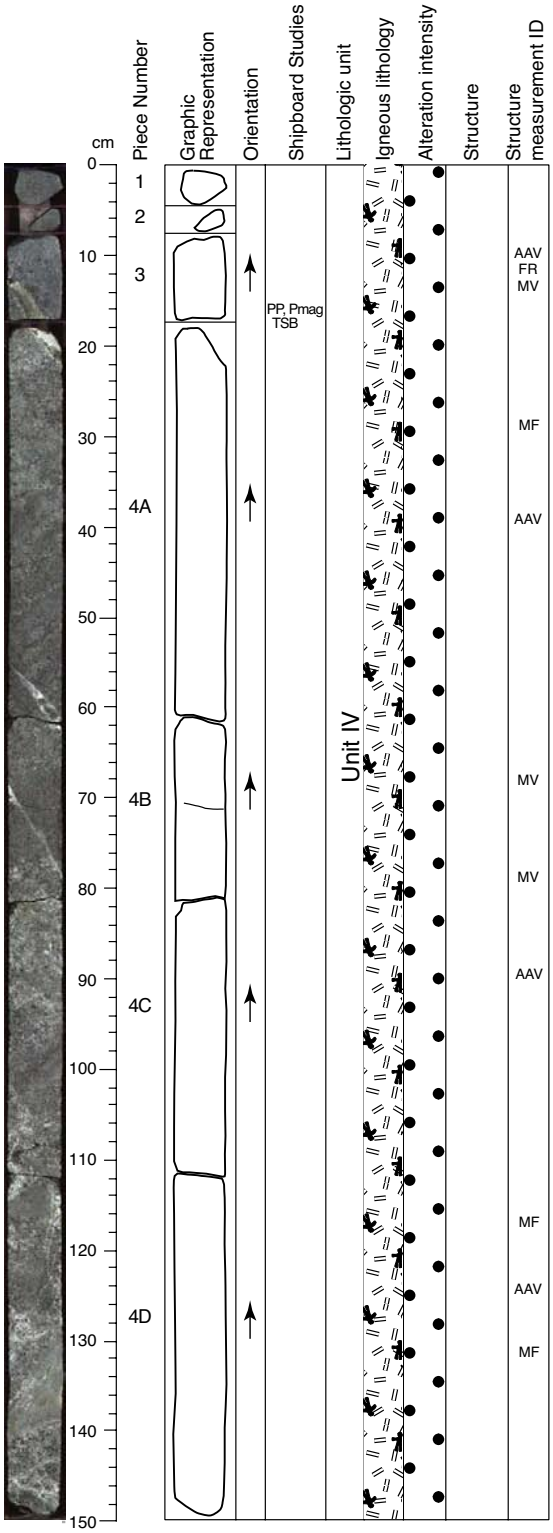
COMMENTS: This short section consists of fine-grained oxide gabbro associated with a coarse-grained domain (Piece 2A, 22-24 cm).

SECONDARY MINERALOGY:
Gabbro in this section is moderately altered (30%). The alteration style is dominated by 40-70% alteration of clinopyroxene to green and minor brown amphibole. Chlorite/smectite after plagioclase and clinopyroxene is present in minor amounts.

METAMORPHIC VEINS:
This section contains minor, dark green, single, straight amphibole veins (0.1 vol.%).

STRUCTURE:
The section consists of fine, medium, and coarse-grained oxide gabbro, cut by a granophyric vein in Piece 4. There is no mesoscopic evidence of crystal plastic deformation in the section. Pieces 1 and 2 are cut by minor shear fractures with little or no offset. Pieces 1 and 2 contain common green amphibole chlorite veins. Piece 2 is cut a green amphibole vein following/replacing a felsic magmatic vein.

Core Photo



209-1275D-27R-1 (Section top: 122.7 mbsf)

UNIT-IV: Oxide gabbro

Pieces 1-4

COLOR: Greenish-gray

PRIMARY MINERALOGY: OXIDE GABBRO

Plagioclase	Mode 50%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Clinopyroxene	Mode 40%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Oxide	Mode 10%

COMMENTS: Oxide gabbro with various grain sizes. This short section consists of fine-grained oxide gabbro associated with a coarse-grained domain (Piece 2A, 22-24 cm). Piece 4B-4D contains granophyre that intrude and brecciate a mixture of fine and medium grained gabbro.

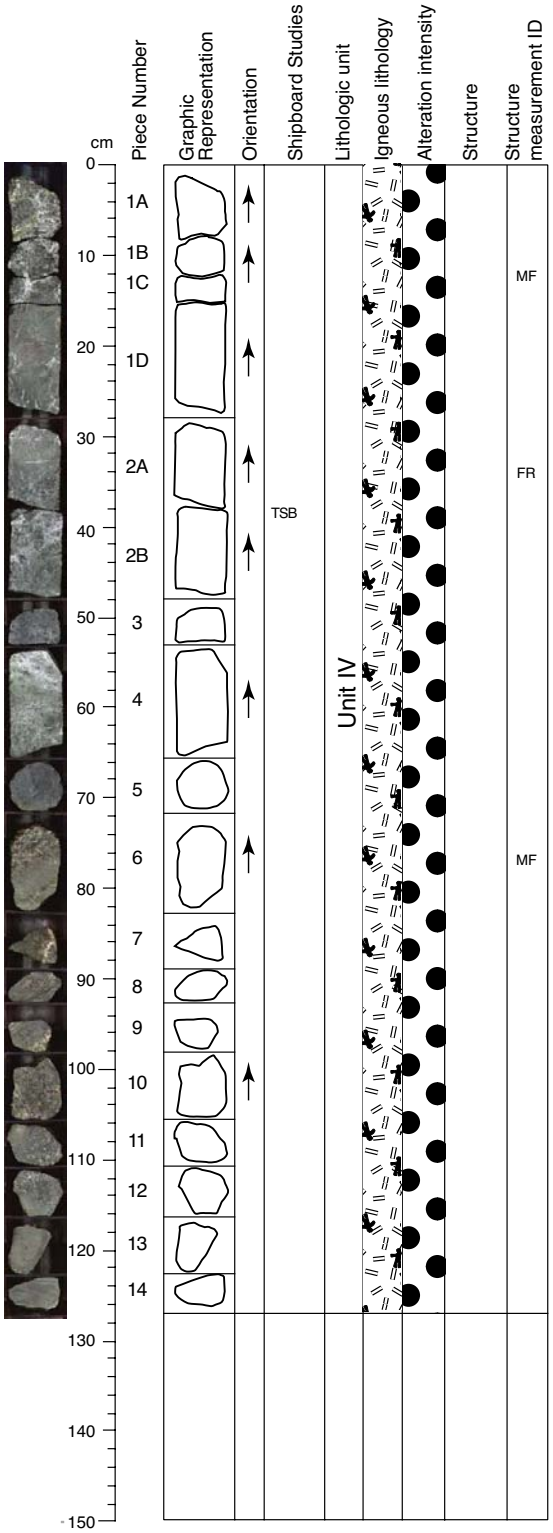
SECONDARY MINERALOGY:
Gabbro in this section is moderately altered (30%). The alteration style is dominated by 40-70% alteration of clinopyroxene to green and minor brown amphibole. Chlorite/smectite after plagioclase and clinopyroxene is present in minor amounts.

METAMORPHIC VEINS:
The gabbro of this section contains several, straight, single, dark green amphibole-chlorite veins (0.5 vol.%). These are particularly prominent in a felsic dikelet in Pieces 3 and the top of Piece 4, where are oriented parallel to the dikelet and locally follow the contact to the enclosing gabbro.

THIN SECTIONS: Sample 1275D-27R-1, 26-28 cm

STRUCTURE:
The section consists of interlayered fine, medium, and coarse-grained oxide gabbro, cut by multiple granophyric veins in Pieces 3 and 4. Below 100 cm in the section the granophyre forms a net vein breccia with enclosed xenoliths of oxide gabbro. Layering or banding contacts in oxide gabbroic rocks are generally defined by grain size changes, but are commonly associated with changes in the modal percentage of mineral phases, especially variations in oxide mineral or plagioclase abundance. Layer or lithologic boundaries between gabbros that mark changes in grain size are variable in orientation. In Piece 5 they range from inclined at 15 to 45 degrees in the cut face of the core. The contacts are planar, so that domains between contacts would be laterally discontinuous and lenticular. There is no mesoscopic evidence of crystal plastic deformation in the section.

Core Photo



209-1275D-27R-2 (Section top: 124.2 mbsf)

UNIT-IV: Oxide gabbro

Pieces 1-14

COLOR: Greenish-gray to white and brown

PRIMARY MINERALOGY: OXIDE GABBRO

Plagioclase	Mode 50%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Clinopyroxene	Mode 40%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Oxide	Mode 10%

COMMENTS: Oxide gabbro with various grain sizes. Pieces 1A-1C, 6, 7-12 are medium grained while Pieces 1D, 2-5, 6, 12-14 are very fine to fine grained. Granophyre dikes intrude and brecciate the gabbro in Pieces 1 and 2.

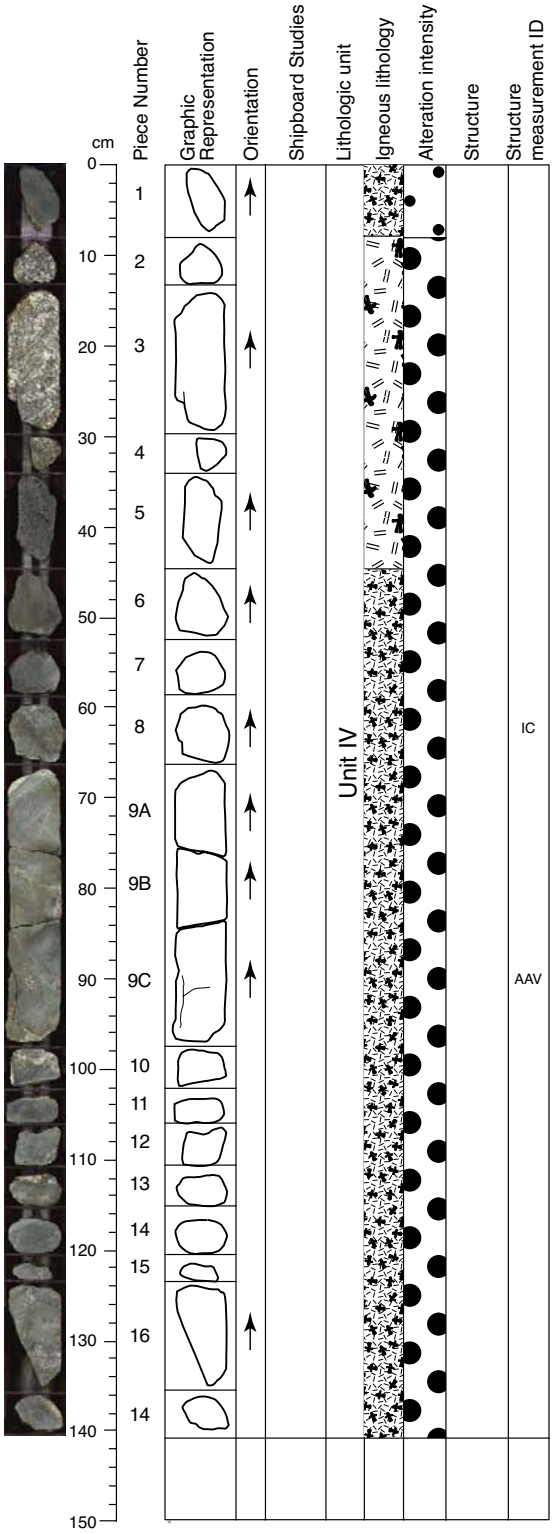
SECONDARY MINERALOGY:
Gabbro in this section is highly altered (50-75%). Clinopyroxene is heavily altered to green and minor brown amphibole. Chlorite/smectite after plagioclase and clinopyroxene is present in noticeable amounts. Milky-white secondary plagioclase is abundant (10-15%), in particular in proximity to felsic veins. Granophyre dikes are moderately altered to secondary plagioclase, green amphibole, and carbonate.

METAMORPHIC VEINS:
This section contains minor dark green amphibole veins (0.1 vol.%).

THIN SECTIONS: Sample 1275D-27R-2, 37-40 cm

STRUCTURE:
The section consists of fine, medium, and coarse-grained oxide gabbro (Pieces 1-4 and 6-12 and diabase (within Pieces 1, 2, 5, 6, and 12-15), cut by granophyric net veins in Pieces 1-4. There are several diabase gabbro contacts in the section. The granophyric net vein cuts the contacts between fine-grained diabase and coarse-grained gabbro in Pieces 1 and 2. Pieces 1 and 2 contain diabase sandwiched between gabbro at the top of Piece 1 and gabbro at the base of Piece 2. Both contacts are exposed in the core. The top contact is inclined only a few degrees and the basal contact is inclined 24 degrees in the cut face of the core. Diabase is intrusive into gabbro. The contact is then cut by later granophyric net veining and both diabase and gabbro are included within the net vein breccia as xenoliths. Piece 6 also contains and gabbro diabase contact inclined at 9 degrees in the cut face of the core. Another diabase contact is exposed in Piece 12, but the sample is poorly oriented. It is clear that the diabase/gabbro contacts are low angle in the present day vertical core reference frame within the section. There is no mesoscopic evidence of crystal plastic deformation in the section. Piece 3 is cut by minor chlorite-filled shear fractures with little or no offset. Pieces 1, 3, and 4 contain common green amphibole chlorite veins. Pieces 3 and 4 are cut by green amphibole veins following/replacing felsic magmatic veins. Piece 4C is cut by an early black amphibole vein.

Core Photo



209-1275D-28R-1 (Section top: 127.7 mbsf)

UNIT-IV: Oxide gabbro

Pieces 1-17

COLOR: Pinkish and whitish gray

PRIMARY MINERALOGY: OXIDE GABBRO

Plagioclase	Mode 50%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Clinopyroxene	Mode 40%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Oxide	Mode 10%

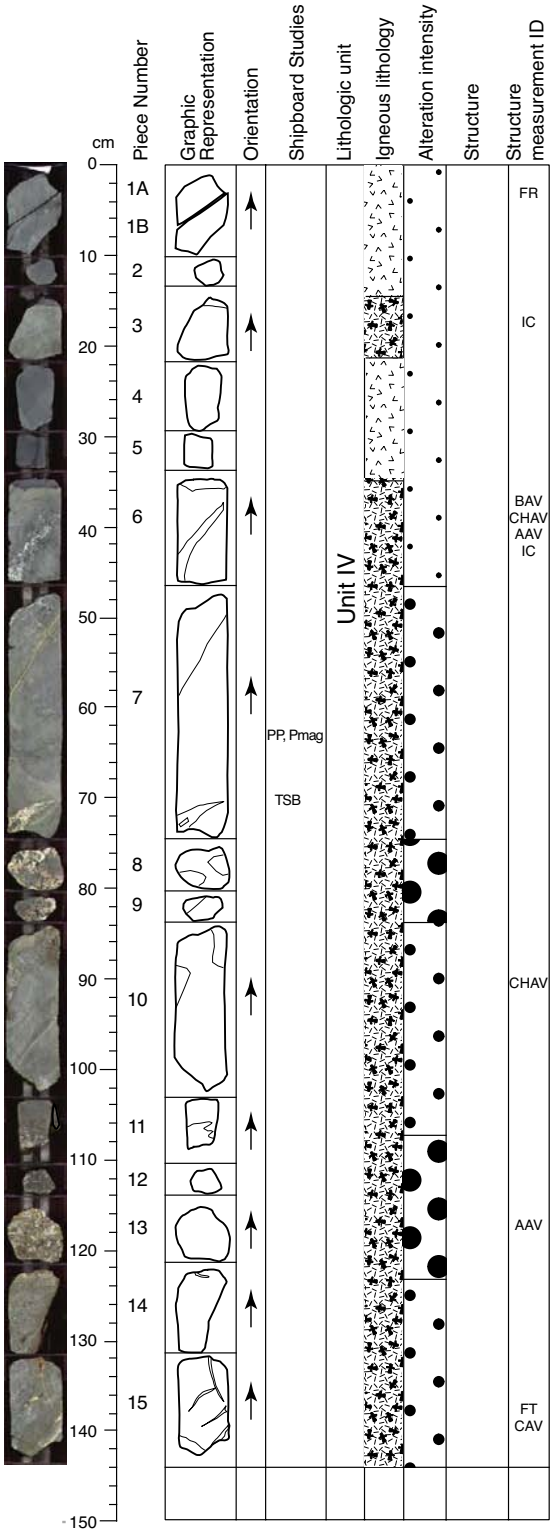
COMMENTS: Oxide gabbro with grain sizes varying from medium to very fine-grained (microgabbro). Pieces 1, and 6-17 are microgabbro mixed with medium-grained gabbro with irregular boundaries while Pieces 2-5 are medium grained. Granophyre dikes intrude Pieces 9 and 10.

SECONDARY MINERALOGY:
Gabbro in this section is moderately (Piece 1) and highly altered (Pieces 2-17). Clinopyroxene is partly altered to green and minor brown amphibole. Chlorite/smectite after plagioclase and clinopyroxene is present in noticeable amounts. Milky-white secondary plagioclase is abundant in Pieces 2-4 and 7-17. Granophyre dikes are moderately altered to secondary plagioclase, green amphibole, and carbonate.

METAMORPHIC VEINS:
Amphibole-chlorite veins are common in the diabase of this section and somewhat less abundant in the gabbro (0.1 vol.%).

STRUCTURE:
The section consists of medium grained oxide gabbro (Pieces 2, 3, and 4) and diabase (within Pieces 1, 2, 5, 6, 12-15). Both lithologies are cut by granophyric veins in Pieces 3-4, 10, 11, 12, 13, 14, and 17. There is no mesoscopic evidence of high temperature crystal plastic deformation in the section. Piece 9 contains low concentrations of open fractures. Pieces 9-14 and 17 contain green amphibole chlorite veins and Piece 2 contains clay-carbonate veins.

Core Photo



209-1275D-29R-1 (Section top: 132.2 mbsf)

UNIT-IV: Oxide gabbro

Piece 1-2, 3, 4-6

COLOR: Gray

PRIMARY MINERALOGY: DIABASE

COMMENTS: Aphyric diabase. Contacts to very fine-grained gabbro (microgabbro) are present in Pieces 3 and 6.

Pieces 3, 6-15

COLOR: Light gray to pinkish and whitish gray

PRIMARY MINERALOGY: OXIDE GABBRO AND MICROGABBRO

Plagioclase	Mode 50%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Clinopyroxene	Mode 40%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Oxide	Mode 10%

COMMENTS: Very fine-grained oxide gabbro (microgabbro) with less amount of coarse- or medium-grained domains in Pieces 8-10, 11-13. Granophyre dikes intrude Pieces 6-7 and 15.

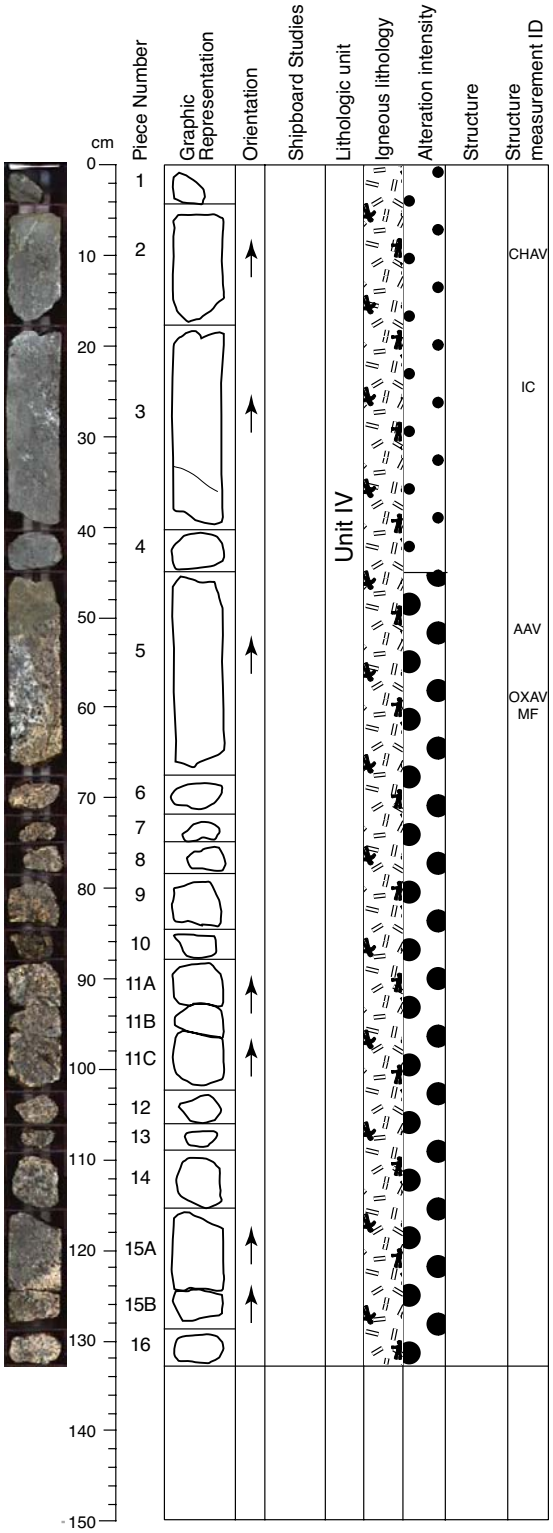
SECONDARY MINERALOGY:
Diabase in this section is slightly altered (about 8%) to green amphibole and minor chlorite. The microgabbro is light gray and moderately altered, while the coarser grained gabbro is pinkish to whitish gray and appears highly altered, mainly due to higher proportions of secondary plagioclase. Clinopyroxene is partly altered to green and minor brown amphibole. Chlorite/smectite after plagioclase and clinopyroxene is present in small amounts. Granophyre dikes are moderately altered to secondary plagioclase, green amphibole, and carbonate.

METAMORPHIC VEINS:
This section contains minor amphibole-chlorite veins (0.1 vol.%).

THIN SECTIONS: Sample 1275D-29R-1, 69-72 cm

STRUCTURE:
The section consists of medium to coarse grained oxide gabbro (Pieces 8, 9, 11, 12, and 13, 14) and mostly diabase (within Pieces 1- 6, 10-11, 14-15). The coarser diabases (i.e., excluding diabase in Pieces 1-4) are cut by leucogabbroic to granophyric veins in Pieces 6-11, and 14 and 15. Piece 6 contains a chilled diabase on coarser diabase contact. The upper diabase is strongly chilled margin against the lower diabase and the pieces show grain size increases in the diabase moving upward from the contact. There is no mesoscopic evidence of high temperature crystal plastic deformation in the section. Piece 15 contains a 0.2 cm wide chlorite-filled fault that has 1 cm offset. Piece 1 contains low concentrations of open fractures. Pieces 2, 4-7, 10-15 contain common green amphibole chlorite veins and Piece 7 has green chlorite replacing a magmatic vein which crosscuts an earlier magmatic vein. Piece 15 contains a clay-carbonate vein.

Core Photo



209-1275D-29R-2 (Section top: 133.21 mbsf)

UNIT-IV: Oxide gabbro

Pieces 1-16

COLOR: Withish and pinkish gray to orange

PRIMARY MINERALOGY: OXIDE GABBRO AND MICROGABBRO

Plagioclase	Mode 50%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Clinopyroxene	Mode 40%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Oxide	Mode 10%

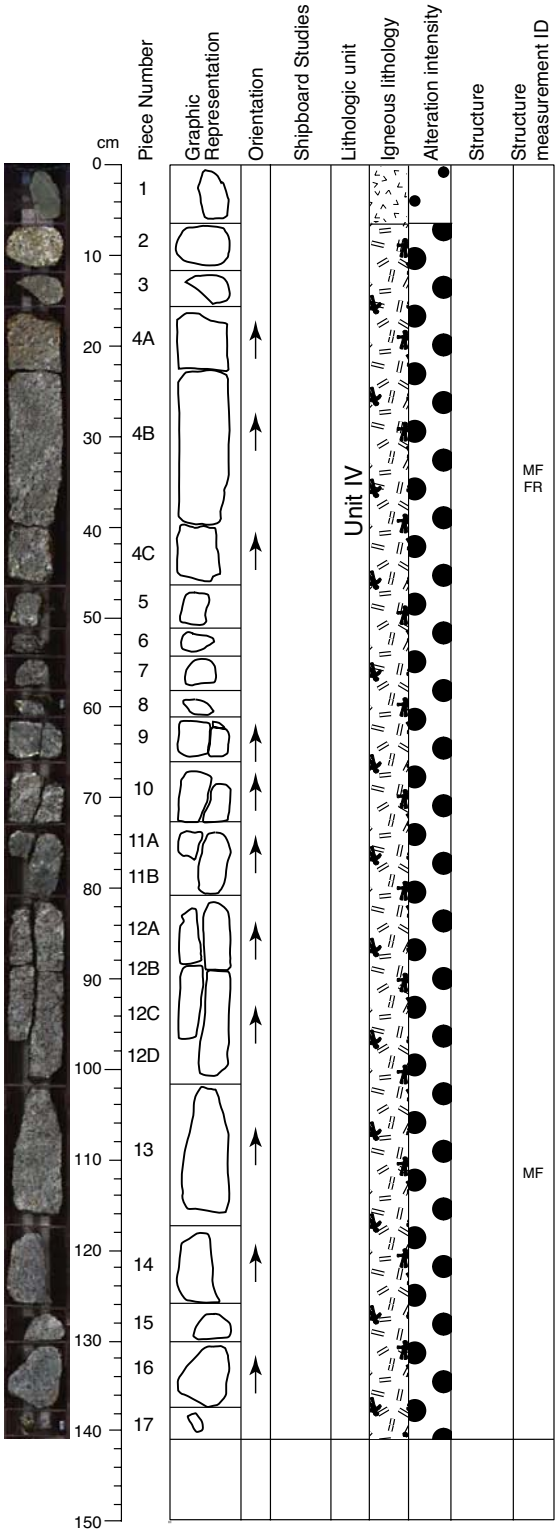
COMMENTS: This section is divided into two parts: the upper part (Pieces 1-5, 0-52 cm) consists of mixture of dominant amount of microgabbro with less amount of medium-grained gabbro. Diabase and granophyre are present in Piece 2 and 3. The lower part is composed mainly of highly altered coarse-grained gabbro.

SECONDARY MINERALOGY:
In Pieces 1-4, the microgabbro is light gray and moderately altered (30%), while the coarser grained gabbro is pinkish to whitish gray and appears highly altered (50%). This difference in alteration intensity is mainly due to higher proportions of secondary plagioclase in the coarse-grained gabbro. Clinopyroxene is partly altered to green and minor brown amphibole. Chlorite/smectite after plagioclase and clinopyroxene is present in small amounts. Pieces 5-16 are highly altered (75%) greenish-gray to orange gabbro with noticeable amounts of chlorite and clay.

METAMORPHIC VEINS:
Dark green amphibole-chlorite veins are rare in the coarse grained gabbro of this section (average: 0.1 vol.%). In the microgabbro these veins are somewhat more abundant.

STRUCTURE:
The sections consist of medium to coarse grained leucocratic gabbro and oxide gabbro (Pieces 5-16) and diabase (Pieces 1-5). Both are cut by later leucocratic gabbroic to granophyric veins (within Pieces 1- 4, 15). A contact between diabase and coarse-grained gabbro (diabase intruding gabbro below) in Piece 5 is inclined at 18 degrees in the cut face of the core. Thus, the contact is low angle in the present day vertical core reference frame. There is no mesoscopic evidence of crystal plastic deformation in the section. Pieces 1 through 5 contain low concentrations of short (<5 cm), irregular-shaped open fractures. Pieces 1 to 6 are cut by common green amphibole chlorite veins and Pieces 5 and 16 are cut by small clay-oxide veins.

Core Photo



209-1275D-30R-1 (Section top: 137.2 mbsf)

UNIT-IV: Oxide gabbro

Piece 1

COLOR: Gray

PRIMARY MINERALOGY: DIABASE

COMMENTS: Aphyric diabase.

Pieces 2-17

COLOR: Greenish-gray to brown

PRIMARY MINERALOGY: OXIDE GABBRO

Plagioclase	Mode 50%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Clinopyroxene	Mode 40%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Oxide	Mode 10%

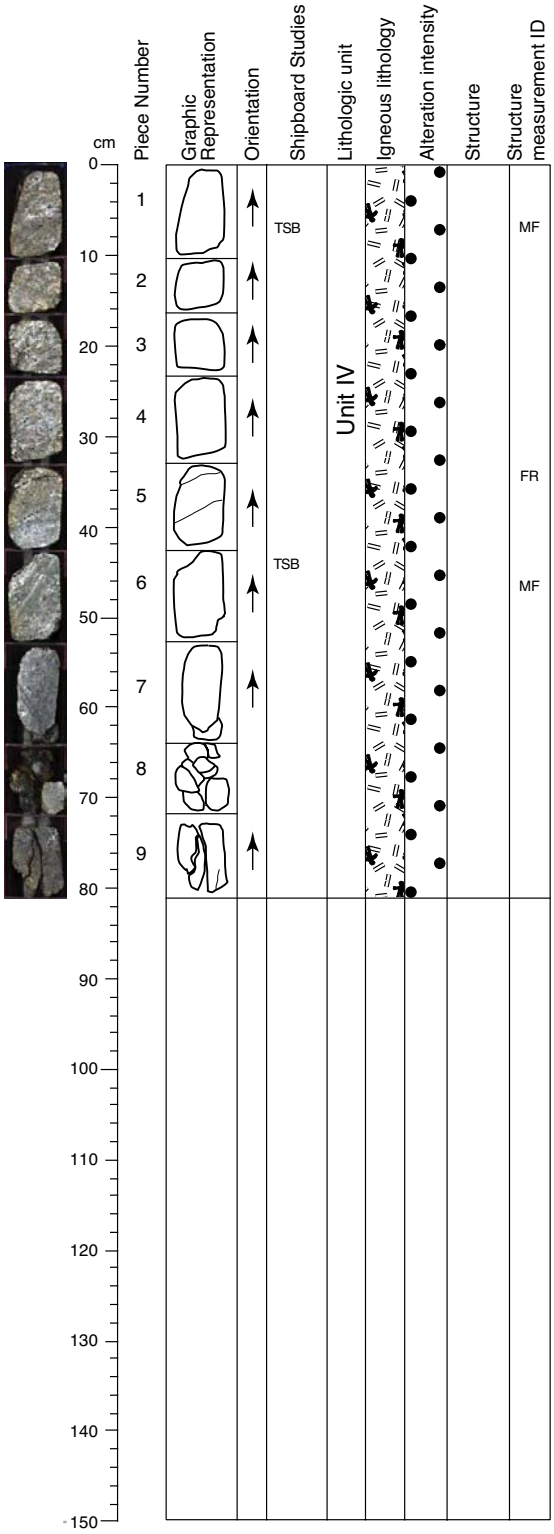
COMMENTS: Coarse-grained gabbro with subvertical, magmatic foliation well developed in Piece 4.

SECONDARY MINERALOGY:
Piece 1 is moderately altered, while Pieces 2-17 are highly altered (45-70%). Clinopyroxene is partly altered to green and minor brown amphibole. Chlorite/smectite after plagioclase and clinopyroxene and secondary plagioclase after plagioclase are present in variable amounts.

METAMORPHIC VEINS:
This section contains minor amphibole-chlorite veins (0.5 vol.%). A single straight amphibole vein is present in Pieces 9 to 13.

STRUCTURE:
The section consists of medium to coarse-grained oxide gabbro (Piece 2-17) and diabase (Piece 1). A weak igneous lamination defined by oxide and preferred dimensional orientation of plagiolcase and clinopyroxene is inclined 65 degrees in the cut face of the core (Piece 4). There is no mesoscopic evidence of crystal plastic deformation in the section and textures appear igneous. Pieces 4, 5, and 9 through 14 contain minor shear fractures and low concentrations of open fractures.

Core Photo



209-1275D-30R-2 (Section top: 138.61 mbsf)

UNIT-IV: Oxide gabbro

Pieces 1-9

COLOR: Greenish gray to brown

PRIMARY MINERALOGY: OXIDE GABBRO

Plagioclase	Mode 50%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Clinopyroxene	Mode 40%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Oxide	Mode 10%

COMMENTS: Coarse-grained gabbro. Moderately foliated. Very well foliated at 35-60 cm.

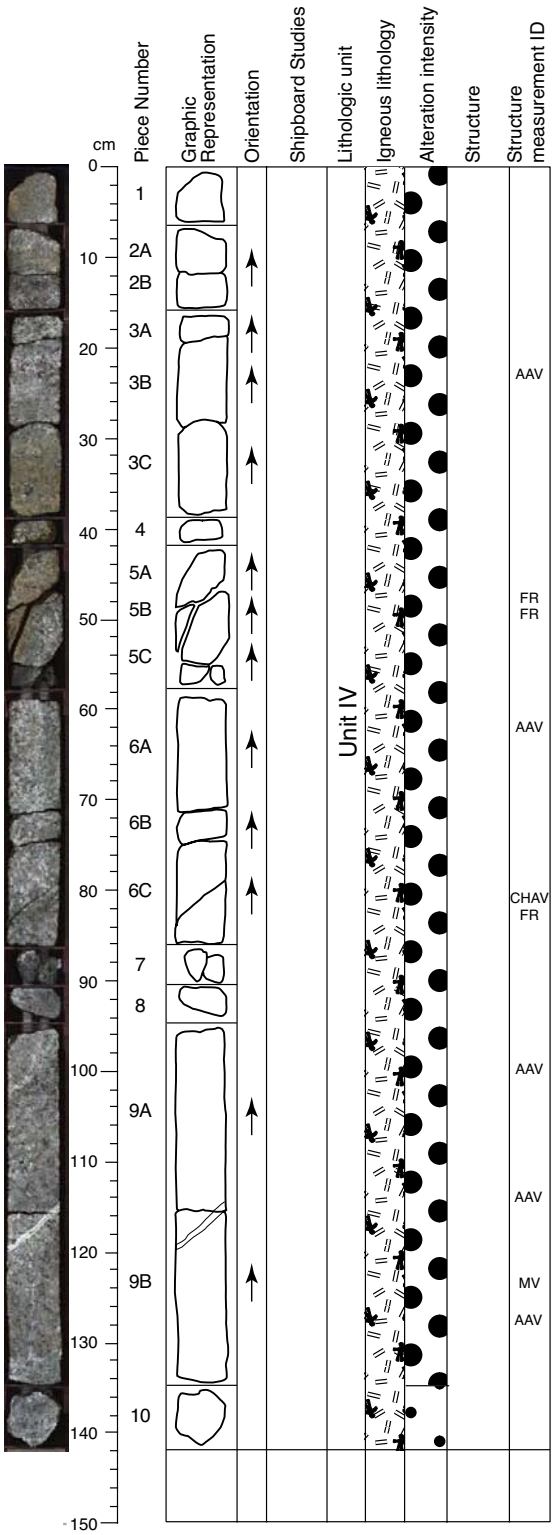
SECONDARY MINERALOGY:
Alteration intensity in this section averages at about 50%. Clinopyroxene is partly altered to green and minor brown amphibole. Chlorite/smectite after plagioclase and clinopyroxene and secondary plagioclase after plagioclase are present in noticeable amounts, in particular in the brownish areas.

METAMORPHIC VEINS:
Amphibole veins are rare in this section (0.1 vol.%).

THIN SECTIONS: Samples 1275D-30R-2, 6-9 cm and 1275D-30R-2, 43-47 cm

STRUCTURE:
The section consists of medium to coarse grained oxide gabbro (Piece 2-17) and diabase (Piece 1). A weak igneous lamination defined by preferred dimensional orientation of plagiolcase laths, prismatic clinopyroxene, and oxides is inclined variably from 15 to 58 degree in the cut face of the core (Pieces 1-7). Thin sections verify that the foliation is of igneous origin. There is no mesoscopic evidence of crystal plastic deformation in the section and textures appear ig

Core Photo



209-1275D-31R-1 (Section top: 141.8 mbsf)

UNIT-IV: Oxide gabbro

Pieces 1-10

COLOR: Greenish gray to gray

PRIMARY MINERALOGY: OXIDE GABBRO

Plagioclase	Mode 50%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Clinopyroxene	Mode 40%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Oxide	Mode 10%

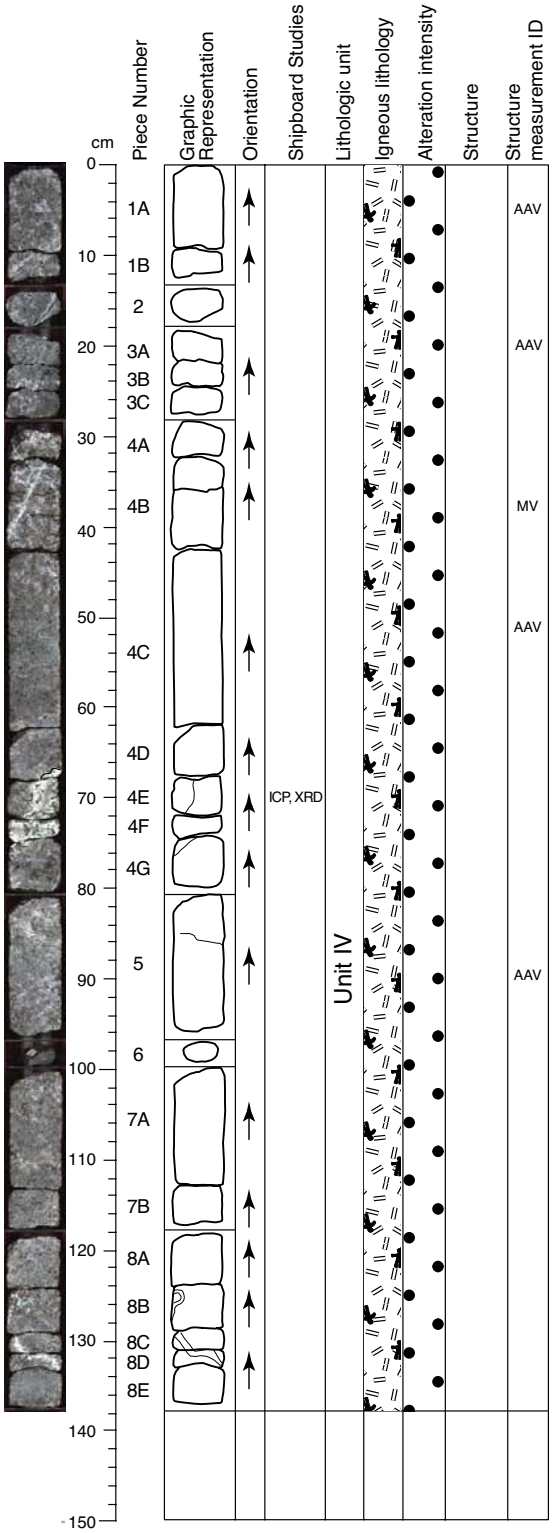
COMMENTS: Oxide gabbro with various grain sizes. Fine- to very fine-grained at 0-13, 24-39, 45-52 cm. Coarse- to medium-grained at 13-24, 39-45, 52-142 cm. Xenolith of coarse-grained gabbro as large as 1 cm occurs in fine-grained gabbro at 35 cm. A granophyre dike cuts vertically along long axis of the section in Piece 9B.

SECONDARY MINERALOGY:
Pieces 1-9 are highly altered (about 45%), while Piece 10 is moderately altered (about 15%). Alteration is mainly to green and minor brown amphibole after clinopyroxene. Chlorite/smectite after plagioclase and clinopyroxene and secondary plagioclase after plagioclase are present in small amounts. The granophyre dike in Piece 9B appears highly altered to secondary plagioclase, green amphibole, clay, and minor carbonate.

METAMORPHIC VEINS:
This section contains minor single, straight amphibole-chlorite veins (0.1 vol.%).

STRUCTURE:
The section consists of medium to coarse grained oxide gabbro cut by granophyric veins in Piece 9. Layers of coarse-grained gabbros are sandwiched between medium grained oxide gabbros in Piece 3. The layer contacts are subhorizontal in the cut face of the core. There is no mesoscopic evidence of crystal plastic deformation in the section.

Core Photo



209-1275D-31R-2 (Section top: 143.22 mbsf)

UNIT-IV: Oxide gabbro

Pieces 1-8

COLOR: Green to whitish green

PRIMARY MINERALOGY: OXIDE GABBRO

Plagioclase	Mode 50%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Clinopyroxene	Mode 40%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Oxide	Mode 10%

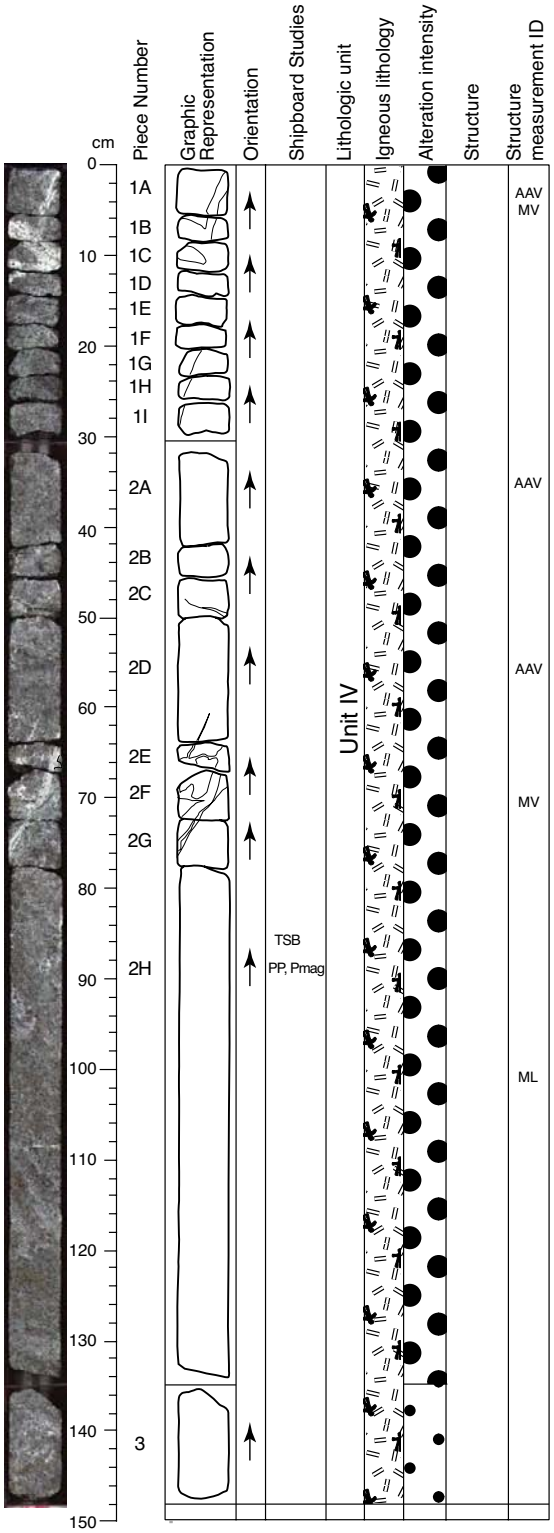
COMMENTS: Coarse-grained oxide gabbro. The top of the section is brecciated (0-50 cm). From 50 to 138 cm coarse-grained gabbros alternate with fine-grained gabbros. Coarse crystals of pyroxene, as much as 2 cm, and plagioclase, as much as 7 cm, occur in Piece 4B.

SECONDARY MINERALOGY:
Gabbro in this section is moderately altered (15-20%). Alteration is mainly to green and minor brown amphibole after clinopyroxene. Chlorite/smectite after plagioclase and clinopyroxene and secondary plagioclase after plagioclase are present in small amounts. Felsic veins in Pieces 4-6 and 7-8 appear highly altered to secondary plagioclase, green amphibole, clay, and minor carbonate.

METAMORPHIC VEINS:
This section contains several single straight amphibole veins that are particularly common in Pieces 1-3 (0.1 Vol.%). Felsic (plagioclase-amphibole-chlorite) dikelets and irregular felsic domains are distributed throughout the core. These are crosscut by amphibole veins at 36 and 73 cm depth.

STRUCTURE:
The section consists of medium to coarse-grained oxide gabbro and very coarse leucocratic gabbro cut by granophyric veins in Pieces 2, 4, 5, and 8. Layers of coarse -grained gabbros are sandwiched between medium grained oxide gabbros. The layer contacts appear subhorizontal in the cut face of the core, but are sometimes obscured by the granophyric veins. There is no mesoscopic evidence of crystal plastic deformation in the section. Piece 9 contains a chlorite-filled small fault with 0.5 cm offset.

Core Photo



209-1275D-31R-3 (Section top: 144.6 mbsf)

UNIT-IV: Oxide gabbro

Pieces 1-3

COLOR: Gray to brown and white to green

PRIMARY MINERALOGY: OXIDE GABBRO

Plagioclase	Mode 50%
	Size < 25 mm
	Shape/Habit Eubhedral to anhedral
Clinopyroxene	Mode 40%
	Size < 25 mm
	Shape/Habit Eubhedral to anhedral
Oxide	Mode 10%

COMMENTS: Bands of coarse pyroxenes in medium-grained gabbro. Piece 2H from 90-130 cm has porphryritic texture.

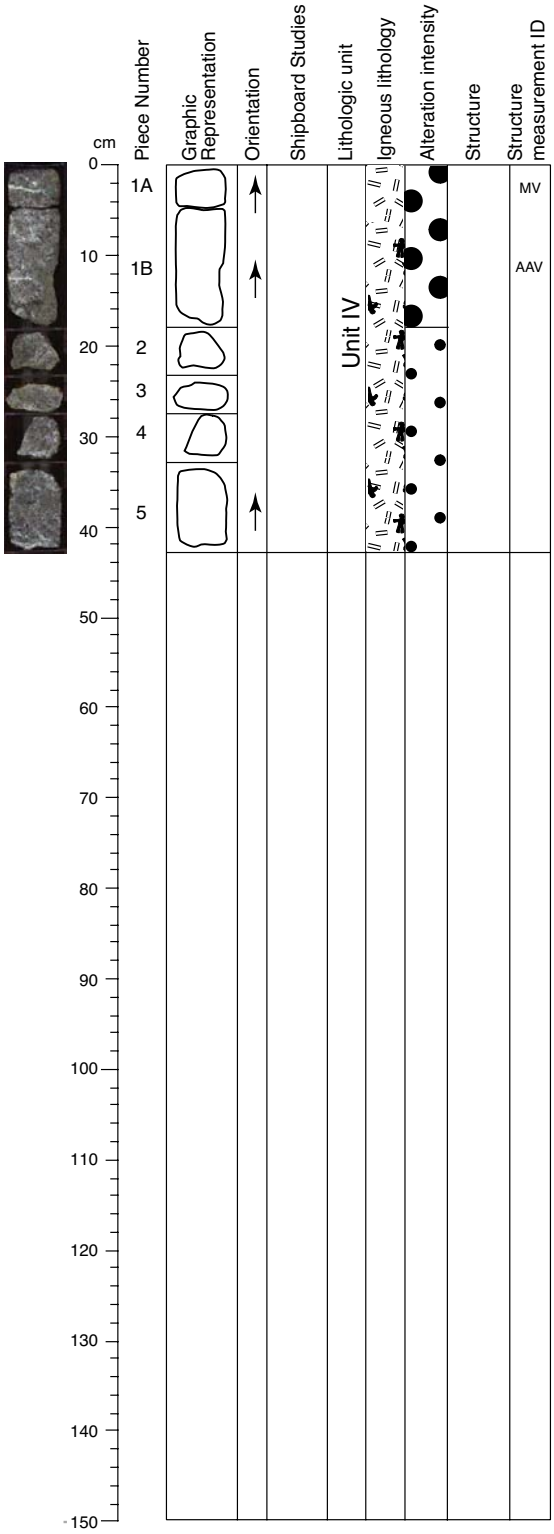
SECONDARY MINERALOGY:
Gray to brown gabbro in this section is highly altered in Pieces 1 and 2 and moderately altered in Piece 3. Alteration is mainly to green and minor brown amphibole after clinopyroxene. Chlorite/smectite after plagioclase and clinopyroxene and secondary plagioclase after plagioclase are present in variable amounts. White to green felsic veins in Pieces 1 and 2 appear highly altered to secondary plagioclase, green amphibole, clay, and minor carbonate.

METAMORPHIC VEINS:
Straight, single, green amphibole veins are common in this section (0.5 vol.%). Felsic (plagioclase-amphibole-chlorite) dikelets in Pieces 1A to 1C and 2C to 2G that are crosscut by these amphibole veins.

THIN SECTIONS: Sample 1275D-31R-3, 85-87 cm

STRUCTURE:
The section consists of medium to coarse-grained oxide gabbro and very coarse leucocratic gabbro cut by granophyric veins in Piece 1 at 1-12 cm and 61-74 cm. There is no mesoscopic evidence of crystal plastic deformation in the section. There is no brittle deformation in this section.

Core Photo



209-1275D-31R-4 (Section top: 146.08 mbsf)

UNIT-IV: Oxide gabbro

Pieces 1-5

COLOR: Green to brown

PRIMARY MINERALOGY: OXIDE GABBRO

Plagioclase	Mode 50%
	Size < 25 mm
	Shape/Habit Eubhedral to anhedral
Clinopyroxene	Mode 40%
	Size < 25 mm
	Shape/Habit Eubhedral to anhedral
Oxide	Mode 10%

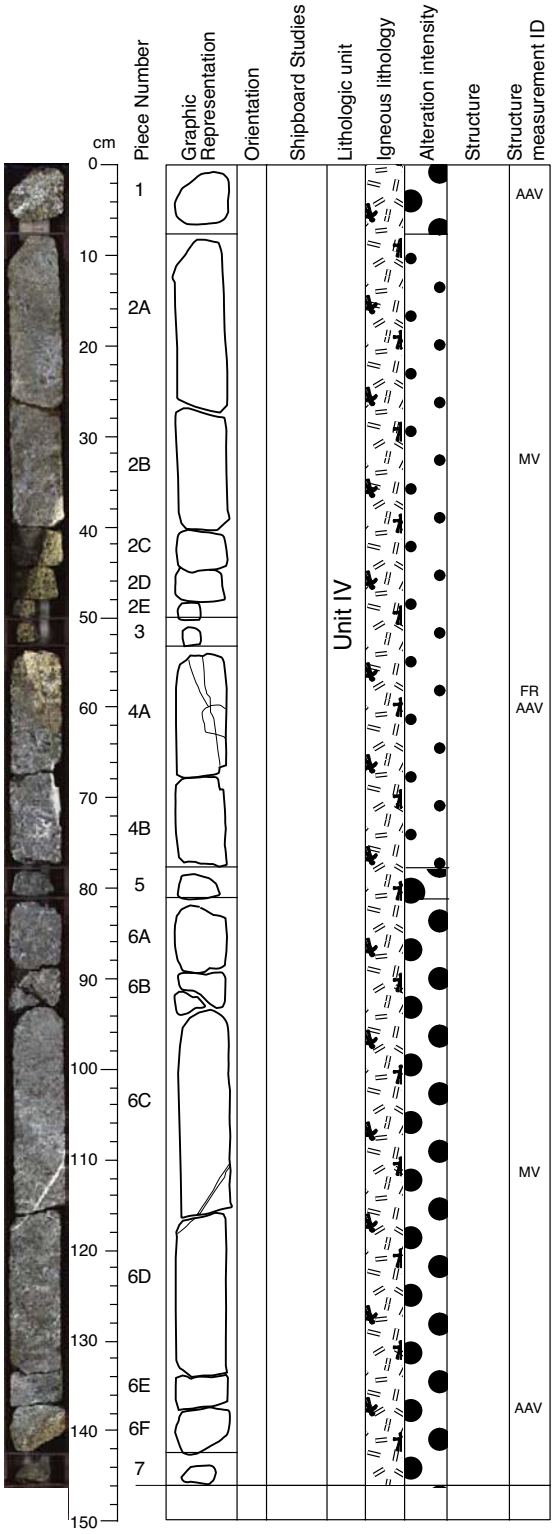
COMMENTS: Very coarse-grained gabbro with pyroxenes as large as 25 mm. These pyroxenes have Carlsbad twins in Piece 5.

SECONDARY MINERALOGY:
Gabbro in this section is highly (Piece 1) to moderately (Pieces 2-5) altered. Alteration is mainly to green and minor brown amphibole after clinopyroxene. Chlorite/smectite after plagioclase and clinopyroxene and secondary plagioclase after plagioclase are present in noticeable amounts.

METAMORPHIC VEINS:
This section contains minor green, single, straight amphibole veins (0.1 vol.%).

STRUCTURE:
The section consists of coarse grained oxide bearing gabbro and very coarse leucocratic gabbro, cut by granophyric veins in Piece 1. There is no mesoscopic evidence of crystal plastic deformation in the section. There is no brittle shear deformation in this section.

Core Photo



209-1275D-32R-1 (Section top: 146.8 mbsf)

UNIT-IV: Oxide gabbro

Pieces 1-7

COLOR: Green to brown and white

PRIMARY MINERALOGY: OXIDE GABBRO

Plagioclase	Mode 50%
	Size < 15 mm
	Shape/Habit Eubhedral to anhedral
Clinopyroxene	Mode 40%
	Size < 15 mm
	Shape/Habit Eubhedral to anhedral
Oxide	Mode 10%

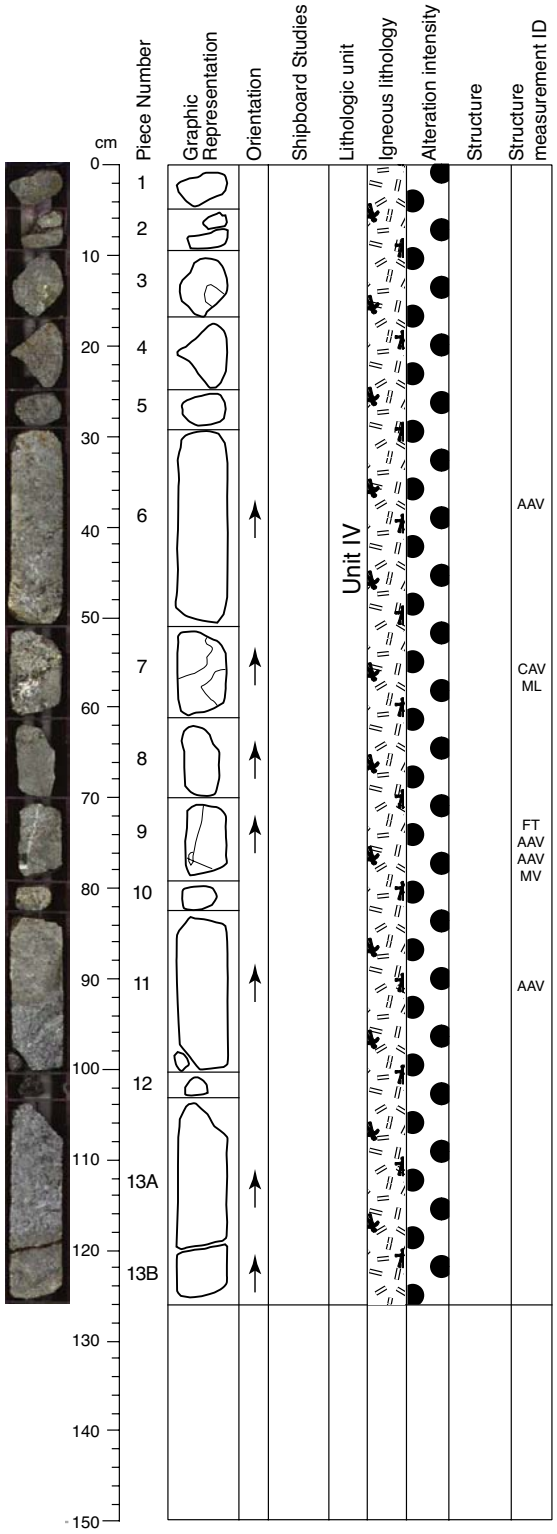
COMMENTS: Coarse-grained oxide gabbro. Granophyre interval at 40-60 cm.

SECONDARY MINERALOGY:
Gabbro in this section is moderately to highly altered (30-60%). Alteration is mainly to green and minor brown amphibole after clinopyroxene. Chlorite/smectite after plagioclase and clinopyroxene and secondary plagioclase after plagioclase are present in noticeable amounts. White and green granophyric dikelets appear highly altered to secondary plagioclase, chlorite, and green amphibole.

METAMORPHIC VEINS:
This section contains minor green, single, straight amphibole veins (0.1 vol.%). Plagioclase-amphibole-chlorite-rich dikelets (felsic magmatic veins) are crosscut by green amphibole veins in Pieces 1 and 6C to 6D.

STRUCTURE:
The section consist of coarse grained oxide bearing gabbro and very coarse leucocratic gabbro (Pieces 2b, 3) cut by many granophyric veins in Pieces 1, 2, 3, and 5. There is no mesoscopic evidence of crystal plastic deformation in the section. Piece 4 is cut by a small shear fracture with minimal offset.

Core Photo



209-1275D-32R-2 (Section top: 148.26 mbsf)

UNIT-IV: Oxide gabbro

Pieces 1-13

COLOR: Greenish and brownish gray

PRIMARY MINERALOGY: OXIDE GABBRO

Plagioclase	Mode 50%
	Size < 15 mm
	Shape/Habit Eubhedral to anhedral
Clinopyroxene	Mode 40%
	Size < 15 mm
	Shape/Habit Eubhedral to anhedral
Oxide	Mode 10%

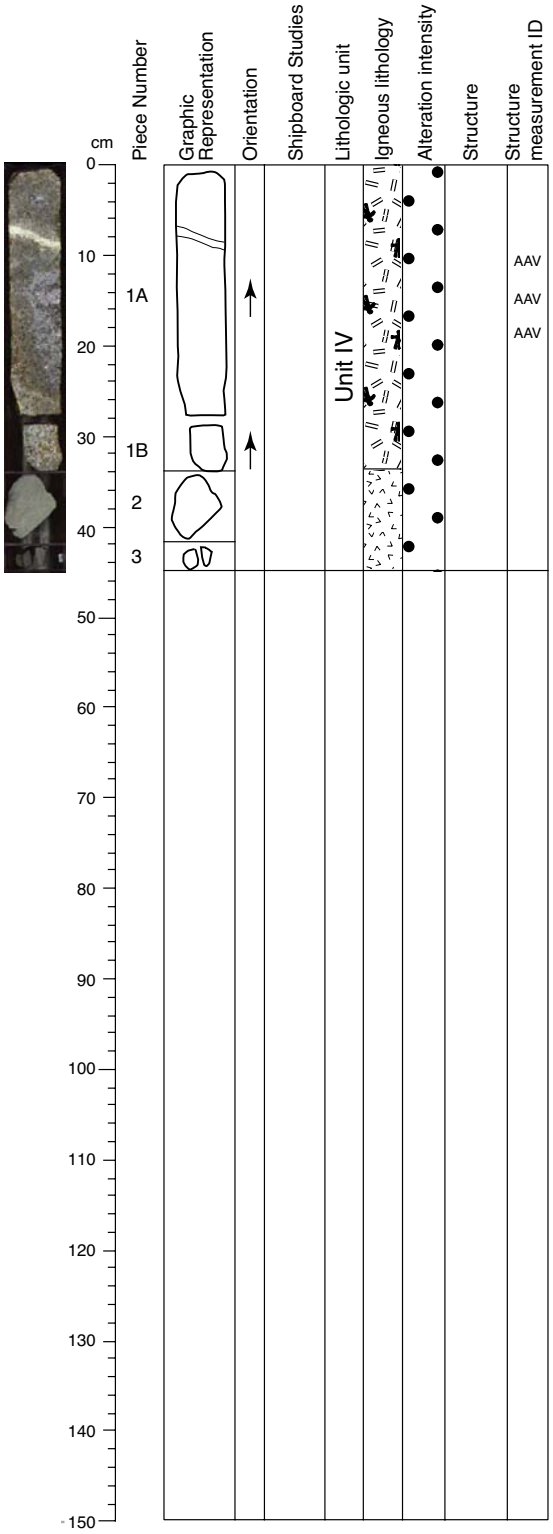
COMMENTS: Oxide gabbros with grain size varying from coarse- (intervals at 30-64, 70-75, 80-83, 93-125 cm) to medium- or fine-grained (intervals at 0-29, 64-70, 75-80, 83-93 cm). Oxide patches in Pieces 6 and 7 associated with granophyre.

SECONDARY MINERALOGY:
Gabbro in this section is highly altered (about 60%). Alteration is mainly to green and minor brown amphibole after clinopyroxene. Chlorite/smectite after plagioclase and clinopyroxene and secondary plagioclase after plagioclase are present in noticeable amounts. White and green granophyric dikelets appear highly altered to secondary plagioclase, chlorite, and green amphibole.

METAMORPHIC VEINS:
This section contains minor green single straight amphibole veins (0.1 vol.%).

STRUCTURE:
The section consists of interlayered fine, medium, and coarse-grained oxide gabbro, cut by granophyric veins in Pieces 7 and 9. Layering or banding contacts in oxide gabbroic rocks are generally defined by grain size changes, but are commonly associated with changes in the modal percentage of mineral phases, especially variations in oxide mineral or plagioclase abundance. Layer or lithologic boundaries between gabbros that mark changes in grain size occur in Pieces 11 and 13. The contacts are inclined between 2 and 14 degrees in the cut face of the core. The contacts are planar to curviplanar. There is no mesoscopic evidence of high temperature crystal plastic deformation in the section. Piece 9 contains a small chlorite-filled fault with 0.5 cm offset.

Core Photo



209-1275D-32R-3 (Section top: 149.52 mbsf)

UNIT-IV: Oxide gabbro

Pieces 1-3

COLOR: Greenish-gray and brown

PRIMARY MINERALOGY: OXIDE GABBRO AND MICROGABBRO

Plagioclase	Mode 50%
	Size < 15 mm
	Shape/Habit Eubhedral to anhedral
Clinopyroxene	Mode 40%
	Size < 15 mm
	Shape/Habit Eubhedral to anhedral
Oxide	Mode 10%

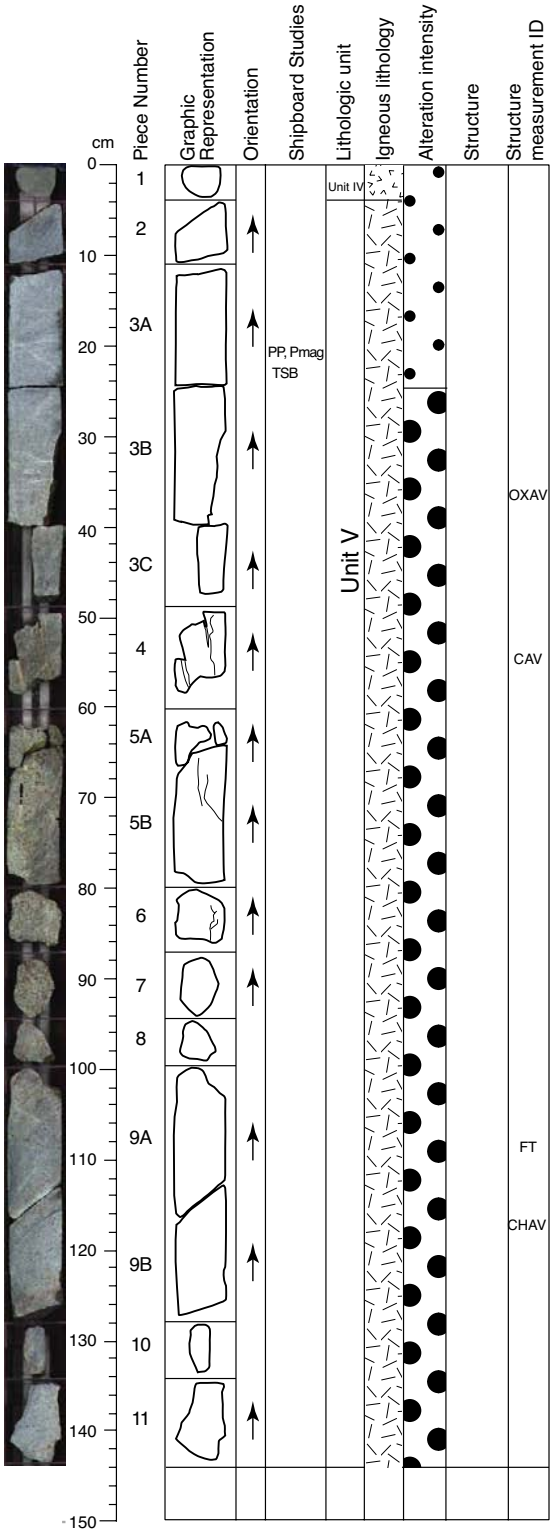
COMMENTS: Coarse- to medium-grained oxide gabbro in Piece 1. Microgabbro or diabase in Pieces 2-.3.

SECONDARY MINERALOGY:
Gabbro in this section is moderately altered (about 40%). Alteration is mainly to green and minor brown amphibole after clinopyroxene. Chlorite/smectite after plagioclase and clinopyroxene and secondary plagioclase after plagioclase are present in noticeable amounts. A difference in alteration style and intensity between the fine-grained and coarse-grained gabbros could not be observed.

METAMORPHIC VEINS:
This section contains minor green, single, straight amphibole veins (0.1 vol.%).

STRUCTURE:
The section consists of coarse grained oxide gabbro (Pieces 1 and 2) and diabase (Piece 3 and 4). Piece 1 is cut by a granophyric vein. There is no mesoscopic evidence of high temperature crystal plastic deformation in the section. There is no brittle deformation in this section.

Core Photo



209-1275D-33R-1 (Section top: 151.3 mbsf)

UNIT-V: Olivine gabbro and oxide gabbro(norite)

Pieces 1-11

COLOR: Light gray to brownish gray

PRIMARY MINERALOGY: DIABASE AND MICROGABBRO

Plagioclase	Mode 50%
	Size < 3 mm
	Shape/Habit Eubhedral to anhedral
Clinopyroxene	Mode 40%
	Size < 3 mm
	Shape/Habit Eubhedral to anhedral
Oxide	Mode 10%

COMMENTS: Aphyric diabase in Piece 1. Pieces 2-11 are microgabbro with 25% olivine phenocrysts.

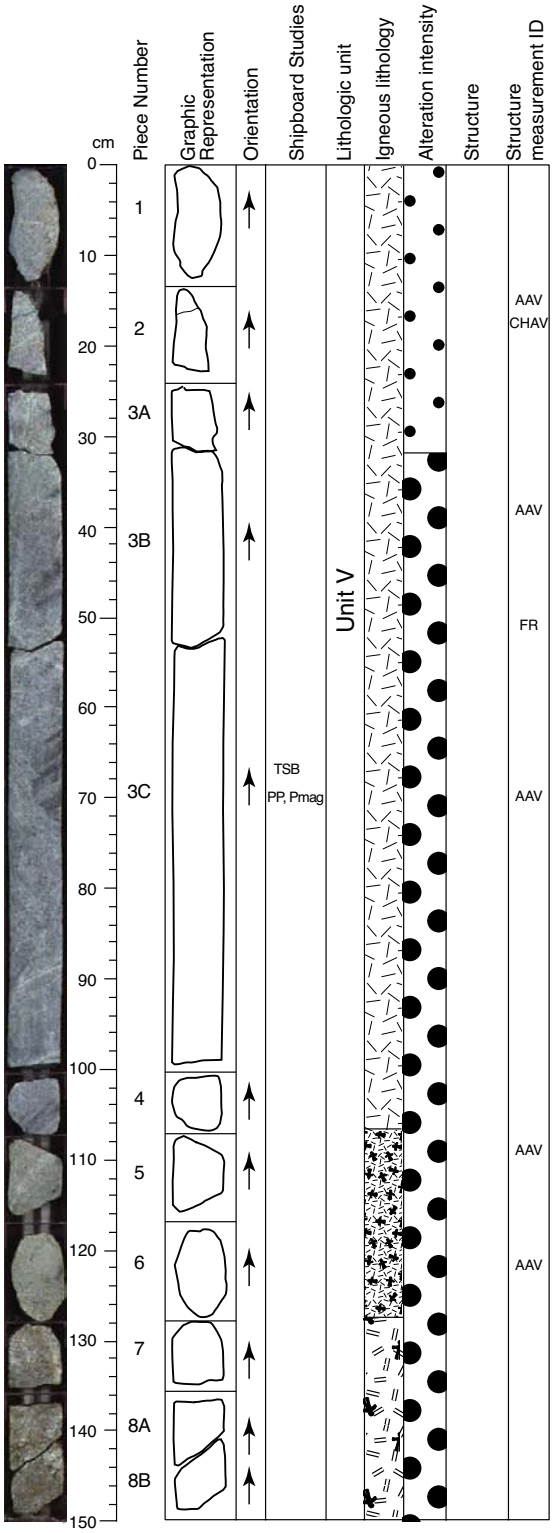
SECONDARY MINERALOGY:
Piece 1 is a moderately altered, gray diabase. Pieces 2-3A are moderately altered (25%), while Pieces 3B-11 are highly altered 45%. Olivine is 40-70% altered to green amphibole, talc and magnetite. Plagioclase is 10-20% altered to chlorite, talc, and secondary plagioclase. Clinopyroxene is only slightly altered to green amphibole.

METAMORPHIC VEINS:
This section contains minor dark green, single, straight amphibole veins (0.1 vol.%). A thick (up to 6-mm wide), single, vuggy carbonate-clay vein is present in Pieces 4 to 6 (1 vol.%).

THIN SECTIONS: Sample 1275D-33R-1, 22-24 cm

STRUCTURE:
The section consists of a fine to medium grained troctolitic oxide to oxide bearing gabbro. There is no mesoscopic evidence of high temperature crystal plastic deformation in the section. Pieces 4, 5, and 6 contain minor shear fractures. Piece 9 contains a small fault with chlorite slickenfibers that indicate strike slip motion.

Core Photo



209-1275D-33R-2 (Section top: 152.74 mbsf)

UNIT-V: Olivine gabbro and oxide gabbro(norite)

Pieces 1-8

COLOR: Light gray to brownish and greenish gray

PRIMARY MINERALOGY: MICROGABBRO AND OXIDE GABBRO

Plagioclase	Mode 50%
	Size < 3 mm
	Shape/Habit Eubhedral to anhedral
Clinopyroxene	Mode 40%
	Size < 3 mm
	Shape/Habit Eubhedral to anhedral
Oxide	Mode 10%

COMMENTS: Grain size gradually increases to the bottom of the section. Pieces 1-3B (0-35 cm) are microgabbro with 25% olivine phenocrysts. Pieces 3B-4 are microgabbro. Pieces 5-8 grades from microgabbro to medium-grained to coarse-grained gabbro.

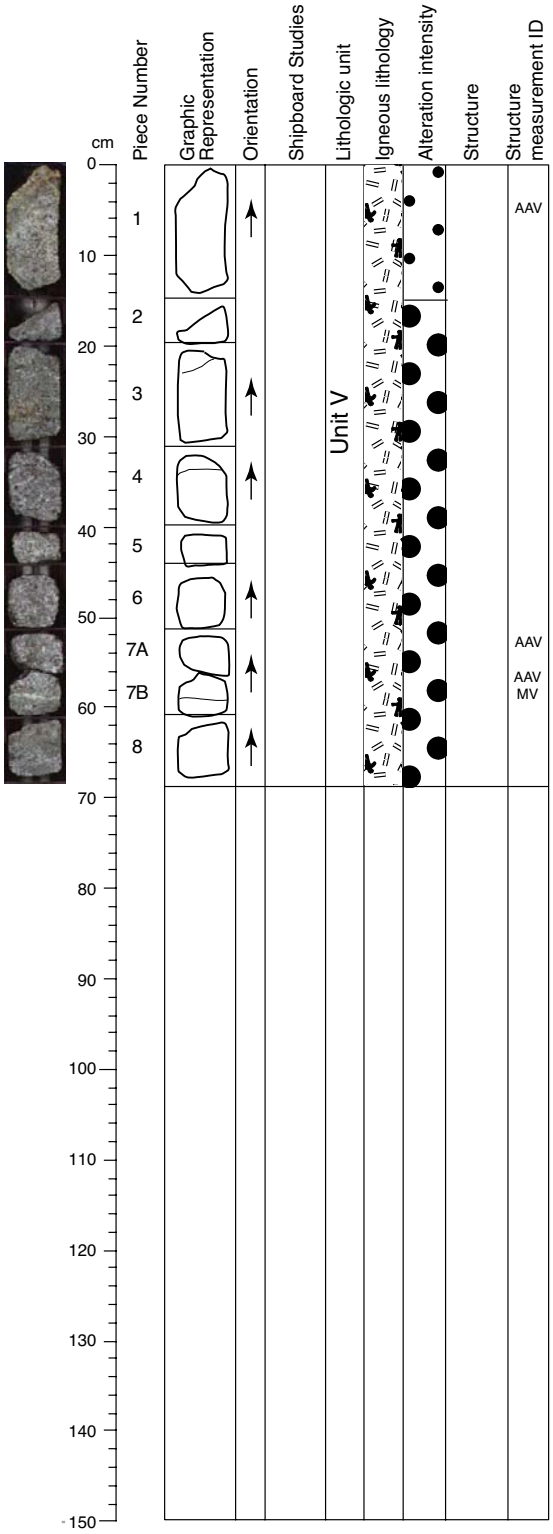
SECONDARY MINERALOGY:
Olivine gabbro is moderately (Pieces 1-4) to highly (Pieces 5-6) altered. Olivine is 40-70% altered to green amphibole, talc and magnetite. Plagioclase is 10-20% altered to chlorite, talc, and secondary plagioclase. Clinopyroxene is only slightly altered to green amphibole. Coarse-grained gabbro (Pieces 7-8) is highly altered, mainly to green amphibole and secondary plagioclase, with minor brown amphibole and chlorite.

METAMORPHIC VEINS:
This section contains minor green, single, straight amphibole veins (0.5 vol.%).

THIN SECTIONS: Sample 1275D-33R-2, 66-68 cm

STRUCTURE:
The section consists of a fine to medium grained troctolitic oxide bearing gabbro (Pieces 1-2) and medium to coarse grained oxide-bearing gabbro. Layering or banding contacts in oxide gabbroic rocks are generally defined by grain size changes, but are commonly associated with changes in the modal percentage of mineral phases, especially variations in oxide mineral or plagioclase abundance. Layering in Piece 2 is inclined by 24 degrees in the cut face of the core. There is no mesoscopic evidence of high temperature crystal plastic deformation in the section. Pieces 2 and 3 contain minor chlorite-filled shear fractures.

Core Photo



209-1275D-33R-3 (Section top: 154.24 mbsf)

UNIT-V: Olivine gabbro and oxide gabbro(norite)

Pieces 1-8

COLOR: Gray to green

PRIMARY MINERALOGY: OXIDE GABBRO

Plagioclase	Mode 50%
	Size < 15 mm
	Shape/Habit Eubhedral to anhedral
Clinopyroxene	Mode 40%
	Size < 15 mm
	Shape/Habit Eubhedral to anhedral
Oxide	Mode 10%

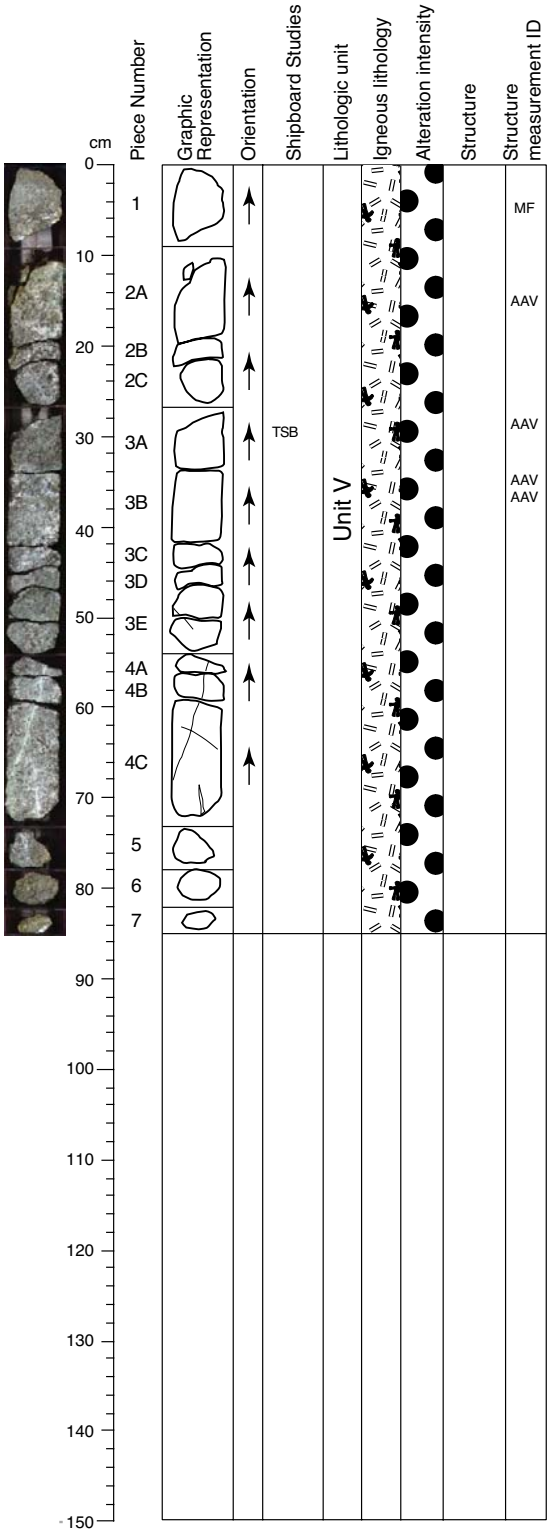
COMMENTS: This short section mainly consists of coarse-grained gabbro with minor amount of microgabbro at intervals of 3-9 cm and 65-69 cm.

SECONDARY MINERALOGY:
Gabbro in this section is moderately (35%) to highly (50%) altered, mainly to green amphibole and secondary plagioclase, with minor brown amphibole and chlorite. Piece 1 contains a composite plagioclase- amphibole-chlorite vein (0.5-1.5 cm wide, 5 vol.% of the Piece) of likely magmatic origin, with green amphibole and chlorite located in the central part.

METAMORPHIC VEINS:
This section contains minor green single straight amphibole veins (0.5 vol.%).

STRUCTURE:
The section consists of coarse grained oxide gabbro and oxide bearing gabbro. Pieces 4, 6 and 7 contain irregular shaped open fractures.Fractures in Piece 4 and 7 are filled with chlorite-amphibole.

Core Photo



209-1275D-34R-1 (Section top: 156.3 mbsf)

UNIT-V: Olivine gabbro and oxide gabbro(norite)

Pieces 1-7

COLOR: Greenish gray and brown

PRIMARY MINERALOGY: OXIDE GABBRO

Plagioclase	Mode 50%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Clinopyroxene	Mode 40%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Oxide	Mode 10%

COMMENTS: This section consists of a fine-grained gabbro in Piece 1 and coarse-grained gabbros in Pieces 2-7. An interval of 5-9 cm is foliated. Piece 3A is plagioclase poor.

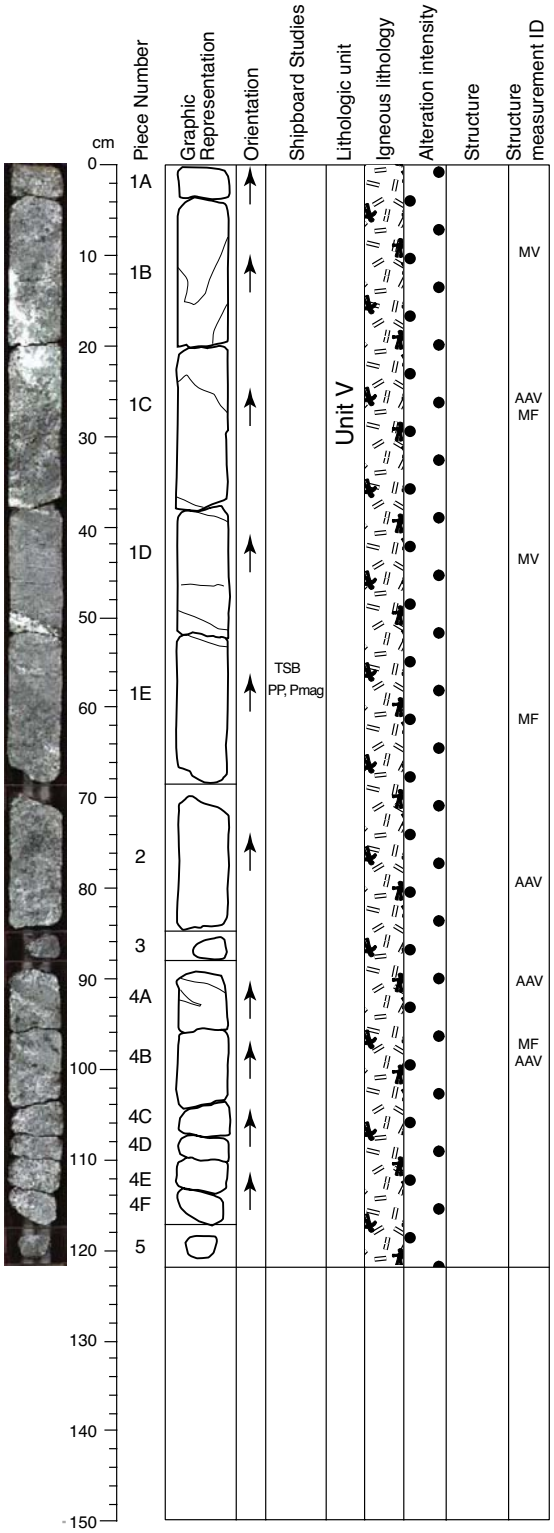
SECONDARY MINERALOGY:
Gabbro in this section is highly (50%) altered, mainly to green amphibole and secondary plagioclase, with minor brown amphibole and chlorite.

METAMORPHIC VEINS:
This section contains minor green single straight amphibole veins (1.0 vol.%). A single 5-mm large amphibole vein is present in Pieces 3 and 4.

THIN SECTIONS: Sample 1275D-34R-1, 28-31 cm

STRUCTURE:
The section consists of medium to coarse grained oxide gabbro. Pieces 2, 3 and 4 contain subhorizontal fractures that may have been induced by drilling. Piece 2, 3 and 4 are cut by amphibole veins.

Core Photo



209-1275D-34R-2 (Section top: 157.15 mbsf)

UNIT-V: Olivine gabbro and oxide gabbro(norite)

Pieces 1-5

COLOR: Greenish gray

PRIMARY MINERALOGY: OXIDE GABBRO

Plagioclase	Mode 50%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Clinopyroxene	Mode 40%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Oxide	Mode 10%

COMMENTS: This section mostly consists of coarse-grained gabbro with minor amount of fine-grained gabbro in Piece 1d. Granophyric segregation or dike at 12-25 cm and at 51 cm. Piece 2 74-76 cm is oxide-rich.

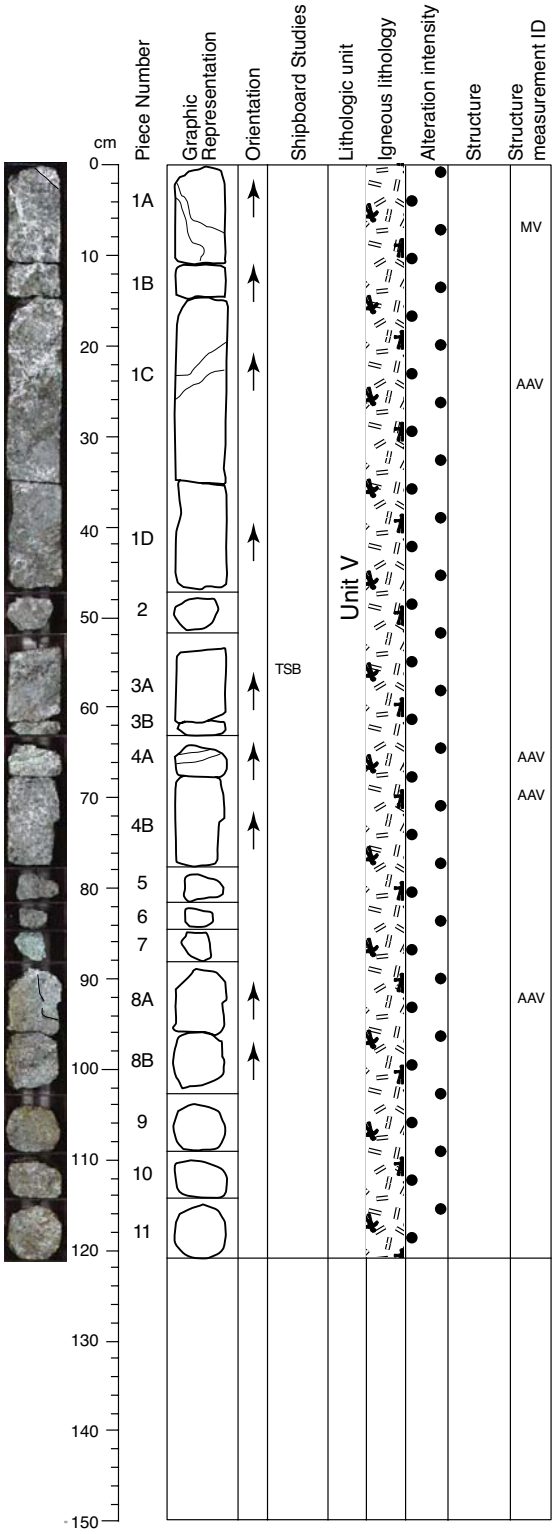
SECONDARY MINERALOGY:
Gabbro in this section is moderately (30%) altered, mainly to green amphibole and secondary plagioclase, with minor brown amphibole and chlorite.

METAMORPHIC VEINS:
This section contains minor green single straight amphibole veins (0.1 vol.%). In Piece 5 the composition of these veins is variable and includes green amphibole-rich as well as plagioclase-rich intervals. Felsic dikelets and patches account for about 2 vol.% of Piece 1 and consists of plagioclase-amphibole-chlorite assemblages. Locally, these felsic domains are crosscut by green amphibole veins.

THIN SECTIONS: Sample 1275D-34R-2, 54-57 cm

STRUCTURE:
The section consists of medium to coarse-grained oxide gabbro, cut by multiple granophyric veins in Pieces 1, 2,and 3. There is no evidence of high temperature crystal plastic deformation. Piece 4 contains subhorizontal fractures that may have been induced by drilling.

Core Photo



209-1275D-34R-3 (Section top: 158.37 mbsf)

UNIT-V: Olivine gabbro and oxide gabbro(norite)

Pieces 1-11

COLOR: Greenish gray

PRIMARY MINERALOGY: OXIDE GABBRO

Plagioclase	Mode 50%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Clinopyroxene	Mode 40%
	Size < 20 mm
	Shape/Habit Eubhedral to anhedral
Oxide	Mode 10%

COMMENTS: This section mostly consists of coarse-grained gabbro with minor amount of medium-grained gabro in Pieces 1C-1D at 31-39 cm and fine-grained gabbro in Piece 3 at 56-59 cm. Piece 3 at 56 cm is oxide rich. Coarse clinopyroxene as large as 2 cm at 99 cm.

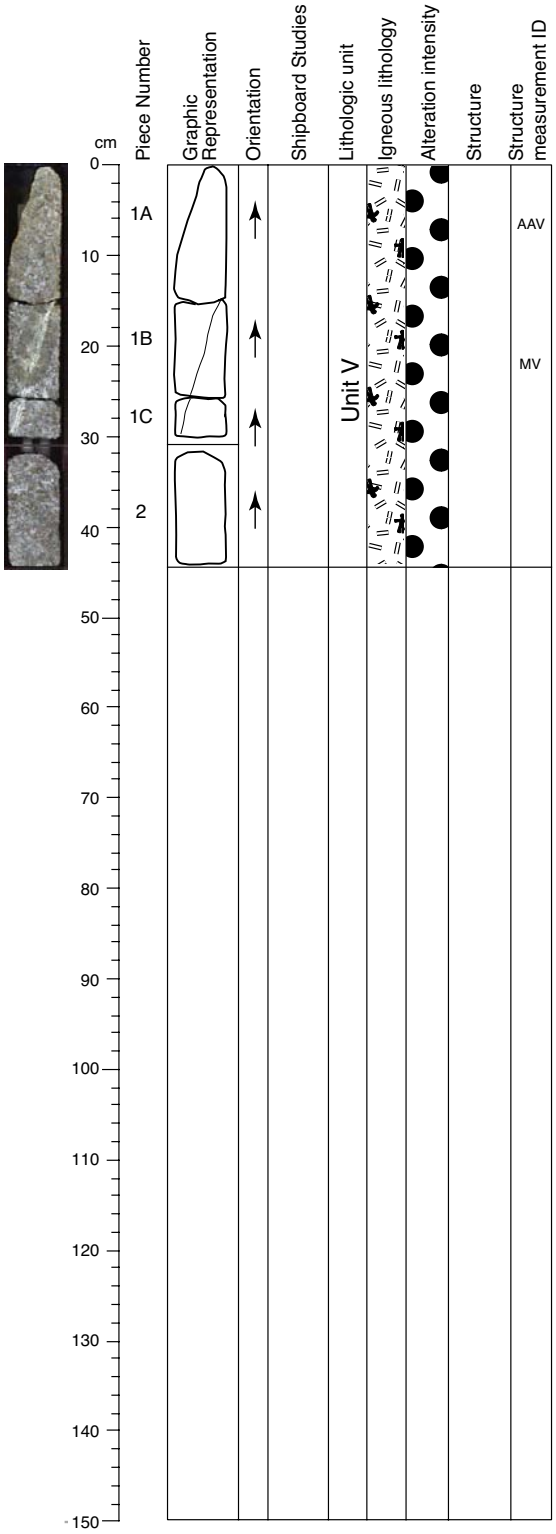
SECONDARY MINERALOGY:
Gabbro in this section is moderately (35%) altered, mainly to green amphibole and secondary plagioclase, with minor brown amphibole and chlorite.

METAMORPHIC VEINS:
This section contains minor green single straight amphibole veins (0.1 vol.%). Felsic dikelets (plagiclase- amphibole-chlorite) are present in Pieces 1 to 4A and account for 0.5 vol.% of this section.

THIN SECTIONS: Sample 1275D-34R-3, 54-57 cm

STRUCTURE:.
The section consists of medium to coarse grained oxide gabbro, cut by multiple granophyric veins in Pieces 1 and 4. There is no evidence of high temperature crystal plastic deformation. There is no brittle shear deformation in this section. Open horizontal fractures in Piece 1 are probably drilling induced.

Core Photo



209-1275D-34R-4 (Section top: 159.58 mbsf)

UNIT-V: Olivine gabbro and oxide gabbro(norite)

Pieces 1-2

COLOR: Greenish gray

PRIMARY MINERALOGY: OXIDE GABBRO

Plagioclase	Mode 50%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Clinopyroxene	Mode 40%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Oxide	Mode 10%

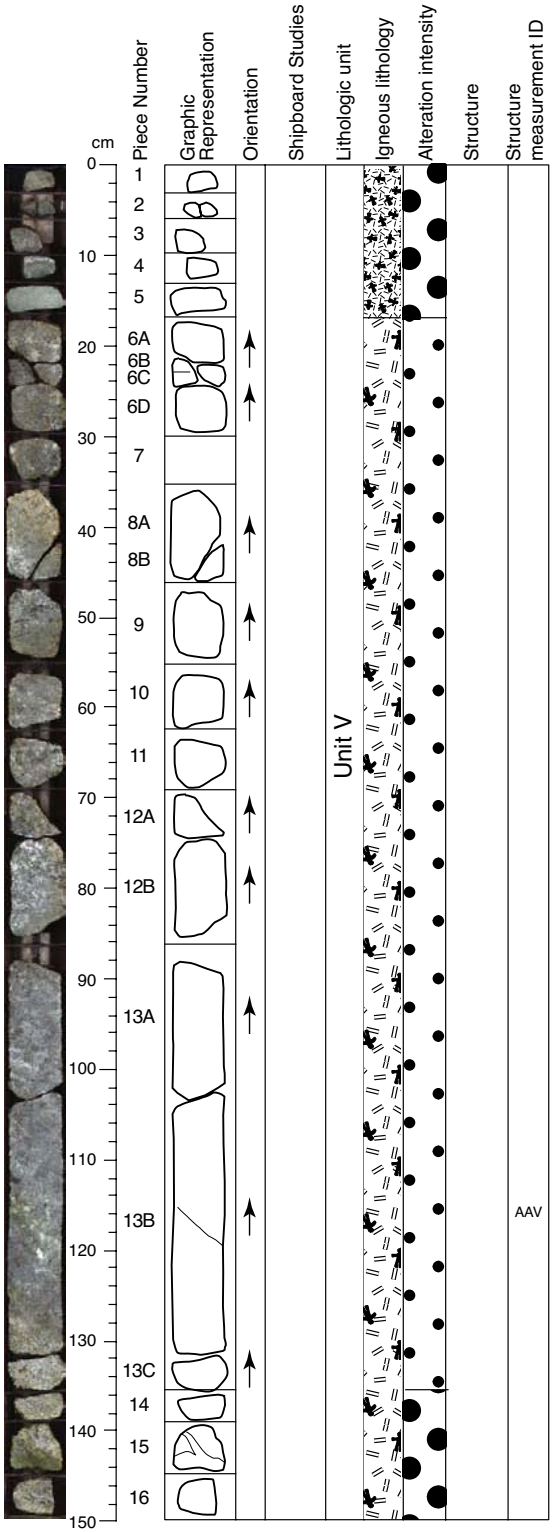
COMMENTS: This section mostly consists of coarse-grained gabbro that is continuous from the previous section.

SECONDARY MINERALOGY:
Gabbro in this section is highly (45%) altered, mainly to green amphibole and secondary plagioclase, with minor brown amphibole and chlorite.

METAMORPHIC VEINS:
Piece 1 contains a 1cm-wide composite vein which account for about 1 vol.% of this piece. The center part consists of white plagioclase and the rims of amphibole.

STRUCTURE:
The section consists of coarse-grained oxide gabbro, cut by a granophyric vein in Piece 1. There is no evidence of high temperature crystal plastic deformation. There is no brittle shear deformation in this section. Open horizontal fractures in Piece 1 are probably drilling induced.

Core Photo



209-1275D-35R-1 (Section top: 160.8 mbsf)

UNIT-V: Olivine gabbro and oxide gabbro(norite)

Pieces 1-17

COLOR: Greenish gray

PRIMARY MINERALOGY: OXIDE GABBRO

Plagioclase	Mode 50%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Clinopyroxene	Mode 40%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Oxide	Mode 10%

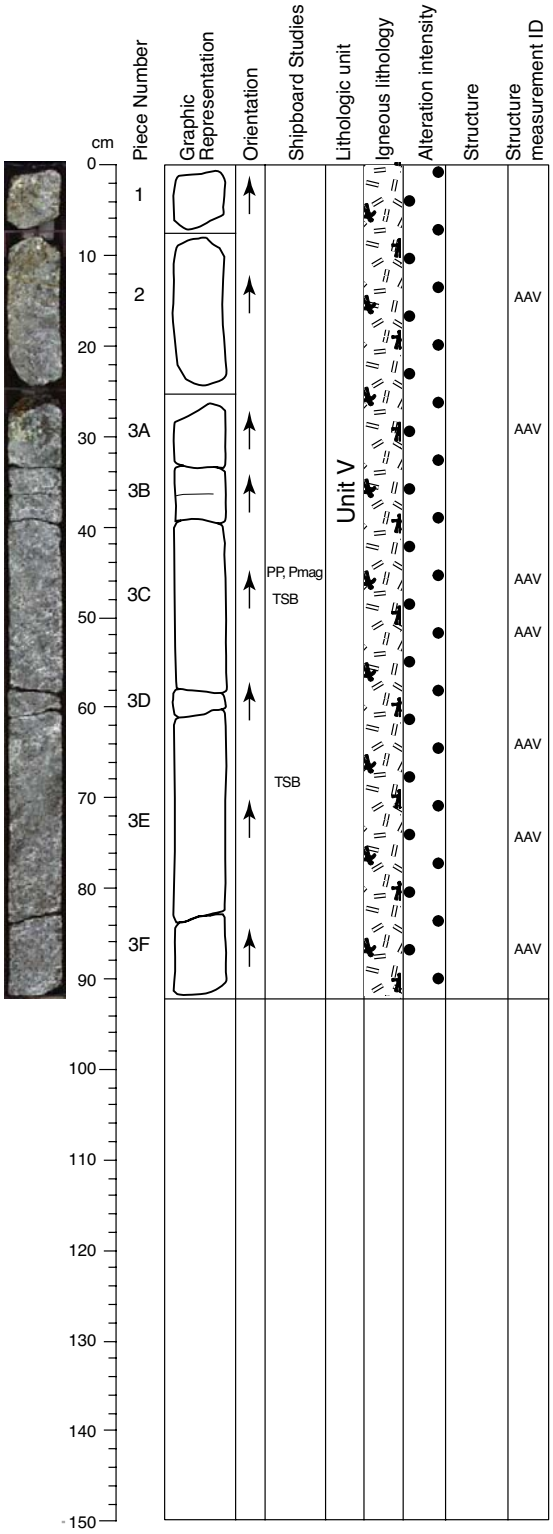
COMMENTS: This section consists of oxide gabbro with various grain sizes. Pieces 1-4 are medium-grained. Piece 5 is fine-grained. Pieces 6-17 are coarse-grained. Plagioclase-rich domains occur at 42-45 cm, 75-84 cm. Granophyric segregation at 114-123 cm. The lower half of Piece 14B is weakly foliated.

SECONDARY MINERALOGY:
Gabbro in this section is moderately to highly (20-70%) altered, mainly to green amphibole and secondary plagioclase, with minor brown amphibole and chlorite. Magmatic veins in Pieces 14-16 appear completely altered to chlorite and amphibole.

METAMORPHIC VEINS:
This section contains dark green single straight amphibole veins (0.5 vol.%). An irregular light green chlorite-rich domain in Pieces 14-16 is interpreted as a completely diabase intrusion rather than a hydrothermal vein.

STRUCTURE:
The section consists of medium to coarse-grained oxide gabbro, cut by a granophyric vein in Piece 4. There is no evidence of high temperature crystal plastic deformation. Piece 15 is a cohesive fault breccia with a matrix of fibrous chlorite. Piece 14 contains dense subhorizontal fracturing with incipient brecciation. Pieces 13 and 16 are cut by minor shear fractures.

Core Photo



209-1275D-35R-2 (Section top: 162.3 mbsf)

UNIT-V: Olivine gabbro and oxide gabbro(norite)

Pieces 1-3

COLOR: Greenish gray

PRIMARY MINERALOGY: OXIDE GABBRO

Plagioclase	Mode 50%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Clinopyroxene	Mode 40%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Oxide	Mode 10%

COMMENTS: This section consists of coarse-grained oxide gabbro. Pieces 3D-3G at 50-93 cm are foliated. Pieces 1-3A are more altered.

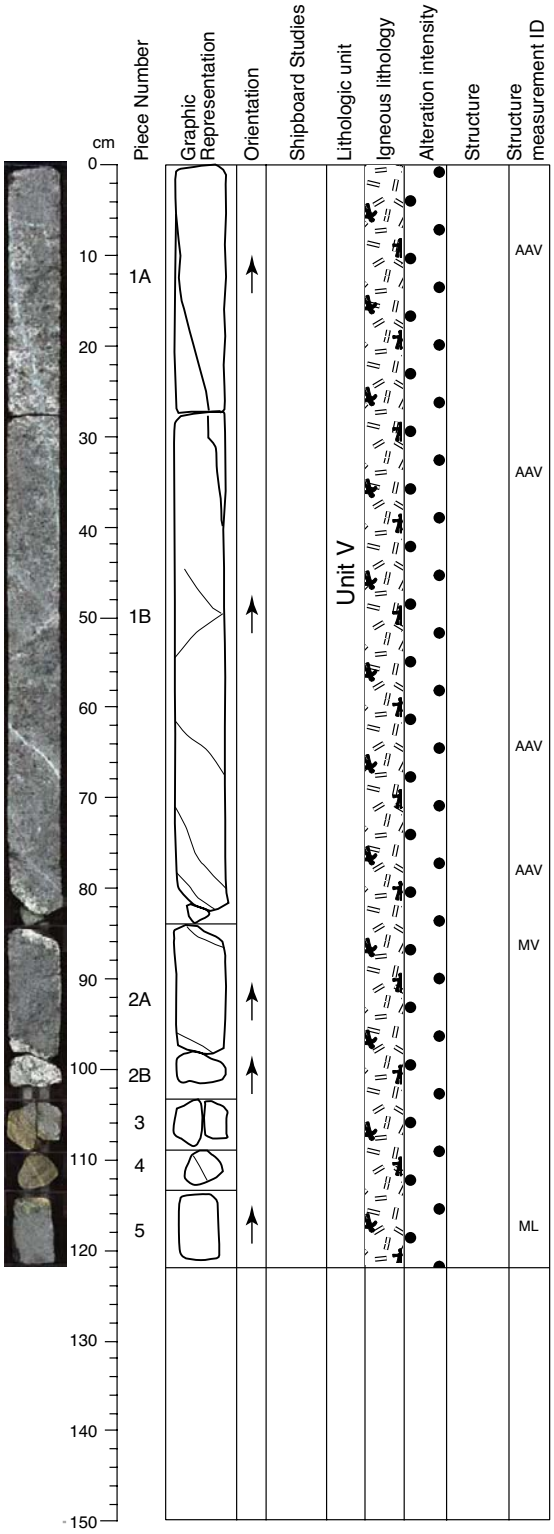
SECONDARY MINERALOGY:
Gabbro in this section is moderately (40%) altered, mainly to green amphibole and secondary plagioclase, with minor brown amphibole and chlorite.

METAMORPHIC VEINS:
This section contains minor dark to light green amphibole-chlorite veins (0.5 vol.%).

THIN SECTIONS: Samples 1275D-35R-2, 47-49 and 1275D-35R-2, 67-70 cm

STRUCTURE:
The section consists of medium to coarse-grained oxide gabbro and coarse leucocratic gabbro (Piece 3). There is no evidence of high temperature crystal plastic deformation. Pieces 1 and 2 are cut by minor shear fractures.

Core Photo



209-1275D-35R-3 (Section top: 163.22 mbsf)

UNIT-V: Olivine gabbro and oxide gabbro(norite)

Pieces 1-3

COLOR: Greenish gray

PRIMARY MINERALOGY: OXIDE GABBRO

Plagioclase	Mode 50%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Clinopyroxene	Mode 40%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Oxide	Mode 10%

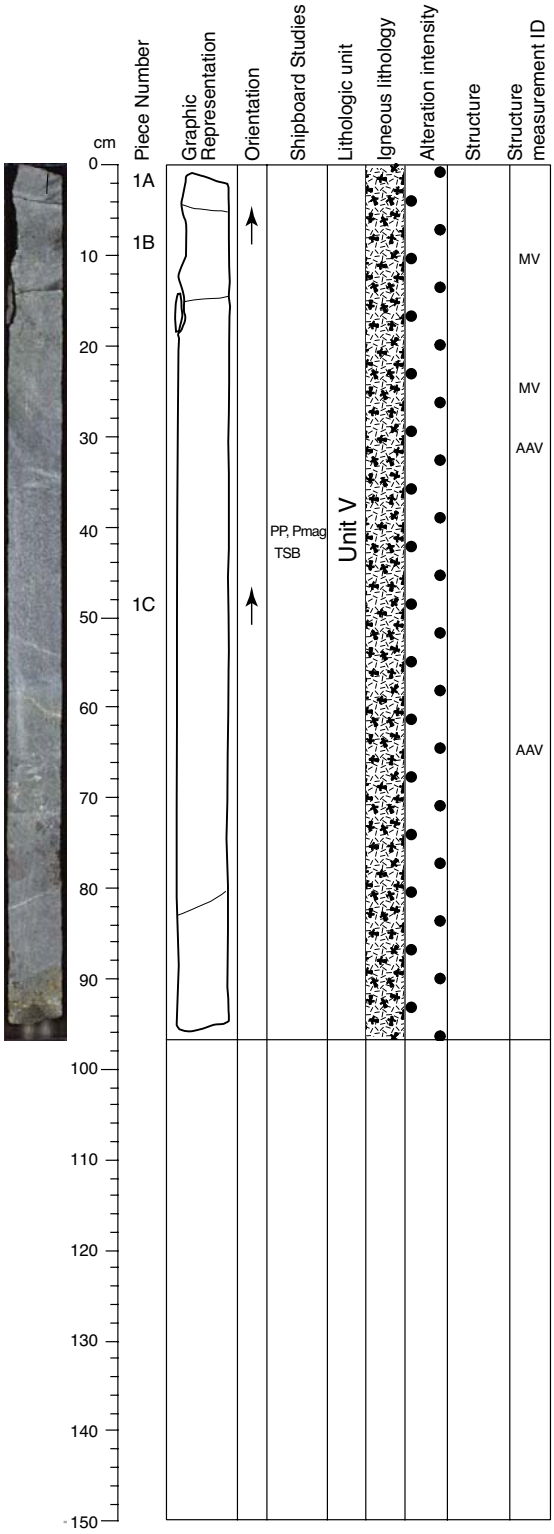
COMMENTS: This section consists of oxide gabbro with variable grain size. Piece 1A (0-7 cm) is coarse-grained. Pieces 1A-2 (7-99 cm) are mixed between medium- and coarse-grained. Pieces 3-5 are fine-grained. Granophyric dike in Piece 2B.

SECONDARY MINERALOGY:
Gabbro in this section is moderately (20-25%) altered, mainly to green amphibole and secondary plagioclase, with minor brown amphibole and chlorite. The granophyre dike in Piece 2B is highly altered to secondary plagioclase and amphibole with minor chlorite.

METAMORPHIC VEINS:
Piece 1 contains several prominent, up to 7-mm thick, single, straight amphibole-chlorite veins (1.0 vol.%). Pieces 2 to 5 contain minor dark green amphibole veins.

STRUCTURE:
The section consists of medium to coarse-grained oxide gabbro and coarse leucocratic gabbro (Piece 3), cut by granophyric veins in Pieces 1 and 2. Pieces 3 and 4 are diorites and Piece 5 contains a contact between oxide micrograbbro, coarse-grained gabbro and diorite. There is no evidence of high temperature crystal plastic deformation in the section. There is no brittle deformation in this section.

Core Photo



209-1275D-35R-4 (Section top: 164.44 mbsf)

UNIT-V: Olivine gabbro and oxide gabbro(norite)

Pieces 1

COLOR: Brownish green

PRIMARY MINERALOGY: MICROGABBRO

Plagioclase	Mode 50%
	Size < 1 mm
	Shape/Habit Eubhedral to anhedral
Clinopyroxene	Mode 40%
	Size < 30 mm
	Shape/Habit Eubhedral to anhedral
Oxide	Mode 10%

COMMENTS: This section consists of microgabbro. Euhedral clinopyroxene megacrysts as large as 3 cm are present at 9-14 cm and 72-80 cm.

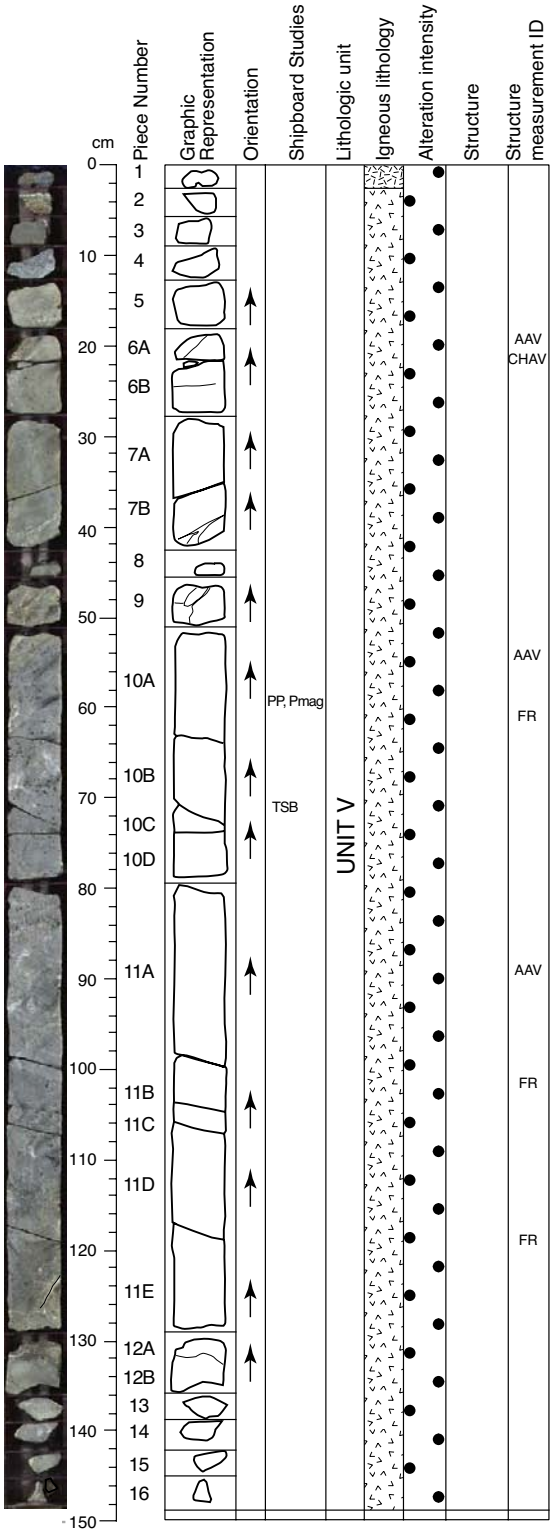
SECONDARY MINERALOGY:
Gabbro in this section is moderately (30%) altered, mainly to green amphibole and secondary plagioclase, with minor brown amphibole and chlorite. Clinopyroxene megacrysts appear largely fresh.

METAMORPHIC VEINS:
This section contains minor green to light green amphibole-chlorite veins (0.5 vol.%).

THIN SECTIONS: Sample 1275D-42-44 cm

STRUCTURE:
The section consists of fine to coarse-grained oxide gabbro cut by granophyric veins at 61, 81, and the base of the section. There is no evidence of high temperature crystal plastic deformation in the section. There is no brittle deformation in this section.

Core Photo



209-1275D-36R-1 (Section top: 165.8 mbsf)

UNIT-V: Olivine gabbro and oxide gabbro(norite)

Pieces 1-16

COLOR:

PRIMARY MINERALOGY: MICROGABBRO AND GABBRO

Plagioclase	Mode 50%
	Size < 1 mm
	Shape/Habit Eubhedral to anhedral
Clinopyroxene	Mode 40%
	Size < 30 mm
	Shape/Habit Eubhedral to anhedral
Oxide	Mode 10%

COMMENTS: This section consists of microgabbro with randomly dispersed brown or black euhedral mineral phase that makes up to 3-5% of rock volume (olivine, pyroxene or amphibole?). A fine-grained gabbro (few mm to few cm thick) is also present in some horizons.

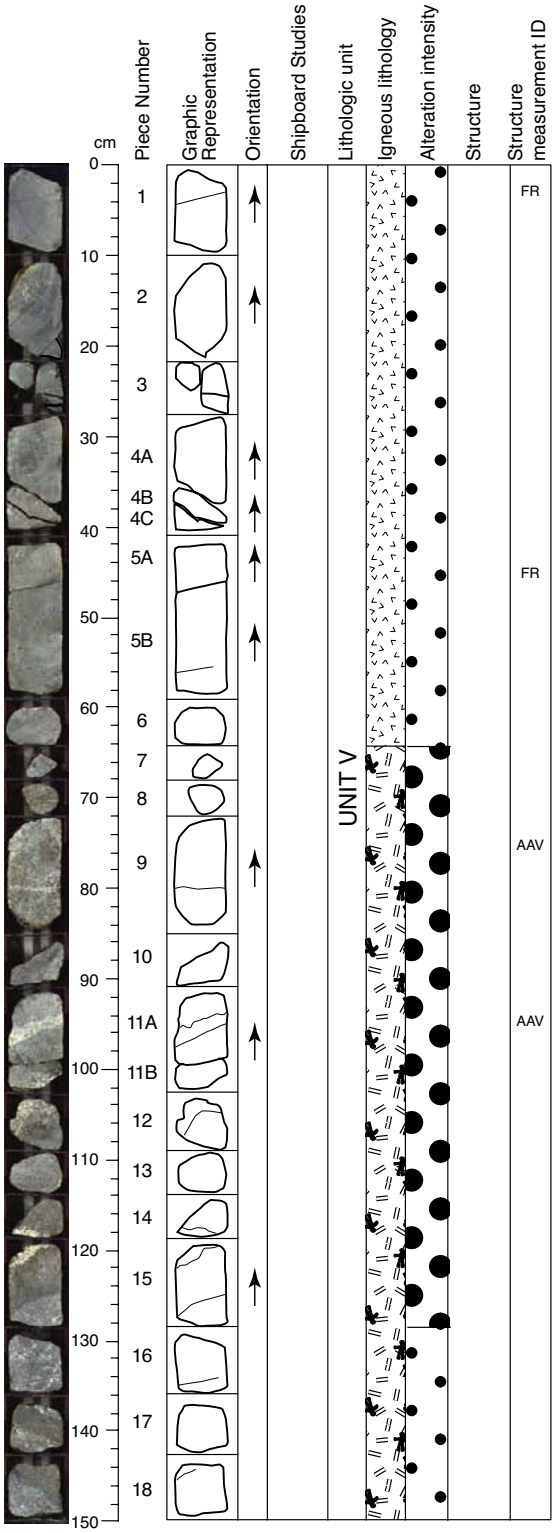
SECONDARY MINERALOGY:
Microgabbro in this section is moderately (30-35%) altered, mainly to green amphibole and secondary plagioclase, with minor brown amphibole and chlorite. Olivine is 50% altered to talc, chlorite, and magnetite.

METAMORPHIC VEINS:
This section contains minor very fine (1mm wide) single, straight amphibole veins (0.1 vol.%).

THIN SECTIONS: Sample 1275D-36R-1, 70-72 cm

STRUCTURE: The section is highly varied and consists troctolitic gabbro (Piece 1, 4), oxide gabbro (Piece 2), quartz dioirte (Piece 3), diabase containing dioritic clasts (Piece 5) diabase (Pieces 6-16). The diabase is cut by garnophyric veins in Pieces 6, 7, 9, 11 and 12. There is no evidence of high temperature crystal plastic deformation in the section. Pieces 1 through 5 contain minor shear fractures and low concentrations of open fractures.

Core Photo



209-1275D-36R-2 (Section top: 167.29 mbsf)

UNIT-V: Olivine gabbro and oxide gabbro(norite)

Pieces 1-18

COLOR: Gray to white and brown

PRIMARY MINERALOGY: GABBRO

Plagioclase	Mode 50%
	Size < 7 mm
	Shape/Habit Eubhedral to anhedral
Clinopyroxene	Mode 40%
	Size < 5 mm
	Shape/Habit Eubhedral to anhedral
Oxide	Mode 10%

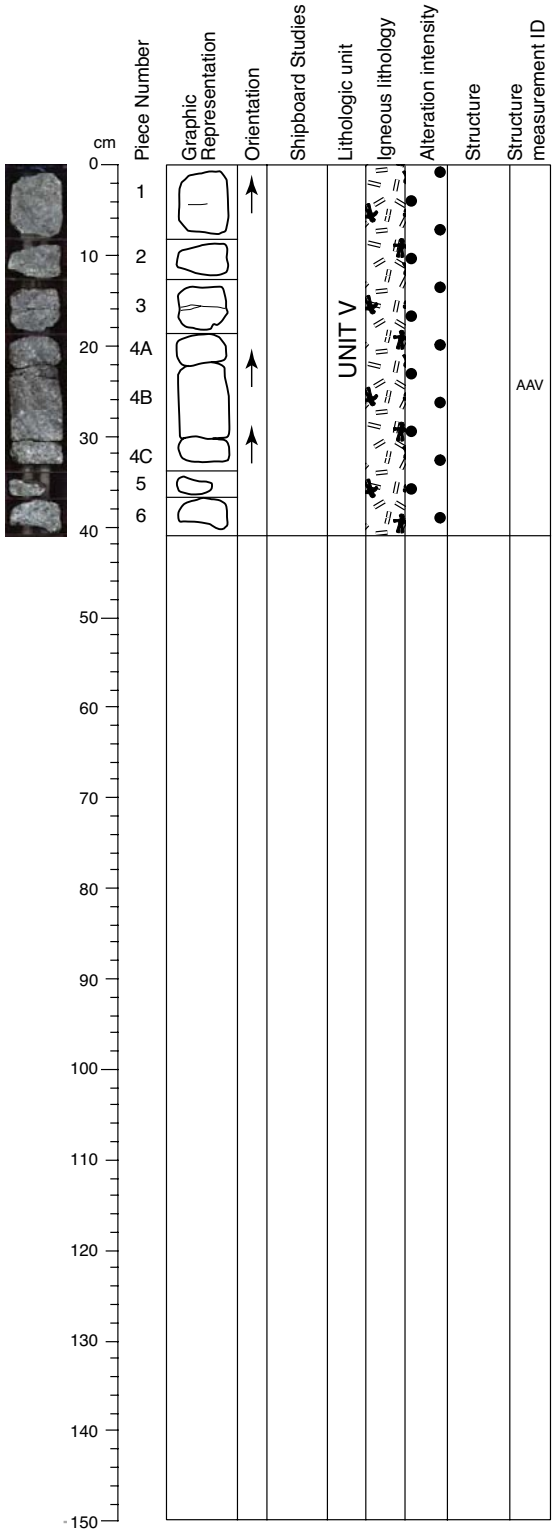
COMMENTS: Pieces 1-6 consist of very fine-grained gabbro or diabase similar to the bottom of previous Section 1275D-36R-1. From Piece 7 to Piece 15 at 125 cm are medium-grained gabbro with granophyre dikes at 97 cm, 104 cm and 118-121 cm. The bottom of the section (125-150 cm) is fine- or medium-grained gabbro with a granophyre dike at 137-140 cm that contains amphibole.

SECONDARY MINERALOGY:
Microgabbro in this section (Pieces 1-6 and 16-18) is moderately altered (40%) altered, mainly to green amphibole and secondary plagioclase, with minor brown amphibole and chlorite. Olivine is 50% altered to talc, chlorite, and magnetite. Gabbro is highly altered (50%) to green amphibole, secondary plagioclase, and minor chlorite and brown amphibole. Pieces 11 to 17 contain numerous granophyric dikelets and irregular felsic domains that appear largely fresh.

METAMORPHIC VEINS:
Both gabbro and microgabbro in this section contain minor single, straight, dark green amphibole veins (0.1 vol.%). Pieces 11 to 17 contain numerous plagioclase-amphibole felsic dikelets and irregular felsic domains (3.0 vol. %), which are locally crosscut by dark green amphibole veins (Pieces 12 and 15).

STRUCTURE:
The section consists of diabase (Pieces 1-5), medium to coarse grained oxide gabbro (Pieces 6-17), cut by granophyric veins in Pieces 2, 5, 8, 10, 11, 13, 14. Both diabase and gabbro are cut by the granophyres. Pieces 3 and 4 are diorites and Piece 5 contains a contact between oxide micrograbbro, coarse-grained gabbro and diorite. The oxide gabbros are marked by layer contacts in Pieces 14, 16 and 17. Layering or banding contacts in oxide gabbroic rocks are generally defined by grain size changes, but are commonly associated with changes in the modal percentage of mineral phases, especially variations in oxide mineral or plagioclase abundance. The layering is inclined by 32 degrees in the cut face of the core, but is variable in the section. The layering can be planar (e.g., Piece 16) or curviplanar (e.g., Piece 14). There is no evidence of high temperature crystal plastic deformation in the section. Pieces 1 through 5 contain minor shear fractures and low concentrations of open fractures.

Core Photo



209-1275D-36R-3 (Section top: 168.79 mbsf)

UNIT-V: Olivine gabbro and oxide gabbro(norite)

Pieces 1-6

COLOR: Brownish gray

PRIMARY MINERALOGY: GABBRO

Plagioclase	Mode 50%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Clinopyroxene	Mode 40%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Oxide	Mode 10%

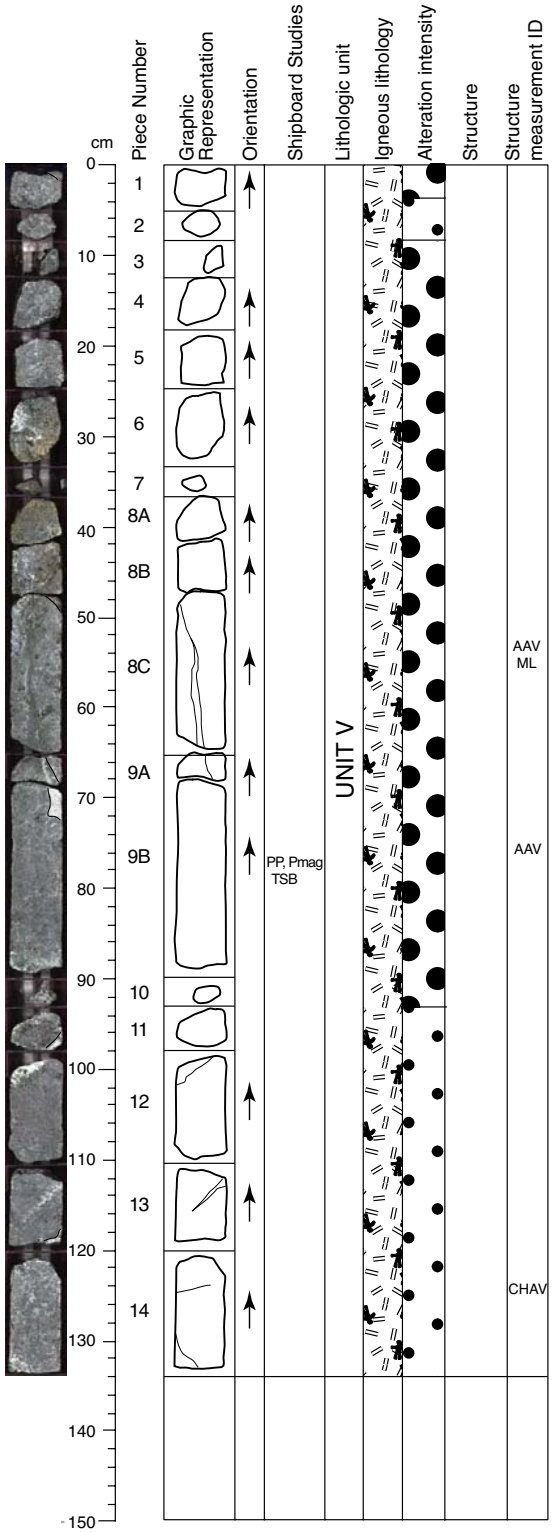
COMMENTS: This section consists of medium- to coarse-grained gabbro.

SECONDARY MINERALOGY:
Gabbro in this section is moderately altered (30%) altered, mainly to green amphibole and secondary plagioclase, with minor brown amphibole and chlorite.

METAMORPHIC VEINS:
This section contains minor single, straight dark green amphibole veins (0.1 vol.%).

STRUCTURE:
The section consists of altered medium to coarse-grained gabbro to leucogabbro (Piece 4) with minor amounts oxide. There is no mesoscopic evidence of crystal plastic deformation. Pieces 3 through 6 contain minor open fractures.

Core Photo



209-1275D-37R-1 (Section top: 170.5 mbsf)

UNIT-V: Olivine gabbro and oxide gabbro(norite)

Pieces 1-14

COLOR: Brownish gray-green

PRIMARY MINERALOGY: GABBRO

Plagioclase	Mode 50%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Clinopyroxene	Mode 40%-45%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Oxide	Mode 5%-10%

COMMENTS: This section consists of oxide gabbro with various grain sizes. Pieces 1-8B are medium- to coarse-grained with granophyre dike at 29 cm. Pieces 8C-13 are fine-grained with granophyre dike at 70 cm, 97-99 cm, and 120 cm. Piece 14 is coarse-grained oxide gabbro.

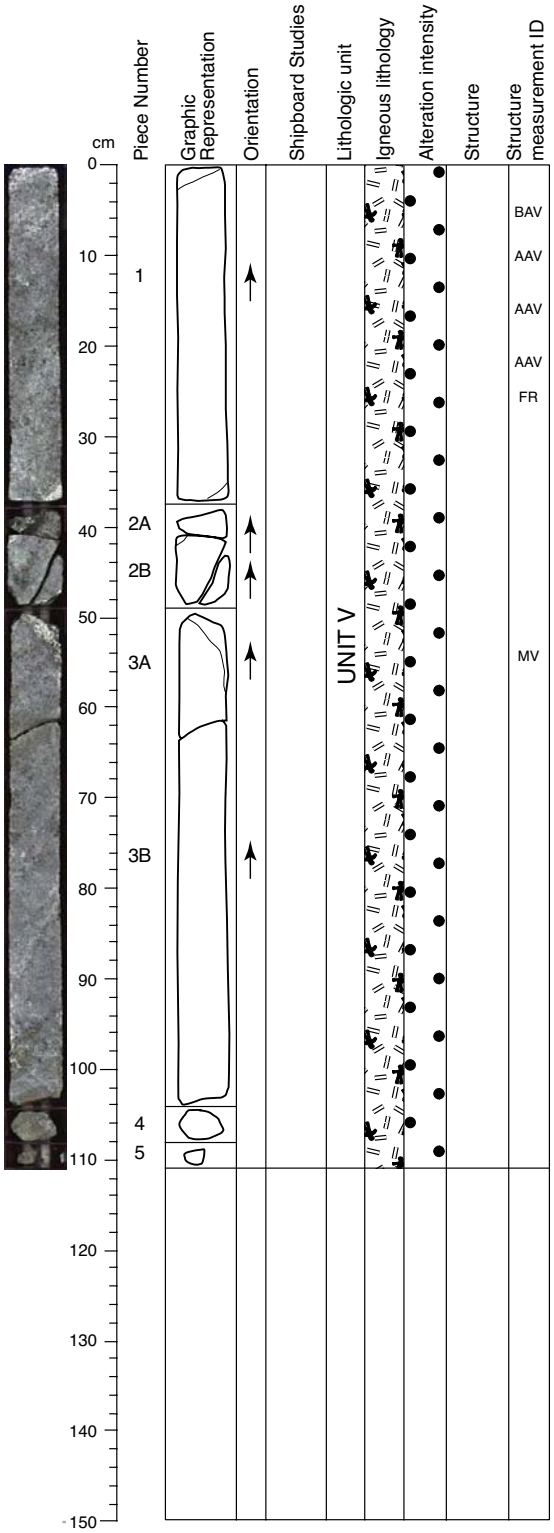
SECONDARY MINERALOGY:
This section is composed of moderately to highly altered gabbro. The top of Piece 1 is gray green and highly altered. The bottom of Piece 1 and Piece 2 are brownish gray and moderately altered. Pieces 3 to 10 are highly altered green to brownish gabbro that have red-brown alteration patches in Pieces 6B and 7. Clinopyroxene is highly altered, mostly to green amphibole with minor chlorite (ca. 10%), while plagioclase is only slightly altered, mostly to secondary green amphibole but with lesser amounts of secondary plagioclase and minor chlorite/smectite.

METAMORPHIC VEINS:
This section contains minor dark green single, straight amphibole veins (0.1 vol.%). Felsic dikelets consisting of plagioclase and amphibole are irregularly distributed and account for approximately 3 vol. %.

THIN SECTIONS: Sample 1275D-37R-1, 78-80 cm

STRUCTURE:
The section consists of medium to coarse-grained oxide gabbro and leucogabbro, with a variety of granophyric veinlets (in Pieces 5 and 8-13). Piece 7 contains a microgabbro vein that is near vertical. There is no mesoscopic evidence of crystal plastic deformation. There is no brittle deformation in this section.

Core Photo



209-1275D-37R-2 (Section top: 171.84 mbsf)

UNIT-V: Olivine gabbro and oxide gabbro(norite)

Pieces 1-5

COLOR: Gray

PRIMARY MINERALOGY: GABBRO

Plagioclase	Mode 50%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Clinopyroxene	Mode 40%-45%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Oxide	Mode 5%-10%

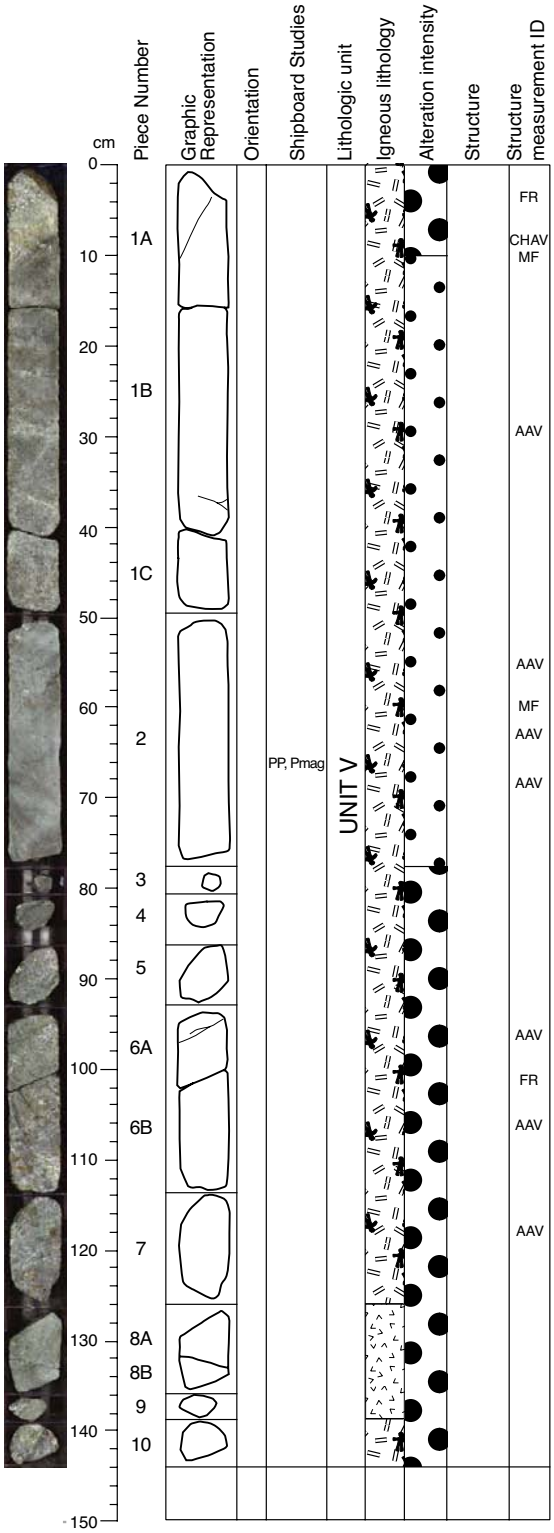
COMMENTS: This section consists of oxide gabbro with various grain sizes. Pieces 1-3 (0-72 cm) are medium-grained with granophyre dike at 0-3, 37-40, 49-51 cm. Pieces 3-5 (72-111 cm) are fine-grained with coarse-grained patches randomly dispersed.

SECONDARY MINERALOGY:
This section is composed entirely of grayish moderately altered gabbro. Clinopyroxene has been highly altered dominantly to green amphibole with minor chlorite, while plagioclase remains relatively fresh. Where altered, plagioclase has been replaced by minor green amphibole and traces of secondary plagioclase. Pieces 1 to 3 host white felsic veins.

METAMORPHIC VEINS:
Individual, dark green, straight, amphibole veins are common in Piece 1 (1.0 vol.%). Minor felsic intrusions are also present in the lower part of Piece 1, Piece 2, and the upper part of Piece 3 (1.0 vol.%).

STRUCTURE:
The section consists of medium to coarse-grained oxide gabbro and leucogabbro, with a variety of granophyric veinlets (in Pieces 1-3). There is no mesoscopic evidence of crystal plastic deformation in the section. Pieces 1 and 2 are cut by minor chlorite-filled shear fractures.

Core Photo



209-1275D-37R-3 (Section top: 172.95 mbsf)

UNIT-V: Olivine gabbro and oxide gabbro(norite)

Pieces 1-5

COLOR: Gray-green.

PRIMARY MINERALOGY: GABBRO

Plagioclase	Mode 50%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Clinopyroxene	Mode 40%-45%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Oxide	Mode 5%-10%

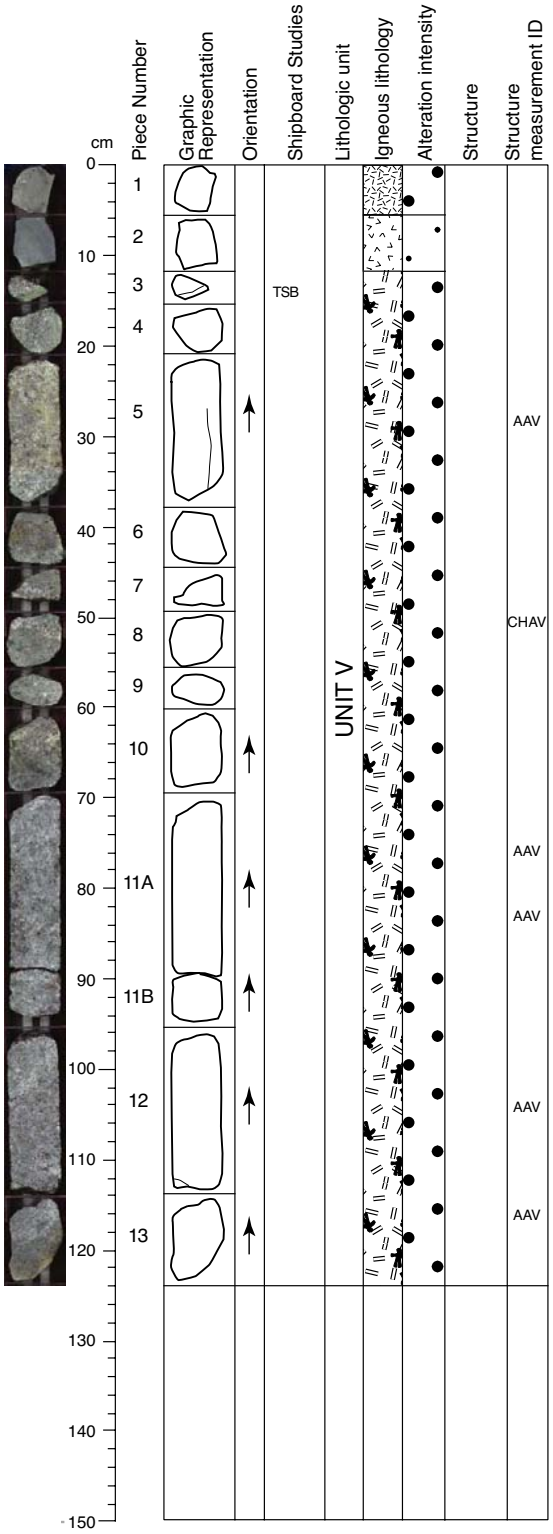
COMMENTS: This section consists of altered oxide gabbro with various grain sizes and minor amount of diabase. Top of Piece 1 (0-3 cm) is coarse-grained while the rest of Piece 1 is medium-grained. Pieces 2-3 are fine-grained gabbro or microgabbro. Pieces 5-7 and 20 are coarse-grained. Piece 8 is diabase without contact to gabbro.

SECONDARY MINERALOGY:
This section is composed of moderately to highly altered gabbro. The top of Piece 1 is gray green and highly altered. The bottom of Piece 1 and Piece 2 are gray brownish and moderately altered. Pieces 3 to 10 are highly altered greenish brownish gabbros, which have rusty red alteration patches in Pieces 6B and 7. Clinopyroxene has been altered mostly to green amphibole with minor chlorite, although in the highly altered Piece 1 clinopyroxene alteration comprises as much as 20%. Plagioclase is typically altered to green amphibole, with minor secondary plagioclase and traces of chlorite/smectite.

METAMORPHIC VEINS:
This section contains minor, individual, green, straight, amphibole-chlorite veins which account for approximately 0.5 vol.% of the core.

STRUCTURE:
The section consists of interlayered coarse, medium and fine-grained gabbros and olivine gabbros (Pieces 1-7), a fine grained porphyritic diabase (Pieces 8 and 9), and a coarse grained oxide bearing gabbro (Piece 10). Layering or banding contacts in oxide gabbroic rocks are generally defined by grain size changes, but are commonly associated with changes in the modal percentage of mineral phases. In this section variations in olivine modal percentage accompany grain size changes to define the layering. Layer contacts are inclined by 1 to 20 degrees in the cut face of the core. Layering is present in Pieces 2 and 6. There is no mesoscopic evidence of crystal plastic deformation in the section. Pieces 1, 6, and 7 contain minor chlorite-filled shear fractures.

Core Photo



209-1275D-38R-1 (Section top: 175.5 mbsf)

UNIT-V: Olivine gabbro and oxide gabbro(norite)

Pieces 1, 3-13

COLOR: Brownish green-gray

PRIMARY MINERALOGY: GABBRO

Plagioclase	Mode 50%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Clinopyroxene	Mode 40%-45%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Oxide	Mode 5%-10%

COMMENTS: This section consists of altered oxide gabbro with various grain sizes and minor amount of diabase. Piece 1 is microgabbro with altered olivine. Piece 2 is a diabase. Pieces 3-13 are coarse-grained gabbro with plagioclase-rich patches at 52 cm and 64 cm.

Piece 2

COLOR: Gray

PRIMARY MINERALOGY: DIABASE

COMMENTS: Aphyric diabase.

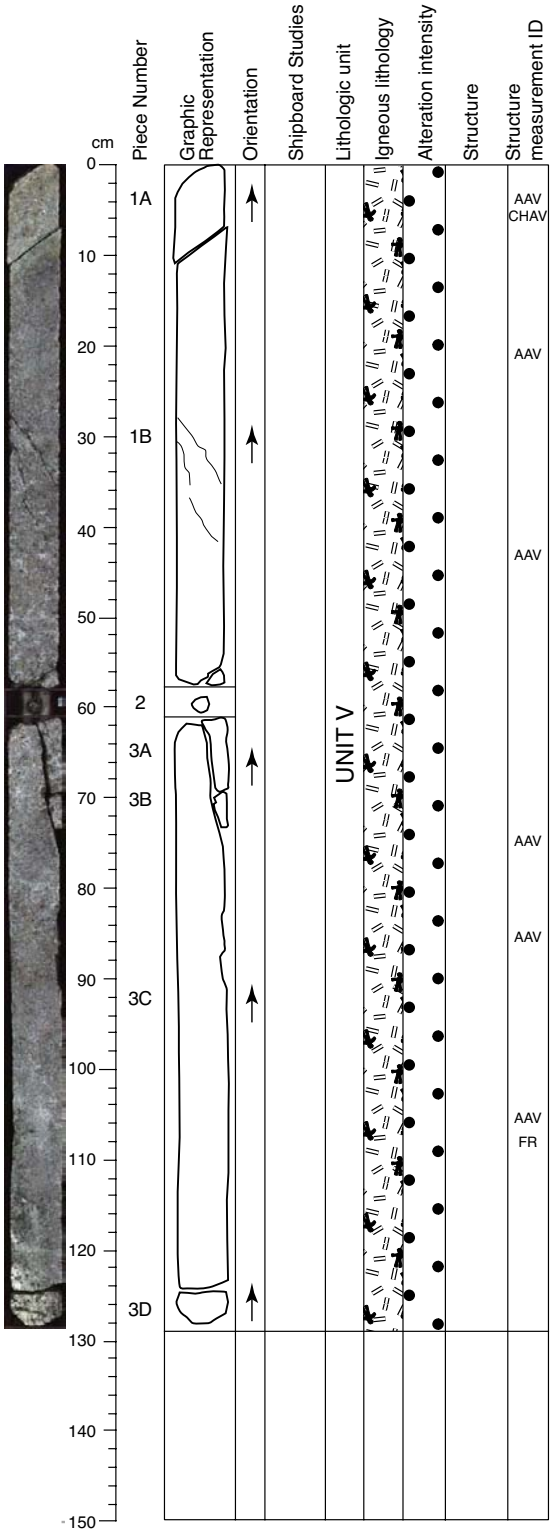
SECONDARY MINERALOGY:
The top piece of this section is gray, moderately altered microgabbro. Piece 2 is a slightly altered diabase. Pieces 3 to 13 are moderately altered gray greenish brownish gabbros. Pieces 3 and 4 contain large green chlorite veins. Alteration styles within both lithologies are broadly similar. Clinopyroxene is altered to green amphibole with minor chlorite while plagioclase is altered to small amounts of green amphibole and chlorite/smectite with trace amounts of secondary plagioclase. While the gabbro is moderately altered, the diabase in Piece 2 is only slightly altered.

METAMORPHIC VEINS:
The diabase of Piece 1 contains rare fine dark green amphibole veinlets (<0.1 vol.%). An exceptional light green chlorite-smectite vein is located at the lower portion of Piece 3 and the upper portion of Piece 4 and has a thickness of about 1cm on either piece. Pieces 5 to 12 contain minor dark green amphibole-chlorite veins (0.1 vol.%).

THIN SECTIONS: Sample 1275D-12-16 cm

STRUCTURE:
The section consists of fine to medium grained interlayered gabbros and oxide gabbros (Pieces 3 to 13) and diabase (Pieces 1 and 2). Pieces 3 and 4 contain a fine-grained chilled margin of diabase in contact with gabbro. Layering or banding contacts in oxide gabbroic rocks are generally defined by grain size changes, but are commonly associated with changes in the modal percentage of mineral phases. Layer contacts are inclined by 28 degrees in the cut face of the core. Layering is present in Pieces 13. There is no mesoscopic evidence of crystal plastic deformation in the section. There is no brittle deformation in this section.

Core Photo



209-1275D-38R-2 (Section top: 176.74 mbsf)

UNIT-V: Olivine gabbro and oxide gabbro(norite)

Pieces 1-2

COLOR: Brownish green-gray

PRIMARY MINERALOGY: GABBRO

Plagioclase	Mode 50%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Clinopyroxene	Mode 40%-45%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Oxide	Mode 5%-10%

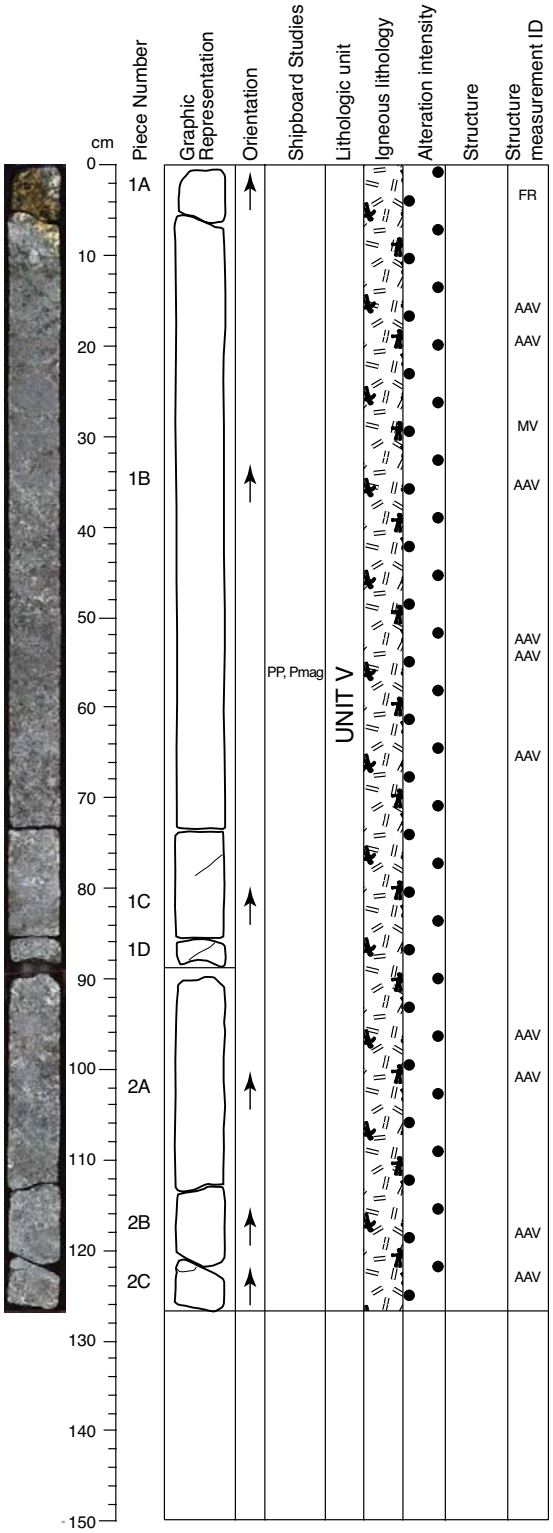
COMMENTS: Coarse-grained oxide gabbro with a granophyre dike at the top of the section.

SECONDARY MINERALOGY:
This section is composed of brownish green-gray, moderately altered gabbro. Alteration style is similar to that seen elsewhere in this core. Clinopyroxene is altered to green amphibole with minor chlorite while plagioclase is altered to small amounts of green amphibole and secondary plagioclase with trace amounts of chlorite smectite.

METAMORPHIC VEINS:
This section contains infrequent dark and light green amphibole-chlorite veins that account for no more than 0.1 vol.% of the core.

STRUCTURE:
The section consists of interlayered medium to very coarse grained gabbros and oxide gabbros cut by granophyre (Piece 3). Layering or banding contacts in oxide gabbroic rocks are generally defined by grain size changes, but are commonly associated with changes in the modal percentage of mineral phases. Layer contacts are inclined from 0-33 degrees in the cut face of the core. Layering is present in Pieces 1 and 3.There is no mesoscopic evidence of crystal plastic deformation in the section. Piece 3 is cut by minor chlorite-filled shear fractures.

Core Photo



209-1275D-38R-3 (Section top: 178.03 mbsf)

UNIT-V: Olivine gabbro and oxide gabbro(norite)

Pieces 1-2

COLOR: Brownish gray-green.

PRIMARY MINERALOGY: GABBRO

Plagioclase	Mode 50%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Clinopyroxene	Mode 40%-45%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Oxide	Mode 5%-10%

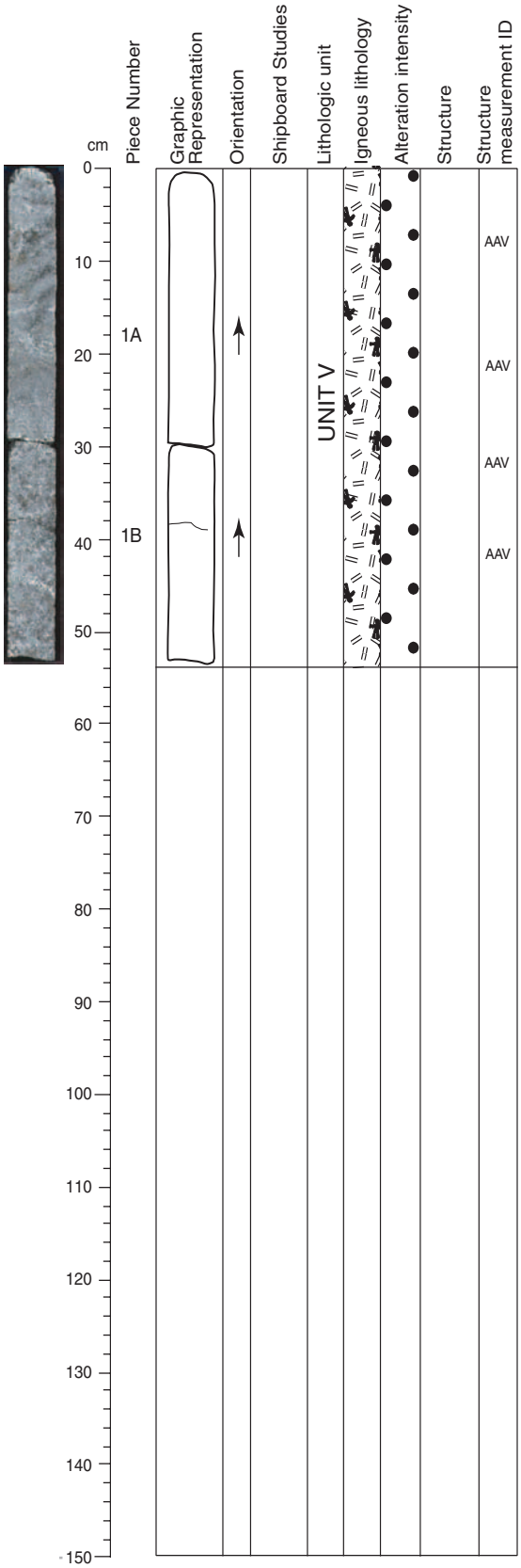
COMMENTS: Coarse-grained oxide gabbro with a granophyre dike at the top of the section.

SECONDARY MINERALOGY:
This section is composed entirely of moderately altered brownish green-gray gabbro. The top of Piece 1 hosts completely altered white and dark green felsic domains. Alteration style is similar to that seen elsewhere in this core. Clinopyroxene is altered to green amphibole with minor chlorite while plagioclase is altered to small amounts of green amphibole and secondary plagioclase with trace amounts of chlorite smectite.

METAMORPHIC VEINS:
This section contains minor dark green amphibole veins that account for no more than 0.1 vol.% of the core. These are particularly common in the upper portion of Piece 1 (0-8 cm).

STRUCTURE:
The section consists of interlayered medium to very coarse grained gabbros and oxide gabbros cut by granophyre (Piece 1 and 2). A thick trondhjemite vein cuts Piece 1 and has pyroxene comb structure along the margin of the vein. Pyroxenes are growing inward into the vein from the gabbro contact. There is no mesoscopic evidence of crystal plastic deformation in the section. Piece 1 is cut by minor chlorite-filled shear fractures. Piece 2 is cut by a chlorite-filled small fault with slickenfibers that indicate strike slip motion.

Core Photo



209-1275D-38R-4 (Section top: 179.3 mbsf)

UNIT-V: Olivine gabbro and oxide gabbro(norite)

Piece 1

COLOR: Brownish green-gray

PRIMARY MINERALOGY: GABBRO

Plagioclase	Mode 50%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Clinopyroxene	Mode 40%-45%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Oxide	Mode 5%-10%

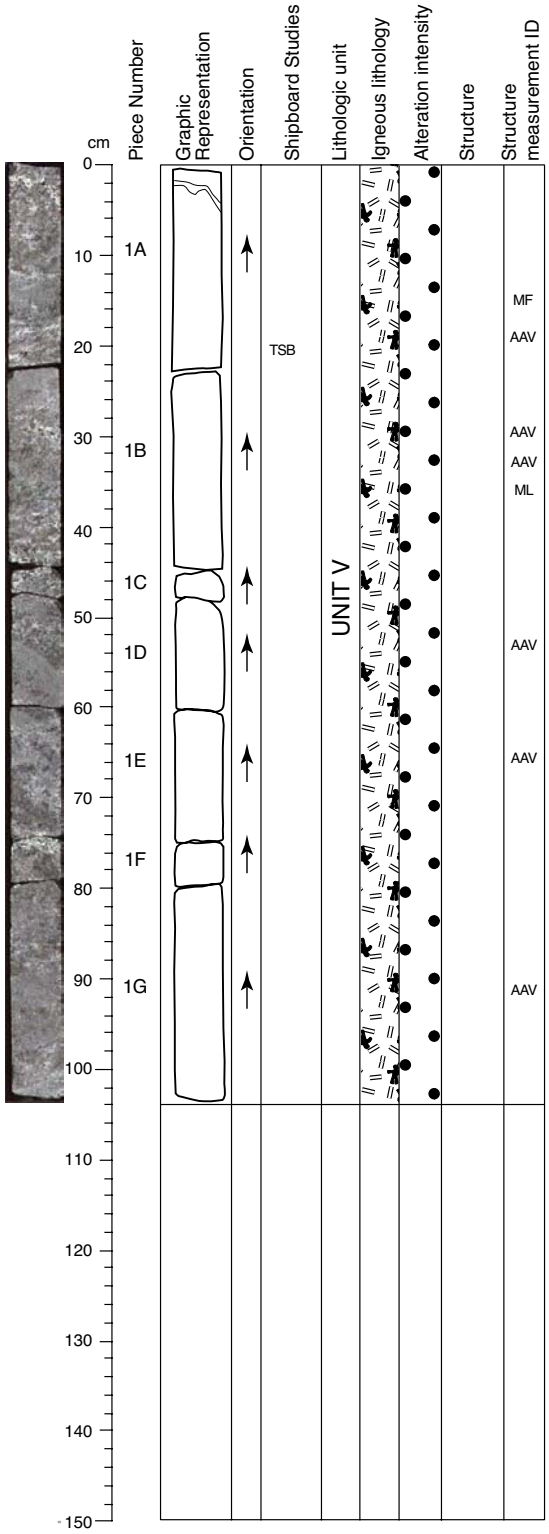
COMMENTS: This short section consists of gabbro with various grain sizes. Piece 1A (0-29 cm) is medium- to fine-grained gabbro while Piece 1B is coarse-grained.

SECONDARY MINERALOGY:
This section is composed entirely of moderately altered brownish green-gray gabbro. Alteration style is similar to that seen elsewhere in this core. Clinopyroxene is altered to green amphibole with minor chlorite while plagioclase is altered to small amounts of green amphibole and secondary plagioclase with trace amounts of chlorite smectite.

METAMORPHIC VEINS:
Dark green single straight amphibole veins are minor in this section (0.1 vol.%).

STRUCTURE:
The section consists of interlayered medium to very coarse-grained gabbros and oxide gabbros cut by granophyric veins. Layering defined by a boundary between coarse grained oxide gabbro below and fine grained gabbro above and an oxide rich layer are both horizontal in the cut face of the core. There is no mesoscopic evidence of crystal plastic deformation in the section. There is no brittle deformation in this section.

Core Photo



209-1275D-39R-1 (Section top: 180.1 mbsf)

UNIT-V: Olivine gabbro and oxide gabbro(norite)

Pieces 1

COLOR: Brownish green-gray

PRIMARY MINERALOGY: OXIDE GABBRO

Plagioclase	Mode 50%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Clinopyroxene	Mode 40%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Oxide	Mode 10%

COMMENTS: Oxide gabbro with variable grain size. Coarse-grained gabbro at 0-10 cm, 17-24 cm (well foliated), 28-52 cm; fine-grained gabbro at 10-17 cm, 24-28 cm, 52-58 cm; medium- to coarse-grained gabbro at 64-104 cm with dispersed crystals of pyroxene as large as 2.5 cm.

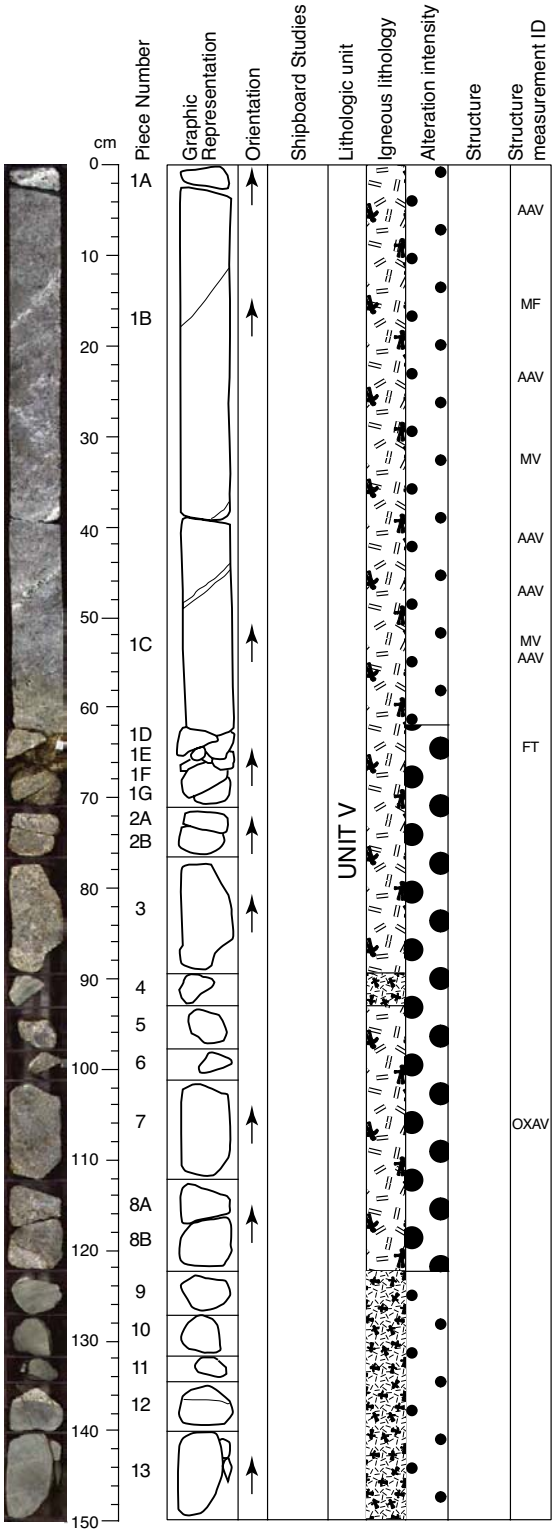
SECONDARY MINERALOGY:
This section is composed entirely of moderately altered brownish green-gray gabbro with a completely altered felsic vein in Piece 1F. Alteration style is similar to that seen elsewhere in this core. Clinopyroxene is altered to green amphibole with minor chlorite while plagioclase is altered to small amounts of green amphibole and secondary plagioclase with trace amounts of chlorite smectite.

METAMORPHIC VEINS:
This section contains minor dark green, single, straight, amphibole veins that account for no more than 0.1 vol.% of the core. Irregular felsic plagioclase-amphibole dikelets are locally present. A 1 cm-wide felsic dikelet is present at a depth of 75 cm from the top of this section which contains numerous amphibole-chlorite veins comprising as much as 10 vol. % of this 1 cm interval.

THIN SECTONS: Sample 1275D-39R-1, 19-22 cm

STRUCTURE:
The section consists of interlayered fine, medium, and coarse-grained oxide gabbro and oxide bearing gabbro. Piece 1 is cut by a granophyric vein. Layering or banding contacts in oxide gabbroic rocks are generally defined by grain size changes, but are commonly associated with changes in the modal percentage of mineral phases, especially variations in oxide mineral or plagioclase abundance. Layer or lithologic boundaries between gabbros that mark changes in grain size are variable in orientation, but typically are inclined at 30 degrees in the cut face of the core. The contacts are planar and appear throughout Piece 1. There is no mesoscopic evidence of crystal plastic deformation in the section. Piece 1 is cut by minor chlorite-filled shear fractures.

Core Photo



209-1275D-39R-2 (Section top: 180.4 mbsf)

UNIT-V: Olivine gabbro and oxide gabbro(norite)

Pieces 1-3, 5-8

COLOR: Greenish gray

PRIMARY MINERALOGY: OXIDE GABBRO

Plagioclase	Mode 50%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Clinopyroxene	Mode 40%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Oxide	Mode 10%

COMMENTS: This section consists of oxide gabbro with variable grain size and a lesser amount of diabase. Fine-grained gabbro at 0-7 cm followed by coarse-grained gabbro at 7-20 cm, medium- to coarse-grained gabbro at 20-90 cm, coarse-grained gabbro at 94-123 cm. Granophyre dikes at 0-3 cm, 28 cm, and 47 cm.

Piece 4, 9-13

COLOR: Brownish green-gray

PRIMARY MINERALOGY: DIABASE

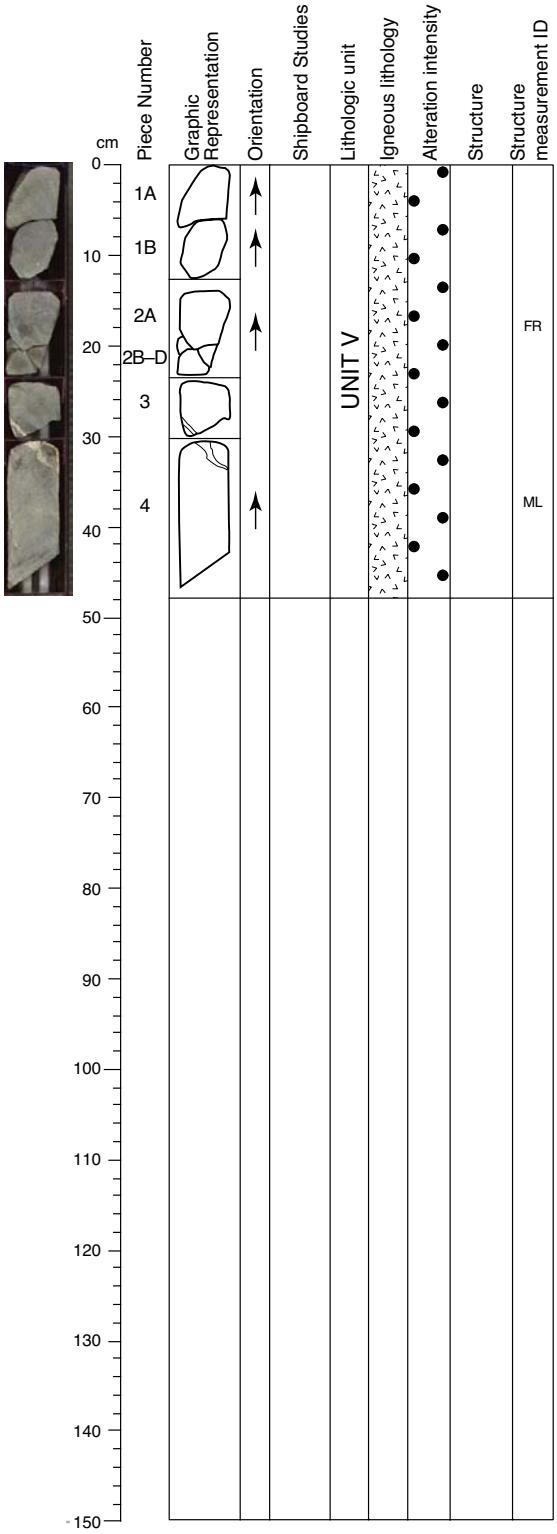
COMMENTS: Aphyric diabase with a contact to microgabbro in Piece 4 or to fine-grained gabbro in Piece 12.

SECONDARY MINERALOGY:
This section is composed of moderately to highly altered gabbro and moderately altered microgabbro. The gabbro of Pieces 1A to 1C is gray greenish brownish and moderately altered, whereby the gabbro of Pieces 2 and 8 is gray brown greenish and highly altered. Pieces 4 and 5 contain fragments of microgabbro. Pieces 9 to 13 are gray brownish microgabbro. Pieces 9 and 12 contain rims of gabbro. Throughout this section of the core clinopyroxene is highly altered to green amphibole with minor chlorite. Plagioclase is commonly only slightly altered to green amphibole, minor secondary plagioclase and traces of chlorite/smectite.

METAMORPHIC VEINS:
Pieces 1 to 6 are composed of gabbro with approximately 1 vol. % of individual, straight, dark green, amphibole veins. Minor plagioclase-amphibole dikelets are present in Piece 1 and typically contain a green amphibole-rich vein in the center. Pieces 9 to 11 and 13 are diabase with minor dark green amphibole veinlets (0.1 vol. %; and approximately 1 mm wide). Piece 12 consists of gabbro and diabase with a sharp contact. The contact between gabbro and diabase in Piece 12 is crosscut by several straight, branched, amphibole-chlorite veins which are ca. up to 3 mm wide and account for as much as 2 vol. % of this piece.

STRUCTURE:
The section consists of interlayered fine, medium, and coarse-grained oxide gabbro (Piece 1-3, 7-8) and diabase (Piece 4, 9-13). Granophyres cut both the gabbros and the diabases. (Piece 1, 4, 5, 9, and 12). Piece 5, 9 and 12 contain contact between diabase and granophyre, where granophyre has intruded the diabase. There is no mesoscopic evidence of crystal plastic deformation in the section. Piece 1 is cut by minor chlorite-filled shear fractures. Pieces 1 and 2 contain high densities of chlorite-filled shear fractures and small faults with slickenfibers that indicate oblique slip.

Core Photo



209-1275D-39R-3 (Section top: 181.42 mbsf)

UNIT-V: Olivine gabbro and oxide gabbro(norite)

Piece 1-4

COLOR: Brownish gray

PRIMARY MINERALOGY: DIABASE

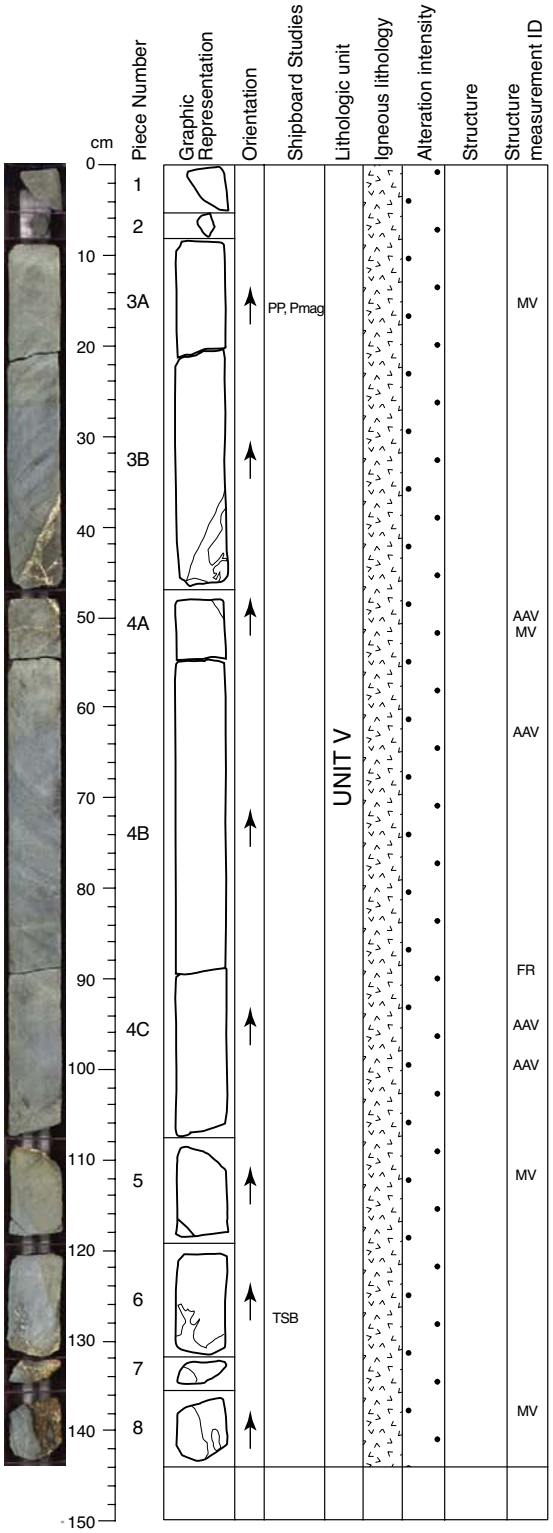
COMMENTS: Aphyric diabase with fine-grained gabbro and granophyre dike at 26-30 cm.

SECONDARY MINERALOGY:
This section is composed entirely of moderately altered gray brownish microgabbro. Pieces 3 and 4 contain white pinkish felsic domains. Throughout this section of the core clinopyroxene is highly altered to green amphibole with minor chlorite. Plagioclase is commonly only slightly altered to green amphibole, minor secondary plagioclase and traces of chlorite/smectite.

METAMORPHIC VEINS:
Piece 2 contains approximately 1 vol.% of straight, branched dark green amphibole veins. Pieces 1, 3 and 4 contain no veins.

STRUCTURE:
The section consists of diabase intruded by a granophyric vein in Pieces 3 and 4. There is no mesoscopic evidence of crystal plastic deformation in the section. Piece 2 contains low concentrations of open fractures.

Core Photo



209-1275D-40R-1 (Section top: 184.1 mbsf)

UNIT-V: Olivine gabbro and oxide gabro(norite)

Piece 1-8

COLOR: Gray to brownish green-gray.

PRIMARY MINERALOGY: DIABASE

COMMENTS: Aphyric diabase with granophyric patches at 40, 108, and 131-139 cm.

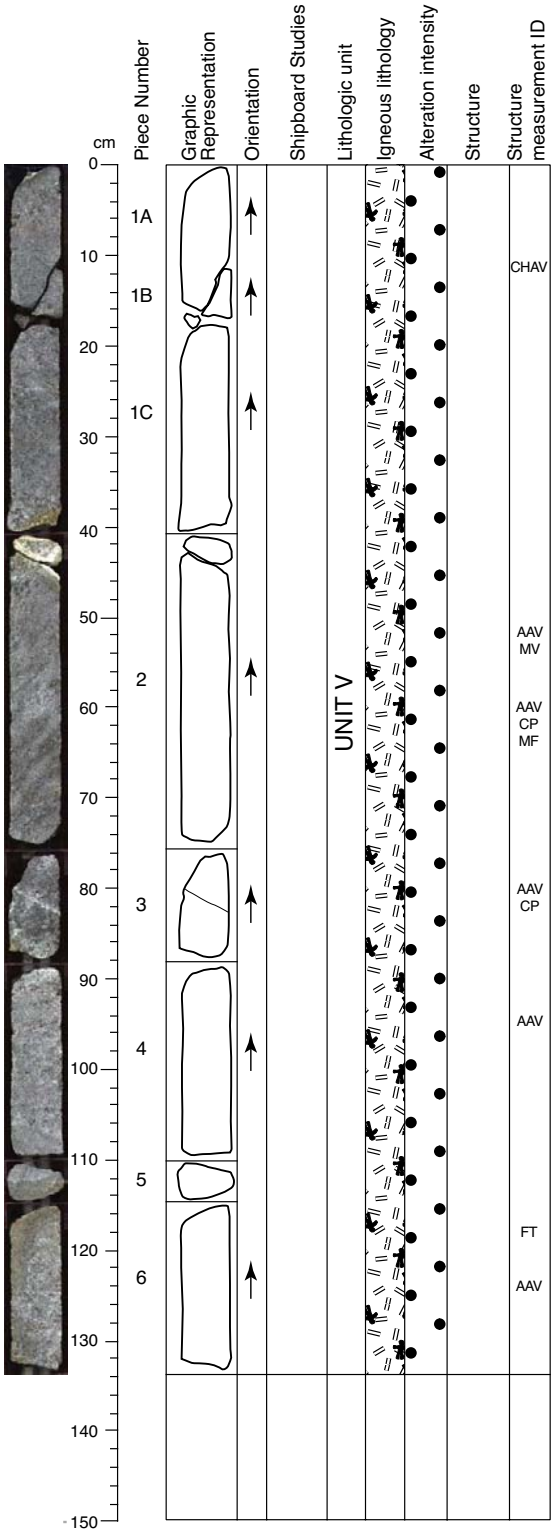
SECONDARY MINERALOGY:
This section is entirely composed of gray slightly altered microgabbro. Clinopyroxene is highly altered to green amphibole with minor chlorite while plagioclase is only slightly altered to small amounts of green amphibole and secondary plagioclase with trace amounts of chlorite smectite. Pieces 3B, 4A and 5 to 8 host felsic white brownish veins.

METAMORPHIC VEINS:
This section contains minor dark green single, straight amphibole veinlets which account for approximately 0.3 vol.% of the core.

THIN SECTIONS: Sample 1275D-40R-1, 126-129 cm

STRUCTURE:
The section consists of diabase intruded by granophyric veins in Pieces 3-8. There is no mesoscopic evidence of crystal plastic deformation in the section. Piece 2 contains low concentrations of open fractures.

Core Photo



209-1275D-40R-2 (Section top: 185.54 mbsf)

UNIT-V: Olivine gabbro and oxide gabro(norite)

Pieces 1-6

COLOR: Brownish green-gray

PRIMARY MINERALOGY: GABBRO

Plagioclase	Mode 50-55%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Clinopyroxene	Mode 45%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Oxide	Mode < 5%

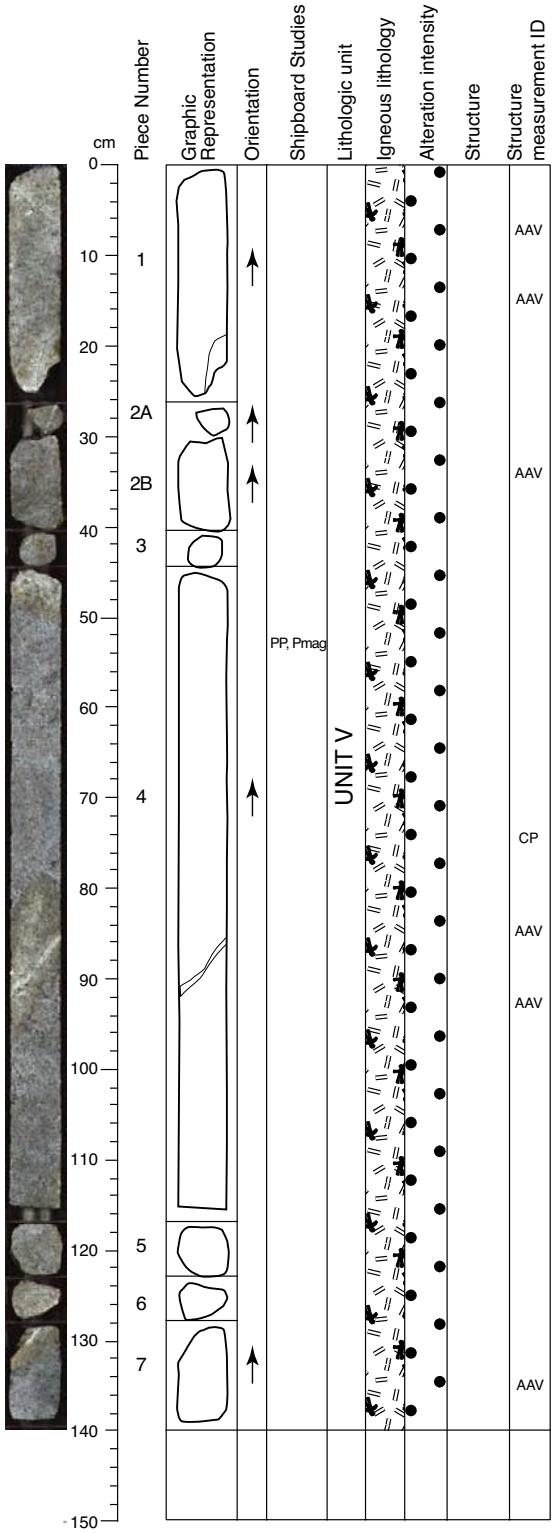
COMMENTS: Gabbro with various grain size. Pieces 1-2A are medium- to coarse-grained and moderately foliated. Piece 2B is bands of fine and medium-grained and well foliated. Pieces 3-4 and 6 are coarse-grained. Piece 5 is fine-grained.

SECONDARY MINERALOGY:
This section is composed entirely of brownish green-gray, moderately altered gabbro. The bottom of Piece 1 and the top of Piece 2 host a very highly altered patch of white felsic material. Piece 6 shows a brownish iron oxyhydroxide staining. Clinopyroxene has been highly altered dominantly to green amphibole with minor chlorite, while plagioclase remains relatively fresh. Plagioclase is moderately altered, being replaced by minor green amphibole and traces of secondary plagioclase.

METAMORPHIC VEINS:
This section contains minor individual, straight, green, amphibole-chlorite veins that account for no more than 0.3 vol.% of the core. Minor plagioclase-amphibole felsic intrusions are present in Pieces 2 and 3. Felsic dikelets in Piece 3 contain a green amphibole-chlorite vein in the center.

STRUCTURE:
The section consists of interlayered medium to coarse-grained gabbros and oxide gabbros that are cut by granophyre in Pieces 2 and 3). Layering or banding contacts in oxide gabbroic rocks are generally defined by grain size changes, but are commonly associated with changes in the modal percentage of mineral phases. Layer contacts are inclined from 22 to 40 degrees in the cut face of the core. Layering is present in Pieces 1 and 2. An igneous lamination is present at the base of Piece 3. There is no mesoscopic evidence of crystal plastic deformation in the section. Piece 3 is cut by minor chlorite-filled shear fractures. Piece 6 contains fractures with minor chlorite slickenfibers that indicate oblique slip.

Core Photo



209-1275D-40R-3 (Section top: 186.88 mbsf)

UNIT-V: Olivine gabbro and oxide gabro(norite)

Pieces 1-7

COLOR: Brownish green-gray

PRIMARY MINERALOGY: GABBRO

Plagioclase	Mode 50-55%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Clinopyroxene	Mode 45%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Oxide	Mode < 5%

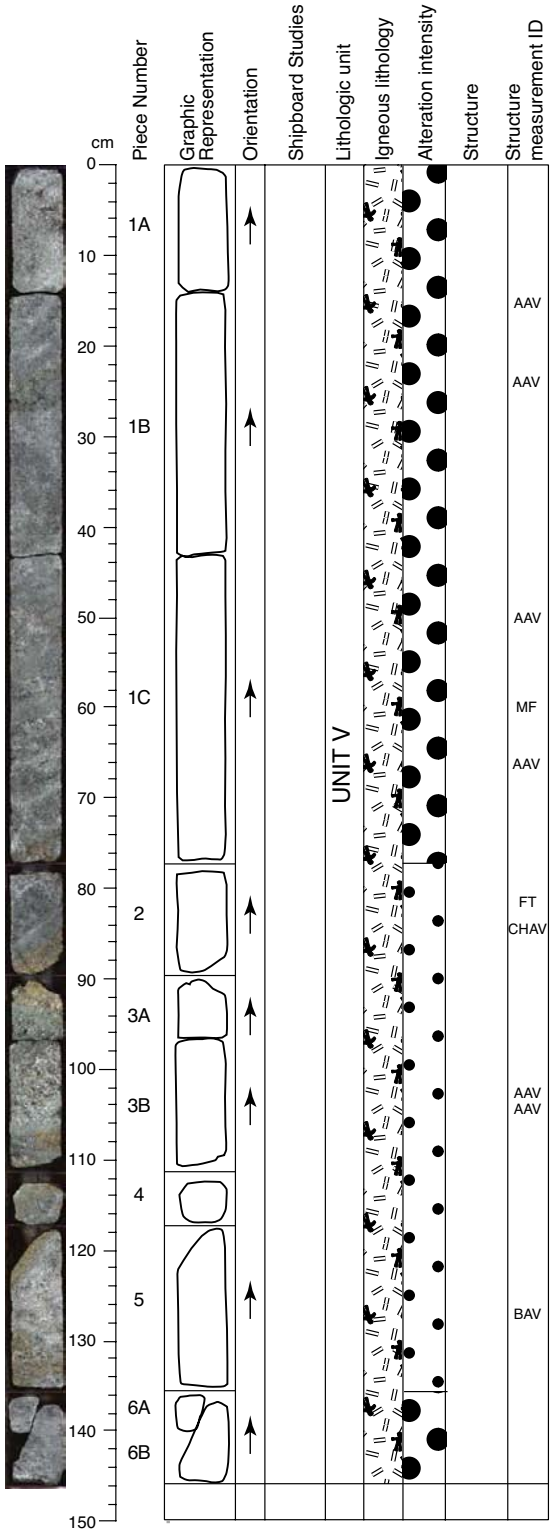
COMMENTS: Medium- to coarse-grained gabbro. Weakly foliated and altered.

SECONDARY MINERALOGY:
This section is composed entirely of brownish green-gray, moderately altered gabbro. Pieces 4 and 6 host completely altered veins with large brownish halos. Alteration style is similar to that seen elsewhere in this core. Clinopyroxene is altered to green amphibole with minor chlorite while plagioclase is altered to small amounts of green amphibole and secondary plagioclase with trace amounts of chlorite smectite.

METAMORPHIC VEINS:
This section contains minor individual, straight, green, amphibole veinlets that account for as much as 0.5 vol.% of this section of core. A 1cm wide plagioclase-rich dikelet is present in Piece 4 at about 93 cm depth. It contains numerous green amphibole-chlorite veins that account for as much as 10 vol.% of the dikelet.

STRUCTURE:
The section consists of medium to coarse-grained gabbros and oxide gabbros that are cut by granophyre in Pieces 2 and 4. Layering or banding contacts in oxide gabbroic rocks are generally defined by grain size changes, but are commonly associated with changes in the modal percentage of mineral phases. A layer contact is present in Piece 7 and it is horizontal in the cut face of the core. There is no mesoscopic evidence of crystal plastic deformation and there is no brittle deformation in this section.

Core Photo



209-1275D-40R-4 (Section top: 188.28 mbsf)

UNIT-V: Olivine gabbro and oxide gabro(norite)

Pieces 1-3

COLOR: Brownish green-gray

PRIMARY MINERALOGY: GABBRO

Plagioclase	Mode 50-55%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Clinopyroxene	Mode 45%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Oxide	Mode < 5%

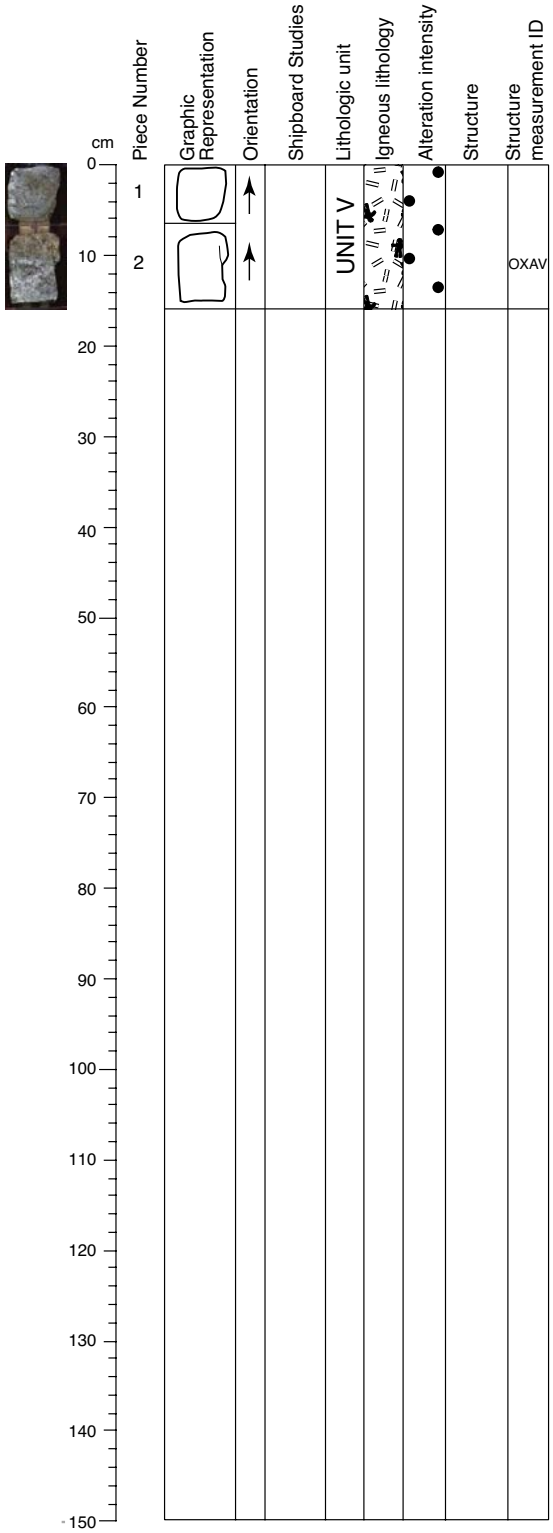
COMMENTS: Gabbro with variable grain sizes. Pieces 1-2 are 3-4 cm thick alternating bands of fine- to very fine-grained gabbro. Two patches of coarse-grained gabbro occur at 26 and 77 cm. Pyroxene-rich band at 74-78 cm. Pieces 3A-3B are coarse-grained while Pieces 3B-6 are fine-grained.

SECONDARY MINERALOGY:
This section consists of greenish-gray, moderately altered gabbro (Piece 1) and highly altered brownish green-gray gabbro (Piece 6) of. As is commonly seen in the majority of this core, clinopyroxene is altered to green amphibole with minor chlorite while plagioclase is altered to small amounts of green amphibole and secondary plagioclase with trace amounts of chlorite smectite.

METAMORPHIC VEINS:
Piece 1 contains minor dark green amphibole veins that account for no more than 0.1 vol.% of the core. Piece 2 contains a single rusty, orange brown, amphibole-hematite vein. Pieces 3 and 4 contain 0.5 vol. % of green amphibole-chlorite veins. Pieces 5 and 6 host no veins.

STRUCTURE:
The section consists of medium to coarse-grained gabbros and oxide gabbros with well defined layering. Layering or banding contacts in gabbroic rocks are generally defined by grain size changes, but are commonly associated with changes in the modal percentage of mineral phases. Layer contacts are present in Pieces 1, 2, and 3. Layering ranges from horizontal in Pieces 1 and 3 to inclined at 27 degrees in the cut face of the core in Piece 2. There is no mesoscopic evidence of crystal plastic deformation in this section. Piece 2 contains a small fault with 0.3 cm offset.

Core Photo



209-1275D-40R-5 (Section top: 189.74 mbsf)

UNIT-V: Olivine gabbro and oxide gabro(norite)

Pieces 1-2

COLOR: Brownish green-gray

PRIMARY MINERALOGY: GABBRO

Plagioclase	Mode 50%-55%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Clinopyroxene	Mode 45%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Oxide	Mode < 5%

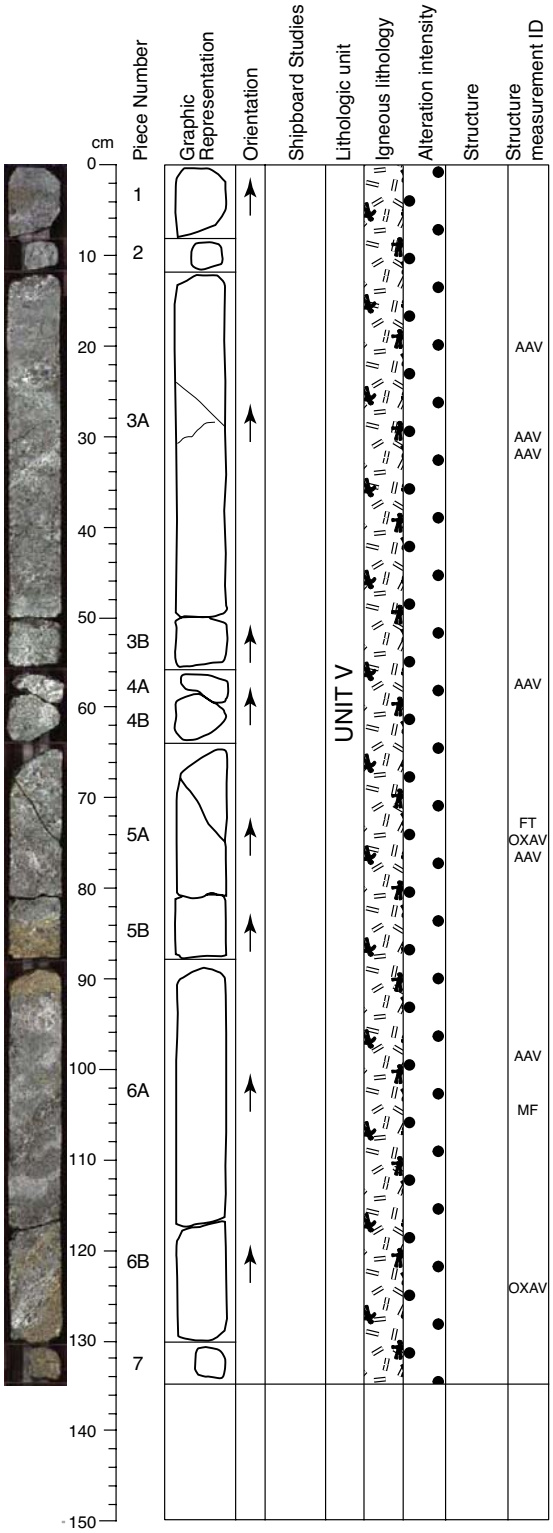
COMMENTS: Gabbro with increasing grain size toward the bottom of section. Piece 1 is fine- to medium-grained. Piece 2 is medium- to coarse-grained and foliated.

SECONDARY MINERALOGY:
The two pieces of this section are gray greenish brownish moderately altered gabbro. As is commonly seen in the majority of this core, clinopyroxene is altered to green amphibole with minor chlorite while plagioclase is altered to small amounts of green amphibole and secondary plagioclase with trace amounts of chlorite smectite.

METAMORPHIC VEINS:
This section contains no veins.

STRUCTURE:
The section consists of medium to coarse-grained gabbros and oxide gabbros with well defined layering. Layering or banding contacts in gabbroic rocks are generally defined by grain size changes, but are commonly associated with changes in the modal percentage of mineral phases. Layer contacts are present in Pieces 1and 2. Layering ranges from horizontal in Piece 2 to inclined at 27 degrees in the cut face of the core in Piece 1. There is no mesoscopic evidence of crystal plastic deformation in the section. There is no brittle deformation in this section.

Core Photo



209-1275D-41R-1 (Section top: 189.8 mbsf)

UNIT-V: Olivine gabbro and oxide gabro(norite)

Pieces 1-7

COLOR: Grayish green

PRIMARY MINERALOGY: GABBRO

Plagioclase	Mode 50%-55%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Clinopyroxene	Mode 45%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Oxide	Mode < 5%

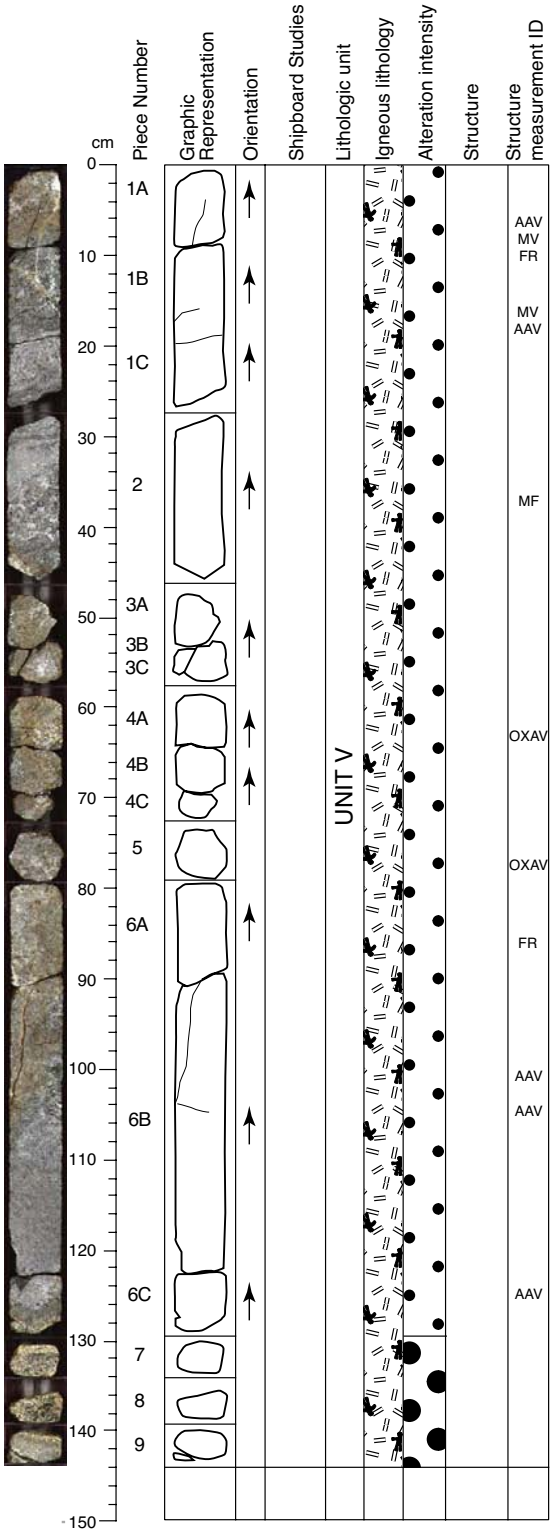
COMMENTS: Gabbro with variable grain sizes. Bands of fine- and medium-grained in Pieces 3-4. Pieces 5-7 are well foliated and have bands of coarse- and fine-grained.

SECONDARY MINERALOGY:
This section of the core comprises grayish green, moderately altered gabbro. Contrasting with large sections of the core where clinopyroxene is highly altered, here clinopyroxene is only moderately altered to green amphibole with minor chlorite while plagioclase is only slightly altered to equal proportions of green amphibole and secondary plagioclase.

METAMORPHIC VEINS:
This section contain individual, straight, amphibole-chlorite veins that account for as much as 1.0 vol.% of this section of core. In Piece 7 some of the amphibole veins have a rusty brown color due to hematite formation.

STRUCTURE:
The section consists of medium to coarse-grained gabbros and oxide gabbros with well defined layering. Granophyric veins wander throughout Piece 7. Layering or banding contacts in gabbroic rocks are generally defined by grain size changes, but are commonly associated with changes in the modal percentage of mineral phases. Layer contacts are present in Pieces 1, 2, and 3. Layering ranges from horizontal in Piece 6 and to inclined at 22 in Piece 3 and 48 degrees in Piece 7 in the cut face of the core. There is no mesoscopic evidence of crystal plastic deformation in the section. Piece 2 contains a small fault with 0.3 cm offset.

Core Photo



209-1275D-41R-2 (Section top: 191.15 mbsf)

UNIT-V: Olivine gabbro and oxide gabbro(norite)

Pieces 1-9

COLOR: Reddish green

PRIMARY MINERALOGY: GABBRO

Plagioclase	Mode 50%-55%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Clinopyroxene	Mode 45%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Oxide	Mode < 5%

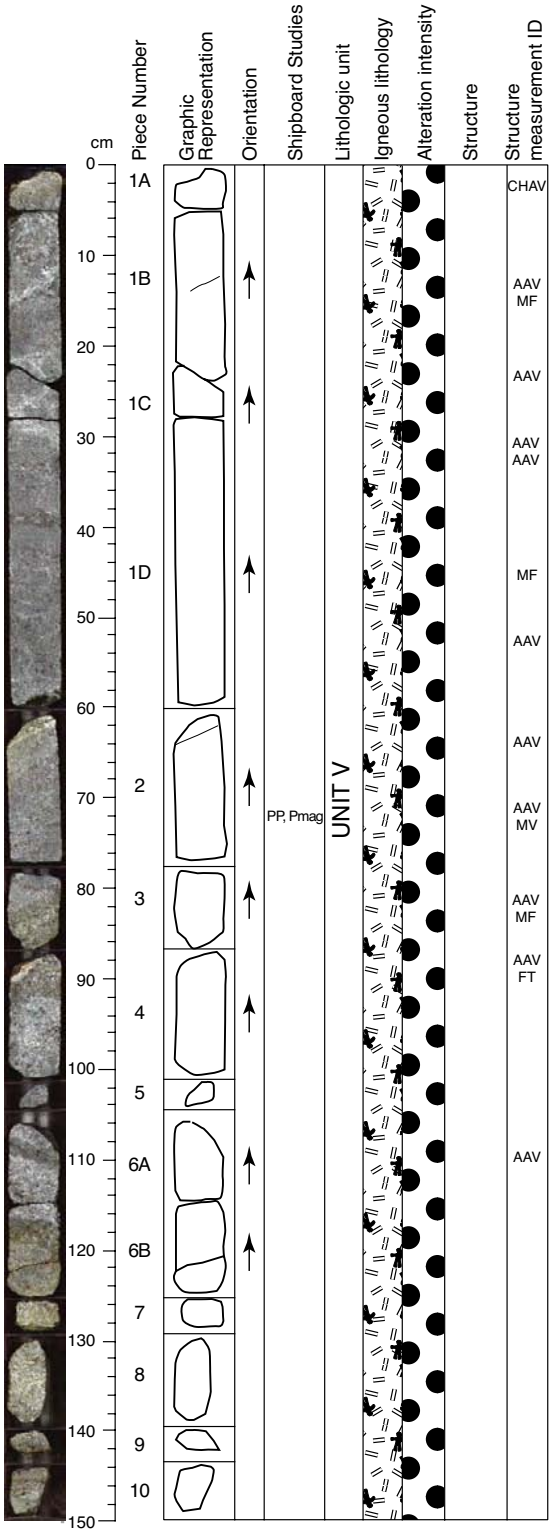
COMMENTS: Gabbro with variable grain sizes through the section. A few cm thick well foliated bands of coarse to fine grain size in Pieces 1-2. Pieces 3-6B are coarse-grained while Pieces 6B-9 are medium-grained.

SECONDARY MINERALOGY:
This section of the core comprises reddish-green, moderately to highly altered gabbro. Clinopyroxene is highly altered in Pieces 1-6 and completely altered in Pieces 7-9 to green amphibole with minor chlorite. Plagioclase is moderately altered in Pieces 1-6 and highly altered in Pieces 7-9 to approximately equal proportions of green amphibole and secondary plagioclase throughout.

METAMORPHIC VEINS:
Pieces 1 to 7 contain dark green, individual, straight, amphibole veins that are locally stained by hematite imparting a rusty appearance. These veins account for as much as 0.5 vol. % of this section of core. Piece 6 contains a prominent light brown carbonate-clay vein that is cuts the upper half of the Piece. Pieces 2, 8 and 9 host no veins.

STRUCTURE:
The section consists of medium to coarse-grained gabbros and oxide gabbros. They are cut by granophyric veins in Pieces 1, 6, and 7-9. Layering or banding contacts in gabbroic rocks are generally defined by grain size changes, but are commonly associated with changes in the modal percentage of mineral phases. A medium to coarse-grained layer contact is present in Piece 2. Layering is inclined at 18 degrees in the cut face of the core. There is no mesoscopic evidence of crystal plastic deformation and there is no brittle deformation in this section.

Core Photo



209-1275D-41R-3 (Section top: 192.59 mbsf)

UNIT-V: Olivine gabbro and oxide gabbro(norite)

Pieces 1-10

COLOR: Greenish gray

PRIMARY MINERALOGY: GABBRO

Plagioclase	Mode 50%-55%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Clinopyroxene	Mode 45%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Oxide	Mode < 5%

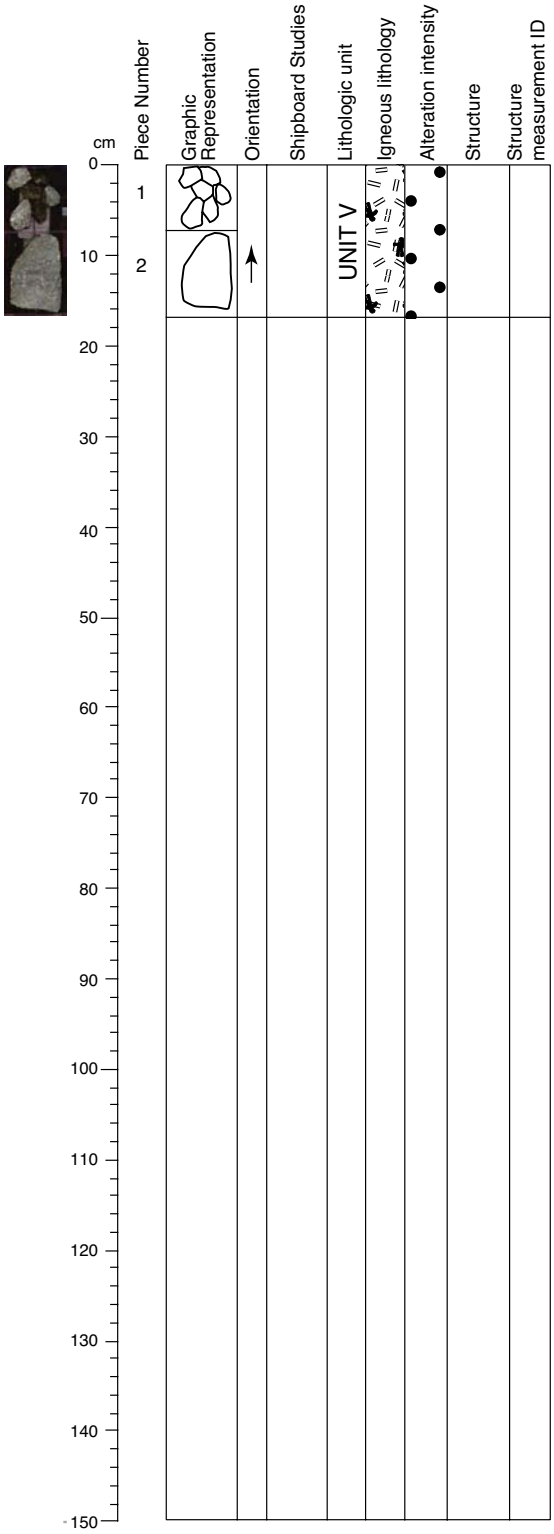
COMMENTS: Gabbro with variable grain sizes through the section. In Pieces 1A-1C, grain size varies from fine-grained at 0-4 cm, coarse-grained at 4-14 cm, and medium-grained at 14-27 cm. Pieces 1D-3 (27-83 cm) have 1-2 cm thick banding of medium- and fine-grained intervals. Pieces 3-10 (83-150 cm) are coarse-grained and locally well foliated.

SECONDARY MINERALOGY:
This section is composed of gray greenish brownish highly altered (Pieces 1 and 2) and gray greenish white (Pieces 2 to 4B) gabbro. Pieces 2 to 4B contain green felsic veins. Clinopyroxene is highly altered to green amphibole with minor chlorite while plagioclase is only moderately altered to equal proportions of green amphibole and secondary plagioclase.

METAMORPHIC VEINS:
Individual, dark green amphibole veins are associated with plagioclase-rich dikelets in Pieces 1, 2C and 3. They account for approximately 0.5 vol% of the section. A carbonate-clay vein is present at the lower margin of Piece 3.

STRUCTURE:
The section consists of medium to coarse-grained gabbros and oxide gabbros with well-defined layering. Gabbros are cut by granophyric veins in Piece 1, 2 and 4. Layering or banding contacts in gabbroic rocks are generally defined by grain size changes, but are commonly associated with changes in the modal percentage of mineral phases. Medium to coarse-grained layer contacts are present in Piece 2, 4, 6, 8 and 10. Layering is inclined at from 3 to 12 degrees in the cut face of the core. There is no mesoscopic evidence of crystal plastic deformation in the section. Piece 4 has slickenfibers on its upper face.

Core Photo



209-1275D-41R-4 (Section top: 194.09 mbsf)

UNIT-V: Olivine gabbro and oxide gabbro(norite)

Pieces 1-2

COLOR: Reddish-green

PRIMARY MINERALOGY: GABBRO

Plagioclase	Mode 50%-55%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Clinopyroxene	Mode 45%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Oxide	Mode < 5%

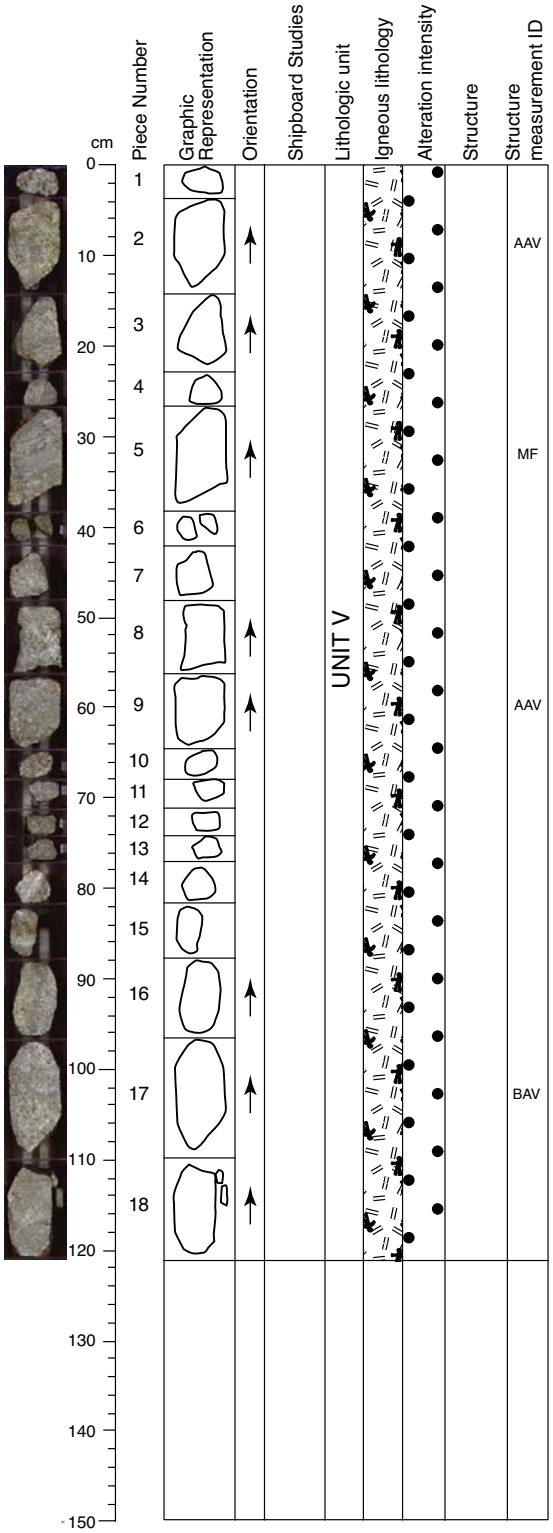
COMMENTS: Medium- to fine-grained gabbro. Piece 2 is fine-grained and well foliated with an oxide band.

SECONDARY MINERALOGY:
These two pieces are composed of reddish-green moderately altered gabbro. Clinopyroxene is moderately altered to green amphibole while plagioclase is only slightly altered, also to green amphibole

METAMORPHIC VEINS:
This section contain no veins.

STRUCTURE:
The section consists of oxide gabbro with layering defined by varying modal percentage of oxide minerals. The layering is oriented subhorizontal. There is no evidence of crystal plastic deformation in the section. The section contains no brittle deformation.

Core Photo



209-1275D-42R-1 (Section top: 194.8 mbsf)

UNIT-V: Olivine gabbro and oxide gabbro(norite)

Pieces 1-18

COLOR: Brownish gray-green.

PRIMARY MINERALOGY: GABBRO

Plagioclase	Mode 50%-55%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Clinopyroxene	Mode 45%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Oxide	Mode < 5%

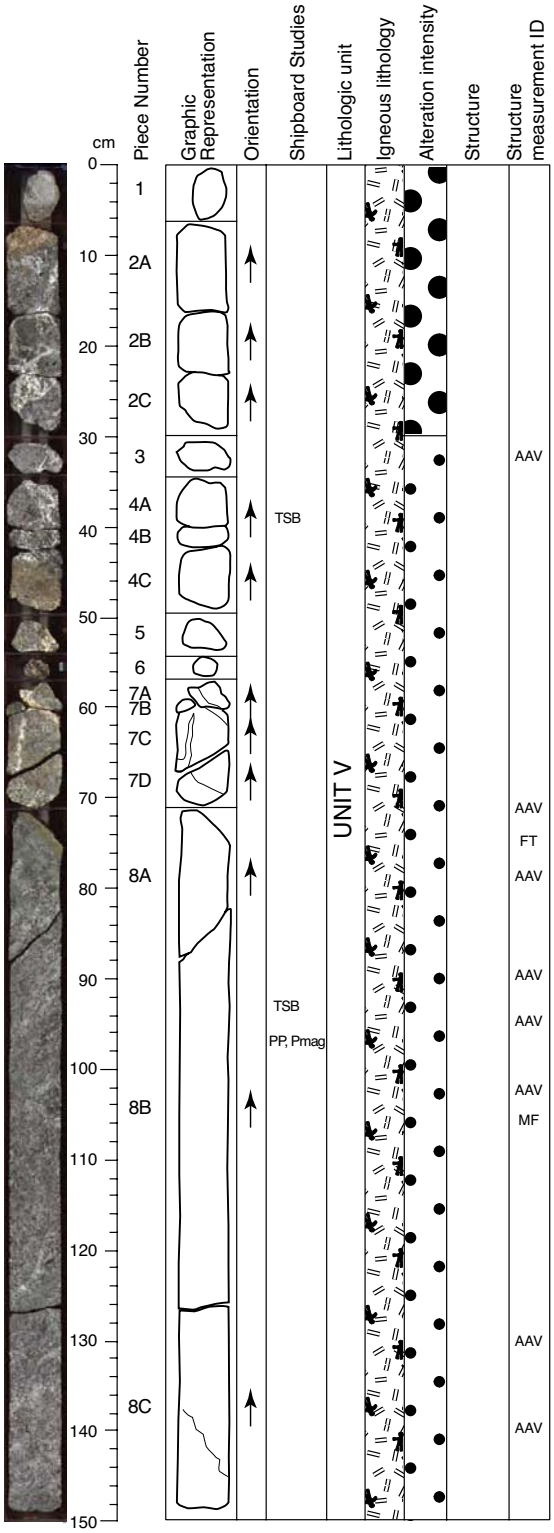
COMMENTS: Gabbro with various grain sizes. Pieces 1-15 have bands of fine- to medium- to coarse-grained. Pieces 16-17 are coarse-grained while Piece 18 is medium-grained. Piece 5 is well foliated.

SECONDARY MINERALOGY:
This section is composed entirely of gray greenish brownish moderately altered gabbro. Clinopyroxene is altered to green amphibole with minor chlorite while plagioclase is altered to small amounts of green amphibole and secondary plagioclase with trace amounts of chlorite

METAMORPHIC VEINS:
Veins are not abundant in this section of the core. Dark green, single, straight amphibole veins are found only in Pieces 2, 15 and 17.

STRUCTURE:
The section consists of medium to coarse-grained gabbros and oxide gabbros with well defined layering. Layer or band contacts in gabbroic rocks are generally defined by grain size changes, but are commonly associated with changes in the modal percentage of mineral phases. Medium to coarse-grained layer contacts are present in Pieces 5, 8, 9 and 15. Layering is inclined at from 3 to 22 degrees in the cut face of the core. There is no mesoscopic evidence of crystal plastic deformation in the section. This section contains no brittle deformation

Core Photo



209-1275D-43R-1 (Section top: 199.3 mbsf)

UNIT-V: Olivine gabbro and oxide gabbro(norite)

Pieces 1-8

COLOR: Greenish-gray

PRIMARY MINERALOGY: GABBRO

Plagioclase	Mode 50%-55%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Clinopyroxene	Mode 45%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Oxide	Mode < 5%

COMMENTS: Coarse- to medium-grained gabbro. Piece 8B is oxide-rich (16%), fine grained gabbro with magmatic foliation.

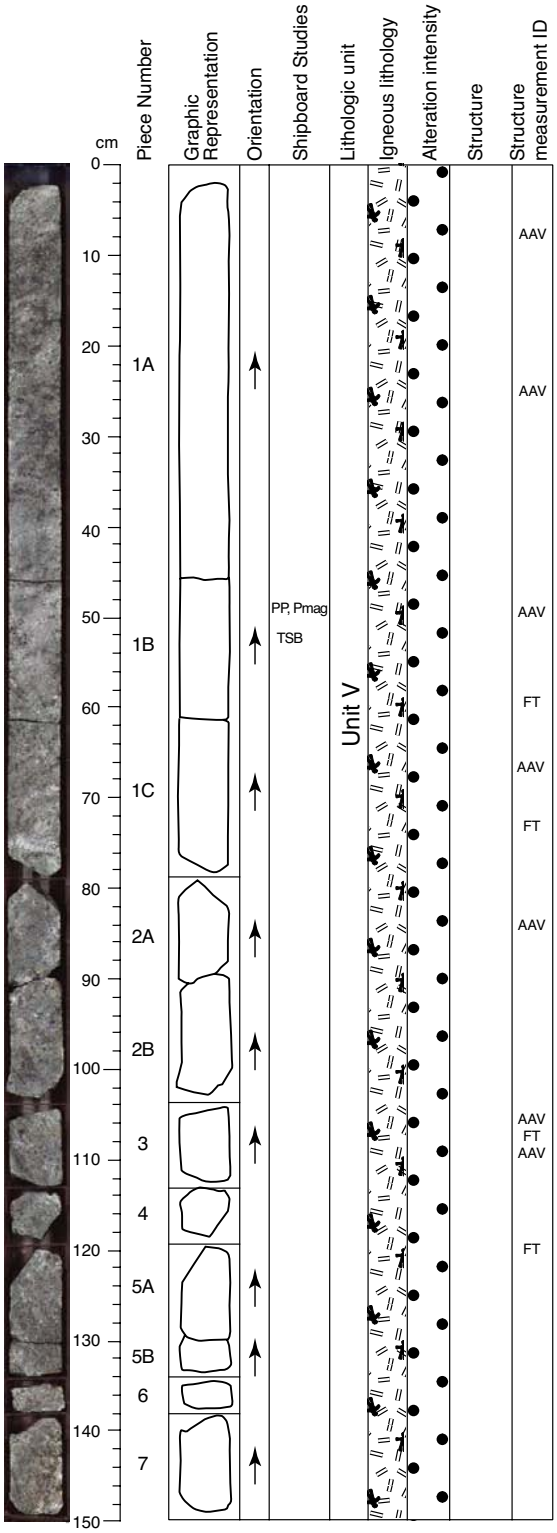
SECONDARY MINERALOGY:
This section is composed of greenish-gray (Pieces 1 and 2) and gray greenish white (Pieces 2 to 4B) gabbro. Alteration varies from highly altered in Pieces 1 and 2 to only moderately altered in Pieces 3 and 4. Pieces 2 to 4B contain green felsic veins. Clinopyroxene is altered to green amphibole with minor chlorite while plagioclase is altered to small amounts of green amphibole and secondary plagioclase with as much as of chlorite/smectite.

METAMORPHIC VEINS:
Dark to light green, single, straight amphibole-chlorite veins are common in Pieces 1,4, 7 and 8 of this section. Very fine (<1mm) rusty, brown, hematite-rich veinlets form en echelon arrays in Pieces 2A and 4C and are surrounded by stained, rusty brown gabbro.

THIN SECTIONS: Samples 1275D-43R-1, 38-40 cm and 1275D-43R-1, 92-94 cm

STRUCTURE:
The section consists of medium to coarse-grained gabbros and oxide gabbros. Pieces 1-7 are affected by a net veined magmatic breccia produced by the intrusion of granophyric liquid. The oxide gabbro and gabbro is included within the granophyre as breccia clasts or xenoliths. A weak lamination or foliation defined by oxides is present between 80 and 91 cm. This may be caused by crystal plastic deformation, but similar foliations have proven to be igneous primary structures throughout the cored interval upon thin section inspection. There is no other mesoscopic evidence of crystal plastic deformation and there is no brittle deformation in this section.

Core Photo



209-1275D-43R-2 (Section top: 200.8 mbsf)

UNIT-V: Olivine gabbro and oxide gabbro(norite)

Pieces 1-7

COLOR: Brownish gray-green

PRIMARY MINERALOGY: GABBRO

Plagioclase	Mode 50%-55%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Clinopyroxene	Mode 45%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Oxide	Mode < 5%

COMMENTS: Well foliated coarse-grained gabbro thorough the section. Piece 1A is coarse-grained gabbro, oxide-rich (18%).

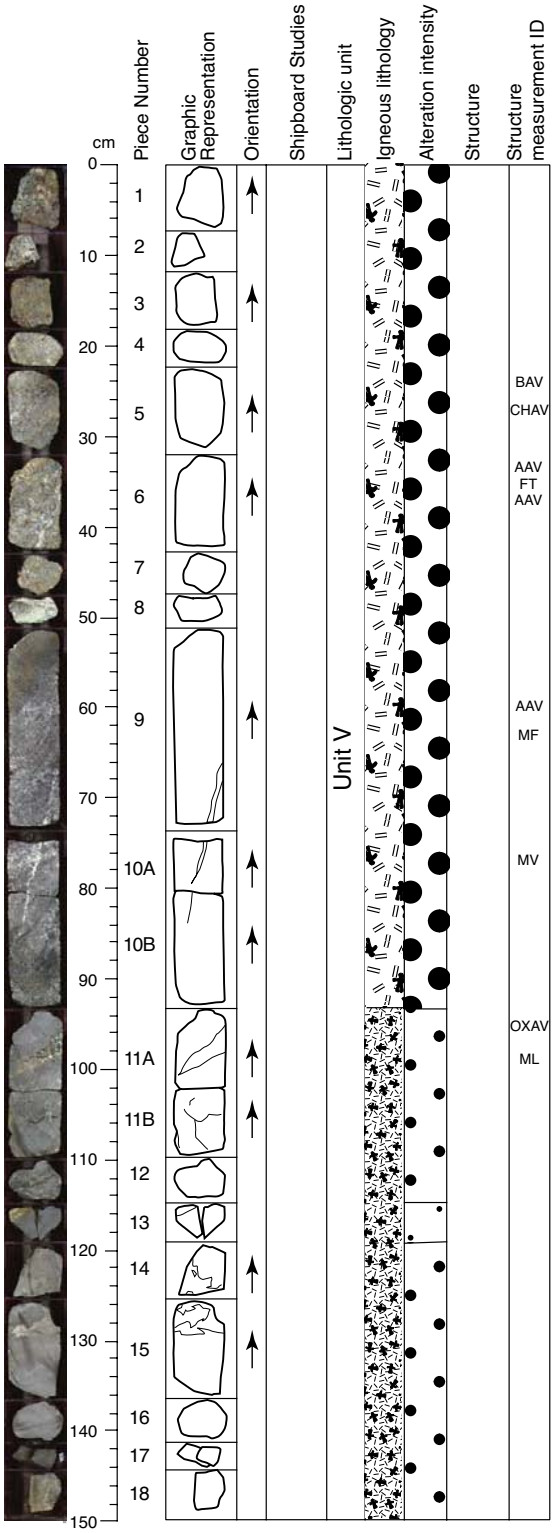
SECONDARY MINERALOGY:
This section consists of moderately altered gabbro. Pieces 1 and 2A are greenish-gray in color while Pieces 2B to 7 are brownish gray-green. Throughout this section of the core clinopyroxene is highly altered to green amphibole with minor chlorite. Plagioclase is commonly only slightly altered to green amphibole, minor secondary plagioclase and traces of chlorite/smectite.

METAMORPHIC VEINS:
This section contains individual, straight amphibole-chlorite veins that comprise no more than 0.5 vol.% of the core.

THIN SECTIONS: Sample 1275D-43R-2, 49-52 cm

STRUCTURE:
The section consists of medium to coarse oxide gabbros with well-defined layering. Layer or band contacts are generally defined by grain size changes, but are commonly associated with changes in the modal percentage of mineral phases. Medium to coarse-grained layer contacts are present in Piece 1. Layering is inclined at from 0 to 22 degrees in the cut face of the core. There is no mesoscopic evidence of crystal plastic deformation in the section. Pieces 1 through 5 contain high concentrations of chlorite-filled shear fractures with slickenfibers. There is incipient brecciation in some locations.

Core Photo



209-1275D-43R-3 (Section top: 202.3 mbsf)

UNIT-V: Olivine gabbro and oxide gabbro(norite)

Pieces 1-18

COLOR: Greenish-gray to brownish green gray.

PRIMARY MINERALOGY: GABBRO AND MICROGABBRO

Plagioclase	Mode 50%-55%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Clinopyroxene	Mode 45%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Oxide	Mode < 5%

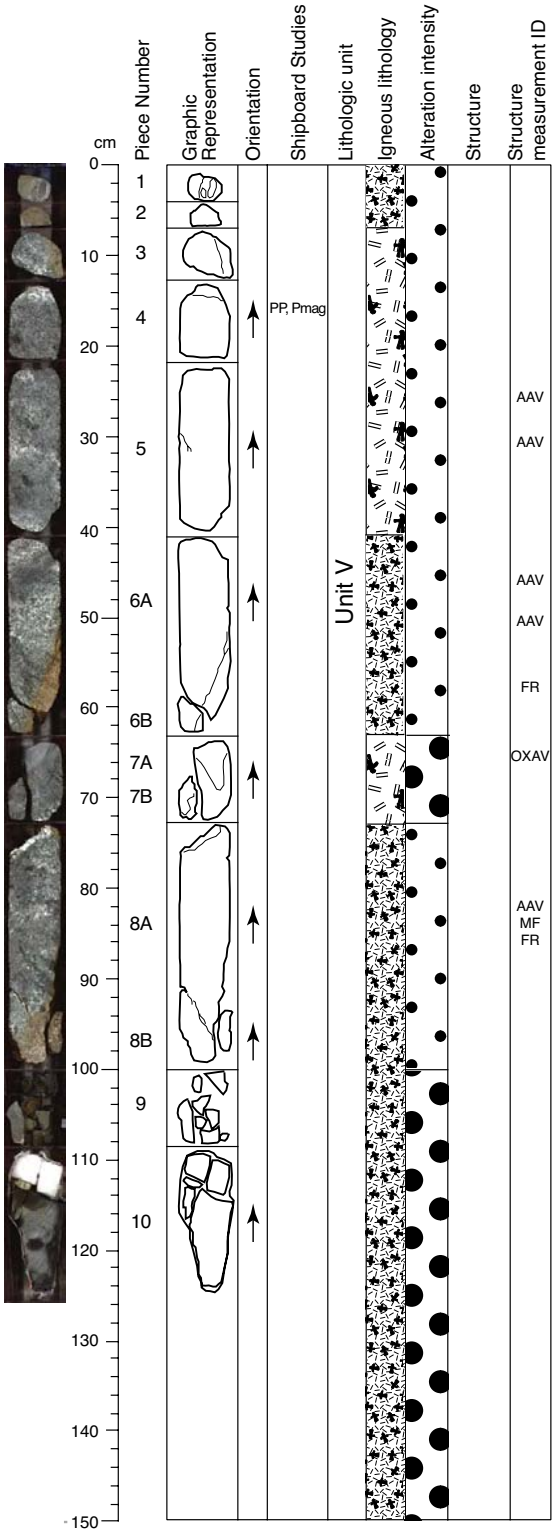
COMMENTS: Gabbro with decreasing grain sizes thorough the section. Pieces 1-2 are coarse-grained while Pieces 3-7 are medium- to coarse-grained. Piece 8 is a breccia of very altered gabbro. Piece 9 (52-58 cm) and 11-18 are microgabbro with medium-grained felsic gabbroic patches. Piece 9 (58-73 cm) is medium to fine grained and well foliated.

SECONDARY MINERALOGY:
This section of the core comprises of highly altered brownish green-gray gabbro (Pieces 1 to 10), moderately altered microgabbro (Pieces 11 and 12 and 14 to 18), slightly altered diabase (Piece 13), and moderately altered gabbro (Pieces 9-10). Clinopyroxene is mostly altered to green amphibole with a little chlorite irrespective of the degree of alteration. Plagioclase is altered to green amphibole, secondary plagioclase and minor chlorite/smectite throughout. The degree of plagioclase alteration to secondary plagioclase is more pronounced in the highly altered gabbro at the top of the section.

METAMORPHIC VEINS:
Straight, light to dark green, individual, amphibole-chlorite veins are common in the gabbro of this section and account for as much as approximately 1.0 vol.% of Pieces 1E and 10. Dark green amphibole veinlets in the diabase of Pieces 11 to 18 are however less abundant (0.5 vol. %).

STRUCTURE:
The section consists of medium to coarse-grained oxide gabbro (Pieces 1-7 and 9), diabase (Pieces 10-18) and a granophyre which includes diabase clasts (Piece 8). There is a single gabbroic layer contact between medium grained oxide gabbro and coarse grained oxide gabbro in Piece 9, which is inclined by 47 degrees in the cut face of the core. Granophyric or gabbroic intrusions occur in both the gabbroic rocks (Piece 6) and the diabases (Pieces 10, 11, 14, 15). The main contact is not exposed between gabbro and diabase, however, Piece 11 contains a gabbro intrusion into the diabase, which could be an indication of the relationship. There is no mesoscopic evidence of crystal plastic deformation in the section. Piece 8 is a cohesive, chlorite-matrix fault breccia. Piece 7 contains high concentrations of shear fractures with incipient brecciation in some locations. Piece 6 contains several small chlorite-filled normal faults with < 1 cm offset. Piece 12 appears to be a magmatic breccia with partial cataclastic overprint.

Core Photo



209-1275D-43R-4 (Section top: 205.06 mbsf)

UNIT-V: Olivine gabbro and oxide gabbro(norite)

Pieces 1-9

COLOR: Red, gray

PRIMARY MINERALOGY: GABBRO AND MICROGABBRO

Plagioclase	Mode 50%-55%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Clinopyroxene	Mode 45%
	Size < 10 mm
	Shape/Habit Eubhedral to anhedral
Oxide	Mode < 5%

COMMENTS: Pieces 1-2, 6, 8-9 are microgabbro with small amount of medium-grained felsic gabbroic patches. Pieces 4-5 and 7 are medium- to coarse-grained gabbro with a felsic dike at 73-74 cm.

SECONDARY MINERALOGY:
This section of the core comprises of moderately gabbro (Pieces 1-6 and Piece 8) and highly altered diabase (Pieces 9 and 10). Clinopyroxene is altered to green amphibole throughout this section of core. Plagioclase is altered to equal proportions of green amphibole and secondary plagioclase.

METAMORPHIC VEINS:
Minor dark green, individual, straight amphibole veins are present throughout the gabbro in this section and account for as much as 0.5 vol. % of Pieces 1 to 8. In Pieces 6 and 8 very fine rusty brown hematite veinlets are present. They commonly form en echelon arrays and impose a stained rusty brown halo in the gabbro. Pieces 9 and 10 are composed of diabase with rare dark green amphibole veinlets.

STRUCTURE:
The section consists of medium to coarse-grained oxide gabbro (Pieces 4, 5, 6,7), diabase (Pieces 8 and 9), and granophyric breccias (Pieces 1 and 2) containing xenoliths of diabase. Granophyric veins cut Pieces 4, 5 and 7. There is no mesoscopic evidence of crystal plastic deformation in the section. Pieces 6, 8 and 10 contain minor, randomly oriented shear fractures.

THIN SECTION:	**209-1275B-3R-1, Piece 9, 57-59 cm**	**TS#221**	**Observer: WB, WM, HD**
ROCK NAME:	**DIABASE/GABBRO CONTACT**		
GRAIN SIZE:	**Fine-grained**		
TEXTURE:	**Aligned/granular**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
GABBRO:					
Plagioclase	50	65	0.40	Euhedral	
Clinopyroxene	0	32	1.10	Euhedral	
Oxide	2	3	0.20	Interstitial	

GENERAL COMMENTS
Contact between a diabase and a gabbro is preserved. It is separated by a completely altered sheared zone (?)
5% microlite diabase aligned parallel to the contact. The matrix is completely altered.
The rock has been deformed at low temperature reducing the grain size and generally obscuring the igneous fabric

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
DIABASE:				
Chlorite	5	Clinopyroxene, mesostasis	Fibrous	In patches
Green amphibole	5	Clinopyroxene, mesostasis	Acicular	In patches
SHEAR ZONE:				
Green amphibole	60		Acicular	
Chlorite	30		Fibrous	
Quartz	10		Anhedral	Very fine, intergrown with chlorite
GABBRO:				
Chlorite	10	Clinopyroxene, plagioclase	Fibrous	In patches
Green amphibole	30	Clinopyroxene, plagioclase	Acicular	In patches
Secondary plagioclase	2	Plagioclase		Along rims and cracks
Sphene	1	Oxide	Equant	Intergrown with oxide and along oxide-plagioclase grain boundaries
Hematite	1	Oxide	Anhedral	Along with sphene
Epidote	Trace	Plagioclase	Prismatic	

GENERAL COMMENTS
There is a subhedral, 0.1 mm large zircon crystal, several euhedral apatite crystals, and several anhedral grains of sphene intergrown with hematite at the dike-shear zone contact.

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
Chlorite	1	Fibrous	Veinlet in diabase
Sphene-actinolite	0.1		Short veinlet in gabbro, equant sphene with needle-like actinolite inclusions

STRUCTURE

Crystal Plastic:
No significant structures

Brittle:
Dike gabbro contact appears sharp and undeformed. Gabbro is cut by a cataclastic shear zone that is cut IN TURN by the dike.
There is a chlorite-ampibole zone between the gabbro and dike that appears sheared, though there are 'ghost' pseudomorphs of larger undeformed amphibole crystals in it. Gabbro contains numerous broken plagioclase deformation twins.

Foliation:
None

Crosscutting Relationships (as are apparent in thin section):
1) Brittle shear zone
2) Dike intrusion
3) Possible shearing and hydrothermal alteration along the dike:gabbro contact.

THIN SECTION:	**209-1275B-3R-1, Piece 13, 84-87 cm**	**TS#222**	**Observer: WM, CG, HD**
ROCK NAME:	**DIABASE/GABBRO CONTACT**		
GRAIN SIZE:	**Fine-grained**		
TEXTURE:	**Felty/granular**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
GABBRO:					
Plagioclase	52	55	0.2	Euhedral	
Clinopyroxene	0	45	0.3	Subhedral	
Oxide	5	5	0.15	Interstitial	

GENERAL COMMENTS
Contact with a diabase is preserved.
The diabase contains 20% plagioclase microlites. The matrix is altered.
Plagioclase microlites in the diabase are aligned parallel to the contact.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
DIABASE:				
Amphibole	50	Clinopyroxenes, matrix		
Chlorite	3	Clinopyroxenes, plagioclase, matrix		
GABBRO:				
Green Amphibole	38	Clinopyroxene		
Brown Amphibole	2	Clinopyroxene		
Amphibole	8	Pyroxenes, Plagioclase	Subhedral to fibrous.	Fibrous in the contact with diabase.
Sphene	Trace	Oxides	Anhedral	Coronas around oxides or finely intergrown with oxides.
Zircon?	Trace		Subhedral. Tetragonal sections.	In the contact between diabase and gabbros.
Hematite	0.5	Oxides		

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**

STRUCTURE
Crystal Plastic:
None

Brittle:
Diabase contains no significant deformation. Gabbro has a 0.5 mm cataclastic shear zone on one side, cut by contact with diabase.
Plagioclase in the gabbro contains numerous plagioclase deformation twins, but no other significant deformation features.

Foliation:

Crosscutting Relationships (as are apparent in thin section):
1) Brittle faulting in gabbro
2) Diabase intrusion and incorporation of gabbro xenolith

THIN SECTION:	**209-1275B-3R-1, Piece 17, 105-107 cm**	**TS#223**	**Observer: CG, WM**
ROCK NAME:	**GABBRO**		
GRAIN SIZE:	**Fine-grained**		
TEXTURE:	**Foliated**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	55	65	2	Subhedral	
Clinopyroxene	5	33	1.5	Subhedral	Some magmatic amphibole(?) could be present.
Oxide	1	2	0.5	Interstitial	

GENERAL COMMENTS
Moderately developed foliation defined by plagioclase and clinopyroxene.
Grain size varies from very fine to fine grained. The fine grained portion is more granular and the foliation is defined by clinopyroxene.
Small patches of recovered neoblasts with 120 degrees triple junctions and bent twins in the plagioclase indicate high temperature deformation.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Green Amphibole	32	Clinopyroxene, Plagioclase	Subhedral to anhedral	
Brown Amphibole	2	Clinopyroxene	Anhedral. Patchy	
Titanite	1	Oxides	Subhedral to anhedral	Coronas and intergrown with oxides.
Secondary Plagioclase	Trace	Plagioclase		Rims of primary plagioclase close to green amphibole.
Hematite	0.5	Oxides	Anhedral	Patches rimming primary oxides.

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**

THIN SECTION:	**209-1275B-4R-1, Piece 26, 127-130 cm**	**TS#224**	**Observer: WB, HD**
ROCK NAME:	**GABBRO**		
GRAIN SIZE:	**Fine-grained**		
TEXTURE:	**Foliated**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	55	67	2	Subhedral	
Clinopyroxene	5	31	1.5	Subhedral	Magmatic amphibole might be present.
Oxide	1	2	0.5	Interstitial	

COMMENTS

Moderately developed foliation defined by plagioclase and clinopyroxene.
Grain size varies from very fine to fine grained. The fine grained portion is a rounded domain.
The very fine grained portion is weaker foliated than the fine grained, with less polysynthetic twinning.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Chlorite	5	Clinopyroxene, plagioclase	Fibrous	In patches.
Green amphibole	30	Clinopyroxene, plagioclase	Acicular and prismatic	Pseudomorphic clinopyroxene.
Secondary plagioclase	5	Plagioclase		Along rims and cracks.
Titanite	0.5	Oxide	Equant	Intergrown with oxide and along oxide-plagioclase grain boundaries. With amphibole inclusions.
Hematite	1	Oxide	Anhedral	Along with titanite.

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
No veins			

STRUCTURE

Crystal Plastic:
Numerous deformation twins, kink bands, and bent plagioclase grains indicate incipient crystal-plastic deformation.

Brittle:
No significant features.

Foliation:
Strong igneous foliation.

Crosscutting Relationships (as are apparent in thin section):

THIN SECTION:	**209-1275B-5R-1, Piece 5, 30-33 cm**	**TS#225**	**Observer: WB, HD**
ROCK NAME:	**GABBRO**		
GRAIN SIZE:	**Fine-grained**		
TEXTURE:	**Foliated**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	50	68	2	Subhedral	
Clinopyroxene	3	30	1.5	Subhedral	
Oxide	1	2	0.5	Interstitial	
Sphene	1	1	0.5	Subhedral to euhedral	Magmatic?

GENERAL COMMENTS

Moderately developed foliation defined by plagioclase and clinopyroxene.
Grain size varies from very-fine- to fin-grained. Fine grained portions are in 0.5 cm thin bands.
Very fine grained bands are more granular; plgaioclase with less polysyntetic twinning
Titanite mostly associated with coarse grained gabbro.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Chlorite	10	Clinopyroxene, plagioclase	Fibrous	In patches.
Green amphibole	40	Clinopyroxene, plagioclase	Acicular and prismatic	Pseudomorphic clinopyroxene.
Secondary plagioclase	6	Plagioclase		Along rims and cracks.
Titanite	1	Oxide	Equant	Intergrown with oxide and along oxide-plagioclase grain boundaries. With amphibole inclusions.
Hematite	1	Oxide	Anhedral	Along with titanite.

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
No veins			

STRUCTURE

Crystal Plastic:
Bent plagioclase grains and kink bands at low angles along with numerous deformation twins and minor plagioclase neoblasts indicates incipient crystal-plastic deformation.

Brittle:
Rare amphibole-filled veins with no visible offset.

Foliation:
Strong igneous foliation.

Crosscutting Relationships (as are apparent in thin section):

1) incipient crystal-plastic deformation
2) fracture and vein filling.

THIN SECTION:	**209-1275B-5R-1, Piece 10, 64-67 cm**	**TS#226**	**Observer: WB, WM, HD**
ROCK NAME:	**GABBRO**		
GRAIN SIZE:	**Fine- to medium-grained**		
TEXTURE:	**Granular/foliated**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	55	60	2	Subhedral	
Clinopyroxene	4	38	1.5	Subhedral	Some is magmatic amphibole(?)
Oxide	1	2	0.5	Interstitial	

GENERAL COMMENTS

Slightly developed foliation defined by plagioclase and clinopyroxene.
Fine to medium grained domains.
Plagioclase in the coarse grained section lacks twinning.
Fine-grained band more mafic with quartz.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Chlorite	5	Clinopyroxene, plagioclase	Fibrous	In patches.
Green amphibole	40	Clinopyroxene, plagioclase	Acicular and prismatic	Pseudomorphic clinopyroxene.
Secondary plagioclase	3	Plagioclase		Along rims and cracks.
Titanite	2	Oxide, plagioclase	Equant	Intergrown with oxide and along oxide-plagioclase grain boundaries. With amphibole inclusions.
Hematite	2	Oxide	Anhedral	Along with titaite.
Quartz	1	Plagioclase?	Anhedral	Along with titanite on former oxide-plagioclase grain boundaries. Interstitial with amphibole needles.

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
No veins			

STRUCTURE

Crystal Plastic:
Bent plagioclase laths, numerous deformation twins, local formation of coarse well crystallized plagioclase neoblasts indicating a weak high-temperature crystal-plastic deformation.

Foliation:
Weak foliation in coarser grained gabbro, likely of igneous origin.

Crosscutting Relationships (as are apparent in thin section):

1) weak crystal-plastic deformation
2) weak brittle deformation and formation of cataclastic band.

THIN SECTION:	**209-1275B-5R-1, Piece 20, 122-125 cm**	**TS#227**	**Observer: WM, WB, HD**
ROCK NAME:	**GABBROIC BRECCIA**		
GRAIN SIZE:	**Fine-grained**		
TEXTURE:	**Breccia**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	17	20	0.2	Rounded	
Clinopyroxene	3	12	0.2	Rounded	
Oxide	2	2	0.2	Rounded	
Matrix		68			

GENERAL COMMENTS
The matrix is very fine grained.
This gabbroic breccia has been deformed to the point where no igneous relations can be discerned.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Chlorite	10	Clinopyroxene, plagioclase		In patches.
Green amphibole	60	Clinopyroxene, plagioclase	Acicular and prismatic	Pseudomorphic clinopyroxene
Secondary plagioclase	5	Plagioclase		Along rims and cracks.
Titanite	2	Oxide, plagioclase	Equant	Intergrown with oxide and along oxide-plagioclase grain boundaries. With amphibole inclusions.
Hematite	1	Oxide	Anhedral	Along with titanite.
Epidote	Trace	Plagioclase	Prismatic	Very rare.

GENERAL COMMENTS
There are patches of amphibolite and moderately chlorite altered microlitic diabase in this rock.
Titanite is particularly abundant in the contact between the dike and the brecciated gabbro.
This looks like a dike intruded syntectonically into a brittle fault. See the band of microlitic diabase that is squeezed in. It appears quenched low-T.

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
No veins			

STRUCTURE

Crystal Plastic:
Weak crystal-plastic indicated in gabbro clasts by bent plagioclase crystals with deformation twins.

Brittle:
Cataclasite consisting of a fine-grained matrix containing about 50% crystal fragments of plagioclase and amphibole.

Foliation:
Clear cataclastic lamination.

Crosscutting Relationships (as are apparent in thin section):
1) Weak crystal-plastic deformation of gabbro
2) Cataclastic deformation

THIN SECTION:	**209-1275B-5R-1, Piece 22, 134-137cm**	**TS#228**	**Observer: WB, HD**
ROCK NAME:	**GABBRO**		
GRAIN SIZE:	**Fine-grained**		
TEXTURE:	**Granular**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	45	58	2	Subhedral	
Clinopyroxene	5	40	1.5	Subhedral	Some magmatic amphibole?
Oxide	1	4	0.5	Interstitial	

COMMENTS Very fine grained rock with a few larger crystals.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Chlorite	5	Clinopyroxene, plagioclase	Fibrous	In patches.
Green amphibole	35	Clinopyroxene, plagioclase	Acicular and prismatic	Pseudomorphic clinopyroxene.
Secondary plagioclase	7	Plagioclase		Along rims and cracks.
Titanite	1	Oxide, plagioclase	Equant	Intergrown with oxide and along oxide-plagioclase grain boundaries. With amphibole inclusions.
Hematite	1	Oxide	Anhedral	Along with titanite.
Quartz	1	Plagioclase?	Anhedral	Along with titanite on former oxide-plagioclase grain boundaries. Interstitial with amphibole needles.

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
No veins			

STRUCTURE

Crystal Plastic:
Bent plagioclase crystals with deformation twins. Neoblast formation within and at the boundaries between coarser plagioclase crystals. Overall a very weak crystal-plastic deformation.

Brittle:
No significant brittle deformation.

Foliation:
none

Crosscutting Relationships (as are apparent in thin section):

THIN SECTION:	**209-1275B-6R-1, Piece 10, 61-64 cm**	**TS#229**	**Observer: NA, CG, ET, HD**
ROCK NAME:	**WEHRLITE**		
GRAIN SIZE:	**Medium-grained**		
TEXTURE:	**Poikilitic**		

MODE (Visual estimate)

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	MORPHOLOGY	COMMENTS
Olivine	35	50	< 8	Subhedral to anhedral	Weakly kinked.
Clinopyroxene	20	35	1.6	Subhedral, oikocrystic	
Plagioclase	2	10	0.5	Interstitial, oikocrystic	
Amphibole	1	3	<0.1	Interstitial, oikocrystic	
Spinel	1	2	<0.15	Subhedral to euhedral	

GENERAL COMMENTS Uuniform sized olivine forms the bulk of this rock with clinopyroxenes and plagioclase filling interstices. Some olivines form clots.

SECONDARY MINERALS	PERCENT PRESENT	REPLACING	MORPHOLOGY	COMMENTS
Chlorite	8	Plagioclase, pyroxenes	Fan-like aggregates	Completely replacing plagioclase or as plagioclase alteration rims.
Talc	10	Olivine, pyroxenes, plagioclase	Anhedral	
Magnetite	2	Olivine, Spinel	Subhedral to anhedral	
Serpentine	8	Olivine, pyroxenes	Ribbon textures	Length-fast serpentine (lizardite). Centers of olivines are iddingsitized olivines (reddish alteration).
Amphibole	3	Pyroxenes		
Iddingsite	3	Olivine		

VEIN / FRACTURE FILLING	PERCENT PRESENT	MORPHOLOGY	COMMENTS
Talc veins.		Branched. Irregular.	Fine grained. Crosscut serpentines.

STRUCTURE

Crystal Plastic:
Very weak crystal-plastic deformation indicated by deformation twins in plagioclase and olivine.

Brittle:
Branching talc veins with no discernable offset.

Foliation:
None

Crosscutting Relationships (as are apparent in thin section): 1) Weak crystal-plastic deformation
2) Fracturing and vein filling.

THIN SECTION: 209-1275B-6R-1, Piece 11, 70-75 cm TS#230 **Observer: NA, CG, ET, HD**
ROCK NAME: OLIVINE GABBRO AND OXIDE GABBRO DIKE
GRAIN SIZE: Medium-grained
TEXTURE: Poikilitic

PRIMARY MINERALOGY	MODE (Visual estimate) PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	MORPHOLOGY	COMMENTS
Olivine GABBRO					
Olivine	30	63	1-6	Subhedral to anhedral	Kinked.
Plagioclase	5	25	1-2	Interstitial, oikocrystic	
Clinopyroxene	3	10	1-1.5	Interstitial, oikocrystic	
Spinel	1	2	0.2-0.7	Euhedral to subhedral	Inclusions of spherical phase.
Dike (Oxide Gabbro):					
Plagioclase	0	50	0.4-4	Subhedral to anhedral	
Amphibole	15	27	0.5-4	Subhedral to anhedral	
Clinopyroxene	0	20	<3	Subhedral to anhedral	
Oxide	1	3	0.2-2	Subhedral to anhedral	

GENERAL COMMENTS
Uniform sized olivine forms the bulk of olivine gabbro with plagioclase and clinopyroxene filling interstices.
Some olivines form clots and meets each other at planar surface and triple junctions.
A 1-cm-wide oxide gabbro dike crosscuts spinel-troctolite with sharp contacts.

SECONDARY MINERALS	PERCENT PRESENT	REPLACING	MORPHOLOGY	COMMENTS
Spinel-Troctolite:				
Chlorite	20	Plagioclase, clinopyroxene		Reaction chlorite-talc banded coronas between plagioclase and olivine. Coronas around fresh olivines.
Talc	20	Plagioclase, olivine		Reaction chlorite-talc banded coronas between plagioclase and olivine. Coronas around fresh olivines. Fine-grained aggregates replacing plagioclase.
Serpentine	10	Olivine	Ribbon textures	
Smectite	1	Olivine		Olivine reaction rims close to carbonate veins.
Carbonates	5	Olivine, plagioclase		
Magnetite	2	Olivine		
Dike (Oxide Gabbro):				
Brown amphibole	40	Clinopyroxene?		
Amphibole	27	Clinopyroxene. Brown amphibole		
Chlorite	30	Plagioclase		
Zoisite?	Trace	Plagioclase		
Secondary Plagioclase	1	Plagioclase		
Titanite	2	Oxides		

VEIN / FRACTURE FILLING	PERCENT PRESENT	MORPHOLOGY	COMMENTS
Carbonate and clay veins		Cross-fractures (Dike). Branched and networks (Troctolite)	

STRUCTURE
Crystal Plastic:
Some deformation twins and undulatory extinction in plagioclase. Most olivine strain free, or contain a few kink bands. Only incipient crystal-plastic deformation.

Brittle:
Carbonate and talc veins with no discernable offset.

Foliation:
None

THIN SECTION:	**209-1275B-6R-1, Piece 11, 70-75 cm**	**TS#230**	**Observer: NA, CG, ET, HD**
ROCK NAME:	**OLIVINE GABBRO AND OXIDE GABBRO DIKE**		
GRAIN SIZE:	**Medium-grained**		
TEXTURE:	**Poikilitic**		

Crosscutting Relationships (as are apparent in thin section):	1) Incipient crystal-plastic deformation 2) Fracturing and vein filling

THIN SECTION:	**209-1275B-6R-2, Piece 4A, 27-30 cm**	**TS#231**	**Observer: NA, WB, ET, HD**
ROCK NAME:	**PLAGIOCLASE HARZBURGITE**		
GRAIN SIZE:	**Medium-grained**		
TEXTURE:	**Poikilitic**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Olivine	25	40	< 8	Subhedral to anhedral	Kinked
Orthopyroxene	30	40	< 12	Oikocryst	
Plagioclase	2	10	< 4	Interstitial	
Clinopyroxene	2	6	< 4	Interstitial, anhedral	Around orthopyroxene.
Amphibole	1	3	< 2	Interstitial, anhedral	In grain boundary.
Spinel	1	1	< 1.2	Subhedral to euhedral	

GENERAL COMMENTS

Olivine crystals are poikiolitically surrounded by orthopyroxene, plagioclase and clinopyroxene.
Spinel grains are commonly enclosed in olivine or orthopyroxene.
Olivine forms reaction rim along grain boundary of spinel grains enclosed in orthopyroxene.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Serpentine	15	Olivine		Along cracks in olivine, forming mesh texture. Along with talc after olivine and orthopyroxene.
Talc	10	Olivine, pyroxene		In coronas along plagioclase-olivine boundaries. After olivine and orthopyroxene.
Chlorite	10	Plagioclase		In coronas along plagioclase-olivine boundaries. After plagioclase.
Green amphibole	1	Pyroxene		Along orthopyroxene grain boundaries.
Magnetite	1	Olivine, pyroxene		Along cracks in olivine, forming mesh texture. Along with talc after olivine and orthopyroxene.

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
Serpentine	1	Cross-fiber	
Talc	1	Fibrous	Cut serpentine veins

STRUCTURE

Crystal Plastic:
Deformation twins in plagioclase, almost no kink bands in olivine. Only incipient crystal-plastic deformation.

Brittle:
Veins

Foliation:

Crosscutting Relationships (as are apparent in thin section):

THIN SECTION: 209-1275B-6R-2, Piece 5, 57-61 cm **TS#232** **Observer: NA, WB, HD**
ROCK NAME: PLAGIOCLASE HARZBURGITE
GRAIN SIZE: Coarse-grained
TEXTURE: Poikilitic

PRIMARY MINERALOGY	MODE (Visual estimate) PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	MORPHOLOGY	COMMENTS
Olivine	10	50	1-25	Subhedral to anhedral	**Kinked.**
Orthopyroxene	10	35	1-15	Interstitial, oikocrystic	
Plagioclase	3	7	0.5-1	Interstitial, oikocrystic	
Amphibole	2	5	1-1.5	Interstitial, oikocrystic	Brown.
Spinel	1	2	0.5-1.5	Euhedral to subhedral	Inclusions of spherical phases (brown amphibole).

COMMENTS Olivine crystals are poikilitically surrounded by orthopyroxene, plagioclase and brown amphibole.
A 1-cm-wide altered vein crosscuts harzburgite. Zircons are present in the vein.

SECONDARY MINERALS	PERCENT PRESENT	REPLACING	MORPHOLOGY	COMMENTS
Serpentine	50	Olivine		Mesh texture.
Chlorite	5	Plagioclase	Fibrous	Pseudomorphing plagioclase.
Talc	10	Orthopyroxene, olivine	Fibrous	Along with green amphibole.
Green amphibole	10	Orthopyroxene, olivine	Acicular	Along with talc.
Magnetite	1	Olivine	Anhedral	Fine-grained along with serpentine in mesh rims.

VEIN / FRACTURE FILLING	PERCENT PRESENT	MORPHOLOGY	COMMENTS

A 1-cm-wide magmatic vein is completely altered to chlorite-amphibole, and talc. The presence of five 0.1 mm zircon grains suggest it was a felsic.
Serpentine cross fractures associated with this magmatic vein cut talc and earlier serpentine vein.
Discontinuous talc and chlorite-amphibole veinlets.

STRUCTURE

Crystal Plastic:
Deformation twins present in olivine and plagioclase indicating incipient crystal-plastic deformation.

Brittle:
Veins with no discernable offset.

Foliation:
None

Crosscutting Relationships (as are apparent in thin section):
1) weak crystal plastic deformation/magmatic vein - order not known
2) serpentine veins

THIN SECTION:	**209-1275B-6R-2, Piece 9, 102-105 cm**	**TS#233**	**Observer: NA, ET, JH, HD**
ROCK NAME:	**OLIVINE GABBRO**		
GRAIN SIZE:	**Coarse-grained**		
TEXTURE:	**Poikilitic**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Olivine	15	65	1-5	Subhedral to anhedral	Kinked.
Plagioclase	5	20	0.5-4	Interstitial, oikocrystic	
Clinopyroxene	5	10	1.5-11	Interstitial, oikocrystic	
Spinel	2	3	0.5-1	Euhedral to subhedral	Inclusions (amphibole, etc.).
Amphibole	0.5	2	0.3	Interstitial	Attached to spinel.

GENERAL COMMENTS Olivine crystals are poikilotically surrounded by plagioclase, clinopyroxene and brown amphibole.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Serpentine	50	Olivine, pyroxene	Mesh texture with some core and rims	
Magnetite/opaque oxides	3	Spinel	Anhedral to subhedral	
Chlorite	17.5	Plagioclase	Microgranular, occasionally fibrous	
Amphibole	2	Clinopyroxene	Anhedral to subhedral	

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
No veins.			

STRUCTURE

Crystal Plastic:
Deformation twins in plagioclase and olivine indicate incipient crystal-plastic deformation.

Brittle:
No significant brittle deformation.

Foliation:
None

Crosscutting Relationships (as are apparent in thin section):

THIN SECTION:	**209-1275B-7R-1, Piece 10, 54-59 cm**	**TS#234**	**Observer: NA, WB, ET, HD**
ROCK NAME:	**TROCTOLITE**		
GRAIN SIZE:	**Coarse-grained**		
TEXTURE:	**Poikilitic**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Olivine	40	60	< 12	Subhedral to anhedral	Kinked.
Plagioclase	2	30	1-2	Interstitial, oikocrystic	
Amphibole	2	5	1-6	Interstitial, oikocrystic	
Spinel	0.5	2	< 1.5	Euhedral to subhedral	Inclusions

GENERAL COMMENTS
Olivine crystals are poikiolitically surrounded by plagioclase and amphibole.
Spinel grains are enclosed in either olivine or plagioclase.
Some olivines have distinct cleavages.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Serpentine	1	Olivine		In rare veins within olivine crystals.
Chlorite	15	Plagioclase	Fibrous	Rimming and pseudomorphing plagioclase.
Talc	35	Olivine, plagioclase	Fibrous	Along with green amphibole.
Green amphibole	5	Olivine, plagioclase	Acicular	Along with talc.
Magnetite	1	Olivine	Euhedral	Associated with talc.

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**

A 3-mm-wide magmatic vein is completely altered to amphibole and talc. The presence of two 0.05 mm zircon grains suggest it was a felsic.

STRUCTURE

Crystal Plastic:
Deformation twins in plagioclase and rare ones in olivine indicate incipient crystal-plastic deformation.

Brittle:
No significant brittle deformation, except intrusion of magmatic vein.

Foliation:
None

Crosscutting Relationships (as are apparent in thin section):

THIN SECTION:	**209-1275B-8R-1, Piece 12, 67-70 cm**	**TS#235**	**Observer: CG, WM, HD**
ROCK NAME:	**GABBRO**		
GRAIN SIZE:	**Medium-grained**		
TEXTURE:	**Foliated**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	44	48	2	Subhedral	
Clinopyroxene	3	46	1.5	Subhedral	
Oxide	3	6	0.5	Interstitial	

GENERAL COMMENTS
More altered than previous sections.
Moderately developed foliation defined by plagioclase and clinopyroxene.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Green Amphibole	45	Clinopyroxene		Zoned crystals with brown cores and green rims.
Brown Amphibole	7	Clinopyroxene		Zoned crystals with brown cores and green rims.
Hematite	Trace			
Sphene	Trace	Oxides		

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
FELSIC VEIN:			
Hornblende		Subhedral	
Secondary Plagioclase		Subhedral to anhedral	
Clays		Anhedral	
Hematite		Anhedral	
Sphene		Anhedral	
Quartz		Anhedral	

STRUCTURE

Crystal Plastic:
Deformation lamellae, bent crystals, and weak neoblast formation in plagioclase indicate a weak crystal-plastic deformation.

Brittle:
Irregular veins with no discernable offset.

Foliation:
Weak preferred orientation to large plagioclase laths of igneous origin.

Crosscutting elationships (as are apparent in thin section):
1) Weak crystal-plastic deformation
2) Fracturing and vein filling

THIN SECTION:	**209-1275B-9R-1, Piece 15, 109-112 cm**	**TS#236**	**Observer: WM, HP, HD**
ROCK NAME:	**GABBRO**		
GRAIN SIZE:	**Fine-grained**		
TEXTURE:	**Foliated**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	62	65	2	Subhedral	
Clinopyroxene	5	33	1.5	Subhedral	
Oxide	1	2	0.5	Interstitial	

COMMENTS Moderately developed foliation defined by plagioclase and clinopyroxene.
Grain size varies from very fine to fine grained. The fine grained portion is more granular and the foliation is defined by clinopyroxene.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Green Amphibole	25	Pyroxene, Plagioclase	Fine needles and patchy aggregates	Pseudomorphing pyroxene and partially replacing plagioclase along internal cracks and grain boundaries.
Brown Amphibole	8	Pyroxene		Associated with green amphibole.
Chlorite	Trace	Pyroxene		
Hematite	Trace	Pyroxene		

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
No veins.		Branched. Irregular.	Fine grained. Crosscut serpentines.

STRUCTURE

Crystal Plastic:
Some bent and kinked plagioclase grains indicate a very weak crystal-plastic deformation. Minor high temperature neoblast formation.

Brittle:
Local fracturing and veining of plagioclase by green amphibole.

Foliation:
Little if any foliation present.

Crosscutting Relationships (as are apparent in thin section): 1) Weak crystal-plastic deformation
2) Intragranular fracturing and veining of plagioclase.

THIN SECTION:	**209-1275B-10R-1, Piece 5, 20-22 cm**	**TS#237**	**Observer: WM, HP, HD**
ROCK NAME:	**GABBRO**		
GRAIN SIZE:	**Fine-grained**		
TEXTURE:	**Foliated**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Very fine grained portion:					
Plagioclase	48	50	0.1	Subhedral	
Clinopyroxene	13	34	0.1	Subhedral	
Amphibole	1	1	0.2		
Oxide	15	15	0.2	Interstitial	
Apatite	<1	<1	0.2	Subhedral	

GENERAL COMMENTS
Fine grained gabbro lens in a very fine grained gabbro.
Moderately well developed foliation in both the fine and very fine grained portions.
Fine grained gabbro has 75% plagioclase, 21% clinopyroxene, 3% oxides, <1% apatite

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Green Amphibole	20	Pyroxene, plagioclase	Coarse single crystals to fine grained aggregates.	Pseudomorphing pyroxene. Replacement of plagioclase along crystal margins and internal cracks.
Brown Amphibole	3	Pyroxene	Usually coarse grained.	Intimately associated with green amphibole.

GENERAL COMMENTS
Alteration of coarse grained domain and enclosing fine-grained domain is the same.
All of the amphibole is of secondary origin.

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
No veins.			

STRUCTURE

Crystal Plastic:
Deformation lamellae and bent plagioclase grains indicate a weak high temperature deformation. Some fine polygonal plagioclase could also indicate high temperature recrystallization.

Brittle:
Fracturing of plagioclase and local veining by green amphibole.

Foliation:
Moderately well developed igneous foliation.

Crosscutting Relationships (as are apparent in thin section):

THIN SECTION:	**209-1275B-10R-1, Piece 10, 78-81 cm**	**TS#238**	**Observer: WM, HP, HD**
ROCK NAME:	**GABBRO**		
GRAIN SIZE:	**Fine-grained**		
TEXTURE:	**Foliated**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	54	55	2	Subhedral	
Clinopyroxene	26	40	1.5	Subhedral	
Oxide	5	5	1.0	Interstitial	

COMMENTS Grain size varies from very fine to fine grained. The fine grained portion is more granular. Moderately well developed foliation in the fine grained part.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Green Amphibole	10	Pyroxene, plagioclase	Needles	Replacing pyroxene. Growing into plagioclase crystals. Along grain margins.
Brown Amphibole	5	Pyroxene	Coarse crystals	Intimately associated with green amphibole.
Secondary Plagioclase	tr	Plagioclase		
Hematite	tr	Plagioclase		

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
No veins.			

STRUCTURE

Crystal Plastic:
Deformation twins in plagioclase and bent plagioclase grains indicate incipient crystal-plastic deformation.

Brittle:
Fractured plagioclase grains with amphibole microcrack and vein fillings. Subparallel brittle fractures, with possible slight movement cross the thin section with green amphibole locally filling them.

Foliation:
Moderately well developed igneous foliation defined by plagioclase laths.

Crosscutting Relationships (as are apparent in thin section): 1) incipient high temperature crystal-plastic deformation
2) brittle fracturing and vein filling

THIN SECTION:	**209-1275B-10R-2, Piece 8A, 41-44 cm**	**TS#239**	**Observer: CG, WM, Hd**
ROCK NAME:	**OXIDE GABBRO**		
GRAIN SIZE:	**Fine-grained**		
TEXTURE:	**Foliated**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	48	50	2.5	Subhedral	
Clinopyroxene	27	37	0.2	Subhedral	
Amphibole	1	1	0.2	Anhedral	
Oxide	12	12	0.3	Interstitial	

COMMENTS Relatively coarse plagioclase relative to the clinopyroxene.
Pyroxene and oxide form multi granular cluster between larger euhedral plagioclase crystals.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Green Amphibole	10	Clinopyroxene		
Secondary Plagioclase	2	Plagioclase		

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
No veins.			

STRUCTURE

Crystal Plastic:
Deformation twins, kinks and slight bends in plagioclase indicate an incipient high temperature deformation.

Brittle:
Numerous fractures with no visible offset cut the section, commonly filled with green amphibole.

Foliation:
Section banded with medium and fine grained intervals showing good igneous lamination defined by plagioclase laths and oxide stringers.

Crosscutting Relationships (as are apparent in thin section): 1) incipient high temperature deformation
2) fracturing and vein filling

THIN SECTION:	**209-1275B-11R-1, Piece 4, 31-34 cm**	**TS#240**	**Observer: WM, HP, HD**
ROCK NAME:	**OXIDE GABBRO**		
GRAIN SIZE:	**Fine- to medium-grained**		
TEXTURE:	**Foliated**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	49	50	2.5	Subhedral	
Clinopyroxene	18	35	0.5	Subhedral	
Amphibole	1	1	0.2	Anhedral	
Oxide	10	10	0.4	Interstitial	

GENERAL COMMENTS
Modal segregations of plagioclase and pyroxene and oxides into discrete bands.
Oxide strongly associated with pyroxene.
Plagioclase associated with mafic minerals is finer grained.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Green Amphibole	19	Pyroxene, Plagioclase	Fine needles and fine aggregates.	Replacing pyroxene, on grain margins of plagioclase.
Brown Amphibole	2	Pyroxene	Relatively coarse individual crystals.	Associated with green amphibole. Typically adjacent to ilmenite.
Secondary Plagioclase	1	Plagioclase		

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
One brown clay-rich, en-echelon veinlet.			

STRUCTURE

Crystal Plastic:
Deformation twins, undulatory extinction in bent grains and a few kinks in plagioclase indicate very weak crystal-plastic deformation.
Brittle:
Numerous microcracks and fractures filled with green amphibole.

Foliation:
Weak to moderate igneous foliation defined by a preferred orientation of plagioclase laths.

Crosscutting Relationships (as are apparent in thin section):
1) Very weak crystal-plastic deformation
2) Fracturing and vein filling

THIN SECTION:	**209-1275B-11R-2, Piece 5, 61-64 cm**	**TS#241**	**Observer: WM, HP, HD**
ROCK NAME:	**OXIDE GABBRO**		
GRAIN SIZE:	**Fine-grained**		
TEXTURE:	**Foliated**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	54	55	1.5	Subhedral	
Clinopyroxene	15	37	0.4	Subhedral	
Amphibole	Trace	Trace	0.2	Subhedral	
Biotite	Trace	Trace	0.2	Interstitial	
Oxide	8	8	0.7	Interstitial	

COMMENTS Weak modal segregation of mafic minerals.
Moderately well developed foliation.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Green Amphibole	20	Pyroxene, plagioclase.	Fine needles.	Replacing pyroxene, along plagioclase grain margins and internal fractures.
Brown Amphibole	3	Pyroxene	Single crystals	Associated with green amphibole.
Secondary Plagioclase	Trace	Plagioclase		
Hematite	Trace			Associated with ilmenite and green amphibole.

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
No veins.			

STRUCTURE

Crystal Plastic:
Plagioclase deformation lamellae, bent grains, and subgrain formation indicate a weak high-temperature crystal-plastic deformation.

Brittle:
Numerous intragranular fractures in plagioclase and some cross cutting en echeron fractures both with sericite or amphibole along them.

Foliation:
Moderately well defined igneous foliation defined by oriented plagioclase laths.

Crosscutting Relationships (as are apparent in thin section): 1) weak crystal-plastic high-temperature deformation
2) fracturing and vein filling

THIN SECTION:	**209-1275B-11R-3, Piece 6, 52-55 cm**	**TS#242**	**Observer: CG, WM, HD**
ROCK NAME:	**GABBROIC CATACLASITE**		
GRAIN SIZE:	**Very fine-grained**		
TEXTURE:	**Brecciated**		

MODE (Visual estimate)

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	MORPHOLOGY	COMMENTS
Plagioclase	30	30	0.1	Subhedral	
Clinopyroxene	5	5	0.1	Subhedral	
Oxide	2	2	0.2	Interstitial	
Matrix		63			

GENERAL COMMENTS This rock has been brecciated obscuring all the igneous features.

SECONDARY MINERALS	PERCENT PRESENT	REPLACING	MORPHOLOGY	COMMENTS
Green Amphibole	50	Matrix, Clinopyroxene		
Brown Amphibole	10	Matrix, Clinopyroxene		
Titanite	3	Oxides		In veins and associated with oxides.
Secondary Plagioclase	Trace	Plagioclase		
Hematite	Trace			

VEIN / FRACTURE FILLING	PERCENT PRESENT	MORPHOLOGY	COMMENTS
No veins.			

STRUCTURE

Crystal Plastic:
Obscured by cataclastic deformation if present.

Brittle:
Gabbro protocataclasite in contact with a cataclasite containing a fine-grained matrix with coarse mineral fragments from a gabbro.
and numerous diabase clasts, grading downwards into a protocataclasite diabase preserving excellent diabasic texture over large areas

Foliation:
Remains of a good igneous lamination present locally in gabbro protocataclasite.

Crosscutting Relationships (as are apparent in thin section): It appears that this is a cataclastic breccia developed along the contact between a gabbro and a diabase.
Late quartz veins cut the cataclasite.

THIN SECTION:	**209-1275B-12R-1, Piece 13, 83-85 cm**	**TS#243**	**Observer: WM, HP, HD**
ROCK NAME:	**OXIDE GABBRO**		
GRAIN SIZE:	**Fine-grained**		
TEXTURE:	**Foliated**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	54	55	1.0	Subhedral	
Clinopyroxene	10	40	0.8	Subhedral	
Amphibole	Trace	Trace	0.6	Subhedral	
Oxide	5	5	0.5	Interstitial	

GENERAL COMMENTS Plagioclase is more equant. Aspect ratio 1.5 on average.
The foliation is weakly defined.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Green Amphibole	23	Pyroxene, plagioclase	Needles, fine aggregates	Forming pyroxene pseudomorphs, replacement of plagioclase along grain margins and cracks.
Brown Amphibole	5	Pyroxene	Subhedral single crystals	
Secondary Plagioclase	1	Plagioclase		
Brown clay	1	Plagioclase, pyroxene	Extremely fine grained.	Associated with amphibole and leucoxene.
Leucoxene	1	Plagioclase, pyroxene	Extremely fine grained.	Associated with amphibole and brown clay.
Hematite	Trace	Plagioclase, pyroxene	Fine grained aggregates and single euhedral crystals.	Associated with amphibole.

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
No veins.			

STRUCTURE

Crystal Plastic:
Plagioclase deformation lamellae, bent grains, and minor subgrain formation indicates an incipient high-temperature crystal-plastic deformation.

Brittle:
Numerous intragranular fractures in plagioclase and crosscutting fractures filled with sericite and amphibole with no visible offset.

Foliation:
Very weak preferred orientation of plagioclase gives a poor igneous foliation.

Crosscutting Relationships (as are apparent in thin section):

THIN SECTION:	**209-1275B-12R-2, Piece 1B, 57-60 cm**	**TS#244**	**Observer: CG, WM, HD**
ROCK NAME:	**OXIDE GABBRO**		
GRAIN SIZE:	**Medium- to fine-grained**		
TEXTURE:	**Foliated**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE(mm)**	**MORPHOLOGY**	**COMMENTS**
	C-F	C-F	C-F		
Plagioclase	38-48	40-50	3-.15	Subhedral	
Clinopyroxene	25-20	50-45	1.5-0.1	Subhedral	
Amphibole	1	1	1.5-0.1	Subhedral	
Oxide (ilmenomagnetite)	10-5	10-5	0.5-0.15	Interstitial	
Apatite	Trace	Trace	0.25		
Sulfides	1	1		Interstitial, inclusions in plagioclase and oxides	

GENERAL COMMENTS
C = medium grained
F = very fine grained
Apatite is found in the clusters associated with the pyroxene and possibly quartz.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Green Amphibole	31-10	Clinopyroxene, Amphibole		
Brown Amphibole	4-15	Clinopyroxene		

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
No veins.			

STRUCTURE

Crystal Plastic:
Plagioclase deformation twins, undulatory extinction, and bending indicate a very weak high-temperature crystal-plastic deformation.

Brittle:
Numerous intergranular microcracks in plagioclase, often partially filled by green amphibole or sericite.

Foliation:
Gabbro is banded due to medium-grained gabbronorite band between two finer grained gabbro domains.

Crosscutting Relationships (as are apparent in thin section):
1) very weak high-temperature crystal-plastic deformation
2) brittle fracture and vein filling

THIN SECTION:	**209-1275B-12R-2, Piece 1B, 86-89 cm**	**TS#245**	**Observer: WM, HP, HD**
ROCK NAME:	**OXIDE GABBRO**		
GRAIN SIZE:	**Fine-grained**		
TEXTURE:	**Granular**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	48	50	0.2-3	Subhedral	
Clinopyroxene	13	36	0.1-1.5	Subhedral	
Amphibole	3	4	0.1-1.5	Subhedral	
Oxide	10	10	0.2-0.5	Interstitial	

GENERAL COMMENTS
Plagioclase is fairly equant; aspect ratio 1-1.75
Nice amphibole grain boundaries clearly demonstrating its magmatic origin.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Green Amphibole	15	Pyroxene, plagioclase.	Needles, fine aggregates, coarse crystals.	Light yellow, very fine aggregates and bluish green bundles of crystal needles. Two different amphiboles? Pseudomorphing pyroxene and partially replacing plagioclase.
Brown Amphibole	5	Pyroxene	Single coarse crystals.	
Secondary Plagioclase	1	Plagioclase		

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
No veins.			

STRUCTURE

Crystal Plastic:
Bent plagioclase grains common, minor neoblast formation, abundant deformation twins indicate a very weak crystal-plastic deformation. Orthopyroxene and clinopyroxene appear relatively unstrained.

Brittle:
Numerous intragranular fractures in plagioclase partially filled by green amphibole.

Foliation:
Not present

Crosscutting Relationships (as are apparent in thin section):
1) Weak crystal plastic deformation
2) intragranular fracturing of plagioclase and partially filling by amphibole

THIN SECTION:	**209-1275B-12R-2, Piece 2, 104-107 cm**	**TS#246**	**Observer: JH, WM, HD**
ROCK NAME:	**OXIDE GABBRO**		
GRAIN SIZE:	**Very fine- to fine-grained**		
TEXTURE:	**Granular**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	35	50	0.1-2	Subhedral	
Clinopyroxene	13	36	0.2-1	Subhedral	
Amphibole	3	4	0.1-1	Subhedral	
Oxide	10	10	0.5-1	Interstitial	

GENERAL COMMENTS
This rock is moderately foliated.
Very fine grained to fine grained domains.
Granophyre dike very fine grained.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Green Amphibole	45	Clinopyroxene, plagioclase	Anhedral, pseudomorphing clinopyroxene	
Secondary Plagioclase	5	Plagioclase	Neoblasts after primary plagioclase	Large concentration in boundaries to fracture in section.
Quartz	Trace		Small, irregular patches	Associated with irregular oxides, more uniform extinction than neighboring strained plagioclase.
Chlorite/smectite	2	Clinopyroxene		In patches.

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
No veins.			

STRUCTURE

Crystal Plastic:
Plagioclase deformation twins, bent grains, and local subgrain formation indicate a very weak high-temperature crystal-plastic deformation.
Irregular albite(?) vein has undulatory extinction and formation of subgrains along grain margins indicating local crystal plastic deformation.

Brittle:
Numerous intragranular fractures in plagioclase show albitization (or analcime) forming along them.

Foliation:
Good foliation present due to alignment of plagioclase laths, particularly in fine grained portion.

Crosscutting Relationships (as are apparent in thin section):
1) Weak crystal plastic deformation
2) Albite vein followed by crystal-plastic deformation
3) Intragranular fracturing of plagioclase

THIN SECTION:	**209-1275B-11R-3, Piece 7, 57-59 cm**	**TS#247**	**Observer: JH, WB, HD**
ROCK NAME:	**DIABASIC BRECCIA WITH ANORTHOSITIC DOMAIN**		
GRAIN SIZE:	**Fine-grained**		
TEXTURE:	**Granular**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	25				
Pyroxene/amphibole	13				
GENERAL COMMENTS	Clasts are unstrained Plagioclase in diabase				
SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**		**MORPHOLOGY**	**COMMENTS**
Quartz	1			Anhedral	In patches; could be primary.
Titanite	1			Subhedral	In patches; could be primary.
Green Amphibole	40	Clinopyroxene		Pseudomorphic and patchy	
Secondary Plagioclase	2	Plagioclase		Anhedral	
FELSIC INTRUSION					
Green amphibole	4	Pyroxenes			
Clay/oxide	10				Very fine-grained interstitial material. Difficult to identify.
Secondary plagioclase	6	Plagioclase		Fine grained neoblastic	Rarely include tiny clinopyroxene grains.
VEIN / FRACTURE FILLING	**PERCENT PRESENT**			**MORPHOLOGY**	**COMMENTS**
Late clay-oxide veins using felsic vein					
GENERAL COMMENTS	Intrusion breccia. Felsic vein material is rich in zircon and sphene Pockets of quartz-amphibole-sphene in wall rock adjacent to felsic material.				

STRUCTURE

Crystal Plastic:
No crystal-plastic deformation.

Brittle:
Felsic intrusion breccia with large angular diabase clasts in a matrix of euhedral plagioclase and angular plagioclase fragments.

Foliation:
None

Crosscutting Relationships (as are apparent in thin section):

THIN SECTION:	**209-1275B-13R-1, Piece 6B, 68-71 cm**	**TS#248**	**Observer: CG, HD**
ROCK NAME:	**OXIDE GABBRO**		
GRAIN SIZE:	**Fine-grained**		
TEXTURE:			

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	45	55	0.2-2.5	Subhedral	
Clinopyroxene	9	35	0.2-1	Subhedral	
Amphibole	2	2	0.2-1	Subhedral	
Oxide (magnetite and ilmenite)	8	8	0.1-1	Interstitial	
Sulfides	Trace			Interstitial	

GENERAL COMMENTS
No significant foliation. Fine grained to very fine grained alternate bands.
Oxide rich band up to 25%.
Wormy orthopyroxene oikocrysts in a fine-grained band.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Green Amphibole	20	Clinopyroxene		Zoned crystal with brown cores and green rims.
Brown Amphibole	15	Clinopyroxene		Zoned crystal with brown cores and green rims.
Biotite	1	Amphibole	Subhedral	

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
Amphibole veins		Irregular	

STRUCTURE

Crystal Plastic:
Abundant deformation twins, slight bending and very minor subgrain formation in plagioclase but no deformation of pyroxenes indicates incipient high-temperature crystal-plastic deformation.

Brittle:
En echelon amphibole filled veins with no visible offset. Minor intragranular microcracks partially filled by green amphibole in plagioclase.

Foliation:
Layered gabbro with a weak magmatic foliation in a finer grained oxide gabbro band defined by a preferred orientation of plagioclase laths.

Crosscutting Relationships (as are apparent in thin section):
1) incipient crystal plastic deformation
2) brittle fracture of plagioclase and formation of en echelon throughgoing fractures with partial filling by amphibole

THIN SECTION:	**209-1275B-13R-1, Piece 9, 128-131 cm**	**TS#249**	**Observer: HP, WM, HD**
ROCK NAME:	**OXIDE GABBRO**		
GRAIN SIZE:	**Very fine- to fine-grained**		
TEXTURE:	**Granular**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	45	46	0.2-2.5	Subhedral	
Clinopyroxene	35	41	0.1-1.5	Subhedral	
Amphibole	2	3	0.1-1	Subhedral	
Oxide	10	10	0.1-1	Interstitial	

GENERAL COMMENTS Change in fabric orientation in thin section.
Moderately developed foliation.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Green Amphibole	15	Pyroxene, plagioclase	Needles and fine aggregates	
Brown Amphibole	3	Pyroxene	Subhedral	Relatively coarse. Commonly in interstitial spaces between plagioclase laths associated with green amphibole. Brown amphibole may be primary.
Secondary Plagioclase	1	Plagioclase	Subhedral	On margins of plagioclase.

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
No veins.			

STRUCTURE

Crystal Plastic:
Abundant deformation twins, some bent grains, undulatory extinction, and minor subgrain formation in plagioclase. No deformation of orthopyroxene and clinopyroxene. Incipient crystal-plastic deformation.

Brittle:
Occasional en echelon fractures and microcracks in plagioclase partially filled with green amphibole.

Foliation:
Moderately well developed igneous foliation defined by a preferred orientation of plagioclase laths.

Crosscutting Relationships (as are apparent in thin section): 1) incipient crystal-plastic deformation
2) fracturing and partial vein filling

THIN SECTION:	**209-1275B-13R-2, Piece 8, 51-53 cm**	**TS#250**	**Observer: WM, HD**
ROCK NAME:	**OXIDE GABBRO**		
GRAIN SIZE:	**Fine-grained**		
TEXTURE:	**Granular**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	48	50	0.2-2.5	Subhedral	
Clinopyroxene	35	41	0.2-1	Subhedral	
Amphibole	1	1	0.2-0.8	Subhedral	
Oxide	8	8	0.1-1.5	Interstitial	

GENERAL COMMENTS Moderately foliated gabbro

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Green Amphibole	7	Pyroxene	Aggregates of fibrous needles	Also replacing brown amphibole?
Brown Amphibole	1	?	Subhedral	In interstitial spaces between plagioclase. Relatively coarse individual grains. Magmatic origin?
Secondary Plagioclase				

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
Fibrous green amphibole veinlet.			

STRUCTURE

Crystal Plastic:
Abundant deformation twins and some slight bends and undulatory extinction with very minor subgrain formation in plagioclase indicates incipient high-temperature crystal-plastic deformation.

Brittle:
Minor fracturing and formation of microcracks in plagioclase with partial filling by green amphibole.

Foliation:
Weak igneous foliation defined by the orientation of plagioclase laths.

Crosscutting Relationships (as are apparent in thin section):
1) Incipient crystal-plastic deformation
2) Fracturing and partially infilling by green amphibole

THIN SECTION:	**209-1275B-14R-1, Piece 10, 50-53 cm**	**TS#251**	**Observer: HP, WM, HD**
ROCK NAME:	**OXIDE GABBRO**		
GRAIN SIZE:	**Medium-grained**		
TEXTURE:	**Granular**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	48	50	0.2-4	Subhedral	
Clinopyroxene	30	42	0.2-1.5.	Subhedral	
Amphibole	1	1	0.2-0.5	Subhedral	
Oxide	7	7	0.1-2	Interstitial	

GENERAL COMMENTS Moderately well developed foliation.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Green Amphibole	10	Pyroxene, plagioclase.	Aggregates of fibrous needles.	Replacing margins of pyroxene, and replacing entire pyroxene crystals. Locally replacing plagioclase along cracks.
Brown Amphibole	1	Pyroxene	Subhedral, interstitial.	May be a primary phase.
Secondary Plagioclase				

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
Green and brown amphibole.	One occurrence	Kinked, irregular.	Well developed in plagioclase, diffuse in amphibole domains (fussy margins, grading into surrounding amphibole).

STRUCTURE

Crystal Plastic:
Abundant plagioclase deformation twins, some bent grains, undulatory extinction of some grains and well developed coarse plagioclase neoblasts in a few places indicate a very weak high-temperature crystal-plastic deformation. No deformation of pyroxene.

Brittle:
Occasional amphibole filled fractures with no visible offset and minor microcracks with some green amphibole in plagioclase indicate minor brittle deformation.

Foliation:

Crosscutting Relationships (as are apparent in thin section):
1) Very weak crystal-plastic deformation
2) Minor brittle fracturing

THIN SECTION:	**209-1275B-14R-1, Piece 13, 81-83 cm**	**TS#252**	**Observer: CG, HP, WM, AC, HD**
ROCK NAME:	**DIABASE**		
GRAIN SIZE:	**Fine-grained**		
TEXTURE:	**Diabasic**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	3	5	0.5-1.5		
Matrix	37	95	0.05-0.1		Plagioclase microlites, clinopyroxene, olivine(?).

GENERAL COMMENTS Sieve textured plagioclase phenocrysts.
Resorbed phenocrysts of plagioclase (An = 70).

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Green Amphibole	50	Pyroxene, plagioclase	Fibrous	
Chlorite	10	Pyroxene.		

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
Green and brown amphibole.		Fibrous, partially aligned needles.	

STRUCTURE

Crystal Plastic:
None

Brittle:
None

Foliation:
None

Crosscutting Relationships (as are apparent in thin section):

THIN SECTION:	**209-1275B-15R-2, Piece 11, 60-63 cm**	**TS#253**	**Observer: WM, HD**
ROCK NAME:	**OXIDE GABBRO**		
GRAIN SIZE:	**Very fine- to fine-grained**		
TEXTURE:	**Granular**		

MODE (Visual estimate)

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	MORPHOLOGY	COMMENTS
Plagioclase	40	45/55	0.2-0.5/0.5-3	Subhedral	
Clinopyroxene	20	47/37	0.1-0.3/0.5-1	Subhedral	
Amphibole	1	1	0.1-0.5	Subhedral	
Oxide	7	7	0.2-0.3/0.5-2.5	Interstitial	

GENERAL COMMENTS F = fine VF = very fine
Moderately developed foliation.

SECONDARY MINERALS	PERCENT PRESENT	REPLACING	MORPHOLOGY	COMMENTS
Green Amphibole	30	Pyroxene, plagioclase	Acicular to blocky, euhedral	
Brown Amphibole	2	Pyroxene	Euhedral	
Secondary Plagioclase	1	Plagioclase		Along cracks.
Hematite	Trace	Magnetite		Rare on rims of magnetite and ilmenite.

VEIN / FRACTURE FILLING	PERCENT PRESENT	MORPHOLOGY	COMMENTS

A 0.5 mm-wide green amphibole-chlorite vein
Multiple microcracks filled with brown amphibole

GENERAL COMMENTS There are in rounded inclusions of pyrrhotite with pentlandite flames in magnetite and plagioclase.

STRUCTURE

Crystal Plastic:
Abundant deformation twins, bent grains, undulatory extinction and minor high temperature neoblast formation indicate a weak crystal plastic deformation. Pyroxenes undeformed.

Brittle:
Numerous plagioclase microcracks partially filled by green amphibole.

Foliation:
Moderately well developed igneous foliation defined by oriented plagioclase laths.

Crosscutting Relationships (as are apparent in thin section):
1) Weak crystal-plastic deformation
2) Fracturing and partial filling of microcracks

THIN SECTION:	**209-1275B-16R-1, Piece 2, 9-12 cm**	**TS#254**	**Observer: WB, HD**
ROCK NAME:	**OXIDE GABBRO**		
GRAIN SIZE:	**Fine-grained**		
TEXTURE:	**Granular**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	45	50	0.2-2.5	Subhedral	
Clinopyroxene	8	41	0.2-1	Subhedral	
Amphibole	1	1	0.2-0.8	Subhedral	
Oxide	8	8	0.1-1.5	Interstitial	

GENERAL COMMENTS Very weakly foliated; domains with high percentage of clinopyroxene, subsequent plagioclase, diabase with aligned microlites.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Green Amphibole	35	Pyroxene, plagioclase	Acicular to prismatic	Along crack and cleavage planes in plagioclase.
Brown Amphibole	1	Pyroxene	Euhedral	Rare, magmatic?
Secondary Plagioclase	1	Plagioclase		
Talc	2	Pyroxene	Fibrous	In contact to microlitic dike.
Chlorite	2	Pyroxene	Fibrous	In contact to microlitic dike.
Titanite	Trace	Oxide	Anhedral	With amphibole needles.
Hematite	Trace	Oxide	Anhedral	

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
Amphibole-filled microcracks			

STRUCTURE

Crystal Plastic:
Numerous bent plagioclase grains, undulatory extinction and deformation twins indicate a weak crystal-plastic deformation.

Brittle:
Intrusion of very fine grained plagioclase phyric diabase (almost glassy) along a sharp contact with a possible slight chill zone.
Diabase contains xenoliths of spinel-troctolite and gabbro. Numerous fractures and microcracks in plagioclase partially filled by green amphibole.

Foliation:
Weak igneous foliation due to preferred orientation of plagioclase laths.

Crosscutting Relationships (as are apparent in thin section):
1) Weak crystal-plastic deformation
2) Intrusion of diabase dikelet
3) Fracturing and partial filling of microcracks and veins

THIN SECTION:	**209-1275B-16R-1, Piece 5, 40-43 cm**	**TS#255**	**Observer: CG, HD**
ROCK NAME:	**OXIDE GABBRO**		
GRAIN SIZE:	**Very fine- to fine-grained**		
TEXTURE:	**Foliated**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
		F/VF	F/VF		
Plagioclase	40	45/55	0.2-0.5/0.5-3	Subhedral	
Clinopyroxene	35	47/37	0.1-0.3/0.5-1	Subhedral	
Amphibole	1	1	0.1-0.5	Subhedral	
Oxide	7	7	0.2-0.3/0.5-2.5	Interstitial	
Ilmenite & Magnetite					
Sulfides (Pyrrhotite-Pentlandite)					

GENERAL COMMENTS
F = fine VF = very fine
Very fine to fine grained bands.
Moderately well developed foliation.
Bent twinning in plagioclase indicates high temperature deformation.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Green Amphibole	18	Clinopyroxene, amphibole	Subhedral	Replacing orthopyroxene commonly associated with brown olivine.
Brown Amphibole	7	Clinopyroxene, amphibole	Subhedral to anhedral.	Patches and intergrowth with green amphibole. Commonly in the core of grains and close to oxides.
Biotite	Trace	Clinopyroxene, amphibole	Anhedral	Patches in the rims of amphiboles.

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
Amphibole vein		Irregular	Subhedral green amphibole and fine intregrowths of green and brown amphibole.

STRUCTURE

Crystal Plastic:
Very weak crystal-plastic deformation indicated by bent plagioclase grains and deformation lamellae.

Brittle:
Amphibole filled cracks with no visible offset. Green amphibole filled microcracks in plagioclase.

Foliation:
Good igneous foliation defined by plagioclase laths.

Crosscutting Relationships (as are apparent in thin section):
1) Very weak crystal-plastic deformation
2) Fracturing and infilling of veins and microcracks

THIN SECTION:	**209-1275B-17R-1, Piece 11, 60-62 cm**	**TS#256**	**Observer: JH, WB, HD**
ROCK NAME:	**MICROGABBRO**		
GRAIN SIZE:	**Fine-grained**		
TEXTURE:	**Granular**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	40	50	0.5-1.5	Subhedral-anhedral	
Clinopyroxene	15	45	0.1-0.2	Subsequent	
Olivine	?	2?	0.1-0.2	Subsequent	
Oxide	3	3	0.2		

GENERAL COMMENTS
Plagioclase phenocrysts look like interstitial or resorbed
Optically zoned plagioclase

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Green Amphibole	25	Clinopyroxene	Pseudomorphic replacement with fine grained aggregates	
Chlorite	1	Clinopyroxene, plagioclase	Interstitial patches of fibrous crystals, along cracks in plagioclase	
Talc	2	Clinopyroxene, olivine?	Fibrous	
Clay/oxide	6			Stains as much as 30% of the section orange-brown.
Magnetite	Trace		Subhedral	Along with talc.

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
Amphibole		Acicular	Forming network of veinlets and microcracks.
Clay/oxide		Fibrous to amorphous	Using (and partly overprinting) amphibole veins.

STRUCTURE
Crystal Plastic:
No significant ductile deformation.

Brittle:
Fractures with no discernable offset, plagioclase microcracks, both containing green amphibole.

Foliation:
None

Crosscutting Relationships (as are apparent in thin section):

THIN SECTION:	**209-1275B-17R-1, Piece 18, 120-122 cm**	**TS#257**	**Observer: WB, HD**
ROCK NAME:	**OXIDE GABBRO**		
GRAIN SIZE:	**Fine-grained**		
TEXTURE:	**Granular/foliated**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
			F/VF		
Plagioclase	40	45/55	0.5-3	Subhedral	
Clinopyroxene	30	47/37	0.5-1	Subhedral	
Amphibole	1	1	0.1-0.5	Subhedral	
Oxide	7	7	0.5-2.5	Interstitial	

GENERAL COMMENTS Weakly foliated; nice interstitial oxide textures but a bit altered.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Green Amphibole	10	Clinopyroxene, plagioclase	Acicular to prismatic	
Brown Amphibole	10	Clinopyroxene	Subhedral to euhedral	
Secondary plagioclase	2	Plagioclase		
Brown clay	2	Clinopyroxene, plagioclase		Along cracks.

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
Amphibole	0.5	Acicular to prismatic	Veinlets and microcracks.
Brown clay	0.2	Fibrous	

STRUCTURE

Crystal Plastic:
Rare bent plagioclase grains and deformation twins indicate an incipient crystal plastic deformation.

Brittle:
Numerous plagioclase microcracks and a few throughgoing fractures are partially filled by amphibole.

Foliation:
Weak igneous foliation defined by oriented plagioclase laths.

Crosscutting Relationships (as are apparent in thin section):
1) incipient crystal-plastic deformation
2) fracturing and vein and microcrack infilling

THIN SECTION:	**209-1275B-18R-2, Piece 1A, 9-12 cm**	**TS#258**	**Observer: HP, WM, ET, HD**
ROCK NAME:	**OXIDE GABBRONORITE**		
GRAIN SIZE:	**Fine-grained**		
TEXTURE:	**Granular**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	45	50	0.4-8	Subhedral to anhedral	
Clinopyroxene	15	27	0.2-4	Anhedral	
Orthopyroxene	6	8	0.5-3	Anhedral, ophitic	Blebs of clinopyroxene exsolution.
Amphibole	2	3	<0.5	Anhedral	Replacing clinopyroxene.
Oxide	10	12	<6	Interstitial	

GENERAL COMMENTS
No pronounced fabric.
Variable grain size but no sharp domains.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Green Amphibole	10	Pyroxene, plagioclase.	Fibrous needles and coarse subhedral single crystals.	Varies from light green-yellow (fibrous aggregates) to green to blue-green (coarse subhedral).
Brown Amphibole	1	Pyroxene?		Magmatic phase?

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**

STRUCTURE

Crystal Plastic:
Bent plagioclase grains, deformation twins, and undulatory extinction indicate a very weak crystal-plastic deformation.

Brittle:
Numerous microcracks in plagioclase and en echelon fractures with no discernable offset are partially filled by green amphibole.

Foliation:
No pronounced foliation or fabric.

Crosscutting Relationships (as are apparent in thin section):
1) Very weak crystal-plastic deformation
2) Fracturing and filling of microcracks and veins

THIN SECTION;	**209-1275B-18R-3 Piece 11B, 99-101 cm**	**TS#259**	**Observer: JH, AC, WM, HD**
ROCK NAME:	**MICROGABBRO**		
GRAIN SIZE:	**Very fine-grained**		
TEXTURE:	**Foliated**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	45	50	0.2-2.5	Subhedral	
Clinopyroxene	25	40	0.2-1	Subhedral	
Orthopyroxene	5	8	0.2-1	Subhedral	
Amphibole	2	2	0.2-0.8	Subhedral	
Oxide	1	1	0.1-1.5	Interstitial	

GENERAL COMMENTS
The microgabbro is cut by a 1-cm-thick band of medium grained gabbro.
Moderately well developed foliation, also in the medium grained gabbro dike.
The dike has 46% plagioclase, 46% clinopyroxene, 4% orthopyroxene, 4% oxides.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
DIABASE/ MICROGABBRO				
Talc	2	Orthopyroxene?		Associated with vermicular opaque oxides.
Green amphibole	18	Clinopyroxene		
Chlorite	trace	Orthopyroxene	Fibrous	Occasional fibers in plagioclase interstices, usually seen in association with talc alteration.
Hematite		Clinopyroxene		
GABBROIC VEIN				
Secondary plagioclase	1			
Green amphibole	12			

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
Amphibole		Acicular, fibrous, replacing former clinopyroxene	
Hematite		Iron staining within discrete vein	

STRUCTURE

Crystal Plastic:
Incipient crystal-plastic deformation indicated by deformation twins, bending and undulatory extinction in plagioclase grains.

Brittle:
Contact between gabbro and diabase is sutured without broken grains suggesting that this is not a dike contact, but rather an igneous lamination. Microfractures in plagioclase filled with green amphibole.

Foliation:
Weak alignment of plagioclase laths gives a poor igneous foliation.

Crosscutting Relationships (as are apparent in thin section):
1) Stretching of gabbroic inclusion in diabase during magmatic flow
2) Very weak crystal-plastic deformation
3) Fracturing and partial infilling of plagioclase microcracks

THIN SECTION:	**209-1275B-19R-1, Piece 5A, 49-51 cm**	**TS#260**	**Observer: JH, WM. AC, HD**
ROCK NAME:	**GABBRONORITE**		
GRAIN SIZE:	**Very fine-grained**		
TEXTURE:	**Porphyritic**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	43	45	0.7	Subhedral to euhedral	
Olivine	1?	2?	0.1	Subhedral	
Orthopyroxene	2	7	0.3	Anhedral	
Clinopyroxene	27	45	0.1	Anhedral	
Amphibole	Trace	Trace	0.15	Anhedral	
Oxides	1	1	0.15	Anhedral	

COMMENTS Large plagioclase crystals up to 2 mm make up 15% of the sample.
The large plagioclase crystals are strongly zoned optically.
Some of these crystals have cores of olivine and clinopyroxene.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Talc	5	Orthopyroxene	Microgranular	Intergrown with opaque oxides.
Opaque oxides	2	Orthopyroxene	Vermicular	
Green amphibole	12	Clinopyroxene	Pseudomorphic	

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
No veins			

STRUCTURE

Crystal Plastic:
Bent plagioclase crystals and numerous deformation lamellae indicate a very weak crystal-plastic deformation.

Brittle:
Numerous small microcracks in plagioclase partially filled by green amphibole.

Foliation:
None

Crosscutting Relationships (as are apparent in thin section):

THIN SECTION:	**209-1275B-19R-1, Piece 6B, 135-137 cm**	**TS#261**	**Observer: JH, WM, ET, HD**
ROCK NAME:	**OXIDE GABBRONORITE**		
GRAIN SIZE:	**Very fine/Fine/Medium**		
TEXTURE:	**Granular**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	40	55	0.4-8	Subhedral to anhedral	
Clinopyroxene	10	25	0.2-4	Anhedral	
Orthopyroxene	1	5	0.5-3	Anhedral	
Amphibole	3	5	<2	Anhedral	Primary or replacing clinopyroxene.
Oxide	10	10	<8	Euhedral to anhedral	

GENERAL COMMENTS
No pronounced fabric.
Grain size layering from fine - very fine - medium grained.
A 1-mm-wide granophyre dike cuts the middle replacing plagioclase and clinopyroxene with plagioclase (more albitic) and amphibole.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Brown amphibole	2	Clinopyroxene	Subhedral	
Green amphibole	4	Clinopyroxene	Anhedral, pseudomorphic	
Talc	Trace	Orthopyroxene	Microgranular	

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	MORPHOLOGY	COMMENTS
Secondary plagioclase		Neoblasts	In granophyre vein.
Chlorite		Fibrous	Trace in vein.
Amphibole		Fibrous, radiating acicular crystals	
Hematite		Amorphous	Stains alteration.

STRUCTURE

Crystal Plastic:
Weak bends in plagioclase and numerous deformation twins indicate an incipient crystal-plastic deformation.

Brittle:
Numerous microcracks in plagioclase some containing green amphibole. Through-going fracture without visible offset contains cataclasized minerals and undeformed plagioclase laths.

Foliation:
Weak plagioclase fabric in finer grained portion parallel to the boundary of a coarser gabbro band.

Crosscutting Relationships (as are apparent in thin section):
1) Incipient crystal-plastic deformation
2) Fracturing and infilling of microfractures in plagioclase

THIN SECTION:	**209-1275B-19R-3, Piece 2, 125-128 cm**	**TS#262**	**Observer: JH, ET, HD**
ROCK NAME:	**OXIDE GABBRO**		
GRAIN SIZE:	**Fine/Medium**		
TEXTURE:	**Granular**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	45	50	0.4-8	Subhedral to anhedral	
Clinopyroxene	20	30	0.2-3	Anhedral	
Amphibole	4	5	<2	Anhedral	Primary or replacing clinopyroxene.
Oxide	15	15	<4	Euhedral to anhedral	

GENERAL COMMENTS
Moderately well developed foliation.
Bent twinning in plagioclase indicates high temperature deformation.
The microgabbro is cut by a 0.5-cm-thick band of medium grained gabbro.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Green amphibole	12	Clinopyroxene	Pseudomorphic	

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
No veins			

STRUCTURE

Crystal Plastic:
Deformation lamellae, kinks, and weak bends in plagioclase indicate an incipient crystal-plastic deformation.

Brittle:
Numerous microcracks in plagioclase with green amphibole. En echelon fractures with no visible offset have green and sometimes brown amphibole along them.

Foliation:
Moderate igneous foliation due to alignment of plagioclase laths.

Crosscutting Relationships (as are apparent in thin section):
1) Incipient crystal-plastic deformation
2) Fracturing and infilling of veins and microcracks

THIN SECTION:	**209-1275B-19R-4 Piece 2, 31-35 cm**	**TS#263**	**Observer: HP, WM, HD**
ROCK NAME:	**OXIDE GABBRO**		
GRAIN SIZE:	**Medium-grained**		
TEXTURE:	**Granular**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	52	55	3.5	Euhedral	Aspect ratio approximately 1:2.
Orthopyroxene	3	4	3.5	Ophitic	
Clinopyroxene	25	35	2.0	Subhedral	
Amphibole	Trace	Trace	1	Anhedral	
Oxides	6	6	2.5	Interstitial	

GENERAL COMMENTS No preferred mineral alignment.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Green Amphibole	12	Pyroxene, plagioclase	Fibrous aggregates.	Associated with brown amphibole.
Brown Amphibole	1	Pyroxene, plagioclase	Fibrous or irregular patchy.	Clearly replacing pyroxene crystals. Locally growing into plagioclase from the margins.
Secondary plagioclase	Trace			

GENERAL COMMENTS Alteration intensity varies on thin section scale from 2 to 40%.

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
No veins.			

STRUCTURE

Crystal Plastic:
Bent plagioclase grains with numerous deformation twins indicate a very weak crystal-plastic deformation.

Brittle:
Numerous plagioclase microcracks with green amphibole along them.

Foliation:
None

Crosscutting Relationships (as are apparent in thin section):
1) Incipient crystal-plastic deformation
2) Fracturing and infilling by green amphibole

THIN SECTION:	**209-1275B-20R-2 Piece 1, 4-6 cm**	**TS#264**	**Observer: JH, HD**
ROCK NAME:	**OXIDE GABBRONORITE**		
GRAIN SIZE:	**Medium-grained**		
TEXTURE:	**Weakly foliated**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	57	60	4.5	Euhedral	
Orthopyroxene	8	12	6.0	Ophitic	
Clinopyroxene	15	20	6.0	Subhedral	
Amphibole	Trace	Trace	1	Anhedral	
Oxides	8	8	1.5	Interstitial	

GENERAL COMMENTS
Clinopyroxene is very elongated (aspect ratio 1:10).
Clinopyroxene has exolved orthopyroxene cores that have in turn exolved clinopyroxene.
Local clusters of plagioclase neoblasts occur a the terminal end of misoriented plagioclase.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Brown amphibole	2	Clinopyroxene	Anhedral - subhedral	
Green amphibole	10	Clinopyroxene	Anhedral to pseudomorphic	
Secondary plagioclase	1	Plagioclase	Neoblastic	

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
Green amphibole		Pseudomorphic	Very fine felsic veins where phases crystallized dependant upon host mineralogy.
Secondary plagioclase		Pseudomorphic	Secondary plagioclase crystallizes adjacent to plagioclase, brown amphibole adjacent to clinopyroxene.
Quartz?		Amorphous	Small patches in vein centers that may be quartz.

STRUCTURE

Crystal Plastic:
Bent plagioclase grains with numerous deformation lamellae indicate an incipient crystal-plastic deformation.

Brittle:
Throughgoing microfault with a very small (0.2 mm) offset along it is filled with quartz and amphibole with albitization of the plagioclase along the crack. Microfractures in plagioclase have green amphibole along them.

Foliation:
Alignment of plagioclase and pyroxene laths gives a fairly good igneous foliation.

Crosscutting Relationships (as are apparent in thin section):
1) Incipient crystal-plastic deformation
2) Fracturing, minor shear, and infilling of veins and cracks

THIN SECTION:	**209-1275B-20R-2 Piece 1c, 33-35 cm**	**TS#265**	**Observer: HP, WM, AC, HD**
ROCK NAME:	**OXIDE MICROGABBRONORITE**		
GRAIN SIZE:	**Fine- to medium-grained**		
TEXTURE:	**Foliated**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	43	45	0.1-6	Subhedral to anhedral	Less strained in very fine grained gabbro.
Clinopyroxene	30	35	0.1-3	Subhedral	
Orthopyroxene	5	8	0.1-3	Subhedral	
Amphibole	2	2	0.2-0.8	Subhedral	
Oxide	10	10	0.1-2	Interstitial	Fill embayments in both plagioclase and clinopyroxene.

GENERAL COMMENTS Weakly developed foliation. Well developed foliation in the very fine grained gabbro, parallel to contact.
Most of the thin section is medium grained. Bands of very fine grained microgabbro (4 mm) alternate within the microgabbro.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Green amphibole	10	Pyroxene, plagioclase		Commonly surrounding oxides. Minor replacement of plagioclase along margins and cracks.
Brown amphibole	1	Pyroxene		
Chlorite	Trace	Pyroxene		Associated with green amphibole.

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
Green and brown amphibole.			Very fine, en echelon arrays of irregular veinlets. Well developed in plagioclase, locally interrupted in pyroxene.

STRUCTURE

Crystal Plastic:
Small amounts of high temperature neoblasts, bent plagioclase grains with undulatory extinction and numerous deformation twins. indicate a weak crystal-plastic deformation. Gabbro banded with schlieren of coarse gabbronorite in finer-grained gabbro.

Brittle:
Numerous microcracks in plagioclase.

Foliation:
Strong igneous foliation defined by oriented plagioclase laths parallel to and around gabbro schlieren.

Crosscutting Relationships (as are apparent in thin section):
1) Stretching of gabbro schlieren in microgabbro during magmatic deformation
2) Indicate a weak crystal-plastic deformation
3) Microcrack formation and infilling with green amphibole

THIN SECTION:	**209-1275B-20R-2 Piece 7, 106-108cm**	**TS#266**	**Observer: JH, WM, AC,HD**
ROCK NAME:	**OXIDE GABBRONORITE**		
GRAIN SIZE:	**Very fine**		
TEXTURE:	**Porphyritic**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	45	50	0.1-0.3	Subhedral to euhedral	
Orthopyroxene	5	6	0.1-0.2	Anhedral	
Clinopyroxene	25	32	0.1-0.2	Anhedral	
Amphibole	4	4	0.1-0.2	Anhedral	
Oxides	8	8	0.10	Anhedral	

GENERAL COMMENTS

Well foliated very fine grained gabbro (95% of the section) in contact with a possibly foliated microgabbro.
Foliation is parallel to the contact.
Microgabbro has plagioclase up to 4 mm.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Green amphibole	10	Clinopyroxene	Anhedral, pseudomorphic.	

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
Amphibole		Fibrous, acicular	Two generations of amphibole veins - First one overprinted by hematite staining, Second generation of amphibole vein crosscuts firsts and does not have hematite overprint.
Hematite		Amorphous, stains vein material	

STRUCTURE

Crystal Plastic:
Bent plagioclase, undulatory extinction and numerous plagioclase deformation twins indicate an incipient crystal-plastic deformation.

Brittle:
Broken appearing plagioclase crystals now infilled with clinopyroxene (altered) at breaks. Lower temperature microcracks with green amphibole along them. Throughgoing amphibole vein with no visible offset.

Foliation:
Well foliated microgabbro due to parallel alignment of plagioclase laths

Crosscutting Relationships (as are apparent in thin section):

1) Incipient crystal-plastic deformation
2) Fracturing and infilling of cracks and veins

THIN SECTION:	**209-1275B-20R-2 Piece 8, 116-119 cm**	**TS#267**	**Observer: ET, WM, HD**
ROCK NAME:	**OXIDE GABBRONORITE**		
GRAIN SIZE:	**Medium/Very fine**		
TEXTURE:	**Granular**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	45	50	0.1-10	Subhedral to anhedral	Aspect ratio <1:2 in medium grained domain.
Clinopyroxene	12	20	0.1-5	Subhedral to anhedral	Blebs of orthopyroxene exsolution.
Orthopyroxene	5	10	0.1-4	Anhedral	
Oxide	15	15	<4	Interstitial, ophitic	
Amphibole	3	5	<2	Anhedral	Primary or replacing clinopyroxene.
Biotite	Trace	Trace	0.1	Subhedral	Attached to oxide in medium grained domain.

GENERAL COMMENTS

Medium-grained domain next to very fine-grained domain with a sharp contact.
Well developed foliation in fine-grained domain parallel to contact.
No obvious fabric in medium-grained domain.
Orthopyroxene in medium-grained domain is either embayed by or graphically intergrown with the oxide.
Amphiboles are commonly associated with oxide grains.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Talc	Trace	Orthopyroxene		
Green amphibole	16	Clinopyroxene, orthopyroxene	Fibrous, pseudomorphic	
Hematite	Trace		Amorphous	Stains some amphibole alteration of pyroxene

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
No veins.			

STRUCTURE

Crystal Plastic:
Faint bending of plagioclase and numerous deformation twins indicate and incipient crystal-plastic foliation.

Brittle:
Numerous plagioclase microcracks and en echelon fractures with no visible offset with green amphibole found along both.

Foliation:
Very strong igneous foliation in fine grained portion of a banded gabbro, with a weaker to non-existent foliation in the coarse-grained sections.

Crosscutting Relationships (as are apparent in thin section):

1) Formation of banding and foliation by magmatic deformation
2) Incipient crystal-plastic deformation
3) Fracturing and local infilling by green amphibole.

THIN SECTION:	**209-1275B-20R-3 Piece 1e, 76-78 cm**	**TS#268**	**Observer: ET, WM, HD**
ROCK NAME:	**OXIDE GABBRONORITE**		
GRAIN SIZE:	**Medium/Very fine**		
TEXTURE:	**Granular**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	45	50	0.1-5	Subhedral to anhedral	
Clinopyroxene	10	20	0.1-5	Subhedral to anhedral	Blebs of orthopyroxene exsolusion.
Orthopyroxene	8	10	0.1-4	Anhedral	
Oxide	15	15	<4	Interstitial, ophitic	Fills embayments in pyroxenes and plagioclase.
Amphibole	3	5	<2	Anhedral	Primary or replacing clinopyroxene.
Biotite	Trace	Trace	0.1	Subhedral	Attached to oxide.

GENERAL COMMENTS

Medium grained domain is surrounded by very fine grained domain with sharp contact.
Well developed foliation in fine-grained domain parallel to contact.
Foliation in medium grained domain is less developed but clearly at an angle to the contact.
Amphiboles are often associated with oxide grains.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Green amphibole	16	Clinopyroxene	Fibrous, pseudomorphic	
Ilmenite	Trace		Subhedral	

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
No veins			

STRUCTURE

Crystal Plastic:
Numerous deformation twins in plagioclase and slight bending of grains indicates an incipient crystal-plastic deformation.

Brittle:
Numerous plagioclase microcracks and a throughgoing fracture have green amphibole crystallized along them.

Foliation:
Well developed foliation in fine grained portion is parallel to contact with coarse gabbro xenolith on one side, and at a sharp angle to it on the other. Coarser gabbro has no evident foliation.

Crosscutting Relationships (as are apparent in thin section):

1) Incipient crystal-plastic deformation
2) Microfractures in plagioclase and fracturing accompanied by infilling with green amphibole.

THIN SECTION:	**209-1275B-21R-1 Piece 10, 26-28 cm**	**TS#269**	**Observer: JH, WM, HD**
ROCK NAME:	**OXIDE MICROGABBRO**		
GRAIN SIZE:	**Fine-grained**		
TEXTURE:	**Foliated**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	48	50	1.5	Subhedral	
Clinopyroxene	17	35	0.2	Anhedral	
Orthopyroxene	1	3	0.2	Anhedral	
Amphibole	2	2	0.2	Subhedral	
Oxides	10	10	1.0	Interstitial	

COMMENTS This thin section contain a boundary between a fine grained and a microgabbro.
Foliation in the microgabbro immediately adjacent to the contact is parallel to the contact but further away is at an angle to it.
Fine-grained gabbro foliation is purely defined and maybe parallel to the contact.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Ilmenite	<1		Subhedral	Pinkish pleochroism, associated with other opaque oxides.
Green amphibole	20	Clinopyroxene	Fibrous, pseudomorphic	

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
Amphibole		Fibrous to anhedral	Amphibole rich vein seems to have either crystallized secondary plagioclase or entrained surrounding primary plagioclase.
Secondary plagioclase?			

STRUCTURE

Crystal Plastic:
Slight bending of plagioclase and deformation twins indicate an incipient crystal-plastic deformation.

Brittle:
Numerous microfractures in plagioclase with green amphibole. Through-going fractures filled with amphibole. 0.4 mm amphibole vein with mineral fragments and slight displacement along it indicating brittle deformation.

Foliation:

Crosscutting Relationships (as are apparent in thin section):
1) Incipient crystal-plastic deformation
2) Numerous plagioclase microfractures, irregular fractures, partially filled with green amphibole
3) Movement on fracture and very local cataclasis of gabbro fragments from walls.

THIN SECTION:	**209-1275B-21R-1 Piece 4c, 90-92 cm**	**TS#270**	**Observer: WM, AC, HD**
ROCK NAME:	**OXIDE GABBRONORITE**		
GRAIN SIZE:	**Medium-grained**		
TEXTURE:	**Foliated**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	43	44	2-8	Subhedral	
Clinopyroxene	28	32	2-4	Anhedral	
Orthopyroxene	4	7	2-4	Anhedral	
Amphibole	5	5	1-3	Subhedral	
Oxides	12	12	1-3	Interstitial	Embaying silicates.

GENERAL COMMENTS

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Secondary plagioclase	<1	Plagioclase	Neoblasts	
Green amphibole	7	Clinopyroxene	Anhedral, pseudomorphic	
Brown amphibole	4	Clinopyroxene	Subhedral	

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
Green amphibole		Fibrous to subhedral	
Opaque oxides		Anhedral, amorphous	Stains some of the amphibole orange brown.

STRUCTURE

Crystal Plastic:
Minor formation of high-temperature neoblasts. Abundant plagioclase deformation twins, some bending of grains. Very weak crystal plastic deformation.

Brittle:
Numerous microfractures in plagioclase with local crystallization of green amphibole. En echelon amphibole filled veins with no discernable offset.

Foliation:
Weak foliation defined by some aligned coarse plagioclase laths.

Crosscutting Relationships (as are apparent in thin section):
1) Very weak incipient crystal-plastic deformation
2) Fracturing and infilling of microcracks and veins

THIN SECTION: 209-1275B-21R-2 Piece 1, 3-5 cm TS#271 Observer: HP, WM, AC, HD
ROCK NAME: OXIDE GABBRONORITE
GRAIN SIZE: Medium-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE (Visual estimate) PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	MORPHOLOGY	COMMENTS
Plagioclase	39	40	1-5	Subsequent	Aspect ratio less than 1:1.5; An = 51.
Clinopyroxene	30	33	1-3	Subhedral-euhedral	Also as wormy oikocrysts associated with oxides.
Orthopyroxene	8	12	1-3	Subhedral-intergrowth	Intergrowth with oxides.
Amphibole	2	3	0.5-1	Anhedral	
Oxides	12	12	0.5-1.5	Interstitial	

GENERAL COMMENTS

SECONDARY MINERALS	PERCENT PRESENT	REPLACING	MORPHOLOGY	COMMENTS
Green amphibole	6	Pyroxene	Fibrous to needles.	Replacing pyroxene along the margins.
Brown amphibole	1	Pyroxene	Subhedral	Locally as patches within pyroxenes. Some relatively coarse crystals are associated with oxide, and pyroxene and may be primary.

VEIN / FRACTURE FILLING	PERCENT PRESENT	MORPHOLOGY	COMMENTS
No veins.			

STRUCTURE

Crystal Plastic:
Slightly bent plagioclase, numerous plagioclase deformation twins, undulatory extinction indicate incipient crystal-plastic deformation.

Brittle:
Numerous microcracks in plagioclase and through-going en echelon cracks partly filled by green amphibole.

Foliation:
None

Crosscutting Relationships (as are apparent in thin section):
1) Incipient crystal-plastic deformation
2) Fracturing and infilling of cracks

THIN SECTION:	**209-1275B-21R-2 Piece 7b, 137-140 cm**	**TS#272**	**Observer: HP, ET, WM, HD**
ROCK NAME:	**OXIDE GABBRONORITE**		
GRAIN SIZE:	**Medium-grained**		
TEXTURE:	**Granular**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	40	50	1-10	Subhedral to anhedral	
Clinopyroxene	15	25	1-5	Subhedral to anhedral	Blebs of exsolved orthopyroxene.
Orthopyroxene	3	8	1-4	Anhedral	
Oxide	12	12	<5	Interstitial, ophitic	
Amphibole	3	5	<2	Anhedral	Primary or replacing clinopyroxene.
Biotite	Trace	Trace	0.2	Subhedral	Attached to oxides with amphibole.

GENERAL COMMENTS

Plagioclase defines a weak foliation.
No obvious fabric in medium grained domain.
Silicates appear to be embayed by oxides.
Some orthopyroxenes and clinopyroxenes form intergrowth.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Green amphibole	10	Pyroxene	Fibrous aggregates	Variable in color: light green to yellow and dark green to bluish.
Brown amphibole	1	Pyroxene	Radiating needles or subhedral coarse grains.	Variable in color: light brown and dark green to bluish. Coarse subhedral crystals are probably of igneous origin.

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
Fibrous light brown to green amphibole			Winding single vein.

STRUCTURE

Crystal Plastic:
Slightly bent plagioclase and numerous deformation twins indicate incipient crystal-plastic deformation.

Brittle:
Numerous microfractures in plagioclase with green amphibole along them. Through-going irregular cracks with no visible offset with green amphibole infilling.

Foliation:
None.

Crosscutting Relationships (as are apparent in thin section):

1) Incipient crystal-plastic deformation
2) Fracture and infilling of cracks and veins

THIN SECTION:	**209-1275B-21R-3, Piece 4, 28-30 cm**	**TS#273**	**Observer: HP, ET, WM, HD**
ROCK NAME:	**OXIDE GABBRONORITE**		
GRAIN SIZE:	**Medium-grained**		
TEXTURE:	**Porphyritic**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	45	50	0.4-5	Subsequent	Define weak foliation.
Clinopyroxene	10	20	0.2-3	Subhedral to anhedral	Blebs of orthopyroxene exsolution.
Orthopyroxene	8	10	0.2-3	Anhedral	
Amphibole	3	5	<2	Anhedral	Primary or replacing clinopyroxene.
Oxide	15	15	<4	Euhedral to Interstitial	
Rutile	Trace	Trace	0.1-0.3	Anhedral	

GENERAL COMMENTS Weak developed foliation. Plagioclase much larger than pyroxene and oxides.
The biggest plagioclase grains are: 1) embayed-even optically discontinuous, 3) optically zoned, 3) lack polysynthetic twinning.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Green amphibole	10	Pyroxene, plagioclase	Fibrous aggregates	Light green-yellow to green.
Brown amphibole	1	Pyroxene	Coarse, subhedral	Variable in color: brown-light brown to bluish-green.

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**

STRUCTURE

Crystal Plastic:
Very slight bending of some plagioclase laths, frequent deformation twins in plagioclase indicate a very incipient crystal plastic deformation.

Brittle:
Microfractures in plagioclase with sericite and some green amphibole.

Foliation:
Little foliation.

Crosscutting Relationships (as are apparent in thin section):
1) Incipient crystal-plastic deformation
2) Fracturing and infilling of microcracks

THIN SECTION:	**209-1275B-18R-1, Piece 9B, 66-70 cm**	**TS#274**	**Observer: JH, WM, AC, HD**
ROCK NAME:	**OXIDE GABBRONORITE**		
GRAIN SIZE:	**Fine-grained**		
TEXTURE:	**Granular**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	35	46	0.5-4	Subhedral to anhedral	
Clinopyroxene	7	36	0.2-3.5	Anhedral	
Orthopyroxene	2	10	0.2-2	Anhedral	
Oxide	7	7	0.1-1.5	Interstitial, ophitic	
Amphibole	1	1.5	0.2-1	Anhedral	
Biotite	0.5	0.5	0.2-0.3	Subhedral	

GENERAL COMMENTS

Gabbro is cut by a granophyric dike that has partially reacted with the gabbro and completely reacted converting clinopyroxene to amphibole.
Granophyre is mostly plagioclase with 8% quartz.
Plagioclase in the granophyre is: 1) blocky (almost square; 2) Sieve textured with abundant fluid inclusions, 3) strongly optically zoned not always concentrically.
Poikilitic sphene fills the interstices of much of the granophyre.
A corner of the thin section is actually a medium grained gabbro completely shot by the reaction with the granophyre.
Localized interstitial carbonate with apatite needles in granophyre.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
COARSE GRAINED GABBRO				
Green amphibole	20	Clinopyroxene	Pseudomorphic	
Talc	Trace	Orthopyroxene	Microgranular	Completely replaces occasional grain, associated with secondary opaque oxides.
Opaque oxides	Trace	Orthopyroxene	Anhedral	Associated with talc alteration and secondary opaque oxides
Chlorite	Trace	Orthopyroxene?	Fibrous, acicular	Small patches only.
Sericite?	Trace	Plagioclase	Elongate	Exploits cleavage of plagioclase.
FINER GRAINED INTRUSION				
Green amphibole	10	Clinopyroxene	Pseudomorphic	Complete replacement of clinopyroxene.
Hematite	2	Clinopyroxene	Amorphous	Imparts orange/brown overprint to amphibole alteration.
Secondary plagioclase	2	Plagioclase	Neoblastic	Some separate neoblasts + subgrain formation within larger primary plagioclase grains.

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
Amphibole		Fibrous	Corrodes plagioclase through which it passes
Hematite		Amorphous	Stains amphibole orange/brown

STRUCTURE

Crystal Plastic:
Very slight bending of plagioclase and plagioclase deformation twins indicate incipient crystal-plastic deformation.

Brittle:
Microfractures in plagioclase and through-going fractures with little discernable displacement, though cross-fiber amphibole on one indicates some shear.

Foliation:
Alignment of plagioclase produces a weak igneous foliation in the gabbro.

Crosscutting Relationships (as are apparent in thin section):

1) Formation of igneous foliation
2) Incipient crystal-plastic deformation
3) Microcrack and fracture formation with infilling by green amphibole and sericite

THIN SECTION:	**209-1275B-19R-1 Piece 5B, 116-121 cm**	**TS#275**	**Observer: JH, HD**
ROCK NAME:	**OXIDE GABBRONORITE**		
GRAIN SIZE:	**Medium- to very fine-grained**		
TEXTURE:	**Foliated**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
	VF/MG	VF/MG	VF/MG	VF/MG	
Plagioclase	46/39	48/40	0.1-1/1-5	Subhedral to anhedral	
Clinopyroxene	20/20	35/35	0.1-1/1-3	Anhedral	
Orthopyroxene	5/10	8/12	0.1-1/1-3	Anhedral	
Oxide	7/12	7/12	0.1-3	Interstitial, ophitic	Enriched in bands.
Amphibole	<2	<2	<2	Anhedral	Primary?
Biotite	Trace	Trace	0.5	Subhedral	

GENERAL COMMENTS VF= very fine grained; MG= medium grained
Moderately well developed foliation.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
GABBRO:				
Chlorite	<1	Clinopyroxene	Fibrous, acicular	Intergrown with green amphibole.
Green amphibole	25	Clinopyroxene	Lath-like, pseudomorphic	More fibrous when intergrown with chlorite.
Secondary plagioclase	1	Plagioclase	Neoblasts	Some grain size reduction in primary plagioclase.
MICROGABBRO:				
Green amphibole	6	Clinopyroxene		
Brown amphibole	1	Clinopyroxene		

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
Brown amphibole		Subhedral	Single vein of fresh brown amphibole, regular grains unlike fibrous amphibole seen elsewhere in this core.

STRUCTURE

Crystal Plastic:
Slight bending of a few plagioclase grains and numerous deformation twins indicate an incipient crystal-plastic deformation.

Brittle:
Fractured plagioclase and microcrack formation with some green amphibole along plagioclase microcracks.

Foliation:
Banded gabbronorite has a 2 cm band of fine grained gabbro between two medium grained intervals with a well developed igneous foliation parallel to the contacts. Contacts is a sharp grain size boundary, sutured without broken grains, indicating that the banding is due to late magmatic flow. Medium-grained gabbro has a foliation varying from weak to none.

Crosscutting Relationships (as are apparent in thin section):
1) Formation of banding by late magmatic flow
2) Incipient crystal-plastic deformation
3) Fracture and infilling of microcracks

THIN SECTION:	**209-1275B-19R-3 Piece 1C, 58-62 cm**	**TS#276**	**Observer: JH, ET, HD**
ROCK NAME:	**OXIDE GABBRONORITE and GRANOPHYRE DIKE**		
GRAIN SIZE:	**Medium/Very fine-grained**		
TEXTURE:	**Granular**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
OXIDE GABBRONORITE:					
Plagioclase	55	60	0.1-8	Subhedral to anhedral	
Clinopyroxene	10	20	0.1-8	Subhedral to anhedral	Blebs of orthopyroxene exsolution.
Orthopyroxene	3	5	0.1-4	Anhedral	Blebs of clinopyroxene exsolution.
Oxide	5	10	<4	Interstitial	Fills embayments in pyroxenes and plagioclase.
Amphibole	3	5	<2	Anhedral	Primary or replacing clinopyroxene.
Biotite	Trace	Trace	0.1-0.2	Subhedral	Attached to oxides with amphibole.
GRANOPHYRE DIKE:					
Plagioclase	60	60	0.1-2	Subhedral	
Quartz	30	30	0.1-0.2	Anhedral	
Amphibole	1	5	0.3	Anhedral	
Biotite	0.5	3	0.1-0.2	Subhedral	
Oxide	1	2	0.5-1	Interstitial	
Zircon	Trace	Trace	0.1	Euhedral to subhedral	
Apatite	Trace	Trace	0.05	Euhedral	

GENERAL COMMENTS

Gabbronorite is crosscut by 1-2 cm wide granophyre dike.
Very fine grained domain is surrounded by medium grained domain with a sharp contact.
Weak foliation is present in very fine grained domain.
No foliation is observed in medium grained domain and in granophyre dike.
Oxide fills embayments in pyroxene and plagioclase.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
OXIDE GABBRONORITE:				
Green amphibole	12	Clinopyroxene	Fibrous, pseudomorphic	
Brown amphibole	4	Clinopyroxene	Anhedral	
Secondary plagioclase	<1	Plagioclase	Neoblastic	Occasionally form at plagioclase/plagioclase boundaries.
GRANOPHYRE:				
Green amphibole	2	Clinopyroxene	Fibrous, patchy	Small, rare interstitial pockets of amphibole after clinopyroxene.

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
Brown/green amphibole		Microgranular, fibrous	Three tiny veins confined to granophyre.
Hematite		Amorphous	

STRUCTURE

Crystal Plastic:
Bent plagioclase grains with abundant deformation twins in gabbro indicate and incipient crystal-plastic deformation.

Brittle:
Microcracks in plagioclase and throughgoing fractures with green amphibole along them.

Foliation:
Local areas of plagioclase alignment, but no systematic foliation.

Crosscutting Relationships (as are apparent in thin section):

1) Weak local plagioclase fabrics due to late magmatic flow
2) Intrusion of granophyre
3) Fracture and microcracking in plagioclase with infilling by green amphibole

THIN SECTION:	**209-1275B-20R-2 Piece 1C, 35-41 cm**	**TS#277**	**Observer: JH. HD**
ROCK NAME:	**OXIDE GABBRONORITE**		
GRAIN SIZE:	**Medium- to very fine--grained**		
TEXTURE:	**Foliated**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
	VF/MG	VF/MG	VF/MG	VF/MG	VF/MG
Plagioclase	49/39	50/40	0.1-1/1-9	Subhedral to anhedral	
Clinopyroxene	25/25	37/35	0.1-1/1-4	Anhedral	
Orthopyroxene	5/10	8/12	0.1-1/1-4	Anhedral	
Oxide	3/12	3/12	0.1-3	Interstitial, ophitic	Enriched in bands.
Amphibole	<2	<2	<2	Anhedral	Primary?
Biotite	Trace	Trace	0.5	Subhedral	

GENERAL COMMENTS VF= very fine grained; MG= medium grained
Moderately well developed foliation. Fine grained part very well foliated

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
OXIDE GABBRONORITE				
Secondary plagioclase	<1	Plagioclase	Neoblastic	Occur at interpenetrating plagioclase/plagioclase boundaries.
Green amphibole	8	Clinopyroxene, orthopyroxene	Anhedral, fibrous, pseudomorphic	
Brown amphibole	4	Clinopyroxene, orthopyroxene	Subhedral	
MICROGABBRO				
Green amphibole	6	Clinopyroxene		

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**

STRUCTURE

Crystal Plastic:
Fairly abundant bent plagioclase grains with subgrain formation indicate a weak crystal-plastic deformation.

Brittle:
Throughgoing fractures with green amphibole common, microcracks in plagioclase common, also with green amphibole along them.

Foliation:
Strongly foliated fine-grained oxide gabbro appears between enclaves of coarse grained gabbro without a good foliation suggests intrusion of microgabbro into coarser gabbro section and then magmatic flow stringing out the coarser gabbro bits. Contact is is a sharp grain size boundary, sutured without broken grains.

Crosscutting Relationships (as are apparent in thin section):
1) Formation of late magmatic flow structures
2) Weak crystal-plastic deformation
3) Fracturing and infilling of microcracks and fractures

THIN SECTION:	**209-1275B-22R-1 Piece 9, 94-100cm**	**TS#278**	**Observer: JH, ET, HD**
ROCK NAME:	**OXIDE GABBRONORITE**		
GRAIN SIZE:	**Medium/Very fine-grained**		
TEXTURE:	**Granular**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
	VF / M	VF / M	VF / M		
Plagioclase	45 / 55	50 / 60	0.05-2 / 0.5-8	Subhedral to anhedral	
Clinopyroxene	10	20 / 25	0.4-4	Subhedral to anhedral	Blebs of orthopyroxene exsolution.
Orthopyroxene	3	5	0.1-4	Anhedral	
Oxide	10 / 3	15 / 5	0.1-1.2 / <4	Interstitial	Fills embayments in pyroxenes and plagioclase.
Amphibole	5 / 3	10 / 5	0.2-1	Anhedral	Associated with oxide or replacing clinopyroxene.
Biotite	Trace	Trace	0.2-1	Subhedral	

GENERAL COMMENTS Medium-grained domain sandwiches a 1- to 2-cm-wide very-fine-grained domain with sharp contact. Moderately well developed foliation in both domains parallel to the contact.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
OXIDE GABBRONORITE:				
Green amphibole	8	Clinopyroxene, orthopyroxene	Fibrous to lath-like, pseudomorphic	Some orthopyroxene quite heavily altered with only core remaining.
MICROGABBRO:				
Secondary plagioclase	<1		Neoblastic	
Green amphibole	10		Fibrous, pseudomorphic	Clinopyroxene in the microgabbro appears more heavily altered than in the oxide gabbronorite.

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
No veins.			

STRUCTURE

Crystal Plastic:
Bent plagioclase and orthopyroxene grains as well as abundant plagioclase deformation twins indicated very weak crystal-plastic deformation.

Brittle:
Numerous small irregular fractures and microfractures in plagioclase with green amphibole along them.

Foliation:
Fine grained gabbro is well foliated, while coarser gabbro is foliated on one side of microgabbro band. Sutured grain-size contact and foliation parallel to contact indicates banding formed in part due to late magmatic flow.

Crosscutting Relationships (as are apparent in thin section):
1) Formation of late magmatic flow structures
2) Very weak crystal-plastic foliation
3) Formation of fractures and microcracks with infilling by green amphibole

THIN SECTION:	**209-1275B-18R-3 Piece 3, 11-17 cm**	**TS#279**	**Observer: WM, AC, JH, HD**
ROCK NAME:	**OXIDE GABBRONORITE**		
GRAIN SIZE:	**Medium- to very fine-grained**		
TEXTURE:	**Foliated**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
	VF/MG	VF/MG	VF/MG	VF/MG	VF/MG
Plagioclase	49/39	50/40	0.1-1/1-9	Subhedral to anhedral	An 54 for medium-grained plagioclase; 45 for fine-grained plagioclase.
Clinopyroxene	25/25	37/35	0.1-1/1-4	Anhedral	
Orthopyroxene	5/10	8/12	0.1-1/1-4	Anhedral	
Oxide	3/12	3/12	0.1-3	Interstitial, ophitic	
Amphibole	<2	<2	<2	Anhedral	Primary?
Biotite	Trace	Trace	0.5	Subhedral	

GENERAL COMMENTS VF= very fine grained; MG= medium grained
Moderately well developed foliation.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
OXIDE GABBRONORITE:				
Green amphibole	6	Clinopyroxene, orthopyroxene	Fibrous, pseudomorphic	Alteration of pyroxenes is much stronger where patches of former pyroxene intersect with amphibole veins.
Secondary plagioclase	Trace	Plagioclase	Neoblastic	Occasional neoblasts at plagioclase/plagioclase interpenetrating boundaries.
MICROGABBRO:				
Green amphibole	16	Clinopyroxene, orthopyroxene	Fibrous to lath-like	
Hematite	<1		Amorphous	Stain diminishes within 1 cm of microgabbro/gabbro boundary.

VEIN / FRACTURE FILLING	**PERCENT PRESENT**		**MORPHOLOGY**	**COMMENTS**
Green amphibole		Clinopyroxene, orthopyroxene	Fibrous to lath-like	
Secondary plagioclase?	Trace		Neoblastic?	Possibly secondary plagioclase but may just be entrained fragments of primary plagioclase. Amphibole veins penetrate both gabbro and microgabbro.
Hematite	Trace		Amorphous	

STRUCTURE

Crystal Plastic:
Bent plagioclase crystals and deformation twins indicate an incipient crystal-plastic deformation.

Brittle:
Throughgoing fractures and numerous microcracks in plagioclase with green amphibole along them.

Foliation:
Strong igneous foliation parallel to banding in thin section, with sutured sharp igneous grain size contact without broken grains indicate formation during late magmatic flow.

Crosscutting Relationships (as are apparent in thin section):
1) Formation of igneous flow structures
2) Incipient crystal-plastic deformation
3) Fracturing and infilling of fractures and microcracks

THIN SECTION: 209-1275B-19R-1 Piece 3, 25-27 cm TS#280 Observer: JH, WM, ET, HD
ROCK NAME: GABBRONORITE, PORPHYRITIC OXIDE GABBRO, MAFIC OXIDE GABBRONORITE, and GABBRO
GRAIN SIZE: Very fine/ Medium-grained
TEXTURE: Granular

PRIMARY MINERALOGY	MODE (Visual estimate) PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	MORPHOLOGY	COMMENTS
	VF / M	VF / M	VF / M		
Plagioclase	60	65	0.1-0.4 / 0.5-4	Euhedral	
Clinopyroxene	15 / 20-15	22 / 32-22	0.05-0.6 / 0.5- 7	Subhedral	
Orthopyroxene	5 / 0-5	10 / 0-10	0.2 / 2	Subhedral	
Oxide	3	3	0.1-0.6 / 1-3	Interstitial	

GENERAL COMMENTS
Whole area is divided into four domains of distinct lithologies by sharp boundaries.
Fine-grained gabbronorite is and has a fabric that is parallel to the boundary but at a small angle away from the contact.
Porphyritic oxide gabbronorite contains 10% large, euhedral plagioclase megacrysts in a finer matrix. Some are bent.
Medium-grained mafic oxide gabbronorite has a weak foliation and consists of granular clinopyroxene and orthopyroxene with euhedral plagioclase and interstitial oxides.
Medium grained gabbro contains euhedral plagioclase (65%), subhedral clinopyroxene (32%), and minor interstitial oxides (3%).

SECONDARY MINERALS	PERCENT PRESENT	REPLACING	MORPHOLOGY	COMMENTS
GABBRO				
Green amphibole	17	Orthopyroxene, clinopyroxene	Fibrous, anhedral to microgranular	Orthopyroxenes appear more strongly altered to microgranular amphibole? than clinopyroxene.
MICROGABBRO				
Green amphibole	8	Orthopyroxene, clinopyroxene	Fibrous, anhedral	

VEIN / FRACTURE FILLING	PERCENT PRESENT	MORPHOLOGY	COMMENTS
Green amphibole			Veins present in microgabbro, not traceable into gabbro.
Chlorite	trace	Fibrous	Forms cross fibers where amphibole vein crosscuts plagioclase.

STRUCTURE

Crystal Plastic:
A few slightly bent plagioclase grains and numerous deformation twins indicate an incipient crystal-plastic deformation.

Brittle:
Numerous en echelon through-going fractures and microfractures in plagioclase with green amphibole along them.

Foliation:
Well developed igneous foliation only in very fine grained gabbro. No clear foliation evident in coarser gabbro. Contacts are generally sharp sutured igneous grain-size contacts, but highly irregular suggesting that this is a large xenolith being digested by a microgabbro intrusion.

Crosscutting Relationships (as are apparent in thin section):
1) Formation of late magmatic structures
2) Incipient crystal-plastic deformation
3) Fracturing and infilling of microcracks and veins

THIN SECTION:	**209-1275D-1R-1 Piece 3, 9-11 cm**	**TS#281**	**Observer: AC, JH**
ROCK NAME:	**MYLONITE (GABBRO?)**		
GRAIN SIZE:			
TEXTURE:	**Mylonitic**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
GENERAL COMMENTS	No primary mineralogy preserved. Contact with a diabase is preserved. Microlites of plagioclase are parallel to the contact. Few plagioclase phenocrysts are present in the diabase.				

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Talc	60	Olivine, pyroxenes	Microgranular to pseudomorphic	Pseudomorphs some heavily deformed and streaked out mineral grains. Microgranular within less discrete zones.
Tremolite	30	Pyroxenes	Fibrous, acicular to lath-like	Fibers appear to partially pseudomorph former pyroxene(?) grains and occasionally appear as subhedral laths.
Opaque oxides	<1	Sphene	Anhedral to subhedral	Replaces sphene in reaction border between diabase and talc altered peridotite(?).
Chlorite	15	Plagioclase		
DIABASE				
Amphibole	12	Pyroxenes		

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
Chlorite		Cross fibers	
Amphibole		Fibrous	Associated with oxide centers.
Oxides		Amorphous, anhedral	Rimmed by fibrous amphibole.

STRUCTURE

Crystal Plastic:
Possible recrystallized neoblasts of amphibole in porphyroclasts within shear zone.

Brittle:
Intense semi-brittle deformation in talc-chlorite schist; contains fractured porphyroclasts of schistose tremolite.
Strong foliation in schistose zone, very fine grained talc and porphyroclasts of possible former diabase now altered to chlorite.
Diabase bordering shear zone is not deformed; but possible diabase clasts are strongly deformed.

Foliation:
Strong foliation in shear zone defined by schistose talc and tremolite.

Crosscutting Relationships (as are apparent in thin section):
1) Early crystal plastic foliation
2) Tremolite alteration and deformation
3) Talc-chlorite semi-brittle deformation, schist formation

THIN SECTION:	**209-1275D-1R-1 Piece 12, 60-62 cm**	**TS#282**	**Observer: AC, CG**
ROCK NAME:	**DIABASIC BRECCIA**		
GRAIN SIZE:			
TEXTURE:	**Very fine-grained**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
GENERAL COMMENTS	Diabase cut by an anorthositic dikelet with lot of accessory phases (zircon, apatite, titanite).				

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Amphibole	53	Clinopyroxene, plagioclase	Fibrous	Replaces clinopyroxene as background alteration. Also as fibrous aggregates in sphene-amphibole veins.
Sphene	15	Oxides/Primary	Subhedral to Euhedral	In rims of veins.
Quartz	2		Subhedral	Polygonal aggregates in small patches associated with sphene.
Chlorite	10	Plagioclase	Fan-like aggregates	Rims of felsic veins.

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
Veins of titanite-amphibole		Anastomosing	Titanite contains acicular inclusions.

STRUCTURE

Crystal Plastic:
Very minor crystal plastic deformation of plagioclase in anorthosite dikelet, undulose extinction and subgrain formation.

Brittle:Bbrittle deformation of diabase along fractures filled with fibrous amphibole.

Foliation:
None vislble in thin section.

Crosscutting Relationships (as are apparent in thin section):
1) Intrusion of anothosite dikelet
2) Brittle fractures filled with schistose amphibole

THIN SECTION:	**209-1275D-1R-1 Piece 19B, 110-113 cm**	**TS#283**	**Observer: AC, CG**
ROCK NAME:	**GABBROIC CATACLASITE WITH CLASTS OF ALTERED DIABASE**		
GRAIN SIZE:	**Very fine-grained**		
TEXTURE:	**Cataclastic**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	28	40			

COMMENTS

Very fine grained gabbroic cataclasite with fragments of altered diabase.
Mafic minerals are totally replaced by alteration mineral phases.
Plagioclases commonly contain accessory minerals such as apatite and zircon.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Green amphibole	60	Clinopyroxene, diabase matrix	Pseudomorphic	Pseudomorphic after clinopyroxene.
Secondary plagioclase	12			
Titanite	Trace			

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
Green amphibole			
Chlorite	Trace	Fibrous	

STRUCTURE

Crystal Plastic:
Minor crystal plastic deformation in plagioclase grains contained in catacalsites.
Ductile deformation textures include undulose extinction, deformation twins and subgrain boundaries; very minor recrystallization.

Brittle:
Strong brittle deformational; Protocataclasite
Clasts of gabbro, microgabbro, diabase and amphibole schist are contained within a matrix of fractured plagioclase and green amphibole.
Clasts are subangular to subrounded and range in size from 1 mm to 10 mm.
matrix percentage is variable and ranges in grain size from 0.01 mm amphibole grains to 0.1 mm plagioclase grains.

Foliation:
No strong foliation is visible in thin section.

Crosscutting elationships (as are apparent in thin section):

1) Very minor ductile deformation
2) Brittle deformation during amphibolite grade metamorphosis

THIN SECTION:	**209-1275D-1R-1 Piece 22, 133-136 cm**	**TS#284**	**Observer: AC, WB**
ROCK NAME:	**TALC-AMPHIBOLE-CHLORITE SC HIST (former gabbro/troctolite?)**		
GRAIN SIZE:			
TEXTURE:	**Schistose**		

MODE (Visual estimate)

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	MORPHOLOGY	COMMENTS
Spinel	<1	1	<2	Subhedral to euhedral	Mineral inclusions in large grains.

GENERAL COMMENTS The original mineralogy and fabric of the rock is completely obscured by alteration and metamorphism. Very few orthopyroxene pseudomorphs left.

SECONDARY MINERALS	PERCENT PRESENT	REPLACING	MORPHOLOGY	COMMENTS

VEIN / FRACTURE FILLING	PERCENT PRESENT		MORPHOLOGY	COMMENTS
Talc	55	Olivine?	Fibrous	
Green amphibole	20	Plagioclase, pyroxene	Felty, acicular, prismatic	Large crystals probably pseudomorphed clinopyroxene. Felty tremolite in foliation bands.
Chlorite	20	Plagioclase?	Fibrous	
Serpentine	4			
Oxide	1		Euhedral	

GENERAL COMMENTS Schistose bands of talc and amphibole. Remainder of rock has original texture preserved: Talc after olivine and chlorite after plagioclase
10%-15% of coarse amphibole may represent altered clinopyroxene. This may indicate the protolith was a troctolitic gabbro.

STRUCTURE

Crystal Plastic:
None visible in thin section.

Brittle:
Strong semi-brittle deformation along schistose bands of talc and colorless amphibole.
schistose amphibole fills fractures and is cut by later anastomosing shear fractures.

Foliation:
Schistose amphibole bands and anastomosing fractures are aligned parallel and define a weak foliation.

Crosscutting Relationships (as are apparent in thin section): 1) Semi-brittle and brittle deformation during amphibole talc alteration

THIN SECTION:	**209-1275D-1R-1 Piece 25, 146-148 cm**	**TS#285**	**Observer: AC, JH, NA**
ROCK NAME:	**GABBROIC CATACLASITE WITH CLASTS OF ALTERED DIABASE**		
GRAIN SIZE:	**Very fine-grained**		
TEXTURE:			

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**

GENERAL COMMENTS Fine-grained gabbroic cataclasite with plagioclase clots and microgabbro clasts.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Amphibole	45		Fibrous, acicular, pseudomorphic	Fibrous bands around clasts of former gabbro, some pseudomorphing former pyroxenes.
Chlorite	15		Fibrous	Clusters of acicular to fibrous chlorite.
Sphene	Trace			Rare grains with narrow oxidation rim within bands of acicular/fibrous amphibole.

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
Amphibole		Fibrous	
Hematite		Amorphous, anhedral	

STRUCTURE

Crystal Plastic:
Minor crystal plastic deformation in plagioclase grains contained in catacalsites.
Ductile deformation textures include undulose extinction, deformation twins and subgrain boundaries; very minor recrystallization.

Brittle:
Strong brittle deformational; protocataclasite.
Clasts of gabbro and microgabbro are contained within a matrix of fractured plagioclase and green amphibole.
Clasts are subangular to subrounded and range in size from 1 mm to 10 mm.
matrix percentage is variable and ranges in grain size from 0.01 mm amphibole grains to 0.1 mm plagioclase grains.

Foliation:
No strong foliation is visible in thin section.

Crosscutting Relationships (as are apparent in thin section):
1) Very minor ductile deformation
2) Brittle deformation during amphibolite grade metamorphosis

THIN SECTION:	**209-1275D-1R-2, Piece 21, 116-118 cm**	**TS#286**	**Observer: AC, WB**
ROCK NAME:	**TROCTOLITE WITH GABBROIC VEIN**		
GRAIN SIZE:	**Medium-grained**		
TEXTURE:	**Granular**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Olivine	15	91	<4	Subhedral to anhedral	
Clinopyroxene	1	2	<4	Interstitial	
Plagioclase	0.5	6	< 4	Interstitial	
Spinel	0.5	1	0.5	Subhedral to euhedral	

GENERAL COMMENTS Most of the rock is severely altered and the primary mineralogy and fabric are partially obscured
Cut by a former gabbroic (?) dike

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Talc	55	Olivine, plagioclase	Fibrous	Pseudomorphic and rimming olivine.
Serpentine	1	Olivine		Along cracks in olivine.
Chlorite	15	Plagioclase	Fibrous	In patches, pseudomorphic plagioclase.
Green amphibole	15	Plagioclase, olivine	Prismatic	
Magnetite	1	Olivine	Anhedral	Fine, with serpentine and talc.
Red clay/Fe-oxyhydroxide	5	Olivine		Dark reddish-brown patches.
White mica	1	Plagioclase	Flaky	Bird-eyes structures, along with chlorite and amphibole.

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
Talc	3	Fibrous	Has oxidized halos

GENERAL COMMENTS A completely talc-chlorite-amphibole altered gabbroic dike cuts a troctolite, with relict plagioclase and olivine.

STRUCTURE

Crystal Plastic:
Very minor crystal plastic deformation, minor undulose extinction and deformation bands in olivine.

Brittle:
Very minor brittle and semi-brittle deformation, some fracturing during amphibole and talc alteration; random alignment of alteration minerals suggests little semi-brittle deformation during alteration.

Foliation:
None visible in thin section.

Crosscutting Relationships (as are apparent in thin section): 1) Very minor ductile deformation
2) Amphibole and talc alteration during very minor brittle deformation.

THIN SECTION:	**209-1275D-2R-1, Piece 12, 59-62 cm**	**TS#287**	**Observer: AC, JH**
ROCK NAME:	**DUNITE**		
GRAIN SIZE:	**Medium-grained**		
TEXTURE:	**Granular**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Olivine	15	90	<8	Subhedral to anhedral	
Clinopyroxene	0	2	<4	Interstitial	
Plagioclase	0	6	< 4	Interstitial	
Spinel	0	2	<1	Subhedral to euhedral	

GENERAL COMMENTS
Most of the rock is severely altered and the primary mineralogy and fabric are partially obscured
Cut by a former (?) gabbroic dike

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Serpentine	40	Olivine	Mesh texture to ribbon texture	Some mesh texture remaining where fresh olivine cores are still preserved. In areas of more complete alteration grades into ribbon texture.
Talc	25	Pyroxenes	Microgranular	Exploits mesh texture within olivine, widespread throughout matrix. Where associated with opaque minerals may be result of orthopyroxene alteration.
Chlorite	6	Plagioclase	Fibrous, pseudomorphic	Partially to completely replacing plagioclase.
Amphibole	9	Pyroxenes	Fibrous to lath-like	Pseudomorphing former pyroxenes.
Magnetite	5	Olivine, pyroxene	Anhedral to euhedral	Anhedral in former olivine margins, occasional euhedral grains in talc/amphibole alteration possibly after orthopyroxene.

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
No veins.			

STRUCTURE

Crystal Plastic:
Very minor crystal plastic deformation, minor undulose extinction and deformation bands in olivine.

Brittle:
Very minor brittle and semi-brittle deformation, some fracturing during amphibole and talc alteration;
faint parallel alignment of talc and amphibole in bands across some areas of thin section suggests weak semibrittle deformation during alteration.

Foliation:
Very faint foliation in parts of thin section defined by parallel alignment of talc and amphibole

Crosscutting Relationships (as are apparent in thin section):
1) Very minor ductile deformation
2) Amphibole and talc alteration during very minor brittle deformation.

THIN SECTION:	**209-1275D-2R-1 Piece 18A, 93-96 cm**	**TS#288**	**Observer: AC, WB, NA**
ROCK NAME:	**GABBROIC CATACLASITE**		
GRAIN SIZE:	**Fine-grained**		
TEXTURE:	**Cataclastic**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
GENERAL COMMENTS	Fine grained gabbroic cataclasite with oxides.				

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Green amphibole	50	Clinopyroxene, plagioclase	Fibrous, prismatic	In patches and finely intergrown with green amphibole in matrix.
Brown amphibole	5	Clinopyroxene	Euhedral	Pleochroic.
Chlorite	10	Plagioclase, clinopyroxene	Fibrous	In patches and finely intergrown with green amphibole in matrix.
Secondary plagioclase	5	Plagioclase		Along cracks and rims.
Sphene	<1	Oxide	Anhedral	Rimming hematite.

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
No veins.			

STRUCTURE

Crystal Plastic:
Minor crystal plastic deformation in plagioclase grains contained in catacalsites.
Ductile deformation textures include undulose extinction, deformation twins and subgrain boundaries; very minor recrystallization.

Brittle:
Strong brittle deformational; protocataclasite.
Clasts of large plagioclase grains within a matrix of fine grained fractured plagioclase and amphibole
matrix percentage is variable and ranges in grain size from 0.01 mm amphibole grains to 0.1 mm plagioclase grains.

Foliation:
No foliation visible in thin section.

Crosscutting Relationships (as are apparent in thin section):
1) Very minor ductile deformation
2) Brittle deformation during amphibolite grade metamorphosis

THIN SECTION:	**209-1275D-2R-1, Piece 27, 142-144 cm**	**TS#289**	**Observer: AC, JH**
ROCK NAME:	**TROCTOLITE**		
GRAIN SIZE:	**Medium-grained**		
TEXTURE:	**Poikilitic**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Olivine	15	85	<4	Subhedral to anhedral	
Clinopyroxene	1	5	<4	Interstitial	
Plagioclase	2	9	< 4	Interstitial	
Spinel	<1	<1	0.5	Subhedral to euhedral	

GENERAL COMMENTS Olivine crystals are poikiolitically surrounded by plagioclase and clinopyroxene.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Serpentine	62	Olivine	Net texture to core and rim structure	Net texture remains where fresh olivine cores are still preserved. When serpentinization is complete core and rim structures are present.
Talc	Trace?	Olivine	Microgranular	Possible present with amphibole within mesh texture framework.
Chlorite	7	Plagioclase	Fibrous, pseudomorphic	Partially to completely replaces plagioclase. Commonly rims plagioclase grains.
Amphibole	10	Olivine	Acicular, pseudomorphic	Forms rims around domains of serpentine in mesh texture
Magnetite	3	Olivine	Anhedral to subhedral	Anhedral within serpentinization, some subhedral grains.

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
Amphibiole		granular	
Opaque oxides		anhedral	

STRUCTURE

Crystal Plastic:
None visible in thin section.

Brittle:
None visible in thin section.

Foliation:
None visible in thin section.

Crosscutting Relationships (as are apparent in thin section): 1) Serpentinitization of olivine and amphibole alteration

THIN SECTION:	**209-1275D-2R-2, Piece 18, 97-100 cm**	**TS#290**	**Observer: AC, WB**
ROCK NAME:	**GABBRO**		
GRAIN SIZE:	**Fine-grained**		
TEXTURE:	**Granular**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	50	65		Subhedral to anhedral	
Pyroxene (???)	0	33??			
Oxide	2	2		Anhedral	Symplectitic on altered phase.
Zircon	<0.5	<0.5	0.1	Euhedral	

GENERAL COMMENTS The mineral phase interstitial to the plagioclase is completely altered, but some cleavages traces are preserved therefore it could be a pyroxene.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Chlorite/smectite	30	Clinopyroxene, plagioclase	Fibrous	Plagioclase cores, complete replacement of clinopyroxene along with oxides.
Brown clay	5	Clinopyroxene, plagioclase	Amorphous	Macroscopically white, may contain carbonate.
Secondary plagioclase	8	Plagioclase		Along cracks and grain boundaries.
Green amphibole	8	Clinopyroxene		Pseudomorph clinopyroxene.
Quartz	1	Plagioclase	Anhedral	In patches, along with chlorite/smectite.

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
Chlorite/smectite	0.2	Fibrous	

STRUCTURE

Crystal Plastic:
Minor to moderate crystal plastic deformation; undulose extinction of large plagioclase porphyroclasts; some minor recrystallization around grain boundaries.
Zones of possible recrystallized plagioclase neoblasts partially obscured by altered amphibole grains.

Brittle:
None visible in thin section.

Foliation:
None visible in thin section.

Crosscutting Relationships (as are apparent in thin section): 1) Ductile deformation at amphibolite facies
2) Static alteration

THIN SECTION:	**209-1275D-6R-1, Piece 17, 89-91 cm**	**TS#291**	**Observer: AC, JH**
ROCK NAME:	**TROCTOLITE/DUNITE (?)**		
GRAIN SIZE:	**Medium-grained**		
TEXTURE:	**Poikilitic**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Olivine	15	89	<4	Subhedral to anhedral	
Clinopyroxene	1	3?	<4	Interstitial	
Plagioclase	1	7?	< 4	Interstitial	
Spinel	<1	<1	0.5	Subhedral to euhedral	

GENERAL COMMENTS The rock is very altered and difficult to estimate primary mineral modal proportions.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Serpentine	35	Olivine	Mesh to ribbon textures	Overall texture resembles mesh texture where olivine cores still preserved. Between mesh texture appears more ribbon like.
Talc	16	Pyroxenes	Microgranular to granular	Associated with opaque minerals (after orthopyroxenes)
Chlorite	12	Plagioclase	Plagioclase	Patches of complete alteration common. Rare relict cores of plagioclase remain with chlorite rims.
Amphibole	12	Pyroxenes	Fibrous to lath-like	Distributed between amphibole poor patches (chlorite rich patches) and amphibole rich patches after pyroxenes.
Clays/oxyhydroxides	5	Olivine	Amorphous	Prominent within serpentine rich lithology, less so within the talc altered areas. Clay mineral has been identified as montmorillionite by XRD.
Magnetite/opaque oxides	2	Olivine, orthopyroxene	Anhedral to euhedral	Anhedral within serpentine alteration with rare euhedral grains. In places associated with talc alteration after orthopyroxene(?).

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
Carbonate		Patchy, banded	Veins of carbonate are banded with coarse grained carbonate in the center and finer grained carbonate in the margins. Veins sometimes developed into larger patchy areas of carbonate.

STRUCTURE

Crystal Plastic:
None visible in thin section.

Brittle:
Extremely minor fracturing during amphibole and talc alteration.

Foliation:
None visible in thin section.

Crosscutting Relationships (as are apparent in thin section):
1) Amphibole alteration
2) Talc alteration
3) Carbonate veins

THIN SECTION:	**209-1275D-7R-1 Piece 7, 85-88 cm**	**TS#292**	**Observer: AC, WB**
ROCK NAME:	**OXIDE GABBRO**		
GRAIN SIZE:	**Fine-grained**		
TEXTURE:	**Granular/foliated**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	35	40	0.5-3.5	Subsequent	Aspect ratio less than 1:1.5; An = 51.
Clinopyroxene	5	33	0.2-2	Subhedral-euhedral	Also as wormy oikocrysts associated with oxides.
Amphibole	2	3	0.1-0.3	Anhedral	
Biotite	<1	<1	0.1-0.2	Anhedral	
Oxides	7	7	0.2-0.8	Interstitial	

GENERAL COMMENTS Bent plagioclase twinning

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Green amphibole	20	Clinopyroxene	Prismatic	Weakly pleochroic
Brown amphibole	3	Clinopyroxene	Euhedral	Intergranular grains may be magmatic
Chlorite/smectite	5	Clinopyroxene, plagioclase		Patchy.
Titanite	<1	Oxide	Anhedral	
Secondary plagioclase	3	Plagioclase		Along cracks and grain boundaries.

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
Green amphibole	0.2		Cut by carbonate-titanite-quartz-amphibole vein.
Carbonate-titanite-amphibole-quartz	0.2		Carbonate-titanite-quartz in plagioclase. Amphibole-titanite in clinopyroxene.

STRUCTURE

Crystal Plastic:
Minor to moderate crystal plastic deformation.
Plagioclase contains undulose extinction, kink bands and subgrain walls; is weakly recrystallized in some locations.
Amphibole may contain partially recrystallized grains.

Brittle:
Minor fracturing during late stages of minor brittle deformation.
Amphibole veins are undeformed.

Foliation:
Weak foliation defined by preferred orientation of elongate plagioclase and amphibole grains; may be partially a magmatic fabric.

Crosscutting Relationships (as are apparent in thin section):
1) Minor ductile deformation
2) Minor brittle deformation
3) Amphibole veins

THIN SECTION:	**209-1275D-8R-1, Piece 18, 128-133 cm**	**TS#293**	**Observer: NA, JH**
ROCK NAME:	**TROCTOLITE WITH GABBRO DIKE**		
GRAIN SIZE:	**Medium-grained**		
TEXTURE:	**Poikilitic**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
TROCTOLITE					
Olivine	3	85	<4	Subhedral to anhedral	Replaced by iddingsite at the contact with gabbro.
Orthopyroxene	0.5?	3?			
Clinopyroxene		3	<4	Interstitial	
Plagioclase	2	8	< 4	Interstitial	
Spinel	<1	1	0.5	Subhedral to euhedral	
GABBRO					
Plagioclase	5	30	<2.5	Anhedral	
Clinopyroxene	4	50	<5	Anhedral	
Amphibole	15	15	<5	Anhedral	
Oxide	5	5	<1.6	Anhedral	Some chromian spinel.

GENERAL COMMENTS Primary minerals in troctolite are mostly in the contact between gabbro dike and troctolite.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
TROCTOLITE				
Serpentine	82	Olivine		
Carbonate	2	Olivine		
Chlorite	6	Plagioclase		
Magnetite/opaque oxides	3	Olivine, orthopyroxene		
Talc	1			
GABBRO				
Talc	15	Orthopyroxene	Microgranular, patchy	Present as semi-continuous bands along former gabbroic margin.
Carbonate	8	?	Coarse granular	
Magnetite/opaque oxides	2	Orthopyroxene	Subhedral	Scattered throughout former gabbro. Associated with talc bands after orthopyroxene.
Chlorite	10	Plagioclase	Patchy, fibrous	
Amphibole	36	Pyroxenes	Euhedral to subhedral, acicular	Patches of radiating acicular crystals within talc altered areas

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
Carbonate		Coarse granular	

STRUCTURE

Crystal Plastic:
Very minor crystal plastic deformation; undulose extinction and deformation bands in relict olivine.

Brittle:
Very minor brittle deformation; slight shear offset across late carbonate veins.

Foliation:
None visible in thin section.

Crosscutting Relationships (as are apparent in thin section):
1) Minor crystal plastic deformation
2) Brown amphibole alteration
3) Serpentinization
4) Late shear fractures and carbonate veins

THIN SECTION:	**209-1275D-9R-1, Piece 3, 15-17 cm**	**TS#294**	**Observer: NA, WB**
ROCK NAME:	**TROCTOLITE**		
GRAIN SIZE:	**Medium-grained**		
TEXTURE:	**Poikilitic**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
TROCTOLITE					
Olivine	3.5	85	<4	Subhedral to anhedral	
Clinopyroxene	1.5	5	<4	Interstitial	
Plagioclase	2.5	8	< 4	Interstitial	
Spinel	1	1	0.5	Subhedral to euhedral	

GENERAL COMMENTS Primary minerals in troctolite are mostly in the contact between gabbro dike and troctolite.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Serpentine	65	Olivine		Mesh texture.
Talc	10	Olivine, clinopyroxene	Fibrous	Rims on olivine.
Magnetite	1	Olivine	Anhedral	Fine-grained with serpentine and talc.
Carbonate	5	Olivine, plagioclase	Anhedral	Rims on olivine kernels. Fine network with oxide.
Brown clay	2	Olivine, plagioclase		
Chlorite	6	Plagioclase	Fibrous	
White mica	Trace	Plagioclase	Coarse, fibrous	
Amphibole	2	Clinopyroxene	Felty	

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
Fine, discontinuous networks of carbonate-clay-oxide veinlets			
Talc-oxide veinlets			

STRUCTURE

Crystal Plastic:
Very minor crystal plastic deformation; undulose extinction and deformation bands in relict olivine.

Brittle:
Very minor brittle deformation; slight shear offset across late talc veins.

Foliation:
None visible in thin section.

Crosscutting Relationships (as are apparent in thin section):
1) Minor crystal plastic deformation
2) Serpentinization
3) Late shear fractures and carbonate veins

THIN SECTION: 209-1275D-9R-2, Piece 4,17-20 cm TS#295 Observer: NA, WB
ROCK NAME: TROCTOLITE
GRAIN SIZE: Medium-grained
TEXTURE: Poikilitic

PRIMARY MINERALOGY	MODE (Visual estimate) PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	MORPHOLOGY	COMMENTS
TROCTOLITE					
Olivine	2.5	85	<4	Subhedral to anhedral	
Clinopyroxene	1	5	<4	Interstitial	
Plagioclase	2	8	< 4	Interstitial	
Spinel	<1	1	0.5	Subhedral to euhedral	

GENERAL COMMENTS Totally serpentinized dunite clasts with spinel are in carbonatite breccia.

SECONDARY MINERALS	PERCENT PRESENT	REPLACING	MORPHOLOGY	COMMENTS
Serpentine	50	Olivine		
Talc	20	Olivine, plagioclase		
Chlorite	10	Clinopyroxene, plagioclase		
Carbonate	10	Plagioclase		
Oxide	1	Olivine		
Green amphibole	3	Clinopyroxene, plagioclase		

VEIN / FRACTURE FILLING	PERCENT PRESENT	MORPHOLOGY	COMMENTS
Cyclically banded serpentine-carbonate veins			

GENERAL COMMENTS This thin section has three lithologies: troctolite, cut by gabbro, and both are cut by a felsic vein that has a sheared margin and contains clasts of the serpentinized troctolite. The gabbro is talc-chlorite-amphibole altered and has some relict plagioclase. The troctolite is serpentinized with minor talc and relict olivine and plagioclase. The felsic vein is completely altered to amphibole and abundant carbonate after plagioclase. The felsic vein is altered to talc near the contact to the gabbro.
Relict olivine is most abundant in the contact between the gabbro and troctolite; it shows only moderate alteration to talc+magnetite.

STRUCTURE

Crystal Plastic:
Very minor crystal plastic deformation; undulose extinction and deformation bands in relict olivine.

Brittle:
Very minor semi-brittle and brittle deformation.
Fibrous talc in veins has weak schistose foliation in particular zones; possible semibrittle deformation.
Possible slight shear offset across late carbonate veins.

Foliation:
Weak foliation in places defined by schistose talc.

Crosscutting Relationships (as are apparent in thin section):
1) Minor crystal plastic deformation
2) Serpentinization
3) Talc alteration and minor semi-brittle deformation
4) Carbonate alteration and veining

THIN SECTION:	**209-1275D-10R-1, Piece 6, 54-56 cm**	**TS#296**	**Observer: NA**
ROCK NAME:	**DUNITE**		
GRAIN SIZE:	**Medium-grained**		
TEXTURE:	**Poikilitic**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Olivine	5	90	<4	Subhedral to anhedral	
Orthopyroxene	1.5	6	<4		
Plagioclase	2.5	3	< 4	Interstitial	
Spinel	<1	1	0.5	Subhedral to euhedral	

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Chlorite	1	Plagioclase	Patchy, fibrous	
Serpentine	75	Olivine (+orthopyroxene?)	Core and rim textures, mesh texture.	Mesh textures preserved where olivine core remain.
Magnetite	4	Olivine (+orthopyroxene?)	Granular, anhedral	Anhedral in serpentine after olivine, granular in serpentine(?) after orthopyroxene.
Amphibole	5	Pyroxenes	Subhedral to lath-like	
Clays/oxyhydroxides	5	Olivine	Amorphous	Possibly Fe stained montmorillonite.

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
Carbonate		Granular	
Chlorite		Fibrous	Clusters of radiating, fibrous crystals in patches and bands.
Clays		Amorphous	

Veins are generally banded with discrete monomineralic bands and patches.

STRUCTURE

Crystal Plastic:
None visible in thin section.

Brittle:
None visible in thin section.

Foliation:
Weak foliation defined by parallel oriented magnetite veins and mesh cells.

Crosscutting Relationships (as are apparent in thin section):
1) Amphibole alteration
2) Serpentinization

THIN SECTION:	**209-1275D-10R-2, Piece14A, 88-91 cm**	**TS#297**	**Observer: NA, WB**
ROCK NAME:	**TROCTOLITE WITH GABBRO DIKE**		
GRAIN SIZE:	**Medium-grained**		
TEXTURE:	**Poikilitic**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
TROCTOLITE					
Olivine	3	88	<4	Subhedral to anhedral	
Orthopyroxene	1	3		Interstitial	
Clinopyroxene	1	2	<4	Interstitial	
Plagioclase	2	6	< 4	Interstitial	
Spinel	<1	1	0.5	Subhedral to euhedral	
GABBRO					

GENERAL COMMENTS Gabbro dike is totally altered, no primary mineralogy is preserved.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Serpentine	55	Olivine	Mesh texture	
Talc	15	Plagioclase, orthopyroxene	Fibrous	Mainly in magmatic vein. Some along orthopyroxene margins.
Chlorite	15	Plagioclase, pyroxene	Fibrous	After plagioclase in the troctolite, in the center of the magmatic vein.
Green amphibole	5	Plagioclase, pyroxene	Prismatic to acicular	Prismatic in center of magmatic vein. Acicular when intergrown with talc in magmatic vein margins.
Magnetite	1	Olivine	Anhedral, fine	Trains in serpentinized olivine.

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
Carbonate veins	1		

GENERAL COMMENTS A composite magmatic vein is completely chlorite-amphibole altered in the center and talc-altered along its margins. Talc veinlets splay off this vein. The magmatic veins are used and cut by carbonate veins.

STRUCTURE

Crystal Plastic:
Very minor crystal plastic deformation; undulose extinction and deformation bands in relict olivine.

Brittle:
Very minor semi-brittle and brittle deformation.
Fibrous amphibole veins across a shear zone accommodated semibrittle strain.

Foliation:
Moderate foliation in places defined by schistose amphibole.

Crosscutting Relationships (as are apparent in thin section):
1) Minor crystal plastic deformation
2) Serpentinization
3) Amphibole alteration and semi-brittle deformation
4) Carbonate veins

THIN SECTION:	**209-1275D-10R-2, Piece14A, 97-99 cm**	**TS#298**	**Observer: WB**
ROCK NAME:	**TROCTOLITE**		
GRAIN SIZE:	**Medium-grained**		
TEXTURE:	**Interstitial**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Olivine	0.5	86		Anhedral to subhedral	
Clinopyroxene	0.5	3	<5	Interstitial	
Orthopyroxene	0.5	2	<2	Interstitial	
Plagioclase	1	6	<5	Interstitial	
Spinel	<1	1	<1.2	Subhedral to euhedral	

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Serpentinite	80	Olivine		
Magnetite	1	Olivine		
Talc	2	Pyroxene		
Amphibole	5	Pyroxene		
Green to brown clay	5	Plagioclase, olivine		
Chlorite	4.5	Plagioclase		

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
Carbonate-clay vein network	2		

GENERAL COMMENTS

Centers of plgioclase grains are preserved. In addition to the typical coronitic replacement by chlorite and talc, plagioclase is altered to greenish-brown clay along the margins of the relicts. Olivine is completely altered to serpentine and trains of magnetite that form mesh textures. Irregular networks of carbonate-clay veinlets (high relief) cut the serpentinized olivine grains and follow former plagioclase-olivine grain boundaries.

STRUCTURE

Crystal Plastic:
None visible in thin section.

Brittle:
None visible in thin section.

Foliation:
None visible in thin section.

Crosscutting Relationships (as are apparent in thin section):

1) Serpentinization
2) Talc alteration

THIN SECTION:	**209-1275D-11R-1, Piece2, 5-10 cm**	**TS#299**	**Observer: NA, WB**
ROCK NAME:	**TROCTOLITE**		
GRAIN SIZE:	**Medium-grained**		
TEXTURE:	**Interstitial**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Olivine	1.5	85	<8	Subhedral to euhedral	
Orthopyroxene	0.5	3	<4	Interstitial	
Clinopyroxene	0.5	4	<3	Interstitial	
Plagioclase	0.5	7	<4	Interstitial	
Spinel	1	1	<2	Subhedral to euhedral	

GENERAL COMMENTS Interstitial plagioclase and pyroxenes concentrate in the center of this thin section.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Serpentine	80	Olivine		Mesh to ribbon textures.
Talc	2.5	Pyroxene	Fibrous	In margin of felsic vein. After pyroxene in the troctolite.
Chlorite	2.5	Pyroxene, plagioclase	Fibrous	In center of felsic vein. After plagioclase in troctolite.
Magnetite	1	Olivine	Anhedral, fine	In mesh-rims.
Amphibole	4.5	Pyroxene	Prismatic to fibrous	In center of felsic vein. After pyroxene in troctolite.
Clay	4.5	Plagioclase, pyroxene	Fibrous, amorphous	Along felsic vein, altering plagioclase relicts in troctolite (brown in TS, white in hand specimen).

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
Serpentine veins as cross-fractures to magmatic vein			

GENERAL COMMENTS
There is a 8-mm wide composite magmatic vein with a clay-altered halo developed along one edge of the slide.
The center of the vein is altered to chlorite and coarse amphibole. The margins are altered to talc.
The distribution of plagioclase and pyroxene is patchy. Plagioclase relicts are partly altered to chlorite and show late-stage clay alteration.

STRUCTURE

Crystal Plastic:
Very minor crystal plastic deformation; undulose extinction of olivine, deformation twins in one plagioclase grain.

Brittle:
Minor semibrittle deformation; schistose chlorite along one margin of slide accommodates low temperature strain.

Foliation:
Moderate foliation in zone of schistose chlorite, no foliation over bulk of thin section.

Crosscutting Relationships (as are apparent in thin section):
1) Weak ductile deformation
2) Serpentinization
3) semibrittle deformation of chlorite schist

THIN SECTION:	**209-1275D-11R-1, Piece12C, 120-124 cm**	**TS#300**	**Observer: NA, JH**
ROCK NAME:	**TROCTOLITE WITH GABBRO**		
GRAIN SIZE:	**Medium-grained**		
TEXTURE:	**Interstitial**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
TROCTOLITE					
Olivine	2	80		Subhedral	
Orthopyroxene	2	7	< 4	Interstitial	
Clinopyroxene	2	4	<4	Interstitial	
Plagioclase	3	8	<3	Interstitial	
Spinel	<1	1	<1	Subhedral to euhedral	
GABBRO					

GENERAL COMMENTS Gabbro dike, possibly plagioclase, is totally altered.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
TROCTOLITE				
Chlorite	5	Plagioclase	Fibrous	Patches of radiating clusters of fibers and fringes around partially altered plagioclase.
Serpentine	48	Olivine	Core and rim	Some core and rim structures remain although some ribbon textures.
Magnetite	2	Olivine, orthopyroxene	Anhedral with serpentine after olivine and with talc after orthopyroxene.	
Amphibole	2	Pyroxene	Small laths	
Talc	3	Orthopyroxene		
GABBRO				
Talc	15	Pyroxenes		Patchy, microgranular to scaly.
Amphibole	3	Acicular to euhedral lozenges		Acicular within talc patches, lozenge shaped when associated with chlorite patches.
Chlorite	12	Fibrous		

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
Serpentine		Cross fiber chrysotile	

STRUCTURE

Crystal Plastic:
Very minor crystal plastic deformation; undulose extinction of olivine, deformation twins in one plagioclase grain.

Brittle:
None visible in thin section.

Foliation:
None visible in thin section.

Crosscutting Relationships (as are apparent in thin section):
1) Weak ductile deformation
2) Serpentinization
3) Amphibole alteration of magmatic veins
4) Talc alteration and veining

THIN SECTION:	**209-1275D-12R-2, Piece8, 46-49 cm**	**TS#301**	**Observer: WB, AC**
ROCK NAME:	**OXIDE GABBRO**		
GRAIN SIZE:	**Fine-grained**		
TEXTURE:	**Granular**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	45	50	0.5-2	Subhedral to anhedral	
Clinopyroxene	20	38	0.2-0.3	Subhedral	
Amphibole	2	2	0.1-0.2	Subhedral	Primary?
Biotite	Trace	Trace	0.1	Interstitial	
Oxide	10	10	0.1-1	Interstitial	

GENERAL COMMENTS Bent plagioclase twinning indicates high temperature deformation.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Green amphibole	15	Clinopyroxene, plagioclase	Fibrous, felty	Abundant near amphibole veinlets.
Brown amphibole	4	Clinopyroxene	Euhedral	In patches.
Secondary plagioclase	1	Plagioclase		Along cracks, some with fluid inclusion trains.

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
Amphibole veinlets and amphibole-filled microcracks in plagioclase			

STRUCTURE

Crystal Plastic:
Very minor crystal plastic deformation; plagioclase has undulose extinction and deformation twins with some minor subgrain formation.
Very few neoblasts are present, no significant recrystallization.

Brittle:
Very minor fracturing, fractures filled with green amphibole; amphibole veins are not deformed.

Foliation:
Weak foliation is defined by shape preferred orientation of plagioclase and amphibole grains, may be a magmatic foliation.

Crosscutting Relationships (as are apparent in thin section): 1) Minor ductile deformation
2) Minor fractures filled with amphibole veins

THIN SECTION:	**209-1275D-13R-1, Piece 4, 18-21 cm**	**TS#302**	**Observer: JH, AC**
ROCK NAME:	**OXIDE GABBRO**		
GRAIN SIZE:	**Fine-grained**		
TEXTURE:	**Granular**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	45	55	0.2-5	Subhedral to euhedral	
Clinopyroxene	4	28	0.2-4	Anhedral	
Orthopyroxene	0	10	0.2-3	Anhedral	
Amphibole	2	2	0.2-0.1	Anhedral	
Oxide	5	5	0.2-1.5	Interstitial	

GENERAL COMMENTS
Bent twinning in plagioclase.
In thin section: grain size reduction from medium to very fine grained.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Secondary plagioclase	10	Plagioclase	Fringes, patches, neoblasts	Secondary fringes around euhedral to moderately resorbed grains (primary?), small interstitial patches, neoblasts at interpenetrating plagioclase/plagioclase contacts.
Green amphibole	24	Pyroxenes	Microgranular to fine grained, acicular	Microgranular/acicular in former pyroxene centers, commonly acicular around margins.
Hematite	Trace		Amorphous/staining	

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**

STRUCTURE

Crystal Plastic:
Minor crystal plastic deformation through most of thin section; plagioclase has undulose extinction and deformation twins with some minor subgrain formation.
Shear zone along edge of slide contains minor to moderate crystal plastic deformation textures; grain size was reduced by a combination of minor recrystallization and cataclasis.

Brittle:
Minor fracturing across bulk of thin section; shear zone along one edge has significant fracturing and grain size reduction of plagioclase and amphibole by fracturing plagioclase appears to have been fracturing during late stages of crystal plastic foliation to further reduce grain size.

Foliation:
None visible in thin section.

Crosscutting Relationships (as are apparent in thin section):
1) Minor ductile deformation
2) Brittle and minor ductile deformation within shear zone
3) Amphibole filled fractures
4) Static alteration

THIN SECTION:	**209-1275D-13R-2, Piece 1B, 45-48 cm**	**TS#303**	**Observer: NA**
ROCK NAME:	**OXIDE GABBRO**		
GRAIN SIZE:	**Fine- to medium-grained**		
TEXTURE:	**Foliated**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	32	45	0.2-5	Subhedral to euhedral	
Clinopyroxene	20	40	0.2-4	Anhedral	
Orthopyroxene	5	10	0.2-3	Anhedral	
Oxide	5	5	0.2-1.5	Interstitial	

GENERAL COMMENTS Alternates bands of fine and medium grained gabbro. Moderately well developed foliation.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Green amphibole	25	Clinopyroxene, plagioclase	Fibrous, prismatic	
Brown amphibole	6	Clinopyroxene	Euhedral	
Chlorite/smectite	2	Plagioclase	Fibrous	In patches with carbonate.
Carbonate	4	Plagioclase	Anhedral	In patches.
Sphene	1	FeTi-oxide	Anhedral	Intergrwon with ilmenite and magnetite.
Secondary plagioclase	4	Plagioclase		Along margins and cracks.

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
Minor carbonate and amphibole veining.			

STRUCTURE

Crystal Plastic:
Moderate ductile deformation, partial recrystallization of plagioclase to coarse polygonal neoblasts.

Brittle:
Brittle overprint during late stages of ducile deformation; fracruing and additional brittle grainsize reduction.
Trhough running brittle fractures are filled with amphibole; amphibole in fractures is undeformed.

Foliation:
Weak foliation defined by shear texture of recrystallized plagioclase.

Crosscutting Relationships (as are apparent in thin section):
1) Ducile deformation
2) Minor brittle deformation
3) Shear fractures filled with amphibole
4) Static alteration

THIN SECTION:	**209-1275D-13R-2, Piece 9, 117-119 cm**	**TS#304**	**Observer: JH**
ROCK NAME:	**OXIDE GABBRO**		
GRAIN SIZE:	**Medium to coarse**		
TEXTURE:	**Foliated**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	15	50	0.02-12	Anhedral	
Clinopyroxene	14	45	0.01-4	Anhedral	
Oxide	5	5	0.01-4	Interstitial	
Zircon	1	1	<0.1	Euhedral	

GENERAL OMMENTS Well developed foliation.
Neoblasts of plagioclase developed in gabbro

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Secondary plagioclase	35	Plagioclase	Neoblasts after primary plagioclase	
Green amphibole	28	Pyroxenes	Subhedral to anhedral	
Iron oxyhydroxides	Trace		Amorphous/staining	
Clay?	2?	Plagioclase	Microgranular	

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
Amphibole		Microgranular	
Hematite		Microgranular	

STRUCTURE

Crystal Plastic:
Very minor crystal plastic deformation; undulose extinction and deformation twins in plagioclase, some minor recrystallization in a few locations.
Grain size variations in plagioclase appear to be a function of igneous grain size variations rather than recrystallization in most locations.

Brittle:
Minor fracturing of plagioclase both on short fractures confined to grains, and through-running fractures that form conjugate pairs across the sample.
No grain size reduction by fracturing; Major fractures are filled with amphibole.

Foliation:
Weak foliation defined by shape preferred orientation of plagioclase, appears to be a magmatic foliation.

Crosscutting Relationships (as are apparent in thin section):
1) Minor ductile deformation
2) Minor fracturing
3) Static alteration

THIN SECTION:	**209-1275D-15R-2, Piece 1, 9-11 cm**	**TS#305**	**Observer: JH, NA**
ROCK NAME:	**OXIDE GABBRONORITE**		
GRAIN SIZE:	**Fine-grained**		
TEXTURE:	**Foliated**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	48	50	<1	Subhedral to euhedral	
Clinopyroxene	15	32	<1	Anhedral	
Orthopyroxene	4	8	<1	Anhedral	
Oxide	10	10	0.2-1.5	Interstitial	

GENERAL COMMENTS Weakly foliated.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Green amphibole	20	Clinopyroxene	Anhedral, pseudomorphic	

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**

STRUCTURE

Crystal Plastic:
Very minor crystal-plastic deformation; undulose extinction and deformation twins in plagioclase; no recrystallization.

Brittle:
Very minor fracturing; no significant brittle deformation.

Foliation:
Very weak foliation defined by shape preferred orientation of plagioclase.

Crosscutting Relationships (as are apparent in thin section):
1) Minor ductile deformation
2) Very minor brittle deformation
3) static alteration

THIN SECTION:	**209-1275D-17R-1, Piece 13, 119-122 cm**	**TS#307**	**Observer: JH**
ROCK NAME:	**MICROGABBRO WITH HARZBURGITE XENOLITHS and GABBRO XENOCRYSTS**		
GRAIN SIZE:	**Very fine-grained (cataclasite) to medium-grained (clasts)**		
TEXTURE:	**Cataclastic**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Matrix					
Plagioclase	50	55	<0.1	Anhedral	
Pyroxene	10	42	<0.1	Anhedral	
Oxides	1	3	<0.1	Anhedral	

GENERAL COMMENTS Large plagioclase and pyroxene phenocrysts up to 8 mm.
A 1 cm clast of harzburgite is included in the cataclasite. Fresh olivine relics.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
GABBRO				
Green amphibole	8	Clinopyroxene	Anhedral, amorphous	
Secondary plagioclase	2	Plagioclase	Anhedral	Forms fringes around primary plagioclase veins.

THIN SECTION:	**209-1275D-16R-1, Piece 7A, 56-59 cm**	**TS#306**	**Observer: WB, NA**
ROCK NAME:	**MICROGABBRO TO GABBRO**		
GRAIN SIZE:	**Very fine- to medium-grained**		
TEXTURE:	**Foliated**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	45	45	0.01-5	Subhedral to euhedral	
Clinopyroxene	20	50	0.01-4	Anhedral	
Oxide	5	5	0.01-1.5	Interstitial	

GENERAL COMMENTS
Microgabbro and gabbro contact is preserved in thin section
Oxide-rich band in contact between microgabbro and fine-grained gabbro.
Microgabbro and fine-grained gabbro are well foliated.
Lamellar intergrowths of two pyroxenes in fine-grained gabbro.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Green amphibole	20	Clinopyroxene, plagioclase	Felty, acicular	Along cracks and grain boundaries after plagioclase. Along rims after clinopyroxene.
Brown amphibole	2	Clinopyroxene	Prismatic	
Chlorite/smectite	6	Plagioclase, clinopyroxene	Fibrous	Patchy, primarily along amphibole-chlorite/smectite vein.
Secondary plagioclase	2	Plagioclase		Along cracks and grain boundaries.
Titanite	<1	FeTi-oxide	Anhedral	

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
Green amphibole-chlorite/smectite vein		Acicular amphibole	1-2 mm wide.

GENERAL COMMENTS
Clinopyroxene is least altered in oxide rich bands in fine-grained gabbro.
There is a felsic plagioclase-quartz vein with minor alteration of plagioclase of carbonate.

STRUCTURE

Crystal Plastic:
Very minor crystal plastic deformation; undulose extinction in plagioclase, no dynamic recrystallization.
Grain size segregations are not related to crystal plastic deformation; appear to be a primary igneous fabric.

Brittle:
Very minor fracturing; Fractures are filled with green amphibole that is undeformed.

Foliation:
Weak foliation is defined by shape preferred orientation of plagioclase; appears to be a primary igneous fabric.

Crosscutting Relationships (as are apparent in thin section):
1) Minor crystal plastic deformation
2) Amphibole filled fractures
3) Static alteration

THIN SECTION:	**209-1275D-17R-1, Piece 13, 119-122 cm**	**TS#307**	**Observer: JH**	
ROCK NAME:	**MICROGABBRO WITH HARZBURGITE XENOLITHS and GABBRO XENOCRYSTS**			
GRAIN SIZE:	**Very fine-grained (cataclasite) to medium-grained (clasts)**			
TEXTURE:	**Cataclastic**			

MICROGABBRO				
Green amphibole	13	Clinopyroxene	Anhedral	Partial replacement of clinopyroxene grains.
HARZBURGITE/ TROCTOLITE				
Talc	12	Olivine	Microgranular to platy	Large areas of olivine replacement. Small areas slightly coarser than microgranular talc.
Magnetite/iron oxides	2	Olivine, orthopyroxene	Anhedral to euhedral	Forms rim around the whole harzburgite/troctolite domain, anhedral after olivine and orthopyroxene, rare euhedral grains.
Chlorite	<1	Plagioclase	Fibrous	Small patches of radiating fibrous needles and grains.

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
Amphibole			
Hematite			Tiny amphibole iron oxide veins

STRUCTURE

Crystal Plastic:
Only minor crystal plastic deformation is apparent in thin section; grain size segregations may be magmatic texture or result of brittle deformation of plagioclase.

Brittle:
Sample appears to have undergone significant semibrittle deformation during formation of green an brown amphibole.
Amphibole crystals are layered in foliation parallel schistose mats, finer grained amphiboles are associated with zone of stronger foliation.
Higher degrees of brittle fracturing of plagioclase are also associated with fine grained amphibole.

Foliation:
Moderate foliation over areas of sampled defined by fibrous amphibole and shape preferred orientation of plagioclase.

Crosscutting Relationships (as are apparent in thin section):
1) Weak ductile deformation
2) Semi-brittle and brittle deformation during amphibole alteration
3) Static alteration

THIN SECTION: 209-1275D-17R-2, Piece 15A, 91-93 cm TS#308 **Observer: WB, NA**
ROCK NAME: TROCTOLITE
GRAIN SIZE: Medium-grained
TEXTURE: Interstitial

PRIMARY MINERALOGY	MODE (Visual estimate) PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	MORPHOLOGY	COMMENTS
Olivine	<1	80	< 7	Subhedral to anhedral	
Orthopyroxene		6	< 5	Interstitial	
Clinopyroxene?		4	< 4	Interstitial	
Plagioclase		9	< 4	Interstitial	
Spinel	1	1	< 2	Subhedral to euhedral	

SECONDARY MINERALS	PERCENT PRESENT	REPLACING	MORPHOLOGY	COMMENTS
Serpentine	88	Olivine, orthopyroxene	Bastite after orthopyroxene	Ribbon texture.
Talc	1	Olivine	Fibrous	Selvages along chlorite patches.
Chlorite	5	Plagioclase	Fibrous	Patchy along margins of former plagioclase.
Amphibole	1	Pyroxene	Acicular	
Carbonate	3	Plagioclase	Anhedral	Patchy in cores of former plagioclase.
Magnetite	1	Olivine		
White mica	Trace	Plagioclase		

VEIN / FRACTURE FILLING	PERCENT PRESENT	MORPHOLOGY	COMMENTS
Serpentine	1		
Carbonate	4		Network, partly using serpentine veins.

GENERAL COMMENTS Plagioclase is replaced by chlorite along its margins. The cores are commonly replaced by carbonate during a later stage of alteration.

STRUCTURE

Crystal Plastic:
None visible in thin section.

Brittle:
Minor brittle fractures filled with talc.

Foliation:
Weak foliation defined by parallel magnetite veins in serpentine.

Crosscutting Relationships (as are apparent in thin section):
1) Serpentinization
2) Brittle fractures filled with talc veins

THIN SECTION:	**209-1275D-17R-3, Piece 2, 35-37 cm**	**TS#309**	**Observer: WB, NA**
ROCK NAME:	**TROCTOLITE/HARZBURGITE**		
GRAIN SIZE:	**Medium-grained**		
TEXTURE:	**Interstitial**		

MODE (Visual estimate)

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	MORPHOLOGY	COMMENTS
Olivine		86	< 6	Subhedral to anhedral	
Pyroxene		10	< 3	Interstitial	
Plagioclase		3	< 3	Interstitial	
Spinel	1	1	< 1.5	Subhedral to euhedral	

SECONDARY MINERALS	PERCENT PRESENT	REPLACING	MORPHOLOGY	COMMENTS
Serpentine	82	Olivine, orthopyroxene	Bastite after orthopyroxene	Ribbon texture.
Talc	1	Olivine	Fibrous	Selvages along chlorite patches.
Chlorite	2	Plagioclase	Fibrous	Patchy along margins of former plagioclase.
Amphibole	1	Pyroxene	Acicular	Patchy.
Carbonate	2	Plagioclase	Anhedral	Patchy in cores of former plagioclase.
Magnetite	1	Olivine		Trains in centers of ribbons.
Brown clay	10	Olivine, orthopyroxene		

VEIN / FRACTURE FILLING	PERCENT PRESENT	MORPHOLOGY	COMMENTS
Serpentine	1		
Carbonate	Trace		

GENERAL COMMENTS There is a small magmatic vein in the lower left corner of the TS that is completely altered to chlorite and amphibole.

STRUCTURE

Crystal Plastic:
None visible in thin section.

Brittle:
Minor late fractures filled with talc.

Foliation:
None visible in thin section.

Crosscutting Relationships (as are apparent in thin section):
1) Serpentinization
2) Talc filled fractures

THIN SECTION:	**209-1275D-18R-1, Piece 17B, 131-133 cm**	**TS#310**	**Observer: WB, NA**
ROCK NAME:	**OXIDE GABBRO**		
GRAIN SIZE:	**Medium- to coarse-grained**		
TEXTURE:	**Foliated**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	45	50	2.5-15	Euhedral	
Orthopyroxene	2	3	1	Ophitic	
Clinopyroxene	20	35	2-15	Subhedral	
Amphibole	Trace	Trace	1	Anhedral	
Oxides	12	12	< 15	Interstitial	

GENERAL COMMENTS
Oxides enriched in bands.
Reaction rim between plagioclase, pyroxenes and oxides

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Green amphibole	15	Clinopyroxene	Felty	
Brown amphibole	2	Clinopyroxene	Euhedral	Some could be magmatic.
Secondary plagioclase	1	Plagioclase		
Talc	1	Orthopyroxene	Fibrous	
Chlorite/smectite	1	Pyroxene, plagioclase	Fibrous	

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
Amphibole-chlorite/smectite vein 0.5 mm wide			
Amphibole-filled microcracks			

STRUCTURE

Crystal Plastic:
Very minor crystal plastic deformation; weak undulose extinction and deformation twins in plagioclase.

Brittle:
Minor shear fractures filled with amphibole.

Foliation:
None visible in thin section.

Crosscutting Relationships (as are apparent in thin section):
1) Very minor ductile deformation
2) Amphibole filled fractures

THIN SECTION:	**209-1275D-19R-1, Piece 13, 91-93 cm**	**TS#311**	**Observer: JH**
ROCK NAME:	**OXIDE GABBRO**		
GRAIN SIZE:	**Coarse-grained**		
TEXTURE:	**Foliated**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	55	60	< 15	Euhedral	Aspect ratio approximately 1:2.
Clinopyroxene	15	35	<15	Subhedral	
Amphibole	Trace	Trace	1	Anhedral	
Oxides	6	5	< 20	Interstitial	

GENERAL COMMENTS Well developed foliation.
Bent plagioclase twinning indicate high temperature deformation.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Green amphibole	20	Clinopyroxene, Brown amphibole?	Anhedral	
Secondary amphibole	3	Plagioclase	Neoblastic	Common in interpenetrating plagioclase/plagioclase contacts.

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**

STRUCTURE

Crystal Plastic:
Very minor crystal plastic deformation; weak undulose extinction and deformation twins in plagioclase.
A few neoblasts along the margins of two plagioclase grains.

Brittle:
Minor fracturing of plagioclase grains, some fractures filled with amphibole; amphibole veins are undeformed.

Foliation:
Weak foliation defined by shape preferred orientation of plagioclase; likely a magmatic foliation.

Crosscutting Relationships (as are apparent in thin section): 1) Very minor ductile deformation
2) Minor brittle fracturing

THIN SECTION:	**209-1275D-20R-1, Piece 2, 5-8 cm**	**TS#312**	**Observer: WB**
ROCK NAME:	**OXIDE GABBRO**		
GRAIN SIZE:	**Medium-grained**		
TEXTURE:	**Foliated**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	50	55	0.1-7	Subhedral	Aspect ratio 1:2.
Clinopyroxene	8	33	0.2-2.5	Anhedral	
Orthopyroxene	1	5	0.2-1	Anhedral	
Oxides	7	7	0.2-1.5	Interstitial	

GENERAL COMMENTS
Moderately well developed foliation.
Neoblasts of plagioclase are well developed.
A very fine-grained microgabbro layer (intrusion) is present in thin section and runs parallel to the foliation.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Green amphibole	25	Clinopyroxene	Felty, acicular	
Brown amphibole	5	Clinpopyroxene	Euhedral	
Secondary plagioclase	1	Plagioclase		
Chlorite/smectite	10	Clinopyroxene, plagioclase	Fibrous	

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
Chlorite/smectite-green amphibole veins			

GENERAL COMMENTS
Microgabbro intruded a medium-grained gabbro. The microgabbro appears more altered with large clinopyroxene crystals are completely altered to amphibole.

STRUCTURE

Crystal Plastic:
Minor to moderate crystal plastic deformation; minor undulose extinction and deformation twins in some grains;
some possible dynamic recrystallization in some locations.
Medium grained plagioclase grains are likely neoblasts resulting from crystal plastic deformation.
Areas of fine grained gabbro do not appear to be recrystallized neoblasts but primary igneous features or the result of magmatic deformation.

Brittle:
Minor fracturing of plagioclase grains, some fractures are filled with amphibole.

Foliation:
Moderate foliation defined by shape preferred orientation of plagioclase

Crosscutting Relationships (as are apparent in thin section):
1) Crystal plastic deformation
2) Weak shear fracturing
3) Static alteration

THIN SECTION:	**209-1275D-21R-1, Piece 8, 63-65 cm**	**TS#313**	**Observer: WB, NA**
ROCK NAME:	**DIABASE**		
GRAIN SIZE:	**Very fine-grained**		
TEXTURE:	**Diabasic**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	5	5	0.3-2.5	Subhedral to euhedral	
Olivine	1?	1?	0.2	Subhedral	
Matrix	85	95	0.1	Anhedral	Microlites of plagioclase and clinopyroxene.

GENERAL COMMENTS Plagioclase phenocrysts up to 2 mm account for 5% of the sample.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Green amphibole	10	Clinopyroxene, mesostasis	Fibrous	Very fine grained
Chlorite	10	Clinopyroxene, mesostasis	Fibrous	Very fine grained

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
Chlorite/smectite vein			

GENERAL COMMENTS Plagioclase phenocrysts are fresh.

STRUCTURE

Crystal Plastic:
None visible in thin section.

Brittle:
None visible in thin section.

Foliation:
None visible in thin section.

Crosscutting Relationships (as are apparent in thin section):

THIN SECTION:	**209-1275D-23R-2, Piece 6, 65-67 cm**	**TS#314**	**Observer: JH, NA**
ROCK NAME:	**MICROGABBRO**		
GRAIN SIZE:	**Very fine-grained**		
TEXTURE:	**Porphyritic**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	45	46	0.1-2	Subhedral to euhedral	
Clinopyroxene		45	0.1	Anhedral	
Amphibole	Trace	Trace	0.15	Anhedral	
Oxides	3	1	0.15	Anhedral	

GENERAL COMMENTS Large plagioclase crystals to 2 mm account for 3% of the sample.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Green amphibole	45	Clinopyroxene	Anhedral	
Talc	<1	Orthopyroxene	Microgranular	Patches interspersed with vermicular/irregular opaque minerals.
Opaque oxides	Trace	Orthopyroxene	Anhedral to vermicular	Associated with talc after orthopyroxene.
Secondary plagioclase	1	Plagioclase		
Chlorite	Trace	Plagioclase?	Fibrous	Radiating fibers of chlorite in small patches.

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
Amphibole		Fibrous	Extremely fine amphibole-rich vein.

STRUCTURE

Crystal Plastic:
Very minor crystal plastic deformation; undulose extinction and deformation twins in some plagioclase grains.

Brittle:
None visible in thin section.

Foliation:
None visible in thin section.

Crosscutting Relationships (as are apparent in thin section):
1) Minor crystal plastic deformation
2) Static alteration

THIN SECTION:	**209-1275D-24R-2, Piece 14, 128-131 cm**	**TS#315**	**Observer: WB, NA**
ROCK NAME:	**OXIDE GABBRO**		
GRAIN SIZE:	**Medium-grained**		
TEXTURE:	**Granular**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	40	45	2.5-7	Euhedral	Aspect ratio approximately 1:2.
Orthopyroxene	2	5	1	Ophitic	
Clinopyroxene	25	42	2-5	Subhedral	
Amphibole	Trace	Trace	1	Anhedral	
Oxides	6	6	< 7	Interstitial	

GENERAL COMMENTS
Moderately developed foliation.
Bent plagioclase twinning.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Green amphibole	20	Clinopyroxene, plagioclase	Felty, acicular in patches	Along cracks in plagioclase.
Brown amphibole	2	Clinopyroxene	Euhedral	Some could be magmatic.
Secondary plagioclase	2	Plagioclase		Along cracks.
Chlorite/smectite	2	Pyroxene, plagioclase	Fibrous	

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
Green amphibole-chlorite/smectite veins	1	Fibrous	1 mm wide

STRUCTURE

Crystal Plastic:
Very minor crystal plastic deformation; undulose extinction and deformation twins in some plagioclase grains.

Brittle:
Minor brittle shear fractures; some filled with amphibole.

Foliation:
None visible in thin section.

Crosscutting Relationships (as are apparent in thin section):
1) Minor crystal plastic deformation
2) Minor brittle fracturing
3) Static alteration

THIN SECTION:	**209-1275D-25R-2, Piece 1, 42-45 cm**	**TS#316**	**Observer: JH, NA**
ROCK NAME:	**OXIDE GABBRO**		
GRAIN SIZE:	**Coarse- to medium-grained**		
TEXTURE:	**Granular**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	55	55	2.5-7	Euhedral	Aspect ratio approximately 1:2.
Orthopyroxene	3	4	1	Ophitic	
Clinopyroxene	27	35	2-5	Subhedral	
Amphibole	Trace	Trace	1	Anhedral	
Oxides	6	6	< 7	Interstitial	

GENERAL COMMENTS
Weakly foliated.
Bent plagioclase twinning.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Secondary plagioclase	1	Plagioclase	Neoblastic	
Green amphibole	8	Clinopyroxene	Anhedral	

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
No veins.			

STRUCTURE

Crystal Plastic:
Very minor crystal plastic deformation; undulose extinction and deformation twins in some plagioclase grains.

Brittle:
Minor brittle shear fractures; some filled with amphibole.

Foliation:
None visible in thin section.

Crosscutting Relationships (as are apparent in thin section):
1) Minor crystal plastic deformation
2) Minor brittle fracturing
3) Static alteration

THIN SECTION:	**209-1275D-27R-1, Piece 4A, 26-28 cm**	**TS#317**	**Observer: NA, WB**
ROCK NAME:	**OXIDE GABBRO**		
GRAIN SIZE:	**Fine- to medium-grained**		
TEXTURE:	**Granular**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	50	52	0.5-5	Euhedral to subhedral	Aspect ratio approximately 1:2.
Orthopyroxene	1	3	1	Ophitic	
Clinopyroxene	20	35	1-3	Subhedral	
Oxides	10	10	< 5	Interstitial	

GENERAL COMMENTS Weakly foliated.
Two pyroxenes intergrowth

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Green amphibole	15	Clinopyroxene, plagioclase	Fibrous, felty	
Brown amphibole	1	Clinopyroxene	Euhedral	In patches
Chlorite/smectite	2	Plagioclase, clinopyroxene	Fibrous	In patches
Secondary plagioclase	1	Plagioclase		Along cracks

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
Green amphibole	1	Straight	Rock alteration highest along this vein.

STRUCTURE

Crystal Plastic:
Very minor crystal plastic deformation; undulose extinction and deformation twins in some plagioclase grains.
Some very minor dynamic recrystallization along the margins of plagioclase grains.

Brittle:
Minor brittle shear fractures; some filled with amphibole.

Foliation:
None visible in thin section.

Crosscutting Relationships (as are apparent in thin section):
1) Minor crystal plastic deformation
2) Minor brittle fracturing
3) Static alteration

THIN SECTION:	**209-1275D-27R-2, Piece 2B, 37-40 cm**	**TS#318**	**Observer: NA, WB**
ROCK NAME:	**GABBRO**		
GRAIN SIZE:	**Fine- to medium-grained**		
TEXTURE:	**Foliated**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	70	75	< 9	Anhedral	Zoning
Orthopyroxene	1	3	<0.5	Ophitic	
Clinopyroxene	5	20	<3	Anhedral	Two pyroxenes intergrowth and twinning.
Oxides	2	2	< 7	Interstitial	
Zircon	Trace	Trace	0.05	Euhedral	

GENERAL COMMENTS Well foliated.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Green amphibole	20	Clinopyroxene, plagioclase	Fibrous, felty	
Brown amphibole	Trace	Clinopyroxene	Euhedral	In patches
Chlorite/smectite	5	Plagioclase, clinopyroxene	Fibrous	In patches
Secondary plagioclase	15	Plagioclase		Neoblasts

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
No Veins.			

GENERAL COMMENTS Turbid plagioclase neoblasts were considered secondary.

STRUCTURE

Crystal Plastic:
Moderate crystal plastic deformation; Undulose extinction and recrystallization of plagioclase to very fine neoblasts around the margins of larger grains.

Brittle:
Moderate brittle fracturing of plagioclase and amphibole; shear fractures cut most grains but do not appear to significantly reduce grain size.

Foliation:
Weak foliation defined by shape preferred orientation of plagioclase.

Crosscutting Relationships (as are apparent in thin section):
1) Crystal plastic deformation
2) Brittle fracturing
3) Static alteration

THIN SECTION:	**209-1275D-29R-1 Piece 7, 69-72 cm**	**TS#319**	**Observer: ET, WB**
ROCK NAME:	**GABBRONORITE AND GRANOPHYRE DIKE**		
GRAIN SIZE:	**Fine-/Medium-grained**		
TEXTURE:	**Granular**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
GABBRONORITE					
Plagioclase	35	50	0.1-1	Subhedral to anhedral	
Clinopyroxene	7	36	0.05-0.1	Anhedral	
Orthopyroxene	2	10	0.05-0.1	Anhedral	
Amphibole	1	1.5	0.1-0.4	Anhedral	
Oxide	2	3	0.1-2	Subhedral to anhedral	
GRANOPHYRE					
Plagioclase	30	35	1-7	Euhedral to subhedral	
Alkali-feldspar	25	30	1-3	Anhedral	
Quartz	10	30	0.5-1	Interstitial, Anhedral	
Amphibole	0	5	1-2	Interstitial, Anhedral	
Oxide	Trace	Trace	0.5-2	Interstitial	

GENERAL COMMENTS

Fine-grained gabbro is cut by coarse-grained granophyric dike.
Amphiboles replace large amount of pyroxenes that creates uncertainty in estimating original percent of pyroxenes.
A 1-cm-wide patch of quartz aggregation in granophyre.
Plagioclase in the granophyre is: 1) blocky (almost square; 2) Sieve textured with abundant fluid inclusions, 3) strongly optically zoned not always concentrically.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
GABBRONORITE				
Green amphibole	25	Clinopyroxene, plagioclase	Fibrous, felty	
Brown amphibole	5	Clinopyroxene	Subhedral	
Chlorite/smectite	5	Plagioclase, clinopyroxene	Fibrous	In patches.
Secondary plagioclase	10	Plagioclase		Along cracks and grain boundaries.
GRANOPHYRE				
Carbonate	3	Feldspar	Blocky	In patches.
Oxides	2	Feldspar		Very fine, mainly in K-feldspar.
Clay	4	Feldspar		Very fine, mainly in K-feldspar.
Green amphibole	5	Amphibole	fibrous to prismatic	Pseudomorphing hornblende?

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
Brown clay veinlet following granophyre vein			

STRUCTURE

Crystal Plastic:
Very minor crystal plastic deformation; undulose extinction and deformation twins in some plagioclase grains.
Some very minor dynamic recrystallization along the margins of plagioclase grains.
Grain size segregations appear to be primary magmatic features.

Brittle:
Minor brittle shear fractures; some filled with amphibole.

Foliation:
None visible in thin section.

Crosscutting Relationships (as are apparent in thin section):

1) Minor crystal plastic deformation
2) Minor brittle fracturing
3) Static alteration

THIN SECTION:	**209-1275D-30R-2, Piece 1, 6-9 cm**	**TS#320**	**Observer: NA, WB**
ROCK NAME:	**OXIDE GABBRO**		
GRAIN SIZE:	**Coarse-grained**		
TEXTURE:	**Granular**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	42	45	<12	Subhedral to interstitial	Zoning
Orthopyroxene	2	4	<0.5	Ophitic	
Clinopyroxene	15	35	<7	Anhedral	Two pyroxenes intergrowth and twinning.
Oxides	15	15	<8	Subhedral to interstitial	

GENERAL COMMENTS Well foliated.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Green amphibole	10	Clinopyroxene, plagioclase	Fibrous, felty	
Brown amphibole	4	Clinopyroxene	Euhedral to subhedral	In patches, some could be primary.
Chlorite/smectite	4	Plagioclase, clinopyroxene	Fibrous	In patches.
Secondary plagioclase	2	Plagioclase		Along cracks.

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
Green amphibole veinlet	1	Fibrous	

STRUCTURE

Crystal Plastic:
Very minor crystal plastic deformation; undulose extinction and deformation twins in some plagioclase grains.

Brittle:
Very few brittle fractures.

Foliation:
None visible in thin section.

Crosscutting Relationships (as are apparent in thin section):
1) Minor crystal plastic deformation
2) Minor brittle fracturing
3) Static alteration

THIN SECTION:	**209-1275D-30R-2, Piece 6, 43-47 cm**	**TS#321**	**Observer: NA, WB**
ROCK NAME:	**OXIDE GABBRO WITH GRANOPHYRE**		
GRAIN SIZE:	**Fine- to medium-grained**		
TEXTURE:	**Foliated**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	34	45	0.01-7	Subhedral to euhedral	
Orthopyroxene	1	3	< 1.5	Anhedral	
Clinopyroxene	15	40	0.02-3	Anhedral	Two pyroxenes intergrowth.
Amphibole	Trace	Trace	0.5	Anhedral	
Oxides	6	6	< 2	Interstitial	Small chromian spinel grains in granophyre.
Biotite	Trace	Trace	< 3	Subhedral	In granophyre.
Quartz	6	6	< 0.6	Subhedral	In granophyre.
Zircon	Trace	Trace	< 0.1	Euhedral	In granophyre.

GENERAL COMMENTS Well foliated.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Green amphibole	12	Clinopyroxene, plagioclase	Fibrous, felty	Intergrown with chlorite/smectite after plagioclase.
Brown amphibole	5	Clinopyroxene	Euhedral to subhedral	Along pyroxene margins, and single euhedral crystals in granophyre that could be primary.
Chlorite/smectite	4	Plagioclase, clinopyroxene	Fibrous	In patches, mostly after plagioclase in granophyre.
Secondary plagioclase	10	Plagioclase		Turbid, small crystals and along cracks of large crystals.

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
No metamorphic veins.			

STRUCTURE

Crystal Plastic:
Minor crystal plastic deformation; undulose extinction and subgrain boundaries in plagioclase and quartz; some minor recrystallization of these phases in a few locations.

Brittle:
Minor fracturing of plagioclase and quartz, no grain size reduction.

Foliation:
Moderate foliation defined by shape preferred orientation of pyroxene and plagioclase, appears to be a magmatic fabric.

Crosscutting Relationships (as are apparent in thin section):
1) Minor ductile deformation
2) Minor fracturing
3) Static alteration

THIN SECTION:	**209-1275D-31R-3 Piece 2A, 85-87 cm**	**TS#322**	**Observer: ET, WB**
ROCK NAME:	**GABBRONORITE**		
GRAIN SIZE:	**Coarse-grained**		
TEXTURE:	**Granular**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	50	60	1-10	Euhedral to subhedral	
Clinopyroxene	15	27	1-10	Anhedral	Blebs of orthopyroxenes.
Orthopyroxene	6	10	1-10	Anhedral	Blebs of clinopyroxenes.
Oxide	2	3	1-3	Subhedral to interstitial	
Amphibole	0.3	0.5	1	Anhedral	Replacing pyroxenes.

GENERAL COMMENTS
Coarse grained gabbronorite with granular texture.
Euhedral rectangular plagioclases are filled with pyroxenes and oxide interstices.
No distinct foliation.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Green amphibole	13	Pyroxene, plagioclase	Fibrous, felty	Patchy.
Brown amphibole	2	Pyroxene	Euhedral	Along pyroxene margins.
Chlorite/smectite	3	Plagioclase, clinopyroxene	Fibrous	In patches and cracks in plagioclase.
Secondary plagioclase	8	Plagioclase		Along cracks and margins.

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
Chlorite/smectite veinlets	0.5	Fibrous	

STRUCTURE

Crystal Plastic:
Very minor crystal plastic deformation; undulose extinction and deformation twins in plagioclase.

Brittle:
Very minor fracturing.

Foliation:
None visible in thin section.

Crosscutting Relationships (as are apparent in thin section):
1) Minor ductile deformation
2) Minor fracturing
3) Minor static alteration

THIN SECTION:	**209-1275D-33R-1, Piece 3A, 22-24 cm**	**TS#323**	**Observer: WB**
ROCK NAME:	**OLIVINE MICROGABBRO**		
GRAIN SIZE:	**Fine-grained**		
TEXTURE:	**Granular**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	10	44	0.2-3	Subhedral to euhedral	
Olivine	10	44	0.2-3	Subsequent-anhedral	
Clinopyroxene	3	10	0.1-2	Anhedral to interstitial	
Amphibole	1	1	0.1-0.2	Subhedral	Primary?
Biotite	Trace?	Trace?	0.1		
Oxide	1	1	0.01-0.5	Subhedral to euhedral	

GENERAL COMMENTS Olivine microgabbro with no distinct foliation.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Green amphibole	25	Clinopyroxene, olivine, plagioclase	Acicular	With talc.
Brown amphibole	1	Clinopyroxene	Euhedral	Along margins.
Chlorite	3	Plagioclase, olivine	Fibrous	In patches.
Secondary plagioclase	10	Plagioclase		Along cracks and margins.
Talc	15	Olivine, plagioclase	Fibrous	With green amphibole and magnetite.
Magnetite	1	Olivine	Subhedral	With talc.

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
No veins.			

STRUCTURE

Crystal Plastic:
Very minor crystal plastic deformation; undulose extinction and deformation twins in plagioclase, faint undulose extinction in relict olivine.

Brittle:
Very minor fracturing; random orientation of late alteration phases suggests limited low-temperature deformation.

Foliation:
None visible in thin section.

Crosscutting Relationships (as are apparent in thin section):
1) Minor ductile deformation
2) Minor fracturing
3) Minor static alteration

THIN SECTION:	**209-1275D-34R-2, Piece 1E, 54-57 cm**	**TS#324**	**Observer: WB**
ROCK NAME:	**OXIDE GABBRO**		
GRAIN SIZE:	**Fine- to coarse-grained**		
TEXTURE:	**Foliated**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	45	55	0.1-10	Subhedral to euhedral	
Clinopyroxene	20	35	0.1-5	Oikocryst	
Orthopyroxene	1	2	<2	Interstitial	
Amphibole	1	3	<3	Oikocryst	
Oxide	5	5	<3	Interstitial	

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Green amphibole	15	Clinopyroxene, plagioclase	Fibrous, felty	Along cracks and margins after plagioclase.
Brown amphibole	1	Clinopyroxene	Euhedral	In patches.
Chlorite/smectite	5	Plagioclase, clinopyroxene	Fibrous	In patches.
Secondary plagioclase	2	Plagioclase		Along cracks.

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
Quartz-green-amphibole veinlet	0.2		

STRUCTURE

Crystal Plastic:
Very minor crystal plastic deformation; undulose extinction and deformation twins in plagioclase.

Brittle:
Very minor fracturing, most fractures are short and confined to individual plagioclase grains.

Foliation:
Moderate foliation defined by shape preferred orientation of elongate plagioclase; appears to be a magmatic foliation.

Crosscutting Relationships (as are apparent in thin section):
1) Minor ductile deformation
2) Minor fracturing

THIN SECTION:	**209-1275D-34R-3 Piece 3A, 54-57 cm**	**TS#325**	**Observer: ET, WB**
ROCK NAME:	**OXIDE GABBRONORITE**		
GRAIN SIZE:	**Fine/Medium-grained**		
TEXTURE:	**Granular**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
	F / M	F / M	F / M		
Plagioclase	55	60	0.1-2 / 2-5	Euhedral to subhedral	
Clinopyroxene	12	20	0.2-1 / 1-4	Anhedral	Blebs of orthopyroxenes.
Orthopyroxene	10	15	0.3-1.2 / 1-5	Anhedral	Blebs of clinopyroxenes.
Oxide	5	5	0.3-1 / 1-4	Subhedral to interstitial	
Amphibole	0.3	0.5	0.1-0.5 / 0.5-1	Anhedral	Primary or replacing pyroxenes.

GENERAL COMMENTS

2 cm wide fine grained domain is sandwiched in a medium grained domain with a sharp contact.
Distinct foliation is present in fine grained domain parallel to the contact.
Weak foliation is observed in medium grained domain parallel to the contact.
Oxide fills embayments in pyroxene and plagioclase.
Bent twinning in plagioclase indicates high temperature deformation.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Green amphibole	15	Clinopyroxene, plagioclase	Acicular	Rimming clinopyroxene or pseudomorphic orthopyroxene. Along cracks after plagioclase.
Brown amphibole	1	Clinopyroxene	Subhedral	Small grains.
Talc	3	Orthopyroxene	Fibrous	Patchy.
Secondary plagioclase	1	Plagioclase		Along grain boundaries.

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
No veins.			

STRUCTURE

Crystal Plastic:
Very minor crystal plastic deformation; undulose extinction and deformation twins in plagioclase.

Brittle:
Very minor fracturing, most fractures are short and confined to individual plagioclase grains.

Foliation:
Weak foliation defined by shape preferred orientation of elongate plagioclase; appears to be a magmatic foliation.

Crosscutting Relationships (as are apparent in thin section):

1) Minor ductile deformation
2) Minor fracturing
3) Static alteration

THIN SECTION:	**209-1275D-35R-2, Piece 3c, 47-49 cm**	**TS#326**	**Observer: NA, JH**
ROCK NAME:	**GABBRO**		
GRAIN SIZE:	**Coarse-grained**		
TEXTURE:	**Granular**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	70	75	<20	Subhedral to euhedral	With oxide lamellae, zoning.
Clinopyroxene	12	22	<10	Anhedral	Two pyroxenes intergrowth and twinning.
Oxides	3	3	<2	Subhedral to interstitial	

GENERAL COMMENTS Very coarse-grained.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Secondary plagioclase	4	Plagioclase	Neoblastic	Forms mostly around grain boundaries and at plagioclase/plagioclase interpenetrating contacts.
Green amphibole	10	Clinopyroxene	Granular to pseudomorphic	
Chlorite/smectite	1	Plagioclase	Microgranular	Occasional regular shaped pockets of fine grained aggregates after plagioclase.

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
No veins.			

STRUCTURE

Crystal Plastic:
Minor crystal plastic deformation; undulose extinction and deformation twins in plagioclase.
Partial recrystallization of several large plagioclase grains; no significant grain size reduction.

Brittle:
Very minor fracturing, many fractures are short and confined to individual plagioclase grains.
Through-running fractures are filled with amphibole; no grain size reduction by fracturing.

Foliation:
None visible in thin section.

Crosscutting Relationships (as are apparent in thin section):
1) Minor ductile deformation
2) Minor fracturing
3) Static alteration

THIN SECTION:	**209-1275D-35R-2, Piece 3e, 67-70 cm**	**TS#327**	**Observer: NA, JH**
ROCK NAME:	**GABBRO**		
GRAIN SIZE:	**Coarse-grained**		
TEXTURE:	**Granular**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	48	50	<20	Euhedral to subhedral	With oxide lamellae, zoning.
Orthopyroxene	Trace	Trace	< 1	Subhedral	
Clinopyroxene	30	45	<10	Anhedral	Two pyroxenes intergrowth and twinning.
Oxides	3	5	<2	Interstitial	

GENERAL COMMENTS Well foliated.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Secondary plagioclase	2	Plagioclase		
Green amphibole	15	Clinopyroxene	Anhedral	Exploiting cleavage and grain boundaries.

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
No veins.			

STRUCTURE

Crystal Plastic:
Very minor crystal plastic deformation; undulose extinction and deformation twins in plagioclase.

Brittle:
Minor fracturing, most fractures are short and confined to individual plagioclase grains.

Foliation:
Weak foliation defined by shape preferred orientation of elongate plagioclase; appears to be a magmatic foliation.

Crosscutting Relationships (as are apparent in thin section):
1) Minor ductile deformation
2) Minor fracturing
3) Static alteration

THIN SECTION:	**209-1275D-35R-4, Piece 1C, 42-44 cm**	**TS#328**	**Observer: AC, JH**
ROCK NAME:	**OLIVINE MICROGABBRO**		
GRAIN SIZE:	**Fine-grained**		
TEXTURE:	**Granular**		

MODE (Visual estimate)

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	MORPHOLOGY	COMMENTS
Plagioclase	30	44	0.2-3	Subhedral to euhedral	
Olivine	35	44	0.2-3	Subsequent-Anhedral	
Clinopyroxene	7	10	0.1-2	Anhedral to interstitial	
Amphibole	1	1	0.1-0.2	Subhedral	Primary?
Biotite	Trace?	Trace?	0.1		
Oxide	1	1	0.01-0.5	Subhedral to euhedral	

GENERAL COMMENTS

Rather fresh olivine.
Plagioclase seems to be an interstitial phase in the rock, however some crystals are well developed and their shape is subhedral.
Reaction rind between plagioclase, olivine and pyroxene.

SECONDARY MINERALS	PERCENT PRESENT	REPLACING	MORPHOLOGY	COMMENTS
Secondary plagioclase	10	Plagioclase	Neoblastic	
Green amphibole	10	Olivine, clinopyroxene	Acicular, granular	
Talc	4	Olivine, orthopyroxene	Microgranular	Fringes around olivine grains, also associated with opaque oxides (possibly after orthopyroxene??)
Chlorite	2	Plagioclase	Fibrous	Patches of fibrous chlorite (possibly after plagioclase??)

VEIN / FRACTURE FILLING	PERCENT PRESENT	MORPHOLOGY	COMMENTS
No veins			

STRUCTURE

Crystal Plastic:
Very minor crystal plastic deformation; undulose extinction and deformation twins in plagioclase.
Minor undulose extinction in relict olivine.

Brittle:
Minor fracturing, most fractures are short and confined to individual plagioclase grains.
Random orientation of alteration minerals suggests limited low temperature alteration.

Foliation:
None visible in thin section.

Crosscutting Relationships (as are apparent in thin section):

1) Minor ductile deformation
2) Minor fracturing
3) Static alteration

THIN SECTION:	**209-1275D-33R-2, Piece 3, 66-68 cm**	**TS#329**	**Observer: NA**
ROCK NAME:	**OLIVINE MICROGABBRO**		
GRAIN SIZE:	**Fine-grained**		
TEXTURE:	**Granular**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	10	44	0.2-3	Subhedral to euhedral	
Olivine	15	44	0.2-3	Subsequent-Anhedral	
Clinopyroxene	5	10	0.1-2	Anhedral to interstitial	
Amphibole	1	1	0.1-0.2	Subhedral	Primary?
Biotite	Trace?	Trace?	0.1		
Oxide	1	1	0.01-0.5	Subhedral to euhedral	

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Green amphibole	20	Olivine, clinopyroxene, plagioclase		
Secondary plagioclase	20	Plagioclase	Anhedral fringes and pockets	Fringes around relicts of primary plagioclase. Pockets of chlorite/ secondary plagioclase completely replace some grains.
Talc	17	Olivine	Microgranular	Present in fringes and more pervasive alteration with amphibole and opaque oxides.
Opaque oxides	2	Olivine	Subhedral	Associated with talc and amphibole after olivine.
Chlorite	9	Plagioclase		

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
No veins.			

STRUCTURE

Crystal Plastic:
Very minor crystal plastic deformation; undulose extinction and deformation twins in plagioclase.
Minor undulose extinction in relict olivine.

Brittle:
Minor fracturing, most fractures are short and confined to individual plagioclase grains.
Random orientation of alteration minerals suggests limited low temperature alteration.

Foliation:
None visible in thin section.

Crosscutting Relationships (as are apparent in thin section):
1) Minor ductile deformation
2) Minor fracturing
3) Static alteration

THIN SECTION:	**209-1275D-34R-1, Piece 3A, 28-31 cm**	**TS#330**	**Observer: AC, JH**
ROCK NAME:	**PYROXENITE**		
GRAIN SIZE:	**Medium-grained**		
TEXTURE:	**Granular**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	9	10	2-8	Anhedral	
Clinopyroxene	65	70	1-7	Anhedral	Exsolution blebs of orthopyroxene.
Orthopyroxene	8	12		Anhedral	Exsolution blebs of clinopyroxene.
Amphibole	1	1	0.1-0.2	Anhedral	Primary?
Oxide	7	7	0.5-3	Subhedral to euhedral	

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Green/brown amphibole	19	Clinopyroxene, orthopyroxene	Anhedral, granular	Exploiting grain edges and cleavage planes.
Secondary plagioclase	1	Plagioclase		

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
No veins.			

STRUCTURE

Crystal Plastic:
Very minor crystal plastic deformation; undulose extinction and deformation twins in plagioclase.
Minor undulose extinction in relict olivine.

Brittle:
Minor fracturing, most fractures are short and confined to individual plagioclase grains.

Foliation:
None visible in thin section.

Crosscutting Relationships (as are apparent in thin section):
1) Minor ductile deformation
2) Minor fracturing

THIN SECTION:	**209-1275D-36R-1, Piece 10B, 70-72 cm**	**TS#331**	**Observer: NA, JH**
ROCK NAME:	**DIABASE WITH GRANOPHYRE**		
GRAIN SIZE:	**Very fine- to fine-grained**		
TEXTURE:	**Granular**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
DIABASE (phenocryst)					
Plagioclase	6	6	0.2-3	Subhedral to euhedral	Clots.
Olivine	1	2	0.2-3	Subhedral	Reaction rim.
Amphibole	1	1	0.1-0.2	Subhedral	
Biotite	1	1	0.1	Anhedral	
Oxide	1	1	0.01-0.5	Subhedral to euhedral	
GRANOPHYRE					
Plagioclase	70	70	< 4	Subhedral to euhedral	Zoning.
Quartz	5	5	< 0.5	Subhedral	
Clinopyroxene	Trace	5	< 1	Subhedral to anhedral	
Amphibole	Trace	12	< 1	Anhedral	
Oxide	5	5	< 0.5	Anhedral to subhedral	
Zircon	Trace	Trace	0.0	Euhedral	Zoning.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Opaque oxides	1	Olivine	Granular, anhedral	From rims around olivine grains. Coarser grained reaction halos around olivine (xenocrysts?). First zone is oxide rich, central zone amphibole laths, outer zone possibly plagioclase (+/- chlorite).
Green amphibole	9	Olivine, primary amphibole?		
Chlorite	Trace			Possible chlorite in outer reaction zones around olivine.

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
No veins.			

STRUCTURE

Crystal Plastic:
Very minor crystal plastic deformation; undulose extinction and weak deformation twins in plagioclase.

Brittle:
Very minor fracturing, most fractures are short and irregular shaped.

Foliation:
None visible in thin section.

Crosscutting Relationships (as are apparent in thin section):
1) Minor crystal plastic deformation
2) Minor fracturing
3) Static alteration

THIN SECTION:	**209-1275D-37R-1, Piece 9B, 78-80 cm**	**TS#332**	**Observer: NA, JH**
ROCK NAME:	**GABBRO**		
GRAIN SIZE:	**Fine- and coarse-grained**		
TEXTURE:	**Foliated**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	47	50	0.5-4	Subhedral to euhedral	Zoning.
Clinopyroxene	30	48	0.5-7	Anhedral	Two pyroxenes intergrowth.
Oxides	2	2	0.2-1.5	Interstitial	

GENERAL COMMENTS Altered very coarse-grained gabbro dike is in the middle of the section.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Green amphibole	19	Clinopyroxene, orthopyroxene, plagioclase	Granular, anhedral to lath-like	Pervasive replacement of clinopyroxene, some corrosion of plagioclase grain margins. Lath-like euhedral amphibole in coarse grained gabbroic vein.
Opaque oxides	2	Orthopyroxene		Some orthopyroxene grains completely altered to opaque oxides.

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
No veins.			

STRUCTURE

Crystal Plastic:
Very minor crystal plastic deformation; undulose extinction and deformation twins in plagioclase.

Brittle:
Minor fracturing, most fractures are short and confined to individual plagioclase grains
several planar samples running across sample are filled with amphibole.

Foliation:
None visible in thin section.

Crosscutting Relationships (as are apparent in thin section):
1) Minor ductile deformation
2) Minor fracturing
3) Static alteration

THIN SECTION:	**209-1275D-38R-1, Piece 3, 12-16 cm**	**TS#333**	**Observer: NA, CG**
ROCK NAME:	**GABBRO WITH ALTERATION VEIN**		
GRAIN SIZE:	**Coarse-grained**		
TEXTURE:	**Weakly foliated**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	50	65	<12	Subhedral to euhedral	Elongated.
Clinopyroxene	<1	35	<12	Anhedral	Two pyroxenes intergrowth.
Oxides	<1	<1	<1.5	Anhedral	

GENERAL COMMENTS Pyroxene is quite altered.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Brown amphibole	5	Clinopyroxene	Anhedral. Patchy	Large anhedral crystals rimming green amphibole intergrowths after clinopyroxene. Small patches within.
Green amphibole	36	Clinopyroxene, plagioclase, brown amphibole.	Fibrous	Pseudomorphically replacing clinopyroxene.
Sericite	1	Plagioclase	Patchy	
Secondary plagioclase	5	Plagioclase	Subhedral to anhedral	Rimming primary plagioclases. Inclusions of fibrous amphibole.
Titanite	2	Fe-Ti-oxides	Anhedral	Intergrowth with magnetite. Rimming Fe-Ti-oxides.
Magnetite	1	Fe-Ti-oxides	Tabular	Intergrowth with titanite. Rimming Fe-Ti-oxides.

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
Amphibolite vein	30	Straight	Fine intergrowth of green and brown amphibole with a well developed schistosity.

STRUCTURE

Crystal Plastic:
Very minor crystal plastic deformation; undulose extinction and deformation twins in plagioclase.

Brittle:
Foliation in portions of greenschist altered zone along edge of sample suggests some semi-brittle deformation during greenschist alteration.
Minor fracturing, most fractures are short and confined to individual plagioclase grains.

Foliation:
Weak foliation defined by shape preferred orientation of plagioclase grains (magmatic fabric) is oblique to foliation of schistose greenschist alteration minerals.

Crosscutting Relationships (as are apparent in thin section):
1) Minor ductile deformation
2) Minor fracturing of plagioclase
3) Alteration during minor semi-brittle deformation

THIN SECTION:	**209-1275D-39R-1, Piece 1A, 19-22 cm**	**TS#334**	**Observer: NA, CG**
ROCK NAME:	**GABBRO**		
GRAIN SIZE:	**Fine/coarse-grained**		
TEXTURE:	**Granular**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
	FG/CG	FG/CG	FG/CG		
Plagioclase	50/42	54/44	0.2-1/3-9	Subhedral	
Orthopyroxene	7/20	10/25	0.2-1/2-8	Subhedral	
Clinopyroxene	30/20	35/25	0.2-1/2-7	Subhedral	
Oxides	<1/6	<1/6	0.2-1/0.5-4	Subhedral to interstitial	

COMMENTS FG= fine-grained; CG= coarse-grained.
Contact between a fine grained and coarse grained gabbro.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Brown amphibole	2	Clinopyroxene, plagioclase.	Subhedral to anhedral	Replacing clinopyroxene. Usually in the core of green amphibole. Associated with oxides.
Green amphibole	8	Clinopyroxene	Subhedral to anhedral	Replacing clinopyroxene. Usually in the core of green amphibole.
Secondary Plagioclase	2	Plagioclase	Anhedral	In the boundary of primary plagioclase.

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
No veins.			

STRUCTURE

Crystal Plastic:
Very minor crystal plastic deformation; undulose extinction and deformation twins in plagioclase.
Some possible recrystallization of plagioclase.

Brittle:
Minor to fracturing with no significant grain size reduction.

Foliation:
None visible in thin section.

Crosscutting Relationships (as are apparent in thin section):
1) Minor ductile deformation
2) Minor fracturing
3) Static alteration

THIN SECTION:	**209-1275D-40R-1, Piece 6, 126-129 cm**	**TS#335**	**Observer: AC, JH**
ROCK NAME:	**DIABASE**		
GRAIN SIZE:	**Fine-grained**		
TEXTURE:	**Diabasic**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT RIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	47	50	0.1-0.3	Anhedral	
Clinopyroxene	20	40	0.1-0.2	Anhedral	
Amphibole	2	3	0.1-0.5	Anhedral	Primary?
Sphene	1	1	0.1-0.2	Subhedral	
Oxide	3	3	0.1	Anhedral	

GENERAL COMMENTS Patches rich in amphibole

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Green amphibole	27	Clinopyroxene, primary amphibole, plagioclase	Granular to pseudomorphic	Mostly replaces clinopyroxene, occasionally alters plagioclase grain boundaries.

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
No veins.			

STRUCTURE

Crystal Plastic:
Very minor crystal plastic deformation; undulose extinction and deformation twins in plagioclase.
Some possible recrystallization of plagioclase.

Brittle:
Minor to moderate fracturing with no significant grain size reduction.

Foliation:
None visible in thin section.

Crosscutting Relationships (as are apparent in thin section):
1) Minor ductile deformation
2) Minor fracturing
3) Static alteration

THIN SECTION:	**209-1275D-43R-1, Piece 4A, 38-40 cm**	**TS#336**	**Observer: NA, CG.**
ROCK NAME:	**GABBRO WITH GRANOPHYRE**		
GRAIN SIZE:	**Fine- to medium-grained**		
TEXTURE:	**Granular**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	35	48		Subhedral to anhedral	
Orthopyroxene	<1	3		Anhedral	
Clinopyroxene	3	40		Anhedral	Two pyroxenes intergrowth.
Zircon	<1	<1		Euhedral	
Oxides	<1	1		Interstitial	
Sulfide	2	2		Anhedral	
Quartz	4	4		Anhedral	Associated with sphene and sulfides.

GENERAL COMMENTS Weakly foliated

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Gabbro and Felsic vein:				
Green amphibole	30	Clinopyroxene, orthopyroxene, plagioclase, primary amphibole	Granular, microgranular, fibrous.	Mostly pseudomorphic alteration of clinopyroxene together with brown amphibole. Also as occasional alteration product in plagioclase grain margins.
Brown amphibole	5	Clinopyroxene	Anhedral. Patchy	Large anhedral crystals rimming green amphibole intergrowths after clinopyroxene. Small patches within clinopyroxene. Pseudomorphically replacing clinopyroxene together with green amphibole.
Sericite	2	Plagioclase	Patchy	Patches in plagioclase.
Secondary plagioclase	10	Plagioclase	Subhedral to anhedral	Rimming primary plagioclase.
Sphene	3	Fe-Ti-oxides	Euhedral to Anhedral	Inclusions of acicular amphibole. Likely primary sphene in felsic vein.
Magnetite	1	Fe-Ti-oxides	Anhedral	
Chlorite	1	Plagioclase, clinopyroxene.	Spherical	Spherical aggregates with fan-like extinction.
Hematite	1	Sulfides	Anhedral	

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
No veins.			

STRUCTURE

Crystal Plastic:
Very minor crystal plastic deformation; undulose extinction and deformation twins in plagioclase.
Some possible recrystallization of plagioclase.

Brittle:
Minor to moderate fracturing with no significant grain size reduction.

Foliation:
None visible in thin section.

Crosscutting Relationships (as are apparent in thin section):
1) Minor ductile deformation
2) Minor fracturing
3) Static alteration

THIN SECTION:	**209-1275D-43R-1, Piece 8A, 92-94 cm**	**TS#337**	**Observer:**
ROCK NAME:	**OXIDE GABBRO**		
GRAIN SIZE:	**Medium-grained**		
TEXTURE:	**Foliated**		

MODE (Visual estimate)

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	MORPHOLOGY	COMMENTS
Plagioclase	45	50	0.1-8	Anhedral to interstitial?	
Clinopyroxene	30	40	0.2-5	Anhedral	
Orthopyroxene	3	5	0.2-4	Anhedral	
Amphibole	Trace	Trace	0.2	Anhedral	
Oxide	8	8	0.2-3	Subhedral to euhedral	

GENERAL COMMENTS
Well developed foliation.
Bent plagioclase twinning indicates high temperature deformation

SECONDARY MINERALS	PERCENT PRESENT	REPLACING	MORPHOLOGY	COMMENTS
Brown amphibole	3	Clinopyroxene, brown amphibole.	Subhedral to anhedral. Patchy.	Patches replacing clinopyroxene. Core of green amphibole. Associated with oxides.
Green amphibole	12	Clinopyroxene	Subhedral to anhedral	Replacing clinopyroxene. Usually in the core of green amphibole.
Secondary Plagioclase	2	Plagioclase	Anhedral	Rimming primary plagioclase.

VEIN / FRACTURE FILLING	PERCENT PRESENT	MORPHOLOGY	COMMENTS
No veins.			

STRUCTURE

Crystal Plastic:
Very minor crystal plastic deformation; undulose extinction and deformation twins in plagioclase.

Brittle:
Minor to fracturing of plagioclase; most fractures are short and confined to individual grains; longer planar fractures are filled with amphibole.

Foliation:
None visible in thin section.

Crosscutting Relationships (as are apparent in thin section):
1) Minor ductile deformation
2) Minor fracturing
3) Static alteration

THIN SECTION:	**209-1275D-43R-2, Piece 1A, 49-52 cm**	**TS#338**	**Observer: CG**
ROCK NAME:	**GABBRO**		
GRAIN SIZE:	**Medium-grained**		
TEXTURE:	**Granular**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	45	50	0.1-8	Anhedral to interstitial?	
Clinopyroxene	30	40	0.2-7	Anhedral	
Orthopyroxene	3	5	0.2-5	Anhedral	
Amphibole	Trace	Trace	0.2	Anhedral	
Oxide	4	5	0.5-2	Subhedral to euhedral	

GENERAL COMMENTS
Clinopyroxene and oxide rich band.
The grain size of the gabbro in thin section grades from fine to medium to coarse grained.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Brown amphibole	3	Clinopyroxene, brown amphibole.	Subhedral to anhedral. Patchy.	Patches replacing clinopyroxene. Core of green amphibole. Associated with oxides.
Green amphibole	11	Clinopyroxene	Subhedral to anhedral. Interstitial.	Replacing clinopyroxene. Usually in the core of green amphibole.
Secondary Plagioclase	2	Plagioclase	Anhedral	Rimming primary plagioclase.
Magnetite	1	Ilmenite	Subhedral	Associated with amphibole.

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
No veins.			

STRUCTURE

Crystal Plastic:
Very minor crystal plastic deformation; undulose extinction and deformation twins in plagioclase.
Some plagioclase grains have subgrains domains and minor recrystallization around grain margins.

Brittle:
Minor to fracturing of plagioclase; most fractures are short and confined to individual grains; longer planar fractures are filled with amphibole.

Foliation:
None visible in thin section.

Crosscutting Relationships (as are apparent in thin section):
1) Minor ductile deformation
2) Minor fracturing
3) Static alteration

THIN SECTION:	**209-1275D-22R-1, Piece 20B, 146-148 cm**	**TS#339**	**Observer:AC, JH**
ROCK NAME:	**GABBRO**		
GRAIN SIZE:	**Fine-grained**		
TEXTURE:	**Granular**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	50	55	0.1-5	Suhedral	
Clinopyroxene	10	36	0.2-2.5	Anhedral	
Orthopyroxene	1	5	0.2-1	Anhedral	
Oxides	4	4	0.2-1.5	Interstitial	

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Secondary plagioclase	2	Plagioclase	Neoblastic	
Green amphibole	29	Clinopyroxene, plagioclase		
Talc	Trace	Orthopyroxene?		

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
No veins.			

STRUCTURE

Crystal Plastic:
Very minor crystal plastic deformation; undulose extinction and deformation twins in plagioclase.
Some plagioclase grains have subgrains domains and minor recrystallization around grain margins.

Brittle:
Minor to fracturing of plagioclase; most fractures are short and confined to individual grains; longer planar fractures are filled with amphbibole.

Foliation:
None visible in thin section.

Crosscutting Relationships (as are apparent in thin section):
1) Minor ductile deformation
2) Minor fracturing
3) Static alteration

THIN SECTION:	**209-1275D-26R-2, Piece 8C, 97-99 cm**	**TS#340**	**Observer: JH, NA**
ROCK NAME:	**OXIDE GABBRO**		
GRAIN SIZE:	**Coarse- to medium-grained**		
TEXTURE:	**Granular**		

	MODE (Visual estimate)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm)**	**MORPHOLOGY**	**COMMENTS**
Plagioclase	45	48	2-6	Subhedral	
Orthopyroxene	3	4	1-2	Subhedral	
Clinopyroxene	27	35	1-3	Subhedral	
Amphibole	Trace	Trace	0.2-1	Anhedral	
Oxides	12	12	<5	Interstitial	

GENERAL COMMENTS
Moderately developed foliation
Bent plagioclase twinning indicates high temperature deformation.

SECONDARY MINERALS	**PERCENT PRESENT**	**REPLACING**	**MORPHOLOGY**	**COMMENTS**
Green amphibole	13	Clinopyroxene, plagioclase	Granular, microgranular, pseudomorphic	Mostly alteration of clinopyroxene but some corrosion of plagioclase grain margins.

VEIN / FRACTURE FILLING	**PERCENT PRESENT**	**MORPHOLOGY**	**COMMENTS**
No veins.			

STRUCTURE

Crystal Plastic:
Very minor crystal plastic deformation; undulose extinction and deformation twins in plagioclase.
Some plagioclase grains have subgrains domains and minor recrystallization around grain margins.

Brittle:
Minor to fracturing of plagioclase; most fractures are short and confined to individual grains; longer planar fractures are filled with amphibole.

Foliation:
None visible in thin section.

Crosscutting Relationships (as are apparent in thin section):
1) Minor ductile deformation
2) Minor fracturing
3) Static alteration