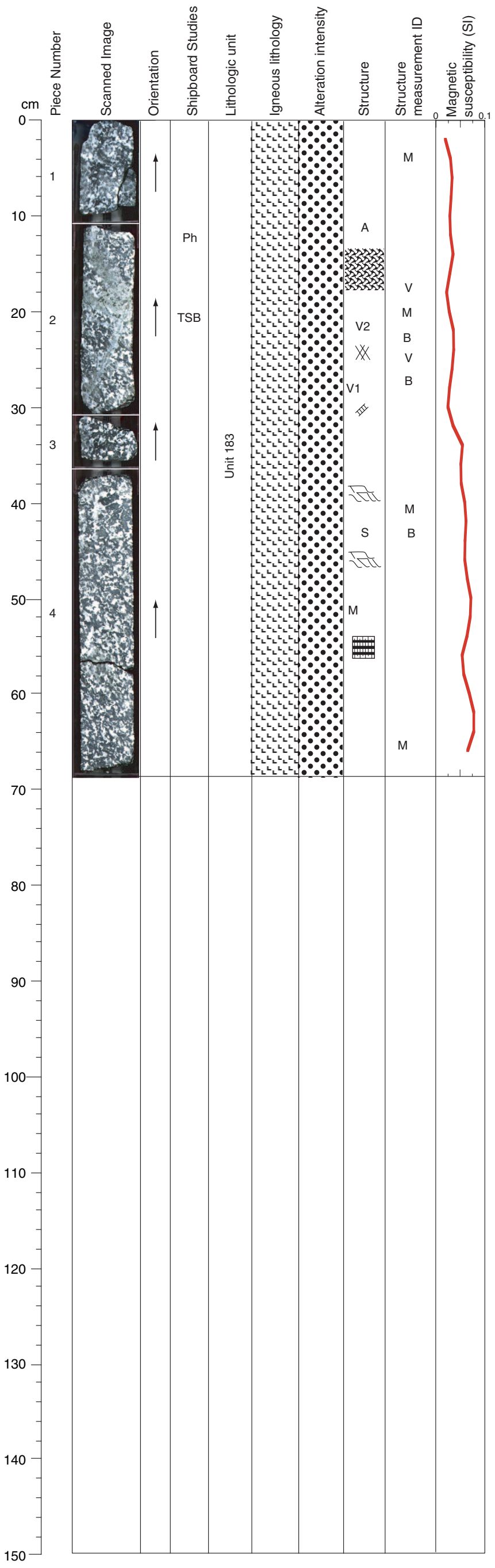
Core Photo



304-U1309D-70R-1 (Section top: 358.00 mbsf)

UNIT-183: Leucocratic Troctolitic Gabbro
Pieces 1–4

PRIMARY MINERALOGY: Determined from Piece 4A (Troctolitic Gabbro)

Olivine	Modal 40% Size 3-10 mm Shape anhedral
Plagioclase	Modal 50% Size 3-9 mm Shape anhedral
Clinopyroxene	Modal 10% Size 4-10 mm Shape anhedral

COMMENTS: This section consists of coarse-grained troctolitic gabbro with domains of olivine gabbro characterized by a higher pyroxene-content. Plagioclase is homogeneously distributed throughout the section whereas clinopyroxene occurs in domains. Weak magmatic foliation is seen in Pieces 1, 3 and 4. Pieces 2 and 3 are cut by a 3 mm wide, fine-grained gabbroic dike.The plagioclase-olivine ratio is inverted compared to the mafic rocks from the previous cores. Clinopyroxene seems to be the last phase to crystallize. A drastic change in crystallization order characterizes this lithology.

SECONDARY MINERALOGY: This section consists of moderately altered olivine gabbro. Olivine appears partially fresh, or rimmed by chlorite because of reaction with surrounding plagioclase. Secondary magnetite is present and forms a mesh texture with serpentine after olivine. Plagioclase may also be altered to prehnite.

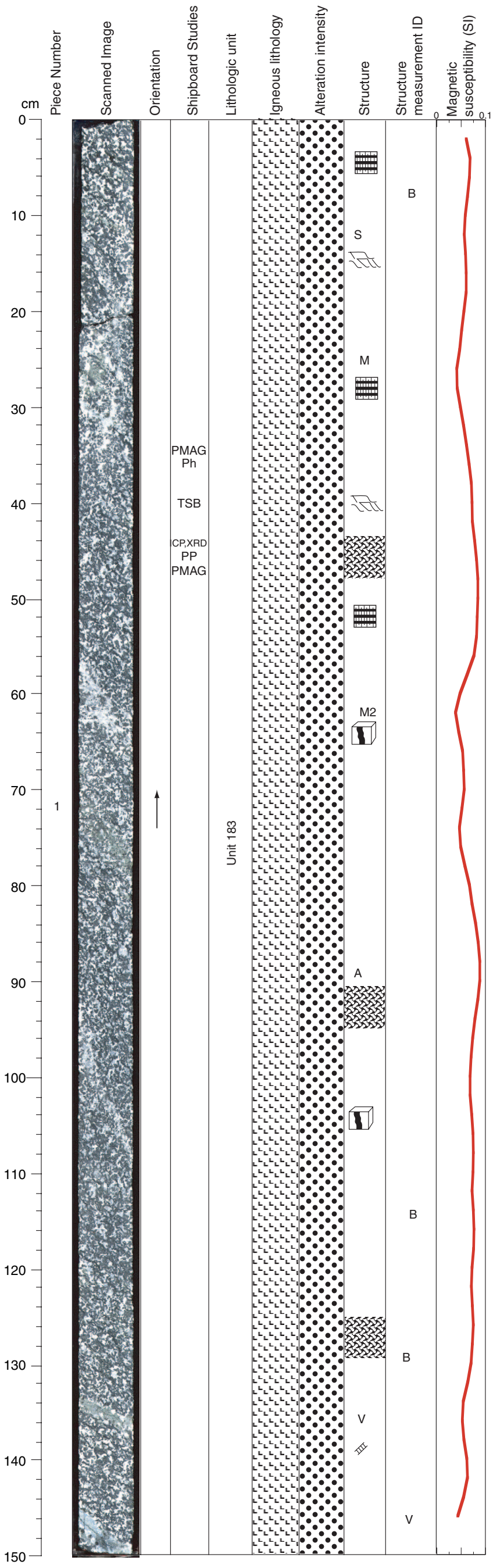
VEIN ALTERATION: A green actinolite vein is present in Piece 2.

THIN SECTIONS:
304-U1309D-70R-1, 19.0- 21.0 cm (#241)

STRUCTURE: A very weak fabric (M) is best defined in Piece 4. Serpentinite mesh texture (S) within the black, serpentine rich portions, and some of the feldspar follows the magmatic fabric. Patchy green alteration (A) grades into a vein (V1) with cross veins (V2) of green serpentine. Thin, black serpentine veinlets intersect plagioclase focussing prehnite alteration (chalky white versus cloudy white). M>S>A>V1>V2

CLOSE UP PHOTOGRAPHS:
1309D_70R_1_11_30.jpg

Core Photo



304-U1309D-70R-2 (Section top: 358.69 mbsf)

UNIT-183: Leucocratic Troctolitic Gabbro
Piece 1

PRIMARY MINERALOGY: Determined from Piece 1A (Troctolitic Gabbro)

Olivine	Modal 40% Size 3-10 mm Shape anhedral
Plagioclase	Modal 50% Size 3-9 mm Shape anhedral
Clinopyroxene	Modal 10% Size 4-10 mm Shape anhedral

COMMENTS: This section consists of coarse-grained troctolitic gabbro with pyroxene-rich domains and is the continuation of the previous section. A weak magmatic foliation with plagioclase- and pyroxene-rich layers is visible. Plagioclase layers occur at 61 cm and 101 cm; pyroxene-rich layer occur at 10 cm, 26-32 cm, 75 cm, 135 cm and 147 cm. A dikelet/vein crosses at 32 cm. Serpentine veins are parallel to the magmatic foliation.

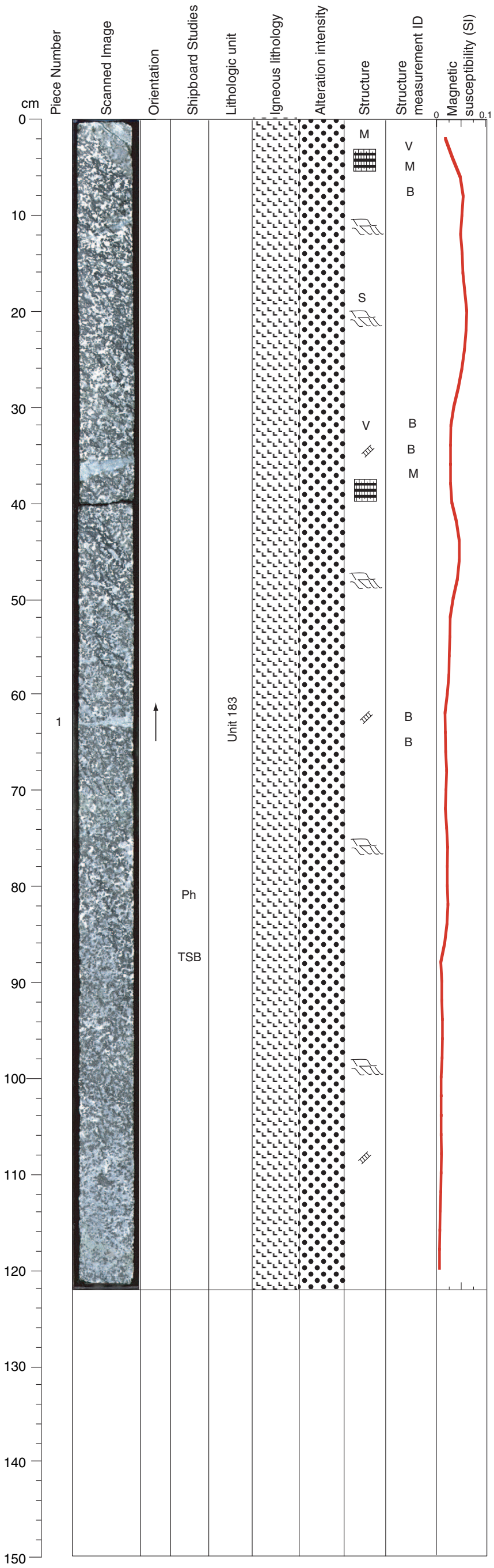
SECONDARY MINERALOGY: This section consists of moderately altered olivine gabbro. Olivine is partially fresh and rimmed by chlorite where it reacted with surrounding plagioclase. Secondary magnetite is present and forms a kind of “mesh” with serpentine after olivine. Plagioclase is altered to prehnite.

THIN SECTIONS:
304-U1309D-70R-2, 39.0-42.0 cm (#242)

STRUCTURE: Dipping magmatic fabric (M) with superposed serpentinization (mesh-texture serpentinite) (S). Patchy alteration (A) and prehnite alteration of feldspar (along the trace of serpentinization fabric). Some local plagioclase enrichment (M2) and later green veins (A). M>M2>S>A

CLOSE UP PHOTOGRAPHS:
1309D_70R_2_36_56.jpg

Core Photo



304-U1309D-70R-3 (Section top: 360.19 mbsf)

UNIT- 183: Leucocratic Troctolitic Gabbro
Piece 1

PRIMARY MINERALOGY: Determined from Piece 1 (20-30 cm interval) (Troctolitic Gabbro)

Olivine	Modal 40% Size 3-10 mm Shape anhedral
Plagioclase	Modal 50% Size 3-9 mm Shape anhedral
Clinopyroxene	Modal 10% Size 4-10 mm Shape anhedral

PRIMARY MINERALOGY: Determined from Piece 1 (30-40 cm interval) (Olivine Gabbro)

Olivine	Modal 35% Size 3-10 mm Shape anhedral
Plagioclase	Modal 45% Size 3-9 mm Shape anhedral
Clinopyroxene	Modal 20% Size 4-10 mm Shape anhedral

COMMENTS: This section consists of coarse-grained troctolitic gabbro with domains of olivine gabbro. Abundance of pyroxene increases downsection and olivine gabbro dominates. Modal composition shifts to higher plagioclase-olivine ratios, with olivine less abundant between 101 and 121 cm. A clinopyroxene-rich domain occurs between 0 and 3 cm. Alteration veins cut the magmatic foliation at 12 cm, 37 cm, 63 cm and 117 cm; serpentine veins parallel the fabric.

SECONDARY MINERALOGY: This section consists of moderately altered plagioclase. Olivine appears fresh, or is rimmed by chlorite on reaction with plagioclase. Abundant secondary magnetite is present and forms a mesh texture with serpentine after olivine. Plagioclase is altered to prehnite.

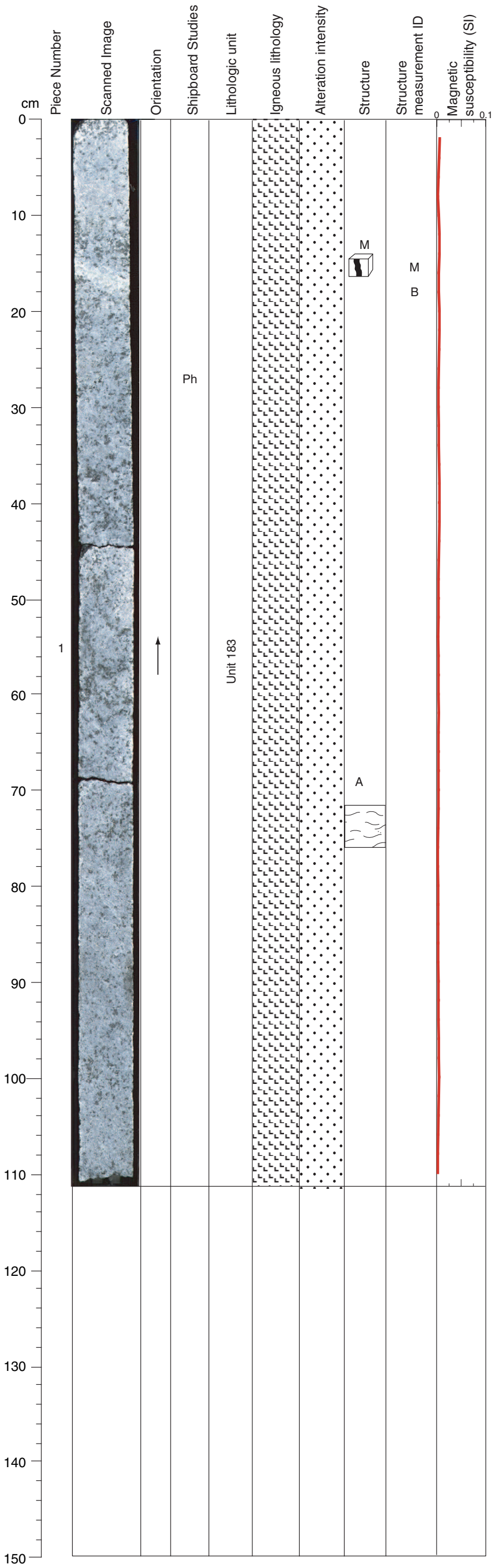
VEIN ALTERATION: Some actnolite-chlorite veins are present in this section (e.g. 36-38 cm).

THIN SECTIONS:
304-U1309D-70R-3, 86.0- 88.0 cm (#243)

STRUCTURE: Strong serpentinite fabric (S). Blue veins (V) dip out of the cut face plane with variable dips. S=>V

CLOSE UP PHOTOGRAPHS:
1309D_70R_3_80_95.jpg

Core Photo



304-U1309D-71R-1 (Section top: 362.80 mbsf)

UNIT-184: Leucocratic Troctolitic Gabbro
Piece 1

PRIMARY MINERALOGY: Determined from Piece 1B (Troctolitic Gabbro)

Olivine	Modal 20% Size 3-6 mm Shape anhedral
Plagioclase	Modal 70% Size 3-11 mm Shape anhedral
Clinopyroxene	Modal 10% Size 3-5 mm Shape anhedral

COMMENTS: This section consists of coarse-grained troctolitic gabbro with domains of olivine gabbro. Modal composition shifts to higher plagioclase-olivine ratios at the top of the section. A clinopyroxene-rich area occurs below 70 cm and the composition grades to olivine gabbro. A chromite-rich spot occurs at 30 cm and an alteration vein at 18 cm.

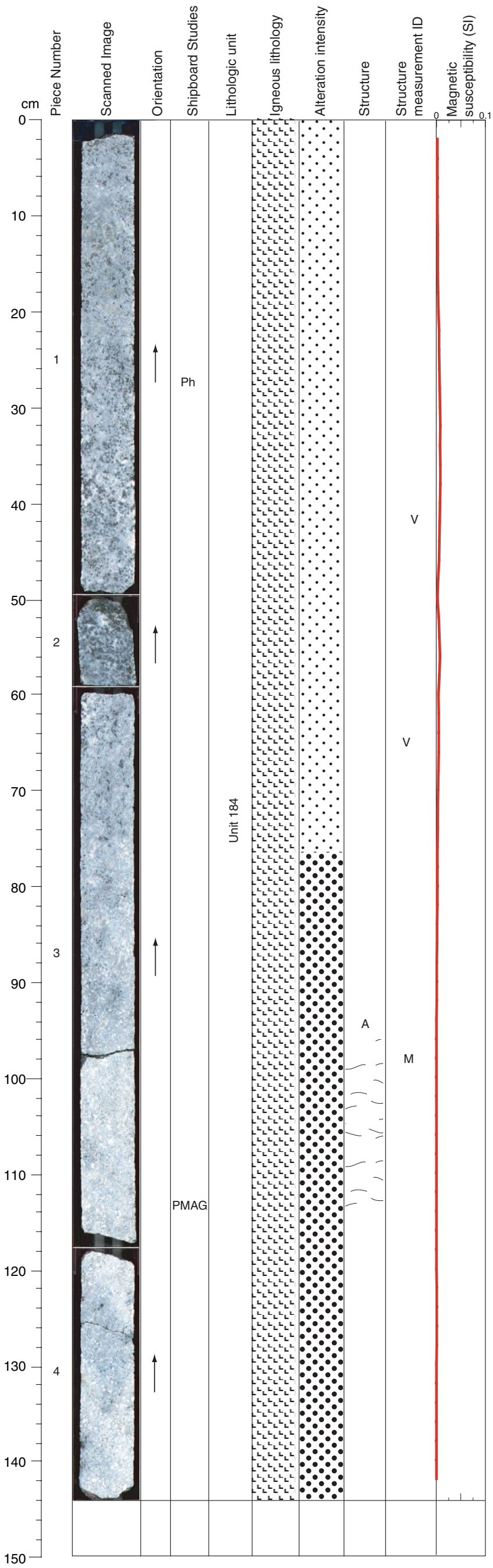
SECONDARY MINERALOGY: The section consists of slightly altered gabbro containing small amounts of chlorite and actinolite.

VEIN ALTERATION: No veins in this section.

STRUCTURE: Coarse-grained gabbro with a few subhorizontal bands of altered plagioclase-rich material (M). One or two “seams” of oxides (or other dark, fine grained minerals) (A). M>?A

CLOSE UP PHOTOGRAPHS:
1309D_71R_1_26_34.jpg

Core Photo



304-U1309D-71R-2 (Section top: 363.92 mbsf)

UNIT-184: Leucocratic Troctolitic Gabbro
Pieces 1–4

PRIMARY MINERALOGY: Determined from Piece 1 (Olivine Gabbro)

Olivine	Modal 20% Size 3-6 mm Shape anhedral
Plagioclase	Modal 64% Size 3-7 mm Shape anhedral
Clinopyroxene	Modal 15% Size 2-5 mm Shape anhedral
Spinel	Modal 1% Size 1-4 mm Shape anhedral

COMMENTS: This section consists of coarse-grained troctolitic gabbro. A clinopyroxene-rich area occurs between 0 cm and 29 cm, and is similar of the bottom part of previous section. Below 29 cm, clinopyroxene abundance is low and olivine gabbro grades to troctolitic gabbro. Simultaneously, the rock color changes and the degree of serpentinization decreases. However, clinopyroxene-content increases again from 123 cm onward and olivine gabbro appears. The style of olivine alteration changes from serpentinization to corona texture below 79 cm.

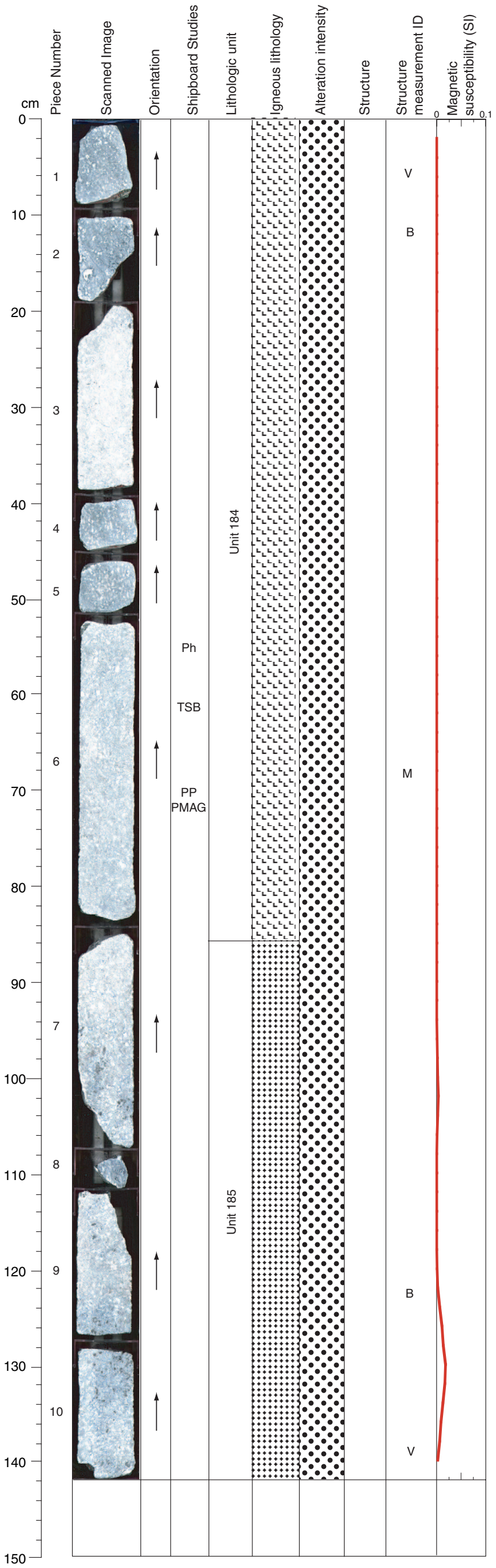
SECONDARY MINERALOGY: The upper part of the section (from 0 to 75 cm) consists of slightly altered gabbro. From 75 to 144 cm the core consists of moderately altered troctolite in which coronas of chlorite, actinolite, and talc have formed between olivine and plagioclase.

VEIN ALTERATION: No veins in this section.

STRUCTURE: Gabbro with variable grain size; into Piece 3 a steeply inclined plagioclase-rich domain with superposed grain boundary alteration (A) (note: alteration follows a primary fabric). Piece 4 contains a pyroxene rich layer (M). M>A

CLOSE UP PHOTOGRAPHS:
1309D_71R_2_26_46.jpg

Core Photo



304-U1309D-71R-3 (Section top: 365.36 mbsf)

UNIT-184: Serpentinized Leucocratic Troctolitic Gabbro
Pieces 1–7

PRIMARY MINERALOGY: Determined from Piece 3A

Olivine	Modal 15% Size 3-9 mm Shape anhedral
Plagioclase	Modal 80% Size 3-15 mm Shape anhedral
Clinopyroxene	Modal 5% Size 4-2 mm Shape anhedral

COMMENTS: This unit consists of coarse-grained troctolitic gabbro with very low clinopyroxene-content. Olivine grain size range between 3 to 15 mm and show corona textures.

UNIT-185: Layered Leucocratic Olivine Gabbro
Pieces 7–10

PRIMARY MINERALOGY: Determined from Piece 7

Olivine	Modal 15% Size 3-7 mm Shape anhedral
Plagioclase	Modal 60% Size 3-15 mm Shape anhedral
Clinopyroxene	Modal 25% Size 3-10 mm Shape anhedral

COMMENTS: This unit consists of coarse–grained olivine gabbro and the first occurrence of a clinopyroxene-rich band marks the boundary between Unit 184 and Unit 185. Clinopyroxene-rich bands occur between 85-97 cm and 128-136 cm.

SECONDARY MINERALOGY: The core consists of moderately altered troctolite with coronas of chlorite, actinolite, and talc formed between olivine and plagioclase. Only a few relict olivine persist.

VEIN ALTERATION: Blue talc vein at 111 - 119 cm.

THIN SECTIONS:
304-U1309D-71R-3, 61.0-63.0 cm (#244)

STRUCTURE: Green, grain boundary alteration (around plagioclase and olivine) does not define a fabric. Variable plagioclase and pyroxene down the core. (No structure symbols inserted).

CLOSE UP PHOTOGRAPHS:
1309D_71R_3_54_84.jpg

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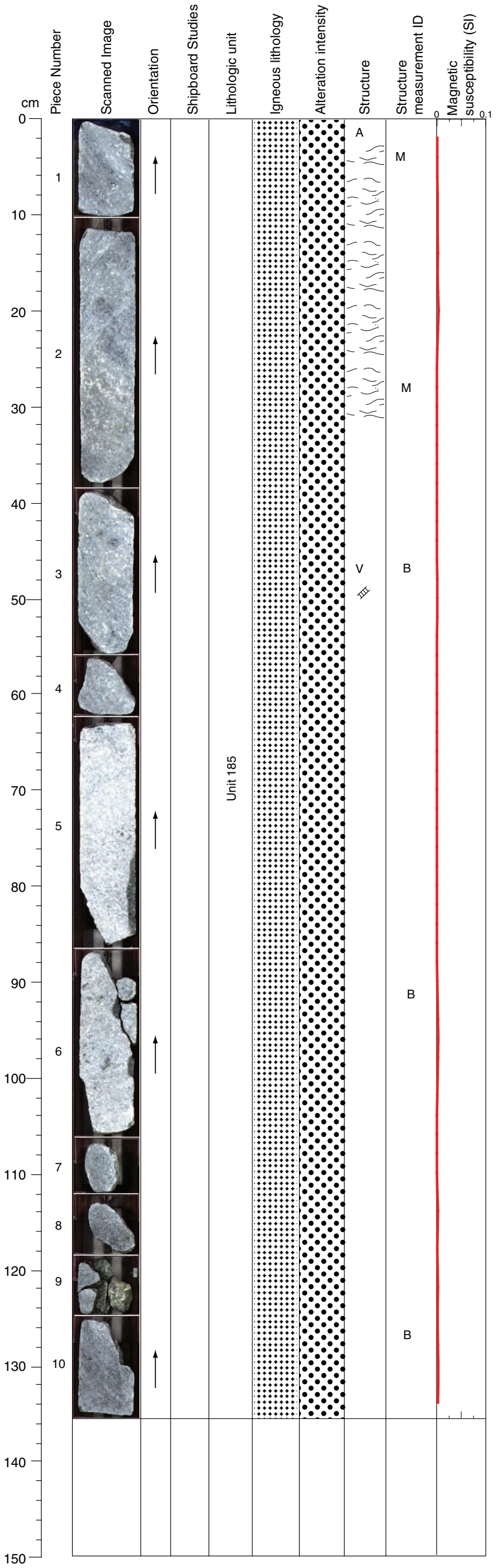


304-U1309D-71R-4 (Section top: 366.78 mbsf)

UNIT-185: Layered Leucocratic Olivine Gabbro
Pieces 1–10

PRIMARY MINERALOGY: Determined from Piece 3

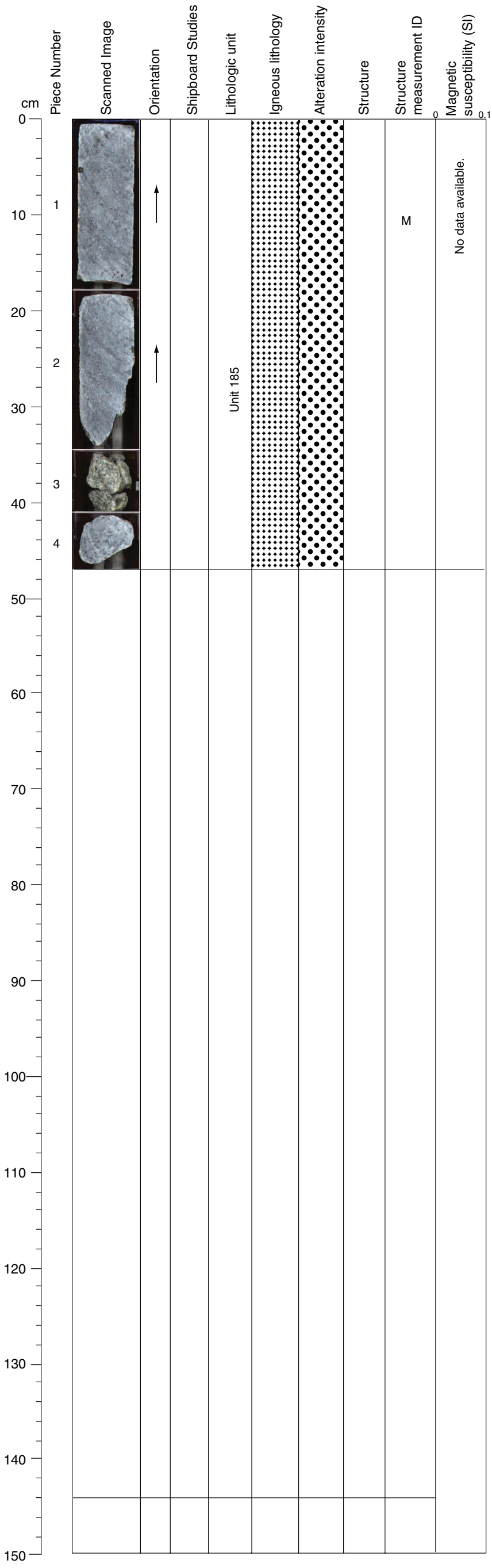
Olivine	Modal 20% Size 2-6 mm Shape anhedral
Plagioclase	Modal 78% Size 3-11 mm Shape anhedral
Clinopyroxene	Modal 2% Size 1-2 mm average, 9 mm maximum Shape anhedral

COMMENTS: This is a heterogenous section in terms of modal composition with pyroxene-rich domains. It consists dominantly of troctolitic gabbro with olivine gabbro domains. Very plagioclase-rich areas occur between 25 cm and 55 cm. A clinopyroxene band crosses at 32 cm. This is a transitional unit with the change in pyroxene habits from oikocrysts to coarse grains.

SECONDARY MINERALOGY: The section consists of moderately altered troctolite in which coronas of chlorite, actinolite, and talc have formed between olivine and plagioclase. Some relict olivine is present.

STRUCTURE: Pyroxene and plagioclase proportions are variable down the core. Troctolitic alteration is very weak but parallels the steeply dipping fabric (A). A single green vein (V) in Piece 3 is steeply dipping and localized in a plagioclase rich area. The section becomes more pyroxene rich toward the base of the section. A>V

Core Photo



304-1309D-71R-5 (Section top: 368.13 mbsf)

UNIT-185: Layered Leucocratic Olivine Gabbro
Pieces 1–4

PRIMARY MINERALOGY: Determined from Piece 1

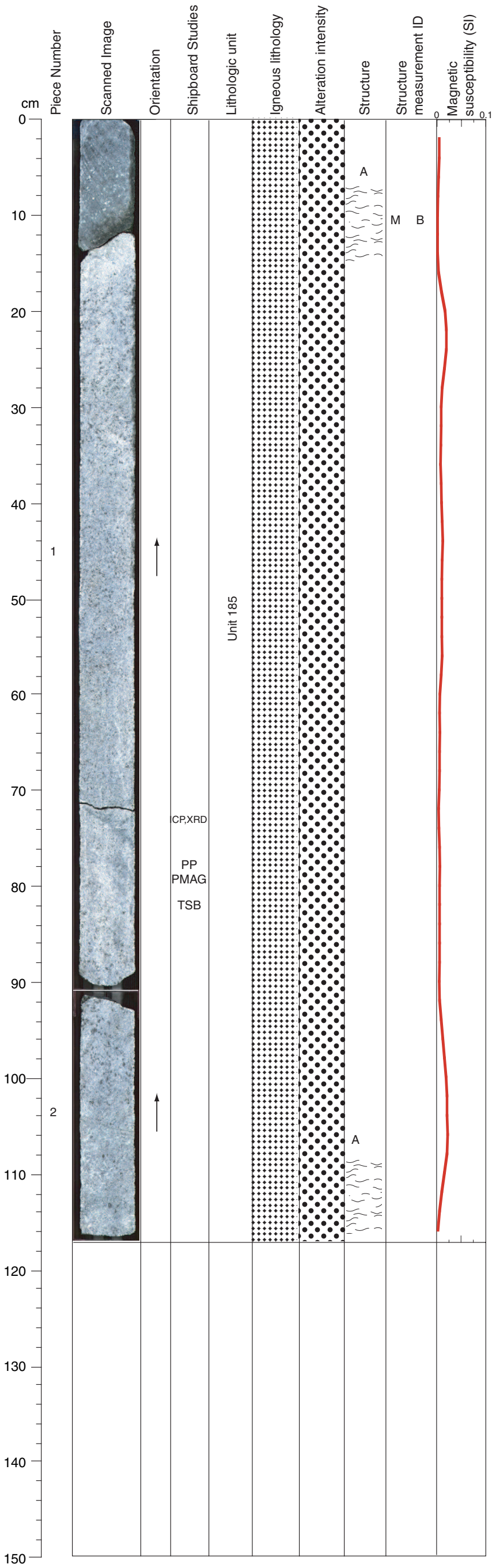
Olivine	Modal 20% Size 2-3 mm Shape anhedral
Plagioclase	Modal 75% Size 4-7 mm Shape anhedral
Clinopyroxene	Modal 5% Size 3-5 mm Shape anhedral

COMMENTS: This unit consists of medium- to coarse-grained troctolitic gabbro with olivine gabbro domains. It is the continuation of the previous section.

SECONDARY MINERALOGY:The section consists of moderately altered troctolite in which coronas of chlorite, actinolite, and talc have formed between olivine and plagioclase

STRUCTURE: Dark gabbro with no structure of note. Chips (Piece 3) show no evidence of faulting. No structure symbols indicated.

Core Photo



304-U1309D-72R-1 (Section top: 367.60 mbsf)

UNIT-185: Layered Leucocratic Olivine Gabbro
Pieces 1–2

PRIMARY MINERALOGY: Determined from Piece 1B

Olivine	Modal 20% Size 2-5 mm Shape anhedral
Plagioclase	Modal 70% Size 3-10 mm Shape anhedral
Clinopyroxene	Modal 10% Size 20 mm average, 35 mm maximum Shape anhedral

COMMENTS: This section consists of medium- to coarse-grained troctolitic gabbro. Clinopyroxene occurs as coarse grains and oikocrysts (as large as 50 mm at 60 cm). A 30 mm wide troctolite band occurs at 17 cm. Olivine shows both corona texture and serpentinization.

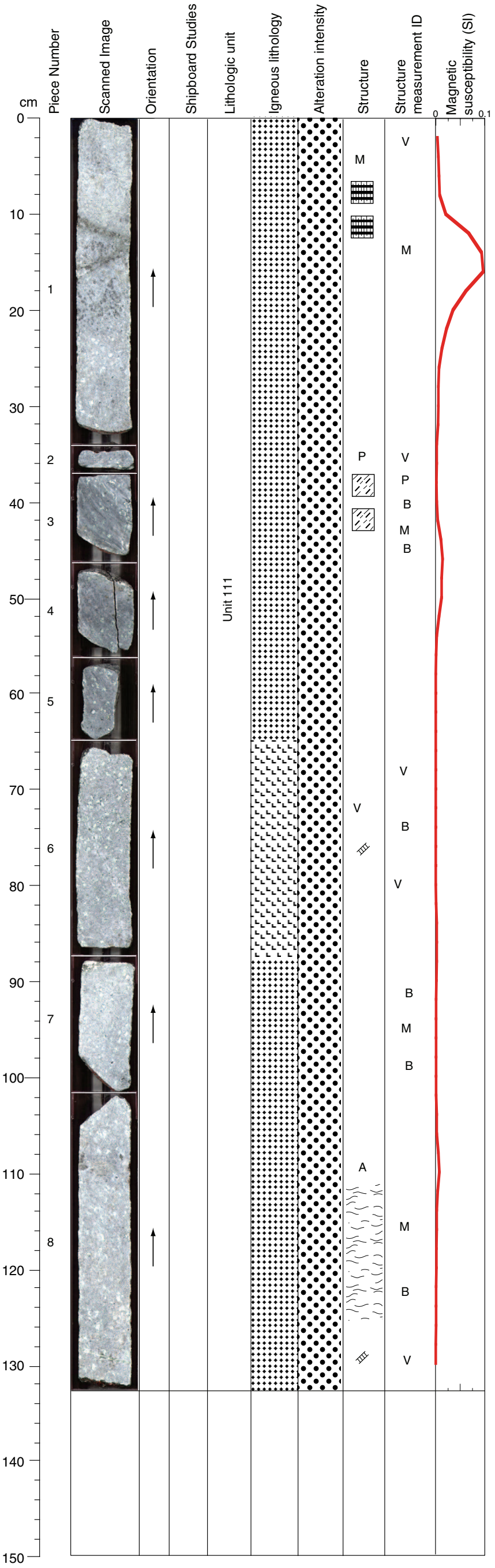
SECONDARY MINERALOGY: This section consists of olivine-gabbro which is moderately altered in greenschist facies. Altered olivine is present between 0-18 cm, and completely replaced by tremolite + chlorite +/- talc and rimmed by chlorite. This alteration forms patches after olivine. Pyroxene crystal margins are slightly altered to actinolte whereas plagioclase is generally fresh.

VEIN ALTERATION: No veins in this section.

THIN SECTIONS:
304-U1309D-72R-1, 81.0-83.0 cm (#245)

STRUCTURE: Inclined feldspar-rich bands with superposed grain boundary alteration (A) (toward the top of Piece 1). Plagioclase enrichment at the base of the section with green alteration.

Core Photo



304-U1309D-72R-2 (Section top: 368.77 mbsf)

UNIT-185: Layered Leucocratic Olivine Gabbro
Pieces 1–8

PRIMARY MINERALOGY: Determined from Piece 1 and 8 (Olivine Gabbro)

Olivine	Modal 20% Size 2-5 mm average, 10 mm maximum Shape anhedral
Plagioclase	Modal 60% Size 3-7 mm Shape anhedral
Clinopyroxene	Modal 20% Size 3-10 mm average, 20 mm maximum Shape anhedral

Determined from Piece 6 (Troctolitic Gabbro)

Olivine	Modal 20% Size 2-5 mm average, 7 mm maximum Shape anhedral
Plagioclase	Modal 73% Size 3-7 mm Shape anhedral
Clinopyroxene	Modal 7% Size 3-5 mm average, 6 mm maximum Shape anhedral

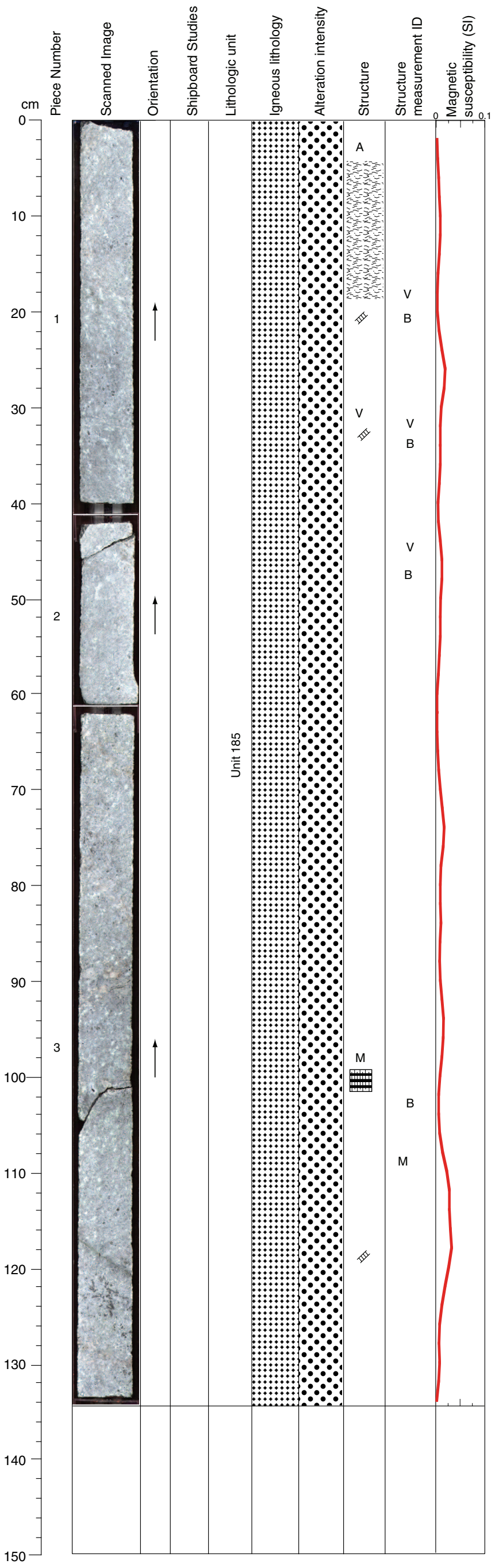
COMMENTS: This section contains medium- to coarse-grained olivine gabbro and troctolitic gabbro. Olivine gabbro occurs at the top and bottom of the section (Pieces 1, 8) and troctolitic gabbro in the center (Piece 6). Gradational compositions are found in between. A shear band cuts between 44 cm and 45 cm. Clinopyroxene occurs as coarse grains and oikocrysts as well. Olivine shows corona texture.

SECONDARY MINERALOGY: This section consists of olivine-gabbro which is moderately altered under greenschist facies conditions. Olivine presents two kinds of alteration : either it is completely replaced by tremolite + chlorite +/- talc and rimmed by chlorite, or alternatively it is partially fresh (maybe replaced by carbonate) and rimmed by chlorite + talc + tremolite. In both cases olivine shows a corona texture. Pyroxene crystal margins are slightly altered to actinolite whereas plagioclase is generally fresh.

VEIN ALTERATION: Green actinolite veins are present in this section (e.g. between 71-84 cm).

STRUCTURE: Pyroxene- and plagioclase-rich layers (around 10 cm each) alternate (M). Grain boundary alteration localized in plagioclase rich portions. Piece 3 has a crystal plastic shear zone (P) that imparts a weak fabric on the surrounding troctolitic units. Within the mylonite, plagioclase and pyroxene approach an S-C texture with seams of amphibole along the shear-zone boundaries. The shear zone is very narrow, and most pyroxene maintains some of the original grain shape. Toward the base of the section green veins (V) with plagioclase-rich vein-walls cut across the gabbro and surrounding alteration fabric. The alteration fabric (A) (grain-boundary alteration) is steeply dipping. M>P>A>V

Core Photo



304-U1309D-72R-3 (Section top: 370.08 mbsf)

UNIT-185: Layered Leucocratic Olivine Gabbro
Pieces 1–3

PRIMARY MINERALOGY: Determined from Piece 2B (Troctolitic Gabbro)

Olivine	Modal 15 % Size 2-6 mm Shape anhedral
Plagioclase	Modal 77% Size 3-6 mm Shape anhedral
Clinopyroxene	Modal 7% Size 3-10 mm average, 23 mm maximum Shape anhedral

PRIMARY MINERALOGY: Determined from Piece 3A (Olivine Gabbro)

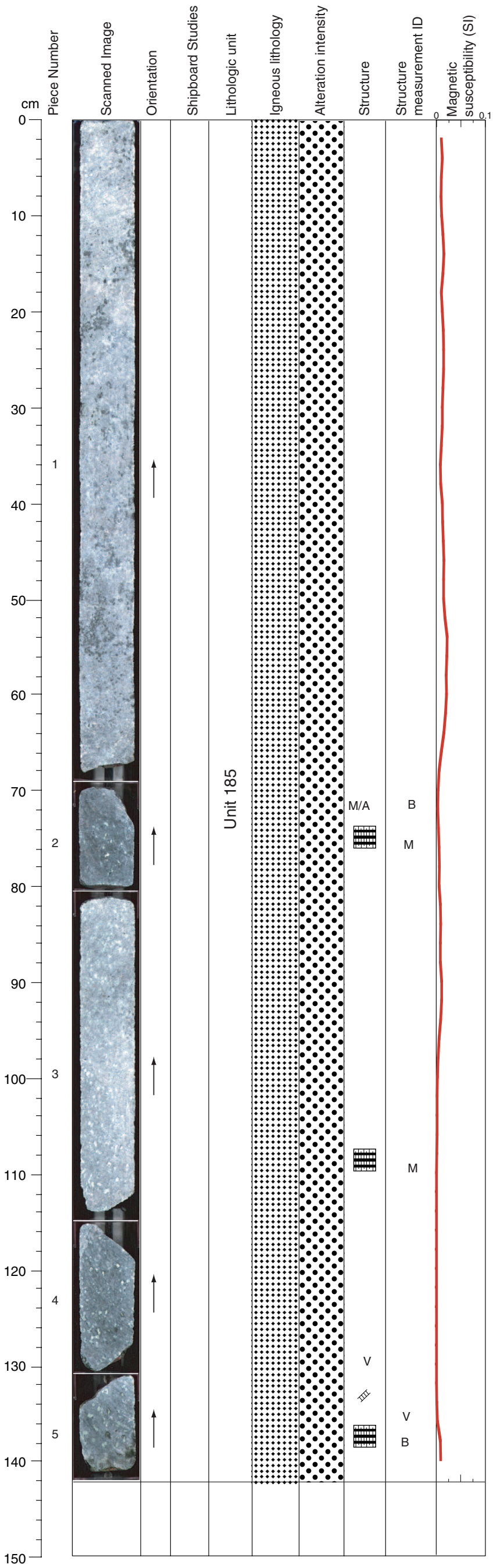
Olivine	Modal 7% Size 3-5 mm Shape anhedral
Plagioclase	Modal 73% Size 4-10 mm Shape anhedral
Clinopyroxene	Modal 20% Size 4-10 mm average, 23 mm maximum Shape anhedral

COMMENTS: This section consists of medium- to coarse-grained troctolitic gabbro and olivine gabbro. Troctolitic gabbro occurs at the top of the section and grades to olivine gabbro below. Bands of coarse clinopyroxene occur between 61-68 cm and 120-130 cm. Clinopyroxene occurs as coarse grains and oikocrysts.

SECONDARY MINERALOGY: This section consists of moderately greenschist facies altered olivine gabbro. Olivine is completely replaced by tremolite + chlorite +/- talc and rimmed by chlorite. Pyroxene margins are slightly altered to actinolite whereas plagioclase generally remained fresh.

STRUCTURE: Steeply dipping alteration fabric (A) (grain-boundary alteration, including surrounding pyroxene grains). Plagioclase-rich, shallowly-dipping feldspar intrusion (M) in Piece 3. Very thin, discontinuous dark green veins (V). M>A>V

Core Photo



304-U1309D-72R-4 (Section top: 371.42 mbsf)

UNIT-185: Layered Leucocratic Olivine Gabbro
Pieces 1–5

PRIMARY MINERALOGY: Determined from Piece 3

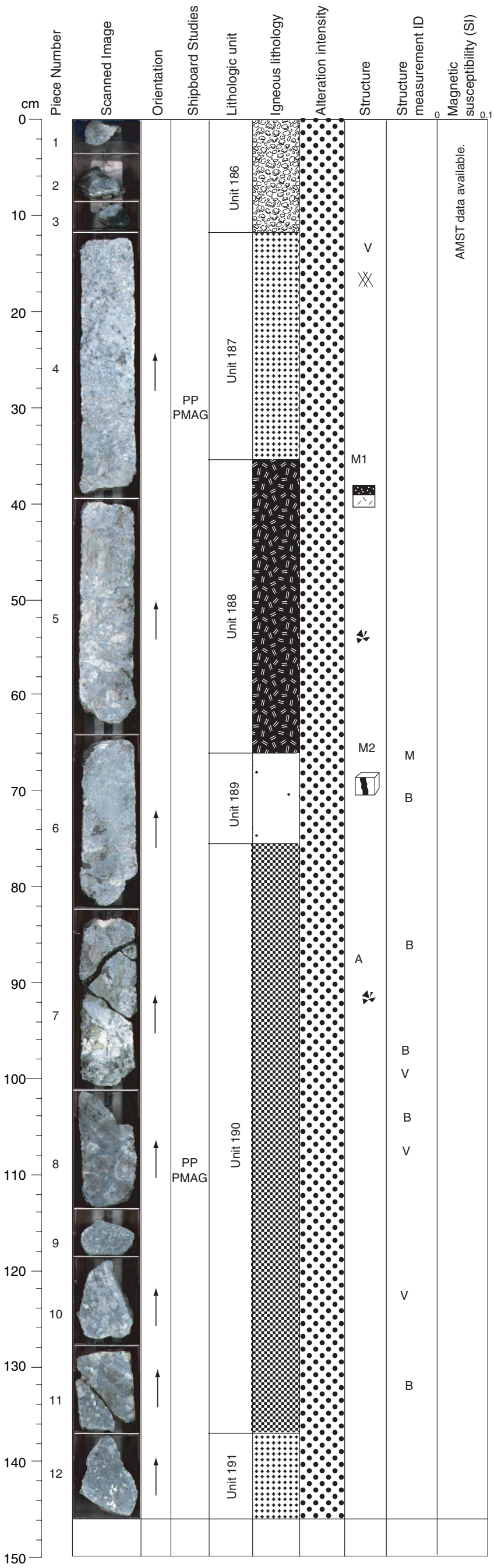
Olivine	Modal 20% Size 4-9 mm Shape anhedral
Plagioclase	Modal 70% Size 3-12 mm Shape anhedral
Clinopyroxene	Modal 10% Size 3-5 mm average, 80 mm maximum (oikocryst) Shape anhedral

COMMENTS: This section consists of medium- to coarse-grained olivine gabbro except for Pieces 4 and 5 that are troctolitic gabbro. Clinopyroxenes occur as coarse grains and oikocrysts as well. A large clinopyroxene oikocryst as large as 80 mm occurs at 40 cm. At the bottom of the section is the contact to a coarse-grained gabbro dike between 139-141 cm.

SECONDARY MINERALOGY: This section consists of moderately greenschist facies altered olivine gabbro. Olivine is completely replaced by tremolite + chlorite +/- talc and rimmed by chlorite. Pyroxene grain margins are slightly altered to actinolte whereas plagioclase are generally fresh.

STRUCTURE: Superposed grain-boundary alteration forms networks following a magmatic fabric (M/A). A single green vein at the base of the section (V). M>A>V

Core Photo



304-U1309D-73R-1 (Section top: 372.40 mbsf)

UNIT-186: Mixed rubble
Pieces 1–3

COMMENTS: This unit consists of coarse-grained gabbro (Piece 1) and serpentinized olivine gabbro (Piece 2 and 3), presumed to be out of place.

UNIT-187: Olivine Gabbro
Piece 4

PRIMARY MINERALOGY: Determined from Piece 4

Olivine	Modal 5% Size 2-4 mm Shape anhedral
Plagioclase	Modal 70% Size 3-5 mm Shape anhedral
Clinopyroxene	Modal 25% Size 3-6 mm Shape anhedral

COMMENTS: This unit consists of a 25 cm wide, coarse-grained olivine gabbro dike. A pyroxene-rich band occurs between 28 cm and 36 cm.

UNIT-188: Olivine-bearing Gabbro
Pieces 4–6

PRIMARY MINERALOGY: Determined from Piece 7

Olivine	Modal 1% Size 4-7 mm average, 10 mm maximum Shape anhedral
Plagioclase	Modal 69% Size 5-15 mm Shape anhedral
Clinopyroxene	Modal 30% Size 3-15 mm average, 45 mm maximum Shape anhedral

COMMENTS: The coarse-grained olivine gabbro grades across a diffuse and interfingering contact into a very coarse-grained olivine-bearing gabbro with pyroxene as large as 60 mm. Piece 5 and 6 contains oxide.

UNIT-189: Microgabbro
Piece 6

PRIMARY MINERALOGY: Too fine grained to determine modal composition in hand sample.

COMMENTS: A fine-grained area occurs with the composition of an olivine gabbro occurs between 66 cm and 78 cm. Clinopyroxene oikocryst occurs at the back side of the core at 69 cm.

UNIT-190: Oxide Gabbro
Pieces 6–11

PRIMARY MINERALOGY: Determined from Piece 8

Plagioclase	Modal 40% Size 4-7 mm Shape anhedral
Clinopyroxene	Modal 60% Size 4-18 mm average, 55 mm maximum Shape anhedral

COMMENTS: This unit consists of coarse-grained oxide gabbro. The contact with the previous unit is steeply dipping and occurs between 70 cm and 80 cm. The oxide gabbro grades into an olivine-bearing gabbro with an orthocumulate texture. Olivine content increases generally down section. Piece 9 has medium grain sizes.

UNIT-191: Olivine Gabbro
Piece 12

PRIMARY MINERALOGY: Determined from Piece 12

Olivine	Modal 10% Size 2-5 mm Shape anhedral
Plagioclase	Modal 75% Size 3-7 mm Shape anhedral
Clinopyroxene	Modal 15% Size 2-3 mm Shape anhedral

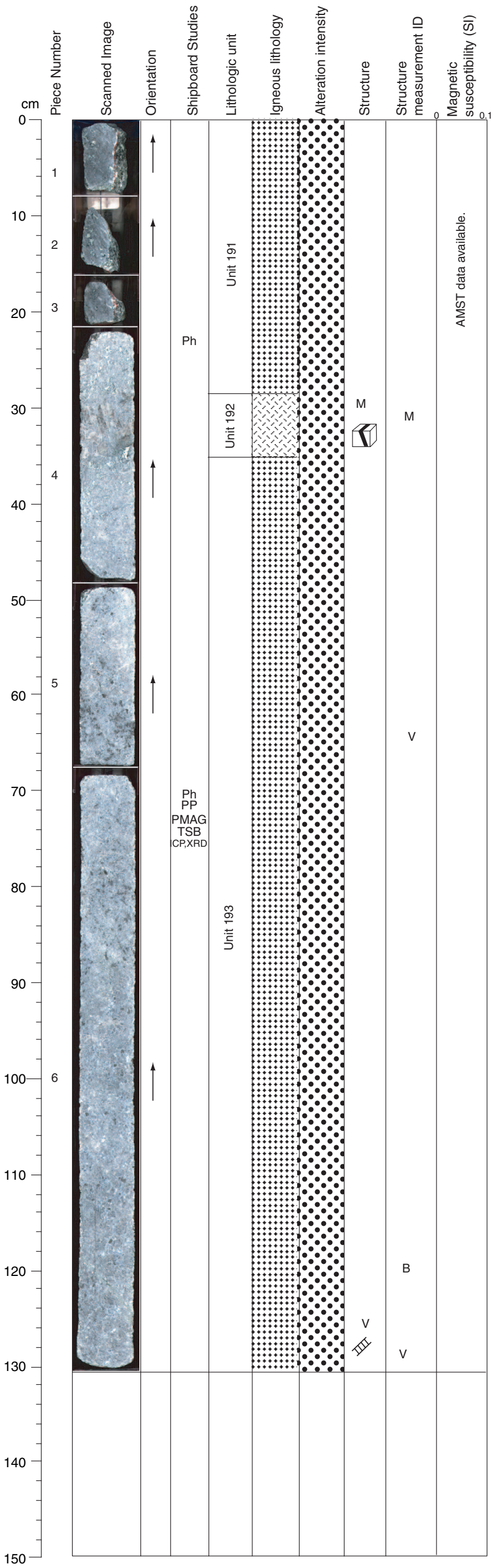
COMMENTS: This unit consists of a single piece of medium-grained olivine gabbro. Olivines show corona texture.

SECONDARY MINERALOGY: From 0 to 37 cm, the core consists of moderately altered troctolite in which coronas of chlorite, actinolite, and talc have formed between olivine and plagioclase. From 37 to 136 cm the core consists of slightly less altered oxide gabbro in which augite has been partially altered to actinolite. From 136 cm to 145 cm the core contains olivine gabbro with corona structures described above.

VEIN ALTERATION: Abundant irregular actinolite veins occur from 90 to 100 cm

STRUCTURE: Gabbro with both steeply and gently dipping thin and discontinuous veins (V). Toward the base of Piece 4 the plagioclase is more continuous (i.e. not internally cracked). Below this change in plagioclase texture is a sharp contact (M1) with a very coarse grained gabbro. The relative ages at this contact are not clear, but a similar contact in Section U1309D-73R-2 shows very clearly that the coarse-grained gabbro intrudes the more olivine-rich equigranular gabbro. Internal to the coarse grained gabbro pyroxene cleavage planes host dark alteration (A), and many grains are fractured. There is a fairly strong alteration coincident with this “brittle” texture. A fine grained, gently dipping intrusive is present in Piece 6 (M2). M1>M2>A>V

Core Photo



304-U1309D-73R-2 (Section top: 373.85 mbsf)

UNIT-191: Olivine Gabbro
Pieces 1–4

PRIMARY MINERALOGY: Determined from Piece 4

Olivine	Modal 7% Size 2-5 mm Shape anhedral
Plagioclase	Modal 68% Size 3-10 mm Shape anhedral
Clinopyroxene	Modal 25% Size 3-5 mm Shape anhedral

COMMENTS: This section starts with coarse-grained olivine gabbro and is the continuation of the previous section.

UNIT-192: Gabbro
Piece 4

PRIMARY MINERALOGY: Determined from Piece 4 (29 – 35 cm interval)

Plagioclase	Modal 55% Size 2-7 mm Shape anhedral
Clinopyroxene	Modal 45% Size 5-7 mm average, 35 mm maximum Shape anhedral

COMMENTS: A 55 mm wide, very coarse-grained gabbro dike with pyroxene grains as large as 35 mm occurs between 29 cm and 34 cm.

UNIT-193: Olivine Gabbro
Pieces 4–6

PRIMARY MINERALOGY: Determined from Piece 6

Olivine	Modal 5% Size 3-4 mm Shape anhedral
Plagioclase	Modal 75% Size 3-9 mm Shape anhedral
Clinopyroxene	Modal 20% Size 2-8 mm average, 50 mm maximum Shape anhedral

COMMENTS: This unit consists of medium- to coarse-grained olivine gabbro that contains clinopyroxene oikocrysts. A green alteration vein crosscuts the section at 122 cm.

SECONDARY MINERALOGY: This section consists of moderately altered olivine gabbro in which coronas of chlorite, actinolite, and talc have formed between olivine and plagiclase.

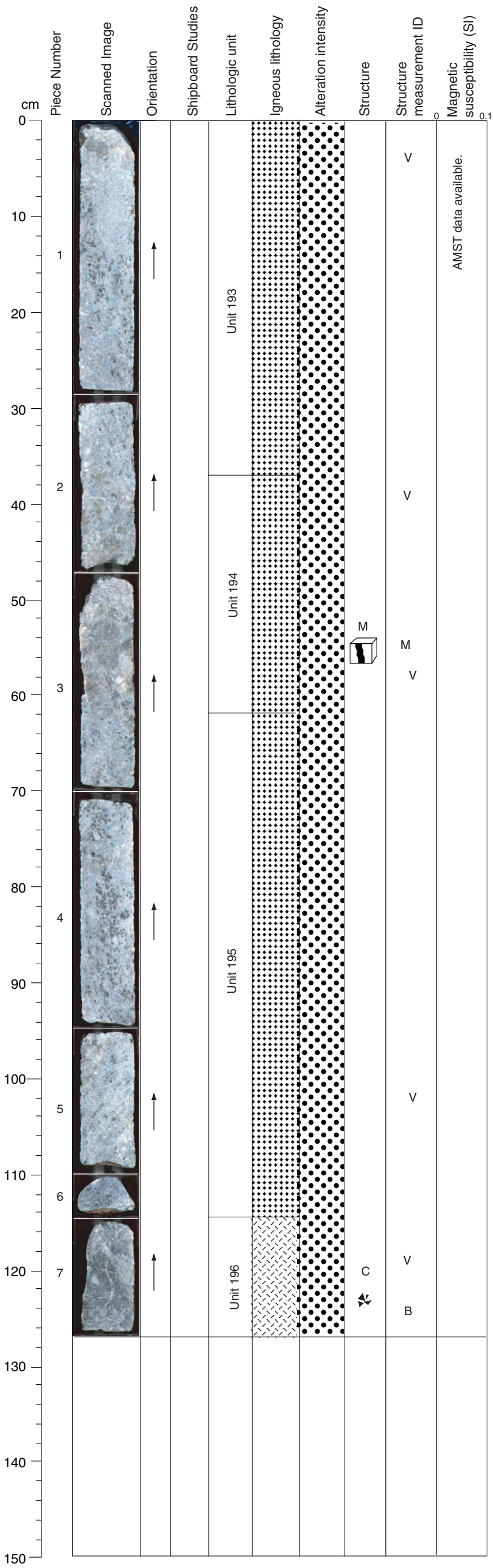
VEIN ALTERATION: Mm-scale tremolite vein at 121 cm with a halo of albite.

THIN SECTIONS:
304-U1309D-73R-2, 72.0-75.0 cm (#246)

STRUCTURE: Alteration rims on olivine and plagioclase are not quite interconnected. Microcracking is localized to the plagioclase and there is a green alteration overprint without a well-defined fabric. A gently dipping coarse-grained pyroxene-rich dike cuts the surrounding rock (M). There are one or two green veins (V) in the section. M>V

CLOSE UP PHOTOGRAPHS:
1309D_73R_2_22_42.jpg
1309D_73R_2_70_90.jpg

Core Photo



304-U1309D-73R-3 (Section top: 375.15 mbsf)

UNIT-193: Olivine Gabbro
Pieces 1–2

PRIMARY MINERALOGY: Determined from Piece 1

Olivine	Modal 5% Size 3-6 mm Shape anhedral
Plagioclase	Modal 75% Size 4-7 mm Shape anhedral
Clinopyroxene	Modal 20% Size 3-6 mm average, 15 mm maximum Shape anhedral

COMMENTS: This section consists of medium-grained olivine gabbro with small clinopyroxene oikocrysts. A coarse-grained gabbro dike cuts the top of the section between 1 and 5 cm. A fine-grained, oval shaped troctolitic domain occurs adjacent to the dike. Olivine in this domain show corona texture, whereas olivine throughout the remainder of the unit is serpentinized.

UNIT-194: Olivine Gabbro
Pieces 2–3

PRIMARY MINERALOGY: Determined from Piece 3

Olivine	Modal 5% Size 6 mm Shape anhedral
Plagioclase	Modal 60% Size 5-18 mm Shape anhedral
Clinopyroxene	Modal 35% Size 5-15 mm average, 31 mm maximum Shape anhedral

COMMENTS: This unit consists of coarse-grained olivine gabbro cutting the medium-grained olivine gabbro from Unit 193.

UNIT-195: Olivine Gabbro
Pieces 3–6

PRIMARY MINERALOGY: Determined from Piece 4

Olivine	Modal 25% Size 1-2 mm Shape anhedral
Plagioclase	Modal 60% Size 2-9 mm Shape anhedral
Clinopyroxene	Modal 15% Size 3-4 mm average, 29 mm maximum Shape anhedral

COMMENTS: This unit consists of coarse-grained, olivine-bearing gabbro. A 15 mm wide, coarse pyroxene-band occurs at 76 cm. Serpentinization of olivine changes gradually between Pieces 4 and 5 toward corona texture that dominates downsection.

UNIT-196: Gabbro
Piece 7

PRIMARY MINERALOGY: Determined from Piece 7

Olivine	Modal <1% Size 3 mm Shape anhedral
Plagioclase	Modal 65% Size 3-6 mm Shape anhedral
Clinopyroxene	Modal 35% Size 3-5 mm average, 25 mm maximum Shape anhedral

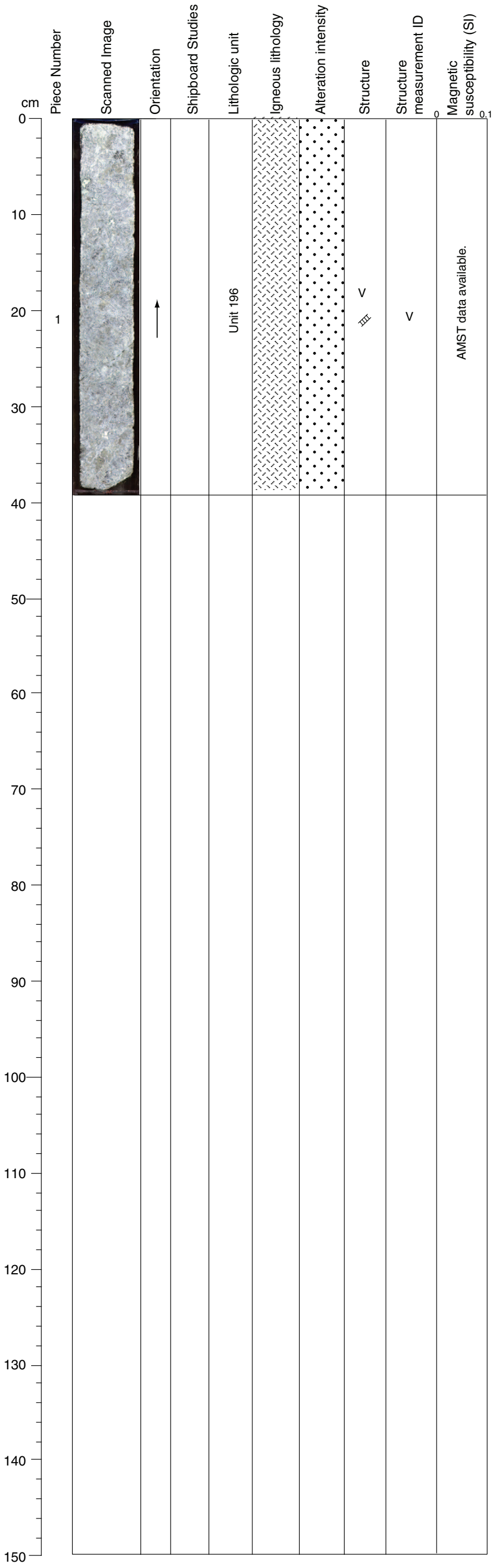
COMMENTS: This unit consists of a single piece of coarse-grained gabbro and is fractured.

SECONDARY MINERALOGY: The upper and lower part of the section consist of moderately altered olivine gabbro in which olivine and plagioclase have reacted to give chlorite, actinolite, and possible talc. Olivine relicts are present. The middle of the section consists of gabbro with large fresh pyroxenes with minor alteration to chlorite and actinolite.

VEIN ALTERATION: Tremolite vein at 64 and 100 cm.

STRUCTURE: Sharp contacts between fine grained gabbro and coarse (pyroxene-rich) grained gabbro (e.g. shallowly dipping intrusive) (coarse intrudes finer) (M). Toward Piece 7 fracture is localized in plagioclase (internally brecciated) (C). M?>C

Core Photo



304-U1309D-73R-4 (Section top: 376.41 mbsf)

UNIT-196: Gabbro
Piece 1

PRIMARY MINERALOGY: Determined from Piece 1

Olivine	Modal 1% Size 2-5 mm Shape anhedral
Plagioclase	Modal 65% Size 3-9 mm Shape anhedral
Clinopyroxene	Modal 35% Size 5-9 mm average, 30 mm maximum Shape anhedral

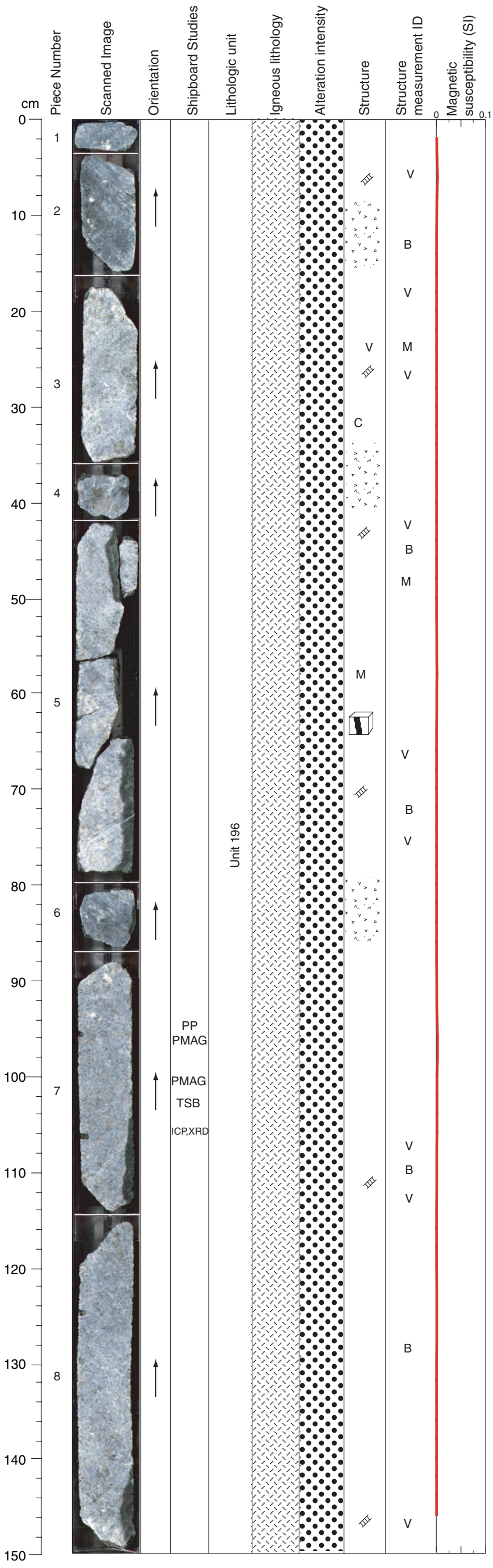
COMMENTS: This unit consists of coarse-grained gabbro with sporadic olivine.

SECONDARY MINERALOGY: Core consists of slightly altered gabbro with minor chlorite and actinolite.

VEIN ALTERATION: Mm-sized hornblende vein at 26 cm.

STRUCTURE: Gently dipping dark vein in the gabbro.

Core Photo



304-U1309D-74R-1 (Section top: 377.20 mbsf)

UNIT-196: Gabbro
Pieces 1–8

PRIMARY MINERALOGY: Determined from Piece 7

Plagioclase	Modal 60% Size 4-12 mm Shape anhedral
Clinopyroxene	Modal 40% Size 4-9 mm Shape anhedral

COMMENTS: This unit consists of coarse-grained gabbro. Piece 2, 4 and 6 are fractured. Piece 3 and 4 show very coarse pyroxenes and might indicate the presence of a dike. A pyroxene-rich zone occurs between 64 cm and 77 cm.

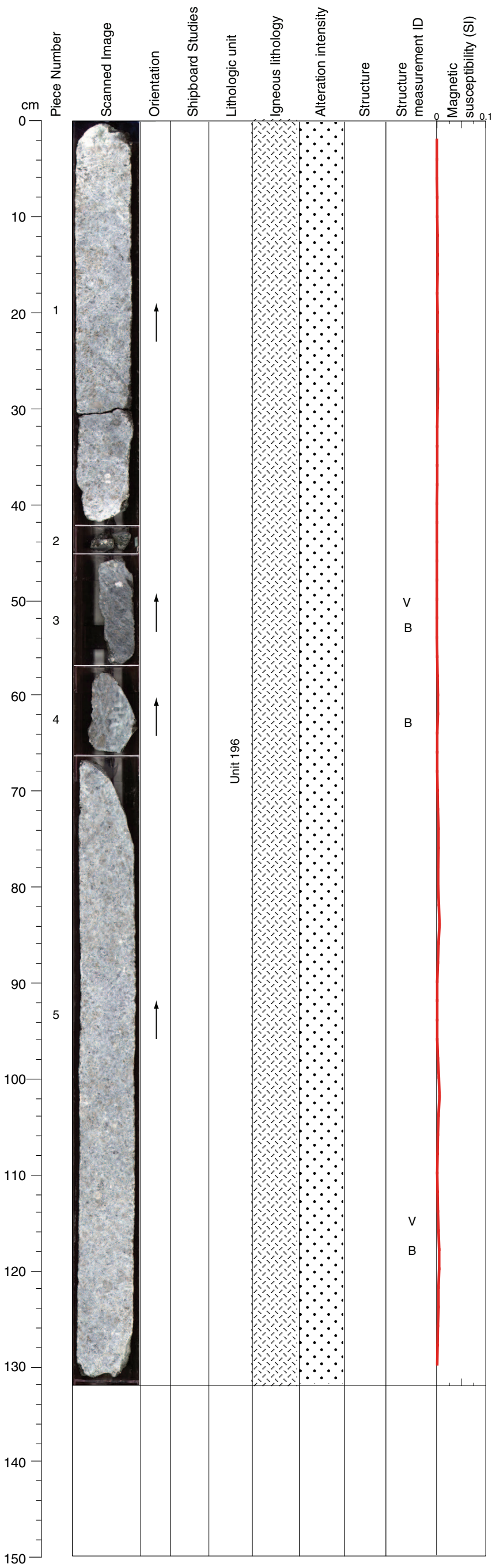
SECONDARY MINERALOGY: This section consists of moderately altered olivine-bearing gabbro. Olivine are completely replaced by tremolite + chlorite +/- talc + magnetite and rimmed by chlorite. Pyroxene edges are slightly altered to actinolte and plagioclase are generally fresh. In thin section at 102-105 cm, orthopyroxene is altered to talc with rims of amphibole, and plagioclase shows local chlorite rims and contains chlorite veins

VEIN ALTERATION: Green actinolite veins are present in this section (e.g. at 29 cm). Amphibole-carbonate veins at various depths contain a hydroscopic mineral, probably smectite

THIN SECTIONS:
304-U1309D-74R-1, 102.0-105.0 cm (#247)

STRUCTURE: Cracking (C) of moderately altered plagioclase. Several fine grained intervals, and green veins (V) associated with plagioclase enriched intervals (M). M?>C>V

Core Photo



304-U1309D-74R-2 (Section top: 378.70 mbsf)

UNIT-196: Gabbro
Pieces 1–5

PRIMARY MINERALOGY: Determined from Piece 1

Plagioclase	Modal 60% Size 5-15 mm Shape anhedral
Clinopyroxene	Modal 40% Size 4-15 mm Shape anhedral

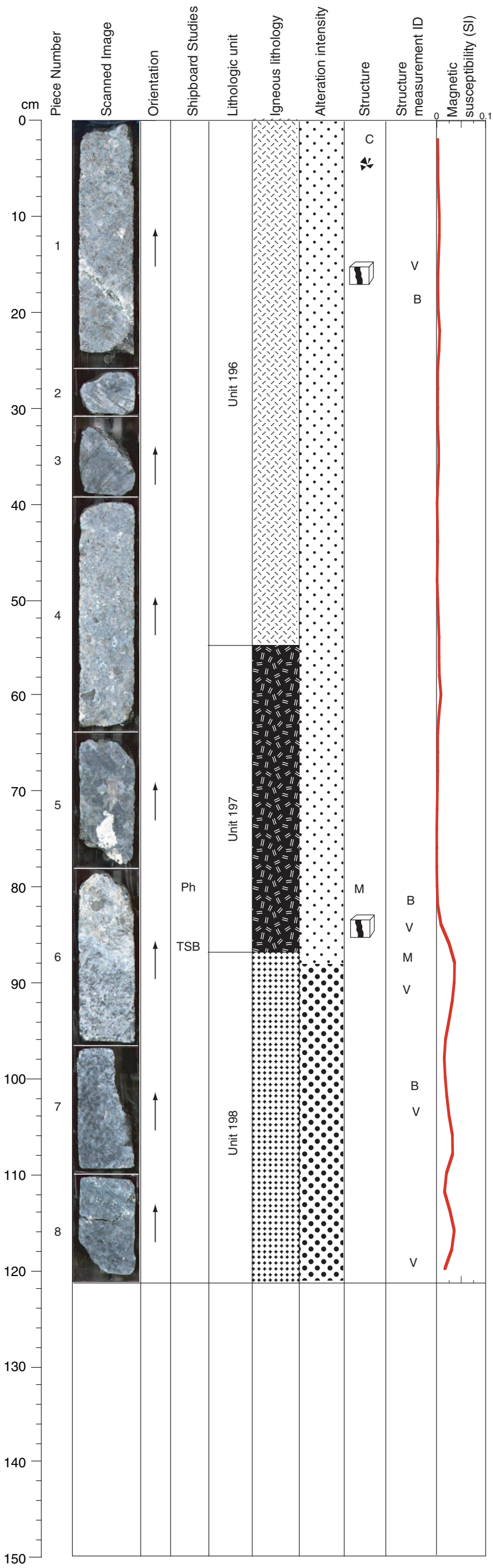
COMMENTS: This section consists of coarse-grained gabbro.

SECONDARY MINERALOGY: This core section consists of slightly altered gabbo in the greenschist facies. Pyroxene grain margins are slightly altered to actinolte and orthopyroxenes are rimmed by chlorite +/- talc. Plagioclase is generally fresh.

VEIN ALTERATION: No veins in this section.

STRUCTURE: Gabbroic textures similar to surrounding sections. No structure symbols applied.

Core Photo



304-U1309D-74R-3 (Section top: 380.81 mbsf)

UNIT-196: Gabbro
Pieces 1–4

PRIMARY MINERALOGY: Determined from Piece 1

Plagioclase	Modal 55% Size 4-9 mm Shape anhedral
Clinopyroxene	Modal 45% Size 5-17mm average, mm maximum Shape anhedral

COMMENTS: This unit consists of coarse-grained gabbro. A clinopyroxene rich area occurs between 64 cm and 77 cm. A green-white alteration vein with amphibole crosscuts at 18 cm.

UNIT-197: Olivine-bearing Gabbro
Pieces 4–6

PRIMARY MINERALOGY: Determined from Piece 5 (65-87 cm interval)

Olivine	Modal 1% Size 5-10 mm average, 17 mm maximum Shape anhedral
Plagioclase	Modal 45% Size 12-22 mm Shape anhedral
Clinopyroxene	Modal 54% Size 6-13 mm average, 40 mm maximum Shape anhedral

COMMENTS: This unit consists of very coarse-grained olivine gabbro dike. Olivine occurs very sporadically.

UNIT-198: Olivine Gabbro
Pieces 6–8

PRIMARY MINERALOGY: Determined from Piece 7

Olivine	Modal 30% Size 4-6 mm Shape anhedral
Plagioclase	Modal 40% Size 4-7 mm Shape anhedral
Clinopyroxene	Modal 30% Size 4-7 mm Shape anhedral

COMMENTS: This unit consists of coarse-grained olivine gabbro. Corona texture forms along the contact with the previous unit in the olivine gabbro clearly because of the intrusion whereas olivine is otherwise serpentinized. Olivine alteration shifts gradually from serpentinization to corona texture below 106 cm. A 12 mm wide talc-tremolite vein occurs at 112 cm.

SECONDARY MINERALOGY: This section consists of moderately altered olivine-bearing gabbro and olivine-gabbro in the greenschist facies. In Piece 4, olivine presents two kinds of alteration : olivine could be completely replaced by tremolite + chlorite +/- talc and rimmed by chlorite, or olivine could be partially fresh (could be replace by carbonate) and just rimmed by chlorite + talc + tremolite. In the two cases olivine shows coronitic texture. Pyroxene edges are slightly altered to actinolte and plagioclase are generally fresh. In thin section at 84-87 cm, the above coronitic relationships are confirmed, and olivine is about 70% altered to talc/tremolite/chlorite (+/- magnetite and sulfide), with minor late serpentine veins.

VEIN ALTERATION: Few actinolite veins are present in this section. Brown-green hydroscopic veins containing amphibole and probably smectites are seen at various depths. Thin carbonate veins are seen in thin section at 84-87 cm

THIN SECTIONS:
304-U1309D-74R-3, 84.0- 87.0 cm (#248)

STRUCTURE: A coarse-grained gabbro intrudes more olivine-rich gabbro (troctolitic) in Piece 6 (M). The contacts have a moderate dip and localizes alteration. In Piece 8 there is a pyroxene-rich vein, also shallowly dipping. Within the gabbro there are two plagioclase textures: one with discontinuous plagioclase intensely microcracked (C), and another more continuous plagioclase. A moderately dipping plagioclase-amphibole vein cuts Piece 1. C>M

CLOSE UP PHOTOGRAPHS:
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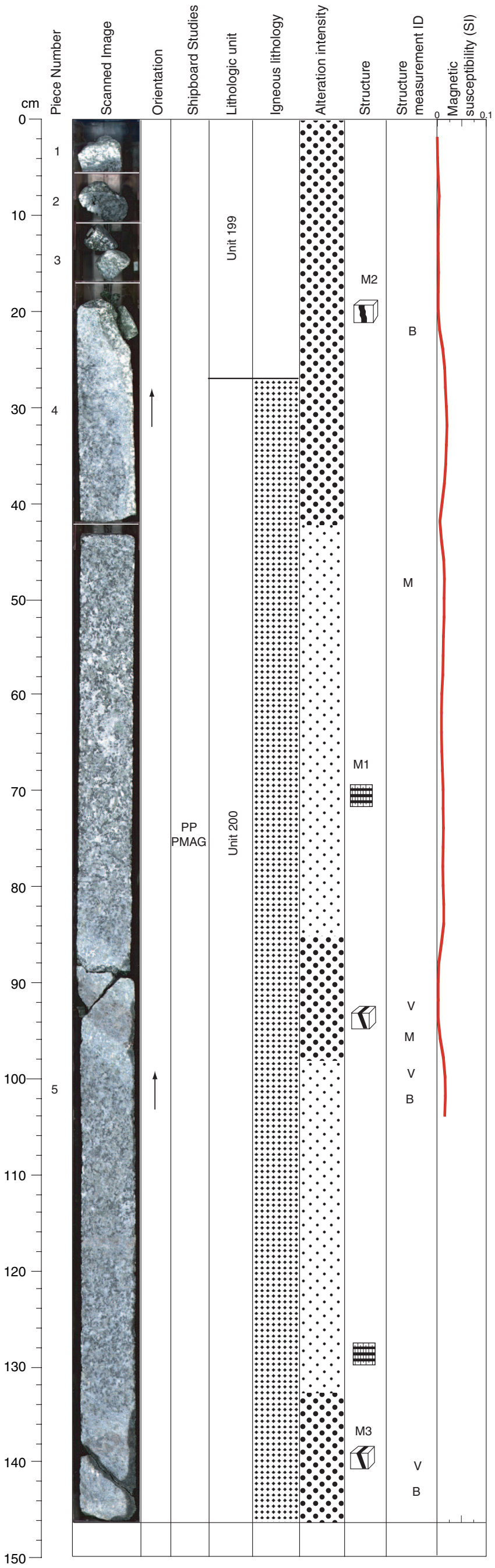
Core Photo



304-U1309D-75R-1 (Section top: 382.00 mbsf)

UNIT-199: Late magmatic leucocratic dike
Pieces 1–4

COMMENTS: The top of the section is characterized by several pieces cut by a late magmatic leucocratic dike that continues to Piece 4.

UNIT-200: Olivine Gabbro
Pieces 4–5

PRIMARY MINERALOGY: Determined from Piece 5A

Olivine	Modal 20% Size 2-3 mm average, 6 mm maximum Shape anhedral
Plagioclase	Modal 60% Size 5-7 mm average, 11 mm maximum Shape subhedral to anhedral
Clinopyroxene	Modal 20% Size 4-6 mm average, 11 mm maximum Shape anhedral

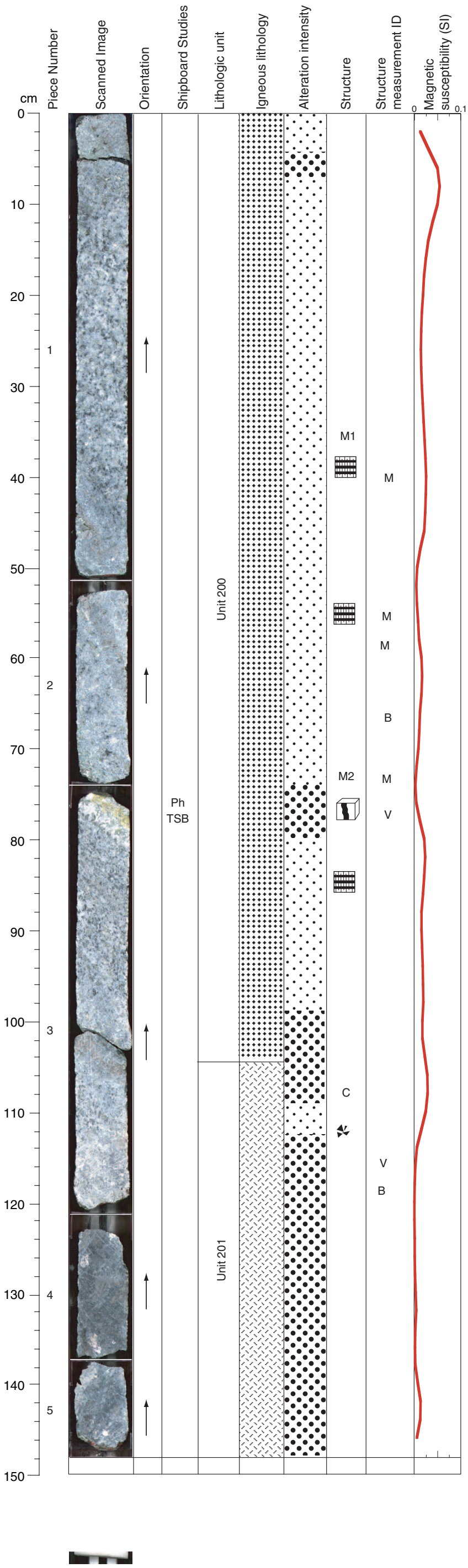
COMMENTS: This unit consists of coarse-grained olivine gabbro that is cut by several coarse-grained gabbro dikes. Gabbro dikes occur at 93 cm with a width of 35 mm, with a reaction zone of 20 mm; at 117 cm with a width of 15 mm and no reaction zone, and at 137 cm with a width of 20 mm, and a reaction zone of 20 mm across.

SECONDARY MINERALOGY: Major sections consist of only slightly altered olivine gabbro in which approximately 5% of the olivine has a corona texture alteration, and ca. 40% is serpentinized. Serpentinization is concentrated in zones (”ladder veins”) approximately 3 mm thick. Plagioclase is slightly altered to prehnite (20%).The corona texture of olivine alteration comprising tremolite +/-talc with a rim of chlorite is well-developed in zones of 2-5 cm width in the vicinity of gabbroic intrusions (85-90 cm, 94-97 cm, 133-145 cm), as well as adjacent to the late magmatic leucocratic intrusion in piece 4 (see below). Olivine is 100% altered in these zones, plagioclase about 30%. Sulfides are present throughout the section.

VEIN ALTERATION: Late magmatic leucocratic dike running along the right side of Piece 4, carries a 2 cm-wide alteration to albite and actinolite. Adjacent to the intrusion there is a 1-2 cm wide zone of corona texture with 100% olivine alteration.

STRUCTURE: The feldspar-rich intrusion (M3) is steeply dipping along the section with green amphibole spaced within blocky plagioclase. Two coarse grained gabbro intrusions (M2) cut the adjacent steeply dipping magmatic foliation (M1). Alteration is localized along the contacts. This section marks the end of an interval with numerous coarse and fine grained gabbroic bodies. M1>M2>M3

Core Photo



304-U1309D-75R-2 (Section top: 383.04 mbsf)

UNIT-200: Olivine Gabbro
Pieces 1–3

PRIMARY MINERALOGY: Determined from Piece 1

Olivine	Modal 20% Size 3-6 mm Shape anhedral
Plagioclase	Modal 60% Size 3-7 mm average, 10 mm maximum Shape subhedral to anhedral
Clinopyroxene	Modal 20% Size 4-7 mm average, 10 mm maximum Shape anhedral

COMMENTS: This unit consists of coarse-grained olivine gabbro. A 30 mm wide, coarse-grained gabbro dike cuts the section between 44 cm and 60 cm, and produced a 30 mm wide reaction zone. A late magmatic leucocratic dike with epidote crosses at the upper edge of Piece 3. Piece 3 shows magmatic foliation as well.

UNIT-201: Gabbro
Pieces 3–6

PRIMARY MINERALOGY: Determined from Piece 4

Plagioclase	Modal 70% Size 3-11 mm average, 23 mm maximum Shape anhedral
Clinopyroxene	Modal 30% Size 4-15 mm average, 40 mm maximum Shape anhedral

COMMENTS: A very coarse-grained gabbro occurs next to the olivine gabbro from Unit 200. The contact relationships are not clear. Either it is not directly related gabbro dike cutting at 104 cm or the intrusion is branching and forming a discontinuous domain of olivine gabbro between 106 cm and 112 cm.

SECONDARY MINERALOGY: This section consists of slightly to moderately altered olivine gabbro in the upper part in which olivine is partly serpentinized and partly altered to corona textures with tremolite +/- talc in the center and chlorite around the margin. Locally present relict olivine cores in the pseudomorphs are in places hematite rich. Very thin carbonate veins occur on the grain boundaries in the vicinity of these corona patches. Certain intervals in the section show more intense alteration with abundant corona textures (5-7 cm, 42-47 cm, 107-109 cm). The lower part of this section consists of moderately altered gabbro in which pyroxene is partly (ca. 20%) altered to actinolite and plagioclase shows alteration to chlorite along its grain boundaries.

VEIN ALTERATION: Late magmatic leucocratic dike at 75 - 80 cm shows considerable alteration with actinolite, epidote, albite, brown hornblende and titanite in a brecciated texture (thin section).

THIN SECTIONS:
304-U1309D-75R-2, 77.0- 80.0 cm (#249)

STRUCTURE: Gabbro at the top of the section preserves large olivine grains with a weak fabric (M) moderately-to-steeply dipping near 40 cm. A feldspar-rich intrusion (M2) at 90 cm is internally altered with large amphibole and blocky plagioclase. Below this magmatic vein the fabric in the gabbro is gently dipping, and paralles the late intrusion. At the base of the section, the fine grained plagioclase becomes more continuous, localizing fractures (C) instead of the microcracks in the finer grained plagioclase. M1>M2>C

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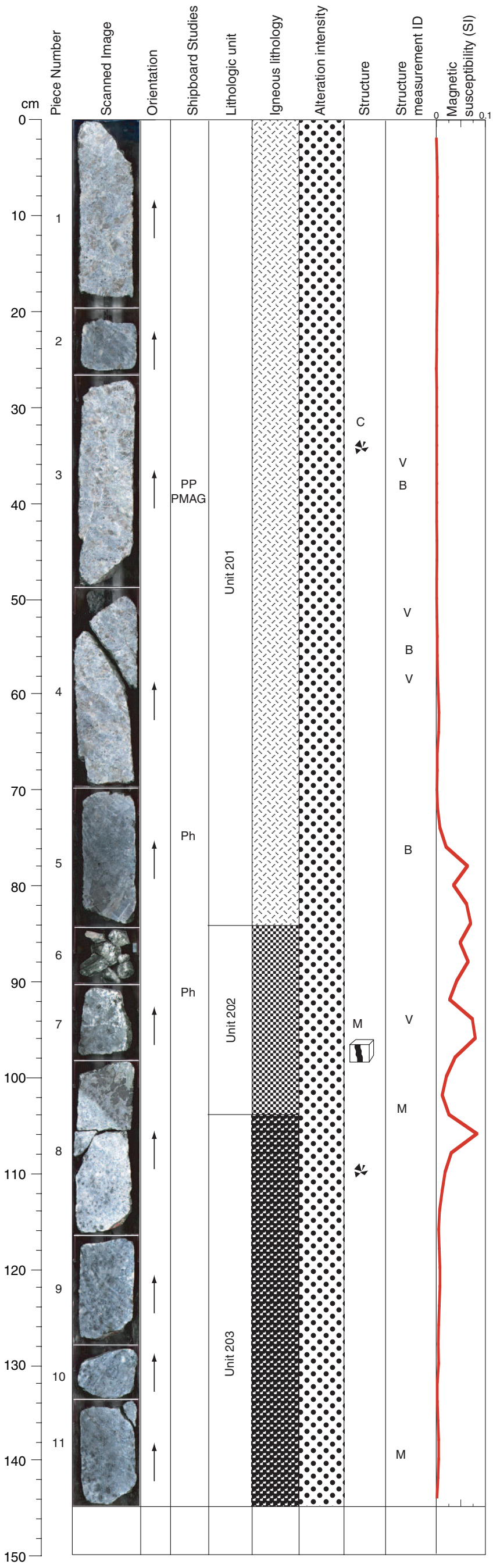
Core Photo



304-U1309D-75R-3 (Section top: 384.52 mbsf)

UNIT-201: Gabbro
Pieces 1–5

PRIMARY MINERALOGY: Determined from Piece 3

Plagioclase	Modal 70% Size 5-19 mm Shape anhedral
Clinopyroxene	Modal 30% Size 4-20 mm Shape anhedral

COMMENTS: This unit consists of coarse-grained gabbro and is the continuation from the previous section. A troctolitic domain occurs between 73 cm and 80 cm with a reaction zone reaching into the gabbro.

UNIT-202: Late magmatic leucocratic dike / Oxide Gabbro
Pieces 6–8

PRIMARY MINERALOGY: Determined from Piece 8A

Plagioclase	Modal 20% Size 4-7 mm average Shape anhedral
Clinopyroxene	Modal 50% Size 7-20mm average Shape anhedral
Oxide	Modal 30 % Size 3-15 mm Shape anhedral

COMMENTS: This unit represents an area where the intrusion of a late magmatic leucocratic dike and an oxide gabbro occurs. They interfinger and it is difficult to separate them into different units. Piece 8 shows both lithologies adjacent to one another. The oxide gabbro is in contact to the troctolite and shows a fine grained margin.

UNIT-203: Leucocratic Troctolite
Pieces 8–11

PRIMARY MINERALOGY: Determined from Piece 9

Olivine	Modal 30% Size 2-8 mm Shape anhedral
Plagioclase	Modal 62% Size 5-7 mm Shape anhedral
Clinopyroxene	Modal 3% Size 4 mm Shape anhedral

COMMENTS: A coarse-grained troctolite is in contact with oxide gabbro. Clinopyroxene occurs only sporadically.

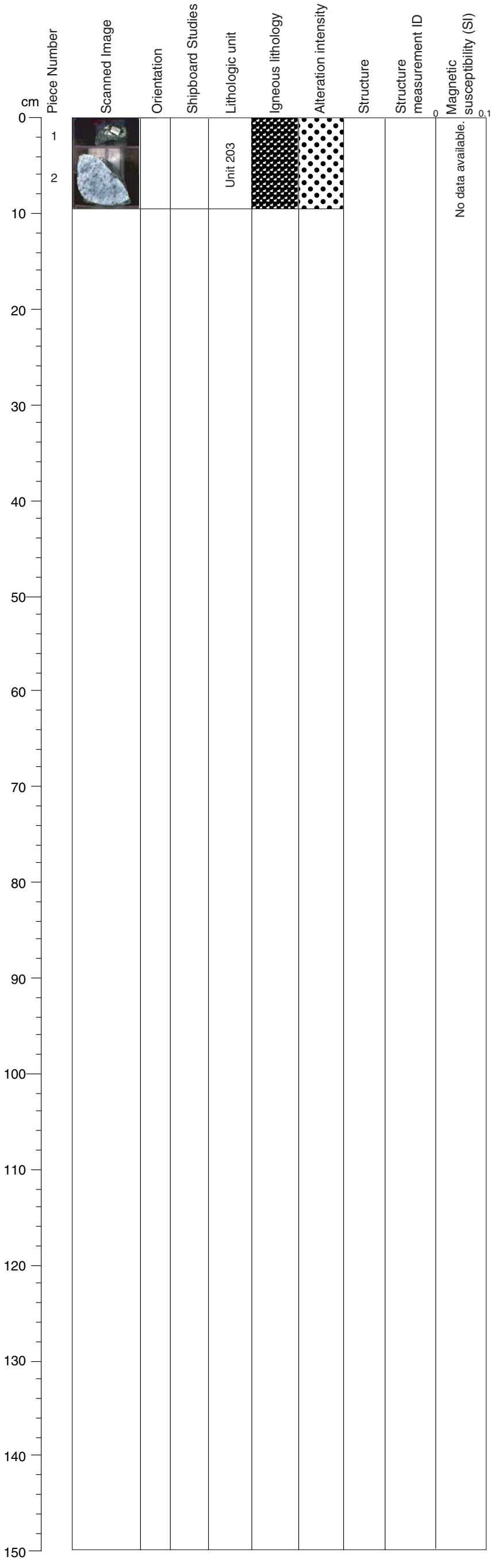
SECONDARY MINERALOGY: The upper portion of the section consists of gabbro with moderate alteration (ca. 20%). Some chlorite and green amphibole grow along the plagioclase and pyroxene grain boundaries. Sulfides are however present in these rocks within veins and on pyroxene cleavage surfaces. The lower part of the section consists of troctolite that is slightly more altered than the overlying gabbro (ca. 40%) because of reaction between olivine and plagioclase producing a corona texture of chlorite + tremolite around olivine. The intensity of corona alteration is variable between 5-80% with an average of 40%. The interval from 101 to 105 cm shows 100% corona alteration. Serpentinization of the olivine in this troctolite is minor (<5%).

VEIN ALTERATION: A leucocratic late magmatic dike that has been altered occurs at 84-103 cm. Secondary plagioclase and actinolite are probably present in the center of this dike.

STRUCTURE: Through Piece 4 there are intervals of fine and coarse grained plagioclase in the gabbro - the fine grain size apparently localizes microfractures; coarse grain size hosts continuous fractures (C). From Pieces 5 through 8 is an altered dioritic dike (M) with pronounced igneous grain shapes of dark minerals. Grain size in the dike fines toward the host rock. M>C(?)

CLOSE UP PHOTOGRAPHS:
1309D_75R_3_74_88.jpg
1309D_75R_3_90_98.jpg

Core Photo



304-U1309D-75R-4 (Section top: 385.97 mbsf)

UNIT-203: Leucocratic Troctolite
Pieces 1-2

PRIMARY MINERALOGY: Determined from Piece 2

Olivine	Modal 30% Size 2-8 mm Shape anhedral
Plagioclase	Modal 62% Size 5-7 mm Shape anhedral
Clinopyroxene	Modal 3% Size 4 mm Shape anhedral

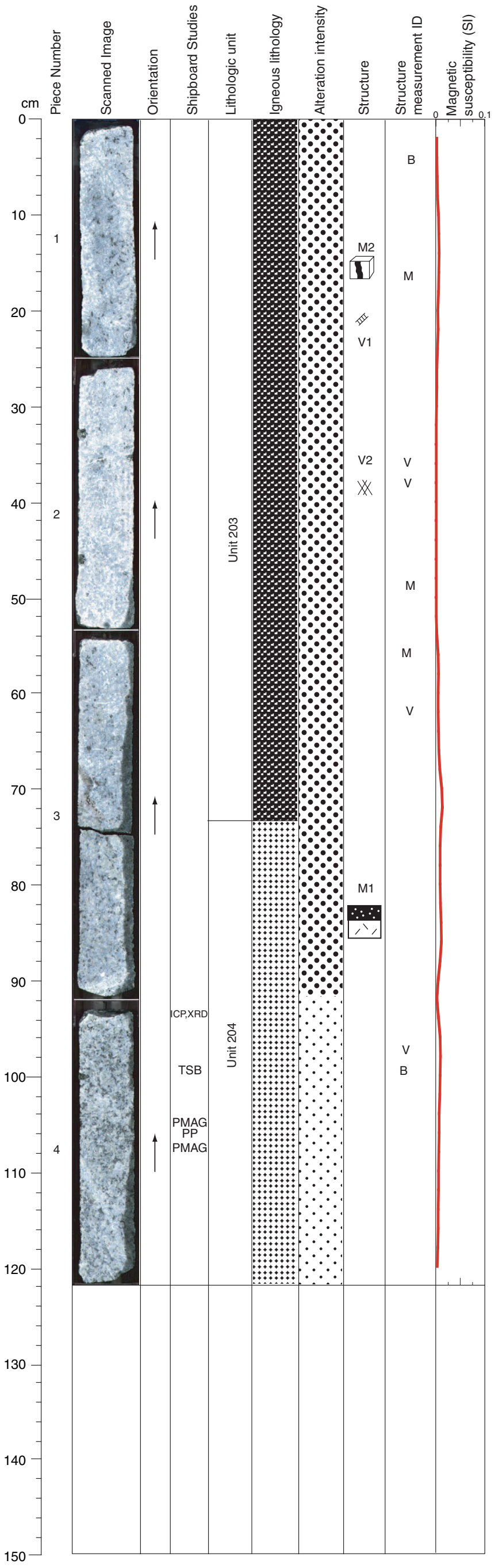
COMMENTS: This section consists of coarse-grained troctolite and is the continuation of the previous section. Olivine is seems to be fairly altered to serpentine and magnetite (ca. 60%).

SECONDARY MINERALOGY: The section consists of troctolite that is moderately altered because of reaction between olivine and plagioclase producing a corona texture of chlorite + tremolite around olivine.

VEIN ALTERATION: No veins in this section.

STRUCTURE: None to report

Core Photo



304-U1309D-76R-1 (Section top: 386.90 mbsf)

UNIT-203: Troctolite
Pieces 1–3

PRIMARY MINERALOGY: Determined from Piece 2 (Troctolitic Gabbro)

Olivine	Modal 15% Size 4-5 mm Shape anhedral
Plagioclase	Modal 73% Size 3-5 mm Shape anhedral
Clinopyroxene	Modal 12% Size 4-6 mm average, 15 mm maximum Shape anhedral

COMMENTS: This unit consists of coarse-grained troctolitic gabbro with increasing pyroxene-content down section. Alteration veins occur at 5 cm, 36 cm, 41 cm, 44 cm, 61 cm and 66 cm. Alteration of olivine changes as domains between corona texture and serpentinization.

UNIT-204: Leucocratic Olivine Gabbro
Pieces 3–4

Determined from Piece 4

Olivine	Modal 25% Size 3-7 mm Shape anhedral
Plagioclase	Modal 55% Size 4-9 mm Shape anhedral
Clinopyroxene	Modal 20% Size 10 mm Shape anhedral

COMMENTS: Olivine gabbro occurs with a gradational contact to the previous unit. Alteration veins occur at 90 cm and 114 cm.

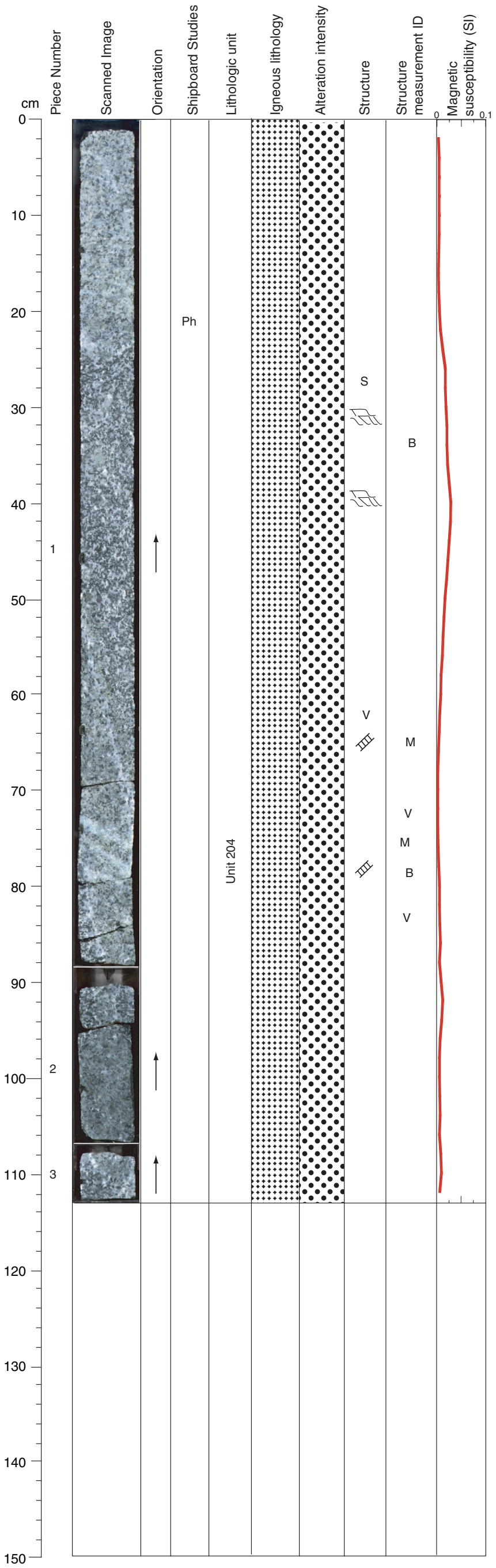
SECONDARY MINERALOGY: The upper part of this section consists of moderately altered troctolite with heterogeneously developed corona textures. Olivine is altered between 10% to 100% (average = 80%) forming coronas of tremolite +/- talc with a rim of chlorite where it was in contact with plagioclase. Corona alteration typically occurs in steeply dipping, 2-3 cm wide zones. The lower part of the section consists of moderately to only slightly altered olivine gabbro. The less abundant olivine is only slightly (ca. 10%) altered. Corona textures are rare in the lowermost part (<5%). Plagioclase is generally fresh. In thin section at 98-101 cm, 30% of olivine shows coronitic texture and 10% is replaced by serpentine. Pyroxene is fresh.

VEIN ALTERATION: Few green actinolite veins are present in this section (e.g. between 2-10cm).

THIN SECTIONS:
304-U1309D-76R-1, 98.0-101.0 cm (#250)

STRUCTURE: Steeply dipping plagioclase-rich domain (M2) on the side of the core. Steeply dipping green veins (V1) are localized in the plagioclase-rich portion. Thin white veins (V2) cut across the surrounding grain-boundary alteration. In the middle of Piece 3 there is a contact with a coarse-grained, dark, less altered gabbro (M1) (Note: Alteration here is an expression in variation in gabbro composition rather than any structural variation.) M1>M2>V1>V2

Core Photo



304-U1309D-76R-2 (Section top: 388.12 mbsf)

UNIT-204: Leucocratic Olivine Gabbro
Pieces 1–3

Determined from Piece 1 (0-20 cm interval)

Olivine	Modal 30% Size 3-6 mm Shape anhedral
Plagioclase	Modal 45% Size 4-10 mm Shape anhedral
Clinopyroxene	Modal 25% Size 3-11 mm Shape anhedral

COMMENTS: This section consists of coarse-grained olivine gabbro with pyroxene-rich and –poor domains. Pyroxene-rich areas occur between 0 -24 cm and 51-89 cm. A steeply dipping plagioclase band crosses at 63 cm.

SECONDARY MINERALOGY: This section consists of moderately altered olivine-gabbro and troctolite. Olivine is generally fresh and rimmed by chlorite, in reaction with plagioclase. Magnetite is present and forms a mesh texture with serpentine after olivine. Between 0-24 cm, alteration is slight and just 5% of olivine is replaced by serpentine and 5% shows a corona texture. In the remainder of the section, olivine is mostly replaced by serpentine (30 to 50%). Pyroxene edges are slightly altered to actinolte and plagioclase is generally fresh. Sulfide is locally present (e.g. between 24-40 cm).

STRUCTURE: Serpentine veinlets intersect plagioclase grains creating a chalk white alteration of the plagioclase (prehnite). The serpentinite fabric (S) is gently dipping where present; below Piece 1 the gabbro is more isotropic. Patchy green alteration and a steeply dipping feldspar-rich vein (V) cut the serpentinite. S>V

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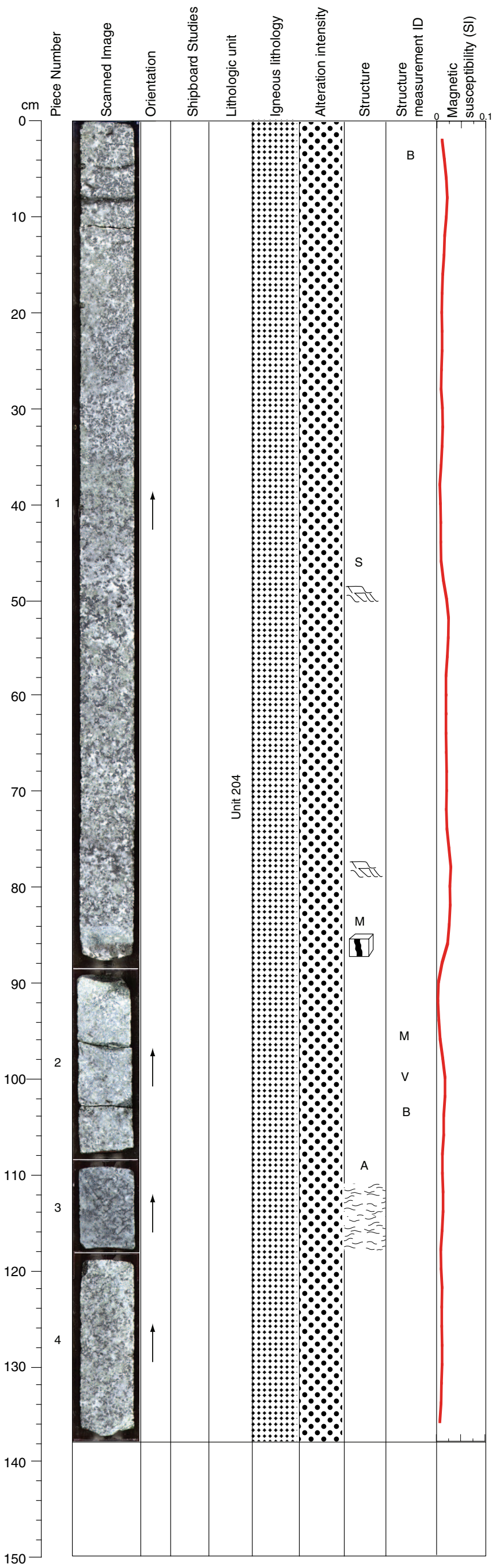


304-U1309D-76R-3 (Section top: 389.24 mbsf)

UNIT-204: Leucocratic Olivine Gabbro
Pieces 1–4

PRIMARY MINERALOGY: Determined from Piece 1 (50-70 cm interval)

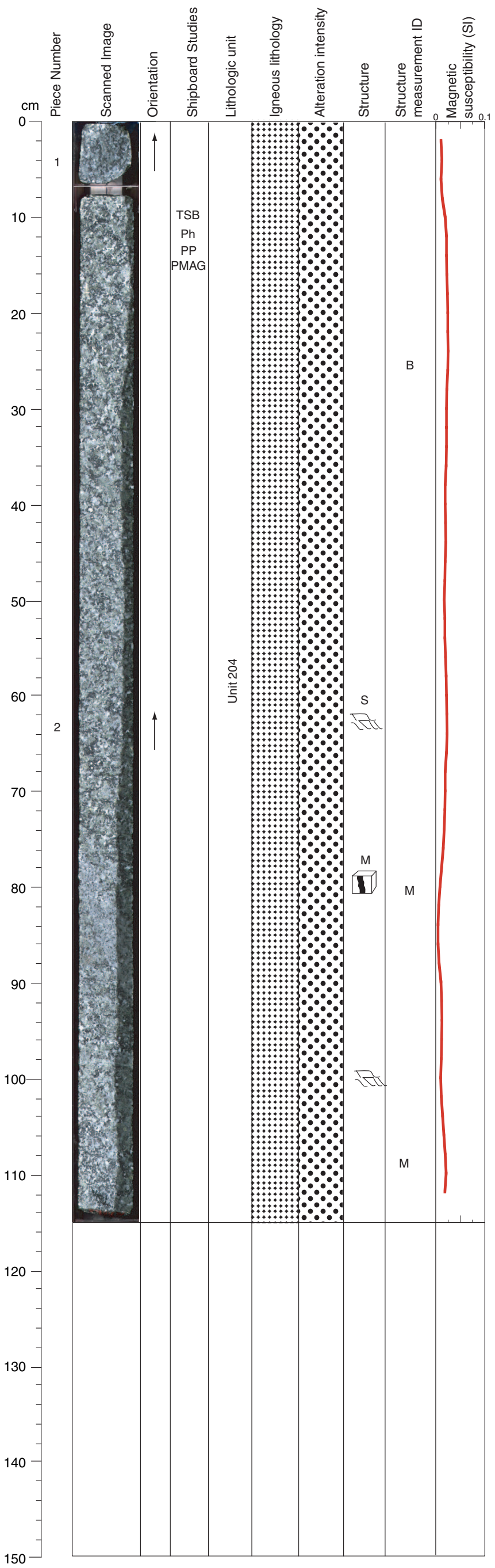
Olivine	Modal 30% Size 3-6 mm Shape anhedral
Plagioclase	Modal 45% Size 3-7 mm Shape anhedral
Clinopyroxene	Modal 25% Size 3-11 mm Shape anhedral

COMMENTS: This section consists of coarse-grained olivine gabbro with pyroxene-rich and –poor domains. A steeply dipping contact separates those layers between 0 cm and 45 cm. Troctolitic bands occur between 27-35 cm, 44-51 cm and 66-71 cm. A gabbroic dike cuts the core between 86-88 cm.

SECONDARY MINERALOGY: This section consists of moderately olivine-gabbro in the greenschist facies. Olivine are generally fresh and rimmed by chlorite, in reaction with plagioclase. Magnetite is present and form a mesh texture with serpentine around olivine, this olivine alteration is more present between 0-84 cm (about 60% of olivine are altered to serpentine, and 5% shows a corona texture). Between 84-118 cm, olivine are completely replaced by tremolite+ chlorite +/- talc and rimmed by chlorite forming corona texture (100 to 60% of olivine alteration). Plagioclase appears fresh. Pyroxene are partially replaced by actinolite.

STRUCTURE: Patches of large olivine grains surrounded by the serpentinite texture (S). Gently dipping magmatic vein (M) cuts the serpentine texture with vein-wall alteration. Piece 3 contrasts with the surrounding pieces with dark grain boundary alteration (A) (amphibole) and a steeply dipping magmatic fabric in the center defined by feldspar grains. S>M>A (note that serpentine foliation follows an earlier magmatic texture - i.e. the serpentinization postdates the magmatic vein).

Core Photo



304-U1309D-77R-1 (Section top: 391.70 mbsf)

UNIT-204: Leucocratic Olivine Gabbro
Pieces 1–2

PRIMARY MINERALOGY: Determined from Piece 1 (20-50 cm interval)

Olivine	Modal 30% Size 3-6 mm Shape anhedral
Plagioclase	Modal 45% Size 3-7 mm Shape anhedral
Clinopyroxene	Modal 25% Size 3-11 mm Shape anhedral

COMMENTS: This section consists of coarse-grained olivine gabbro. It has very homogeneous composition except between 80-89 cm and 106-113 cm that are plagioclase-rich.

SECONDARY MINERALOGY: This section consists of moderately altered olivine-gabbro in the greenschist facies. Olivine are generally fresh and rimed by chlorite, in reaction with plagioclase. Magnetite is present and forms a mesh texture with serpentine around olivine. Serpentinization is dominant (80% of olivine alteration) between 0-113 cm. Plagioclase is altered to prehnite, and between 78-87 cm this alteration is more important than serpentine after olivine, due to a plagioclase-rich interval. Pyroxene is partially replaced by actinolite.

VEIN ALTERATION: No veins in this section.

THIN SECTIONS:
304-U1309D-77R-1, 8.0- 11.0 cm (#251)

STRUCTURE: Subhorizontal serpentine network (S), with mesh texture serpentine wraps around large olivine grains. Inconspicuous dipping bands of plagioclase (M) near 80 cm and variable pyroxene throughout the section. S>M

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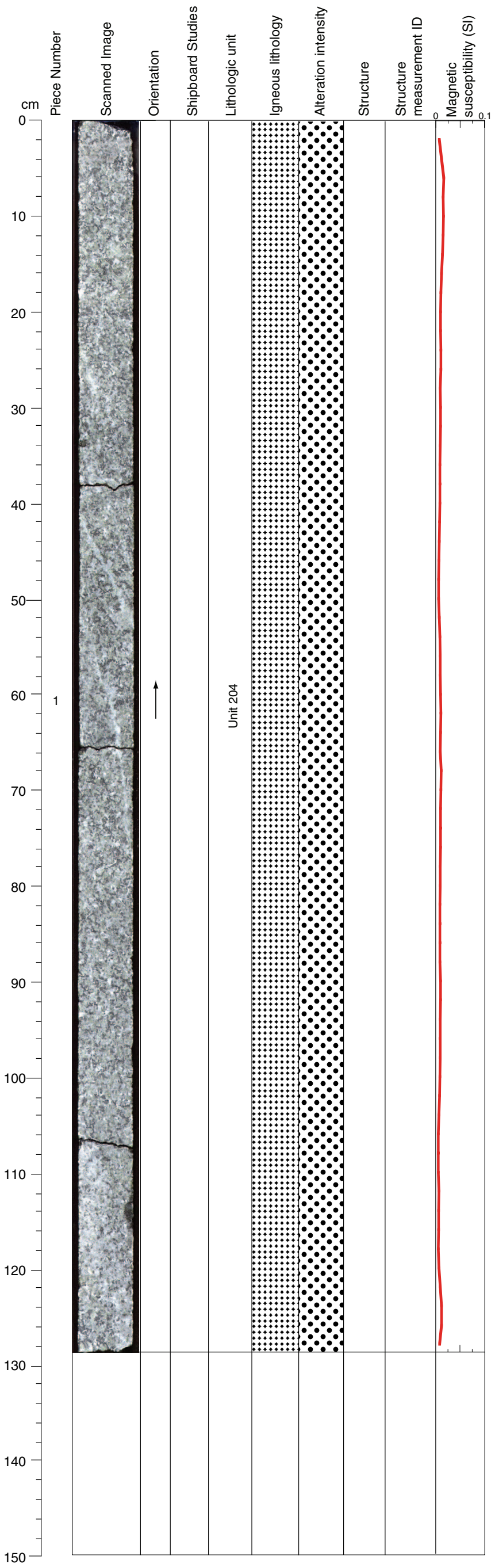


304-U1309D-77R-2 (Section top: 392.84 mbsf)

UNIT-204: Leucocratic Olivine Gabbro
Piece 1

PRIMARY MINERALOGY: Determined from Piece 1B (40-65 cm interval)

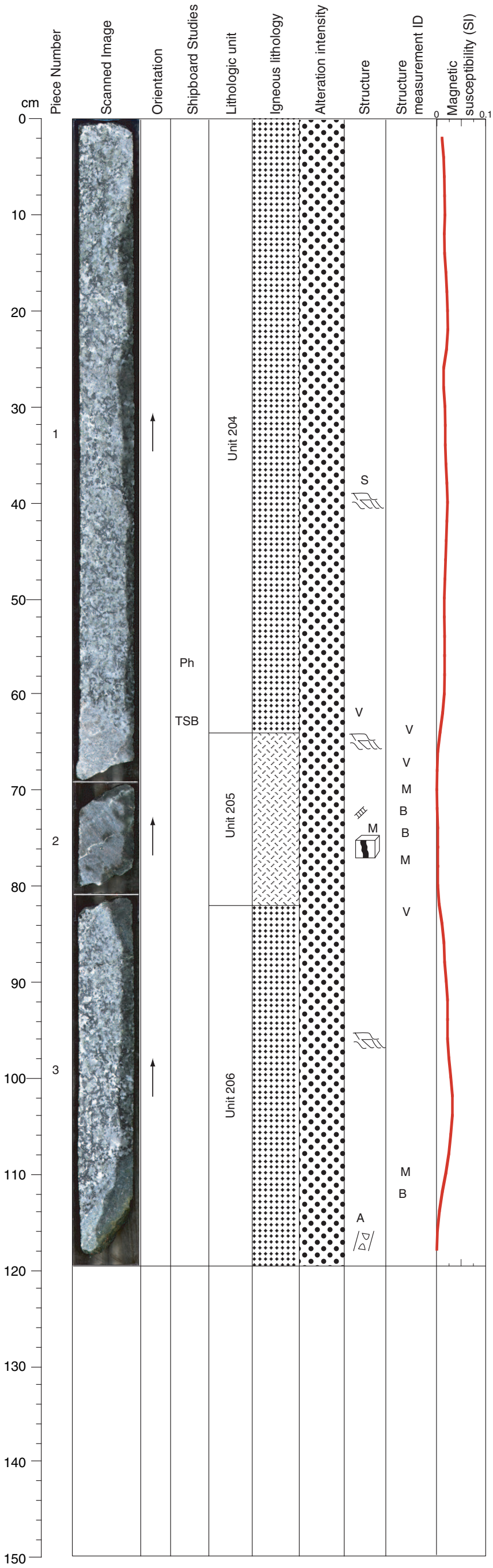
Olivine	Modal 25% Size 3-6 mm Shape anhedral
Plagioclase	Modal 45% Size 3-6 mm Shape anhedral
Clinopyroxene	Modal 30% Size 3-11 mm Shape subhedral to anhedral

COMMENTS: This section consists of coarse-grained olivine gabbro with a homogeneous composition. Irregular shaped pyroxene-poor domains occur below 103 cm. Alteration veins cut the section at 39 cm, 48 cm and 59 cm.

SECONDARY MINERALOGY: This section consists of moderately altered olivine gabbro in the greenschist facies. Olivine is generally fresh and rimed by chlorite, in reaction with plagioclase. Magnetite is present and forms a mesh texture with serpentine after olivine, and is the dominant olivine alteration texture in this section (60% serpentine after olivine and 5% corona texture). Plagioclase is altered to prehnite. Pyroxene is partially replaced by actinolite. At 39, 48 and 59 cm, a steeply dipping 8 millimeter wide zone of amphibole-chlorite alteration occurs in the sectiom, with 100 % olivine alteration (corona-type). This zone probably predates serpentine-prehnite ladder veins.

STRUCTURE: Serpentinite texture (S) is continuous across plagioclase forming bands of chalk white prehnite across plagioclase. The serpentinite texture surrounds large olivine grains. A steeply dipping plagioclase-rich vein (V) at ~60 cm and feldspar enrichment at the base of the section are noteworthy. S>V

Core Photo



304-U1309D-77R-3 (Section top: 394.13 mbsf)

UNIT-204: Leucocratic Olivine Gabbro
Piece 1

PRIMARY MINERALOGY: Determined from Piece 1 (30-55 cm interval)

Olivine	Modal 30% Size 3-9 mm Shape anhedral
Plagioclase	Modal 40% Size 3-8 mm Shape anhedral
Clinopyroxene	Modal 30% Size 4-14 mm Shape anhedral

COMMENTS: The upper half of the section consists of coarse-grained gabbro that is the continuation of the previous section. An alteration vein cuts at 26 cm.

UNIT-205: Gabbro
Pieces 1–3

PRIMARY MINERALOGY: Determined from Piece 2

Plagioclase	Modal 70% Size 4-6 mm (grain boundaries are not clear) Shape anhedral
Clinopyroxene	Modal 30% Size 3-12 mm Shape anhedral

COMMENTS: This unit consists of a coarse-grained gabbro dike that intruded the olivine gabbro. A 2-3 mm wide reaction zone with corona texture formed within the olivine gabbro. A weak magmatic foliation is visible.

UNIT-206: Leucocratic Olivine Gabbro
Piece 3

PRIMARY MINERALOGY: Determined from Piece 3

Olivine	Modal 30% Size 3-9 mm Shape anhedral
Plagioclase	Modal 40% Size 3-8 mm Shape anhedral
Clinopyroxene	Modal 30% Size 4-14 mm Shape anhedral

COMMENTS: This unit consists of coarse-grained gabbro and is the continuation from Unit 204. A late magmatic leucocratic dike with epidote cuts the end of the section.

SECONDARY MINERALOGY: This section consists of moderately altered olivine gabbro and gabbro in the greenschist facies. In the olivine gabbro, olivine is generally fresh and rimmed by chlorite, in reaction with plagioclase. Magnetite is present and forms a mesh texture with serpentine around olivine. Plagioclase is altered to prehnite. Pyroxene is partially replaced by actinolite. In the metagabbro, orthopyroxene shows an alteration rim composed by chlorite +/- talc. Plagioclase seems to be fresh. Intervals in this section show more intense alteration with abundant corona textures (at the contact between olivine-gabbro and gabbroic dike, 111-115 cm) and other show a more important serpentinization (0-63 cm, 63-111cm). In thin section, olivine alteration in this section is approximately 20% corona texture, and 10% serpentine after olivine.

VEIN ALTERATION: Some actinolite-clays veins are present in this section (e.g. at 88 cm). Serpentine/prehnite veins in olivine gabbro pass into prehnite veins in gabbro. Between 115-118 cm, a epidote-bearing dike is present.

THIN SECTIONS:
304-U1309D-77R-3, 61.0- 63.0 cm (#252)

STRUCTURE: Similar structure to Section U1309D-77R-2 to 63 cm. At 63 cm there is a gabbroic intrusion (M) with internal veins (not carbonate) and fractures (V). There is a deflection in the orientation of the serpentine fabric (S) from subhorizontal toward the top of the section, to steeply dipping adjacent to the intrusion. At the base of the section the serpentine folia are steeply dipping and there is an alteration band (A). S>M>V>A

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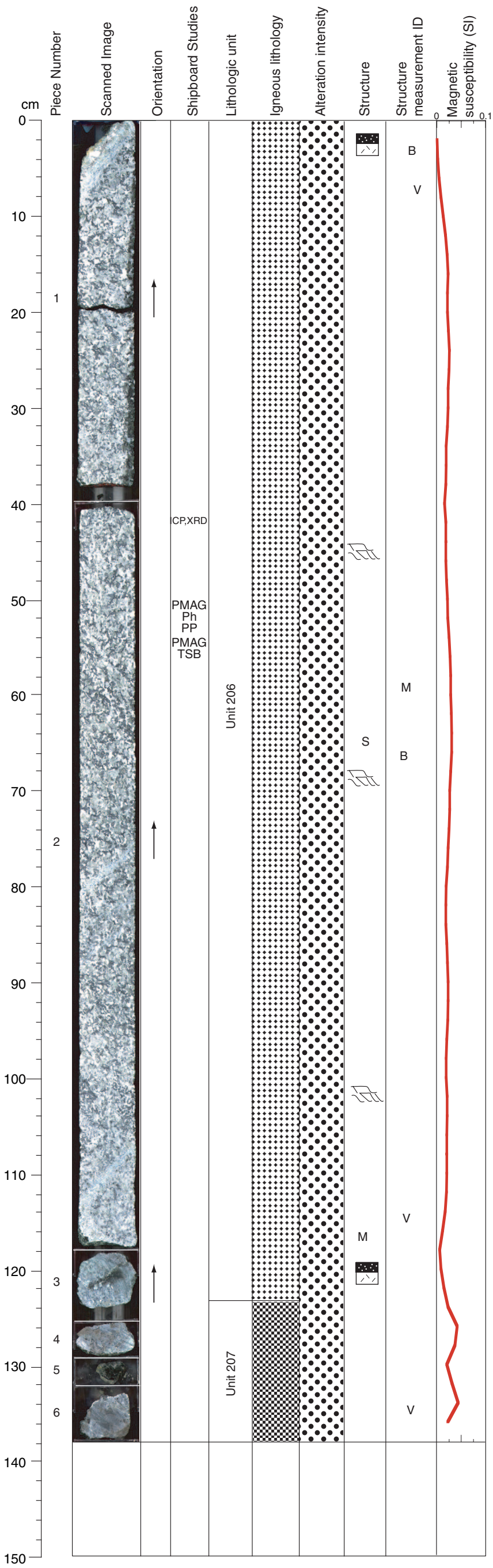

304-U1309D-77R-4 (Section top: 395.32 mbsf)

UNIT-206: Leucocratic Olivine Gabbro
Pieces 1–3

PRIMARY MINERALOGY: Determined from Piece 1B

Olivine	Modal 25% Size 4-7 mm Shape anhedral
Plagioclase	Modal 40% Size 4-7 mm Shape anhedral
Clinopyroxene	Modal 30% Size 4-11 mm Shape anhedral

COMMENTS: This unit consists of compositionally homogeneous, coarse-grained olivine gabbro. A late magmatic leucocratic dike has intruded the section and the previous section as well. The lower contact is partly preserved at the edge of Piece 1. A 10 mm wide reaction zone formed in the olivine gabbro. A small, triangular shaped troctolitic area with medium grain size occurs at 105 cm. Alteration veins crosscuts at 78 cm, 82 cm, 85 and 110 cm.

UNIT-207: Oxide Gabbro
Pieces 3–6

PRIMARY MINERALOGY: Determined from Piece 4 and 6

Plagioclase	Modal 48% Size 10-33 mm Shape anhedral
Clinopyroxene	Modal 45% Size 5-21mm Shape anhedral
Oxides	Modal 7% Size 2-11 mm Shape anhedral

COMMENTS: A very coarse-grained oxide gabbro intrudes the olivine gabbro. It has a pronounced fine grained margin at the top contact.

SECONDARY MINERALOGY: This section consists of moderately altered olivine gabbro in the greenschist facies. At the top, olivine is generally fresh and rimmed by chlorite, in reaction with plagioclase. Magnetite is present and forms a mesh texture with serpentine after olivine. In this zone, olivine is mostly altered to serpentine (about 70%) and shows less than 5% corona texture. Between 108-116 cm, an irregular zone with 80% coronite alteration, is present. Between 118-125 cm, olivine is completely replaced by tremolite + chlorite +/- talc and rimmed by chlorite, forming coronas. Pyroxene edges are slightly altered to actinolite. Plagioclase appears fresh. In thin section, no coronas are present and 40% of olivine is replaced by serpentine in average.

VEIN ALTERATION: A late leucocratic magmatic dike is present between 0-4 cm, and shows at the contact with olivine-gabbro. A carbonate vein is present between 118-122 cm.

THIN SECTIONS:
304U-U1309D-77R-4, 56.0-59.0 cm (#253)

STRUCTURE: Gabbro from Section U1309D-77R-3 continues, with intense alteration at the contact (M) with blocky plagioclase and green amphibole. The gabbro cuts mesh-texture serpentinite (S) that is steeply dipping (the texture). Throughout the rest of the section there is the same serpentinite-plagioclase texture that typified previous sections. There is a contact at the base of the section with another coarse-grained gabbro intrusion. S>M

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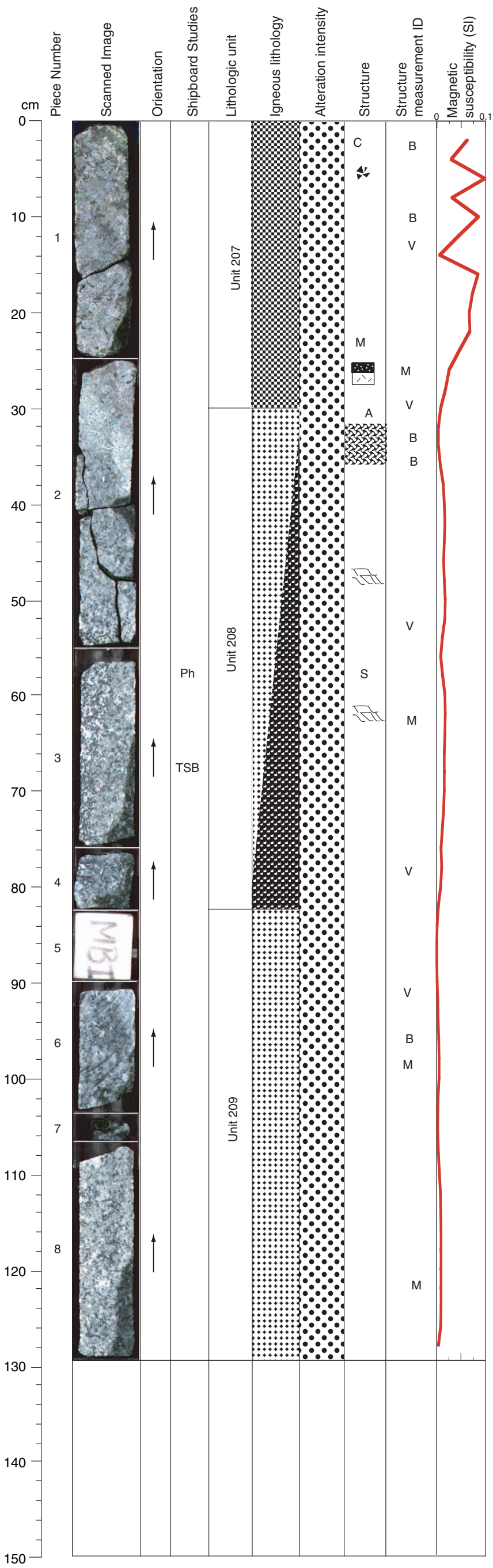

304-U1309D-78R-1 (Section top: 396.50 mbsf)

UNIT-207: Oxide Gabbro
Pieces 1–2

PRIMARY MINERALOGY: Determined from Piece 1A

Plagioclase	Modal 60% Size 7-21 mm Shape anhedral
Clinopyroxene	Modal 30% Size 6-21mm average, 36 mm maximum Shape anhedral
Oxide	Modal 10% Size 2-15 mm average, 21 mm maximum Shape anhedral
Sulfide	Modal 1% Size 1-3 mm Shape anhedral

COMMENTS: A coarse-grained oxide gabbro dike occurs at the top of the section, and represents the continuation from the previous section. A late magmatic leucocratic dike is visible at the edge of Piece 1. Sulfides occur between the late magmatic dike and the oxide gabbro.

UNIT-208: Leucocratic Olivine Gabbro and Troctolite
Pieces 2–4

PRIMARY MINERALOGY: Determined from Piece 3

Olivine	Modal 40% Size 3-6 mm Shape anhedral
Plagioclase	Modal 50% Size 3-5 mm average, 10 mm maximum Shape anhedral
Clinopyroxene	Modal 10% Size 3-7 mm Shape anhedral

COMMENTS: This unit contains an interval with a vertical contact between olivine gabbro and troctolite. A 35 mm wide reaction zone extends into the olivine gabbro.

UNIT-209: Leucocratic Olivine Gabbro
Pieces 4–8

PRIMARY MINERALOGY: Determined from Piece 8

Olivine	Modal 25% Size 3-7 mm average Shape anhedral
Plagioclase	Modal 40% Size 3-7 mm average, 15 mm maximum Shape anhedral
Clinopyroxene	Modal 35% Size 3-5 mm average, 9 mm maximum Shape anhedral

COMMENTS: The bottom of the section consists of coarse-grained olivine gabbro.

SECONDARY MINERALOGY: This section consists of moderately altered oxide gabbro (at the top) and olivine gabbro (at the bottom). In the upper part, pyroxene is partially altered to actinolite; plagioclase is rimmed by chlorite. In the lower part, olivine is either fresh, or rimmed by chlorite in reaction with plagioclase. Magnetite is present and forms a mesh texture with serpentine around olivine. This kind of olivine alteration is more present between 50-128 cm where 40% of olivine is replaced by serpentine and just 5% shows a corona texture. In thin section at 66 cm, 15% of olivine shows a coronitic texture and 20% is replaced by serpentine. Between 34-39 cm, olivine is completely replaced by tremolite + chlorite +/- talc and rimmed by chlorite (100% of olivine shows coronitic texture). This zone is very rich in hematite on the edges. Pyroxene is partially altered to actinolite. Some pyrite is present in this section. Between 90-93 cm, a tremolite/talc rich alteration is present on the edge of core.

VEIN ALTERATION: A carbonate vein is present between 34-39 cm. A late magmatic leucocratic dike is present between 1-3 cm and shows signifnicant secondary plagioclase and actinolite.

THIN SECTIONS:
304-U1309D-78R-1, 66.0- 68.0 cm (#254)

STRUCTURE: The gabbroic section continues from Section U1309D-77R-4 with feldspar-rich (internally cracked (C)) intervals containing a superposed green alteration. Piece 2 has a sharp contact (M) with slightly “smeared out” and altered olivine gabbro. The alteration zone (A) is in sharp contact below with less altered troctolitic gabbro with strong serpentinized textures (S) along grain boundaries. The base of the section grades into a serpentinized interval with little anisotropic texture. S>M>C>A

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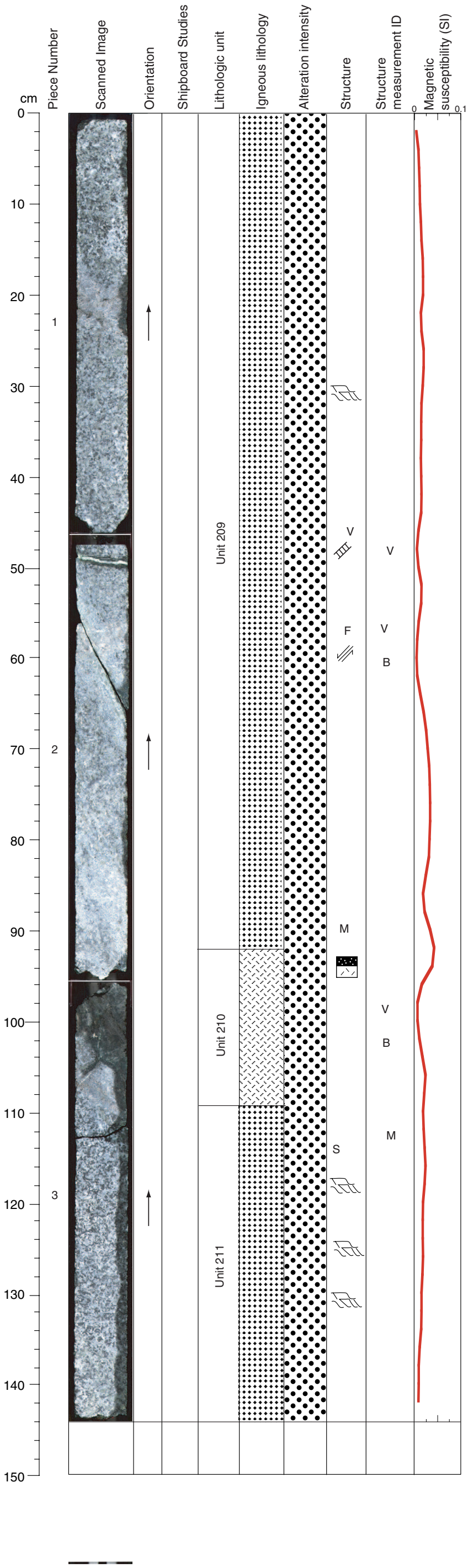


304-U1309D-78R-2 (Section top: 397.79 mbsf)

UNIT-209: Leucocratic Olivine Gabbro
Pieces 1–2

PRIMARY MINERALOGY: Determined from Piece 1

Olivine	Modal 25% Size 2-9 mm Shape anhedral
Plagioclase	Modal 40% Size 3-9 mm Shape anhedral
Clinopyroxene	Modal 35% Size 4-10 mm Shape anhedral

COMMENTS: This unit consists of coarse-grained olivine gabbro. Coarse pyroxene bands occur between 18-23 cm and 55-59 cm. and may represent dikes but the absence of the usually observed reaction zone suggests otherwise. A troctolitic band occurs between 83 cm and 90 cm. Weak magmatic foliation is visible below 60 cm.

UNIT-210: Gabbro
Pieces 2–3

PRIMARY MINERALOGY: Determined from Piece 3A

Plagioclase	Modal 70% Size 5-10 mm average, 20 mm maximum Shape anhedral
Clinopyroxene	Modal 30% Size 6-23 mm Shape anhedral

COMMENTS: A very coarse-grained gabbro dike cuts the weak magmatic foliation.

UNIT-211: Leucocratic Olivine Gabbro
Piece 3

PRIMARY MINERALOGY: Determined from Piece 3B

Olivine	Modal 35% Size 3-5 mm Shape anhedral
Plagioclase	Modal 45% Size 4 mm Shape anhedral
Clinopyroxene	Modal 20% Size 2-3 mm Shape anhedral

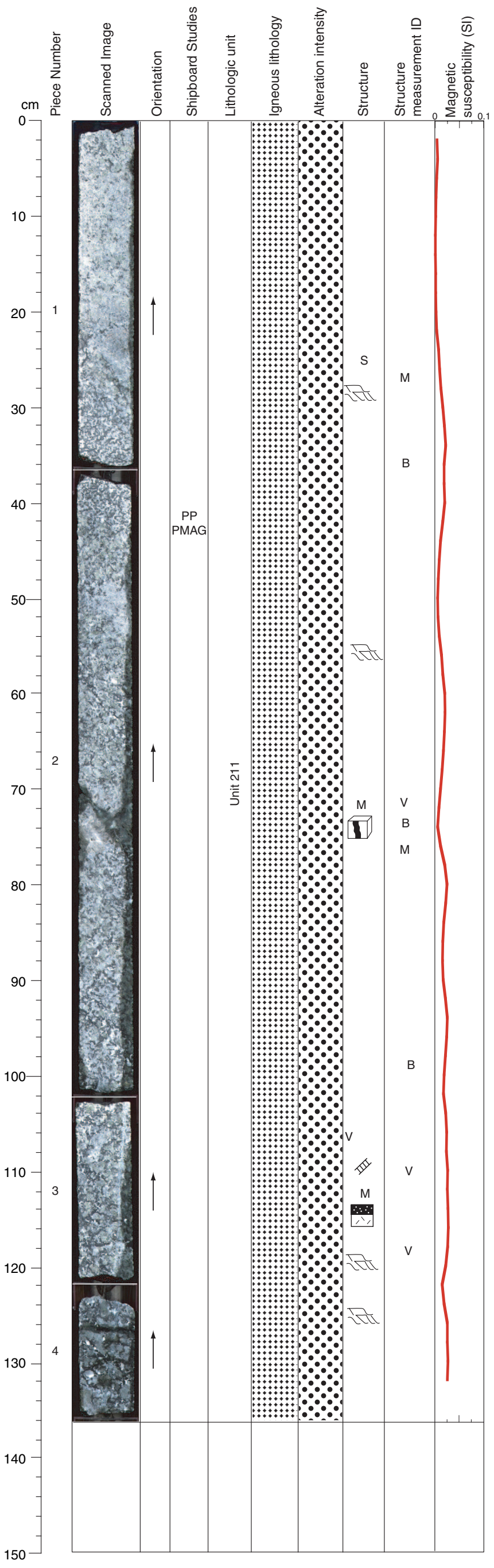
COMMENTS: The remainder of the section consists of coarse-grained olivine gabbro that is the continuation from Unit 209.

SECONDARY MINERALOGY: This section consists of moderately altered olivine gabbro and gabbro (at the center of the section). In the olivine gabbro, pyroxene is partially altered to actinolite, plagioclase is rimmed by chlorite. Olivine is generally fresh and rimmed by chlorite, due to reaction with plagioclase. Magnetite is present and forms a mesh texture with serpentine after olivine. This olivine alteration is more important than corona texture between 0-5 cm. Certain intervals in the section show more intense alteration with abundant corona textures where olivine are completely replaced by tremolite + chlorite +/- talc and rimmed by chlorite (5-6 cm, 80-95 cm, Piece 3). Pyroxene is partially altered to actinolite. In the gabbro, pyroxene is partially altered to actinolite and plagioclase is generally fresh. Some pyrite is present in this section.

VEIN ALTERATION: A carbonate vein is present between 96-108 cm.

STRUCTURE: Brecciated green vein (V) (carbonate rich) in Piece 2 cuts a steeply dipping serpentine fabric. A very narrow serpentine-talc rich fault (F) with down-dip mineral lineation is present at 68 cm. Variably altered and mixed coarse-grained gabbro and troctolite (?) are in sharp contact (M) with serpentinite (S) near 100 cm. The fabric in the serpentinite is steeply dipping and discontinuous around plagioclase. S>M>V>F

Core Photo



304-U1309D-78R-3 (Section top: 399.23 mbsf)

UNIT-211: Leucocratic Olivine Gabbro
Pieces 1–4

PRIMARY MINERALOGY: Determined from Piece 2 (55-70 cm interval)

Olivine	Modal 30% Size 3-7 mm Shape anhedral
Plagioclase	Modal 40% Size 3-6 mm Shape anhedral
Clinopyroxene	Modal 30% Size 3-9 mm Shape anhedral

PRIMARY MINERALOGY: Determined from Piece 4 (this piece has coarser grains on the average than the previous one)

Olivine	Modal 35% Size 4-11 mm Shape anhedral
Plagioclase	Modal 40% Size 3-7 mm average, 9 mm maximum Shape anhedral
Clinopyroxene	Modal 25% Size 4-15 mm average, 24 mm maximum Shape anhedral

COMMENTS: This section consists of coarse-grained olivine gabbro that shows coarsening down section. A troctolitic domain occurs between 0-12 cm and a plagioclase-rich domain between 49-55 cm. A 50 mm wide gabbro dike with coarse grain sizes as large as 12 mm occurs between 69-75 cm. No reaction zone formed at the contact.

SECONDARY MINERALOGY: This section consists of moderately greenschist facies altered olivine gabbro. Olivine is generally fresh and rimmed by chlorite, in reaction with plagioclase. Magnetite is present and forms a mesh texture with serpentine around olivine. In the upper part of this section (between 0-31 cm), the corona texture after olivine is about 5% and serpentinized olivine between 5 to 15%. The lower part shows a more important olivine alteration with serpentine mesh texture (about 80%); approximately 20% of plagioclase grains are altered to prehnite. Pyroxene is partially replaced by actinolite in the upper part, but are generally fresh at the bottom of the section. Plagioclase seem to be fresh. A dike with coarse-grained pyroxene and plagioclase cuts the olivine-gabbro between 69-75 cm, and shows alteration in the greenschist facies.

VEIN ALTERATION: Some talc veins are present in this section (e.g. in Piece 3).

STRUCTURE: Gabbro with serpentinite texture (S) intruded by gabbro with variable grain size. Note the deflection in the serpentine texture toward a steeper dip adjacent to the contact (M). The gabbroic section ends at 118 cm with more serpentinite with folia around coarse grained olivine and plagioclase. There is also a coarse grained gabbro intrusion (M) at about 72 cm (about 10 cm wide). Steeply dipping blue veins (V) cut the gabbro in Pieces 3 and 4. S>M>V

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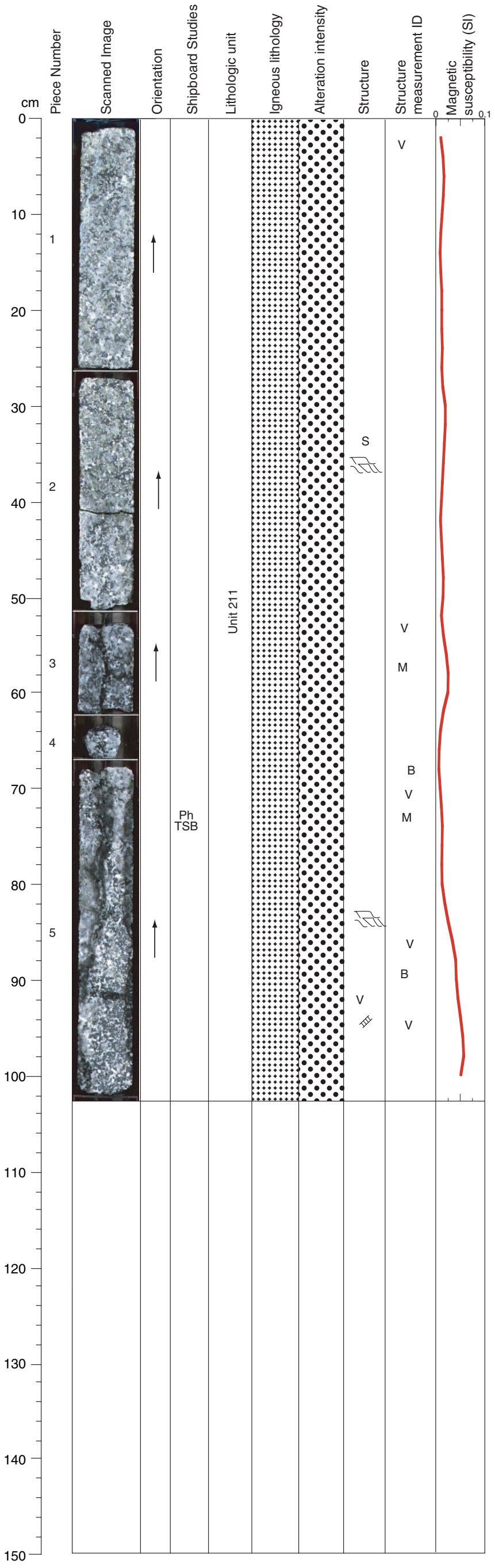

304-U1309D-78R-4 (Section top: 400.58 mbsf)

UNIT-211: Leucocratic Olivine Gabbro
Pieces 1–5

PRIMARY MINERALOGY: Determined from Piece 2

Olivine	Modal 25% Size 3-5 mm Shape anhedral
Plagioclase	Modal 40% Size 3-6 mm Shape anhedral
Clinopyroxene	Modal 35% Size 4-11 mm Shape anhedral

PRIMARY MINERALOGY: Determined from Piece 5 (this piece has higher olivine and lower clinopyroxene modal composition than the previous one)

Olivine	Modal 40% Size 3-5 mm Shape anhedral
Plagioclase	Modal 40% Size 3-7 mm Shape anhedral
Clinopyroxene	Modal 20% Size 3-6 mm

COMMENTS: This section consists of coarse-grained olivine gabbro. Piece 5 contains an olivine-rich band with small plagioclase grains and less clinopyroxene. It widens below 83 cm, representing the major part of the core.

SECONDARY MINERALOGY: This section consists of moderately altered olivine gabbro and troctolite (at the center of the section). Olivine is generally fresh and rimed by chlorite, due to reaction with plagioclase. Magnetite is present and forms a mesh texture with serpentine after olivine (main olivine alteration in this section). Between 51-100 cm, steeply dipping zones occur where 100% of the olivne is altered to serpentine. Plagioclase is altered to prehnite. Pyroxene is partially replaced by actinlolite. There is a sharp transition seen in thin section at 73-75 cm, from almost fresh olivine showing associated reaction with plagioclase to serpentinized olivine associated with plagioclase altered to prehnite.

VEIN ALTERATION: No veins in this section.

THIN SECTIONS:
304-U1309D-78R-4, 73.0-75.0 cm (#255)

STRUCTURE: Coarse olivine grains; vein (V) comprising blocky plagioclase cuts the serpentinite texture (S) at the base of the section. The serpentinite texture localizes into a narrow, steeply dipping band. S>V

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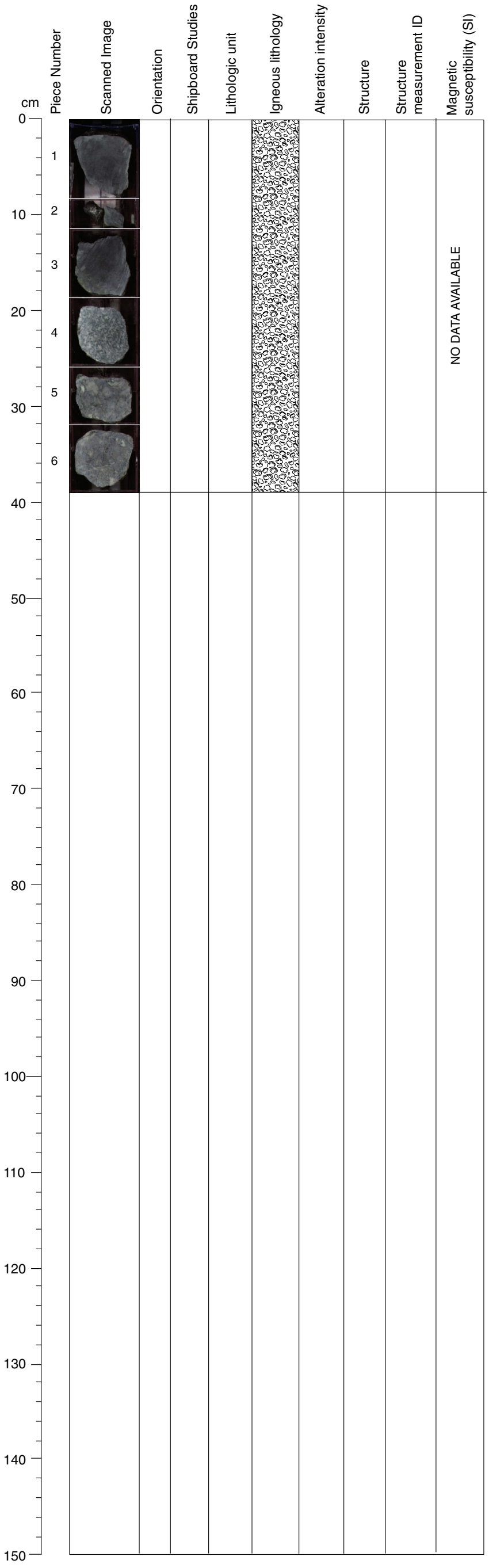


305-U1309D-79G-1 (Section top: 0.00 mbsf)

UNIT-a (For the ghost core, no unit numbers were assigned): Diabase rubble

Pieces 1–3

COMMENTS: Rubble, probably out of place.

UNIT-b: Troctolite rubble

Piece 4

Plagioclase	Modal 60% Size 3 mm average Shape anhedral
Olivine	Modal 40% Size 3 mm average Shape anhedral

COMMENTS: Rubble, probably out of place.

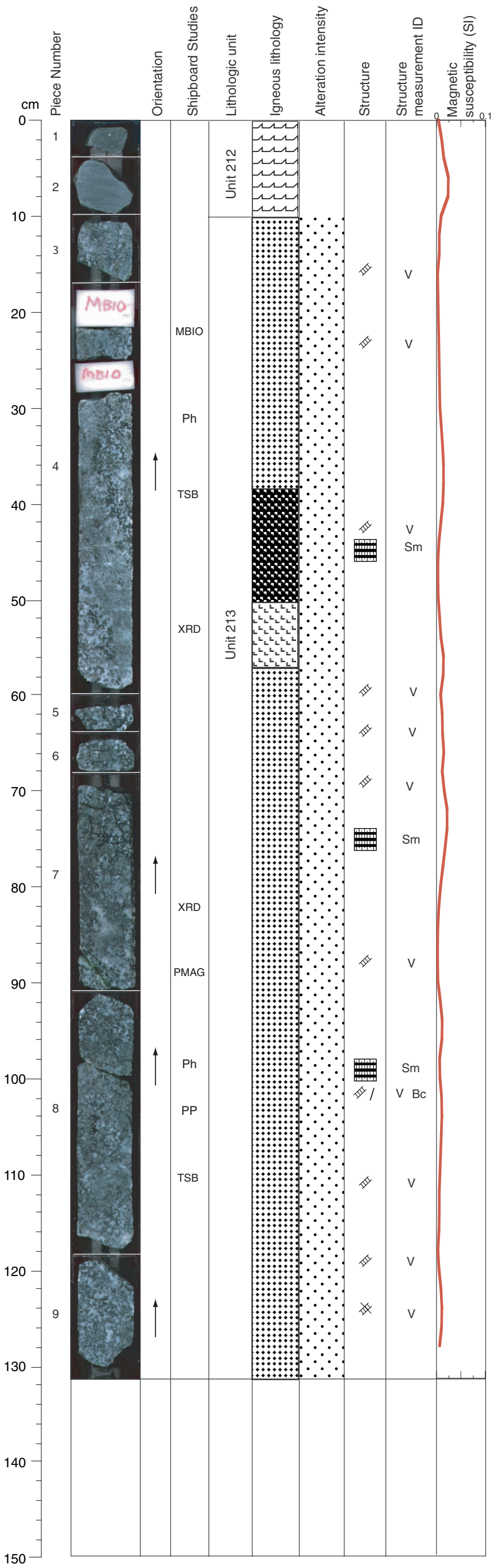
UNIT-c: Gabbro rubble

Piece 5-6

Plagioclase	Modal 60% Size 10 mm average Shape anhedral
Clinopyroxene	Modal 40% Size 12 mm average Shape anhedral
Plagioclase	Modal 1% Size 3 mm average Shape anhedral

COMMENTS: Rubble, probably out of place.

Core Photo



305-U1309D-80R-1 (Section top: 401.30 mbsf)

UNIT-212: Diabase Rubble
Pieces 1–2

COMMENTS: Unit 212 consists of 2 pieces of fine-grained diabase rubble, presumed to be not in place.

UNIT-213: Olivine Gabbro
Pieces 3-9

PRIMARY MINERALOGY: Determined from Piece 8

Olivine	Modal 20% Size 1-5 mm Shape interstitial
Plagioclase	Modal 60% Size 4-6 mm Shape anhedral
Clinopyroxene	Modal 20% Size 12 mm average Shape subhedral-anhedral

COMMENTS: Unit 213 predominantly consists of medium-grained olivine gabbro. A leucocratic zone or intrusion consisting of 5% olivine and 95% plagioclase occurs at 38-50 cm and grades into a troctolitic gabbro from 50-57 cm. The remainder of the section is olivine gabbro with locally variable modal proportions of the three primary phases. The margins of the leucocratic lithology and the surrounding olivine gabbro are diffuse and are marked by locally abundant sulfides. Orthopyroxene, identified first in thin section, but not in hand specimen, occurs in interval 110-113 cm.

SECONDARY MINERALOGY: Actinolite/tremolite, chlorite, plagioclase

COMMENTS: Core is moderately altered, with serpentinization of olivine. Corona texture is scarce to absent in this section. Vein assemblages include late talc-carbonate with weak associated alteration, abundant green to dark green amphibole/chlorite veins. Serpentine veins are scarce, associated with strong alteration. A set of parallel, pale green to white, subhorizontal haloed vein is associated with vertical igneous feature in Piece 4.

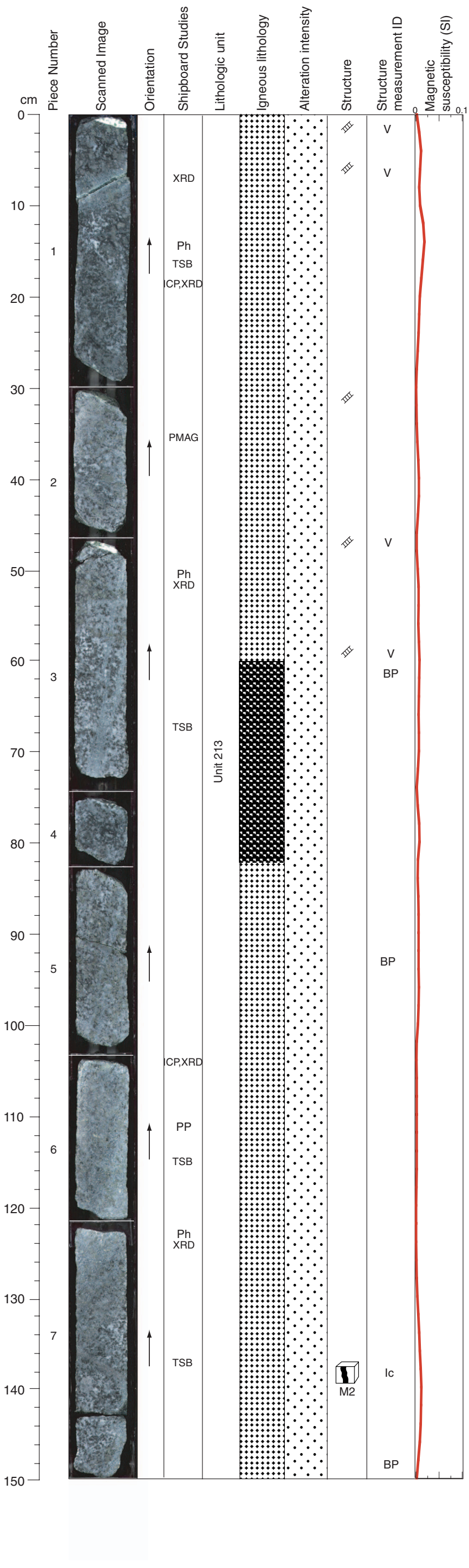
VEIN ALTERATION: Talc, calcite, serpentine, chlorite, amphibole, secondary plagioclase

THIN SECTIONS:
305-U1309D-80R-1, 39-41 cm (#257)
305-U1309D-80R-1, 110-113 cm (#258)

STRUCTURE: There is a weak magmatic foliation in this olivine gabbro except for a steeply dipping plagioclase-rich band of magmatic origin, later crosscut by horizontal white veins (Piece 4). Texturally, the rock is continuous with Core U1309D-78R (Expedition 304) in that it shows a network-type arrangement of plagioclase-olivine surrounding zones of olivine gabbro. Very minor late veining/fracturing.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-80R-1, 32-60 cm WET
305-U1309D-80R-1, 99-117 cm WET

Core Photo



305-U1309D-80R-2 (Section top: 402.61 mbsf)

UNIT-213: Olivine Gabbro
Pieces 1-7

PRIMARY MINERALOGY: Determined from Piece 6

Olivine	Modal 20% Size 1-10 mm Shape interstitial
Plagioclase	Modal 60% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 20% Size 8 mm average Shape subhedral-anhedral

COMMENTS: This section is a continuation of Unit 213. A relatively pyroxene-poor troctolitic zone occurs at 60-82 cm. 10 mm wide hornblende (?) veins occur at 64 cm and 138 cm.

SECONDARY MINERALOGY: Chlorite, actinolite/tremolite

COMMENTS: Section has low alteration (10%), showing some patches of corona texture replacing plagioclase. This texture is well-developed in alteration halo adjacent to a vein at 8 cm. There are two dike/veins with alteration haloes at 50 cm. Olivine is altered to serpentine and tremolite.

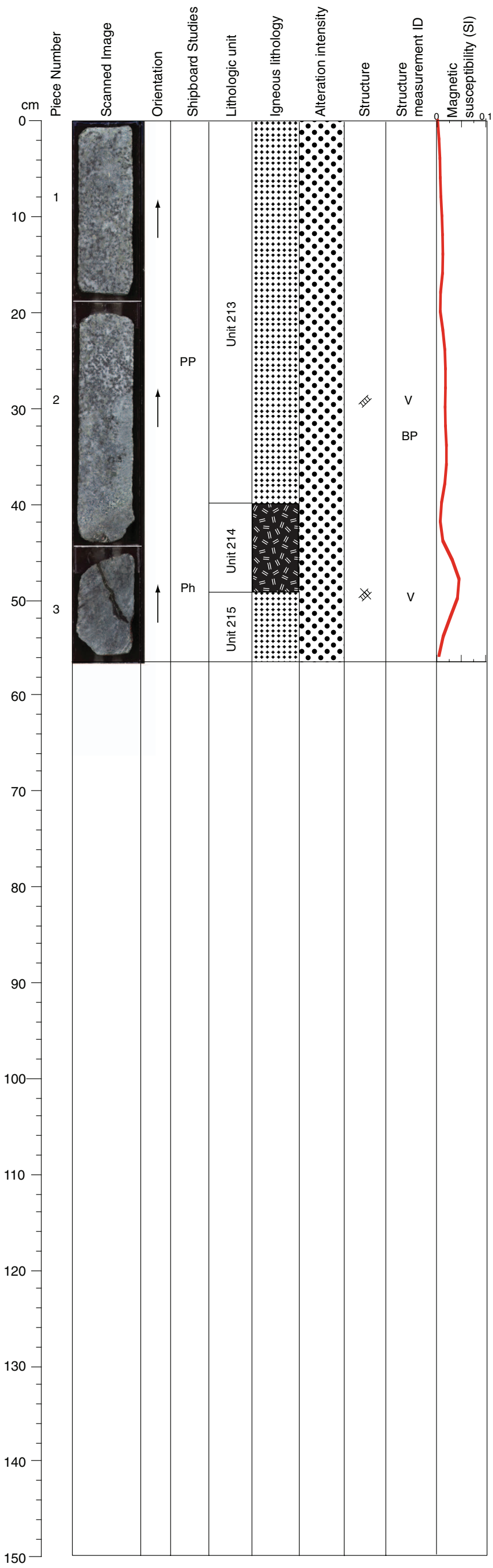
VEIN ALTERATION: Talc, calcite, serpentine, chlorite, plagioclase, amphibole

THIN SECTIONS:
305-U1309D-80R-2, 16-19 cm (#259)
305-U1309D-80R-2, 67-70 cm (#260)
305-U1309D-80R-2, 115-117 cm (#261)
305-U1309D-80R-2, 136-138 cm (#262)

STRUCTURE: Continuing from Section 305-U1309D-80R-1, the olivine gabbro with a weak magmatic foliation is intruded by a shallowly dipping, 1 cm thick magmatic pyroxenite vein (M2) plus steeply dipping alteration zones showing olivine with corona type alteration as described from Expedition 304 higher up in the core. Steep dark veins associated with cataclasis. Later veins, less steep, with ~5 mm of talc infill.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-80R-2, 14-26 cm WET
305-U1309D-80R-2, 14-26 cm WET (back)
305-U1309D-80R-2, 51-74 cm WET
305-U1309D-80R-2, 110-128 cm WET
305-U1309D-80R-2, 123-143 cm WET

Core Photo



305-U1309D-80R-3 (Section top: 404.11 mbsf)

UNIT-213: Olivine Gabbro
Pieces 1-2

PRIMARY MINERALOGY:

Olivine	Modal 20% Size 1 mm Shape interstitial
Plagioclase	Modal 60% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 20% Size 8 mm average Shape subhedral-anhedral

COMMENTS: Unit 213 continues from the previous section at 0-40 cm in this section (Piece 1 and part of Piece 2).

UNIT-214: Olivine-bearing Gabbro
Pieces 2–3

PRIMARY MINERALOGY: Determined from Piece 2 (43 cm)

Olivine	Modal 1% Size 3-7 mm Shape interstitial
Plagioclase	Modal 80% Size 3-6 mm Shape anhedral
Clinopyroxene	Modal 20% Size 3-12 mm Shape subhedral

COMMENTS: Unit 214 is a medium-grained 50 mm wide olivine-bearing gabbro dikelet at 40-49 cm with inclined, sharp, and altered contacts on both sides.

UNIT-215: Olivine Gabbro
Piece 3

PRIMARY MINERALOGY:

Olivine	Modal 20% Size 1 mm average Shape interstitial
Plagioclase	Modal 60% Size 3-6 mm Shape anhedral
Clinopyroxene	Modal 20% Size 3-12 mm Shape subhedral

COMMENTS: Unit 215, in the bottom 5 cm of Piece 3, is a continuation of the same type of olivine gabbro as in Unit 213.

SECONDARY MINERALOGY: Serpentine, chlorite, pale amphibole

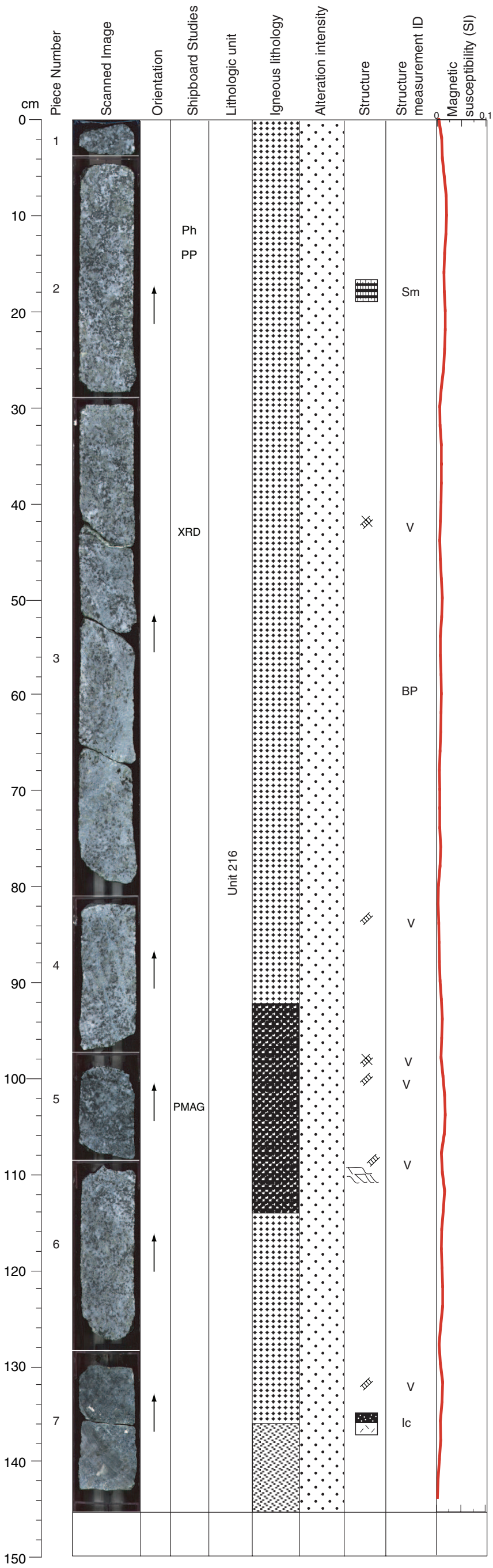
COMMENTS: Section with a low alteration (around 20%), and some patches of corona texture after plagioclase. The olivine is likely altered to tremolite and serpentine.

VEIN ALTERATION: Serpentine, actinolite, chlorite

STRUCTURE: The same olivine gabbro as before but with no distinct magmatic fabric. Gabbro with olivine corona type alteration are common and dip moderately. White veins with small cataclasis cross cut the earlier dark veins (Piece 3).

CLOSE-UP PHOTOGRAPHS:
305-U1309D-80R-3, 46-56 cm WET

Core Photo



305-U1309D-81R-1 (Section top: 405.40 mbsf)

UNIT-216: Olivine Gabbro
Pieces 1-7

PRIMARY MINERALOGY:

Olivine	Modal 20% Size 1-5 mm Shape anhedral to interstitial
Plagioclase	Modal 60% Size 1-5 mm Shape anhedral
Clinopyroxene	Modal 20% Size 6 mm average Shape subhedral

COMMENTS: Unit 216 is the same medium-grained olivine gabbro as Unit 213. There is a plagioclase-rich zone within the unit at 46-72 cm and a troctolite zone at 92-114 cm. The bottom 5 cm of the section is a zone of olivine-free gabbro.

SECONDARY MINERALOGY: Chlorite, amphibole, serpentine, prehnite (?)

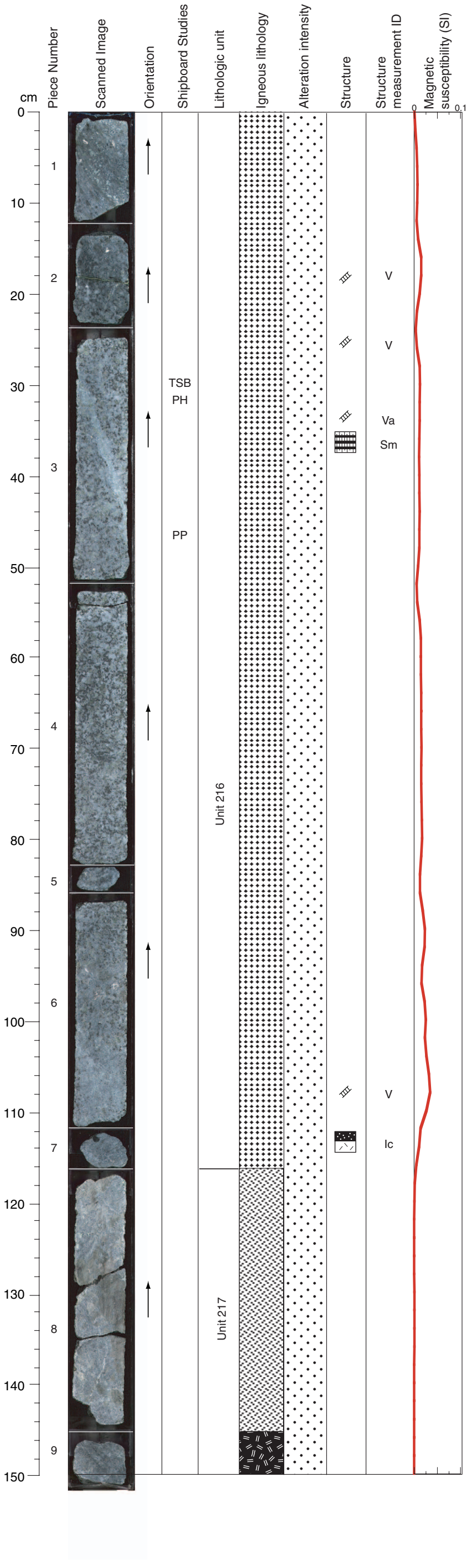
COMMENTS: Corona texture developed in alteration halo related to veins. Plagioclase is ringed by a corona of chlorite. The overall alteration is around 10%. The olivine is lightly serpentinized. Sulfides occur in Piece 5.

VEIN ALTERATION: Serpentine, actinolite, chlorite

STRUCTURE: Continuing from above, weakly magmatically foliated gabbro cut by 3 cm coarse-grained olivine free gabbro dikelet. Crosscut by a steeply dipping alteration network in the middle of the section. Later fractures infilled with white-pale green minerals. Slight serpentine folation in Piece 6.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-81R-1, 4-28 cm WET

Core Photo



305-U1309D-81R-2 (Section top: 406.84 mbsf)

UNIT-216: Olivine Gabbro
Pieces 1-7

PRIMARY MINERALOGY:

Olivine	Modal 20% Size 1-5 mm Shape anhedral to interstitial
Plagioclase	Modal 60% Size 1-5 mm Shape anhedral
Clinopyroxene	Modal 20% Size 6 mm average Shape subhedral

COMMENTS: The medium-grained olivine gabbro from the previous section continues in this section from 0-116 cm. Minor modal gradation to 30:35:35 (olivine:plagioclase:clinopyroxene) is observed in the 20-116 cm interval.

UNIT-217: Olivine-bearing Gabbro
Pieces 8,9

PRIMARY MINERALOGY:

Olivine	Modal 1% Size 3 mm average Shape anhedral
Plagioclase	Modal 45% Size 5 mm average Shape subhedral
Clinopyroxene	Modal 55% Size 5-50 mm Shape subhedral

COMMENTS: Pegmatitic olivine-bearing gabbro. The upper interval from 116-145 cm is coarser grained than lower in the unit, with pyroxene grain size up to 50 mm. Locally olivine-free gabbro zone at 145-150 cm.

SECONDARY MINERALOGY: Chlorite, amphibole, serpentine, carbonate, prehnite(?), plagioclase(?).

COMMENTS: Corona texture developed around veins. About 10% alteration throughout. In some places, the corona alteration replacing plagioclase (likely pale green amphibole rimmed by chlorite) is filled by a soft mineral (?).

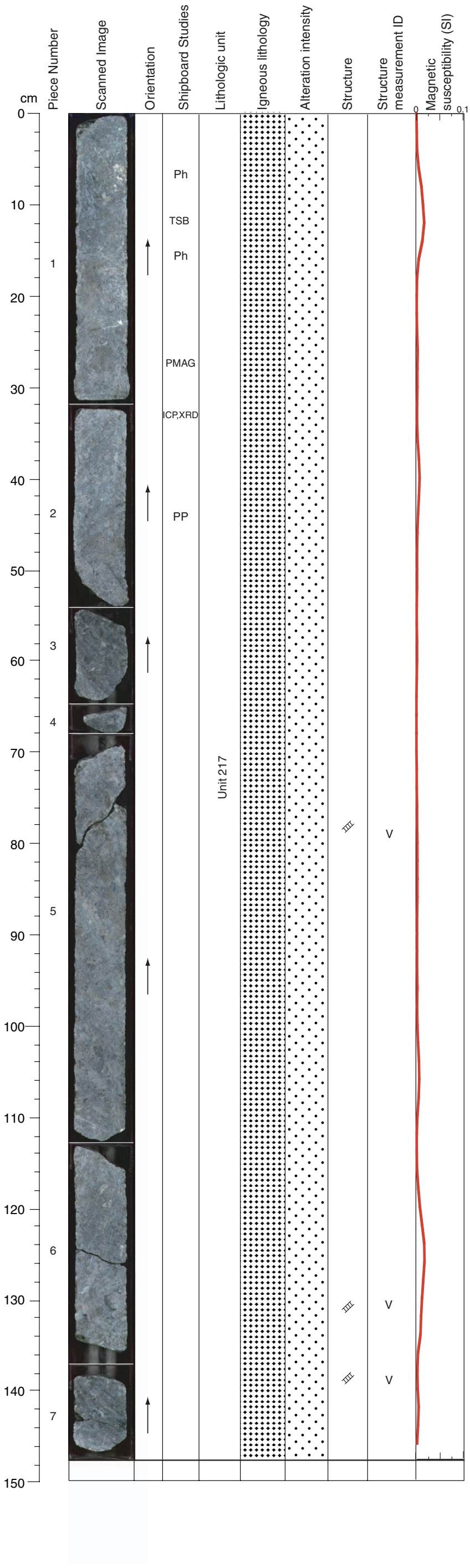
VEIN ALTERATION: Chlorite, amphibole, calcite, plagioclase

THIN SECTIONS:
305-U1309D-81R-2, 30-33 cm (#263)

STRUCTURE: Continuing from above intermittent weak magmatic foliation. Igneous contact preserved in Piece 7, but the piece is not oriented. Below coarse-grained, undeformed gabbro, massive gabbro with weak veining. A first generation of dark veins with an alteration halo dipping steeply. Later fractures filled with white minerals dipping subhorizontally. Weak cataclasis with no strain deformation occurs in pegmatitic gabbro in lower pieces.

CLOSE-UP PHOTOGRAPH:
305-U1309D-81R-2, 30-33 cm WET

Core Photo



305-U1309D-81R-3 (Section top: 408.34 mbsf)

UNIT-217: Gabbro
Pieces 1-7

PRIMARY MINERALOGY:

Olivine	Modal <1% Size 3 mm average Shape anhedral
Plagioclase	Modal 45% Size 5 mm average Shape subhedral
Clinopyroxene	Modal 55% Size 5-50 mm Shape subhedral

COMMENTS: Continuation of pegmatitic olivine-bearing gabbro Unit 217. Locally olivine-richer zone at 5-15 cm.

SECONDARY MINERALOGY: Chlorite, pale amphibole, serpentine, prehnite, talc, plagioclase?

COMMENTS: Some corona texture around alteration minerals after olivine (serpentine, tremolite ?) occurs in the first 14 cm (Piece 1). About 10% alteration throughout.

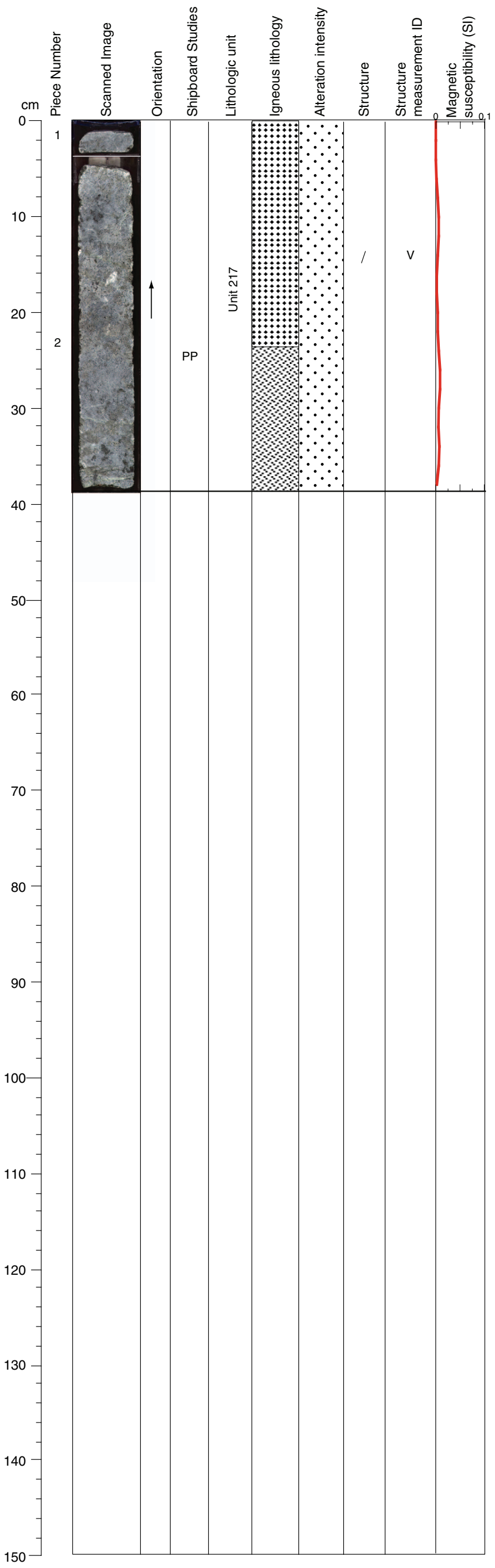
VEIN ALTERATION: Talc, chlorite, actinolite, serpentine

THIN SECTIONS:
305-U1309D-81R-3, 12-14 cm (#264)

STRUCTURE: Continuing from above coarse grained gabbro with no definite magmatic foliation. Dark green veins dipping steeply. Tiny cracks and fractures in very coarse grained gabbro.

CLOSE_UP PHOTOGRAPHS:
305-U1309D-81R-3, 5-20 cm WET
305-U1309D-81R-3, 5-20 cm WET (back)
305-U1309D-81R-3, 12-24 cm WET

Core Photo



305-U1309D-81R-4 (Section top: 409.84 mbsf)

UNIT-217: Gabbro
Pieces 1-2

PRIMARY MINERALOGY:

Olivine	Modal <1% Size 3 mm average Shape anhedral
Plagioclase	Modal 45% Size 5 mm average Shape subhedral
Clinopyroxene	Modal 55% Size 5-50 mm Shape subhedral

COMMENTS: Continuation of Pegmatitic Gabbro Unit 217.

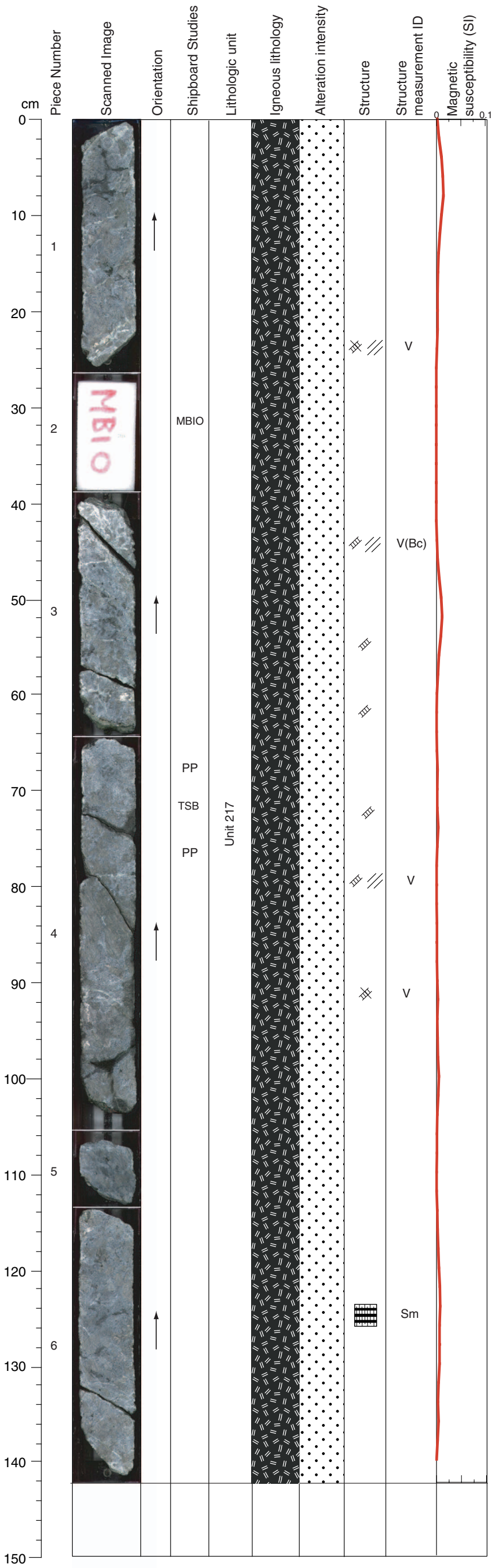
SECONDARY MINERALOGY: Serpentine?, chlorite, pale amphibole, secondary plagioclase?

COMMENTS: Alteration is about 10%.

VEIN ALTERATION: Actinolite, chlorite

STRUCTURE: Continuing from above coarse grained gabbro with no definite magmatic foliation. Weak cataclastic deformation with irregular orientations. Tiny subhorizontal veins occur with white infillings.

Core Photo



305-U1309D-82R-1 (Section top: 410.20 mbsf)

UNIT-217: Olivine-bearing Gabbro
Pieces: 1-6

PRIMARY MINERALOGY: Determined from Piece 6

Olivine	Modal 2% Size 4 mm average Shape interstitial
Plagioclase	Modal 45% Size 15 mm average Shape subhedral
Clinopyroxene	Modal 55% Size 15 mm average Shape subhedral

COMMENTS: Continuation of pegmatitic olivine-bearing gabbro Unit 217.

SECONDARY MINERALOGY: Serpentine, chlorite, pale amphibole, plagioclase?

COMMENTS: Low alteration (about 10%). Olivine is likely altered to serpentine and pale amphibole. This gabbro is cut by numerous white veins (?) in all directions. At 90-93 cm (Piece 4), an alteration halo of 3 cm thick adjacent to a white vein.

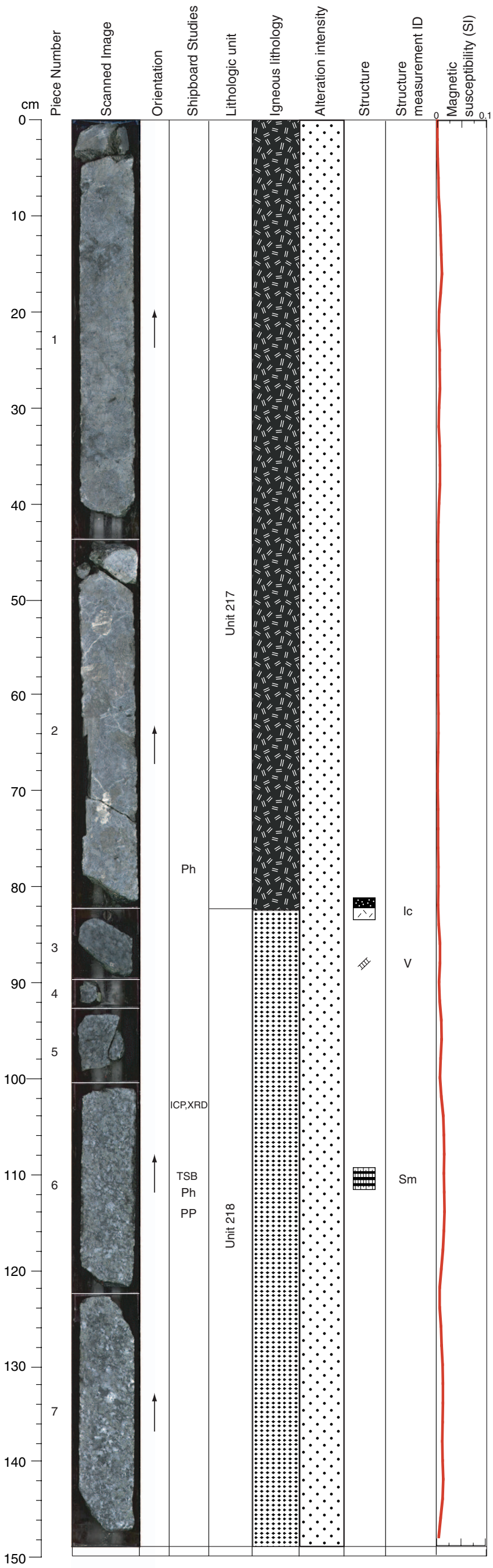
VEIN ALTERATION: Amphibole, chlorite

THIN SECTIONS:
305-U1309D-82R-1, 72-75 cm (#265)

STRUCTURE: Continuing from above, very coarse grained gabbro, which locally picks up a very weak magmatic strain. Many shallowlly dipping veins occur with white mineral infillings. Intervals of these veins are up to a few centimeters. No cataclasis apparent.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-82R-1, 78-87 cm WET (back)
305-U1309D-82R-1, 78-87 cm WET

Core Photo



305-U1309D-82R-2 (Section top: 411.63 mbsf)

UNIT-217:Olivine-bearing Gabbro
Pieces: 1-2

PRIMARY MINERALOGY: Determined from Piece 2a

Olivine	Modal <1% Size 5 mm average Shape interstitial
Plagioclase	Modal 50% Size 15 mm average Shape subhedral
Clinopyroxene	Modal 50% Size 20-90 mm Shape subhedral

COMMENTS: Continuation of pegmatitic olivine-bearing gabbro Unit 217. Grain size increases toward the bottom of the unit.

UNIT-218: Olivine Gabbro
Pieces: 3-7

PRIMARY MINERALOGY: Determined from Piece 6

Olivine	Modal 25% Size 6 mm average Shape interstitial
Plagioclase	Modal 40% Size 4 mm average Shape subhedral
Clinopyroxene	Modal 35% Size 4 mm average Shape subhedral

COMMENTS: Similar to previous medium-grained olivine gabbro (e.g., Unit 216) with local variations in modal abundances from troctolitic to olivine gabbro.

SECONDARY MINERALOGY: Serpentine, chlorite, pale amphibole, plagioclase

COMMENTS: Low alteration (about 10%).

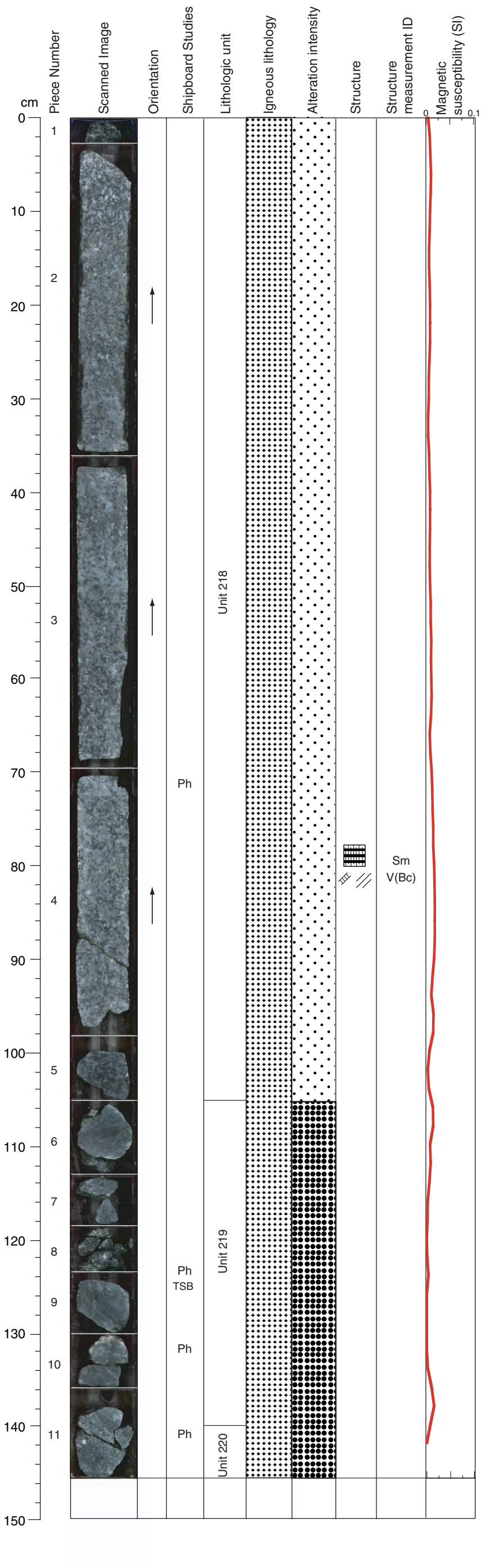
VEIN ALTERATION: Serpentine, amphibole, chlorite

THIN SECTIONS:
305-U1309D-82R-2, 110-112 cm (#266)

STRUCTURE: Continuing from above very coarse grained gabbro (M1) with only local weak magmatic strain. Igneous contact to olivine gabbro (M2) with weak to moderate magmatic strain. Very coarse grained gabbro (M1) fines up to contact, indicating that M2>M1. Many shallowly dipping veins occur with white mineral infillings. Intervals of these veins are up to a few centimeters. No cataclasis apparent, open fractures and pale green vein/fault at base of Piece 3.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-82R-2, 48-70 cm WET
305-U1309D-82R-2, 110-113 cm WET

Core Photo



305-U1309D-82R-3 (Section top: 413.13 mbsf)

UNIT-218: Olivine Gabbro
Pieces: 1-5

PRIMARY MINERALOGY: Determined from Piece 6

Olivine	Modal 25% Size 6 mm average Shape interstitial
Plagioclase	Modal 40% Size 4 mm average Shape subhedral
Clinopyroxene	Modal 35% Size 4 mm average Shape subhedral

COMMENTS: Continuation of Unit 218 from previous section. Local variations in modal abundances from troctolitic gabbro to olivine gabbro.

UNIT-219: Olivine Gabbro, Mylonite
Pieces: 6-11

COMMENTS: Fine-grained mylonite zone cutting olivine gabbro. Mineralogy of the mylonite zone is indistinct, but pieces of olivine gabbro rubble are found within the mylonitic zone.

UNIT-220: Olivine Gabbro
Pieces: 11

PRIMARY MINERALOGY:

Olivine	Modal 25% Size 6 mm average Shape interstitial
Plagioclase	Modal 40% Size 4 mm average Shape subhedral
Clinopyroxene	Modal 35% Size 4 mm average Shape subhedral

COMMENTS: Unit 220 is a medium-grained olivine gabbro similar to Unit 218. Boundary with overlying mylonite is distinct in Piece 11.

SECONDARY MINERALOGY: Serpentine, chlorite, pale amphibole, dark amphibole?, prehnite?, plagioclase?

COMMENTS: Corona texture appears in contact with the mylonites at 108, 125 and 139 cm, with a thick rim of chlorite around the plagioclase.

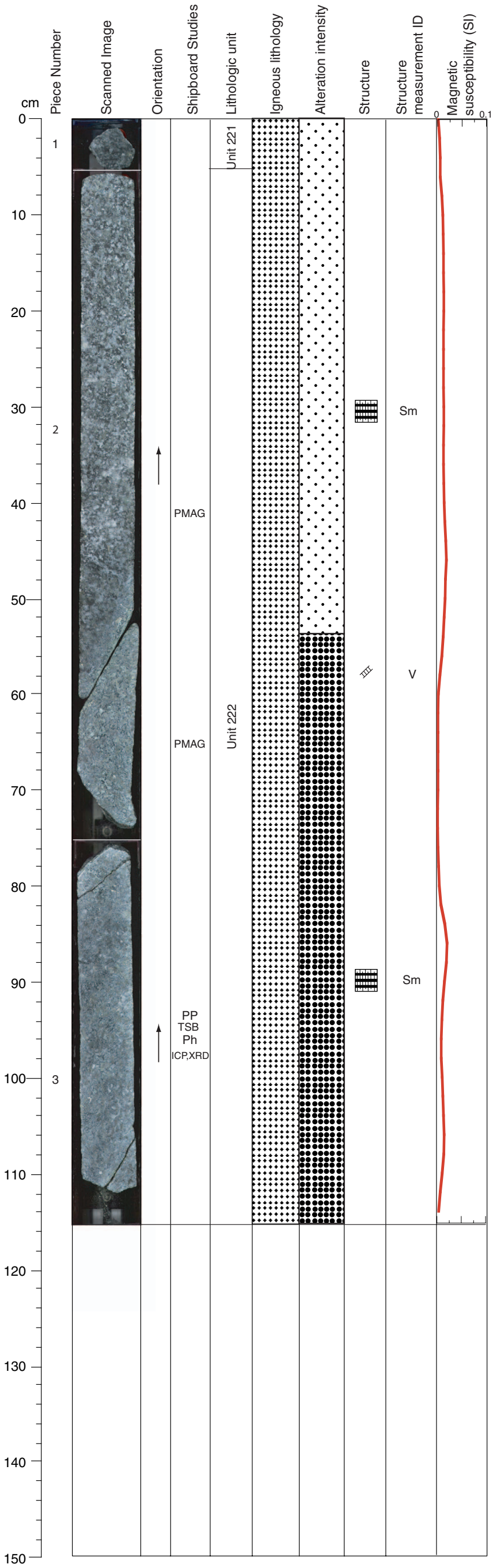
VEIN ALTERATION: Actinolite, chlorite, talc

THIN SECTIONS:
305-U1309D-82R-3, 125-127 cm (#267)

STRUCTURE: Weak to moderately strained olivine gabbro continues from section above. At base of section, mylonitic to protomylonitic shear zone with sharp contacts, internal low strain zones. Pieces not oriented. Gabbro with no brittle structure in upper part. Only small veins crosscutting the mylonite in Pieces 6-9.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-82R-3, 71-90 cm WET
305-U1309D-82R-3, 124-129 cm WET
305-U1309D-82R-3, 131-134 cm WET
305-U1309D-82R-3, 138-145 cm WET

Core Photo



305-U1309D-83R-1 (Section top: 415.00 mbsf)

UNIT-221: Rubble
Piece 1

UNIT-222: Olivine Gabbro
Pieces: 2-3

PRIMARY MINERALOGY: Determined from Piece 2a

Olivine	Modal 30% Size 6 mm average Shape interstitial
Plagioclase	Modal 30% Size 7 mm average Shape subhedral
Clinopyroxene	Modal 40% Size 8 mm average Shape subhedral

COMMENTS: Unit 222 is a medium-grained olivine gabbro similar to Unit 218.

SECONDARY MINERALOGY: Chlorite,pale amphibole, prehnite?, plagioclase?

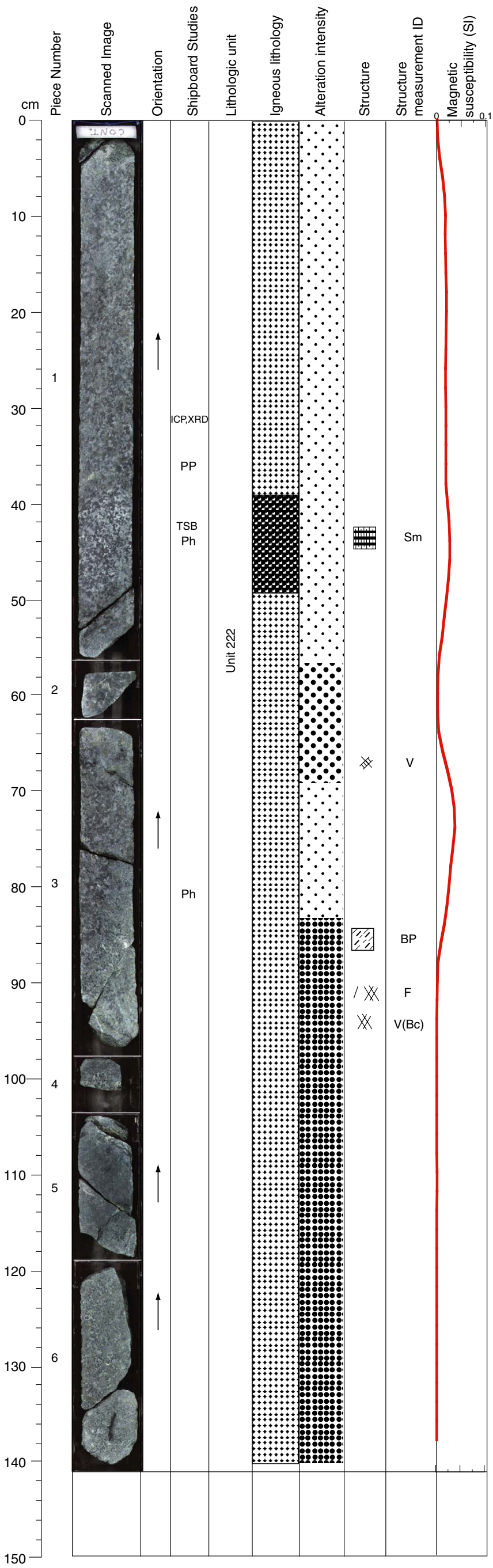
COMMENTS: Alteration is less than 10% up to 54 cm and around 50% until the end of the core. At 54 cm there is a fracture with an alteration halo. Corona texture starts from this fracture. The plagioclase are rimmed by chlorite.

THIN SECTIONS:
305-U1309D-83R-1, 95-97 cm (#268)

STRUCTURE: Weak magmatic fabric in olivine gabbro with intermittent steep zones of destroyed fabric in corona type altered gabbro. Massive rock with very minor veining and slight serpentine foliation associated with altered olivine in gabbro.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-83R-1, 95-98 cm WET

Core Photo



305-U1309D-83R-2 (Section top: 416.15 mbsf)

UNIT-222: Olivine Gabbro
Pieces: 1-6

PRIMARY MINERALOGY: Determined from Piece 1a

Olivine	Modal 30% Size 6 mm average Shape interstitial
Plagioclase	Modal 30% Size 7 mm average Shape subhedral
Clinopyroxene	Modal 40% Size 8 mm average Shape subhedral

COMMENTS: Continuation of Unit 222 medium-grained olivine gabbro from previous section. There is a troctolite zone with 45% olivine and 55% plagioclase at 36-49 cm and grades downhole to a troctolitic gabbro in near-vertical contact with olivine gabbro at 80 cm.

SECONDARY MINERALOGY: Chlorite,pale amphibole, serpentine, prehnite, plagioclase?

COMMENTS: Alteration coronas (with thick rim of chlorite) around plagioclase are related to the fractures located at 69 and 75 cm (Piece 3) and in Pieces 5 and 6. Several tiny white veins cut these pieces.

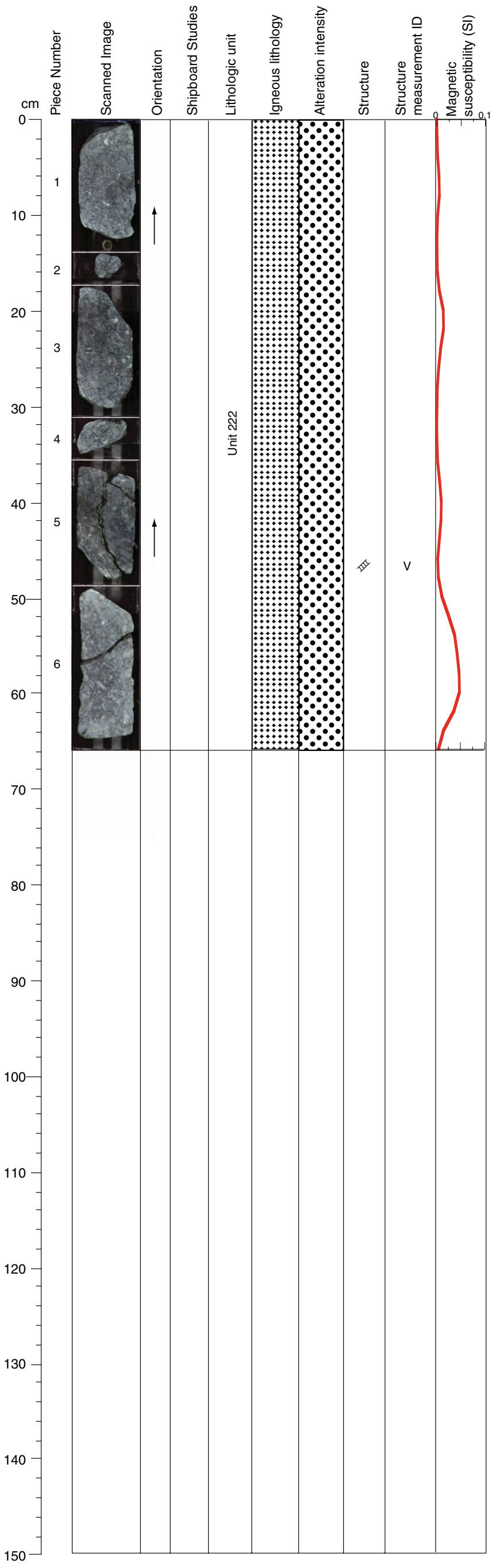
VEIN ALTERATION: Serpentine, actinolite, chlorite, talc

THIN SECTIONS:
305-U1309D-83R-2, 42-45 cm (#269)

STRUCTURE: Weak magmatic fabric in olivine gabbro with intermittent steep zones of destroyed fabric in corona type altered gabbro. Dark green veins crosscut by lighter green/open fractures. A fault crosscuts a network of cataclastic/vein at bottom of Piece 3. Interval of intense cataclastic deformation in Piece 5, with some strain (sense not measured).

CLOSE-UP PHOTOGRAPHS:
305-U1309D-83R-2, 42-45 cm WET
305-U1309D-83R-2, 76-92 cm WET

Core Photo



305-U1309D-83R-3 (Section top: 417.55 mbsf)

UNIT-222: Olivine Gabbro
Pieces: 1-6

PRIMARY MINERALOGY: Determined from Piece 1a

Olivine	Modal 30% Size 6 mm average Shape interstitial
Plagioclase	Modal 30% Size 7 mm average Shape subhedral
Clinopyroxene	Modal 40% Size 8 mm average Shape subhedral

COMMENTS: Continuation of Unit 222 medium-grained olivine gabbro from previous section. Upper intervals contain more altered olivine than lower interval.

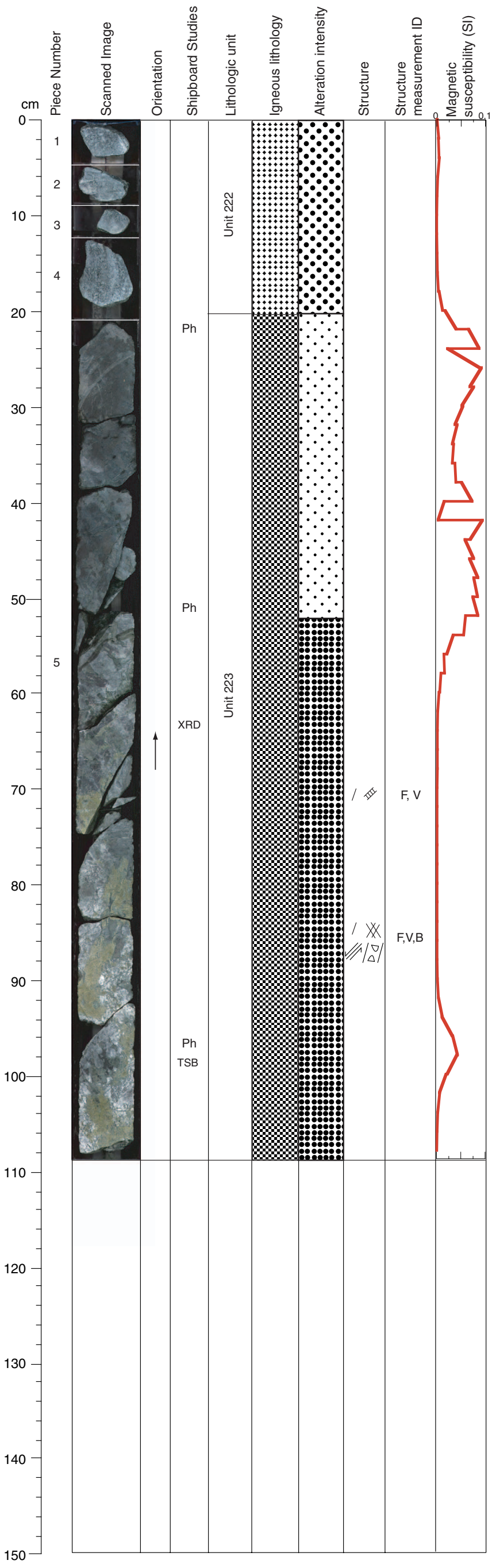
SECONDARY MINERALOGY: Chlorite, pale amphibole, plagioclase?

COMMENTS: Corona texture is better developed than in previous section, and some coronas are made of very soft mineral (?).

VEIN ALTERATION: Talc, chlorite

STRUCTURE: Olivine gabbro with corona type alteration and no preserved magmatic fabric. White veins with associated open fractures (late). A pale green vein with fibers (no sense of shear). Cataclasis associated with white veining intense in Piece 5.

Core Photo



305-U1309D-84R-1 (Section top: 419.80 mbsf)

UNIT-222: Olivine Gabbro rubble
Pieces: 1-4

PRIMARY MINERALOGY:

Olivine	Modal 30% Size 6 mm average Shape interstitial
Plagioclase	Modal 30% Size 7 mm average Shape subhedral
Clinopyroxene	Modal 40% Size 8 mm average Shape subhedral

COMMENTS: Continuation of Unit 222 medium-grained olivine gabbro from previous section.

UNIT-223: Oxide Gabbro
Piece: 5

PRIMARY MINERALOGY:

Oxides	Modal 5% Shape interstitial
Plagioclase	Modal 20% Size 7 mm average Shape interstitial
Clinopyroxene	Modal 75% Size 20 mm average Shape subhedral

COMMENTS: Pegmatitic oxide gabbro. Interval 21-50 cm is a pyroxene-rich boundary of the pegmatitic intrusion. From 50-106 cm there is abundant epidote alteration in the gabbro. The less-altered marginal interval corresponds to a magnetic susceptibility high.

SECONDARY MINERALOGY: Chlorite, pale amphibole, serpentine, prehnite?, plagioclase, epidote

COMMENTS: The corona texture is more developed in the first part of the section. From 20 cm, the gabbro is cut by a lot of tiny white veins (?). At 61cm, a white vein (carbonate?) is associated with sulfides. From 70-104 cm, patches of epidote (up to 7 cm long) occur and all the green amphibole crystals look interconnected by a network of the same amphibole.

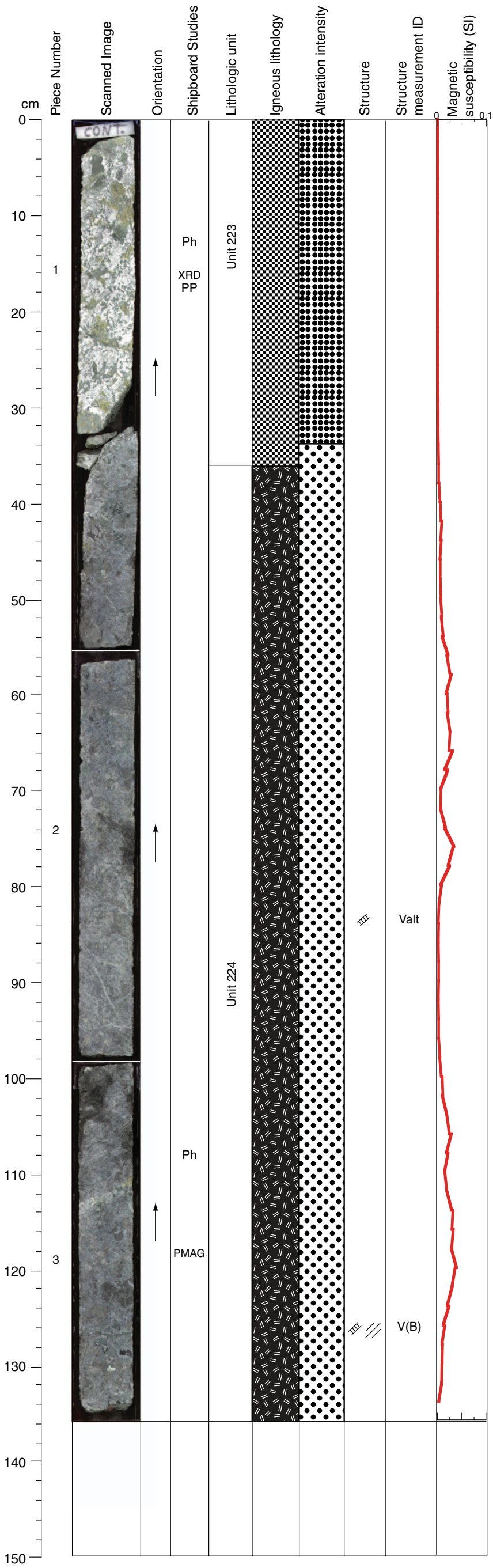
VEIN ALTERATION:Amphibole, chlorite, talc, chlorite, talc

THIN SECTIONS:
305-U1309D-84R-1, 96-98 cm (#270)

STRUCTURE: Medium to coarse grained gabbro with no preserved magmatic fabric and pervasive epidote\ chlorite network. Upper part : Massive, no deformation except minor veining and associated cataclasis. Coarse grained gabbro with fractures and veining, no strain. Pegmatitic section with strong cataclasis and fault veins displacing epidote alteration (reverse).

CLOSE-UP PHOTOGRAPHS:
305-U1309D-84R-1, 22-31 cm WET
305-U1309D-84R-1, 51-59 cm WET
305-U1309D-84R-1, 95-100 cm WET

Core Photo



305-U1309D-84R-2 (Section top: 420.88 mbsf)

UNIT-223: Oxide Gabbro
Piece: 1

PRIMARY MINERALOGY: Determined from Piece 1b

Oxides	Modal 5% Shape interstitial
Plagioclase	Modal 60% Size 1-25 mm Shape subhedral
Clinopyroxene	Modal 35% Size 20 mm average Shape subhedral

COMMENTS: Continuation of Unit 223 pegmatitic gabbro. The interval of Piece 1 from 0-36 cm continues the zone of epidote alteration. At 36 cm there is an inclined, 5 cm wide alteration contact with the next unit. The lower contact also appears to have increased modal oxides.

UNIT-224: Olivine-bearing Gabbro
Pieces: 1-3

PRIMARY MINERALOGY: Determined from Piece 2

Olivine	Modal 1% Size 2 mm average Shape interstitial
Plagioclase	Modal 60% Size 5 mm average Shape subhedral
Clinopyroxene	Modal 40% Size 8 mm average Shape subhedral

COMMENTS: Unit 224 is a pegmatitic olivine-bearing gabbro with only a minor difference in modal mineralogy from Unit 223 with the addition of small amounts of interstitial olivine. The units are separated by an alteration front. Olivine is abundant locally in patches and there is also a band of epidote at 113-114 cm.

SECONDARY MINERALOGY: Chlorite, pale amphibole, plagioclase, epidote

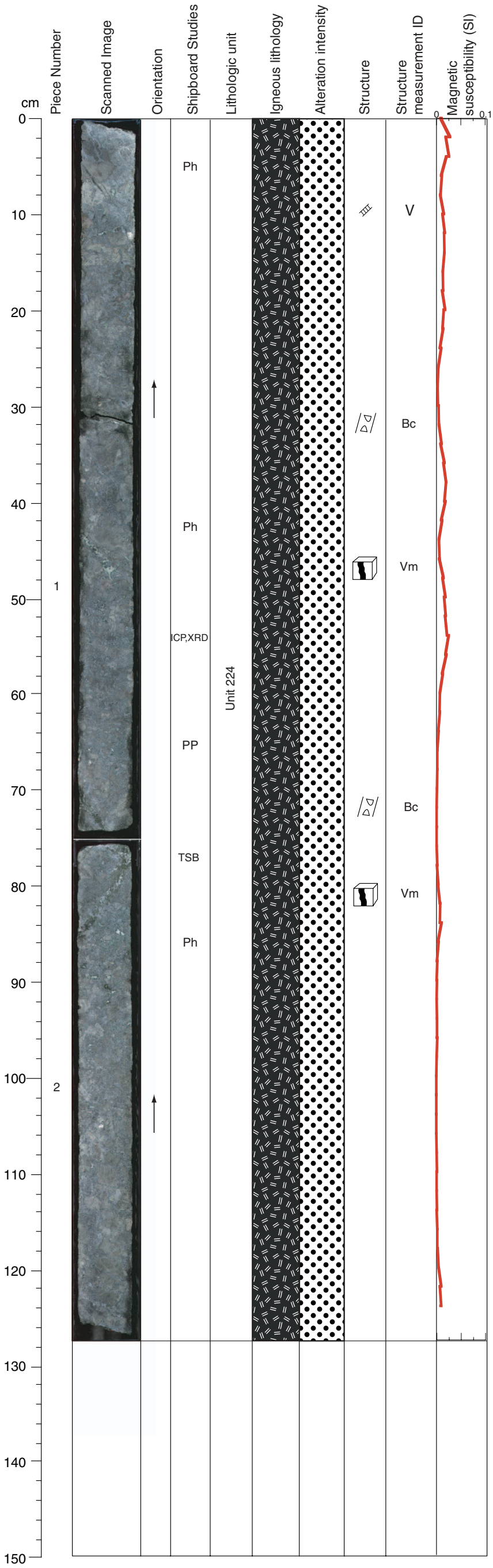
COMMENTS: Continuation of previous section with epidote patches and green amphibole. Corona texture appears in Piece 2 at 60 cm, likely related to a vein. At 113 cm (Piece 3), another patch of epidote occurs related to a vein/dike.

VEIN ALTERATION: Amphibole, plagioclase, chlorite, epidote

STRUCTURE: Coarse grained gabbro with pervasive epidote\ chlorite network at top of section. Some late vein related alteration. No preserved magmatic fabric or plastic deformation. Lower portion: No deformation except for dark green veins with associated cataclasis crosscut by steeply dipping white veins.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-84R-2, 8-25 cm WET
305-U1309D-84R-2, 108-117 cm WET

Core Photo



305-U1309D-84R-3 (Section top: 422.23 mbsf)

UNIT-224: Olivine-bearing Gabbro

Pieces: 1-2

PRIMARY MINERALOGY: Determined from Piece 2

Olivine	Modal 3% Size 2 mm average Shape interstitial
Plagioclase	Modal 57% Size 5-20 mm Shape subhedral
Clinopyroxene	Modal 40% Size 20 mm average Shape subhedral

COMMENTS: This section is a continuation of Unit 224, pegmatitic olivine-bearing gabbro. Interstitial olivine is heterogeneously distributed.

SECONDARY MINERALOGY: Chlorite, pale amphibole, prehnite, plagioclase

COMMENTS: Some patches of corona texture around altered plagioclase.

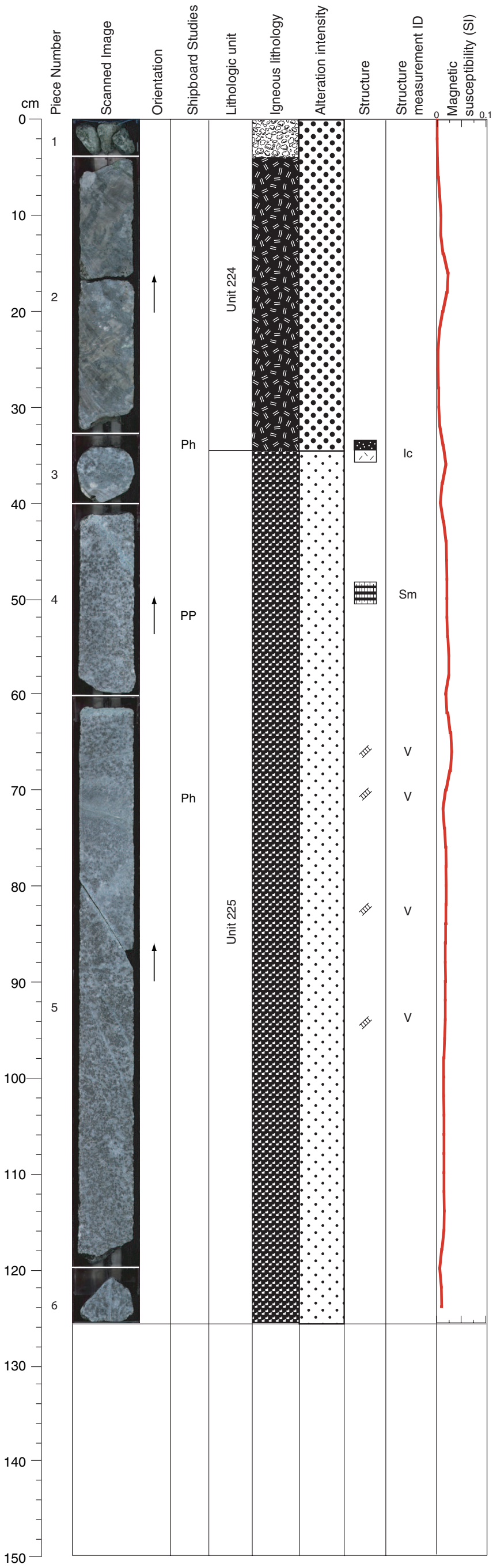
VEIN ALTERATION: Amphibole, plagioclase, chlorite

THIN SECTIONS:
305-U1309D-84R-3, 77-80 cm (#271)

STRUCTURE: Coarse grained pegmatitic gabbro exhibiting no magmatic fabric or plastic alteration. Some later magmatic veins. Massive gabbro section with local cataclastic areas, no strain and earlier dark green veins; no evidence of strain.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-84R-3, 2-15 cm WET
305-U1309D-84R-3, 39-51 cm WET
305-U1309D-84R-3, 76-90 cm WET

Core Photo



305-U1309D-85R-1 (Section top:424.60 mbsf)

UNIT-224: Olivine-bearing Gabbro
Pieces: 2-3

PRIMARY MINERALOGY:

Olivine	Modal 3% Size 2 mm average Shape interstitial
Plagioclase Modal 57%	Size 5-20 mm Shape subhedral
Clinopyroxene	Modal 40% Size 20 mm average Shape subhedral

COMMENTS: This section is a continuation of Unit 224, pegmatitic olivine-bearing gabbro.

UNIT-225: Troctolite
Pieces: 3-6

PRIMARY MINERALOGY: Determined from Piece 5b

Olivine	Modal 60% Size 5 mm average Shape anhedral
Plagioclase	Modal 40% Size 1-10 mm Shape anhedral

COMMENTS: Unit 225 is a medium-grained troctolite. A gradual increase in olivine abundance down-section. There is a small, irregular, anastomosing green (amphibole or pyroxene) magmatic vein at 70-71 cm.

SECONDARY MINERALOGY: Chlorite, pale amphibole, dark amphibole? serpentine, prehnite?

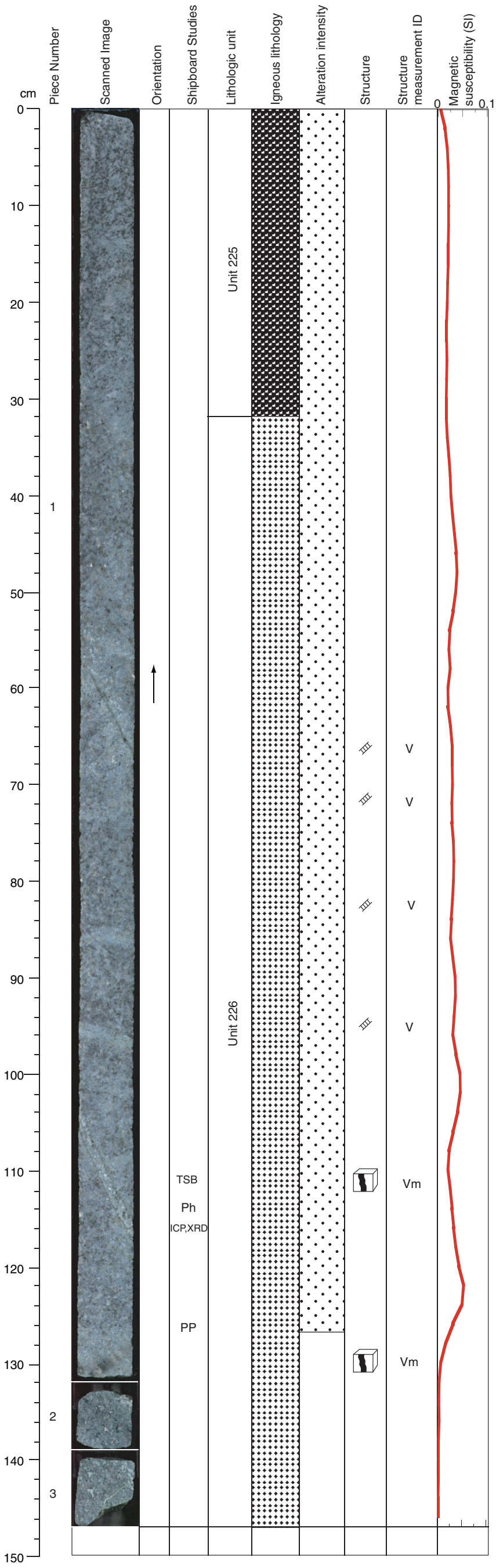
COMMENTS: Corona texture is related to contact with the coarse-grained olivine-bearing gabbro and the vein/fractures occuring in the troctolite.

VEIN ALTERATION: Amphibole, plagioclase, chlorite

STRUCTURE: Pegmatitic gabbro with undeformed crystals up to 7 cm in contact with olivine gabbro with weak magmatic fabric and local poikilitic cpx up to 2 cm. Pegmatitic gabbro is shattered (cataclasis) with neither strain nor preferred orientation. Small white veins with alteration halo (< 1 mm) and white or pale green veins with < 2 cm alteration halo. No cross-cutting relationship.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-85R-1, 34-39 cm WET
305-U1309D-85R-1, 67-74 cm WET

Core Photo



305-U1309D-85R-2 (Section top: 425.85 mbsf)

UNIT-225: Troctolite
Piece: 1

PRIMARY MINERALOGY:

Olivine	Modal 60% Size 5 mm average Shape anhedral
Plagioclase	Modal 40% Size 1-10 mm Shape anhedral

COMMENTS: Continuation of Unit 225 medium-grained troctolite from the previous section.

UNIT-226: Olivine Gabbro
Pieces: 1-3

PRIMARY MINERALOGY: Determined from Piece 1

Olivine	Modal 50% Size 3 mm average Shape subhedral
Plagioclase	Modal 30% Size 5 mm average Shape subhedral
Clinopyroxene	Modal 20% Size 5 mm average Shape subhedral

COMMENTS: Unit 226 is a medium-grained olivine gabbro. Modally variable through the section (thin section is from olivine-deficient interval). A sharp, steeply dipping contact between Units 225 and 226 is seen at 30 cm. A steeply dipping 1 cm thick felsic vein at 103-117 cm corresponds to a local high in magnetic susceptibility, possibly from oxides precipitated in the vein or in a reaction zone with surrounding gabbro. A zone of variously oriented veins at 85-117 cm corresponds in general to a series of minor magnetic susceptibility peaks.

SECONDARY MINERALOGY: Chlorite, pale amphibole, prehnite?, plagioclase?

COMMENTS: Corona texture appears at 45 cm (Piece 1) and is likely related to the veins/dikes occuring along the entire piece. The alteration of the plagioclase in the coronae increases in Pieces 2 and 3.

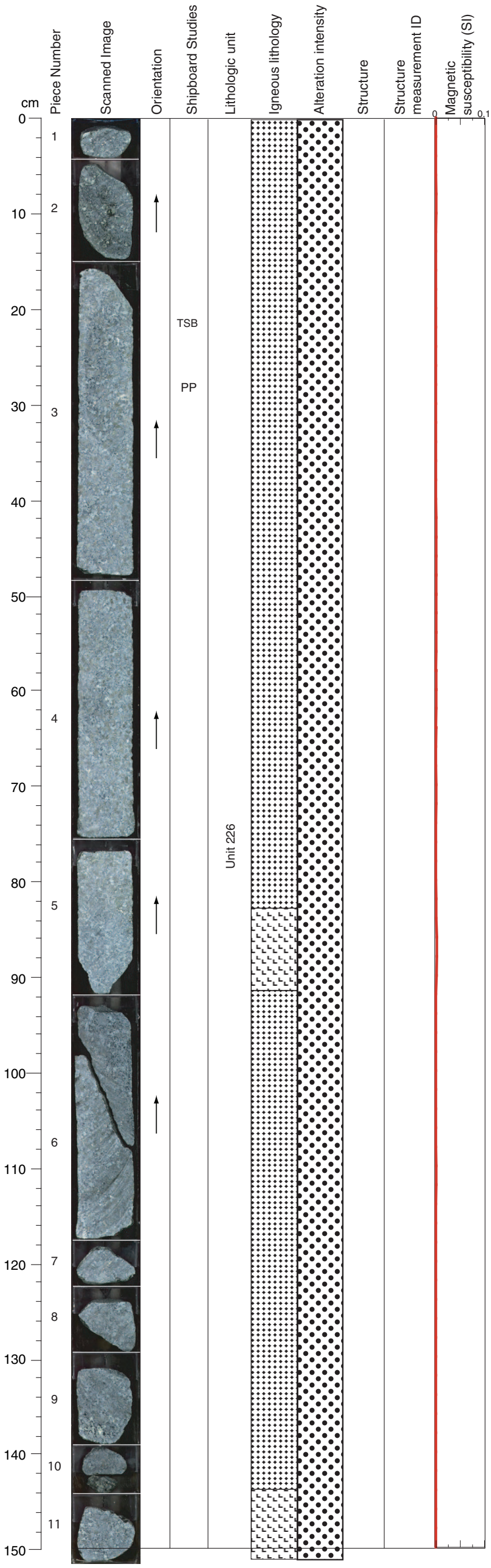
VEIN ALTERATION: Amphibole, talc, chlorite

THIN SECTIONS:
305-U1309D-85R-2, 111-113 cm (#272)

STRUCTURE: Olivine gabbro (M1) with progressively increasing olivine corona type alteration down-core. Magmatic fabric disappears correspondingly. Two later magmatic veins, one plagioclase rich one (M2), another a coarse grained pyroxenite (M3) perhaps relating to pegmatitic gabbro unit. Fractures and veins occur locally. Green veins (V1) formed before small white veins (V2). M1 > M2,M3 >V1>V2.

CLOSE-UP PHOTOGRAPH:
305-U1309D-85R-2, 100-120 cm

Core Photo



305-U1309D-85R-3 (Section top: 427.32 mbsf)

UNIT-226: Olivine Gabbro
Pieces: 1-11

PRIMARY MINERALOGY: Determined from Piece 3

Olivine	Modal 30% Size 4 mm average Shape anhedral
Plagioclase	Modal 30% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 40% Size 4 mm average Shape anhedral

COMMENTS: Continuation of Unit 226 medium-grained olivine gabbro. Zones of troctolitic gabbro in which clinopyroxene is locally scarce are found at 83-91 cm and 144-151 cm intervals.

SECONDARY MINERALOGY: Chlorite, pale amphibole, prehnite?, plagioclase?

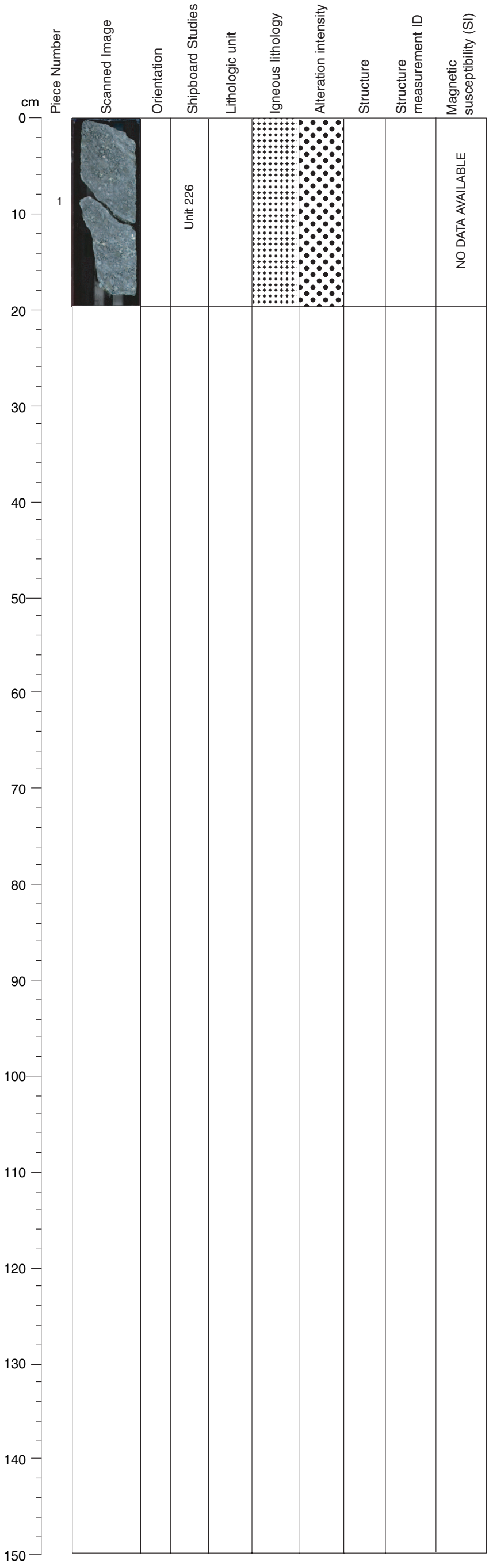
COMMENTS: The corona texture occurs throughout the section, locally some higher degree of alteration of the plagioclase to a soft mineral (?) occurs.

THIN SECTIONS:
305-U1309D-85R-3, 21-23 cm (#273)

STRUCTURE: Homogeneously altered olivine gabbro with olivine corona alteration and no plastic/magmatic fabric but fine cataclasis/veining (very minor) in one piece.

CLOSE-UP PHOTOGRAPH:
305-U1309D-85R-3,18-30 cm WET

Core Photo



305-U1309D-85R-4 (Section top: 428.82 mbsf)

UNIT-226: Olivine Gabbro
Piece: 1

PRIMARY MINERALOGY:

Olivine	Modal 30% Size 4 mm average Shape anhedral
Plagioclase	Modal 30% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 40% Size 4 mm average Shape anhedral

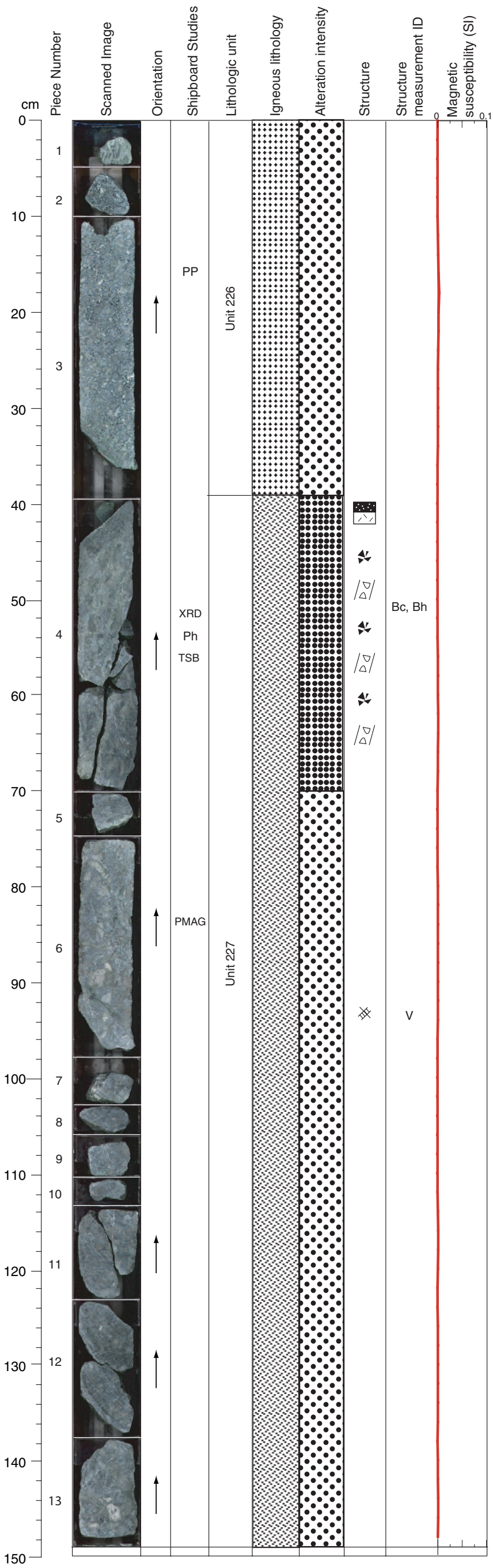
COMMENTS: Continuation of Unit 226 medium-grained olivine gabbro.

SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: Same corona texture as in the previous section.

STRUCTURE: Homogeneously altered olivine gabbro with olivine corona alteration and no structural fabric. No brittle deformation apparent.

Core Photo



305-U1309D-86R-1 (Section top: 429.40 mbsf)

UNIT-226: Olivine Gabbro
Pieces: 1-3

PRIMARY MINERALOGY:

Olivine	Modal 30% Size 4 mm average Shape interstitial
Plagioclase	Modal 30% Size 4 mm average Shape anhedral
Clinopyroxene	Modal 40% Size 5 mm average Shape subhedral

COMMENTS: Continuation of Unit 226 medium-grained olivine gabbro.

UNIT-227: Gabbro
Pieces: 4-13

PRIMARY MINERALOGY:

Plagioclase	Modal 45% Size 15 mm maximum Shape anhedral
Clinopyroxene	Modal 55% Size 3-20 mm Shape subhedral

COMMENTS: Unit 227 is coarse-grained gabbro. Rare olivine chadacrysts found always enclosed in coarse-grained clinopyroxene oikocrysts. Olivine distribution is heterogeneous.

SECONDARY MINERALOGY: Serpentine, chlorite, pale amphibole, dark amphibole?, prehnite?, plagioclase?

COMMENTS: Corona texture is well-developed in the olivine gabbro (Pieces 1,2,3). The coarser-grained gabbro is cut by numerous tiny pale green veins (amphibole ?)

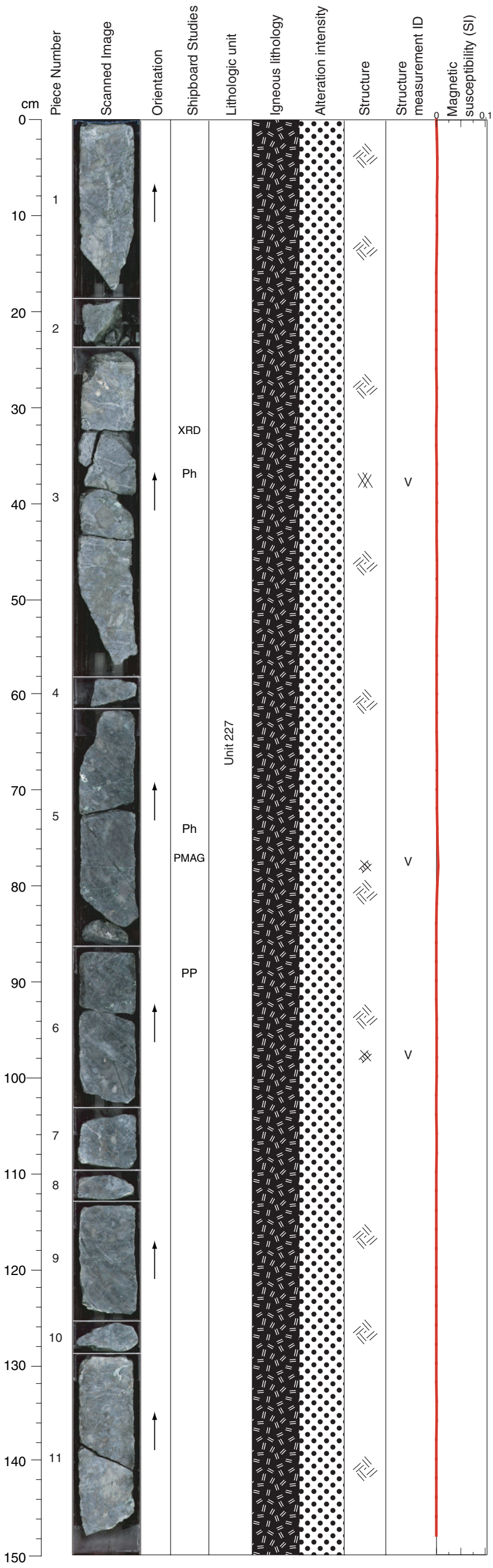
VEIN ALTERATION: Serpentine, amphibole, plagioclase, chlorite

THIN SECTIONS:
305-U1309D-86R-1, 56-59 cm (#274)

STRUCTURE: Strain-free sequence of olivine gabbro with corona alteration and pegmatitic gabbro. Large cataclastic zone, ~8 cm wide and steeply dipping. Cataclastic/hydrothermal breccia of large-grain gabbros. Dark, green veins without alteration halo with little or no cataclasis, and steeply dipping.

CLOSE-UP PHOTOGRAPH:
305-U1309D-86R-1, 50-67 cm WET

Core Photo



305-U1309D-86R-2 (Section top: 430.90 mbsf)

UNIT-227: Olivine-bearing Gabbro
Pieces: 1-11

PRIMARY MINERALOGY:

Olivine	Modal 1% Size 4 mm average Shape interstitial
Plagioclase	Modal 55% Size 15 mm maximum Shape anhedral
Clinopyroxene	Modal 45% Size 3-70 mm Shape subhedral

COMMENTS: Continuation of Unit 227. This section contains enough olivine to qualify as coarse-grained olivine-bearing gabbro.

SECONDARY MINERALOGY: Serpentine, chlorite, pale amphibole, dark amphibole?, prehnite, plagioclase

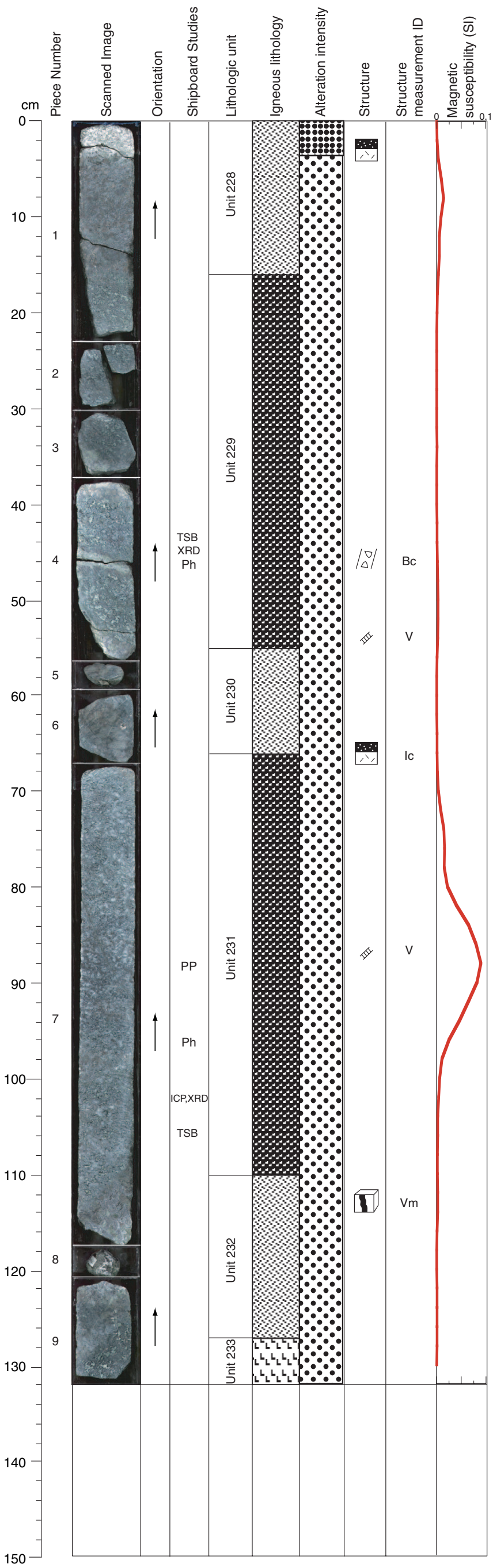
COMMENTS: Some corona texture occurs as patches in the rock, and the interior of the coronae is composed of soft mineral (?). Several veins cut this section.

VEIN ALTERATION: Amphibole, plagioclase, chlorite, talc

STRUCTURE: Pegmatitic gabbro with neither plastic nor magmatic strain. Exhibits cataclasis but no strain, cut by a first set of dark veins and a later set of white veins. Dark veins have consistent, steep dip. Some of the veins have a halo, and very limited cataclasis.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-86R-2, 31-45 cm WET
305-U1309D-86R-2, 72-84 cm WET

Core Photo



305-U1309D-86R-3 (Section top: 432.39 mbsf)

UNITS-228, 230, 232: Gabbro
Pieces: 1, 5-6, 7-9

PRIMARY MINERALOGY: Based on Piece 1

Plagioclase	Modal 50% Size 4 mm average Shape anhedral
Clinopyroxene	Modal 50% Size 4 mm average Shape subhedral

COMMENTS: Units 228, 230, and 232 are medium- to coarse-grained gabbro. Contacts between the alternating gabbro and troctolite units are generally diffuse. These units are gabbro dikes intruding troctolite. The top of unit 228 at the top of the core is intensely altered and may be the contact zone with the surrounding unit (not seen).

UNITS-229, 231: Troctolite
Pieces: 1-4, 7

PRIMARY MINERALOGY: Based on Piece 7

Olivine	Modal 50% Size 5 mm average Shape anhedral
Plagioclase	Modal 50% Size 4 mm average Shape anhedral
Clinopyroxene	Modal 1-2% Size 1-2 mm Shape interstitial

COMMENTS: Units 229 and 231 are equigranular medium-grained troctolite. Contacts between the alternating gabbro and troctolite units are generally diffuse. A magnetic susceptibility high at 88 cm in Piece 7 of troctolite Unit 231 appears to be correlated with a brown vein. Magnetic susceptibility highs generally correlate with olivine-bearing zones.

UNIT-233: Troctolitic Gabbro
Piece: 9

PRIMARY MINERALOGY:

Olivine	Modal 47% Size 5 mm average Shape anhedral
Plagioclase	Modal 47% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 6% Size 5 mm average Shape subhedral

COMMENTS: Unit 233 is a medium-grained troctolitic gabbro. Contact with gabbro dike of Unit 232 is wavy with tiny interstitial clinopyroxene infiltration in the host.

SECONDARY MINERALOGY: Chlorite, pale amphibole, serpentine, prehnite?, secondary plagioclase?

COMMENTS: Corona texture occurs along the entire section with different degrees of alteration of the interiors of the coronae. The higher degree of alteration is related to the occurence of fractures/veins and alteration haloes close to the corona texture.

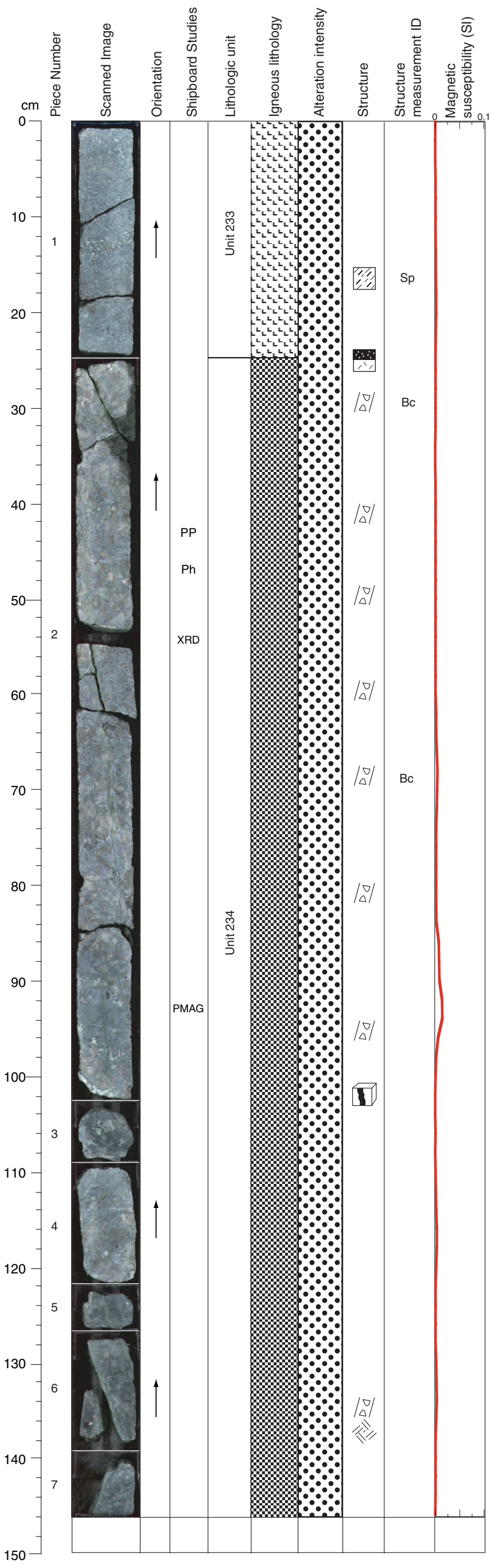
VEIN ALTERATION: Amphibole, plagioclase, chlorite, talc

THIN SECTIONS:
305-U1309D-86R-3, 46-48 cm (#275)
305-U1309D-86R-3, 106-109 cm (#276)

STRUCTURE: No clear link between this section and the previous one; (plastically?) strained gabbro (M1) in concordant contact to (plastically?) strained pegmatitic gabbro (M2) in concordant contact to (plastically?) strained olivine gabbro with corona olivines (M3). Fabric of latter is truncated by undeformed pegmatitic gabbro (M4) occurring probably also as cm-scale undeformed lozenges (M4) within the olivine gabbro. Relative age M1,M3 >M2>M4. Gabbro has no brittle deformation; microcracking on coarser grain section. Limited veins steeply dipping as in Section 305-U1309D-86R-2.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-86R-3, 42-51 cm WET
305-U1309D-86R-3, 78-92 cm WET
305-U1309D-86R-3, 93-105.0 cm WET
305-U1309D-86R-3, 108-117 cm WET
305-U1309D-86R-3, 108-117 cm WET (back)
305-U1309D-86R-3, 121-131 cm WET
305-U1309D-86R-3, 121-131 cm WET (back)

Core Photo



305-U1309D-87R-1 (Section top: 434.20 mbsf)

UNIT-233: Troctolitic Gabbro
Piece: 1

PRIMARY MINERALOGY:

Olivine	Modal 47% Size 5 mm average Shape anhedral
Plagioclase	Modal 47% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 6% Size 5 mm average Shape subhedral

COMMENTS: This is a continuation of Unit 233 equigranular medium-grained troctolitic gabbro.

UNIT-234: Oxide Gabbro
Pieces: 2-7

PRIMARY MINERALOGY:

Olivine	Modal 1% Size 1-10 mm Shape interstitial
Plagioclase	Modal 48% Size 2-30 mm, 12 mm average Shape subhedral
Clinopyroxene	Modal 49% Size 2-30 mm, 12 mm average Shape subhedral
Oxide	Modal 2% Size 5 mm average Shape subhedral

COMMENTS: Unit 234 is a coarse-grained oxide gabbro. The upper part of the unit contains poikilitic clinopyroxene. Oxide crystals are large and unevenly distributed. The magnetic susceptibility of the core is low in general, suggesting that the oxides are multi-domain crystals.

SECONDARY MINERALOGY: Serpentine chlorite, pale amphibole, prehnite, plagioclase

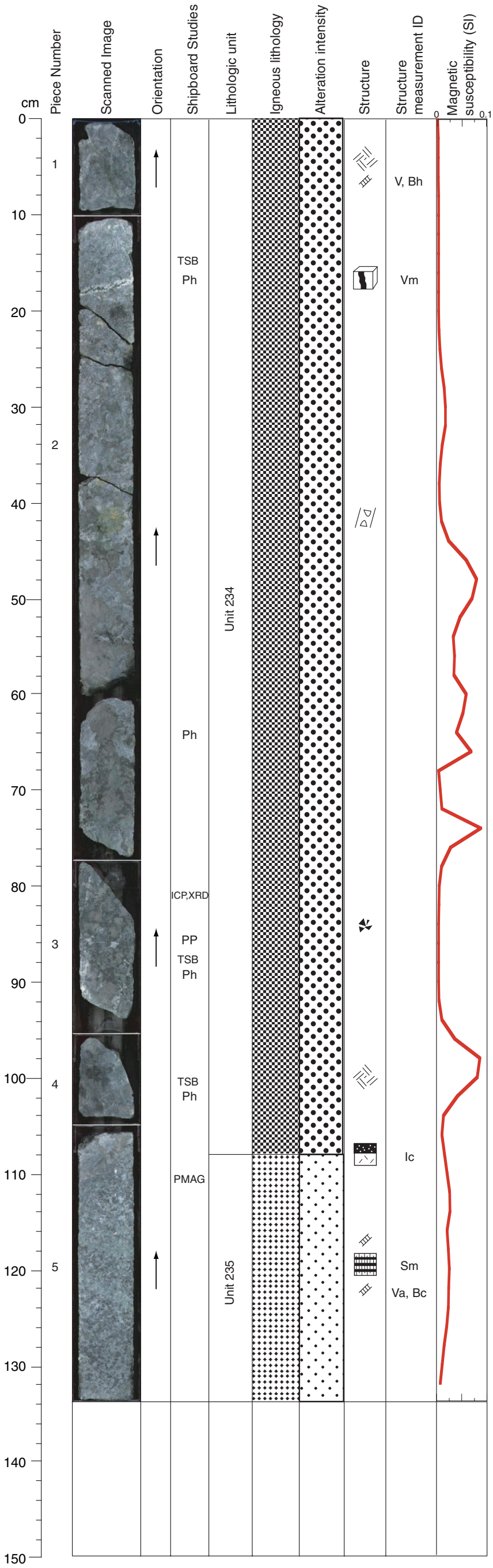
COMMENTS: Piece 1 displays corona texture with relatively altered centers, filled by soft mineral (?). The corona texture is more discrete in the oxide gabbro, but shows the same degree of alteration as the troctolitic gabbro. The oxide gabbro is cut by numerous green veins (amphibole) with alteration haloes.

VEIN ALTERATION: Amphibole, plagioclase, chlorite

STRUCTURE: Olivine (corona alterated) gabbro with clear (plastic?) fabric in unpreserved contact to unstrained, pegmatitic, locally olivine-bearing gabbro which show little deformation. Pegmatitic oxide (olivine-) gabbro with intense cataclasis (no brittle strain) both occuring distributed and along green shear zones with green vein infill (subvertical and over a large section of core), crosscutting earlier white veins.

CLOSE-UP PHOTOGRAPH:
305-U1309D-87R-1, 40-52 cm WET

Core Photo



305-U1309D-87R-2 (Section top: 435.66 mbsf)

UNIT-234: Oxide Gabbro
Pieces: 1-5

PRIMARY MINERALOGY:

Plagioclase	Modal 48% Size 1-20 mm Shape subhedral
Clinopyroxene	Modal 48% Size 2-40 mm, 30 mm average Shape subhedral
Oxide	Modal 4% Size 5 mm average Shape interstitial

COMMENTS: This is a continuation of Unit 234 oxide gabbro. Local enrichment of oxide is seen at 78-104 cm, which corresponds to a variably high magnetic susceptibility signal. Other magnetic highs at 50-66 cm may also correspond to oxide enrichments. At 16-17 cm there is an open vein with feldspar crystallized at the walls. Vein filling is fine-grained and altered, possibly under igneous conditions. The lower contact with olivine gabbro is diffuse over 2 cm and is accompanied by grain size reduction.

UNIT-235: Olivine Gabbro
Piece: 5

PRIMARY MINERALOGY:

Olivine	Modal 40% Size 6 mm average Shape subhedral
Plagioclase	Modal 25% Size 5 mm average Shape subhedral
Clinopyroxene	Modal 35% Size 3 mm average Shape subhedral

COMMENTS: Unit 235 is medium-grained olivine gabbro. The contact with the intrusive oxide unit above at 106-112 cm is gradational with wavy, interlocked grain size reduction over 5 cm, from very coarse (20 mm) to fine (5 mm) at the contact. Possible modal infiltration.

SECONDARY MINERALOGY: Serpentine, chlorite, pale amphibole, epidote

COMMENTS: Piece 2 (oxide gabbro) is cut by a white and green polycrystalline vein (plagioclase and amphibole). At 40-45 cm there are patches of epidote. The olivine-gabbro (Piece 5) displays some corona texture.

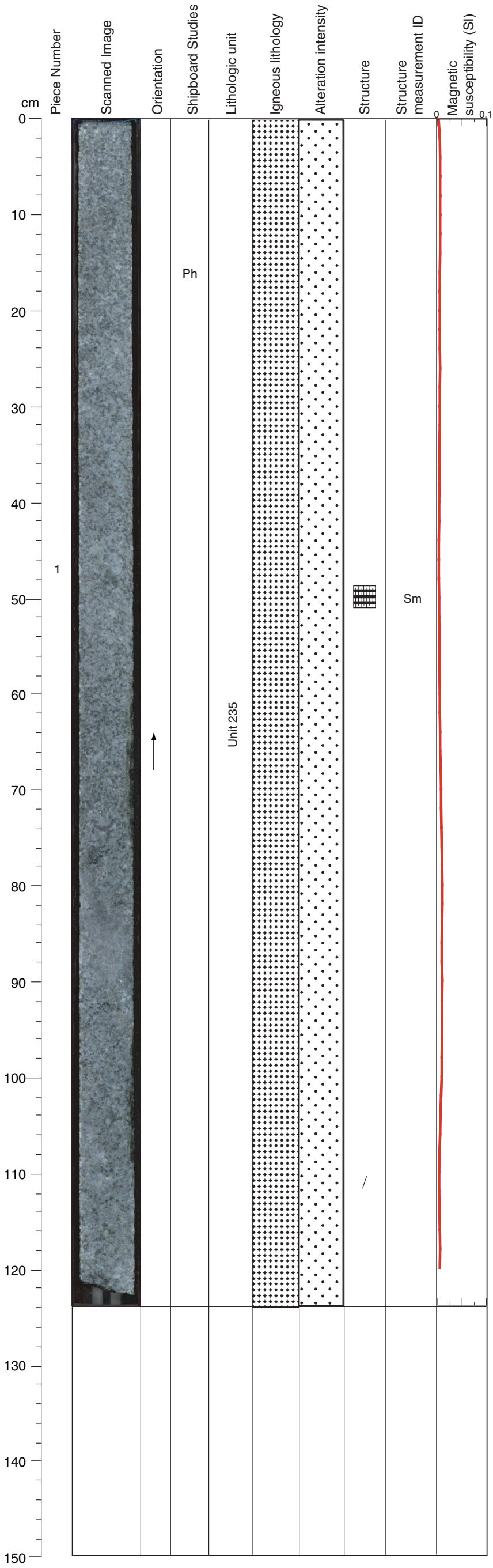
VEIN ALTERATION: Serpentine, talc, amphibole, plagioclase, chlorite

THIN SECTIONS:
305-U1309D-87R-2, 15-18 cm (#277)
305-U1309D-87R-2, 87-89 cm (#278)

STRUCTURE: Pegmatitic gabbro with local oxides but no strain in upper part in structurally discordant contact to magmatically deformed olivine gabbro with no olivine corona alteration. Coarse oxide olivine gabbro has cataclastic deformation. Variations in intensity of brittle deformation is associated with mineralogy – it is much more intense in plagioclase-rich areas (i.e. Piece 3 –cataclastic/hydrothermal breccia). Slight serpentine foliation of altered olivine.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-87R-2, 11-23 cm WET
305-U1309D-87R-2, 60-75 cm WET
305-U1309D-87R-2, 60-75 cm DRY
305-U1309D-87R-2, 80-96 cm WET
305-U1309D-87R-2, 104-115 cm WET

Core Photo



305-U1309D-88R-1 (Section top: 439.00 mbsf)

UNIT-235: Olivine Gabbro
Piece: 1

PRIMARY MINERALOGY: Determined from 305-U1309D-88R-4, Piece 1

Olivine	Modal 35% Size 1-15 mm, 4 mm average Shape interstitial
Plagioclase	Modal 30% Size 1-10 mm, 5 mm average Shape anhedral
Clinopyroxene	Modal 35% Size 5 mm average Shape anhedral

COMMENTS: This is a continuation of Unit 235 equigranular medium-grained olivine gabbro. This unit is a remarkably continuous and homogeneous interval of olivine gabbro.

SECONDARY MINERALOGY: Chlorite, pale amphibole

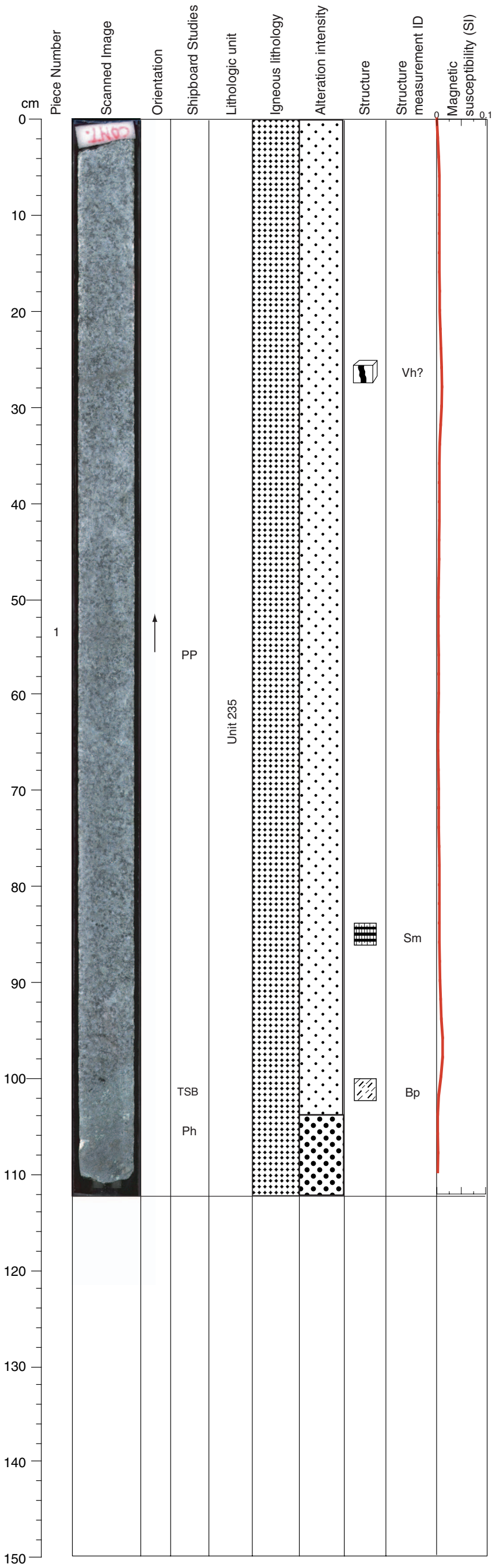
COMMENTS: Some small patches of corona texture. Low-degree of alteration of the olivine-gabbro (around 10%)

VEIN ALTERATION: n/a

STRUCTURE: Continuing from above, olivine gabbro occurs with clearly varying magmatic strain of moderate dip and no brittle deformation.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-88R-1, 15-25 cm WET

Core Photo



305-U1309D-88R-2 (Section top: 440.50 mbsf)

UNIT-235: Olivine Gabbro
Piece: 1

PRIMARY MINERALOGY: Determined from 305-U1309D-88R-4, Piece 1

Olivine	Modal 35% Size 1-15 mm, 3 mm average Shape anhedral
Plagioclase	Modal 30% Size 1-10 mm, 5 mm average Shape anhedral
Clinopyroxene	Modal 35% Size 10 mm average Shape anhedral

COMMENTS: This is a continuation of Unit 235 equigranular medium-grained olivine gabbro. A zone of coarse-grained clinopyroxene is found at 104-109 cm.

SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: Alteration halos due to proximity to veins at 25 cm (pyroxene vein?) and at 67 cm (amphibole vein?). Corona texture appears at the end of the section in an alteration halo that is 5 cm thick. The inner part of the corona is moderately to highly altered (soft mineral?).

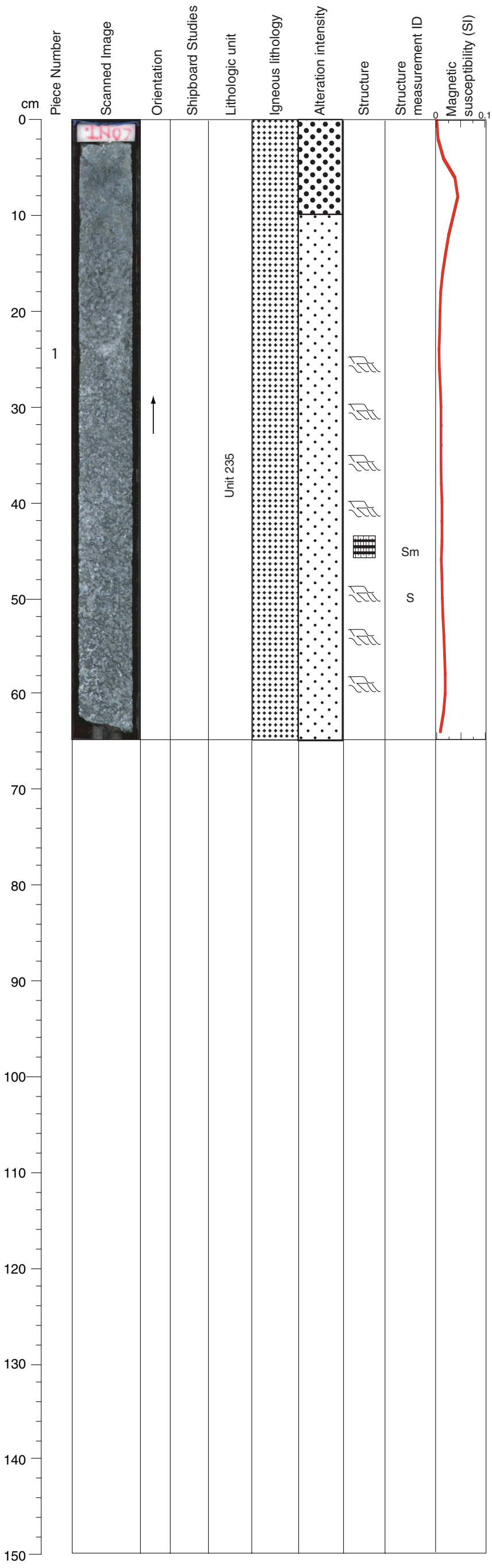
VEIN ALTERATION: n/a

THIN SECTIONS:
305-U1309D-88R-2, 100-103 cm (#279)

STRUCTURE: Moderately dipping, weak magmatic fabric in olivine gabbro containing a few subparallel dark brown veins (M) of possibly hydrothermal origin. Minor veining occurs locally.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-88R-2, 100-112 cm WET

Core Photo



305-U1309D-88R-3 (Section top: 441.62 mbsf)

UNIT-235: Olivine Gabbro
Piece: 1

PRIMARY MINERALOGY: Determined from 305-U1309D-88R-4, Piece 1

Olivine	Modal 35% Size 1-15 mm, 4 mm average Shape interstitial
Plagioclase	Modal 30% Size 1-10 mm, 5 mm average Shape anhedral
Clinopyroxene	Modal 35% Size 5 mm average Shape anhedral

COMMENTS: This is a continuation of Unit 235 equigranular medium-grained olivine gabbro.

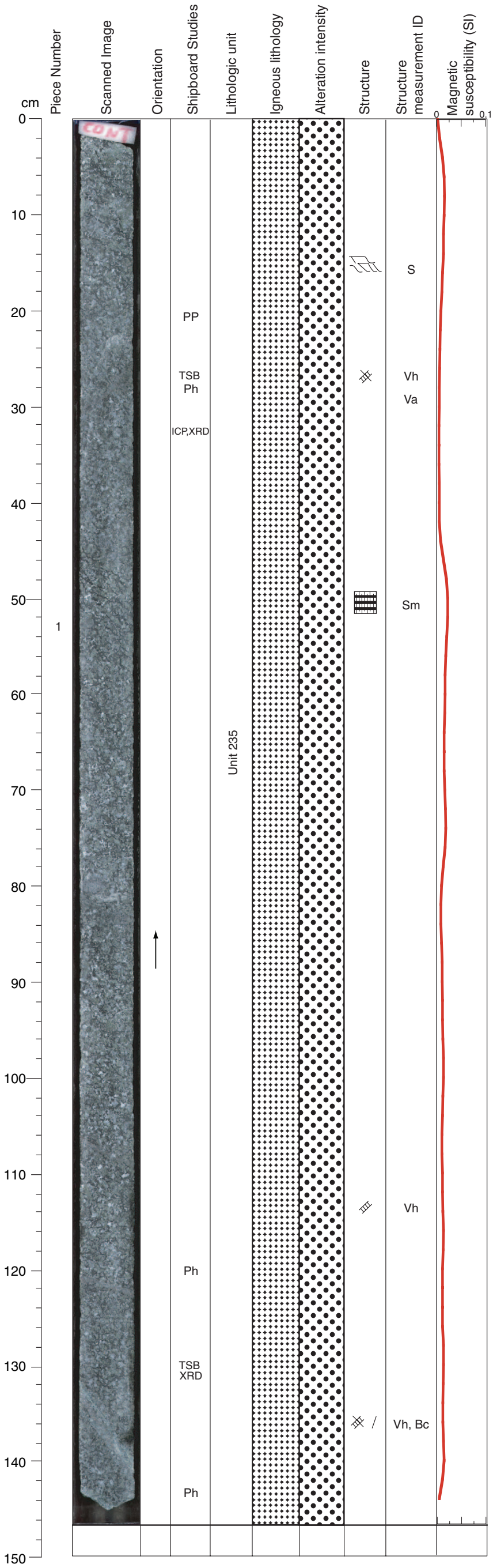
SECONDARY MINERALOGY: Chlorite, pale amphibole, serpentine

COMMENTS: Some small-diameter corona texture. Serpentine veins occur from 29 cm to the end of the section.

VEIN ALTERATION: Serpentine, chlorite

STRUCTURE: Moderately dipping, weak magmatic fabric in olivine gabbro with a weak, moderately dipping serpentine foliation.

Core Photo



305-U1309D-88R-4 (Section top: 442.27 mbsf)

UNIT-235: Olivine Gabbro
Piece: 1

PRIMARY MINERALOGY: Determined from Piece 1

Olivine	Modal 35% Size 1-15 mm, 4 mm average Shape interstitial
Plagioclase	Modal 30% Size 1-10 mm, 5 mm average Shape anhedral
Clinopyroxene	Modal 35% Size 5 mm average Shape anhedral

COMMENTS: This is a continuation of Unit 235 equigranular medium-grained olivine gabbro. Thin sections have 1% to 3% modal orthopyroxene not identified in macroscopic description.

SECONDARY MINERALOGY: Chlorite, pale amphibole, serpentine

COMMENTS: Anastomosing network of serpentine veins. At 109 and 122 cm, pyroxene dikes occur. At 140 cm alteration halo (1.5 cm thick) with some corona texture due to the occurence of pale green veins (amphibole).

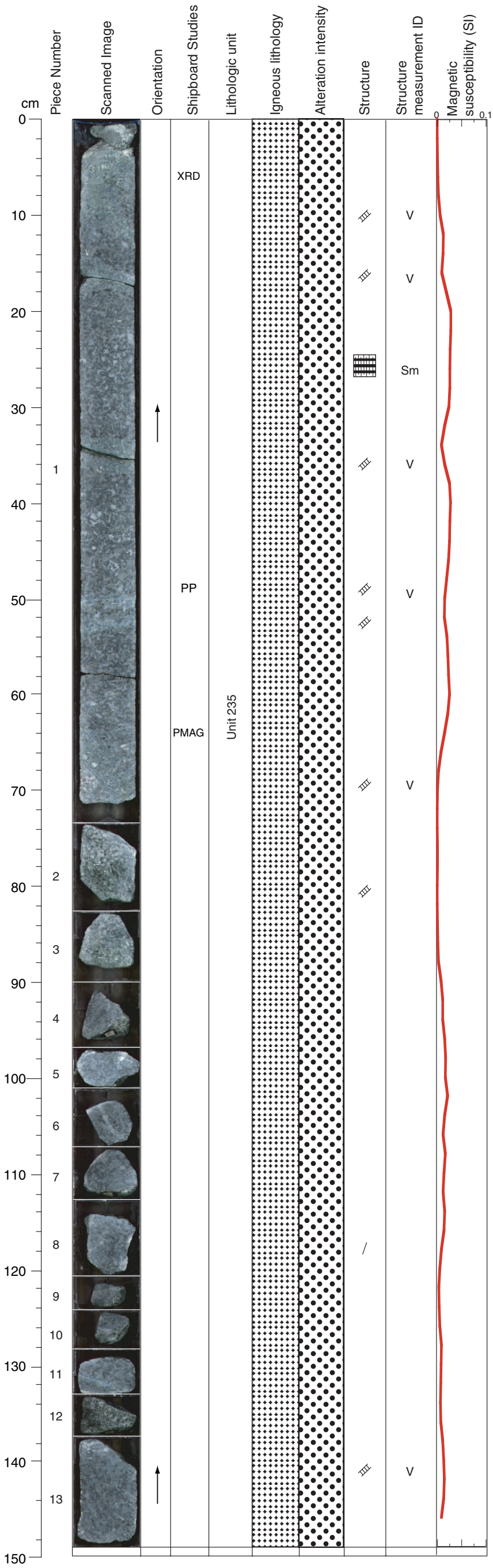
VEIN ALTERATION: Amphibole, serpentine, chlorite

THIN SECTIONS:
305-U1309D-88R-4, 27-29 cm (#280)
305-U1309D-88R-4, 132-135 cm (#281)

STRUCTURE: Moderately dipping, weak magmatic fabric in olivine gabbro containing a few dark brown veins typically < 1 cm thick parallel and oblique to fabric (M). In addition pale green veins occur, locally with restricted cataclastic deformation, and weak, moderately dipping serpentinite foliation.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-88R-4, 25-38 cm WET
305-U1309D-88R-4, 118-125 cm WET
305-U1309D-88R-4, 129-144 cm WET

Core Photo



305-U1309D-88R-5 (Section top: 443.73 mbsf)

UNIT-235: Olivine Gabbro
Pieces: 1-13

PRIMARY MINERALOGY: Determined from 305-U1309D-88R-4, Piece 1

Olivine	Modal 35% Size 1-15 mm, 4 mm average Shape interstitial
Plagioclase	Modal 30% Size 1-10 mm, 5 mm average Shape anhedral
Clinopyroxene	Modal 35% Size 5 mm average Shape anhedral

COMMENTS: This is a continuation of Unit 235 equigranular medium-grained olivine gabbro.

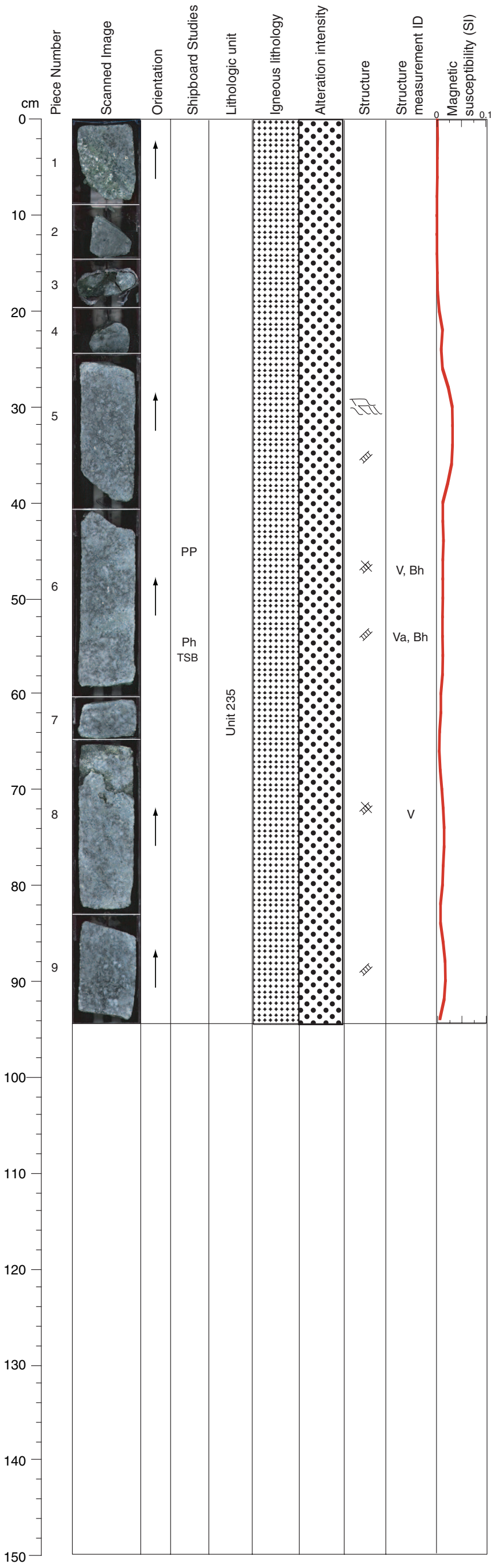
SECONDARY MINERALOGY: Chlorite, pale amphibole, serpentine, prehnite?, plagioclase?

COMMENTS: Corona texture occurs mainly in Pieces 1 to 3, in alteration halos formed by green veins (amphibole) and fractures. Some coronas display highly altered soft mineral (?).

VEIN ALTERATION: Amphibole, talc, chlorite

STRUCTURE: Weakly to moderately dipping magmatic foliation in olivine gabbro which has veining spaced at 10 cm. Pale green veins also occur with alteration halo on the order of 1 cm thickness.

Core Photo



305-U1309D-88R-6 (Section top: 445.23 mbsf)

UNIT-235: Olivine Gabbro
Pieces: 1-9

PRIMARY MINERALOGY: Determined from 305-U1309D-88R-4, Piece 1

Olivine	Modal 35% Size 1-15 mm, 4 mm average Shape interstitial
Plagioclase	Modal 30% Size 1-10 mm, 5 mm average Shape anhedral
Clinopyroxene	Modal 35% Size 5 mm average Shape anhedral

COMMENTS: This is a continuation of Unit 235 equigranular medium-grained olivine gabbro.

SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: Corona texture occurs in Piece 1 related to two dark green veins (amphibole, chlorite ?).

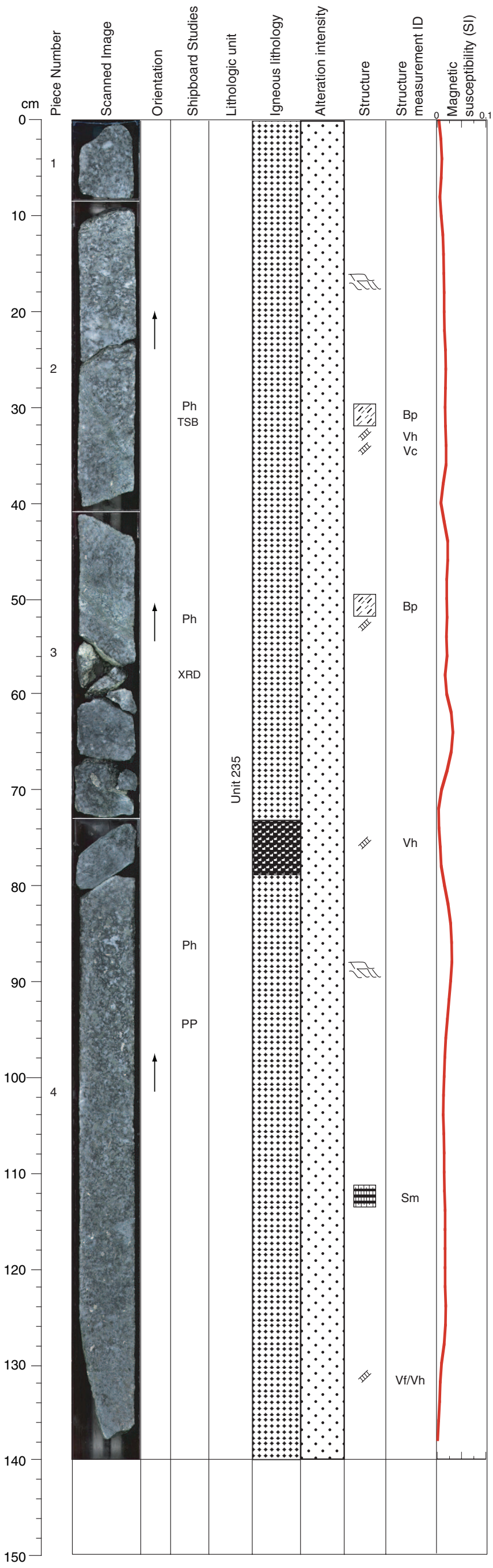
VEIN ALTERATION: n/a

THIN SECTIONS:
305-U1309D-88R-6, 52-56 cm (#282)

STRUCTURE: No clear magmatic fabric in olivine gabbro. Steeply dipping dark green veins, minor cracking and later veining with cataclasis (fault vein) are notable. Weak, moderately dipping serpentinite foliation.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-88R-6, 44-58 cm WET

Core Photo



305-U1309D-89R-1 (Section top: 443.80 mbsf)

UNIT-235: Olivine Gabbro
Pieces: 1-3, 4b

PRIMARY MINERALOGY: Based on average of several pieces

Olivine	Modal 40% Size 1-7 mm, 4 mm average Shape interstitial
Plagioclase	Modal 20% Size 20 mm maximum Shape anhedral
Clinopyroxene	Modal 40% Size 1-20 mm, 5 mm average Shape anhedral

COMMENTS: This is a continuation of Unit 235 equigranular medium-grained olivine gabbro. Vein with magmatic zircon and apatite at 27-36 cm. Rubble clast at 72-78 cm (Piece 4a) is troctolite (50:50 olivine:plagioclase) with no discernible contact with olivine gabbro portion of the unit.

SECONDARY MINERALOGY: Serpentine, chlorite, pale amphibole, prehnite?, plagioclase?

COMMENTS: At 50 cm corona texture occurs in an alteration halo (around 3 cm thick) related to a vein/dike. Network of serpentine veins located at 86-96 cm.

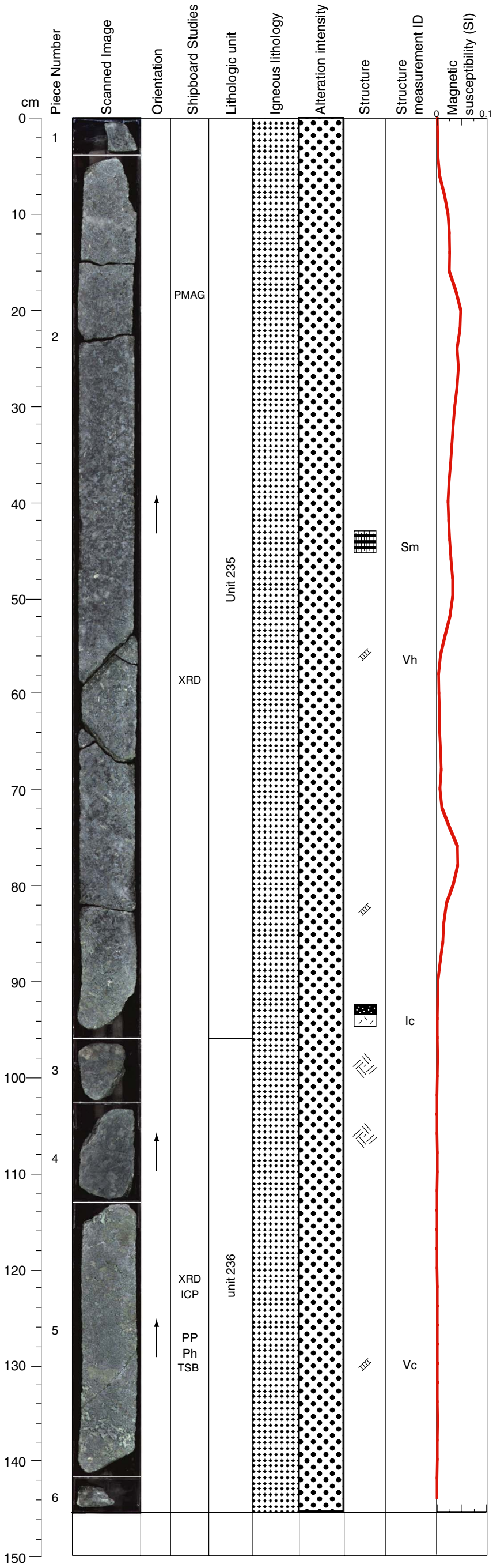
VEIN ALTERATION: Serpentine, talc, calcite,amphibole, plagioclase, chlorite

THIN SECTIONS:
305-U1309D-89R-1, 29-31 cm (#284)

STRUCTURE: Weak to absent strain in olivine gabbro (M1). Greenish alteration (BP1) band and brown pyroxene-rich band (BP2) are subparallel to weak, moderately dipping foliation in gabbro. M1>BP1, 2. Brittle features include sets of veins, limited brecciation and crosscutting families of veins.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-89R-1, 24-40 cm WET
305-U1309D-89R-1, 41-54 cm WET
305-U1309D-89R-1, 85-95 cm WET

Core Photo



305-U1309D-89R-2 (Section top: 445.20 mbsf)

UNIT-235: Olivine Gabbro
Pieces: 1-2

PRIMARY MINERALOGY: Based on average of several pieces

Olivine	Modal 40% Size 1-7 mm, 4 mm average Shape interstitial
Plagioclase	Modal 20% Size 20 mm maximum Shape anhedral
Clinopyroxene	Modal 40% Size 1-20 mm, 5 mm average Shape anhedral

COMMENTS: This is a continuation of Unit 235 equigranular medium-grained olivine gabbro.

UNIT-236: Olivine Gabbro
Pieces: 3-6

PRIMARY MINERALOGY: Based on average of several pieces

Olivine	Modal 40% Size 1-7 mm, 4 mm average Shape interstitial
Plagioclase	Modal 20% Size 20 mm maximum Shape anhedral
Clinopyroxene	Modal 40% Size 1-20 mm, 9 mm average Shape anhedral

COMMENTS: Unit 236 is a seriate medium-grained olivine gabbro. It is distinguished from Unit 235 by larger clinopyroxenes and more variable overall grain size starting at 96 cm in the section.

SECONDARY MINERALOGY: Serpentine, chlorite, pale amphibole, prehnite, plagioclase

COMMENTS: Corona texture is well-developed, especially at 57-63 cm in the piece between the two fractures, and also in some other areas where dark green rim (chlorite ?) is thicker (84-91 cm Piece 1 and at the end of Piece 5).

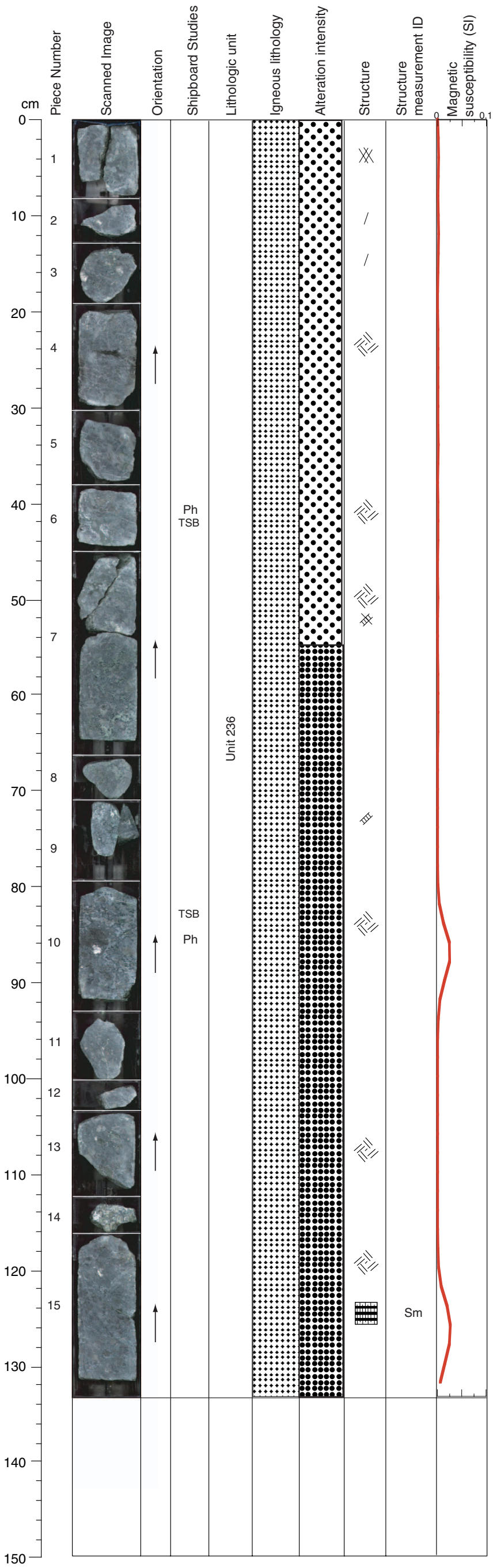
VEIN ALTERATION: Amphibole, plagioclase, chlorite, sulfide

THIN SECTIONS:
305-U1309D-89R-2, 130-133 cm (#285)

STRUCTURE: Weak to absent magmatic strain in olivine gabbro (M1). Absent strain in coarser olivine gabbro (M2) occurring below 95 cm at igneous contact. Evolution, apparently related to grain size, in coarser olivine gabbro (described below): M1 >M2. Massive olivine gabbro with widely spaced hydrothermal veins (dark green). Lower unit of coarser olivine gabbro with cataclastic deformation. Veins with sulfide.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-89R-2, 125-137 cm WET

Core Photo



305-U1309D-89R-3 (Section top: 446.65 mbsf)

UNIT-236: Olivine Gabbro
Pieces: 1-15

PRIMARY MINERALOGY: Based on average of several pieces

Olivine	Modal 20% Size 1-5 mm Shape interstitial
Plagioclase	Modal 40% Size 1-15 mm Shape anhedral
Clinopyroxene	Modal 40% Size 1-35 mm Shape anhedral

COMMENTS: Continuation of Unit 236 seriate medium-grained olivine gabbro. Tiny sulfide vein at 28 cm. Modes highly variable.

SECONDARY MINERALOGY: Serpentine, chlorite, pale amphibole, prehnite?, secondary plagioclase.

COMMENTS: Corona texture of two different kinds: (1) white to pale green coronas with rim of chlorite and (2) pinkish coronas with altered olivine inside.

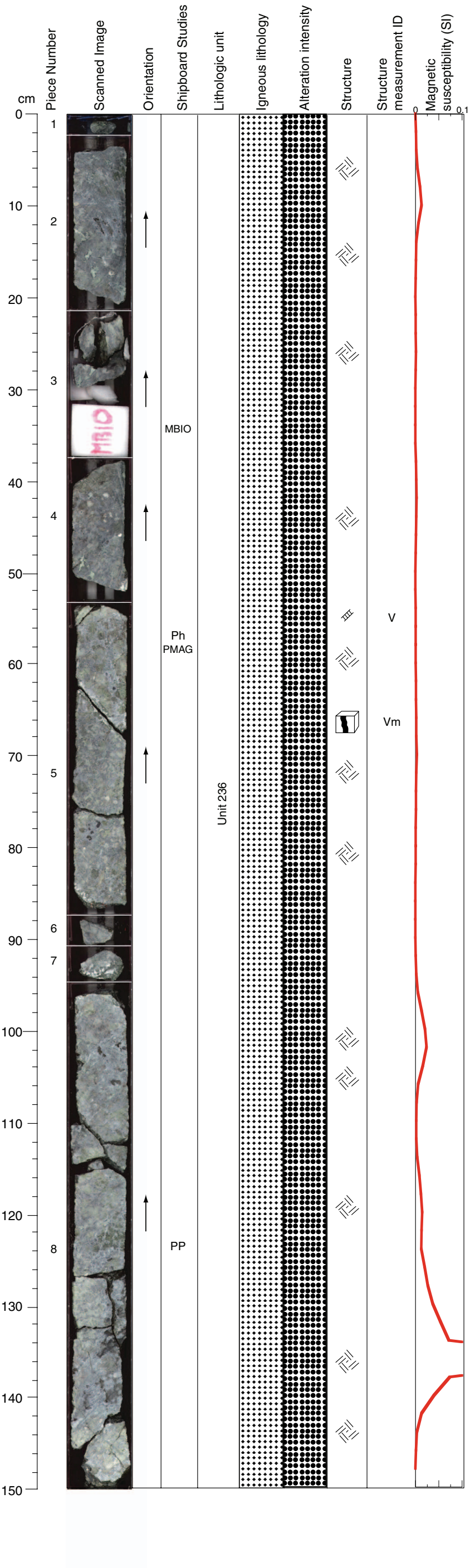
VEIN ALTERATION: n/a

THIN SECTIONS:
305-U1309D-89R-3, 42-44 cm (#286)
305-U1309D-89R-3, 82-84 cm (#287)

STRUCTURE: Olivine gabbro with no magmatic strain grades into pegmatitic gabbro down core. Toward base of core we note weak magmatic strain. Coarse grain olivine gabbro with abundant cataclasis, random orientation, and no strain visible and locally hair line veins.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-89R-3, 38-44 cm WET
305-U1309D-89R-3, 80-90 cm WET

Core Photo



305-U1309D-90R-1 (Section top: 448.60 mbsf)

UNIT-236: Olivine Gabbro
Pieces: 1-8

PRIMARY MINERALOGY: Determined from Piece 2

Olivine	Modal 3-6% Size 3-20 mm Shape interstitial
Plagioclase	Modal 60% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 34-37% Size 3-30 mm, 10 mm average Shape anhedral

COMMENTS: Continuation of Unit 236 seriate medium-grained olivine gabbro. This portion of the unit is more variable in both grain size and olivine content, ranging from medium- to coarse-grained and olivine-bearing gabbro to olivine gabbro.

SECONDARY MINERALOGY: Serpentine, chlorite, pale amphibole, prehnite?, plagioclase?

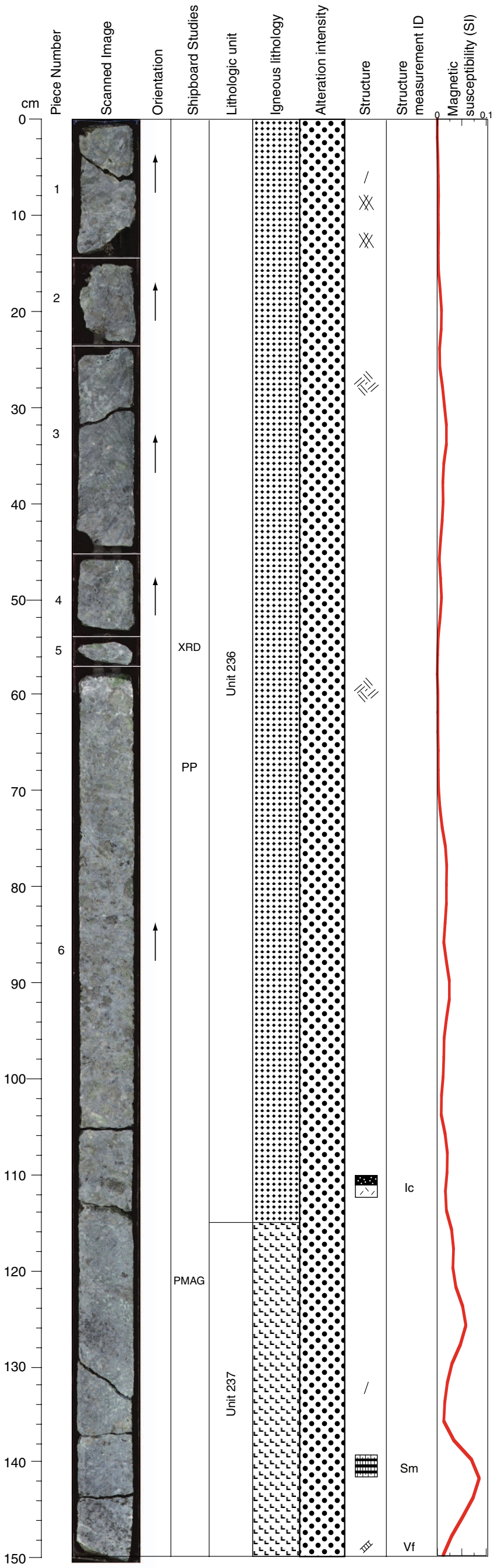
COMMENTS: Same as previous section with two kinds of alteration coronae: (1) white to pale green coronas with rim of chlorite and (2) pinkish coronas with altered olivine interiors. At 69 cm, polycrystalline vein (plagioclase and amphibole?).

VEIN ALTERATION: Amphibole, plagioclase, chlorite

STRUCTURE: Pegmatitic gabbro with no strain and with abundant cataclasis (distributed) and cataclastic, dark green fault veins.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-90R-1, 58-73 cm WET

Core Photo



305-U1309D-90R-2 (Section top: 450.10 mbsf)

UNIT-236: Olivine Gabbro
Pieces: 1-6b

PRIMARY MINERALOGY: Determined from Piece 6a

Olivine	Modal 3-6% Size 3-20 mm Shape interstitial
Plagioclase	Modal 60% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 34-37% Size 3-30 mm, 10 mm average Shape anhedral

COMMENTS: Continuation of Unit 236 seriate coarse-grained olivine gabbro. This portion of the unit is variable in both grain size and olivine content, but is dominantly coarse-grained olivine gabbro.

UNIT-237: Troctolitic Gabbro
Pieces: 6c-6f

PRIMARY MINERALOGY:

Olivine	Modal 67% Size 4-14 mm Shape anhedral
Plagioclase	Modal 30% Size 4 mm average Shape anhedral
Clinopyroxene	Modal 3% Size 1-2 mm Shape anhedral

COMMENTS: Unit 237 is seriate medium-grained troctolitic gabbro. There is a diffuse large contact between coarse-grained olivine gabbro of Unit 236 and Unit 237. Clinopyroxene patches mark diffuse magmatic contact over 50 cm.

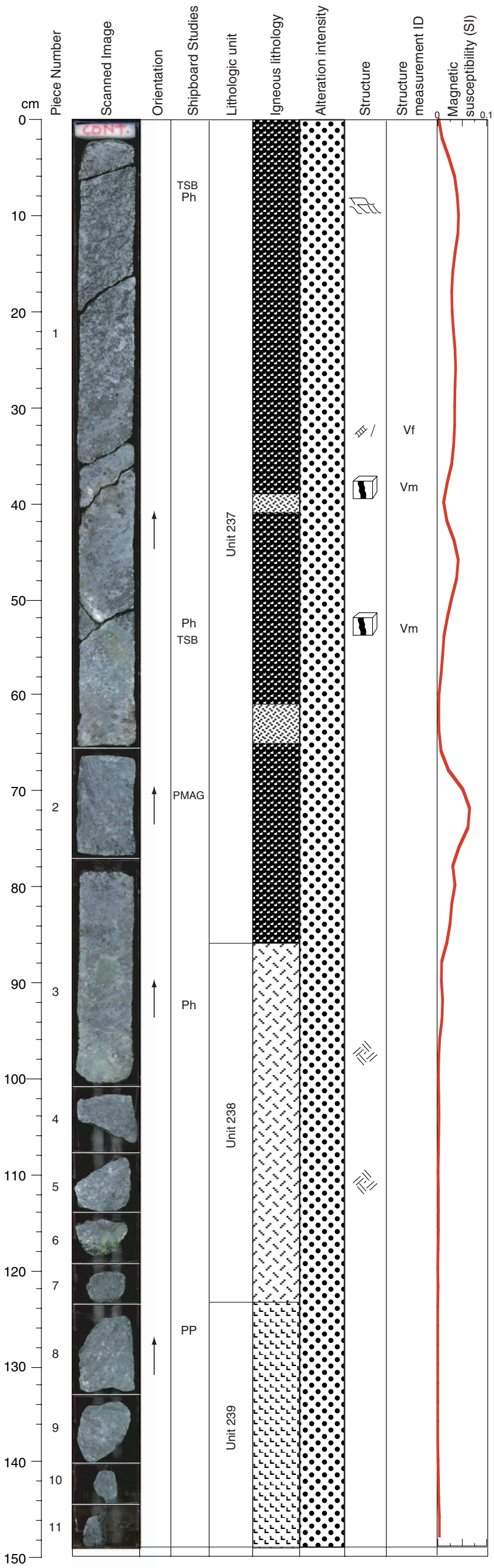
SECONDARY MINERALOGY: Serpentine, chlorite, pale amphibole, prehnite, plagioclase

COMMENTS: Corona texture occurs in the olivine gabbro but is more abundant and well-developed in the troctolite.

VEIN ALTERATION: Talc, chlorite

STRUCTURE: Coarse olivine gabbro with no strain, becoming significantly finer grained below 112 cm. Cataclasis is more abundant in upper part and decreases down core. Contact with finer grain gabbro (heterogeneous) with some veining and open fractures. No evidence of strain on brittle features.

Core Photo



305-U1309D-90R-3 (Section top: 451.60 mbsf)

UNIT-237: Troctolite cut by gabbro
Pieces: 1a-1d, 1e-1f, 2-3

PRIMARY MINERALOGY: Based on average of several pieces

Olivine	Modal 67% Size 4-14 mm Shape anhedral
Plagioclase	Modal 30% Size 4 mm average Shape anhedral
Clinopyroxene	Modal 3% Size 1-2 mm Shape anhedral

COMMENTS: Continuation of Unit 237 seriate medium-grained troctolite. Narrow, coarse-grained gabbro dikes cut the troctolite at 39-41 cm (Pieces 1d-1e) and 61-65 cm (Piece 1f). Dike contacts are diffuse, interlocked grains. Troctolite zones generally correlate with magnetic susceptibility highs and gabbro dikes correspond to lows.

UNIT-238: Gabbro
Pieces: 3-7

PRIMARY MINERALOGY: Based on average of several pieces

Olivine	Modal <1% Size 1 mm Shape interstitial
Plagioclase	Modal 40% Size 2-20 mm Shape anhedral
Clinopyroxene	Modal 60% Size 3-55 mm, 25 mm average Shape anhedral

COMMENTS: Unit 238 is coarse-grained seriate gabbro. It contains isolated patches of troctolite.

UNIT-239: Troctolite
Pieces: 8-11

PRIMARY MINERALOGY: Modal data from Section U1309D-91-1, Piece 2a

Olivine	Modal 25% Size 1-10 mm Shape anhedral
Plagioclase	Modal 70% Size 2-19 mm Shape anhedral
Clinopyroxene	Modal 5% Size 1-6 mm, 25 mm average Shape interstitial

COMMENTS: Unit 239 is medium-grained seriate troctolite.

SECONDARY MINERALOGY: Serpentine, chlorite, pale amphibole, prehnite, plagioclase

COMMENTS: Piece 1 displays some corona texture and an anastomosing network of veins. The coronas are more developed at 60 cm related to a 3 cm thick dike/vein of epidote-plagioclase-amphibole and continue until the end of the section.

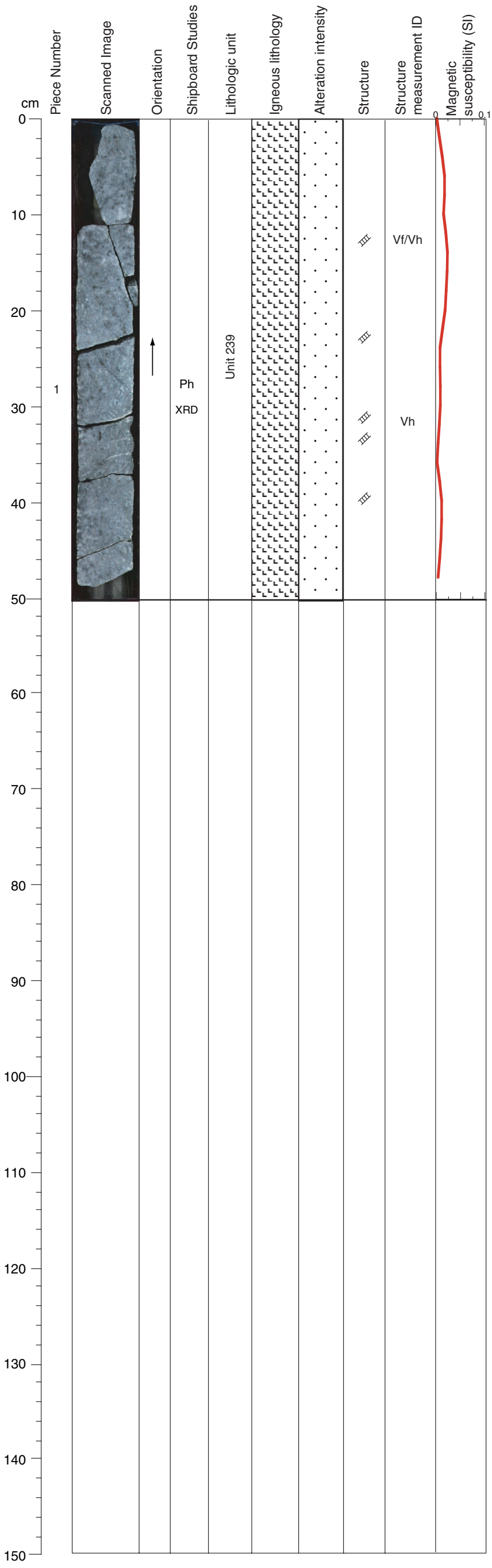
VEIN ALTERATION: Talc, epidote, amphibole, plagioclase, chlorite

THIN SECTIONS:
305-U1309D-90R-3, 6-8 cm (#288)
305-U1309D-90R-3, 54-56 cm (#289)

STRUCTURE: Olivine gabbro (M1) with no strain, scattered pegmatitic crystals between 87 and 112 cm. Two late magmatic veins (pyroxenite M2 and leucocratic vein M3) at 39 and 53 cm with different orientations, M1 > M2, M3. Serpentinite foliation is shallowly dipping and truncated by magmatic veins cut by later fault veins filled with white material. Coarser sections with cataclastic deformation and very minor veining.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-90R-3, 5-15 cm WET
305-U1309D-90R-3, 43-65 cm WET
305-U1309D-90R-3, 86-100 cm WET

Core Photo



305-U1309D-90R-4 (Section top: 453.10 mbsf)

UNIT-239: Troctolite
Piece 1

PRIMARY MINERALOGY: Modal data from U1309D-91R-1, Piece 2a

Olivine	Modal 25% Size 1-10 mm Shape anhedral
Plagioclase	Modal 70% Size 2-19 mm Shape anhedral
Clinopyroxene	Modal 5% Size 1-6 mm, 25 mm average Shape interstitial

COMMENTS: Unit 239 is medium-grained seriate troctolite.

SECONDARY MINERALOGY: Chlorite, pale amphibole, prehnite?, plagioclase?

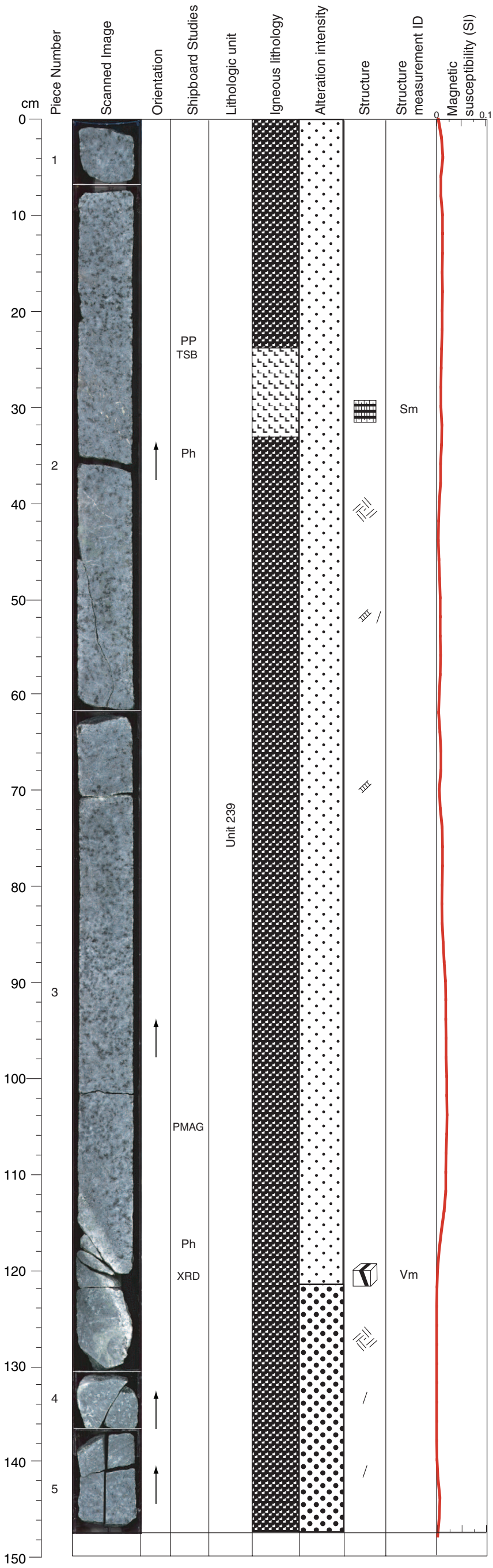
COMMENTS: Corona texture occurs on the side edge of the section, likely related to several white veins (talc-carbonate).

VEIN ALTERATION: Talc, carbonate

STRUCTURE: Olivine gabbro showing no strain, cut by shallow-dipping white veins in turn crosscut by dark green vein fault with alteration halo.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-90R-4, 27-42 cm WET

Core Photo



305-U1309D-91R-1 (Section top: 453.40 mbsf)

UNIT-239: Troctolite
Pieces: 1-5

PRIMARY MINERALOGY: Based on Piece 2a

Olivine	Modal 25% Size 1-10 mm Shape anhedral
Plagioclase	Modal 70% Size 2-19 mm Shape anhedral
Clinopyroxene	Modal 5% Size 1-6 mm, 25 mm average Shape interstitial

COMMENTS: Continuation of Unit 239 medium-grained seriate troctolite. Interval from 24-33 cm is troctolitic gabbro. Thin section from interval 25-30 cm contains orthopyroxene.

SECONDARY MINERALOGY: Chlorite, pale amphibole.

COMMENTS: The corona texture appears and is well-developed after a 2 cm-thick vein (amphibole and plagioclase, at 112-124 cm).

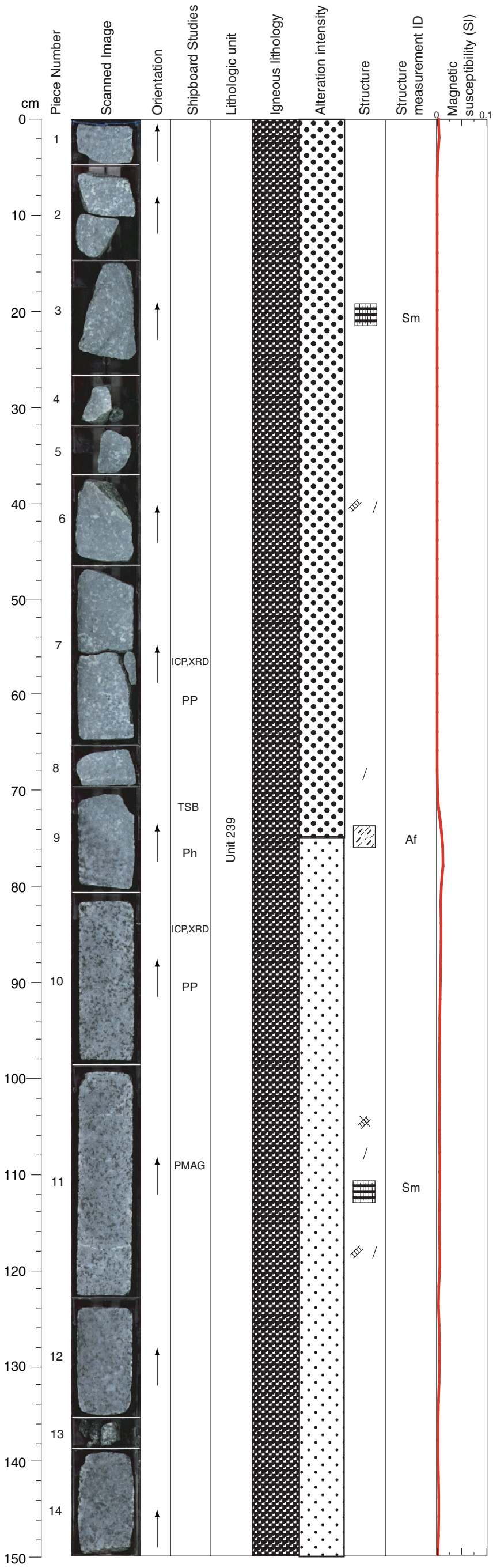
VEIN ALTERATION: Talc, sulfides, amphibole, plagioclase, chlorite

THIN SECTIONS:
305-U1309D-91R-1, 25-28 cm (#290)

STRUCTURE: Olivine gabbro with weak magmatic strain and scattered skeletal poikilitic clinopyroxene of pegmatitic dimension. One leucocratic vein.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-91R-1, 21-35 cm WET
305-U1309D-91R-1, 24-36 cm WET
305-U1309D-91R-1, 24-36 cm DRY
305-U1309D-91R-1, 24-36 cm WET
305-U1309D-91R-1, 109-130 cm WET

Core Photo



305-U1309D-91R-2 (Section top: 454.88 mbsf)

UNIT-239: Troctolite
Pieces: 1-14

PRIMARY MINERALOGY: Based on average of several pieces

Olivine	Modal 25% Size 1-10 mm Shape anhedral
Plagioclase	Modal 70% Size 2-19 mm Shape anhedral
Clinopyroxene	Modal 5% Size 1-6 mm, 25 mm average Shape interstitial

COMMENTS: Continuation of Unit 239 medium-grained seriate troctolite. The modal ratio of olivine:plagioclase varies along the section and there appears to be an alteration boundary at 75 cm, which is associated with a minor increase in magnetic susceptibility. There is also a more plagioclase-rich zone in Piece 11 and a clinopyroxene-bearing zone at 126-130 cm.

SECONDARY MINERALOGY: Chlorite, pale amphibole, prehnite? secondary plagioclase?

COMMENTS: Corona texture is well-developed (continuation of previous section) until 76 cm. The inner part of the coronas are highly altered (soft). After 76 cm no corona texture.

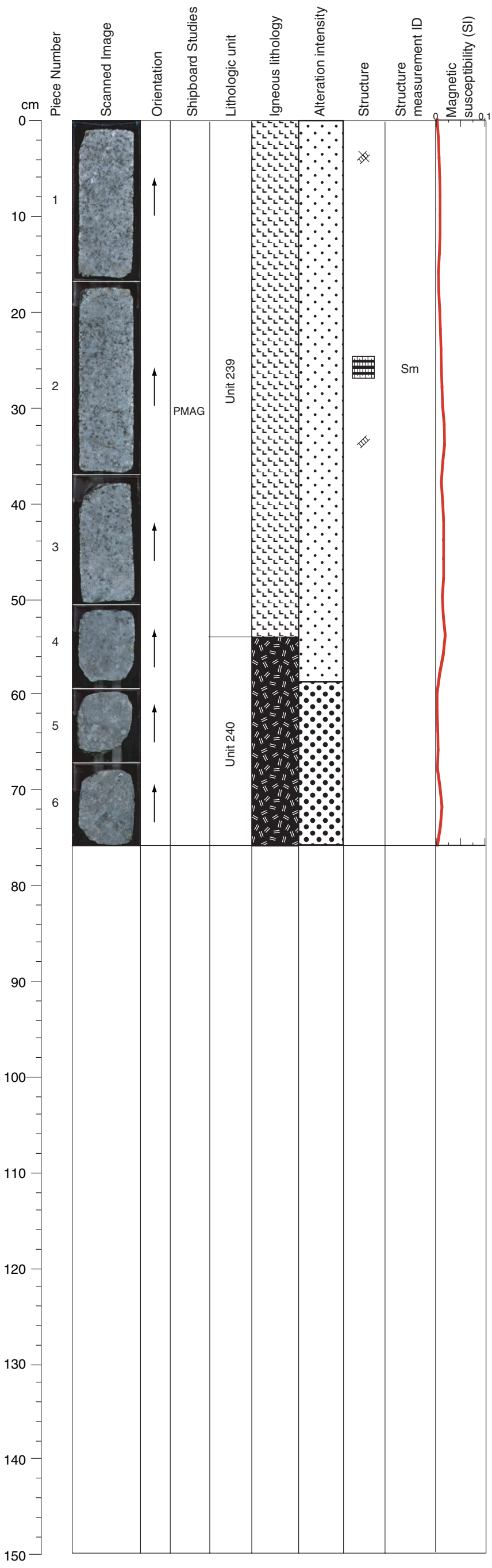
VEIN ALTERATION: amphibole, plagioclase, chlorite

THIN SECTIONS:
305-U1309D-91R-2, 72-75 cm (#291)

STRUCTURE: Olivine gabbro with corona olivine alteration and weak magmatic strain in upper part of section. Beneath a sharp alteration front (Af) olivine gabbro of somewhat stronger magmatic fabric, no olivine corona alteration and local skeletal poikilitic clinopyroxene of pegmatitic dimension.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-91R-2, 71-80 cm WET

Core Photo



305-U1309D-91R-3 (Section top: 456.38 mbsf)

UNIT-239: Troctolitic Gabbro
Pieces: 1-4

PRIMARY MINERALOGY: Based on average of several pieces

Olivine	Modal 45% Size 1-10 mm Shape anhedral
Plagioclase	Modal 45% Size 1-8 mm Shape anhedral
Clinopyroxene	Modal 6% Size 1-4 mm, 3 mm average Shape anhedral

COMMENTS: Continuation of Unit 239. There is a gradual increase in clinopyroxene down section to troctolitic gabbro lithology.

UNIT-240: Olivine-bearing Gabbro
Pieces: 4-6

PRIMARY MINERALOGY: Based on Piece 6

Olivine	Modal 1% Size 1-3 mm Shape anhedral
Plagioclase	Modal 70% Size 1-8 mm Shape anhedral
Clinopyroxene	Modal 30% Size 1-15 mm, 4 mm average Shape anhedral

COMMENTS: Unit 240 is coarse-grained seriate olivine-bearing gabbro.

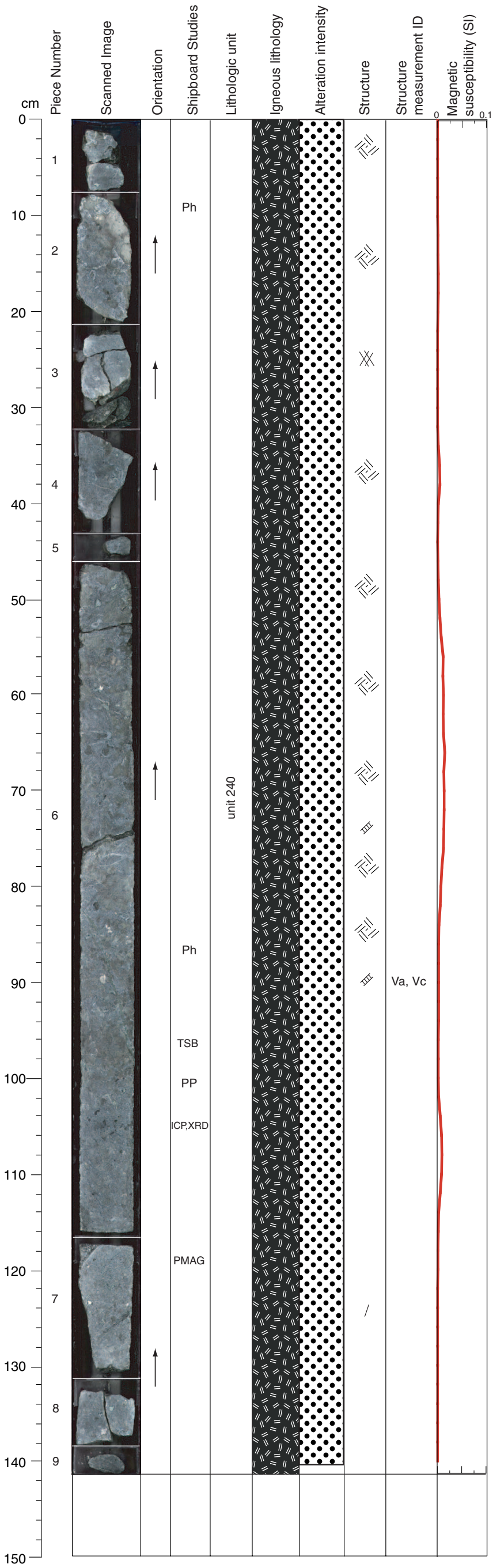
SECONDARY MINERALOGY: Serpentine, chlorite, pale amphibole.

COMMENTS: Continuation of well-developed corona texture from the previous section with a low degree of alteration.

VEIN ALTERATION: Amphibole, plagioclase, chlorite

STRUCTURE: Continuing from above, troctolitic gabbro with some magmatic strain, but diffuse contact to unstrained, somewhat coarser, pyroxene-rich gabbro in lower part.

Core Photo



305-U1309D-92R-1 (Section top: 458.20 mbsf)

UNIT-240: Olivine-bearing Gabbro
Pieces: 1-9

PRIMARY MINERALOGY: Based on Piece 6b

Olivine	Modal 5% Size 1-10 mm Shape anhedral
Plagioclase	Modal 45% Size 1-8 mm Shape anhedral
Clinopyroxene	Modal 50% Size to 80 mm Shape subhedral

COMMENTS: Continuation of Unit 240 coarse-grained seriate olivine-bearing gabbro. Olivine is well preserved and contains corona texture. Clinopyroxene in the unit is pegmatitic at 7-63 cm. Grain size reduces to medium at 80-100 cm.

SECONDARY MINERALOGY: Serpentine, chlorite, pale amphibole, prehnite?, secondary plagioclase?

COMMENTS: Corona alteration of two kinds (1) pale-green coronas and (2) pinkish coronas around the altered olivines.

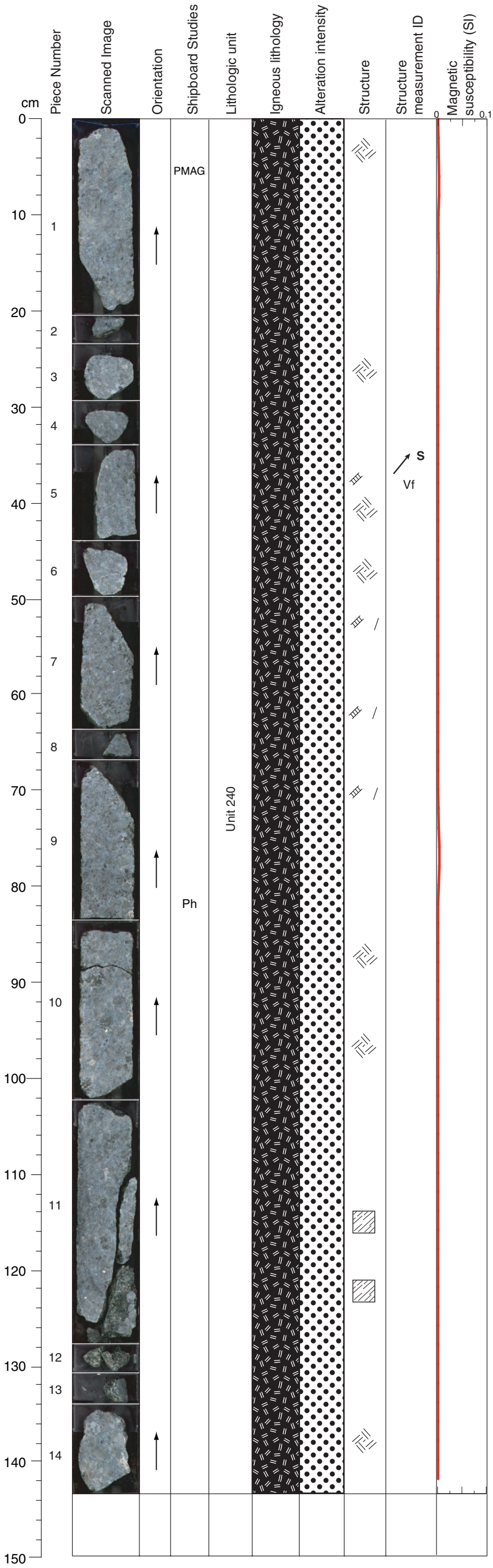
VEIN ALTERATION: Amphibole, chlorite

THIN SECTIONS:
305-U1309D-92R-1, 96-99 cm (#292)

STRUCTURE: Texturally heterogeneous, below 100 cm more homogeneous, olivine gabbro with no strain, corona textures of olivine. Gabbro with varying texture, some dark green veins with alteration halo, and late pervasive, random cataclasis.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-92R-1, 8-21 cm WET
305-U1309D-92R-1, 80-100 cm WET

Core Photo



305-U1309D-92R-2 (Section top: 459.61 mbsf)

UNIT-240: Olivine-bearing Gabbro
Pieces: 1-14

PRIMARY MINERALOGY: Based on average of several pieces

Olivine	Modal 3% Size 3 mm average Shape anhedral
Plagioclase	Modal 50% Size 1-8 mm Shape anhedral
Clinopyroxene	Modal 50% Size 4 mm average Shape subhedral

COMMENTS: Continuation of Unit 240 coarse-grained seriate olivine-bearing gabbro.

SECONDARY MINERALOGY: Chlorite, pale amphibole, prehnite?, secondary plagioclase?

COMMENTS: Some small patches of corona texture.

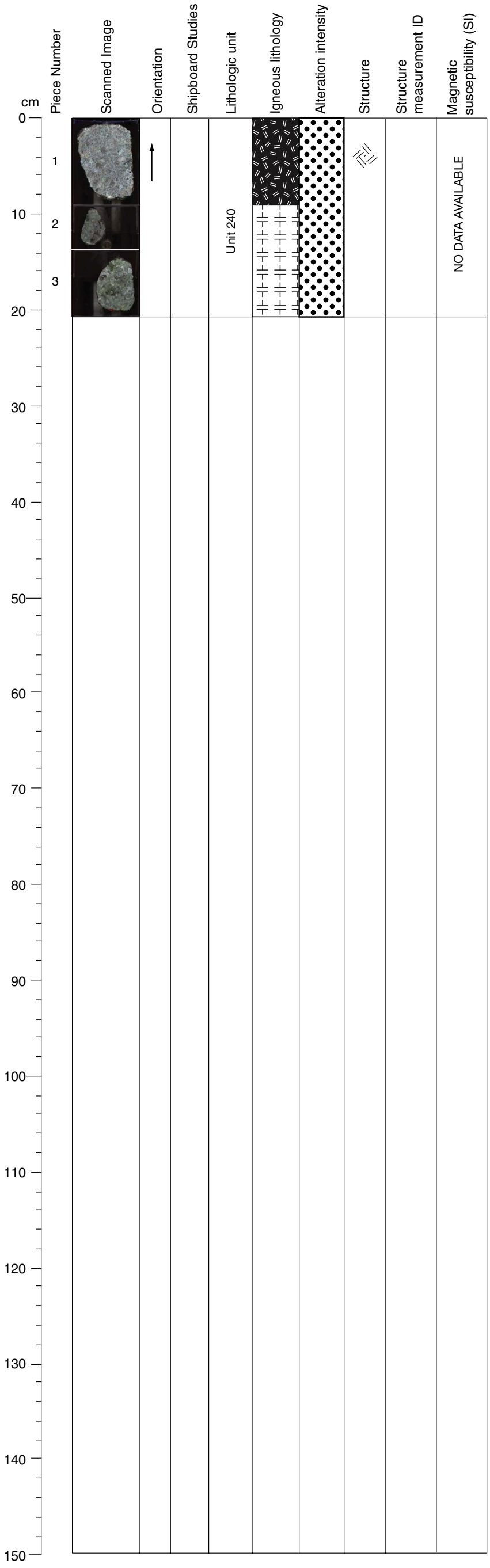
VEIN ALTERATION: Amphibole, plagioclase, chlorite

THIN SECTIONS:

STRUCTURE: Olivine gabbro with no strain, corona olivines, below 90 cm pegmatitic crystals of clinopyroxene. Gabbro with varying texture, some dark green veins with alteration halo, and late pervasive, random cataclasis. Fault veins with pale green, fibrous material (subhorizontal plunge).

CLOSE-UP PHOTOGRAPHS:
305-U1309D-92R-2, 80-100 cm WET

Core Photo



305-U1309D-92R-3 (Section top: 461.04 mbsf)

UNIT-240: Olivine-bearing Gabbro
Pieces: 1-3

PRIMARY MINERALOGY:

Olivine	Modal 3% Size 3 mm average Shape anhedral
Plagioclase	Modal 50% Size 1-8 mm Shape anhedral
Clinopyroxene	Modal 50% Size 4 mm average Shape subhedral

COMMENTS: Continuation of Unit 240 coarse-grained seriate olivine-bearing gabbro. Pieces 2-3 are more metamorphosed.

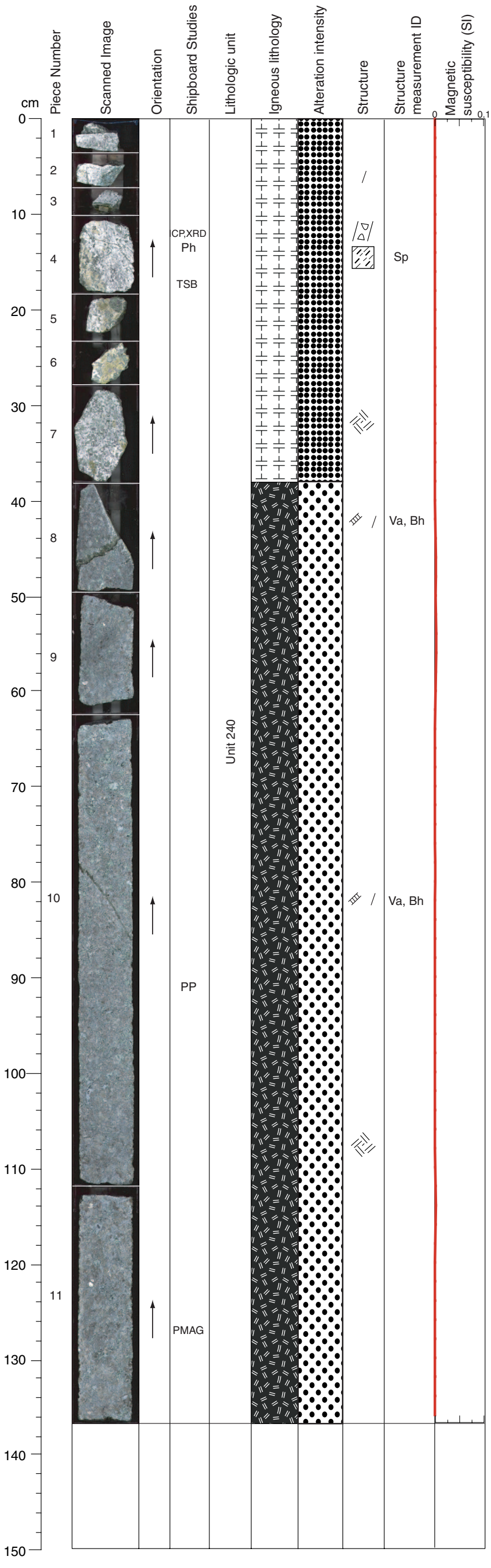
SECONDARY MINERALOGY: Chlorite, pale amphibole.

COMMENTS: Some small alteration coronas and patches of epidote in Piece 3.

THIN SECTIONS:

STRUCTURE: Olivine gabbro, no strain, in Pieces 2 and 3 epidote alteration. Gabbro with varying texture with late pervasive, random cataclasis.

Core Photo



305-U1309D-93R-1 (Section top: 463.00 mbsf)

UNIT-240: Olivine-bearing Gabbro

Pieces: 1-11

PRIMARY MINERALOGY:

Olivine	Modal 3% Size 3 mm average Shape anhedral
Plagioclase	Modal 50% Size 1-8 mm Shape anhedral
Clinopyroxene	Modal 50% Size 1-9 mm, 5 mm average Shape subhedral

COMMENTS: Continuation of Unit 240 coarse-grained seriate olivine-bearing gabbro. Pieces 1-7 are a zone of intense epidote alteration.

SECONDARY MINERALOGY: Amphibole, chlorite, talc, epidote

COMMENTS: From Pieces 1 to 7, the gabbro is rich in plagioclase, amphibole, and epidote. The amphibole minerals look interconnected by a vein network. Corona alteration of two kinds (1) pale-green coronas and (2) pinkish coronas around the altered olivines. At 80-86 cm there is an alteration halo (1 cm wide) adjacent to an amphibole-chlorite (?) vein.

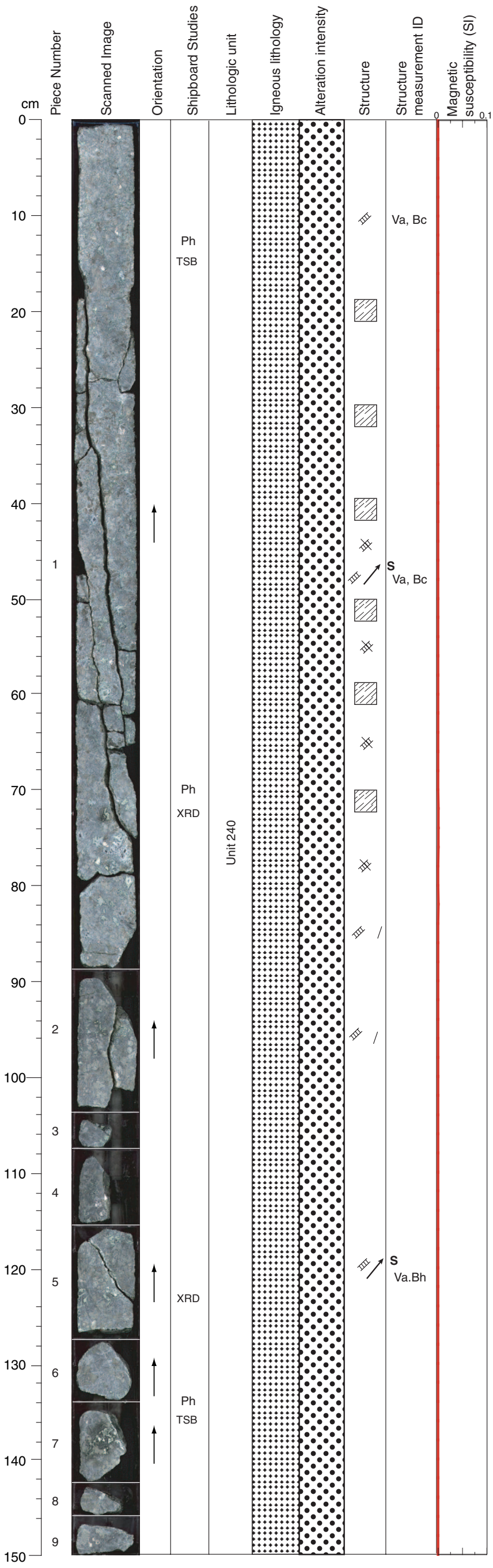
VEIN ALTERATION: n/a

THIN SECTIONS:
305-U1309D-93R-1, 16-18 cm (#293)

STRUCTURE: No strain in this olivine gabbro which locally develops pegmatitic clinopyroxene crystals. Texture completely lost in Pieces 1 to 6 where hydrothermal epidotite-chlorite developed, in Pieces 1 to 4 with hint of a layered (plastic??) structure. Coarse-grained gabbro with epidote, late cataclasis without strain, some earlier cataclastic veins light and dark green, with bands of deformation and associated strain.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-93R-1, 11-18 cm WET

Core Photo



305-U1309D-93R-2 (Section top: 464.36 mbsf)

UNIT-240: Olivine Gabbro
Pieces: 1-9

PRIMARY MINERALOGY: Based on average of several pieces

Olivine	Modal 3% Size 3 mm average Shape anhedral
Plagioclase	Modal 50% Size 1-8 mm Shape anhedral
Clinopyroxene	Modal 50% Size 1-9 mm, 5 mm average Shape subhedral

COMMENTS: Continuation of Unit 240 coarse-grained seriate olivine-bearing gabbro.

SECONDARY MINERALOGY: Serpentine, chlorite, pale amphibole, prehnite, secondary plagioclase.

COMMENTS: Corona alteration of two kinds (1) pale-green coronas and (2) pinkish coronas around the altered olivines. The pale green coronas are more developed and more altered to a soft mineral. In Piece 7, the corona texture seems to be interconnected and shows a high degree of alteration. The edges of Pieces 5, 6, and 7 are covered by serpentine.

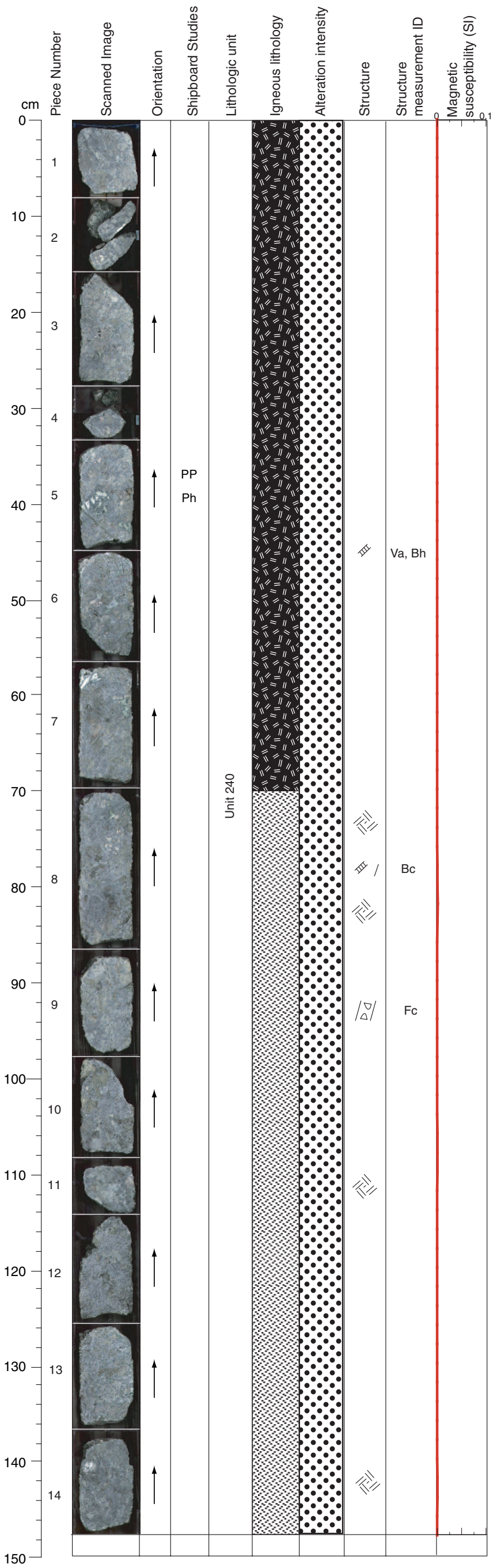
VEIN ALTERATION: Amphibole, chlorite, talc, calcite

THIN SECTIONS:
305-U1309D-93R-2, 15-18 cm (#294)
305-U1309D-93R-2, 135-137 cm (#295)

STRUCTURE: Continued from above, olivine gabbro with corona textured olivine more abundant in local clusters, no strain. Coarse gabbro with distributed late cataclasis and bands of more intense, localized cataclasis (<5 mm and subvertical). Plunge in steeply dipping vein fibers is subhorizontal.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-93R-2, 12-19 cm WET
305-U1309D-93R-2, 65-80 cm WET
305-U1309D-93R-2, 134-142 cm WET

Core Photo



305-U1309D-93R-3 (Section top: 465.86 mbsf)

UNIT-240: Olivine-bearing Gabbro
Pieces: 1-7

PRIMARY MINERALOGY: mode from Piece 3

Olivine	Modal 3% Size 5 mm average Shape anhedral
Plagioclase	Modal 50% Size 1-8 mm Shape anhedral
Clinopyroxene	Modal 50% Size 1-9 mm, 5 mm average Shape subhedral

COMMENTS: Continuation of Unit 240 coarse-grained seriate olivine-bearing gabbro. Olivine abundance decreases drastically at 70 cm.

UNIT-240: Gabbro
Pieces: 8-14

PRIMARY MINERALOGY: mode from Piece 11

Olivine	Modal <1% Size 1-10 mm Shape anhedral
Plagioclase	Modal 50% Size 1-8 mm Shape anhedral
Clinopyroxene	Modal 50% Size 2-30 mm Shape anhedral

COMMENTS: Continuation of Unit 240, but grading into coarse-grained gabbro lithology down section. Coarse to pegmatitic clinopyroxene.

SECONDARY MINERALOGY: Serpentine, chlorite, pale amphibole, prehnite? secondary plagioclase?

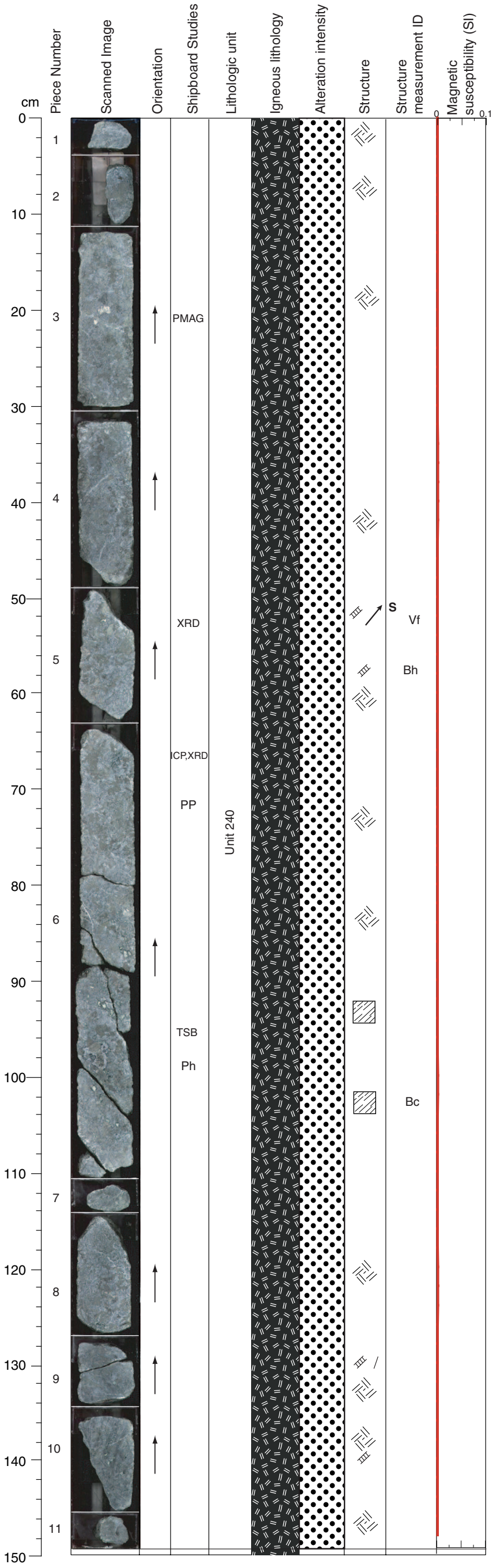
COMMENTS: Some corona texture appears with increasing degree of alteration from 40 cm until Piece 8. From Pieces 9 to 14, the coronas occur as patches with a low degree of alteration.

VEIN ALTERATION: Amphibole, plagioclase, chlorite

STRUCTURE: Olivine gabbro with no strain, below 73 cm olivine clusters are absent, local pegmatitic clinopyroxene grains. Coarse gabbro with a first generation of dark green veins, a second generation of thin, open fractures, and distributed late cataclasis.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-93R-3, 34-44 cm WET

Core Photo



305-U1309D-94R-1 (Section top: 467.80 mbsf)

UNIT-240: Olivine-bearing Gabbro
Pieces: 1-11

PRIMARY MINERALOGY: Based on Pieces 4-6

Olivine	Modal 4% Size 1-15 mm Shape subhedral to interstitial
Plagioclase	Modal 55% Size 1-8 mm Shape interstitial
Clinopyroxene	Modal 41% Size 4-30 mm Shape anhedral

COMMENTS: Continuation of Unit 240 coarse-grained seriate olivine-bearing gabbro. Heterogeneous olivine distribution, locally olivine gabbro

SECONDARY MINERALOGY: Serpentine, chlorite, pale amphibole, prehnite? secondary plagioclase?

COMMENTS: Corona alteration of 2 kinds (1) pale-green coronas and (2) pinkish coronas around the altered olivines. In Piece 6, the pinkish corona is associated with sulfides. The edge of Piece 6 (at 53 cm) is made of serpentine.

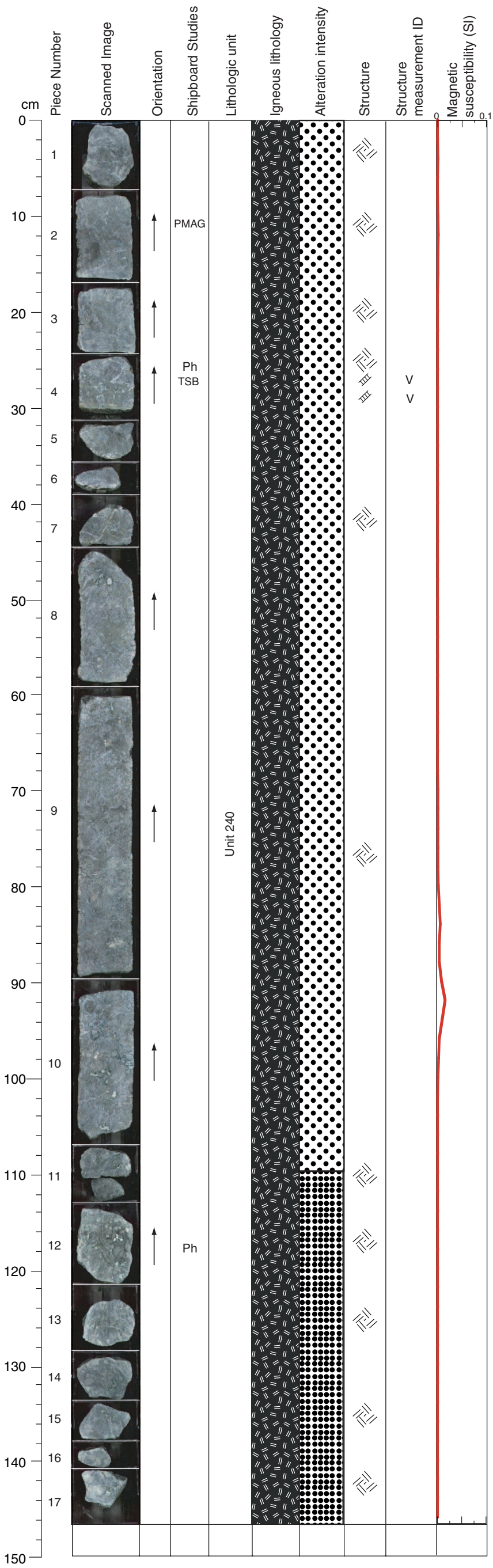
VEIN ALTERATION: Amphibole, chlorite, talc, calcite

THIN SECTIONS:
305-U1309D-94R-1, 95-97 cm (#296)

STRUCTURE: Olivine gabbro with no strain, local pegmatitic clinopyroxene grains, corona textured olivine. Coarse olivine gabbro with distributed cataclasis, dark green veins, and irregular alteration white veins. Later pale green/white fibrous fault veins.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-94R-1, 93-104 cm WET

Core Photo



305-U1309D-94R-2 (Section top: 469.30 mbsf)

UNIT-240: Olivine-bearing Gabbro
Pieces: 1-17

PRIMARY MINERALOGY: Based on Piece 9

Olivine	Modal 4% Size 1-15 mm Shape subhedral to interstitial
Plagioclase	Modal 55% Size 1-8 mm Shape interstitial
Clinopyroxene	Modal 41% Size 4-30 mm Shape anhedral

COMMENTS: Continuation of Unit 240 coarse-grained seriate olivine-bearing gabbro. Heterogeneous olivine distribution, locally olivine gabbro.

SECONDARY MINERALOGY: Serpentine, chlorite, pale amphibole, prehnite, secondary plagioclase.

COMMENTS: Corona alteration of 2 kinds (1) pale-green coronas and (2) pinkish coronas around the altered olivines. Entire section is cut by a network of tiny white (talc, carbonate?) and dark (serpentine, chlorite, amphibole?) veins.

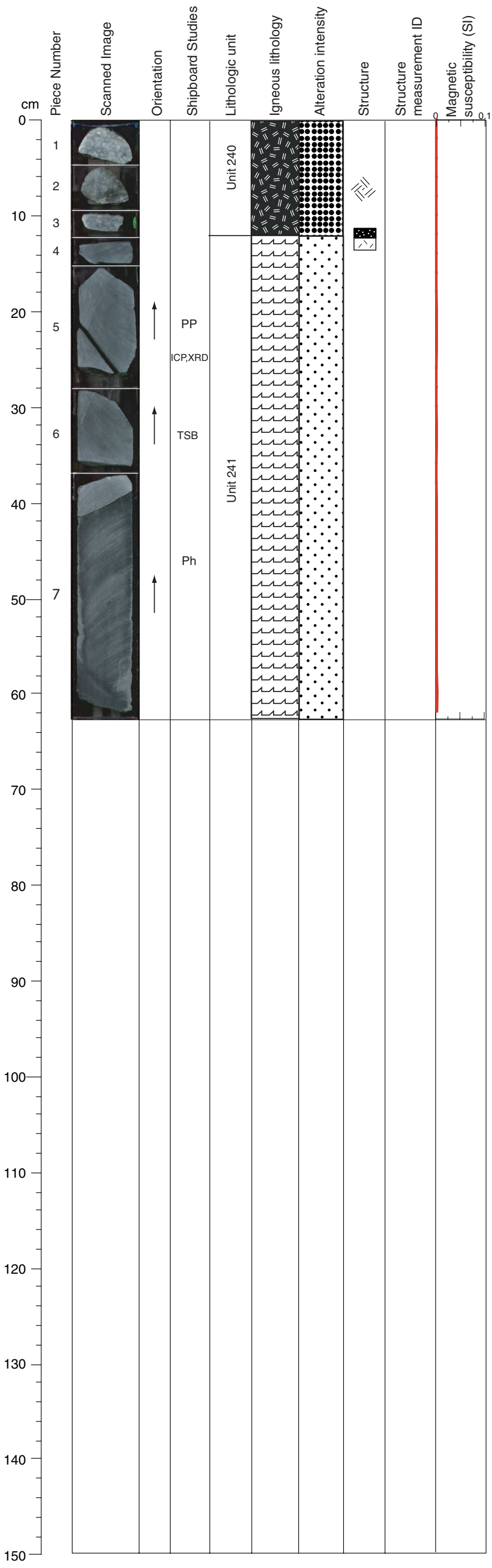
VEIN ALTERATION: n/a

THIN SECTIONS:
305-U1309D-94R-2, 27-30 cm (#297)

STRUCTURE: Olivine gabbro with no strain, local pegmatitic clinoyroxene grains, corona textured olivine. Coarse gabbro with serpentine vein (subhorizontal) >dark green vein crosscutting it, and later white veins.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-94R-2, 25-30 cm WET
305-U1309D-94R-2, 113-120 cm WET

Core Photo



305-U1309D-94R-3 (Section top: 470.77 mbsf)

UNIT-240: Olivine-bearing Gabbro
Pieces: 1-3

PRIMARY MINERALOGY: Based on Piece 1

Olivine	Modal 4% Size 1-15 mm Shape subhedral to interstitial
Plagioclase	Modal 55% Size 1-8 mm Shape interstitial
Clinopyroxene	Modal 41% Size 4-30 mm Shape anhedral

COMMENTS: Continuation of Unit 240 coarse-grained seriate olivine-bearing gabbro.

UNIT-241: Diabase
Pieces: 4-7

PRIMARY MINERALOGY:

COMMENTS: Unit 241 is microcrystalline diabase. There are rare large olivine and plagioclase crystals up to 8 mm in size. Diabase intrudes the gabbro and shows a chill zone in Piece 4, but no glassy margin.

SECONDARY MINERALOGY: Serpentine, chlorite, pale amphibole.

COMMENTS: Alteration halo in the diabase.

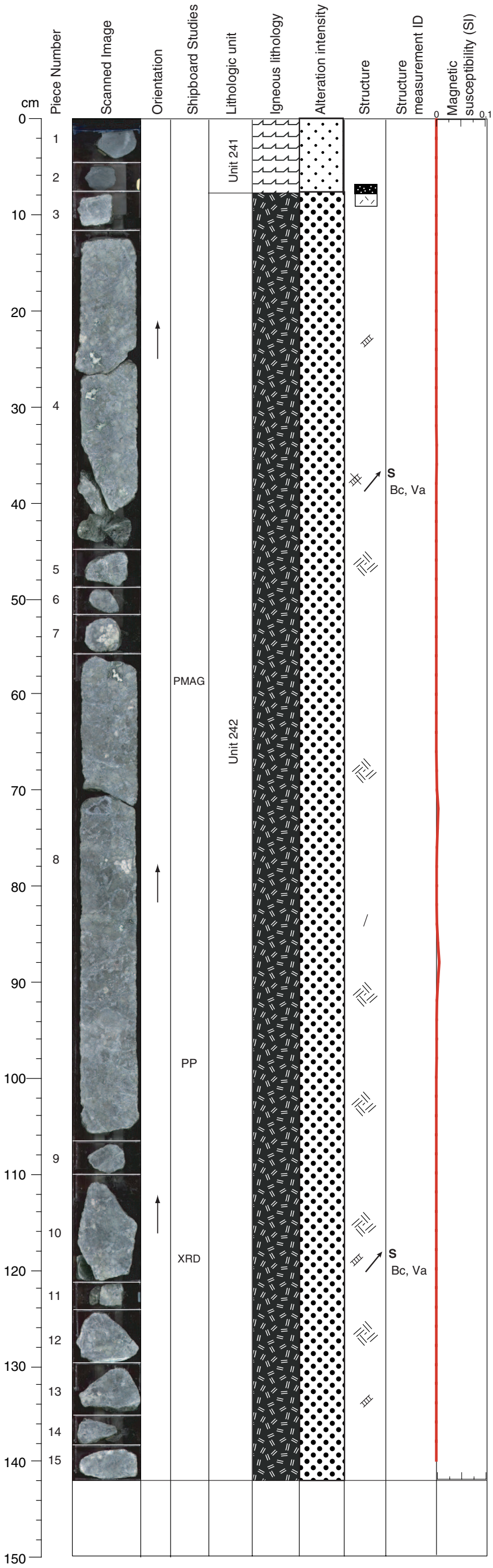
VEIN ALTERATION: Amphibole, chlorite

THIN SECTIONS:
305-U1309D-94R-3, 34-36 cm (#298)

STRUCTURE: Olivine gabbro with no strain above unpreserved contact to diabase with local olivine, contact Piece 4 appears chilled. Coarse gabbro with late cataclasis and no veins.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-94R-3, 48-55 cm WET

Core Photo



305-U1309D-95R-1 (Section top: 472.60 mbsf)

UNIT-241: Diabase rubble

COMMENTS: Unit 241 consists of 2 pieces of microcrystalline diabase rubble, presumed to be in place and therefore a continuation from the previous core.

UNIT-242: Olivine-bearing gabbro
Pieces: 2-15

PRIMARY MINERALOGY: Based on Piece 8

Olivine	Modal 4% Size 2-28 mm Shape subhedral to interstitial
Plagioclase	Modal 56% Size 2-20 mm Shape anhedral
Clinopyroxene	Modal 40% Size 6-20 mm Shape subhedral

COMMENTS: This unit is a coarse-grained seriate olivine-bearing gabbro, very similar to Unit 240.

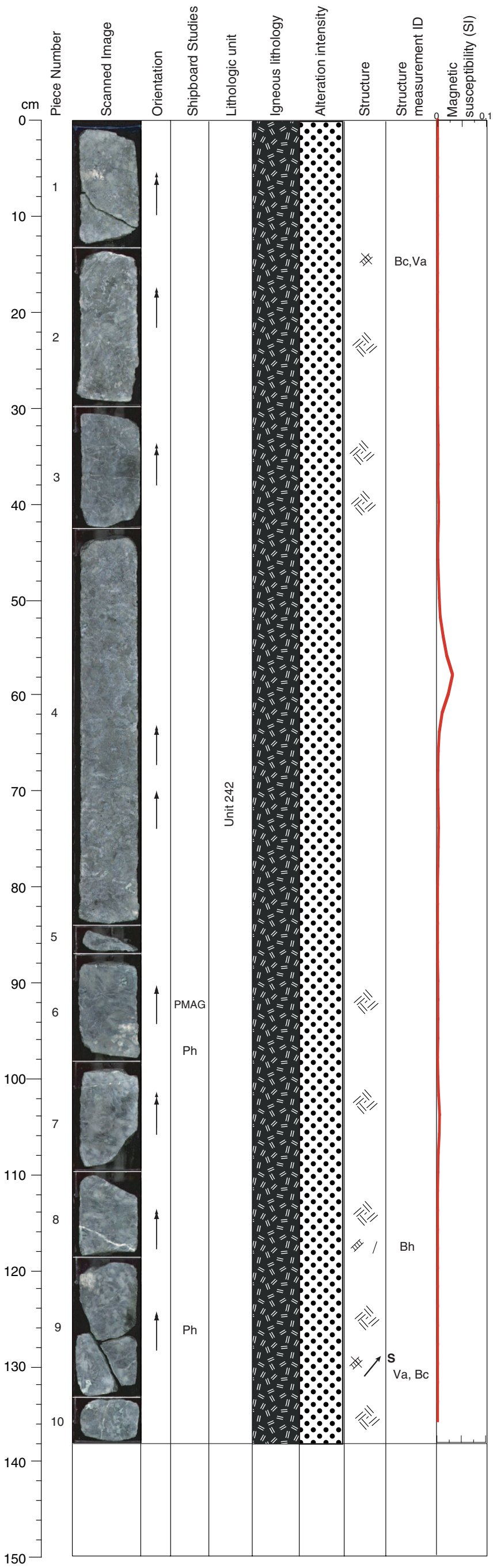
SECONDARY MINERALOGY: Serpentine, chlorite, pale amphibole, prehnite? secondary plagioclase?

COMMENTS: Some patches of corona texture are highly altered to soft mineral. Network of tiny white veins (talc, carbonate) cut the olivine-bearing gabbro.

VEIN ALTERATION: Talc, carbonate

STRUCTURE: Chilled Piece 2 from above diabase against olivine gabbro with no strain and common pegmatitic clinopyroxene. Coarse gabbro with distributed cataclasis and pale green veins steeply dipping.

Core Photo



305-U1309D-95R-2 (Section top: 474.01 mbsf)

UNIT-242: Olivine-bearing gabbro
Pieces: 1-10

PRIMARY MINERALOGY: Based on Piece 4

Olivine	Modal 4% Size 2-28 mm Shape subhedral to interstitial
Plagioclase	Modal 56% Size 2-20 mm Shape anhedral
Clinopyroxene	Modal 40% Size 6-20 mm Shape subhedral

COMMENTS: Continuation of Unit 242: coarse-grained seriate olivine-bearing gabbro. Olivine rich patches occur locally, with pronounced coronitic alteration and fresh olivine cores.

SECONDARY MINERALOGY: Serpentine, chlorite, pale amphibole, prehnite? secondary plagioclase?

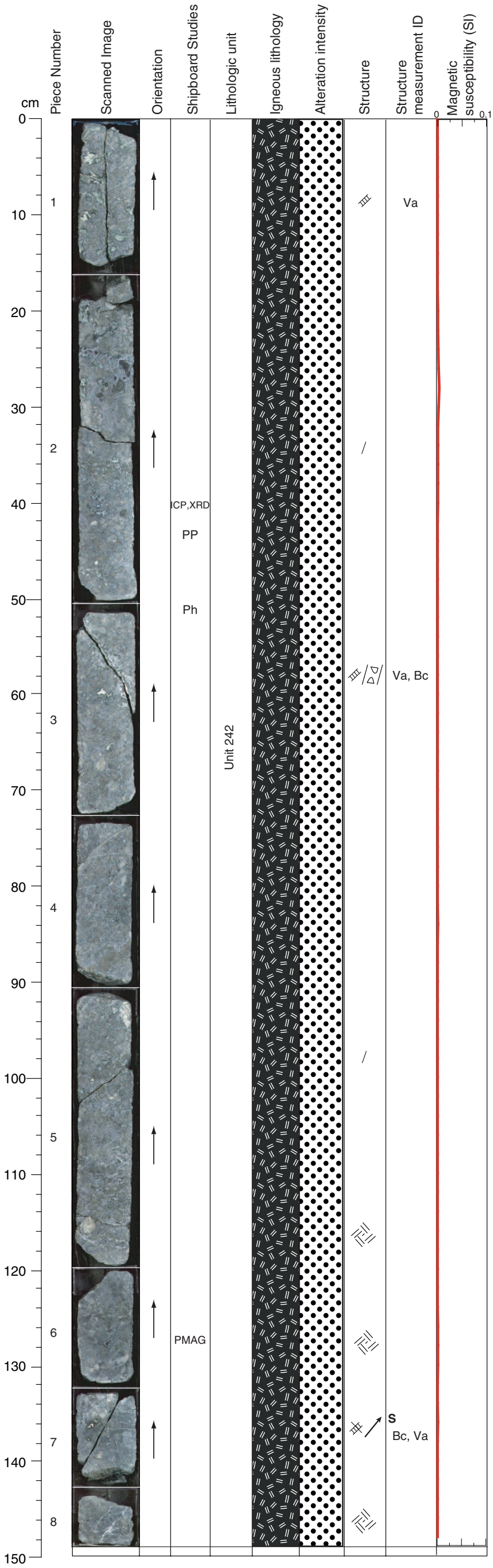
COMMENTS: Some patches of corona texture are highly altered to soft mineral. Network of tiny white veins (talc, carbonate) cut the olivine-bearing gabbro.

VEIN ALTERATION: Talc, carbonate

STRUCTURE: Coarse olivine gabbro with no strain and common pegmatitic clinopyroxene. Coarse gabbro with slight veining and later cataclasis, with open calcite veins and fibrous fault vein.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-95R-2, 99-109 cm WET
305-U1309D-95R-2, 120-132 cm WET
305-U1309D-95R-2, 120-132 cm WET (side)

Core Photo



305-U1309D-95R-3 (Section top: 475.38 mbsf)

UNIT-242: Olivine-bearing gabbro
Pieces: 1-8

PRIMARY MINERALOGY: Based on Pieces 3-5

Olivine	Modal 4% Size 2-28 mm Shape subhedral to interstitial
Plagioclase	Modal 56% Size 2-20 mm Shape anhedral
Clinopyroxene	Modal 40% Size 6-20 mm Shape subhedral

COMMENTS: Continuation of Unit 242: coarse-grained seriate olivine-bearing gabbro. Locally coarse-grained olivine-rich patches occur with up to 25% modal (at 23 cm).

SECONDARY MINERALOGY: Serpentine, chlorite, pale amphibole, prehnite? secondary plagioclase?

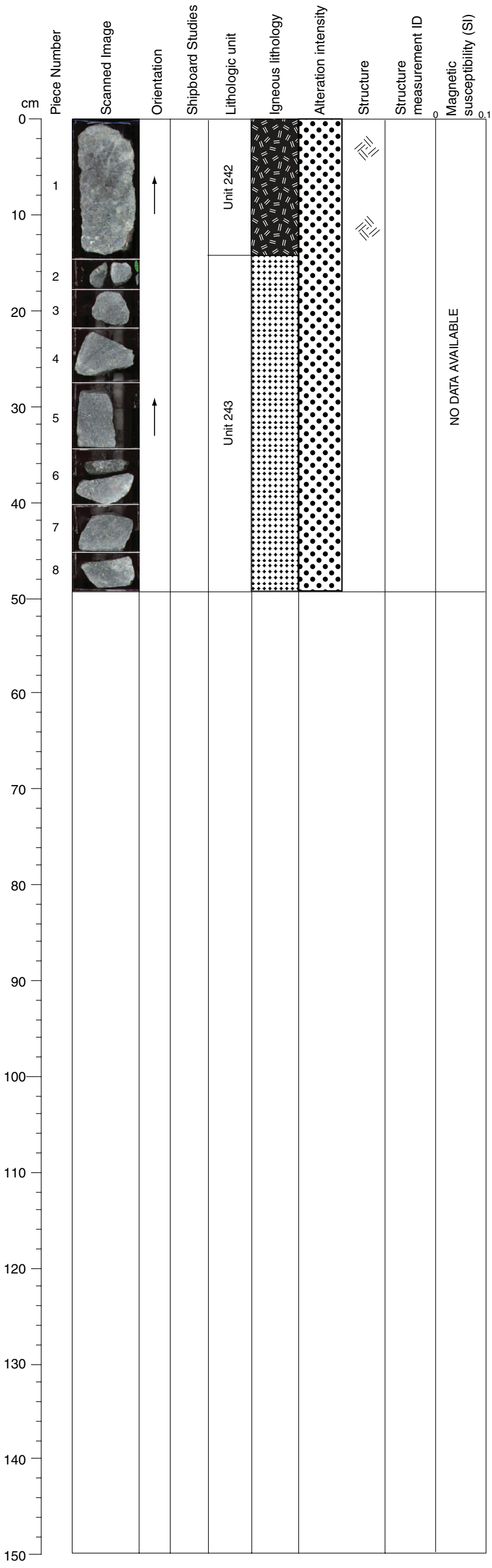
COMMENTS: Corona texture of 2 kinds: (1) pale-green corona with inner part highly altered to soft mineral and (2) pinkish corona around olivine. Network of tiny white veins (talc, carbonate) cut the olivine-bearing gabbro.

VEIN ALTERATION: Chlorite, talc, carbonate

STRUCTURE: Coarse olivine gabbro with no strain and local pegmatitic clinopyroxene. Coarse gabbro with few veins and later distributed, irregular cracks, some associated with alteration veins. Fault veins with subhorizontal fibers, some cracked.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-95R-3, 51-64 cm WET

Core Photo



305-U1309D-95R-4 (Section top: 476.88 mbsf)

UNIT-242: Olivine-bearing gabbro
Piece: 1

PRIMARY MINERALOGY: Based on Piece 1

Olivine	Modal 4% Size 2-28 mm Shape subhedral to interstitial
Plagioclase	Modal 56% Size 2-20 mm Shape anhedral
Clinopyroxene	Modal 40% Size 6-20 mm Shape subhedral

UNIT-243: Olivine gabbro
Pieces: 2-8

PRIMARY MINERALOGY: Based on Piece 5

Olivine	Modal 7% Average size 2 mm Shape interstitial
Plagioclase	Modal 63% Size 2-10 mm Shape anhedral
Clinopyroxene	Modal 20% Size 3-15 mm Shape anhedral

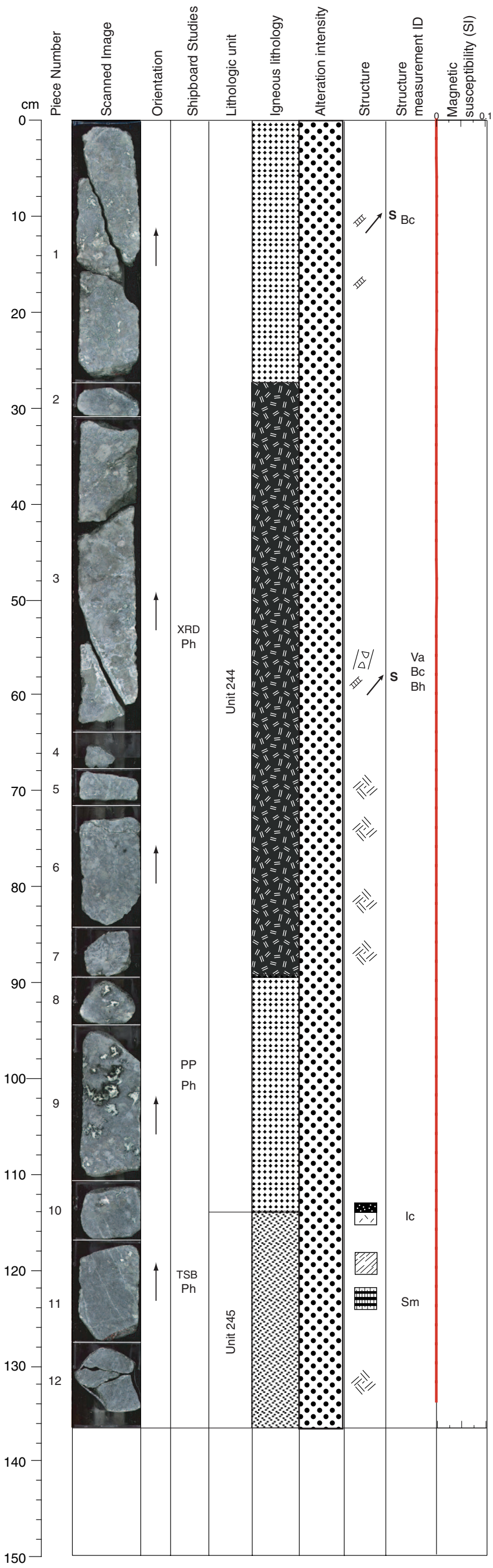
COMMENTS: This unit consists of fine- to medium-grained seriate olivine gabbro.

SECONDARY MINERALOGY: Chlorite, pale amphibole, prehnite, secondary plagioclase.

COMMENTS: Corona texture with the size of the coronas decreasing toward the end of the section.

STRUCTURE: Coarse olivine gabbro with no strain and local pegmatitic clinopyroxene. Coarser gabbro has later cataclasis with no strain.

Core Photo



305-U1309D-96R-1 (Section top: 477.40 mbsf)

UNIT-244: Olivine gabbro.
Piece: 1

PRIMARY MINERALOGY: Based on Piece 1

Olivine	Modal 6% Size 2-10 mm Shape interstitial
Plagioclase	Modal 55% Size 2-10 mm Shape anhedral to interstitial
Clinopyroxene	Modal 40% Size 2-20 mm Shape subhedral

UNIT-244: Olivine-bearing gabbro
Pieces: 2-10

PRIMARY MINERALOGY: Based on Piece 6

Olivine	Modal 4% Size 2-15 mm Shape interstitial
Plagioclase	Modal 55% Size 2-20 mm Shape anhedral to interstitial
Clinopyroxene	Modal 40% Size 3-35 mm Shape subhedral

COMMENTS: This unit consists of a coarse-grained seriate olivine gabbro with moderately variable modal compositions. Between 27 and 90 cm, olivine mode is less than 5%. Changes are gradual. Between 51 and 61 cm a leucocratic vein occurs.

UNIT-245: Medium-grained leucogabbro
Pieces: 10-12

PRIMARY MINERALOGY: Based on Piece 11

Plagioclase	Modal 80% Size up to 20 mm Shape anhedral
Clinopyroxene	Modal 20% Size up to 10 mm Shape subhedral

SECONDARY MINERALOGY: Serpentine, chlorite, pale amphibole, zeolite?

COMMENTS: Corona texture occurs with a high degree of alteraton to a soft material. The coronas in Piece 9 (at 96-110 cm) show the highest degree of alteration with thicker rims of chlorite (around 1-2 mm thick). Network of white (talc, carbonate) veins.

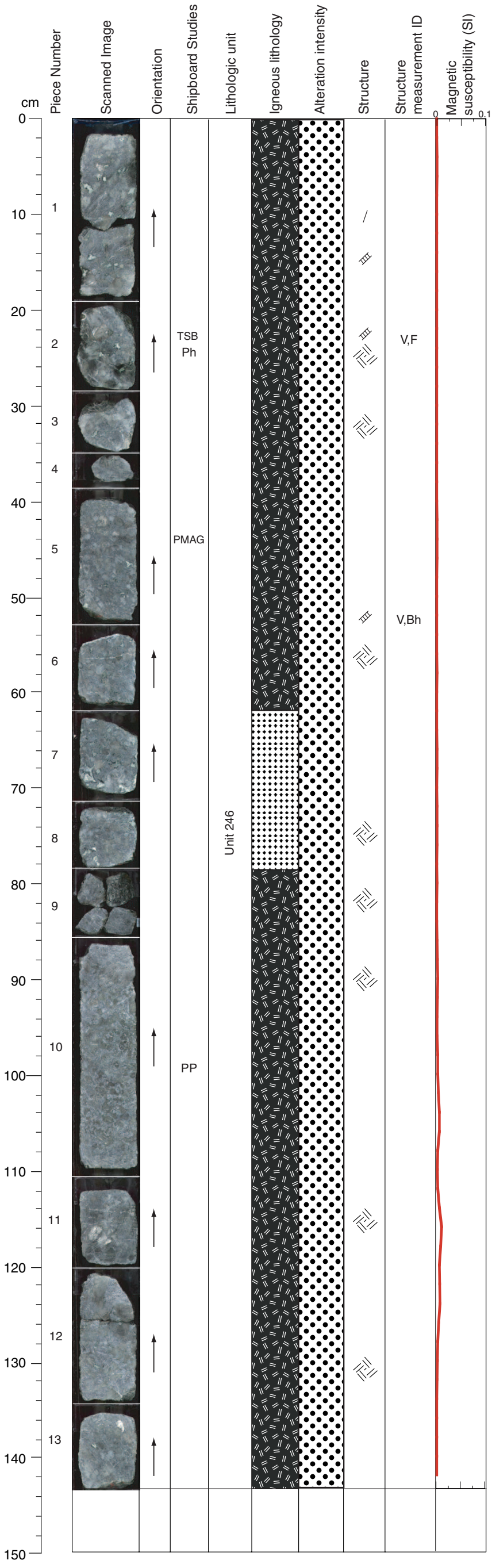
VEIN ALTERATION: Chlorite, talc, carbonate

THIN SECTIONS:
305-U1309D-96R-1, 121-123 cm (#299)

STRUCTURE: Coarse olivine gabbro with no strain, local pegmatitic clinopyroxene and heterogeneous olivine with corona alteration in igneous contact to fine-grained gabbro with weak magmatic strain. Gabbro with cataclastic network, irregular veins with alteration halo and subhorizontal fibers along fault veins.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-96R-1, 50-63 cm WET
305-U1309D-96R-1, 95-110 cm WET
305-U1309D-96R-1, 118-127 cm WET

Core Photo



305-U1309D-96R-2 (Section top: 478.77 mbsf)

UNIT-246: Olivine-bearing gabbro
Pieces: 1-13

PRIMARY MINERALOGY: Based on Piece 5

Olivine	Modal 4% Size 2-12 mm Shape subhedral to interstitial
Plagioclase	Modal 56% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 40% Size 6-20 mm Shape subhedral

COMMENTS: This unit consists of a medium-grained seriate olivine-bearing gabbro. In the interval between 62 and 78 cm coarse-grained olivine-rich patches occur with up to 15 % modal olivine.

SECONDARY MINERALOGY: Chlorite, pale amphibole, prehnite? secondary plagioclase?

COMMENTS: Corona texture occurs with a high degree of alteraton to a soft material until Piece 8.

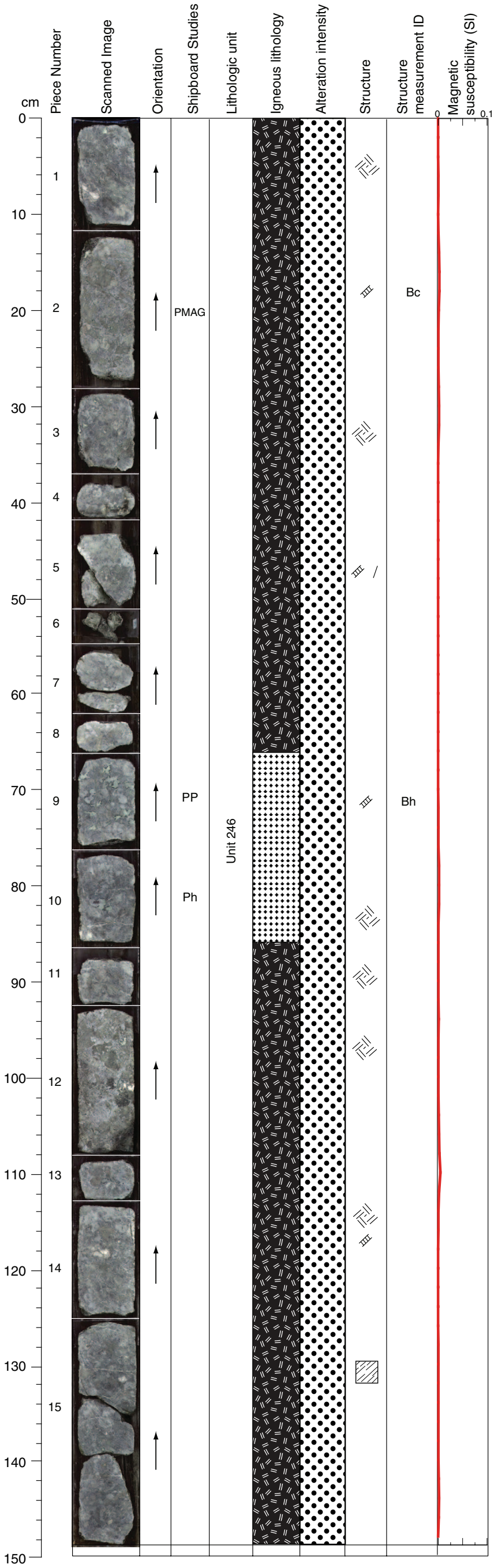
VEIN ALTERATION: Chlorite, talc, carbonate

THIN SECTIONS:
305-U1309D-96R-2, 23-25 cm (#300)

STRUCTURE: Lower contact of fine grained gabbro not preserved. Section consists of coarse olivine gabbro without strain, local pegmatitic clinopyroxene and heterogeneous olivine with corona alteration. Fine gabbro with late cataclasis and earlier pale green veins showing small normal dispalcement. Calcite vein with sulfides.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-96R-2, 19-28 cm WET

Core Photo



305-U1309D-96R-3 (Section top: 480.21 mbsf)

UNIT-246: Olivine-bearing gabbro
Pieces: 1-15

PRIMARY MINERALOGY: Based on Piece 9

Olivine	Modal 4% Size 2-28 mm Shape subhedral to interstitial
Plagioclase	Modal 56% Size 2-20 mm Shape anhedral
Clinopyroxene	Modal 40% Size 6-20 mm Shape subhedral

COMMENTS: Continuation of Unit 246: medium-grained seriate olivine-bearing gabbro. In the interval between 66 and 86 cm coarse-grained olivine-rich patches occur with as much as 15 % modal olivine.

SECONDARY MINERALOGY: Chlorite, pale amphibole, serpentine, prehnite? secondary plagioclase?

COMMENTS: Some patches of corona texture. Network of tiny white veins.

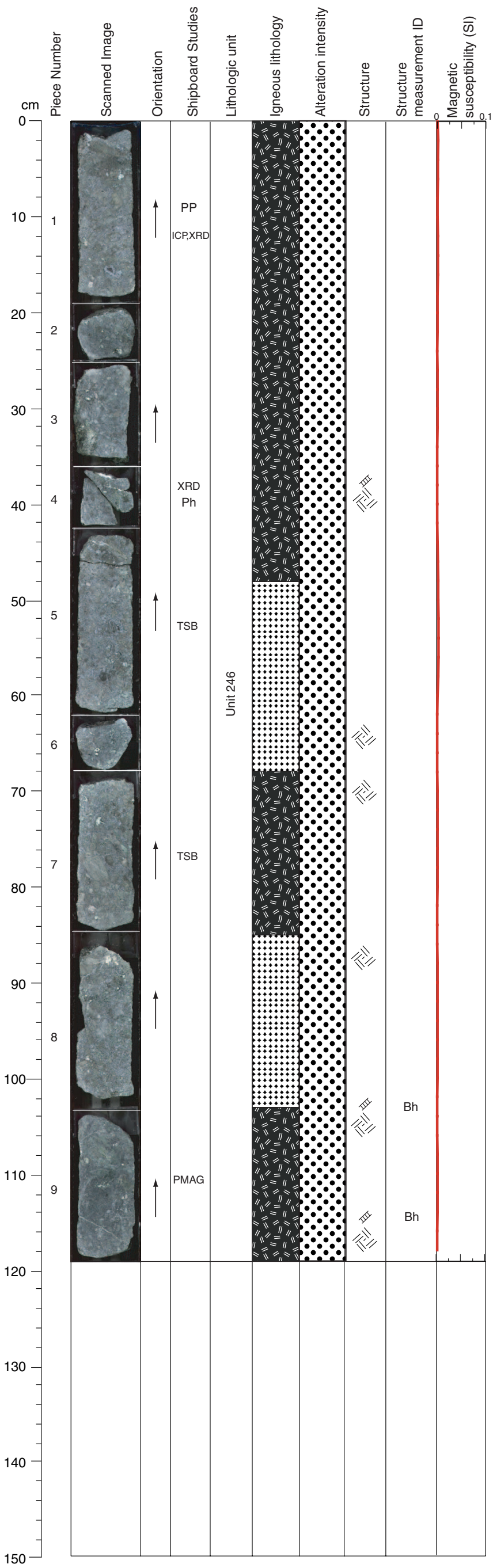
VEIN ALTERATION: Amphibole, chlorite

THIN SECTIONS:

STRUCTURE: Coarse olivine gabbro with no strain, local pegmatitic clinopyroxene and heterogeneous olivine with corona alteration. Coarse gabbro with late cataclasis, earlier dark green veins, later fault veins and small white veins, subhorizontal locally.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-96R-3, 77-85 cm WET

Core Photo



305-U1309D-97R-1 (Section top: 482.20 mbsf)

UNIT-246: Olivine-bearing gabbro
Pieces: 1-9

PRIMARY MINERALOGY: Based on Piece 7

Olivine	Modal 4% Size 2-28 mm Shape subhedral to interstitial
Plagioclase	Modal 56% Size 2-20 mm Shape anhedral
Clinopyroxene	Modal 40% Size 6-20 mm Shape subhedral

COMMENTS: Continuation of Unit 246: coarse-grained seriate olivine-bearing gabbro. Medium to coarse grain size. In general the entire section has high grain size variability from fine to pegmatitic. Locally grain size distribution is quasi-bimodal. Pieces 5 and 6 are fine to medium grain size. Olivine forms patches of small grains, part of them appear subhedral, part interstitial.

SECONDARY MINERALOGY: Chlorite, pale amphibole, serpentine, prehnite? secondary plagioclase?

COMMENTS: Some patches of corona texture.

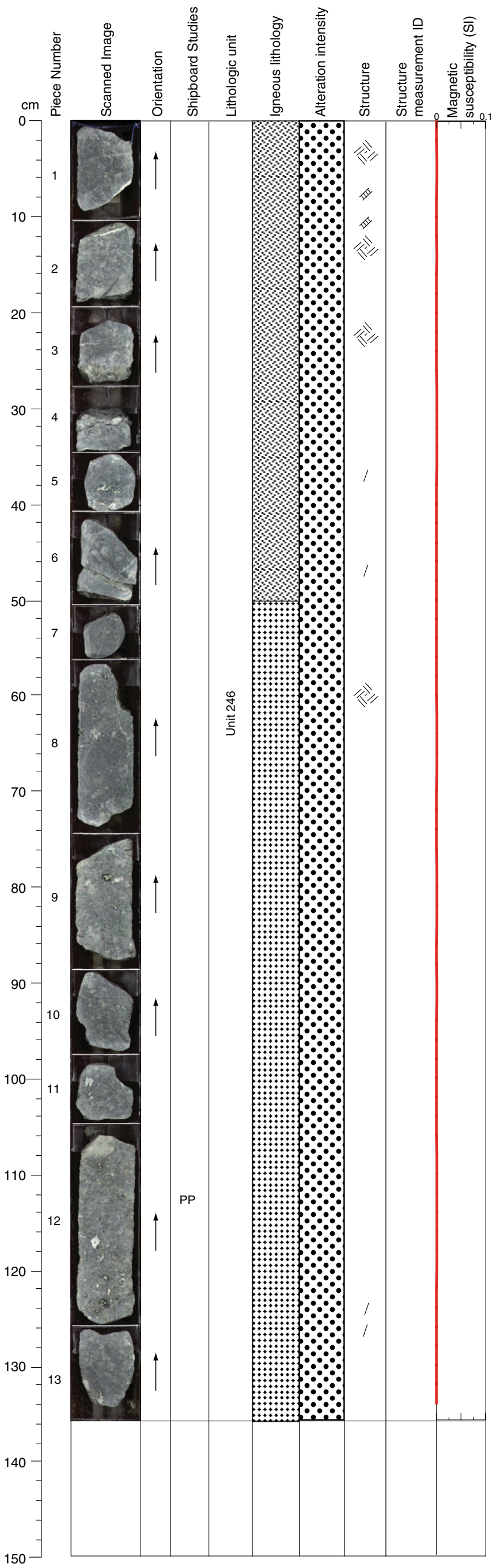
VEIN ALTERATION: Talc, carbonate, sulfides

THIN SECTIONS:
305-U1309D-97R-1, 52-54 cm (#301)
305-U1309D-97R-1, 77-79 cm (#302)

STRUCTURE: Coarse olivine gabbro with no strain, local pegmatitic clinopyroxene and olivine with corona alteration. Coarse gabbro dark green cataclastic and irregular veins, later white open veins, crosscut by hairline, pale green veins. No strain apparent on veins. Late cataclasis with no strain.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-97R-1, 36-42 cm WET
305-U1309D-97R-1, 69-84 cm WET

Core Photo



305-U1309D-97R-2 (Section top: 483.39 mbsf)

UNIT-246: Olivine-bearing gabbro
Pieces: 1-13

PRIMARY MINERALOGY: Based on Pieces 8-11

Olivine	Modal 4% Size 2-28 mm Shape subhedral to interstitial
Plagioclase	Modal 56% Size 2-20 mm Shape anhedral
Clinopyroxene	Modal 40% Size 6-20 mm Shape subhedral

COMMENTS: Continuation of Unit 246: coarse-grained seriate olivine-bearing gabbro. Locally coarse-grained olivine-rich patch occurs at 34-40 cm with up to 25% modal olivine. From 50-134 cm the unit is characterized by large amounts of interstitial scattered olivine trains. Locally the olivine grain size increases leading to larger, less distributed patches.

SECONDARY MINERALOGY: Chlorite, pale amphibole, serpentine, prehnite? secondary plagioclase?

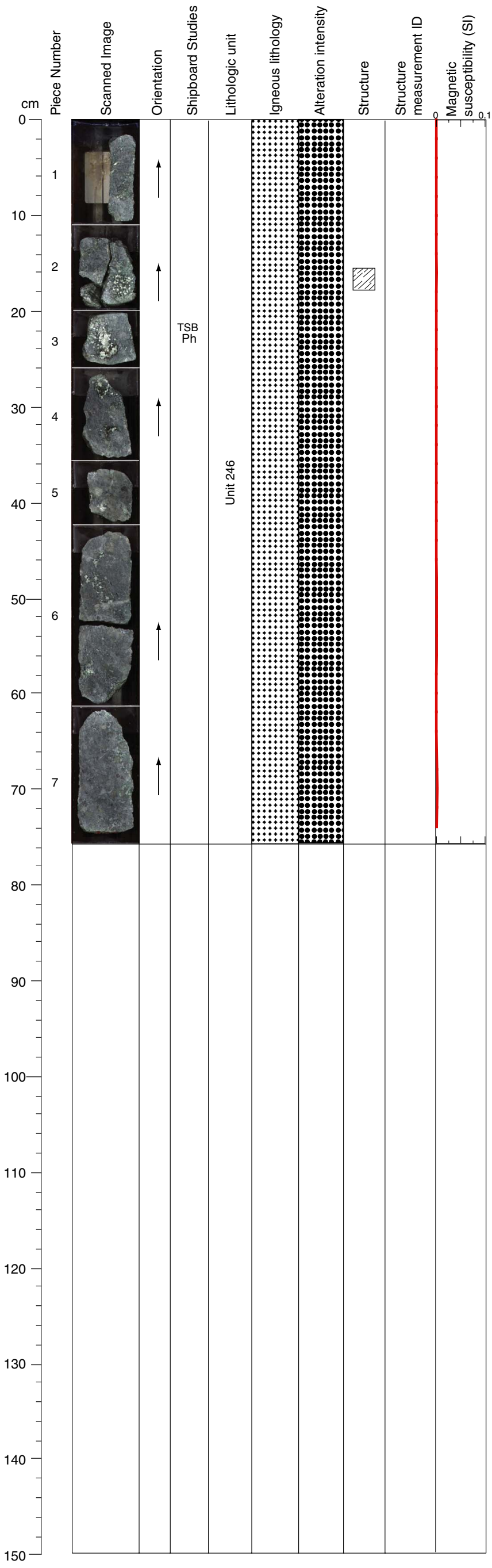
COMMENTS: Some patches of corona texture with locally different degrees of alteration of the interior of the coronas.

VEIN ALTERATION: Chlorite, talc

THIN SECTIONS:

STRUCTURE: Medium grained olivine gabbro with no strain, local pegmatitic clinopyroxene and olivine with corona alteration. Dark green cataclastic and irregular veins, later white open vein. No strain apparent on veins. Late cataclasis with no strain. One vein with white green material (cracked open).

Core Photo



305-U1309D-97R-3 (Section top: 484.75 mbsf)

UNIT-246: Olivine-bearing gabbro
Pieces: 1-7

PRIMARY MINERALOGY: Based on several pieces

Olivine	Modal 7% Size 1-30 mm Shape subhedral to interstitial
Plagioclase	Modal 68% Size 2-20 mm Shape anhedral
Clinopyroxene	Modal 25% Size 1-30 mm Shape subhedral

COMMENTS: Continuation of Unit 246: coarse-grained seriate olivine-bearing gabbro. In this section the aggregation of the interstitial olivine forms patches of large, interstitial, olivine. This aggregation results in strong modal variation. The grain size is strongly variable.

SECONDARY MINERALOGY: Chlorite, pale amphibole, serpentine, prehnite? secondary plagioclase? zeolite?

COMMENTS: Some patches of corona textures within Piece 3 (20-25 cm) that have a high degree of alteration in their centers to a soft mineral and are associated with sulfides.

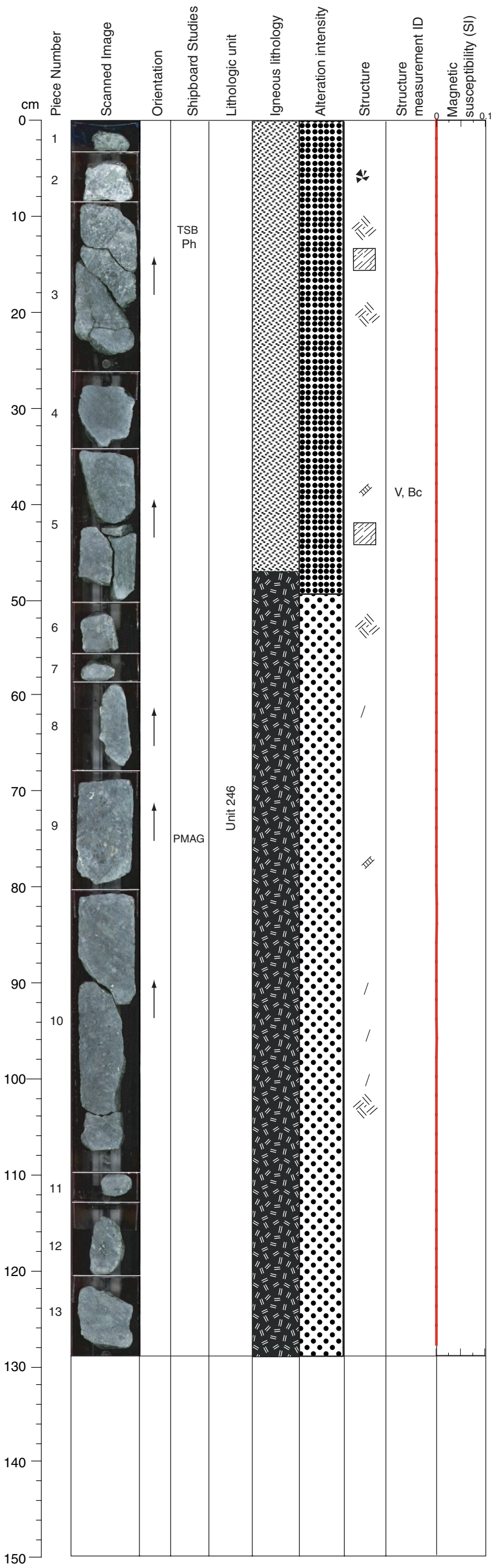
VEIN ALTERATION: n/a

THIN SECTIONS:
305-U1309D-97R-3, 21-23 cm (#303)

STRUCTURE: Olivine gabbro with no strain, local pegmatitic clinopyroxene and olivine with corona alteration. Less cataclasis than Sections U1309D-97R-1 and -2. Cataclastic and irregular veins. No strain apparent on veins. Late cataclasis with no strain.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-97R-3, 19-26 cm WET

Core Photo



305-U1309D-98R-1 (Section top: 487.00 mbsf)

UNIT-246: Olivine-bearing gabbro
Pieces: 1-13

PRIMARY MINERALOGY: Modal data from Piece 10

Olivine	Modal 1% Size 1-30 mm Shape subhedral to interstitial
Plagioclase	Modal 45% Size 2-20 mm Shape anhedral
Clinopyroxene	Modal 55% Size 1-30 mm Shape subhedral

COMMENTS: Continuation of Unit 246: coarse-grained seriate olivine-bearing gabbro.

SECONDARY MINERALOGY: Chlorite, pale amphibole, serpentine, prehnite? secondary plagioclase?

COMMENTS: Some patches of corona texture with different degrees of alteration.

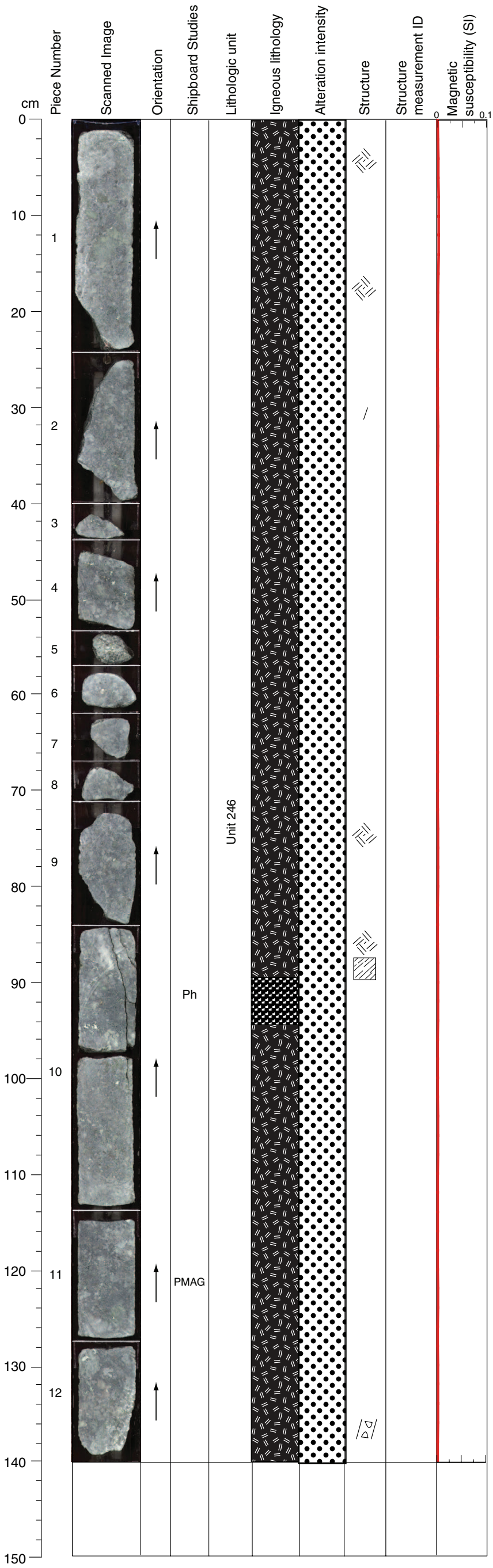
VEIN ALTERATION: Chlorite, talc

THIN SECTIONS:
305-U1309D-98R-1, 11-14 cm (#304)

STRUCTURE: Medium-grained olivine gabbro (corona alteration) with local pegmatite-sized green and brown clinopyroxene. Intense cataclasis in upper part, and decreasing in the lower two-thirds of the section. Minor sets of dark and light-green veins crosscutting each other.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-98R-1, 9-20 cm WET

Core Photo



305-U1309D-98R-2 (Section top: 488.29 mbsf)

UNIT-246: Olivine-bearing gabbro
Pieces: 1-12

PRIMARY MINERALOGY: Modal data from Piece 2

Olivine	Modal 1% Size 3 mm average Shape subhedral to interstitial
Plagioclase	Modal 45% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 55% Size 2-50 mm Shape subhedral

COMMENTS: Continuation of Unit 246: coarse-grained seriate olivine-bearing gabbro. There is a troctolite interval at 90-95 cm with 20:80:1 0livine:plagiocalse:clinopyroxene and a thin olivine-rich vein (<1 cm) at 104-110 cm.

SECONDARY MINERALOGY: Chlorite, pale amphibole, serpentine, prehnite? secondary plagioclase?

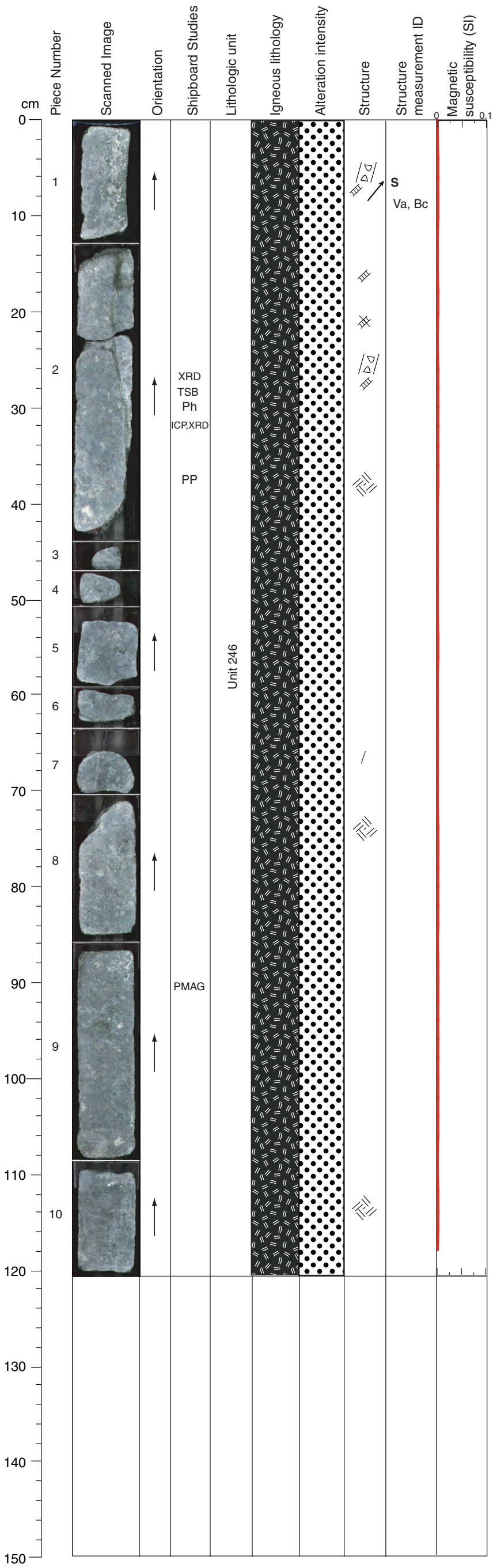
COMMENTS: Some patches of corona textures.

VEIN ALTERATION: Chlorite, talc

STRUCTURE: Medium-grained olivine gabbro (corona alteration) with local pegmatite-sized green and brown clinopyroxene, local weak indication of a moderately dipping fabric. Light green veins crosscut by light green, and late cataclastic deformation along irregular cataclastic veins steeply dipping.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-98R-2, 84-113 cm WET

Core Photo



305-U1309D-98R-3 (Section top: 489.70 mbsf)

UNIT-246: Olivine-bearing gabbro
Pieces: 1-10

PRIMARY MINERALOGY: Modal data from Piece 8

Olivine	Modal 1% Size 1-5 mm Shape subhedral to interstitial
Plagioclase	Modal 40% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 60% Size 2-20 mm Shape subhedral

COMMENTS: Continuation of Unit 246: coarse-grained seriate olivine-bearing gabbro.

SECONDARY MINERALOGY: Chlorite, pale amphibole, serpentine, prehnite? secondary plagioclase?

COMMENTS: Some patches of corona textures.

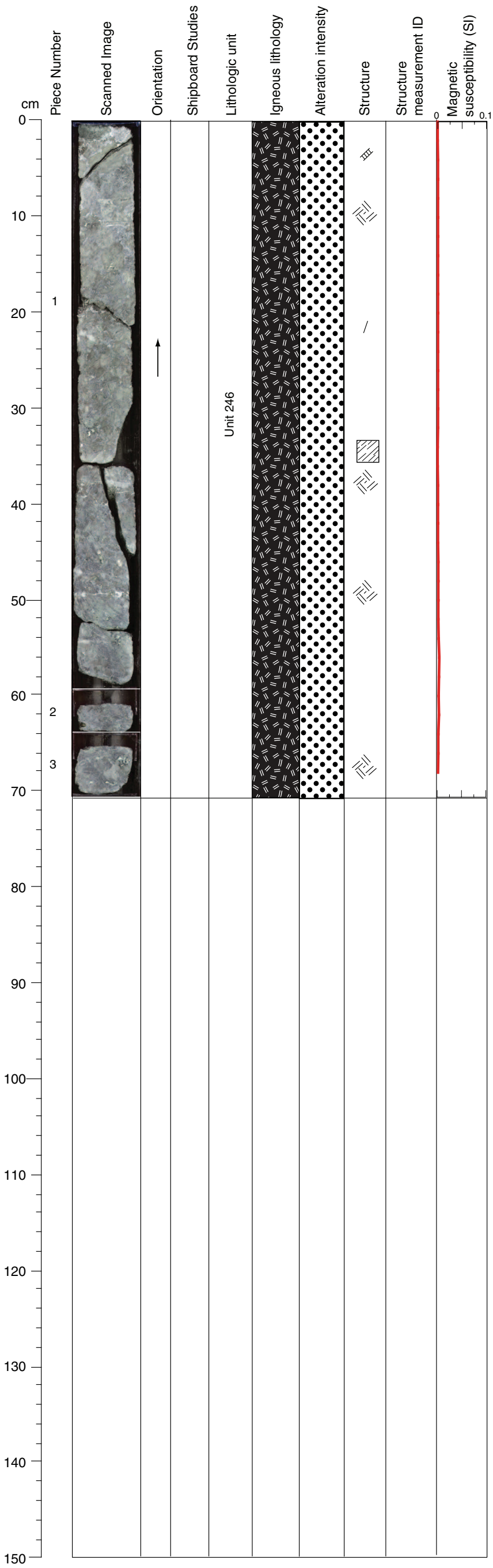
VEIN ALTERATION: Amphibole, plagioclase, chlorite

THIN SECTIONS:
305-U1309D-98R-3, 28-30 cm (#305)

STRUCTURE: Medium-grained olivine gabbro (corona alteration) with local pegmatite-sized green and brown clinopyroxene. Anostomosing cataclastic zones running subvertical, and subvertical veins with fibrous talc (subhorizontal fibers).

CLOSE-UP PHOTOGRAPHS:
305-U1309D-98R-3, 24-42 cm WET

Core Photo



305-U1309D-98R-4 (Section top: 490.91 mbsf)

UNIT-246: Olivine-bearing gabbro
Pieces: 1-3

PRIMARY MINERALOGY: Modal data from Piece 1c

Olivine	Modal 1% Size 3 mm average Shape subhedral to interstitial
Plagioclase	Modal 30% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 70% Size to 20 mm Shape subhedral

COMMENTS: Continuation of Unit 246: coarse-grained seriate olivine-bearing gabbro.

SECONDARY MINERALOGY: Chlorite, pale amphibole, serpentine, prehnite? secondary plagioclase?

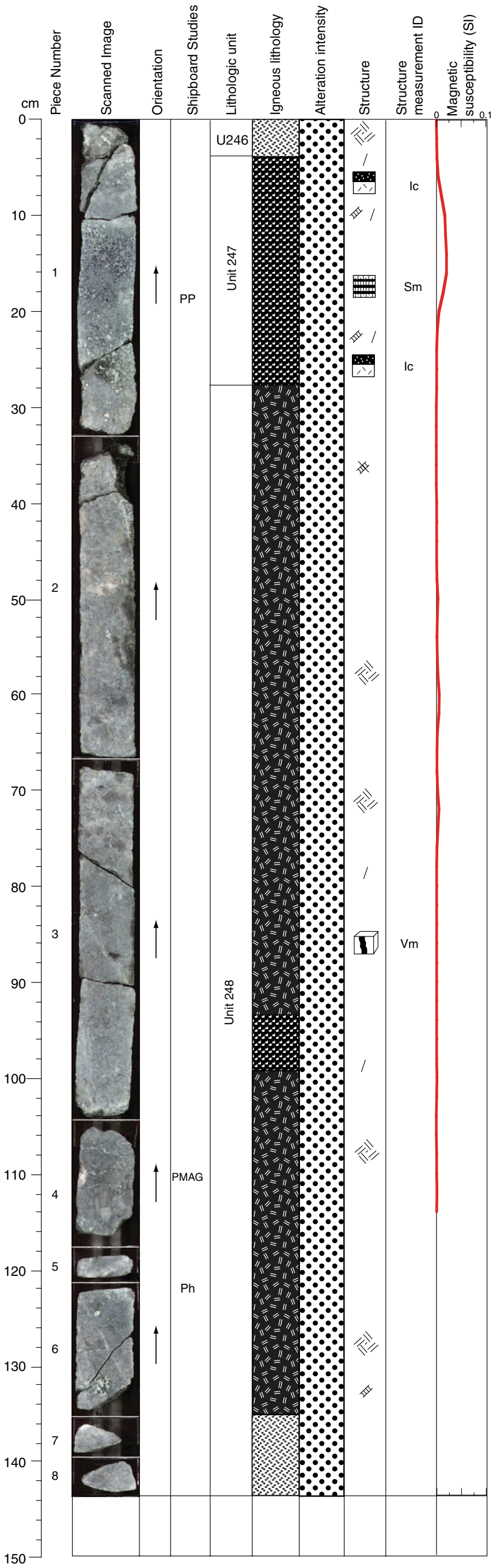
COMMENTS: Some patches of corona textures with associated sulfides.

VEIN ALTERATION: Chlorite, talc, carbonate

THIN SECTIONS:

STRUCTURE: Coarse grained olivine gabbro with no magmatic strain. Light green veins crosscut by white, irregular veins. Some veins are associated with a small alteration halo.

Core Photo



305-U1309D-99R-1 (Section top: 491.80 mbsf)

UNIT-246: Gabbro
Piece: 1a

PRIMARY MINERALOGY: Based on Piece 1a

Plagioclase	Modal 30% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 70% Size up to 20 mm Shape subhedral

COMMENTS: Bottom of Unit 246: coarse-grained seriate gabbro. Piece 1a appears to be the altered margin of the unit.

UNIT-247: Troctolite
Pieces: 1a-1b

PRIMARY MINERALOGY: Based on Piece 1b

Olivine	Modal 35% Size 5 mm average Shape subhedral to interstitial
Plagioclase	Modal 65% Size 5 mm average Shape anhedral

COMMENTS: Unit 247 is a medium-grained troctolite interval.

UNIT-248: Olivine-bearing Gabbro
Pieces: 1b-8

PRIMARY MINERALOGY: Mode from several places in the section

Olivine	Modal 1% Size 5 mm average Shape anhedral to interstitial
Plagioclase	Modal 50% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 50% Size up to 50 mm Shape subhedral

COMMENTS: Unit 248 is a medium-grained olivine-bearing gabbro with large clinopyroxene oikocrysts as observed in other gabbro units. Mode varies along section. A troctolite interval with 30:70 olivine:plagioclase is observed at 94-100 cm and is classified as part of this unit.

SECONDARY MINERALOGY: Chlorite, pale amphibole, serpentine, prehnite? secondary plagioclase?

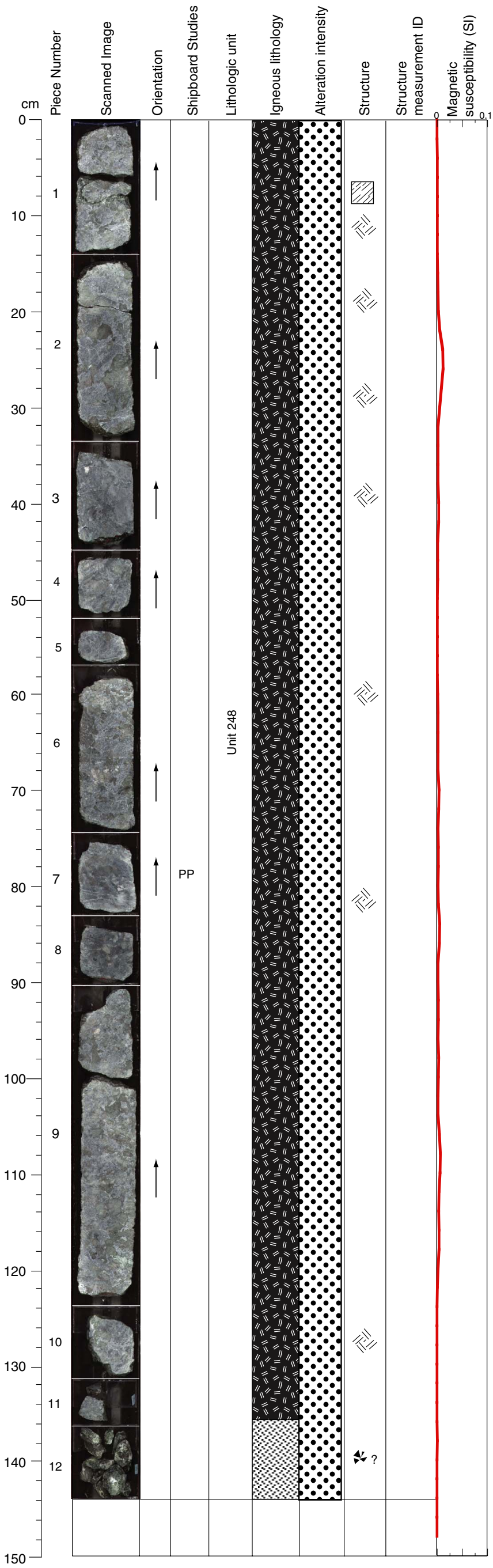
COMMENTS: Corona textures are well-developed in Piece 1 and are larger and have more alteration close to the fracture. Some patches of corona textures are moderately to highly developed in the rest of the olivine-bearing gabbro section.

VEIN ALTERATION: Amphibole, plagioclase, chlorite, talc, carbonate

STRUCTURE: Gabbro with no magmatic strain except in troctolitic zones occurring in Pieces 1 and 3. Pegmatite-sized clinopyroxene crystals in gabbro. Irregularly distributed cataclasis (more at top level). Fracture network in coarser gabbro, and few veins with epidote.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-99R-1, 122-134 cm WET

Core Photo



305-U1309D-99R-2 (Section top: 493.24 mbsf)

UNIT-248: Olivine-bearing Gabbro
Pieces: 1-12

PRIMARY MINERALOGY: Based on several pieces

Olivine	Modal 1% Size 4 mm average Shape anhedral to interstitial
Plagioclase	Modal 50% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 50% Size 10 mm average Shape subhedral

COMMENTS: Continuation of Unit 248 medium-grained olivine bearing gabbro. Mode varies along section. Bottom of section at 136-143 cm is olivine-poor rubble.

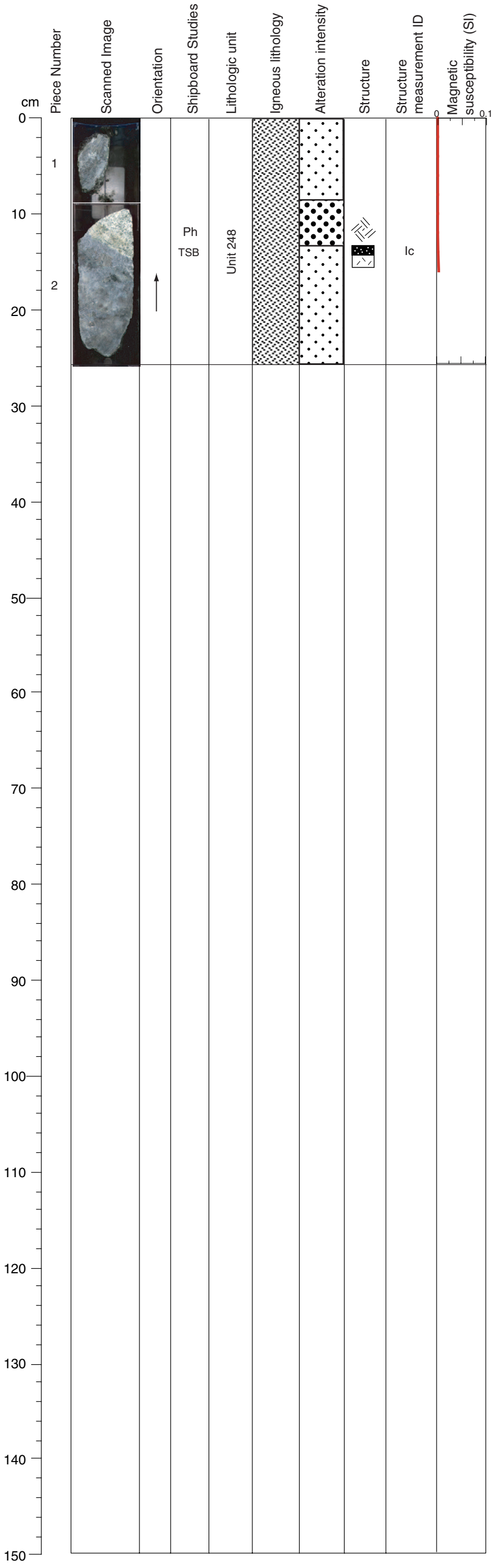
SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: Same as previous section. Some patches of corona textures moderately to highly developed.

VEIN ALTERATION: Chlorite, talc, carbonate

STRUCTURE: Coarse-grained gabbro without ductile strain and common pegmatite-sized clinopyroxene. Some veining and cataclasis (late). At bottom shattered rock with cataclasite – fault zone?

Core Photo



305-U1309D-99R-3 (Section top: 494.68 mbsf)

UNIT-248: Gabbro
Pieces: 1-2

PRIMARY MINERALOGY: Based on Piece 2

Olivine	Modal <1% Size 2 mm average Shape anhedral to interstitial
Plagioclase	Modal 55% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 45% Size 10 mm average Shape subhedral

COMMENTS: Continuation of Unit 248 medium-grained gabbro. Altered leucocratic vein in sharp contact with gabbro at 13 cm.

SECONDARY MINERALOGY: Chlorite, pale amphibole, secondary plagioclase, epidote.

COMMENTS: Leucocratic dike at the top of Piece 2 (8-12 cm) of plagioclase, amphibole.

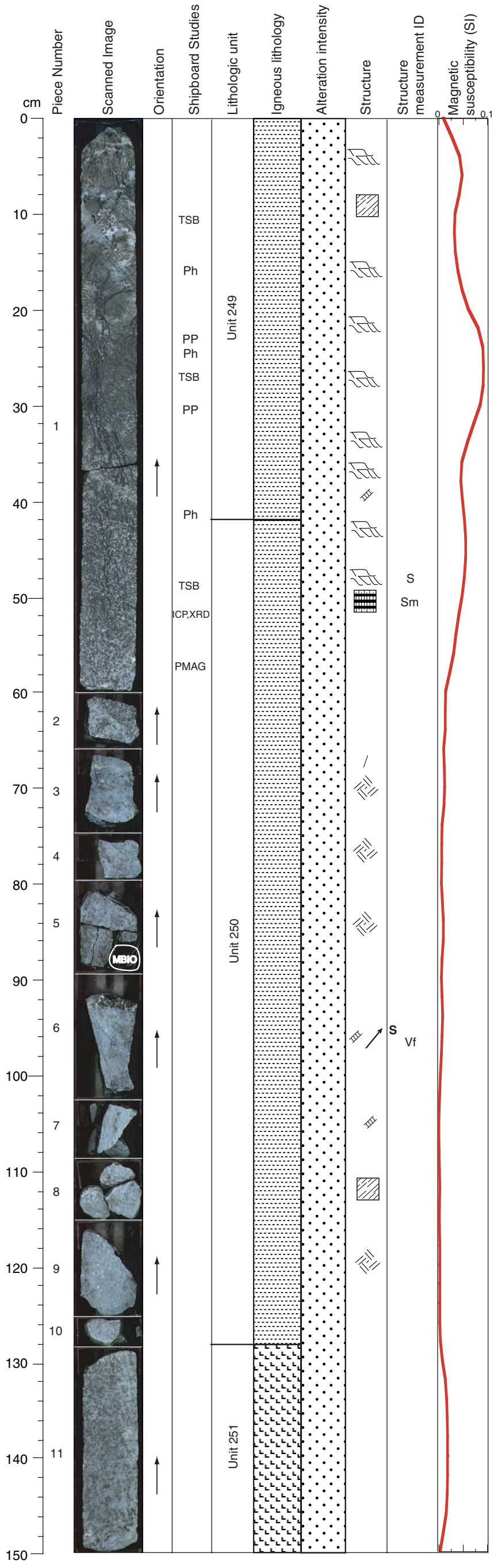
VEIN ALTERATION: Amphibole, plagioclase, chlorite

THIN SECTIONS:
305-U1309D-99R-3, 13-16 cm (#306)

STRUCTURE: Coarse-grained gabbro without ductile strain, common pegmatite-sized clinopyroxene except in a leucocratic zone with epidote lower contact to gabbro. Upper contact not preserved. Some cataclasis crosscut by magmatic vein.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-99R-3, 10-24 cm WET

Core Photo



305-U1309D-100R-1 (Section top: 496.60 mbsf)

UNIT-249: Olivine-rich Troctolite
Pieces: 1a-1b

PRIMARY MINERALOGY: Based on Piece 1a

Olivine	Modal 88% Size 10 mm average Shape subhedral
Plagioclase	Modal 4% Size 1 mm average Shape interstitial
Clinopyroxene	Modal 8% Size 1-25 mm, 3 mm average Shape interstitial

COMMENTS: Unit 249 is a medium-grained olivine-rich troctolite. Very complex. Boundaries to unit below difficult to draw. Clinopyroxene oikocrysts are abundant, 2 to 3 cm diameter. Dunitic patches. No clearly defined spinel seen. Diffuse crosscutting gabbro dikelet (?) with diffuse, poorly constrained boundaries, consisting of coarse clinopyroxene and plagioclase at 13 cm, possibly cutting a large clinopyroxene oikocryst in half.

UNIT-250: Olivine-rich Troctolite
Pieces: 1b-10

PRIMARY MINERALOGY: Based on several pieces

Olivine	Modal 85% Size 4 mm average Shape subhedral
Plagioclase	Modal 14% Size 3 mm average Shape interstitial
Clinopyroxene	Modal 1% Size 1 mm average Shape interstitial

COMMENTS: Unit 250 is a medium-grained olivine-rich troctolite. Boundary to upper unit defined as sudden increase in modal plagioclase and clear subhorizontal fabric. Modes estimated from Piece 1b. Pieces 3-10 appear to be similar to this unit, although cataclastic deformation and strong alteration overprint preclude a conclusive assignment.

UNIT-251: Troctolitic Gabbro
Piece: 11

PRIMARY MINERALOGY: Based on Piece 11

Olivine	Modal 30% Size 5 mm average Shape subhedral
Plagioclase	Modal 55% Size 10 mm average Shape interstitial
Clinopyroxene	Modal 15% Size up to 15 mm Shape interstitial

COMMENTS: Unit 251 is a medium-grained troctolitic gabbro. This unit is different in that it has abundant coarse, non-oikocryst clinopyroxene.

SECONDARY MINERALOGY: serpentine, chlorite, amphibole, magnetite

COMMENTS: Anastomosing network of serpentine-oxide veins in the olivine-rich troctolite. The olivine is altered to serpentine and displays mesh texture. Sulfides occur in troctolite from about 13 cm-62 cm.

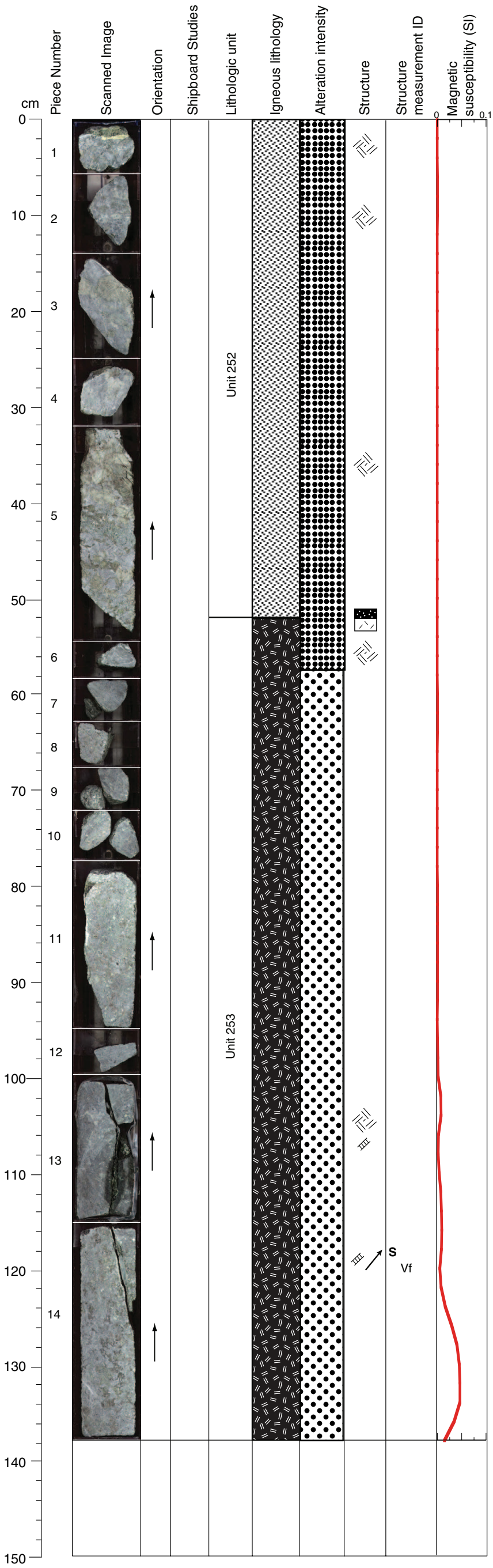
VEIN ALTERATION: Serpentine, amphibole, chlorite

THIN SECTIONS:
305-U1309D-100R-1, 10-13 cm (#307)
305-U1309D-100R-1, 26-28 cm (#308)
305-U1309D-100R-1, 48-50 cm (#309)

STRUCTURE:Unpreserved contact from previous section to a dunite with oikocrystic clinopyroxene (no fabric) grading - with increasing content of plagioclase but now rare clinopyroxene - into a troctolite with magmatic alignment of interstitial plagioclase. This in turn grades into nearly olivine-free gabbro without ductile strain. Massive gabbro with almost no cataclasis, and scarce veins. Three generations can be recognized. Serpentinized dunite (?) at top with strong serpentinite foliation, consistent in short intervals but different dips down the section, and crosscut by hairline veins. Below, gabbro with varying texture and numerous dark veins with dark green (serpentinite) fibrous material – Vf).

CLOSE-UP PHOTGRAPHS:
305-U1309D-100R-1, 9-23 cm WET
305-U1309D-100R-1, 9-23 cm DRY
305-U1309D-100R-1, 9-23 cm WET
305-U1309D-100R-1, 23-35 cm WET
305-U1309D-100R-1, 23-35 cm DRY
305-U1309D-100R-1, 35-52 cm WET
305-U1309D-100R-1, 35-52 cm DRY

Core Photo



305-U1309D-100R-2 (Section top: 498.10 mbsf)

UNIT-252: Gabbro
Pieces: 1-5

PRIMARY MINERALOGY: Based on average of all pieces

Olivine	Modal 1% Size 2 mm average Shape interstitial
Plagioclase	Modal 45% Size 2-45 mm Shape subhedral to anhedral
Clinopyroxene	Modal 55% Size up to 4 mm Shape anhedral

COMMENTS: Unit 252 is a medium-grained gabbro. Olivines form interstitial trains, modes estimated on Piece 5.

UNIT-253: Olivine-bearing Gabbro
Pieces: 6-14

PRIMARY MINERALOGY: Modes estimated on Piece 14.

Olivine	Modal 5% Size 3 mm average Shape interstitial
Plagioclase	Modal 70% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 25% Size 2-20 mm Shape anhedral

COMMENTS: Unit 253 is a medium-grained olivine-bearing gabbro.

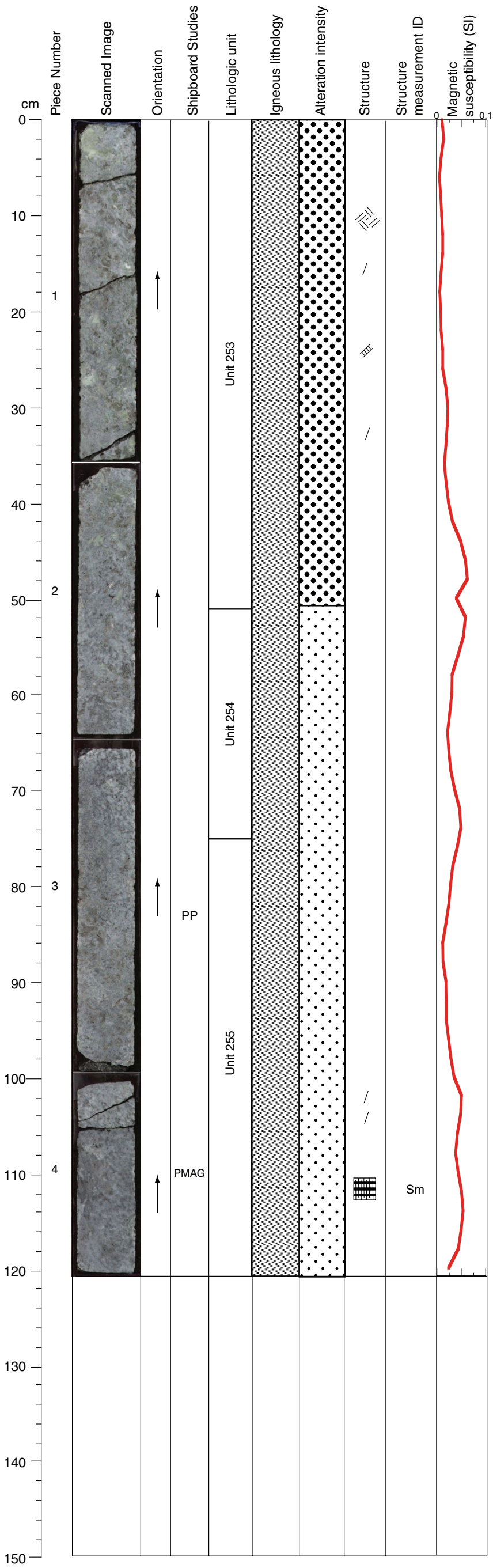
SECONDARY MINERALOGY: Chlorite, pale amphibole, plagioclase? prehnite?

COMMENTS: Some patches of corona texture (e.g. at 100-125 cm adjacent to a green vein of amphibole).

VEIN ALTERATION: Amphibole, chlorite, talc

STRUCTURE: Grain size increases over cm-scale to a pegmatitic, olivine-free gabbro with hints of strain. Below Piece 5, undeformed medium-grained olivine gabbro picks up magmatic strain in Piece 14 with moderate dip and becomes nearly olivine free. Veins and cracks, irregular, on top. Steep dark veins and fibers that are subhorizontal on lower part.

Core Photo



305-U1309D-100R-3 (Section top: 499.48 mbsf)

UNIT-253: Gabbro
Pieces: 1-2

PRIMARY MINERALOGY: Mode determined on Piece 1

Olivine	Modal 1% Size to 7 mm Shape interstitial
Plagioclase	Modal 65% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 35% Size to 35 mm Shape anhedral

COMMENTS: Continuation of Unit 253 coarse-grained gabbro, but with slightly coarser grain size.

UNIT-254: Gabbro
Pieces: 2-3

PRIMARY MINERALOGY: Mode determined on Piece 3.

Olivine	Modal 1% Size to 4 mm Shape interstitial
Plagioclase	Modal 65% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 35% Size 3 mm average Shape anhedral

COMMENTS: Unit 254 is medium-grained gabbro with similar lithology to previous unit, but with more leucocratic appearance.

UNIT-255: Gabbro
Pieces: 3-4

PRIMARY MINERALOGY: Based on Piece 4

Olivine	Modal 1% Size to 4 mm Shape interstitial
Plagioclase	Modal 65% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 35% Size 3 mm average Shape anhedral

COMMENTS: Unit 255 is medium-grained gabbro with similar lithology to previous unit, but with clear foliation defined by interstitial clinopyroxene at 100-120 cm.

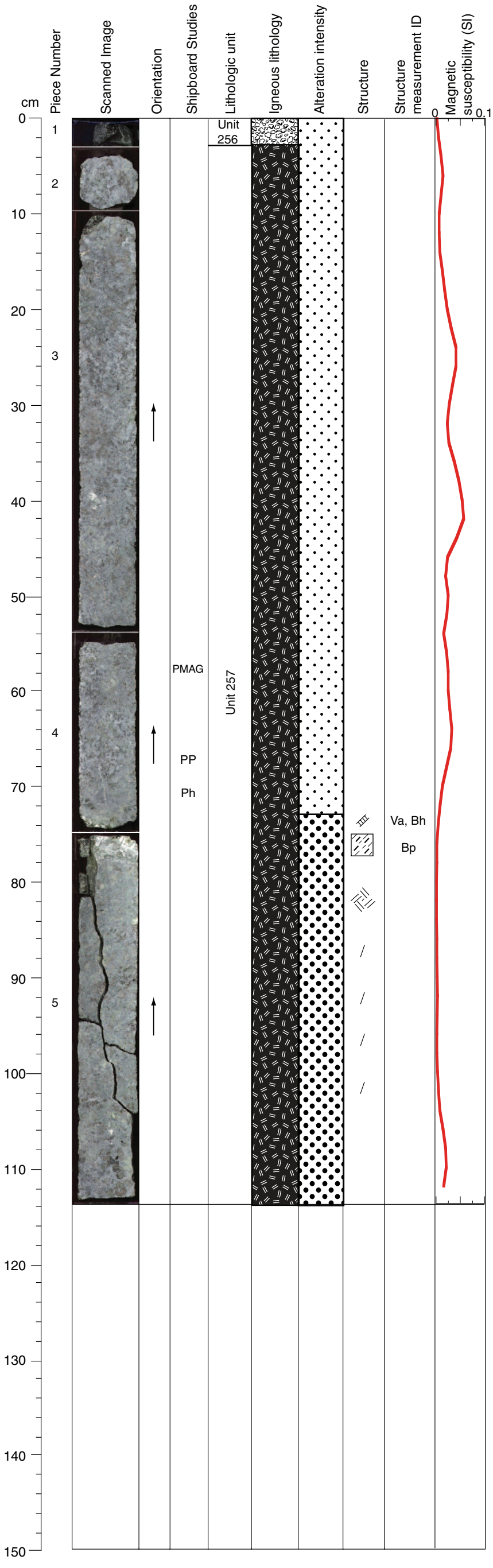
SECONDARY MINERALOGY: Serpentine, chlorite, pale amphibole

COMMENTS: Low alteration of gabbro in this section. Piece 4 contains some discrete corona texture and sulfides.

VEIN ALTERATION: n/a

STRUCTURE: A unit without magmatic strain but heterogeneous appearance due to 10 cm scale variation of clinopyroxene grain size in olivine free gabbro and varying plagioclase content. Minor fracturing/cataclasis, earlier dark green veins steeply dipping.

Core Photo



305-U1309D-101R-1 (Section top: 501.40 mbsf)

UNIT-256: Rubble
Piece 1

COMMENTS: Unit 256 is rubble comprising one piece of diabase and one piece of gabbro, origin uncertain.

UNIT-257: Olivine-bearing Gabbro
Pieces: 2-5

PRIMARY MINERALOGY: Based on Piece 3

Olivine	Modal 1% Size to 4 mm Shape interstitial
Plagioclase	Modal 60% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 40% Size 3 mm average Shape anhedral

COMMENTS: Unit 257 is medium- coarse-grained gabbro with similar lithology to Unit 255. There is a 3 cm wide coarse leucocratic dikelet at 73-77 cm.

SECONDARY MINERALOGY: Serpentine, chlorite, pale amphibole, plagioclase

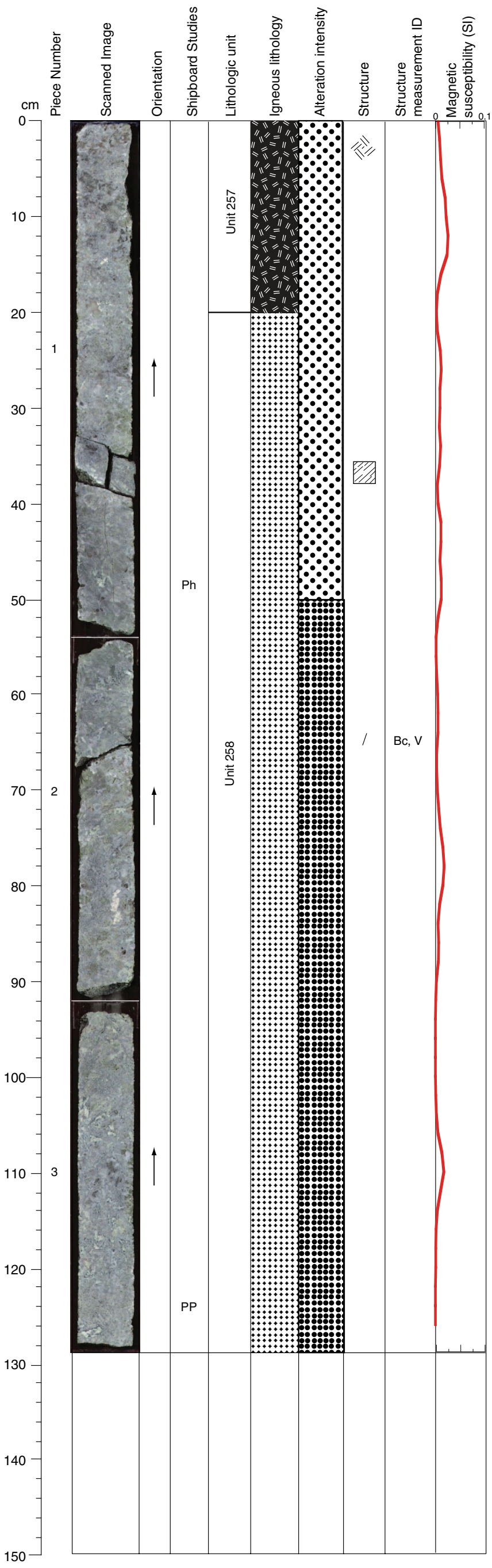
COMMENTS: Some patches of corona texture. Low alteration. At 74-78 cm, leucocratic vein (plagioclase, amphibole replacing pyroxene and sulfides).

VEIN ALTERATION: Amphibole, plagioclase, chlorite, carbonate

STRUCTURE: Medium-grained olivine gabbro, no ductile fabric, with locally coarse clinopyroxene and variable modal olivine. Scarce veining and cataclasis. Magmatic vein with associated cataclastic vein.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-101R-1, 75-80 cm WET

Core Photo



305-U1309D-101R-2 (Section top: 502.53 mbsf)

UNIT-257: Olivine-bearing Gabbro
Piece 1

PRIMARY MINERALOGY:

Olivine	Modal 1% Size to 4 mm Shape interstitial
Plagioclase	Modal 60% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 40% Size 3 mm average Shape anhedral

COMMENTS: Continuation of Unit 257 medium- coarse-grained olivine-bearing gabbro.

UNIT-258: Olivine Gabbro
Pieces: 1-3

PRIMARY MINERALOGY:

Olivine	Modal 15% Size 2-12 mm Shape interstitial
Plagioclase	Modal 55% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 30% Size to 30 mm Shape anhedral

COMMENTS: Unit 258 is coarse-grained olivine gabbro. More olivine-rich patches, coarser than previous section, grain size increases gradually down section. Boundary to upper unit defined as first occurrence of coarse clinopyroxene oikocryst. Color zoning in clinopyroxene.

SECONDARY MINERALOGY: Chlorite, pale amphibole, plagioclase?, prehnite?

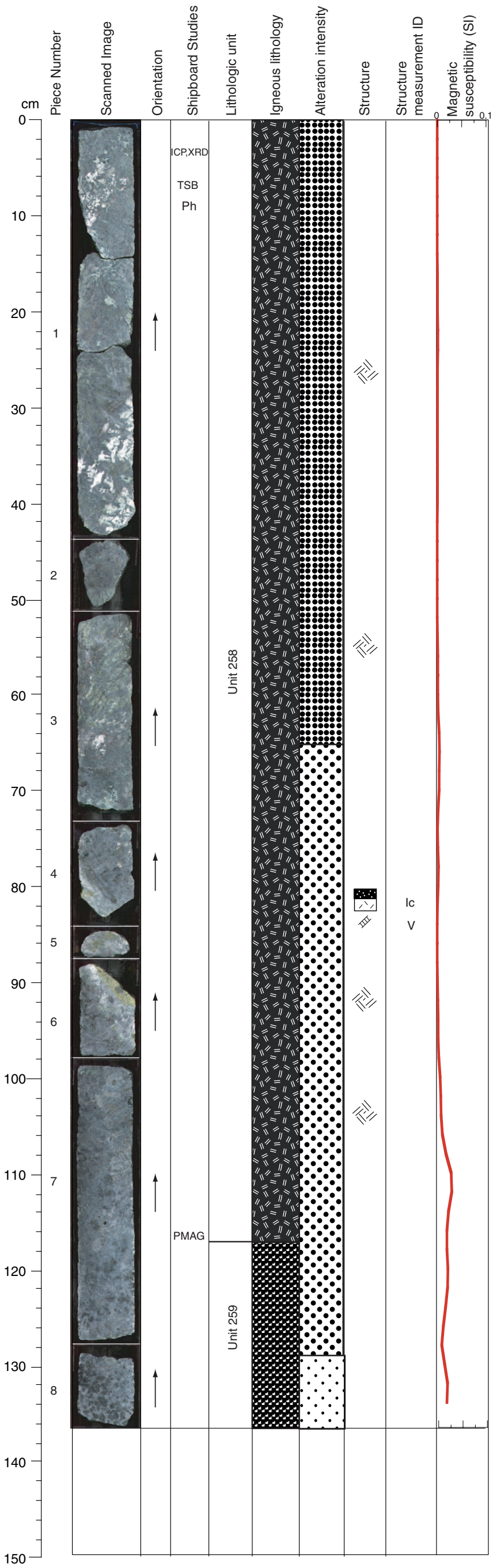
COMMENTS: Moderately altered corona texture along the section where overall color is pale green. In some areas alteration is higher and coronas have a thick rim of chlorite. The olivine grains are altered to serpentine.

VEIN ALTERATION: Amphibole, plagioclase, chlorite

STRUCTURE: Coarse grained olivine gabbro, no ductile fabric, with locally coarse clinopyroxene and olivine mode varying along schlieren. Limited cataclasis, irregular fractures, some with calcite infilling.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-101R-2, 48-52 cm WET

Core Photo



305-U1309D-101R-3 (Section top: 503.82 mbsf)

UNIT-258: Olivine-bearing Gabbro
Pieces: 1-7

PRIMARY MINERALOGY: Based on Piece 1b

Olivine	Modal 2% Size 1-12 mm Shape interstitial
Plagioclase	Modal 50% Size 3-10 mm Shape anhedral
Clinopyroxene	Modal 45% Size up to 150 mm Shape subhedral

COMMENTS: Continuation of Unit 258 coarse-grained olivine bearing gabbro. Very coarse to pegmatitic. Clinopyroxene oikocrysts exceed core diameter, possibly up to 30 cm and include interconnected plagioclase.

UNIT-259: Troctolite
Pieces: 7-8

PRIMARY MINERALOGY: Based on Piece 8

Olivine	Modal 65% Size 2-12 mm Shape anhedral
Plagioclase	Modal 30% Size 2-5 mm Shape anhedral
Clinopyroxene	Modal 3% Size 1-7 mm Shape subhedral

COMMENTS: Unit 259 is medium- to coarse-grained troctolite.

SECONDARY MINERALOGY: Chlorite, pale amphibole, prehnite? plagioclase?

COMMENTS: Corona texture occurs in the entire section. The coronas show different degrees of alteration, locally completely altered to soft material (talc?). The pyroxene grains are likely replaced by amphibole. At 79-92 cm, there is a leucocratic vein of plagioclase, amphibole, and epidote.

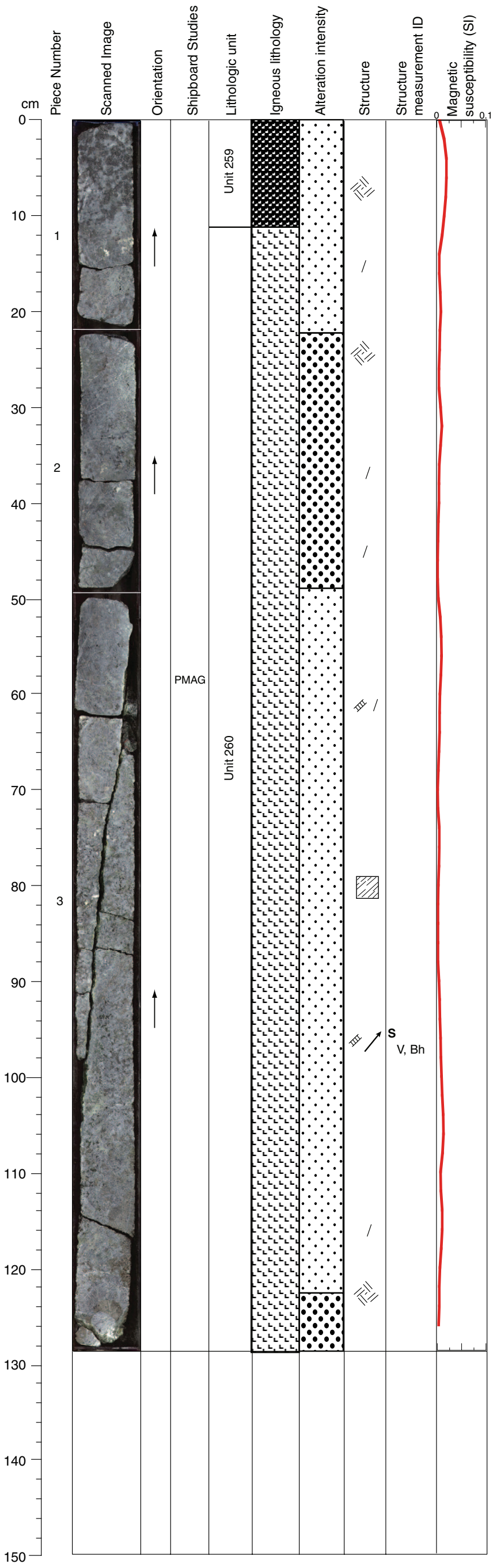
VEIN ALTERATION: n/a

THIN SECTIONS:
305-U1309D-101R-3, 6-8 cm (#310)

STRUCTURE: Coarse-grained olivine gabbro grading into troctolite in Piece 7, no ductile fabric, pegmatitic clinopyroxene, olivine mode varying along schlieren, one moderately dipping leucocratic vein. Hydrothermal vein (epidote-rich). Fractures crosscut the crystals, and alteration associated with fractures/faults (very slight displacement). Underlain by gabbro with scarce cataclasis and veining and irregular, minor serpentine foliation (<5 mm in length, not penetrative).

CLOSE-UP PHOTOGRAPHS:
305-U1309D-101R-3, 8-12 cm WET

Core Photo



305-U1309D-101R-4 (Section top: 505.19 mbsf)

UNIT-259: Troctolite
Pieces: 1a

PRIMARY MINERALOGY: Based on Piece 1a

Olivine	Modal 65% Size 2-12 mm Shape anhedral
Plagioclase	Modal 30% Size 2-5 mm Shape anhedral
Clinopyroxene	Modal 3% Size 1-7 mm Shape subhedral

COMMENTS: Continuation of Unit 259 medium- to coarse-grained troctolite.

UNIT-260: Troctolitic Gabbro
Pieces: 1a-3

PRIMARY MINERALOGY: based on Piece 2

Olivine	Modal 25% Size 1-10 mm, 3 mm average Shape anhedral
Plagioclase	Modal 72% Size 2-5 mm Shape anhedral
Clinopyroxene	Modal 3% Size 2-50 mm Shape interstitial

COMMENTS: Unit 260 is coarse- to very coarse-grained troctolitic gabbro. Clinopyroxene shape, size (2-50 mm) and mode (5-20%) highly variable. Unit grades from olivine gabbro to troctolitic gabbro. Poorly defined subvertical contacts.

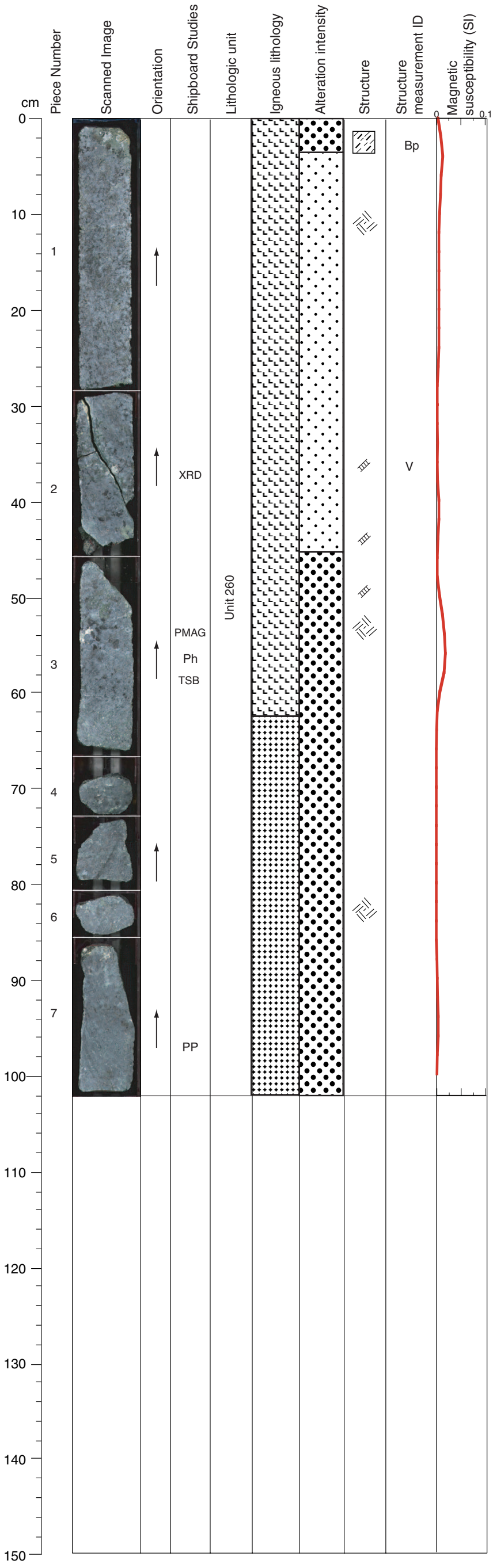
SECONDARY MINERALOGY: Serpentine, chlorite, pale amphibole, plagioclase

COMMENTS: Olivine is altered to serpentine + oxides. Pyroxene grains are likely replaced by amphibole. Between 50-100 cm (Piece 3), a fracture cuts the piece and an alteration halo extends into the surrounding rock related to this the fracture.

VEIN ALTERATION: Plagioclase, chlorite

STRUCTURE: Coarse-grained olivine gabbro grading into troctolite, no ductile fabric, pegmatitic clinopyroxene, olivine mode varying along schlieren, no corona alteration. Steeply-dipping epidote, some earlier, minor white veining.

Core Photo



305-U1309D-101R-5 (Section top: 506.47 mbsf)

UNIT-260: Troctolitic Gabbro
Pieces: 1a-7

PRIMARY MINERALOGY: Based on Piece 1a

Olivine	Modal 25% Size 1-10 mm, 3 mm average Shape anhedral
Plagioclase	Modal 72% Size 2-5 mm Shape anhedral
Clinopyroxene	Modal 3% Size 1-3 mm, 2 mm average Shape interstitial

COMMENTS: Continuation of Unit 260 coarse-grained troctolitic gabbro. Uppermost part of this section consists of a 1-2 cm wide medium-grained epidote-bearing leucocratic dikelet. Both grain size and modes vary throughout the lower part of this section from troctolitic gabbro to olivine gabbro.

SECONDARY MINERALOGY: Chlorite, pale amphibole, prehnite? plagioclase, epidote

COMMENTS: At the top of Piece 1 (2 cm), there is a vein of plagioclase, amphibole, and epidote. An alteration halo is developed around the vein at 29-44 cm. Corona texture occurs as patches that are locally more altered. At 60 cm there is a contact between the upper part where olivine is altered to serpentine and the lower part, where the pale green corona texture with highly altered part to soft mineral occurs.

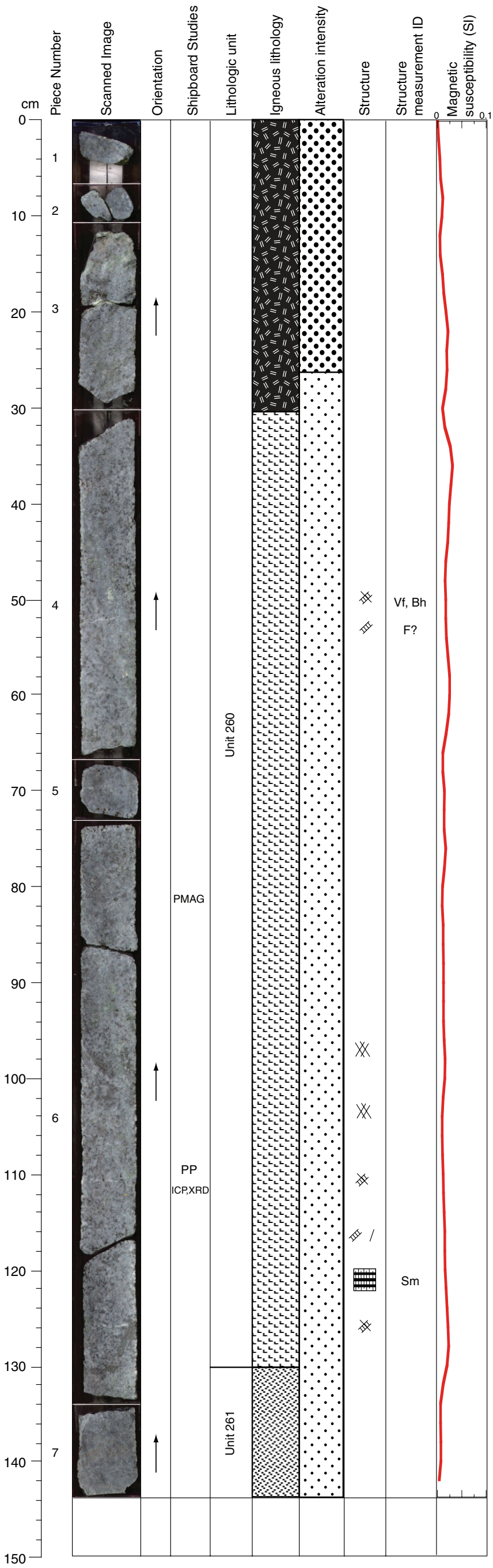
VEIN ALTERATION: Plagioclase, chlorite, carbonate

THIN SECTIONS:
305-U1309D-101R-5, 59-62 cm (#311)

STRUCTURE: Coarse grained olivine gabbro grading into troctolite, no ductile fabric, rare coarse clinopyroxene, no corona alteration. Epidote-rich, steep vein with fibers.

CLOSE-UP PHOTGRAPHS:
305-U1309D-101R-5, 55-65 cm WET

Core Photo



305-U1309D-102R-1 (Section top: 506.20 mbsf)

UNIT-260: Troctolitic to Olivine-bearing Gabbro
Pieces: 1-6c

PRIMARY MINERALOGY: Modal data from Piece 4

Olivine	Modal 25% Size 5 mm average Shape anhedral
Plagioclase	Modal 72% Size 4 mm average Shape anhedral
Clinopyroxene	Modal 3% Size 5 mm average Shape anhedral

COMMENTS: Continuation of Unit 260 modally grading between troctolitic and olivine-bearing gabbro. Interstitial clinopyroxene at 90-102 cm.

UNIT-261: Gabbro
Pieces: 6c-7

PRIMARY MINERALOGY: Based on Piece 7

Olivine	Modal <1% Size 1 mm average Shape interstitial
Plagioclase	Modal 80% Size 4 mm average Shape anhedral
Clinopyroxene	Modal 20% Size to 20 mm Shape anhedral

COMMENTS: Unit 261 is coarse-grained gabbro.

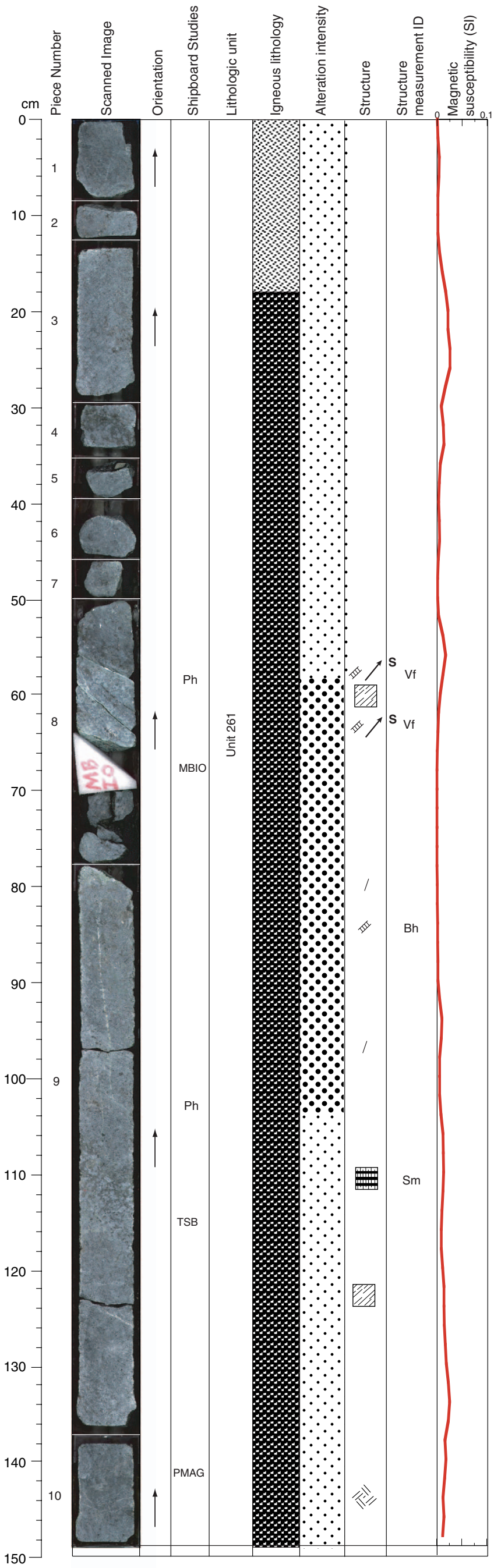
SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: Top of Piece 1 shows green orange minerals (clay?). Some patches of corona texture. In Piece 4 and 6, alteration zone with development of tiny coronas. The pyroxene are altered to amphibole.

VEIN ALTERATION: Chlorite, talc

STRUCTURE: Troctolite to olivine gabbro, no coarse clinopyroxene, little corona alteration, likely weak magmatic fabric in troctolite of Piece 6. Almost no cataclasis, and scarce veins. Three generations can be recognized: subvertical hairline dark green anastomosing veins with cataclasis, subhorizontal hairline lighter green veins and subhorizontal cracks with some white alteration crosscutting previous veins.

Core Photo



305-U1309D-102R-2 (Section top: 507.64 mbsf)

UNIT-261: Troctolite
Pieces: 1-10

PRIMARY MINERALOGY: Modal data from Piece 4

Olivine	Modal 30% Size 5 mm average Shape anhedral to interstitial
Plagioclase	Modal 70% Size 7 mm average Shape anhedral
Clinopyroxene	Modal 1% Size 1 mm average Shape interstitial

COMMENTS: Continuation of Unit 261 medium-grained troctolite to gabbro. Olivine and clinopyroxene medium grained. Clinopyroxene: fine interstitial or a few coarse grains. Leucocratic zone at 126-130 cm.

SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: Piece 8 is cut by two fractures (57 and 60 cm) likely filled by chlorite and talc and an alteration halo (up to 1 cm wide per side), more corona texture is associated with these veins. Some minerals (pyroxene-amphibole) have grown over the coronas around olivine.

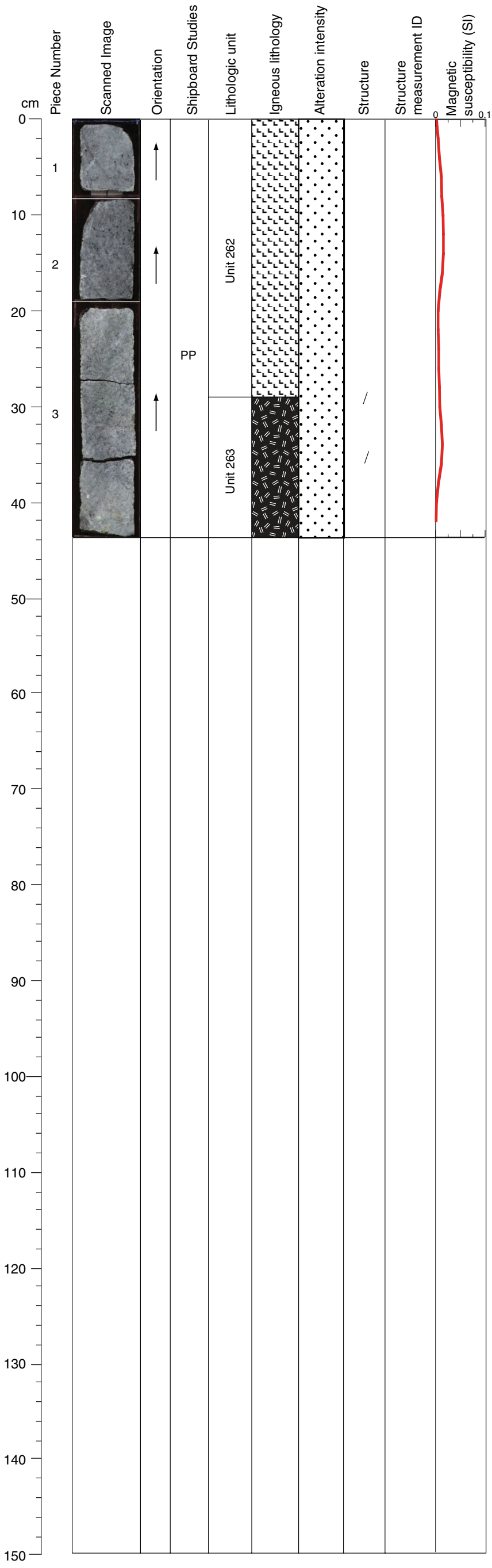
VEIN ALTERATION: Chlorite, talc

THIN SECTIONS:
305-U1309D-102R-2, 113-116 cm (#312)

STRUCTURE: Troctolite to olivine gabbro, massive medium grained clinopyroxene, little corona alteration, likely weak magmatic fabric in troctolite. Varying cataclasis (weak) and veining.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-102R-2, 53-65 cm WET
305-U1309D-102R-2, 103-120 cm WET

Core Photo



305-U1309D-102R-3 (Section top: 509.14 mbsf)

UNIT-262: Troctolite
Pieces: 1-3b

PRIMARY MINERALOGY: Modal data from Piece 2

Olivine	Modal 25% Size 3 mm average Shape anhedral to interstitial
Plagioclase	Modal 75% Size 7 mm average Shape anhedral

COMMENTS: Unit 262 medium-grained troctolite.

UNIT-263: Olivine-bearing gabbro
Pieces: 3b-3c

PRIMARY MINERALOGY: Modal data from Piece 4

Olivine	Modal 2% Size 2 mm average Shape interstitial
Plagioclase	Modal 80% Size 7 mm average Shape anhedral
Clinopyroxene	Modal 20% Size 1 mm average Shape anhedral

COMMENTS: Unit 263 medium-grained olivine-bearing gabbro.

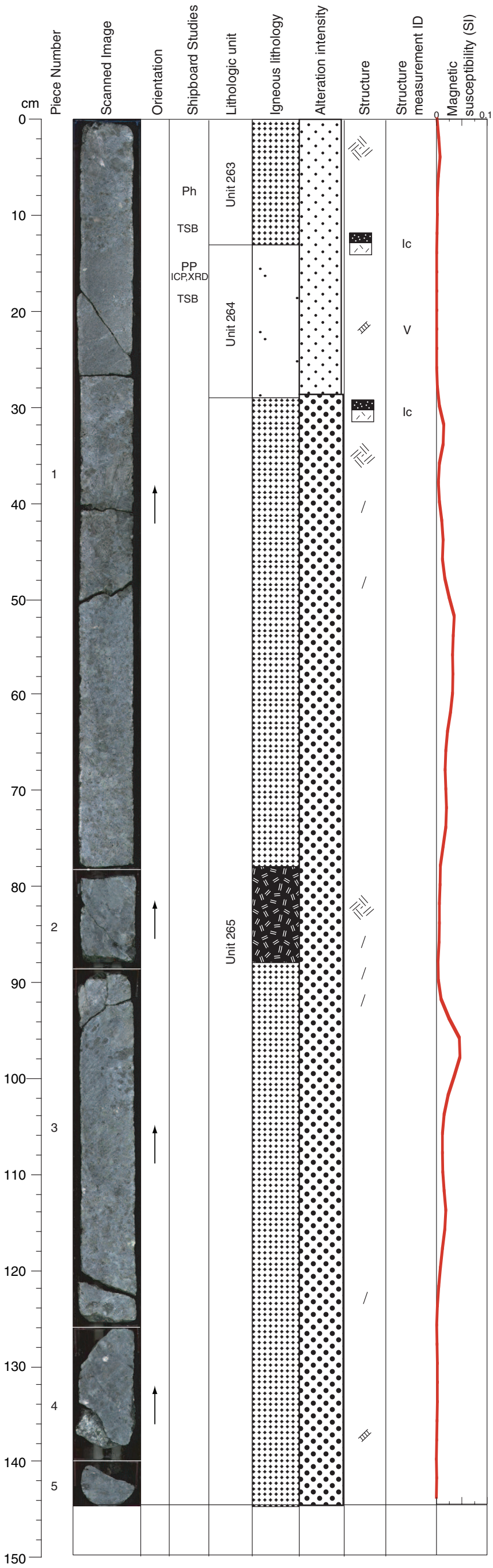
SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: Some patches of corona texture.

VEIN ALTERATION: n/a

STRUCTURE: Gabbro with poikilitic clinopyroxene, no fabric, rare olivine. Scarce veining and cataclasis.

Core Photo



305-U1309D-103R-1 (Section top: 511.00 mbsf)

UNIT-263: Olivine gabbro
Pieces: 1a

PRIMARY MINERALOGY: Based on Piece 1a

Olivine	Modal 20% Size 5 mm average Shape interstitial
Plagioclase	Modal 55% Size 7 mm average Shape anhedral
Clinopyroxene	Modal 25% Size 7 mm average Shape anhedral

COMMENTS: Continuation of Unit 263 medium-grained olivine gabbro. Grain size reduction toward diabase contact.

UNIT-264: Microgabbro
Pieces: 1a-1c

COMMENTS: Diffuse contacts. Grain size reduction towards contact in olivine gabbro host.

UNIT-265: Olivine gabbro
Pieces: 1c-5

PRIMARY MINERALOGY: Modes from Piece 1e

Olivine	Modal 20% Size up to 13 mm Shape euhedral
Plagioclase	Modal 60% Size 4 mm average Shape anhedral
Clinopyroxene	Modal 20% Size 5 mm average Shape anhedral

COMMENTS: Medium- to coarse-grained.

SECONDARY MINERALOGY: Chlorite, pale amphibole, serpentine

COMMENTS: Some patches of corona texture around olivines altered to serpentine and tremolite. In Pieces 4 and 5, some pyroxenes likley replacing the corona occur.

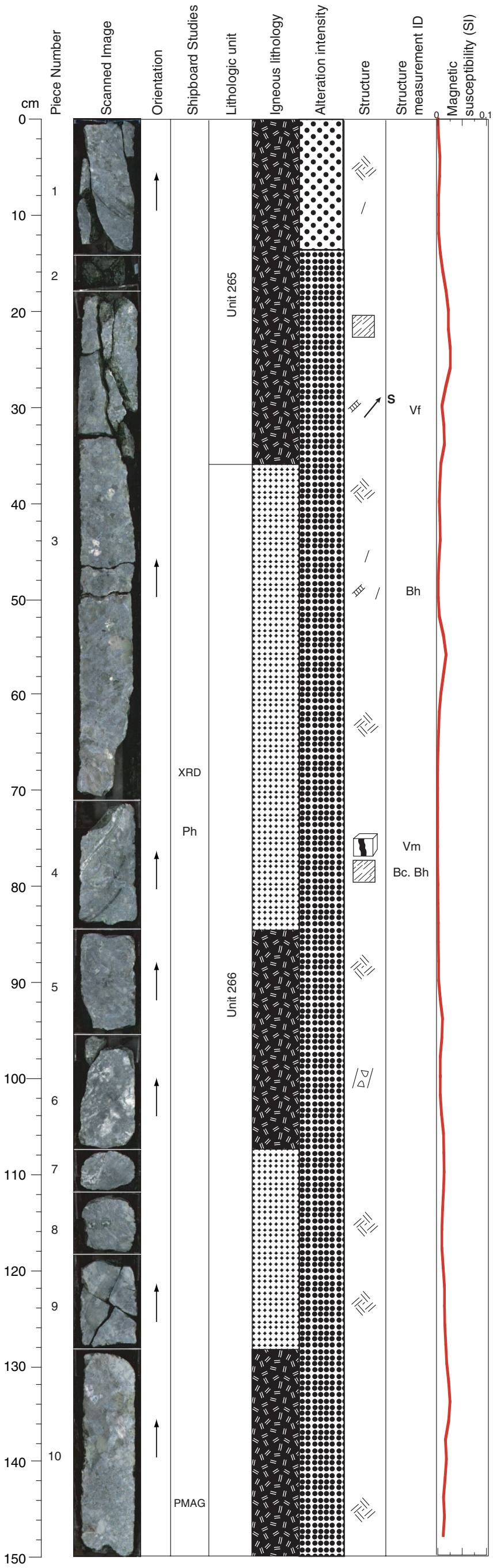
VEIN ALTERATION: n/a

THIN SECTIONS:
305-U1309D-103R-1, 11-14 cm (#313)
305-U1309D-103R-1, 18-21 cm (#314)

STRUCTURE: Olivine gabbro, no fabric, coarse to pegmatitic clinopyroxene. Shallowly dipping microgabbro sill with subparallel contacts. Little deformation (cataclasis), fine white veins and cracked open veins with green material infills. Microgabbro in thin section shows plastic deformation.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-103R-1, 7-18 cm WET

Core Photo



305-U1309D-103R-2 (Section top: 512.45 mbsf)

UNIT-265: Olivine gabbro
Pieces: 1-3c

PRIMARY MINERALOGY: Based on average of several pieces

Olivine	Modal 20% Size to 13 mm Shape euhedral
Plagioclase	Modal 60% Size 4 mm average Shape anhedral
Clinopyroxene	Modal 20% Size 5 mm average Shape anhedral

COMMENTS: Continuation of Unit 265.

UNIT-266: Olivine gabbro
Pieces: 3c-10

PRIMARY MINERALOGY: Modes from Piece 10

Olivine	Modal 5% Size to 15 mm Shape euhedral
Plagioclase	Modal 60% Size 4 mm average Shape anhedral
Clinopyroxene	Modal 35% Size to 50 mm Shape subhedral

COMMENTS: Very coarse to pegmatitic. Clinopyroxene displays color zoning (reddish at outermost rim).

SECONDARY MINERALOGY: Chlorite, pale amphibole, serpentine

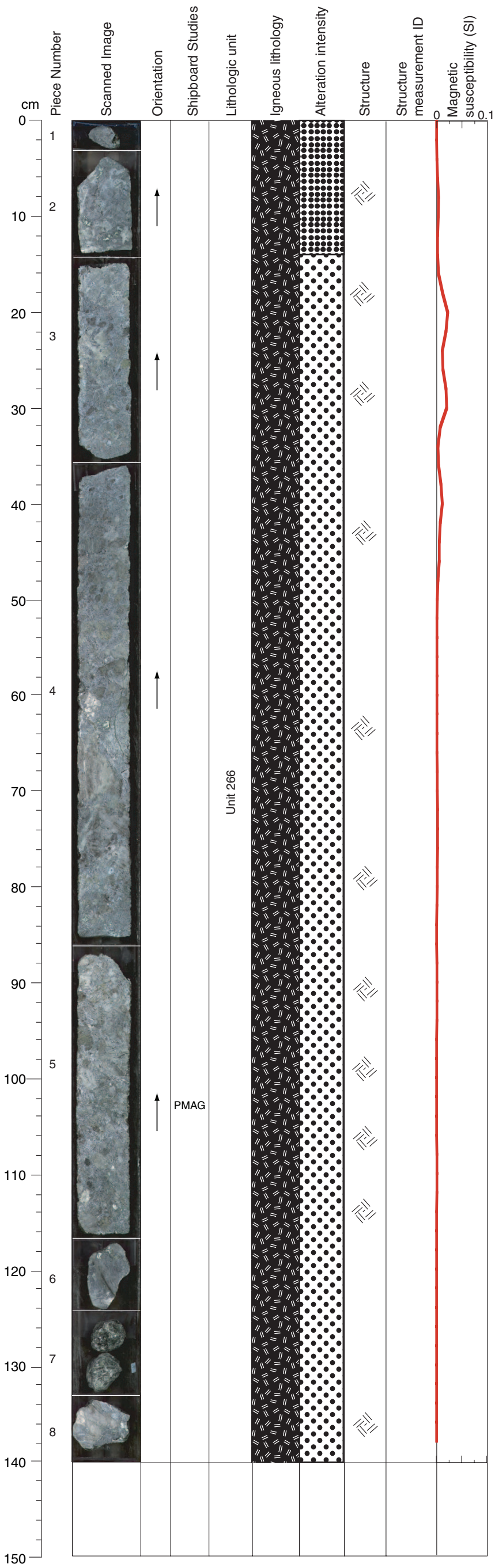
COMMENTS: Some patches of corona texture around the altered olivine and some pale green coronas with different degrees of alteration occurs. The big pyroxene in Piece 4 tends to be replaced by amphibole (greenish color).

VEIN ALTERATION: Amphibole, plagioclase, chlorite, talc, carbonate, sulfides

STRUCTURE: Olivine gabbro, no fabric, coarse to pegmatitic clinopyroxene. Shallow leucocratic vein at top of section. More late cataclastic deformation than earlier section, steep veins with subhorizontal fibers, and cataclastic veins with alteration halo, and irregular veins with carbonate and pyrite.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-103R-2, 72-83 cm WET

Core Photo



305-U1309D-103R-3 (Section top: 513.95 mbsf)

UNIT-266: Olivine gabbro
Pieces: 1-8

PRIMARY MINERALOGY: Modes from Piece 4

Olivine	Modal 6% Size 3-20 mm Shape subhedral
Plagioclase	Modal 45% Size 4 mm average Shape anhedral
Clinopyroxene	Modal 49% Size to 70 mm Shape subhedral

COMMENTS: Continuation of Unit 266.

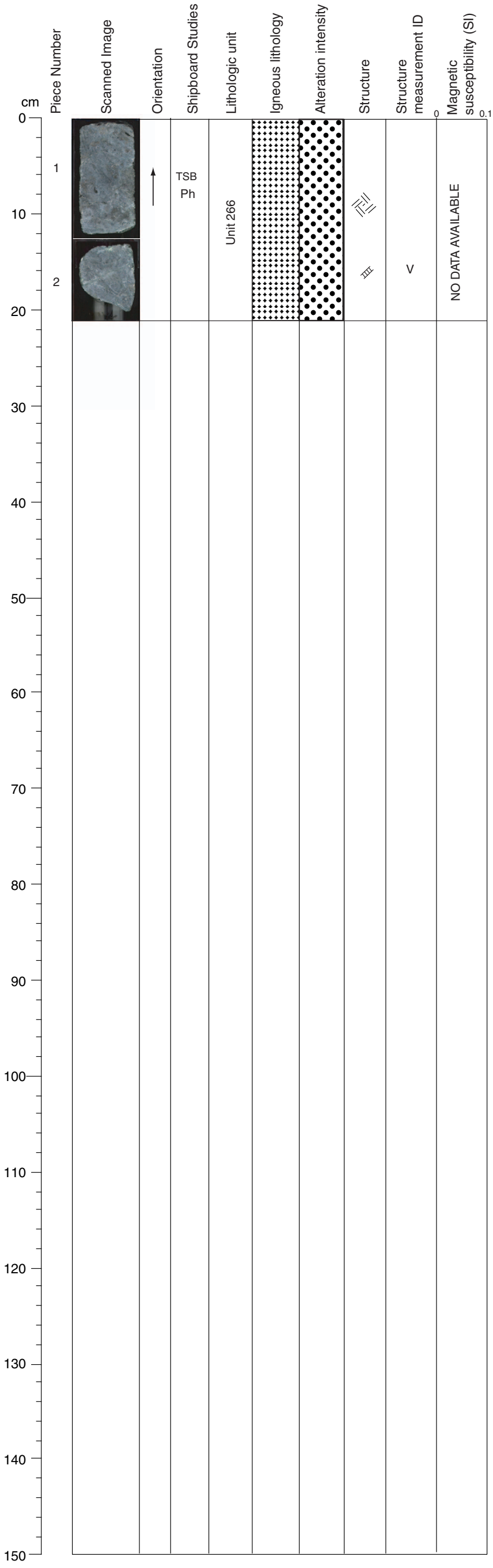
SECONDARY MINERALOGY: Chlorite, pale amphibole, serpentine

COMMENTS: Some patches of corona texture around the altered olivine and some pale green coronas with different degrees of alteration occurs. Most of the pyroxene tends to be replaced by amphibole (greenish color).

VEIN ALTERATION: Amphibole, chlorite, talc

STRUCTURE: Olivine gabbro, no fabric, coarse to pegmatitic clinopyroxene. Late cataclasis, irregular dark veins (fine). Heterogeneous cataclasis and veining.

Core Photo



305-U1309D-103R-4 (Section top: 515.35 mbsf)

UNIT-266: Olivine gabbro
Pieces: 1-2

PRIMARY MINERALOGY: Modes from Piece 1

Olivine	Modal 5% Size 2-20 mm Shape subhedral
Plagioclase	Modal 65% Size 5-15 mm Shape anhedral
Clinopyroxene	Modal 30% Size to 40 mm Shape subhedral

COMMENTS: Continuation of Unit 266.

SECONDARY MINERALOGY: Chlorite, pale amphibole, serpentine

COMMENTS: Some patches of corona texture around the altered olivine and few pale green coronas. Some olivines do not have alteration coronas. At 8 cm, contact between altered olivine to serpentine and altered olivine with corona.

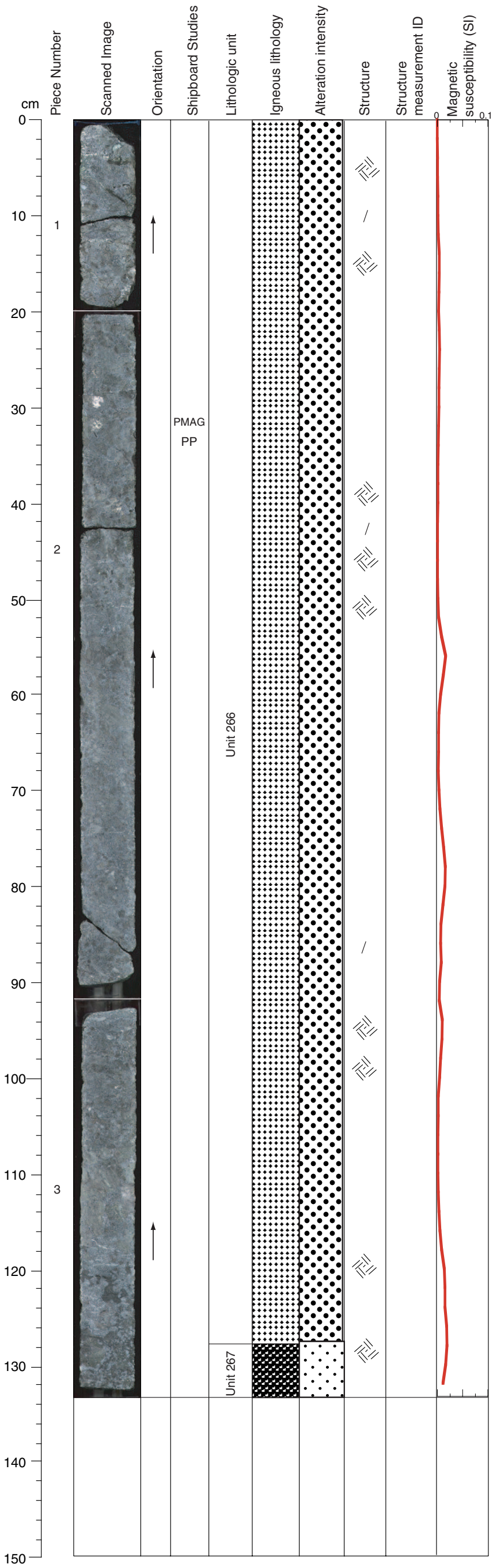
VEIN ALTERATION: Amphibole, chlorite

THIN SECTIONS:
305-U1309D-103R-4, 5-7 cm (#315)

STRUCTURE: Olivine gabbro, no fabric, coarse to pegmatitic clinopyroxene. Late cataclasis, irregular dark veins (fine).

CLOSE-UP PHOTOGRAPHS:
305-U1309D-103R-4, 7-10 cm WET

Core Photo



305-U1309D-104R-1 (Section top: 515.80 mbsf)

UNIT-266: Olivine gabbro
Pieces: 1-3

PRIMARY MINERALOGY: Modes from Piece 2b

Olivine	Modal 5% Size 3-15 mm Shape subhedral
Plagioclase	Modal 70% Size 5-15 mm Shape anhedral
Clinopyroxene	Modal 25% Size to 45 mm Shape subhedral

COMMENTS: Continuation of Unit 266.

UNIT-267: Troctolite
Piece: 3

PRIMARY MINERALOGY: Modes from U1309D-104R-2, Piece 1a

Olivine	Modal 5% Size 3-15 mm Shape subhedral
Plagioclase	Modal 70% Size 5-15 mm Shape anhedral
Clinopyroxene	Modal 25% Size to 45 mm Shape subhedral

COMMENTS: Unit 267 medium- to coarse-grained troctolite.

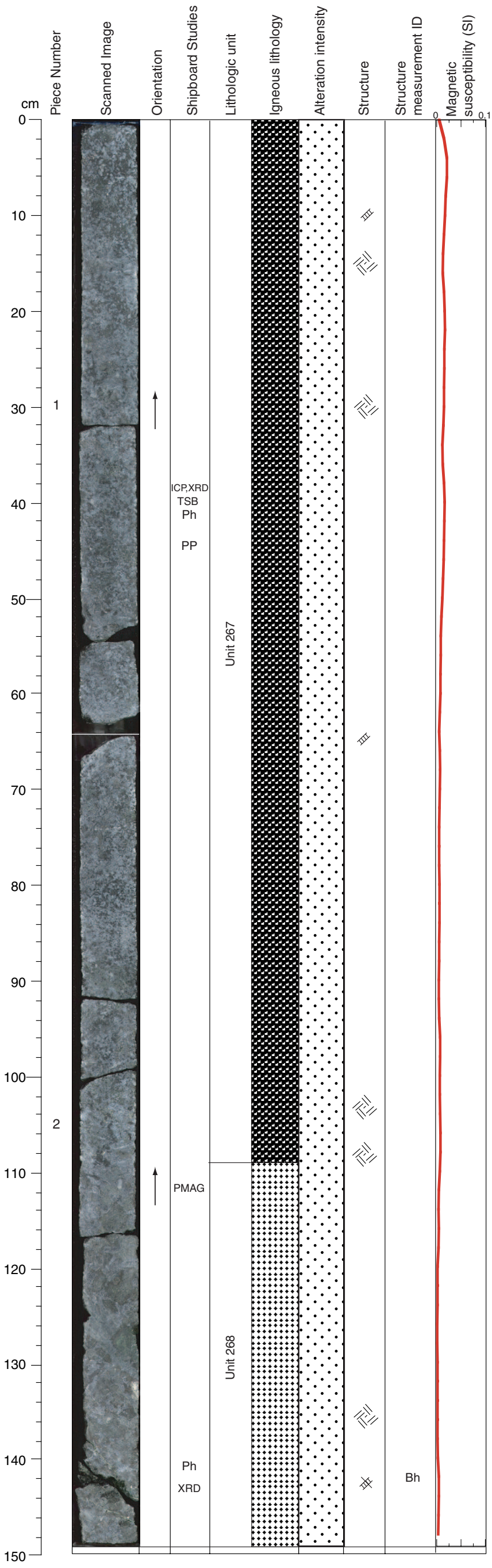
SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: Some patches of corona texture around the altered olivine and few pale green coronas.

VEIN ALTERATION: n/a

STRUCTURE: Gabbro with local olivine and – except for few zones – with pegmatitic clinopyroxene. A few veins, and small amounts of cataclasis.

Core Photo



305-U1309D-104R-2 (Section top: 517.12 mbsf)

UNIT-267: Troctolite
Pieces: 1-2c

PRIMARY MINERALOGY: Modes from Piece 1a

Olivine	Modal 20% Size 5 mm average Shape anhedral
Plagioclase	Modal 65% Size 8 mm average Shape subhedral
Clinopyroxene	Modal 15% Size to 40 mm Shape anhedral

COMMENTS: Unit 267 medium- to coarse-grained troctolite. Bronze clinopyroxene oikocrysts. Diffuse leucocratic patch at 86 cm. Locally olivine-rich zone is at 0-10 cm.

UNIT-268: Olivine Gabbro
Pieces: 2c-e

PRIMARY MINERALOGY: Modes from Piece 2d

Olivine	Modal 20% Size 4 mm Shape anhedral
Plagioclase	Modal 55% Size 5-15 mm Shape anhedral
Clinopyroxene	Modal 25% Size to 50 mm Shape subhedral

COMMENTS: Unit 268 is medium- to coarse-grained olivine gabbro. Growth zones in clinopyroxene oikocrysts. Modes vary from clinopyroxene- to plagioclase-rich downcore.

SECONDARY MINERALOGY: Chlorite, pale amphibole, serpentine

COMMENTS: Some patches of corona texture around the altered olivine and some pale green coronas.

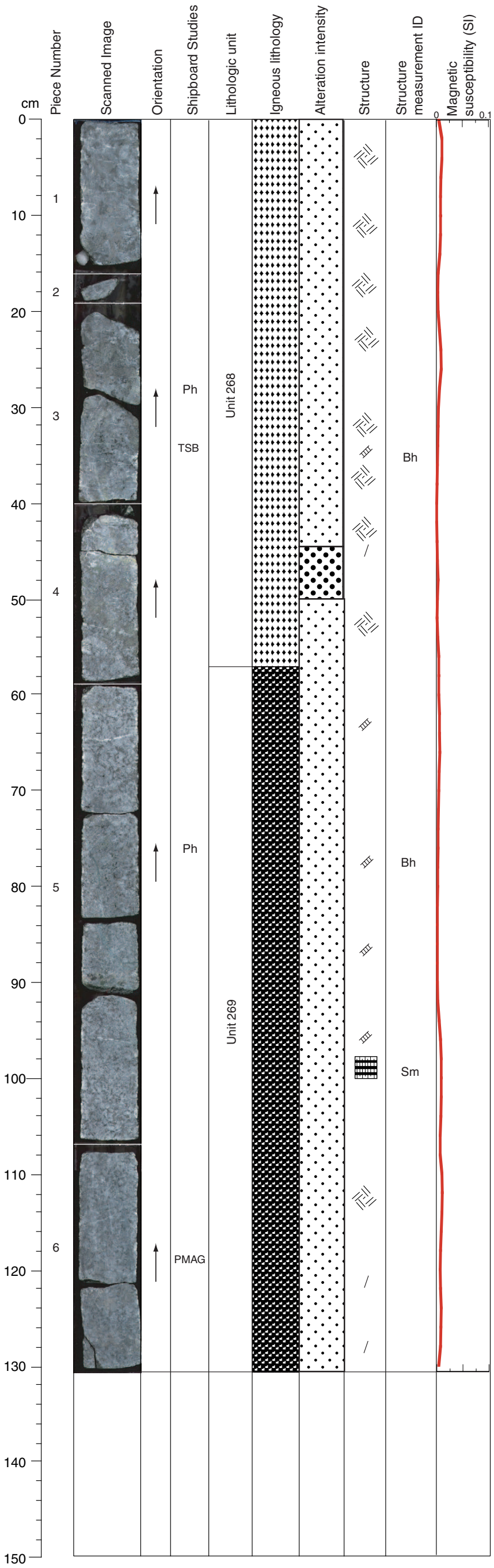
VEIN ALTERATION: Chlorite, talc

THIN SECTIONS:
305-U1309D-104R-2, 40-43 cm (#316)

STRUCTURE: Gabbro, below 100 cm with pegmatitic clinopyroxene, no fabric. A few veins, and small amounts of cataclasis.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-104R-2, 37-45 cm WET
305-U1309D-104R-2, 136-149 cm WET

Core Photo



305-U1309D-104R-3 (Section top: 518.62 mbsf)

UNIT-268: Olivine Gabbro
Pieces: 1-4b

PRIMARY MINERALOGY: Modes from Piece 1

Olivine	Modal 5% Size 4 mm Shape anhedral
Plagioclase	Modal 65% Size 5-15 mm Shape anhedral
Clinopyroxene	Modal 30% Size up to 50 mm Shape subhedral

COMMENTS: Continuation of Unit 268 medium- to coarse-grained olivine gabbro. Olivine mode difficult to determine.

UNIT-269: Troctolite
Pieces: 4b-6

PRIMARY MINERALOGY: Modes from Piece 5d

Olivine	Modal 20% Size 1-5 mm Shape interstitial
Plagioclase	Modal 80% Size up to 20 mm Shape subhedral
Clinopyroxene	Modal 1% Size 2 mm average Shape subhedral

COMMENTS: Unit 269 is medium-grained troctolite. Olivine mode may be overestimated due to alteration (see comment in Section 305-U1309D-86R-003).

SECONDARY MINERALOGY: Chlorite, pale amphibole, serpentine, plagioclase, epidote

COMMENTS: Olivines are altered to serpentine and sulfides are abundant. The section is cut by several tiny white veins (talc?). At 40-45 cm there is a leucocratic dike (amphibole + plagioclase + epidote) forms an alteration halo (~ 1 cm wide on either side of the dike).

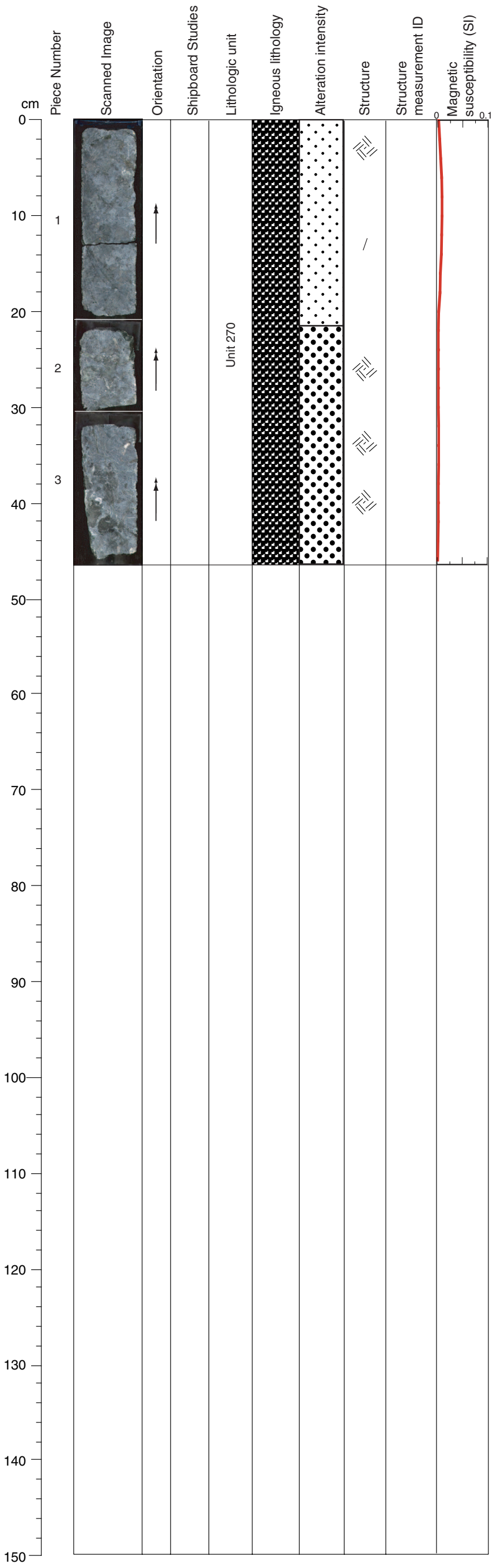
VEIN ALTERATION: Amphibole, chlorite, talc

THIN SECTIONS:
305-U1309D-104R-3, 33-36 cm (#317)

STRUCTURE: Gabbro with pegmatitic clinopyroxene, below 57 cm finer grained and abundant plagioclase, no fabric. Subhorizontal white veins cut by steeply dipping pale green veins. Medium grained gabbro with similar type of veining but less abundant.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-104R-3, 28-39 cm WET
305-U1309D-104R-3, 73-90 cm WET

Core Photo



305-U1309D-104R-4 (Section top: 519.93 mbsf)

UNIT-270: Troctolite
Pieces: 1-3

PRIMARY MINERALOGY: Modes from Piece 3

Olivine	Modal 35% Size 10 mm average Shape subhedral
Plagioclase	Modal 60% Size 4 mm average Shape subhedral
Clinopyroxene	Modal 3% Size up to 17 mm Shape subhedral

COMMENTS: Unit 270 coarse-grained troctolite. No contact observed between Units 269 and 270. Olivine mode may be overestimated and clinopyroxene mode underestimated; unit may be coarse-grained gabbro (see comment in Section 305-U1309D-86R-003, Unit 229).

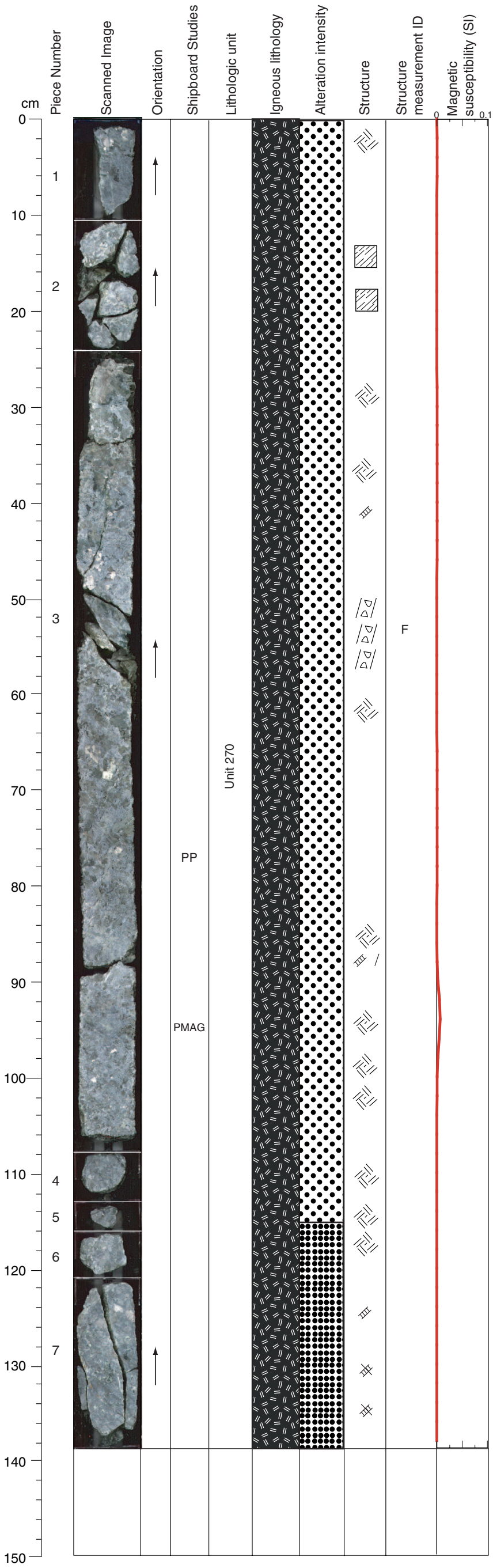
SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: The pyroxene in Pieces 2 and 3 are likely replaced by amphibole.

VEIN ALTERATION: n/a

STRUCTURE: Gabbro with pegmatitic clinopyroxene, no fabric. Late cataclasis and little veining.

Core Photo



305-U1309D-105R-1 (Section top: 520.60 mbsf)

UNIT-270: Olivine-bearing Gabbro
Pieces: 1-7

PRIMARY MINERALOGY: Modes from Piece 3d

Olivine	Modal 3% Size 1 mm average Shape interstitial
Plagioclase	Modal 52% Size 4 mm average Shape subhedral
Clinopyroxene	Modal 45% Size 5-40 mm Shape subhedral

COMMENTS: Unit 270 coarse-grained olivine-bearing gabbro. Pegmatitic clinopyroxene at 27 cm. Olivine-rich zone at 121-138 cm.

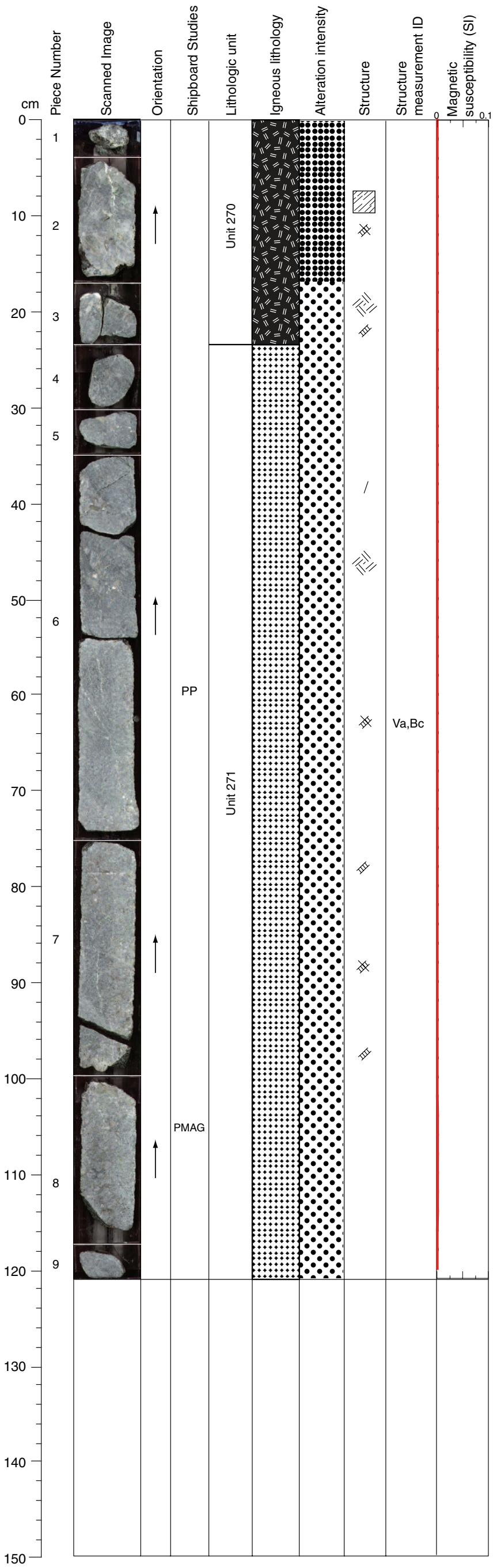
SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: Corona throughout. At the end of the section (Piece 7), there are moderately altered pale green coronas.

VEIN ALTERATION: Amphibole, chlorite, talc

STRUCTURE: Coarse gabbro with no fabric, olivine bearing near base, local pegmatitic clinopyroxene. Very shattered with some veining. A fault (F) crosscutting the section.

Core Photo



305-U1309D-105R-2 (Section top: 521.98 mbsf)

UNIT-270: Olivine-bearing Gabbro
Pieces: 1-3

PRIMARY MINERALOGY: Modes from Piece 3d

Olivine	Modal 3% Size 3 mm average Shape interstitial
Plagioclase	Modal 52% Size 4 mm average Shape subhedral
Clinopyroxene	Modal 45% Size 5-40 mm Shape subhedral

COMMENTS: Unit 270 coarse-grained Olivine-bearing Gabbro.

UNIT-271: Olivine Gabbro
Pieces: 4-9

PRIMARY MINERALOGY: Modes from Piece 6c

Olivine	Modal 20% Size 2 mm average Shape interstitial to anhedral
Plagioclase	Modal 70% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 10% Size 5 mm average Shape anhedral

COMMENTS: Unit 271 medium-grained Olivine Gabbro.

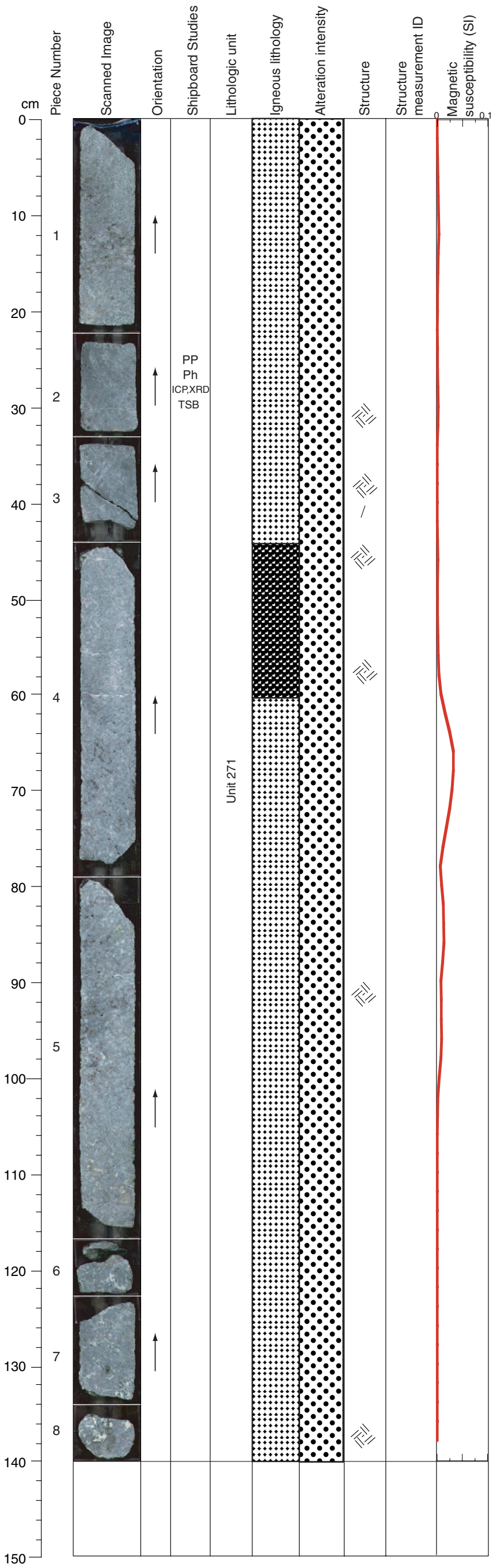
SECONDARY MINERALOGY: Chlorite, pale amphibole, serpentine, prehnite? plagioclase?

COMMENTS: Pale green alteration coronas occur in the entire section, likely related to several veins cutting the section. In Piece 6, at 40 cm, there is a contact between a fine-grained gabbro and a coarser grained gabbro, pale green alteration coronas are better developed above this contact in the finer grained gabbro. The big pyroxene grains are likely altered to amphibole.

VEIN ALTERATION: Talc, carbonate

STRUCTURE: Coarse gabbro with no fabric, pegmatitic clinopyroxene above 25 cm, below olivine gabbro with corona texture. White-filled veins, irregular and steeply dipping, and some white subhorizontal alteration veins.

Core Photo



305-U1309D-105R-3 (Section top: 523.19 mbsf)

UNIT-271: Olivine Gabbro
Pieces: 1-8

PRIMARY MINERALOGY: Modes from Piece 5

Olivine	Modal 25% Size 4 mm average Shape anhedral
Plagioclase	Modal 65% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 10% Size up to 25 mm Shape anhedral

COMMENTS: Unit 271 medium-grained Olivine Gabbro. Part of Piece 4 in interval from 44-60 is medium-grained troctolite with 20:80 olivine:plagioclase. Coarse clinopyroxene grains at 109-119 cm. Olivine-rich zone at 120-140 cm.

SECONDARY MINERALOGY: Chlorite, pale amphibole, prehnite? plagioclase?

COMMENTS: Pale-green alteration coronae in the entire section, size of the coronae and degree of alteration of the interiors increase downward, as does the thickness of the chlorite rims.

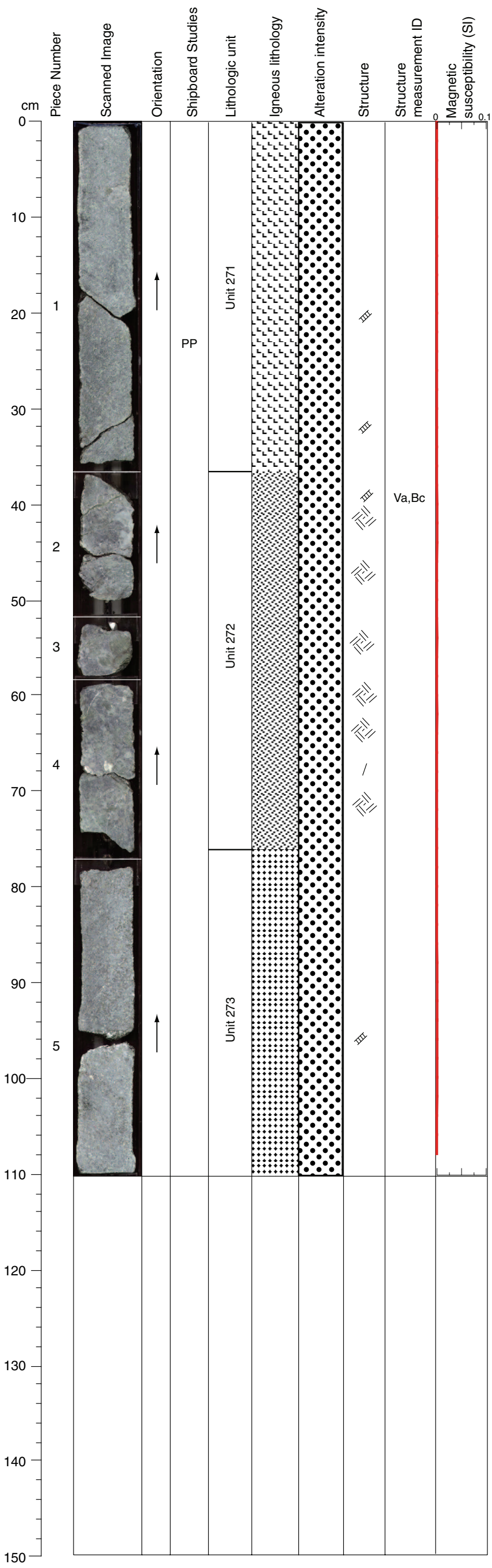
VEIN ALTERATION: n/a

THIN SECTIONS:
305-U1309D-105R-3, 28-31 cm (#318)

STRUCTURE: Coarse gabbro with local coarse clinopyroxene and abundant corona altered olivine, no fabric. No cataclasis, some small fractures and veins. Weak serpentinite foliation and some cracks and veins.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-105R-3, 23-32 cm WET

Core Photo



305-U1309D-106R-1 (Section top: 525.40 mbsf)

UNIT-271: (Troctolitic?) Gabbro
Piece: 1

PRIMARY MINERALOGY: Modes from Piece 1a

Olivine	Modal 35% Size 5 mm average Shape anhedral
Plagioclase	Modal 65% Size 7 mm average Shape subhedral
Clinopyroxene	Modal 3% Size 3 mm average Shape subhedral

COMMENTS: Continuation of Unit 271 medium-grained troctolitic gabbro. Olivine mode may be overestimated.

UNIT-272: Gabbro
Pieces: 2-4

PRIMARY MINERALOGY: Modes from Piece 4a

Olivine	Modal <1% Size 1 mm average Shape anhedral
Plagioclase	Modal 60% Size 7 mm average Shape subhedral
Clinopyroxene	Modal 40% Size 20 mm average Shape subhedral

COMMENTS: Unit 272 coarse-grained gabbro.

UNIT-273: Olivine Gabbro
Piece: 5

PRIMARY MINERALOGY: Modes from Piece 1a

Olivine	Modal 20% Size 5 mm average Shape anhedral
Plagioclase	Modal 60% Size 7 mm average Shape subhedral
Clinopyroxene	Modal 20% Size 3 mm average Shape subhedral

COMMENTS: Unit 273 medium-grained olivine gabbro similar to Unit 271. Olivine mode may be overestimated.

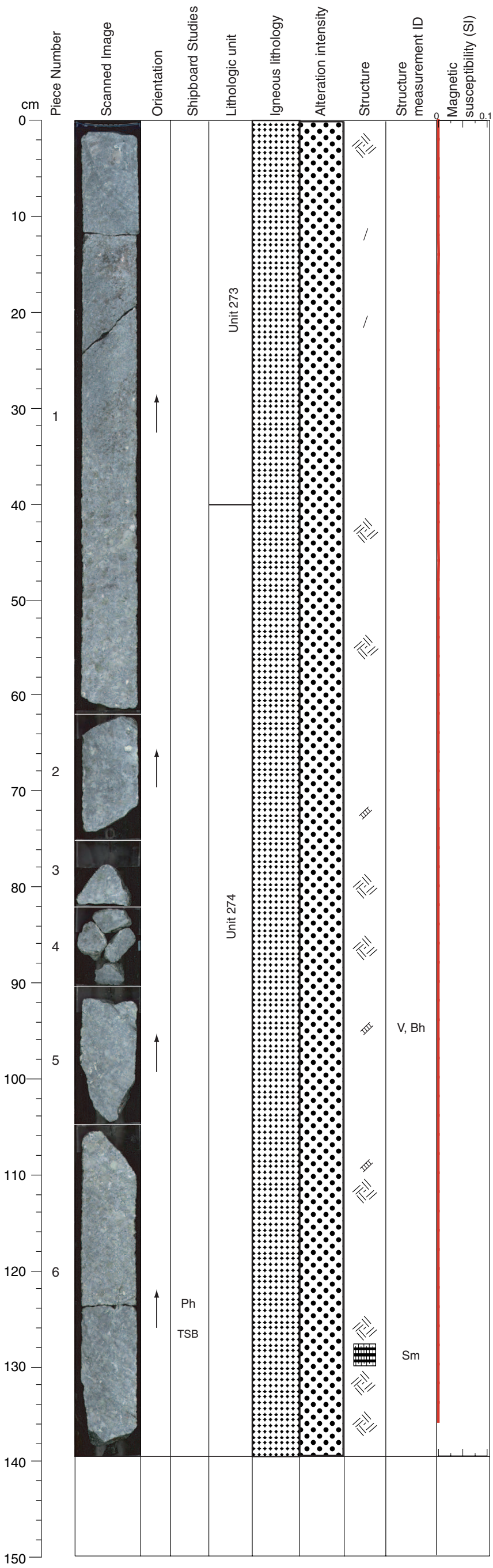
SECONDARY MINERALOGY: Chlorite, pale amphibole, prehnite?, plagioclase?

COMMENTS: Pale green alteration coronas occur in Pieces 1 and 5 and are well developed. Some shiny bronze mineral (pyroxene or amphibole) replaces the coronas. The development of the texture is likely related to the contact with coarser grained gabbro where pyroxene grains tend to be replaced by amphibole.

VEIN ALTERATION: Amphibole, plagioclase, chlorite, carbonate

STRUCTURE: No fabric in olivine gabbro with corona texture and without large clinopyroxene grains in interval 36 to 75 cm. Scarce moderately dipping thin veins and crosscutting fractures. Coarser gabbro has cataclasis.

Core Photo



305-U1309D-106R-2 (Section top: 526.50 mbsf)

UNIT-273: Olivine Gabbro
Pieces: 1a-c

PRIMARY MINERALOGY: Modes from Piece 1a

Olivine	Modal 20% Size 4 mm average Shape anhedral
Plagioclase	Modal 60% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 20% Size to 25 mm Shape anhedral

COMMENTS: Continuation of Unit 273 medium-grained olivine gabbro.

UNIT-274: Olivine Gabbro
Pieces: 1c-6b

PRIMARY MINERALOGY: Modes from Piece 6

Olivine	Modal 5% Size 3 mm average Shape anhedral to interstitial
Plagioclase	Modal 55% Size to 20 mm Shape anhedral
Clinopyroxene	Modal 40% Size up to 15 mm Shape anhedral

COMMENTS: Unit 274 is coarse-grained olivine gabbro.

SECONDARY MINERALOGY: Chlorite, pale amphibole, prehnite? plagioclase?

COMMENTS: Pale green alteration coronas are well developed with locally varying degree of alteration and with different thickness of the chlorite rim.

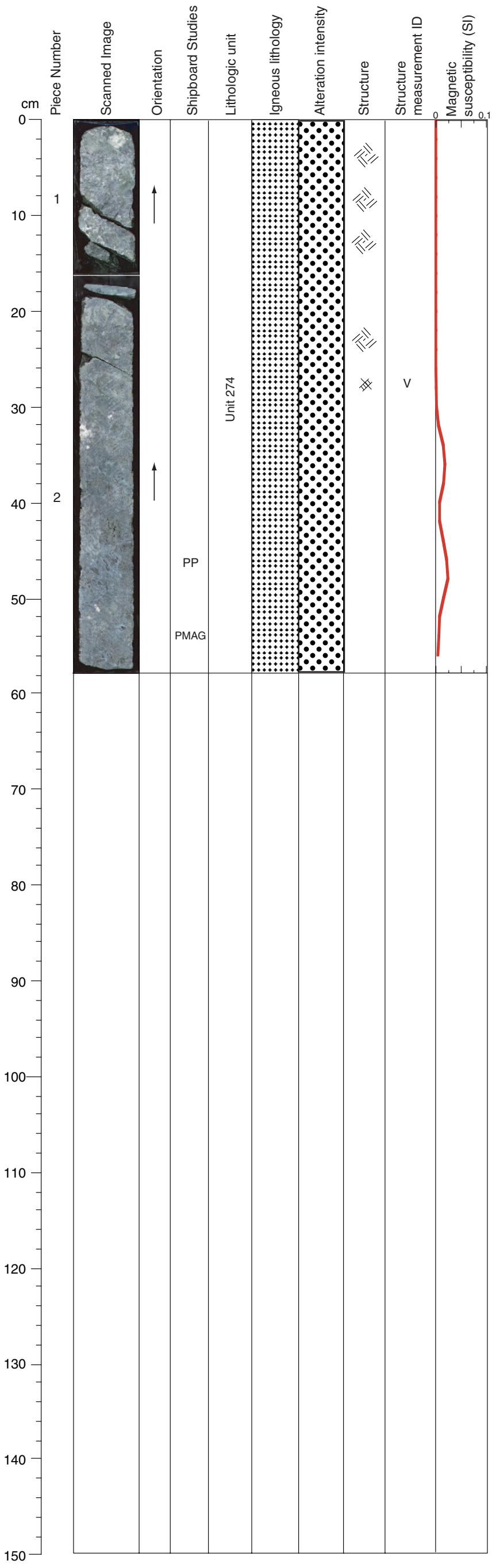
VEIN ALTERATION: Amphibole, plagioclase, chlorite

THIN SECTIONS:
305-U1309D-106R-2, 127-130 cm (#319)

STRUCTURE: Weak magmatic fabric dipping moderately in Pieces 5 and 6 in olivine gabbro with corono olivine alteration. Scarce moderately dipping thin veins and crosscutting fractures, Coarse gabbro with later irregular fractures, locally subvertical.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-106R-2, 123-137 cm WET

Core Photo



305-U1309D-106R-3 (Section top: 527.89 mbsf)

UNIT-274: Olivine Gabbro
Pieces: 1-2

PRIMARY MINERALOGY: Modes from Piece 2c

Olivine	Modal 15% Size 3 mm average Shape anhedral to interstitial
Plagioclase	Modal 75% Size to 20 mm Shape anhedral
Clinopyroxene	Modal 10% Size to 20 mm Shape subhedral

COMMENTS: Unit 274 is coarse-grained olivine gabbro.

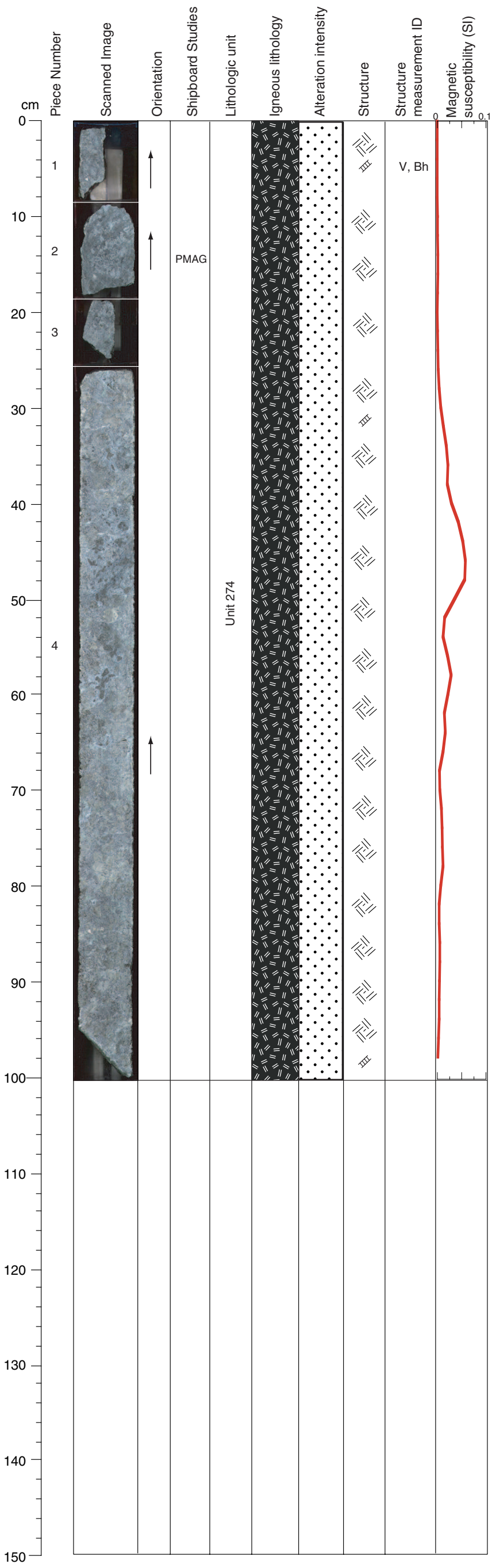
SECONDARY MINERALOGY: Chlorite, pale amphibole, prehnite? plagioclase?

COMMENTS: Some alteration coronas around olivine and some pale green alteration coronas occur. The large pyroxene grains tend to be replaced by amphibole.

VEIN ALTERATION: n/a

STRUCTURE: No fabric in olivine gabbro with corona texture and clinopyroxene as large as 2 cm. Irregular fractures with small white veins. Moderately dipping green veins.

Core Photo



305-U1309D-107R-1 (Section top: 530.20 mbsf)

UNIT-274: Olivine-bearing Gabbro
Pieces: 1-4

PRIMARY MINERALOGY: Modes from Piece 4

Olivine	Modal 15% Size 2 mm average Shape anhedral to interstitial
Plagioclase	Modal 75% Size up to 20 mm Shape anhedral
Clinopyroxene	Modal 10% Size up to 30 mm Shape subhedral

COMMENTS: Unit 274 is coarse-grained olivine-bearing gabbro. Olivine-rich zone at 45 cm.

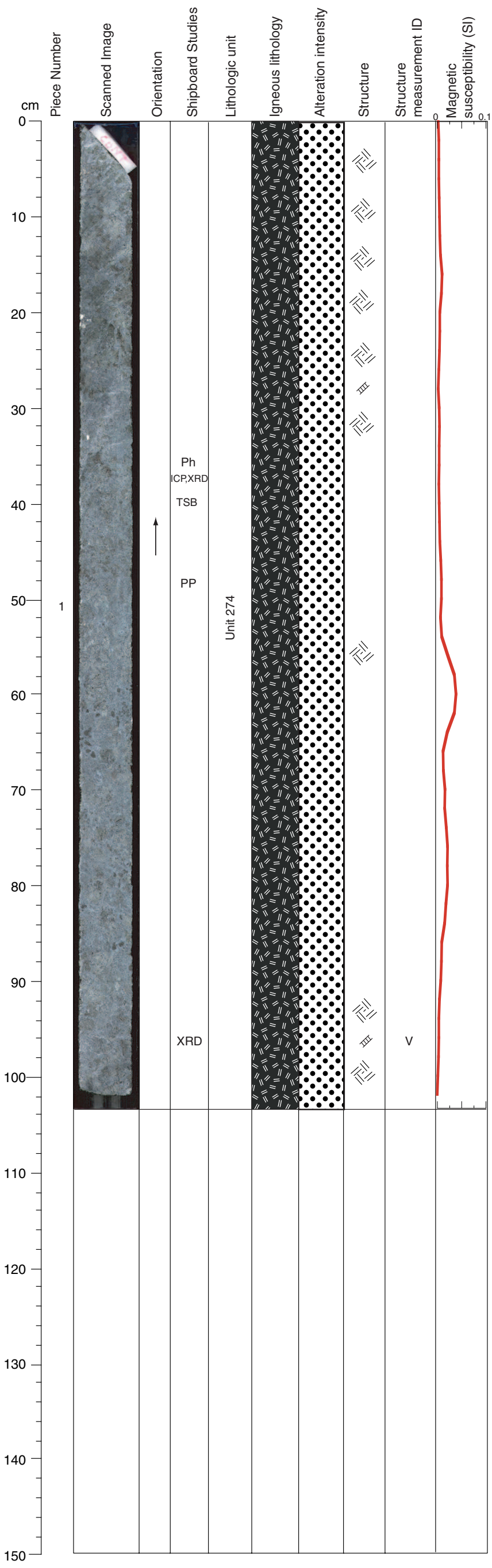
SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: Corona texture around altered olivine and a few pale green alteration coronas.

VEIN ALTERATION: n/a

STRUCTURE: Coarse-grained gabbro without any fabric, common cm-scale oikocrystic clinopyroxene includes plagioclase grains. A few dark green veins dipping steeply. Irregular minor fractures.

Core Photo



305-U1309D-107R-2 (Section top: 531.20 mbsf)

UNIT-274: Olivine-bearing Gabbro
Pieces: 1

PRIMARY MINERALOGY: Modes from Piece 1

Olivine	Modal 15% Size 2 mm average Shape anhedral to interstitial
Plagioclase	Modal 75% Size to 20 mm Shape anhedral
Clinopyroxene	Modal 10% Size to 30 mm Shape subhedral

COMMENTS: Unit 274 is coarse-grained olivine-bearing gabbro. Olivine-rich zone at 60 cm.

SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: Corona texture around altered olivine and a few pale green alteration coronas.

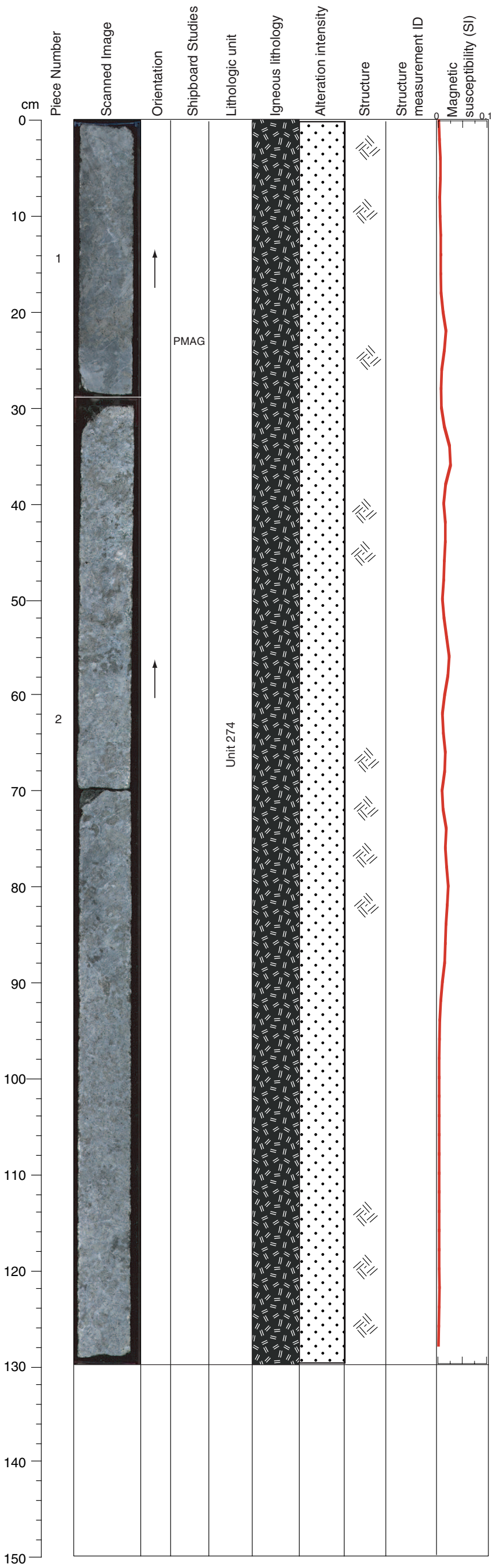
VEIN ALTERATION: Amphibole, chlorite

THIN SECTIONS:
305-U1309D-107R-2, 38-41 cm (#320)

STRUCTURE: Coarse-grained gabbro without any fabric, common cm-scale oikocrystic clinopyroxene includes plagioclase grains. Irregular minor fractures. Crosscutting dark vein (V).

CLOSE-UP PHOTOGRAPHS:
305-U1309D-107R-2, 35-45 cm WET

Core Photo



305-U1309D-107R-3 (Section top: 532.23 mbsf)

UNIT-274: Olivine-bearing Gabbro
Pieces: 1-2

PRIMARY MINERALOGY: Modes from Piece 2a

Olivine	Modal 3% Size 2 mm average Shape anhedral to interstitial
Plagioclase	Modal 55% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 42% Size 7 mm average Shape subhedral

COMMENTS: Unit 274 coarse-grained olivine-bearing gabbro.

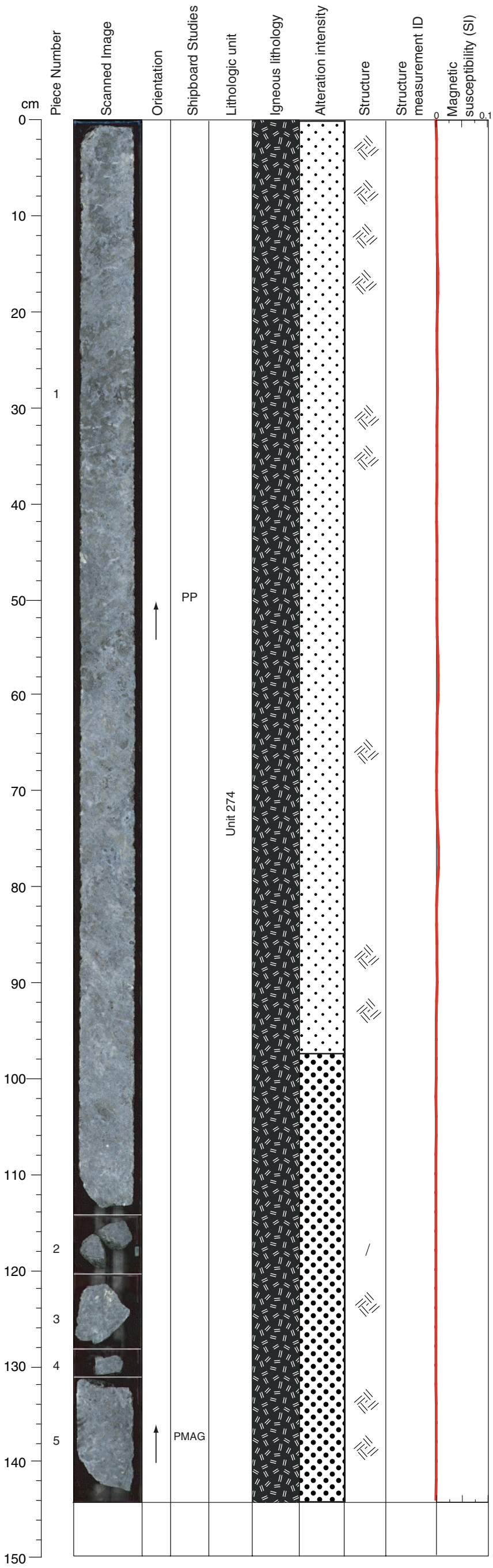
SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: Corona texture occurs around a few, slightly altered olivine grains and there are a few pale green alteration coronas. Some altered olivines do not show coronas.

VEIN ALTERATION: n/a

STRUCTURE: Coarse-grained gabbro without any fabric, common cm-scale oikocrystic clinopyroxene includes plagioclase grains. Irregular minor fractures.

Core Photo



305-U1309D-107R-4 (Section top: 533.52 mbsf)

UNIT-274: Olivine-bearing Gabbro
Pieces: 1-5

PRIMARY MINERALOGY: Modes from Piece 2a previous section

Olivine	Modal 3% Size 2 mm average Shape anhedral to interstitial
Plagioclase	Modal 55% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 42% Size 7 mm average Shape subhedral

COMMENTS: Unit 274 is coarse-grained olivine-bearing gabbro.

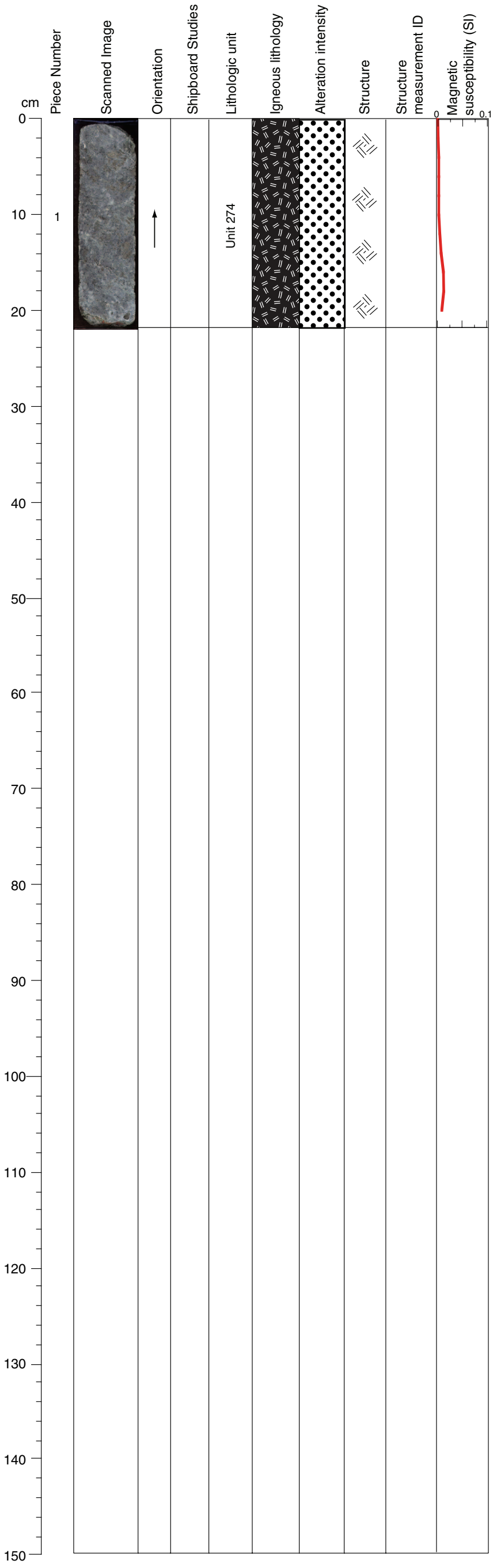
SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: Some corona texture occurs around altered olivine and there are pale green alteration coronas with locally high degrees of alteration to a soft mineral.

VEIN ALTERATION: Amphibole, chlorite

STRUCTURE: Coarse-grained gabbro without any fabric, common cm-scale oikocrystic clinopyroxene includes plagioclase grains. Irregular minor fractures.

Core Photo



305-U1309D-107R-5 (Section top: 534.96 mbsf)

UNIT-274: Olivine-bearing Gabbro
Pieces: 1

PRIMARY MINERALOGY: Modes from Piece 2a Section 305-U1309D-107R-003

Olivine	Modal 3% Size 2 mm average Shape anhedral to interstitial
Plagioclase	Modal 55% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 42% Size 7 mm average Shape subhedral

COMMENTS: Unit 274 is coarse-grained olivine-bearing gabbro.

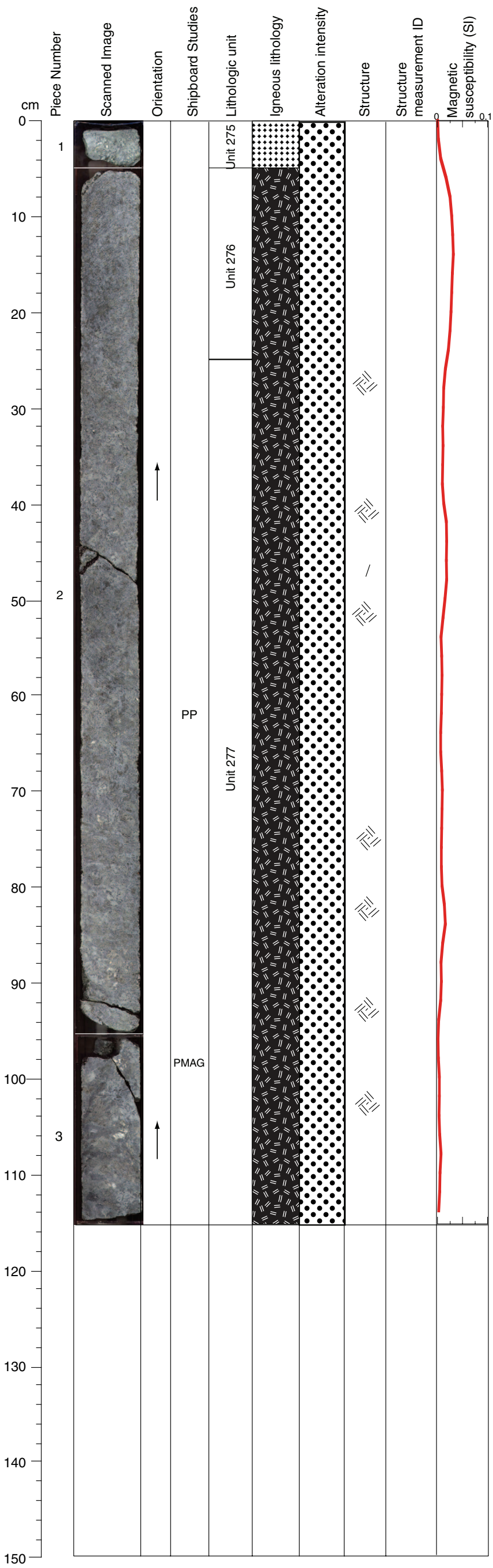
SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: Some corona texture around altered olivine and pale green alteration coronas.

VEIN ALTERATION: n/a

STRUCTURE: Coarse-grained gabbro without any fabric, common cm-scale oikocrystic clinopyroxene includes plagioclase grains. Irregular minor fractures.

Core Photo



305-U1309D-108R-1 (Section top: 535.00 mbsf)

UNIT-275: Rubble
Piece: 1

COMMENTS: Unit 275 gabbro rubble.

UNIT-276: Olivine-bearing Gabbro
Piece: 2

PRIMARY MINERALOGY: Modal data from Piece 2a

Olivine	Modal 1% Size 3 mm average Shape anhedral
Plagioclase	Modal 75% Size 7 mm average Shape anhedral
Clinopyroxene	Modal 25% Size 5 mm average Shape subhedral

COMMENTS: Unit 276 coarse-grained olivine-bearing gabbro. Three types of pyroxene: bronze oikocryst, brown coarse, gray skeletal.

UNIT-277: Olivine-bearing Gabbro
Pieces: 2-3

PRIMARY MINERALOGY: Modal data from Piece 2b

Olivine	Modal 1% Size 3 mm average Shape anhedral
Plagioclase	Modal 80% Size 7 mm average Shape anhedral
Clinopyroxene	Modal 20% Size up to 30 mm Shape subhedral

COMMENTS: Unit 277 coarse-grained olivine-bearing gabbro. Coarse skeletal clinopyroxene becomes more pronounced in this unit.

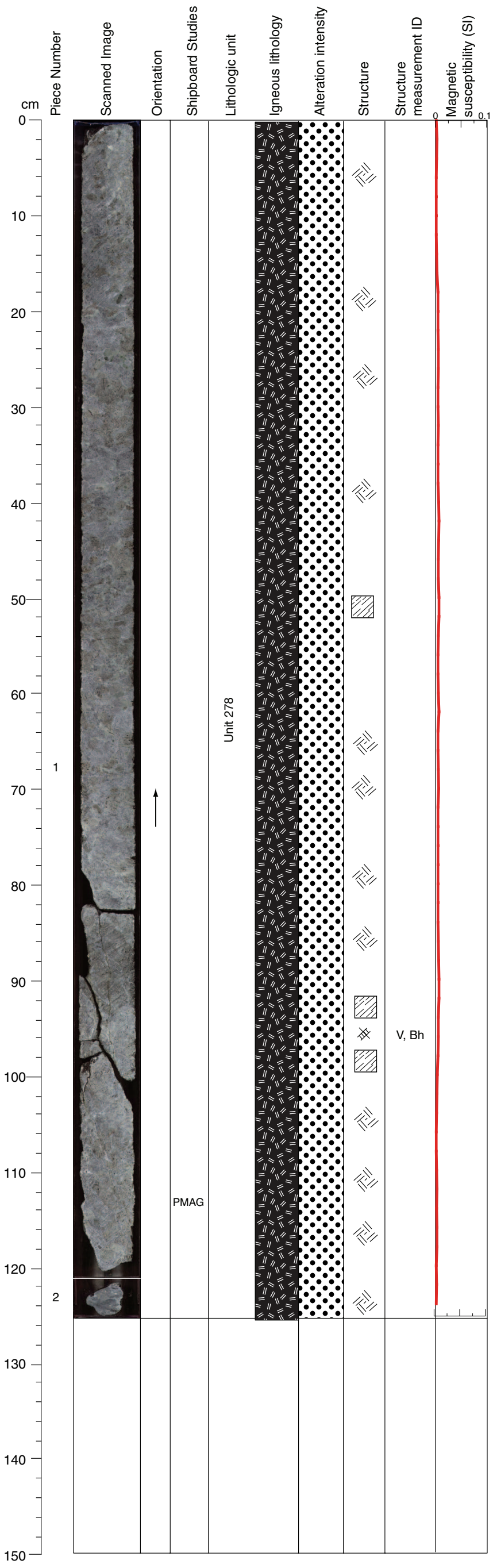
SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: Some corona texture around altered olivine and patches of pale green alteration coronas with varying degrees of alteration. The pyroxene tends to be replaced by amphibole.

VEIN ALTERATION:n/a

STRUCTURE: Coarse-grained olivine gabbro with massive clinopyroxene, lacks large clinopyroxene grains above 20 cm, corona-olivine alteration. Irregular minor fractures. Green dark vein.

Core Photo



305-U1309D-108R-2 (Section top: 536.15 mbsf)

UNIT-278: Olivine-bearing Gabbro
Pieces: 1-2

PRIMARY MINERALOGY: Modal data from Piece 1

Olivine	Modal 1% Size 3 mm average Shape anhedral
Plagioclase	Modal 80% Size 7 mm average Shape anhedral
Clinopyroxene	Modal 20% Size to 30 mm Shape subhedral

COMMENTS: Unit 278 is coarse-grained olivine-bearing gabbro. No skeletal clinopyroxene.

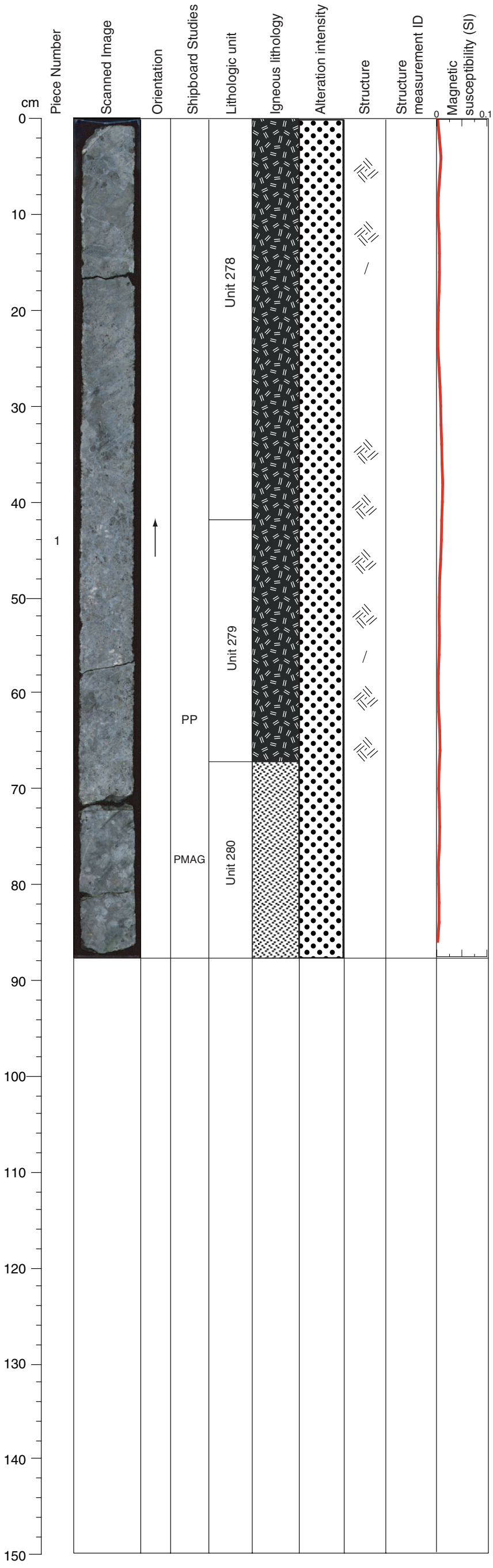
SECONDARY MINERALOGY: Serpentine, chlorite, pale amphibole

COMMENTS: No corona texture around altered olivine. Numerous tiny white veins cut the pieces (talc-carbonate).

VEIN ALTERATION: Chlorite, talc

STRUCTURE: Coarse-olivine gabbro with massive clinopyroxene, no ductile fabric. Some irregular fractures and dark green vein.

Core Photo



305-U1309D-108R-3 (Section top: 537.39 mbsf)

UNIT-278: Olivine-bearing Gabbro
Pieces: 1a-1b

PRIMARY MINERALOGY: Modal data from piece 1a

Olivine	Modal 1% Size 3 mm average Shape anhedral
Plagioclase	Modal 80% Size 7 mm average Shape anhedral
Clinopyroxene	Modal 20% Size to 30 mm Shape subhedral

COMMENTS: Unit 278 is coarse-grained olivine-bearing gabbro. No skeletal clinopyroxene.

UNIT-279: Olivine-bearing Gabbro
Pieces: 1b-1c

PRIMARY MINERALOGY: Modal data from Piece 1c

Olivine	Modal 1% Size 3 mm average Shape anhedral
Plagioclase	Modal 80% Size 7 mm average Shape anhedral
Clinopyroxene	Modal 20% Size to 30 mm Shape subhedral

COMMENTS: Same as Unit 277 coarse-grained olivine-bearing gabbro. Coarse skeletal clinopyroxene again present in this unit.

UNIT-280: Gabbro
Pieces: 1c-1e

PRIMARY MINERALOGY: Modal data from Piece 1d

Olivine	Modal <1% Size 3 mm average Shape anhedral
Plagioclase	Modal 60% Size 15 mm average Shape anhedral
Clinopyroxene	Modal 40% Size 15 mm average Shape anhedral

COMMENTS: Unit 280 is coarse-grained gabbro.

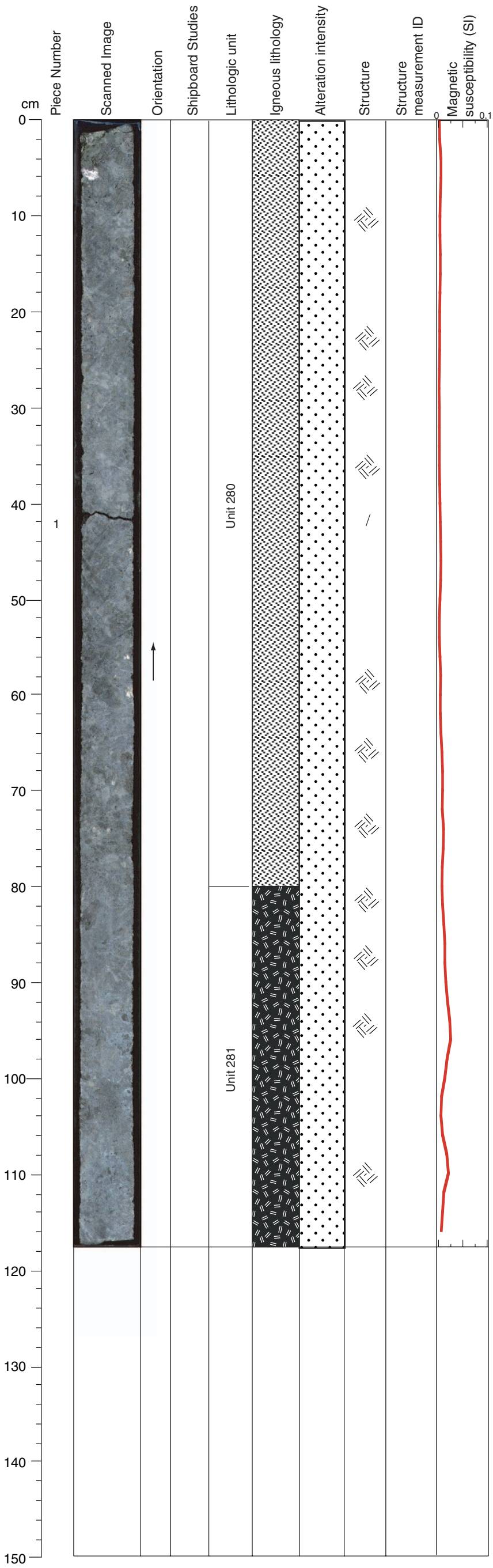
SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: Some corona texture around altered olivine.

VEIN ALTERATION: Chlorite, talc

STRUCTURE: Coarse gabbro with massive and oikocrystic, large clinopyroxene. Weak cataclasis.

Core Photo



305-U1309D-108R-4 (Section top: 538.27 mbsf)

UNIT-280: Gabbro
Pieces: 1a-1b

PRIMARY MINERALOGY: Modal data from Piece 1a

Olivine	Modal <1% Size 1 mm average Shape anhedral
Plagioclase	Modal 60% Size 15 mm average Shape anhedral
Clinopyroxene	Modal 40% Size 7 mm average Shape anhedral

COMMENTS: Continuatiion of Unit 280 coarse-grained gabbro.

UNIT-281: Olivine-bearing Gabbro
Pieces: 1b

PRIMARY MINERALOGY: Modal data from Piece 1b

Olivine	Modal 2% Size 5 mm average Shape anhedral
Plagioclase	Modal 70% Size 15 mm average Shape anhedral
Clinopyroxene	Modal 28% Size to 20 mm Shape anhedral

COMMENTS: Unit 281 is coarse-grained olivine-bearing gabbro.

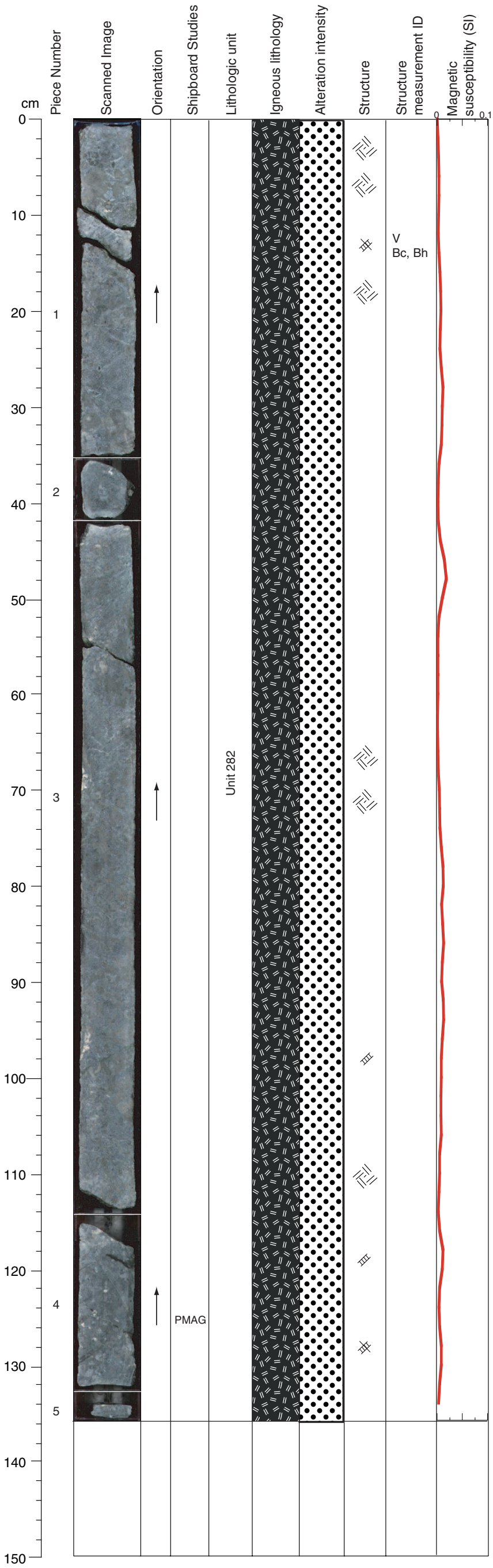
SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: Some corona texture around altered olivine and pale green alteration coronas.

VEIN ALTERATION: n/a

STRUCTURE: Coarse-grained gabbro with massive and rarely oikocrystic, large clinopyroxene. Weak cataclasis.

Core Photo



305-U1309D-109R-1 (Section top: 539.80 mbsf)

UNIT-282: Olivine-bearing Gabbro
Pieces: 1-5

PRIMARY MINERALOGY: Modal data from Piece 1c

Olivine	Modal 2% Size 3 mm average Shape anhedral
Plagioclase	Modal 63% Size to 15 mm Shape euhedral to anhedral
Clinopyroxene	Modal 35% Size to 35 mm Shape subhedral

COMMENTS: Unit 282 is coarse-grained olivine-bearing gabbro. Variable pyroxene mode (30-35%), size (maximum 35 mm) and shape (anhedral poikilitic to skeletal), and olivine mode (0 - 4%). Some corona texture in olivine plagioclase, intergranular and chadacryst. Piece 3 catactastic and plagioclase rich.

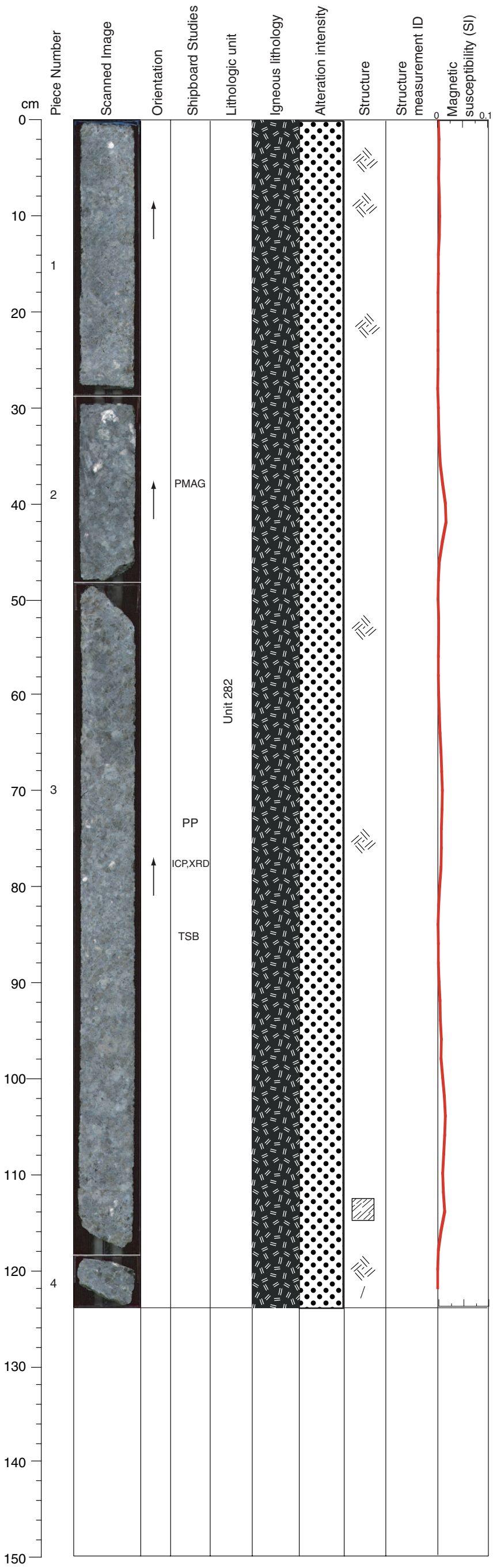
SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: Olivine is moderately altered. At 59-70 cm: alteration halo likely related to the veins.

VEIN ALTERATION: Talc, chlorite

STRUCTURE: Coarse-grained gabbro with massive, rarely oikocrystic, large clinopyroxene. Fracture vein set in upper part, and distributed cataclasis and minor veining.

Core Photo



305-U1309D-109R-2 (Section top: 541.15 mbsf)

UNIT-282: Olivine-bearing Gabbro
Pieces: 1-4

PRIMARY MINERALOGY: Modal data from Piece 1

Olivine	Modal <1% Size 3 mm average Shape anhedral
Plagioclase	Modal 50% Size to 15 mm Shape euhedral to anhedral
Clinopyroxene	Modal 50% Size to 20 mm Shape subhedral

COMMENTS: Continuation of Unit 282 coarse-grained olivine-bearing gabbro. Variable pyroxene mode, size, and shape (anhedral poikilitic to skeletal), and olivine mode (0 - 4%). Some corona texture in olivine; plagioclase, intergranular and chadacryst.

SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: Some corona texture around altered olivine and pale green alteration affects some coronas especially in the bottom half of the section.

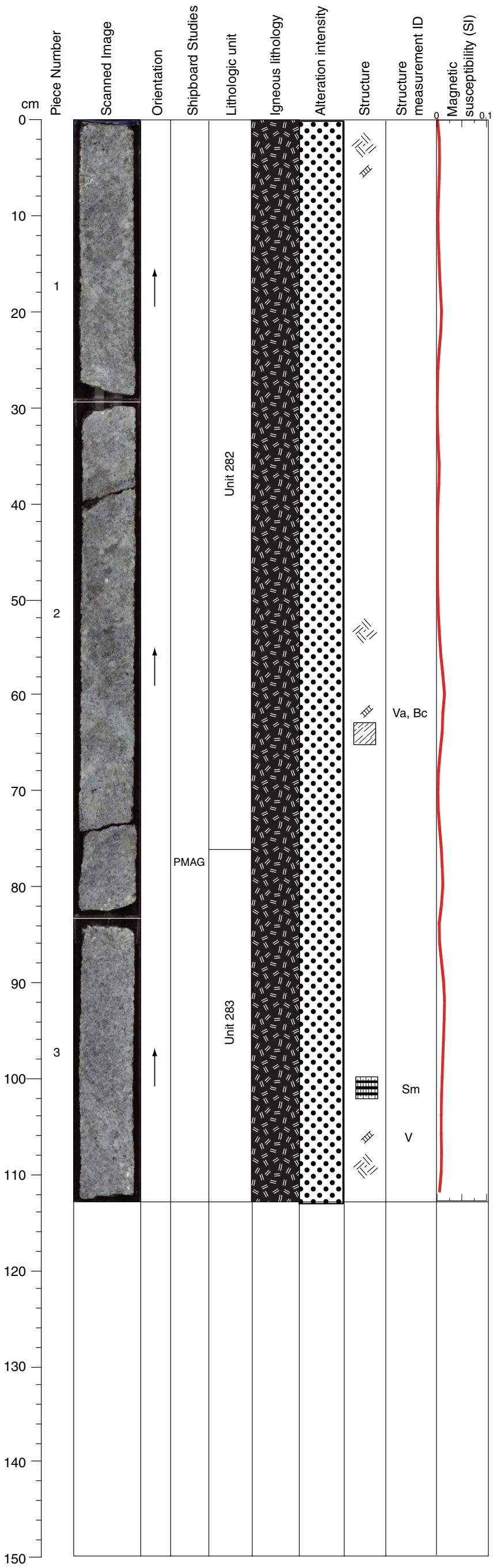
VEIN ALTERATION: Chlorite, talc

THIN SECTIONS:
305-U1309D-109R-2, 85-88 cm (#321)

STRUCTURE: Coarse-grained gabbro with massive, large clinopyroxene, olivine from 0 to 20 cm with corona alteration. Very little cataclasis and no veining.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-109R-2, 80-90 cm WET

Core Photo



305-U1309D-109R-3 (Section top: 542.39 mbsf)

UNIT-282: Olivine-bearing Gabbro
Pieces: 1-2c

PRIMARY MINERALOGY: Modal data from previous section

Olivine	Modal <1% Size 3 mm average Shape anhedral
Plagioclase	Modal 50% Size to 15 mm Shape euhedral to anhedral
Clinopyroxene	Modal 50% Size up to 20 mm Shape subhedral

COMMENTS: Continuation of Unit 282 coarse-grained olivine-bearing gabbro.

UNIT-283: Olivine-bearing Gabbro
Pieces: 2c-3

PRIMARY MINERALOGY: Modal data from Piece 3

Olivine	Modal <1% Size 3 mm average Shape anhedral
Plagioclase	Modal 65% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 35% Size 3 mm average Shape subhedral

COMMENTS: Unit 283 is medium-grained olivine-bearing gabbro. Seriate but nearly equigranular. Olivine small with coronas.

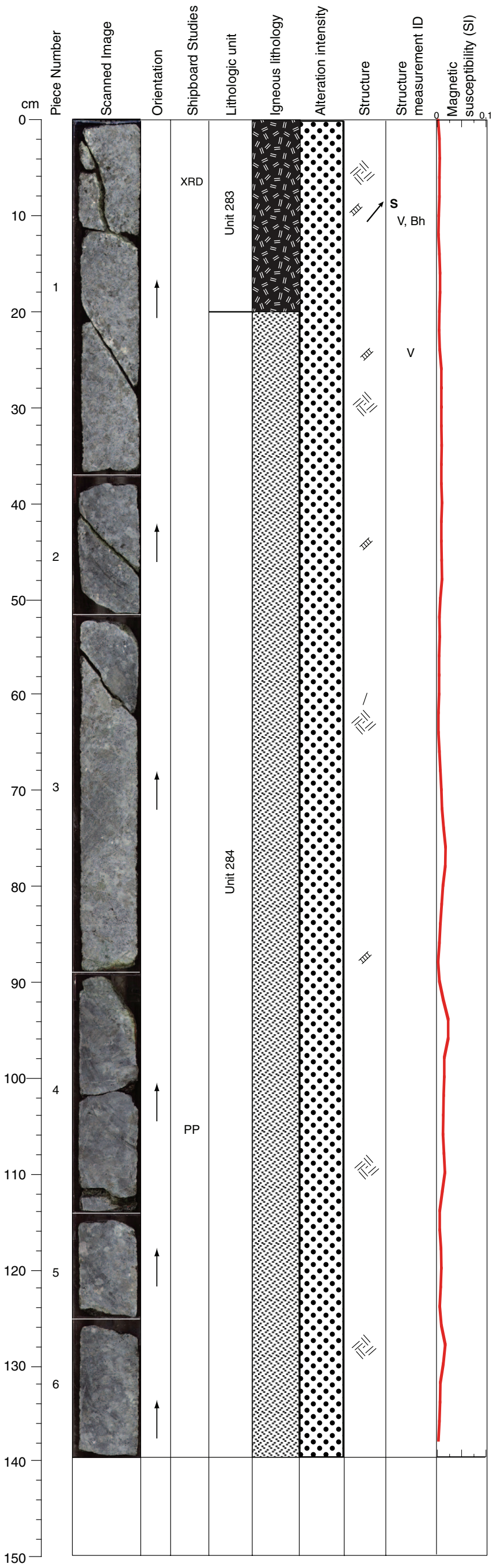
SECONDARY MINERALOGY: Chlorite, pale amphibole, serpentine

COMMENTS: Some corona texture around altered olivine and patches of pale green alteration coronas occur scattered through the section.

VEIN ALTERATION: Amphibole, plagioclase, chlorite, talc

STRUCTURE: Pegmatitic gabbro becoming medium grained down core, weak hint of magmatic fabric in finer grained rocks (Sm). Dark green vein with alteration halo. Pale fracture vein, irregular and steeply dipping.

Core Photo



305-U1309D-109R-4 (Section top: 543.52 mbsf)

UNIT-283: Olivine-bearing Gabbro
Pieces: 1a-1c

PRIMARY MINERALOGY: Modal data from previous section Piece 3

Olivine	Modal <1% Size 3 mm average Shape anhedral
Plagioclase	Modal 65% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 35% Size 3 mm average Shape subhedral

COMMENTS: Continuation of Unit 283 medium-grained olivine-bearing gabbro. Grain size gradually changes to coarse-grained downhole.

UNIT-284: Gabbro
Pieces: 1c-6

PRIMARY MINERALOGY: Modal data from Piece 4a

Olivine	Modal <1% Size 1 mm average Shape anhedral
Plagioclase	Modal 50% Size 5 mm average Shape anhedral to euhedral
Clinopyroxene	Modal 50% Size 15 mm average Shape subhedral to anhedral

COMMENTS: Unit 284 coarse-grained gabbro. Pyroxene coarse at the top of this part and the size reduces toward the bottom. Trace sulfides and oxides.

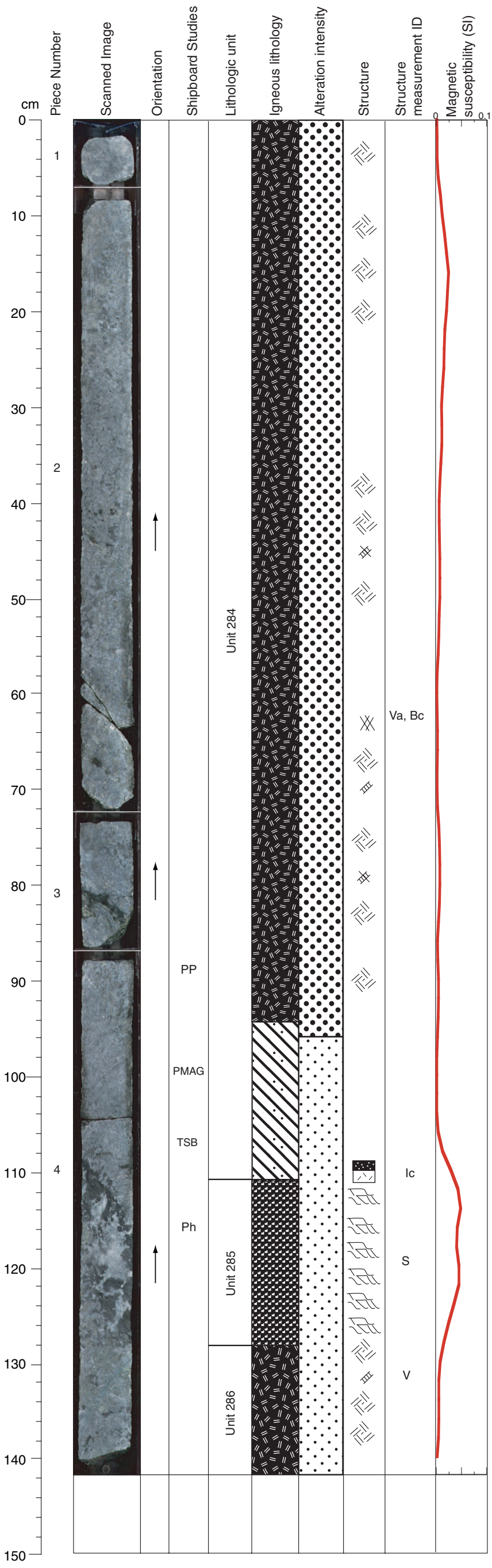
SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: Some corona textures around altered olivine and pale green alteration affects some coronas. At 7 cm, a fracture is filled by a green vein (chlorite, amphibole) with scattered sulfides. Between Pieces 3 and 4 there is an alteration zone rich in green amphibole and patches of epidote.

VEIN ALTERATION: Amphibole, talc, chlorite, sulfides

STRUCTURE: Olivine gabbro with massive, but not very large clinopyroxene. A set of steeply dipping veins, some regular, other irregular with fibers steeply dipping (top). Alteration zones. Little cataclasis.

Core Photo



305-U1309D-110R-1 (Section top: 544.60 mbsf)

UNIT-284: Olivine-bearing to Olivine Gabbro
Pieces: 1-4a

PRIMARY MINERALOGY: Modal data from previous section and from Piece 2

Olivine	Modal trace to 20% Size 5 mm average Shape anhedral
Plagioclase	Modal 40 to 60% Size 15 mm average Shape subhedral to anhedral
Clinopyroxene	Modal 40% Size to 20 mm Shape subhedral to anhedral

COMMENTS: Continuation of Unit 284 medium-grained olivine-bearing gabbro. Olivine and plagioclase mode varies considerably down hole. Coarse-grained olivine gabbro interval at 8-24 cm. Coarse-grained troctolitic interval at 40-55 cm. Olivine corona in troctolitic part. About 3% needle shape black mineral included in plagioclase. Thin section observations confirmed an anorthositic interval at 93-110 cm.

UNIT-285: Troctolite
Pieces: 4b

PRIMARY MINERALOGY: Modal data from Piece 4b

Olivine	Modal 48% Size to 30 mm Shape anhedral
Plagioclase	Modal 51% Size to 80(?) mm Shape interstitial
Clinopyroxene	Modal 1% Size to 10 mm Shape anhedral

COMMENTS: Unit 285 coarse-grained troctolite intrusion. Highly heterogeneous. Plagioclase concentrated at the center of the intrusion, olivine at the margin.

UNIT-286: Olivine-bearing Gabbro
Pieces: 4a

PRIMARY MINERALOGY: Modal data from Piece 1a of next section

Olivine	Modal 4% Size 1-7 mm Shape interstitial
Plagioclase	Modal 46% Size 1-20 mm Shape euhedral to anhedral
Clinopyroxene	Modal 50% Size to 90 mm Shape anhedral

COMMENTS: Unit 286 is coarse-grained olivine-bearing gabbro. Euhedral plagioclase (~1 mm) chadacrysts in very coarse skeletal pyroxene.

SECONDARY MINERALOGY: Chlorite, pale amphibole, serpentine

COMMENTS: Alteration coronas around the olivine grains, likely altered to tremolite, serpentine, and talc, and the plagioclase grains are rimmed by chlorite. Alteration halos of varying widths surround veins of amphibole/chlorite that fill fractures. At 107-120 cm, there is a zone showing foliation of the serpentine + oxide veins, and these are accompanied by sulfides.

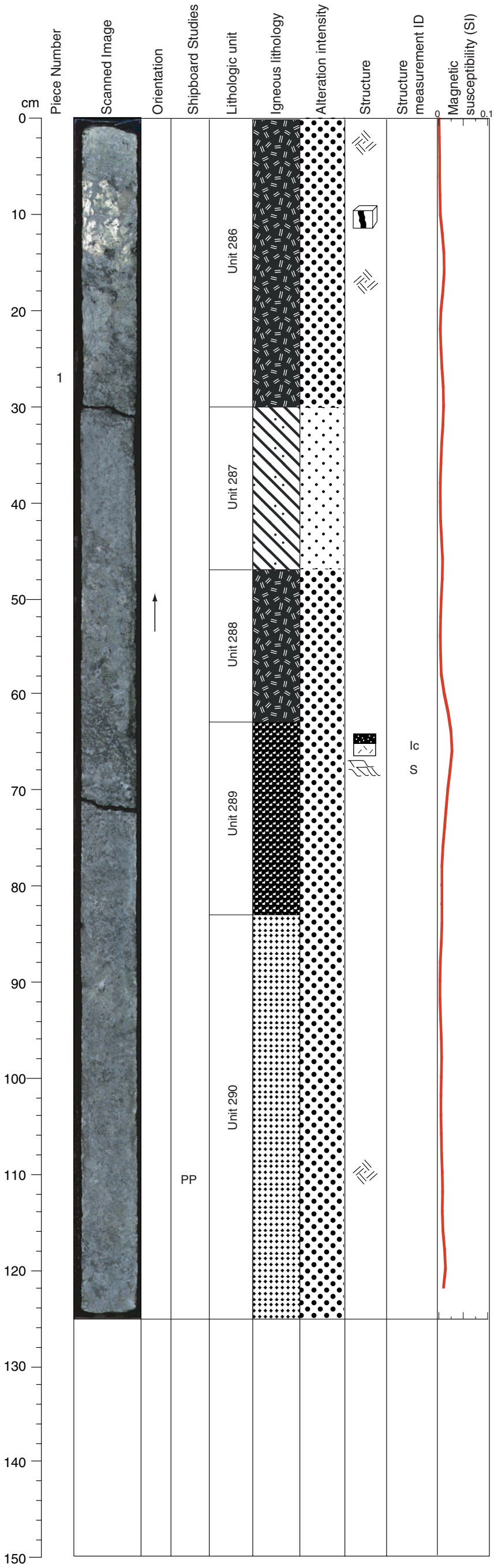
VEIN ALTERATION: Talc, chlorite

THIN SECTIONS:
305-U1309D-110R-1, 109-112 cm (#322)

STRUCTURE: Olivine gabbro with massive clinopyroxene, no fabric, in lower part ultramafic is heavily veined with plagioclase, giving a bulk troctolite composition. Gabbro with leucoratic and troctolite dikes. Intense serpentinite foliation in olivine-rich areas of troctolite. Minor veining and heterogeneous late cataclasis. Serpentinization foliation crosscut by dark green vein, subvertical.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-110R-1, 105-128 cm WET

Core Photo



305-U1309D-110R-2 (Section top: 546.02 mbsf)

UNIT-286: Olivine-bearing Gabbro
Pieces: 1a

PRIMARY MINERALOGY: Modal data from Piece 1a

Olivine	Modal 4% Size 1-7 mm Shape interstitial
Plagioclase	Modal 46% Size 1-20 mm Shape euhedral to anhedral
Clinopyroxene	Modal 50% Size to 90 mm Shape anhedral

COMMENTS: Unit 286 is coarse-grained olivine-bearing gabbro. Euhedral plagioclase (~1 mm) chadacrysts in very coarse skeletal pyroxene.

UNIT-287: Anorthosite
Pieces: 1b

PRIMARY MINERALOGY: Modal data from Piece 1b

Olivine	Modal <1% Size 1 mm average Shape anhedral
Plagioclase	Modal 90% Size 4 mm average Shape anhedral
Clinopyroxene	Modal 10% Size 3 mm average Shape interstitial

COMMENTS: Unit 287 is medium-grained anorthosite with around 10 % clinopyroxene on average. Plagioclase-rich, upper contact is troctolitic.

UNIT-288: Olivine-bearing Gabbro
Pieces: 1b

PRIMARY MINERALOGY: Modal data from Piece 1b

Olivine	Modal 1% Size 1 mm Shape anhedral
Plagioclase	Modal 65% Size 7 mm average Shape euhedral to anhedral
Clinopyroxene	Modal 35% Size 10 mm average Shape anhedral

COMMENTS: Unit 288 is coarse-grained olivine-bearing gabbro. Euhedral plagioclase in skeletal pyroxene oikocryst.

UNIT-289: Troctolite
Pieces: 1c

PRIMARY MINERALOGY: Modal data from Piece 1c

Olivine	Modal 30% Size 3 mm average Shape anhedral
Plagioclase	Modal 62% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 3% Size to 20 mm Shape anhedral

COMMENTS: Unit 289 medium-grained troctolite. Pyroxene oikocryst at 65-70 cm. Plagioclase richer in lower part.

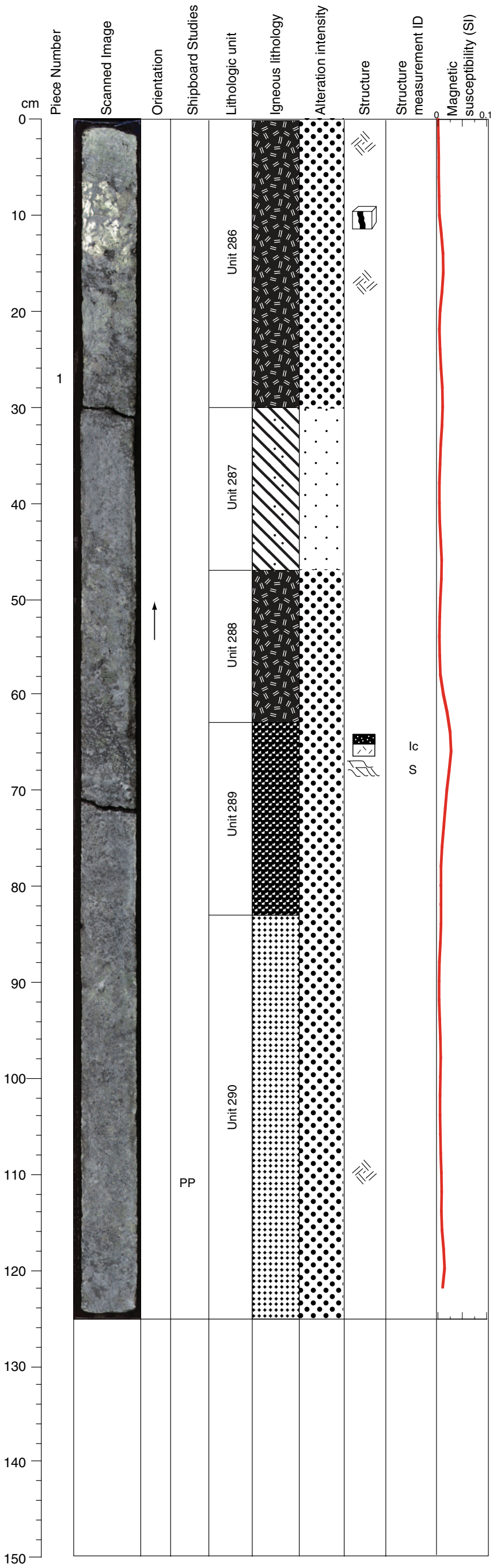
UNIT-290: Olivine Gabbro
Pieces: 1c

PRIMARY MINERALOGY: Modal data from Piece 1c

Olivine	Modal 10% Size 3 mm average Shape anhedral
Plagioclase	Modal 50% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 40% Size 4 mm average Shape subhedral to anhedral

Continued on next page

Core Photo



305-U1309D-110R-2, Continued (Section top: 546.02 mbsf)

COMMENTS: Unit 290 is coarse-grained olivine gabbro. Olivine mode decreases down core. Pyroxene oikocrysts smaller than in other intervals. Pyroxene more interstitial in upper part (boundary with troctolite), the lower part of the core is troctolitic.

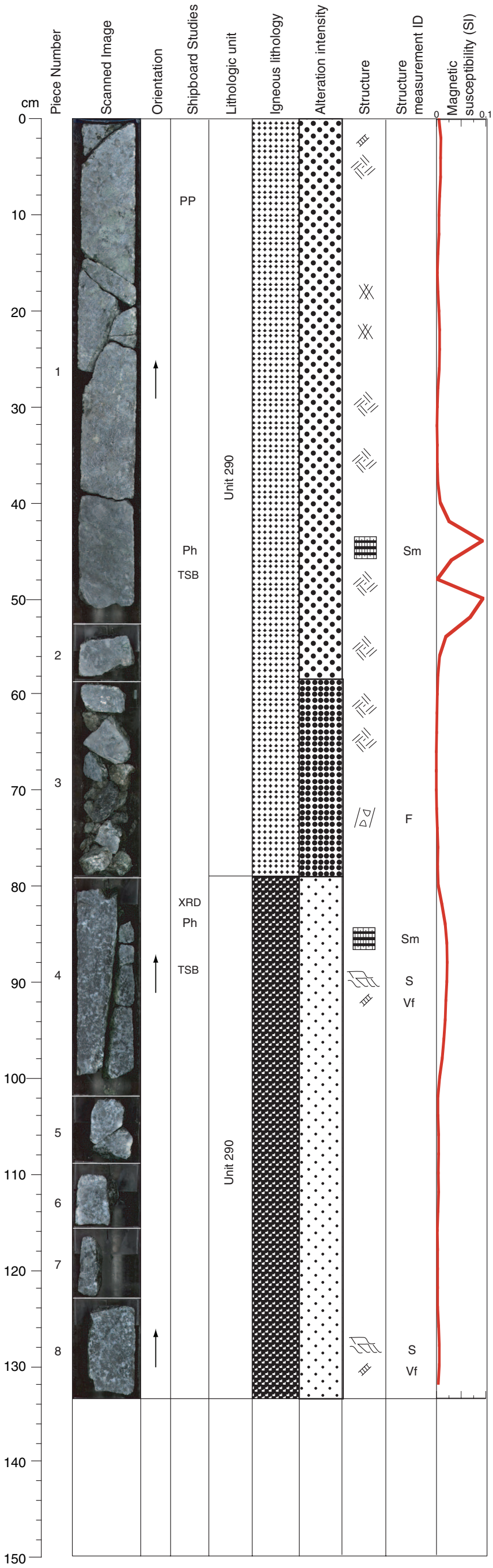
SECONDARY MINERALOGY: Chlorite, pale amphibole, serpentine

COMMENTS: Pyroxene grains tend to be altered to amphibole. Large (7 cm wide) bronze pyroxene occurs at 7-14 cm in Piece 1. The olivine and pyroxene grains are partially altered to tremolite. At 60-67 cm, there is a finer grained zone with foliation of the serpentine + oxide veins. The “foliation” has the same orientation as one described in the previous section.

VEIN ALTERATION: Serpentine

STRUCTURE: Olivine gabbro with troctolitic band but no clear fabric, 10 cm oikocrystic clinopyroxene at top of section. Gabbro with troctolite dike. Serpentinite foliation well developed in troctolite, and very limited cataclasis or veining.

Core Photo



305-U1309D-110R-3 (Section top: 547.27 mbsf)

UNIT-290: Olivine Gabbro
Pieces: 1-3

PRIMARY MINERALOGY: Modal data from previous section, Piece 1c

Olivine	Modal 10% Size 3 mm average Shape anhedral
Plagioclase	Modal 50% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 40% Size 4 mm average Shape subhedral to anhedral

COMMENTS: Continuation of Unit 290 coarse-grained olivine gabbro. Large pyroxene grains between 27-50 cm. Oxide concentration between 42-50 cm. Piece 3 rubble.

UNIT-291: Troctolite
Pieces: 4-8

PRIMARY MINERALOGY: Modal data from Piece 4

Olivine	Modal 46% Size 3 mm average Shape anhedral
Plagioclase	Modal 50% Size 4 mm average Shape anhedral
Clinopyroxene	Modal 4% Size 3 mm average Shape anhedral

COMMENTS: Unit 291 is medium-grained troctolite. Pyroxene at 97 cm.

SECONDARY MINERALOGY: Chlorite, pale amphibole, serpentine

COMMENTS: Throughout the section fractures are filled by green mineral (chlorite and/or amphibole?). Sulfides are associated with these veins. Corona alteration around olivine is rare. The olivine is altered to serpentine and oxides, also associated with sulfides, in the troctolite. The “foliation” is parallel to the subvertical fractures throughout the section.

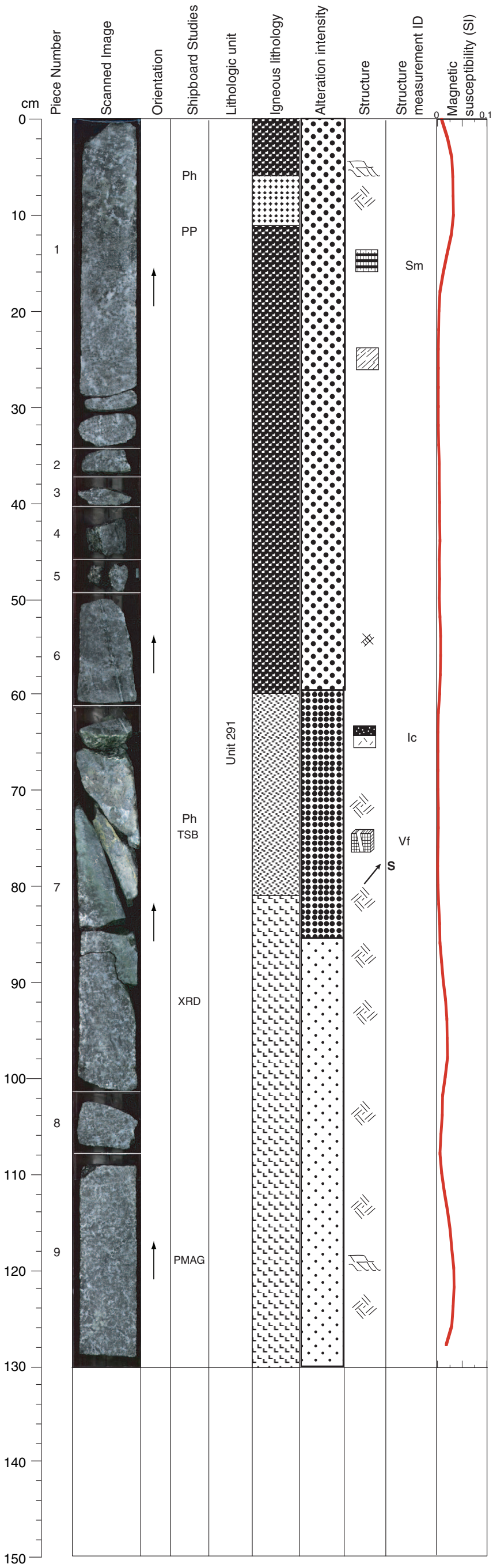
VEIN ALTERATION: Serpentine, talc, chlorite

THIN SECTIONS:
305-U1309D-110R-3, 46-49 cm (#323)
305-U1309D-110R-3, 89-91 cm (#324)

STRUCTURE: Coarse gabbro with massive or oikocrystic clinopyroxene, in one band clearly visible, probable plastic strain. In lower part a troctolitic band with weak magmatic fabric of plagioclase. Coarse gabbro (top) and troctolite (bottom). Highly fractured section interpreted as fault (F). Troctolite shows serpentinization foliations crosscut by veins. Steep dark green veins with oblique fibers.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-110R-3, 40-52 cm WET
305-U1309D-110R-3, 81-89 cm WET

Core Photo



305-U1309D-111R-1 (Section top: 549.40 mbsf)

UNIT-291: Troctolite, Troctolitic Gabbro, Olivine Gabbro
Pieces: 1-9

PRIMARY MINERALOGY: Modal data from Section 305-U1309D-110R-3, Piece 4

Olivine	Modal 46% Size 3 mm average Shape anhedral
Plagioclase	Modal 50% Size 4 mm average Shape anhedral
Clinopyroxene	Modal 4% Size 3 mm average Shape anhedral

COMMENTS: Continuation of Unit 291. The unit is modally variable down section from medium-grained troctolite to coarse-grained gabbro. Small magnetic susceptibility peaks correspond to olivine content. No clear igneous contacts are seen.

SECONDARY MINERALOGY: Chlorite, pale amphibole, serpentine

COMMENTS: The olivine grains in the troctolite are altered to serpentine + oxides and some sulfides are associated. Some chlorite veins cut the section (especially Piece 6) and are haloed by alteration zones of varying width. The plagioclase are green (alteration or replacement by chlorite or green amphibole?). At 72 cm there is an alteration halo containing epidote, surrounding two parallel fractures filled by a green composite of chlorite and tremolite/talc(?).

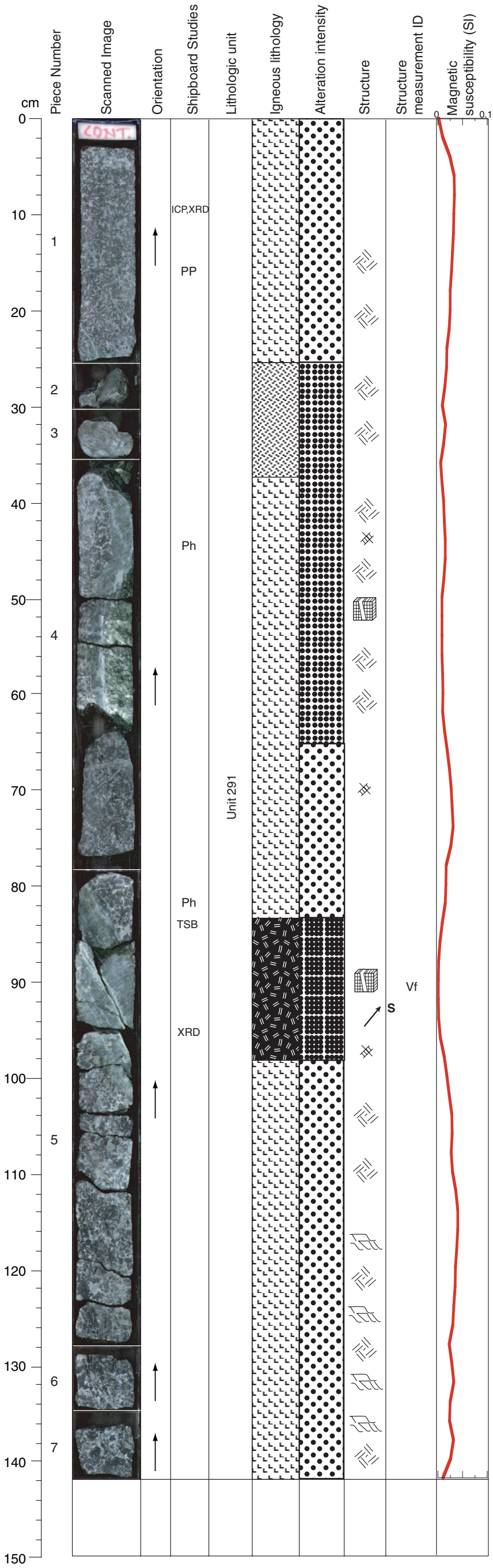
VEIN ALTERATION: Serpentine, talc, chlorite, epidote

THIN SECTIONS:
305-U1309D-111R-1, 70-73 cm (#325)

STRUCTURE: Medium-grained troctolite with plagioclase-rich schlieren oblique to steeply dipping, weak magmatic fabric. Lineation appears subhorizontal. All cut by cm-scale subhorizontal, coarse gabbro. Top : complex gabbro/troctolite with serpentinite foliation and cataclasis. Large alteration vein with associated set of fault veins.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-111R-1, 0-20 cm WET
305-U1309D-111R-1, 58-90 cm WET

Core Photo



305-U1309D-111R-2 (Section top: 550.70 mbsf)

UNIT-291: Troctolitic Gabbro, Olivine-bearing Gabbro, Gabbro
Pieces: 1-7

PRIMARY MINERALOGY: Modal data from Piece 1

Olivine	Modal 68% Size 4 mm average Shape anhedral
Plagioclase	Modal 30% Size 4 mm average Shape anhedral
Clinopyroxene	Modal 2% Size 3 mm average Shape anhedral

COMMENTS: Continuation of Unit 291. The unit is modally variable down section from medium-grained troctolitic gabbro to gabbro. Magnetic susceptibility highs correspond to higher olivine content. No clear igneous contacts are seen. Vertical contact between troctolite and (olivine?) gabbro or possibly alteration front visible at 38-63 cm. Altered gabbro dike at 80-100 cm. Clinopyroxene-rich patch: 98-112 cm.

SECONDARY MINERALOGY: Chlorite, pale amphibole, serpentine

COMMENTS: Several alteration zones occur in this section related to fractures filled by an aggregate of green minerals (serpentine + chlorite/tremolite?). An alteration halo is well developed in Pieces 4a-c, and reaches widths of 2 cm. The halo is likely composed of chlorite and actinolite overprinting the earlier chlorite tremolite/talc alteration. Piece 4d shows two generations of veins (darker crosscutting lighter).

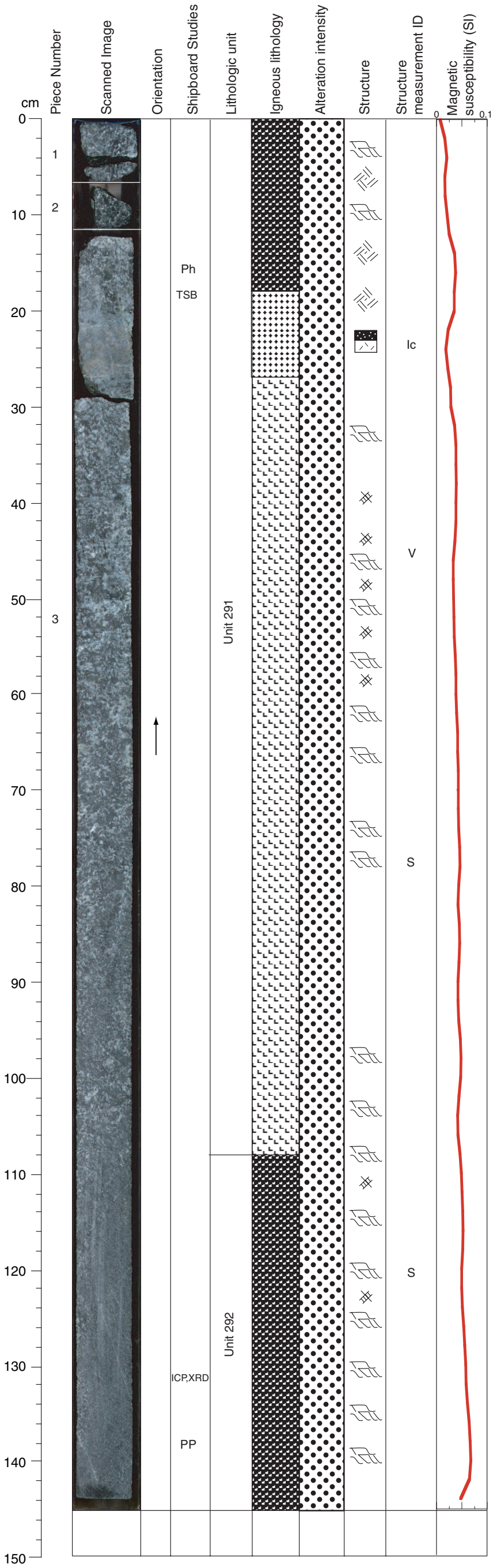
VEIN ALTERATION: Amphibole, talc, chlorite

THIN SECTIONS:
305-U1309D-111R-2, 82-85 cm

STRUCTURE: Medium-grained troctolitic gabbro with no clear ductile fabric. Near bottom of section transition into a network of plagioclase around cm-scale kernels of olivine. Clinopyroxene is massive, not poikilitic. Troctolite with cataclasis and weak serpentinite foliation, sections with veining. Large fibrous fault vein.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-111R-2, 45-74 cm WET
305-U1309D-111R-2, 79-103 cm WET

Core Photo



305-U1309D-111R-3 (Section top: 552.12 mbsf)

UNIT-291: Troctolite, Troctolitic Gabbro, Olivine Gabbro
Pieces: 1-3

PRIMARY MINERALOGY: Modal data from Piece 3

Olivine	Modal 68% Size 4 mm average Shape anhedral
Plagioclase	Modal 30% Size 4 mm average Shape anhedral
Clinopyroxene	Modal 2% Size 3 mm average Shape anhedral

COMMENTS: Continuation of Unit 291. The unit is modally variable down section from medium-grained troctolite to coarse-grained olivine gabbro. Overall magnetic susceptibility high indicates olivine presence. No clear igneous contacts are seen. Horizontal clinopyroxene dike, fine-grained reaction zone at 20-27 cm. Troctolite to troctolitic gabbro with clinopyroxene-rich patches from 27-108 cm.

UNIT-292: Troctolite to olivine-rich troctolite
Piece: 3

PRIMARY MINERALOGY: Modal data from Piece 3

Olivine	Modal 50% Size 1 mm average Shape anhedral
Plagioclase	Modal 50% Size 0.8 mm average Shape anhedral
Clinopyroxene	Modal <1% Size <1 mm average Shape anhedral

COMMENTS: Unit 292 is fine-grained olivine-rich troctolite. Modes are approximate due to fine grain size. Vertical contact with troctolitic gabbro on left side of core image.

SECONDARY MINERALOGY: Chlorite, pale amphibole, serpentine

COMMENTS: Alteration in the clinopyroxene dike at 22-30 cm includes chlorite tremolite/actinolite(?) and sulfides. Several later subparallel, subvertical veins cut across the dike. Numerous subhorizontal sets of pale green veinlets occur below the dike. These are crosscut by dark green serpentinite veins. Serpentine foliations are present from about 70 cm to the bottom of the section. Serpentinization appears more pervasive in the finer-grained material at the bottom of the section.

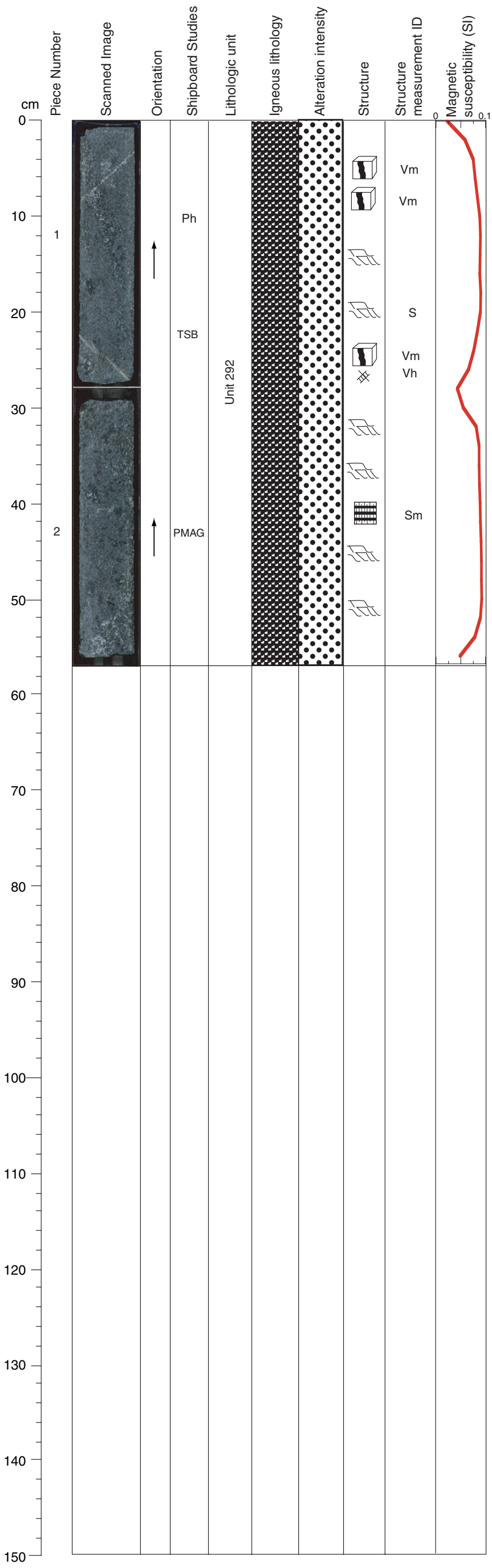
VEIN ALTERATION: Amphibole, talc, chlorite, serpentine

THIN SECTIONS:
305-U1309D-111R-3, 18-21 cm (#327)

STRUCTURE: Medium-grained troctolitic gabbro with no clear ductile fabric. Near bottom of section much finer grained. Crosscutting coarse-grained gabbro. Troctolite with weak serpentine foliations, pyroxene vein with additional veins, and subhorizontal veins post-serpentinization. At bottom fine grain (dunite) with linear, crosscutting veins.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-111R-3, 12-28 cm WET

Core Photo



305-U1309D-111R-4 (Section top: 553.57 mbsf)

UNIT-292: Olivine-rich Troctolite and troctolitic gabbro
Pieces: 1-2

PRIMARY MINERALOGY: Modal data from Piece 1

Olivine	Modal 70% Size 1 mm average Shape anhedral
Plagioclase	Modal 30% Size 0.8 mm average Shape anhedral
Clinopyroxene	Modal <1% Size <1 mm average Shape anhedral

COMMENTS: Continuation of Unit 292 is fine- to medium-grained olivine-rich troctolite. 0-18 cm inclined contact with troctolitic gabbro: 29-56 cm has scattered 10-40 mm olivine grains. High magnetic susceptibility throughout this section indicative of high serpentinized olivine content.

SECONDARY MINERALOGY: Chlorite, pale amphibole, serpentine

COMMENTS: Alteration is similar to bottom of previous section. Serpentine foliation continues. Pervasive alteration of olivine to serpentine and oxides, and associated with sulfides. Light (late magmatic leucocratic) veins are cut by serpentine stringers perpendicular to the leucocratic veins (especially at 26 cm).

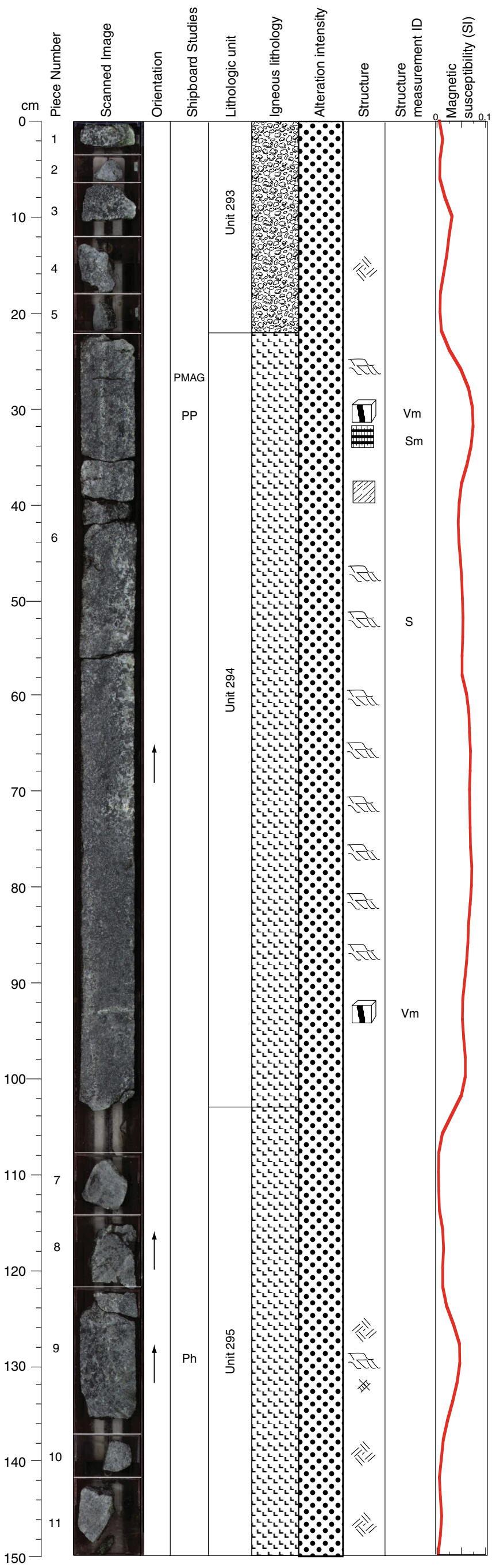
VEIN ALTERATION: Serpentine

THIN SECTIONS:
305-U1309D-111R-4, 22-25 cm (#328)

STRUCTURE: Fine grained troctolitic gabbro with weakly, moderate to steep magmatic fabric by alignment of plagioclase, steeply dipping coarser grained schlieren of more gabbroic composition, all cut by two highly planar, 2 mm, steeply dipping gabbro and plagioclase-rich veins. Fine grain dunite with linear veins (continuation of previous section). Crosscutting set of veins.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-111R-4, 0-27 cm WET

Core Photo



305-U1309D-112R-1 (Section top: 554.20 mbsf)

UNIT-293: Rubble
Pieces: 1-5

PRIMARY MINERALOGY: Modes not determined on rubble

COMMENTS: Unit 293 is troctolite rubble. Uncertain whether it is in place.

UNIT-294: Troctolitic gabbro
Piece: 6

PRIMARY MINERALOGY: Modal data from Piece 6

Olivine	Modal 65% Size 1 mm average Shape anhedral
Plagioclase	Modal 30% Size 0.8 mm average Shape anhedral
Clinopyroxene	Modal 5% Size <1 mm average Shape anhedral

COMMENTS: Unit 294 is fine- to medium-grained troctolitic gabbro. Vertical leucocratic vein: 22-45 cm. Vertical gradational contact with relatively clinopyroxene-rich medium-grained olivine gabbro interval: 35-74 cm, clinopyroxene < 10 mm.

UNIT-295: Troctolitic gabbro
Pieces: 7-11

PRIMARY MINERALOGY: Modal data from Piece 8

Olivine	Modal 65% Size 1 mm average Shape anhedral
Plagioclase	Modal 30% Size 0.8 mm average Shape anhedral
Clinopyroxene	Modal 5% Size <1 mm average Shape anhedral

COMMENTS: Unit 295 is fine- to medium-grained troctolitic gabbro. Clinopyroxene-rich patch in Piece 7, olivine aligned in Piece 8, large clinopyroxene (25 mm) at 131-132 cm, large olivine crystals and clinopyroxene and plagioclase-rich concentrations at 127-134 cm.

SECONDARY MINERALOGY: Chlorite, pale amphibole, serpentine

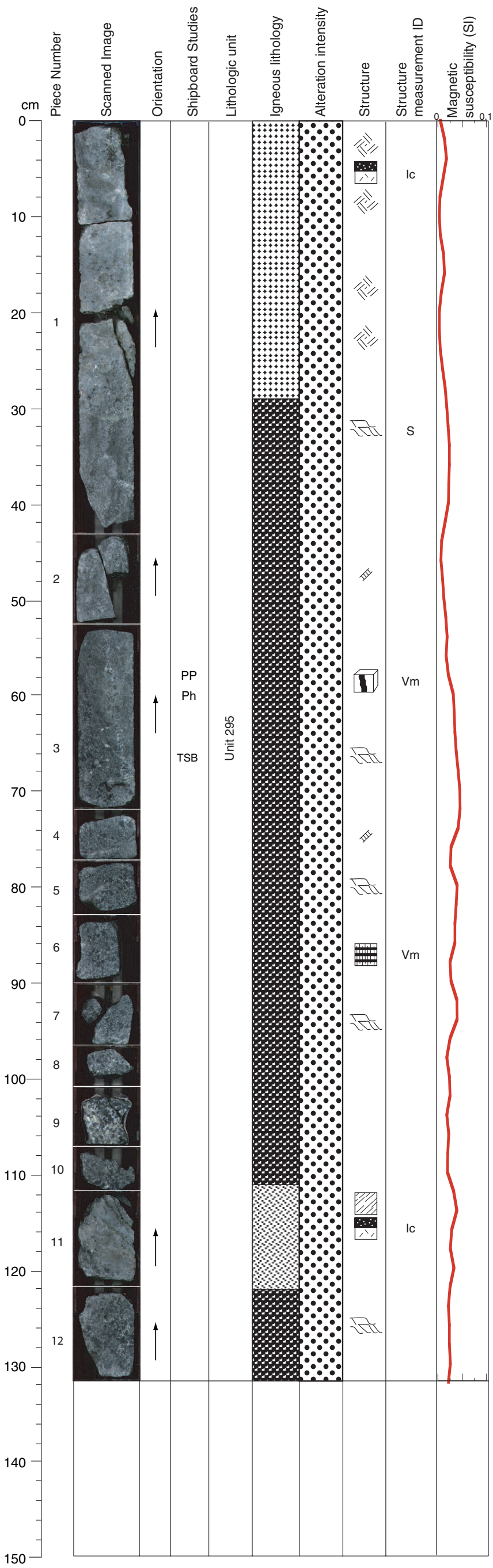
COMMENTS: Continued pervasive serpentinization of olivine and development of serpentinite foliation stringers throughout the troctolite, alteration of plagioclase to green mineral aggregate (amphibole/chlorite) with associated sulfides. The leucocratic intrusive is similarly altered but may have more abundant chlorite/actinolite.

VEIN ALTERATION: Amphibole, talc, chlorite, serpentine, plagioclase?

STRUCTURE: Fine-grained troctolitic gabbro with steeply dipping magmatic fabric by alignment of plagioclase and steeply dipping coarser grained schlieren of more gabbroic composition, all cut mm-sized subhorizontal gabbroic veinlet. Troctolite with weak serpentine foliation, and white subhorizontal veins. Gabbro at bottom, showing cataclasis.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-112R-1, 125-136 cm WET

Core Photo



305-U1309D-112R-2 (Section top: 555.70 mbsf)

UNIT-295: Olivine gabbro, troctolite, gabbro
Pieces: 1-12

PRIMARY MINERALOGY: Modal data from various pieces

Olivine	Modal 5% Size 1-17 mm Shape anhedral
Plagioclase	Modal 50% Size 1-15 mm Shape subhedral
Clinopyroxene	Modal 45% Size 2-50 mm Shape anhedral

COMMENTS: Continuation of Unit 295 in this section comprises medium-grained olivine gabbro, fine- to medium-grained troctolite, coarse-grained gabbro with no major igneous unit boundaries, just gradual modal variability. Vertical plagioclase and clinopyroxene rich band (5-20 mm) at 29-70 cm, larger olivine grains (<15 mm) at 53-111 cm, clinopyroxene-rich band in Piece 9.

SECONDARY MINERALOGY: Chlorite, pale amphibole, serpentine

COMMENTS: The coarser-grained gabbro shows alteration coronas around olivine (tremolite). In the troctolite, serpentinization of olivine, with black patches of serpentine. Maybe some apatite patches at 31 cm? In Piece 11 (113-121 cm) there are several subparallel narrow veins of an aggregate of chlorite and ampibole that have produced an alteration zone in surrounding rock where alteration halos have merged.

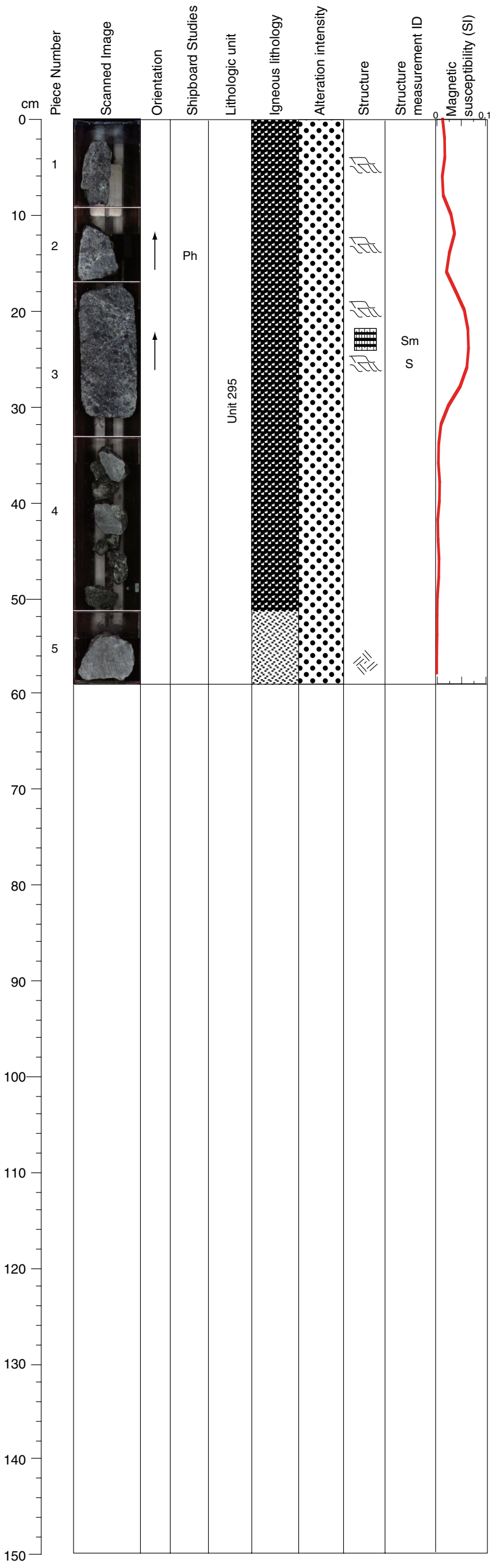
VEIN ALTERATION: Amphibole, talc, chlorite, plagioclase?, serpentine?

THIN SECTIONS:
305-U1309D-112R-2, 67-70 cm (#329)

STRUCTURE: Fine-grained troctolitic gabbro with weak steeply dipping magmatic fabric and steeply dipping coarser grained schlieren of more gabbroic composition, towards bottom larger olivine kernels with plagiclase-rich network, in Piece 9 coarser grained olivine-rich gabbro. Cut by shallowly and moderately dipping coarse-grained gabbro in Pieces 1 and 11. Gabbro transitioning to troctolite with pyroxene vein. Cataclasis on pyroxene grains, limited cataclasis and veining elsewhere.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-112R-2, 53-71 cm WET

Core Photo



305-U1309D-112R-3 (Section top: 557.02 mbsf)

UNIT-295: Troctolite, Gabbro
Pieces: 1-5

PRIMARY MINERALOGY: Modal data from Piece 3

Olivine	Modal 80% Size 4 mm average Shape anhedral
Plagioclase	Modal 18% Size 4 mm average Shape anhedral
Clinopyroxene	Modal 2% Size 4 mm average Shape anhedral

COMMENTS: Continuation of Unit 295 in this section comprises medium-grained gabbro and medium-grained troctolite with no obvious igneous unit boundaries. Leucocratic coarse grain (<25 mm) vein at 6-26 cm.

SECONDARY MINERALOGY: Chlorite, pale amphibole, serpentine

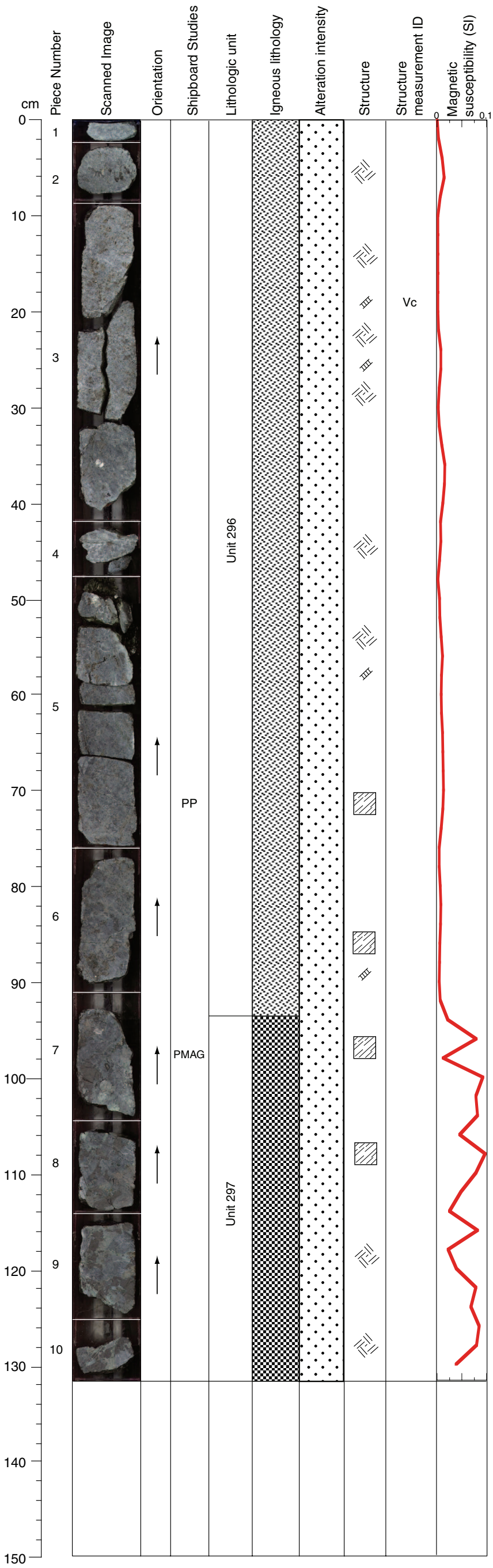
COMMENTS: In Pieces 1-3 the olivine is partially altered to serpentine/oxide and the plagioclase to chlorite. In more leucocratic patches there is also chlorite and ampibole (actinolite?). The coarser grained gabbro is altered as in Section 305-U1309D-112R-2.

VEIN ALTERATION: n/a

STRUCTURE: Fine-grained troctolitic gabbro with weak steeply dipping magmatic fabric and larger olivine kernels with plagioclase rich network, at bottom contact in rubbly pieces to gabbro. Troctolite with weak serpentinite foliation and shattered gabbro.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-112R-3, 17-32 cm WET

Core Photo



305-U1309D-113R-1 (Section top: 559.00 mbsf)

UNIT-296: Gabbro
Pieces: 1-6

PRIMARY MINERALOGY: Modal data from Piece 6

Plagioclase	Modal 60% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 40% Size 5 mm average Shape anhedral

COMMENTS: Unit 296 coarse-grained gabbro.

UNIT-297: Oxide Gabbro
Pieces: 7-10

PRIMARY MINERALOGY: Modal data from Piece 9

Plagioclase	Modal 40% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 35% Size 5 mm average Shape anhedral
Oxide	Modal 25% Size 5 mm average Shape subhedral

COMMENTS: Unit 297 is coarse-grained oxide gabbro. Oxide shape: intergranular and massive. Contains sulfides.

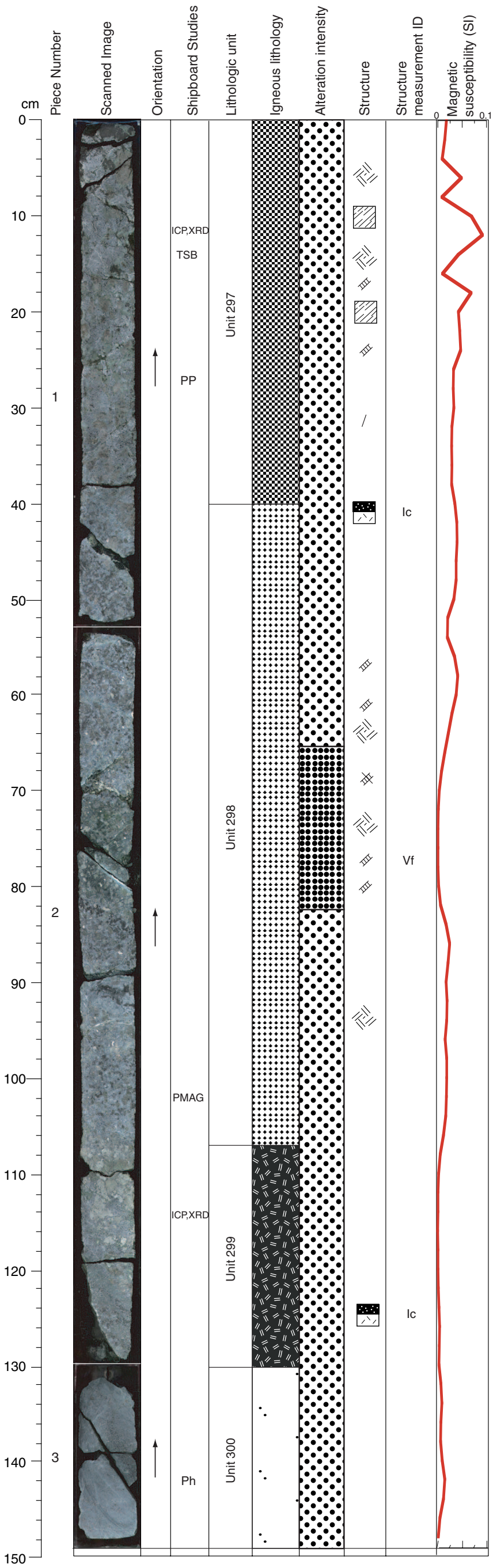
SECONDARY MINERALOGY: Chlorite, pale amphibole, serpentine

COMMENTS: The upper two pieces of the section shows pale-green alteration overprint. The alteration of the coarser oxide gabbro is similar to that of the previous sections. Sulfides occur in the last piece of the section related to the serpentinized olivines.

VEIN ALTERATION: Amphibole, talc, chlorite

STRUCTURE: Medium-grained gabbro without fabric becoming gradually pegmatitic towards base of core. Coarse pyroxenite with late cataclasis (intense, no clear orientation). Late irregular veins with dark green infill, and earlier veins (scarce).

Core Photo



305-U1309D-113R-2 (Section top: 560.32 mbsf)

UNIT-297: Oxide Gabbro
Pieces: 1a-1b

PRIMARY MINERALOGY: Modal data from Piece 1a

Plagioclase	Modal 50% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 25% Size 5 mm average Shape anhedral
Oxide	Modal 25% Size 5 mm average Shape subhedral

COMMENTS: Continuation of Unit 297 coarse-grained oxide gabbro. Oxide drastically decreases at 10 cm.

UNIT-298: Olivine Gabbro
Pieces: 1b-2e

PRIMARY MINERALOGY: Modal data from Piece 2a

Olivine	Modal 10% Size 3 mm average Shape anhedral
Plagioclase	Modal 60% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 30% Size 5 mm average Shape subhedral

COMMENTS: Unit 298 medium-grained olivine gabbro.

UNIT-299: Gabbro
Pieces: 2e-2f

PRIMARY MINERALOGY: Modal data from Piece 2e

Olivine	Modal 2% Size 3 mm average Shape anhedral
Plagioclase	Modal 70% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 30% Size 10 mm average Shape subhedral

COMMENTS: Unit 299 medium-grained gabbro. Coarse-grained clinopyroxene dominant at 107 cm.

UNIT-300: Microgabbro
Piece: 3

PRIMARY MINERALOGY:

COMMENTS: Unit 300 is microgabbro with 4 cm clinopyroxene crystals.

SECONDARY MINERALOGY: Chlorite, pale amphibole, serpentine

COMMENTS: Corona alteration around olivine grains. Pale green (actinolite?) overprints, particularly on pyroxene are more prominant in this section. They are better developed near, three veins (from 56 to 68 cm). Sulfides are associated. Between about 66-76 cm, there are several veins of chlorite + ampible with alteration zones extending several cm thick around each vein, corona texture is well developed in this zone.

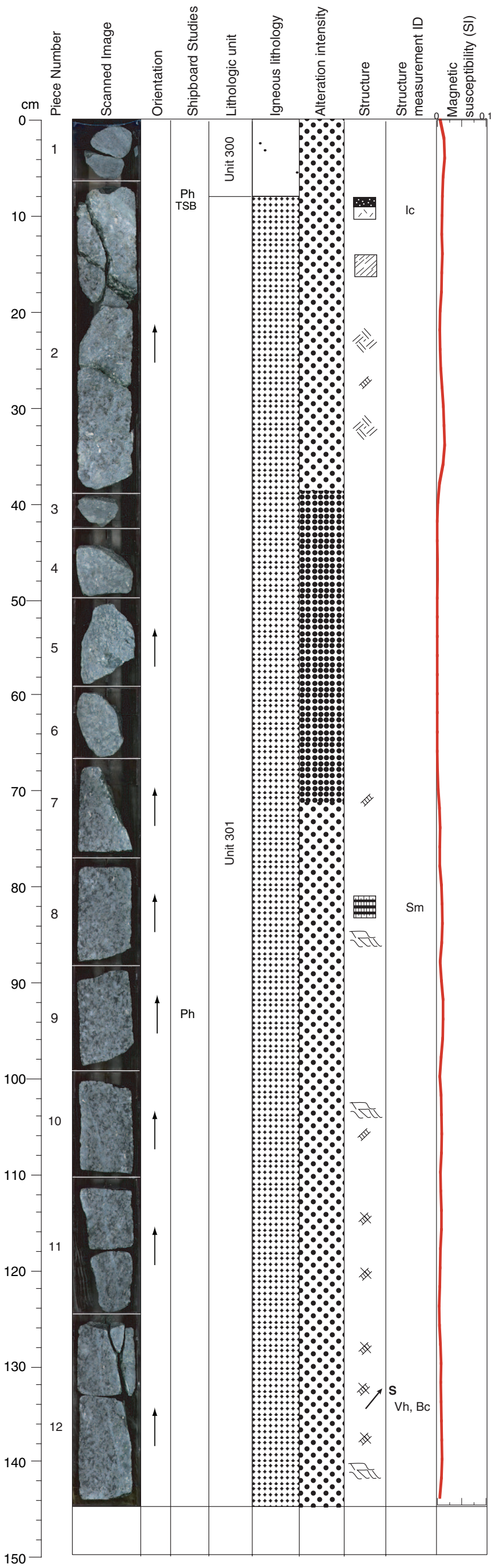
VEIN ALTERATION: Amphibole, talc, chlorite, sulfides

THIN SECTIONS:
305-U1309D-113R-2, 15-17 cm (#330)

STRUCTURE: Strain-free gabbro, changing across igneous contacts from coarse/pegmatitic to medium grained and across another contact to a microgabbro. Coarse pyroxenite with late cataclasis (intense, no clear orientation) and crosscutting veins. Late irregular veins with dark green infill and earlier veins (scarce). Central part shows a succession of pyroxenite with late cataclasis and veins (magmatic vein > green vein with alteration halo > subhorizontal white vein). Irregular distribution, and white alteration halos.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-113R-2, 10-20 cm WET
305-U1309D-113R-2, 64-86 cm WET
305-U1309D-113R-2, 141-149 cm WET

Core Photo



305-U1309D-113R-3 (Section top: 561.82 mbsf)

UNIT-300: Microgabbro
Pieces: 1-2

PRIMARY MINERALOGY:

COMMENTS: Continuation of Unit 300 microgabbro.

UNIT-301: Olivine Gabbro
Pieces: 2-12

PRIMARY MINERALOGY: Modal data from Piece 8

Olivine	Modal 25% Size 5 mm average Shape anhedral to interstitial
Plagioclase	Modal 60% Size 7 mm average Shape subhedral
Clinopyroxene	Modal 15% Size 5 mm average Shape subhedral

COMMENTS: Unit 301 medium-grained olivine gabbro. Coarse-grained clinopyroxene dominant at 11-12 cm.

SECONDARY MINERALOGY: Chlorite, pale amphibole, serpentine

COMMENTS: The corona texture is well developed to Piece 5 (to 60 cm). Chlorite veins cut the two last pieces, where a network of dark serpentine veins appear. In Piece 7 (67-77 cm) there is a pale green alteration halo (2 cm wide) around a vein that lies on the side of the piece. The halo continues into the top of Piece 8. A pale green vein and alteration halo ~0.5 cm wide cuts across Piece 10 at a high angle and a second subparallel one occurs at the base of the piece. These two haloed veins extend to the base of the section.

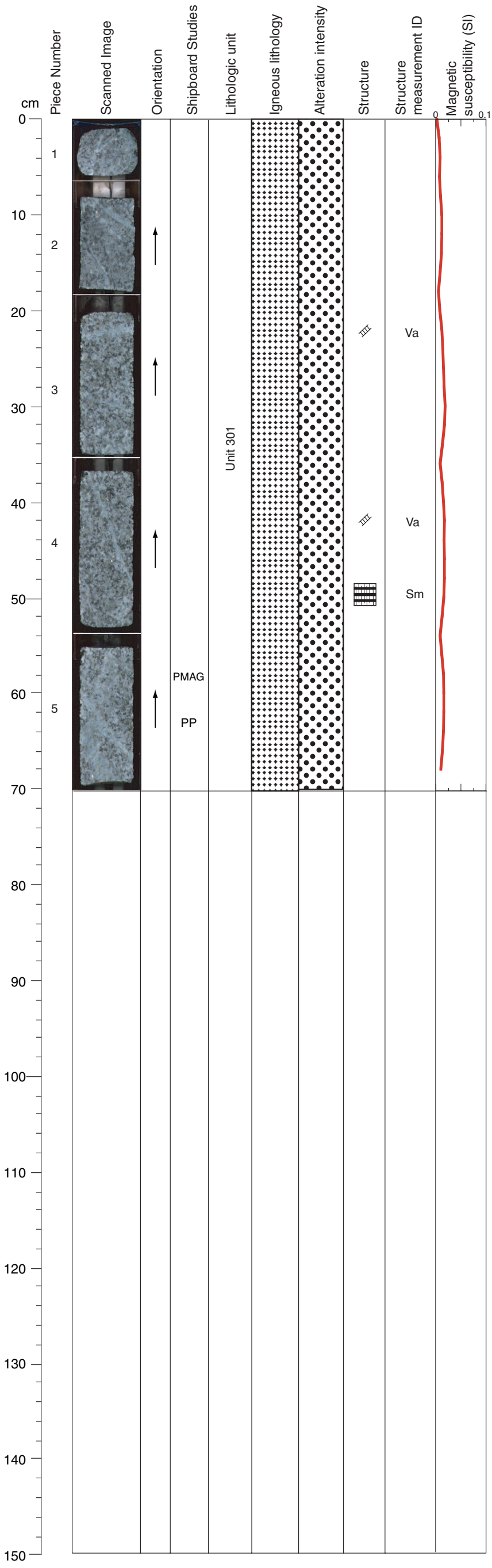
VEIN ALTERATION: Amphibole, talc, chlorite

THIN SECTIONS:
305-U1309D-113R-3, 9-12 cm (#331)

STRUCTURE: Microgabbro at top of the section without strain in moderately dipping contact to gabbro with magmatic strain, fabric of which is steeply dipping with shallow lineation. Weak serpentine foliation, vein/cracks with green alteration halos.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-113R-3, 6-18 cm WET
305-U1309D-113R-3, 88-98 cm WET

Core Photo



305-U1309D-113R-4 (Section top: 563.27 mbsf)

UNIT-301: Olivine Gabbro
Pieces: 1-5

PRIMARY MINERALOGY: Modal data from Piece 3

Olivine	Modal 25% Size 5 mm average Shape anhedral to interstitial
Plagioclase	Modal 60% Size 7 mm average Shape subhedral
Clinopyroxene	Modal 15% Size 5 mm average Shape subhedral

COMMENTS: Continuation of Unit 301 medium-grained olivine gabbro.

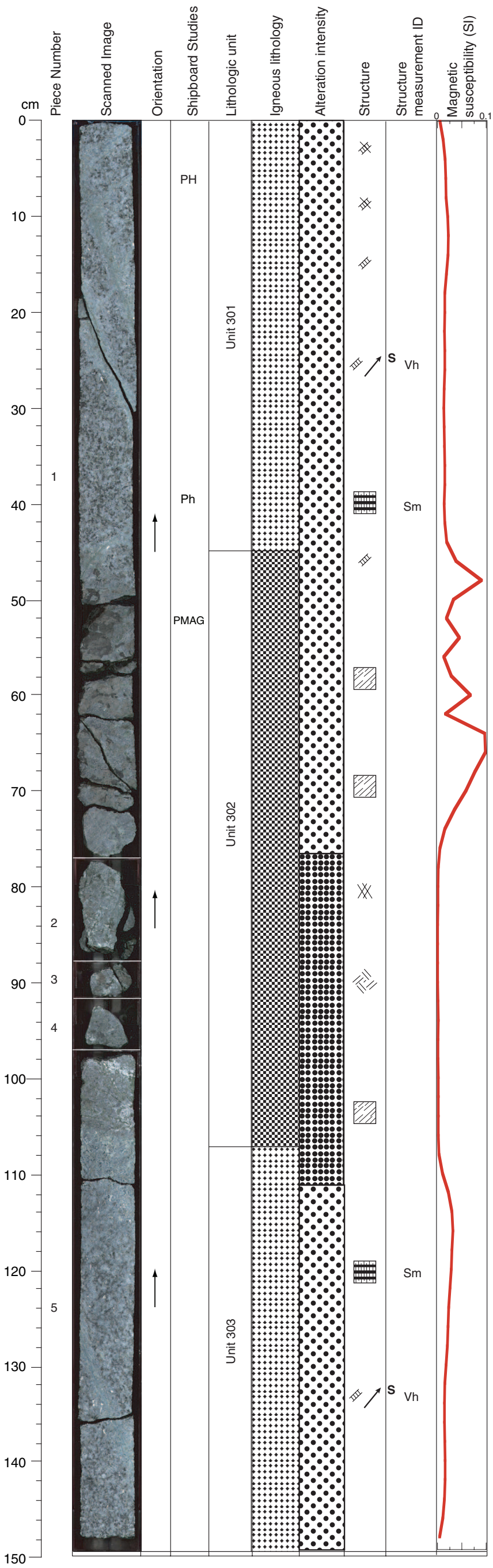
SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: The high-angle veins from the previous section continue through this entire section, but vary in dip. The width of the alteration zones around these veins varies and is widest at the base of the section.

VEIN ALTERATION: Amphibole, talc, chlorite

STRUCTURE: Gabbro with moderately dipping foliation and shallow lineation. Medium gabbro with weak serpentine foliation (irregular), and more abundant green veins.

Core Photo



305-U1309D-114R-1 (Section top: 563.80 mbsf)

UNIT-301: Olivine Gabbro
Pieces: 1a-1b

PRIMARY MINERALOGY: Modal data from Piece 1a

Olivine	Modal 45% Size 5 mm average Shape anhedral to interstitial
Plagioclase	Modal 35% Size 7 mm average Shape subhedral
Clinopyroxene	Modal 20% Size 5 mm average Shape subhedral

COMMENTS: Continuation of Unit 301 medium-grained olivine gabbro.

UNIT-302: Oxide Gabbro
Pieces: 1b-5a

PRIMARY MINERALOGY: Modal data from Piece 1f

Plagioclase	Modal 45% Size 7 mm average Shape subhedral
Clinopyroxene	Modal 45% Size 5 mm average Shape subhedral
Oxide	Modal 10% Size 5 mm average Shape subhedral to interstitial

COMMENTS: Unit 302 is coarse-grained oxide gabbro.

UNIT-303: Olivine Gabbro
Pieces: 5a-5c

PRIMARY MINERALOGY: Modal data from Piece 5b

Olivine	Modal 45% Size 5 mm average Shape anhedral to interstitial
Plagioclase	Modal 35% Size 7 mm average Shape subhedral
Clinopyroxene	Modal 20% Size 5 mm average Shape subhedral

COMMENTS: Unit 303 is medium-grained olivine gabbro.

SECONDARY MINERALOGY: Chlorite, pale amphibole, serpentine, secondary plagioclase?

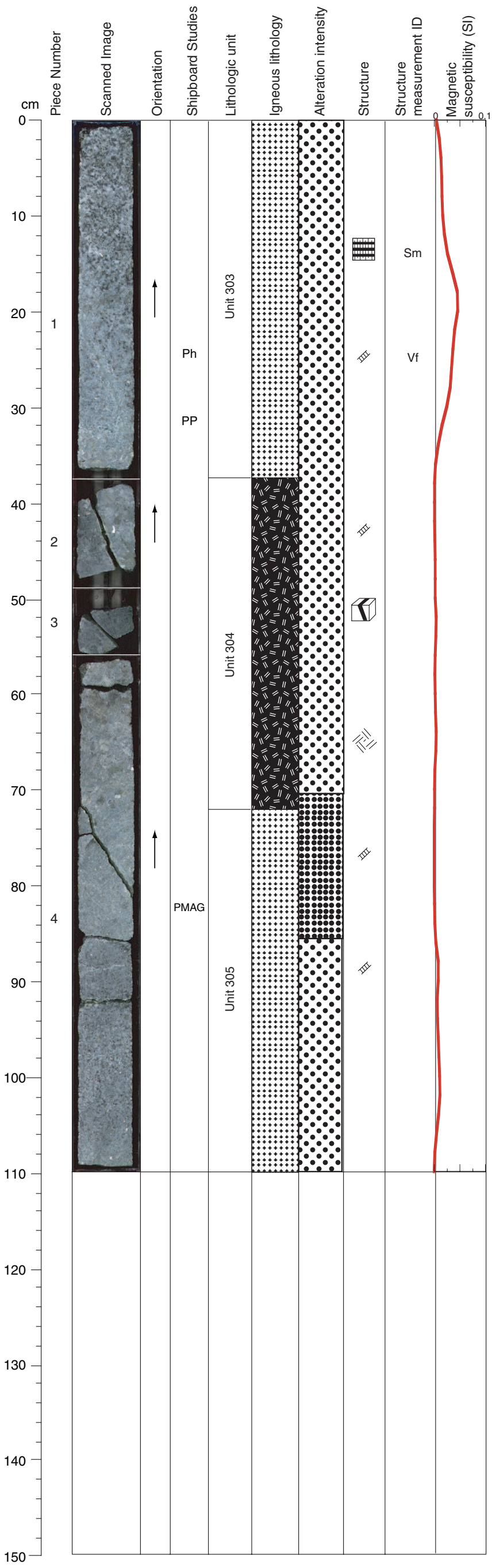
COMMENTS: The alteration is similar to the previous core and the network of veins described therein continues in this section in Piece 1 until 48 cm. A different sort of vein network appears in the coarse leucogabbo starting in Piece 2 at about 80 cm. The veins in this lithology (e.g., see 100-105 cm) lack the alteration halos characteristic of the previous sections. Haloed veins reappear at ~127 cm.

VEIN ALTERATION: Amphibole, plagioclase, chlorite, talc

STRUCTURE: Olivine gabbro with weak magmatic strain and only rare corona olivine alteration cut by pegmatitic gabbro without strain. Medium gabbro with several shear zones, green veins, and a cataclastic zone in center of section (shattered pyroxenite and veined, cataclastic gabbro).

CLOSE-UP PHOTOGRAPHS:
305-U1309D-114R-1, 0-35 cm WET
305-U1309D-114R-1, 39-50 cm WET

Core Photo



305-U1309D-114R-2 (Section top: 565.30 mbsf)

UNIT-303: Olivine Gabbro
Pieces: 1

PRIMARY MINERALOGY: Modal data from Piece 1

Olivine	Modal 40% Size 5 mm average Shape anhedral
Plagioclase	Modal 40% Size 7 mm average Shape anhedral
Clinopyroxene	Modal 20% Size 3 mm average Shape anhedral

COMMENTS: Continuation of Unit 303 medium-grained olivine gabbro.

UNIT-304: Olivine-bearing Gabbro
Pieces: 2-4b

PRIMARY MINERALOGY: Modal data from Piece 2

Olivine	Modal 1% Size 5 mm average Shape anhedral
Plagioclase	Modal 40% Size 4 mm average Shape anhedral
Clinopyroxene	Modal 60% Size 7 mm average Shape subhedral

COMMENTS: Unit 304 medium-grained olivine-bearing gabbro.

UNIT-305: Olivine Gabbro
Pieces: 4b-4e

PRIMARY MINERALOGY: Modal data from Piece 4d

Olivine	Modal 40% Size 5 mm average Shape anhedral
Plagioclase	Modal 40% Size 7 mm average Shape anhedral
Clinopyroxene	Modal 20% Size 3 mm average Shape anhedral

COMMENTS: Unit 305 medium-grained olivine gabbro.

SECONDARY MINERALOGY: Chlorite, pale amphibole

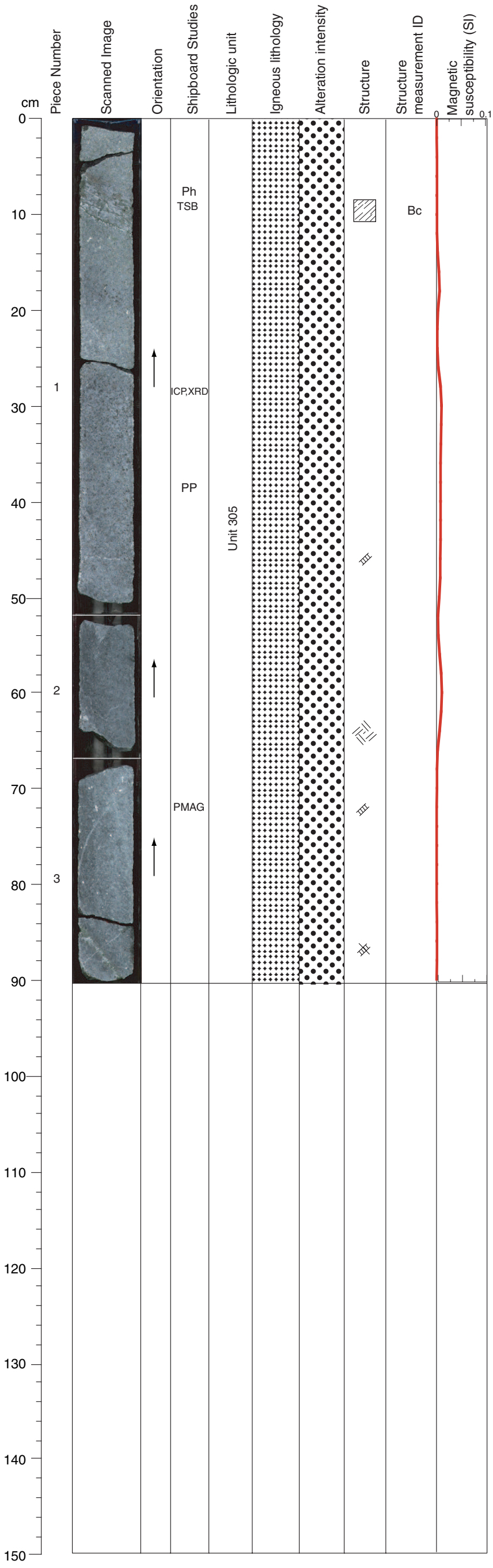
COMMENTS: Alteration in Piece 1 to about 15 cm shows minor corona texture. A wide alteration halo around a chlorite/talc vein from 20 to 34 cm imparts a pale green overprint on the rock. In the coarser gabbro of Pieces 2 to 4 (38 - 70 cm) pryoxene grains have thin green actinolite(?) rims and a chlorite/actinoite(?) vein in Piece 2 has a pale green alteration halo. The finer grained gabbro in the lower part of the section appears less affected by the pale green later alteration except adjacent to veins.

VEIN ALTERATION: Amphibole, talc, chlorite

STRUCTURE: Olivine gabbro with weak magmatic strain changes along an alteration front at 43 cm to olivine gabbro with corona olivine and no discernible fabric. Veins and a pyroxenite crosscutting dike.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-114R-2, 20-37 cm WET

Core Photo



305-U1309D-114R-3 (Section top: 566.40 mbsf)

UNIT-305: Olivine Gabbro
Pieces: 1-3

PRIMARY MINERALOGY: Modal data from Piece 1c

Olivine	Modal 30% Size 5 mm average Shape anhedral
Plagioclase	Modal 50% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 20% Size 3 mm average Shape anhedral

COMMENTS: Continuation of Unit 305 medium-grained olivine gabbro.

SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: A pale-green alteration is prevalent in Pieces 1a-c to about 27 cm. This is probably associated with a network of veins that cut through Piece 1b between 7-12 cm. Piece 2 is less altered. Piece 3 again shows the pale green overprint. A late leucocratic magmatic vein with a halo (~1 cm wide) cuts through the base of Piece 4b (85-90 cm) and is crosscut by a fracture filled with a white mineral(?).

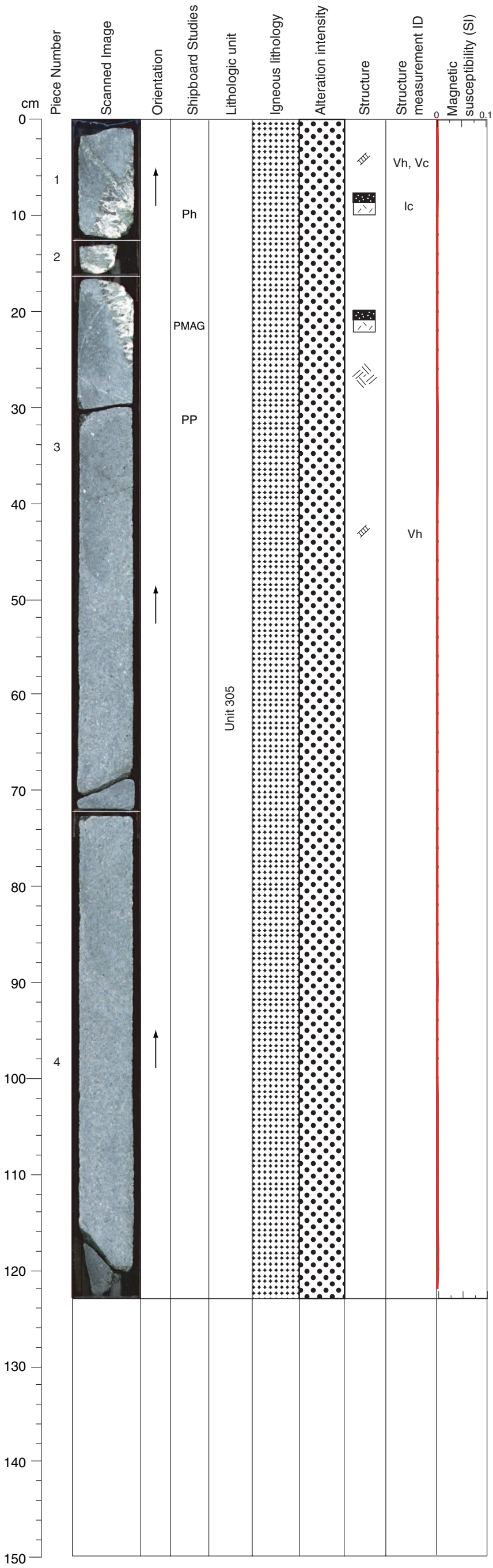
VEIN ALTERATION: Amphibole, talc, chlorite, plagioclase

THIN SECTIONS:
305-U1309D-114R-3, 7-10 cm (#332)

STRUCTURE: Olivine gabbro without visible strain but with corona olivine. Discrete fragile, cataclastic zones.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-114R-3, 0-15 cm WET

Core Photo



305-U1309D-115R-1 (Section top: 568.60 mbsf)

UNIT-305: Gabbro
Pieces: 1-4

PRIMARY MINERALOGY: Modal data from Piece 4

Plagioclase	Modal 70% Size 4 mm average Shape anhedral
Clinopyroxene	Modal 30% Size 4 mm average Shape anhedral

COMMENTS: Continuation of Unit 305 medium-grained gabbro. No olivine in this interval. Coarse-grained (<25 mm) leucocratic vein at 6-26 cm.

SECONDARY MINERALOGY: Chlorite, pale amphibole

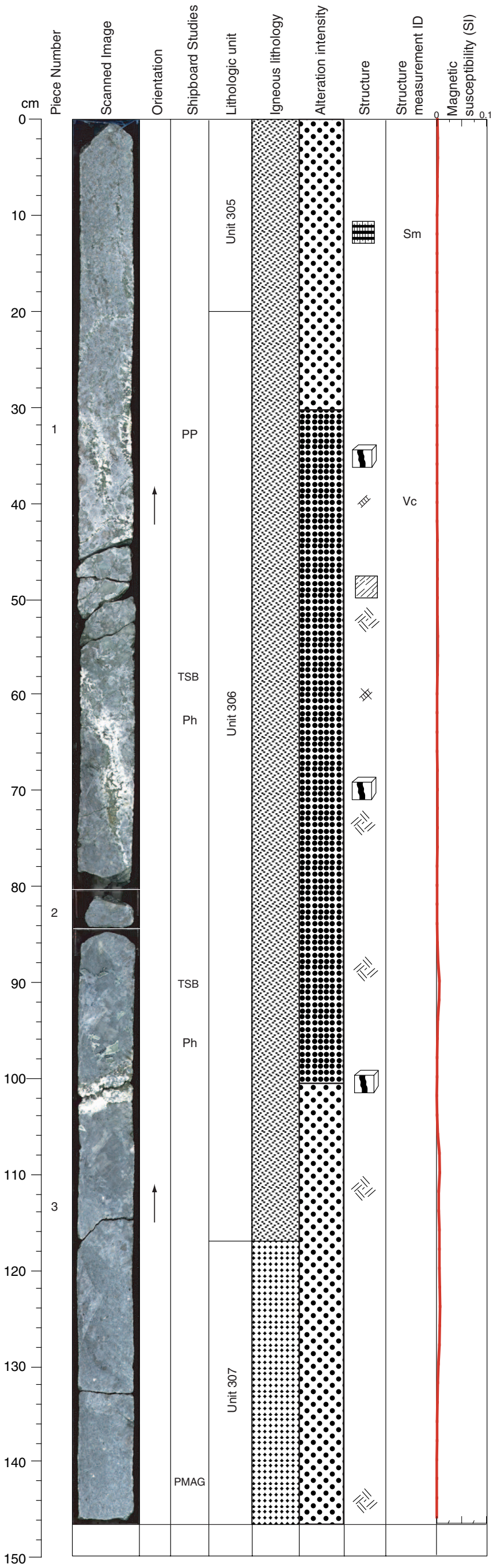
COMMENTS: The gabbro of this section shows alteration affects similar to those of the previous core. A coarse, leucocratic gabbro region (amphibole, plagioclase, and epidote) at 10-26 cm has an associated alteration zone (pale green overprint). At apparent dikelet/veinlet (?) crosscuts the upper part of Piece 1. The pale green overprint alteration commonly associated with such leucocratic regions pervades this section. Some corona texure is associated with this leucocratic material, otherwise the coronas are very small and disseminated in the section.

VEIN ALTERATION: Amphibole, plagioclase, chlorite

STRUCTURE: Gabbro with corona texture, no ductile strain and a curved, but generally steep contact to leucocratic vein. Several sets of veins, different generations, irregularly spaced, and with no consistent dipping direction. No cataclastic deformation, except for hydrothermal veins at top.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-115R-1, 0-10 cm WET

Core Photo



305-U1309D-115R-2 (Section top: 569.83 mbsf)

UNIT-305: Gabbro
Pieces: 1

PRIMARY MINERALOGY: Modal data from previous section, Piece 4

Plagioclase	Modal 70% Size 4 mm average Shape anhedral
Clinopyroxene	Modal 30% Size 4 mm average Shape anhedral

COMMENTS: Continuation of Unit 305 medium-grained gabbro.

UNIT-306: Gabbro
Pieces: 1-3b

PRIMARY MINERALOGY: Modal data from Piece 3a

Plagioclase	Modal 80% Size 2-30 mm Shape subhedral-anhedral
Clinopyroxene	Modal 20% Size 2-40 mm Shape subhedral-anhedral

COMMENTS: Unit 306 is coarse-grained to pegmatitic gabbro. Leucocratic veins/zones at 20-43 cm (oblique and vertical), 57-78 cm (oblique), 99-103 cm (horizontal).

UNIT-307: Olivine Gabbro
Pieces: 3c-3d

PRIMARY MINERALOGY: Modal data from Piece 3d

Olivine	Modal 7% Size 2 mm average Shape interstitial
Plagioclase	Modal 58% Size 4 mm average Shape anhedral
Clinopyroxene	Modal 35% Size 3 mm average Shape subhedral

COMMENTS: Unit 307 is medium-grained olivine gabbro. Oblique dikelet of coarse grain gabbro at 123-140 cm.

SECONDARY MINERALOGY: Chlorite, pale amphibole, serpentine, talc? secondary plagioclase?

COMMENTS: Several leucocratic dikes (green amphibole, plagioclase and epidote) in this section, forming an alteration zone where pyroxene grains are transformed to green amphibole. Well-developed corona textures (up to 2 cm diameter) around olivine and also pale-green coronas. One corona (at 88-90 cm) shows different phases of olivine replacement by serpentine, tremolite, and talc with a chlorite rim. Some olivine grains do not show coronas but show sulfides associated with the secondary tremolite.

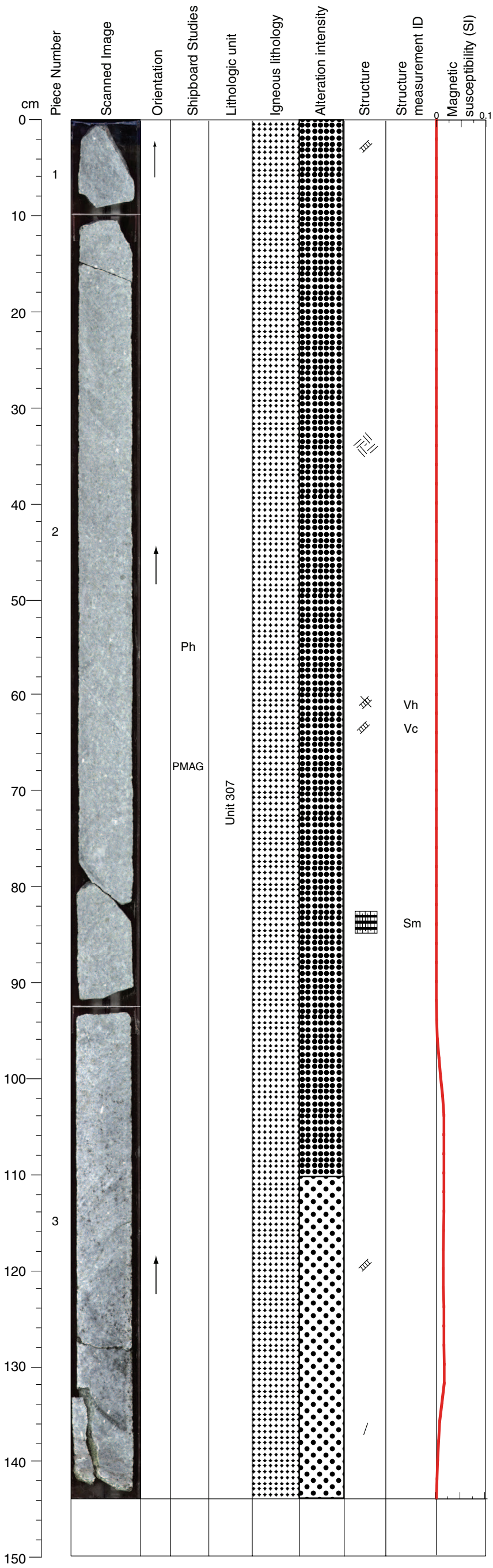
VEIN ALTERATION: Amphibole, epidote, chlorite, plagioclase

THIN SECTIONS:
305-U1309D-115R-2, 57-59 cm (#333)
305-U1309D-115R-2, 89-91 cm (#334)

STRUCTURE: Gabbro with corona texture and steep foliation becoming coarser down core with leucocratic veins. Steeply dipping magmatic veins and later veining (hydrothermal and sets of cataclastic veining).

CLOSE-UP PHOTOGRAPHS:
305-U1309D-115R-2, 54-79 cm WET
305-U1309D-115R-2, 92-100 cm WET

Core Photo



305-U1309D-115R-3 (Section top: 571.30 mbsf)

UNIT-307: Olivine Gabbro
Pieces: 1-3

PRIMARY MINERALOGY: Modal data from Piece 2a

Olivine	Modal 7% Size 3 mm average Shape interstitial
Plagioclase	Modal 58% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 35% Size 2 mm average Shape subhedral

COMMENTS: Continuation of Unit 307 medium-grained olivine gabbro. Zone with enrichment and larger grains of plagioclase and olivine at 97-136 cm, clinopyroxene-rich band at 136-143 cm, olivine-rich zone at 92-104 cm.

SECONDARY MINERALOGY: Chlorite, pale amphibole, secondary plagioclase?

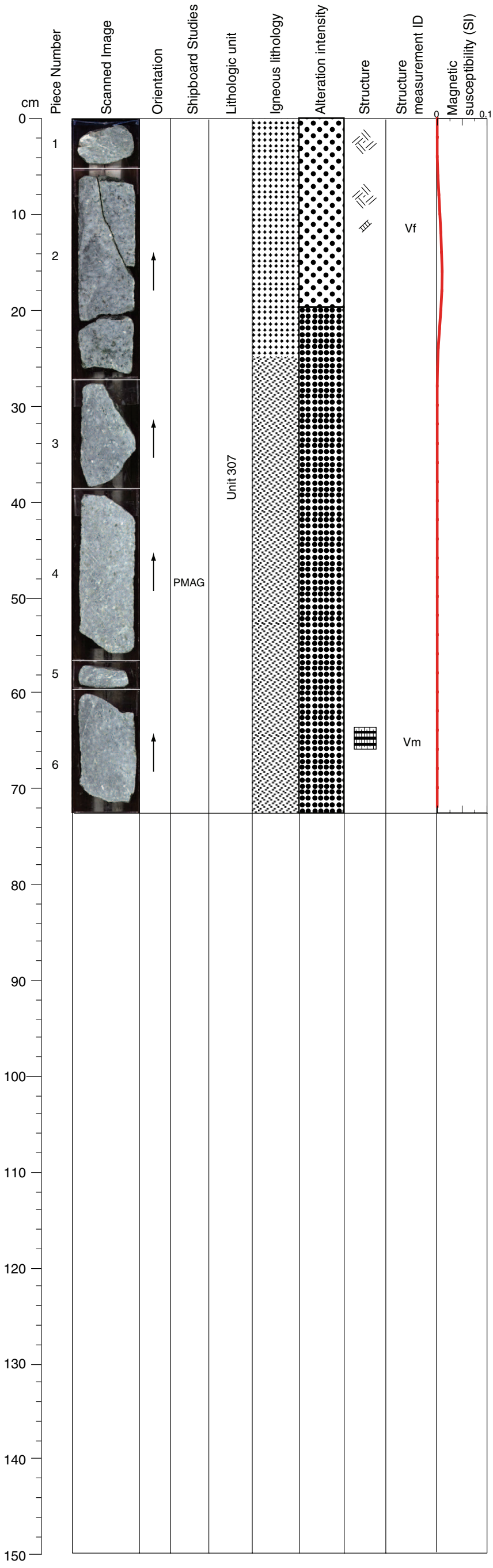
COMMENTS: The section shows a pervasive pale green overprint on earlier alteration. Small corona texture occurs throughout the finer-grained part of the section. The degree of overprinting is slightly less between 120 and 138 cm.

VEIN ALTERATION: Amphibole, talc, chlorite, plagioclase

STRUCTURE: Gabbro with corona alteration and weak, steeply dipping foliation. Numerous, subparallel veins, closely spaced. Early dark green vein set consistently steeply dipping, and a younger more brittle set following the earlier veins or subhorizontal. Veining abruptly disappears at bottom of the section.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-115R-3, 50-70 cm WET

Core Photo



305-U1309D-115R-4 (Section top: 572.74 mbsf)

UNIT-307: Olivine Gabbro and Gabbro
Pieces: 1-6

PRIMARY MINERALOGY: Modal data from several pieces

Olivine	Modal 0-7% Size 3 mm average Shape interstitial
Plagioclase	Modal 58-60% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 35-40% Size 2 mm average Shape subhedral

COMMENTS: Continuation of Unit 307 medium-grained olivine gabbro grading to olivine-free gabbro.

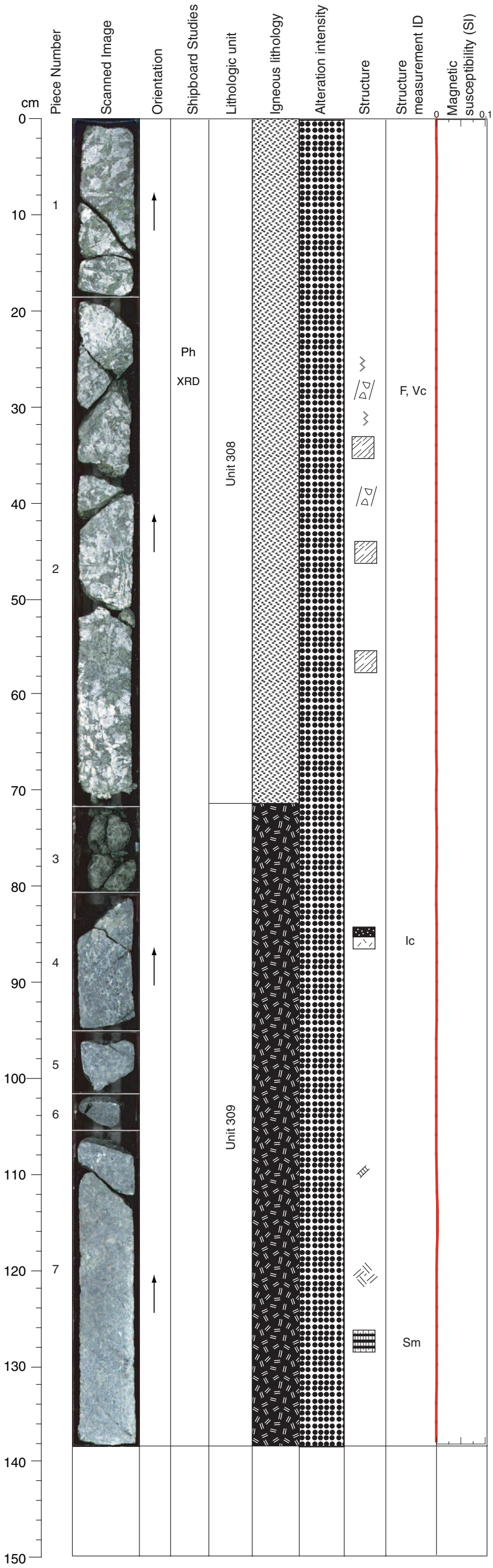
SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: A zone of alteation apparently adjacent to a leucocratic igneous intrusion appears in Piece 1. A general pale green alteration overprint occurs throughout the section. Some pale green coronas occur scattered throughout the section, associated with sulfides (in the corona).

VEIN ALTERATION: Talc

STRUCTURE: Gabbro with corona alteration and weak, steeply dipping foliation. Irregular, late dark green veins (with talc?) and scarce cataclasis and veining.

Core Photo



305-U1309D-116R-1 (Section top: 573.40 mbsf)

UNIT-308: Leucocratic Gabbro
Pieces: 1-2

PRIMARY MINERALOGY: Modal data from several pieces

Plagioclase	Modal 60% Size 3 mm average Shape subhedral
Clinopyroxene	Modal 40% Size 10 mm average Shape subhedral

COMMENTS: Unit 308 is coarse-grained gabbro, appears leucocratic, but this may be an alteration feature. Sulfides at 50-64 cm.

UNIT-309: Olivine-bearing Gabbro
Pieces: 3-7

PRIMARY MINERALOGY: Modal data from Piece 7b

Olivine	Modal 2% Size 1-7 mm Shape interstitial
Plagioclase	Modal 63% Size 1-7 mm Shape anhedral
Clinopyroxene	Modal 35% Size 1-10 mm Shape subhedral

COMMENTS: Unit 309 is medium-grained olivine-bearing gabbro. Clinopyroxene-rich zone at 114-118 cm.

SECONDARY MINERALOGY: Chlorite, pale amphibole

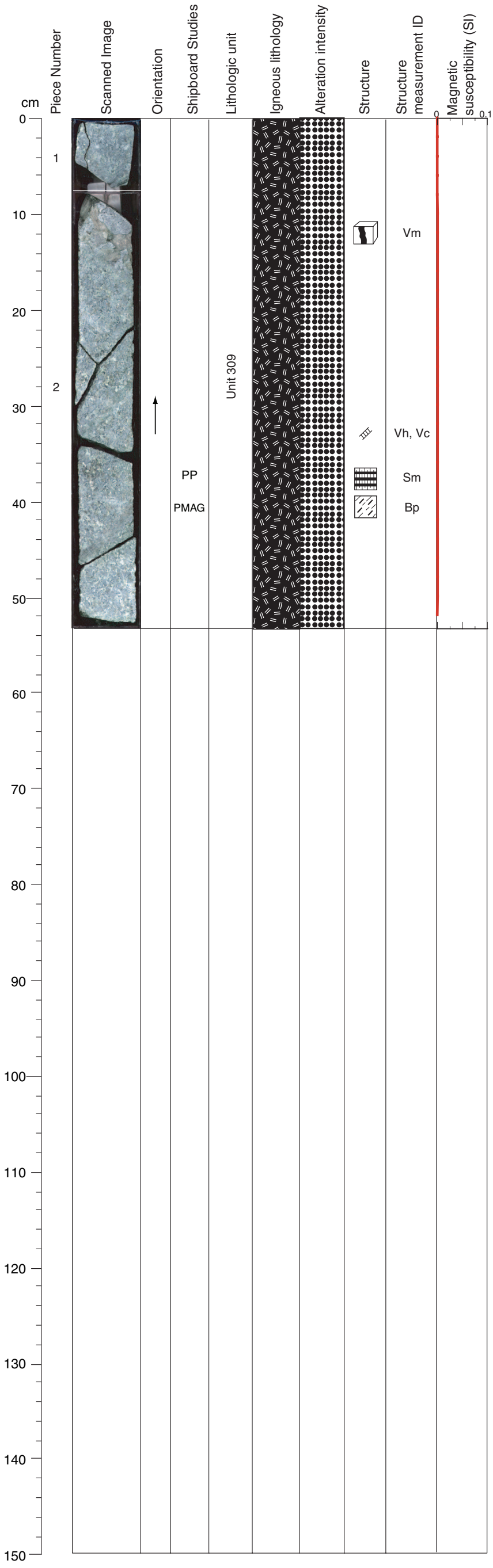
COMMENTS: Leucocratic dike/alteration at tope of section, with amphibole (replacing pyroxene?) and plagioclase. Sulfides are associated with these minerals. Piece 3 is a collection of rubble that is deeply altered to chlorite/actinolite(?). The coarse gabbro at the top of Piece 4 is green and likely has been altered to actinolite(?). At 85 cm and below there is pale green corona texture in the finer gabbro, which continues to through the section.

VEIN ALTERATION: Amphibole, plagioclase, chlorite

STRUCTURE: Brecciated, highly altered coarse grained gabbro with abundant corona alterations grading into more magmatic texture down core, no ductile strain. Large grain pegmatite (?) with cataclastic shear bands, and distributed deformation around them, 50 cm wide if the dip of zone is given by shear zones, and a possible fault zone (rubble fine-grain (fault gouge?)). Undeformed gabbros at bottom.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-116R-1, 20-36 cm WET

Core Photo



305-U1309D-116R-2 (Section top: 574.79 mbsf)

UNIT-309: Olivine-bearing Gabbro
Pieces: 1-2

PRIMARY MINERALOGY: Modal data from Piece 2

Olivine	Modal 2% Size 4 mm average Shape interstitial
Plagioclase	Modal 63% Size 4 mm average Shape anhedral
Clinopyroxene	Modal 35% Size 4 mm average Shape anhedral

COMMENTS: Continuation of Unit 309 medium-grained olivine-bearing gabbro. A narrow band of pegmatitic gabbro occurs between 9-16 cm at the top of Piece 2.

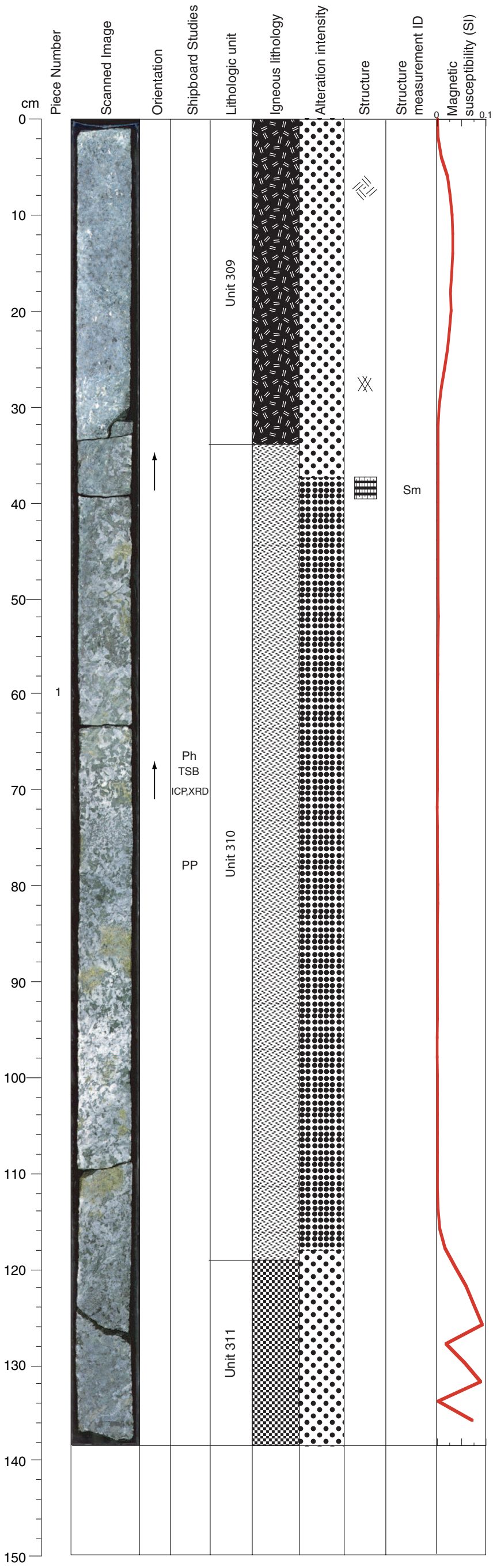
SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: Piece 1 is similar to the previous section. The pegmatitic gabbro at the top of Piece 2 shows alteration rims of actinolite after clinopyroxene. Alteration coronas throughout the section with thicker rim of chlorite than in the previous section.

VEIN ALTERATION: Talc, chlorite

STRUCTURE: Gabbro with corona alterations and weak magmatic foliation in contact with pegmatitic gabbro and moderately dipping brittle-plastic zone showing relative motion. Slight veining. No apparent brittle deformation.

Core Photo



305-U1309D-116R-3 (Section top: 575.32 mbsf)

UNIT-309: Olivine-bearing Gabbro
Pieces: 1a-1b

PRIMARY MINERALOGY: Modal data from Piece 1a

Olivine	Modal 3% Size 1-3 mm Shape interstitial
Plagioclase	Modal 42% Size 4 mm average Shape anhedral
Clinopyroxene	Modal 55% Size 4 mm average Shape subhedral

COMMENTS: Continuation of Unit 309 medium-grained olivine-bearing gabbro.

UNIT-310: Gabbro
Pieces: 1c-1e

PRIMARY MINERALOGY: Modal data from Piece 1c

Plagioclase	Modal 70% Size 2-35 mm Shape anhedral
Clinopyroxene	Modal 30% Size 2-25 mm Shape anhedral

COMMENTS: Unit 310 is coarse-grained gabbro. Epidote alteration in patches, oxide starts to appear at 119 cm.

UNIT-311: Oxide Gabbro
Pieces: 1e-1f

PRIMARY MINERALOGY: Modal data from Piece 1f

Plagioclase	Modal 60% Size 4 mm average Shape anhedral
Clinopyroxene	Modal 35% Size 4 mm average Shape anhedral
Oxide	Modal 2-3% Size 1 mm average Shape interstitial

COMMENTS: Unit 311 is medium-grained oxide gabbro. Patches of interstitial oxide at bottom of section.

SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: Corona texture related to the occurence of leucocratic dikes and veins. At 40-130 cm, leucocratic gabbro with amphibole, plagioclase, pyroxene, patches of epidote (up to 5 cm diameter) and sulfides. The pyroxene present on the top of the section are progressively replaced by green amphibole (actinolite?).

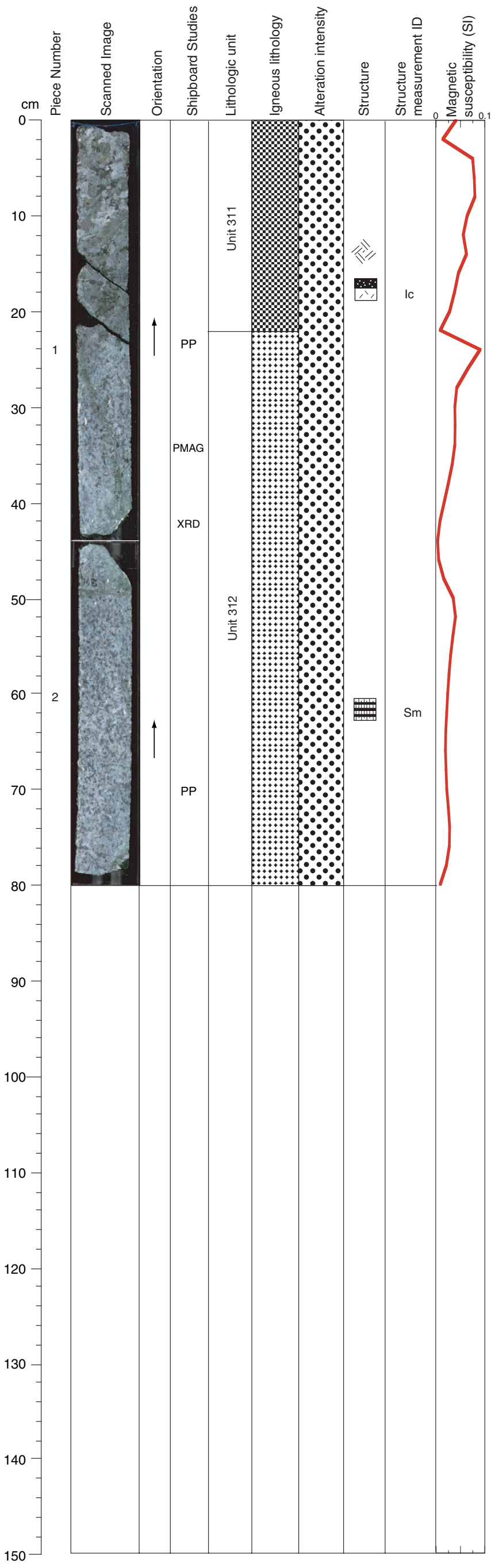
VEIN ALTERATION: Amphibole, talc, chlorite

THIN SECTIONS:
305-U1309D-116R-3, 67-70 cm (#335)

STRUCTURE: Gabbro with corona alteration and weak magmatic foliation in upper part of section and variably textured, grain-size layered, commonly pegmatitic gabbro with abundant epidotite-bearing alteration. Slight veining crosscut by pegmatitic dike with cataclasis and veining, and some shear cracks at the bottom of the section.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-116R-3, 63-76 cm WET

Core Photo



305-U1309D-116R-4 (Section top: 576.71 mbsf)

UNIT-311: Oxide Gabbro
Pieces: 1a-1b

PRIMARY MINERALOGY: Modal data from Piece 1a

Plagioclase	Modal 45% Size up to 25 mm Shape anhedral
Clinopyroxene	Modal 50% Size up to 20 mm Shape anhedral
Oxide	Modal 5% Size 3 mm average Shape interstitial

COMMENTS: Continuation of Unit 311 medium- to coarse-grained oxide gabbro.

UNIT-312: Olivine Gabbro
Pieces: 1b-2

PRIMARY MINERALOGY: Modal data from Piece 2

Olivine	Modal 15% Size 2 mm average Shape interstitial
Plagioclase	Modal 65% Size 4 mm average Shape anhedral
Clinopyroxene	Modal 20% Size 3 mm average Shape subhedral

COMMENTS: Unit 312 is medium-grained olivine gabbro.

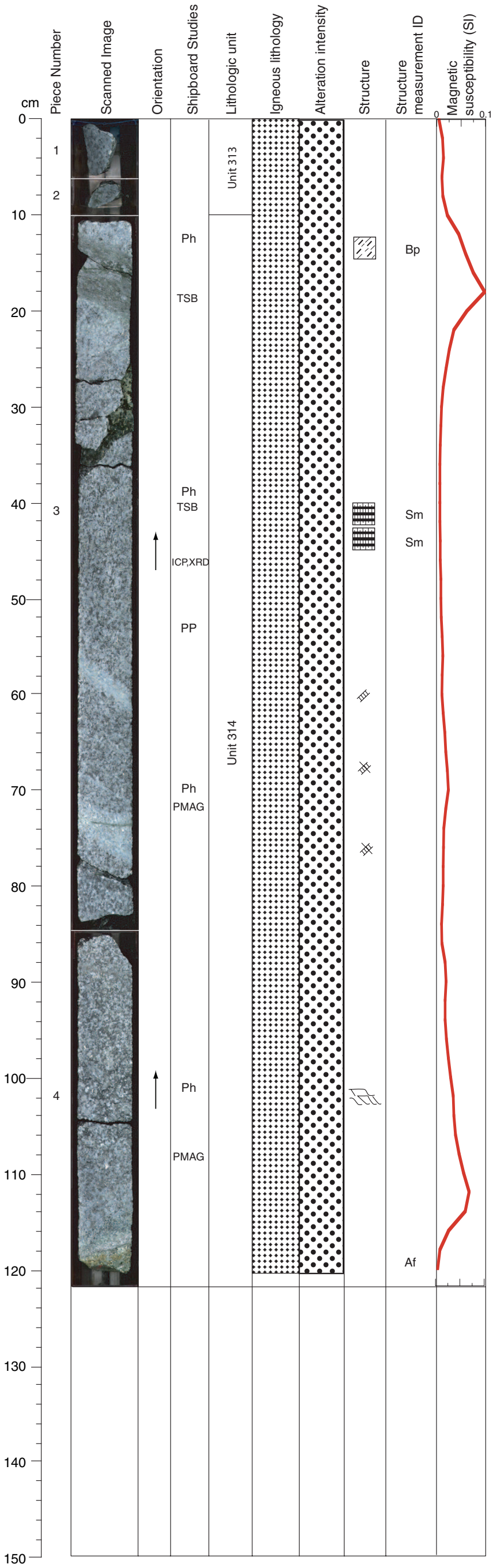
SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: There are reaction rims of green ampibole (actinolite?) around clinopyroxene in the coarse gabbro. Some corona texture occurs in the finer-grained gabbro, related to dark green veins. Below 50 cm there is less well-developed corona texture.

VEIN ALTERATION: Amphibole, plagioclase, chlorite

STRUCTURE: Gabbro with no coronas and weak magmatic foliation. Slightly cracked and veined gabbro.

Core Photo



305-U1309D-117R-1 (Section top: 578.20 mbsf)

UNIT-313: Olivine Gabbro (rubble)
Pieces: 1-2

PRIMARY MINERALOGY:

COMMENTS: Unit 313 is medium-grained olivine gabbro rubble, uncertain if in place.

UNIT-314: Olivine Gabbro
Pieces: 3-4

PRIMARY MINERALOGY: Modal data from Piece 3

Olivine	Modal 30% Size 5 mm average Shape interstitial
Plagioclase	Modal 60% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 30% Size 5 mm average Shape subhedral

COMMENTS: Unit 314 is medium-grained olivine gabbro.

SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: Pieces 1 and 2 are coarse gabbro (out of place?) with alteration rims of green amphibole (actinolite?) around clinopyroxene. In Pieces 3a-b there is a network of green veins (chlorite/actinolite?) that have a pale green halo affecting the surrounding gabbro by enhancing formation of corona texture. Below about 27 cm the pale overprint is missing except where veins crosscut the section (e.g. 57-62 and 72-78 cm). A leucocratic zone occurs at the base of the section and there is an associated alteration halo about 3 cm wide above it.

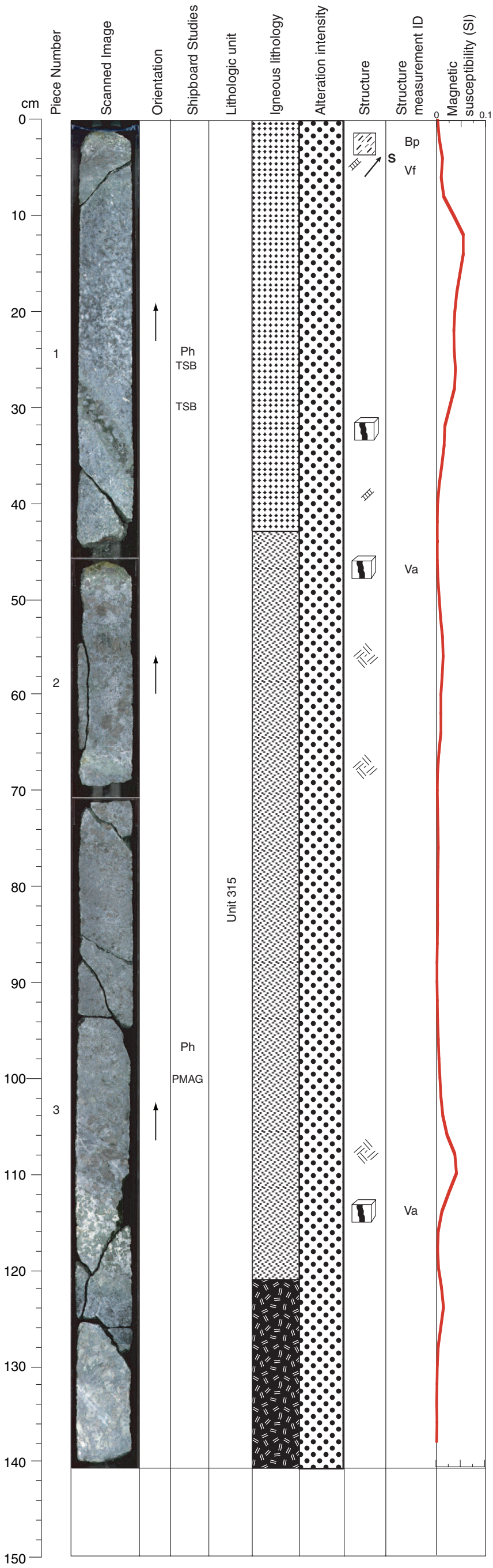
VEIN ALTERATION: Amphibole, talc, chlorite

THIN SECTIONS:
305-U1309D-117R-1, 17-20 cm (#336)
305-U1309D-117R-1, 38-41 cm (#337)

STRUCTURE: Medium-grained gabbro with steeply dipping magmatic fabric and brittle-plastic offset zone with shallow dip in Piece 3, alteration front at bottom of section. Minor veining and random serpentinite foliations (weak) with a shear zone on top (cracking/cataclasis superimposed on plastic (?) shear zone).

CLOSE-UP PHOTOGRAPHS:
305-U1309D-117R-1, 11-28 cm WET
305-U1309D-117R-1, 38-55 cm WET
305-U1309D-117R-1, 70-77 cm WET
305-U1309D-117R-1, 105-120 cm WET

Core Photo



305-U1309D-117R-2 (Section top: 579.41 mbsf)

UNIT-315: Olivine Gabbro, Gabbro, Olivine-bearing Gabbro
Pieces: 1-3i

PRIMARY MINERALOGY: Modal data from several pieces

Olivine	Modal 1-30% Size 1-10 mm Shape interstitial
Plagioclase	Modal 65-70% Size 6 mm average Shape anhedral
Clinopyroxene	Modal 30-35% Size 3-25 mm Shape subhedral

COMMENTS: Unit 315 is medium-grained olivine gabbro, coarse-grained gabbro and olivine-bearing gabbro. Epidote alteration at top of this section. Coarse grained clinopyroxene concentrated at the alteration fronts. Modes change down section to 1:70:30 olivine:plagioclase:clinopyroxene at bottom of section.

SECONDARY MINERALOGY: Chlorite, pale amphibole, serpentine

COMMENTS: A reaction zone similar to that at the base of the previous section appears at the top of Piece 1a and comprises an alteration zone about 2.5 cm wide. Corona texture is moderately developed throughout the section. A leucocratic dike cuts across the section from 27-38 cm and has an alteration halo about 3 cm wide in which a pale green alteration overprints the previous alteration. The top of Piece 2a appears to preserve a small amount of leucocratic material with an alteration halo similar to that at the top of Piece 1a. Further down section large clinopyroxene grains have distinct reaction rims of green amphibole (actinolite?). Alteration in a leucocratic zone from 110 to 124 cm includes clinopyroxene that has been extensively altered to green ampibole (actinolite?) and surrounding minerals that have been altered to a white mineral aggregate (talc/tremolite?)

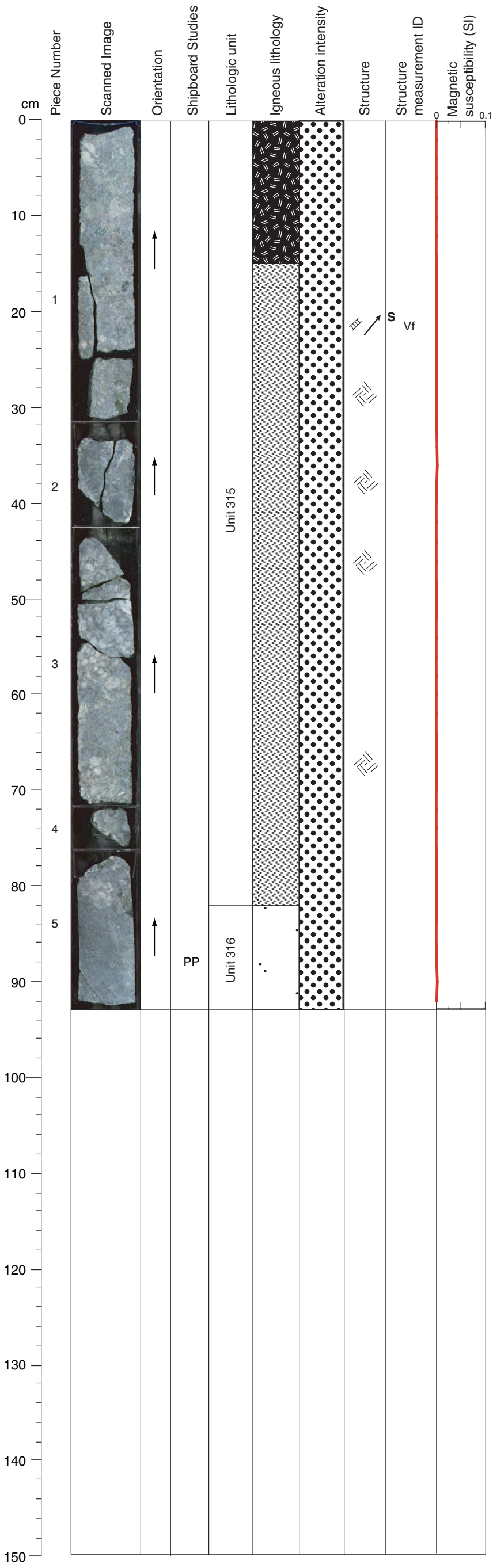
VEIN ALTERATION: Amphibole, talc, chlorite

THIN SECTIONS:
305-U1309D-117R-2, 25-28 cm (#338)
305-U1309D-117R-2, 28-31 cm (#339)

STRUCTURE: Pegmatitic gabbro in igneous contact against medium grained gabbro, no strain. All epidote-related alteration spatially restricted to pegmatitic rocks, either internally or at contact with gabbo. Heterogeneous section with gabbro, dikes, and a more pyroxene-rich area. Limited cataclasis and veining. Dark green fault veins with strike-slip indicators.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-117R-2, 24-41 cm WET
305-U1309D-117R-2, 97-117 cm WET

Core Photo



305-U1309D-117R-3 (Section top: 580.83 mbsf)

UNIT-315: Olivine-bearing Gabbro, Gabbro
Pieces: 1-5a

PRIMARY MINERALOGY: Modal data from Piece 1a and 3c

Olivine	Modal 0-1% Size 1-10 mm Shape interstitial
Plagioclase	Modal 70-30% Size 6 mm average Shape anhedral
Clinopyroxene	Modal 30-70% Size 3-25 mm Shape subhedral

COMMENTS: Continuation of Unit 315 coarse-grained olivine-bearing gabbro grading to gabbro. Clinopyroxene-rich zone at 45-57 cm.

UNIT-316: Microgabbro
Pieces: 5a

PRIMARY MINERALOGY:

COMMENTS: Unit 316 is a fine-grained microgabbro; modes difficult to estimate in hand specimen.

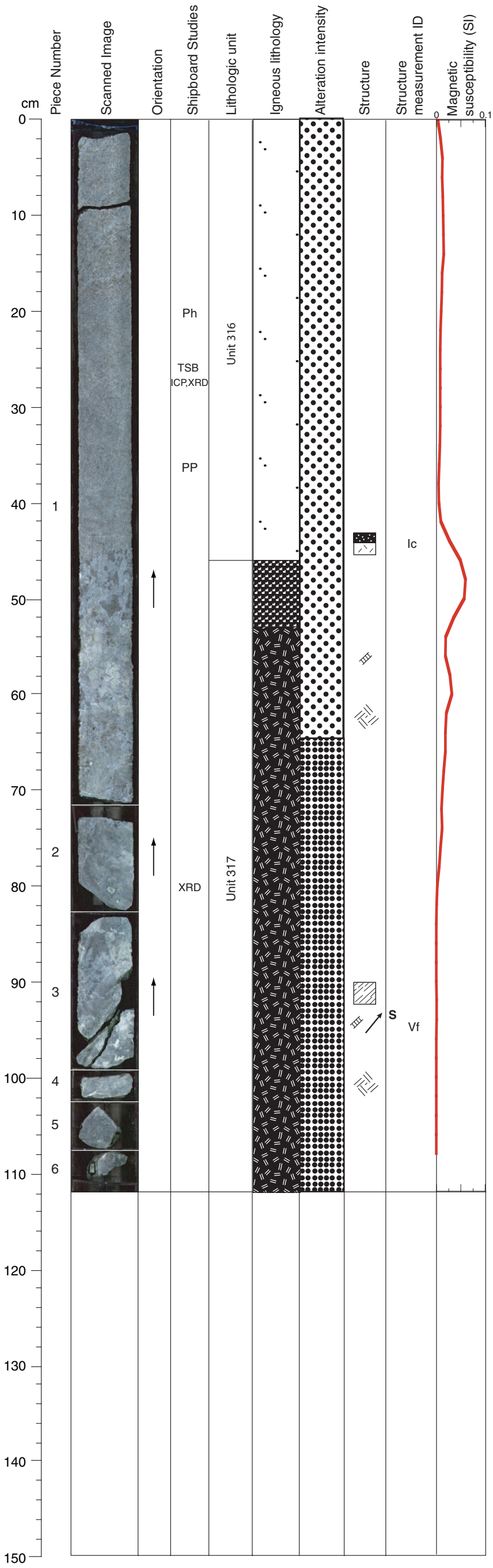
SECONDARY MINERALOGY: Chlorite, pale amphibole, serpentine

COMMENTS: Pieces 1a-c show similar alteration as the previous section. Beginning with Piece 2 through 3c and the top of 3d (to about 58 cm) the gabbro has a pale gray green overprint. Below that interval alteration in the coarse gabbro is similar to previous sections. The fine-grained gabbro below 81 cm has a pervasive pale green alteration overprint.

VEIN ALTERATION: Talc, chlorite

STRUCTURE: Coarse-grained gabbro in igneous contact against microgabbro, no ductile strain. Slight veining and apparent generalized cataclasis (?). Many cataclastic veins with talc fiber. At bottom a plastically deformed shear zone (?) with late veining.

Core Photo



305-U1309D-117R-4 (Section top: 581.76 mbsf)

UNIT-316: Microgabbro
Pieces: 1a-1b

COMMENTS: Continuation of Unit 316 fine-grained microgabbro; modes difficult to estimate in hand specimen. 3% modal orthopyroxene seen in thin section.

UNIT-317: Troctolite, Olivine-bearing Gabbro
Pieces: 1b-6

PRIMARY MINERALOGY: Modal data from Pieces 1b and 2

Olivine	Modal 60 -> 1% Size 2-20 mm Shape anhedral
Plagioclase	Modal 40 -> 50% Size 7 mm average Shape anhedral
Clinopyroxene	Modal 0 -> 50% Size up to 40 mm Shape subhedral

COMMENTS: Unit 317 coarse-grained troctolite grading to olivine-bearing gabbro. Troctolite zone at 45-50 cm changing to olivine gabbro and olivine-bearing gabbro below.

SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: The alteration in Piece 1a and 1b (to 45 cm) is similar to previous section. At about 45 cm an alteration front appears abruptly and extends down section throughout the remainder of the piece. Within this alteration zone, there is a more pronounced pale green overprint on the rock and dark patches (oxide?). At 51 cm a large clinopyroxene is heavily altered to pale green ampibole, some distinct corona texture appears at 80 cm.

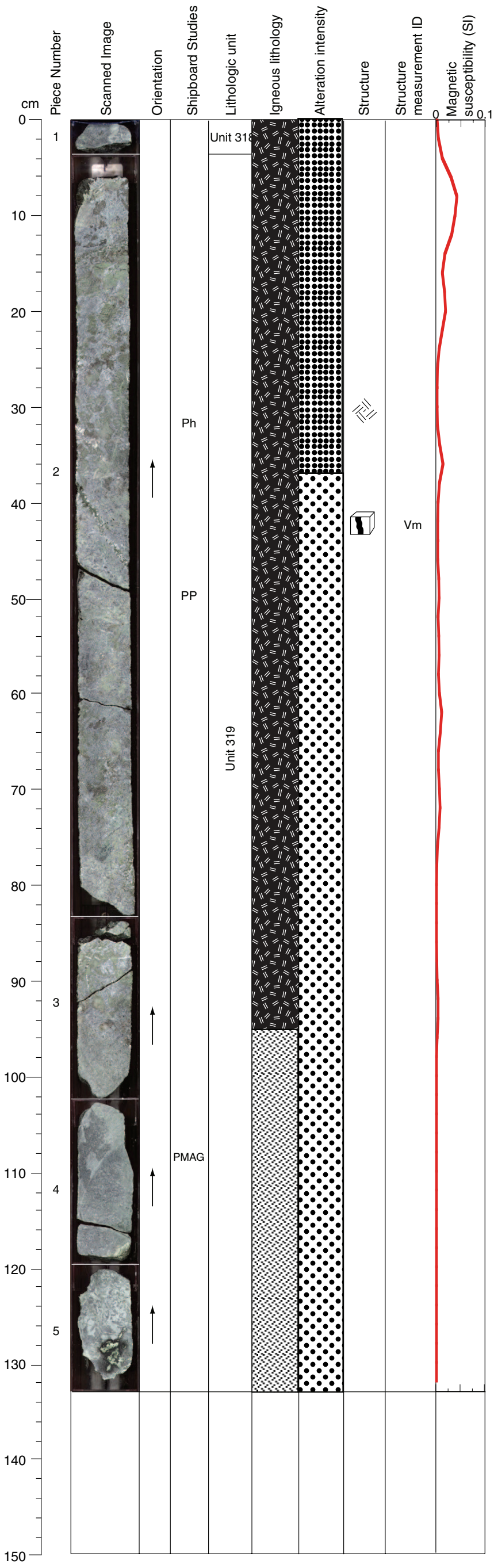
VEIN ALTERATION: Talc, chlorite

THIN SECTIONS:
305-U1309D-117R-4, 24-27 cm (#340)

STRUCTURE: Microgabbro in contact to coarse, locally pegmatitic gabbro (with large amphibole?), no ductile strain. Very homogeneous, fine grain material, plastic (?) deformation underlain by coarse gabbro with irregular veining.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-117R-4, 20-30 cm WET

Core Photo



305-U1309D-118R-1 (Section top: 583.00 mbsf)

UNIT-318: Rubble
Pieces: 1

COMMENTS: Unit 318 is olivine-bearing gabbro rubble with uncertain stratigraphic origin.

UNIT-319: Olivine-bearing Gabbro
Pieces: 2-5

PRIMARY MINERALOGY: Modal data from Piece 2b

Olivine	Modal 4% Size 2-20 mm Shape anhedral
Plagioclase	Modal 55% Size 4 mm average Shape anhedral
Clinopyroxene	Modal 41% Size up to 50 mm Shape subhedral

COMMENTS: Unit 319 is coarse-grained to medium-grained olivine gabbro to olivine-bearing gabbro to microgabbro. Olivine-rich zone at 7-14 cm and 120-133 cm; between these zones is nearly olivine-free gabbro modally variable along section. Zone of microgabbro at 95-120 cm.

SECONDARY MINERALOGY: Chlorite, pale amphibole

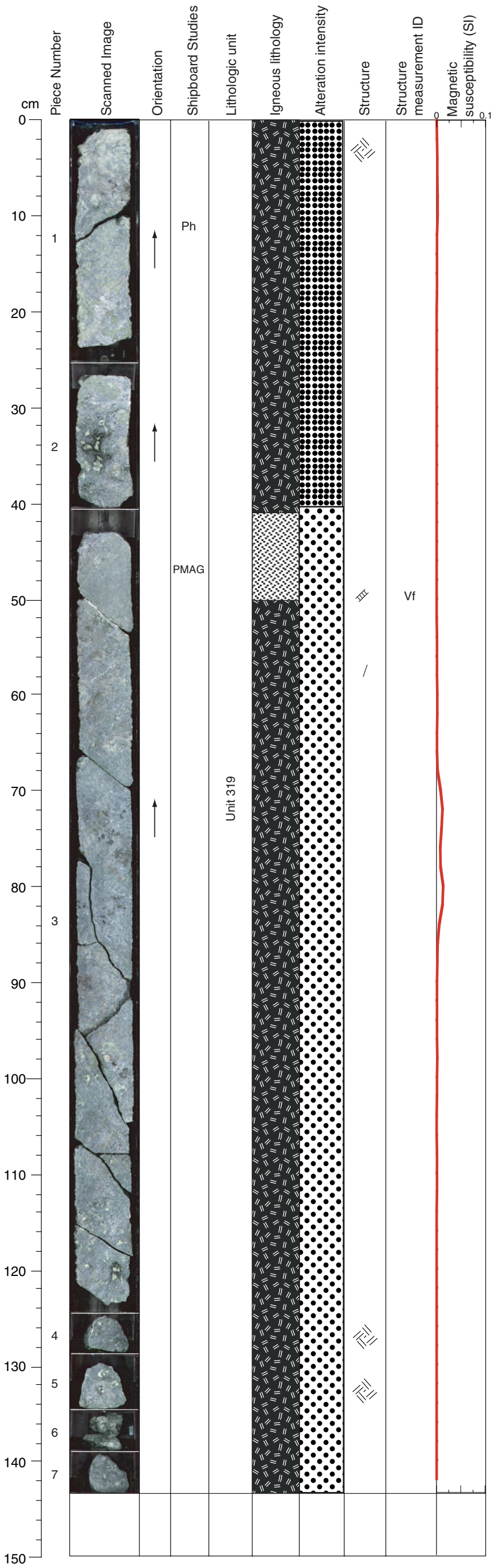
COMMENTS: Piece 1 shows the same alteration as in the bottom of the previous section. From 6-96 cm, clinopyroxene grains in the coarse gabbro have green cores and brown rims. Pale green alteration overprints the entire section. Well-developed corona texture appears at about 128 cm.

VEIN ALTERATION: Amphibole, chlorite, plagioclase, talc

STRUCTURE: Gabbro with pegmatitic amphiboles (?) in igneous contact with microgabbro, no ductile strain. Moderately dipping amphibole vein in Piece 1. Heterogeneous, weak veining and cataclasis.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-118R-1, 32-47 cm WET

Core Photo



305-U1309D-118R-2 (Section top: 584.33 mbsf)

UNIT-319: Olivine-bearing Gabbro
Pieces: 1-7

PRIMARY MINERALOGY: Modal data from Piece 2a

Olivine	Modal 2% Size 2 mm Shape anhedral
Plagioclase	Modal 58% Size 4 mm average Shape anhedral
Clinopyroxene	Modal 40% Size up to 50 mm Shape subhedral

COMMENTS: Unit 319 is coarse-grained olivine-bearing gabbro. Zone of fine-grained gabbro at 41-50 cm. Locally olivine-rich zone at 60-86 cm.

SECONDARY MINERALOGY: Chlorite, pale amphibole

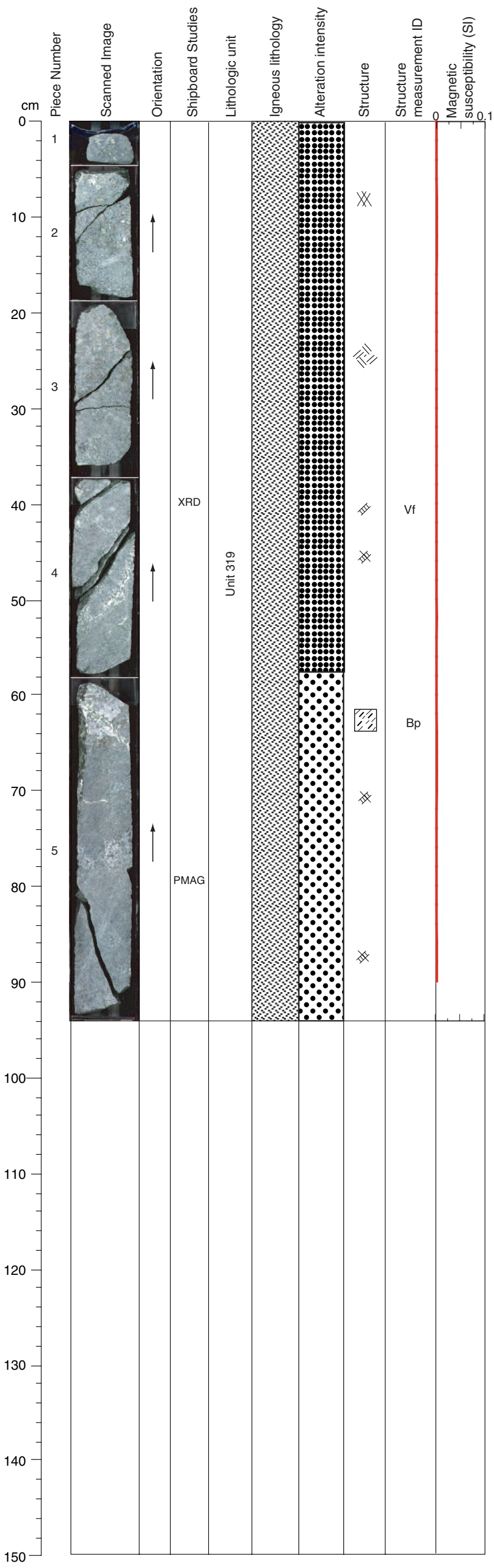
COMMENTS: Some pale-green 1-2 cm size pale-green corona highly altered to talc and with thick rims of chlorite. The pyroxene grains are partially altered and replaced by green amphibole (actinolite).

VEIN ALTERATION: Amphibole, chlorite, talc

STRUCTURE: Medium-grained gabbro with corona texture and locally large amphibole (?) grains, no ductile strain. Minor veins and heterogeneous cataclasis with a finer grained band (deformed?).

CLSOE-UP PHOTOGRAPHS:
305-U1309D-118R-2, 12-23 cm WET

Core Photo



305-U1309D-118R-3 (Section top: 585.77 mbsf)

UNIT-319: Gabbro
Pieces: 1-5

PRIMARY MINERALOGY: Modal data from Piece 5a

Plagioclase	Modal 65% Size 4 mm average Shape anhedral
Clinopyroxene	Modal 35% Size up to 50 mm Shape subhedral

COMMENTS: Continuation of Unit 319 medium-grained gabbro. Zone of coarser clinopyroxene at 19-30 cm, several clinopyroxene-rich patches in this section, leucocratic zones at 42-52 cm and 58-66 cm, finer grained zone at 45-57 cm.

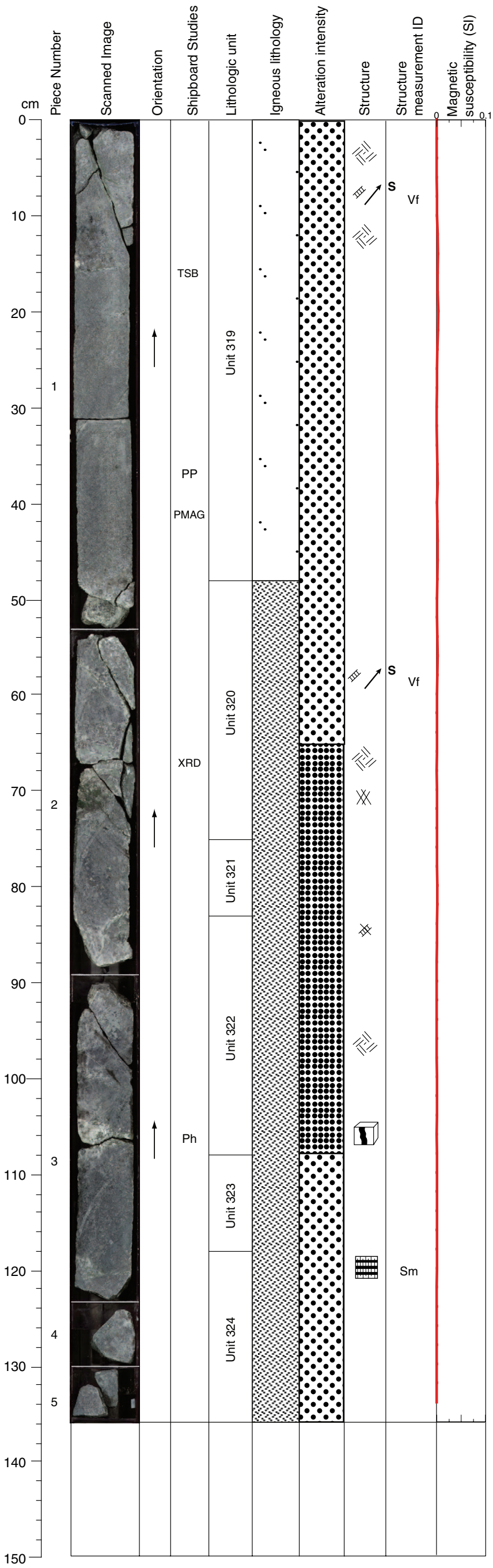
SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: Corona texture in Pieces 1 and 2. Below that clinopyroxene grains have green alteration rims (actinolite?). Leucocratic zones have altered plagioclase

VEIN ALTERATION: Amphibole, chlorite, plagioclase

STRUCTURE: Medium-grained gabbro with corona texture and locally large amphibole (?) grains, no ductile strain, alteration halo around moderately dipping vein in Piece 5. Complex set of veins and cataclasis. Earlier magmatic veins.

Core Photo



305-U1309D-119R-1 (Section top: 587.80 mbsf)

UNIT-319: Microgabbro
Pieces: 1a-1d

COMMENTS: Continuation of Unit 319. This zone is microgabbro with medium-grained patch at 10-15 cm.

UNIT-320: Gabbro
Pieces: 1d-2f

PRIMARY MINERALOGY: Modal data from Piece 2b

Olivine	Modal <1% Size 2 mm Shape anhedral
Plagioclase	Modal 75% Size up to 32 mm Shape anhedral
Clinopyroxene	Modal 25% Size to 20 mm Shape subhedral

COMMENTS: Unit 320 coarse-grained gabbro, moderately leucocratic.

UNIT-321: Gabbro
Pieces: 2f

PRIMARY MINERALOGY: Modal data from Piece 2f

Plagioclase	Modal 70% Size 4 mm average Shape anhedral
Clinopyroxene	Modal 30% Size 3 mm average Shape subhedral

COMMENTS: Unit 321 medium-grained gabbro.

UNIT-322: Gabbro
Pieces: 2f-3c

PRIMARY MINERALOGY: Modal data from Piece 3b

Plagioclase	Modal 80% Size to 35 mm Shape anhedral
Clinopyroxene	Modal 20% Size to 20 mm Shape subhedral

COMMENTS: Unit 322 is coarse-grained gabbro. Sulfide along fracture. Basically the same lithology as Unit 320.

UNIT-323: Gabbro
Pieces: 3c

PRIMARY MINERALOGY: Modal data from Piece 3c

Plagioclase	Modal 70% Size 4 mm average Shape anhedral
Clinopyroxene	Modal 30% Size 3 mm average Shape subhedral

COMMENTS: Unit 323 is medium-grained gabbro. This section is quite variable and contains leucocratic zones/veins at 1-3 cm, 19 cm (horizontal, 5 mm), 32-36 cm (horizontal, 5-15 mm), 44-51 cm (oblique, < 5 mm), 76-99 cm (oblique, <15 mm).

UNIT-324: Gabbro
Pieces: 3c-5

PRIMARY MINERALOGY: Modal data from Piece 5

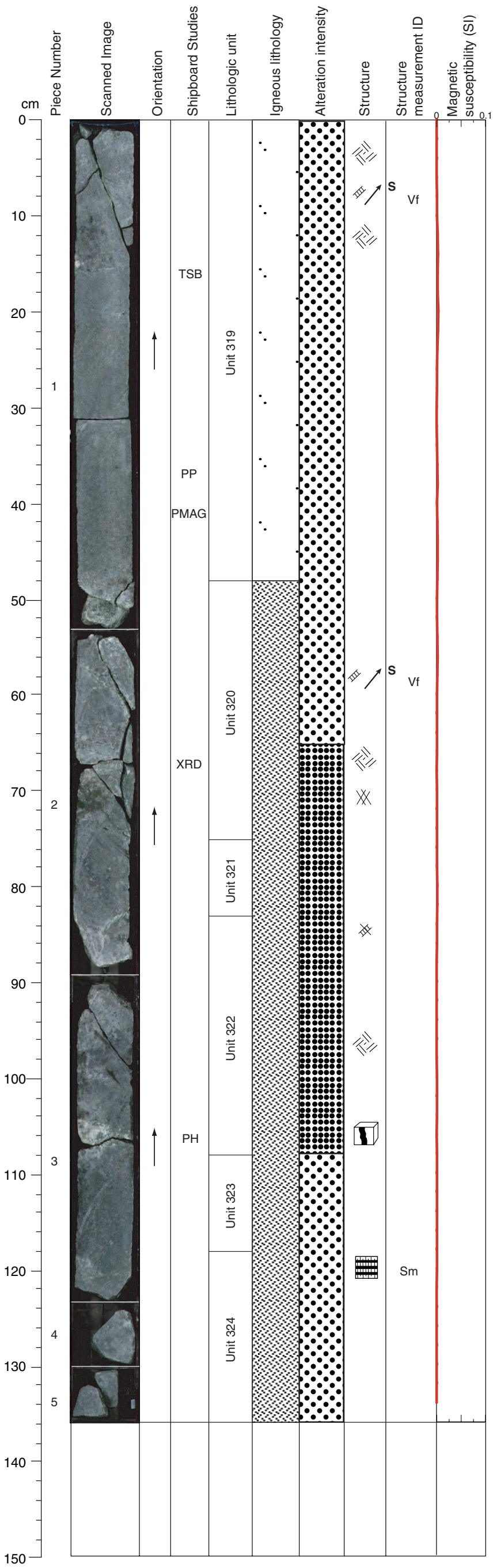
Olivine	Modal <1% Size 2 mm Shape anhedral
Plagioclase	Modal 75% Size to 15 mm Shape anhedral
Clinopyroxene	Modal 25% Size to 12 mm Shape subhedral

COMMENTS: Unit 324 coarse-grained gabbro, moderately leucocratic.

SECONDARY MINERALOGY: Chlorite, pale amphibole

Continued on next page

Core Photo



305-U1309D-119R-1, Continued (Section top: 587.80 mbsf)

COMMENTS: Minor corona texture. Pale green alteration halos of varying widths surround green veins (chlorite/amphibole). Large pyroxenes altered to green ampibole (66-73 cm). In leucocratic zones clinopyroxene is altered to green amphibole and plagioclase to a white aggregate.

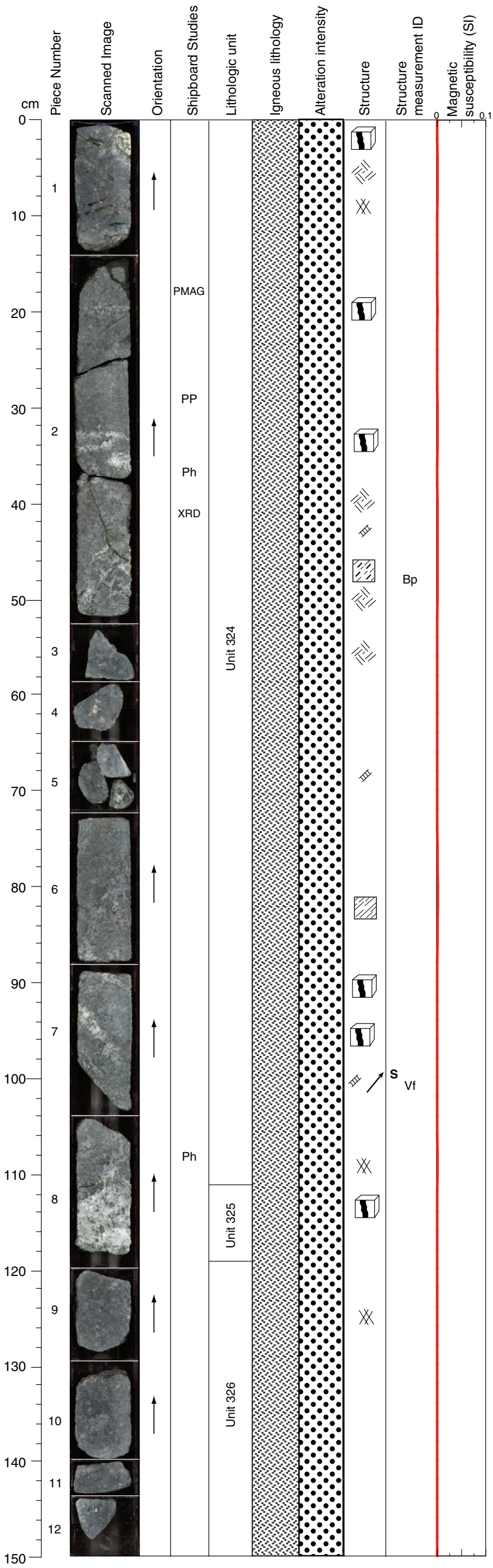
VEIN ALTERATION: Amphibole, chlorite, plagioclase, talc, carbonate

THIN SECTIONS:
305-U1309D-119R-1, 14-17 cm (#341)

STRUCTURE: Apparently undeformed microgabbro, coarsening in interval 70 to 107 cm and then associated with brecciation and alteration. In Piece 3 weak evidence for a moderately dipping layering. Complex set of veins and cataclasis, steeply dipping on upper part of section. Earlier magmatic veins are associated with cataclastic veining sets. Continuation from last section in Core 305-U1309D-118R.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-119R-1, 10-21 cm WET

Core Photo



305-U1309D-119R-2 (Section top: 589.16 mbsf)

UNIT-324: Gabbro
Pieces: 1-8

PRIMARY MINERALOGY: Modal data from Piece 2a-b

Olivine	Modal <1% Size 2 mm Shape anhedral
Plagioclase	Modal 60% Size to 15 mm Shape anhedral
Clinopyroxene	Modal 40% Size to 12 mm Shape anhedral

COMMENTS: Unit 324 is medium- to coarse-grained gabbro.

UNIT-325: Gabbro
Piece 8

PRIMARY MINERALOGY: Modal data from Piece 8

Plagioclase	Modal 84% Size to 15 mm Shape anhedral
Clinopyroxene	Modal 15% Size to 12 mm Shape anhedral
Sulfide	Modal ?1% Size 1 mm Shape interstital

COMMENTS: Unit 325 is coarse-grained leucocratic gabbro.

UNIT-326: Gabbro
Pieces: 9-12

PRIMARY MINERALOGY: Modal data from Piece 10

Plagioclase	Modal 60% Size to 20 mm Shape anhedral
Clinopyroxene	Modal 40% Size to 17 mm Shape anhedral

COMMENTS: Unit 326 medium- to coarse-grained gabbro.

SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: Some pale green coronas moderately to highly altered to talc, and likely related to occurence of leucocratic zones (plagioclase, amphibole) in this section (at 20, 34, 50, 77-86, 89-93, and 112-117 cm). Sulfides are associated with these zones. Pyroxene grains are replaced by green amphibole.

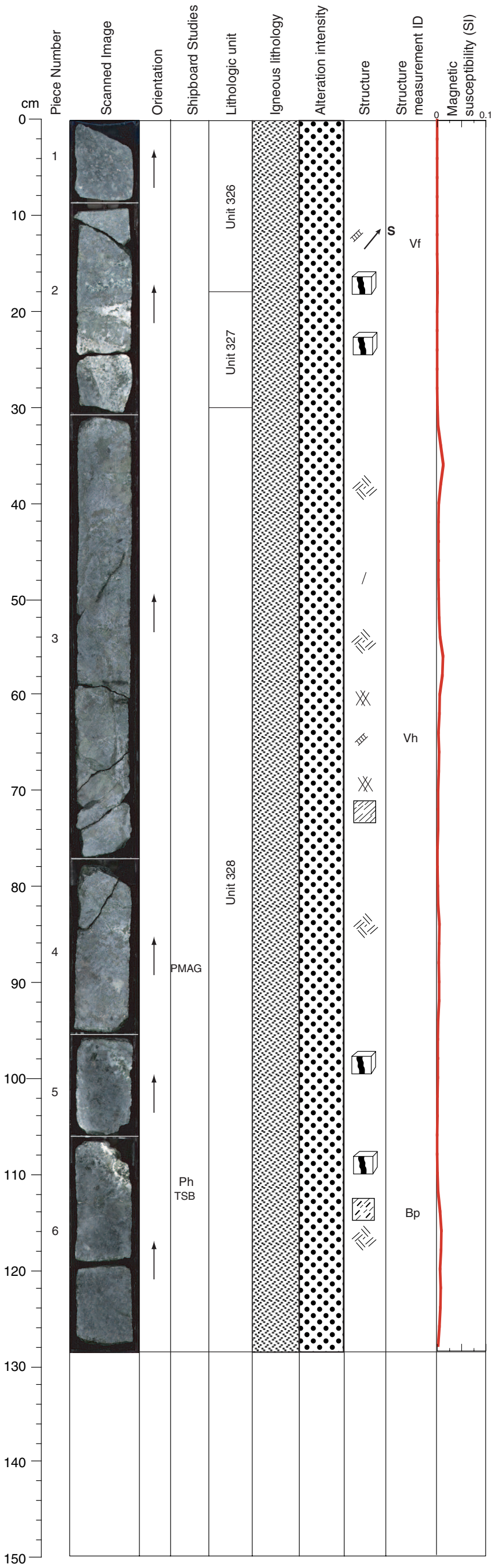
VEIN ALTERATION: Amphibole, chlorite, plagioclase, talc, carbonate

THIN SECTIONS:

STRUCTURE: Gabbro, coarsening in central part of section, no discernible ductile fabric. In coarse part more alteration and evidence for mm-scale ductile strain. Many magmatic veins and associated later brittle veins, and later set crosscutting them. Very heterogeneous.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-119R-2, 37-52 cm WET
305-U1309D-119R-2, 106-119 cm WET

Core Photo



305-U1309D-119R-3 (Section top: 590.66 mbsf)

UNIT-326: Gabbro
Pieces: 1-2b

PRIMARY MINERALOGY: Modal data from Piece 1

Plagioclase	Modal 60% Size 3 mm Shape anhedral
Clinopyroxene	Modal 40% Size to 8 mm Shape anhedral

COMMENTS: Continuation of Unit 326 medium-grained gabbro.

UNIT-327: Gabbro
Pieces: 2b, 5, 6a

COMMENTS: Unit 327 is coarse-grained leucocratic gabbro. Leucocratic oblique veins also at 94-101 cm (20 mm) and 106-110 cm (30 mm, with halo).

UNIT-328: Olivine-bearing Gabbro
Pieces: 3-6

PRIMARY MINERALOGY: Modal data from Piece 3a

Olivine	Modal 3% Size 1-12 mm Shape anhedral
Plagioclase	Modal 67% Size 2-30 mm Shape anhedral
Clinopyroxene	Modal 30% Size 2-40 mm Shape subhedral

COMMENTS: Unit 328 is coarse-grained olivine-bearing gabbro.

SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: General pale green alteration throughout, but local corona texture is developed adjacent to veins and intrusive leucocratic material. Within leucocratic zones pyroxene is altered to green amphibole and plagioclase to an aggregate of white minerals.

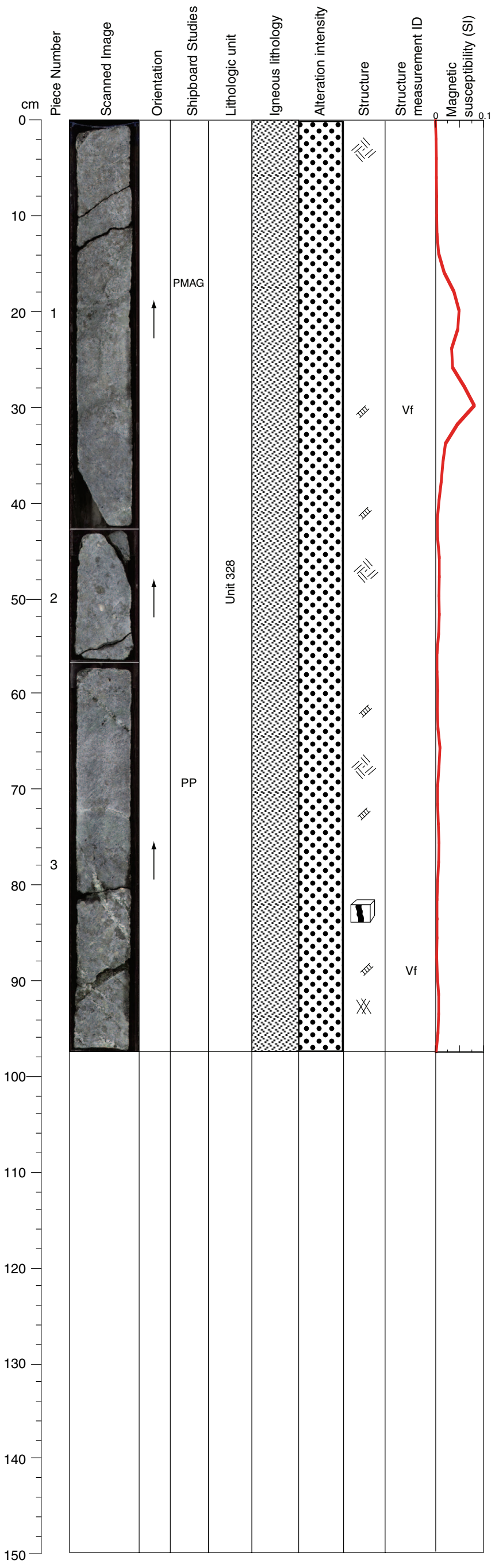
VEIN ALTERATION: Amphibole, chlorite, plagioclase, epidote

THIN SECTIONS:
305-U1309D-119R-3, 111-113 cm (#342)

STRUCTURE: Gabbro with no clear mineral fabric, coarsening locally and then associated with more alteration and mm-scale plastic strain. Many magmatic veins. Green, steeply dipping veins (Vh) crosscut by later, more brittle fractures/veins. Very heterogeneous.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-119R-3, 110-121 cm WET

Core Photo



305-U1309D-119R-4 (Section top: 591.95 mbsf)

UNIT-328: Gabbro
Pieces: 1-3

PRIMARY MINERALOGY: Modal data from Piece 1c

Oxide	Modal 1% Size 1 mm Shape anhedral
Plagioclase	Modal 64% Size 2-30 mm Shape anhedral
Clinopyroxene	Modal 35% Size 2-40 mm Shape subhedral

COMMENTS: Continuation of Unit 328 coarse-grained gabbro. Interstital oxides present along vein margin 17-32 cm.

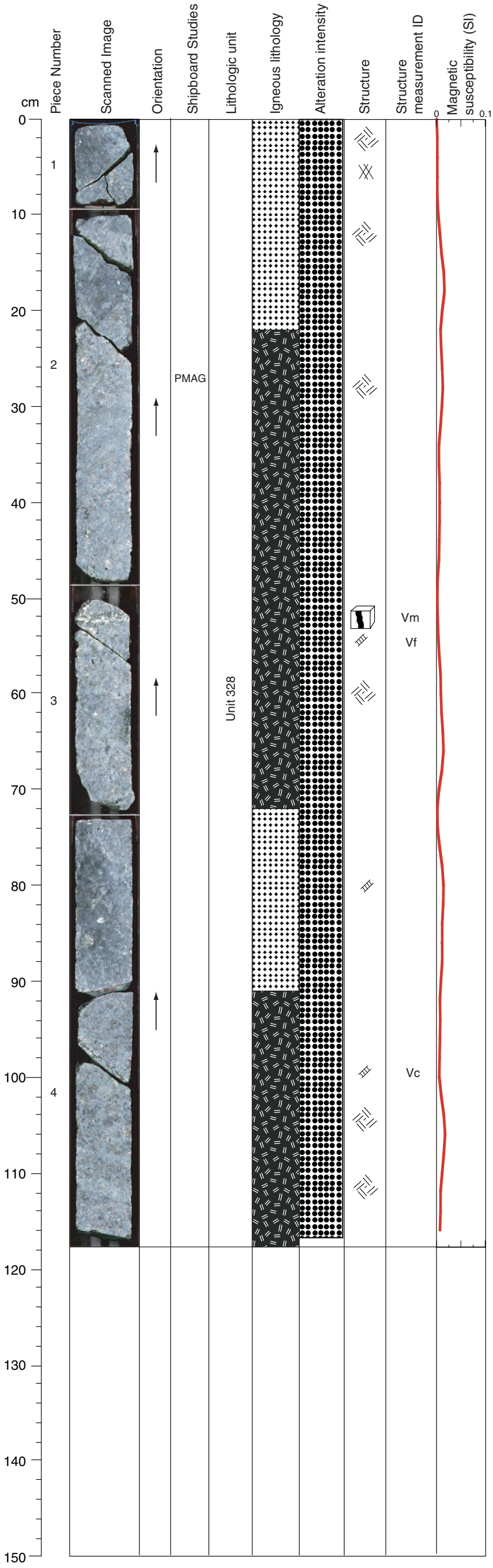
SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: Pale green coronas and coronas around olivine altered to tremolite. This section is cut by leucocratic zones (plagioclase and green amphibole, at 60, 72 and 77 cm) one of which has a small patch of dark alteration (oxides?) halo where a fracture crosscuts the zone.

VEIN ALTERATION: Amphibole, chlorite, plagioclase, talc

STRUCTURE: Gabbro with variable grain size and no high temperature ductile fabric and localized brittle or ductile shear zones on mm-scale. Alteration veins and diffuse networks of fractures with associated alteration.

Core Photo



305-U1309D-120R-1 (Section top: 592.60 mbsf)

UNIT-328: Olivine Gabbro to Olivine-bearing Gabbro
Pieces: 1-4

PRIMARY MINERALOGY: Modal data from several pieces

Olivine	Modal 3-7% Size 3 mm average Shape anhedral
Plagioclase	Modal 63-66% Size 1-17 mm Shape anhedral
Clinopyroxene	Modal 30-35% Size 1-20 mm Shape subhedral

COMMENTS: Continuation of Unit 328 medium- to coarse-grained olivine gabbro to olivine-bearing gabbro. Horizontal leucocratic magmatic dikelet (10 mm) at 51cm, oblique leucocratic dikelet (10 mm) at 99cm.

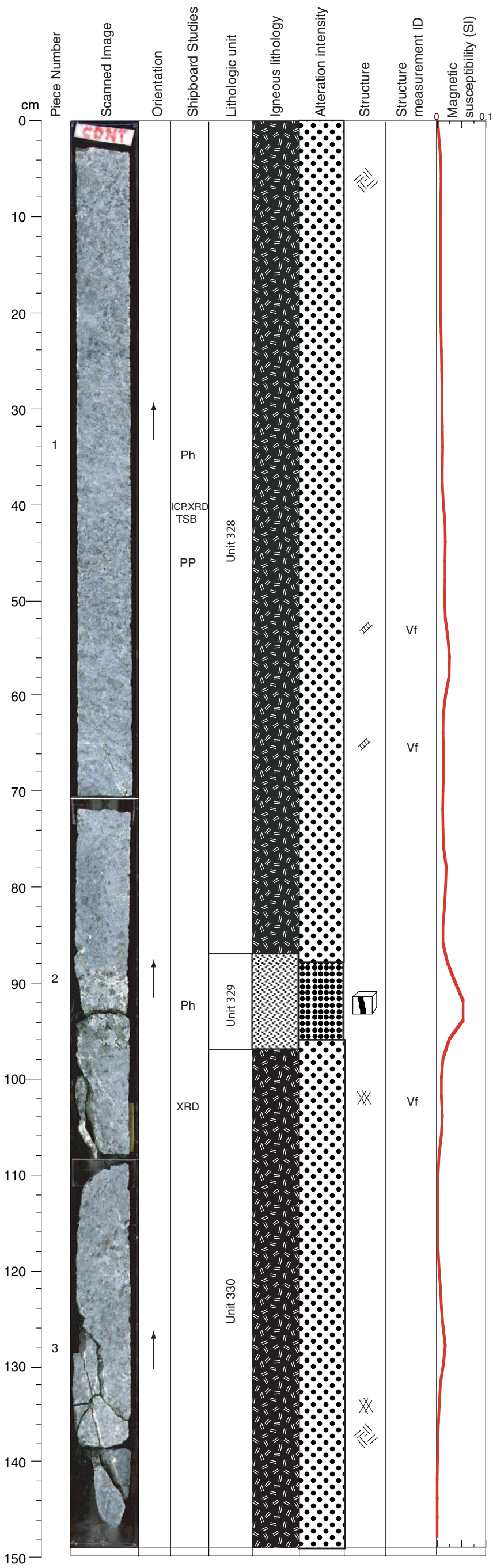
SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: The alteration is similar ot that of the previous section. Alteration halos of various widths are present adjacent to veins filled with green chlorite/actinolite(?) and alteration and around leucocratic igneous intrusive material has replaced clinopyroxene with greem amphibole and plagioclase with a white mineral aggregate.

VEIN ALTERATION: Amphibole, chlorite, plagioclase, talc

STRUCTURE: No clear mineral fabric in gabbro which is coarser from 0 to 30 cm in section. Shallow dipping plagioclase rich vein present. A couple of veins, dark green and hydrothermal, dipping parallel.

Core Photo



305-U1309D-120R-2 (Section top: 593.78 mbsf)

UNIT-328: Olivine-bearing Gabbro
Pieces: 1-2a

PRIMARY MINERALOGY: Modal data from Piece 1

Olivine	Modal 2% Size 2-4 mm Shape anhedral
Plagioclase	Modal 73% Size 2-30 mm Shape anhedral
Clinopyroxene	Modal 25% Size 2-10 mm Shape subhedral

COMMENTS: Continuation of Unit 328 medium-grained olivine-bearing gabbro. Oblique magmatic leucocratic vein (< 10 mm) at 60-70 cm.

UNIT-329: Gabbro
Pieces: 2a-2b

PRIMARY MINERALOGY: Modal data from Pieces 2a-2b

Plagioclase	Modal 70% Size 4-20 mm Shape subhedral
Clinopyroxene	Modal 30% Size 1-25 mm Shape subhedral

COMMENTS: Unit 329 is coarse-grained leucocratic gabbro. Trace of sulfide.

UNIT-330: Olivine-bearing Gabbro
Pieces: 2b-3

PRIMARY MINERALOGY: Modal data from Piece 3a

Olivine	Modal 2% Size 2-4 mm Shape anhedral
Plagioclase	Modal 73% Size 2-30 mm Shape anhedral
Clinopyroxene	Modal 25% Size 2-10 mm Shape subhedral

COMMENTS: Unit 330 is medium- to coarse grained olivine-bearing gabbro.

SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: Some small coronas related to the leucocratic dike (plagioclase and green amphibole) occur at 60-70 cm (Piece 1). At 90-96 cm a thick (6 cm wide) leucocratic dike with an alteration zone occurs, with pyroxene altered to green amphibole. Sulfides are found associated with this leucocratic veins.

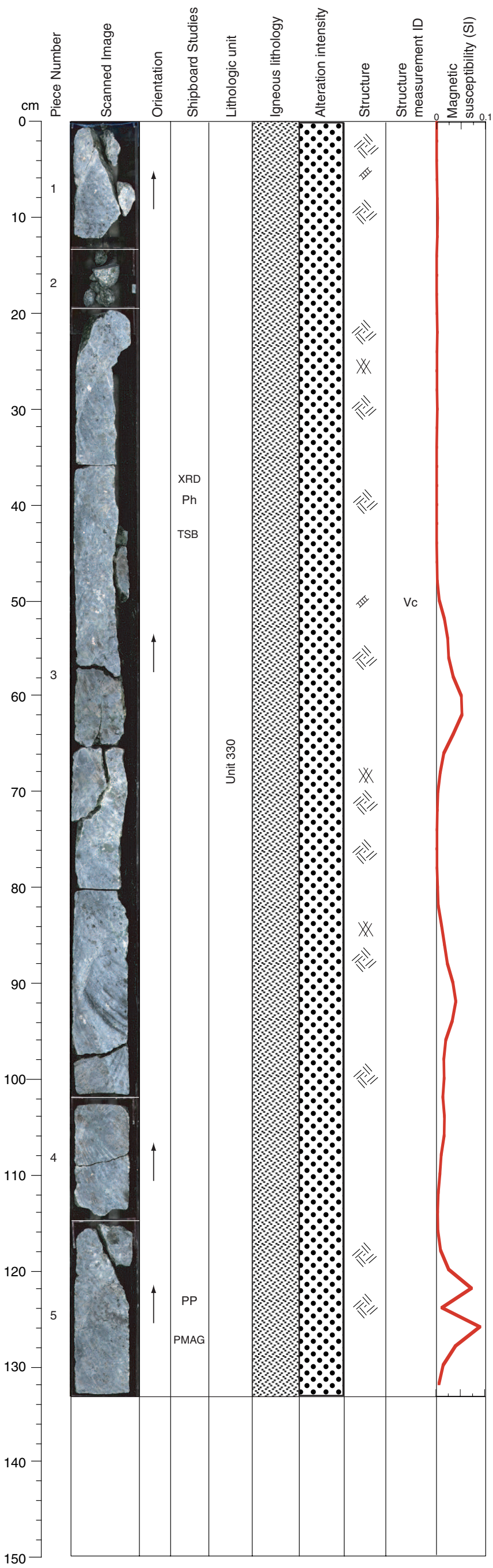
VEIN ALTERATION: Amphibole, chlorite, plagioclase, talc, sulfides

THIN SECTIONS:
305-U1309D-120R-2, 41-43 cm (#343)

STRUCTURE: Gabbro with no clear mineral fabric, by 87 cm coarser grained and sulfide bearing alteration below. Vein set, dark green and hydrothermal, dipping moderately. More fracturing at base along steeply dipping talc and sulfide veins.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-120R-2, 35-45 cm WET
305-U1309D-120R-2, 93-107 cm WET

Core Photo



305-U1309D-120R-3 (Section top: 595.28 mbsf)

UNIT-330: Gabbro
Pieces: 1-5

PRIMARY MINERALOGY: Modal data from Piece 3b

Olivine	Modal <1% Size 1-3 mm Shape anhedral
Plagioclase	Modal 65% Size 1-4 mm Shape anhedral
Clinopyroxene	Modal 35% Size 1-10 mm Shape subhedral

COMMENTS: Continuation of Unit 330 medium- to coarse grained gabbro. Trace of sulfide and oxide at 110-133, 10% oxide at: 123-126, locally coarse-grained at 58-80 cm and 96-115 cm.

SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: The alteration is similar to the previous section. There is a distinct alteration boundary at interval 90-102 cm with very light green alteration overprint on one side and a general pale green alteration on the other. A minor amount of corona texture appears near the bottom of the section.

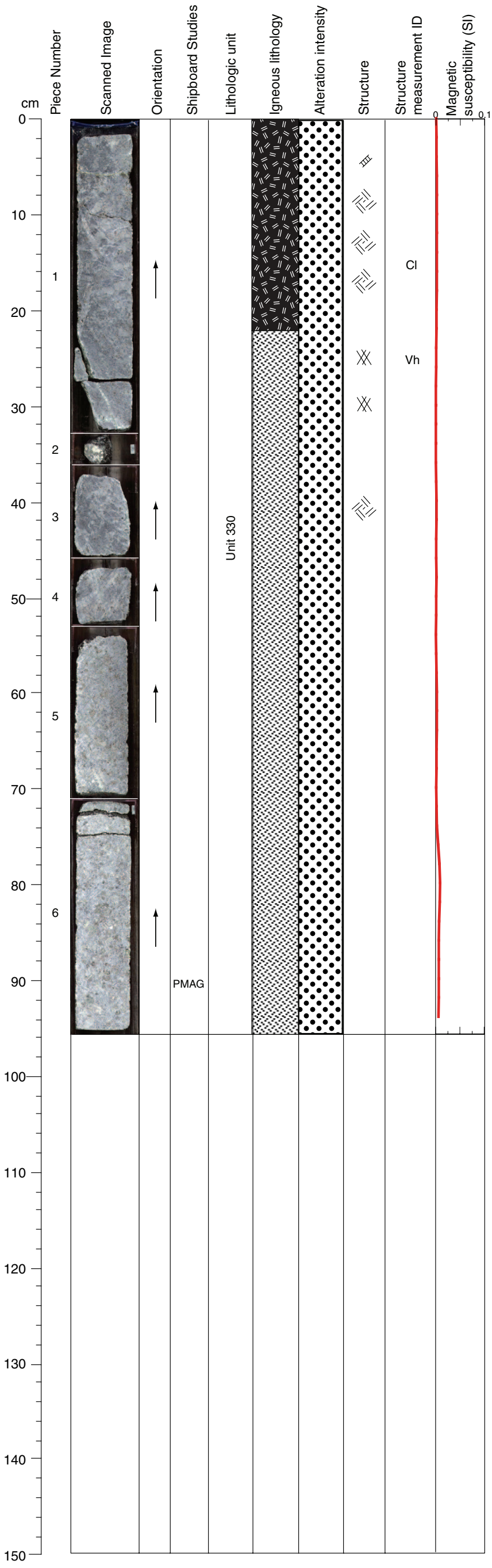
VEIN ALTERATION: Amphibole, chlorite, plagioclase, talc, sulfides, carbonate

THIN SECTIONS:
305-U1309D-120R-3, 42-45 cm (#344)

STRUCTURE: Vari-textured gabbro ranging from fine to coarse grained, no clear fabric. Lots of drilling-induced fracturing, a long talc- and carbonate-filled irregular vein steeply dipping and containing sulfides - running along most of the section.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-120R-3, 37-58 cm WET

Core Photo



305-U1309D-120R-4 (Section top: 596.61 mbsf)

UNIT-330: Olivine-bearing Gabbro and Gabbro
Pieces: 1-6

PRIMARY MINERALOGY: Modal data from Piece 1a, 5a

Olivine	Modal ?1% Size 3 mm average Shape anhedral
Plagioclase	Modal 70-75% Size 5-50 mm Shape anhedral
Clinopyroxene	Modal 30-25% Size 1-20 mm Shape subhedral

COMMENTS: Continuation of Unit 330 medium- to coarse-grained olivine-bearing gabbro to gabbro. Sulfide in alteration vein at 66-74 cm.

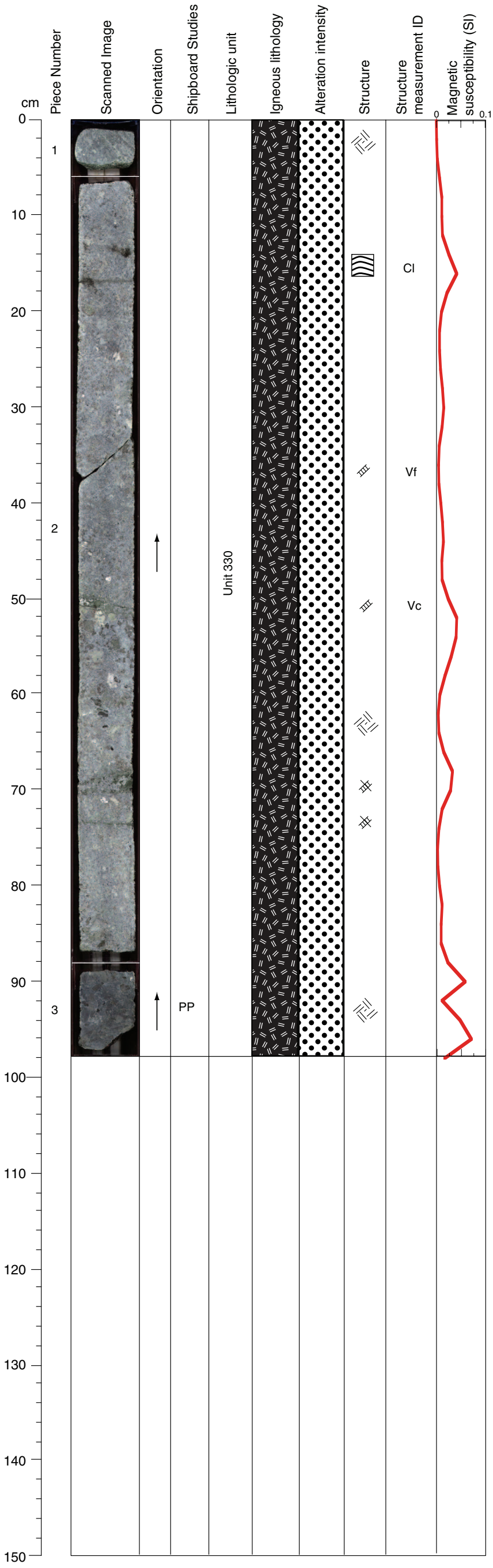
SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: The pyroxene and olivine in the coarser grained part (from Piece 1 to 4) are altered with a green amphibole rim around them. From 1 to 20 cm, the gabbro is cut by several tiny white veins of talc. Pieces 5 and 6 are finer grained gabbro with a dark blue and green color related to the amphibole and chlorite minerals in the rock.

VEIN ALTERATION: Chlorite, talc

STRUCTURE: Varitextured gabbro ranging from fine to coarse grained, no clear fabric except for local preferred orientation of large amphibole (?) grains at 15 cm in section. Microcracking along plagioclase grains and steeply dipping veins, decreasing in intensity downward.

Core Photo



305-U1309D-121R-1 (Section top: 597.40 mbsf)

UNIT-330: Olivine-bearing gabbro

Pieces 1-3

PRIMARY MINERALOGY (estimated from Piece 1):

Plagioclase	Modal 35-60% Size 5-15 mm Shape anhedral
Clinopyroxene	Modal 30-50% Size 5 mm average, to 50 mm Shape anhedral
Olivine	Modal 3-10% Size to 30 mm Shape anhedral

COMMENTS: This section consists of medium-grained olivine-bearing gabbro. Grain size and modes vary gradually but unsystematically throughout this section. A metamorphically overprinted leucocratic magmatic dikelet crosscuts the gabbro at 50 cm.

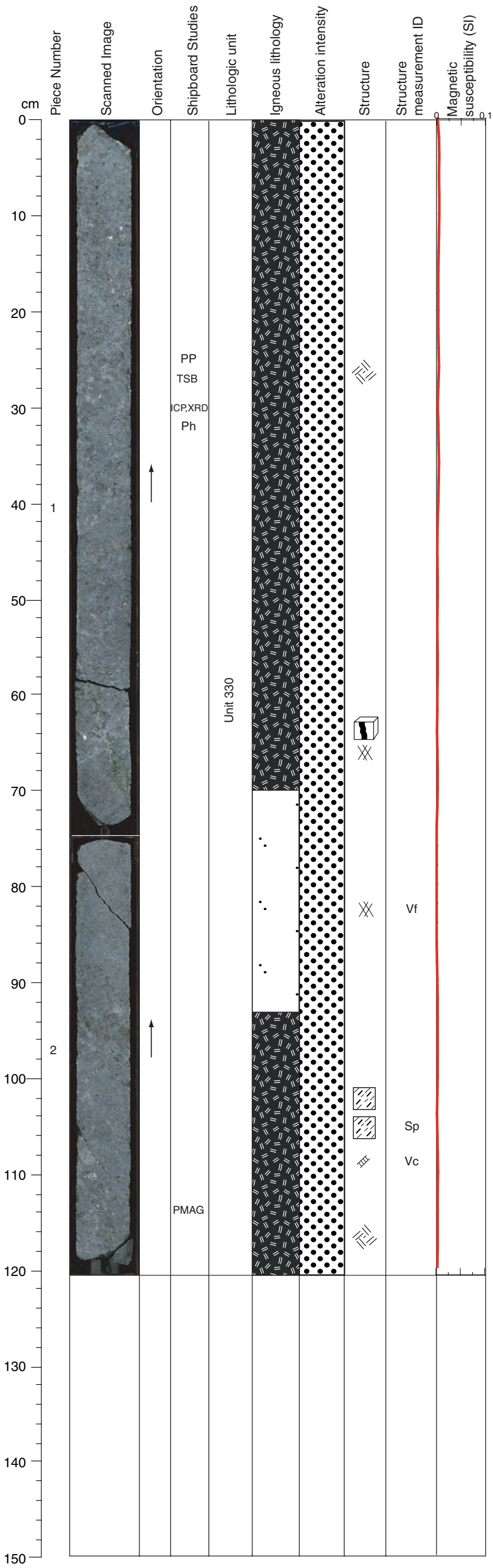
SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: There is some corona texture in the gabbros and a pale green overprint appears throughout the section above 88 cm. There are several patches of dark serpentine/oxide associated with veins at about 14-17 cm. Leucocratic intrusions contain green aggregates of chlorite and ampibole (actinolite?). Texture coarsens and degree of alteration decreases slightlly at 88 cm.

VEIN ALTERATION: Chlorite, talc

STRUCTURE: Varitextured gabbro ranging from fine to coarse grained, no clear ductile fabric except for local preferred orientation of large amphibole (?) grains at 92 cm. Several veins at different angles and diffuse alteration zones either subhorizontal or subvertical. Dark green veins cut by white hairline fracture veins.

Core Photo



305-U1309D-121R-2 (Section top: 598.38 mbsf)

UNIT-330: Olivine-bearing gabbro and microgabbro
Pieces 1-2

PRIMARY MINERALOGYModal data from Piece 1A:

Plagioclase	Modal 57% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 40% Size 4 mm average Shape anhedral
Olivine	Modal 3% Size 3 mm average Shape anhedral

COMMENTS: Continuation of Unit 330 medium-grained olivine-bearing gabbro. with an interval of microgabbro from 70-93 cm. Coarse clinopyroxene is concentrated at 93-98 cm.

SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: Coexisting pale green coronas of actinolite-tremolite-talc after olivine and tremolite coronas around olivine are found in this section, as well as shiny pyroxene. The green color of the background indicates a significant amount of amphibole.

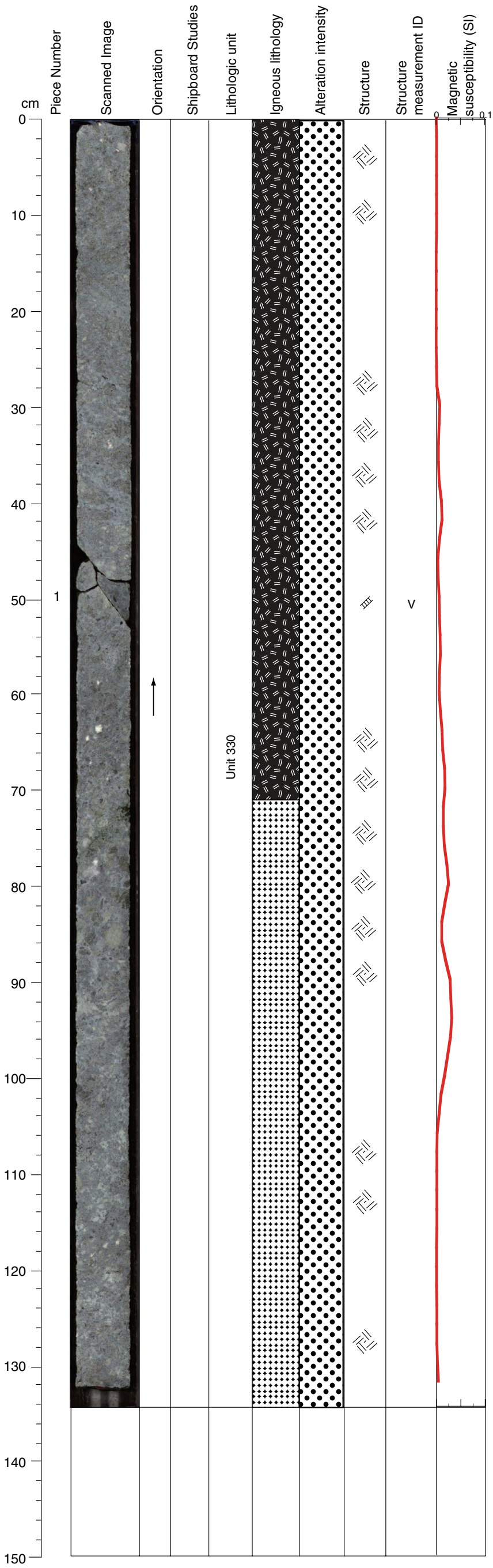
VEIN ALTERATION: Amphibole, chlorite, plagioclase, talc

THIN SECTIONS:
305-U1309D-121R-2, 26-28 cm (#345)

STRUCTURE: Varitextured gabbro ranging from fine to coarse grained, no clear ductile fabric. In Piece 3, 10-cm-scale shear zone with plastic strain. Scarce white veins, slight cataclasis, locally crosscutting an alteration/magmatic vein. In middle of section finer grained zone with possible plastic deformation. Patchy alteration in bands (green-bluish). At bottom coarser gabbro with late fracture vein crosscutting foliation, possibly associated with distributed microfracturing and overprinting pre-existing plastic foliation.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-121R-2, 22-35 cm WET

Core Photo



305-U1309D-121R-3 (Section top: 599.59 mbsf)

UNIT-330: Olivine-bearing gabbro
Piece 1

PRIMARY MINERALOGY (estimated from U1309D-121R001, Piece 1):

Plagioclase	Modal 35-60% Size 5-15 mm Shape anhedral
Clinopyroxene	Modal 30-50% Size 5 mm average, to 50 mm Shape anhedral
Olivine	Modal 3-10% Size to 30 mm Shape anhedral

COMMENTS: This medium-grained olivine-bearing gabbro forms the continuation of the previous section.

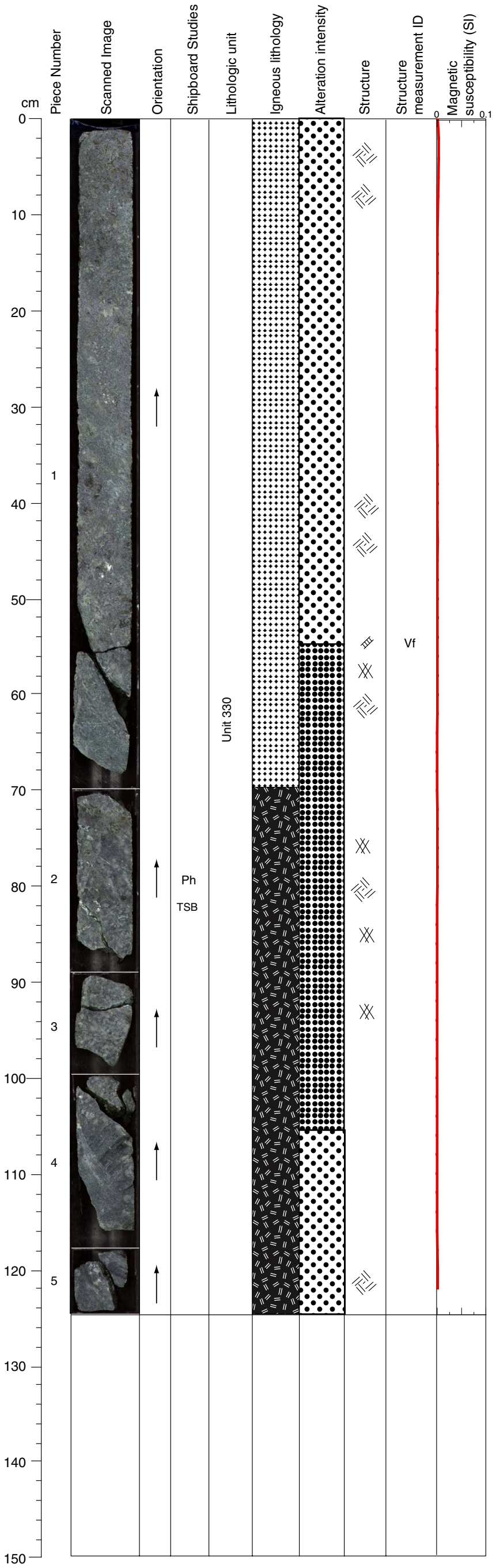
SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: Alteration is moderate and fairly uniform throughout the section with pyroxenes altered to green ampibole and very minor coronas around olivine in contact with plagioclase. There are a few alteration halos of small but varying width near veins.

VEIN ALTERATION: n/a

STRUCTURE: Varitextured gabbro ranging from fine to coarse grained, no clear ductile fabric. Oikocrystic amphibole (?) appears. Minor irregular fracturing. A few dark green veins.

Core Photo



305-U1309D-121R-4 (Section top: 600.94 mbsf)

UNIT-330: Olivine-bearing gabbro
Pieces 1-5

PRIMARY MINERALOGY (estimated from U1309D-121R-001, Piece 1):

Plagioclase	Modal 35-60% Size 5-15 mm Shape anhedral
Clinopyroxene	Modal 30-50% Size 5 mm average, to 50 mm Shape anhedral
Olivine	Modal 3-10% Size up to 30 mm Shape anhedral

COMMENTS: This medium-grained olivine-bearing gabbro forms the continuation of the previous section.

SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: Coexisitng pale green tremolite-talc-chlorite coronas and tremolite-serpentine coronas around olivine, which increase in abundance to the end of the section.

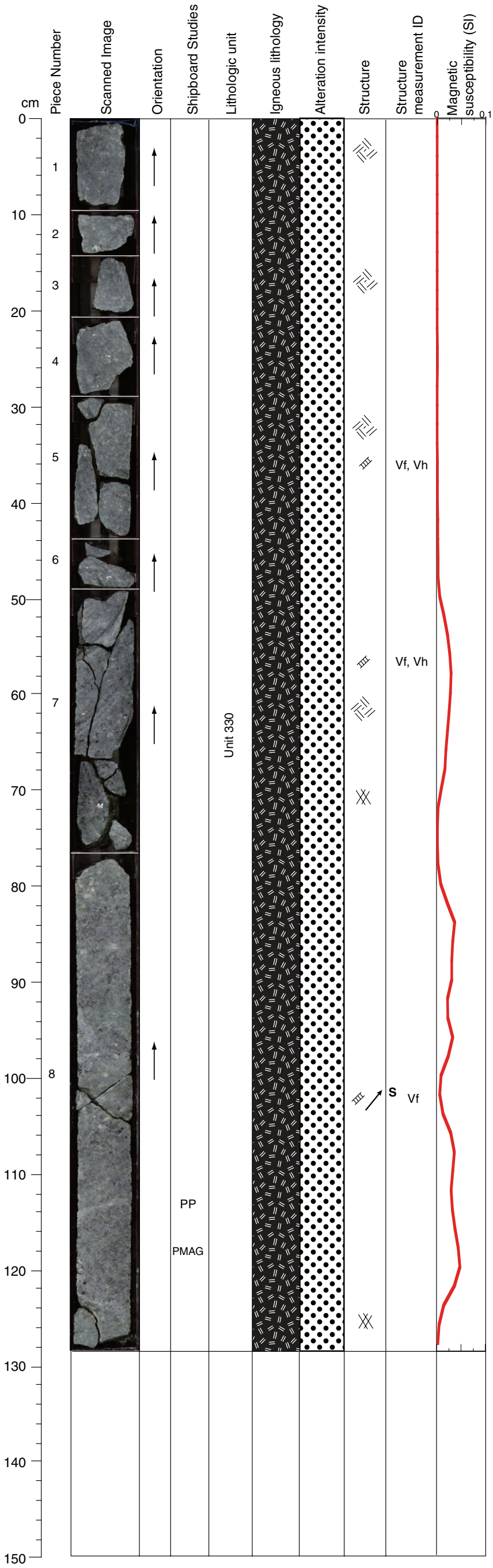
VEIN ALTERATION: Chlorite, talc

THIN SECTIONS:
305-U1309D-121R-4, 80-83 cm (#346)

STRUCTURE: Varitextured gabbro ranging from fine to coarse grained, below 40 cm mainly coarse grained, no clear ductile fabric, oikocrystic amphibole (?). Very scarce cataclasis underlain by gabbro with alteration along moderately dipping veins, and cataclasis on irregular fracture network.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-121R-4, 70-87 cm WET

Core Photo



305-U1309D-122R-1 (Section top: 602.20 mbsf)

UNIT-330: Olivine-bearing gabbro
Pieces 1-8

PRIMARY MINERALOGY (estimated from U1309D-121R001, Piece 1):

Plagioclase	Modal 35-60% Size 5-15 mm Shape anhedral
Clinopyroxene	Modal 30-50% Size 5 mm average, to 50 mm Shape anhedral
Olivine	Modal 3-10% Size to 30 mm Shape anhedral

COMMENTS: This medium-grained olivine-bearing gabbro forms the continuation of the previous section. In Pieces 6 to 8, fine oxides occur in minor quantities.

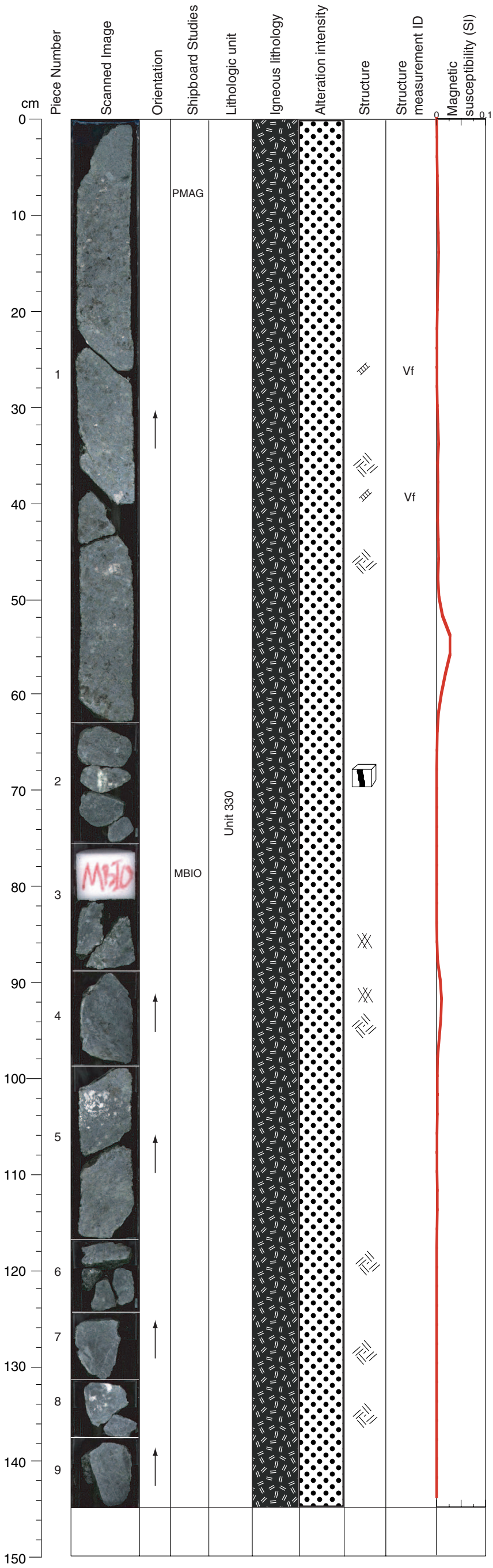
SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: Some corona texture occcurs to about 72 cm. In the coarser gabbro below 72 cm clinopyroxene grains have thin alteration rims of green amphibole. Pale green alteration halos of varying widths afffect the rock near veins.

VEIN ALTERATION: Amphibole, chlorite, talc

STRUCTURE: Gabbro with relatively homogeneous grain size but no strain. Distributed cataclasis and drilling-induced fractures. Lower section less fractured. Steeply dipping dark green veins, and a talc vein with subhorizontal fibers.

Core Photo



305-U1309D-122R-2 (Section top: 603.48 mbsf)

UNIT-330: Olivine-bearing gabbro
Pieces 1-9

PRIMARY MINERALOGY (estimated from U1309D-121R-001, Piece 1):

Plagioclase	Modal 35-60% Size 5-15 mm Shape anhedral
Clinopyroxene	Modal 30-50% Size 5 mm average, to 50 mm Shape anhedral
Olivine	Modal 3-10% Size to 30 mm Shape anhedral

COMMENTS: This medium-grained olivine-bearing gabbro forms the continuation of the previous section. The bottom of Piece 1d contains coarse discolored pyroxene and plagioclase, that may represent the contact to a non-recovered leucocratic magmatic dikelet.

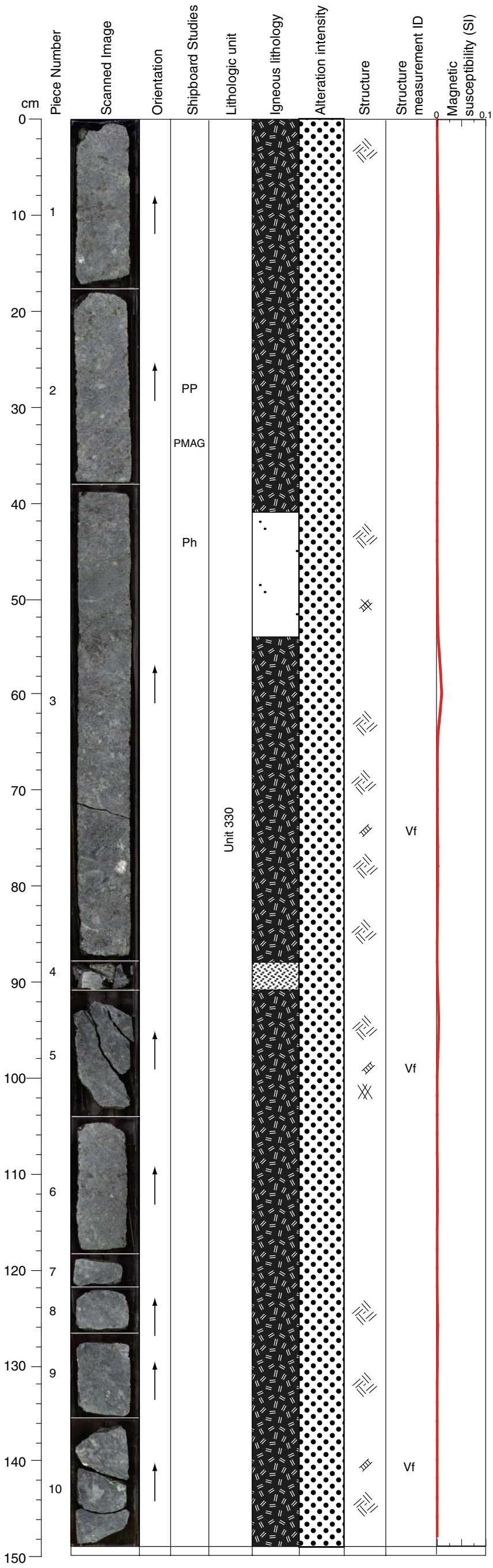
SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: Coexisting pale green tremolite-talc-chlorite coronas and tremolite-serpentine coronas around olivine. Sulfides are found in the coronas. In Piece 3, leucocratic dike (amphibole and plagioclase).

VEIN ALTERATION: Amphibole, chlorite, plagioclase, talc

STRUCTURE: Gabbro with large oikocrystic amphibole up to 10 cm including abundant plagioclase, no ductile fabric. Cataclasis and limited veining crosscut by dark green veins.

Core Photo



305-U1309D-122R-3 (Section top: 604.93 mbsf)

UNIT-330: Olivine-bearing gabbro
Pieces 1-10

PRIMARY MINERALOGY (estimated from U1309D-121R001, Piece 1):

Plagioclase	Modal 35-60% Size 5-15 mm Shape anhedral
Clinopyroxene	Modal 30-50% Size 5 mm average, to 50 mm Shape anhedral
Olivine	Modal 3-10% Size to 30 mm Shape anhedral

COMMENTS: This medium-grained olivine-bearing gabbro forms the continuation of the previous section. Between 41 and 54 cm, the grain size is reduced to 1 to 3 mm, without changing modal composition. Between 76 and 88 cm, a coarse grain size is accompanied by an increase in plagioclase mode (60%).

SECONDARY MINERALOGY: Chlorite, pale amphibole

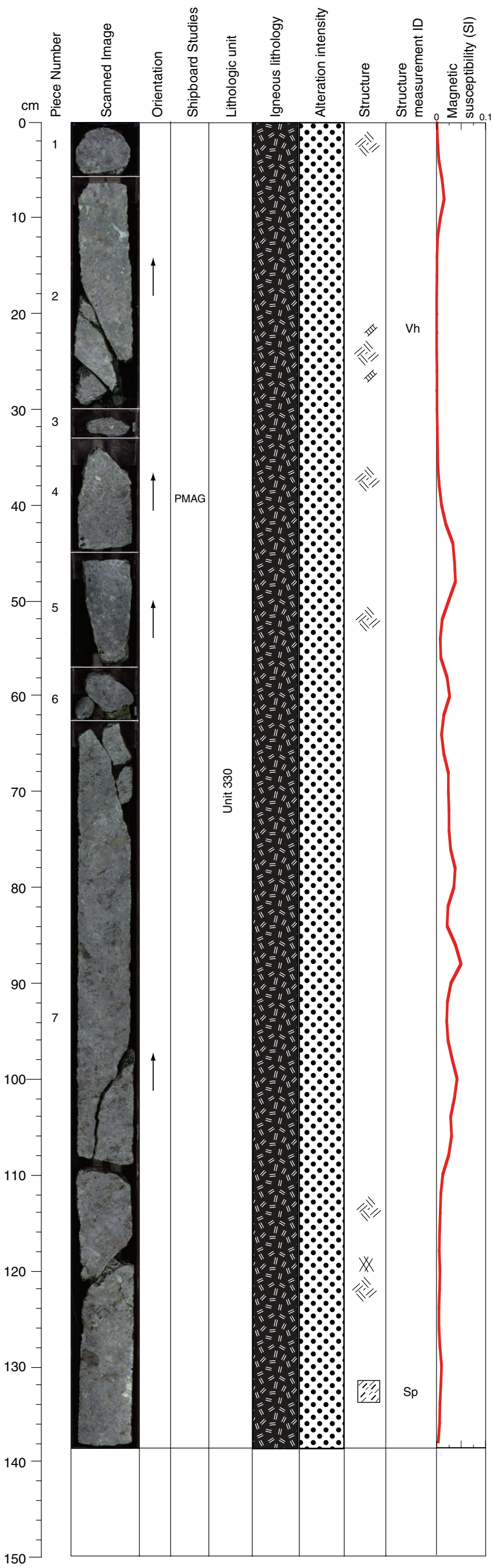
COMMENTS: Throughout most of the section alteration is as in the previous sections, where clinopyroxene has thin reaction rims of green amphibole (actinolite?) and minor development of corona texture. A few small veins with no halos cut the section. Below 92 cm, corona texture reappears, associated with a higher density of green veins.

VEIN ALTERATION: Amphibole, chlorite, talc, carbonate

STRUCTURE: Gabbro with large oikocrystic amphibole, no ductile fabric, grain size decreasing down core. Several vein sets and cataclasis. Bands of greenish alteration associated with sets of brittle fractures.

CLOSE_UP PHOTOGRAPHS:
305-U1309D-122R-3, 43-55 cm WET

Core Photo



305-U1309D-123R-1 (Section top: 607.00 mbsf)

UNIT-330: Olivine-bearing gabbro
Pieces 1-7

PRIMARY MINERALOGY (estimated from U1309D-121R-001, Piece 1):

Plagioclase	Modal 35-60% Size 5-15 mm Shape anhedral
Clinopyroxene	Modal 30-50% Size 5 mm average, to 50 mm Shape anhedral
Olivine	Modal 3-10% Size up to 30 mm Shape anhedral

COMMENTS: Continuation of the previous section. Medium-grained disseminated oxides were identified locally in the interval between 74 and 142, not exceeding 1% modal on average.

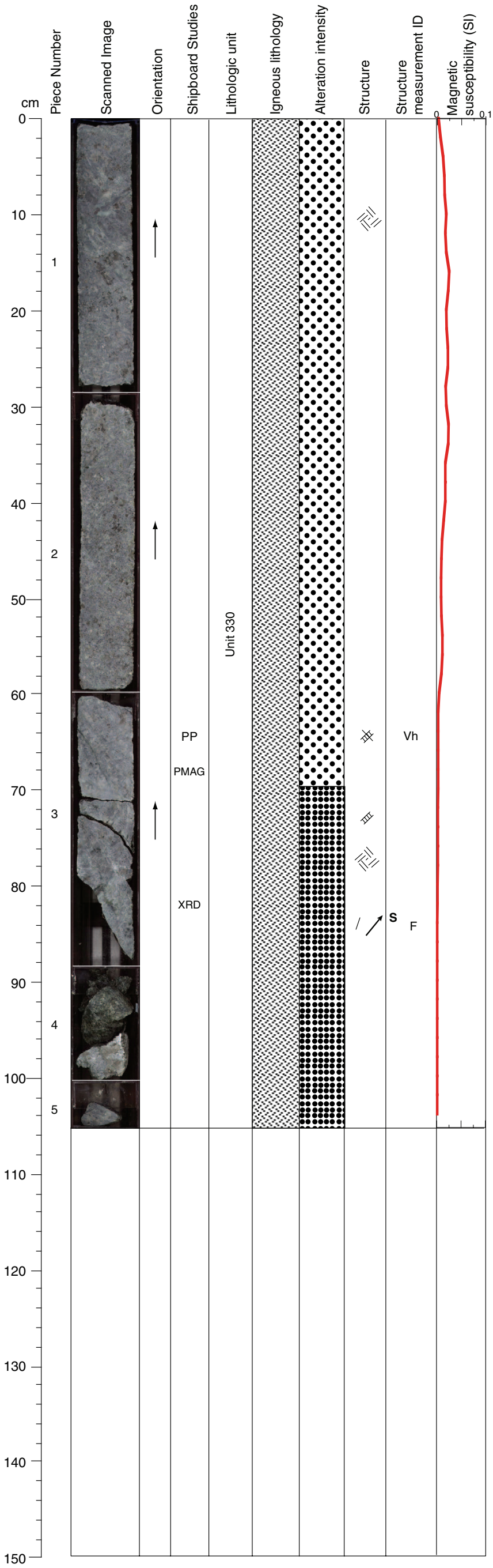
SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: Corona texture to about 30 cm (through Piece 2). Alteration in the lower part of the section includes large pyroxene grains with alteration rims of dark brown amphibole (76 cm) as well as brown pyroxene to with rims of green amphible (113 cm).

VEIN ALTERATION: Amphibole, chlorite, talc

STRUCTURE: Texturally variable gabbro, no ductile strain. Distributed cataclasis and drilling-induced fractures. Reduction of cataclasis in lower part.

Core Photo



305-U1309D-124R-1 (Section top: 611.80 mbsf)

UNIT-330: Disseminated oxide gabbro
Pieces 1-5

PRIMARY MINERALOGY:

Plagioclase	Modal 60% Size 5-15 mm Shape anhedral
Clinopyroxene	Modal 40% Size 5 mm average, to 50 mm Shape subhedral to anhedral
Oxides	Modal 2% Size to 30 mm Shape anhedral to interstitial

COMMENTS: Continuation of the previous section.

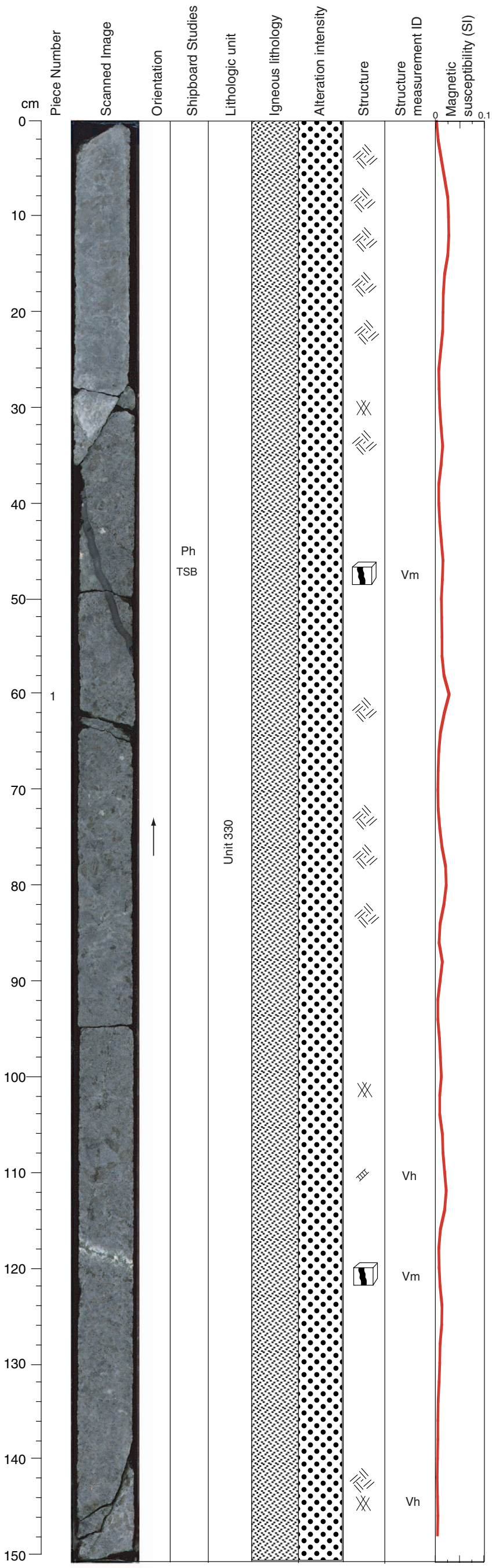
SECONDARY MINERALOGY: Chlorite, pale amphibole, serpentine

COMMENTS: Minor development of corona texture in Piece 1. Piece 2 and below are affected by alteration of pyroxene to green amphibole to varying degrees. Fractures with secondary mineral fill occur below 64 cm, but veins have no alteration halos.

VEIN ALTERATION: Amphibole, chlorite, talc

STRUCTURE: Gabbro varying in grain size from coarse to fine on small scale, no ductile strain. Distributed cataclasis and small, dark veins (magmatic ?). Coarse gabbro with cataclasis and >1 cm fault zone.

Core Photo



305-U1309D-124R-2 (Section top: 612.86 mbsf)

UNIT-330: Disseminated oxide gabbro
Piece 1

PRIMARY MINERALOGY (estimated from Piece 1a):

Plagioclase	Modal 60% Size 5-15 mm Shape anhedral
Clinopyroxene	Modal 40% Size 5 mm average, to 50 mm Shape subhedral to anhedral
Oxides	Modal 2% Size to 30 mm Shape anhedral to interstitial

COMMENTS: Continuation of the previous section. At 40-55 cm, a 1 cm wide diabase dikelet with a chilled margin crosscuts the gabbro. A leucocratic magmatic vein with an alteration halo crosscuts at 118 to 120 cm.

SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: Serpentine-tremolite coronas around the olivines. The rock is green due to the high amount of amphibole partially replacing the pyroxene grains. At 38-55 cm, 1 cm thick dark vein/intrusion of aphyric rock (?), without any alteration halo. At 117 cm, leucocratic zone of amphibole-plagioclase-epidote of 1.5 cm wide surrounds a thin green vein.

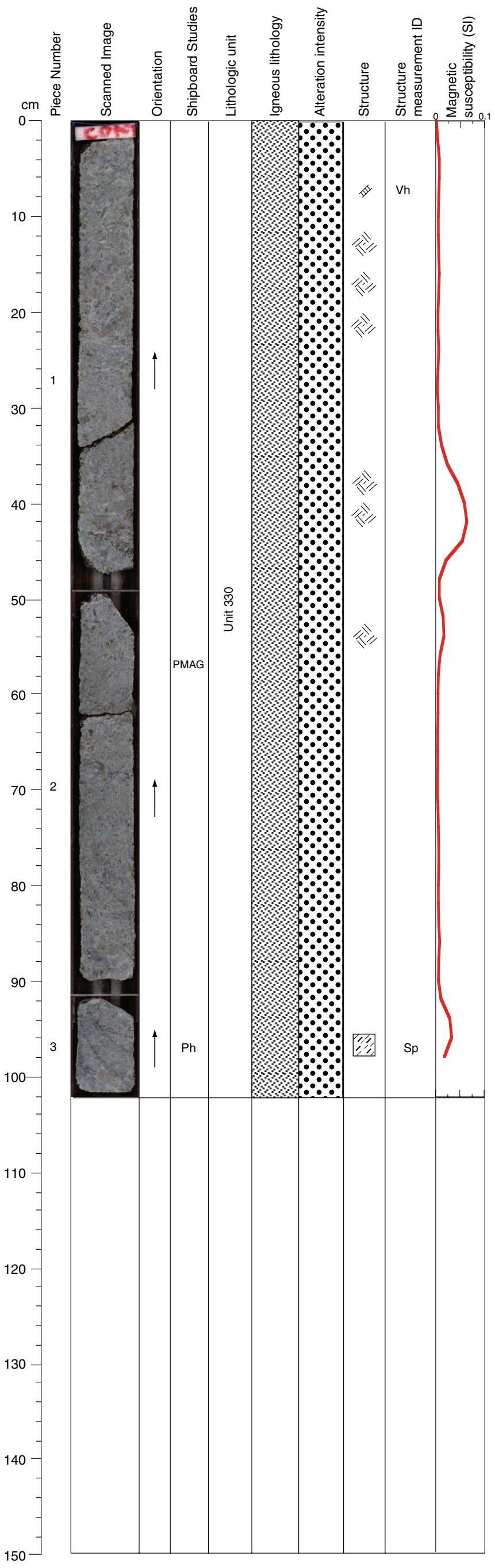
VEIN ALTERATION: Amphibole, chlorite, plagioclase

THIN SECTIONS:
305-U1309D-124R-2, 45-47 cm (#347)

STRUCTURE: Gabbro varying in grain size from coarse to fine on small scale, no ductile strain, minor late basalt and one leucocratic vein. Cataclasis and magmatic, hydrothermal and brittle veining across.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-124R-2, 36-55 cm WET

Core Photo



305-U1309D-124R-3 (Section top: 614.37 mbsf)

UNIT-330: Disseminated oxide gabbro
Pieces 1 to 3

PRIMARY MINERALOGY (estimated from U1309D-124R-2, Piece 1a):

Plagioclase	Modal 60% Size 5-15 mm Shape anhedral
Clinopyroxene	Modal 40% Size 5 mm average, to 50 mm Shape subhedral to anhedral
Oxides	Modal 2% Size to 30 mm Shape anhedral to interstitial

COMMENTS: Continuation of the previous section.

SECONDARY MINERALOGY: Chlorite, pale amphibole, serpentine

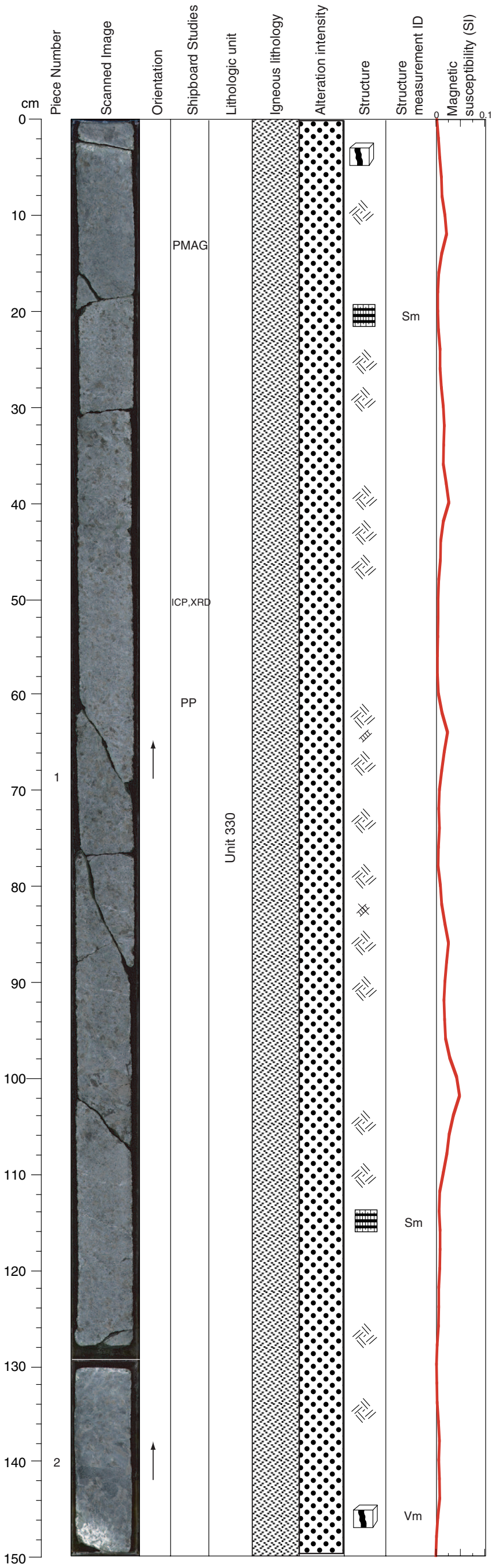
COMMENTS: Alteration similar to previous sections with green ampibole reaction rims around brown pyroxene grains and general green core. A few <1 mm wide veins cut the section and have green alteration halos of varying widths.

VEIN ALTERATION: Plagioclase

STRUCTURE: Gabbro varying in grain size from coarse to fine on small scale, no ductile strain except for a 6 cm ductile shear zone. Irregular cataclasis.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-124R-3, 93-103 cm WET

Core Photo



305-U1309D-124R-4 (Section top: 615.40 mbsf)

UNIT-330: Disseminated oxide gabbro
Pieces 1 to 2

PRIMARY MINERALOGY (estimated from U1309D-124R-2, Piece 1a):

Plagioclase	Modal 60% Size 5-15 mm Shape anhedral
Clinopyroxene	Modal 40% Size 5 mm average, to 50 mm Shape subhedral to anhedral
Oxides	Modal 2% Size up to 30 mm Shape anhedral to interstitial

COMMENTS: Continuation of the previous section. Leucocratic magmatic dikelet with alteration halos crosscut the gabbro at 2, 130, and 150 cm, forming breaking planes and leading to incomplete recovery.

SECONDARY MINERALOGY: Chlorite, pale amphibole, serpentine

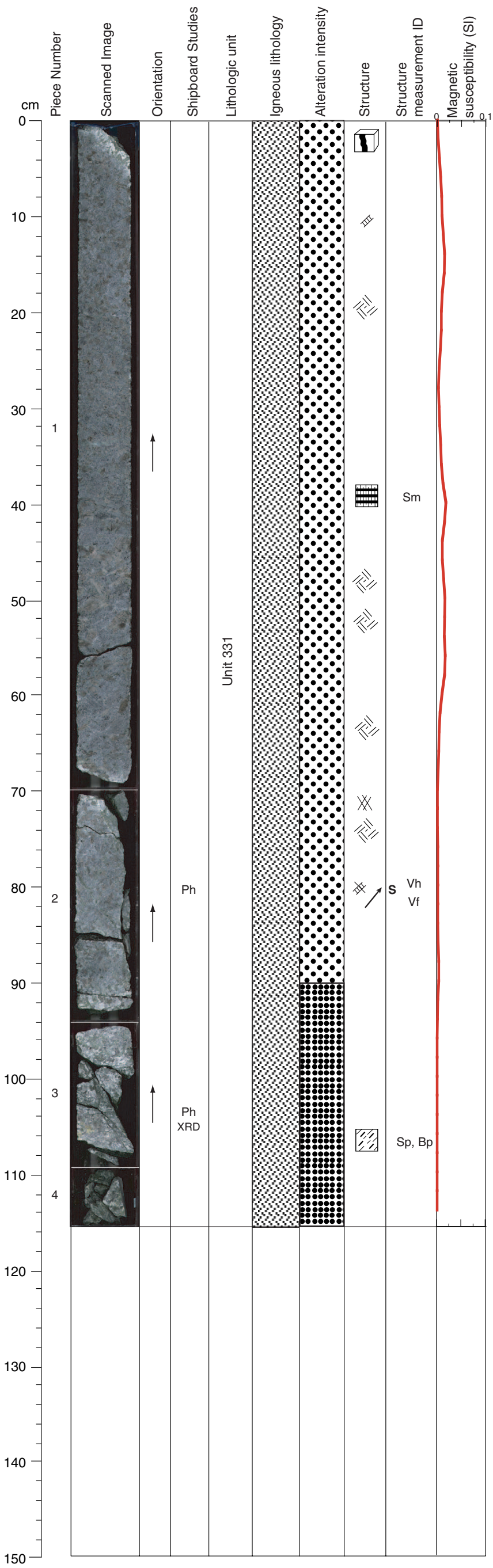
COMMENTS: Olivine are altered to serpentine and tremolite and the pyroxene grains are partially replaced by green amphibole (actinolite). At 2 cm, leucocratic dike. The end of Piece 1 is marked by a green alteration zone, which continues on top of Piece 2. At the end of the section, alteration zone with plagioclase and green amphibole replacing preexisting pyroxene.

VEIN ALTERATION: Amphibole, chlorite, plagioclase

STRUCTURE: Gabbro varying in grain size from coarse to fine on small scale, with local zones of clearly developed strain truncated (!) by zone without strain. Some irregular fracturing and a cataclastic zone - earlier magmatic veins. Dark green subhorizontal vein with fibers.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-124R-4, 130-149 cm DRY (back)

Core Photo



305-U1309D-125R-1 (Section top: 616.60 mbsf)

UNIT-331: Gabbro
Pieces 1 to 4

PRIMARY MINERALOGY:

Plagioclase	Modal 60% Size 5-15 mm Shape anhedral
Clinopyroxene	Modal 40% Size 5 mm average, to 50 mm Shape anhedral

COMMENTS: Both olivine and oxides appear locally in minor abundance in medium- to coarse-grained gabbro. Leucocratic magmatic dikelets with alteration halos crosscut the gabbro at the very top of the section, at 68 cm, and more dominantly at 92 cm, forming breaking planes and leading to incomplete recovery.

SECONDARY MINERALOGY: Chlorite, pale amphibole

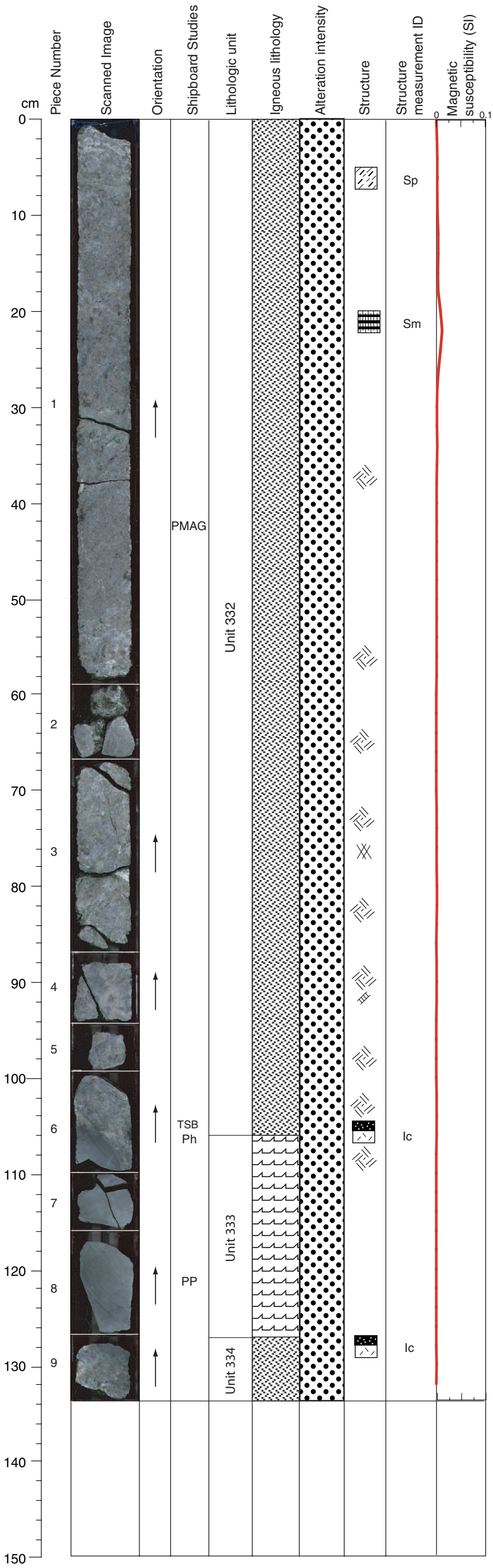
COMMENTS: General level of alteration is similar to previous sections. The top of Piece 1a and the boundary contact region between Pieces 1b and 2 and in several pieces at the bottom of the section contain leucocratic igneous material in which pyroxene has been heavily altered to green amphibole (actinolite?) and plagioclase has been altered to a white aggregate. A few thin veins with narrow white haloes cut the section.

VEIN ALTERATION: Amphibole, chlorite, plagioclase

STRUCTURE: Gabbro with variable grain size picks up weak fabric between 20 and 67 cm and has high strain zone below 100 cm in section. Distributed cataclasis. Crosscut by pegmatitic zone with cataclasis, cataclastic veins, highly deformed. Fault zone?

CLOSE-UP PHOTOGRAPHS:
305-U1309D-125R-1, 74-85 cm WET
305-U1309D-125R-1, 101-108 cm WET

Core Photo



305-U1309D-125R-2 (Section top: 617.76 mbsf)

UNIT-332: Gabbro
Pieces 1 to 6

PRIMARY MINERALOGY: (estimated from Piece 3b)

Plagioclase	Modal 60% Size 5-15 mm Shape anhedral
Clinopyroxene	Modal 40% Size 4 mm average, up to 15 mm Shape anhedral

COMMENTS: This unit consists of medium- to coarse-grained gabbro. Its upper contact is a sheared leucocratic dike.

UNIT-333: Diabase
Pieces 6 to 8

PRIMARY MINERALOGY: (microcrystalline, no phenocrysts, no ophitic texture)

COMMENTS: This 20 cm thick diabase interval has sharp well-preserved contacts and a chilled margin to the surrounding gabbro on both sides. The contact is wavy, lobate, rather than straight. The host gabbro at the contact appears cataclastically deformed.

UNIT-334: Gabbro
Piece 9

COMMENTS: Continuation of Unit 332 medium- to coarse-grained gabbro.

SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: The gabbro shows olivine altered to serpentine and tremolite, and contains a significant amount of green amphibole. At the top of Piece 1, a zone of leucocratic gabbro (plagioclase + green amphibole) surrounds several veins. A thicker (3 mm) vein at 7 cm has epidote (?). The section contains a lot of sulfide. At 106 cm, there is a contact between the coarse-grained gabbro and an aphyric fine-grained mafic intrusion. The margin has a green alteration halo. Green alteration zones are related to several veins, and the intrusive contains a significant amount of sulfides. This intrusion disappears at 128 cm where it contacts coarse-grained gabbro. Green amphibole partially replaces pyroxene in the coarse gabbro.

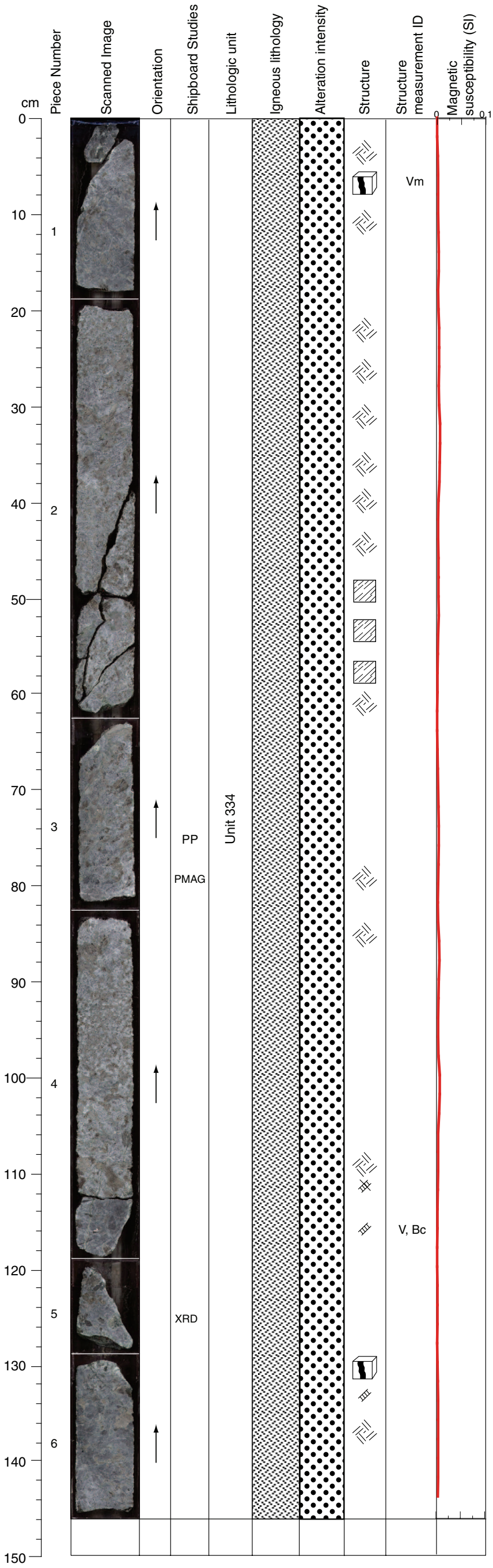
VEIN ALTERATION: Amphibole, chlorite, plagioclase, talc

THIN SECTIONS:
305-U1309D-125R-2, 104-106 cm (#348)

STRUCTURE: Mylonitic gabbro at top of section changes to a steeper but weaker fabric down core. At 80 cm fabric no longer appears and transition to coarse grained gabbro. Igneous contact to basalt in lower part of section. Little cataclasis and veining.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-125R-2, 100-110 cm WET

Core Photo



305-U1309D-125R-3 (Section top: 619.10 mbsf)

UNIT-334: Gabbro
Pieces 1-6

PRIMARY MINERALOGY: (estimated from U1309D-125R-002, Piece 3b)

Plagioclase	Modal 60% Size 5-15 mm Shape anhedral
Clinopyroxene	Modal 40% Size 4 mm average, to 15 mm Shape anhedral

COMMENTS: Continuation of Unit 334 gabbro, on average slightly more coarse grained. No change in modal composition.

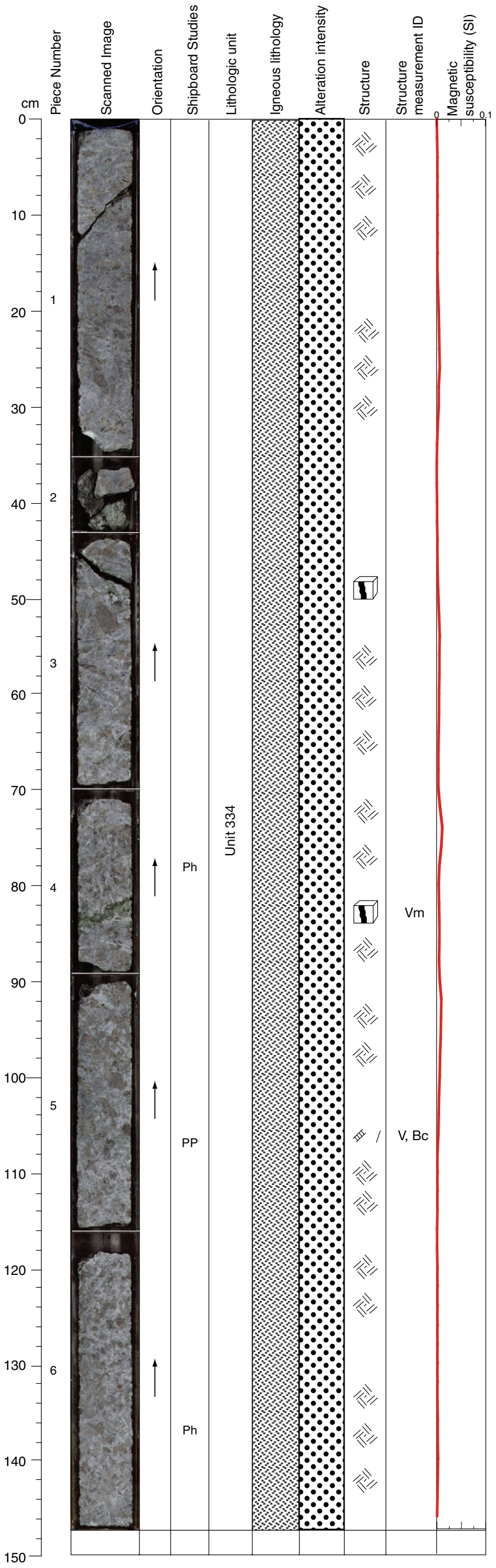
SECONDARY MINERALOGY: Chlorite, pale amphibole, serpentine

COMMENTS: Green amphibole reaction rims form around brown pyroxene grains. Plagioclase is partially altered to chlorite and other minerals. Several fractures with secondary green minerals (no halos above 107 cm) cut the section. Small patches of leucocratic igneous material fringes pieces below 121 cm and contains plagioclase altered to white minerals (saussurite?) and pyroxene altered to green ampibole.

VEIN ALTERATION: Chlorite, talc

STRUCTURE: Varitextured gabbro without ductile strain. In Piece 6 leucocratic vein with alteration halo. Minor cataclasis and veining.

Core Photo



305-U1309D-125R-4 (Section top: 620.56 mbsf)

UNIT-334: Gabbro
Pieces 1-6

PRIMARY MINERALOGY: (estimated from U1309D-125R-002, Piece 3b)

Plagioclase	Modal 60% Size 5-15 mm Shape anhedral
Clinopyroxene	Modal 40% Size 4 mm average, to 15 mm Shape anhedral

COMMENTS: Continuation of Unit 334 gabbro.

SECONDARY MINERALOGY: Chlorite, pale amphibole

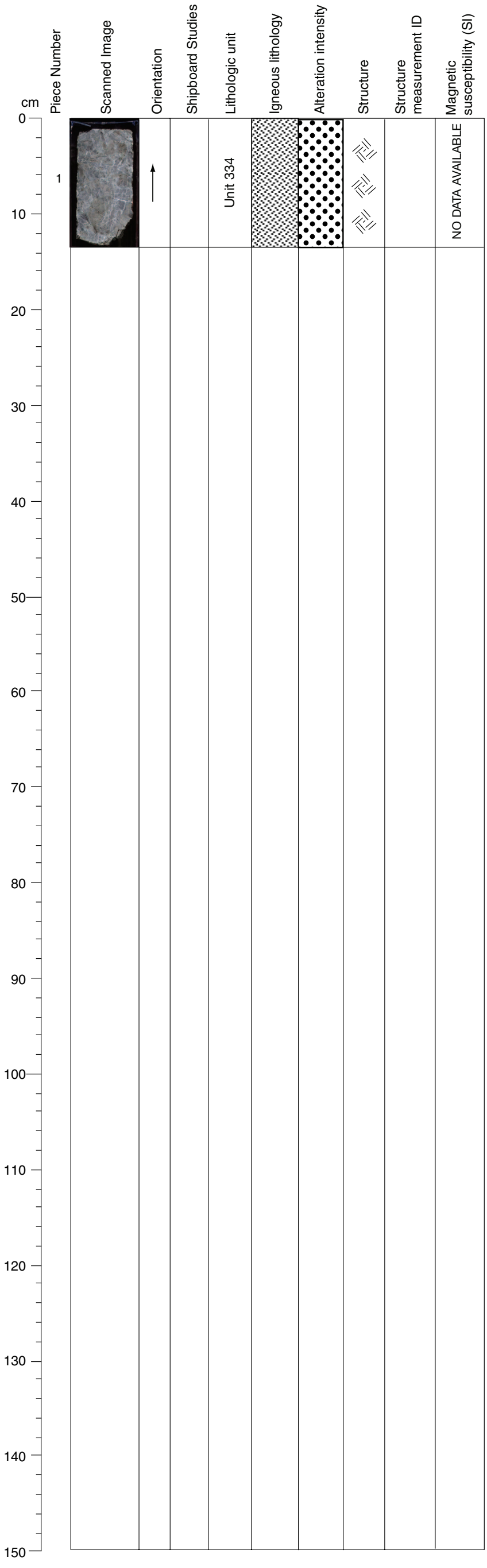
COMMENTS: Olivines are altered to serpentine and tremolite and pyroxenes are partially altered to green amphibole (actinolite). The gabbro shows a green background color due to the significant amount of amphibole present. At 46 and 82 cm, leucocratic dikes (plagioclase + green amphibole).

VEIN ALTERATION: Amphibole, chlorite, plagioclase

STRUCTURE: Varitextured gabbro without ductile strain. In Piece 6 leucocratic vein with alteration halo. Vein in Piece 4. Some irregular fracturing and a cataclastic zone along earlier magmatic vein.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-125R-4, 70-88 cm WET

Core Photo



305-U1309D-125R-5 (Section top: 622.03 mbsf)

UNIT-334: Gabbro
Piece 1

COMMENTS: Continuation of Unit 334 gabbro.

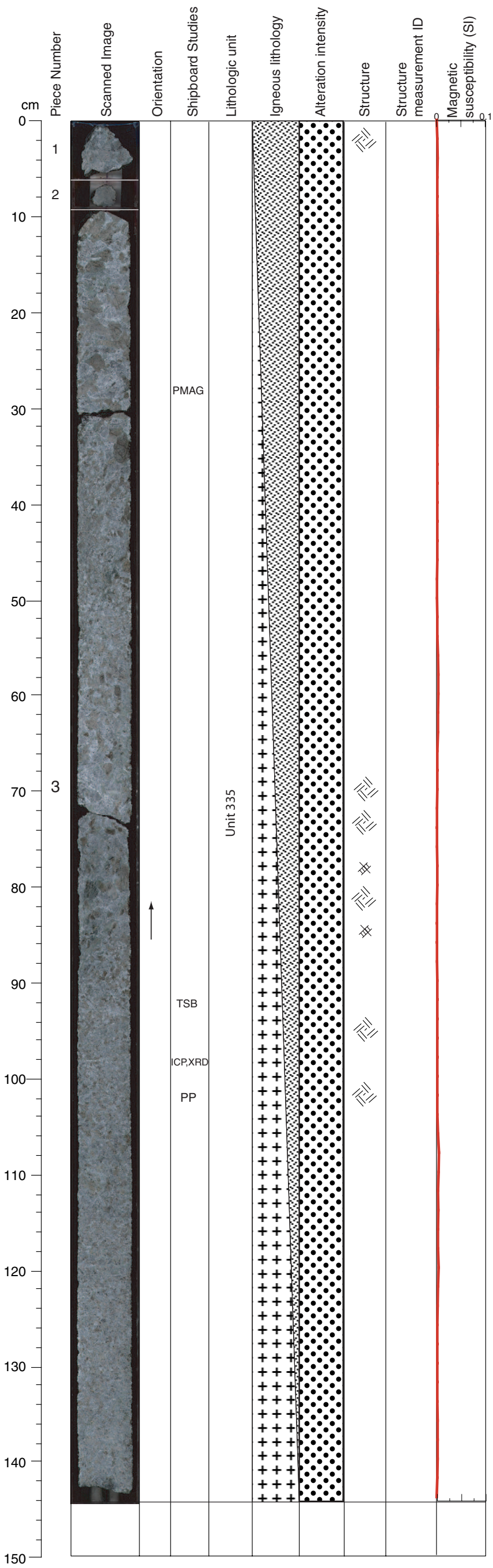
SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: Green amphibole reaction rims form around brown pyroxene grains. Plagioclase is partially altered to chlorite and other minerals. Several fractures with secondary white minerals (no halos) cut the piece.

VEIN ALTERATION: n/a

STRUCTURE: Coarse gabbro without ductile strain. Minor irregular fracturing.

Core Photo



305-U1309D-126R-1 (Section top: 621.40 mbsf)

UNIT-335: Gabbro, Gabbronorite
Pieces 1 to 3

PRIMARY MINERALOGY: (estimated from Piece 3b)

Plagioclase	Modal 50 to 60% Size 5-15 mm Shape anhedral
Amphibole	Modal 40 to 50% Size 10 mm average, to 25 mm Shape anhedral

COMMENTS: This unit consists of coarse-grained gabbro. Grain size and modal compositions change unsystematically thoughout this section. 7% primary modal orthopyroxene seen in thin section at 90-93 cm making this a gabbronorite.

SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: The grain size of this gabbro decreases to the end of the section. The pyroxene grains are partially replaced to green amphibole (actinolite), and the altered olivine grains are rimmed by tremolite.

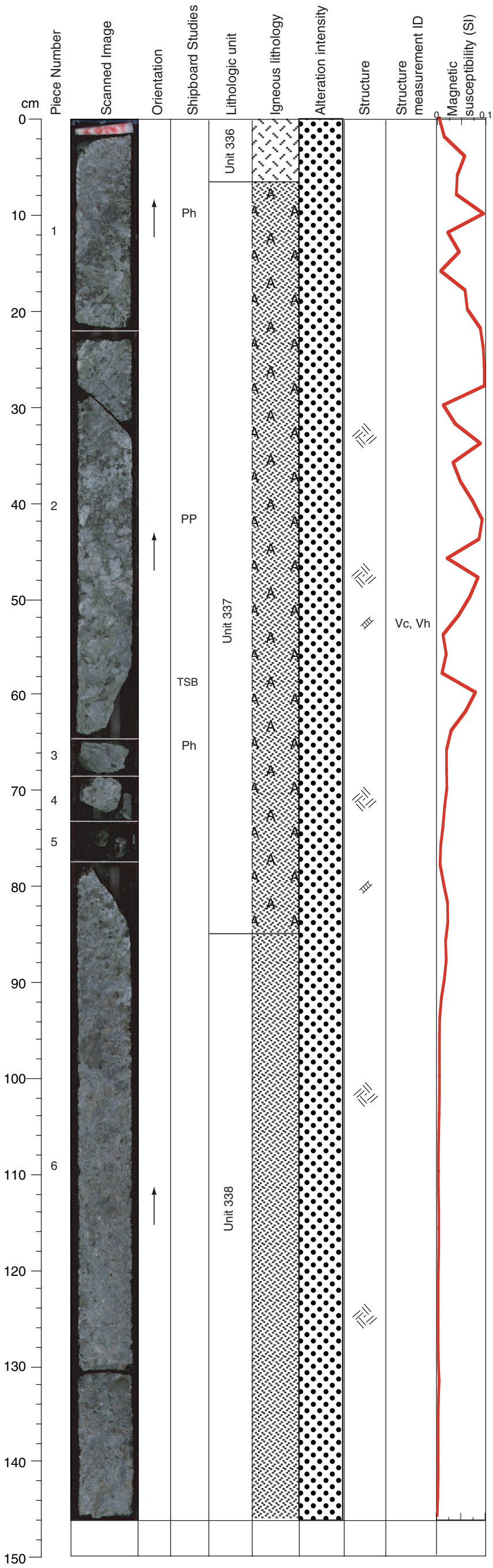
VEIN ALTERATION: Plagioclase, chlorite, talc.

THIN SECTIONS:
305-U1309D-126R-1, 90-93 cm (#349)

STRUCTURE: Coarse gabbro without ductile strain, below 86 cm finer grained, clinopyroxene rimmed by green amphibole. Pervasive minor irregular fractures.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-126R-1, 85-100 cm WET

Core Photo



305-U1309D-126R-2 (Section top: 622.85 mbsf)

UNIT-336: Gabbro
Piece 1

COMMENTS: This unit continues from the previous section.

UNIT-337: Oxide-amphibole gabbro
Pieces 1 to 6

PRIMARY MINERALOGY: (estimated from Piece 2b)

Plagioclase	Modal 50% Size 5-15 mm Shape anhedral
Clinopyroxene	Modal 35% Size 10 mm average, to 25 mm Shape anhedral
Oxide	Modal 40 to 50% Size 10 mm average, to 25 mm Shape anhedral

COMMENTS:This unit consists of coarse-grained leucocratic oxide-bearing gabbro, containing coarse amphiboles that may be partly of magmatic origin. The contact to the upper unit is sharp and marked by an extreme enrichment of oxides (50%) and bladed amphiboles that grow perpendicular to the wall, suggesting a non-tectonic, statically magmatic growth of both phases. A more pronounced fragmentation can be observed down section. Thin section observations did not resolve the possible primary origin of the amphiboles.

UNIT-338: Gabbro
Pieces 6

PRIMARY MINERALOGY: (estimated from Piece 2b)

Plagioclase	Modal 50-60% Size 5-10 mm Shape anhedral
Clinopyroxene	Modal 40-50% Size 10 mm average, up to 20 mm Shape anhedral

COMMENTS: This unit consists of coarse-grained gabbro, similar to Unit 336.

SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: From 43 to 80 cm, alteration zone with 1-2 cm size amphibole and plagioclase, cut by late green amphibole veins and associated with a lot of sulfides. The olivines in this zone are altered to tremolite and a tiny white mineral (?) occurs associated with the altered olivine.

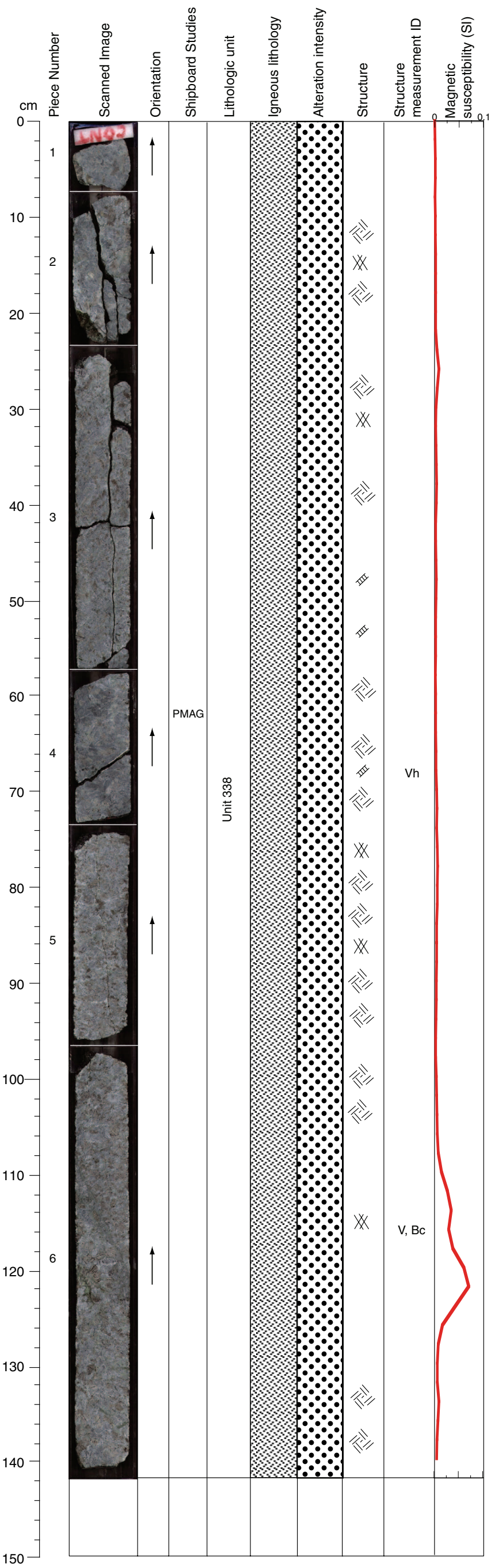
VEIN ALTERATION: Amphibole, plagioclase, chlorite.

THIN SECTIONS:
305-U1309D-126R-2, 57-59 cm (#350)

STRUCTURE: Medium to coarse grained gabbro with common pegmatite sized clinopyroxene or amphibole (up to 10 cm), no ductile strain. Veining and cataclasis concentrated along an amphibolite zone (large crystals).

CLOSE-UP PHOTOGRAPHS:
305-U1309D-126R-2, 0-22 cm WET
305-U1309D-126R-2, 46-63 cm WET
305-U1309D-126R-2, 62-68 cm WET

Core Photo



305-U1309D-126R-3 (Section top: 624.31 mbsf)

UNIT-338: Gabbro
Pieces 1 to 6

PRIMARY MINERALOGY: (estimated from Section U1309D-126R-002, Piece 2b)

Plagioclase	Modal 50-60% Size 5-10 mm Shape anhedral
Clinopyroxene	Modal 40-50% Size 10 mm average, to 20 mm Shape anhedral

COMMENTS: This coarse-grained gabbro continues from the previous section.

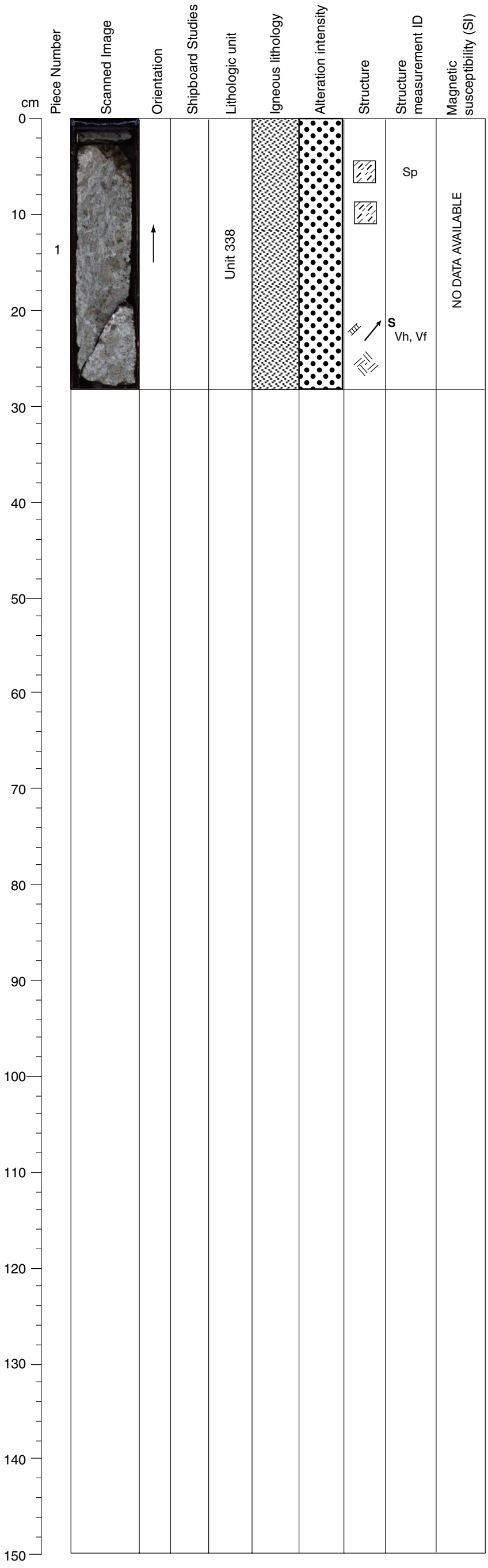
SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: Olivines are altered and rimmed by amphibole (tremolite) and the pyroxenes are partially replaced by green amphibole (actinolite). The pieces are fractured and a lot of veinlets cut the section. At 110 cm, a 0.5 cm wide, green vein (amphibole) appears.

VEIN ALTERATION: Amphibole, plagioclase, chlorite, talc, carbonate, sulfide.

STRUCTURE: Medium to coarse grained gabbro with common pegmatitic clinopyroxene or amphibole (up to 10 cm), no ductile strain. Veining and minor cracking. Large cataclastic veins with branching. White veins with calcite and sulfides.

Core Photo



305-U1309D-126R-4 (Section top: 625.73 mbsf)

UNIT-338: Gabbro
Piece 1

PRIMARY MINERALOGY: (estimated from U1309D-126R-002, Piece 2b)

Plagioclase	Modal 50-60% Size 5-10 mm Shape anhedral
Clinopyroxene	Modal 40-50% Size 10 mm average, to 20 mm Shape anhedral

COMMENTS: This coarse-grained gabbro continues from the previous section.

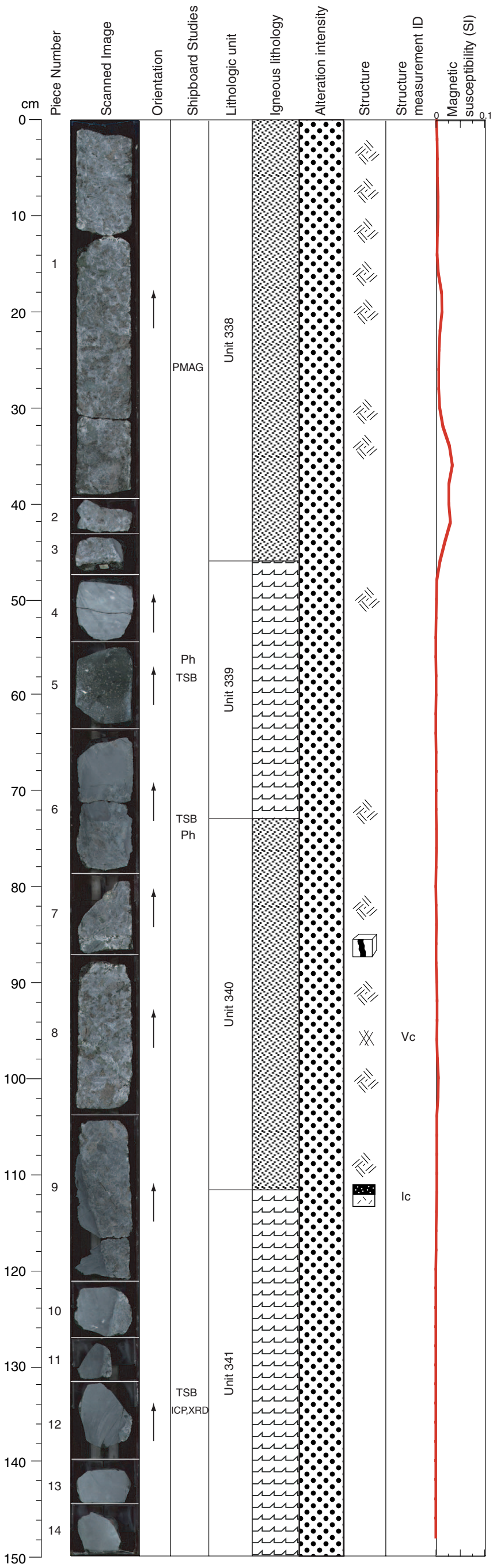
SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: Olivines are altered and rimmed by amphibole (tremolite) and the pyroxenes are partially replaced by green amphibole (actinolite). Network of amphibole veins. The plagioclase shows a pinkish-white color.

VEIN ALTERATION: Amphibole, chlorite.

STRUCTURE: Medium to coarse grained gabbro with common pegmatitic clinopyroxene or amphibole (up to 10 cm), no ductile strain. ductile strain zone of 2 mm thickness in Piece 1. Dark green vein with fibers.

Core Photo



305-U1309D-127R-1 (Section top: 626.20 mbsf)

UNIT-338, 340: Gabbro
Pieces 1-3, 6b-9a

PRIMARY MINERALOGY: (estimated from Section U1309D-126R-002, Piece 2b)

Plagioclase	Modal 50-60% Size 5-10 mm Shape anhedral
Clinopyroxene	Modal 40-50% Size 10 mm average, to 20 mm Shape anhedral

COMMENTS: Units 338 and 340 are coarse-grained gabbro.

UNIT-339, 341: Diabase
Pieces 4-6a, 9a-14

COMMENTS: Units 339 and 341 are microcrystalline diabase.

SECONDARY MINERALOGY: Chlorite, pale amphibole, serpentine

COMMENTS: Green amphibole reaction rims occur around brown pyroxene grains. Plagioclase is partially altered to chlorite and other minerals. Several fractures with secondary green minerals (no halos) cut the section. A narrow fringe of leucocratic igneous material occurs between Pieces 1a and 1b. Plagioclase in this fringe is altered to white aggregate and pyroxene is altered to green ampibole. MInor corona texture is developed in Piece 3. Pieces 4 to 6b are fine-grained intrusive that contains small xenocrysts of the surrounding material. The intrusive has a slight greenish cast suggesting alteration of the type seen throughout the core. A narrow zone of leucocratic material occurs at about 86-89 cm. Plagioclase in this interval is altered to white aggregate and pyroxene is altered to green amphibole. More of the fine-grained intrusive occurs from 108 cm through the end of the section (150 cm). As above, it is altered with a slight greenish cast.

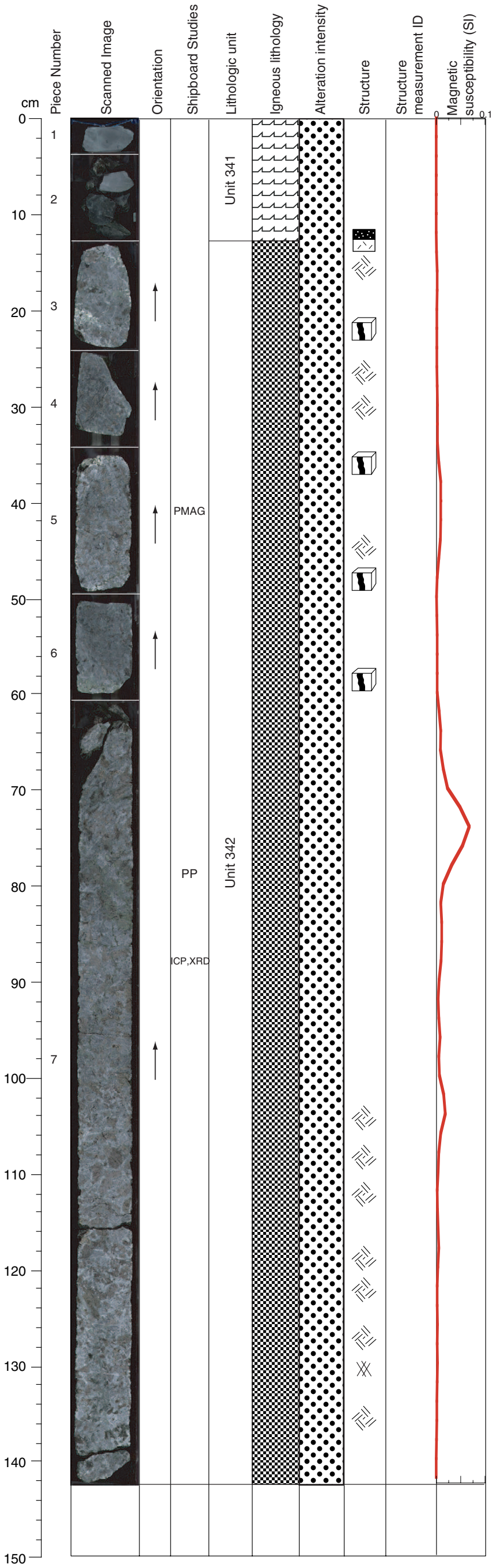
VEIN ALTERATION: Amphibole, plagioclase, chlorite, sulfides.

THIN SECTIONS:
305-U1309D-127R-1, 57-60 cm (#351)
305-U1309D-127R-1, 72-74 cm (#352)
305-U1309D-127R-1, 132-135 cm (#353)

STRUCTURE: Coarse to pegmatitic gabbro in sharp contact with intervening diabase, no ductile strain. Minor fracturing and veins in gabbro. A few microcracks in diabase.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-127R-1, 54-63 cm WET
305-U1309D-127R-1, 54-63 cm DRY
305-U1309D-127R-1, 72-75 cm WET
305-U1309D-127R-1, 133-140 cm WET

Core Photo



305-U1309D-127R- 2 (Section top: 627.70 mbsf)

UNIT-341: Diabase (rubble)
Pieces 1-2

COMMENTS: Continuation of Unit 341 microcrystalline diabase.

UNIT-342: Oxide-bearing Gabbro
Pieces: 3-7

PRIMARY MINERALOGY: Modal data from Piece 7b

Oxide	Modal ?1% Size <1 mm average Shape anhedral
Plagioclase	Modal 60% Size 5mm average Shape anhedral
Clinopyroxene	Modal 40% Size 13 mm average Shape subhedral

COMMENTS: Unit 342 consists of coarse-grained disseminated oxide-bearing gabbro. The oxides are heterogeneously distributed.

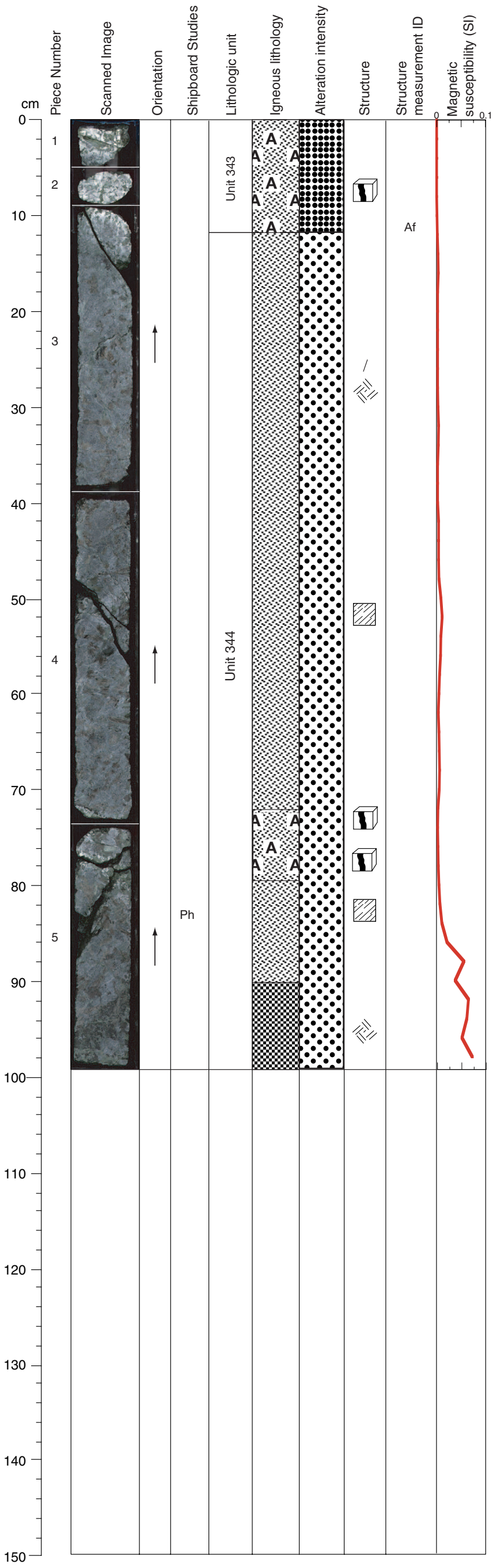
SECONDARY MINERALOGY: Chlorite, pale amphibole, serpentine

COMMENTS: Pieces 1 and 2 are more of the fine-grained intrusive seen in the previous section. As above, it is altered with a slight greenish cast. Beginning at about 13 cm in Piece 3 and continuing throughout the section, there are patches of leucocratic igneous material in which plagioclase is altered to a white aggregate and pyroxene is altered to green amphibole. Minor corona texture is developed near these patches in the adjacent gabbro. The general background alteration of the gabbro is similar to higher sections with alteration rims of green amphibole on brown pyroxene grains and some alteration of plagioclase to.

VEIN ALTERATION: Amphibole, plagioclase, chlorite.

STRUCTURE: Coarse to pegmatitic gabbro in sharp contact to intervening diabase, no ductile strain. Distributed cataclasis, pegmatitic veins, and later hydrothermal (?) veins.

Core Photo



305-U1309D-127R-3 (Section top: 629.12 mbsf)

UNIT-343: Gabbro
Pieces: 1-3a

PRIMARY MINERALOGY: Modal data from Piece 2

Plagioclase	Modal 80% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 20% Size 3 mm average Shape subhedral

COMMENTS: Unit 343 was interpreted to be a coarse-grained leucocratic gabbro dikelet. The upper contact is not preserved. The lower contact is sharp and well preserved in the topmost part of Piece 2. As core descriptions continued and thin sections became available, leucocratic layers such as this one appeared to be not magmatic. Primary magmatic grains are optically continuous across the inferred contact. This suggests that the whitish saussuritization overprint of the plagioclase is due to non-magmatic fluid focussing effect, rather than a purely magmatic feature.

UNIT-344: Gabbro
Pieces: 3b-5

PRIMARY MINERALOGY: Modal data from Piece 5

Plagioclase	Modal 80% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 20% Size 3 mm average Shape subhedral

COMMENTS: Unit 344 coarse-grained gabbro. Oxide concentrates at 91-98 cm (4 cm thick zone: oxide: 60%, amphibole: 20%, plagioclase: 20%). Leucocratic zone at 70-80 cm.

SECONDARY MINERALOGY: Chlorite, pale amphibole

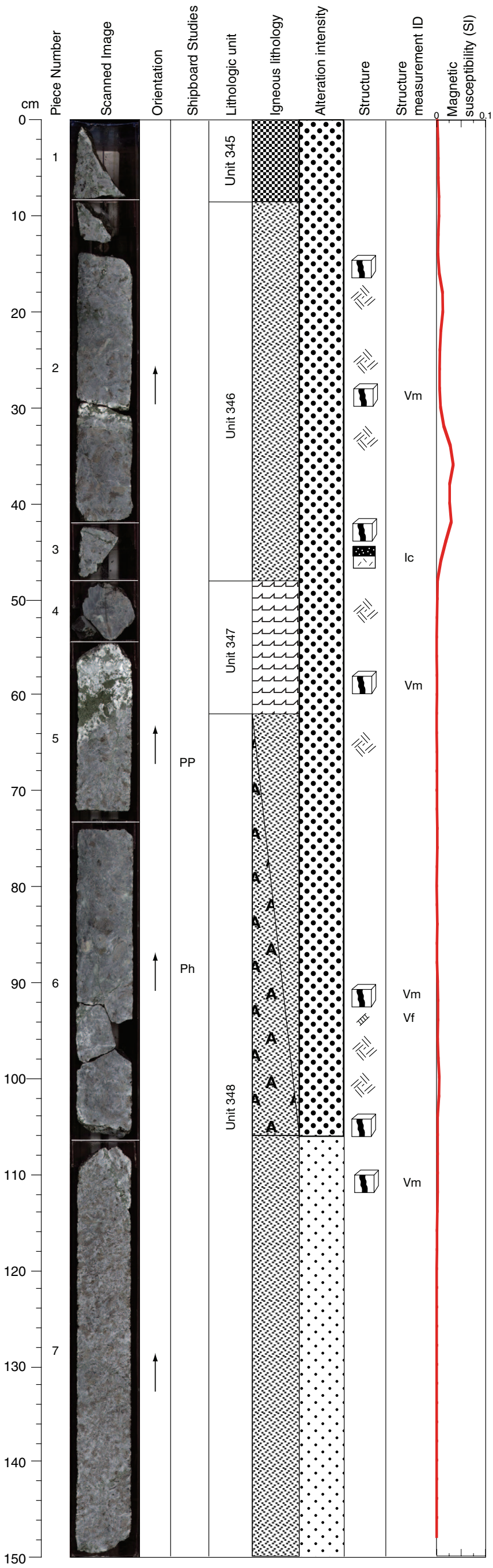
COMMENTS: There are several patches of leucocratic igneous material in the section, especially in Pieces 1 and 2, in which plagioclase is altered to a white aggregate and pyroxene is altered to green amphibole. The general background alteration of the gabbro is similar to higher sections with alteration rims of green amphibole on brown pyroxene grains and some alteration of plagioclase to chlorite.

VEIN ALTERATION: Amphibole, plagioclase, chlorite.

STRUCTURE: Coarse to pegmatitic gabbro with alteration front at top of section. Late cataclasis and veining and pegmatitic contact on top.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-127R-3, 78-98 cm WET

Core Photo



305-U1309D-128R-1 (Section top: 631.00 mbsf)

UNIT-345: Oxide Gabbro rubble
Piece: 1

PRIMARY MINERALOGY: modes not determined on rubble

COMMENTS: This unit is oxide gabbro rubble. Uncertain if in place.

UNITS-346 and 348: Gabbro
Pieces: 2-4 and 5-7, respectively

PRIMARY MINERALOGY: Modal data from Pieces 2b and 7

Plagioclase	Modal 55% Size 5 mm average, to 15 mm Shape subhedral
Clinopyroxene	Modal 45% Size 10 mm average, to 20 mm Shape subhedral

COMMENTS: Units 346 and 348 consist of coarse-grained gabbro. At 27-29 cm, a horizontal leucocratic magmatic vein crosscuts the gabbro. The vein is 20 mm wide and compositionally similar to Unit 347. At 49 to 55 cm, a cryptocrystalline diabase patch with chilled margin occurs. It has lobate contacts to the surrounding fragmented gabbro.

UNIT-347: Diabase
Piece: 5

PRIMARY MINERALOGY: No modal estimate

COMMENTS: This unit consists of a diabase and an associated leucocratic gabbroic dike, and forms the beginning of complex zone of melt-injected, brittlely deformed and metamorphically overprinted gabbros, described in the units down section. The dike itself contains 65% white milky euhedral plagioclase crystals that also grow on the lower contact wall. The remainder is a fine-grained green amphibole-bearing matrix, and fine-grained brittlely deformed plagioclase fragments. Thin section observations in similar fine-grained green matrix assemblage revealed a ghost ophitic texture, suggesting that it may be strongly overprinted diabase.

SECONDARY MINERALOGY: Chlorite, pale amphibole

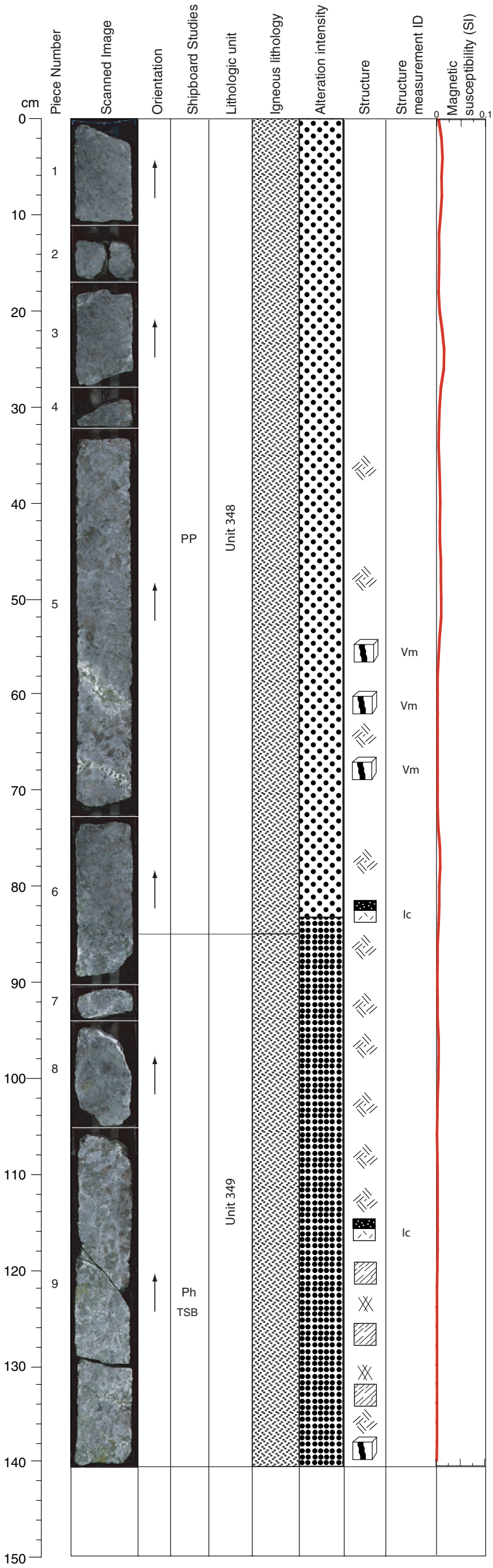
COMMENTS: Gabbros with altered olivine and pyroxene partially replaced to green amphibole. At 28-30 cm leucocratic zone (plagioclase-amphibole) associated with a fracture. The alteration zone related to this vein is 1 cm thick and the olivines show a rim of tremolite. At 49 cm, contact between the gabbro and the aphyric rock, which shows a green corona at the contact. Close to this, some pale green coronas with a thick rim of chlorite appear. At 55-65 cm, a leucocratic zone (10 cm wide, plagioclase-amphibole) occurs with gradual transition to the “host” gabbro. Other leucocratic zones are observed at 90 and 107 cm.

VEIN ALTERATION: Amphibole, plagioclase, chlorite.

STRUCTURE: Coarse gabbro crosscut by magmatic/alteration veins. Heterogenous distribution of cataclasis, preferentially along leucocratic areas. Dark green veins (magmatic) prior to cataclasis. Dark green vein crosscut by brittle fracture with slight normal displacement.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-128R-1, 84-98 cm WET

Core Photo



305-U1309D-128R-2 (Section top: 632.50 mbsf)

UNIT-348: Gabbro
Pieces: 1-6

PRIMARY MINERALOGY: Modal data from Section U1309D-128R-001, Pieces 2b and 7

Plagioclase	Modal 55% Size 5 mm average, to 15 mm Shape subhedral
Clinopyroxene	Modal 45% Size 10 mm average, to 20 mm Shape subhedral

COMMENTS: Continuation of previous section. Patchy, irregular leucocratic coarse-grained gabbro crosscuts at 60 and 68 cm.

UNIT-349: Gabbro
Pieces: 6-9

PRIMARY MINERALOGY: No modal estimate

COMMENTS: This unit consists of a complex zone of brittlely deformed and metamorphically overprinted gabbros. Fragments of gabbroic wallrock material of Unit 346 are embedded in a matrix of Unit 347 leucocratic, amphibole-bearing gabbro. Plagioclase displays both undeformed euhedral and brittlely deformed crystals. Primary amphibole may be present, as suggested from the coarse plagioclase-amphibole intergrowths.

SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: This gabbro has altered olivine rimmed by tremolite and pyroxene partially replaced to green amphibole (actinolite). At 57 and 67 cm, leucocratic zones (plagioclase-amphibole, and epidote). At 82 cm, leucocratic alteration zone, with pyroxene still present, amphibole, epidote and sulfides. The altered pyroxenes contain a lot of sulfides.

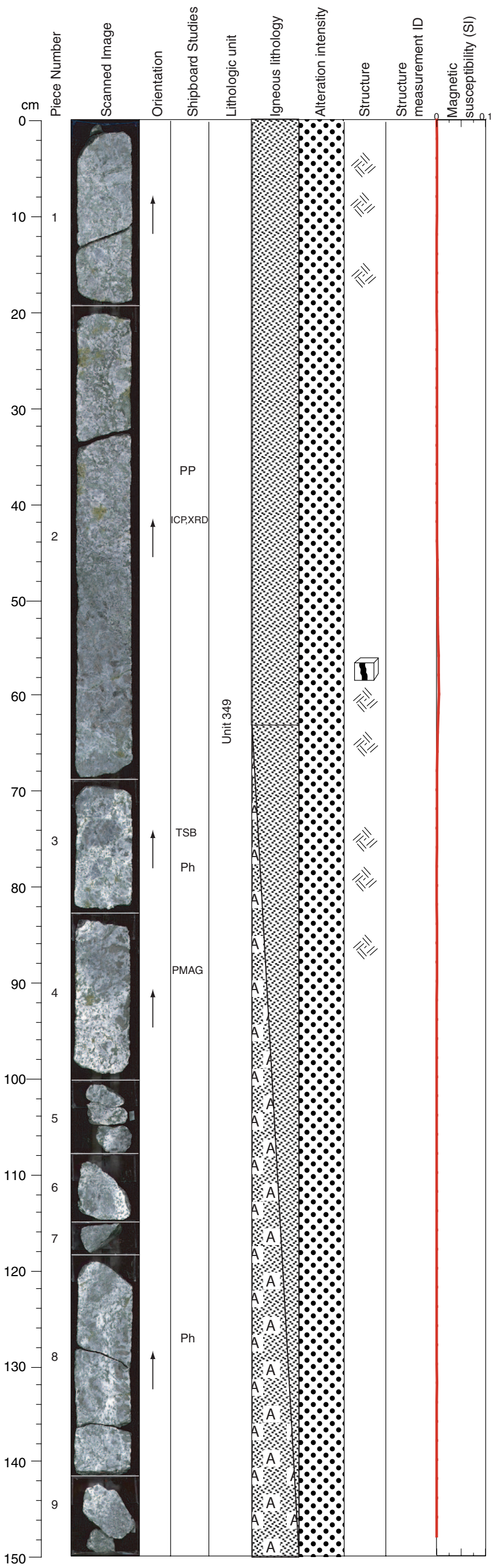
VEIN ALTERATION: Amphibole, plagioclase, chlorite.

THIN SECTIONS:
305-U1309D-128R-2, 122-125 cm (#354)

STRUCTURE: Coarse gabbro with large clinopyroxene/amphibole and 50% leucocratic stockwork-type alteration and leucocratic veins, no ductile strain. Lower part is a cataclastic leucocratic zone with no well developed structure ('shattered' look).

CLOSE-UP PHOTOGRAPHS:
305-U1309D-128R-2, 120-130 cm WET

Core Photo



305-U1309D-128R-3 (Section top: 633.91 mbsf)

UNIT-349: Gabbro
Pieces: 1-9

COMMENTS: Continuation of previous section. Strong patchy epidote replacement in the leucocratic domains. A relatively large fragment of undeformed and gabbro wallrock occurs between 50 and 63 cm.

SECONDARY MINERALOGY: Chlorite, pale amphibole, epidote

COMMENTS: Leucocratic zone throughout most of the section (plagioclase, amphibole, epidote patches). Some pieces of gabbro appear in the zone (at 44-62 cm, 72-76 cm, 85-90 cm, and Piece 8) without strong alteration of the pyroxenes.

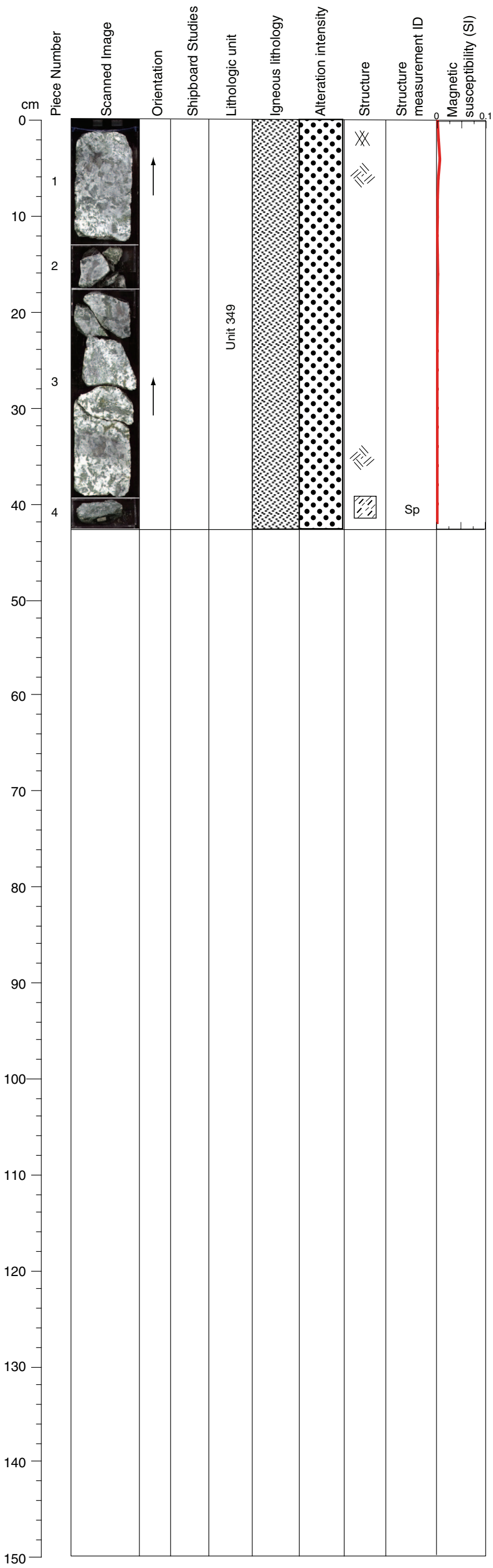
VEIN ALTERATION: Amphibole, plagioclase, chlorite, epidote.

THIN SECTIONS:
305-U1309D-128R-3, 73-76 cm (#355)

STRUCTURE: Leucocratic stockwork-type alteration (90%) and rare (relict?) coarse gabbro with large clinopyroxene/amphibole, no ductile strain. Cataclastic leucocratic zone with no well developed structure ('shattered' look) and a few veins - less deformation than bottom of previous section.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-128R-3, 70-82 cm WET
305-U1309D-128R-3, 119-135 cm WET

Core Photo



305-U1309D-128R-4 (Section top: 635.41 mbsf)

UNIT-349: Gabbro
Pieces: 1-4

COMMENTS: Continuation of previous section.

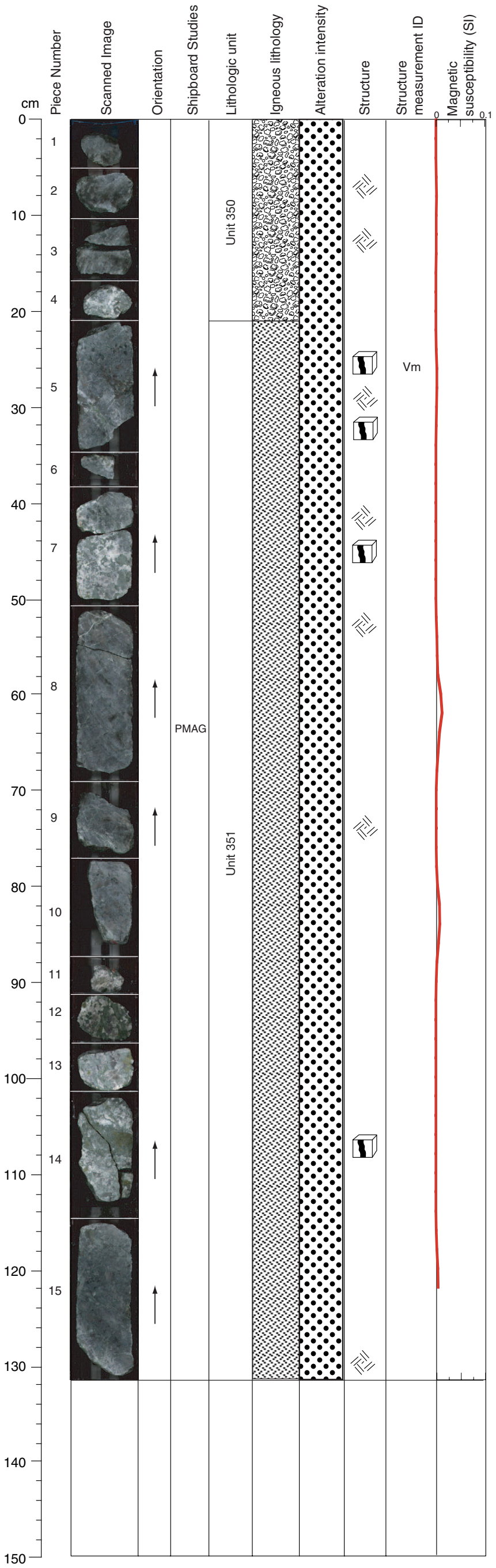
SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: Pervasive leucocratic alteration near veins. Elsewhere alteration similar to other sections of coarse gabbro.

VEIN ALTERATION: Amphibole, plagioclase, chlorite, carbonate.

STRUCTURE: Continued from former section but with a protomylonitic shear zone of mm-thickness at 40 cm depth, no ductile strain. Cataclastic leucocratic zone with no well developed structure ('shattered' look) and a few veins.

Core Photo



305-U1309D-129R-1 (Section top: 635.80 mbsf)

UNIT-350: Gabbro rubble
Piece: 1-4

PRIMARY MINERALOGY: modes not determined on rubble

COMMENTS: This unit is gabbro rubble. Uncertain if in place.

UNIT-351: Gabbro
Pieces: 5-15

PRIMARY MINERALOGY: No modal estimate

COMMENTS: Unit 351 gabbro. Between 52 and 85 cm, a relatively undeformed fragment of gabbro wallrock with little leucocratic melt injection occurs.

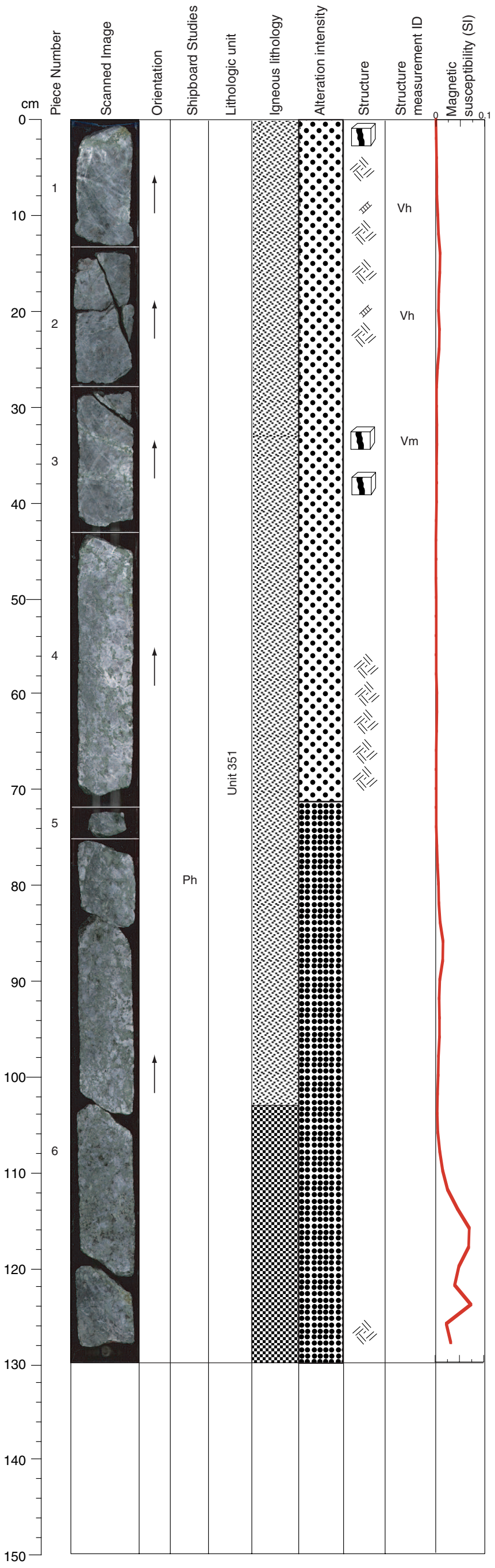
SECONDARY MINERALOGY: Chlorite, pale amphibole, epidote

COMMENTS: Alteration of the gabbro rubble is typical of this lithology with green amphibole reaction rims around brown amphibole and placioclase replaced in part by a white aggregate. In the leucocratic gabbro, alteration has added a pale green overprint with plagioclase altered to a white aggregate and possible reaction of amphibole to pale amphibole. Epidote patches are possibly primary(?). Green veins have halos of white in some places (altered plagioclase).

VEIN ALTERATION: Amphibole, chlorite, carbonate.

STRUCTURE: Coarse gabbro with 50% leucocratic stockwork alteration, no ductile strain. Late cataclasis (slight), and locally more cataclastic zones.

Core Photo



305-U1309D-129R-2 (Section top: 637.03 mbsf)

UNIT-351: Gabbro, oxide-bearing gabbro
Pieces: 1-6

PRIMARY MINERALOGY: No modal estimate

COMMENTS: Continuation of previous section. Between 33 and 103 cm, an interval with few gabbroic wallrock fragments, consists of coarse euhedral plagioclase laths and coarse, bladed green amphiboles in equal modal proportions. Despite the presence of fine disseminated oxides (<1 %) at plagioclase-amphibole grain boundaries, there is no corresponding high in the magnetic susceptibility. Between 103 cm and the end of this section, the amount of slightly more coarse-grained oxides abruptly increases to 3% modal, accompanied by a strong increase in the magnetic susceptibility.

SECONDARY MINERALOGY: Chlorite, pale amphibole, epidote

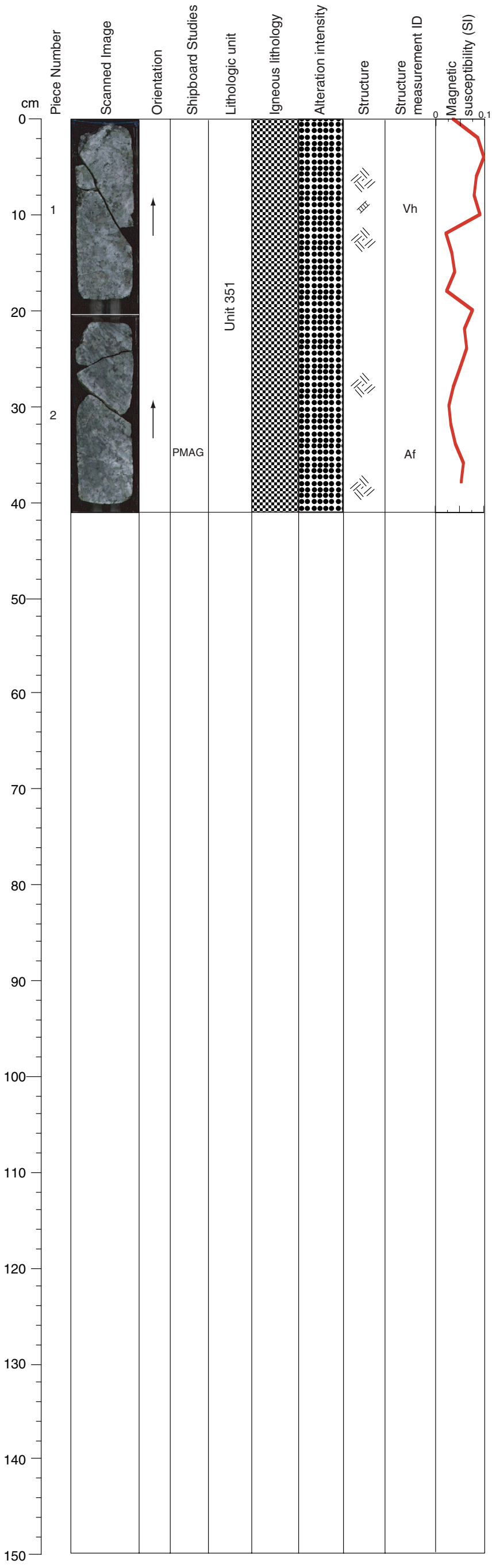
COMMENTS: Alteration of the gabbro is typical of this lithology with green amphibole reaction rims around brown amphibole and plagioclase replaced in part bya white aggregate. In the leucocratic gabbro, alteration has added a pale green overprint with plagioclase altered to a white aggregate and possible reaction of amphibole to pale amphibole. Epidote patches are possibly primary(?). Green veins have halos of white in some places (altered plagioclase).

VEIN ALTERATION: Amphibole, plagioclase, chlorite, epidote.

STRUCTURE: No ductile strain. Leucocratic zone with small gabbro area with lots of veining and cataclasis (late). Inhomogenous deformation and texture.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-129R-2, 79-81 cm WET

Core Photo



305-U1309D-129R-3 (Section top: 638.32 mbsf)

UNIT-351: Gabbro
Pieces: 1-2

PRIMARY MINERALOGY: No modal estimate

COMMENTS: Continuation of Unit 351. Modal oxide increases to 5%. The shape of the green amphibole is dominantly blocky subhedral, rather than bladed, suggesting that clinopyroxene may have been the precursor phase.

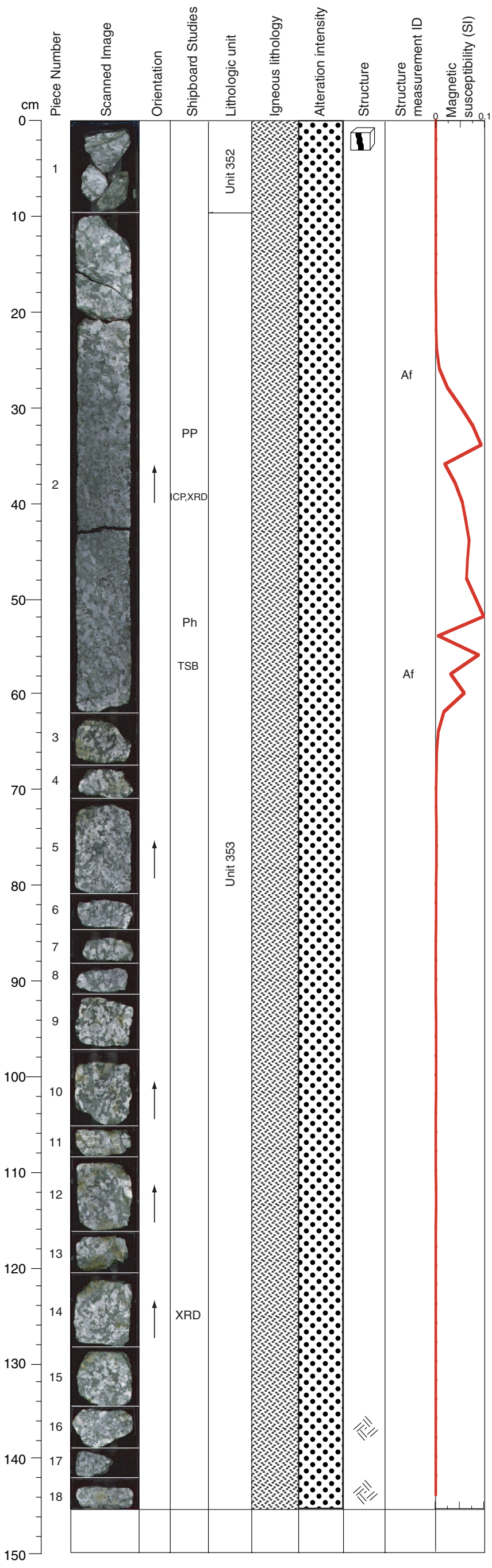
SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: same as previous

VEIN ALTERATION: Plagioclase.

STRUCTURE: Gabbro (coarse) with a few veins and minor cataclasis. Alteration fronts discernible.

Core Photo



305-U1309D-130R-1 (Section top: 640.60 mbsf)

UNIT-352: Gabbro
Pieces: 1

PRIMARY MINERALOGY:

COMMENTS: Rubble with similar lithology as next interval.

UNIT-353: Oxide-bearing Gabbro
Pieces: 2-18

PRIMARY MINERALOGY: Modal data from Pieces 2 and 10

Plagioclase	Modal 45-50% Size 1-25 mm Shape subhedral to anhedral
Clinopyroxene	Modal tr(?)% Size 1 mm Shape anhedral
Secondary (?) Amphibole	Modal 47-50% Size 1-10 mm Shape subhedral
Oxide	Modal 3-7% Size 1-3 mm Shape interstitial to anhedral

COMMENTS: Unit 353 is coarse-grained oxide-bearing gabbro. Local concentration of oxides at 30-60 cm.

SECONDARY MINERALOGY: Chlorite, pale amphibole, epidote

COMMENTS: Leucocratic zones throughout most of the section (plagioclase, amphibole, and epidote) from 10 to 61 cm, coarse-grained gabbro (olivines are altered and the pyroxenes are replaced by green amphibole). The contact between the two rocks is diffuse with a progressive alteration zone.

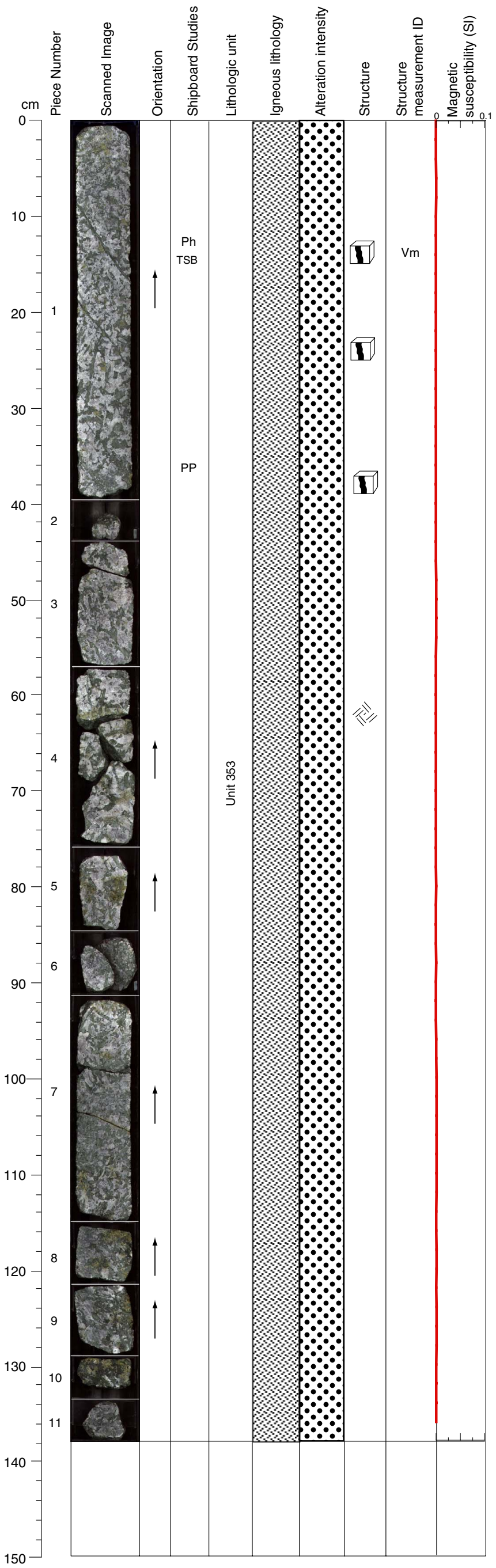
VEIN ALTERATION: Amphibole, plagioclase, chlorite, epidote.

THIN SECTIONS:
305-U1309D-130R-1, 55-58 cm (#356)

STRUCTURE: Trondhjemite with minor veining and some cataclasis. Apatite bearing. Section of gabbro near 40 cm is barely altered or deformed. Alteration fronts visible.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-130R-1, 43-60 cm DRY
305-U1309D-130R-1, 43-60 cm WET

Core Photo



305-U1309D-130R-2 (Section top: 642.05 mbsf)

UNIT-353: Gabbro
Pieces: 1-11

PRIMARY MINERALOGY: Modal data from Piece 3b

Plagioclase	Modal 65% Size 2-25 mm Shape euhedral to anhedral
Clinopyroxene	Modal tr(?)% Size 1 mm Shape anhedral
Secondary Amphibole	Modal 35% Size 2-15 mm Shape subhedral to anhedral
Oxide	Modal <1% Size 1 mm Shape interstitial to anhedral

COMMENTS: Continuation of Unit 353 coarse-grained gabbro. Epidote appears throughout this section. Some primary clinopyroxene(?).

SECONDARY MINERALOGY: Chlorite, pale amphibole, epidote

COMMENTS: Leucocratic zone/intrusion(?) same as previous section, with plagioclase, amphibole and some patches of epidote. At 8, 19 and 30 cm, late green veins (amphibole).

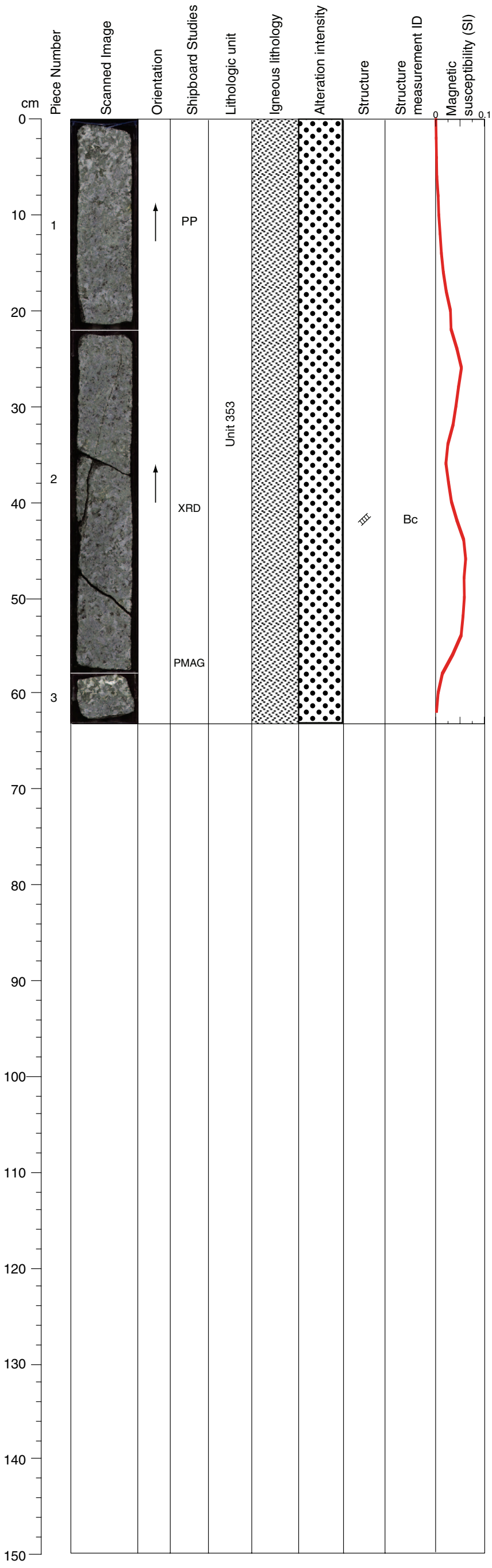
VEIN ALTERATION: Amphibole, plagioclase, chlorite, sulfides, epidote.

THIN SECTIONS:
305-U1309D-130R-2, 13-16 cm (#357)

STRUCTURE: Trondhjemite with veins (magmatic) crosscutting in a set at top of section. Cataclasis appears to be associated with veins.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-130R-2, 10-17 cm WET

Core Photo



305-U1309D-130R-3 (Section top: 643.43 mbsf)

UNIT-353: Oxide-bearing Gabbro
Pieces: 1-3

PRIMARY MINERALOGY: Modal data from Piece 1 and 2a

Plagioclase	Modal 50-55% Size 2-25 mm Shape euhedral to anhedral
Clinopyroxene	Modal tr(?)% Size 1 mm Shape anhedral
Secondary Amphibole	Modal 40-45% Size 2-15 mm Shape subhedral to anhedral
Oxide	Modal 5-7% Size 1-3 mm Shape interstitial to anhedral

COMMENTS: Continuation of Unit 353 medium- to coarse-grained oxide-bearing gabbro. Some primary clinopyroxene. Fine-grained acicular amphibole at 13 cm. Grain size increases down section.

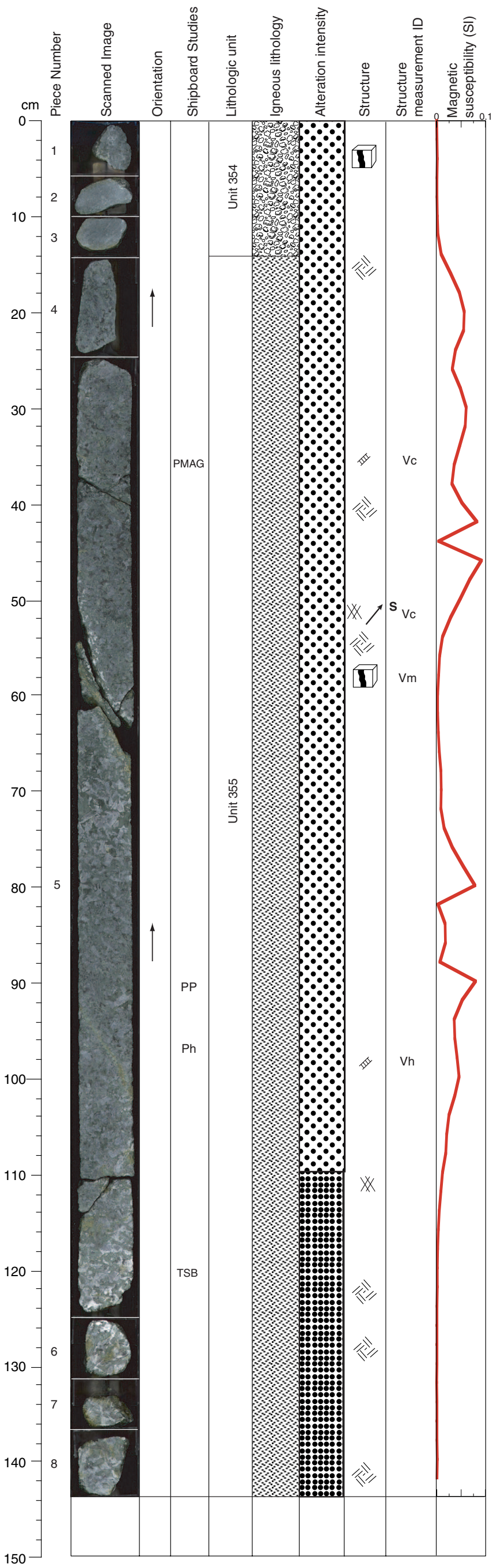
SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: This section continues from the previous section with significant amount of amphibole, replacing the olivines and pyroxenes. Less leucocratic material from 10 to 60 cm. At 60-63 cm, on top of Piece 3, a leucocratic zone appears.

VEIN ALTERATION: Chlorite, talc, carbonate, sulfide.

STRUCTURE: Gabbro (coarse) with a leucocratic zone at bottom, and a brittle fracture with sulfide (subvertical). Alteration diminishes down core and diorite/gabbro discernible.

Core Photo



305-U1309D-131R-1 (Section top: 645.40 mbsf)

UNIT-354: Rubble
Pieces: 1-3

COMMENTS: Mixed rubble.

UNIT-355: Oxide-bearing Gabbro
Pieces: 4-8

PRIMARY MINERALOGY: Modal data from Pieces 5b, 5f

Plagioclase	Modal 60% Size 1-29 mm Shape euhedral to anhedral
Clinopyroxene	Modal tr(?)% Size 1 mm Shape anhedral
Secondary Amphibole	Modal 35% Size 2-15 mm Shape subhedral to anhedral
Oxide	Modal 3-5% Size 1-3 mm Shape interstitial to anhedral

COMMENTS: Unit 355 is similar to Unit 353 medium- to coarse-grained oxide-bearing gabbro. Oblique leucocratic (now epidote-rich) vein at 54-67 cm, trace of sulfides. Coarser plagioclase grains (<30 mm) at 68-78 cm. Variable oxide mode along section. Epidote-rich vein at 93-101 cm.

SECONDARY MINERALOGY: Chlorite, pale amphibole, epidote

COMMENTS: Alteration of the gabbro in Piece 1 is typical of this lithology with green amphibole reaction rims around brown amphibole and placioclase replaced in part by saussuritic(?) material. Leucocratic material occurs at the bottom of the piece. Pieces 2 and 3 are finer grained and are greenish, suggesting alteration similar to that seen in the coarser grained gabbro. Lower in the section there are additional areas of leucocratic material with alteration similar to Piece 1. Epidote patches occur especially between 92 and 102 cm.

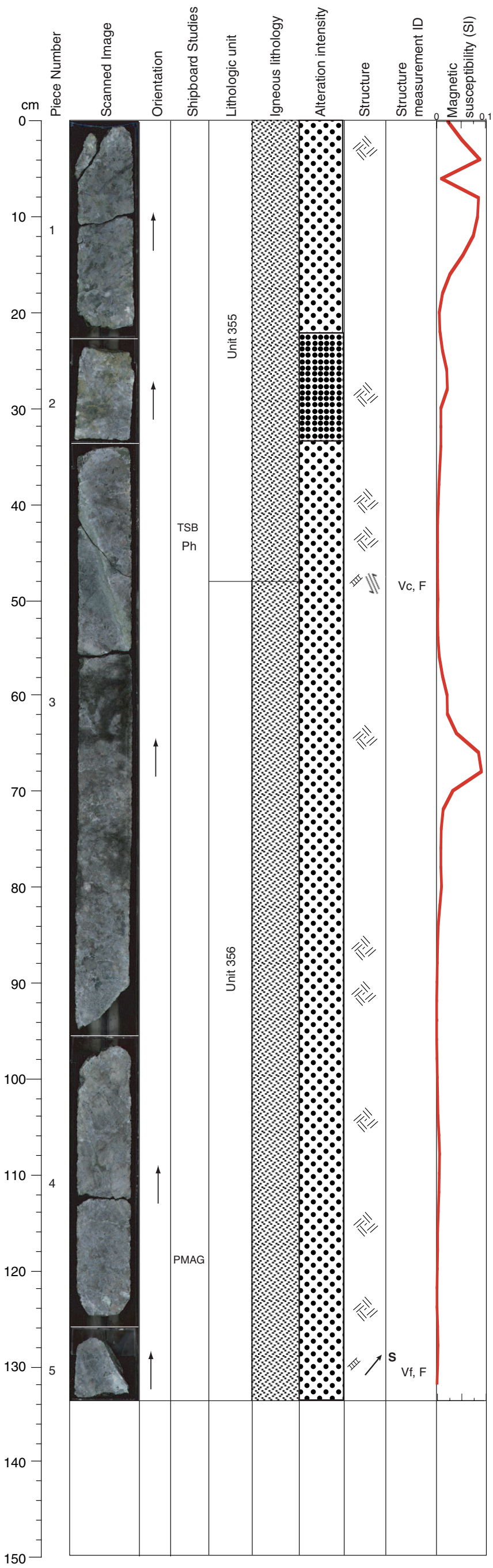
VEIN ALTERATION: Amphibole, plagioclase, chlorite, carbonate, sulfide, epidote.

THIN SECTIONS:
305-U1309D-131R-1, 119-121 cm (#358)

STRUCTURE: Foliated gabbro and diabase in what is probably rubble in Pieces 1 to 3. As of Piece 4, coarse grained amphibole-plagioclase rock with no ductile strain. Crosscut by magmatic veins that localize later cataclastic deformation. Irregular cracks with sulfide.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-131R-1, 48-70 cm WET
305-U1309D-131R-1, 90-105 cm WET
305-U1309D-131R-1, 111-125 cm WET

Core Photo



305-U1309D-131R-2 (Section top: 646.83 mbsf)

UNIT-355: Gabbro
Pieces: 1-3a

PRIMARY MINERALOGY: Modal data from Pieces 1c to 3a

Plagioclase	Modal 65% Size 35 mm Shape euhedral to anhedral
Clinopyroxene	Modal 25% Size 25 mm Shape anhedral
Amphibole	Modal 10% Size 2-15 mm Shape subhedral to anhedral

COMMENTS: Unit 355 consists of coarse-grained oxide-bearing gabbro. Possibly primary magmatic amphibole, now largely replaced by secondary green amphibole. Epidote-enrichment at 23-33 cm. Oxide patches.

UNIT-356: Gabbro
Pieces: 3a-5

PRIMARY MINERALOGY: Modal data from Pieces 3b

Plagioclase	Modal 55% Size 35 mm Shape euhedral to anhedral
Clinopyroxene	Modal 45% Size 25 mm Shape anhedral

COMMENTS: Unit 356 medium- to coarse-grained gabbro. Two clinopyroxene-rich bands (20 mm) at 64-72 cm.

SECONDARY MINERALOGY: Chlorite, pale amphibole, epidote, serpentine

COMMENTS: Gabbro alteration in this section is similar to that of previous sections. Green amphibole reaction rims occur on brown pyroxene and plagioclase is partially altered to an mixture of white minerals, but there is more prominent veining in some intervals (especially 38-55 cm) in zones of leucocratic material.

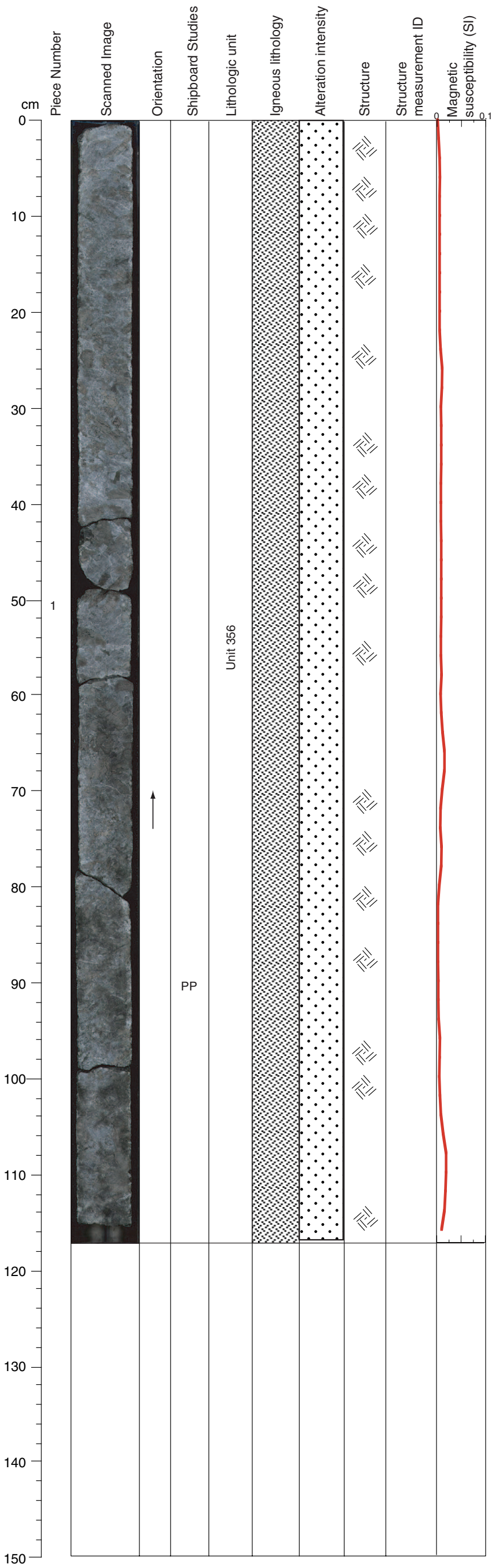
VEIN ALTERATION: Amphibole, plagioclase, chlorite.

THIN SECTIONS:
305-U1309D-131R-2, 41-43 cm (#359)

STRUCTURE: Continued from previous section, but with more clinopyroxene instead of amphibole, with magnetite. Abundant epidote alteration associated with green amphibole. No ductile strain. Magmatic vein overprinted by brittle deformation. Late irregular, distributed cataclastic deformation.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-131R-2, 23-32 cm WET
305-U1309D-131R-2, 39-55 cm WET

Core Photo



305-U1309D-131R-3 (Section top: 648.16 mbsf)

UNIT-356: Gabbro
Pieces: 1

PRIMARY MINERALOGY: Modal data from Piece 1a

Plagioclase	Modal 55% Size to 45 mm Shape euhedral to anhedral
Clinopyroxene	Modal 45% Size to 60 mm Shape euhedral to subhedral

COMMENTS: Continuation of Unit 356 coarse-grained gabbro.

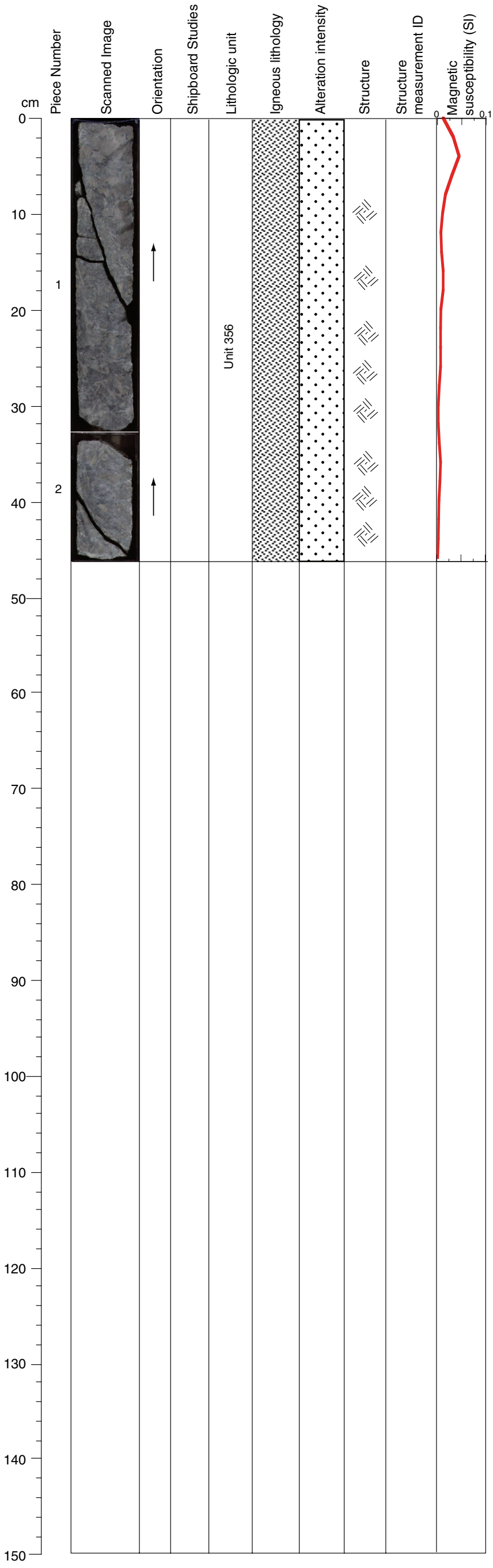
SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: In general, the gabbro alteration in this section is similar to that of previous sections. Green amphibole reaction rims occur on brown pyroxene and plagioclase is partially altered to a mixture of white minerals (saussurite?). Some fractures in some intervals are associated with white alteration of adjacent plagioclase.

VEIN ALTERATION: Chlorite, talc, carbonate.

STRUCTURE: Coarse grained gabbro with amphibole, no ductile strain. Very coarse grained in places. Late irregular, distributed cataclastic deformation. Continuation of previous section.

Core Photo



305-U1309D-131R-4 (Section top: 649.33 mbsf)

UNIT-356: Gabbro
Pieces: 1-2

PRIMARY MINERALOGY: Modal data from Piece 1a

Plagioclase	Modal 55% Size up to 45 mm Shape euhedral to anhedral
Clinopyroxene	Modal 45% Size up to 60 mm Shape euhedral to subhedral

COMMENTS: Continuation of Unit 356 coarse-grained gabbro.

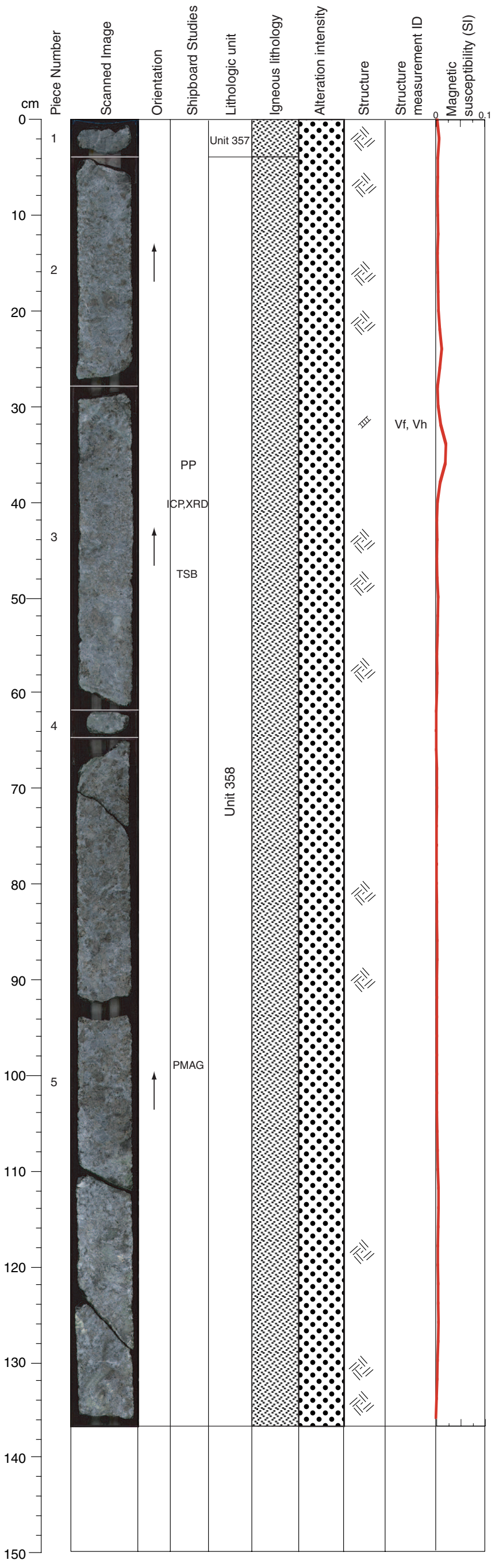
SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: In general, the gabbro alteration in this section is similar to that of previous sections. There are more numerous fractures throughout this gabbro and they are associated with white alteration of adjacent plagioclase.

VEIN ALTERATION: Amphibole, chlorite.

STRUCTURE: Coarse grained gabbro with amphibole, no ductile strain. Late irregular, distributed cataclastic deformation.

Core Photo



305-U1309D-132R-1 (Section top: 650.20 mbsf)

UNIT-357: Rubble
Pieces: 1

COMMENTS: Rubble may be in place.

UNIT-358: Gabbro
Pieces: 2-5

PRIMARY MINERALOGY: Modal data from U1309D-132R-003, Piece 4

Plagioclase	Modal 45% Size to 45 mm Shape euhedral to anhedral
Clinopyroxene	Modal 55% Size to 60 mm Shape euhedral to subhedral

COMMENTS: Unit 358 medium- to coarse-grained gabbro. 1% modal orthopyroxene seen in thin section at 45-48 cm.

SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: The olivines of this gabbro are altered to serpentine (?) + tremolite as rim, and sulfides occur in the altered olivine. The pyroxene are also partially replaced to green amphibole (actinolite). At 29 cm, green amphibole vein without alteration halo. From 118 cm to the end of the section, development of shiny pyroxenes.

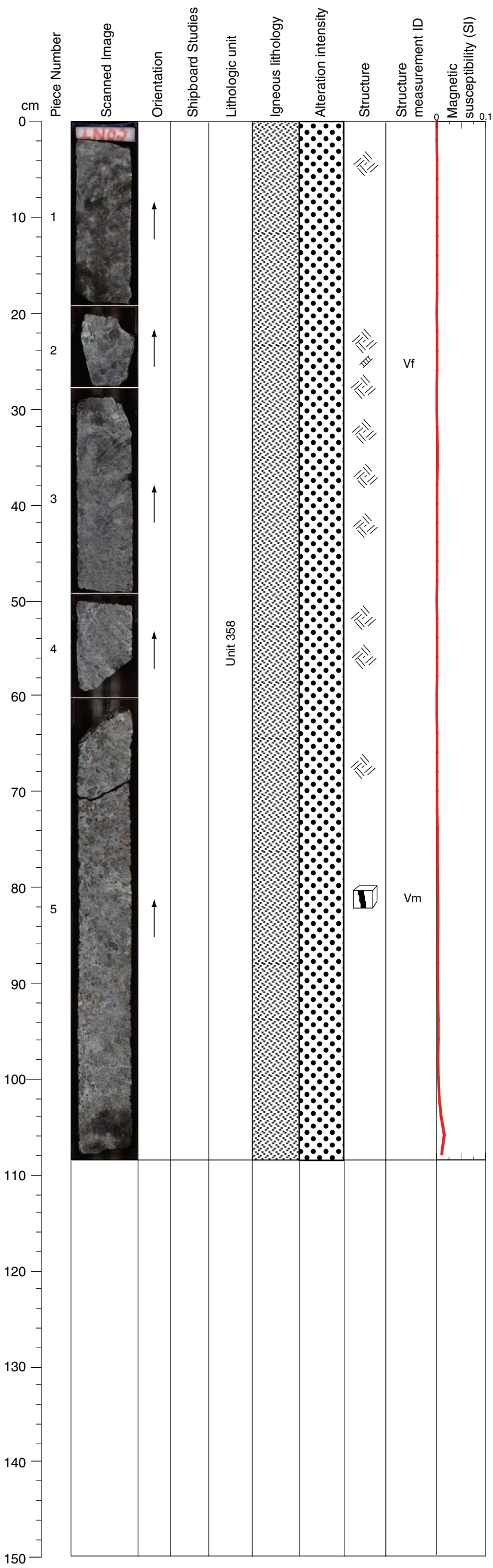
VEIN ALTERATION: Amphibole, chlorite.

THIN SECTIONS:
305-U1309D-132R-1, 45-48 cm (#360)

STRUCTURE: Coarse grained gabbro, no ductile strain, locally pegmatitic amphibole. Late cataclastic, some veining. Green steeply-dipping vein with slight normal offset.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-132R-1, 42-50 cm WET

Core Photo



305-U1309D-132R-2 (Section top: 651.57 mbsf)

UNIT-358: Gabbro
Pieces: 1-5

PRIMARY MINERALOGY: Modal data from U1309D-132R-003, Piece 4

Plagioclase	Modal 45% Size to 45 mm Shape euhedral to anhedral
Clinopyroxene	Modal 55% Size to 60 mm Shape euhedral to subhedral

COMMENTS: Continuation of Unit 358 medium- to coarse-grained gabbro.

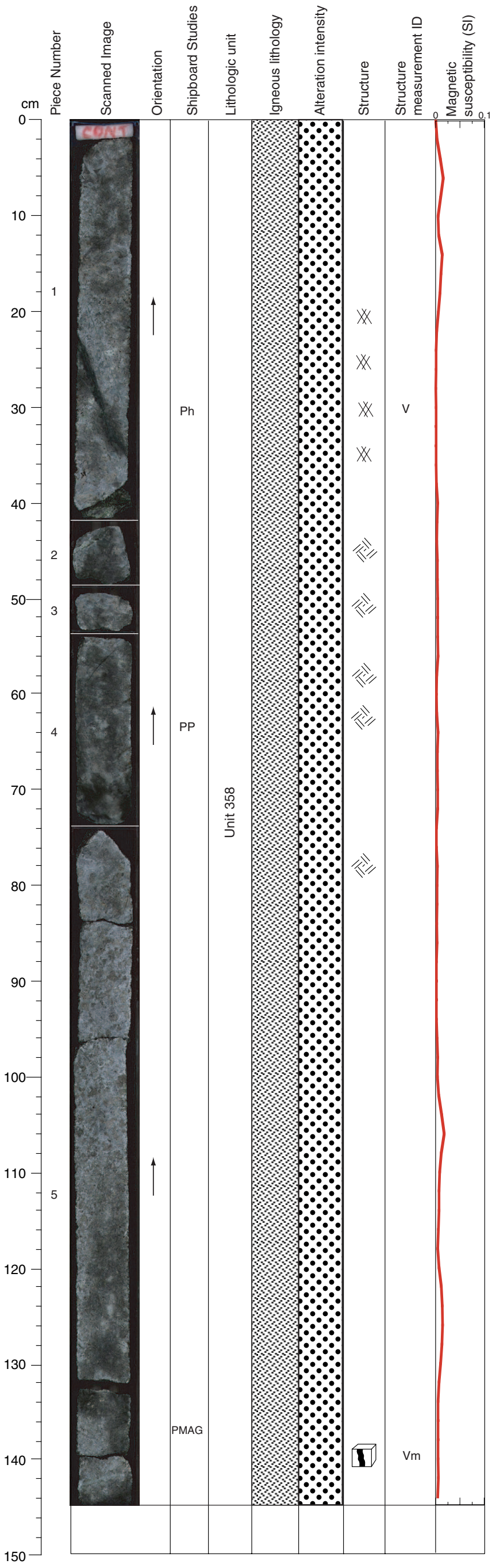
SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: Gabbro with altered olivines and pyroxenes with replacement and coronas of green amphibole. Significant amount of sulfides. The rock is cut by a lot of tiny white veins (talc). At 80 cm, 1 cm thick leucocratic (plagioclase, amphibole).

VEIN ALTERATION: Amphibole, chlorite.

STRUCTURE: Coarse grained gabbro with no ductile strain. Late cataclastic, limited veining.

Core Photo



305-U1309D-132R-3 (Section top: 652.66 mbsf)

UNIT-358: Gabbro
Pieces: 1-5

PRIMARY MINERALOGY: Modal data from Piece 4

Plagioclase	Modal 45% Size to 45 mm Shape euhedral to anhedral
Clinopyroxene	Modal 55% Size to 60 mm Shape euhedral to subhedral

COMMENTS: Continuation of Unit 358 medium- to coarse-grained gabbro.

SECONDARY MINERALOGY: Chlorite, pale amphibole

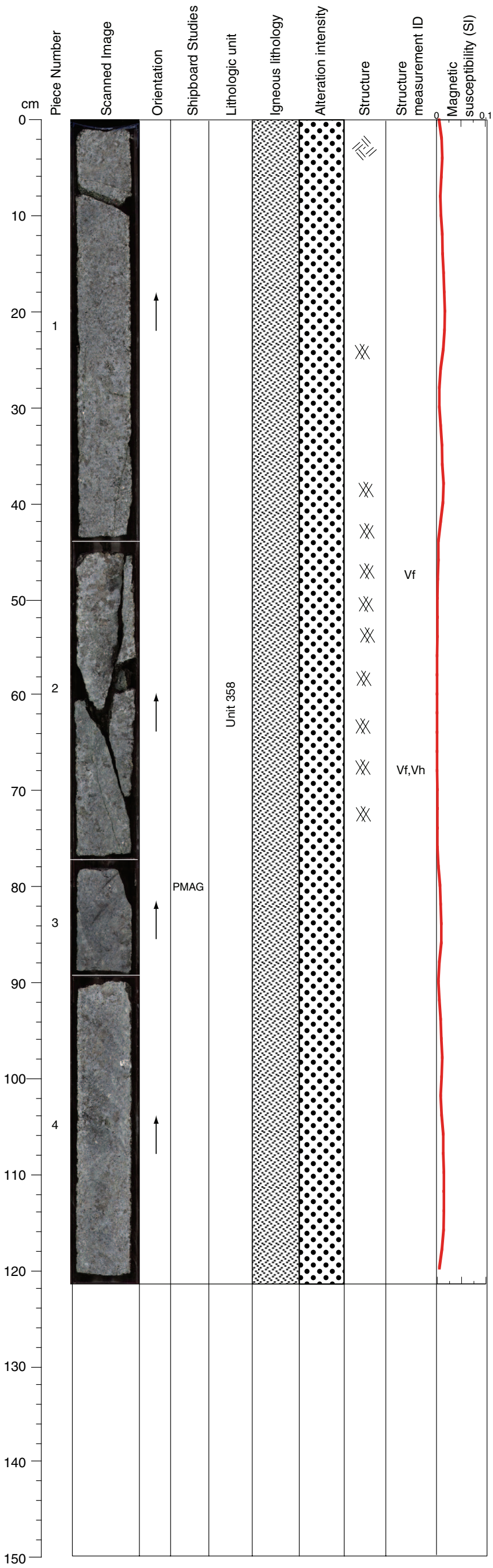
COMMENTS: General alteration of the gabbro is similar to previous sections. A green vein cuts the core at a high angle between 23 to 35 cm.

VEIN ALTERATION: Amphibole, plagioclase, chlorite, talc.

STRUCTURE: Coarse grained fabric with locally pegmatitic crystals, no ductile strain, 2 mm wide plagioclase vein of magmatic origin. Late cataclastic, some dark green vein set on top.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-132R-3, 20-36 cm WET

Core Photo



305-U1309D-132R-4 (Section top: 654.12 mbsf)

UNIT-358: Gabbro
Pieces: 1-4

PRIMARY MINERALOGY: Modal data from U1309D-132R-003, Piece 4

Plagioclase	Modal 45% Size to 45 mm Shape euhedral to anhedral
Clinopyroxene	Modal 55% Size to 60 mm Shape euhedral to subhedral

COMMENTS: Continuation of Unit 358 medium- to coarse-grained gabbro.

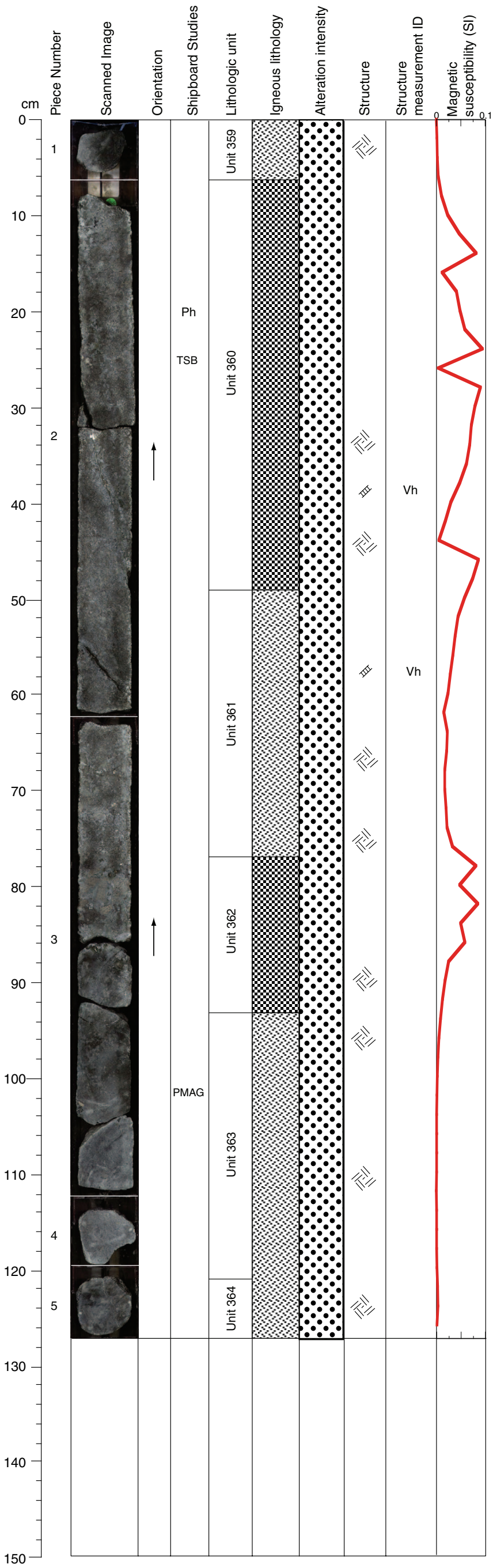
SECONDARY MINERALOGY: Chlorite, pale amphibole, serpentine

COMMENTS: Gabbro with altered olivine and pyroxene to green amphibole. At 41-76 cm, fracture filled by thin green veins (tremolite-chlorite?).

VEIN ALTERATION: Amphibole, chlorite.

STRUCTURE: Coarse grained gabbro, no ductile strain. Late cataclastic, limited veining, some cracks crosscutting.

Core Photo



305-U1309D-133R-1 (Section top: 655.00 mbsf)

UNIT-359: Gabbro rubble
Pieces: 1

COMMENTS: Unit 359 medium- to coarse-grained gabbro rubble.

UNIT-360: Oxide Gabbro
Pieces: 2a, b

PRIMARY MINERALOGY: Modal data from Piece 2a

Plagioclase	Modal 50% Size 3 mm average Shape subhedral
Clinopyroxene	Modal 20% Size 3 mm average Shape subhedral
Oxide	Modal 30% Size 3 mm Shape anhedral

COMMENTS: Unit 360 medium- to coarse-grained oxide gabbro. 1.5 cm width oxide-rich vein. Sharp subhorizontal contact. Pyroxene replaced by oxide? 6% modal orthopyroxene observed in thin section from 24-26 cm.

UNIT-361: Gabbro
Pieces: 2b-3a

PRIMARY MINERALOGY: Modal data from Piece 2b

Plagioclase	Modal 54% Size 3 mm Shape subhedral
Clinopyroxene	Modal 45% Size 3 mm Shape subhedral
Oxide	Modal <1% Size 1 mm Shape anhedral

COMMENTS: Unit 361 medium-grained gabbro.

UNIT-362: Oxide Gabbro
Pieces: 3a-c

PRIMARY MINERALOGY: Modal data from Piece 3a

Plagioclase	Modal 45% Size 7 mm average Shape subhedral to euhedral
Clinopyroxene	Modal 35% Size 12 mm average Shape subhedral to euhedral
Oxide	Modal 20% Size 2 mm average Shape anhedral

COMMENTS: Unit 362 coarse-grained oxide gabbro. Unclear contact between medium-grained gabbro.

UNIT-363: Gabbro
Pieces: 3c-4

PRIMARY MINERALOGY: Modal data from Piece 3c

Plagioclase	Modal 65% Size 3 mm average Shape subhedral
Clinopyroxene	Modal 35% Size 3 mm average Shape subhedral

COMMENTS: Unit 363 fine- to medium-grained gabbro. Grain size gradation to microgabbro at 103 cm.

UNIT-364: Gabbro
Pieces: 5

PRIMARY MINERALOGY: Modal data from Piece 5

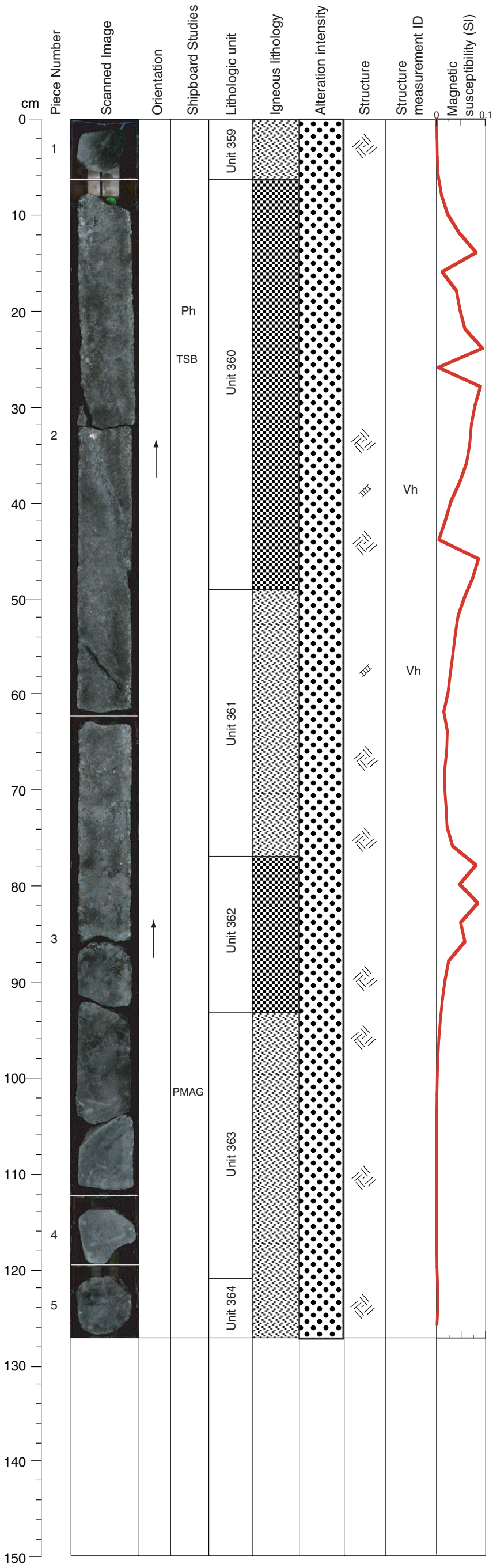
Plagioclase	Modal 70% Size up to 20 mm Shape anhedral
Clinopyroxene	Modal 30% Size up to 20 mm Shape subhedral

COMMENTS: Unit 364 coarse-grained gabbro.

SECONDARY MINERALOGY: Chlorite, pale amphibole

Continued on next page

Core Photo



305-U1309D-133R-1, Continued (Section top: 655.00 mbsf)

COMMENTS: In general, the gabbro alteration in this section is similar to that of previous sections. A vein halo (about 1 cm wide) in Piece 2b from 32 to 48 cm produces light patches within plagioclase surrounding a vein.

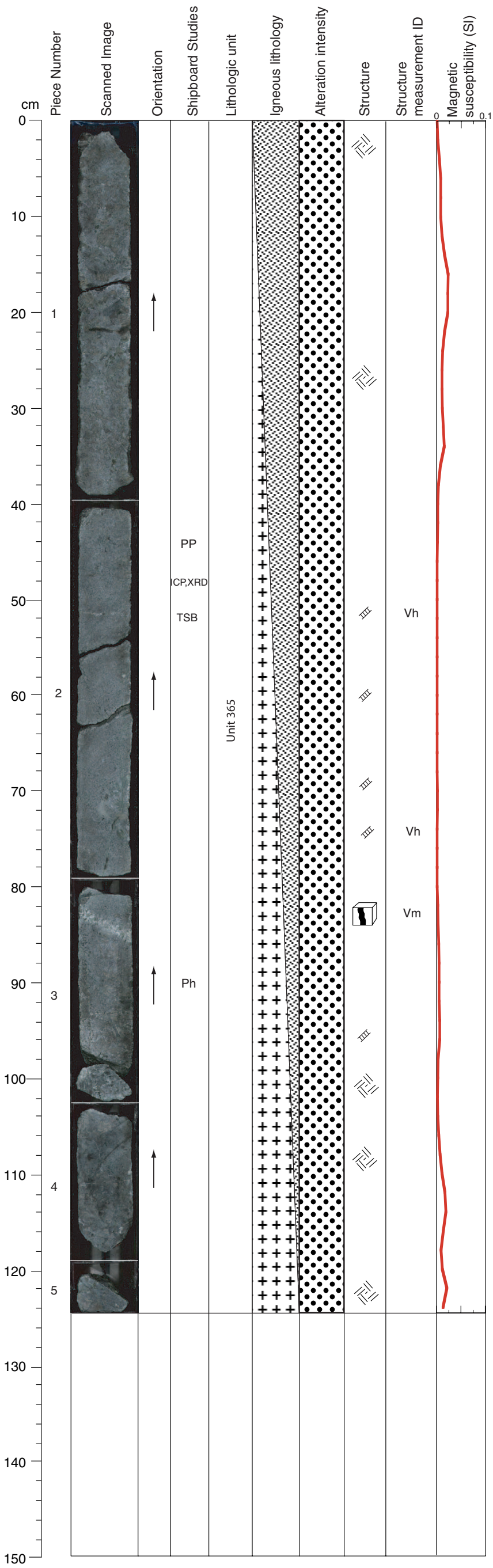
VEIN ALTERATION: Amphibole, chlorite.

THIN SECTIONS:
305-U1309D-133R-1, 24-26 cm (#361)

STRUCTURE: Several magmatic contacts between undeformed fine-grained gabbro, coarse grained gabbro, and microgabbro. Microgabbro has local patches with ductile fabric, but consistent trend difficult to see. Cataclastic deformation distributed and slight, limited veining.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-133R-1, 10-30 cm DRY

Core Photo



305-U1309D-133R-2 (Section top: 656.27 mbsf)

UNIT-365: Gabbro to Gabbronorite
Pieces: 1-5

PRIMARY MINERALOGY: Modal data from several pieces

Plagioclase	Modal 50-65% Size up to 12 mm Shape anhedral
Clinopyroxene	Modal 35-65% Size up to 25 mm Shape subhedral

COMMENTS: Continuation of Unit 365 fine- to coarse-grained gabbro. Grain size reduces to microgabbro downhole. Leucocratic dikelet in 81-85 cm interval. 15% modal primary orthopyroxene observed in thin section at 50-53 cm.

SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: In general, the gabbro alteration in this section is similar to that of previous sections. From 51 to 79 cm a fracture filled with a green secondary mineral mixture (chlorite/actinolite?) shows very minor patchy development of alteration haloes, both white (altered plagioclase?) and dark (serpentinized mafic?). A leucocratic alteration zone, between 82 and 86 cm, is associated with a very thin green vein.

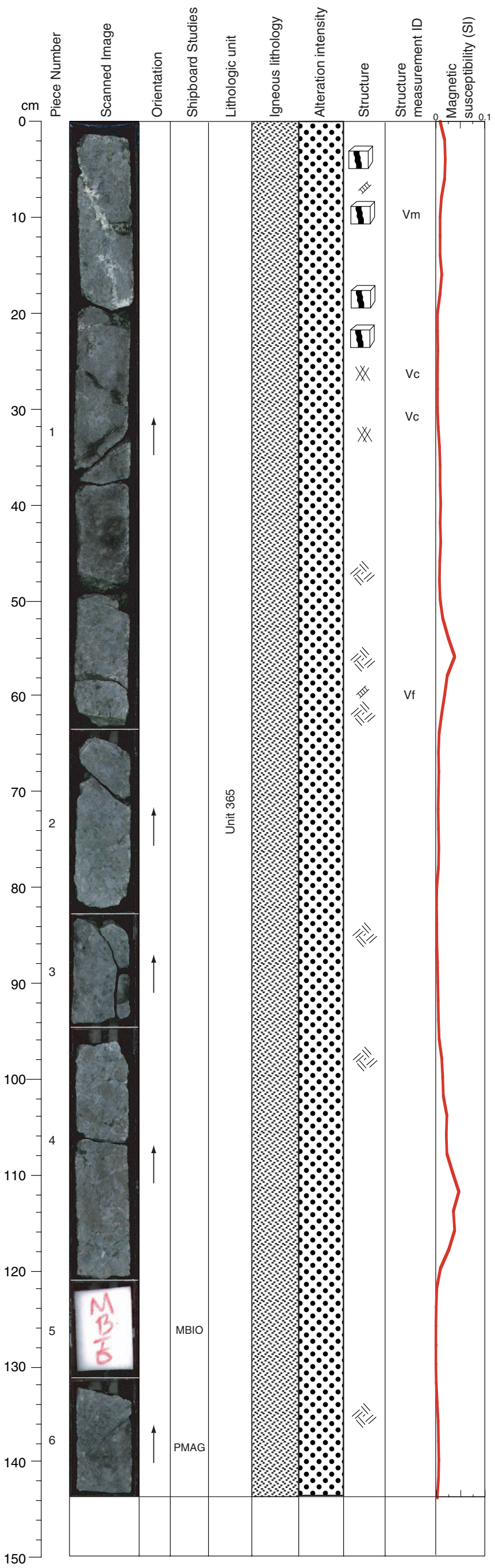
VEIN ALTERATION: Amphibole, chlorite, carbonate.

THIN SECTIONS:
305-U1309D-133R-2, 50-53 cm (#362)

STRUCTURE: Coarse gabbro becoming fine grained between 50 and 80 cm in section, no ductile strain. Plagioclase-rich vein of 5 mm thickness in Piece 3. White veins and later subvertical open cracks.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-133R-2, 40-64 cm WET
305-U1309D-133R-2, 80-97 cm WET

Core Photo



305-U1309D-133R-3 (Section top: 657.51 mbsf)

UNIT-365: Gabbro
Pieces: 1-6

PRIMARY MINERALOGY: Modal data from Piece 2b

Plagioclase	Modal 65% Size up to 12 mm Shape anhedral
Clinopyroxene	Modal 35% Size up to 20 mm Shape subhedral

COMMENTS: Continuation of Unit 365 medium- to coarse-grained gabbro. Grain size variation along section. Leucocratic dikelet and alteration in Piece 1a and b.

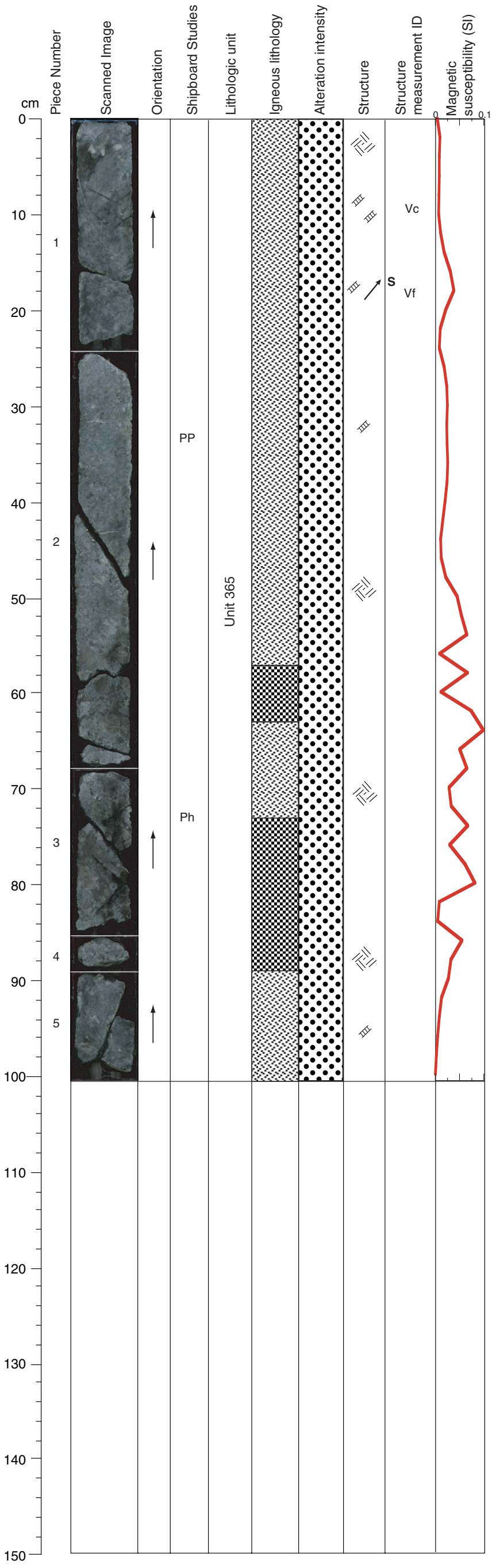
SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: General alteration of the gabbro is similar to previous sections. Piece 1a contains a thin green vein surrounded by an alteration zone in which plagioclase is altered to white patches. The bottom of Piece 3b has a diffuse overprint of green alteration from about 73 cm to the end.

VEIN ALTERATION: Amphibole, chlorite.

STRUCTURE: Coarse grained gabbro with locally pegmatititc crystals. No ductile fabric. Plagioclase-rich network veining in Piece 1. Thin brittle vein sets and cataclasis. Opened pale green vein with sulfides.

Core Photo



305-U1309D-133R-4 (Section top: 658.95 mbsf)

UNIT-365: Gabbro
Pieces: 1-5

PRIMARY MINERALOGY: Modal data from Piece 2a

Plagioclase	Modal 65% Size to 12 mm Shape anhedral
Clinopyroxene	Modal 35% Size to 20 mm Shape subhedral

COMMENTS: Continuation of Unit 365 coarse-grained gabbro. Pyroxene megacryst in Piece 1, 3-11 cm (60 mm wide). Oxide-rich parts with up to 35 % oxide at 57-63 cm and 73-89 cm.

SECONDARY MINERALOGY: Chlorite, pale amphibole

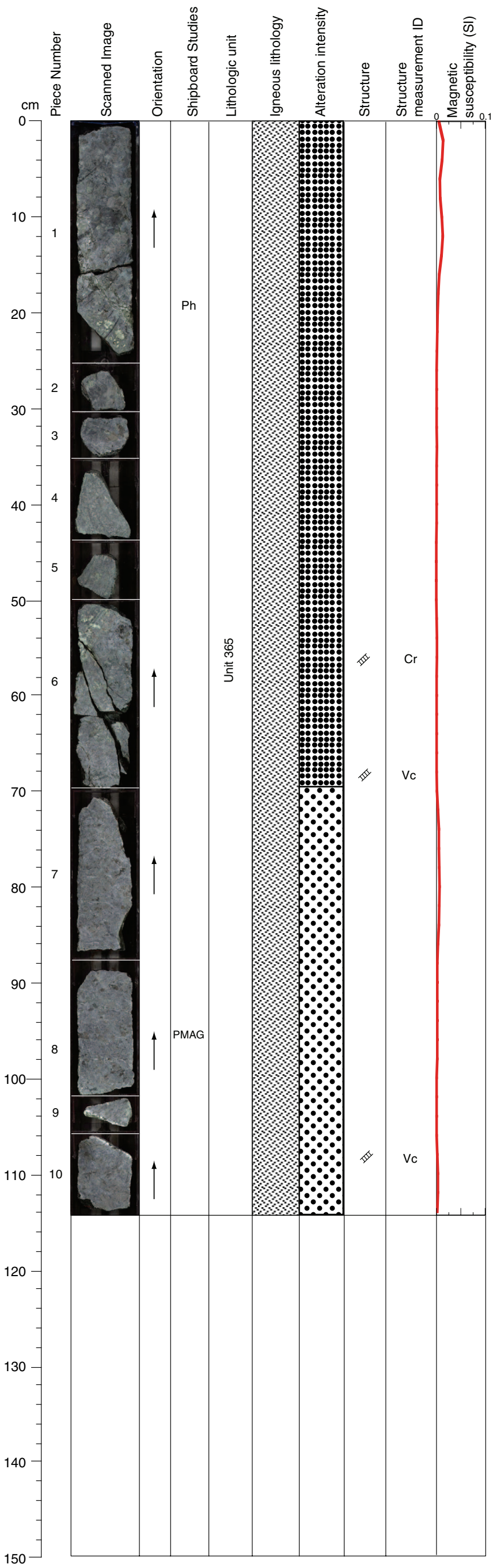
COMMENTS: General alteration of the gabbro is similar to that in previous sections. Piece 1a contains a set of enechelon green veins from 6 cm to 11 cm that lack alteration halos. The contact area between Pieces 1a and 1b has a 0.2 cm wide green vein that also lacks an alteration halo. The bottom of Piece 3b has a diffuse overprint of green alteration from about 73 cm to the bottom of the piece.

VEIN ALTERATION: Amphibole, chlorite.

STRUCTURE: Coarse-grained gabbro, no ductile strain fabric. Irregular veins following contacts and late cataclasis. Opened en echelon vein (Vc in Piece 1).

CLOSE-UP PHOTOGRAPHS:
305-U1309D-133R-4, 68-84 cm DRY

Core Photo



305-U1309D-134R-1 (Section top: 659.80 mbsf)

UNIT-365: Gabbro
Pieces: 1-10

PRIMARY MINERALOGY: Modal data from Piece 7 and 10

Plagioclase	Modal 30% Size to 12 mm Shape anhedral
Clinopyroxene	Modal 70% Size to 20 mm Shape subhedral

COMMENTS: Continuation of Unit 365 coarse-grained gabbro. Local modal amphibole (?) as much as 50% and clinopyroxene 20% in Piece 10.

SECONDARY MINERALOGY: Chlorite, pale amphibole

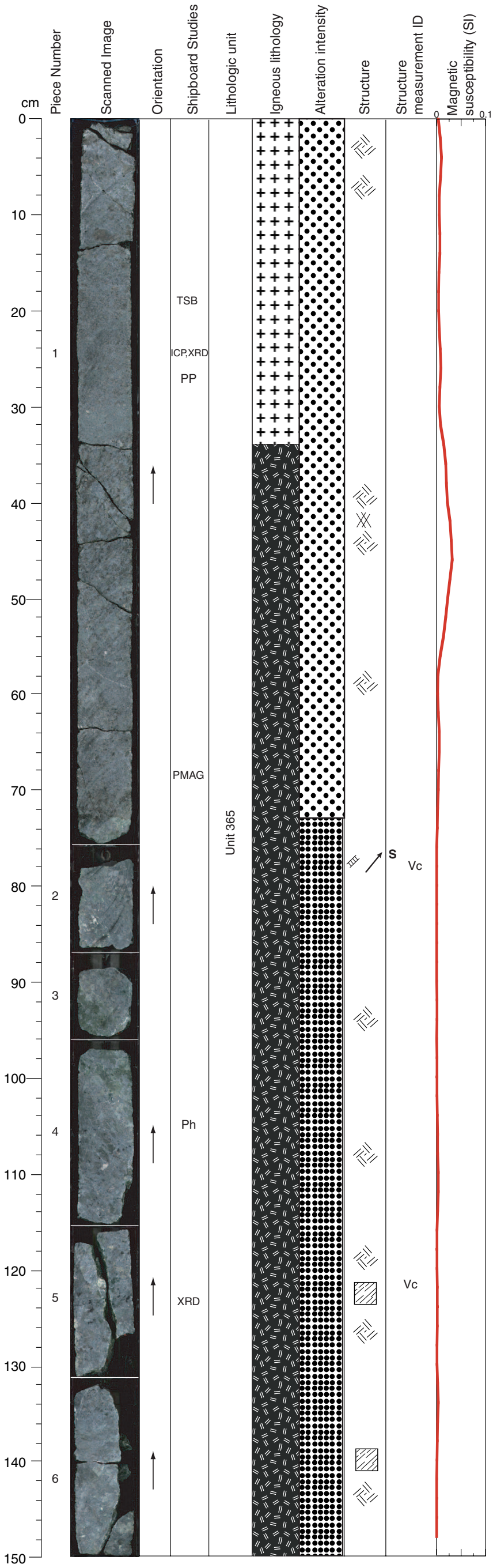
COMMENTS: Gabbro with green amphibole replacing the pyroxenes and surrounding the olvines. At 15 cm, amphibole and plagioclase vein associated with alteration halo. The highly altered to talc pale green coronas appear after this vein. Sulfides are observed with this alteration. Pale green coronas and coronas of tremolite around olivine are found until the end of the section. At 105 cm, plagioclase-amphibole vein is observed between two pieces.

VEIN ALTERATION: Amphibole, plagioclase, chlorite.

STRUCTURE: Coarse grained gabbro, no ductile strain fabric. Coarse-grained gabbro with magmatic veins. Brittle deformation along magmatic veins, and distributed along the section. Several phases of veining and deformation (dark green (?) along magmatic veins < tremolite-filled veins).

CLOSE-UP PHOTOGRAPHS:
305-U1309D-134R-1, 10-24 cm WET

Core Photo



305-U1309D-134R-2 (Section top: 660.95 mbsf)

UNIT-365: Gabbronorite - Olivine-bearing Gabbro
Pieces: 1-6

PRIMARY MINERALOGY: Modal data from piece 1c

Plagioclase	Modal 30% Size up to 12 mm Shape anhedral
Clinopyroxene	Modal 70% Size up to 20 mm Shape subhedral

COMMENTS: Continuation of Unit 365 coarse-grained gabbro. Olivine-bearing zone starting at 34 cm. 20% primary modal orthopyroxene observed in thin section at 17-20 cm making this interval a gabbronorite.

SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: From 76 cm, moderately altered pale green coronas with a rim of chlorite appear. Shiny pyroxene are found close to the coronas. At 116-130 cm fracture filled by carbonate and sulfides.

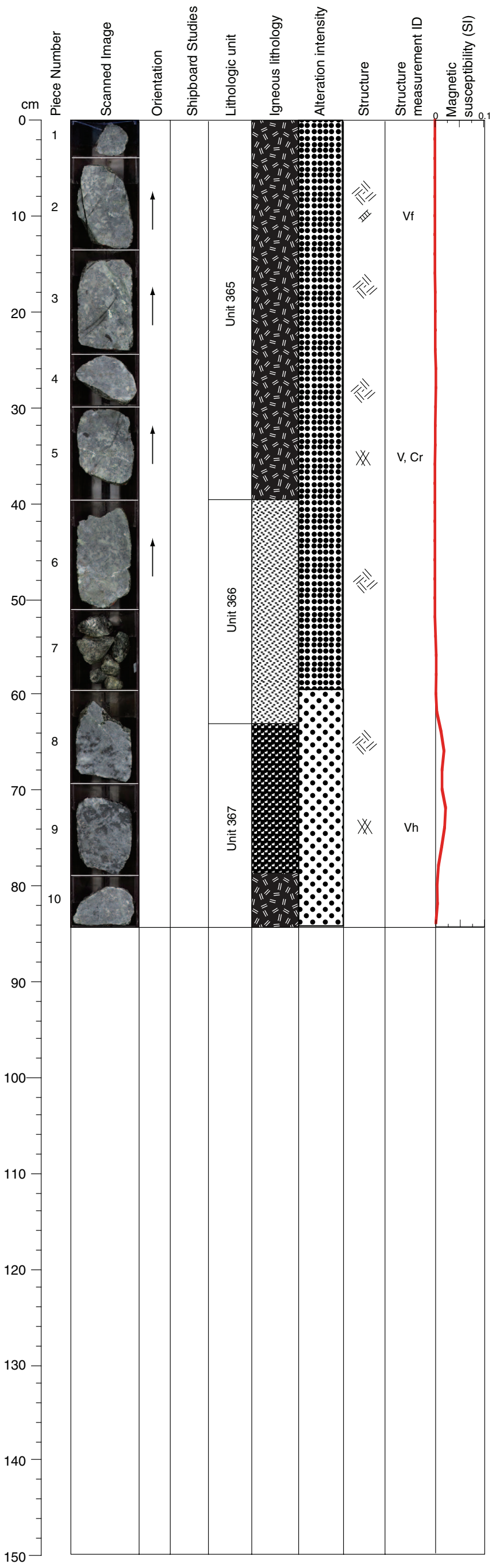
VEIN ALTERATION: Amphibole, plagioclase, chlorite, talc.

THIN SECTIONS:
305-U1309D-134R-2, 17-20 cm (#363)

STRUCTURE: Coarse grained gabbro with local pegmatitic grains, transitional into microgabbro which has a moderately dipping microfabric. Medium-fine grained gabbro, plastically deformed (?), with no cataclasis and minor veining, underlain by section with steeply dipping veins with sulfide.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-134R-2 10-30 cm WET
305-U1309D-134R-2, 97-115 cm WET

Core Photo



305-U1309D-134R-3 (Section top: 662.45 mbsf)

UNIT-365: Olivine-bearing Gabbro
Pieces: 1-5

PRIMARY MINERALOGY: Modal data from Piece 2

Olivine	Modal 2% Size 7 mm Shape subhedral
Plagioclase	Modal 70% Size 5 mm Shape anhedral
Clinopyroxene	Modal 28% Size 5 mm Shape subhedral

COMMENTS: Continuation of Unit 365 coarse-grained olivine-bearing gabbro.

UNIT-366: Gabbro
Pieces: 6-8

PRIMARY MINERALOGY: Modal data from Piece 6

Plagioclase	Modal 20% Size 8 mm average Shape subhedral to anhedral
Clinopyroxene	Modal 80% Size to 80 mm Shape anhedral

COMMENTS: Unit 366 is coarse-grained gabbro. Large clinopyroxene-oikocrysts. Coarse clinopyroxene at boundary with troctolite.

UNIT-367: Troctolite to Olivine-bearing Gabbro
Pieces: 9-10

PRIMARY MINERALOGY: Modal data from Piece 9

Olivine	Modal 35% Size 6 mm average Shape subhedral
Plagioclase	Modal 65% Size 8 mm average Shape subhedral to anhedral
Clinopyroxene	Modal 1% Size 5 mm average Shape anhedral

COMMENTS: Unit 367 is coarse-grained troctolite. Olivine-bearing gabbro with 1:85:14 olivine:plagioclase:clinopyroxene in Piece 10.

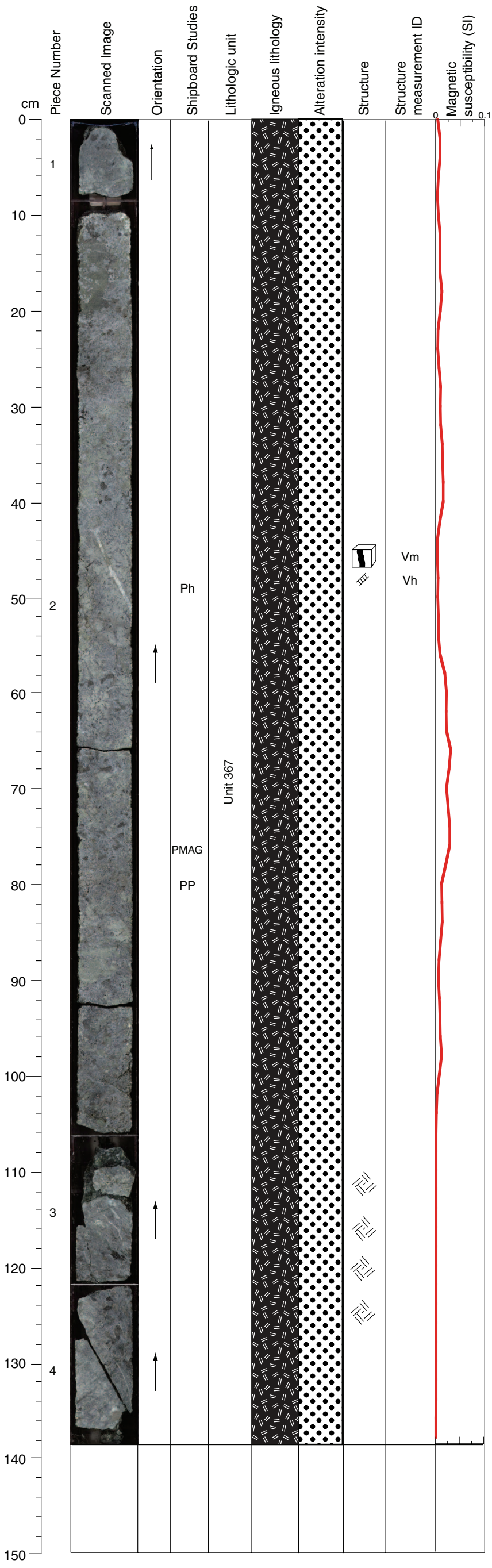
SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: Both pale green coronas and tremolite coronas around olivines are observed (alteration to serpentine + termolite + sulfides), and shiny pyroxenes are located close to these coronas. At 15 cm, amphibole veins with highly altered to talc pale green coronas. From 65 to 76 cm, network of serpentine veins.

VEIN ALTERATION: Amphibole, chlorite, talc.

STRUCTURE: Coarse grained gabbro, no ductile strain fabric. Cataclastic and talc-tremolite veins, with irregularly spaced shattered zones.

Core Photo



305-U1309D-135R-1 (Section top: 664.60 mbsf)

UNIT-367: Olivine-bearing Gabbro
Pieces: 1-4

PRIMARY MINERALOGY: Modal data from Piece 2b

Olivine	Modal 4% Size 1-7 mm Shape anhedral
Plagioclase	Modal 55% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 41% Size to 70 mm Shape anhedral

COMMENTS: Continuation of Unit 367 coarse-grained olivine-bearing gabbro. Felsic vein at 42-50 cm.

SECONDARY MINERALOGY: Chlorite, pale amphibole

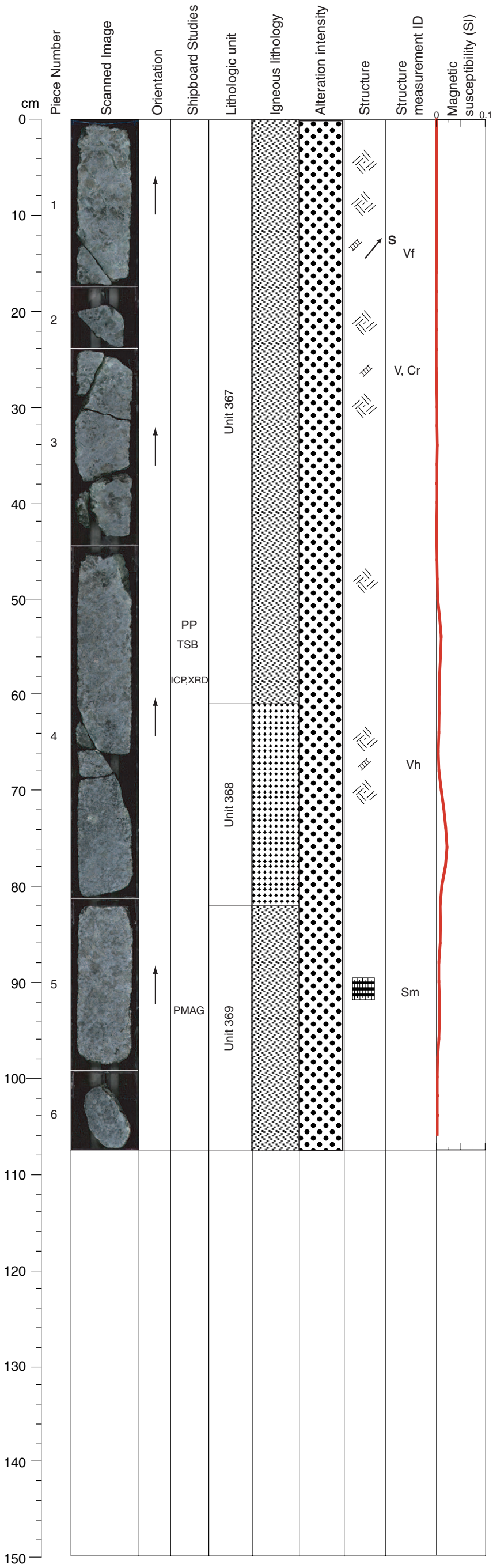
COMMENTS: The general alteration of gabbro is similar to previous sections, with brown pyroxene fringed by green alteration halos and plagioclase partially altered (to saussurite?) In addition, however, in this section there are patches where there are grains of green amphibole (after brown pyroxene?) that has brown alteration rims (later amphibole?).

VEIN ALTERATION: Amphibole, plagioclase, carbonate.

STRUCTURE: Coarse-grained gabbro, no ductile strain fabric, local green vein. Coarse gabbro with large pyroxene grains. Very few veins (dark green, magmatic), and small amounts of cataclasis. Minor irregular fracturing (drilling induced). Some of the irregular fractures have sulfides.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-135R-1, 40-56 cm WET

Core Photo



305-U1309D-135R-2 (Section top: 665.98 mbsf)

UNIT-367: Gabbro
Pieces: 1-4a

PRIMARY MINERALOGY: Modal data from Piece 1

Plagioclase	Modal 60% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 40% Size up to 15 mm Shape anhedral

COMMENTS: Continuation of Unit 367 coarse-grained gabbro. 2% modal orthopyroxene in thin section 53-55 cm.

UNIT-368: Olivine Gabbro
Pieces: 4a-4b

PRIMARY MINERALOGY: Modal data from Piece 4a

Olivine	Modal 25% Size 3 mm average Shape anhedral
Plagioclase	Modal 60% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 15% Size 3 mm average Shape anhedral

COMMENTS: Unit 368 medium-grained olivine gabbro.

UNIT-369: Gabbro
Pieces: 5-6

PRIMARY MINERALOGY: Modal data from Piece 5

Olivine	Modal <1% Size 3 mm average Shape anhedral
Plagioclase	Modal 50% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 45% Size 5 mm average Shape anhedral

COMMENTS: Unit 369 coarse-grained gabbro.

SECONDARY MINERALOGY: Chlorite, pale amphibole, serpentine

COMMENTS: The general alteration of gabbro is similar to previous sections, with brown pyroxene fringed by green alteration halos and plagioclase partially altered There is a halo around a green vein on the edge of Piece 4b. Below this green grains with brown alteration rims occur.

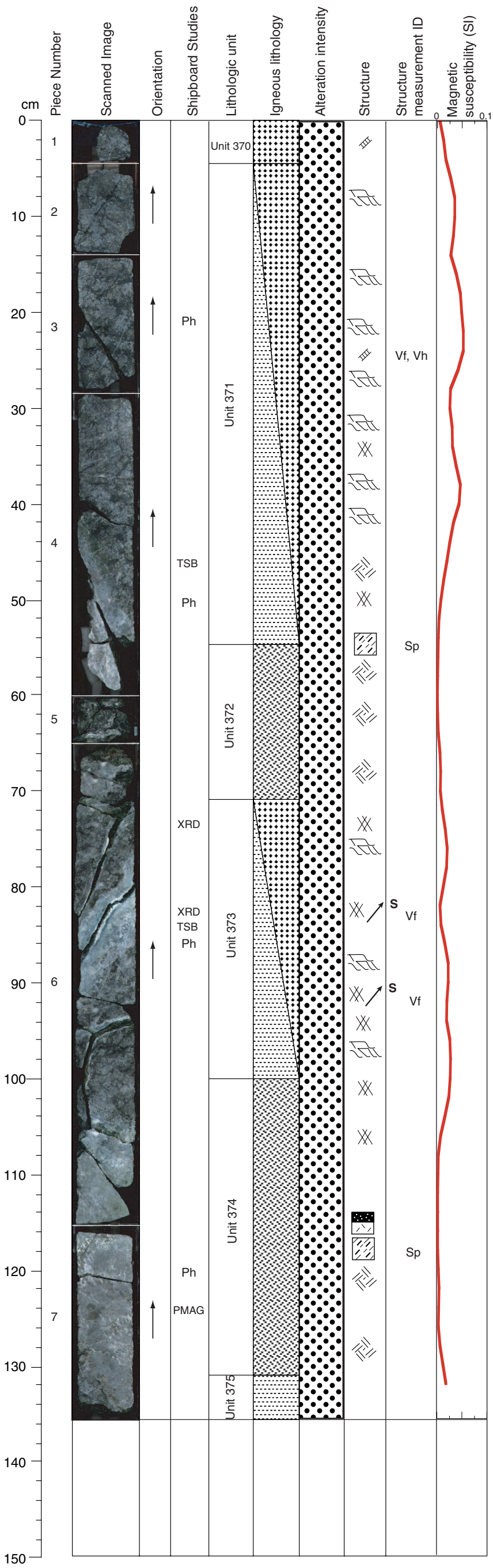
VEIN ALTERATION: Amphibole, chlorite, talc.

THIN SECTIONS:
305-U1309D-135R-2, 53-55 cm (#364)

STRUCTURE: Coarse grained gabbro, no ductile strain fabric except at base where there is a hint of moderately-dipping mineral foliation. Several open veins (talc/tremolite).

CLOSE-UP PHOTOGRAPHS:
305-U1309D-135R-2, 45-65 cm WET

Core Photo



305-U1309D-136R-1 (Section top: 669.40 mbsf)

UNIT-370: Olivine Gabbro Rubble
Pieces: 1

PRIMARY MINERALOGY:

Olivine	Modal <1% Size 3 mm average Shape anhedral
Plagioclase	Modal 50% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 45% Size 5 mm average Shape anhedral

COMMENTS: Unit 370 coarse-grained gabbro rubble.

UNIT-371, 373, 375: Olivine-rich Troctolite
Pieces: 2-4b, 6b-f, 7b

PRIMARY MINERALOGY: Modal data from Piece 2

Olivine	Modal 78% Size 2 mm average Shape anhedral
Plagioclase	Modal 7% Size 5 mm average Shape interstitial
Clinopyroxene	Modal 15% Size 10 mm average Shape anhedral

COMMENTS: Units 371, 373, and 375 are medium-grained poikilitic olivine-rich troctolite. Interstitial to oikocrystic clinopyroxene including olivine chadacryst. Plagioclase interstitial.

UNIT-372, 374: Shear zone Gabbro
Pieces: 4b-6a, 6g-7b

COMMENTS: Units 372 and 374 are sheared gabbro. Too deformed and altered to define mineral modal proportions.

SECONDARY MINERALOGY: Chlorite, pale amphibole, serpentine

COMMENTS: The troctolite shows a network of serpentine veins. Olivine are altered to serpentine and sulfides are observed. At 80 cm, serpentine-tremolite-chlorite (?) vein with an alteration halo of 6 cm thick (blue-green round minerals (?) likely associated with tremolite). The same veins occur at 94 and 106 cm. The alteration halo associated to those veins are thicker in the lower part than in the upper part. Some coronas are observed associated with these alteration halos.

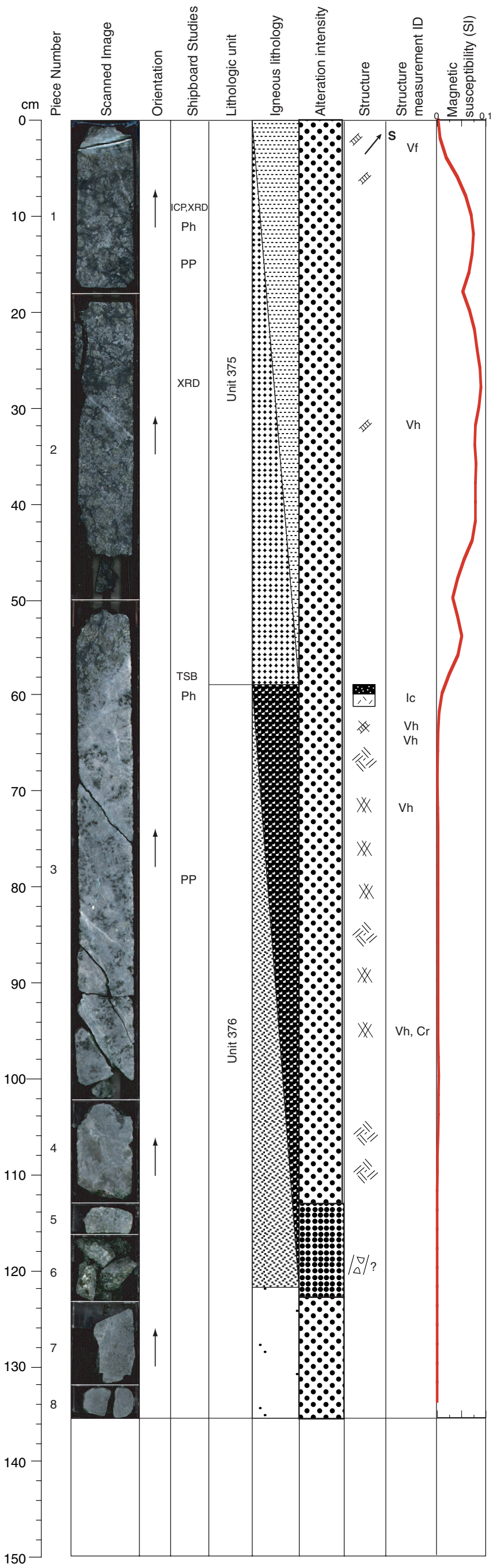
VEIN ALTERATION: Serpentine, amphibole, plagioclase, chlorite, talc, carbonate.

THIN SECTIONS:
305-U1309D-136R-1, 45-48 cm (#365)
305-U1309D-136R-1, 82-85 cm (#366)

STRUCTURE: Largely undeformed poikilitic plagioclase wehrlite with irregular serpentinite foliation. Local focused mylonitic shear zones. Contact to gabbro in lower part of section shows significant strain highly oblique to contact. Gabbro grades into microgabbro. Dark serpentinite veins crosscut by black blue veins. Section of ultramafics with intense vein fault density and some cataclasis. Gabbro (medium) at bottom of section, with heterogeneous texture (alteration?), slight serpentinite foliation, and veins with cataclasis.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-136R-1, 14-28 cm WET
305-U1309D-136R-1, 41-59 cm WET
305-U1309D-136R-1, 70-90 cm WET
305-U1309D-136R-1, 116-135 cm WET

Core Photo



305-U1309D-136R-2 (Section top: 670.76 mbsf)

UNIT-375: Plagioclase-bearing Wehrlite
Pieces: 1-3a

PRIMARY MINERALOGY: Modal data from Piece 2

Olivine	Modal 65% Size 3 mm average Shape anhedral
Plagioclase	Modal 10% Size 5 mm average Shape interstitial
Clinopyroxene	Modal 25% Size 10 mm average Shape anhedral

COMMENTS: Continuation of Unit 375 medium-grained poikilitic plagioclase-bearing wehrlite. This type of wehrlite belongs to olivine-rich troctolite series continuously from last section.

UNIT-376: Gabbro to Troctolite
Pieces: 3a-8

PRIMARY MINERALOGY: Modal data from Piece 3b

Olivine	Modal 5% Size 3 mm average Shape anhedral
Plagioclase	Modal 80% Size 5 mm average Shape interstitial
Clinopyroxene	Modal 5% Size 10 mm average Shape anhedral

COMMENTS: Unit 376 medium-grained gabbro. Leucocratic zone including troctolite patches and large subhedral pyroxene grains. Troctolite: olivine=50%, plagioclase=50%. Microgabbro from 123-136 cm.

SECONDARY MINERALOGY: Chlorite, pale amphibole, serpentine

COMMENTS: The olivine are altered to serpentine and a network of serpentine veins are visible in the upper part of the section. At 2 cm, small vein (talc-tremolite-serpentine ?). At 55 cm, leucocratic zone, rich in plagioclase, which has a pinkish white color, and green amphibole. This zone is cut by several veins (amphibole + chlorite ?) and significant amount of sulfides are observed. Before the contact (102 cm) with the coarser grained gabbro, some tiny coronas with chlorite rim are observed.

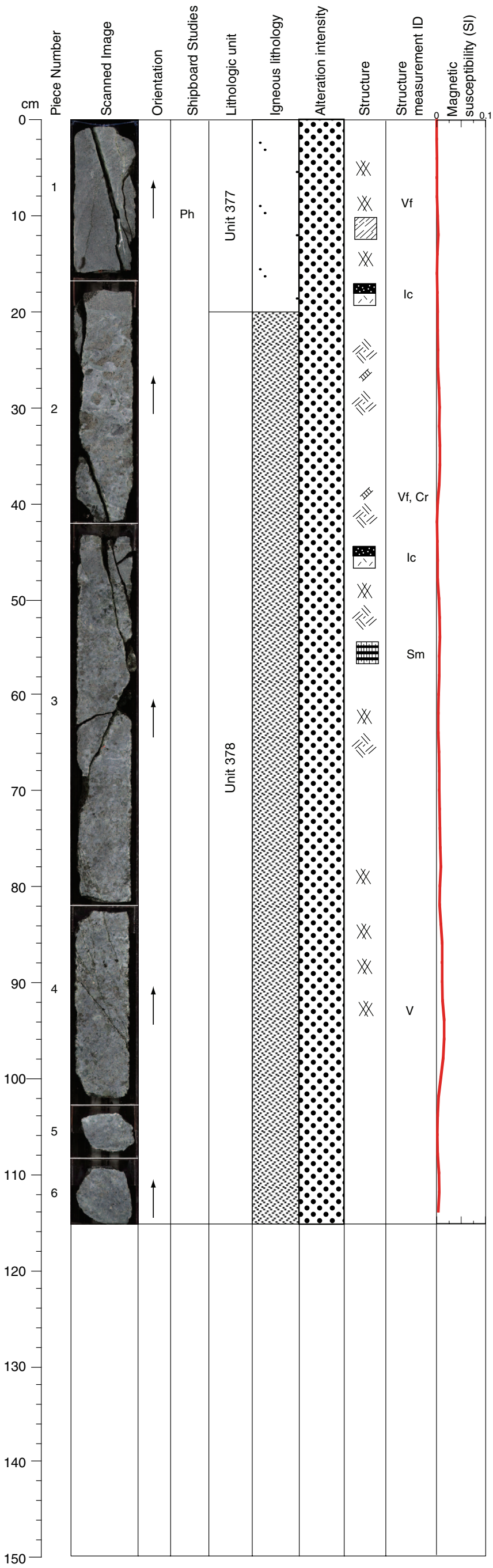
VEIN ALTERATION: Serpentine, amphibole, chlorite, talc, carbonate.

THIN SECTIONS:
305-U1309D-136R-2, 57-60 cm (#367)

STRUCTURE: A sequence of undeformed units, going down section from poikilitic plagioclase wehrlite to rather massive troctolite, to gabbro, and to microgabbro. Latter shows patches of strain which are not homogeneous on scale of core. A white vein (hydrothermal) and a subhorizontal talc/tremolite vein at top of section is followed by leucocratic alteration zone with hydrothermal/cataclastic veins and a cataclastic gabbro breccia (loose fragments). This is underlain by finer grained gabbro (veined and cracked). Veining history : Black blue veins cut by light green, irregular vein associated with darker, earlier vein and a later set of cracks with sulfides on their planes.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-136R-2, 0-18 cm WET
305-U1309D-136R-2, 50-70 cm WET

Core Photo



305-U1309D-136R-3 (Section top: 672.12 mbsf)

UNIT-377: Microgabbro
Pieces: 1-2a

PRIMARY MINERALOGY:

COMMENTS: Unit 377 is microgabbro. Too fine grained to define minerals and modal proportions.

UNIT-378: Gabbro
Pieces: 2a-6

PRIMARY MINERALOGY: Modal data from Piece 3

Plagioclase	Modal 60% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 40% Size 3 mm average Shape anhedral

COMMENTS: Unit 378 is coarse-grained gabbro. Two kinds of pyroxene (coarse grained brown:medium grained black = 95:5).

SECONDARY MINERALOGY: Chlorite, pale amphibole, serpentine

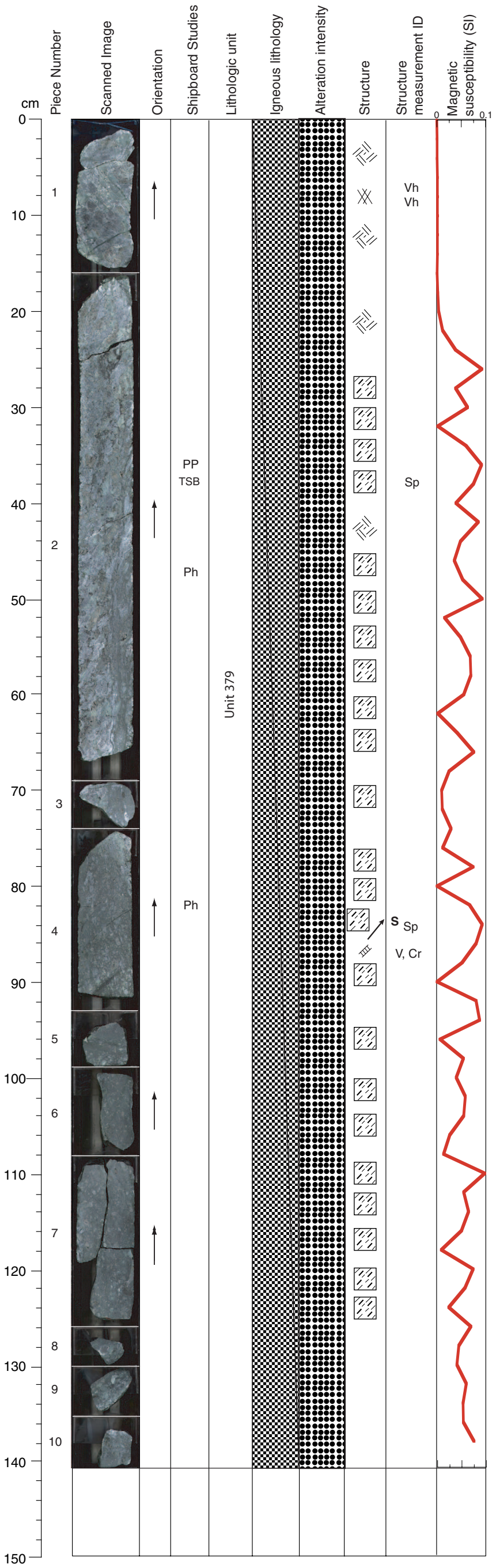
COMMENTS: Fine-grained gabbro on top with white veins (calcite?) and alteration halo related to that vein (0.5 cm thick). At 20 cm diffuse contact with a coarser grained gabbro. The olivines are altered to serpentine and rimmed by tremolite.

VEIN ALTERATION: Amphibole, chlorite, carbonate.

STRUCTURE: Microgabbro in shallow igneous contact and also interwoven with coarser gabbro below. Coarser gabbro shows locally weak ductile fabric. Steeply cutting veins with sulfides on top, underlain by medium- to coarse-grained gabbro with brittle fractures (open cracks) and some veining.

CLOSE-UP PHOTGRAPHS:
305-U1309D-136R-3, 0-16 cm WET

Core Photo



305-U1309D-137R-1 (Section top: 674.20 mbsf)

UNIT-379: Oxide Gabbro
Pieces: 1-10

PRIMARY MINERALOGY: Modal data from Piece 2b

Olivine	Modal 5% Size 3 mm average Shape anhedral
Plagioclase	Modal 45% Size to 20 mm Shape anhedral
Clinopyroxene	Modal 45% Size to 20 mm Shape anhedral
Oxide	Modal 5% Size 3 mm average Shape anhedral

COMMENTS: Unit 379 coarse-grained oxide gabbro. Vertical shear zone; very clear boundary with undeformed gabbro. Oxides are concentrated along deformation foliation and disseminated in the fine-grained shear zone. Oxide mode may be underestimated due to very fine grain size and disseminated character, but this interval has a very high magnetic susceptibility consistent with high proportion of single domain oxide. Brown amphibole (25 mm) at 88 cm.

SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: The alteration in this section is generally similar to previous sections of coarse gabbro, but there is a concentration of secondary chorite/serpentine/magnetite(?) in a zone of deformed gabbro from about 34 cm to at least 130 cm. Within this zone there is a network of dark veins (serpentine?) and around it there is some leucocratic alteration especially in Piece 2b.

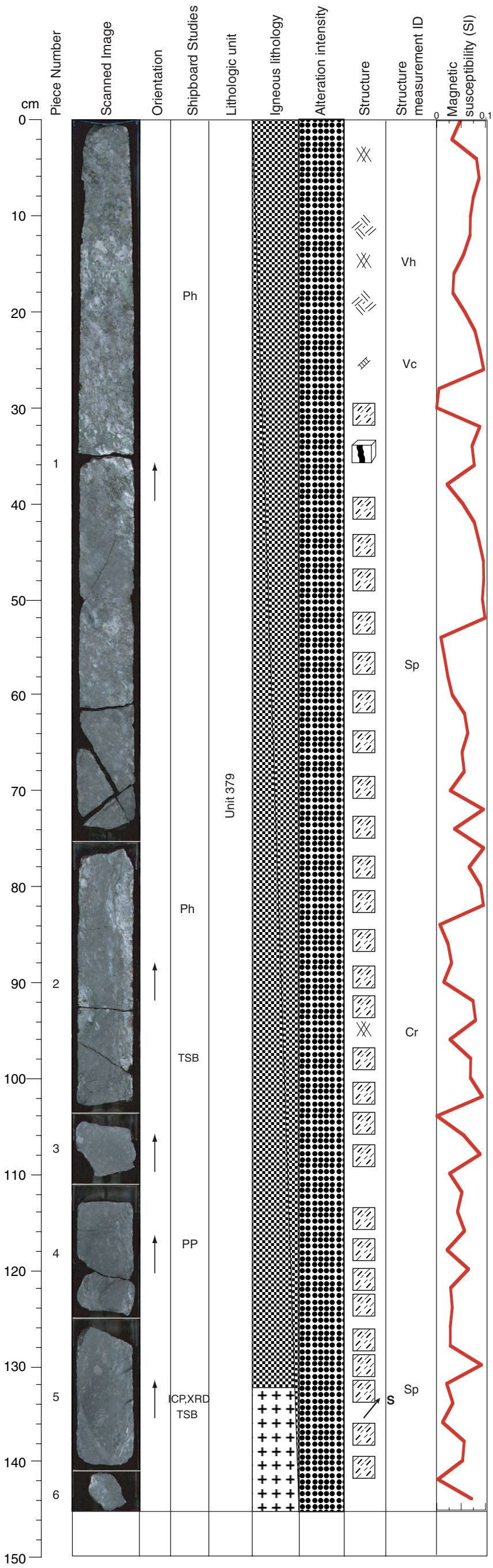
VEIN ALTERATION: Amphibole, chlorite.

THIN SECTIONS:
305-U1309D-137R-1, 45-47 cm (#368)

STRUCTURE: Gabbro with moderate to high plastic strain. Mineral foliation and probably also lineation are steeply dipping. Two crosscutting dense vein sets and associated cataclastic deformation along vein-parallel cracks at top of section. Rest is a vertical brittle-plastic shear zone with concentration of deformation along 270 side crosscut by a few moderately-dipping cracks (open fractures). Intensity of cataclastic deformation appears to be very low.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-137R-1, 40-57 cm WET
305-U1309D-137R-1, 74-90 cm WET

Core Photo



305-U1309D-137R-2 (Section top: 675.60 mbsf)

UNIT-379: Oxide Gabbro to Gabbronorite
Pieces: 1-6

PRIMARY MINERALOGY: Modal data from 137R1-001, Piece 2b

Olivine	Modal 5% Size 3 mm average Shape anhedral
Plagioclase	Modal 45% Size to 20 mm Shape anhedral
Clinopyroxene	Modal 45% Size to 20 mm Shape anhedral
Oxide	Modal 5% Size 3 mm average Shape anhedral

COMMENTS: Continuation of Unit 379 coarse-grained oxide gabbro. 10% modal orthopyroxene observed in thin section from 133-135 cm making this interval a gabbronorite.

SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: The background alteration of the gabbro in this section is generally similar to previous sections of coarse gabbro, but there is a continuation of the deformation seen in the previous section and zones of alteration asociated with it. Mainly the deformation is accompanied by secondary chorite/serpentine/magnetite(?) and a network of dark veins (serpentine?). There are patches of leucocratic alteration especially in Pieces 1a, 1b, 2a, and 2b.

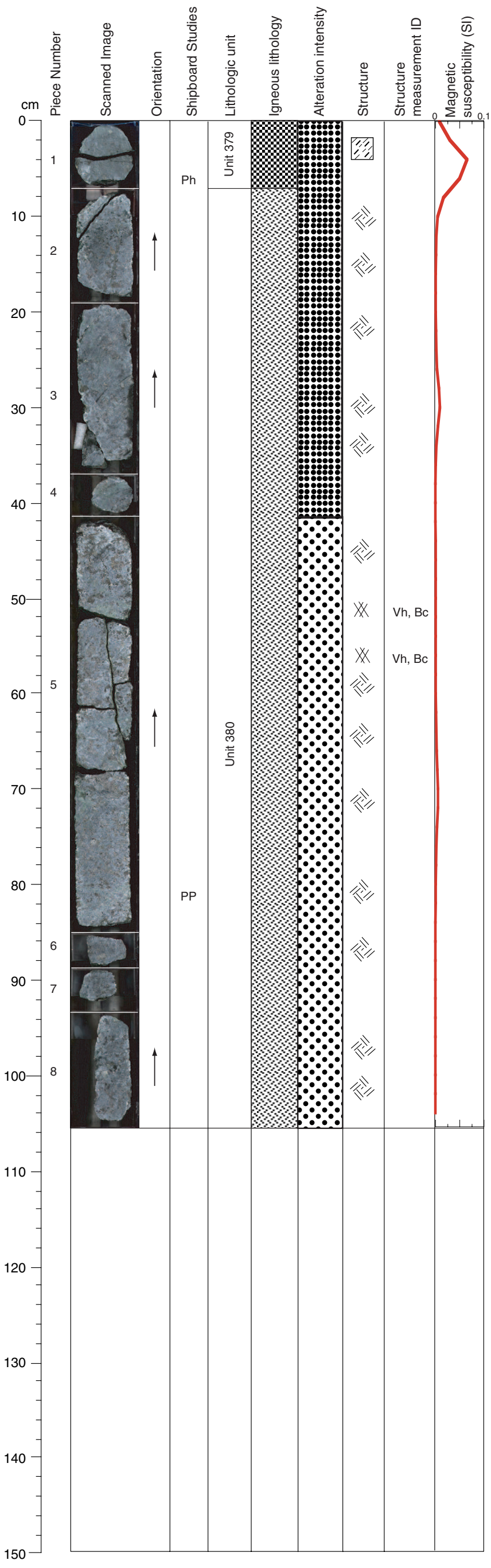
VEIN ALTERATION: Amphibole, chlorite.

THIN SECTIONS:
305-U1309D-137R-2, 96-98 cm (#369)
305-U1309D-137R-2, 133-135 cm (#370)

STRUCTURE: Gabbro with moderate to high plastic strain. Mineral foliation and probably also lineation are steeply dipping. Subvertical vein that towards top turn into cataclastic zone. This cataclastic zone is later crosscut by subhorizontal grey green veins. Toward bottom of section, several brittle fractures (late), some open cracks with sulfides.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-137R-2, 10-25 cm WET
305-U1309D-137R-2, 76-92 cm WET
305-U1309D-137R-2, 125-140 cm WET

Core Photo



305-U1309D-137R-3 (Section top: 677.05 mbsf)

UNIT-379: Oxide Gabbro
Pieces: 1

PRIMARY MINERALOGY: Modal data from Piece 1

Olivine	Modal 5% Size 3 mm average Shape anhedral
Plagioclase	Modal 45% Size to 20 mm Shape anhedral
Clinopyroxene	Modal 45% Size to 20 mm Shape anhedral
Oxide	Modal 5% Size 3 mm average Shape anhedral

COMMENTS: Continuation of Unit 379 coarse-grained oxide gabbro.

UNIT-380: Gabbro
Pieces: 2-8

PRIMARY MINERALOGY: Modal data from Piece 5f

Plagioclase	Modal 55% Size 4 mm average Shape anhedral
Clinopyroxene	Modal 45% Size 4 mm average Shape anhedral

COMMENTS: Unit 380 is medium-grained gabbro.

SECONDARY MINERALOGY: Chlorite, pale amphibole

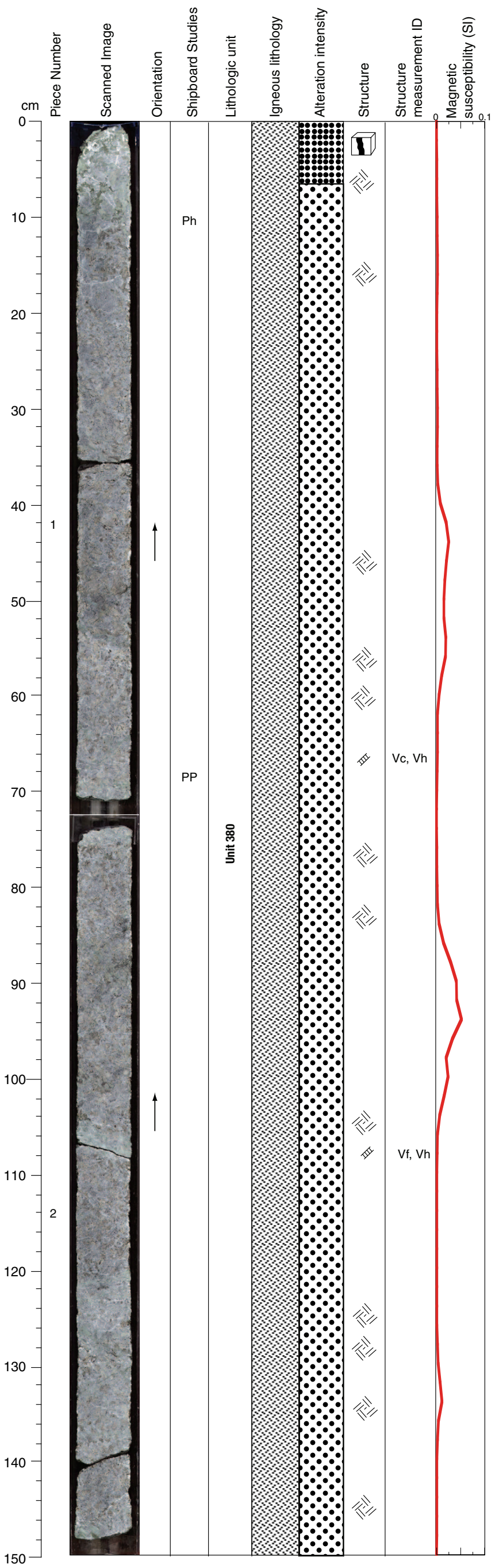
COMMENTS: Pieces 1a and 1b show a continuation of the deformed material in the previous section, but below that the gabbro is intact and the background alteration throughout the remainder of this section is generally similar to previous sections of coarse gabbro.There are patches of leucocratic alteration especially in Pieces 1a, 1b, 2a, and 2b.

VEIN ALTERATION: Chlorite, talc, carbonate, sulfide.

STRUCTURE: Except for Piece 1, undeformed medium-grained gabbro. Limited cataclasis and some crosscutting cracks and veins.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-137R-3, 8-18 cm WET

Core Photo



305-U1309D-138R-1 (Section top: 679.00 mbsf)

UNIT-380: Gabbro
Pieces: 1-2

PRIMARY MINERALOGY: Modal data from Piece 1b

Plagioclase	Modal 40% Size 4 mm average Shape anhedral
Clinopyroxene	Modal 60% Size 4 mm average Shape anhedral

COMMENTS: Continuation of Unit 380 medium- to coarse-grained gabbro. Grain size varies to coarse in places. Oxide at 40-60 cm, 85-103 cm, sulfides at 50-52 cm, modal based on Piece 1b

SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: Leucocratic alteration on top of the section, where pyroxene grains are altered to amphibole. Some local alteration zones to green amphibole related to fractures or veins cutting the gabbro.

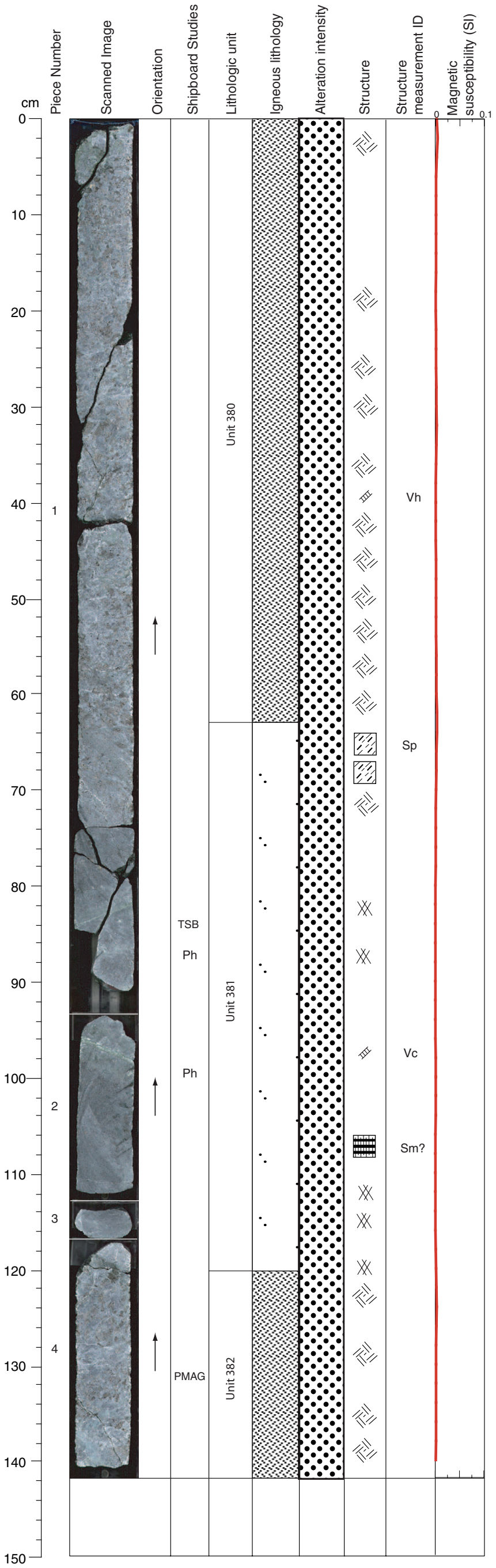
VEIN ALTERATION: Amphibole, chlorite, talc.

THIN SECTIONS:

STRUCTURE: Coarse-grained gabbro with no ductile strain. Limited cataclasis and some crosscutting cracks and veins.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-138R-1, 0-20 cm WET

Core Photo



305-U1309D-138R-2 (Section top: 680.50 mbsf)

UNIT-380: Gabbro
Pieces: 1a-1d

PRIMARY MINERALOGY: Modal data from Piece 1b

Plagioclase	Modal 40% Size 4 mm average Shape anhedral
Clinopyroxene	Modal 60% Size 4 mm average Shape anhedral

COMMENTS: Continuation of Unit 380 medium- to coarse-grained gabbro.

UNIT-381: Microgabbro
Pieces: 1d-4

COMMENTS: Unit 381 fine-grained microgabbro. 2% modal orthopyroxene in thin section from 81-85 cm.

UNIT-382: Gabbro
Piece 4

PRIMARY MINERALOGY: Modal data from Piece 4

Plagioclase	Modal 40% Size 4 mm average Shape anhedral
Clinopyroxene	Modal 60% Size 4 mm average Shape anhedral

COMMENTS: Unit 382 medium- to coarse-grained gabbro.

SECONDARY MINERALOGY: Chlorite, pale amphibole, serpentine

COMMENTS: At 64 cm, green amphibole vein marking the contact with the following mylonites. At 95 cm, the mylonite is cut by a green vein (talc-tremolite-serpentine?). An alteration halo associated with that vein appears over 6 cm wide. The lower contact of the mylonites is at 117 cm. There is no alteration zone at this contact.

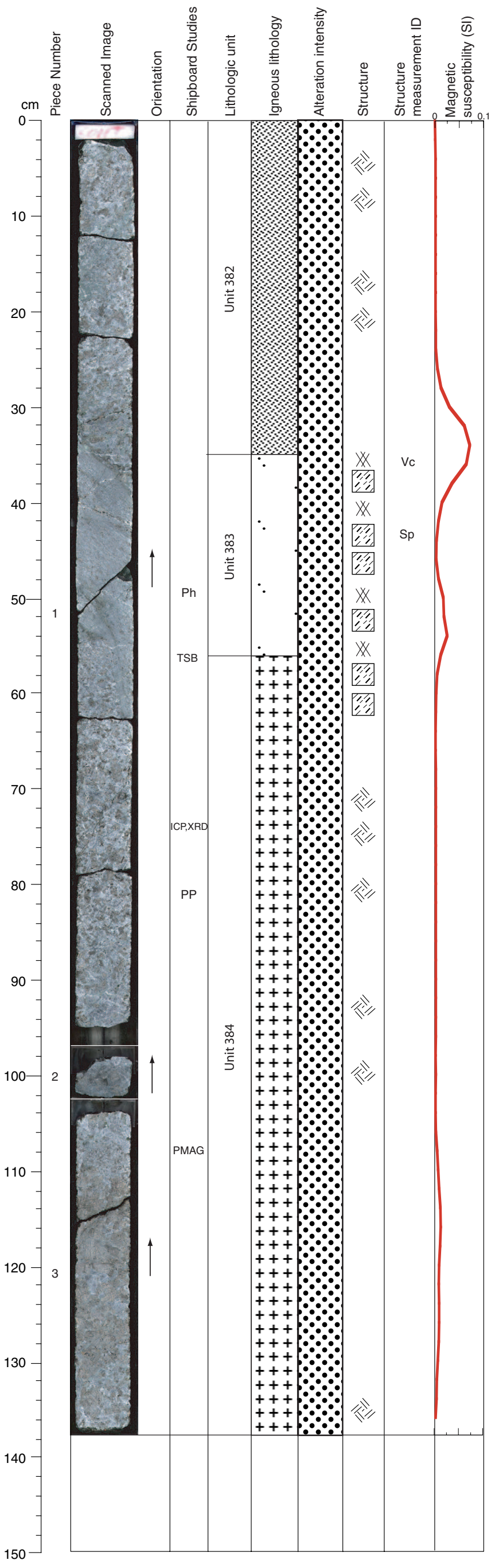
VEIN ALTERATION: Amphibole, chlorite, talc, carbonate, sulfide.

THIN SECTIONS:
305-U1309D-138R-2, 81-85 cm (#371)

STRUCTURE: Coarse gabbro with no ductile strain including a microgabbro interval having some magmatic (or plastic?) strain. Upper contact to microgabbro is marked by plastic strain but lower contact at 118 cm appears to be an igneous contact. Coarse gabbro with limited cataclasis and some irregular veining steeply dipping. Fine-grained gabbro is crosscut by shallow dipping cataclastic fault. Thin section 138R-2, 81-85 cm shows plastic strain in fine gabbro zone.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-138R-2, 80-93 cm WET
305-U1309D-138R-2, 93-111 cm WET

Core Photo



305-U1309D-138R-3 (Section top: 681.91 mbsf)

UNIT-382: Gabbro
Pieces: 1a-1c

PRIMARY MINERALOGY: Modal data from Piece 1b

Plagioclase	Modal 40% Size 4 mm average Shape anhedral
Clinopyroxene	Modal 60% Size 4 mm average Shape anhedral

COMMENTS: Continuation of Unit 382 medium- to coarse-grained gabbro.

UNIT-383: Microgabbro
Pieces: 1c-1d

PRIMARY MINERALOGY:

COMMENTS: Unit 383 fine-grained microgabbro.

UNIT-384: Gabbronorite
Pieces: 1d-3

PRIMARY MINERALOGY: Modal data from Piece 3b

Plagioclase	Modal 35% Size 4 mm average Shape anhedral
Clinopyroxene	Modal 65% Size 4 mm average Shape anhedral

COMMENTS: Unit 384 is medium- to coarse-grained gabbro. Distinct wavy contacts and flow fabric in microgabbro. 20% modal orthopyroxene seen in thin section from 55-59 cm making this a gabbronorite.

SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: Alteration of the olivine and pyroxene to green amphibole. At 38 cm, sharp contact of the coarse-grained gabbro and the mylonites. After the contact with the mylonites, the gabbro contains a significant amount of sulfides.

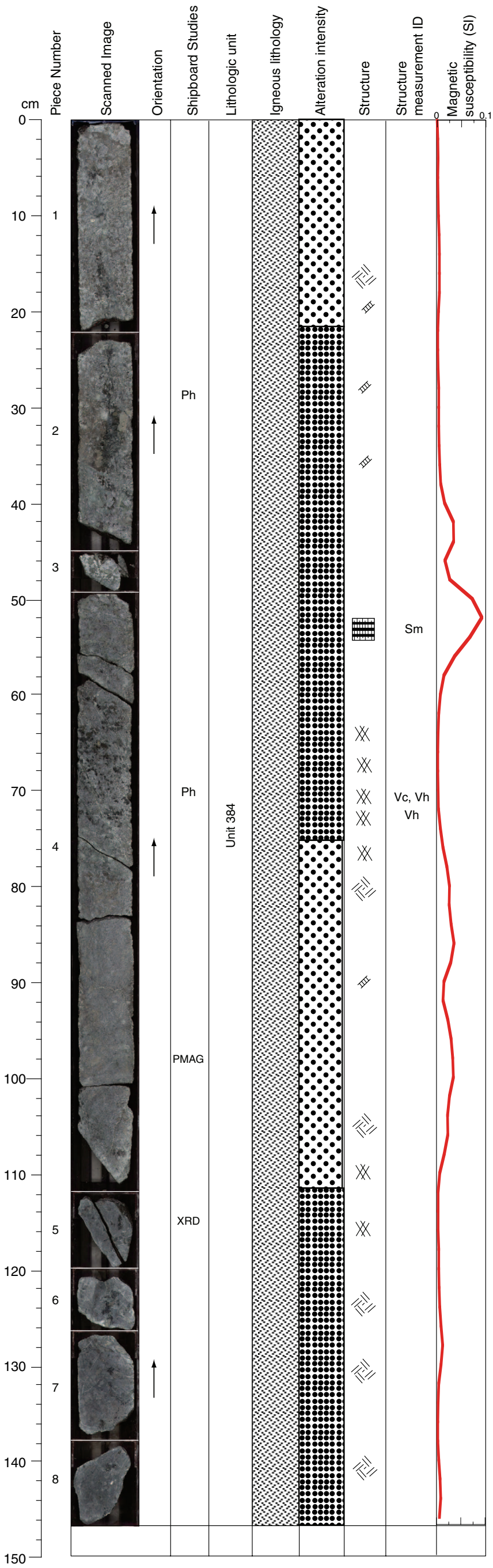
VEIN ALTERATION: Amphibole, chlorite, carbonate.

THIN SECTIONS:
305-U1309D-138R-3, 55-59 cm (#372)

STRUCTURE: Coarse gabbro with intervening microgabbro intervals which show sharply limited section of plastic strain, discontinuous along strike. Limited cataclasis and some irregular veining steeply dipping. Fine darker bands (shear zones) anastamosing. Overall shear zone shows bands of different orientations and sharp contacts. Below the shear zone, coarse gabbro with limited cataclasis (same as top of section) with almost no deformation.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-138R-3, 46-53 cm DRY

Core Photo



305-U1309D-139R-1 (Section top: 683.80 mbsf)

UNIT-384: Gabbro
Pieces: 1-8

PRIMARY MINERALOGY: Modal data from Piece 1

Plagioclase	Modal 50-65% Size 5 mm average, to 10 mm Shape anhedral
Clinopyroxene	Modal 35-50% Size 10 mm average, to 20 Shape anhedral

COMMENTS: This unit is the continuation from the previous section and consists of coarse-grained seriate gabbro, with both modal and grain size fluctuations. A leucocratic vein crosscuts at 45-49 cm.

SECONDARY MINERALOGY: Chlorite, pale amphibole

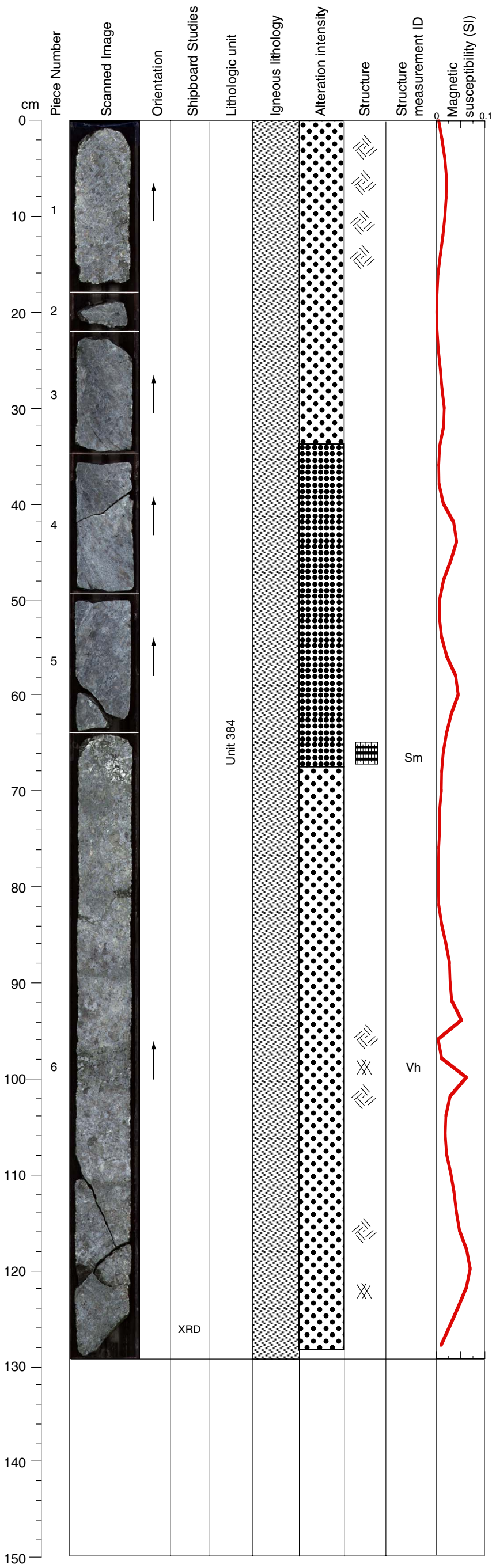
COMMENTS: The background alteration throughout this section is generally similar to previous sections of coarse gabbro.There minor leucocratic alteration scattered throughout the section.

VEIN ALTERATION: Amphibole, chlorite, talc, carbonate, sulfide.

STRUCTURE: Medium-grained gabbro, locally even finer grained (plastically deformed?), picks up magmatic strain only locally. A set of subparallel veins closely spaced (<1 cm) in Piece 4. Bottom is coarse gabbro with nondescript cataclasis.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-139R-1, 23-43 cm WET
305-U1309D-139R-1, 62-76 cm WET

Core Photo



305-U1309D-139R-2 (Section top: 685.27 mbsf)

UNIT-384: Gabbro
Pieces: 1-6

COMMENTS: This is the continuation from the previous section and consists of coarse-grained seriate gabbro, with both modal and grain size fluctuations. A leucocratic vein crosscuts at 64-69 cm.

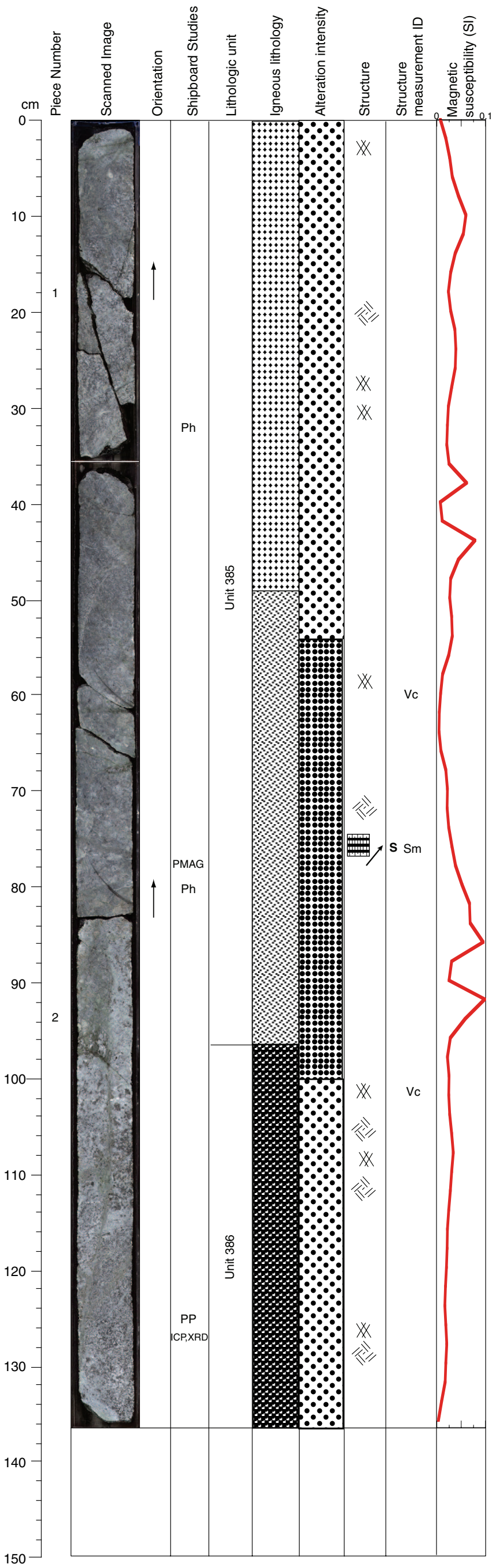
SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: The general background alteration is similar to other sections of coarse gabbro. There is a zone of deformed gabbro in Piece 3 that has a fine network of minute green veins giving a pale-green cast to the rock. The top of Piece 6 has a leucocratic alteration zone associated with fine green veins. Between about 97 to 101 cm there is an alteration zone in which all the mafic minerals are altered to a green aggregate of chlorite and actinolite (?). A single <1 mm-wide vein cuts across this zone at a high angle and has an associated narrow (2 mm) halo with white plagioclase alteration.

VEIN ALTERATION: Amphibole, chlorite, carbonate.

STRUCTURE: Medium grained, locally olivine bearing gabbro or leucocratic, without a clear ductile strain fabric. Limited cataclasis and some crosscutting cracks and veins.

Core Photo



305-U1309D-139R-3 (Section top 686.56 mbsf)

UNIT-385: Olivine Gabbro and Gabbro
Pieces: 1-2a

PRIMARY MINERALOGY: Olivine Gabbro

Olivine	Modal 20% Size 3mm average Shape anhedral
Plagioclase	Modal 60% Size 5 mm average Shape anhedral to subhedral
Clinopyroxene	Modal 20% Size 3 mm average Shape anhedral

PRIMARY MINERALOGY: Gabbro
Pieces: 2a-2d Mode from Piece 2c

Olivine	Modal 1% Size 1 mm average Shape anhedral
Plagioclase	Modal 65% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 34% Size 4 mm average Shape anhedral

COMMENTS: This unit consists of coarse-grained seriate olivine-bearing gabbro, with both modal and grain size fluctuations. Particularly the modal olivine abundance in this section appears to vary strongly, diffusely and unsystematically and can be enriched in irregular, around 5 cm-sized, serpentinized near-troctolitic patches (particularly in the intervals 5-49 cm and 95-136 cm). Locally pervasive corona alteration after clinopyroxene can potentially lead to an overestimation of the modal olivine.

UNIT-386: Troctolite
Pieces: 2d

PRIMARY MINERALOGY: Mode from Piece 2d

Olivine	Modal 30% Size 3 mm average Shape anhedral
Plagioclase	Modal 70% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 1% Size 2 mm average Shape anhedral

COMMENTS: This unit consists of medium-grained seriate troctolite in a sheared zone. Local concentration of oxides in shear zone at 80-96 cm.

SECONDARY MINERALOGY: Chlorite, pale amphibole, serpentine

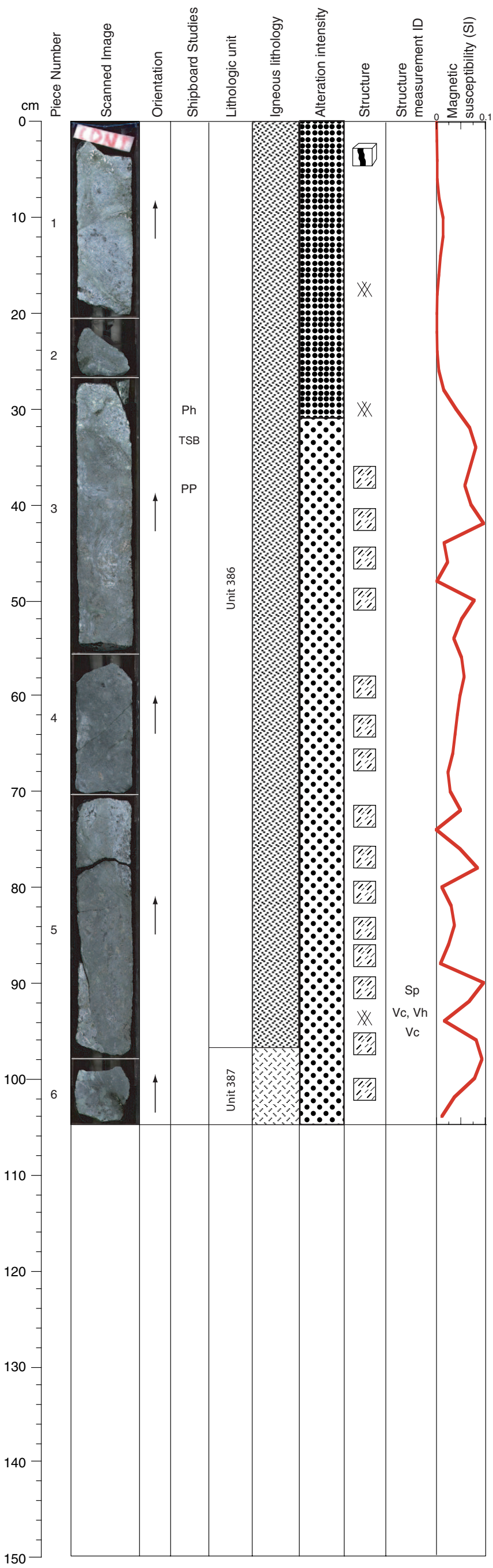
COMMENTS: The general background alteration is similar to that in other lithologies of this type seen higher in the hole. Some corona texture is developed in finer grained olivine-, troctolitic gabbro and alteration rims on clinopyroxene (to green ampibole) is pervasive in the coarser gabbro. In parts of the coarse gabbro there is a network of fine green veins (e.g., bottom of Piece 2b). Some wider green veins have thin (~2 mm) green alteration halos.

VEIN ALTERATION: Serpentine, amphibole, chlorite, carbonate.

STRUCTURE: Gabbro with variable grain size ranging from fine- to medium- grained, locally steep magmatic fabric with steep stretching lineation developed. Limited cataclasis and some crosscutting cracks and veins.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-139R-3, 27-54 cm WET
305-U1309D-139R-3, 70-86 cm WET

Core Photo



305-U1309D-139R-4 (Section top: 687.92 mbsf)

UNIT-386: Gabbro
Pieces: 1-6

PRIMARY MINERALOGY:

Plagioclase	Modal 50-60% Size 5 mm average, to 10 mm Shape anhedral
Clinopyroxene	Modal 40-50% Size 10 mm average, to 20 mm Shape anhedral
Olivine	Modal 0-2% Size 4 mm average Shape anhedral

COMMENTS: This unit consists of coarse-grained seriate gabbro, with less modal and grain size fluctuations than the previous unit. Modal olivine abundance, in particular, remains low to absent thoughout this section. Interstitial oxides occur locally, and appear to be enriched in the steeply dipping shear zone in the lowermost part of this unit (87-102 cm). The contact to the Unit 387 is tectonic.

UNIT-387: Gabbro
Pieces 5-6

PRIMARY MINERALOGY:

Plagioclase	Modal 65% Size 10 mm average, to 40 mm Shape tabular subhedral
Amphibole	Modal 35% Size up to 20 mm Shape elongate-bladed subhedral

COMMENTS: This unit consists of very coarse-grained amphibole gabbro. Plagioclase is blocky, amphiboles are mainly bladed, possibly partly (maybe not entirely) magmatic, partly replacing clinopyroxene.

SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: Patches of leucocratic alteration surround several green veins in Pieces 1 to 3 to a depth of abut 40 cm. The general background alteration remains the same as in earlier sections of coarse gabbro. A green vein at 51 to 52 cm has a very narrow (0.1 cm) green alteration halo, but lower in the section some fractures lack either secondary mineral filling or alteration.

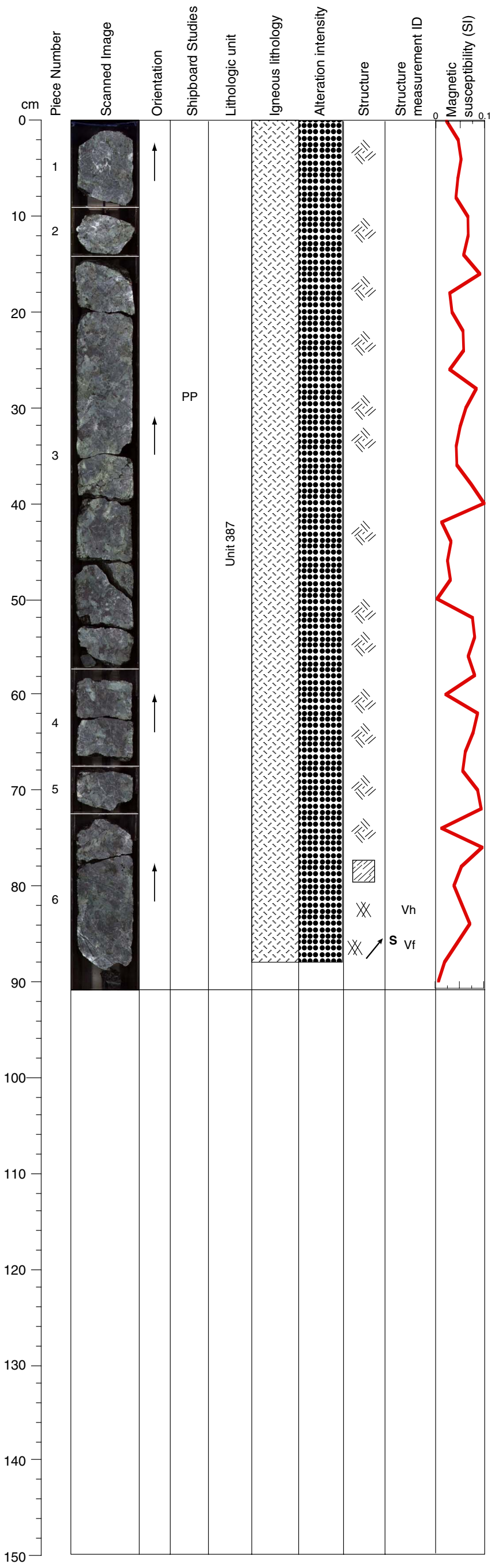
VEIN ALTERATION: Amphibole, chlorite.

THIN SECTIONS:
305-U1309D-139R-4, 32-35 cm (#373)

STRUCTURE: Undeformed to weakly magmatically deformed, fine-grained gabbro shows strain (similar to Sections U1309D-137R-1, and 137R-2) in local plastic shear zones. In last piece sheared contact to coarse-grained oxide gabbro. Minor fractures and veins in less deformed gabbro.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-139R-4, 25-32 cm WET
305-U1309D-139R-4, 27-42 cm WET

Core Photo



305-U1309D-140R-1 (Section top: 688.60 mbsf)

UNIT-387: Gabbro

Pieces 1-6

PRIMARY MINERALOGY:

Plagioclase	Modal 65% Size 10 mm average, up to 40 Shape tabular subhedral
Amphibole	Modal 35% Size to 20 mm Shape elongate-bladed subhedral

COMMENTS: This unit consists of very coarse-grained amphibole gabbro, which is fractured but not shattered. Plagioclase is blocky, amphiboles are mainly bladed, possibly partly (maybe not entirely) magmatic, partly replacing clinopyroxene. Coarse oxide-rich patches, as high as 10% locally. No primary clinopyroxene nor olivine detected.

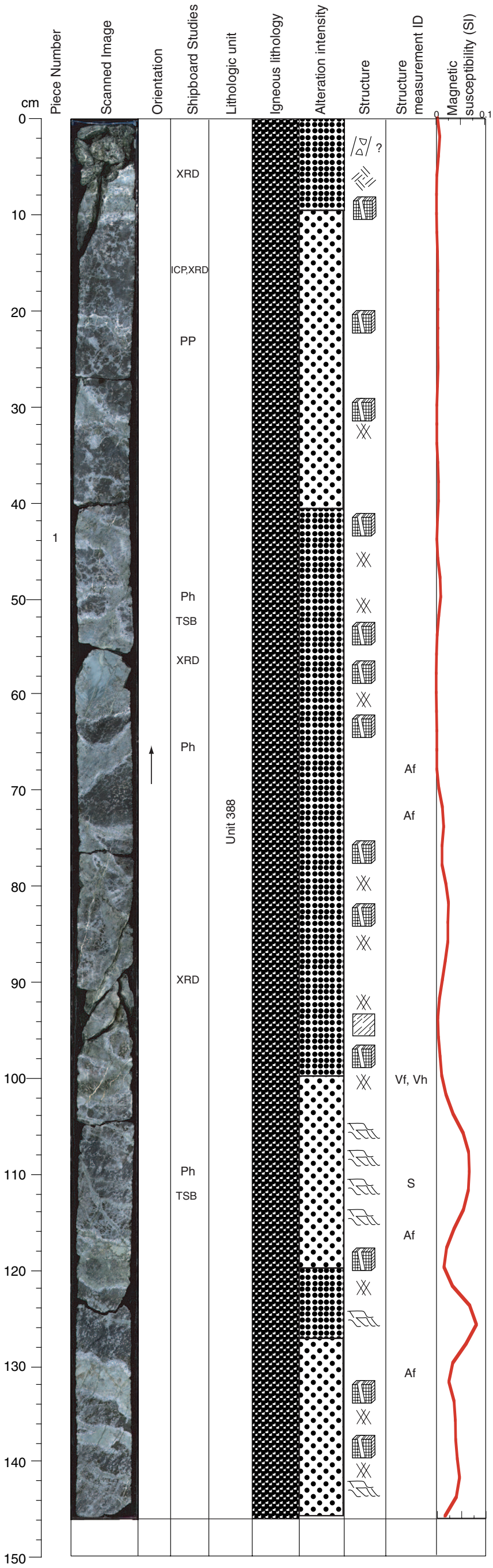
SECONDARY MINERALOGY: Chlorite, pale amphibole, serpentine

COMMENTS: The previous minerals (olivine and pyroxene) are replaced to amphibole. This section is cut by numerous tiny veins, and a significant amount of sulfides are observed. At 86 cm, polycrystalline vein (plagioclase-amphibole).

VEIN ALTERATION: Amphibole, chlorite.

STRUCTURE: Coarse, undeformed oxide gabbro, all presumed primary clinopyroxene altered to amphibole. Cataclastic deformation and no strain. Lots of veining.

Core Photo



305-U1309D-140R-2 (Section top: 689.51 mbsf)

UNIT-388: Plagioclase-bearing olivine-rich troctolite, Oxide Gabbro and Diabase
Pieces 1

PRIMARY MINERALOGY: (Plagioclase-bearing olivine-rich troctolite)

Olivine	Modal 80-90% Size and shape unknown
Plagioclase	Modal 2-8%? Size <1 mm Shape interstitial
Clinopyroxene	Modal 2-8% Size oikocrysts 20 mm diameter Shape interstitial

COMMENTS: This unit is a very complex zone, consisting of three endmember lithologies as seen in hand specimen and confirmed by thin section observations: (1) a plagioclase-bearing olivine-rich troctolite, 'intruded', fragmented and strongly hydrothermally overprinted by (2) Oxide-bearing Gabbo, and subsequently injected by (3) Diabase.
(1) The olivine-rich troctolite is very olivine rich (nearly completely serpentinized), dominantly subrounded grain shape, defined by up to 20 mm clinopyroxene (interstitial network) oikocrysts. Interstitial plagioclase appears to be dispersed througout this rock, but is strongly altered to chlorite. Overall, this rock type is very similar to Unit 271. Alteration ranges from 50% to 100% on a decimeter scale.
(2) The olivine-rich troctolite is crosscut by oxide-rich gabbro, which is by itself strongly altered. Possible primary amphiboles were identified in thin section. Oxides and granular plagioclase are well preserved.
(3) This oxide gabbro contains very pale green, homogeous looking patches, highly irregular in shape resembling coarse clinopyroxene oikocrysts. They are very dense, hard and in thin section contain a pronounced ghost ophitic texture, unambiguously indicating an diabase origin.

SECONDARY MINERALOGY: Chlorite, pale amphibole, serpentine, talc?

COMMENTS: This section is cut by several 1.5 to 2 cm thick green veins (amphibole and ?), which have a white rim of plagioclase when they are in contact with the host rock. The olivine-rich troctolite part is dark (brown color), likely oxidized serpentine. Some wide green veins are cut by late pale green veins (?). Some plagioclase grains seem to be completely replaced by actinolite. There are chlorite rims around the olivine where they are in contact with plagioclase. The “cooked effect” decreases toward the end of the section and a network of serpentine veins is visible.

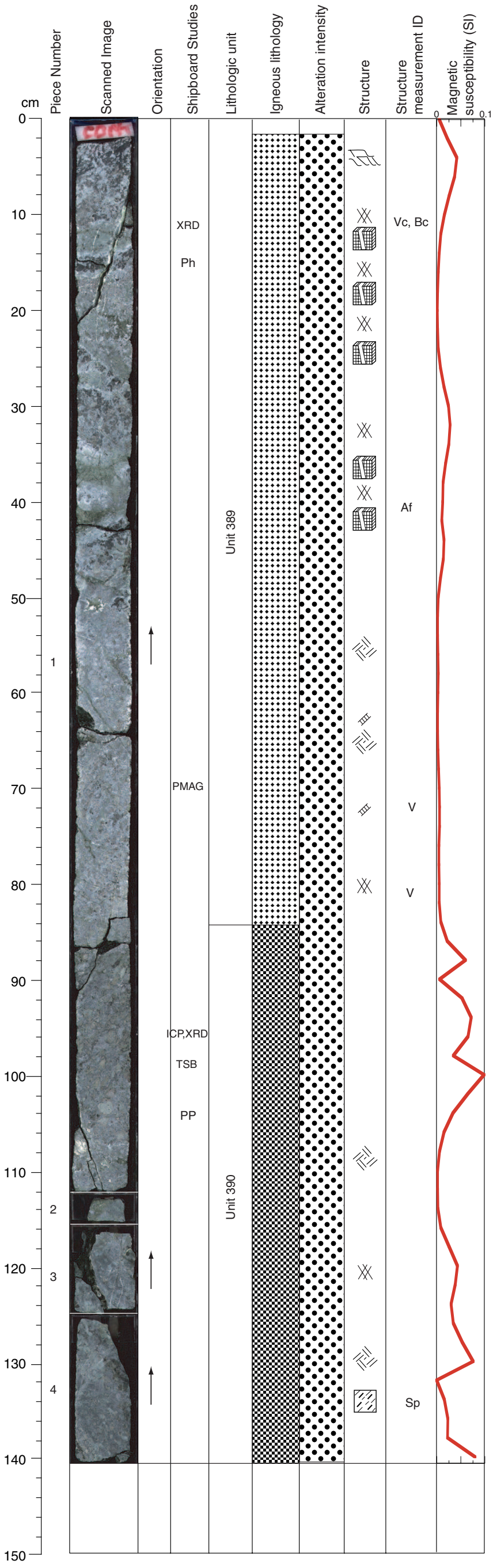
VEIN ALTERATION: Serpentine, amphibole, plagioclase, chlorite, talc, quartz, carbonate, sulfides, epidote.

THIN SECTIONS:
305-U1309D-140R-2, 50-53 cm (#374)
305-U1309D-140R-2, 111-113 cm (#375)
305-U1309D-140R-2, 128-131 cm (#376)

STRUCTURE: Lens-shaped bodies of poikilitic plagioclase wehrlite embedded in an altered greenish matrix. There is a weak preferred orientation of the greenish matrix. Olivine-rich troctolite has marked serpentinization foliation locally. Later veins (alteration/magmatic?) that are emplaced after serpentinization. Latest irregular, brittle veins filled with talc.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-140R-2, 41-56 cm WET
305-U1309D-140R-2, 57-77 cm WET
305-U1309D-140R-2, 103-122 cm WET
305-U1309D-140R-2, 123-145 cm WET

Core Photo



305-U1309D-140R-3 (Section top: 690.97 mbsf)

UNIT-389: Olivine Gabbro
Pieces 1a-1d

PRIMARY MINERALOGY:

Olivine	Modal 40% (top) to 5% (bottom) Size and shape unknown
Plagioclase	Modal 30% (top) to 75 (bottom) Size 10 mm average Shape anhedral
Clinopyroxene	Modal 30% (top) to 25% (bottom) Size 10 mm average Shape anhedral

COMMENTS: In terms of the strongly focused hydrothermally overprinted vein network, this unit is the continuation of the previous section. The igneous lithology, however, changes on a short interval. The topmost 2 cm of this section is still serpentine rich. The clinopyroxene and plagioclase modal content increases gradually down section, from olivine-rich gabbro to olivine-bearing leucogabbro. At 55 and 58 cm, first oxides start in thin oblique tapered bands. In Piece 1d, the olivine mode is down to <5%. Possibly primary amphibole occurs, but blocky appearance and absence of elongate blades suggest clinopyroxene replacement.

UNIT-390: Oxide Gabbro
Pieces: 1d-4

PRIMARY MINERALOGY:

Oxide	Modal 3% Size 5 mm average Shape anhedral
Plagioclase	Modal 70% Size 5 mm average, to 15 mm Shape anhedral
Clinopyroxene	Modal 25% Size 5 mm average, to 20 mm Shape anhedral

COMMENTS: This unit consists of mainly coarse-grained oxide gabbro. It is possible that primary amphibole is preserved in this section, not unlike the amphibole gabbros in the upper part of this core. In contrast to the more elongate blade-shape amphiboles of Unit 387, these are more blocky and may be pyroxene pseudomorphs.

SECONDARY MINERALOGY: Chlorite, pale amphibole, serpentine

COMMENTS: Same alteration as the previous section, with the wide green veins continuing but the “cooked effect” is less marked. At 43 cm, coarse-grained gabbro with altered olivines and pyroxenes partially replaced to green amphibole.

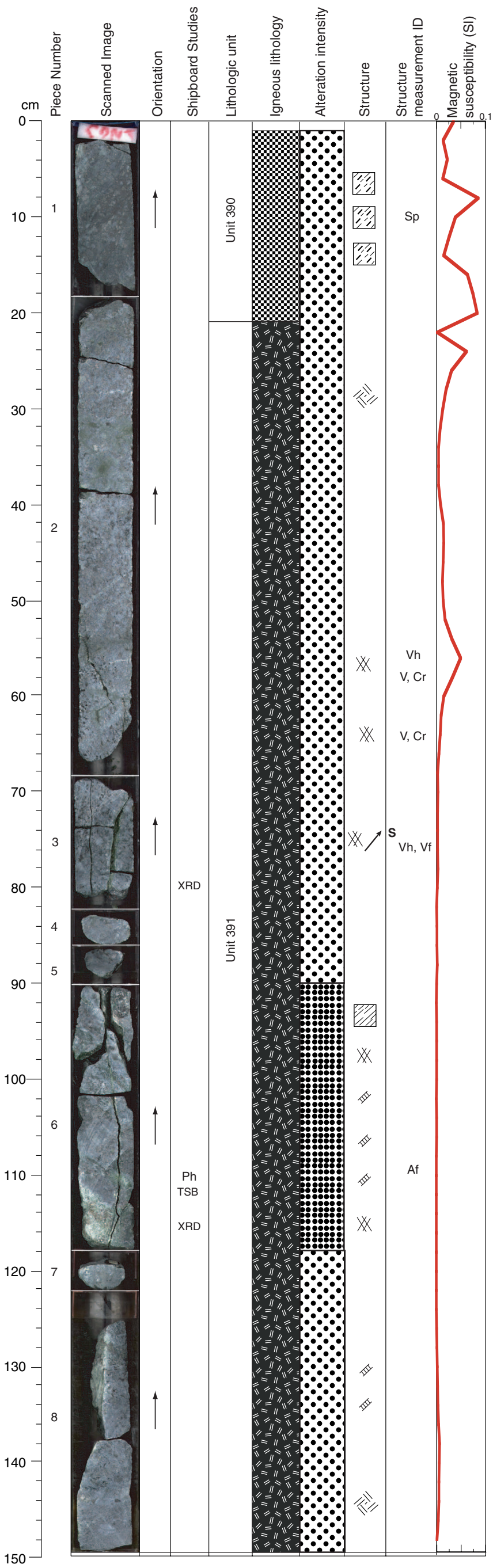
VEIN ALTERATION: Amphibole, plagioclase, chlorite, talc, quartz, carbonate.

THIN SECTIONS:
305-U1309D-140R-3, 97-100 cm (#377)

STRUCTURE: In top part a well preserved olivine gabbro but further down section affected by strong alteration similar to the greenish network in Section U1309D-140R-2. No ductile strain. Irregular dark green veins and later subveritcal open cracks talc filled (fibers at high angle to crack plane).

CLOSE-UP PHOTOGRAPHS:
305-U1309D-140R-3, 5-25 cm WET
305-U1309D-140R-3, 86-102 cm WET

Core Photo



305-U1309D-140R-4 (Section top: 692.38 mbsf)

UNIT-390: Oxide Gabbro
Pieces 1-2a

PRIMARY MINERALOGY:

Oxide	Modal 40% Size unknown Shape anhedral
Plagioclase	Modal 30% Size 10 mm average, to 20 mm Shape angular
Clinopyroxene	Modal 30% Size 10 mm average, to 20 mm Shape angular

COMMENTS: Continuation from the previous section. Oxides are strongly enriched along a shear zone at 6 to 14 cm. Their modal abundance drastically decreases in the next 8 cm, as supported by the low magnetic susceptibility.

UNIT-391: Olivine-bearing Gabbro
Pieces 2a-8

PRIMARY MINERALOGY:

Plagioclase	Modal 50-55% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 45-50% Size 5 mm average, to 10 mm Shape subhedral
Olivine	Modal 2% Size 5 mm average, to 10 mm Shape subhedral

COMMENTS: This unit consists of modally variable medium- to coarse-grained olivine-bearing gabbro. Pervasive alteration and fragmentation is observed in around 115 cm. The bottom-most interval from 141 cm onward consists of deformed microgabbro.

SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: Same alteration as the last part of the previous section, with altered olivine, amphibole replacing pyroxene and chlorite. At 70-80 cm, filled fractures. At 93 cm, alteration zone appears related to these veins. At 112 and 124 cm, leucocratic alteration zone (green amphibole, talc?).

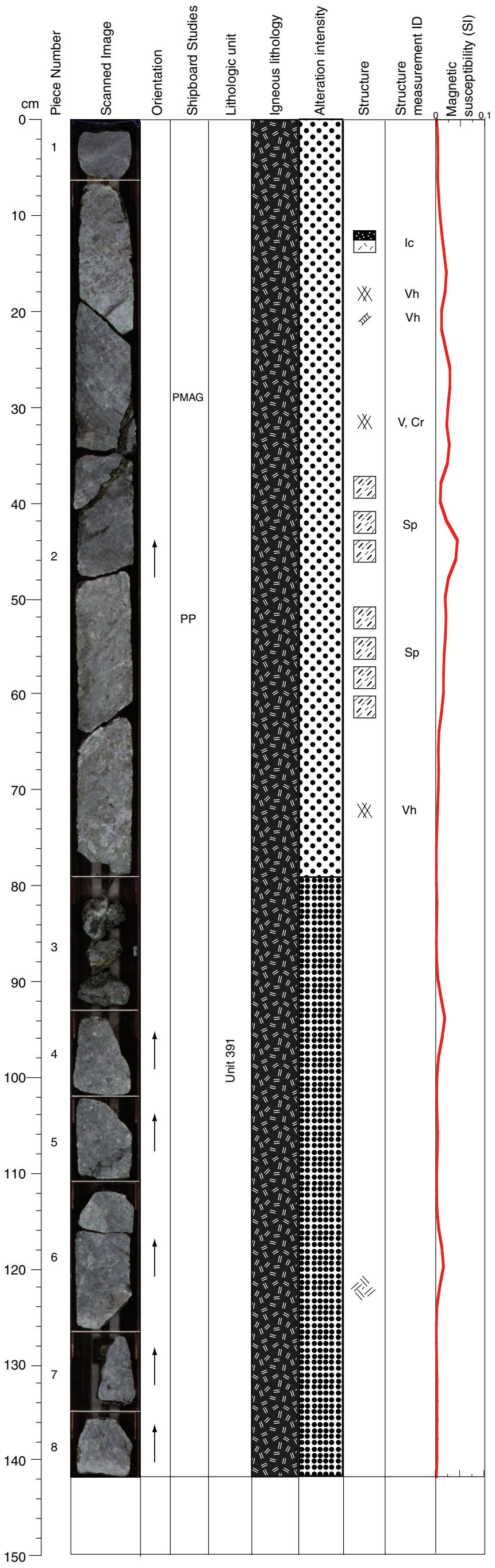
VEIN ALTERATION: Amphibole, plagioclase, chlorite, talc, quartz, carbonate.

THIN SECTIONS:
305-U1309D-140R-4, 109-112 cm (#378)

STRUCTURE: Gabbro, toward base more alteration with intervening microgabbro which has hint of a ductile fabric but too weak to measure. Local plastic strain fabric in gabbro. Medium grain gabbro with a plastic deformation zone on top, and a light/yellow green alteration zone associated with steeply dipping vein faults in lower part of section. Irregular cracks with white infill and sulfides.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-140R-4, 101-117 cm WET

Core Photo



305-U1309D-141R-1 (Section top: 693.40 mbsf)

UNIT-391: Olivine-bearing gabbro
Pieces: 1 to 8

PRIMARY MINERALOGY: Modal data from Piece 6b

Plagioclase	Modal 55-65% Size 5 mm average, to 10 mm Shape anhedral
Clinopyroxene	Modal 35-45% Size to 50 mm Shape anhedral to interstitial
Olivine	Modal 2% Size to 50 mm Shape anhedral to interstitial

COMMENTS: This unit consists of medium- to coarse-grained, to a lesser extent coarse-grained olivine-bearing gabbro, with fluctuations in both grain size and olivine mode on a decimeter scale.

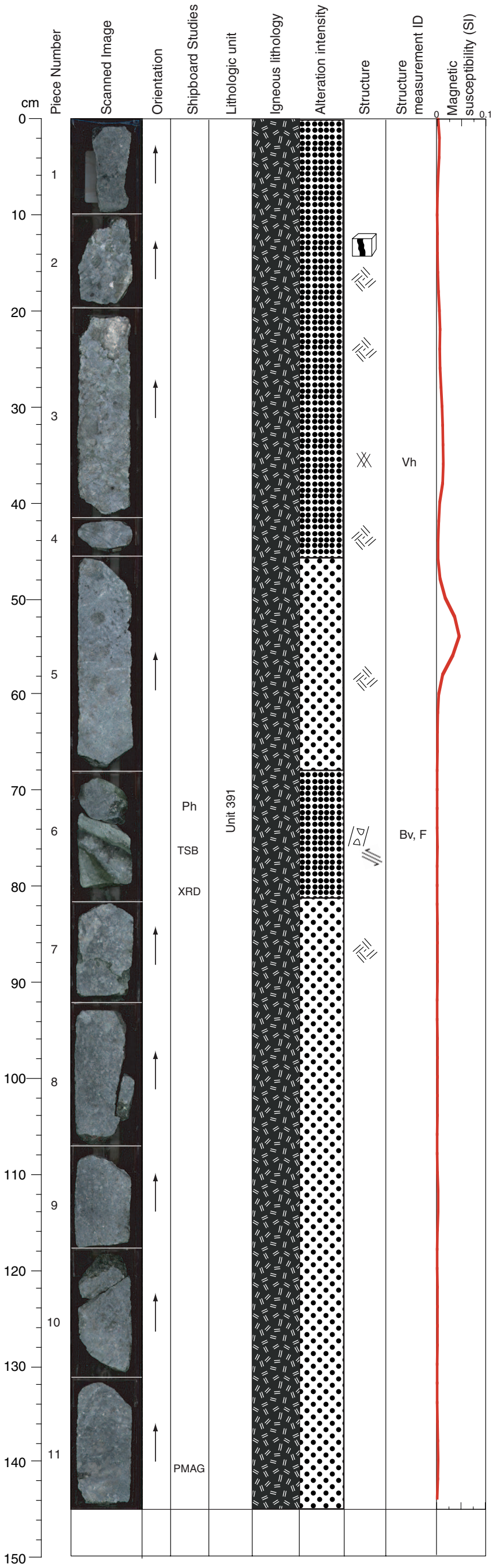
SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: Piece 2 is finer grained gabbro and has a general greenish cast. It has two veins cutting across it, one green and a crosscutting white vein. Faint white veins cut across the coarser gabbro in the rest of the section. The background alteration is similar to that which pervades the coarse gabbro in earlier sections, but in addition, this section has several veins with leucocratic alteration haloes.

VEIN ALTERATION: Amphibole, plagioclase, chlorite, sulfide.

STRUCTURE: Microgabbro in Piece 1 is continuous from the previous section and in igneous contact to gabbro which, near bottom of core, has large clinopyroxene grains. Several plastic strain intervals, moderately dipping, occur in the gabbro, no magmatic strain. Set of steeply dipping dark green veins on top of Piece 2, and another set that are pale green (talc?) at bottom of this piece. In middle portion of the section a cataclastic breccia. Irregular cataclasis and earlier dark green veins with alteration.

Core Photo



305-U1309D-141R-2 (Section top: 694.82 mbsf)

UNIT-391: Olivine-bearing gabbro
Pieces: 1 to 11

PRIMARY MINERALOGY: Modal data from U1309D-141R-001, Piece 6b

Plagioclase	Modal 55-65% Size 5 mm average, to 10 mm Shape anhedral
Clinopyroxene	Modal 35-45% Size to 50 mm Shape anhedral to interstitial
Olivine	Modal 2% Size to 50 mm Shape anhedral to interstitial

COMMENTS: These medium- to coarse-grained olivine-bearing gabbros form the continuation of the previous section. Between 50 and 57 cm, an olivine-rich patch occurs.

SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: In Piece 1 the general alteration is similar to other coarse gabbros with brown pyroxene rimmed with narrow fringes of green amphibole (actinolite?). In Piece 2 there is a reverse of this alteration trend (near leucocratic alteration) going to typically green cores showing brown alteration rims. This type of alteration persists through Piece 4. Piece 5 shows both types of alteration. Piece 6 has two networks of narrow green anastomosing veins. The green veins are associated with alteration of plagioclase to a white aggregate.

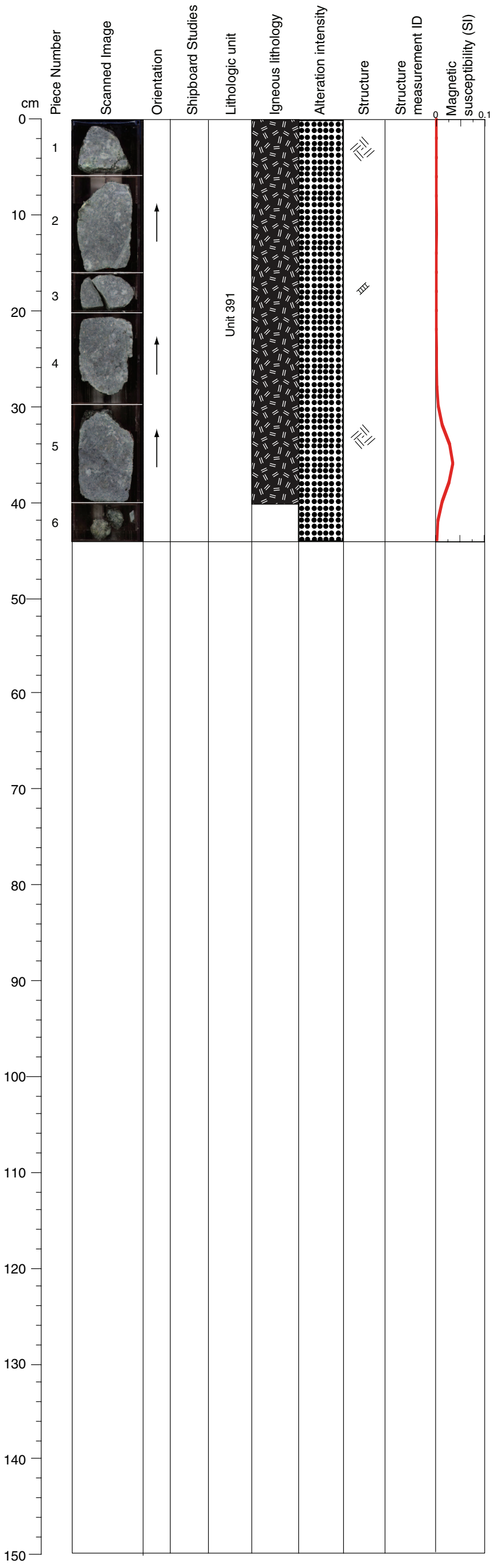
VEIN ALTERATION: Amphibole, plagioclase, chlorite, talc.

THIN SECTIONS:
305-U1309D-141R-2, 75-78 cm (#379)

STRUCTURE: Fine- to medium-grained gabbro with locally coarse pyroxene grains, no ductile strain. A 2 cm cataclastic shear zone with well-developed fault gouge (apparent reverse sense of shear) in Piece 6, which is irregular in shape, as well as in contacts. Irregular fractures, open fractures, and veins distributed slightly.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-141R-2, 69-80 cm WET
305-U1309D-141R-2, 116-130 cm WET

Core Photo



305-U1309D-141R-3 (Section top: 696.27 mbsf)

UNIT-391: Olivine-bearing gabbro
Pieces: 1 to 6

PRIMARY MINERALOGY: Modal data from Section U1309D-141R-001, Piece 6b

Plagioclase	Modal 55-65% Size 5 mm average, to 10 mm Shape anhedral
Clinopyroxene	Modal 35-45% Size to 50 mm Shape anhedral to interstitial
Olivine	Modal 2% Size to 50 mm Shape anhedral to interstitial

COMMENTS: These medium- to coarse-grained olivine-bearing gabbros form the continuation of the previous section.

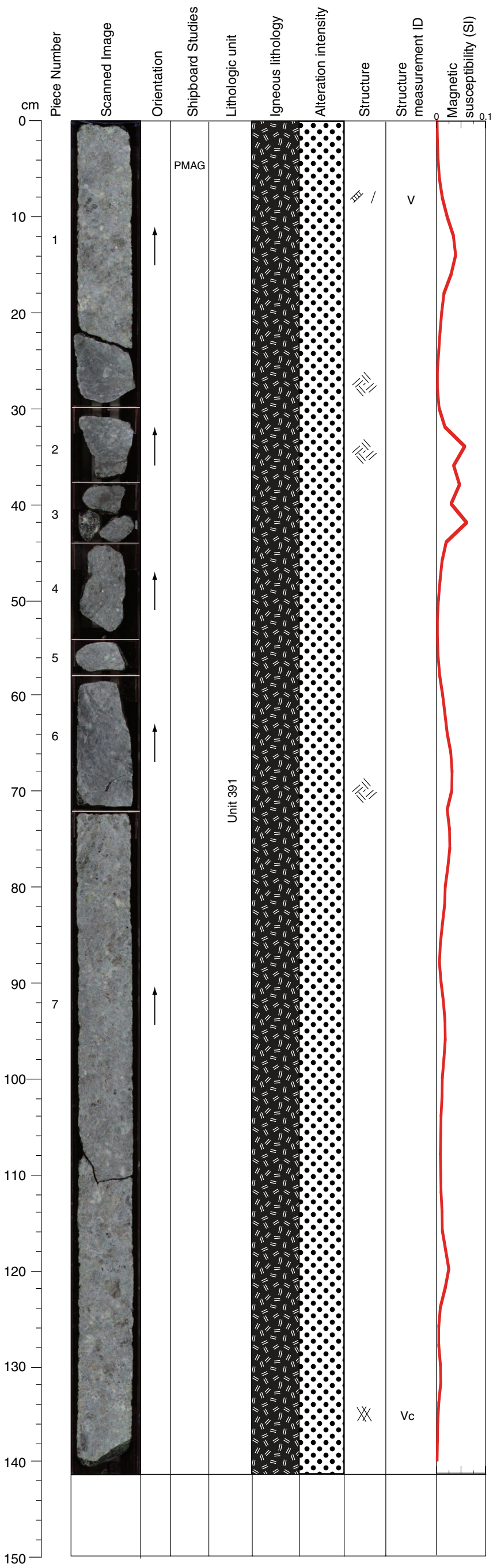
SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: General alteration is similar to that observed in earlier sections of gabbro. This section has a few small green veins, but no alteration halos. Several fractures occur in the section that are filled with drilling mud. There is a small amount of faint corona texture developed in the lower half of Piece 5.

VEIN ALTERATION: n/a

STRUCTURE: Fine to medium grained gabbro, locally coarse grains, no ductile strain. Slight fracturing and veining.

Core Photo



305-U1309D-142R-1 (Section top: 698.20 mbsf)

UNIT-391: Olivine-bearing gabbro
Pieces: 1 to 7

PRIMARY MINERALOGY: Modal data from Piece 6b

Plagioclase	Modal 50-60% Size 5 mm average, to 30 mm Shape anhedral
Clinopyroxene	Modal 40-50% Size to 30 mm Shape anhedral to interstitial
Olivine	Modal 3% Size to 50 mm Shape anhedral to interstitial

COMMENTS: These dominantly medium-grained olivine-bearing gabbros form the continuation of the previous core. Between 34 and 44 cm, an oxide-rich patch occurs.

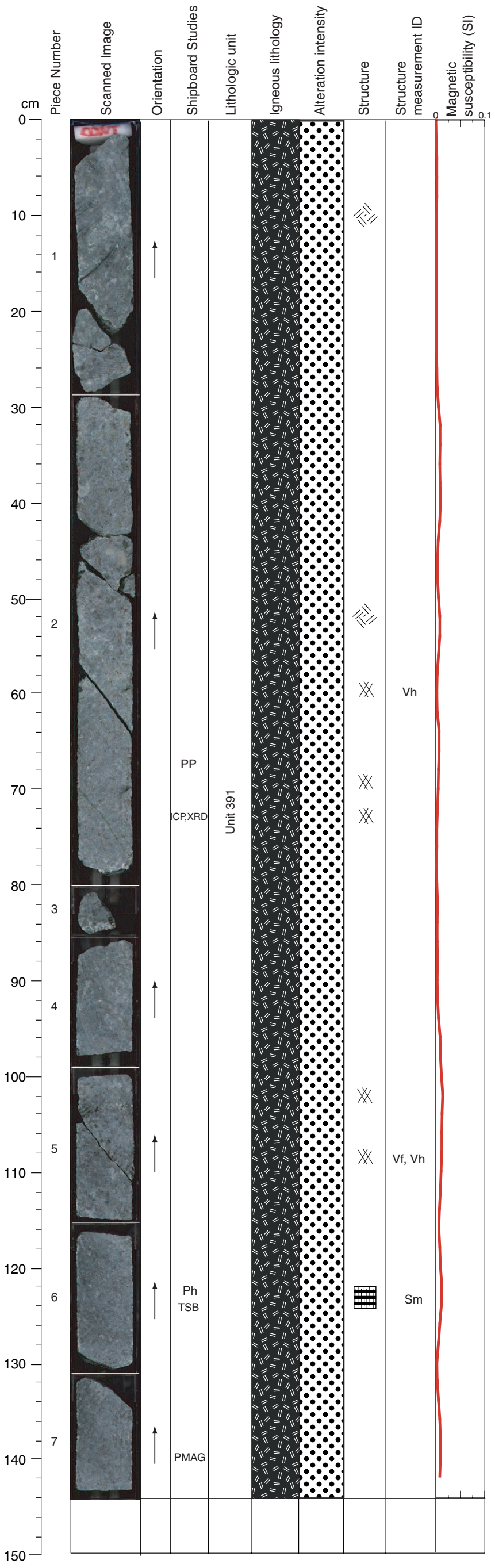
SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: Both pale-green coronas and coronas around olivine are observed at the end of the section. The pyroxene are partially altered to amphibole.

VEIN ALTERATION: Amphibole, plagioclase, chlorite, talc.

STRUCTURE: Fine- to medium-grained gabbro, locally coarse grains, hint of magmatic fabric at 66 cm, but not strong enough to measure. No plastic strain. Late cracking, distributed cataclasis, and limited veining.

Core Photo



305-U1309D-142R-2 (Section top: 699.61 mbsf)

UNIT-391: Olivine-bearing gabbro
Pieces: 1 to 7

PRIMARY MINERALOGY: Modal data from U1309D-142R-01, Piece 6b

Plagioclase	Modal 50-60% Size 5 mm average, to 30 mm Shape anhedral
Clinopyroxene	Modal 40-50% Size to 30 mm Shape anhedral to interstitial
Olivine	Modal 3% Size to 50 mm Shape anhedral to interstitial

COMMENTS: These dominantly medium-grained olivine-bearing gabbros form the continuation of the previous section.

SECONDARY MINERALOGY: Chlorite, pale amphibole, talc

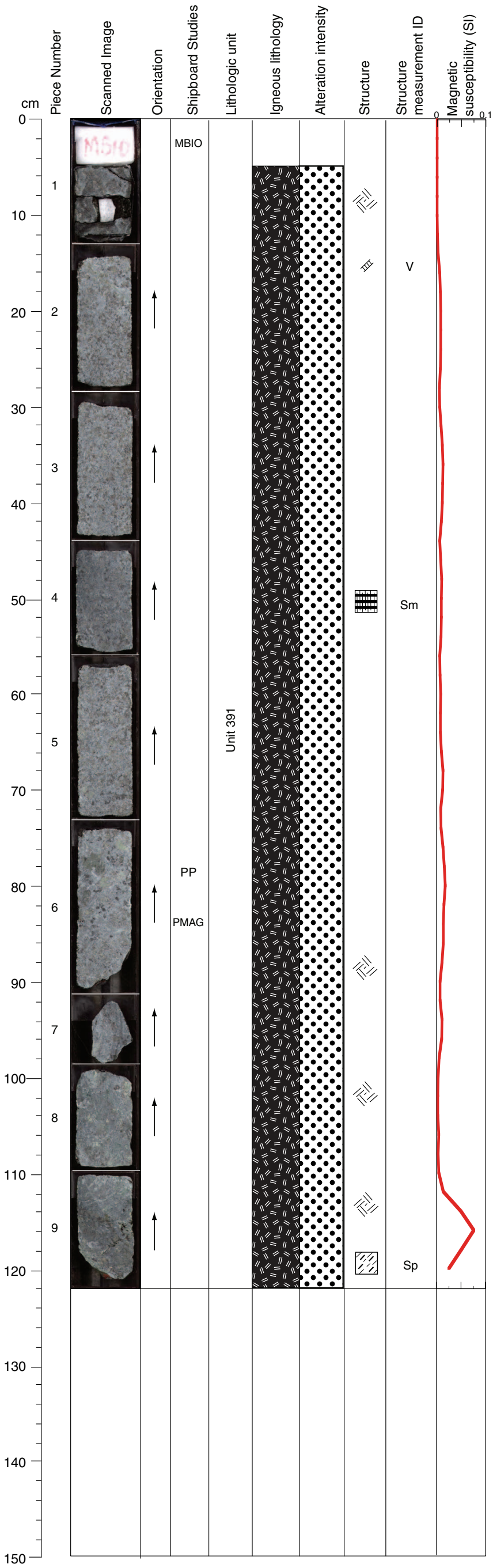
COMMENTS: Continuation of the alteration of the previous section. Both pale green coronas (relatively altered to talc) and coronas around olivine are observed at the top of the section. The pyroxene grains are partially altered to amphibole.

VEIN ALTERATION: Amphibole, chlorite, talc, carbonate, sulfide.

THIN SECTIONS:
305-U1309D-142R-2, 123-125 cm (#380)

STRUCTURE: Fine- to medium-grained gabbro, locally coarse grains, in lower part develop weakly, steeply dipping, magmatic strain. Set of moderately-dipping dark green veins.

Core Photo



305-U1309D-142R-3 (Section top: 701.05 mbsf)

UNIT-391: Olivine-bearing gabbro
Pieces: 1 to 9

PRIMARY MINERALOGY: Modal data from I1309D-142R-001, Piece 6b

Plagioclase	Modal 50-60% Size 5 mm average, to 30 mm Shape anhedral
Clinopyroxene	Modal 40-50% Size to 30 mm Shape anhedral to interstitial
Olivine	Modal 3% Size to 50 mm Shape anhedral to interstitial

COMMENTS: These dominantly medium-grained olivine-bearing gabbros form the continuation of the previous section.

SECONDARY MINERALOGY: Chlorite, pale amphibole

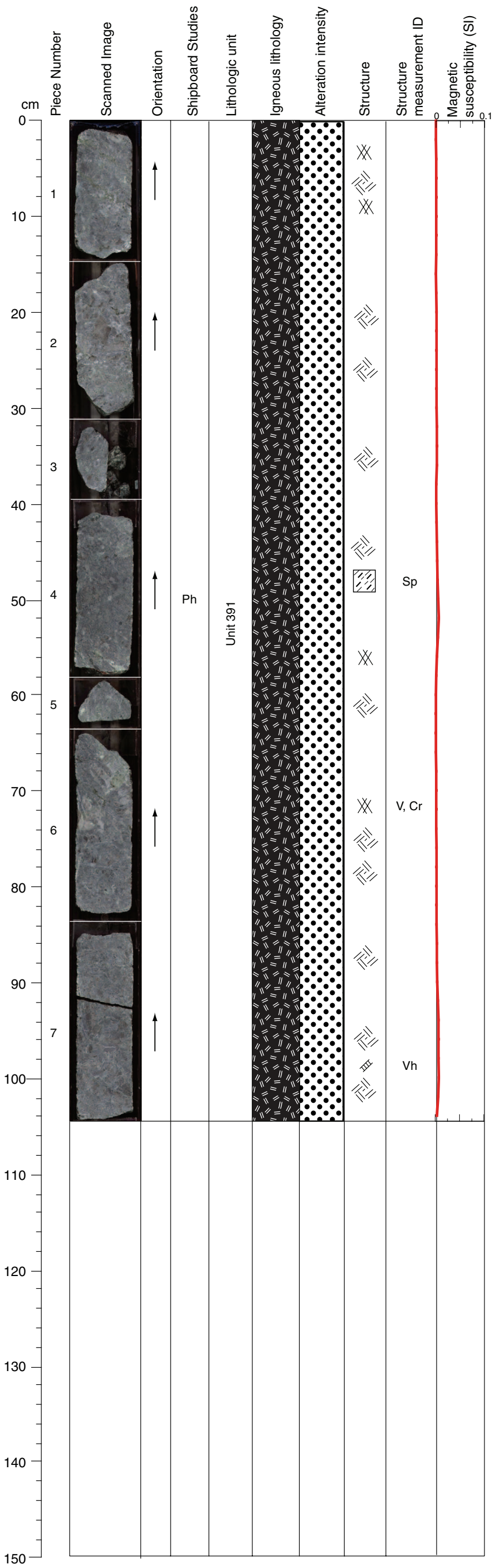
COMMENTS: Both pale green coronas and coronas around olivine are observed around 75 cm. The pyroxene grains are partially altered to amphibole.

VEIN ALTERATION: Amphibole, chlorite, talc.

THIN SECTIONS:

STRUCTURE: Fine to medium grained gabbro, locally coarse grains, weak magmatic fabric with moderate dip in upper half, at bottom plastic strain has developed. Early dark green veins and alteration zones, maybe in network. Irregular crack network with carbonate and sulfide.

Core Photo



305-U1309D-143R-1 (Section top: 703.00 mbsf)

UNIT-391: Olivine-bearing gabbro
Pieces: 1 to 7

PRIMARY MINERALOGY: Modal data from Piece 6a

Plagioclase	Modal 50-60% Size 5 mm average, to 20 mm Shape anhedral
Clinopyroxene	Modal 40-50% Size to 30 mm Shape anhedral to interstitial
Olivine	Modal 3% Size to 50 mm Shape anhedral to interstitial

COMMENTS: These medium- to coarse-grained olivine-bearing gabbros form the continuation of the previous core.

SECONDARY MINERALOGY: Chlorite, pale amphibole

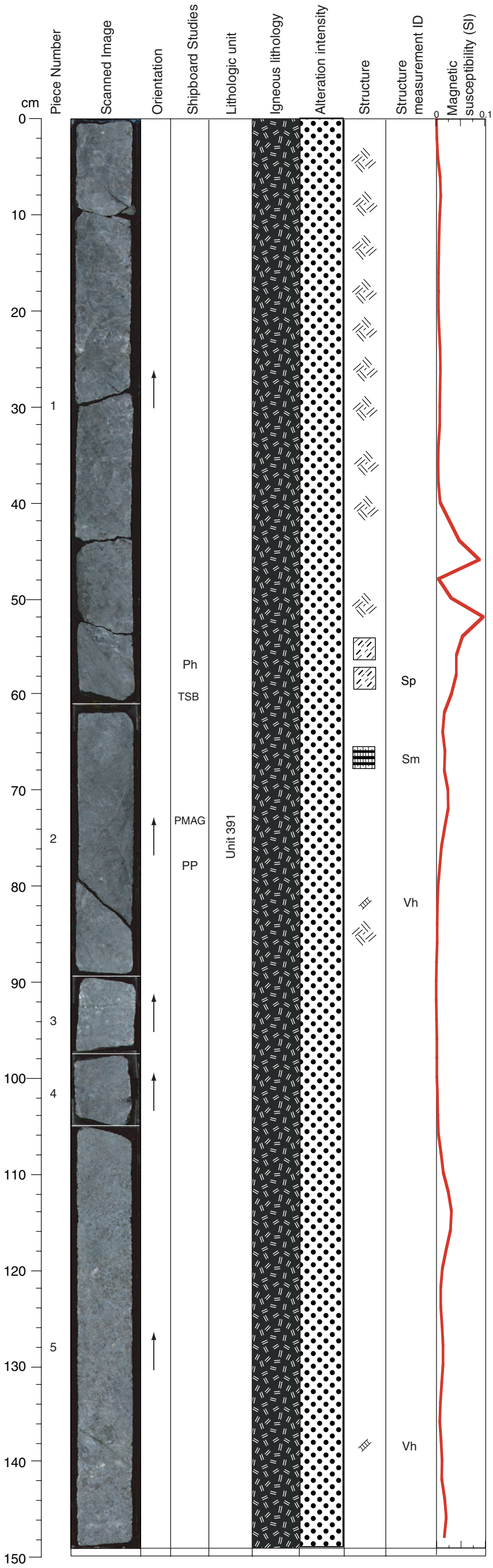
COMMENTS: The background alteration is similar to previous sections of olivine gabbro. A network of fractures and green and white veins crosscut the section. Some veins have narrow halos of white, altered plagioclase.

VEIN ALTERATION: Amphibole, chlorite, talc.

STRUCTURE: Gabbro, medium- to coarse-grained, no magmatic strain, but local plastic strain in shear zones. Open cracks and cataclasis.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-143R-1, 40-57 cm WET
305-U1309D-143R-1, 40-57 cm DRY

Core Photo



305-U1309D-143R-2 (Section top: 704.04 mbsf)

UNIT-391: Olivine-bearing gabbro
Pieces: 1 to 5

COMMENTS: These dominantly medium-grained olivine-bearing gabbros form the continuation of the previous section. Between 46 and 58 cm, an oxide-bearing shear zone occurs. A 3 mm wide vein of possible magmatic origin crosscuts at 139 cm.

PRIMARY MINERALOGY: Modal data from Section U1309D-143R001, Piece 6a

Plagioclase	Modal 50-60% Size 5 mm average, to 20 mm Shape anhedral
Clinopyroxene	Modal 40-50% Size to 30 mm Shape anhedral to interstitial
Olivine	Modal 3% Size to 50 mm Shape anhedral to interstitial

SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: Similar to the previous section, but higher density of fractures (white alteration fringes in contact with fracture faces).

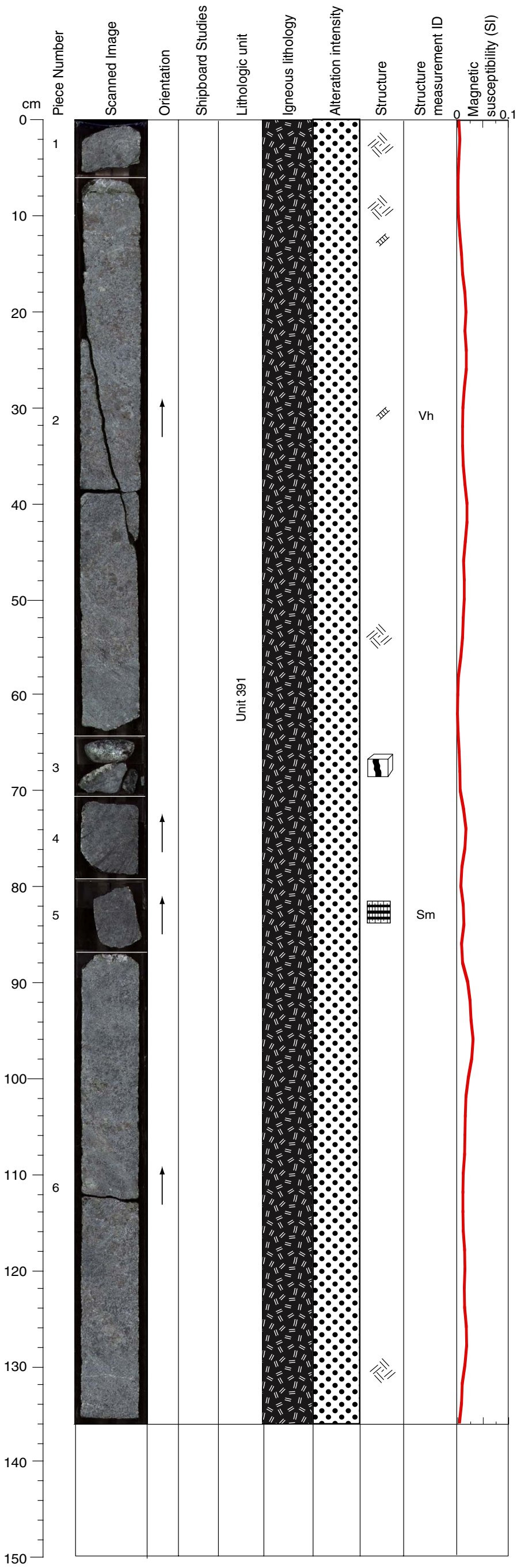
VEIN ALTERATION: Serpentine, amphibole, chlorite, talc.

THIN SECTIONS:
305-U1309D-143R-2, 58-61 cm (#381)

STRUCTURE: Coarse-grained gabbro in sheared contact to medium/fine grained gabbro, weak magmatic strain in Pieces 2 to 5, clearly marked plastic strain shear zones with steeply dipping planes, one with apparent normal sense movement. Some green veins and minor microfracturing.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-143R-2, 53-60 cm WET

Core Photo



305-U1309D-143R-3 (Section top: 705.54 mbsf)

UNIT-391: Olivine-bearing gabbro
Pieces: 1 to 6

PRIMARY MINERALOGY: Modal data from Section U1309D-143R-001, Piece 6a

Plagioclase	Modal 50-60% Size 5 mm average, to 20 mm Shape anhedral
Clinopyroxene	Modal 40-50% Size to 30 mm Shape anhedral to interstitial
Olivine	Modal 3% Size to 50 mm Shape anhedral to interstitial

COMMENTS: These dominantly medium-grained olivine-bearing gabbros form the continuation of the previous section.

SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: Same as previous section.

VEIN ALTERATION: Chlorite, talc, carbonate.

STRUCTURE: Medium-grained gabbro, local magmatic strain. Minor fractures and veins.