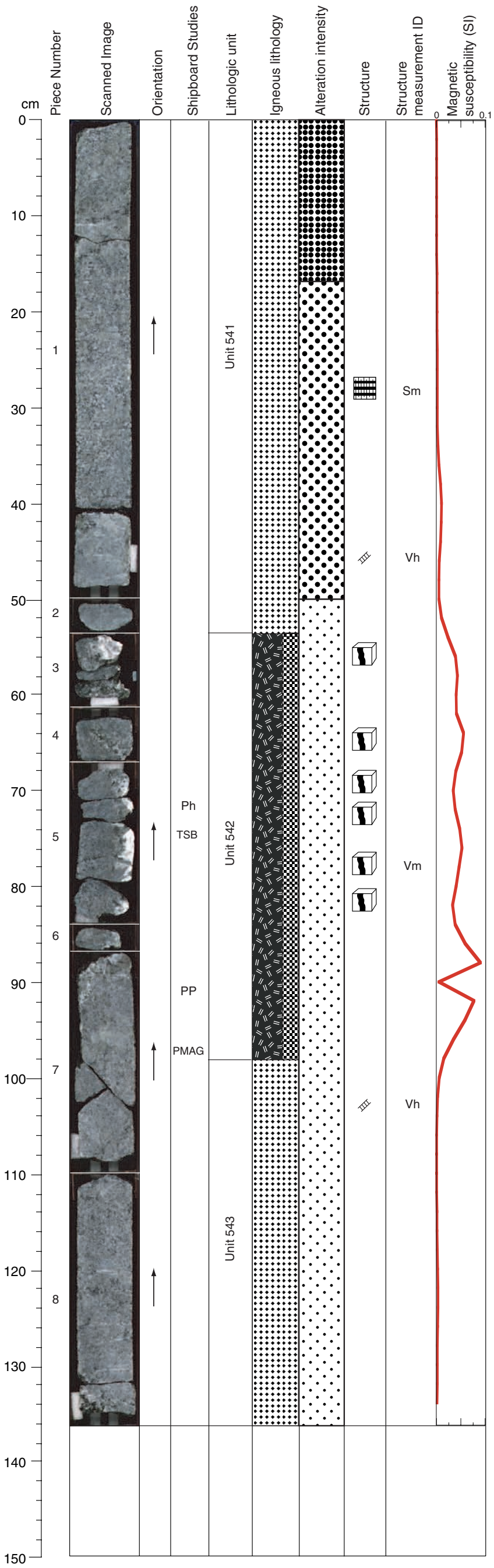
Core Photo



305-U1309D-216R-1 (Section top: 1039.20 mbsf)

UNIT-541: Olivine Gabbro
Pieces: 1-2

PRIMARY MINERALOGY: Modal data from Piece 1b

Olivine	Modal 25% Size 3 mm average Shape anhedral
Plagioclase	Modal 35% Size 3 mm average Shape subhedral to anhedral
Clinopyroxene	Modal 40% Size 3 mm average Shape anhedral

COMMENTS: Continuation of Unit 541 medium-grained olivine gabbro.

UNIT-542: Olivine-bearing Gabbro
Pieces: 3-7a

PRIMARY MINERALOGY: Modal data from Piece 5

Olivine	Modal 3% Size 1 mm average Shape anhedral to interstitial
Plagioclase	Modal 50% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 47% Size 3 mm average Shape anhedral

COMMENTS: Unit 542 is medium-grained olivine-bearing gabbro. Leucocratic (felsic) vein along margin of gabbro. Massive oxide appears along the boundary of the felsic vein and gabbro, and at 93 cm in gabbro. The felsic vein contains euhedral amphibole. Mineral mode is for gabbro.

UNIT-543: Olivine Gabbro; oxide gabbro
Pieces: 7a-8

PRIMARY MINERALOGY: Modal data from Piece 8a

Olivine	Modal 10% Size 3 mm average Shape anhedral to interstitial
Plagioclase	Modal 40% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 50% Size 3 mm average Shape anhedral

COMMENTS: Unit 543 is medium-grained olivine gabbro. Coarse clinopyroxene at 80-86 cm.

SECONDARY MINERALOGY: Chlorite, pale amphibole, epidote

COMMENTS: Piece 1 (1 to 40 cm) is a fine-grained gabbro with serpentinized olivine. From 40 cm, coarse-grained gabbro with alteration of pyroxenes to green amphibole. Pieces 3-6, leucocratic alteration with plagioclase, sphene, green amphibole (likely replacing the previous mineralogy). From 88 to 92 cm, leucocratic vein.

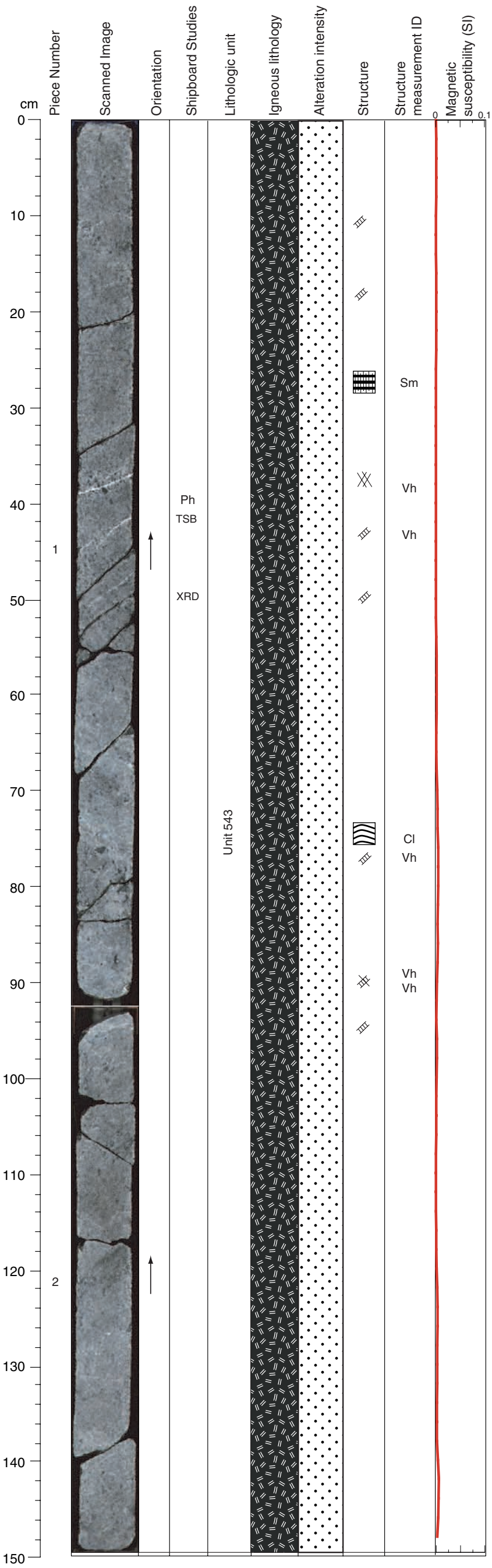
VEIN ALTERATION: Amphibole, zeolite

THIN SECTIONS:
305-U1309D-216R-1, 73-76 cm (#543)

STRUCTURE: Fine- to medium-grained olivine gabbro with a weak magmatic foliation (Sm) as well as weak, distributed serpentine foliation at the top of the section and showing a steeply dipping leucocratic intrusion (Vm). Later subhorizontal white veins (Vh).

CLOSE-UP PHOTOGRAPHS:
305-U1309D-216R-1, 53-83 cm WET

Core Photo



305-U1309D-216R-2 (Section top: 1040.56 mbsf)

UNIT-543: Olivine-bearing Gabbro
Pieces: 1-2

PRIMARY MINERALOGY: Modal data from Piece 2d

Olivine	Modal 5% Size 3 mm average Shape anhedral to interstitial
Plagioclase	Modal 40% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 55% Size 3 mm average Shape anhedral

COMMENTS: Unit 543 is medium-grained olivine-bearing gabbro.

SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: Fine-grained gabbro with serpentinzed olivines. Small amount of sulfides. At 37, 41, 47, and 63 cm, white veins (calcite, zeolites??) with alteration halos around them, 1 cm wide with dark minerals (amphibole?). From 60 to 94 cm, very thin pale green amphibole veins with alteration around (rimmed pyroxenes by green amphibole).

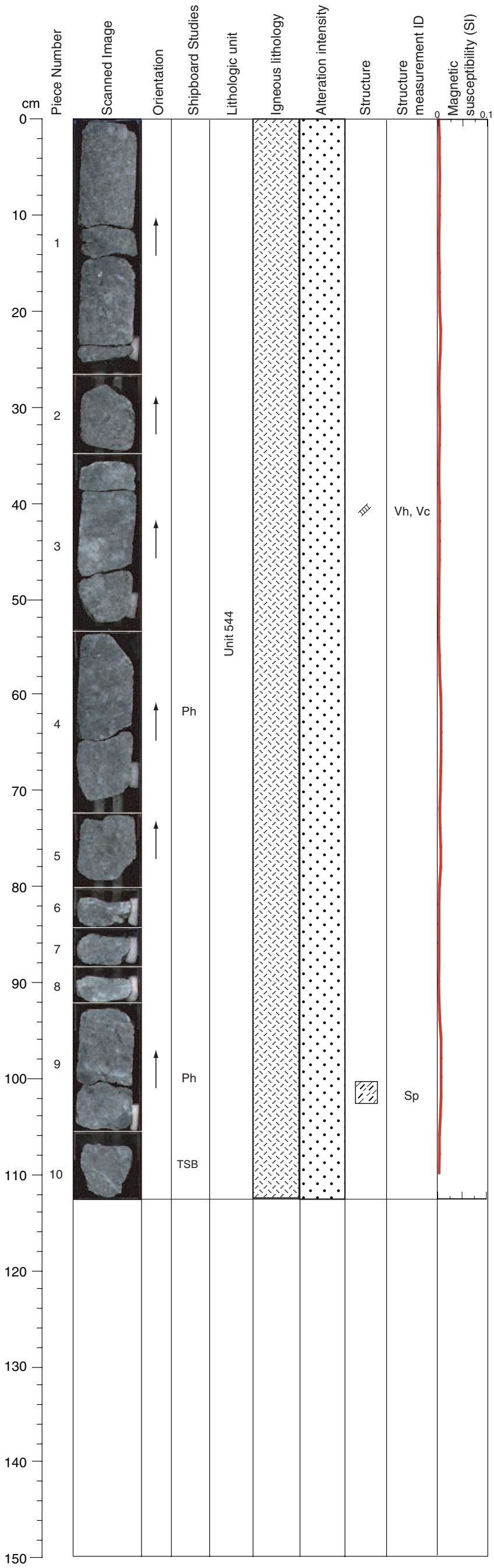
VEIN ALTERATION: Amphibole, chlorite, quartz, carbonate, zeolite

THIN SECTIONS:
305-U1309D-216R-2, 40-43 cm (#543)

STRUCTURE: Fine-grained olivine gabbro showing magmatic foliation and banding. Set of early dark green veins and later, shallowly dipping, irregular subhorizontal white vein.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-216R-2, 29-59 cm WET

Core Photo



305-U1309D-216R-3 (Section top: 1042.06 mbsf)

UNIT-544: Gabbro
Pieces: 1-10

PRIMARY MINERALOGY: Modal data from Piece 5

Plagioclase	Modal 50% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 50% Size 4 mm average Shape anhedral

COMMENTS: Unit 544 is medium-grained gabbro.

SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: Coarse-grained with several thin white veinlets (talc, carbonate) and thin pale green veins at 40 and 111 cm, with alteration of the pyroxenes to green amphibole. Few sulfides.

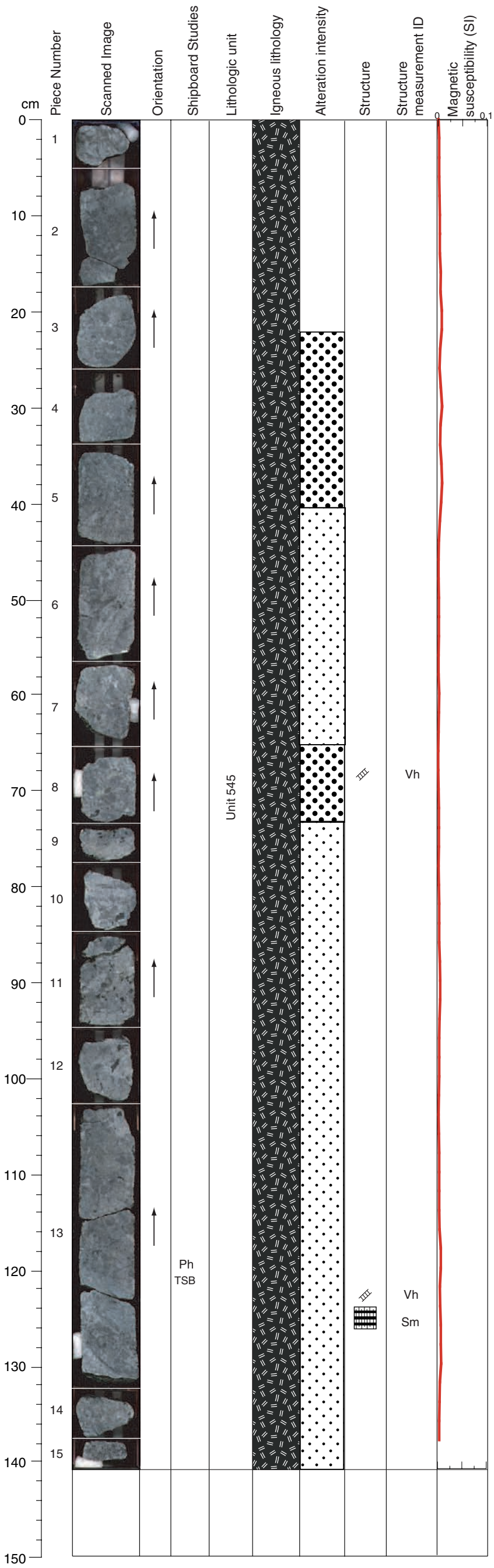
VEIN ALTERATION: Amphibole, chlorite, carbonate

THIN SECTIONS:
305-U1309D-216R-3, 108-111 cm (#545)

STRUCTURE: Coarse grained isotropic gabbro. Set of dark green veins.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-216R-3, 93-112 cm WET
305-U1309D-216R-3, 93-112 cm DRY

Core Photo



305-U1309D-217R-1 (Section top: 1044.00 mbsf)

UNIT-545: Olivine-bearing Gabbro
Pieces: 1-15

PRIMARY MINERALOGY: Modal data from Piece 13a

Olivine	Modal 3% Size 1-10 mm Shape anhedral
Plagioclase	Modal 57% Size 2-10 mm Shape anhedral
Clinopyroxene	Modal 40% Size 3-30 mm Shape anhedral

COMMENTS: Unit 545 is medium- to coarse-grained olivine-bearing gabbro.

SECONDARY MINERALOGY: chlorite, pale amphibole, talc

COMMENTS: Coarse-grained gabbro with thin white veinlets (talc?). Piece 4 shows pale green coronas with chlorite rims related to numerous green veins cutting the piece. Few sulfides. From Piece 3 to 15, serpentinized olivines sometimes have rims around them. At 118-124 cm, finer-grained part with pale green coronas related to amphibole veins.

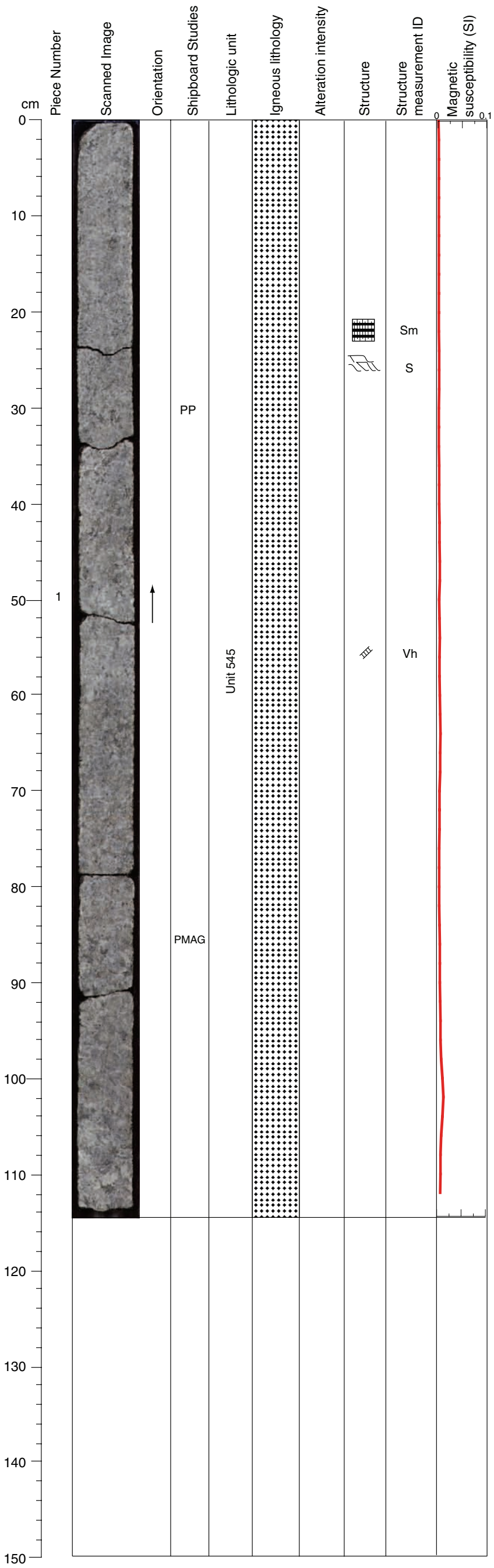
VEIN ALTERATION: Amphibole, chlorite, carbonate

THIN SECTIONS:
305-U1309D-217R-1, 120-122 cm (#546)

STRUCTURE: Coarse gabbro with small fine grained interval showing a magmatic fabric. Set of early dark green veins with wide alteration zone and later pale green irregular veins.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-217R-1, 114-132 cm WET

Core Photo



305-U1309D-217R-2 (Section top: 1045.41 mbsf)

UNIT-545: Olivine Gabbro
Pieces: 1

PRIMARY MINERALOGY: Modal data from Piece 1d

Olivine	Modal 10% Size 1-5 mm Shape anhedral
Plagioclase	Modal 50% Size 1-10 mm Shape anhedral
Clinopyroxene	Modal 40% Size 2-25 mm Shape anhedral

COMMENTS: Unit 545 is medium- to coarse-grained olivine gabbro. Pegmatitic clinopyroxene at 58-59 cm and 96-100 cm.

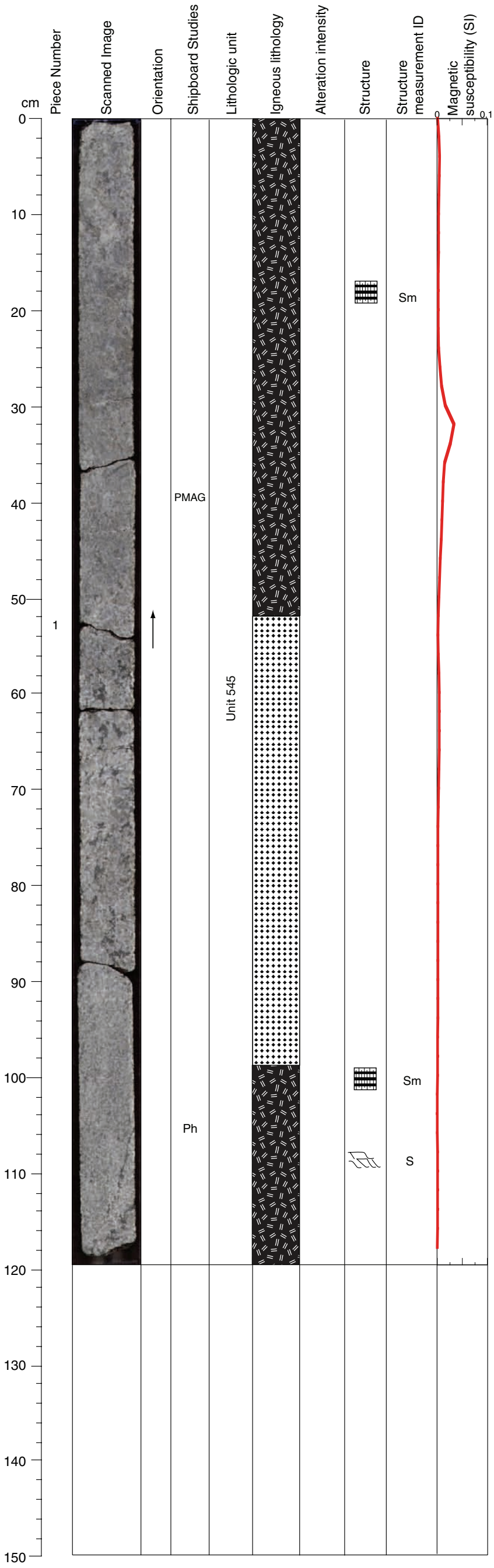
SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: Medium- to fine-grained gabbro with serpentinzed olivine. Significant amount of sulfides.

VEIN ALTERATION: Amphibole, chlorite

STRUCTURE: Medium- to coarse-grained gabbro exhibiting a weak magmatic foliation at the top of the section. A faint dark green vein with alteration halo and locally steep serpentine foliation (S).

Core Photo



305-U1309D-217R-3 (Section top: 1046.56 mbsf)

UNIT-545: Olivine-bearing Gabbro
Pieces: 1a, 1b, and 1e

PRIMARY MINERALOGY: Modal data from Piece 1a

Olivine	Modal 5% Size 2 mm Shape anhedral
Plagioclase	Modal 40% Size 2 mm Shape anhedral
Clinopyroxene	Modal 55% Size 3 mm Shape anhedral

UNIT-545: Olivine Gabbro
Pieces: 1b-1e

PRIMARY MINERALOGY: Modal data from Piece 1c

Olivine	Modal 20% Size 5 mm Shape anhedral
Plagioclase	Modal 60% Size 5 mm Shape anhedral
Clinopyroxene	Modal 20% Size 5 mm Shape anhedral

COMMENTS: Unit 545 is medium- to coarse-grained olivine-bearing and olivine gabbro.

SECONDARY MINERALOGY: serpentine

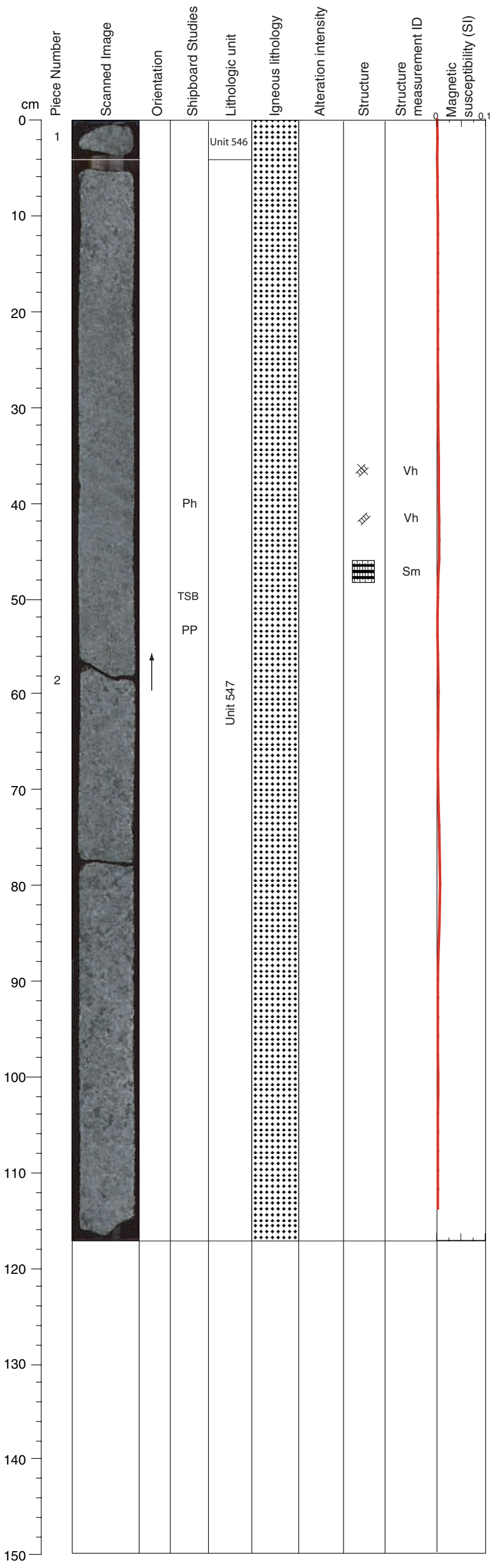
COMMENTS: Coarse-grained gabbro with serpentinized olivine. Higher olivine content between 51 and 87 cm. At 90 cm, finer-grained part cut by serpentine veins (106-116 cm).

VEIN ALTERATION: Serpentine

STRUCTURE: Olivine bearing gabbro showing a weak magmatic fabric (Sm) in the fine-grained sections and no fabric in the medium-grained sections. Slight serpentinization, that is locally aligned forming isolated 'serpentine' veins (S).

CLOSE-UP PHOTOGRAPHS:
305-U1309D-217R-3, 90-120 cm WET

Core Photo



305-U1309D-218R-1 (Section top: 1048.8 mbsf)

UNIT-546: Rubble
Piece 1

COMMENTS: Unit 546 is rubble.

UNIT-547: Olivine Gabbro
Pieces: 2

PRIMARY MINERALOGY: Modal data from Piece 2a

Olivine	Modal 10-25% Size 1 mm average Shape anhedral
Plagioclase	Modal 45-60% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 25-35% Size 3 mm average Shape anhedral

COMMENTS: Unit 547 is medium-grained olivine gabbro. Homogeneous grain size throughout this section.

SECONDARY MINERALOGY: chlorite, pale amphibole

COMMENTS: Fine- to coarse-grained gabbro with serpentinized olivine. From 34 to 42 cm and at 60 cm, amphibole veins with alteration haloes (0.5 cm wide).

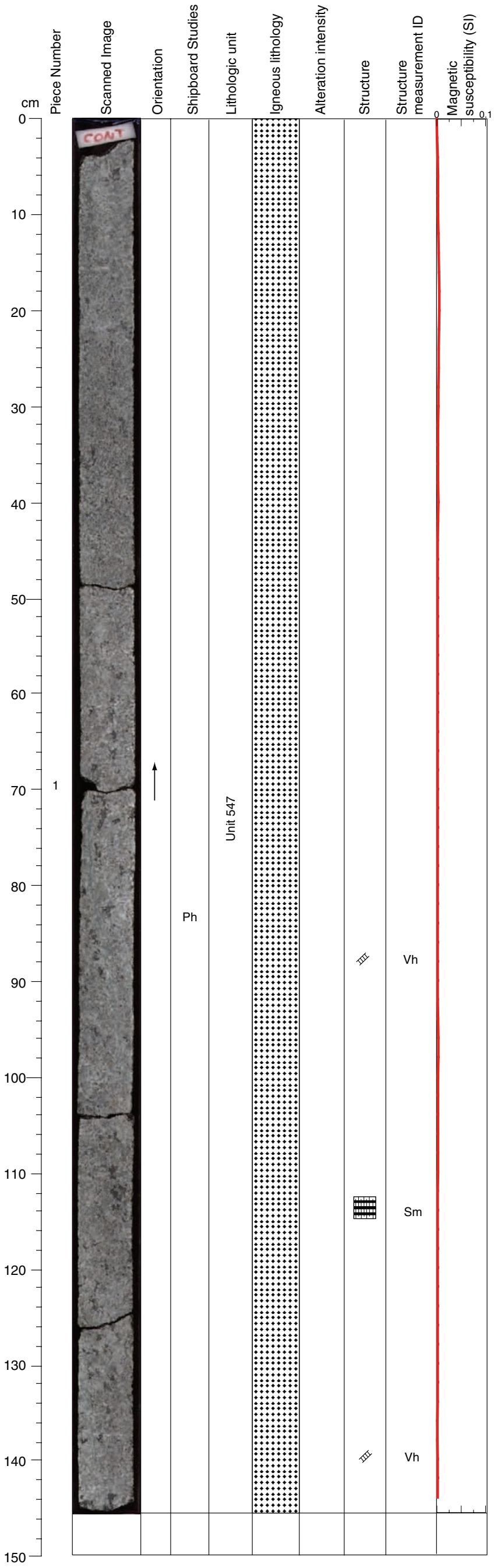
VEIN ALTERATION: Amphibole, chlorite

THIN SECTIONS:
305-U1309D-218R-1, 48-50 cm (#547)

STRUCTURE: Dominantly fine-grained gabbro with clearly visible magmatic fabric throughout. A set of moderately dipping veins, spaced ~4 to 5 cm in the upper part of the section.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-218R-1, 30-50 cm WET

Core Photo



305-U1309D-218R-2 (Section top: 1049.97 mbsf)

UNIT-547: Olivine Gabbro
Pieces: 1

PRIMARY MINERALOGY: Modal data from Piece 1a

Olivine	Modal 20% Size 2 mm average Shape anhedral
Plagioclase	Modal 45% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 35% Size 3 mm average Shape anhedral

COMMENTS: Unit 547 is medium-grained olivine gabbro.

SECONDARY MINERALOGY: chlorite, pale amphibole

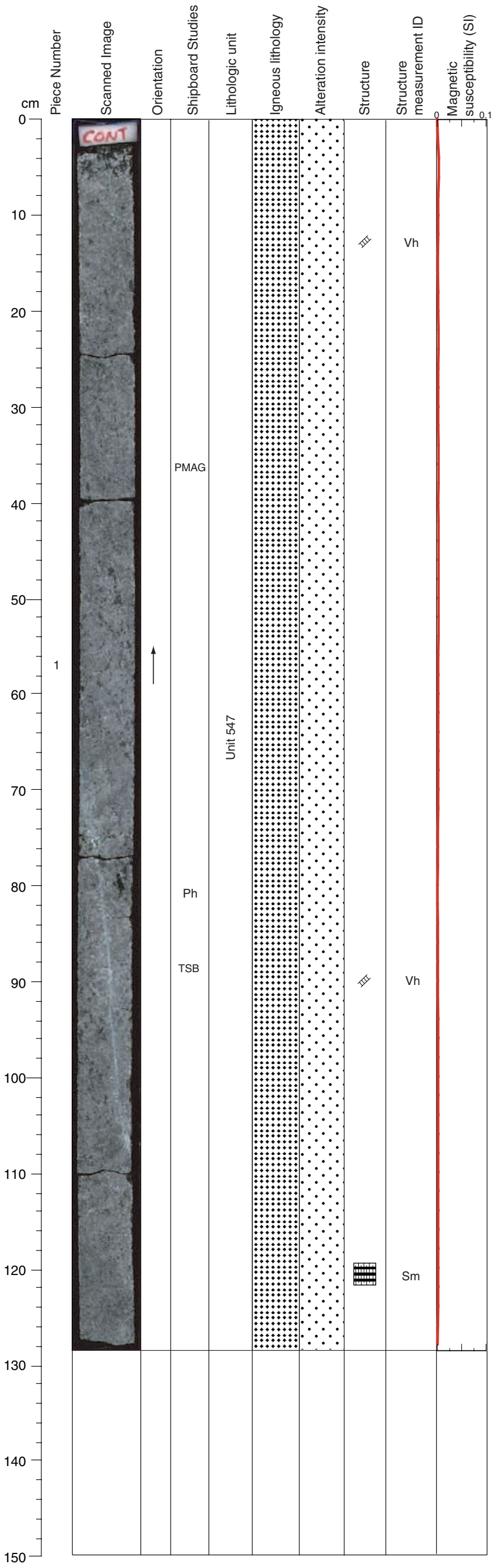
COMMENTS: Continuation of the previous section. Fine-grained gabbro with serpentinized olivine. From 70 to 102 cm, and from 128 to 144 cm, dark green amphibole veins with alteration halo and replacement of the previous minerals to green amphibole.

VEIN ALTERATION: Serpentine, amphibole, chlorite

STRUCTURE: Medium-grained gabbro with faint magmatic fabric developed. Wisps of serpentine (no clear foliation) and a set of steep dark green veins, and later subhorizontal, irregular white veins.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-218R-2, 70-100 cm WET

Core Photo



305-U1309D-218R-3 (Section top: 1051.43 mbsf)

UNIT-547: Olivine Gabbro
Pieces: 1

PRIMARY MINERALOGY: Modal data from Piece 1a

Olivine	Modal 20% Size 2 mm average Shape anhedral
Plagioclase	Modal 45% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 35% Size 3 mm average Shape anhedral

COMMENTS: Unit 547 is medium-grained olivine gabbro. Finer grained at 115-128 cm.

SECONDARY MINERALOGY: Talc, chlorite, pale amphibole

COMMENTS: Continuation of the previous section. Fine-grained gabbro with serpentinized olivine. Pale green and white vein from 1 to 21 cm with tiny alteration halo. From 60 to 108 cm, white and green vein (amphibole + zeolite + prehnite??) with alteration haloes. Alteration and replacement of pyroxene to green amphibole.

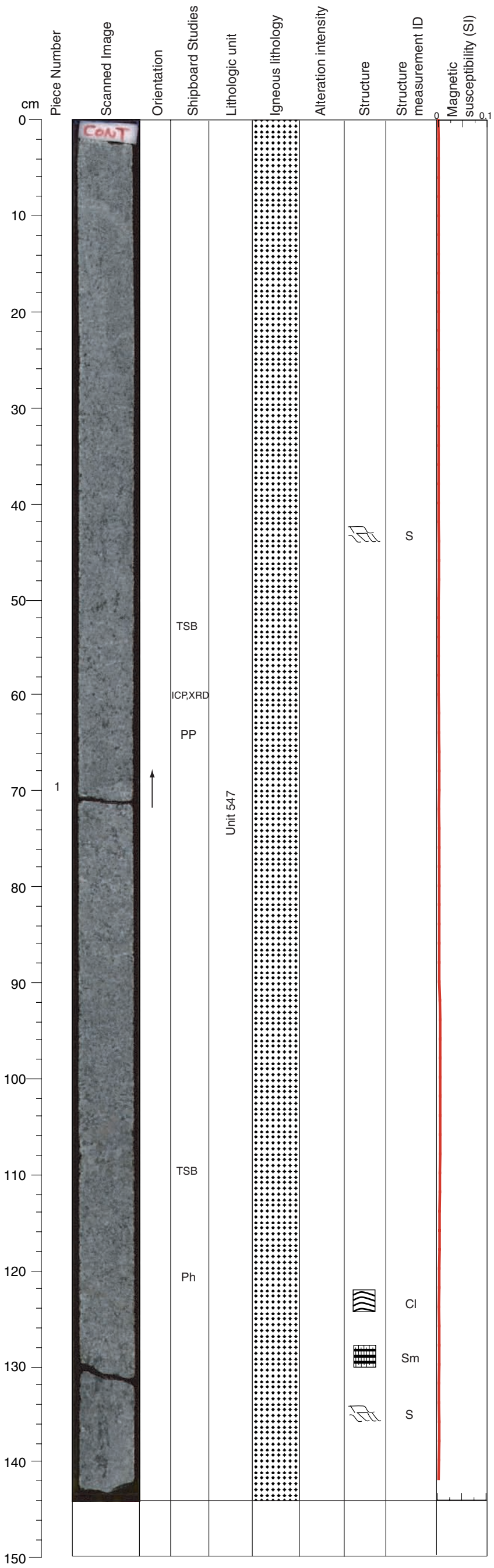
VEIN ALTERATION: Amphibole, zeolite

THIN SECTIONS:
305-U1309D-218R-3, 87-89 cm (#548)

STRUCTURE: Medium-grained gabbro with faint magmatic fabric developed. Irregular serpentinization that shows no clear foliation (dark wisps). Steep, irregular white-pale green veins.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-218R-3, 66-96 cm WET

Core Photo



305-U1309D-218R-4 (Section top: 1052.72 mbsf)

UNIT-547: Olivine Gabbro
Pieces: 1

PRIMARY MINERALOGY: Modal data from Piece 1b

Olivine	Modal 25% Size 2 mm average Shape anhedral
Plagioclase	Modal 50% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 25% Size 1 mm average Shape anhedral

COMMENTS: Unit 547 is medium-grained olivine gabbro. Coarse-pegmatitic clinopyroxene band at 106-111 cm.

SECONDARY MINERALOGY: chlorite, pale amphibole

COMMENTS: Continuation of the previous section. Fine-grained gabbro with serpentinized olivine.

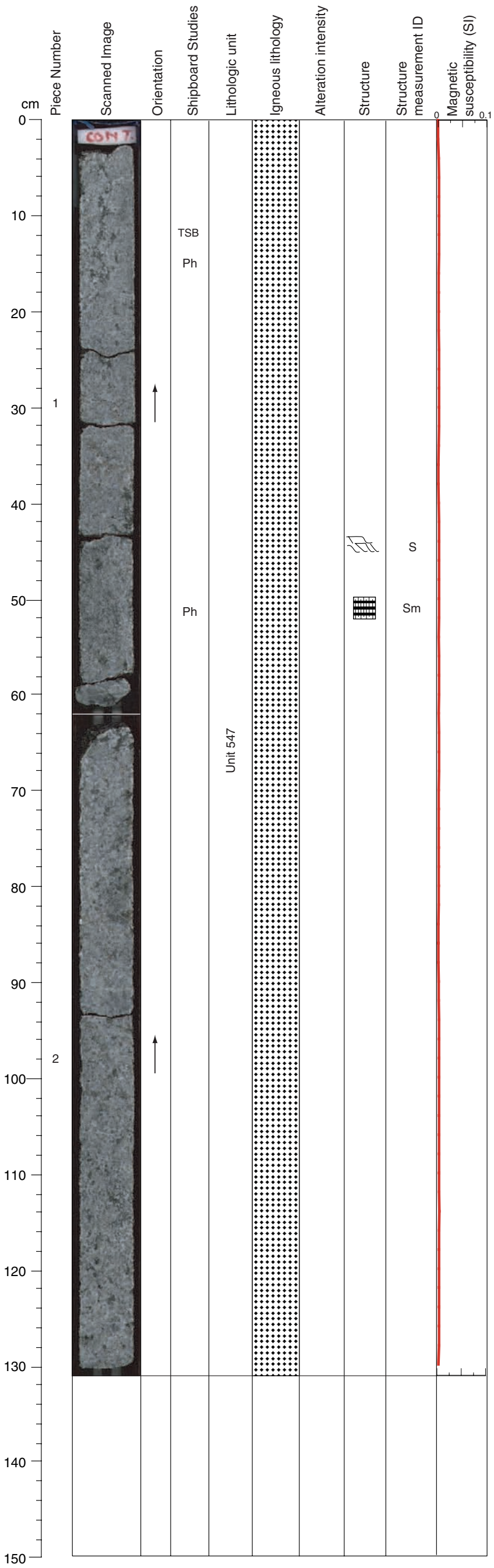
VEIN ALTERATION: Serpentine

THIN SECTIONS:
305-U1309D-218R-4, 52-54 cm (#549)
305-U1309D-218R-4, 108-111 cm (#550)

STRUCTURE: Medium-grained gabbro with faint magmatic fabric at perhaps small obliquity to local modal layering. Irregular serpentinization that shows no clear foliation, but more pervasive at the bottom of the section.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-218R-4, 44-64 cm WET
305-U1309D-218R-4, 115-142 cm WET

Core Photo



305-U1309D-219R-1 (Section top: 1053.60 mbsf)

UNIT-547: Olivine Gabbro
Pieces: 1-2

PRIMARY MINERALOGY: Modal data from Piece 1a, 2b

Olivine	Modal 8% Size 3 mm average Shape anhedral
Plagioclase	Modal 65% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 27% Size 3 mm average Shape anhedral

COMMENTS: Unit 547 is medium-grained olivine gabbro. Olivine is concentrated in a vertical band, separating medium and finer grained crystals, in the center of the section. Patches and vertical bands of finer grained crystals from 0-23 cm.

SECONDARY MINERALOGY: Serpentine

COMMENTS: Continuation of the previous section. Coarse-grained gabbro with serpentinized olivine. Thin carbonate veins (at 28 and 40 cm). From 97 to 129 cm, thin white vein with alteration halo around it (replacement to green amphibole).

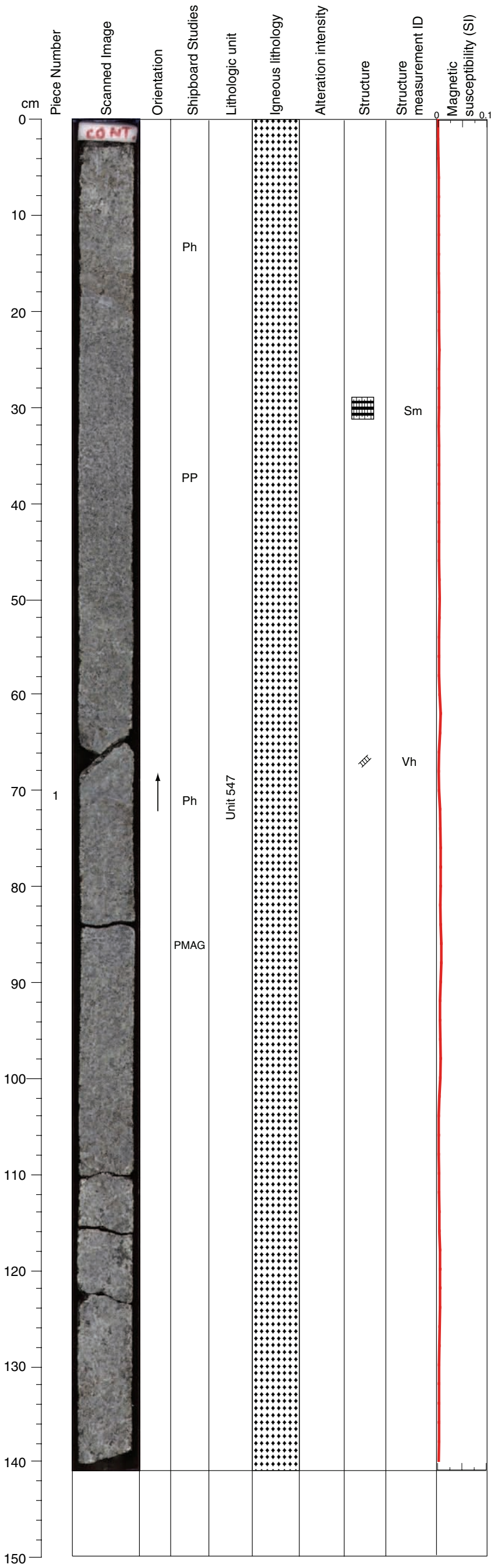
VEIN ALTERATION: Zeolite

THIN SECTIONS:
305-U1309D-219R-1, 11-14 cm (#551)

STRUCTURE: Fine- to medium-grained olivine gabbro with clear magmatic foliation (Sm) changing to coarse-grained gabbro with no magmatic fabric in lower part of section. Transition not preserved. A single, subvertical fracture with vein infill. Irregular, scarce serpentinization with no apparent foliation.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-219R-1, 2-23 cm WET
305-U1309D-219R-1, 44-62 cm WET

Core Photo



305-U1309D-219R-2 (Section top: 1054.92 mbsf)

UNIT-547: Olivine Gabbro to Olivine-bearing Gabbro
Pieces: 1

PRIMARY MINERALOGY: Modal data from Piece 1a, 1c

Olivine	Modal 1-5% Size 3 mm average Shape anhedral
Plagioclase	Modal 65-70% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 25-34% Size 3 mm average Shape anhedral

COMMENTS: Unit 547 is medium-grained olivine gabbro. Coarse-grained clinopyroxene dike from 14-18 cm. Coarser grained at 70-72 cm. Band of light brown orthopyroxene at 102 cm.

SECONDARY MINERALOGY: chlorite, pale amphibole

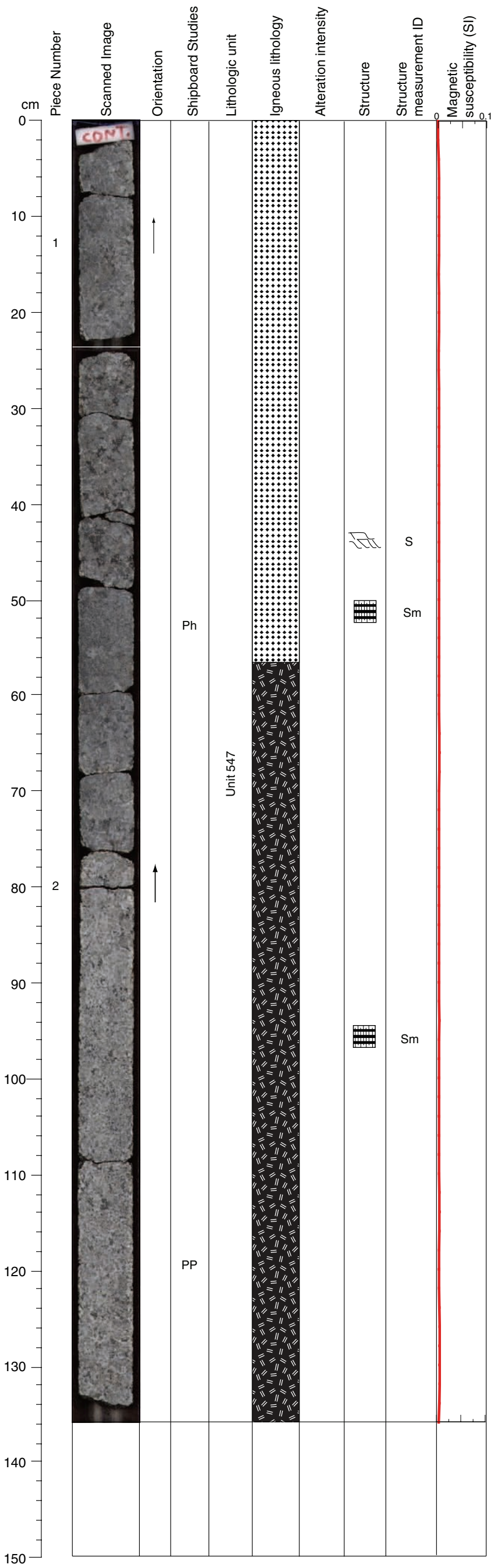
COMMENTS: Continuation of the previous section. Coarse-grained gabbro (1-18 cm) with serpentinized olivine, cut by white vein (1-9 cm). From 66 to 70 cm pale green vein without alteration halo. Significant amount of sulfides.

VEIN ALTERATION: Amphibole, chlorite

STRUCTURE: Medium-grained olivine gabbro with faint magmatic fabric. A single pale green vein.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-219R-2, 7-27 cm WET
305-U1309D-219R-2, 65-83 cm WET

Core Photo



305-U1309D-219R-3 (Section top: 1056.33 mbsf)

UNIT-547: Olivine Gabbro
Pieces: 1-2d

PRIMARY MINERALOGY: Modal data from Piece 1b

Olivine	Modal 8% Size 4 mm average Shape anhedral
Plagioclase	Modal 65% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 27% Size 4 mm average Shape anhedral

COMMENTS: Unit 547 fine- to medium-grained olivine gabbro. Olivine-rich zone at 49-56 cm.

UNIT-547: Olivine-bearing Gabbro
Pieces: 2d-2i

PRIMARY MINERALOGY: Modal data from Piece 2e

Olivine	Modal 4% Size 4 mm average Shape anhedral
Plagioclase	Modal 62% Size 4 mm average Shape anhedral
Clinopyroxene	Modal 34% Size 4 mm average Shape anhedral

COMMENTS: Unit 547 is medium- to coarse-grained olivine-bearing gabbro.

SECONDARY MINERALOGY: Chlorite, pale amphibole

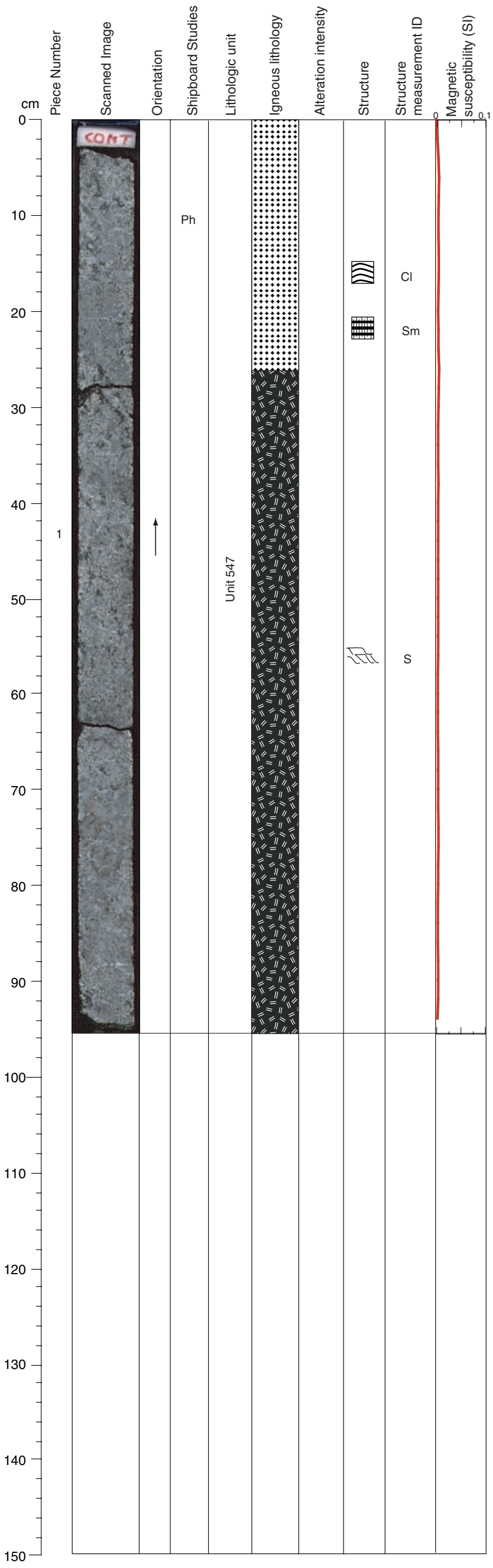
COMMENTS: Continuation of the previous section. Coarse-grained gabbro with serpentinized olivine and local variations of the grain size. Several thin white veinlets (talc).

VEIN ALTERATION: No vein

\STRUCTURE: Medium-grained olivine gabbro with faint magmatic fabric. Serpentinization without foliation.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-219R-3, 49-68 cm WET

Core Photo



305-U1309D-219R-4 (Section top: 1057.70 mbsf)

UNIT-547: Olivine Gabbro
Pieces: 1a

PRIMARY MINERALOGY: Modal data from Piece 1a

Olivine	Modal 8% Size 4 mm average Shape anhedral
Plagioclase	Modal 74% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 18% Size 4 mm average Shape anhedral

UNIT-547: Olivine-bearing Gabbro
Pieces: 1b-1c

PRIMARY MINERALOGY: Modal data from Piece 1c

Olivine	Modal 4% Size 4 mm average Shape anhedral
Plagioclase	Modal 64% Size 4 mm average Shape anhedral
Clinopyroxene	Modal 36% Size 4 mm average Shape anhedral

COMMENTS: Unit 547 is medium- to coarse-grained olivine gabbro and olivine-bearing gabbro.

SECONDARY MINERALOGY: Chlorite, pale amphibole

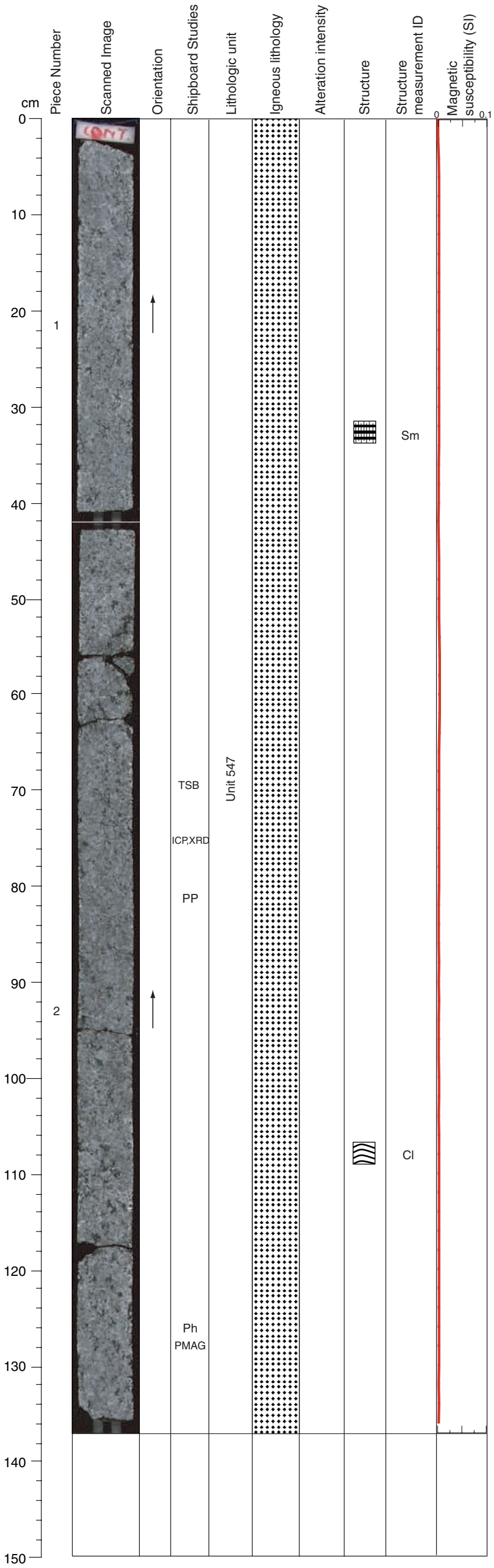
COMMENTS: Continuation of the previous section. Coarse-grained gabbro with serpentinized olivine. Significant amount of sulfides. Amphibole alteration (70-73 cm) with replacement of the pyroxenes.

VEIN ALTERATION: Amphibole, chlorite

STRUCTURE: Medium-grained olivine gabbro with faint magmatic fabric. Weak compositional layering. Irregular, scarce serpentinization with no apparent foliation.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-219R-4, 3-27 cm WET

Core Photo



305-U1309D-220R-1 (Section top: 1058.40 mbsf)

UNIT-547: Olivine Gabbro
Pieces: 1-2

PRIMARY MINERALOGY: Modal data from Piece 1

Olivine	Modal 20-25% Size 4 mm average Shape anhedral
Plagioclase	Modal 50% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 30% Size 7 mm average Shape anhedral

COMMENTS: Unit 547 is medium- to coarse-grained olivine gabbro. Olivine shows high angle (45° to near-vertical) lineation from Core U1309D-220R to -222R.

SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: Continuation of the previous section. Coarse-grained gabbro with serpentinized olivine. Amphibole replaces some of the pyroxenes.

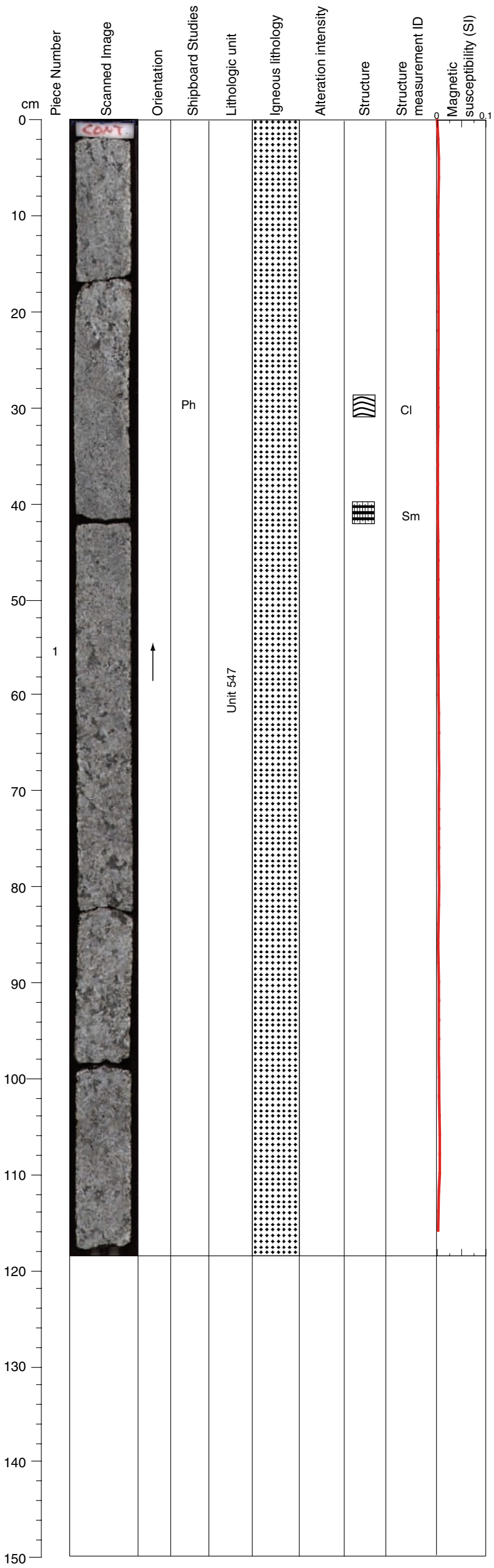
VEIN ALTERATION: No vein

THIN SECTIONS:
305-U1309D-220R-1, 68-70 cm (#552)

STRUCTURE: Medium-grained olivine gabbro with faint magmatic fabric and weak compositional layering. Subhorizontal minor cracks.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-220R-1, 56-76 cm WET
305-U1309D-220R-1, 118-136 cm WET

Core Photo



305-U1309D-220R-2 (Section top: 1059.77 mbsf)

UNIT-547: Olivine Gabbro
Pieces: 1

PRIMARY MINERALOGY: Modal data from Piece 1a

Olivine	Modal 15% Size 4 mm average Shape anhedral
Plagioclase	Modal 45% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 40% Size 7 mm average Shape anhedral

COMMENTS: Unit 547 is medium- to coarse-grained olivine gabbro. Coarse, olivine-rich along high-angle boundary with mid-section medium- to fine-grained olivine gabbro at 20-50 cm.

SECONDARY MINERALOGY: Serpentine

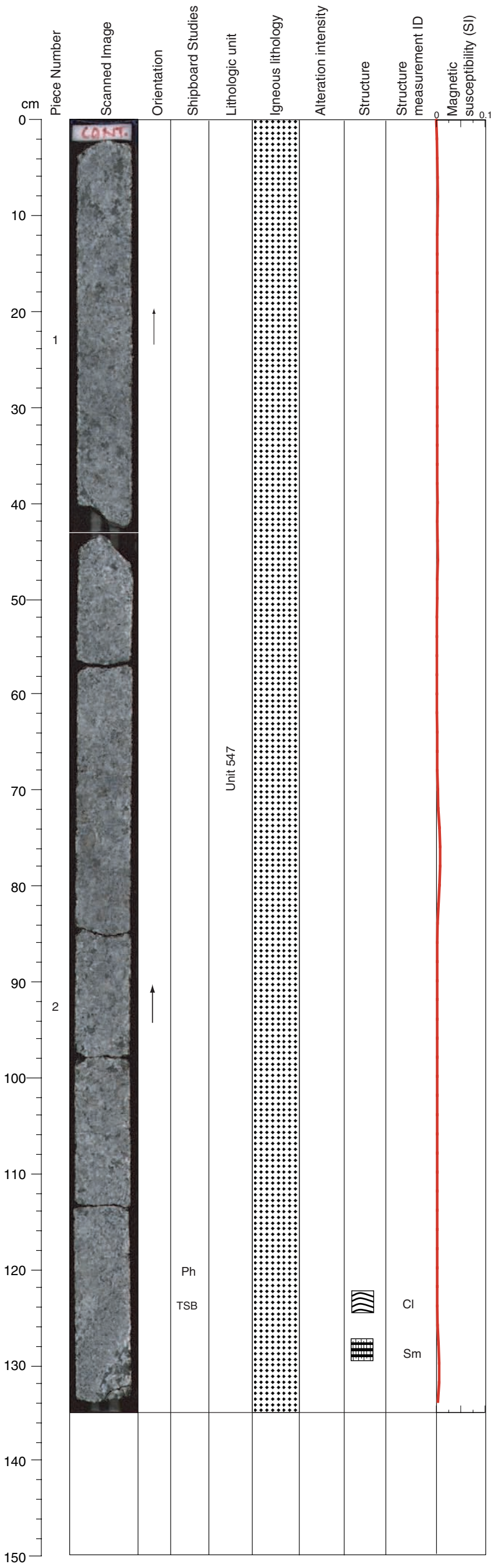
COMMENTS: Continuation of the previous section. Coarse-grained gabbro with a finer grained interval from about 18 to 58 cm, contains serpentinized olivine throughout. Amphibole replaces some of the pyroxenes.

VEIN ALTERATION: No vein

STRUCTURE: Medium-grained olivine gabbro with faint magmatic fabric. With weak compositional layering. Subhorizontal minor cracks.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-220R-2, 18-42 cm WET

Core Photo



305-U1309D-220R-3 (Section top: 1060.95 mbsf)

UNIT-547: Olivine Gabbro
Pieces: 1-2

PRIMARY MINERALOGY: Modal data from Piece 2e

Olivine	Modal 10-20% Size to 15 mm Shape anhedral
Plagioclase	Modal 30-60% Size to 15 mm Shape anhedral
Clinopyroxene	Modal 20-30% Size to 15 mm Shape anhedral

COMMENTS: Unit 547 is medium- to coarse-grained olivine gabbrox oxide at 77 cm. Coarse grained (troctolitic?) layer continues to the next section (high angle layer). Fine-grained along boundary.

SECONDARY MINERALOGY: Serpentine

COMMENTS: Continuation of the previous section. Coarse-grained gabbro with serpentinized olivine. Amphibole replaces some of the pyroxenes. In the coarser material at the bottom of Piece 2 there is a slightly greater degree of alteration (especially of plagioclase). The gabbro is finer grained from about 221 cm to immediately above the coarser material at the bottom of Piece 2.

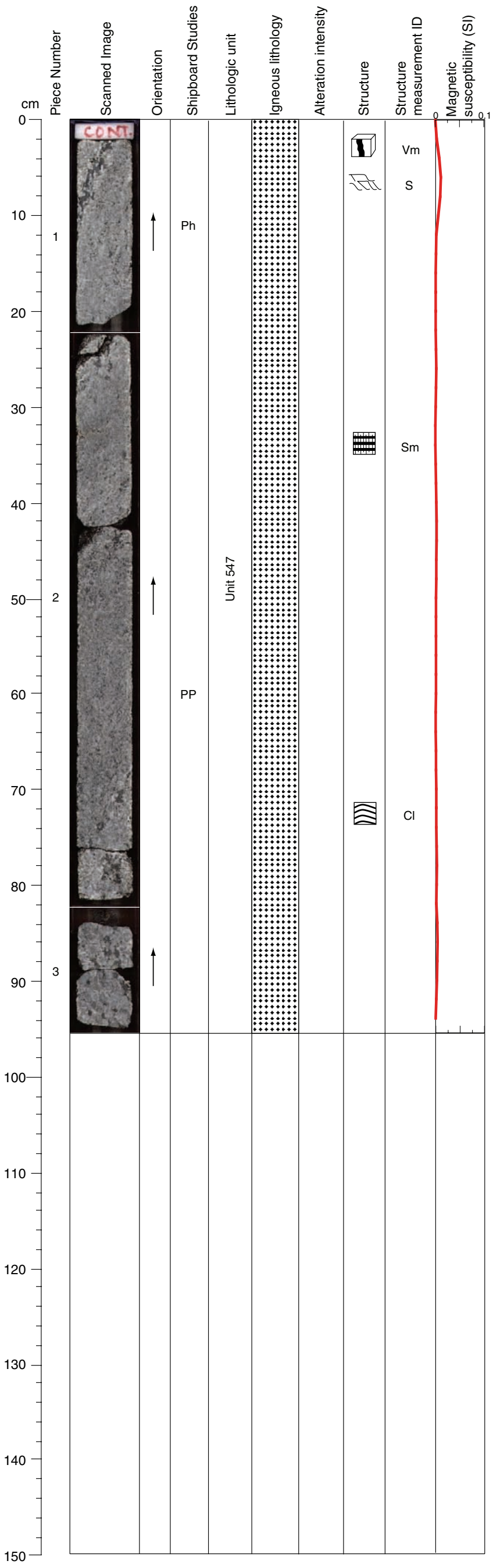
VEIN ALTERATION: Serpentine

THIN SECTIONS:
305-U1309D-220R-3, 123-125 cm (#553)

STRUCTURE: Medium-grained olivine gabbro with faint magmatic fabric. With weak compositional layering. Subhorizontal minor cracks.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-220R-3, 113-134 cm WET
305-U1309D-220R-3, 113-134 cm DRY

Core Photo



305-U1309D-220R-4 (Section top: 1062.30 mbsf)

UNIT-547: Olivine Gabbro
Pieces: 1-3

PRIMARY MINERALOGY: Modal data from Piece 1

Olivine	Modal 10-20% Size 5 mm average Shape anhedral
Plagioclase	Modal 50-80% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 10-30% Size 6 mm average Shape anhedral

COMMENTS: Unit 547 is medium- to coarse-grained olivine gabbro. Pronounced olivine-rich modal banding.

SECONDARY MINERALOGY: Serpentine

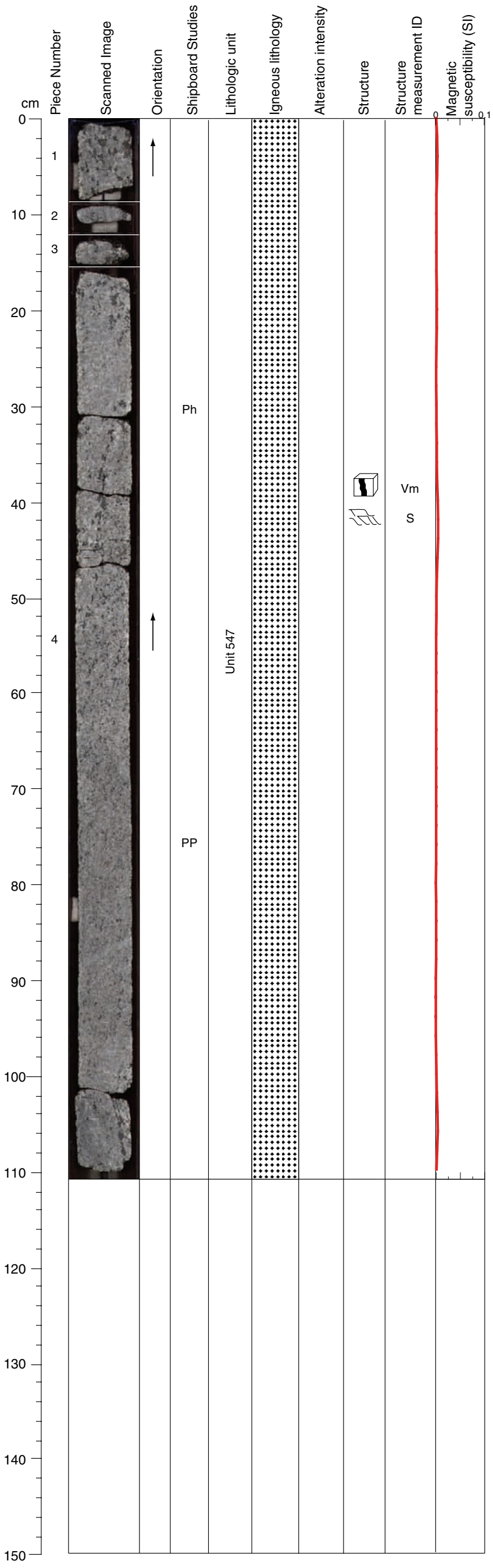
COMMENTS: A coarse, probably magmatic vein/dike cuts the top of Piece 1 to 11 cm. The olivine in this vein is altered to serpentine and the plagioclase is white. Alteration is generally similar to the previous section, although the grain size is finer, except for patches of coarser grained gabbro at the bottom of Piece 2 (and all of Piece 3). The gabbro contains serpentinized olivine and a small amount of amphibole replaces some of the pyroxenes.

VEIN ALTERATION: Serpentine

STRUCTURE: Medium-grained olivine gabbro with faint magmatic fabric. With weak compositional layering. Subhorizontal minor cracks.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-220R-4, 3-22 cm WET

Core Photo



305-U1309D-221R-1 (Section top: 1063.20 mbsf)

UNIT-547: Olivine Gabbro
Pieces: 1-4

PRIMARY MINERALOGY: Modal data from Piece 4d

Olivine	Modal 15% Size 3 mm average Shape anhedral
Plagioclase	Modal 45% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 40% Size 4 mm average Shape anhedral

COMMENTS: Unit 547 is medium- to coarse-grained olivine gabbro. Pronounced olivine-rich modal banding. High angle olivine- rich seam (<1 cm thick) at 18-53 cm. Clinopyroxene poor at 100-110 cm and continuing to next section.

SECONDARY MINERALOGY: Serpentine, chlorite

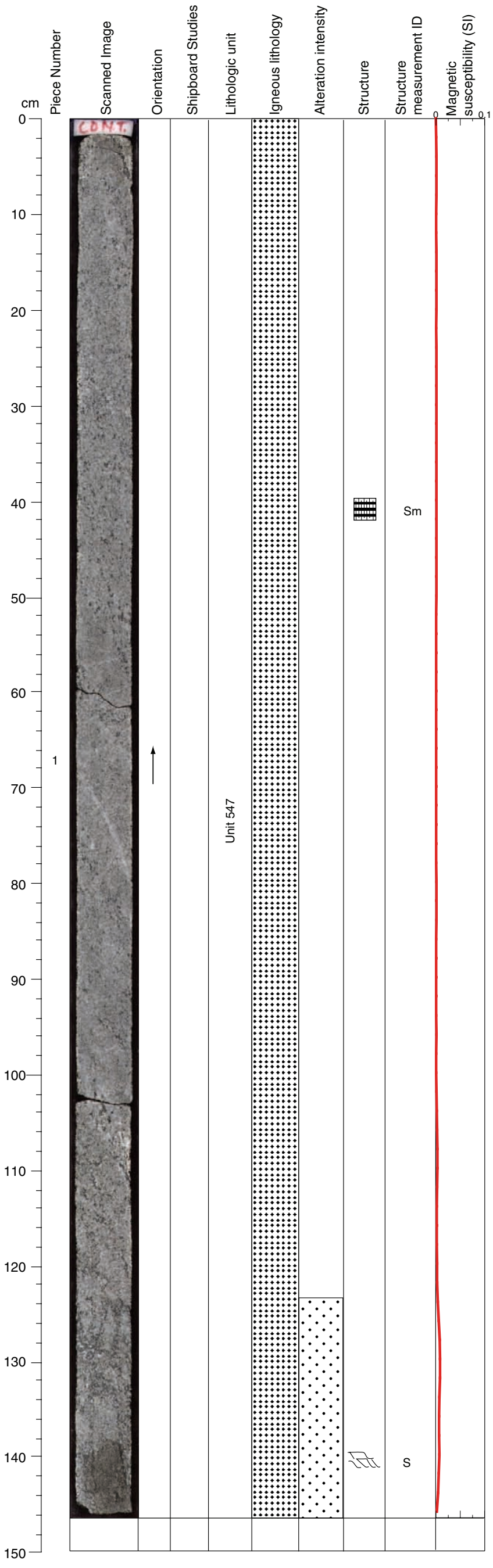
COMMENTS: Coarse-grained gabbro with serpentinized olivine. At 27-45 cm, serpentine veins. From 55 cm toward the end of the section finer grained part with green amphibole vein at 84 cm.

VEIN ALTERATION: No vein

STRUCTURE: Fine- to medium-grained olivine gabbro with steep magmatic foliation and subparallel coarser grained schlieren of more troctolitic composition that is slightly serpentinized.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-221R-1, 27-42 cm WET

Core Photo



305-U1309D-221R-2 (Section top: 1064.31 mbsf)

UNIT-547: Olivine Gabbro
Pieces: 1

PRIMARY MINERALOGY: Modal data from Piece 1a

Olivine	Modal 15% Size 3 mm average Shape anhedral
Plagioclase	Modal 45% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 40% Size 4 mm average Shape anhedral

COMMENTS: Unit 547 is medium- to coarse-grained olivine gabbro. Pronounced olivine-rich modal banding. Olivine abundance increases to bottom of this section. Clinopyroxene poor, plagioclase rich at 140-148 cm.

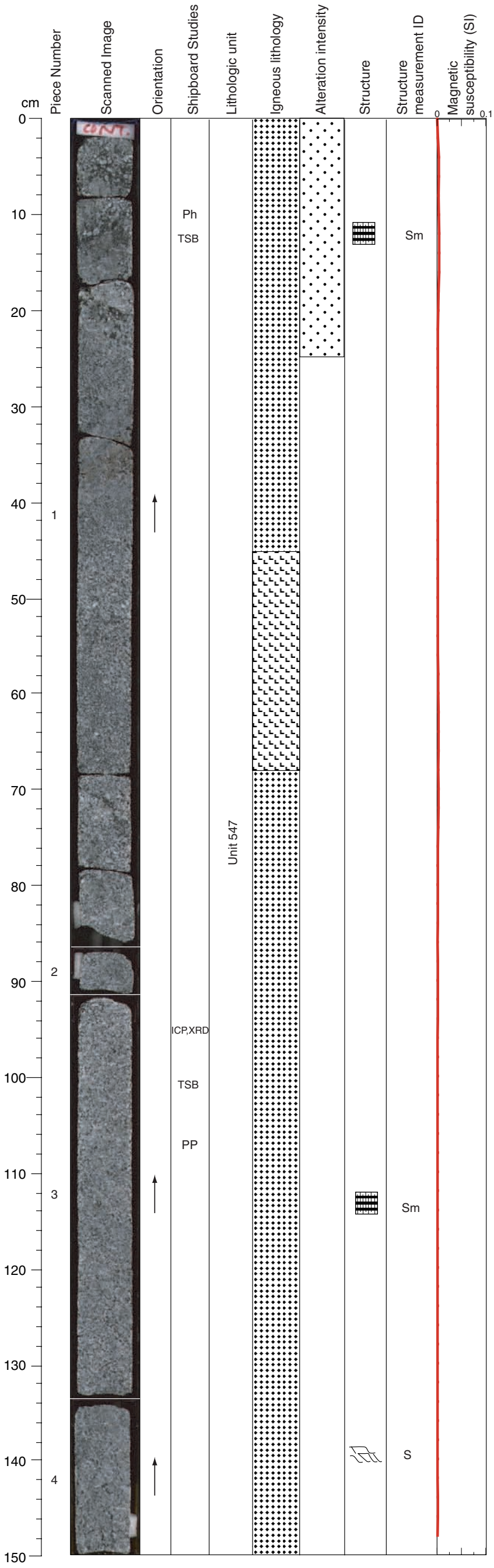
SECONDARY MINERALOGY: Serpentine, chlorite, pale amphibole

COMMENTS: Coarse-grained gabbro with serpentinized olivine. Amphibole replaces some of the pyroxenes. A white vein cuts the section from about 68-80 cm. A zone of patchy white alteration of plagioclase extends from 100 to 110 cm. A zone of slightly higher alteration associated with a network of fine green veins extends from about 120 cm to the end of the section.

VEIN ALTERATION: Serpentine

STRUCTURE: Fine- to medium-grained olivine gabbro with steep magmatic foliation and subtle modal layering. Weak serpentinization.

Core Photo



305-U1309D-221R-3 (Section top: 1065.78 mbsf)

UNIT-547: Olivine Gabbro
Pieces: 1-4

PRIMARY MINERALOGY: Modal data from Piece 3

Olivine	Modal 15-20% Size 3 mm average Shape anhedral
Plagioclase	Modal 60% Size 4 mm average Shape anhedral
Clinopyroxene	Modal 15-20% Size 4 mm average Shape anhedral

COMMENTS: Unit 547 is medium- to coarse-grained olivine gabbro. Pronounced olivine-rich modal banding. Troctolitic gabbro interval at 45-67 cm. Coarse-grained clinopyroxene-rich gabbro dike at 32-40 cm.

SECONDARY MINERALOGY: Serpentine, chlorite, pale amphibole

COMMENTS: Coarse-grained gabbro with serpentinized olivine and amphibole after some of the pyroxene grians is present in the upper 23 cm of the section. Below that the gabbro is finer grained (except between 31 and 40 cm) and although the grain size varies somewhat down section, the general alteration remains similar with seprentinized olivine, white patches of alteration of plagioclase and soem amphibole after pyroxene.

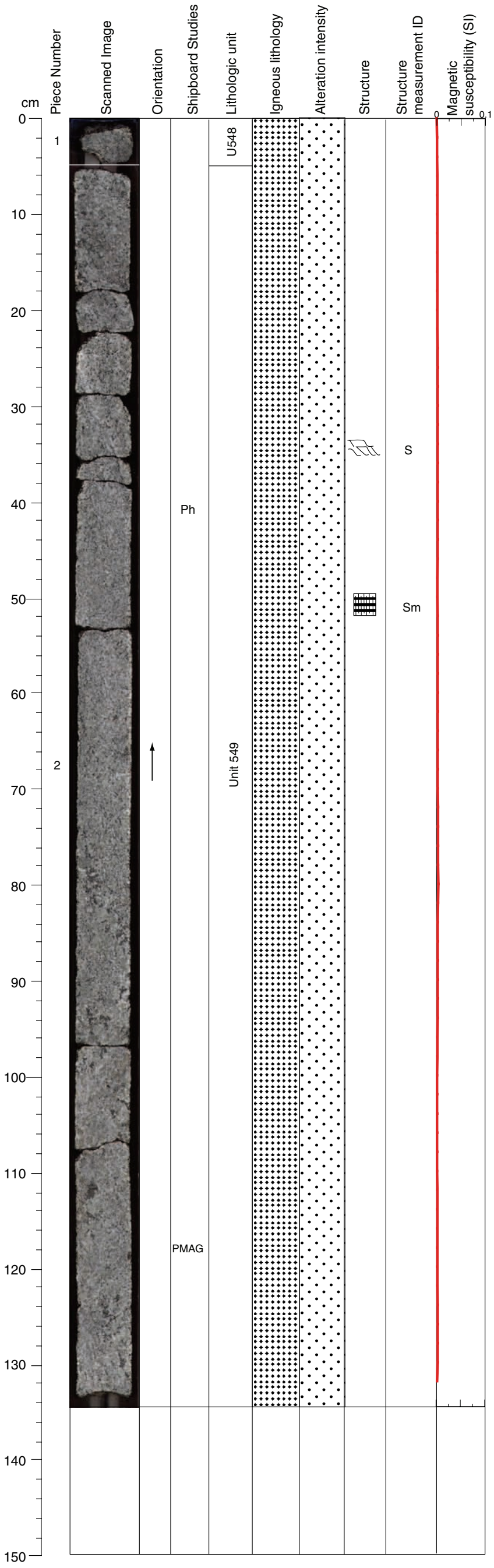
VEIN ALTERATION: No vein

THIN SECTIONS:
305-U1309D-221R-3, 10-13 cm (#554)
305-U1309D-221R-3, 100-102 cm (#555)

STRUCTURE: Fine- to medium-grained olivine gabbro with moderate to steep magmatic foliation and 1 cm scale (magmatic?) shear zone at top of section. Weak serpentinization, more homogeneously distributed in the finer section.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-221R-3, 2-17 cm WET
305-U1309D-221R-3, 2-17 cm DRY
305-U1309D-221R-3, 91-111 cm WET

Core Photo



305-U1309D-222R-1 (Section top: 1068.00 mbsf)

UNIT-548: Rubble
Pieces: 1

COMMENTS: Unit 548 rubble may be in place

UNIT-549: Olivine Gabbro
Pieces: 2

PRIMARY MINERALOGY: Modal data from Pieces 2a and 2h

Olivine	Modal 3-13% Size 2 mm average Shape anhedral
Plagioclase	Modal 60-72% Size 4 mm average Shape anhedral
Clinopyroxene	Modal 17-37% Size 4 mm average Shape anhedral

COMMENTS: Unit 549 is medium- to coarse-grained olivine gabbro. High variation in grain size and mode with olivine- and plagioclase-rich patches and oblique bands. Some light brown pyroxene.

SECONDARY MINERALOGY: Serpentine, chlorite, pale amphibole

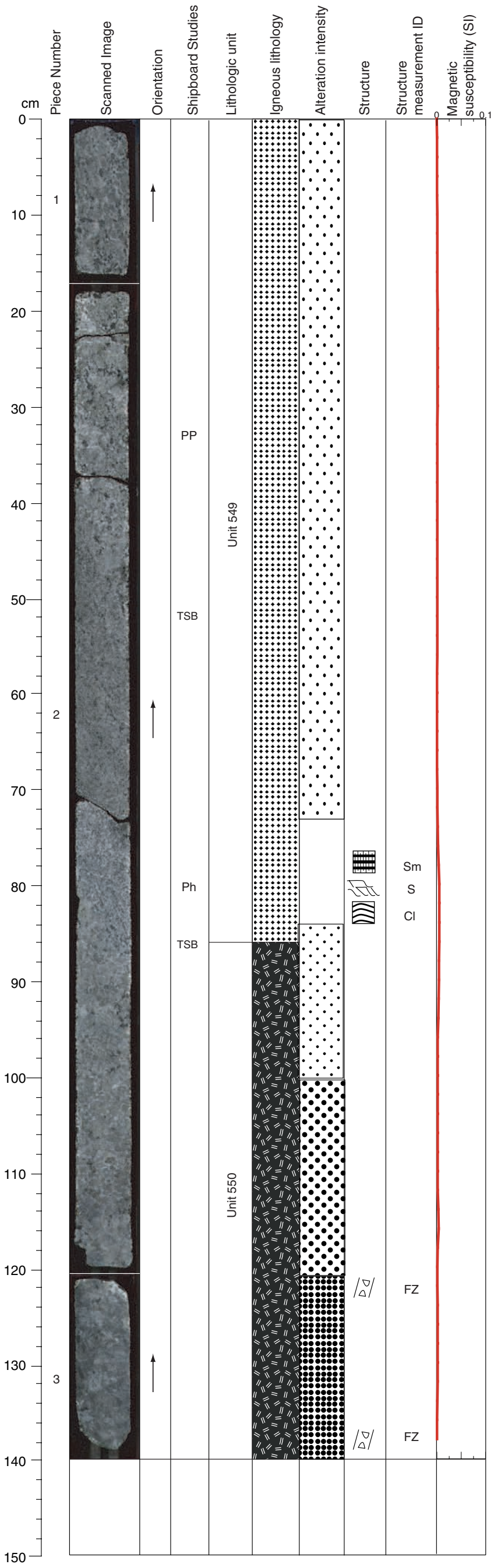
COMMENTS: Coarse-grained gabbro with serpentinization of olivines, serpentine veins occur at 26-40 cm. Significant amount of sulfides.

VEIN ALTERATION: No vein

STRUCTURE: Fine- to medium-grained olivine gabbro with magmatic foliation and magmatic schlieren in upper part of section. Weak serpentinization, which is locally foliated.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-222R-1, 30-54 cm WET

Core Photo



305-U1309D-222R-2 (Section top: 1069.35 mbsf)

UNIT-549: Olivine Gabbro
Pieces: 1-2d

PRIMARY MINERALOGY: Modal data from several pieces

Olivine	Modal 15-25% Size up to 15 mm Shape anhedral
Plagioclase	Modal 55-75% Size up to 20 mm Shape anhedral
Clinopyroxene	Modal 15-47% Size up to 35 mm Shape anhedral

COMMENTS: Unit 549 fine- to coarse-grained olivine gabbro. Large variation in grain size and mode.

UNIT-550: Olivine-bearing Gabbro
Pieces: 2d-3

PRIMARY MINERALOGY: Modal data from Piece 3

Olivine	Modal 3% Size 3 mm average Shape anhedral
Plagioclase	Modal 50% Size up to 20 mm Shape anhedral
Clinopyroxene	Modal 47% Size up to 35 mm Shape anhedral

COMMENTS: Unit 550 medium- to coarse-grained olivine-bearing gabbro. Sharp contact with previous unit at 84 cm.

SECONDARY MINERALOGY: Serpentine, chlorite, pale amphibole

COMMENTS: Coarse-grained gabbro with serpentinized olivine. From 44 cm, finer-grained part with change at 80 cm to coarser-grained part. At 93 cm green amphibole veins with alteration halo. At 120 cm, pale green veins with alteration of the surrounding pyroxenes. At 137 cm (end of the section), leucocratic alteration.

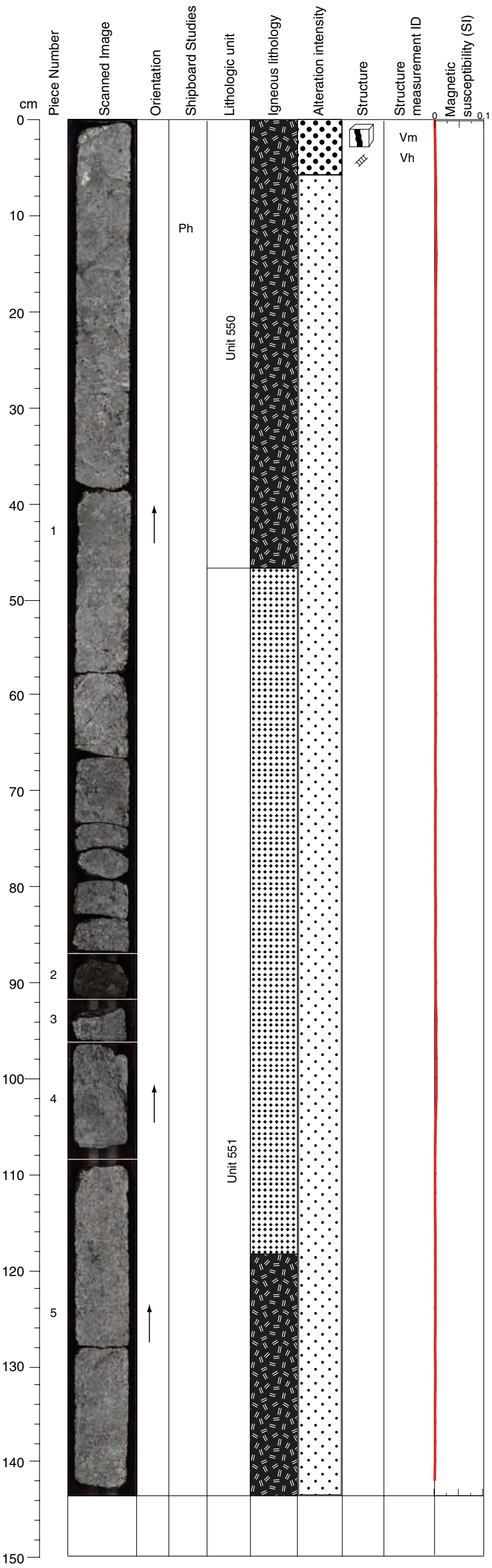
VEIN ALTERATION: Amphibole, chlorite, carbonate

THIN SECTIONS:
305-U1309D-222R-2, 51-53 cm (#556)
305-U1309D-222R-2, 84-87 cm (#557)

STRUCTURE: Fine to coarse olivine gabbro with magmatic foliation in upper section and sharp contact between fine and coarse gabbro. Weak serpentinization, which is locally foliated. Tiny fault zones in the bottom of the section.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-222R-2, 30-60 cm WET
305-U1309D-222R-2, 72-95 cm WET

Core Photo



305-U1309D-222R-3 (Section top: 1070.75 mbsf)

UNIT-550: Olivine-bearing Gabbro
Pieces: 1a-1b

PRIMARY MINERALOGY: Modal data from Piece 1a

Olivine	Modal 2% Size 2 mm average Shape anhedral
Plagioclase	Modal 43% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 55% Size up to 90 mm Shape anhedral

COMMENTS: Unit 550 is medium- to coarse-grained olivine-bearing gabbro.

UNIT-551: Olivine Gabbro
Pieces: 1b-5a

PRIMARY MINERALOGY: Modal data from Piece 1c

Olivine	Modal 15% Size 4 mm average Shape anhedral
Plagioclase	Modal 55% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 30% Size 3 mm average Shape anhedral

UNIT-551: Olivine-bearing Gabbro
Pieces: 5a-5b

PRIMARY MINERALOGY: Modal data from Piece 5a

Olivine	Modal 3% Size 2 mm average Shape anhedral
Plagioclase	Modal 60% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 37% Size 2 mm average Shape anhedral

COMMENTS: Unit 551 fis ine- to coarse-grained olivine gabbro and olivine-bearing gabbro. Some tabular plagioclase. Patches of finer grained crystals.

SECONDARY MINERALOGY: Chlorite, pale amphibole

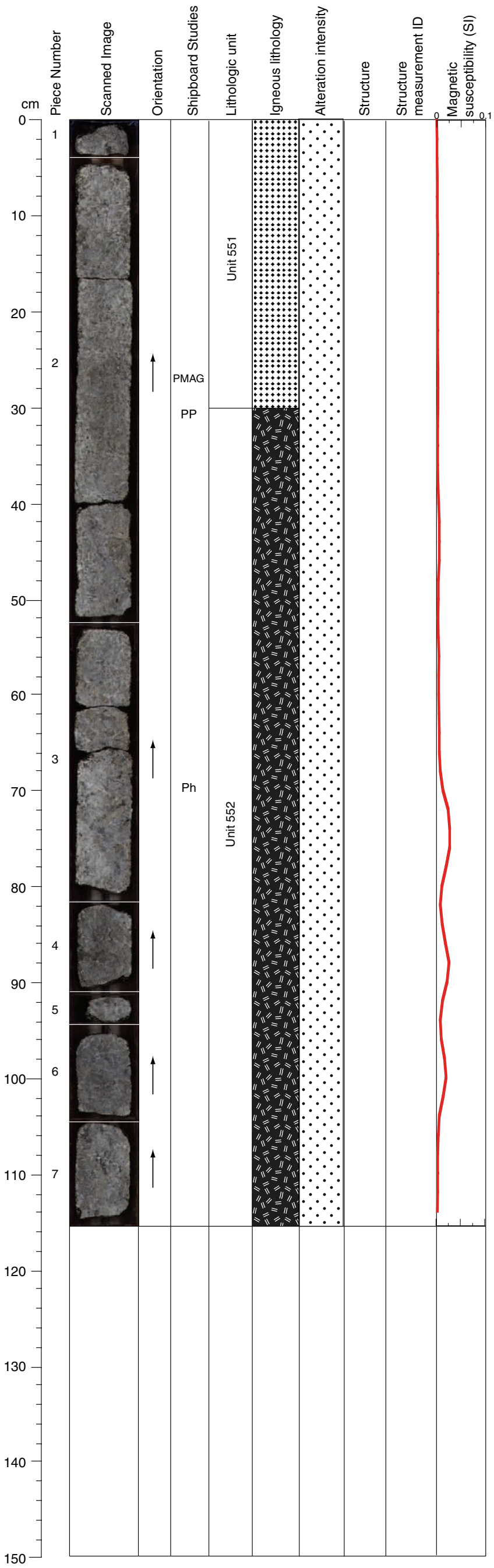
COMMENTS: Coarse-grained gabbro with leucocratic alteration of top piece (1.5 cm thick) and 4 cm wide alteration halo around. Serpentinization of the olivines. Several thin white veinlets around the grains.

VEIN ALTERATION: Amphibole, zeolite

STRUCTURE: Coarse- to medium-grained gabbro with no clear magmatic or plastic fabric and local leucocratic vein. Weak distributed serpentinization.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-222R-3, 0-25 cm WET

Core Photo



305-U1309D-222R-4 (Section top: 1072.19 mbsf)

UNIT-551: Olivine Gabbro
Pieces: 1-2b

PRIMARY MINERALOGY: Modal data from Piece 2a

Olivine	Modal 15% Size 3 mm average Shape anhedral
Plagioclase	Modal 60% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 25% Size 3 mm average Shape anhedral

COMMENTS: Unit 551 is medium-grained olivine gabbro.

UNIT-552: Olivine-bearing Gabbro
Pieces: 2b-7

PRIMARY MINERALOGY: Modal data from several pieces

Olivine	Modal 1-3% Size 2 mm average Shape anhedral
Plagioclase	Modal 37-39% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 60% Size 3 mm average Shape anhedral

COMMENTS: Unit 552 is medium- to coarse-grained olivine-bearing gabbro. Fine- to medium-grained at 53-61 cm. Large light brown pyroxenes. Oxide at 71-101 cm (Piece 4 ~1 %). Trace of sulfide.

SECONDARY MINERALOGY: Chlorite, pale amphibole

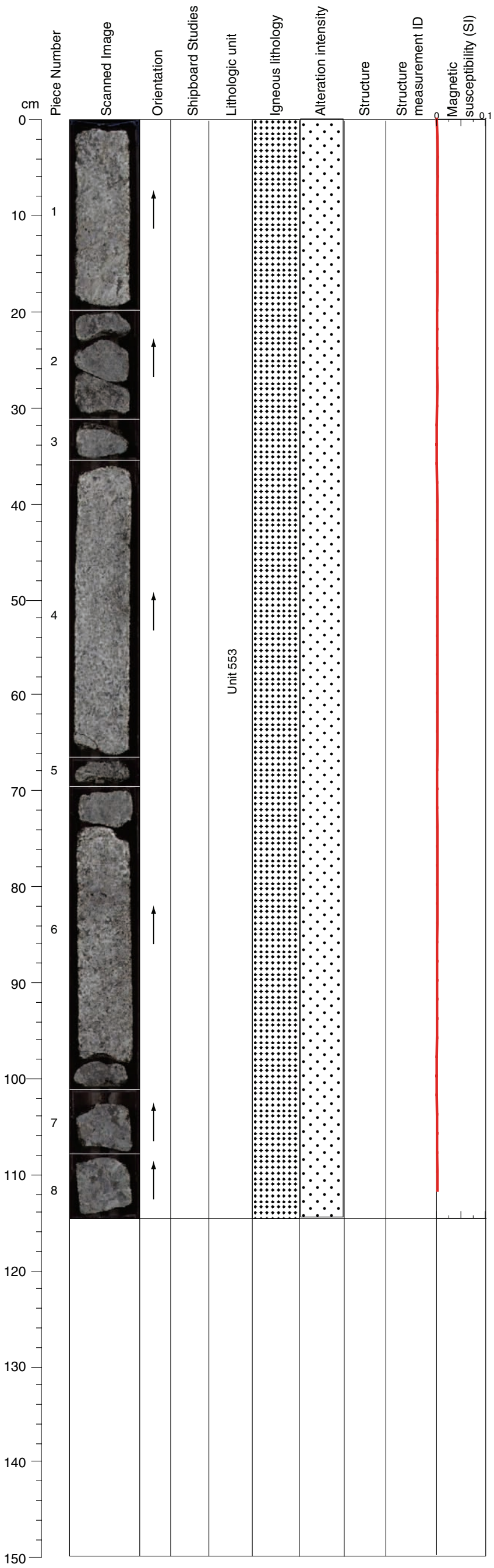
COMMENTS: Coarse-grained gabbro with low alteration on Piece 1. Piece 2 is more altered with alteration/replacement of the pyroxene to green amphibole. Significant amount of sulfides. The degree of alteration increases toward the end of the section, with more serpentinized olivine and more sulfides.

VEIN ALTERATION: Zeolite

STRUCTURE: Medium- to coarse-grained gabbro with local oxides and sulfides, no magmatic or plastic fabric. Minor cataclasis in pegmatitic part.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-222R-4, 62-81 cm WET

Core Photo



305-U1309D-223R-1 (Section top: 1072.80 mbsf)

UNIT-553: Olivine Gabbro
Pieces: 1-8

PRIMARY MINERALOGY: Modal data from Piece 4

Olivine	Modal 20% Size 2 mm average Shape anhedral
Plagioclase	Modal 45% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 35% Size 3 mm average Shape anhedral

COMMENTS: Unit 553 is medium-grained olivine gabbro. Oxide at 81 cm. Gradual change in grain size.

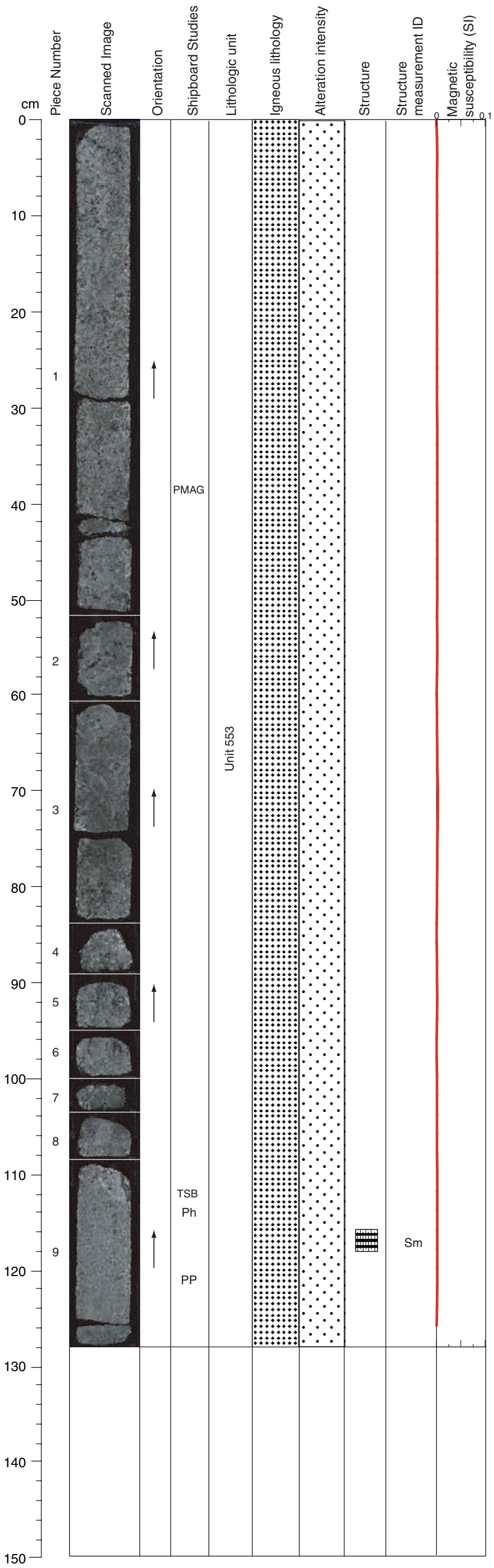
SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: Fine-grained gabbro with serpentinization of olivine. Pieces 7 and 8 are coarser grained part with several thin white veinlets around the grains. Significant amount of sulfides.

VEIN ALTERATION: No vein

STRUCTURE: Medium-grained gabbro, becoming olivine bearing down section, no magmatic or plastic strain. Weak serpentinization.

Core Photo



305-U1309D-223R-2 (Section top: 1073.94 mbsf)

UNIT-553: Olivine Gabbro
Pieces: 1-9

PRIMARY MINERALOGY: Modal data from Piece 1a

Olivine	Modal 20% Size 1 mm average Shape anhedral
Plagioclase	Modal 50% Size 1 mm average Shape anhedral
Clinopyroxene	Modal 30% Size to 20 mm Shape anhedral

COMMENTS: Unit 553 is medium-grained olivine gabbro. Grain size varies from fine to coarse. Oxide- and sulfide- bearing at 71-72 cm. Boundary of grain size change seen on back side of Piece 9a.

SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: Fine- to medium-grained gabbro with serpentinization of olivine. Few sulfides.

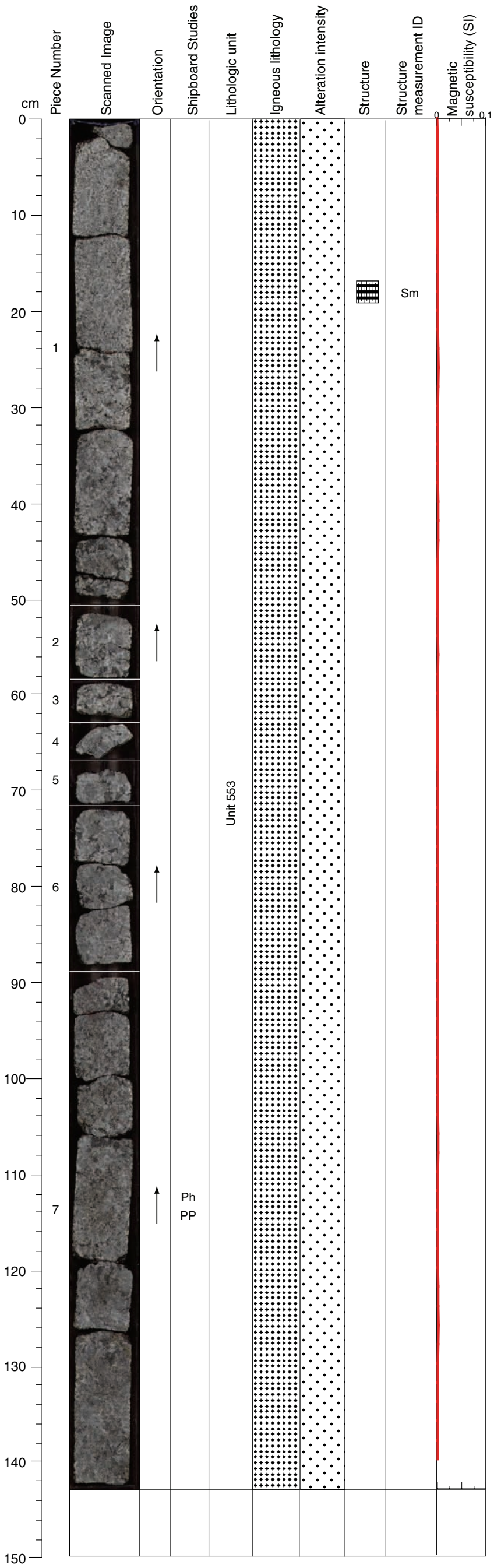
VEIN ALTERATION: No vein

THIN SECTIONS:
305-U1309D-223R-2, 111-114 cm (#558)

STRUCTURE: Medium-grained olivine bearing gabbro with weak magmatic fabric developed in lower part of section. Weak serpentinization. Slight cataclasis throughout.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-223R-2, 108-127 cm WET

Core Photo



305-U1309D-223R-3 (Section top: 1075.22 mbsf)

UNIT-553: Olivine Gabbro
Pieces: 1-7

PRIMARY MINERALOGY: Modal data from several pieces

Olivine	Modal 15-25% Size 1-5 mm average Shape anhedral
Plagioclase	Modal 45-65% Size 2-5 mm average Shape anhedral
Clinopyroxene	Modal 20-40% Size 2-5 mm average Shape anhedral

COMMENTS: Unit 553 is medium- to coarse-grained olivine gabbro.

SECONDARY MINERALOGY: Chlorite, pale amphibole

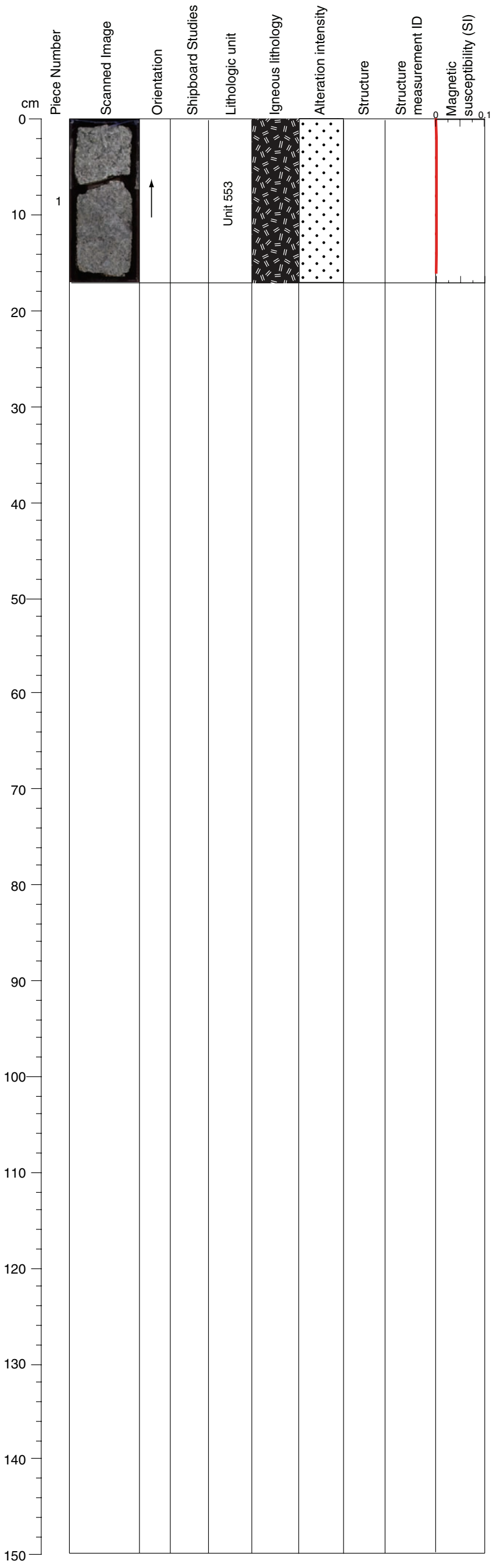
COMMENTS: Medium-grained gabbro with serpentinization of olivine. Few sulfides.

VEIN ALTERATION: No vein

STRUCTURE: Medium-grained olivine bearing gabbro with weak magmatic fabric developed in uppermost part of section. Distributed, scarce serpentinization and some open cracks.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-223R-3, 106-126 cm WET

Core Photo



305-U1309D-223R-4 (Section top: 1076.65 mbsf)

UNIT-553: Olivine-bearing Gabbro
Pieces: 1

PRIMARY MINERALOGY: Modal data from Pieces 1a

Olivine	Modal 3% Size 2 mm average Shape anhedral
Plagioclase	Modal 60% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 35% Size 2 mm average Shape anhedral

COMMENTS: Unit 553 is medium- to coarse-grained olivine-bearing gabbro.

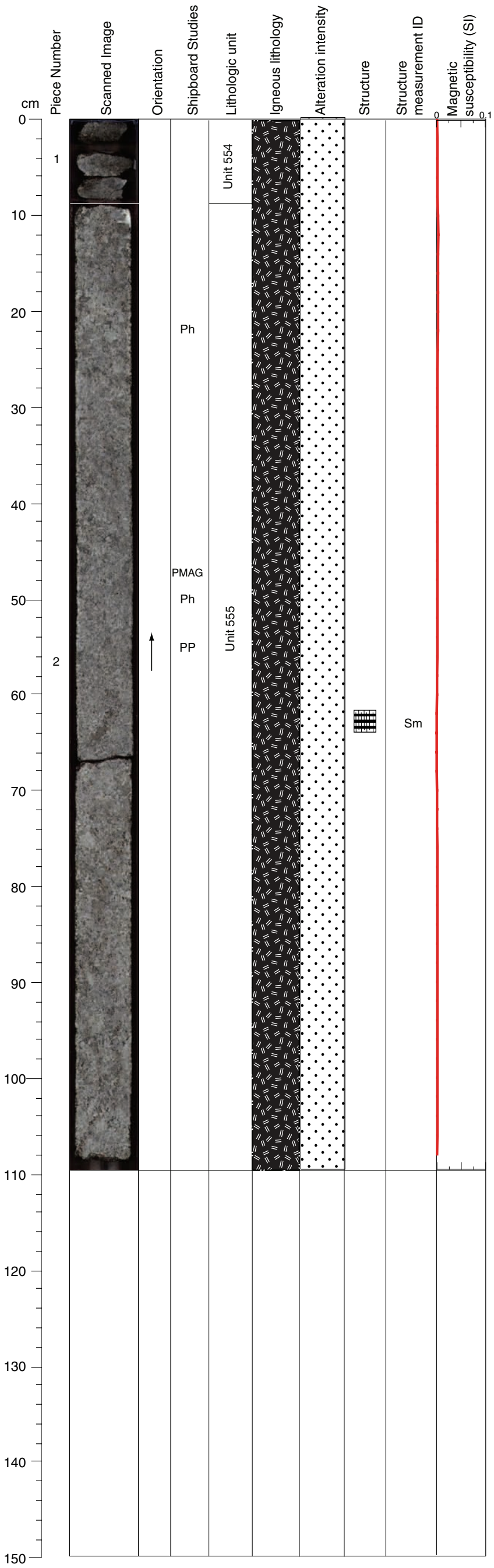
SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: Medium-grained gabbro with serpentinization of olivine. Few sulfides.

VEIN ALTERATION: No vein

STRUCTURE: Medium-grained isotropic gabbro. Distributed, scarce serpentinization and some open cracks.

Core Photo



305-U1309D-224R-1 (Section top: 1077.60 mbsf)

UNIT-554: Rubble
Pieces: 1

COMMENTS: Unit 554 is gabbro rubble.

UNIT-555: Olivine-bearing Gabbro
Pieces: 2

PRIMARY MINERALOGY: Modal data from Piece 2a

Olivine	Modal 3% Size 3 mm average Shape anhedral
Plagioclase	Modal 57% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 40% Size 6 mm average Shape anhedral

COMMENTS: Unit 555 is medium- to coarse-grained olivine-bearing gabbro.

SECONDARY MINERALOGY: Chlorite, pale amphibole

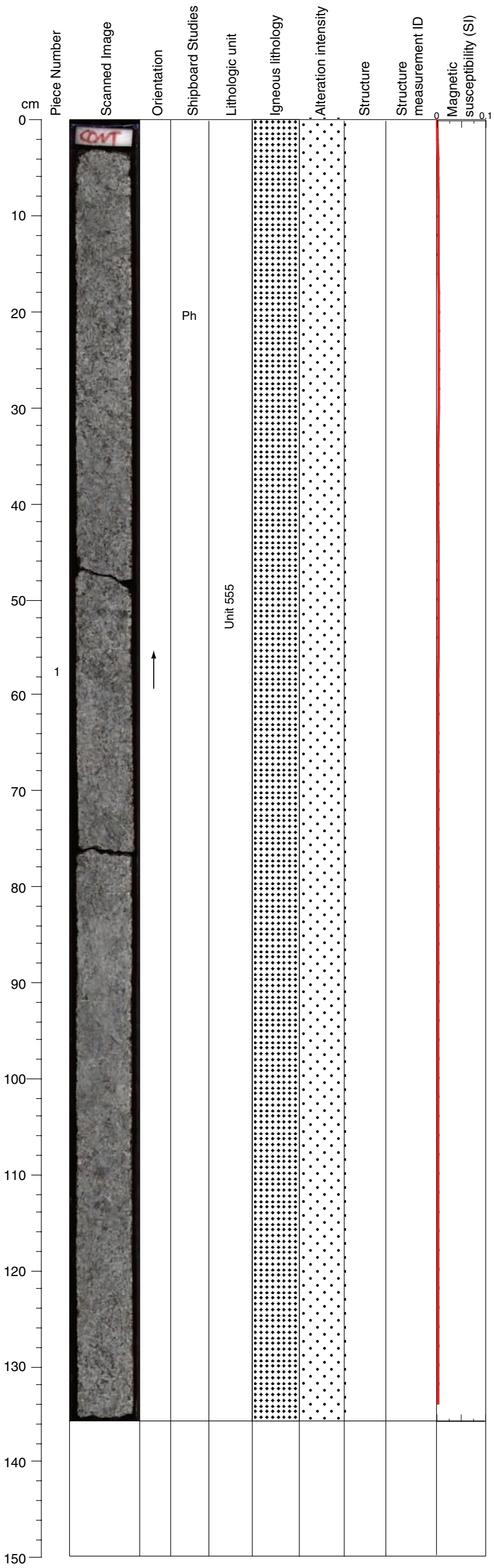
COMMENTS: Coarse-grained gabbro with leucocratic alteration in Piece 1 and top of Piece 2. Significant amount of sulfides.

VEIN ALTERATION: No vein

STRUCTURE: Medium-grained olivine gabbro with local faint magmatic foliation developed.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-224R-1, 47-67 cm WET

Core Photo



305-U1309D-224R-2 (Section top: 1078.70 mbsf)

UNIT-555: Olivine Gabbro
Pieces: 1

PRIMARY MINERALOGY: Modal data from Piece 1a

Olivine	Modal 15% Size 2 mm average Shape anhedral
Plagioclase	Modal 60% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 25% Size 5 mm average Shape anhedral

COMMENTS: Unit 555 is medium- to coarse-grained olivine gabbro.

SECONDARY MINERALOGY: Chlorite, pale amphibole

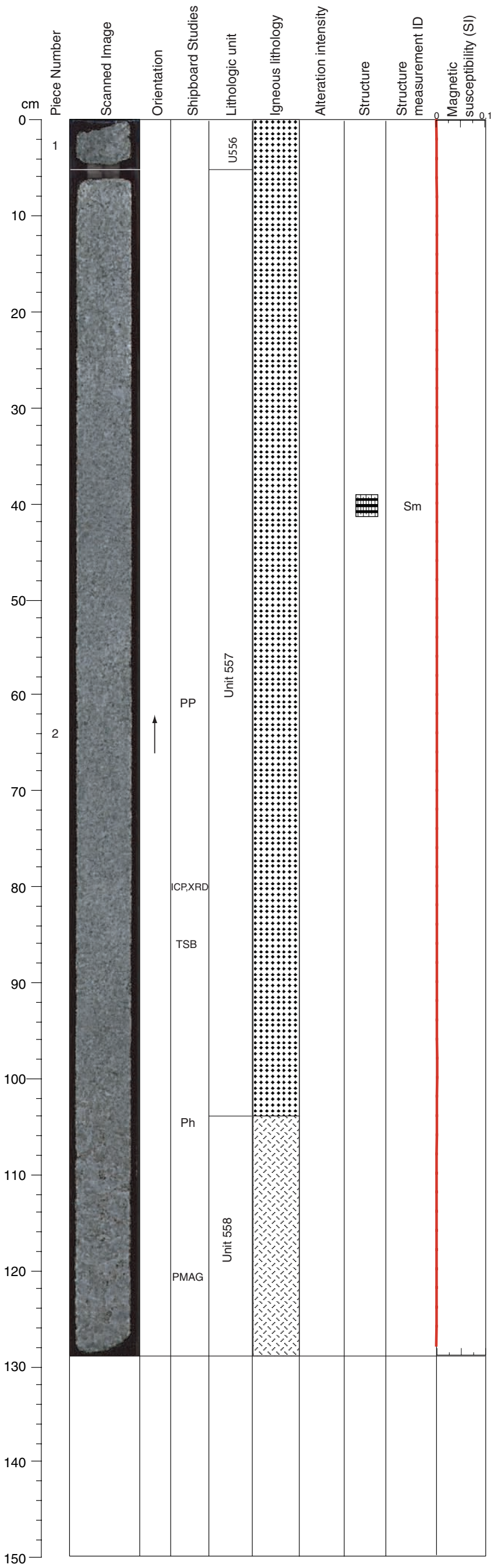
COMMENTS: Continuation of the previous section. Coarse-grained gabbro with serpentinization of olivine and rim of green amphibole around the pyroxene.

VEIN ALTERATION: No vein

STRUCTURE: Coarse-grained isotropic olivine gabbro with very weak serpentinization.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-224R-2, 14-34 cm WET

Core Photo



305-U1309D-225R-1 (Section top: 1082.40 mbsf)

UNIT-556: Olivine Gabbro Rubble
Pieces: 1

PRIMARY MINERALOGY: Modal data from Piece 1

Olivine	Modal 15% Size 1 mm average Shape anhedral
Plagioclase	Modal 55% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 30% Size 2 mm average Shape anhedral

COMMENTS: Unit 556 is fine- to medium-grained olivine gabbro rubble in place.

UNIT-557: Olivine Gabbro
Pieces: 2

PRIMARY MINERALOGY: Modal data from Piece 2

Olivine	Modal 15% Size 1 mm average Shape anhedral
Plagioclase	Modal 55% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 30% Size 2 mm average Shape anhedral

COMMENTS: Unit 557 is fine- to medium-grained olivine gabbro.

UNIT-558: Gabbro
Pieces: 2

PRIMARY MINERALOGY: Modal data from Piece 2

Plagioclase	Modal 55% Size 4 mm average Shape anhedral
Clinopyroxene	Modal 45% Size 4 mm average Shape anhedral

COMMENTS: Unit 558 medium- to coarse-grained gabbro.

SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: Very fine-grained gabbro relatively fresh with some serpentinized olivine grains.

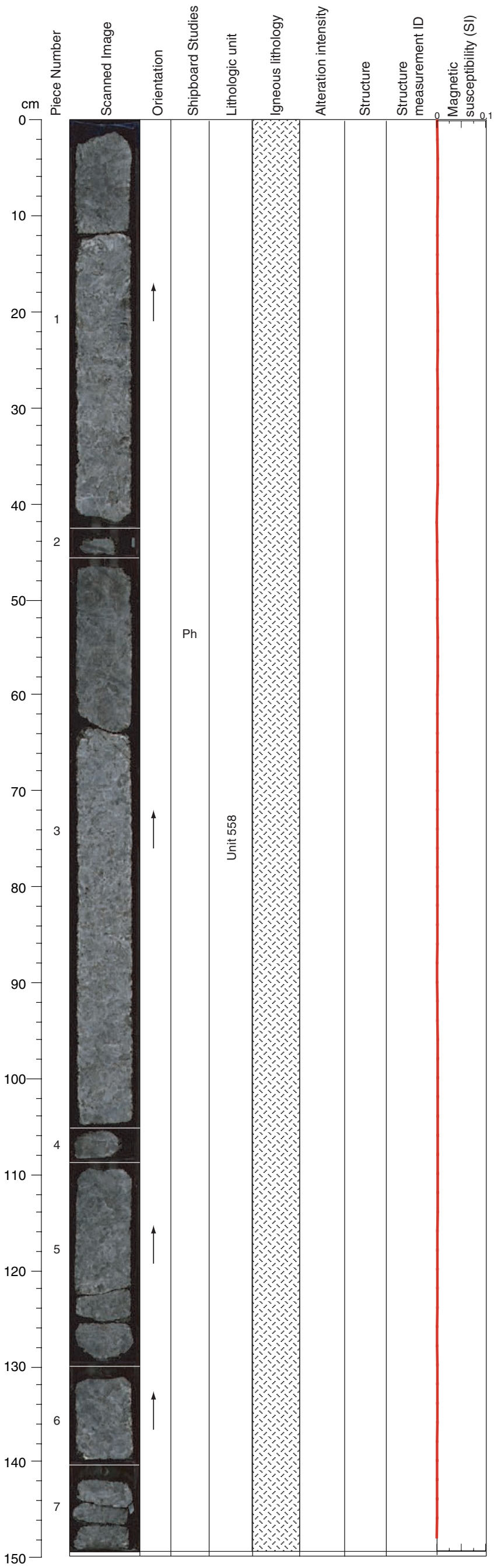
VEIN ALTERATION: No vein

THIN SECTIONS:
305-U1309D-225R-1, 85-87 cm (#559)

STRUCTURE: Medium-grained gabbro with local magmatic foliation developed.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-225R-1, 70-90 cm WET
305-U1309D-225R-1, 92-114 cm WET

Core Photo



305-U1309D-225R-2 (Section top: 1083.69 mbsf)

UNIT-558: Gabbro
Pieces: 1-7

PRIMARY MINERALOGY: Modal data from Piece 3b

Plagioclase	Modal 65% Size to 20 mm Shape anhedral
Clinopyroxene	Modal 35% Size to 30 mm Shape anhedral

COMMENTS: Continuation of Unit 558 coarse-grained gabbro.

SECONDARY MINERALOGY: Chlorite, pale amphibole

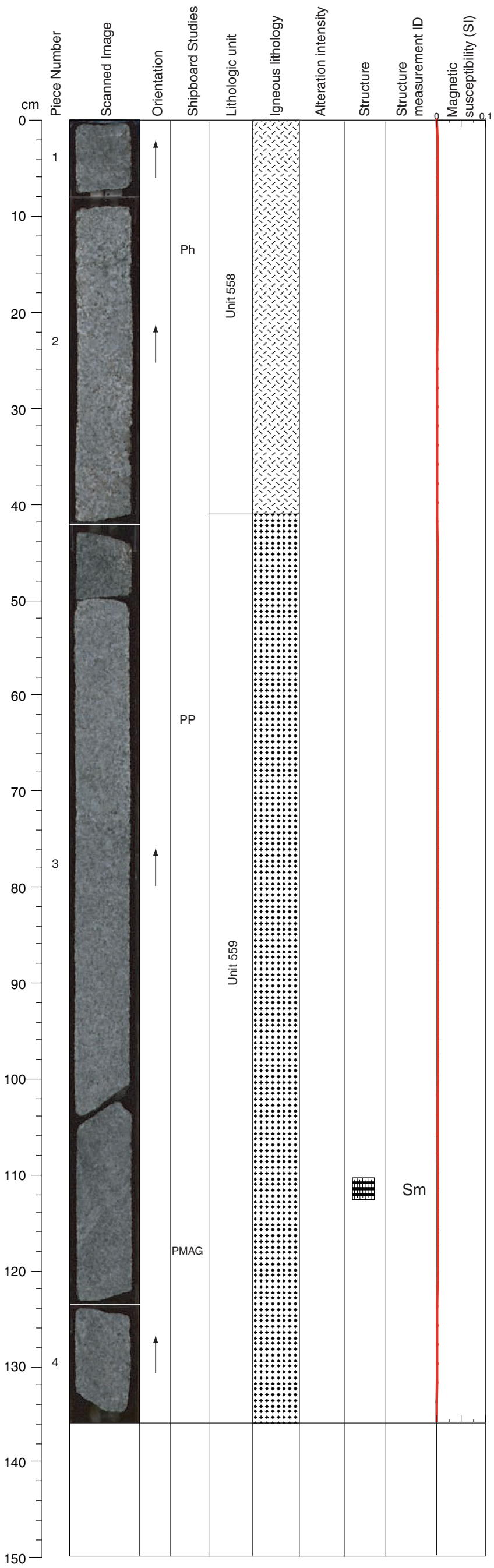
COMMENTS: Coarse-grained gabbro relatively fresh with some local alteration of the pyroxene to green amphibole. Significant amount of sulfides.

VEIN ALTERATION: Zeolite

STRUCTURE: Coarse-grained isotropic gabbro with slight cataclasis.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-225R-2, 46-62 cm WET

Core Photo



305-U1309D-225R-3 (Section top: 1085.19 mbsf)

UNIT-558: Gabbro
Pieces: 1-2

PRIMARY MINERALOGY: Modal data from Piece 2

Plagioclase	Modal 50% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 50% Size 2 mm average Shape anhedral

COMMENTS: Continuation of Unit 558 medium-grained gabbro. Coarser grained pyroxene (orthopyroxene?) band crosscuts at 29-41 cm (seen at back side).

UNIT-559: Olivine Gabbro
Pieces: 3-4

PRIMARY MINERALOGY: Modal data from Piece 3b

Olivine	Modal 15% Size 1 mm average Shape anhedral
Plagioclase	Modal 50% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 35% Size 2 mm average Shape anhedral

COMMENTS: Unit 559 is fine- to medium-grained olivine gabbro.

SECONDARY MINERALOGY: Serpentine, chlorite, pale amphibole

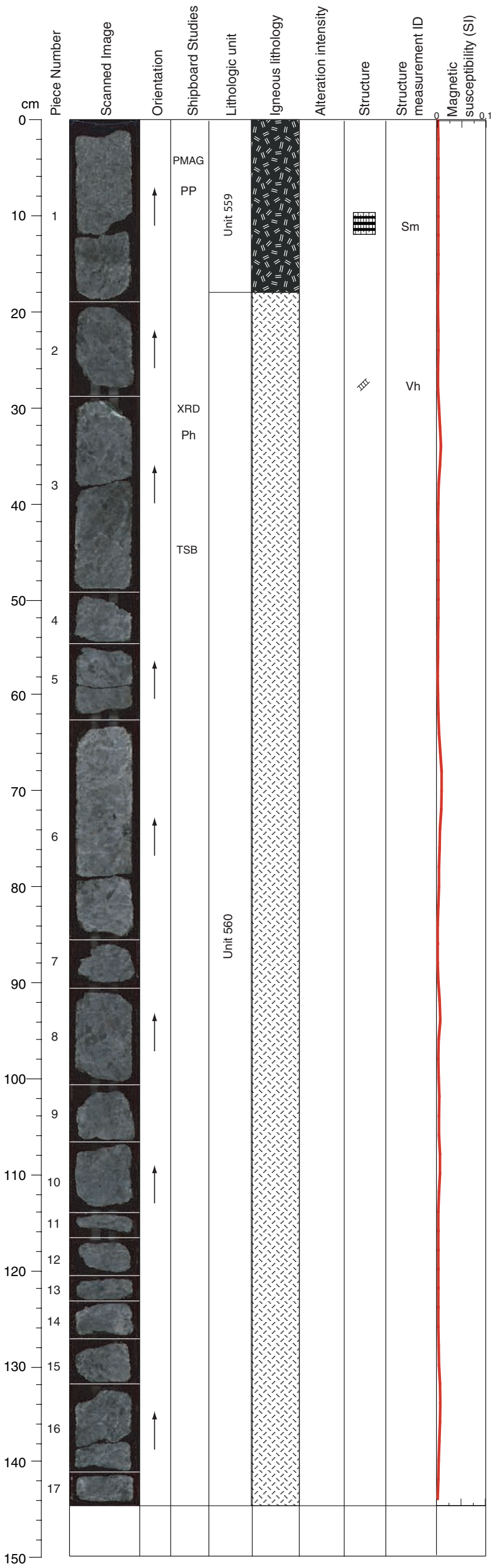
COMMENTS: Coarse-grained gabbro relatively fresh with serpentinized olivine grains. Thin white veins at 16 cm, and 112-120 cm with alteration halo.

VEIN ALTERATION: No vein

STRUCTURE: Medium-grained gabbro with weak magmatic foliation.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-225R-3, 9-24 cm WET

Core Photo



305-U1309D-226R-1 (Section top: 1087.20 mbsf)

UNIT-559: Olivine-bearing Gabbro
Pieces: 1

PRIMARY MINERALOGY: Modal data from Piece 1a

Olivine	Modal 5% Size 1 mm average Shape anhedral
Plagioclase	Modal 50% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 45% Size 2 mm average Shape anhedral

COMMENTS: Unit 559 is fine- to medium-grained olivine-bearing gabbro.

UNIT-560: Gabbro
Pieces: 2-17

PRIMARY MINERALOGY: Modal data from Piece 6a

Plagioclase	Modal 50% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 50% Size 10 mm average Shape anhedral

COMMENTS: Unit 560 is coarse-grained gabbro.

SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: Minor alteration of pyroxene to green amphibole and white patches in plagioclase. Green and white vein from 29 to 32 cm with green amphibole replacement of adjacent pyroxene.

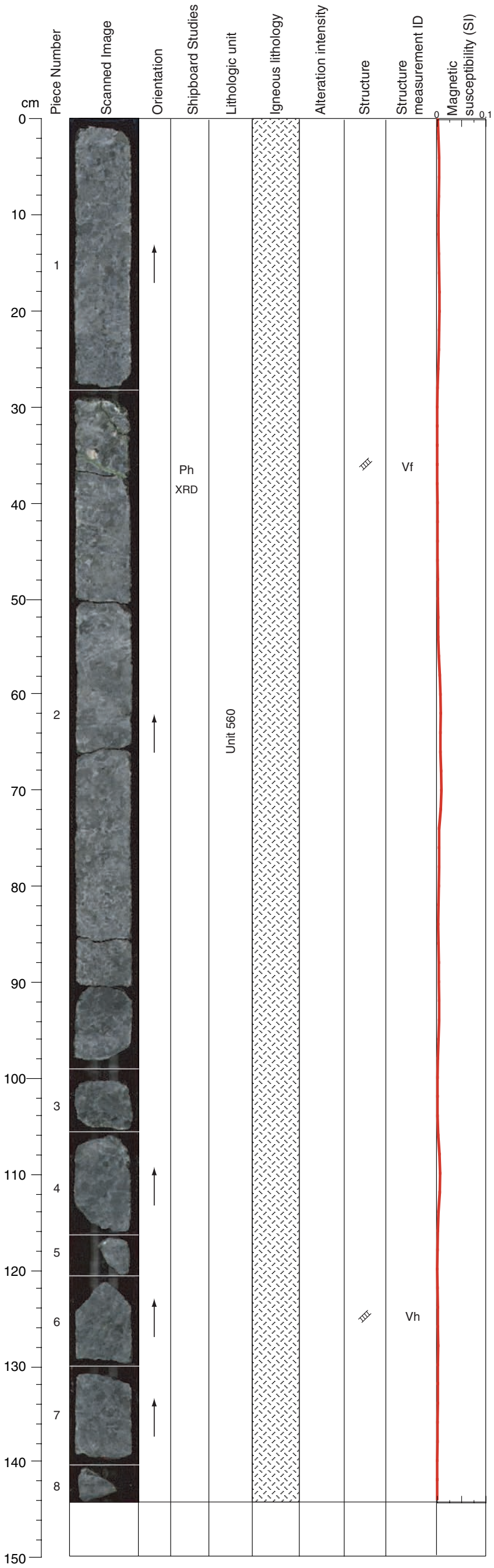
VEIN ALTERATION: Amphibole, talc, carbonate, zeolite

THIN SECTIONS:
305-U1309D-226R-1, 43-46 cm (#560)

STRUCTURE: Coarse-grained isotropic gabbro except for top of section where medium-grained with weak magmatic foliation. A few pale green veins and slight cataclasis.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-226R-1, 28-48 cm WET

Core Photo



305-U1309D-226R-2 (Section top: 1088.65 mbsf)

UNIT-560: Gabbro
Pieces: 1-8

PRIMARY MINERALOGY: Modal data from Piece 2c

Plagioclase	Modal 25% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 75% Size 10 mm average Shape anhedral

COMMENTS: Continuation of Unit 560 coarse-grained gabbro.

SECONDARY MINERALOGY: Chlorite, pale amphibole

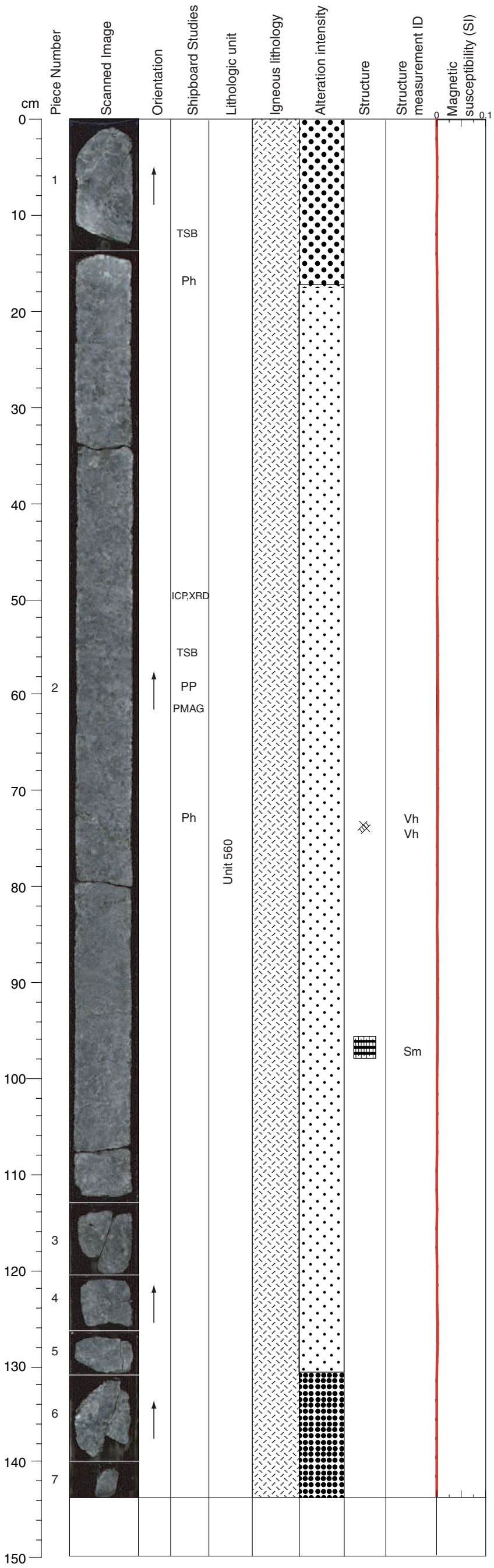
COMMENTS: Alteration of pyroxene to green amphibole, and white patches in plagioclase with some white alteration at plagioclase grain boundaries. A green vein from 29 to 34 cm has an alteration halo about 1 cm wide. A green and white vein from 35 to 38 cm lacks a halo as does a green vein from 123 to 129 cm.

VEIN ALTERATION: Amphibole, chlorite, talc, carbonate

STRUCTURE: Coarse to pegmatitic isotropic gabbro. A few dark green veins and later pale green veins.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-226R-2, 29-50 cm WET

Core Photo



305-U1309D-226R-3 (Section top: 1090.10 mbsf)

UNIT-560: Gabbro
Pieces: 1-7

PRIMARY MINERALOGY: Modal data from Piece 2b

Plagioclase	Modal 50% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 50% Size 10 mm average Shape anhedral

COMMENTS: Continuation of Unit 560 fine- to medium-grained gabbro.

SECONDARY MINERALOGY: Talc, chlorite, pale amphibole

COMMENTS: Light green vein material coats the top of Piece 1 (no halo). Most of the section shows slight green amphibole replacement of pyroxene and white patches (or borders) on plagioclase. A higher degree of alteration from about 8 to 18 cm is associated with a network of fine green veins. A green and white vein extends from 72 to 76 cm and has an alteration halo of about 5 mm (total). Alteration is greater in Pieces 4, 5, and 6.

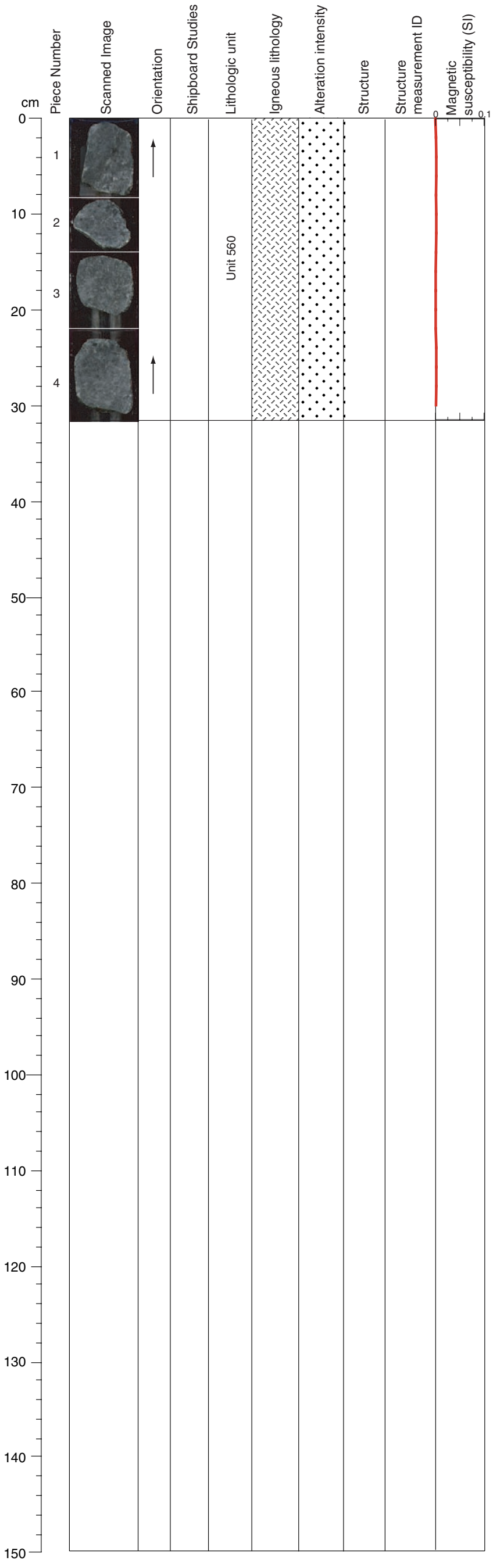
VEIN ALTERATION: Amphibole, chlorite, talc, carbonate

THIN SECTIONS:
305-U1309D-226R-3, 10-13 cm (#561)
305-U1309D-226R-3, 55-57 cm (#562)

STRUCTURE: Coarse isotropic gabbro with interval of fine-grained gabbro with weak magmatic foliation. A dark green vein crosscut by a pale green vein at 74 cm.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-226R-3, 0-22 cm WET
305-U1309D-226R-3, 42-62 cm WET
305-U1309D-226R-3, 68-88 cm WET

Core Photo



305-U1309D-226R-4 (Section top: 1091.54 mbsf)

UNIT-560: Gabbro
Pieces: 1-4

PRIMARY MINERALOGY: Modal data from Piece 3

Plagioclase	Modal 55% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 45% Size 2 mm average Shape anhedral

COMMENTS: Continuation of Unit 560 is seriate to equigranular medium-grained gabbro.

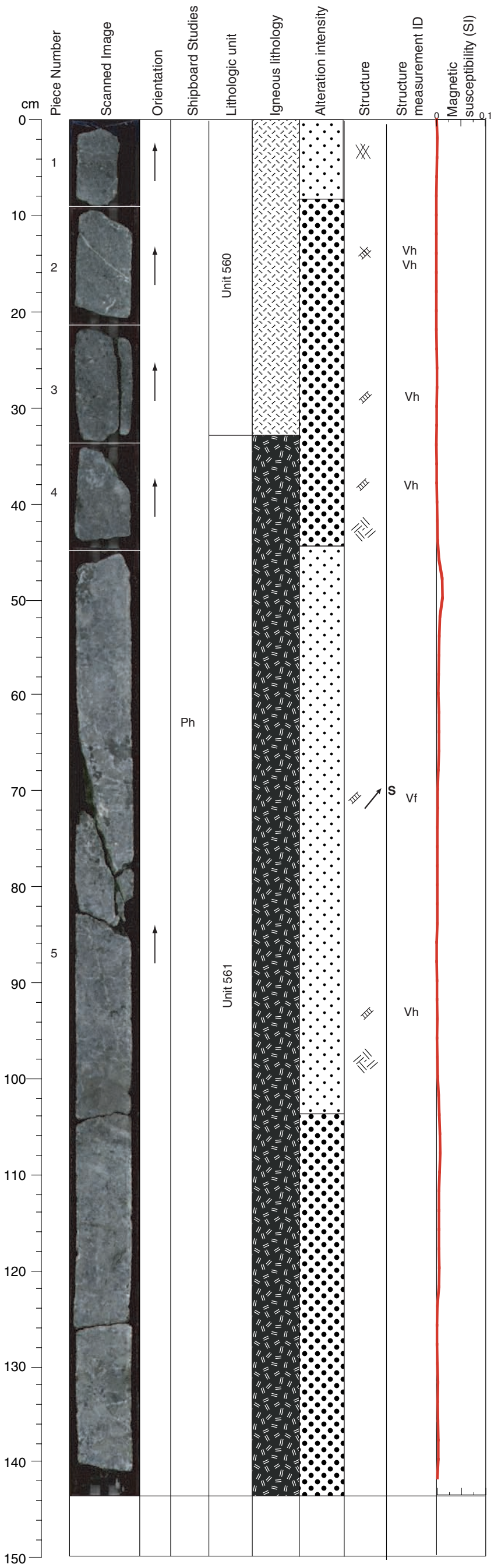
SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: Pyroxene is partially altered to green amphibole and plagioclase has white patches. Green and white vein material coats the bottom of Piece 2.

VEIN ALTERATION: Amphibole, talc, carbonate

STRUCTURE: Medium-grained isotropic gabbro.

Core Photo



305-U1309D-227R-1 (Section top: 1092.00 mbsf)

UNIT-560: Gabbro
Pieces: 1-3

PRIMARY MINERALOGY: Modal data from Piece 3

Plagioclase	Modal 55% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 45% Size 3 mm average Shape anhedral

COMMENTS: Continuation of Unit 560 seriate to equigranular medium-grained gabbro.

UNIT-561: Olivine-bearing Gabbro
Pieces: 4-5

PRIMARY MINERALOGY: Modal data from Piece 5e

Olivine	Modal 2% Size 1 mm average Shape anhedral
Plagioclase	Modal 58% Size to 20 mm Shape anhedral
Clinopyroxene	Modal 40% Size to 25 mm Shape anhedral

COMMENTS: Unit 561 is coarse-grained olivine-bearing gabbro. Medium-grained and coarse-grained interlayering. Oikocrystal pyroxene. Partly pegmatitic.

SECONDARY MINERALOGY: Chlorite, pale amphibole, talc

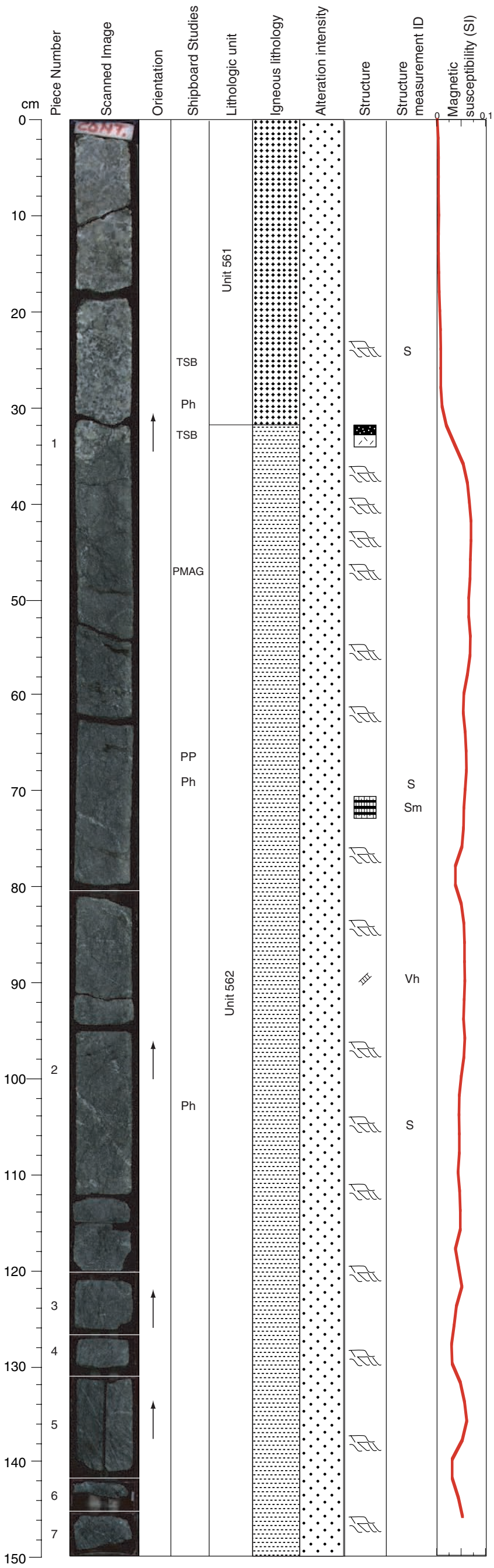
COMMENTS: Coarse-grained gabbro with finer grained part. Piece 1 to 4 finer grained gabbro with leucocratic alteration on the top and at 10 cm, pale green and white vein with alteration halo around and alteration of the pyroxenes to green amphibole. Piece 5 is a coarse-grained gabbro with green vein (green amphibole + talc) at 63-80 cm, with 2 cm wide of alteration halo and the pyroxenes are altered to green amphibole in this alteration zone.

VEIN ALTERATION: Amphibole, chlorite, talc, carbonate, zeolite

STRUCTURE: Medium- to coarse-grained gabbro with no magmatic or plastic foliation. Set of very steep pale green veins and white veins on upper part.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-227R-1, 56-80 cm WET

Core Photo



305-U1309D-227R-2 (Section top: 1093.43 mbsf)

UNIT-561: Olivine Gabbro
Pieces: 1a-1d

PRIMARY MINERALOGY: Modal data from Piece 1c

Olivine	Modal 25% Size 3 mm average Shape anhedral
Plagioclase	Modal 50% Size 4 mm average Shape anhedral
Clinopyroxene	Modal 25% Size to 15 mm Shape anhedral

COMMENTS: Unit 561 is medium- to coarse-grained olivine gabbro.

UNIT-562: Olivine-rich Troctolite
Pieces: 1d-7

PRIMARY MINERALOGY: Modal data from Piece 2a

Olivine	Modal 85% Size 1 mm average Shape anhedral
Plagioclase	Modal 15% Size 1 mm average Shape anhedral

COMMENTS: Unit 562 is fine-grained olivine-rich troctolite. Gabbroic veins. Subhedral to euhedral spinel inclusions both in plagioclase and olivine. Several plagioclase-free dunite patches. Less alteration between 64-134 cm.

SECONDARY MINERALOGY: Chlorite, pale amphibole, serpentine

COMMENTS: Piece 1 is a coarse-grained gabbro with a significant amount of sulfides. At 30-36 cm diffuse contact with serpentinized troctolite. Network of serpentine veins.

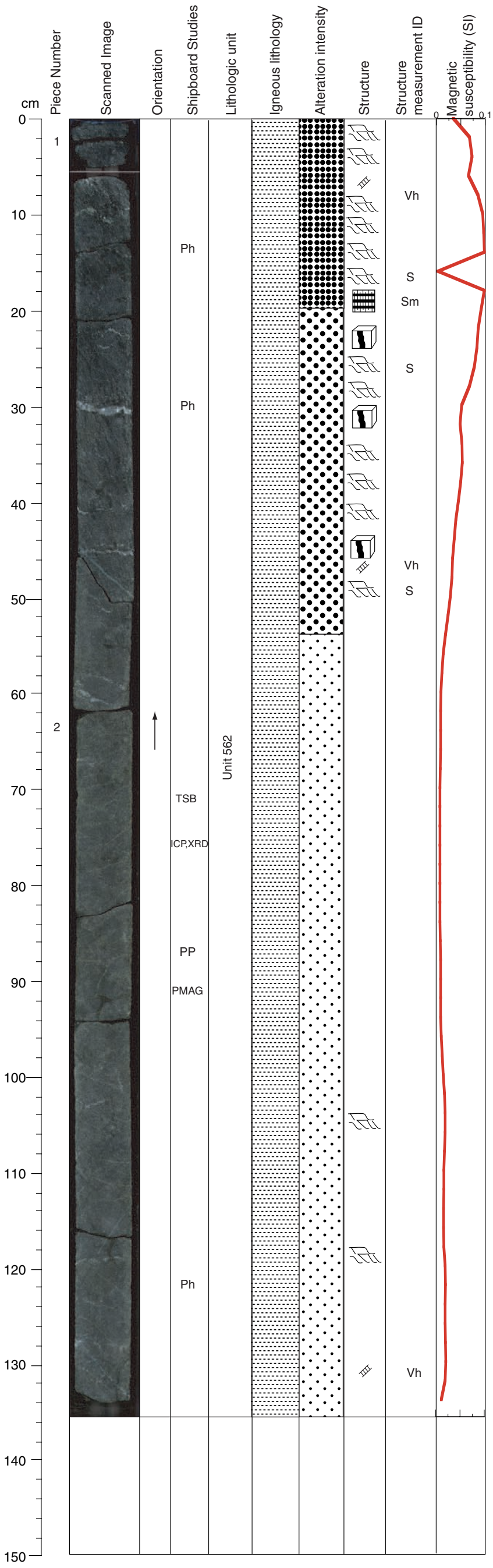
VEIN ALTERATION: Serpentine, talc, zeolite

THIN SECTIONS:
305-U1309D-227R-2, 24-26 cm (#563)
305-U1309D-227R-2, 32-34 cm (#564)

STRUCTURE: Fine-grained troctolite with magmatic foliation and magmatic veins. Weak serpentinization that increases toward the contact to the gabbro.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-227R-2, 22-45 cm WET
305-U1309D-227R-2, 61-78 cm WET
305-U1309D-227R-2, 85-111 cm WET

Core Photo



305-U1309D-227R-3 (Section top: 1094.93 mbsf)

UNIT-562: Olivine-rich Troctolite
Pieces: 1-2

PRIMARY MINERALOGY: Modal data from Piece 1a

Olivine	Modal 85% Size 1 mm average Shape anhedral
Plagioclase	Modal 15% Size 1 mm average Shape anhedral

COMMENTS: Continuation of Unit 562 fine-grained olivine-rich troctolite. Gabbroic veins.

SECONDARY MINERALOGY: Serpentine, chlorite?

COMMENTS: Serpentinized troctolites with serpentine vein network. At 31 and 46 cm, gabbroic dikes 1 cm thick. The section is cut by numerous green amphibole veins with alteration halos. From 56 cm toward the end of the section, the rock is relatively fresh. At 129 cm, pale green vein with reaction zone.

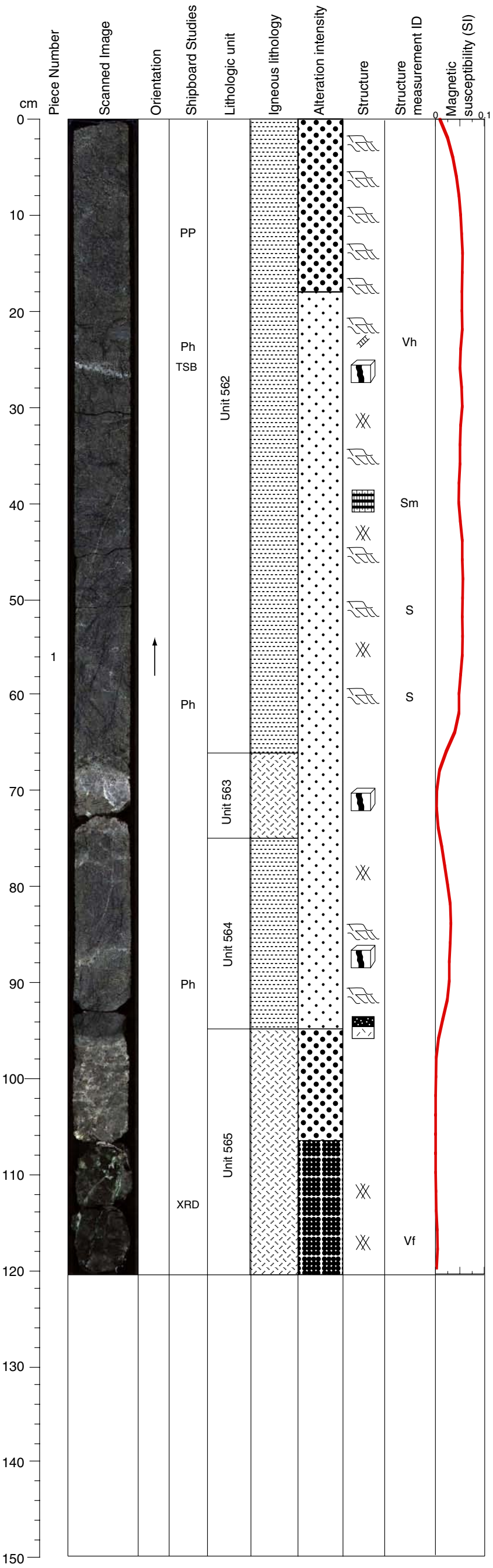
VEIN ALTERATION: Serpentine, amphibole, talc, carbonate, zeolite

THIN SECTIONS:
305-U1309D-227R-3, 70-72 cm (#565)

STRUCTURE: Fine-grained, with magmatic foliation (Sm) visible in upper part of section and several gabbroic magmatic veins. Well-developed serpentine foliation in the upper part.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-227R-3, 6-21 cm WET
305-U1309D-227R-3, 22-51 cm WET
305-U1309D-227R-3, 68-83 cm WET
305-U1309D-227R-3, 117-135 cm WET

Core Photo



305-U1309D-228R-1 (Section top: 1096.80 mbsf)

UNIT-562: Olivine-rich Troctolite
Pieces: 1a-1c

PRIMARY MINERALOGY: Modal data from Piece 1b

Olivine	Modal 85% Size 1 mm average Shape anhedral
Plagioclase	Modal 15% Size 1 mm average Shape anhedral

COMMENTS: Continuation of Unit 562 equigranular to seriate fine-grained olivine-rich troctolite. Gabbroic veins. Subhedral to euherdal spinel inclusions both in plagioclase and olivine. Oikocrystal pyroxene, large sulfides in gabbro veins.

UNIT-563: Gabbro
Pieces: 1c-1d

PRIMARY MINERALOGY: Modal data from Piece 1c

Plagioclase	Modal 55% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 45% Size 25 mm average Shape anhedral

COMMENTS: Unit 563 is coarse-grained gabbro dike.

UNIT-564: Olivine-rich Troctolite
Pieces: 1d-1e

PRIMARY MINERALOGY: Modal data from Piece 1e

Olivine	Modal 85% Size 1 mm average Shape anhedral
Plagioclase	Modal 15% Size 1 mm average Shape anhedral

COMMENTS: Unit 564 (same as 562) is equigranular to seriate fine-grained olivine-rich troctolite. Gabbroic veins. Rare oikocrystic pyroxenes. Large sulfides in gabbro veins.

UNIT-565: Gabbro
Pieces: 1e-1g

PRIMARY MINERALOGY: Modal data from Piece 1g

Plagioclase	Modal 50% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 50% Size 10 mm average Shape anhedral

COMMENTS: Unit 565 is coarse-grained gabbro.

SECONDARY MINERALOGY: Serpentine, chlorite, pale amphibole

COMMENTS: From 1 to 95 cm, serpentinized troctolite with serpentine vein network. At 22-23 cm, 1 cm thick green vein (green amphibole?). At 27 cm, gabbroic intrusion 1 cm wide. At 69-75 cm pegmatitic intrusion (plagioclase, pyroxene, green amphibole). At 96 cm contact with a coarse-grained gabbro with no alteration zone. The pegmatite is cut by numerous thin white veins and at 107-113, several green amphibole veins are observed.

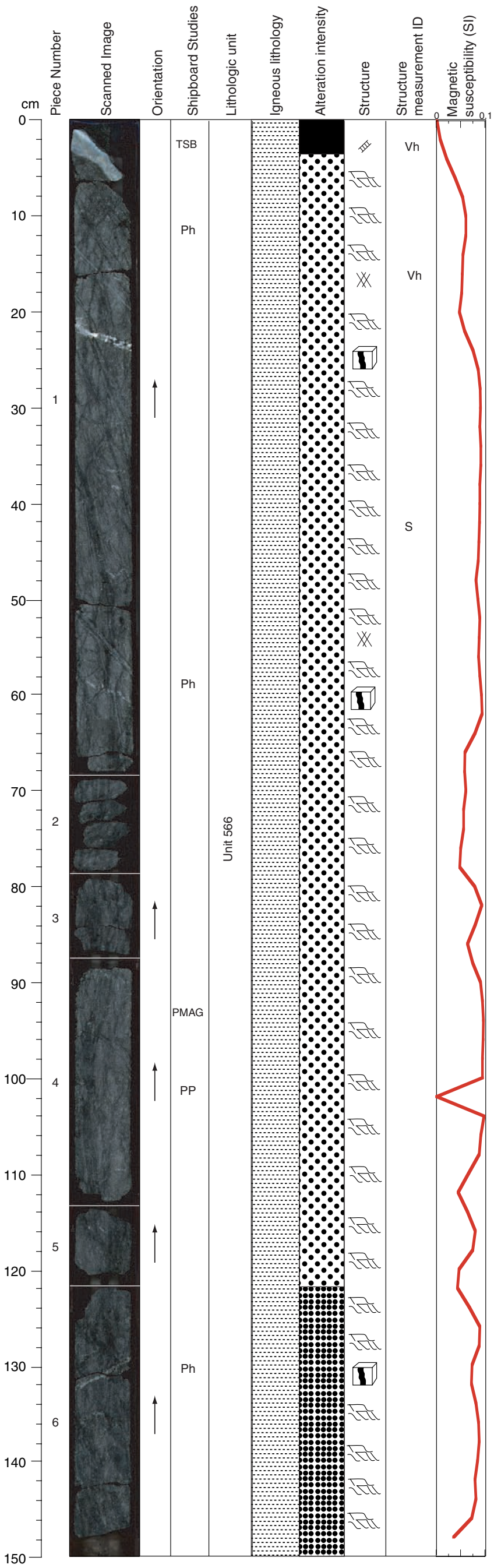
VEIN ALTERATION: Serpentine, amphibole, talc, carbonate, zeolite

THIN SECTIONS:
305-U1309D-228R-1, 24-27 cm (#566)

STRUCTURE: Serpentized troctolite with no magmatic or plastic strain in igneous contact to coarse gabbro. Several magmatic veins < 1 cm thick, some with network appearance, cut the troctolite. The coarse gabbro at the bottom, which is more highly cataclastically deformed with set of pale green fault veins.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-228R-1, 18-45 cm WET
305-U1309D-228R-1, 51-73 cm WET
305-U1309D-228R-1, 84-104 cm WET

Core Photo



305-U1309D-228R-2 (Section top: 1098.01 mbsf)

UNIT-566: Olivine-rich Troctolite
Pieces: 1-6

PRIMARY MINERALOGY: Modal data from Piece 1

Olivine	Modal 85% Size 1 mm average Shape anhedral
Plagioclase	Modal 15% Size 1 mm average Shape anhedral

COMMENTS: Unit 566 is equigranular to seriate fine-grained olivine-rich troctolite. Gabbroic veins.

SECONDARY MINERALOGY: Serpentine, chlorite, pale amplibole

COMMENTS: Serpentinized troctolite. From 1 to 3 cm alteration zone with pyroxene and green amphibole related to vein (talc, tremolite?). At 23 cm, gabbroic intrusion with significant amount of sulfides. From 65 cm toward the end of the section, the plagioclase display a green color.

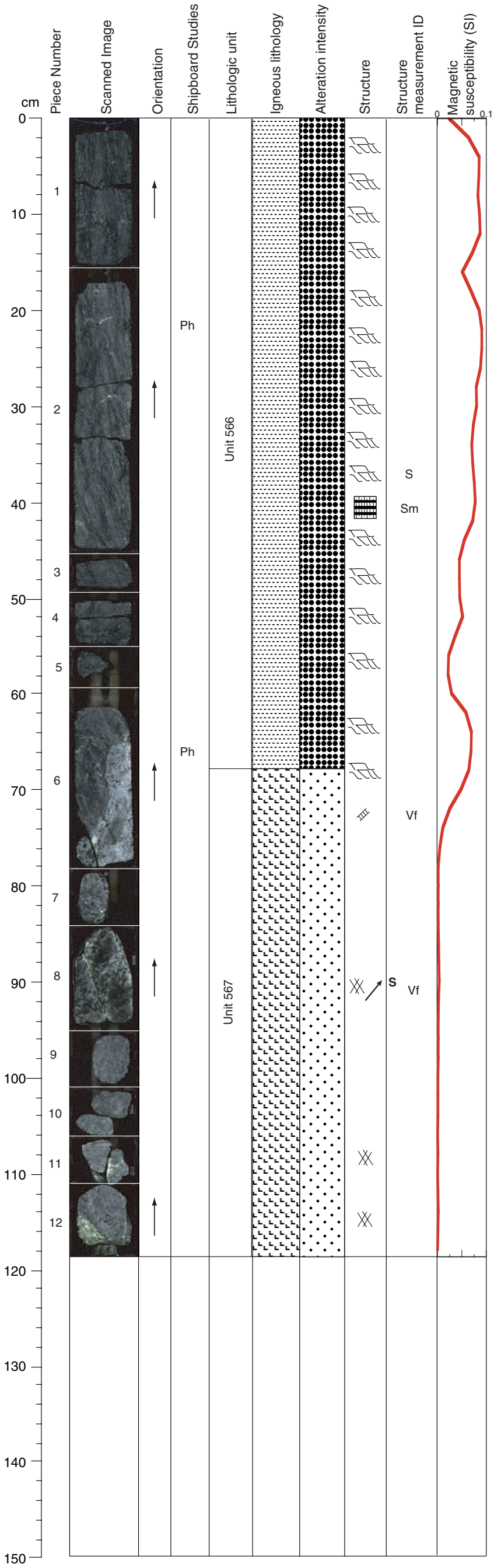
VEIN ALTERATION: Serpentine, amphibole, talc, zeolite

THIN SECTIONS:
305-U1309D-228R-2, 0-3 cm (#567)

STRUCTURE: Troctolite with no magmatic or plastic strain fabric and several magmatic gabbroic veins and segregation-type veinlets of similar orientation. Steep serpentine foliations increasing downward and steep gray veins.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-228R-2, 0-27 cm WET
305-U1309D-228R-2, 51-68 cm WET
305-U1309D-228R-2, 122-147 cm WET

Core Photo



305-U1309D-228R-3 (Section top: 1099.51 mbsf)

UNIT-566: Olivine-rich Troctolite
Pieces: 1-6

PRIMARY MINERALOGY: Modal data from Piece 2c

Olivine	Modal 85% Size 1 mm average Shape anhedral
Plagioclase	Modal 15% Size 1 mm average Shape anhedral

COMMENTS: Continuation of Unit 566 equigranular to seriate fine-grained olivine-rich troctolite.

UNIT-567: Troctolitic Gabbro
Pieces: 6-12

PRIMARY MINERALOGY: Modal data from Piece 8

Olivine	Modal 20% Size 3 mm average Shape anhedral
Plagioclase	Modal 65% Size 4 mm average Shape anhedral
Clinopyroxene	Modal 15% Size 5 mm average Shape anhedral

COMMENTS: Unit 567 is seriate coarse-grained troctolitic gabbro.

SECONDARY MINERALOGY: Chlorite, pale amplibole

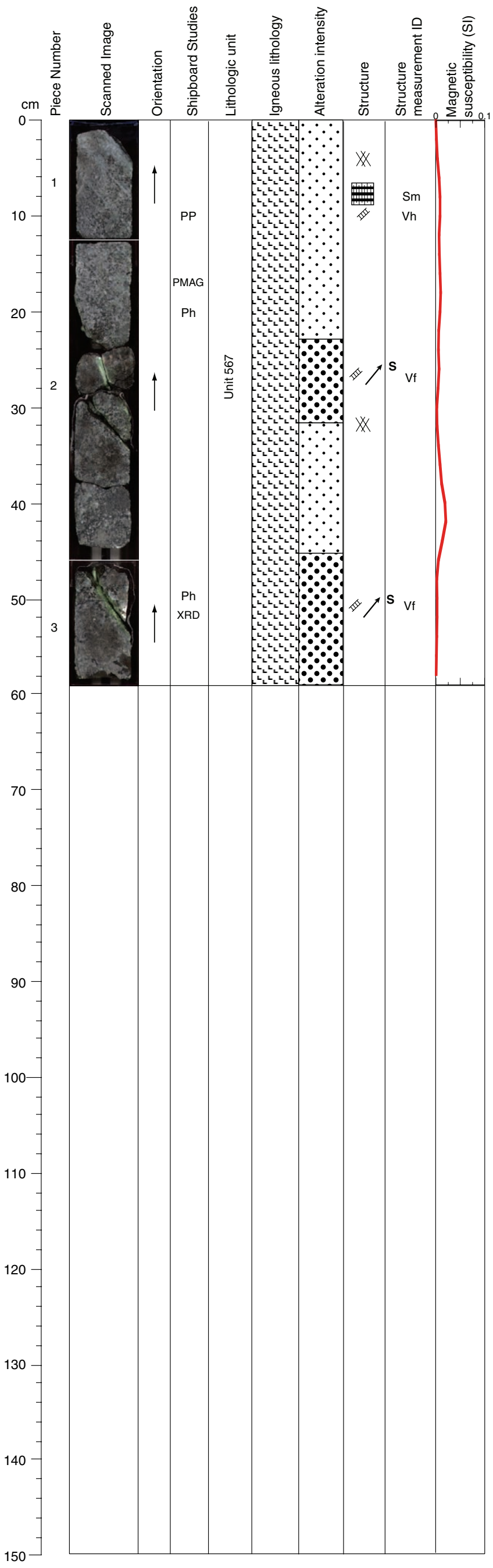
COMMENTS: From Piece 1 to 6, serpentinized troctolite. At 63 cm, contact with gabbro or leucocratic intrusion. Piece 8 is cut by green amphibole vein that also appears on the edges of Pieces 10 to 12.

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

STRUCTURE: Troctolite with weak plagioclase fabric (Sm) parallel to segregation-type veins. In lower part of section, steep contact to gabbro. Steep serpentine foliations pervasive in troctolite. Steeply-dipping pale green fault vein with steep plunge in Piece 8.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-228R-3, 15-43 cm WET
305-U1309D-228R-3, 59-76 cm WET

Core Photo



305-U1309D-228R-4 (Section top: 1100.70 mbsf)

UNIT-567: Troctolitic Gabbro
Pieces: 1-3

PRIMARY MINERALOGY: Modal data from Piece 2a

Olivine	Modal 35% Size 2 mm average Shape anhedral
Plagioclase	Modal 50% Size 4 mm average Shape anhedral
Clinopyroxene	Modal 15% Size 6 mm average Shape anhedral

COMMENTS: Continuation of Unit 567 seriate coarse-grained troctolitic gabbro. Wehrlitic patches at 28-46 cm. Occasional oikocrystic pyroxene. Grain size increases down section.

SECONDARY MINERALOGY: Chlorite, pale amplibole

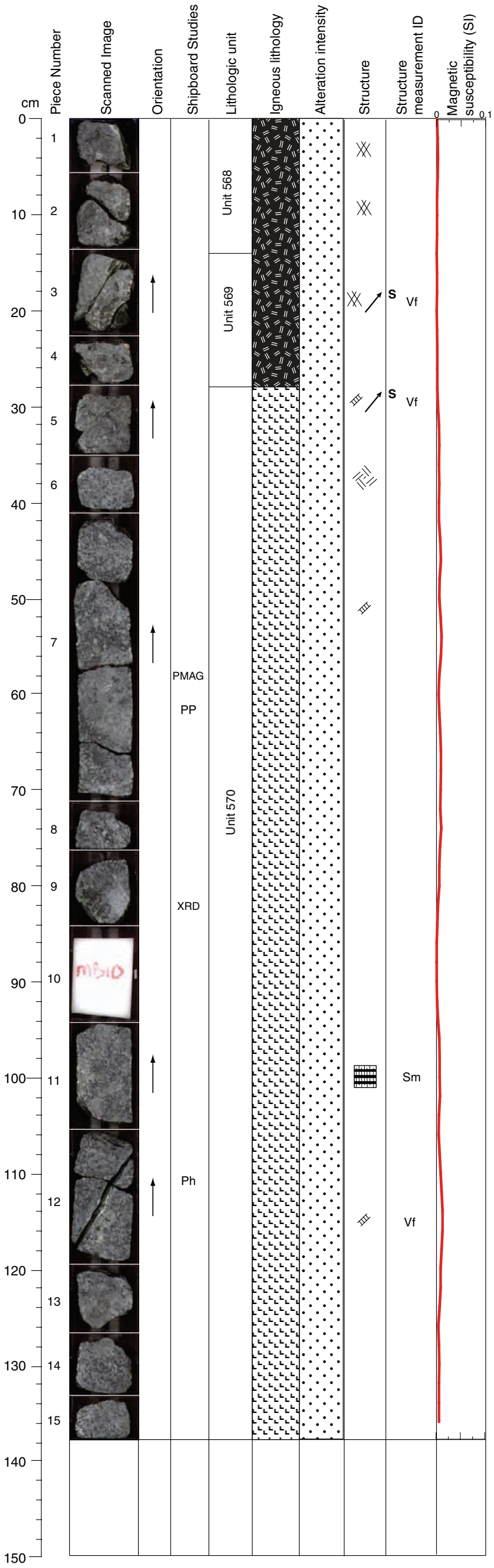
COMMENTS: Coarse-grained gabbro with serpentinized olivine, cut at 24-27 cm and 46-53 cm by green amphibole veins (+ talc) that have associated alteration.

VEIN ALTERATION: Amphibole, talc, chlorite, carbonate

STRUCTURE: Weak magmatic fabric (Sm). Olivine-rich area has early set of gray veins and a later set of pale green fault veins.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-228R-4, 13-37 cm WET
305-U1309D-228R-4, 46-58 cm WET
305-U1309D-228R-4, 46-58 cm DRY

Core Photo



305-U1309D-229R-1 (Section top: 1101.60 mbsf)

UNIT-568: Olivine-bearing Gabbro Rubble
Pieces: 1-2

PRIMARY MINERALOGY:

Olivine	Modal 35% Size 2 mm average Shape anhedral
Plagioclase	Modal 50% Size 4 mm average Shape anhedral
Clinopyroxene	Modal 15% Size 6 mm average Shape anhedral

COMMENTS: Unit 568 is coarse-grained olivine-bearing gabbro rubble.

UNIT-569: Olivine-bearing Gabbro
Pieces: 3-4

PRIMARY MINERALOGY: Mode from Piece 3

Olivine	Modal 5% Size 2 mm average Shape anhedral
Plagioclase	Modal 60% Size 4 mm average Shape anhedral
Clinopyroxene	Modal 35% Size 6 mm average Shape anhedral

COMMENTS: Unit 569 is coarse-grained olivine-bearing gabbro.

UNIT-570: Troctolitic Gabbro
Pieces: 5-15

PRIMARY MINERALOGY: Mode from Piece 7b

Olivine	Modal 30% Size 2 mm average Shape anhedral
Plagioclase	Modal 60% Size 4 mm average Shape anhedral
Clinopyroxene	Modal 10% Size 5 mm average Shape anhedral

COMMENTS: Unit 570 is medium-grained troctolitic gabbro. Clinopyroxene oikocrysts at 57-66 cm.

SECONDARY MINERALOGY: Chlorite, pale amplibole.

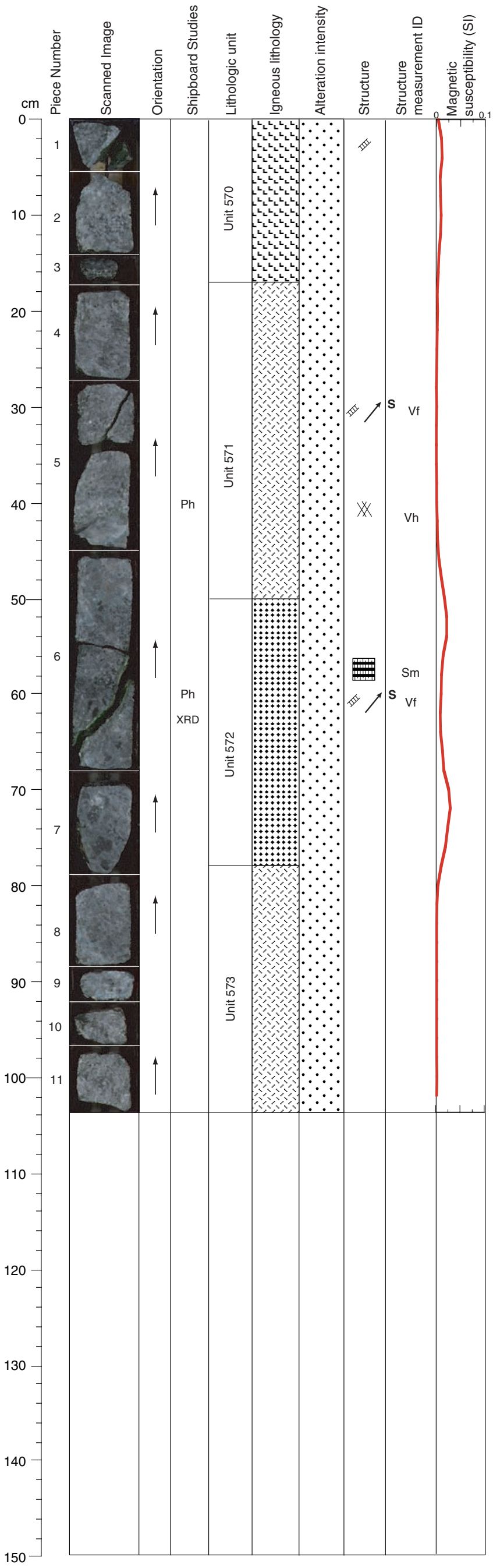
COMMENTS: From Piece 1 to 4 pegmatitic gabbro with vein (talc ?) at 13-20 cm (Piece 3). This vein is observed on the edge of Piece 1 and in Piece 5 (28-34 cm). Serpentinization of olivine. Significant amount of sulfides. From Piece 5 to 15, medium-grained gabbro with serpentinized olivine. At 104-117 cm, green amphibole veins with alteration halo.

VEIN ALTERATION: Amphibole, talc, carbonate

STRUCTURE: Medium-grained gabbro showing a weak magmatic fabric (Sm) in the lower part of the section. Steep pale green vein set (vein faults). Late irregular subhorizontal cracks.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-229R-1, 100-119 cm WET

Core Photo



305-U1309D-229R-2 (Section top: 1102.98 mbsf)

UNIT-570: Troctolitic Gabbro
Pieces: 1-3

PRIMARY MINERALOGY: Mode from Piece 2

Olivine	Modal 30% Size 1 mm average Shape anhedral
Plagioclase	Modal 60% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 10% Size 1 mm average Shape anhedral

COMMENTS: Unit 570 is medium-grained troctolitic gabbro.

UNIT-571: Gabbro
Pieces: 4-6

PRIMARY MINERALOGY: Mode from Piece 5b

Plagioclase	Modal 60% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 40% Size 2 mm average Shape anhedral

COMMENTS: Unit 571 is medium- coarse-grained gabbro.

UNIT-572: Olivine Gabbro
Pieces: 6-7

PRIMARY MINERALOGY: Mode from Piece 6b

Olivine	Modal 35% Size 1 mm average Shape anhedral
Plagioclase	Modal 50% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 15% Size 1 mm average Shape anhedral

COMMENTS: Unit 572 is medium-grained olivine gabbro.

UNIT-573: Gabbro
Pieces: 8-11

PRIMARY MINERALOGY: Mode from Piece 8

Plagioclase	Modal 60% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 40% Size 1 mm average Shape anhedral

COMMENTS: Unit 573 is fine- to medium-grained gabbro.

SECONDARY MINERALOGY: Chlorite, pale amphibole

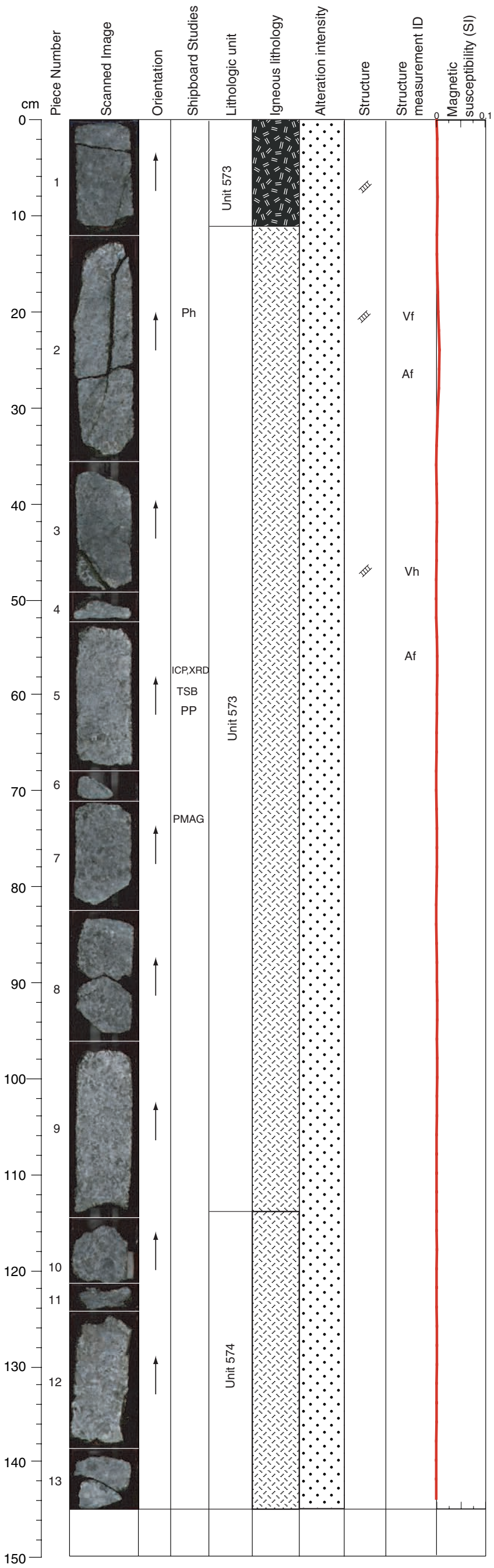
COMMENTS: Medium-grained gabbro with green amphibole veins at 4-5 cm with alteration halo. Serpentinized olivines. At 40-43 cm, leucocratic alteration with alteration zone.

VEIN ALTERATION: Amphibole, chlorite, talc, carbonate

STRUCTURE: Medium- to coarse-grained gabbro showing a weak magmatic foliation (Sm) in medium-grained intervals. Dark green vein with alteration halo and pale green fault veins with shallow-plunging fibrous mineral.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-229R-2, 38-68 cm WET
305-U1309D-229R-2, 58-68 cm DRY

Core Photo



305-U1309D-230R-1 (Section top: 1105.50 mbsf)

UNIT-573: Olivine-bearing Gabbro to Gabbro
Pieces: 1-9

PRIMARY MINERALOGY: Mode from Pieces 1b and 5

Olivine	Modal 0-5% Size 2 mm average Shape anhedral
Plagioclase	Modal 45% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 50-55% Size 2 mm average Shape anhedral

COMMENTS: Unit 573 fine- to medium-grained olivine-bearing gabbro to gabbro. Modes vary and grain size increases down section. As much as 8% orthopyroxene observed in thin section.

UNIT-574: Gabbro
Pieces: 10-13

PRIMARY MINERALOGY: Mode from Piece 12

Plagioclase	Modal 30% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 70% Size 5 mm average Shape anhedral

COMMENTS: Unit 574 is coarse-grained gabbro.

SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: Alteration is variable throughout the section. The background alteration of the gabbro involves green amphibole after pyroxene and white patches or veinlets through plagioclase. Green veins or vein networks are present from 5 cm to 11 cm in Piece 1. A similar vein cuts through Piece 2, but also contains white material (zeolite?). An alteration zone 1.5 cm thick at the top of Piece 3a is associated with a network of green veins as is one between 40 and 43 cm. A third vein cuts the bottom of Piece 3 from about 44 to 49 cm and is associated with a 1 cm wide zone of higher alteration in the adjacent gabbro. Alteration with a set of green veins occurs in Pieces 4 and 6, the bottom 1 cm of Piece 7 and the top 1 cm of Piece 8. The top of Piece 9 is slightly lighter than the remainder of the piece (plagioclase is more altered). A set of vertical green veins cut the right side of Piece 11 and there is a halo of alteration around the vein set.

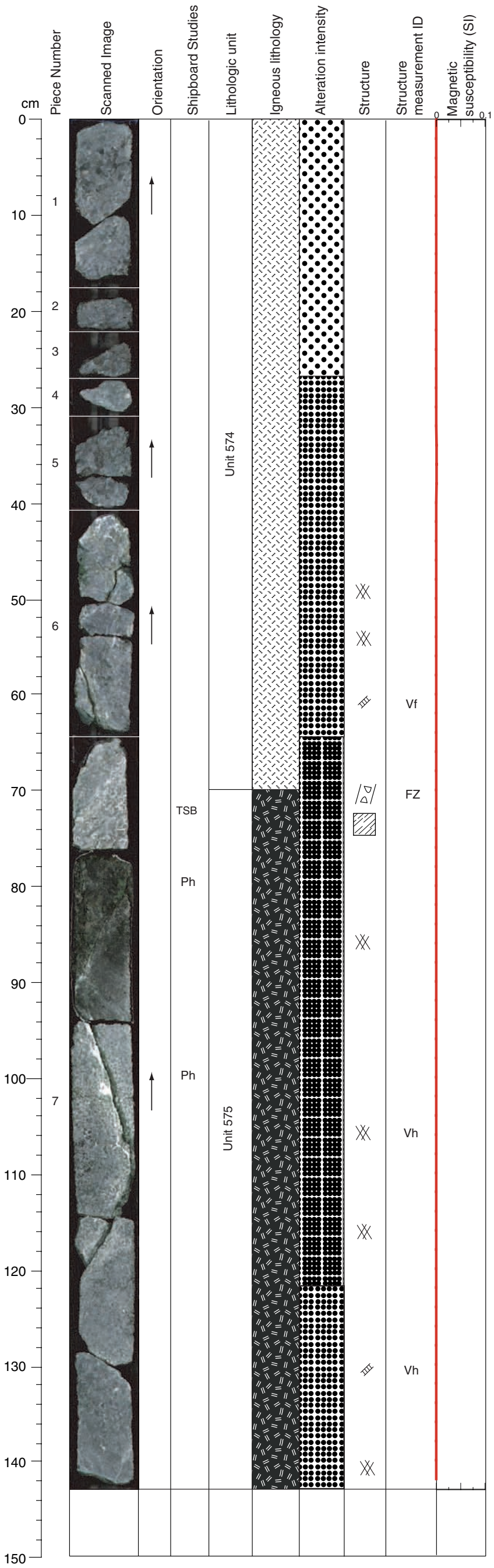
VEIN ALTERATION: Amphibole, chlorite, talc

THIN SECTIONS:
305-U1309D-230R-1, 58-60 cm (#568)

STRUCTURE: Medium to coarse grained isotropic gabbro. Earlier dark green vein and later irregular pale green veins.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-230R-1, 13-35 cm WET
305-U1309D-230R-1, 52-67 cm WET

Core Photo



305-U1309D-230R-2 (Section top: 1106.95 mbsf)

UNIT-574: Gabbro
Pieces: 1-7b

PRIMARY MINERALOGY: Mode from Piece 1a

Plagioclase	Modal 40% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 60% Size 5 mm average Shape anhedral

COMMENTS: Unit 574 is coarse-grained gabbro. Oxide in Piece 5. Severely altered and deformed (cataclastic?) at 68-90 cm.

UNIT-575: Olivine-bearing Gabbro
Pieces: 7

PRIMARY MINERALOGY: Mode from Piece 7e

Olivine	Modal 5% Size 1 mm average Shape anhedral
Plagioclase	Modal 45% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 50% Size 2 mm average Shape anhedral

COMMENTS: Unit 575 is fine- to medium-grained olivine-bearing gabbro.

SECONDARY MINERALOGY: Chlorite, pale amphibole, secondary plagioclase

COMMENTS: Alteration is greater in the top 2 cm of Piece 1a and the bottom 2 cm. Vein material coats the break between Pieces 1a and 1b and the top of Piece 1b also has a zone of alteration about 1.5 cm thick. Piece 4 is more highly altered and pale green. Piece 6 is cut by green and white veins and is generally more altered. The alteration and veining become more prominant down section and Piece 7 has several sets of veins and associated alteration halos of varying width. There are patches of white in the vein from 94 to 110 cm.

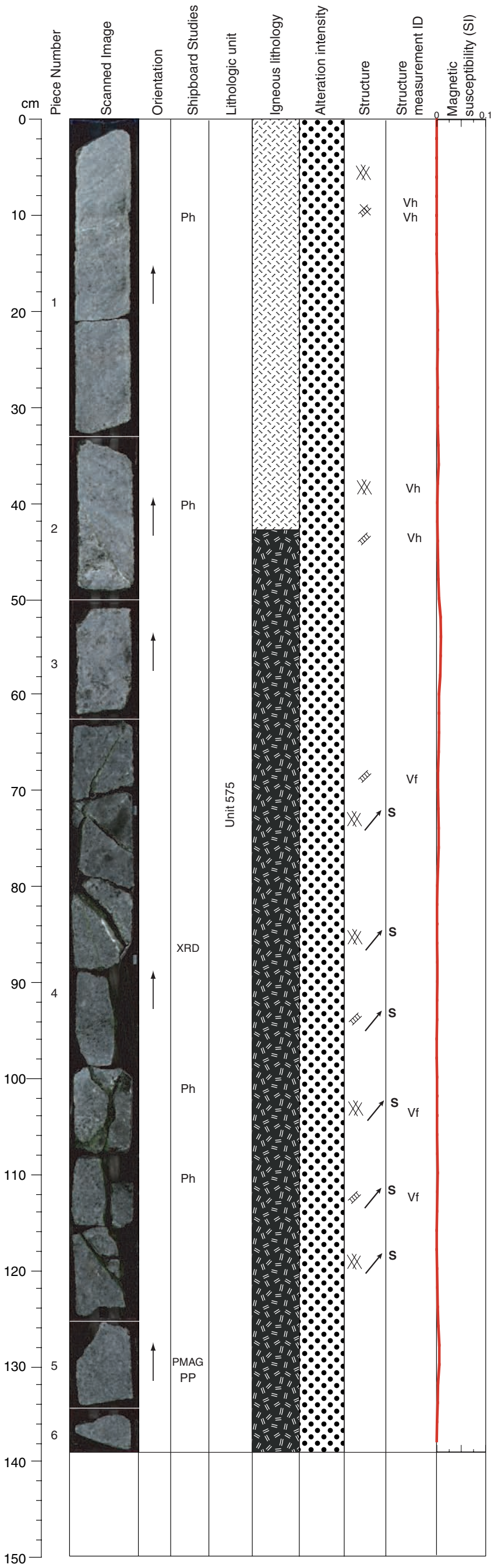
VEIN ALTERATION: Amphibole, chlorite, talc, epidote, carbonate, zeolite

THIN SECTIONS:
305-U1309D-230R-2, 70-74 cm (#569)

STRUCTURE: Medium-grained isotropic gabbro. Fault zone with breccia (4 mm in maximum) in Piece 7a. Steep white veins locally with alteration halo. Cataclasis distributed.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-230R-2, 64-94 cm WET
305-U1309D-230R-2, 95-115 cm WET

Core Photo



305-U1309D-230R-3 (Section top: 1108.38 mbsf)

UNIT-575: Gabbro to Olivine-bearing Gabbro
Pieces: 1-6

PRIMARY MINERALOGY: Mode from Piece 1b and 3

Olivine	Modal 1-5% Size 1 mm average Shape anhedral
Plagioclase	Modal 35-50% Size 1 mm average Shape anhedral
Clinopyroxene	Modal 45-65% Size 1 mm average Shape anhedral

COMMENTS: Unit 575 is fine- to medium-grained gabbro to olivine-bearing gabbro.

SECONDARY MINERALOGY: Chlorite, pale amplibole

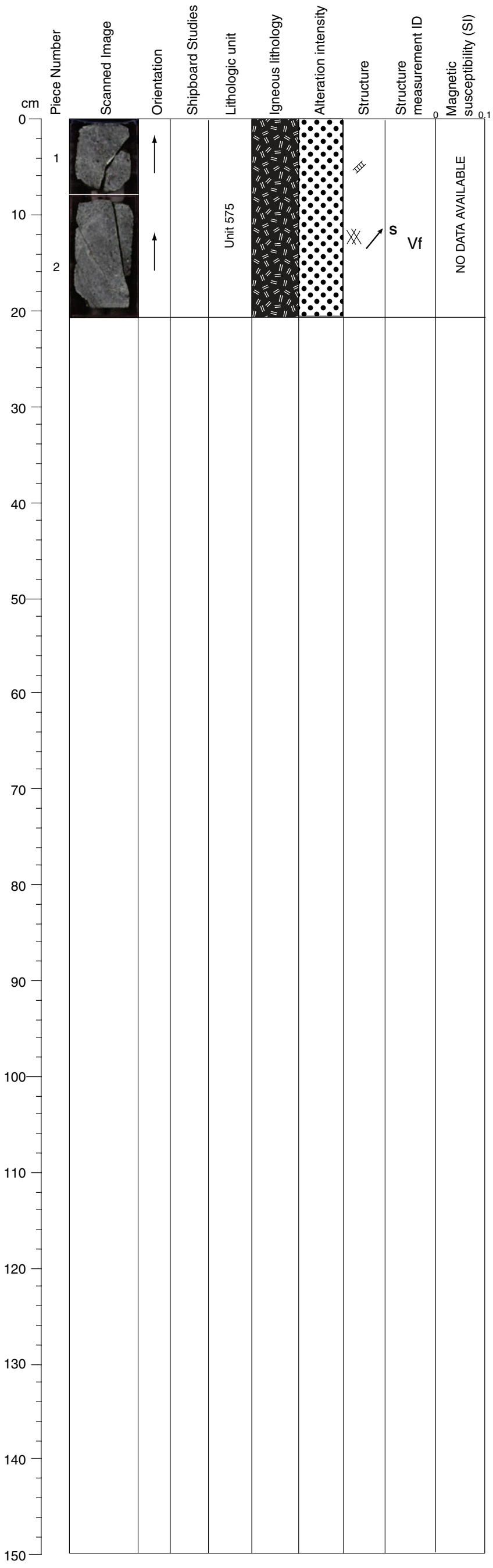
COMMENTS: In the upper 2 pieces gabbro is altered to a light green (actinolite/talc/prehnite?) probably related to several subparallel diagonal light-green veins that cut through this part of the section. In Piece 2 a yellow green and white vein cuts the section at a higher angle and the gabbro is slightly fresher below this vein. In Piece 4 there are numerous green and white veins crosscutting the gabbro at various angles and alteration in the rock is greatest within alteration halos of varying widths adjacent to the veins. There is some weak corona texture developed in the alteration halos.

VEIN ALTERATION: Amphibole, chlorite, talc, carbonate, zeolite

STRUCTURE: Medium- to coarse-grained isotropic gabbro. Set of dark green veins and later irregular, but steeply dipping pale green veins.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-230R-3, 0-20 cm WET
305-U1309D-230R-3, 34-49 cm WET
305-U1309D-230R-3, 98-107 cm DRY
305-U1309D-230R-3, 99-123 cm WET

Core Photo



305-U1309D-230R-4 (Section top: 1109.77 mbsf)

UNIT-575: Olivine-bearing Gabbro
Pieces: 1-2

PRIMARY MINERALOGY: Mode from Piece 2

Olivine	Modal 5% Size 1 mm average Shape anhedral
Plagioclase	Modal 50% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 45% Size 1 mm average Shape anhedral

COMMENTS: Unit 575 is fine- to medium-grained olivine-bearing gabbro.

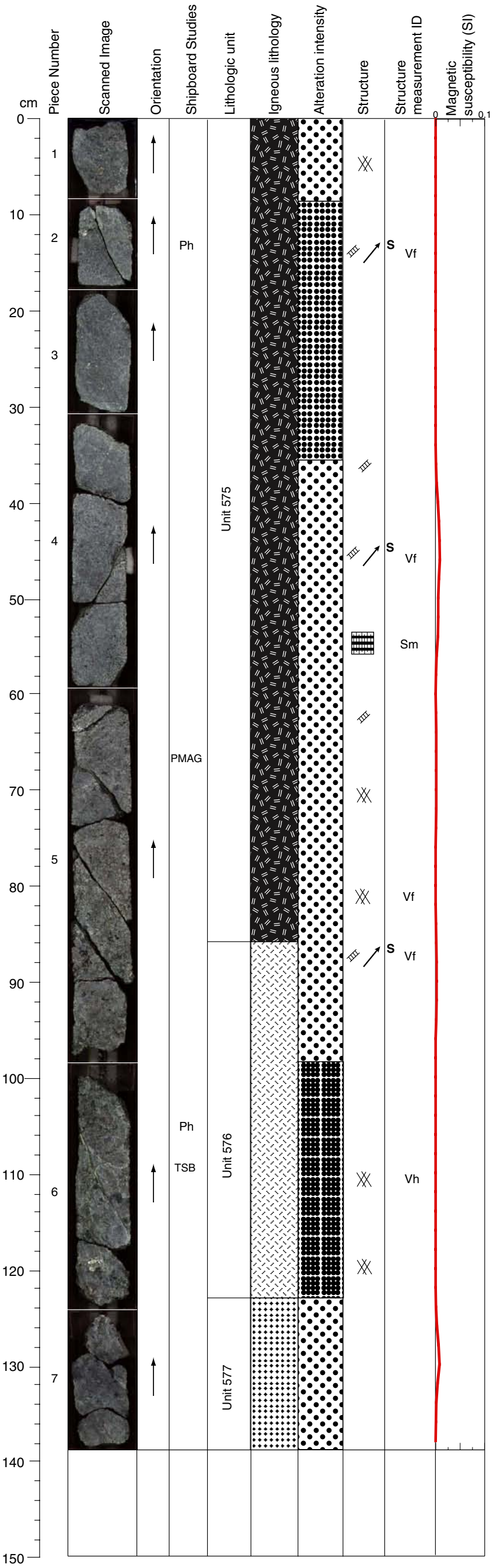
SECONDARY MINERALOGY: Chlorite, pale amplibole

COMMENTS: Alteration is similar to the previous section with several green and white veins crosscutting the core and alteration greatest within a few mm of the veins. The general background alteration is green amphibole after pyroxene and plagioclase altered to white patches. Olivine in the gabbro is altered to serpentine. There is some weak corona texture developed in the section.

VEIN ALTERATION: Amphibole, chlorite, talc, carbonate, zeolite

STRUCTURE: Medium-grained isotropic gabbro with steeply-dipping irregular pale green veins.

Core Photo



305-U1309D-231R-1 (Section top: 1110.30 mbsf)

UNIT-575: Olivine-bearing Gabbro
Pieces: 1-5d

PRIMARY MINERALOGY: Mode from Piece 3

Olivine	Modal 1% Size 1 mm average Shape anhedral
Plagioclase	Modal 55% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 45% Size 1 mm average Shape anhedral

COMMENTS: Unit 575 is fine- to medium-grained olivine-bearing gabbro.

UNIT-576: Gabbro
Pieces: 5e-6b

PRIMARY MINERALOGY: Mode from Piece 6a

Plagioclase	Modal 25% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 75% Size 5 mm average Shape anhedral

COMMENTS: Unit 576 is medium- to coarse-grained gabbro.

UNIT-577: Olivine Gabbro
Pieces: 7

PRIMARY MINERALOGY: Mode from Piece 7

Olivine	Modal 5% Size 1 mm average Shape anhedral
Plagioclase	Modal 65% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 30% Size 5 mm average Shape anhedral

COMMENTS: Unit 577 is medium- to coarse-grained olivine gabbro.

SECONDARY MINERALOGY: Chlorite, pale amphibole, talc

COMMENTS: Several thin dark green veins cut Piece 1 and are surrounded by adjacent corona texture. Several light green and white veins cut Pieces 2, 3, and the top of 4 and surrounding gabbro is more highly altered. Light green and white vein cuts Pieces 4a and 4b and a darker green vein cuts Pieces 4b and 4c and the latter has an alteration halo about 1 cm wide. The bottom of Piece 4 and top of Piece 5 each have about 1.5 cm wide zones of more highly altered pyroxene (to green amphibole?), probably related to a vein between the two pieces as amphibole coats the bottom of Piece 5 and top of Piece 6. At about 106 cm to the bottom of Piece 6 there is a yellow-green (epidote), green and white branching vein. It has a variable alteration halo in the adjacent gabbro with minor corona texture.

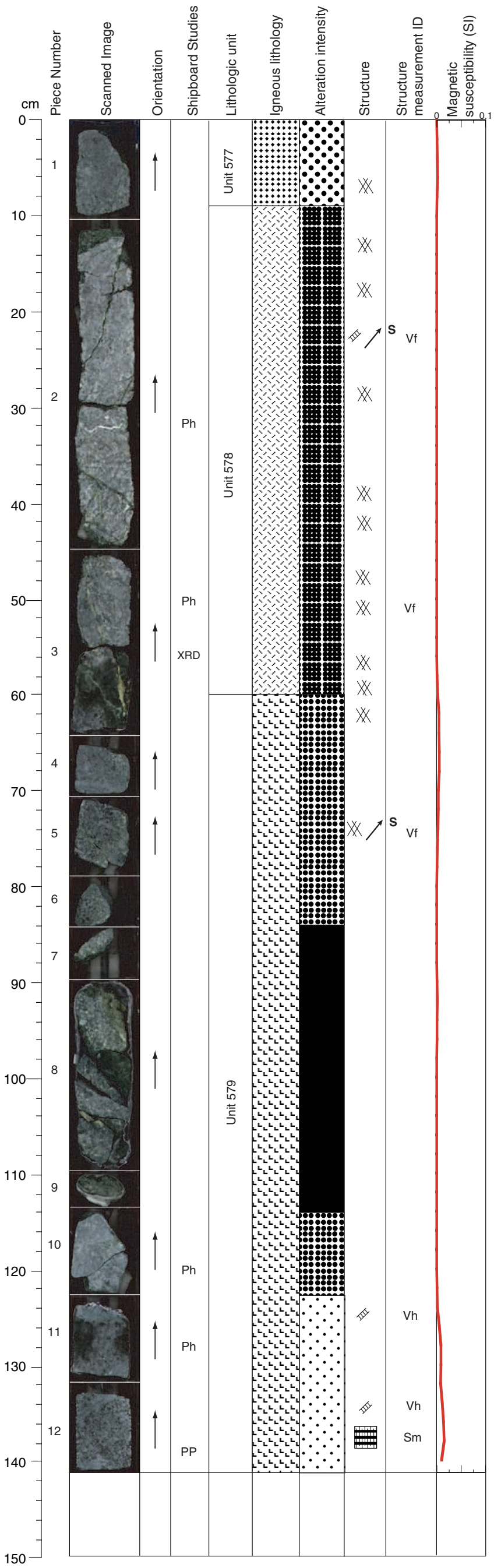
VEIN ALTERATION: Amphibole, chlorite, talc, carbonate, epidote, zeolite

THIN SECTIONS:
305-U1309D-231R-1, 108-110 cm (#570)

STRUCTURE: Medium-grained gabbro with locally developed foliation of magmatic origin. Dark green irregular veins cut by pale green veins. In Piece 6 possible epidote alteration in dark green branching veins.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-231R-1, 8-30 cm WET
305-U1309D-231R-1, 98-122 cm WET

Core Photo



305-U1309D-231R-2 (Section top: 1111.69 mbsf)

UNIT-577: Olivine Gabbro
Piece 1

PRIMARY MINERALOGY: Mode from Piece 1

Olivine	Modal 10% Size 2 mm average Shape anhedral
Plagioclase	Modal 55% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 35% Size 2 mm average Shape anhedral

COMMENTS: Unit 577 is medium-grained olivine gabbro.

UNIT-578: Gabbro
Pieces: 2-3b

PRIMARY MINERALOGY: Mode from Piece 2b

Plagioclase	Modal 25% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 75% Size 2 mm average Shape anhedral

COMMENTS: Unit 578 is medium-grained gabbro.

UNIT-579: Troctolitic Gabbro
Pieces: 3b-12

PRIMARY MINERALOGY: Mode from Piece 12

Olivine	Modal 40% Size 2 mm average Shape anhedral
Plagioclase	Modal 50% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 10% Size 1 mm average Shape anhedral

COMMENTS: Unit 579 is medium-grained troctolitic gabbro.

SECONDARY MINERALOGY: Chlorite, pale amphibole, secondary plagioclase

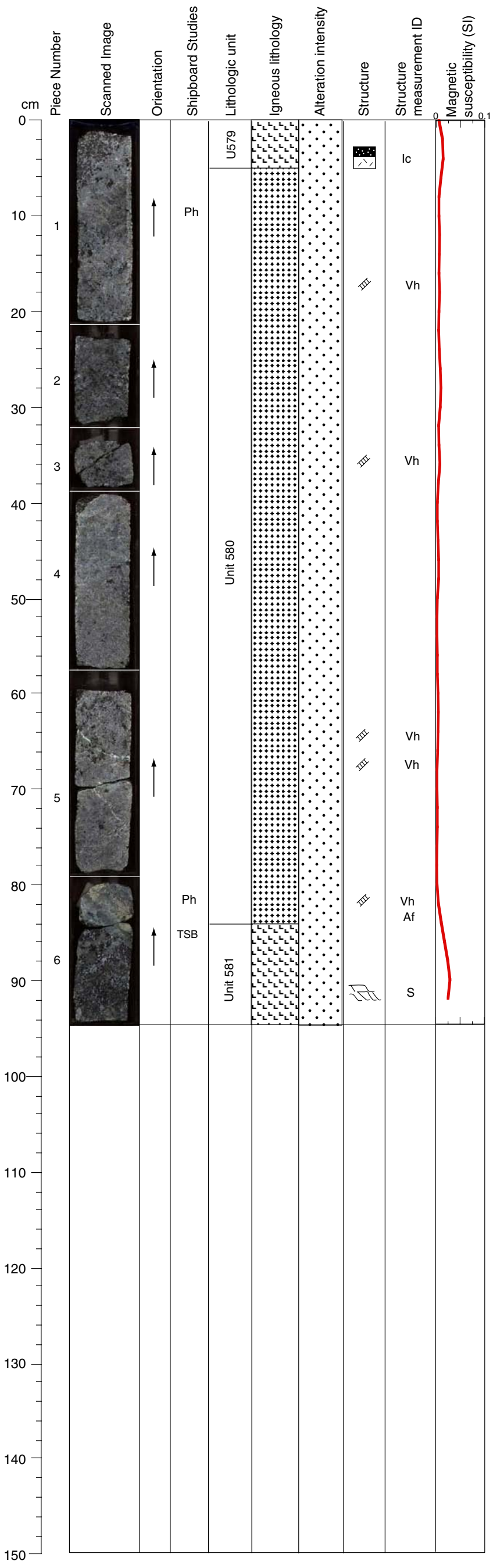
COMMENTS: General alteration of the gabbro includes green amphibole after pyroxene and plagioclase altered to white patches and to light green (prehnite/chlorite?) material. The entire section is crosscut by numerous veins that include light green and white minerals. Between 38 and 62 cm and again from 103 to 105 cm there is a yellow green mineral (epidote?) partially infilling the middle of the larger veins. A dark serpentine vein cuts the top corner of Piece 12. Corona texture is variably developed around veins.

VEIN ALTERATION: Amphibole, chlorite, talc, carbonate, epidote, zeolite

STRUCTURE: Fine- to medium-grained gabbro with magmatic foliation (Sm) visible in lower part of section associated with olivine gabbro of same location. Irregular cataclastic vein with fault gouge in middle section, some of which include epidote.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-231R-2, 29-44 cm WET
305-U1309D-231R-2, 45-64 cm WET
305-U1309D-231R-2, 110-131 cm WET
305-U1309D-231R-2, 123-131 cm DRY

Core Photo



305-U1309D-231R-3 (Section top: 1113.10 mbsf)

UNIT-579: Troctolitic Gabbro
Pieces: 1

PRIMARY MINERALOGY: Mode from Piece 1

Olivine	Modal 70% Size 2 mm average Shape anhedral
Plagioclase	Modal 20% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 10% Size 1 mm average Shape anhedral

COMMENTS: Unit 579 is medium-grained troctolitic gabbro.

UNIT-580: Olivine Gabbro
Pieces: 1-5

PRIMARY MINERALOGY: Mode from Piece 4

Olivine	Modal 20% Size 2 mm average Shape anhedral
Plagioclase	Modal 45% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 35% Size 2 mm average Shape anhedral

COMMENTS: Unit 580 is medium-grained olivine gabbro. Anhedral pyroxene-rich band at 2 to 10 cm. Inhomogeneous in grain size and modal ratio. Olivine-rich (40%) in Piece 2 and olivine-poor at 39-47 cm.

UNIT-581: Troctolitic Gabbro
Pieces: 6

PRIMARY MINERALOGY: Mode from Piece 6

Olivine	Modal 60% Size 2 mm average Shape anhedral
Plagioclase	Modal 30% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 10% Size 3 mm average Shape anhedral

COMMENTS: Unit 581 medium- to coarse-grained troctolitic gabbro.

SECONDARY MINERALOGY: Chlorite, pale amphibole, serpentine

COMMENTS: General background alteration has green amphibole after pyroxene and plagioclase altered to white patches. Some horizontal white fractures (e.g., Piece 2) probably show alteration of plagioclase. Piece 3 has a green vein with a 1 cm wide (total) halo. Alteration from 39 to 48 cm is associated with a network of fine light green veins. Some corona texture in this interval. Piece 5a has a green and white vein with apparent spherules of zeolite and an associated alteration halo ~2 mm-1 cm wide. The break between Pieces 5a and 5b was probably along light green vein of amphibole and chlorite and it is surrounded by an alteration halo about 1.5 cm wide. Branching off from this vein is a pale green and white vein with adjacent plagioclase grains more highly atered to white patches. Pieces 6a and the upper 2 cm of Piece 6b are highly altered (epidote-bearing) coarser gabbro with thin green amphibole veins. The adjacent troctolite is more highly altered for about 1 cm from the contact.

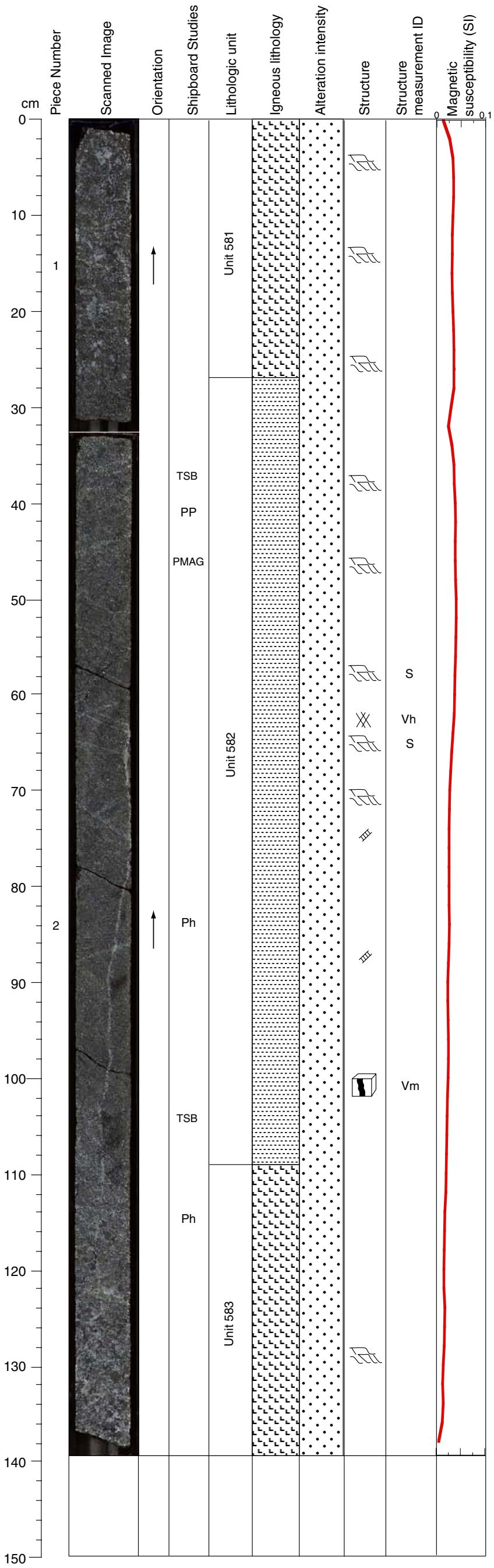
VEIN ALTERATION: Amphibole, chlorite, talc, carbonate, epidote, zeolite

THIN SECTIONS:
305-U1309D-231R-3, 83-86 cm (#571)

STRUCTURE: Medium-grained gabbro with no clear magmatic fabric in igneous contact with olivine gabbro at top of section and in sheared contact with troctolite at bottom of section. Gabbro with pale green veins and locally dark green veins, and alteration zone with dark green veins in Piece 6. Steeply dipping white vein. Troctolite with moderate serpentinization. Gray veins and serpentinization foliation that is well developed.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-231R-3, 0-21 cm WET
305-U1309D-231R-3, 79-94 cm WET

Core Photo



305-U1309D-232R-1 (Section top: 1115.10 mbsf)

UNIT-581: Troctolitic Gabbro
Pieces: 1

PRIMARY MINERALOGY: Mode from Piece 1

Olivine	Modal 60% Size 2 mm average Shape anhedral
Plagioclase	Modal 35% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 5% Size 3 mm average Shape anhedral

COMMENTS: Unit 581 is medium- to coarse-grained troctolitic gabbro.

UNIT-582: Olivine-rich Troctolite
Pieces: 2a-d

PRIMARY MINERALOGY: Mode from Piece 2b

Olivine	Modal 80% Size 1 mm average Shape anhedral
Plagioclase	Modal 18% Size 1 mm average Shape anhedral
Clinopyroxene	Modal 2% Size 1 mm average Shape anhedral

COMMENTS: Unit 582 is fine-grained olivine-rich troctolite. Vertical gabbro vein cuts through from 64 cm to the end of this section. Pyroxene concentrated especially in and around gabbro vein. Trace spinel. In thin section clinopyroxene is up to 15% oikocrystic interstitial together with plagioclase as intercumulus phase.

UNIT-583: Troctolitic Gabbro
Pieces: 2d

PRIMARY MINERALOGY: Mode from Piece 2d

Olivine	Modal 50% Size 2 mm average Shape anhedral
Plagioclase	Modal 43% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 7% Size 3 mm average Shape anhedral

COMMENTS: Unit 583 is medium- to coarse-grained troctolitic gabbro. Coarse-grained gabbro vein at 124 cm. Grain size and modal composition gradually change from the last unit. Large grain size variation. Plagioclase oikocryst. Trace spinel.

SECONDARY MINERALOGY: Serpentine, chlorite

COMMENTS: Serpentinized troctolite with a serpentine foliation extending the length of the section. Overprinted by several light green and white veins with thin (1-2 m wide) alteration halos. A vein (possibly magmatic) from about 63 to 125 cm cuts nearly vertically through Piece 2.

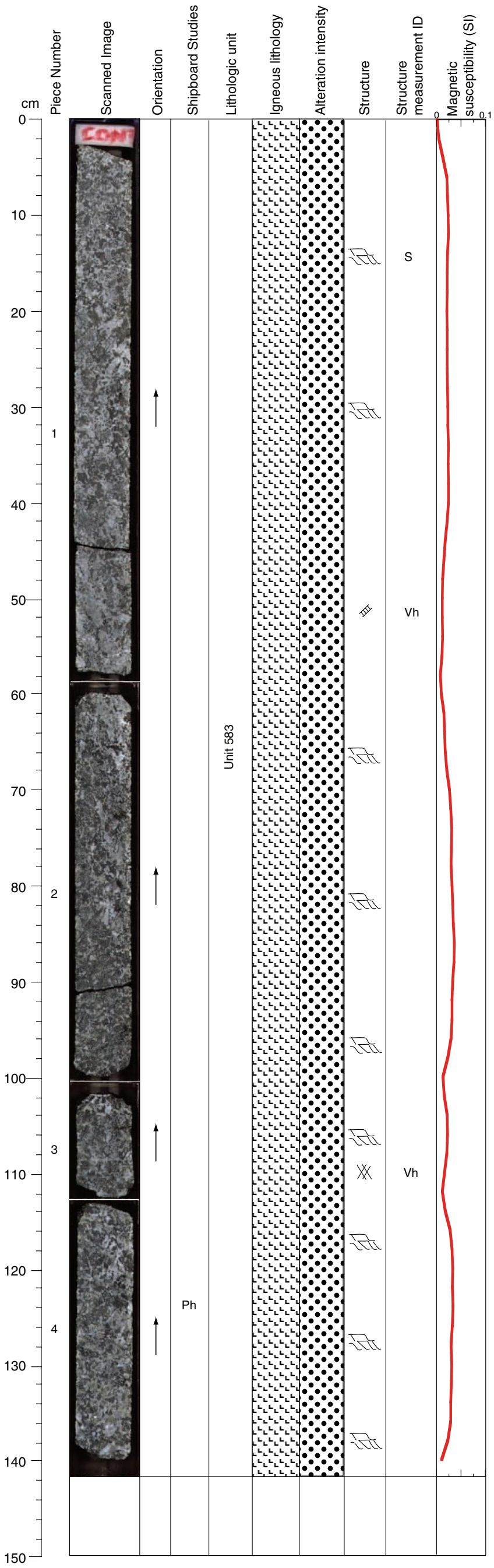
VEIN ALTERATION: Serpentine, amphibole, chlorite

THIN SECTIONS:
305-U1309D-232R-1, 35-38 cm (#572)
305-U1309D-232R-1, 102-105 cm (#573)

STRUCTURE: Steep gabbro veinlet (Vm). No consistent magmatic or plastic fabric discernible. Gray veins (Vh) and serpentinization foliation (S) that is well developed.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-232R-1, 33-60 cm WET
305-U1309D-232R-1, 78-99 cm WET
305-U1309D-232R-1, 97-125 cm WET

Core Photo



305-U1309D-232R-2 (Section top: 1116.50 mbsf)

UNIT-583: Troctolitic Gabbro
Pieces: 1-4

PRIMARY MINERALOGY: Mode from Piece 1a

Olivine	Modal 47% Size 5 mm average Shape anhedral
Plagioclase	Modal 45% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 8% Size 5 mm average Shape anhedral

COMMENTS: Unit 583 is coarse-grained troctolitic gabbro. Large grain size variation. Plagioclase includes olivine and pyroxene chadacrysts.

SECONDARY MINERALOGY: Serpentine, chlorite

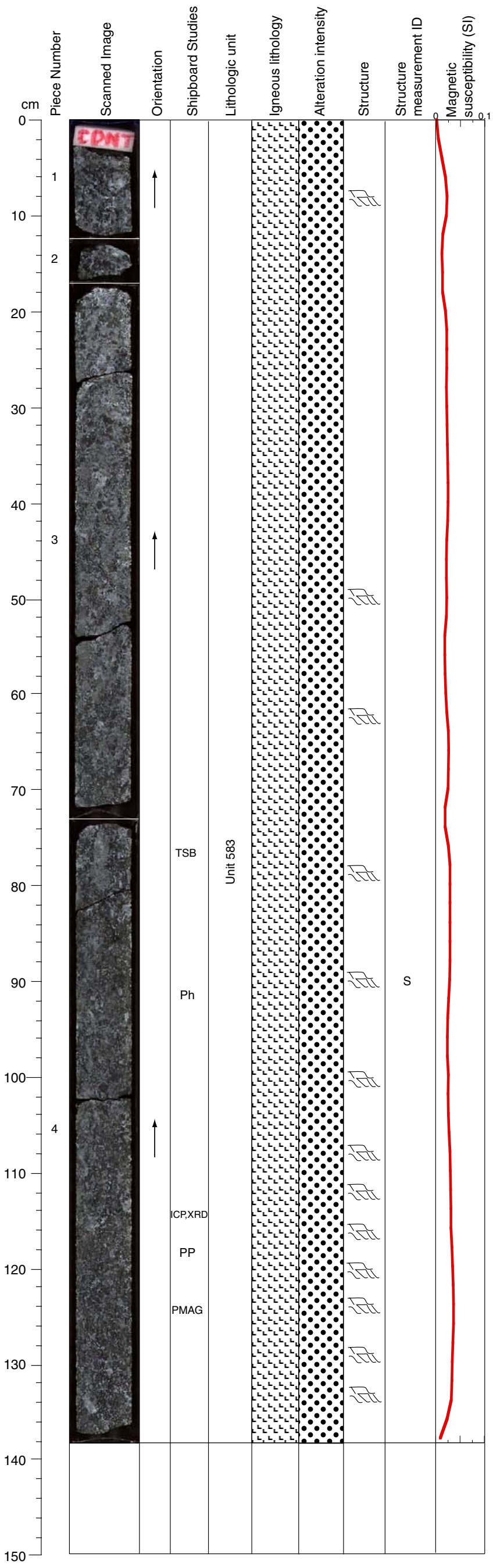
COMMENTS: Serpentinized olivine and plagioclase altered to white minerals (especially around subhorizontal cracks in the rock). A light green fine vein network with alteration halo of about 3 mm cuts the rock from 50 to 53 cm,

VEIN ALTERATION: Serpentine, amphibole, chlorite

STRUCTURE: Medium-grained, with no consistent fabric orientation. Weak veining and some irregular serpentinization with discontinuous foliation.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-232R-2, 113-140 cm WET

Core Photo



305-U1309D-232R-3 (Section top: 1117.92 mbsf)

UNIT-583: Troctolitic Gabbro
Pieces: 1-4

PRIMARY MINERALOGY: Mode from Piece 3b

Olivine	Modal 50% Size 5 mm average Shape anhedral
Plagioclase	Modal 40% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 10% Size 5 mm average Shape anhedral

COMMENTS: Unit 583 is coarse-grained troctolitic gabbro. Large grains, plagioclase and pyroxene intergrowth.

SECONDARY MINERALOGY: Serpentine, chlorite

COMMENTS: Serpentinized olivine, green amphibole after pyroxene and white minerals after plagioclase. Serpentine foliation, mainly vertical, pervades the section.

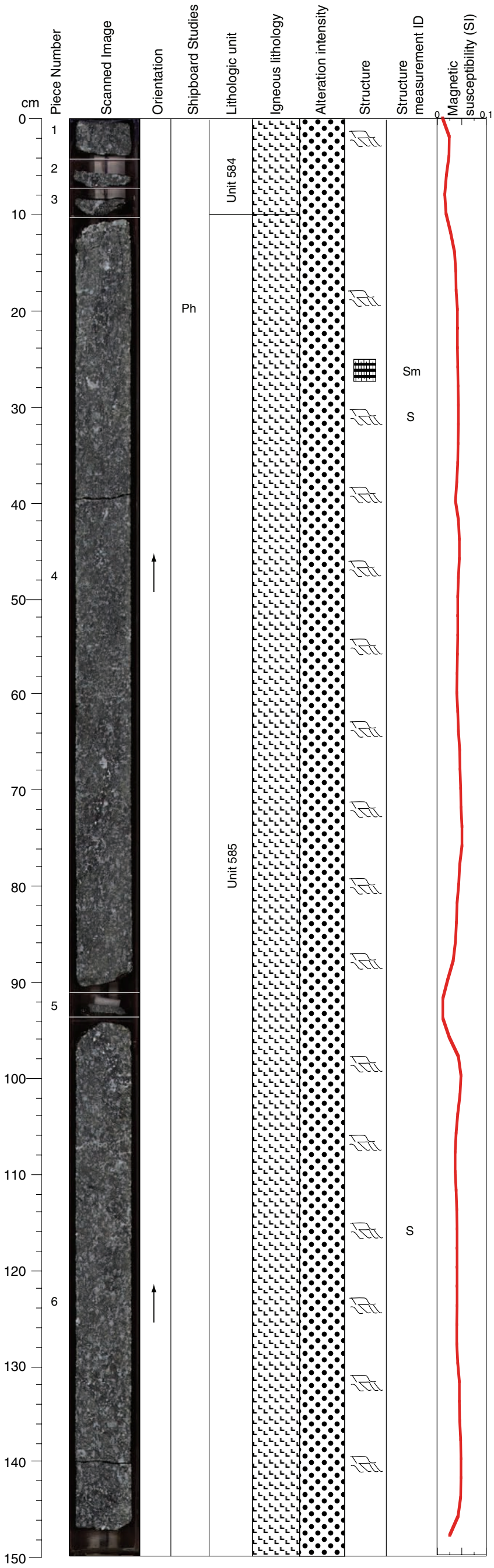
VEIN ALTERATION: Serpentine

THIN SECTIONS:
305-U1309D-232R-3, 75-77 cm (#574)

STRUCTURE: Troctolitic gabbro with no consistent magmatic or plastic foliation. Spheroidal, cm-scale bodies of olivine-free gabbro are present in the troctolitic matrix. Weak veining and some irregular serpentinization with discontinuous foliation.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-232R-3, 73-93 cm WET
305-U1309D-232R-3, 80-102 cm WET

Core Photo



305-U1309D-233R- 1 (Section top: 1119.90 mbsf)

UNIT-584: Troctolitic Gabbro
Pieces: 1-3

PRIMARY MINERALOGY: Mode from Piece 3

Olivine	Modal 60% Size 5 mm average Shape anhedral
Plagioclase	Modal 30% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 10% Size 5 mm average Shape anhedral

COMMENTS: Unit 584 coarse-grained troctolitic gabbro.

UNIT-585: Troctolitic Gabbro
Pieces: 4-6

PRIMARY MINERALOGY: Mode from Piece 4b

Olivine	Modal 60% Size 5 mm average Shape anhedral
Plagioclase	Modal 30% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 10% Size 5 mm average Shape anhedral

COMMENTS: Unit 585 coarse-grained troctolitic gabbro. Green pyroxene chadacryst in plagioclase oikocryst. Small oikocrystal to interstitial pyroxene.

SECONDARY MINERALOGY: Serpentine, chlorite

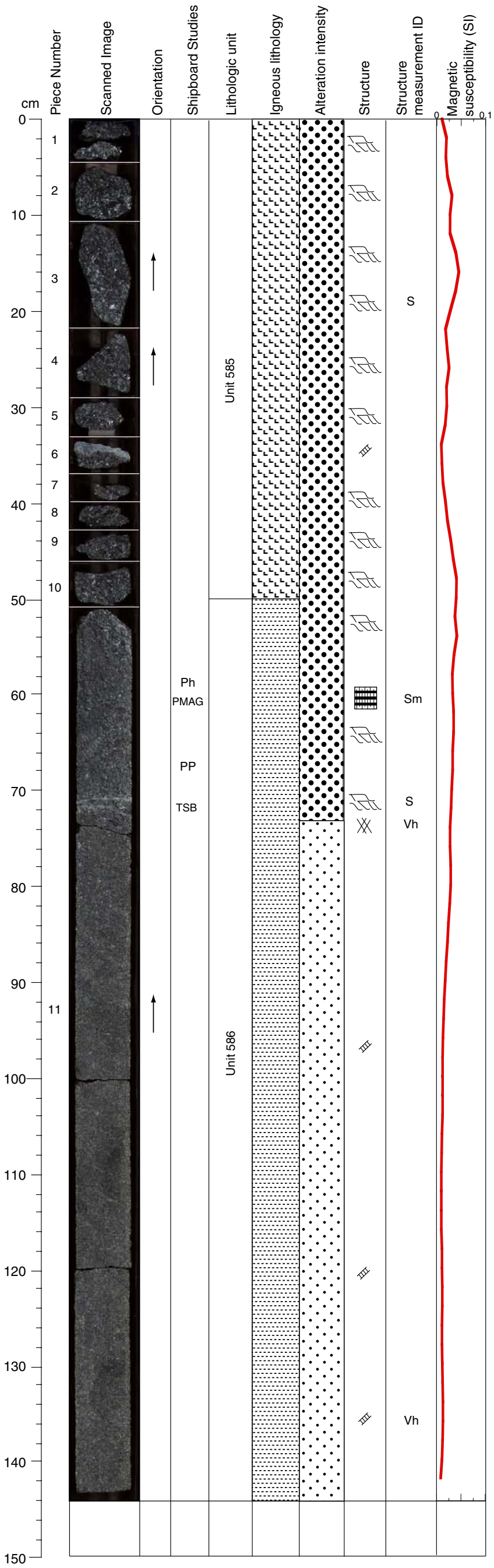
COMMENTS: Serpentinized olivine, pyroxene partially altered to green amphibole, and plagioclase altered to a white mineral (patchy). A nearly vertical serpentine foliation pervades the entire section.

VEIN ALTERATION: Serpentine

STRUCTURE: Troctolite showing a weak elongation and alignment of plagioclase crystals (Sm). Steep serpentinite foliation.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-233R-1, 10-39 cm WET

Core Photo



305-U1309D-233R-2 (Section top: 1121.40 mbsf)

UNIT-585: Troctolitic Gabbro
Pieces: 1-10

PRIMARY MINERALOGY: Mode from Piece 3

Olivine	Modal 60% Size 5 mm average Shape anhedral
Plagioclase	Modal 30% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 10% Size 5 mm average Shape anhedral

COMMENTS: Unit 585 is coarse-grained troctolitic gabbro.

UNIT-586: Olivine-rich Troctolite
Pieces: 11

PRIMARY MINERALOGY: Mode from Piece 11

Olivine	Modal 85% Size 1 mm average Shape anhedral
Plagioclase	Modal 12% Size 1 mm average Shape anhedral
Clinopyroxene	Modal 3% Size 1 mm average Shape anhedral

COMMENTS: Unit 586 is fine-grained olivine-rich troctolite.

SECONDARY MINERALOGY: Serpentine, chlorite

COMMENTS: Alteration is greatest in Pieces 1-10. Serpentinized olivine in the troctolite and plagioclase altered to white minerals. There is a zone of possible rodingitization in Piece 6 from 34 to 36 cm. Light green, subhorizontal veins cut Piece 11a at about 71 to 73 cm. Strong serpentine foliation is present to a depth of about 74 cm and becomes much weaker until it is virtually absent below about 84 cm. From 132 to 138 cm a dark green serpentinite vein cuts the section.

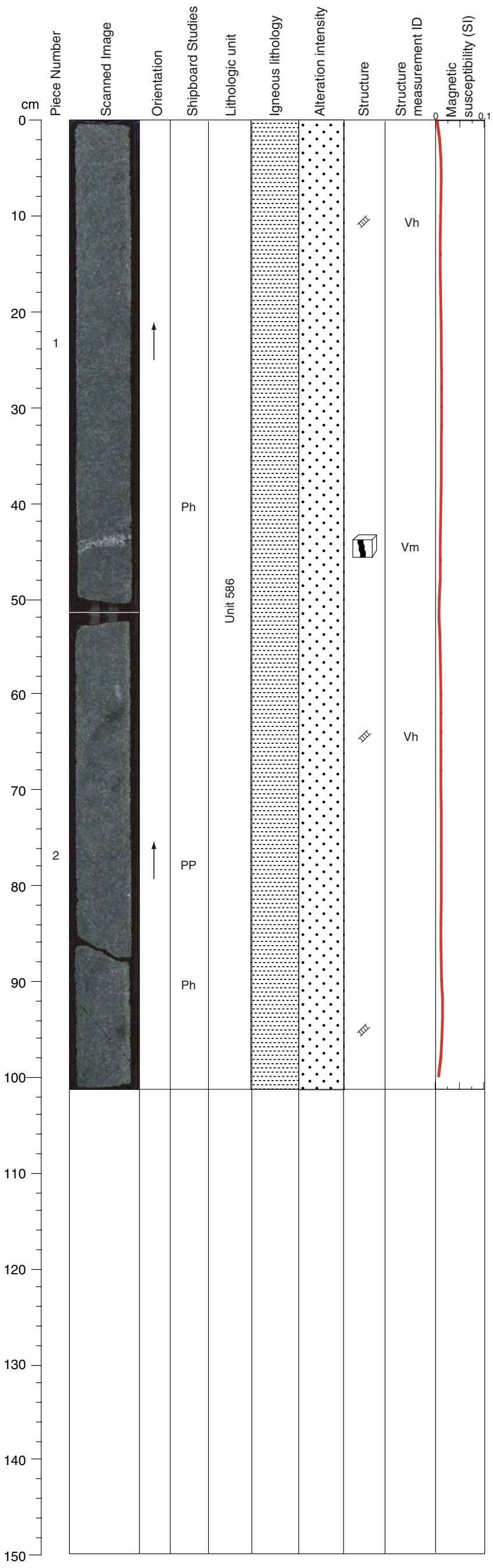
VEIN ALTERATION: Serpentine, amphibole, carbonate

THIN SECTIONS:
305-U1309D-233R-2, 70-73 cm (#575)

STRUCTURE: Troctolite showing a weak elongation and alignment of plagioclase crystals. Alteration front exhibited but orientation not measurable. Serpentine folation well developed in uppermost 50 cm interval of section.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-233R-2, 51-75 cm WET

Core Photo



305-U1309D-233R-3 (Section top: 1122.85 mbsf)

UNIT-586: Olivine-rich Troctolite
Pieces: 1-2

PRIMARY MINERALOGY: Mode from Piece 2a

Olivine	Modal 85% Size 1 mm average Shape anhedral
Plagioclase	Modal 12% Size 1 mm average Shape anhedral
Clinopyroxene	Modal 3% Size 1 mm average Shape anhedral

COMMENTS: Continuation of Unit 586 fine-grained olivine-rich troctolite. Gabbro vein at 43 cm.

SECONDARY MINERALOGY: Serpentine, chlorite?

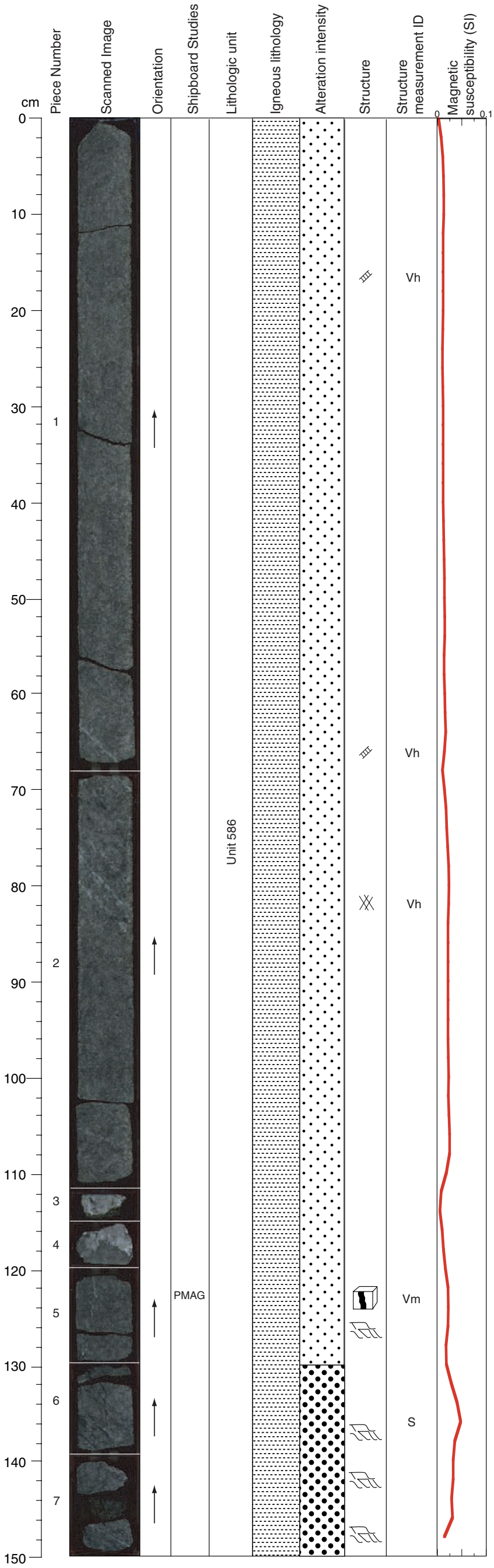
COMMENTS: Very slight serpentinization. A thin (2 mm) serpentine vein cuts the section from 92 to 99 cm.

VEIN ALTERATION: Serpentine

STRUCTURE: Very fine-grained troctolite showing no magmatic fabric. Serpentine veins and subhorizontal white vein.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-233R-3, 31-51 cm WET
305-U1309D-233R-3, 86-101 cm WET

Core Photo



305-U1309D-234R-1 (Section top: 1124.70 mbsf)

UNIT-586: Olivine-rich Troctolite
Pieces: 1-7

PRIMARY MINERALOGY: Mode from Piece 1b

Olivine	Modal 85% Size 1 mm average Shape anhedral
Plagioclase	Modal 12% Size 1 mm average Shape anhedral
Clinopyroxene	Modal 3% Size 1 mm average Shape anhedral

COMMENTS: Continuation of Unit 586 fine-grained olivine-rich troctolite. Gabbro vein at 112-118 cm.

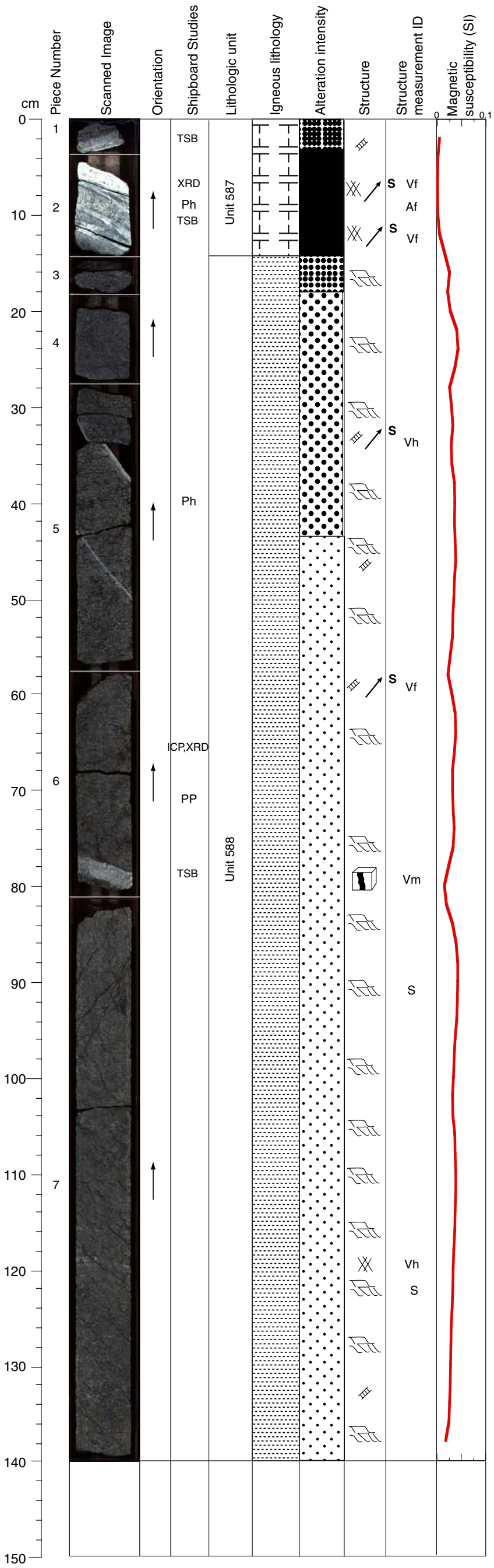
SECONDARY MINERALOGY: Serpentine, chlorite?

COMMENTS: Some serpentinization of olivine, a light green vein cuts the section from 63 to 70 cm and subparallel veins cut the section from 74 cm to about 86 cm. Narrow halos of varying width (up to 1 cm). Pieces 3 and 4 contain gabbro that has alteration of olivine to serpentine, pyroxene to amphibole and plagioclase to white and light green minerals. A near vertical veinlet of gabbroic composition cuts the section below Piece 4 and is superimposed by branching serpentine veins. A weak serpentinite foliation occurs in the bottom of Pieces 4 through 6a and becomes more pronounced in Piece 6b. A thin light green vein with a narrow (2 mm) alteration halo cuts Piece 7c.

VEIN ALTERATION: Serpentine, amphibole, carbonate

STRUCTURE: Very fine-grained troctolite with a magmatic vein that is not oriented. Moderate serpentinization foliation at the bottom.

Core Photo



305-U1309D-234R-2 (Section top: 1126.20 mbsf)

UNIT-587: Olivine-rich Troctolite
Pieces: 1-2

COMMENTS: Unit 587 is metamorphic rock. Vein alteration of troctolitic rock. Diffuse contact with troctolitic rock at top of Piece 1.

UNIT-588: Olivine-rich Troctolite
Pieces: 3-7

PRIMARY MINERALOGY: Mode from Piece 5b

Olivine	Modal 85% Size 1 mm average Shape anhedral
Plagioclase	Modal 12% Size 1 mm average Shape anhedral
Clinopyroxene	Modal 3% Size 1 mm average Shape anhedral

COMMENTS: Unit 588 fine-grained olivine-rich troctolite. Felsic vein (1.5 cm thick) at 76-78 cm.

SECONDARY MINERALOGY: Serpentine, chlorite, talc, prehnite? secondary plagioclase?

COMMENTS: Serpentinized olivine predominates the section and a strong serpentine foliation runs throughout, branching and changing direction in Piece 7a. A zone of rodingitization associated with light green veins in Piece 2 includes alteration halos about 2 cm wide that affect both Pieces 1 and 2. Additional light green veins cut the section from 31 to 38 cm and from 43 to 50 cm (latter has a 1.5 cm alteration halo). A serpentine vein from 60 to 64 cm. A set of subparallel, thin, vertical light-green vein cuts the section from about 52 to 81 cm (cuts across a thin gabbro seam at the bottom of Piece 6). Thin light green veins cut the section at 97 cm, 101 to 102 cm, and 120 cm, 126 cm, 128 cm, and 132 to 134 cm.

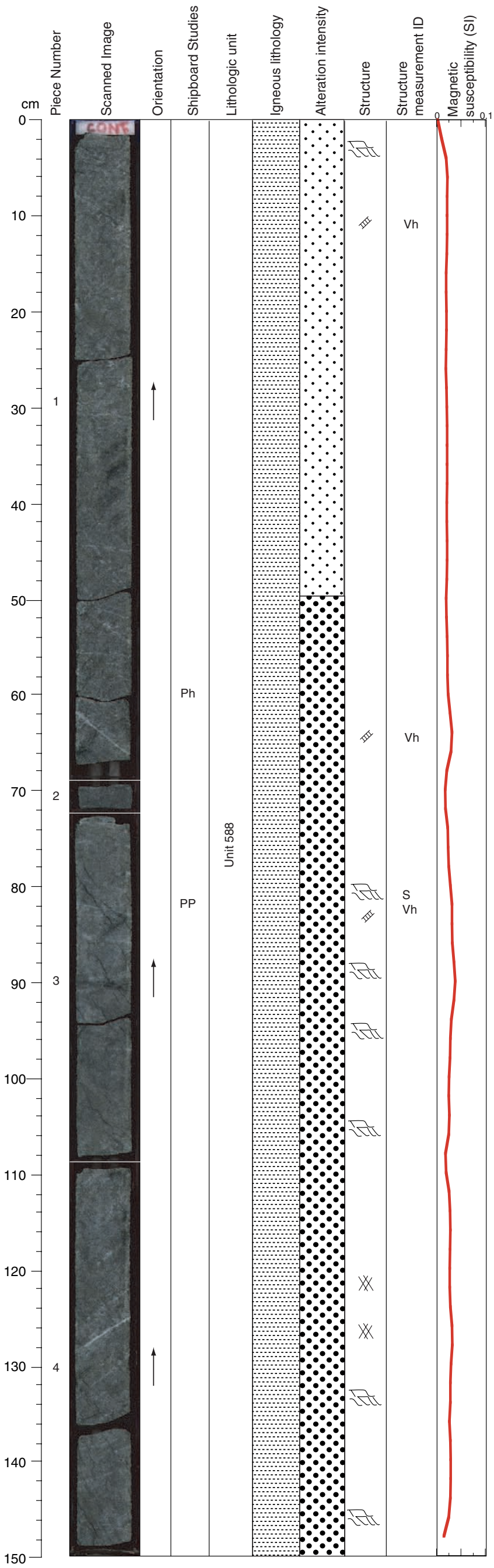
VEIN ALTERATION: Serpentine, amphibole, chlorite, zeolite

THIN SECTIONS:
305-U1309D-234R-2, 0-3 cm (#576)
305-U1309D-234R-2, 9-12 cm (#577)
305-U1309D-234R-2, 77-80 cm (#578)

STRUCTURE: Fine-grained troctolite with no magmatic or plastic strain, alteration zone at top of section with potential displacment zones and one magmatic vein. Weak serpentine foliations.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-234R-2, 0-18 cm WET
305-U1309D-234R-2, 31-56 cm WET
305-U1309D-234R-2, 58-81 cm WET

Core Photo



305-U1309D-234R-3 (Section top: 1127.60 mbsf)

UNIT-588: Olivine-rich Troctolite
Pieces: 1-4

PRIMARY MINERALOGY: Mode from Piece 1b

Olivine	Modal 85% Size 1 mm average Shape anhedral
Plagioclase	Modal 12% Size 1 mm average Shape anhedral
Clinopyroxene	Modal 3% Size 1 mm average Shape anhedral

COMMENTS: Continuation of Unit 588 fine-grained olivine-rich troctolite.

SECONDARY MINERALOGY: Serpentine, chlorite?

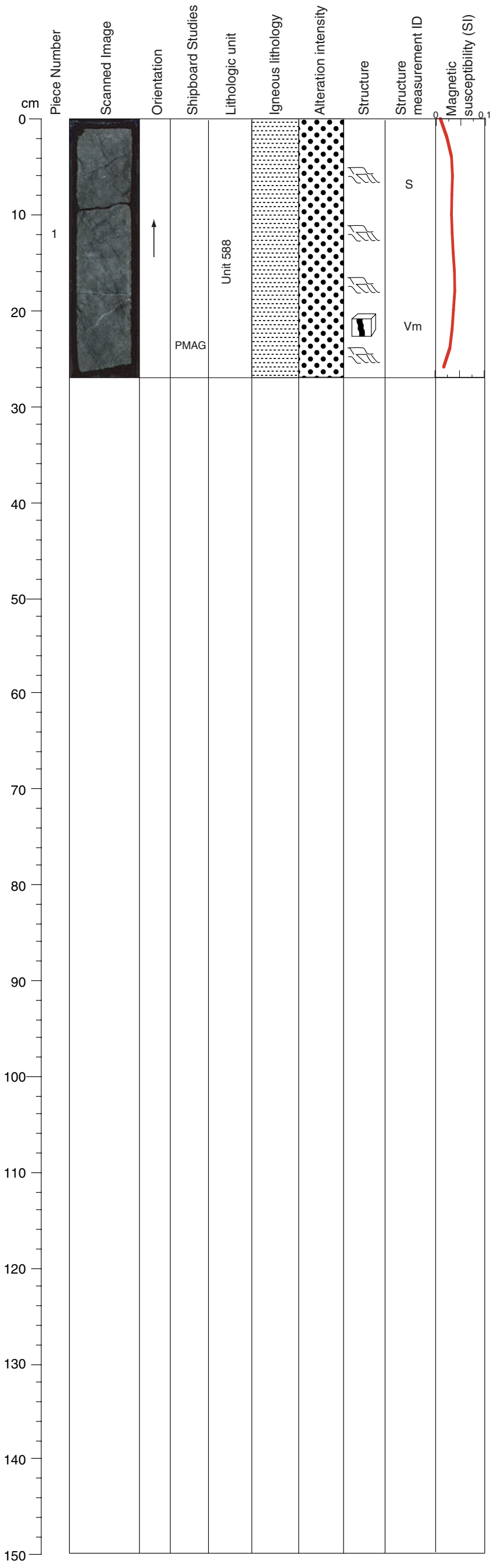
COMMENTS: Serpentinization of olivine dominates the alteration of this section. Plagioclase is altered to white/light green minerals (chlorite?). A weak serpentine foliation runs throughout the section, becoming more pronounced below about 77 cm where it is crosscut by several thin green veins (one set subhorizontal and one set at high angle). There is also a subhorizontal serpentine vein at about 90 cm. Several subparallel green veins cut the core below 114 cm. One of these is 2-3 mm wide, extends ~25-29 cm and has an alteration halo about 1.5 cm wide.

VEIN ALTERATION: Serpentine, amphibole, carbonate

STRUCTURE: Fine-grained, without visible magmatic or plastic fabric. Weak serpentinization and gray veins.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-234R-3, 50-68 cm WET

Core Photo



305-U1309D-234R-4 (Section top: 1129.10 mbsf)

UNIT-588: Olivine-rich Troctolite
Pieces: 1

PRIMARY MINERALOGY: Mode from Piece 1b

Olivine	Modal 85% Size 1 mm average Shape anhedral
Plagioclase	Modal 12% Size 1 mm average Shape anhedral
Clinopyroxene	Modal 3% Size 1 mm average Shape anhedral

COMMENTS: Continuation of Unit 588 fine-grained olivine-rich troctolite.

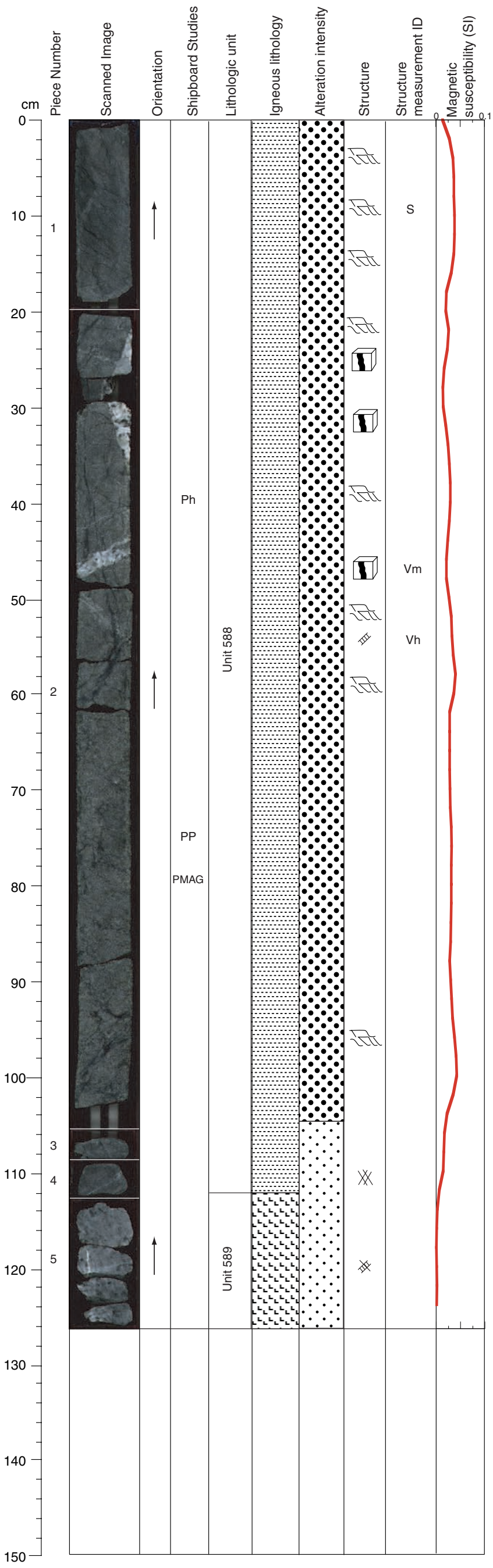
SECONDARY MINERALOGY: Serpentine, chlorite?

COMMENTS: Serpentinized olivine and minor altered plagioclase. Serpentine foliation crosscut by a serpentine vein from 3-6 cm and by light green veins at 18 cm and a rodingitized magmatic vein between 19 and 22 cm.

VEIN ALTERATION: Serpentine, amphibole, carbonate

STRUCTURE: Fine grained, without visible magmatic or plastic fabric. 3 mm gabbroic, wiggly vein (Vm). Weak serpentinization and gray veins.

Core Photo



305-U1309D-235R-1 (Section top: 1129.50 mbsf)

UNIT-588: Olivine-rich Troctolite
Pieces: 1-4

PRIMARY MINERALOGY: Mode from Piece 1

Olivine	Modal 90% Size 1 mm average Shape anhedral
Plagioclase	Modal 7% Size 1 mm average Shape anhedral
Clinopyroxene	Modal 3% Size 1 mm average Shape anhedral

COMMENTS: Continuation of Unit 588 fine-grained olivine-rich troctolite. Coarse grained gabbro marginal contact at 21-37 cm. Gabbroic dikelet (1.5cm thick) at 45-47 cm.

UNIT-589: Troctolitic Gabbro
Pieces: 5

PRIMARY MINERALOGY: Mode from Piece 5a

Olivine	Modal 20% Size 2 mm average Shape anhedral
Plagioclase	Modal 70% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 10% Size 1 mm average Shape anhedral

COMMENTS: Unit 589 is medium-grained troctolitic gabbro.

SECONDARY MINERALOGY: Serpentine, chlorite, pale amphibole

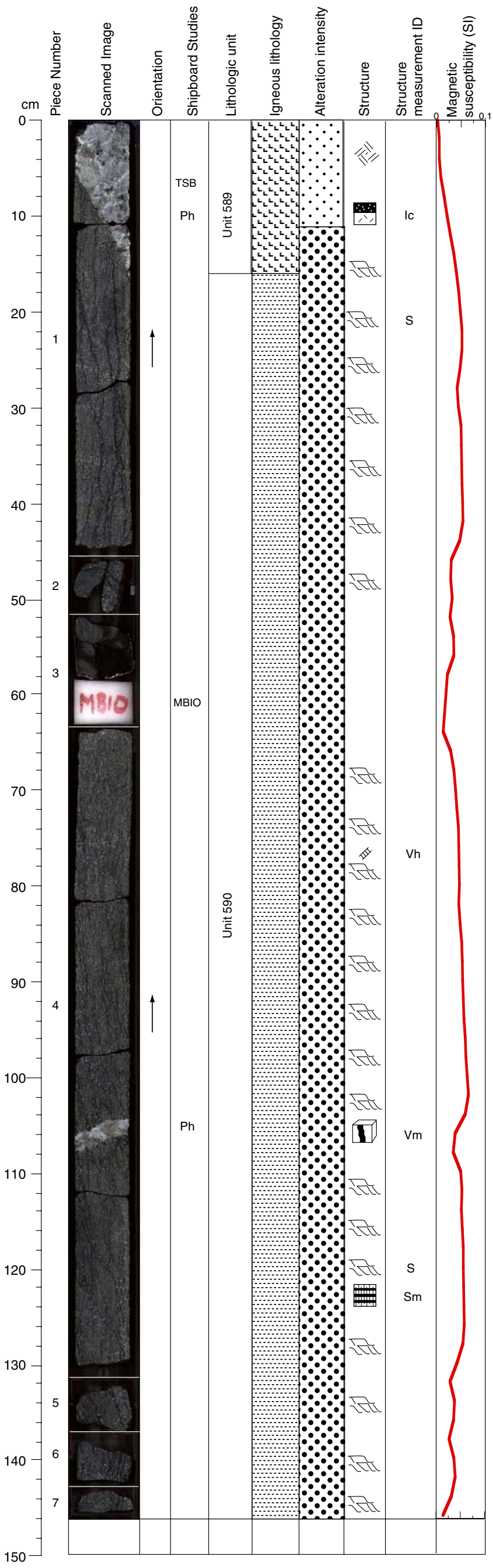
COMMENTS: Serpentinized olivine and minor altered plagioclase throughout the section. A gabbroic intrusion between 22 and 38 cm has pyroxene altered to green amphibole and plagioclase altered to white patches (similar gabbroic vein between 44 and 48 cm). Serpentine foliation appears throughout the ultramafic rock in the section. A green vein from 50 to 55 cm has a 1.5 cm alteration halo and crosscuts a large, branching serpentine vein that cuts Pieces 2c-e. A narrow green and white vein cuts Piece 4. Piece 5 is a gabbro with serpentinized olivine, pyroxene largely altered to green amphibole, and plagioclase to chlorite. A white (zeolite?) vein cuts vertically through Piece 5b.

VEIN ALTERATION: Serpentine, amphibole, chlorite, carbonate, zeolite

STRUCTURE: Fine grained, no magmatic or plastic strain fabric, several gabbroic veins (Vm). Weak serpentinization and gray veins.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-235R-1, 29-56 cm WET

Core Photo



305-U1309D-235R-2 (Section top: 1130.76 mbsf)

UNIT-589: Troctolitic Gabbro
Pieces: 1

PRIMARY MINERALOGY: Mode from Piece 1a

Olivine	Modal 20% Size 2 mm average Shape anhedral
Plagioclase	Modal 70% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 10% Size 5 mm average Shape anhedral

COMMENTS: Unit 589 is medium- to coarse-grained troctolitic gabbro. Coarse-grained clinopyroxene along contact with next unit.

UNIT-590: Olivine-rich Troctolite
Pieces: 1-7

PRIMARY MINERALOGY: Mode from Piece 4a

Olivine	Modal 90% Size 1 mm average Shape anhedral
Plagioclase	Modal 7% Size 1 mm average Shape anhedral
Clinopyroxene	Modal 3% Size 1 mm average Shape anhedral

COMMENTS: Unit 590 is fine-grained olivine-rich troctolite.

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

COMMENTS: Piece 1a and the top of Piece 1b are rodingitized gabbro. A mafic intrusion from 105 to 108 cm has pyroxene that is mostly altered to green amphibole and plagioclase to chlorite. Most of the section is ultramafic with olivine partially serpentinized and plagioclase altered to white secondary products. A strong, nearly vertical serpentine foliation occurs throughout the section.

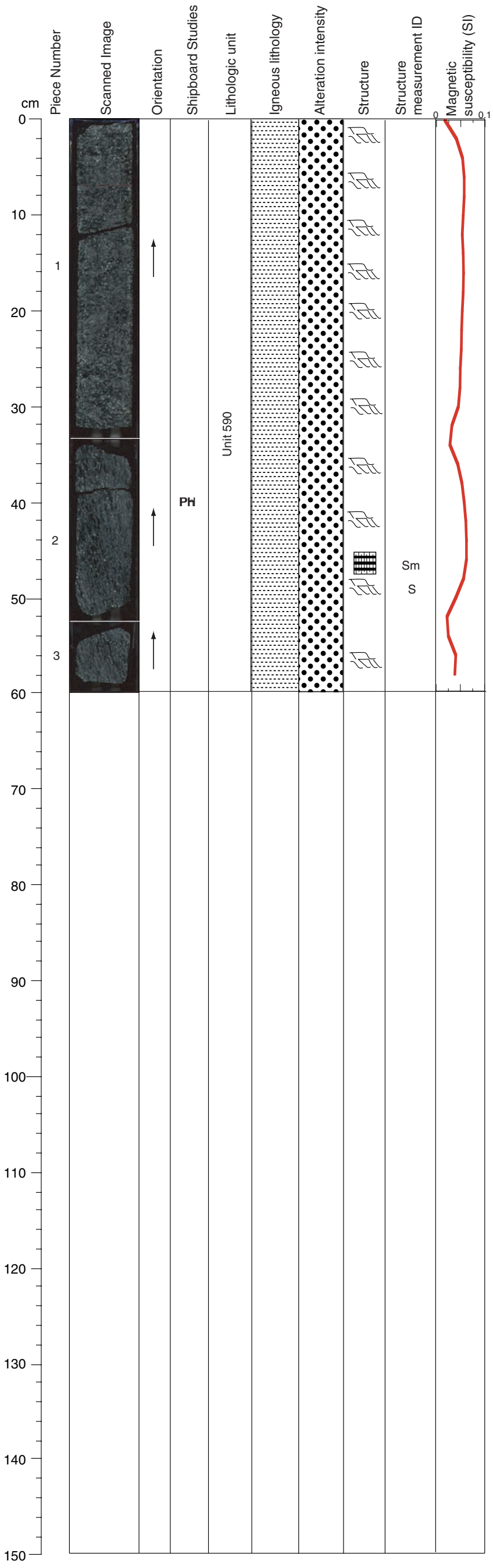
VEIN ALTERATION: Serpentine

THIN SECTIONS:
305-U1309D-235R-2, 5-8 cm (#579)

STRUCTURE: Fine-grained olivine rich gabbro with weak elongation of plagioclase and several magmatic veins. Steep (subvertical) serpentinite foliation with gabbro dikes, that are crosscut by serpentinite foliation.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-235R-2, 0-28 cm WET
305-U1309D-235R-2, 98-113 cm WET

Core Photo



305-U1309D-235R-3 (Section top: 1132.22 mbsf)

UNIT-590: Olivine-rich Troctolite
Pieces: 1-3

PRIMARY MINERALOGY: Mode from Piece 2b

Olivine	Modal 85% Size 1 mm average Shape anhedral
Plagioclase	Modal 15% Size 1 mm average Shape anhedral

COMMENTS: Continuation of Unit 590 fine-grained olivine-rich troctolite.

SECONDARY MINERALOGY: Serpentine, chlorite?

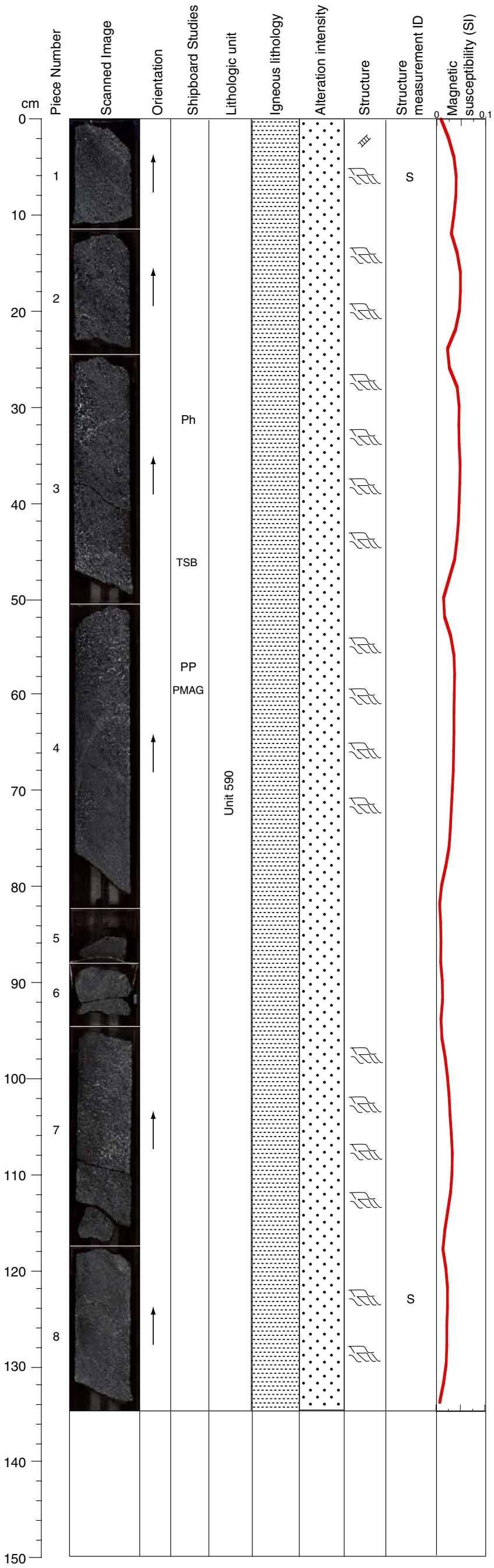
COMMENTS:The section is serpentinized ultramafic rock with minor plagioclase altered to white secondary products. A strong serpentine foliation affects Pieces 2 and 3.

VEIN ALTERATION: Serpentine, amphibole, carbonate

STRUCTURE: Troctolite with steep (subvertical) serpentinite foliation.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-235R-3, 33-51 cm WET

Core Photo



305-U1309D-236R-1 (Section top: 1134.30 mbsf)

UNIT-590: Olivine-rich Troctolite
Pieces: 1-8

PRIMARY MINERALOGY: Mode from Piece 3

Olivine	Modal 85% Size 1 mm average Shape anhedral
Plagioclase	Modal 15% Size 1 mm average Shape anhedral
Clinopyroxene	Modal <2% Size 1 mm average Shape anhedral

COMMENTS: Continuation of Unit 590 fine-grained olivine-rich troctolite. Clinopyroxene oikocrysts at 107 and 124 cm. Variable olivine grain size.

SECONDARY MINERALOGY: Serpentine, chlorite?

COMMENTS: Serpentinized olivine and altered plagioclase (varying grain sizes) to white patches. Light green vein material coats the top corner of Piece 1 and a similar vein cuts the piece from 0 to 5 cm (alteration halo ~1 cm wide). Serpentine foliation is present throughout most of the section.

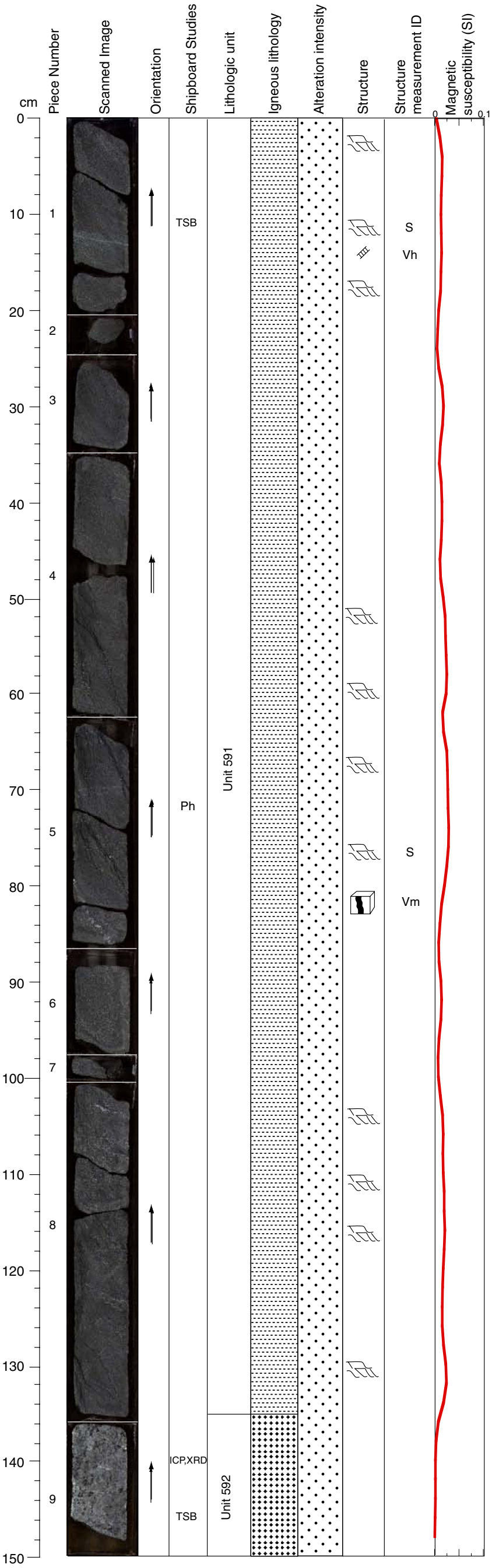
VEIN ALTERATION: Serpentine, amphibole, carbonate

THIN SECTIONS:
305-U1309D-236R-1, 45-47 cm (#580)

STRUCTURE: Clear magmatic alignment of plagioclase subparallel to a discontinous gabbroic veinlet. Well-developed serpentine foliation and gray veins.

CLOSE-Up PHOTOGRAPHS:
305-U1309D-236R-1, 25-50 cm WET

Core Photo



305-U1309D-236R-2 (Section top: 1135.65 mbsf)

UNIT-591: Olivine-rich Troctolite
Pieces: 1-8

PRIMARY MINERALOGY: Mode from Piece 4a

Olivine	Modal 85% Size 1 mm average Shape anhedral
Plagioclase	Modal <15% Size 1 mm average Shape anhedral

COMMENTS: Unit 591 is fine-grained olivine-rich troctolite. Felsic vein (0.5 cm thick) in Piece 5c.

UNIT-592: Olivine gabbro
Pieces: 9

PRIMARY MINERALOGY: Mode from piece 9

Olivine	Modal 15% Size 2 mm average Shape anhedral
Plagioclase	Modal 55% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 30% Size 2 mm average Shape anhedral

COMMENTS: Unit 592 is medium-grained olivine gabbro.

SECONDARY MINERALOGY: Serpentine, chlorite, pale amphibole

COMMENTS: Serpentinized olivine and altered plagioclase (minor). Serpentine foliation is present above 136 cm. One gabbroic vein (magmatic) in Pieces 5a and 5b is altered to serpentine amphibole and chlorite. The gabbro of Piece 9 is heavily altered to serpentine, amphibole, and chlorite.

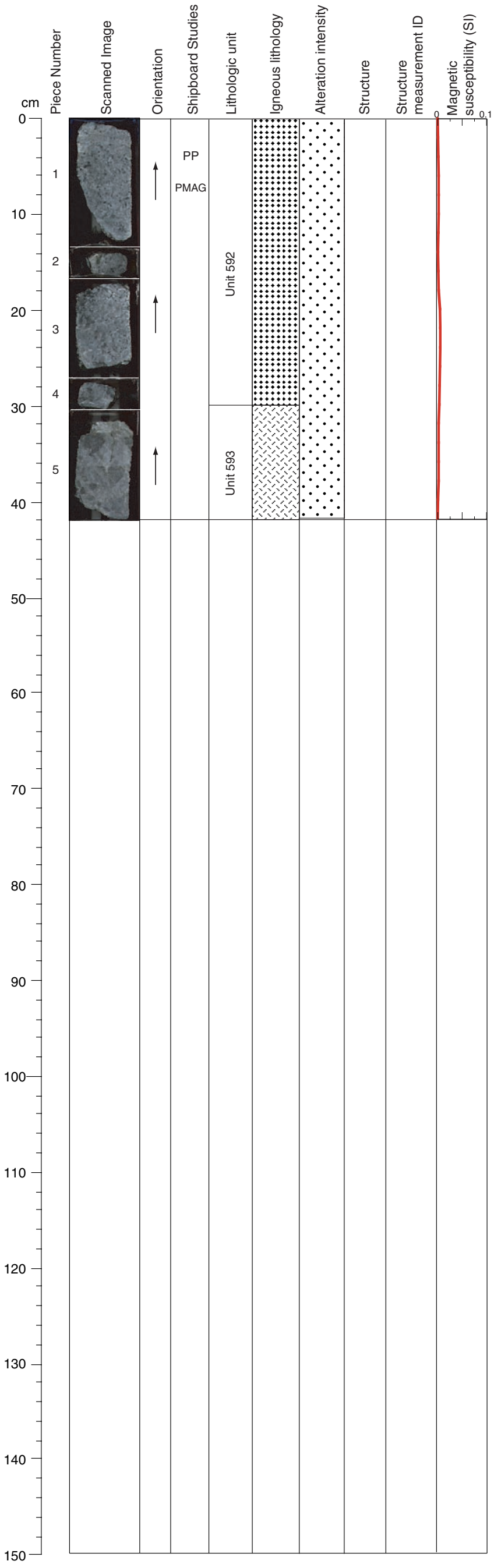
VEIN ALTERATION: Serpentine, amphibole, carbonate

THIN SECTIONS:
305-U1309D-236R-2, 10-13 cm (#581)
305-U1309D-236R-2, 144-147 cm (#582)

STRUCTURE: Olivine gabbro grading locally into dunitic parts, no clear magmatic foliation.At bottom of section unpreserved contact to less olivine-rich unit. Weak serpentinization and gray veins.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-236R-2, 0-21 cm WET
305-U1309D-236R-2, 62-85 cm WET
305-U1309D-236R-2, 137-149 cm WET

Core Photo



305-U1309D-236R-3 (Section top: 1137.15 mbsf)

UNIT-592: Olivine Gabbro
Pieces: 1-4

PRIMARY MINERALOGY: Mode from Piece 1

Olivine	Modal 15% Size 2 mm average Shape anhedral
Plagioclase	Modal 55% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 30% Size 2 mm average Shape anhedral

COMMENTS: Continuation of Unit 592 medium-grained olivine gabbro.

UNIT-593: Gabbro
Pieces: 5

PRIMARY MINERALOGY: Mode from Piece 5

Plagioclase	Modal 35% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 65% Size 5 mm average Shape anhedral

COMMENTS: Unit 593 is coarse-grained gabbro.

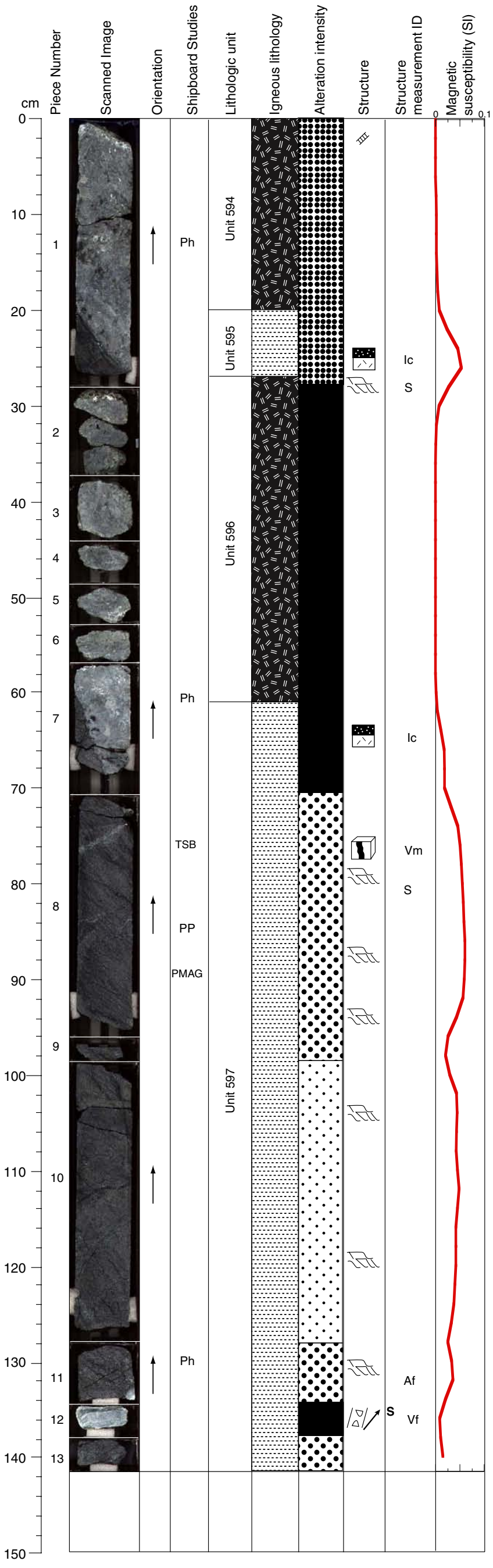
SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: The gabbro of this section is heavily altered to serpentine, amphibole, and chlorite. White veins/fracture (?) cut through Pieces 3 and 4.

VEIN ALTERATION: No vein

STRUCTURE: Gabbro with decreasing amount of olivine down-section and becoming coarse grained.No magmatic or plastic strain.

Core Photo



305-U1309D-237R-1 (Section top: 1139.10 mbsf)

UNIT-594: Olivine-bearing Gabbro
Pieces: 1

PRIMARY MINERALOGY: Mode from Piece 1

Olivine	Modal 2% Size 2 mm average Shape anhedral
Plagioclase	Modal 55% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 45% Size 3 mm average Shape anhedral

COMMENTS: Unit 594 is medium-grained olivine-bearing gabbro.

UNIT-595: Olivine-rich Troctolite
Pieces: 1b

PRIMARY MINERALOGY: Mode from Piece 1b

Olivine	Modal 90% Size 1 mm average Shape anhedral
Plagioclase	Modal 5% Size 1 mm average Shape anhedral
Clinopyroxene	Modal 5% Size 1 mm average Shape anhedral

COMMENTS: Unit 595 is fine-grained olivine-rich troctolite. Corner part of this piece shows sharp contact with olivine-bearing gabbro. Clinopyroxene oikocryst.

UNIT-596: Olivine-bearing Gabbro
Pieces: 2-7a

PRIMARY MINERALOGY: Mode from Piece 7a

Olivine	Modal 4% Size 2 mm average Shape anhedral
Plagioclase	Modal 65% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 30% Size 4 mm average Shape anhedral

COMMENTS: Unit 596 is medium-grained olivine-bearing gabbro.

UNIT-597: Olivine-rich Troctolite
Pieces: 7a-13

PRIMARY MINERALOGY: Mode from Piece 10b

Olivine	Modal 85% Size 1 mm average Shape anhedral
Plagioclase	Modal 15% Size 1 mm average Shape anhedral
Clinopyroxene	Modal <1% Size 1 mm average Shape anhedral

COMMENTS: Unit 597 is fine-grained olivine-rich troctolite. Contact with gabbroic rock at 61-73 cm (Pieces 7 and 8).

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

COMMENTS: Rodingitized gabbro in the upper 1 cm of Piece 1 and all of Piece 12, associated with actinolite veins. Highly altered gabbro in Pieces 1 through 7 with small high-angle contacts with serpentinized ultramafic rock. Ultramafic rock is heavily altered to serpentine. Serpentine foliation pervades Pieces 8 to 11 and 13.

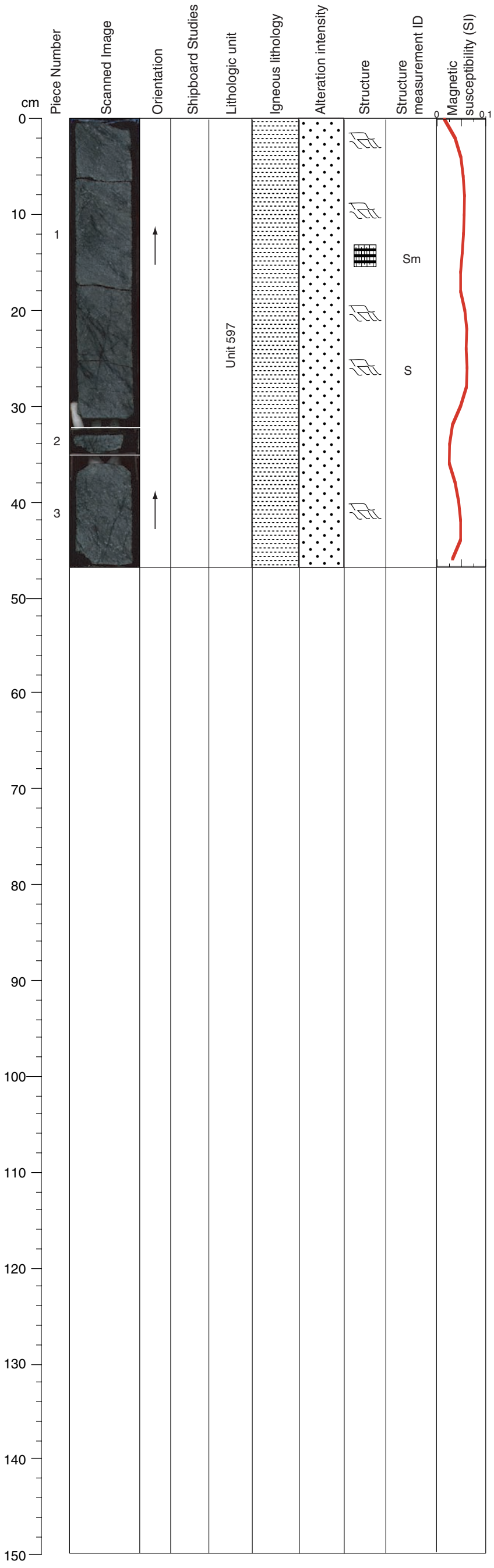
VEIN ALTERATION: Serpentine, amphibole, chlorite, talc, zeolite

THIN SECTIONS:
305-U1309D-237R-1, 74-77 cm (#583)

STRUCTURE: Only one trace of foliation visible, parallel to magmatic veinlets of gabbroic composition. Several igneous contacts to gabbro preserved, others obviously not recovered. Moderate serpentinization with crosscutting sets of veins and a fault vein (Vf) at the base of the section.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-237R-1, 0-27 cm WET
305-U1309D-237R-1, 57-79 cm WET
305-U1309D-237R-1, 128-141 cm WET

Core Photo



305-U1309D-237R-2 (Section top: 1140.52 mbsf)

UNIT-597: Olivine-rich Troctolite
Pieces: 1-3

PRIMARY MINERALOGY: Mode from Piece 1b

Olivine	Modal 85% Size 1 mm average Shape anhedral
Plagioclase	Modal 15% Size 1 mm average Shape anhedral
Clinopyroxene	Modal <1% Size 1 mm average Shape anhedral

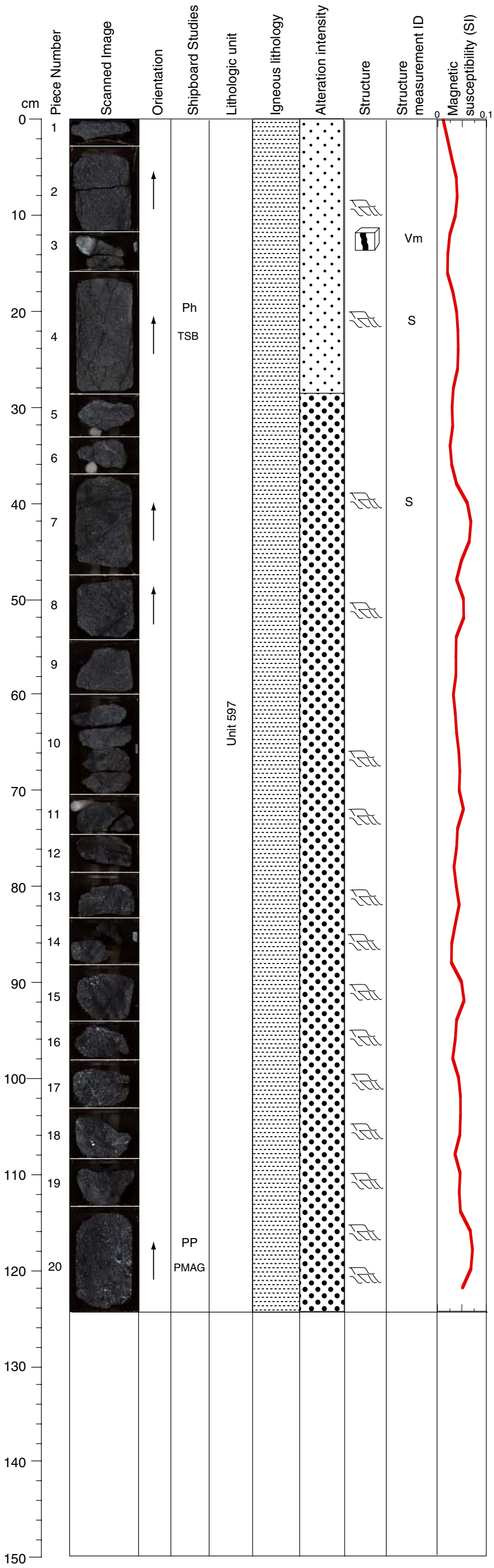
COMMENTS: Continuation of Unit 597 fine-grained olivine-rich troctolite.

SECONDARY MINERALOGY: Serpentine, chlorite?

COMMENTS: Serpentinized ultramafic rock with serpentine foliation throughout.

STRUCTURE: Troctolite showing a weak magmatic fabric. Irregularly distributed serpentinite foliation.

Core Photo



305-U1309D-238R-1 (Section top: 1143.90 mbsf)

UNIT-597: Olivine-rich Troctolite
Pieces: 1-20

PRIMARY MINERALOGY: Mode from Piece 20

Olivine	Modal 80% Size 1 mm average Shape anhedral
Plagioclase	Modal 17% Size 1 mm average Shape anhedral
Clinopyroxene	Modal 3% Size 1 mm average Shape anhedral

COMMENTS: Continuation of Unit 597 fine-grained olivine-rich troctolite. Grain size increases toward bottom of this section. Felsic vein in Piece 3.

SECONDARY MINERALOGY: Serpentine, chlorite?

COMMENTS: Serpentinized dunite with strong serpentine foliation. Minor plagioclase is altered to white minerals. Piece 3 contains a small piece of altered gabbro with pyroxene altered to pale amphibole and possible zeolite replacement after plagioclase. Wide serpentine veins (up to 4 mm) cut several of the pieces down section. Several thin light green veins cut across the serpentine foliation (Pieces 4, 7, 17, 18). Minor corona texture occurs around some plagioclase grains.

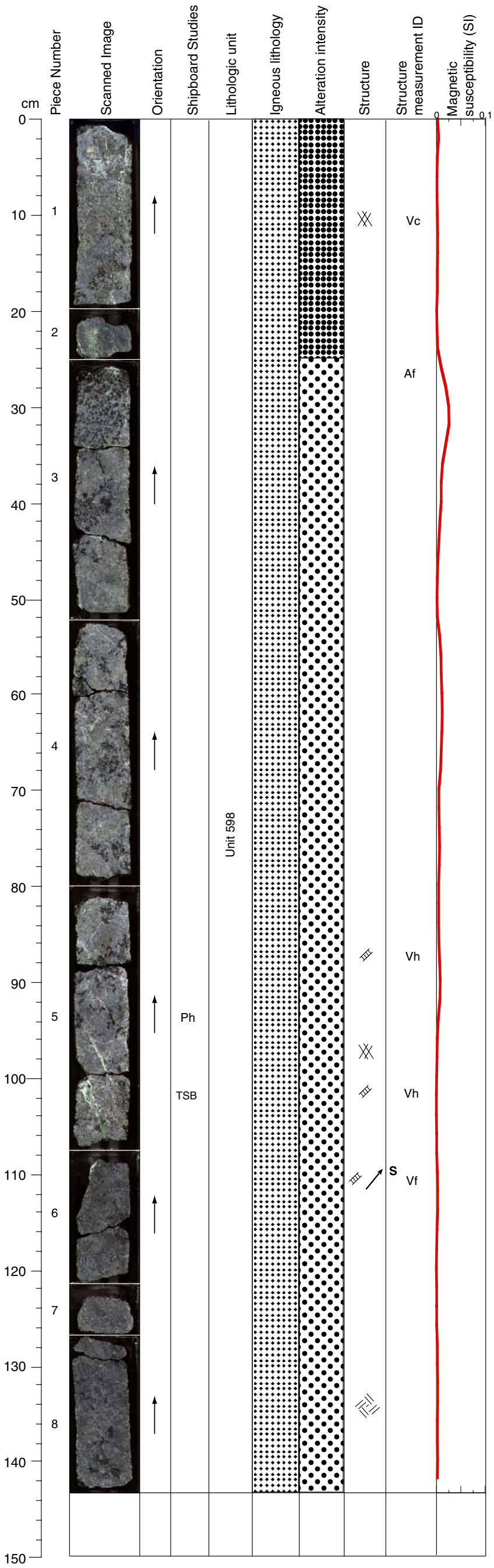
VEIN ALTERATION: Serpentine, amphibole.

THIN SECTIONS:
305-U1309D-238R-1, 21-24 cm (#584)

STRUCTURE: Troctolite showing a random plagioclase network. Serpentine foliations.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-238R-1, 16-28 cm WET

Core Photo



305-U1309D-239R-1 (Section top: 1148.70 mbsf)

UNIT-598: Olivine Gabbro
Pieces: 1-8

PRIMARY MINERALOGY: Mode from several pieces

Olivine	Modal 10-35% Size 2 mm average Shape anhedral
Plagioclase	Modal 40% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 25-50% Size 3 mm average Shape anhedral

COMMENTS: Unit 598 medium-grained olivine gabbro. Heterogeneous modal assemblage.

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

COMMENTS: Gabbro has alteration of pyroxene to green amphibole, plagioclase to pale green and white patches (chlorite and zeolite?). Subvertical green and white veins cut Piece 1 and part of Piece 2. There is some pale green alteration corona texture in Piece 2. Alteration in the rest of the section has a pale green cast with serpentinized olivine, pyroxene altered to green amphibole, and plagioclase altered to pale green and white patches. Two green and white veins cut the section between 93 and 106 cm.

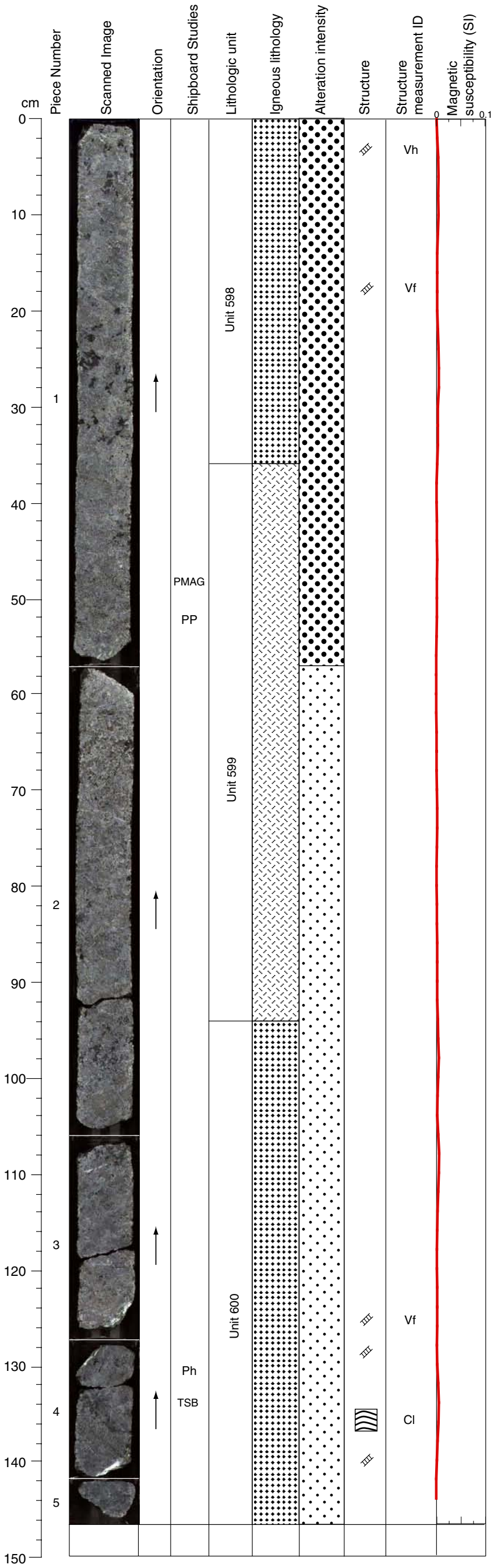
VEIN ALTERATION: Amphibole, talc, carbonate, zeolite.

THIN SECTIONS:
305-U1309D-239R-1, 101-103 cm (#585)

STRUCTURE: Isotropic gabbro with heterogeneous distribution of olivine, grain size varies from medium to pegmatitic. Weak serpentinization, a few subvertical pale green veins and white veins.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-239R-1, 80-106 cm WET

Core Photo



305-U1309D-239R-2 (Section top: 1150.13 mbsf)

UNIT-598: Olivine Gabbro
Pieces: 1

PRIMARY MINERALOGY: Mode from Piece 1

Olivine	Modal 15% Size 5 mm average Shape anhedral
Plagioclase	Modal 40% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 45% Size 5 mm average Shape anhedral

COMMENTS: Unit 598 is medium- to coarse-grained olivine gabbro.

UNIT-599: Gabbro
Pieces: 1-2b

PRIMARY MINERALOGY: Mode from Piece 2a

Olivine	Modal <1% Size 1 mm average Shape anhedral
Plagioclase	Modal 45% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 55% Size 3 mm average Shape anhedral

COMMENTS: Unit 599 is medium-grained gabbro.

UNIT-600: Olivine Gabbro
Pieces: 2b-5

PRIMARY MINERALOGY: Mode from Pieces 2b, 4b

Olivine	Modal 10-15% Size 5 mm average Shape anhedral
Plagioclase	Modal 50% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 35-40% Size 5 mm average Shape anhedral

COMMENTS: Unit 600 is fine- to coarse-grained olivine gabbro. Sulfide in Piece 4b.

SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: Alteration of olivine to serpentine, pyroxene to green amphibole and plagioclase to chlorite and white patches. A green and white vein coats the bottom and the top of Piece 4.

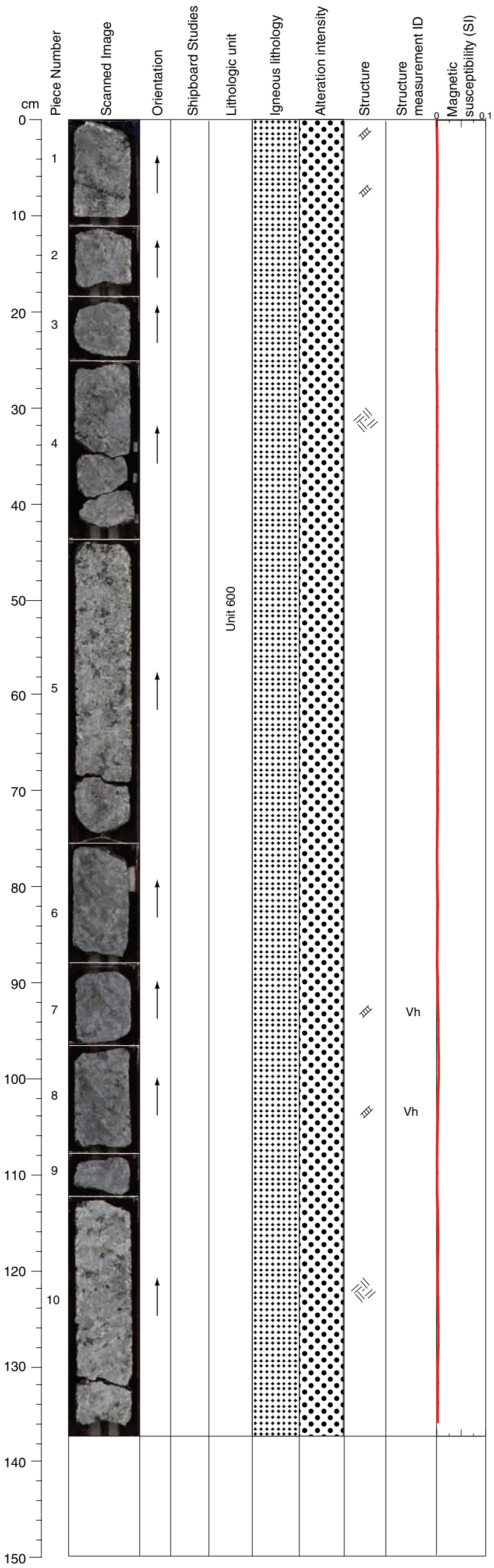
VEIN ALTERATION: Amphibole, chlorite, talc, carbonate, zeolite.

THIN SECTIONS:
305-U1309D-239R-2, 133-136 cm (#587)

STRUCTURE: Medium-grained gabbro with no clear magmatic or plastic fabric and heterogeneous distribution of olivine. Pale green fault veins, irregular, short white veins (shallowly dipping rather than sub horizontal) and open fractures.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-239R-2, 118-141 cm WET

Core Photo



305-U1309D-239R-3 (Section top: 1151.60 mbsf)

UNIT-600: Olivine Gabbro
Pieces: 1-10

PRIMARY MINERALOGY: Mode from Piece 5a

Olivine	Modal 15% Size 3 mm average Shape anhedral
Plagioclase	Modal 40% Size 4 mm average Shape anhedral
Clinopyroxene	Modal 45% Size 4 mm average Shape anhedral

COMMENTS: Unit 600 is medium- to coarse-grained olivine gabbro.

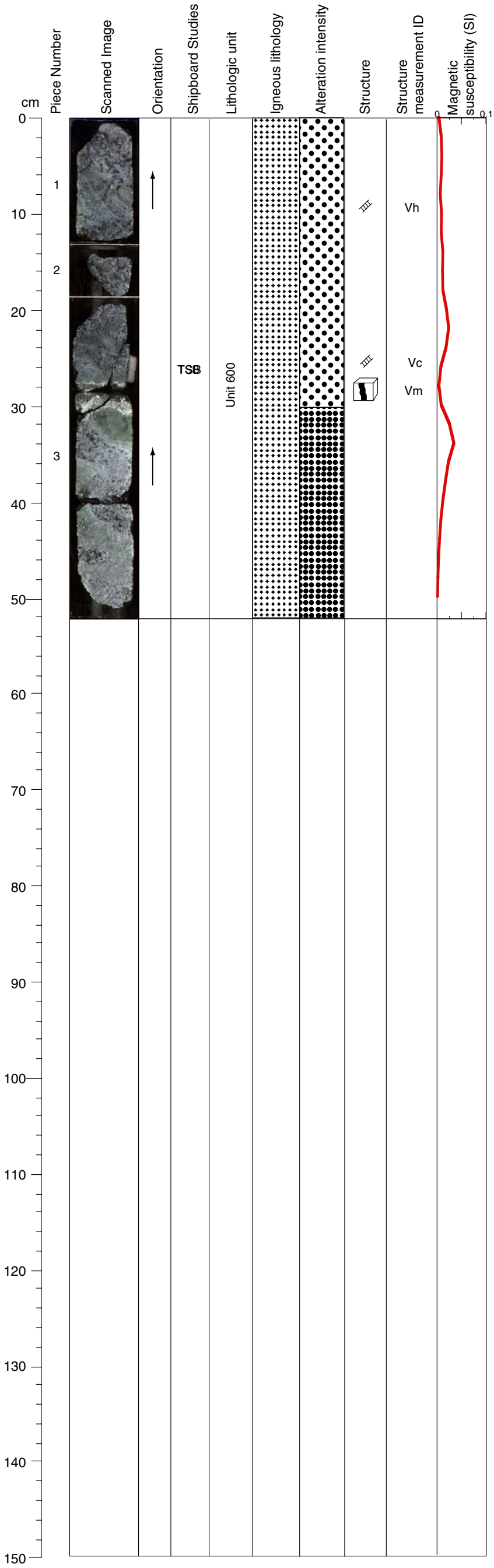
SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: Alteration of olivine to serpentine, pyroxene to green amphibole and plagioclase to chlorite and white patches. A green and white vein coats the top of Piece 1.

VEIN ALTERATION: Serpentine, amphibole, chlorite, talc, zeolite.

STRUCTURE: Medium-grained gabbro with no clear magmatic or plastic fabric and heterogeneous distribution of olivine. Dark green veins and later minor cataclasis.

Core Photo



305-U1309D-239R-4 (Section top: 1152.97 mbsf)

UNIT-600: Olivine Gabbro
Pieces: 1-3

PRIMARY MINERALOGY: Mode from Piece 1

Olivine	Modal 25% Size 3 mm average Shape anhedral
Plagioclase	Modal 50% Size 4 mm average Shape anhedral
Clinopyroxene	Modal 25% Size 5 mm average Shape anhedral

COMMENTS: Unit 600 is medium- to coarse-grained olivine gabbro. Severely altered felsic vein at 25-35 cm.

SECONDARY MINERALOGY: Chlorite, pale amphibole

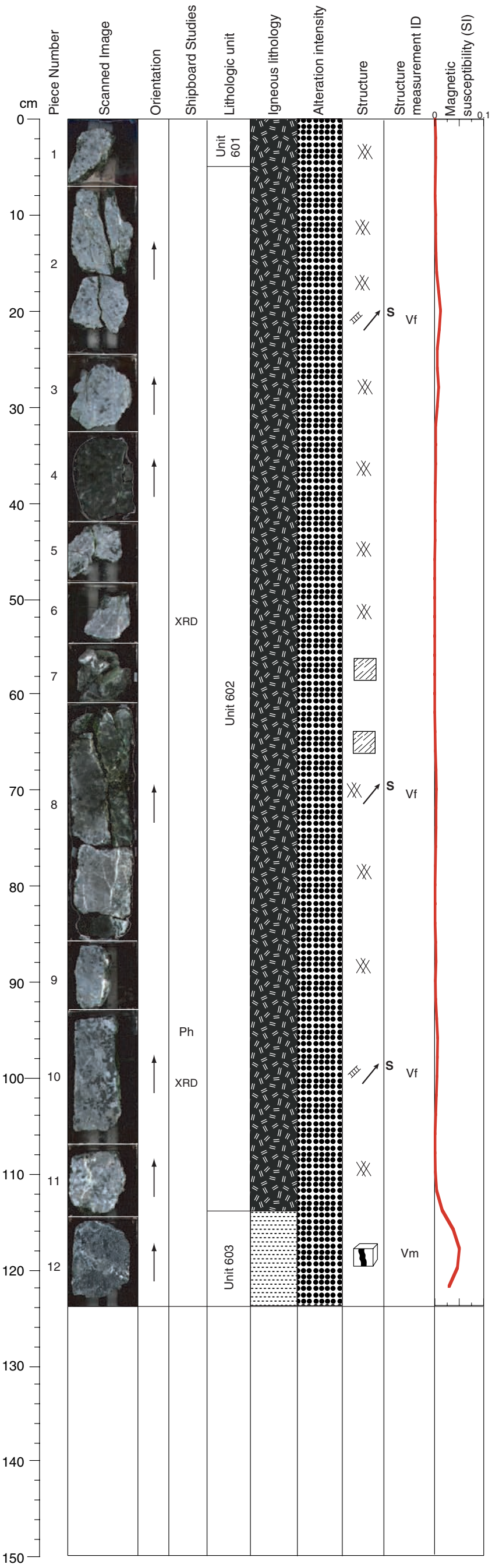
COMMENTS: Alteration of olivine to serpentine, pyroxene to green amphibole, and plagioclase to chlorite and white patches. Several green and white veins cut the section in Pieces 1 and 3. Diabase (26 cm to 35 cm) is altered to green amphibole and corona texture is present in troctolite surrounding the diabase. A leucocratic zone within the diabase extends from about 27 to 31 cm. A zone of 100% alteration extends from 36 to 47 cm.

VEIN ALTERATION: Amphibole, plagioclase, chlorite, talc, carbonate, slip fiber, zeolite.

THIN SECTIONS:
305-U1309D-239R-4, 25-28 cm (#586)

STRUCTURE: Medium-grained gabbro with no visible fabric but a likely magmatic vein (green alteration) of shallow dip. Dark green veins with distinct alteration zones.

Core Photo



305-U1309D-240R-1 (Section top: 1153.50 mbsf)

UNIT-601: Olivine-bearing Gabbro Rubble
Pieces: 1

COMMENTS: Unit 601 is coarse-grained olivine-bearing gabbro rubble.

UNIT-602: Olivine-bearing Gabbro
Pieces: 2-12

PRIMARY MINERALOGY: Mode from Piece 4

Olivine	Modal 5% Size 3 mm average Shape anhedral
Plagioclase	Modal 75% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 20% Size 3 mm average Shape anhedral

COMMENTS: Unit 602 is coarse-grained olivine-bearing gabbro. Pegmatitic pyroxene at 63-71 cm. Olivine-rich at 93-105 cm (~30%). Oikocrystic pyroxene.

UNIT-603: Olivine-rich Troctolite
Piece 12

PRIMARY MINERALOGY: Mode from Piece 12

Olivine	Modal 80% Size 2 mm average Shape anhedral
Plagioclase	Modal 5% Size 1 mm average Shape anhedral
Clinopyroxene	Modal 15% Size 1 mm average Shape anhedral

COMMENTS: Unit 603 is medium-grained olivine-rich troctolite.

SECONDARY MINERALOGY: Chlorite, pale amphibole, talc

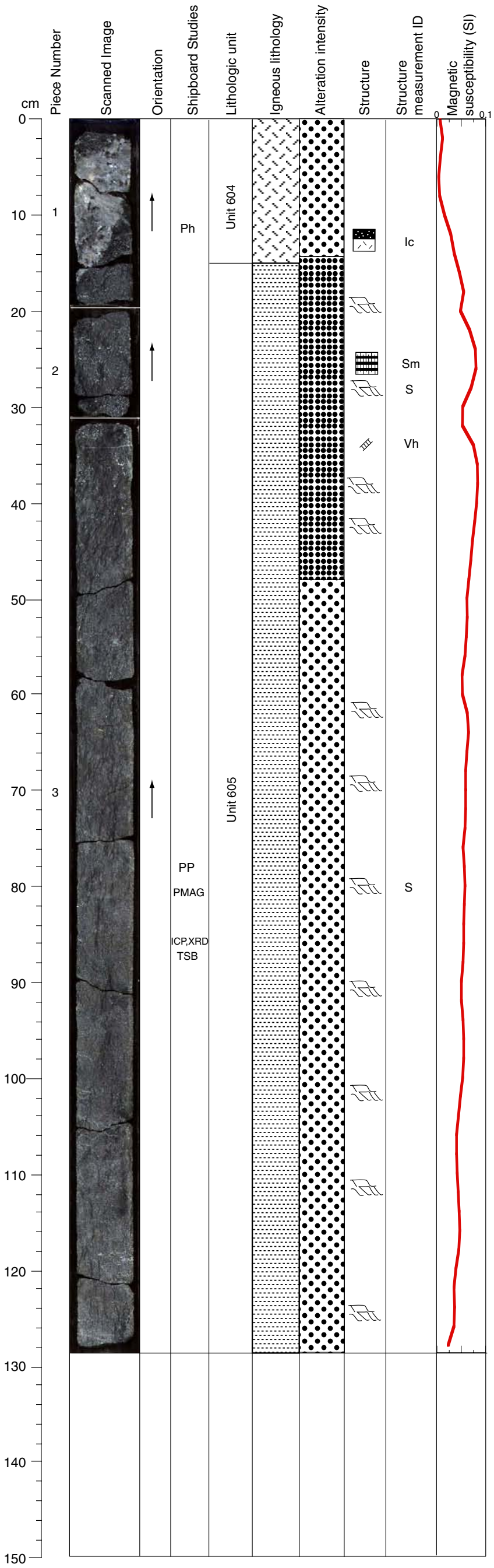
COMMENTS: Altered and deformed gabbro contains serpentinized olivine, green amphibole after pyroxene and chlorite and white patches after plagioclase. A complex zone of branching green and white veins extends from 0 to 114 cm and is associated with a higher degree of alteration. Piece 12 is a troctolite with olivine altered to serpentine and plagioclase to chlorite and white minerals. It is cut by a serpentine foliation that extends through a gabbroic intrusion which is itself altered to green ampibole and chlorite.

VEIN ALTERATION: Amphibole, plagioclase, chlorite, talc, carbonate, slip fiber, zeolite.

STRUCTURE: Medium-grained isotropic, locally olivine bearing gabbro, contact to isotropic troctolitic gabbro is not preserved. Totally cataclasized gabbro with irregular, pale green veins with subhorizontal fibers on veins, underlain by serpentinized troctolite.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-240R-1, 85-105 cm WET

Core Photo



305-U1309D-240R-2 (Section top: 1154.74 mbsf)

UNIT-604: Gabbro
Pieces: 1a-b

PRIMARY MINERALOGY: Mode from Piece 1b

Plagioclase	Modal 60% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 40% Size 5 mm average Shape anhedral

COMMENTS: Unit 604 is coarse-grained gabbro, a dike into troctolite.

UNIT-605: Olivine-rich Troctolite
Pieces: 1b-3

PRIMARY MINERALOGY: Mode from Piece 2a

Olivine	Modal 80% Size 2 mm average Shape anhedral
Plagioclase	Modal 8% Size 1 mm average Shape anhedral
Clinopyroxene	Modal 12% Size 1 mm average Shape anhedral

COMMENTS: Unit 605 is fine-grained olivine-rich troctolite. Clinopyroxene oikocrysts.

SECONDARY MINERALOGY: Serpentine, chlorite, pale amphibole

COMMENTS: Serpentinized troctolite with serpentine vein foliation and from 1 to 15 cm gabbroic intrusion of 6 m wide.

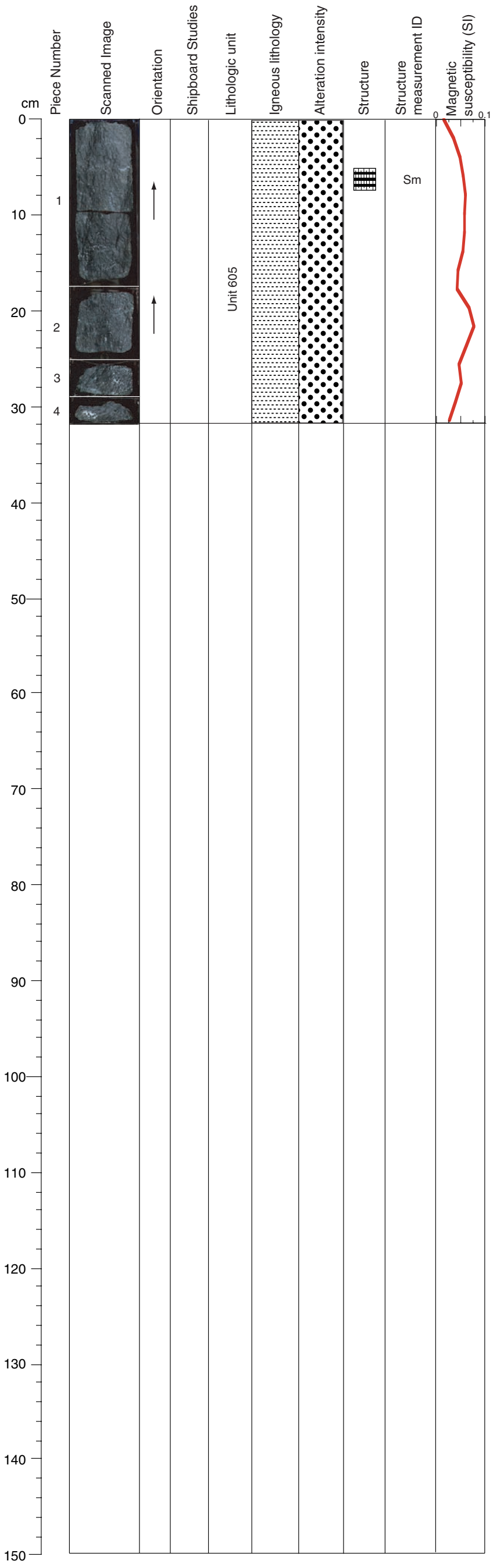
VEIN ALTERATION: Serpentine

THIN SECTIONS:
305-U1309D-240R-2, 86-88 cm (#588)

STRUCTURE: Isotropic gabbro truncating fine-grained troctolitic gabbro with weak alignment of plagioclase. Anastomosing steep serpentine foliations and a few gray veins.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-240R-2, 0-19 cm WET
305-U1309D-240R-2, 75-91 cm WET

Core Photo



305-U1309D-240R-3 (Section top: 1156.03 mbsf)

UNIT-605: Olivine-rich Troctolite
Pieces: 1-4

PRIMARY MINERALOGY: Mode from Piece 1a

Olivine	Modal 85% Size 2 mm average Shape anhedral
Plagioclase	Modal 8% Size 1 mm average Shape anhedral
Clinopyroxene	Modal 7% Size 1 mm average Shape anhedral

COMMENTS: Unit 605 is fine-grained olivine-rich troctolite. Clinopyroxene oikocrysts.

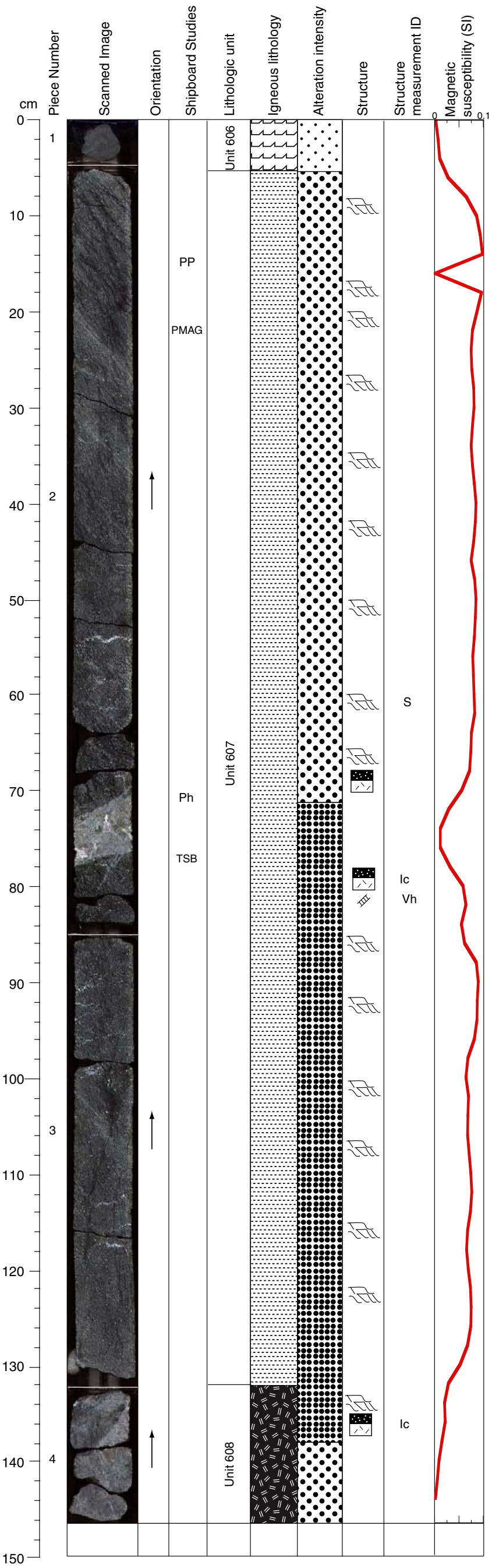
SECONDARY MINERALOGY: Serpentine, chlorite?

COMMENTS: Serpentinized troctolite with serpentine vein foliation.

VEIN ALTERATION: Serpentine

STRUCTURE: Fine-grained troctolitic gabbro with possible weak anisotropic fabric of the plagioclase network in some parts. Anastomosing steep serpentine foliations.

Core Photo



305-U1309D-241R-1 (Section top: 1158.30 mbsf)

UNIT-606: Diabase Rubble
Pieces: 1

COMMENTS: Unit 606 is diabase rubble.

UNIT-607: Olivine-rich Troctolite
Pieces: 2-3c

PRIMARY MINERALOGY: Mode from Piece 3a

Olivine	Modal 80% Size 1 mm average Shape anhedral
Plagioclase	Modal 10% Size 1 mm average Shape anhedral
Clinopyroxene	Modal 10% Size 1 mm average Shape anhedral

COMMENTS: Unit 607 is fine-grained olivine-rich troctolite. Coarse-grained gabbro dike at 72-79 cm.

UNIT-608: Olivine-bearing Gabbro
Pieces: 4

PRIMARY MINERALOGY: Mode from Piece 4

Olivine	Modal 5% Size 3 mm average Shape anhedral
Plagioclase	Modal 55% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 45% Size 3 mm average Shape anhedral

COMMENTS: Unit 608 is coarse-grained olivine-bearing gabbro. Troctolite fragment entrained in gabbro at 134 cm.

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

COMMENTS: Serpentinized troctolite with serpentine vein foliation. From 70 to 76 cm, gabbroic intrusion highly altered and with a 1 cm wide green blue alteration halo on each side. In Piece 4, at 132 cm, contact with the serpentinized troctolite and the coarse-grained gabbro.

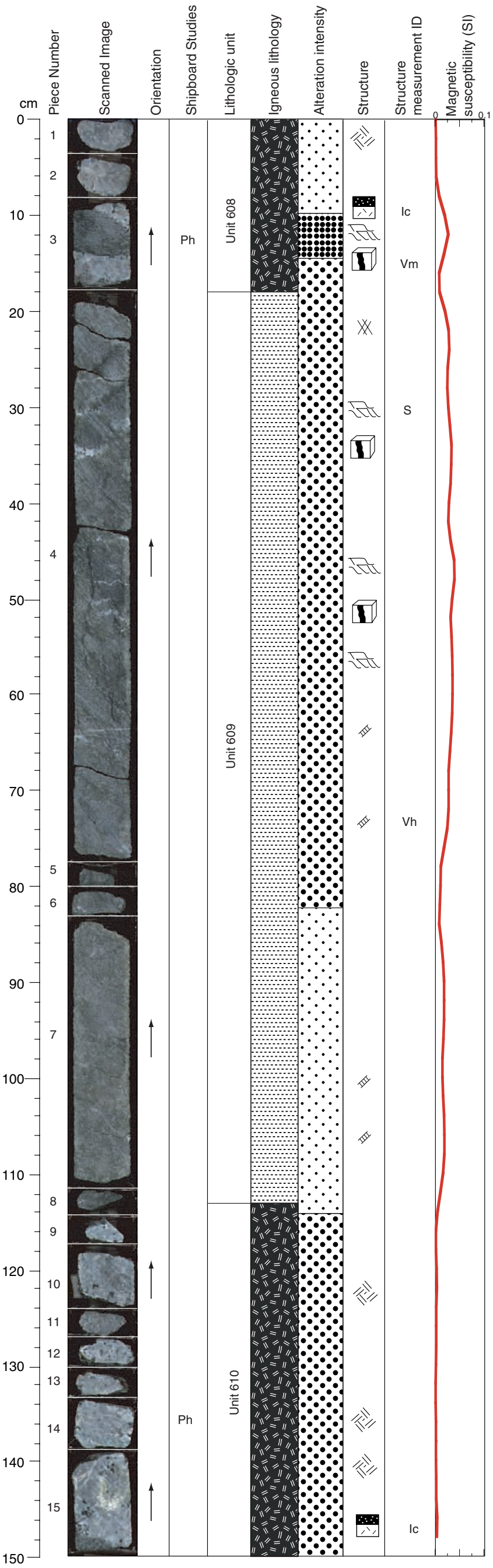
VEIN ALTERATION: Serpentine, amphibole, chlorite

THIN SECTIONS:
305-U1309D-241R-1, 76-78 cm (#589)

STRUCTURE: Troctolitic gabbro with overall random plagioclase network. Subvertical serpentinite foliations with some anastomosing zones.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-241R-1, 64-83 cm WET

Core Photo



305-U1309D-241R-2 (Section top: 1159.77 mbsf)

UNIT-608: Olivine-bearing Gabbro
Pieces: 1-3

PRIMARY MINERALOGY: Mode from Piece 2

Olivine	Modal 5% Size 3 mm average Shape anhedral
Plagioclase	Modal 55% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 40% Size 8 mm average Shape anhedral

COMMENTS: Unit 608 coarse-grained olivine-bearing gabbro. Troctolite fragment entrained in gabbro at 10 cm.

UNIT-609: Olivine-rich Troctolite
Pieces: 4-8

PRIMARY MINERALOGY: Mode from Piece 4d

Olivine	Modal 85% Size 1 mm average Shape anhedral
Plagioclase	Modal 8% Size 1 mm average Shape anhedral
Clinopyroxene	Modal 7% Size 1 mm average Shape anhedral

COMMENTS: Unit 609 is fine-grained olivine-rich troctolite.

UNIT-610: Olivine-bearing Gabbro
Pieces: 9-15

PRIMARY MINERALOGY: Mode from Piece 10

Olivine	Modal 5% Size 5 mm average Shape anhedral
Plagioclase	Modal 55% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 40% Size 6 mm average Shape anhedral

COMMENTS: Unit 610 is coarse-grained olivine-bearing gabbro. Fine-grained troctolite at the top and the bottom. Pegmatitic from 134 cm to the bottom. Coarse pyroxene grain (~70 mm) at the bottom.

SECONDARY MINERALOGY: Serpentine, chlorite, pale amphibole

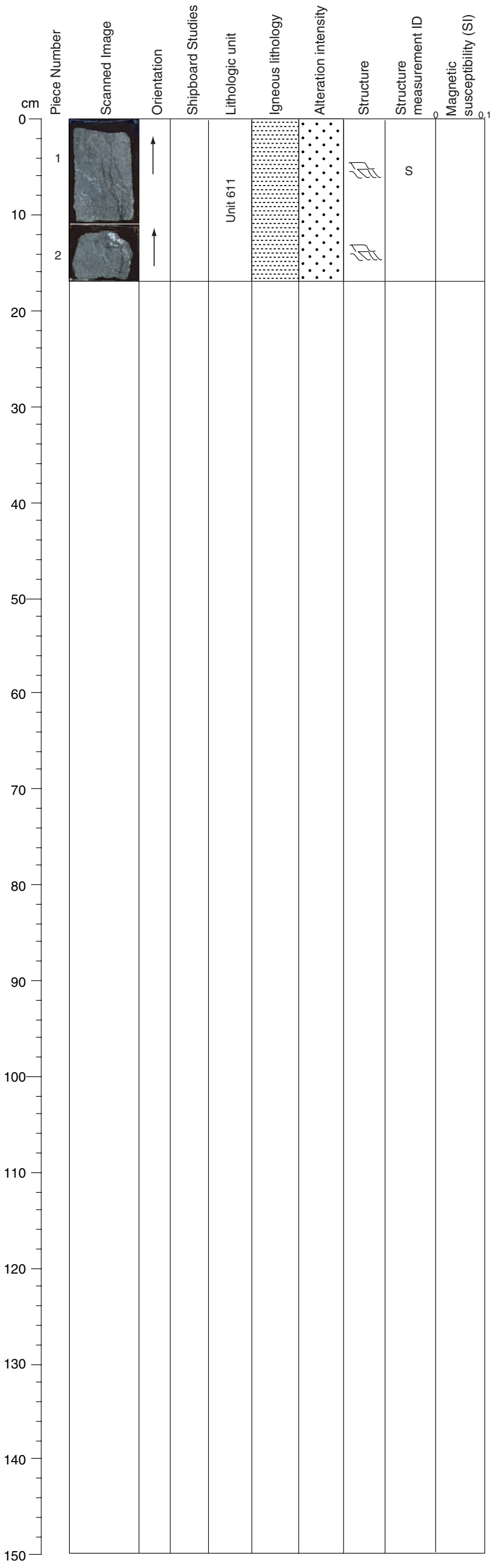
COMMENTS: From Piece 1 to 3, coarse-grained gabbro with amphibole alteration. At 10-15 cm serpentinized troctolite in contact with coarse-grained gabbro at 15 cm. Alteration zone of the serpentinized troctolite with tremolite rims around the serpentinized olivines. At 18 cm (Piece 4) serpentinized troctolite with serpentine vein foliation. At 68-76 cm, dark blue chlorite vein. At 77-114 cm, relatively fresh part very fine-grained. From Piece 9 to 15, coarse-grained gabbro with rims of tremolite around the serpentinized olivine. At 146 cm, a contact with serpentinized troctolite.

VEIN ALTERATION: Serpentine, amphibole, chlorite, zeolite

STRUCTURE: Troctolite with irregular veins. No preferred mineral orientation. Contacts with intrusive gabbros preserved. Gabbro has a few dark green veins. Troctolite has weak serpentinite foliation.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-241R-2, 8-26 cm WET
305-U1309D-241R-2, 132-148 cm WET

Core Photo



305-U1309D-241R-3 (Section top: 1161.27 mbsf)

UNIT-611: Olivine-rich Troctolite
Pieces: 1-2

PRIMARY MINERALOGY: Mode from Piece 1a

Olivine	Modal 80% Size 1 mm average Shape anhedral
Plagioclase	Modal 5% Size 1 mm average Shape anhedral
Clinopyroxene	Modal 15% Size 1 mm average Shape anhedral

COMMENTS: Unit 611 is fine-grained olivine-rich troctolite.

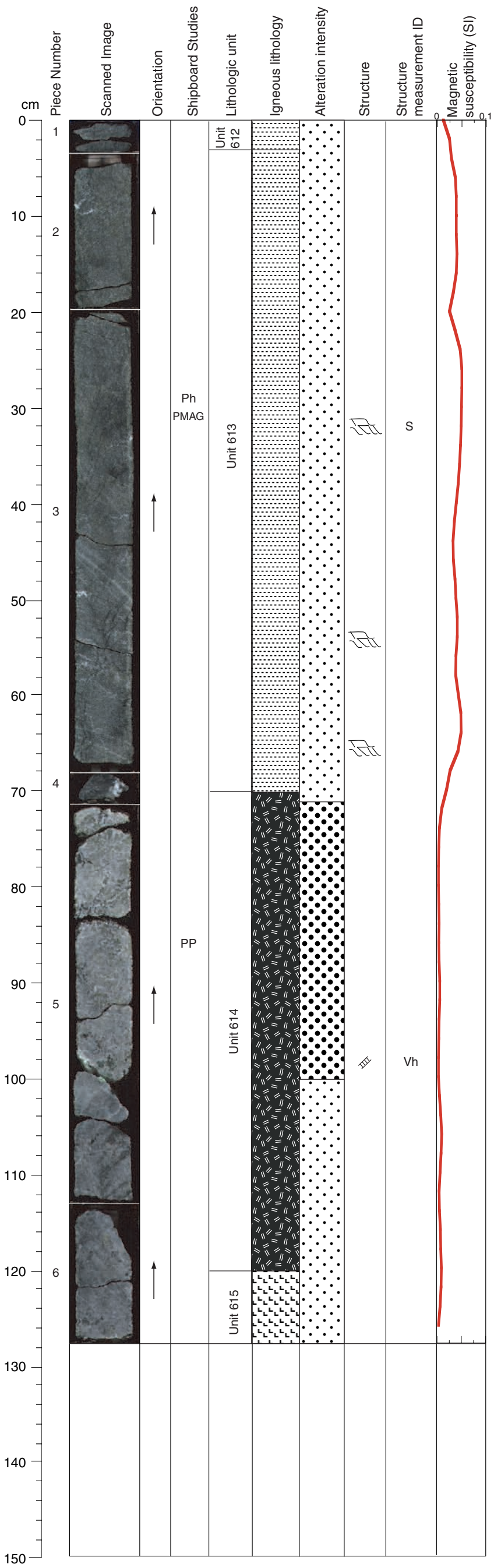
SECONDARY MINERALOGY: Serpentine, chlorite?

COMMENTS: Serpentinized troctolite.

VEIN ALTERATION: Serpentine

STRUCTURE: Troctolite with no consistent orientation of the plagioclase network. Weak steeply dipping serpentinite foliations.

Core Photo



305-U1309D-242R-1 (Section top: 1163.10 mbsf)

UNIT-611: Olivine-rich Troctolite Rubble
Pieces: 1

COMMENTS: Unit 612 is fine-grained dunitic troctolite rubble.

UNIT-613: Dunitic Troctolite
Pieces: 2-4

PRIMARY MINERALOGY: Mode from Piece 2a

Olivine	Modal 85% Size 1 mm average Shape anhedral
Plagioclase	Modal 15% Size 1 mm average Shape anhedral
Clinopyroxene	Modal 1% Size 1 mm average Shape anhedral

COMMENTS: Unit 613 is fine-grained olivine-rich troctolite. Clinopyroxene oikocryst.

UNIT-614: Olivine-bearing Gabbro
Pieces: 5-6a

PRIMARY MINERALOGY: Mode from Piece 5b

Olivine	Modal 3% Size 4 mm average Shape anhedral
Plagioclase	Modal 60% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 37% Size 4 mm average Shape anhedral

COMMENTS: Unit 614 is medium-grained olivine-bearing gabbro.

UNIT-615: Troctolitic Gabbro
Pieces: 6b

PRIMARY MINERALOGY: Mode from Piece 6b

Olivine	Modal 15% Size 4 mm average Shape anhedral
Plagioclase	Modal 80% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 5% Size 2 mm average Shape anhedral

COMMENTS: Unit 615 is medium-grained troctolitic gabbro.

SECONDARY MINERALOGY: Serpentine, chlorite, pale amphibole

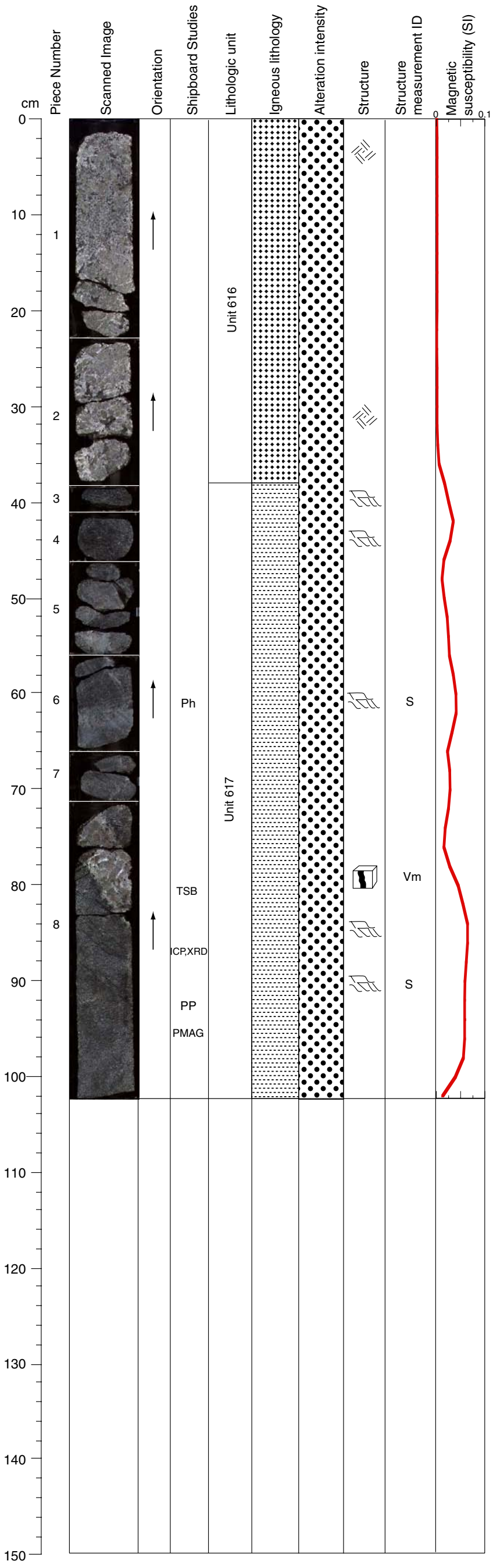
COMMENTS: From Piece 1 to 4, serpentinized troctolite with serpentine vein foliation. In Piece 4 contact between serpentinized troctolite and gabbroic intrusion. In Pieces 5 and 6, coarse-grained gabbro with pyroxene altered to green amphibole and serpentinzation of olivine. From 97 to 99 cm, fractures filled by green vein (amphibole, talc, zeolite).

VEIN ALTERATION: Serpentine, amphibole, talc, zeolite

STRUCTURE: Troctolite in unpreserved contact to medium grained gabbro, no preferred mineral elongations observed. Troctolite with plagioclase-rich irregular veinlets. Troctolite with local steeply dipping serpentinite foliations. Gabbro with pale green veins and slight cataclasis.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-242R-1, 20-44 cm WET

Core Photo



305-U1309D-242R-2 (Section top: 1164.37 mbsf)

UNIT-616: Olivine Gabbro
Pieces: 1-2

PRIMARY MINERALOGY: Mode from Piece 1a

Olivine	Modal 20% Size 3 mm average Shape anhedral
Plagioclase	Modal 55% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 25% Size 5 mm average Shape anhedral

COMMENTS: Unit 616 is medium-grained olivine gabbro.

UNIT-617: Olivine-rich Troctolite
Pieces: 3-8

PRIMARY MINERALOGY: Mode from Piece 8c

Olivine	Modal 85% Size 1 mm average Shape anhedral
Plagioclase	Modal 15% Size 1 mm average Shape anhedral
Clinopyroxene	Modal 1% Size 2 mm average Shape anhedral

COMMENTS: Unit 617 is fine-grained olivine-rich troctolite. Clinopyroxene oikocryst. Gabbroic dikelets in Piece 5, at 63 cm, and at 73-82 cm.

SECONDARY MINERALOGY: Serpentine, chlorite, pale amphibole

COMMENTS: Pieces 1 and 2 are a coarse-grained gabbro with serpentinized olivine and pyroxene altered to green amphibole. Pieces 3 and 4 are a serpentinized troctolite. In Piece 5 contact between the serpentinized troctolite and the coarse-grained gabbro, with alteration of the pyroxene to green amphibole. In Pieces 6 to 8, serpentinized troctolite with gabbroic intrusions at 62-64 cm, and 72-84 cm, the contacts are diffuse and the pyroxene in the gabbroic dikes are altered to green amphibole.

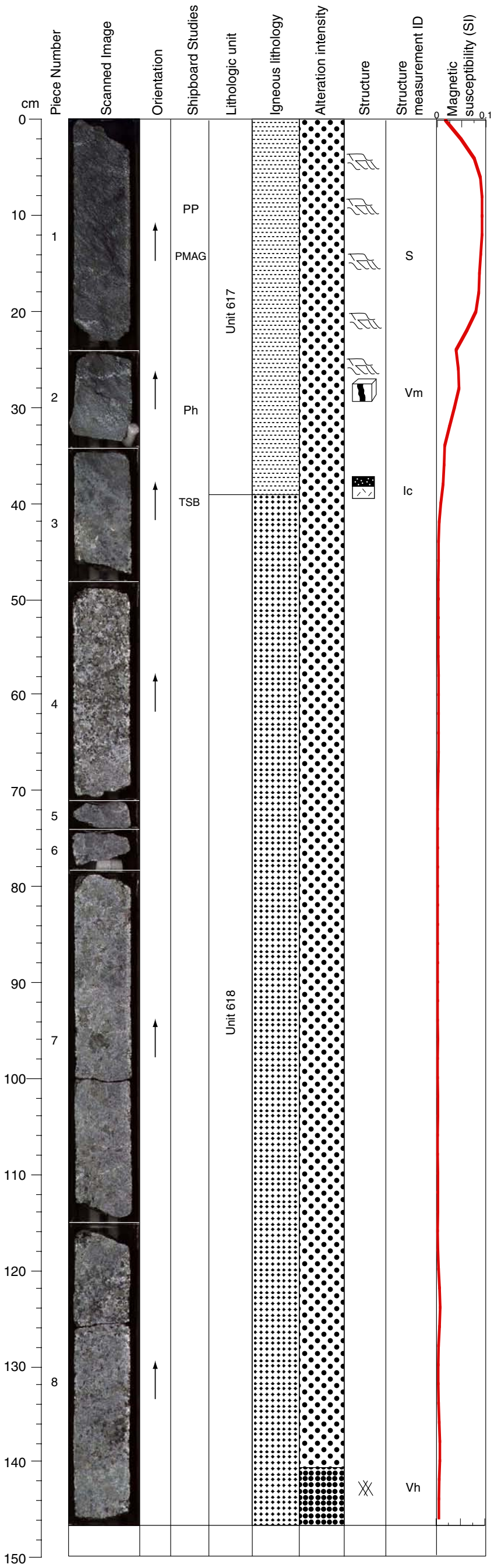
VEIN ALTERATION: Serpentine, amphibole, talc, zeolite

THIN SECTIONS:
305-U1309D-242R-2, 80-82 cm (#590)

STRUCTURE: Olivine gabbro in unpreserved contact with troctolite, the latter being cut at moderate dip by 3 cm thick medium-grained gabbro. No magmatic or plastic strain fabrics. Steep irregular serpentine foliations.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-242R-2, 57-83 cm WET

Core Photo



305-U1309D-243R-1 (Section top: 1167.90 mbsf)

UNIT-617: Olivine-rich Troctolite
Pieces: 1-3

PRIMARY MINERALOGY: Mode from Piece 8c

Olivine	Modal 85% Size 1 mm average Shape anhedral
Plagioclase	Modal 15% Size 1 mm average Shape anhedral
Clinopyroxene	Modal 1% Size 2 mm average Shape anhedral

COMMENTS: Unit 617 is fine-grained olivine-rich troctolite. Felsic vein (3 mm thick) at 27 cm. Clinopyroxene oikocryst-rich in Piece 2. Gradational contact with olivine gabbro and reaction halo in Piece 3.

UNIT-618: Olivine Gabbro
Pieces: 3-8

PRIMARY MINERALOGY: Mode from Piece 4 and 7a

Olivine	Modal 10-20% Size 3 mm average Shape anhedral
Plagioclase	Modal 45-75% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 15-35% Size 5 mm average Shape anhedral

COMMENTS: Unit 618 is medium-grained olivine gabbro. Pegmatitic clinopyroxene oikocryst at 42 cm. Plagioclase rich. Modal abundances dramatically change along section.

SECONDARY MINERALOGY: Serpentine, chlorite, pale amphibole

COMMENTS: From Piece 1 to 3 (1-36 cm) serpentinized troctolite with serpentine vein foliation. At 36 cm, diffuse contact with medium-grained gabbro with serpentinized olivine. From Piece 3 to 8, medium-grained gabbro with serpentinized olivine and pyroxene altered to green amphibole. At 141-145 cm, thin green veins with alteration halos around them.

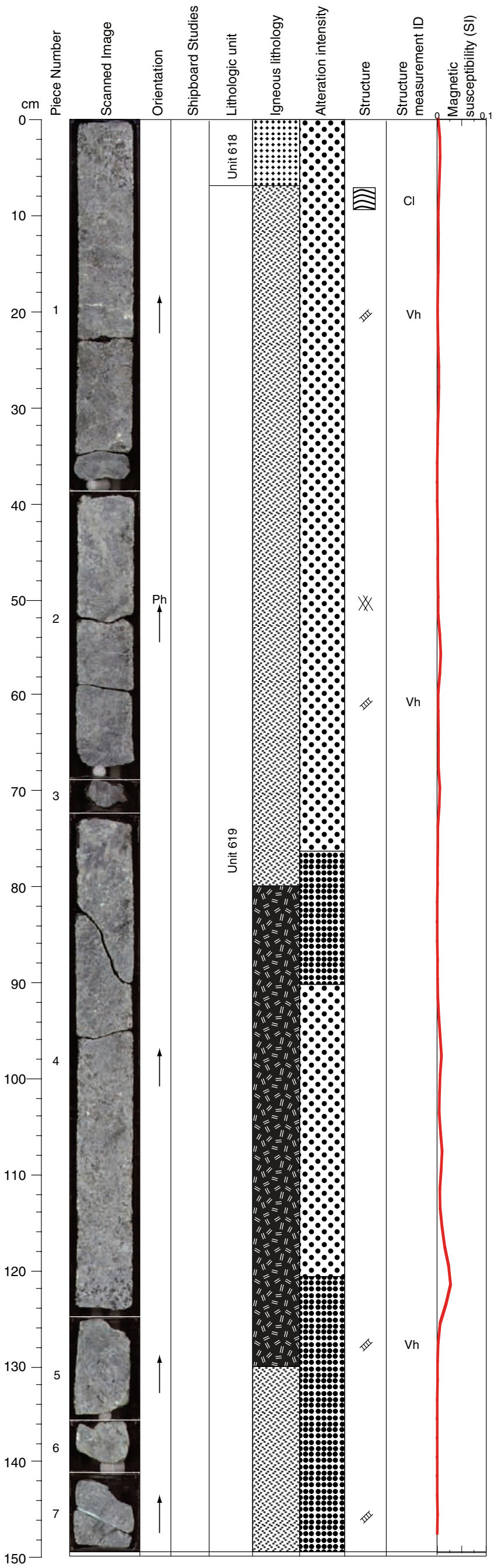
VEIN ALTERATION: Serpentine, amphibole, chlorite

THIN SECTIONS:
305-U1309D-243R-1, 39-42 cm (#591)

STRUCTURE: Troctolite with no clear fabric of the interstitial plagioclase grains and discontinous plagioclase veinlets with a preferred orientation. Troctolite is in contact with isotropic gabbro that has irregular distribution of olivine. Intense serpentine foliation in upper part. A few dark green veins in gabbro.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-243R-1, 24-48 cm WET

Core Photo



305-U1309D-243R-2 (Section top: 1169.37 mbsf)

UNIT-618: Olivine Gabbro
Piece 1a

PRIMARY MINERALOGY: Mode from Piece 1a

Olivine	Modal 10% Size 3 mm average Shape anhedral
Plagioclase	Modal 50% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 40% Size 5 mm average Shape anhedral

COMMENTS: Unit 618 is medium-grained olivine gabbro.

UNIT-619: Gabbro
Pieces: 1a-4a

PRIMARY MINERALOGY: Mode from Piece 2a

Plagioclase	Modal 35% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 65% Size 8 mm average Shape anhedral

COMMENTS: Unit 619 is coarse-grained gabbro. Fine-grained gabbro at 5-8 cm (along contact with previous olivine gabbro). Clinopyroxene oikocryst.

UNIT-619: Olivine-bearing Gabbro
Pieces: 4a-5

PRIMARY MINERALOGY: Mode from Pieces 4a and 4b

Olivine	Modal 3% Size 1 mm average Shape anhedral
Plagioclase	Modal 57% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 40% Size 3 mm average Shape anhedral

COMMENTS: Unit 619 is medium-grained olivine-bearing gabbro. Olivine-rich at 124-130 cm.

UNIT-619: Gabbro
Pieces: 5-7

PRIMARY MINERALOGY: Mode from Piece 5

Plagioclase	Modal 60% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 30% Size 3 mm average Shape anhedral

COMMENTS: Unit 619 is medium-grained gabbro. Severely altered.

SECONDARY MINERALOGY: Chlorite, pale amphibole, talc

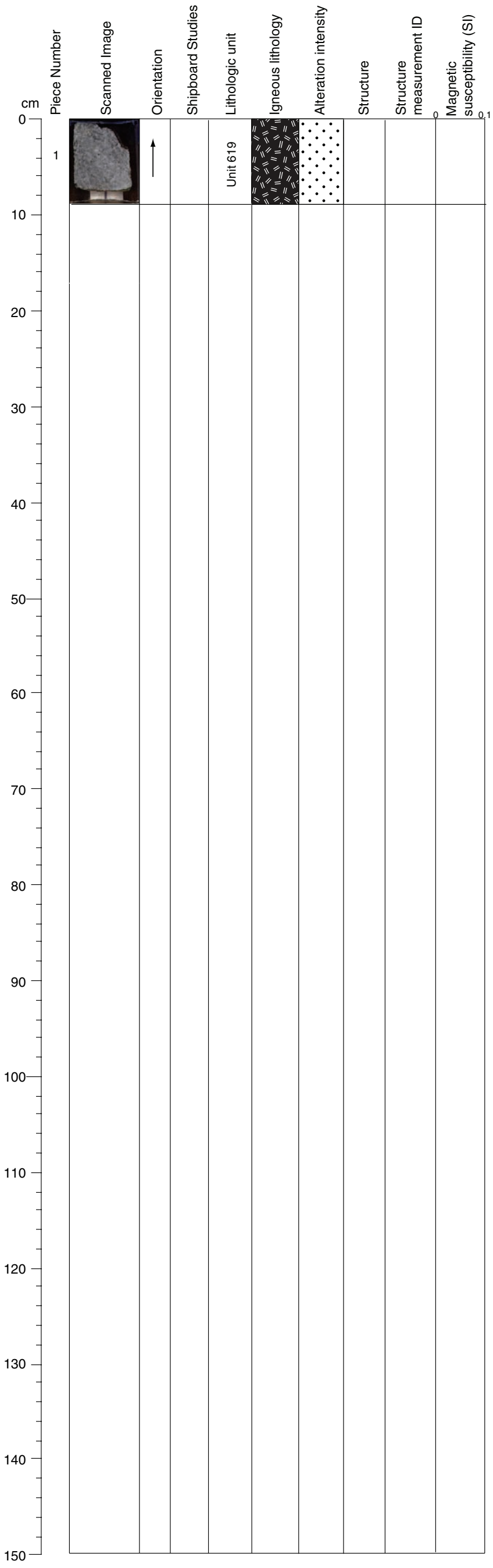
COMMENTS: Medium- to coarse-grained gabbro with serpentinized olivine and alteration of the pyroxene to green amphibole. At 20 cm, white and green vein (amphibole, chlorite, carbonate). Piece 2 is cut by several thin amphibole veins. From 80 cm toward the end of the section, corona texture related to numerous green amphibole veins. From 122 to 125 cm, rim of tremolite around the serpentinized olivine.

VEIN ALTERATION: Amphibole, chlorite, carbonate

STRUCTURE: Isotropic, medium-grained gabbro with compositional (olivine-rich) layers. A few pale green veins.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-243R-2, 40-67 cm WET

Core Photo



305-U1309D-243R-3 (Section top: 1170.87 mbsf)

UNIT-619: Olivine-bearing Gabbro
Pieces: 1

PRIMARY MINERALOGY: Mode from Piece 1

Olivine	Modal 1% Size 1 mm average Shape anhedral
Plagioclase	Modal 65% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 35% Size 3 mm average Shape anhedral

COMMENTS: Unit 619 is medium-grained olivine-bearing gabbro.

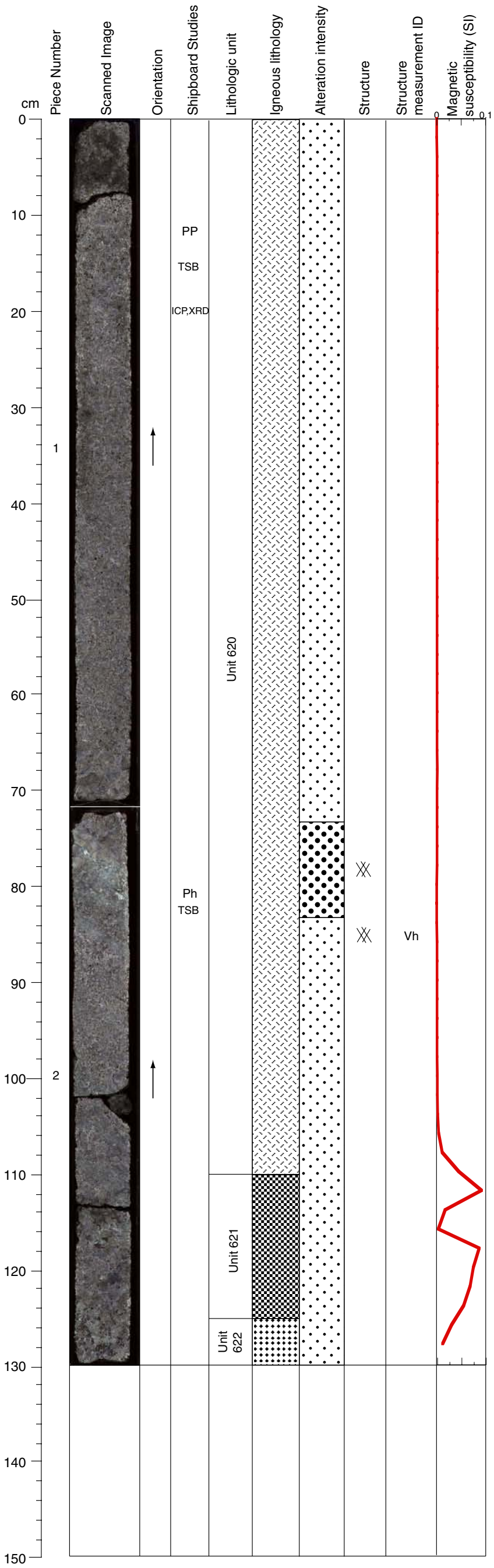
SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: Fine-grained gabbro with serpentinized olivine.

VEIN ALTERATION: no vein

STRUCTURE: Olivine rich gabbro, fine grained, without visible magmatic or plastic fabric.

Core Photo



305-U1309D-244R-1 (Section top: 1172.70 mbsf)

UNIT-620: Gabbro
Pieces: 1-2b

PRIMARY MINERALOGY: Mode from Piece 1a

Plagioclase	Modal 50% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 50% Size 3 mm average Shape anhedral

COMMENTS: Unit 620 is a coarse-grained gabbro. Abundant orthopyroxene observed in thin section.

UNIT-621: Oxide Gabbro
Pieces: 2b-c

PRIMARY MINERALOGY: Mode from Piece 2c

Plagioclase	Modal 53% Size 4 mm average Shape anhedral
Clinopyroxene	Modal 42% Size 5 mm average Shape anhedral
Oxide	Modal 5% Size 4 mm average Shape anhedral

COMMENTS: Unit 621 is coarse-grained oxide gabbro. Oxide has higher concentration at 113 cm. Large sulfide with oxide. As much as 7% orthopyroxene observed in thin section.

UNIT-622: Olivine Gabbro
Pieces: 2c

PRIMARY MINERALOGY: Mode from Piece 2c

Olivine	Modal 30% Size 5 mm average Shape anhedral
Plagioclase	Modal 25% Size 4 mm average Shape anhedral
Clinopyroxene	Modal 45% Size 6 mm average Shape anhedral

COMMENTS: Unit 622 is coarse-grained olivine gabbro.

SECONDARY MINERALOGY: Chlorite, pale amphibole, talc

COMMENTS: Coarse-grained gabbro with thick pale green vein from ~75-80 cm, with alteration halo 5 cm wide. The pyroxene in this zone are altered to green amphibole. At 87 cm, green amphibole vein without alteration halo. From 113 to 128 cm, big sulfide grains.

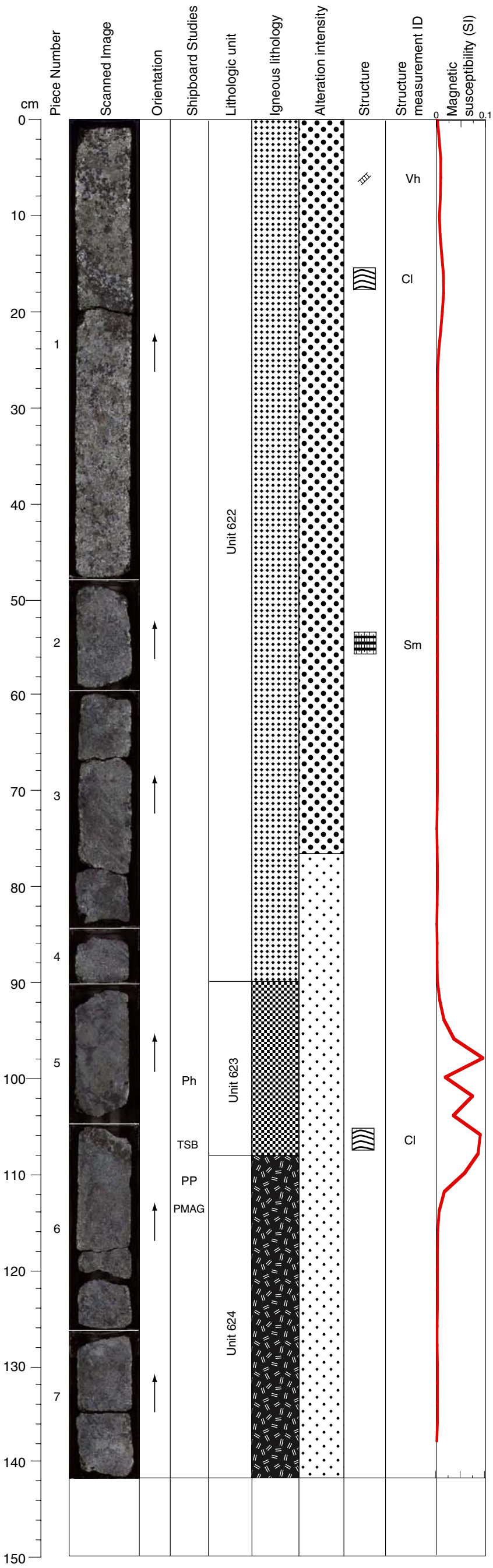
VEIN ALTERATION: Amphibole, chlorite, carbonate, zeolite

THIN SECTIONS:
305-U1309D-244R-1, 14-16 cm (#592)
305-U1309D-244R-1, 80-83 c (#593)

STRUCTURE: Medium-grained isotropic oxide gabbro occurs, locally coarse grained. Set of dark green veins.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-244R-1, 8-28 cm WET
305-U1309D-244R-1, 72-102 cm WET

Core Photo



305-U1309D-244R-2 (Section top: 1174.00 mbsf)

UNIT-622: Olivine Gabbro
Pieces: 1-4

PRIMARY MINERALOGY: Mode from Piece 1

Olivine	Modal 10% Size 7 mm average Shape anhedral
Plagioclase	Modal 45% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 45% Size 10 mm average Shape anhedral

COMMENTS: Unit 622 is coarse-grained olivine gabbro. Olivine Gabbro/ Gabbro interlayering.

UNIT-623: Oxide Gabbro
Pieces: 5-6a

PRIMARY MINERALOGY: Mode from Piece 5

Plagioclase	Modal 53% Size 4 mm average Shape anhedral
Clinopyroxene	Modal 42% Size 5 mm average Shape anhedral
Oxide	Modal 5% Size 4 mm average Shape anhedral

COMMENTS: Unit 623 is coarse-grained oxide gabbro. Oxide has higher concentration at 100-108 cm with sulfide.

UNIT-624: Olivine-bearing Gabbro
Pieces: 6a-7

PRIMARY MINERALOGY: Mode from Piece 6a

Olivine	Modal 2% Size 1 mm average Shape anhedral
Plagioclase	Modal 50% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 48% Size 2 mm average Shape anhedral

COMMENTS: Unit 624 is fine- to medium-grained olivine-bearing gabbro.

SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: Coarse-grained gabbro with serpentinized olivine and pyroxene altered to green amphibole amd significant amount of sulfies (large grains). From 79 to 103 cm, pegmatitic part with sulfides in the minerals that are slighlty altered to green amphibole. From 105 to 108 cm (top of Piece 6), leucocratic alteration with pyroxene altered to green amphibole and very significant amount of sulfides.

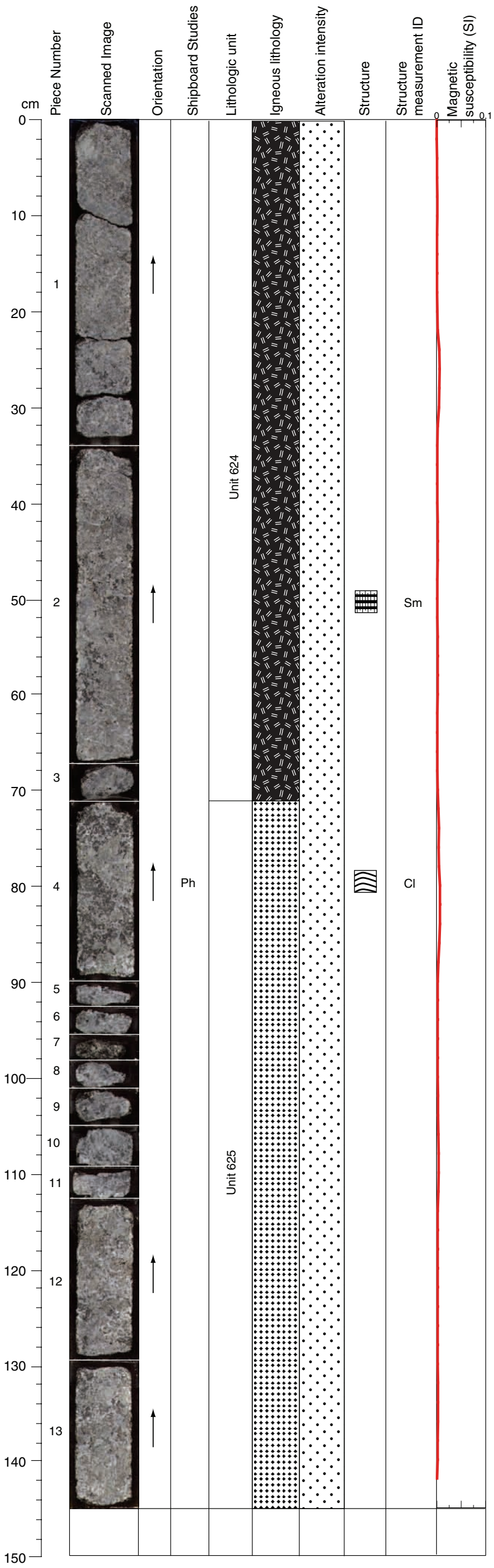
VEIN ALTERATION: Amphibole, chlorite

THIN SECTIONS:
305-U1309D-244R-2, 105-108 cm (#594)

STRUCTURE: Medium-grained gabbro with olivine rich layers, an oxide band and a short interval with magmatic foliation in fine-grained gabbro. A few dark green veins. Very weak serpentinization of some olivine rich domains in upper part.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-244R-2, 90-118 cm WET

Core Photo



305-U1309D-244R-3 (Section top: 1175.41 mbsf)

UNIT-624: Olivine-bearing Gabbro
Pieces: 1-3

PRIMARY MINERALOGY: Mode from Piece 2

Olivine	Modal 2% Size 4 mm average Shape anhedral
Plagioclase	Modal 48% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 50% Size 5 mm average Shape anhedral

COMMENTS: Unit 624 is coarse-grained olivine-bearing gabbro.

UNIT-625: Olivine Gabbro
Pieces: 4-13

PRIMARY MINERALOGY: Mode from Piece 12

Olivine	Modal 8% Size 8 mm average Shape anhedral
Plagioclase	Modal 40% Size 6 mm average Shape anhedral
Clinopyroxene	Modal 52% Size 7 mm average Shape anhedral

COMMENTS: Unit 625 is coarse-grained olivine gabbro. Olivine-rich at 71-89 cm. Troctolite/gabbro layering.

SECONDARY MINERALOGY: Chlorite, pale amphibole.

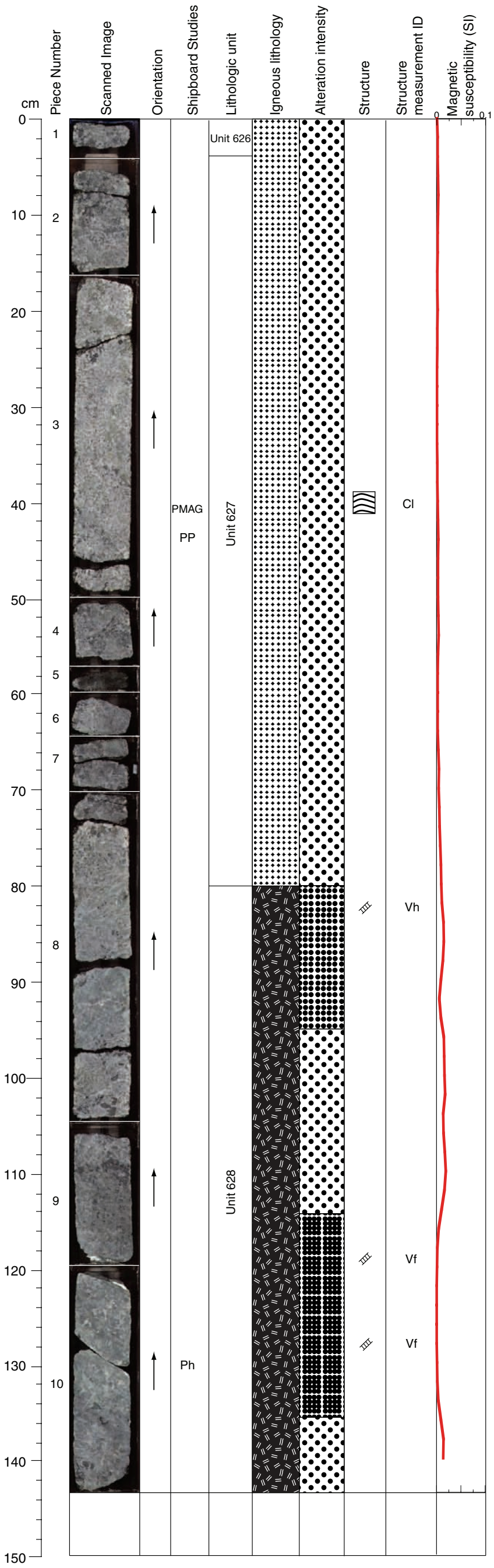
COMMENTS: Coarse-grained gabbro with serpentinized olivine and pyroxene altered to green amphibole. Significant amount of sulfides. From 1 to 10 cm, numerous thin pale green amphibole veins.

VEIN ALTERATION: Amphibole, chlorite

STRUCTURE: Gabbro to olivine gabbro, common modal layering parallel to magmatic foliation, moderately dipping.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-244R-3, 71-89 cm WET

Core Photo



305-U1309D-245R-1 (Section top: 1177.50 mbsf)

UNIT-626: Olivine Gabbro Rubble
Piece 1

COMMENTS: Unit 626 is olivine gabbro rubble.

UNIT-627: Olivine Gabbro
Pieces: 2-8b

PRIMARY MINERALOGY: Mode from Piece 4

Olivine	Modal 15% Size 3 mm average Shape anhedral
Plagioclase	Modal 65% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 20% Size 4 mm average Shape anhedral

COMMENTS: Unit 627 is medium-grained olivine gabbro.

UNIT-628: Olivine-bearing Gabbro
Pieces: 8b-10

PRIMARY MINERALOGY: Mode from Piece 10a

Olivine	Modal 5% Size 2 mm average Shape anhedral
Plagioclase	Modal 50% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 45% Size 3 mm average Shape anhedral

COMMENTS: Unit 628 is medium-grained olivine-bearing gabbro.

SECONDARY MINERALOGY: Chlorite, pale amphibole, talc

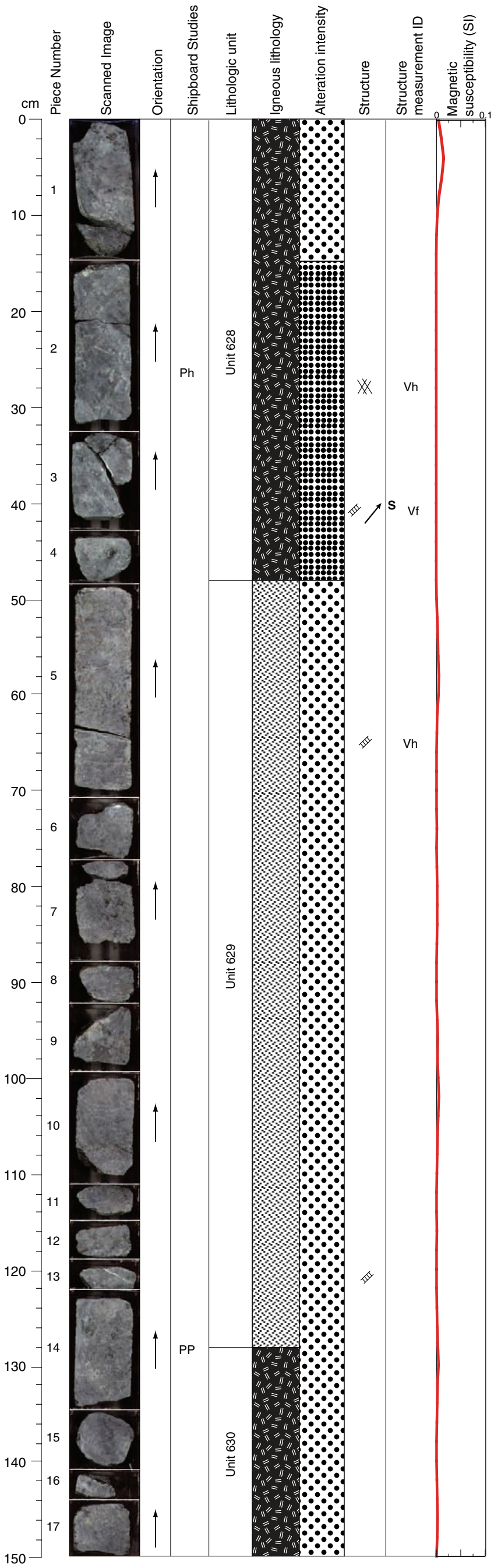
COMMENTS: From Piece 1 to 10 coarse-grained gabbro with serpentinized olivine and alteration of the pyroxene to green amphibole. Significant amount of sulfides. From 80 to 96 cm (Piece 8), amphibole (tremolite) rim around the serpentinized olivine and pale green coronas likely related to numerous green amphibole veins. The edges of Pieces 9 and 10 are made of serpentine veins. Piece 10 shows amphibole rim around serpentinized olivine and pale green coronas (tremolite, talc, actinolite), related to green and white veins (amphibole, chlorite, carbonate) at 126-127 cm.

VEIN ALTERATION: Amphibole, chlorite, carbonate

STRUCTURE: Medium-grained, locally olivine bearing gabbro with weak modal layering and no magmatic or plastic mineral foliation. Shallow-dipping zeolite veins (white and fibrous), and earlier hydrothermal dark green veins with broad alteration halos.

CLOSE-Up PHOTOGRAPHS
305-U1309D-245R-1, 120-140 cm WET

Core Photo



305-U1309D-245R-2 (Section top: 1178.92 mbsf)

UNIT-628: Olivine-bearing Gabbro
Pieces: 1-4

PRIMARY MINERALOGY: Mode from Piece 2b

Olivine	Modal 5% Size 3 mm average Shape anhedral
Plagioclase	Modal 65% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 30% Size 4 mm average Shape anhedral

COMMENTS: Unit 628 is medium- to coarse-grained olivine-bearing gabbro.

UNIT-629: Gabbro
Pieces: 4-14

PRIMARY MINERALOGY: Mode from Piece 5

Plagioclase	Modal 60% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 40% Size 4 mm average Shape anhedral

COMMENTS: Unit 629 is medium- to coarse-grained gabbro.

UNIT-630: Olivine-bearing Gabbro
Pieces: 14-17

PRIMARY MINERALOGY: Mode from Piece 17

Olivine	Modal 2% Size 3 mm average Shape anhedral
Plagioclase	Modal 52% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 45% Size 2 mm average Shape anhedral

COMMENTS: Unit 630 is medium-grained olivine-bearing gabbro.

SECONDARY MINERALOGY: Chlorite, pale amphibole, talc

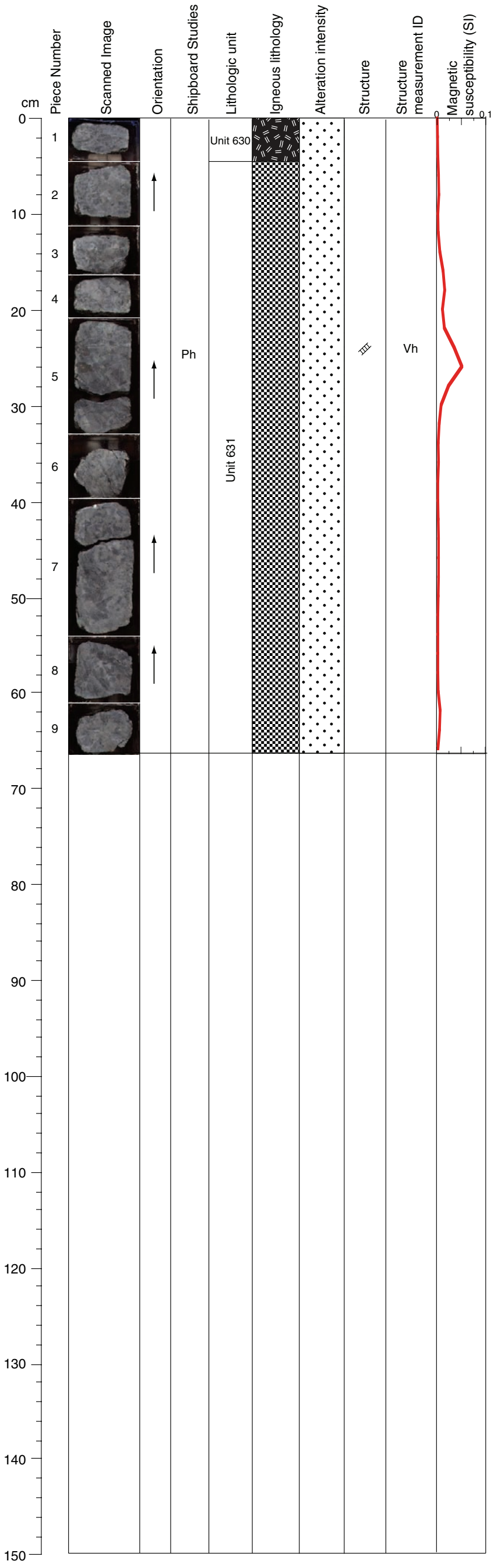
COMMENTS: Coarse-grained gabbro cut by numerous green amphibole veins. In Piece 2 at 24 and 26 cm, pale white and green veins (amphibole, carbonate, zeolite) with alteration of the pyroxene to pale green amphibole and amphibole rims around the serpentinized olivine. In Piece 3 (34-41 cm) same alteration continuing in Piece 4. From Piece 5 to the end of the section, coarse-grained gabbro with several green amphibole veins and alteration of the pyroxene to green amphibole.

VEIN ALTERATION: Amphibole, chlorite, talc, carbonate, zeolite

STRUCTURE: Medium-grained, isotropic gabbro with local olivine-rich patches. Pale green veins with fibrous minerals.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-245R-2, 15-43 cm WET

Core Photo



305-U1309D-245R-3 (Section top: 1180.42 mbsf)

UNIT-630: Olivine-bearing Gabbro
Pieces: 1

PRIMARY MINERALOGY: Mode from Piece 1

Olivine	Modal 2% Size 3 mm average Shape anhedral
Plagioclase	Modal 52% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 45% Size 2 mm average Shape anhedral

COMMENTS: Unit 630 is medium-grained olivine-bearing gabbro.

UNIT-631: Oxide Gabbro
Pieces: 2-9

PRIMARY MINERALOGY: Mode from Piece 7b

Oxide	Modal 3% Size 3 mm average Shape anhedral
Plagioclase	Modal 45% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 52% Size 8 mm average Shape anhedral

COMMENTS: Unit 631 is coarse-grained oxide gabbro.

SECONDARY MINERALOGY: Chlorite, pale amphibole, talc

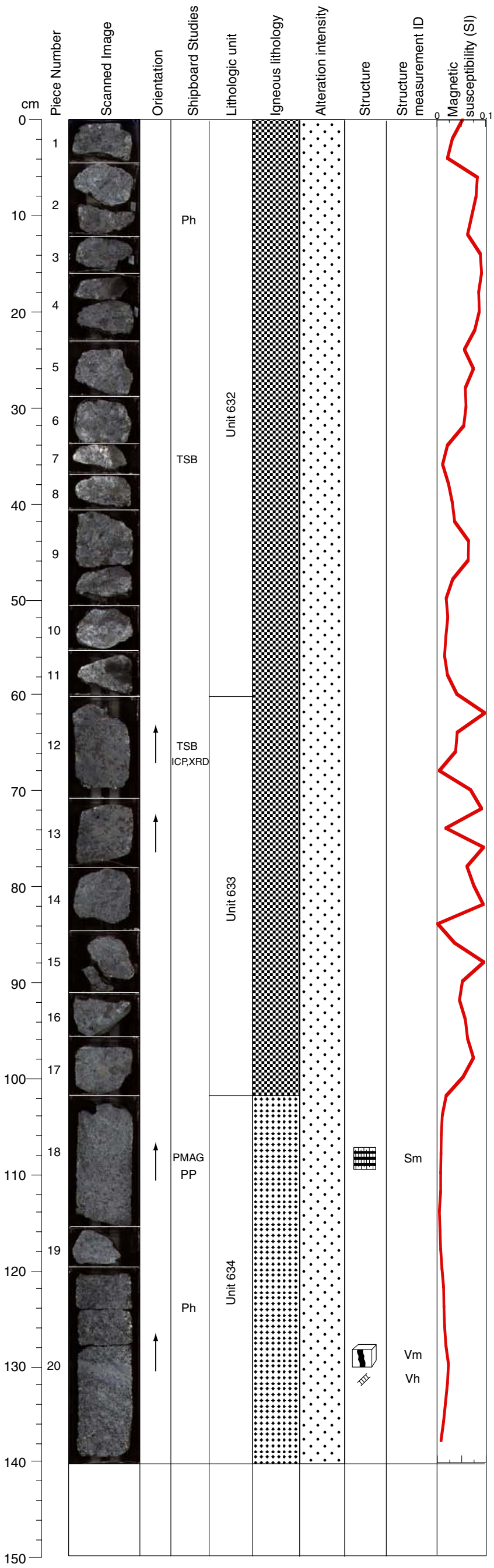
COMMENTS: Coarse-grained to pegmatitic gabbro with alteration of the pyroxene to green amphibole and big grains of sulfides.

VEIN ALTERATION: Zeolite

STRUCTURE: Medium-grained, in places oxide- and sulfide-bearing gabbro, no magmatic or plastic mineral foliation. A few white veins and slight distributed cataclasis.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-245R-3, 12-39 cm WET

Core Photo



305-U1309D-246R-1 (Section top: 1182.30 mbsf)

UNIT-632: Oxide Gabbro Rubble
Pieces: 1-12

PRIMARY MINERALOGY: Mode from Piece 12

Oxide	Modal 15% Size 7 mm average Shape anhedral
Plagioclase	Modal 40% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 45% Size 8 mm average Shape anhedral

COMMENTS: Unit 632 is coarse-grained oxide gabbro rubble.

UNIT-633: Oxide Gabbro
Pieces: 13-17

PRIMARY MINERALOGY: Mode from Piece 13

Oxide	Modal 15% Size 7 mm average Shape anhedral
Plagioclase	Modal 40% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 45% Size 8 mm average Shape anhedral

COMMENTS: Unit 633 is coarse-grained oxide gabbro.

UNIT-634: Olivine Gabbro
Pieces: 18-20

PRIMARY MINERALOGY: Mode from Piece 20

Olivine	Modal 40% Size 1 mm average Shape anhedral
Plagioclase	Modal 40% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 20% Size 2 mm average Shape anhedral

COMMENTS: Unit 634 is medium-grained olivine gabbro. Olivine/clinopyroxene ratio increases down section.

SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: The overall alteration includes serpentinized olivine, pyroxene replaced by green amphibole, and plagioclase altered to chlorite and white patches or lineaments. Pieces 6, 7, 8, 10, 11. Some corona texture occurs near veins (e.g., 128 to 131 cm in Piece 20c).

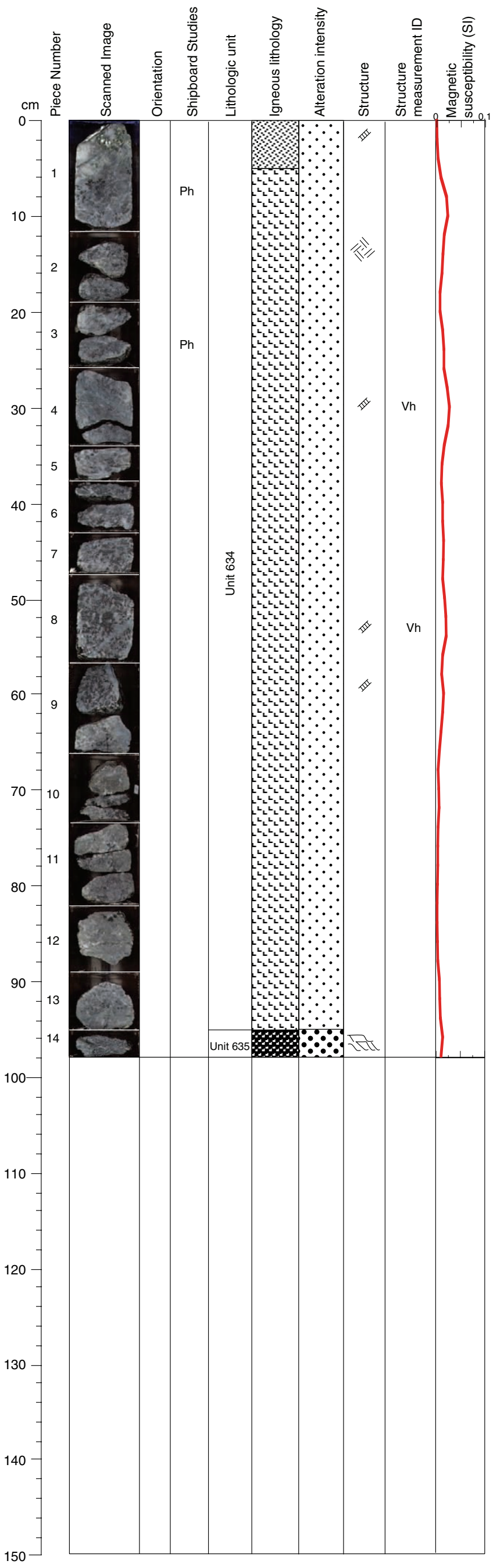
VEIN ALTERATION: Amphibole, secondary plagioclase, talc, carbonate, zeolite

THIN SECTIONS
305-U1309D-246R-1, 34-36 cm (#595)
305-U1309D-246R-1, 64-66 cm (#596)

STRUCTURE: Isotropic oxide gabbro with titanite-amphibole bearing leucocratic vein at 35 cm (piece not oriented) with relatively sharp transition to a finer grained, magmatically foliated gabbro. The foliated gabbro contains a subhorizontal green vein (Vh) with irregular margin.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-246R-1, 0-22 cm WET
305-U1309D-246R-1, 29-50 cm WET
305-U1309D-246R-1, 60-77 cm WET
305-U1309D-246R-1, 119-138 cm WET

Core Photo



305-U1309D-246R-2 (Section top: 1183.69 mbsf)

UNIT-634: Troctolitic Gabbro
Pieces: 1-14

PRIMARY MINERALOGY: Mode from Piece 8

Olivine	Modal 30% Size 2 mm average Shape anhedral
Plagioclase	Modal 55% Size 4 mm average Shape anhedral
Clinopyroxene	Modal 15% Size 4 mm average Shape anhedral

COMMENTS: Unit 634 is medium-grained troctolitic gabbro.

UNIT-635: Troctolite
Pieces: 14

PRIMARY MINERALOGY: Mode from Piece 14

Olivine	Modal 50% Size 1 mm average Shape anhedral
Plagioclase	Modal 50% Size 1 mm average Shape anhedral

COMMENTS: Unit 635 is fine-grained troctolite.

SECONDARY MINERALOGY: Chlorite, pale amphibole, talc, serpentine

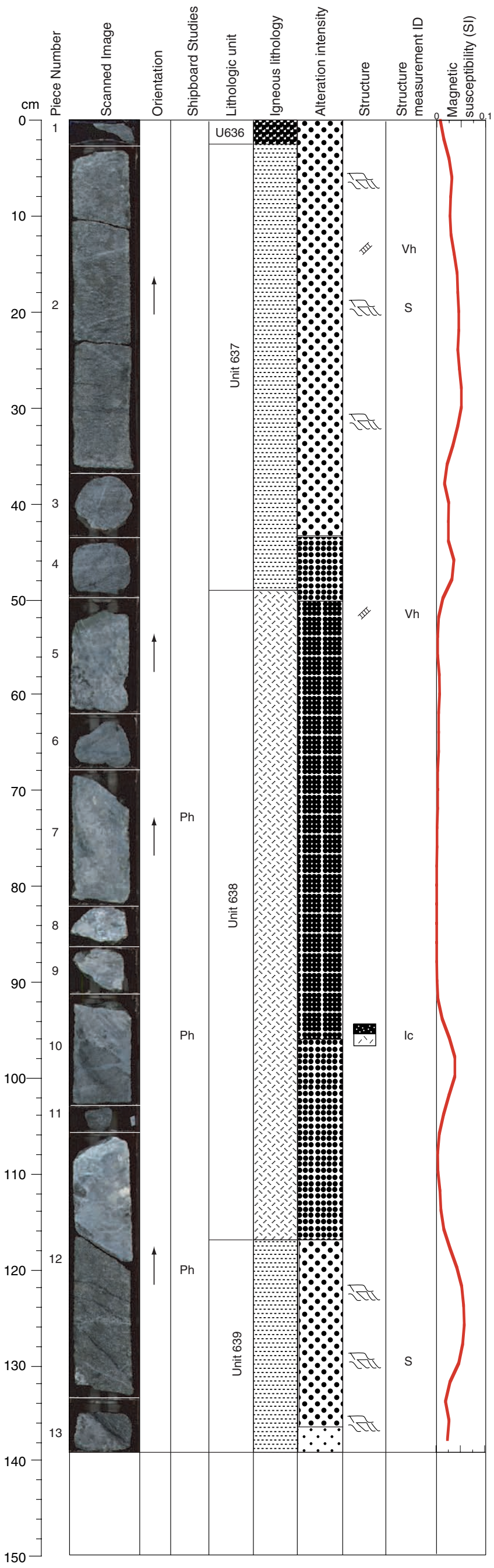
COMMENTS: The general alteration of the gabbro in this section includes serpentinization of olivine, partial replacement of pyroxene by green amphibole and of plagioclase by chlorite. Alteration is greates adjacent to veins. The top of Piece 1 has corona texture as do Pieces 4a, 8, and 9 near green vein networks. Piece 14 is partially troctolitic. All the olivine is altered to serpentine and there is a slight serpentine foliation developed in the rock.

VEIN ALTERATION: Serpentine, amphibole, chlorite, carbonate, zeolite

STRUCTURE: Medium-grained gabbro, either oxide bearing or locally rich in olivine, no magmatic or plastic foliation except in last Piece of Section (not oriented). Dark green veins in gabbro and serpentine foliations in troctolite.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-246R-2, 0-11 cm WET
305-U1309D-246R-2, 19-33 cm WET

Core Photo



305-U1309D-247R-1 (Section top: 1187.10 mbsf)

UNIT-636: Troctolite Rubble
Piece 1

COMMENTS: Unit 636 is fine-grained troctolite rubble.

UNIT-637: Olivine-rich Troctolite
Pieces: 2-4

PRIMARY MINERALOGY: Mode from Piece 2c

Olivine	Modal 80% Size 1 mm average Shape anhedral
Plagioclase	Modal 15% Size 1 mm average Shape anhedral
Clinopyroxene	Modal 5% Size 1 mm average Shape anhedral

COMMENTS: Unit 637 is fine-grained olivine-rich troctolite.

UNIT-638: Gabbro
Pieces: 5-12a

PRIMARY MINERALOGY: Mode from Piece 7

Plagioclase	Modal 50% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 50% Size 6 mm average Shape anhedral

COMMENTS: Unit 638 is coarse-grained gabbro. Altered contact or vein at 50-52 cm. Troctolite patch at 56-60 cm. Dunitic troctolite at 95-105 cm; contact sharp but uneven. Lower contact with dunitic troctolite is at the bottom of Piece 12a.

UNIT-639: Dunitic Troctolite
Pieces: 12b-13

PRIMARY MINERALOGY: Mode from Piece 12b

Olivine	Modal 80% Size 2 mm average Shape anhedral
Plagioclase	Modal 15% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 5% Size 1 mm average Shape anhedral

COMMENTS: Unit 639 is fine-grained dunitic troctolite. Clinopyroxene oikocrysts. Coarse-grained gabbroic vein at 133-138 cm.

SECONDARY MINERALOGY: Serpentine, chlorite, pale amphibole, talc

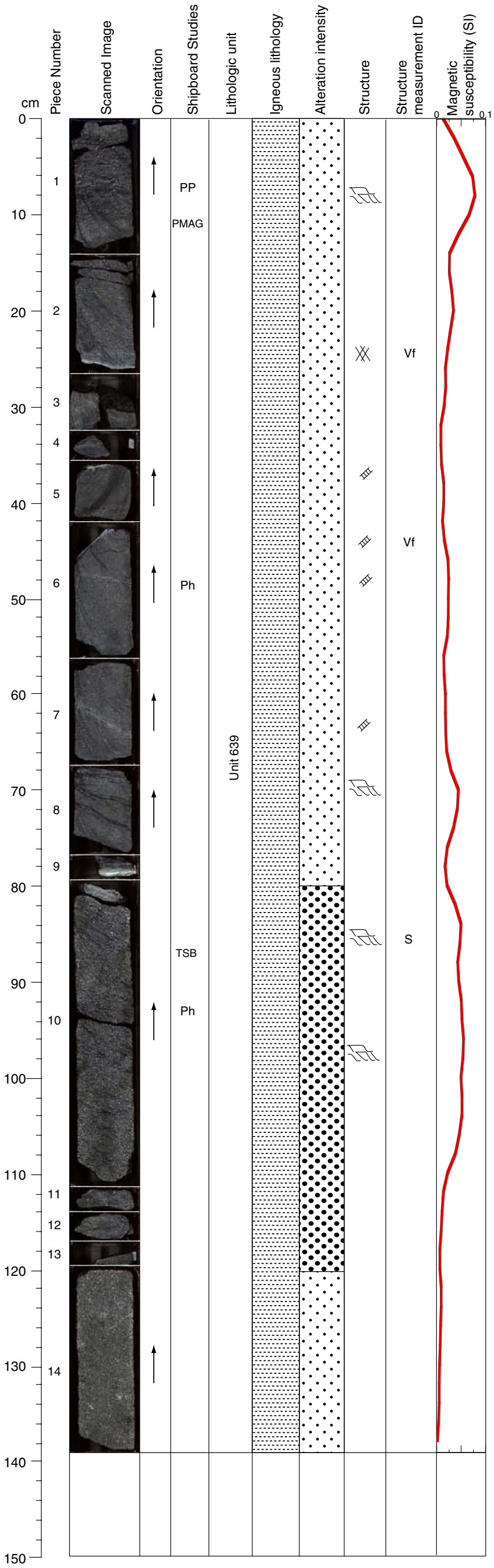
COMMENTS: The upper cm of the section is troctolitic similar to Piece 14 of the previous section. All the olivine is altered to serpentine and there is a slight serpentine foliation. Several narrow (~1 mm) light green veins crosscut the section at various angles between 0 and 49 cm and again in Pieces 7-9 and Piece 12a. The top of Piece 5 , which is gabbro, is medium green (actinolitic?) and is cut by white veins that turn to dark green veins outside the alteration zone. The background alteration of Piece 5 through 10 is overprinted by a pale green cast, involves some corona texture (especially in Piece 8) and includes serpentinization of olivine, amphibole replacement of pyroxene, and chloritization of plagioclase as well as the development of some white patches and lineaments in the rock. serpentinized troctolite reappears at ~98-105 cm and again below ~116 cm. The top of Piece 12a has a network of light green veins extending from the upper surface into former troctolite that has be extensively altered to a mixture of serpentine, chlorite, and talc (?).

VEIN ALTERATION: Serpentine, amphibole, chlorite, carbonate, zeolite

STRUCTURE: Interlayered fine-grained troctolite and coarse-grained to pegmatitic gabbro, no magmatic or plastic fabric. Serpentine foliation locally developed in troctolite and a few gray veins.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-247R-1, 62-81 cm WET
305-U1309D-247R-1, 82-102 cm WET
305-U1309D-247R-1, 105-132 cm WET

Core Photo



305-U1309D-247R-2 (Section top: 1188.49 mbsf)

UNIT-639: Olivine-rich Troctolite
Pieces: 1-14

PRIMARY MINERALOGY: Mode from Piece 10

Olivine	Modal 80% Size 2 mm average Shape anhedral
Plagioclase	Modal 20% Size 2 mm average Shape anhedral

COMMENTS: Unit 639 is fine-grained olivine-rich troctolite.

SECONDARY MINERALOGY: Serpentine, chlorite?

COMMENTS: The upper part of the section is highly serpentinized with a strong, subhorizontal serpentine foliation. There are narrow light-green alteration zones at the bottoms of Pieces 2, 9 and the tops of Pieces 5, 6, and 10. Light green veins (with alteration halos of varying widths) cut Pieces 7 and 8. The serpentine foliation is better developed in Pieces 10a and 10b where a subvertical, plagioclase-free zone cuts the rock.

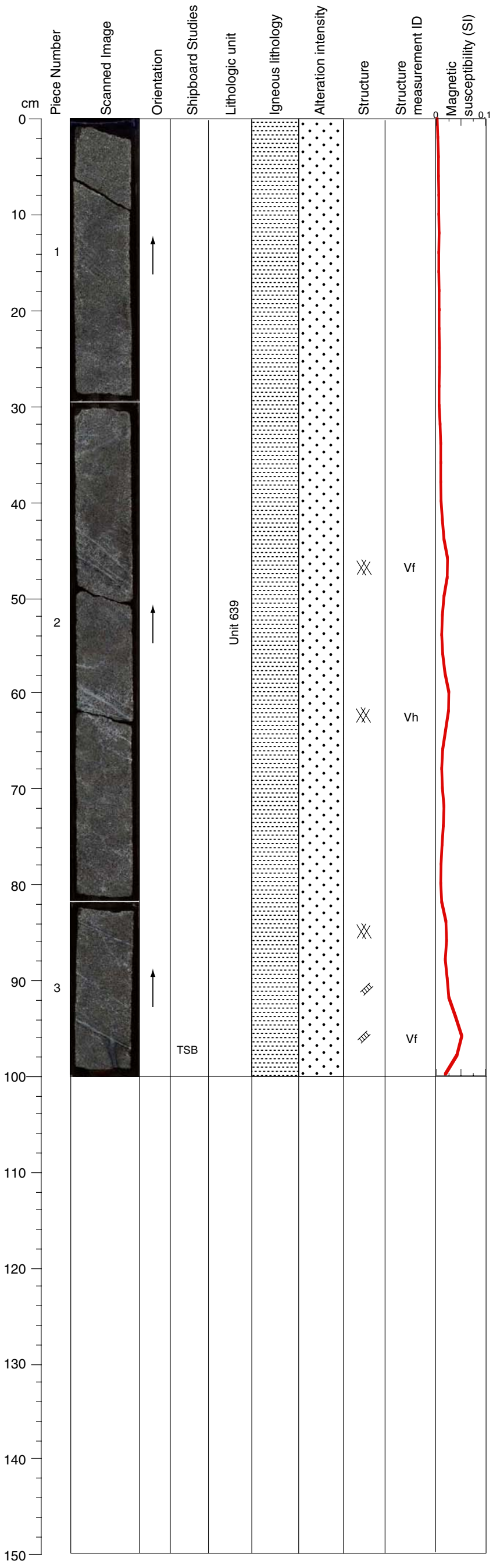
VEIN ALTERATION: Serpentine, amphibole, chlorite, talc, carbonate, zeolite.

THIN SECTIONS:
305-U1309D-247R-2, 86-88 cm (#597)

STRUCTURE: Fine-grained troctolite with local plagioclase-free patches and no magmatic or plastic fabric developed. Serpentine foliations developed locally with a few fault veins (pale green) with fibers.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-247R-2, 42-67 cm WET
305-U1309D-247R-2, 81-111 cm WET

Core Photo



305-U1309D-247R-3 (Section top: 1189.89 mbsf)

UNIT-639: Olivine-rich Troctolite
Pieces: 1-3

PRIMARY MINERALOGY: Mode from Piece 1b

Olivine	Modal 85% Size 2 mm average Shape anhedral
Plagioclase	Modal 10% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 5% Size 1 mm average Shape anhedral

COMMENTS: Unit 639 is fine-grained olivine-rich troctolite.

SECONDARY MINERALOGY: Serpentine, chlorite?

COMMENTS: Serpentinized olivine and chloritized plagioclase are present throughout the section. Several light green veins cut the rock in every piece. Some of the veins are accompanied by alteration halos of varying widths in which the olivine is completely altered to serpentine and the plagioclase is altered to pale green material (chlorite and amphibole?). Piece 3 at the bottom shows a vein of light and dark green that terminates against a crosscutting green and white vein.

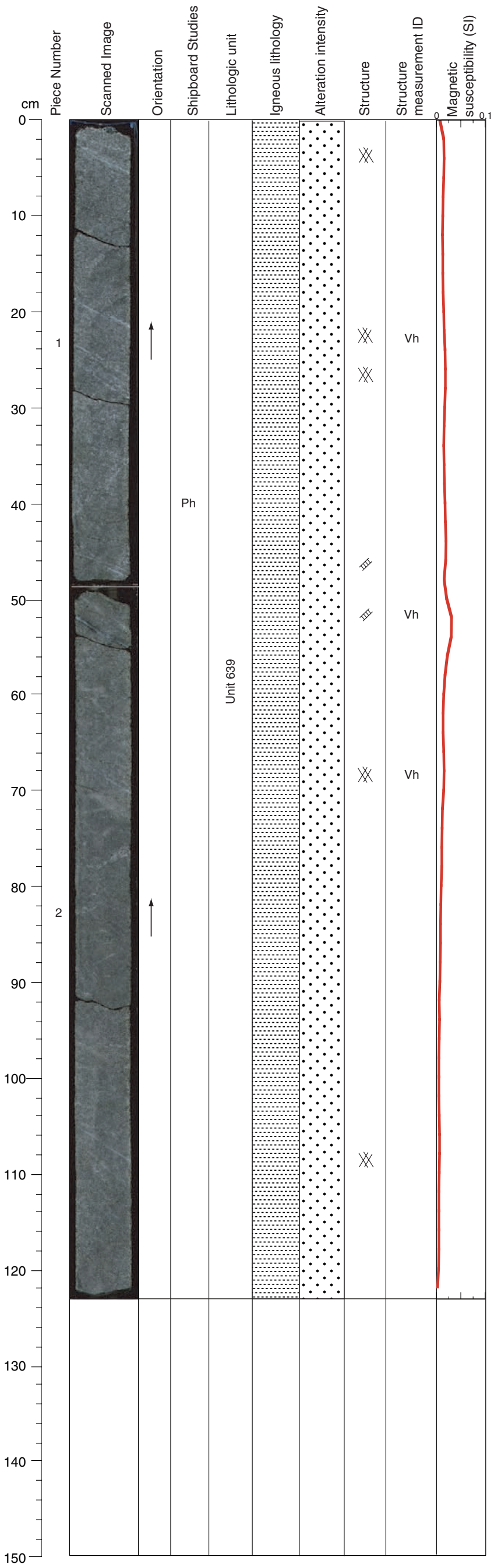
VEIN ALTERATION: Serpentine, amphibole, chlorite, zeolite

THIN SECTIONS:
305-U1309D-247R-3, 97-98 cm (#598)

STRUCTURE: Troctolite and wehrlite, irregular distribution of both lithologies, coarse-grained poikilitic clinopyroxene common, no preferred orientations of minerals. Dark green veins and a set of later pale green veins.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-247R-3, 82-100 cm WET

Core Photo



305-U1309D-248R-1 (Section top: 1191.90 mbsf)

UNIT-639: Olivine-rich Troctolite
Pieces: 1-2

PRIMARY MINERALOGY: Mode from Piece 1c

Olivine	Modal 85% Size 2 mm average Shape anhedral
Plagioclase	Modal 8% Size 1 mm average Shape anhedral
Clinopyroxene	Modal 7% Size 1 mm average Shape anhedral

COMMENTS: Unit 639 is fine-grained olivine-rich troctolite. Oikocryst clinopyroxene.

SECONDARY MINERALOGY: Serpentine, chlorite?

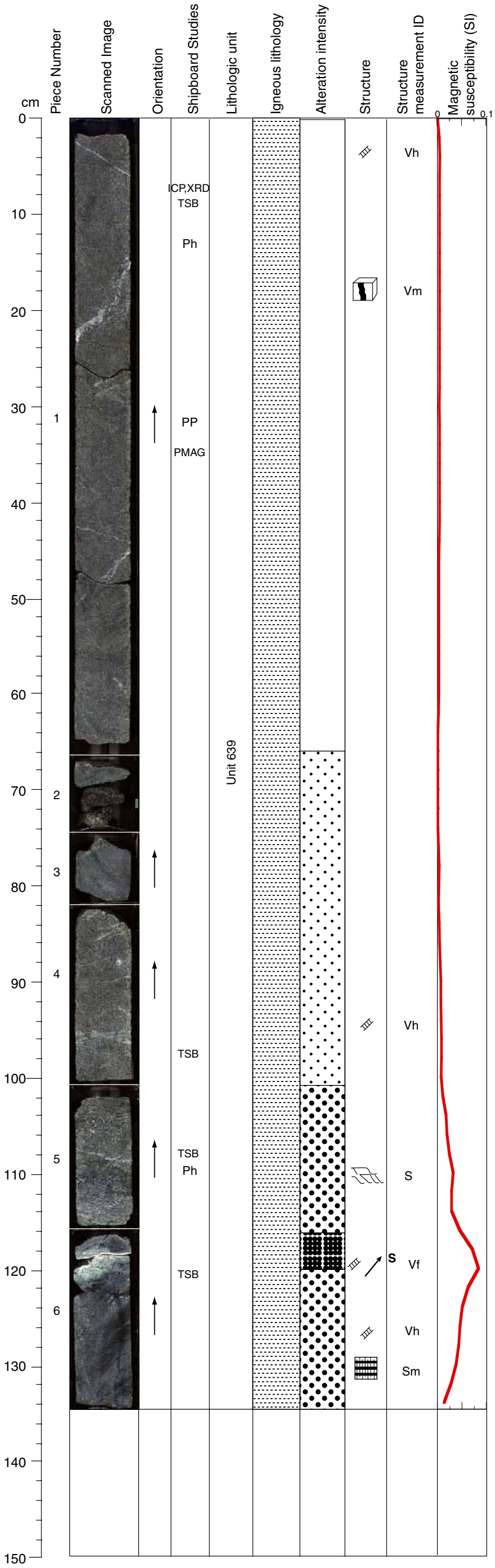
COMMENTS: Serpentinized with discrete serpentine foliation. At 51 cm, green vein (amphibole, chlorite) with alteration halo around it.

VEIN ALTERATION: Serpentine, amphibole, chlorite

STRUCTURE: Olivine-rich rock with clinopyroxene and/or plagioclase as interstitial phase, no mineral fabric but slight preferred orientation of discontinuous plagioclase veinlets. Later gray veins.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-248R-1, 28-55 cm WET

Core Photo



305-U1309D-248R-2 (Section top: 1193.14 mbsf)

UNIT-639: Olivine-rich Troctolite
Pieces: 1-6

PRIMARY MINERALOGY: Mode from Piece 1c

Olivine	Modal 85% Size 2 mm average Shape anhedral
Plagioclase	Modal 8% Size 1 mm average Shape anhedral
Clinopyroxene	Modal 7% Size 1 mm average Shape anhedral

COMMENTS: Unit 639 is fine-grained olivine-rich troctolite. Clinopyroxene is heterogeneously distributed. Grain size increases down section. Leucocratic vein at 13-22 cm.

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

COMMENTS: Slightly serpentinized olivine-rich troctolite with several light green veins cuttiing the section at a low angle in all pieces. One vein (late magmatic) cuts the bottom of Piece 1a, but is not associated with an alteration halo. Thin (<1 mm) green veins cut the section at low angles and several zones of higher alteration of plagioclase (to chlorite/tremolite?) cross the section in most pieces. The bottom of piece 5 is more highly altered with and shows strong subhorizontal serpentine foliation between 110 and 112 cm and alteration of plagioclase to light green (chlorite tremolite?) products.Pieces 6a, 6b and the top of 6c are altered to a pale green and white zone of secondary products associated with a light green and white vein. The surrounding troctolite has developed corona texture that is overprinted with a pale green cast. A vertical vein of green with an alteration halo about 5 mm wide that extends from 121 cm to the end of the section.

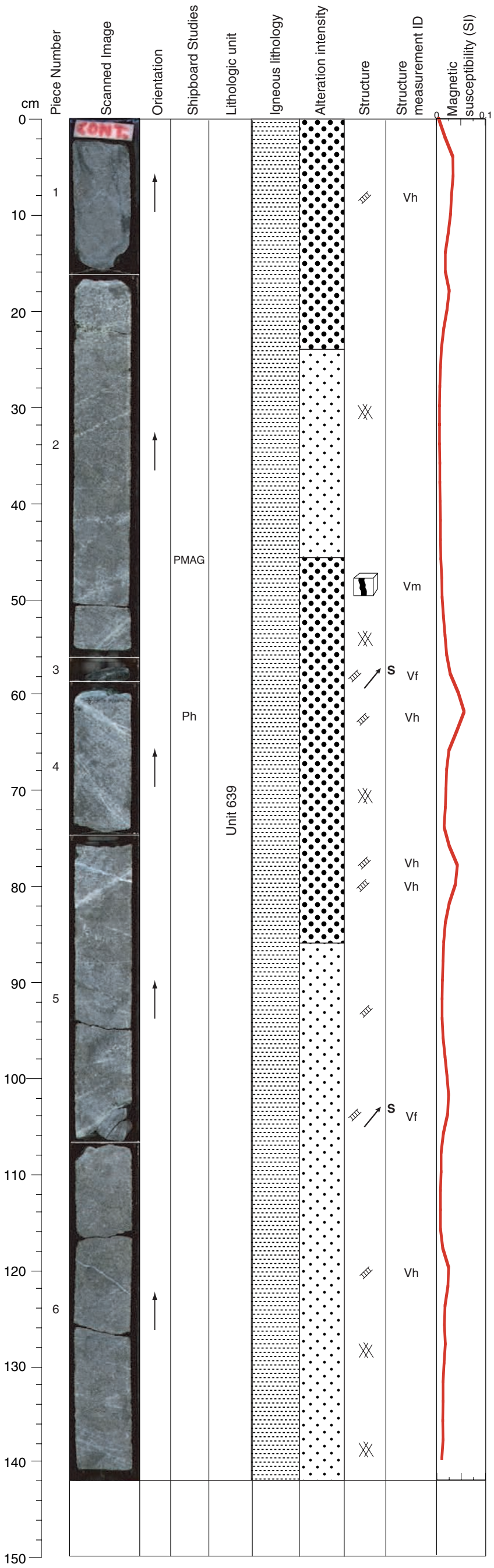
VEIN ALTERATION: Serpentine, amphibole, chlorite

THIN SECTIONS:
305-U1309D-248R-2, 7-9 cm (#599)
305-U1309D-248R-2, 96-99 cm (#600)
305-U1309D-248R-2, 107-110 cm (#601)
305-U1309D-248R-2, 119-121 cm (#602)

STRUCTURE: Olivine-rich rock with plagioclase and/or clinopyroxene, local plagioclase veinlets with later gray veins, and a weak magmatic fabric of shallow dip developed in lowest part of section with locally intense serpentine foliations.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-248R-2, 0-26 cm WET
305-U1309D-248R-2, 86-116 cm WET
305-U1309D-248R-2, 116-135 cm WET

Core Photo



305-U1309D-248R-3 (Section top: 1194.49 mbsf)

UNIT-639: Olivine-rich Troctolite
Pieces: 1-6

PRIMARY MINERALOGY: Mode from Piece 1

Olivine	Modal 85% Size 2 mm average Shape anhedral
Plagioclase	Modal 8% Size 1 mm average Shape anhedral
Clinopyroxene	Modal 7% Size 1 mm average Shape anhedral

COMMENTS: Unit 639 is fine-grained olivine-rich troctolite.

SECONDARY MINERALOGY: Serpentine, chlorite, pale amphibole

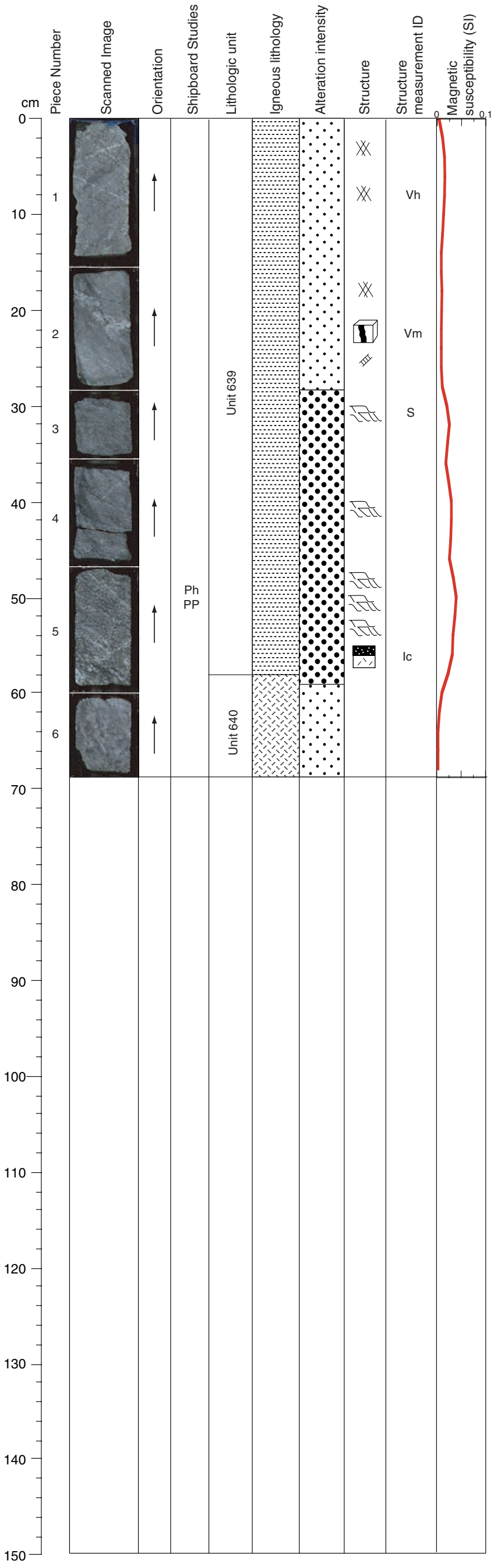
COMMENTS: The troctolite of this section is altered to serpentine and chlorite and has numerous light green and white veins with alteration halos of various widths. Corona texture is developed in the more altered areas adjacent to veins and vein networks. Thicker veins occur at the top of Piece 2 (3 mm) and the bottom of Piece 5b (2 mm).

VEIN ALTERATION: Serpentine, amphibole, chlorite, zeolite

STRUCTURE: Olivine-rich rock with poikilitic clinopyroxene or interstitial plagioclase, no clear preferred mineral alignment, veinlets of clinopyroxene. Dark green veins and pale green veins.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-248R-3, 59-74 cm WET

Core Photo



305-U1309D-248R-4 (Section top: 1195.92 mbsf)

UNIT-639: Olivine-rich Troctolite
Pieces: 1-5

PRIMARY MINERALOGY: Mode from Piece 3

Olivine	Modal 85% Size 2 mm average Shape anhedral
Plagioclase	Modal 8% Size 1 mm average Shape anhedral
Clinopyroxene	Modal 7% Size 1 mm average Shape anhedral

COMMENTS: Unit 639 is fine-grained olivine-rich troctolite. Leucocratic vein 21-25 cm. Plagioclase increases down section.

UNIT-640: Gabbro
Pieces: 6

PRIMARY MINERALOGY: Mode from Piece 6

Plagioclase	Modal 60% Size 6 mm average Shape anhedral
Clinopyroxene	Modal 40% Size 6 mm average Shape anhedral

COMMENTS: Unit 640 is coarse-grained gabbro.

SECONDARY MINERALOGY: Serpentine, chlorite, pale amphibole

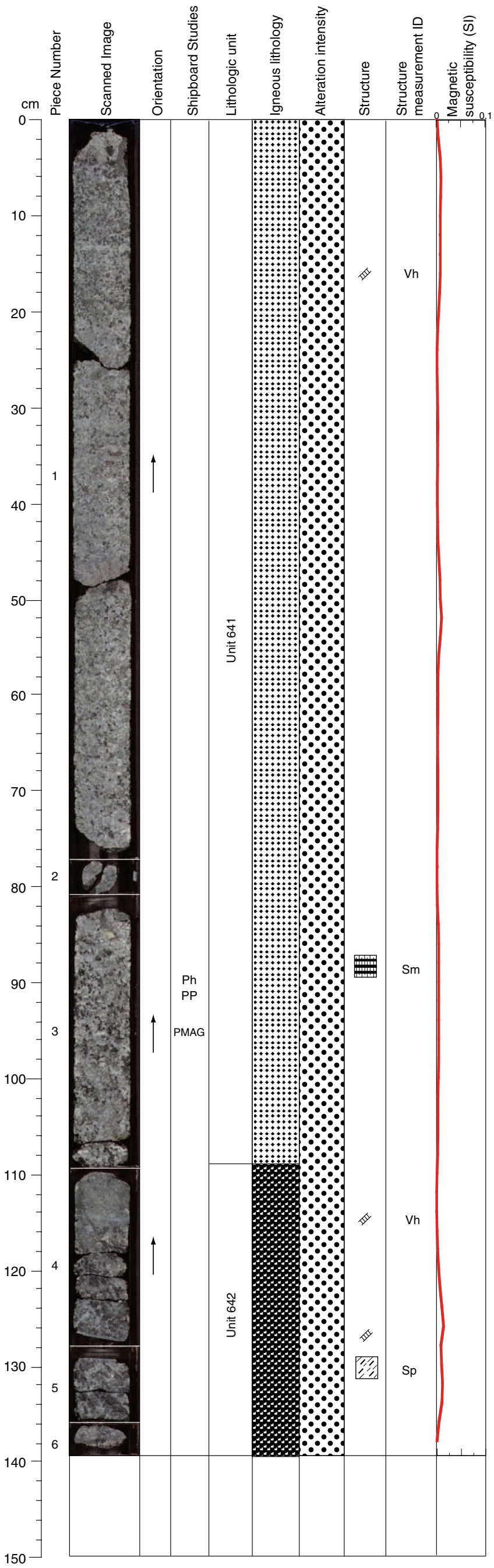
COMMENTS: Pieces 1 and 2 are serpentinized olivine-rich troctolite with gabbroic intrusion at 20-21 cm. Pieces 3 and 5 are serpentinized troctolite with serpentine vein foliation. Piece 6 is coarse-grained gabbro.

VEIN ALTERATION: Serpentine, zeolite

STRUCTURE: Troctolite, wehrlite or olivine gabbro, increasing plagioclase toward contact to gabbro, no clear preferred mineral fabric. Intense serpentine foliation in Piece 5. Minor gray veins and a few pale green veins.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-248R-4, 47-59 cm WET

Core Photo



305-U1309D-249R-1 (Section top: 1196.70 mbsf)

UNIT-641: Olivine Gabbro
Pieces: 1-3

PRIMARY MINERALOGY: Mode from Piece 1c

Olivine	Modal 10% Size 7 mm average Shape anhedral
Plagioclase	Modal 45% Size 7 mm average Shape anhedral
Clinopyroxene	Modal 45% Size 7 mm average Shape anhedral

COMMENTS: Unit 641 is coarse-grained olivine gabbro. Modal layering.

UNIT-642: Troctolite
Pieces: 4-6

PRIMARY MINERALOGY: Mode from Piece 5

Olivine	Modal 50% Size 10 mm average Shape anhedral
Plagioclase	Modal 50% Size 10 mm average Shape anhedral

COMMENTS: Unit 642 is coarse-grained troctolite.

SECONDARY MINERALOGY: Chlorite, pale amphibole

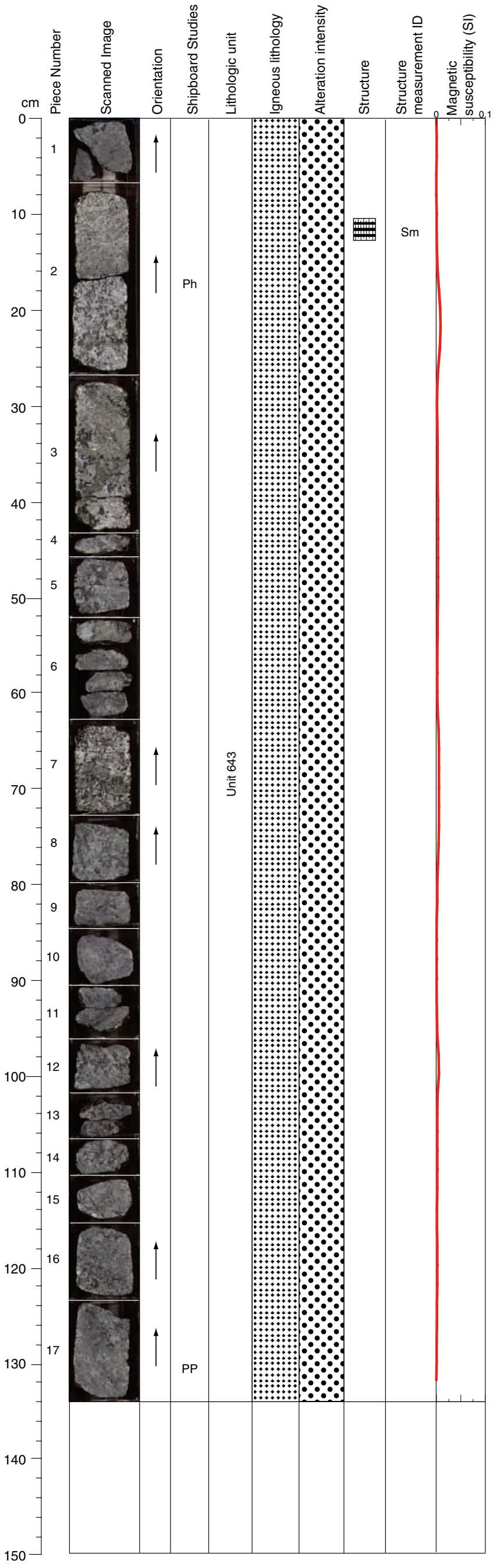
COMMENTS: The coarse gabbro at the top of Piece 1a is partially altered to green amphibole, serpentinized olivine and white and pale green (chlorite?) secondary minerals. The medium grained gabbro to 21 cm shows similar alteration products. The section is more altered near the numerous light green and white veins that cut all pieces.

VEIN ALTERATION: Serpentine, amphibole, chlorite

STRUCTURE: Medium- to coarse-grained olivine gabbro with crude mineral foliation (Sm) locally developed and suspected plastic strain (Sp) observed near base of section. A few dark green veins.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-249R-1, 81-106 cm WET

Core Photo



305-U1309D-249R-2 (Section top: 1198.10 mbsf)

UNIT-643: Olivine Gabbro
Pieces: 1-17

PRIMARY MINERALOGY: Mode from Piece 7

Olivine	Modal 25% Size 4 mm average Shape anhedral
Plagioclase	Modal 55% Size 8 mm average Shape anhedral
Clinopyroxene	Modal 20% Size 10 mm average Shape anhedral

COMMENTS: Unit 643 is coarse-grained olivine gabbro. Gabbro/Troctolite interlayering. Brown and green pyroxenes.

SECONDARY MINERALOGY: Chlorite, pale amphibole

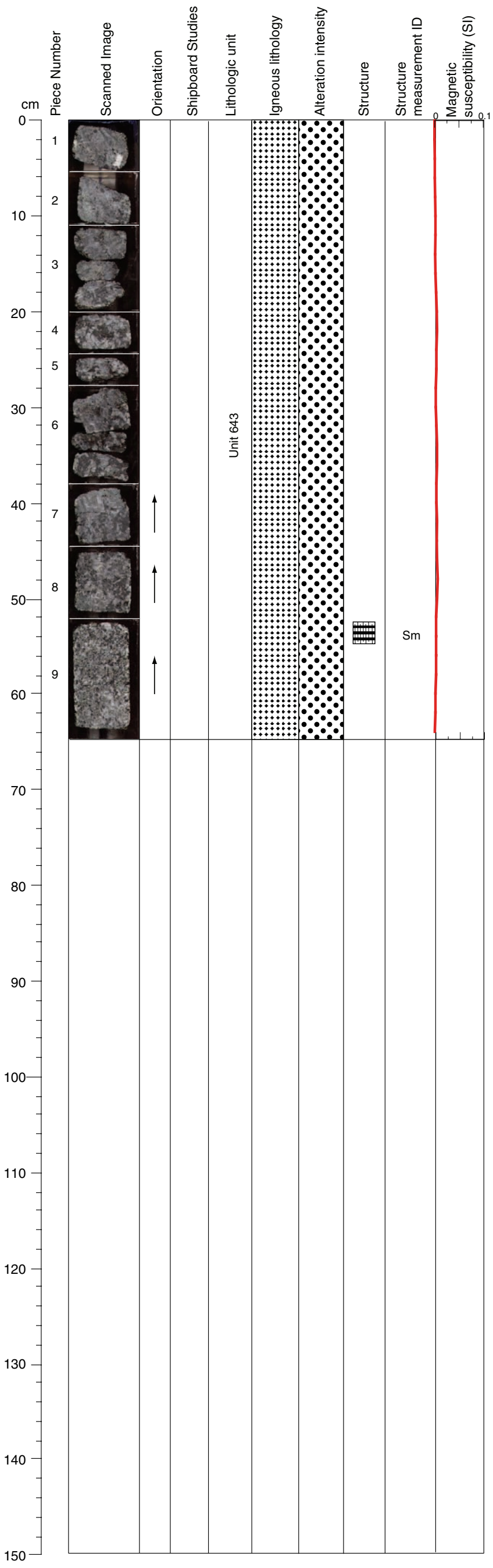
COMMENTS: Coarse-grained gabbro with serpentinized olivine and pyroxene altered to green amphibole.

VEIN ALTERATION: no vein

STRUCTURE: Medium-grained olivine gabbro with local pegmatitic clinopyroxene grains. Suspected plastic strain at top of section, otherwise no preferred mineral alignment. A few subhorizontal white cracks, irregular and short with slight cataclasis.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-249R-2, 7-26 cm WET

Core Photo



305-U1309D-249R-3 (Section top: 1199.44 mbsf)

UNIT-643: Olivine Gabbro
Pieces: 1-9

PRIMARY MINERALOGY: Mode from Piece 9

Olivine	Modal 25% Size 5 mm average Shape anhedral
Plagioclase	Modal 50% Size 6 mm average Shape anhedral
Clinopyroxene	Modal 25% Size 5 mm average Shape anhedral

COMMENTS: Unit 643 is coarse-grained olivine gabbro. Olivine gabbro/troctolite interlayering. Brown and green pyroxenes.

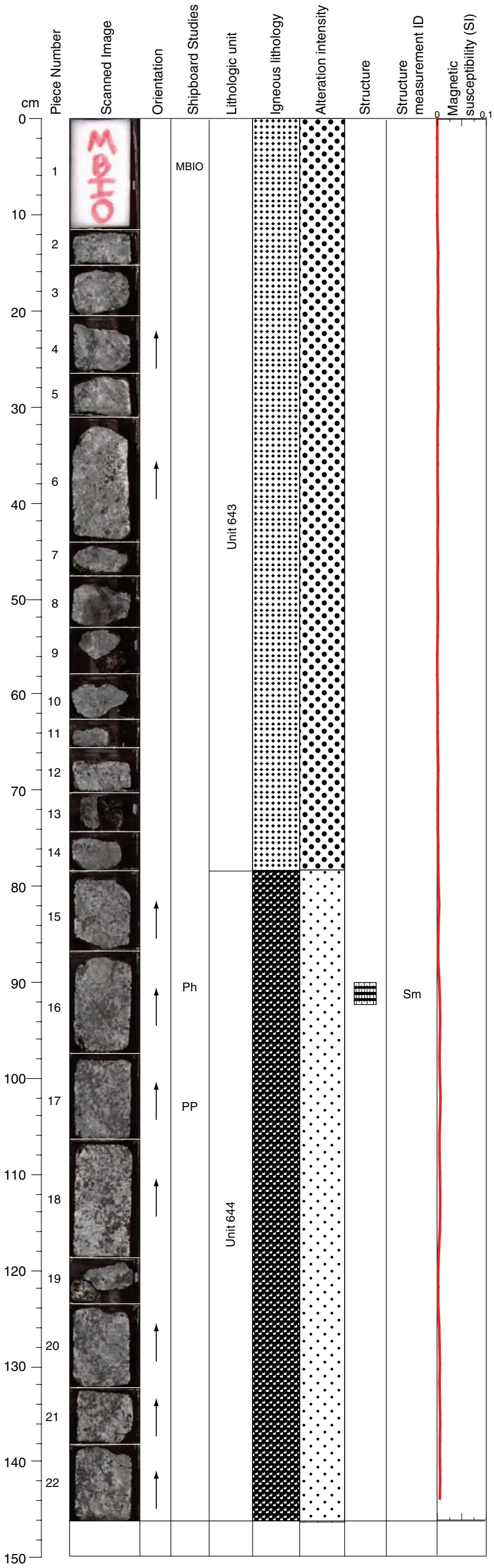
SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: Coarse-grained gabbro with serpentinized olivine and pyroxene altered to green amphibole.

VEIN ALTERATION: no vein

STRUCTURE: Medium-grained olivine gabbro with local faint magmatic foliation displayed. Pegmatitic to fine olivine gabbro at bottom of section with slight cataclasis.

Core Photo



305-U1309D-250R-1 (Section top: 1201.50 mbsf)

UNIT-643: Olivine Gabbro
Pieces: 1-14

PRIMARY MINERALOGY: Mode from Piece 6

Olivine	Modal 10% Size 2 mm average Shape anhedral
Plagioclase	Modal 60% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 30% Size 2 mm average Shape anhedral

COMMENTS: Unit 643 is fine- to medium-grained olivine gabbro.

UNIT-644: Troctolite
Pieces: 15-22

PRIMARY MINERALOGY: Mode from Piece 16

Olivine	Modal 35% Size 5 mm average Shape anhedral
Plagioclase	Modal 62% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 3% Size 2 mm average Shape anhedral

COMMENTS: Unit 644 is medium- to coarse-grained troctolite.

SECONDARY MINERALOGY: Serpentine, chlorite, pale amphibole

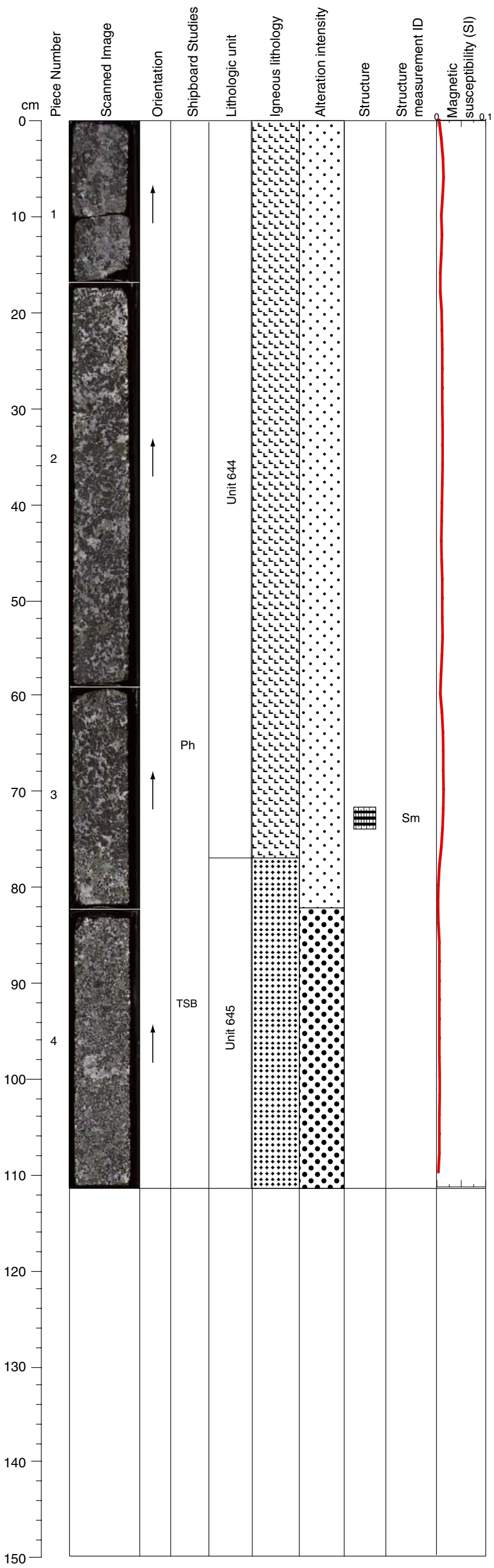
COMMENTS: Olivine is altered to serpentine, pyroxene to green amphibole and plagiocalse to pale green and white minerals. Some leucocratic material coats the side of Piece 6. patches of greater alteration of pyroxene to green amphibole occur scattered throughout the section.

VEIN ALTERATION: no vein

STRUCTURE: Medium-grained olivine gabbro with local faint magmatic foliation. Pegmatitic to fine olivine gabbro at bottom of section with slight cataclasis.

CLOSE-UP PHTOTGRAPHS:
305-U1309D-250R-1, 87-107 cm WET

Core Photo



305-U1309D-250R-2 (Section top: 1202.96 mbsf)

UNIT-644: Troctolitic Gabbro
Pieces: 1-3

PRIMARY MINERALOGY: Mode from Piece 2

Olivine	Modal 45% Size 5 mm average Shape anhedral
Plagioclase	Modal 50% Size 4 mm average Shape anhedral
Clinopyroxene	Modal 5% Size 5 mm average Shape anhedral

COMMENTS: Unit 644 is medium- to coarse-grained troctolitic gabbro.

UNIT-645: Olivine Gabbro
Pieces: 3-4

PRIMARY MINERALOGY: Mode from Piece 4

Olivine	Modal 40% Size 2 mm average Shape anhedral
Plagioclase	Modal 35% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 25% Size 3 mm average Shape anhedral

COMMENTS: Unit 645 is medium-grained olivine gabbro.

SECONDARY MINERALOGY: Serpentine, chlorite, pale amphibole

COMMENTS: The gabbro shows alteration of olivine to serpentine, pyroxene to green amphibole and plagioclase to pale green (chlorite) and patches of white secondary products. In Pieces 1 to 3 from 0 to about 80 cm the more abundant olivine is altered to serpentine. Below about 77 cm large pyroxene grains are highly altered to green amphibole and the plagioclase is more altered.

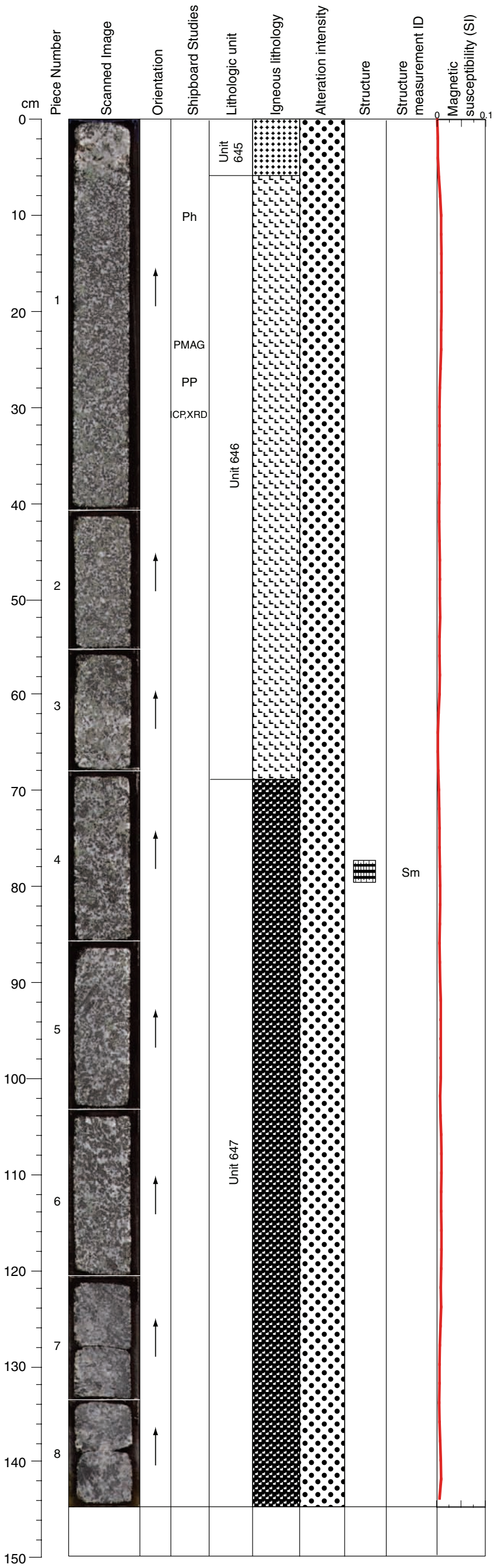
VEIN ALTERATION: no veins

THIN SECTIONS:
305-U1309D-250R-2, 91-94 cm (#603)

STRUCTURE: Coarse-grained olivine-rich gabbro with weak magmatic foliation (Sm).

CLOSE-UP PHOTOGRAPHS:
305-U1309D-250R-2, 59-82 cm WET
305-U1309D-250R-2, 83-111 cm WET

Core Photo



305-U1309D-250R-3 (Section top: 1204.08 mbsf)

UNIT-645: Olivine Gabbro
Pieces: 1

PRIMARY MINERALOGY: Mode from Piece 1

Olivine	Modal 10% Size 2 mm average Shape anhedral
Plagioclase	Modal 50% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 40% Size 4 mm average Shape anhedral

COMMENTS: Unit 645 is coarse-grained olivine gabbro.

UNIT-646: Troctolitic Gabbro
Pieces: 1-3

PRIMARY MINERALOGY: Mode from Piece 1

Olivine	Modal 40% Size 2 mm average Shape anhedral
Plagioclase	Modal 45% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 15% Size 3 mm average Shape anhedral

COMMENTS: Unit 646 is medium-grained troctolitic gabbro. Coarse olivine grains at 6-10 cm. Low olivine/clinopyroxene ratio at 60-68 cm.

UNIT-647: Troctolite
Pieces: 3-8

PRIMARY MINERALOGY: Mode from Piece 8a

Olivine	Modal 40% Size 3 mm average Shape anhedral
Plagioclase	Modal 55% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 5% Size 3 mm average Shape anhedral

COMMENTS: Unit 647 is medium-grained troctolite.

SECONDARY MINERALOGY: Serpentine, chlorite, pale amphibole

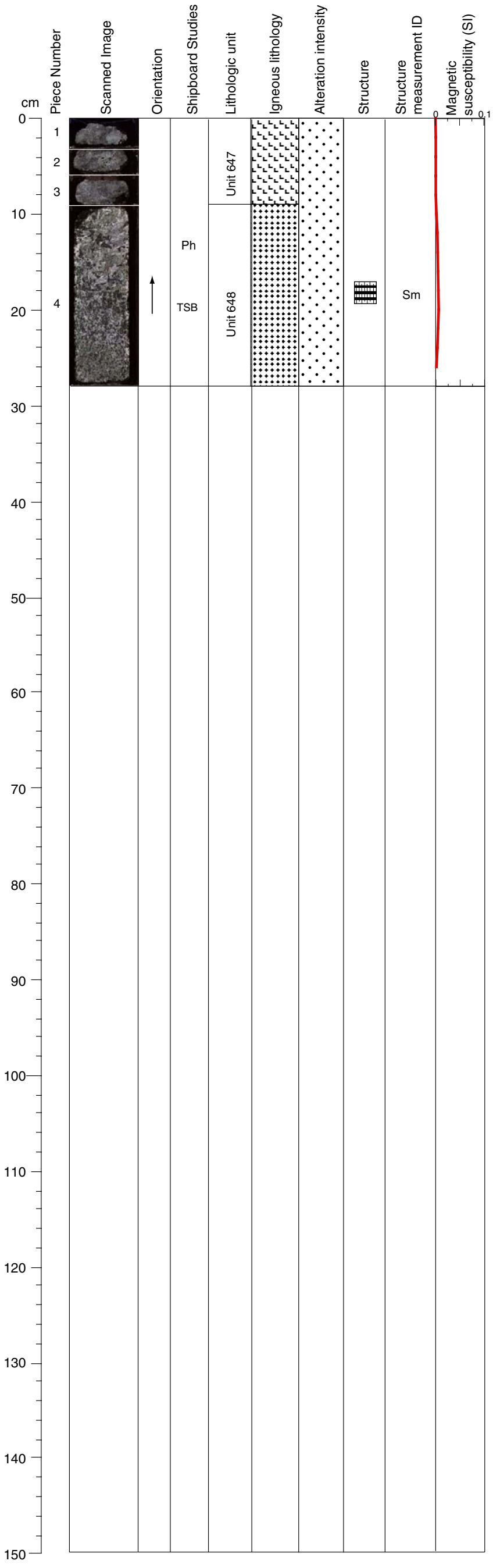
COMMENTS: The gabbro shows alteration of olivine to serpentine, pyroxene to green amphibole and plagioclase to pale green (chlorite) and patches of white secondary products.

VEIN ALTERATION: Serpentine

STRUCTURE: Medium-grained olivine-rich gabbro with weak magmatic fabric developed in most intervals of section. Olivine appears to be partially serpentinized (black microcracks restricted to olivine grains).

CLOSE-UP PHOTOGRAPHS:
305-U1309D-250R-3, 0-20 cm WET

Core Photo



305-U1309D-250R-4 (Section top: 1205.53 mbsf)

UNIT-647: Troctolitic Gabbro
Pieces: 1-3

COMMENTS: Unit 647 is medium-grained troctolitic gabbro - 3 small pieces.

UNIT-648: Olivine Gabbro
Pieces: 4

PRIMARY MINERALOGY: Mode from Piece 4

Olivine	Modal 40% Size 3 mm average Shape anhedral
Plagioclase	Modal 40% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 20% Size 2 mm average Shape anhedral

COMMENTS: Unit 648 is medium- to coarse-grained olivine gabbro.

SECONDARY MINERALOGY: Serpentine, chlorite, pale amphibole

COMMENTS: The gabbro in this section shows alteration of olivine to serpentine, pyroxene to green amphibole and plagioclase to pale green (chlorite) and patches of white secondary products. Grain size of the rock varies throughout the section, but alteration remains relatively constant.

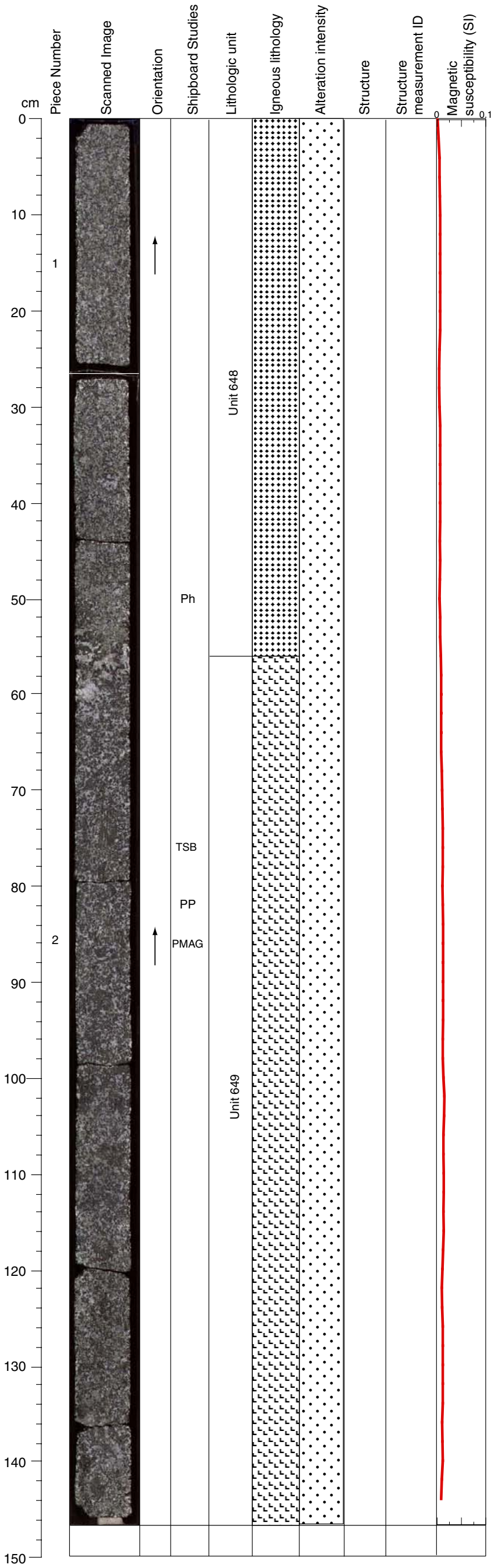
VEIN ALTERATION: no veins

THIN SECTIONS:
305-U1309D-250R-4, 17-20 cm (#604)

STRUCTURE: Medium-grained olivine-rich gabbro with weak magmatic fabric. Weak cataclasis.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-250R-4, 9-28 cm WET
305-U1309D-250R-4, 9-28 cm DRY (back)

Core Photo



305-U1309D-251R-1 (Section top: 1206.30 mbsf)

UNIT-648: Olivine Gabbro
Pieces: 1-2b

PRIMARY MINERALOGY: Mode from Piece 1

Olivine	Modal 40% Size 3 mm average Shape anhedral
Plagioclase	Modal 40% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 20% Size 2 mm average Shape anhedral

COMMENTS: Unit 648 is medium-grained olivine gabbro. Increasing clinopyroxene modal abundance and coarse grained clinopyroxene concentrated at 55 cm.

UNIT-649: Troctolitic Gabbro
Pieces: 2b-2f

PRIMARY MINERALOGY: Mode from Piece 2c

Olivine	Modal 55% Size 3 mm average Shape anhedral
Plagioclase	Modal 40% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 5% Size 3 mm average Shape anhedral

COMMENTS: Unit 649 is medium-grained troctolitic gabbro. Coarse olivine with harrisitic texture below the clinopyroxene concentration (noted above) and decreasing in grain size at 55-56 cm. Increasing clinopyroxene/plagioclase ratio toward bottom of section.

SECONDARY MINERALOGY: Serpentine, chlorite, pale amphibole

COMMENTS: Olivine is altered to serpentine, pyroxene to green amphibole and plagioclase to pale green and white minerals.

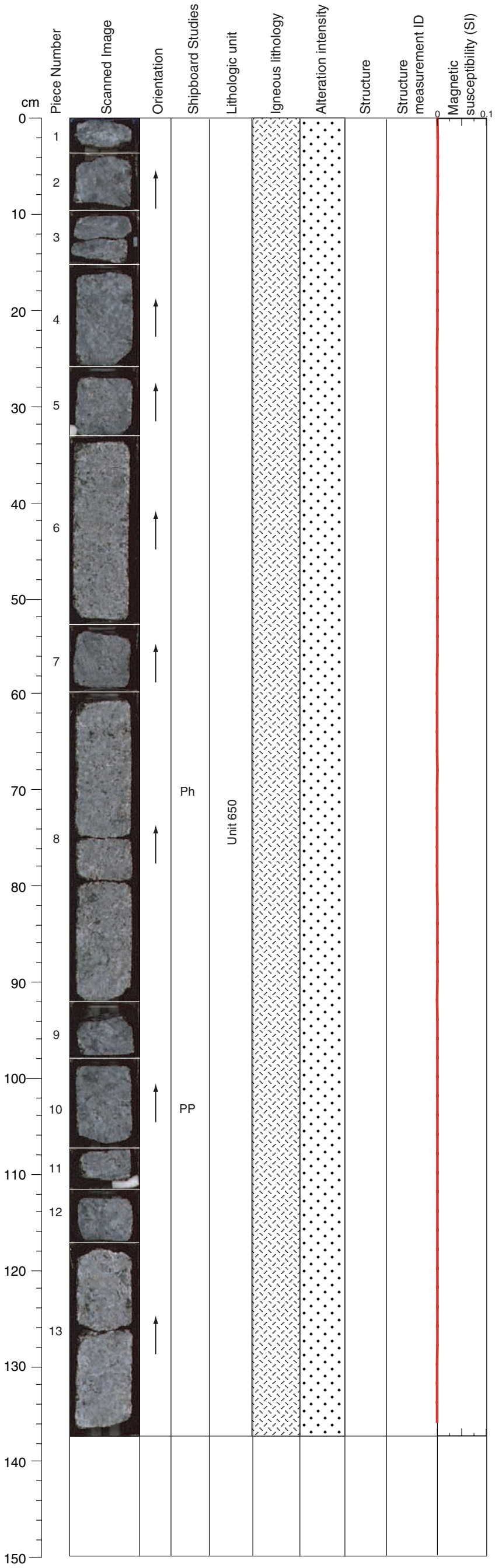
VEIN ALTERATION: No veins

THIN SECTIONS:
305-U1309D-251R-1, 74-77 cm (#605)

STRUCTURE: Medium-grained olivine-rich gabbro with clots of olivine.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-251R-1, 44-64 cm WET
305-U1309D-251R-1, 70-90 cm WET

Core Photo



305-U1309D-251R-2 (Section top: 1207.77 mbsf)

UNIT-650: Gabbro
Pieces: 1-13

PRIMARY MINERALOGY: Mode from Piece 8a

Plagioclase	Modal 60% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 40% Size 3 mm average Shape anhedral

COMMENTS: Unit 650 is medium-grained gabbro.

SECONDARY MINERALOGY: Chlorite, pale amphibole

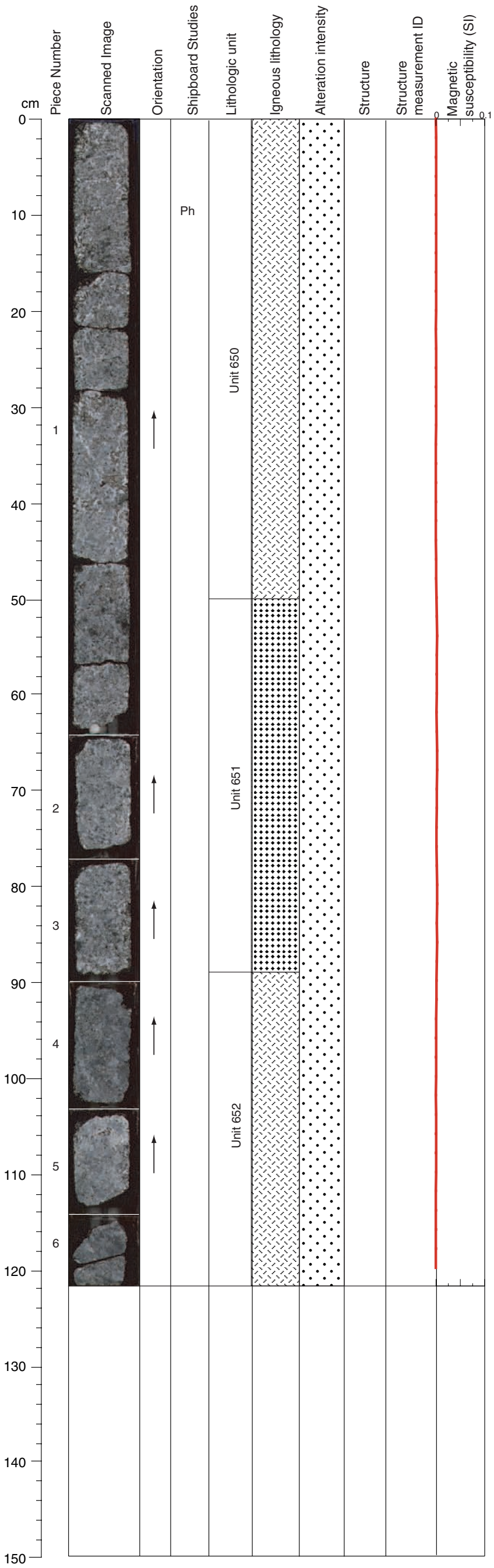
COMMENTS: The gabbro shows alteration of olivine to serpentine, pyroxene to green amphibole and plagioclase to pale green (chlorite) and patches of white secondary products.

VEIN ALTERATION: no veins

STRUCTURE: Medium-grained gabbro, local olivine patches, no mineral fabric. Very weak cataclastic deformation and some subhorizontal open cracks.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-251R-2, 60-79 cm WET

Core Photo



305-U1309D-251R-3 (Section top: 1209.15 mbsf)

UNIT-650: Gabbro
Pieces: 1a-1d

PRIMARY MINERALOGY: Mode from Piece 1c

Plagioclase	Modal 60% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 40% Size 5 mm average Shape anhedral

COMMENTS: Unit 650 is medium- to coarse-grained gabbro.

UNIT-651: Olivine Gabbro
Pieces: 1e-3

PRIMARY MINERALOGY: Mode from Piece 2

Olivine	Modal 7% Size 2 mm average Shape anhedral
Plagioclase	Modal 63% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 30% Size 2 mm average Shape anhedral

COMMENTS: Unit 651 is medium-grained olivine gabbro.

UNIT-652: Gabbro
Pieces: 4-6

PRIMARY MINERALOGY: Mode from Piece 4

Plagioclase	Modal 60% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 40% Size 5 mm average Shape anhedral

COMMENTS: Unit 652 is medium- to coarse-grained gabbro.

SECONDARY MINERALOGY: Chlorite, pale amphibole

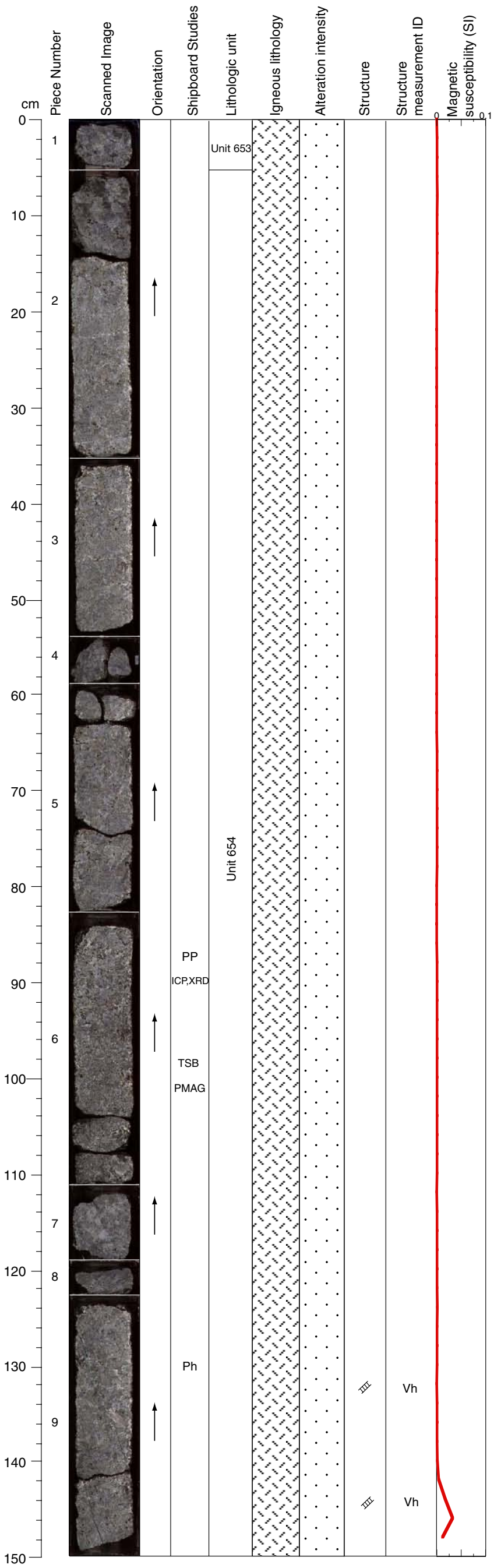
COMMENTS: The gabbro shows alteration of olivine to serpentine, pyroxene to green amphibole and plagioclase to pale green (chlorite) and patches of white secondary products. A green and white vein cuts across Piece 1d at a high angle.

VEIN ALTERATION: Zeolite

STRUCTURE: Medium-grained gabbro, local olivine patches, no mineral fabric. Very weak cataclastic deformation and some subhorizontal open cracks. Subhorizontal pale green veins (scarce, at bottom of section).

CLOSE-UP PHOTOGRAPHS:
305-U1309D-251R-3, 0-22 cm WET

Core Photo



305-U1309D-252R-1 (Section top: 1211.10 mbsf)

UNIT-653: Gabbro Rubble
Piece 1

COMMENTS: Unit 653 is gabbro rubble.

UNIT-654: Gabbro
Pieces: 2-9

PRIMARY MINERALOGY: Mode from Piece 3

Plagioclase	Modal 45% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 55% Size 3 mm average Shape anhedral

COMMENTS: Unit 654 is medium-grained gabbro.

SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: The gabbro shows alteration of pyroxene to green amphibole and plagioclase to pale green (chlorite) and patches of white secondary products. Where present olivine is partially altered to serpentine. Green and white veins cut the section at 46 cm and from 126 cm to the end of the section.

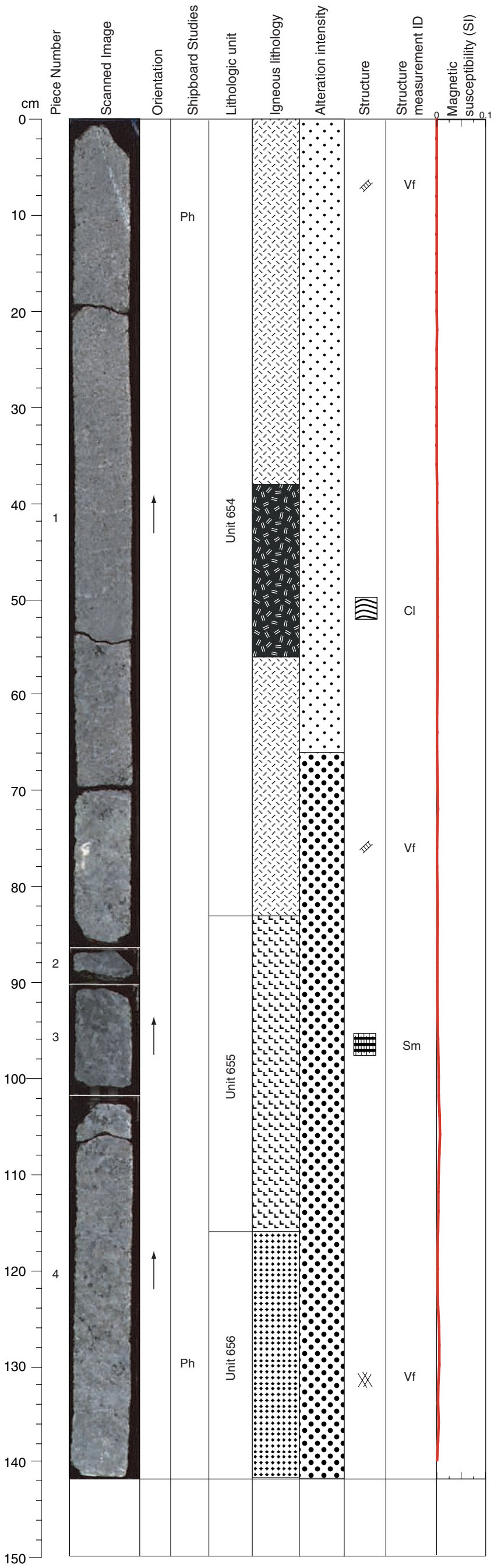
VEIN ALTERATION: Amphibole, chlorite

THIN SECTIONS:
305-U1309D-252R-1, 97-99 cm (#606)

STRUCTURE: Medium-grained isotropic gabbro. Locally both steep and subhorizontal pale green fault veins (base of section).

CLOSE-UP PHOTOGRAPHS:
305-U1309D-252R-1, 83-100 cm WET
305-U1309D-252R-1, 122-148 cm WET

Core Photo



305-U1309D-252R-2 (Section top: 1212.60 mbsf)

UNIT-654: Gabbro
Pieces: 1a-d

PRIMARY MINERALOGY: Mode from Piece 1b

Plagioclase	Modal 50-75% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 25-50% Size 3 mm average Shape anhedral

COMMENTS: Unit 654 is medium-grained gabbro. Olivine-bearing interval at 38-56 cm

UNIT-655: Troctolitic Gabbro
Pieces: 1d-4a

PRIMARY MINERALOGY: Mode from Piece 1d

Olivine	Modal 20% Size 3 mm average Shape anhedral
Plagioclase	Modal 65% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 15% Size 2 mm average Shape anhedral

COMMENTS: Unit 655 is medium-grained troctolitic gabbro.

UNIT-656: Olivine Gabbro
Pieces: 4b

PRIMARY MINERALOGY: Mode from Piece 4b

Olivine	Modal 20% Size 3 mm average Shape anhedral
Plagioclase	Modal 40% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 40% Size 3 mm average Shape anhedral

COMMENTS: Unit 656 is medium-grained olivine gabbro.

SECONDARY MINERALOGY: Chlorite, pale amphibole

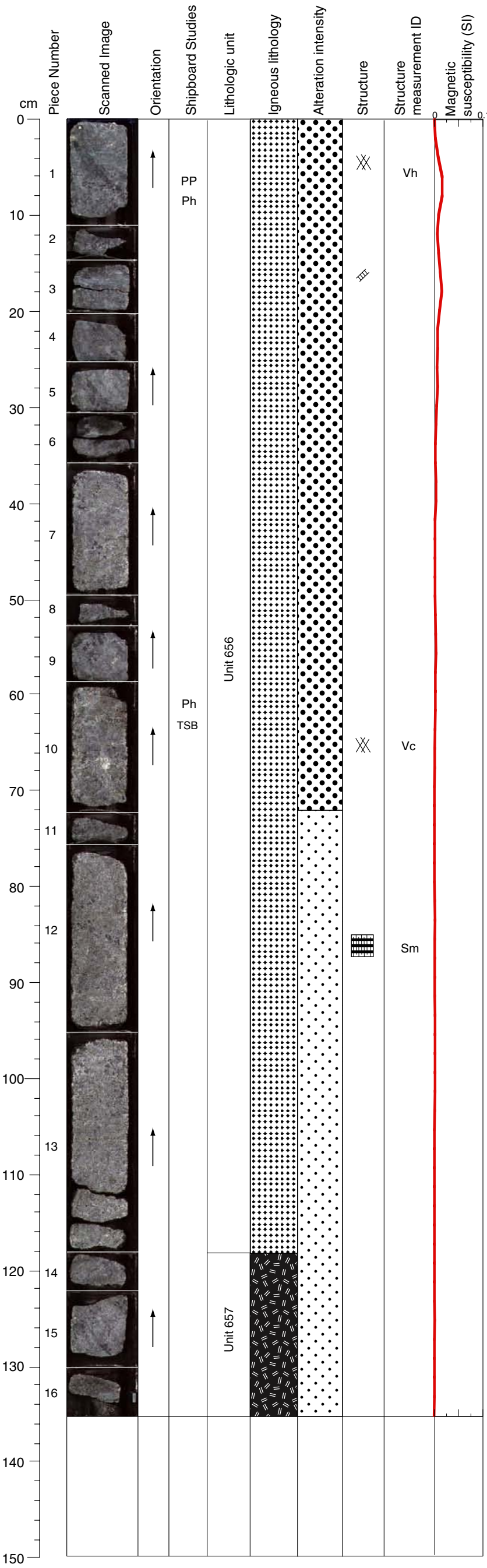
COMMENTS: The gabbro shows alteration of pyroxene to green amphibole and plagioclase to pale green (chlorite) and patches of white secondary products. Where present olivine is partially altered to serpentine. A green and white vein cuts the section from 0 to 13 cm and has an alteration halo about 7 mm wide. Patches of more leucocratic alteration appear below about 67 cm and the alteration becomes heavier toward the bottom, from 126 cm to the end of the section. Corona texture is developed from about 132 cm to the bottom of the section.

VEIN ALTERATION: Amphibole, chlorite, zeolite

STRUCTURE: Medium-grained olivine bearing gabbro with well developed compositonal and grain size banding and magmatic foliation developed. Steep dark green veins with some associated cataclasis.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-252R-2, 0-20 cm WET
305-U1309D-252R-2, 121-141 cm WET

Core Photo



305-U1309D-252R-3 (Section top: 1214.02 mbsf)

UNIT-656: Olivine Gabbro
Pieces: 1-13

PRIMARY MINERALOGY: Mode estimated from several pieces

Olivine	Modal 10-25% Size 3 mm average Shape anhedral
Plagioclase	Modal 40-55% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 20-45% Size 3 mm average Shape anhedral

COMMENTS: Unit 656 is medium-grained olivine gabbro. Clinopyroxene oikocryst. Olivine has inhomogeneous distribution and its abundance decreases 103-110 cm.

UNIT-657: Olivine-bearing Gabbro
Pieces: 14-16

PRIMARY MINERALOGY: Mode from Piece 14

Olivine	Modal 5% Size 2 mm average Shape anhedral
Plagioclase	Modal 55% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 40% Size 3 mm average Shape anhedral

COMMENTS: Unit 657 is medium-grained olivine-bearing gabbro.

SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: The gabbro shows alteration of pyroxene to green amphibole and plagioclase to pale green (chlorite) and patches of white secondary products. Where present olivine is partially altered to serpentine. Green and white vein material coats the top of Piece 1 and from 59 to 72 cm there is an alteration halo about 4 mm wide. Patches of more leucocratic alteration appear around the veins and corona texture is developed near the veins.

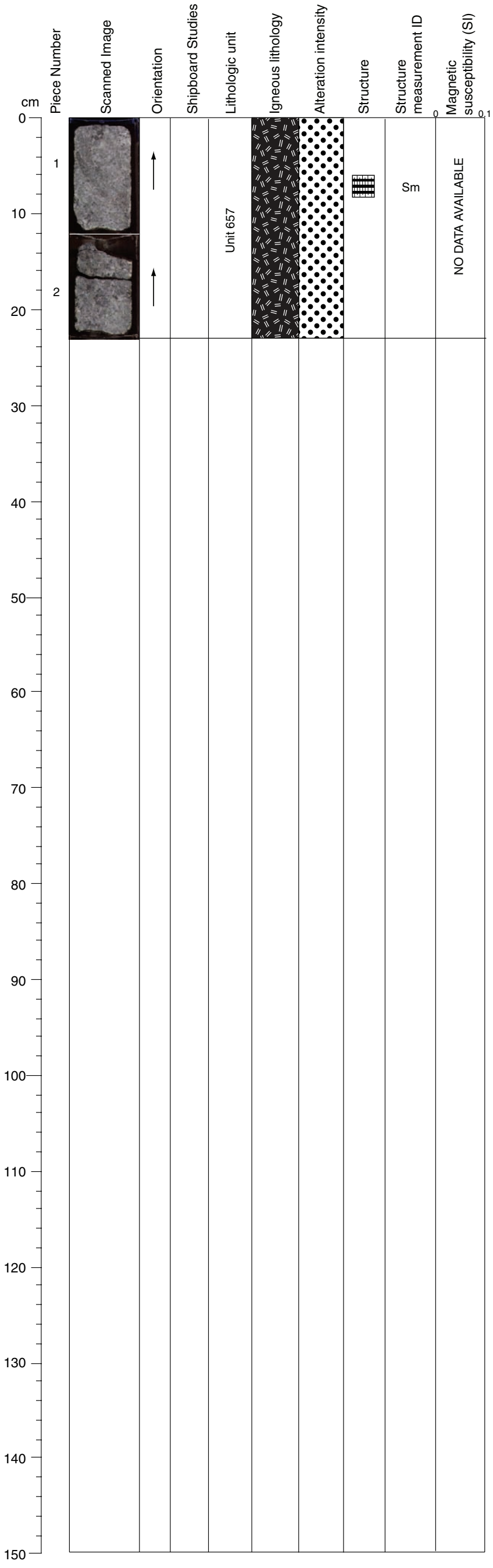
VEIN ALTERATION: Amphibole, chlorite, zeolite

THIN SECTIONS:
305-U1309D-252R-3, 61-63 cm (#607)

STRUCTURE: Medium-grained gabbro with local olivine patches, weak magmatic foliation and layering developed in lower part of section. Steep dark green veins with some associated cataclasis.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-252R-3, 0-20 cm WET
305-U1309D-252R-3, 53-72 cm WET

Core Photo



305-U1309D-252R-4 (Section top: 1215.38 mbsf)

UNIT-657: Olivine-bearing Gabbro
Pieces: 1-2

PRIMARY MINERALOGY: Mode from Piece 1

Olivine	Modal 5% Size 2 mm average Shape anhedral
Plagioclase	Modal 50% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 45% Size 3 mm average Shape anhedral

COMMENTS: Unit 657 is medium-grained olivine-bearing gabbro.

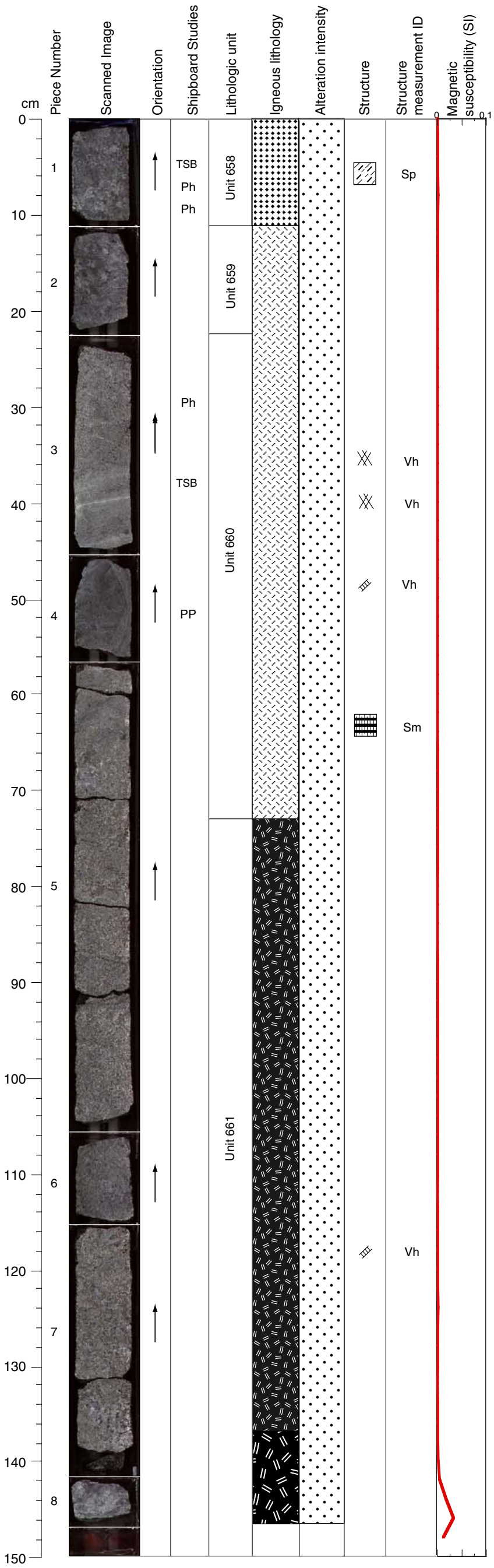
SECONDARY MINERALOGY: Chlorite, pale amphibole.

COMMENTS: Coarse-grained gabbro with serpentinized olivine and pyroxene altered to green amphibole.

VEIN ALTERATION: no veins

STRUCTURE: Medium-grained gabbro with local olivine patches, weak magmatic foliation developed.

Core Photo



305-U1309D-253R-1 (Section top: 1215.90 mbsf)

UNIT-658: Olivine Gabbro
Pieces: 1

PRIMARY MINERALOGY: Mode from Piece 1

Olivine	Modal 15% Size 3 mm average Shape anhedral
Plagioclase	Modal 55% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 30% Size 4 mm average Shape anhedral

COMMENTS: Unit 658 is medium-grained olivine gabbro.

UNIT-659, 660: Gabbro
Pieces: 2-5c

PRIMARY MINERALOGY: Mode from Piece 3

Plagioclase	Modal 50% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 50% Size 4 mm average Shape anhedral

COMMENTS: Units 659-660 are fine- to medium-grained gabbro.

UNIT-661: Olivine-bearing Gabbro
Pieces: 5c-8

PRIMARY MINERALOGY: Mode from Piece 1

Olivine	Modal 3% Size 3 mm average Shape anhedral
Plagioclase	Modal 50% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 47% Size 4 mm average Shape anhedral

COMMENTS: Unit 661 is medium-grained olivine-bearing gabbro.

SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: Pieces 1 and 2 are coarse-grained gabbro with pyroxene altered to green and brown amphibole. From Pieces 3 to 5, fine-grained gabbro. At 39, 41, 45 cm, pale green veins (amphibole + zeolite?). At 66 cm, the grain size increases with pyroxene altered to brown amphibole.

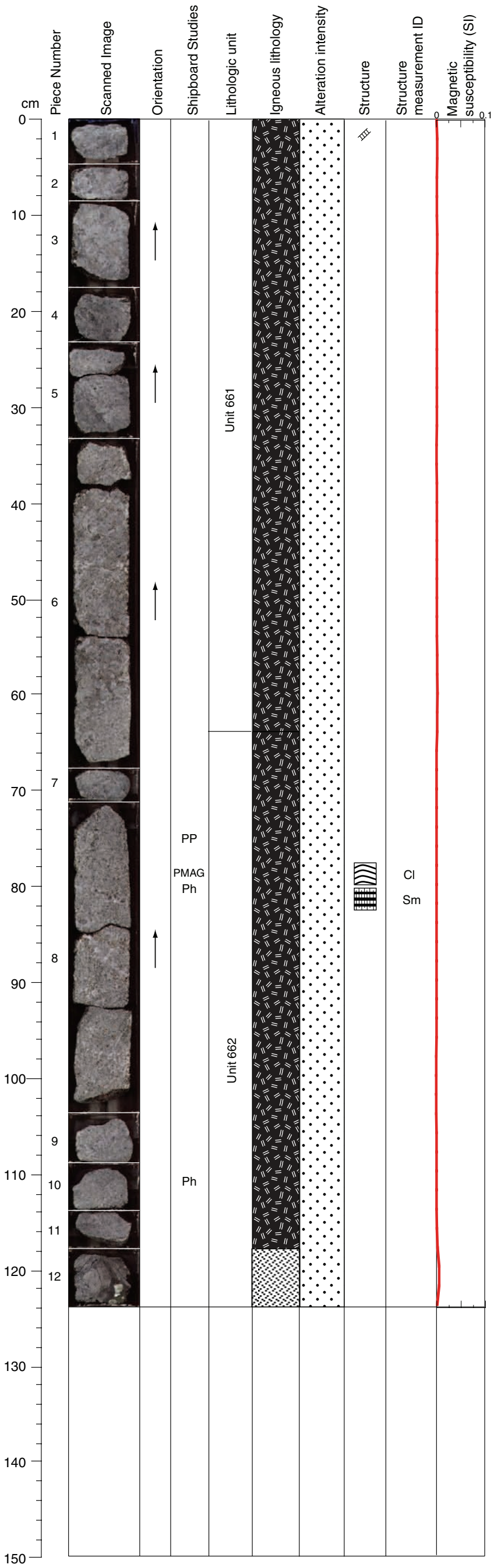
VEIN ALTERATION: Amphibole, chlorite, zeolite

THIN SECTIONS:
305-U1309D-253R-1, 3-6 cm (#608)
305-U1309D-253R-1, 36-39 cm (#609)

STRUCTURE: Fine- to medium-grained, olivine-free gabbro with weak magmatic fabric (Sm) developed in most parts of section. Grain size banding present locally and plastic strain shear zone (Sp) present in top of section. Pale green veins and shalllowly dipping irregular cracks.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-253R-1, 0-22 cm WET
305-U1309D-253R-1, 0-10 cm DRY
305-U1309D-253R-1, 23-44 cm WET

Core Photo



305-U1309D-253R-2 (Section top: 1217.37 mbsf)

UNIT-661: Olivine-bearing Gabbro
Pieces: 1-6c

PRIMARY MINERALOGY: Mode from Piece 6b

Olivine	Modal 1% Size 2 mm average Shape anhedral
Plagioclase	Modal 45% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 55% Size 10 mm average Shape anhedral

COMMENTS: Unit 661 is coarse-grained olivine-bearing gabbro.

UNIT-662: Olivine-bearing Gabbro
Pieces: 6c-12

PRIMARY MINERALOGY: Mode from Piece 8a

Olivine	Modal <5% Size 2 mm average Shape anhedral
Plagioclase	Modal 55% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 40% Size 5 mm average Shape anhedral

COMMENTS: Unit 662 is fine- to coarse-grained olivine-bearing gabbro to olivine-free gabbro. Tabular amphibole present in Piece 12.

SECONDARY MINERALOGY: Chlorite, pale amphibole

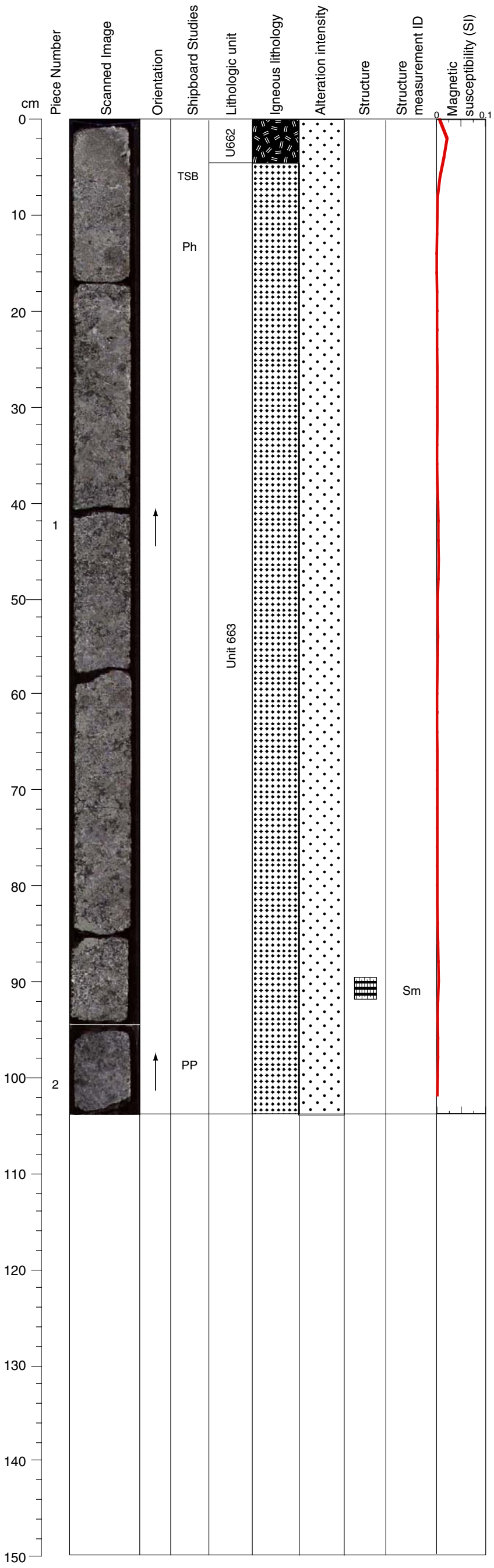
COMMENTS: From Piece 1 to 5, pegmatitic gabbro with pyroxene altered to green and brown amphibole. Significant amount of sulfides. From Piece 6 to 11, coarse-grained gabbro with serpentinized olivine and pyroxene altered to green and brown amphibole. Piece 12 is a pegmatitic gabbro with alteration to green amphibole.

VEIN ALTERATION: Amphibole, zeolite

STRUCTURE: Medium- to coarse-grained gabbro with weak magmatic fabric developed in medium-grained parts. Local grain size banding. Slight, steeply dipping veining and open cracks in lower part of section.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-253R-2, 71-92 cm WET
305-U1309D-253R-2, 108-123 cm WET

Core Photo



305-U1309D-253R-3 (Section top: 1218.61 mbsf)

UNIT-662: Olivine-bearing Gabbro
Piece 1a

PRIMARY MINERALOGY: Mode from Piece 1a

Olivine	Modal 1% Size 1 mm average Shape anhedral
Plagioclase	Modal 55% Size 1 mm average Shape anhedral
Clinopyroxene	Modal 45% Size 1 mm average Shape anhedral

COMMENTS: Unit 662 is fine-grained olivine-bearing gabbro. Coarse gabbronoritic dikelets observed in thin section.

UNIT-663: Olivine Gabbro
Pieces: 1a-2

PRIMARY MINERALOGY: Mode from Piece 1d

Olivine	Modal 12% Size 2 mm average Shape anhedral
Plagioclase	Modal 45% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 43% Size 4 mm average Shape anhedral

COMMENTS: Unit 663 is medium- to coarse-grained olivine gabbro.

SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: Coarse-grained gabbro with serpentinized olivine and pyroxene altered to green and brown amphibole. Significant amount of sulfides.

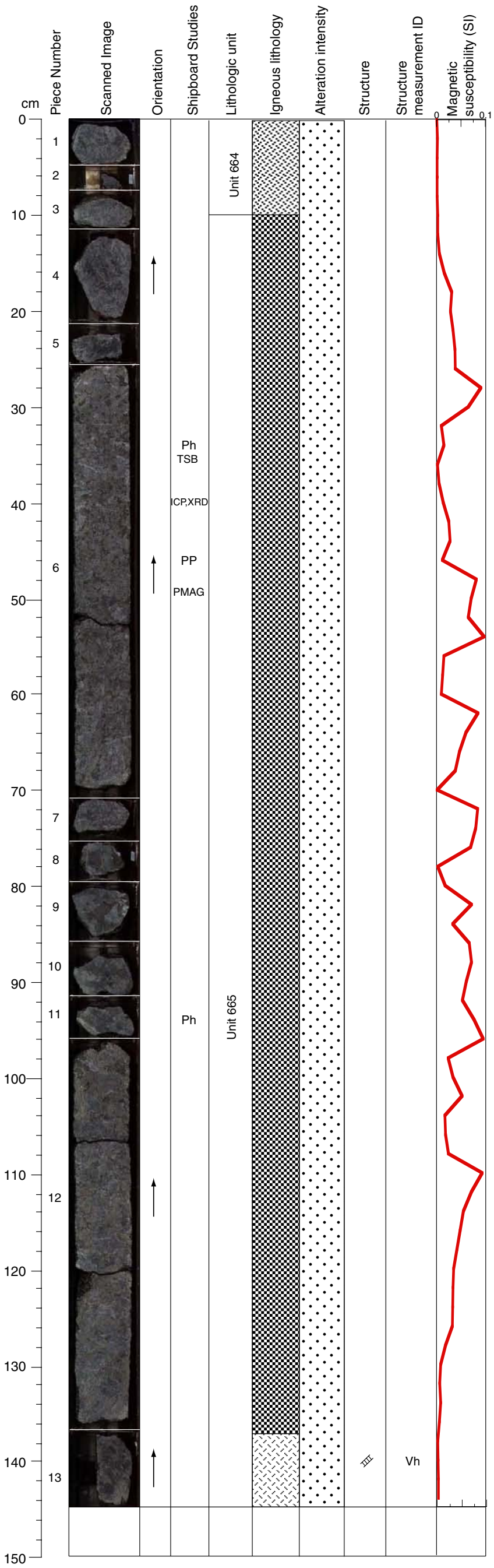
VEIN ALTERATION: no veins

THIN SECTIONS:
305-U1309D-253R-3, 4-7 cm (#610)

STRUCTURE: Medium to coarse grain size, at top of section fine-grained olivine-bearing gabbro with weak magmatic fabric developed throughout.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-253R-3, 0-25 cm WET

Core Photo



305-U1309D-254R-1 (Section top: 1220.70 mbsf)

UNIT-664: Gabbro Rubble
Pieces: 1-3

PRIMARY MINERALOGY: Mode from Piece 3

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

COMMENTS: Unit 664 is coarse-grained gabbro rubble.

UNIT-665: Oxide Gabbro to Gabbro
Pieces: 4-13

PRIMARY MINERALOGY: Mode from several pieces

Plagioclase	Modal 55-65% Size 10 mm average Shape anhedral
Clinopyroxene	Modal 30-35% Size 10 mm average Shape anhedral
Oxide	Modal 5-15% Size 10 mm average Shape anhedral

COMMENTS: Unit 665 is coarse-grained oxide gabbro to gabbro. Oxide abundance decreases down section.

SECONDARY MINERALOGY: Chlorite, pale amphibole, sulfide

COMMENTS: Alteration of olivine to serpentine, pyroxene to green amphibole and palgioclase to chlorite and white patches (clays?).

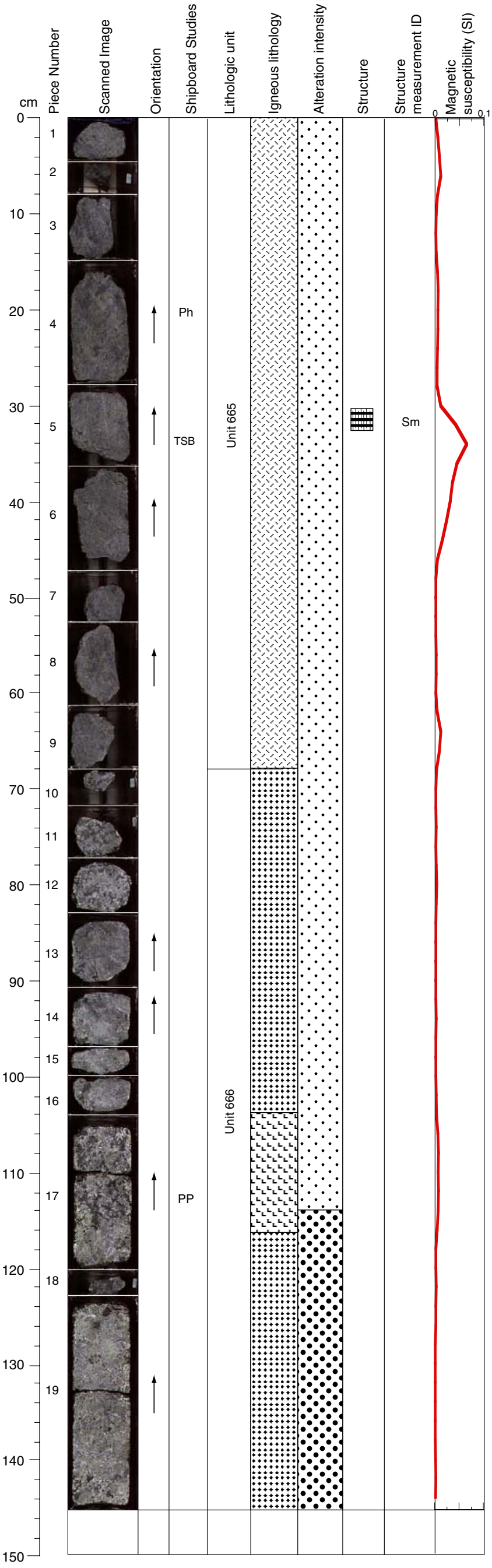
VEIN ALTERATION: Amphibole, chlorite

THIN SECTIONS:
305-U1309D-254R-1, 34-36 cm (#611)

STRUCTURE: Coarse-grained oxide gabbro showing no fabric.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-254R-1, 26-53 cm WET
305-U1309D-254R-1, 80-107 cm WET

Core Photo



305-U1309D-254R-2 (Section top: 1222.15 mbsf)

UNIT-665: Gabbro
Pieces: 1-9

PRIMARY MINERALOGY: Mode from Piece 5

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

COMMENTS: Unit 665 is coarse-grained gabbro. Oxide concentration at 32-36 cm.

UNIT-666: Olivine Gabbro
Pieces: 10-16, 17b-19

PRIMARY MINERALOGY: Mode from Pieces 12, 19

Olivine	Modal 8-20% Size 6 mm average Shape anhedral
Plagioclase	Modal 50-67% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 25-30% Size 8 mm average Shape anhedral

COMMENTS: Unit 666 is coarse-grained olivine gabbro

UNIT-666: Troctolitic Gabbro
Pieces: 17a-17b

PRIMARY MINERALOGY: Mode from Piece 17

Olivine	Modal 30% Size 4 mm average Shape anhedral
Plagioclase	Modal 60% Size 4 mm average Shape anhedral
Clinopyroxene	Modal 10% Size 8 mm average Shape anhedral

COMMENTS: Unit 666 is coarse-grained troctolitic gabbro interval

SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: From Piece 1 to 9, coarse-grained gabbro with a very significant amount of sulfides and alteration of the pyroxene to green amphibole. From Piece 10 to 15, coarse-grained gabbro with serpentinized olivine and alteration of the pyroxene to green amphibole.

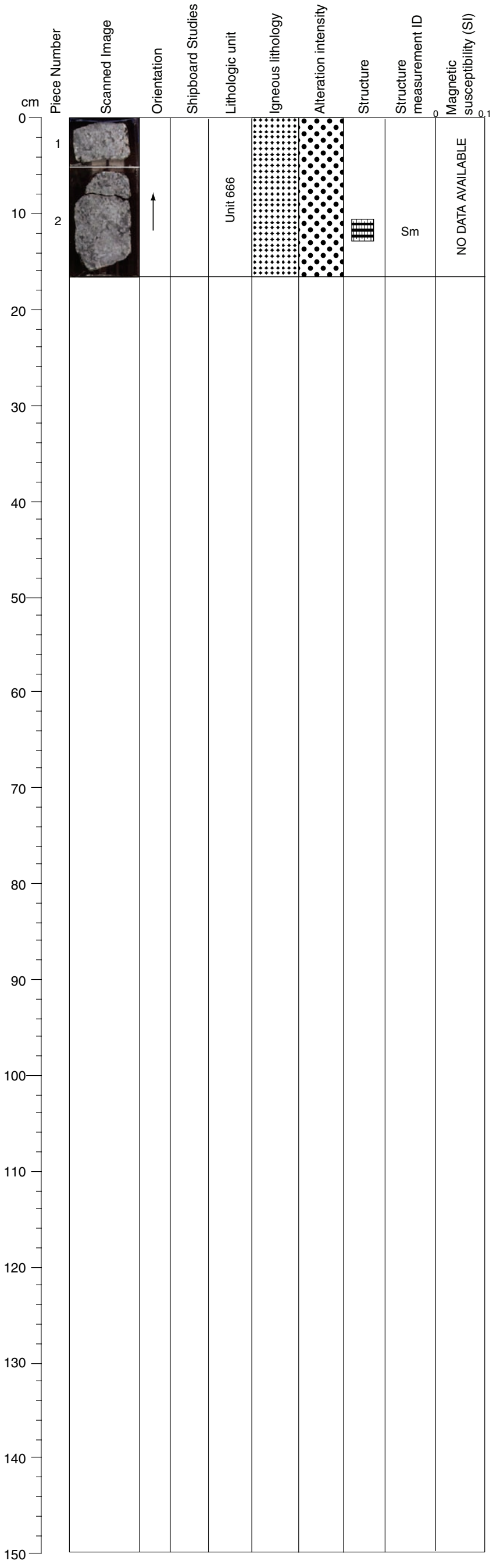
VEIN ALTERATION: Amphibole, chlorite

THIN SECTIONS:
305-U1309D-254R-2, 33-35 cm (#612)

STRUCTURE: Medium-grained olivine gabbro exhibits a weak fabric in upper section. Few oxide bands are seen.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-254R-2, 15-36 cm WET
305-U1309D-254R-2, 15-36 cm WET

Core Photo



305-U1309D-254R-3 (Section top: 1223.60 mbsf)

UNIT-666: Olivine Gabbro
Pieces: 1-2

PRIMARY MINERALOGY: Mode from Piece 2

Olivine	Modal 10% Size 4 mm average Shape anhedral
Plagioclase	Modal 65% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 25% Size 8 mm average Shape anhedral

COMMENTS: Unit 666 is coarse-grained olivine gabbro.

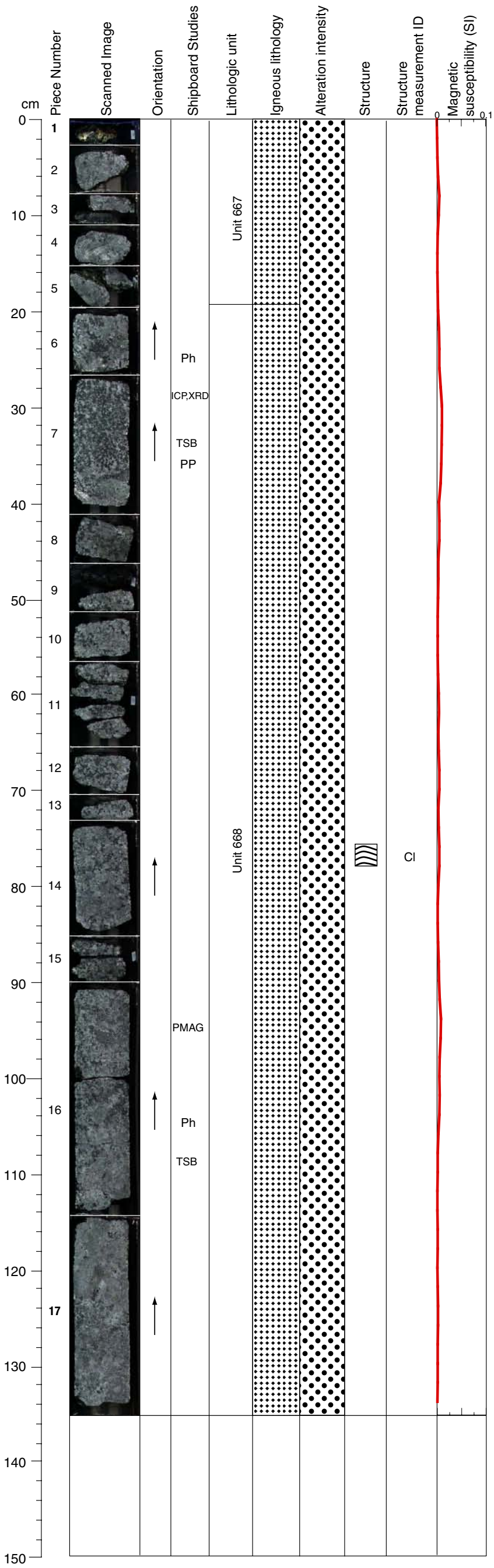
SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: Coarse-grained gabbro with serpentinized olivine and alteration of the pyroxene to green and brown amphibole.

VEIN ALTERATION: n/a

STRUCTURE: Olivine gabbro showing a weak magmatic foliation (Sm). Slight cataclasis.

Core Photo



305-U1309D-255R-1 (Section top: 1225.50 mbsf)

UNIT-667: Olivine Gabbro Rubble
Pieces: 1-5

COMMENTS: Unit 667 is olivine gabbro rubble.

UNIT-668: Olivine Gabbro
Pieces: 6-17

PRIMARY MINERALOGY: Mode from Piece 7

Olivine	Modal 45% Size 3 mm average Shape anhedral
Plagioclase	Modal 40% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 15% Size 4 mm average Shape anhedral

COMMENTS: Unit 668 is medium-grained olivine gabbro. Increasing grain size at 104-135 cm.

SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: Overall greenish cast to rocks in this section. Alteration of olivine to serpentine, pyroxene to green amphibole, and plagioclase to chlorite and white patches (?).

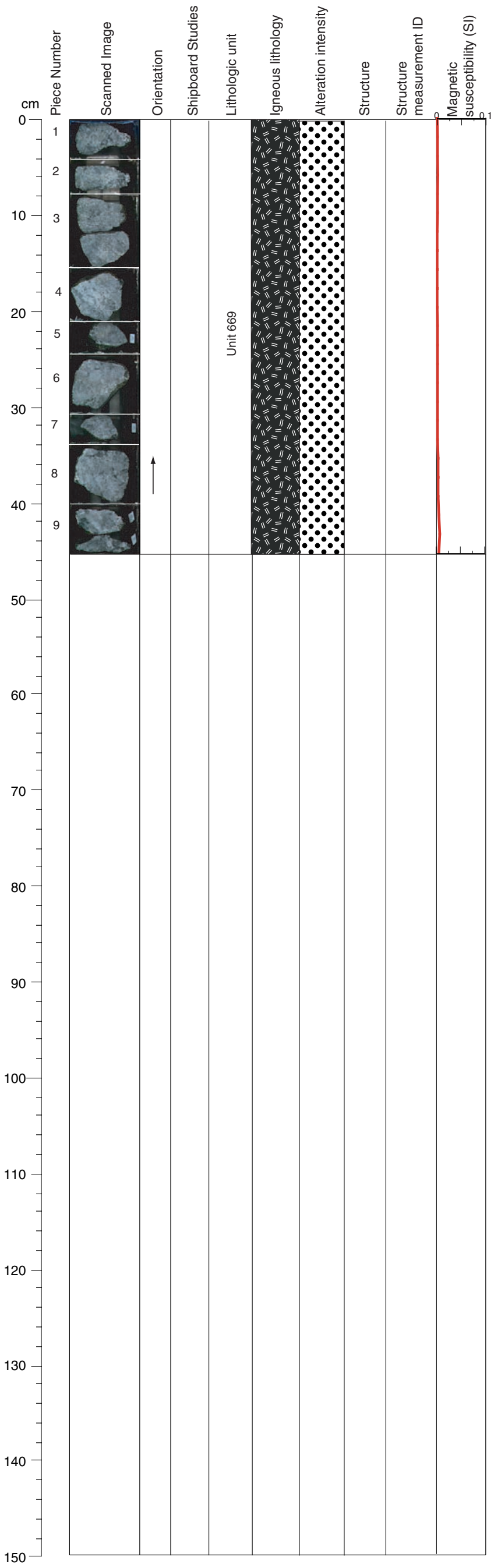
VEIN ALTERATION: Amphibole, chlorite.

THIN SECTIONS:
305-U1309D-255R-1, 33-35 cm (#613)
305-U1309D-255R-1, 107-110 cm (#614)

STRUCTURE: Medium-grained olivine gabbro with coarse-grained interval and local modal banding developed, no clear magmatic foliation. Distributed cataclasis at bottom of the section and associated yellow green alteration.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-255R-1, 20-41 cm WET
305-U1309D-255R-1, 90-114 cm WET

Core Photo



305-U1309D-255R-2 (Section top: 1226.86 mbsf)

UNIT-669: Olivine-bearing Gabbro
Pieces: 1-9

PRIMARY MINERALOGY: Mode from Piece 8

Olivine	Modal 3% Size 3 mm average Shape anhedral
Plagioclase	Modal 47% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 50% Size 4 mm average Shape anhedral

COMMENTS: Unit 669 is medium-grained olivine-bearing gabbro. Ultramafic rock within Piece 9.

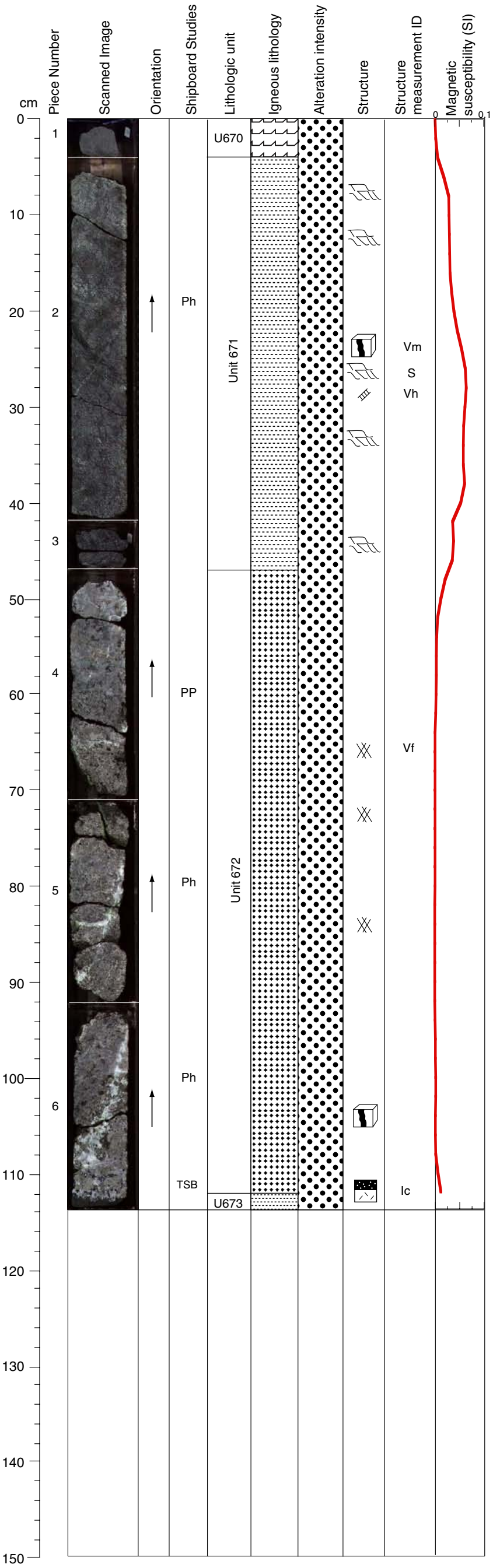
SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: Alteration of higher degree has imparted a greenish cast to the entire section. Alteration includes serpentine after olivine, green amphibole after pyroxene, and chlorite after plagioclase. Green and white vein minerals fill a fracture in Piece 4. Some white fractures and patches appear throughout the section.

VEIN ALTERATION: n/a

STRUCTURE: Medium-grained gabbro with olivine near base of section, no magmatic or plastic fabric.

Core Photo



305-U1309D-256R-1 (Section top: 1230.30 mbsf)

UNIT-670: Diabase Rubble
Pieces: 1

COMMENTS: Unit 670 is diabase rubble.

UNIT-671: Olivine-rich Troctolite
Pieces: 2-3

PRIMARY MINERALOGY: Mode from Piece 2b

Olivine	Modal 75% Size 1 mm average Shape anhedral
Plagioclase	Modal 20% Size 1 mm average Shape anhedral
Clinopyroxene	Modal 5% Size 4 mm average Shape anhedral

COMMENTS: Unit 671 is fine-grained olivine-rich troctolite. Rare clinopyroxene oikocrysts.

UNIT-672: Olivine Gabbro
Pieces: 4-6b

PRIMARY MINERALOGY: Mode from Piece 5a

Olivine	Modal 10% Size 2 mm average Shape anhedral
Plagioclase	Modal 50% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 40% Size 2 mm average Shape anhedral

COMMENTS: Unit 672 is medium-grained olivine gabbro between olivine-rich troctolites. Felsic vein crosscuts at 93-111 cm.

UNIT-673: Olivine-rich Troctolite
Pieces: 6b

PRIMARY MINERALOGY: Mode from Piece 2b

Olivine	Modal 75% Size 1 mm average Shape anhedral
Plagioclase	Modal 20% Size 1 mm average Shape anhedral
Clinopyroxene	Modal 5% Size 4 mm average Shape anhedral

COMMENTS: Unit 673 is fine-grained olivine-rich troctolite. Thin sliver of olivine-rich troctolite on top of Piece 4a forms contact with olivine gabbro unit.

SECONDARY MINERALOGY: Serpentine, chlorite, pale amphibole

COMMENTS: Olivine altered to serpentine, pyroxene to amphibole and plagioclase to chlorite. A serpentine foliation appears in Pieces 1-3. Veins occur in Pieces 2, and 4 to 6, some with halos of varying width (maximum is 7 mm) and some branching networks in Piece 6.

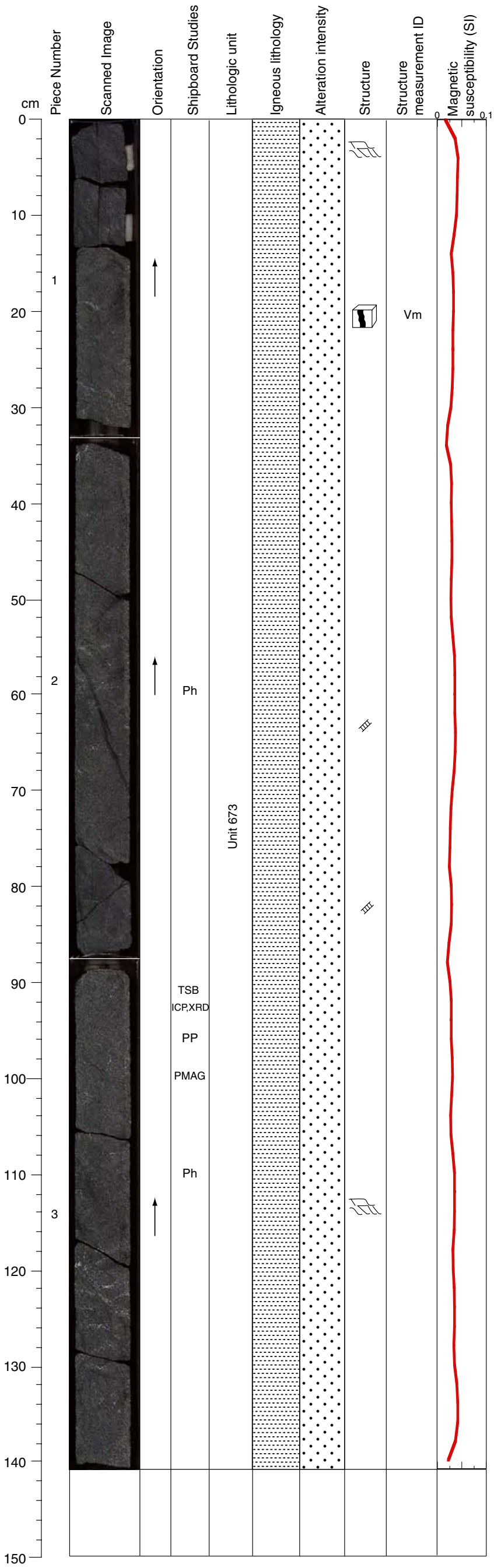
VEIN ALTERATION: Serpentine, amphibole, plagioclase, clay, carbonate, zeolite.

THIN SECTIONS:
305-U1309D-256R-1, 110-112 cm (#615)

STRUCTURE: Fine-grained trocolite truncated by medium to coarse, locally olivine bearing gabbro. Weak serpentine foliation with moderately-dipping, well-developed foliation. In gabbro, pale green vein with fibers and a contact with a sliver of serpentinized troctolite at bottom of section (Ic).

CLOSE-UP PHOTOGRAPHS:
305-U1309D-256R-1, 9-30 cm WET
305-U1309D-256R-1, 71-92 cm WET
305-U1309D-256R-1, 92-114 cm WET

Core Photo



305-U1309D-256R-2 (Section top: 1231.44 mbsf)

UNIT-673: Olivine-rich Troctolite
Pieces: 1-3

PRIMARY MINERALOGY: Mode from Piece 2a

Olivine	Modal 80% Size 2 mm average Shape anhedral
Plagioclase	Modal 20% Size 1 mm average Shape anhedral

COMMENTS: Unit 673 is fine-grained olivine-rich troctolite.

SECONDARY MINERALOGY: Serpentine, chlorite?

COMMENTS: Mainly serpentine alteration after olivine with weak serpentine foliation (nearly vertical). A few serpentine veins (en echelon in Piece 2a).

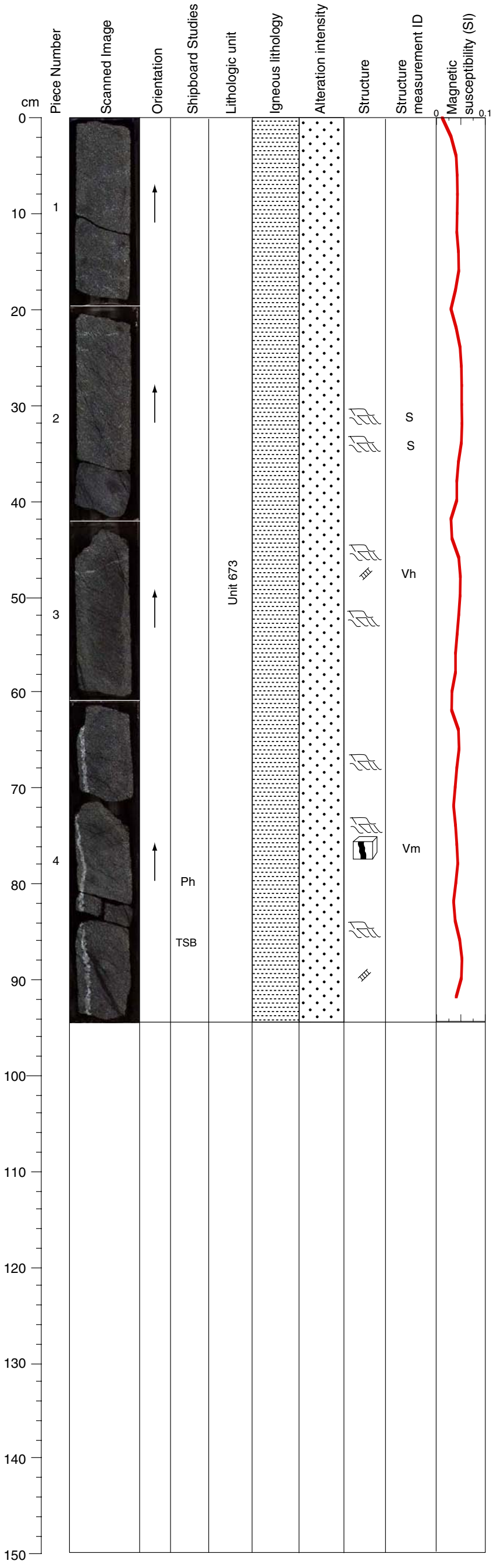
VEIN ALTERATION: Serpentine.

THIN SECTIONS:
305-U1309D-256R-2, 90-92 cm (#616)

STRUCTURE: Fine-grained troctolite with no clear magmatic foliation but several discontinuous clinopyroxene or plagioclase-rich veins. Weak serpentine foliation and veins.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-256R-2, 52-73 cm WET
305-U1309D-256R-2, 88-105 cm WET
305-U1309D-256R-2, 105-128 cm WET

Core Photo



305-U1309D-256R-3 (Section top: 1232.85 mbsf)

UNIT-673: Olivine-rich Troctolite
Pieces: 1-4

PRIMARY MINERALOGY: Mode from Piece 2a

Olivine	Modal 80% Size 2 mm average Shape anhedral
Plagioclase	Modal 20% Size 1 mm average Shape anhedral

COMMENTS: Unit 673 is fine-grained olivine-rich troctolite.

SECONDARY MINERALOGY: Serpentine, chlorite

COMMENTS: Alteration includes serpentine (with weak foliation) after olivine and chlorite after plagioclase, with some green amphibole in a magmatic (?) vein in Piece 4. A 7 mm wide serpentine vein cuts the lower part of Piece 4.

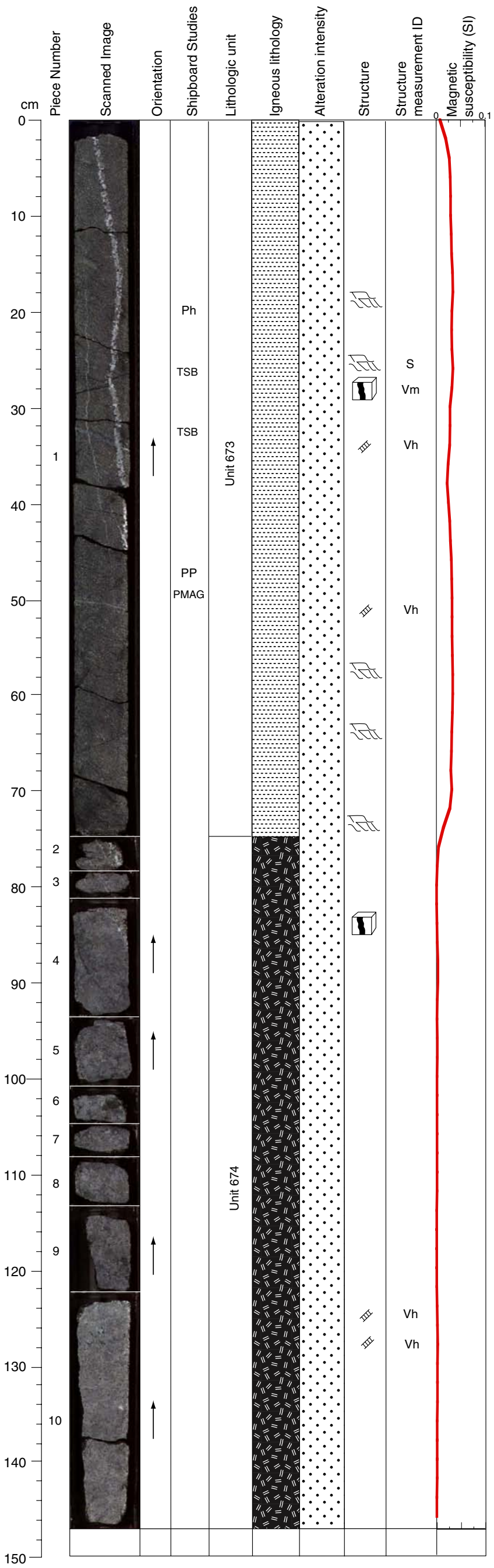
VEIN ALTERATION: Serpentine, amphibole.

THIN SECTIONS:
305-U1309D-256R-3, 85-88 cm (#617)

STRUCTURE: Fine-grained troctolite with near-vertical gabbroic vein, no magmatic or plastic fabric. A steep magmatic vein and serpentinite foliation dipping moderately.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-256R-3, 71-94 cm WET

Core Photo



305-U1309D-257R-1 (Section top: 1235.10 mbsf)

UNIT-673: Olivine-rich Troctolite
Pieces: 1

PRIMARY MINERALOGY: Mode from Piece 1

Olivine	Modal 80% Size 2 mm average Shape anhedral
Plagioclase	Modal 20% Size 1 mm average Shape anhedral

COMMENTS: Unit 673 is fine-grained olivine-rich troctolite.

UNIT-674: Olivine-bearing Gabbro
Pieces: 2-10

PRIMARY MINERALOGY: Mode from Piece 10a

Olivine	Modal 2% Size 2 mm average Shape anhedral
Plagioclase	Modal 45% Size 1 mm average Shape anhedral
Clinopyroxene	Modal 53% Size 3 mm average Shape anhedral

COMMENTS: Unit 674 is medium-grained olivine-bearing gabbro.

SECONDARY MINERALOGY: Serpentine, chlorite

COMMENTS: Serpentinized olivine and chloritized plagioclase. Two magmatic (?) veins cut nearly vertically through Piece 1 from 0~51 cm (one is about 7 mm wide the other is about 2 mm wide). There is similar material in Piece 2 and 4. These veins contain amphibole after pyroxene and chlorite and a white alteration product after plagioclase. An en echelon serpentine vein set (possibly offset along a fracture/fault) occurs at 26 to 29 cm. There are several amphibole veins in Piece 1 (d and f) and one crosscuts both of the “magmatic” veins in Piece 1d.

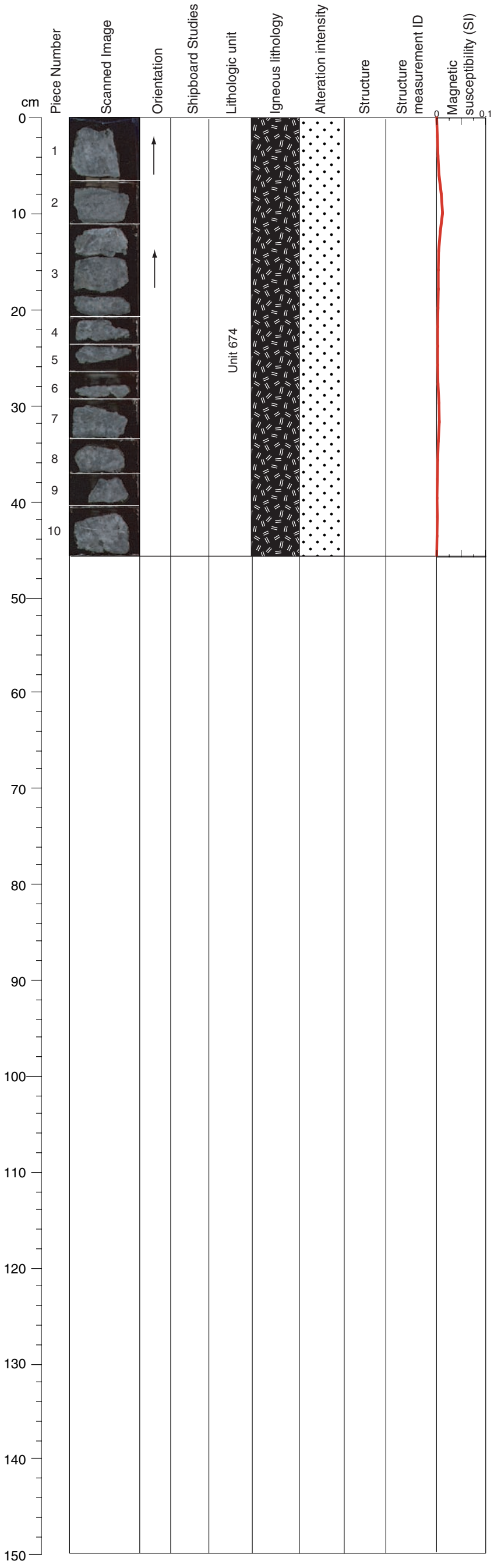
VEIN ALTERATION: Serpentine, amphibole, chlorite, zeolite.

THIN SECTIONS:
305-U1309D-257R-1, 25-28 cm (#618)
305-U1309D-257R-1, 32-34 cm (#619)

STRUCTURE: Fine-grained troctolite with nearly vertical gabbroic vein and no magmatic or plastic fabric visible in hand specimen.Contact to locally olivine bearing gabbro is not preserved. Steep magmatic veins and serpentinite foliation that is moderately dipping. Underlain by gabbro with a few subhorizontal open cracks crosscutting previous magmatic veins and some dark green veins.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-257R-1, 10-37 cm WET

Core Photo



305-U1309D-257R-2 (Section top: 1236.57 mbsf)

UNIT-674: Olivine-bearing Gabbro
Pieces: 1-10

PRIMARY MINERALOGY: Mode from Piece 3b

Olivine	Modal 2% Size 2 mm average Shape anhedral
Plagioclase	Modal 45% Size 1 mm average Shape anhedral
Clinopyroxene	Modal 53% Size 3 mm average Shape anhedral

COMMENTS: Unit 674 is medium-grained olivine-bearing gabbro.

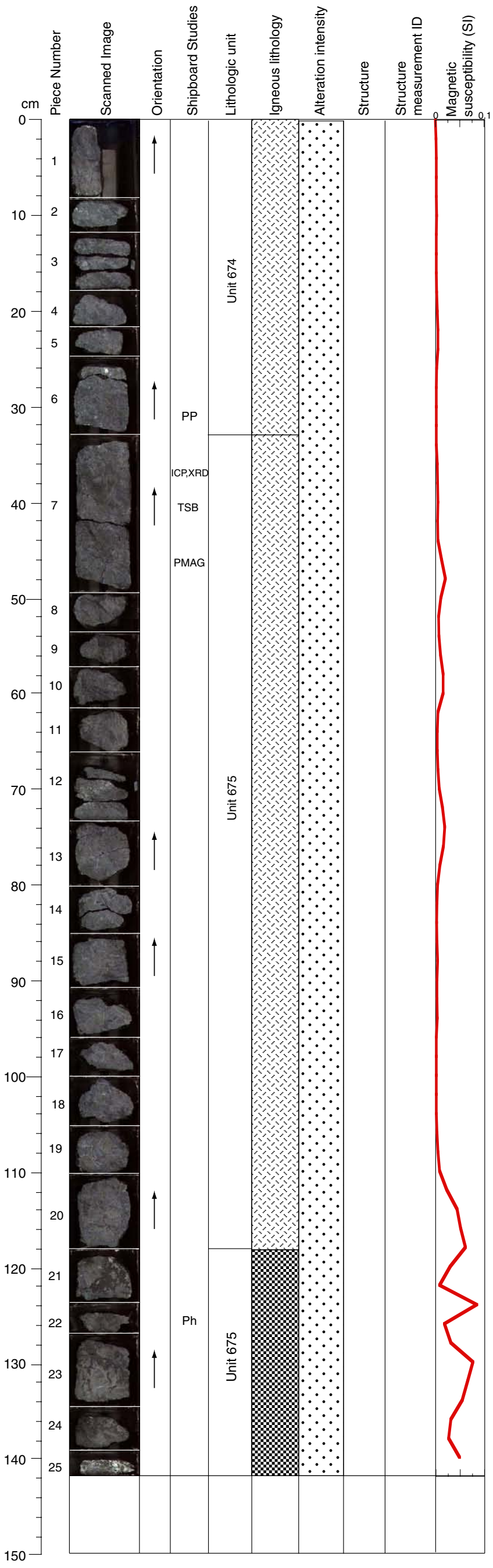
SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: General alteration includes green amphibole after pyroxene, and chlorite after plagioclase with very minor serpentine after olivine. Pieces 3 and 10 contain veins of zeolite.

VEIN ALTERATION: Zeolite

STRUCTURE: Medium-grained isotropic gabbro with slight cataclasis.

Core Photo



305-U1309D-258R-1 (Section top: 1239.90 mbsf)

UNIT-674: Gabbro
Pieces: 1-6

PRIMARY MINERALOGY: Mode from Piece 6

Plagioclase	Modal 45% Size 1 mm average Shape anhedral
Clinopyroxene	Modal 55% Size 3 mm average Shape anhedral

COMMENTS: Unit 674 is medium-grained gabbro.

UNIT-675: Gabbro
Pieces: 7-20

PRIMARY MINERALOGY: Mode from Piece 7a-b

Plagioclase	Modal 50% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 49% Size 5 mm average Shape anhedral
Oxide	Modal <1% Size 5 mm average Shape anhedral

UNIT-675: Oxide Gabbro
Pieces: 21-25

PRIMARY MINERALOGY: Mode from Piece 23

Plagioclase	Modal 5% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 70% Size 5 mm average Shape anhedral
Oxide	Modal 25% Size 5 mm average Shape anhedral

COMMENTS: Unit 675 is coarse-grained gabbro and oxide gabbro. Trace of oxide (<10 mm) and sulfide from 33-118 cm. Oxide concentration zone 118-142 cm. Oxide (<30 mm) and sulfide. Leucocratic veins. Over the next sections the unit changes because of presence of rubble or grain size (e.g., microgabbro Unit 679), oxide-bearing gabbro intervals appear and disappear to Unit 680 at least.

SECONDARY MINERALOGY: Chlorite, pale amphibole, sulfide

COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase. Veins in Pieces 12 and 14 have alteration halos of 5 mm width.

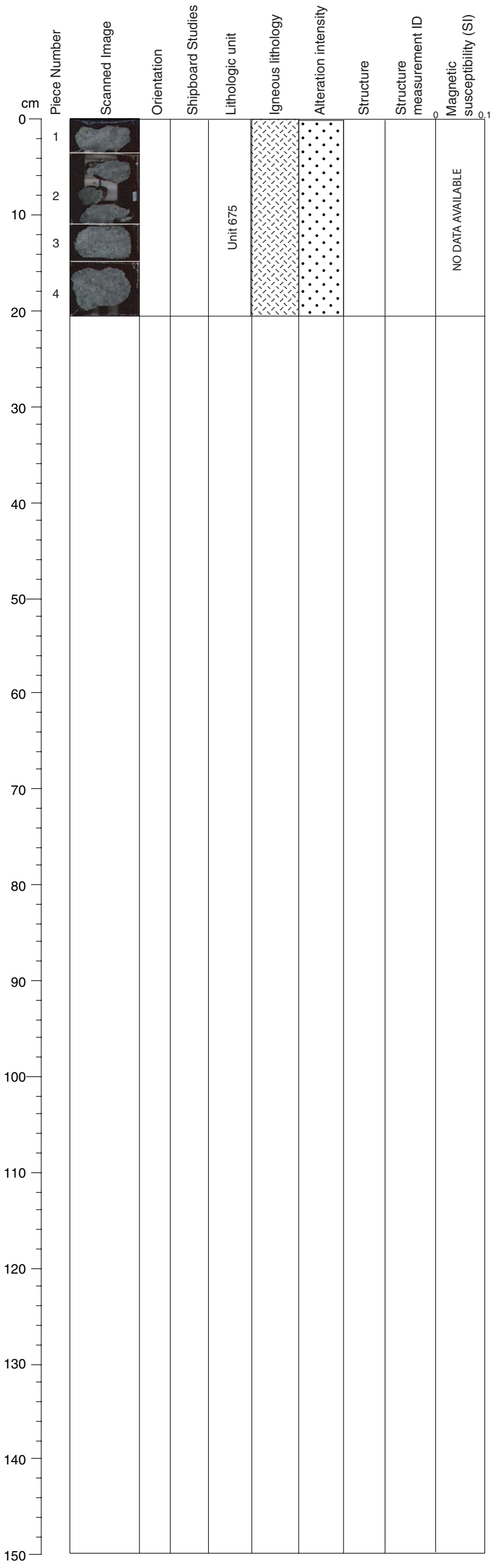
VEIN ALTERATION: Amphibole, plagioclase, chlorite, zeolite.

THIN SECTIONS:
305-U1309D-258R-1, 40-42 cm (#620)

STRUCTURE: Medium- to coarse-grained, locally oxide-rich isotropic gabbro. Dark green veins and subhorizontal open fractures.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-258R-1, 118-141 cm WET

Core Photo



305-U1309D-258R-2 (Section top: 1241.32 mbsf)

UNIT-675: Gabbro
Pieces: 1-4

PRIMARY MINERALOGY: Mode from Piece 4

Plagioclase	Modal 45% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 54% Size 5 mm average Shape anhedral
Oxide	Modal 1% Size 5 mm average Shape anhedral

COMMENTS: Unit 675 is medium- to coarse-grained gabbro. Oxide (<3 mm) 1% and trace of sulfide.

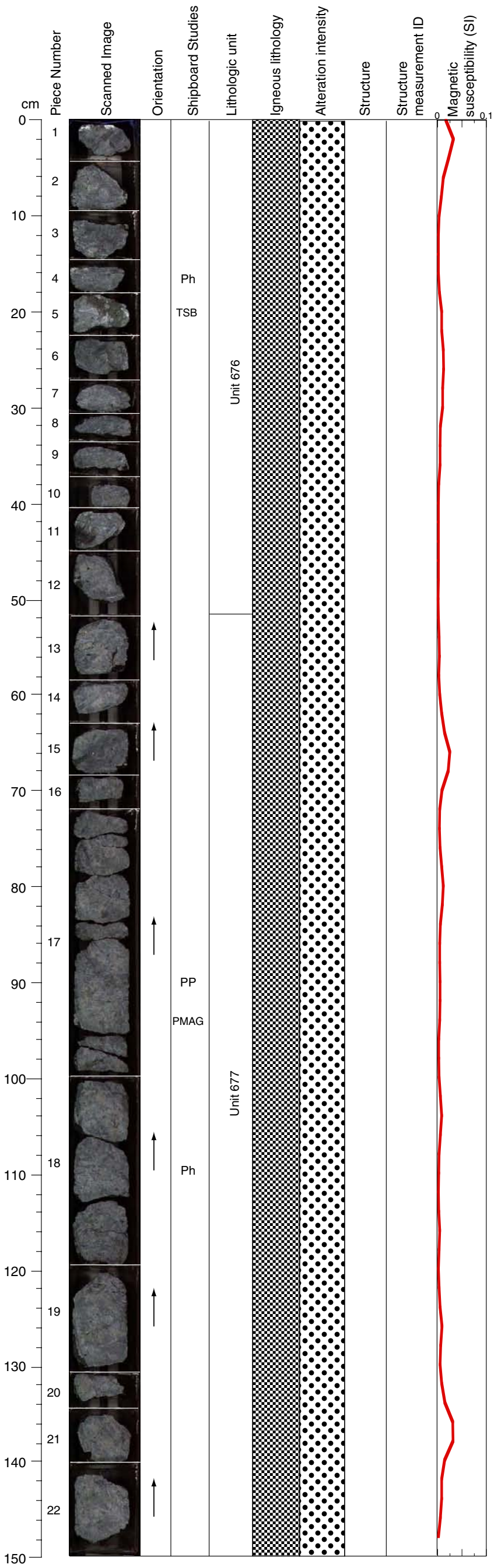
SECONDARY MINERALOGY: Chlorite, pale amphibole, sulfide

COMMENTS: General alteration includes green amphibole after pyroxene and chlorite after plagioclase. There is very minor serpentine after olivine.

VEIN ALTERATION: n/a

STRUCTURE: Medium- to coarse-grained isotropic gabbro.

Core Photo



305-U1309D-259R-1 (Section top: 1244.70 mbsf)

UNIT-676: Oxide Gabbro Rubble
Pieces: 1-12

COMMENTS: Unit 676 is medium- to coarse-grained oxide gabbro rubble. Mode not determinable. Leucocratic veins.

UNIT-677: Oxide Gabbro
Pieces: 13-22

PRIMARY MINERALOGY: Mode from Piece 17

Plagioclase	Modal 44% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 55% Size 5 mm average Shape anhedral
Oxide	Modal 1% Size 5 mm average Shape anhedral

COMMENTS: Unit 677 is medium- to coarse-grained oxide gabbro. Trace of sulfide.

SECONDARY MINERALOGY: Chlorite, pale amphibole, sulfide

COMMENTS: Alteration includes chlorite after plagioclase, green amphibole after pyroxene and very minor sperpentine after olivine. Veins in Pieces 9 and 11 are braided or networks of dark green amphibole.

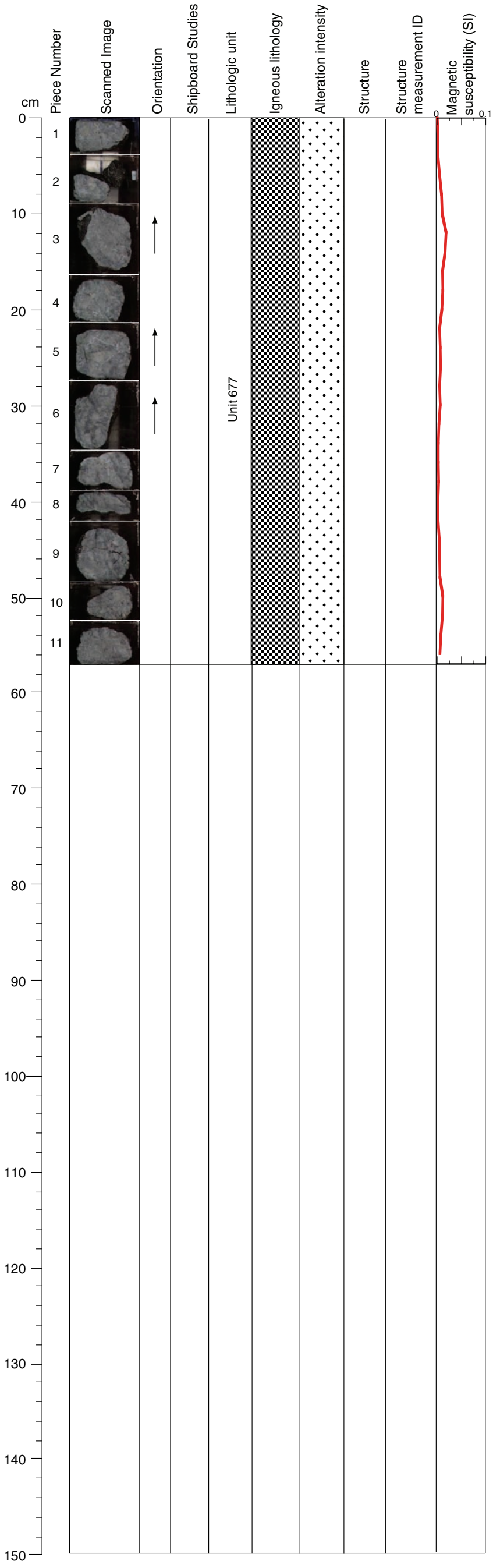
VEIN ALTERATION: Amphibole, chlorite, zeolite.

THIN SECTIONS:
305-U1309D-259R-1, 19-21 cm (#621)

STRUCTURE: Medium- to coarse-grained isotropic gabbro, locally oxide- and sphene-bearing. A few dark green veins and later slight cataclasis.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-259R-1, 0-27 cm WET
305-U1309D-259R-1, 100-119 cm WET

Core Photo



305-U1309D-259R-2 (Section top: 1246.20 mbsf)

UNIT-677: Oxide Gabbro
Pieces: 1-11

PRIMARY MINERALOGY: Mode from Piece 5

Plagioclase	Modal 55% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 45% Size 4 mm average Shape anhedral
Oxide	Modal <1% Size 3 mm average Shape anhedral

COMMENTS: Unit 677 medium- to coarse-grained oxide gabbro. Trace of sulfide.

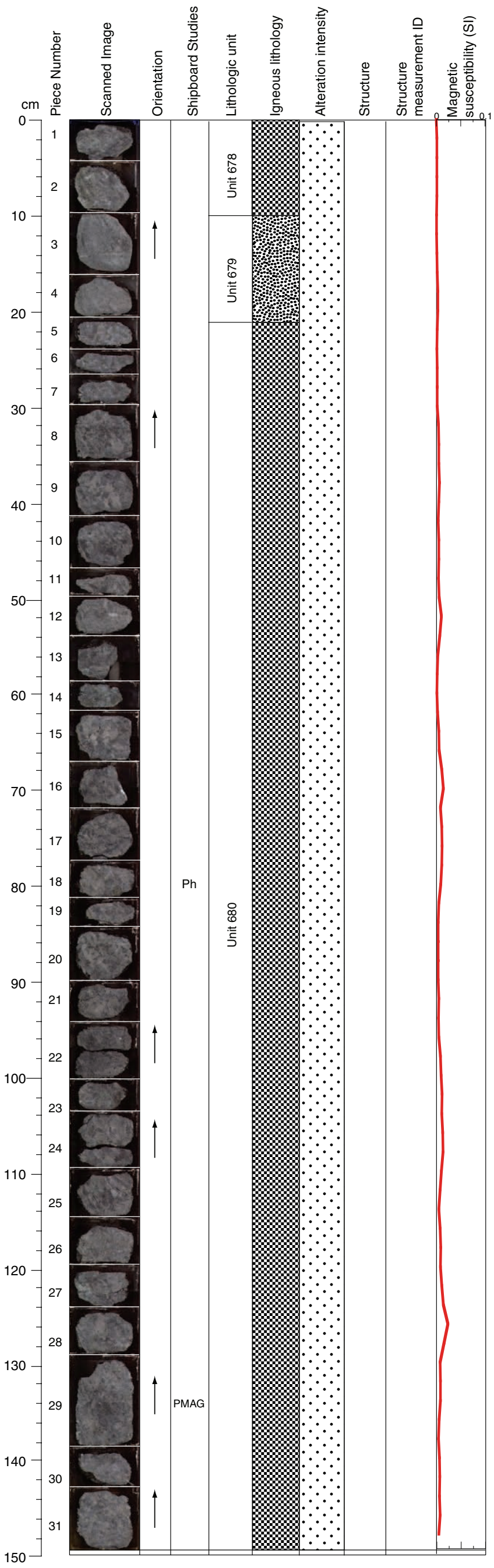
SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: Alteration of pyroxene to green amphibole and plagioclase to chlorite.

VEIN ALTERATION: n/a

STRUCTURE: Medium- to coarse-grained isotropic gabbro, locally oxide- and sphene-bearing. A few dark green veins and later slight cataclasis.

Core Photo



305-U1309D-260R-1 (Section top: 1249.50 mbsf)

UNIT-678: Oxide Gabbro Rubble
Pieces: 1-2

COMMENTS: Unit 678 is medium- to coarse-grained oxide gabbro rubble.

UNIT-679: Microgabbro
Pieces: 3-4

PRIMARY MINERALOGY: Mode from Piece 4

Plagioclase	Modal 50% Size <1 mm average Shape anhedral
Clinopyroxene	Modal 50% Size <1 mm average Shape anhedral

COMMENTS: Unit 679 is microgabbro.

UNIT-680: Oxide Gabbro
Pieces: 5-31

PRIMARY MINERALOGY: Mode from Pieces 24-27

Plagioclase	Modal 50% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 49% Size 5 mm average Shape anhedral
Oxide	Modal 1% Size 3 mm average Shape anhedral

COMMENTS: Unit 680 is coarse-grained oxide gabbro. Visible oxide in Pieces 6, 10, 13, 15-18, 20-22, 24, 27 and 28.

SECONDARY MINERALOGY: Chlorite, pale amphibole, sulfide

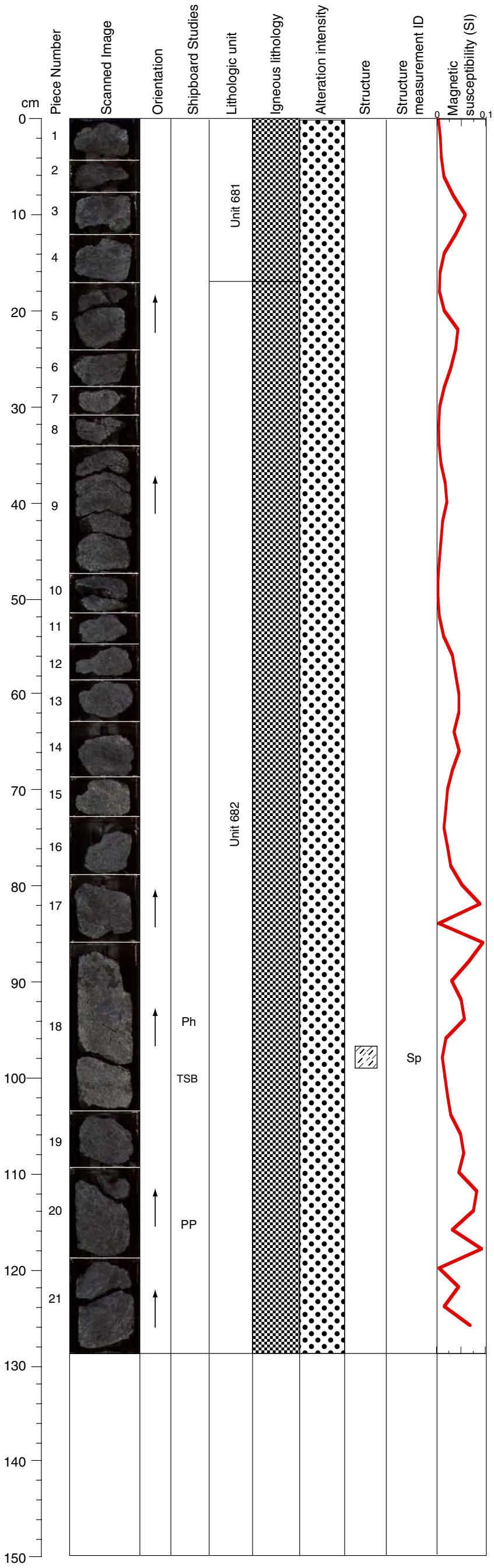
COMMENTS: Alteration of pyroxene to green amphibole and plagioclase to chlorite. Dark green amphibole vein networks occur in Pieces 2, 5, 6, and 7 in brecciated rock. Piece 3 contains a white vein (zeolites?) with an alteration halo 4 mm wide.

VEIN ALTERATION: Amphibole, chlorite, zeolite.

STRUCTURE: Medium to coarse, commonly oxide-bearing gabbro.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-260R-1, 70-92 cm WET

Core Photo



305-U1309D-261R-1 (Section top: 1254.30 mbsf)

UNIT-681: Oxide Gabbro Rubble
Pieces: 1-4

PRIMARY MINERALOGY: Mode from Piece 3

Plagioclase	Modal 55% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 35% Size 5 mm average Shape anhedral
Oxide	Modal 10% Size 3 mm average Shape anhedral

COMMENTS: Unit 681 medium- to coarse-grained oxide gabbro rubble.

UNIT-682: Oxide Gabbro
Pieces: 5-21

PRIMARY MINERALOGY: Mode from Piece 20b

Plagioclase	Modal 40% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 40% Size 4 mm average Shape anhedral
Oxide	Modal 20% Size 3 mm average Shape anhedral

COMMENTS: Unit 682 is coarse-grained oxide gabbro. Massive oxide at 80-123 cm.

SECONDARY MINERALOGY: Chlorite, pale amphibole, sulfide

COMMENTS: General alteration includes green amphibole after pyroxene and chlorite after plagioclase. Veins occur in Piece 5 (dark green) and Piece 11 (white)

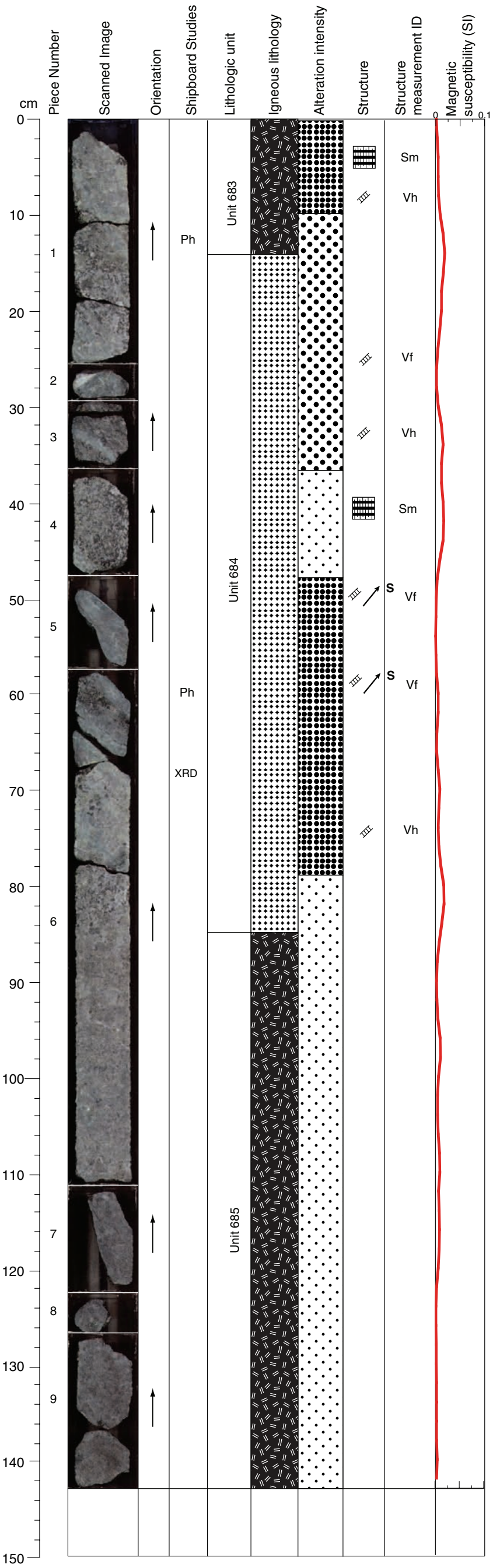
VEIN ALTERATION: Amphibole, chlorite, zeolite.

THIN SECTIONS:
305-U1309D-261R-1, 99-101 cm (#622)

STRUCTURE: Oxide gabbro with an interval of plastic strain (Sp) in middle of section in fine-grained gabbro, moderate dip. No magmatic fabric.

CLOSE-UP PHOTGRAPHS:
305-U1309D-261R-1, 73-103 cm WET
305-U1309D-261R-1, 73-103 cm DRY

Core Photo



305-U1309D-261R-2 (Section top: 1255.59 mbsf)

UNIT-683: Olivine-bearing Gabbro
Pieces: 1-2

PRIMARY MINERALOGY: Mode from Piece 2a

Olivine	Modal 3% Size 2 mm average Shape anhedral
Plagioclase	Modal 52% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 45% Size 4 mm average Shape anhedral

COMMENTS: Unit 683 is medium-grained olivine-bearing gabbro.

UNIT-684: Olivine Gabbro
Pieces: 2-6b

PRIMARY MINERALOGY: Mode from Piece 4

Olivine	Modal 40% Size 2 mm average Shape anhedral
Plagioclase	Modal 40% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 20% Size 2 mm average Shape anhedral

COMMENTS: Unit 684 is medium-grained olivine gabbro. Possibly severely altered, vein-material at 47-58 cm.

UNIT-685: Olivine-bearing Gabbro
Pieces: 6b-9

PRIMARY MINERALOGY: Mode from Piece 6b

Olivine	Modal 2% Size 1 mm average Shape anhedral
Plagioclase	Modal 45% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 53% Size 3 mm average Shape anhedral

COMMENTS: Unit 685 is medium-grained olivine-bearing gabbro. Decreasing olivine abundance to bottom.

SECONDARY MINERALOGY: Chlorite, pale amphibole

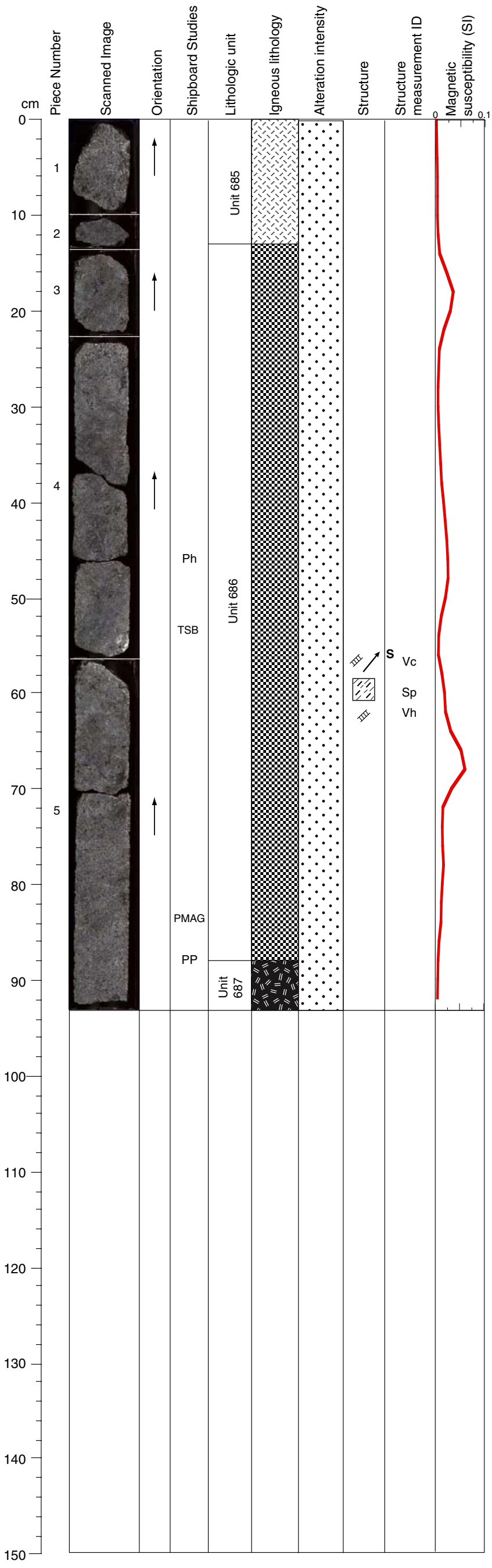
COMMENTS: From Piece 1 to 6 (1-80 cm), coarse-grained gabbro with serpentinized olivine and pyroxene altered to green amphibole. From 24 to 30 cm, white and green vein (amphibole, carbonate, zeolite?) with corona texture observed close to this vein. On the edge of Piece 5, pale green vein with corona alteration. From 80 cm toward the end of the section, medium-grained gabbro with alteration of the pyroxene to green amphibole related to thin amphibole veins.

VEIN ALTERATION: Serpentine, amphibole, chlorite, talc

STRUCTURE: Gabbro to olivine gabbro, local magmatic fabric developed. Set of pale green fault veins moderately dipping and with slicken fibers.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-261R-2, 0-25 cm WET
305-U1309D-261R-2, 58-79 cm WET

Core Photo



305-U1309D-261R-3 (Section top: 1257.02 mbsf)

UNIT-685: Gabbro
Pieces: 1-2

PRIMARY MINERALOGY: Mode from Piece 1a

Plagioclase	Modal 50% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 50% Size 3 mm average Shape anhedral

COMMENTS: Unit 685 is medium-grained gabbro.

UNIT-686: Oxide Gabbro
Pieces: 3-5b

PRIMARY MINERALOGY: Mode from Piece 5a

Oxide	Modal 2% Size 3 mm average Shape anhedral
Plagioclase	Modal 45% Size 4 mm average Shape anhedral
Clinopyroxene	Modal 53% Size 4 mm average Shape anhedral

COMMENTS: Unit 686 is medium- to coarse-grained oxide gabbro. Coarse-grained clinopyroxene concentration at 10-14 cm and 62-67 cm.

UNIT-687: Olivine-bearing Gabbro
Pieces: 5b

PRIMARY MINERALOGY: Mode from Piece 5b

Olivine	Modal 1% Size 1 mm average Shape anhedral
Plagioclase	Modal 45% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 55% Size 3 mm average Shape anhedral

COMMENTS: Unit 687 is medium-grained olivine-bearing gabbro.

SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: The background alteration of the section includes green amphibole after pyroxene, chlorite after plagioclase, and some serpentine after olivine. There are patches of leucocratic alteration at the bottom of Piece 4c and the top of Piece 5a. Several green veins cut the section in Pieces 3, 4, and 5a

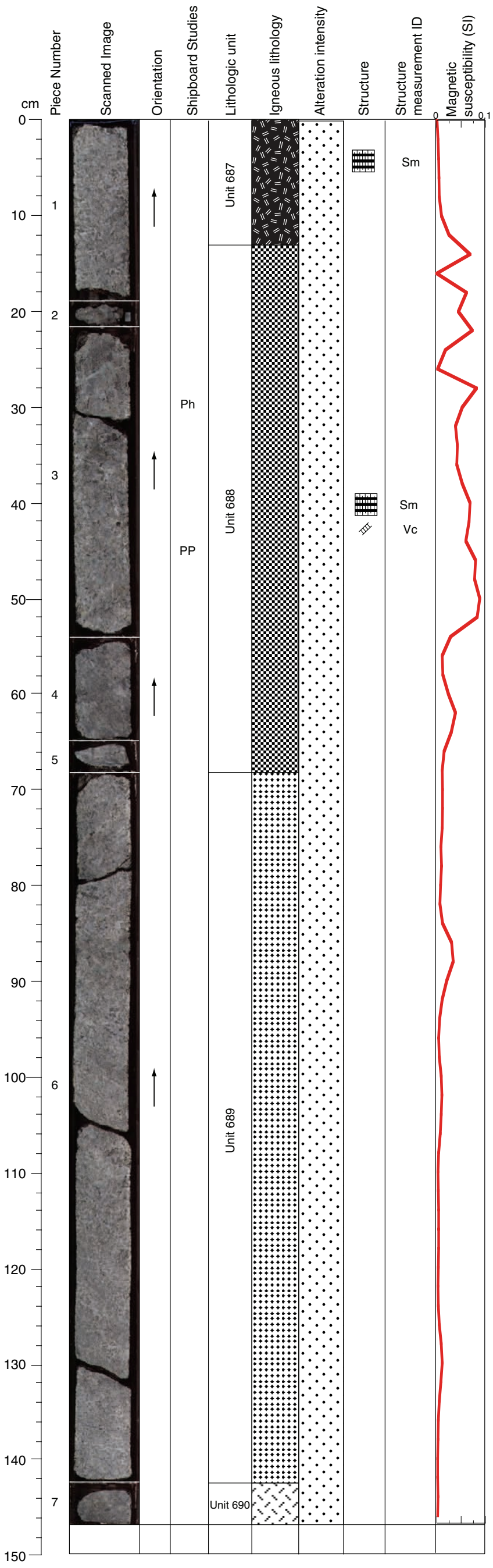
VEIN ALTERATION: Amphibole, chlorite, slip fiber.

THIN SECTIONS:
305-U1309D-261R-3, 52-55 cm (#623)

STRUCTURE: Gabbro, rarely oxide bearing, with thin plastic strain, steep shear zone, no magmatic fabric. A few dark green veins.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-261R-3, 40-56 cm WET
305-U1309D-261R-3, 40-56 cm DRY

Core Photo



305-U1309D-262R-1 (Section top: 1259.10 mbsf)

UNIT-687: Olivine-bearing Gabbro
Piece 1

PRIMARY MINERALOGY: Mode from Piece 1

Olivine	Modal 5% Size 2 mm average Shape anhedral
Plagioclase	Modal 60% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 35% Size 4 mm average Shape anhedral

COMMENTS: Unit 687 is medium-grained olivine-bearing gabbro.

UNIT-688: Oxide Gabbro
Pieces: 1-5a

PRIMARY MINERALOGY: Mode from Piece 3b

Oxide	Modal 2% Size 4 mm average Shape anhedral
Plagioclase	Modal 58% Size 4 mm average Shape anhedral
Clinopyroxene	Modal 40% Size 6 mm average Shape anhedral

COMMENTS: Unit 688 is coarse-grained oxide gabbro.

UNIT-689: Olivine Gabbro
Pieces: 4-7

PRIMARY MINERALOGY: Mode from Piece 6a

Olivine	Modal 12% Size 4 mm average Shape anhedral
Plagioclase	Modal 53% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 45% Size 6 mm average Shape anhedral

COMMENTS: Unit 689 is fine- to medium-grained olivine gabbro.

UNIT-690: Gabbro
Pieces: 7

PRIMARY MINERALOGY: Mode from Piece 7

Plagioclase	Modal 55% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 45% Size 6 mm average Shape anhedral

COMMENTS: Unit 690 is medium-grained gabbro.

SECONDARY MINERALOGY: Chlorite, pale amphibole, sulfide

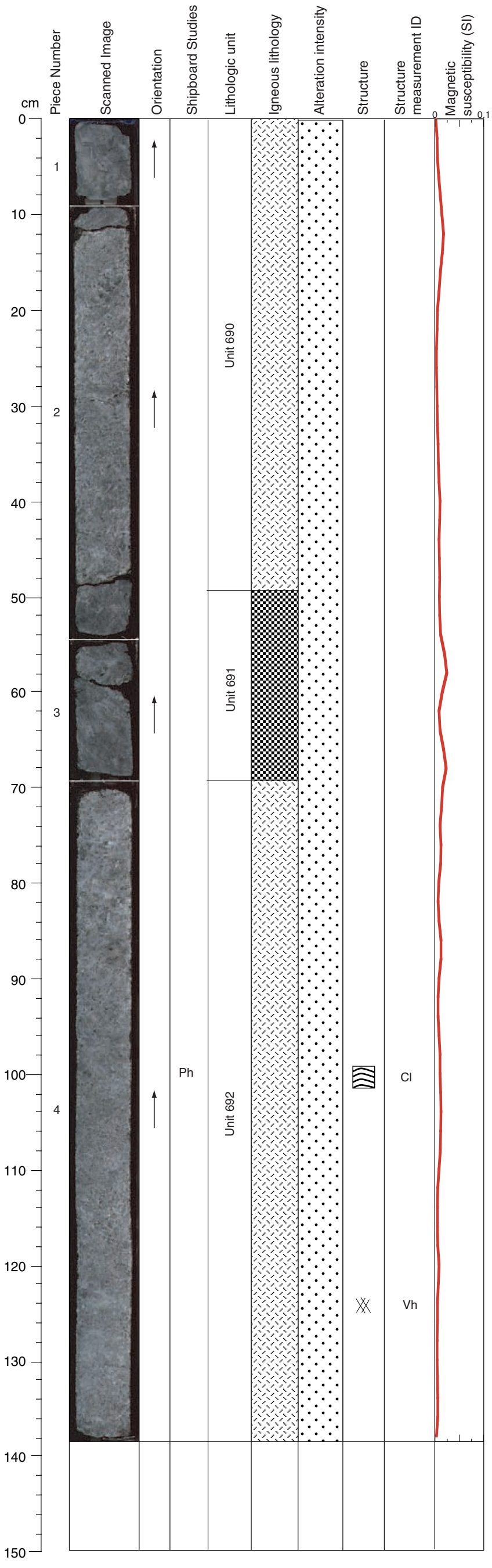
COMMENTS: Coarse-grained gabbro with alteration of the pyroxene to green amphibole. Piece 2 is a pegmatitic gabbro with the same alteration of pyroxene as Piece 1 and a high amount of sulfides. White veins cut Pieces 3a and 3b and Piece 5.

VEIN ALTERATION: Zeollite

STRUCTURE: Medium-grained gabbro with weak magmatic fabric. Interleaved is an interval of coarse grained oxide gabbro without magmatic fabric. No plastic strain. An irregular steep crack, and irregular, short white cracks gently dipping.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-262R-1, 22-47 cm WET

Core Photo



305-U1309D-262R-2 (Section top: 1260.57 mbsf)

UNIT-690: Gabbro
Pieces: 1-2b

PRIMARY MINERALOGY: Mode from Piece 1

Plagioclase	Modal 55% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 45% Size 6 mm average Shape anhedral

COMMENTS: Unit 690 is medium- to coarse-grained gabbro.

UNIT-691: Oxide Gabbro
Pieces: 2c-3

PRIMARY MINERALOGY: Mode from Piece 2b

Oxide	Modal 1% Size 4 mm average Shape anhedral
Plagioclase	Modal 54% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 45% Size 10 mm average Shape anhedral

COMMENTS: Unit 691 is coarse-grained oxide gabbro.

UNIT-692: Gabbro
Pieces: 4

PRIMARY MINERALOGY: Mode from Piece 4

Plagioclase	Modal 55% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 45% Size 6 mm average Shape anhedral

COMMENTS: Unit 692 is fine- to coarse-grained gabbro.

SECONDARY MINERALOGY: Chlorite, pale amphibole, sulfide

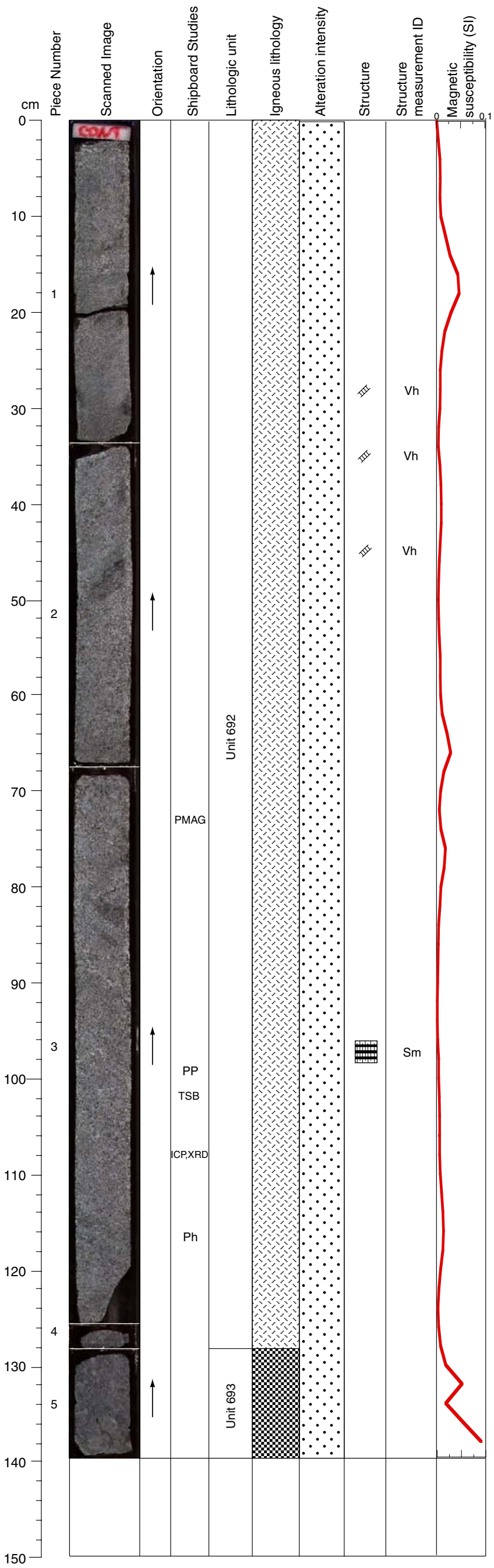
COMMENTS: Coarse-grained gabbro with pyroxene altered to green amphibole and variations of the grain size (finer-part at 104-112 cm, and coarser part in Pieces 1 and 3). At 125 and 130 cm, thin green amphibole veins. High amount of sulfides in the pegmatitic part.

VEIN ALTERATION: Amphibole, chlorite.

STRUCTURE: Medium- to coarse-grained gabbro, cm-scale variation, discontinous intervals of mm-wide plastic strain shear zones developed, weak magmatic strain likely subparallel to the crude compositional layering. Set of dark green veins shallowly dipping.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-262R-2, 90-110 cm WET
305-U1309D-262R-2, 90-110 cm DRY

Core Photo



305-U1309D-262R-3 (Section top: 1261.95 mbsf)

UNIT-692: Gabbro
Pieces: 1-4

PRIMARY MINERALOGY: Mode from several pieces

Plagioclase	Modal 50-60% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 40-50% Size 6 mm average Shape anhedral

COMMENTS: Unit 692 is fine- to coarse-grained gabbro.

UNIT-693: Oxide Gabbro
Pieces: 5

PRIMARY MINERALOGY: Mode from Piece 5

Oxide	Modal 5% Size 4 mm average Shape anhedral
Plagioclase	Modal 50% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 45% Size 10 mm average Shape anhedral

COMMENTS: Unit 693 is coarse-grained oxide gabbro.

SECONDARY MINERALOGY: Chlorite, pale amphibole, sulfide

COMMENTS: Continuation of previous section. Medium (from 1 to 15 cm) to fine-grained gabbro. At 45 cm, thin green amphibole veins with thin (1 cm wide) alteration halo around it. The pyroxene are slightly altered to green amphibole. At 118 cm, dark green amphibole vein. Piece 5 is a pegmatitic gabbro with a significant amount of sulfides.

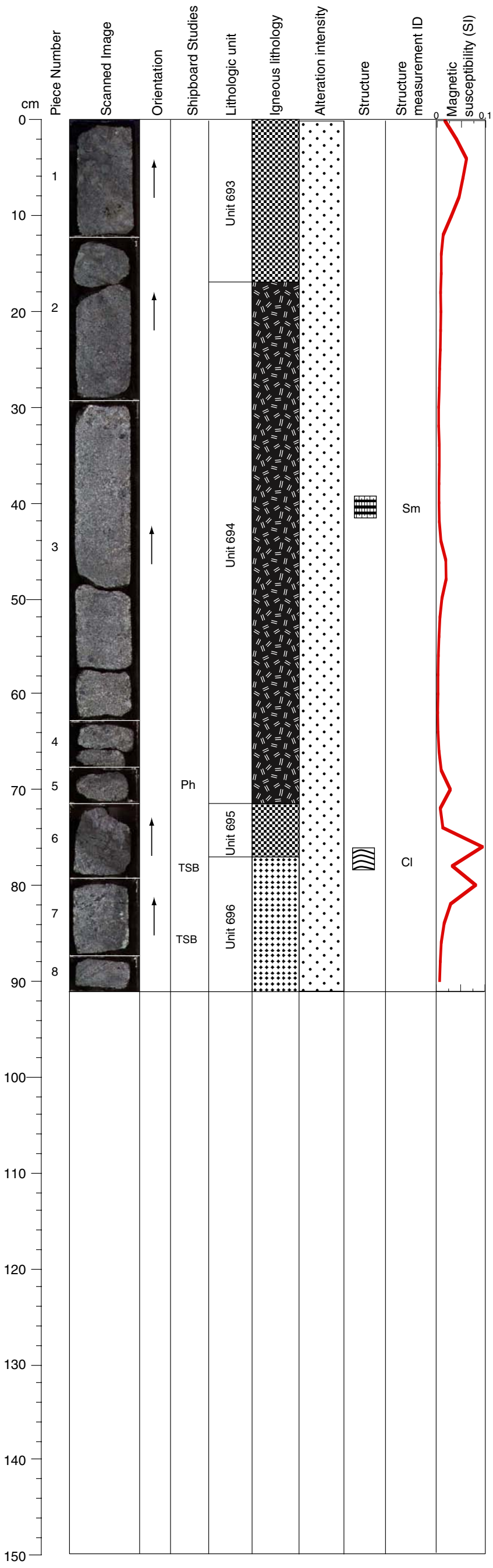
VEIN ALTERATION: Amphibole, chlorite, slip fiber.

THIN SECTIONS:
305-U1309D-262R-3, 101-104 cm (#624)

STRUCTURE: Fine- to coarse-grained oxide-free gabbro with weak magmatic foliation. At base of section coarse grained oxide-gabbro displaying no magmatic or plastic strain. A few dark green veins.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-262R-3, 95-115 cm WET
305-U1309D-262R-3, 105-125 cm WET

Core Photo



305-U1309D-262R-4 (Section top: 1263.34 mbsf)

UNIT-693: Oxide Gabbro
Pieces: 1-2a

PRIMARY MINERALOGY: Mode from Piece 1

Oxide	Modal 5% Size 4 mm average Shape anhedral
Plagioclase	Modal 50% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 45% Size 10 mm average Shape anhedral

COMMENTS: Unit 693 is coarse-grained oxide gabbro.

UNIT-694: Olivine-bearing Gabbro
Pieces: 2b-5

PRIMARY MINERALOGY: Mode from Piece 3a

Olivine	Modal 4% Size 2 mm average Shape anhedral
Plagioclase	Modal 50% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 46% Size 3 mm average Shape anhedral

COMMENTS: Unit 694 is medium-grained olivine-bearing gabbro.

UNIT-695: Oxide Gabbro
Pieces: 6

PRIMARY MINERALOGY: Mode from Piece 6

Oxide	Modal 20% Size 10 mm average Shape anhedral
Plagioclase	Modal 40% Size 6 mm average Shape anhedral
Clinopyroxene	Modal 40% Size 10 mm average Shape anhedral

COMMENTS: Unit 695 is pegmatitic oxide gabbro.

UNIT-696: Olivine Gabbro
Pieces: 7-8

PRIMARY MINERALOGY: Mode from Piece 7

Olivine	Modal 10% Size 2 mm average Shape anhedral
Plagioclase	Modal 50% Size 4 mm average Shape anhedral
Clinopyroxene	Modal 40% Size 5 mm average Shape anhedral

COMMENTS: Unit 696is medium-grained olivine gabbro.

SECONDARY MINERALOGY: Chlorite, pale amphibole, sulfide

COMMENTS: Piece 1 is a pegmatitic gabbro with pyroxene altered to green amphibole. From Piece 2 to 8, fine-grained gabbro with the same degree of alteration. At 72-76 cm, oxide concentration associated with a significant amount of sulfides.

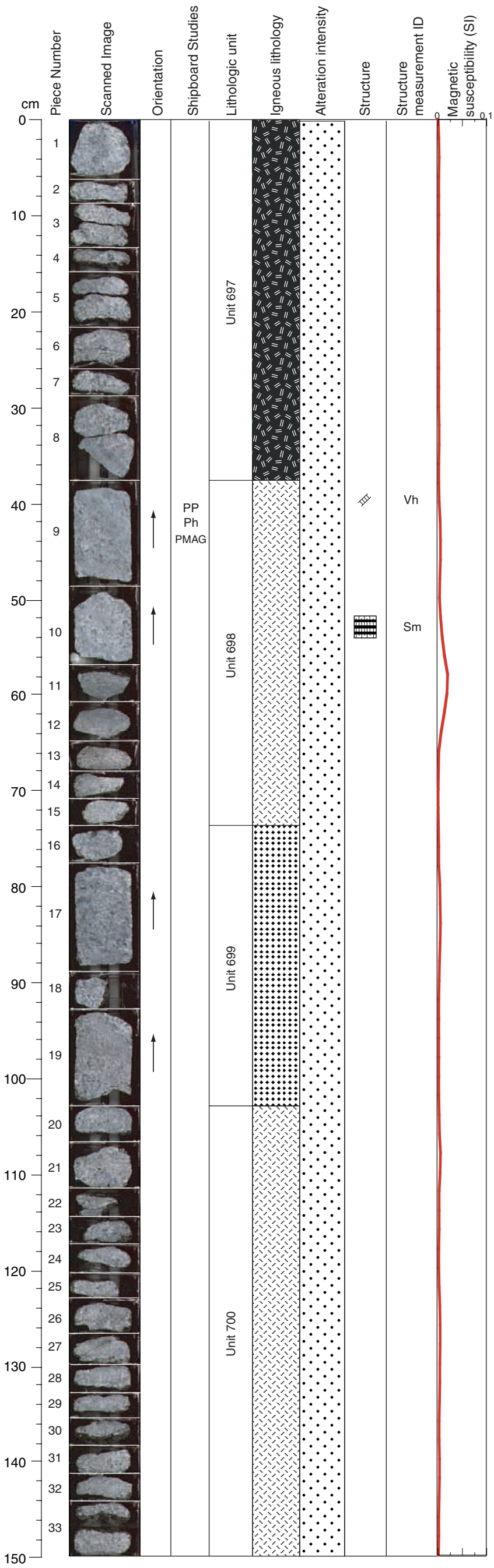
VEIN ALTERATION: Amphibole, chlorite.

THIN SECTIONS:
305-U1309D-262R-4, 76-79 cm (#625)
305-U1309D-262R-4, 84-87 c (#626)

STRUCTURE: Coarse grained oxide gabbro, also a distinct band with sulfide, in medium-grained, weakly magmatically foliated gabbro. Some open cracks and slight cataclasis.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-262R-4, 68-87 cm WET

Core Photo



305-U1309D-263R-1 (Section top: 1263.90 mbsf)

UNIT-697: Olivine-bearing Gabbro
Pieces: 1-8

PRIMARY MINERALOGY: Mode from Piece 1

Olivine	Modal 1% Size 1 mm average Shape anhedral
Plagioclase	Modal 54% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 45% Size 3 mm average Shape anhedral

COMMENTS: Unit 697 is medium-grained olivine-bearing gabbro.

UNIT-698: Gabbro
Pieces: 9-15

PRIMARY MINERALOGY: Mode from Piece 10

Plagioclase	Modal 50% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 50% Size 2 mm average Shape anhedral

COMMENTS: Unit 698 is medium-grained gabbro.

UNIT-699: Olivine Gabbro
Pieces: 16-19

PRIMARY MINERALOGY: Mode from Piece 17

Olivine	Modal 15% Size 2 mm average Shape anhedral
Plagioclase	Modal 55% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 30% Size 3 mm average Shape anhedral

COMMENTS: Unit 699 is medium-grained olivine gabbro.

UNIT-700: Gabbro
Pieces: 20-33

PRIMARY MINERALOGY: Mode from Piece 26

Plagioclase	Modal 50% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 50% Size 2 mm average Shape anhedral

COMMENTS: Unit 700 is medium-grained gabbro.

SECONDARY MINERALOGY: Chlorite, pale amphibole

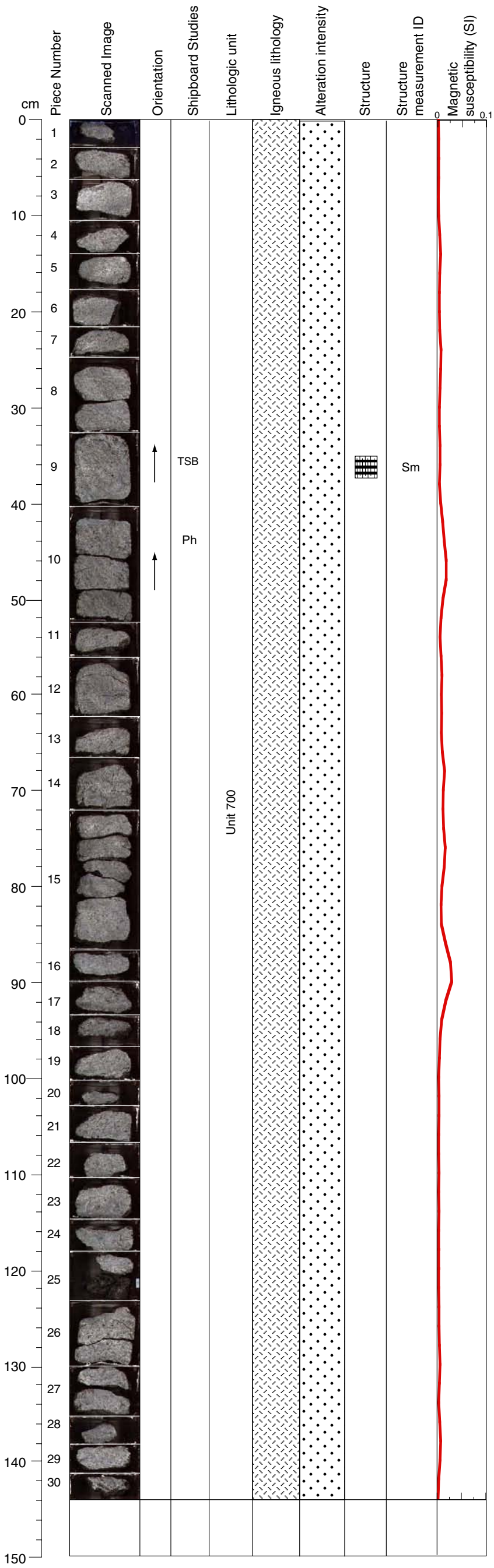
COMMENTS: Coarse-grained gabbro with serpentinized olivine and pyroxene altered to green amphibole. Braided, dark green veins cut Pieces 9 and 10.

VEIN ALTERATION: Amphibole, chlorite.

STRUCTURE: Fine- to medium-grained gabbro with magmatic foliation visible in larger pieces. A few dark green veins, open cracks and slight cataclasis.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-263R-1, 38-56 cm WET

Core Photo



305-U1309D-263R-2 (Section top: 1265.40 mbsf)

UNIT-700: Gabbro
Pieces: 1-30

PRIMARY MINERALOGY: Mode from Piece 9

Plagioclase	Modal 45% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 55% Size 2 mm average Shape anhedral

COMMENTS: Unit 700 is medium-grained gabbro. Oxide-bearing in Piece 7, 12 and 17.

SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: Coarse-grained gabbro with serpentinized olivine and pyroxene altered to green amphibole. A dark green vein with alteration halo 1 cm wide cuts the top of Piece 10a.

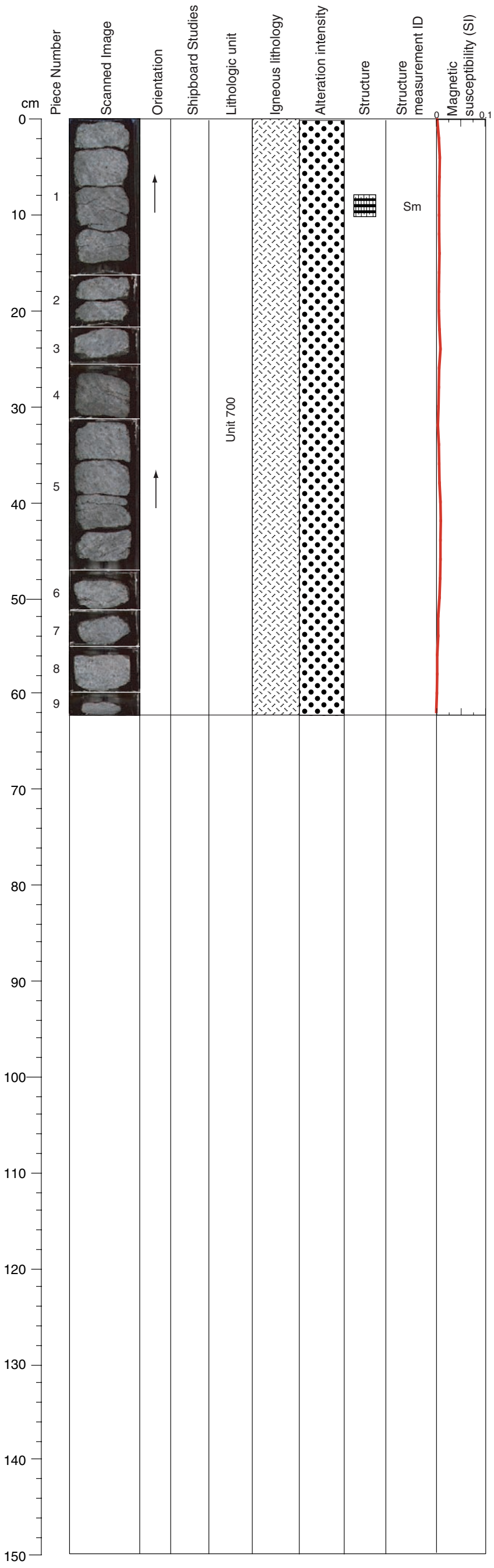
VEIN ALTERATION: Amphibole, chlorite.

THIN SECTIONS:
305-U1309D-263R-2, 34-37 cm (#627)

STRUCTURE: Medium -grained gabbro with magmatic foliation (Sm) developed. Weak plastic strain locally discernible.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-263R-2, 32-51 cm WET

Core Photo



305-U1309D-263R-3 (Section top: 1266.84 mbsf)

UNIT-700: Gabbro
Pieces: 1-9

PRIMARY MINERALOGY: Mode from Piece 5a

Plagioclase	Modal 45% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 55% Size 2 mm average Shape anhedral

COMMENTS: Unit 700 is medium-grained gabbro.

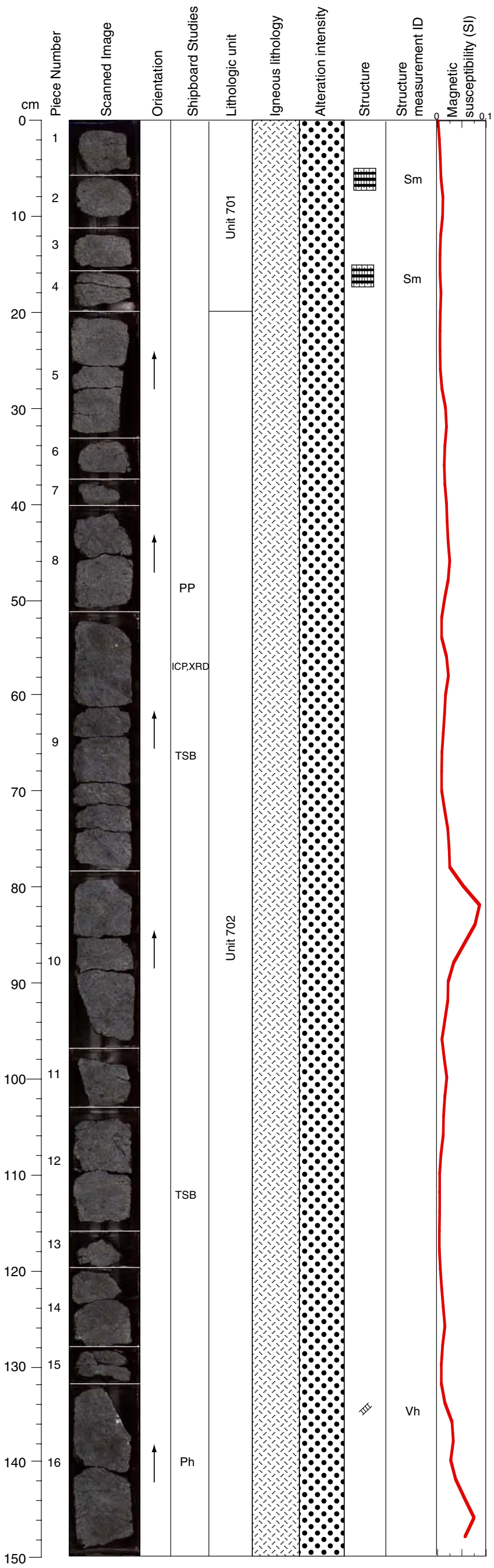
SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: Coarse-grained gabbro with serpentinized olivine and pyroxene altered to green amphibole.

VEIN ALTERATION: n/a

STRUCTURE: Medium-grained gabbro with weak magmatic foliation developed. Possible plastic fabric.

Core Photo



305-U1309D-264R-1 (Section top: 1268.70 mbsf)

UNIT-701: Gabbro Rubble
Pieces: 1-4

PRIMARY MINERALOGY:

COMMENTS: Unit 701 medium-grained gabbro rubble, may be in place. Trace of oxide and sulfide.

UNIT-702: Gabbro
Pieces: 5-16

PRIMARY MINERALOGY: Mode from Piece 5a

Oxide	Modal <1% Size 2 mm average Shape anhedral
Plagioclase	Modal 60% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 40% Size 2 mm average Shape anhedral

COMMENTS: Unit 702 fine- to coarse-grained gabbro with disseminated oxide. Trace of oxide and sulfide. Piece 16: Oxide 3%. Patches and bands of finer grained crystals.

SECONDARY MINERALOGY: Chlorite, pale amphibole, sulfide

COMMENTS: General alteration includes green amphibole after pyroxene and chlorite after plagioclase. There is some leucocratic alteration at the edge of Piece 16 and light green vein material (saponite?).

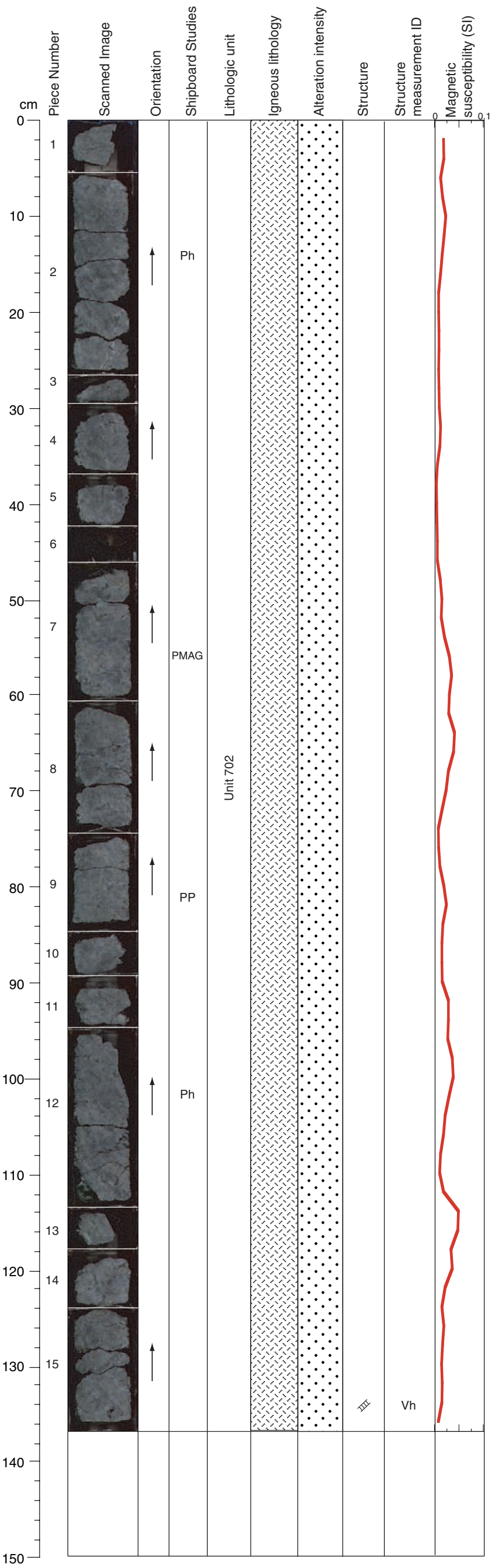
VEIN ALTERATION: Saponite and carbonate.

THIN SECTIONS:
305-U1309D-264R-1, 65-67 cm (#628)
305-U1309D-264R-1, 111-114 cm (#629)

STRUCTURE: Fine- to medium-grained gabbro with magmatic foliation developed, intercalated with oxide gabbro that displays a random mineral arrangement. Possible plastic strain. A single dark green vein.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-264R-1, 51-78 cm WET
305-U1309D-264R-1, 103-115 cm WET
305-U1309D-264R-1, 133-150 cm WET

Core Photo



305-U1309D-264R-2 (Section top: 1270.20 mbsf)

UNIT-702: Gabbro
Pieces: 1-15

PRIMARY MINERALOGY: Mode from Piece 7b

Oxide	Modal 2% Size 2 mm average Shape anhedral
Plagioclase	Modal 55% Size 4 mm average Shape anhedral
Clinopyroxene	Modal 43% Size 5 mm average Shape anhedral

COMMENTS: Unit 702 is medium- to coarse-grained gabbro with disseminated oxide. Oxide-rich patches and zones. Trace of sulfide.

SECONDARY MINERALOGY: Chlorite, pale amphibole, sulfide

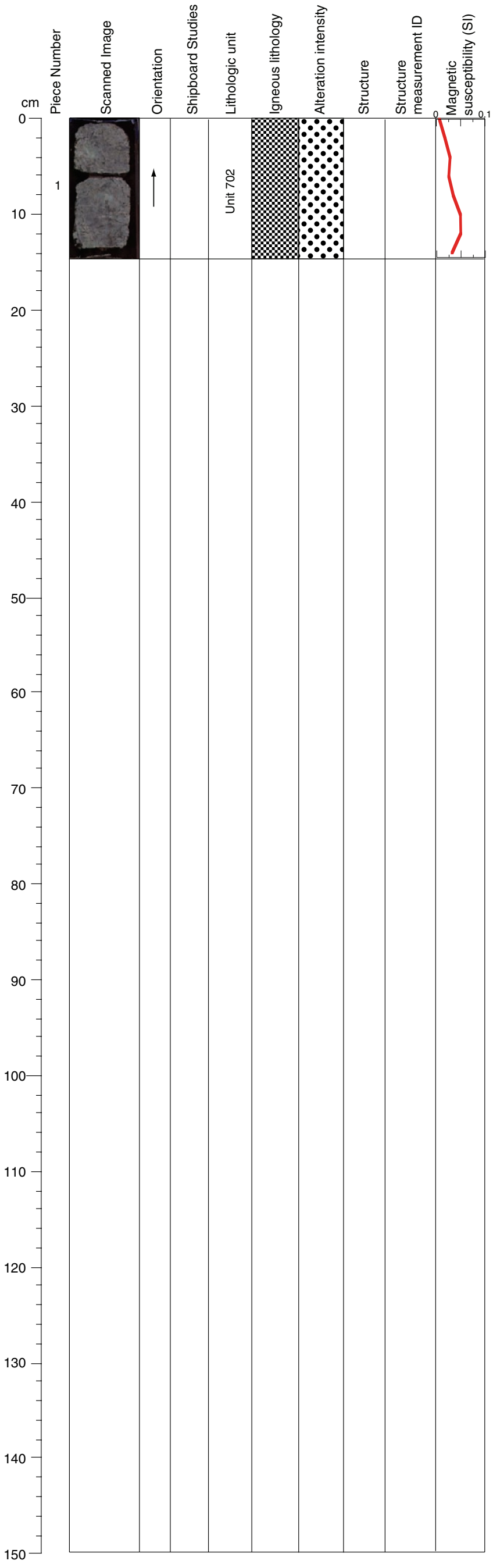
COMMENTS: General alteration includes green amphibole after pyroxene and chlorite after plagioclase. There is a white vein in the bottom of Piece 2.

VEIN ALTERATION: Zeolite.

STRUCTURE: Medium to coarse, isotropic oxide-bearing gabbro. Open cracks.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-264R-2, 6-26 cm WET
305-U1309D-264R-2, 95-113 cm WET

Core Photo



305-U1309D-264R-3 (Section top: 1271.57 mbsf)

UNIT-702: Oxide Gabbro
Pieces: 1

PRIMARY MINERALOGY: Mode from Piece 1

Oxide	Modal 3% Size 5 mm average Shape anhedral
Plagioclase	Modal 50% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 47% Size 6 mm average Shape anhedral

COMMENTS: Unit 702 is coarse-grained oxide gabbro. Trace of sulfide (< 2mm).

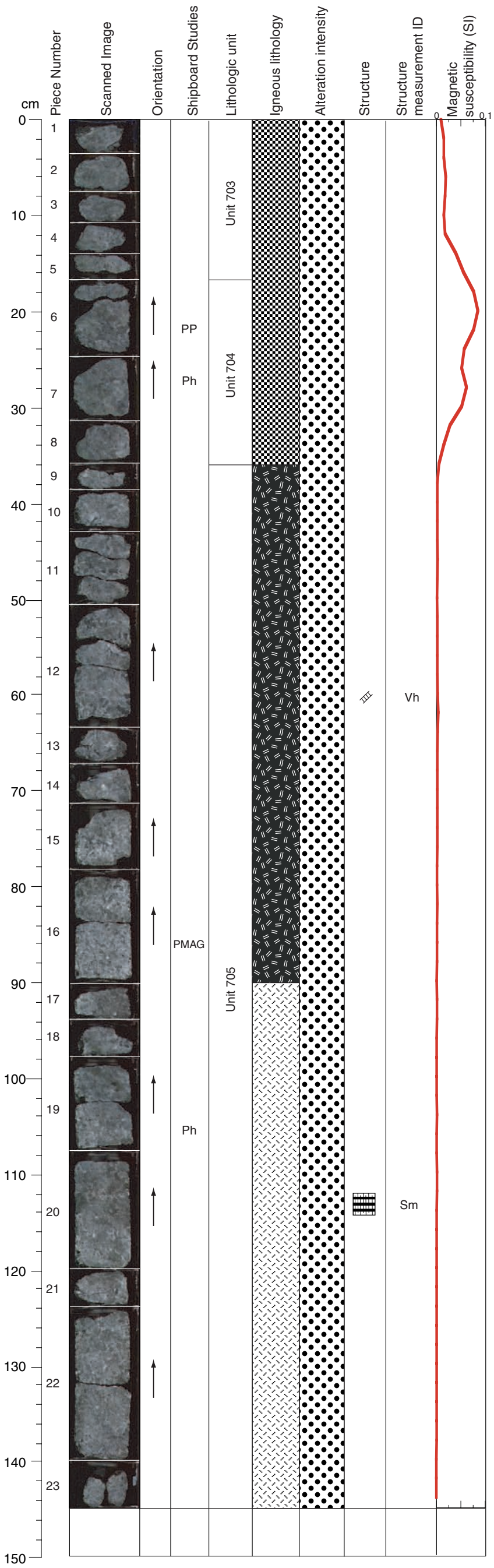
SECONDARY MINERALOGY: Chlorite, pale amphibole, sulfide

COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase and very minor serpentine after olivine.

VEIN ALTERATION: n/a

STRUCTURE: Medium to coarse, isotropic oxide gabbro. Slight cataclasis.

Core Photo



305-U1309D-265R-1 (Section top: 1273.50 mbsf)

UNIT-703, 704: Oxide Gabbro
Pieces: 1-8

PRIMARY MINERALOGY: Mode from Piece 6b

Oxide	Modal 20% Size 5 mm average Shape anhedral
Plagioclase	Modal 35% Size 4 mm average Shape anhedral
Clinopyroxene	Modal 45% Size 4 mm average Shape anhedral

COMMENTS: Units 703 and 704 are medium- to coarse-grained oxide gabbro. Unit 703 is rubble.

UNIT-705: Olivine-bearing Gabbro and Gabbro
Pieces: 9-23

PRIMARY MINERALOGY: Mode from several pieces

Olivine	Modal 0-5% Size 2 mm average Shape anhedral
Plagioclase	Modal 40-50% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 50-60% Size 4 mm average Shape anhedral

COMMENTS: Unit 705 is medium-grained olivine-bearing gabbro to gabbro.

SECONDARY MINERALOGY: Chlorite, pale amphibole, sulfide

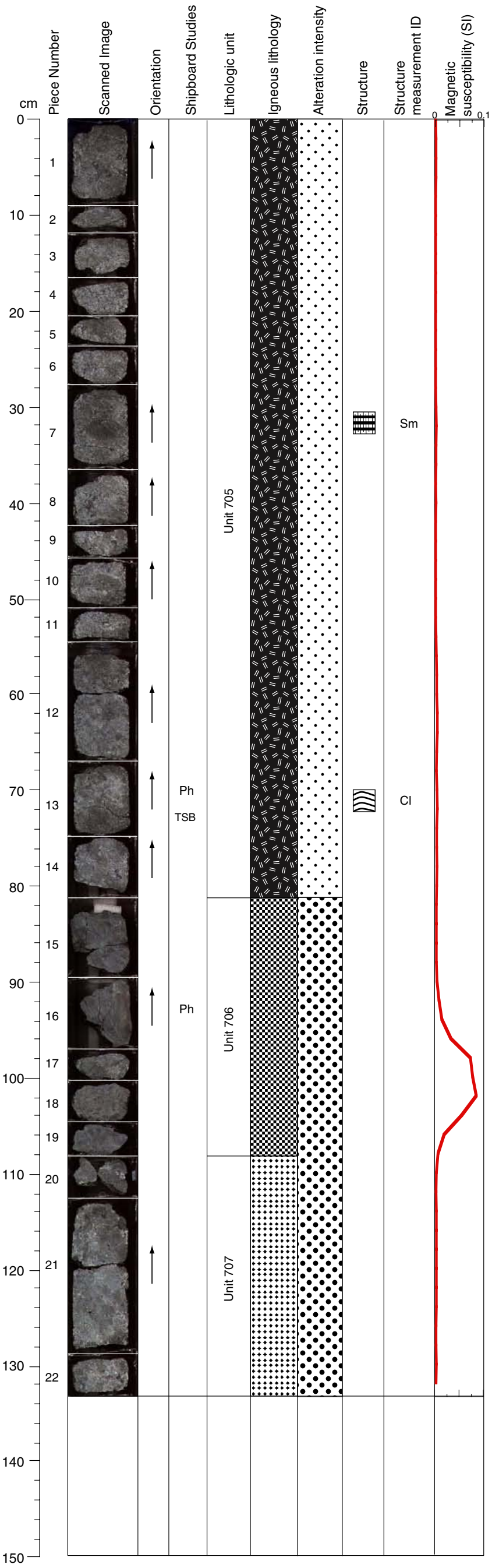
COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase and serpentine after olivine. Dark green veins mostly braided and all with alteration halos (2 -7 mm wide) cut Pieces 12b, 12c, 18 and 19.

VEIN ALTERATION: Amphibole, chlorite.

STRUCTURE: Medium to coarse isotropic oxide gabbro in gradational contact to medium-grained gabbro with weak magmatic foliation. A few dark green veins.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-265R-1, 17-36 cm WET
305-U1309D-265R-1, 94-119 cm WET

Core Photo



305-U1309D-265R-2 (Section top: 1274.95 mbsf)

UNIT-705: Olivine-bearing Gabbro
Pieces: 1-14

PRIMARY MINERALOGY: Mode from Piece 1

Olivine	Modal 3% Size 3 mm average Shape anhedral
Plagioclase	Modal 55% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 42% Size 4 mm average Shape anhedral

COMMENTS: Unit 705 is medium-grained olivine-bearing gabbro.

UNIT-706: Oxide Gabbro
Pieces: 15-19

PRIMARY MINERALOGY: Mode from Piece 19

Oxide	Modal 5% Size 3 mm average Shape anhedral
Clinopyroxene	Modal >90% Size 4 mm average Shape anhedral

COMMENTS: Unit 706 is coarse-grained oxide gabbro. Mainly composed of coarse -pegmatitic clinopyroxene with oxide. Pyroxenite? As much as 2% sulfide.

UNIT-707: Olivine Gabbro
Pieces: 20-22

PRIMARY MINERALOGY: Mode from Piece 21

Olivine	Modal 5% Size 5 mm average Shape anhedral
Plagioclase	Modal 25% Size 4 mm average Shape anhedral
Clinopyroxene	Modal 70% Size 12 mm average Shape anhedral

COMMENTS: Unit 707 medium- to coarse-grained olivine gabbro.

SECONDARY MINERALOGY: Chlorite, pale amphibole, sulfide

COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches and streaks occur in plagioclase.

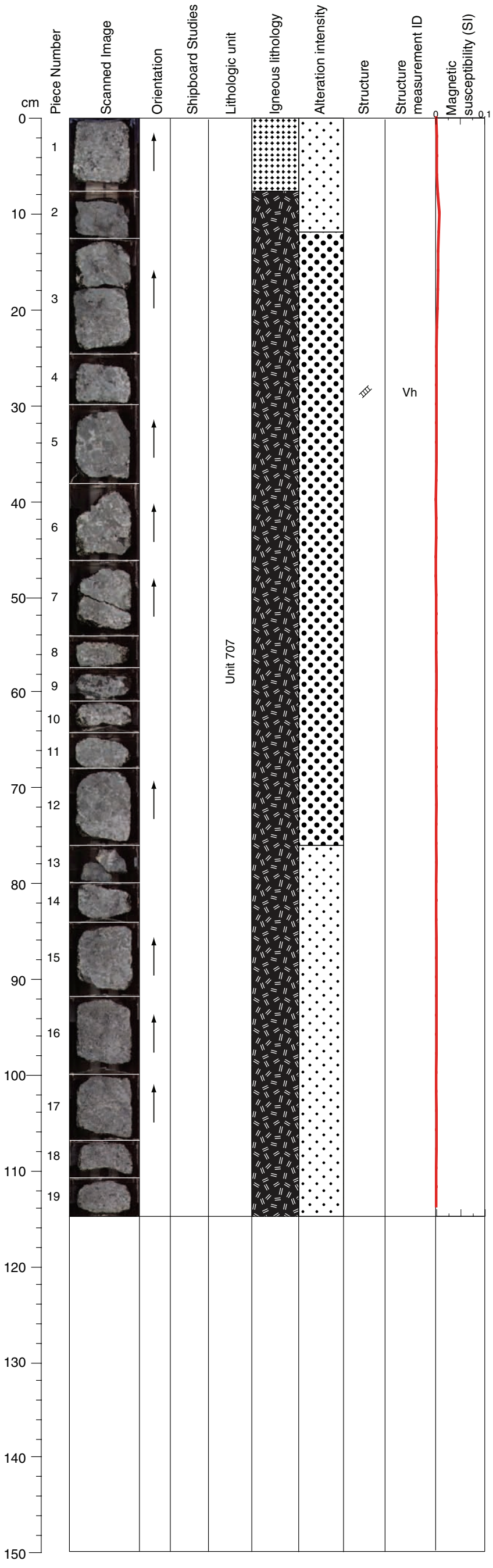
VEIN ALTERATION: n/a

THIN SECTIONS:
305-U1309D-265R-2, 72-74 cm (#630)

STRUCTURE: Oxide gabbro, coarse-grained, isotropic, interleaved with medium-grained gabbro typically displaying a magmatic foliation and local grain size layering. Slight cataclasis.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-265R-2, 55-80 cm WET
305-U1309D-265R-2, 89-104 cm WET

Core Photo



305-U1309D-266R-1 (Section top: 1278.30 mbsf)

UNIT-707: Olivine Gabbro / Olivine-bearing Gabbro
Pieces: 1-19

PRIMARY MINERALOGY: Mode from several pieces

Olivine	Modal 2-10% Size 3 mm average Shape anhedral
Plagioclase	Modal 20-55% Size 4 mm average Shape anhedral
Clinopyroxene	Modal 35-77% Size 2-70 mm Shape anhedral

COMMENTS: Unit 707 is fine- to coarse-grained olivine gabbro to olivine-bearing gabbro.

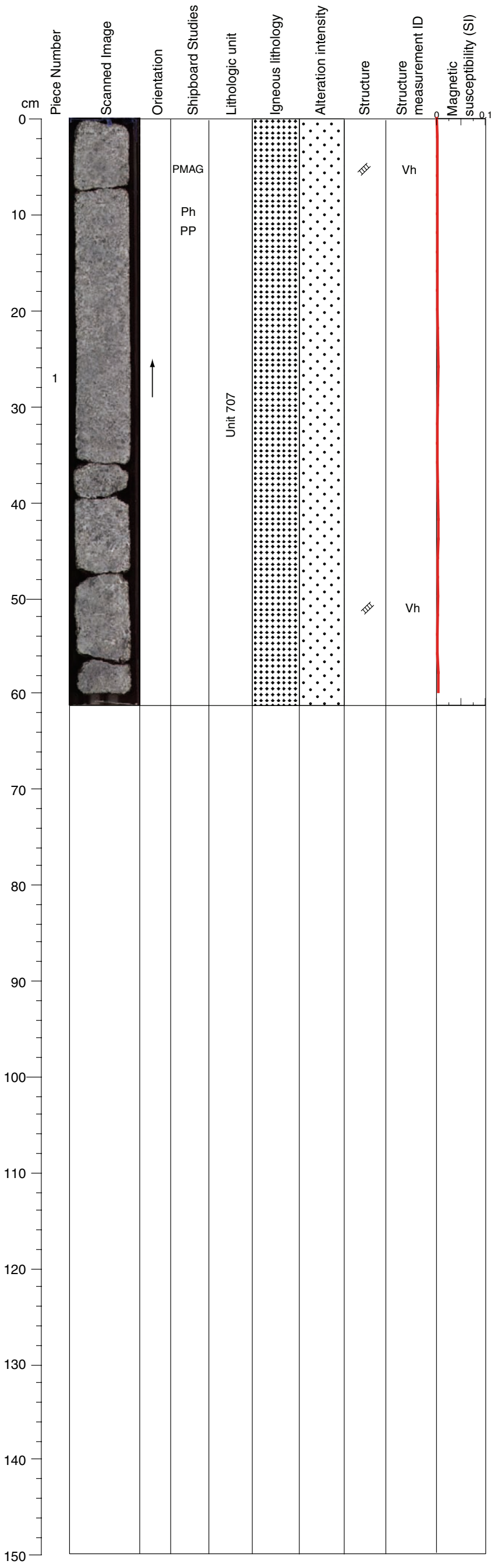
SECONDARY MINERALOGY: Chlorite, pale amphibole, sulfide

COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches and streaks occur in plagioclase.

VEIN ALTERATION: n/a

STRUCTURE: Fine- to medium-grained, isotropic, locally olivine-bearing gabbro. A few dark green veins.

Core Photo



305-U1309D-266R-2 (Section top: 1279.45 mbsf)

UNIT-707: Olivine Gabbro
Pieces: 1

PRIMARY MINERALOGY: Mode from Piece 1b

Olivine	Modal 10% Size 2 mm average Shape anhedral
Plagioclase	Modal 35% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 55% Size 2 mm average Shape anhedral

COMMENTS: Unit 707 is fine- to medium-grained olivine gabbro.

SECONDARY MINERALOGY: Chlorite, pale amphibole

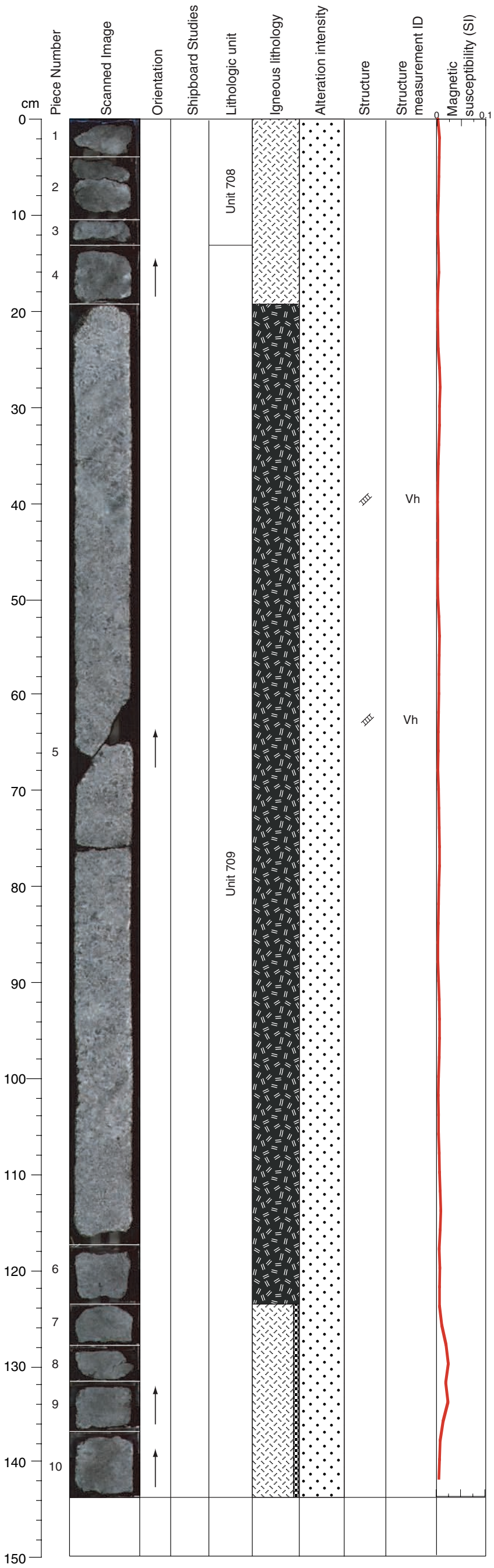
COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches and streaks occur in plagioclase. A braided green vein occurs in Piece 1b.

VEIN ALTERATION: Amphibole, chlorite.

STRUCTURE: Fine- to medium-grained, isotropic, locally olivine-bearing gabbro. A few dark green veins dipping moderately.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-266R-2, 0-20 cm WET

Core Photo



305-U1309D-267R-1 (Section top: 1283.10 mbsf)

UNIT-708: Gabbro
Pieces: 1-3

COMMENTS: Unit 708 gabbro rubble.

UNIT-709: Gabbro
Piece: 4

PRIMARY MINERALOGY: Mode from Piece 4

Plagioclase	Modal 50% Size 4 mm average Shape anhedral
Clinopyroxene	Modal 50% Size 5 mm average Shape anhedral

UNIT-709: Olivine-bearing Gabbro
Pieces: 5-6
PRIMARY MINERALOGY: Mode from Piece 5c

Olivine	Modal 5% Size 2 mm average Shape anhedral
Plagioclase	Modal 50% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 45% Size 2 mm average Shape anhedral

UNIT-709: Gabbro / Oxide Gabbro
Pieces: 7-10
PRIMARY MINERALOGY: Mode from Piece 10

Oxide	Modal 2% Size 2 mm average Shape anhedral
Plagioclase	Modal 48% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 50% Size 2 mm average Shape anhedral

COMMENTS: Unit 709 is coarse-grained gabbro, fine- to medium-grained olivine-bearing gabbro, and medium-grained oxide-bearing gabbro. Massive oxide only seen at edge of pieces and is not assigned to a separate unit.

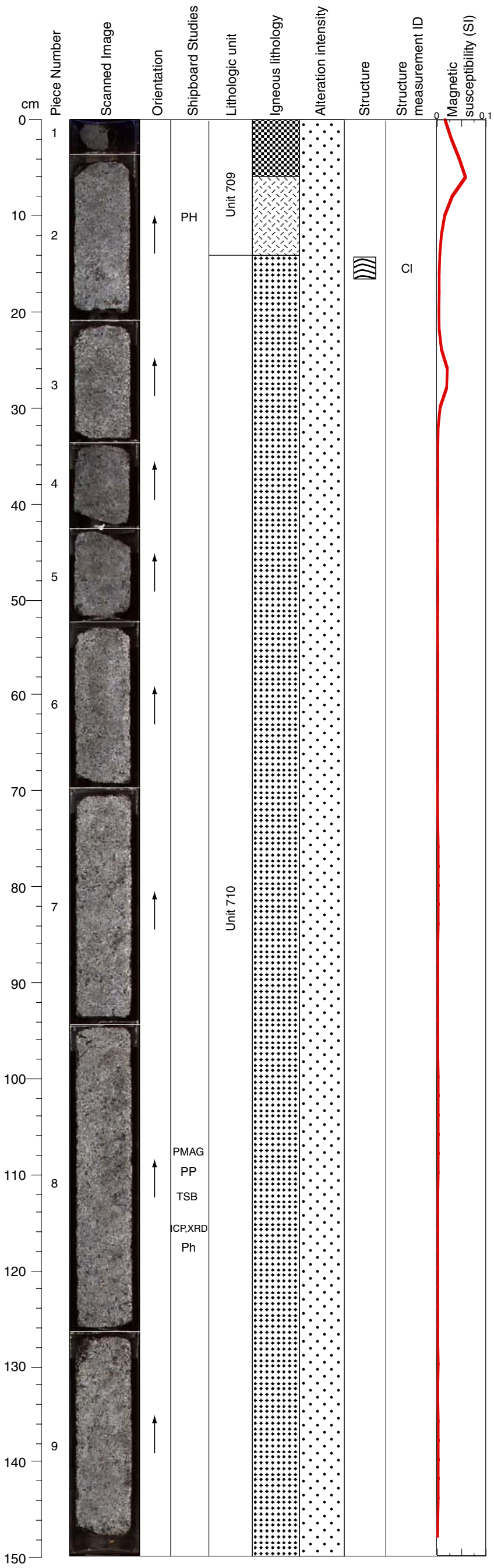
SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches and streaks occur in plagioclase. Dark green veins occur in Pieces 5a, 5c, and 9. Alteration halos occur around the veins in Piece 5.

VEIN ALTERATION: Amphibole, chlorite.

STRUCTURE: Medium-grained, locally coarse-grained, locally olivine-bearing, locally oxide bearing, isotropic gabbro. A few dark green veins dipping moderately.

Core Photo



305-U1309D-267R-2 (Section top: 1284.54 mbsf)

UNIT-709: Gabbro / Oxide Gabbro
Pieces: 1-2

PRIMARY MINERALOGY: Mode from Piece 2

Oxide	Modal 0-2% Size 2 mm average Shape anhedral
Plagioclase	Modal 48-50% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 50% Size 2 mm average Shape anhedral

COMMENTS: Unit 709 is fine- to medium-grained-grained gabbro. Oxide at 0-6 cm, then absent.

UNIT-710: Olivine Gabbro
Pieces: 2-9

PRIMARY MINERALOGY: Mode from Piece 7

Olivine	Modal 15% Size 2 mm average Shape anhedral
Plagioclase	Modal 45% Size 1 mm average Shape anhedral
Clinopyroxene	Modal 40% Size 2 mm average Shape anhedral

COMMENTS: Unit 710 is medium-grained olivine gabbro. Slightly increasing olivine abundance to bottom and into next section.

SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches and streaks occur in plagioclase.

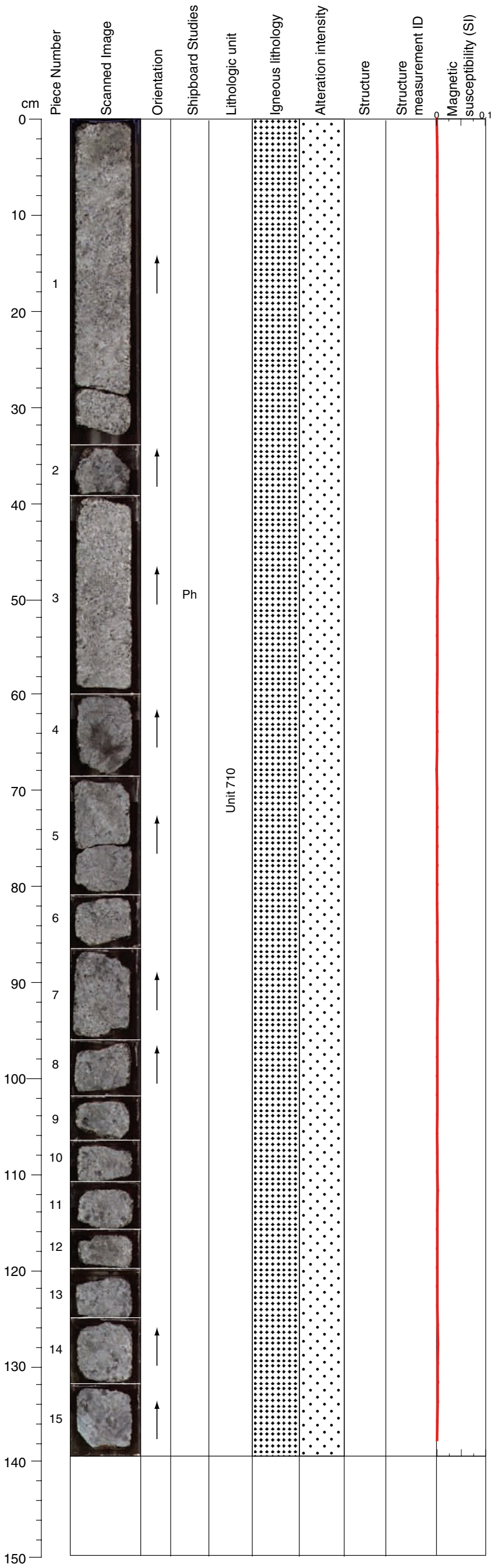
VEIN ALTERATION: n/a

THIN SECTIONS:
305-U1309D-267R-2, 112-114 cm (#631)

STRUCTURE: Fine-, but mostly medium-grained gabbro with two grain-size contacts. No magmatic or plastic fabric.

CLOSE-UP PHOTOGRAPHS;
305-U1309D-267R-2, 4-20 cm WET
305-U1309D-267R-2, 105-125 cm WET

Core Photo



305-U1309D-267R-3 (Section top: 1286.04 mbsf)

UNIT-710: Olivine Gabbro
Pieces: 1-15

PRIMARY MINERALOGY: Mode from Piece 1a

Olivine	Modal 20% Size 2 mm average Shape anhedral
Plagioclase	Modal 45% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 35% Size 5 mm average Shape anhedral

COMMENTS: Unit 710 is medium- to coarse-grained olivine gabbro.

SECONDARY MINERALOGY: Chlorite, pale amphibole

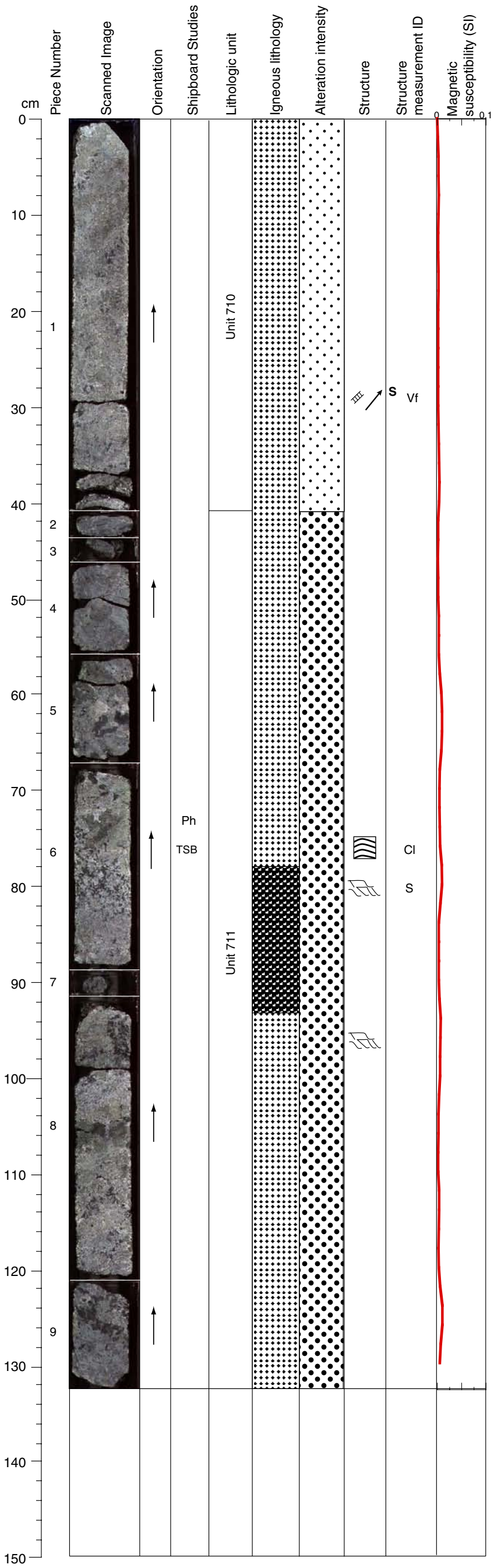
COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches and streaks occur in plagioclase. Light green slip fiber material coats the bottom of Piece 15.

VEIN ALTERATION: Slip fiber.

STRUCTURE: Medium-grained, typically olivine-bearing gabbro with no magmatic or plastic fabric. A few dark green veins dipping moderately, slight cataclasis.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-267R-3, 40-59 cm WET

Core Photo



305-U1309D-268R-1 (Section top: 1287.90 mbsf)

UNIT-710: Olivine Gabbro
Pieces: 1

PRIMARY MINERALOGY: Mode from Piece 1

Olivine	Modal 7% Size 2 mm average Shape anhedral
Plagioclase	Modal 43% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 50% Size 5 mm average Shape anhedral

COMMENTS: Unit 710 is medium-grained olivine gabbro.

UNIT-711: Olivine Gabbro
Pieces: 2-6, 8a-9

PRIMARY MINERALOGY: Mode from several pieces

Olivine	Modal 20% Size 5 mm average Shape anhedral
Plagioclase	Modal 50% Size 6 mm average Shape anhedral
Clinopyroxene	Modal 30% Size 6 mm average Shape anhedral

UNIT-711: Troctolite
Pieces: 6-8a

PRIMARY MINERALOGY: Mode from Piece 6

Olivine	Modal 20% Size 4 mm average Shape anhedral
Plagioclase	Modal 77% Size 4 mm average Shape anhedral
Clinopyroxene	Modal 3% Size 1 mm average Shape anhedral

COMMENTS: Unit 711 is coarse-grained olivine gabbro and medium-grained troctolite. The unit is quite inhomogeneous, composed of coarse-grained olivine gabbro with gradual changes in mode and grain size. Pegmatitic clinopyroxene at 67-74 cm.

SECONDARY MINERALOGY: Chlorite, pale amphibole, serpentine.

COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and serpentine after olivine. White patches and streaks occur in plagioclase. Light green slip-fiber material coats the top of Piece 1a.

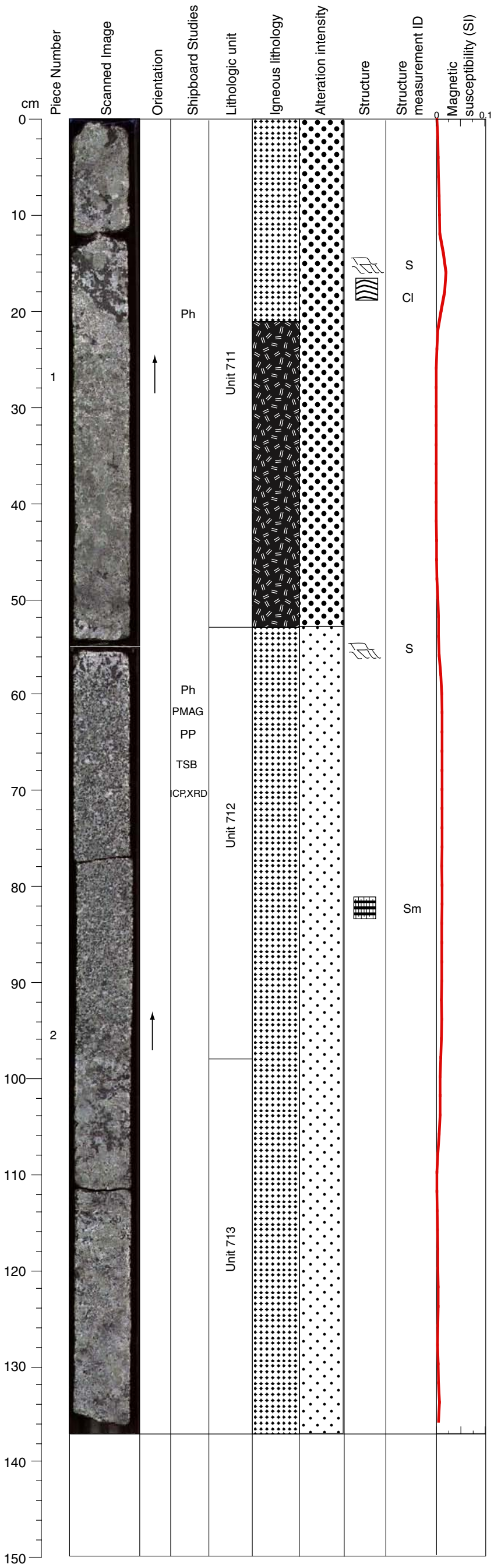
VEIN ALTERATION: Amphibole, slip-fiber.

THIN SECTIONS:
305-U1309D-268R-1, 75-78 cm (#632)

STRUCTURE: Medium-grained, locally coarse or even pegmatitic gabbro, common olivine, no magmatic or plastic strain foliation. Pale green veins dipping moderately. A level of intense seprentinization with no clear foliation in Piece 6.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-268R-1, 58-87 cm WET

Core Photo



305-U1309D-268R-2 (Section top: 1289.23 mbsf)

UNIT-711: Olivine Gabbro
Pieces: 1-2a

PRIMARY MINERALOGY: Mode from Piece 1a

Olivine	Modal 20% Size 5 mm average Shape anhedral
Plagioclase	Modal 35% Size 6 mm average Shape anhedral
Clinopyroxene	Modal 45% Size 6 mm average Shape anhedral

UNIT-711: Olivine-bearing Gabbro
Pieces: 1-2a

PRIMARY MINERALOGY: Mode from Piece 1b

Olivine	Modal 3% Size 5 mm average Shape anhedral
Plagioclase	Modal 25% Size 6 mm average Shape anhedral
Clinopyroxene	Modal 72% Size 6 mm average Shape anhedral

COMMENTS: Unit 711 is medium- to coarse-grained olivine gabbro and olivine-bearing gabbro. Pegmatitic clinopyroxene band at 104-110 cm.

UNIT-712 and 713: Olivine Gabbro
Pieces: 2

PRIMARY MINERALOGY: Mode from several pieces

Olivine	Modal 30% Size 5 mm average Shape anhedral
Plagioclase	Modal 25-45% Size 6 mm average Shape anhedral
Clinopyroxene	Modal 30-45% Size 6 mm average Shape anhedral

COMMENTS: Units 712 and 713 are medium- to coarse-grained olivine gabbro. Troctolitic zone at 53-58 cm. Unit 713 is quite inhomogeneous (in mode and grain size).

SECONDARY MINERALOGY: Chlorite, pale amphibole, serpentine

COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and serpentine after olivine. White patches and streaks occur in plagioclase.

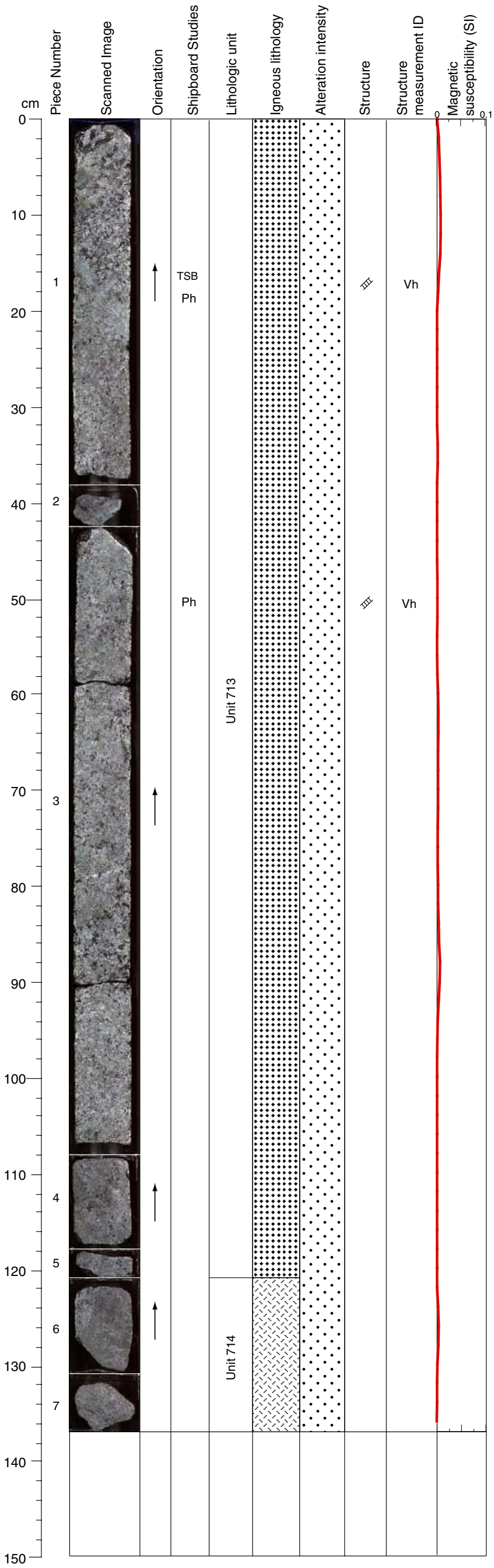
VEIN ALTERATION: n/a

THIN SECTIONS:
305-U1309D-268R-2, 66-68 cm (#633)

STRUCTURE: Olivine-bearing to olivine-rich gabbro. In olivine-rich intervals there is moderately dipping magmatic foliation (Sm) in the form of aligned, flattened olivine grains. Modal and grain size contacts are apparent, here classified as compositional layering (Cl). Weak serpentinization in olivine that is not foliated.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-268R-2, 11-28 cm WET
305-U1309D-268R-2, 55-77 cm WET

Core Photo



305-U1309D-268R-3 (Section top: 1290.60 mbsf)

UNIT-713: Olivine Gabbro
Pieces: 1-5

PRIMARY MINERALOGY: Mode from Pieces 1 and 3b

Olivine	Modal 15-25% Size 3 mm average Shape anhedral
Plagioclase	Modal 40% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 35-45% Size 5 mm average Shape anhedral

COMMENTS: Unit 713 is medium-grained olivine gabbro. Coarse olivine at 98-108 cm and coarse clinopyroxene at 108-111 cm.

UNIT-714: Gabbro
Pieces: 6-7

PRIMARY MINERALOGY: Mode from Piece 6

Plagioclase	Modal 50% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 50% Size 4 mm average Shape anhedral

COMMENTS: Unit 714 is medium-grained gabbro.

SECONDARY MINERALOGY: Chlorite, pale amphibole, serpentine

COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and serpentine after olivine. White patches and streaks occur in plagioclase. Veins occur in Pieces 1 and 3. Most of the veins are dark green amphibole chlorite veins, but two are white zeolite veins.

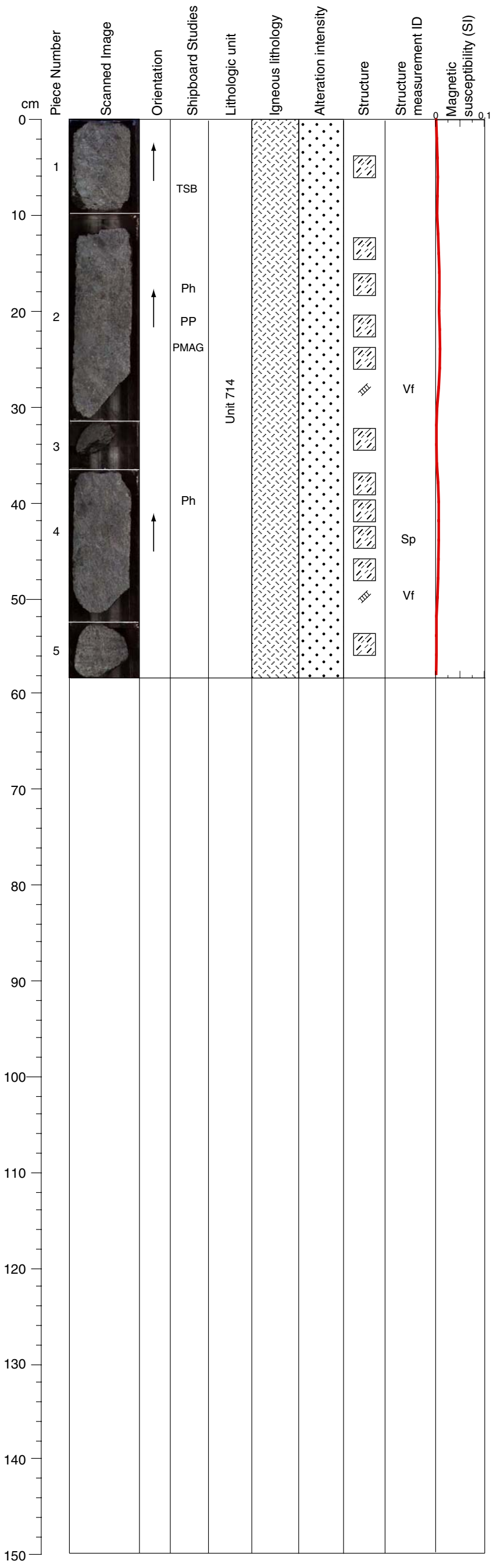
VEIN ALTERATION: Amphibole, chlorite, zeolite.

THIN SECTIONS:
305-U1309D-268R-3, 15-18 cm (#634)

STRUCTURE: Medium-, locally fine-grained, olivine-bearing, completely isotropic gabbro. Set of dark green veins dipping moderately with alteration associated.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-268R-3, 9-29 cm WET
305-U1309D-268R-3, 43-60 cm WET

Core Photo



305-U1309D-268R-4 (Section top: 1291.97 mbsf)

UNIT-714: Gabbro
Pieces: 1-5

PRIMARY MINERALOGY: Mode from Piece 2

Plagioclase	Modal 45% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 55% Size 4 mm average Shape anhedral

COMMENTS: Unit 714 is medium-grained gabbro. As much as 15% orthopyroxene observed in thin section.

SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches and streaks occur in plagioclase.

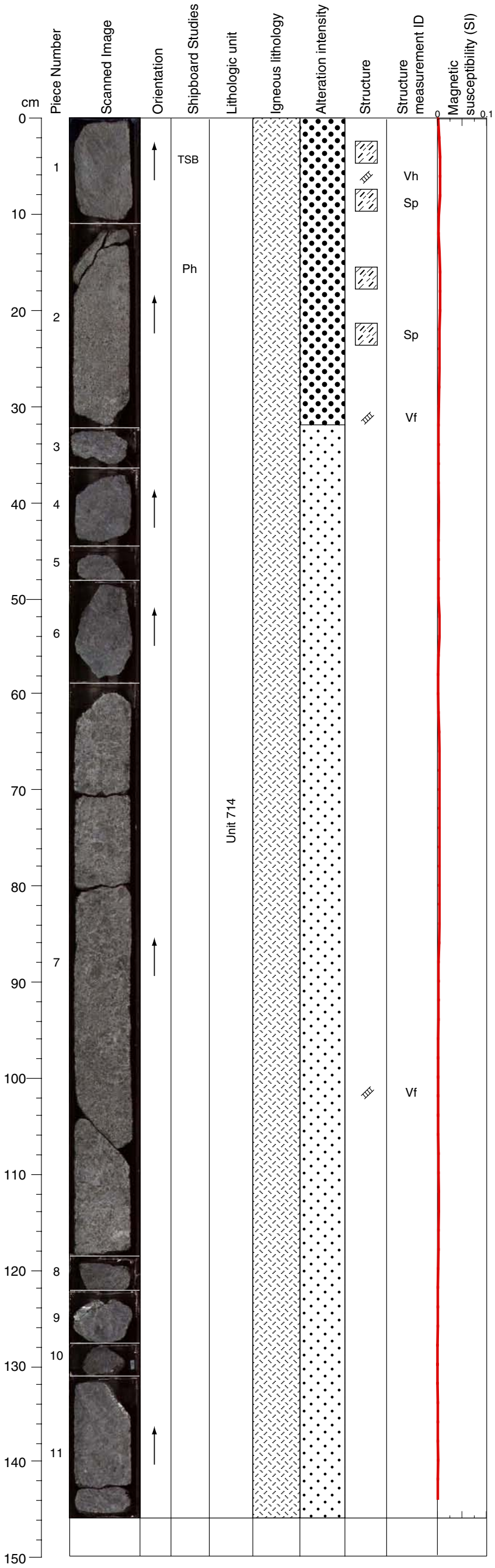
VEIN ALTERATION: n/a

THIN SECTIONS:
305-U1309D-268R-4, 6-9 cm (#635)

STRUCTURE: Coarse-grained gabbro cut by a vertical plastic strain shear zone with steep mineral stretching lineation. Dark green veins dipping moderately.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-268R-4, 0-30 cm WET
305-U1309D-268R-4, 0-30 cm DRY
305-U1309D-268R-4, 36-59 cm WET
305-U1309D-268R-4, 36-59 cm DRY

Core Photo



305-U1309D-269R-1 (Section top: 1292.70 mbsf)

UNIT-714: Gabbro
Pieces: 1-11

PRIMARY MINERALOGY: Mode from Piece 2 and 6

Plagioclase	Modal 55-60% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 40-45% Size 4 mm average Shape anhedral

COMMENTS: Unit 714 is fine- to medium-grained gabbro. Strongly sheared.

SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches and streaks occur in plagioclase. White, dark green and green and white veins occur in Pieces 1, 2, 7a, 7c-d, and 9.

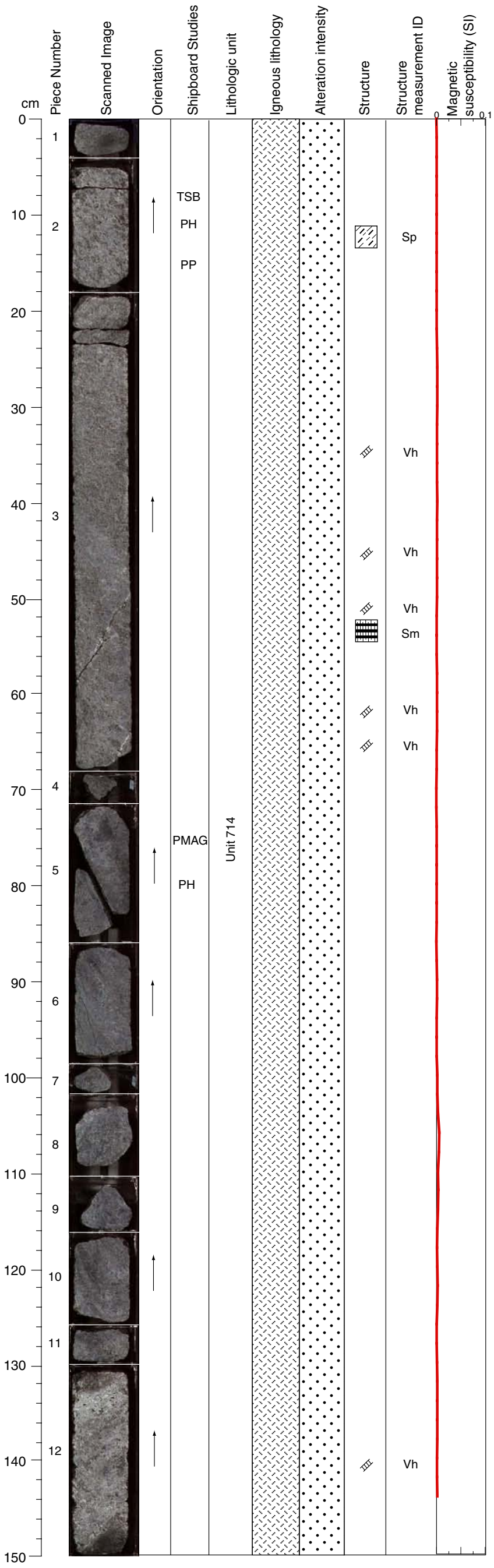
VEIN ALTERATION: Amphibole, chlorite, zeolite

THIN SECTIONS:
305-U1309D-269R-1, 3-5 cm (#636)

STRUCTURE: Medium-grained gabbro with steep plastic strain shear zone with a steep lineation in upper part of section. A few dark green fault veins dipping moderately.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-269R-1, 0-30 cm WET
305-U1309D-269R-1, 0-30 cm DRY

Core Photo



305-U1309D-269R-2 (Section top: 1294.16 mbsf)

UNIT-714: Gabbro
Pieces: 1-12

PRIMARY MINERALOGY: Mode from Piece 12

Plagioclase	Modal 55% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 45% Size 7 mm average Shape anhedral

COMMENTS: Unit 714 is coarse-grained gabbro. Porphyroblastic in Piece 2. As much as 15% orthopyroxene observed in thin section.

SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches and streaks occur in plagioclase. Green and white, white, and dark green veins occur in Pieces 3c, 5a, 6, and 12.

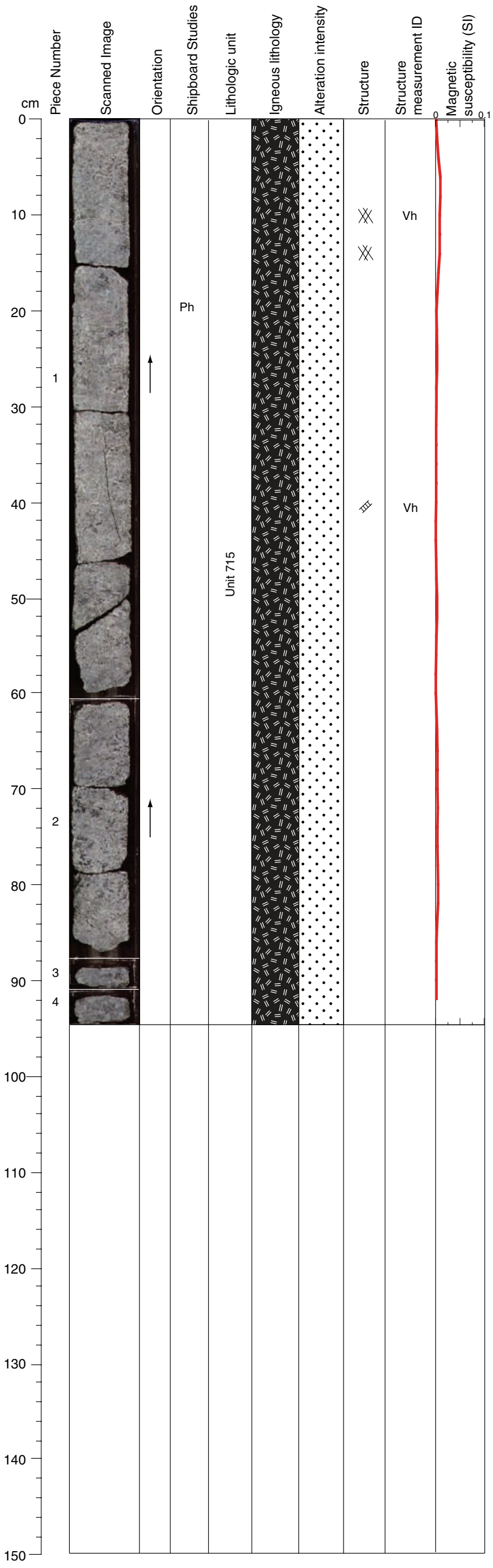
VEIN ALTERATION: Amphibole, chlorite, zeolite.

THIN SECTIONS:
305-U1309D-269R-2, 7-10 cm (#637)

STRUCTURE: Medium-grained gabbro with local magmatic foliation and local plastic strain shear zone 15 cm in thickness. A few dark green veins and open cracks with white infills, both of which dip moderately.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-269R-2, 0-17 cm WET
305-U1309D-269R-2, 0-17 cm DRY
305-U1309D-269R-2, 71-98 cm WET

Core Photo



305-U1309D-269R-3 (Section top: 1295.66 mbsf)

UNIT-715: Olivine-bearing Gabbro
Pieces: 1-4

PRIMARY MINERALOGY: Mode from Piece 1a

Olivine	Modal 5% Size 5 mm average Shape anhedral
Plagioclase	Modal 50% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 45% Size 5 mm average Shape anhedral

COMMENTS: Unit 715 is coarse-grained olivine-bearing gabbro.

SECONDARY MINERALOGY: Chlorite, pale amphibole

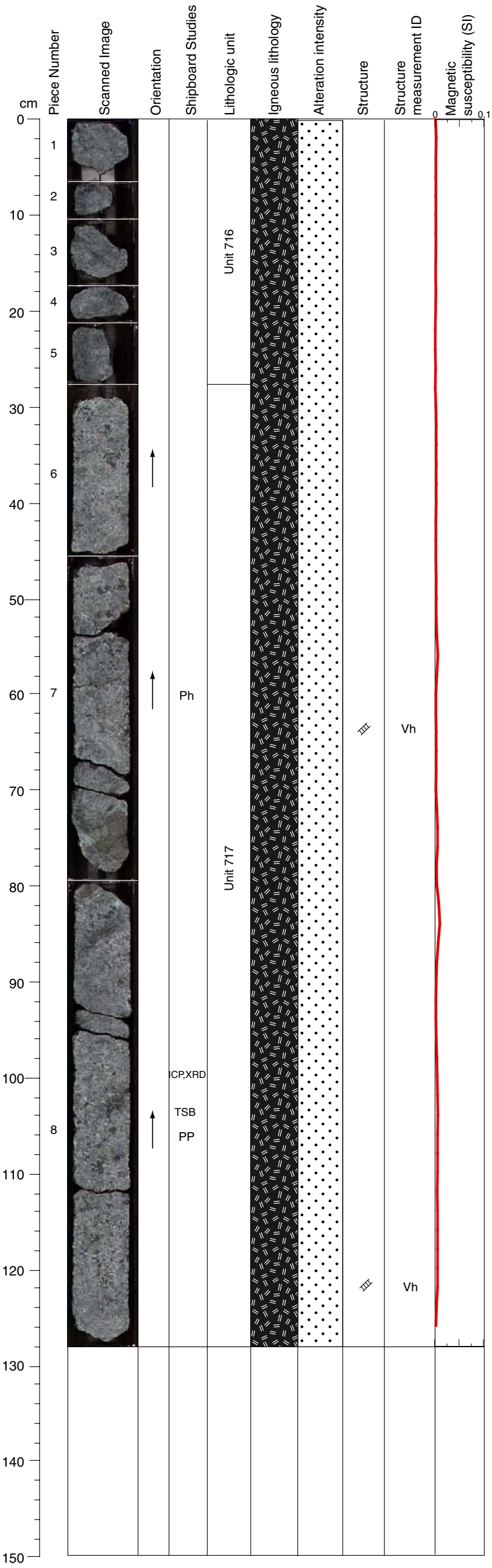
COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches and streaks occur in plagioclase. Dark green braided, branching veins, with alteration halos from 5 -10 mm thick, occur in Pieces 1, and 2.

VEIN ALTERATION: Amphibole, chlorite.

STRUCTURE: Medium-grained isotropic gabbro, increasing olivine content toward bottom of section. Set of dark green veins dipping moderately and a later steeply-dipping irregular, open crack.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-269R-3, 15-45 cm WET

Core Photo



305-U1309D-270R-1 (Section top: 1297.50 mbsf)

UNIT-716: Olivine-bearing Gabbro Rubble
Pieces: 1-5

COMMENTS: Unit 716 is coarse-grained olivine-bearing gabbro rubble.

UNIT-717: Olivine-bearing Gabbro
Pieces: 6-8

PRIMARY MINERALOGY: Mode from Piece 7b

Olivine	Modal 4% Size 3 mm average Shape anhedral
Plagioclase	Modal 46% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 50% Size 2 mm average Shape anhedral

COMMENTS: Unit 717 is medium-grained olivine-bearing gabbro. Increasing in olivine abundance at 79-128 cm. Coarse-grained clinopyroxene band at 70-90 cm.

SECONDARY MINERALOGY: Chlorite, pale amphibole

COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches and streaks occur in plagioclase. Dark green and green veins occur in Pieces 6, 7b (braided) and 8c. These have alteration halos varying from 3 to 7 mm wide. Two light green vein sets occur in Pieces 7d and from Pieces 7d to 8a (slip-fiber).

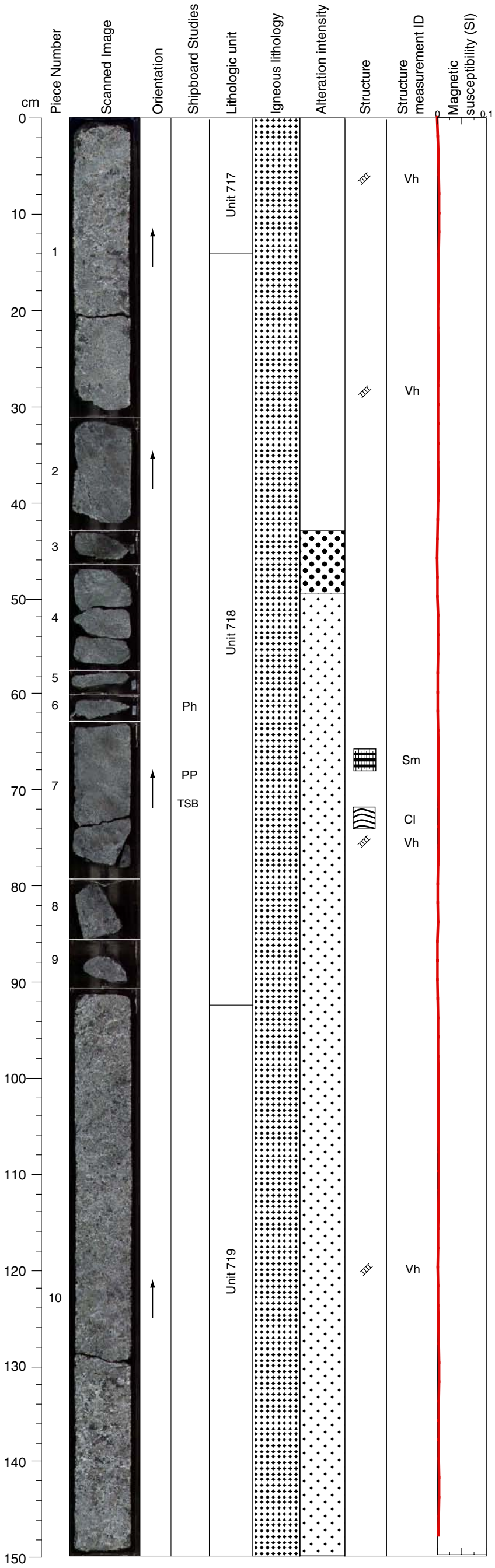
VEIN ALTERATION: Amphibole, chlorite, clay, carbonate.

THIN SECTIONS:
305-U1309D-270R-1, 103-105 cm (#638)

STRUCTURE: Medium-grained, olivine bearing, isotropic gabbro. A few dark green veins dipping shallowly.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-270R-1, 53-78 cm WET
305-U1309D-270R-1, 93-111 cm WET

Core Photo



305-U1309D-270R-2 (Section top: 1298.78 mbsf)

UNITS-717, -718, -719: Olivine Gabbro
Pieces: 1-10

PRIMARY MINERALOGY: Mode from several pieces

Olivine	Modal 5-15% Size 3 mm average Shape anhedral
Plagioclase	Modal 50-55% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 30-50% Size 3 mm average Shape anhedral

COMMENTS: Units 717-719 are fine- to medium-grained olivine gabbro. Upper boundary (14-40 cm) with olivine gabbro is irregularly shaped. Variable grain size at 92-120 cm (in Piece 10a).

SECONDARY MINERALOGY: Chlorite, pale amphibole, talc

COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches and streaks occur in plagioclase. White, dark green veins occur in Pieces 1, 2, 3, 4, 5, 7, and 10. Most of the dark green veins are either braided or networks and have alteration halos of 5 -10 mm.

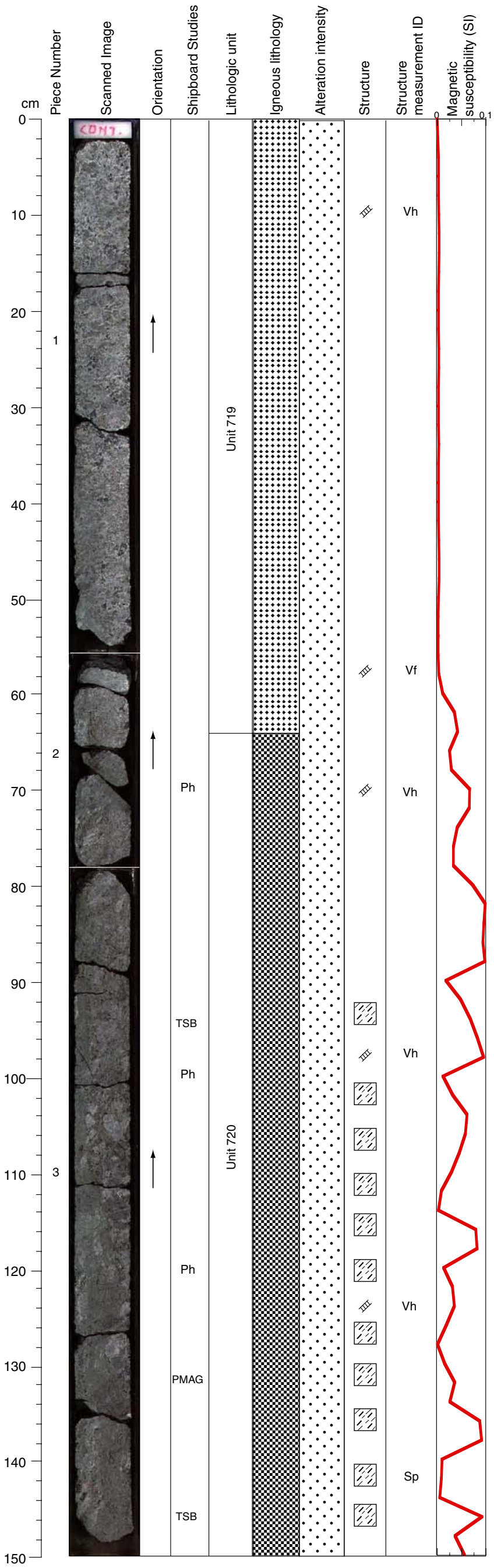
VEIN ALTERATION: Amphibole, chlorite, zeolite.

THIN SECTIONS:
305-U1309D-270R-2, 70-73 cm (#639)

STRUCTURE: Medium-grained gabbro with local fine-grained intervals. Shallow to moderate dipping dark green veins and slight cataclasis.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-270R-2, 47-77 cm WET

Core Photo



305-U1309D-270R-3 (Section top: 1300.28 mbsf)

UNIT-719: Olivine Gabbro
Pieces: 1-2b

PRIMARY MINERALOGY: Mode from Piece 1c

Olivine	Modal 10% Size 3 mm average Shape anhedral
Plagioclase	Modal 40% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 50% Size 3 mm average Shape anhedral

COMMENTS: Unit 719 is medium-grained olivine gabbro.

UNIT-720: Oxide Gabbro
Pieces: 2b-3

COMMENTS: Unit 720 is sheared oxide gabbro. Severely deformed (vertically sheared?). Some undeformed fragments contain oxide. Oxide appears along sheared zone.

SECONDARY MINERALOGY: Chlorite, pale amphibole, sulfide

COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches and streaks occur in plagioclase. Dark green veins occur in Pieces 1 and 3. These generally are braided and have alteration halos from 10 to 15 mm thick.

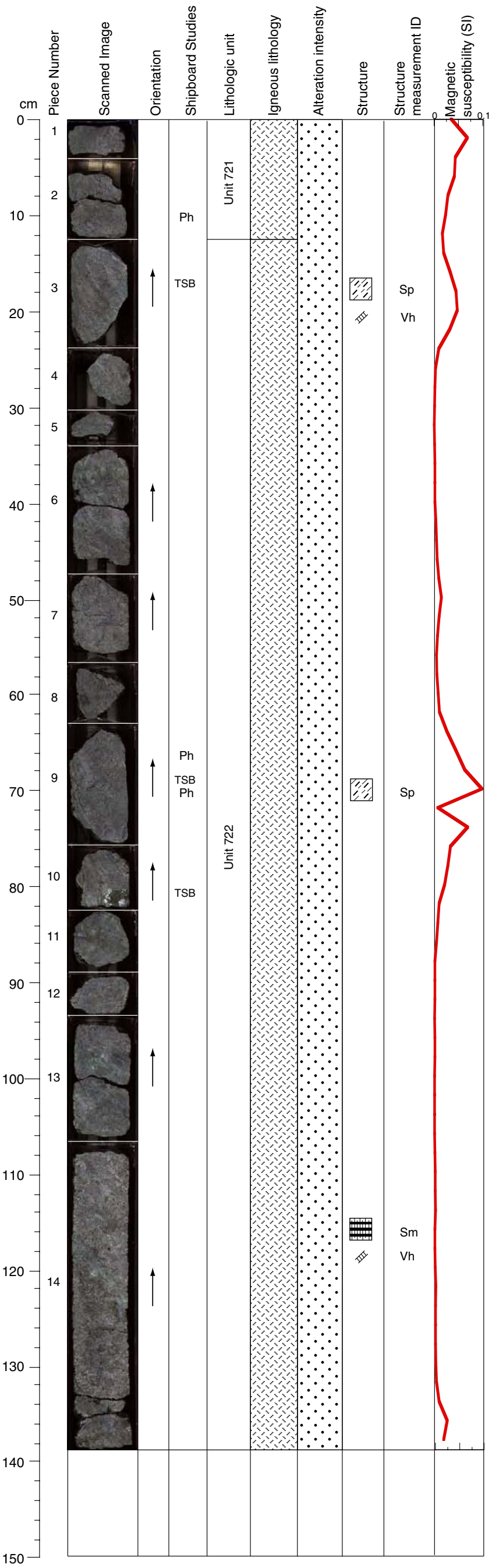
VEIN ALTERATION: Amphibole, chlorite.

THIN SECTIONS:
305-U1309D-270R-3, 93-95 cm (#640)
305-U1309D-270R-3, 145-147 cm (#641)

STRUCTURE: Medium-grained gabbro grading into oxide gabbro. Steep plastic strain shear zone with sharp margins developed in oxide gabbro only. Shallow to moderately dipping dark green veins.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-270R-3, 56-78 cm WET
305-U1309D-270R-3, 88-118 cm WET
305-U1309D-270R-3, 88-118 cm DRY
305-U1309D-270R-3, 118-148 cm WET
305-U1309D-270R-3, 118-148 cm DRY

Core Photo



305-U1309D-271R-1 (Section top: 1302.30 mbsf)

UNIT-721: Gabbro Rubble
Pieces: 1-2

COMMENTS: Unit 721 is coarse-grained gabbro rubble.

UNIT-722: Gabbro (Gabbronorite)
Pieces: 3-14

PRIMARY MINERALOGY: Mode from Piece 3

Plagioclase	Modal 60% Size 4 mm average Shape anhedral
Clinopyroxene	Modal 40% Size 6 mm average Shape anhedral

COMMENTS: Unit 722 is coarse-grained gabbro. Contains disseminated oxide. Less than 5% orthopyroxene was observed in three thin sections.

SECONDARY MINERALOGY: Pale amphibole, chlorite, sulfide

COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches and streaks occur in plagioclase. Dark green veins cut Pieces 3, 5, 6 ,11 ,13 ,14. In Pieces 3, 13a, and 14a there are alteration 1-cm thick halos around the veins and in the latter two the veins are braided.

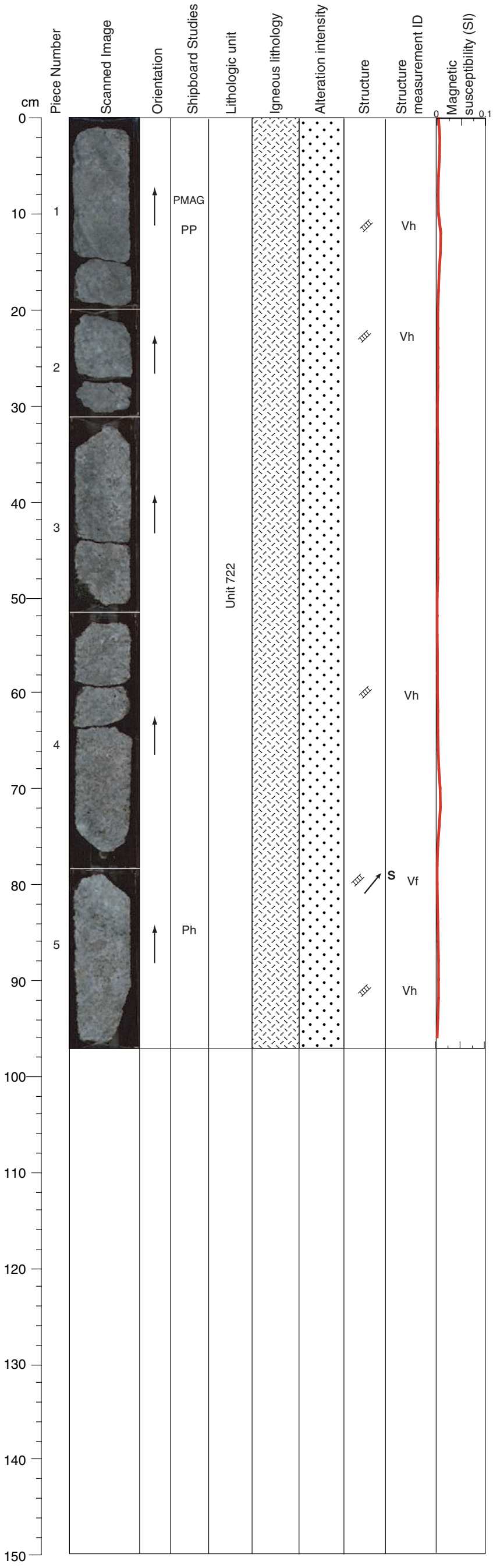
VEIN ALTERATION: Amphibole, chlorite.

THIN SECTIONS:
305-U1309D-271R-1, 16-19 cm (#642)
305-U1309D-271R-1, 68-70 cm (#643)
305-U1309D-271R-1, 80-82 cm (#644)

STRUCTURE: Coarse-grained gabbro, locally plastically deformed. A few dark green veins dipping moderately. Slight cataclasis.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-271R-1, 0-23 cm WET
305-U1309D-271R-1, 0-23 cm DRY
305-U1309D-271R-1, 63-88 cm WET
305-U1309D-271R-1, 63-75 cm DRY

Core Photo



305-U1309D-271R-2 (Section top: 1303.69 mbsf)

UNIT-722: Gabbro
Pieces: 1-5

PRIMARY MINERALOGY: Mode from Piece 1

Plagioclase	Modal 60% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 40% Size 5 mm average Shape anhedral

COMMENTS: Unit 722 is medium- to coarse-grained gabbro.

SECONDARY MINERALOGY: Pale amphibole, chlorite

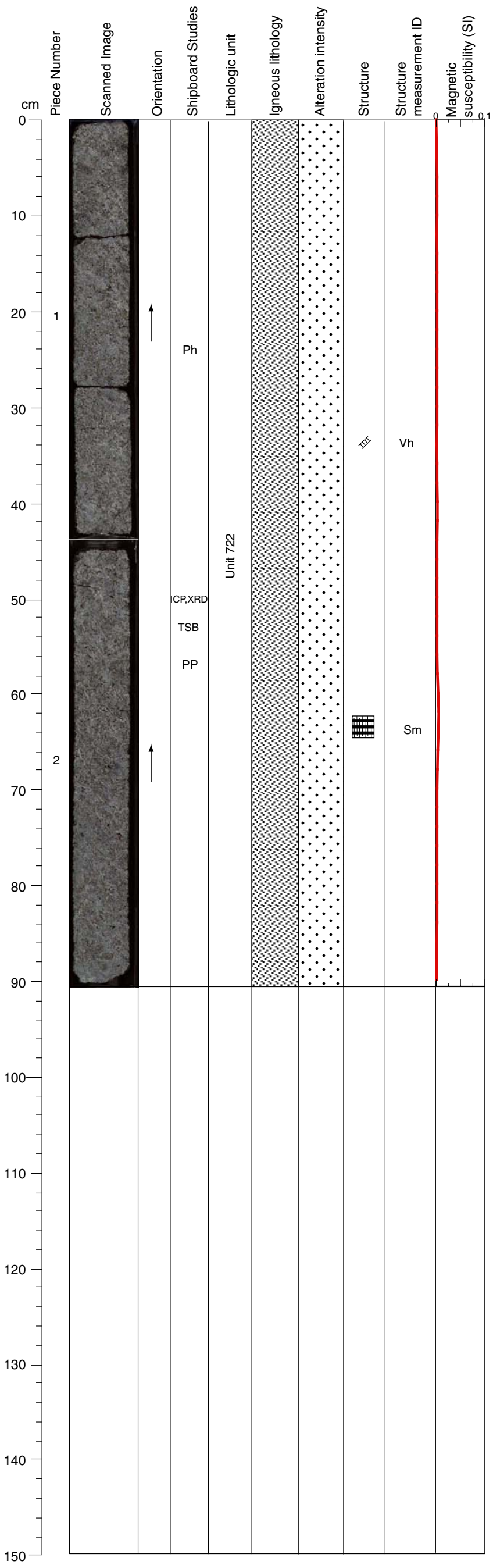
COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches and streaks occur in plagioclase. Dark green veins occur in Pieces 1a and 2a. Both sets have alteration halos of about 5 mm. Light-green slip-fiber veins occur in Pieces 4c through 5 and have smaller alteration halos (2 mm) than previous sections.

VEIN ALTERATION: Amphibole, chlorite, slip fiber.

STRUCTURE: Medium-grained gabbro, no magmatic or plastic fabric. A few dark green veins dipping moderately.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-271R-2, 78-96 cm WET

Core Photo



305-U1309D-271R-3 (Section top: 1304.66 mbsf)

UNIT-722: Gabbro (Gabbronorite)
Pieces: 1-2

PRIMARY MINERALOGY: Mode from Piece 1

Plagioclase	Modal 65% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 35% Size 5 mm average Shape anhedral

COMMENTS: Unit 722 is medium- to coarse-grained gabbro. About 7% orthopyroxene observed in thin section.

SECONDARY MINERALOGY: Pale amphibole, chlorite

COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches and streaks occur in plagioclase. A dark green vein occurs in Pieces 1a and 2a. It is braided and has an alteration halo 10 mm wide.

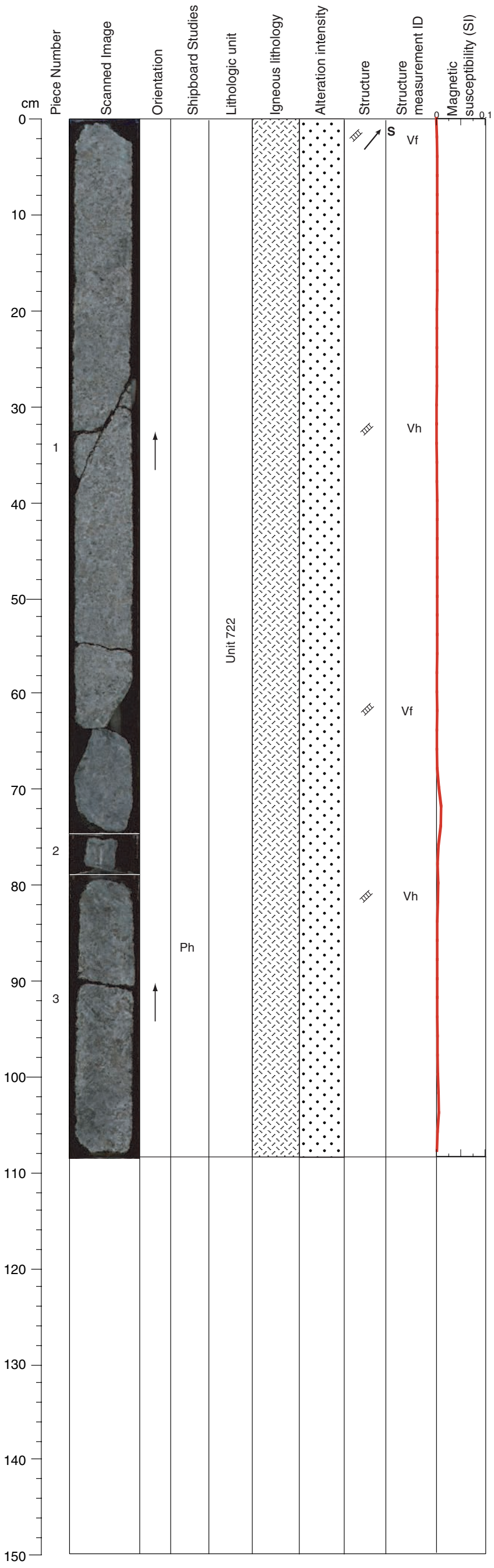
VEIN ALTERATION: Amphibole and chlorite.

THIN SECTIONS:
305-U1309D-271R-3, 52-54 cm (#645)

STRUCTURE: Medium-grained gabbro with clear magmatic fabric dipping moderately. A few dark green veins dipping shallowly.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-271R-3, 12-42 cm WET
305-U1309D-271R-3, 44-64 cm WET

Core Photo



305-U1309D-271R-4 (Section top: 1305.57 mbsf)

UNIT-722: Gabbro
Pieces: 1-3

PRIMARY MINERALOGY: Mode from Piece 1a

Plagioclase	Modal 60% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 40% Size 5 mm average Shape anhedral

COMMENTS: Unit 722 is coarse-grained gabbro. Oxide at 80 cm.

SECONDARY MINERALOGY: Pale amphibole, chlorite

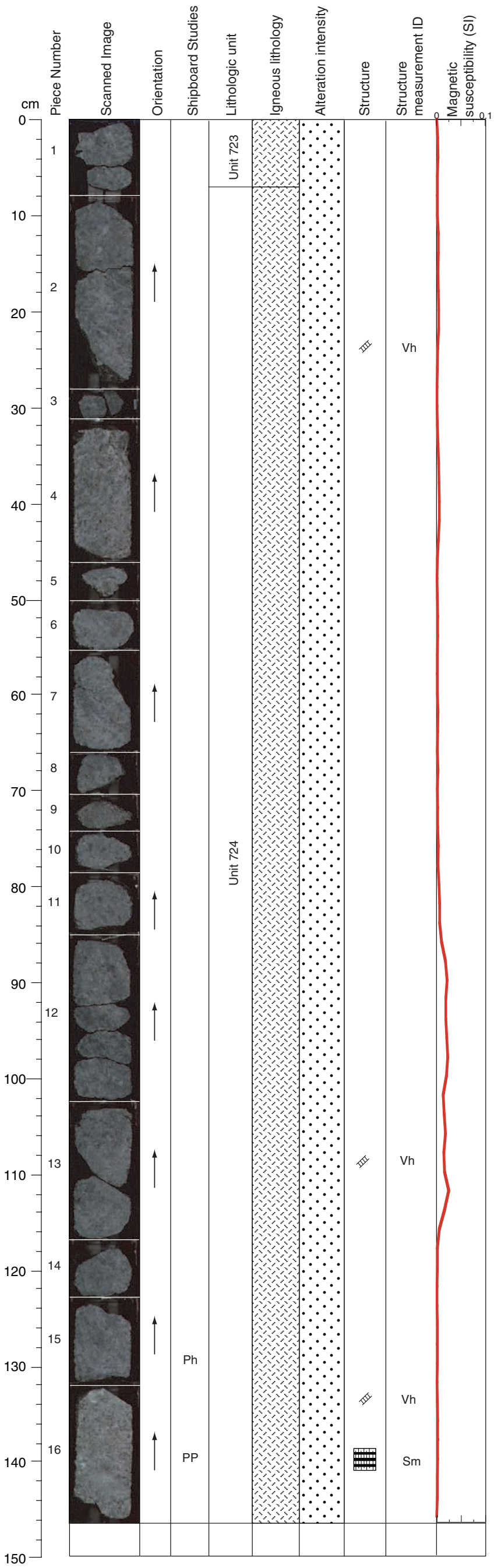
COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches and streaks occur in plagioclase. A light-green, slip-fiber vein occurs in Piece 1a (from 1 cm to 3 cm) and has an alteration halo 20 mm wide. A green vein (saponite) occurs in Pieces 1c to 1d (58 cm to 68 cm). A dark green vein cuts Piece 3a and has an alteration halo about 10 mm wide.

VEIN ALTERATION: Amphibole, chlorite, saponite.

STRUCTURE: Medium-grained gabbro, no magmatic or plastic fabric. A few dark green veins dipping moderately to steeply.

CLOSE-UP PHTOOGRAPHS:
305-U1309D-271R-4, 79-108 cm WET

Core Photo



305-U1309D-272R-1 (Section top: 1307.10 mbsf)

UNIT-723: Gabbro Rubble
Pieces: 1-2

COMMENTS: Unit 723 is coarse-grained gabbro rubble.

UNIT-724: Gabbro
Pieces: 2-16

PRIMARY MINERALOGY: Mode from Piece 4

Plagioclase	Modal 60% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 40% Size 5 mm average Shape anhedral

COMMENTS: Unit 724 is coarse-grained gabbro. Oxide at 8-27 cm.

SECONDARY MINERALOGY: Pale amphibole, chlorite

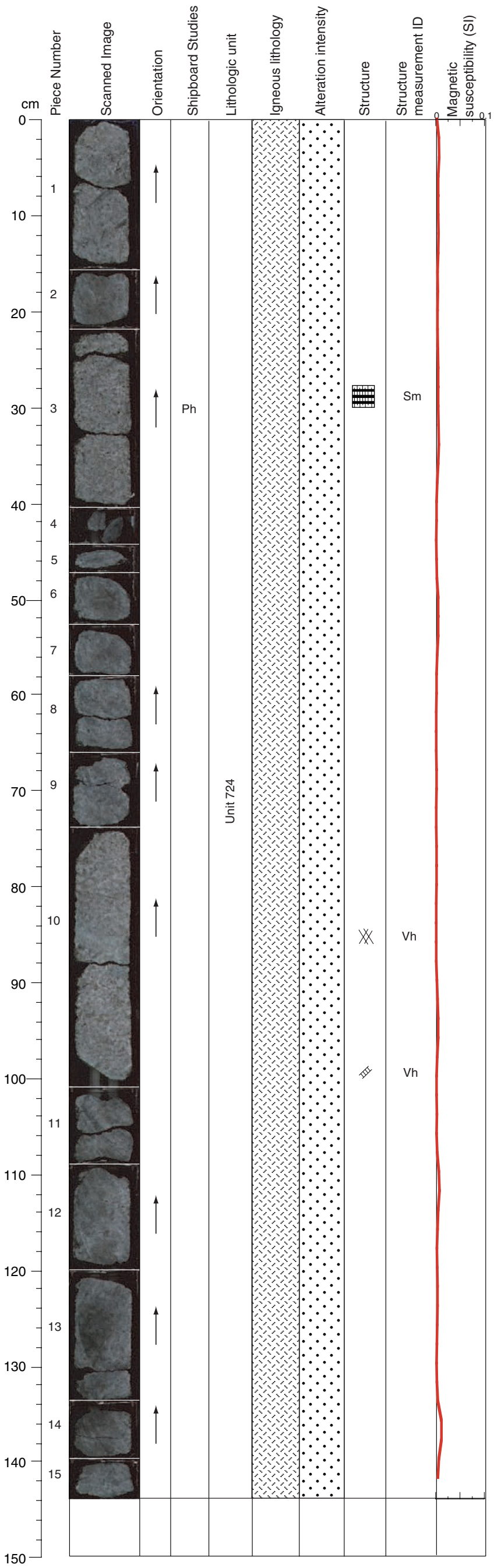
COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches and streaks occur in plagioclase. A white vein occurs in Piece 2b. The vein contains a trace of chlorite. Two dark-green, braided vein sets occur in Piece 16. Both sets have alteration halos of about 10 mm.

VEIN ALTERATION: Amphibole, chlorite, zeolite.

STRUCTURE: Medium grained gabbro, magmatic foliation locally developed. A few dark green veins dipping moderate to steeply.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-272R-1, 123-145 cm WET

Core Photo



305-U1309D-272R-2 (Section top: 1308.57 mbsf)

UNIT-724: Gabbro
Pieces: 1-15

PRIMARY MINERALOGY: Mode from Piece 3b

Plagioclase	Modal 50% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 50% Size 5 mm average Shape anhedral

COMMENTS: Unit 724 coarse-grained gabbro. Disseminated oxide and sulfides.

SECONDARY MINERALOGY: Pale amphibole, chlorite

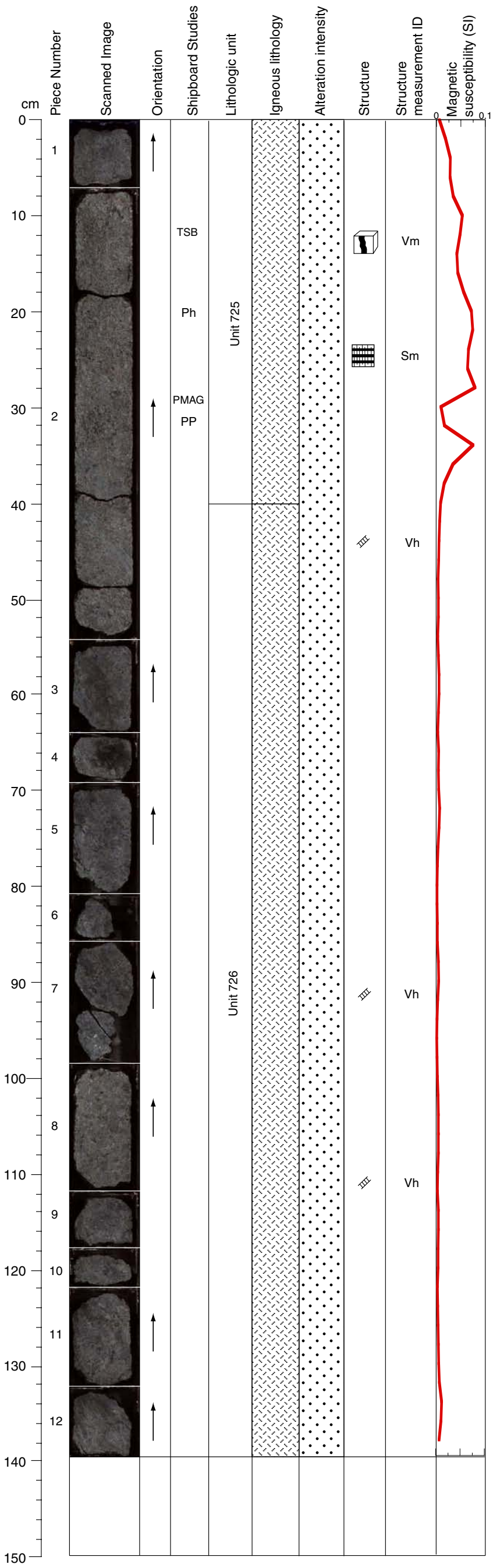
COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches and streaks occur in plagioclase. Dark green, braided veins occur in Pieces 10a, 10b and 15. Both sets have alteration halos about 10 mm thick.

VEIN ALTERATION: Amphibole, chlorite.

STRUCTURE: Medium- to coarse-grained gabbro, magmatic foliation locally developed. Moderately dipping dark green veins with local branching.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-272R-2, 21-39 cm WET

Core Photo



305-U1309D-272R-3 (Section top: 1310.00 mbsf)

UNIT-725: Desseminated Gabbro
Pieces: 1-2b

PRIMARY MINERALOGY: Mode from Piece 1b

Oxide	Modal 4% Size 6 mm average Shape anhedral
Plagioclase	Modal 51% Size 6 mm average Shape anhedral
Clinopyroxene	Modal 45% Size 7 mm average Shape anhedral

COMMENTS: Unit 725 is coarse-grained desseminated gabbro.

UNIT-726: Gabbro
Pieces: 2c-12

PRIMARY MINERALOGY: Mode from Piece 5

Plagioclase	Modal 60% Size 4 mm average Shape anhedral
Clinopyroxene	Modal 40% Size 6 mm average Shape anhedral

COMMENTS: Unit 726 is medium- to coarse-grained gabbro.

SECONDARY MINERALOGY: Pale amphibole, chlorite

COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches and streaks occur in plagioclase. Dark green veins occur in Pieces 2c (braided with a 1 cm alteration halo) and Pieces 7a-c (network). A white (zeolite) vein occurs in Piece 5.

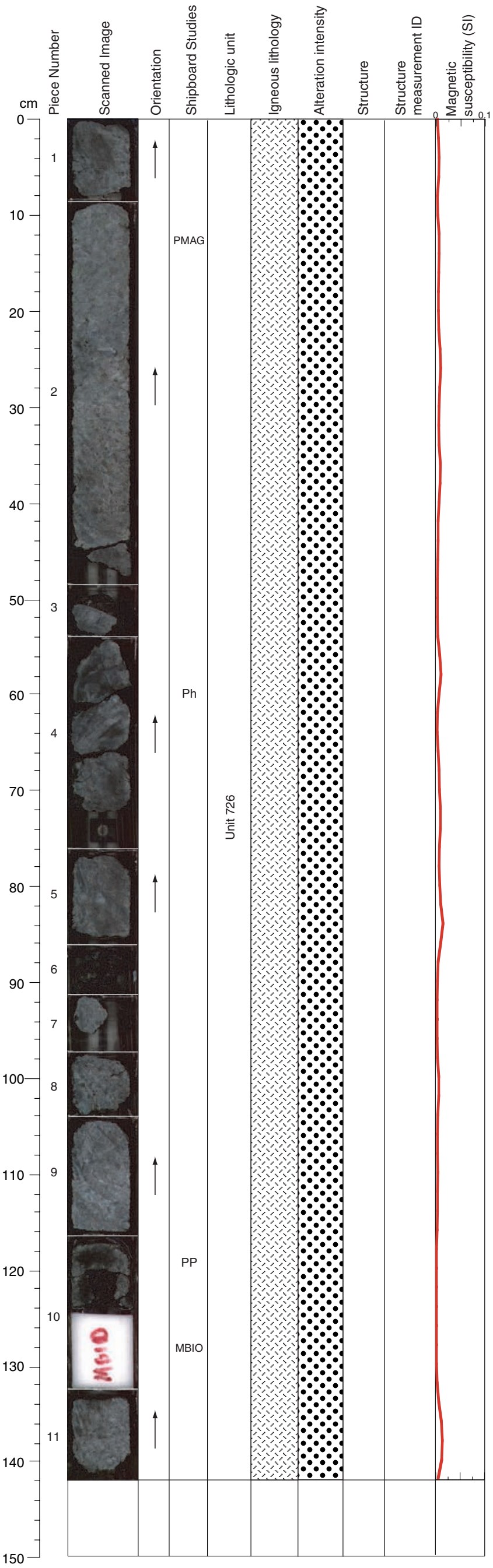
VEIN ALTERATION: Amphibole, chlorite, zeolite.

THIN SECTIONS:
305-U1309D-272R-3, 10-13 cm (#646)

STRUCTURE: Medium-grained oxide gabbro and coarse-grained gabbro, locally magmatic foliation (Sm) developed in oxide gabbro. Oxide rich vein (Vm) cuts foliation. A few dark green veins dipping moderately.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-272R-3, 7-18 cm DRY (back)
305-U1309D-272R-3, 7-36 cm WET

Core Photo



305-U1309D-273R-1 (Section top: 1311.90 mbsf)

UNIT-726: Gabbro
Pieces: 1-11

PRIMARY MINERALOGY: Mode from Piece 2a

Plagioclase	Modal 60% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 40% Size 6 mm average Shape anhedral

COMMENTS: Unit 726 is coarse-grained gabbro.

SECONDARY MINERALOGY: Pale amphibole, chlorite

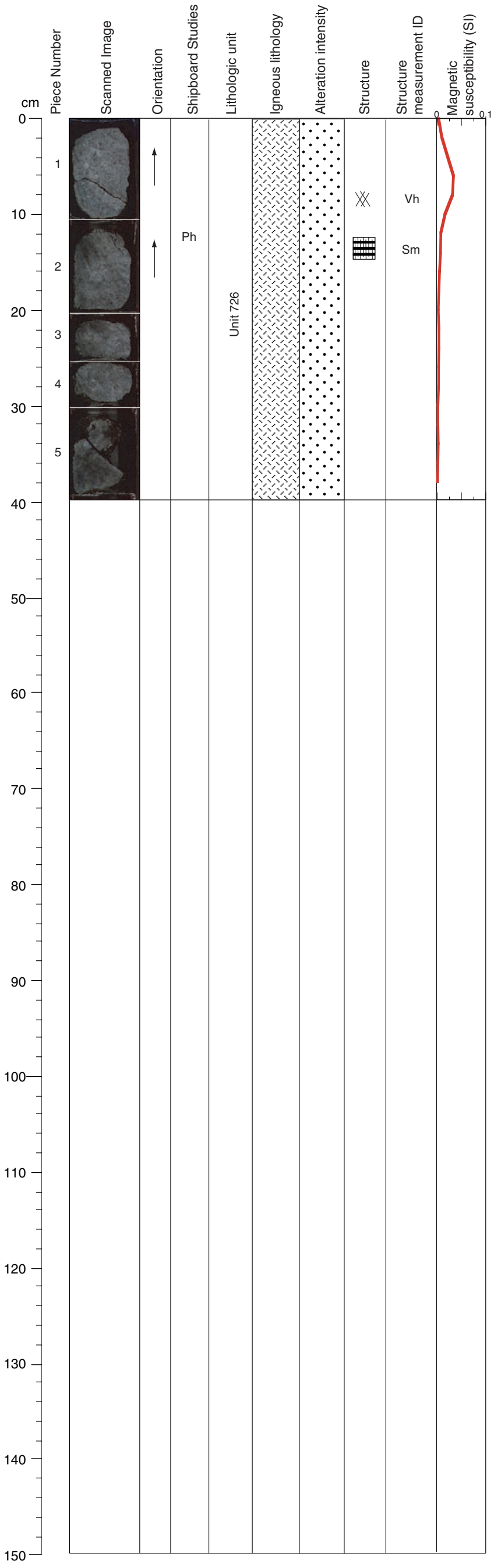
COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches and streaks occur in plagioclase. Dark green veins occur in Pieces 1 (brecciated) and 9 (1 cm alteration halo). A light green (slip-fiber) vein occurs in Piece 4b.

VEIN ALTERATION: Amphibole, chlorite, carbonate, slip fiber.

STRUCTURE: Medium- to coarse-grained gabbro with local pegmatitic grains, completely isotropic. Slight cataclasis.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-273R-1, 54-72 cm WET

Core Photo



305-U1309D-273R-2 (Section top: 1313.32 mbsf)

UNIT-726: Gabbro
Pieces: 1-5

PRIMARY MINERALOGY: Mode from Piece 2

Plagioclase	Modal 60% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 40% Size 5 mm average Shape anhedral

COMMENTS: Unit 726 is medium- to coarse-grained gabbro.

SECONDARY MINERALOGY: Pale amphibole, chlorite

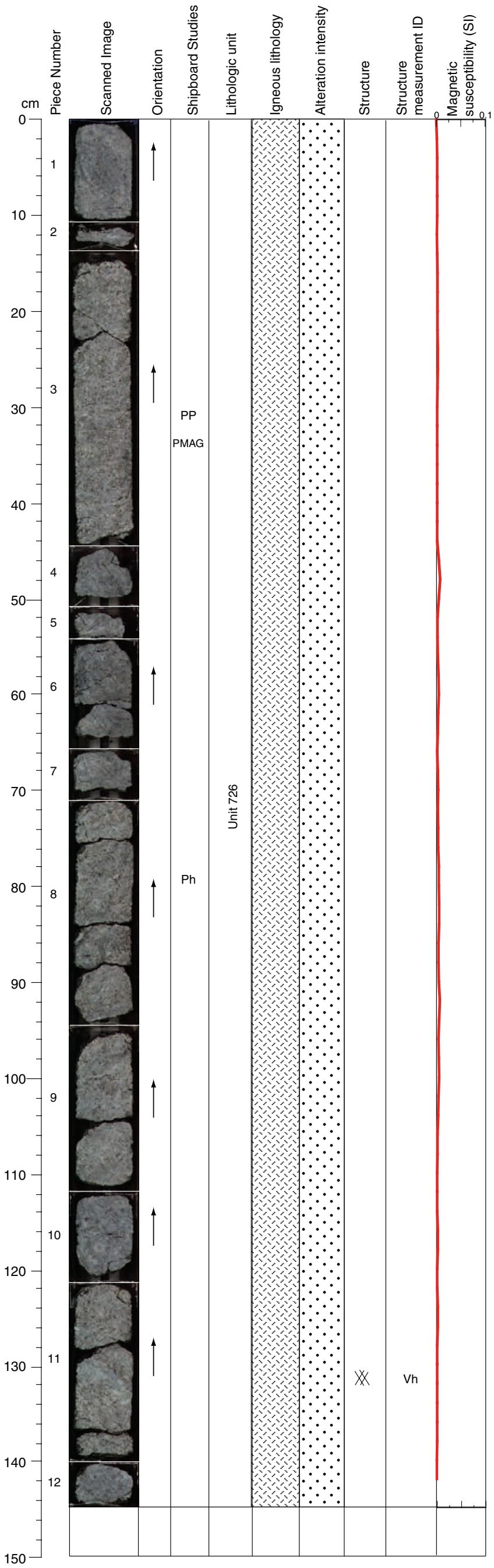
COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches and streaks occur in plagioclase. Dark green vein occurs in Piece 1 (5 mm alteration halo).

VEIN ALTERATION: Amphibole, chlorite.

STRUCTURE: Medium-grained gabbro with no olivine, magmatic foliation developed throughout. Slight cataclasis and a few dark green veins dipping moderately.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-273R-2, 0-20 cm WET

Core Photo



305-U1309D-274R-1 (Section top: 1316.70 mbsf)

UNIT-726: Gabbro
Pieces: 1-12

PRIMARY MINERALOGY: Mode from Piece 3b

Plagioclase	Modal 60% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 40% Size 2 mm average Shape anhedral

COMMENTS: Unit 726 is medium-grained gabbro. Through this section, secondary amphibole is abundant and oxide is very rarely present in some pieces.

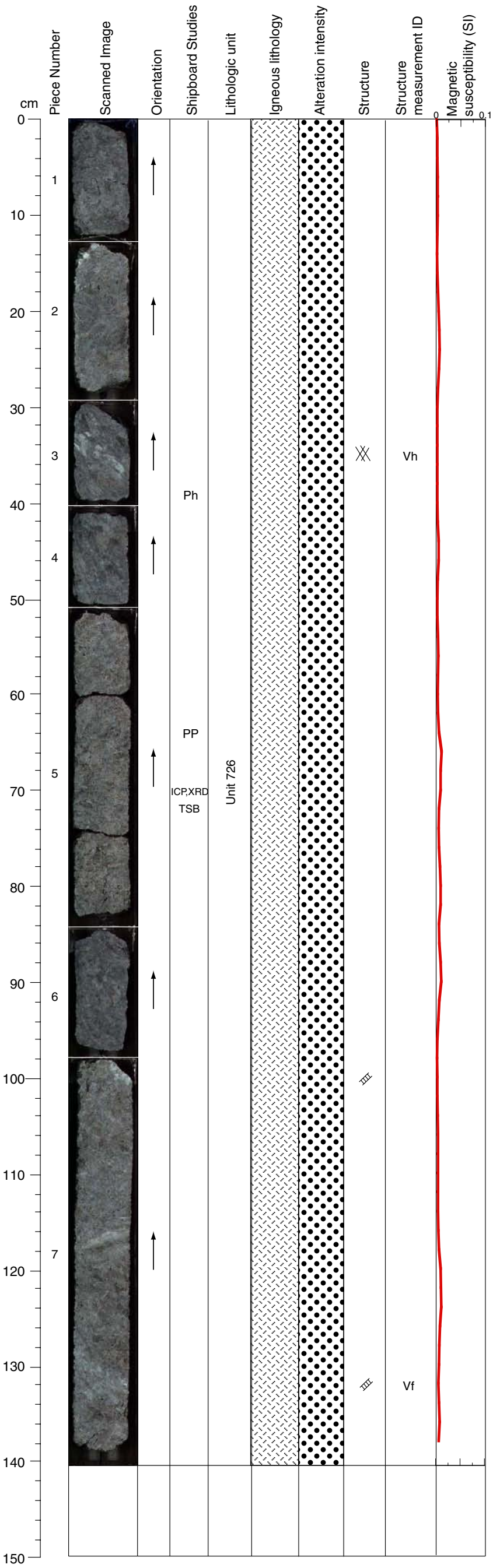
SECONDARY MINERALOGY: Pale amphibole, chlorite

COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches and streaks occur in plagioclase. Dark green vein occurs in Piece 11b (10 mm alteration halo).

VEIN ALTERATION: Amphibole, chlorite.

STRUCTURE: Medium-grained, locally oxide-bearing gabbro, no clear mineral foliation observed. A few dark green veins dipping shallowly and subhorizontal open cracks with white infill.

Core Photo



305-U1309D-274R-2 (Section top: 1318.14 mbsf)

UNIT-726: Gabbro (Gabbronorite)
Pieces: 1-7

PRIMARY MINERALOGY: Mode from Piece 5b

Plagioclase	Modal 60% Size 4 mm average Shape anhedral
Clinopyroxene	Modal 40% Size 3 mm average Shape anhedral

COMMENTS: Unit 726 is medium- to coarse-grained gabbro. A representative thin section contained around 15% coarse orthopyroxene.

SECONDARY MINERALOGY: Pale amphibole, chlorite

COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches and streaks occur in plagioclase. Combination green and white veins occur in Pieces 3 and 7. All have 1 cm alteration halos.

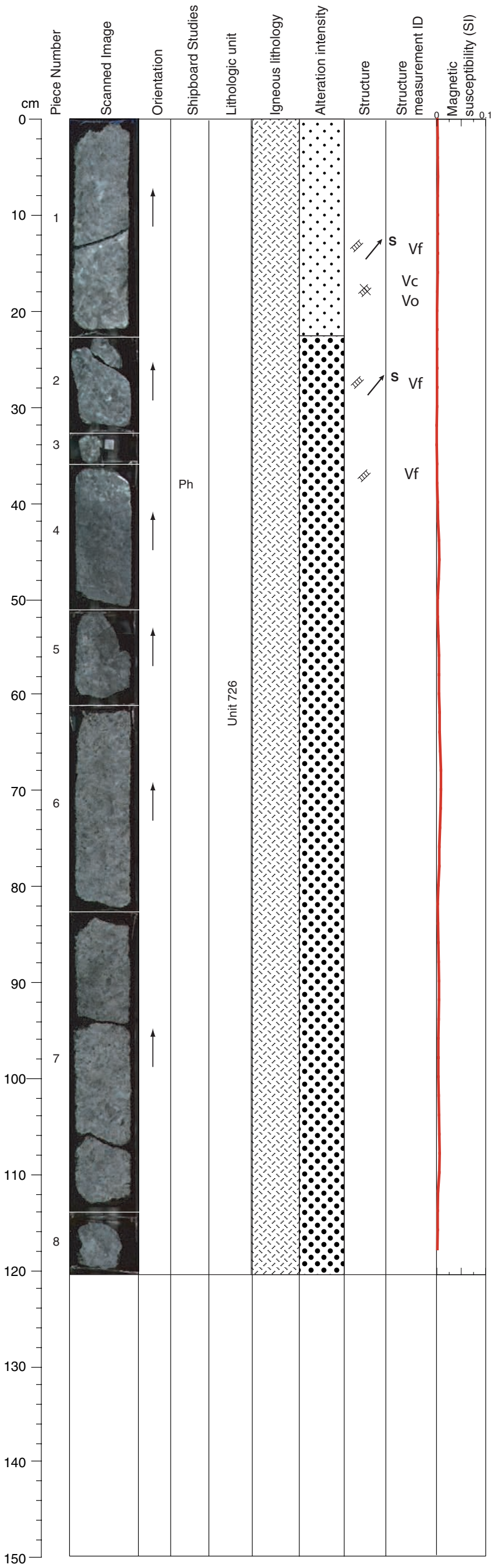
VEIN ALTERATION: Amphibole, chlorite, zeolite.

THIN SECTIONS:
305-U1309D-274R-2, 71-73 cm (#647)

STRUCTURE: Medium-grained, isotropic gabbro. Set of dark green veins dipping shallowly and slight cataclasis distributed.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-274R-2, 30-51 cm WET
305-U1309D-274R-2, 60-83 cm WET

Core Photo



305-U1309D-274R-3 (Section top: 1319.54 mbsf)

UNIT-726: Gabbro
Pieces: 1-8

PRIMARY MINERALOGY: Mode from Piece 6

Plagioclase	Modal 50% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 50% Size 3 mm average Shape anhedral

COMMENTS: Unit 726 is medium-grained gabbro.

SECONDARY MINERALOGY: Pale amphibole, chlorite, talc

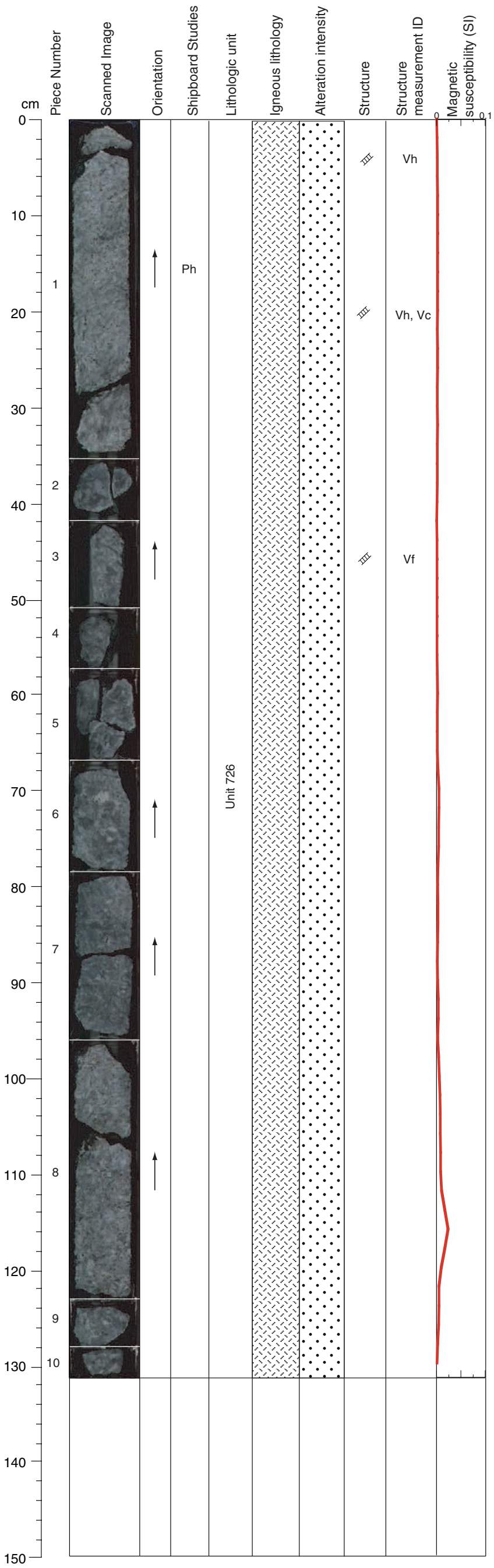
COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches and streaks occur in plagioclase. Two white, zeolite-bearing veins occur in Piece 1b. There is a branching network of these (with green) from 20 to 23 cm. Dark green veins occur in Pieces 1a-b, 2, and 7. The sets in Pieces 1 and 2 have alteration halos about 5 mm thick. A light-green, slip-fiber vein occurs in Piece 4 and has a wide alteration halo (20 mm).

VEIN ALTERATION: Amphibole, chlorite, slip fiber, zeolite.

STRUCTURE: Medium-grained, isotropic gabbro. Moderately dipping dark green veins with white infill crosscut by later steeply dipping pale green veins at 18 cm.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-274R-3, 23-51 cm WET

Core Photo



305-U1309D-275R-1 (Section top: 1321.50 mbsf)

UNIT-726: Gabbro
Pieces: 1-10

PRIMARY MINERALOGY: Mode from Piece 1b

Plagioclase	Modal 65% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 35% Size 5 mm average Shape anhedral

COMMENTS: Unit 726 is medium- to coarse-grained gabbro.

SECONDARY MINERALOGY: Pale amphibole, chlorite

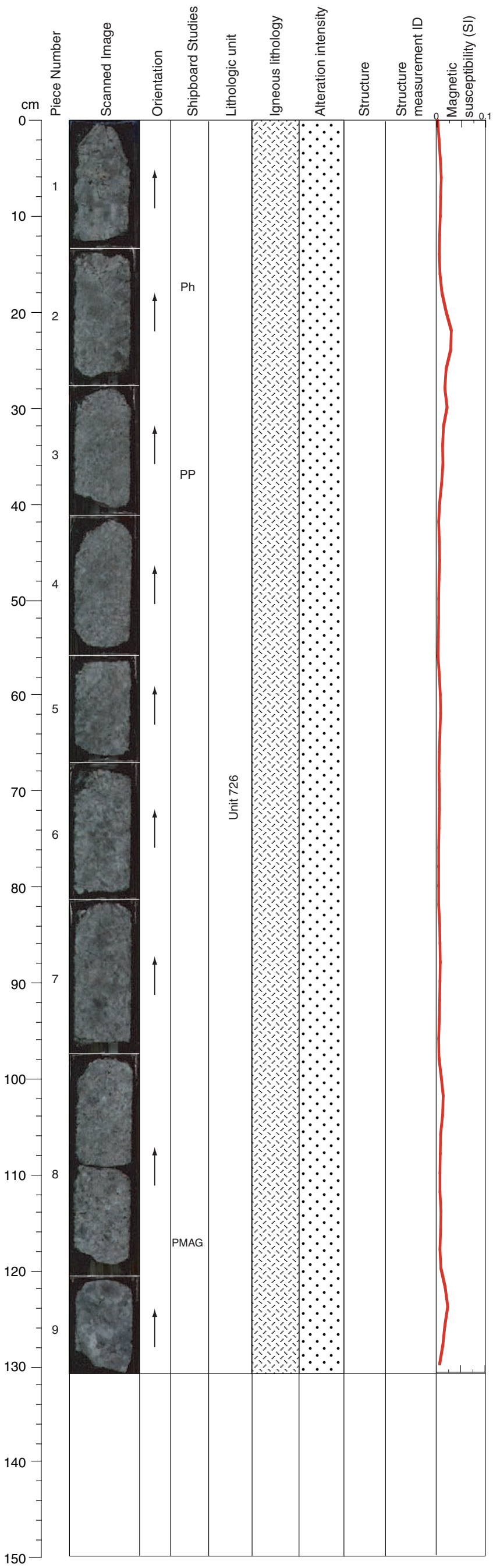
COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches and streaks occur in plagioclase. A white zeolite vein occurs in Piece 1a from 17 to 29 cm. Dark green veins occur in Pieces 1a, 1c (10 mm halo), 2a-b, 3, 5, and 8b (5 mm halo). Both sets have alteration halos typically about 5 mm thick.

VEIN ALTERATION: Chlorite, amphibole zeolite.

STRUCTURE: Medium-grained, isotropic gabbro. A few dark green veins dipping moderately to steeply, later steeply-dipping open cracks.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-275R-1, 4-29 cm WET

Core Photo



305-U1309D-275R-2 (Section top: 1322.81 mbsf)

UNIT-726: Gabbro
Pieces: 1-9

PRIMARY MINERALOGY: Mode from Piece 4

Plagioclase	Modal 55% Size 7 mm average Shape anhedral
Clinopyroxene	Modal 45% Size 7 mm average Shape anhedral

COMMENTS: Unit 726 is medium- to coarse-grained gabbro. Trace of sulfide and oxide at 0-28 cm.

SECONDARY MINERALOGY: Pale amphibole, chlorite

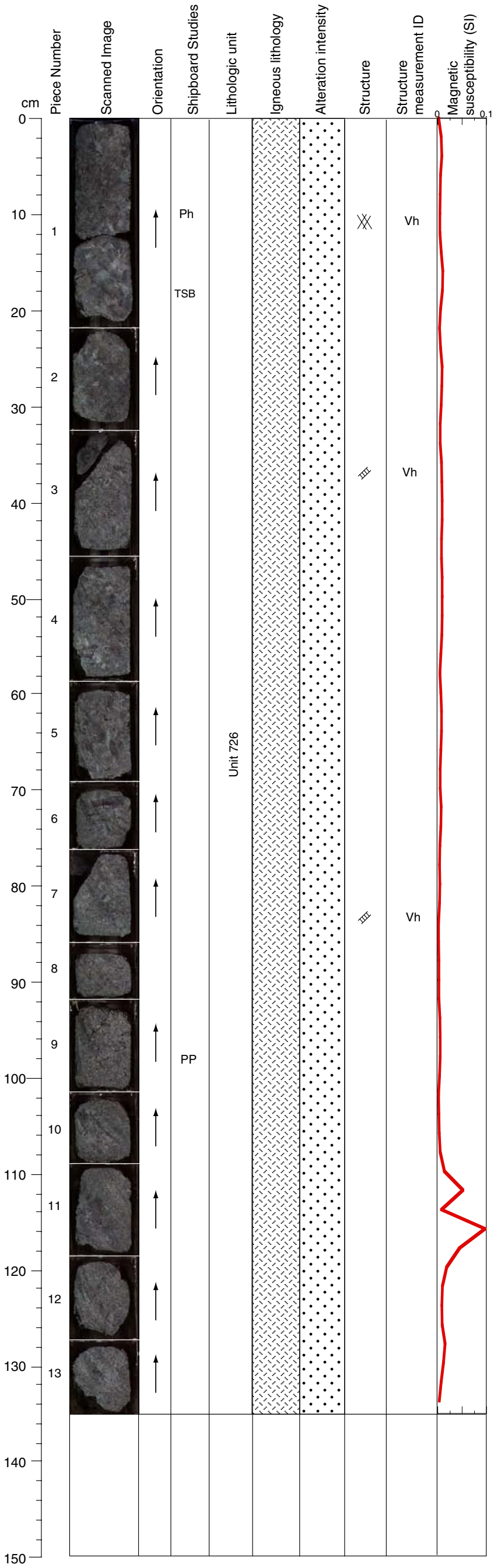
COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches and streaks occur in plagioclase. A faint zone of brecciated material with zeolite mineralization occurs from 73 to 92 cm (difficult to see in scans, better when core is wet).

VEIN ALTERATION: Zeolite

STRUCTURE: Medium-grained, isotropic gabbro.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-275R-2, 0-27 cm WET

Core Photo



305-U1309D-275R-3 (Section top: 1324.12 mbsf)

UNIT-726: Gabbro
Pieces: 1-13

PRIMARY MINERALOGY: Mode from Pieces 4 and 9

Plagioclase	Modal 55-60% Size 4 mm average Shape anhedral
Clinopyroxene	Modal 40-45% Size 4 mm average Shape anhedral

COMMENTS: Unit 726 is medium- to coarse-grained gabbro. Patches of coarser grained crystals. Trace of oxide in Piece 13. Few large orthopyroxene grains observed in thin section (modally as much as 2%).

SECONDARY MINERALOGY: Pale amphibole, chlorite

COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches and streaks occur in plagioclase. Dark green veins occur in Pieces 1a, 1b, 3a-b, and 7.

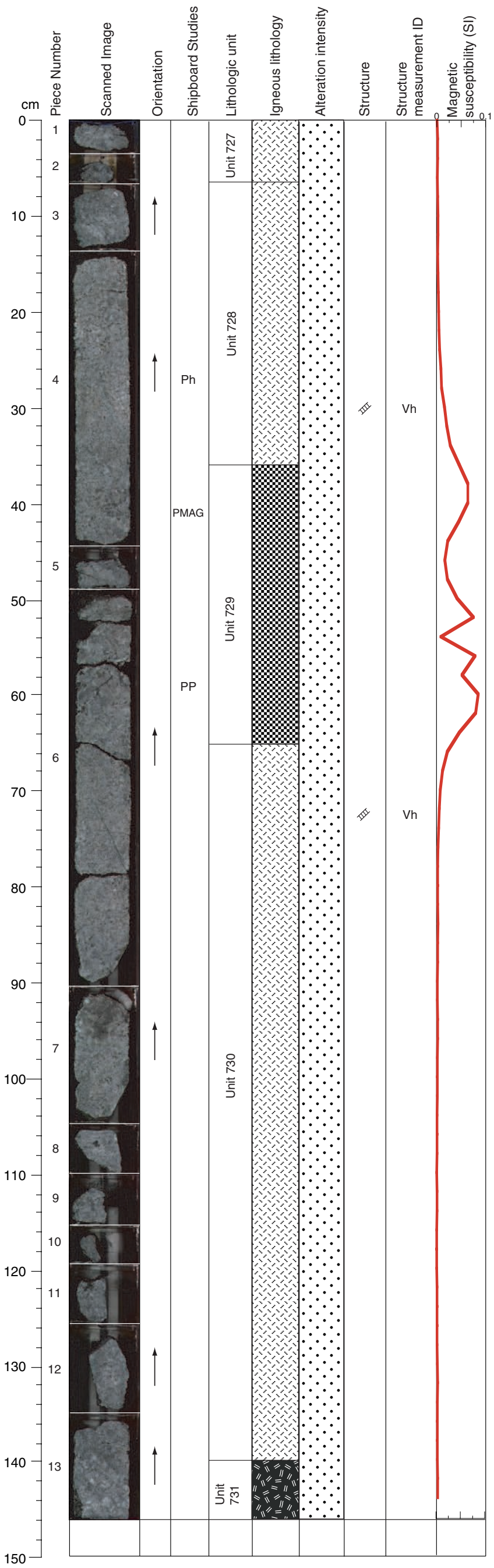
VEIN ALTERATION: Amphibole, chlorite.

THIN SECTIONS:
305-U1309D-275R-3, 16-19 cm (#648)

STRUCTURE: Medium-grained, locally sulfide-bearing gabbro, no magmatic or plastic strain fabric developed. A few dark green veins dipping moderate to steeply.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-275R-3, 0-21 cm WET

Core Photo



305-U1309D-276R-1 (Section top: 1326.30 mbsf)

UNIT-727, -728: Gabbro
Pieces: 1-4

PRIMARY MINERALOGY: Mode from Piece 3

Plagioclase	Modal 60% Size 4 mm average Shape anhedral
Clinopyroxene	Modal 40% Size 2 mm average Shape anhedral

COMMENTS: Units 727, 728 medium-grained gabbro; Pieces 1-2 are rubble and comprise Unit 727.

UNIT-729: Oxide Gabbro
Pieces: 4-6c

PRIMARY MINERALOGY: Mode from Pieces 4-6c

Oxide	Modal 7% Size 5 mm average Shape anhedral
Plagioclase	Modal 53% Size 4 mm average Shape anhedral
Clinopyroxene	Modal 40% Size 4 mm average Shape anhedral

COMMENTS: Unit 729 is coarse-grained oxide gabbro. Gradational boundaries with surrounding gabbro units.

UNIT-730 Gabbro
Pieces: 6d-13

PRIMARY MINERALOGY: Mode from Piece 6d

Plagioclase	Modal 60% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 40% Size 2 mm average Shape anhedral

COMMENTS: Unit 730 is medium-grained gabbro.

UNIT-731 Olivine-bearing Gabbro
Pieces: 13

PRIMARY MINERALOGY: Mode from Piece 13

Olivine	Modal 4% Size 3 mm average Shape anhedral
Plagioclase	Modal 41% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 55% Size 4 mm average Shape anhedral

COMMENTS: Unit 731 is medium-grained olivine-bearing gabbro.

SECONDARY MINERALOGY: Pale amphibole, chlorite

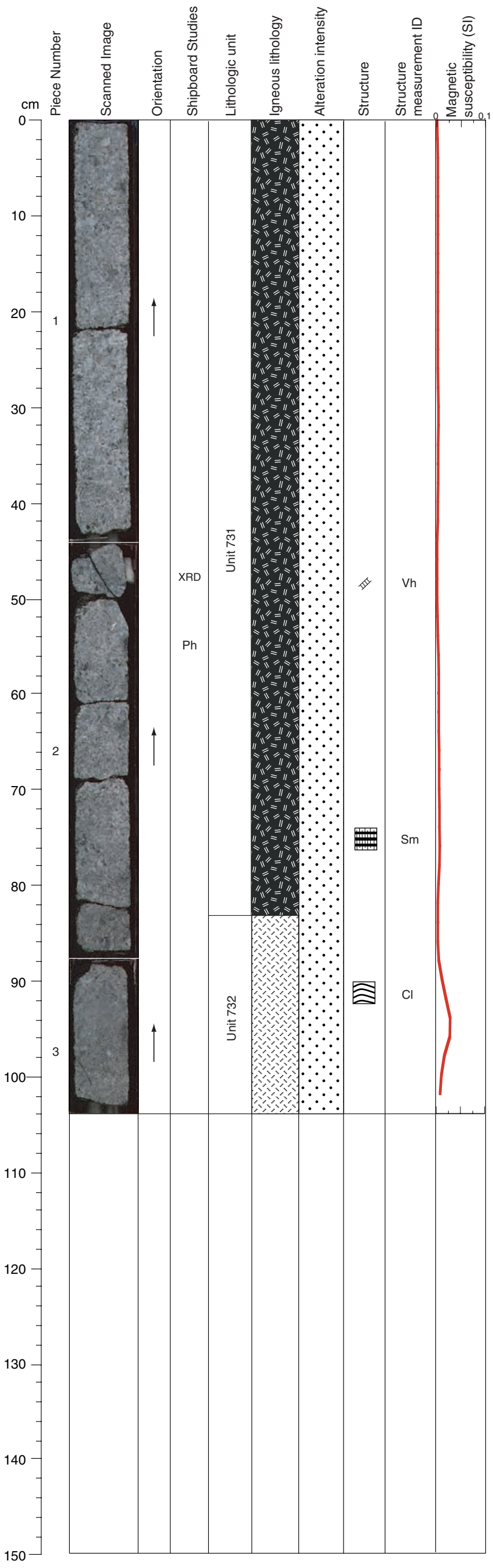
COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches and streaks occur in plagioclase. Dark green veins occur in Pieces 4 (halo ~4 mm), 6, 7 (halo ~5 mm), and 13 (braided).

VEIN ALTERATION: Amphibole and chlorite

STRUCTURE: Medium-grained, locally oxide-bearing gabbro, isotropic gabbro. A few dark green veins dipping steeply.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-276R-1, 14-44 cm WET

Core Photo



305-U1309D-276R-2 (Section top: 1327.76 mbsf)

UNIT-731 Olivine-bearing Gabbro
Pieces: 1-2e

PRIMARY MINERALOGY: Mode from Piece 1b

Olivine	Modal 4% Size 3 mm average Shape anhedral
Plagioclase	Modal 41% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 55% Size 4 mm average Shape anhedral

COMMENTS: Unit 731 is medium-grained olivine-bearing gabbro.

UNIT-732 Gabbro
Pieces: 2e-3

PRIMARY MINERALOGY: Mode from Piece 3

Plagioclase	Modal 60% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 40% Size 2 mm average Shape anhedral

COMMENTS: Unit 732 is medium-grained gabbro.

SECONDARY MINERALOGY: Pale amphibole, chlorite

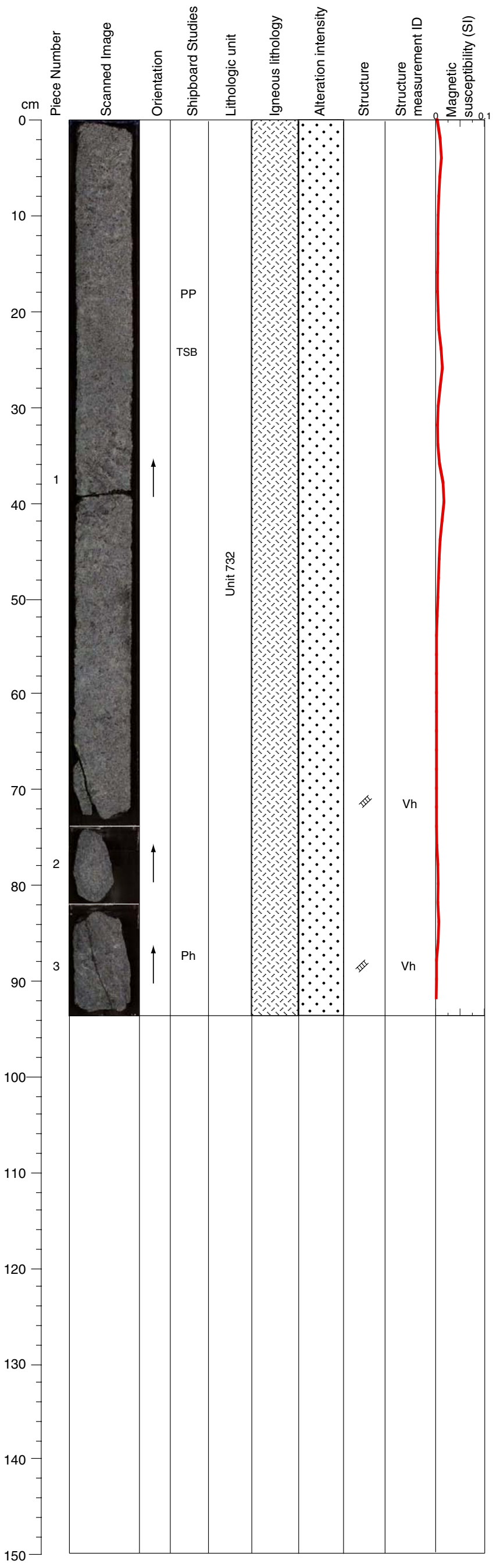
COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches and streaks occur in plagioclase. Dark green veins occur in Pieces 1b (halo ~10 mm) and 2c.

VEIN ALTERATION: Amphibole, chlorite, talc.

STRUCTURE: Medium-grained, locally olivine bearing gabbro with common, faint modal banding parallel to a locally developed magmatic foliation. A single dark green vein.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-276R-2, 44-69 cm WET

Core Photo



305-U1309D-276R-3 (Section top: 1328.80 mbsf)

UNIT-732 Gabbro (Gabbronite)
Pieces: 1-3

PRIMARY MINERALOGY: Mode from Piece 1b

Plagioclase	Modal 65% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 35% Size 2 mm average Shape anhedral

COMMENTS: Unit 732 is medium-grained gabbro. As much as 9% orthopyroxene observed in thin section.

SECONDARY MINERALOGY: Pale amphibole, chlorite

COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches and streaks occur in plagioclase. Dark green veins occur in Pieces 1a-c (halos ~ 5 mm) and Piece 3 (composite).

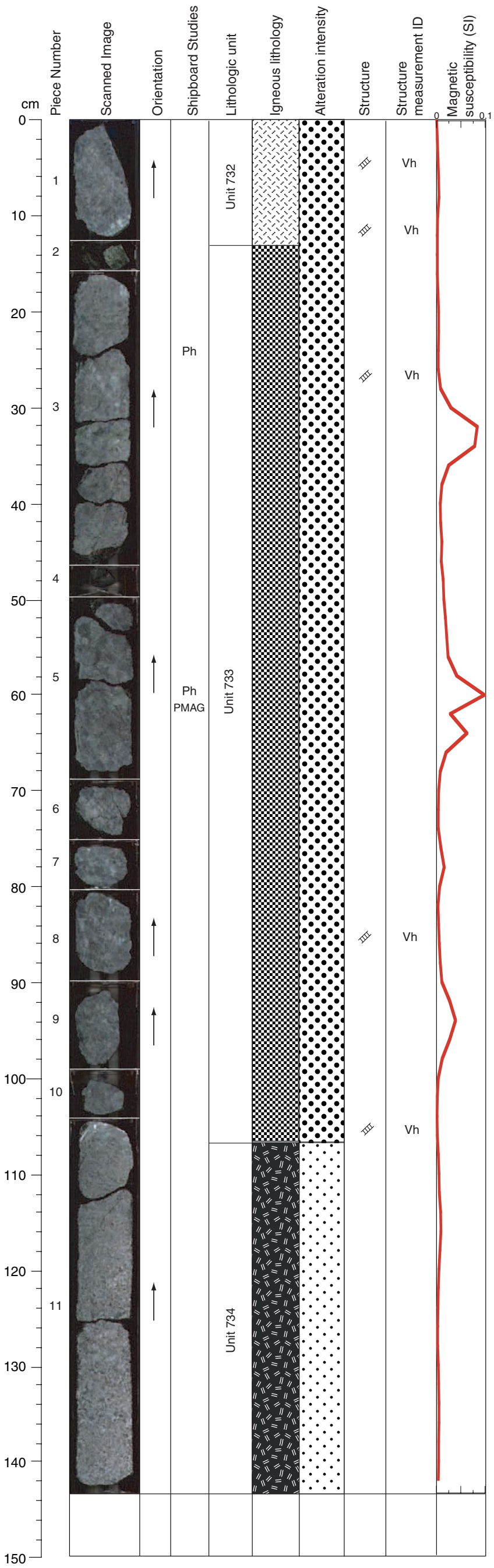
VEIN ALTERATION: Amphibole, chlorite.

THIN SECTIONS:
305-U1309D-276R-3, 23-26 cm (#649)

STRUCTURE: Medium-grained gabbro with no certain magmatic or plastic fabric. Possible indication for steep magmatic fabric but pattern is inconsistent. A few dark green veins steeply dipping at bottom of section.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-276R-3, 10-30 cm WET
305-U1309D-276R-3, 84-93 cm WET

Core Photo



305-U1309D-277R-1 (Section top: 1329.60 mbsf)

UNIT-732 Gabbro
Pieces: 1

PRIMARY MINERALOGY: Mode from Piece 1

Plagioclase	Modal 65% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 35% Size 2 mm average Shape anhedral

COMMENTS: Unit 732 is medium-grained gabbro.

UNIT-733 Oxide Gabbro
Pieces: 2-11a

PRIMARY MINERALOGY: Mode from Piece 5c

Oxide	Modal 5% Size 4 mm average Shape anhedral
Plagioclase	Modal 65% Size 4 mm average Shape anhedral
Clinopyroxene	Modal 30% Size 10 mm average Shape anhedral

COMMENTS: Unit 733 is coarse-grained oxide gabbro. This unit starts at small piece containing oxide. Massive oxide (< 11 mm).

UNIT-734 Olivine-bearing Gabbro
Pieces: 11a-11c

PRIMARY MINERALOGY: Mode from Piece 11c

Olivine	Modal 3% Size 4 mm average Shape anhedral
Plagioclase	Modal 45% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 52% Size 5 mm average Shape anhedral

COMMENTS: Unit 734 is medium-grained olivine-bearing gabbro.

SECONDARY MINERALOGY: Pale amphibole, chlorite, talc

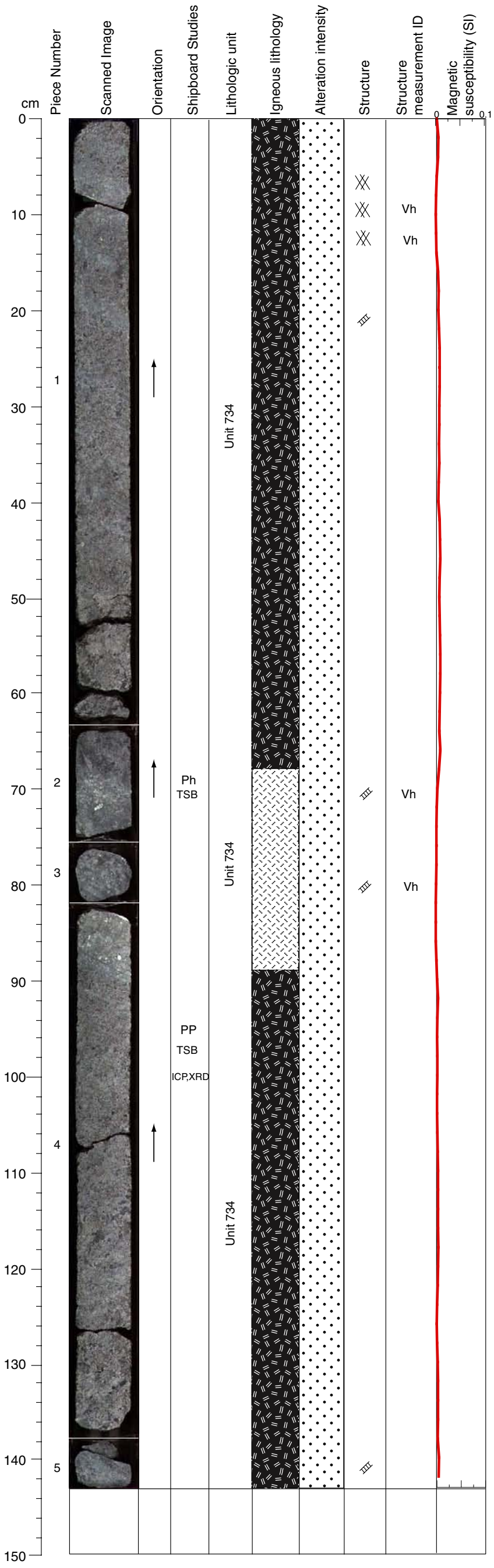
COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches and streaks occur in plagioclase. Alteration is stronger in Pieces 1-10. Some patches of leucocratic alteration occur in the bottom of Piece 1 and top of Piece 11. A green and white vein (branching) occurs in Piece 3b and green and white vein material coats the top of 11a. Dark green veins occur in Pieces 3d-e, and 11b.

VEIN ALTERATION: Amphibole, chlorit, carbonate, slip-fiber, talc, zeolite.

STRUCTURE: Medium-grained, in oxide bearing part somewhat coarser grained gabbro, no magmatic or plastic strain visible. Set of open cracks (locally steeply dipping) and pale green veins shallowly dipping.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-277R-1, 16-46 cm WET
305-U1309D-277R-1, 50-68 cm WET

Core Photo



305-U1309D-277R-2 (Section top: 1331.04 mbsf)

UNIT-734 Olivine-bearing Gabbro and Gabbro
Pieces: 1-5

PRIMARY MINERALOGY: Mode from several pieces

Olivine	Modal 1-4% Size 3 mm average Shape anhedral
Plagioclase	Modal 41-65% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 35-55% Size 3 mm average Shape anhedral

COMMENTS: Unit 734 is medium-grained olivine-bearing gabbro. Gabbro interval from 68-89 cm.

SECONDARY MINERALOGY: Pale amphibole, chlorite, talc

COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches and streaks occur in plagioclase. Dark green veins appear in Pieces 1a (braided with alteration halo ~ 20 mm), 1b (several sets with halos from 5 to 15 mm), 4a (two braided sets with halos a total of 50 mm wide), and 5b (with alteration halo about 20 mm). Green and white vein material coats the bottom of Piece 1a. Minor corona texture appears in Pieces 2, 3, top of 4, and Piece 5 in associated with fine veining.

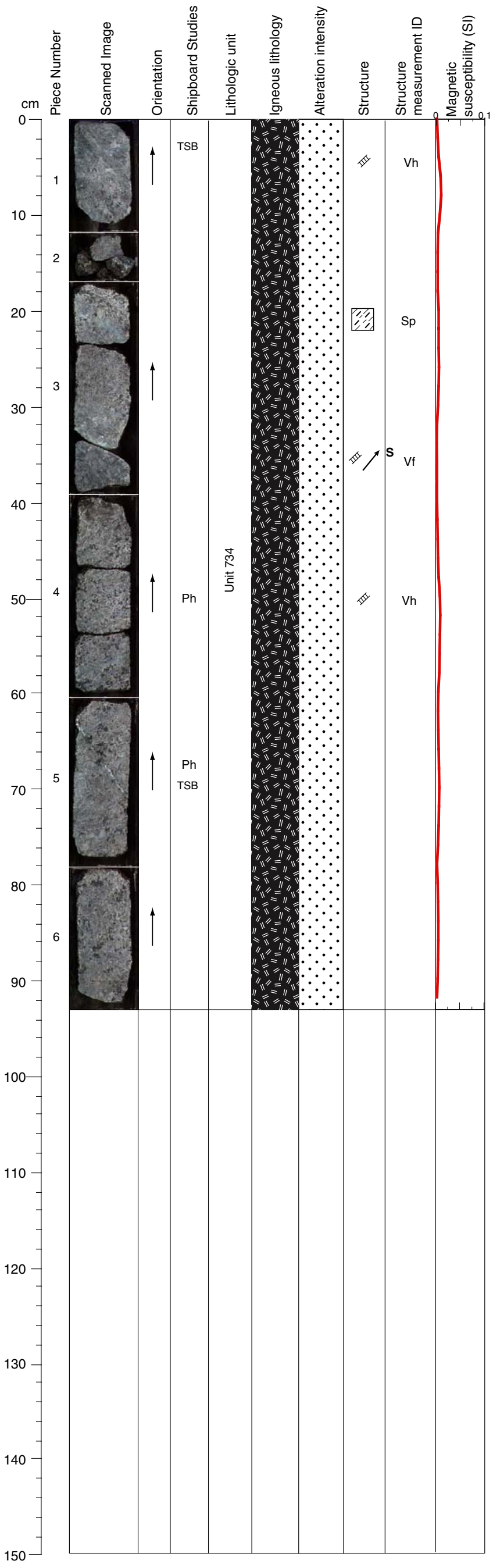
VEIN ALTERATION: Amphibole, chlorite, carbonate, slip-fiber, zeolite.

THIN SECTIONS:
305-U1309D-277R-2, 69-71 cm (#650)
305-U1309D-277R-2, 96-98 cm (#651)

STRUCTURE: Medium-grained, isotropic gabbro, interval with oxide gabbro. Moderately dipping dark green veins with alteration halos, and set of shallow dipping, white fault veins and associated alteration.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-277R-2, 63-75 cm WET
305-U1309D-277R-2, 82-106 cm WET

Core Photo



305-U1309D-277R-3 (Section top: 1332.47 mbsf)

UNIT-734 Olivine-bearing Gabbro
Pieces: 1-6

PRIMARY MINERALOGY: Mode from Piece 6

Olivine	Modal 4% Size 2 mm average Shape anhedral
Plagioclase	Modal 46% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 50% Size 3 mm average Shape anhedral

COMMENTS: Unit 734 is medium-grained olivine-bearing gabbro. Slightly olivine-rich (>5%) at 43-60 cm.

SECONDARY MINERALOGY: Pale amphibole, chlorite

COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches and streaks occur in plagioclase. Dark green/light green veins appear in Pieces 1a (braided with alteration halo ~ 15 mm), bottom of 3b and top of 3c, and Piece 4c (braided/branching with halos ~5 mm each). Light green vein (braided) appears in Piece 3a (halo ~ 7 mm), and in Piece 5 near the top with a crosscutting vein of green and white from 62 to 71 cm (halo ~ 3 mm). Some very minor corona texture appears near some veins within alteration halos.

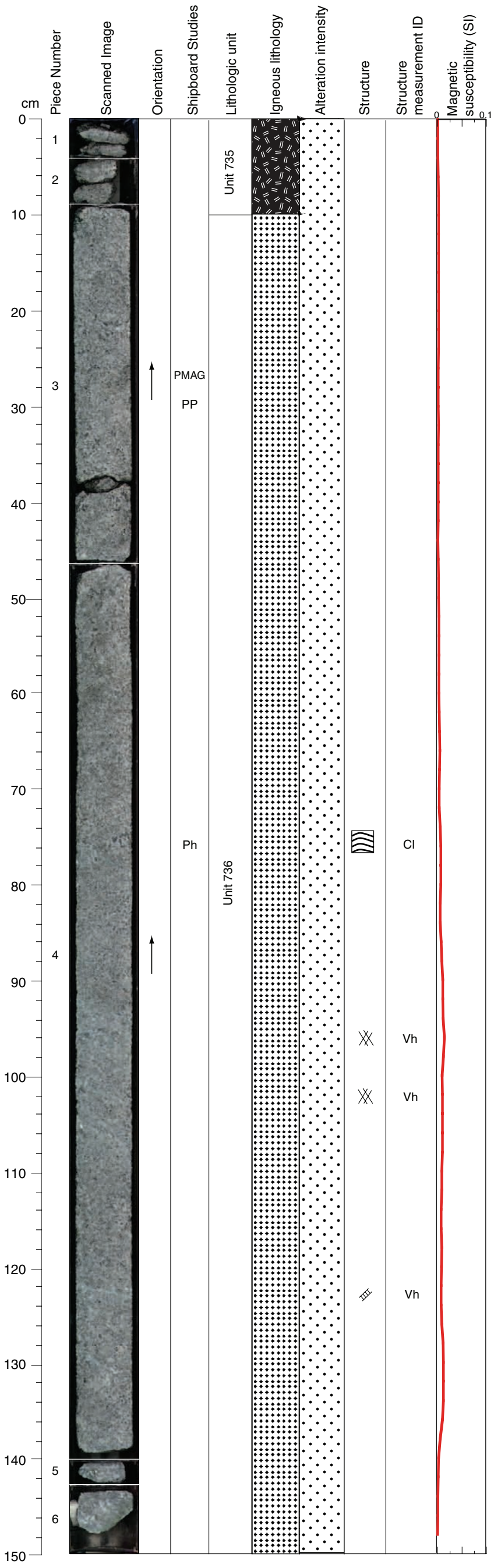
VEIN ALTERATION: Amphibole, chlorite, carbonate, slip-fiber, zeolite.

THIN SECTIONS:
305-U1309D-277R-3, 2-4 cm (#652)
305-U1309D-277R-3, 68-72 cm (#653)

STRUCTURE: Medium-grained gabbro, locally olivine bearing, narrow zone of plastic strain. Shallow dipping pale green irregular veins, some of which have fibers.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-277R-3, 0-24 cm WET
305-U1309D-277R-3, 39-60 cm WET
305-U1309D-277R-3, 60-77 cm WET

Core Photo



305-U1309D-278R-1 (Section top: 1334.40 mbsf)

UNIT-735 Olivine-bearing Gabbro Rubble
Pieces: 1-2

COMMENTS: Unit 735 is medium-grained olivine-bearing gabbro. Slightly olivine-rich (>5%) at 43-60 cm.

UNIT-736 Olivine Gabbro
Pieces: 3-6

PRIMARY MINERALOGY: Mode from Piece 3

Olivine	Modal 10% Size 3 mm average Shape anhedral
Plagioclase	Modal 45% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 45% Size 2 mm average Shape anhedral

COMMENTS: Unit 736 is medium-grained olivine gabbro. Oxide in Piece 6.

SECONDARY MINERALOGY: Pale amphibole, chlorite

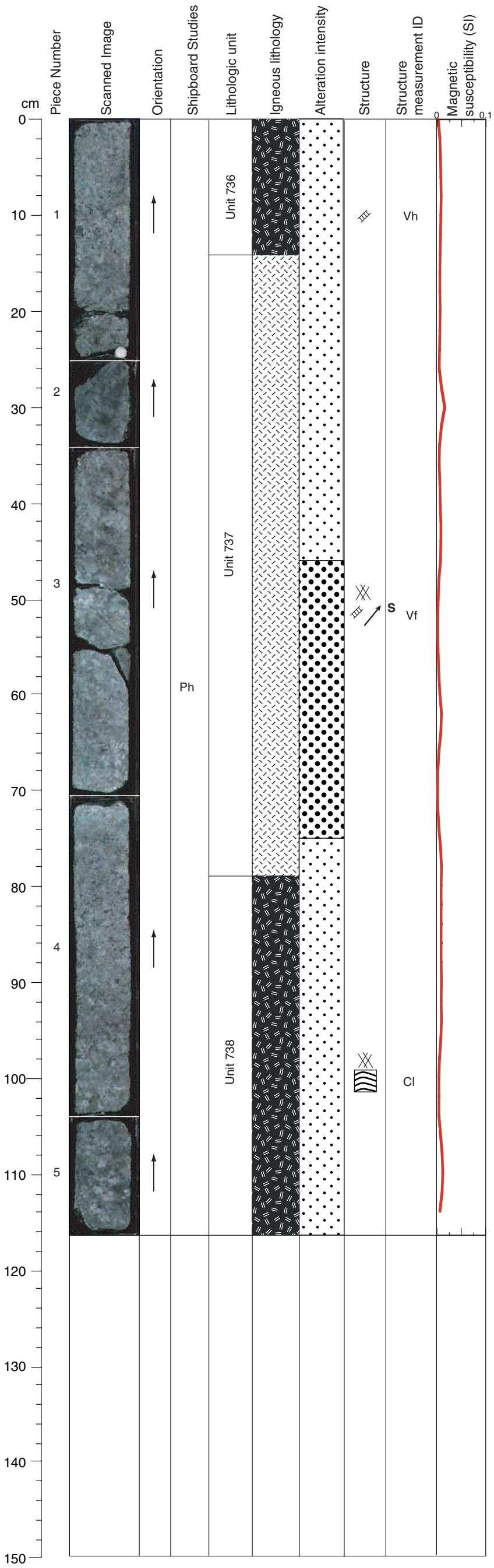
COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches and streaks occur in plagioclase. Several sets of braided green and green and white veins appear in Piece 4. Alteration halos ~ 10 mm per vein set, but they overlap in several areas, thus the related alteration appears to extend for much of the affected interval and corona texture appears in the alteration halos. Corona texture also appears in Pieces 5 and 6 and may be related to alteration associated with green and white vein that coats the bottom of Piece 6.

VEIN ALTERATION: Amphibole, chlorite, carbonate, slip-fiber, zeolite.

STRUCTURE: Medium-grained gabbro with subtle modal banding developed. No magmatic or plastic strain fabric visible. Set of shallow dipping dark green veins.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-278R-1, 73-99 cm WET

Core Photo



305-U1309D-278R-2 (Section top: 1335.90 mbsf)

UNIT-736 Olivine-bearing Gabbro
Pieces: 1a

PRIMARY MINERALOGY: Mode from Piece 1a

Olivine	Modal 5% Size 3 mm average Shape anhedral
Plagioclase	Modal 45% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 50% Size 2 mm average Shape anhedral

COMMENTS: Unit 736 is medium-grained olivine-bearing gabbro.

UNIT-737 Gabbro
Pieces: 1a-4

PRIMARY MINERALOGY: Mode from Piece 3c

Olivine	Modal <1% Size 3 mm average Shape anhedral
Plagioclase	Modal 45% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 55% Size 2 mm average Shape anhedral

COMMENTS: Unit 737 is medium-grained gabbro.

UNIT-738 Olivine-bearing Gabbro
Pieces: 4-5

PRIMARY MINERALOGY: Mode from Piece 4

Olivine	Modal 5% Size 3 mm average Shape anhedral
Plagioclase	Modal 40% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 55% Size 2 mm average Shape anhedral

COMMENTS: Unit 738 is medium-grained olivine-bearing gabbro.

SECONDARY MINERALOGY: Pale amphibole, chlorite, talc

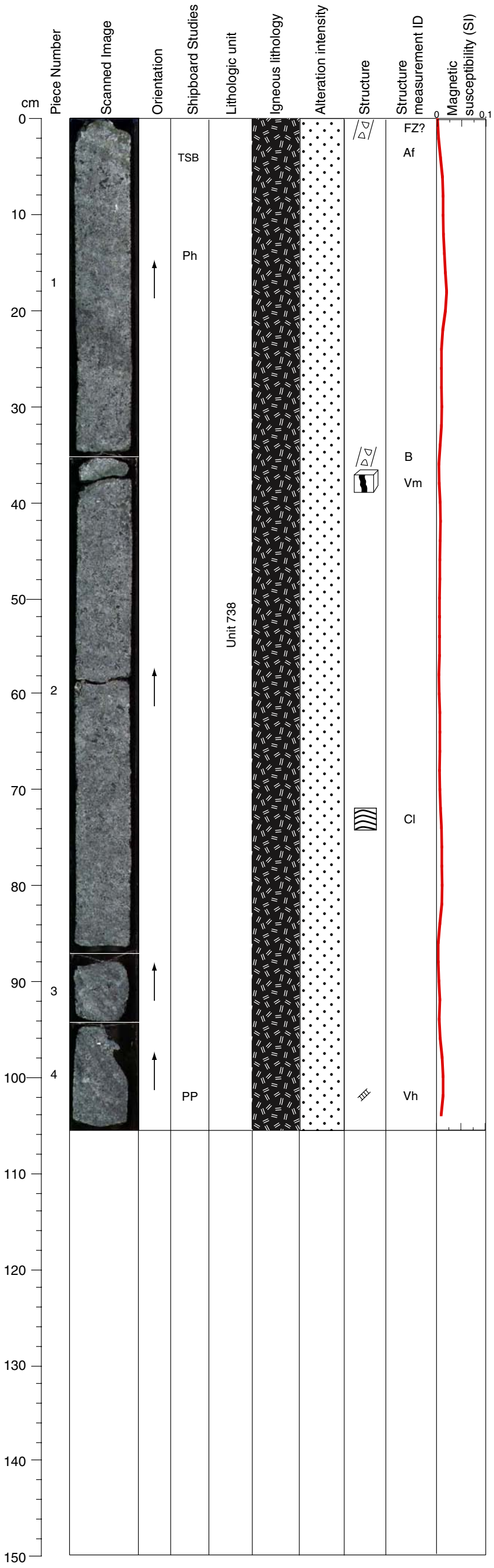
COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches and streaks occur in plagioclase. A green vein with some white patches (alteration halo 4 mm) appears in Piece 1. Several sets of braided or branching green and green and white veins appear in Piece 3 and the top of Piece 4. Alteration halos ~ 10 mm per vein set, and minor corona texture appears in the alteration halos. A patch of leucocratic alteration appears in the bottom of Piece 3 and the top of Piece 4. Corona texture is present within about 20 mm of this contact. Similar alteration also appears at the bottom of Piece 4 and the top of Piece 5.

VEIN ALTERATION: Amphibole, carbonate, slip-fiber, zeolite.

STRUCTURE: Medium-grained, isotropic gabbro with unusually sharply defined transition into olivine gabbro at base of section, here classified as compositonal layering (Cl). Several dark green veins dipping moderately and some cataclasis in lower part.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-278R-2, 49-70 cm WET

Core Photo



305-U1309D-278R-3 (Section top: 1337.04 mbsf)

UNIT-738 Olivine-bearing Gabbro
Pieces: 1-4

PRIMARY MINERALOGY: Mode from Piece 4

Olivine	Modal 5% Size 3 mm average Shape anhedral
Plagioclase	Modal 45% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 50% Size 2 mm average Shape anhedral

COMMENTS: Unit 738 is medium-grained olivine-bearing gabbro.

SECONDARY MINERALOGY: Pale amphibole, chlorite

COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches and streaks occur in plagioclase. A patch of leucocratic alteration appears in the top 20 mm of Piece 1 and the top 10 mm of Pieces 2a-b. Green vein material coats the bottom of Piece 2a and top of Piece 2b. A green vein with some white patches appears in the top of Piece 4.

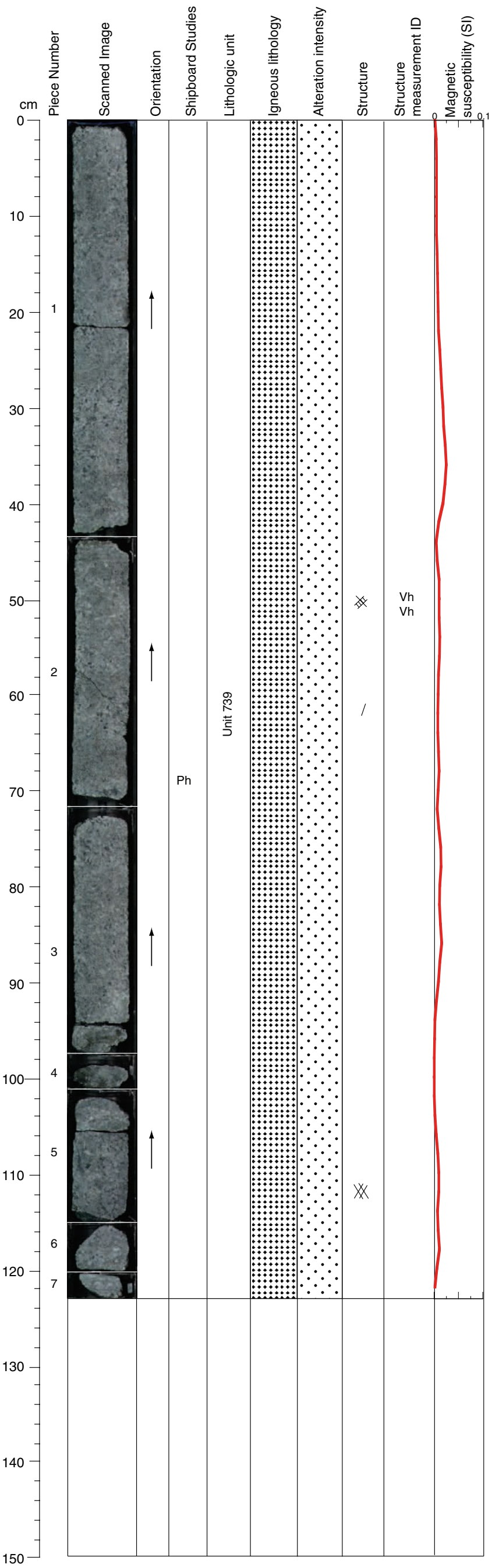
VEIN ALTERATION: Amphibole, plagioclase, chlorite, slip-fiber, zeolite.

THIN SECTIONS:
305-U1309D-278R-3, 2-5 cm (#654)

STRUCTURE: Medium-grained to fine-grained gabbro, local grain size banding developed, no magmatic or plastic fabric. A cataclastic zone on top of section (dark green), and a few dark green veins shallowly dipping.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-278R-3, 0-25 cm WET

Core Photo



305-U1309D-279R-1 (Section top: 1339.20 mbsf)

UNIT-739 Olivine Gabbro
Pieces: 1-7

PRIMARY MINERALOGY: Mode from Piece 3a

Olivine	Modal 10% Size 3 mm average Shape anhedral
Plagioclase	Modal 40% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 50% Size 2 mm average Shape anhedral

COMMENTS: Unit 739 is medium-grained olivine gabbro.

SECONDARY MINERALOGY: Pale amphibole, chlorite

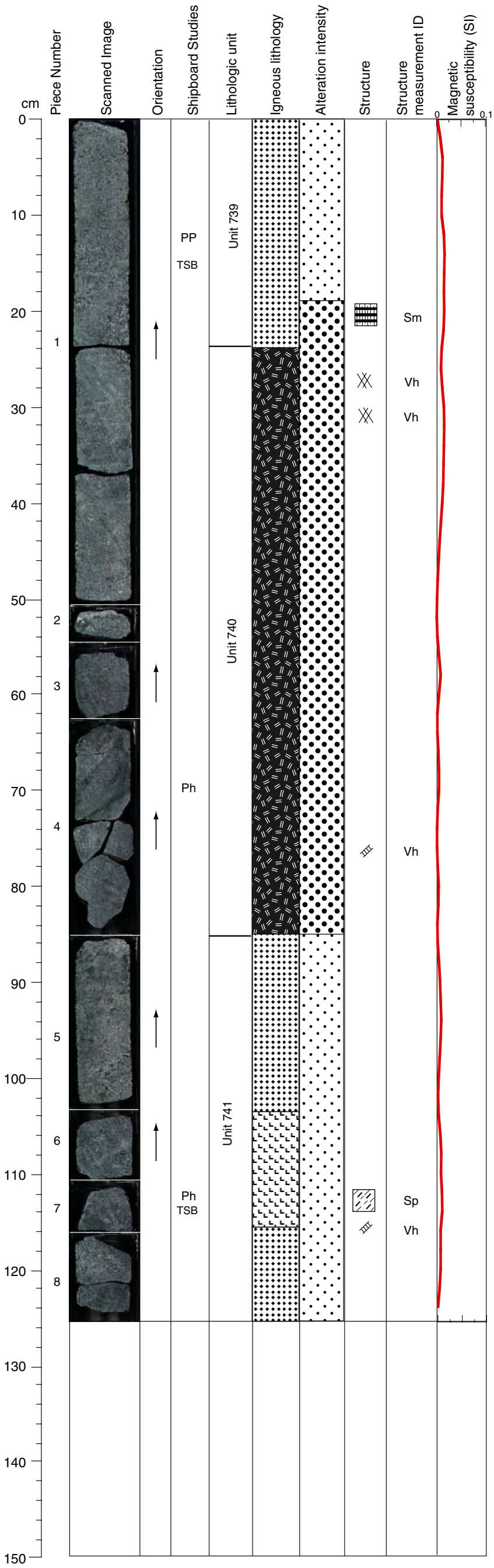
COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches and streaks occur in plagioclase. A patch of leucocratic alteration appears in the top 20 mm of Piece 1 and the top 10 mm of Pieces 2a-b. Green vein material coats the bottom of Piece 2a and top of Piece 2b. A green vein with some white patches appears in the top of Piece 4.

VEIN ALTERATION: Amphibole, chlorite.

STRUCTURE: Fine- to medium-grained gabbro with a few dark green veins, some of them with alteration halos. Later open cracks with dark green infill.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-279R-1, 44-70 cm WET

Core Photo



305-U1309D-279R-2 (Section top: 1340.43 mbsf)

UNIT-739 Olivine Gabbro
Piece 1a

PRIMARY MINERALOGY: Mode from Piece 1a

Olivine	Modal 15% Size 2 mm average Shape anhedral
Plagioclase	Modal 40% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 45% Size 2 mm average Shape anhedral

COMMENTS: Unit 739 is medium-grained olivine gabbro.

UNIT-740 Olivine-bearing Gabbro
Pieces: 1b-4

PRIMARY MINERALOGY: Mode from Piece 1c

Olivine	Modal 2% Size 3 mm average Shape anhedral
Plagioclase	Modal 45% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 53% Size 2 mm average Shape anhedral

COMMENTS: Unit 740 is medium-grained olivine-bearing gabbro. Coarse-grained leucocratic dikelet at 51-54 cm and 61-64 cm.

UNIT-741 Olivine Gabbro
Pieces: 5-8 (excluding troctolitic gabbro interval described below)

PRIMARY MINERALOGY: Mode from Piece 8

Olivine	Modal 10% Size 3 mm average Shape anhedral
Plagioclase	Modal 40% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 50% Size 2 mm average Shape anhedral

UNIT-741 Troctolitic Gabbro
Pieces: 6-7

PRIMARY MINERALOGY: Mode from Piece 6

Olivine	Modal 25% Size 3 mm average Shape anhedral
Plagioclase	Modal 75% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 5% Size 2 mm average Shape anhedral

COMMENTS: Unit 741 is medium-grained olivine gabbro. This unit includes inhomogeneous pieces. Fine-scale grain size and modal variations within this interval. Fine-grained gabbro in Piece 6 and olivine gabbro in Piece 8. Medium-grained troctolititc gabbro in Pieces 6-7.

SECONDARY MINERALOGY: Pale amphibole, chlorite, talc

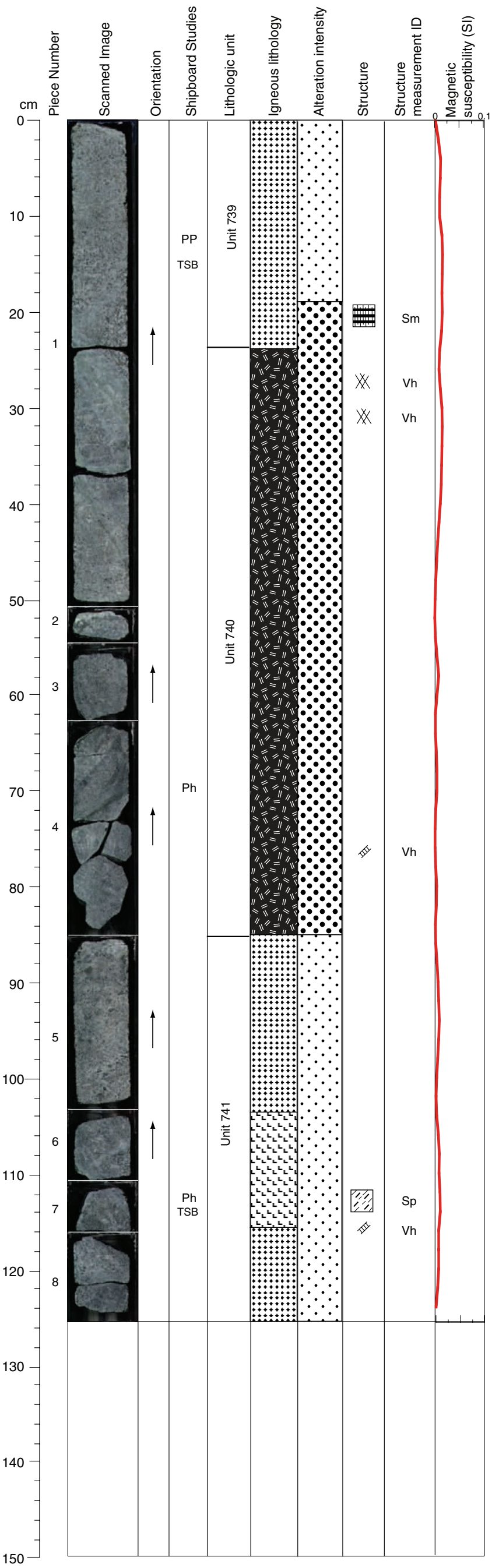
COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and very minor serpentine after olivine. White patches and streaks occur in plagioclase. A patch of leucocratic alteration appears in the top of Pieces 2 and 5. Numerous dark green braided veins occur throughout the section. They have alteration halos that vary from 7 mm to 20 mm wide and some corona texture has developed in the alteration zones. Fault gouge occurs in Piece 2a, 51 cm to 53 cm and has associated light green vein material (including carbonate).

VEIN ALTERATION: Amphibole, plagioclase, chlorite, carbonate, slip-fiber, zeolite.

THIN SECTIONS:
305-U1309D-279R-2, 14-16 cm (#655)
305-U1309D-279R-2, 113-115 cm (#656)

Continued on next page

Core Photo

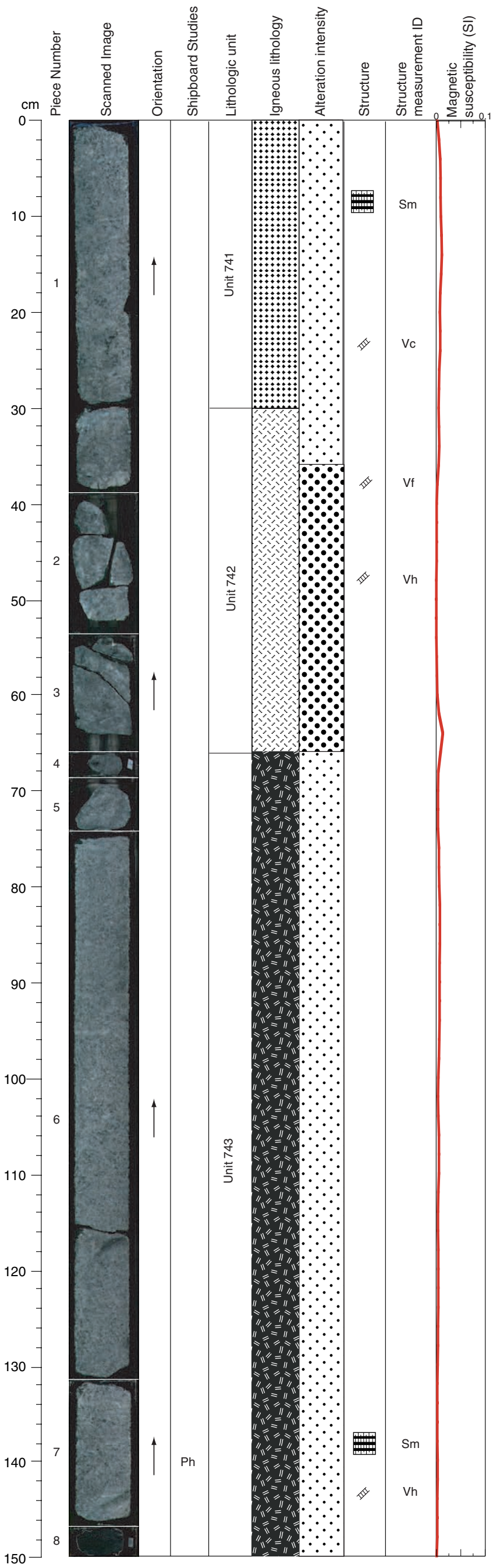


305-U1309D-279R-2, Continued (Section top: 1340.43 mbsf)

STRUCTURE: Medium-grained gabbro with weak magmatic fabric best seen in upper part of section and local plastic strain developed at base of section, perhaps related to more leucocratic gabbro. There is a set of early hydrothermal, moderately dipping veins, and a later, steeper set.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-279R-2, 12-42 cm WET
305-U1309D-279R-2, 63-84 cm WET
305-U1309D-279R-2, 103-125 cm WET
305-U1309D-279R-2, 103-125 cm DRY (back)

Core Photo



305-U1309D-279R-3 (Section top: 1341.68 mbsf)

UNIT-741 Olivine Gabbro
Pieces: 1a

PRIMARY MINERALOGY: Mode from Piece 1a

Olivine	Modal 15% Size 2 mm average Shape anhedral
Plagioclase	Modal 35% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 45% Size 2 mm average Shape anhedral

COMMENTS: Unit 741 is medium-grained olivine gabbro.

UNIT-742 Gabbro
Pieces: 1b-3

PRIMARY MINERALOGY: Mode from Piece 2

Plagioclase	Modal 35% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 65% Size 4 mm average Shape anhedral

COMMENTS: Unit 742 is medium- to coarse-grained gabbro.

UNIT-743 Olivine-bearing Gabbro
Pieces: 4-8

PRIMARY MINERALOGY: Mode from Piece 6b

Olivine	Modal 5% Size 2 mm average Shape anhedral
Plagioclase	Modal 50% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 45% Size 2 mm average Shape anhedral

COMMENTS: Unit 743 is medium-grained olivine-bearing gabbro.

SECONDARY MINERALOGY: Pale amphibole, chlorite

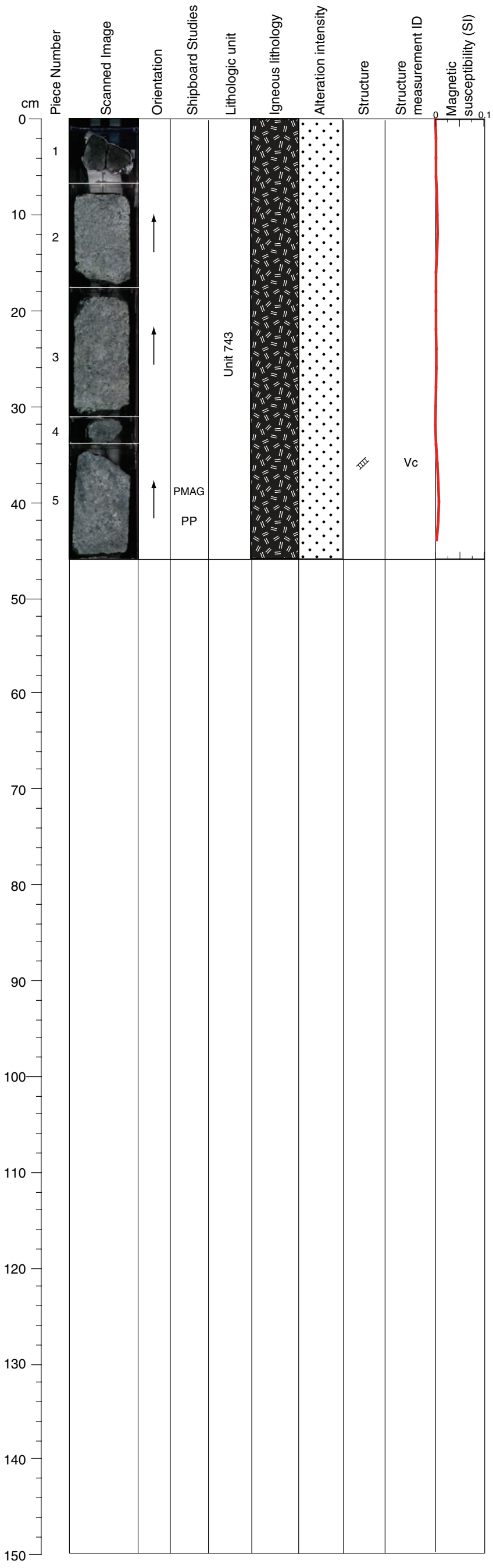
COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches and streaks occur in plagioclase. A green vein with some white patches appears in Piece 1a. Two sets of braided green veins appear in the upper 2 cm of Piece 2b (alteration halos 5 mm each). A patch of leucocratic alteration appears in the bottom inner corners of Piece 2b-c and the side of Piece 2d. Alteration zones (halos?) ~10 mm wide mark Pieces 3a-b and may indicate that a dark green braided vein ran between the two pieces. Minor corona texture appears in the alteration zone. A light green vein appears from 108 to 111 cm (Piece 6a) with a 3 mm wide alteration halo. A dark green vein (braided) cuts the bottom of Piece 7 (alteration halo ~7 mm wide).

VEIN ALTERATION: Amphibole, chlorite, carbonate, slip-fiber

STRUCTURE: Medium-grained gabbro, olivine-bearing, weak magmatic fabric developed locally. Dark green veins, pale green veins and open fractures with white infill, all of them dipping steeply.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-279R-3, 132-146 cm WET

Core Photo



305-U1309D-279R-4 (Section top: 1343.18 mbsf)

UNIT-743 Olivine-bearing Gabbro
Pieces: 1-5

PRIMARY MINERALOGY: Mode from Piece 3

Olivine	Modal 5% Size 2 mm average Shape anhedral
Plagioclase	Modal 50% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 45% Size 2 mm average Shape anhedral

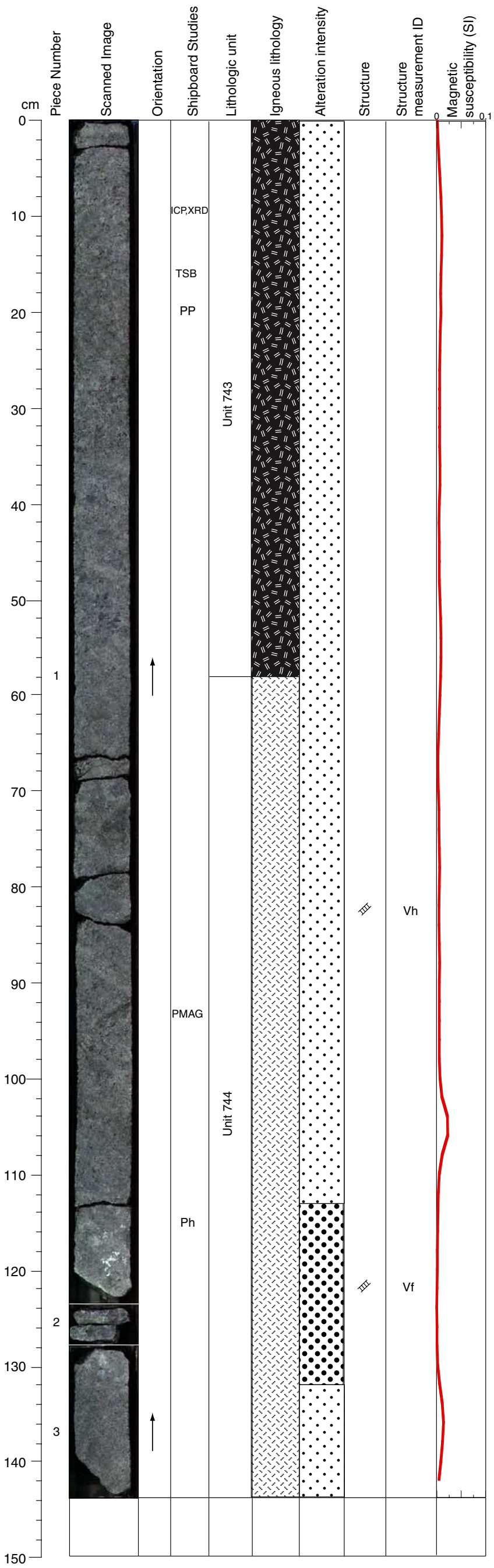
COMMENTS: Unit 743 is medium-grained olivine-bearing gabbro.

SECONDARY MINERALOGY: Pale amphibole, chlorite

COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches and streaks occur in plagioclase. Minor corona texture appears in Piece 4.

STRUCTURE: Medium-grained isotropic gabbro. A single open crack with dark green infill dipping shallowly.

Core Photo



305-U1309D-280R-1 (Section top: 1344.00 mbsf)

UNIT-743 Olivine-bearing Gabbro (Olivine-bearing Gabbronite)
Pieces: 1a

PRIMARY MINERALOGY: Mode from Piece 1a

Olivine	Modal 5% Size 2 mm average Shape anhedral
Plagioclase	Modal 50% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 45% Size 4 mm average Shape anhedral

COMMENTS: Unit 743 is medium-grained olivine-bearing gabbro. Orthopyroxene as much 7% observed in thin section.

UNIT-744 Gabbro
Pieces: 1a-3

PRIMARY MINERALOGY: Mode from Piece 1f

Plagioclase	Modal 50% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 45% Size 4 mm average Shape anhedral

COMMENTS: Unit 744 is medium-grained gabbro. Trace of sulfide.

SECONDARY MINERALOGY: Pale amphibole, chlorite, talc

COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches and streaks occur in plagioclase. Several sets of braided green veins appear in Pieces 1e-g (alteration halos 3-5 mm). A patch of leucocratic alteration and minor corona texture development appears in the bottom of Piece 1g through the top of Piece 3.

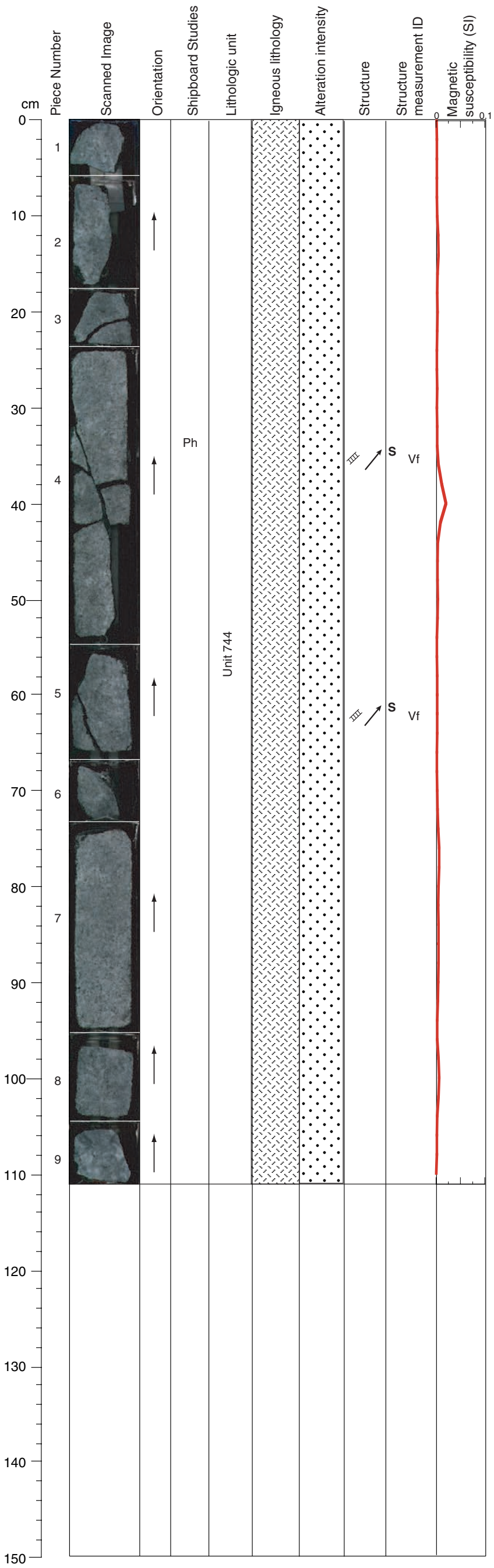
VEIN ALTERATION: Amphibole, chlorite, carbonate, slip-fiber, zeolite.

THIN SECTIONS:
305-U1309D-280R-1, 15-17 cm (#657)

STRUCTURE: Medium-grained, olivine bearing gabbro with alteration patch. Shallowly dipping dark green vein and moderately dipping pale green veins.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-280R-1, 0-30 cm WET
305-U1309D-280R-1, 95-123 cm WET

Core Photo



305-U1309D-280R-2 (Section top: 1345.44 mbsf)

UNIT-744 Gabbro
Pieces: 1-9

PRIMARY MINERALOGY: Mode from Piece 8

Plagioclase	Modal 35% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 65% Size 4 mm average Shape anhedral

COMMENTS: Unit 744 medium-grained gabbro. Piece 9 is coarse-grained gabbro with 60% plagioclase and 40% clinopyroxene and 10 mm grain size.

SECONDARY MINERALOGY: Pale amphibole, chlorite

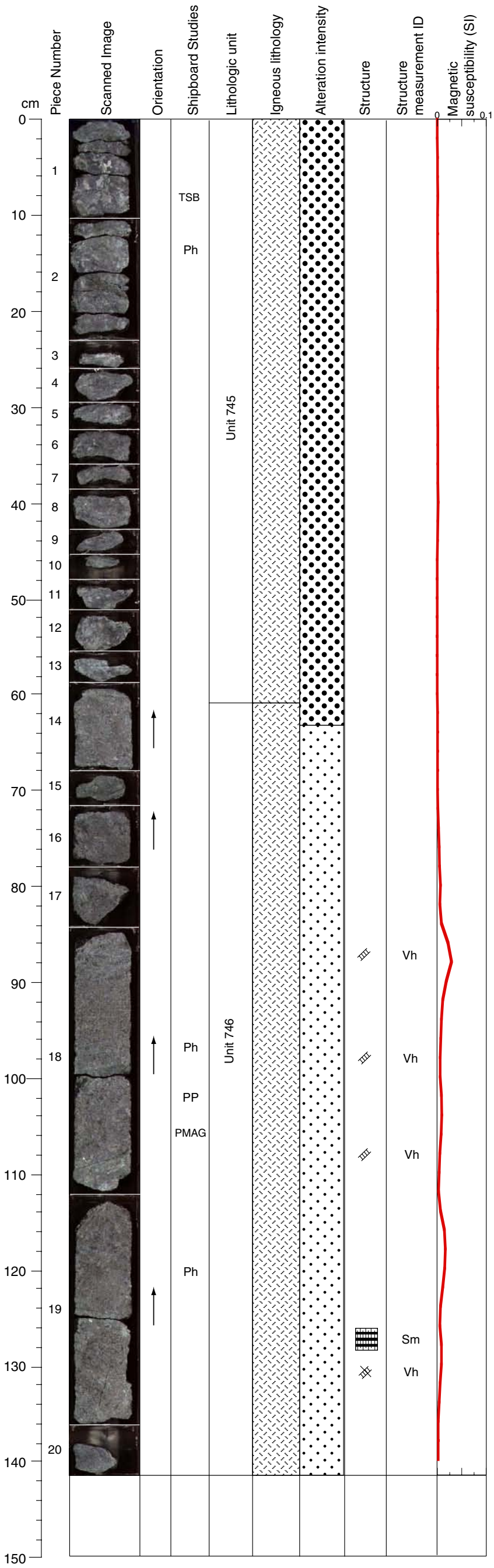
COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches occur in plagioclase. Several dark green veins appear in Pieces 2 (alteration halos 3-5 mm), 4a-b and 5a-b. A light green vein appears in Piece 9 (contains carbonate). Minor corona texture appears at the bottom of Piece 1.

VEIN ALTERATION: Amphibole, chlorite, carbonate, slip-fiber, zeolite.

STRUCTURE: Medium- to locally coarse-grained, isotropic gabbro with scattered olivine. Early dark green veins dipping steeply with fibrous minerals.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-280R-2, 24-54 cm WET

Core Photo



305-U1309D-281R-1 (Section top: 1348.80 mbsf)

UNIT-745, -746 Gabbro
Pieces: 1-20

PRIMARY MINERALOGY: Mode from Piece 18a

Plagioclase	Modal 35% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 65% Size 3 mm average Shape anhedral

COMMENTS: Unit 745 and 746 are medium- to coarse-grained gabbro. Pieces 1-13 (Unit 745) are small discs with same modal composition as Unit 746.

SECONDARY MINERALOGY: Pale amphibole, chlorite, talc

COMMENTS: The section is broken into numerous biscuits. General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches and streaks occur in plagioclase. Green veins appear in every piece and alteration halos 2-10 mm occur around many of them. Patches of leucocratic alteration and minor corona texture devlopment appears in several pieces.

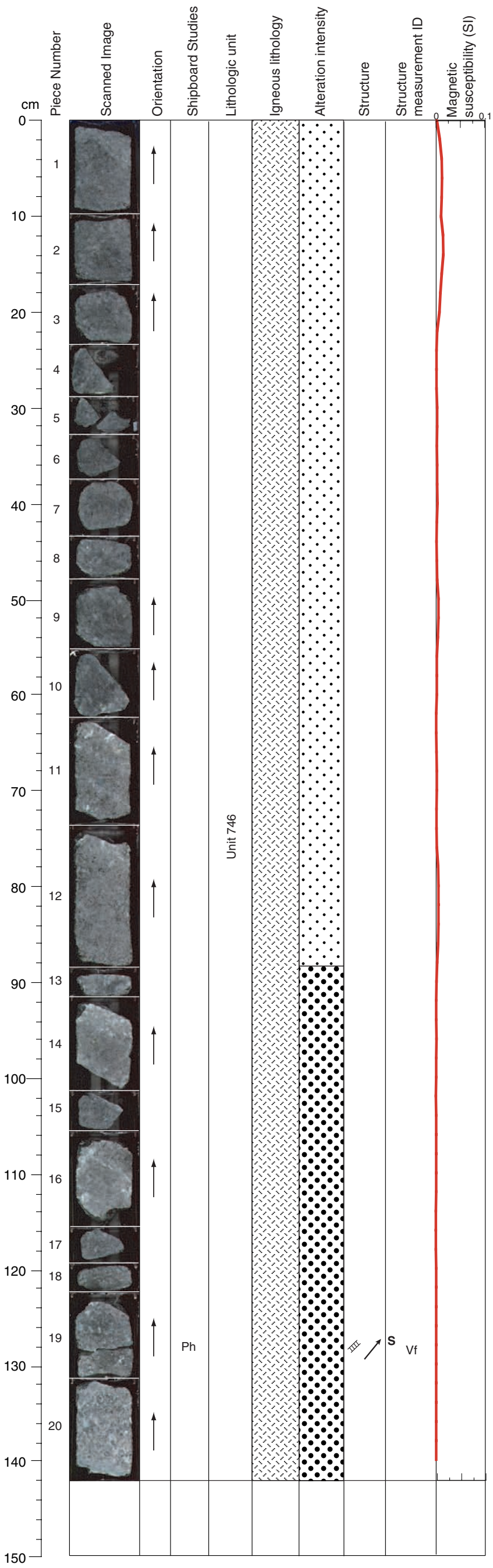
VEIN ALTERATION: Amphibole, chlorite, carbonate, slip-fiber, zeolite.

THIN SECTIONS:
305-U1309D-281R-1, 6-9 cm (#658)

STRUCTURE: Medium-grained gabbro with magmatic fabric weakly developed in lowest part of section. Regular pale dark green veins dipping shallowly and later steeply dipping open fracture.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-281R-1, 0-23 cm WET
305-U1309D-281R-1, 84-112 cm WET
305-U1309D-281R-1, 112-136 cm WET

Core Photo



305-U1309D-281R-2 (Section top: 1350.21 mbsf)

UNIT-746 Gabbro
Pieces: 1-20

PRIMARY MINERALOGY: Mode from Piece 12

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

COMMENTS: Unit 746 is medium-grained gabbro. Upper part (0-25 cm) shows higher alteration.

SECONDARY MINERALOGY: Pale amphibole, chlorite, talc

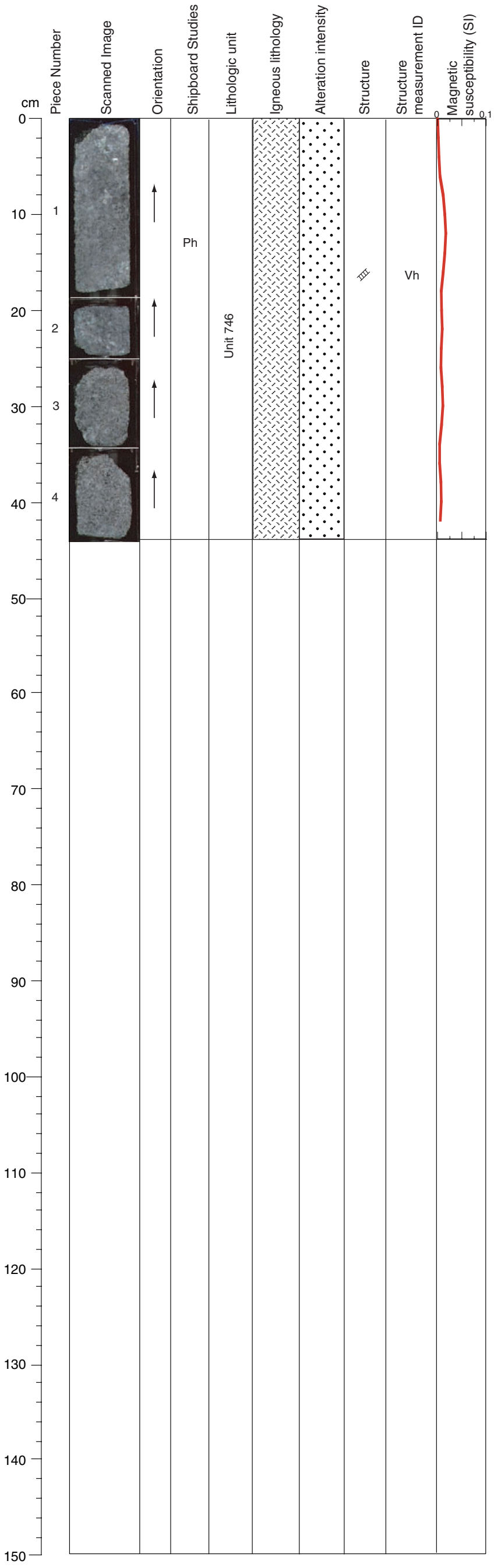
COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches and streaks occur in plagioclase. Green veins appear in almost every piece and alteration halos 2-20 mm occur around many of them. Gouge appears in Piece 4. Patches of leucocratic alteration and minor corona texture occur in Pieces 10, 11, 14, 16, 19, and 20.

VEIN ALTERATION: Amphibole, chlorite, carbonate, slip-fiber, zeolite.

STRUCTURE: Medium-grained gabbro with no magmatic or plastic strain discernible. Steeply dipping dark green veins with fibrous minerals.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-281R-2, 123-142 cm WET

Core Photo



305-U1309D-281R-3 (Section top: 1351.63 mbsf)

UNIT-746 Gabbro
Pieces: 1-4

PRIMARY MINERALOGY: Mode from Piece 4

Plagioclase	Modal 55% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 45% Size 2 mm average Shape anhedral

COMMENTS: Unit 746 is medium-grained gabbro.

SECONDARY MINERALOGY: Pale amphibole, chlorite, talc

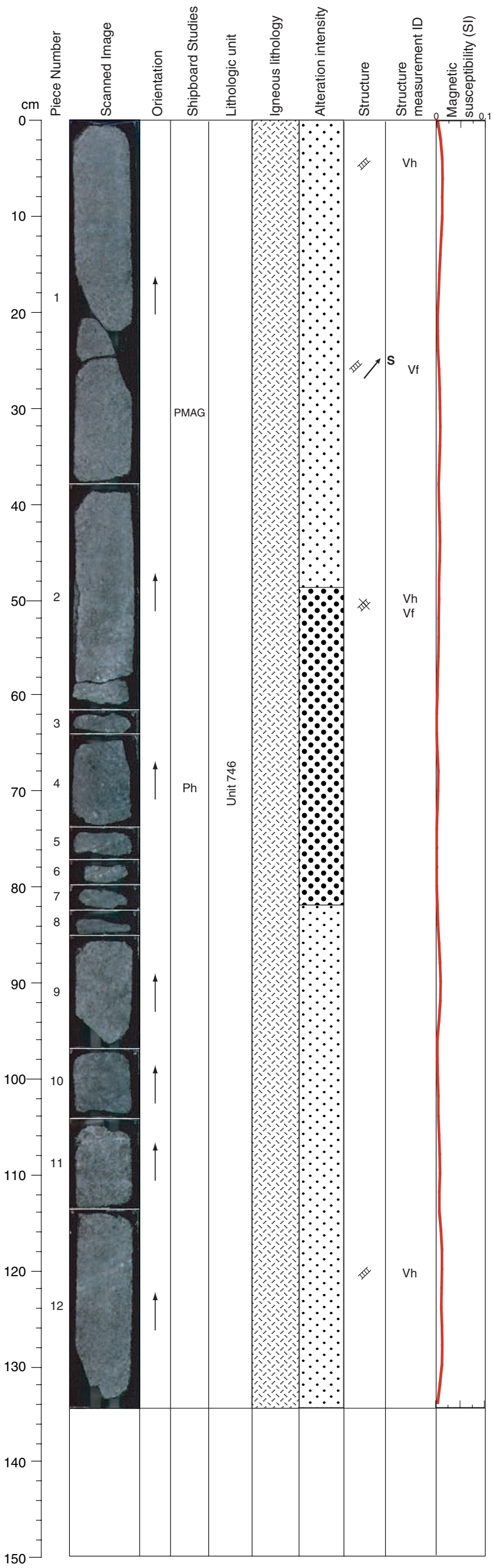
COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches and streaks occur in plagioclase. Several sets of braided green veins appear in Pieces 1 and 2 (alteration halos 10 mm each).

VEIN ALTERATION: Amphibole, chlorite

STRUCTURE: Medium-grained gabbro with no magmatic or plastic strain developed. Dark green veins with various dips.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-281R-3, 0-23 cm WET

Core Photo



305-U1309D-282R-1 (Section top: 1353.60 mbsf)

UNIT-746 Gabbro
Pieces: 1-12

PRIMARY MINERALOGY: Mode from Piece 1a

Plagioclase	Modal 45% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 55% Size 2 mm average Shape anhedral

COMMENTS: Unit 746 is medium-grained gabbro. Larger grain size at 52-120 cm.

SECONDARY MINERALOGY: Pale amphibole, chlorite, talc

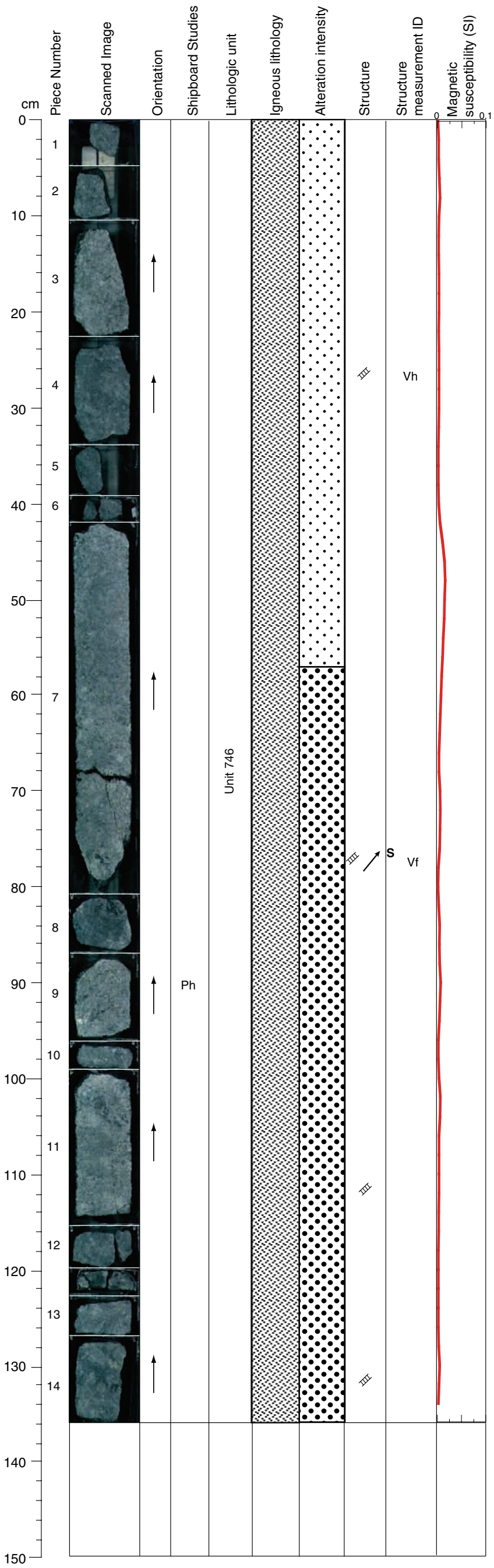
COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. Nearly every piece contains a green to blue-green vein (alteration halos 5-10 mm).

VEIN ALTERATION: Amphibole, chlorite, carbonate, slip-fiber.

STRUCTURE: Medium- to coarse-grained gabbro showing no plastic or magmatic strain. Set of dark green veins.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-282R-1, 51-81 cm WET

Core Photo



305-U1309D-282R-2 (Section top: 1354.94 mbsf)

UNIT-746 Gabbro
Pieces: 1-15

PRIMARY MINERALOGY: Mode from Piece 7a

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

COMMENTS: Unit 746 is medium- to coarse-grained gabbro. Grain size varies up to 15 mm. Trace of sulfide.

SECONDARY MINERALOGY: Pale amphibole, chlorite

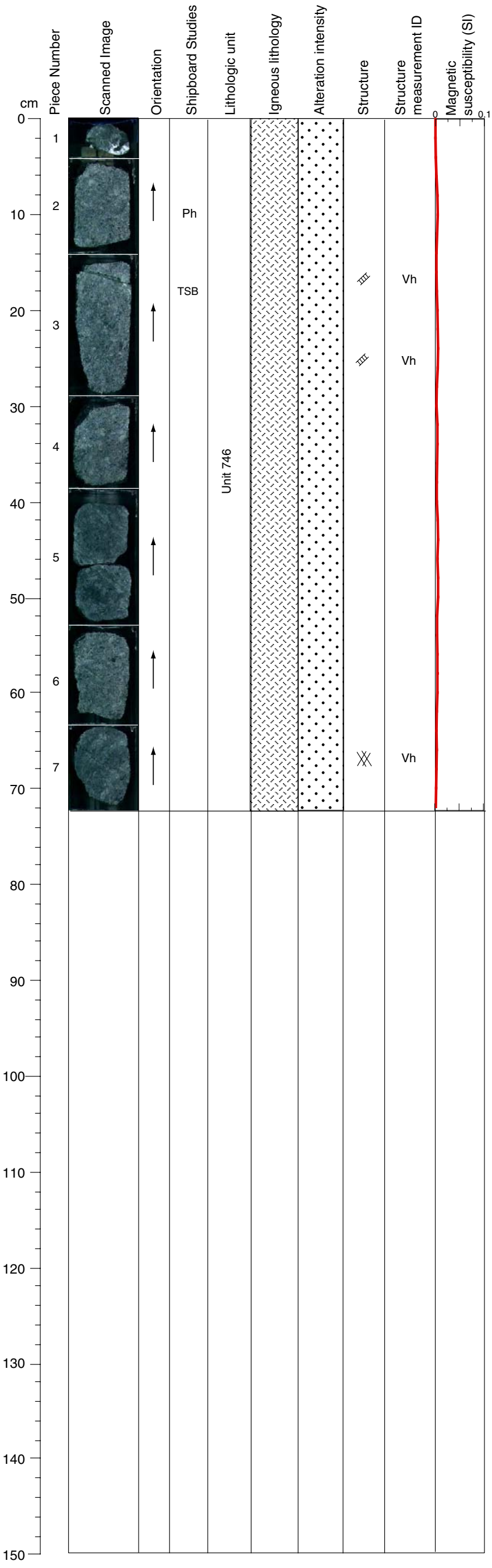
COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. Pieces 7, 10, and 15 contain green veins (alteration halos ~10 mm).

VEIN ALTERATION: Amphibole, chlorite, clay, carbonate, slip fiber, zeolite.

STRUCTURE: Medium-grained gabbro with no magmatic or plastic strain discernible. Steeply dipping dark green veins with fibrous minerals plunging shallowly.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-282R-2, 75-105 cm WET

Core Photo



305-U1309D-282R-3 (Section top: 1356.30 mbsf)

UNIT-746 Gabbro
Pieces: 1-7

PRIMARY MINERALOGY: Mode from Piece 3

Plagioclase	Modal 45% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 55% Size 3 mm average Shape anhedral

COMMENTS: Unit 746 is medium- to coarse-grained gabbro. Leucocratic dikelet in Piece 1.

SECONDARY MINERALOGY: Pale amphibole, chlorite

COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. Pieces 1, 3 (halo 20 mm), 5 (halos 10-15 mm), and 6 contain green or white veins.

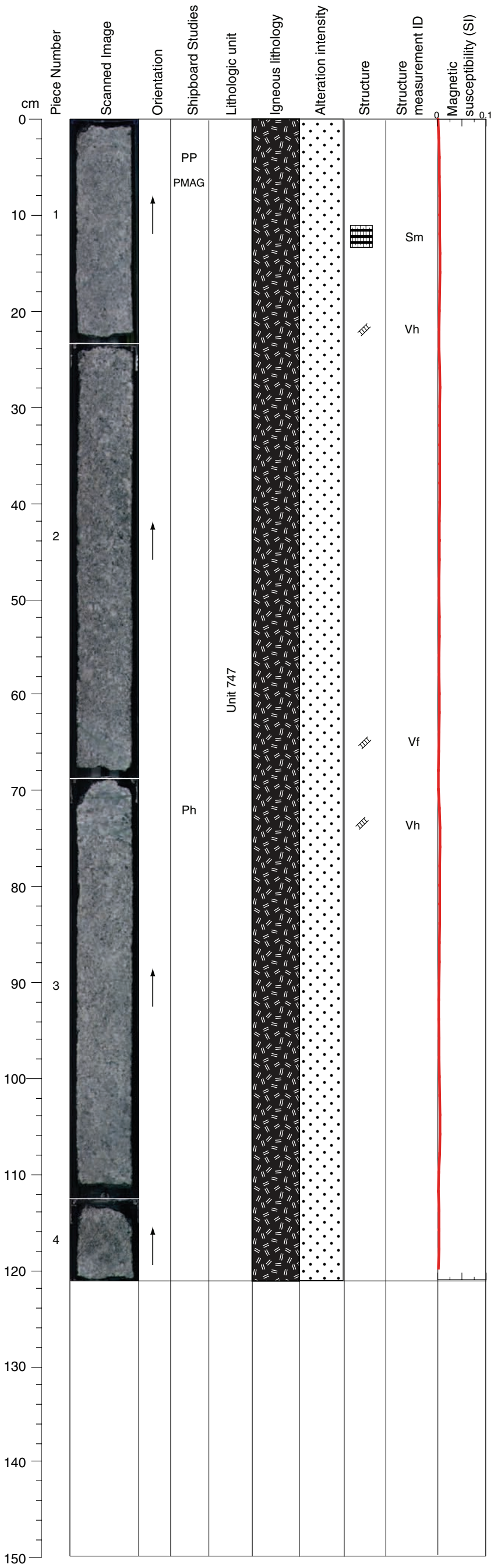
VEIN ALTERATION: Amphibole, chlorite, clay, carbonate, zeolite.

THIN SECTIONS:
305-U1309D-282R-3, 16-19 cm (#659)

STRUCTURE: Medium-grained gabbro showing no fabric and small leucocratic piece possibly rubble containing amphibole and plagioclase. Medium-grained gabbro with no magmatic or plastic strain developed. Dark green veins with various dips.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-282R-3, 0-28 cm WET

Core Photo



305-U1309D-283R-1 (Section top: 1358.40 mbsf)

UNIT-747 Olivine-bearing Gabbro
Pieces: 1-4

PRIMARY MINERALOGY: Mode from Piece 2

Olivine	Modal 5% Size 2 mm average Shape anhedral
Plagioclase	Modal 55% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 40% Size 4 mm average Shape anhedral

COMMENTS: Unit 747 is medium-grained olivine-bearing gabbro. Olivine inhomogeneously distributed through this section. Coarse clinopyroxene (25 mm) at 110 cm.

SECONDARY MINERALOGY: Pale amphibole, chlorite

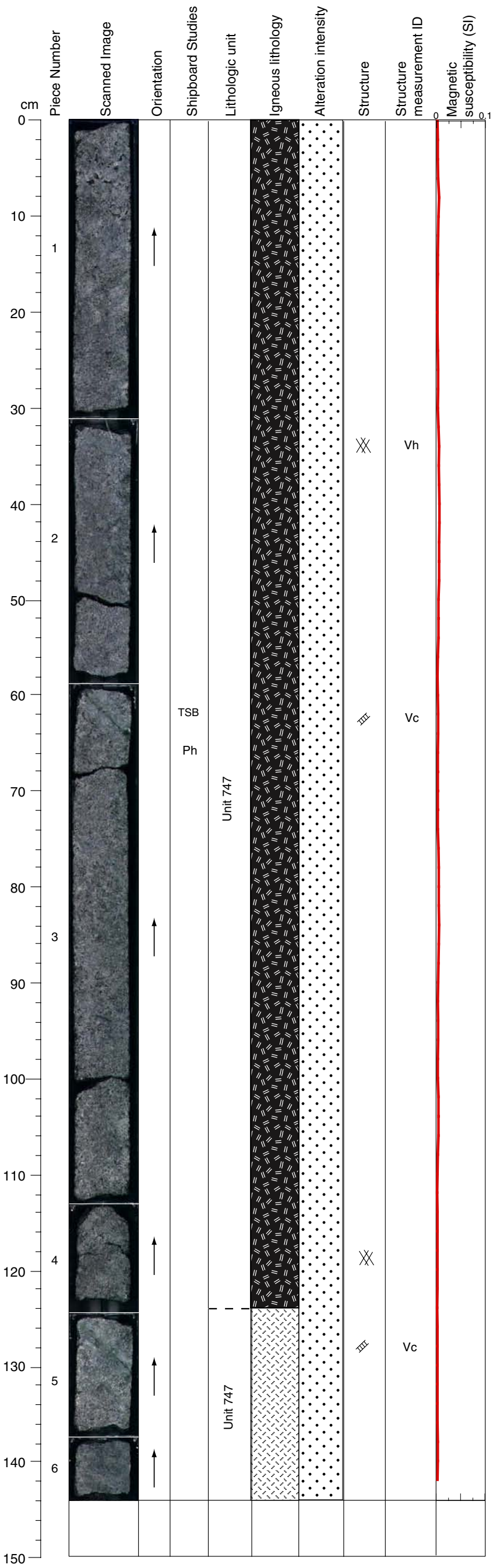
COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches and streaks occur in plagioclase. Several green veins appear in Pieces 1, 2, and 3 (alteration halos 10-20 mm).

VEIN ALTERATION: Amphibole, chlorite.

STRUCTURE: Medium-grained olivine bearing gabbro with a weak magmatic fabric developed at the top of the section. Set of dark green veins moderately dipping with some cataclasis.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-283R-1, 60-80 cm WET

Core Photo



305-U1309D-283R-2 (Section top: 1359.61 mbsf)

UNIT-747 Olivine-bearing Gabbro
Pieces: 1-4

PRIMARY MINERALOGY: Mode from Piece 2a

Olivine	Modal 5% Size 2 mm average Shape anhedral
Plagioclase	Modal 55% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 40% Size 4 mm average Shape anhedral

UNIT-747 Gabbro
Pieces: 5-6

PRIMARY MINERALOGY: Mode from Piece 5

Plagioclase	Modal 40% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 60% Size 2 mm average Shape anhedral

COMMENTS: Unit 747 is medium-grained olivine-bearing gabbro grading into gabbro at the bottom.

SECONDARY MINERALOGY: Pale amphibole, chlorite

COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. Dark green veins appear in Pieces 2, 3, and 5 (alteration halos 5-20 mm).

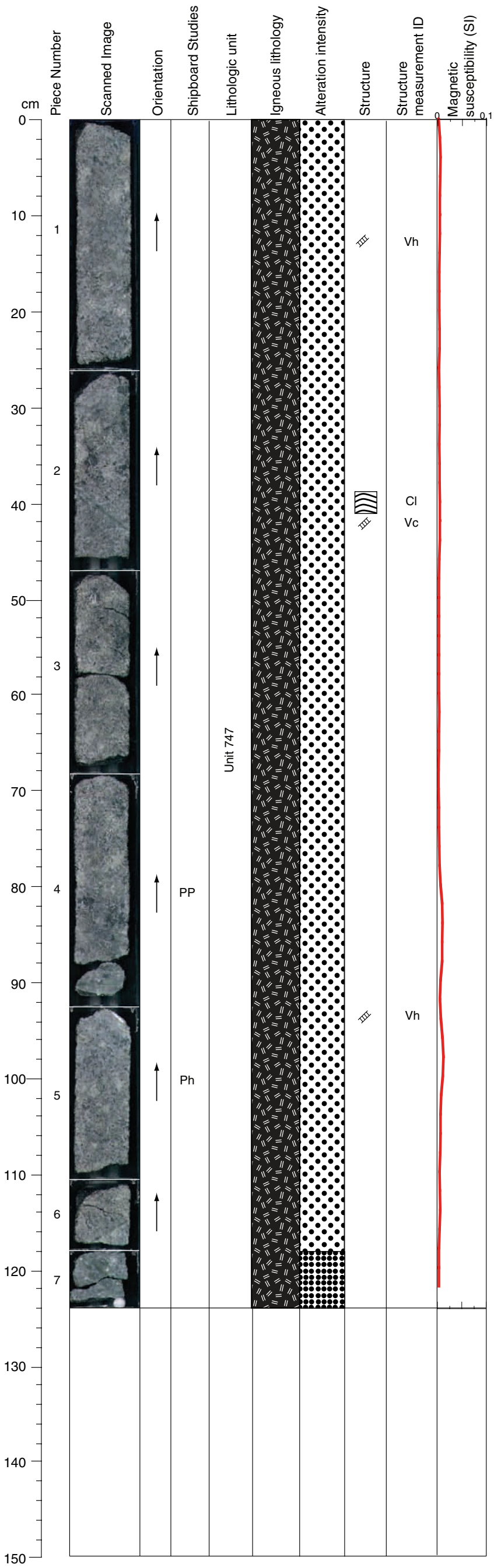
VEIN ALTERATION: Amphibole, chlorite.

THIN SECTIONS:
305-U1309D-283R-2, 60-63 cm (#660)

STRUCTURE: Medium-grained olivine bearing gabbro showing no magmatic or plastic strain. Dark green set of veins.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-283R-2, 59-79 cm WET
305-U1309D-283R-2, 125-144 cm WET

Core Photo



305-U1309D-283R-3 (Section top: 1361.05 mbsf)

UNIT-747 Olivine-bearing Gabbro
Pieces: 1-7

PRIMARY MINERALOGY: Mode from Piece 2

Olivine	Modal 3% Size 2 mm average Shape anhedral
Plagioclase	Modal 37% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 60% Size 8 mm average Shape anhedral

COMMENTS: Unit 747 is medium-grained olivine-bearing gabbro. Leucocratic rock in Piece 7.

SECONDARY MINERALOGY: Pale amphibole, chlorite

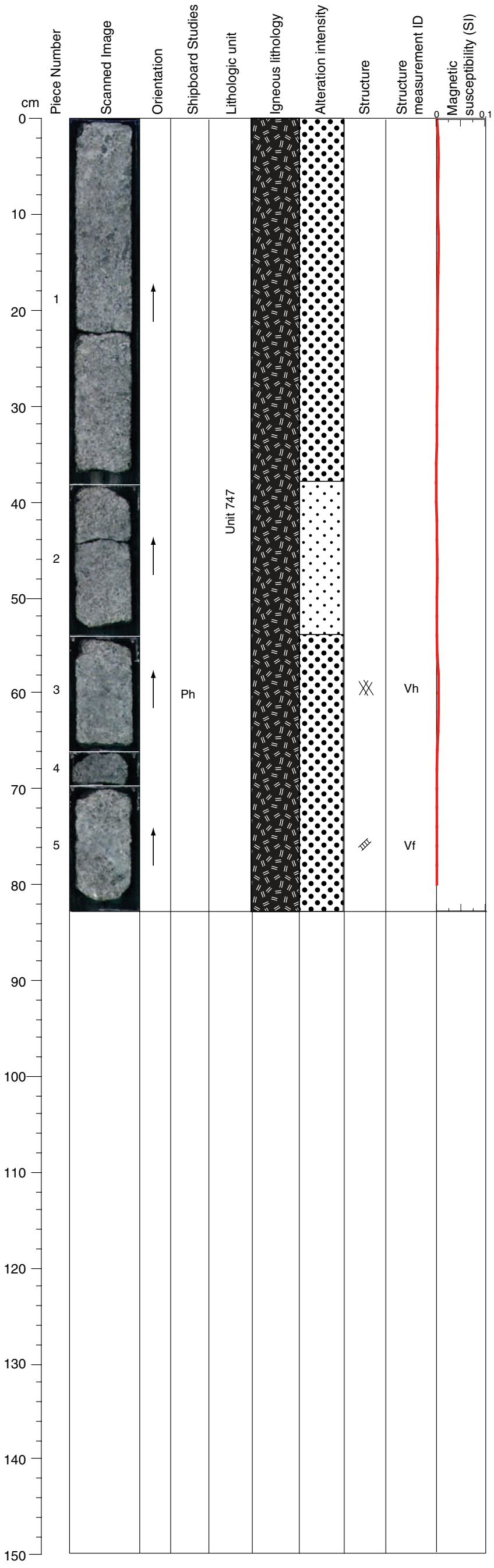
COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches and streaks occur in plagioclase. Dark green veins appear in Pieces 1, 2, 4, 5, and 7 (alteration halos 5-10 mm).

VEIN ALTERATION: Amphibole, chlorite, carbonate, slip-fiber, zeolite.

STRUCTURE: Coarse- to medium-grained olivine gabbro showing no magmatic foliation. Moderately dipping dark green veins and a white-filled subparallel vein.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-283R-3, 93-123 cm WET

Core Photo



305-U1309D-283R-4 (Section top: 1362.29 mbsf)

UNIT-747 Olivine-bearing Gabbro
Pieces: 1-5

PRIMARY MINERALOGY: Mode from Piece 1

Olivine	Modal 5% Size 3 mm average Shape anhedral
Plagioclase	Modal 35% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 60% Size 4 mm average Shape anhedral

COMMENTS: Unit 747 is medium-grained olivine-bearing gabbro.

SECONDARY MINERALOGY: Pale amphibole, chlorite

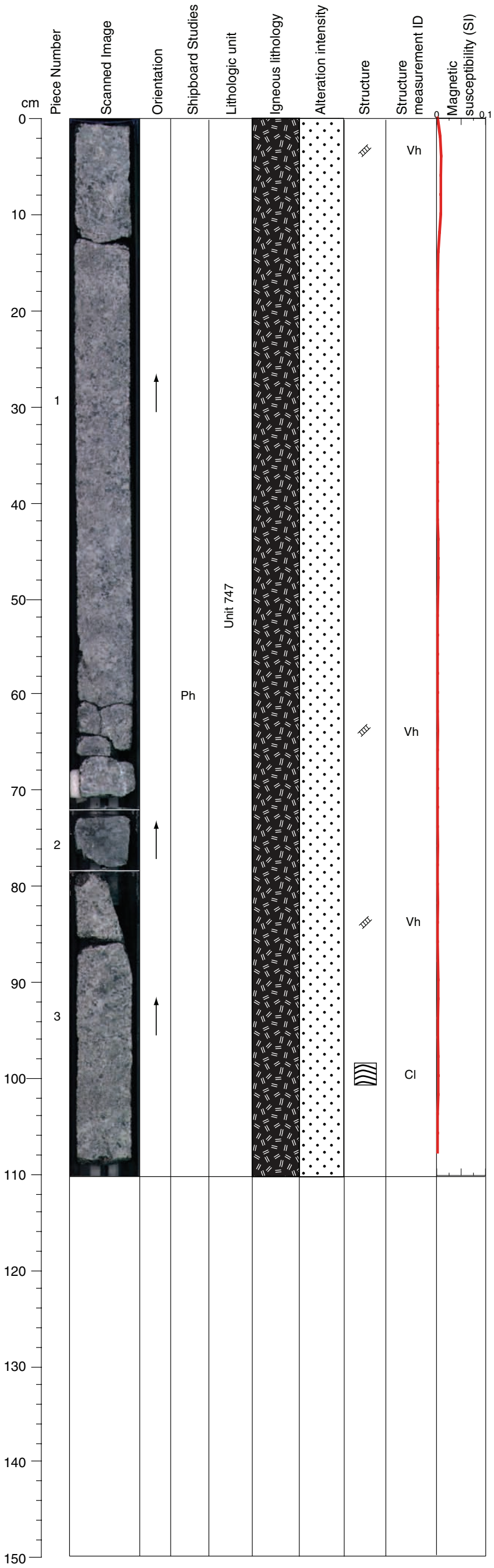
COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches and streaks occur in plagioclase. Several green veins appear in Pieces 3 and 5 (alteration halos 10-20 mm)

VEIN ALTERATION: Amphibole, chlorite.

STRUCTURE: Coarse- to medium-grained olivine gabbro exhibiting no plastic or magmatic strain. A set of shallowly dipping dark green veins.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-283R-4, 54-82 cm WET

Core Photo



305-U1309D-284R-1 (Section top: 1363.20 mbsf)

UNIT-747 Olivine-bearing Gabbro
Pieces: 1-3

PRIMARY MINERALOGY: Mode from Piece 1

Olivine	Modal 5% Size 3 mm average Shape anhedral
Plagioclase	Modal 35% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 60% Size 4 mm average Shape anhedral

COMMENTS: Unit 747 is medium-grained olivine-bearing gabbro. Inhomogeneous olivine distribution.

SECONDARY MINERALOGY: Pale amphibole, chlorite

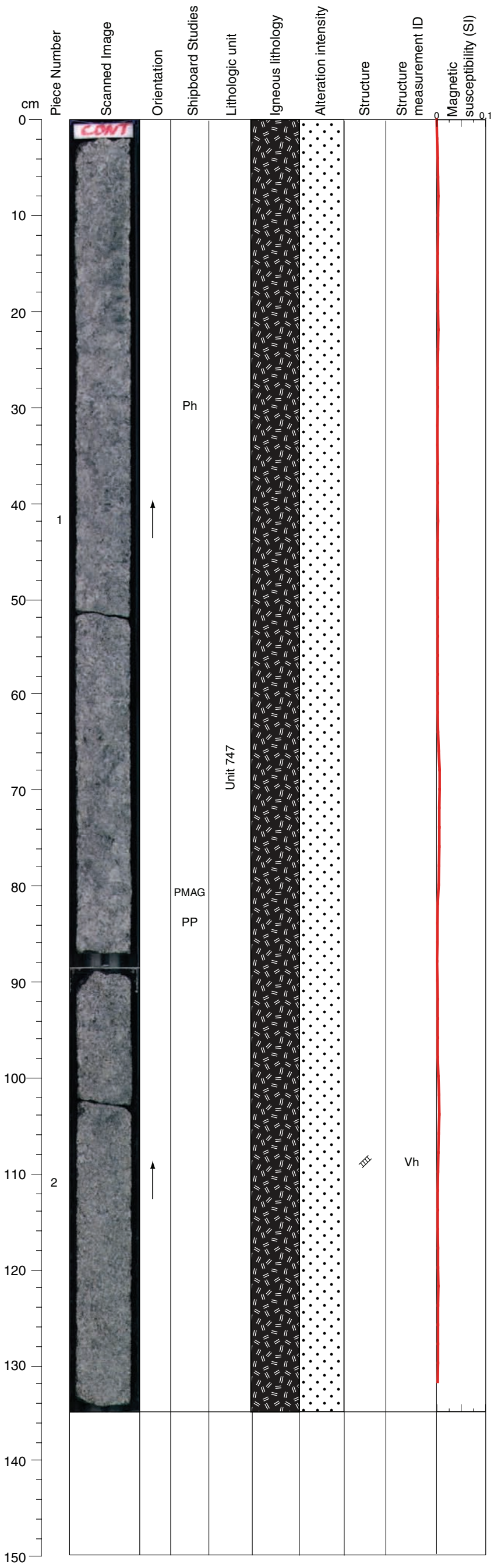
COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches and streaks occur in plagioclase. Dark green veins appear in Piece 1a (halo ~5 mm), 2, and 3 (alteration halos 2-5 mm). A white vein in Pieces 1b-e (irregular halo ~2 mm), a light green vein in Piece 2 (branching with a 2 mm halo), and a green vein in Pieces 3a-b.

VEIN ALTERATION: Serpentine, amphibole, chlorite, clay, carbonate, slip-fiber, zeolite.

STRUCTURE: Medium-grained, olivine-bearing, faintly grain-size-layered gabbro without magmatic or plastic fabric. Steeply dipping dark green veins.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-284R-1, 56-79 cm WET

Core Photo



305-U1309D-284R-2 (Section top: 1364.31 mbsf)

UNIT-747 Olivine-bearing Gabbro
Pieces: 1-2

PRIMARY MINERALOGY: Mode from Piece 1

Olivine	Modal 5% Size 3 mm average Shape anhedral
Plagioclase	Modal 55% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 40% Size 4 mm average Shape anhedral

COMMENTS: Unit 747 is medium-grained olivine-bearing gabbro. Inhomogeneous olivine distribution.

SECONDARY MINERALOGY: Pale amphibole, chlorite

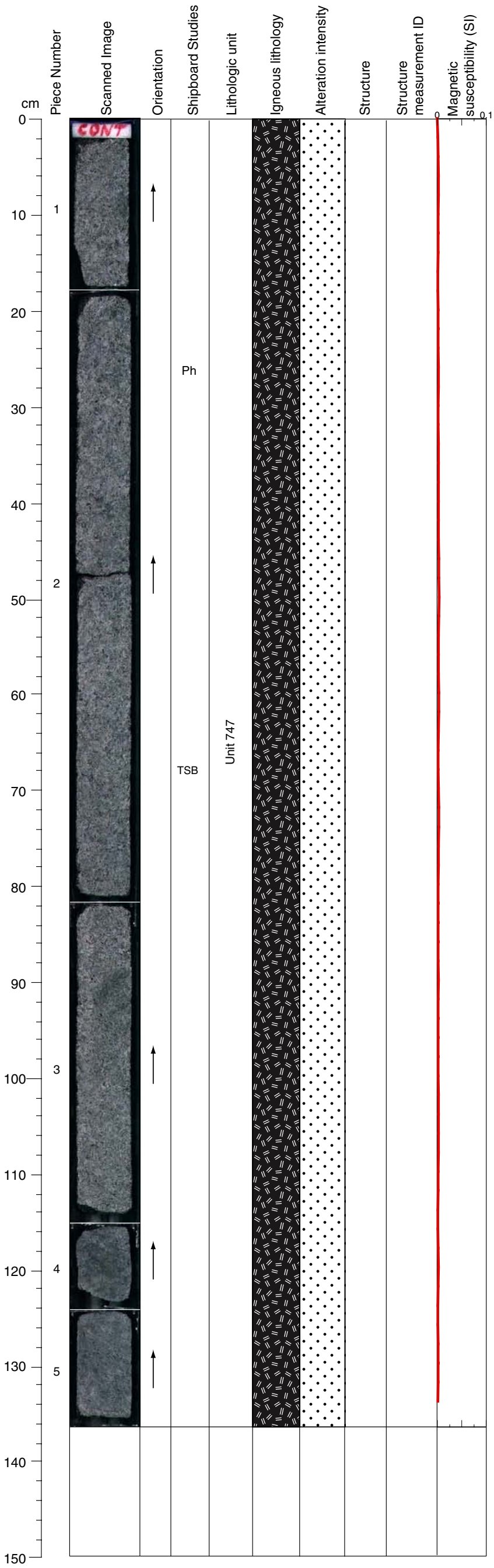
COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches and streaks occur in plagioclase. A white vein occurs in Pieces 1b which has an irregular halo to about 5 mm.

VEIN ALTERATION: Zeolite

STRUCTURE: No magmatic foliation. A few open cracks, steeply dipping.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-284R-2, 20-40 cm WET

Core Photo



305-U1309D-284R-3 (Section top: 1365.66 mbsf)

UNIT-747 Olivine-bearing Gabbro
Pieces: 1-5

PRIMARY MINERALOGY: Mode from Piece 2b

Olivine	Modal 5% Size 3 mm average Shape anhedral
Plagioclase	Modal 55% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 40% Size 4 mm average Shape anhedral

COMMENTS: Unit 747 is medium-grained olivine-bearing gabbro, continued from previous section. Inhomogeneous olivine distribution. Orthopyroxene as much 3% in thin section.

SECONDARY MINERALOGY: Pale amphibole, chlorite

COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches and streaks occur in plagioclase.

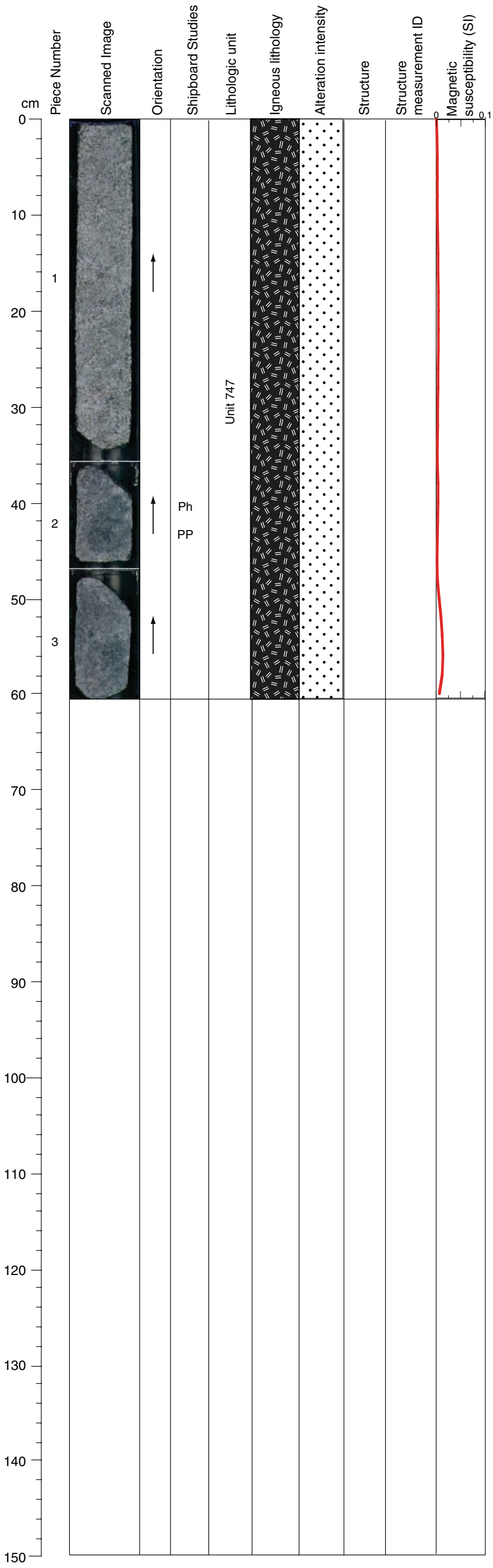
VEIN ALTERATION: n/a

THIN SECTIONS:
305-U1309D-284R-3, 66-69 cm (#661)

STRUCTURE: Medium-grained.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-284R-3, 18-48 cm WET
305-U1309D-284R-3, 60-80 cm WET

Core Photo



305-U1309D-284R-4 (Section top: 1367.02 mbsf)

UNIT-747 Olivine-bearing Gabbro
Pieces: 1-3

PRIMARY MINERALOGY: Mode from Piece 1

Olivine	Modal 5% Size 3 mm average Shape anhedral
Plagioclase	Modal 55% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 40% Size 4 mm average Shape anhedral

COMMENTS: Unit 747 is medium-grained olivine-bearing gabbro.

SECONDARY MINERALOGY: Pale amphibole, chlorite

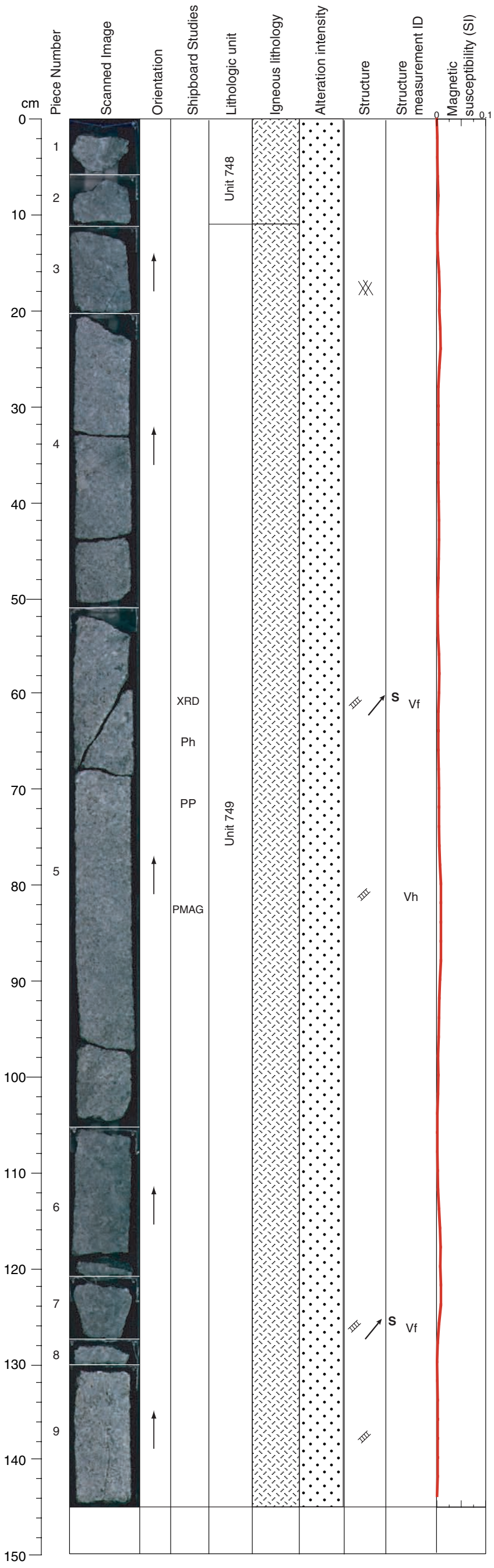
COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches and streaks occur in plagioclase. A dark green vein appears in Piece 3 (halo ~7 mm).

VEIN ALTERATION: Amphibole, chlorite.

STRUCTURE: Medium-grained.

CLOSE-UP PHOTORAPHS:
305-U1309D-284R-4, 36-61 cm WET

Core Photo



305-U1309D-285R-1 (Section top: 1368.00 mbsf)

UNIT-748 Gabbro Rubble
Pieces: 1-2

COMMENTS: Unit 748 is medium-grained gabbro.

UNIT-749 Gabbro
Pieces: 3-9

PRIMARY MINERALOGY: Mode from several pieces

Plagioclase	Modal 50-55% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 45-50% Size 5 mm average Shape anhedral

COMMENTS: Unit 749 is medium- to coarse-grained gabbro.

SECONDARY MINERALOGY: Pale amphibole, chlorite

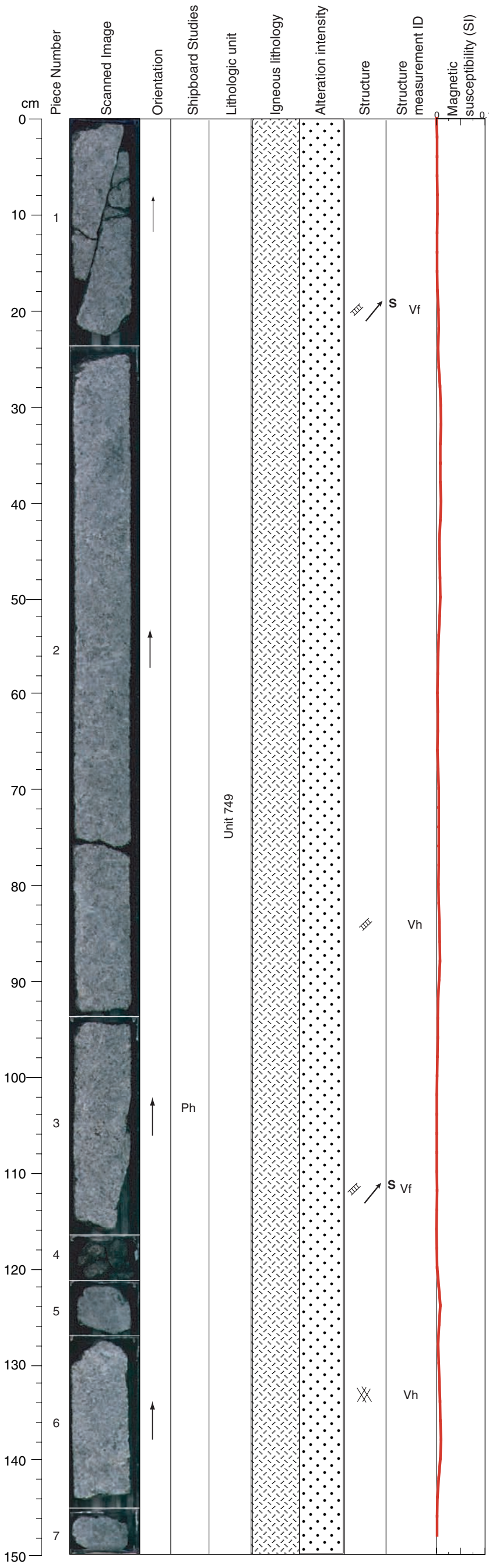
COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches and streaks occur in plagioclase. Piece 6 appears more heavily altered in proximity to a vein. Dark green veins appear in Pieces 1, 3, 4, 5, and 9 (alteration halos of from 5 to 10 mm). A light green vein appears in Piece 6 (carbonate and slip fiber)

VEIN ALTERATION: Amphibole, chlorite, carbonate, slip fiber.

STRUCTURE: Medium-grained, isotropic gabbro. A few steeply dipping pale green fault veins and a few open cracks.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-285R-1, 51-74 cm WET

Core Photo



305-U1309D-285R-2 (Section top: 1369.45 mbsf)

UNIT-749 Gabbro
Pieces: 1-7

PRIMARY MINERALOGY: Mode from Piece 2b

Plagioclase	Modal 45% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 55% Size 3 mm average Shape anhedral

COMMENTS: Unit 749 is medium-grained gabbro.

SECONDARY MINERALOGY: Pale amphibole, chlorite

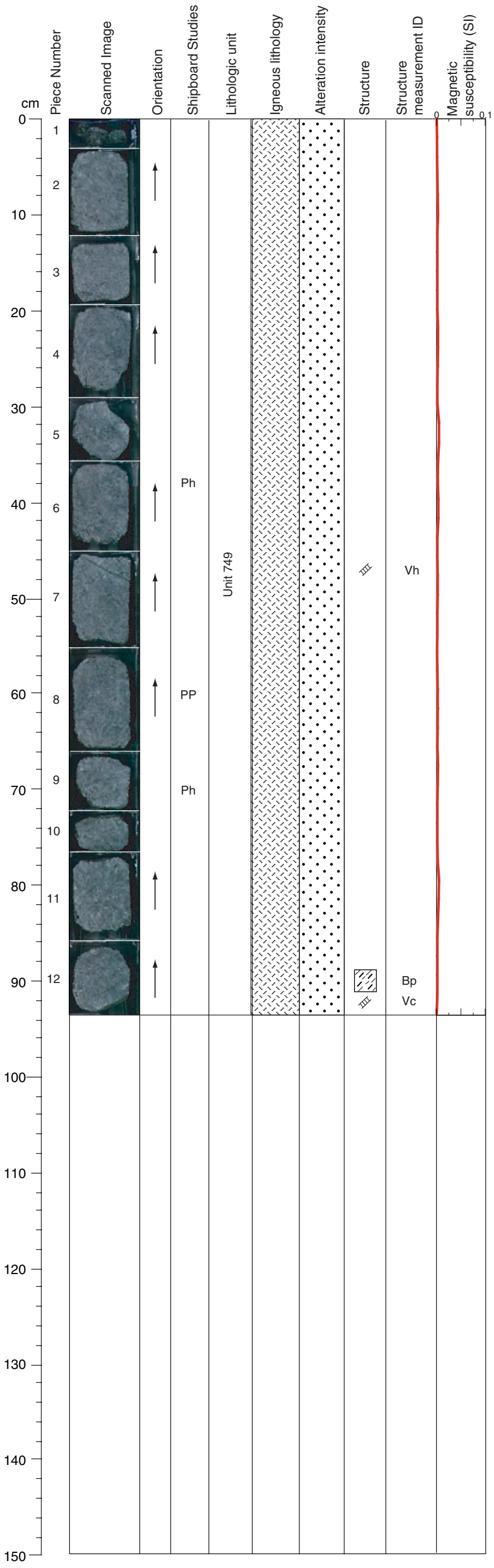
COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches and streaks occur in plagioclase. Dark green veins appear in Pieces 1, 2, and 6 (alteration halos of 2 to 5 mm). A green vein appears in Piece 3 (serpentine, clay, and carbonate)

VEIN ALTERATION: Serpentine, amphibole, chlorite, clay, carbonate.

STRUCTURE: Medium-grained, isotropic gabbro. Steeply dipping dark green fault veins and subhorizontal fibers.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-285R-2, 94-116 cm WET

Core Photo



305-U1309D-285R-3 (Section top: 1370.95 mbsf)

UNIT-749 Gabbro
Pieces: 1-12

PRIMARY MINERALOGY: Mode from Piece 4

Plagioclase	Modal 50% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 50% Size 3 mm average Shape anhedral

COMMENTS: Unit 749 is medium-grained gabbro.

SECONDARY MINERALOGY: Pale amphibole, chlorite, talc?

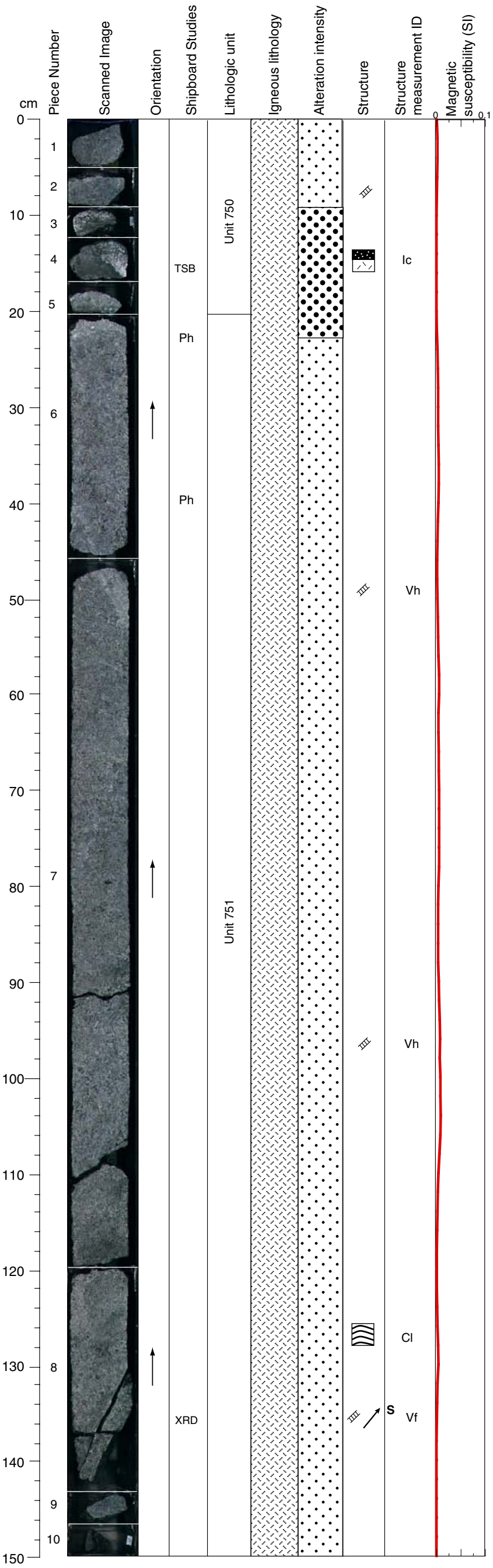
COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches and streaks occur in plagioclase. Dark green veins appear in Pieces 5, 7, 9, 12 with alteration halos 5-10 mm wide. Veins within breccia zones occur in Pieces 9-11.

VEIN ALTERATION: Amphibole, chlorite

STRUCTURE: Medium-grained gabbro with brittle-plastic shear zones (Bp) of several cm width at base of section. Dark green veins dipping moderately.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-285R-3, 29-55 cm WET
305-U1309D-285R-3, 66-93 cm WET

Core Photo



305-U1309D-286R-1 (Section top: 1372.80 mbsf)

UNIT-750 Gabbro
Pieces: 1-5

COMMENTS: Unit 750 is medium-grained gabbro rubble.

UNIT-751 Gabbro
Pieces: 6-10

PRIMARY MINERALOGY: Mode from Piece 6

Plagioclase	Modal 55% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 45% Size 3 mm average Shape anhedral

COMMENTS: Unit 751 is fine- to medium-grained gabbro. Trace of olivine. Thin green (amphibolite?) dikelets cut through the pieces subvertically. Oxide at the contact between the veins and gabbro.

SECONDARY MINERALOGY: Pale amphibole, chlorite

COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches and streaks occur in plagioclase. Some leucocratic alteration products appear in Pieces 3, 4, and in the tops of Pieces 5 and 6. Dark green veins appear in Pieces 6, 7, 8 with alteration halos 2-15 mm wide.

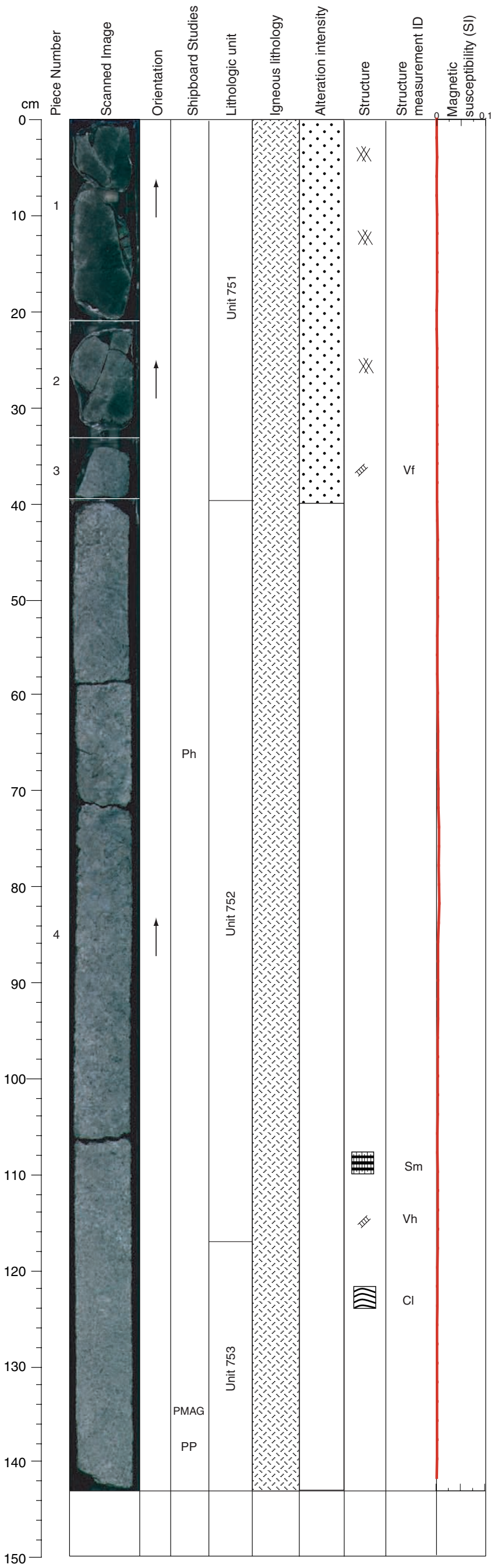
VEIN ALTERATION: Serpentine, amphibole, plagioclase, chlorite, clay, carbonate, zeolite.

THIN SECTIONS:
305-U1309D-286R-1, 14-16 cm (#662)

STRUCTURE: Medium- to coarse-grained olivine gabbro showing no magmatic foliation but local grain size layering. Steeply dipping pale green fault veins with subhorizontal fibers.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-286R-1, 9-29 cm WET
305-U1309D-286R-1, 37-57 cm WET

Core Photo



305-U1309D-286R-2 (Section top: 1374.30 mbsf)

UNIT-751 Gabbro
Pieces: 1-3

PRIMARY MINERALOGY: Mode from Piece 3

Plagioclase	Modal 50% Size 4 mm average Shape anhedral
Clinopyroxene	Modal 50% Size 5 mm average Shape anhedral

COMMENTS: Unit 751 is medium- to coarse-grained gabbro.

UNIT-752 Gabbro
Pieces: 4a-d

PRIMARY MINERALOGY: Mode from Piece 4a

Plagioclase	Modal 50% Size up to 25 mm Shape anhedral
Clinopyroxene	Modal 50% Size up to 30 mm Shape anhedral

COMMENTS: Unit 752is medium- to coarse-grained gabbro. Pegmatitic in some places.

UNIT-753 Gabbro
Pieces: 4d

PRIMARY MINERALOGY: Mode from Piece 4d

Plagioclase	Modal 50% Size 1 mm average Shape anhedral
Clinopyroxene	Modal 50% Size 1 mm average Shape anhedral

COMMENTS: Unit 753 is fine- to medium grained gabbro. Green (amphibole?) vein at 114-118 cm.

SECONDARY MINERALOGY: Pale amphibole, chlorite

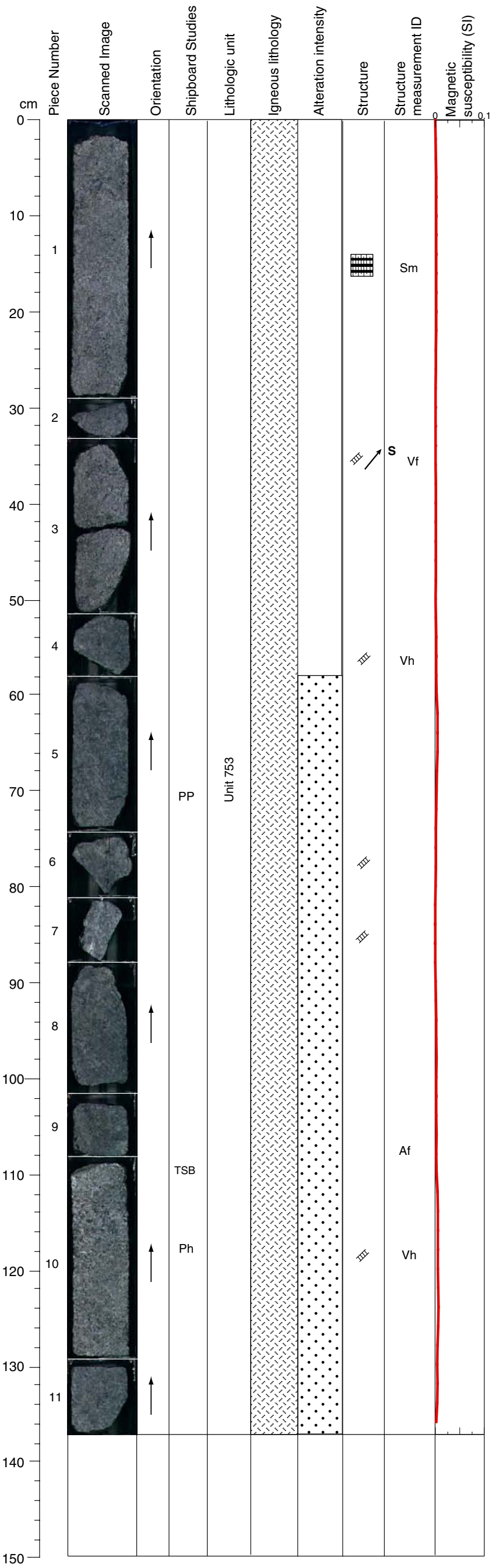
COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches and streaks occur in plagioclase. Dark green veins appear in Pieces 1, 2, 3, 4 with alteration halos of from 5 to 15 mm.

VEIN ALTERATION: Serpentine, amphibole, chlorite, clay, carbonate.

STRUCTURE: Coarse- to medium-grained gabbro showing a weak magmatic fabric within medium-grained section. Set of steep fault veins and a few dark green veins dipping shallowly.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-286R-2, 59-89 cm WET

Core Photo



305-U1309D-286R-3 (Section top: 1375.73 mbsf)

UNIT-753 Gabbro
Pieces: 1-11

PRIMARY MINERALOGY: Mode from Piece 5

Plagioclase	Modal 55-60% Size 4 mm average Shape anhedral
Clinopyroxene	Modal 40-45% Size 4 mm average Shape anhedral

COMMENTS: Unit 753 is fine- to coarse-grained gabbro. Variable grain size and mode. Oikocrystic pyroxene. Green (amphibolite?) dikelet at 110-113 cm.

SECONDARY MINERALOGY: Pale amphibole, chlorite

COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches and streaks occur in plagioclase. Dark green veins appear in Pieces 4, 7, 10 (4 mm thick) with alteration halos of from 5 to 20 mm.

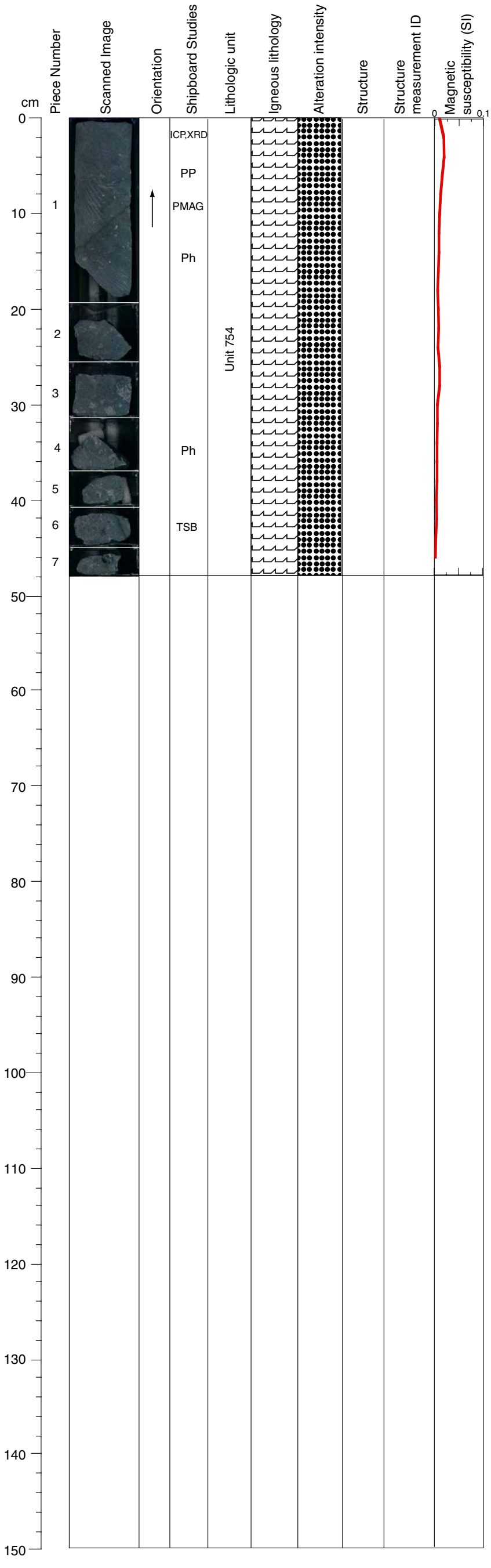
VEIN ALTERATION: Amphibole, chlorite, zeolite.

THIN SECTIONS
305-U1309D-286R-3, 109-112 cm (#663)

STRUCTURE: Medium-grained gabbro showing a weak magmatic fabric. Dark green open veins and fault veins, steeply dipping.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-286R-3, 109-129 cm WET

Core Photo



305-U1309D-287R-1 (Section top: 1377.60 mbsf)

UNIT-754 Diabase
Pieces: 1-7

COMMENTS: Unit 754 is sparsely-phyric diabase. Several xenoliths of gabbro, plagioclase clots, and fine- to medium-grained gabbroic aggregates (<2 cm). Olivine xenocryst (?) (<10 mm) at 43 cm.

SECONDARY MINERALOGY: Pale amphibole, chlorite

COMMENTS: The diabase has a generally greenish cast and a 3 mm wide vein of green amphibole cuts Piece 1 from 9 to about 10 cm. The alteration of the larger xenocrysts and xenoliths is similar to that of the previous sections of gabbro and includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. Some plagioclase has white patches.

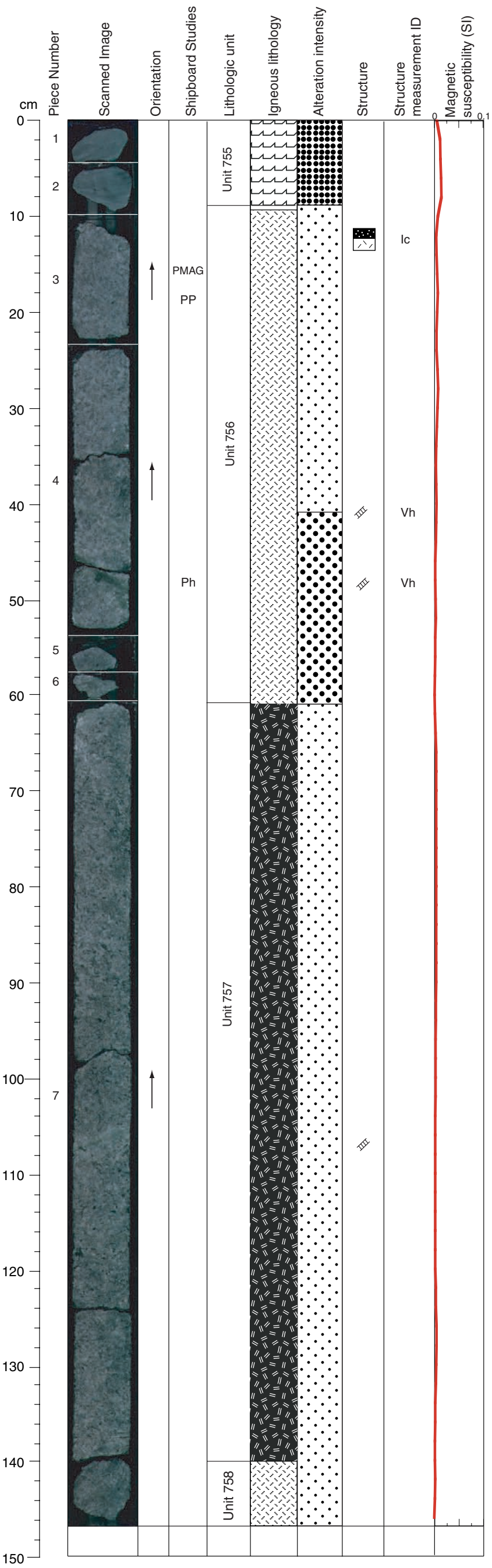
VEIN ALTERATION: Amphibole, chlorite.

THIN SECTIONS:
305-U1309D-287R-1, 42-44 cm (#664)

STRUCTURE: Very fine-grained diabase with phenocrysts. A steep alteration vein, with no penetrative deformation.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-287R-1, 0-25 cm WET
305-U1309D-287R-1, 26-48 cm WET

Core Photo



305-U1309D-288R-1 (Section top: 1379.60 mbsf)

UNIT-755 Diabase Rubble
Pieces: 1-2

COMMENTS: Unit 755 is sparsely-phyric diabase. Rubble probably in place.

UNIT-756 Gabbro
Pieces: 3-6

PRIMARY MINERALOGY: Mode from Piece 3

Plagioclase	Modal 40% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 60% Size 3 mm average Shape anhedral

COMMENTS: Unit 756 is medium-grained gabbro.

UNIT-757 Olivine-bearing Gabbro
Pieces: 7a-c

PRIMARY MINERALOGY: Mode from Piece 7a

Olivine	Modal 5% Size 2 mm average Shape anhedral
Plagioclase	Modal 40% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 55% Size 2 mm average Shape anhedral

COMMENTS: Unit 757 is medium-grained olivine-bearing gabbro.

UNIT-758 Gabbro
Pieces: 7d

PRIMARY MINERALOGY: Mode from Piece 7d

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

COMMENTS: Unit 758 is medium-grained gabbro.

SECONDARY MINERALOGY: Pale amphibole, chlorite

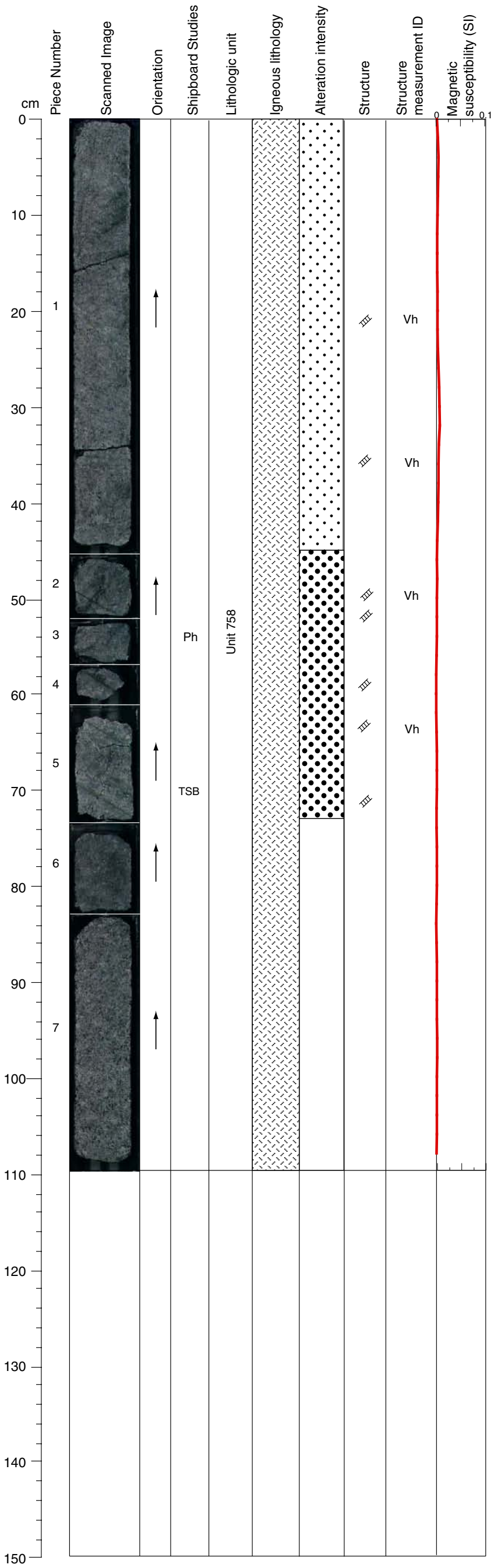
COMMENTS: The diabase of Pieces 1 and 2 have a greenish cast and xenocrysts/xenoliths of pyroxene (with some minor plagioclase show alteration similar to gabbros lower in the section). This includes green amphibole after pyroxene and chlorite after plagioclase. In the gabbroic lower part of the section there are also white patches and streaks in plagioclase. Dark green veins appear in Pieces 1, 3, 4b-c, 6, and 7 with alteration halos 5-20 mm wide.

VEIN ALTERATION: Amphibole, chlorite.

STRUCTURE: Diabase rollers on top and underlying gabbro with moderately dipping dark green veins.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-288R-1, 35-65 cm WET

Core Photo



305-U1309D-288R-2 (Section top: 1381.07 mbsf)

UNIT-758 Gabbro
Pieces: 1-7

PRIMARY MINERALOGY: Mode from Piece 1b

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

COMMENTS: Unit 758 is medium-grained gabbro.

SECONDARY MINERALOGY: Pale amphibole, chlorite

COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches and streaks occur in plagioclase. Dark green veins appear in Pieces 1, 2, 4, 5 and 6 with alteration halos 5-20 mm wide. Minor corona texture is developed in Piece 4.

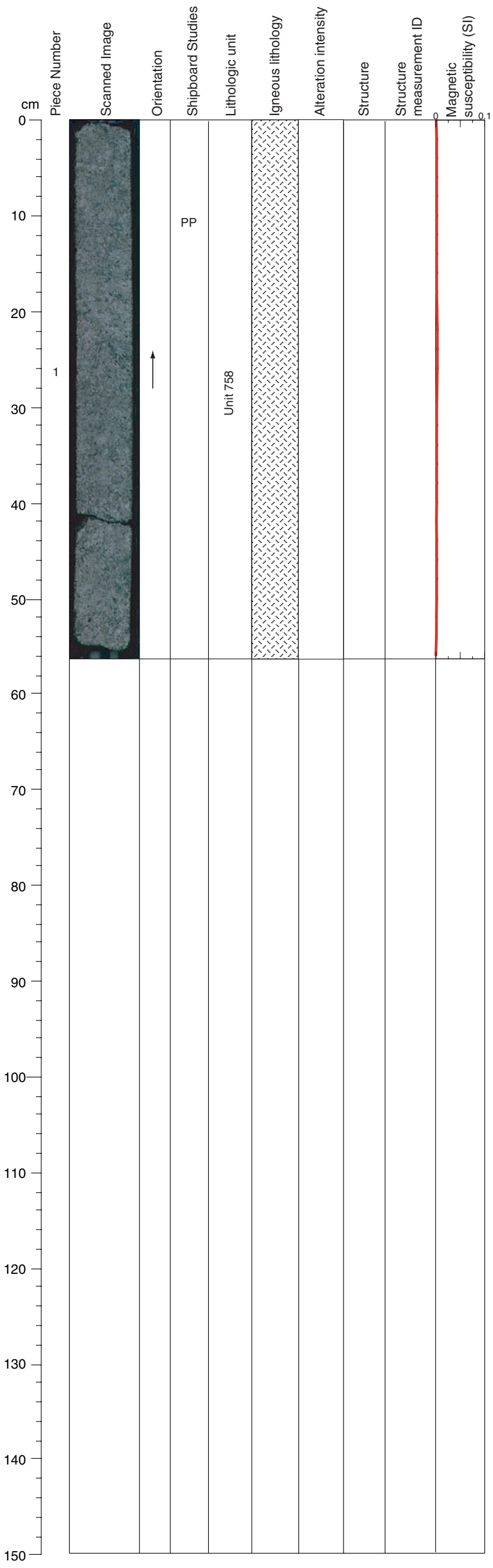
VEIN ALTERATION: Amphibole, chlorite.

THIN SECTIONS:
305-U1309D-288R-2, 69-72 cm (#665)

STRUCTURE: Medium-grained, isotropic gabbro. Set of shallowly dipping green veins.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-288R-2, 45-73 cm WET

Core Photo



305-U1309D-288R-3 (Section top: 1382.17 mbsf)

UNIT-758 Gabbro
Pieces: 1

PRIMARY MINERALOGY: Mode from Piece 1a

Plagioclase	Modal 40% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 60% Size 2 mm average Shape anhedral

COMMENTS: Unit 758 is medium-grained gabbro.

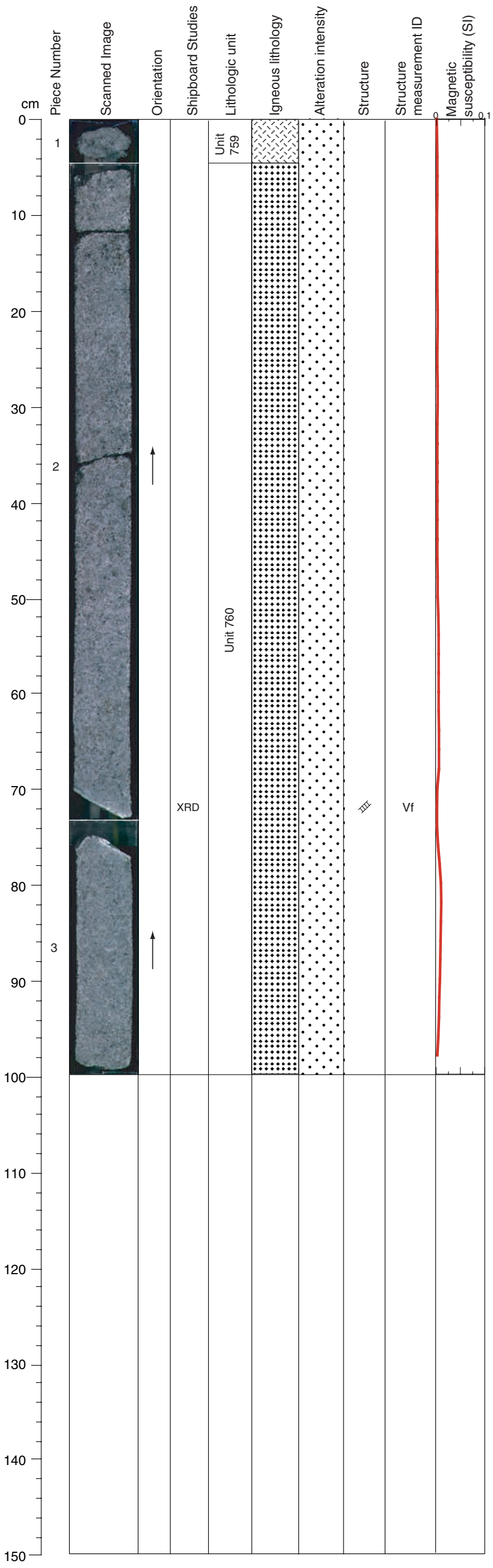
SECONDARY MINERALOGY: Pale amphibole, chlorite

COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches and streaks occur in plagioclase.

VEIN ALTERATION: n/a

STRUCTURE: Medium-grained, isotropic gabbro.

Core Photo



305-U1309D-289R-1 (Section top: 1382.40 mbsf)

UNIT-759 Gabbro Rubble
Pieces: 1

COMMENTS: Unit 759 is medium-grained gabbro rubble.

UNIT-760 Olivine Gabbro
Pieces: 2-3

PRIMARY MINERALOGY: Mode from Piece 2b

Olivine	Modal 8% Size 3 mm average Shape anhedral
Plagioclase	Modal 42% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 50% Size 4 mm average Shape anhedral

COMMENTS: Unit 760 is medium-grained olivine gabbro.

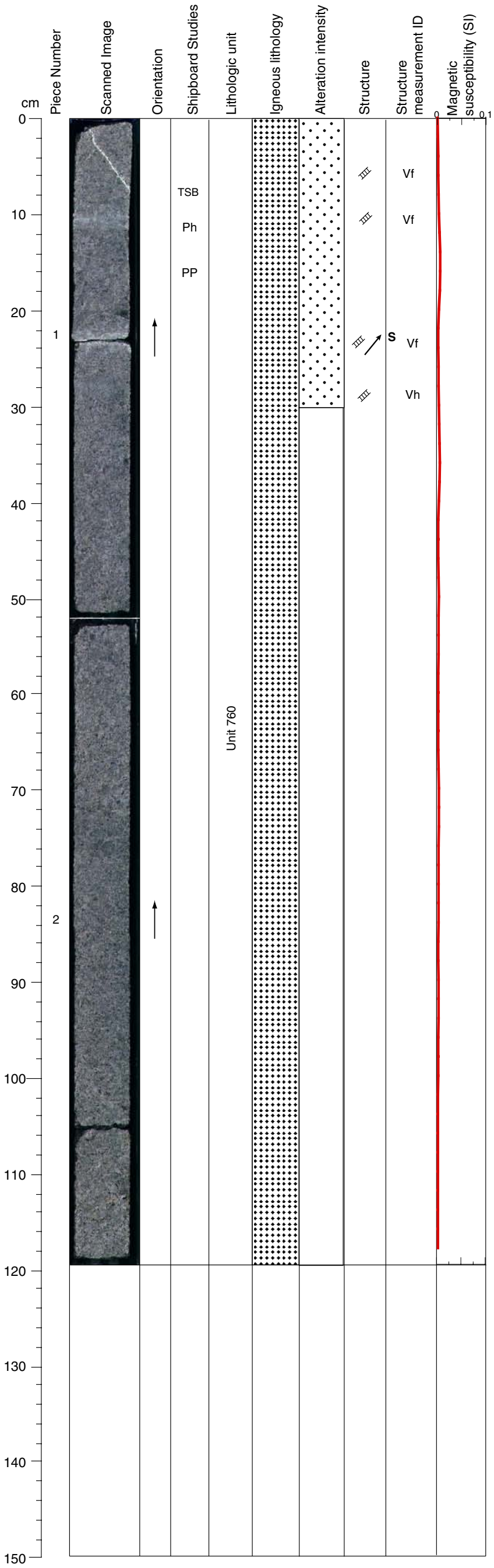
SECONDARY MINERALOGY: Pale amphibole, chlorite

COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches occur in plagioclase. Faint green veins appear in Pieces 2c with alteration halos of from 5 mm. Green and white vein material coats the bottom of Piece 2c and top of Piece 3. An alteration halo extends for about 15 mm on either side of these coatings.

VEIN ALTERATION: Amphibole, chlorite, slip-fiber, zeolite.

STRUCTURE: Medium-grained gabbro without a clearly defined magmatic or plastic fabric. A shallowly dipping vein with white infill.

Core Photo



305-U1309D-289R-2 (Section top: 1383.39 mbsf)

UNIT-760 Olivine Gabbro
Pieces: 1-2

PRIMARY MINERALOGY: Mode from Piece 2a

Olivine	Modal 8% Size 3 mm average Shape anhedral
Plagioclase	Modal 42% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 50% Size 4 mm average Shape anhedral

COMMENTS: Unit 760 is medium-grained olivine gabbro.

SECONDARY MINERALOGY: Pale amphibole, chlorite

COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches occur in plagioclase. A white vein cuts Piece 1 from ~1-8 cm and has an alteration halo about 5 mm wide. A light, subhorizontal, braided, bluish-greenish vein cuts Piece 1a at about 10 cm and has an alteration halo that is 30 mm wide. Green and white vein material coats the bottom of Piece 1a and top of Piece 1b. An alteration halo extends for about 12 mm on either side of these coatings.

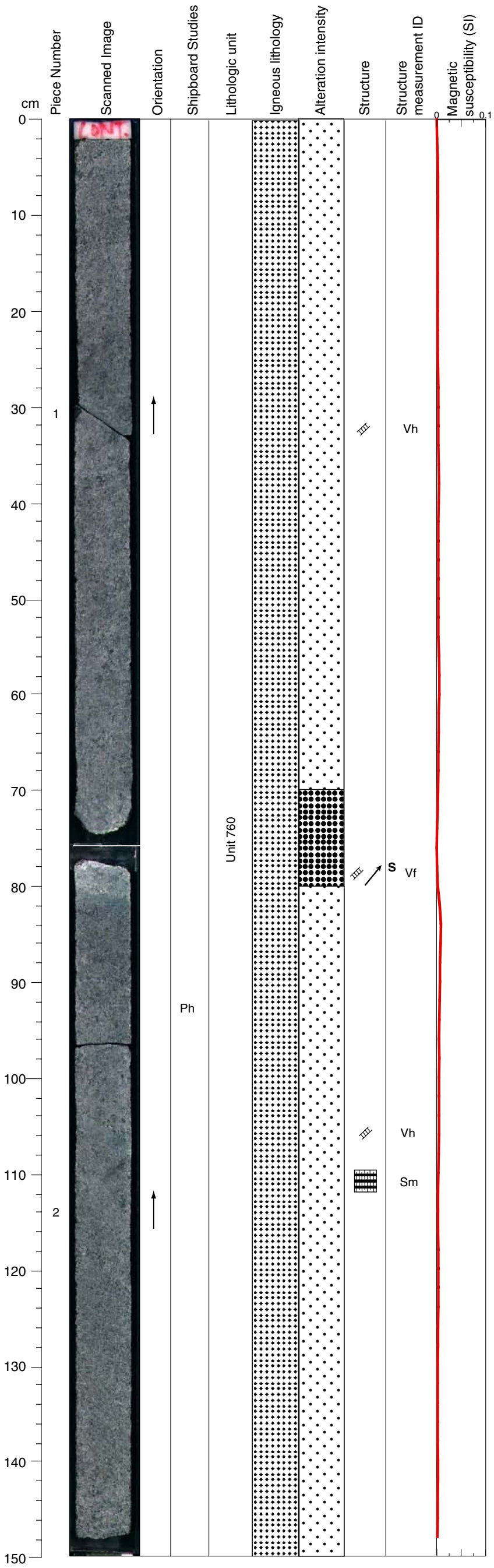
VEIN ALTERATION: Amphibole, chlorite, slip-fiber, zeolite.

THIN SECTIONS:
305-U1309D-289R-2, 6-9 cm (#666)

STRUCTURE: Medium-grained, isotropic gabbro. Shallow to moderately dipping dark green veins with white infills and alteration halo.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-289R-2, 0-30 cm WET

Core Photo



305-U1309D-289R-3 (Section top: 1384.59 mbsf)

UNIT-760 Olivine Gabbro
Pieces: 1-2

PRIMARY MINERALOGY: Mode from Piece 1b

Olivine	Modal 8% Size 3 mm average Shape anhedral
Plagioclase	Modal 42% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 50% Size 4 mm average Shape anhedral

COMMENTS: Unit 760 is medium-grained olivine gabbro continued from previous section.

SECONDARY MINERALOGY: Pale amphibole, chlorite, talc

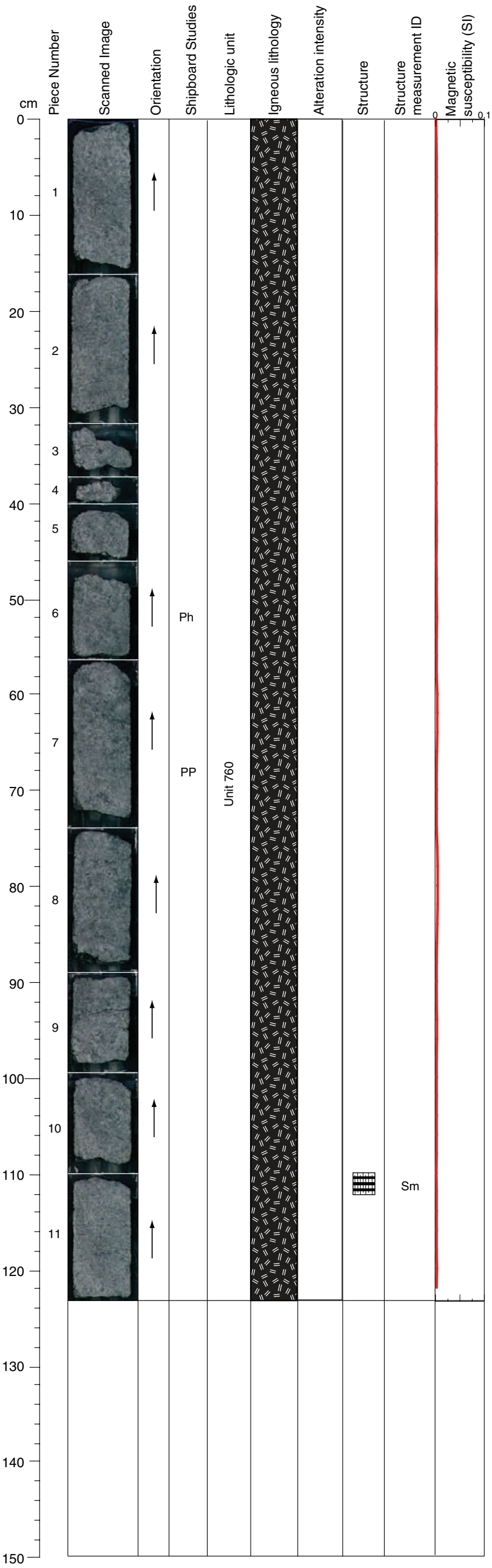
COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches occur in plagioclase. Green vein material coats the bottom of Piece 1a and top of Piece 1b and a green vein lies subparallel to the break between these pieces about 1 cm above the break. An alteration halo extends for about 15 mm above the break and about 3 mm below. Green and white vein material coats the bottom of Piece 1b and top of Piece 2a. An alteration halo with leucocratic material extends for about 20 mm above the bottom of Piece 1b and for about 45 mm below the top of Piece 2a. A green vein with alteration halo of about 7 mm cuts Piece 2b from 104 to 108 cm

VEIN ALTERATION: Amphibole, chlorite, slip-fiber, zeolite.

STRUCTURE: Medium-grained gabbro with magmatic foliation developed in second piece. Shallowly dipping green veins and a white vein

CLOSE-UP PHOTOGRAPHS:
305-U1309D-289R-3, 76-106 cm WET.

Core Photo



305-U1309D-289R-4 (Section top: 1386.09 mbsf)

UNIT-760 Olivine-bearing Gabbro
Pieces: 1-11

PRIMARY MINERALOGY: Mode from Piece 7

Olivine	Modal 5% Size 3 mm average Shape anhedral
Plagioclase	Modal 40% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 55% Size 4 mm average Shape anhedral

COMMENTS: Unit 760 is medium-grained olivine-bearing gabbro.

SECONDARY MINERALOGY: Pale amphibole, chlorite

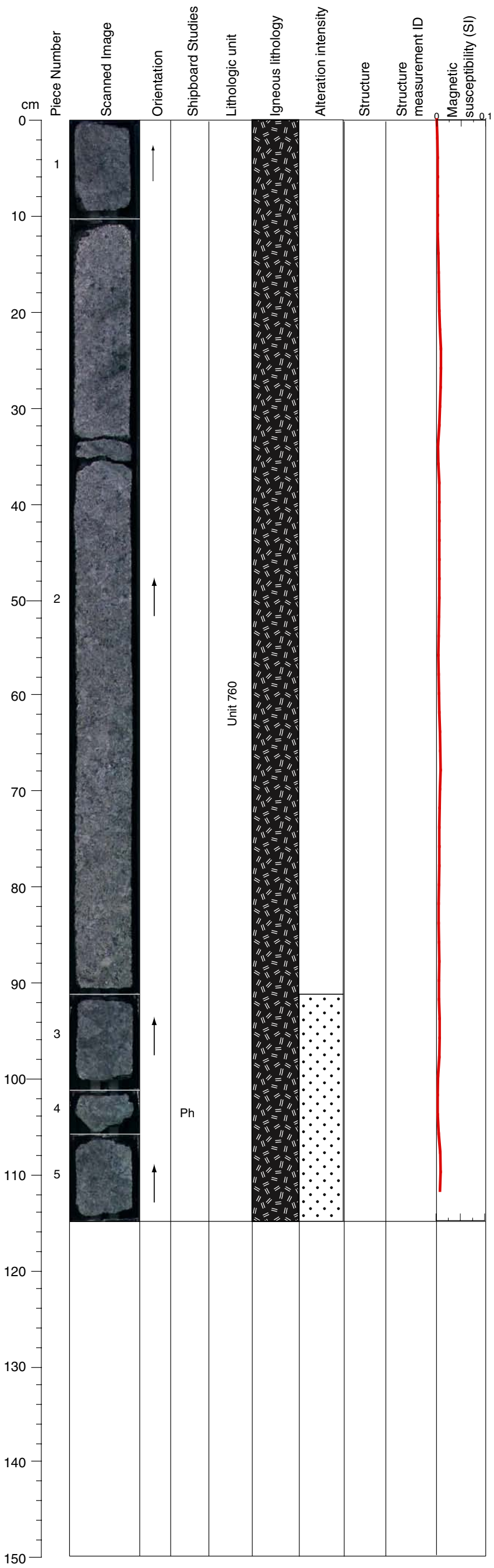
COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches and streaks occur in plagioclase.

VEIN ALTERATION: n/a

STRUCTURE: Medium-grained gabbro with magmatic foliation visible in lower part of section. No plastic strain. A few open cracks.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-289R-4, 46-72 cm WET

Core Photo



305-U1309D-290R-1 (Section top: 1387.20 mbsf)

UNIT-760 Olivine-bearing Gabbro
Pieces: 1-5

PRIMARY MINERALOGY: Mode from Piece 2c

Olivine	Modal 5% Size 3 mm average Shape anhedral
Plagioclase	Modal 45% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 50% Size 4 mm average Shape anhedral

COMMENTS: Unit 760 is medium-grained olivine-bearing gabbro.

SECONDARY MINERALOGY: Pale amphibole, chlorite

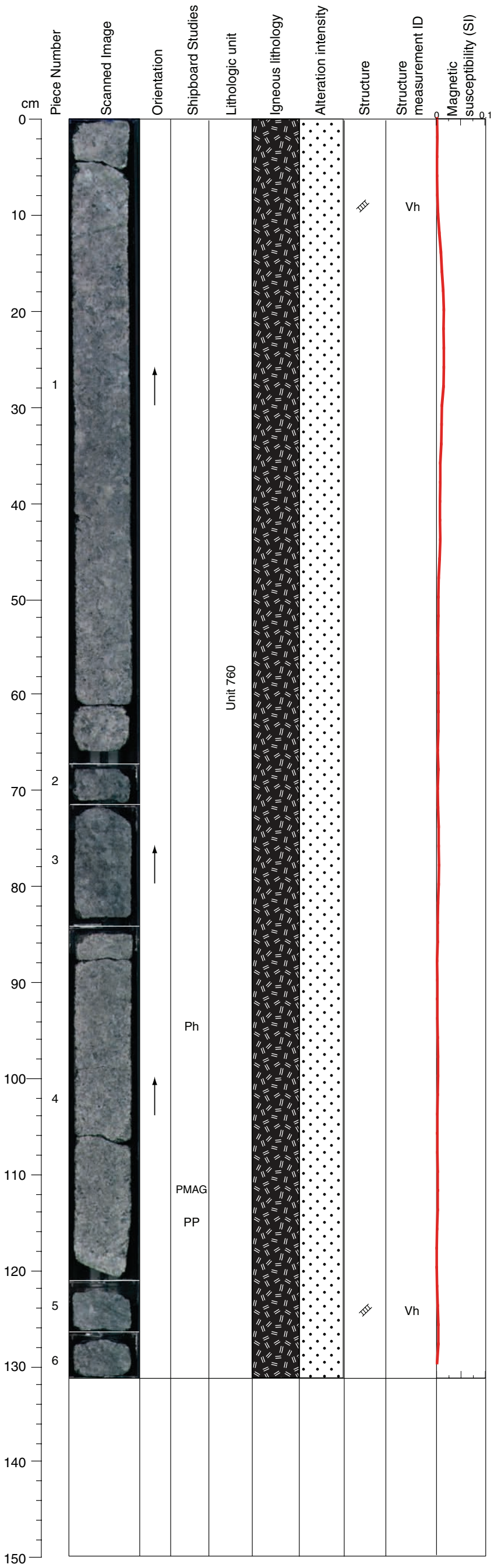
COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches occur in plagioclase. Slight corona texture is developed in Pieces 3-5.

VEIN ALTERATION: Amphibole, chlorite, zeolite.

STRUCTURE: Medium-grained, isotropic gabbro. A few veins at bottom in roller (not measurable).

CLOSE-UP PHOTOGRAPHS:
305-U1309D-290R-1, 92-114 cm WET

Core Photo



305-U1309D-290R-2 (Section top: 1388.34 mbsf)

UNIT-760 Olivine-bearing Gabbro
Pieces: 1-6

PRIMARY MINERALOGY: Mode from Piece 1

Olivine	Modal 5% Size 3 mm average Shape anhedral
Plagioclase	Modal 40% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 55% Size 4 mm average Shape anhedral

COMMENTS: Unit 760 is medium-grained olivine-bearing gabbro.

SECONDARY MINERALOGY: Pale amphibole, chlorite, sulfide

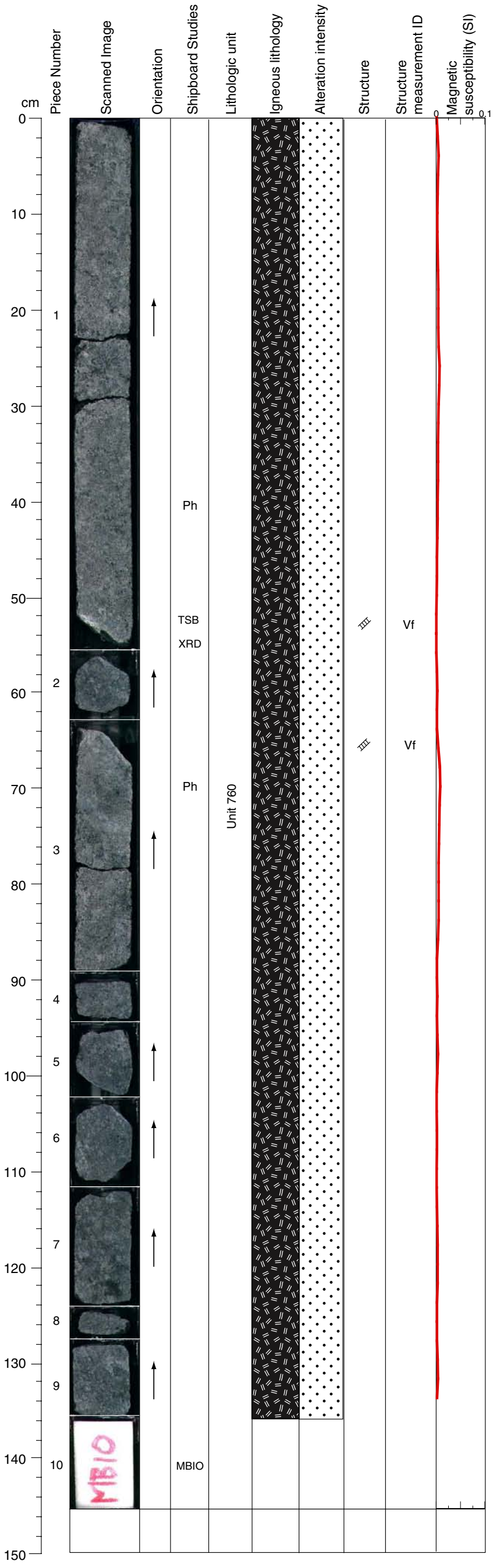
COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches occur in plagioclase. Green and white vein sets cut Piece 2b and an alteration halo of about 1 cm either side of the vein affects both Pieces 1a and 1b. Dark green vein at 11-12 cm has a halo of about 5 mm. An alteration halo extends for about 15 mm from the base of Piece 4c and green vein material coats the bottom of the piece. A branching green vein cuts Piece 5 and has an alteration halo from 3 to 10 mm.

VEIN ALTERATION: Amphibole, chlorite, carbonate, slip-fiber, zeolite.

STRUCTURE: Medium-grained, isotropic gabbro. A few dark green veins moderately dipping.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-290R-2, 84-107 cm WET

Core Photo



305-U1309D-290R-3 (Section top: 1389.65 mbsf)

UNIT-760 Olivine-bearing Gabbro
Pieces: 1-10

PRIMARY MINERALOGY: Mode from Piece 1

Olivine	Modal 5% Size 3 mm average Shape anhedral
Plagioclase	Modal 40% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 55% Size 4 mm average Shape anhedral

COMMENTS: Unit 760 is medium-grained olivine-bearing gabbro.

SECONDARY MINERALOGY: Pale amphibole, chlorite

COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches occur in plagioclase. A green and white vein material coats the bottom of Piece 1c and has an alteration halo at least 10 mm wide. Green veins appear in Pieces 5, 6, and 7 and have alteration halos of up to about 10 mm.

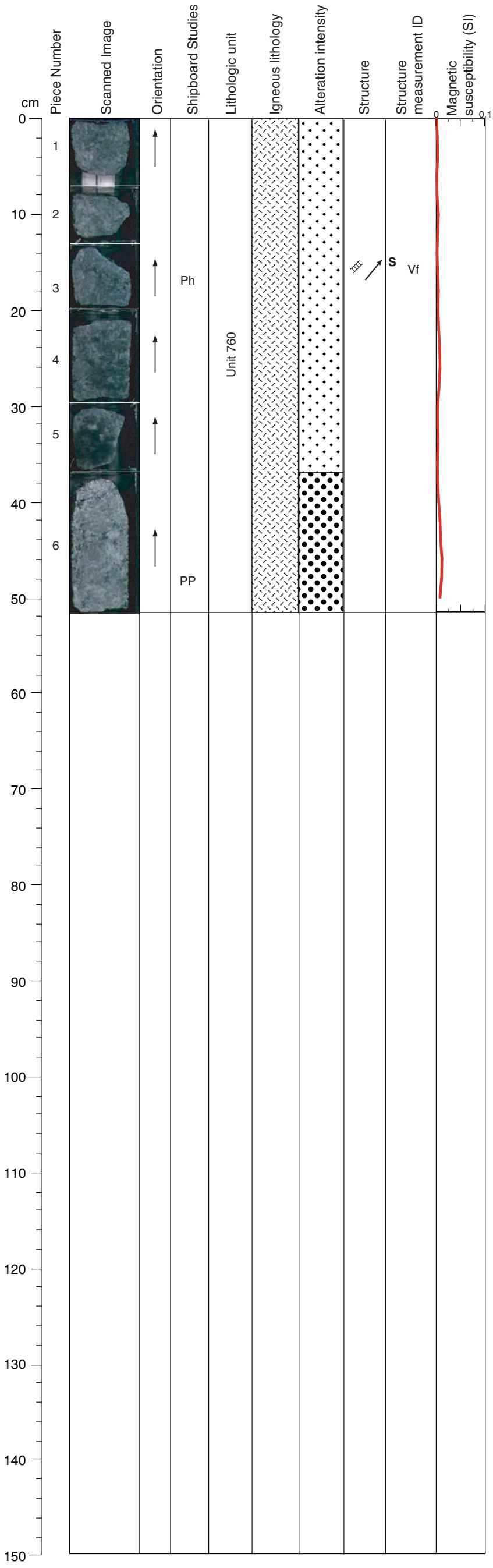
VEIN ALTERATION: Amphibole, chlorite, carbonate, slip-fiber, zeolite.

THIN SECTIONS:
305-U1309D-290R-3, 51-54 cm (#667)

STRUCTURE: Medium-grained, isotropic, olivine-bearing gabbro. A few dark green veins dipping moderately.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-290R-3, 30-55 cm WET
305-U1309D-290R-3, 63-89 cm WET

Core Photo



305-U1309D-290R-4 (Section top: 1391.10 mbsf)

UNIT-760 Gabbro
Pieces: 1-6

PRIMARY MINERALOGY: Mode from Piece 4

Olivine	Modal <1% Size 3 mm average Shape anhedral
Plagioclase	Modal 55% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 45% Size 4 mm average Shape anhedral

COMMENTS: Unit 760 is medium-grained gabbro.

SECONDARY MINERALOGY: Pale amphibole, chlorite, sulfide

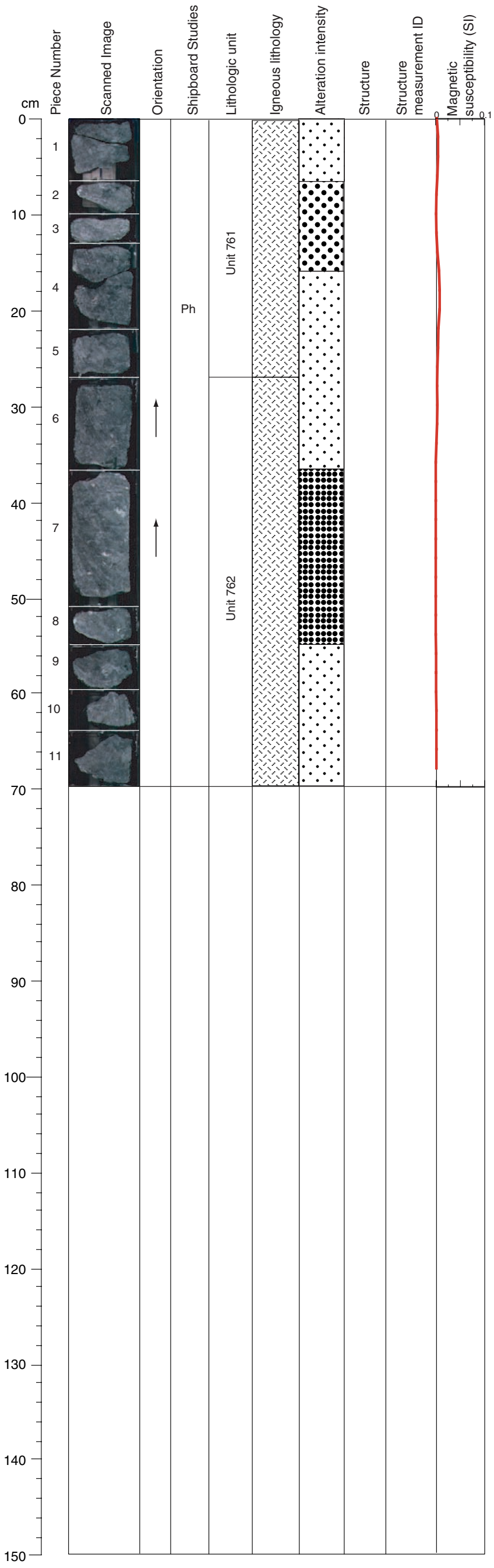
COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches occur in plagioclase. Green vein material coats the top of Piece 3 and has an alteration halo about 10 mm wide.

VEIN ALTERATION: Amphibole, chlorite(?)

STRUCTURE: Medium-grained, isotropic, olivine-bearing gabbro. A few dark green veins dipping shallowly.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-290R-4, 14-37 cm WET

Core Photo



305-U1309D-291R-1 (Section top: 1392.00 mbsf)

UNIT-761 Gabbro Rubble
Pieces: 1-5

COMMENTS: Unit 761 is medium-grained gabbro rubble, may be in place.

UNIT-762 Gabbro
Pieces: 6-11

PRIMARY MINERALOGY: Mode from Piece 7

Plagioclase	Modal 55% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 45% Size 4 mm average Shape anhedral

COMMENTS: Unit 762 is medium-grained gabbro.

SECONDARY MINERALOGY: Pale amphibole, chlorite, talc, prehnite? secondary plagioclase?

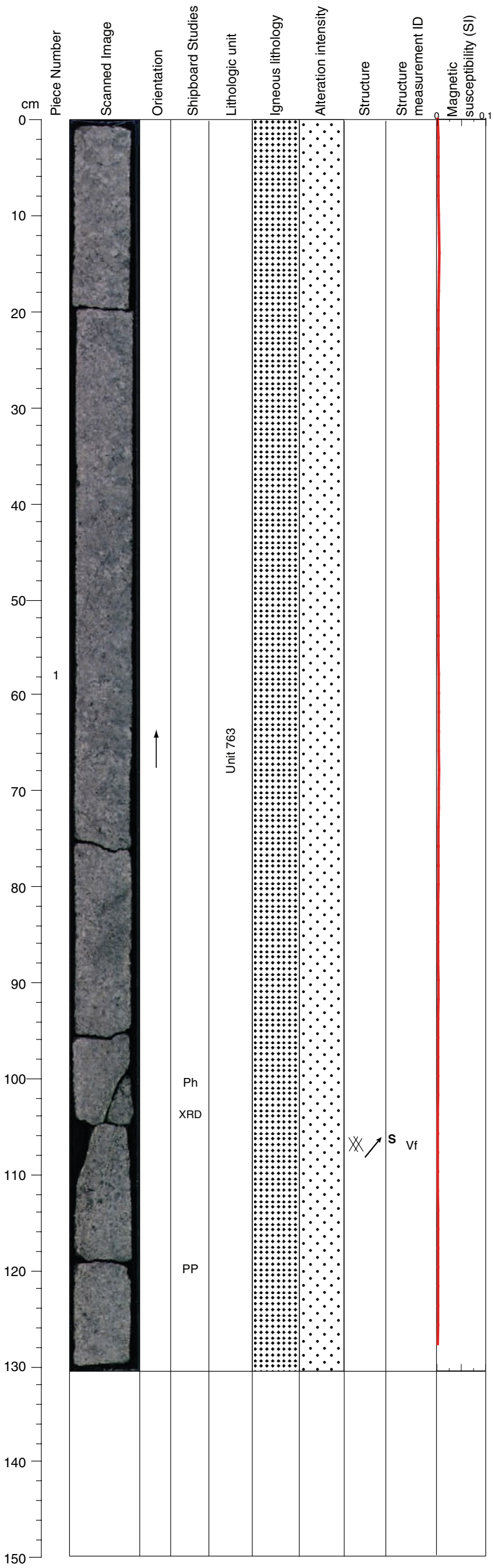
COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches and streaks occur in plagioclase. Dark green veins occur in Pieces 3-4 and 7 and white veins occur in Pieces 7 and 10. The dark green veins have alteration halos from 5 to 10 mm wide. There is a small amount of leucocratic alteration in the bottom of Pieces 2 and 3 and the top of Piece 4. There is some minor corona texture developed in the more altered pieces.

VEIN ALTERATION: Amphibole, chlorite, zeolite

STRUCTURE: Medium-grained, isotropic gabbro. Slight cataclasis distributed.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-291R-1, 7-36 cm WET

Core Photo



305-U1309D-291R-2 (Section top: 1392.70 mbsf)

UNIT-763 Olivine Gabbro
Pieces: 1

PRIMARY MINERALOGY: Mode from Piece 1a

Olivine	Modal 5% Size 3 mm average Shape anhedral
Plagioclase	Modal 45% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 50% Size 4 mm average Shape anhedral

COMMENTS: Unit 763 is medium-grained olivine gabbro. Larger clinopyroxene grains at 0-19 cm. Trace of sulfide. Plagioclase content increases down section.

SECONDARY MINERALOGY: Pale amphibole, chlorite

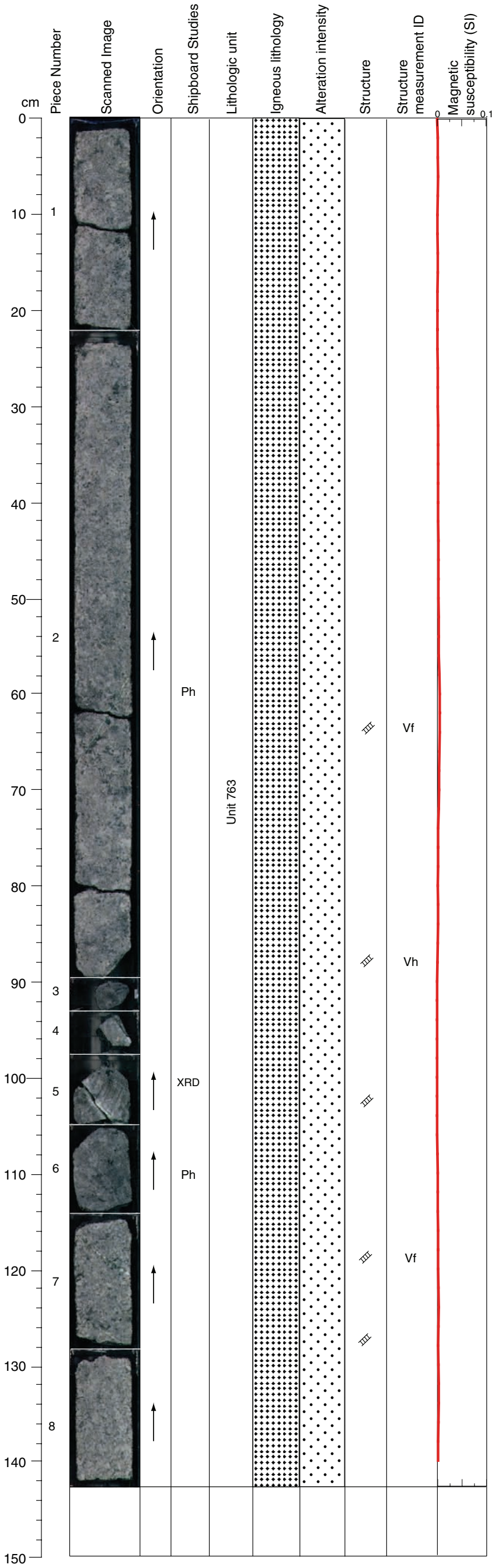
COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches and streaks occur in plagioclase. White zeolite vein occurs in Piece 1c and green and white veins occur in Pieces 1d-f.

VEIN ALTERATION: Clay, carbonate and zeolite.

STRUCTURE: Medium-grained, isotropic gabbro. Steeply dipping pale green fault veins with fibers plunging subhorizontally.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-291R-2, 95-119 cm WET

Core Photo



305-U1309D-291R-3 (Section top: 1394.00 mbsf)

UNIT-763 Olivine Gabbro
Pieces: 1-8

PRIMARY MINERALOGY: Mode from Piece 2b

Olivine	Modal 8% Size 3 mm average Shape anhedral
Plagioclase	Modal 40% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 52% Size 4 mm average Shape anhedral

COMMENTS: Unit 763 is medium-grained olivine gabbro.

SECONDARY MINERALOGY: Pale amphibole, chlorite

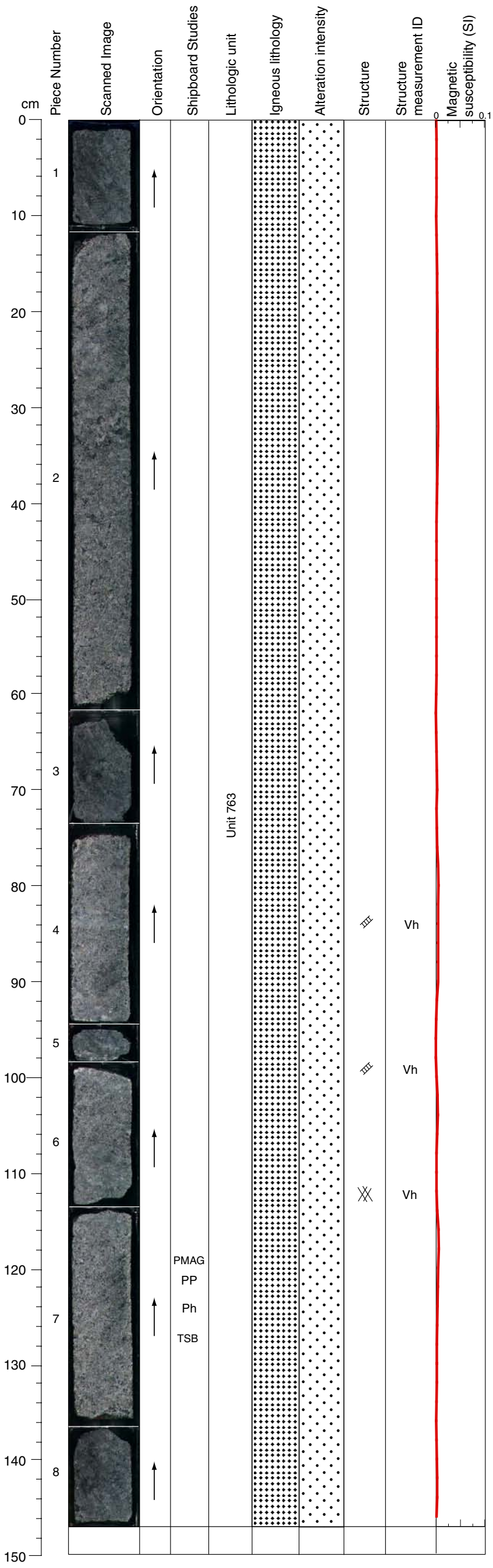
COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches and streaks occur in plagioclase. Dark green veins occur in Pieces 4 to 7 (halos from 7 to 10 mm) and a light green vein network occurs in Pieces 5-6 (halo 20 mm).

VEIN ALTERATION: Amphibole, chlorite, zeolite

STRUCTURE: Medium-grained, olivine-bearing, isotropic gabbro. Pale green veins dipping moderately

CLOSE-UP PHOTOGRAPHS:
305-U1309D-291R-3, 50-74 cm WET
305-U1309D-291R-3, 97-127 cm WET
.

Core Photo



305-U1309D-291R-4 (Section top: 1395.43 mbsf)

UNIT-763 Olivine Gabbro
Pieces: 1-8

PRIMARY MINERALOGY: Mode from several pieces

Olivine	Modal 8-10% Size 3 mm average Shape anhedral
Plagioclase	Modal 45-60% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 32-45% Size up to 17 mm Shape anhedral

COMMENTS: Unit 763 is medium- to coarse-grained olivine gabbro.

SECONDARY MINERALOGY: Pale amphibole, chlorite

COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches and streaks occur in plagioclase. Dark green veins occur in Pieces 4 , 6, and 7 (halos from 7 to 10 mm) and a light green vein network occurs in Pieces 5 through 6 (halo 20 mm).

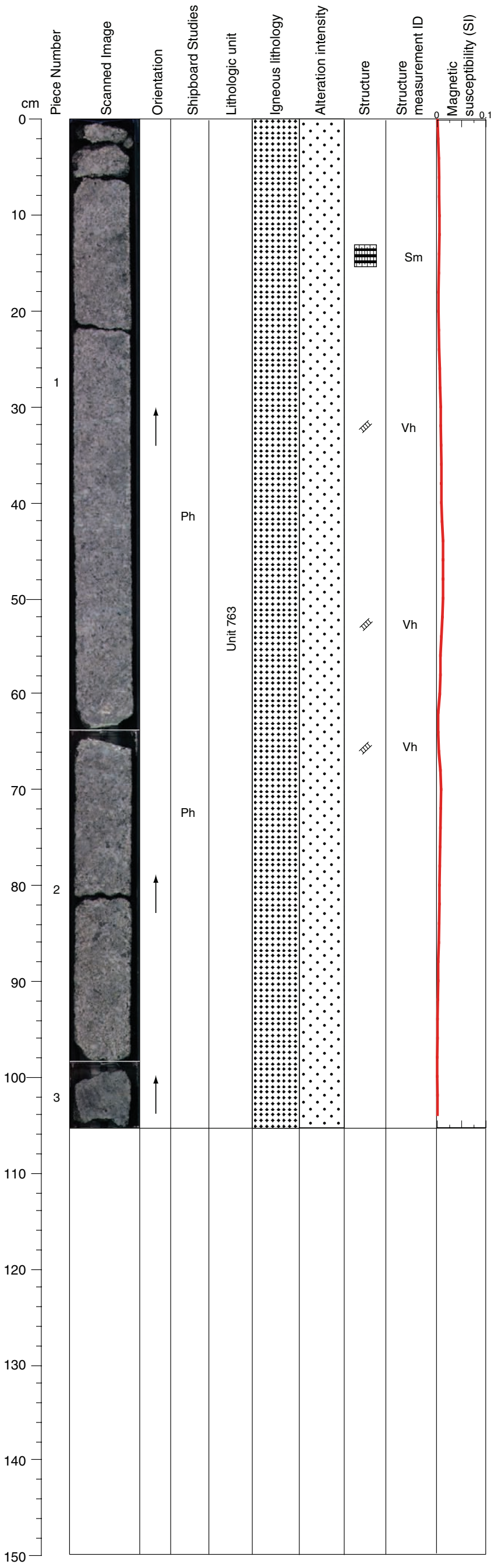
VEIN ALTERATION: Amphibole, chlorite, carbonate, zeolite

THIN SECTIONS:
305-U1309D-291R-4, 125-128 cm (#668)

STRUCTURE: Medium-grained, olivine-bearing, isotropic gabbro. A set of dark green veins.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-291R-4, 105-135 cm WET

Core Photo



305-U1309D-292R-1 (Section top: 1396.80 mbsf)

UNIT-763 Olivine Gabbro
Pieces: 1-3

PRIMARY MINERALOGY: Mode from Piece 1

Olivine	Modal 8% Size 3 mm average Shape anhedral
Plagioclase	Modal 60% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 32% Size 4 mm average Shape anhedral

COMMENTS: Unit 763 is medium- to coarse-grained olivine gabbro.

SECONDARY MINERALOGY: Pale amphibole, chlorite

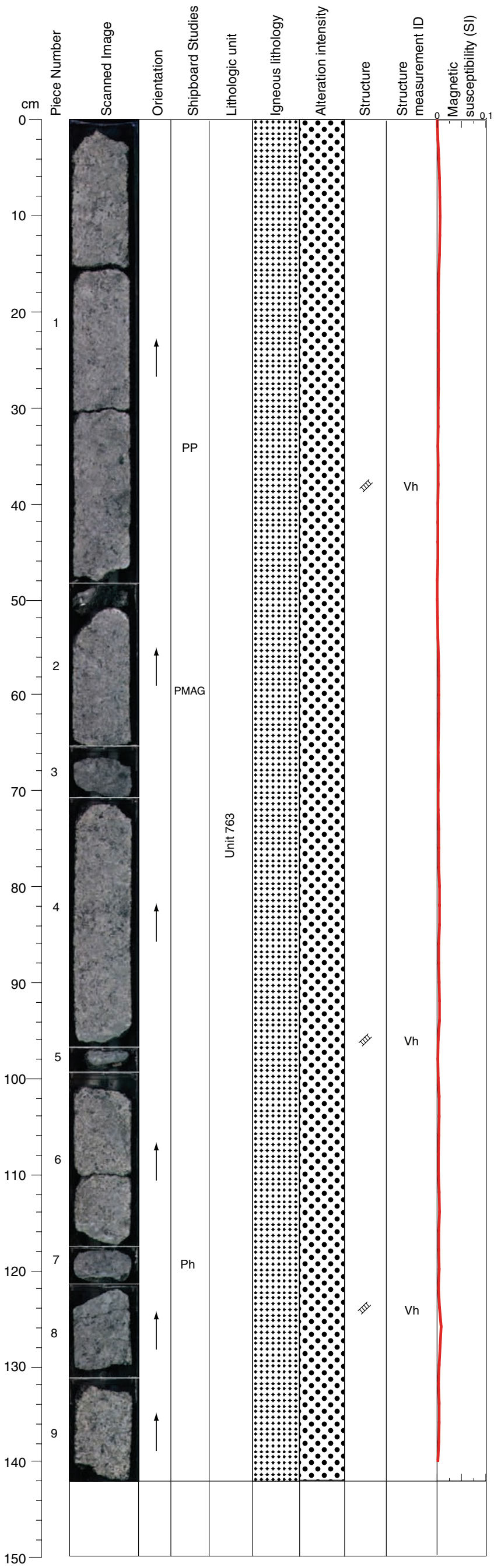
COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches and streaks occur in plagioclase. Dark green veins occur in Pieces 1d and 2a , 6, (halos ~7 mm). A green and white set of veins in fault gouge (?) occurs in Piece 1d. A light green vein occurs in Piece 2a (halo 20 mm).

VEIN ALTERATION: Amphibole, plagioclase, chlorite, slip-fiber, zeolite

STRUCTURE: Medium-grained, olivine gabbro showing a weak magmatic foliation at top. A set of dark green veins, shallow dipping.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-292R-1, 36-64 cm WET
305-U1309D-292R-1, 64-81 cm WET

Core Photo



305-U1309D-292R-2 (Section top: 1397.85 mbsf)

UNIT-763 Olivine Gabbro
Pieces: 1-9

PRIMARY MINERALOGY: Mode from several pieces

Olivine	Modal 8-10% Size 3 mm average Shape anhedral
Plagioclase	Modal 25-65% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 27-65% Size 4 mm average Shape anhedral

COMMENTS: Unit 763 is medium- to coarse-grained olivine gabbro. Trace of sulfide.

SECONDARY MINERALOGY: Pale amphibole, chlorite

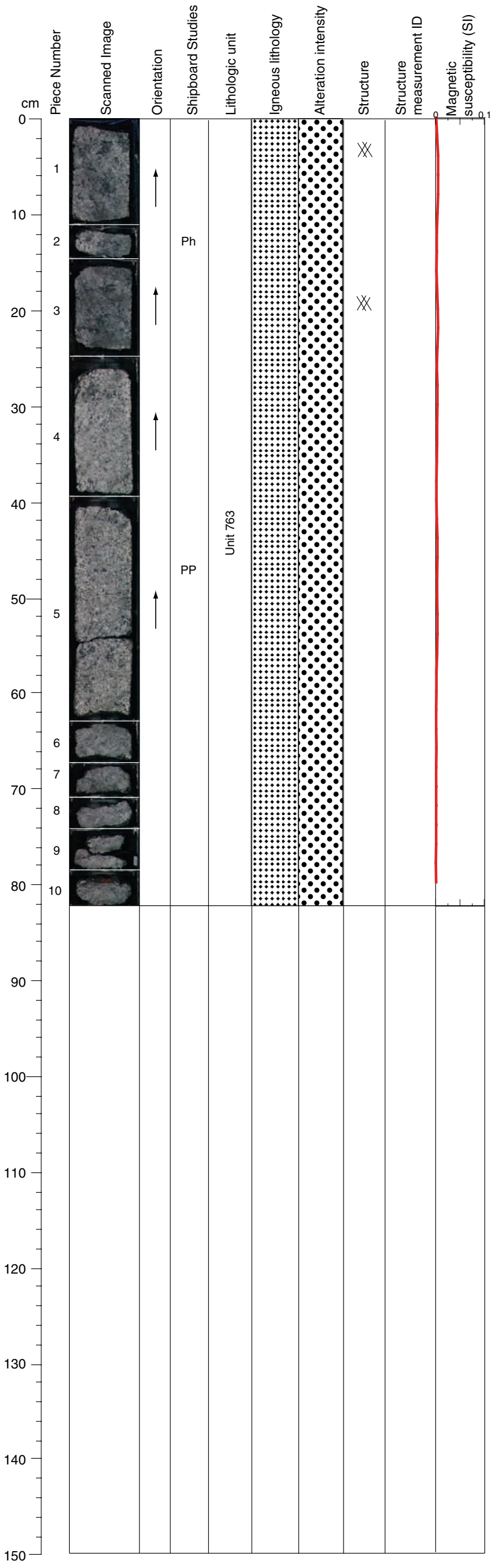
COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches and streaks occur in plagioclase. Dark green veins occur in Pieces 4 , 5, and 8 (halos from 10 to 15 mm).

VEIN ALTERATION: Amphibole, chlorite.

STRUCTURE: Medium to course olivine gabbro. Shallowly dipping dark green veins with alteration halos and some open cracks.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-292R-2, 110-131 cm WET

Core Photo



305-U1309D-292R-3 (Section top: 1399.28 mbsf)

UNIT-763 Olivine Gabbro
Pieces: 1-10

PRIMARY MINERALOGY: Mode from several pieces

Olivine	Modal 8-25% Size 3 mm average Shape anhedral
Plagioclase	Modal 50-60% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 25-32% Size 4 mm average Shape anhedral

COMMENTS: Unit 763 is medium- to coarse-grained olivine gabbro. Trace of sulfide.

SECONDARY MINERALOGY: Pale amphibole, chlorite

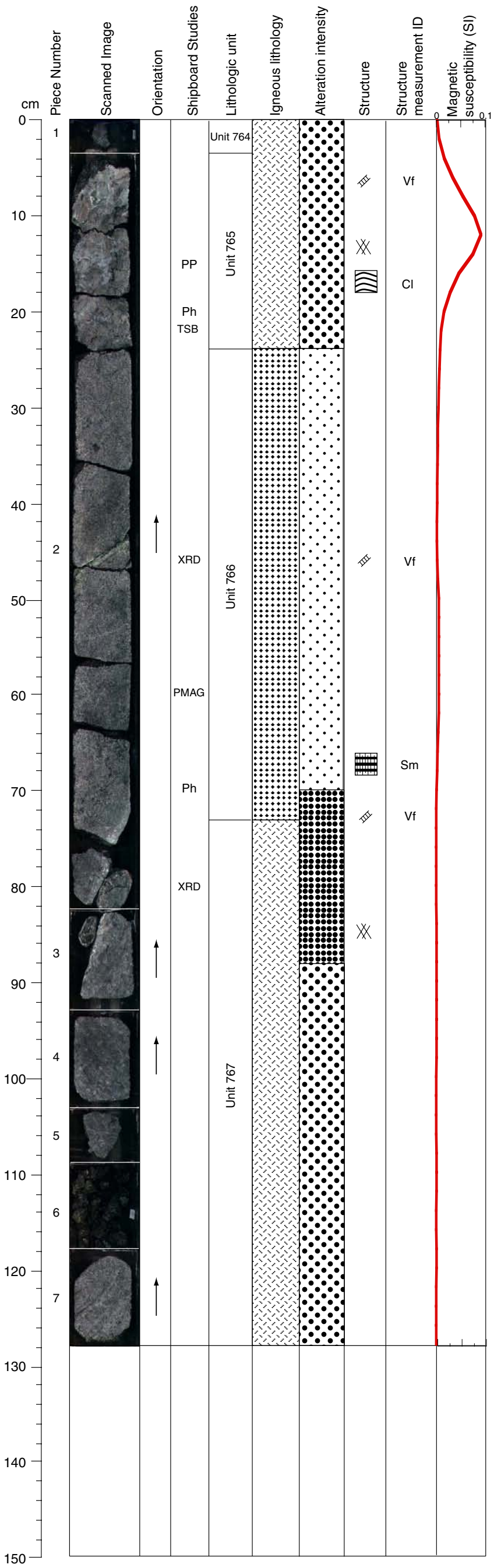
COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches and streaks occur in plagioclase.

VEIN ALTERATION: n/a

STRUCTURE: Medium- to coarse-grained olivine bearing gabbro showing no fabric. Open cracks and slight catalasis at top in coarse gabbro.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-292R-3, 0-24 cm WET

Core Photo



305-U1309D-293R-1 (Section top: 1401.60 mbsf)

UNIT-764 Rubble
Pieces: 1

COMMENTS: Unit 764 is rubble.

UNIT-765 Gabbro
Pieces: 2a-2c

PRIMARY MINERALOGY: Mode from Piece 2b

Plagioclase	Modal 45% Size 6 mm average Shape anhedral
Clinopyroxene	Modal 55% Size 10 mm average Shape anhedral

COMMENTS: Unit 765 is coarse-grained gabbro. Trace oxide and sulfide, green amphibole from clinopyroxene. As much as 15% orthopyroxene observed in thin section.

UNIT-766 Olivine Gabbro
Pieces: 2d-2h

PRIMARY MINERALOGY: Mode from several pieces

Olivine	Modal 10-25% Size 2 mm average Shape anhedral
Plagioclase	Modal 35-40% Size 2 mm average Shape anhedral
Clinopyroxene	Modal 50% Size 3 mm average Shape anhedral

COMMENTS: Unit 766 is fine- to medium-grained olivine gabbro.

UNIT-767 Gabbro
Pieces: 2h-7

PRIMARY MINERALOGY: Mode from several pieces

Plagioclase	Modal 45-50% Size 3 mm average Shape anhedral
Clinopyroxene	Modal 40% Size 1 mm average Shape anhedral

COMMENTS: Unit 767 is fine- to coarse-grained gabbro.

SECONDARY MINERALOGY: Pale amphibole, chlorite, talc, secondary plagioclase, sulfide

COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches and streaks occur in plagioclase. Dark green veins occur in Pieces 2f and 2g-3b with alteration halo of from 7 to 15 mm. A light green vein with an irregular halo about 2 mm wide occurs in Pieces 2a-2d. A green and white vein occurs in Pieces 2e-2f.

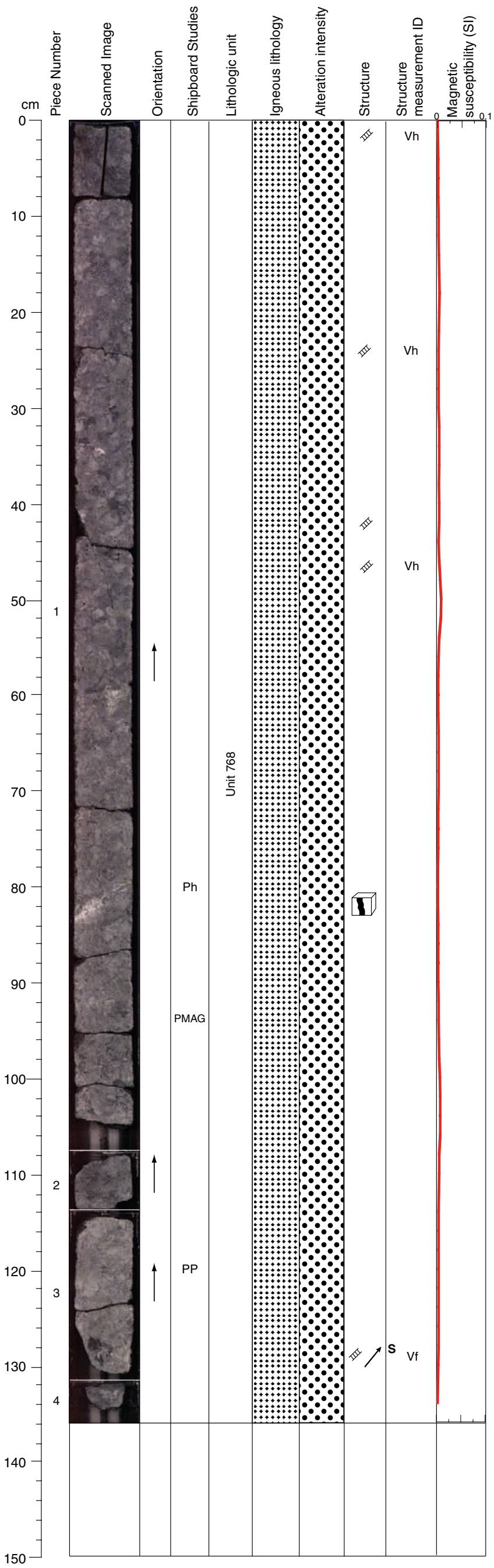
VEIN ALTERATION: Amphibole, chlorite, clay, carbonate, slip-fiber, zeolite

THIN SECTIONS:
305-U1309D-293R-1, 21-23 cm (#669)

STRUCTURE: Coarse- to medium-grained gabbro showing a weak magmatic fabric in medium-grained intervals. Set of pale green veins with white infill. Some veins have large alteration halos.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-293R-1, 4-34 cm WET
305-U1309D-293R-1, 63-93 cm WET

Core Photo



305-U1309D-294R-1 (Section top: 1406.40 mbsf)

UNIT-768 Olivine Gabbro
Pieces: 1-4

PRIMARY MINERALOGY: Mode from several pieces

Olivine	Modal 5-8% Size 3 mm average Shape anhedral
Plagioclase	Modal 40-50% Size 7 mm average Shape anhedral
Clinopyroxene	Modal 45-52% Size 7 mm average Shape anhedral

COMMENTS: Unit 768 is medium- to coarse-grained olivine gabbro. Inhomogeneous olivine distribution.

SECONDARY MINERALOGY: Pale amphibole, chlorite

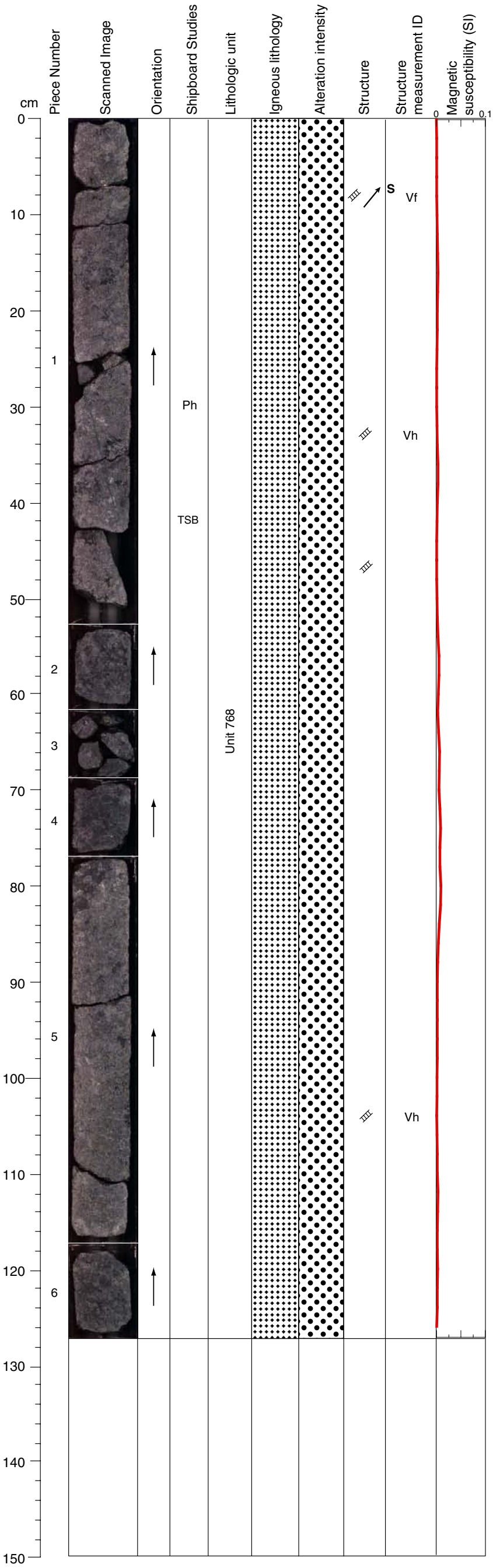
COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches and streaks occur in plagioclase. Light green, vein material coats the top of Piece 1a. A set of green veins occurs in Piece 79 to 84 cm with an alteration halo about 15 mm wide.

VEIN ALTERATION: Clay, calcite, amphibole, chlorite, zeolite

STRUCTURE: Coarse-grained gabbro showing no foliation. Dark green veins mostly dipping steeply.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-294R-1, 73-97 cm WET

Core Photo



305-U1309D-294R-2 (Section top: 1407.76 mbsf)

UNIT-768 Olivine Gabbro
Pieces: 1-6

PRIMARY MINERALOGY: Mode from Piece 5

Olivine	Modal 8% Size 5 mm average Shape anhedral
Plagioclase	Modal 40% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 52% Size 5 mm average Shape anhedral

COMMENTS: Unit 768 is medium- to coarse-grained olivine gabbro. Coarse-grained olivine-rich interval 78-83 cm.

SECONDARY MINERALOGY: Pale amphibole, chlorite

COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches and streaks occur in plagioclase. A light green, branching vein occurs in Piece 1a. Dark green veins occur in Pieces 1c and 1d to Piece 1f with alteration halos of 10 to 20 mm.

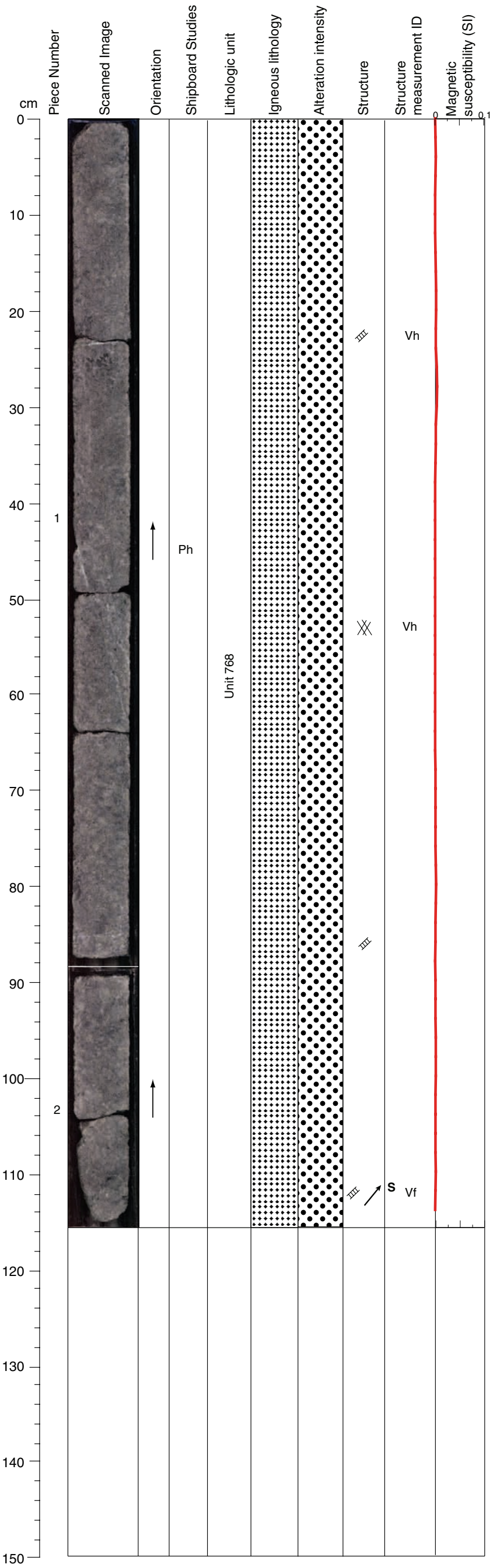
VEIN ALTERATION: Amphibole, chlorite, clay, carbonate.

THIN SECTIONS:
305-U1309D-294R-2, 41-43 cm (#670)

STRUCTURE: Coarse-grained gabbro showing no magmatic fabric. Steep dark green veins and some open cracks and slight cataclasis.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-294R-2, 26-52 cm WET

Core Photo



305-U1309D-294R-3 (Section top: 1409.03 mbsf)

UNIT-768 Olivine Gabbro
Pieces: 1-2

PRIMARY MINERALOGY: Mode from Piece 1b

Olivine	Modal 5% Size 5 mm average Shape anhedral
Plagioclase	Modal 40% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 55% Size 5 mm average Shape anhedral

COMMENTS: Unit 768 is medium- to coarse-grained olivine gabbro.

SECONDARY MINERALOGY: Pale amphibole, chlorite

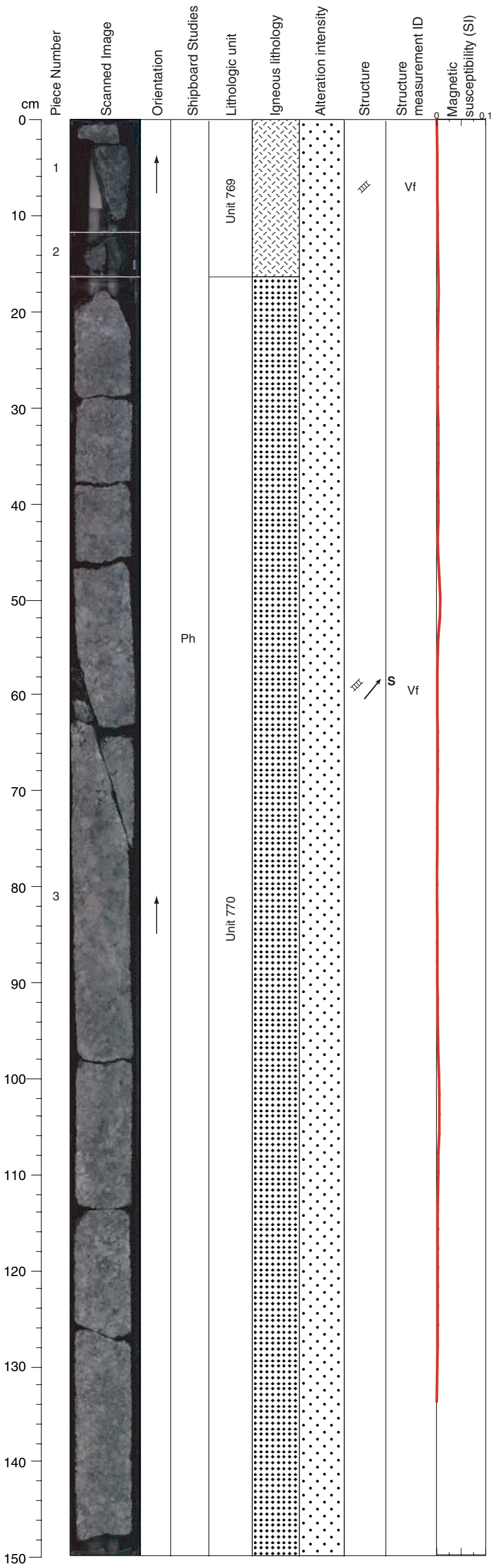
COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches and streaks occur in plagioclase. White veins occur in Piece 1b.

VEIN ALTERATION: Amphibole, chlorite, clay, carbonate.

STRUCTURE: Coarse-grained gabbro exhibiting no foliation. Steep dark green veins and shallow white veins.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-294R-3, 35-65 cm WET

Core Photo



305-U1309D-295R-1 (Section top: 1411.20 mbsf)

UNIT-769 Gabbro
Pieces: 1-2

PRIMARY MINERALOGY: Mode from Piece 1b

Olivine	Modal <1% Size 2 mm average Shape anhedral
Plagioclase	Modal 60% Size 5 mm average Shape anhedral
Clinopyroxene	Modal 40% Size 6 mm average Shape anhedral

COMMENTS: Unit 769 is coarse-grained gabbro.

UNIT-770 Olivine Gabbro
Pieces: 3

PRIMARY MINERALOGY: Mode from Piece 3h

Olivine	Modal 10% Size 5 mm average Shape anhedral
Plagioclase	Modal 50% Size 6 mm average Shape anhedral
Clinopyroxene	Modal 40% Size 10 mm average Shape anhedral

COMMENTS: Unit 770 is medium- to coarse-grained olivine gabbro. Fine-grained at 17-37 cm. Oikocrystal pyroxene. Olivine mode variable.

SECONDARY MINERALOGY: Pale amphibole, chlorite

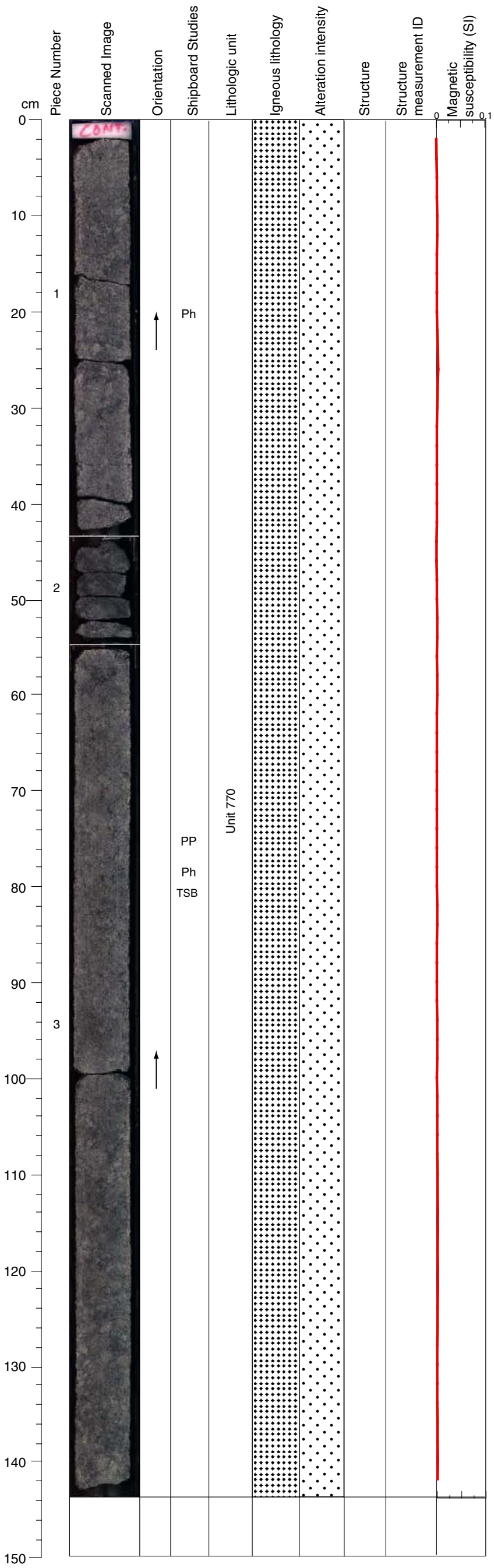
COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches and streaks occur in plagioclase. Dark green to green veins occur in Pieces 1b and 1d-g.

VEIN ALTERATION: Chlorite, clay, carbonate.

STRUCTURE: Coarse -grained, olivine-bearing gabbro showing no magmatic foliation or plastic strain. Steeply dipping dark green veins with fibrous minerals.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-295R-1, 47-77 cm WET

Core Photo



305-U1309D-295R-2 (Section top: 1412.70 mbsf)

UNIT-770 Olivine Gabbro
Pieces: 1-3

PRIMARY MINERALOGY: Mode from Piece 3a

Olivine	Modal 10% Size 5 mm average Shape anhedral
Plagioclase	Modal 55% Size 4 mm average Shape anhedral
Clinopyroxene	Modal 35% Size 6 mm average Shape anhedral

COMMENTS: Unit 770 is medium- to coarse-grained olivine gabbro. Fine-grained part at 2-6 cm. Oikocrystal pyroxene.

SECONDARY MINERALOGY: Pale amphibole, chlorite

COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches and streaks occur in plagioclase.

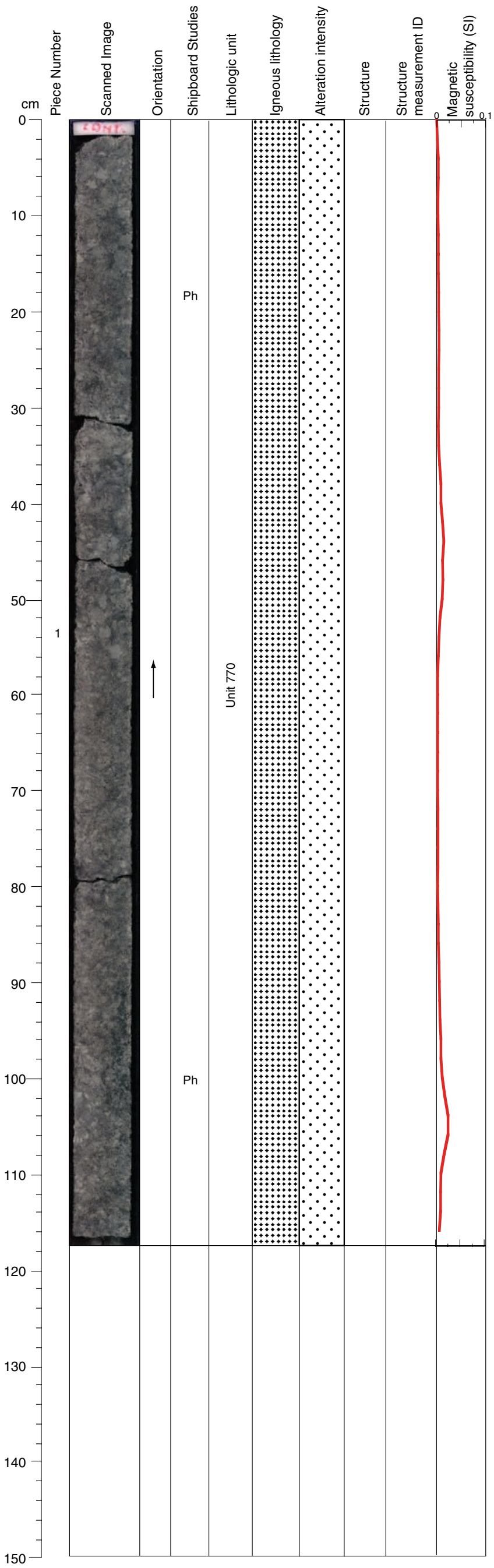
VEIN ALTERATION: n/a

THIN SECTIONS:
305-U1309D-295R-2, 79-82 cm (#671)

STRUCTURE: Coarse- to medium-grained gabbro showing no foliation.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-295R-2, 16-43 cm WET
305-U1309D-295R-2, 70-90 cm WET

Core Photo



305-U1309D-295R-3 (Section top: 1414.14 mbsf)

UNIT-770 Olivine Gabbro
Pieces: 1

PRIMARY MINERALOGY: Mode from Piece 1a

Olivine	Modal 10% Size 5 mm average Shape anhedral
Plagioclase	Modal 55% Size 4 mm average Shape anhedral
Clinopyroxene	Modal 35% Size 6 mm average Shape anhedral

COMMENTS: Unit 770 is medium- to coarse-grained olivine gabbro. Olivine modal increase at 90-104 cm (~20%). Heterogeneous grain size variation medium to coarse.

SECONDARY MINERALOGY: Pale amphibole, chlorite

COMMENTS: General alteration includes green amphibole after pyroxene, chlorite after plagioclase, and minor serpentine after olivine. White patches and streaks occur in plagioclase.

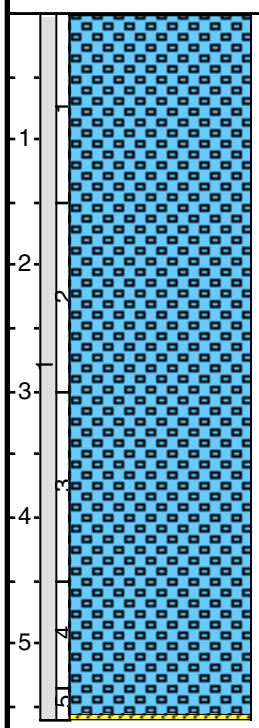
VEIN ALTERATION: n/a

STRUCTURE: Coarse-grained olivine gabbro showing no magmatic foliation or plastic strain.

CLOSE-UP PHOTOGRAPHS:
305-U1309D-295R-3, 2-32 cm WET
305-U1309D-295R-3, 90-117 cm WET

Core Photo

Site U1309 Hole E Core 1R Cored 0–3.80 mbsf



CALCAREOUS OOZE

0-8 cm and 20-28 cm are stiff silty clayey fine sand, light tan (10YR 7/4). The rest of Section U1309E-1R-1 is tacky but severely drilling disturbed mud (10YR 8/3).

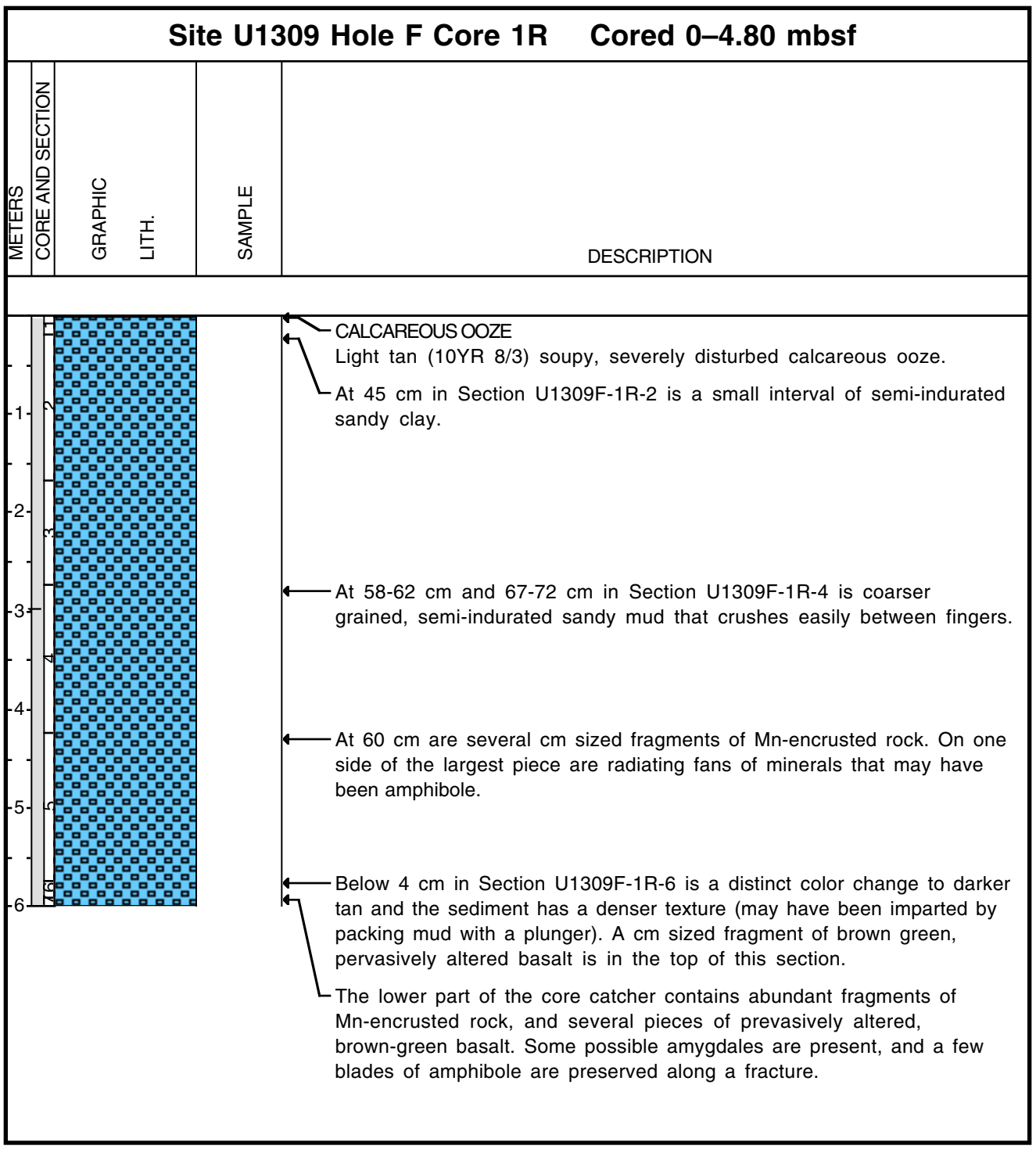
Section U1309E-1R-2 is soupy mud, with a thin interval at 8-13 cm of stiff, silty sand. At 93 cm are thin laminae of green, sandy silt.

At 6-20 cm in Section U1309E-1R3 is a smear of green (5G 7/2 to 5G 5/2) silty, clayey sand with rare subcentimeter fragments of greenschist facies altered basalt. Overall the section is soupy and has a slightly greener cast than sections above with disseminated black sand.

0-6 cm in Section U1309E-1R-4 is similar to the green silty sand in Section 1R-3. The rest of the section is similar to the soupy to tacky, severely disturbed mud from Section 1R-3.

The upper part of the core catcher contains stiff clayey silt with abundant foraminifera and fine sand sized black particles. The bottom of the section contains a 7 cm, rounded fragment of green metabasalt (breccia?). One edge of the basalt has a sheared margin, and ghosts of stretched fragments are vaguely visible in hand sample.

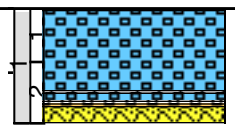
Core Photo


Site U1309 Hole F Core 1R Cored 0–4.80 mbsf
METERS
CORE AND SECTION
GRAPHIC
LITH.
SAMPLE
DESCRIPTION
1
2
3
4
5
6
CALCAREOUS OOZE
Light tan (10YR 8/3) soupy, severely disturbed calcareous ooze.
At 45 cm in Section U1309F-1R-2 is a small interval of semi-indurated sandy clay.
At 58-62 cm and 67-72 cm in Section U1309F-1R-4 is coarser grained, semi-indurated sandy mud that crushes easily between fingers.
At 60 cm are several cm sized fragments of Mn-encrusted rock. On one side of the largest piece are radiating fans of minerals that may have been amphibole.
Below 4 cm in Section U1309F-1R-6 is a distinct color change to darker tan and the sediment has a denser texture (may have been imparted by packing mud with a plunger). A cm sized fragment of brown green, pervasively altered basalt is in the top of this section.
The lower part of the core catcher contains abundant fragments of Mn-encrusted rock, and several pieces of prevasively altered, brown-green basalt. Some possible amygdales are present, and a few blades of amphibole are preserved along a fracture.

Core Photo

Site U1309 Hole G Core 1X Cored 0–3.50 mbsf

METERS | CORE AND SECTION | GRAPHIC LITH. | SAMPLE | DESCRIPTION



CALCAREOUS OOZE

Dark tan silty clay with abundant microfossils. Dark sand sized rock fragments and mineral grains. Rare disturbed streaks of gray-green clay and rare mm sized green metabasalt fragments.

3 cm clast of indurated ooze and red brown hyaloclastite.

Dark tan clayey silt with sand sized grains similar to Section U1309G-1X-1.

2 cm thick red brown layer of almost exclusively hyaloclastite (no carbonate). Does not appear reworked. Mostly red brown glass fragments, with mm sized black fragments of basalt. Some basalt fragments have red brown glass adhering, but may be stuck together with calcareous ooze and not in place.

3 cm thick layer of light tan micrfossil-bearing calcareous ooze with abundant sub-cm sized fragments of green metabasalt.

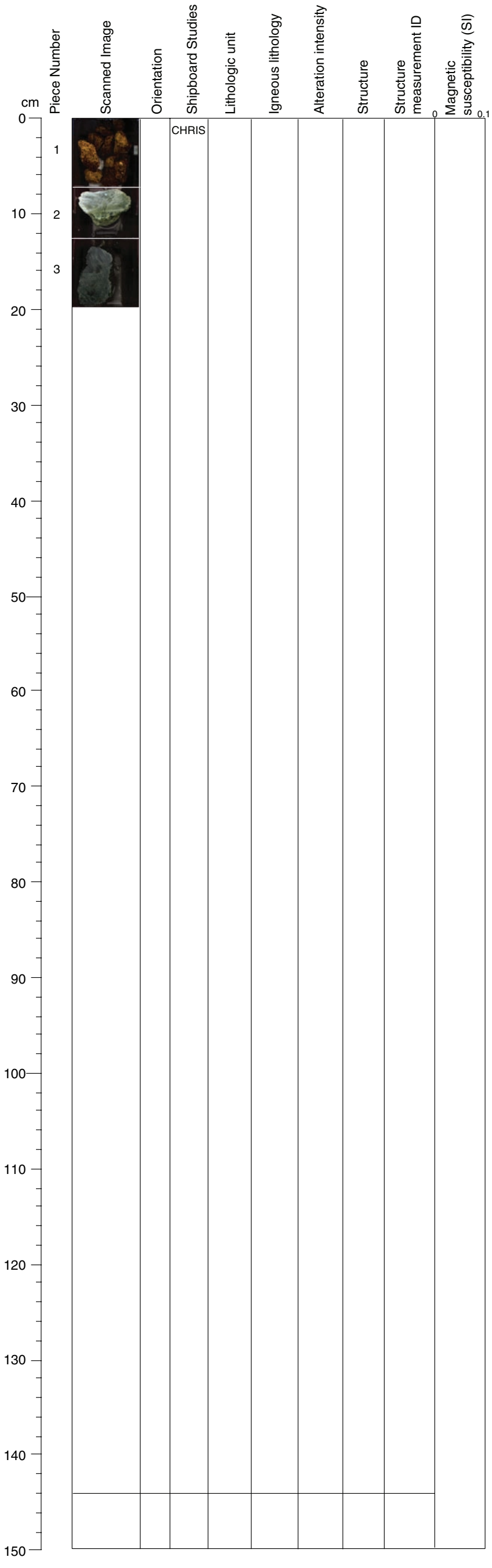
2 cm thick red brown hyaloclastite. Does not appear reworked (no carbonate).

Thin (<0.5 cm) layer of microfossil-bearing calcareous ooze with sharp contact above to hyaloclastite and below to gray green clay.

Gray-green with hints of brown, densely packed silty clay. May be drilling induced but contact with ooze above is sharp and subhorizontal.

12 cm thick interval of conglomerate, roughly size graded fragments to >2 cm at base. Most fragments appear to be metabasalt; all fragments are rounded to subrounded. Appears to be a sedimentary deposit but it was densely packed into the XCB cutting shoe and could be drilling generated.

Core Photo



304-U1309H-1R-1 (Section top: 0.00 mbsf)

Piece 1: Several pieces of hyaloclastite and Mn-encrusted, semilithified microfossil-bearing ooze. The pieces contain sub-mm sized basalt fragments, and fresh and palagonitized bsaltic glass.

Piece 2: Talc-tremolite schist. The rock is well foliated and possibly folded, indicating that it formed during ductile or semibrittle deformation. The schist is overprinted by a brecciation event, resulting in minor disruption foliation.

Piece 3: Brecciated diabase/basalt.The brecciaton of this rock is somewhat localized, separating regions that remain relatively undeformed. This texture suggests that the rock did not experience significant shear displacement, although it may represent part of the brittle process zone adjacent to a fault.