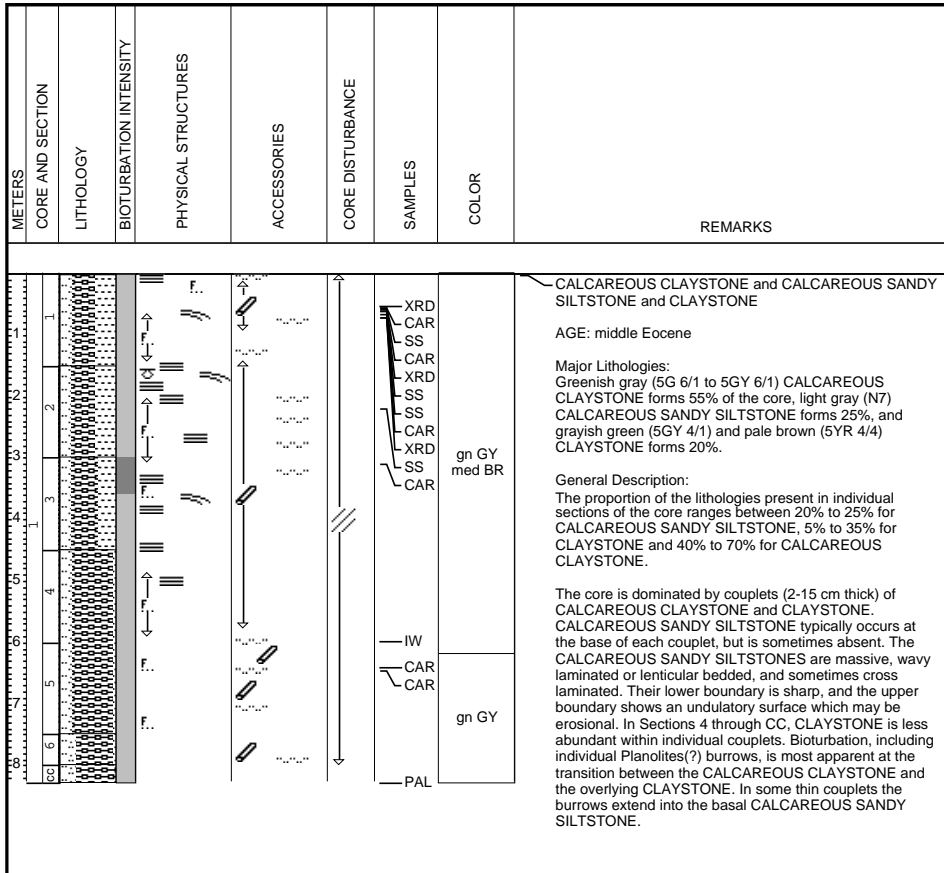


SITE 1068 HOLE A CORE 1R

CORED 711.3-720.9 mbsf

1068A-1R



SITE 1068 HOLE A CORE 2R

CORED 720.9-730.6 mbsf

1068A-2R

METERS	CORE AND SECTION	LITHOLOGY	BIOTURBATION INTENSITY	PHYSICAL STRUCTURES	ACCESSORIES	CORE DISTURBANCE	SAMPLES	COLOR	REMARKS
							<p>CAR XRD XRD CAR CAR XRD XRD</p> <p>TSB</p> <p>gn GY lt GY</p> <p>XRD CAR</p> <p>gn GY</p> <p>TSB TSB</p> <p>gn GY lt GY</p> <p>gn GY</p> <p>PAL</p>	<p>gn GY lt GY</p> <p>gn GY</p> <p>gn GY lt GY</p> <p>gn GY</p>	<p>CALCAREOUS CLAYSTONE and CALCAREOUS SANDY SILTSTONE</p> <p>AGE: middle Eocene</p> <p>Major Lithologies: Greenish gray (5G 6/1 to 5GY 6/1) CALCAREOUS CLAYSTONE forms 70% of the core and light gray (N7) CALCAREOUS SANDY SILTSTONE forms 20%.</p> <p>Minor Lithology: Grayish green (5GY 4/1) CLAYSTONE forms 10% of the core.</p> <p>General Description: The proportion of CALCAREOUS CLAYSTONE within each section of the core ranges between 65% and 85%, whereas CALCAREOUS SANDY SILTSTONES forms between 10% and 20%, and CLAYSTONE between 5% and 15%.</p> <p>Couplets (3-12 cm thick) of CALCAREOUS CLAYSTONE overlain by CLAYSTONE occur throughout the core. CALCAREOUS SILTSTONE typically occurs at the base of each couplet, but is sometimes absent. The CALCAREOUS SILTSTONES are massive, wavy laminated or lenticular bedded, and sometimes cross laminated. The lower and upper boundaries are usually sharp, with the upper one often showing an undulatory surface which may be erosional. Some gradational boundaries are also present. In Sections 4 through CC CLAYSTONE is less abundant. Within individual couplets bioturbation, including individual Planolites(?) burrows, is most apparent at the transition between the CALCAREOUS CLAYSTONE and the overlying CLAYSTONE.</p>

SITE 1068 HOLE A CORE 3R

CORED 730.6-740.3 mbsf

1068A-3R

METERS	CORE AND SECTION	LITHOLOGY	BIOTURBATION INTENSITY	PHYSICAL STRUCTURES	ACCESSORIES	CORE DISTURBANCE	SAMPLES	COLOR	REMARKS
0.0	1								<p>CALCAREOUS SILTY CLAYSTONE</p> <p>AGE: early Eocene</p> <p>Major Lithology: Greenish gray (5G 6/1 to 5GY 6/1) CALCAREOUS SILTY CLAYSTONE forms ~60% of the core.</p> <p>Minor Lithology: Light gray (N7) CALCAREOUS SANDY SILTSTONE forms 15% of the core, dark greenish gray (5GY 4/1) to olive gray (5Y 4/1) CLAYSTONE forms 10% and light greenish gray (5GY 8/1) NANNOFOSSIL CHALK forms 5%.</p> <p>General Description: The proportion of CALCAREOUS SILTY CLAYSTONE within each section of the core ranges between 50% and 75%, whereas CALCAREOUS SANDY SILTSTONE forms between 5% and 35%, and CLAYSTONE between 5% and 20%.</p> <p>The core consists of thin to medium bedded CALCAREOUS SILTY CLAYSTONE, CLAYSTONE and CALCAREOUS SANDY SILTSTONE. Some upward darkening intervals occur in Sections 3, 4, 6, and 7. NANNOFOSSIL CHALK occurs in Section 3, 33-60 cm, and Section 6, 36-42 cm, 50-70 cm, and 126-140 cm. The CALCAREOUS SILTSTONES are massive, wavy laminated or lenticular bedded, and sometimes cross laminated. Ball and pillow structures occur in the CALCAREOUS SANDY SILTSTONE in Section 1, 33-35 cm. The lower and upper boundaries of the CALCAREOUS SANDY SILTSTONE are usually sharp, with the upper one often showing an undulatory surface that may be erosional. Some gradational boundaries are also present. Bioturbation, including individual Planolites(?) burrows, is most common in CALCAREOUS SILTY CLAYSTONE and the overlying CLAYSTONE, however burrowing sometimes also disrupts thin CALCAREOUS SANDY SILTSTONE beds.</p>
0.1	2							mdk gn GY mit GY	
0.2	3							XRD SS CAR SS XRD CAR SS XRD CAR CAR XRD SS SS	
0.3	4							mit gn GY mit GY	
0.4	5								
0.5	6								
0.6	7							TSB dk gn GY mit GY	
0.7	8							PAL	

METERS	CORE AND SECTION	LITHOLOGY	BIOTURBATION INTENSITY	PHYSICAL STRUCTURES	ACCESSORIES	CORE DISTURBANCE	SAMPLES	COLOR	REMARKS
0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3 2.4 2.5 2.6 2.7 2.8 2.9 3.0 3.1 3.2 3.3 3.4 3.5 3.6 3.7 3.8 3.9 4.0 4.1 4.2 4.3 4.4 4.5 4.6 4.7 4.8 4.9 5.0 5.1 5.2 5.3 5.4 5.5 5.6 5.7 5.8 5.9 6.0 6.1 6.2 6.3 6.4 6.5 6.6 6.7 6.8 6.9 7.0 7.1 7.2 7.3 7.4 7.5 7.6 7.7 7.8 7.9 8.0 8.1 8.2 8.3 8.4 8.5 8.6 8.7 8.8 8.9 9.0 9.1 9.2 9.3 9.4 9.5 9.6 9.7 9.8 9.9 10.0	1 2 3 4 5								<p>CLAYSTONE</p> <p>AGE: early Eocene</p> <p>Major Lithology Moderate brown (5YR 4/4) CLAYSTONE forms ~80% of the core.</p> <p>Minor Lithologies: Greenish gray (5G 6/1) and light gray (N7) CALCAREOUS SANDY SILTSTONE forms ~10% of the core, moderate yellowish brown CALCAREOUS CLAYSTONE < 10%, and light greenish gray (5GY 8/1) medium grained CALCAREOUS FORAMINIFERAL SANDSTONE the remaining ~2%.</p> <p>General Description: Upward darkening sequences composed of CALCAREOUS CLAYSTONE are abundant in Section 1, poorly developed in Section 5, and absent in Sections 2, 3 and 4. Sections 2 through 5 are dominated by brown CLAYSTONE containing laminae and thin beds as much as 2 cm thick of greenish gray to light gray CALCAREOUS SANDY SILTSTONE which contain parallel, cross and lenticular laminae. The laminae are sometimes disrupted by bioturbation or soft sediment deformation, which results in some of the upper and lower boundaries being gradational. Thicker intervals of this lithology occur in Section 1, 19-23 cm, Section 3, 10-16 cm, Section 4, 122-126 cm, Section 5, 11-15 cm, 34-40 cm, and 67-76 cm. The thicker intervals contain the same sedimentary structures as their thinner counterparts, with the addition of slumping in Section 3, 10-16 cm. The CALCAREOUS SANDY SILTSTONES have sharp bases, and the amount of greenish gray more clay-rich laminae increases upwards. Beds of medium grained CALCAREOUS FORAMINIFERAL SANDSTONE with faint parallel laminae and scattered black plant fragments occur in Section 3, 40-51 cm, Section 4, 4-9 cm, and Section 5, 48-55 cm. This lithology was fractured into pieces by drilling, making it uncertain whether the sharp tops and bases are original depositional features. Isolated burrows, 0.5-2.0 mm in diameter, filled with SANDY SILTSTONE occasionally occur within the brown CLAYSTONES. Smaller highly compacted burrows filled with a very pale orange (10YR 8/2) fine grained limestone are scattered throughout many CLAYSTONE intervals.</p>

METERS	CORE AND SECTION	LITHOLOGY	BIOTURBATION INTENSITY	PHYSICAL STRUCTURES	ACCESSORIES	CORE DISTURBANCE	SAMPLES	COLOR	REMARKS
0.0	1						CAR XRD XRD CAR CAR XRD XRD CAR	med BR pal ye BR It GY med BR med BR	<p>— CALCAREOUS CLAYSTONE and CLAYSTONE</p> <p>AGE: early Eocene</p> <p>Major Lithologies: Moderate brown (5YR 4/4) to moderate yellowish brown (10YR 5/4) CLAYSTONE forms ~45% of the core, and pale yellowish brown (10YR 6/2) to grayish orange (10YR 7/4) CALCAREOUS CLAYSTONE forms ~35%.</p> <p>Minor Lithologies: Light gray (N6) to greenish gray (5GY 6/1) CALCAREOUS SANDY SILTSTONE and CALCAREOUS SANDSTONE, and pale gray (N6) to greenish gray (5GY 6/1) medium to fine grained CALCAREOUS FORAMINIFERAL SANDSTONE each form <10 % of the core. Very light gray (N8) to light greenish gray (5GY 8/1) CALCAREOUS CHALK form ~5%, and dusky brown (5YR 2/2) to dark greenish gray (5G 4/1) SANDSTONE, containing orange colored granule sized clasts forms < 1% of the core.</p> <p>General Description: The upward-darkening sequences, in which CLAYSTONE shows a burrowed contact with an underlying CALCAREOUS CLAYSTONE or CALCAREOUS CHALK, occur throughout most of the core. It is best developed in Section 1, and from Section 3, 90 cm, to Section 4, 100 cm. Some of the lower parts of the CALCAREOUS CLAYSTONE intervals have massive bases between 2 and 7 cm thick that are unaffected by bioturbation. In Section 5 light colored CALCAREOUS CHALK occurs in place of CALCAREOUS CLAYSTONE in the sequence. Thin SANDY SILTSTONE occurs as laminae or thin beds at the bases of many of the upward-darkening sequences, and shows parallel, lenticular and/or disrupted laminae. Thicker intervals of CALCAREOUS SANDY SILTSTONE to CALCAREOUS SANDSTONE occur in Section 4, 63-78 cm, 134-145 cm, and Section 5, 89-97 cm. They contain parallel, cross, lenticular and disrupted laminae, and show a fining-upwards change in grain size. Throughout the core, some of the sandy and silty intervals are pyritized. Where the lighter colored CALCAREOUS CLAYSTONES overlie the CLAYSTONES, the contact between them may be sharp or burrowed, and when burrowed, a few burrow fills of CALCAREOUS SANDY SILT may occur. Medium grained CALCAREOUS FORAMINIFERAL SANDSTONE occurs in Section 2, 0-36 cm, and Section 4, 108-112 cm. Both intervals show parallel lamination, and the first interval also contains lenticular thin beds; grain size varies across the laminae.</p>
0.5	2						CAR XRD XRD CAR CAR XRD XRD CAR	med BR pal ye BR It GY med BR med BR	
1.0	3						TSB IW TSB SS	gy OR med ye BR	
1.5	4						XRD	gy OR	
2.0	5						TSB	gy OR med ye BR	
2.5	6						PAL		

SITE 1068 HOLE A CORE 8R

CORED 778.9-788.5 mbsf

1068A-8R

METERS	CORE AND SECTION	LITHOLOGY	BIOTURBATION INTENSITY	PHYSICAL STRUCTURES	ACCESSORIES	CORE DISTURBANCE	SAMPLES	COLOR	REMARKS
0.0	1						SS SS		<p>CLAYSTONE and CALCAREOUS CLAYSTONE</p> <p>AGE: late Paleocene</p> <p>Major Lithologies: Moderate brown (5YR 3/4 to 5YR 4/4) CLAYSTONE forms ~55% of the core, and pale yellowish brown (10YR 6/2) to greenish gray (5GY 6/1) CALCAREOUS CLAYSTONE forms ~30%.</p> <p>Minor Lithologies: Light gray (N6) to greenish gray (5GY 6/1) CALCAREOUS SILTSTONE forms 15% of the core and mottled dark gray (N3) to white (N9) medium to fine grained CALCAREOUS FORAMINIFERAL SANDSTONE forms < 5 % of the core.</p> <p>General Description: Sections 1 through 3 are dominated by thin to medium bedded moderate brown CLAYSTONE and CALCAREOUS CLAYSTONE. On average 70% of Sections 1 through 3 is CLAYSTONE, 25% CALCAREOUS CLAYSTONE, and < 5% CALCAREOUS SILTSTONE. CALCAREOUS SILTSTONE occurs as thin laminae and lenses highly disturbed by burrowing. Sections 4 through CC are dominated by upward darkening sequences, 1-7 cm thick, of CALCAREOUS CLAYSTONE and CLAYSTONE. Thin light gray CALCAREOUS SILTSTONE beds or laminae occur at the base of some upward darkening intervals. They contain parallel, cross, lenticular and disrupted laminae. Bioturbation, including individual Planolites(?) burrows, is common in the transition between the CALCAREOUS SILTY CLAYSTONE and the overlying CLAYSTONE. A thinly bedded interval of CALCAREOUS CLAYSTONE and CLAYSTONE with rare sand laminae occurs in Section 7, 31-52 cm. Medium grained CALCAREOUS FORAMINIFERAL SANDSTONE occurs in Section 5, 27-33 cm, Section 6, 142-144, and Section 7, 58 cm, to Section CC, 11 cm. The CALCAREOUS FORAMINIFERAL SANDSTONE in Section 5 and 6 is parallel laminated, and in Section CC contains lenses of greenish gray CLAYSTONE.</p>
0.1	2						CAR XRD CAR XRD	med BR	
0.2	3							med BR gn GY	
0.3	4							med BR	
0.4	5							med BR pal ye BR	
0.5	6							pal ye BR med BR	
0.6	7							TSB	
0.7	CC						TSB CAR XRD PAL		

METERS	CORE AND SECTION	LITHOLOGY	BIOTURBATION INTENSITY	PHYSICAL STRUCTURES	ACCESSORIES	CORE DISTURBANCE	SAMPLES	COLOR	REMARKS
								<p>dk gn GY lt gn GY</p>	<p>CALCAREOUS CLAYSTONE and CLAYSTONE</p> <p>AGE: late Paleocene</p> <p>Major Lithologies: Light greenish gray (5GY 8/1) CALCAREOUS CLAYSTONE forms ~60% of the core and dark greenish gray (5GY 4/1) CLAYSTONE forms ~20%.</p> <p>Minor Lithologies: Light gray (N7) CALCAREOUS SANDY SILTSTONE forms ~10% of the core, CALCAREOUS to NANNOFOSSIL CHALK forms <5%, and CONGLOMERATE occurs only in Section 2 (136-148 cm).</p> <p>General Description: The core is dominated by upward-darkening sequences, 2 to 20 cm thick, in which CALCAREOUS CLAYSTONE is overlain by a thinner layer of darker colored CLAYSTONE. Within each sequence, the contact between the two lithologies is indistinct due to bioturbation, and distinct burrows are visible in the upper part of the CALCAREOUS CLAYSTONE. The lower parts of the CALCAREOUS CLAYSTONE sometimes show parallel lamination. CALCAREOUS to NANNOFOSSIL CHALK sometimes (e.g. Section 3, 134-139 cm) occurs in place of CALCAREOUS CLAYSTONE. Unusually thick intervals (10-30 cm) of CALCAREOUS CLAYSTONE occur in Sections 6 and 7. Thin laminae or single burrow fills of CALCAREOUS SANDY SILTSTONE occur at the bases of nearly all the upward-darkening sequences. Occasionally thicker (3-10 cm) intervals of CALCAREOUS SANDY SILTSTONE, usually mixed with laminae of CALCAREOUS CLAYSTONE, occur at the bases of the upward-darkening sequences (Section 1, 79-82.5 cm, 100-107 cm, 135-141 cm; Section 2, 4-7 cm, 61-65 cm, 108-112 cm; Section 3, 106-116 cm; Section 4, 93-98 cm, Section 5, 82-94 cm; Section 6, 74-80 cm), and show one or more of the following types of lamination: parallel, wavy, cross and lenticular lamination. The CONGLOMERATE contains clasts of shallow water limestone, pelite and mica schist. In Section 2, 136-141.5 cm it shows several parallel layers of alternate CONGLOMERATE and CALCAREOUS CLAYSTONE, and between 141.5-148 cm it is present as burrow fillings in the underlying CALCAREOUS CLAYSTONE.</p>

SITE 1068 HOLE A CORE 10R

CORED 798.1-807.7 mbsf

1068A-10R

METERS	CORE AND SECTION	LITHOLOGY	BIOTURBATION INTENSITY	PHYSICAL STRUCTURES	ACCESSORIES	CORE DISTURBANCE	SAMPLES	COLOR	REMARKS
							CAR XRD XRD CAR	gn GY dk gn GY dk gn GY gn GY	<p>CALCAREOUS and NANNOFOSSIL CHALK</p> <p>AGE: late Paleocene</p> <p>Major Lithologies: Greenish gray (5GY 6/1) CALCAREOUS and NANNOFOSSIL CHALK forms ~60% of the core and dark greenish gray (5GY 4/1) CLAYSTONE forms ~30%.</p> <p>Minor Lithology: Light gray (N7) CALCAREOUS SANDY SILTSTONE forms ~10% of the core.</p> <p>General Description: The core is dominated by upward-darkening sequences, 4 to 25 cm thick, of CALCAREOUS or NANNOFOSSIL CHALK overlain by a thinner layer of darker colored CLAYSTONE. Within each sequence, the contact between the two lithologies is indistinct, and distinct burrows are visible in the upper part of the CALCAREOUS or NANNOFOSSIL CHALK. The CALCAREOUS and NANNOFOSSIL CHALK sometimes show parallel lamination. Thin layers (0.5 to 3 cm) or lenses of CALCAREOUS SANDY SILTSTONE occur at the bases of some of the upward-darkening sequences, sometimes grading upward into laminated CALCAREOUS or NANNOFOSSIL CHALK. The CALCAREOUS SANDY SILTSTONE layers show one or more of the following types of lamination: parallel, wavy, cross and lenticular lamination. The base is often sharp. In several upward-darkening sequences the CALCAREOUS SANDY SILTSTONE is missing or limited to a thin disturbed (bioturbated) laminae or bed.</p>

SITE 1068 HOLE A CORE 11R

CORED 807.7-817.3 mbsf

1068A-11R

METERS	CORE AND SECTION	LITHOLOGY	BIOTURBATION INTENSITY	PHYSICAL STRUCTURES	ACCESSORIES	CORE DISTURBANCE	SAMPLES	COLOR	REMARKS
1.0	1						XRD CAR	dk gn GY	<p>CALCAREOUS CLAYSTONE and CLAYSTONE</p> <p>AGE: late Paleocene</p> <p>Major Lithologies: Light greenish gray (5GY 8/1) CALCAREOUS CLAYSTONE forms ~60% of the core, and dark greenish gray (5GY 4/1) to grayish brown (5GY 8/1) CLAYSTONE forms ~30% of the core.</p> <p>Minor Lithology: Light gray (N7) CALCAREOUS SANDY SILTSTONE forms ~5% of the core.</p> <p>General Description: Upward-darkening sequences, 3 to 35 cm thick, in which lighter colored CALCAREOUS CLAYSTONE is overlain by darker CLAYSTONE, occur throughout the core. Within each sequence the contact between the two lithologies is indistinct due to bioturbation, and distinct burrows are visible in the upper part of the CALCAREOUS CLAYSTONES. The lower parts of the CALCAREOUS CLAYSTONE sometimes show parallel lamination. CLAYSTONE is the dominant lithology in Sections 1-3, except where thick CALCAREOUS CLAYSTONES occur (Section 2, 18-42, 65-78 cm; Section 3, 62-79 cm). CALCAREOUS CLAYSTONE is the dominant lithology in Sections 4 and 5, occurring in thick intervals which reach 32 cm thickness (Section 5, 41-73 cm). Thin laminae or single burrow fills of CALCAREOUS SANDY SILTSTONE occur at the bases of nearly all the upward-darkening sequences. Occasionally thicker (3-11 cm) intervals of CALCAREOUS SANDY SILTSTONE, usually mixed with laminae of CALCAREOUS CLAYSTONE, occur at the bases of the upward-darkening sequences (Section 1, 34-37 cm; Section 2, 78-83 cm; Section 4, 49-53, 94-105 cm) and show one or more of the following types of lamination: parallel, wavy, cross and lenticular lamination.</p>
2.0	2						XRD CAR XRD CAR	med gn GY dk gn GY	
3.0	3						XRD IW	lt gn GY dk gn GY	
4.0	4							lt gn GY dk gn GY	
5.0	5							lt gn GY gn GY	
6.0	6							dk gn GY	

SITE 1068 HOLE A CORE 12R

CORED 817.3-826.9 mbsf

1068A-12R

METERS	CORE AND SECTION	LITHOLOGY	BIOTURBATION INTENSITY	PHYSICAL STRUCTURES	ACCESSORIES	CORE DISTURBANCE	SAMPLES	COLOR	REMARKS
							<p>SS SS</p> <p>XRD CAR XRD CAR CAR XRD SS TSB SS TSB SS</p> <p>mdk BR dk gn GY</p> <p>PAL</p>	<p>CLAYSTONE</p> <p>AGE: late Paleocene</p> <p>Major Lithology: Moderate dark brown (5YR 4/4), grayish brown (5GY 8/1), light brown (5YR 6/4), dark greenish gray (5GY 6/1) CLAYSTONE forms ~95% of the core.</p> <p>Minor Lithologies: Medium gray (N7) CALCAREOUS SANDY SILTSTONE and light green (5G 8/1) to greenish gray (5GY 6/1) CALCAREOUS CLAYSTONE each form <5% of the core.</p> <p>General Description: The core is dominated by massive moderate dark brown CLAYSTONE, but contains some upward-darkening sequences of greenish gray to light brown CALCAREOUS CLAYSTONE (containing >10% dolomite) overlain by dark greenish gray or grayish brown CLAYSTONE (Section 1, 0 cm to Section 3, 50 cm). Within each sequence, the contact between the two lithologies is indistinct due to bioturbation, and distinct burrows are visible in the upper part of the CALCAREOUS CLAYSTONE. A relatively long CLAYSTONE interval occurs between Section 3, 50 cm and Section 5, 105 cm. From Section 5, 105 cm, to Section 7, 73 cm, both massive CLAYSTONE intervals and isolated upward darkening sequences (10-20 cm thick) occur.</p>	

SITE 1068 HOLE A CORE 15R

CORED 846.3-855.9 mbsf

1068A-15R

METERS	CORE AND SECTION	LITHOLOGY	BOTULFIBRARIAN INTERSTICULAR ABUNDANCE	PHYSICAL STRUCTURES	ACCESSORIES	CORE DISTURBANCE	SAMPLES	COLOR	REMARKS
									<p>NANNOFOSSIL CHALK and NANNOFOSSIL CLAYSTONE</p> <p>AGE: Maastrichtian</p> <p>Major Lithologies: Light greenish gray (5Y 8/1), yellowish gray (5Y 8/1) and light brown (5YR 6/4) NANNOFOSSIL CHALK, and greenish gray (5GY 6/1) and light brown (5YR 5/6) NANNOFOSSIL CLAYSTONE comprise ~95% of Sections 1-4.</p> <p>Minor Lithologies: Pieces of BRECCIA occur in Sections 5 and 6. Moderate brown (5YR 3/4) CLAYSTONE forms ~1% of Sections 1-4, and occurs in Section 5, 0-20 cm. Light gray (N7) and light greenish gray (5GY 8/1) CALCAREOUS SANDY SILTSTONE forms ~5% of Sections 1-4.</p> <p>General Description: The calcareous lithologies show a wide range of colors, some of which are probably due to diagenetic changes (the greenish gray colors), making it difficult to distinguish between NANNOFOSSIL CLAYSTONE and NANNOFOSSIL CHALK. Upward darkening sequences are dominated by NANNOFOSSIL CHALKS. Burrow fills of CALCAREOUS CLAYSTONE, or less commonly CLAYSTONE, occur in upper parts of the NANNOFOSSIL CHALK in individual sequences. CLAYSTONES up to 2 cm thick occur at the tops of a few upward darkening sequences. The upward darkening sequences are between 2 and 30 cm thick; some of them contain basal laminae of CALCAREOUS SANDY SILTSTONE.</p> <p>BRECCIA occurs from Section 5, 20 cm to the base of the core at Piece 8 in Section 6, 82 cm. Most of the clasts are gabbro and anorthosite, with less abundant foliated amphibolite. On the basis of matrix characteristic, at least two breccia units are present. (1) In Section 5 and the top 1 cm of Piece 1 in Section 6, the matrix of the BRECCIA consists of white to pinkish gray very fine-grained limestone; smear slides taken from this matrix contain nannofossils. Towards the top of the BRECCIA (Section 5, 20-23 cm) the limestone matrix is pale orange in color. Scattered coarse sand and granule-sized clasts of metabasic rocks occur within the matrix. (2) The matrix of the lower BRECCIA unit (Section 6, Pieces 2-4) consists of greenish red to greenish gray carbonate mudstone with numerous clasts of meta-basic rocks ranging from silt to pebble in size.</p>

SITE 1068 HOLE A CORE 16R

CORED 855.9-865.6 mbsf

1068A-16R

METERS	CORE AND SECTION	LITHOLOGY	CLAST ABUNDANCE	PHYSICAL STRUCTURES	ACCESSORIES	CORE DISTURBANCE	SAMPLES	COLOR	REMARKS
							<p>SS XRD TSB</p> <p>TSB GEO TSB</p> <p>SS</p> <p>GEO TSB TSB</p>		<p>BRECCIA</p> <p>AGE: ?Early Cretaceous</p> <p>Major Lithology: The entire core is composed of BRECCIA.</p> <p>General Description: The BRECCIA is dominated by dark greenish gray clasts of meta-basic rocks. These include anorthosite, foliated amphibolite, microamphibolite, and metagabbro. The matrix consists of very pale orange (10YR 8/2) to moderate orange pink (5YR 8/4) carbonate mudstone. In places (Section 3, Pieces 1 and 2) the matrix shows diffuse randomly oriented bands of red-brown coloration that are a few millimeters across. The proportion of clasts to matrix varies from <20% to >50%; where it is >50%, the breccia is considered clast supported. Sand (>0.5 mm) and granule-sized clasts are always present within the carbonate mud matrix and are generally matrix supported. Clasts with a rim of spary calcite occur in Section 5, Pieces 3 and 6, and Section 6, Piece 5. Spary calcite occurs between clasts in Section 2, Piece 9, possibly due to filling of original void spaces. Veins <1-2 mm across occur in Section 4, Piece 2B, and Section 5, Piece 9. In places, smaller clasts (<1 cm) are concentrated above large clasts (>5 cm). Clast size as measured in the cores seldom exceeds 10 cm, except in: Section 1, Piece 1 is 15 cm long and consists entirely of metagabbro; Section 3, Piece 4 is 12 cm long and consists of foliated anorthosite; Section 4, lower part of Piece 1 is 25 cm long and consists of altered gabbro.</p>

SITE 1068 HOLE A CORE 17R

CORED 865.6-869.2 mbsf

1068A-17R

METERS	CORE AND SECTION	LITHOLOGY	CLAST ABUNDANCE	PHYSICAL STRUCTURES	ACCESSORIES	CORE DISTURBANCE	SAMPLES	COLOR	REMARKS
									<p>BRECCIA</p> <p>AGE: barren</p> <p>Major Lithology: The entire core is composed of BRECCIA.</p> <p>General Description: The BRECCIA is dominated by dark gray clasts of meta-basic rocks (predominantly foliated amphibolite and microamphbolite with less abundant metagabbros) and minor amounts of light green mostly angular to subrounded clasts (epidosite). The matrix is composed of moderate brown (5YR 4/4) calcareous silt-sized material. Below Section 4, 140 cm, the matrix is more reddish in color. The proportion of clasts to matrix varies from 30% to >50%. The BRECCIA is poorly sorted, with clasts typically 0.1 to 6 cm in size (rare clasts are >8 cm). Below large clasts and clusters of clasts, white calcite spar occurs, possibly filling original inter-clast porosity (Section 1, Piece 1, 31-36 cm, Pieces 2, 3, Piece 5, 68-71 cm, Piece 6, 88-91 cm, Piece 7, 95-110 cm; Section 3, Piece 1, 40-56 cm; Section 4, Piece 1, 60-115 cm, Piece 2, 125-134 cm, Piece 3 135-139 cm). Moderate reddish brown (10R 4/6) silt and sand-sized material occurs in Section 2, 102-106 cm, and Section 3, 0-1 cm, within which occurs 0.1-1 cm subrounded clasts. The thin reddish brown unit has a graded contact with the BRECCIA above and below.</p>

SITE 1068 HOLE A CORE 18R

CORED 869.2-875.2 mbsf

1068A-18R

METERS	CORE AND SECTION	LITHOLOGY	CLAST ABUNDANCE	PHYSICAL STRUCTURES	ACCESSORIES	CORE DISTURBANCE	SAMPLES	COLOR	REMARKS
							<p>XRD TSB GEO XRD XRD XRD TSB GEO XRD TSB</p>	<p>BRECCIA</p> <p>AGE: barren</p> <p>Major Lithology: The entire core is composed of BRECCIA.</p> <p>General Description: The BRECCIA is dominated by dark gray highly angular clasts of meta-basic rocks (predominantly foliated amphibolite and microamphibolite, with less abundant meta gabbro and minor epidosite). The matrix consists of fine-grained carbonate containing silt to sand-sized meta-basic mineral and rock fragments. The matrix color is dominantly moderate reddish brown (10R 4/6) in Section 1 and Section 2, Piece 1; dark greenish gray (5GY 4/1) in Section 2, Pieces 2-10, and Section 3, Pieces 1 and 2; dark greenish gray to light olive brown (5Y 5/6) in Section 3, Pieces 4-9, and Section 4, Pieces 1-3; and moderate brown (5YR 4/4) to moderate yellow (5Y 7/6) in Section 4, Pieces 4-6. The proportion of clasts to matrix is 30-50% in Section 1, Section 2, Pieces 1 and 4, and Section 4, Pieces 4-6, whereas it is >50% in Section 2, Pieces 3 and 5, Section 3, and Section 4, Pieces 1-3. Intervals with >50% clasts are considered clast supported. Small areas of calcite cement, apparently filling earlier void space, occur in Section 3, Pieces 2, 4, and 7-9. Measured clast size does not exceed 10 cm, and is typically <7 cm. There is an upward decrease in clast size from Section 1, Piece 3, 82 cm to the top of Section 1.</p>	

SITE 1068 HOLE A CORE 19R

CORED 875.2-884.9 mbsf

1068A-19R

METERS	CORE AND SECTION	LITHOLOGY	CLAST ABUNDANCE	PHYSICAL STRUCTURES	ACCESSORIES	CORE DISTURBANCE	SAMPLES	COLOR	REMARKS
1 2 3 4 5 6							XRD TSB TSB TSB TSB XRD	med ye BR dk GY lt gy GN .. dsk ye GN dk GY dsk YE dk GY pal OL	<p>BRECCIA</p> <p>AGE: barren</p> <p>Major Lithology: The entire core is composed of BRECCIA.</p> <p>General Description: The BRECCIA is dominated by dark gray highly angular clasts of meta-basic rocks (metagabbro and anorthosite) in a matrix of fine-grained carbonate containing silt to sand-sized meta-basic mineral and rock fragments. Within the matrix, chlorite (particularly in the bottom half of Section 2, Piece 3) and Fe-oxhydroxides (Section 5) occur. The color of the matrix is variable: moderate yellowish brown (10YR 5/4) to dark greenish gray (5G 4/1), light olive gray (5Y 5/2), grayish yellow green (5GY 7/2), grayish green (10G 4/2), dusky yellow green (5GY 5/2), dusky yellow (5Y 6/4). The proportion of clasts to matrix varies from <20% to >50%; where it is >50%, the BRECCIA is clast supported. In Section 3, Piece 1D, two inclined bands (~ 2 cm thick) of darker colored matrix occur. Between Section 3, Piece 1G and Section 4, Piece 1A, ~25 cm, the matrix shows faint irregular banding, and within this interval, the distinction between clasts and matrix is not as sharp as elsewhere in the core. A calcite vein 0.5 cm wide occurs in Section 1, Pieces 3C and 3D, banding within it indicates three stages of calcite precipitation. In places, the calcite filling of the vein is continuous with calcite spar occurring between clasts, some of which show jig-saw fabrics. Section 3, Piece 1D, contains two inclined bands (~ 2 cm thick) of darker colored matrix.</p>

SITE 1068 HOLE A CORE 20R

CORED 884.9-894.5 mbsf

1068A-20R

SITE 1068

METERS	CORE AND SECTION	LITHOLOGY	CLAST ABUNDANCE	PHYSICAL STRUCTURES	ACCESSORIES	CORE DISTURBANCE	SAMPLES	COLOR	REMARKS
20.0	1								<p>BRECCIA</p> <p>AGE: barren</p> <p>Major Lithology: Nearly the entire core is composed of BRECCIA.</p> <p>General Description: The BRECCIA is dominated by dark gray highly angular clasts of meta-basic rocks (metagabbro and anorthosite) in a matrix of fine-grained carbonate and meta-basic mineral and rock fragments. The matrix contains chlorite in Sections 2 and 4. The matrix in Section 7 is dominated by serpentine. Calcite veins occur in Sections 3, 5, and 6. Clast size generally ranges from sand-sized to 3 cm; however, clasts 9 to 15 cm in length are present in Section 3, Piece 1A, and Section 5, Pieces 4 and 5. The proportion of clasts to matrix varies from 20% to >50%; where it is >50%, the BRECCIA is considered clast supported. The color of the matrix is dominantly pale green (5G 7/2) in Section 1 to Section 4, Piece 3; dark yellowish orange (10YR 6/6) in Section 4, Piece 3 to Section 5, Piece 2; moderate brown (5YR 3/4) to greenish gray (5G 6/1) in Section 5, Pieces 2-12; and greenish gray to grayish green (5G 5/2) in Section 6 and Section 7, Piece 1. Dusky blue (5PB 3/2) to black (N1) serpentinite rubble occurs at the base of the core.</p>

173-1068A-15R-5

SUBUNIT IVA: BRECCIA

Pieces 3, 5-14

COLOR: Clasts: meta-anorthosite, bluish gray (6B 3/1). Matrix: light greenish gray (5GY 8/1) to light brown (5YR 6/4).

METAMORPHIC STRUCTURES: Meta-anorthosite is weakly foliated.

CLASTS: 85% of rock:

Meta-anorthosite clasts: 90% of clasts (size: 2-16 cm, shape: subangular to angular)

Meta-anorthosite

Mineral Name	Mode (%)	Size (mm)	Shape	Comments
plagioclase	90	2-4	anhedral	equigranular
chlorite?	10	<1	platy	alteration
epidote	<1	<1	granular	

Foliated Microamphibolite clasts: 5% of clasts (size: 0.5-2 cm, shape: rounded)

Mineral Name	Mode (%)	Size (mm)	Shape	Comments
amphibole	60	>1	anhedral	elongate parallel to foliation
plagioclase	40	>1	anhedral	elongate parallel to foliation

Yellow brown alteration that transects foliation

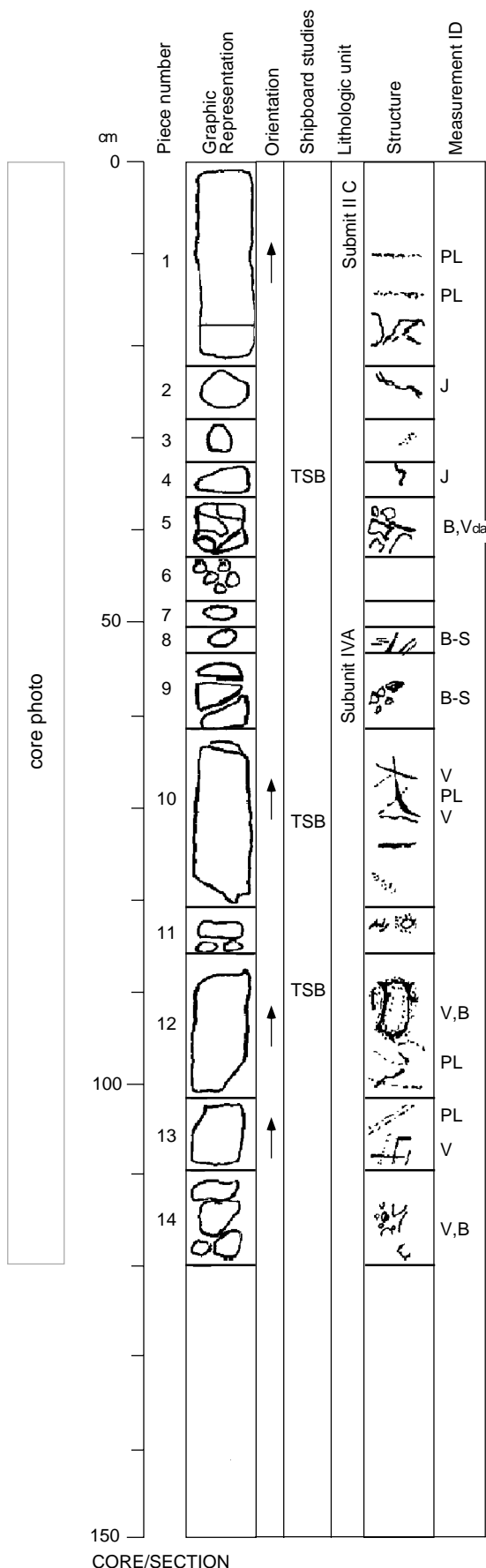
Epidote-rich clasts: 5% of clasts (size: 0.5-3 cm, shape: rounded)

Mineral Name	Mode (%)	Size (mm)	Shape	Comments
plagioclase	30	<1	anhedral	elongate parallel to foliation
epidote?	50	<1	anhedral	granular
quartz	15	<1	anhedral	
chlorite	5	<1	platy	

MATRIX: 10% of rock: Consists of fine-grained carbonate.

VEINS: <5% of rock: Meta-anorthosite clasts contain zoisite? veins 3-5 mm wide that are discordant to foliation. Plagioclase+epidote+calcite veins appear to crosscut quartz veins.

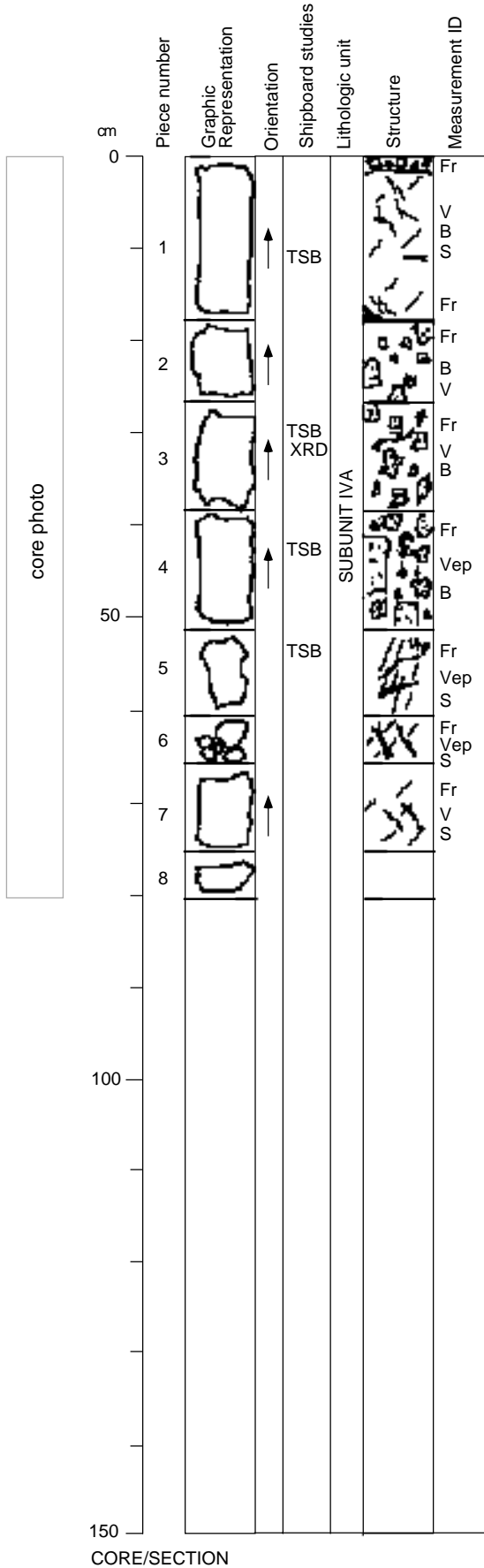
ADDITIONAL COMMENTS: Varies from matrix-supported to clast supported. Clasts range in size from 2 mm to >16 cm. This section contains about 5% pinkish gray (1Y 8/1) fine-grained limestone clasts, 0.4 to >4 cm in size and subangular to subrounded in shape. Pieces 1, 2 and 4 are devoid of basement clasts except one tonalite clast in the lower part of Piece 1.



173-1068A-15R-6

SUBUNIT IVA: BRECCIA

Pieces 1-8



COLOR: Clasts: meta-anorthosite, greenish black (5GY 2/1); metagabbro, bluish gray (6B 3/1); amphibolite, dark gray (N2). Matrix: grayish red (10R 4/2) to greenish gray (5GY 6/1).

IGNEOUS STRUCTURES: Pieces 1,2,4,7,8 (meta-anorthosites) are equigranular to weakly foliated.

METAMORPHIC STRUCTURES: Pieces 3,6 (amphibolite) and Piece 5 (tonalite) are foliated.

CLASTS: 80% of rock: (Note: suspect preferential recovery of clasts)

Mixed metagabbrometa-anorthosite clasts: 75% of clasts (size: 1 mm-15 cm, shape: subangular to angular)

Metagabbro

Mineral Name	Mode (%)	Size (mm)	Shape	Comments
plagioclase	50	1-4	anhedral	elongated parallel to foliation
amph(?) - pyx(?)	20	1-5	anhedral	elongated parallel to foliation
epidote	<1	<1	anhedral	

Meta-anorthosite

Mineral Name	Mode (%)	Size (mm)	Shape	Comments
plagioclase	90	2-4	anhedral	equigranular
chlorite	10	<1	platy	
epidote	<1	<1	granular	

Foliated Amphibolite clasts: 25% of clasts (size: >2 cm, shape: angular)

Mineral Name	Mode (%)	Size (mm)	Shape	Comments
amphibole	25	>1	anhedral	elongated parallel to foliation
plagioclase	60	>1	anhedral	elongated parallel to foliation
chlorite	10	<1	anhedral	elongated parallel to foliation
biotite	<5	<1	anhedral	elongated parallel to foliation

MATRIX: 20% of rock: Consists of fine-grained carbonate.

VEINS: <1% of rock.

ADDITIONAL COMMENTS: This section contains both matrix supported breccia and individual pieces of rock (≤8 cm) that are interpreted to be fragments of larger clasts.

173-1068A-16R-1

SUBUNIT IVA: BRECCIA

Pieces 2-8

COLOR: Matrix: grayish orange-pink (10R 8/2) to moderate orange-pink (10R 7/4).

CLASTS: 70% of rock:

Pieces 2, 4B, 5A, 5B, 5C, 6, 7

Metagabbro: 30% of clasts (size: 1-17 cm, shape: angular)

Mineral Name	Mode (%)	Size (mm)	Shape	Comments
plagioclase	50-70	<1-3	anhedral	elongated
pyx-amph(?)	30-50	<1-2	anhedral	elongated

Foliated in Pieces 2 and 6. Mylonitic(?) in Pieces 5C, 6 and 7.

Pieces 3B, 4A, 5B, 6

Meta-anorthosite: 30% of clasts (size: 5-9 cm, shape: angular)

Mineral Name	Mode (%)	Size (mm)	Shape	Comments
plagioclase	90	1-4	anhedral	equigranular
chlorite	10	<1	platy	

Piece 5D is strongly deformed with abundant epidote stringers. Prehnite(?) vein in Piece 6 is 2-5 mm wide.

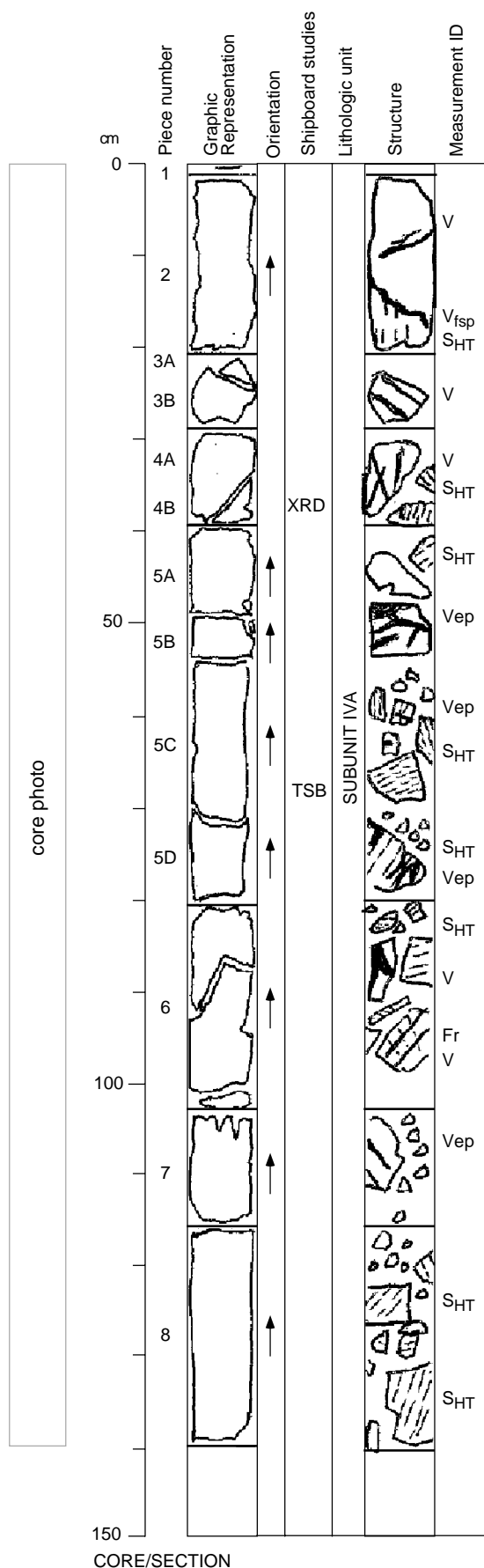
Pieces 5C,D, 6, 7

Foliated amphibolite: 40% of clasts (size: 1-5 cm, shape: angular)

Mineral Name	Mode (%)	Size (mm)	Shape	Comments
amphibole	60	0.1	anhedral	elongated parallel to foliation
plagioclase	40	0.1	anhedral	elongated parallel to foliation

MATRIX: 30% of rock.

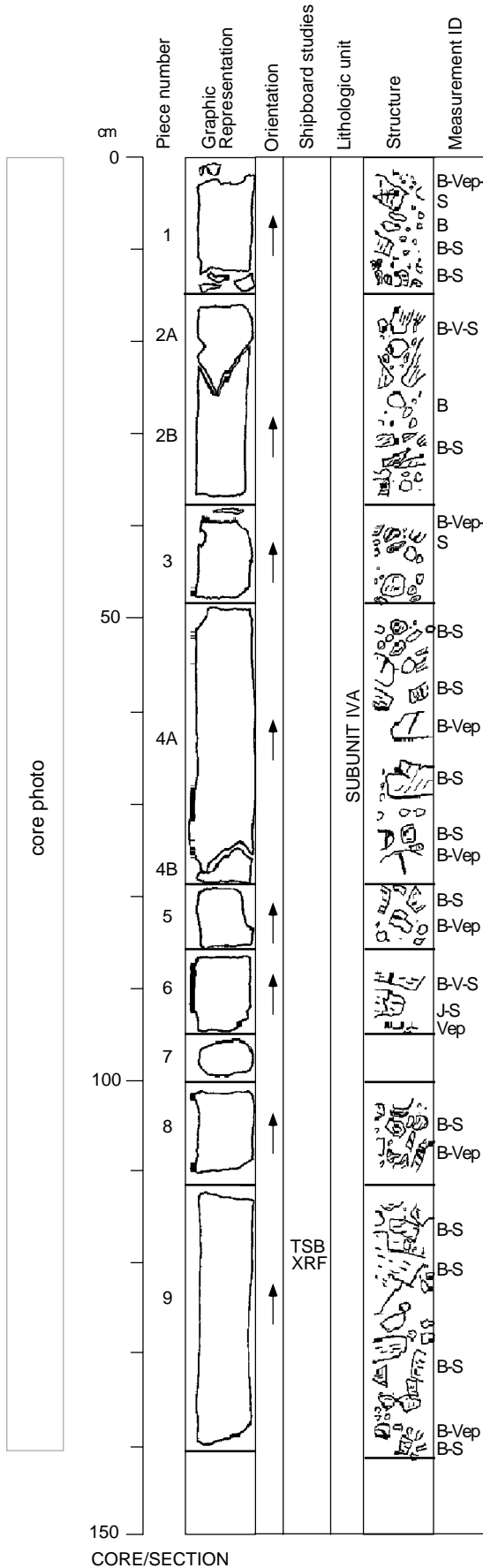
ADDITIONAL COMMENTS: Piece 1 is a light brown sediment fragment with moderate brown colored filled burrows: probably fallen down hole from up section. Piece 3A is matrix (limestone).



CORE/SECTION

173-1068A-16R-2

SUBUNIT IVA: BRECCIA



Pieces 1-9

COLOR: Matrix: grayish orange pink (10R 8/2) to moderate orange pink (10R 7/4). Clast colors: meta-anorthosite, greenish-gray (5GY 6/1); metagabbros, amphibolite and unidentified fine-grained rocks, greenish-black (5GY 2/1); epidosite, moderate greenish-yellow (10Y 7/4).

CLASTS: 70% of rock:

Metagabbro 10% of clasts (size: <1-6 cm, shape: angular to subangular)

Mineral Name	Mode (%)	Size (mm)	Shape	Comments
plagioclase	60	<1-3	anhedral	locally elongated parallel to foliation
Pyx-Amph(?)	35	<1-3	anhedral	locally elongated parallel to foliation
epidote	5	<1	anhedral	locally elongated parallel to foliation

Meta-anorthosite 45% of clasts (size: <1-4 cm, shape: angular)

Mineral Name	Mode (%)	Size (mm)	Shape	Comments
plagioclase	90	1-4	anhedral	equigranular
chlorite	10	<1	platy	

Foliated amphibolite 15% of clasts: (size: <1-4 cm, shape: angular)

Mineral Name	Mode (%)	Size (mm)	Shape	Comments
amphibole	60	>1	anhedral	elongated parallel to foliation
plagioclase	40	>1	anhedral	elongated parallel to foliation

Microamphibolite 25% of clasts (size: <1-9 cm, shape: angular)

Mineral Name	Mode (%)	Size (mm)	Shape	Comments
plagioclase	50-70	<1	anhedral	equant to elongated
amphibole	30-50	<1	anhedral	equant to elongated

MATRIX: 30% of rock: mostly calcite

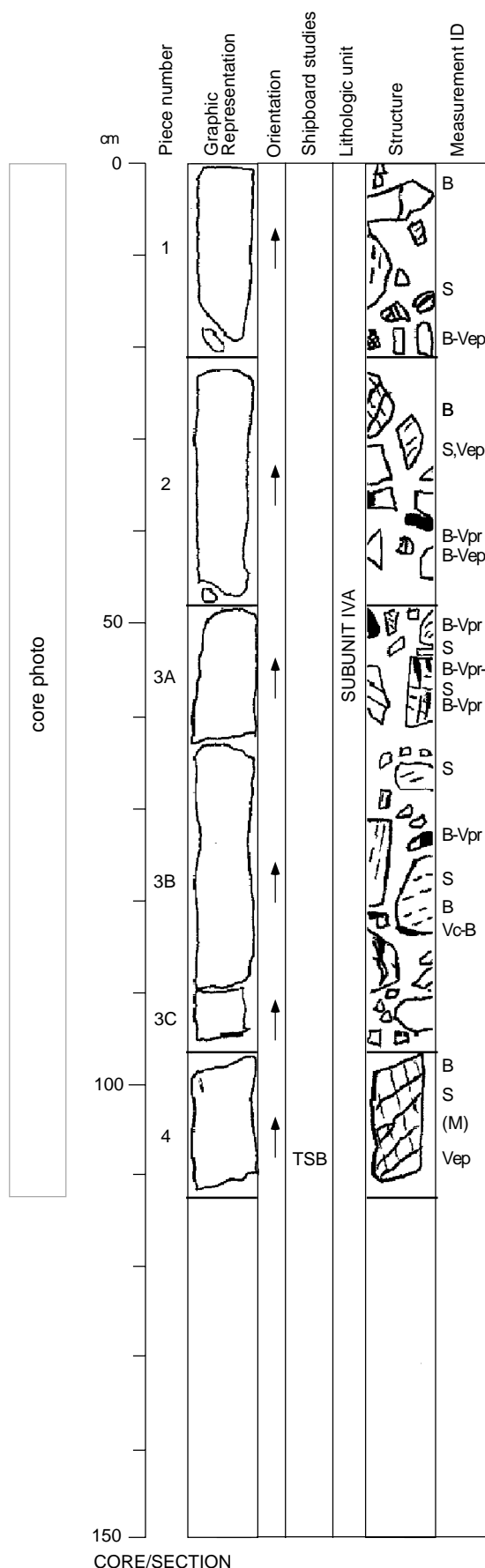
VEINS: Meta-anorthosite contains prehnite veins.

ADDITIONAL COMMENTS: Other clast types include epidosite (<5%). Metagabbro ranges from weakly to strongly foliated. Meta-anorthosite is locally foliated. Microamphibolite is variably foliated.

173-1068A-16R-3

SUBUNIT IVA: BRECCIA

Pieces 1-4



COLOR: Matrix: grayish orange pink (10R 8/2) to moderate orange-pink (10R 7/4). Clast colors: meta-anorthosite, greenish-gray (5GY 6/1); metagabbro and amphibolite, greenish-black (5GY 2/1); epidosite, moderate greenish-yellow (10Y 7/4).

CLASTS: 70% of rock

Metagabbro: 20% of clasts (size: <1-7 cm, shape: angular)

Mineral Name	Mode (%)	Size (mm)	Shape	Comments
plagioclase	60	<1-3	anhedral	locally elongated parallel to foliation
pyx-amph(?)	35	<1-3	anhedral	locally elongated parallel to foliation
epidote	5	<1	anhedral	locally elongated parallel to foliation

Meta-anorthosite: 10% of clasts (size: <1-15 cm, shape: angular)

Mineral Name	Mode (%)	Size (mm)	Shape
plagioclase	90	1-4	equigranular
chlorite	10	<1	platy

Foliated amphibolite: 40% of clasts (size: <1-5 cm, shape: angular)

Mineral Name	Mode (%)	Size (mm)	Shape	Comments
amphibole	60	0.1	anhedral	elongated parallel to foliation
plagioclase	40	0.1	anhedral	elongated parallel to foliation

Microamphibolite: 30% of clasts (size: <1-10 cm, shape: angular)

Mineral Name	Mode (%)	Size (mm)	Shape	Comments
plagioclase	50-70	<1	anhedral	equant to elongated
pyx-amph(?)	30-50	<1	anhedral	equant to elongated

MATRIX: 30% of rock: mostly calcite

VEINS: Meta-anorthosite contains prehnite and sericite veins.

ADDITIONAL COMMENTS: Additional clast types include epidosite and breccia, and Piece 3B (74-75 cm) contains a small talc clast. Metagabbro is usually strongly foliated. Micro-amphibolite appears to grade with increasing deformation into amphibolite.

SUBUNIT IVA: BRECCIA

Pieces 1-7

COLOR: Matrix: grayish-orange pink (10R 8/2) to moderate orange-pink (10R 7/4). Clast colors: meta-anorthosite, greenish-gray (5GY 6/1); metagabbros, amphibolite and unidentified fine-grained rocks, greenish-black (5GY 2/1); epidosite, moderate greenish-yellow (10Y 7/4).

CLASTS: 70% of rock:

Metagabbro: 35% of clasts (size: <1-27 cm, shape: angular)

Mineral Name	Mode (%)	Size (mm)	Shape	Comments
plagioclase	60	<1-3	anhedral	locally elongated parallel to foliation
pyx-amph(?)	35	<1-3	anhedral	locally elongated parallel to foliation
epidote	5	<1	anhedral	locally elongated parallel to foliation

Meta-anorthosite: 10% of clasts (size: <7 cm, shape: angular)

Mineral Name	Mode (%)	Size (mm)	Shape	Comments
plagioclase	90	1-4	equigranular	
chlorite	10	<1	platy	

Foliated amphibolite: 25% of clasts (size: <1-5 cm, shape: angular)

Mineral Name	Mode (%)	Size (mm)	Shape	Comments
amphibole	60	>1	anhedral	elongated parallel to foliation
plagioclase	40	>1	anhedral	elongated parallel to foliation

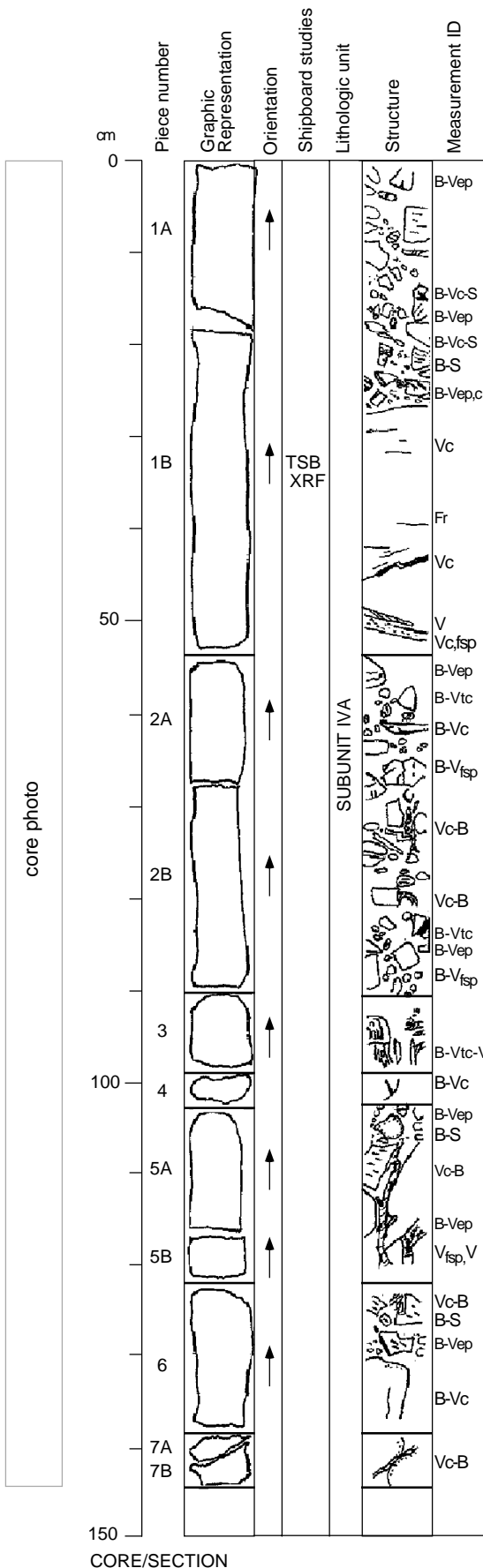
Microamphibolite: 20% of clasts (size: <6 cm, shape: angular)

Mineral Name	Mode (%)	Size (mm)	Shape	Comments
plagioclase	50-70	<1	anhedral	equant/elongated
amphibole	30-50	<1	anhedral	equant /elongated

MATRIX: 30% of rock: mostly calcite

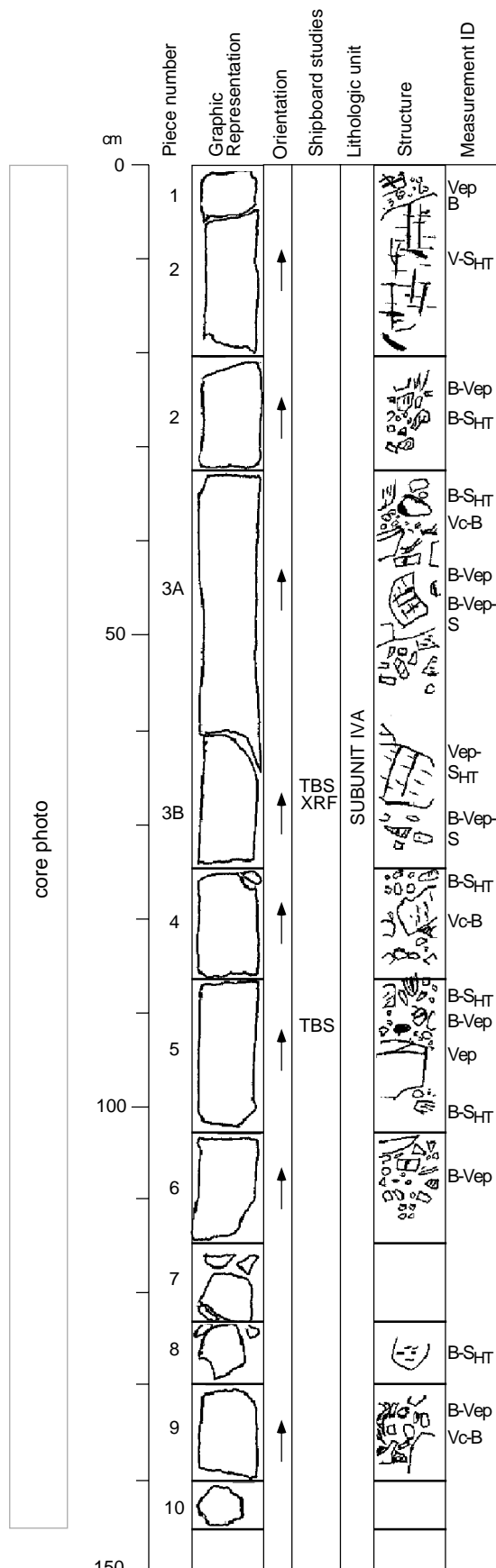
VEINS: Meta-anorthosite contains prehnite veins.

ADDITIONAL COMMENTS: Additional clast types include epidosite. Metagabbro ranges from weakly to strongly foliated. Micro-amphibolite is variably foliated.



173-1068A-16R-5

SUBUNIT IVA: BRECCIA



CORE/SECTION

Pieces 1-10

COLOR: Matrix: grayish orange pink (10R 8/2) to moderate orange-pink (10R 7/4). Clast colors: meta-anorthosite, greenish-gray (5GY 6/1); metagabbros, amphibolites and unidentified fine-grained rocks, greenish-black (5GY 2/1); epidosite; moderate greenish-yellow (10Y 7/4).

CLASTS: 70% of rock:

Metagabbro: 5% of clasts (size: <1-5 cm, shape: angular)

Mineral Name	Mode (%)	Size (mm)	Shape
plagioclase	90	1-4	equigranular
chlorite	10	<1	platy

Foliated amphibolite: 20% of clasts (size: <1-5 cm shape: angular)

Mineral Name	Mode (%)	Size (mm)	Shape	Comments
amphibole	60	>1	anhedral	elongated parallel to foliation
plagioclase	40	>1	anhedral	elongated parallel to foliation

Microamphibolite: 35% of clasts (size: <8 cm, shape: angular)

Mineral Name	Mode (%)	Size (mm)	Shape	Comments
plagioclase	50-70	<1	anhedral	equant to elongated
amphibole	30-50	<1	anhedral	equant to elongated

MATRIX: 30% of rock: mostly calcite

VEINS: Meta-anorthosite contains prehnite veins and is highly altered.

ADDITIONAL COMMENTS: Additional clast types include epidosite, breccia and unidentified fine-grained rocks (5-10%). Metagabbros and amphibolites range from weakly to strongly foliated.

173-1068A-16R-6

SUBUNIT IVA: BRECCIA

Pieces 1-10

COLOR: Matrix: grayish orange pink (10R 8/2) to moderate orange pink (10R 7/4). Clast colors: meta-anorthosite, greenish gray (5GY 6/1); metagabbros, amphibolites and unidentified fine-grained rocks, greenish black (5GY 2/1); epidosite; moderate greenish yellow (10Y 7/4).

CLASTS: 60% of rock:

Metagabbro: 20% of clasts (size: <1-5 cm, shape: angular)

Mineral	Mode (%)	Size (mm)	Shape	Comments
plagioclase	60	<1-3	anhedral	locally elongated parallel to foliation
pyx-amph(?)	35	<1-3	anhedral	locally elongated parallel to foliation
epidote	5	<1	anhedral	locally elongated parallel to foliation

Meta-anorthosite: 10% of clasts (size: <1-6 cm, shape: angular)

Mineral	Mode (%)	Size (mm)	Shape	Comments
plagioclase	90	1-4	equigranular	
chlorite	10	<1	platy	

Foliated amphibolite: 40% of clasts (size: <1-5 cm, shape: angular)

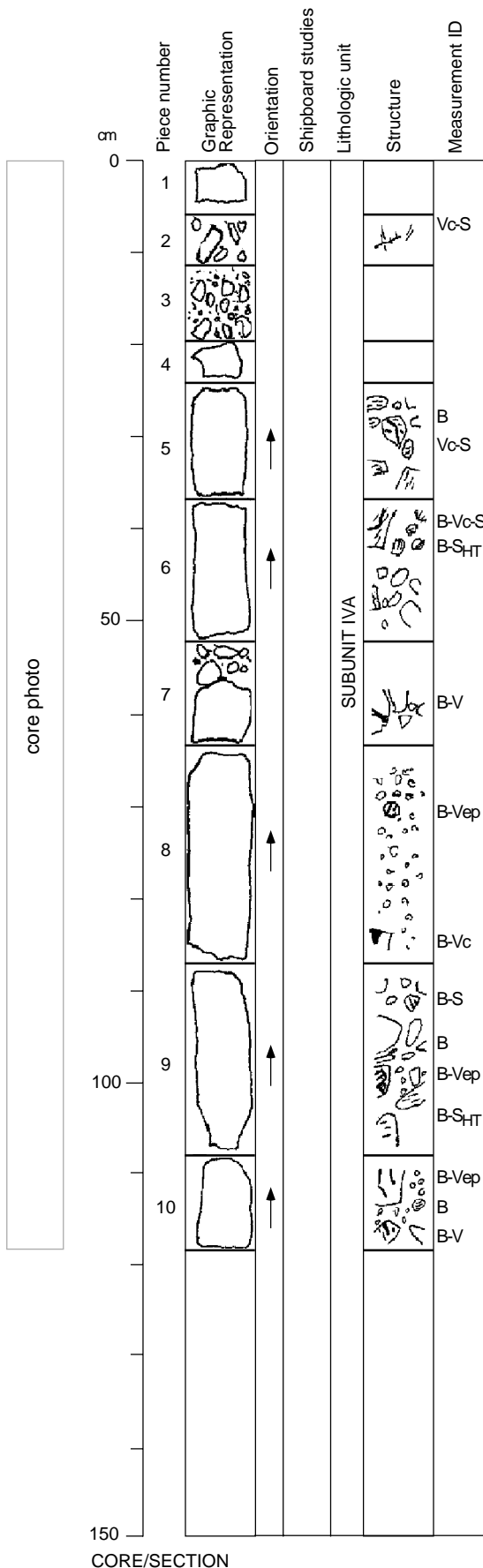
Mineral	Mode (%)	Size (mm)	Shape	Comments
amphibole	60	>1	anhedral	elongated parallel to foliation
plagioclase	40	>1	anhedral	elongated parallel to foliation

Microamphibolite: 30% of clasts (size: <1-6 cm, shape: angular)

Mineral	Mode (%)	Size (mm)	Shape	Comments
plagioclase	50-70	<1	anhedral	equant to elongated
amphibole	30-50	<1	anhedral	equant to elongated

MATRIX: 40% of rock: mostly calcite

ADDITIONAL COMMENTS: Additional clast types include epidosite, breccia and unidentified fine-grained rocks. Metagabbro usually strongly foliated. Microamphibolite is variably foliated.



CORE/SECTION

173-1068A-17R-1

SUBUNIT IVB: BRECCIA

Pieces 1-7

COLOR: Matrix: banded matrix, grayish-red (5R 4/2); mottled matrix, dark greenish-gray (5G 4/1) and greenish-gray (5GY 6/1). Clast colors: meta anorthosite, greenish-gray (5GY 6/1); metagabbro and amphibolite, greenish-black (5GY 2/1); epidosite, moderate greenish-yellow (10Y 7/4).

CLASTS: 80% of rock:

Metagabbro: 10% of clasts (size: <1-4 cm, shape: angular)

Mineral Name	Mode (%)	Size (mm)	Shape	Comments
plagioclase	60	<3	anhedral	locally elongated parallel to foliation
pyx-amph(?)	35	<3	anhedral	locally elongated parallel to foliation
epidote	5	<1	anhedral	locally elongated parallel to foliation

Foliated amphibolite: 30% of clasts (size: <0.5-8 cm, shape: angular)

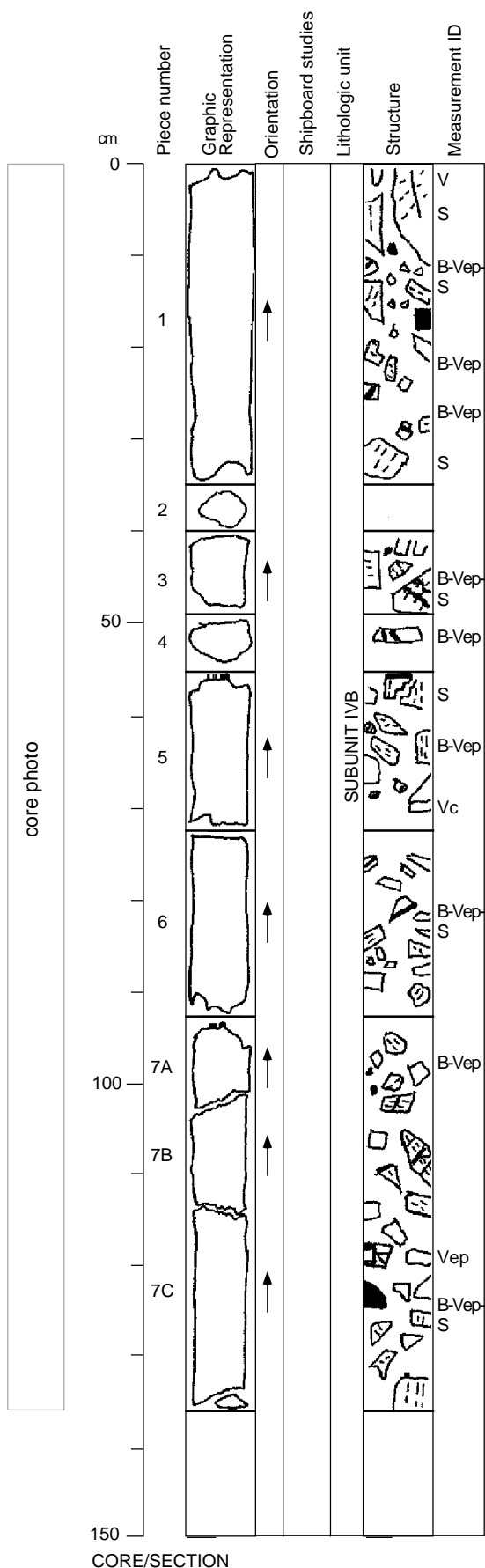
Mineral Name	Mode (%)	Size (mm)	Shape	Comments
amphibole	60	>1	anhedral	elongated parallel to foliation
plagioclase	40	>1	anhedral	elongated parallel to foliation

Micro-amphibolite: 50% of clasts (size: <0.5-8 cm, shape: angular)

Mineral Name	Mode (%)	Size (mm)	Shape	Comments
plagioclase	50-70	<1	anhedral	equant to elongated
amphibole	30-50	<1	anhedral	equant to elongated

MATRIX: 20% of rock: mostly calcite

ADDITIONAL COMMENTS: Epidosite, meta-anorthosite and fine-grained unidentified clasts: 5%-10%. Foliation in clasts ranges from weak to strong.



CORE/SECTION

173-1068A-17R-2

SUBUNIT IVB: BRECCIA

Pieces 1-2

COLOR: Matrix: banded matrix, grayish-red (5R 4/2); mottled; dark greenish-gray (5G 4/1) and greenish-gray (5GY 6/1). Clast colors: meta-anorthosite, greenish-gray (5GY 6/1); metagabbro and amphibolite, greenish-black (5GY 2/1); epidosite, moderate greenish-yellow (10Y 7/4).

CLASTS: 70% of rock

Micro-amphibolite: 30% of clasts (size: <0.5-8 cm, shape: angular)

Mineral Name	Mode (%)	Size (mm)	Shape	Comments
plagioclase	50-70	<1	anhedral	equant to elongated
amphibole	30-50	<1	anhedral	equant to elongated

Foliated amphibolite: 40% of clasts (size: <0.5-8 cm, shape: angular)

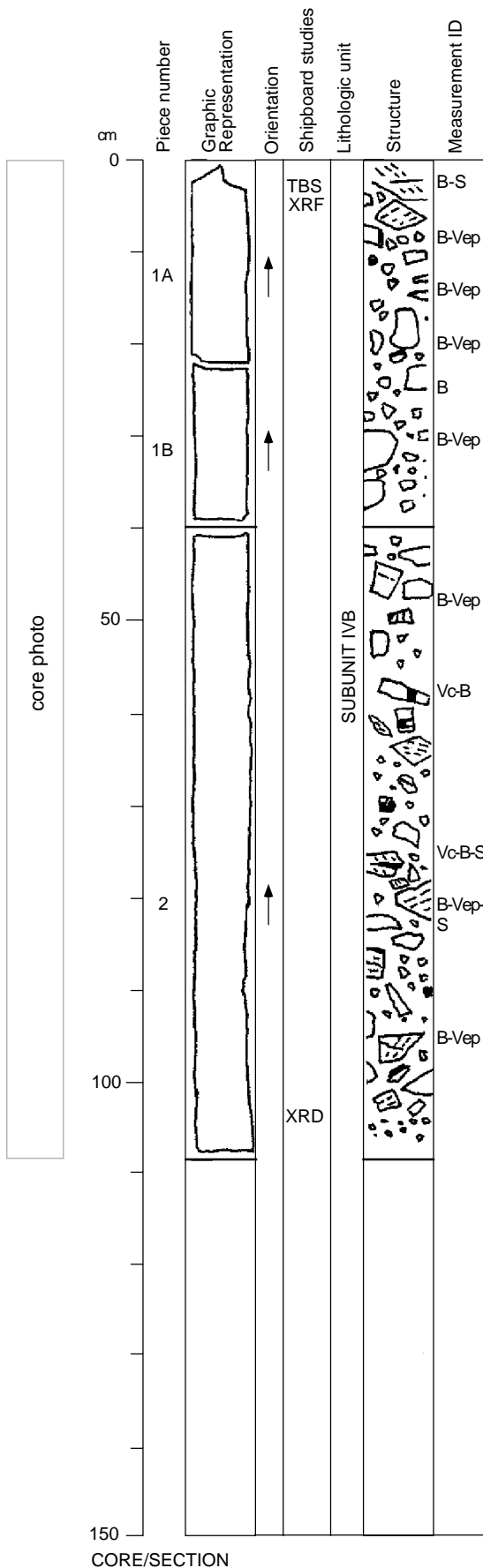
Mineral Name	Mode (%)	Size (mm)	Shape	Comments
amphibole	60	>1	anhedral	elongated parallel to foliation
plagioclase	40	>1	anhedral	elongated parallel to foliation

Metagabbro: 20% of clasts (size: <1-3 cm, shape: angular)

Mineral Name	Mode (%)	Size (mm)	Shape	Comments
plagioclase	60	<3	anhedral	locally elongated parallel to foliation
pyx-amph(?)	35	<3	anhedral	locally elongated parallel to foliation
epidote	5	<1	anhedral	locally elongated parallel to foliation

MATRIX: 30% of rock: mostly calcite

ADDITIONAL COMMENTS: Epidosite, meta-anorthosite and fine-grained unidentified rocks 5%-10%. Foliation in clasts ranges from weak to strong. 3 cm thick red clay-rich, matrix-supported breccias present at the base of the core.



173-1068A-17R-3

SUBUNIT IVB: BRECCIA

Piece 1

COLOR: Matrix: banded matrix, grayish-red (5R 4/2); mottled, dark greenish-gray (5G 4/1) and greenish-gray (5GY 6/1). Clast colors: metagabbro and amphibolite, greenish-black (5GY 2/1); epidosite, moderate greenish-yellow (10Y 7/4).

CLASTS: 70% of rock

Foliated amphibolite: 60% of clasts (size: <1-5 cm, shape: angular)

Mineral Name	Mode (%)	Size (mm)	Shape	Comments
amphibole	60	>1	anhedral	elongated parallel to foliation
plagioclase	40	>1	anhedral	elongated parallel to foliation

Microamphibolite: 30% of clasts (size: <0.5-8 cm, shape: angular)

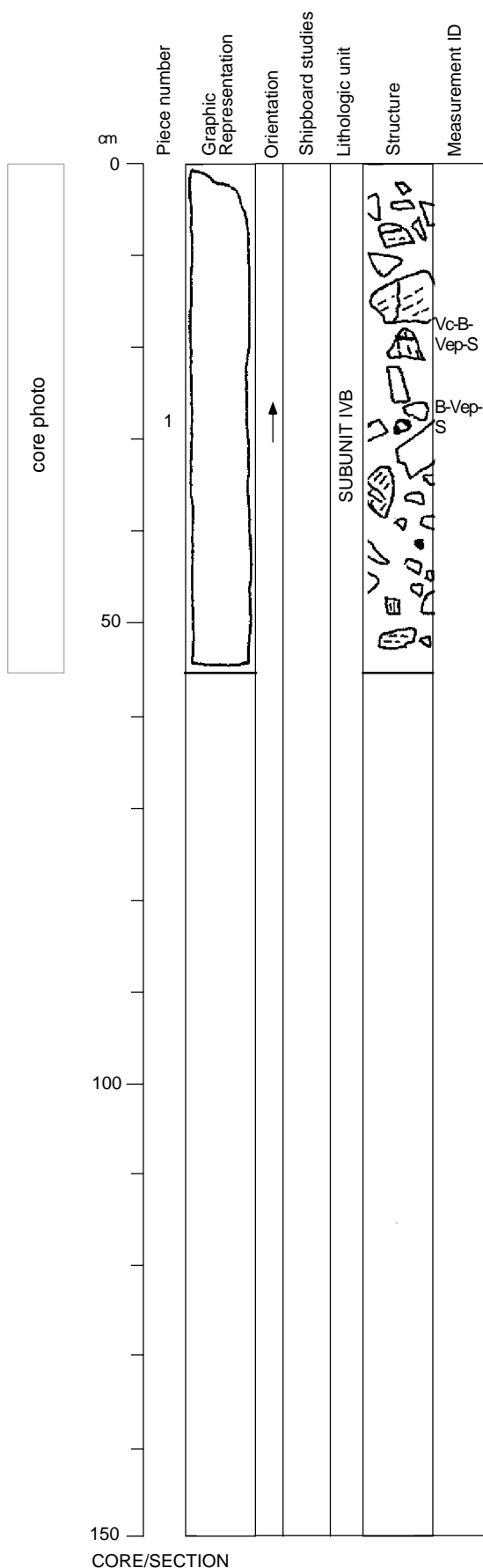
Mineral Name	Mode (%)	Size (mm)	Shape	Comments
plagioclase	50-70	<1	anhedral	equant to elongated
amphibole	30-50	<1	anhedral	equant to elongated

Metagabbro: 5% of clasts (size: <1-4 cm, shape: angular)

Mineral Name	Mode (%)	Size (mm)	Shape	Comments
plagioclase	60	<3	anhedral	locally elongated parallel to foliation
pyx-amph(?)	35	<3	anhedral	locally elongated parallel to foliation
epidote	5	<1	anhedral	locally elongated parallel to foliation

MATRIX: 30% of rock: mostly calcite

ADDITIONAL COMMENTS: Epidosite and fine-grained unidentified rocks 5%-10%. Foliation in clasts ranges from weak to strong.



SUBUNIT IVB: BRECCIA

Pieces 1-3

COLOR: Matrix: banded matrix, grayishred (5R 4/2); mottled, dark greenish-gray (5G 4/1) and greenish-gray (5GY 6/1). Clast colors: metagabbro and amphibolite, greenish-black (5GY 2/1); epidosite, moderate greenish-yellow (10Y 7/4).

CLASTS: 70% of rock

Foliated amphibolite: 50% of clasts (size: <1-5 cm, shape: angular)

Mineral Name	Mode (%)	Size (mm)	Shape	Comments
amphibole	60	>1	anhedral	elongated parallel to foliation
plagioclase	40	>1	anhedral	elongated parallel to foliation

Microamphibolite: 35% of clasts (size: <0.5-8 cm, shape: angular)

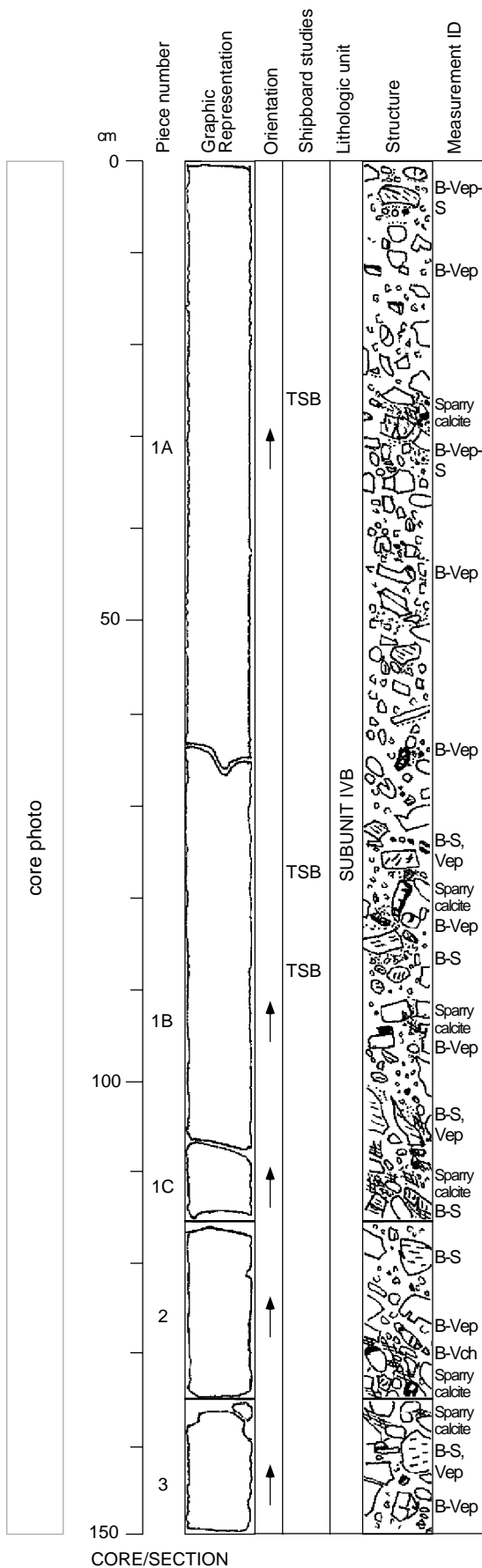
Mineral Name	Mode (%)	Size (mm)	Shape	Comments
plagioclase	50-70	<1	anhedral	equant to elongated
amphibole	30-50	<1	anhedral	equant to elongated

Metagabbro: 10% of clasts (size: <1-4 cm, shape: angular)

Mineral Name	Mode (%)	Size (mm)	Shape	Comments
plagioclase	60	<3	anhedral	locally elongated parallel to foliation
pyx-amph(?)	35	<3	anhedral	locally elongated parallel to foliation
epidote	5	<1	anhedral	locally elongated parallel to foliation

MATRIX: 30% of rock: mostly calcite

ADDITIONAL COMMENTS: Epidosite and fine-grained unidentified rocks 5%. Foliation in clasts ranges from weak to strong. More calcite lined pores towards base of core.



CORE/SECTION

173-1068A-18R-1

SUBUNIT IVB: BRECCIA

Pieces 1-3

COLOR: Matrix: primarily grayish-red (5R 4/2) and localized mottled dark greenish-gray (5G 4/1) and greenish-gray (5GY 6/1). Clast colors: metagabbro and amphibolite, greenish-black (5GY 2/1); epidosite, moderate greenish-yellow (10Y 7/4).

CLASTS: 60% of rock:

Metagabbro: 10% of clasts (size: <1-4 cm, shape: angular)

Mineral Name	Mode (%)	Size (mm)	Shape	Comments
plagioclase	60	<6	anhedral	locally elongated parallel to foliation
Pyx-Amph(?)	35	<3	anhedral	locally elongated parallel to foliation
epidote	5	<1	anhedral	locally elongated parallel to foliation

Foliated amphibolite: 35% of clasts (size: <1-5 cm, shape: angular)

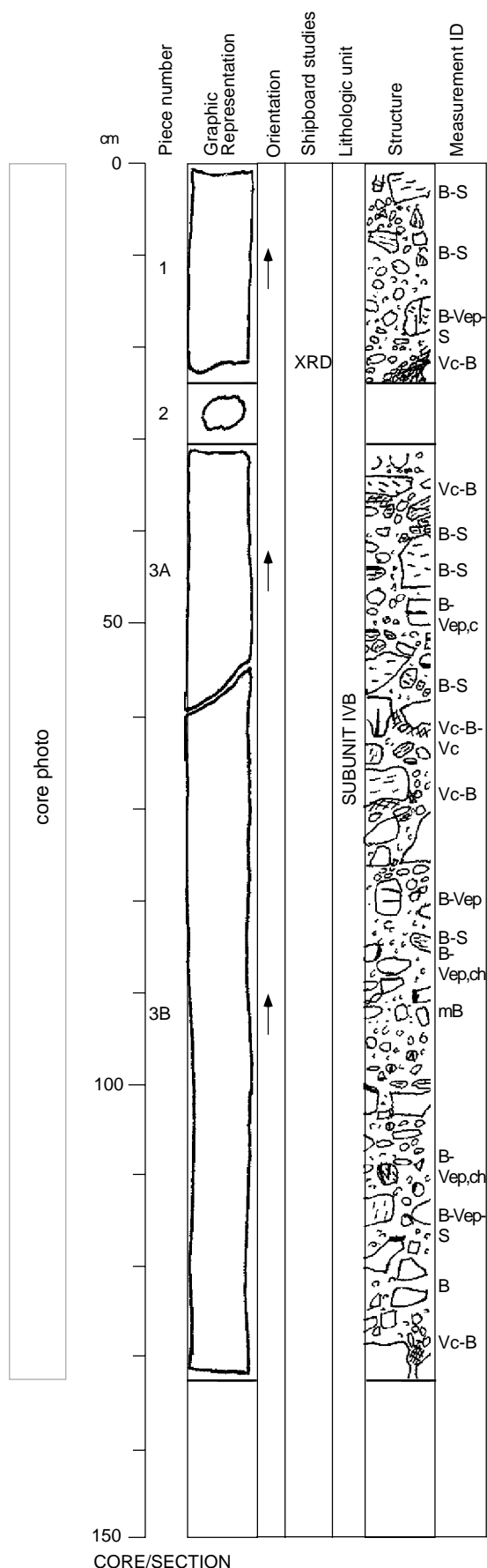
Mineral Name	Mode (%)	Size (mm)	Shape	Comments
amphibole	60	>1	anhedral	elongated parallel to foliation
plagioclase	40	>1	anhedral	elongated parallel to foliation

Micro-amphibolite: 50% of clasts (size: <6.5 cm, shape: angular)

Mineral Name	Mode (%)	Size (mm)	Shape	Comments
plagioclase	50-70	<2	anhedral	equant to elongated
amphibole	30-50	<1	anhedral	equant to elongated

MATRIX: 40% of rock: mostly calcite

ADDITIONAL COMMENTS: 5% of clasts are epidosite. Possible relationship between appearance of calcite veining and reduction of matrix from red to green color.



CORE/SECTION

173-1068A-18R-2

SUBUNIT IVB: BRECCIA

Piece 1A

COLOR: Matrix: primarily grayish-red (5R 4/2), below 50 cm color changes gradationally to mottled dark greenish-gray (5G 4/1) and greenish-gray (5GY 6/1). Clast colors: amphibolite, greenish-black (5GY 2/1); epidosite, moderate greenish-yellow (10Y 7/4).

CLASTS: 60% of rock:

Foliated amphibolite: 30% of clasts (size: <1-5 cm, shape: angular)

Mineral Name	Mode (%)	Size (mm)	Shape	Comments
amphibole	60	>1	anhedral	elongated parallel to foliation
plagioclase	40	>1	anhedral	elongated parallel to foliation

Microamphibolite: 65% of clasts (size: <5 cm, shape: angular)

Mineral Name	Mode (%)	Size (mm)	Shape	Comments
plagioclase	50-70	<1	anhedral	equant to elongated
amphibole	30-50	<1	anhedral	equant to elongated

MATRIX: 40% of rock: mostly calcite

ADDITIONAL COMMENTS: 5% of clasts are epidosite. Possible relationship between appearance of calcite veining and reduction of matrix from red color to green. Minor fine-grained metabasite and epidosite which includes a 5 cm clast with anastomosing epidote veining.

Pieces 1B, 2-10

COLOR: Matrix: mottled, dark greenish-gray (5G 4/1) and greenish-gray (5GY 6/1). Clast colors: amphibolite, greenish-black (5GY 2/1); epidosite, moderate greenish-yellow (10Y 7/4).

CLASTS: 80% of rock:

Foliated amphibolite: 10% of clasts (size: <1-5 cm, shape: angular)

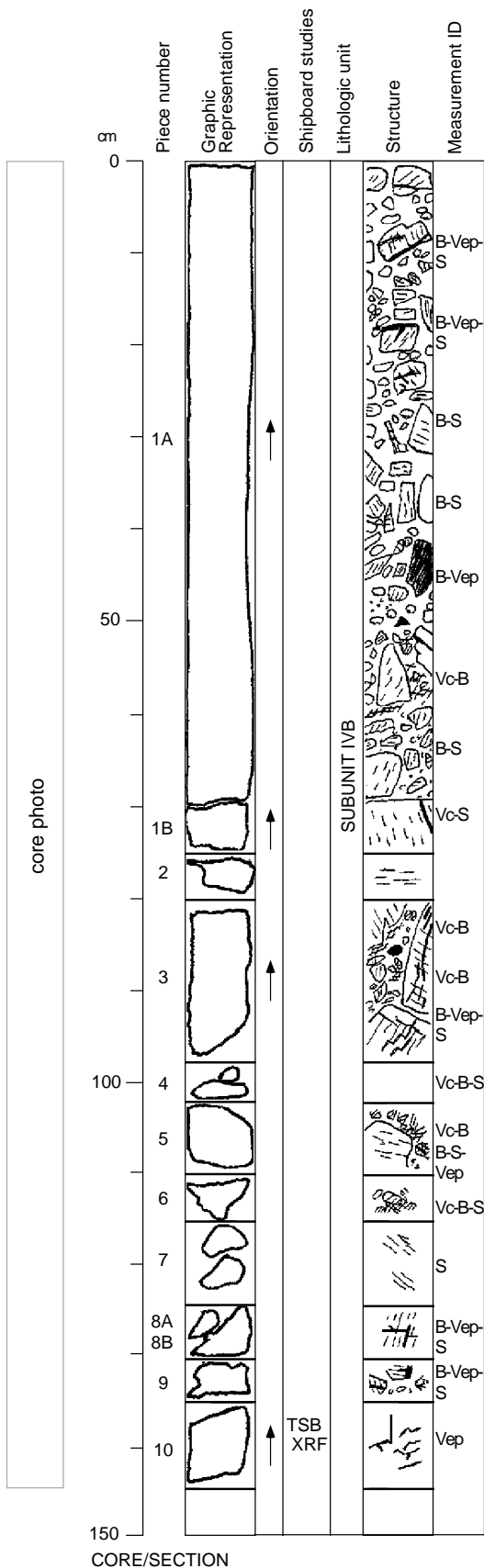
Mineral Name	Mode (%)	Size (mm)	Shape	Comments
amphibole	60	>1	anhedral	elongated parallel to foliation
plagioclase	40	>1	anhedral	elongated parallel to foliation

Micro-amphibolite: 90% of clasts (size: <0.1-10 cm, shape: angular)

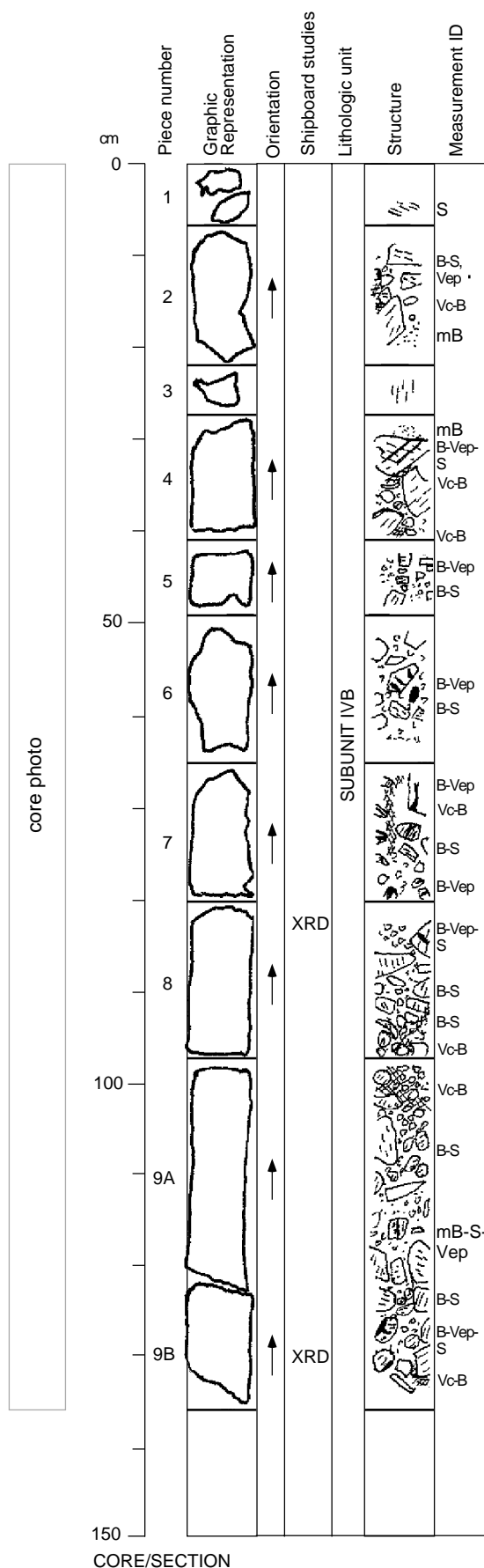
Mineral Name	Mode (%)	Size (mm)	Shape	Comments
plagioclase	50-70	<1	anhedral	equant to elongated
amphibole	30-50	<1	anhedral	equant to elongated

MATRIX: 20% of rock: mostly calcite

ADDITIONAL COMMENTS: Micro-amphibolite is foliated. Some clasts contain epidote veining. One clast of epidosite breccia (1.5 cm). Calcite veining.



173-1068A-18R-3



SUBUNIT IVB: BRECCIA

Pieces 1-3

COLOR: Matrix: mottled, dark greenish-gray (5G 4/1) and greenish-gray (5GY 6/1). Clast colors: amphibolite, greenish-black (5GY 2/1).

CLASTS: 60% of rock:

Foliated amphibolite: 100% of clasts (size: <0.1-10 cm, shape: angular)

Mineral Name	Mode (%)	Size (mm)	Shape	Comments
plagioclase	60	<6	anhedral	locally elongated parallel to foliation
amphibole	35	<4	anhedral	locally elongated parallel to foliation
epidote	5	<1	anhedral	locally elongated parallel to foliation

MATRIX: 40% of rock: mostly calcite

ADDITIONAL COMMENTS: Calcite veining.

Pieces 4-9

COLOR: Matrix: mottled, olive brown (5Y 4/4) with dusky blue-green (5BG 3/2) to dusky-green (5G 3/2). Clast colors: amphibolite, greenish --- black (5GY 2/1).

CLASTS: 60% of rock:

Foliated amphibolite: 80% of clasts (size: <6 cm, shape: angular)

Mineral Name	Mode (%)	Size (mm)	Shape	Comments
plagioclase	60	<3	anhedral	locally elongated parallel to foliation
amphibole	35	<3	anhedral	locally elongated parallel to foliation
epidote	5	<1	anhedral	locally elongated parallel to foliation

Micro-amphibolite: 20% of clasts (size: <6 cm, shape: angular)

Mineral Name	Mode (%)	Size (mm)	Shape	Comments
plagioclase	50-70	<1	anhedral	equant to elongated
amphibole	30-50	<1	anhedral	equant to elongated

Fine-grained metabasite: 20% of clasts (size: <2 cm, shape: angular)

MATRIX: 40% of rock: mostly calcite

ADDITIONAL COMMENTS: Localized intraclast epidote veining.

SUBUNIT IVB: BRECCIA

Pieces 1-6

COLOR: Matrix: mottled, dark greenish gray (5G 4/1) and greenish gray (5GY 6/1). Clast colors: amphibolite, greenish black (5GY 2/1).

CLASTS: 60% of rock:

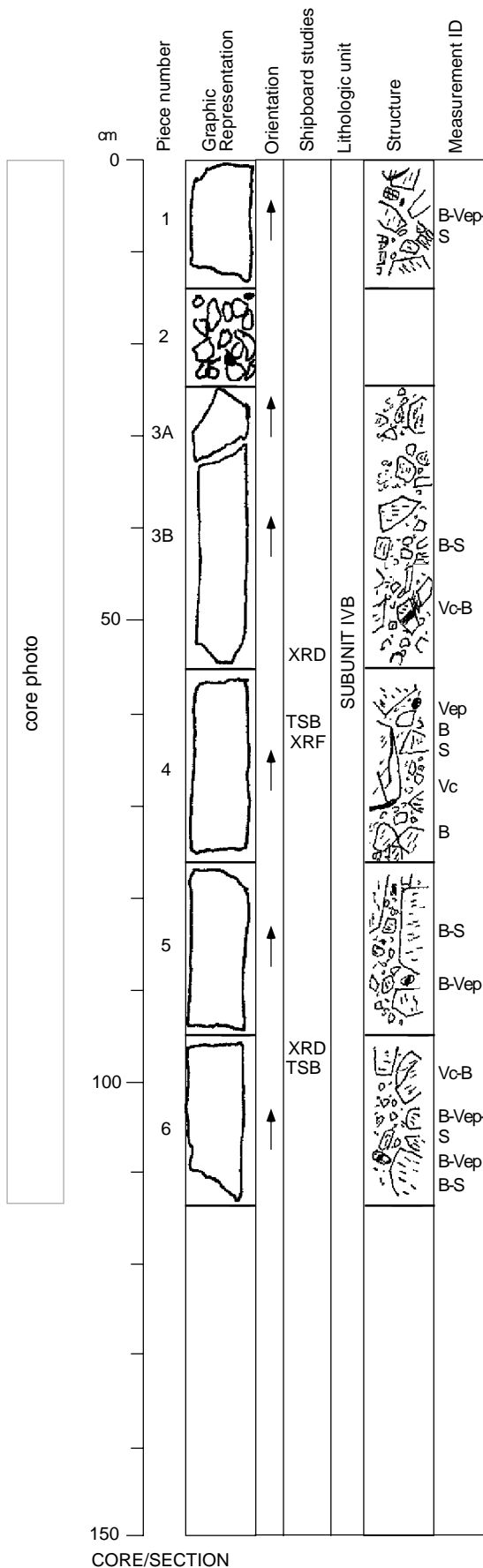
Foliated Amphibolite: 100% of clasts (size: <0.1-10 cm, shape: angular)

Mineral Name	Mode (%)	Size (mm)	Shape	Comments
plagioclase	60	<6	anhedral	locally elongated parallel to foliation
amphibole	35	<5	anhedral	locally elongated parallel to foliation
epidote	5	<1	anhedral	locally elongated parallel to foliation

MATRIX: 40% of rock: mostly calcite

VEINS: calcite veins

ADDITIONAL COMMENTS: <1% of clasts are very fine-grained metabasite and epidosite.



173-1068A-19R-1

SUBUNIT IVB: BRECCIA

Pieces 1-3

COLOR: Matrix: moderate yellowish brown (10YR 5/4) to light olive gray (5Y 5/2); Amphibolite clasts: dark gray (N3).

CLASTS: 50% of rock:

Foliated amphibolite: 50% of clasts (size: <6 cm, shape: angular)

Mineral Name	Mode (%)	Size (mm)	Shape	Comments
plagioclase	60	<6	anhedral	locally elongated parallel to foliation
amphibole	35	<5	anhedral	locally elongated parallel to foliation
epidote	5	<1	anhedral	locally elongated parallel to foliation

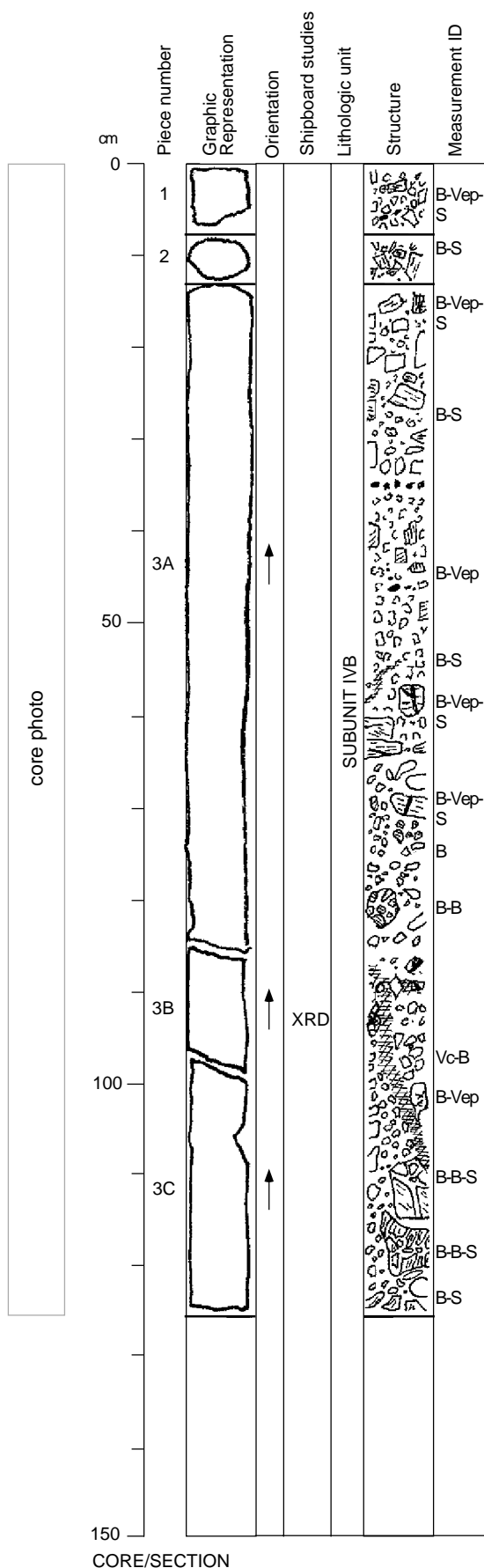
Microamphibolite 50% of clasts (size: 1 mm-4 cm, shape: angular)

Mineral Name	Mode (%)	Size (mm)	Shape	Comments
amphibole	80-85	<1-2	anhedral	equant to elongated
plagioclase	10-15	<1-2	anhedral	equant to elongated
epidote	0-5	<1	anhedral	

MATRIX: 50% of rock: fine-grained, calcite, chlorite

VEINS: <5% of rock: Large calcite vein (5 mm wide) with light and dark bands of vein filling (some drusy calcite) in Pieces 3B and 3C. Smaller calcite veins (0.5 mm wide) in Piece 3A. Epidote veins (0.5-1.0 mm wide) within the micro-amphibolite clasts.

ADDITIONAL COMMENTS: Some epidote occurs around margins of amphibolite clasts. Individual epidote clasts (0.5-1.0 mm size) constitute <1% of total clasts. Some micro-amphibolite clasts are partially altered to brown oxyhydroxide.



173-1068A-19R-2

SUBUNIT IVB: BRECCIA

Pieces 1-7

COLOR: Matrix: grayish olive green (5GY 3/2), moderate yellowish brown (10YR 5/4), and dark reddish brown (10R3/4). Clasts: Dark gray (N3).

CLASTS: 60% of rock:

Microamphibolite 70% of clasts (size: 0.5-4.0 cm, shape: angular to subangular)

Mineral Name	Mode (%)	Size (mm)	Shape	Comments
amphibole	60	<0.5	anhedral	
plagioclase	40	<0.5	anhedral	

Foliated amphibolite: 30% of clasts-Pieces 1A,5,7 (size: 1-5 cm, shape: angular)

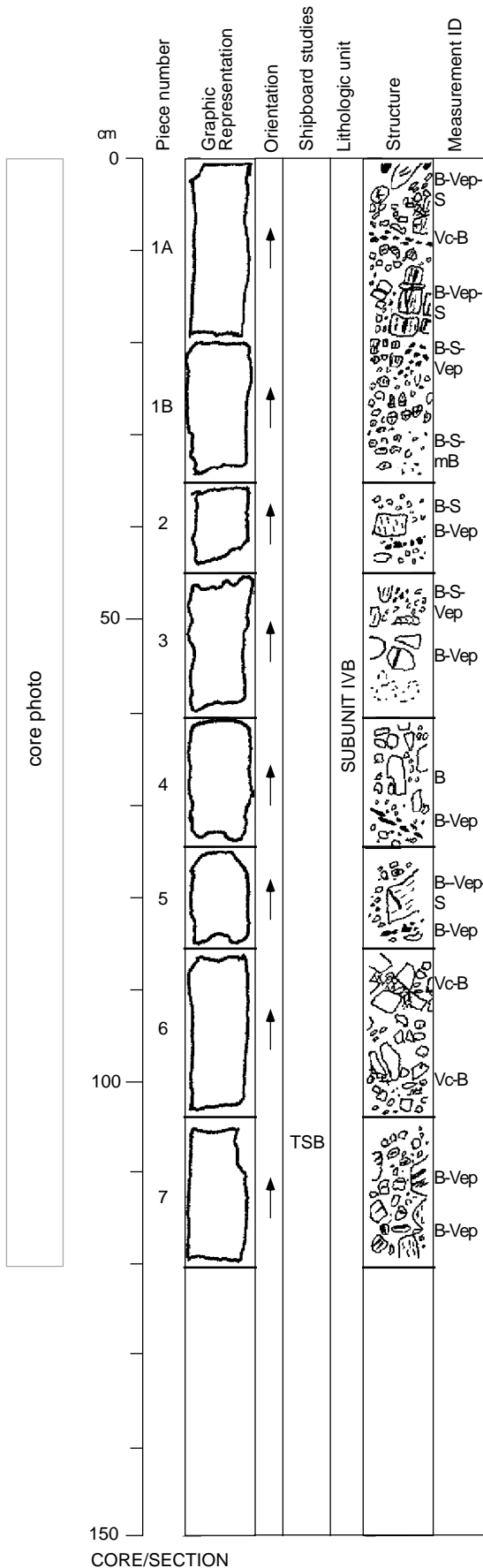
Mineral Name	Mode (%)	Size (mm)	Shape	Comments
plagioclase	50	<1-2	anhedral elongated	
amphibole	50	<1-2	anhedral elongated	

Clast from Piece 5 has a plagioclase-rich layer (1 cm wide).

MATRIX: 40% of rock: Fine-grained carbonate. Piece 3 (bottom half) has heavily chloritized matrix.

VEINS: <1% of rock: Epidote veins (0.5 mm wide) within some clasts.

ADDITIONAL COMMENTS: Other clast types constitute < 2% of clasts are meta-anorthosite (1 cm) and epidosite (2 mm).



173-1068A-19R-3

SUBUNIT IVB: BRECCIA

Piece 1

COLOR: Matrix: grayish green (10GY 5/2), light olive gray (5Y 5/2), light greenish gray (5GY 8/1), pale green (10G 6/2), and dark yellowish orange (10YR 6/6). Clasts: dark gray (N3).

CLASTS: 40% of rock:

Foliated amphibolite 25% of clasts (size: <1-12 cm, shape: angular to subangular)

Mineral Name	Mode (%)	Size (mm)	Shape	Comments
plagioclase	50	1-5	anhedral	elongated parallel to foliation
amphibole	45	1	anhedral	elongated parallel to foliation

Microamphibolite 70% of clasts (size: 1-4 cm, shape: angular)

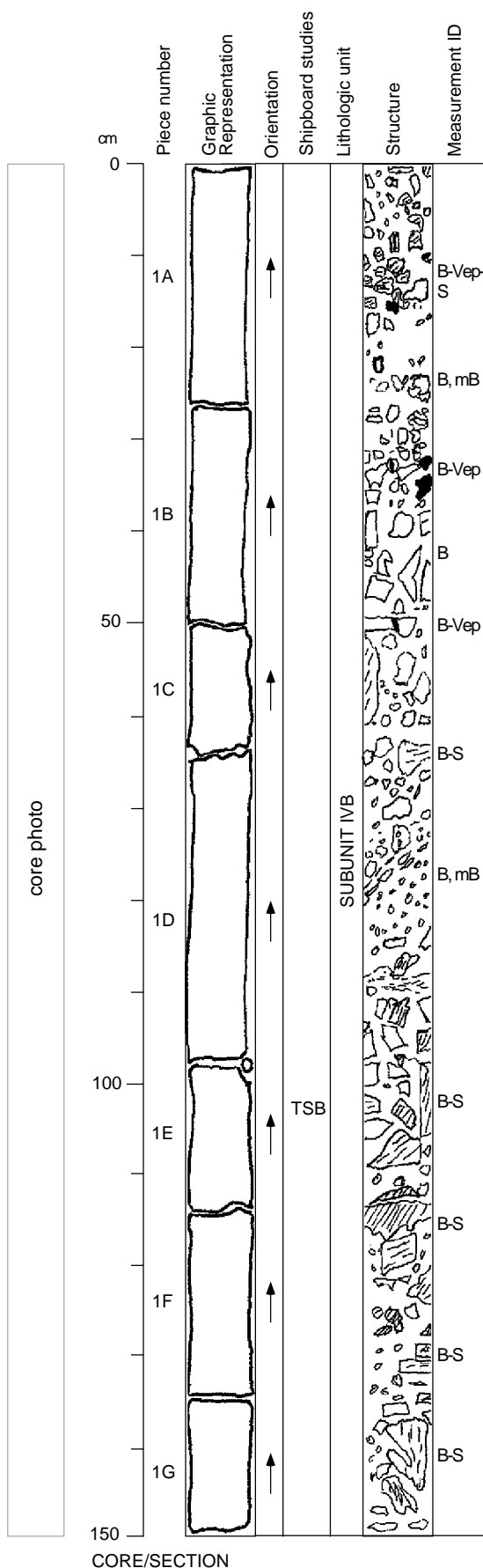
Mineral Name	Mode (%)	Size (mm)	Shape	Comments
amphibole	40(?)	<0.5	subhedral	elongated parallel to foliation
plagioclase	60(?)	<0.5	subhedral	elongated parallel to foliation
epidote	<1	<0.2	granular	

Meta-anorthosite 5% of clasts (size: <1-5 cm, shape: angular)

Mineral Name	Mode (%)	Size (mm)	Shape	Comments
plagioclase	80-90	1-2	subhedral	
epidote	10-20	0.5	granular	
oxyhydroxides	0-10	0.1		

MATRIX: 60% of rock: fine-grained, carbonate

ADDITIONAL COMMENTS: Pieces 1C and 1D have green alteration mineral present in the matrix.



SUBUNIT IVB: BRECCIA

Pieces 1-4

COLOR: Matrix: Dark yellowish orange (10YR6/6), grayish green (5G 5/2), and light olive gray (5Y 5/2).

IGNEOUS STRUCTURES: Primary foliation in metagabbro clasts.

METAMORPHIC STRUCTURES: Weak foliation in microamphibolite clasts.

CLASTS: 50% of rock:

Metagabbro 60% of clasts-Pieces 1 and 2 (size: 0.5-6.0 cm, shape: angular to subangular)

Mineral Name	Mode (%)	Size (mm)	Shape	Comments
pyroxene	40-45	5	granular	Opx and Cpx(?)
plagioclase	50	1-3	granular	
olivine(?)	5-10	1	Serpentine/Iddingsite(?)	

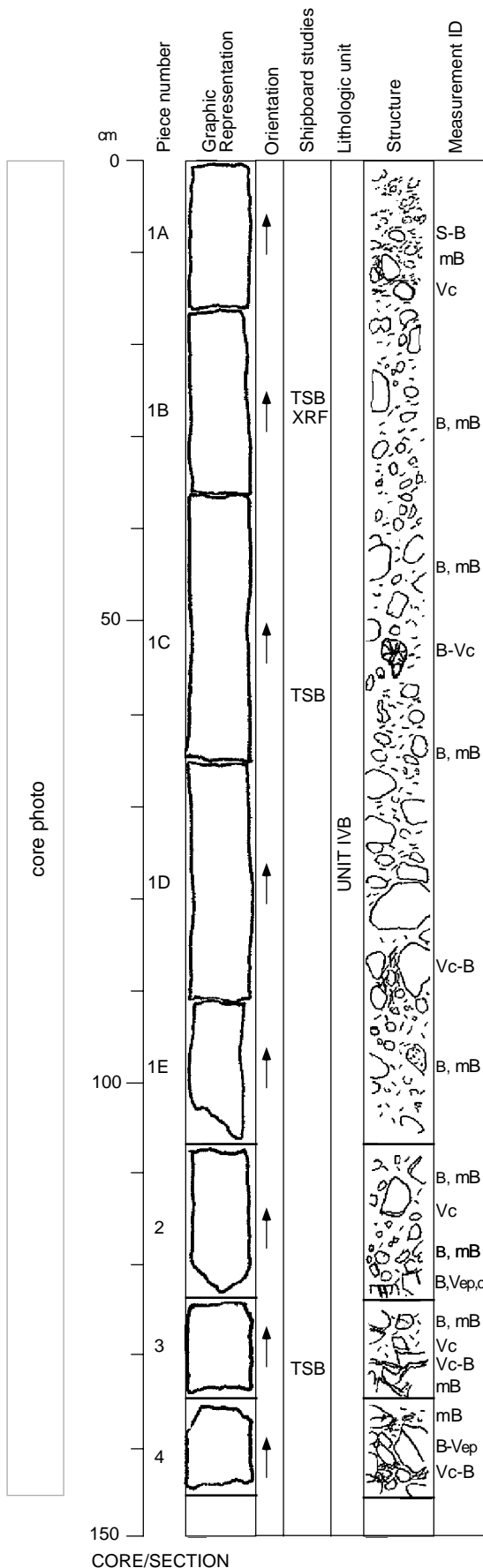
Microamphibolite 20% of clasts-Pieces 3 and 4 (size: 1-4 cm, shape: angular)

Mineral Name	Mode (%)	Size (mm)	Shape	Comments
amphibole	40	<1	anhedral elongated parallel to foliation	
plagioclase	60	<1	anhedral elongated parallel to foliation	

Anorthosite 5% of clasts-Pieces 1C, 1D, and 1E (size: 0.5-4 cm, shape: angular)

Mineral Name	Mode (%)	Size (mm)	Shape	Comments
plagioclase	90-100	5	granular	
pyroxene(?)	0-10	5	granular	

MATRIX: 50% of rock: fine-grained, carbonate.



CORE/SECTION

173-1068A-19R-5

SUBUNIT IVB: BRECCIA

Pieces 1-6

COLOR: Matrix: grayish green (10GY 5/2), dark reddish brown (10R 3/4), and moderate yellowish brown (10YR 5/4).
IGNEOUS STRUCTURES: Weak foliation and layering.

CLASTS: 35% of rock:

Metagabbro with interlayered meta-anorthosite 30% of clasts- Pieces 2B, 2C and 3 (size: 1 mm-6 cm, shape: angular to subangular)

Mineral Name	Mode (%)	Size (mm)	Shape	Comments
plagioclase	50-80	1-5	subhedral	
pyroxene	20-50	2-3	anhedral	elongated

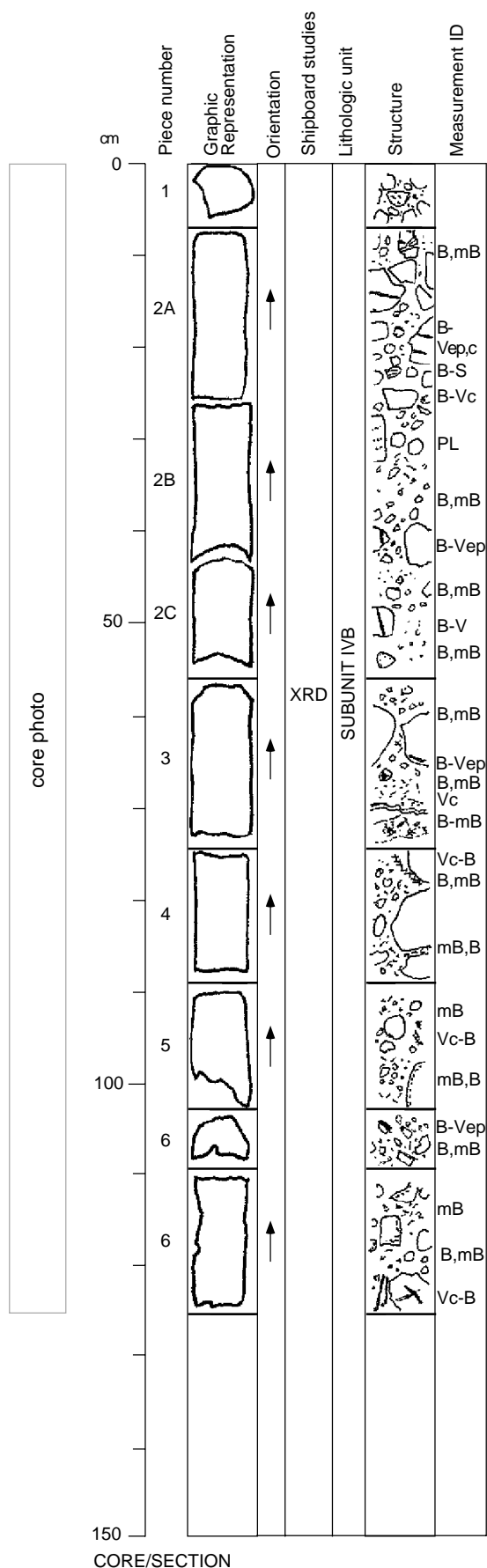
Microamphibolite 70% of clasts-Pieces 1, 2A, 5, and 6 (size: 1 mm-5 cm, shape: angular)

Mineral Name	Mode (%)	Size (mm)	Shape	Comments
plagioclase	60	<1-1	anhedral	elongated
amphibolite	40	<1-1	anhedral	elongated

MATRIX: 65% of rock: fine-grained, carbonates, Fe-oxhydroxides

VEINS: < 2% of rock: Calcite vein in Piece 3. Epidote vein in Pieces 2C and 3. Feldspar vein in Piece 2A.

ADDITIONAL COMMENTS: Metagabbro clasts in Pieces 3, 4, and 5 (~5%). Miscellaneous metagabbro clasts (~10%).



173-1068A-19R-6

SUBUNIT IVB: BRECCIA

Pieces 1-11

COLOR: Dark reddish brown (10R 3/4), moderate yellowish brown (10YR 5/4), and medium bluish gray (5B 5/1).

METAMORPHIC STRUCTURES: Possible weak foliation in metagabbro clasts.

CLASTS: 40% of rock:

Metagabbro 60% of clasts (size: <1-5 cm, shape: angular to subangular)

Mineral Name	Mode (%)	Size (mm)	Shape	Comments
plagioclase	50	1-4	anhedral	elongated
pyroxene	50	1-2	anhedral	elongated

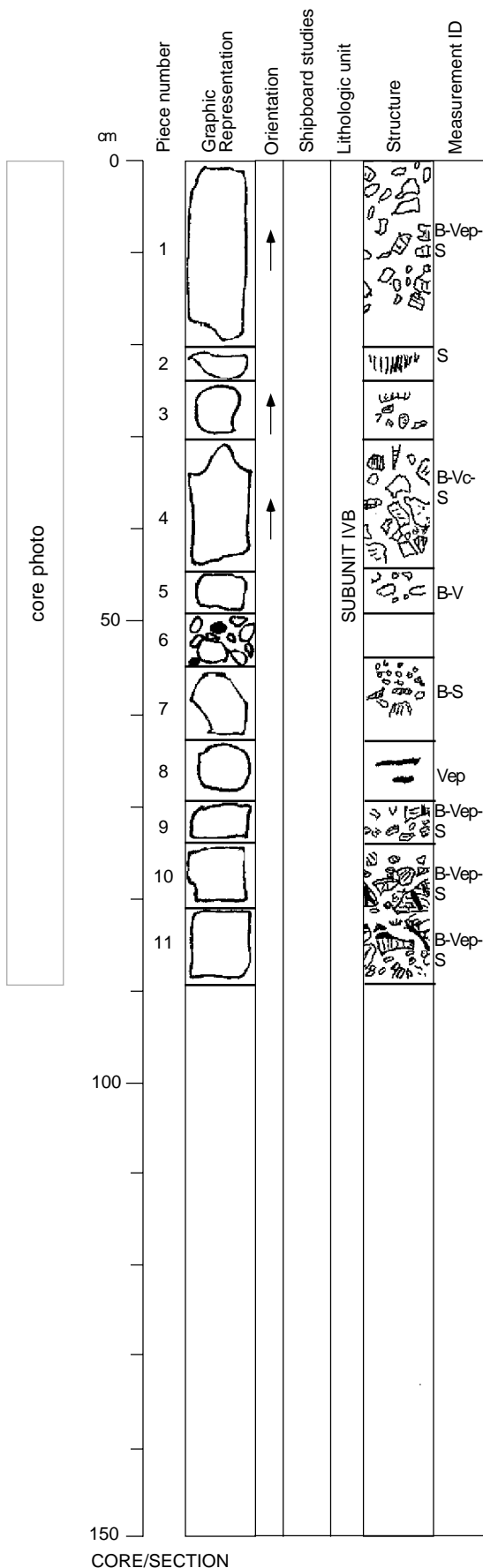
Microamphibolite 40% of clasts (size: <1-1.5 cm, shape: angular)

Mineral Name	Mode (%)	Size (mm)	Shape	Comments
plagioclase	30	<1	anhedral	
amphibole	70	<1	anhedral	

MATRIX: 60% of rock: fine-grained, carbonate

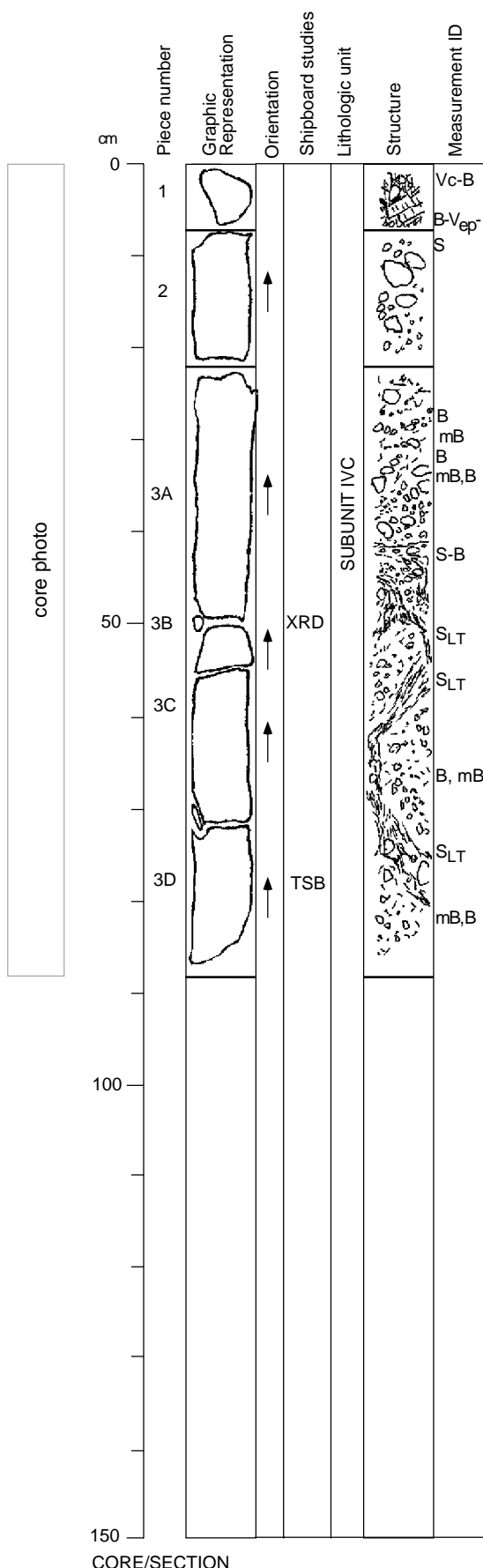
VEINS: 2% of rock: Epidote veins (0.5-4.0 mm wide) dominant in Pieces 10 and 11; also in Piece 8.

ADDITIONAL COMMENTS: Talc(?) within altered metagabbro clast in Piece 1.



CORE/SECTION

173-1068A-20R-1



SUBUNIT IVC: BRECCIA

Piece 1

COLOR: Medium bluish gray (5B 5/1).

CLASTS: 80% of rock:

Metagabbro 100% of clasts (size: 0.5-3.5 cm , shape: angular)

Mineral Name	Mode (%)	Size (mm)	Shape	Comments
plagioclase	25	1-2	anhedral	elongated parallel to foliation
pyroxene	70	1-2	anhedral	elongated parallel to foliation
epidote	5	<1	granular	

MATRIX: 20% of rock: calcite fill

SUBUNIT IVC: BRECCIA

Pieces 2-3D

COLOR: Matrix: Pale green (10G 6/2) to grayish blue green (5BG 5/2).

CLASTS: 30% of rock:

Meta-anorthosite 70% of clasts (size: 0.5 cm, shape: angular)

Mineral Name	Mode (%)	Size (mm)	Shape	Comments
plagioclase	90-100	<1-5	granular	
amph-pyx(?)	0-10	<1-2	anhedral	elongated parallel to foliation

Metagabbro 30% of clasts (size: <1-4 cm, shape: subangular to subrounded)

Mineral Name	Mode (%)	Size (mm)	Shape	Comments
plagioclase	50-60	1-5	anhedral	elongated parallel to foliation
amph-pyrox(?)	40	1-3	anhedral	elongated parallel to foliation
olivine (serp)	0-10	1	granular	

MATRIX: 70% of rock: carbonate, chlorite

ADDITIONAL COMMENTS: Clasts are altered. Epidote clast (1%) is rounded and 5 mm in diameter.

CORE/SECTION

173-1068A-20R-2

SUBUNIT IVC: BRECCIA

Piece 1

COLOR: Matrix: pale green (10G 6/2).

CLASTS: 40% of rock:

Anorthosite 50% of clasts (size: 0.5-2.0 cm, shape: subangular to subrounded)

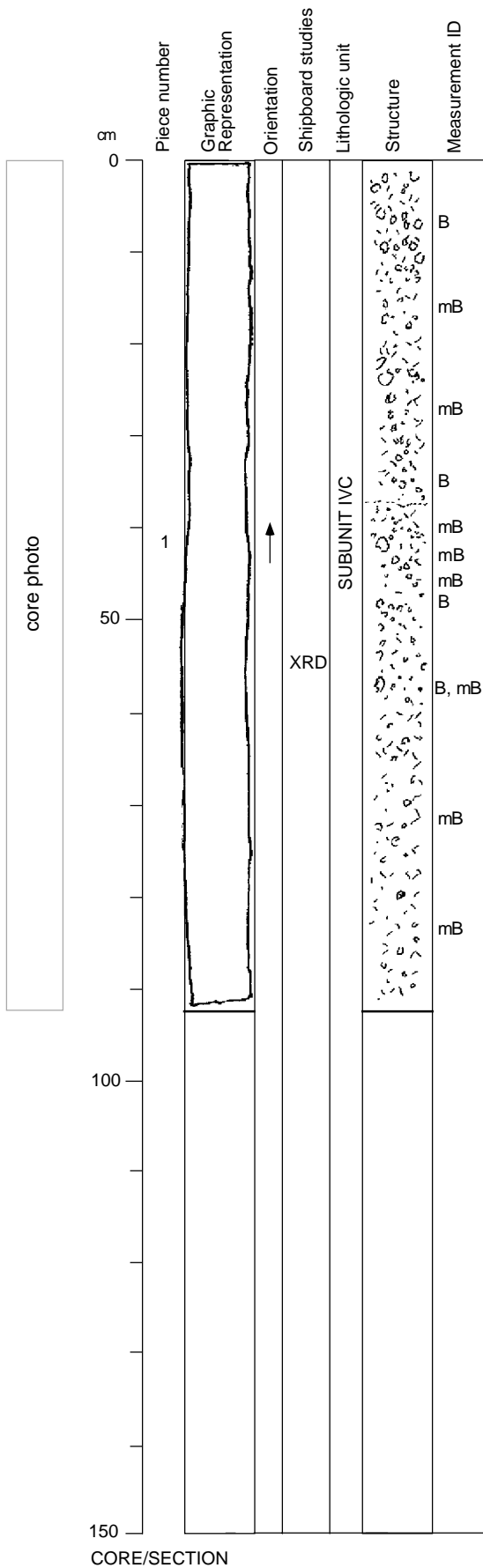
Mineral Name	Mode (%)	Size (mm)	Shape	Comments
plagioclase	90	<1	anhedral	elongated parallel to foliation
amphibole	10	<1	anhedral	elongated parallel to foliation

Metagabbro 50% of clasts (size: 0.5-2.0 cm, shape: subangular to subrounded)

Mineral Name	Mode (%)	Size (mm)	Shape	Comments
plagioclase	50	1	anhedral	elongated parallel to foliation
amphibole	50	1	anhedral	elongated parallel to foliation

MATRIX: 60% of rock: carbonate, chlorite.

ADDITIONAL COMMENTS: Clasts are rimmed by chlorite.



173-1068A-20R-3

UNIT IVC: BRECCIA

Piece 1

COLOR: Matrix: Pale green (10G 6/2) to yellowish gray (5Y 5/2).

CLASTS: 30% of rock:

Meta-anorthosite 70% of clasts (size: <1-6 cm, shape: subangular to subrounded)

Mineral Name	Mode (%)	Size (mm)	Shape	Comments
plagioclase	95	1-10	granular	
pyroxene	5	<1	granular	

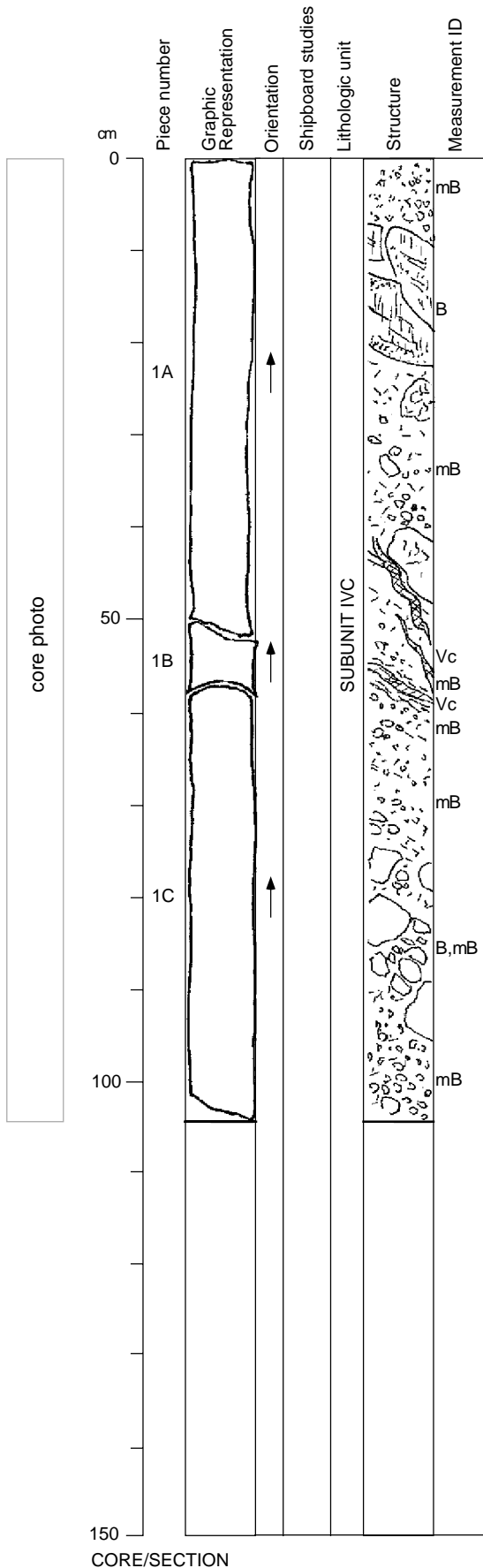
Metagabbro 30% of clasts (size: <1-6 cm, shape: subangular to subrounded)

Mineral Name	Mode (%)	Size (mm)	Shape	Comments
plagioclase	70	1-3	anhedral	elongated parallel to foliation
pyroxene	30	1-2	anhedral	elongated parallel to foliation

MATRIX: 70% of rock: calcite, chlorite

VEINS: <5% of rock: Chlorite veins and epidote veins within metagabbro clasts. Calcite veins up to 5 mm thick.

ADDITIONAL COMMENTS: Hematite in small shear (5 mm thick).



SUBUNIT IVC: BRECCIA

Pieces 1-4

COLOR: Matrix: Moderate yellowish brown (10YR 5/4), pale green (10G 6/2), and dusky yellow green (5GY 5/2).

CLASTS: 60% of rock:

Meta-anorthosite 70% of clasts (size: <1-2 cm, shape: subangular to subrounded)

Mineral Name	Mode (%)	Size (mm)	Shape	Comments
plagioclase	100	2-3	granular	

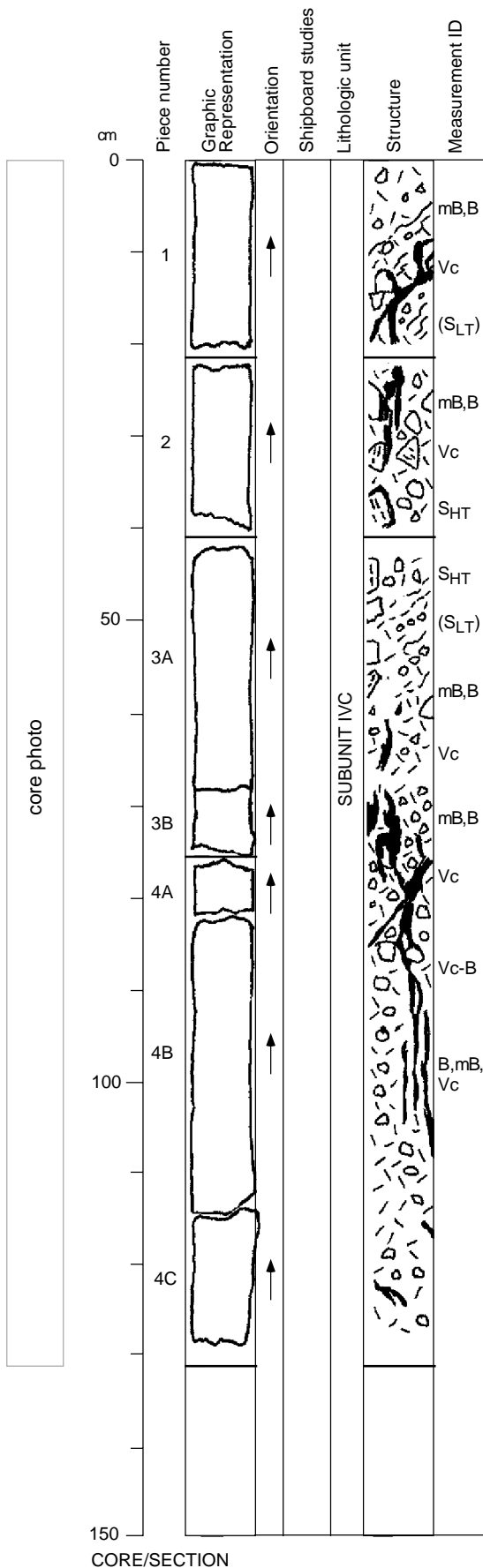
Metagabbro 30% of clasts (size: <1-4 cm, shape: subangular to subrounded)

Mineral Name	Mode (%)	Size (mm)	Shape	Comments
plagioclase	40	1-3	anhedral	elongated parallel to foliation
amphibole	40	2	elongate	
olivine	2-20	1	granular	

MATRIX: 30% of rock: calcite, chlorite

VEINS: 10% of rock: Meta-anorthosite clasts are cut by epidote veins (1 mm wide). Calcite veins (up to 1.5 cm wide) are subvertical and branching. Hematitic veins in Pieces 1 and 3.

ADDITIONAL COMMENTS: Highly calcified section. Possibly altered pyroxenite clast in Piece 2 (4 cm long) is brownish gray (5YR 2/1), 5 mm grain size, and similar to pyroxene in the metagabbro clasts.



173-1068A-20R-5

SUBUNIT IVC: BRECCIA

Pieces 1-12

COLOR: Matrix: light bluish gray (5B 2/1), dark yellowish orange (10YR 6/6), grayish green (10G 4/2).

METAMORPHIC STRUCTURES: Mylonite in Pieces 4 and 5

CLASTS: 60% of rock:

Metagabbro 80% of clasts (size: 5 mm-15 cm, shape: angular)

Mineral Name	Mode (%)	Size (mm)	Shape	Comments
plagioclase	50	2-5	anhedral	elongated parallel to foliation
amphibole	50	2-15	anhedral	elongated parallel to foliation
olivine	<5	<1	granular	

Pieces 7-12 contain highly chloritized metagabbro clasts.

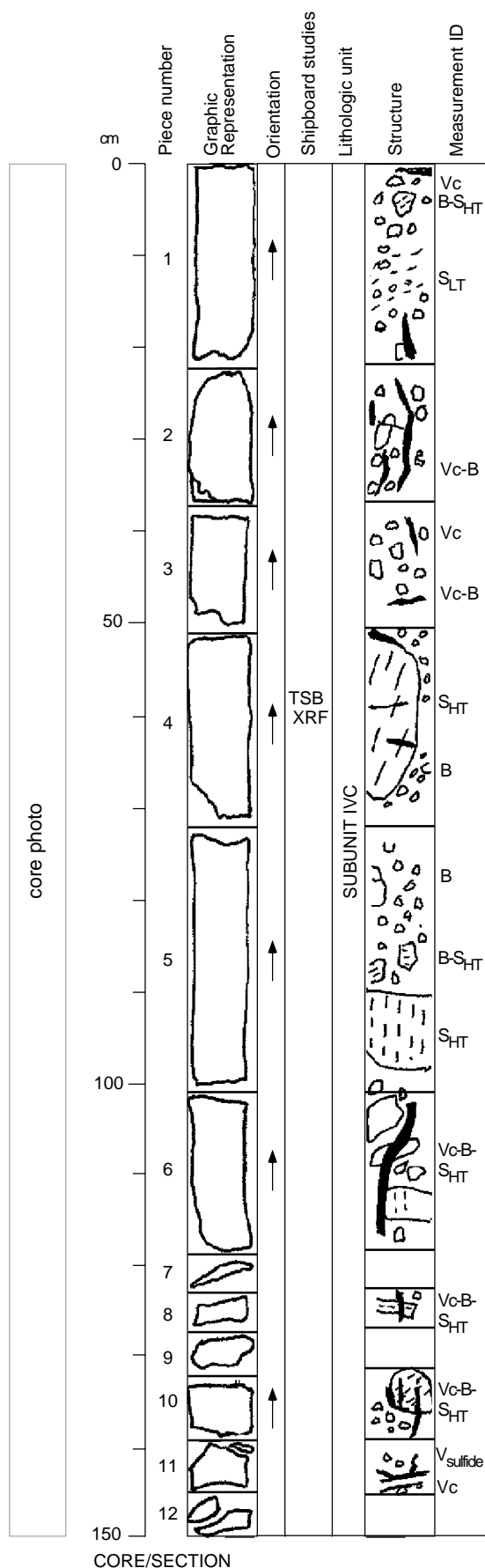
Meta-anorthosite 20% of clasts (size: 1-2 cm, shape: angular)

Mineral Name	Mode (%)	Size (mm)	Shape	Comments
plagioclase	90	3	granular	
amphibole	10	2	anhedral	elongated parallel to foliation

MATRIX: 40% of rock: calcite, Fe-oxyhydroxides, some hematitic spots or stringers in Pieces 1 and 4

VEINS: 2% of rock: Calcite vein (up to 5 mm wide) subvertical to subhorizontal showing progressively infilling layers parallel to the walls.

ADDITIONAL COMMENTS: In Pieces 8-12, sulfide (pyrite, granular, 0.5 mm) stringers that are 3 mm thick. In Pieces 9-12, possible mixture of chlorite and serpentine.



CORE/SECTION

SUBUNIT IVC: BRECCIA

Pieces: 1-20

COLOR: Dusky blue-green (5BG 3/2).

CLASTS: 60% of rock:

Metagabbro, 90% of clasts (size: 1 mm- 3 cm, shape:subangular)

Mineral Name	Mode (%)	Size (mm)	Shape	Comments
olivine (serp)	10	1	granular	
amphibole	40	1-3	anhedral	elongated parallel to foliation
plagioclase	50	2-4	anhedral	elongated parallel to foliation

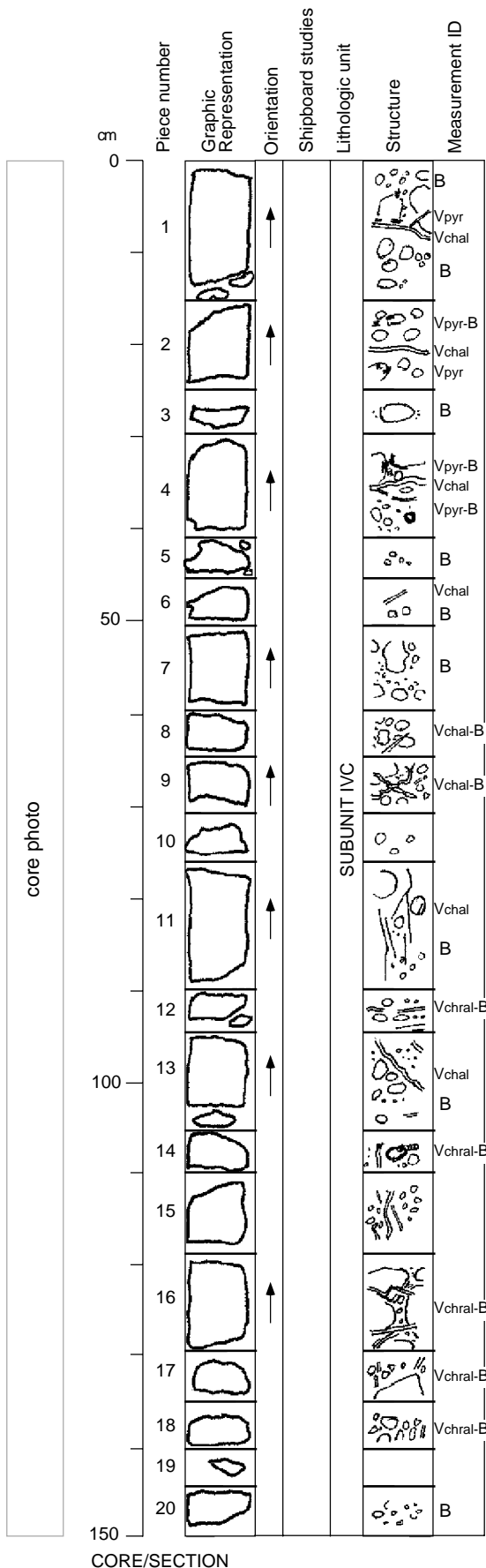
Meta-anorthosite, 10% of clasts (size: 2 cm, shape:subangular)

Mineral Name	Mode (%)	Size (mm)	Shape	Comments
plagioclase	90	2	anhedral	elongated parallel to foliation
amphibole	10	1	anhedral	elongated parallel to foliation

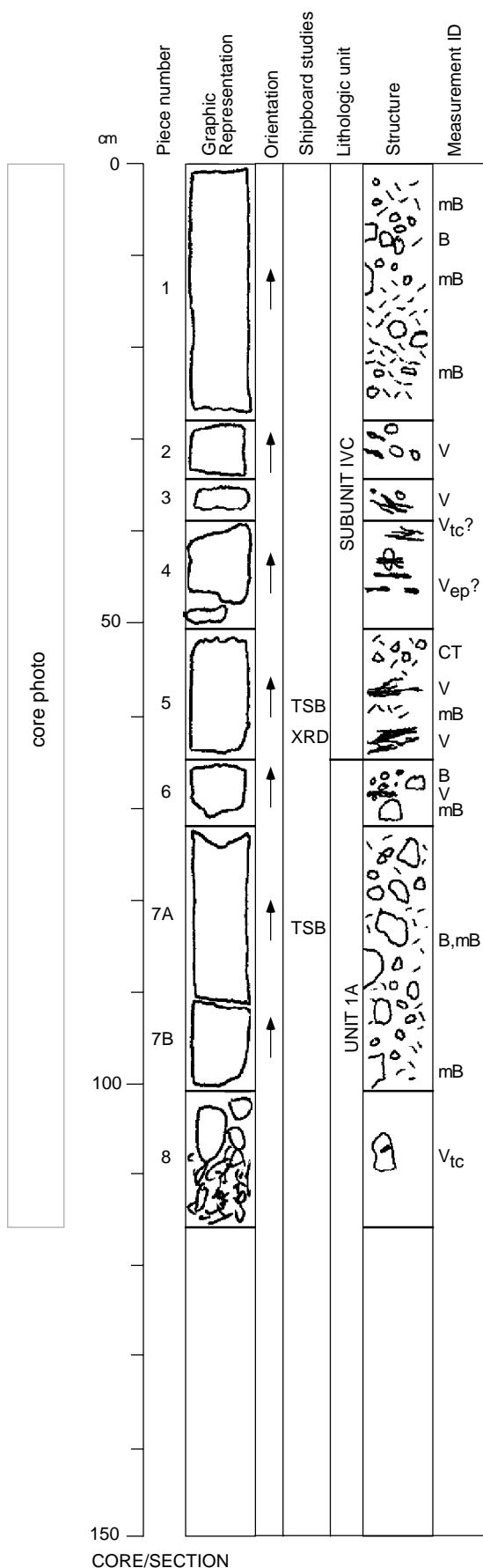
MATRIX: 40% of rock: calcite and reworked clasts

VEINS: <2% of rock: In Pieces 1, 2, 4, sulfides (pyrite granular, 0.5 mm), disseminated. Calcite filling weakly to steeply dipping veins.

ADDITIONAL COMMENTS: grain-supported to matrix-supported.



173-1068A-20R-7



SUBUNIT IVC: BRECCIA

Pieces 1-5

COLOR: Matrix: pale yellowish green (10GY 7/2).

CLASTS: 40% of rock:

Metagabbro, 100% of clasts (size: 5 mm- 1.5 m, shape: sub-angular)

Mineral Name	Mode (%)	Size (mm)	Shape	Comments
plagioclase	50-60	1-4	anhedral	elongated parallel to foliation
amphibole	35-40	1-4	anhedral	elongated parallel to foliation
olivine (serp)	5-10	1	granular	

MATRIX: 60% of rock: chlorite, calcite

UNIT 1A: BRECCIA SERPENTINITE

Pieces: 6-8

COLOR: Matrix: medium light gray (N6) to dusky blue (5PB 3/2).
Clasts: black (N1).

CLASTS: 30% of rock:

Dunite, 100% of clasts (size: 1 mm- 4.5 cm, shape: rounded)

Mineral Name	Mode (%)	Size (mm)	Comments
serpentine	95	1	
spinel(?)	<5	<1	

MATRIX: 70% of rock: Serpentine, chlorite, calcite.

UNIT 1A: SERPENTINITE BRECCIA

Pieces 1-2

COLOR: Serpentinite: grayish-black (N2). Veins: mottled, very pale green (10G 8/2), originally pale blue green (5BG 7/2) but changes to pale green on exposure to atmosphere after about 20 minutes.

IGNEOUS STRUCTURES: 1-8 mm pale anhedral shapes might be pseudomorphs after pyroxene.

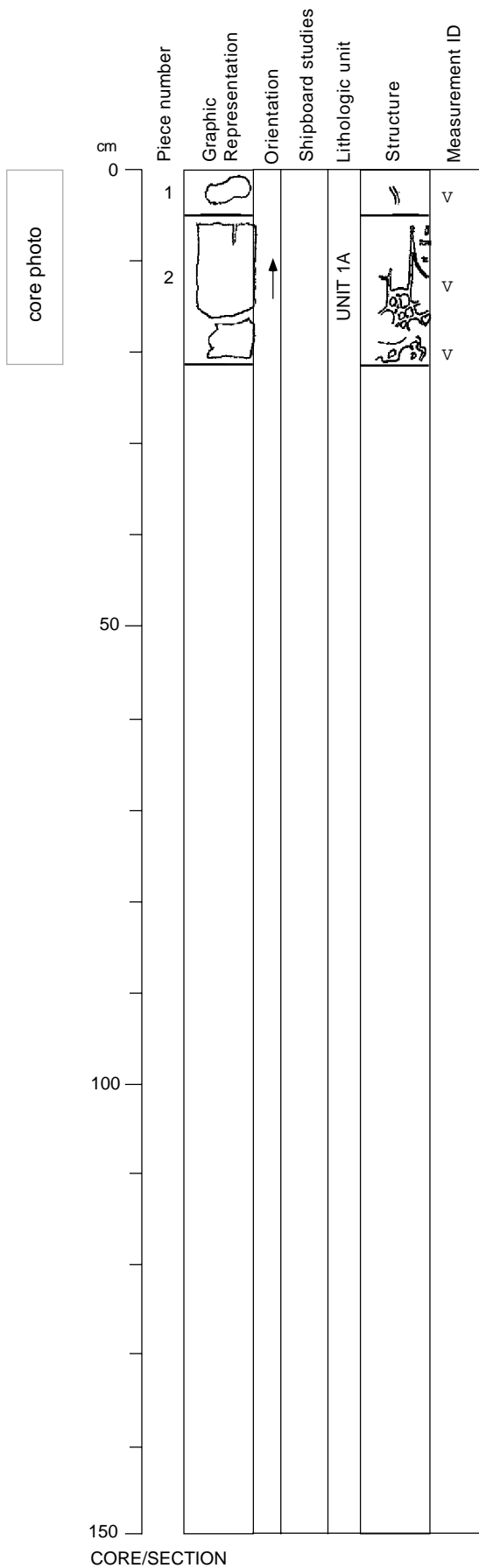
METAMORPHIC STRUCTURES: None.

MINERALOGY:

Mineral Name	Mode (%)	Size (mm)	Comments
serpentine	100	<<1	massive dark serpentinite
spinel	<1	<1	

VEINS: Locally anastomosing vein networks of possibly chrysotile.

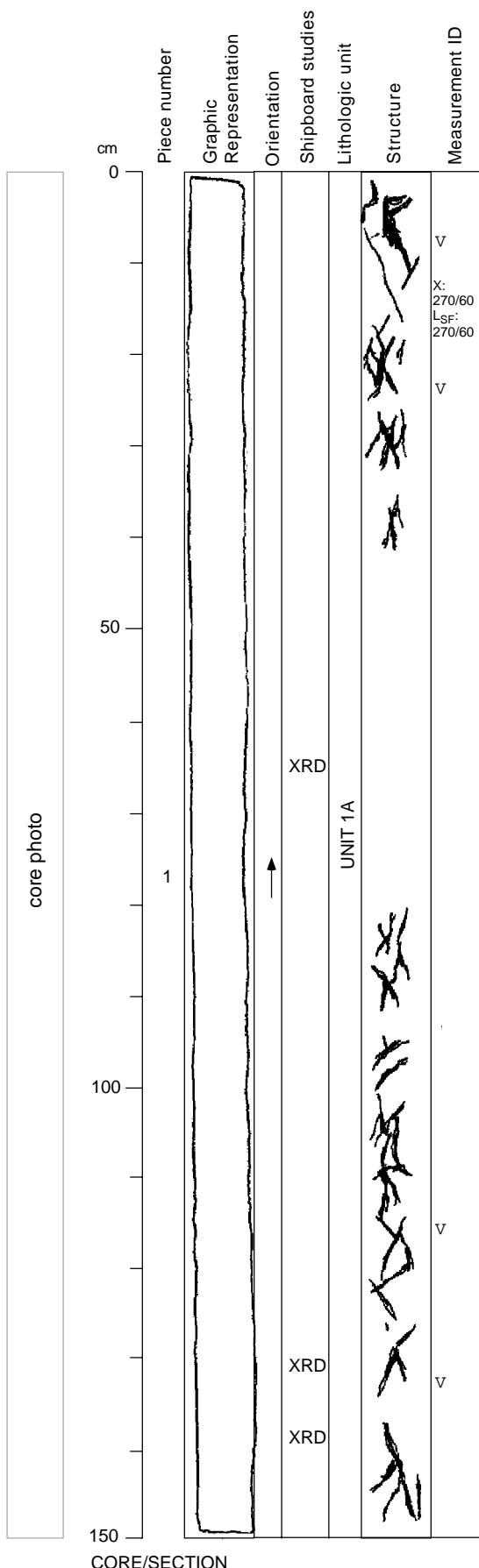
ADDITIONAL COMMENTS: Hydrogen sulfide odor.



173-1068A-21R-2

UNIT 1A: SERPENTINITE BRECCIA

Piece 1



COLOR: Serpentinite: grayish-black (N2). Veins: mottled, very pale green (10G 8/2), originally pale blue green (5BG 7/2) but changes to pale green on exposure to atmosphere after ~ 20 minutes.

IGNEOUS STRUCTURES: 1-8 mm pale anhedral shapes might be pseudomorphs after pyroxene. Traces of <1 mm pseudomorphs after spinel?

METAMORPHIC STRUCTURES: Possible relict (weak) igneous or metamorphic foliation is defined by 1.2 mm elongated black shapes at 101-106 cm.

MINERALOGY:

Mineral Name	Mode (%)	Size (mm)	Comments
serpentine	100	<<1	massive dark serpentinite

VEINS: Locally anastomosing vein networks of possibly chrysotile.

ADDITIONAL COMMENTS: Hydrogen sulfide odor. Drilling disturbance. Brecciated at all scales. Unidentified sulfide phase coats exterior surface of some serpentinite fragments at ~ 130 cm. Density (37-39 cm) = 2.6 g/cc.

CORE/SECTION

173-1068A-21R-3

UNIT 1A: SERPENTINITE BRECCIA

Piece 1

COLOR: Serpentine: grayish-black (N2). Veins: mottled, very pale green (10G 8/2), originally pale blue green (5BG 7/2) but changes to pale green on exposure to atmosphere after about 20 minutes.

IGNEOUS STRUCTURES: 1-8 mm pale anhedral shapes might be pseudomorphs after pyroxene.

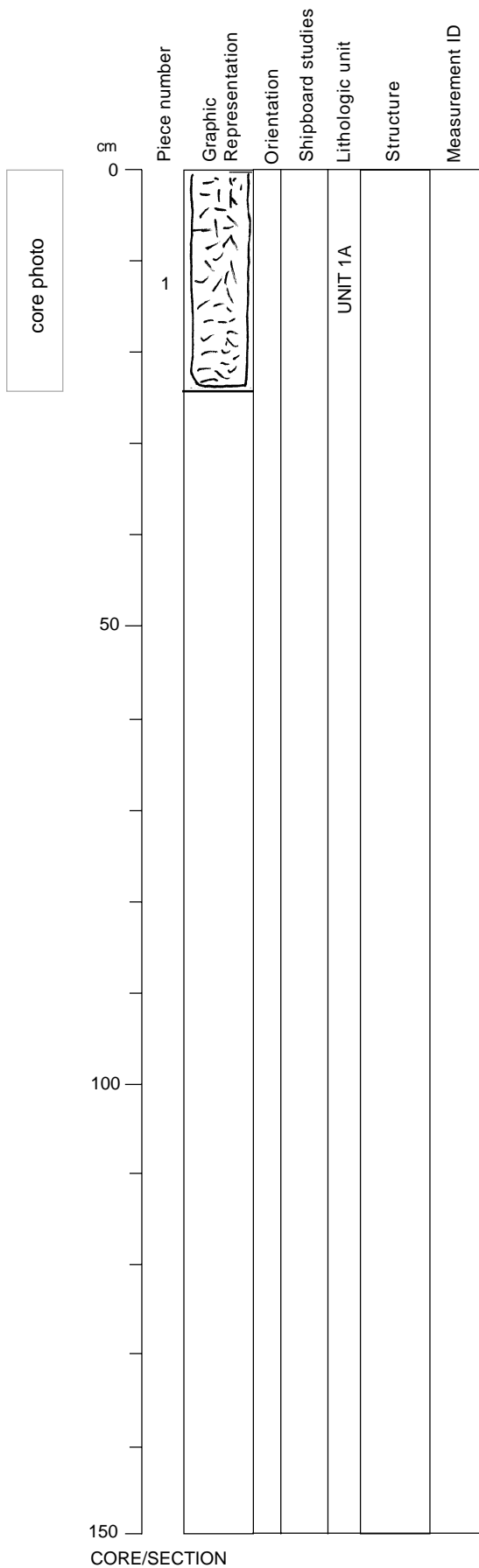
METAMORPHIC STRUCTURES: None.

MINERALOGY:

Mineral Name	Mode (%)	Size (mm)	Comments
serpentine	100	<<1	massive dark serpentine

VEINS: Locally anastomosing vein networks of possibly chrysotile.

ADDITIONAL COMMENTS: Rock gives off hydrogen sulfide odor. Drilling disturbance.



CORE/SECTION

173-1068A-22R-1

UNIT 1B: SERPENTINIZED PERIDOTITE

Pieces 1-6

COLOR: Serpentinite: grayish-black (N2). Veins: mottled, very pale green (10G 8/2), originally pale blue green (5BG 7/2) but changes to pale green on exposure to atmosphere after about 20 minutes.
IGNEOUS STRUCTURES: 1-8 mm pale anhedral shapes might be pseudomorphs after pyroxene.
METAMORPHIC STRUCTURES: None.

MINERALOGY:

Mineral Name	Mode (%)	Size (mm)	Comments
serpentine	100	<<1	massive dark serpentinite

VEINS: Locally anastomosing vein networks of possibly chrysotile.

ADDITIONAL COMMENTS: Hydrogen sulfide odor. Drilling disturbance. Rectangular fracture patterns (kernel texture). Fractures with growth of vein normal to main vein. Some cross-slip fiber relationships evident. Most pieces include black to brown spots.

Pieces 7-12

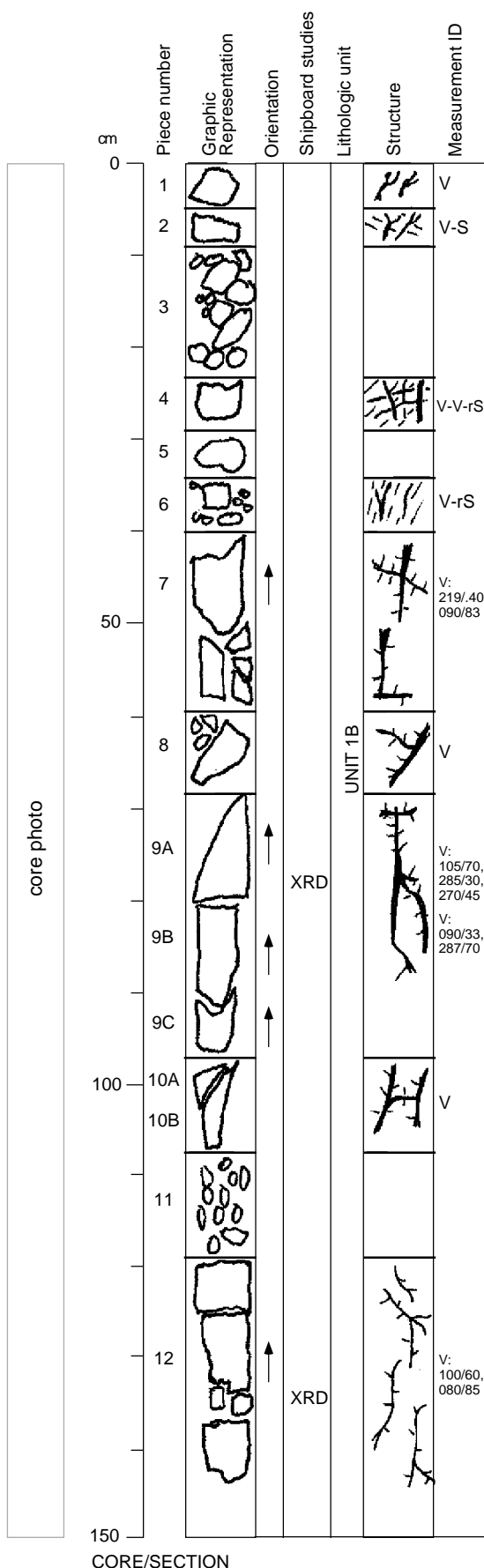
COLOR: Serpentinite: Grayish-black (N2). Veins: Mottled, very pale green (10G 8/2), originally pale blue green (5BG 7/2) but changes to pale green on exposure to atmosphere after about 20 minutes.
IGNEOUS AND METAMORPHIC STRUCTURES: 1-8 mm pale anhedral shapes might be pseudomorphs after pyroxene. Most pieces include disseminated ~ 0.5 mm black and brown spots after spinel.

MINERALOGY:

Mineral Name	Mode (%)	Size (mm)	Comments
serpentine	100	<<1	massive dark serpentinite

VEINS: Vein width generally less than 5 mm. Locally anastomosing vein networks of light green serpentinite chrysotile. Rectangular fracture patterns (kernel texture). Fractures with growth of vein normal to main artery vein. Some cross-slip fiber relationships evident. Green to dark green vein material showing colloform banding. Slickensided vein surfaces.

ADDITIONAL COMMENTS: Hydrogen sulfide odor. Drilling disturbance.



CORE/SECTION

UNIT 1B: SERPENTINIZED PERIDOTITE

Piece 1

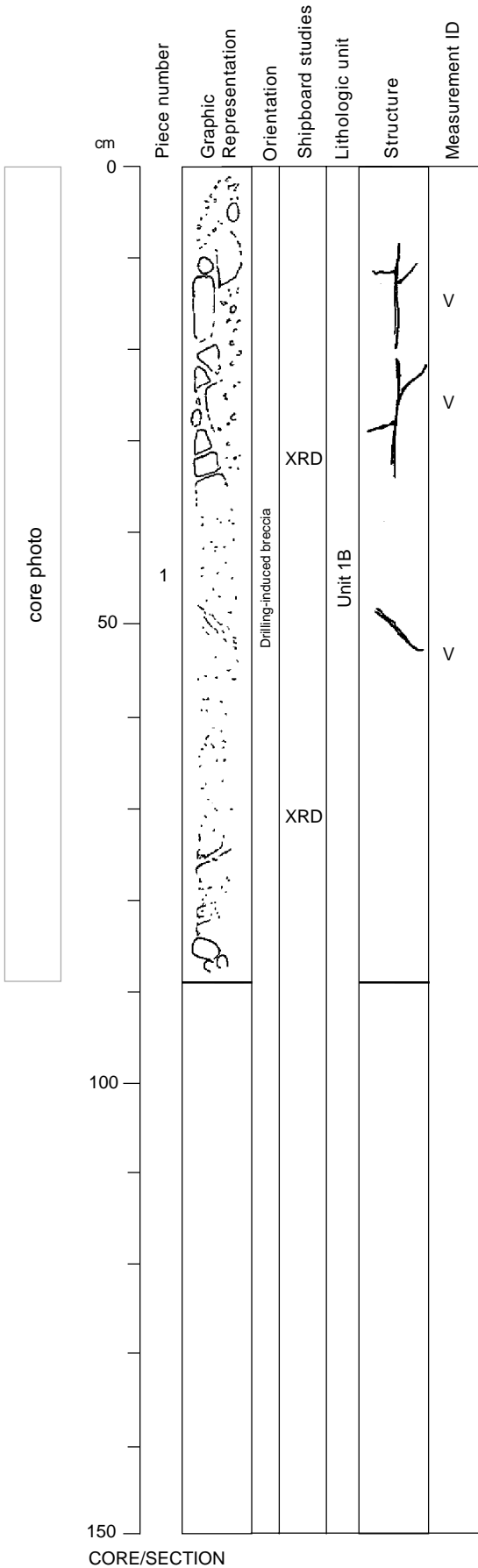
COLOR: Serpentine: grayish-black (N2). Veins: mottled, very pale green (10G 8/2), originally pale blue green (5BG 7/2) but changes to pale green on exposure to atmosphere after about 20 minutes.
IGNEOUS AND METAMORPHIC STRUCTURES: None.

MINERALOGY:

Mineral Name	Mode (%)	Size (mm)	Comments
serpentine	100	<<1	massive dark serpentine

VEINS: Similar to 1068A-22R-1

ADDITIONAL COMMENTS: Hydrogen sulfide odor. Strong drilling disturbance.



173-1068A-22R-3

UNIT 1B: SERPENTINIZED PERIDOTITE

Piece 1

core photo	cm	0	1	Drilling-induced breccia	UNIT 1B	Y	V
	150						

COLOR: Serpentinite: grayish-black (N2). Veins: mottled, very pale green (10G 8/2), originally pale blue green (5BG 7/2) but changes to pale green on exposure to atmosphere after about 20 minutes.
IGNEOUS AND METAMORPHIC STRUCTURES: No obvious mineral pseudomorphs or foliation.

MINERALOGY:

Mineral Name	Mode (%)	Size (mm)	Comments
serpentine	100	<<1	massive dark serpentinite

VEINS: Similar to 1068A-22R-1

ADDITIONAL COMMENTS: Hydrogen sulfide odor. Strong drilling disturbance.

CORE/SECTION

173-1068A-23R-1

UNIT 1B: SERPENTINIZED PERIDOTITE

Pieces: 1-9

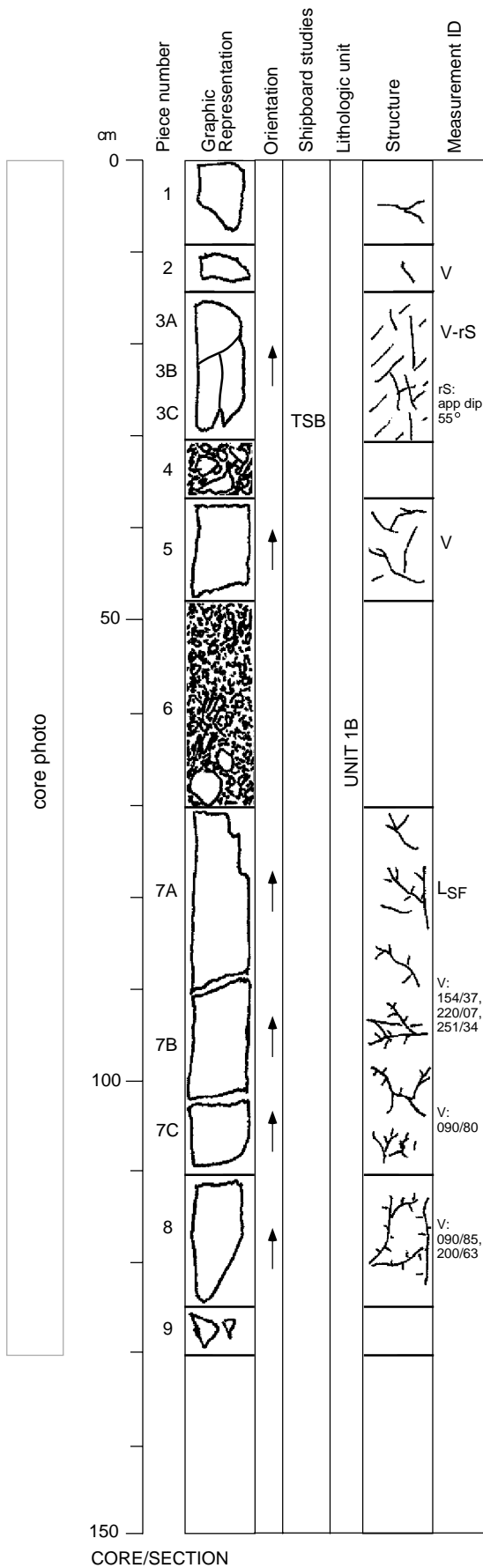
COLOR: Serpentine: greenish-black (N2). Veins: pale green (10G 8/2).

MINERALOGY:

Mineral Name	Mode (%)	Size (mm)	Comments
serpentine	100	<<1	pseudomorphs olivine, pyroxene rimmed by chlorite
spinel	<1	<1	

VEINS: 2%-5% of rock: irregular network, 2-5 mm in width.

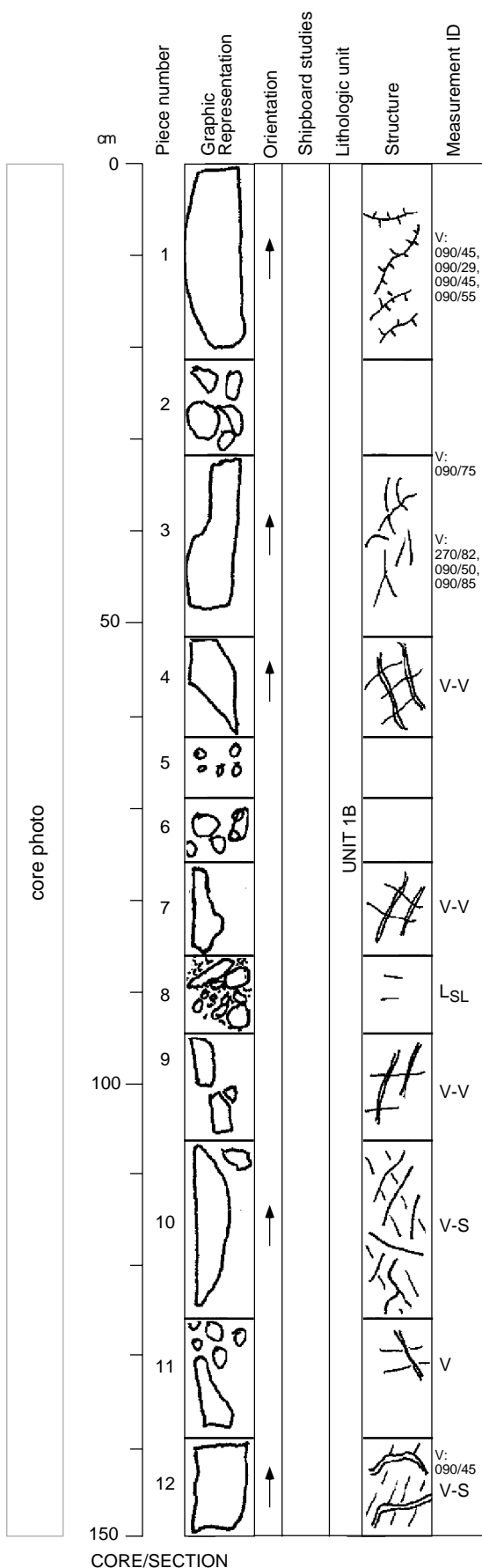
ADDITIONAL COMMENTS: H₂S released by reaction with 10% HCl.



173-1068A-23R-2

UNIT 1B: SERPENTINIZED PERIDOTITE

Pieces 1-12



COLOR: greenish-black (N2) to grayish-brown (5YR 3/2). Veins: pale green (10G 8/2).

METAMORPHIC STRUCTURES: Weak foliation defined by alignment of spinel.

MINERALOGY:

Mineral Name	Mode (%)	Size (mm)	Comments
serpentine	80-95	<<1	pseudomorphs olivine, pyroxene
spinel	<2	<1	rimmed by chlorite
chlorite	10	<<1	replacing plagioclase

VEINS: 2% of rock: 0.5-5 mm white serpentine(?) Vein network.

ADDITIONAL COMMENTS: Protolith peridotite contained 5% pyroxene, 1-3 mm (in Piece 1), olivine <0.5 mm. H₂S released by reaction with 10% HCl

173-1068A-23R-3

UNIT 1B: SERPENTINIZED PERIDOTITE

Piece 1

COLOR: Serpentine: moderate brown (5YR 4/4), greenish-black (N2).
Veins: pale green (10G 8/2).

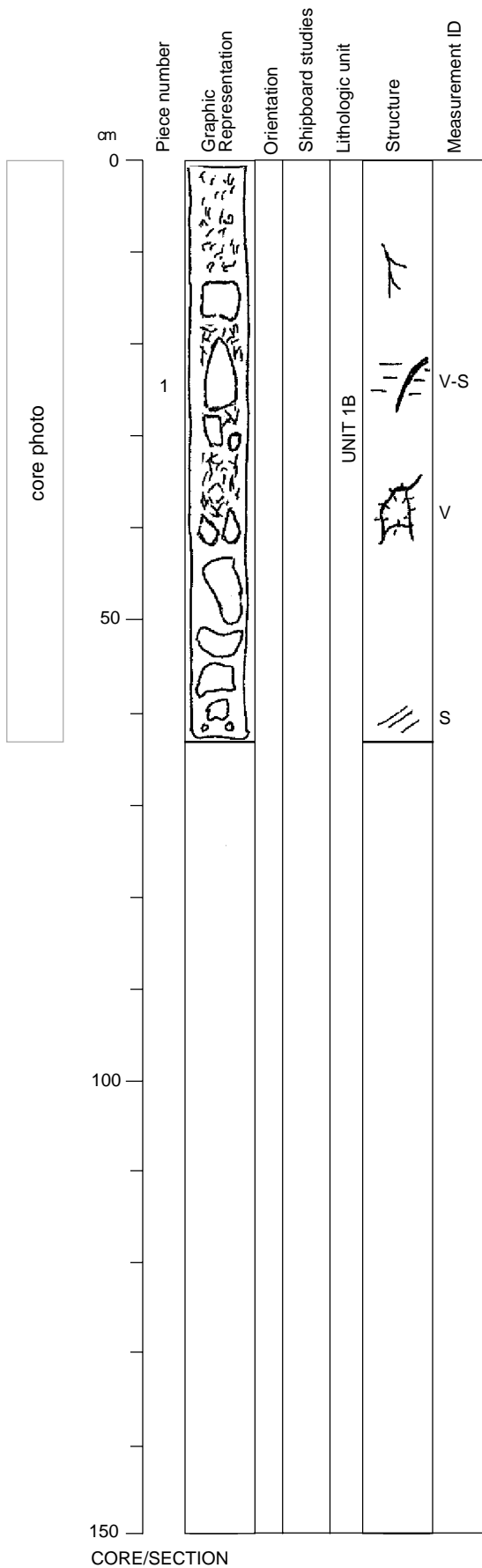
METAMORPHIC STRUCTURES: Weak foliation defined by alignment of spinel.

MINERALOGY:

Mineral Name	Mode (%)	Size (mm)	Comments
serpentine	80-95	<<1	pseudomorphs olivine, pyroxene
spinel	<2	<1	rimmed by chlorite
chlorite	5	<<1	replacing plagioclase

VEINS: 1-2% of rock: 0.5-5 mm pale green to white serpentine vein networks.

ADDITIONAL COMMENTS: Protolith peridotite contained 5% 1-3 mm pyroxene and <0.5 mm olivine. H₂S is released by reaction with 10% HCl.



173-1068A-24R-1

UNIT 1B: SERPENTINIZED PERIDOTITE

Pieces 1-9

COLOR: Serpentine: greenish-black (N2). Veins: pale green (10G 8/2).

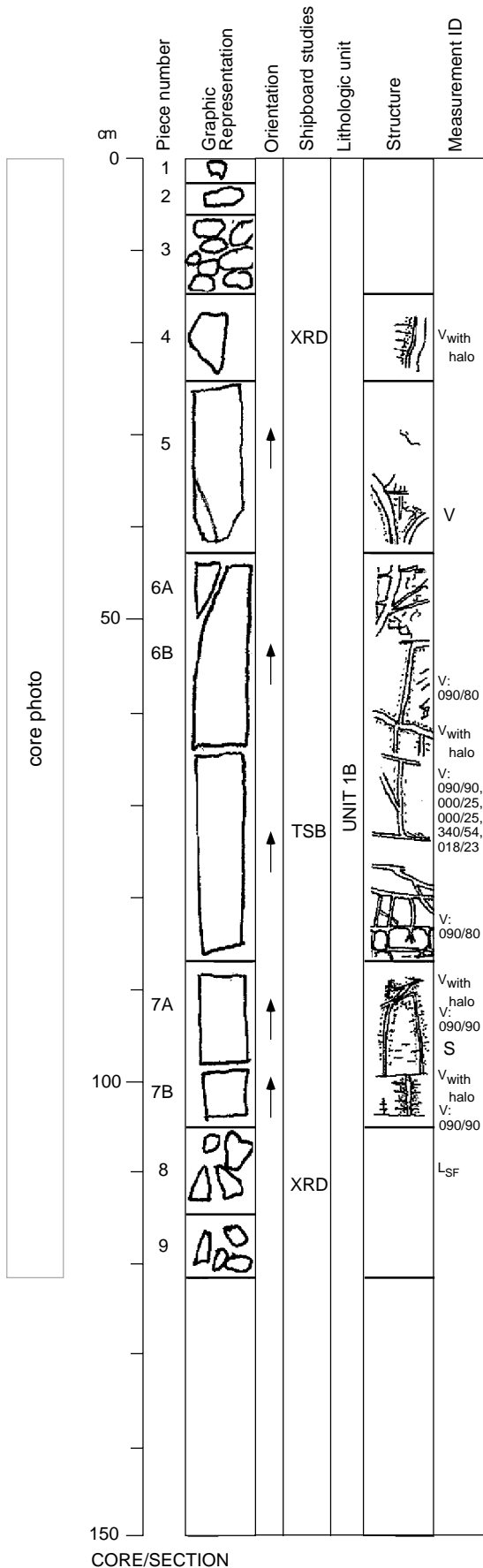
METAMORPHIC STRUCTURES: Foliation defined by alignment of spinel.

MINERALOGY:

Mineral Name	Mode (%)	Size (mm)	Comments
serpentine	80-95	<<1	pseudomorphs olivine, pyroxene
spinel	<2	<1	rimmed by chlorite
chlorite	5	<<1	replacing plagioclase

VEINS: 2%-5% of rock: pale green to white serpentine, 0.3-1.2 mm, net pattern.

ADDITIONAL COMMENTS: H₂S is released by reaction with 10% HCl. Up to 20% of bastite pseudomorphs after pyroxenes.



CORE/SECTION

173-1068A-24R-2

UNIT 1B: SERPENTINIZED PERIDOTITE

Pieces 1-11

COLOR: Serpentine: greenish-black (N2) to dusky brown (5YR 2/2).
Veins: pale green 10G 8/2.

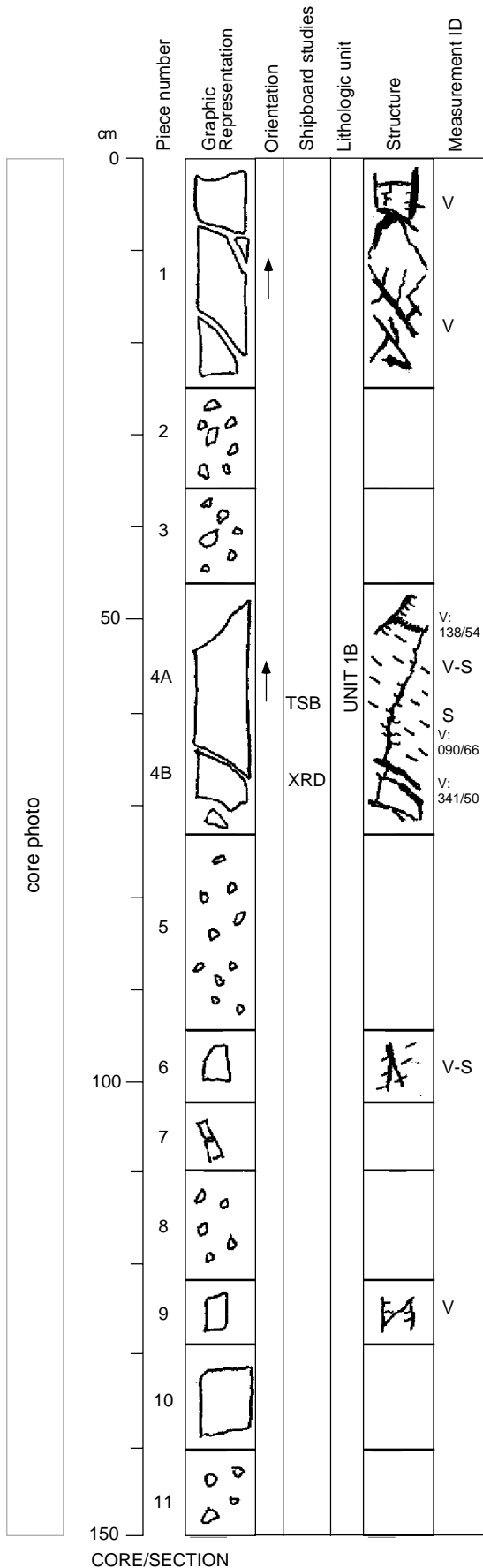
METAMORPHIC STRUCTURES: Foliation defined by alignment of spinel.

MINERALOGY:

Mineral Name	Mode (%)	Size (mm)	Comments
serpentine	80-95	<<1	pseudomorphs olivine, pyroxene
spinel	<2	<1	rimmed by chlorite
chlorite	10	<<1	replacing plagioclase

VEINS: 1% of rock: pale green to white serpentine vein network, localized brecciation, yellow green wall rock alteration in Piece 11.

ADDITIONAL COMMENTS: H₂S is released by reaction with 10% HCl. Up to 15% of bastite pseudomorphs after pyroxenes.

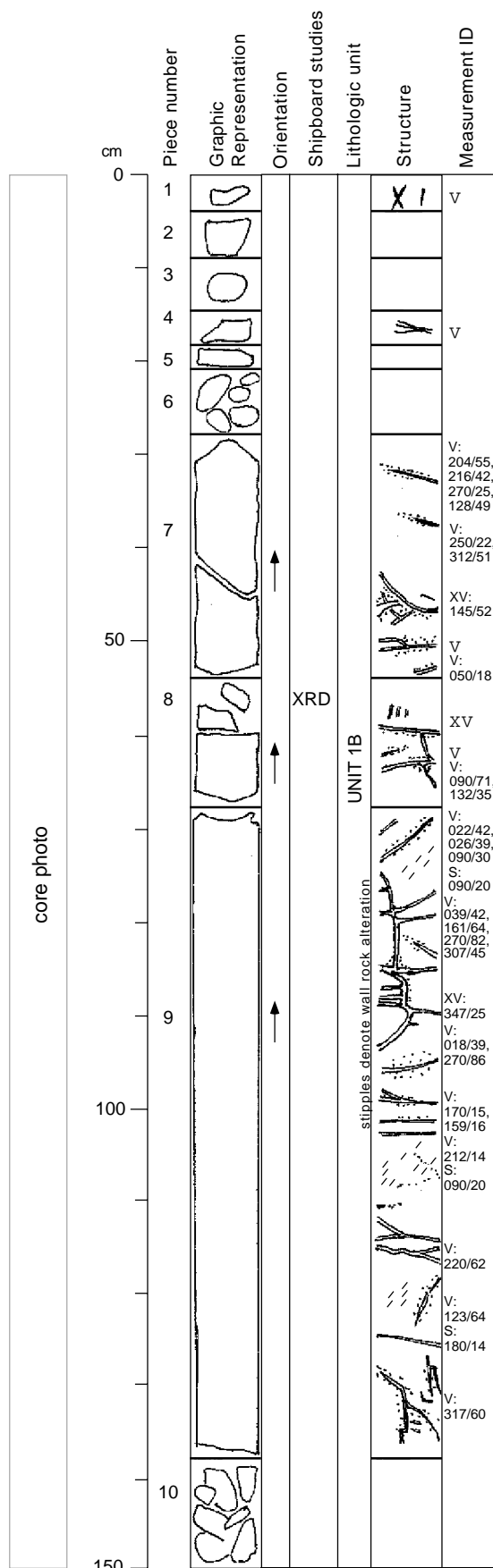


CORE/SECTION

173-1068A-25R-1

UNIT 1B: SERPENTINIZED PERIDOTITE

Pieces 1-10



COLOR: Serpentine: mottled, brownish-black (5YR 2/1), dark greenish gray (5G 4/1). Veins: pale blue green (5BG 7/2).
METAMORPHIC STRUCTURES: Relict, weak foliation defined by elongate bastite and spinel. Some finer grained regions appear more strongly foliated.

MINERALOGY:

Mineral Name	Mode (%)	Size (mm)	Comments
serpentine	95	<<1	pseudomorph after olivine and pyroxenes
spinel	<2	<2	elongate chains
chlorite	<4	<<1	pseudomorph after plagioclase, surrounding bastite

VEINS: <5% of rock: possible minerals include serpentine (chrysotile, lizardite(?)), talc(?), brucite(?). Apparently no calcite. Locally developed kernel structure.

ADDITIONAL COMMENTS: >50% serpentine replacing olivine. 10-30% 2-4 mm bastite pseudomorphs after pyroxenes.

CORE/SECTION

173-1068A-25R-2

UNIT 1B: SERPENTINIZED PERIDOTITE

Pieces 1-8

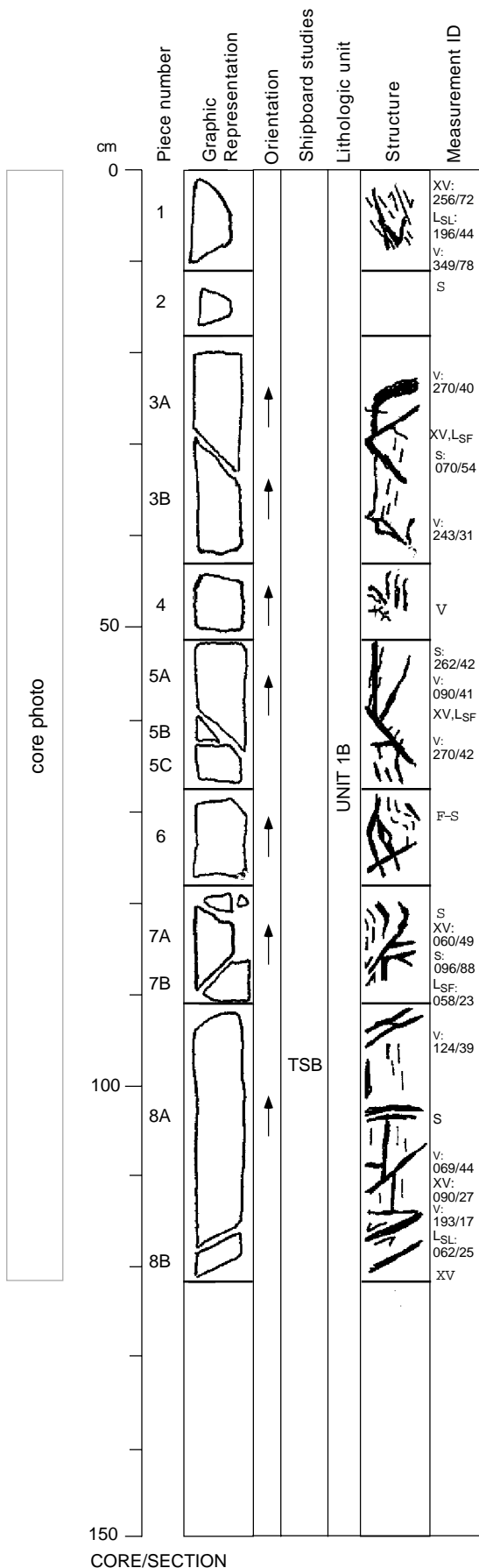
COLOR: Serpentine: mottled, brownish-black (5YR 2/1) dark greenish gray (5G 4/1). Veins: pale blue green (5BG 7/2).
METAMORPHIC STRUCTURES: Weak to strong foliation defined by bastite and spinel.

MINERALOGY:

Mineral Name	Mode (%)	Size (mm)	Comments
serpentine	95	<<1	pseudomorph after olivine and pyroxenes
spinel	<2	<2	elongate chains
chlorite	<4	<<1	pseudomorph after plagioclase, surrounding bastite

VEINS: <5% of rock: possible minerals include serpentine (chrysotile, lizardite(?)), talc(?), Brucite(?) Apparently no calcite. Locally developed kernel structure.

ADDITIONAL COMMENTS: >50% serpentine replacing olivine. 10-30% 2-4 mm bastite pseudomorphs after pyroxenes. More strongly veined than 25R-1.



173-1068A-25R-3

UNIT 1B: SERPENTINIZED PERIDOTITE

Pieces 1-10

COLOR: Serpentine: mottled, brownish-black (5YR 2/1), dark greenish gray (5G 4/1), grayish-black (N2). Veins: pale blue green (5BG 4/1).

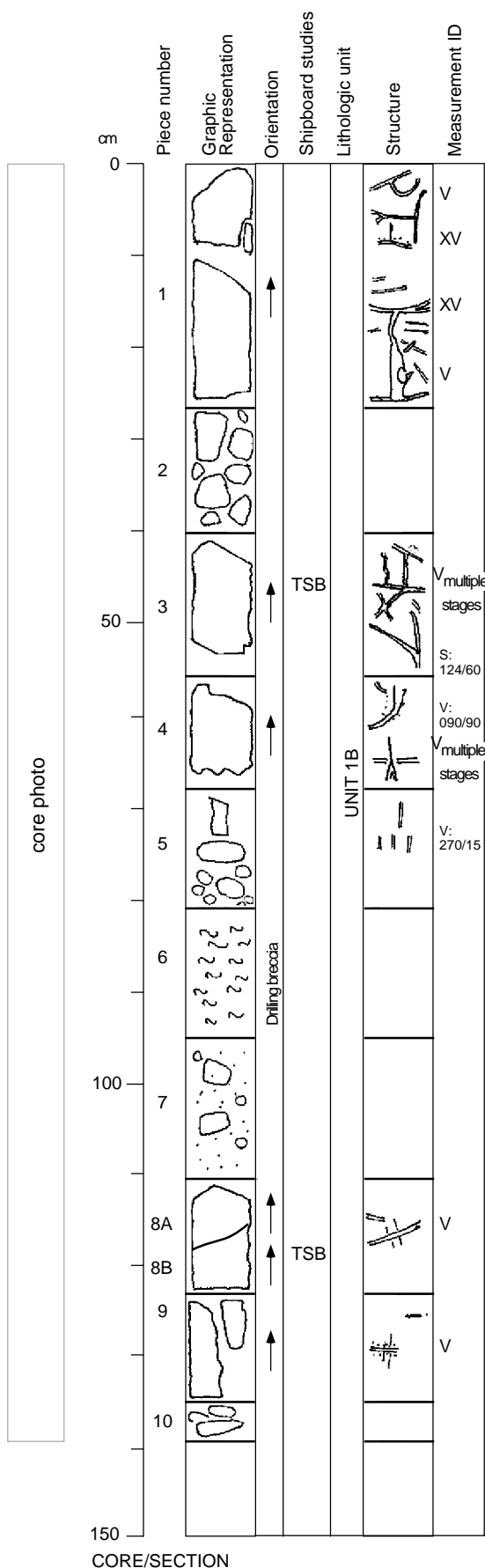
METAMORPHIC STRUCTURES: Relict foliation defined by spinel and pyroxene. Foliation generally weak.

MINERALOGY:

Mineral Name	Mode (%)	Size (mm)	Comments
serpentine	95	<<1	pseudomorph after olivine and pyroxenes
spinel	<2	<2	elongate chains
chlorite	<4	<<1	pseudomorph after plagioclase, surrounding bastite

VEINS: <5% of rock: possible minerals include serpentine (chrysotile, lizardite(?)), talc(?), brucite(?), no calcite, some anastomosing.

ADDITIONAL COMMENTS: >60% serpentine replacing olivine. 10-30% 1-10 mm bastite pseudomorphs after pyroxenes (15%). Pieces 6, 7 show strong drilling disturbance.



173-1068A-26R-1

UNIT 1B: SERPENTINIZED PERIDOTITE

Pieces 1-5

COLOR: Serpentine: mottled; brownish-black (5YR 2/1), dark greenish gray (5G 4/1), grayish-black (N2). Veins: pale blue green (5BG 4/1).

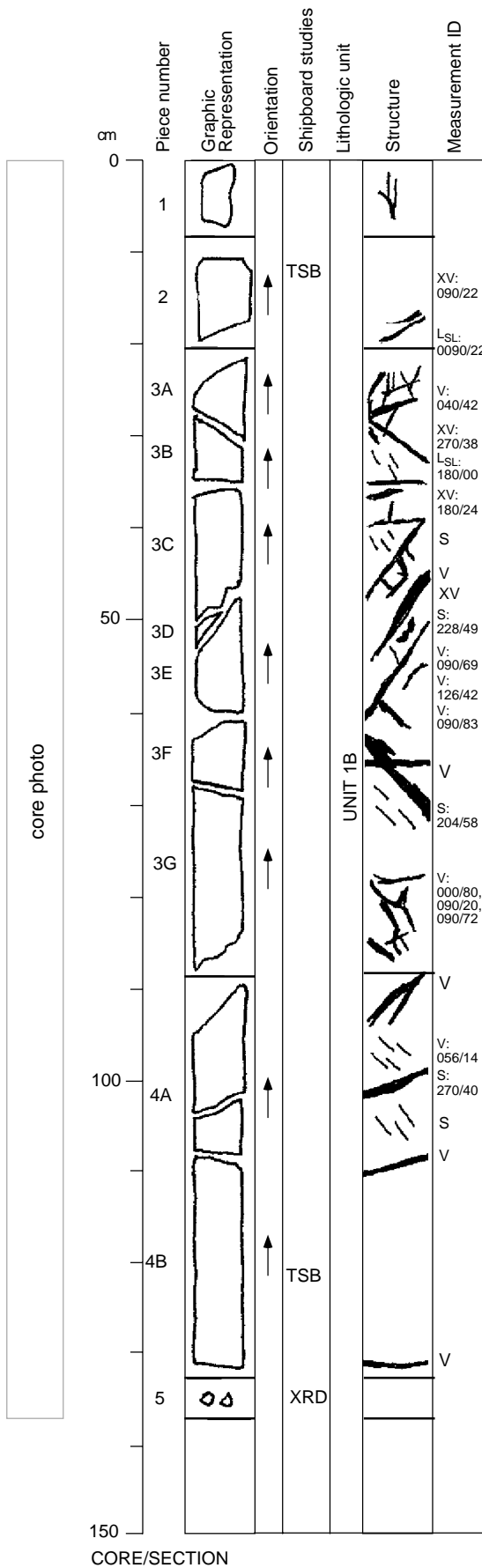
METAMORPHIC STRUCTURES: Relict foliation defined by spinel and pyroxene. Foliation generally weak.

MINERALOGY:

Mineral Name	Mode (%)	Size (mm)	Comments
serpentine	>95	<<1	pseudomorph after olivine and pyroxenes
spinel	<5	<2	anhedral, elongate chains
chlorite	<2	<<1	pseudomorph after plagioclase, surrounding bastite

VEINS: 5-8% <1.5 cm, serpentine (chrysotile (cross-fiber), lizardite(?)), talc, brucite, chlorite, sulfides. No calcite apparent. Some anastomosing and kernel-textured vein networks.

ADDITIONAL COMMENTS: Serpentine is a pseudomorph after olivine (>60%-100%), <10 mm bastite pseudomorphs after pyroxenes (0%-20%), contact between spinel-rich dunite and harzburgite in Piece 2 at 8-12 cm, Piece 1 relatively rich in plagioclase pseudomorphs.



173-1068A-26R-2

UNIT 1B: SERPENTINIZED PERIDOTITE

Pieces 1-4

COLOR: Serpentine: mottled, brownish-black (5YR 2/1), dark greenish gray (5G 4/1), grayish-black (N2). Veins: pale blue green (5BG 4/1).

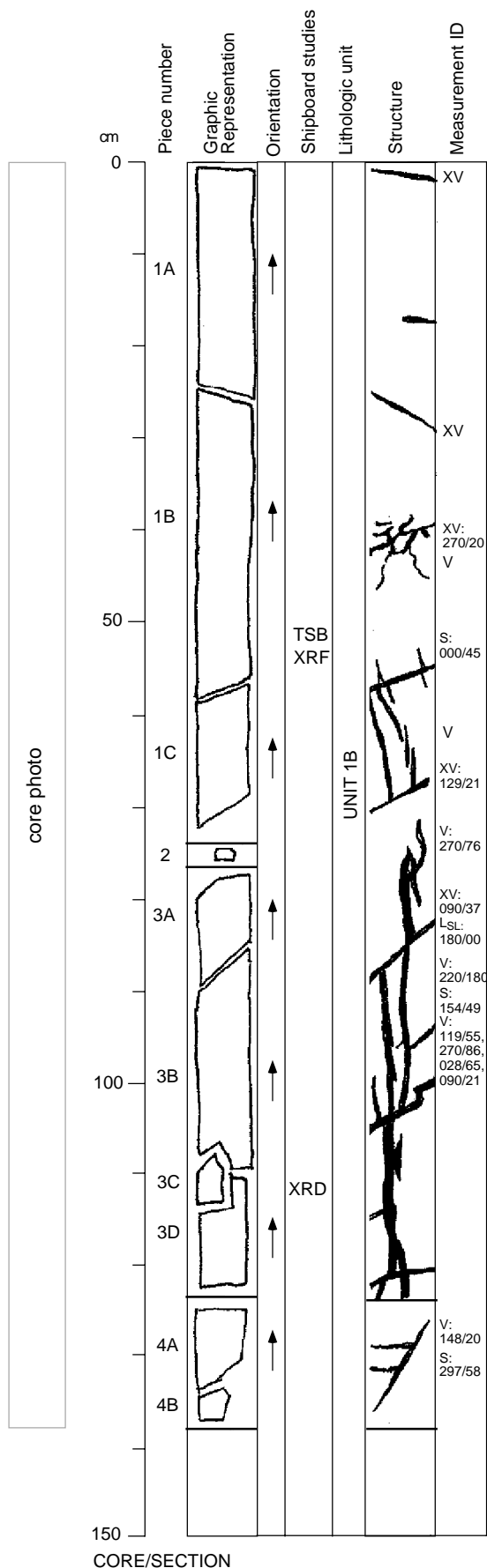
METAMORPHIC STRUCTURES: Foliation generally weak to absent.

MINERALOGY:

Mineral Name	Mode (%)	Size (mm)	Comments
serpentine	95	<<1	pseudomorph after olivine and pyroxenes
spinel	<2	<2	anhedral, elongate chains
chlorite	<3	<<1	pseudomorph after plagioclase, surrounding bastite

VEINS: 5%-8% <4 cm wide, possible minerals: serpentine (chrysotile (cross fiber), lizardite(?)), talc, brucite, chlorite, no calcite some anastomosing, bifurcating, and kernel-textured vein networks.

ADDITIONAL COMMENTS: Serpentine is a pseudomorph after olivine (>50%) and <8 mm bastite pseudomorphs pyroxenes (10%-40%). Piece 2 is largely vein material.



173-1068A-26R-3

UNIT 1B: SERPENTINIZED PERIDOTITE

Pieces 1-7

COLOR: Serpentine: greenish-black (5GY 2/1). Veins: moderate green to light green (5G 5/6, 5G 7/4).

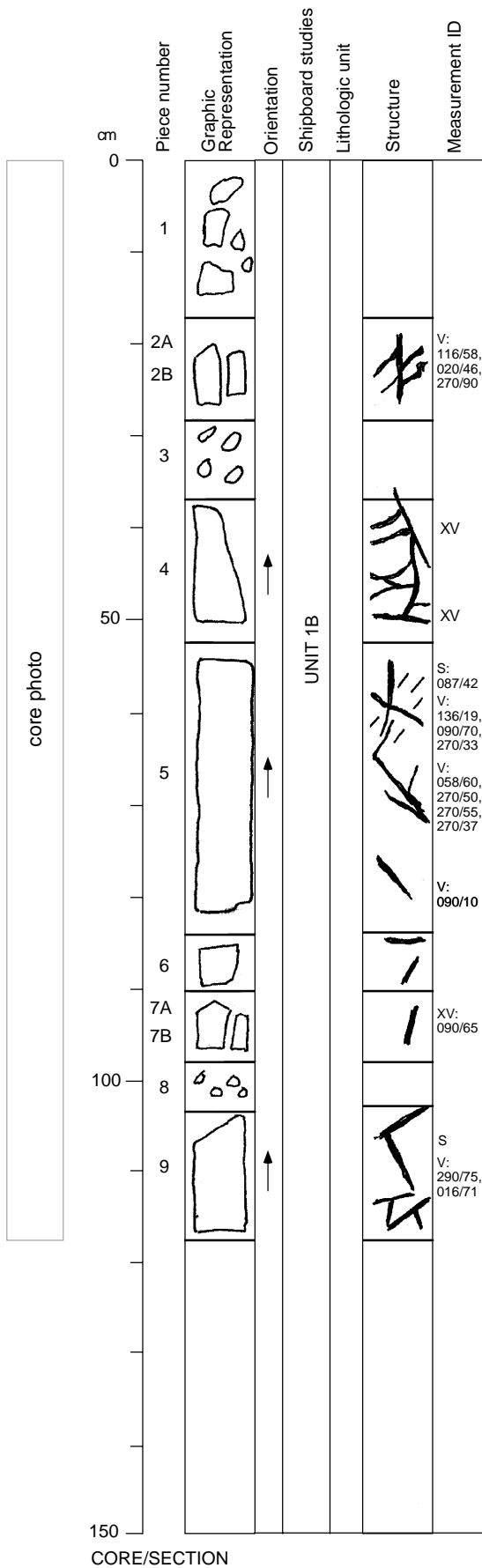
METAMORPHIC STRUCTURES: Foliation generally weak to absent. In Piece 4 defined by spinel.

MINERALOGY:

Mineral Name	Mode (%)	Size (mm)	Comments
serpentine	95	<<1	Pseudomorph after olivine and pyroxenes
spinel	<2	<1	anhedral, elongate chains
chlorite	<5	<<1	Pseudomorph after plagioclase, surrounding bastite

VEINS: <5% Possible minerals serpentine (chrysotile antigorite(?)), talc, brucite, chlorite. No calcite apparent.

ADDITIONAL COMMENTS: Serpentine is a pseudomorph after olivine (>50%) and pyroxenes (10%-20%). Core generally depleted in pyroxenes (bastite)-originally harzburgite to dunite. Pieces 1, 3 and 8 largely destroyed by drilling disturbance.



CORE/SECTION

173-1068A-26R-4

UNIT 1B: SERPENTINIZED PERIDOTITE

Pieces 1-3

COLOR: Serpentinite: greenish-black (5GY 2/1). Veins: moderate green to light green (5G 5/6, 5G 7/4).

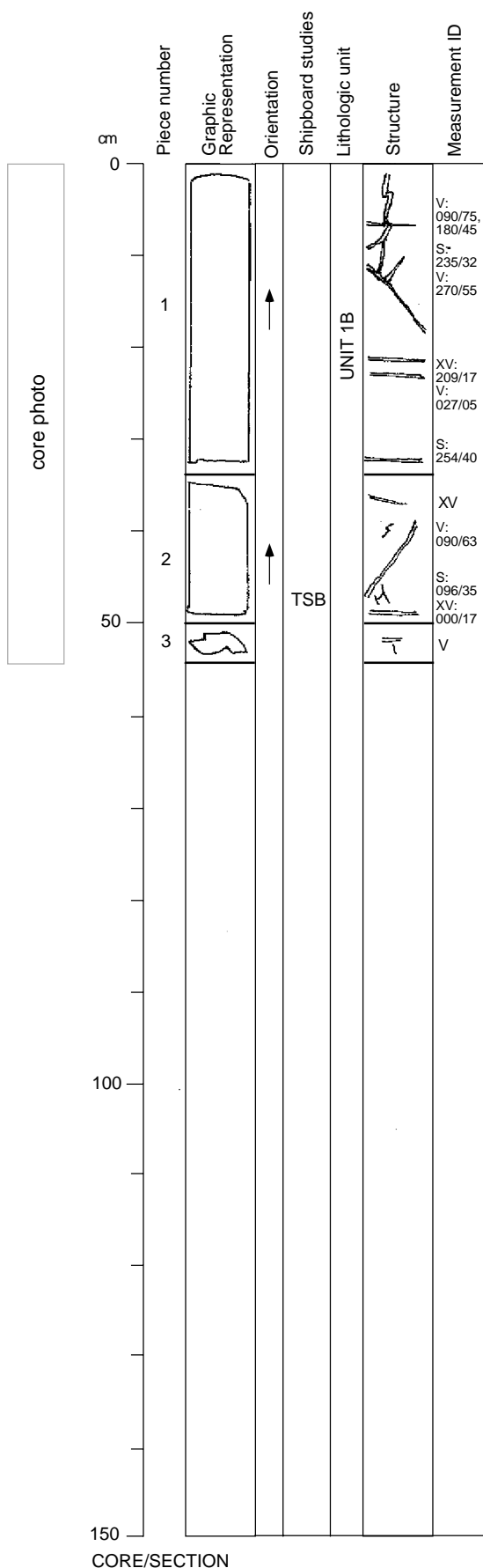
METAMORPHIC STRUCTURES: Foliation generally weak to absent.

MINERALOGY:

Mineral Name	Mode (%)	Size (mm)	Comments
serpentine	95	<<1	pseudomorph after olivine and pyroxenes
spinel	<2	<1	elongate chains
chlorite	<5	<<1	replaces plagioclase, rims bastite

VEINS: <5% Possible minerals serpentine (chrysotile, lizardite(?)), talc, brucite, chlorite. No calcite apparent.

ADDITIONAL COMMENTS: Serpentine is a pseudomorph after olivine (>50%) and pyroxenes (10%-20%).



173-1068A-27R-1

UNIT 1B: SERPENTINIZED PERIDOTITE

Pieces 1-11

COLOR: Serpentine: dark yellowish-brown (10YR 4/2). Veins: light greenish-gray to grayish-green (5G 8/1 to 5G 5/2).

IGNEOUS STRUCTURES: None.

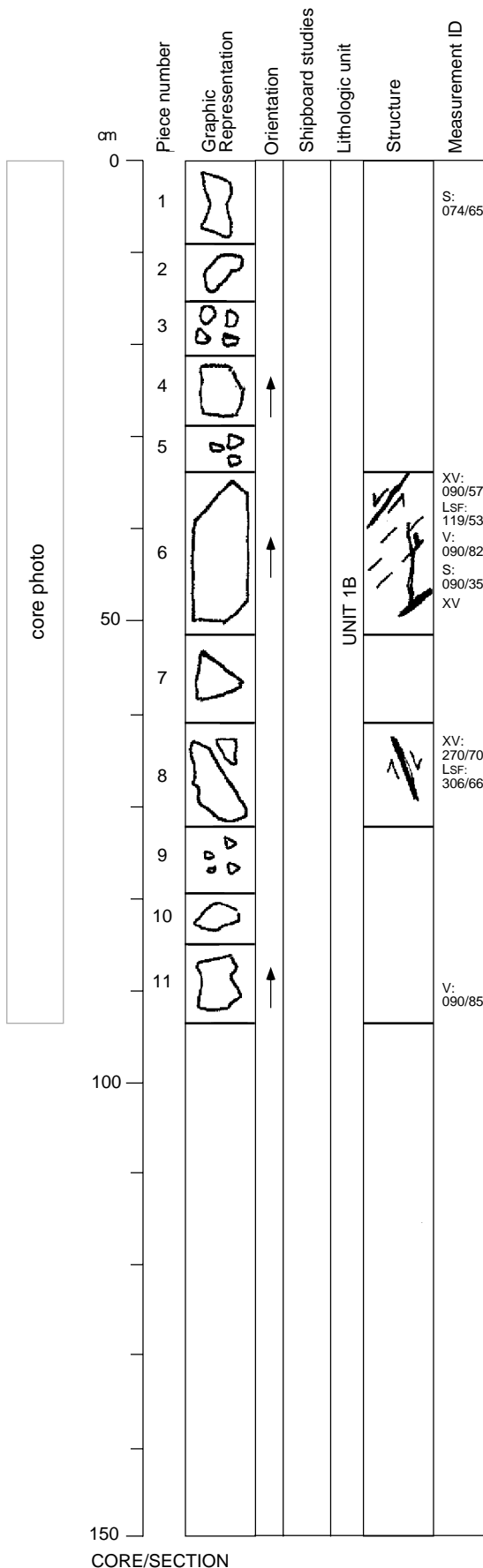
METAMORPHIC STRUCTURES: Foliation defined by alignment of replaced plagioclase and spinel.

MINERALOGY:

Mineral Name	Mode (%)	Size (mm)	Comments
serpentine	90	<<1	pseudomorph after olivine and pyroxenes
spinel	<2	<2	elongate chains
chlorite	1-5	<<1	pseudomorph after plagioclase, surrounding bastite

VEINS: 5%-10% of rock: Serpentine veins are 1-3 mm wide; some veins with black walls, also in herring-bone pattern.

ADDITIONAL COMMENTS: Serpentine is a pseudomorph after olivine (>50%) and pyroxenes (10%-30%).



173-1068A-27R-2

UNIT 1B: SERPENTINIZED PERIDOTITE

Piece 1

COLOR: Serpentine: grayish-brown (5YR 3/2). Veins: pale green (5G 7/2).

IGNEOUS STRUCTURES: None.

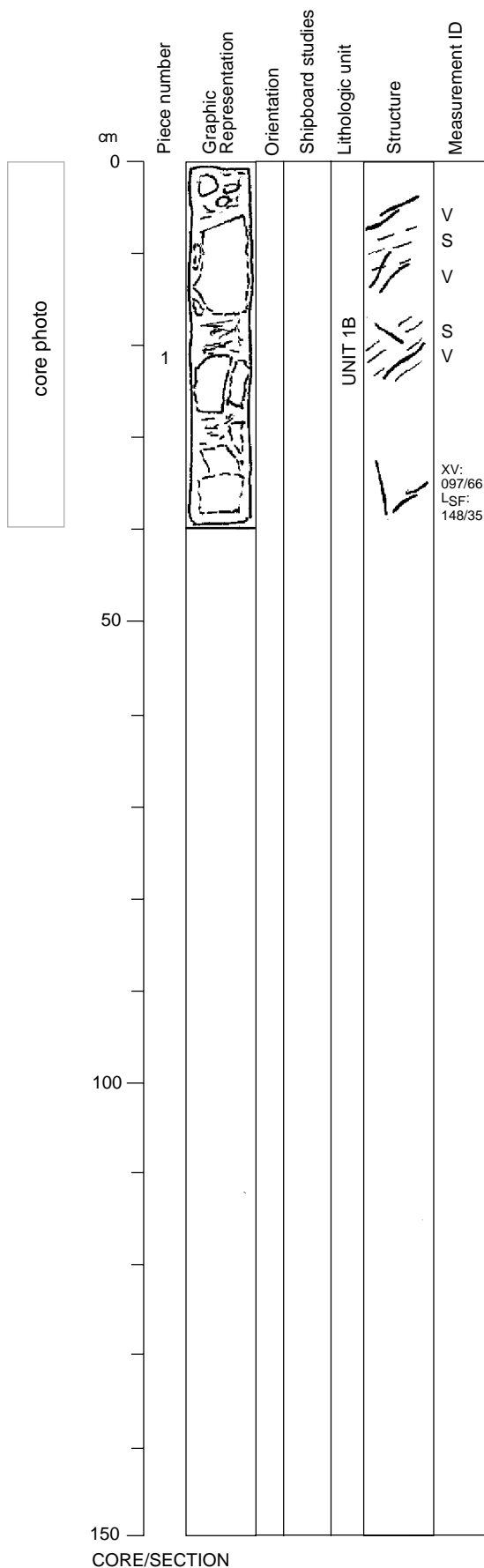
METAMORPHIC STRUCTURES: None.

MINERALOGY:

Mineral Name	Mode (%)	Size (mm)	Comments
serpentine	90	<<1	pseudomorph after olivine and pyroxenes
spinel	<2	<2	elongate chains
chlorite	<5	<<1	pseudomorph after plagioclase, surrounding bastite

VEINS: 10% of rock: Serpentine veins are up to 2 mm wide.

ADDITIONAL COMMENTS: Drilling produced brecciation of sample. Serpentine is a pseudomorph after olivine (>70%) and pyroxenes (10%-20%).



173-1068A-27R-3

UNIT 1B: SERPENTINIZED DUNITE

Piece 1

COLOR: Serpentine: dark yellowish brown (10YR 4/2). Veins: light greenish-gray (5G 8/1).

IGNEOUS STRUCTURES: None.

METAMORPHIC STRUCTURES: None.

MINERALOGY:

Mineral Name	Mode (%)	Size (mm)	Comments
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serpentine	97	?	pseudomorph after olivine and pyroxenes
spinel	3	≤0.5	anhedral

VEINS: 3% of rock: Serpentine veins are <1-3 mm wide; also magnetite(?) veins.

ADDITIONAL COMMENTS: Bastite is very rare.

Pieces 2-5

COLOR: Serpentine: brownish black to dusky yellowish brown (5YR 2/1 to 10YR 2/2). Veins: pale green (5G 7/2).

IGNEOUS STRUCTURES: None.

METAMORPHIC STRUCTURES: Foliation defined by alignment of replaced plagioclase and spinel.

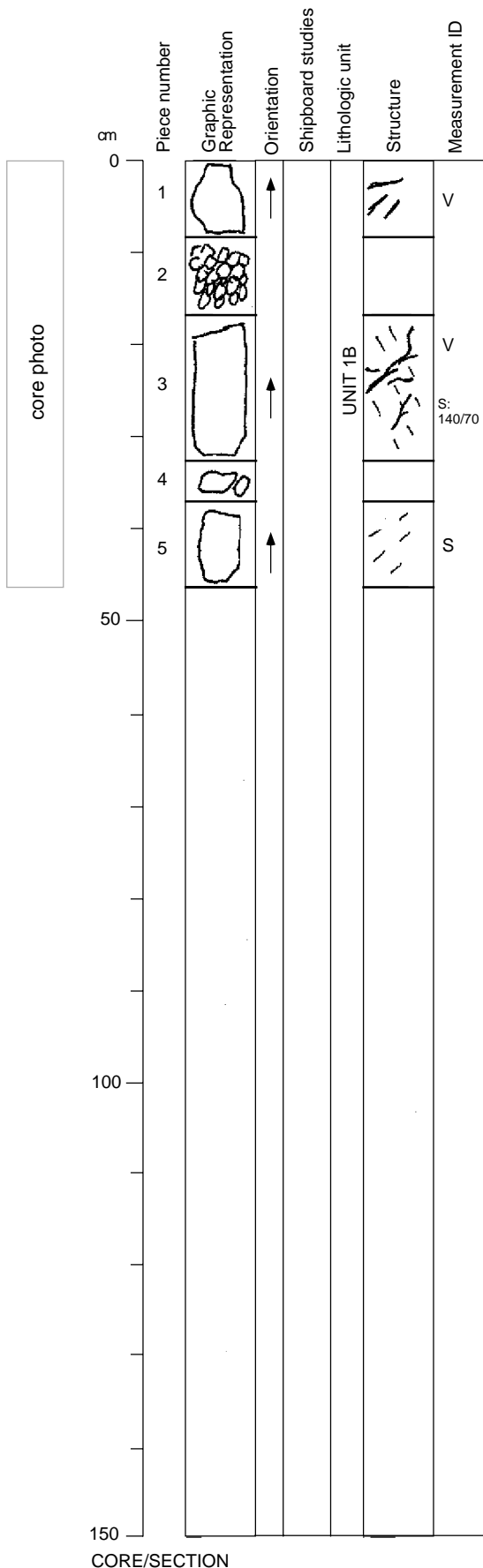
MINERALOGY:

Mineral Name	Mode (%)	Size (mm)	Comments
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serpentine	85	<<1	pseudomorph after olivine and pyroxenes
spinel	<2	<2	elongate chains
chlorite	<5-10	<<1	pseudomorph after plagioclase, surrounding bastite

VEINS: 5%-10% of rock: Serpentine veins are up to 6 mm wide.

ADDITIONAL COMMENTS: Serpentine is a pseudomorph after olivine (>50%) and pyroxenes (10%-20%).



173-1068A-28R-1

UNIT 1B: SERPENTINIZED PERIDOTITE

Pieces 1-4

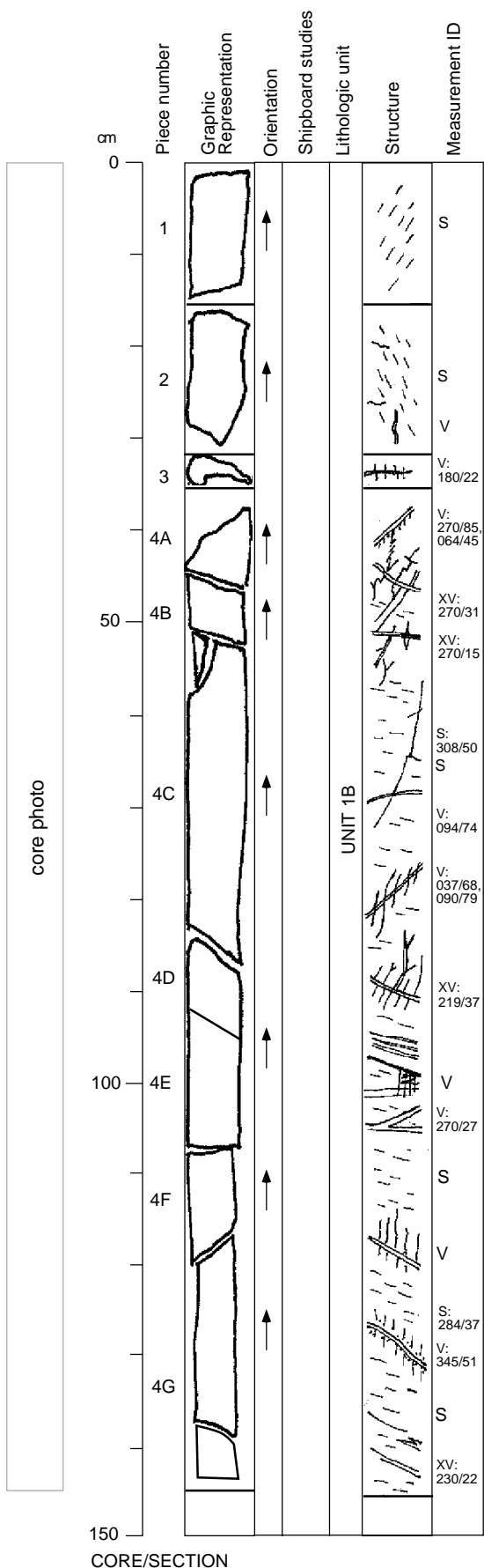
COLOR: Serpentine: olive black to olive gray (5Y 2/1 to 5Y 3/2).
 Veins: pale green to light greenish gray (10G 6/2 to 5G 8/1).
IGNEOUS STRUCTURES: None.
METAMORPHIC STRUCTURES: None.

MINERALOGY:

Mineral Name	Mode (%)	Size (mm)	Comments
serpentine	95	<<1	pseudomorph after olivine and pyroxenes
spinel	<2	<2	elongate chains
chlorite	<2-10	<<1	pseudomorph after plagioclase, surrounding bastite

VEINS: 5% of rock: Serpentine and chlorite veins are 1-5 mm wide; magnetite(?) vein is 1 mm wide.

ADDITIONAL COMMENTS: Serpentine is a pseudomorph after olivine (>50%) and pyroxenes (10%-20%). Low plagioclase content in Piece 1.



CORE/SECTION

173-1068A-28R-2

UNIT 1B: SERPENTINIZED PERIDOTITE

Pieces 1-5

COLOR: Serpentine: olive gray (5Y 3/2). Veins: pale green to light greenish gray (10G 6/2 to 5G 8/1).

IGNEOUS STRUCTURES: None.

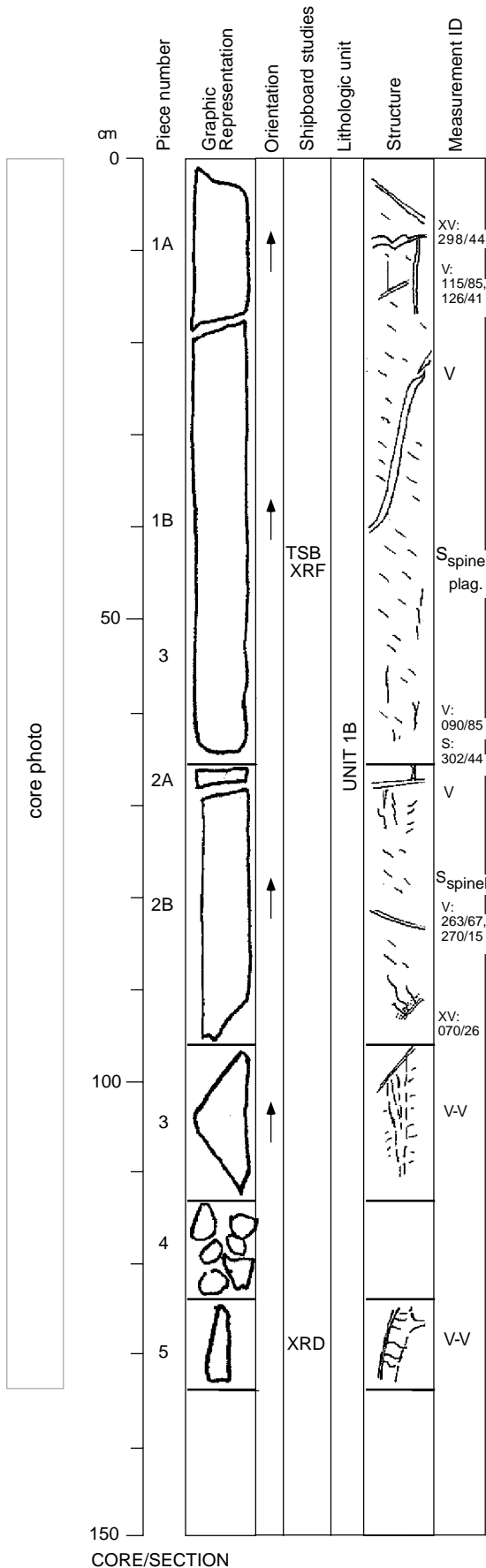
METAMORPHIC STRUCTURES: Foliation defined by alignment of replaced plagioclase.

MINERALOGY:

Mineral Name	Mode (%)	Size (mm)	Comments
serpentine	95	<<1	Pseudomorph after olivine and pyroxenes elongate chains
spinel	<2	<2	
chlorite	5-10	<<1	Pseudomorph after plagioclase, surrounding bastite

VEINS: <5% of rock: Pieces 3 and 5 are 50% vein material along one side of piece. Piece 4 is vein material rubble (lizardite(?)).

ADDITIONAL COMMENTS: Serpentine is a pseudomorph after olivine (>50%) and pyroxenes (10%-20%).



173-1068A-28R-3

UNIT 1B: SERPENTINIZED PERIDOTITE

Pieces 1-6

COLOR: Serpentine: olive black (5Y 2/1). Veins: pale green to light greenish gray (10G 6/2 to 5G 8/1).

IGNEOUS STRUCTURES: None.

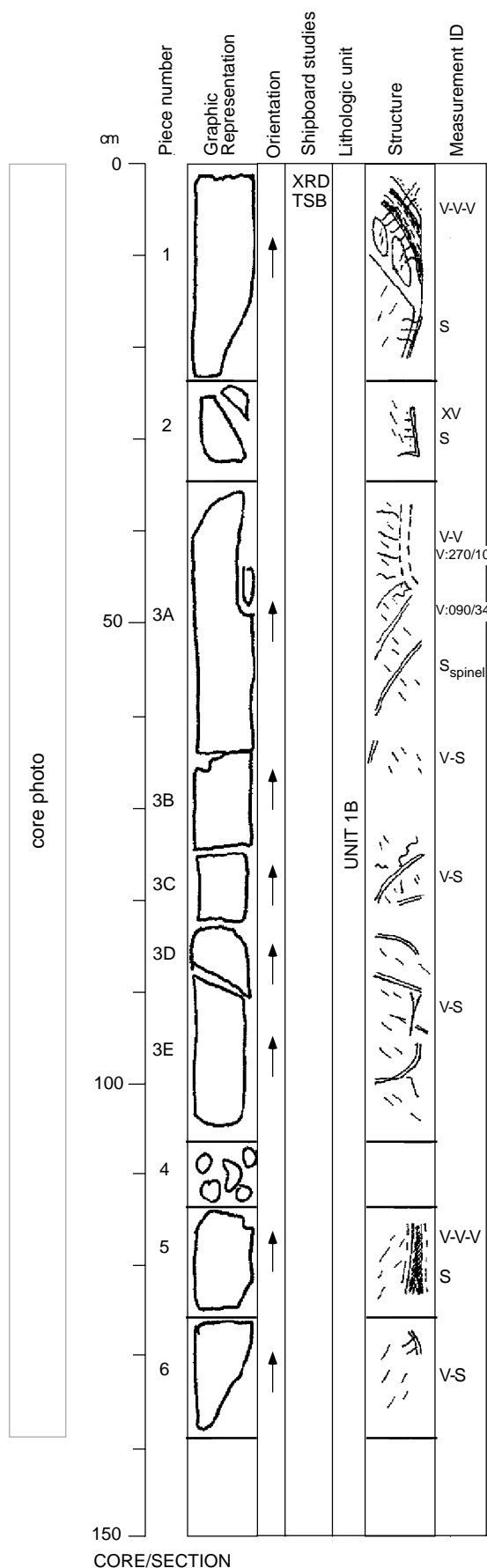
METAMORPHIC STRUCTURES: Foliation defined by alignment of replaced plagioclase in Piece 5.

MINERALOGY:

Mineral Name	Mode (%)	Size (mm)	Comments
serpentine	85	<<1	pseudomorph after olivine and pyroxenes
spinel	<2	<2	elongate chains
chlorite	2-10	<<1	pseudomorph after plagioclase, surrounding bastite

VEINS: 5%-10% of rock: large serpentine/chlorite vein in Piece 1 is at least 2 cm wide; other large veins in Pieces 3A and 5.

ADDITIONAL COMMENTS: Serpentine is a pseudomorph after olivine (>50%) and pyroxenes (10%-20%). Abundance of pseudomorphs after plagioclase is highest in Pieces 1, 3A, 3E, 4, and 5.



173-1068A-28R-4

UNIT 1B: SERPENTINIZED PERIDOTITE

Pieces 1-9

COLOR: Serpentine: olive black to olive gray (5Y 2/1 to 5Y 3/2).
Veins: pale green to light greenish-gray (10G 6/2 to 5G 8/1).

IGNEOUS STRUCTURES: None.

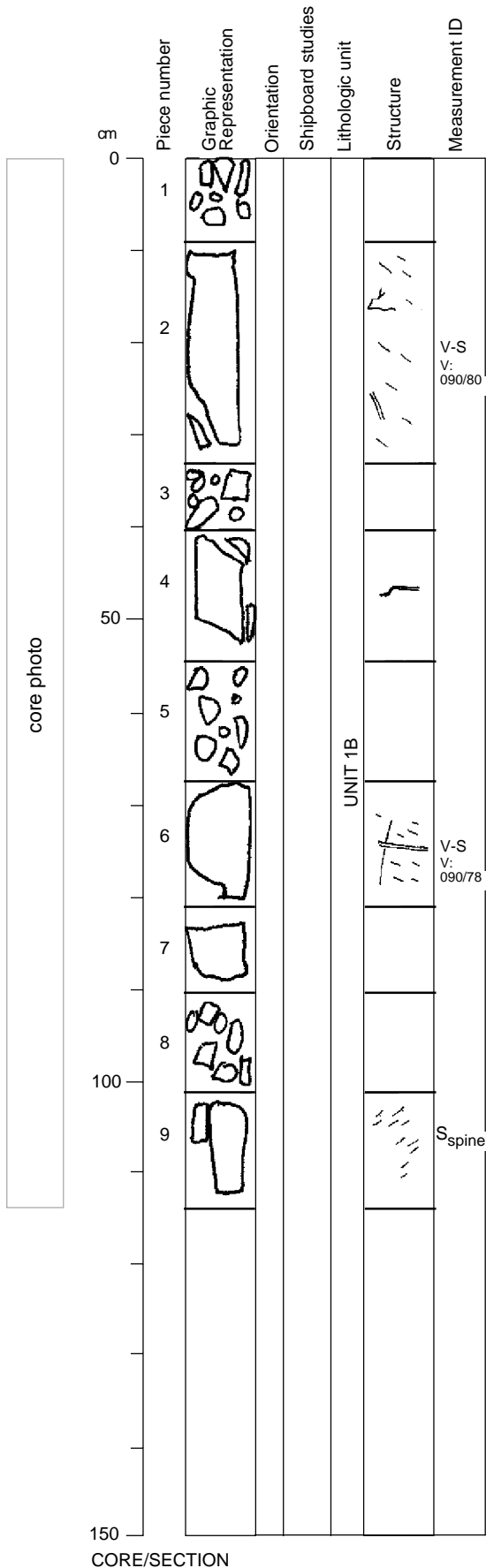
METAMORPHIC STRUCTURES: Foliation defined by alignment of replaced plagioclase.

MINERALOGY:

Mineral Name	Mode (%)	Size (mm)	Comments
serpentine	85	<<1	Pseudomorph after olivine and pyroxenes elongate chains
spinel	<2	<2	Pseudomorph after plagioclase, surrounding bastite
chlorite	5	<<1	

VEINS: <2% of rock: Serpentine, chlorite, and magnetite(?) veins are ≤1 mm wide.

ADDITIONAL COMMENTS: Serpentine is a pseudomorph after olivine (>70%) and pyroxenes (10%-20%). Pieces 1, 3, 5, and 8 are rubble.



CORE/SECTION

173-1068A-29R-1

UNIT 1B: SERPENTINIZED PERIDOTITE

Pieces 1-16

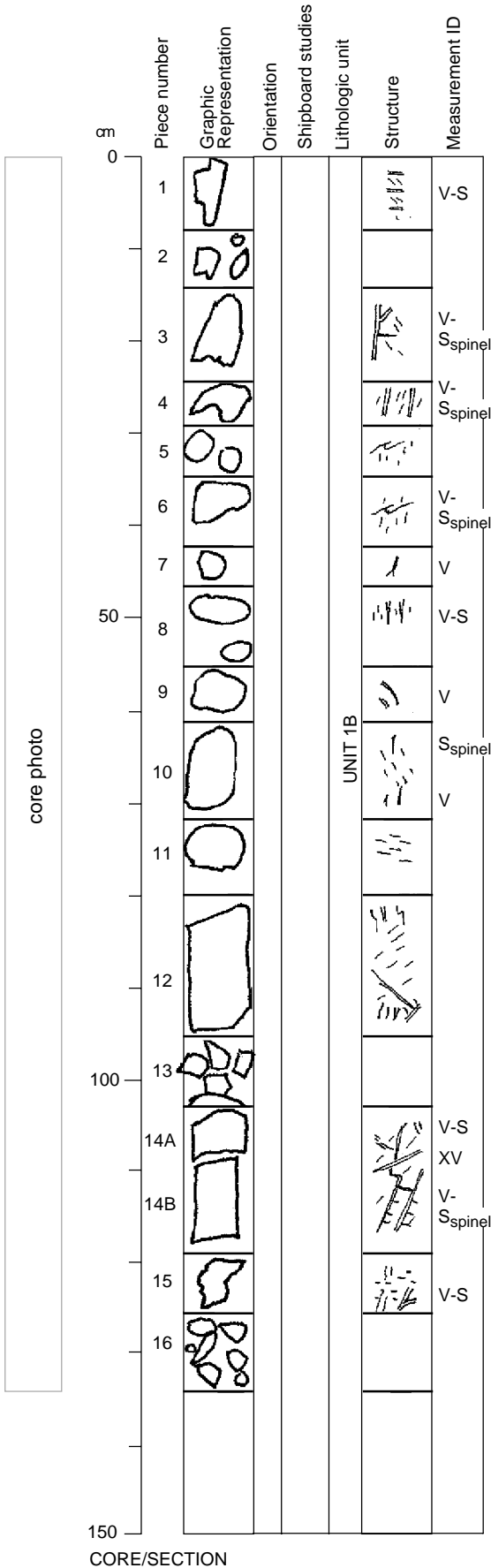
COLOR: Serpentine: olive black (5Y 2/1) to olive gray (5Y 2/1).
 Veins: pale green to light greenish gray (10G 6/2 to 5G 8/1).
METAMORPHIC STRUCTURES: Weakly foliated.

MINERALOGY:

Mineral Name	Mode (%)	Size (mm)	Shape	Comments
serpentine	95	<1	mesh	pseudomorphs after olivine (80%) and pyroxene (15%)
spinel	<5	<0.5	elongated	rimmed by chlorite
chlorite	2-10	<0.5	elongated	replacing plagioclase

VEINS: <5% of rock: pale green, serpentine minerals(?).

ADDITIONAL COMMENTS: Foliation defined by elongation of former plagioclase and spinel. About 15% of bastite pseudomorphs after pyroxenes.



CORE/SECTION

173-1068A-29R-2

UNIT 1B: SERPENTINIZED PERIDOTITE

Pieces 1-4

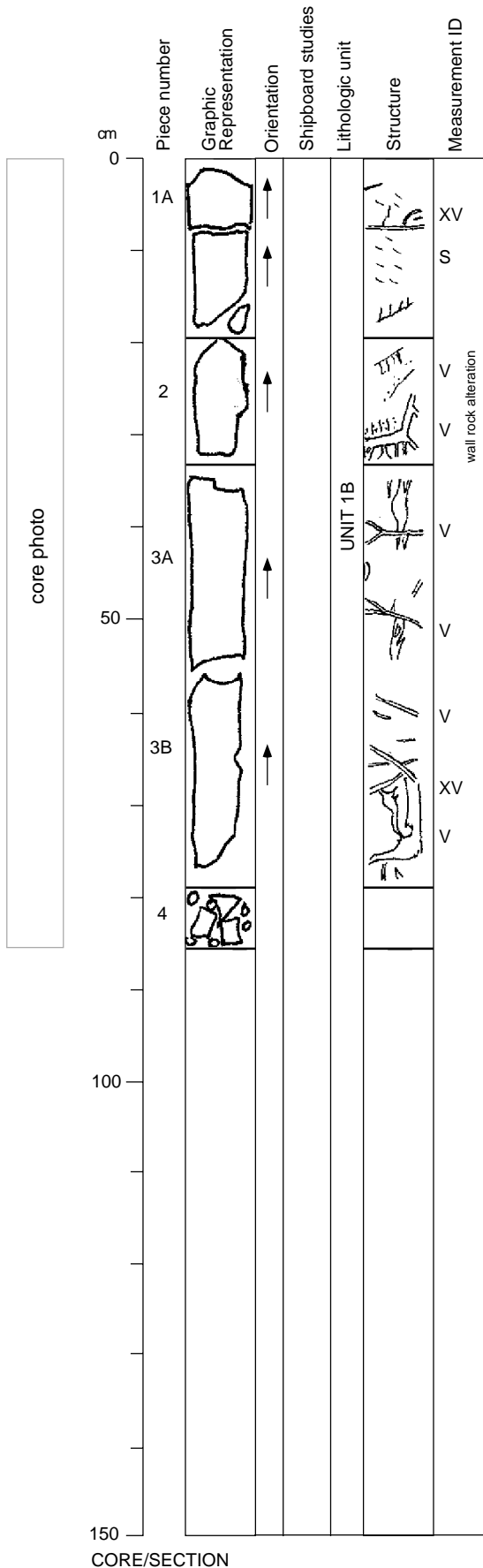
COLOR: Serpentinite: olive black (5Y 2/1) to olive gray (5Y 2/1).
 Veins: pale green to light greenish gray (10G 6/2 to 5G 8/1).
METAMORPHIC STRUCTURES: Foliated.

MINERALOGY:

Mineral	Mode (%)	Size (mm)	Shape	Comments
serpentine	95	<1	mesh	pseudomorphs after olivine (70%) and pyroxene (25%)
spinel	<5	<0.5	elongated	rimmed by chlorite replacing plagioclase texture
chlorite	2-10	<0.5	platy	replacing plagioclase

VEINS: 5%-10% of rock: vein network, veins contain pale green to white serpentine minerals(?)

ADDITIONAL COMMENTS: Foliation defined by elongated spinel, former plagioclase and former pyroxene. Up to 15% of bastite pseudomorphs after pyroxenes.



173-1068A-29R-3

UNIT 1B: SERPENTINIZED PERIDOTITE

Pieces 1-5

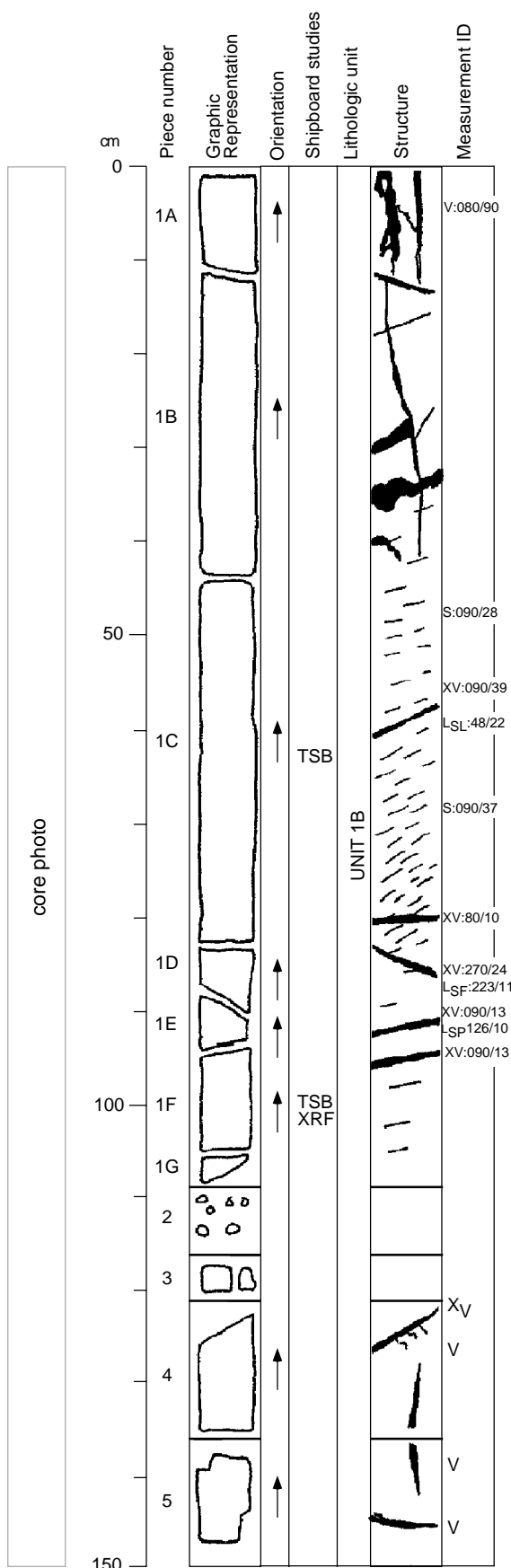
COLOR: Serpentine: olive black to yellowish-brown (5Y 2/1 to 10Y 4/2). Veins: pale green (10G 6/2).

METAMORPHIC STRUCTURES: Strong foliation.

MINERALOGY:

Mineral Name	Mode (%)	Size (mm)	Shape	Comments
serpentine	90	0.1-3	elongated	pseudomorphs after olivine (60%) and pyroxene (30%)
spinel	<2	0.5	elongated	surrounded by plagioclase
chlorite	2-10	0.5	elongated	replacing plagioclase
carbonate	<1	2	granular	filling core of mesh texture

VEINS: 1%-5% of rock: horizontal to subvertical branching vein networks. Foliation defined by alignment of spinel, former plagioclase and pyroxene. Brown color due to Mg-carbonate(?) About 15% of bastite pseudomorphs after pyroxenes.



CORE/SECTION