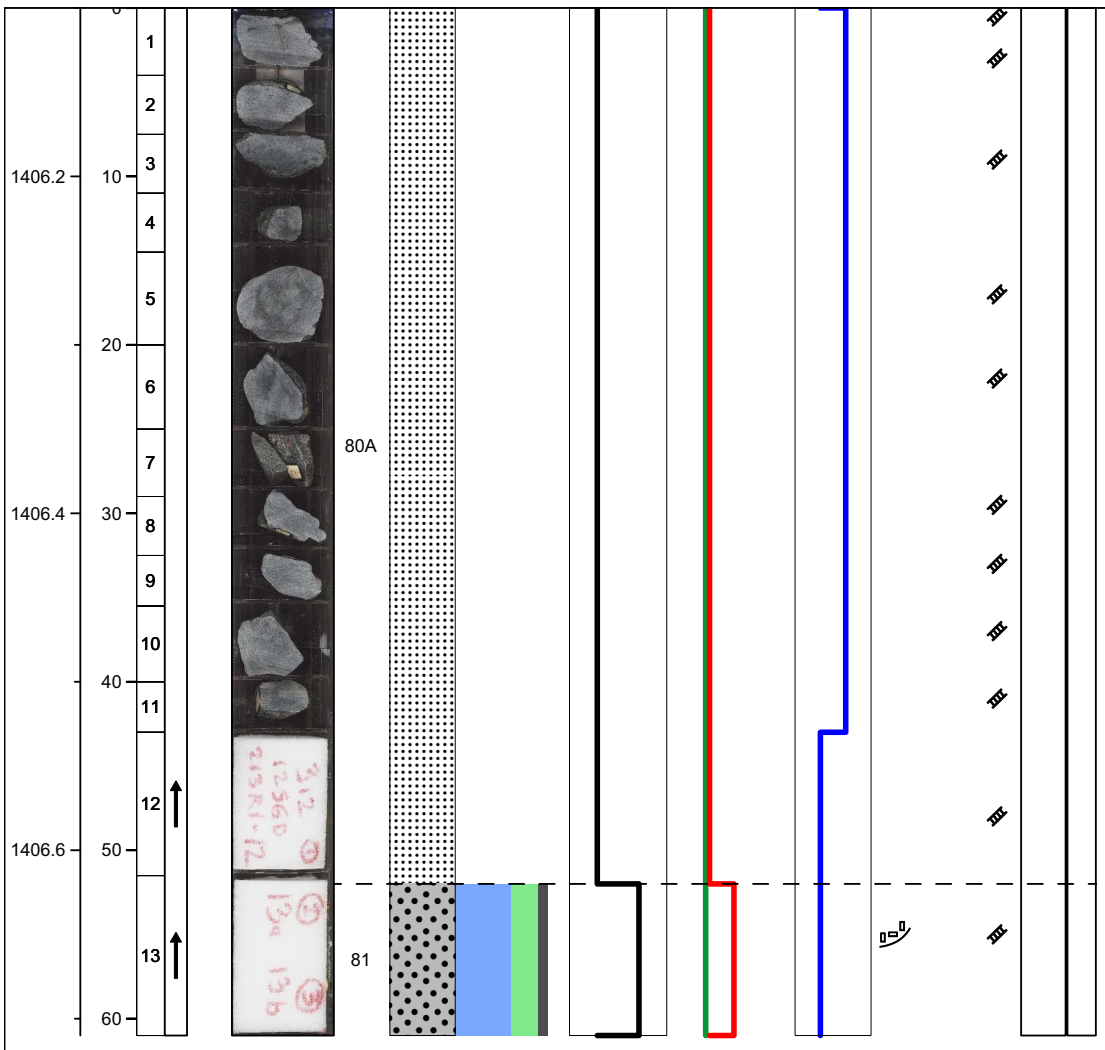
Core Photo

Hole 335(312)-1256D-213R Section 1, Top of Section: 1406.1 m (CSF-A)



Unit: 80A
Section: 312-U1256D-213R-1-A
Interval (cm): 0-52 **Pieces:** 1–11, parts of 12–13
Rock name: aphyric basalt
Upper unit boundary: not recovered
Lower unit boundary: apparent igneous contact in Piece 13
Groundmass modal grain size: microcrystalline-cryptocrystalline
Glass abundance (%):
Altered glass abundance (%):
Vesicles:
Texture:
Alteration: Totally recrystallized; moderate to high background alteration; patchy (40% of highly altered patches)
Veins: Amphibole, quartz and magnetite veins. Light gray halos are present around some amphibole veins
Structures: Piece 13 with an intrusive contact between Gabbro 1 and sheeted dikes and piece 12 with a magmatic vein were missing. Above the contact, all of the pieces except for Piece 7 have veins and fractures. Veins are in most places 0.1 mm wide but there are wider veins with complex >1 mm wide halos in Piece 1, 6, and 9. The veins are either light or dark green (chlorite and actinolite), sulfide bearing in places, with splays, curved, planar, anastomosing, and irregular morphologies. One brown vein is present in Piece 1. Fractures are 0.1 mm wide throughout and either irregular or planar. Alteration patches in Pieces 2–4 and 5 are light green and sulfide bearing in places. The patches have elongate and amoeboid morphologies.

Additional comments:
The igneous textures are obscured by metamorphic overprint, but it is likely that the original texture was intergranular. Piece 12 is cut by a 5 mm wide medium-grained oxide gabbro dike that has no chilled margin. This dike is likely to be related to the gabbros of Unit 81 below. Piece 13 contains an igneous contact between altered dike rocks above and gabbro below.

Unit: 81
Section: 312-U1256D-213R-1-A
Interval (cm): 52-61 **Pieces:** parts of 12 and 13
Rock name: oxide gabbro
Upper unit boundary: intrusive margins in Piece 13
Lower unit boundary: intrusive margins in Piece 13
Mineralogy:

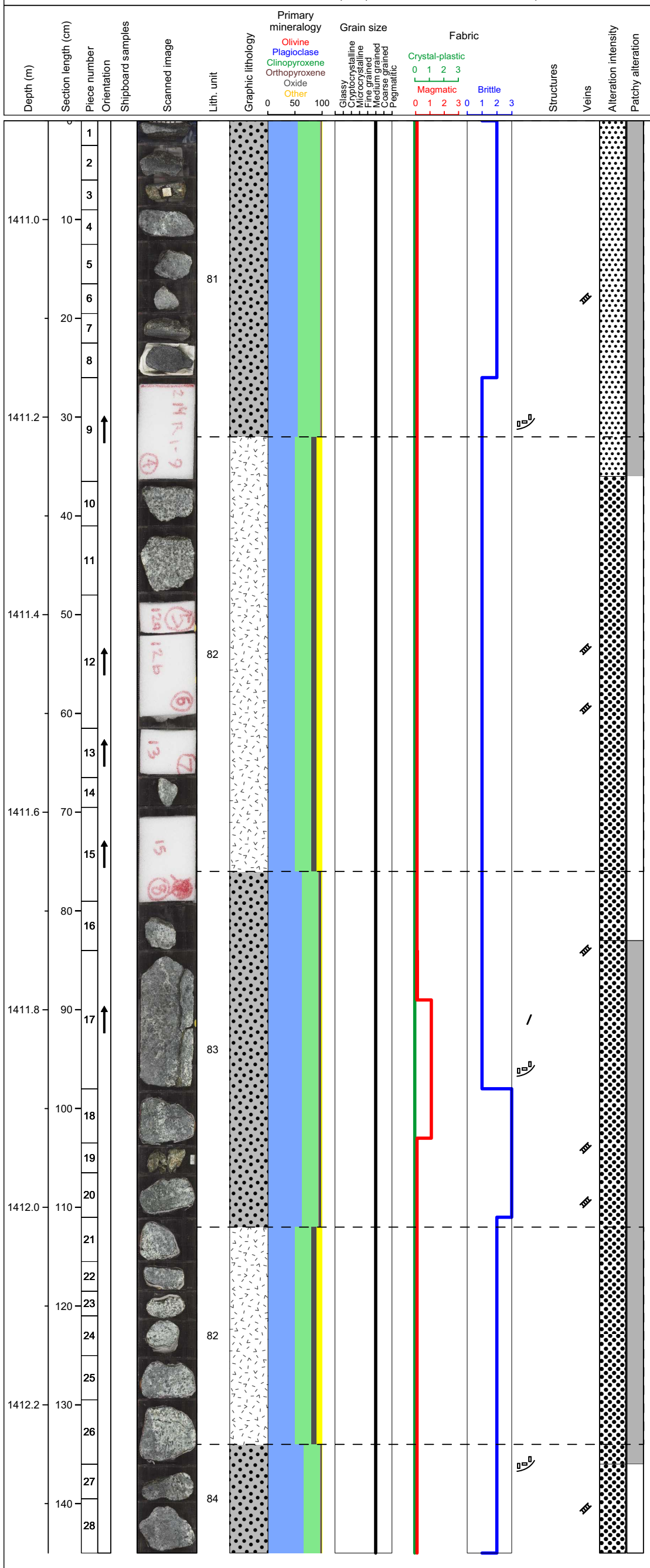
	Modal (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Habit, shape, comments
Plagioclase	60	0.5	1.5	1	subhedral-euhedral
Clinopyroxene	30	0.2	2	1	subhedral
Oxides	10	0.1	2	1	interstitial, anhedral

Alteration: High background alteration; 10% of recrystallized domains
Veins: Amphibole + magnetite veins with pale gray alteration halos present in piece 13
Structures: This unit contains gabbro cut by veins of chlorite and actinolite, some of which are surrounded by alteration halos.

Additional comments:
This unit is composed of mixed gabbro and altered dike material. The gabbro occurs in two dikes, 5 mm thick in Piece 12 and 40 mm thick in Piece 13. This gabbro has an intrusive contact with the altered basalt host. There is a 0.5 mm wide band of oxides on the margin of the intrusion, but little change in grain size in the gabbro toward the margin. The gabbro appears to have a broadly equigranular texture with equant crystal shapes but has been subject to later alteration.

Core Photo

Hole 335(312)-1256D-214R Section 1, Top of Section: 1410.9 m (CSF-A)



Unit: 81
Section: 312-U1256D-214R-1-A
Interval (cm): 0-32 **Pieces:** 1–8 and part of 9
Rock name: opx-bearing oxide gabbro
Upper unit boundary: intrusive margins in Piece 13 of Core 213R-1
Lower unit boundary: intrusive margin in Piece 9 of Core 214R-1
Mineralogy:

	Modal (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Habit, shape, comments
Plagioclase	55.9	0.1	1	0.7	tabular, euhedral, needle-like plag locally
Clinopyroxene	40	0.1	1.5	0.4	interstitial, subhedral
Orthopyroxene	2	3	8	4	equant, anhedral
Oxides	2	0.2	1	0.5	equant, angular aggregates
Sulfides	0.1			0.2	subequant, amoeboid aggregates

Alteration: Moderate background alteration; patchy (20% of Highly altered patches)
Veins: No veins
Structures: Diffuse, thin, gabbroic dikes/magmatic veins intrude other gabbroic rocks throughout the section, locally with leucocratic domains (Unit 81) intruding melanocratic domains (Unit 82), but this relationship is not clear everywhere. Patchy alteration and light green and white veins are present in Pieces 2, 17, 18, and 20.

Additional comments:
This unit is composed of mixed gabbro and altered dike material, spanning the boundary between gabbro and basalt. There is a variation from microcrystalline in Piece 2 to medium grained in Piece 9. The lower contact occurs in Piece 9, where an intrusive margin with Unit 82 occurs.

Unit: 82
Section: 312-U1256D-214R-1-A
Interval (cm): 32-76 **Pieces:** part of 9, all of 10–14, parts of 15
Rock name: oxide qtz-diorite
Upper unit boundary: intrusive margins in Piece 9 of Core 213R-1
Lower unit boundary: intrusive margin with Unit 84 in Piece 26 of Core 214R-1
Mineralogy:

	Modal (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Habit, shape, comments
Plagioclase	50			3	tabular, subhedral
Clinopyroxene	30			5	elongate, subhedral, cpx as long as 1.5 cm, very high aspect ratio; could possibly be amphibole
Oxides	10			1	equant, anhedral
Quartz	10			2	equant, subhedral

Alteration: High background pervasive alteration
Veins: Zeolite filing single vein with minor epidote halo in piece 12
Structures: The contact between Unit 82 and Unit 81 is well defined in Pieces 12 and 15, and very sharp in Piece 12.

Additional comments:
This gabbro has an inequigranular seriate texture. It is distinguished from the surrounding Units 81, 83, and 84 principally on the basis of color, with the plagioclase in this unit being noticeably more pale on cut surfaces than the plagioclase in Units 81, 83, and 84. The clinopyroxenes are occasionally euhedral and elongate, and may have been replaced by amphibole in places. The order of intrusion of these units is difficult to determine from the exposed contacts. Some parts of this unit are much coarser than the average given above, with grain sizes as large as 10 mm in Piece 27.

Unit: 83
Section: 312-U1256D-214R-1-A
Interval (cm): 76-112 **Pieces:** parts of 15 and 16, all of 17–20
Rock name: opx-bearing oxide gabbro
Upper unit boundary: intrusive margin with Unit 82 in Piece 15
Lower unit boundary: not recovered
Mineralogy:

	Modal (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Habit, shape, comments
Olivine	1			0.3	
Plagioclase	61.9	0.5	3	1	tabular, euhedral
Clinopyroxene	30	0.5	10	4	equant, anhedral, cpx both as subophitic anhedral grains and euhedral elongate grains
Orthopyroxene	1	1	4	2	equant, anhedral, opx locally poikilitic
Oxides	5	0.5	2	1	equant, interstitial aggregates
Quartz	1	0.5	2	1	equant, subhedral
Sulfides	0.1	0.2	1	1	angular aggregates

Alteration: High background alteration; patchy (70% of Highly altered patches)
Veins: Zeolite and epidote veins with amphibole rich halos
Structures: Patchy alteration and light green and white veins are present in Pieces 17, 18, and 20.

Additional comments:
This gabbro has an inequigranular seriate texture. It is distinguished from Unit 82 on the basis of modal mineralogy as well as color, with the plagioclase in this unit being darker on cut surfaces than the plagioclase in Unit 82. The upper contact is diffuse over a 1–2 mm width, but this unit appears to have a smaller grain size than Unit 82 near the contact. The clinopyroxenes are occasionally euhedral and elongate, and may have been replaced by amphibole in places. The order of intrusion of these units is difficult to determine from the exposed contacts.

Unit: 82
Section: 312-U1256D-214R-1-A
Interval (cm): 112-134 **Pieces:** 21-26
Rock name: oxide qtz-diorite
Upper unit boundary: intrusive boundary with unit 83 in Pieces 17 and 18
Lower unit boundary: not recovered
Mineralogy:

	Modal (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Habit, shape, comments
Plagioclase	50			3	tabular, subhedral
Clinopyroxene	30			5	elongate, subhedral, cpx as long as 1.5 cm, very high aspect ratio; could possibly be amphibole
Oxides	10			1	equant, anhedral
Quartz	10			2	equant, subhedral

Alteration: High background alteration; patchy (70% of Highly altered patches)
Veins: No veins
Structures: The contact between Unit 82 and Unit 81 is well defined in Pieces 12 and 15, and very sharp in Piece 12.

Additional comments:
See Unit 82 above.

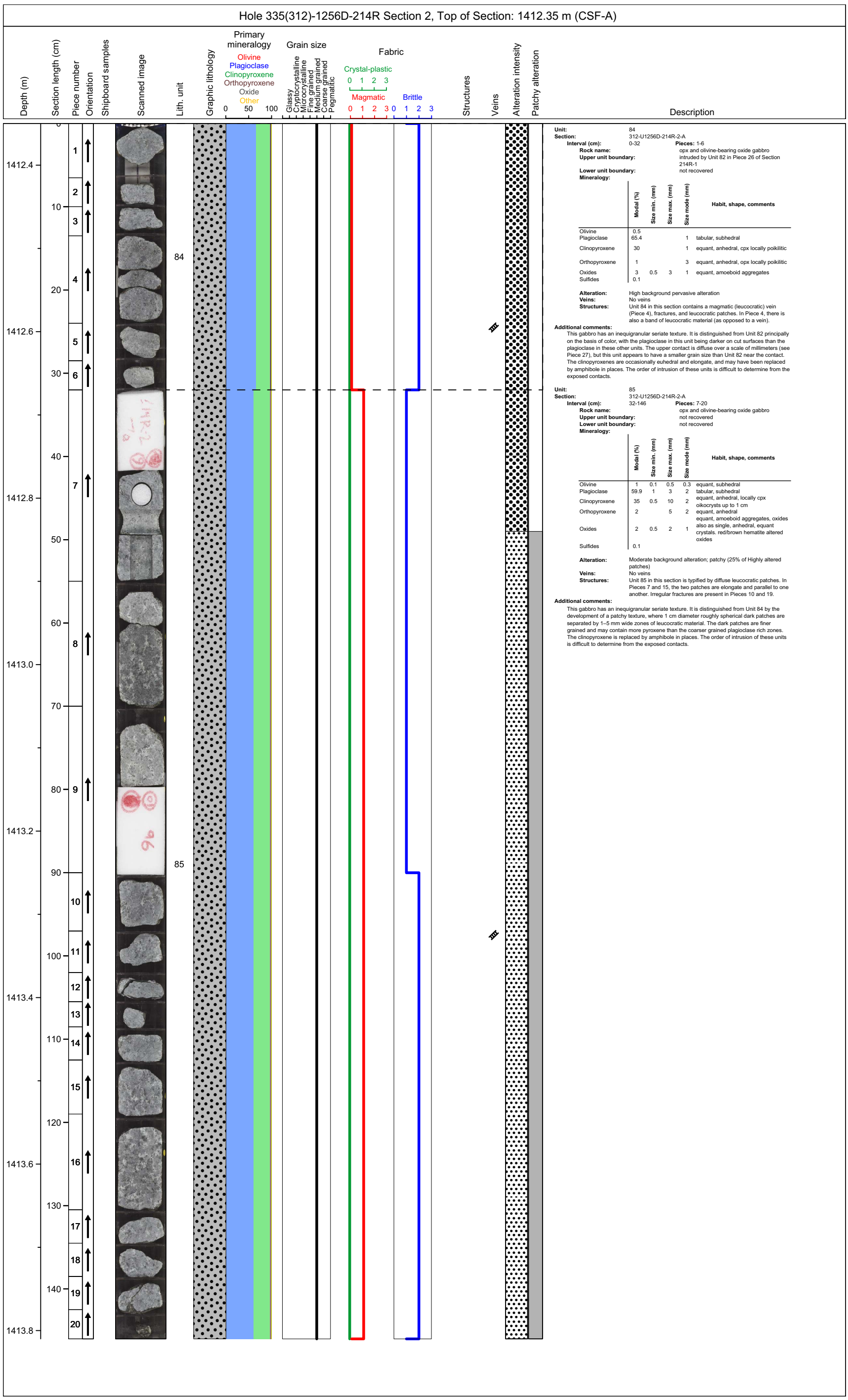
Unit: 84
Section: 312-U1256D-214R-1-A
Interval (cm): 134-145 **Pieces:** 26-28
Rock name: opx and olivine-bearing oxide gabbro
Upper unit boundary: intrusive margin with Unit 82 in Piece 26
Lower unit boundary: not recovered
Mineralogy:

	Modal (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Habit, shape, comments
Olivine	0.5				
Plagioclase	65.4			1	tabular, subhedral, locally highly elongate plag
Clinopyroxene	30			1	equant, anhedral, cpx locally poikilitic
Orthopyroxene	1			3	equant, anhedral, opx locally poikilitic
Oxides	3	0.5	3	1	equant, amoeboid aggregates
Sulfides	0.1				

Alteration: High background pervasive alteration
Veins: No veins
Structures: Intrusive relationship with Unit 82 is sharp.

Additional comments:
Unit 84 is very similar to Unit 83, and may indeed be part of the same magmatic body. Both are intruded by Unit 82 because they are not contiguous in the core they are defined as seperate units. Piece 27 has been altered a green color, and contains epidote. A qtz-plagioclase intergrowth texture can also be observed in this piece.

Core Photo



Unit: 84
Section: 312-U1256D-214R-2-A
Interval (cm): 0-32 **Pieces:** 1-6
Rock name: opx and olivine-bearing oxide gabbro
Upper unit boundary: intruded by Unit 82 in Piece 26 of Section 214R-1
Lower unit boundary: not recovered
Mineralogy:

	Modal (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Habit, shape, comments
Olivine	0.5				
Plagioclase	65.4			1	tabular, subhedral
Clinopyroxene	30			1	equant, anhedral, cpx locally poikilitic
Orthopyroxene	1			3	equant, anhedral, opx locally poikilitic
Oxides	3	0.5	3	1	equant, amoeboid aggregates
Sulfides	0.1				

Alteration: High background pervasive alteration
Veins: No veins
Structures: Unit 84 in this section contains a magmatic (leucocratic) vein (Piece 4), fractures, and leucocratic patches. In Piece 4, there is also a band of leucocratic material (as opposed to a vein).

Additional comments:
This gabbro has an inequigranular seriate texture. It is distinguished from Unit 82 principally on the basis of color, with the plagioclase in this unit being darker on cut surfaces than the plagioclase in these other units. The upper contact is diffuse over a scale of millimeters (see Piece 27), but this unit appears to have a smaller grain size than Unit 82 near the contact. The clinopyroxenes are occasionally euhedral and elongate, and may have been replaced by amphibole in places. The order of intrusion of these units is difficult to determine from the exposed contacts.

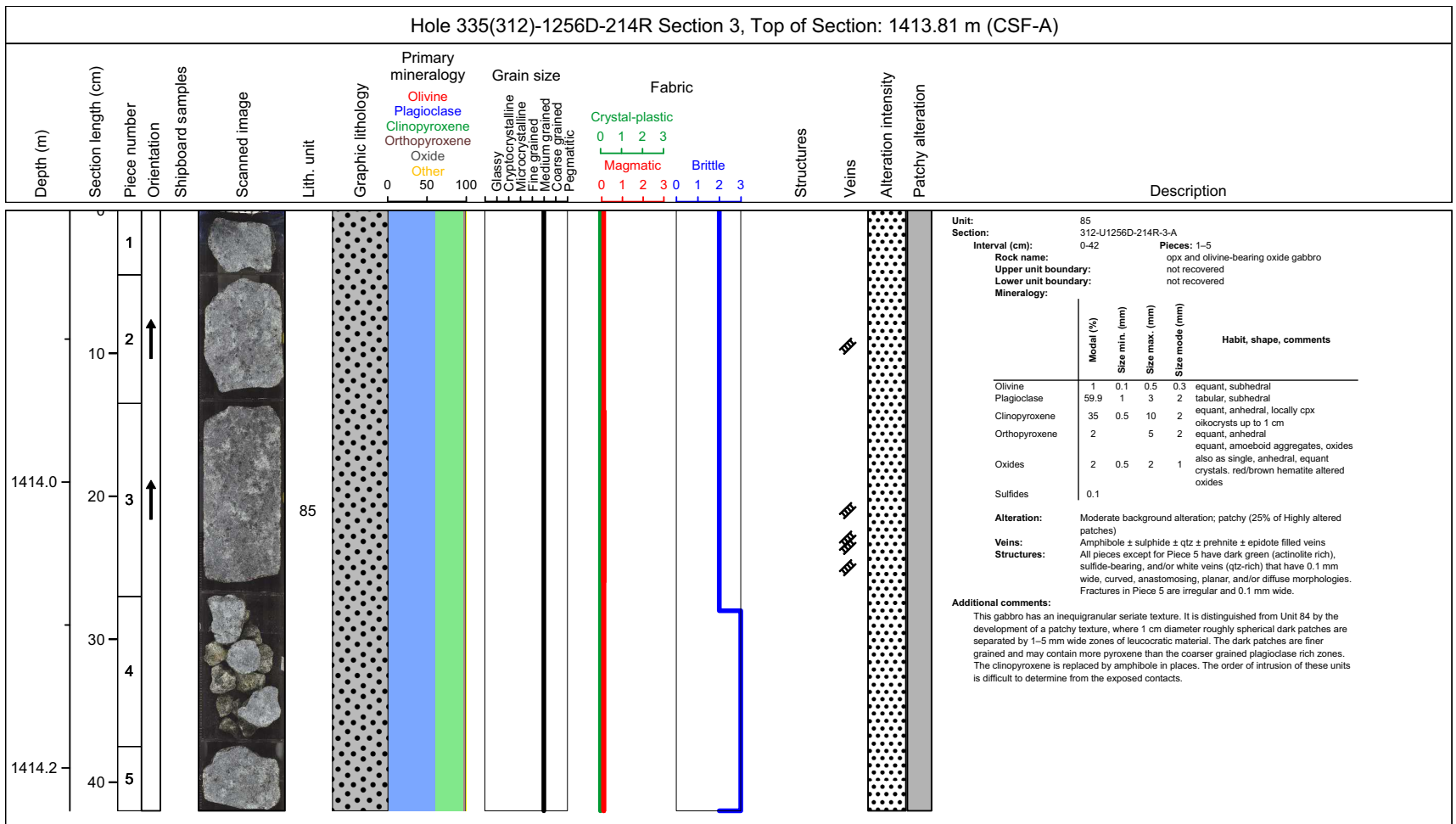
Unit: 85
Section: 312-U1256D-214R-2-A
Interval (cm): 32-146 **Pieces:** 7-20
Rock name: opx and olivine-bearing oxide gabbro
Upper unit boundary: not recovered
Lower unit boundary: not recovered
Mineralogy:

	Modal (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Habit, shape, comments
Olivine	1	0.1	0.5	0.3	equant, subhedral
Plagioclase	59.9	1	3	2	tabular, subhedral
Clinopyroxene	35	0.5	10	2	equant, anhedral, locally cpx oikocrysts up to 1 cm
Orthopyroxene	2		5	2	equant, anhedral
Oxides	2	0.5	2	1	equant, amoeboid aggregates, oxides also as single, anhedral, equant crystals. red/brown hematite altered oxides
Sulfides	0.1				

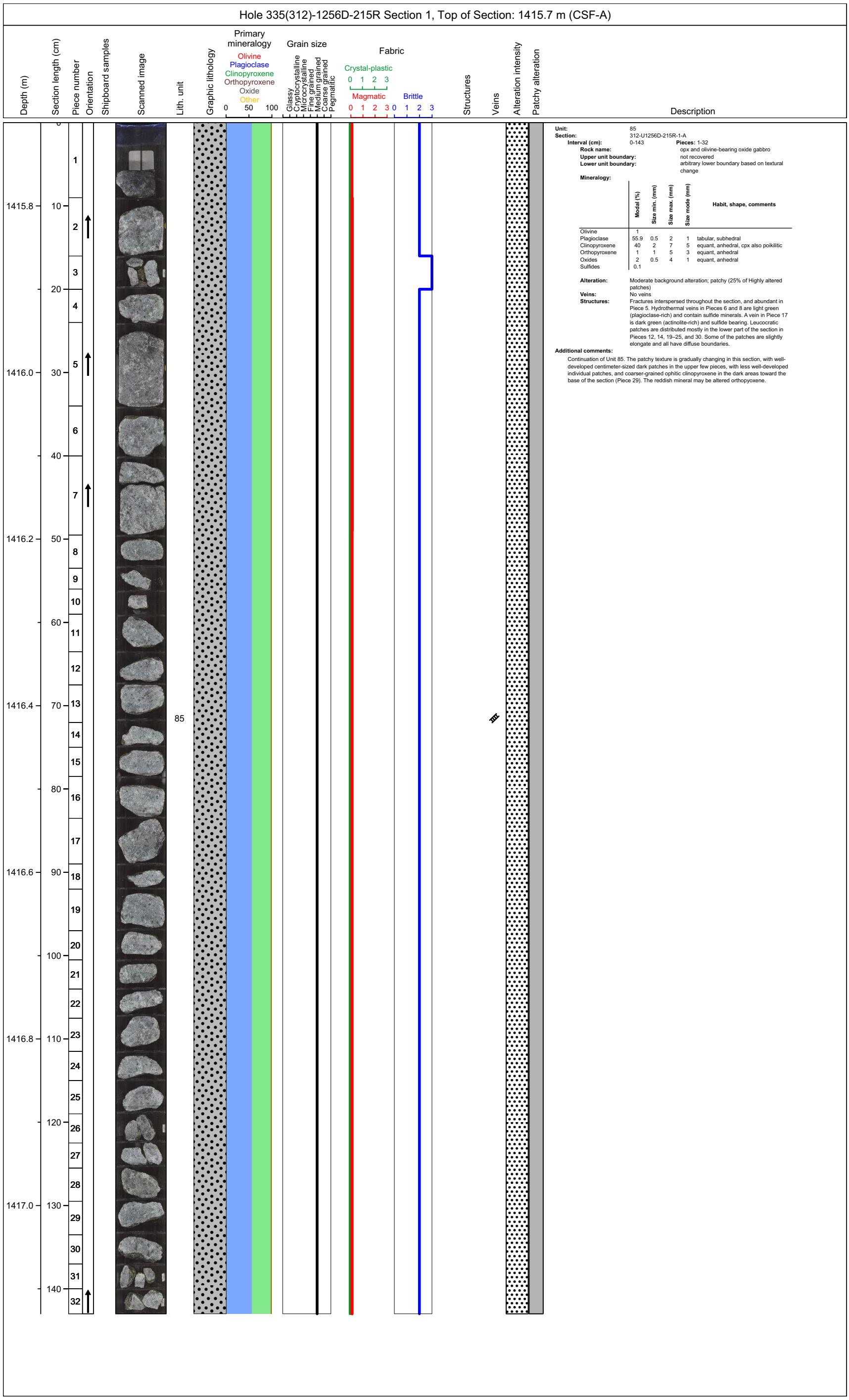
Alteration: Moderate background alteration; patchy (25% of Highly altered patches)
Veins: No veins
Structures: Unit 85 in this section is typified by diffuse leucocratic patches. In Pieces 7 and 15, the two patches are elongate and parallel to one another. Irregular fractures are present in Pieces 10 and 19.

Additional comments:
This gabbro has an inequigranular seriate texture. It is distinguished from Unit 84 by the development of a patchy texture, where 1 cm diameter roughly spherical dark patches are separated by 1–5 mm wide zones of leucocratic material. The dark patches are finer grained and may contain more pyroxene than the coarser grained plagioclase rich zones. The clinopyroxene is replaced by amphibole in places. The order of intrusion of these units is difficult to determine from the exposed contacts.

Core Photo


Hole 335(312)-1256D-214R Section 3, Top of Section: 1413.81 m (CSF-A)
Depth (m)
Section length (cm)
Piece number
Orientation
Shipboard samples
Scanned image
Lith. unit
Graphic lithology
Primary mineralogy
Olivine
Plagioclase
Clinopyroxene
Orthopyroxene
Oxide
Other
0 50 100
Grain size
Glassy
Cryptocrystalline
Microcrystalline
Fine grained
Medium grained
Coarse grained
Pegmatitic
Fabric
Crystal-plastic
0 1 2 3
Magmatic
0 1 2 3
Brittle
0 1 2 3
Structures
Veins
Alteration intensity
Patchy alteration
Description
1414.0
1414.2
10
20
30
40
1
2
3
4
5
85
Unit: 85
Section: 312-U1256D-214R-3-A
Interval (cm): 0-42
Pieces: 1–5
Rock name: opx and olivine-bearing oxide gabbro
Upper unit boundary: not recovered
Lower unit boundary: not recovered
Mineralogy:
Olivine 1 0.1 0.5 0.3 equant, subhedral
Plagioclase 59.9 1 3 2 tabular, subhedral
Clinopyroxene 35 0.5 10 2 equant, anhedral, locally cpx oikocrysts up to 1 cm
Orthopyroxene 2 5 2 equant, anhedral
Oxides 2 0.5 2 1 equant, amoeboid aggregates, oxides also as single, anhedral, equant crystals. red/brown hematite altered oxides
Sulfides 0.1
Alteration: Moderate background alteration; patchy (25% of Highly altered patches)
Veins: Amphibole ± sulphide ± qtz ± prehnite ± epidote filled veins
Structures: All pieces except for Piece 5 have dark green (actinolite rich), sulfide-bearing, and/or white veins (qtz-rich) that have 0.1 mm wide, curved, anastomosing, planar, and/or diffuse morphologies. Fractures in Piece 5 are irregular and 0.1 mm wide.
Additional comments:
This gabbro has an inequigranular seriate texture. It is distinguished from Unit 84 by the development of a patchy texture, where 1 cm diameter roughly spherical dark patches are separated by 1–5 mm wide zones of leucocratic material. The dark patches are finer grained and may contain more pyroxene than the coarser grained plagioclase rich zones. The clinopyroxene is replaced by amphibole in places. The order of intrusion of these units is difficult to determine from the exposed contacts.

Core Photo



Unit: 85
Section: 312-U1256D-215R-1-A
Interval (cm): 0-143 **Pieces:** 1-32
Rock name: opx and olivine-bearing oxide gabbro
Upper unit boundary: not recovered
Lower unit boundary: arbitrary lower boundary based on textural change

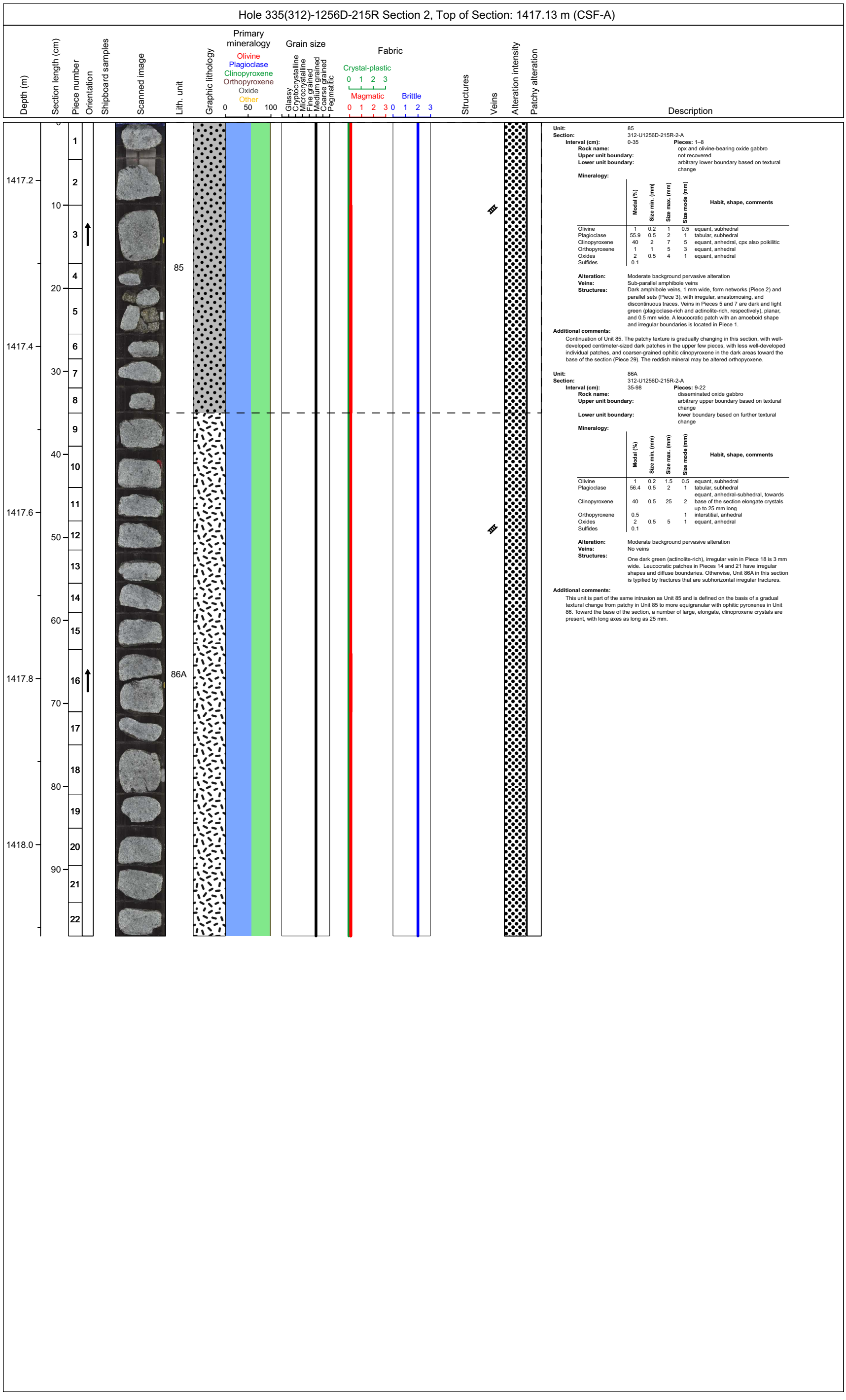
Mineralogy:

	Modal (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Habit, shape, comments
Olivine	1				
Plagioclase	55.9	0.5	2	1	tabular, subhedral
Clinopyroxene	40	2	7	5	equant, anhedral, cpx also poikilitic
Orthopyroxene	1	1	5	3	equant, anhedral
Oxides	2	0.5	4	1	equant, anhedral
Sulfides	0.1				

Alteration: Moderate background alteration; patchy (25% of Highly altered patches)
Veins: No veins
Structures: Fractures interspersed throughout the section, and abundant in Piece 5. Hydrothermal veins in Pieces 6 and 8 are light green (plagioclase-rich) and contain sulfide minerals. A vein in Piece 17 is dark green (actinolite-rich) and sulfide bearing. Leucocratic patches are distributed mostly in the lower part of the section in Pieces 12, 14, 19–25, and 30. Some of the patches are slightly elongate and all have diffuse boundaries.

Additional comments:
Continuation of Unit 85. The patchy texture is gradually changing in this section, with well-developed centimeter-sized dark patches in the upper few pieces, with less well-developed individual patches, and coarser-grained ophitic clinopyroxene in the dark areas toward the base of the section (Piece 29). The reddish mineral may be altered orthopyoxene.

Core Photo



Unit: 85
Section: 312-U1256D-215R-2-A
Interval (cm): 0-35 **Pieces:** 1–8
Rock name: opx and olivine-bearing oxide gabbro
Upper unit boundary: not recovered
Lower unit boundary: arbitrary lower boundary based on textural change

Mineralogy:

	Modal (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Habit, shape, comments
Olivine	1	0.2	1	0.5	equant, subhedral
Plagioclase	55.9	0.5	2	1	tabular, subhedral
Clinopyroxene	40	2	7	5	equant, anhedral, cpx also poikilitic
Orthopyroxene	1	1	5	3	equant, anhedral
Oxides	2	0.5	4	1	equant, anhedral
Sulfides	0.1				

Alteration: Moderate background pervasive alteration
Veins: Sub-parallel amphibole veins
Structures: Dark amphibole veins, 1 mm wide, form networks (Piece 2) and parallel sets (Piece 3), with irregular, anastomosing, and discontinuous traces. Veins in Pieces 5 and 7 are dark and light green (plagioclase-rich and actinolite-rich, respectively), planar, and 0.5 mm wide. A leucocratic patch with an amoeboid shape and irregular boundaries is located in Piece 1.

Additional comments:
Continuation of Unit 85. The patchy texture is gradually changing in this section, with well-developed centimeter-sized dark patches in the upper few pieces, with less well-developed individual patches, and coarser-grained ophitic clinopyroxene in the dark areas toward the base of the section (Piece 29). The reddish mineral may be altered orthopyroxene.

Unit: 86A
Section: 312-U1256D-215R-2-A
Interval (cm): 35-98 **Pieces:** 9-22
Rock name: disseminated oxide gabbro
Upper unit boundary: arbitrary upper boundary based on textural change
Lower unit boundary: lower boundary based on further textural change

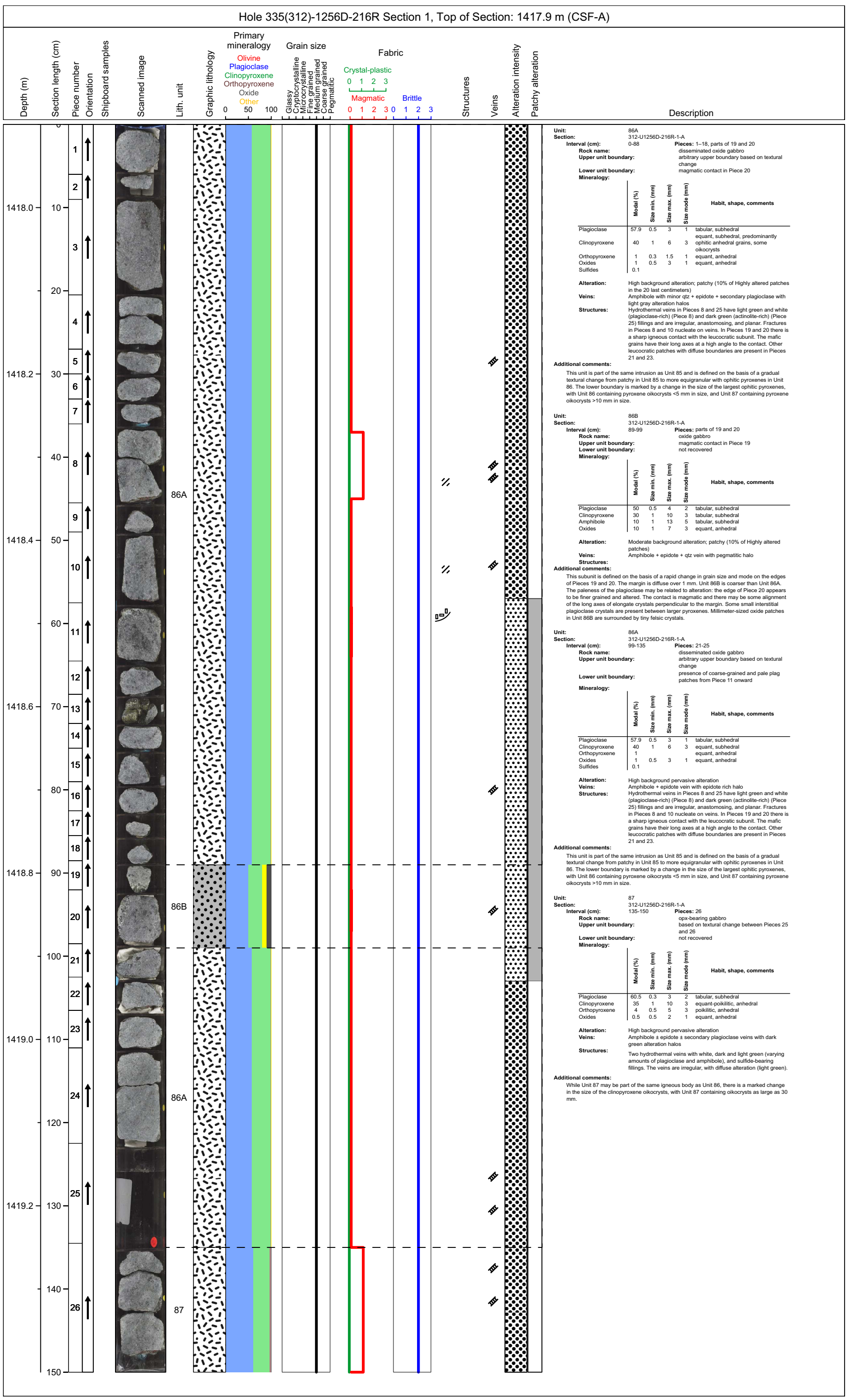
Mineralogy:

	Modal (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Habit, shape, comments
Olivine	1	0.2	1.5	0.5	equant, subhedral
Plagioclase	56.4	0.5	2	1	tabular, subhedral
Clinopyroxene	40	0.5	25	2	equant, anhedral-subhedral, towards base of the section elongate crystals up to 25 mm long
Orthopyroxene	0.5			1	interstitial, anhedral
Oxides	2	0.5	5	1	equant, anhedral
Sulfides	0.1				

Alteration: Moderate background pervasive alteration
Veins: No veins
Structures: One dark green (actinolite-rich), irregular vein in Piece 18 is 3 mm wide. Leucocratic patches in Pieces 14 and 21 have irregular shapes and diffuse boundaries. Otherwise, Unit 86A in this section is typified by fractures that are subhorizontal irregular fractures.

Additional comments:
This unit is part of the same intrusion as Unit 85 and is defined on the basis of a gradual textural change from patchy in Unit 85 to more equigranular with ophitic pyroxenes in Unit 86. Toward the base of the section, a number of large, elongate, clinoproxene crystals are present, with long axes as long as 25 mm.

Core Photo



Unit: 86A
Section: 312-U1256D-216R-1-A
Interval (cm): 0-88 **Pieces:** 1–18, parts of 19 and 20
Rock name: disseminated oxide gabbro
Upper unit boundary: arbitrary upper boundary based on textural change
Lower unit boundary: magmatic contact in Piece 20
Mineralogy:

	Modal (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Habit, shape, comments
Plagioclase	57.9	0.5	3	1	tabular, subhedral
Clinopyroxene	40	1	6	3	equant, subhedral, predominantly ophitic anhedral grains, some oikocrysts
Orthopyroxene	1	0.3	1.5	1	equant, anhedral
Oxides	1	0.5	3	1	equant, anhedral
Sulfides	0.1				

Alteration: High background alteration; patchy (10% of Highly altered patches in the 20 last centimeters)
Veins: Amphibole with minor qtz + epidote + secondary plagioclase with light gray alteration halos
Structures: Hydrothermal veins in Pieces 8 and 25 have light green and white (plagioclase-rich) (Piece 8) and dark green (actinolite-rich) (Piece 25) fillings and are irregular, anastomosing, and planar. Fractures in Pieces 8 and 10 nucleate on veins. In Pieces 19 and 20 there is a sharp igneous contact with the leucocratic subunit. The mafic grains have their long axes at a high angle to the contact. Other leucocratic patches with diffuse boundaries are present in Pieces 21 and 23.

Additional comments:
This unit is part of the same intrusion as Unit 85 and is defined on the basis of a gradual textural change from patchy in Unit 85 to more equigranular with ophitic pyroxenes in Unit 86. The lower boundary is marked by a change in the size of the largest ophitic pyroxenes, with Unit 86 containing pyroxene oikocrysts <5 mm in size, and Unit 87 containing pyroxene oikocrysts >10 mm in size.

Unit: 86B
Section: 312-U1256D-216R-1-A
Interval (cm): 89-99 **Pieces:** parts of 19 and 20
Rock name: oxide gabbro
Upper unit boundary: magmatic contact in Piece 19
Lower unit boundary: not recovered
Mineralogy:

	Modal (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Habit, shape, comments
Plagioclase	50	0.5	4	2	tabular, subhedral
Clinopyroxene	30	1	10	3	tabular, subhedral
Amphibole	10	1	13	5	tabular, subhedral
Oxides	10	1	7	3	equant, anhedral

Alteration: Moderate background alteration; patchy (10% of Highly altered patches)
Veins: Amphibole + epidote + qtz vein with pegmatitic halo
Structures:

Additional comments:
This subunit is defined on the basis of a rapid change in grain size and mode on the edges of Pieces 19 and 20. The margin is diffuse over 1 mm. Unit 86B is coarser than Unit 86A. The paleness of the plagioclase may be related to alteration: the edge of Piece 20 appears to be finer grained and altered. The contact is magmatic and there may be some alignment of the long axes of elongate crystals perpendicular to the margin. Some small interstitial plagioclase crystals are present between larger pyroxenes. Millimeter-sized oxide patches in Unit 86B are surrounded by tiny felsic crystals.

Unit: 86A
Section: 312-U1256D-216R-1-A
Interval (cm): 99-135 **Pieces:** 21-25
Rock name: disseminated oxide gabbro
Upper unit boundary: arbitrary upper boundary based on textural change
Lower unit boundary: presence of coarse-grained and pale plag patches from Piece 11 onward
Mineralogy:

	Modal (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Habit, shape, comments
Plagioclase	57.9	0.5	3	1	tabular, subhedral
Clinopyroxene	40	1	6	3	equant, subhedral
Orthopyroxene	1				equant, anhedral
Oxides	1	0.5	3	1	equant, anhedral
Sulfides	0.1				

Alteration: High background pervasive alteration
Veins: Amphibole + epidote vein with epidote rich halo
Structures: Hydrothermal veins in Pieces 8 and 25 have light green and white (plagioclase-rich) (Piece 8) and dark green (actinolite-rich) (Piece 25) fillings and are irregular, anastomosing, and planar. Fractures in Pieces 8 and 10 nucleate on veins. In Pieces 19 and 20 there is a sharp igneous contact with the leucocratic subunit. The mafic grains have their long axes at a high angle to the contact. Other leucocratic patches with diffuse boundaries are present in Pieces 21 and 23.

Additional comments:
This unit is part of the same intrusion as Unit 85 and is defined on the basis of a gradual textural change from patchy in Unit 85 to more equigranular with ophitic pyroxenes in Unit 86. The lower boundary is marked by a change in the size of the largest ophitic pyroxenes, with Unit 86 containing pyroxene oikocrysts <5 mm in size, and Unit 87 containing pyroxene oikocrysts >10 mm in size.

Unit: 87
Section: 312-U1256D-216R-1-A
Interval (cm): 135-150 **Pieces:** 26
Rock name: opx-bearing gabbro
Upper unit boundary: based on textural change between Pieces 25 and 26
Lower unit boundary: not recovered
Mineralogy:

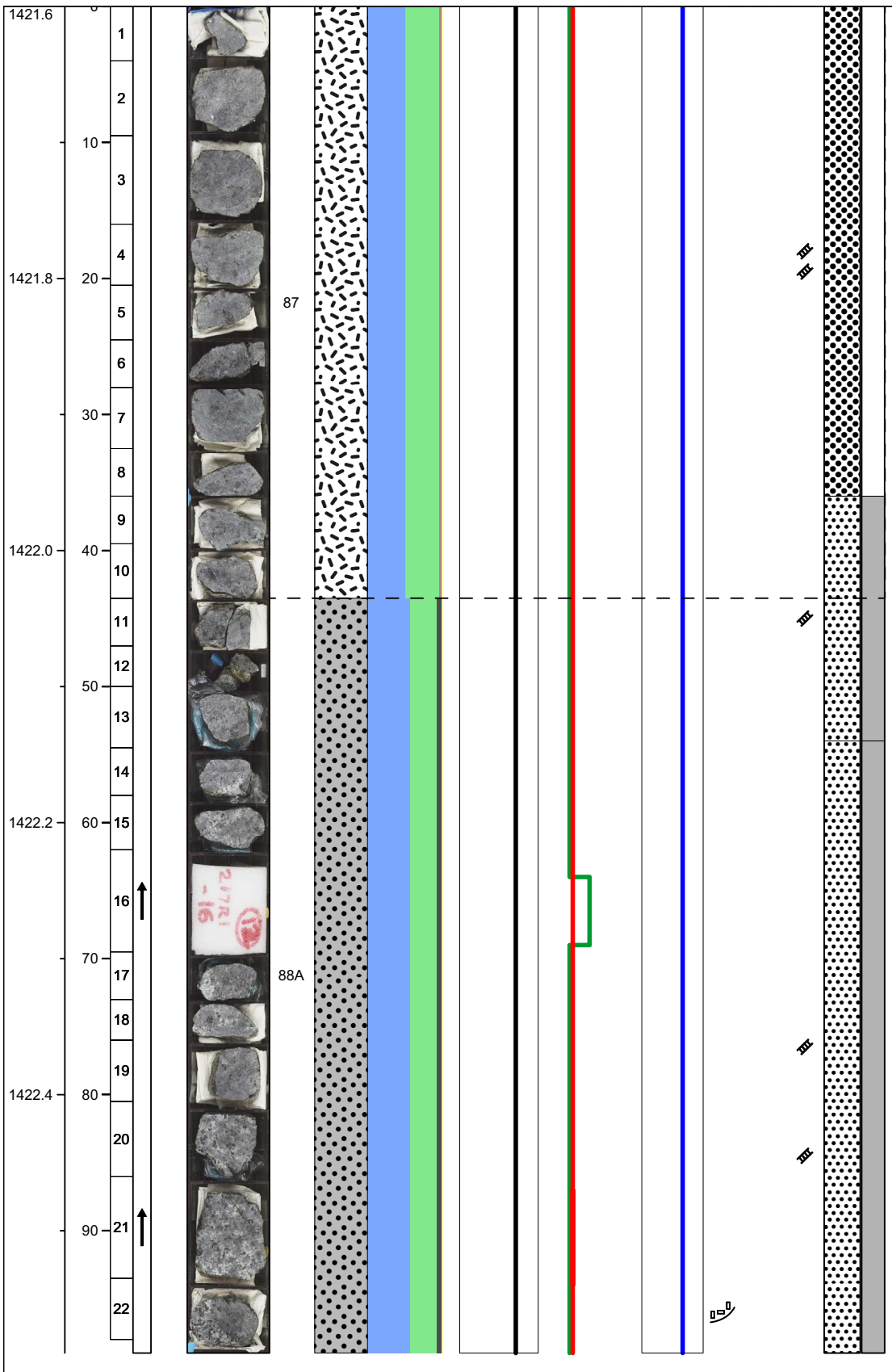
	Modal (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Habit, shape, comments
Plagioclase	60.5	0.3	3	2	tabular, subhedral
Clinopyroxene	35	1	10	3	equant-poikilitic, anhedral
Orthopyroxene	4	0.5	5	3	poikilitic, anhedral
Oxides	0.5	0.5	2	1	equant, anhedral

Alteration: High background pervasive alteration
Veins: Amphibole ± epidote ± secondary plagioclase veins with dark green alteration halos
Structures: Two hydrothermal veins with white, dark and light green (varying amounts of plagioclase and amphibole), and sulfide-bearing fillings. The veins are irregular, with diffuse alteration (light green).

Additional comments:
While Unit 87 may be part of the same igneous body as Unit 86, there is a marked change in the size of the clinopyroxene oikocrysts, with Unit 87 containing oikocrysts as large as 30 mm.

Core Photo

Hole 335(312)-1256D-217R Section 1, Top of Section: 1421.6 m (CSF-A)



Description

Unit: 87
Section: 312-1256D-217R-1-A
Interval (cm): 0-43.5 **Pieces:** 1-10
Rock name: disseminated oxide opx-bearing gabbro
Upper unit boundary: based on textural change between Pieces 25 and 26 of Section 216R-1
Lower unit boundary: not recovered
Mineralogy:

	Modal (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Habit, shape, comments
Plagioclase	50.9	0.3	3	2	tabular, subhedral
Clinopyroxene	45	2	15	8	oikocrystic, anhedral
Orthopyroxene	3	1	3	2	interstitial, anhedral
Oxides	1	0.5	6	2	equant, anhedral
Sulfides	0.1				

Alteration: High background alteration; patchy (10% of Moderatly altered patches in the last 8 centimeters)
Veins: Amphibole vein
Structures: Several leucocratic patches in Pieces 3, 7, 9, and 10. Patches are irregular and spherical. In Piece 7 there is a planar and sharp, dark green (amphibole-rich) vein.

Additional comments:
While Unit 87 may be part of the same igneous body as Unit 86, there is a marked change in the size of the clinopyroxene oikocrysts, with Unit 87 containing oikocrysts as large as 30 mm. This unit is devoid of the large coarse-grained patches with pale plagioclase which are found in Unit 88.

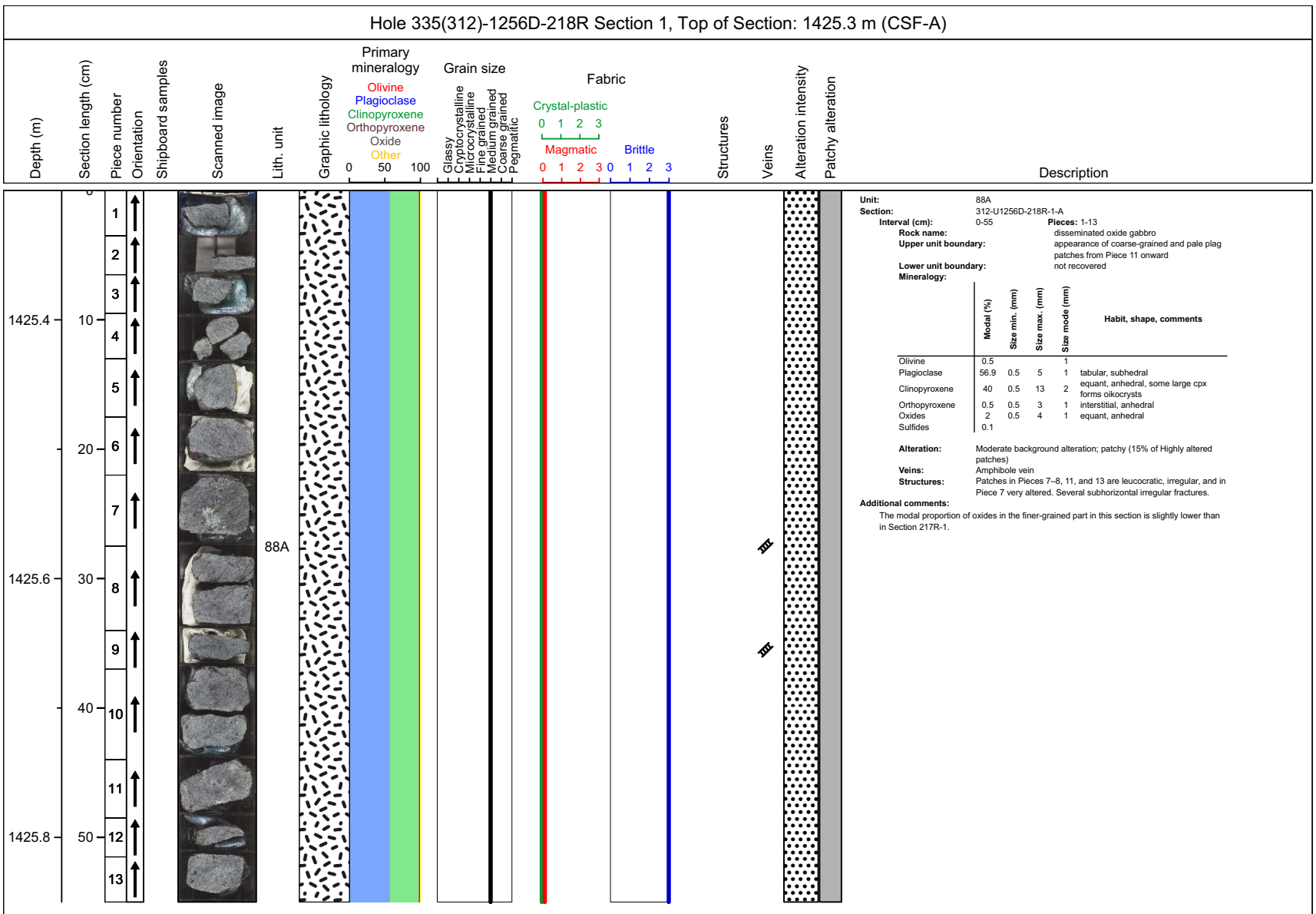
Unit: 88A
Section: 312-1256D-217R-1-A
Interval (cm): 43.5-99 **Pieces:** 11-22
Rock name: oxide gabbro
Upper unit boundary: appearance of coarse-grained and pale plag patches from Piece 11 onward
Lower unit boundary: not recovered
Mineralogy:

	Modal (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Habit, shape, comments
Plagioclase	57.4	0.5	6	3	subequant, subhedral
Clinopyroxene	35	1	8	4	tabular, subhedral, in fine-grained part cpx forms oikocrysts
Orthopyroxene	0.5	1	5	2	anhedral
Oxides	7	0.5	5	1	equant, anhedral
Quartz	0.1				

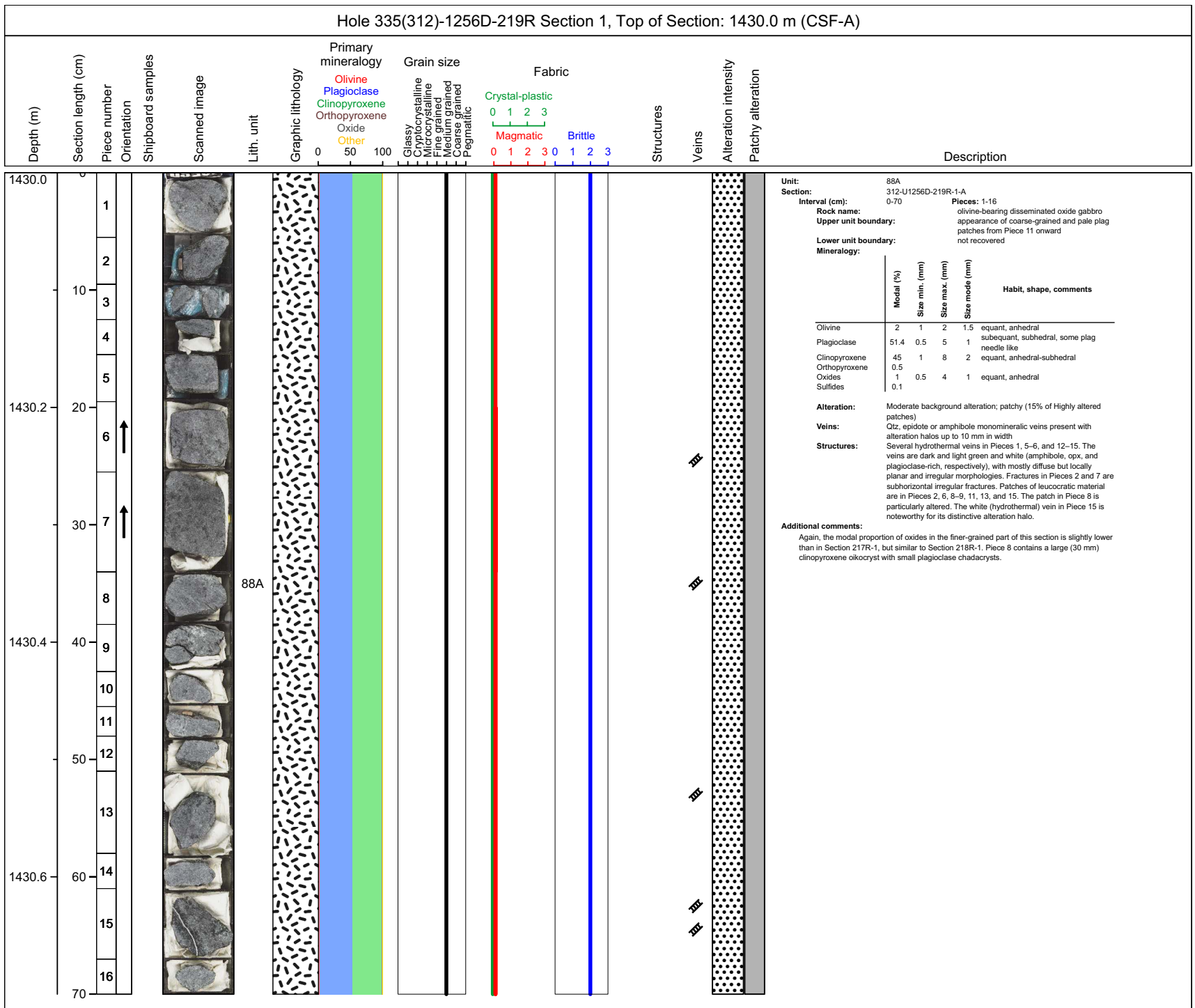
Alteration: Moderate background alteration; patchy (35% of Highly altered patches)
Veins: Amphibole + zeolite vein
Structures: Leucocratic patches in all of the pieces, with one patch in Piece 22 classified as an igneous contact based on its sharp boundary and strong contrast in lithology (leucocratic against melanocratic). Pieces 20 and 22 have dark and light green minerals filling irregular, anastomosing, and splayed veins with dark and light green (amphibole-rich) minerals fillings.

Additional comments:
Unit 88 may be part of the same igneous body as Unit 87, and is defined by the downhole appearance of diffuse zones with coarser grain size, (altered) pale plagioclase and a higher modal content of oxide minerals; this appears very similar to the oxide gabbro/diorite patches have seen earlier (e.g., Section 214R-1). The background finer-grained gabbro is very similar to Unit 87, still containing large clinopyroxene oikocrysts. The variation in grain size between the coarser and finer parts appears to be igneous in origin, but the paler plagioclase in the coarser parts may indicate that alteration of these portions occurred more readily. Coarser regions do not contain clinopyroxene with poikilitic texture (in contrast to the finer regions). The boundaries between the coarser and finer regions vary in nature, sometimes being very diffuse (e.g., Piece 16) and in other cases, fairly sharp (Piece 22), occurring over a couple of millimeters or less.

Core Photo


Hole 335(312)-1256D-218R Section 1, Top of Section: 1425.3 m (CSF-A)
Depth (m)
Section length (cm)
Piece number
Orientation
Shipboard samples
Scanned image
Lith. unit
Graphic lithology
Primary mineralogy
Olivine
Plagioclase
Clinopyroxene
Orthopyroxene
Oxide
Other
0 50 100
Grain size
Glassy
Cryptocrystalline
Microcrystalline
Fine grained
Medium grained
Coarse grained
Pegmatitic
Fabric
Crystal-plastic
0 1 2 3
Magmatic
Brittle
0 1 2 3 0 1 2 3
Structures
Veins
Alteration intensity
Patchy alteration
Description
1425.4
1425.6
1425.8
10
20
30
40
50
1 2 3 4 5 6 7 8 9 10 11 12 13
88A
Unit: 88A
Section: 312-U1256D-218R-1-A
Interval (cm): 0-55
Pieces: 1-13
Rock name: disseminated oxide gabbro
Upper unit boundary: appearance of coarse-grained and pale plag patches from Piece 11 onward
Lower unit boundary: not recovered
Mineralogy:
Modal (%) | Size min. (mm) | Size max. (mm) | Size mode (mm) | Habit, shape, comments
Olivine 0.5 1
Plagioclase 56.9 0.5 5 1 tabular, subhedral
Clinopyroxene 40 0.5 13 2 equant, anhedral, some large cpx forms oikocrysts
Orthopyroxene 0.5 0.5 3 1 interstitial, anhedral
Oxides 2 0.5 4 1 equant, anhedral
Sulfides 0.1
Alteration: Moderate background alteration; patchy (15% of Highly altered patches)
Veins: Amphibole vein
Structures: Patches in Pieces 7–8, 11, and 13 are leucocratic, irregular, and in Piece 7 very altered. Several subhorizontal irregular fractures.
Additional comments:
The modal proportion of oxides in the finer-grained part in this section is slightly lower than in Section 217R-1.

Core Photo



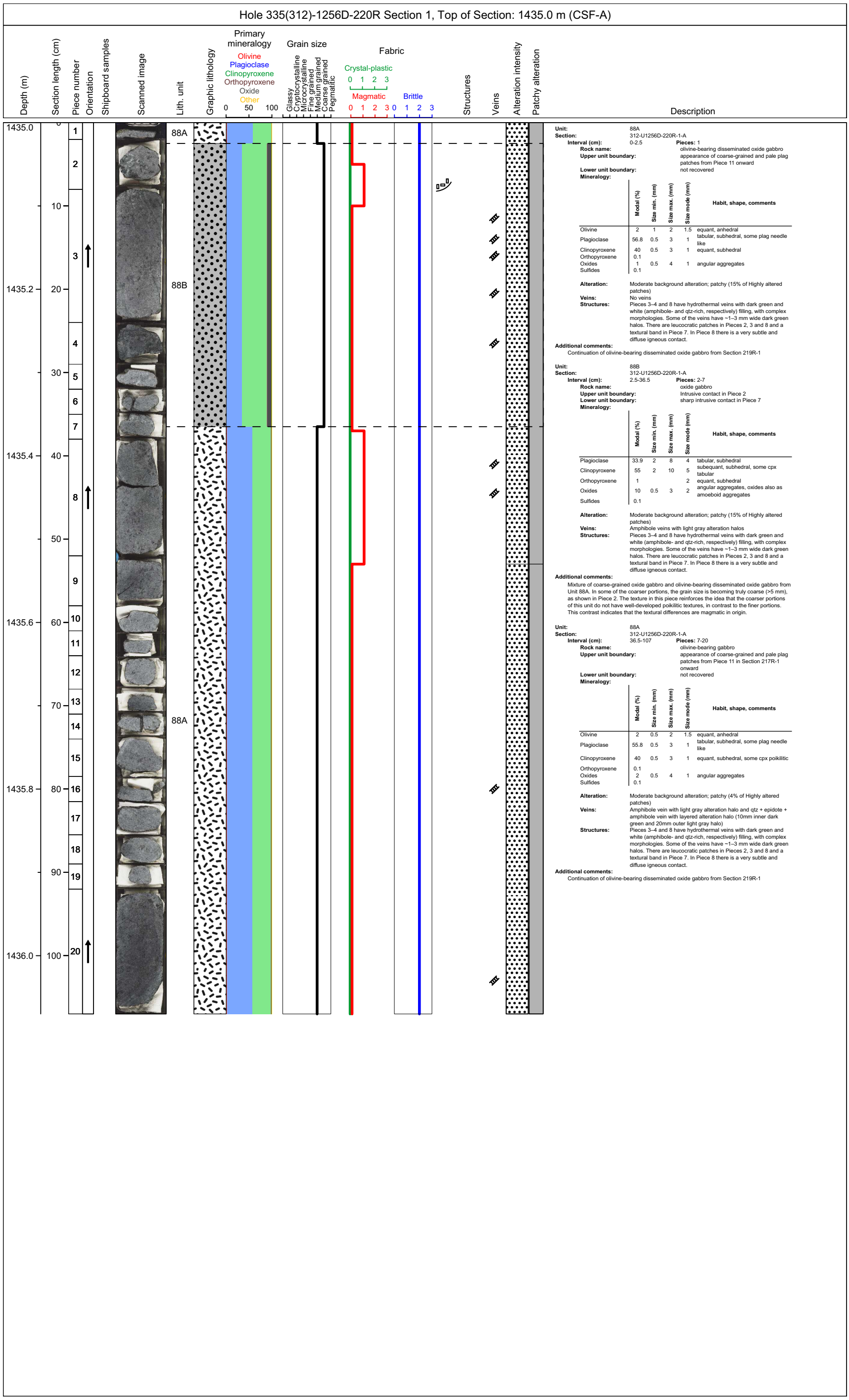
Unit: 88A
Section: 312-U1256D-219R-1-A
Interval (cm): 0-70 **Pieces:** 1-16
Rock name: olivine-bearing disseminated oxide gabbro
Upper unit boundary: appearance of coarse-grained and pale plag patches from Piece 11 onward
Lower unit boundary: not recovered
Mineralogy:

	Modal (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Habit, shape, comments
Olivine	2	1	2	1.5	equant, anhedral
Plagioclase	51.4	0.5	5	1	subequant, subhedral, some plag needle like
Clinopyroxene	45	1	8	2	equant, anhedral-subhedral
Orthopyroxene	0.5				
Oxides	1	0.5	4	1	equant, anhedral
Sulfides	0.1				

Alteration: Moderate background alteration; patchy (15% of Highly altered patches)
Veins: Qtz, epidote or amphibole monomineralic veins present with alteration halos up to 10 mm in width
Structures: Several hydrothermal veins in Pieces 1, 5–6, and 12–15. The veins are dark and light green and white (amphibole, opx, and plagioclase-rich, respectively), with mostly diffuse but locally planar and irregular morphologies. Fractures in Pieces 2 and 7 are subhorizontal irregular fractures. Patches of leucocratic material are in Pieces 2, 6, 8–9, 11, 13, and 15. The patch in Piece 8 is particularly altered. The white (hydrothermal) vein in Piece 15 is noteworthy for its distinctive alteration halo.

Additional comments:
Again, the modal proportion of oxides in the finer-grained part of this section is slightly lower than in Section 217R-1, but similar to Section 218R-1. Piece 8 contains a large (30 mm) clinopyroxene oikocryst with small plagioclase chadacrysts.

Core Photo



Unit: 88A
Section: 312-U1256D-220R-1-A
Interval (cm): 0-2.5 **Pieces:** 1
Rock name: olivine-bearing disseminated oxide gabbro
Upper unit boundary: appearance of coarse-grained and pale plag patches from Piece 11 onward
Lower unit boundary: not recovered
Mineralogy:

	Modal (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Habit, shape, comments
Olivine	2	1	2	1.5	equant, anhedral
Plagioclase	56.8	0.5	3	1	tabular, subhedral, some plag needle like
Clinopyroxene	40	0.5	3	1	equant, subhedral
Orthopyroxene	0.1				
Oxides	1	0.5	4	1	angular aggregates
Sulfides	0.1				

Alteration: Moderate background alteration; patchy (15% of Highly altered patches)
Veins: No veins
Structures: Pieces 3–4 and 8 have hydrothermal veins with dark green and white (amphibole- and qtz-rich, respectively) filling, with complex morphologies. Some of the veins have ~1–3 mm wide dark green halos. There are leucocratic patches in Pieces 2, 3 and 8 and a textural band in Piece 7. In Piece 8 there is a very subtle and diffuse igneous contact.
Additional comments: Continuation of olivine-bearing disseminated oxide gabbro from Section 219R-1

Unit: 88B
Section: 312-U1256D-220R-1-A
Interval (cm): 2.5-36.5 **Pieces:** 2-7
Rock name: oxide gabbro
Upper unit boundary: Intrusive contact in Piece 2
Lower unit boundary: sharp intrusive contact in Piece 7
Mineralogy:

	Modal (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Habit, shape, comments
Plagioclase	33.9	2	8	4	tabular, subhedral
Clinopyroxene	55	2	10	5	subequant, subhedral, some cpx tabular
Orthopyroxene	1			2	equant, subhedral
Oxides	10	0.5	3	2	angular aggregates, oxides also as amoeboid aggregates
Sulfides	0.1				

Alteration: Moderate background alteration; patchy (15% of Highly altered patches)
Veins: Amphibole veins with light gray alteration halos
Structures: Pieces 3–4 and 8 have hydrothermal veins with dark green and white (amphibole- and qtz-rich, respectively) filling, with complex morphologies. Some of the veins have ~1–3 mm wide dark green halos. There are leucocratic patches in Pieces 2, 3 and 8 and a textural band in Piece 7. In Piece 8 there is a very subtle and diffuse igneous contact.
Additional comments: Mixture of coarse-grained oxide gabbro and olivine-bearing disseminated oxide gabbro from Unit 88A. In some of the coarser portions, the grain size is becoming truly coarse (>5 mm), as shown in Piece 2. The texture in this piece reinforces the idea that the coarser portions of this unit do not have well-developed poikilitic textures, in contrast to the finer portions. This contrast indicates that the textural differences are magmatic in origin.

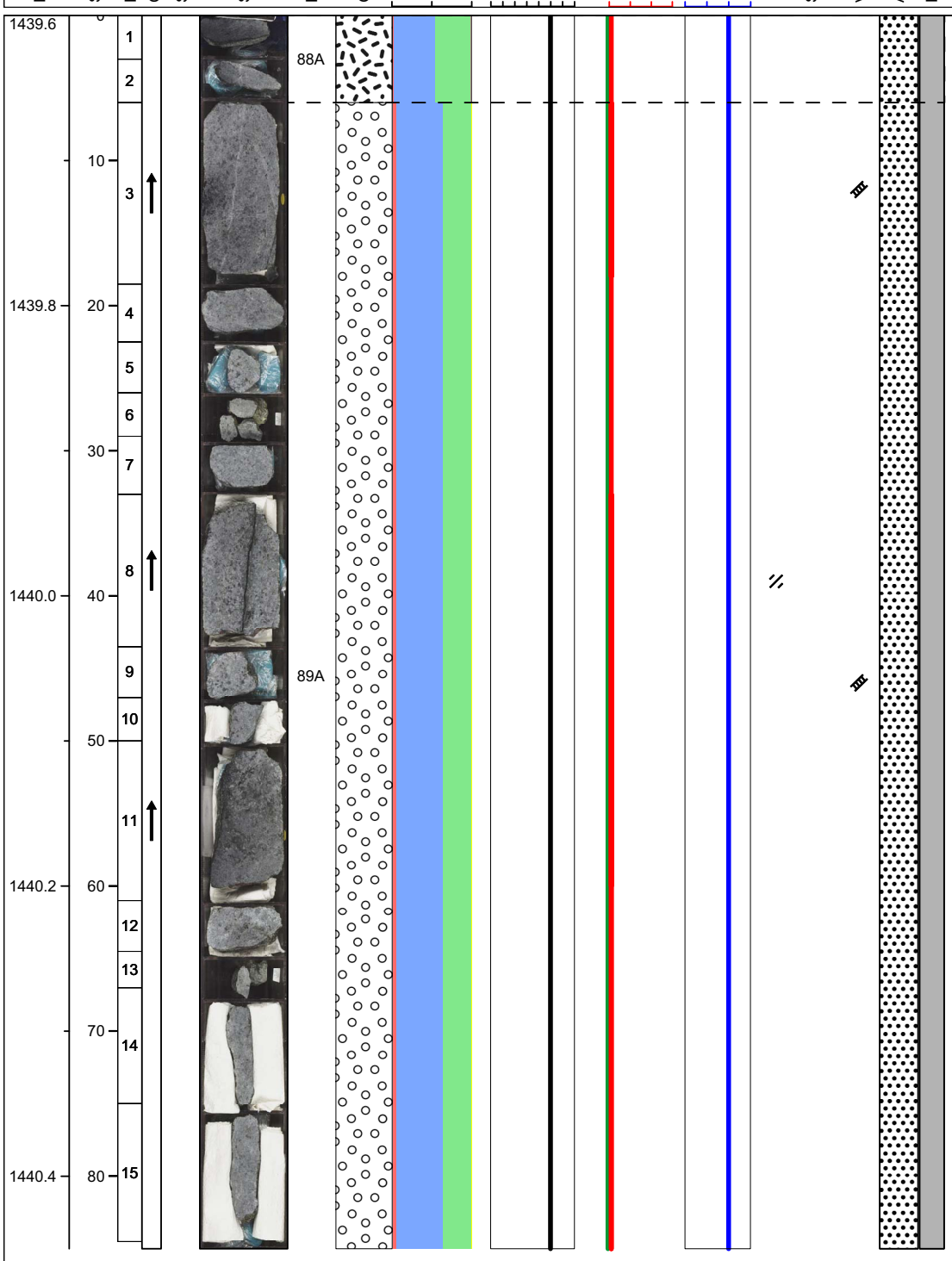
Unit: 88A
Section: 312-U1256D-220R-1-A
Interval (cm): 36.5-107 **Pieces:** 7-20
Rock name: olivine-bearing gabbro
Upper unit boundary: appearance of coarse-grained and pale plag patches from Piece 11 in Section 217R-1 onward
Lower unit boundary: not recovered
Mineralogy:

	Modal (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Habit, shape, comments
Olivine	2	0.5	2	1.5	equant, anhedral
Plagioclase	55.8	0.5	3	1	tabular, subhedral, some plag needle like
Clinopyroxene	40	0.5	3	1	equant, subhedral, some cpx poikilitic
Orthopyroxene	0.1				
Oxides	2	0.5	4	1	angular aggregates
Sulfides	0.1				

Alteration: Moderate background alteration; patchy (4% of Highly altered patches)
Veins: Amphibole vein with light gray alteration halo and qtz + epidote + amphibole vein with layered alteration halo (10mm inner dark green and 20mm outer light gray halo)
Structures: Pieces 3–4 and 8 have hydrothermal veins with dark green and white (amphibole- and qtz-rich, respectively) filling, with complex morphologies. Some of the veins have ~1–3 mm wide dark green halos. There are leucocratic patches in Pieces 2, 3 and 8 and a textural band in Piece 7. In Piece 8 there is a very subtle and diffuse igneous contact.
Additional comments: Continuation of olivine-bearing disseminated oxide gabbro from Section 219R-1

Core Photo

Hole 335(312)-1256D-221R Section 1, Top of Section: 1439.6 m (CSF-A)



Unit: 88A
Section: 312-U1256D-221R-1-A
Interval (cm): 0-6 **Pieces:** 1-2
Rock name: olivine-bearing disseminated oxide gabbro
Upper unit boundary: appearance of coarse-grained and pale plag patches from Piece 11 in Section 217R-1 onward
Lower unit boundary: not recovered
Mineralogy:

	Modal (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Habit, shape, comments
Olivine	2	0.5	3	1	equant, anhedral
Plagioclase	51.5	0.7	2	1	tabular, subhedral
Clinopyroxene	45	1	12	3	equant, subhedral
Orthopyroxene	0.5	1	3	2	equant, anhedral
Oxides	1	1	2	1	equant, anhedral

Alteration: Moderate background alteration; patchy (4% of Highly altered patches)
Veins: No veins
Structures: Hydrothermal veins in Pieces 2, 3, 8, 11, with dark and light green (anphibole- and chorite-rich, respectively) and white fillings. The veins are irregular in morphology. In Piece 8, the vein has a 4 mm dark green halo. Fractures in Pieces 3, 11, and 15 are subhorizontal irregular fractures. Some poorly defined patches are present in Pieces 11 and 12.

Additional comments:
There appears to be a gradual decrease in the content of oxide in this unit, so that by Piece 3 of this section the rock is a gabbro rather than oxide gabbro. The size of the poikilitic clinopyroxenes appears to be dropping, and the coarse patches are less prominent, with less difference in grain size between the coarser and finer portions.

Unit: 89A
Section: 312-U1256D-221R-1-A
Interval (cm): 6-85 **Pieces:** 3-15
Rock name: olivine-gabbro
Upper unit boundary: first appearance of olivine gabbro
Lower unit boundary: sharp drop in olivine content in Piece 3 of 223R-2
Mineralogy:

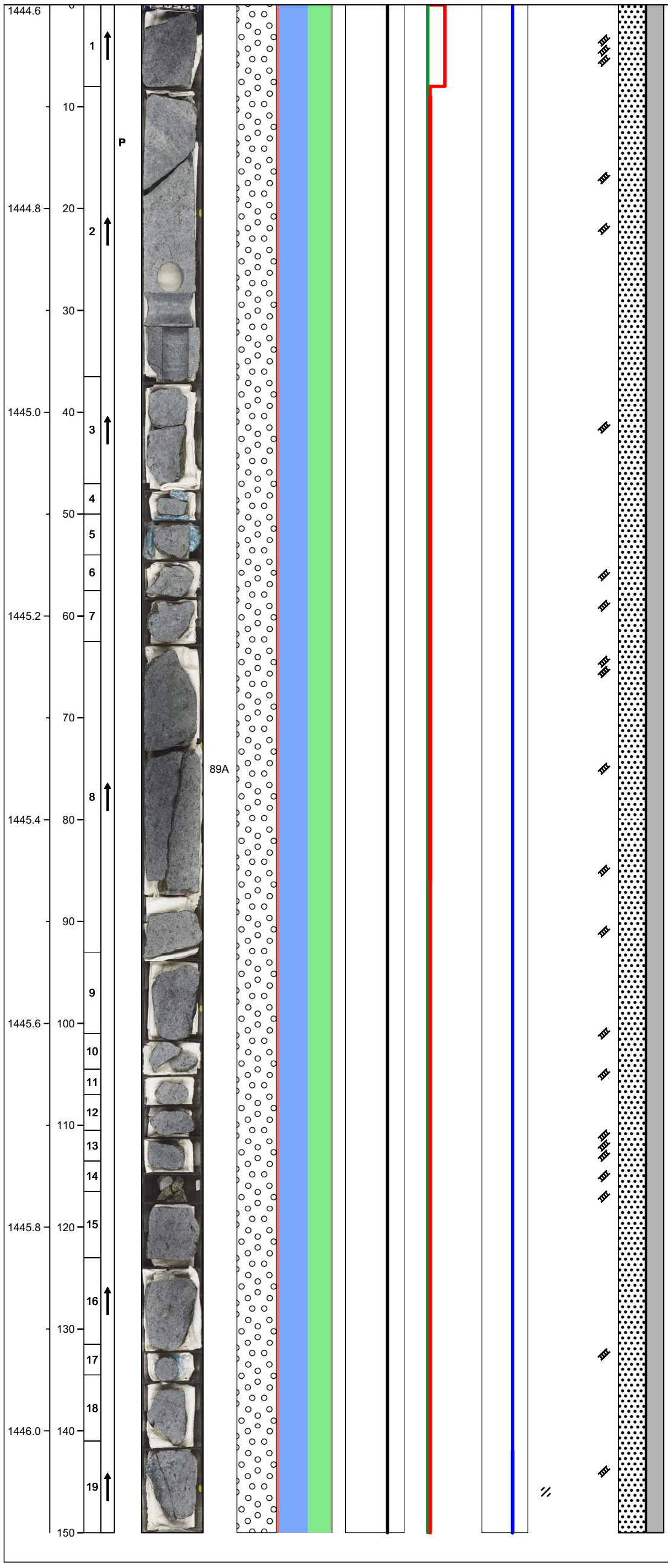
	Modal (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Habit, shape, comments
Olivine	5	0.8	5	2	equant, anhedral
Plagioclase	58.9	0.8	4	1	tabular, subhedral
Clinopyroxene	35	0.5	3	1.5	equant, subhedral
Orthopyroxene	0.5			1.5	
Oxides	0.5	1	2	1	equant, anhedral
Sulfides	0.1				

Alteration: Moderate background alteration; patchy (4% of Highly altered patches)
Veins: Qtz + secondary plagioclase vein and amphibole veinwith dark green inner halo and outer patchy dark green halo
Structures: Hydrothermal veins in Pieces 2, 3, 8, 11, with dark and light green (anphibole- and chorite-rich, respectively) and white fillings. The veins are irregular in morphology. In Piece 8, the vein has a 4 mm dark green halo. Fractures in Pieces 3, 11, and 15 are subhorizontal irregular fractures. Some poorly defined patches are present in Pieces 11 and 12.

Additional comments:
Olivine content is sufficiently high to define an olivine gabbro unit. There is an associated change to an equigranular, subophitic texture.

Core Photo

Hole 335(312)-1256D-222R Section 1, Top of Section: 1444.6 m (CSF-A)



Unit: 89A
Section: 312-U1256D-222R-1-A
Interval (cm): 0-150 **Pieces:** 1-19
Rock name: opx-bearing olivine-gabbro
Upper unit boundary: first appearance of olivine gabbro
Lower unit boundary: sharp drop in olivine content in Piece 3 of 223R-2

Mineralogy:

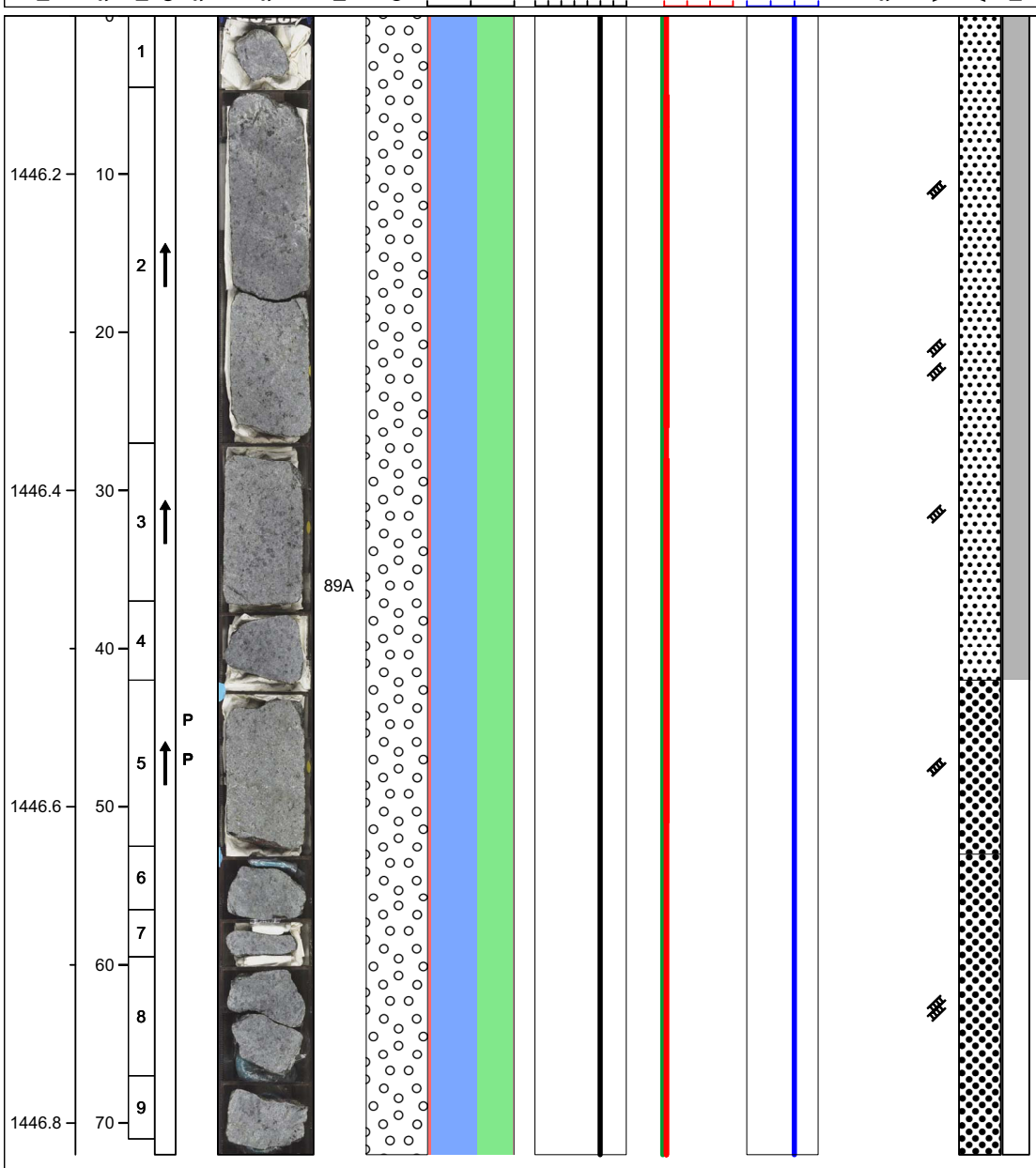
	Modal (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Habit, shape, comments
Olivine	5	0.5	4	1	equant, anhedral
Plagioclase	51.5	0.5	6	1	tabular, subhedral
Clinopyroxene	40	1	15	3	equant, subhedral, some poikilitic cpx
Orthopyroxene	3	1	5	2	poikilitic, anhedral
Oxides	0.5	1	8	2	equant, anhedral

Alteration: Moderate background alteration; patchy (4% of Highly altered patches)
Veins: Amphibole ± chlorite ± qtz ± carbinate veins. Alteration halos are generally either light gray or dark green
Structures: Leucocratic patches are present in Pieces 5, 6, 7, 10, and 16. Veins with diffuse morphologies are present in most pieces. They dip moderately to steeply. Piece 8a has green patches around a subhorizontal vein. A dark alteration patch was observed in Piece 19 accompanied by a hydrothermal vein.

Additional comments:
Very similar olivine gabbro to Section 221R-1. Olivine mode varies slightly, hovering around 5%.

Core Photo

Hole 335(312)-1256D-222R Section 2, Top of Section: 1446.1 m (CSF-A)



Unit: 89A
Section: 312-U1256D-222R-2-A
Interval (cm): 0-72 **Pieces:** 1-9
Rock name: opx-bearing olivine-gabbro
Upper unit boundary: first appearance of olivine gabbro
Lower unit boundary: sharp drop in olivine content in Piece 3 of 223R-2

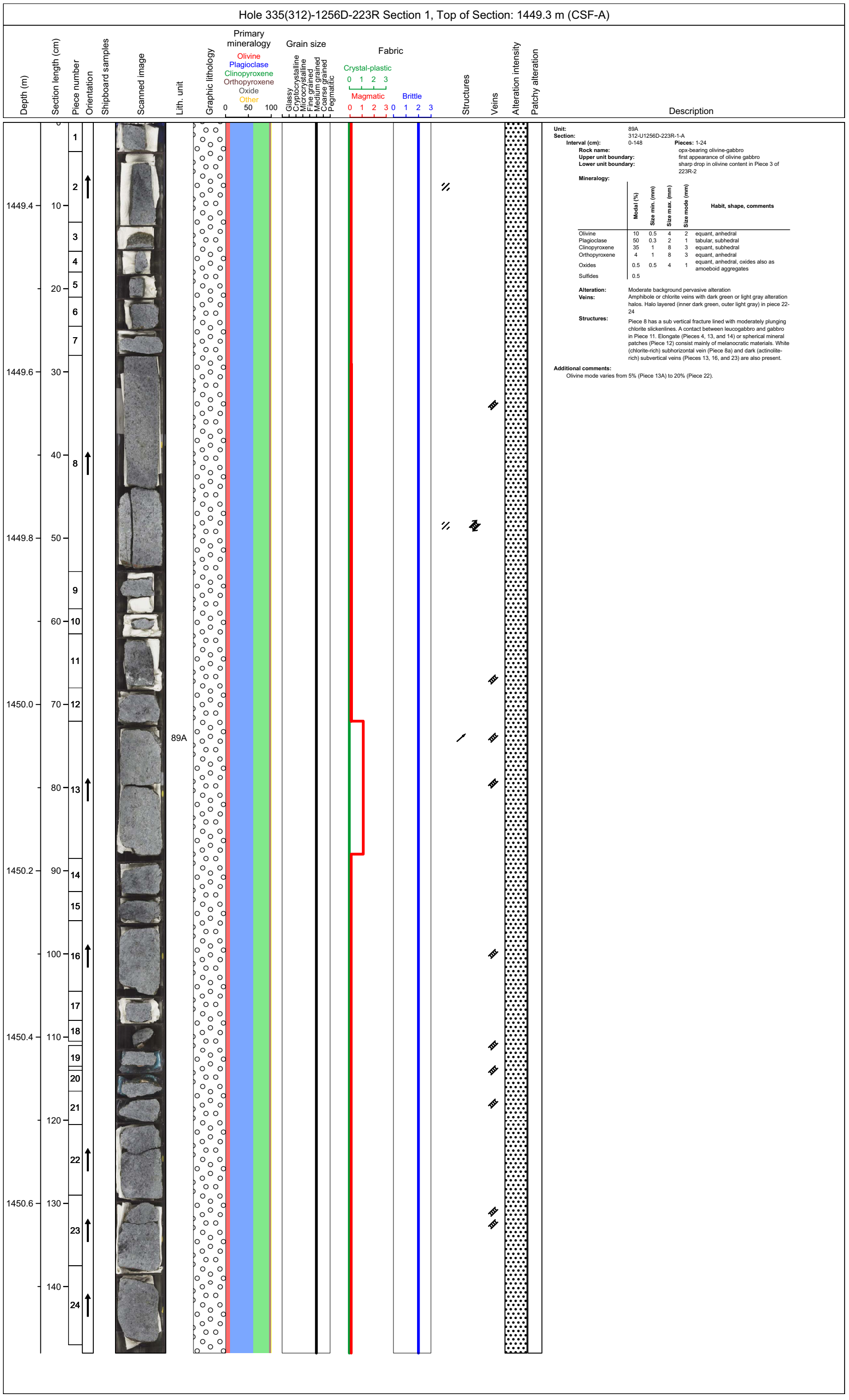
Mineralogy:

	Modal (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Habit, shape, comments
Olivine	5	0.5	4	1	equant, anhedral
Plagioclase	53	0.5	6	1	tabular, subhedral
Clinopyroxene	40	1	15	3	equant, subhedral
Orthopyroxene	1.5	1	5	2	poikilitic, anhedral
Oxides	0.5	1	8	2	equant, anhedral

Alteration: High background alteration; patchy (4% of Highly altered patches in the first 42 centimeters)
Veins: Amphibole or chlorite veins with dark green halos
Structures: Leucocratic patches in Pieces 1 and 2 closely connected to subvertical and subhorizontal veins with green mineral (amphibole) fillings. Piece 5 has subvertical, parallel set of diffuse veins that accompany light green alteration.

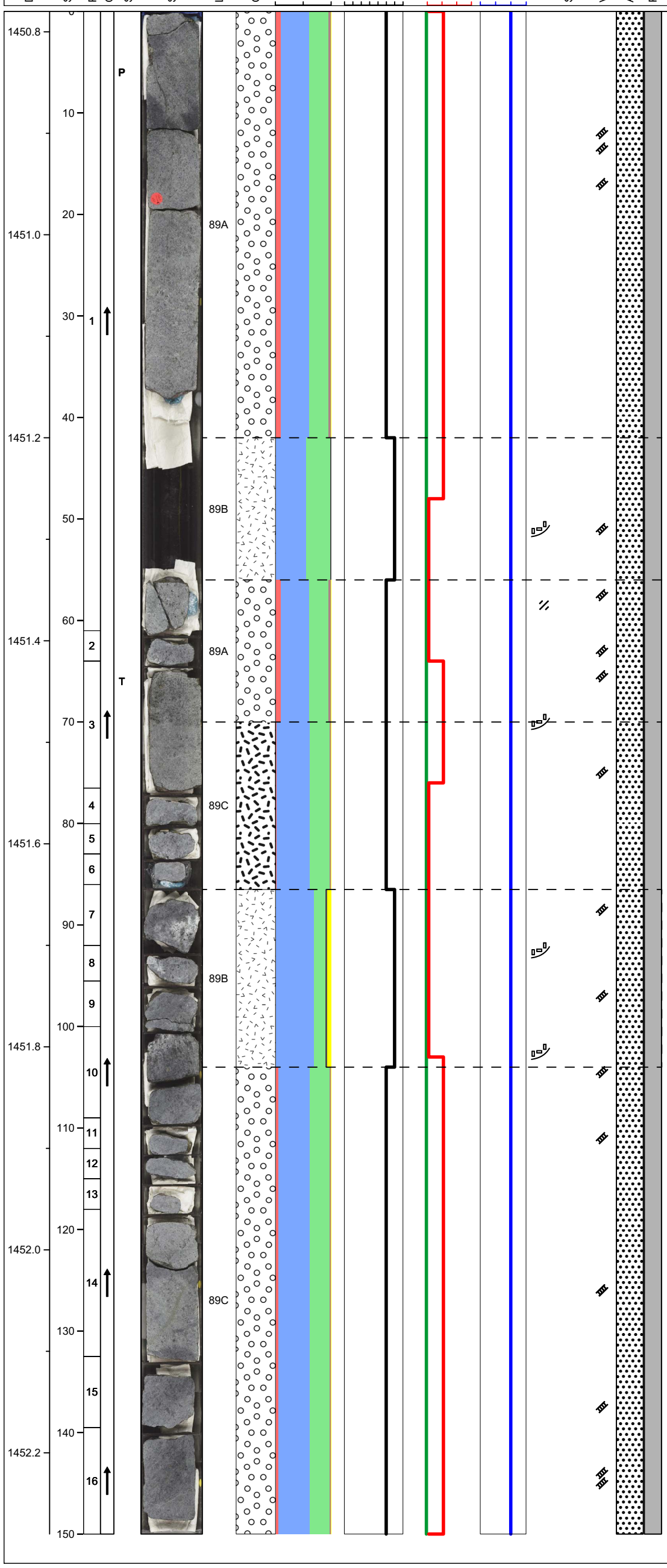
Additional comments:
Very similar olivine gabbro to Section 221R-1 and 222R-1. Olivine mode varies slightly, exceeding 10% in Piece 8.

Core Photo


Hole 335(312)-1256D-223R Section 1, Top of Section: 1449.3 m (CSF-A)
Depth (m)
Section length (cm)
Piece number
Orientation
Shipboard samples
Scanned image
Lith. unit
Graphic lithology
Primary mineralogy
Olivine
Plagioclase
Clinopyroxene
Orthopyroxene
Oxide
Other
Grain size
Glassy
Cryptocrystalline
Microcrystalline
Fine grained
Medium grained
Coarse grained
Pegmatitic
Fabric
Crystal-plastic
Magmatic
Brittle
Structures
Veins
Alteration intensity
Patchy alteration
Description
89A
Unit: 89A
Section: 312-U1256D-223R-1-A
Interval (cm): 0-148
Pieces: 1-24
Rock name: opx-bearing olivine-gabbro
Upper unit boundary: first appearance of olivine gabbro
Lower unit boundary: sharp drop in olivine content in Piece 3 of 223R-2
Mineralogy:
Olivine 10 0.5 4 2 equant, anhedral
Plagioclase 50 0.3 2 1 tabular, subhedral
Clinopyroxene 35 1 8 3 equant, subhedral
Orthopyroxene 4 1 8 3 equant, anhedral
Oxides 0.5 0.5 4 1 equant, anhedral, oxides also as amoeboid aggregates
Sulfides 0.5
Alteration: Moderate background pervasive alteration
Veins: Amphibole or chlorite veins with dark green or light gray alteration halos. Halo layered (inner dark green, outer light gray) in piece 22-24
Structures: Piece 8 has a sub vertical fracture lined with moderately plunging chlorite slickenlines. A contact between leucogabbro and gabbro in Piece 11. Elongate (Pieces 4, 13, and 14) or spherical mineral patches (Piece 12) consist mainly of melanocratic materials. White (chlorite-rich) subhorizontal vein (Piece 8a) and dark (actinolite-rich) subvertical veins (Pieces 13, 16, and 23) are also present.
Additional comments:
Olivine mode varies from 5% (Piece 13A) to 20% (Piece 22).

Core Photo

Hole 335(312)-1256D-223R Section 2, Top of Section: 1450.78 m (CSF-A)



Unit: 89A
Section: 312-U1256D-223R-2-A
Interval (cm): 0-42 **Pieces:** 1a-1e
Rock name: opx-bearing olivine-gabbro
Upper unit boundary: first appearance of olivine gabbro
Lower unit boundary: not recovered
Mineralogy:

	Modal (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Habit, shape, comments
Olivine	10	0.5	4	2	equant, anhedral
Plagioclase	50	0.3	2	1	tabular, subhedral
Clinopyroxene	35	1	8	3	equant, subhedral
Orthopyroxene	4	1	8	3	equant, anhedral
Oxides	0.5	0.5	4	1	equant, anhedral, oxides also as amoeboid aggregates. described from 223R-1
Sulfides	0.5				

Alteration: Moderate background alteration; patchy (7% of Highly altered patches)
Veins: Amphibole, chlorite and chlorite + qtz veins with dark green halos
Structures: Leucocratic, coarse-grained gabbros are recognized as subhorizontal layers (Pieces 1d, 1e, and 10) or patches (Pieces 2, 5, 7, 8, and 9) in otherwise fine- to medium-grained melanocratic gabbros. Alteration patches are present in Pieces 3 and 16. Subvertical veins accompany dark green (amphibole) mineral fillings and diffuse contacts (Pieces 1b, 1c, 10, 14, and 16), whereas subhorizontal veins have light green and white mineral fillings (Pieces 1d, 1e, 3, and 16).
Additional comments: The olivine gabbro is cut by a couple of coarse grained dikes; since these are discrete (rather than diffuse) these dikes are defined as a subunit.

Unit: 89B
Section: 312-U1256D-223R-2-A
Interval (cm): 42-56 **Pieces:** 1e
Rock name: oxide qtz-diorite
Upper unit boundary: intrusive margins in Piece 1e
Lower unit boundary: not recovered
Mineralogy:

	Modal (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Habit, shape, comments
Plagioclase	55	0.2	7	5	tabular, subhedral-euhedral
Clinopyroxene	43	0.2	8	5	equant, anhedral-euhedral
Oxides	2	0.2	2.5	2	anhedral-euhedral

Alteration: Moderate background alteration; patchy (7% of Highly altered patches)
Veins: Chlorite + qtz vein
Structures: No structure specific to the oxide gabbro is noted.
Additional comments: This subunit occurs as a pair of thin dikes (one 2 cm thick, the other close to 5 cm) which cut Unit 89. The margins are less diffuse and straighter than those in the patches in Unit 88, and the dike margins are almost parallel sided. We therefore define these two intrusive bodies as a separate subunit.

Unit: 89A
Section: 312-U1256D-223R-2-A
Interval (cm): 56-70 **Pieces:** 1f-3
Rock name: opx-bearing olivine-gabbro
Upper unit boundary: not recovered
Lower unit boundary: sharp modal contact in Piece 3; olivine disappears below
Mineralogy:

	Modal (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Habit, shape, comments
Olivine	10	0.5	4	2	equant, anhedral
Plagioclase	50	0.3	2	1	tabular, subhedral
Clinopyroxene	35	1	8	3	equant, subhedral
Orthopyroxene	4	1	8	3	equant, anhedral
Oxides	0.5	0.5	4	1	equant, anhedral, oxides also as amoeboid aggregates
Sulfides	0.5				

Alteration: Moderate background alteration; patchy (7% of Highly altered patches)
Veins: Amphibole or chlorite veins with dark green or light gray alteration halos.
Structures: Leucocratic, coarse-grained gabbros are recognized as subhorizontal layers (Pieces 1d, 1e, and 10) or patches (Pieces 2, 5, 7, 8, and 9) in otherwise fine- to medium-grained melanocratic gabbros. Alteration patches are present in Pieces 3 and 16. Subvertical veins accompany dark green (amphibole) mineral fillings and diffuse contacts (Pieces 1b, 1c, 10, 14, and 16), whereas subhorizontal veins have light green and white mineral fillings (Pieces 1d, 1e, 3, and 16).
Additional comments: Olivine mode variable; there is an olivine-rich zone in Piece 3, in sharp modal contact with an olivine-bearing gabbro below. This defines the boundary between olivine gabbro Units 1256D-89A and 89C.

Unit: 89C
Section: 312-U1256D-223R-2-A
Interval (cm): 70-86.5 **Pieces:** 3a-7
Rock name: olivine and opx-bearing gabbro
Upper unit boundary: sharp modal contact in Piece 3; olivine rich above
Lower unit boundary: not recovered
Mineralogy:

	Modal (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Habit, shape, comments
Olivine	2	0.5	2	1	equant, anhedral
Plagioclase	60	0.3	1.5	0.8	tabular, subhedral
Clinopyroxene	35	0.3	3	1	equant, subhedral
Orthopyroxene	2	0.5	3	1.5	equant, subhedral
Oxides	0.5	0.5	1	1	equant, anhedral
Sulfides	0.5				

Alteration: Moderate background alteration; patchy (7% of Highly altered patches)
Veins: No veins
Structures: No structure specific to the olivine gabbro is noted.
Additional comments: Olivine-poor top of second olivine gabbro series (Unit 1256D-89C).

Unit: 89B
Section: 312-U1256D-223R-2-A
Interval (cm): 86.5-104 **Pieces:** 7-10a
Rock name: oxide qtz-diorite
Upper unit boundary: irregular, diffusive boundary in Piece 7
Lower unit boundary: sharp, planar intrusive contact in Piece 10A
Mineralogy:

	Modal (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Habit, shape, comments
Plagioclase	69	1	6	3	tabular, subhedral
Clinopyroxene	20	1	10	4	equant, subhedral
Oxides	4	0.5	3	2	equant, anhedral
Quartz	7	0.3	1	0.5	equant, anhedral

Alteration: Moderate background alteration; patchy (7% of Highly altered patches)
Veins: Amphibole or chlorite veins
Structures: No structure specific to the olivine gabbro is noted.
Additional comments: Intrusive patch of evolved oxide qtz diorite.

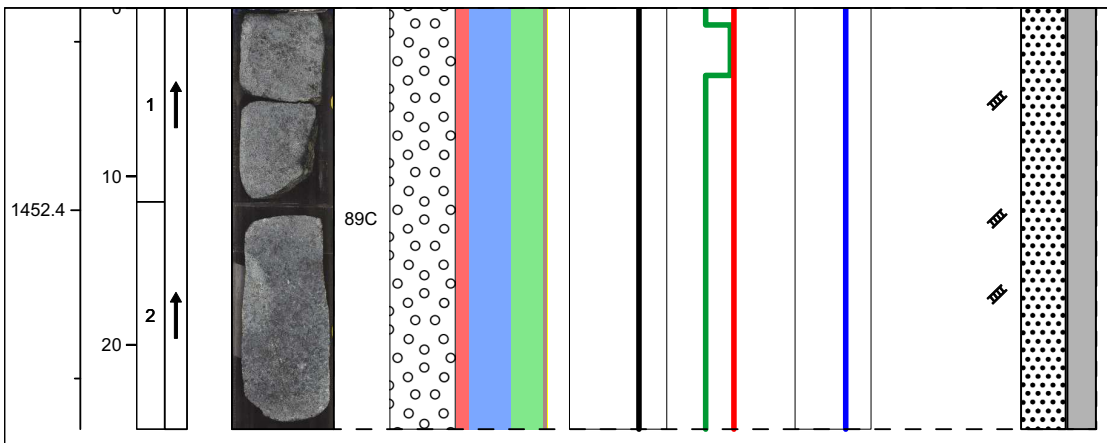
Unit: 89C
Section: 312-U1256D-223R-2-A
Interval (cm): 104-150 **Pieces:** 10a-16
Rock name: opx-bearing olivine-gabbro
Upper unit boundary: sharp, planar intrusive contact in Piece 10A
Lower unit boundary: not recovered
Mineralogy:

	Modal (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Habit, shape, comments
Olivine	5	0.5	2	1	equant, anhedral
Plagioclase	57	0.3	1.5	0.8	tabular, subhedral
Clinopyroxene	35	0.3	3	1	equant, subhedral
Orthopyroxene	2	0.5	3	1.5	equant, subhedral
Oxides	0.5	0.5	1	1	equant, anhedral
Sulfides	0.5				

Alteration: Moderate background alteration; patchy (7% of Highly altered patches)
Veins: Amphibole or chlorite veins with dark green or light gray alteration halos. Halo layered (inner dark green, outer light gray) in piece 16
Structures: No structure specific to the olivine gabbro is noted.
Additional comments: Middle part of second olivine gabbro series (Unit 1256D-89C).

Core Photo

Hole 335(312)-1256D-223R Section 3, Top of Section: 1452.28 m (CSF-A)



Unit: 89C
Section: 312-U1256D-223R-3-A
Interval (cm): 0-25 **Pieces:** 1-2
Rock name: opx-bearing olivine-gabbro
Upper unit boundary: sharp, planar intrusive contact in Piece 10A of 223R-2
Lower unit boundary: not recovered
Mineralogy:

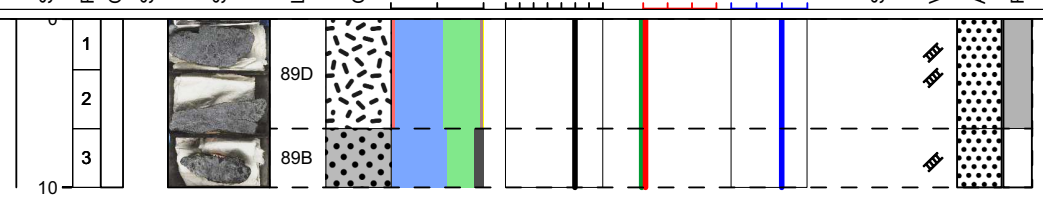
	Modal (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Habit, shape, comments
Olivine	15	0.5	4	2	equant, anhedral
Plagioclase	45	0.3	2	1	tabular, subhedral
Clinopyroxene	35	1	8	3	equant, subhedral
Orthopyroxene	4	1	8	3	equant, anhedral
Oxides	0.5	0.5	4	1	equant, anhedral, oxides also as amoeboid aggregates
Sulfides	0.5				

Alteration: Moderate background alteration; patchy (7% of Highly altered patches)
Veins: Chlorite + sulphide and amphibole vein with a dark green inner halo and light gray outer halo
Structures: Oriented Piece 1a exhibits several structural features of magmatic and deformation origins. Horizontal textural banding of magmatic origin (defined by alternation of coarse- and medium-grained layer) shows reverse sense shear by later high temperature magmatic deformation. Textural banding and a vein with dark alteration halo are in Piece 1b. Oriented Piece 2 has a subhorizontal vein with white fillings and a subvertical vein with green mineral fillings. Leucocratic patches are distributed along the green vein.

Additional comments:
Basal, olivine-rich part (20% in Piece 3) of second olivine gabbro series (Unit 1256D-89C). In this section, a couple of diffuse coarse patches are present.

Core Photo

Hole 335(312)-1256D-224R Section 1, Top of Section: 1454.3 m (CSF-A)



Unit: 89D
Section: 312-U1256D-224R-1-A
Interval (cm): 0-6.5 **Pieces:** 1-2
Rock name: olivine and opx bearing gabbro
Upper unit boundary: not recovered
Lower unit boundary: not recovered
Mineralogy:

	Modal (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Habit, shape, comments
Olivine	4	0.5	3	2	equant, anhedral
Plagioclase	52.4	0.3	2	0.8	tabular, subhedral
Clinopyroxene	40	1	5	1.5	equant, subhedral
Orthopyroxene	3	1	3	1.5	equant, anhedral
Oxides	0.5			2	equant, anhedral
Sulfides	0.1				

Alteration: Moderate background alteration; patchy (7% of Highly altered patches)
Veins: Chlorite + qtz vein
Structures: Piece 1 has parallel veins with green (amphibole-rich) and white (qtz-rich) mineral fillings. There is a thin irregular vein in Piece 2.
Additional comments:

Olivine poor gabbro; perhaps top of third olivine gabbro series? Defined as Unit 1256D-89D.

Unit: 89B
Section: 312-U1256D-224R-1-A
Interval (cm): 6.5-10 **Pieces:** 3
Rock name: oxide gabbro
Upper unit boundary: not recovered
Lower unit boundary: not recovered
Mineralogy:

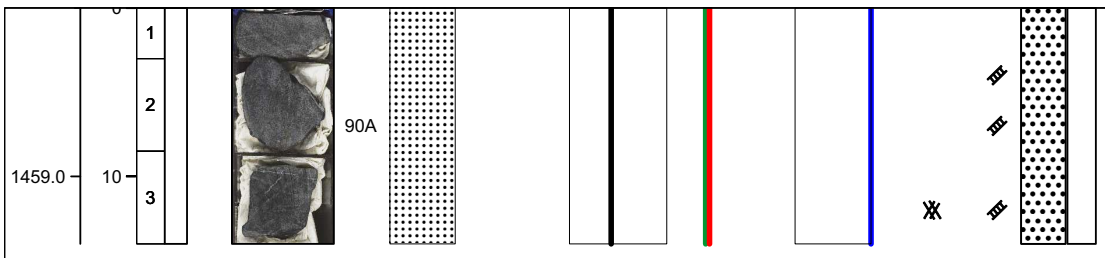
	Modal (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Habit, shape, comments
Plagioclase	60	1	3	2	tabular, subhedral
Clinopyroxene	30	2	10	4	equant, subhedral
Oxides	10	0.5	4	3	equant, anhedral

Alteration: Moderate background pervasive alteration
Veins: No veins
Structures: No structure specific to the olivine gabbro is noted.
Additional comments:

Small, isolated piece of oxide gabbro. Reminiscent of the intrusive oxide-rich intrusives higher in gabbro 1.

Core Photo

Hole 335(312)-1256D-225R Section 1, Top of Section: 1458.9 m (CSF-A)



Unit: 90A
Section: 312-U1256D-225R-1-A
Interval (cm): 0-14 **Pieces:** 1–3
Rock name: aphyric basalt
Upper unit boundary: not recovered
Lower unit boundary: not recovered
Groundmass modal grain size: cryptocrystalline-fine grained
Glass abundance (%):
Altered glass abundance (%):
Phenocrysts:

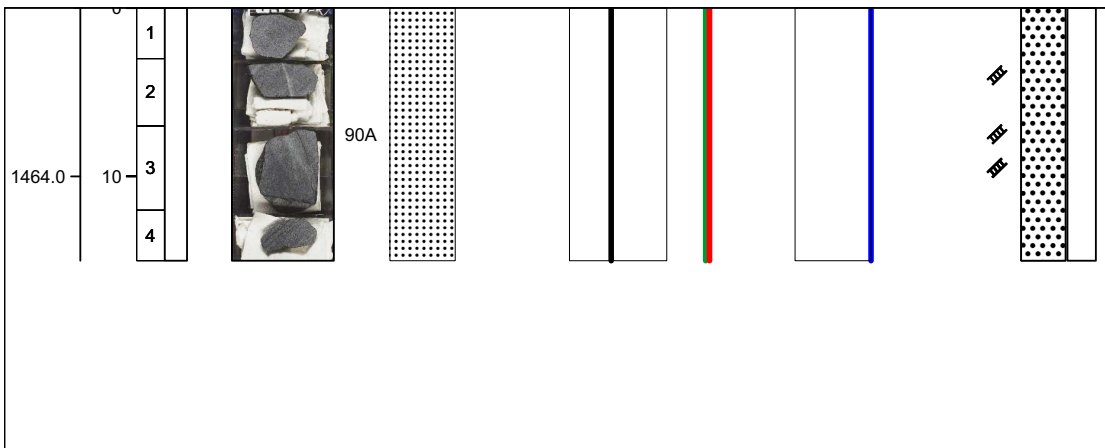
	Modal (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Comments
Clinopyroxene		50	50		

Vesicles:
Texture:
Alteration: Totally recrystallized; moderate background alteration
Veins: Single quartz, chlorite and magnetite vein
Structures: A leucocratic patch is present in Piece 1. All pieces have patchy alteration features and some confined irregular joints. Piece 2 has fracture with dark green (actinolite) film. Piece 3 contains abundant cross-cutting veins of quartz and amphibole.

Additional comments:
Pieces 1 and 2 are fine-grained rocks, with textures that look similar to the basalt dikes from Unit 80A and shallower. This original intergranular texture has been overprinted by later metamorphic heating. Piece 3 is cryptocrystalline, containing a number of conjugate pairs of shear bands and veins. This piece bears many similarities to samples from close to dike margins from the sheeted dikes above. These three pieces may correspond to parts of a dike that has cut the gabbros, and has then undergone later contact metamorphism. The low recovery in this section (and the previous section) may be related to a return to the altered fine-grained basalt.

Core Photo

Hole 335(312)-1256D-226R Section 1, Top of Section: 1463.9 m (CSF-A)



Unit: 90A
Section: 312-U1256D-226R-1-A
Interval (cm): 0-15 **Pieces:** 1–4
Rock name: aphyric basalt
Upper unit boundary: drop in grain size on Piece 1 of Section 225R-1
Lower unit boundary: not recovered
Groundmass modal grain size:
Glass abundance (%):
Altered glass abundance (%):
Phenocrysts:

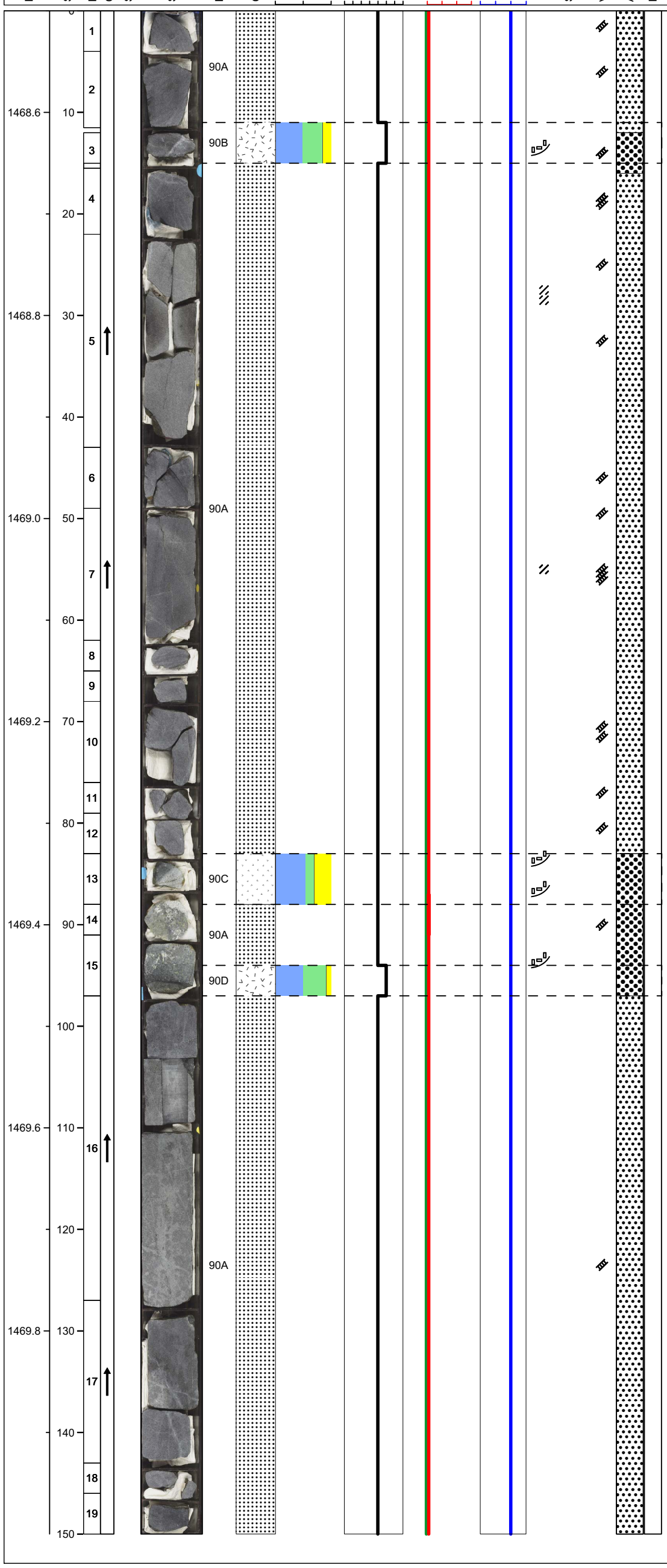
	Modal (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Comments
Clinopyroxene		50	50		

Vesicles:
Texture:
Alteration: Totally recrystallized; moderate background alteration
Veins: Amphibole and secondary plagioclase veins with dark green to light gray halos
Structures: Irregular and splayed veins with diffuse boundaries are in two (Pieces 2 and 4) of the four unoriented pieces.

Additional comments:
The grain size and texture of these pieces is similar to Pieces 1 and 2 of Section 225R-1. The original igneous texture appears to have been strongly overprinted by thermal metamorphism, giving the rock a pale granular appearance.

Core Photo

Hole 335(312)-1256D-227R Section 1, Top of Section: 1468.5 m (CSF-A)



Unit: 90A
Section: 312-U1256D-227R-1-A
Interval (cm): 0-11 **Pieces:** 1, 2, parts of 3
Rock name: aphyric basalt
Upper unit boundary: drop in grain size in Piece 1 of Section 225R-1
Lower unit boundary: igneous contact with Unit 90D in Piece 14
Groundmass modal grain size:
Glass abundance (%):
Altered glass abundance (%):
Vesicles:
Texture:
Alteration: Totally recrystallized; moderate background alteration
Veins: Single amphibole vein
Structures: White, light green, and dark (quartz, chlorite, and actinolite-rich, respectively) conjugate veins, vein networks, and individual veins are present in Pieces 1–7 and 16–19. The veins have planar and irregular but very diffuse morphology and light green alteration halos (Pieces 4, 6, 16, and 19). A melanocratic band in Piece 10 and Pieces 2 and 4 define an irregular magmatic foliation. Elongate and spherical igneous patches are present in Piece 7. A slight increase in grain size from the top to bottom of this section is noted.
Additional comments: A slight increase in grain size from the top to bottom of this section is noted. The unit is cut by a number of thin intrusions.

Unit: 90B
Section: 312-U1256D-227R-1-A
Interval (cm): 11-15 **Pieces:** parts of 3
Rock name: qtz-diorite
Upper unit boundary: igneous contact in Piece 3
Lower unit boundary: igneous contact in Piece 3
Mineralogy:

	Modal (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Habit, shape, comments
Plagioclase	49	0.1	5	3	subhedral-euhedral
Clinopyroxene	35	0.1	3	2	anhedral-euhedral
Oxides	1	0.1	1.2	1	interstitial, anhedral
Quartz	15	0.1	1	0.5	interstitial, anhedral

Alteration: High background pervasive alteration
Veins: Amphibole vein
Structures: A green, 1.2 cm-wide magmatic vein is present in Piece 3 with an irregular morphology.
Additional comments: 15 mm thick dike cutting Unit 90A with a sutured margin. Grain size is larger in the dike than in the host.

Unit: 90A
Section: 312-U1256D-227R-1-A
Interval (cm): 15-83 **Pieces:** 4–12, parts of 13
Rock name: aphyric basalt
Upper unit boundary: drop in grain size in Piece 1 of Section 225R-1
Lower unit boundary: igneous contact with Unit 90D in Piece 14
Groundmass modal grain size:
Glass abundance (%):
Altered glass abundance (%):
Vesicles:
Texture:
Alteration: Totally recrystallized; moderate background alteration
Veins: Amphibole and quartz + chlorite veins. Rare light gray or dark green alteration halos
Structures:
Additional comments: A slight increase in grain size from the top to bottom of this section is noted. The unit is cut by a number of thin intrusions.

Unit: 90C
Section: 312-U1256D-227R-1-A
Interval (cm): 83-88 **Pieces:** parts of 13 and 14
Rock name: tonalite
Upper unit boundary: igneous contact with Unit 90A in Piece 13
Lower unit boundary: igneous contact with Unit 90A in Piece 15
Mineralogy:

	Modal (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Habit, shape, comments
Plagioclase	54	0.1	1.2	0.5	euhedral
Clinopyroxene	15	0.1	0.5	0.3	interstitial, anhedral
Oxides	1	0.1	0.3	0.2	anhedral
Quartz	30	0.1	0.5	0.3	interstitial, anhedral

Alteration: High background pervasive alteration
Veins: Chlorite or amphibole veins
Structures: Pieces 13 and 14 have diffuse and irregular igneous contacts between metabasalt and fine-grained tonalite.
Additional comments: Thin dike cutting Unit 90A, slightly coarser than host and with no chilled margin. The margin is fairly straight, but diffuse over 1 mm and related to an alteration halo in the host rock. In the working half there is a small vein of Unit 90C that appears to enter Unit 90D, implying that Unit 90C cuts Unit 90D.

Unit: 90A
Section: 312-U1256D-227R-1-A
Interval (cm): 88-94 **Pieces:** Parts of 14 and 15
Rock name: aphyric basalt
Upper unit boundary: drop in grain size in Piece 1 of Section 225R-1
Lower unit boundary: igneous contact with Unit 90D in Piece 14
Groundmass modal grain size:
Glass abundance (%):
Altered glass abundance (%):
Vesicles:
Texture:
Alteration: High background alteration
Veins: No veins
Structures:
Additional comments:

Unit: 90D
Section: 312-U1256D-227R-1-A
Interval (cm): 94-97 **Pieces:** parts of 14 and 15
Rock name: qtz-diorite
Upper unit boundary: igneous contact with Unit 90D in Piece 14
Lower unit boundary: Intrusive contact with Unit 90A in Piece 15
Mineralogy:

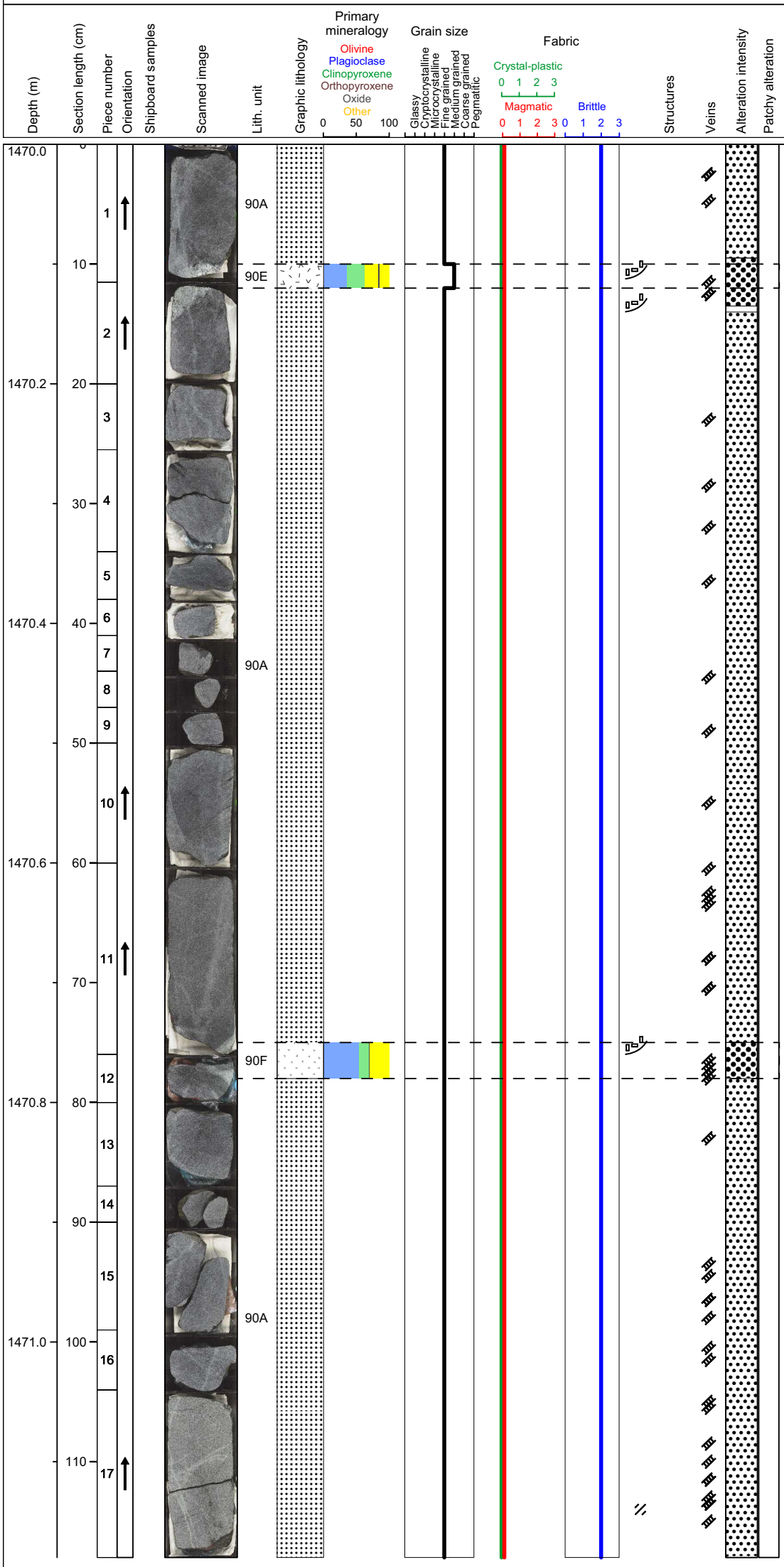
	Modal (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Habit, shape, comments
Plagioclase	50	0.1	7	1.5	subhedral-euhedral
Clinopyroxene	40	0.1	3	1.5	interstitial, subhedral
Oxides	2	0.1	0.8	0.5	interstitial, anhedral
Quartz	8	0.1	0.8	0.5	interstitial, anhedral

Alteration: High background pervasive alteration
Veins: No veins
Structures: Igneous contacts were recorded in Pieces 14 and 15, respectively, as irregular medium-grained leuco-gabbro fragments and 1.3 cm wide dikelet.
Additional comments: Thin dike cuts Unit 90A and possibly Unit 90C. It is coarser grained than both of these units with diffuse and irregular margins. The grain size is variable in this dike.

Unit: 90A
Section: 312-U1256D-227R-1-A
Interval (cm): 97-150 **Pieces:** 16-19
Rock name: aphyric basalt
Upper unit boundary: drop in grain size in Piece 1 of Section 225R-1
Lower unit boundary: igneous contact with Unit 90D in Piece 14
Groundmass modal grain size:
Glass abundance (%):
Altered glass abundance (%):
Vesicles:
Texture:
Alteration: Totally recrystallized; moderate background alteration
Veins: No veins
Structures:
Additional comments:

Core Photo

Hole 335(312)-1256D-227R Section 2, Top of Section: 1470.0 m (CSF-A)



Unit: 90A
Section: 312-U1256D-227R-2-A
Interval (cm): 1-10 **Pieces:** part of 1
Rock name: aphyric basalt
Upper unit boundary: drop in grain size in Piece 1 of Section 225R-1
Lower unit boundary: igneous contact with Unit 90A in Piece 12
Groundmass modal grain size:
Glass abundance (%):
Altered glass abundance (%):
Vesicles:
Texture:
Alteration: Totally recrystallized; moderate background alteration
Veins: Chlorite + amphibole vein
Structures: Piece 7 was missing. Pieces 1, 2, 10, 11, and 17 are oriented. Hydrothermal veins in all the pieces (except Pieces 6, 8, and 14), have irregular, planar, splayed, and curved morphologies and dark green, light green, and white (amphibole, chlorite, and quartz-rich, respecively) mineral fillings. Many veins are very diffuse (e.g., Pieces 3, 11, and 17) and visible by the presence of dark green and light green alteration halos. Several irregular fractures widespread in all the pieces. In Pieces 10 and 12, fractures and veins show subparallel orientation, whereas in Pieces 1, 3, 11, and 13, they form several crosscutting relationships. Pieces 1, 2, 11, and 12 present sharp igneous contacts (Units 90E and 90F).

Additional comments:
After the slight increase in grain size observed in the last section (227R-1), there appears to be a slight and gradual decrease in grain size from the top to the bottom of this section.

Unit: 90E
Section: 312-U1256D-227R-2-A
Interval (cm): 10-12 **Pieces:** part of 1 and 2
Rock name: disseminated oxide qtz-diorite
Upper unit boundary: igneous contact in Piece 2
Lower unit boundary: igneous contact in Piece 3
Mineralogy:

	Modal (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Habit, shape, comments
Plagioclase	35	0.1	5	2.5	subhedral
Clinopyroxene	28	0.1	5	2	anhedral-euhedral
Amphibole	20	0.5	2	1	elongate, subhedral-euhedral
Oxides	2	0.1	1.5	0.8	interstitial, anhedral
Quartz	15	0.1	1	0.5	interstitial, anhedral

Alteration: High background pervasive alteration
Veins: Amphibole + chlorite vein
Structures: Piece 2 shows a sharp and planar contact between the host rock and mediumgrained leuco-gabbro, more altered (green secondary minerals) in the inner part. The contact between the two units is highlighted by 1 mm wide mafic minerals chilled margin.

Additional comments:
This thin dike cuts Unit 90A. It is coarser than the host rock, and the margin is diffuse over 2–3 mm, with apparent baking of the host rock shown by a darkening over a 2 mm wide zone.

Unit: 90A
Section: 312-U1256D-227R-2-A
Interval (cm): 12-75 **Pieces:** 3–10, 13–17 and parts of 2, 11, and 12
Rock name: aphyric basalt
Upper unit boundary: drop in grain size in Piece 1 of Section 225R-1
Lower unit boundary: igneous contact with Unit 90A in Piece 12
Groundmass modal grain size:
Glass abundance (%):
Altered glass abundance (%):
Vesicles:
Texture:
Alteration: Totally recrystallized; moderate background alteration
Veins: Amphibole veins. One amphibole + epidote and one amphibole + chlorite vein
Structures:
Additional comments:
See Unit 90A above.

Unit: 90F
Section: 312-U1256D-227R-2-A
Interval (cm): 75-78 **Pieces:** parts of 11 and 12
Rock name: tonalite
Upper unit boundary: igneous contact with Unit 90A in Piece 11
Lower unit boundary: sharp increase in grain-size from Piece 5 of
Mineralogy:

	Modal (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Habit, shape, comments
Plagioclase	54	0.1	1.2	0.5	euhedral
Clinopyroxene	15	0.1	0.5	0.3	interstitial, anhedral
Oxides	1	0.1	0.3	0.2	anhedral
Quartz	30	0.1	0.5	0.3	interstitial, anhedral

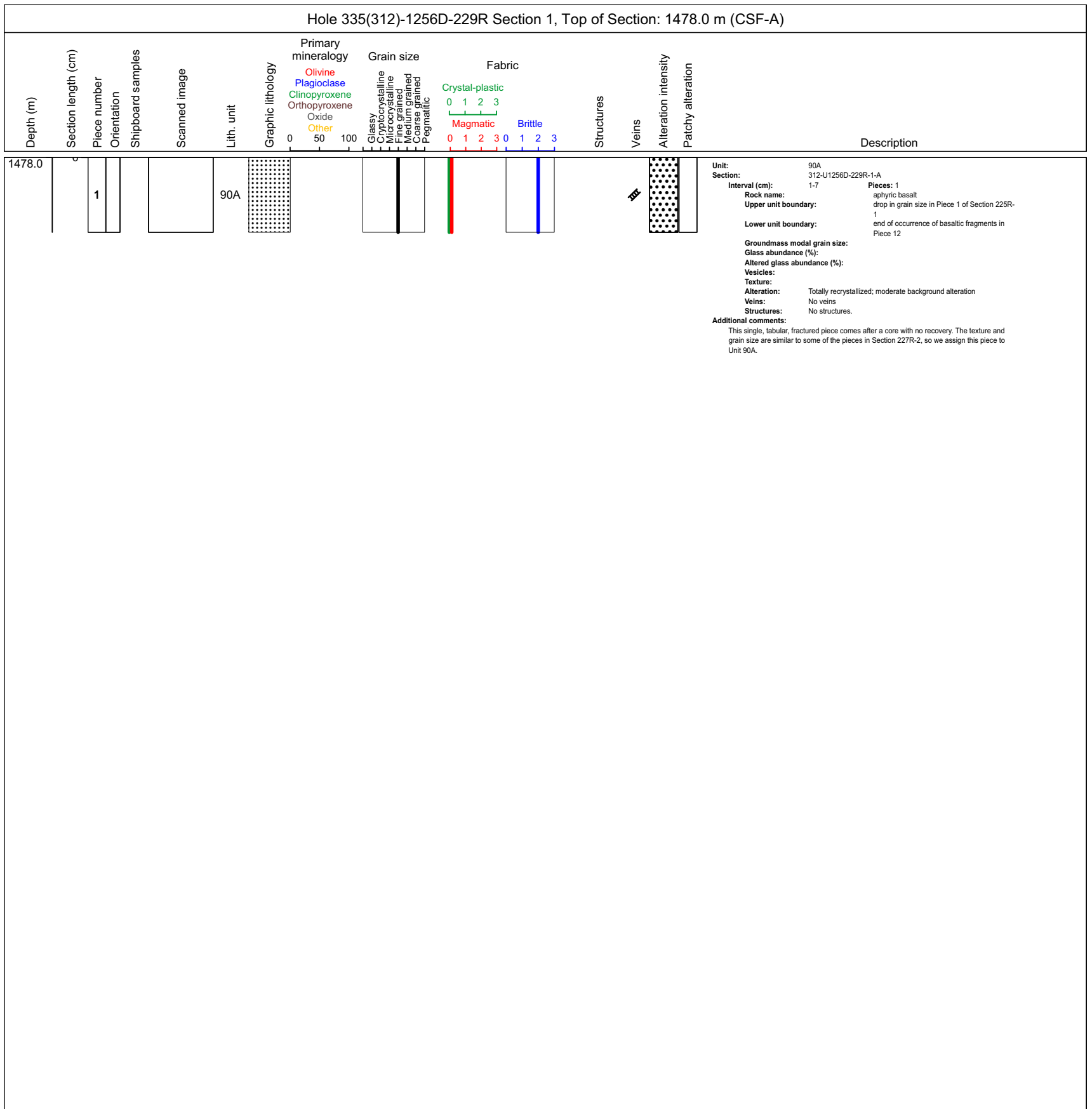
Alteration: High background pervasive alteration
Veins: Chlorite or amphibole veins woth light gray to yellow-green alteration halos
Structures: Pieces 11 and 12 show two sharp igneous contacts. In Piece 11, the tonalite dikelet is in contact with a finer-grained portion of the host rock. In Piece 12, the contact is 0.8 cm wide and cut by a hydrothermal dark green (amphibole-rich) vein.

Additional comments:
This thin dike cuts Unit 90A. The mineralogy and texture is very similar to that found in Unit 90C. The grain size is slightly higher in the dike than in the host rock, and there is no chilled margin. The margin is quite straight in Piece 11 and diffuse over 1 mm width. In Piece 12, the geometry of the margin is more complex, showing a pinched bulbous tip about 5 mm wide where the margin is more diffuse. This apparent increase in the width of the diffuse zone may show that the cut surface is subparallel to the margin.

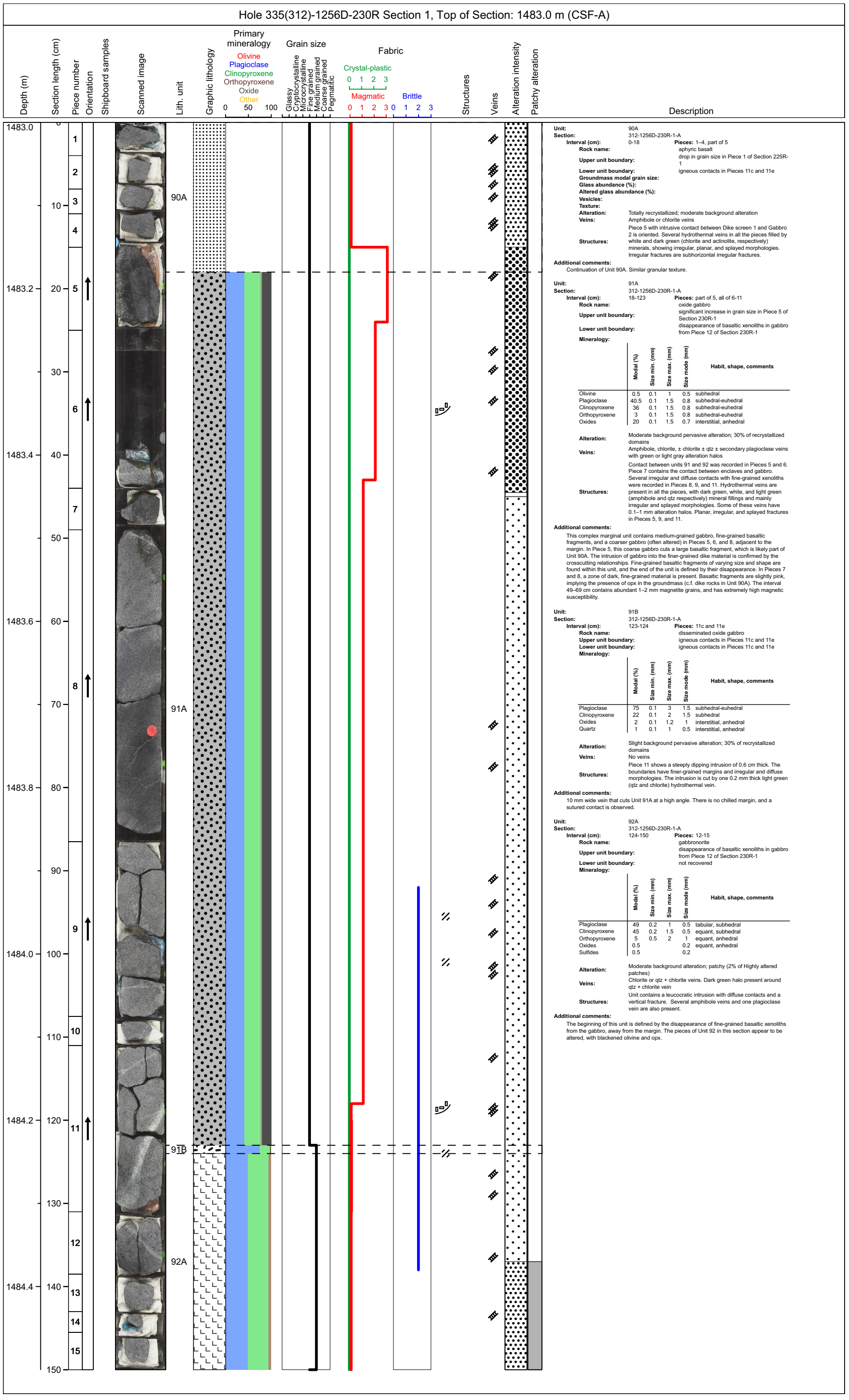
Unit: 90A
Section: 312-U1256D-227R-2-A
Interval (cm): 78-118 **Pieces:** 13–17 and part 12
Rock name: aphyric basalt
Upper unit boundary: drop in grain size in Piece 1 of Section 225R-1
Lower unit boundary: igneous contact with Unit 90A in Piece 12
Groundmass modal grain size:
Glass abundance (%):
Altered glass abundance (%):
Vesicles:
Texture:
Alteration: Totally recrystallized; moderate background alteration
Veins: Amphibole or chlorite veins
Structures:
Additional comments:
See Unit 90A above.

1256D-228R-1 NO RECOVERY

Core Photo


Hole 335(312)-1256D-229R Section 1, Top of Section: 1478.0 m (CSF-A)
Depth (m)
Section length (cm)
Piece number
Orientation
Shipboard samples
Scanned image
Lith. unit
Graphic lithology
Primary mineralogy
Olivine
Plagioclase
Clinopyroxene
Orthopyroxene
Oxide
Other
0 50 100
Grain size
Glassy
Cryptocrystalline
Microcrystalline
Fine grained
Medium grained
Coarse grained
Pegmatitic
Fabric
Crystal-plastic
0 1 2 3
Magmatic
0 1 2 3
Brittle
0 1 2 3
Structures
Veins
Alteration intensity
Patchy alteration
Description
1478.0
1
90A
Unit: 90A
Section: 312-U1256D-229R-1-A
Interval (cm): 1-7
Pieces: 1
Rock name: aphyric basalt
Upper unit boundary: drop in grain size in Piece 1 of Section 225R-1
Lower unit boundary: end of occurrence of basaltic fragments in Piece 12
Groundmass modal grain size:
Glass abundance (%):
Altered glass abundance (%):
Vesicles:
Texture:
Alteration: Totally recrystallized; moderate background alteration
Veins: No veins
Structures: No structures.
Additional comments:
This single, tabular, fractured piece comes after a core with no recovery. The texture and grain size are similar to some of the pieces in Section 227R-2, so we assign this piece to Unit 90A.

Core Photo



Unit: 90A
Section: 312-1256D-230R-1-A
Interval (cm): 0-18 **Pieces:** 1–4, part of 5
Rock name: aphyric basalt
Upper unit boundary: drop in grain size in Piece 1 of Section 225R-1
Lower unit boundary: igneous contacts in Pieces 11c and 11e
Groundmass modal grain size:
Glass abundance (%):
Altered glass abundance (%):
Vesicles:
Texture:
Alteration: Totally recrystallized; moderate background alteration
Veins: Amphibole or chlorite veins
Structures: Piece 5 with intrusive contact between Dike screen 1 and Gabbro 2 is oriented. Several hydrothermal veins in all the pieces filled by white and dark green (chlorite and actinolite, respectively) minerals, showing irregular, planar, and splayed morphologies. Irregular fractures are subhorizontal irregular fractures.

Additional comments:
Continuation of Unit 90A. Similar granular texture.

Unit: 91A
Section: 312-1256D-230R-1-A
Interval (cm): 18-123 **Pieces:** part of 5, all of 6-11
Rock name: oxide gabbro
Upper unit boundary: significant increase in grain size in Piece 5 of Section 230R-1
Lower unit boundary: disappearance of basaltic xenoliths in gabbro from Piece 12 of Section 230R-1
Mineralogy:

	Modal (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Habit, shape, comments
Olivine	0.5	0.1	1	0.5	subhedral
Plagioclase	40.5	0.1	1.5	0.8	subhedral-euhedral
Clinopyroxene	36	0.1	1.5	0.8	subhedral-euhedral
Orthopyroxene	3	0.1	1.5	0.8	subhedral-euhedral
Oxides	20	0.1	1.5	0.7	interstitial, anhedral

Alteration: Moderate background pervasive alteration; 30% of recrystallized domains
Veins: Amphibole, chlorite, ± chlorite ± qtz ± secondary plagioclase veins with green or light gray alteration halos
Structures: Contact between units 91 and 92 was recorded in Pieces 5 and 6. Piece 7 contains the contact between enclaves and gabbro. Several irregular and diffuse contacts with fine-grained xenoliths were recorded in Pieces 8, 9, and 11. Hydrothermal veins are present in all the pieces, with dark green, white, and light green (amphibole and qtz respectively) mineral fillings and mainly irregular and splayed morphologies. Some of these veins have 0.1–1 mm alteration halos. Planar, irregular, and splayed fractures in Pieces 5, 9, and 11.

Additional comments:
This complex marginal unit contains medium-grained gabbro, fine-grained basaltic fragments, and a coarser gabbro (often altered) in Pieces 5, 6, and 8, adjacent to the margin. In Piece 5, this coarse gabbro cuts a large basaltic fragment, which is likely part of Unit 90A. The intrusion of gabbro into the finer-grained dike material is confirmed by the crosscutting relationships. Fine-grained basaltic fragments of varying size and shape are found within this unit, and the end of the unit is defined by their disappearance. In Pieces 7 and 8, a zone of dark, fine-grained material is present. Basaltic fragments are slightly pink, implying the presence of opx in the groundmass (c.f. dike rocks in Unit 90A). The interval 49–69 cm contains abundant 1–2 mm magnetite grains, and has extremely high magnetic susceptibility.

Unit: 91B
Section: 312-1256D-230R-1-A
Interval (cm): 123-124 **Pieces:** 11c and 11e
Rock name: disseminated oxide gabbro
Upper unit boundary: igneous contacts in Pieces 11c and 11e
Lower unit boundary: igneous contacts in Pieces 11c and 11e
Mineralogy:

	Modal (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Habit, shape, comments
Plagioclase	75	0.1	3	1.5	subhedral-euhedral
Clinopyroxene	22	0.1	2	1.5	subhedral
Oxides	2	0.1	1.2	1	interstitial, anhedral
Quartz	1	0.1	1	0.5	interstitial, anhedral

Alteration: Slight background pervasive alteration; 30% of recrystallized domains
Veins: No veins
Structures: Piece 11 shows a steeply dipping intrusion of 0.6 cm thick. The boundaries have finer-grained margins and irregular and diffuse morphologies. The intrusion is cut by one 0.2 mm thick light green (qtz and chlorite) hydrothermal vein.

Additional comments:
10 mm wide vein that cuts Unit 91A at a high angle. There is no chilled margin, and a sutured contact is observed.

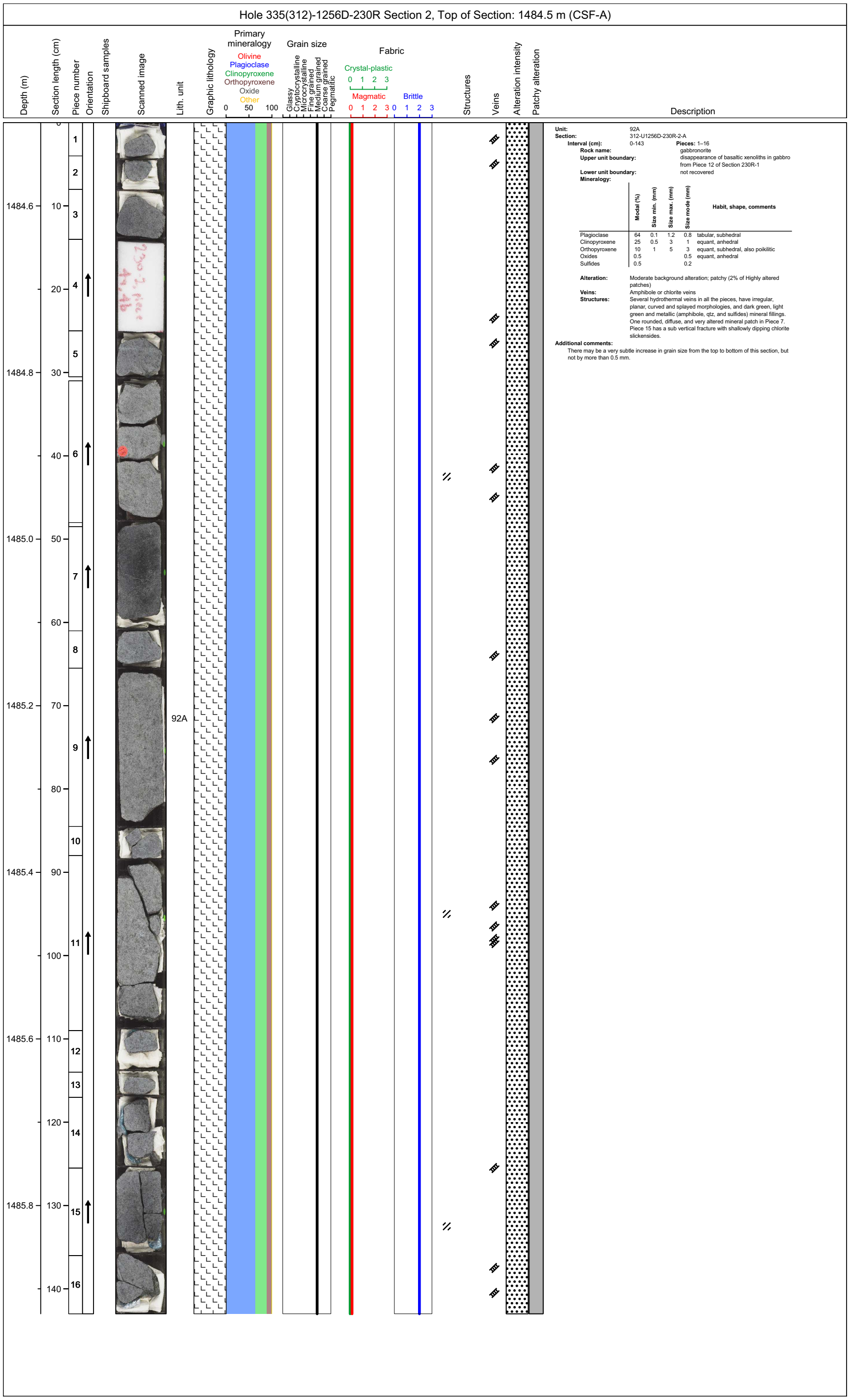
Unit: 92A
Section: 312-1256D-230R-1-A
Interval (cm): 124-150 **Pieces:** 12-15
Rock name: gabbronorite
Upper unit boundary: disappearance of basaltic xenoliths in gabbro from Piece 12 of Section 230R-1
Lower unit boundary: not recovered
Mineralogy:

	Modal (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Habit, shape, comments
Plagioclase	49	0.2	1	0.5	tabular, subhedral
Clinopyroxene	45	0.2	1.5	0.5	equant, subhedral
Orthopyroxene	5	0.5	2	1	equant, anhedral
Oxides	0.5			0.2	equant, anhedral
Sulfides	0.5			0.2	

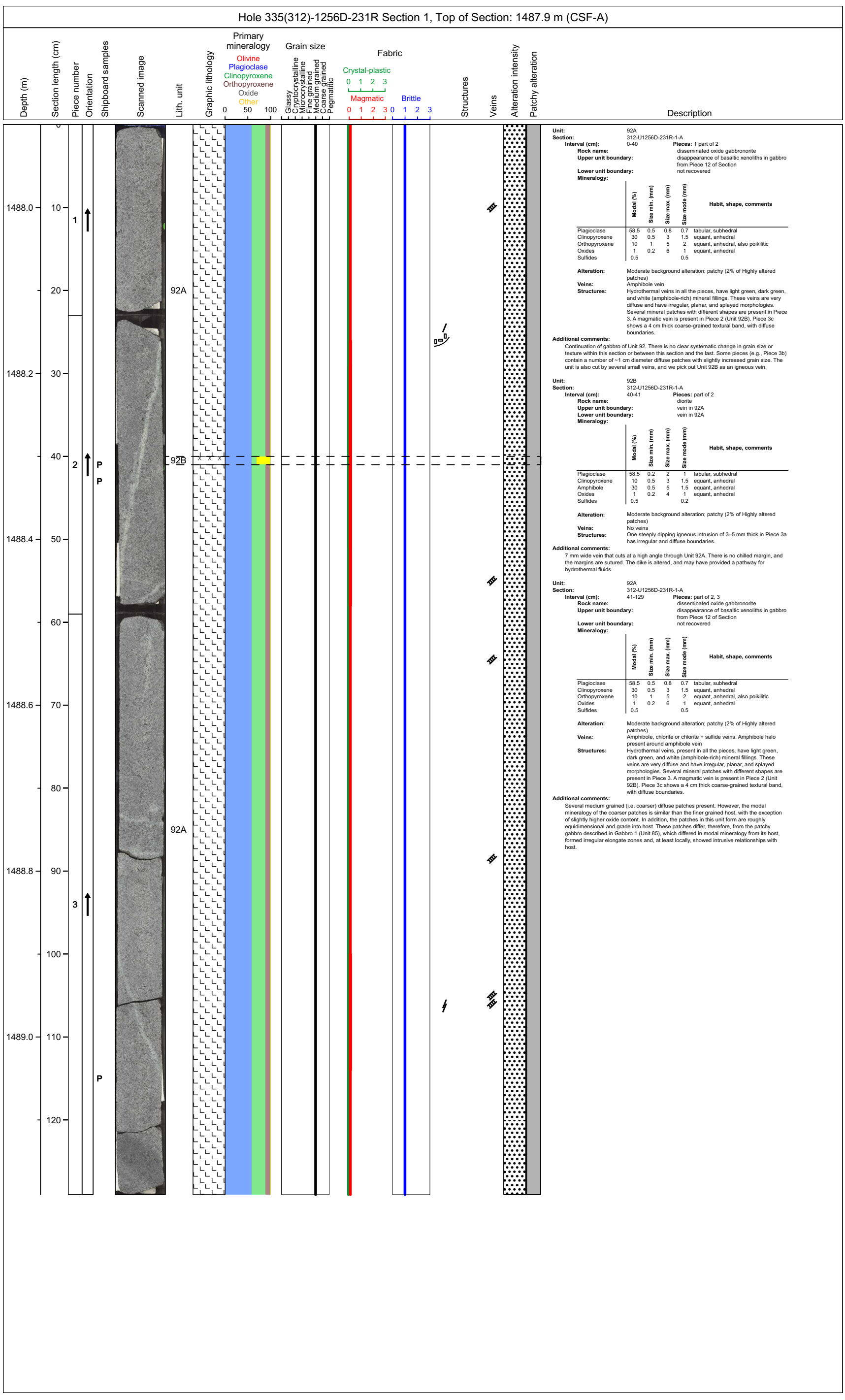
Alteration: Moderate background alteration; patchy (2% of Highly altered patches)
Veins: Chlorite or qtz + chlorite veins. Dark green halo present around qtz + chlorite vein
Structures: Unit contains a leucocratic intrusion with diffuse contacts and a vertical fracture. Several amphibole veins and one plagioclase vein are also present.

Additional comments:
The beginning of this unit is defined by the disappearance of fine-grained basaltic xenoliths from the gabbro, away from the margin. The pieces of Unit 92 in this section appear to be altered, with blackened olivine and opx.

Core Photo


Hole 335(312)-1256D-230R Section 2, Top of Section: 1484.5 m (CSF-A)
Depth (m)
Section length (cm)
Piece number
Orientation
Shipboard samples
Scanned image
Lith. unit
Graphic lithology
Primary mineralogy
Olivine
Plagioclase
Clinopyroxene
Orthopyroxene
Oxide
Other
0 50 100
Grain size
Glassy
Cryptocrystalline
Microcrystalline
Fine grained
Medium grained
Coarse grained
Pegmatitic
Fabric
Crystal-plastic
0 1 2 3
Magmatic
0 1 2 3
Brittle
0 1 2 3
Structures
Veins
Alteration intensity
Patchy alteration
Description
1484.6
1484.8
1485.0
1485.2
1485.4
1485.6
1485.8
92A
Unit: 92A
Section: 312-U1256D-230R-2-A
Interval (cm): 0-143
Pieces: 1–16
Rock name: gabbronorite
Upper unit boundary: disappearance of basaltic xenoliths in gabbro from Piece 12 of Section 230R-1
Lower unit boundary: not recovered
Mineralogy:
Modal (%) | Size min. (mm) | Size max. (mm) | Size mode (mm) | Habit, shape, comments
Plagioclase 64 0.1 1.2 0.8 tabular, subhedral
Clinopyroxene 25 0.5 3 1 equant, anhedral
Orthopyroxene 10 1 5 3 equant, subhedral, also poikilitic
Oxides 0.5 0.5 equant, anhedral
Sulfides 0.5 0.2
Alteration: Moderate background alteration; patchy (2% of Highly altered patches)
Veins: Amphibole or chlorite veins
Structures: Several hydrothermal veins in all the pieces, have irregular, planar, curved and splayed morphologies, and dark green, light green and metallic (amphibole, qtz, and sulfides) mineral fillings. One rounded, diffuse, and very altered mineral patch in Piece 7. Piece 15 has a sub vertical fracture with shallowly dipping chlorite slickensides.
Additional comments:
There may be a very subtle increase in grain size from the top to bottom of this section, but not by more than 0.5 mm.

Core Photo



Unit: 92A
Section: 312-U1256D-231R-1-A
Interval (cm): 0-40 **Pieces:** 1 part of 2
Rock name: disseminated oxide gabbronorite
Upper unit boundary: disappearance of basaltic xenoliths in gabbro from Piece 12 of Section
Lower unit boundary: not recovered
Mineralogy:

	Modal (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Habit, shape, comments
Plagioclase	58.5	0.5	0.8	0.7	tabular, subhedral
Clinopyroxene	30	0.5	3	1.5	equant, anhedral
Orthopyroxene	10	1	5	2	equant, anhedral, also poikilitic
Oxides	1	0.2	6	1	equant, anhedral
Sulfides	0.5			0.5	

Alteration: Moderate background alteration; patchy (2% of Highly altered patches)
Veins: Amphibole vein
Structures: Hydrothermal veins in all the pieces, have light green, dark green, and white (amphibole-rich) mineral fillings. These veins are very diffuse and have irregular, planar, and splayed morphologies. Several mineral patches with different shapes are present in Piece 3. A magmatic vein is present in Piece 2 (Unit 92B). Piece 3c shows a 4 cm thick coarse-grained textural band, with diffuse boundaries.

Additional comments:
Continuation of gabbro of Unit 92. There is no clear systematic change in grain size or texture within this section or between this section and the last. Some pieces (e.g., Piece 3b) contain a number of ~1 cm diameter diffuse patches with slightly increased grain size. The unit is also cut by several small veins, and we pick out Unit 92B as an igneous vein.

Unit: 92B
Section: 312-U1256D-231R-1-A
Interval (cm): 40-41 **Pieces:** part of 2
Rock name: diorite
Upper unit boundary: vein in 92A
Lower unit boundary: vein in 92A
Mineralogy:

	Modal (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Habit, shape, comments
Plagioclase	58.5	0.2	2	1	tabular, subhedral
Clinopyroxene	10	0.5	3	1.5	equant, anhedral
Amphibole	30	0.5	5	1.5	equant, anhedral
Oxides	1	0.2	4	1	equant, anhedral
Sulfides	0.5			0.2	

Alteration: Moderate background alteration; patchy (2% of Highly altered patches)
Veins: No veins
Structures: One steeply dipping igneous intrusion of 3–5 mm thick in Piece 3a has irregular and diffuse boundaries.

Additional comments:
7 mm wide vein that cuts at a high angle through Unit 92A. There is no chilled margin, and the margins are sutured. The dike is altered, and may have provided a pathway for hydrothermal fluids.

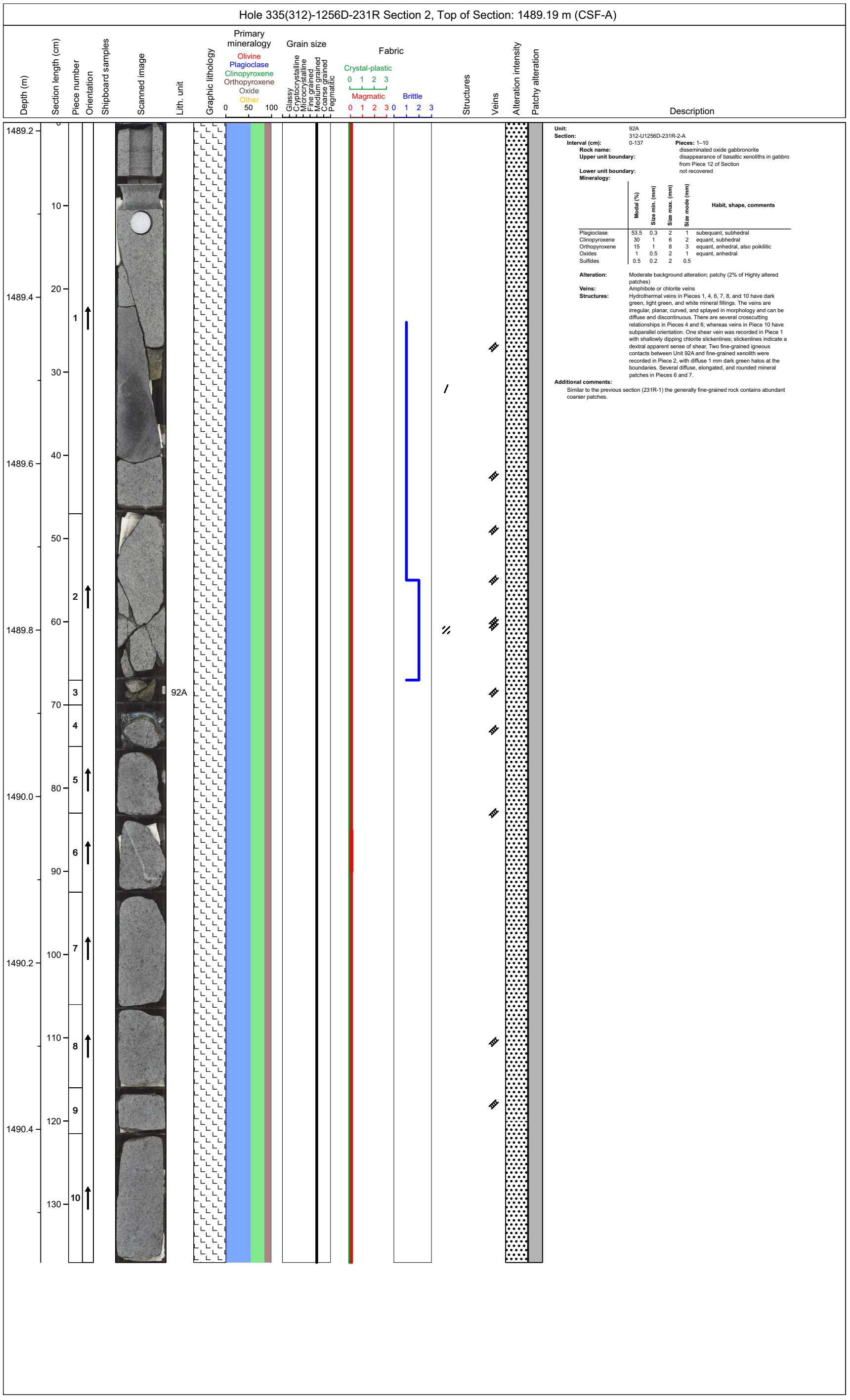
Unit: 92A
Section: 312-U1256D-231R-1-A
Interval (cm): 41-129 **Pieces:** part of 2, 3
Rock name: disseminated oxide gabbronorite
Upper unit boundary: disappearance of basaltic xenoliths in gabbro from Piece 12 of Section
Lower unit boundary: not recovered
Mineralogy:

	Modal (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Habit, shape, comments
Plagioclase	58.5	0.5	0.8	0.7	tabular, subhedral
Clinopyroxene	30	0.5	3	1.5	equant, anhedral
Orthopyroxene	10	1	5	2	equant, anhedral, also poikilitic
Oxides	1	0.2	6	1	equant, anhedral
Sulfides	0.5			0.5	

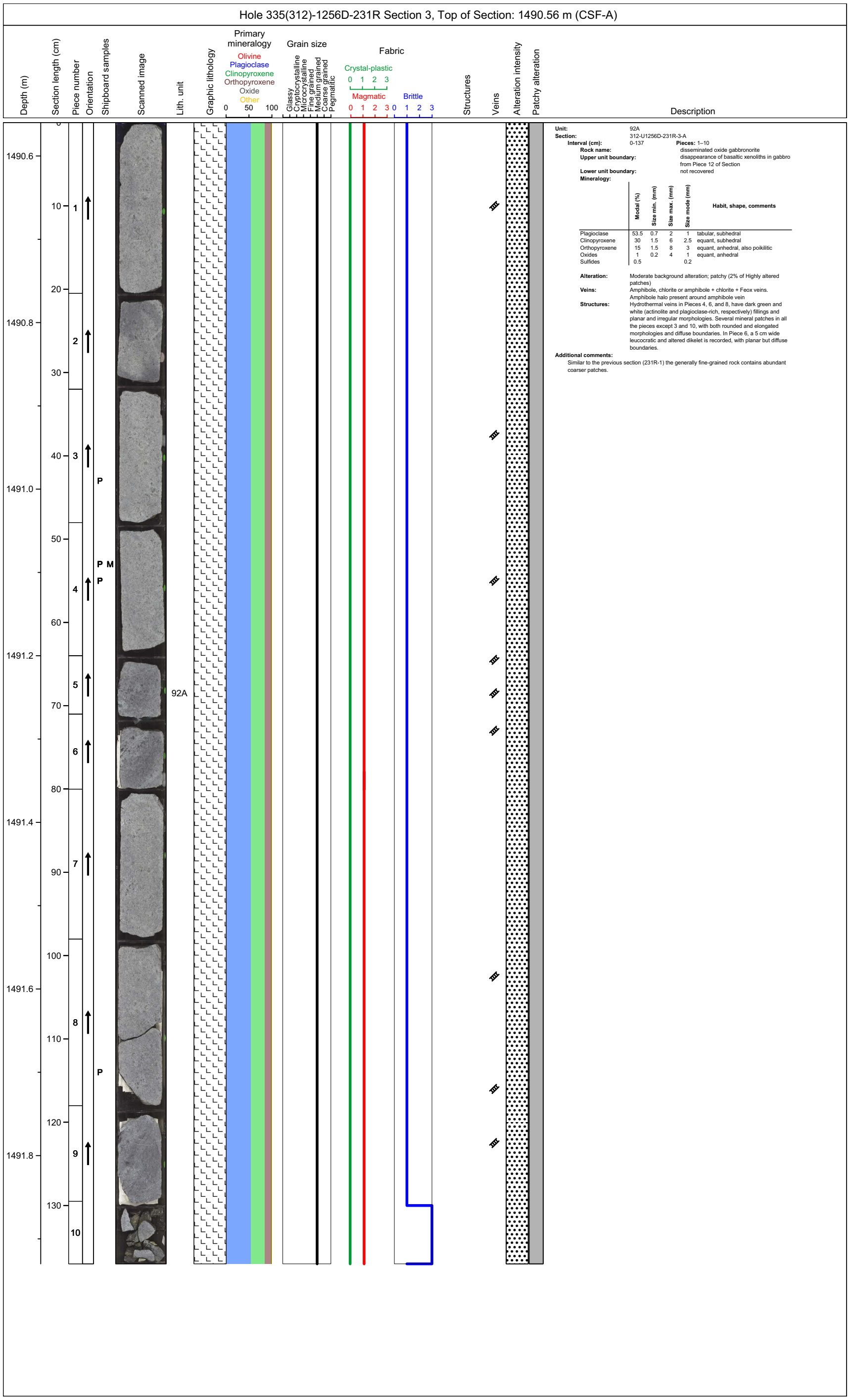
Alteration: Moderate background alteration; patchy (2% of Highly altered patches)
Veins: Amphibole, chlorite or chlorite + sulfide veins. Amphibole halo present around amphibole vein
Structures: Hydrothermal veins, present in all the pieces, have light green, dark green, and white (amphibole-rich) mineral fillings. These veins are very diffuse and have irregular, planar, and splayed morphologies. Several mineral patches with different shapes are present in Piece 3. A magmatic vein is present in Piece 2 (Unit 92B). Piece 3c shows a 4 cm thick coarse-grained textural band, with diffuse boundaries.

Additional comments:
Several medium grained (i.e. coarser) diffuse patches present. However, the modal mineralogy of the coarser patches is similar than the finer grained host, with the exception of slightly higher oxide content. In addition, the patches in this unit form are roughly equidimensional and grade into host. These patches differ, therefore, from the patchy gabbro described in Gabbro 1 (Unit 85), which differed in modal mineralogy from its host, formed irregular elongate zones and, at least locally, showed intrusive relationships with host.

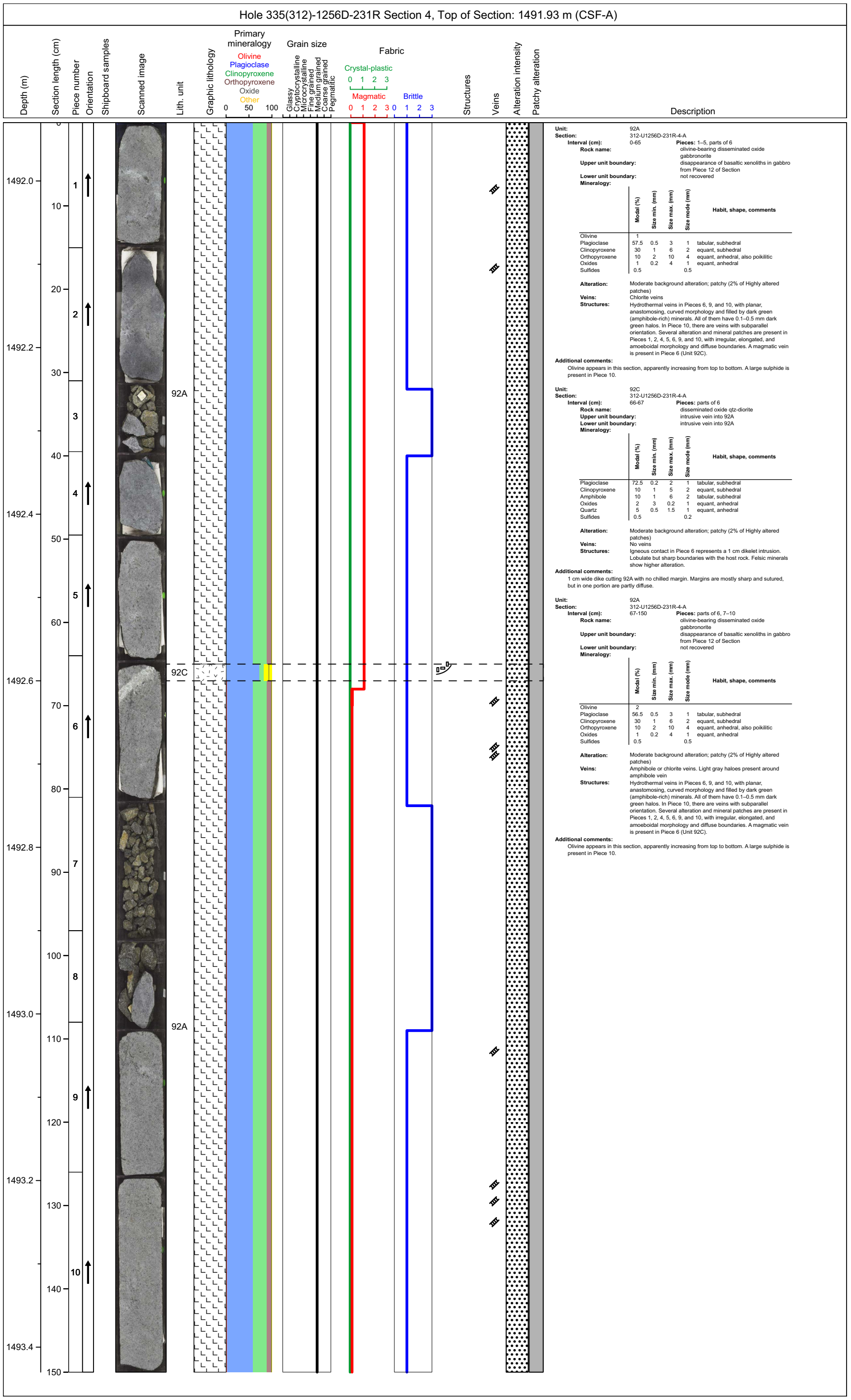
Core Photo


Hole 335(312)-1256D-231R Section 2, Top of Section: 1489.19 m (CSF-A)
Depth (m)
Section length (cm)
Piece number
Orientation
Shipboard samples
Scanned image
Lith. unit
Graphic lithology
Primary mineralogy
Olivine
Plagioclase
Clinopyroxene
Orthopyroxene
Oxide
Other
0 50 100
Grain size
Glassy
Cryptocrystalline
Microcrystalline
Fine grained
Medium grained
Coarse grained
Pegmatitic
Fabric
Crystal-plastic
0 1 2 3
Magmatic
0 1 2 3
Brittle
0 1 2 3
Structures
Veins
Alteration intensity
Patchy alteration
Description
1489.2
1489.4
1489.6
1489.8
1490.0
1490.2
1490.4
10
20
30
40
50
60
70
80
90
100
110
120
130
1
2
3
4
5
6
7
8
9
10
92A
Unit: 92A
Section: 312-U1256D-231R-2-A
Interval (cm): 0-137
Pieces: 1–10
Rock name: disseminated oxide gabbronorite
Upper unit boundary: disappearance of basaltic xenoliths in gabbro from Piece 12 of Section
Lower unit boundary: not recovered
Mineralogy:
Plagioclase 53.5 0.3 2 1 subequant, subhedral
Clinopyroxene 30 1 6 2 equant, subhedral
Orthopyroxene 15 1 8 3 equant, anhedral, also poikilitic
Oxides 1 0.5 2 1 equant, anhedral
Sulfides 0.5 0.2 2 0.5
Modal (%)
Size min. (mm)
Size max. (mm)
Size mode (mm)
Habit, shape, comments
Alteration: Moderate background alteration; patchy (2% of Highly altered patches)
Veins: Amphibole or chlorite veins
Structures: Hydrothermal veins in Pieces 1, 4, 6, 7, 8, and 10 have dark green, light green, and white mineral fillings. The veins are irregular, planar, curved, and splayed in morphology and can be diffuse and discontinuous. There are several crosscutting relationships in Pieces 4 and 6; whereas veins in Piece 10 have subparallel orientation. One shear vein was recorded in Piece 1 with shallowly dipping chlorite slickenlines; slickenlines indicate a dextral apparent sense of shear. Two fine-grained igneous contacts between Unit 92A and fine-grained xenolith were recorded in Piece 2, with diffuse 1 mm dark green halos at the boundaries. Several diffuse, elongated, and rounded mineral patches in Pieces 6 and 7.
Additional comments:
Similar to the previous section (231R-1) the generally fine-grained rock contains abundant coarser patches.

Core Photo


Hole 335(312)-1256D-231R Section 3, Top of Section: 1490.56 m (CSF-A)
Depth (m)
Section length (cm)
Piece number
Orientation
Shipboard samples
Scanned image
Lith. unit
Graphic lithology
Primary mineralogy
Olivine
Plagioclase
Clinopyroxene
Orthopyroxene
Oxide
Other
0 50 100
Grain size
Glassy
Cryptocrystalline
Microcrystalline
Fine grained
Medium grained
Coarse grained
Pegmatitic
Fabric
Crystal-plastic
0 1 2 3
Magmatic
0 1 2 3
Brittle
0 1 2 3
Structures
Veins
Alteration intensity
Patchy alteration
Description
1490.6
1490.8
1491.0
1491.2
1491.4
1491.6
1491.8
10
20
30
40
50
60
70
80
90
100
110
120
130
1
2
3
4
5
6
7
8
9
10
P
P M
P
92A
Unit: 92A
Section: 312-U1256D-231R-3-A
Interval (cm): 0-137
Pieces: 1–10
Rock name: disseminated oxide gabbronorite
Upper unit boundary: disappearance of basaltic xenoliths in gabbro from Piece 12 of Section
Lower unit boundary: not recovered
Mineralogy:
Modal (%) | Size min. (mm) | Size max. (mm) | Size mode (mm) | Habit, shape, comments
Plagioclase 53.5 0.7 2 1 tabular, subhedral
Clinopyroxene 30 1.5 6 2.5 equant, subhedral
Orthopyroxene 15 1.5 8 3 equant, anhedral, also poikilitic
Oxides 1 0.2 4 1 equant, anhedral
Sulfides 0.5 0.2
Alteration: Moderate background alteration; patchy (2% of Highly altered patches)
Veins: Amphibole, chlorite or amphibole + chlorite + Feox veins. Amphibole halo present around amphibole vein
Structures: Hydrothermal veins in Pieces 4, 6, and 8, have dark green and white (actinolite and plagioclase-rich, respectively) fillings and planar and irregular morphologies. Several mineral patches in all the pieces except 3 and 10, with both rounded and elongated morphologies and diffuse boundaries. In Piece 6, a 5 cm wide leucocratic and altered dikelet is recorded, with planar but diffuse boundaries.
Additional comments:
Similar to the previous section (231R-1) the generally fine-grained rock contains abundant coarser patches.

Core Photo



Unit: 92A
Section: 312-U1256D-231R-4-A
Interval (cm): 0-65 **Pieces:** 1–5, parts of 6
Rock name: olivine-bearing disseminated oxide gabbronorite
Upper unit boundary: disappearance of basaltic xenoliths in gabbro from Piece 12 of Section
Lower unit boundary: not recovered
Mineralogy:

	Modal (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Habit, shape, comments
Olivine	1				
Plagioclase	57.5	0.5	3	1	tabular, subhedral
Clinopyroxene	30	1	6	2	equant, subhedral
Orthopyroxene	10	2	10	4	equant, anhedral, also poikilitic
Oxides	1	0.2	4	1	equant, anhedral
Sulfides	0.5			0.5	

Alteration: Moderate background alteration; patchy (2% of Highly altered patches)
Veins: Chlorite veins
Structures: Hydrothermal veins in Pieces 6, 9, and 10, with planar, anastomosing, curved morphology and filled by dark green (amphibole-rich) minerals. All of them have 0.1–0.5 mm dark green halos. In Piece 10, there are veins with subparallel orientation. Several alteration and mineral patches are present in Pieces 1, 2, 4, 5, 6, 9, and 10, with irregular, elongated, and amoeboidal morphology and diffuse boundaries. A magmatic vein is present in Piece 6 (Unit 92C).
Additional comments: Olivine appears in this section, apparently increasing from top to bottom. A large sulphide is present in Piece 10.

Unit: 92C
Section: 312-U1256D-231R-4-A
Interval (cm): 66-67 **Pieces:** parts of 6
Rock name: disseminated oxide qtz-diorite
Upper unit boundary: intrusive vein into 92A
Lower unit boundary: intrusive vein into 92A
Mineralogy:

	Modal (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Habit, shape, comments
Plagioclase	72.5	0.2	2	1	tabular, subhedral
Clinopyroxene	10	1	5	2	equant, subhedral
Amphibole	10	1	6	2	tabular, subhedral
Oxides	2	3	0.2	1	equant, anhedral
Quartz	5	0.5	1.5	1	equant, anhedral
Sulfides	0.5			0.2	

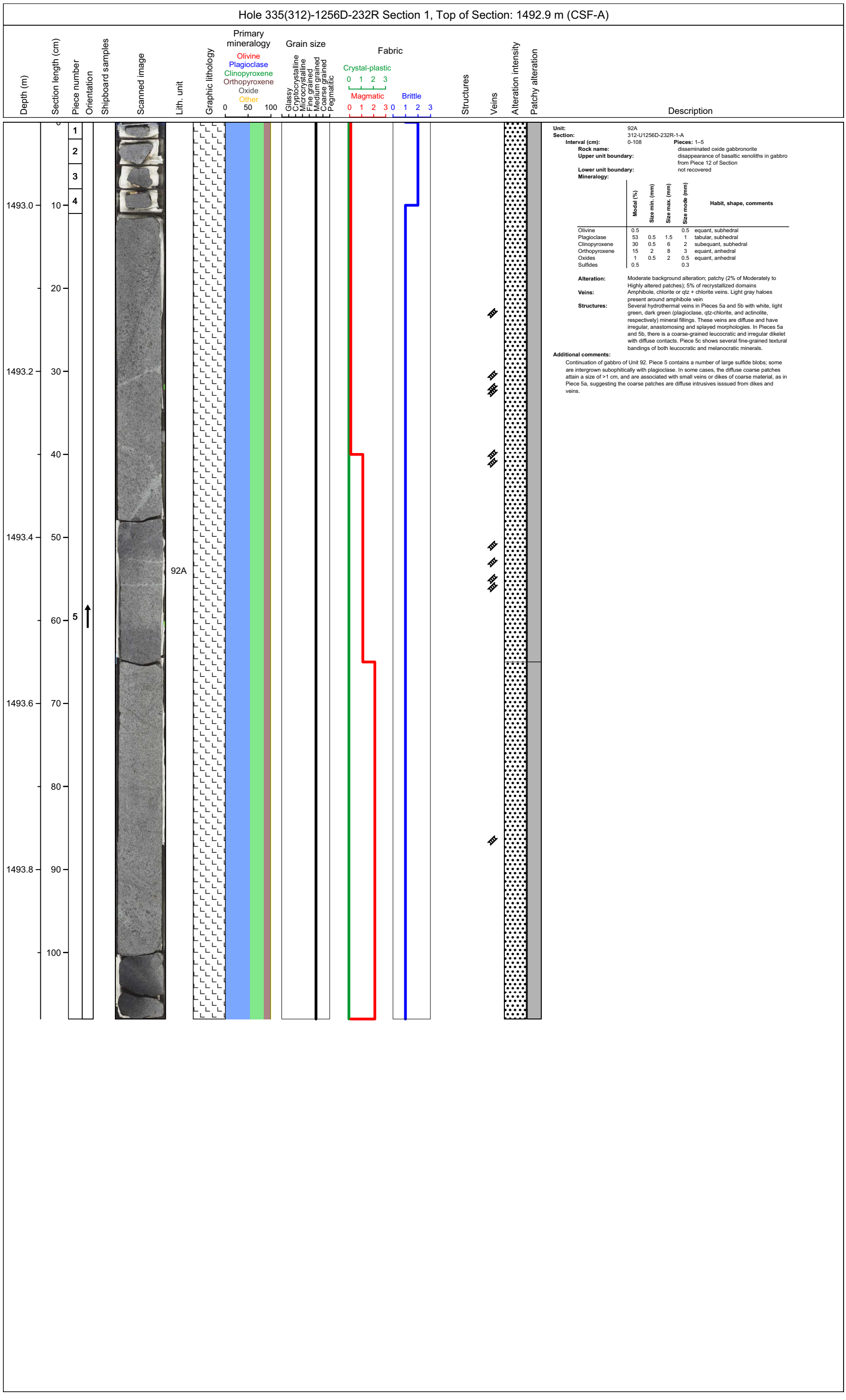
Alteration: Moderate background alteration; patchy (2% of Highly altered patches)
Veins: No veins
Structures: Igneous contact in Piece 6 represents a 1 cm dikelet intrusion. Lobulate but sharp boundaries with the host rock. Felsic minerals show higher alteration.
Additional comments: 1 cm wide dike cutting 92A with no chilled margin. Margins are mostly sharp and sutured, but in one portion are partly diffuse.

Unit: 92A
Section: 312-U1256D-231R-4-A
Interval (cm): 67-150 **Pieces:** parts of 6, 7–10
Rock name: olivine-bearing disseminated oxide gabbronorite
Upper unit boundary: disappearance of basaltic xenoliths in gabbro from Piece 12 of Section
Lower unit boundary: not recovered
Mineralogy:

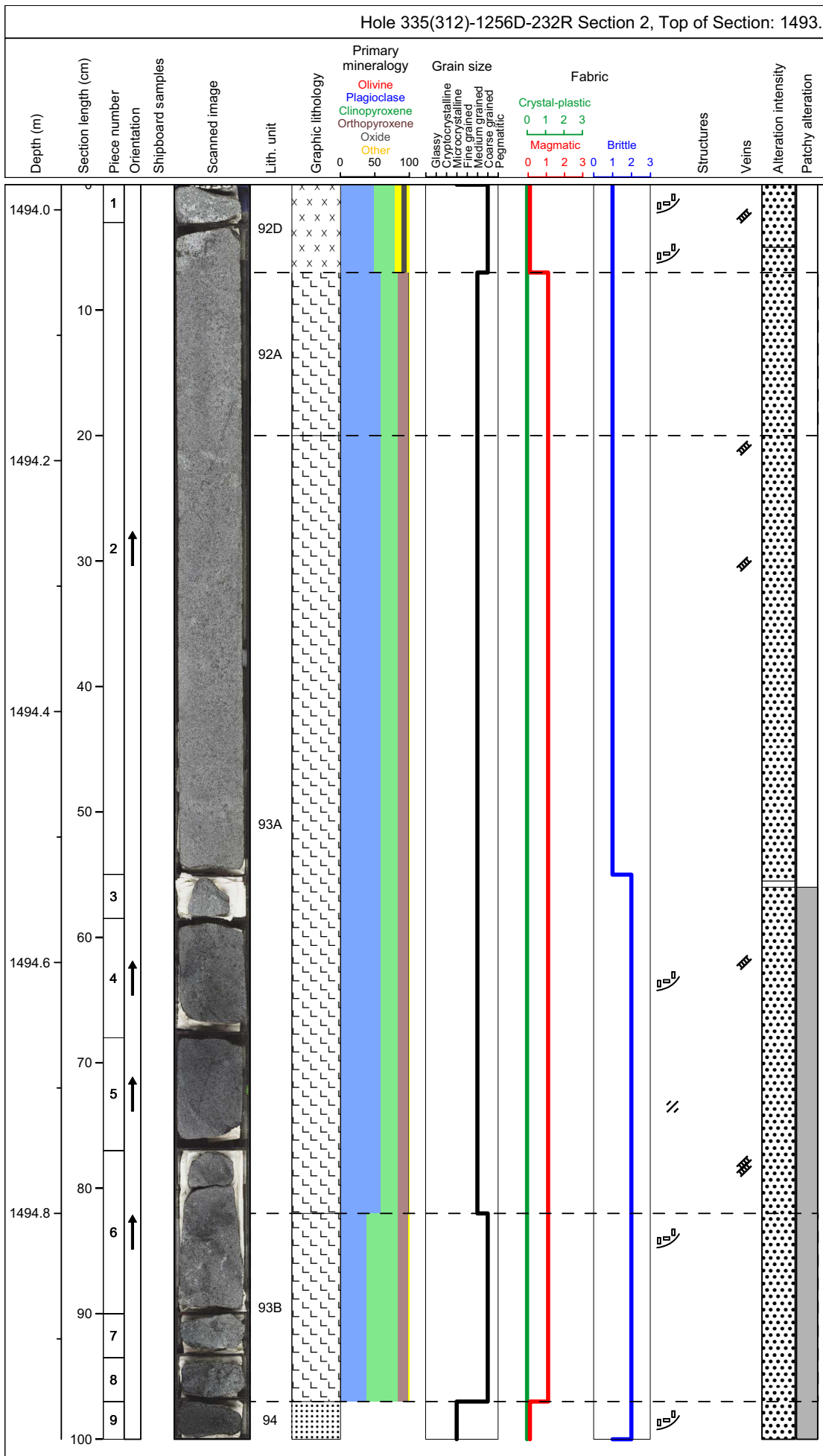
	Modal (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Habit, shape, comments
Olivine	2				
Plagioclase	56.5	0.5	3	1	tabular, subhedral
Clinopyroxene	30	1	6	2	equant, subhedral
Orthopyroxene	10	2	10	4	equant, anhedral, also poikilitic
Oxides	1	0.2	4	1	equant, anhedral
Sulfides	0.5			0.5	

Alteration: Moderate background alteration; patchy (2% of Highly altered patches)
Veins: Amphibole or chlorite veins. Light gray haloes present around amphibole vein
Structures: Hydrothermal veins in Pieces 6, 9, and 10, with planar, anastomosing, curved morphology and filled by dark green (amphibole-rich) minerals. All of them have 0.1–0.5 mm dark green halos. In Piece 10, there are veins with subparallel orientation. Several alteration and mineral patches are present in Pieces 1, 2, 4, 5, 6, 9, and 10, with irregular, elongated, and amoeboidal morphology and diffuse boundaries. A magmatic vein is present in Piece 6 (Unit 92C).
Additional comments: Olivine appears in this section, apparently increasing from top to bottom. A large sulphide is present in Piece 10.

Core Photo


Hole 335(312)-1256D-232R Section 1, Top of Section: 1492.9 m (CSF-A)
Depth (m)
Section length (cm)
Piece number
Orientation
Shipboard samples
Scanned image
Lith. unit
Graphic lithology
Primary mineralogy
Olivine
Plagioclase
Clinopyroxene
Orthopyroxene
Oxide
Other
0 50 100
Grain size
Glassy
Cryptocrystalline
Microcrystalline
Fine grained
Medium grained
Coarse grained
Pegmatitic
Fabric
Crystal-plastic
0 1 2 3
Magmatic
0 1 2 3
Brittle
1 2 3
Structures
Veins
Alteration intensity
Patchy alteration
Description
1493.0
1493.2
1493.4
1493.6
1493.8
92A
5
Unit: 92A
Section: 312-U1256D-232R-1-A
Interval (cm): 0-108
Pieces: 1–5
Rock name: disseminated oxide gabbronorite
Upper unit boundary: disappearance of basaltic xenoliths in gabbro from Piece 12 of Section
Lower unit boundary: not recovered
Mineralogy:
Modal (%)
Size min. (mm)
Size max. (mm)
Size mode (mm)
Habit, shape, comments
Olivine 0.5 0.5 equant, subhedral
Plagioclase 53 0.5 1.5 1 tabular, subhedral
Clinopyroxene 30 0.5 6 2 subequant, subhedral
Orthopyroxene 15 2 8 3 equant, anhedral
Oxides 1 0.5 2 0.5 equant, anhedral
Sulfides 0.5 0.3
Alteration: Moderate background alteration; patchy (2% of Moderately to Highly altered patches); 5% of recrystallized domains
Veins: Amphibole, chlorite or qtz + chlorite veins. Light gray haloes present around amphibole vein
Structures: Several hydrothermal veins in Pieces 5a and 5b with white, light green, dark green (plagioclase, qtz-chlorite, and actinolite, respectively) mineral fillings. These veins are diffuse and have irregular, anastomosing and splayed morphologies. In Pieces 5a and 5b, there is a coarse-grained leucocratic and irregular dikelet with diffuse contacts. Piece 5c shows several fine-grained textural bandings of both leucocratic and melanocratic minerals.
Additional comments:
Continuation of gabbro of Unit 92. Piece 5 contains a number of large sulfide blobs; some are intergrown subophitically with plagioclase. In some cases, the diffuse coarse patches attain a size of >1 cm, and are associated with small veins or dikes of coarse material, as in Piece 5a, suggesting the coarse patches are diffuse intrusives isssued from dikes and veins.

Core Photo



Unit: 92D
Section: 312-U1256D-232R-2-A
Interval (cm): 0-7 **Pieces:** parts of 1 and 2
Rock name: oxide diorite
Upper unit boundary: not recovered
Lower unit boundary: intrusive into 92A
Mineralogy:

	Modal (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Habit, shape, comments
Plagioclase	48.5	1	6	2	tabular, subhedral
Clinopyroxene	30	2	8	3	equant, subhedral
Amphibole	10	2	8	3	subequant, subhedral
Oxides	8	0.2	4	1	equant, anhedral
Quartz	3	0.5	1.5	1	equant, anhedral
Sulfides	0.5		2	0.5	

Alteration: Moderate background pervasive alteration
Veins: No veins
Structures: Two igneous contacts were recorded in Pieces 1 and 2. The contact in Piece 1 has a sharp boundary, whereas in Piece 2 it is diffuse and irregular. Increase in grain size of the felsic minerals from the central portion to the edge of the intrusion in Piece 2.

Additional comments:
The poikilitic texture is still present in Piece 2, and there is no clear decrease in grain size as the base of the Unit and the associated intrusion is approached.

Unit: 92A
Section: 312-U1256D-232R-2-A
Interval (cm): 7-20 **Pieces:** parts of 1 and 2
Rock name: disseminated oxide gabbronorite
Upper unit boundary: disappearance of basaltic xenoliths in gabbro from Piece 12 of Section
Lower unit boundary: appearance of basaltic enclaves in disseminated oxide gabbronorite of 92A
Mineralogy:

	Modal (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Habit, shape, comments
Plagioclase	58	0.2	3	1	tabular, subhedral
Clinopyroxene	25	0.5	3	1.5	equant, anhedral
Orthopyroxene	15	1	4	2	equant, anhedral
Oxides	1	0.2	1	0.5	equant, anhedral
Sulfides	1	0.5	4	1	

Alteration: Moderate background pervasive alteration; 2% of recrystallized domains
Veins: No veins
Structures:

Additional comments:
Thin dike with diffuse contact.

Unit: 93A
Section: 312-U1256D-232R-2-A
Interval (cm): 20-82 **Pieces:** part of 2, 3–6a, parts of 6b
Rock name: disseminated oxide gabbronorite
Upper unit boundary: appearance of basaltic enclaves in disseminated oxide gabbronorite of 92A
Lower unit boundary: increase in grain size and associated poikilitic texture in Piece 6B
Mineralogy:

	Modal (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Habit, shape, comments
Plagioclase	58	0.2	3	1	tabular, subhedral
Clinopyroxene	25	0.5	3	1.5	equant, anhedral
Orthopyroxene	15	1	4	2	equant, anhedral
Oxides	1	0.2	1	0.5	equant, anhedral
Sulfides	1	0.5	4	1	

Alteration: Moderate background alteration; patchy (55% of Moderately altered patches in the last 30 centimeters); 10% of recrystallized domains
Veins: Amphibole or chlorite veins
Structures: Several hydrothermal veins were recorded in Pieces 2, 4, and 6, showing dark green, light green, and white mineral fillings and irregular and planar morphologies. Some of these veins (e.g. Piece 2) are very diffuse and visible by the light green alteration halos (0.1–2 mm). Some irregular fractures are in Pieces 2, 5, 6, 7, and 9. Mostly rounded and altered mineral patches in Pieces 2 and 3; Piece 5 has several leucocratic patches with different shape and diffuse boundaries. Piece 2 contains a basaltic xenolith fragment.

Additional comments:
This marginal unit is very similar to the Unit 91 described at the upper contact of this gabbro, containing medium-grained gabbro (similar to Unit 92), fine-grained basaltic fragments, and a coarser, possibly pegmatitic gabbro in Pieces 3, 4, and 6–9, adjacent to the margin. The lower contact in Piece 9a is fairly sharp and sutured, and shows no decrease in the gabbro grain size toward the contact.

Unit: 93B
Section: 312-U1256D-232R-2-A
Interval (cm): 82-97 **Pieces:** part of 6b, 7-8
Rock name: disseminated oxide gabbronorite
Upper unit boundary: increase in grain size and associated poikilitic texture in Piece 6B
Lower unit boundary: sharp contact with basalt in piece 9
Mineralogy:

	Modal (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Habit, shape, comments
Plagioclase	37.5	1	6	2	tabular, subhedral
Clinopyroxene	45	2	8	4	equant, subhedral
Orthopyroxene	15	2	12	6	equant, subhedral
Oxides	1	0.2	1	0.5	equant, anhedral
Quartz	1	0.5	1	0.8	equant, anhedral
Sulfides	0.5			0.5	

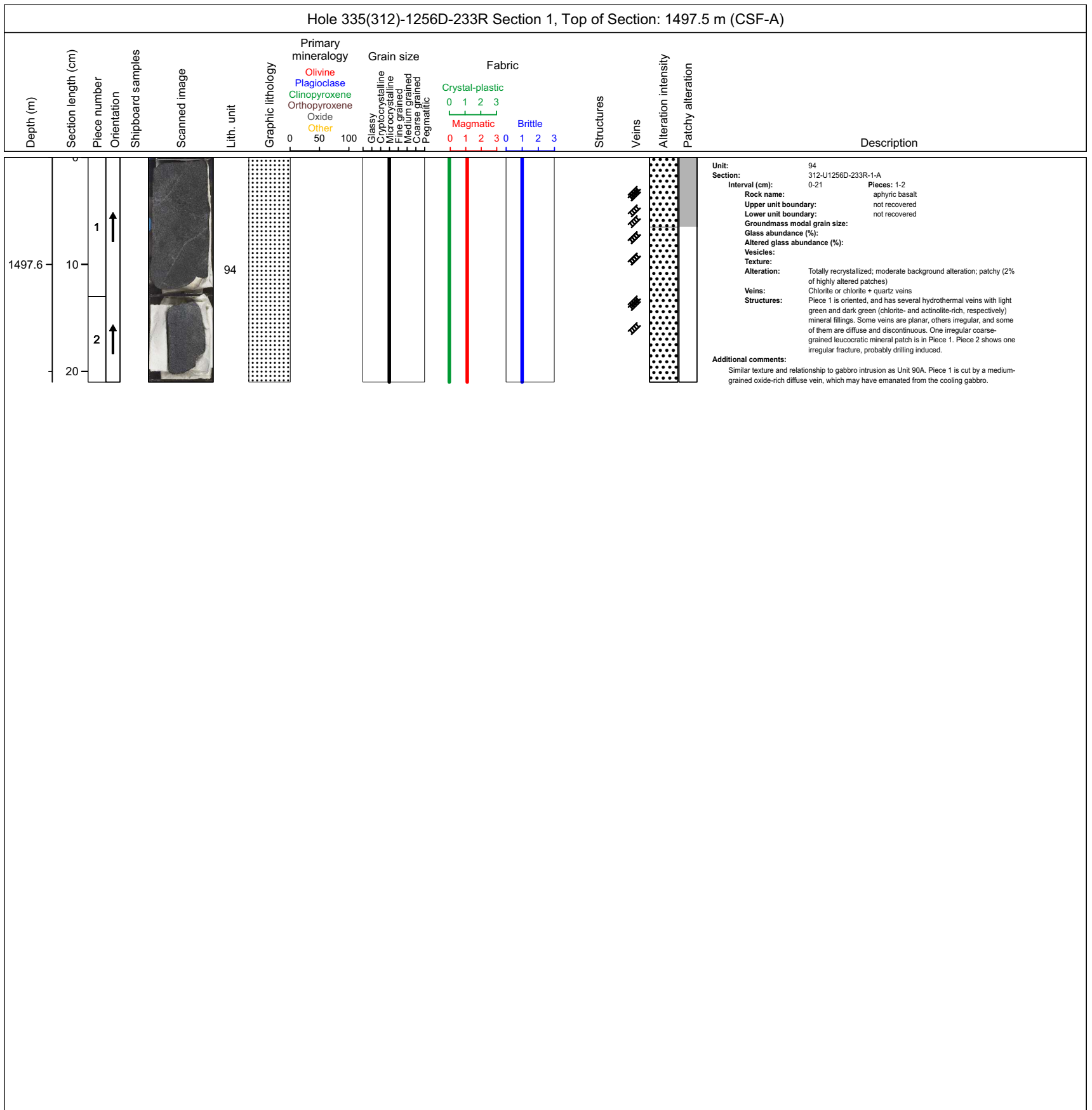
Alteration: Moderate background alteration; patchy (55% of Moderately altered patches); 10% of recrystallized domains
Veins: Chlorite veins
Structures: Several hydrothermal veins were recorded in Pieces 2, 4, and 6, showing dark green, light green, and white mineral fillings and irregular and planar morphologies. Some of these veins (e.g. Piece 2) are very diffuse and visible by the light green alteration halos (0.1–2 mm). Some irregular fractures are in Pieces 2, 5, 6, 7, and 9. Mostly rounded and altered mineral patches in Pieces 2 and 3; Piece 5 has several leucocratic patches with different shape and diffuse boundaries. Piece 2 contains a basaltic xenolith fragment.

Additional comments:

Unit: 94
Section: 312-U1256D-232R-2-A
Interval (cm): 97-100 **Pieces:** 9
Rock name: aphyric basalt
Upper unit boundary: intrusive contact with gabbronorite in piece 9
Lower unit boundary: not recovered
Groundmass modal grain size:
Glass abundance (%):
Altered glass abundance (%):
Vesicles:
Texture:
Alteration: Moderate background alteration; patchy (55% of moderatelly altered patches); 10% of recrystallized domains
Veins: No veins
Structures: An igneous contact with diffuse boundaries was recorded in Piece 9; it is cut by three irregular fractures.

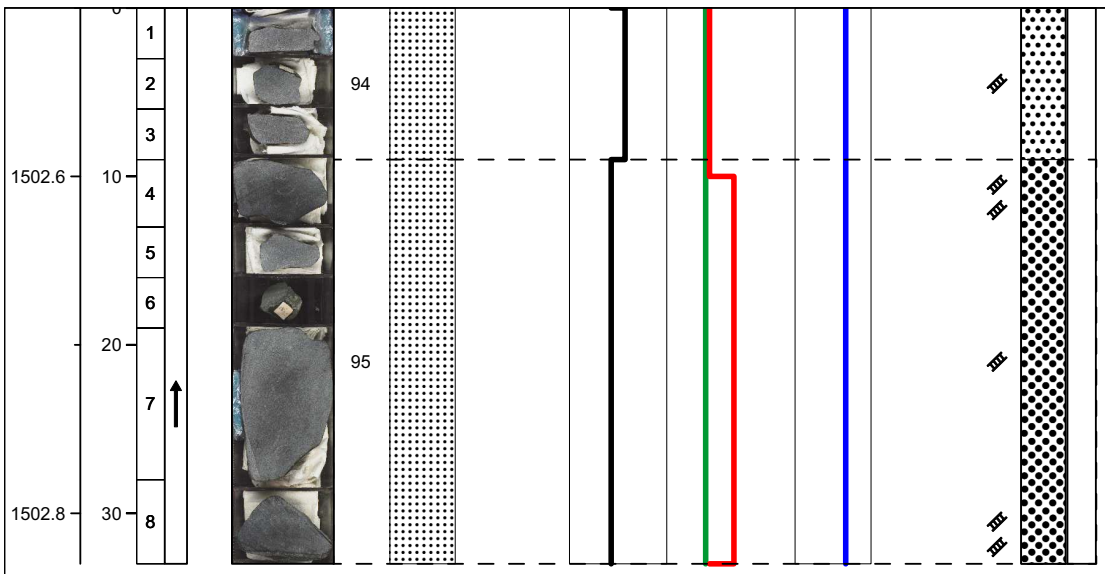
Additional comments:
Contains basaltic enclaves, Some are pinkish, granular, and very fine grained, suggsting 2-pyroxene hornfels. Similar texture and relationship to gabbro intrusion as Unit 90A. It is not certain whether this fine-grained portion of Piece 9 is a basaltic xenolith in the gabbro or is truly the margin, but we log it as part of Unit 94, which continues in the next two sections.

Core Photo


Hole 335(312)-1256D-233R Section 1, Top of Section: 1497.5 m (CSF-A)
Depth (m)
Section length (cm)
Piece number
Orientation
Shipboard samples
Scanned image
Lith. unit
Graphic lithology
Primary mineralogy
Olivine
Plagioclase
Clinopyroxene
Orthopyroxene
Oxide
Other
0 50 100
Grain size
Glassy
Cryptocrystalline
Microcrystalline
Fine grained
Medium grained
Coarse grained
Pegmatitic
Fabric
Crystal-plastic
0 1 2 3
Magmatic
Brittle
0 1 2 3 0 1 2 3
Structures
Veins
Alteration intensity
Patchy alteration
Description
1497.6
10
20
1
2
94
Unit: 94
Section: 312-U1256D-233R-1-A
Interval (cm): 0-21 Pieces: 1-2
Rock name: aphyric basalt
Upper unit boundary: not recovered
Lower unit boundary: not recovered
Groundmass modal grain size:
Glass abundance (%):
Altered glass abundance (%):
Vesicles:
Texture:
Alteration: Totally recrystallized; moderate background alteration; patchy (2% of highly altered patches)
Veins: Chlorite or chlorite + quartz veins
Structures: Piece 1 is oriented, and has several hydrothermal veins with light green and dark green (chlorite- and actinolite-rich, respectively) mineral fillings. Some veins are planar, others irregular, and some of them are diffuse and discontinuous. One irregular coarse-grained leucocratic mineral patch is in Piece 1. Piece 2 shows one irregular fracture, probably drilling induced.
Additional comments:
Similar texture and relationship to gabbro intrusion as Unit 90A. Piece 1 is cut by a medium-grained oxide-rich diffuse vein, which may have emanated from the cooling gabbro.

Core Photo

Hole 335(312)-1256D-234R Section 1, Top of Section: 1502.5 m (CSF-A)



Description

Unit: 94
Section: 312-U1256D-234R-1-A
Interval (cm): 0-9 **Pieces:** 1-3
Rock name: aphyric basalt
Upper unit boundary: intrusive contact with gabbronorite in piece 9, Section 232R-2
Lower unit boundary: not recovered
Groundmass modal grain size:
Glass abundance (%):
Altered glass abundance (%):
Vesicles:
Texture:
Alteration: Totally recrystallized; moderate background alteration
Veins: No veins
Structures: One hydrothermal vein filled by dark green (chlorite-rich) minerals, with planar and sharp boundaries in Piece 1.
Additional comments:
This section shows a gradual drop in grain size from the overlying section, becoming cryptocrystalline.

Unit: 95
Section: 312-U1256D-234R-1-A
Interval (cm): 9-33 **Pieces:** 4-8
Rock name: aphyric basalt
Upper unit boundary: not recovered
Lower unit boundary: not recovered
Groundmass modal grain size:
Glass abundance (%):
Altered glass abundance (%):
Vesicles:
Texture:
Alteration: High background alteration
Veins: Chlorite or chlorite + quartz veins
Structures: Several hydrothermal veins filled by dark green and white (chlorite, and quartz-rich, respectively) minerals in Pieces 4, 6, 7, and 8, with sharp and planar boundaries. In Piece 7, some pyrite crystals show a preferred orientation.
Additional comments:
Very pale basalt, with unusually smooth drilled surface. Thin section shows that the nature of alteration is very different to that of Unit 94.

SAMPLE: 335(312)-1256D-213R-1-W 51/54-TS 59
Rock name: contact: dike/gabbro
Rock comment: "contact granoblastic dike, oxide gabbro. The modal estimates in the gabbro are made by comparison with visual estimation charts, and are based on the coarsest part of the gabbro close to the contact. More than 1 cm from the contact the gabbro is highly altered, and the grainsize of this altered material is significantly smaller than that of the gabbro at the contact. The size and proportion of oxides increases from the contact up to 1 cm away from the contact, and then drops markedly in the highly altered zone. Comparison with the core shows that the change in grain size is most likely caused by alteration rather than reflecting an original igneous texture.
Unit/subunit: 80A
Piece no.: 13A

PRIMARY MINERALOGY Number of domains: 2 Nature of igneous domains: contact between two units

Igneous domain name: domain 1 Domain lithology: granoblastic dike
Domain grain size: microcrystalline Grain size distribution: equigranular
Domain texture: granoblastic Relative abundance (%):
General comment: former variolitic texture; metamorphically transformed granoblastic dike

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Plagioclase	45	50		0.05	0.6	0.2	subhedral	lath-shaped	continuous zoning abundant			subhedral laths in radiating variolitic patches
Clinopyroxene	0	47										completely altered
Opaque	3	3		0.01	0.2	0.1	subhedral					

Igneous domain name: domain 2 Domain lithology: medium-grained oxide gabbro
Domain grain size: medium-grained Grain size distribution: inequigranular
Domain texture: seriate Relative abundance (%):
General comment:

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Olivine												completely altered, originally surrounded by opx? HIGHLY QUESTIONABLE!!
Plagioclase	50	55		0.4	3	1.3	subhedral	lath-shaped				large subhedral laths, smaller more equant; partly altered
Clinopyroxene	0	30		0.4	2	1	subhedral					
Opaque	15	10		0.4	3.5	1.2	subhedral					

SECONDARY MINERALOGY

Alteration domain or feature: lower part Total alteration (%): 71.5
Recrystallization: Recrystallization degree:
General alteration comment: Needle-like actinolite in Qtz

	Present (%)	Comment
Actinolite	2	intersticial
Green hornblende	30	replacing cpx & plag
Other amphibole	0.5	primary
Epdote	5	replacing plag
Chlorite	7	replacing plag & actinolite
Quartz	3	replacing plag
Secondary plag.	15	albite replacing plag
Prehnite	5	replacing plag
Titanite	2	replacing titanomagnetite
Magnetite	3	replacing cpx & titanomagnetite
Ca carbonates	1	replacing plag

Alteration domain or feature: upper part Total alteration (%): 71.5
Recrystallization: Recrystallization degree:
General alteration comment:

	Present (%)	Comment
Green hornblende	25	replacing cpx
Secondary plag.	3	replacing plag
Magnetite	8	replacing cpx & titanomagnetite

VEINS AND HALOS

Vein fill compositional comment:	Vein generation:	Average vein thicknes (mm):	Halo width (mm):	Total halo (%):

MICROSTRUCTURES
Microstructure comments

SAMPLE: 335(312)-1256D-214R-1-W 34/35-TS 65
Rock name: contact: oxide gabbro / oxide diorite
Rock comment: Section can also be interpreted as to consist of two lithologies: one related to the cpx-oikocrysts (oxide-free, small plag lath, evtl. doleritic patches, doleritic part); and the other correspond to a much coarser grained (in terms of plag laths) and appearance of Qtz (tonalitic part): eventually this is the record of activity of two magmas. These two lithology have diffused contact.
Unit/subunit: 81
Piece no.: 9

PRIMARY MINERALOGY Number of domains: 2 Nature of igneous domains: contact between two units

Igneous domain name: domain 1
Domain grain size: medium-grained
Domain texture: seriate
General comment:
Domain lithology: medium-grained oxide gabbro
Grain size distribution: inequigranular
Relative abundance (%):

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Olivine	0	5		0.2	1.8	1	subhedral					
Plagioclase	40	55		0.1	2	1	subhedral	tabular	continuous zoning abundant			partly altered; dusty inclusion; chadachrist laths are smaller than plag of other portions
Clinopyroxene	15	37		1	7	3	anhedral					chadacrysts are plag laths; strongly altered to actinolite and desseminated tiny oxide
Opaque	3	3		0	1.5	0.8	anhedral					two populations: 1) primary oxides, interstitial, partly poikilitic; 2) tiny oxide grains as alteration product

Igneous domain name: domain 2
Domain grain size: medium-grained
Domain texture: seriate
General comment:
Domain lithology: medium-grained oxide diorite
Grain size distribution: inequigranular
Relative abundance (%):

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Plagioclase	10	53		0.5	6	3	subhedral	tabular				partly altered
Clinopyroxene	0	20		0.2	8	3	subhedral	prismatic				completely altered to fibrous actinolite and disseminated tiny oxide;
Opaque	7	7		0	2	1	anhedral					1) anhedral, interstitial, 2) anhedral granular
Quartz	20	20		1	6	3	anhedral					micrographic texture with completely altered plag

SECONDARY MINERALOGY

Alteration domain or feature:
Recrystallization:
General alteration comment:
Total alteration (%): 61.3
Recrystallization degree:

	Present (%)	Comment
Green hornblende	25	replacing cpx, minor plag. replaces all cpx in tonalite, partial cpx in dolerite
Epdote	1.5	replacing plag
Chlorite	2	replacing plag
Quartz	0.5	in laumontite, interstitial between two plag; euhedral, dusty apperance because replaced (by laumontite ?)
Secondary plag.	25	albite, only 1% in dolerite
Prehnite	3	replacing plag, colorless or pale brown
Other Ca-Al sec.	0.8	laumontite replacing plag
Titanite	2	euhedral, interstitial. replacing plag
Magnetite	1.5	replacing cpx, associated with green hbl

VEINS AND HALOS
Vein fill compositional comment: Vein generation: Average vein thicknes (mm): Halo width (mm): Total halo (%):

MICROSTRUCTURES
Microstructure comments

SAMPLE: 335(312)-1256D-214R-1-W 41/47-TS 60
Rock name: medium-grained oxide diorite qtz-rich
Rock comment: Section contains two areas with different grain sizes and also different modal proportions, therefore the estimation of the modal proportions is weak; Grain boundaries are unclear and extinction patchy. Interpreted to be upper amphibolite-grade deformation with a component of recovery.
Unit/subunit: 82
Piece no.: 11

PRIMARY MINERALOGY Number of domains: 1 Nature of igneous domains:

Igneous domain name: domain 1 Domain lithology: medium-grained oxide diorite
Domain grain size: medium-grained Grain size distribution: inequigranular
Domain texture: seriate Relative abundance (%):
General comment:

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Plagioclase	45			0.5	5	3	subhedral-euhedral	tabular	continuous zoning abundant			
Amphibole	25			0.2	8	2	anhedral to subhedral	acicular		green to brown		mostly altered to fibrous actinolite; some relics shows nice cleavage and green-brown colors; some are poikilitic
Opaque	7			0	5	0.5	anhedral	interstitial				1) primary oxides, interstitial, partly poikilitic; 2) tiny oxide grains as alteration product
Quartz	23			0.2	3	1	anhedral	granular				interstitial, partly gaphic intergrowth with plag

SECONDARY MINERALOGY

Alteration domain or feature: Total alteration (%): 52.1
Recrystallization: Recrystallization degree:
General alteration comment:

	Present (%)	Comment
Actinolite	8	replacing hbl
Brown hornblende	20	replacing cpx, opx. only minor amounts of magmatic pyrox is left
Epdote	2	replacing plag
Chlorite	5	replacing plag & actinolite
Quartz	0.1	interstitial, dusty and associated with epidote & chlorite
Secondary plag.	20	replacing plag along cleavages and microfractures
Prehnite	1	replacing plag
Titanite	2	subhedral, small disseminated crystals, or large crystals in or adjacent to large Fe-Ti oxides
Magnetite	2	replacing cpx. tiny crystals associated with hbl and actinolite

VEINS AND HALOS

Vein fill compositional comment:	Vein generation:	Average vein thicknes (mm):	Halo width (mm):	Total halo (%):

MICROSTRUCTURES
Microstructure comments

SAMPLE: 335(312)-1256D-214R-1-W 70/73-TS 66
Rock name: contact: medium-grained oxide gabbro / medium-grained qtz-rich oxide diorite
Rock comment: contact between two units; the contact zone is written as individual domain. Section can also be interpreted as to consist of three lithologies: 1) coarser grained oxide gabbro part, 2) doleritic part related to the cpx-oikocrysts (with small plag lath), 3) tonalitic part. These contacts is not clear (diffused).
Unit/subunit: 82
Piece no.: 15

PRIMARY MINERALOGY Number of domains: 3 Nature of igneous domains: contact between two units; contact is also a domain

Igneous domain name: domain 1
Domain grain size: medium-grained
Domain texture: seriate
General comment:
Domain lithology: medium-grained oxide diorite
Grain size distribution: inequigranular
Relative abundance (%):

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Plagioclase	45			0.22	4.5	3	anhedral-subhedral	bladed to tabular				some are anhedral interstitial; hardly altered to albite
Clinopyroxene	20			0.2	9	3	anhedral-subhedral	prismatic to interstitial				completely altered to fibrous actinolite and disseminated tiny oxide, some show curved shape
Opaque	10			0	2	1	anhedral	interstitial				interstitial, some with plag and qtz inclusion
Quartz	25			0.1	3.5	1.8	anhedral	interstitial				micrographic texture with completely altered plag

Igneous domain name: domain 2
Domain grain size: medium-grained
Domain texture: ophitic to seriate
General comment:
Domain lithology: contact zone
Grain size distribution: inequigranular
Relative abundance (%):

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Plagioclase	50			0.5	5.5	3	subhedral	bladed to tabular				highly altered to albite, chlorite and oxide
Clinopyroxene	40			0.2	6	3	subhedral	prismatic				completely altered to fibrous actinolite and disseminated tiny oxide, some with small brown amphibole
Opaque	7			0	2.5	1.3	anhedral	interstitial				interstitial, some with plag and qtz inclusion
Quartz	3			0.3	0.5	0.4	anhedral	interstitial				some show micrographic texture with plag (completely altered)

Igneous domain name: domain 3
Domain grain size: medium-grained
Domain texture: ophitic to seriate
General comment:
Domain lithology: medium-grained oxide gabbro
Grain size distribution: inequigranular
Relative abundance (%):

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Plagioclase	35			0.1	0.5	0.3	subhedral	bladed to tabular				strongly altered, chadachrist laths in poikilitic cpx
Clinopyroxene	60			2	7	4.5	anhedral	poikilitic				chadacrysts are plag laths; strongly altered to actinolite and oxide
Opaque	5			0	0.5	0.25	anhedral	interstitial				interstitial, some with plag and qtz inclusion

SECONDARY MINERALOGY

Alteration domain or feature:
Recrystallization:
General alteration comment:
Total alteration (%): 96
Recrystallization degree:

	Present (%)	Comment
Green hornblende	28	replacing cpx, minor plag
Brown hornblende	2	primary? rim replaced by chlorite
Epdote	5	replacing plag
Chlorite	10	replacing green hbl, minor plag. frequently a thin rim of amphibole replacing cpx
Secondary plag.	30	albite often dusty, main replacement product of plag
Prehnite	8	replacing plag
Other Ca-Al sec.	2	laumontite replacing plag
Titanite	7	repalcing titanomagnetite into or around titanomagnetite, well developed when in contact with the vein
Magnetite	3	replacing cpx
Ca carbonates	1	calcite replacing plag, one large - and several large parts in the center of - plag crystal

VEINS AND HALOS

Vein fill compositional comment:	Vein generation:	Average vein thicknes (mm):	Halo width (mm):	Total halo (%):

MICROSTRUCTURES
Microstructure comments

SAMPLE: 335(312)-1256D-214R-1-W 94/95-TS 67
Rock name: medium-grained oxide gabbro qtz-bearing
Rock comment: There are some completely altered obscured objects which eventually could represent former olivines and/or orthopyroxene. Curious mineral assemblage of this rock suggests that relatively coarse-grained, quartz-bearing portion and quartz-free, olivine-bearing portion are derived from different origin. / Several titanomagnetite crystals, especially larger ones, show exsolution of ilmenite and, perhaps, haematite (?)

Unit/subunit: 83
Piece no.: 17

PRIMARY MINERALOGY Number of domains: 1 Nature of igneous domains:

Igneous domain name: domain 1 Domain lithology: medium-grained qtz bearing oxide gabbro
Domain grain size: medium-grained Grain size distribution: inequigranular
Domain texture: ophitic to seriate Relative abundance (%):
General comment:

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Olivine	0	1		0.2	1.2	1	subhedral					originally surrounded by opx?
Plagioclase	15	57		0.1	4.2	2	anhedral-subhedral	bladed to tabular	stongy zoned scarce			partly altered
Clinopyroxene	35	34		0.4	5	2.5	anhedral-subhedral	prismatic to poikilitic				some are intersititat. headly altered to fibrous actinolite and disseminated tiny oxide, some altered to brownish amphibole, poikilitic cpx include plag laths as chadocryst.
Opaque	5			0	2.5	1	anhedral	interstitial				1) anhedral, interstitial, 2) anhedral granular; 1) primary oxides, interstitial, often with inclusion (qtz, plag and cpx) ; 2) tiny oxide grains as alteration product
Quartz	3	3		0.3	4.5	2.5	anhedral	interstitial to poikilitic				micrographic texture with completely altered plag, some poikilitic qtz include plag laths as chadocrysts.

SECONDARY MINERALOGY

Alteration domain or feature: Total alteration (%): 63
Recrystallization: Recrystallization degree:
General alteration comment:

	Present (%)	Comment
Green hornblende	25	replacing cpx. 1-2% magmatic cpx relicts
Brown hornblende	0.5	primary?
Other amphibole	0.5	orthoamphibole, overprint on plag
Epdote	3	replacing plag
Chlorite	7	replacing plag & minor green hbl
Secondary plag.	8	albite
Prehnite	5	replacing plag
Other Ca-Al sec.	7	laumontite replacing plag, strong replacement in the lower part of the slide
Titanite	3	interstitial
Magnetite	4	replacing cpx

VEINS AND HALOS

Vein fill compositional comment:	Vein generation:	Average vein thicknes (mm):	Halo width (mm):	Total halo (%):

MICROSTRUCTURES
Microstructure comments

SAMPLE: 335(312)-1256D-214R-1-W 108/111-TS 61
Rock name: medium-grained oxide gabbro qtz-rich
Rock comment: Primary magmatic features are strongly overprinted by strong alteration, therefore related descriptions are poorly constrained; it is not possible to estimate the primary mode; not clear whether primary mafic phase was cpx or hornblende. / Epidote, quartz, prehnite rich alteration patches grading to - and/or crosscut by

Unit/subunit: 83
Piece no.: 20

PRIMARY MINERALOGY Number of domains: 1 Nature of igneous domains:

Igneous domain name: domain 1 Domain lithology: medium-grained qtz bearing oxide gabbro
Domain grain size: medium-grained Grain size distribution: inequigranular
Domain texture: seriate Relative abundance (%):
General comment:

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Plagioclase				0.4	8	4	subhedral	tabular				completely altered to dusty brownish masses
Clinopyroxene					6	3	anhedral	poikilitic				only pseudomorphs present; completely altered to fibrous actinolite plus tiny oxide
Opaque				0	3	1	anhedral	interstitial				1) anhedral, interstitial, 2) anhedral granular; 1) primary oxides, interstitial, often with inclusion (qtz, plag and cpx) ; 2) tiny oxide grains as alteration product
Quartz							anhedral	interstitial				probably primary in small amount; much of secondary qtz

SECONDARY MINERALOGY

Alteration domain or feature: Total alteration (%): 100
Recrystallization: Recrystallization degree:
General alteration comment:

	Present (%)	Comment
Green hornblende	28	replacing cpx / hbl?
Other amphibole	0.5	orthamphibole?
Epdote	15	replacing plag
Chlorite	10	replacing plag
Quartz	10	igneous
Zeolite	12	replacing plag
Prehnite	10	replacing plag
Titanite	5	replacing titanomagnetite into or in contact with magnetite
Magnetite	10	replacing cpx. large primary and tiny secondary magnetite

VEINS AND HALOS

Vein fill compositional comment:	Vein generation:	Average vein thicknes (mm):	Halo width (mm):	Total halo (%):

MICROSTRUCTURES
Microstructure comments

SAMPLE: 335(312)-1256D-214R-1-W 121/124-TS 62
Rock name: medium-grained oxide diorite qtz-rich
Rock comment: Primary magmatic features are strongly overprinted by strong alteration, therefore related descriptions are poorly constrained; it is not possible to estimate the primary mode; not clear whether primary mafic phase was cpx or hornblende
Unit/subunit: 82
Piece no.: 24

PRIMARY MINERALOGY Number of domains: 1 Nature of igneous domains:

Igneous domain name: domain 1 Domain lithology: medium-grained oxide diorite
Domain grain size: medium-grained Grain size distribution: inequigranular
Domain texture: seriate Relative abundance (%):
General comment:

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Plagioclase	5	65		0.5	1.2	1	anhedral-subhedral					nearly completely altered
Clinopyroxene	0	15		0.4	0.9	0.6	anhedral					strongly altered to actinolite; not clear whether the primary mafic phase was hbl or cpx
Opaque	5	5		0.1	1	0.1	subhedral-euhedral					
Quartz	15	15					anhedral	granular				interstitial, partly gaphic intergrowth with plag

SECONDARY MINERALOGY

Alteration domain or feature: Total alteration (%): 65.5
Recrystallization: Recrystallization degree:
General alteration comment:

	Present (%)	Comment
Green hornblende	30	replacing cpx and/or hbl. better developed where replacing cpx, dusty looking where replacing plag (less well developed)
Epdote	5	replacing plag or interstitial
Chlorite	1	replacing plag
Secondary plag.	5	replacing plag along cracks and an irregular rim
Zeolite	15	replacing plag, colorless or pale brown because dusty appearance, two cleavages
Prehnite	0.5	replacing plag
Titanite	1	interstitial, associated with magnetite
Magnetite	8	replacing cpx, seen as blebs in actinolite crystals

VEINS AND HALOS
Vein fill compositional comment: Vein generation: Average vein thicknes (mm): Halo width (mm): Total halo (%):

MICROSTRUCTURES
Microstructure comments

SAMPLE: 335(312)-1256D-214R-1-W 136/139-TS 68
Rock name: contact: oxide diorite qtz-rich
Rock comment: Alteration produces granophyric texture of the feldspars which are strongly fractured, especially in the tonalite (unit 82). The contact between both units is diffuse and difficult to distinguish. Plagioclase crystals in the gabbro portion (unit 84) seem to be less fractured than those in the tonalite (unit 82). Plagioclase crystals in the gabbro can show undolatory extinction. However, this extinction may be the result of the cutting angle of the crystals in the thin section. There is no evidence for strong recrystallization. No preference alignment of the crystals was observed, neither in the gabbro nor the tonalite nor the contact between them

Unit/subunit: 82
Piece no.: 27

PRIMARY MINERALOGY Number of domains: 2 Nature of igneous domains: contact between two units

Igneous domain name: domain 1
Domain grain size: medium-grained
Domain texture: seriate
General comment:
Domain lithology: medium-grained oxide diorite
Grain size distribution: inequigranular
Relative abundance (%):

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Plagioclase	20	40		0.4	4	3	subhedral	lath-shaped				often highly altered
Amphibole	5	30		0.6	6	2	subhedral	elongate		green to brownish green		hbl; sometimes diamond shaped sections with cleavages at 56 degrees.
Opaque	10	10		0.5	2	1	subhedral					
Quartz	20	20		0.8	4	2						granophyric intergrowths

Igneous domain name: domain 2
Domain grain size: medium-grained
Domain texture: ophitic to seriate
General comment:
Domain lithology: medium-grained oxide gabbro
Grain size distribution: inequigranular
Relative abundance (%):

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Olivine	0	5		0.3	1	0.7	subhedral to anhedral					originally surrounded by opx?
Plagioclase	30	58		0.4	2	1						elongate subhedral laths as chadacrysts, more equant crystals in coarser regions.
Clinopyroxene	10	34		0.4	4	2		poikilitic				fresh cpx as oikocrysts, altered as interstitial
Opaque	3	3		0.5	1	0.8		interstitial				

SECONDARY MINERALOGY

VEINS AND HALOS
Vein fill compositional comment: Vein generation: Average vein thicknes (mm): Halo width (mm): Total halo (%):

MICROSTRUCTURES
Microstructure comments

SAMPLE: 335(312)-1256D-214R-2-W 0/6-TS 63
Rock name: fine-grained oxide gabbro hbl-rich
Rock comment: Due to strong alteration of the mafic phases to actinolite, the primary relations between cpx and hornblende are unclear, also the initial modal proportions. Section can also be interpreted as to consist of two lithologies: one related to the cpx-oikocrysts (oxide-free, small plag lath, evtl. doleritic patches); and the other correspond to a much coarser grained (in terms of plag laths) oxide-rich hornblende gabbro: eventually this is the record of a mixing/percolation process of two magmas

Unit/subunit: 84
Piece no.: 1

PRIMARY MINERALOGY Number of domains: 1 Nature of igneous domains:

Igneous domain name: domain 1 Domain lithology: fine-grained oxide gabbro
Domain grain size: fine-grained Grain size distribution: inequigranular
Domain texture: seriate Relative abundance (%):
General comment:

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Olivine	0.2	2		0.2	1.7	1	subhedral to anhedral					completely altered
Plagioclase	50	55		0.1	3	2	subhedral	bladed to tabular	stongy zoned scarce			partly altered; dusty inclusion; chadachrist laths are smaller than plag of the rock outside
Clinopyroxene	20	25		0.5	4	3	anhedral	poikilitic				chadacrysts are plag laths; strongly altered to actinolite
Orthopyroxene	0	0.001		0.2	1	0.8	subhedral	interstitial				completely altered
Amphibole	0	15		0.5	5	2	subhedral	prismatic				hbl; strongly altered to actinolite; not clear whether the primary mafic phase was hbl or cpx
Opaque	3	3		0	2	1	anhedral	interstitial				1) anhedral, interstitial, 2) anhedral granular. 1) primary oxides, interstitial, partly poikilitic; 2) tiny oxide grains as alteration product

SECONDARY MINERALOGY

Alteration domain or feature: Total alteration (%): 36
Recrystallization: Recrystallization degree:
General alteration comment:

	Present (%)	Comment
Actinolite	10	replacing cpx
Green hornblende	20	replacing cpx. locally relict cpx crystals are evident
Secondary plag.	10	replacing plag
Magnetite	6	replacing cpx, interstitial. blebs in green hbl and actinolite

VEINS AND HALOS

Vein fill compositional comment:	Vein generation:	Average vein thicknes (mm):	Halo width (mm):	Total halo (%):

MICROSTRUCTURES
Microstructure comments

SAMPLE: 335(312)-1256D-214R-2-W 15/17-TS 69
Rock name: medium-grained oxide gabbro
Rock comment: Grain fracture is moderate, and no cataclastic or granophyric textures are apparent. A large amount of plagioclase crystals, usually the smaller ones, present a slight undolatory extinction on lobulated borders. No generation of subgrains was observed. Alteration appears to have been static. An irregular, discontinious and partly splayed fracture crosscuts all the section. The fracture crosscut several crystals of the host rock but no displacement was observed in this. It is highly possible that this fracture is drilling induced
Unit/subunit: 84
Piece no.: 4A

PRIMARY MINERALOGY Number of domains: 1 Nature of igneous domains:

Igneous domain name: domain 1 Domain lithology: medium-grained disseminated oxide gabbro
Domain grain size: medium-grained Grain size distribution:
Domain texture: granular to poikilitic Relative abundance (%):
General comment:

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Olivine	0	1		0.2	1.5	1	subhedral					completely altered
Plagioclase	55	55		0.1	2	1	subhedral-euhedral		stongy zoned abundant			
Clinopyroxene	20	43		0.2	4	2	anhedral	poikilitic				oikocrystic
Orthopyroxene	0	0.001				1.2	anhedral					
Opaque	1	1		0.1	1.3	0.5	subehdral-euhedral					primary oxides with sulphide inclusions

SECONDARY MINERALOGY

Alteration domain or feature: Total alteration (%): 34
Recrystallization: Recrystallization degree:
General alteration comment:

	Present (%)	Comment
Green hornblende	15	replacing cpx
Brown hornblende	5	replacing cpx
Chlorite	10	replacing cpx, green hbl, minor plag
Magnetite	3	replacing cpx, associated with green hbl
Pyrite	0.5	disseminated, locally seen adjacent to magnetite
Chalcopyrite	0.5	disseminated

Alteration domain or feature: Total alteration (%): 45
Recrystallization: Recrystallization degree:
General alteration comment:

	Present (%)	Comment
Green hornblende	25	replacing cpx, minor olivine. 2% magmatic cpx is preserved, at the top of the slide
Brown hornblende	0.5	core of actinolitic hbl replacing cpx
Other amphibole	0.5	orthoamphibole? colorless, parallel extinction, one in epidote
Epdote	1	replacing plag
Chlorite	2	replacing green hbl, plag. olivine?
Secondary plag.	2	albite
Prehnite	3	replacing plag
Other Ca-Al sec.	8	laumontite replacing plag
Titanite	3	interstitial
Magnetite	2	replacing cpx, olivine, associated with green hbl

VEINS AND HALOS
Vein fill compositional comment: Vein generation: Average vein thicknes (mm): Halo width (mm): Total halo (%):

MICROSTRUCTURES
Microstructure comments

SAMPLE: 335(312)-1256D-214R-2-W 50/51-TS 64
Rock name: medium-grained disseminated oxide gabbro hbl-bearing
Rock comment: Due to strong alteration of the mafic phases to actinolite, the primary relations between cpx and hornblende are unclear, also the initial modal proportions. Modal proportions of primary estimated by comparison with standard visual estimation chart. Eventually the symplectitic rims of the clinopyroxene reflects a reaction with a late-stage hornblende-saturated hydrous magma producing amphibole. Varytextrured: inequigranular, subhedral granular, partly poikilitic
Unit/subunit: 85
Piece no.: 7b

PRIMARY MINERALOGY Number of domains: 1 Nature of igneous domains:

Igneous domain name: domain 1 Domain lithology: medium-grained disseminated oxide gabbro
Domain grain size: medium-grained Grain size distribution: inequigranular
Domain texture: granular to poikilitic Relative abundance (%):
General comment:

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Olivine	0	3		0.3	2	1.2	subhedral					completely altered, originally surrounded by opx?
Plagioclase	45	47		0.1	3	1	subhedral	bladed to tabular	stongy zoned scarce			some are strongly zoned but chadacryst are unzoned; partly altered; dusty inclusion
Clinopyroxene	20	40		0.2	5	3	anhedral	poikilitic				chadacrysts are plag laths; show sometimes symplectitic structures at the rim; strongly altered to actinolite
Amphibole	0	5				1	subhedral	prismatic				hbl; strongly altered to actinolite
Opaque	4	4		0.05	1	0.5	anhedral	interstitial				1) anhedral, interstitial, 2) anhedral granular. 1) primary oxides, interstitial, partly poikilitic; 2) tiny oxide grains as alteration product

SECONDARY MINERALOGY

Alteration domain or feature: Total alteration (%): 43.1
Recrystallization: Recrystallization degree:
General alteration comment:

	Present (%)	Comment
Actinolite	5	replacing cpx, plag altered along cracks and cleavage traces
Green hornblende	20	replacing cpx
Other amphibole	0.1	replacing cpx. colorless to very mildly pleochroic in shades of green. moderately high relief with a ribbed appearance, found in association with other amphiboles
Epdote	2	replacing plag or interstitial
Chlorite	1	replacing olivine
Secondary plag.	20	replacing plag
Titanite	0.1	interstitial & euhedral, with epidote
Magnetite	0.2	disseminated and replacing cpx, olivine. most commonly as bleb networks in actinolite and green hbl
Chalcopyrite	tr	disseminated, associated with secondary minerals (epidote, chlorite + minor actinolite)
Other	0.2	dark green phyllosilicate

VEINS AND HALOS

Vein fill compositional comment:	Vein generation:	Average vein thicknes (mm):	Halo width (mm):	Total halo (%):

MICROSTRUCTURES
Microstructure comments

SAMPLE: 335(312)-1256D-214R-3-W 6/10-TS 70
Rock name: medium-grained oxide gabbro olivine-bearing
Rock comment: A few completely altered obscured fragments could represent former olivines or orthopyroxenes / There are no veins in this thin section. / Titanomagnetite crystals commonly present exolution of ilmenite and rarely of pyrrhotite
Unit/subunit: 85
Piece no.: 2

PRIMARY MINERALOGY Number of domains: 1 Nature of igneous domains:

Igneous domain name: domain 1 Domain lithology: medium-grained oxide gabbro
Domain grain size: medium-grained Grain size distribution:
Domain texture: granular to poikilitic, seriate Relative abundance (%):
General comment:

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Olivine	0	3		0.2	1.2	0.8	anhedral	interstitial				completely altered, originally surrounded by opx?
Plagioclase	45	55		0.1	2.5	2	subhedral-euhedral					highly altered
Clinopyroxene	20	39		0.2	7	10	anhedral-subhedral	poikilitic				symplektitic structures (mainly at the rim), replaced by actinolite
Opaque	3	3		0.2	2.2	2.5	subhedral-anhedral	interstitial				seems that many of the big grains are products of alteration

SECONDARY MINERALOGY

Alteration domain or feature: Total alteration (%): 61
Recrystallization: Recrystallization degree:
General alteration comment:

	Present (%)	Comment
Green hornblende	25	replacing cpx. some of this is not very well developed giving a dusty appearance
Epdote	1	replacing plag or interstitial
Secondary plag.	25	replacing plag
Prehnite	0.5	interstitial
Magnetite	6	replacing cpx + disseminated. blebs in green hbl
Hematite	2.5	disseminated
Pyrite	1	disseminated

VEINS AND HALOS

Vein fill compositional comment:	Vein generation:	Average vein thicknes (mm):	Halo width (mm):	Total halo (%):

MICROSTRUCTURES
Microstructure comments

SAMPLE: 335(312)-1256D-215R-1-W 10/15-TS 119
Rock name: medium-grained disseminated oxide gabbro
Rock comment: The sample was selected for thin section due to its clear macroscopic patchiness into pale coarse regions and finer darker regions. It is clear that the darker regions correpsond to the clinopyroxene oikocrysts, and the apparently coarser regions to those parts with sub-equant plagioclase that either contained more primary amphibole or have undergone preferential alteration. The texture may results from some sort of in-situ crystallisation process of the gabbro body (amongst several alternatives). No fresh orthopyroxene was observed in thin section

Unit/subunit: 85
Piece no.: 2

PRIMARY MINERALOGY Number of domains: 1 Nature of igneous domains:

Igneous domain name: domain 1 Domain lithology: medium-grained disseminated oxide gabbro
Domain grain size: medium-grained Grain size distribution: inequigranular
Domain texture: seriate to ophitic Relative abundance (%):
General comment:

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Olivine	2	3		1	2	1.4	subhedral	interstitial				some fresh parts, showing high birefringence and some exsolution of Ti oxide. often altered to chlorite and oxides. occurs with oikocrysts and sometimes includes plag
Plagioclase	50	55		0.2	5	2	subhedral	subequant to elongate				plag texture varies according to whether found as chadacryst in cpx, or outside the cpx. chadacrysts tend to be elongate and unzoned, while in regions between oikocrysts the plag is sub-equant and shows more pronounced concentric zoning
Clinopyroxene	20	39		0.8	12	2		poikilitic to interstitial				cpx is present as large oikocrysts, up to 12 mm in size, and is often fresh in the cores of these oikocrysts. between the oikocrysts, an altered interstitial mafic phase is present, which may been either primary amphibole or cpx
Opaque	3	3		0.1	3	1		interstitial				only occurs in coarse non-ophitic portions

SECONDARY MINERALOGY

Alteration domain or feature: Total alteration (%): 21.15
Recrystallization: Recrystallization degree:
General alteration comment:

	Present (%)	Comment
Green hornblende	18	replacing cpx, olivine, minor plag. pale blue green when replacing olivine
Talc	0.05	replacing olivine. fresh olivine relicts occur
Chlorite	0.5	replacing plag
Secondary plag.	1.5	replacing plag. locally up to 5%
Magnetite	1	replacing olivine
Pyrite	0.05	disseminated
Other sulfides	0.05	disseminated
Other	0.05	brown green phyllosilicate replacing olivine. pleocroic when in minor amounts, dark green not pleocroic when completely replcing olivine. associated with magnetite

VEINS AND HALOS

Vein fill compositional comment:	Vein generation:	Average vein thicknes (mm):	Halo width (mm):	Total halo (%):

MICROSTRUCTURES
Microstructure comments

SAMPLE: 335(312)-1256D-215R-1-W 84/88-TS 71
Rock name: medium-grained oxide gabbro olivine-bearing
Rock comment: Due to strong alteration of the mafic phases to actinolite, the initial modal proportions of cpx,opx and hbl are unclear.
Unit/subunit: 85
Piece no.: 17

PRIMARY MINERALOGY Number of domains: 1 Nature of igneous domains:

Igneous domain name: domain 1 Domain lithology: medium-grained oxide gabbro
Domain grain size: medium-grained Grain size distribution:
Domain texture: granular to poikilitic Relative abundance (%):
General comment:

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Olivine	3	3			1	0.6	subhedral to euhedral					strongly altered, partly to talc; initially probably prismatic, (not poikilitic), some are possibly opx
Plagioclase	50	50		0.1	3	2	subhedral	bladed to tabular				chadachrist laths are smaller than plag of the rock outside
Clinopyroxene	40	40		0.1	1	0.6	anhedral-subhedral	poikilitic				show sometimes symplectitic structures at the rim, sometimes hbl involved; mantled by hbl; altered to actinolite
Amphibole	3	3		0.1	2	0.5	anhedral	interstitial				forms coronas around cpx, fills interstices, forms isolated crystals; show often cpx relics inside; strongly altered to actinolite plus oxide
Opaque	4	4		0.1	2	0.5	anhedral	interstitial				primary oxides, interstitial, partly poikilitic

SECONDARY MINERALOGY

Alteration domain or feature: Total alteration (%): 40.2
Recrystallization: Recrystallization degree:
General alteration comment: plag is most intensely altered in plag-rich areas and along the late-magmatic vein. Non-poikilitic cpx is more intensely altered, poikilitic cpx is commonly altered along grain margins and cracks

	Present (%)	Comment
Actinolite	2	replacing cpx, olivine
Green hornblende	13	replacing cpx, vein
Brown hornblende	5	replacing cpx, actinolite, vein. coronas around cpx, especially where cpx is cut by the vein
Other amphibole	0.5	secondary cpx, replacing cpx, stripey; altered exsolution lamellae?
Epdote	0.5	replacing plag or interstitial
Secondary plag.	20	replacing plag
Prehnite	0.5	replacing plag, interstitial
Titanite	0.1	interstitial & euhedral, with epidote
Magnetite	1	replacing cpx & olivine, disseminated blebs in fibrous amphibole after cpx
Pyrite	0.1	disseminated
Other	1	dark brown-green phyllosilicate replacing olivine

VEINS AND HALOS

Vein fill compositional comment:	Vein generation:	Average vein thicknes (mm):	Halo width (mm):	Total halo (%):

MICROSTRUCTURES

Microstructure comments

SAMPLE: 335(312)-1256D-215R-2-W 12/14-TS 72
Rock name: medium-grained disseminated oxide gabbro
Rock comment: Very well-defined reaction rims between amphibole and plagioclase/ brown areas of large hornblende grains are ?/ Titanomagnetite crystals present exolution of ilmenite, as lamellas, and titanite, as lamellas and patches in the crystal borders.
Unit/subunit: 85
Piece no.: 3

PRIMARY MINERALOGY Number of domains: 1 Nature of igneous domains:

Igneous domain name: domain 1 Domain lithology: medium-grained disseminated oxide gabbro
Domain grain size: medium-grained Grain size distribution: inequigranular
Domain texture: seriate to ophitic Relative abundance (%):
General comment:

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Plagioclase	60	65		0.1	2.5	1.2	euhdral	equant to lath-shaped				large plag are present throughout the section. those included in cpx oikocrysts are not strongly zoned. those present away from oikocrysts tend to be strongly zoned. small equant plag only occurs outside oikocrysts
Clinopyroxene	5	32		0.5	50	3		poikilitic to interstitial				highly altered. large cpx oikocrysts occupy patches of the section. in the rest, the pyrox forms smaller interstitial crystals. the large oikocrysts are most likely to be primary pyrox, but it is not yet clear whether the other interstitial crystals were primary pyrox or amphibole
Amphibole												the large oikocrysts are most likely to be primary pyrox, but it is not yet clear whether the other interstitial crystals were primary pyrox or amphibole
Opaque	3	3		0.5	2	1		interstitial				only found outside cpx oikocrysts, in regions with coarser plag

SECONDARY MINERALOGY

Alteration domain or feature: Total alteration (%): 33
Recrystallization: Recrystallization degree:
General alteration comment: cpx is variably altered throughou this section.

	Present (%)	Comment
Green hornblende	20	replacing cpx
Brown hornblende	3	replacing cpx, locally seen as patches within less altered cpx
Chlorite	tr	replacing cpx and intertitial
Secondary plag.	5	replacing plag
Magnetite	5	replacing cpx and intertitial

VEINS AND HALOS

Vein fill compositional comment:	Vein generation:	Average vein thicknes (mm):	Halo width (mm):	Total halo (%):

MICROSTRUCTURES
Microstructure comments

SAMPLE: 335(312)-1256D-215R-2-W 40/44-TS 73
Rock name: medium-grained disseminated oxide gabbro
Rock comment: No orthopyroxene was observed in thin section. / There are no veins in this thin section. / Noteworthy that there are two amphiboles - well-crystallized green (hint of brown?) hornblende and actinolite. In the origianl 312 EXCEL sheet it was written 215R-1, but it is 215R-2.

Unit/subunit: 86
Piece no.: 10

PRIMARY MINERALOGY Number of domains: 1 Nature of igneous domains:

Igneous domain name: domain 1 Domain lithology: medium-grained disseminated oxide gabbro
Domain grain size: medium-grained Grain size distribution: inequigranular
Domain texture: seriate Relative abundance (%):
General comment:

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Plagioclase	50	55		0.2	4	1.8	subhedral-euhedral	lath-shaped to interstitial	strongly zoned abundant			large laths are strongly zoned
Clinopyroxene	20	43		0.8	2	1.2		interstitial				mostly altered to amphiboles, but primary pyrox is preserved in the cores of some crystals. primary amphibole may also have been present
Amphibole												primary amphibole may also have been present. cpx mostly altered to amphiboles, but primary pyrox is preserved in the cores of some crystals
Opaque	2	2		0.8	0.2	0.6		interstitial				

SECONDARY MINERALOGY

Alteration domain or feature: Total alteration (%): 29.5
Recrystallization: Recrystallization degree:
General alteration comment: cpx exhibits varying degrees of alteration in this slide

	Present (%)	Comment
Other amphibole	20	replacing cpx
Secondary plag.	5	replacing plag
Magnetite	4	replacing cpx, large blebs in amphibole crystals related to the alteration of cpx.
Pyrite	0.5	disseminated

VEINS AND HALOS

Vein fill compositional comment:	Vein generation:	Average vein thicknes (mm):	Halo width (mm):	Total halo (%):

MICROSTRUCTURES
Microstructure comments

SAMPLE: 335(312)-1256D-215R-2-W 67/71-TS 74
Rock name: medium-grained disseminated oxide gabbro
Rock comment: Hornblende is texturally earlier than actinolite. Hornblende has a variety of brown and blue-tinted portions in the otherwise dominant green variety.
Unit/subunit: 86
Piece no.: 16B

PRIMARY MINERALOGY Number of domains: 1 Nature of igneous domains:

Igneous domain name: domain 1 Domain lithology: medium-grained disseminated oxide gabbro
Domain grain size: medium-grained Grain size distribution: inequigranular
Domain texture: seriate Relative abundance (%):
General comment:

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Plagioclase	55	60		0.2	2	1.3	subhedral-euhedral	lath-shaped	concentric zoning			smaller subhedral
Clinopyroxene	15	38		0.4	4	1.8		interstitial				sub-ophitic texture partly enclosing large plag laths in places. primary cpx is certainly present, and in some places is overgrown by a high temperature hbl, which may be late magmatic or related to high temperature fluid-flow
Amphibole												hbl is texturally earlier than actinolite. hbl has a variety of brown and blue-tinted portions in the otherwise dominant green variety
Opaque	3	2		0.4	3	1		interstitial				

SECONDARY MINERALOGY

Alteration domain or feature: Total alteration (%): 24.2
Recrystallization: Recrystallization degree:
General alteration comment: euhedral/interstitial areas of very fine-grained brown/green translucent mineral; actinolite?

	Present (%)	Comment
Actinolite	3	replacing cpx
Green hornblende	19	replacing cpx
Epdote	0.1	replacing plag
Secondary plag.	5	replacing plag
Pyrite	0.1	disseminated

VEINS AND HALOS

Vein fill compositional comment:	Vein generation:	Average vein thicknes (mm):	Halo width (mm):	Total halo (%):

MICROSTRUCTURES
Microstructure comments

SAMPLE: 335(312)-1256D-216R-1-W 88/91-TS 75
Rock name: contact: medium-grained disseminated oxide gabbro and medium-grained oxide gabbro
Rock comment: contact: medium-grained disseminated oxide gabbro/medium-grained oxide gabbro. Magmatic contact between two lithologies showing similar mineralogy but different grain sizes. Comb texture at the contact in the coarser grained rock suggests that the coarser rock type intrudes the finer one. Modal proportions of primary estimated by comparison with standard visual estimation chart (not from the coarser grained rim due to the pervasive alteration and limited amount).
Unit/subunit: 86A
Piece no.: 19

PRIMARY MINERALOGY Number of domains: 2 Nature of igneous domains: contact between two units

Igneous domain name: domain 1 Domain lithology: medium-grained disseminated oxide gabbro
Domain grain size: medium-grained Grain size distribution:
Domain texture: subhedral granular Relative abundance (%):
General comment:

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Plagioclase	35	58		0.3	2	1	subhedral	bladed-tabular				strongly altered (products: dusty brownish masses)
Clinopyroxene	7	30		0.1	5	2	anhedral-subhedral	interstitial				mantled by hb; strongly altered to actinolite
Amphibole	10	10		0.1	2	1	anhedral	interstitial				forms coronas around cpx, but probably also isolated crystals; show often cpx relics inside; strongly altered to actinolite plus oxide
Opaque	2	2		0.1	2	1	anhedral	interstitial				primary oxides; partly poikilitic

Igneous domain name: domain 2 Domain lithology: medium-grained oxide gabbro
Domain grain size: medium-grained Grain size distribution:
Domain texture: subhedral granular Relative abundance (%):
General comment: strongly altered. due to strong alteration of the mafic phases to actinolite, the primary relations between cpx and hbl are unclear, also the initial modal proportions.

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Plagioclase					5		subhedral	bladed-tabular				strongly altered (products: dusty brownish masses)
Clinopyroxene					5							was probably the major primary mafic phase; strongly altered to actinolite
Amphibole												presence unclear due to strong alteration; intensely altered to actinolite plus oxide
Opaque	5						anhedral	interstitial				partly poikilitic; forming a large aggregate

SECONDARY MINERALOGY

Alteration domain or feature: Total alteration (%): 65.02
Recrystallization: Recrystallization degree:
General alteration comment: cpx exhibits varying degrees of alteration in this slide

	Present (%)	Comment
Green hornblende	20	replacing cpx / amphibole
Epdote	0.01	replacing plag
Secondary plag.	40	replacing plag
Magnetite	5	replacing cpx and interstitial
Pyrite	0.01	disseminated

VEINS AND HALOS

Vein fill compositional comment:	Vein generation:	Average vein thicknes (mm):	Halo width (mm):	Total halo (%):

MICROSTRUCTURES
Microstructure comments

SAMPLE: 335(312)-1256D-216R-1-W 119/122-TS 76
Rock name: medium-grained gabbro
Rock comment: Proportions of primary minerals were estimated by comparison with standard chart. No quartz or olivine were found in this thin section, although they were reported in the visual core description. The original 312 EXCEL file piece was written #26 but it is piece 24B. This section is devoid of strong ophitic texture or development of portion with fine-grained plagioclase chadacrysts in clinpyroxene oikocrysts. Actinolite is texturally later than hornblende. The hornblende locally exhibits pleochroism from green to clear and even a touch of brown. Local brown, clear hornblende in triple junctions of plagioclase - magmatic or uralite? (NH).
Unit/subunit: 86A
Piece no.: 24B

PRIMARY MINERALOGY Number of domains: 1 Nature of igneous domains:

Igneous domain name: domain 1 Domain lithology: medium-grained oxide
Domain grain size: medium-grained Grain size distribution: inequigranular
Domain texture: seriate Relative abundance (%):
General comment:

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Plagioclase	50	55		0.2	2	1.2	subhedral-euhedral	lath-shaped	concentric zoning			larger laths have marked concentric zoning, and sometimes enter into a subophitic texture with cpx. the smaller grains grow in interstitial regions
Clinopyroxene	0	44		0.4	4	1.5	subhedral					interstitial, sometimes forming sub-ophitic texture that partially encloses large plag laths. Altered
Opaque	1	1		0.2	1	0.8		interstitial				

SECONDARY MINERALOGY

Alteration domain or feature: Total alteration (%): 10
Recrystallization: Recrystallization degree:
General alteration comment:

	Present (%)	Comment
Actinolite	39	replacing cpx or plag along micro cracks and cleaveage surfaces
Green hornblende	4	interlocking <1 mm subhedral prismatic crystals replace larger cpx grains
Secondary plag.	4	replacing plag
Magnetite	2	small blebs replacing cpx within fibrous actinolite

VEINS AND HALOS

Vein fill compositional comment:	Vein generation:	Average vein thicknes (mm):	Halo width (mm):	Total halo (%):

MICROSTRUCTURES
Microstructure comments

SAMPLE: 335(312)-1256D-216R-1-W 142/147-TS 77
Rock name: medium-grained oxide gabbro
Rock comment: Due to alteration , initial proportions of cpx and hbl are unclear. Parts of this thin section have been strongly influenced by alteration, particularly in the region around the obvious veins. However, there is a fair amount of moderately fresh clinopyroxene preserved. There are a range of observations that can be made in this section which can be synthesised as follows. Large clinopyroxene oikocrysts generally contain isolated, unzoned, large, elongate plagioclase, and do not include any oxide phases. Areas with interstitial amphibole contain more equant, zoned plagioclase with a seriate texture that commonly touch and form aggregates of crystals. The regions with interstitial amphibole also contain the Fe-Ti oxides. The boundaries of these regions are often marked by unusual vermicular textures in clinpyroxene where the clinpoyroxene is touching the amphiboles. The change in plagioclase texture between the ophitic clinopyroxene and the interstitial amphibole indicates that the amphibole may have been primary, in which case the vermicular texture is part of a corona texture. The alternative is that alteration has simply picked out regions with more equant, touching plagioclase because fluid was able to flow more easily in these parts. However, in this case, the flow has very carefully picked out regions that correspond to variation in the primary igneous texture.

Unit/subunit: 86A
Piece no.: 26

PRIMARY MINERALOGY Number of domains: 1 Nature of igneous domains:

Igneous domain name: domain 1 Domain lithology: medium-grained oxide gabbro
Domain grain size: medium-grained Grain size distribution: inequigranular
Domain texture: seriate with poikilitic patches Relative abundance (%):
General comment:

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Plagioclase	55	60		0.2	4	1.2	subhedral-euhedral	lath-shaped				large, elongate, unzoned laths are present as chadacrysts in cpx. away from oikocrysts, laths are more equant and zoned, and show seriate texture. interestingly, this boundary in textures also relates to a change from mildly altered cpx oikocrysts to interstitial amphibole.
Clinopyroxene	12	15		3	6	4		interstitial				largely fresh cpx sitting in oikocrysts, sometimes showing reaction textures with amphibole at edge of oikocrysts, resulting in vermicular intergrowths
Amphibole	22	22		5	1	2		interstitial				some amphibole is likely to have been generated by hydrothermal alteration of cpx. however, some of the amphibole may well have been primary
Opaque	3	3		1	5	2		interstitial				only found outside of areas containing cpx oikocrysts

SECONDARY MINERALOGY

Alteration domain or feature: Total alteration (%): 32
Recrystallization: Recrystallization degree:
General alteration comment:

	Present (%)	Comment
Actinolite	3	replacing cpx, usually seen as discrete needles
Green hornblende	22	replacing cpx
Chlorite	2	interstitial and replacing plag
Secondary plag.	5	replacing plag
Magnetite	3	blebs replacing cpx

VEINS AND HALOS

Vein fill compositional comment:	Vein generation:	Average vein thicknes (mm):	Halo width (mm):	Total halo (%):

MICROSTRUCTURES
Microstructure comments

SAMPLE: 335(312)-1256D-217R-1-W 4/9-TS 78
Rock name: medium-grained disseminated oxide gabbro
Rock comment: Large grain size variation. Some fresh albeit dusty cpx.
Unit/subunit: 87
Piece no.: 2

PRIMARY MINERALOGY Number of domains: 1 Nature of igneous domains:

Igneous domain name: domain 1 Domain lithology: medium-grained disseminated oxide gabbro
Domain grain size: medium-grained Grain size distribution:
Domain texture: subhedral granular, ophitic Relative abundance (%):
General comment:

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Olivine	0	0.001		0.2	0.5	0.3	subhedral					might also be opx (?); strongly altered
Plagioclase	58	60		0.2	4	2	subhedral-euhedral		strongly zoned			
Clinopyroxene	20	38		0.1	4	2	subhedral	interstitial				replaced by actinolite
Opaque	1	1		0.5	1	0.8	anhedral-subhedral					

SECONDARY MINERALOGY

Alteration domain or feature: Total alteration (%): 34.06
Recrystallization: Recrystallization degree:
General alteration comment:

	Present (%)	Comment
Actinolite	3	replacing cpx
Green hornblende	20	replacing cpx
Secondary plag.	10	replacing plag
Magnetite	4	replacing cpx
Pyrite	0.01	disseminated, associated with actinolite
Chalcopyrite	0.05	disseminated, seems to be associated with green hbl

VEINS AND HALOS

Vein fill compositional comment:	Vein generation:	Average vein thicknes (mm):	Halo width (mm):	Total halo (%):

MICROSTRUCTURES
Microstructure comments

SAMPLE: 335(312)-1256D-217R-1-W 64/69-TS 79
Rock name: contact: coarse to medium-grained qtz bearing oxide gabbro and medium-grained olivine-opx bearing disseminated oxide gabbro
Rock comment: Modal proportions of primary estimated by comparison with standard visual estimation chart. Frequent plagioclase included in olivine. Chlorite-rich reaction rim between plagioclase and unidentified dark green. mineral
Unit/subunit: 88
Piece no.: 16

PRIMARY MINERALOGY Number of domains: 2 Nature of igneous domains: contact between two gabbro units

Igneous domain name: domain 1 Domain lithology: coarse to medium-grained qtz bearing oxide gabbro
Domain grain size: coarse-medium-grained Grain size distribution: inequigranular
Domain texture: subhedral, seriate Relative abundance (%):
General comment:

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Plagioclase	58			0.3	11	5	subhedral	tabular				some show zoning; common cpx inclusions
Clinopyroxene	30			0.5	8.5	4	subhedral	prismatic				strongly altered to fibrous amphibole and disseminated tiny oxides; some with symplectitic texture; some with small brown amphibole patches
Opaque	7			0.1	4	2	anhedral-subhedral	interstitial				
Quartz	5			0.2	2.5	1.3	anhedral	interstitial				often show micrographic texture with altered plag; some include plag laths

Igneous domain name: domain 2 Domain lithology: medium-grained olivine-opx bearing disseminated oxide gabbro
Domain grain size: medium-grained Grain size distribution: inequigranular
Domain texture: subhedral, seriate Relative abundance (%):
General comment:

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Olivine	1			1.2	5	3	anhedral	interstitial				strongly altered, corona texture between olivine and plag
Plagioclase	65			0.1	3	1.5	anhedral-subhedral	tabular, acicular, interstitial	multiple zoning			some with small plag inclusion; some show multiple zoning
Clinopyroxene	30			0.3	6	3	anhedral	interstitial, poikilitic				some show symplectite texture (probably with illmenite) between fresh and altered part; some with plag as chadacrysts
Orthopyroxene	3			1.2	5	3	anhedral	interstitial, poikilitic				
Opaque	1						anhedral	interstitial				between plag framework

SECONDARY MINERALOGY

Alteration domain or feature: Total alteration (%): 19.5
Recrystallization: Recrystallization degree:
General alteration comment:

	Present (%)	Comment
Actinolite	20	replacing cpx
Epdote	0.5	replacing plag
Chlorite	0.5	replacing plag, actinolite. very light green when as reaction rim between plag and olivine
Dusty CPX	5	replacing cpx
Secondary plag.	6	albite
Prehnite	1	replacing plag
Other Ca-Al sec.	1	pumpellyite replacing plag
Titanite	3	replacing titanomagnetite
Magnetite	2	replacing cpx
Other	0.5	dark green+brown phyllosilicate replacing olivine. associated with magnetite. dark green, not or slightly pleocroic, very low birefrengence. no fresh olivine

VEINS AND HALOS

Vein fill compositional comment:	Vein generation:	Average vein thicknes (mm):	Halo width (mm):	Total halo (%):

MICROSTRUCTURES
Microstructure comments

SAMPLE: 335(312)-1256D-217R-1-W 89/92-TS 80
Rock name: medium-grained oxide gabbro
Rock comment: Plagioclase rich area is highly altered to quartz + calcite + epidote + prehnite.
Unit/subunit: 88
Piece no.: 21

PRIMARY MINERALOGY Number of domains: 1 Nature of igneous domains:

Igneous domain name: domain 1 Domain lithology: medium-grained oxide
Domain grain size: medium-grained Grain size distribution:
Domain texture: subhedral granular, seriate Relative abundance (%):
General comment:

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Plagioclase	45	50		0.2	4.5	2	subhedral-euhedral		strongly zoned			
Clinopyroxene	3	40		0.1	4	2	anhedral-subhedral					replaced by actinolite
Opaque	8	8		0.2	3	2						
Quartz	2	2		0.2	2.1	1	anhedral	interstitial				

SECONDARY MINERALOGY

Alteration domain or feature: Total alteration (%): 73.9
Recrystallization: Recrystallization degree:
General alteration comment:

	Present (%)	Comment
Green hornblende	50	replacing cpx
Brown hornblende	2	replacing cpx
Epdote	0.5	replacing plag or interstitial
Chlorite	0.1	replacing plag. spherulitic patches
Quartz	2	replacing cpx & plag
Secondary plag.	18	replacing plag
Prehnite	0.1	replacing plag & qtz
Titanite	0.1	interstitial
Magnetite	0.5	replacing cpx, <<0.1 mm round to euhedral inclusions within fibrous amphibole
Pyrite	0.1	disseminated

VEINS AND HALOS

Vein fill compositional comment:	Vein generation:	Average vein thicknes (mm):	Halo width (mm):	Total halo (%):

MICROSTRUCTURES
Microstructure comments

SAMPLE: 335(312)-1256D-219R-1-W 61/62-TS 81
Rock name: medium-grained disseminated oxide gabbro opx-bearing
Rock comment:
Unit/subunit: 88
Piece no.: 15

PRIMARY MINERALOGY Number of domains: 1 Nature of igneous domains:

Igneous domain name: domain 1 Domain lithology: medium-grained opx bearing disseminated oxide gabbro
Domain grain size: medium-grained Grain size distribution:
Domain texture: subhedral granular, seriate Relative abundance (%):
General comment:

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Plagioclase	15	50		0.2	4	3	anhedral-subhedral					altered
Clinopyroxene	15	45		0.2	4	2	anhedral-subhedral	interstitial				replaced partly by actinolite
Amphibole	4	4						interstitial				
Opaque	1	1		0.1	2	0.5	anhedral					

SECONDARY MINERALOGY

Alteration domain or feature: Total alteration (%): 46.1
Recrystallization: Recrystallization degree:
General alteration comment:

	Present (%)	Comment
Green hornblende	15	replacing cpx
Chlorite	15	replacing plag and green hbl. often found in close association with actinolitic hbl
Secondary plag.	10	replacing plag
Prehnite	0.1	spherulitic patch within qtz
Titanite	0.1	replacing plag, euhedral grains, associated with qtz and epidote
Pyrite	0.1	disseminated
Ca carbonates	0.5	calcite replacing plag & cpx or interstitial in more intensely altered patches, with qtz
Other	0.5	dark green phyllosilicate, not or slightly pleocroic, very low birefrengence. no fresh olivine

VEINS AND HALOS

Vein fill compositional comment:	Vein generation:	Average vein thicknes (mm):	Halo width (mm):	Total halo (%):

MICROSTRUCTURES
Microstructure comments

SAMPLE: 335(312)-1256D-220R-1-W 8/10-TS 82
Rock name: medium-grained disseminated oxide gabbro with coarse and subophitic domains
Rock comment: This sample was selected for thin section due to the macroscopic diffuse portion of coarse grained plagioclase observed in hand-specimen. The mineralogy and textures of this coarse-grained and the fine-grained portions are therefore listed separately above. The proportions of primary minerals were estimated by visual inspection and comparison with standard chart. The patchy texture developed in this section is similar to many described from the gabbros where any patchiness has been observed.
Unit/subunit: 88
Piece no.: 3

PRIMARY MINERALOGY Number of domains: 2 Nature of igneous domains: mix of two lithologies within one gabbro

Igneous domain name: domain 1 Domain lithology: disseminated oxide gabbro
Domain grain size: medium-grained Grain size distribution: inequigranular
Domain texture: subhedral seriate Relative abundance (%): 65
General comment: this domain is related to the coarser part in the interstices

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Plagioclase	45	60		1	11	5	subhedral	tabular, equant				zoned
Clinopyroxene	5	38		1	10			interstitial				mafic phases extensively altered to actinolite
Opaque	2	2		1	5	3	subhedral	interstitial				

Igneous domain name: domain 2 Domain lithology: disseminated oxide gabbro
Domain grain size: medium-grained Grain size distribution: inequigranular
Domain texture: subhedral poikilitic Relative abundance (%): 35
General comment: this domain is related to the poikilitic portions

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Plagioclase	45	60		0.1	2	0.6	euhedral	lath-shaped, elongate				zoned
Clinopyroxene	24	39		0.5	2	1		oikocrysts				partly altered, often with vermicular intergrowth
Opaque	1	1		0.4	0.1	0.2	subhedral					

SECONDARY MINERALOGY

Alteration domain or feature: Total alteration (%): 38
Recrystallization: Recrystallization degree:
General alteration comment:

	Present (%)	Comment
Actinolite	3	replacing cpx
Green hornblende	17	replacing cpx
Chlorite	2	replacing plag along fracures in plag laths
Secondary plag.	15	replacing plag
Magnetite	6	replacing cpx, pale brown, very finely crystallised

VEINS AND HALOS

Vein fill compositional comment:	Vein generation:	Average vein thicknes (mm):	Halo width (mm):	Total halo (%):

MICROSTRUCTURES
Microstructure comments

SAMPLE: 335(312)-1256D-220R-1-W 24/29-TS 83
Rock name: medium-grained oxide gabbro with domains of coarser and subophitic portions
Rock comment: This sample was selected for thin section due to the macroscopic diffuse portion of coarse grained plagioclase observed in hand-specimen. The mineralogy and textures of this coarse-grained and the fine-grained portions are therefore listed separately above. The proportions of primary minerals were estimated by visual inspection and comparison with standard chart. The patchy texture developed in this section is similar to many described from the gabbros where any patchiness has been observed. Many sections have this split into coarser portions with equant zoned plagioclase and finer portions with ophitic clinopyroxene. The patchiness is macroscopically visible in this case both because the crystals in the coarser part are unusually coarse but possibly also because this sample is quite highly altered.

Unit/subunit: 88
Piece no.: 4

PRIMARY MINERALOGY Number of domains: 2 Nature of igneous domains: mix of two lithologies within one gabbro

Igneous domain name: domain 1 Domain lithology: medium-grained oxide gabbro
Domain grain size: medium-grained Grain size distribution: inequigranular
Domain texture: subhedral seriate Relative abundance (%): 65
General comment: this domain is related to the coarser part in the interstices

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Plagioclase	45	55		1	7	5	subhedral	lath-shaped, equant	normal zoning			often show normal zoning
Clinopyroxene	0	38		0.8	4	2		interstitial				mafic phases extensively altered to actinolite
Opaque	7	7		1	5	3	subhedral	interstitial				

Igneous domain name: domain 2 Domain lithology: medium-grained disseminated oxide gabbro
Domain grain size: medium-grained Grain size distribution: inequigranular
Domain texture: subhedral poikilitic Relative abundance (%): 35
General comment: this domain is related to the poikilitic portions

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Plagioclase	45	55		0.4	0.8	0.6		lath-shaped, elongate	slight zonation			chadacrysts within cpx; not strongly zoned, occasional slight zonation
Clinopyroxene	15	44		0.5	2	1						forming oikocrysts
Opaque	1	1		0.4	0.1	0.2	subhedral					

SECONDARY MINERALOGY

Alteration domain or feature: coarse-grain portion Total alteration (%): 27.6
Recrystallization: Recrystallization degree:
General alteration comment:

	Present (%)	Comment
Actinolite	8	replacing cpx
Chlorite	10	replacing cpx, plag, interstitial. very fine-grained, occurs along cracks/as patches in plag and as rims around replacing cpx, overgrowing amphibole? most abundant adjacent to the chlorite vein network
Dusty CPX	12	very fine colourless/brown replacement of cpx
Secondary plag.	5	replacing plag
Magnetite	1	replacing cpx as blebs in actinolite and green hbl
Pyrite	0.1	disseminated

Alteration domain or feature: Total alteration (%): 34.6
Recrystallization: Recrystallization degree:
General alteration comment:

	Present (%)	Comment
Actinolite	13	replacing cpx
Green hornblende	2	replacing cpx
Epdote	0.1	interstitial
Chlorite	23	replacing cpx, plag, interstitial. most abundant adjacent to the chlorite vein network
Dusty CPX	2	replacing cpx
Quartz	0.5	replacing plag
Secondary plag.	6	replacing plag
Magnetite	4	replacing cpx, very fine, intergrown with actinolite

VEINS AND HALOS

Vein fill compositional comment:	Vein generation:	Average vein thicknes (mm):	Halo width (mm):	Total halo (%):

MICROSTRUCTURES
Microstructure comments

SAMPLE: 335(312)-1256D-220R-1-W 40/43-TS 84
Rock name: medium-grained disseminated oxide gabbro
Rock comment: Although this sample shows significant grain-size variation, clear boundary is not observed. Ophitic texture is unclear in this section. Coarse to medium-grained plagioclase show strong zoning, and small plagioclase is less zoned. Small subhedral olivines with altered magnetite rim are surrounded by chlorite + actinolite, suggesting primary existence of orthopyroxene around the olivines. Possible fluid inclusions in plagioclase (could be subgrains?).
Unit/subunit: 88
Piece no.: 8A

PRIMARY MINERALOGY Number of domains: 1 Nature of igneous domains:

Igneous domain name: domain 1 Domain lithology: medium-grained disseminated oxide gabbro
Domain grain size: medium-grained Grain size distribution: inequigranular
Domain texture: subhedral, seriate Relative abundance (%):
General comment:

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Olivine	0.2	1		0.5	1	0.7	subhedral					mostly altered, originally surrounded by opx
Plagioclase	45	54		0.1	3	1.2	subhedral-euhedral	lath-shaped, elongate	strongly zoned			strongly zoned
Clinopyroxene	15	42		0.1	4	1	subhedral	interstitial				partly altered
Orthopyroxene	0.2	2		0.4	1.5	1	subhedral	interstitial				mostly altered
Opaque	1	1		0.4	0.1	0.2	subhedral					

SECONDARY MINERALOGY

Alteration domain or feature: ophitic portions Total alteration (%): 38.511
Recrystallization: Recrystallization degree:
General alteration comment:

	Present (%)	Comment
Actinolite	5	replacing cpx, olivine, mionor plag. usually very fine-grained inassociation with chlorite
Green hornblende	15	replacing cpx
Brown hornblende	5	replacing cpx
Chlorite	10	replacing cpx, plag, olivine. often found in aggregates with actinolite
Secondary plag.	5	replacing plag
Magnetite	3	replacing cpx, very fine, intergrown with actinolite
Pyrite	0.5	disseminated
Chalcopyrite	0.01	disseminated
Other	0.001	dark green unidentified replacing olivine in between fresh olivine and magnetite reaction rim

VEINS AND HALOS

Vein fill compositional comment:	Vein generation:	Average vein thicknes (mm):	Halo width (mm):	Total halo (%):

MICROSTRUCTURES
Microstructure comments

SAMPLE: 335(312)-1256D-220R-1-W 52/58-TS 85
Rock name: medium-grained oxide gabbro ol-opx-bearing
Rock comment: Modal proportions of primary minerals estimated by comparison with standard visual estimation chart. Due to strong alteration of the mafic phases to actinolite, the primary relations between ol, opx, cpx and hornblende are unclear, and the initial modal proportions.
Unit/subunit: 88
Piece no.: 9A

PRIMARY MINERALOGY Number of domains: 1 Nature of igneous domains:

Igneous domain name: domain 1 Domain lithology: medium-grained olivine-opx bearing oxide gabbro
Domain grain size: medium-grained Grain size distribution: inequigranular
Domain texture: subhedral, seriate Relative abundance (%):
General comment:

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Olivine	3					1.5						strongly altered, only disrupted cores or relics preserved, all show dark probably oxide-rich alteration halos.
Plagioclase	45					2	subhedral	lath-shaped, tabular				
Clinopyroxene	35					3	anhedral					strongly altered to actinolite
Orthopyroxene	2					3		prismatic				strongly altered
Amphibole	10					4	anhedral	corona				strongly altered to actinolite plus oxide
Opaque	5					2						many large grains, some of them obviously secondary

SECONDARY MINERALOGY

Alteration domain or feature: Total alteration (%): 32.5
Recrystallization: Recrystallization degree:
General alteration comment:

	Present (%)	Comment
Actinolite	8	replacing cpx
Green hornblende	10	replacing cpx
Brown hornblende	3	replacing cpx
Chlorite	10	replacing cpx and plag. often seen in a fine grained aggregate with actinolite
Secondary plag.	5	replacing plag
Magnetite	3	replacing cpx & olivine, seen as blebs in green hbl and in olivine alteration halos
Pyrite	0.5	disseminated
Other	1	iddingsite replacing olivine, seen as a halo around fresh olivine

VEINS AND HALOS

Vein fill compositional comment:	Vein generation:	Average vein thicknes (mm):	Halo width (mm):	Total halo (%):

MICROSTRUCTURES
Microstructure comments

SAMPLE: 335(312)-1256D-221R-1-W 58/60-TS 86
Rock name: medium-grained gabbro
Rock comment: Modal proportions of primary estimated by comparison with standard visual estimation chart.
Unit/subunit: 88
Piece no.: 11

PRIMARY MINERALOGY Number of domains: 1 Nature of igneous domains:

Igneous domain name: domain 1 Domain lithology: medium-grained gabbro
Domain grain size: medium-grained Grain size distribution: inequigranular
Domain texture: subhedral, seriate Relative abundance (%):
General comment:

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Plagioclase	40	50		0.2	6	3	subhedral	tabular, subequant	strongly zoned			some strongly zoned
Clinopyroxene	5	49		0.4	2.5	1.5	anhedral	interstitial				often with brownish amphibole patch
Opaque	0.001	0.001		0.1	2	1	anhedral	interstitial				

SECONDARY MINERALOGY

Alteration domain or feature: Total alteration (%): 29.05
Recrystallization: Recrystallization degree:
General alteration comment:

	Present (%)	Comment
Actinolite	10	replacing cpx usually forming fine-grained aggregates, sometimes with chlorite
Green hornblende	10	replacing cpx
Brown hornblende	1	replacing cpx, seen as tiny patches within other amphibole alteration phases
Other amphibole	20	replacing cpx
Chlorite	10	replacing cpx and plag. locally seen along fractures and twin boundaries in plag
Secondary plag.	5	replacing plag
Magnetite	3	replacing cpx, seen as blebs in actinolite and chlorite, related to the alteration of cpx
Pyrite	0.05	disseminated

VEINS AND HALOS

Vein fill compositional comment:	Vein generation:	Average vein thicknes (mm):	Halo width (mm):	Total halo (%):

MICROSTRUCTURES
Microstructure comments

SAMPLE: 335(312)-1256D-222R-1-W 23/25-TS 87
Rock name: medium-grained gabbro olivine-opx-bearing
Rock comment: Inclusions in olivine?.
Unit/subunit: 89
Piece no.: 2B

PRIMARY MINERALOGY Number of domains: 1 Nature of igneous domains:

Igneous domain name: domain 1 Domain lithology: medium-grained olivine-opx bearing gabbro
Domain grain size: medium-grained Grain size distribution: inequigranular
Domain texture: seriate Relative abundance (%):
General comment:

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Olivine	1	3		0.5	2	1	anhedral-subhedral	interstitial				generally altered
Plagioclase	43	45		0.1	2	1.5	subhedral-euhedral		strongly zoned			strongly zoned
Clinopyroxene	30	49		2	4	2	anhedral					replaced partly by actinolite
Orthopyroxene	1	3		0.5	3	1	anhedral	interstitial				strongly altered
Opaque	0.001	0.001		0.2	0.6	0.5	anhedral	interstitial				

SECONDARY MINERALOGY

Alteration domain or feature: Total alteration (%): 17.6
Recrystallization: Recrystallization degree:
General alteration comment:

	Present (%)	Comment
Actinolite	15	replacing cpx, seen as aggregates of very fine needles
Brown hornblende	1	replacing olivine, just a staining?
Chlorite	10	replacing cpx & plag
Secondary plag.	2	replacing plag
Magnetite	4	olivine, replacing cpx, seen as blebs within alteration amphiboles when associated with cpx and seen as a reaction rim when involivineed with the alteration of magnetite.
Pyrite	0.1	disseminated
Other	0.5	brown unidentified replacing olivine, just a staining?

VEINS AND HALOS

Vein fill compositional comment:	Vein generation:	Average vein thicknes (mm):	Halo width (mm):	Total halo (%):

MICROSTRUCTURES
Microstructure comments

SAMPLE: 335(312)-1256D-222R-1-W 55/57-TS 88
Rock name: medium-grained gabbro
Rock comment: Large grainsize variation
Unit/subunit: 88
Piece no.: 6

PRIMARY MINERALOGY Number of domains: 1 Nature of igneous domains:

Igneous domain name: domain 1 Domain lithology: medium-grained gabbro
Domain grain size: medium-grained Grain size distribution: equigranular
Domain texture: poikilitic Relative abundance (%):
General comment:

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Olivine	0	1		0.2	2	1	subhedral	interstitial				completely altered
Plagioclase	30	48		0.2	3	2	subhedral-euhedral		strongly zoned			strongly zoned
Clinopyroxene	1	50		1	6	2	subhedral					replaced by actinolite
Opaque	0.001	0.001		0.01	1	0.6	anhedral-subhedral					

SECONDARY MINERALOGY

Alteration domain or feature: Total alteration (%): 41
Recrystallization: Recrystallization degree:
General alteration comment:

	Present (%)	Comment
Actinolite	20	replacing cpx
Green hornblende	5	replacing cpx
Brown hornblende	10	replacing cpx. seen as inclusions in other secondary amphibole phases
Chlorite	15	replacing cpx & plag along fractures and twin planes in plag
Secondary plag.	5	replacing plag
Magnetite	6	replacing cpx, dominantly seen as blebs in secondary amphibole phases

VEINS AND HALOS

Vein fill compositional comment:	Vein generation:	Average vein thicknes (mm):	Halo width (mm):	Total halo (%):

MICROSTRUCTURES
Microstructure comments

SAMPLE: 335(312)-1256D-222R-2-W 5/10-TS 89
Rock name: contact: medium-grained olivine gabbronorite/ coarse-grained oxide gabbro
Rock comment: Large olivine and orthopyroxene occur in boundary between olivine gabbronorite and oxide gabbro. Those large crystals are counted as constituent minerals of olivine gabbronorite
Unit/subunit: 88
Piece no.: 2A

PRIMARY MINERALOGY Number of domains: 2 Nature of igneous domains: contact between two gabbros

Igneous domain name: domain 1 Domain lithology: medium-grained olivine gabbronorite
Domain grain size: medium-grained Grain size distribution: inequigranular
Domain texture: seriate Relative abundance (%):
General comment:

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Olivine	3	8		0.5	3.3	1	subhedral					surrounded by magnetite rim
Plagioclase	60	60		0.2	1.8	1	subhedral		strongly zoned scarce			sometimes strongly zoned
Clinopyroxene	12	20		0.3	4	1	anhedral, interstitial					sometimes twinning
Orthopyroxene	5	10		0.3	5	0.8	anhedral, interstitial					often around a olivine
Opaque	2	2		0.2	2.5	0.8	anhedral, interstitial					

Igneous domain name: domain 2 Domain lithology: coarse-grained oxide gabbro
Domain grain size: coarse-grained Grain size distribution: inequigranular
Domain texture: seriate Relative abundance (%):
General comment:

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Plagioclase	40	50		0.8	6.5	4	subhedral-euhedral		commonly zoned scarce			commonly zoned
Clinopyroxene	30	40		0.5	6.5	4	interstitial					
Opaque	10	10		0.2	6	3		interstitial				

SECONDARY MINERALOGY

Alteration domain or feature: Total alteration (%): 29
Recrystallization: Recrystallization degree:
General alteration comment:

	Present (%)	Comment
Green hornblende	10	replacing cpx, opx, olivine
Epdote	0.5	replacing plag
Talc	0.5	replacing olivine
Chlorite	1	replacing plag, olivine
Dusty CPX	12	replacing cpx
Secondary plag.	2	replacing plag in microfractures
Magnetite	2	replacing olivine
Other	1	brown-green phylosilicate replacing olivine, in magnetite rim or in between fresh olivine and magnetite rim

VEINS AND HALOS

Vein fill compositional comment:	Vein generation:	Average vein thicknes (mm):	Halo width (mm):	Total halo (%):

MICROSTRUCTURES

Microstructure comments

SAMPLE: 335(312)-1256D-223R-1-W 42/43-TS 90
Rock name: medium-grained gabbro olivine-opx bearing
Rock comment: Grain fracture is slim-to-none (olivine-bearing sections have almost no plag, grain fracture, coincidence?).Secondary plagioclase is abundant with irregular extinction and forms interesting reaction textures with CPX. Large grain size variation.
Unit/subunit: 89
Piece no.: 8A

PRIMARY MINERALOGY Number of domains: 1 Nature of igneous domains:

Igneous domain name: domain 1 Domain lithology: medium-grained olivine and opx-bearing gabbro
Domain grain size: medium-grained Grain size distribution: inequigranular
Domain texture: poikilitic Relative abundance (%):
General comment:

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Olivine	2	5		1	4	1.5	subhedral-euhedral					high birefringence
Plagioclase	48	50		0.4	2	1	subhedral-euhedral		strongly zoned scarce			some crystals are strongly zoned
Clinopyroxene	25	39		0.4	2.5	1.5	anhedral, interstitial					replaced by actinolite
Orthopyroxene	3	5		1.5	3	1.2	anhedral, interstitial					opx show weak paleochroism from X' = pale reddish-brown to Z' = pale greenish-brown
Opaque	0.001	0.001		0.2	1.2	0.8	subhedral-euhedral					

SECONDARY MINERALOGY

Alteration domain or feature: Total alteration (%): 45.71
Recrystallization: Recrystallization degree:
General alteration comment:

	Present (%)	Comment
Green hornblende	10	replacing cpx, minor plag
Brown hornblende	10	replacing cpx & interstitial. brown, grading to green amphibole
Talc	0.2	replacing olivine. associated with magnetite rim
Chlorite	3	replacing olivine, opx, minor plag, interstitial
Dusty CPX	20	replacing cpx
Magnetite	2	replacing olivine as tiny grains forming a rim between fresh olivine and actinolite + actinolite replacing olivine
Pyrite	0.5	replacing olivine, disseminated
Other	0.01	green+brown phyllosilicate replacing olivine between fresh olivine and magnetite-rich reaction rim

VEINS AND HALOS

Vein fill compositional comment:	Vein generation:	Average vein thicknes (mm):	Halo width (mm):	Total halo (%):

MICROSTRUCTURES
Microstructure comments

SAMPLE: 335(312)-1256D-223R-1-W 62/67-TS 91
Rock name: medium-coarse-grained oxide gabbro olivine-opx-bearing
Rock comment: Large grainsize variation of plagioclase.
Unit/subunit: 88
Piece no.: 11

PRIMARY MINERALOGY Number of domains: 1 Nature of igneous domains:

Igneous domain name: domain 1 Domain lithology: medium-coarse-grained olivine and opx-bearing oxide gabbro
Domain grain size: medium-grained Grain size distribution: inequigranular
Domain texture: poikilitic Relative abundance (%):
General comment:

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Olivine	0.5	2		0.2	3	1.5	subhedral					
Plagioclase	50	55		0.1	6	2	subhedral-euhedral		strongly zoned scarce			some crystals are strongly zoned
Clinopyroxene	25	35		0.2	5	3	anhedral, interstitial					replaced by actinolite
Orthopyroxene	1.5	3		0.5	2.5	1.5	anhedral, interstitial					
Opaque	5	5		0.2	4	2	anhedral-subhedral					large mm-scale subhedral to euhedral oxides associated with sulphides

SECONDARY MINERALOGY

Alteration domain or feature: Total alteration (%): 13.51
Recrystallization: Recrystallization degree:
General alteration comment:

	Present (%)	Comment
Actinolite	8	replacing cpx, olivine. 15% in patch, replacing cpx
Green hornblende	1	replacing cpx
Brown hornblende	2	replacing cpx
Epdote	0.1	1% in patch replacing plag, associated with prehnite
Chlorite	5	replacing cpx, olivine, plag. 30% in patch, replacing plag and replacing cpx
Secondary plag.	2	replacing plag. 2% in patch, replacing primary plag
Prehnite	4	4% in patch replacing plag
Magnetite	2	replacing cpx, olivine. 2% in patch, associated with actinolite (blebs)
Pyrite	0.5	disseminated
Chalcopyrite	0.01	disseminated
Other	1	dark green phyllosillicate replacing olivine

VEINS AND HALOS

Vein fill compositional comment:	Vein generation:	Average vein thicknes (mm):	Halo width (mm):	Total halo (%):

MICROSTRUCTURES
Microstructure comments

SAMPLE: 335(312)-1256D-223R-2-W 39/41-TS_92
Rock name: medium-grained olivine gabbronorite
Rock comment: There are no veins! Olivine replacement is characterised by the development of a composite halo around the olivine crystal. The inner halo is magnetite and the outer halo is a chlorite-actinolite combo. Locally talc can be observed between the magnetite and the olivine.
Unit/subunit: 89
Piece no.: 1E

PRIMARY MINERALOGY Number of domains: 1 Nature of igneous domains:

Igneous domain name: domain 1 Domain lithology: medium-grained olivine gabbronorite
Domain grain size: medium-grained Grain size distribution: inequigranular
Domain texture: seriate Relative abundance (%):
General comment:

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Olivine	5	15		0.8	1.5	1	subhedral					partly broken down with oxide rims. contains melt inclusions, fluid inclusions and possible exsolution lamellae of titanium oxides.
Plagioclase	45	50		0.2	1.6	1.1	subhedral					heterogeneous textures, with plag sometimes occurring as chadacrysts in mafic oikocrysts, and at other times as aggregates of small, zoned, equant crystals
Clinopyroxene	5	25		0.4	5	2	oikocrysts					occurs rarely, may have formed much of now-altered mafic material
Orthopyroxene	5	8		2	3	1.5	interstitial					also now partly altered
Amphibole	0.001	0.001		0.2	0.2	0.2	subhedral			one dark brown pleochroic amphibole with good cleavages in irregular octagonal section. these have been overprinted by actinolite to a large extent		
Opaque	1	1		0.1	0.5	0.3	subhedral-interstisial					one dark brown pleochroic amphibole with good cleavages in irregular octagonal section. these have been overprinted by actinolite to a large extent

SECONDARY MINERALOGY

Alteration domain or feature: Total alteration (%): 19.1
Recrystallization: Recrystallization degree:
General alteration comment: It is very difficult to confidently assess the alteration of plag

	Present (%)	Comment
Actinolite	20	replacing cpx, olivine
Brown hornblende	5	replacing cpx
Talc	0.5	seen between olivine and magnetite reaction rims
Chlorite	8	replacing cpx, plag, olivine. commonly associated with actinolite in fine grained alteration aggregates
Secondary plag.	2	replacing plag
Magnetite	3	replacing cpx, olivine, seen as rims around olivine and along fractures within olivine. blebs in secondary amphibole phases
Pyrite	0.5	disseminated, often associated with chalcopyrite
Chalcopyrite	0.1	disseminated, associated with pyrite

VEINS AND HALOS

Vein fill compositional comment:	Vein generation:	Average vein thicknes (mm):	Halo width (mm):	Total halo (%):

MICROSTRUCTURES
Microstructure comments

SAMPLE: 335(312)-1256D-223R-2-W 57/60-TS_93
Rock name: medium-grained gabbro olivine-opx-bearing
Rock comment: similar to other sections from the gabbro unit, this sections presents titanomagnetite crystals with exolution of ilmenite and very rare of hematite.
Unit/subunit: 89A
Piece no.: 1A

PRIMARY MINERALOGY Number of domains: 1 Nature of igneous domains:

Igneous domain name: domain 1 Domain lithology: medium-grained olivine-opx bearing gabbro
Domain grain size: medium-grained Grain size distribution: inequigranular
Domain texture: seriate Relative abundance (%):
General comment:

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Olivine	0.2	1		0.4	1.2	1	subhedral					
Plagioclase	43	45		0.5	2	1	subhedral-euhedral		strongly zoned scarce			some crystals are strongly zoned
Clinopyroxene	10	52		1	5	4	anhedral, interstitial					replaced by actinolite
Orthopyroxene	0.5	1		0.4	2	1	anhedral, interstitial					
Opaque	1	1		0.2	2	0.4	anhedral-subhedral					large mm-scale oxides (subhedral)

SECONDARY MINERALOGY

Alteration domain or feature: Total alteration (%): 43.7
Recrystallization: Recrystallization degree:
General alteration comment: The cores of some replacing cpxs appear to be recrystallized to secondary replacing cpx, which is intergrown with amphibole.

	Present (%)	Comment
Green hornblende	30	replacing cpx, opx?
Brown hornblende	3	replacing cpx, olivine? brown-green pale pleochroic mineral intergrown with magnetite around relict fresh olivine core
Other amphibole	1	secondary cpx?
Talc	0.5	some olivine grains are completely replaced by fine talc, with the original eudhedral olivine grain edges delineated by fine magnetite + trace pyrite grains; other olivine grains are partially altered to talc + magnetite along cracks and round their rims
Dusty CPX	5	replacing cpx
Secondary plag.	2	replacing plag
Magnetite	3	replacing cpx, olivine. <0.1 mm magnetite grains occur as regular lines through talc after olivine, and are disseminated in altered cpx
Pyrite	0.1	replacing olivine, disseminated
Ca carbonates	0.1	interstitial calcite, patches within acicular/fibrous amphibole patches

VEINS AND HALOS

Vein fill compositional comment:	Vein generation:	Average vein thicknes (mm):	Halo width (mm):	Total halo (%):

MICROSTRUCTURES
Microstructure comments

SAMPLE: 335(312)-1256D-223R-2-W 65/67-TSB_Piece 3-TS_01
Rock name: medium-grained olivine gabbronorite
Rock comment: From the microscopic point of view the whole rock is patchy with seriate granular texture; in the two domains however, textures are equigranular granular; patchy distribution of the two domains; some parts of the rocks are pervasively altered; here, the identification of primary features is difficult; not clear whether brown amphibole is of primary or secondary origin, but obviously more arguments indicate secondary origin
Unit/subunit: 89A
Piece no.: 3

PRIMARY MINERALOGY Number of domains: 2 Nature of igneous domains: mix of two lithologies

Igneous domain name: domain 1 Domain lithology: medium-grained disseminated oxide olivine gabbronorite
Domain grain size: medium-grained Grain size distribution: equigranular
Domain texture: granular Relative abundance (%): 80
General comment: estimation of abundance unsafe due to pervasive alteration ; only very few larger prismatic cpx were found which could be regarded as primocryst; unclear whether cpx where in deed very rare, or wheter it was pervasively altered

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Olivine	15	20		0.15	2	1	subhedral to euhedral	prismatic			inclusion-bearing	very probable melt inclusion have been present (now altered); contains mu-sized wormy exsolutions of probably oxides
Plagioclase	32	45		0.1	4	0.5	subhedral	tabular to elongated	variable abundant		inclusion-bearing	especially larger crystals bear tiniest exsolution of probably oxide
Clinopyroxene	5	26		0.2	1	0.5	anhedral	equant to prismatic		colorless	overgrowth	pervasive overgrown by actinolite; only one larger aggregate was observed; original mode extremely questionalbe; eventually there was much less
Orthopyroxene	5	8		0.2	4	1	subhedral	prismatic		colorless		
Amphibole	40			0.01	0.5	0.1	subhedral	fibrous aggregates		pale green to green		most are aggregates of pale green actinolites or flakes of brown hbl; some are brown, elongated and prismatic interlocking with plag and of interstitial growth implying a magmatic origin
Opaque	3	1		0.05	1	0.25	anhedral	equant			interstitial	some of the larger opaques are sulfides; some of the larger oxides are associated with brown amphibole; lots of tiny secondary oxides around the olivines

Igneous domain name: domain 2 Domain lithology: microcrystalline gabbro
Domain grain size: microcrystalline Grain size distribution: equigranular
Domain texture: granular Relative abundance (%): 20
General comment: estimation of abundance unsafe due to pervasive alteration; similar textural patches were mentioned as "microgranular domains" in Teagle et al. 2006

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Plagioclase	50	50		0.01	1	0.15	anhedral to subhedral	prismatic to elongate	variable abundant			plag and cpx form a granoblastic network with curved crystal boundaries
Clinopyroxene	20	50		0.05	0.5	0.2	subhedral	prismatic		colorless	overgrown	overgrown by actinolite; filled with tiny oxides; not clear whether some of the cpx are in deed opx
Amphibole	30											

SECONDARY MINERALOGY

VEINS AND HALOS

Vein fill compositional comment:	Vein generation:	Average vein thicknes (mm):	Halo width (mm):	Total halo (%):

MICROSTRUCTURES

Microstructure comments
submagmatic fractures are present indicated by an optically coherent cpx crystal is cut by a line of plag crystals. this suggests the cpx crystal grew, was cut by a fracture, the fracture was filled in with melt and plag crystallized. olivine has normal extinction

SAMPLE: 335(312)-1256D-223R-2-W 101/105-TS_94
Rock name: contact: medium-grained opx-bearing olivine gabbro / coarse-grained oxide gabbro
Rock comment: Thin thin section shows contact between medium-grained orthopyroxene-bearing olivine gabbro (Unit 89a) and coarse-grained oxide gabbro (Unit 89b). The contact is characterised by perpendicular growth of clinopyroxene and plagioclase to lithologic boundary and high modal proportion of clinopyroxene. The medium-grained orthopyroxene-bearing gabbro contains fine-grained troctolite xenolith or patch (~6.0 mm in long axis) which shows granular texture with strongly zoned plagioclase
Unit/subunit: 89A
Piece no.: 10

PRIMARY MINERALOGY Number of domains: 2 Nature of igneous domains: contact between two gabbros

Igneous domain name: domain 1 Domain lithology: medium-grained opx-bearing olivine gabbro
Domain grain size: medium-grained Grain size distribution: inequigranular
Domain texture: seriate Relative abundance (%):
General comment:

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Olivine	7	15		0.2	1.2	0.8	anhedral-subhedral					partly replaced by opx in later magmatic stage
Plagioclase	40	45		0.1	1.5	0.8	subhedral		commonly zoned scarce			
Clinopyroxene	30	35		0.1	4.5	1	subhedral-interstitial					large oikocryst
Orthopyroxene	2	4		0.2	1	0.8	subhedral-interstitial					
Opaque	1	1		0.1	1	0.5	anhedral, interstitial					

Igneous domain name: domain 2 Domain lithology: coarse-grained oxide gabbro
Domain grain size: coarse-grained Grain size distribution: inequigranular
Domain texture: seriate Relative abundance (%):
General comment:

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Plagioclase	50	65		0.2	10.5	6	subhedral-euhedral					highly altered, cpx and oxides inclusions
Clinopyroxene	15	31		0.2	4	2.5	subhedral					oxides and plag inclusions
Opaque	4	4		0.2	5	3	anhedral-subhedral					

SECONDARY MINERALOGY

Alteration domain or feature: Total alteration (%):
Recrystallization: Recrystallization degree:
General alteration comment:

	Present (%)	Comment
Actinolite	4	pale blue green replacing olivine. may be intimately associated with a phyllosilicate
Green hornblende	4	replacing cpx, plag. 15% in coarse grained gabbro
Chlorite	4	replacing plag, olivine. absent in coarse grained gabbro
Secondary plag.	0.5	replacing plag. 3% in coarse grained gabbro
Magnetite	5	replacing olivine
Other	1.5	brown and green phyllosilicate. very pleocroic. replaces the core or the total area of olivine

VEINS AND HALOS

Vein fill compositional comment:	Vein generation:	Average vein thicknes (mm):	Halo width (mm):	Total halo (%):

MICROSTRUCTURES
Microstructure comments

SAMPLE: 335(312)-1256D-223R-3-W 1/6-TS 95
Rock name: medium-grained olivine bearing disseminated oxide gabbronorite with veins
Rock comment: This section is complicated, and merits further detailed inspection. Several features indicate that this section represents an extreme continuation of the textural development in the thermally altered basaltic dikes from higher up the hole. Key pieces of evidence are the apparent presence of a relict variolitic texture in some portions of the slide (mid-bottom of the left side, for example). Here, radiating plagioclase fans out in an arrangement very similar to the textures observed in the lowermost basaltic dikes. Also, the intergranular clinopyroxenes in these areas contain many small oxides, and have the dusty appearance so commonly found in the altered basaltic dikes. These patches are often then overgrown and partly contained within orthopyroxene oikocrysts. This suggests that the rock is a partially remelted basaltic dike, that has recooled slowly enough, or in sufficiently wet conditions, to grow large oikocrysts containing some of the original igneous texture. Total disaggregation of the rock cannot have occurred, or the original igneous texture would have been destroyed. These large orthopyroxene oikocrysts possibly grew concurrently with the large orthopyroxene crystals found in the coarse "vein" portion of this section. On the right-hand side of the section, between the two coarse patches, a linear feature cuts from top middle towards bottom right. This feature is about 1mm wide. The plagioclase in this feature is smaller and more equant than the plagioclase in the surrounding areas. Granular orthopyroxene and fibrous actintolite are also present in this feature. Critically, some of the orthopyroxene that appears in this feature is part of optically continous oikocrysts that are also present in the coarser backgroun area. Is it possible that this feature was once a hydrothermal vein present in the basalt, which has subsequently been overprinted by the event that caused orthopyroxene crystallisation. The order of events here seems to have been 1) solidification of fine-grained basaltic dike with development of variolitic/intergranular texture 2) hydrothermal veins and relatively low temperature alteration 3) partial melting and recrystallisation in thermal aureole of adjacent gabbroic intrusion (Unit 88). / All plagioclase crystals look fresh but contain an "infinity" of tiny-tiny inclusions, giving the plagioclase a general light gray apperance. One 0.1-0.3 mm hornblende and actinolitic hornblende vein (top left), with very diffuse boundaries. The elongated coarse grained pach displays the same secondary minerals as the rest of the slide./ Note: Titanomagnetite is commonly developed in this section, and it present very rare exolution of ilmenite (increasing in temperature with respect to previous, upper, rocks?). Chalcopyrite grows in the borders or in within titanomagnetite crystals, as slightly elongated crystals. The longest axes of these chalcopyrite crystals seem to have growth parallel to the shear zone.

Unit/subunit: 89A
Piece no.: 1

PRIMARY MINERALOGY Number of domains: 2 Nature of igneous domains: coarse "vein" within a medium-grained gabbro

Igneous domain name: domain 1
Domain grain size: coarse-grained
Domain texture: seriate
General comment:
Domain lithology: coarse-grained disseminated oxide gabbronorite
Grain size distribution: inequigranular
Relative abundance (%):

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Plagioclase	55	60		0.4	4	2	subhedral-euhedral	tabular				
Clinopyroxene	4	8		0.4	2	1	interstitial					oikocrysts
Orthopyroxene	20	30		2	5	4	subhedral-interstitial					oikocrysts
Opaque	1	1		1	3	2	interstitial					

Igneous domain name: domain 2
Domain grain size: medium-grained
Domain texture: poikilitic
General comment:
Domain lithology: medium-grained disseminated oxide gabbronorite
Grain size distribution: inequigranular
Relative abundance (%):

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Olivine	4	5		0.1	0.8	0.2	subhedral					occurs in 3 or 4 isolated patches, altered to oxides at margins. contain exsolution structures, possibly of Ti-oxides. smaller olivines in granular texture are overgrown by opx and cpx
Plagioclase	50	60		0.05	4	0.4	subhedral-euhedral	tabular				
Clinopyroxene	7	18		0.1	0.4	0.6	subhedral	granular				granular cpx often contain large many small oxides, giving them a dusty appearance
Orthopyroxene	10	15		0.1	4	2	subhedral	granular				large oikocrysts include plag, olivine and cpx chadacrysts
Opaque	2	2		0.1	3	0.2	interstitial					

SECONDARY MINERALOGY

Alteration domain or feature:
Recrystallization:
General alteration comment:
Total alteration (%): 24.1
Recrystallization degree:

	Present (%)	Comment
Actinolite	0.5	blue green, associated with minor chlorite around olivine
Green hornblende	15	replacing cpx, opx, minor plag
Brown hornblende	2	primary
Talc	0.1	replacing olivine
Chlorite	2	replacing plag, olivine. minor when associated with actinolite around olivine
Titanite	1	disseminated
Magnetite	2	replacing olivine along crack and as a rim
Other oxide	0.5	disseminated
Pyrite	1	disseminated
Chalcopyrite	0.5	disseminated
Other	0.5	dark brown green phyllosilicate replacing olivine, associated with magnetite

VEINS AND HALOS

Vein fill compositional comment:	Vein generation:	Average vein thicknes (mm):	Halo width (mm):	Total halo (%):

MICROSTRUCTURES
Microstructure comments

SAMPLE: 335(312)-1256D-224R-1-W 4/5-TS 96
Rock name: medium-grained olivine gabbronorite
Rock comment: Plagioclase appears reasonably fresh only partially altered to secondary plagioclase (albite?) along fractures. Interstitial clinopyroxene partially altered to actinolitic hornblende. Actinolitic hornblende vein cut with halo in which clinopyroxene is completely replaced by actinolitic hornblende. / Titanomagnetite crystals have weak exolution of ilmenite, and they are also rarely accompanied by hematite (?) and chalcopyrite. / There is one vein in this section. It is composed of actinolite and appears to pre-date later crystal growth. Olivine is variably altered in this section with some fresh cores of olivine still evident. /
Unit/subunit: 89
Piece no.: 2

PRIMARY MINERALOGY Number of domains: 1 Nature of igneous domains:

Igneous domain name: domain 1 Domain lithology: medium-grained olivine bearing gabbronorite
Domain grain size: medium-grained Grain size distribution: inequigranular
Domain texture: seriate Relative abundance (%):
General comment:

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Olivine	0	1		0.2	0.2	0.2	subhedral?					completely altered
Plagioclase	44	45		0.5	5	2	subhedral-euhedral					partially altered to albite along fractures
Clinopyroxene	10	30		2	5	3	subhedral					replaced by actinolitic hbl
Orthopyroxene	15	23		0.2	2	1	subhedral-interstitial					
Opaque		0.001					anhedral					1. 0.5 to 1.5 mm oxides between plag lath, 2. 50um to 150um dissemimated Fe-Ti oxides

SECONDARY MINERALOGY

Alteration domain or feature: Total alteration (%): 0
Recrystallization: Recrystallization degree:
General alteration comment:

	Present (%)	Comment
Actinolite	15	replacing cpx, opx, seen as rims around altered olivine
Green hornblende	2	replacing interstitial cpx and rimming
Chlorite	5	replacing cpx, opx (and olivine). seen as rims around olivine with actinolite
Magnetite	6	replacing cpx, seen as halos around and cracks within olivine
Other	0.5	dark green-brown phyllosilicate (unidentified) replacing olivine, seen as halos around fresh olivine

VEINS AND HALOS

Vein fill compositional comment:	Vein generation:	Average vein thicknes (mm):	Halo width (mm):	Total halo (%):

MICROSTRUCTURES
Microstructure comments

SAMPLE: 335(312)-1256D-225R-1-W 0/3-TS 97
Rock name: fine-grained aphyric basalt
Rock comment: Partially recrystallized to granular assemblage with smooth annealed grain boundaries./ Igneous texture is maintained by plagioclase but both clinopyroxene and ti-oxide phases partially to completely recrystallized to rounded grains. Orthopyroxene appears (to DT?) to replace actinolite + magnetite hydrothermal replacement of primary clinopyroxene. Plagioclase appears mostly fresh although grain edges are smooth and rounded. Alteration is patchy with zones of common granular orthopyroxene but other regions dominated by actinolite or dusty clinopyroxene. Rare wispy 0.1 mm actinolite (?) veins.
Unit/subunit: 90
Piece no.: 1

PRIMARY MINERALOGY Number of domains: 1 Nature of igneous domains:

Igneous domain name: domain 1 Domain lithology: fine-grained aphyric basalt
Domain grain size: fine-grained Grain size distribution:
Domain texture: intergranular Relative abundance (%):
General comment:

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Plagioclase	52	52		0.1	3	0.8	subhedral-euhedral		strongly zoned abundant			mostly fresh and strongly zoned, partially replaced by albite, actinolite
Clinopyroxene	44	44					anhedral, interstitial					dusty cpx, actinolite + magnetite, then opx
Opaque	4	4		0.1	1	0.5	anhedral,interstitial					recrystallized to large rounded blebs

SECONDARY MINERALOGY

Alteration domain or feature: Total alteration (%): 29
Recrystallization: Recrystallization degree:
General alteration comment:

	Present (%)	Comment
Actinolite	20	replacing cpx and veins
Dusty CPX	10	replacing cpx
Secondary plag.	5	replacing plag. soft grain boundaries, grains are euhedral but sub-rounded
Other	14	opx

VEINS AND HALOS

Vein fill compositional comment:	Vein generation:	Average vein thicknes (mm):	Halo width (mm):	Total halo (%):

MICROSTRUCTURES
Microstructure comments

SAMPLE: 335(312)-1256D-225R-1-W 9/12-TS 98
Rock name: fine-grained to cryptocrystalline aphyric basalt
Rock comment: Partially recrystallized to granoblastic assemblage. Clinopyroxene replaced by dusty clinopyroxene or actinolite + magnetite. Opaques sub-angular ratehr than sub-rounded in higher granblastic dikes. / Numerous vein generations an associated halos. Early diffuse actinolite veins cut across by later actinolite veins. Both generatoins have 2 mm recrystallized "clean" actinolite-rich halos. These veins cut across by thin chlorite+actinolite veins. All veins cross-cut by 0.5 to 2 mm braided quartz veins that include slivers of actinolite+chlorite+secondary plagioclase altered wall rock. Thick ~ 1mm quartz-chlorite vein, cross-cut and offset by pure quartz vein. Quartz veins can exploit trace of earlier actinolite veins.
Unit/subunit: 90A
Piece no.: 3

PRIMARY MINERALOGY Number of domains: 1 Nature of igneous domains:

Igneous domain name: domain 1 Domain lithology: fine-grained to cryptocrystalline aphyric basalt
Domain grain size: microcrystalline Grain size distribution:
Domain texture: intergranular Relative abundance (%):
General comment:

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Plagioclase	45	45		0.2	0.4	0.3	subhedral-euhedral					minor secondary plag, actinolite
Clinopyroxene	5	45		0.2	0.4	0.3	anhedral prismatic					highly altered (actinolite, brownish dusty masses, tiny oxide grains).
Opaque	11	10		0.2	0.3	0.2	subhedral					1) primary oxides 2) disseminated tiny oxide grains

SECONDARY MINERALOGY

Alteration domain or feature: Total alteration (%): 21
Recrystallization: Recrystallization degree:
General alteration comment:

	Present (%)	Comment
Actinolite	30	replacing cpx, veins
Dusty CPX	15	replacing cpx
Secondary plag.	5	replacing plag with actinolite after plag
Magnetite	2	replacing cpx with actinolite
Pyrite	1	disseminated

VEINS AND HALOS

Vein fill compositional comment:	Vein generation:	Average vein thicknes (mm):	Halo width (mm):	Total halo (%):

MICROSTRUCTURES
Microstructure comments

SAMPLE: 335(312)-1256D-227R-1-W 12/14-TS 99
Rock name: contact: fine-grained aphyric basalt / medium-grained qtz-rich oxide diorite
Rock comment: Unit 90B is a 2 cm wide gabbroic dike cutting the metamorphosed basalt of Unit 90A. There is no chilled margin, and the contact zone is marked by enhanced alteration of the host dike in a 2-3 mm wide halo, indicating either that the gabbro was the source of the fluid for alteration, or that the gabbro has subsequently acted as a preferential conduit for hydrothermal fluids. / In both basalt and gabbro, all plagioclase crystals look fresh but contain an "infinity" of tiny-tiny inclusions, giving the plagioclase a general light gray apperance . The rim of plagioclasse is frequently inclusions-free (edge of crystal optical effect?)
Unit/subunit: 90A
Piece no.: 3

PRIMARY MINERALOGY Number of domains: 2 Nature of igneous domains: contact between basalt and diorite

Igneous domain name: domain 1 Domain lithology: fine-grained aphyric basalt
Domain grain size: fine-grained Grain size distribution:
Domain texture: intergranular Relative abundance (%):
General comment:

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Plagioclase	51	55		0.2	0.8	0.4	subhedral	tabular				original igneous texture (intergranular) has been overpinted by later heating, with the development of some smaller equant plag in a granular texture
Clinopyroxene	20	34		0.1	0.6	0.3	interstitial-subhedral	granular				
Orthopyroxene	5	7		0.1	0.4	0.3	subhedral					growing in granular texture
Opaque	4	4		0.1	0.4	0.2	interstitial-subhedral					

Igneous domain name: domain 2 Domain lithology: medium-grained qtz-rich oxide diorite
Domain grain size: medium-grained Grain size distribution: inequigranular
Domain texture: seriate Relative abundance (%):
General comment:

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Plagioclase	30	40		0.4	5.5	2	subhedral	tabular				
Clinopyroxene	30	30		0.3	3	2	interstitial-subhedral					now present as amphibole, but may have originally been cpx
Opaque	5	5		0.1	0.8	0.3	interstitial					
Quartz	25	25		0.4	0.8	0.6	granophyric intergrowths					granophyric intergrowths

SECONDARY MINERALOGY

Alteration domain or feature: fine-grained basalt (unit Total alteration (%): 9.5
Recrystallization: Recrystallization degree:
General alteration comment:

	Present (%)	Comment
Actinolite	2	replacing cpx, opx. associated with chlorite as a rim around "rounded" opx
Green hornblende	4	replacing cpx
Chlorite	3	replacing opx
Magnetite	2	replacing cpx
Pyrite	0.5	disseminated

Alteration domain or feature: medium-grained diorite Total alteration (%): 34.05
Recrystallization: Recrystallization degree:
General alteration comment:

	Present (%)	Comment
Green hornblende	30	replacing cpx, plag
Chlorite	1.5	replacing plag & actinolite
Titanite	1	disseminated
Magnetite	2	replacing cpx
Pyrite	0.5	disseminated
Chalcopyrite	0.05	disseminated

VEINS AND HALOS
Vein fill compositional comment: Vein generation: Average vein thicknes (mm): Halo width (mm): Total halo (%):

MICROSTRUCTURES
Microstructure comments

SAMPLE: 335(312)-1256D-227R-1-W 23/28-TS 100
Rock name: fine-grained aphyric basalt
Rock comment: Primary igneous features are unclear because of strong metamorphism. / One 0.3-0.5 mm vein of actinolite + titanite + quartz, with (about 3 mm thick) adjacent alteration halo slowly grading to less altered rock. All plagioclase crystals look fresh but contain an "infinity" of tiny-tiny inclusions, giving the plagioclase a general light gray apperance . The rim of plagioclase is frequently inclusions-free (edge of crystal optic effect?).
Unit/subunit: 90A
Piece no.: 5A

PRIMARY MINERALOGY Number of domains: 1 Nature of igneous domains:

Igneous domain name: domain 1 Domain lithology: fine-grained aphyric basalt
Domain grain size: fine-grained Grain size distribution:
Domain texture: intergranular Relative abundance (%):
General comment:

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Plagioclase	49	50		0.2	1	0.4	subhedral		some crystals are zoned			some crystals are zoned
Clinopyroxene	15	42		0.2	1	0.4	interstitial-subhedral					primary features are obscured by metamorphism
Opaque	8	8		0.2	0.5	0.3	anhedral					primary features are obscured by metamorphism

SECONDARY MINERALOGY

Alteration domain or feature: Total alteration (%): 34
Recrystallization: Recrystallization degree:
General alteration comment:

	Present (%)	Comment
Actinolite	7	replacing opx
Green hornblende	23	replacing cpx
Chlorite	5	replacing opx, plag
Titanite	1	disseminated, anhedral
Magnetite	4	replacing cpx
Pyrite	1	disseminated

VEINS AND HALOS

Vein fill compositional comment:	Vein generation:	Average vein thicknes (mm):	Halo width (mm):	Total halo (%):

MICROSTRUCTURES
Microstructure comments

SAMPLE: 335(312)-1256D-227R-1-W 84/86-TS 101
Rock name: contact: fine-grained aphyric basalt/fine-grained trondhjemite
Rock comment: This piece shows a contact between highly altered fine-grained aphyric basalt and highly altered fine-grained trondhjemite. No chilled margins are visible. Because of strong alteration, primary igneous features of the basalt is unclear. Abnormaly high modal proportion of mafic minerals in the basalt is unlikely for primary modal proportion, interms of igneous petrological point of view./ The basalt is completely altered, predominantly to chlorite (with fine grains of titanite after magnetite?) and quartz, obscuring the primary modal mineralogy. Epidote and prehnite are most abundant near the margin of the trondhjemite, which is almost completely altered to secondary plagioclase + chlorite. In the fine-grained trondhjemite, plagioclase is very rich in inclusions, giving the plagioclase a dirty appearance, difficult to determine if primary or secondary.
Unit/subunit: 90A
Piece no.: 13

PRIMARY MINERALOGY Number of domains: 2 Nature of igneous domains: contact between basalt and trondhjemite

Igneous domain name: domain 1 Domain lithology: fine-grained aphyric basalt
Domain grain size: fine-grained Grain size distribution: inequigranular
Domain texture: Relative abundance (%):
General comment:

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Plagioclase	0.001	30					subhedral					too altered, see comments
Clinopyroxene	0	68					interstitial-subhedral?					too altered, see comments
Opaque	2	2					subhedral					

Igneous domain name: domain 2 Domain lithology: fine-grained trondhjemite
Domain grain size: fine-grained Grain size distribution: inequigranular
Domain texture: seriate Relative abundance (%):
General comment:

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Plagioclase	0	80		0.1	1.2	1	subhedral					highly altered
Clinopyroxene	0	10		0.1	0.8	0.6	anhedral, interstitial?					highly altered
Opaque	2	2		0.1	0.9	0.3	anhedral-subhedral					
Quartz	8	8		0.1	0.3	0.2	interstitial					

SECONDARY MINERALOGY

Alteration domain or feature: fine-grained basalt Total alteration (%): 100.5
Recrystallization: Recrystallization degree:
General alteration comment: Epidote most abundant along diffuse margin between the basalt and the trondhjemite

	Present (%)	Comment
Epdote	1	replacing plag
Chlorite	80	replacing cpx & plag. fine-grained aggregates replace most of the primary minerals, some spherultic patches
Quartz	12	replacing plag
Secondary plag.	1	replacing plag
Titanite	5	occurs as euhedral grains, within epidote or qtz, and as fine disseminated grains intergrown with chlorite giving it a dirty/speckled appearance (replacing magnetite?)
Magnetite	1	replacing cpx. fine inclusions within chlorite

Alteration domain or feature: fine-grained trondhjemite Total alteration (%): 92.5
Recrystallization: Recrystallization degree:
General alteration comment: Euhedral equant grains of epidote in the cores of altered plag crystals; in intersitial patches as prismatic grains, that surround magnetite grains and contain euhedral titanite.

	Present (%)	Comment
Epdote	3	replacing plag or interstitial
Chlorite	10	replacing plag, primary mafic phase, interstitial. commonly with a spherultic texture
Quartz	2	replacing plag, qtz, interstitial. interstitial qtz areas contain fewer inclusions and appear clearer; some contain euhedral epidote grains and spherules of chlorite
Secondary plag.	75	replacing plag
Prehnite	0.5	replacing plag. intergrown with chlorite
Titanite	2	replacing plag, interstitial
Magnetite	0.5	mafic. inclusions in chlorite; replaced by titanite?

VEINS AND HALOS

Vein fill compositional comment:	Vein generation:	Average vein thicknes (mm):	Halo width (mm):	Total halo (%):

MICROSTRUCTURES
Microstructure comments

SAMPLE: 335(312)-1256D-227R-1-W 87/91-TS 102
Rock name: contact: fine-grained trondhjemite / medium-grained oxide diorite?
Rock comment: This thin section contains fine-grained trondhjemite (90C) and medium-grained oxide diorite ? (90D). Boundary between both lithologies is diffuse and unclear under the microscope. Since medium-grained oxide diorite is extremely altered, estimation of primary igneous mineralogy was impossible. General texture, mordal propotion of mafic/felsic minerals and rarely preserved pseudomorph suggest that the rock have been composed of Cpx+Amp+Pl+Qtz+Oxide, diroritic assemblage. / The proportions of the various secondary minerals are variable from one part of the slide to another one. Average proportions are given above.
Unit/subunit: 90C
Piece no.: 14

PRIMARY MINERALOGY Number of domains: 2 Nature of igneous domains: contact between trondhjemite and diorite?

Igneous domain name: domain 1 Domain lithology: fine-grained trondhjemite
Domain grain size: fine-grained Grain size distribution: inequigranular
Domain texture: seriate Relative abundance (%):
General comment:

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Plagioclase	0	87		0.3	1.5	0.6	subhedral-euhedral	tabular				completely altered
Clinopyroxene	0	1		0.1	0.4	0.3	subhedral					completely altered
Opaque	2	2		0.1	0.4	0.2	interstitial-subhedral					secondary ?
Quartz	10	10		0.1	0.6	0.3	anhedral, interstitial					

Igneous domain name: domain 2 Domain lithology: medium-grained oxide diorite?
Domain grain size: medium-grained Grain size distribution: inequigranular
Domain texture: seriate Relative abundance (%):
General comment:

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment

SECONDARY MINERALOGY

Alteration domain or feature: Total alteration (%):
Recrystallization: Recrystallization degree:
General alteration comment: The replacement product of plag is questionable

	Present (%)	Comment
Other amphibole	1	orthoamphibole?? associated with qtz, colorless, high relief, cleavage perpendicular to elongation, 1st order colors, parallel extinction
Epdote	40	replacing plag
Chlorite	8	replacing plag
Quartz	10	subhedral, associated with epidote
Secondary plag.	5	replacing plag. possibly more. the replacement product of plag is questionable
Other Ca-Al sec.	5	laumontite replacing plag possibly more
Titanite	4	disseminated

VEINS AND HALOS

Vein fill compositional comment:	Vein generation:	Average vein thicknes (mm):	Halo width (mm):	Total halo (%):

MICROSTRUCTURES
Microstructure comments

SAMPLE: 335(312)-1256D-227R-2-W 71/75-TS 103
Rock name: contact: fine-grained basalt / fine-grained trondhjemite
Rock comment: Modal proportions estimated by comparison with standard visual inspection chart. The tronhjemite is highly altered, and appears to have been a source of hydrothermal fluids for alteration of the host basalt, with the degree of alteration generally decreasing with distance from the contact. There is no obvious drop in grainsize of the trondhjemite towards the contact with the basalt. / There are several cross-cutting 0.2 mm veins within the basaltic part of this section, including a granular pale green clinopyroxene (diopside; partialy replaced by chlorite and actinolite) + plagioclase vein, and an actinolite vein. Where these two veins cross the actinolite extends 2 mm up the clinopyroxene + plagioclase vein, indicating that the actinolite vein is the later of the two. However, the actinolite vein may be a completely replaced by clinopyroxene vein. These veins have 1-3 mm diffuse actinolitic halos, and were described as 'annealed' in the macroscopic core descriptions. The basalt has a 15 mm chlorite rich halo (50% chlorite) along the margin of the trondhjemite. /
Unit/subunit: 90A
Piece no.: 11

PRIMARY MINERALOGY Number of domains: 2 Nature of igneous domains: contact between basalt and trondhjemite

Igneous domain name: domain 1 Domain lithology: fine-grained basalt
Domain grain size: fine-grained Grain size distribution:
Domain texture: intergranular Relative abundance (%):
General comment:

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Plagioclase	45	55		0.1	0.4	0.2	subhedral	tabular				
Clinopyroxene	10	38		0.2	0.4	0.3	interstitial-subhedral					variably altered, often with many oxide inclusions to give a dusty appearance
Orthopyroxene	2	4		0.2	0.2	0.3	interstitial-subhedral	granular				only occur in limited patchs, sometimes overprinted by later alteration
Opaque	3	3		0.1	0.4	0.2	interstitial					

Igneous domain name: domain 2 Domain lithology: fine-grained trondhjemite
Domain grain size: fine-grained Grain size distribution: equigranular
Domain texture: Relative abundance (%):
General comment:

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Plagioclase	30	75		0.4	1.2	0.7	subhedral	tabular				dusty alteration
Amphibole	0	3		0.1	0.2	0.1	interstitial					altered to epidote, calcite?
Opaque	2	2		0.1	0.2	0.1	interstitial					
Quartz	15	20		0.1	0.4	0.2	anhedral-interstitial					

SECONDARY MINERALOGY

Alteration domain or feature: fine-grained basalt (unit Total alteration (%): 26.1
Recrystallization: Recrystallization degree:
General alteration comment: plag has tiny inclusions that give it a dusty appearance

	Present (%)	Comment
Actinolite	15	replacing cpx along cleavage planes, and plag around rims
Chlorite	1	replacing cpx, plag, interstitial. most abundant in a 15 mm halo along adjacent to the trondhjemite dike, where it comprises ~50% of the rock and overgrows actinolite
Dusty CPX	10	replacing cpx
Secondary plag.	8	replacing plag
Titanite	5	replacing cpx, plag. intergrown with actinolite replacing cpx, and along plag cleavage planes
Magnetite	2	replacing cpx. inclusions within actinolite (that replaces after replacing cpx) giving the replacing cpx a very dusty appearance
Pyrite	0.1	disseminated

Alteration domain or feature: fine-grained trondhjemite Total alteration (%): 84
Recrystallization: Recrystallization degree:
General alteration comment: plag completely recrystallised, and full of tiny inclusions giving it a very dirty appearance.

	Present (%)	Comment
Epdote	2	replacing plag or interstitial. disseminated euhedral crystals and anhedral interstitial grains, most abundant adjacent to a very fine chlorite + qtz vein that parallels the unit margin
Chlorite	5	replacing cpx? plag. there are spherultic patches of chlorite within some qtz grains
Quartz	5	recrystallized quartz?
Secondary plag.	68	replacing plag
Prehnite	0.5	interstitial. associated with epidote and titanite
Titanite	3	interstitial, replacing magnetite & plag. euhedral grains associated with/included within epidote; rims on magnetite grains
Ca carbonates	0.5	interstitial calcite

VEINS AND HALOS

Vein fill compositional comment:	Vein generation:	Average vein thicknes (mm):	Halo width (mm):	Total halo (%):

MICROSTRUCTURES
Microstructure comments

SAMPLE: 335(312)-1256D-227R-2-W 113/117-TS 105
Rock name: fine-grained oxide gabbronorite qtz-bearing
Rock comment: Modal proportions of primary estimated by comparison with standard visual estimation chart. / One 1.5 mm vein, with very diffuse boundaries, made of actinolitic hornblende, euhedral titanite, quartz, thin actinolite needles, minor chlorite, minor epidote. One 0.2 mm vein (with sharp boundaries) made of actinolite hornblende. All plagioclase crystals look fresh but contain an "infinity" of tiny-tiny inclusions, giving the plagioclase a general light gray apperance . The rim of plagioclase is frequently inclusions-free.
Unit/subunit: 90A
Piece no.: 17

PRIMARY MINERALOGY Number of domains: 1 Nature of igneous domains:

Igneous domain name: domain 1 Domain lithology: fine-grained qtz-bearing oxide gabbronorite
Domain grain size: fine-grained Grain size distribution: inequigranular
Domain texture: seriate Relative abundance (%):
General comment:

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Plagioclase	60	65		0.1	1.6	0.7	subhedral	tabular				with numeous tiny inclusions, often with microgranular cpx, opx and oxide as inclusion
Clinopyroxene	3	20		0.05	1.5	0.5	subhedral	tabular				altered to fibrous green amphibole and tiny oxide
Orthopyroxene	5	7		0.4	0.15		subhedral-euhedral					some with bled-like inclusion, show pleochroism from colorless to reddish, some with rounded oxide inclusion
Opaque	7	7		0	0.5	0.15	anhedral-subhedral					
Quartz	1	1		0.05	0.6	0.15	subhedral	equant				interstital, some include acicular mineral

SECONDARY MINERALOGY

Alteration domain or feature: Total alteration (%):
Recrystallization: Recrystallization degree:
General alteration comment:

	Present (%)	Comment
Green hornblende	5	replacing cpx. 10% when adjacent to vein
Magnetite	2	replacing cpx
Pyrite	1	disseminated
Other sulfides	1	disseminated

VEINS AND HALOS

Vein fill compositional comment:	Vein generation:	Average vein thicknes (mm):	Halo width (mm):	Total halo (%):

MICROSTRUCTURES
Microstructure comments

SAMPLE: 335(312)-1256D-230R-1-W 15/18-TS 106
Rock name: contact: dike/gabbro
Rock comment: This slide is made of three or four disinct zones. Firslt, a fine-grained bsasltic dike rock. This has been cut but the oxide gabbro in a 1 cm thick dike. This dike has then been cut by the (low oxide) gabbro. In both the basalt and the gabbro, the proportion of orthopyroxene present increases with proximity to the margin, perhaps indicating both thermal and chemcial exchange between the host rock and the intrusion. In a 5 mm wide band at the intrusion, up to 2 mm subhedral subequant orthopyroxene crystals are present, sometimes enclosing clinopyroxene and plagioclase. The increase in orthopyroxene contentof the basalt towards the margin indicates that the orthopyroxene is of metamorphic, rather than primary igneous, origin./ All plagioclase crystals look fresh but contain an "infinity" of tiny-tiny inclusions, giving the plagioclase a general light gray apperance . The rim of plagioclase is frequently inclusions-free. One 0.3 mm hornblende-actinolitic vein cross-cutting both basalt and gabbro. The basalt/gabbro contact is extensively altered, with abundant actinolitic-hornblende (up to 100% in some places). / Titanomagnetite crystals display different characteristics between the three rock types present in the section. On both oxide and less oxide gabbro, titanomagnetite crystals present exolutions of ilmenite, while in the fine grain (host rock) portion, they do not. Also, in the less oxide gabbro it seems that ilmenite has exolution of hematite in portion where the ilmenite pockets, inside the titanomagnetite, became large enough.
Unit/subunit: 90A
Piece no.: 5

PRIMARY MINERALOGY Number of domains: 3 Nature of igneous domains: contact between two units

Igneous domain name: domain 1 Domain lithology: fine-grained aphyric basalt
Domain grain size: fine-grained Grain size distribution: inequigranular
Domain texture: Relative abundance (%):
General comment: granular overprint of intergranulr flow-aligned texture

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Plagioclase	50	55		0.05	0.4	0.2	subhedral	tabular				tabular plag appear to show some weak flow alignment
Clinopyroxene		22.5		0.1	0.2	0.15	subhedral	equant				at the top end of the section, about half of the pyrox is cpx and the rest is opx. next to the contact with the gabbro all of the pyrox is opx. there is a gradual increase in opx content towards the contact
Orthopyroxene		45		0.3	0.2		subhedral	equant				at the top end of the section, about half of the pyrox is cpx and the rest is opx. next to the contact with the gabbro all of the pyrox is opx. there is a gradual increase in opx content towards the contact
Opaque	5	5		0.1	0.2	0.1	anhedral					

Igneous domain name: domain 2 Domain lithology: medium-grained gabbro
Domain grain size: medium-grained Grain size distribution: inequigranular
Domain texture: seriate Relative abundance (%):
General comment:

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Plagioclase	50	55		0.4	3	2	subhedral	tabular				laths
Clinopyroxene	25	40		0.4	1.5	1.2	anhedral					containing many inclusions of oxide
Opaque	2	2		0.1	0.4	0.2	anhedral					
Quartz	3	3		0.4	0.8	0.6	anhedral					granophyric intergrowth

Igneous domain name: domain 3 Domain lithology: medium-grained oxide gabbro
Domain grain size: medium-grained Grain size distribution: inequigranular
Domain texture: seriate Relative abundance (%):
General comment:

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Plagioclase	45	50		0.4	5	3	subhedral	tabular				
Clinopyroxene	10	30		0.4	2.5	2	anhedral					
Opaque	20	20		0.2	2	1.8	anhedral					
Quartz		0.001		0.2	0.3	0.2	anhedral					

SECONDARY MINERALOGY

Alteration domain or feature: fine-grained basalt Total alteration (%):
Recrystallization: Recrystallization degree:
General alteration comment:

	Present (%)	Comment
Actinolite	5	replacing cpx
Magnetite	2	replacing cpx
Pyrite	0.1	disseminated

Alteration domain or feature: gabbro Total alteration (%):
Recrystallization: Recrystallization degree:
General alteration comment:

	Present (%)	Comment
Green hornblende	5	replacing cpx
Brown hornblende	1	replacing cpx and surrounded by green hbl
Epdote	1	some large slabs replacing plag
Chlorite	4	replacing cpx & plag. in microfractures of plag when crosscut by main vein, associated with actinolitic hbl when replacing cpx
Magnetite	3	replacing cpx
Pyrite	0.1	disseminated

VEINS AND HALOS

Vein fill compositional comment:	Vein generation:	Average vein thicknes (mm):	Halo width (mm):	Total halo (%):

MICROSTRUCTURES
Microstructure comments

SAMPLE: 335(312)-1256D-230R-1-W 49/54-TS 107
Rock name: contact: dike/gabbro
Rock comment: This thin section consists of three defferent portions. The dominant portion is fine-grained metabasalt. This basalt is overprinted by high-temperature metamorphism, and change the mineral assemblage to two-pyroxene+plagioclase assemblages. The texture is also possibly changed by metamorphism. Two gabbroic portions contain xenocrystic orthopyroxene crystals, suggesting later intrusion to meta basalts. fine-grained gabbro shows relatively similar texture to a kind of metabasalts, however, very minor amount of oxides in this rock suggest that possibility of accumulation of plagioclase+clinopyroxene from the melt. / All plagioclase crystals look fresh but contain an "infinity" of tiny-tiny inclusions, giving the plagioclase a general light gray apperance . The rim of plagioclase is frequently inclusions-free. The slide displays a dark halo, one of which clearly related to a vein of 'granular' orthopyroxene+clinopyroxene both partly replaced at rim by actinolite. One sinuous 0.2-0.4 mm vein and several linear veins of 'granular' orthopyroxene+clinopyroxene both partly replaced at rim by actinolite. One linear 1 mm vein of quartz + plagioclase + clinopyroxene + hornblende + actinolitic hornblende, cross-cutting the dark alteration halos. One 0.05 mm vein of chlorite + actinolite lining one edge of the slide.
Unit/subunit: 90A
Piece no.: 8A

PRIMARY MINERALOGY Number of domains: 3 Nature of igneous domains: contact between two units

Igneous domain name: domain 1 Domain lithology: fine-grained aphyric basalt
Domain grain size: fine-grained Grain size distribution:
Domain texture: intergranular Relative abundance (%):
General comment: holocrystalline, intergranular

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Plagioclase	45	50		0.2	1	0.5	subhedral		scarce			rarely strong zoning
Clinopyroxene	20	43		0.2	0.7	0.5	anhedral-subhedral					
Opaque	7	7		0.1	0.5	0.3	anhedral-subhedral					

Igneous domain name: domain 2 Domain lithology: medium-grained gabbro
Domain grain size: medium-grained Grain size distribution: inequigranular
Domain texture: granular Relative abundance (%):
General comment:

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Plagioclase	45	48		0.2	0.7	0.6	subhedral		abundant			tiny numerous inclusions. commonly zoned
Clinopyroxene	30	49		0.3	1.1	0.7	anhedral-subhedral					oxides and opx inclusions
Opaque	3	3		0.1	0.5	0.3	euhedral-anhedral					

Igneous domain name: domain 3 Domain lithology: fine-grained gabbro
Domain grain size: fine-grained Grain size distribution: inequigranular
Domain texture: seriate Relative abundance (%):
General comment:

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Plagioclase	55	64		0.1	0.7	0.4	subhedral-euhedral					inclusions of corroded cpx
Clinopyroxene	25	35		0.1	0.7	0.5	anhedral-subhedral					rarely corroded plag inclusions
Opaque	1	1		0.001	0.3	0.2	anhedral					

SECONDARY MINERALOGY

Alteration domain or feature: Total alteration (%):
Recrystallization: Recrystallization degree:
General alteration comment:

	Present (%)	Comment
Green hornblende	2	replacing rounded granular opx and cpx
Epdote	1	replacing plag
Smectite	20	replacing rounded granular Opx and cpx, pleocroic dark to middle olive green, parallel extinction
Magnetite	1	replacing cpx
Pyrite	1	disseminated

VEINS AND HALOS

Vein fill compositional comment:	Vein generation:	Average vein thicknes (mm):	Halo width (mm):	Total halo (%):

MICROSTRUCTURES
Microstructure comments

SAMPLE: 335(312)-1256D-230R-1-W 59/63-TS 108
Rock name: fine-grained oxide gabbro with meta-basaltic fragment (oxide gabbronorite)
Rock comment: Since the basaltic rocks have been strongly metamorphosed and recrystallized, present high-temperature metamorphic assemblages are described as "primary mineralogy". Two orthopyroxene/plagioclase zones are visible in the thin sections. One is cutting the fine-grained basalt and one occurs at the transition between fine-grained gabbro and medium-grained basalt. Furthermore the transition gabbro/basalt is characterized by a zone of plagioclase and oxides without pyroxene between the orthopyroxene/plagioclase zones and the fine-grained gabbro. On the basis of the metamorphic texture of the orthopyroxene/plagioclase zone and the "vein", who is cutting the fine-grained basalt, they may represent a metamorphic reactionzone, triggered by percolating fluids (?). / In both basalt and gabbro, all plagioclase crystals look fresh but contain an "infinity" of tiny-tiny inclusions, giving the plagioclase a general light gray apperance. The rim of plagioclasse is frequently inclusions-free

Unit/subunit: 91A
Piece no.: 8B

PRIMARY MINERALOGY Number of domains: 2 Nature of igneous domains: contact between two units

Igneous domain name: domain 1 Domain lithology: fine-grained opx bearing oxide gabbro
Domain grain size: fine-grained Grain size distribution: equigranular
Domain texture: seriate Relative abundance (%):
General comment:

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Plagioclase	50	55		0.1	2	0.7	subhedral-euhedral					medium grained plag partly occur in clusters
Clinopyroxene	25	39		0.5	2	0.7	anhedral-subhedral					
Orthopyroxene	1	2		0.2	2	1	subhedral					
Opaque	4	4		0.1	2	1.2	anhedral-subhedral					Fe-Ti oxides are heterogenous contributed, see comments

Igneous domain name: domain 2 Domain lithology: fine-grained metabasalt
Domain grain size: fine-grained Grain size distribution: equigranular
Domain texture: seriate Relative abundance (%):
General comment:

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Plagioclase	43	45		0.1	0.7	0.4	subhedral-euhedral					small pyrox inclusions
Clinopyroxene	23	25		0.1	0.4	0.3	subhedral-euhedral					granular
Orthopyroxene	23	25		0.1	0.3	0.2	subhedral-euhedral					commonly guranular
Opaque	5	5		0.1	0.3	0.2	anhedral					

SECONDARY MINERALOGY

Alteration domain or feature: fine basalt clast Total alteration (%): 2.3
Recrystallization: Recrystallization degree:
General alteration comment:

	Present (%)	Comment
Actinolite	1	replacing cpx
Secondary plag.	2	replacing plag
Titanite	2	replacing cpx and opx (?). very fine grains intergrown with actinolite in 0.5 to 1.5 mm patches, and along cracks between optically continuous relict opx fragments?
Magnetite	0.1	replacing cpx
Pyrite	0.1	disseminated
Chalcopyrite	0.1	disseminated

Alteration domain or feature: medium host gabbro Total alteration (%): 14.2
Recrystallization: Recrystallization degree:
General alteration comment:

	Present (%)	Comment
Actinolite	5	replacing cpx and opx (?)
Chlorite	1	replacing cpx, interstitial
Dusty CPX	5	replacing cpx
Secondary plag.	5	replacing plag
Magnetite	1	disseminated, replacing cpx
Pyrite	0.1	disseminated
Chalcopyrite	0.1	disseminated

VEINS AND HALOS

Vein fill compositional comment:	Vein generation:	Average vein thicknes (mm):	Halo width (mm):	Total halo (%):

MICROSTRUCTURES
Microstructure comments

SAMPLE: 335(312)-1256D-230R-1-W 126/130-TS 109
Rock name: contact: gabbro and xenolitic dike assumed
Rock comment: Assumed contact between gabbro and xenolitic dikeD, contact between Unit 91A and 91B. This thin section shows contact between fine-grained gabbronorite (meta-basalt) and coarse-grained gabbro. The boundary is marked by significant grain size change. The fiine-grained gabbronorite is probably strongly metamorphosed metabasalt, however, "most primary" igneous features have been completely modified. Hence, high-temperature metamorphic assemblages or neary magmatic, secondary assemblages are described as "primary mineralogy". / All plagioclase crystals look fresh but contain an "infinity" of tiny-tiny inclusions, giving the plagioclase a general light gray apperance. The rim of plagioclase is frequently inclusions-free. One 0.4-0.8 mm vein of chlorite (edge) and quartz (center). /

Unit/subunit: 91A
Piece no.: 11

PRIMARY MINERALOGY Number of domains: 2 Nature of igneous domains: contact between two units

Igneous domain name: domain 1
Domain grain size: fine-grained
Domain texture: seriate
General comment: metabasalt?
Domain lithology: fine-grained disseminated oxide gabbronorite
Grain size distribution: inequigranular
Relative abundance (%):

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Plagioclase	53	55		0.2	1.2	0.7	subhedral-euhedral		abundant			commonly zoned
Clinopyroxene	10	22		0.2	2	0.8	anhedral					
Orthopyroxene	17	21		0.1	5	2	anhedral					poikilitic texture
Opaque	2	2		0.2	1.5	0.7	anhedral					

Igneous domain name: domain 2
Domain grain size: coarse-grained
Domain texture: seriate
General comment:
Domain lithology: Coarse-grained disseminated oxide gabbro
Grain size distribution: inequigranular
Relative abundance (%):

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Plagioclase	20	60		0.3	4	2.5	subhedral-euhedral		abundant			commonly zoned, thin overgrowth in rim
Clinopyroxene	5	38		0.3	4	2.5	anhedral-subhedral					
Opaque	2	2		0.3	2	0.7	anhedral					

SECONDARY MINERALOGY

Alteration domain or feature:
Recrystallization:
General alteration comment:
Total alteration (%):
Recrystallization degree:

	Present (%)	Comment
Green hornblende	5	replacing cpx
Brown hornblende	3	replacing cpx
Chlorite	3	replacing cpx, green hbl, plag. also in alteration patch
Quartz	0.5	as small alteration patch
Magnetite	2	replacing cpx
Pyrite	1	disseminated
Chalcopyrite	0.1	disseminated, intergrown with pyrite

VEINS AND HALOS
Vein fill compositional comment: Vein generation: Average vein thicknes (mm): Halo width (mm): Total halo (%):

MICROSTRUCTURES
Microstructure comments

SAMPLE: 335(312)-1256D-230R-2-W 36/40-TS 110
Rock name: fine-grained disseminated oxide gabbro opx-hbl-bearing
Rock comment: Modal proportions of primary estimated by comparison with standard visual estimation chart. / There are no veins in this section. /
Unit/subunit: 91
Piece no.: 6B

PRIMARY MINERALOGY Number of domains: 1 Nature of igneous domains:

Igneous domain name: domain 1 Domain lithology: fine-grained hbl bearing disseminated oxide gabbro-gabbronorite
Domain grain size: fine-grained Grain size distribution: inequigranular
Domain texture: poikilitic Relative abundance (%):
General comment:

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Plagioclase	58	60		0.1	2	0.8	subhedral	tabular	scarce			some show strong zoning with corroded core, with numerous tiny oxide inclusions in core, some with tiny cpx as inclusion
Clinopyroxene	5	30		0.05	1.5	0.8	subhedral					some with pale brown amphibole patches
Orthopyroxene		5		4.2	2		anhedral					some poikilitic opx with bleb intergrowth of cpx (similar to granoblasitic cpx)
Amphibole	2	2		0.2	0.5	0.35	subhedral					with pleochroism from brown to colorless
Opaque	3	3		0	1	0.3	anhedral-subhedral					

SECONDARY MINERALOGY

Alteration domain or feature: Total alteration (%): 18.51
Recrystallization: Recrystallization degree:
General alteration comment:

	Present (%)	Comment
Actinolite	15	replacing cpx
Green hornblende	5	replacing cpx
Brown hornblende	2	replacing cpx
Chlorite	3	replacing cpx and plag
Secondary plag.	5	replacing plag
Magnetite	3	replacing cpx
Pyrite	0.5	disseminated
Chalcopyrite	0.01	disseminated
Other sulfides	0.1	disseminated

VEINS AND HALOS

Vein fill compositional comment:	Vein generation:	Average vein thicknes (mm):	Halo width (mm):	Total halo (%):

MICROSTRUCTURES
Microstructure comments

SAMPLE: 335(312)-1256D-231R-2-W 13/16-TS 111
Rock name: medium-grained gabbronorite
Rock comment: Olivine is entirely altered in this section to a talc + magnetite core with a rim of actinolite + chlorite. There are no veins in this section. inequigranular, seriate to poiklitic
Unit/subunit: 92A
Piece no.: 1A

PRIMARY MINERALOGY Number of domains: 1 Nature of igneous domains:

Igneous domain name: domain 1 Domain lithology: medium-grained gabbronorite
Domain grain size: medium-grained Grain size distribution: inequigranular
Domain texture: seriate Relative abundance (%):
General comment:

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Olivine	0	0.001					anhedral-subhedral					completely altered
Plagioclase	48	50		0.5	2.6	2	subhedral-euhedral		abundant			sometimes needle-like, commonly strong zoning
Clinopyroxene	15	30		1	4	2	subhedral					partly altered to actinolite
Orthopyroxene	10	18		1	3	2	anhedral					
Opaque	1	1		0	1	0.3	subhedral					

SECONDARY MINERALOGY

Alteration domain or feature: Total alteration (%): 18.9
Recrystallization: Recrystallization degree:
General alteration comment:

	Present (%)	Comment
Actinolite	20	replacing cpx (and olivine rims) and opx
Brown hornblende	3	replacing cpx
Talc	1.5	replacing olivine
Chlorite	8	plag, replacing cpx (and olivine rims)
Secondary plag.	2	replacing plag
Pyrite	0.2	disseminated
Chalcopyrite	0.2	disseminated
Other sulfides	1	disseminated

VEINS AND HALOS

Vein fill compositional comment:	Vein generation:	Average vein thicknes (mm):	Halo width (mm):	Total halo (%):

MICROSTRUCTURES
Microstructure comments

SAMPLE: 335(312)-1256D-231R-3-W 21/25-TS 112
Rock name: medium-grained oxide gabbronorite
Rock comment: There are no veins in this thin section. Olivine replacement is either partial (with fresh olivine core with brown-green pleochroic phyllosilicate and magnetite inner reaction rim and outer, actinolite-chlorite rim) or complete (with talc + magnetite core and chlorite-actinolite outer rim). / Titanomagnetite crystals present a wek exolution of ilmenite, mostly as patches in the border and as planes in the iner portion of the crystal.
Unit/subunit: 92A
Piece no.: 2

PRIMARY MINERALOGY Number of domains: 1 Nature of igneous domains:

Igneous domain name: domain 1 Domain lithology: medium-grained oxide gabbronorite
Domain grain size: medium-grained Grain size distribution: inequigranular
Domain texture: seriate Relative abundance (%):
General comment:

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Olivine	0.001	1		0.2	1.2	0.8	anhedral-subhedral					accompanied by opx
Plagioclase	48	50		0.4	2	1	subhedral-euhedral		abundant			partly altered, commonly zoned
Clinopyroxene	15	34		0.4	4	2	anhedral					partly replaced by actinolite, oikocrystic
Orthopyroxene	7	10		0.2	5	2	anhedral					oikocrystic
Opaque	5	5		0.001	2		subhedral					disminated tiny oxides. subhedral 1-2mm Fe-Ti oxides occuring at the replaced cpx

SECONDARY MINERALOGY

Alteration domain or feature: Total alteration (%): 21.6
Recrystallization: Recrystallization degree:
General alteration comment: There are no veins in this thin section. Olivine replacement is either partial (with fresh olivine core with brown-green pleochroic phyllosilicate and magnetite inner reaction rim and outer, actinolite-chlorite rim) or complete (with talc + magnetite core and chlorite-actinolite outer rim). / Titanomagnetite crystals present a wek exolution of ilmenite, mostly as patches in the border and as planes in the iner portion of the crystal.

	Present (%)	Comment
Actinolite	20	replacing cpx, opx (rims of olivine)
Green hornblende	3	replacing cpx
Brown hornblende	2	replacing cpx
Talc	1	replacing olivine
Chlorite	8	replacing cpx, plag (rims of olivine)
Secondary plag.	4	replacing plag
Magnetite	4	replacing cpx & olivine
Pyrite	0.1	disseminated
Other	0.5	green-brown phyllosilicate replacing olivine

VEINS AND HALOS

Vein fill compositional comment:	Vein generation:	Average vein thicknes (mm):	Halo width (mm):	Total halo (%):

MICROSTRUCTURES
Microstructure comments

SAMPLE: 335(312)-1256D-232R-1-W 97/100-TS 113
Rock name: medium-grained disseminated gabbronorite
Rock comment: There are no veins in this section. The plagioclase in this section commonly has millions of tiny tiny inclusions in, giving an almost grey appearance in plane polarized light. The inclusions are commonly observed in strands parallel to twin planes. There is no contact in this section. The plagioclase with poikilitic texture have mostly a larger grain size (>1mm) than the plagioclase with seriate texture / Titanomagnetite crystals are unusually broken in this section. They do not seem to be strongly associated with titanite. In some places, they seem to coexist with pyrite or unusual large crystals of ilmenite. Larger titanomagnetite crystals display a cery weak lammla exolution of ilmenite. equigranular poikilitic to seriate, containing granoblastic xenolith
Unit/subunit: 92A
Piece no.: 5C

PRIMARY MINERALOGY Number of domains: 1 Nature of igneous domains:

Igneous domain name: domain 1 Domain lithology: medium-grained disseminated gabbronorite
Domain grain size: medium-grained Grain size distribution: inequigranular
Domain texture: poikilitic Relative abundance (%):
General comment:

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Olivine	0	1		0.3	0.8	0.5	anhedral					completely altered, accompaied by opx
Plagioclase	49	50		0.2	2	1	subhedral-euhedral		abundant			tiny inclusions, zoned
Clinopyroxene	5	35		0.2	1.5	0.8	anhedral					altered
Orthopyroxene	9	12		0.2	1.5	0.8	anhedral					
Opaque	2	2		0.2	1	0.4	anhedral-subhedral					occurs in interstices of plag lath

SECONDARY MINERALOGY

Alteration domain or feature: Total alteration (%): 10.1
Recrystallization: Recrystallization degree:
General alteration comment:

	Present (%)	Comment
Actinolite	22	replacing cpx, opx (?), olivine (?). commonly seen as fine-grained aggregates
Brown hornblende	1	replacing cpx
Talc	0.5	seen in the cores of altered olivine with magnetite
Chlorite	4	replacing cpx, plag (olivine?). often associated with actinolite. seen in rims around olivine with actinolite
Magnetite	4	replacing cpx & olivine, tiny blebs in altered cpx and larger crystals when associated with olivine alteration
Pyrite	0.5	disseminated
Chalcopyrite	0.1	disseminated

VEINS AND HALOS

Vein fill compositional comment:	Vein generation:	Average vein thicknes (mm):	Halo width (mm):	Total halo (%):

MICROSTRUCTURES
Microstructure comments

SAMPLE: 335(312)-1256D-232R-2-W 0/3-TS 114
Rock name: contact: diorite / gabbro
Rock comment: The former TS114 has been renamed to TS111. Modal proportions of primary estimated by comparison with standard visual estimation chart. Thin section separate two part ; one is medium-grained diorite part, another is fine-grained gabbronorite part. In diorite part, amphibole coexist with clinopyroxene in one grain. It is difficult to estimate mode of amphibole and clinopyroxene. / Plagioclase looks mostly fresh but contains millions of "tiny tiny" inclusions. Clinoproxene is pale green (secondary diopside?).
Unit/subunit: 92A
Piece no.: 1

PRIMARY MINERALOGY Number of domains: 2 Nature of igneous domains: mix of two lithologies within one gabbro

Igneous domain name: domain 1 Domain lithology: medium-grained oxide qtz-diorite
Domain grain size: medium-grained Grain size distribution: inequigranular
Domain texture: seriate Relative abundance (%):
General comment:

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Plagioclase		30		0.1	5.5	3	subhedral	tabular				hardly altered, anhedral interstital
Clinopyroxene		40		0.5	8	3	subhedral	prismatic				replaced to greenish to pale brownish amphibole
Amphibole		15		0.2	3.2	1.5	subhedral-euhedral					prismatic
Opaque		5		0.05	1.25	0.5	anhedral					
Quartz		10		0.2	3.5	1.7	anhedral					micrographic texture with plag

Igneous domain name: domain 2 Domain lithology: fine-grained oxide gabbronorite
Domain grain size: fine-grained Grain size distribution: inequigranular
Domain texture: seriate Relative abundance (%):
General comment:

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Plagioclase		65		0.05	2.5	0.5	subhedral	tabular	scarce			with numerous "tiny tiny" oxide inclusions, some with microgranular cpx inclusion, often strong zoning, anhedral interstital
Clinopyroxene		18		0.1	0.8	0.4	subhedral					some replaced to pale brownish amphibole
Orthopyroxene		10		0.3	2	1.2	subhedral	prismatic				some with bleb-like inclusion of cpx, subhedral poikilitic to prismatic
Amphibole		2		0.1	0.7	0.3	subhedral					colorless amhibole, show cleavage, prismatic
Opaque		5		0.001	0.8	0.3	anhedral-subhedral					

SECONDARY MINERALOGY

Alteration domain or feature: Total alteration (%):
Recrystallization: Recrystallization degree:
General alteration comment:

	Present (%)	Comment
Green hornblende	15	replacing cpx
Brown hornblende	8	replacing cpx
Chlorite	1.5	replacing plag, green hbl
Magnetite	3	replacing cpx
Pyrite	1	disseminated, often associated with chalcopyrite
Chalcopyrite	0.1	disseminated, often associated with pyrite

VEINS AND HALOS

Vein fill compositional comment:	Vein generation:	Average vein thicknes (mm):	Halo width (mm):	Total halo (%):

MICROSTRUCTURES
Microstructure comments

SAMPLE: 335(312)-1256D-232R-2-W 52/54-TS 115
Rock name: medium-grained oxide gabbronorite with fine-grained fragments
Rock comment: Complex relationship between medium-grained and finer grains parts of this rock. The boundaries are sometimes clear, with coarse grained forming on the medium gained side of the margin, and no clear variation in grain-size of the fine-grained portion towards the margin (see top right part of slide). Some medium-grained zones are also seen to occur within the predominantly fine-grained portion. Only the microcrystalline zones of the fine-grained portion have been described in detail above. However, four or five linear elongate lenses (1x5 mm) of granular plagioclase have fomed within the fine-grained region. These are surrounded by regions of similar thickness that contain up to 1mm diameter oikocrystic/oikoblastic orthopyroxene and clinopyroxene that enclose granular plagioclase and oxides. These pairings into dark and light zones may correspond to some sort of segregation at high temperature, perhaps related to the presence of partial melt (speculation!). / Plagioclase looks mostly fresh but contains millions of "tiny tiny" inclusions. Frequent inclusions-free rims. The presence of olivine in this section prior to alteration is questionable. /

Unit/subunit: 93
Piece no.: 2

PRIMARY MINERALOGY Number of domains: 2 Nature of igneous domains: mix of two lithologies within one gabbro

Igneous domain name: domain 1 Domain lithology: medium-grained oxide gabbronorite
Domain grain size: medium-grained Grain size distribution: inequigranular
Domain texture: seriate Relative abundance (%):
General comment: this domain is regarded as gabbroic matrix

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Olivine	0	2		0.8	1	1	subhedral					entirely altered to oxides and phyllosilicates
Plagioclase	50	55		0.2	2	1.2	subhedral	tabular				dusty alteration
Clinopyroxene	15	25		0.4	1.6	1	anhedral					partially altered to actinolite
Orthopyroxene	13	15		0.4	1.4	1	anhedral					interstitial to sub-ophitic
Opaque	3	3		0.2	0.4	0.3	anhedral					interstitial

Igneous domain name: domain 2 Domain lithology: fine-grained gabbro
Domain grain size: fine-grained Grain size distribution: equigranular
Domain texture: Relative abundance (%):
General comment: this domain is regarded as "fragments"; probably xenoliths of stoped dikes

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Plagioclase	55	55		0.1	0.1	0.1	subhedral	columnar				granular
Clinopyroxene	40	45		0.1	0.2	0.15	anhedral	equant				granular
Opaque	0.001	0.001		0.01	0.03	0.02	anhedral					interstitial

SECONDARY MINERALOGY

Alteration domain or feature: medium-grained gabbro Total alteration (%): 12.01
Recrystallization: Recrystallization degree:
General alteration comment:

	Present (%)	Comment
Actinolite	6	replacing cpx, opx
Green hornblende	5	replacing cpx
Brown hornblende	1	replacing cpx
Chlorite	2	replacing plag
Magnetite	3	replacing cpx & olivine (?), seen as blebs associated with amphiboles and larger grains potentially associated with olivine alteration
Pyrite	1	disseminated
Chalcopyrite	0.01	disseminated

Alteration domain or feature: microcrystalline part of the Total alteration (%): 0
Recrystallization: Recrystallization degree:
General alteration comment: Alteration of the cpx is only very minor

	Present (%)	Comment
Actinolite	5	replacing cpx

VEINS AND HALOS

Vein fill compositional comment:	Vein generation:	Average vein thicknes (mm):	Halo width (mm):	Total halo (%):

MICROSTRUCTURES
Microstructure comments

SAMPLE: 335(312)-1256D-232R-2-W 98/100-TS 116
Rock name: contact: dike/gabbro
Rock comment: Modal proportions estimated by comparison with visual chart. The coarsest gabbro unit seems to have entrained the fine-grained material. There is an unusual band of clinopyroxene/amphibole which is about 2 mm wide and runs sub-parallel to the contact between coarse and fine material, at a distance of about 2mm from the contact. This clinopyroxene/amphibole is packed with oxide inclusions. Most of the larger orthopyroxene crystals are also concentrated close to the margin. The contact between the coarsest gabbro and the fine-grained material is fairly distinct and sutured. However, the contact between the finer medium-grained gabbro and the fine-grained material is not always sharp and is commonly gradational. The origin of the fine-grained rock is under debate. One possibility is that it was a fine-grained bsaltic rock that was subsequently reheated to first form a granular texture, and then perhaps in a second event, the development of the orthopyroxene oikocrysts/blasts which enclose the granular texture. One argument in favour of such a mechanism comes from stufy of the texture of the fine-grained dike material from above the gabbro, as observed in thin section 99, which has a very similar plagioclase texture, and has granular rather than oikocryst/blast orthopyroxene. Another possibility is that the rock was originally intruded as a fine-greained gabbronorite, and that the orthopyroxene overgrowth textures are part of the original igneous fabric. In this case the granular nature of the clinopyroxene must also be a primary igneous feature, and is not like any of the other fine-grained intrusive rocks seen in this section that have retained their igneous texture. The fine-grained part may either be part of the adjoining fine-grained unit, or possibly a fine-grained xenolith within the gabbro./ Olivine replacement in the bottom section occurs with the formation of a magnetite rich rim and phyllosilicate core. All plagioclase crystals look fresh but contain an "infinity" of tiny-tiny inclusions, giving the plagioclase a general light gray apperance. The rim of plagioclase is frequently inclusions-free.

Unit/subunit: 93
Piece no.: 9

PRIMARY MINERALOGY Number of domains: 3 Nature of igneous domains: contact between two units

Igneous domain name: domain 1 Domain lithology: coarse-grained qtz-bearing gabbronorite
Domain grain size: coarse-grained Grain size distribution: inequigranular
Domain texture: seriate Relative abundance (%):
General comment: top of slide

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Plagioclase	40	55		0.8	4	2	subhedral					shows concentric zoning. dusty alteration
Clinopyroxene	0	30		0.4	4	1.5	subhedral					interstitial
Orthopyroxene	4	8		0.8	3	2	subhedral					often enclosing small plag and cpx crystals
Opaque	2	2		0.8	4	1	anhedral-subhedral					interstitial
Quartz	5	5		0.4	4	3	anhedral					granophyric intergrowth

Igneous domain name: domain 2 Domain lithology: medium-grained qtz-bearing gabbronorite
Domain grain size: medium-grained Grain size distribution: inequigranular
Domain texture: seriate Relative abundance (%):
General comment: bottom of slide

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Olivine	1	0.001										altered to oxide rim (see alteration comments below)
Plagioclase	40	55		0.2	2	1.4	subhedral	tabular				some dusty alteration
Clinopyroxene	25	35		1	2	1.5	anhedral					ophitic
Orthopyroxene	8	8		1	3	2	anhedral-subhedral					near margin with finer grained basalt, contains many tiny cpx. ophitic and interstitial-subhedral
Opaque	1	1		0.5	2	0.5						
Quartz	1	1		0.1	0.5	1	anhedral					granophyric blebs and patches?

Igneous domain name: domain 3 Domain lithology: fine-grained basalt
Domain grain size: fine-grained Grain size distribution: equigranular
Domain texture: Relative abundance (%):
General comment: middle of slide, granular altered

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Plagioclase	40	55		0.2	0.8	0.4	subhedral	tabular				granular texture, with larger crystals often being tabular, and smaller subequant
Clinopyroxene	15	26		0.2	0.4	0.3	subhedral					granular, altered to dusty appearance
Orthopyroxene	14	16		1	5	3	anhedral					large crystals enclosing granular plag, poikilitic/poikiliblastic
Opaque	3	3		0.1	1	0.4	anhedral					interstitial

SECONDARY MINERALOGY

Alteration domain or feature: coarser medium-grained Total alteration (%): 20.2
Recrystallization: Recrystallization degree:
General alteration comment:

	Present (%)	Comment
Actinolite	25	replacing cpx, often seen as halos around relatively unaltered cpx
Chlorite	12	replacing cpx & plag. seen along fractures and twin planes in plag
Secondary plag.	5	replacing plag
Magnetite	2	replacing cpx, olivine
Pyrite	0.1	disseminated
Chalcopyrite	0.1	disseminated

Alteration domain or feature: fine-grained granular Total alteration (%):
Recrystallization: Recrystallization degree:
General alteration comment:

	Present (%)	Comment
Actinolite	2	replacing cpx and opx
Chlorite	1	replacing cpx
Dusty CPX	5	replacing cpx
Secondary plag.	3	replacing plag
Pyrite	0.5	disseminated
Chalcopyrite	0.05	disseminated

Alteration domain or feature: finer medium-grained Total alteration (%):
Recrystallization: Recrystallization degree:
General alteration comment:

	Present (%)	Comment
Actinolite	7	replacing cpx
Brown hornblende	1	replacing cpx
Chlorite	8	replacing cpx, plag
Secondary plag.	10	replacing plag
Magnetite	2	replacing cpx
Pyrite	0.5	disseminated
Chalcopyrite	0.5	disseminated
Other	0.1	phyllosilicate (unidentified) replacing olivine

VEINS AND HALOS
Vein fill compositional comment: Vein generation: Average vein thicknes (mm): Halo width (mm): Total halo (%):

MICROSTRUCTURES
Microstructure comments

SAMPLE: 335(312)-1256D-233R-1-W 13/15-TS 120
Rock name: fine-grained aphyric basalt
Rock comment: This rock is strongly metamorphosed by post-magmatic high-temperature metamorphism, and tprimary igneous texture and mineralogy are unclear. Hence, secondary, metamorphic assemblages are described as "primary features". No igenous contact in that section. A 50um small vein filled by actinolite/cpx brown stuff is visible. / All plagioclase crystals look fresh but contain an "infinity" of tiny-tiny inclusions, giving the plagioclase a general light gray apperance. The rim of plagioclase is frequently inclusion-free. Several sinuous 0.05-0.1 mm veins of actinolitic hornblende, invading the host-rock.
Unit/subunit: 94
Piece no.: 2

PRIMARY MINERALOGY Number of domains: 1 Nature of igneous domains:

Igneous domain name: domain 1 Domain lithology: fine-grained aphyric basalt
Domain grain size: fine-grained Grain size distribution: inequigranular
Domain texture: Relative abundance (%):
General comment:

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Plagioclase	45	50		0.2	1.5	0.5	subhedral-euhedral		abundant			commonly zoned
Clinopyroxene	15	38		0.2	0.8	0.5	anhedral					altered
Orthopyroxene	0.001	10		0.1	0.3	0.2	anhedral					granular
Opaque	2	2		0.1	0.3	0.1	subhedral					

SECONDARY MINERALOGY

Alteration domain or feature: Total alteration (%): 18.1
Recrystallization: Recrystallization degree:
General alteration comment:

	Present (%)	Comment
Actinolite		replacing cpx, opx
Chlorite	5	replacing cpx
Ilmenite		3
Pyrite	0.1	disseminated

VEINS AND HALOS

Vein fill compositional comment:	Vein generation:	Average vein thicknes (mm):	Halo width (mm):	Total halo (%):

MICROSTRUCTURES
Microstructure comments

SAMPLE: 335(312)-1256D-234R-1-W 19/22-TS 117
Rock name: fine-grained basalt
Rock comment: Highly altered fine-grained basalt from beneath the lower gabbro. Is highly recrystallized but does not have a granular appearance. Alteration typical of actinolitic-hornblende-rich alteration in Cores 180R-ish. Abundant dusty, corroded clinopyroxene. No sign of granoblastic texture. The mode which is described is from the groundmass; phenocrysts were described as < 1%
Unit/subunit: 95
Piece no.: 7

PRIMARY MINERALOGY Number of domains: 1 Nature of igneous domains:

Igneous domain name: domain 1 Domain lithology: fine-grained basalt
Domain grain size: fine-grained Grain size distribution: inequigranular
Domain texture: Relative abundance (%):
General comment:

	Present (%)	Original (%)	Vol. repl. (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Zoning	Color, exsolution	Special features	Comment
Plagioclase	5	50		0.1	0.5	0.2	subhedral					numbers given are for the groundmass; groundmass plag is atered to secondarz plag + actinolite. rare glomerocryst with cpx; plag "overgrowth around cpx glomerocryst? highly altered to secondary plag + amphibole
Clinopyroxene	5	44		0.2	0.8	0.5	anhedral					altered to to dusty cpx + actinolite
Opaque	5	5		0.1	0.3	0.5	euhedral-anhedral	acicular to equant sub-angular				

SECONDARY MINERALOGY

Alteration domain or feature: Total alteration (%): 87
Recrystallization: Recrystallization degree:
General alteration comment:

	Present (%)	Comment
Green hornblende	14	replacing cpx, plag
Chlorite	5	replacing cpx, plag. green-brown in places - chlorite-smectite?
Dusty CPX	20	replacing cpx
Quartz	3	interstitial
Secondary plag.	45	replacing plag

VEINS AND HALOS

Vein fill compositional comment:	Vein generation:	Average vein thicknes (mm):	Halo width (mm):	Total halo (%):

MICROSTRUCTURES
Microstructure comments