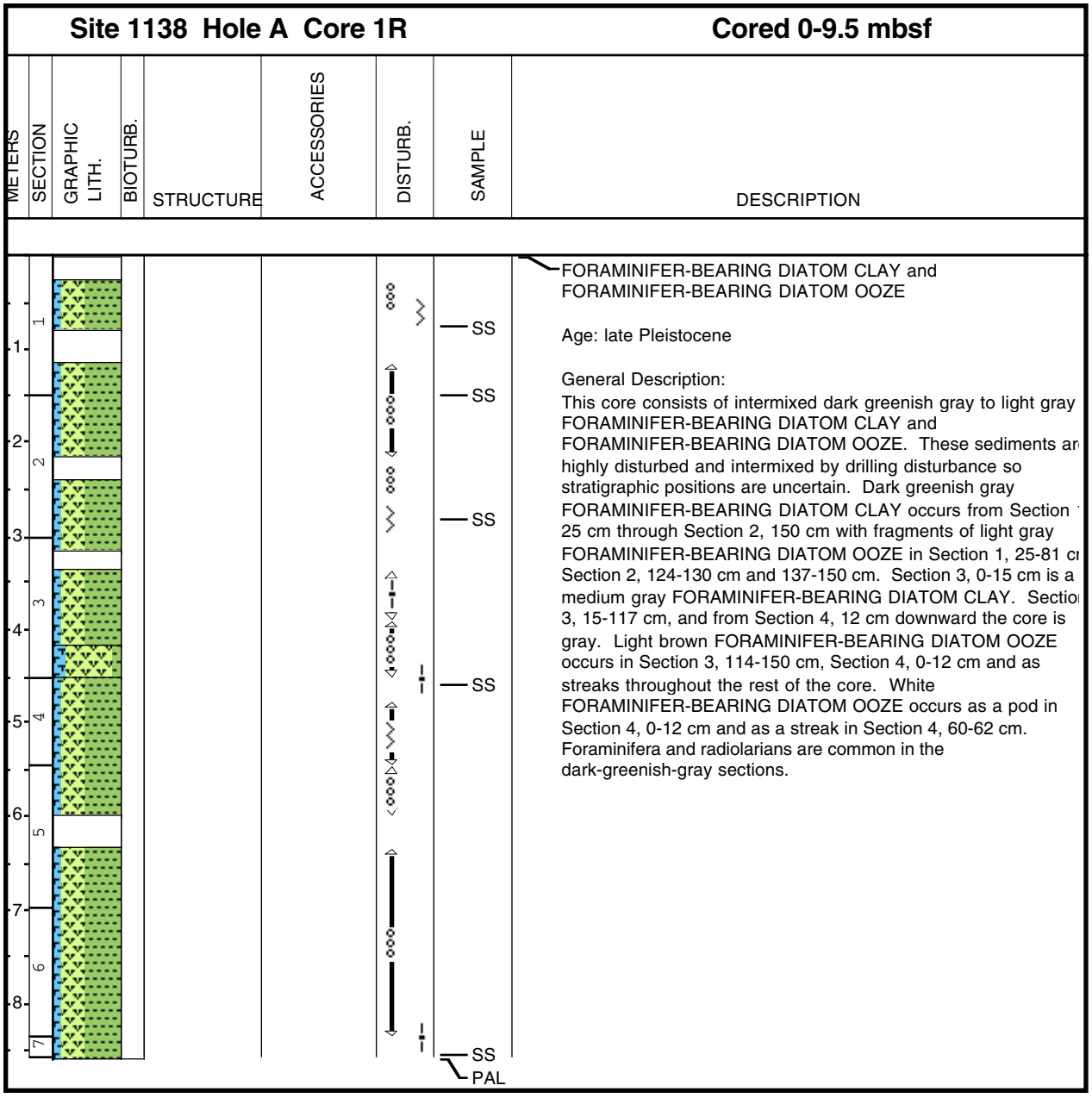
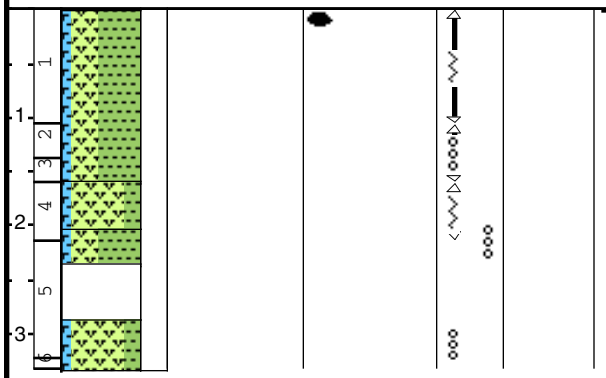
Core Photo

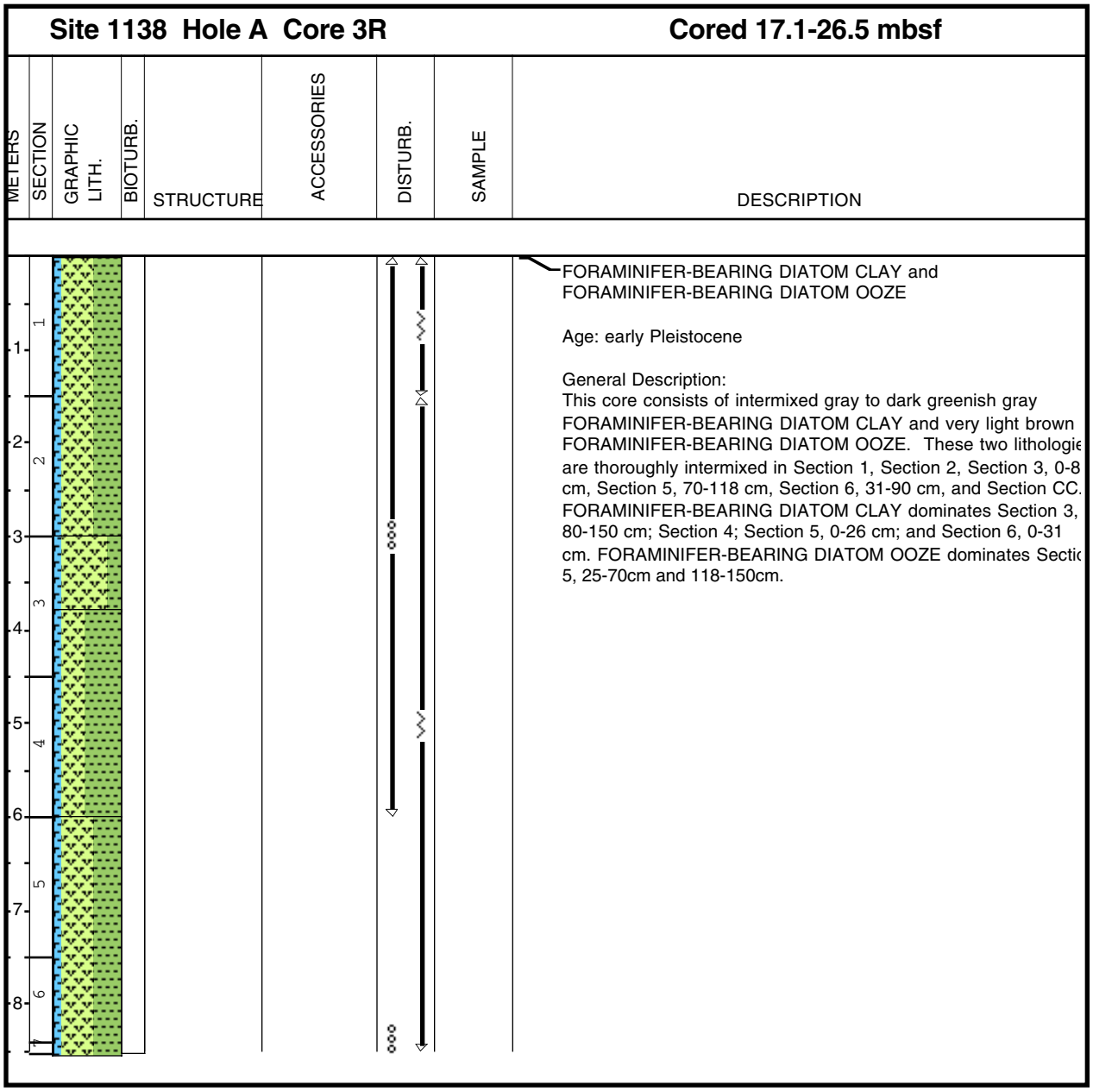

Site 1138 Hole A Core 1R
Cored 0-9.5 mbsf
METERS
SECTION
GRAPHIC LITH.
BIOTURB.
STRUCTURE
ACCESSORIES
DISTURB.
SAMPLE
DESCRIPTION
SS
SS
SS
SS
SS
PAL
FORAMINIFER-BEARING DIATOM CLAY and
FORAMINIFER-BEARING DIATOM OOZE
Age: late Pleistocene
General Description:
This core consists of intermixed dark greenish gray to light gray
FORAMINIFER-BEARING DIATOM CLAY and
FORAMINIFER-BEARING DIATOM OOZE. These sediments ar
highly disturbed and intermixed by drilling disturbance so
stratigraphic positions are uncertain. Dark greenish gray
FORAMINIFER-BEARING DIATOM CLAY occurs from Section
25 cm through Section 2, 150 cm with fragments of light gray
FORAMINIFER-BEARING DIATOM OOZE in Section 1, 25-81 cr
Section 2, 124-130 cm and 137-150 cm. Section 3, 0-15 cm is a
medium gray FORAMINIFER-BEARING DIATOM CLAY. Sectio
3, 15-117 cm, and from Section 4, 12 cm downward the core is
gray. Light brown FORAMINIFER-BEARING DIATOM OOZE
occurs in Section 3, 114-150 cm, Section 4, 0-12 cm and as
streaks throughout the rest of the core. White
FORAMINIFER-BEARING DIATOM OOZE occurs as a pod in
Section 4, 0-12 cm and as a streak in Section 4, 60-62 cm.
Foraminifera and radiolarians are common in the
dark-greenish-gray sections.

Core Photo

Site 1138 Hole A Core 2R — **Cored 9.5-17.1 mbsf**

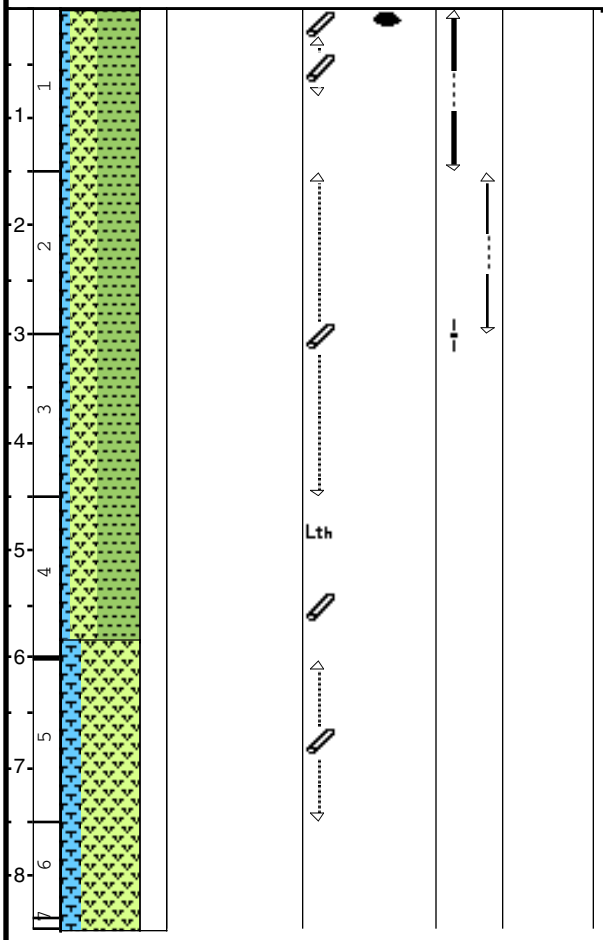


Core Photo


Site 1138 Hole A Core 3R
Cored 17.1-26.5 mbsf
METERS
SECTION
GRAPHIC LITH.
BIOTURB.
STRUCTURE
ACCESSORIES
DISTURB.
SAMPLE
DESCRIPTION
FORAMINIFER-BEARING DIATOM CLAY and
FORAMINIFER-BEARING DIATOM OOZE
Age: early Pleistocene
General Description:
This core consists of intermixed gray to dark greenish gray
FORAMINIFER-BEARING DIATOM CLAY and very light brown
FORAMINIFER-BEARING DIATOM OOZE. These two lithologie
are thoroughly intermixed in Section 1, Section 2, Section 3, 0-8
cm, Section 5, 70-118 cm, Section 6, 31-90 cm, and Section CC.
FORAMINIFER-BEARING DIATOM CLAY dominates Section 3,
80-150 cm; Section 4; Section 5, 0-26 cm; and Section 6, 0-31
cm. FORAMINIFER-BEARING DIATOM OOZE dominates Sectic
5, 25-70cm and 118-150cm.

Core Photo

Site 1138 Hole A Core 4R — **Cored 26.5-36 mbsf**



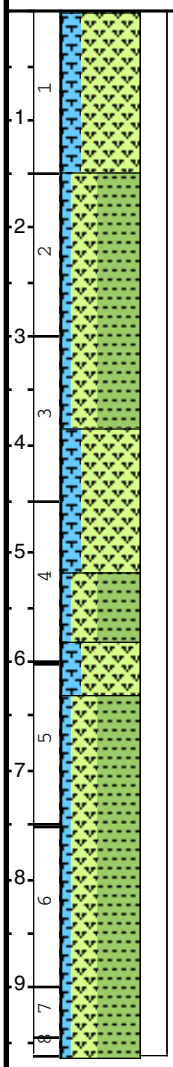
FORAMINFER-BEARING DIATOM CLAY and
FORAMINFER-BEARING DIATOM OOZE

Age: early Pleistocene

General Description:
This core consists of interbedded light gray to dark gray FORAMINFER-BEARING DIATOM CLAY and very light brown t light gray FORAMINFER-BEARING DIATOM OOZE. Radiolariar are also common. Burrows are rare to common.

Core Photo

Site 1138 Hole A Core 5R **Cored 36-45.4 mbsf**

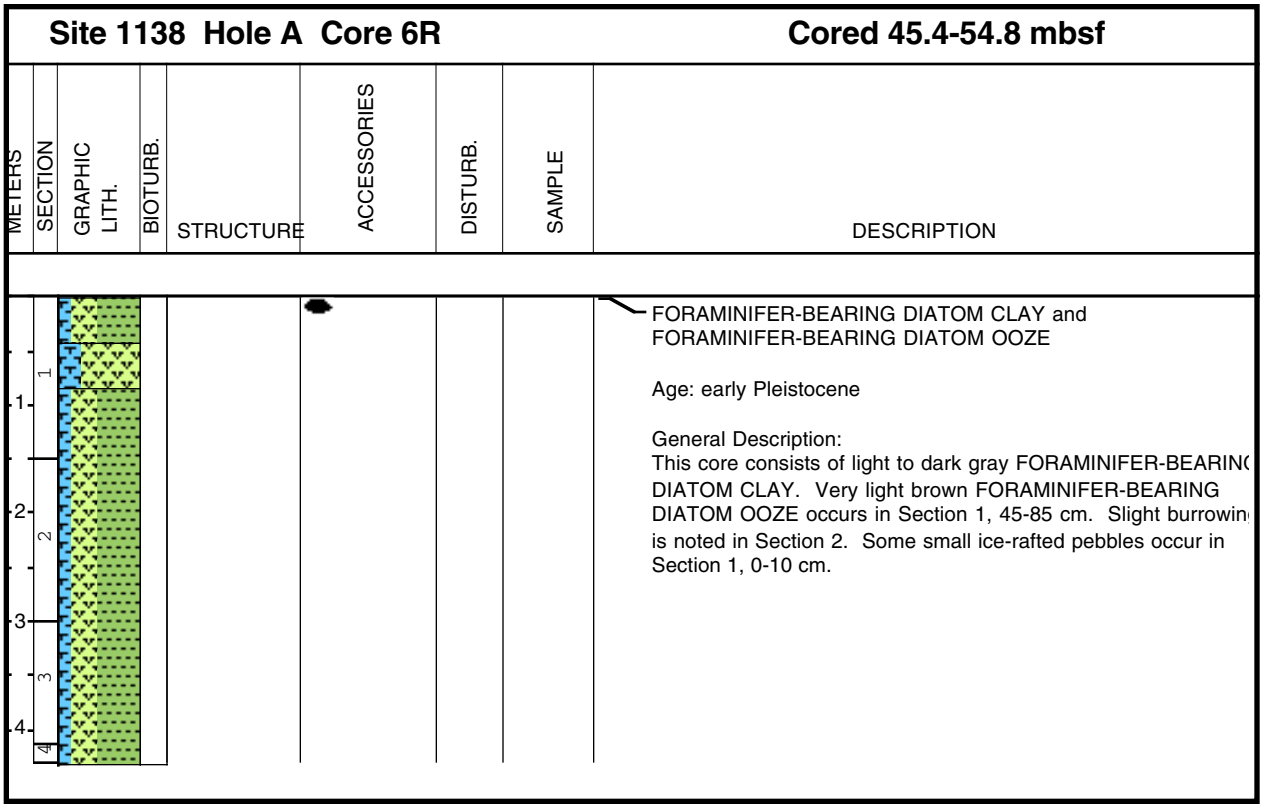


FORAMINIFER-BEARING DIATOM OOZE and
FORAMINIFER-BEARING DIATOM CLAY

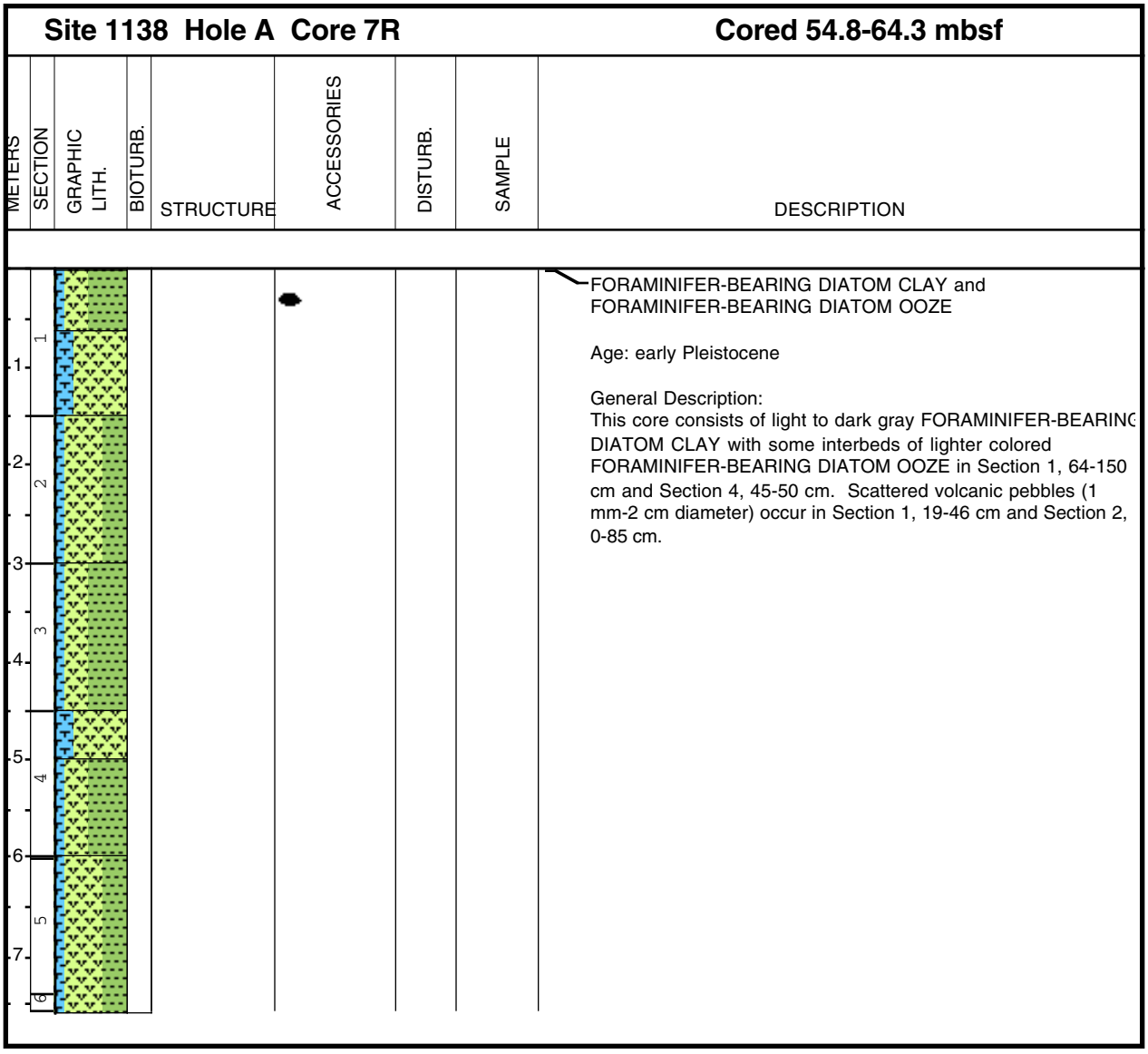
Age: early Pleistocene

General Description:
This core consists of interbedded medium gray to very light brown FORAMINIFER-BEARING DIATOM OOZE and medium t dark gray FORAMINIFER-BEARING DIATOM CLAY. Two small (<0.5 cm diameter) ice-rafted pebbles occur in Section 1, 5-10 cm. Mottling may reflect burrowing. Diatoms are more common browner areas.

Core Photo

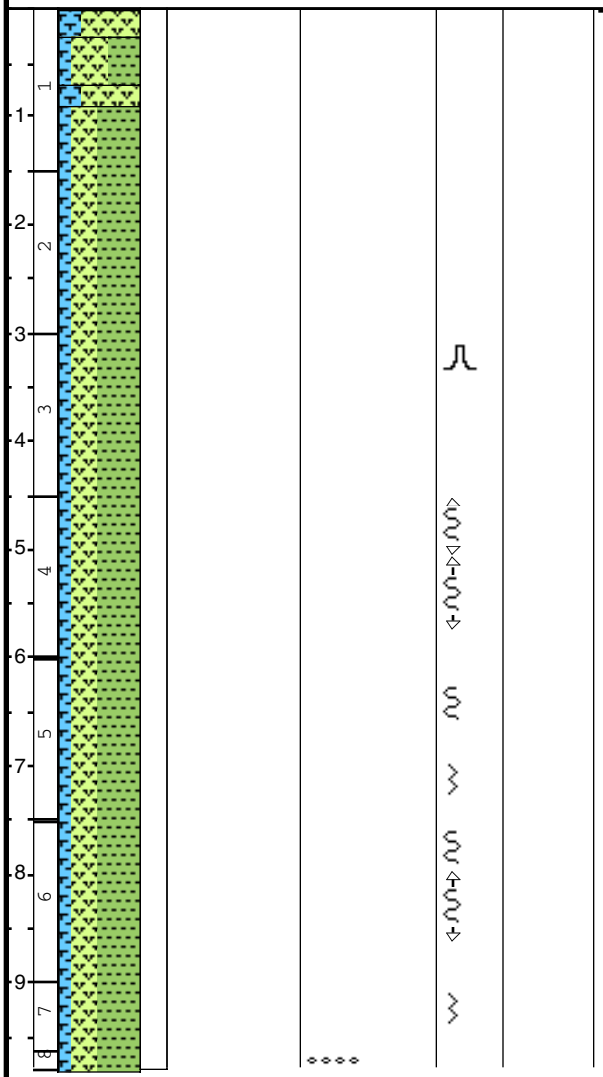

Site 1138 Hole A Core 6R
Cored 45.4-54.8 mbsf
METERS
SECTION
GRAPHIC LITH.
BIOTURB.
STRUCTURE
ACCESSORIES
DISTURB.
SAMPLE
DESCRIPTION
1
2
3
4
FORAMINIFER-BEARING DIATOM CLAY and
FORAMINIFER-BEARING DIATOM OOZE
Age: early Pleistocene
General Description:
This core consists of light to dark gray FORAMINIFER-BEARIN(
DIATOM CLAY. Very light brown FORAMINIFER-BEARING
DIATOM OOZE occurs in Section 1, 45-85 cm. Slight burrowin
is noted in Section 2. Some small ice-rafted pebbles occur in
Section 1, 0-10 cm.

Core Photo


Site 1138 Hole A Core 7R
Cored 54.8-64.3 mbsf
METERS
SECTION
GRAPHIC LITH.
BIOTURB.
STRUCTURE
ACCESSORIES
DISTURB.
SAMPLE
DESCRIPTION
FORAMINIFER-BEARING DIATOM CLAY and
FORAMINIFER-BEARING DIATOM OOZE
Age: early Pleistocene
General Description:
This core consists of light to dark gray FORAMINIFER-BEARING
DIATOM CLAY with some interbeds of lighter colored
FORAMINIFER-BEARING DIATOM OOZE in Section 1, 64-150
cm and Section 4, 45-50 cm. Scattered volcanic pebbles (1
mm-2 cm diameter) occur in Section 1, 19-46 cm and Section 2,
0-85 cm.

Core Photo

Site 1138 Hole A Core 8R **Cored 64.3-73.7 mbsf**

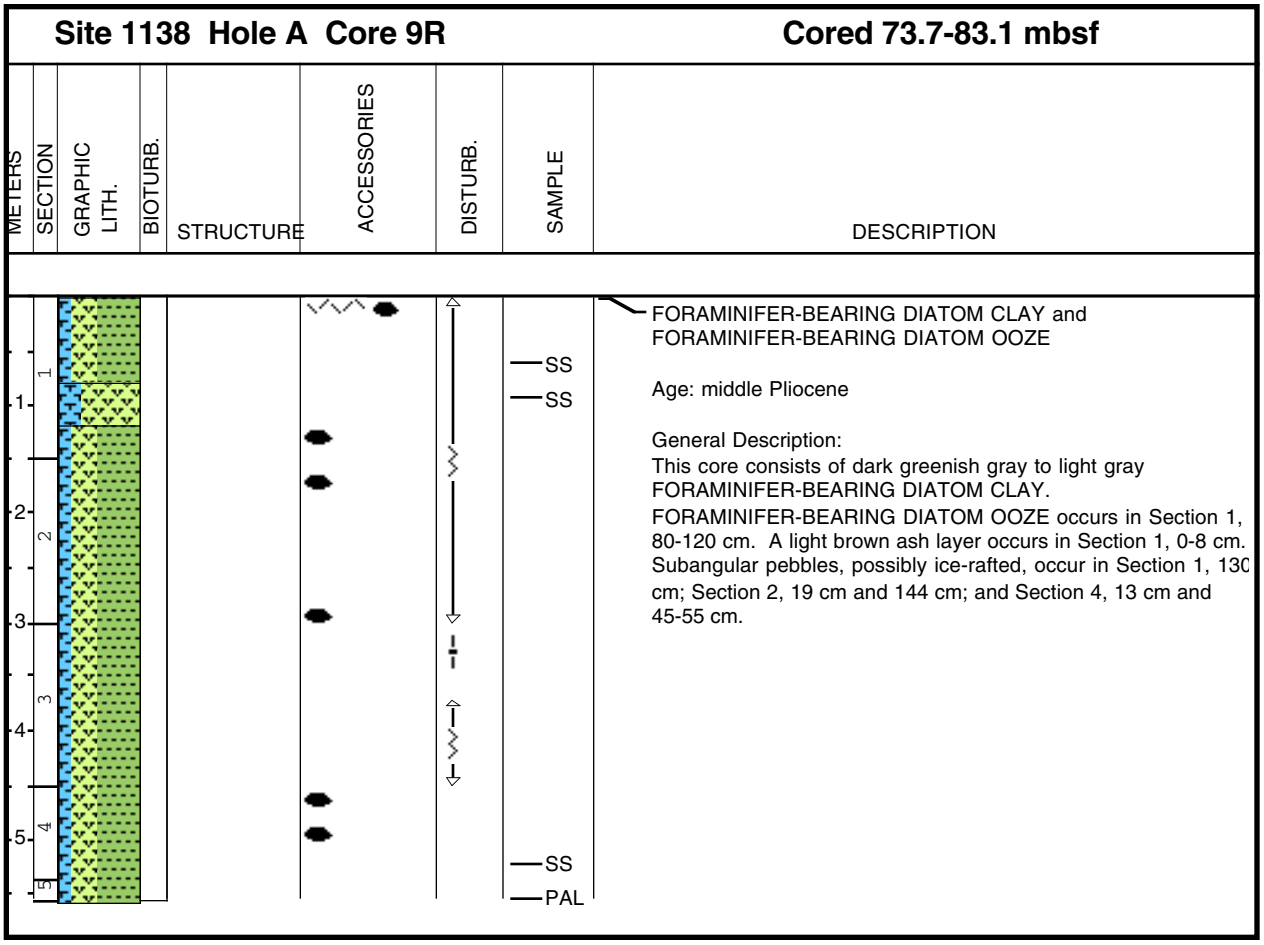


FORAMINIFER-BEARING DIATOM CLAY and
FORAMINIFER-BEARING DIATOM OOZE

Age: late Pliocene

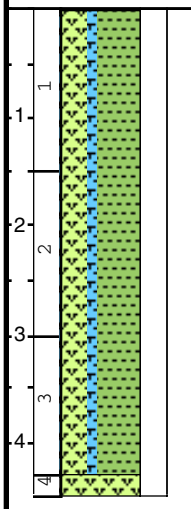
General Description:
This core consists of light to dark gray FORAMINIFER-BEARIN(DIATOM CLAY. Very light brown to light gray FORAMINIFER-BEARING DIATOM OOZE occurs in Section 1, 0-29 cm and possibly 73-90 cm. A burrowed ash layer occurs at Section 2, 71-73 cm. Starting with Section 3, deformation of the sediments occurs that appears to be soft-sediment deformation, rather than core disturbance. Features such as rounded and deformed clasts of variegated muds, layers contorted by flowage, and steeply dipping, truncated layers are present and are evidence of soft-sediment deformation. The sediment has also suffered from drilling disturbance so the exact interval(s) of primary soft-sediment deformation are uncertain. A 2-mm thick layer of coarse pumice crystals occurs in the CC, 6 cm.

Core Photo


Site 1138 Hole A Core 9R
Cored 73.7-83.1 mbsf
METERS
SECTION
GRAPHIC LITH.
BIOTURB.
STRUCTURE
ACCESSORIES
DISTURB.
SAMPLE
DESCRIPTION
SS
SS
SS
PAL
FORAMINIFER-BEARING DIATOM CLAY and
FORAMINIFER-BEARING DIATOM OOZE
Age: middle Pliocene
General Description:
This core consists of dark greenish gray to light gray
FORAMINIFER-BEARING DIATOM CLAY.
FORAMINIFER-BEARING DIATOM OOZE occurs in Section 1,
80-120 cm. A light brown ash layer occurs in Section 1, 0-8 cm.
Subangular pebbles, possibly ice-rafted, occur in Section 1, 130
cm; Section 2, 19 cm and 144 cm; and Section 4, 13 cm and
45-55 cm.

Core Photo

Site 1138 Hole A Core 10R **Cored 83.1-92.7 mbsf**



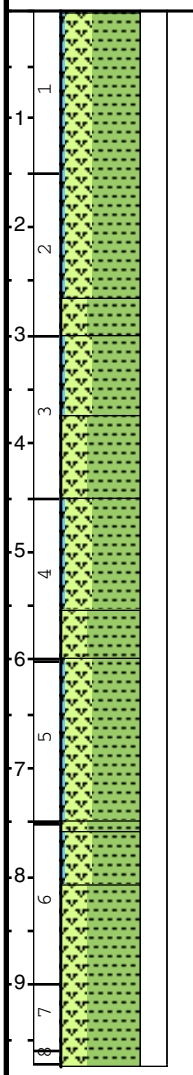
FORAMINIFER-BEARING DIATOM CLAY

Age: middle Pliocene

General Description:
This core consists of light, medium, and dark greenish gray FORAMINIFER-BEARING DIATOM CLAY, except the Core Catcher which contains mottled light and medium gray DIATOM OOZE. Granules of ice-rafted detritus occur in Section 1, 12-16 cm and 62 cm, and Section 2, 94 cm. A 1-cm diameter pumice fragment occurs in Section 2, 46 cm. A layer with pumice and feldspar grains occurs in Section 2, 107-12cm.

Core Photo

Hole 1138A Core 11R **92.7-102.3 mbsf**

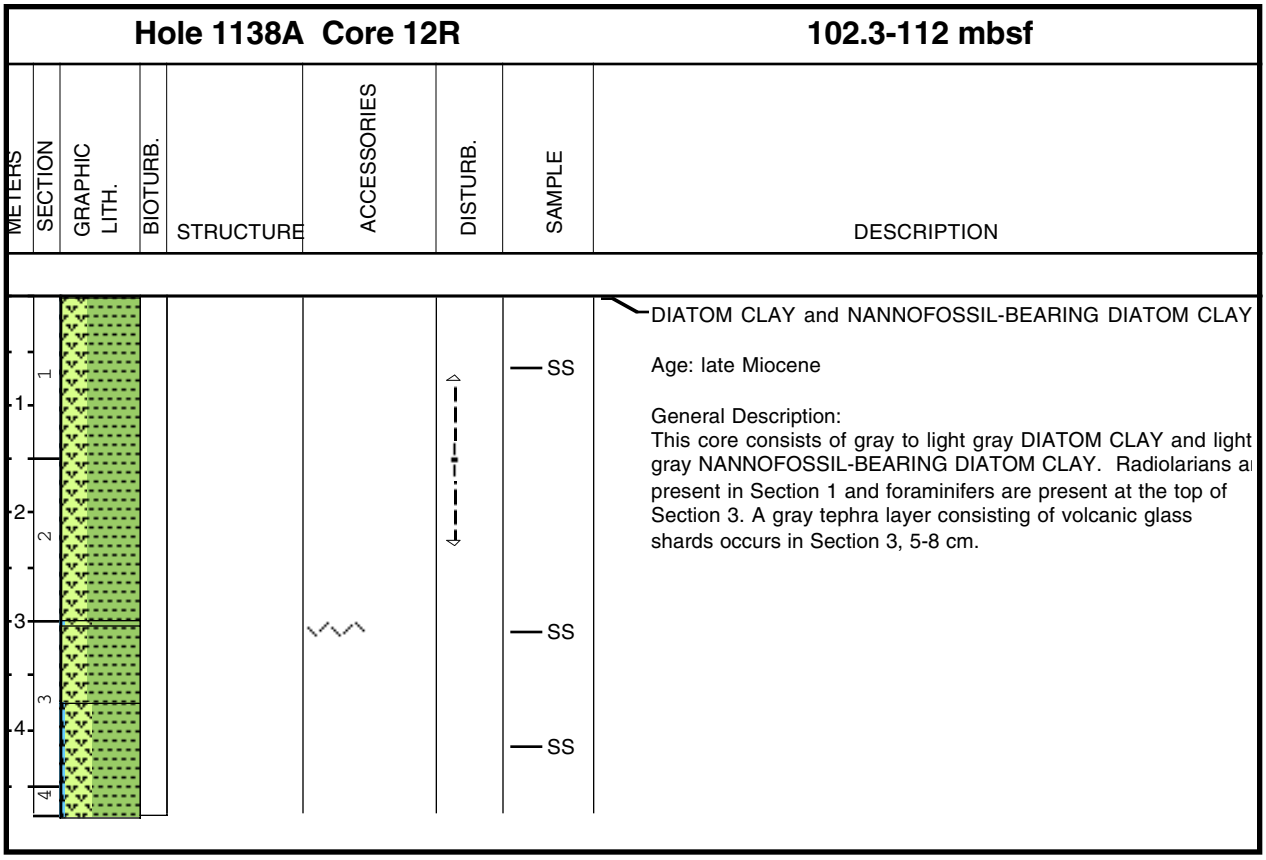


FORAMINIFER-BEARING DIATOM CLAY and DIATOM CLAY

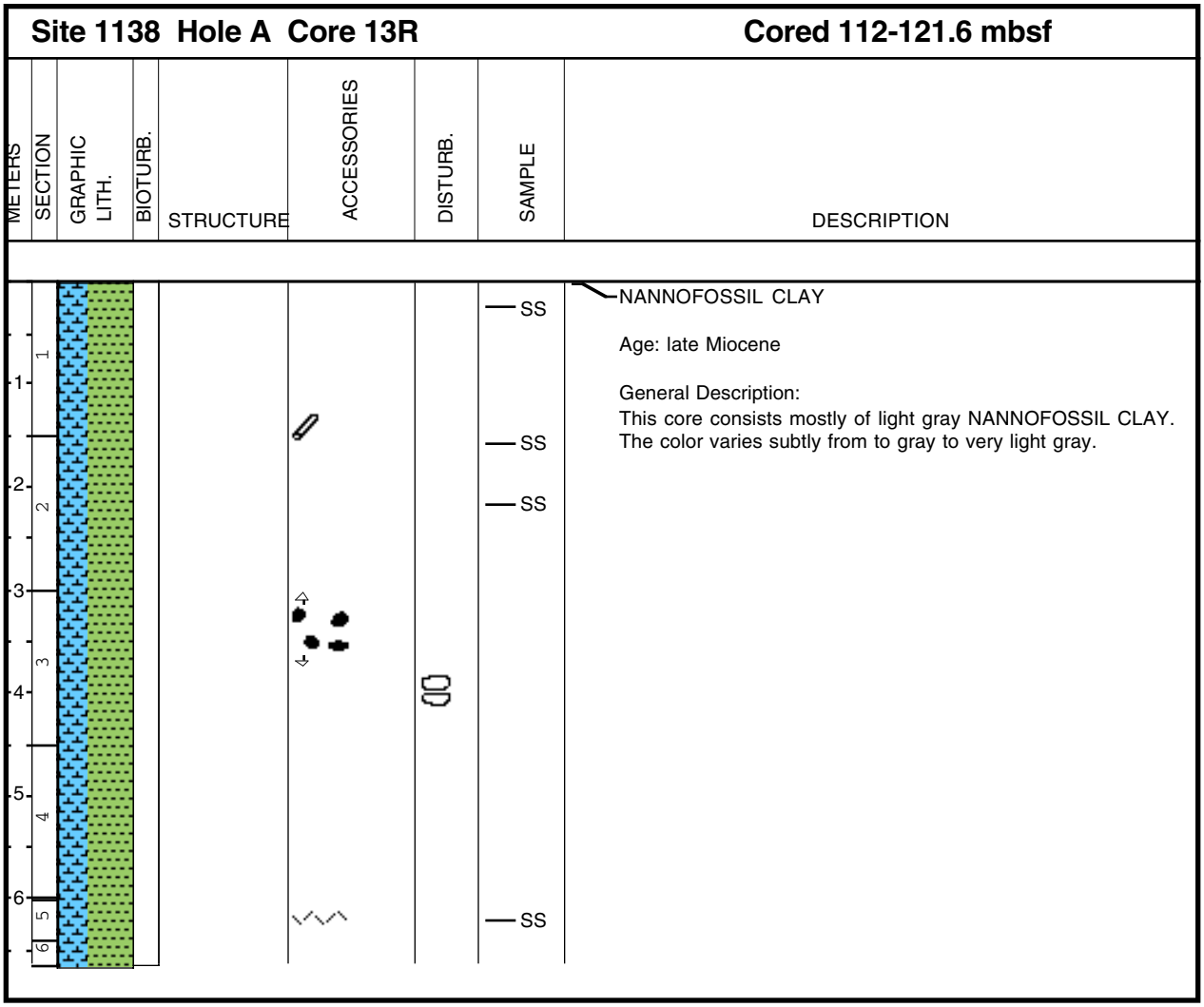
Age: middle Pliocene

General Description:
This core consists of light greenish gray FORAMINIFER-BEARING DIATOM CLAY and greenish gray DIATOM CLAY. Minor drilling disturbance is indicated by curved color boundaries and streaks of light and dark sediment in Section 2, 95-130 cm. The core is slightly mottled in Sections 1 and 3. A 1-cm granule occurs in Section 2, 40 cm.
.

Core Photo

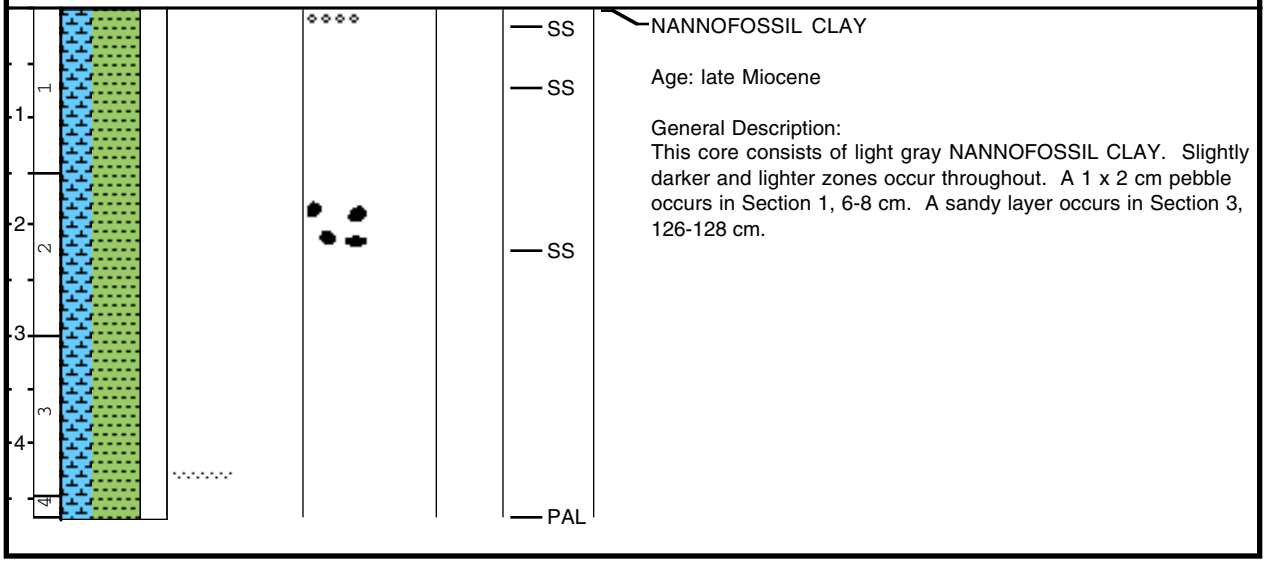

Hole 1138A Core 12R
102.3-112 mbsf
METERS
SECTION
GRAPHIC LITH.
BIOTURB.
STRUCTURE
ACCESSORIES
DISTURB.
SAMPLE
DESCRIPTION
1
2
3
4
SS
SS
SS
DIATOM CLAY and NANNOFOSSIL-BEARING DIATOM CLAY
Age: late Miocene
General Description:
This core consists of gray to light gray DIATOM CLAY and light gray NANNOFOSSIL-BEARING DIATOM CLAY. Radiolarians a present in Section 1 and foraminifers are present at the top of Section 3. A gray tephra layer consisting of volcanic glass shards occurs in Section 3, 5-8 cm.

Core Photo


Site 1138 Hole A Core 13R
Cored 112-121.6 mbsf
METERS
SECTION
GRAPHIC LITH.
BIOTURB.
STRUCTURE
ACCESSORIES
DISTURB.
SAMPLE
DESCRIPTION
SS
SS
SS
SS
NANNOFOSSIL CLAY
Age: late Miocene
General Description:
This core consists mostly of light gray NANNOFOSSIL CLAY.
The color varies subtly from to gray to very light gray.

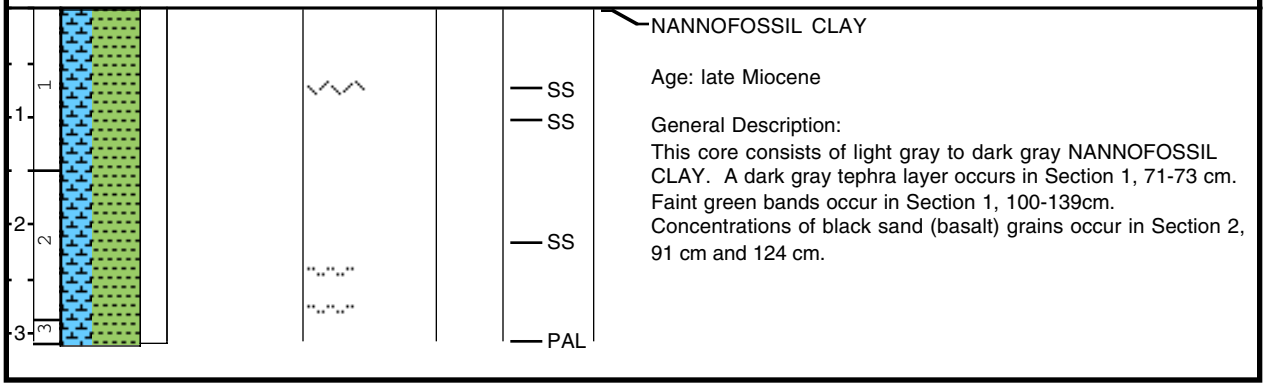
Core Photo

Site 1138 Hole A Core 14R **Cored 121.6-131.2 mbsf**

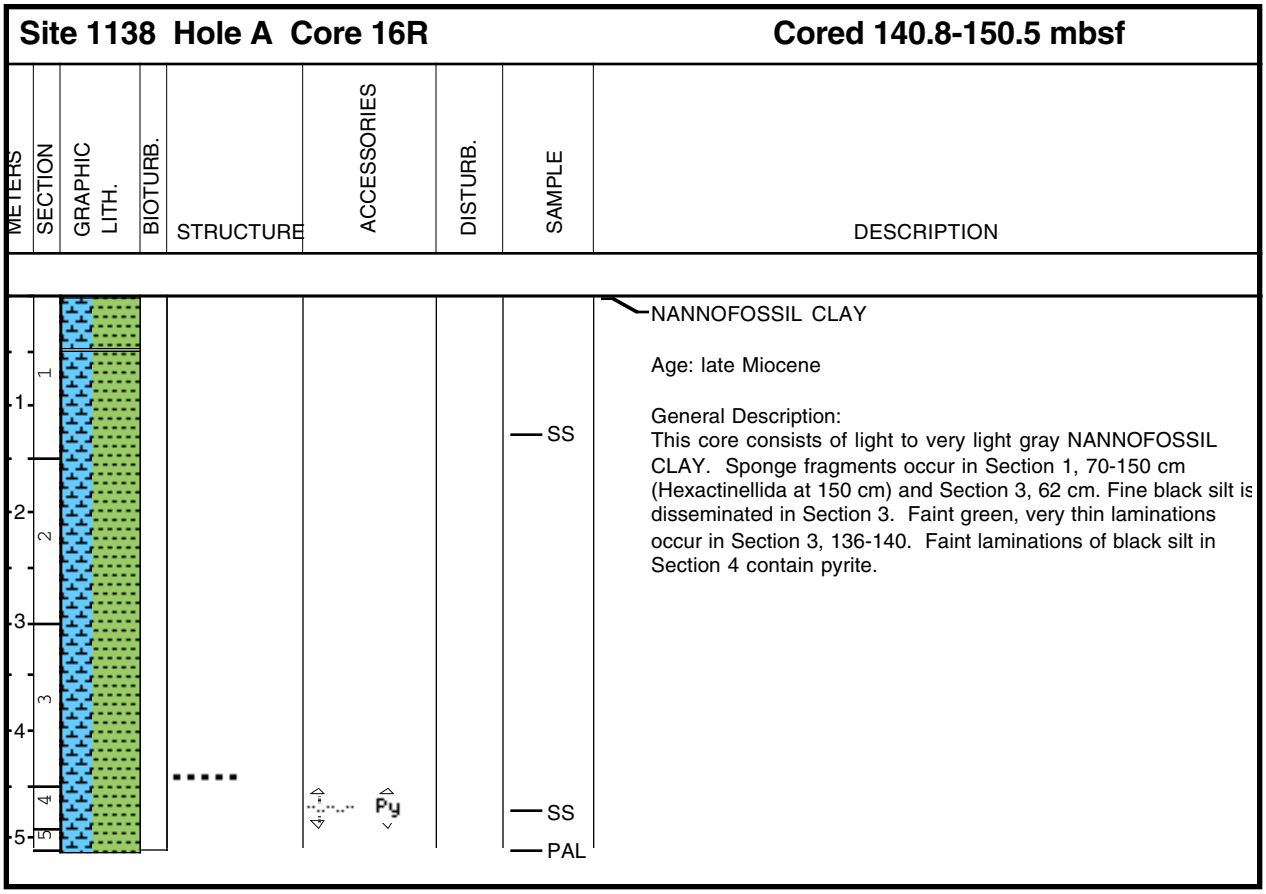


Core Photo

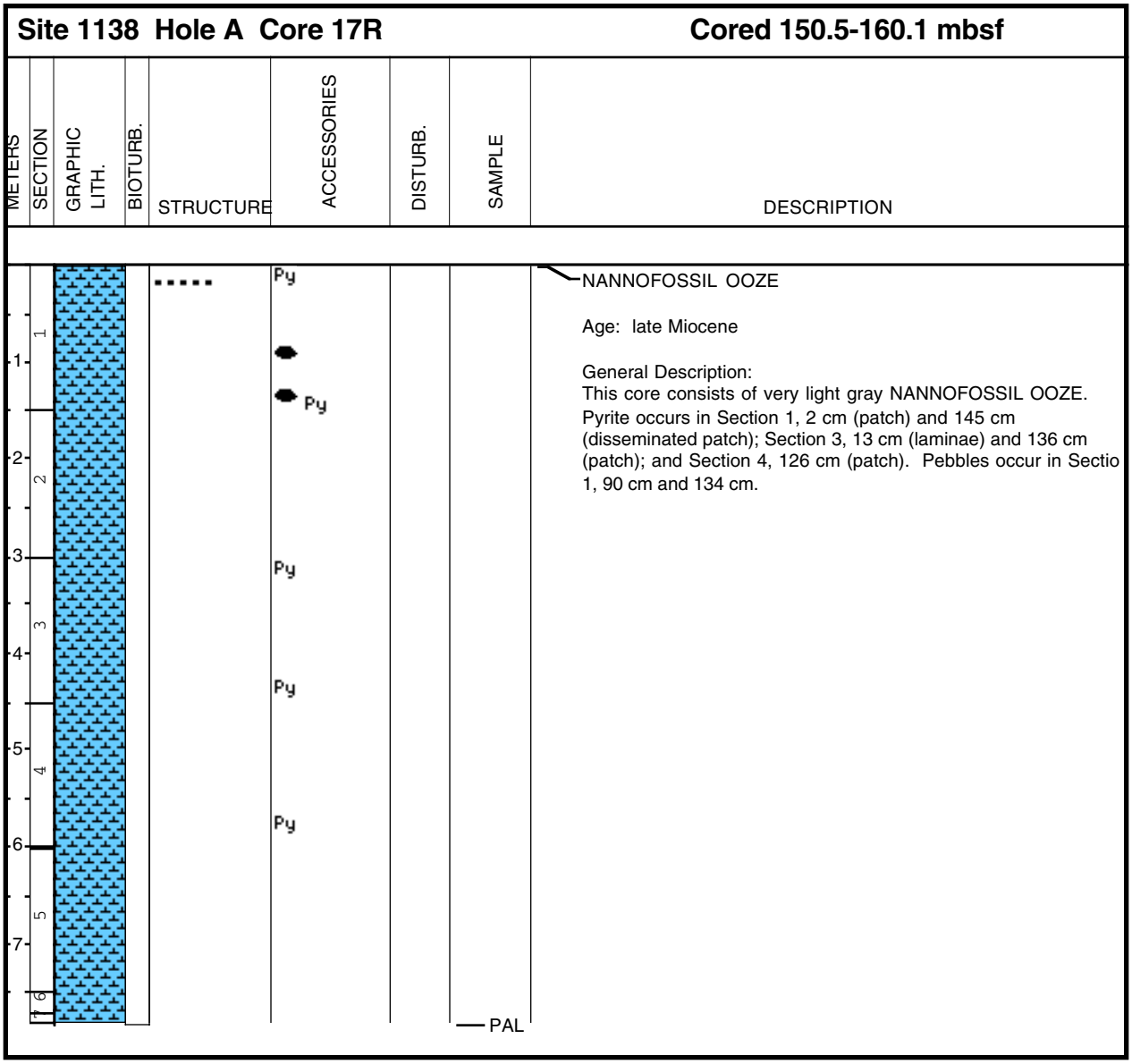
Site 1138 Hole A Core 15R **Cored 131.2-140.8 mbsf**



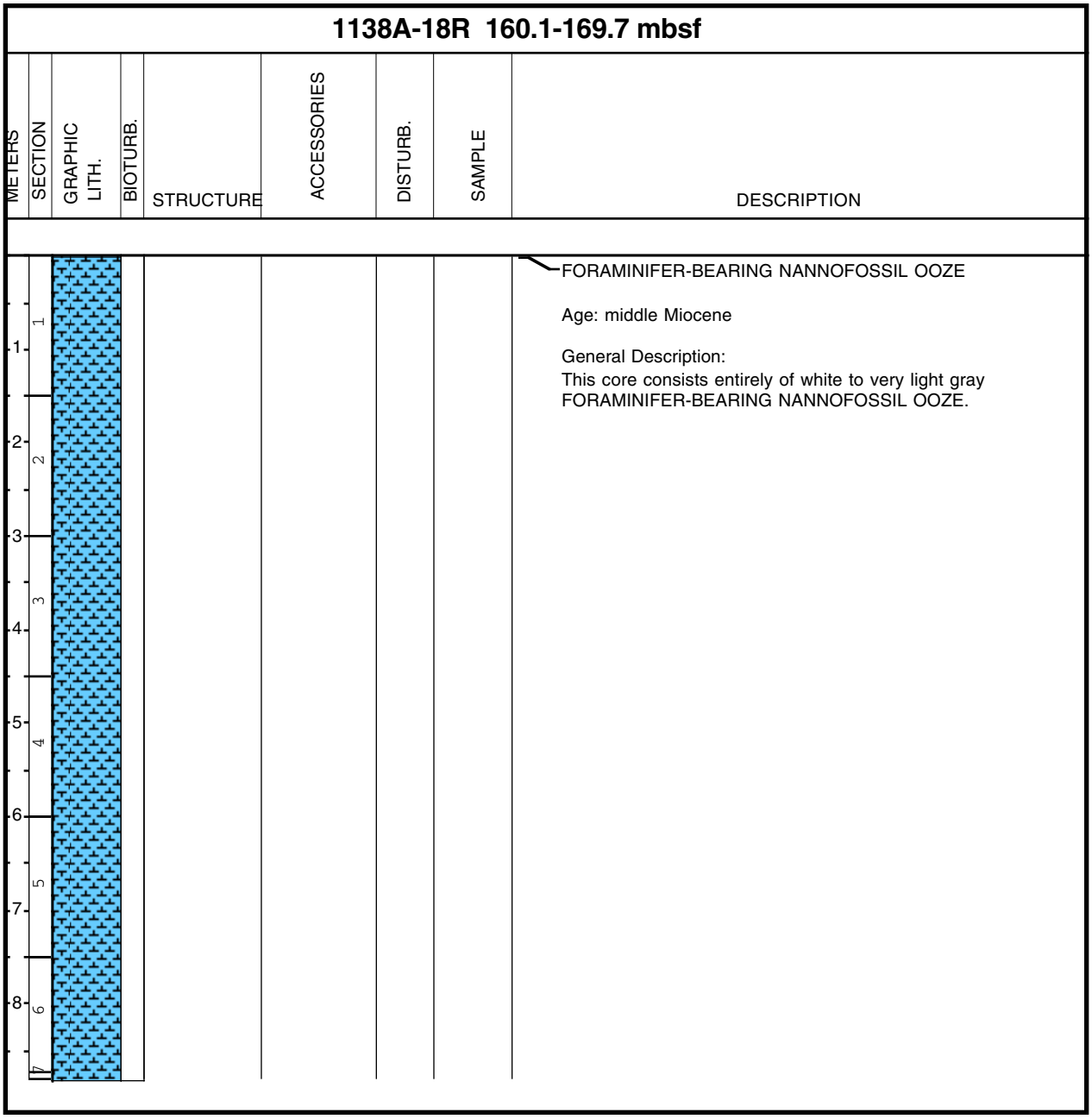
Core Photo


Site 1138 Hole A Core 16R
Cored 140.8-150.5 mbsf
METERS
SECTION
GRAPHIC LITH.
BIOTURB.
STRUCTURE
ACCESSORIES
DISTURB.
SAMPLE
DESCRIPTION
NANNOFOSSIL CLAY
Age: late Miocene
General Description:
This core consists of light to very light gray NANNOFOSSIL CLAY. Sponge fragments occur in Section 1, 70-150 cm (Hexactinellida at 150 cm) and Section 3, 62 cm. Fine black silt is disseminated in Section 3. Faint green, very thin laminations occur in Section 3, 136-140. Faint laminations of black silt in Section 4 contain pyrite.
SS
SS
PAL
Py

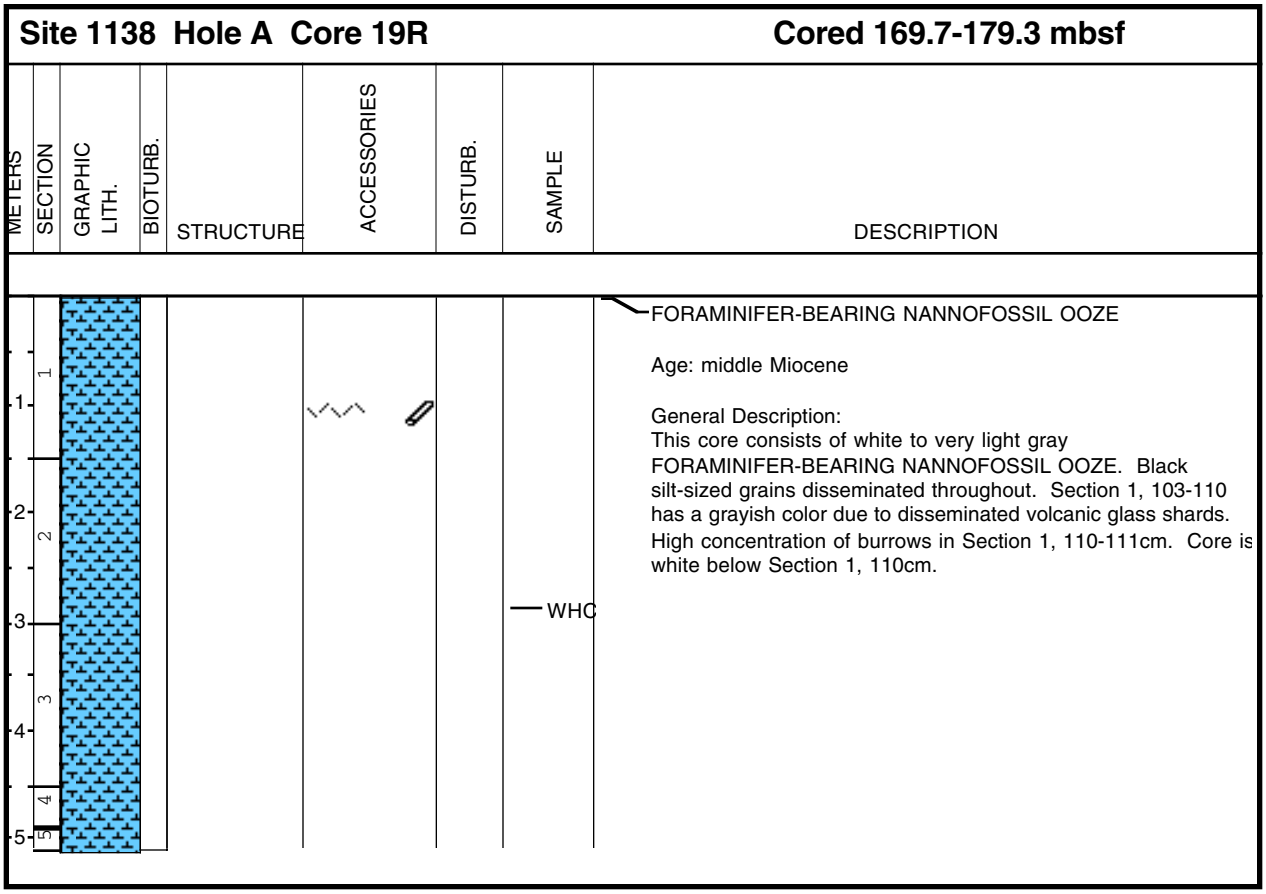
Core Photo


Site 1138 Hole A Core 17R
Cored 150.5-160.1 mbsf
METERS
SECTION
GRAPHIC LITH.
BIOTURB.
STRUCTURE
ACCESSORIES
DISTURB.
SAMPLE
DESCRIPTION
Py
Py
Py
Py
Py
PAL
NANNOFOSSIL OOZE
Age: late Miocene
General Description:
This core consists of very light gray NANNOFOSSIL OOZE. Pyrite occurs in Section 1, 2 cm (patch) and 145 cm (disseminated patch); Section 3, 13 cm (laminae) and 136 cm (patch); and Section 4, 126 cm (patch). Pebbles occur in Sectio 1, 90 cm and 134 cm.

Core Photo

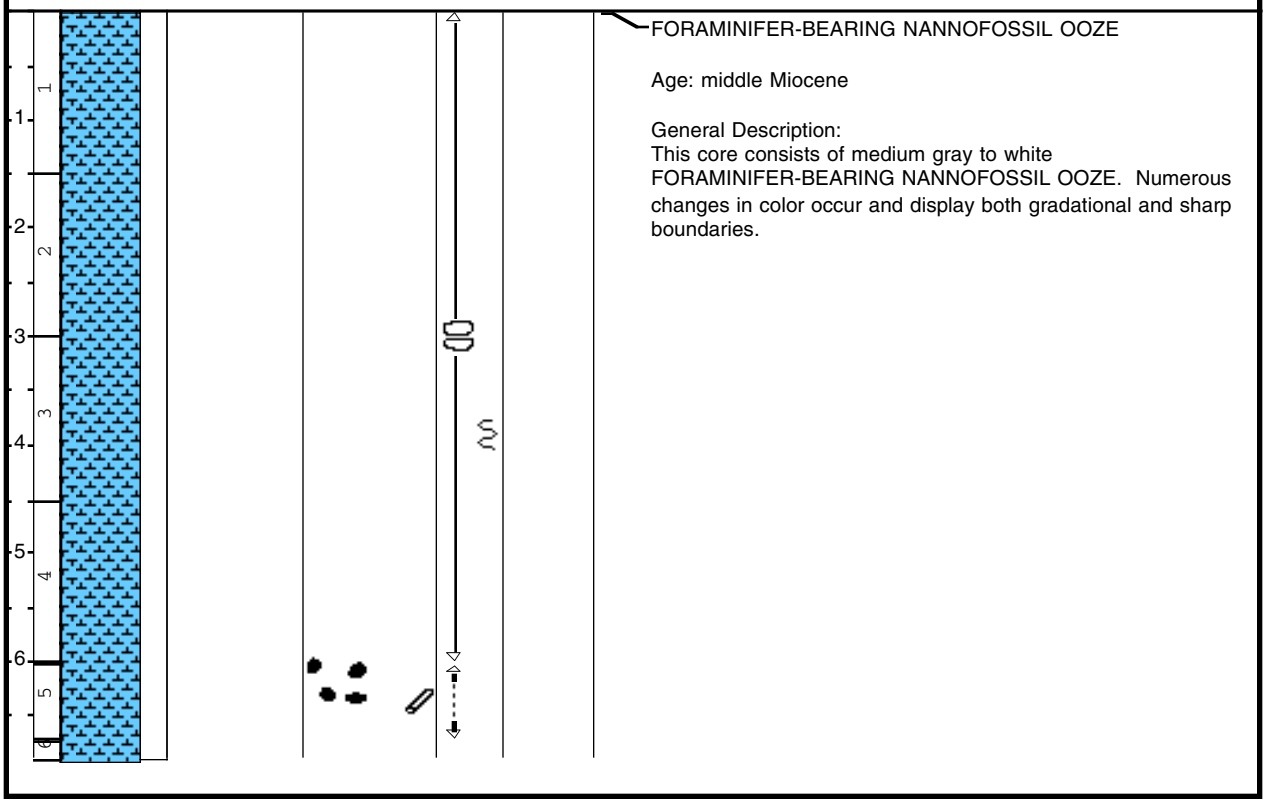

1138A-18R 160.1-169.7 mbsf
METERS
SECTION
GRAPHIC LITH.
BIOTURB.
STRUCTURE
ACCESSORIES
DISTURB.
SAMPLE
DESCRIPTION
FORAMINIFER-BEARING NANNOFOSSIL OOZE
Age: middle Miocene
General Description:
This core consists entirely of white to very light gray FORAMINIFER-BEARING NANNOFOSSIL OOZE.

Core Photo

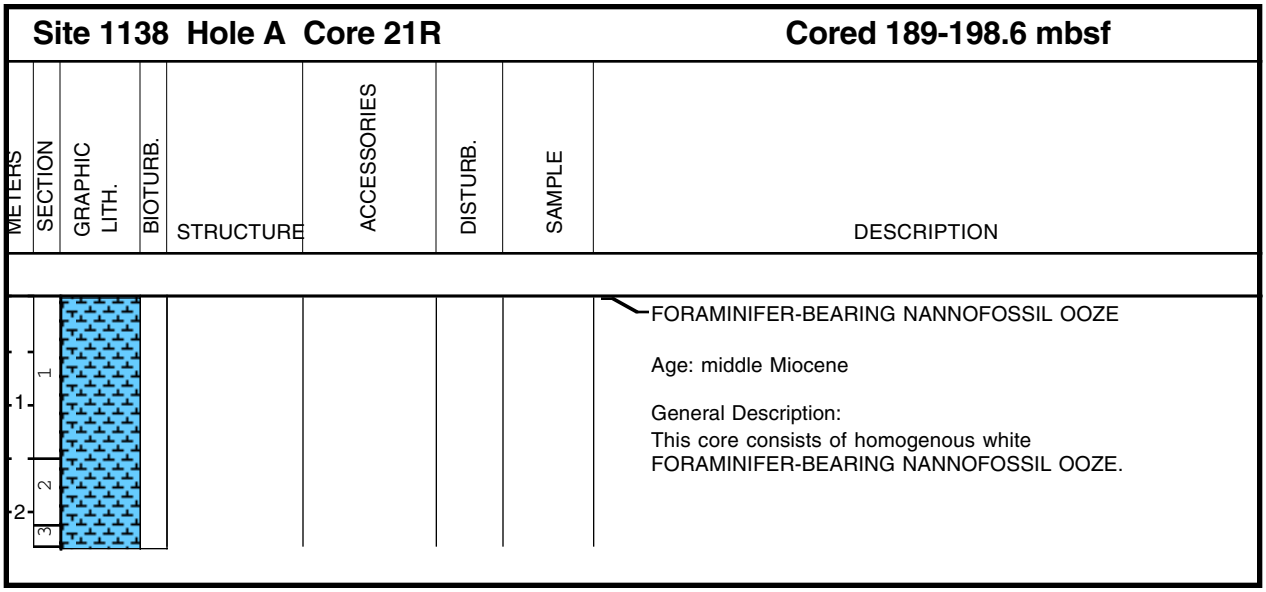

Site 1138 Hole A Core 19R
Cored 169.7-179.3 mbsf
METERS
SECTION
GRAPHIC LITH.
BIOTURB.
STRUCTURE
ACCESSORIES
DISTURB.
SAMPLE
DESCRIPTION
1
2
3
4
5
WHC
FORAMINIFER-BEARING NANNOFOSSIL OOZE
Age: middle Miocene
General Description:
This core consists of white to very light gray FORAMINIFER-BEARING NANNOFOSSIL OOZE. Black silt-sized grains disseminated throughout. Section 1, 103-110 has a grayish color due to disseminated volcanic glass shards. High concentration of burrows in Section 1, 110-111cm. Core is white below Section 1, 110cm.

Core Photo

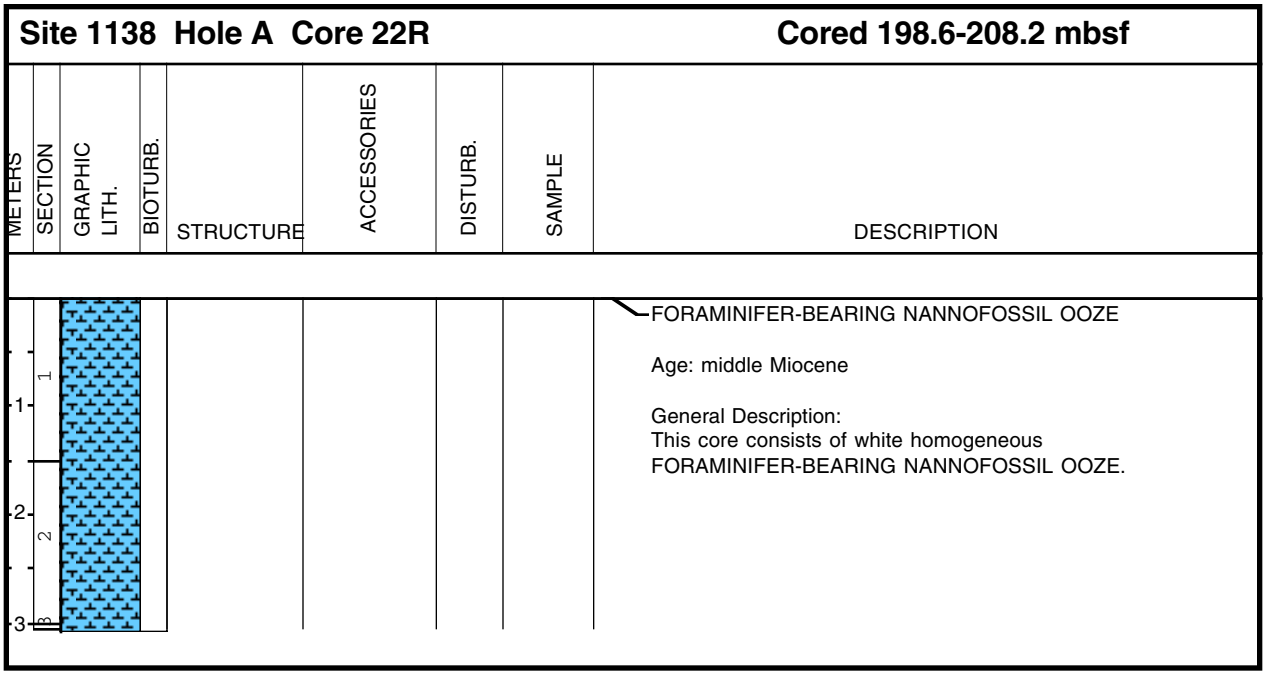
Site 1138 Hole A Core 20R **Cored 179.3-189 mbsf**



Core Photo

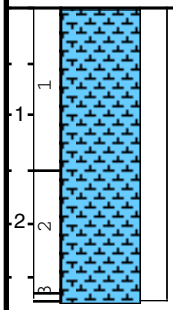

Site 1138 Hole A Core 21R
Cored 189-198.6 mbsf
METERS
SECTION
GRAPHIC LITH.
BIOTURB.
STRUCTURE
ACCESSORIES
DISTURB.
SAMPLE
DESCRIPTION
1
2
FORAMINIFER-BEARING NANNOFOSSIL OOZE
Age: middle Miocene
General Description:
This core consists of homogenous white FORAMINIFER-BEARING NANNOFOSSIL OOZE.

Core Photo


Site 1138 Hole A Core 22R
Cored 198.6-208.2 mbsf
METERS
SECTION
GRAPHIC LITH.
BIOTURB.
STRUCTURE
ACCESSORIES
DISTURB.
SAMPLE
DESCRIPTION
1
2
3
1
2
CC
FORAMINIFER-BEARING NANNOFOSSIL OOZE
Age: middle Miocene
General Description:
This core consists of white homogeneous
FORAMINIFER-BEARING NANNOFOSSIL OOZE.

Core Photo

Site 1138 Hole A Core 23R **Cored 208.2-217.8 mbsf**

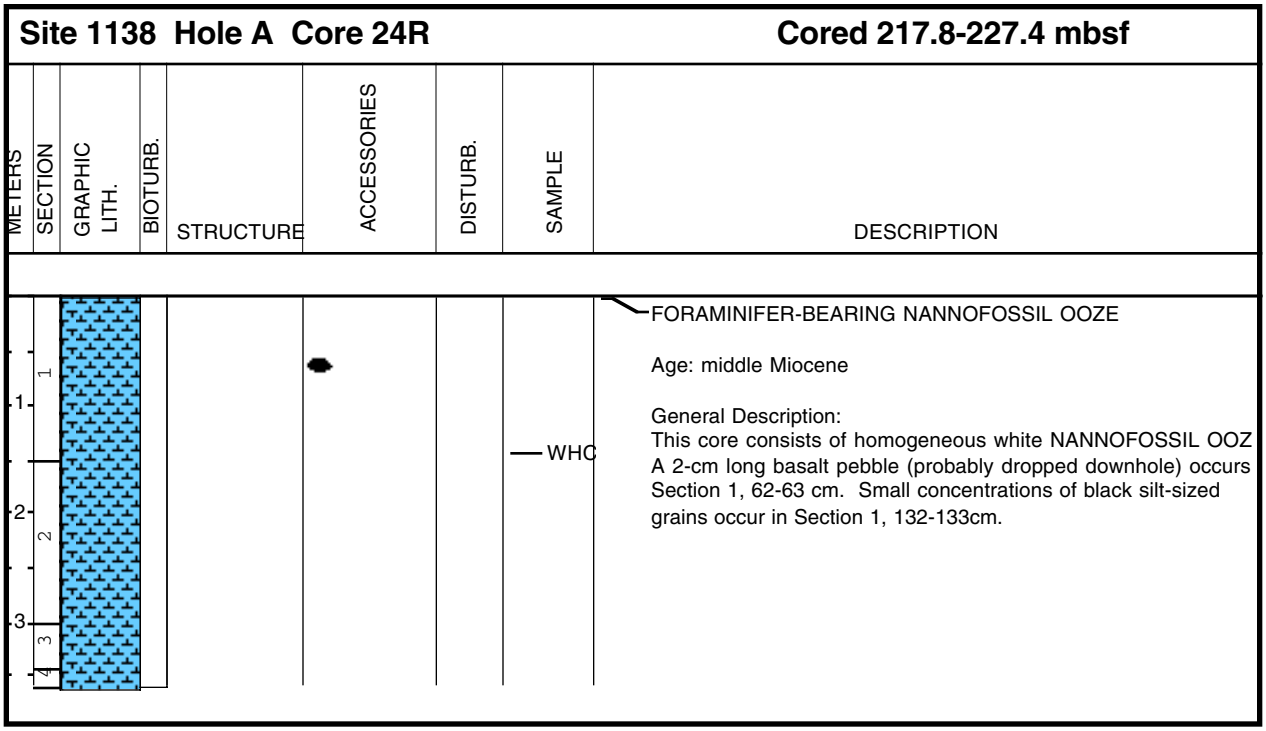


FORAMINIFER-BEARING NANNOFOSSIL OOZE

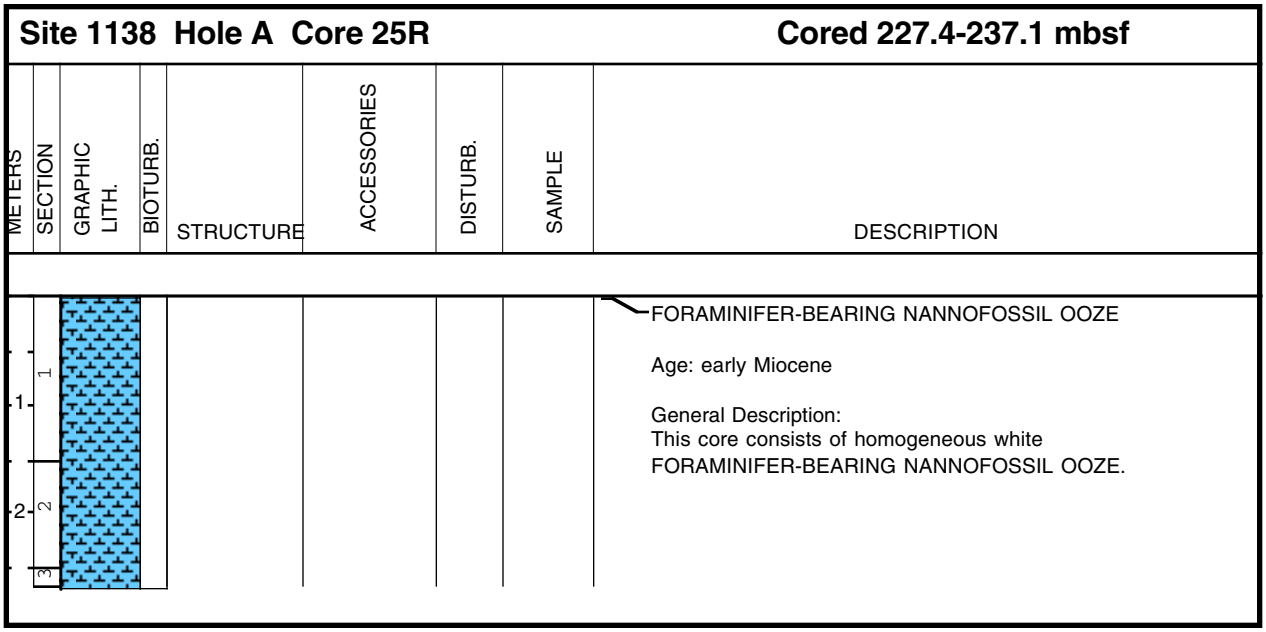
Age: middle Miocene

General Description:
This core consists of white homogeneous FORAMINIFER-BEARING NANNOFOSSIL OOZE.

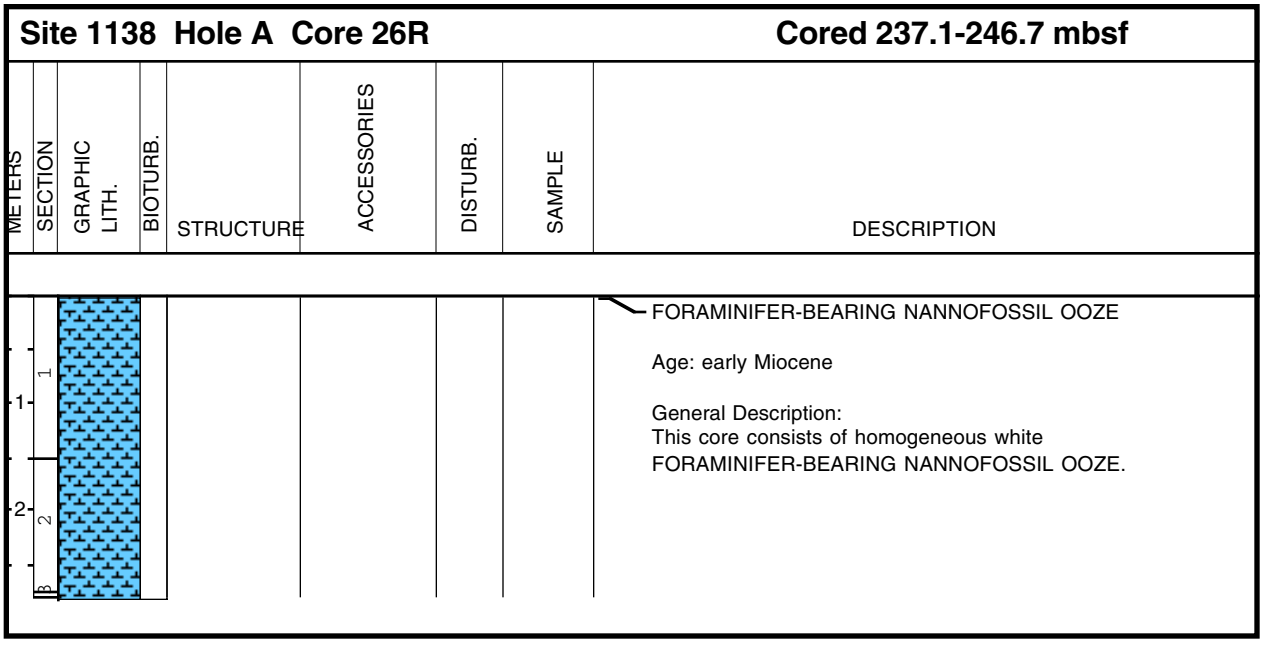
Core Photo


Site 1138 Hole A Core 24R
Cored 217.8-227.4 mbsf
METERS
SECTION
GRAPHIC LITH.
BIOTURB.
STRUCTURE
ACCESSORIES
DISTURB.
SAMPLE
DESCRIPTION
1
2
3
WHC
FORAMINIFER-BEARING NANNOFOSSIL OOZE
Age: middle Miocene
General Description:
This core consists of homogeneous white NANNOFOSSIL OOZ
A 2-cm long basalt pebble (probably dropped downhole) occurs
Section 1, 62-63 cm. Small concentrations of black silt-sized
grains occur in Section 1, 132-133cm.

Core Photo


Site 1138 Hole A Core 25R
Cored 227.4-237.1 mbsf
METERS
SECTION
GRAPHIC LITH.
BIOTURB.
STRUCTURE
ACCESSORIES
DISTURB.
SAMPLE
DESCRIPTION
1
2
1
2
3
FORAMINIFER-BEARING NANNOFOSSIL OOZE
Age: early Miocene
General Description:
This core consists of homogeneous white
FORAMINIFER-BEARING NANNOFOSSIL OOZE.

Core Photo


Site 1138 Hole A Core 26R
Cored 237.1-246.7 mbsf
METERS
SECTION
GRAPHIC LITH.
BIOTURB.
STRUCTURE
ACCESSORIES
DISTURB.
SAMPLE
DESCRIPTION
1
2
FORAMINIFER-BEARING NANNOFOSSIL OOZE
Age: early Miocene
General Description:
This core consists of homogeneous white
FORAMINIFER-BEARING NANNOFOSSIL OOZE.

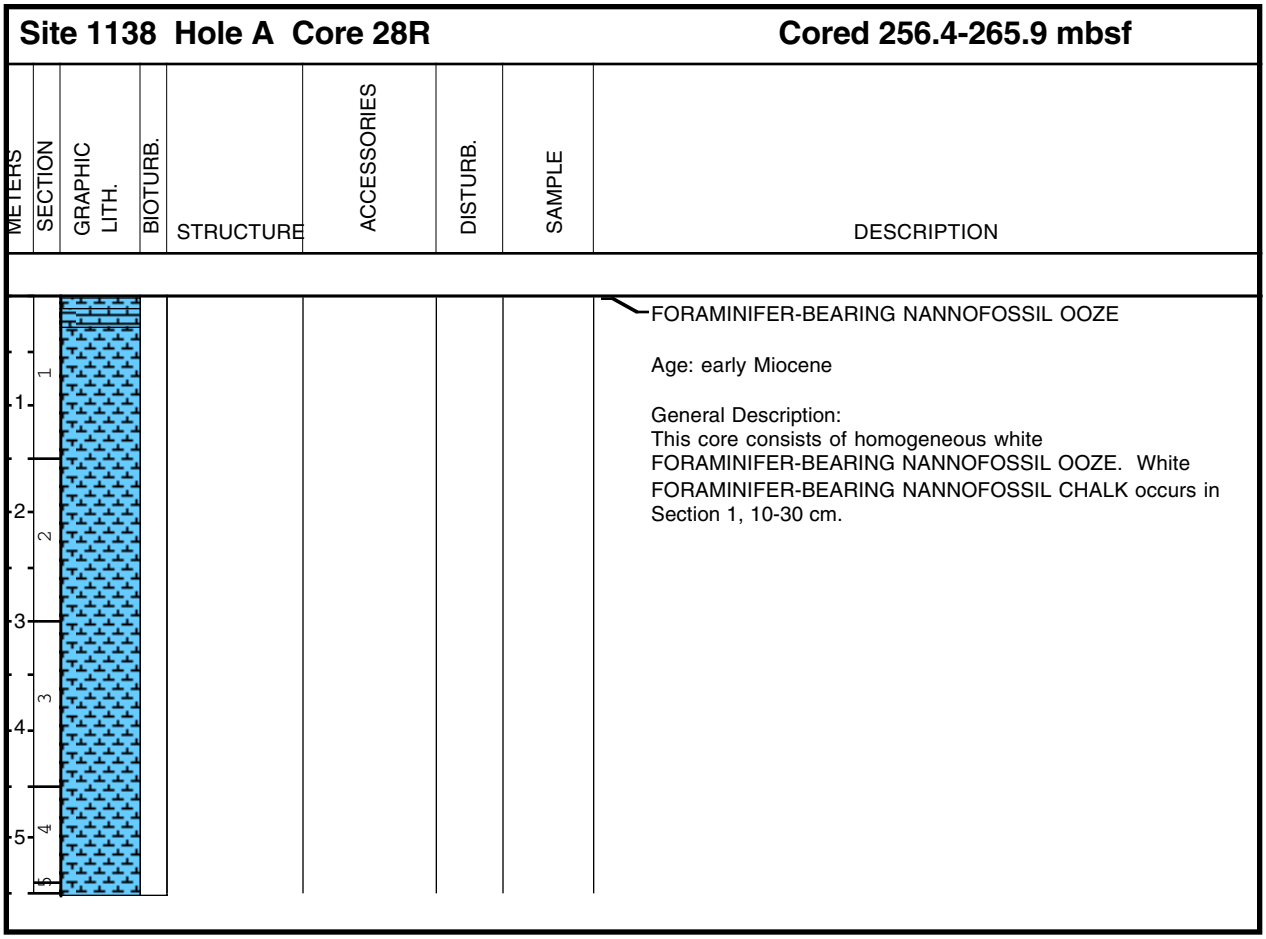
Core Photo

Site 1138 Hole A Core 27R **Cored 246.7-256.4 mbsf**

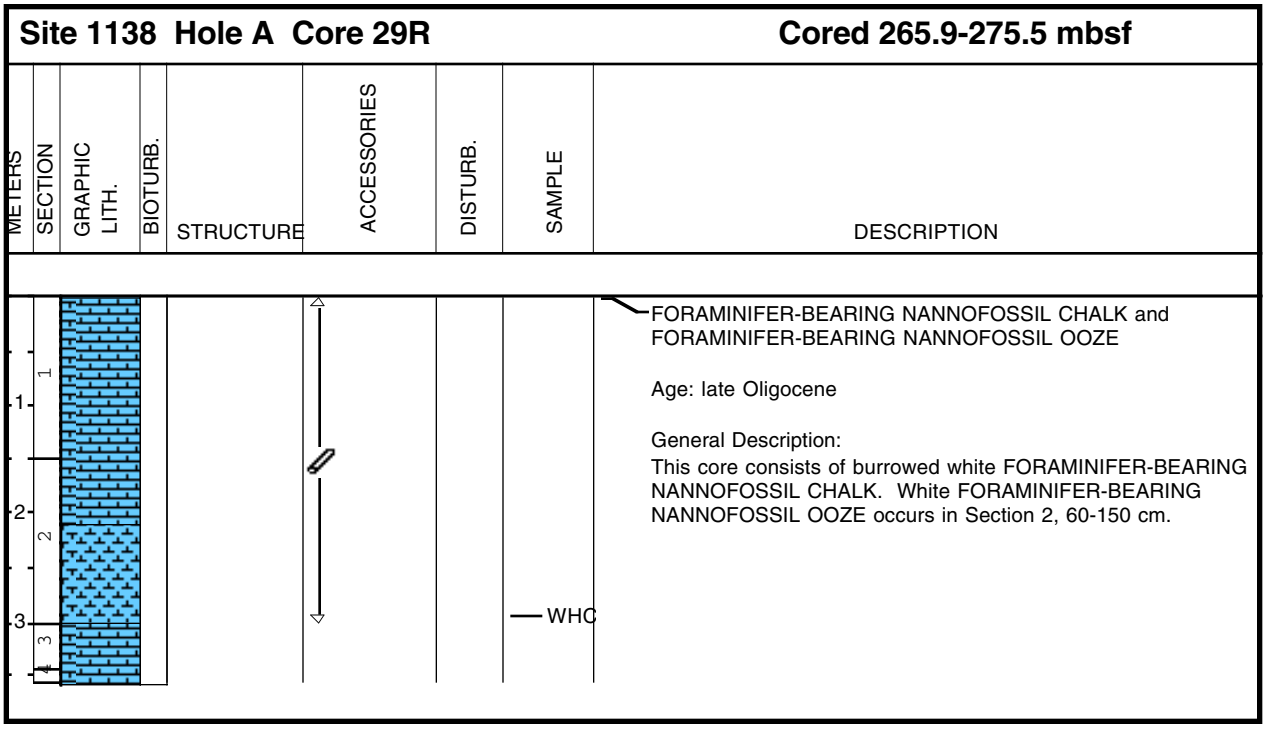
METERS	SECTION	GRAPHIC LITH.	BIOTURB.	STRUCTURE	ACCESSORIES	DISTURB.	SAMPLE	DESCRIPTION
1	1, 2							FORAMINIFER-BEARING NANNOFOSSIL OOZE Age: early Miocene General Description: This core consists of homogeneous white FORAMINIFER-BEARING NANNOFOSSIL OOZE.

Core Photo

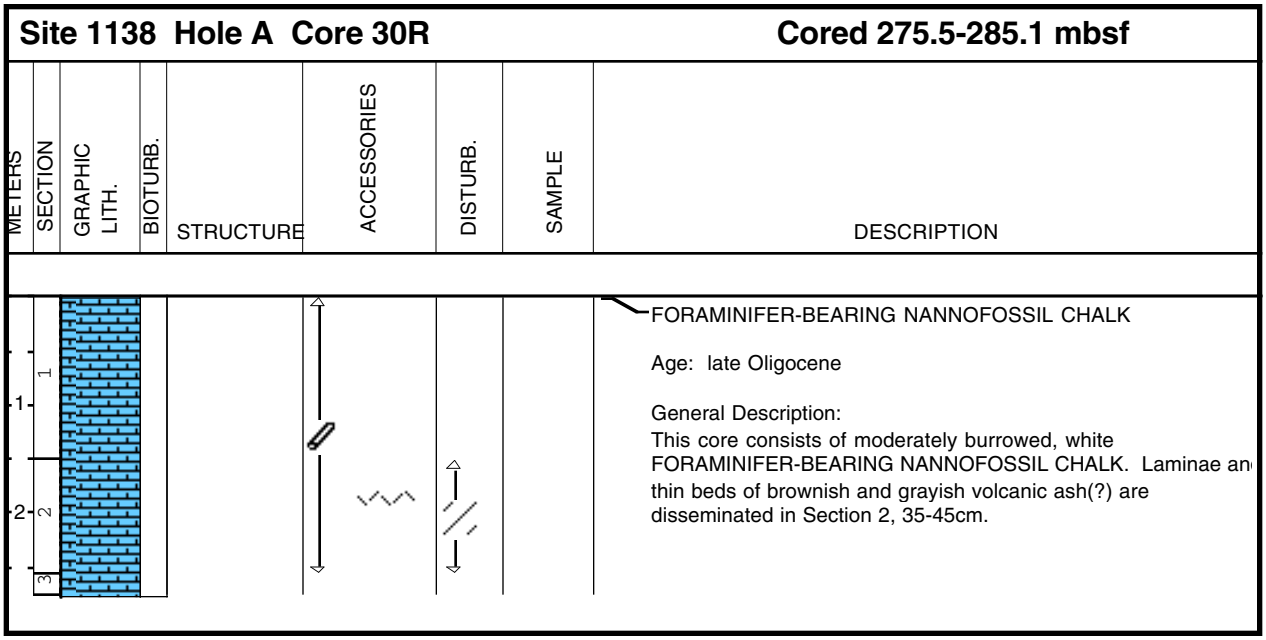
Site 1138 Hole A Core 28R **Cored 256.4-265.9 mbsf**



Core Photo

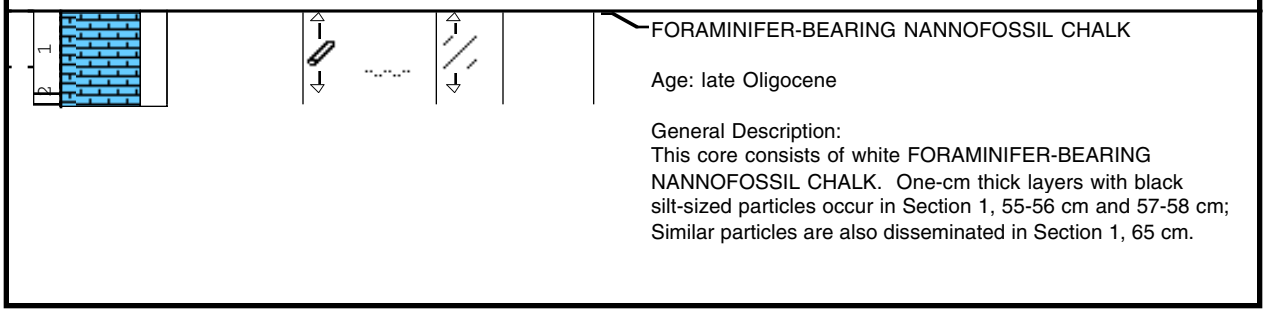

Site 1138 Hole A Core 29R
Cored 265.9-275.5 mbsf
METERS
SECTION
GRAPHIC LITH.
BIOTURB.
STRUCTURE
ACCESSORIES
DISTURB.
SAMPLE
DESCRIPTION
1
2
3
WHC
FORAMINIFER-BEARING NANNOFOSSIL CHALK and
FORAMINIFER-BEARING NANNOFOSSIL OOZE
Age: late Oligocene
General Description:
This core consists of burrowed white FORAMINIFER-BEARING NANNOFOSSIL CHALK. White FORAMINIFER-BEARING NANNOFOSSIL OOZE occurs in Section 2, 60-150 cm.

Core Photo


Site 1138 Hole A Core 30R
Cored 275.5-285.1 mbsf
METERS
SECTION
GRAPHIC LITH.
BIOTURB.
STRUCTURE
ACCESSORIES
DISTURB.
SAMPLE
DESCRIPTION
1
2
1
2
3
FORAMINIFER-BEARING NANNOFOSSIL CHALK
Age: late Oligocene
General Description:
This core consists of moderately burrowed, white FORAMINIFER-BEARING NANNOFOSSIL CHALK. Laminae an
thin beds of brownish and grayish volcanic ash(?) are disseminated in Section 2, 35-45cm.

Core Photo

Site 1138 Hole A Core 31R **Cored 285.1-294.7 mbsf**

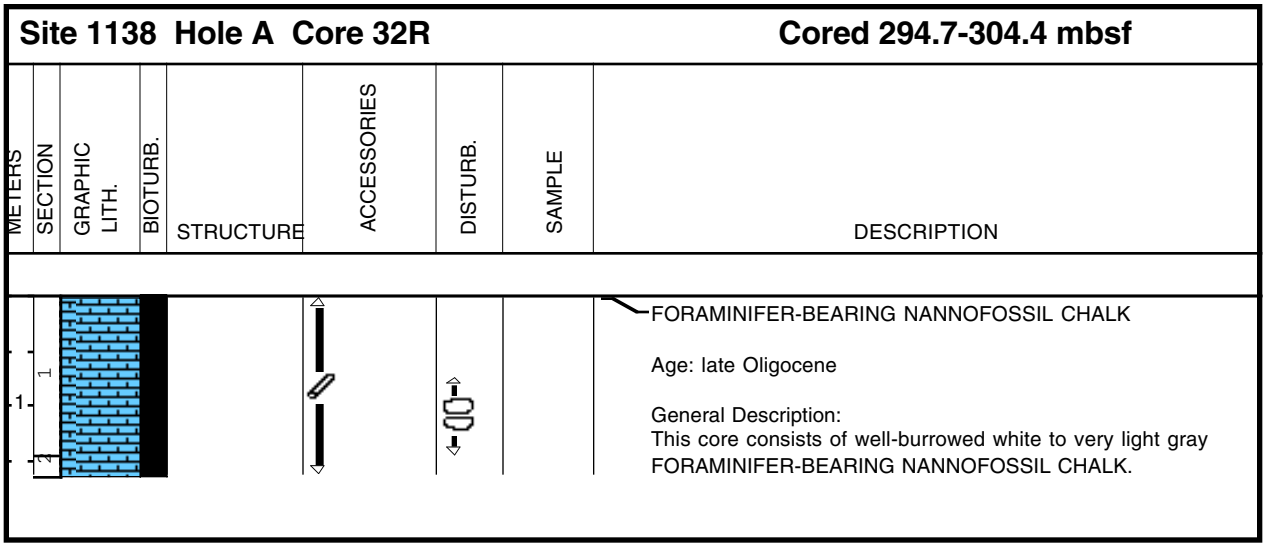


FORAMINIFER-BEARING NANNOFOSSIL CHALK

Age: late Oligocene

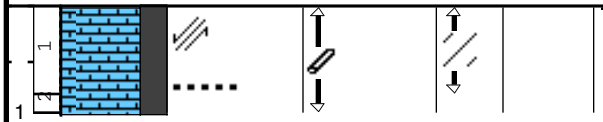
General Description:
This core consists of white FORAMINIFER-BEARING NANNOFOSSIL CHALK. One-cm thick layers with black silt-sized particles occur in Section 1, 55-56 cm and 57-58 cm; Similar particles are also disseminated in Section 1, 65 cm.

Core Photo


Site 1138 Hole A Core 32R
Cored 294.7-304.4 mbsf
METERS
SECTION
GRAPHIC LITH.
BIOTURB.
STRUCTURE
ACCESSORIES
DISTURB.
SAMPLE
DESCRIPTION
1
1
2
FORAMINIFER-BEARING NANNOFOSSIL CHALK
Age: late Oligocene
General Description:
This core consists of well-burrowed white to very light gray FORAMINIFER-BEARING NANNOFOSSIL CHALK.

Core Photo

Site 1138 Hole A Core 33R **Cored 304.4-314.1 mbsf**

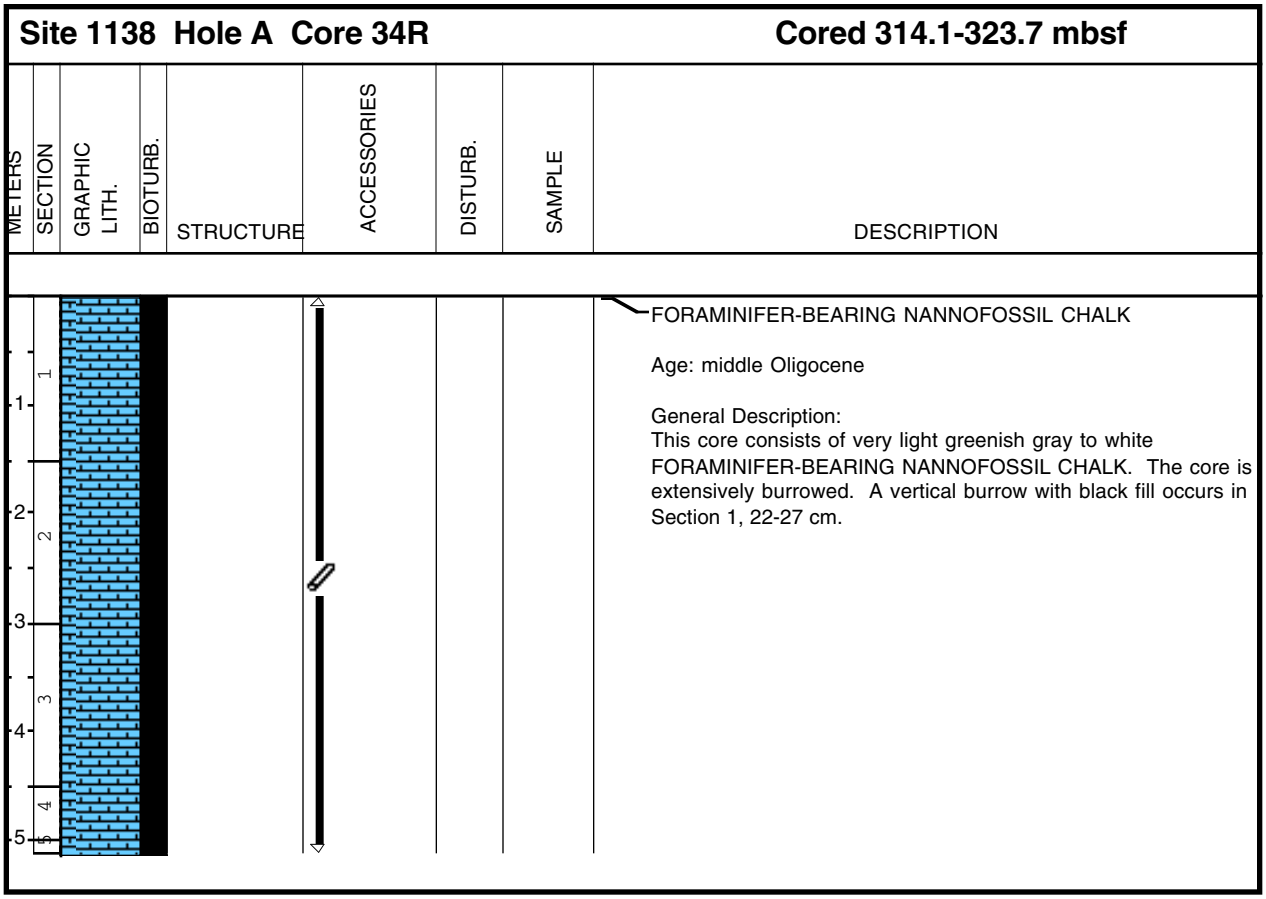


FORAMINIFER-BEARING NANNOFOSSIL CHALK

Age: late Oligocene

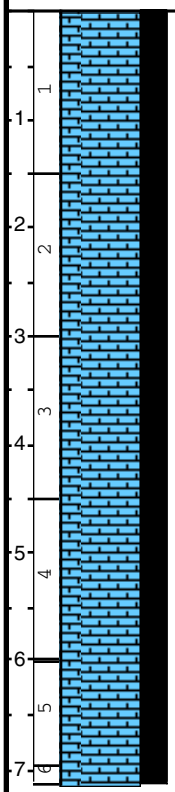
General Description:
This core consists of well-burrowed very light greenish gray to white FORAMINIFER-BEARING NANNOFOSSIL CHALK. Faint laminations in Section 1, 74-75 cm may be burrows.

Core Photo


Site 1138 Hole A Core 34R
Cored 314.1-323.7 mbsf
METERS
SECTION
GRAPHIC LITH.
BIOTURB.
STRUCTURE
ACCESSORIES
DISTURB.
SAMPLE
DESCRIPTION
FORAMINIFER-BEARING NANNOFOSSIL CHALK
Age: middle Oligocene
General Description:
This core consists of very light greenish gray to white FORAMINIFER-BEARING NANNOFOSSIL CHALK. The core is extensively burrowed. A vertical burrow with black fill occurs in Section 1, 22-27 cm.

Core Photo

Site 1138 Hole A Core 35R **Cored 323.7-333 mbsf**



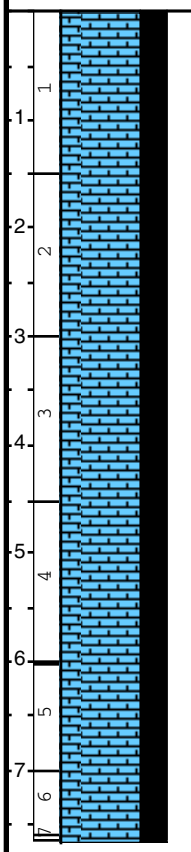
FORAMINIFER-BEARING NANNOFOSSIL CHALK

Age: middle Oligocene

General Description:
This core consists of light greenish gray to white FORAMINIFER-BEARING NANNOFOSSIL CHALK. The entire core is extensively burrowed. Black fine silt is sparsely disseminated throughout. Color variation occurs through the core. The darker intervals occur in Section 1, 50-135 cm; Section 2, 4-15 cm, 70-85 cm, 128-136 cm, and 141-150 cm; Section 3, 0-24 cm and 35-42 cm; Section 4, 21-55 cm, 89-104 cm, and 138-150 cm; and Section 5, 54-80 cm.

Core Photo

Site 1138 Hole A Core 36R **Cored 333-342.6 mbsf**



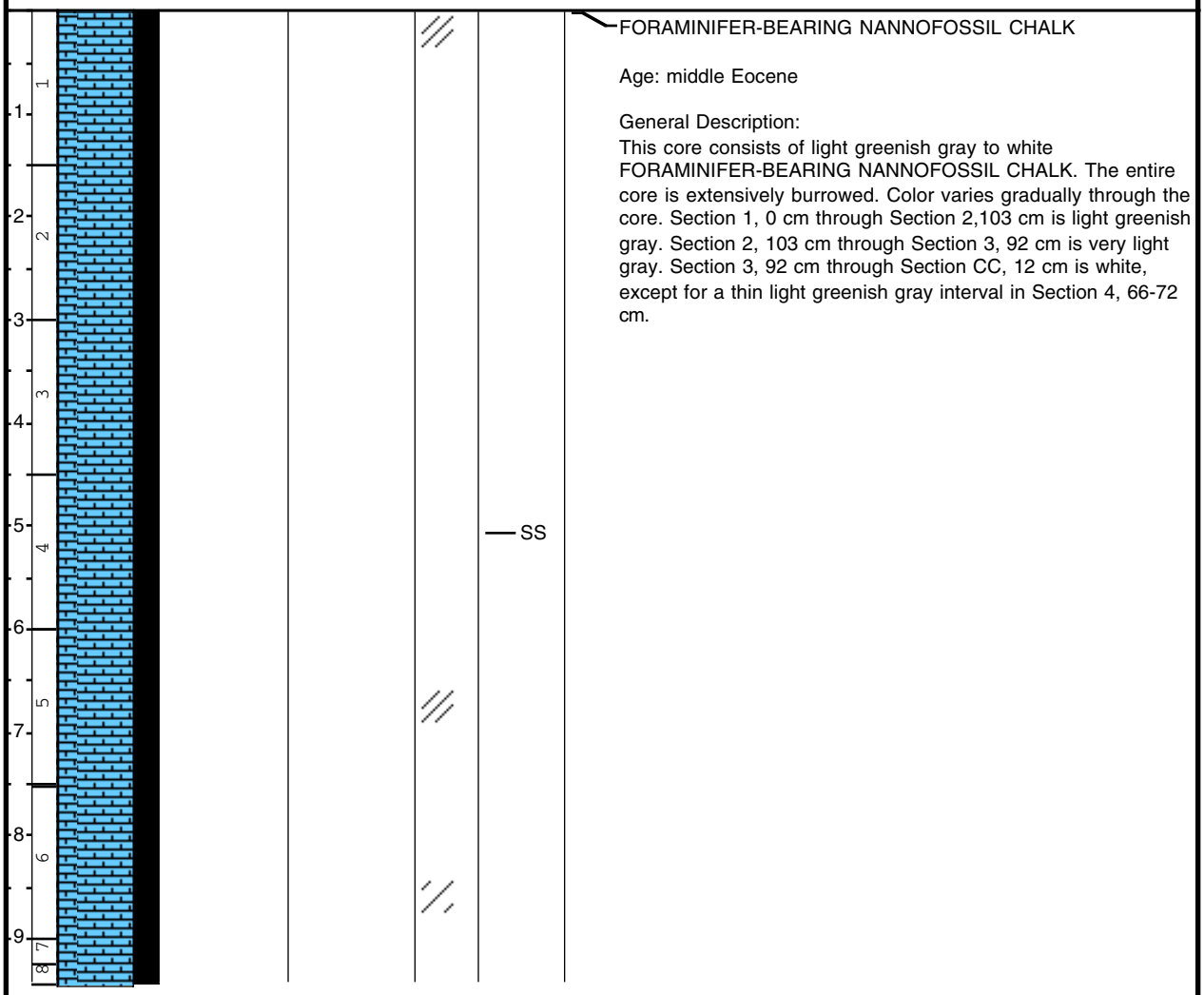
FORAMINIFER-BEARING NANNOFOSSIL CHALK

Age: late Eocene to early Oligocene

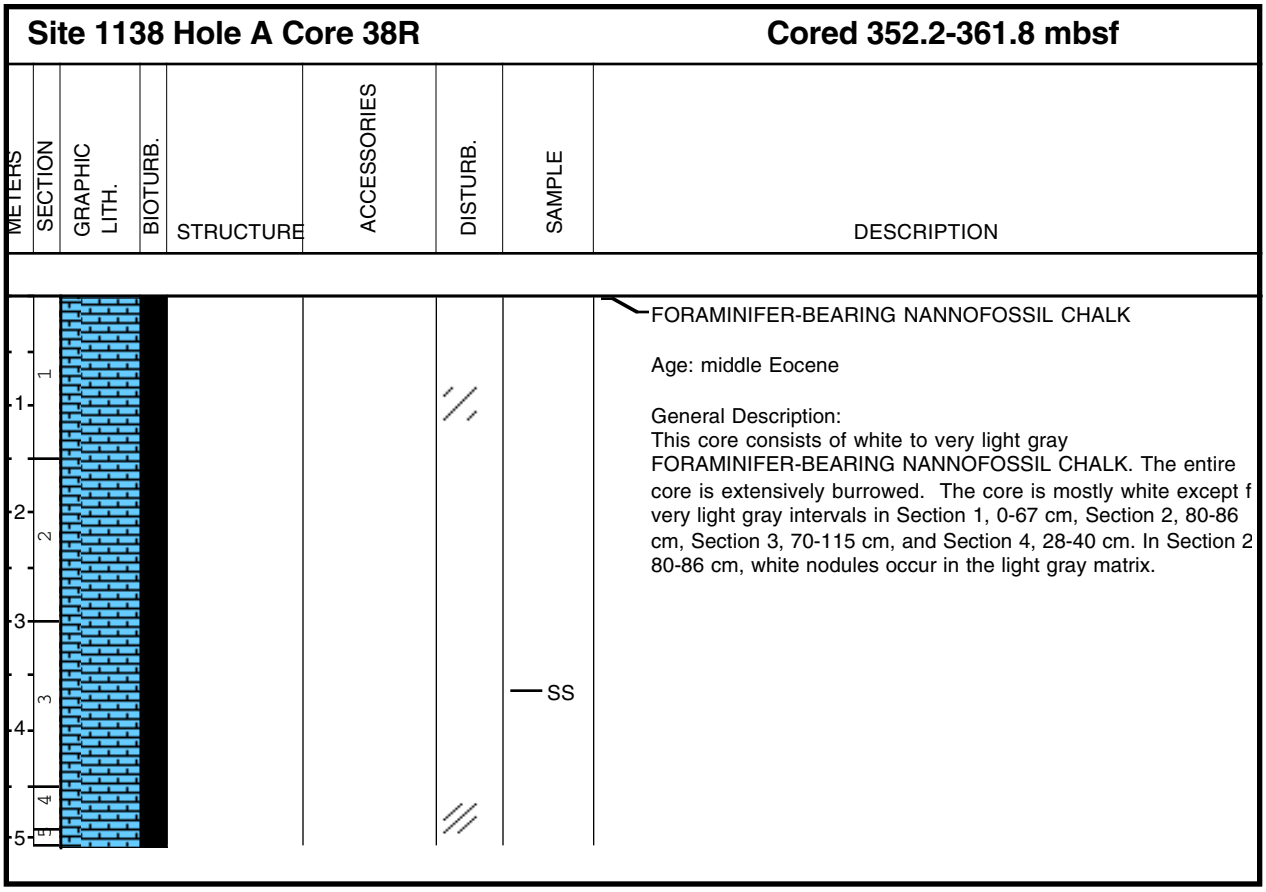
General Description:
This core consists of very light greenish gray to white FORAMINIFER-BEARING NANNOFOSSIL CHALK. The entire core is extensively burrowed. Black fine silt is sparsely disseminated throughout. Some foraminifers are filled with green material. Color variation occurs throughout the core. Dark intervals occur in Section 1, 5-10 cm (dark green) and Section 1, 60-77 cm, 102-110 cm, and 140-150 cm (slightly dark). A light interval occurs in Section 4, 117-127 cm. Section 5, 75-102 cm is light gray.

Core Photo

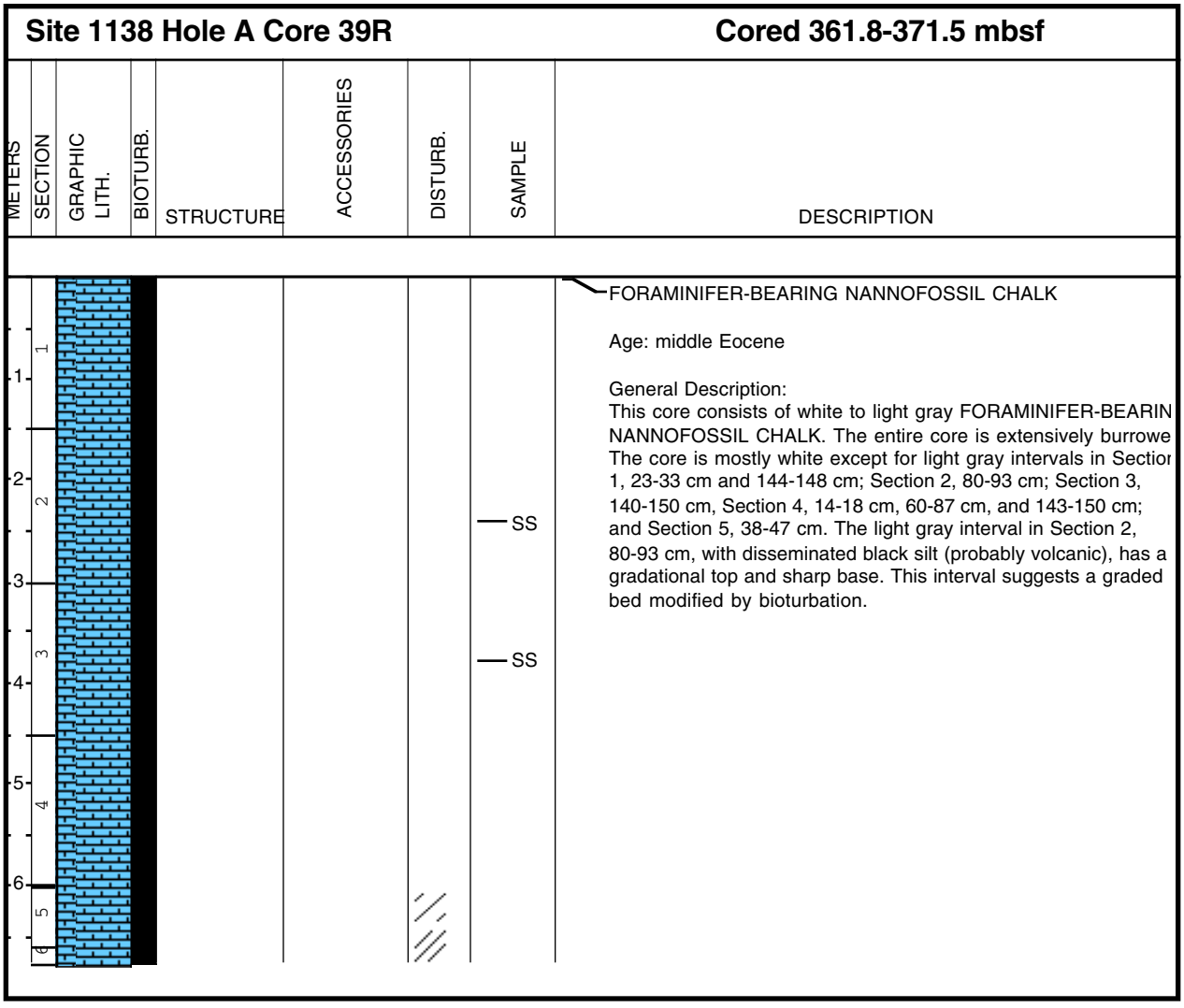
Site 1138 Hole A Core 37R **Cored 342.6-352.2 mbsf**



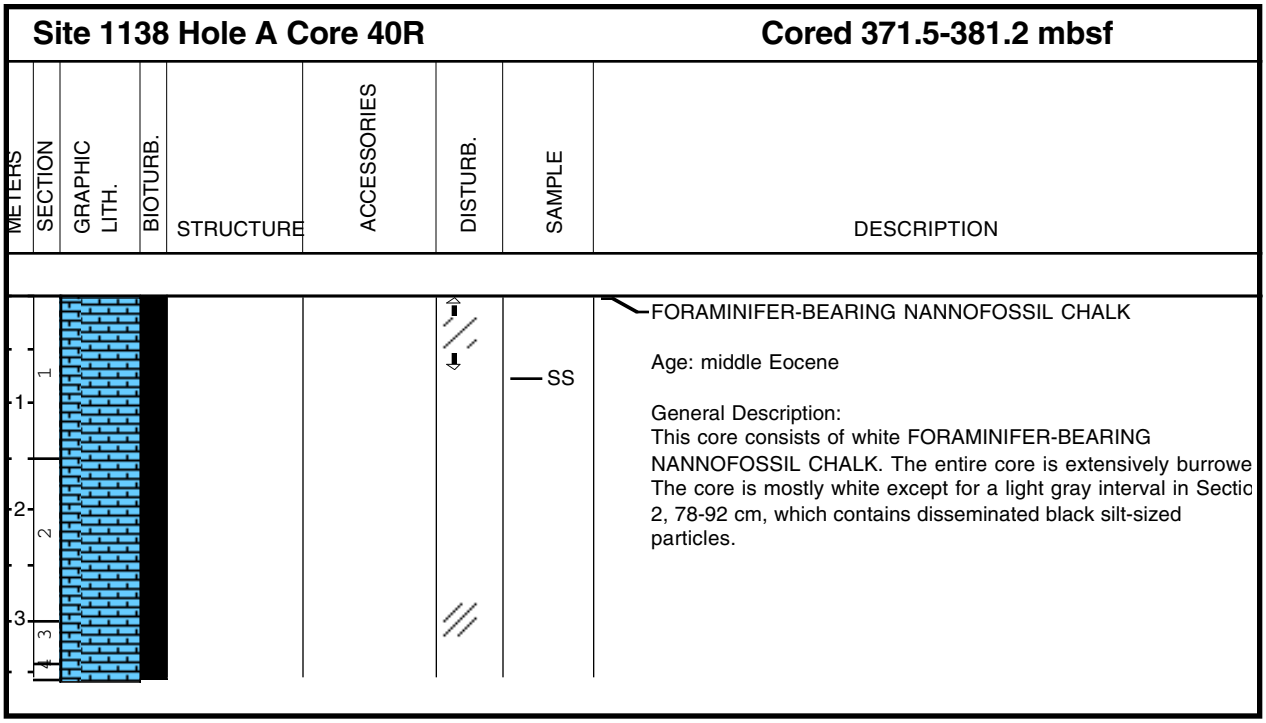
Core Photo


Site 1138 Hole A Core 38R
Cored 352.2-361.8 mbsf
METERS
SECTION
GRAPHIC LITH.
BIOTURB.
STRUCTURE
ACCESSORIES
DISTURB.
SAMPLE
DESCRIPTION
1
2
3
4
5
SS
FORAMINIFER-BEARING NANNOFOSSIL CHALK
Age: middle Eocene
General Description:
This core consists of white to very light gray FORAMINIFER-BEARING NANNOFOSSIL CHALK. The entire core is extensively burrowed. The core is mostly white except f very light gray intervals in Section 1, 0-67 cm, Section 2, 80-86 cm, Section 3, 70-115 cm, and Section 4, 28-40 cm. In Section 2 80-86 cm, white nodules occur in the light gray matrix.

Core Photo

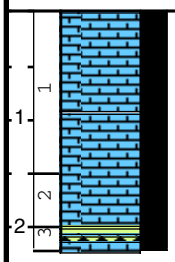

Site 1138 Hole A Core 39R
Cored 361.8-371.5 mbsf
METERS
SECTION
GRAPHIC LITH.
BIOTURB.
STRUCTURE
ACCESSORIES
DISTURB.
SAMPLE
DESCRIPTION
FORAMINIFER-BEARING NANNOFOSSIL CHALK
Age: middle Eocene
General Description:
This core consists of white to light gray FORAMINIFER-BEARIN
NANNOFOSSIL CHALK. The entire core is extensively burrowe
The core is mostly white except for light gray intervals in Sectio
1, 23-33 cm and 144-148 cm; Section 2, 80-93 cm; Section 3,
140-150 cm, Section 4, 14-18 cm, 60-87 cm, and 143-150 cm;
and Section 5, 38-47 cm. The light gray interval in Section 2,
80-93 cm, with disseminated black silt (probably volcanic), has a
gradational top and sharp base. This interval suggests a graded
bed modified by bioturbation.
SS
SS

Core Photo


Site 1138 Hole A Core 40R
Cored 371.5-381.2 mbsf
METERS
SECTION
GRAPHIC LITH.
BIOTURB.
STRUCTURE
ACCESSORIES
DISTURB.
SAMPLE
DESCRIPTION
1
2
3
SS
FORAMINIFER-BEARING NANNOFOSSIL CHALK
Age: middle Eocene
General Description:
This core consists of white FORAMINIFER-BEARING NANNOFOSSIL CHALK. The entire core is extensively burrowe
The core is mostly white except for a light gray interval in Sectio
2, 78-92 cm, which contains disseminated black silt-sized particles.

Core Photo

Site 1138 Hole A Core 41R **Cored 381.2-390.8 mbsf**



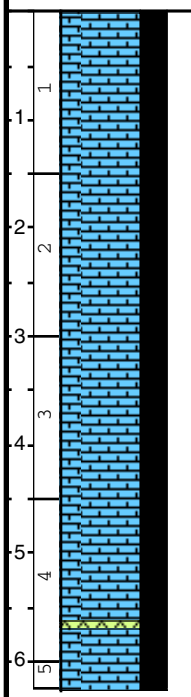
FORAMINIFER-BEARING NANNOFOSSIL CHALK, CHERT and PORCELLANITE

Age: middle Eocene

General Description:
This core consists of white FORAMINIFER-BEARING NANNOFOSSIL CHALK. The entire core is extensively burrowe Section 1, 65-81 cm contains disseminated black fine silt (probably volcanic). Section 1, 80-81 cm is laminated. Section CC contains brown CHERT, with granule-sized round blebs of residual CHALK (~5%), and light gray PORCELLANITE. The CHERT-PORCELLANITE contact is sharp and cuspate, whereas the PORCELLANITE-CHALK contact is sharp and flat.

Core Photo

Site 1138 Hole A Core 42R **Cored 390.8-400.4 mbsf**

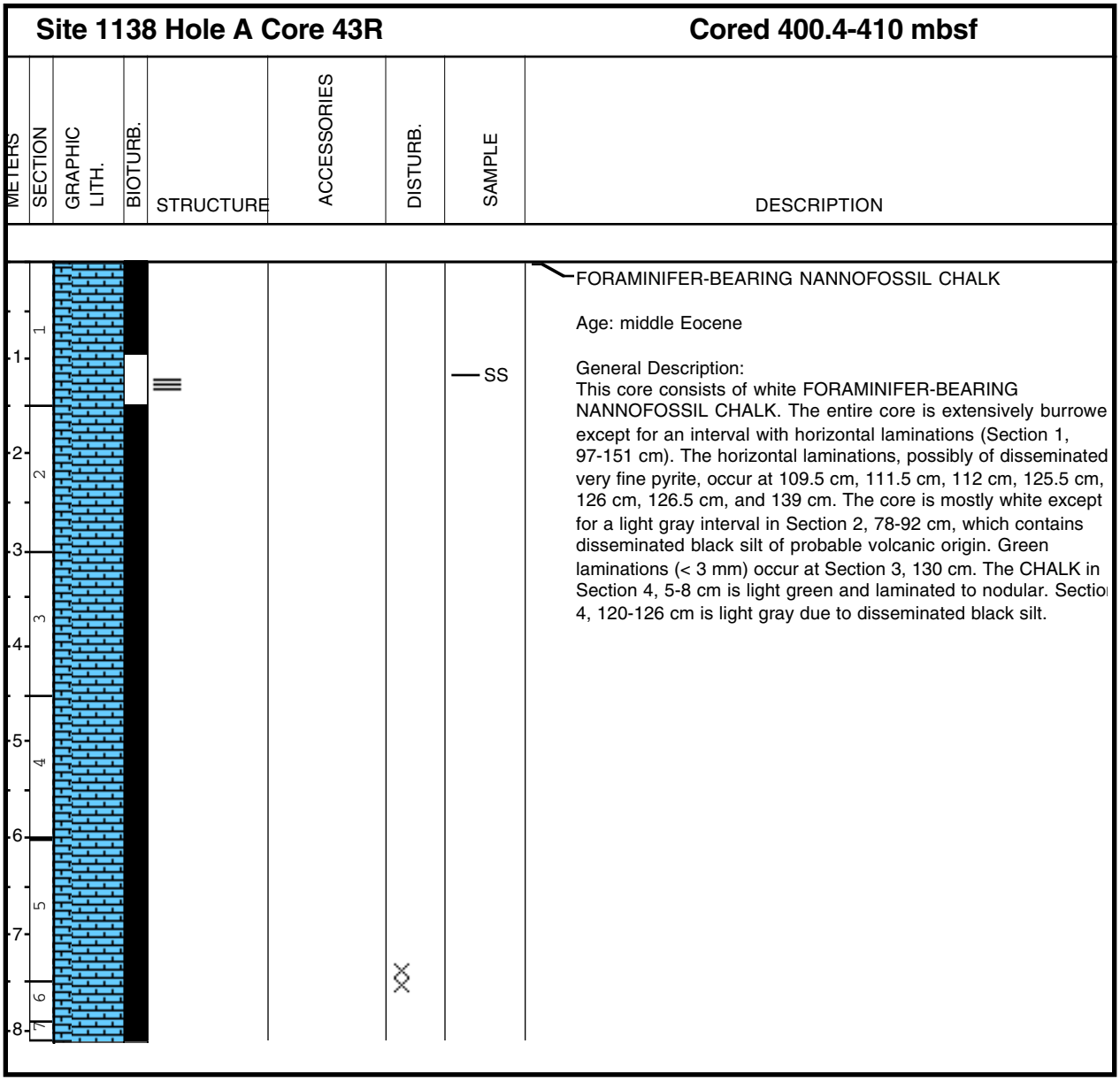


FORAMINIFER-BEARING NANNOFOSSIL CHALK

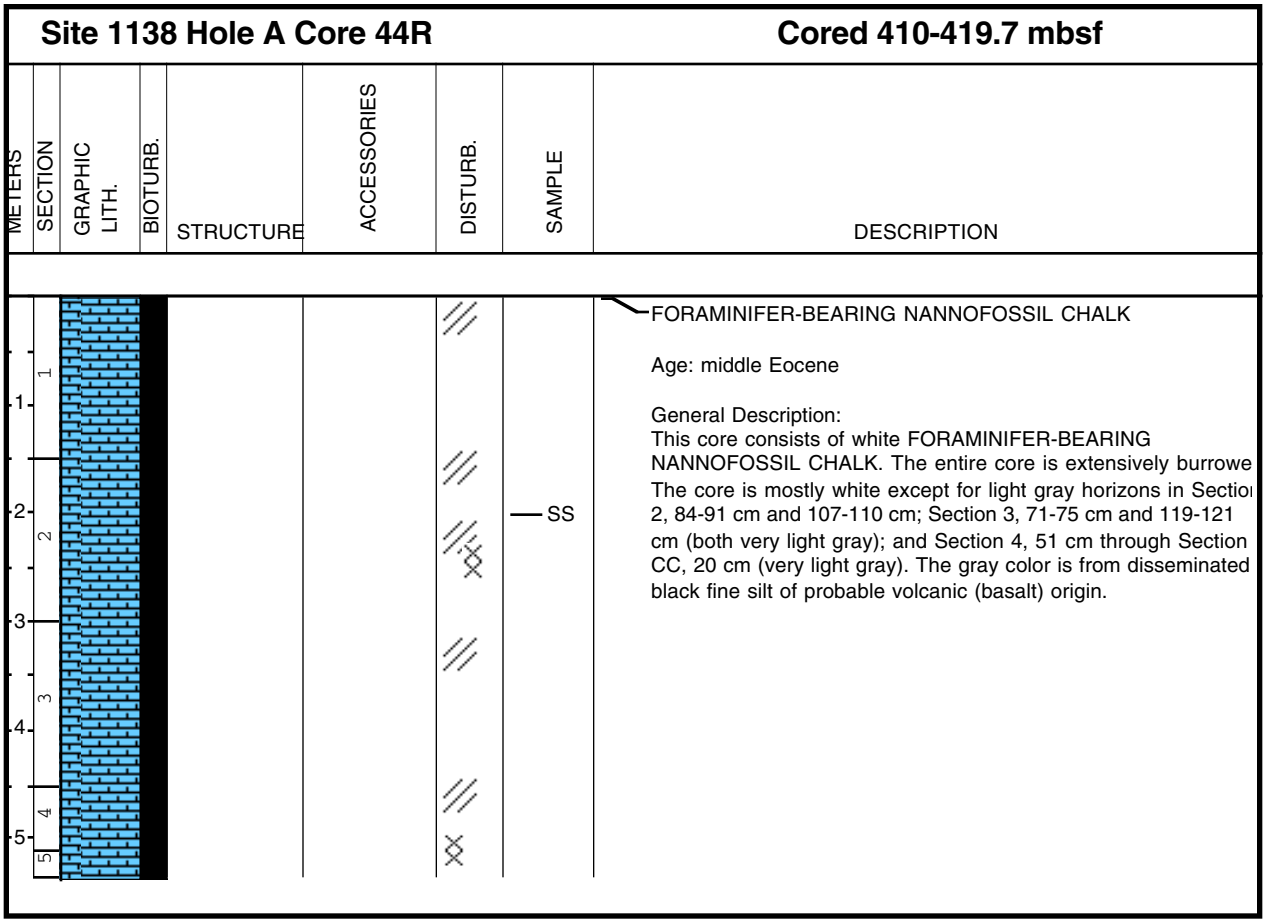
Age: middle Eocene

General Description:
This core consists of white FORAMINIFER-BEARING NANNOFOSSIL CHALK. The entire core is extensively burrowe The core is mostly white except for gray intervals in Section 1, 53-57 cm (dark gray); Section 1, 72-79 cm (gray zone with sharp base); Section 2, 74-85 cm and 111-117 cm (light gray zones); and Section 4, 51-52 cm (1.5 cm irregular laminated light green bed). PORCELLANITE occurs in Section 4, 114-120 cm.

Core Photo

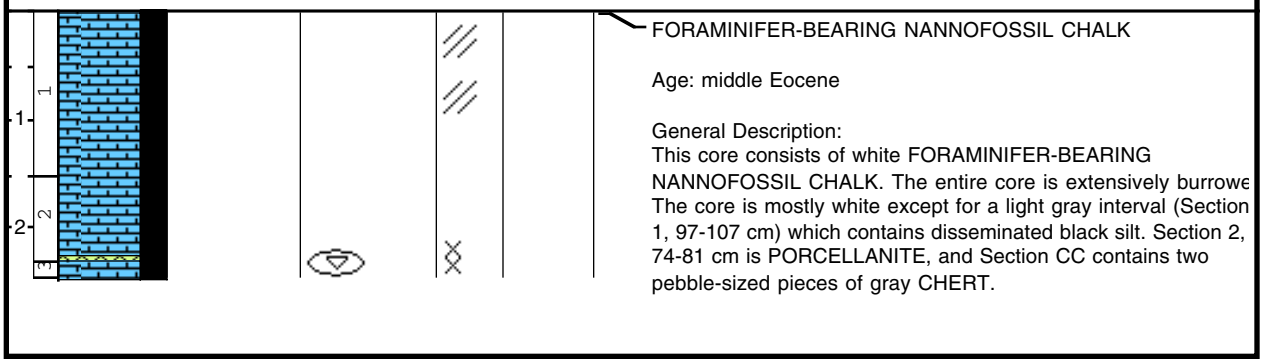

Site 1138 Hole A Core 43R
Cored 400.4-410 mbsf
METERS
SECTION
GRAPHIC LITH.
BIOTURB.
STRUCTURE
ACCESSORIES
DISTURB.
SAMPLE
DESCRIPTION
SS
FORAMINIFER-BEARING NANNOFOSSIL CHALK
Age: middle Eocene
General Description:
This core consists of white FORAMINIFER-BEARING NANNOFOSSIL CHALK. The entire core is extensively burrowe except for an interval with horizontal laminations (Section 1, 97-151 cm). The horizontal laminations, possibly of disseminated very fine pyrite, occur at 109.5 cm, 111.5 cm, 112 cm, 125.5 cm, 126 cm, 126.5 cm, and 139 cm. The core is mostly white except for a light gray interval in Section 2, 78-92 cm, which contains disseminated black silt of probable volcanic origin. Green laminations (< 3 mm) occur at Section 3, 130 cm. The CHALK in Section 4, 5-8 cm is light green and laminated to nodular. Sectio 4, 120-126 cm is light gray due to disseminated black silt.

Core Photo

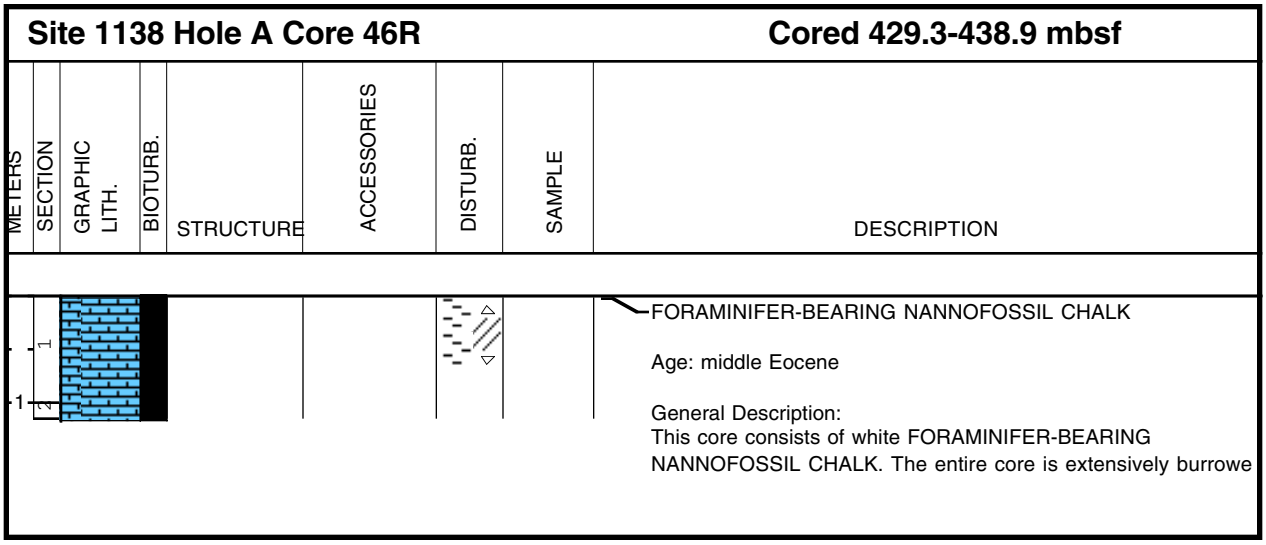

Site 1138 Hole A Core 44R
Cored 410-419.7 mbsf
METERS
SECTION
GRAPHIC LITH.
BIOTURB.
STRUCTURE
ACCESSORIES
DISTURB.
SAMPLE
DESCRIPTION
SS
FORAMINIFER-BEARING NANNOFOSSIL CHALK
Age: middle Eocene
General Description:
This core consists of white FORAMINIFER-BEARING NANNOFOSSIL CHALK. The entire core is extensively burrowe
The core is mostly white except for light gray horizons in Sectio
2, 84-91 cm and 107-110 cm; Section 3, 71-75 cm and 119-121 cm (both very light gray); and Section 4, 51 cm through Section CC, 20 cm (very light gray). The gray color is from disseminated black fine silt of probable volcanic (basalt) origin.

Core Photo

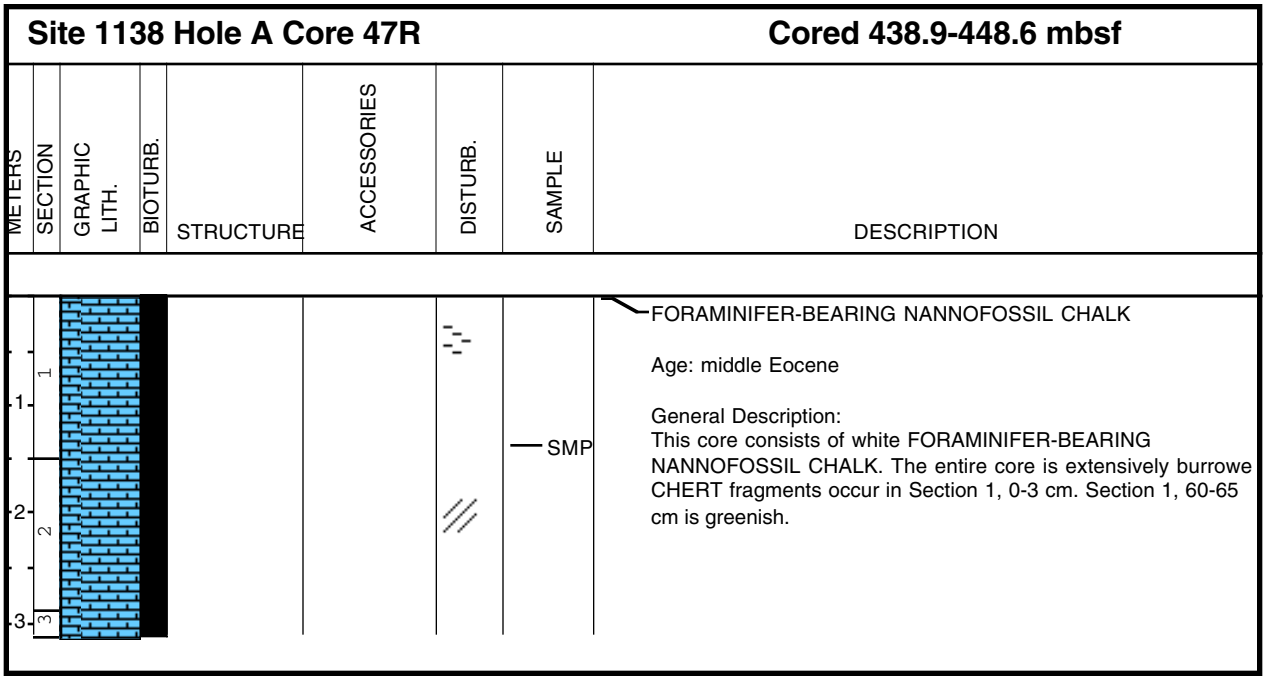
Site 1138 Hole A Core 45R **Cored 419.7-429.3 mbsf**



Core Photo

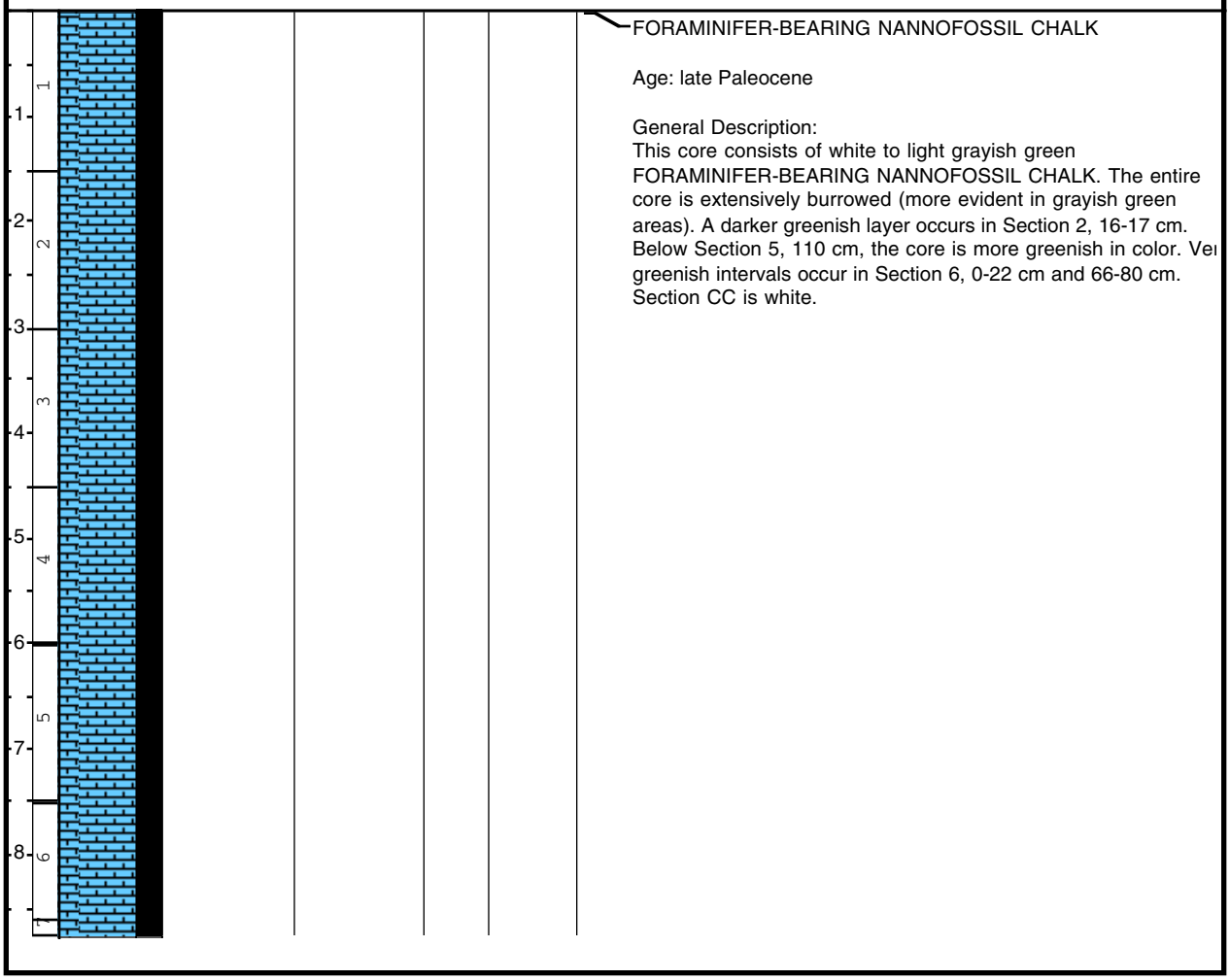

Site 1138 Hole A Core 46R
Cored 429.3-438.9 mbsf
METERS
SECTION
GRAPHIC LITH.
BIOTURB.
STRUCTURE
ACCESSORIES
DISTURB.
SAMPLE
DESCRIPTION
1
1
1
4
FORAMINIFER-BEARING NANNOFOSSIL CHALK
Age: middle Eocene
General Description:
This core consists of white FORAMINIFER-BEARING
NANNOFOSSIL CHALK. The entire core is extensively burrowe

Core Photo

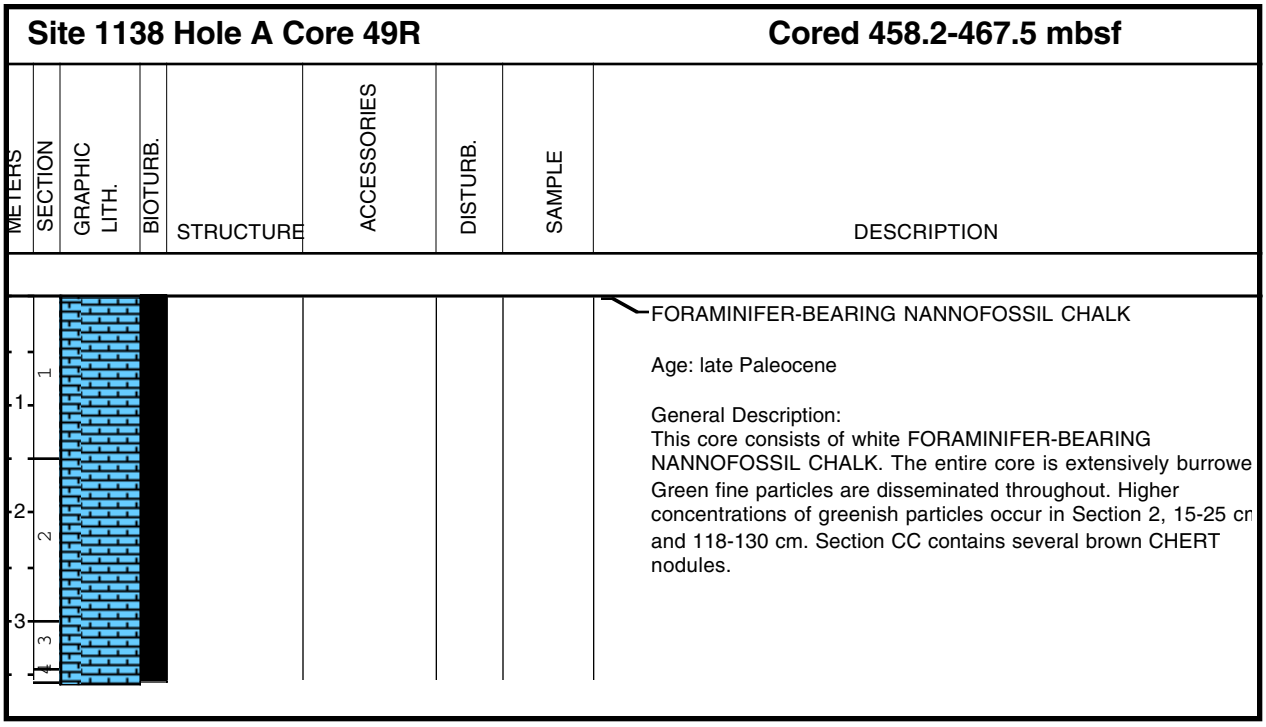

Site 1138 Hole A Core 47R
Cored 438.9-448.6 mbsf
METERS
SECTION
GRAPHIC LITH.
BIOTURB.
STRUCTURE
ACCESSORIES
DISTURB.
SAMPLE
DESCRIPTION
1
2
3
SMP
FORAMINIFER-BEARING NANNOFOSSIL CHALK
Age: middle Eocene
General Description:
This core consists of white FORAMINIFER-BEARING NANNOFOSSIL CHALK. The entire core is extensively burrowe
CHERT fragments occur in Section 1, 0-3 cm. Section 1, 60-65 cm is greenish.

Core Photo

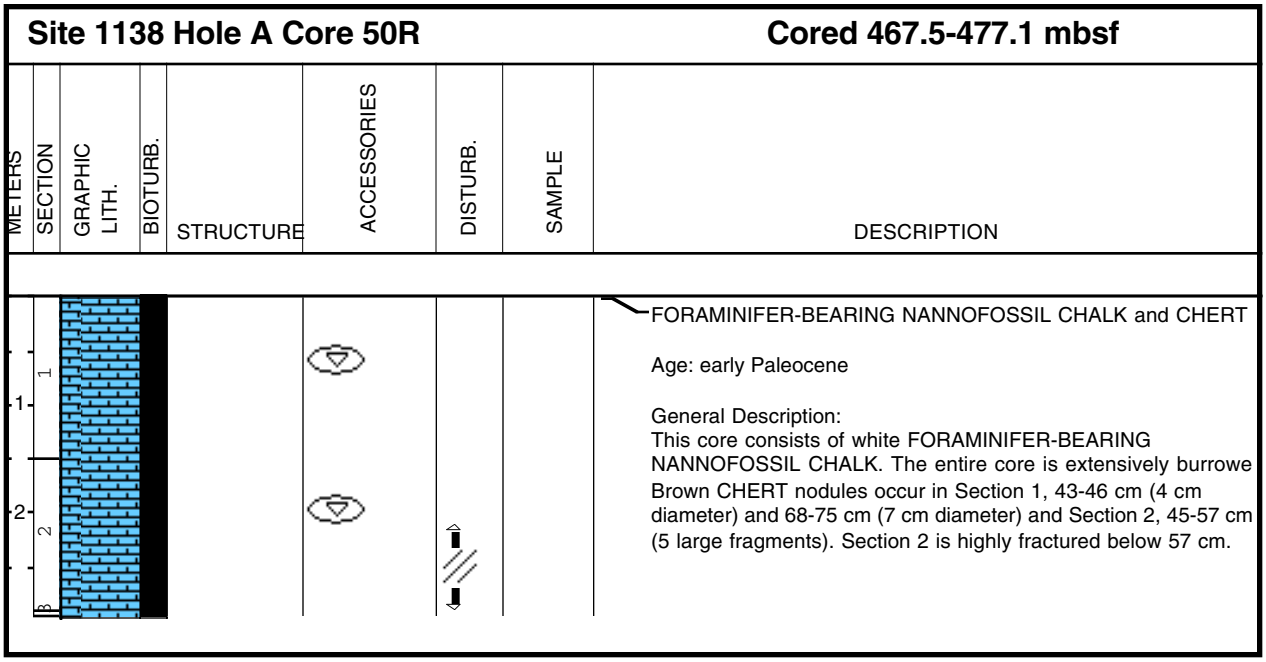
Site 1138 Hole A Core 48R **Cored 448.6-458.2 mbsf**



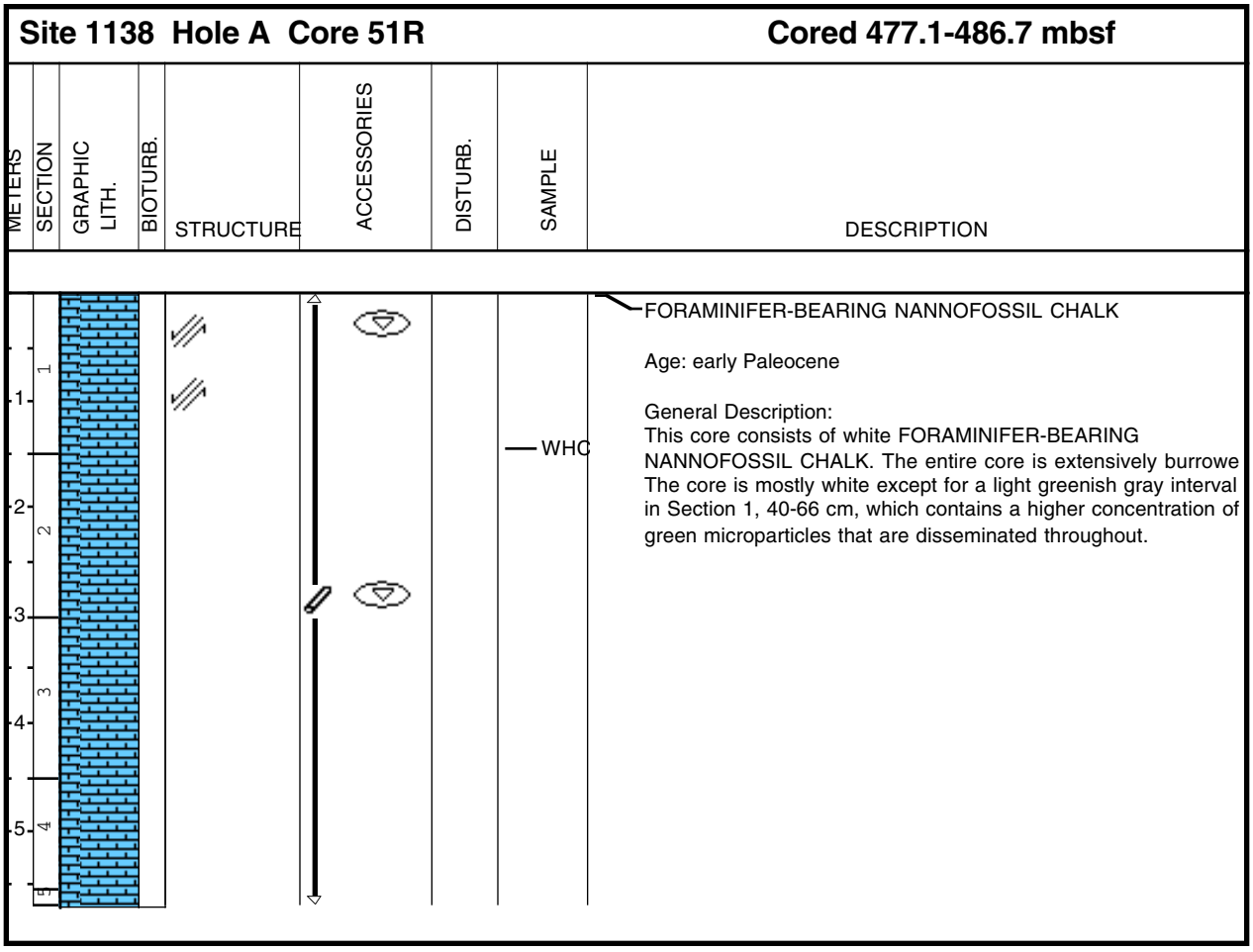
Core Photo


Site 1138 Hole A Core 49R
Cored 458.2-467.5 mbsf
METERS
SECTION
GRAPHIC LITH.
BIOTURB.
STRUCTURE
ACCESSORIES
DISTURB.
SAMPLE
DESCRIPTION
1
2
3
FORAMINIFER-BEARING NANNOFOSSIL CHALK
Age: late Paleocene
General Description:
This core consists of white FORAMINIFER-BEARING NANNOFOSSIL CHALK. The entire core is extensively burrowe
Green fine particles are disseminated throughout. Higher concentrations of greenish particles occur in Section 2, 15-25 cr
and 118-130 cm. Section CC contains several brown CHERT nodules.

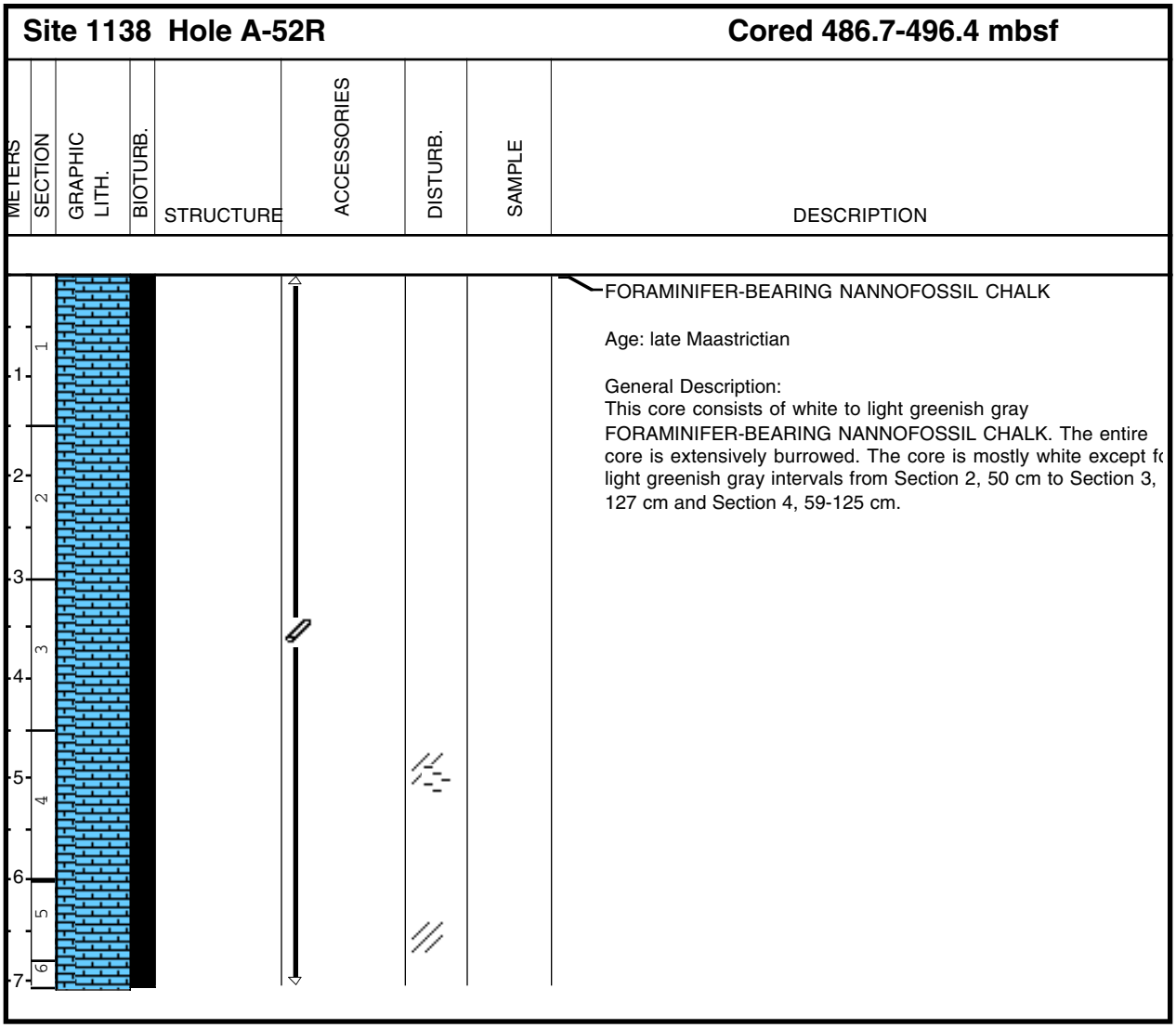
Core Photo


Site 1138 Hole A Core 50R
Cored 467.5-477.1 mbsf
METERS
SECTION
GRAPHIC LITH.
BIOTURB.
STRUCTURE
ACCESSORIES
DISTURB.
SAMPLE
DESCRIPTION
1
2
1
2
CC
FORAMINIFER-BEARING NANNOFOSSIL CHALK and CHERT
Age: early Paleocene
General Description:
This core consists of white FORAMINIFER-BEARING NANNOFOSSIL CHALK. The entire core is extensively burrowe
Brown CHERT nodules occur in Section 1, 43-46 cm (4 cm diameter) and 68-75 cm (7 cm diameter) and Section 2, 45-57 cm (5 large fragments). Section 2 is highly fractured below 57 cm.

Core Photo

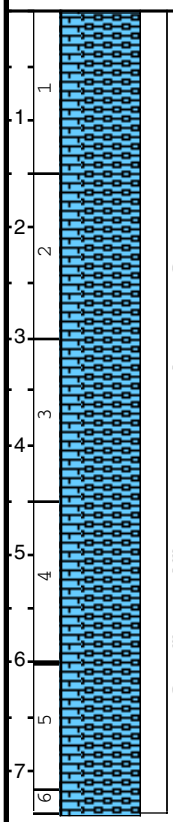

Site 1138 Hole A Core 51R
Cored 477.1-486.7 mbsf
METERS
SECTION
GRAPHIC LITH.
BIOTURB.
STRUCTURE
ACCESSORIES
DISTURB.
SAMPLE
DESCRIPTION
1
2
3
4
5
WHC
FORAMINIFER-BEARING NANNOFOSSIL CHALK
Age: early Paleocene
General Description:
This core consists of white FORAMINIFER-BEARING NANNOFOSSIL CHALK. The entire core is extensively burrowe
The core is mostly white except for a light greenish gray interval in Section 1, 40-66 cm, which contains a higher concentration of green microparticles that are disseminated throughout.

Core Photo


Site 1138 Hole A-52R
Cored 486.7-496.4 mbsf
METERS
SECTION
GRAPHIC LITH.
BIOTURB.
STRUCTURE
ACCESSORIES
DISTURB.
SAMPLE
DESCRIPTION
FORAMINIFER-BEARING NANNOFOSSIL CHALK
Age: late Maastrictian
General Description:
This core consists of white to light greenish gray
FORAMINIFER-BEARING NANNOFOSSIL CHALK. The entire
core is extensively burrowed. The core is mostly white except fo
light greenish gray intervals from Section 2, 50 cm to Section 3,
127 cm and Section 4, 59-125 cm.

Core Photo

Site 1138 Hole A Core 53R **Cored 496.4-505.6 mbsf**

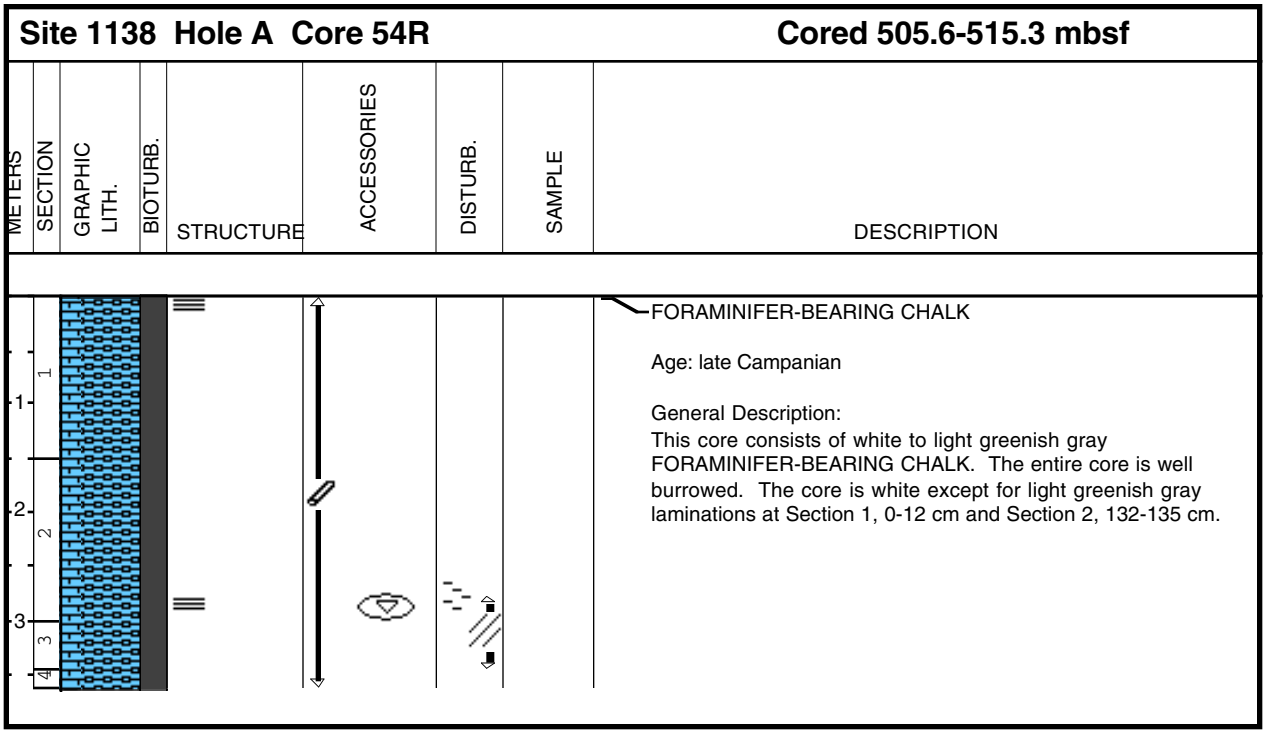


FORAMINIFER-BEARING CHALK

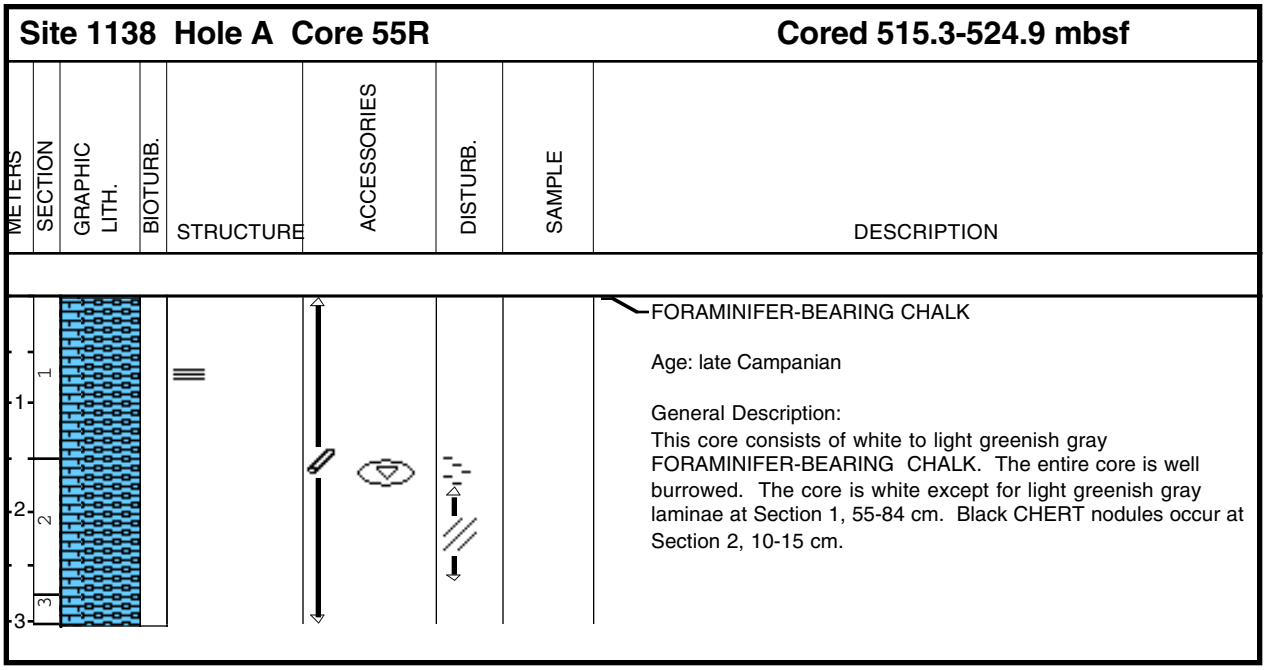
Age: late Campanian

General Description:
This core consists of white to light greenish gray FORAMINIFER-BEARING CHALK. The entire core is well burrowed. One highly fractured chert nodule occurs in Section 5 102-103 cm. Light greenish gray zones and <1 mm thick laminae occur in Section 1, 57-67 cm; Section 2, 63-82 cm, 84 cm, 140-150 cm; Section 3, 28 cm; Section 4, 49-50 cm, 65 cm, 109-140 cm, 147 cm; and Section 5, 21cm, 29 cm. The rest of the core is white.

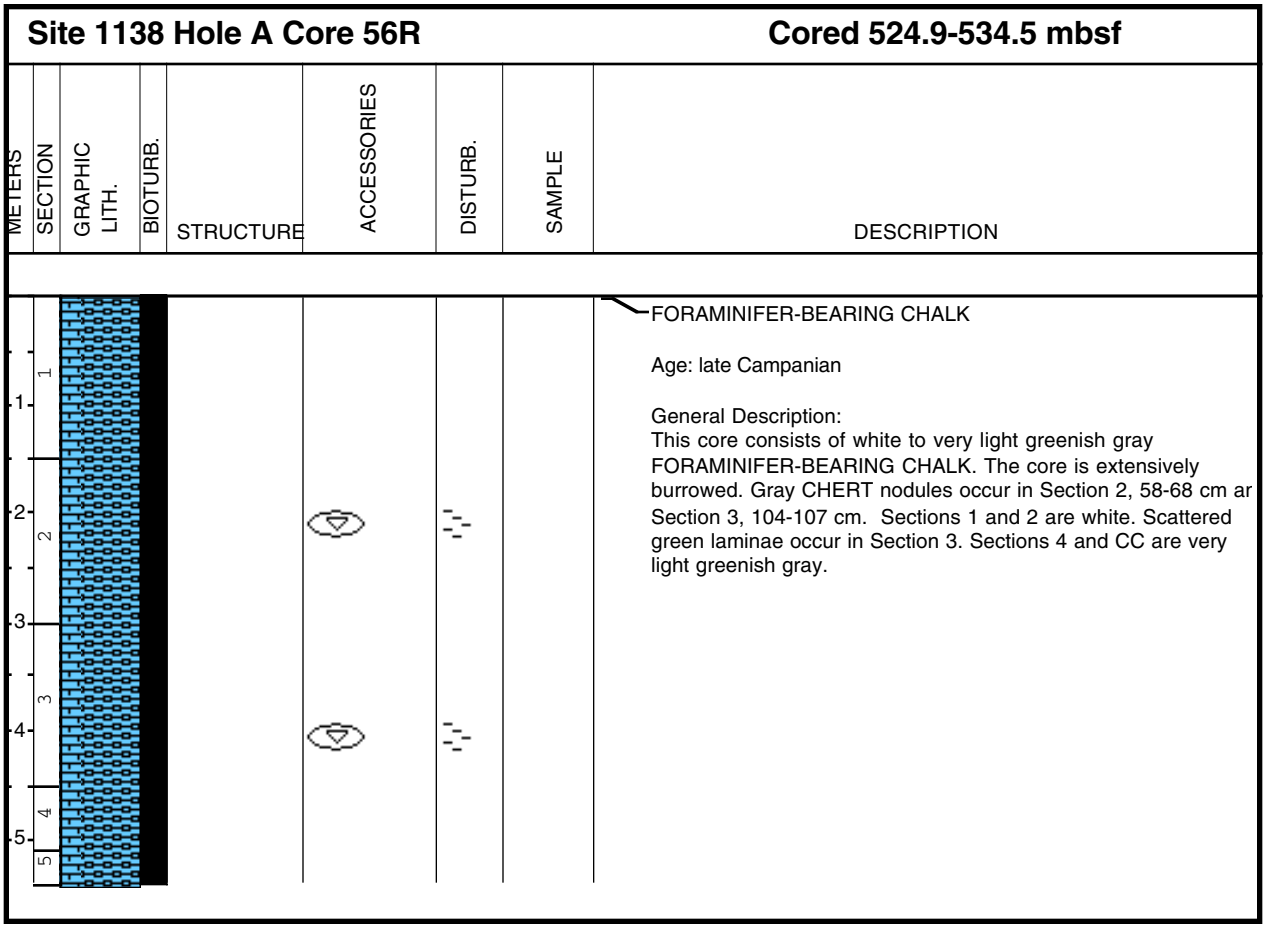
Core Photo


Site 1138 Hole A Core 54R
Cored 505.6-515.3 mbsf
METERS
SECTION
GRAPHIC LITH.
BIOTURB.
STRUCTURE
ACCESSORIES
DISTURB.
SAMPLE
DESCRIPTION
1
2
3
4
FORAMINIFER-BEARING CHALK
Age: late Campanian
General Description:
This core consists of white to light greenish gray FORAMINIFER-BEARING CHALK. The entire core is well burrowed. The core is white except for light greenish gray laminations at Section 1, 0-12 cm and Section 2, 132-135 cm.

Core Photo

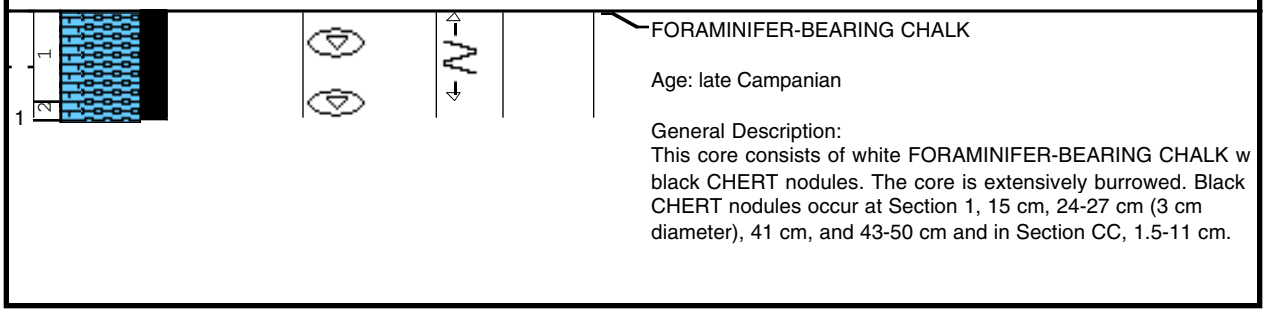

Site 1138 Hole A Core 55R
Cored 515.3-524.9 mbsf
METERS
SECTION
GRAPHIC LITH.
BIOTURB.
STRUCTURE
ACCESSORIES
DISTURB.
SAMPLE
DESCRIPTION
1
2
3
FORAMINIFER-BEARING CHALK
Age: late Campanian
General Description:
This core consists of white to light greenish gray FORAMINIFER-BEARING CHALK. The entire core is well burrowed. The core is white except for light greenish gray laminae at Section 1, 55-84 cm. Black CHERT nodules occur at Section 2, 10-15 cm.

Core Photo

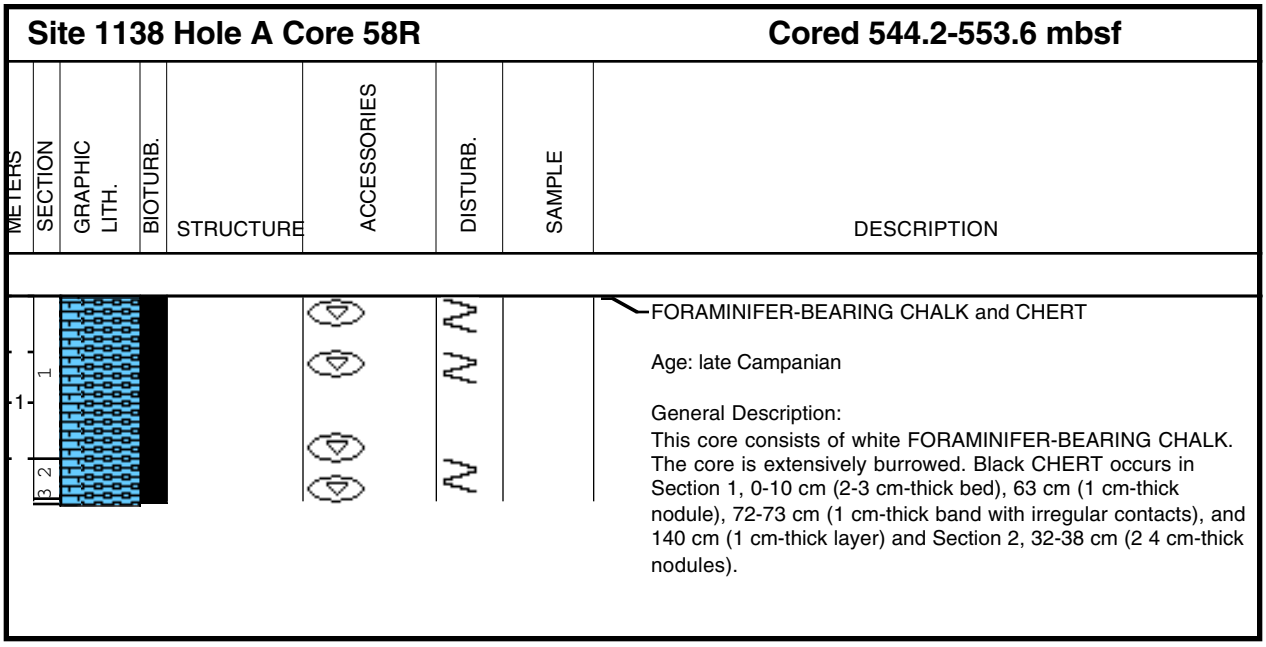

Site 1138 Hole A Core 56R
Cored 524.9-534.5 mbsf
METERS
SECTION
GRAPHIC LITH.
BIOTURB.
STRUCTURE
ACCESSORIES
DISTURB.
SAMPLE
DESCRIPTION
FORAMINIFER-BEARING CHALK
Age: late Campanian
General Description:
This core consists of white to very light greenish gray FORAMINIFER-BEARING CHALK. The core is extensively burrowed. Gray CHERT nodules occur in Section 2, 58-68 cm ar Section 3, 104-107 cm. Sections 1 and 2 are white. Scattered green laminae occur in Section 3. Sections 4 and CC are very light greenish gray.

Core Photo

Site 1138 Hole A Core 57R **Cored 534.5-544.2 mbsf**

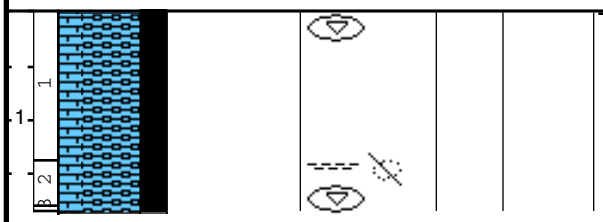


Core Photo


Site 1138 Hole A Core 58R
Cored 544.2-553.6 mbsf
METERS
SECTION
GRAPHIC LITH.
BIOTURB.
STRUCTURE
ACCESSORIES
DISTURB.
SAMPLE
DESCRIPTION
1
1
2
3
FORAMINIFER-BEARING CHALK and CHERT
Age: late Campanian
General Description:
This core consists of white FORAMINIFER-BEARING CHALK. The core is extensively burrowed. Black CHERT occurs in Section 1, 0-10 cm (2-3 cm-thick bed), 63 cm (1 cm-thick nodule), 72-73 cm (1 cm-thick band with irregular contacts), and 140 cm (1 cm-thick layer) and Section 2, 32-38 cm (2 4 cm-thick nodules).

Core Photo

Site 1138 Hole A Core 59R **Cored 553.6-563.3 mbsf**



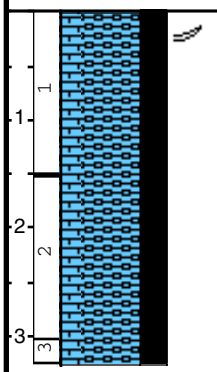
FORAMINIFER-BEARING CHALK

Age: late Campanian

General Description:
This core consists of white FORAMINIFER-BEARING CHALK. The core is extensively burrowed. Black CHERT nodules occur Section 1, 10-14 cm and Section 2, 36-42 cm. A dark greenish gray to black laminated zone occurs in Section 2, 4-6.5 cm. A large, flat-lying inoceramid shell occurs in Section 2, 6.5-7.5 cm.

Core Photo

Site 1138 Hole A Core 60R **Cored 563.3-572.9 mbsf**

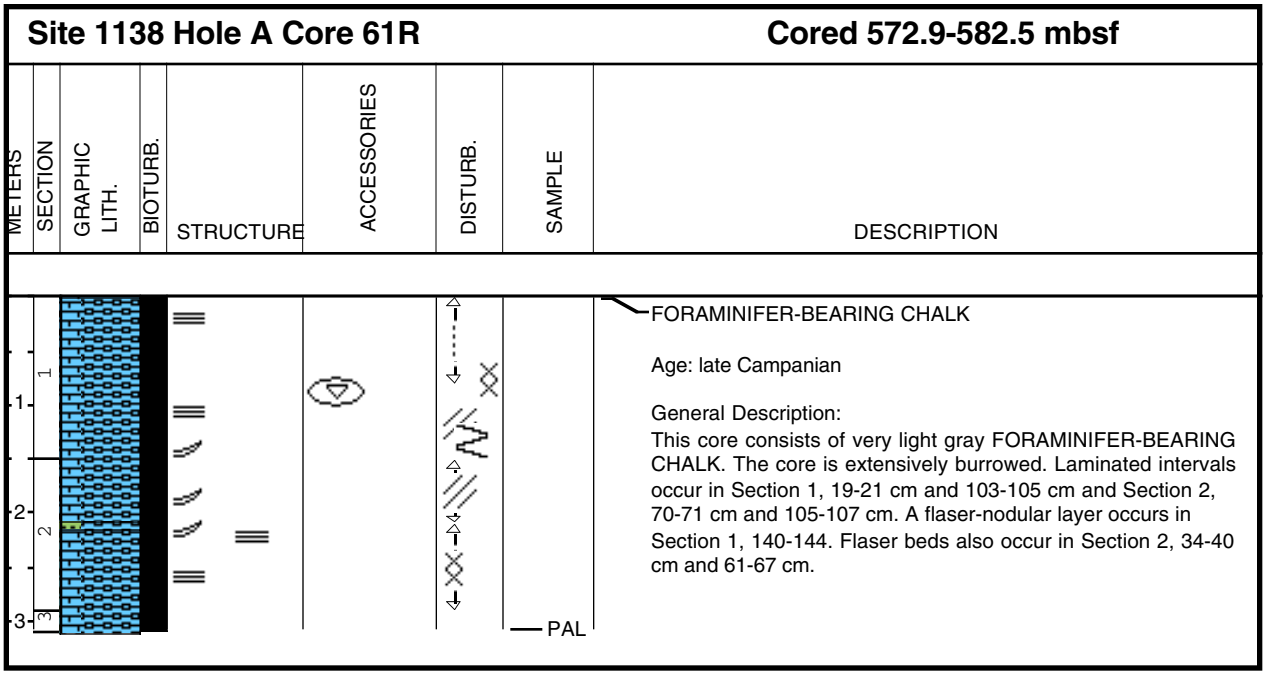


FORAMINIFER-BEARING CHALK

Age: late Campanian

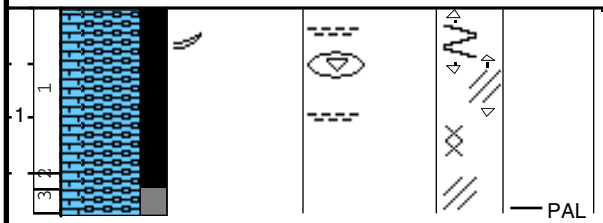
General Description:
This core consists of very light gray FORAMINIFER-BEARING CHALK with CHERT nodules. The core is extensively burrowed. Black CHERT nodules occur in Section 1, 4 cm, 56-61 cm, and 117-118 cm; Section 2, 89-90 cm; and Section CC, 2-3 cm. Dark laminated layers occur in Section 1, 146-149 cm; and Section 2, 101-102 cm, 124-126 cm, and 130-133 cm. A normal fault occurs in Section 1, 146-149 cm.

Core Photo


Site 1138 Hole A Core 61R
Cored 572.9-582.5 mbsf
METERS
SECTION
GRAPHIC LITH.
BIOTURB.
STRUCTURE
ACCESSORIES
DISTURB.
SAMPLE
DESCRIPTION
1
2
3
PAL
FORAMINIFER-BEARING CHALK
Age: late Campanian
General Description:
This core consists of very light gray FORAMINIFER-BEARING CHALK. The core is extensively burrowed. Laminated intervals occur in Section 1, 19-21 cm and 103-105 cm and Section 2, 70-71 cm and 105-107 cm. A flaser-nodular layer occurs in Section 1, 140-144. Flaser beds also occur in Section 2, 34-40 cm and 61-67 cm.

Core Photo

Site 1138 Hole A Core 62R **Cored 582.5-592.2 mbsf**



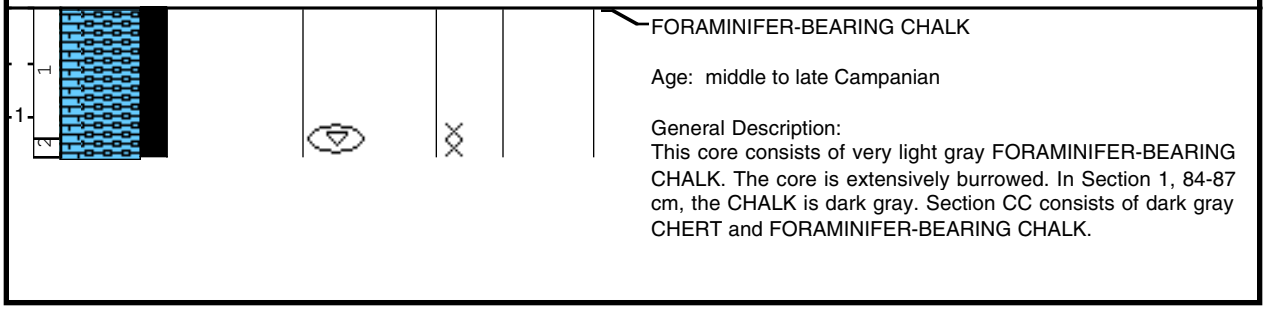
FORAMINIFER-BEARING CHALK

Age: late Campanian

General Description:
This core consists of very light gray to gray FORAMINIFER-BEARING CHALK. The core is extensively burrowed. Dark gray CHERT occurs in Section 1, 51-59 cm. A flaser-bedded, gray clay-rich interval occurs in Section 1, 28-35 cm. Dark layers 1-2 mm thick occur in Section 1, 19 cm (2 mm), 98 cm (1 mm), and 102 cm (1 mm flaser).

Core Photo

Site 1138 Hole A Core 63R **Cored 592.2-601.8 mbsf**

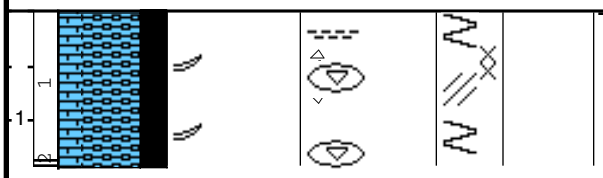


Age: middle to late Campanian

General Description:
This core consists of very light gray FORAMINIFER-BEARING CHALK. The core is extensively burrowed. In Section 1, 84-87 cm, the CHALK is dark gray. Section CC consists of dark gray CHERT and FORAMINIFER-BEARING CHALK.

Core Photo

Site 1138 Hole A Core 64R **Cored 601.8-611.5 mbsf**



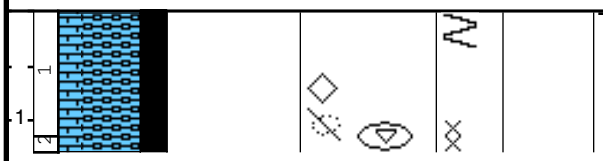
FORAMINIFER-BEARING CHALK

Age: middle to late Campanian

General Description:
This core consists of light gray FORAMINIFER-BEARING CHALK. The core is extensively burrowed. CHERT fragments occur in Section 1, 33-41 cm (gray), 53-58 cm (black), 84-85 cm (black), and 131-137 cm (dark gray). Gray, flaser-bedded intervals occur in Section 1, 44-50 cm, 98-102 cm, and 115-120 cm. A 3 mm-thick dark layer occurs in Section 1, 20 cm.

Core Photo

Site 1138 Hole A Core 65R **Cored 611.5-621.1 mbsf**



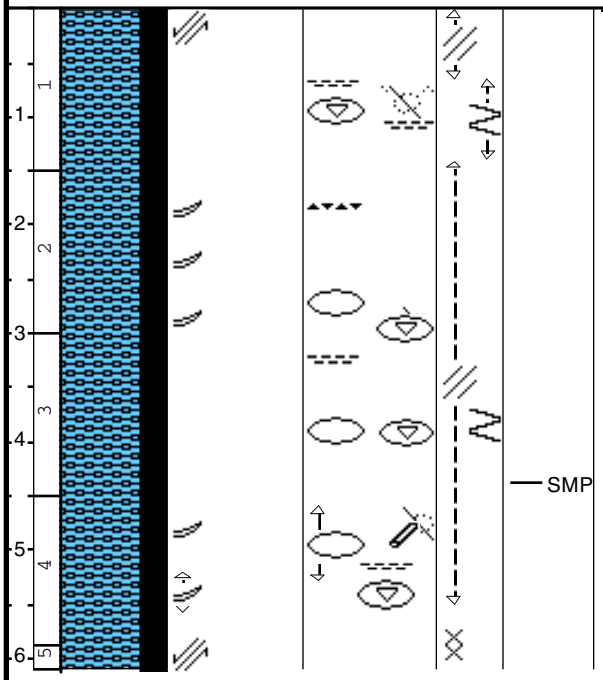
FORAMINIFER-BEARING CHALK

Age: middle to late Campanian

General Description:
This core consists of very light gray FORAMINIFER-BEARING CHALK. The core is extensively burrowed. A gastropod occurs Section 1, 41 cm, a shell-rich lithoclast (>2 cm x 0.5 cm) occurs at 68 cm, and an inoceramid fragment occurs at 104 cm. Drilling breccia in Section CC contains gray CHERT.

Core Photo

Site 1138 Hole A Core 66R **Cored 621.1-630.7 mbsf**

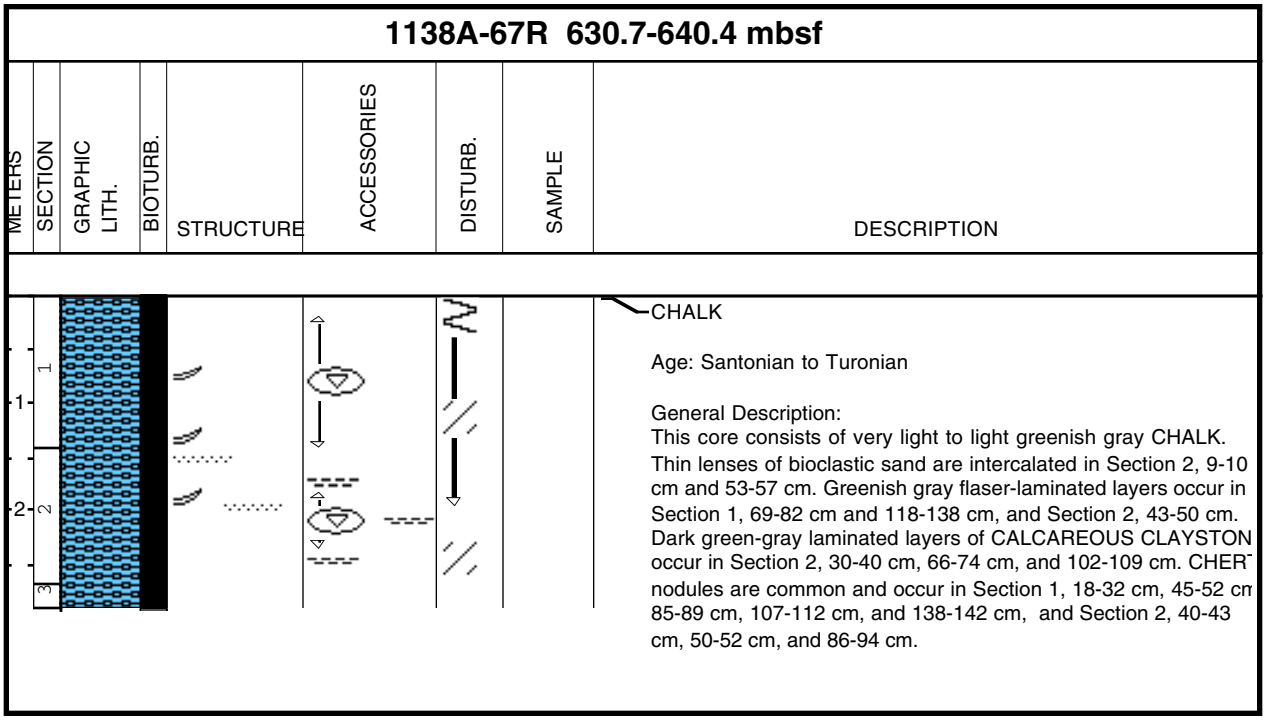


CHALK

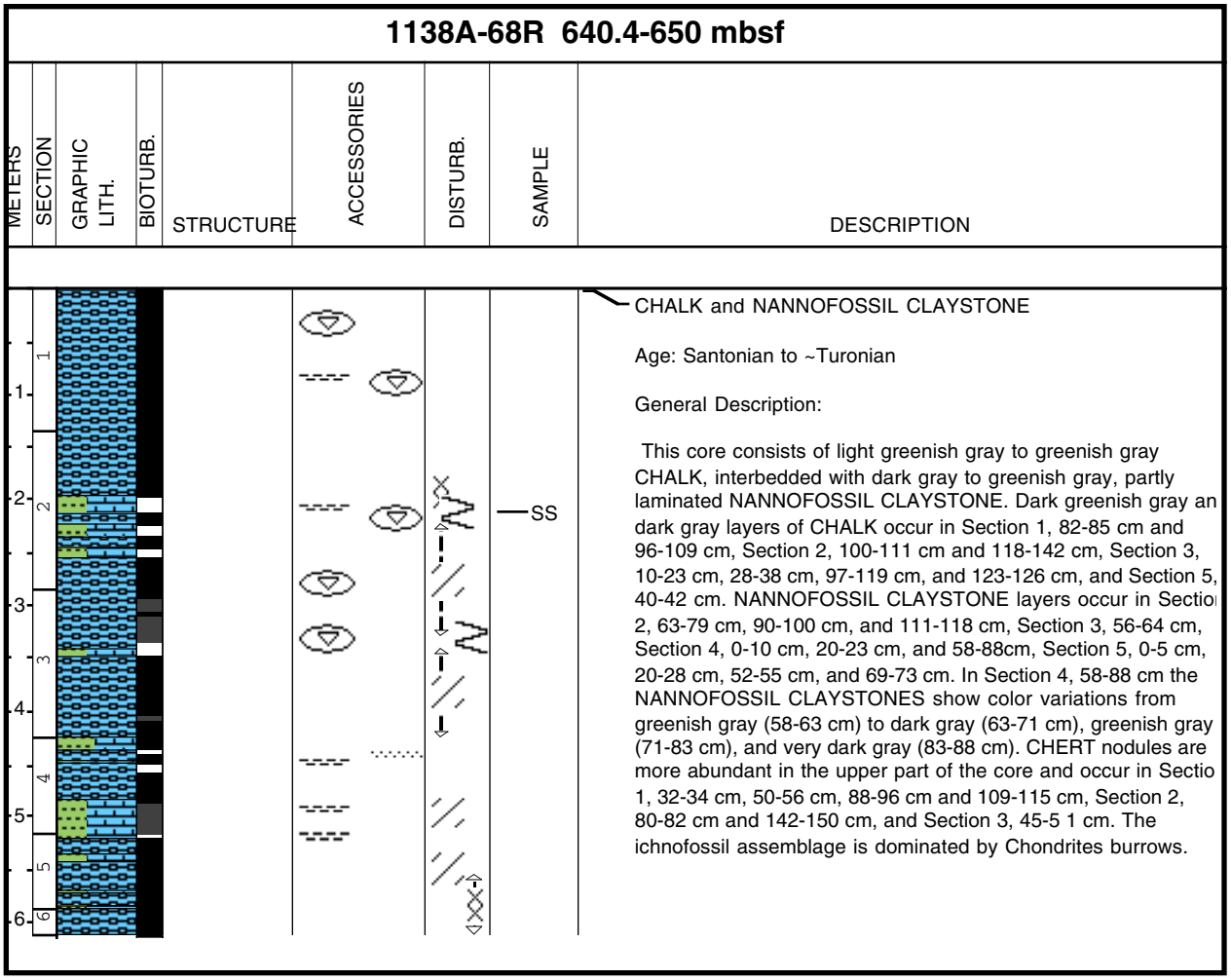
Age: Santonian to Turonian

General Description:
This core consists of very light gray CHALK. A dark laminated interval occurs in Section 1, 67-70 cm over a lens of bioclastic sand (Section 1, 72-73 cm). A 0.3 cm-thick dark clayey layer in Section 1, 107 cm. A microbreccia layer with chalk clasts occurs in Section 2, 30-30.5 cm). Gray flaser-bedded layers occur in Section 2, 31-35 cm, 67-70 cm, 91-94 cm, 133-136 cm. A nodula layer occurs in Section 2, 120-123 cm. A dark laminated interval occurs in Section 3, 21-26 cm. Nodular layers occur in Section 3 68-72 cm, 85-90 cm, 102-108 cm and Section 4, 6-14 cm. A bioclastic lens occurs in Section 4, 25 cm. A dark flaser-laminated interval occurs in Section 4, 28-32 cm. Nodular layers occur in Section 4, 39-44 cm, 62-63 cm. Green NANNOFOSSIL-BEARING CLAYSTONE occurs in Section 4, 63-65 cm) and dark laminated to nodular flaser-bedded intervals occur in Section 4, 69-70 cm, 74-80 cm, 98-106 cm. Shell fragments include possible brachiopods (Section 2, 140 cm) and possible inoceramids (Section 3, 79 cm). Most of the core is extensively burrowed, including Chondrites (Section 1, 4-6 cm). Dark gray CHERT occurs in thin beds and patches (Section 1, 92-102 cm; Section 2, 145 cm; Section 3, 90-94 cm; and Section 4, 90 cm). Microfaults (Section 1, 9 cm and Section CC, 8 cm) display normal offsets.

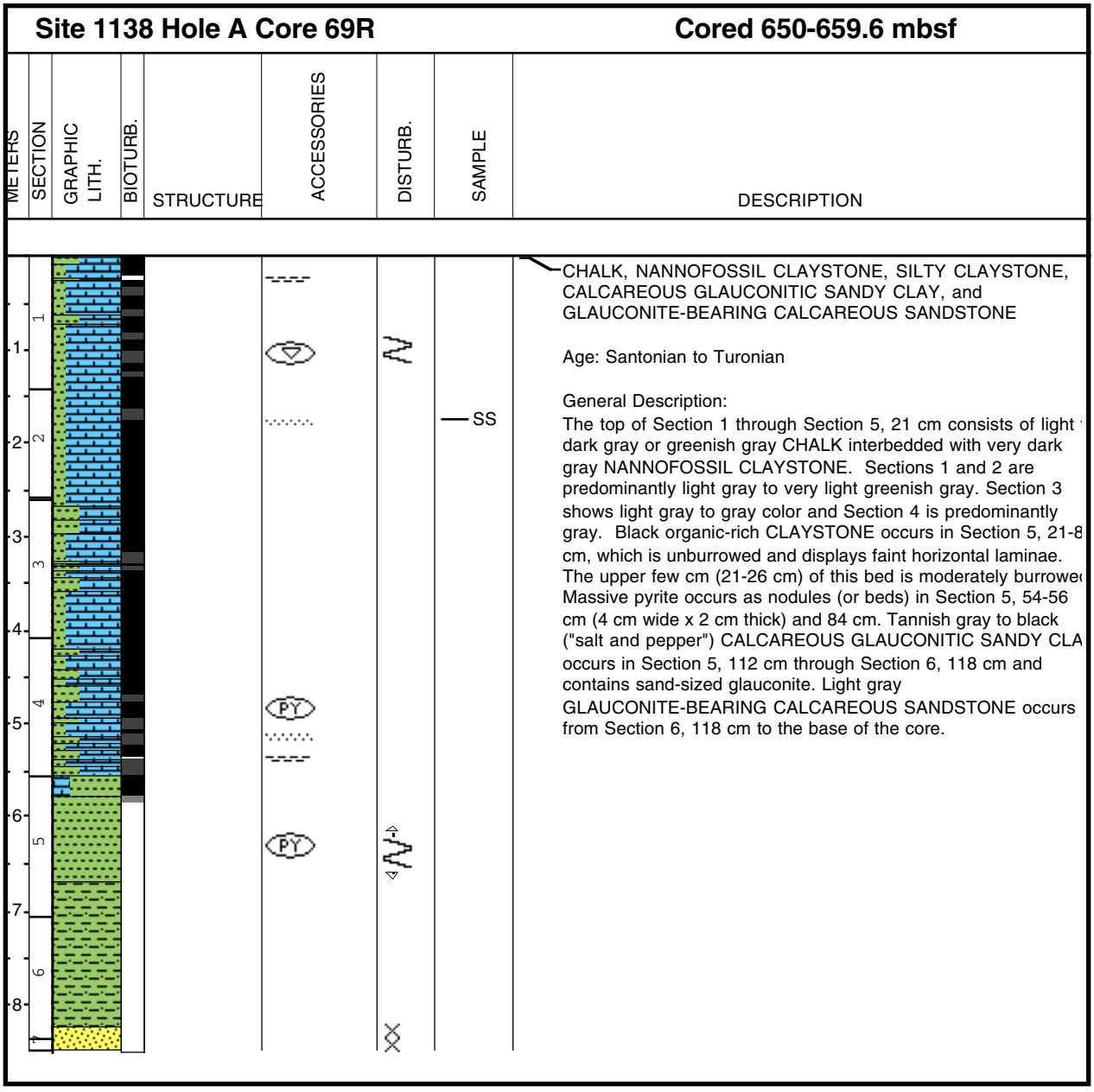
Core Photo


1138A-67R 630.7-640.4 mbsf
METERS
SECTION
GRAPHIC LITH.
BIOTURB.
STRUCTURE
ACCESSORIES
DISTURB.
SAMPLE
DESCRIPTION
1
2
1
2
3
CHALK
Age: Santonian to Turonian
General Description:
This core consists of very light to light greenish gray CHALK. Thin lenses of bioclastic sand are intercalated in Section 2, 9-10 cm and 53-57 cm. Greenish gray flaser-laminated layers occur in Section 1, 69-82 cm and 118-138 cm, and Section 2, 43-50 cm. Dark green-gray laminated layers of CALCAREOUS CLAYSTON occur in Section 2, 30-40 cm, 66-74 cm, and 102-109 cm. CHERT nodules are common and occur in Section 1, 18-32 cm, 45-52 cm 85-89 cm, 107-112 cm, and 138-142 cm, and Section 2, 40-43 cm, 50-52 cm, and 86-94 cm.

Core Photo

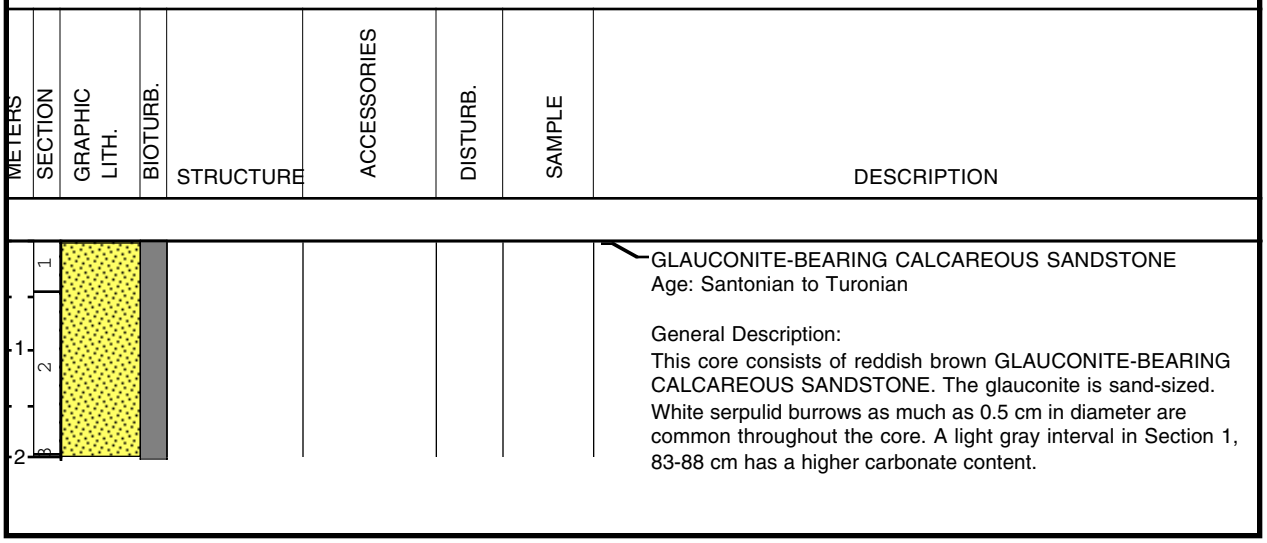

1138A-68R 640.4-650 mbsf
METERS
SECTION
GRAPHIC LITH.
BIOTURB.
STRUCTURE
ACCESSORIES
DISTURB.
SAMPLE
DESCRIPTION
SS
CHALK and NANNOFOSSIL CLAYSTONE
Age: Santonian to ~Turonian
General Description:
This core consists of light greenish gray to greenish gray CHALK, interbedded with dark gray to greenish gray, partly laminated NANNOFOSSIL CLAYSTONE. Dark greenish gray an dark gray layers of CHALK occur in Section 1, 82-85 cm and 96-109 cm, Section 2, 100-111 cm and 118-142 cm, Section 3, 10-23 cm, 28-38 cm, 97-119 cm, and 123-126 cm, and Section 5, 40-42 cm. NANNOFOSSIL CLAYSTONE layers occur in Sectio 2, 63-79 cm, 90-100 cm, and 111-118 cm, Section 3, 56-64 cm, Section 4, 0-10 cm, 20-23 cm, and 58-88cm, Section 5, 0-5 cm, 20-28 cm, 52-55 cm, and 69-73 cm. In Section 4, 58-88 cm the NANNOFOSSIL CLAYSTONES show color variations from greenish gray (58-63 cm) to dark gray (63-71 cm), greenish gray (71-83 cm), and very dark gray (83-88 cm). CHERT nodules are more abundant in the upper part of the core and occur in Sectio 1, 32-34 cm, 50-56 cm, 88-96 cm and 109-115 cm, Section 2, 80-82 cm and 142-150 cm, and Section 3, 45-5 1 cm. The ichnofossil assemblage is dominated by Chondrites burrows.

Core Photo


Site 1138 Hole A Core 69R
Cored 650-659.6 mbsf
METERS
SECTION
GRAPHIC LITH.
BIOTURB.
STRUCTURE
ACCESSORIES
DISTURB.
SAMPLE
DESCRIPTION
SS
PY
PY
CHALK, NANNOFOSSIL CLAYSTONE, SILTY CLAYSTONE, CALCAREOUS GLAUCONITIC SANDY CLAY, and GLAUCONITE-BEARING CALCAREOUS SANDSTONE
Age: Santonian to Turonian
General Description:
The top of Section 1 through Section 5, 21 cm consists of light dark gray or greenish gray CHALK interbedded with very dark gray NANNOFOSSIL CLAYSTONE. Sections 1 and 2 are predominantly light gray to very light greenish gray. Section 3 shows light gray to gray color and Section 4 is predominantly gray. Black organic-rich CLAYSTONE occurs in Section 5, 21-8 cm, which is unburrowed and displays faint horizontal laminae. The upper few cm (21-26 cm) of this bed is moderately burrowe Massive pyrite occurs as nodules (or beds) in Section 5, 54-56 cm (4 cm wide x 2 cm thick) and 84 cm. Tannish gray to black ("salt and pepper") CALCAREOUS GLAUCONITIC SANDY CLA occurs in Section 5, 112 cm through Section 6, 118 cm and contains sand-sized glauconite. Light gray GLAUCONITE-BEARING CALCAREOUS SANDSTONE occurs from Section 6, 118 cm to the base of the core.

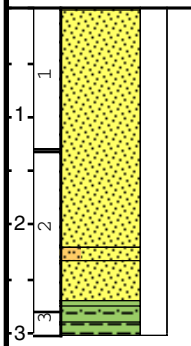
Core Photo

Site 1138 Hole A Core 70R **Cored 659.6-669.2 mbsf**



Core Photo

Site 1138 Hole A Core 71R **Cored 669.2-678.9 mbsf**



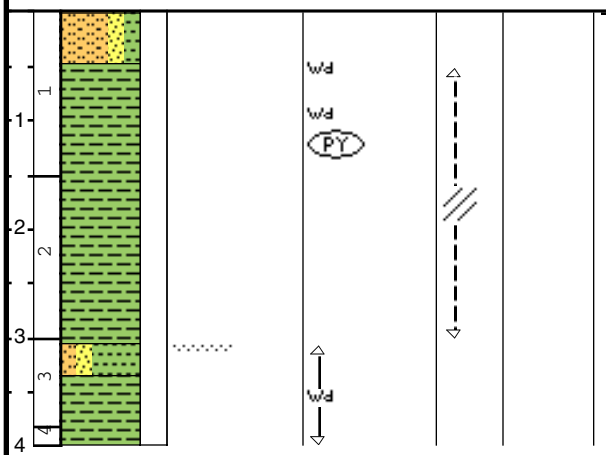
GLAUCONITE-BEARING CALCAREOUS SANDSTONE, SANDSTONE, SANDY CLAYSTONE, and SILTY CLAYSTONE

Age: Santonian to Turonian

General Description:
The top of the core to Section 2, 50 cm consists of reddish brov to dark reddish brown GLAUCONITE-BEARING CALCAREOUS SANDSTONE. The glauconite is sand-sized. In Sections 1, 29-3 cm and 2, 68-91 cm, the SANDSTONE is light brown and carbonate content is higher than above and below these intervals. Shell fragments are scattered through Section 1 and Section 2, 27-50 cm contains numerous, large fragments of Pectin shells. Section 1, 91-104 cm is rust-colored (ferruginous), well-laminated GLAUCONITE-BEARING SILTY SANDSTONE. The laminations show subtle cross-stratification. Section 2, 104-138 is light brown SANDSTONE with scattered pebbles as much as 0.5 cm in diameter. Several sharp contacts with lighter carbonate-rich material below, occur in Section2, 121 cm, 124 cm, 127 cm, and 137 cm. The basal contact is undulating. Section 2, 138-141 cm is dark brown very fine SANDSTONE anc Section 2, 141-146 is dark brown SILTY CLAYSTONE. Rusty brown SANDY CLAYSTONE with scattered small pebbles, scattered black grains, shell fragments as much as 2 mm, and wood fragments occurs from Section 2, 146 cm through Section CC, 9 cm. Dark brown SILTY CLAYSTONE with common white shell fragments and other bioclastic particles occurs in Section CC, 9-21 cm.

Core Photo

Site 1138 Hole A Core 72R **Cored 678.9-688.5 mbsf**



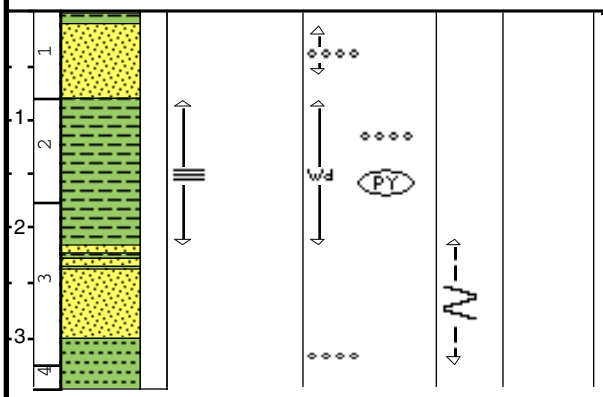
SILTY CLAYSTONE, SANDY CLAYEY SILTSTONE, and SANI
SILTY CLAYSTONE

Age: Late Cretaceous

General Description:
This core consists predominantly of dark brown SILTY CLAYSTONE. The core also contains brown SANDY CLAYEY SILTSTONE (Section 1, 0-50 cm) and brown to dark brown SANDY SILTY CLAYSTONE (Section 3, 6-34 cm). Wood fragments as much as 2 cm in diameter are common to abundant and occur throughout much of the core. Pyrite occurs as a large (5 cm diameter) nodule in Section 1, 120-122 cm, and as rare small nodules (1-3 mm in Section 1 and as much as 1 cm in Section 2), and as cement in a SANDSTONE bed in Section 3, 6 cm. Small white shells and bioclastic material are common in Section 2.

Core Photo

Site 1138 Hole A Core 73R **Cored 688.5-698.1 mbsf**

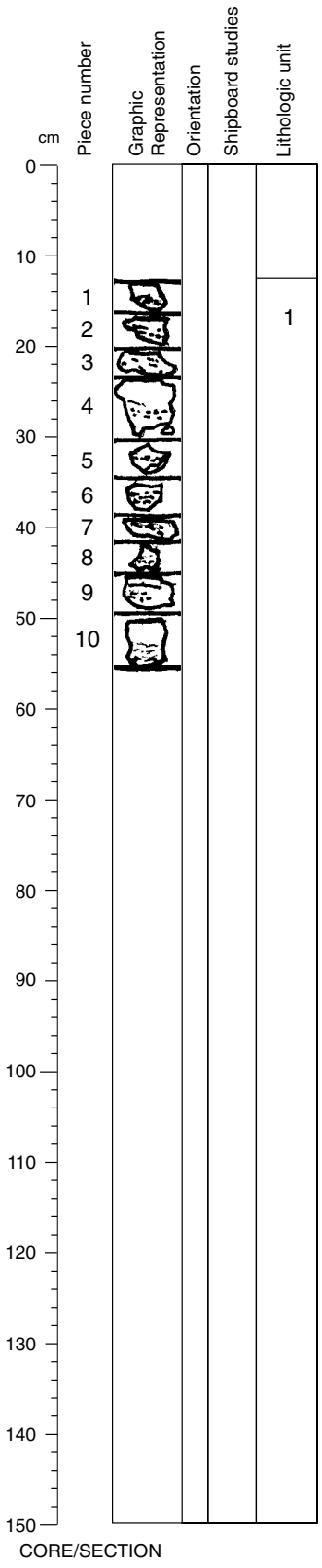


SILTY CLAYSTONE and SANDSTONE

Age: Late Cretaceous

General Description:
This core consists of interbedded dark brown SILTY CLAYSTONE and coarse SANDSTONE of variegated colors. Th CLAYSTONE shows subtle laminae in some intervals and small wood fragments are oriented along some laminae. Small wood fragments are also commonly disseminated throughout the sediment. SANDSTONE occurs in Section 1, 13-81 cm has pebbly horizons with pebbles as much as 1 cm in diameter. The matrix is coarse sand. Another SANDSTONE bed occurs in Section 3, 40-126 cm and appears to coarsen downward and become highly altered towards the base of the bed. A large rusty brown claystone clast or altered pebble occurs in Section 3, 115-120 cm and a red weathered pebble occurs at 148-150 cm. The CLAYSTONE in Section CC is of variegated color (red, blui gray, rust, greenish gray), brecciated, and appears to represent a regolith developed in weathered basalt.

Core Photo



183-1138A-74R-1 **Section top: 698.10 (mbsf)**

UNIT 1: APHYRIC TRACHYTE

Pieces: 1-10

CONTACTS: Not recovered; the top of Unit 1 is inferred to be above Piece 1.

PHENOCRYSTS:	**% Mode**	**Grain Size (mm): Max**	**Min**	**Avg.**	**Shape/Habit**
Sanidine:	1	1	0.5		Subhedral, elongate to equant

GROUNDMASS: Very fine grained.

VESICLES: Sparsely vesicular; vesicles are ~1 mm in size.

COLOR: Pale pinkish brown to gray, with bands of very light brown to pale green spherules in a dark green matrix.

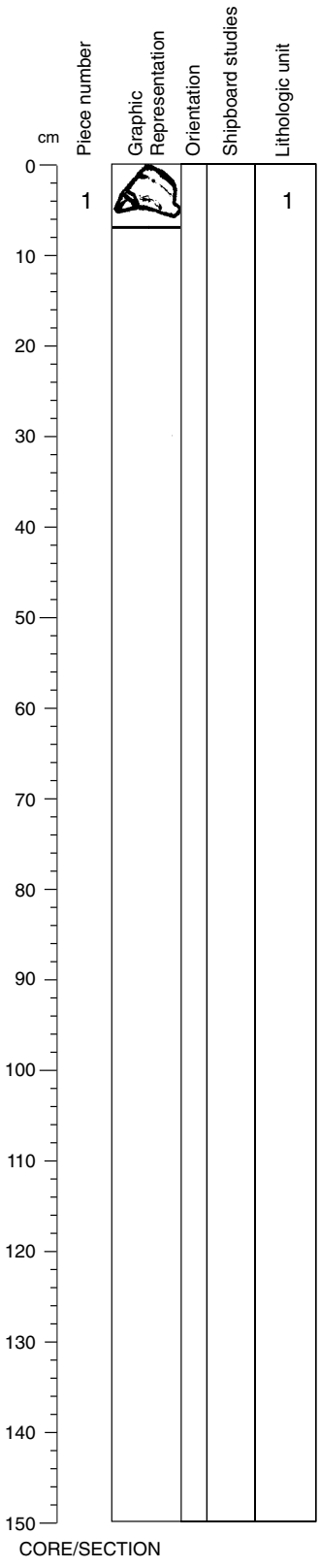
STRUCTURE: Massive, with spherulitc texture. Poorly developed, mm-scale flow banding is present in Pieces 1-5, 7, and 8. Flow bands are wider in Pieces 6, 9, and 10.

ALTERATION: Moderate to high.

VEINS/FRACTURES: Sparse, irregular fine fractures.

COMMENTS: The two unnumbered pieces in the interval from 0-13 cm are dark siltstone, similar to that recovered in Core 73R.

Core Photo



183-1138A-75R-1 **Section top: 707.80 (mbsf)**

UNIT 1: SPARSELY PORPHYRITIC TRACHYTE

Pieces: 1

CONTACTS: None.

PHENOCRYSTS:	**%**	**Grain Size (mm):**			
	Mode	**Max**	**Min**	**Avg.**	**Shape/Habit**
Plagioclase:	<1	1.2	0.2	0.6	Euhedral, tabular

GROUNDMASS: Very fine grained to aphanitic.

VESICLES: None.

COLOR: Dark gray with red bands.

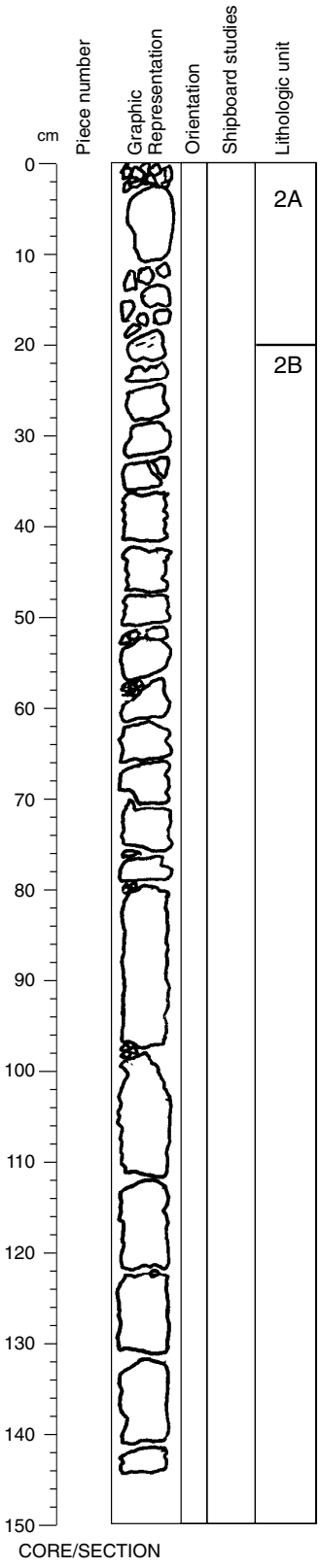
STRUCTURE: Massive, with irregular red layers and a crude flow banding.

ALTERATION: Moderate to high.

VEINS/FRACTURES: None.

COMMENTS:

Core Photo



183-1138A-76R-1 **Section top: 717.40 (mbsf)**

UNIT 2A: CLAY
UNIT 2B: PUMICE LITHIC BRECCIA

CONTACTS: The contact between Subunits 2A and 2B is at 20 cm.

ALTERATION: High.

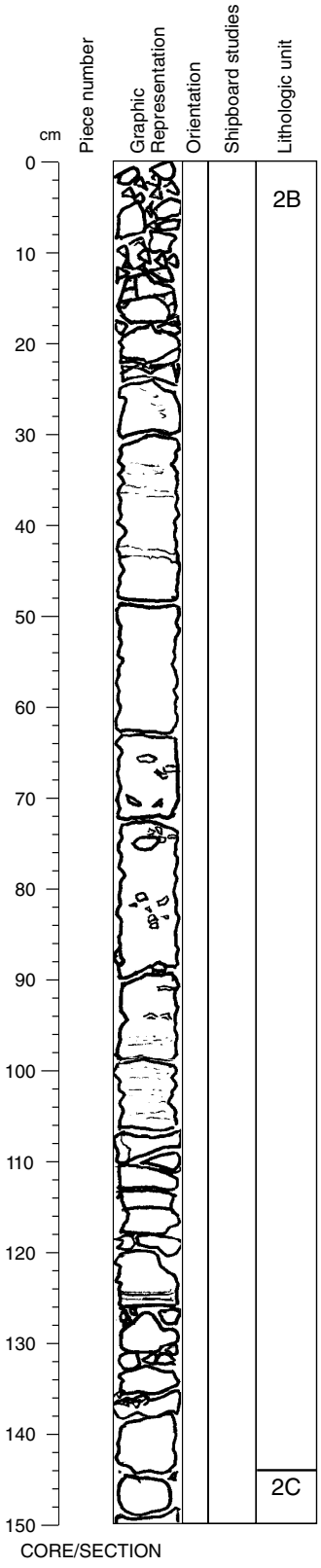
GENERAL DESCRIPTION:

Unit 2A: The interval from 0-20 cm contains dark gray to black, variably indurated clay with some red oxidation.

Unit 2B: The interval from 20-149 cm contains multiple beds of laminated sediments with variable concentrations of pumice and lithic clasts and a variety of grain sizes, grading, and sorting. Alteration is generally high; many intervals are altered almost completely to clay minerals. Several red oxidized intervals may be the result of former subaerial exposure.

20-30 cm: Red (oxidized), very coarse sand.
30-34 cm: Green, very coarse sand.
34-52 cm: Pale green, flattened granules to small pebbles (pumice lapilli?) in a red clay matrix. There is more red clay toward the base of the interval.
52-74 cm: Pale green, flattened granules (pumice lapilli?) in a pale green clay matrix. Contains a few <3-mm, angular lithic fragments.
74-76 cm: Pale green, flattened granules (pumice lapilli?) in a red clay matrix. Contains a few <3-mm, angular lithic fragments.
76-86 cm: Pale green, flattened granules (pumice lapilli?) in a pale green clay matrix. Contains a few <3-mm, angular lithic fragments.
86-94 cm: Graded, pale green, very coarse sand to medium sand.
94-103 cm: Very coarse sand in a pale green clay matrix.
103-108 cm: Banded, pale green, very coarse sand with a central red (oxidized) band at 105 cm. The pale green zones appear to be zones of leached iron oxide.
108-114cm: Green, very coarse sand to granules in a clay matrix.
114-120 cm: Green, medium sand with scattered lithic granules to small pebbles at the base.
120-136 cm: Flattened, pale green, very coarse sand to granules (pumice lapilli?) in a clay matrix.
136-144 cm: Pale green, flattened granules in a red (oxidized) clay matrix. A sharp change in grain size and oxidation is present at 136 cm.

Core Photo



183-1138A-76R-2 **Section top: 718.90 (mbsf)**

UNIT 2B: PUMICE LITHIC BRECCIA
UNIT 2C: CLAY

CONTACTS: The contact between Subunits 2B and 2C is at 144 cm

ALTERATION: High.

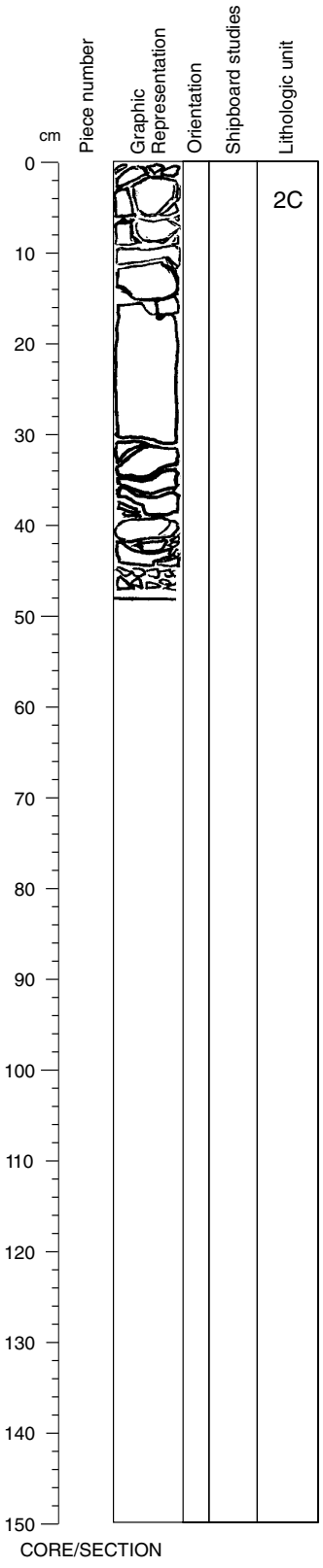
GENERAL DESCRIPTION:

Unit 2B: The interval from 0-144 cm contains multiple beds of laminated sediments with variable concentrations of pumice and lithic clasts and a variety of grain sizes, grading and sorting. Alteration is generally high; many intervals are altered almost completely to clay minerals.

0-36 cm: Pale green, flattened granules to pebbles in a red (oxidized) clay matrix. Green clasts are more abundant toward the base of the interval.
36-47 cm: Massive pale green clay matrix with very coarse sand- to granule-size clasts, which form stringers. A weak reverse grading is evident.
47-50 cm: Altered lithic coarse sand.
50-56 cm: Coarse lithic sand grains in a massive, pale green clay matrix.
56-90 cm: Very coarse sand- to pebble-size, pale green pumice, and medium sand- to granule-size lithic clasts in a massive, pale green clay to fine sand matrix. Interval is poorly sorted.
90-144 cm: Bedding varies from mm-scale to cm-scale, with some sharp bases, but most contacts are gradational. Interval is principally composed of fine sand layers, very coarse sand lithic layers, and mixed-clast granular layers; individual layers are moderately to poorly sorted.

Unit 2C: The interval from144-150 cm contains massive, reddish brown, oxidized clay with similar lithic content and clast distribution patterns as the underlying massive, pale green clay in Section 76R-3. Contains scattered, angular lithic granules (<2%), sometimes in clusters of two or three. This interval is more oxidized than the lower part of Subunit 2C.

Core Photo



183-1138A-76R-3 **Section top: 720.40 (mbsf)**

UNIT 2C: CLAY

CONTACTS: None.

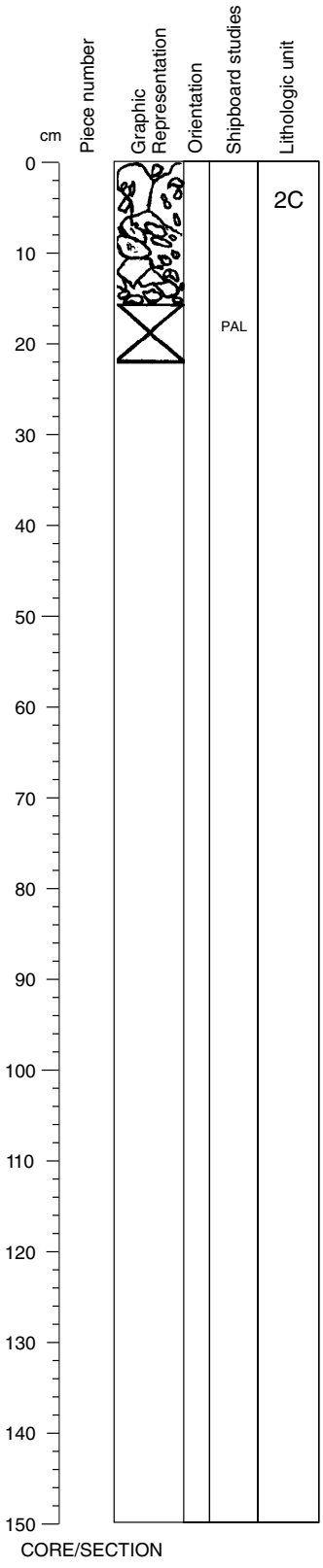
ALTERATION: High.

GENERAL DESCRIPTION:

Unit 2C: The interval from 0-45cm contains massive, reddish brown, oxidized clay with similar lithic content and clast distribution as the underlying massive, pale green clay. Contains scattered, angular lithic granules and small pebbles (<2%), commonly in clusters of two or three. This interval is more oxidized than the lower part of Subunit 2C.

The interval from 45-47 cm contains massive pale green clay. Contains scattered, angular lithic granules and small pebbles (<2%), commonly in clusters of two or three. There is no evidence of former pumice clasts within this clay. This interval has been disturbed by coring.

Core Photo



183-1138A-76R-CC **Section top: 720.86 (mbsf)**

UNIT 2C: CLAY

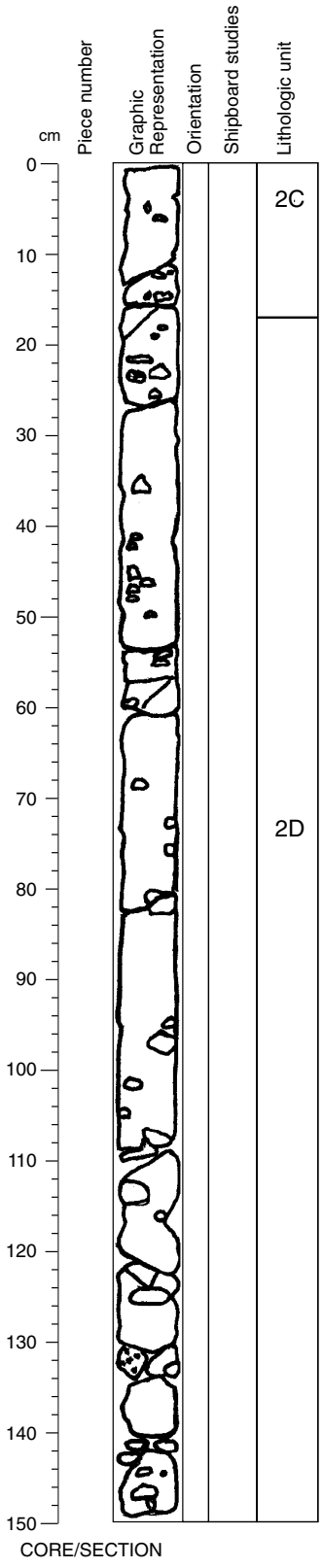
CONTACTS: None.

ALTERATION: High.

GENERAL DESCRIPTION:

Unit 2C: The interval from 0-16 cm contains massive, pale green clay. Contains scattered, angular lithic granules and small pebbles (<2%), commonly in clusters of two or three. Maximum lithic clast size is 1 x 1 cm. There is no evidence of former pumice clasts within this clay. This interval has been disturbed by coring.

Core Photo



183-1138A-77R-1 **Section top: 722.20 (mbsf)**

UNIT 2C: CLAY
UNIT 2D: PUMICE LITHIC BRECCIA

CONTACTS: The contact between Subunits 2C and 2D is at 17 cm.

ALTERATION: High.

GENERAL DESCRIPTION:

Unit 2C: The interval from 0-17 cm contains massive pale green clay. Contains scattered, angular lithic granules and small pebbles (<2%), commonly in clusters of two or three. Maximum lithic clast size is 0.6 x 1.2 cm. "Ghosts" of pale green pumice pebbles are present in this highly altered clay interval.

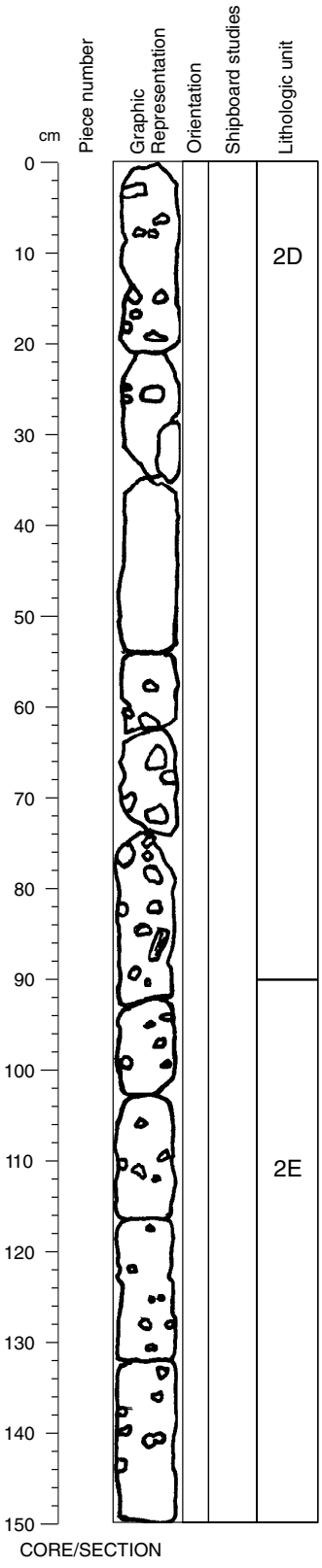
Unit 2D: The interval from 17-150 cm contains brown to green pumice lithic breccia with a clayey, medium sand matrix.

17-53 cm: The breccia is moderately to poorly sorted, with subround granule- to pebble-size, pale green pumice lapilli, and dark, lithic coarse sand to pebbles distributed throughout the interval. The maximum clast size is 0.9 x 1.6 cm. This interval is poorer in clasts than intervals lower in the section.

53-95 cm: Brown and more altered than the 17-53 cm interval; the matrix is clayey and variably oxidized to a reddish orange color. The larger clasts are subangular to subround, altered, pale green pumice lapilli with a maximum size of 2.2 x 2.6 cm. Dark granule- to small-pebble-size lithic clasts have angular to subangular shapes and a maximum size of 0.8 x 1 cm. This interval has a gradational contact with the underlying interval.

95-150 cm: More pebbly than the 17-53 cm interval; the matrix is clayey, medium sand. The breccia is poorly sorted, with subround granule- to pebble-size, pale green pumice lapilli, and dark, lithic coarse sand to pebbles distributed throughout the interval. The maximum clast is 1.5 x 4 cm.

Core Photo



183-1138A-77R-2 **Section top: 723.70 (mbsf)**

UNIT 2D: PUMICE LITHIC BRECCIA
UNIT 2E: LITHIC BRECCIA WITH PUMICE

CONTACTS: The contact between Subunits 2D and 2E is at 90 cm.

ALTERATION: Moderate to high.

GENERAL DESCRIPTION:

Unit 2D: The interval from 0-90 cm contains brown pumice lithic breccia with a clayey, medium sand matrix.

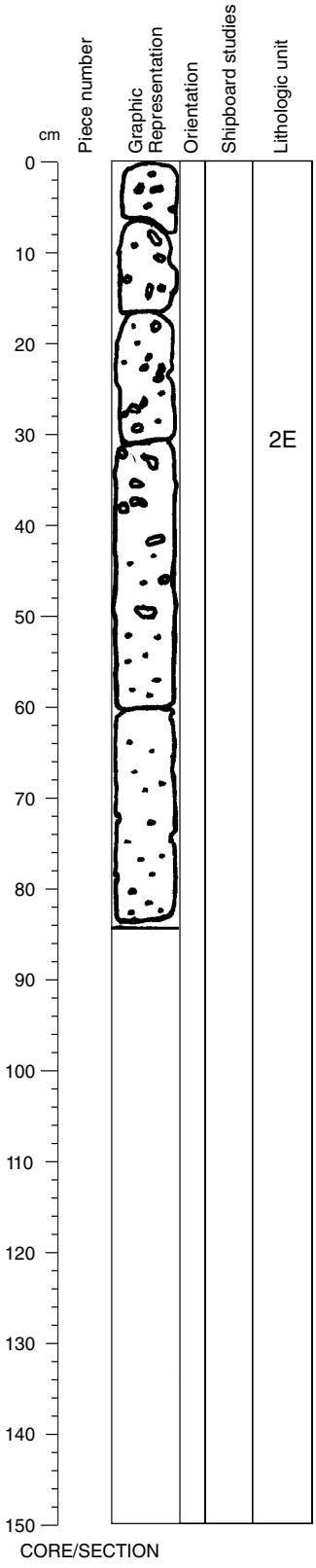
0-34 cm: Poorly sorted, subrounded, granule- to pebble-size, pale green pumice lapilli and dark, lithic coarse sand to pebbles. A concentration of larger pebbles is present at ~20 cm; between 30 and 34 cm is a large (2.6 x 6.6 cm) lithic cobble, the largest clast in Unit 2.

34-57 cm: This is a finer-grained interval. The matrix is clayey, medium to coarse sand; the pale green altered pumice and lithic clasts are dominantly granule size.

57-90 cm: Lithic pebbles are concentrated in this zone at the base of the subunit. The matrix is medium to coarse sand; the lithic clasts are granule to pebble size, and the pumice is pale green, altered, and very coarse sand to granule size.

Unit 2E: The interval from 90-150 cm contains dark green lithic breccia with pumice. Lithic clasts range from medium sand to small pebble size, whereas pumice clasts are granule to small-pebble size. Subunit 2E is less altered than Subunit 2D. Lithic clasts are angular to subround, and vary in vesicularity, crystal content, and alteration. The maximum lithic pebble size is 0.5 x 1.2 cm. Pumice clasts are irregular, and angular to subangular.

Core Photo



183-1138A-77R-3 **Section top: 725.20 (mbsf)**

UNIT 2E: LITHIC BRECCIA WITH PUMICE

Pieces: None.

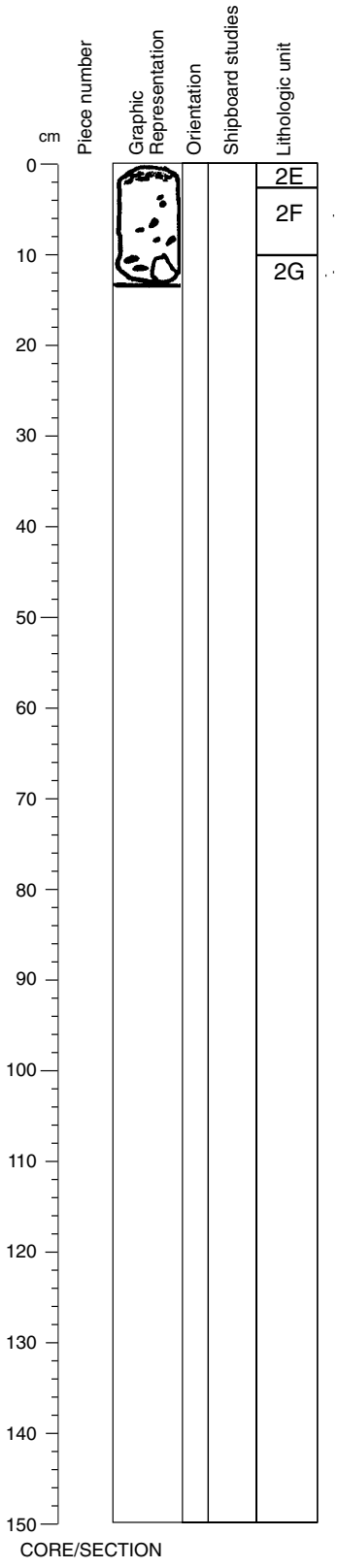
CONTACTS: None.

ALTERATION: Moderate.

GENERAL DESCRIPTION:

Unit 2E: The interval from 0-83 cm contains dark green, polymictic, lithic breccia with pumice. Lithic clasts are medium lithic sand to small pebble size, angular to subround, dominantly mafic volcanic (basaltic?), and vary in vesicularity, crystal content, and alteration. Subordinate pumice clasts are granule to small pebble size, irregular, and angular to subangular. Lithic pebbles are more abundant from 0-51cm.

Core Photo



183-1138A-77R-CC **Section top: 726.05 (mbsf)**

UNIT 2E: LITHIC SAND
UNIT 2F: VOLCANIC ASH WITH ACCRETIONARY LAPILLI
UNIT 2G: PUMICE LITHIC BRECCIA

CONTACTS: The contact between Subunits 2E and 2F is at 2 cm; the contact between Subunits 2F and 2G is at 10 cm.

ALTERATION: Moderate to high.

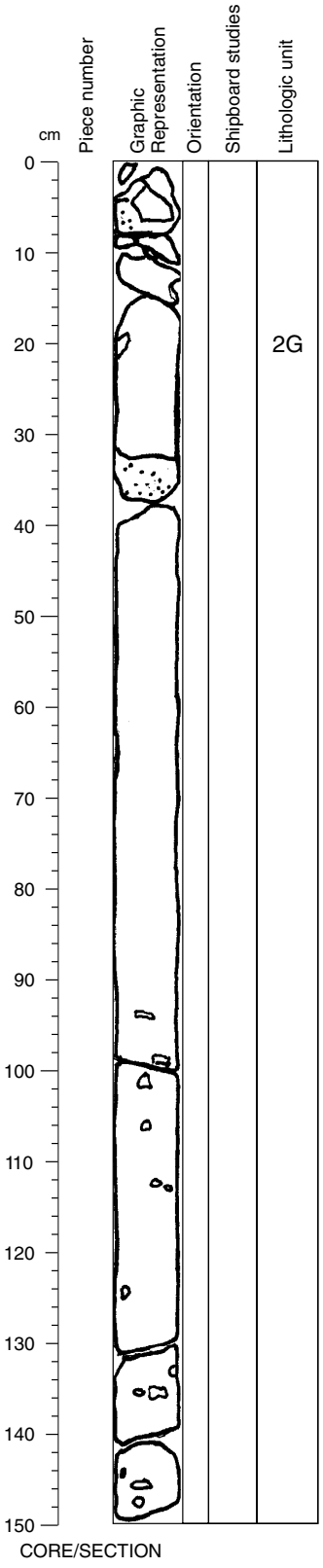
GENERAL DESCRIPTION:

Unit 2E: The interval from 0-2 cm contains slightly oxidized, very coarse lithic sand. A sharp erosional contact with the underlying volcanic ash is present.

Unit 2F: The interval from 2-10 cm contains pale brown volcanic ash, altered to silty clay. Entire interval contains normally graded accretionary lapilli, indicating that the subunit is a fall deposit and that the ash interacted with water in the ash cloud. There is a mantling contact with the underlying pumice lithic breccia.

Unit 2G: The interval from 10-12 cm contains irregular, 2 x 3 cm, pale green pumice clasts from the top of the underlying portion of this subunit.

Core Photo



183-1138A-78R-1 **Section top: 727.00 (mbsf)**

UNIT 2G: PUMICE LITHIC BRECCIA

CONTACTS: None.

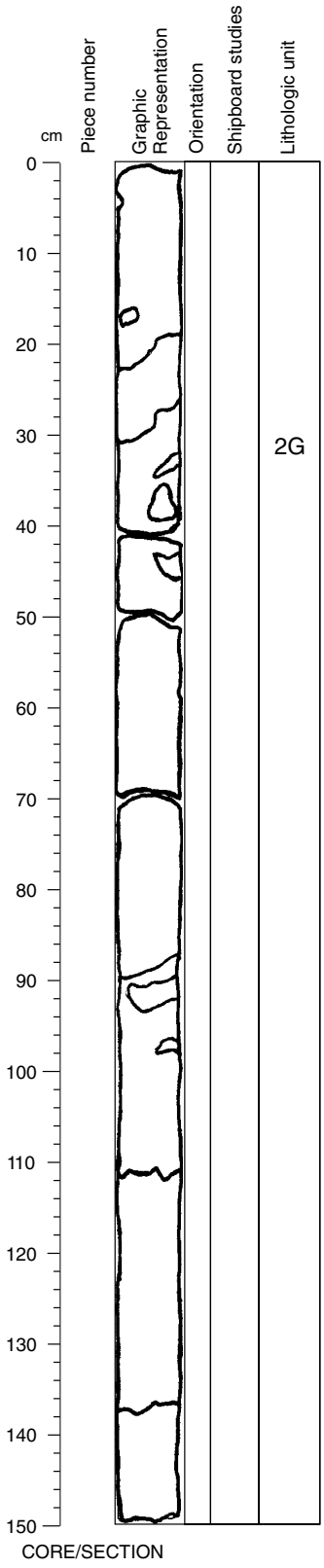
ALTERATION: Moderate.

GENERAL DESCRIPTON:

Unit 2G: Dark gray to black, variably indurated clay with some reddish oxidation in the interval from 0-13 cm is similar to clay in Section 76R-1 (0-20 cm) and is interpreted as material that fell downhole during coring.

The interval from 13-150 cm contains pumice lithic breccia. Lithic granular tocoarse sand dominates the matrix, whereas small-pebble-size, pale green pumice lapilli dominate the clast component. Sorting is moderate to poor; clast distribution is relatively even. Some intervals have diffuse boundaries with a greater abundance of pumice clasts. Pumice clast size (maximum 1 x 2 cm) increases slightly toward the top of the section. Pumice clasts are irregular, and angular to subangular. Lithic fragments are angular to subround, and variably altered but indurated. The matrix is medium to very coarse sand, similar in composition to the clasts.

Core Photo



183-1138A-78R-2 **Section top: 728.50 (mbsf)**

UNIT 2G: PUMICE LITHIC BRECCIA

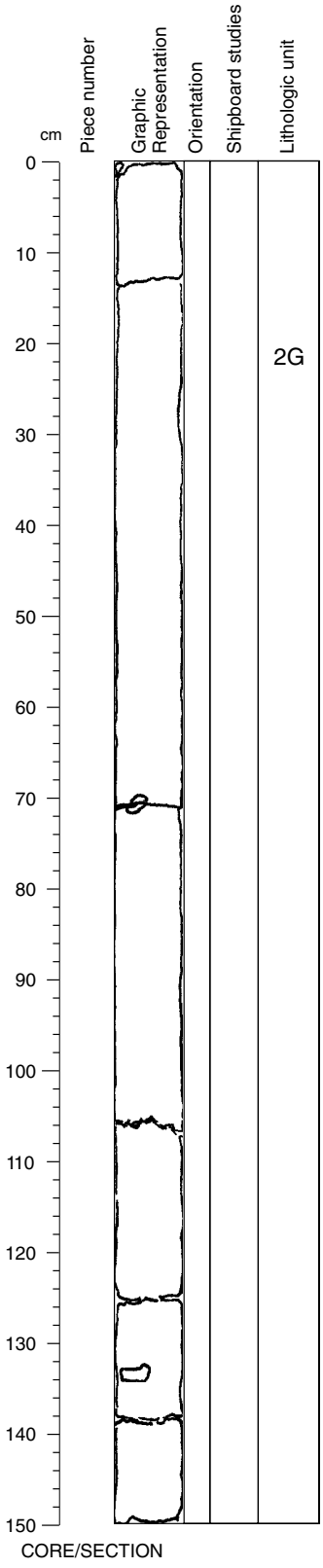
CONTACTS: None.

ALTERATION: Moderate.

GENERAL DESCRIPTION:

Unit 2G: The interval from 0-150 cm contains pumice lithic breccia. Lithic, granular to coarse sand dominates the matrix, whereas small-pebble-size, pale green pumice lapilli dominate the clast component. Sorting is moderate to poor, but the clast distribution is relatively even. Lithic clasts in the 0-44 cm interval are normally graded. Two intervals have larger pebble-size clasts of highly plagioclase-clinopyroxene-phyric basaltic composition: (1) a concentration of large (<2 x 3 cm) lithic pebbles is at 25-44 cm; (2) a 2 x 6 cm pumice clast is at 90 cm. Pumice clasts are irregular, and angular to subangular. Lithic clasts are angular to subrounded; they are variably altered but many remain indurated. The matrix is medium to very coarse sand and similar in composition to the clasts.

Core Photo



183-1138A-78R-3 **Section top: 730.00 (mbsf)**

UNIT 2G: PUMICE LITHIC BRECCIA

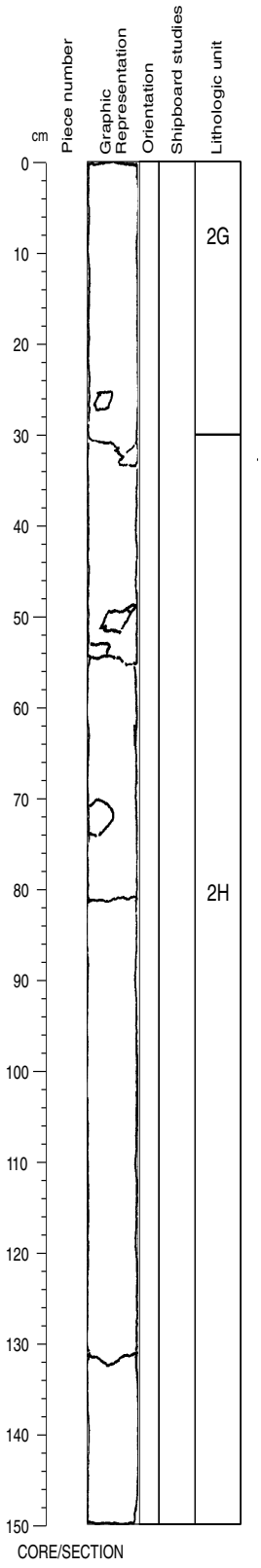
CONTACTS: None.

ALTERATION: Moderate.

GENERAL DESCRIPTION:

Unit 2G: The interval from 0-150 cm contains pumice lithic breccia. Lithic granular to coarse sand dominates the matrix, whereas small-granule- to pebble-size, pale green pumice lapilli dominate the clast component. Sorting is moderate to poor but the clast distribution is relatively even. Slightly larger pumice clasts are present at 50-70 cm and 124-134 cm. Pumice clasts are ≤1.2 x 2.3 cm, irregular, and angular to subangular. Lithic fragments are angular to subrounded; they are variably altered but many remain indurated. The matrix is medium to very coarse sand similar in composition to the clasts.

Core Photo



183-1138A-78R-4 **Section top: 731.50 (mbsf)**

UNIT 2G: PUMICE LITHIC BRECCIA
UNIT 2H: PUMICE LITHIC BRECCIA

CONTACTS: The contact between Subunits 2G and 2H is at 27 cm.

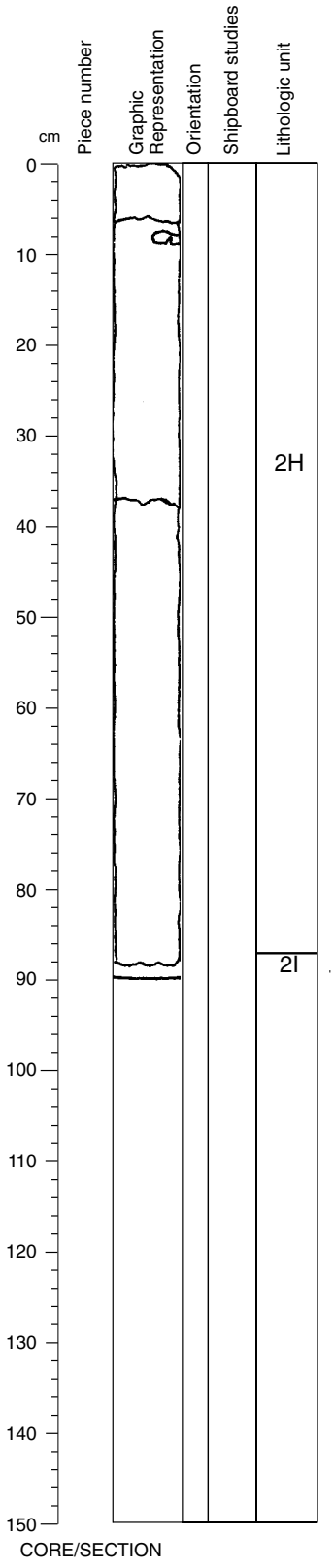
ALTERATION: High.

GENERAL DESCRIPTON:

Unit 2G: The interval from 0-27 cm contains pumice lithic breccia. Normally graded, lithic, granular to coarse sand dominates the matrix, whereas reversely graded, granule- to small-pebble-size, pale green pumice lapilli dominate the clast component. Pumice clast size increases slightly toward the top of the section, whereas the lowest part of this subunit is richer in lithic fragments. Lithic fragments are angular to subround; they are variably altered but many remain indurated. Matrix is coarse to very coarse sand similar in composition to the clasts. Pumice clasts are ≤1 x 1 cm, irregular, and angular to subangular. The contact with Subunit 2H at 27 cm is sharp.

Unit 2H: The interval from 27-150 cm contains pumice lithic breccia. Ungraded to normally graded, lithic, granular to coarse sand dominates the matrix, whereas reversely graded granule- to pebble-size, pale green pumice lapilli dominate the clast component. Pumice clast size increases slightly toward the top of the subunit; abundance of pumice clasts is greatest at 27-80 cm, but some large pebble-size pumice clasts are present throughout the subunit. Lithic fragments are angular to subround; they are variably altered altered but many remain indurated. Matrix is clayey, coarse to very coarse sand, and similar in composition to the clasts. The upper part of this subunit has more pumice in the matrix granule fraction than the underlying portion. Pumice clasts are ≤1.5 x 3.4 cm, irregular, and angular to subangular.

Core Photo



183-1138A-78R-5 **Section top: 733.00 (mbsf)**

UNIT 2H: PUMICE LITHIC BRECCIA
UNIT 2I: PUMICE LITHIC BRECCIA

CONTACTS: The contact between Subunits 2H and 2I is at 87 cm.

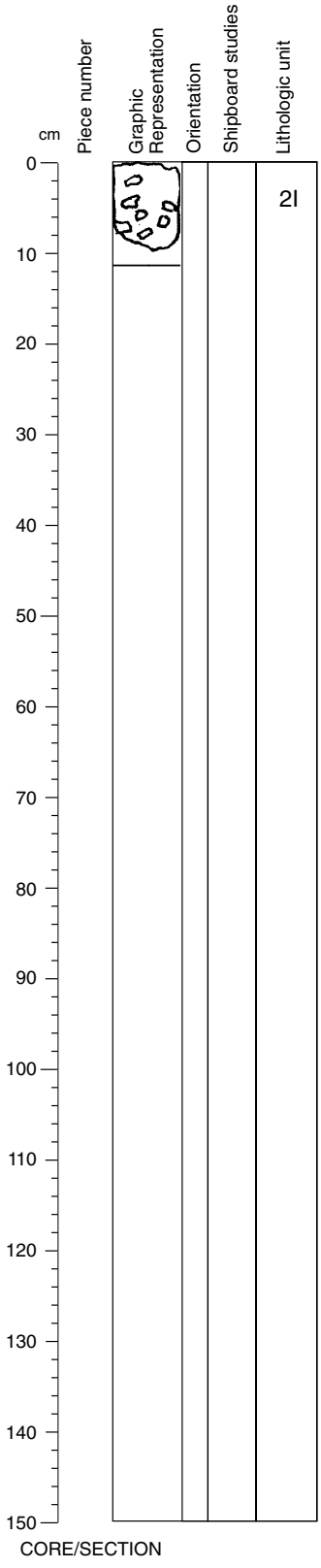
ALTERATION: High.

GENERAL DESCRIPTION:

Unit 2H: The interval from 0-87 cm contains pumice lithic breccia. Normally graded, small pebble to very coarse sand dominates the matrix, whereas reversely graded, granule- to pebble-size, pale green pumice lapilli dominate the clast component. Pumice clast size increases toward the top of the subunit; greatest abundance of pumice clasts is between 0 and 10 cm. Lithic fragments are angular to subrounded and variably altered, but many remain indurated. Matrix is clayey, coarse to very coarse sand, similar in composition to the clasts. Lithic-clast-dominated intervals are less altered than the adjacent, more pumiceous intervals. Pumice clasts are ≤1 x 2 cm, irregular, and angular to subangular. Transitions from lithic-rich to pumice-rich intervals are gradational.

Unit 2I: The interval from 87-88 cm is pumice lithic breccia. The contact with subunit 2H at 87 cm is sharp.

Core Photo



183-1138A-78R-CC **Section top: 733.89 (mbsf)**

UNIT 2I: PUMICE LITHIC BRECCIA

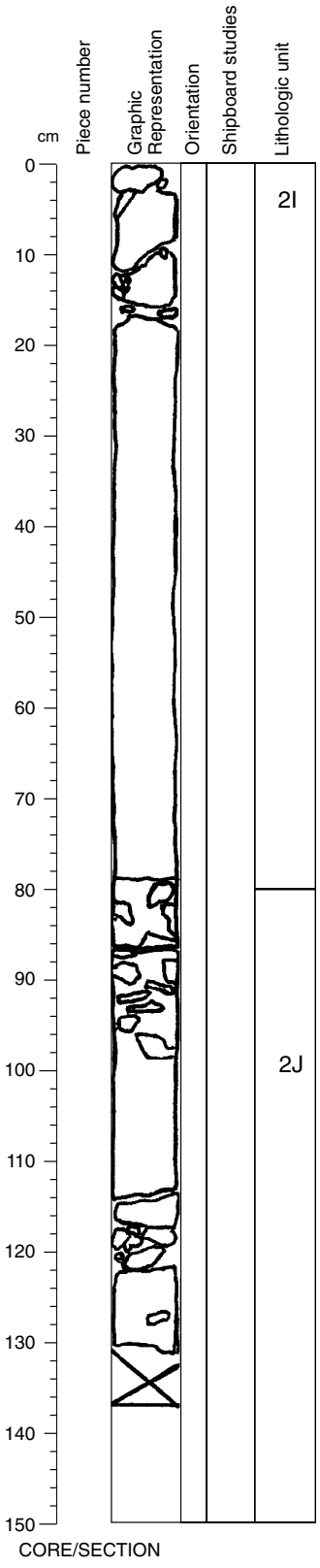
CONTACTS: None.

ALTERATION: High.

GENERAL DESCRIPTION:

Unit 2I: Tne interval from 0-10 cm is pumice lithic breccia. Lithic, granular to very coarse sand dominates the matrix, whereas granule- to pebble-size, pale green pumice lapilli dominate the clast component. The angular to subround lithic fragments are variably altered, but many remain indurated. Matrix is clayey coarse to very coarse sand, similar in composition to the clasts. Pumice clasts are irregular to angular. Maximum pumice clast is 1 x 1 cm; maximum lithic clast is 0.5 x 0.5 cm.

Core Photo



183-1138A-79R-1 **Section top: 736.60 (mbsf)**

UNIT 2I: PUMICE LITHIC BRECCIA
UNIT 2J: PUMICE LITHIC BRECCIA

CONTACTS: The contact between Subunits 2I and 2J is at 80 cm.

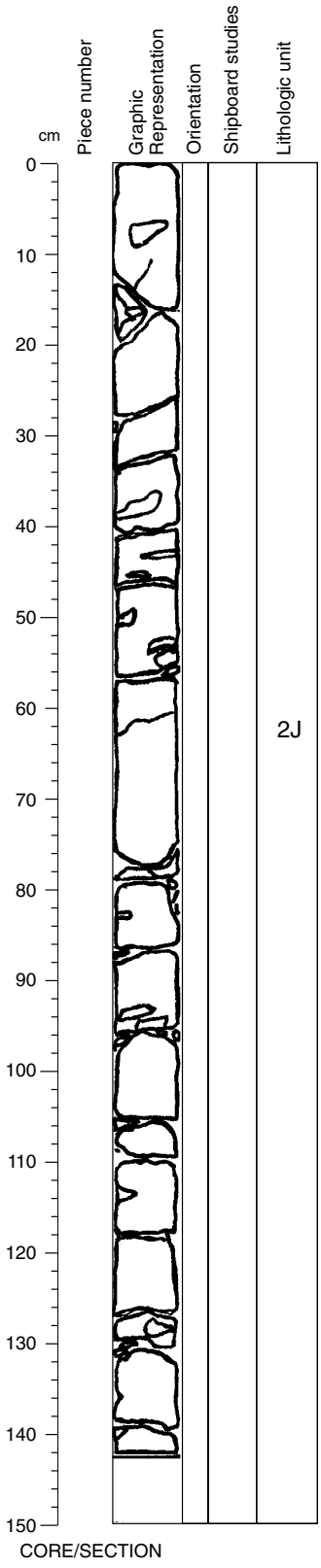
ALTERATION: High.

GENERAL DESCRIPTION:

Unit 2I: The interval from 0-80 cm is pumice lithic breccia. Normally graded, small pebbles to very coarse sand dominate the matrix, whereas reversely graded, granule- to pebble-size, pale green pumice lapilli dominate the clast component. Pumice clast size increases toward the top of the subunit; greatest abundance of pumice clasts is at 0-40 cm. The angular to subround lithic fragments are variably altered, but many remain indurated. Matrix is clayey, coarse to very coarse sand, similar in composition to the clasts. Lithic-fragment-dominated intervals are less altered than adjacent, more pumiceous intervals. Pumice clasts are ≤1 x 2 cm, and irregular to angular. Transitions from lithic-fragment-rich to pumice-rich intervals are gradational.

Unit 2J: The interval from 80-130 cm is pumice lithic breccia. Normally graded, small pebbles to very coarse sand dominate the matrix, whereas reversely graded, granule- to pebble-size, pale green pumice lapilli dominate the clast component. Pumice clast size increases toward the top of the subunit; the greatest abundance of pumice clasts is at 80-98 cm. The angular to subround lithic fragments are variably altered but many remain indurated. Matrix is coarse to very coarse sand, similar in composition to the clasts. Lithic-fragment-dominated intervals are less altered than adjacent, more pumiceous intervals. Pumice clasts are ≤2 x 3 cm, and irregular to angular. Transitions from lithic-fragment-rich to pumice-rich intervals are gradational.

Core Photo



183-1138A-79R-2 **Section top: 737.96 (mbsf)**

UNIT 2J: PUMICE LITHIC BRECCIA

CONTACTS: The contact between Subunits 2J and 2K is inferred to be at the base of the section.

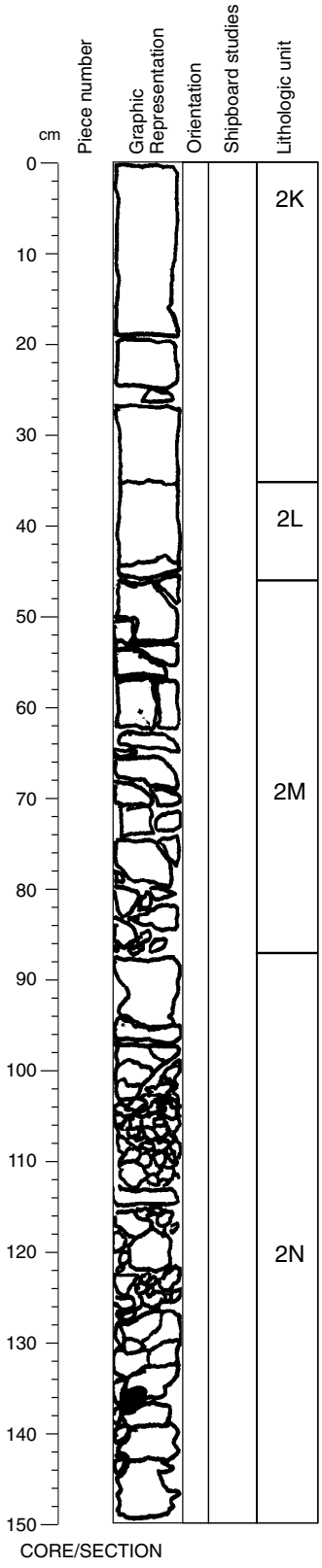
ALTERATION: High.

GENERAL DESCRIPTION:

Unit 2J: The interval from 0-143 cm is pumice lithic breccia. Normally graded, small pebbles to very coarse sand dominate the matrix; the clast component is composed of multiple beds (pulses) of 6-18 cm thick, ungraded to reversely graded, granule- to pebble-size, pale green pumice lapilli. Pumice clast size increases toward the top of the section. The angular to subround lithic fragments are variably altered, but many remain indurated. Matrix is clayey, coarse to very coarse sand, similar in composition to the clasts. Lithic-fragment-dominated intervals are less altered than adjacent, more pumiceous intervals. Pumice clasts are ≤1 x 2 cm, and irregular to angular. Transitions from lithic-rich to pumice-rich intervals are gradational.

Core Photo

183-1138A-79R-3 **Section top: 739.37 (mbsf)**



UNIT 2K: PEBBLY LITHIC BRECCIA
UNIT 2L: VOLCANIC ASH WITH ACCRETIONARY LAPILLI
UNIT 2M: CLAY
UNIT 2N: CLAY

CONTACTS: Contacts are at 0 cm (Subunits 2J-2K), 35 cm (Subunits 2K-2L), 46 cm (Subunits 2L-2M), and 87 cm (Subunits 2M-2N).

ALTERATION: High.

GENERAL DESCRIPTION:

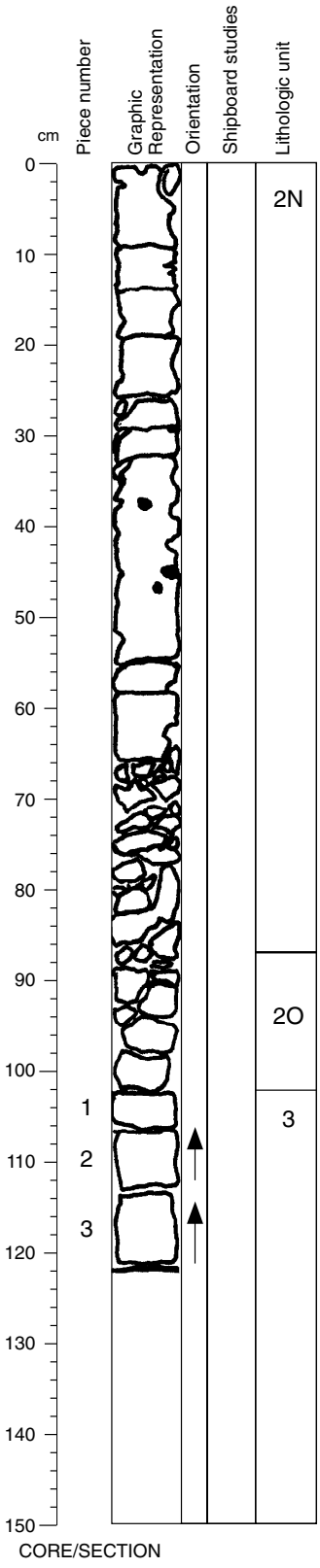
Unit 2K: The interval from 0-35 cm contains reversely graded, angular to subround, granular to pebbly lithic breccia. Granules are variably altered, but many remain indurated. Matrix is clayey, coarse to very coarse sand, similar in composition to the granules and pebbles. This subunit is less altered than adjacent subunits.

Unit 2L: The interval from 35-46 cm contains green, normally graded volcanic ash, altered to silty clay, with a laminated fine to medium sand-size lithic concentration at the base (43-46 cm). Contains accretionary lapilli from 35-40 cm, indicating the subunit is a fall deposit and that the ash interacted with water in the ash cloud. There is a mantling contact with the underlying grayish brown clay.

Unit 2M: The interval from 46-87 cm is grayish-brown clay. Contains scattered, isolated, angular to subangular lithic granules and small pebbles (<1%).

Unit 2N: The interval from 87-150 cm contains pale green clay with bands of red oxidation, especially near the top of the subunit. Contains scattered, angular lithic granules and small pebbles (<2%), sometimes in clusters of two or three. “Ghosts” of pumice clasts are not present (probably because of intense alteration). The core is disturbed between 100 and 130 cm.

Core Photo



183-1138A-79R-4 **Section top: 740.87 (mbsf)**

UNIT 2N: CLAY
UNIT 2O: CLAY

CONTACTS: The contact between Subunits 2N and 2O is at 87 cm. The inferred contact between Units 2 and 3 is at 102 cm, above Piece 1.

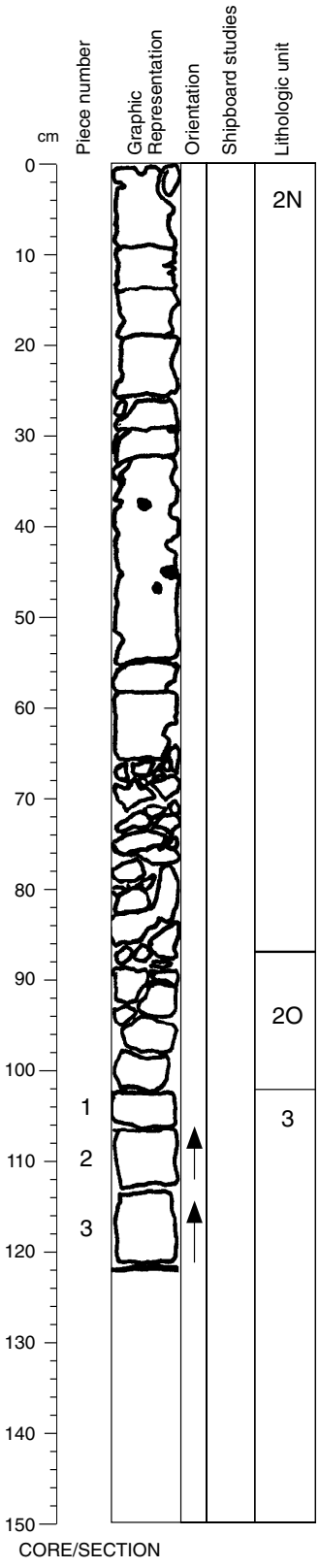
ALTERATION: High.

GENERAL DESCRIPTON:

Unit 2N: The interval from 0-76 cm contains pale green clay with bands of red oxidation, especially in the intervals 54-56 cm and 59-68 cm, and has a distinct red band at 70 cm. Contains scattered, angular lithic granules and small pebbles (<2%), sometimes in clusters of two or three. “Ghosts” of pebble-size pumice clasts are evident in the lower part of this interval. The interval from 76-87 cm contains green silty clay with a laminated sand lens at 77-79 cm; laminated interval contains many dark, fine to medium sand-size grains.

Unit 2O: The interval from 87-102 cm is dark brown clay with <1% very coarse sand-size lithic clasts, distributed randomly.

Core Photo



183-1138A-79R-4 **Section top: 740.87 (mbsf)**

UNIT 3: MODERATELY PLAGIOCLASE-PHYRIC BASALT

Pieces: 1-3

CONTACTS: Not recovered; the contact between Units 2 and 3 is inferred to be between the lowermost sediment at 102 cm and the top of Piece 1.

PHENOCRYSTS:	% Mode	Grain Size (mm): Max	Min	Avg.	Shape/Habit
Plagioclase:	5	2	0.5	1	Subhedral to anhedral; single crystals and some glomerocrysts

GROUNDMASS: Aphanitic to fine grained.

VESICLES: Moderately vesicular. Vesicles are round, 1-10 mm, and filled with light and dark green clay.

COLOR: Light gray.

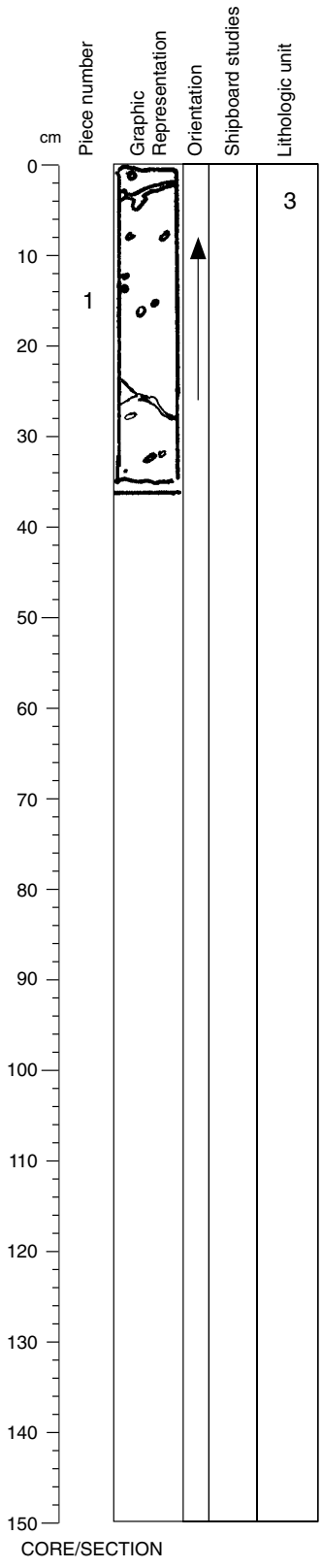
STRUCTURE: Massive.

ALTERATION: High. Clay replaces much of the groundmass.

VEINS/FRACTURES: None.

COMMENTS: Possibly the lower part of a vesicular flow top.

Core Photo



183-1138A-79R-5 **Section top: 742.07 (mbsf)**

UNIT 3: MODERATELY PLAGIOCLASE-PHYRIC BASALT

Pieces: 1

CONTACTS: None.

PHENOCRYSTS:

	% Mode	Grain Size (mm): Max	Min	Avg.	Shape/Habit
Plagioclase:	5	2	0.5	1	Subhedral to anhedral

GROUNDMASS: Aphanitic to fine grained.

VESICLES: Sparsely vesicular; vesicles filled with light green clay and calcite.

COLOR: Light gray.

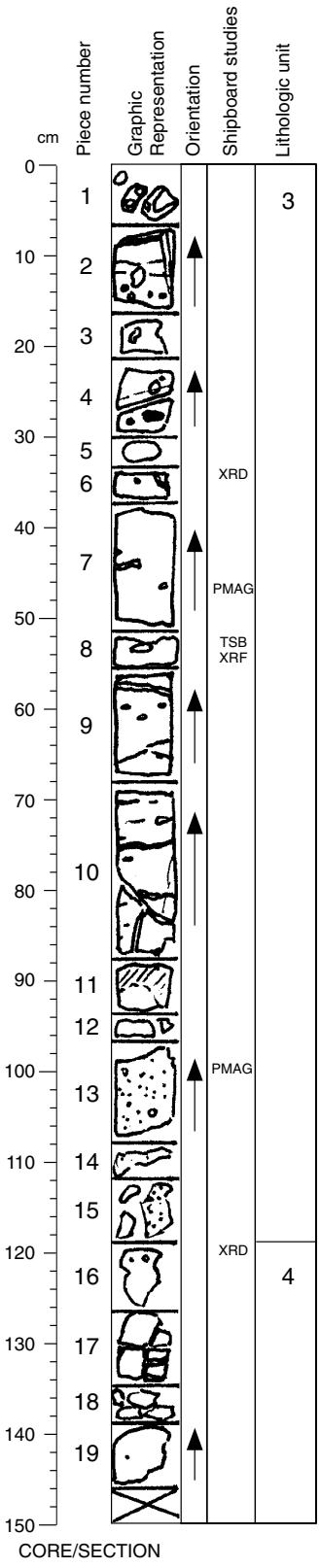
STRUCTURE: Massive.

ALTERATION: High.

VEINS/FRACTURES: Sinuous veins (1-5 mm thick) filled with light green clay and calcite are present, as well as some hairline, subhorizontal fractures.

COMMENTS: Probably top of massive interior.

Core Photo



183-1138A-80R-1 **Section top: 746.30 (mbsf)**

UNIT 3: SPARSELY PLAGIOCLASE-PHYRIC BASALT

Pieces: 1-15

CONTACTS: Not recovered; the contact between Units 3 and 4 is inferred to be between Pieces 15 and 16.

PHENOCRYSTS:	**%**	**Grain Size (mm):**			
	Mode	**Max**	**Min**	**Avg.**	**Shape/Habit**
Plagioclase:	2	5	0.5	2	Subhedral to anhedral; mainly blocky, rare laths; commonly in glomerocrysts
Clinopyroxene:	<0.5	3.5	0.25	1.5	Subhedral to anhedral; in glomerocrysts with plagioclase

GROUNDMASS: Fine grained.

VESICLES: Pieces 2-11 are sparsely vesicular; Pieces 12-15 are moderately vesicular. Vesicles in Pieces 2-11 are 1-28 mm, round, and filled or partly filled. Piece 4B contains a vug. Vesicles in Pieces 12-15 are 1-5 mm, with variable shapes; most are entirely filled. The fillings are green and blue-green clay, calcite and, to a lesser extent, zeolite. Geopetal structures are present.

COLOR: Pale gray, with patches of green in the groundmass (Pieces 13-15), possibly associated with areas of locally higher vesicle abundance.

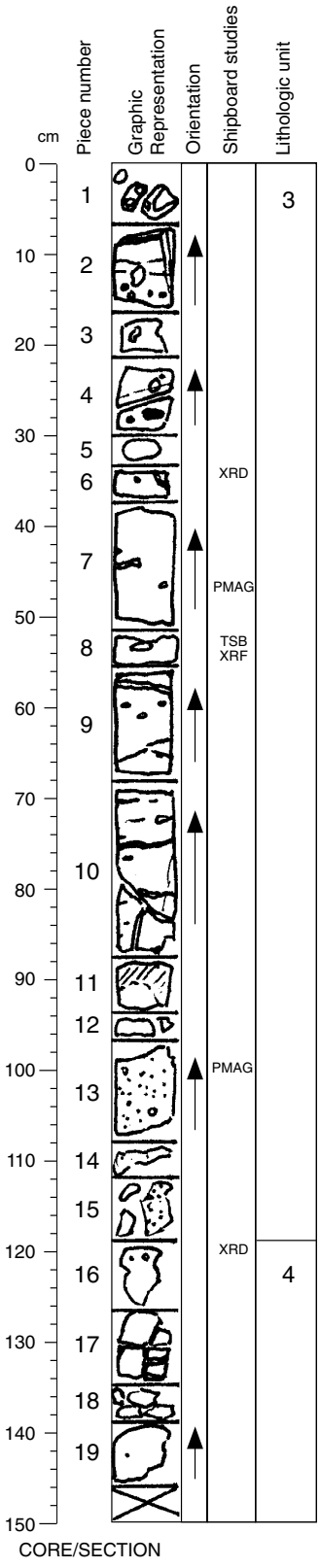
STRUCTURE: Massive. Contains subhorizontal wisps with a higher concentration of clay after mesostasis.

ALTERATION: Slight to moderate.

VEINS/FRACTURES: Numerous subhorizontal and subvertical clay- and calcite-filled veins, 0.2-5 mm wide, are present.

COMMENTS: Interior and basal crust of a lova flow.

Core Photo



183-1138A-80R-1 **Section top: 746.30 (mbsf)**

UNIT 4: APHYRIC BASALTIC BRECCIA

Pieces: 16-19

CONTACTS: Not recovered; the contact between Units 3 and 4 is inferred to be between Pieces 15 and 16 at 119 cm.

PHENOCRYSTS:	% Mode	Grain Size (mm): Max	Min	Avg.	Shape/Habit
Plagioclase:	≤1	2	0.5		Subhedral to anhedral (abundance varies among clasts); with rare clinopyroxene in glomerocrysts
Clinopyroxene:	trace	1	0.25		Anhedral (abundance varies among clasts)

GROUNDMASS: Piece 16 is very fine grained. Pieces 17-19 are aphanitic.

VESICLES: Slightly to moderately vesicular; vesicles are filled with zeolite and clay.

COLOR: Dark gray to greenish black; clasts in Pieces 17-19 have reddish patches.

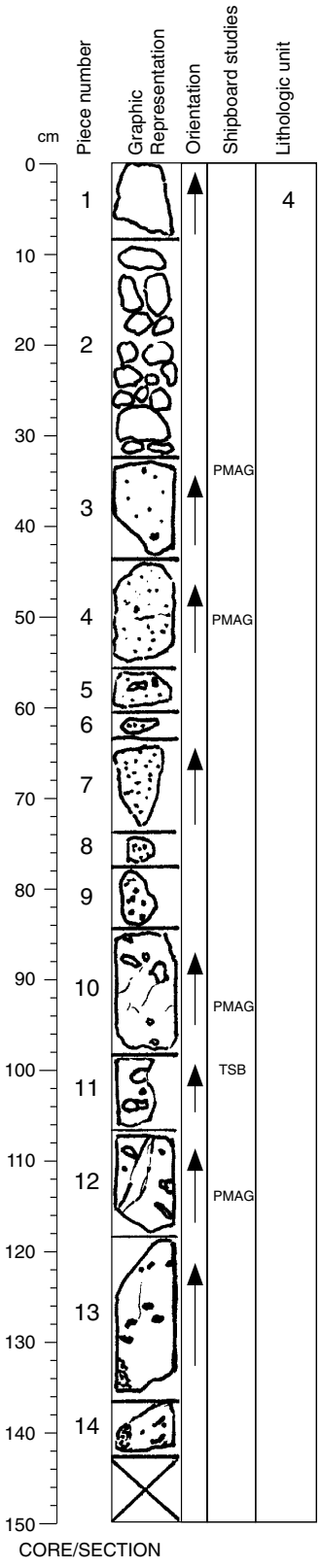
STRUCTURE: Brecciated.

ALTERATION: Very high in Piece 16; complete in Pieces 17-19.

VEINS/FRACTURES: Piece 16 has abundant, ≤2-mm-wide, irregular veins filled with calcite and zeolite.

COMMENTS: Pieces 17-19 have a waxy appearance, and are broken along fault surfaces marked by slickensides.

Core Photo



183-1138A-80R-2 **Section top: 747.77 (mbsf)**

UNIT 4: APHYRIC BASALTIC BRECCIA AND SPARSELY PLAGIOCLASE-PHYRIC BASALT

Pieces: 1-14

CONTACTS: None.

PHENOCRYSTS:	**%**	**Grain Size (mm):**			
	Mode	**Max**	**Min**	**Avg.**	**Shape/Habit**
Plagioclase:	2	2.5	0.25	1	Subhedral to anhedral; commonly with clinopyroxene in round clusters
Olivine:	trace?			0.6	Subhedral to anhedral; fresh in Piece 9
Clinopyroxene:	<0.5	2.5	<0.25	1	Subhedral to anhedral; generally around edges of clusters

GROUNDMASS: Aphanitic in Pieces 1 and 2, with a waxy appearance in Piece 1. Fine grained in Pieces 3-14.

VESICLES: Moderately vesicular; some highly vesicular patches in Piece 2. Vesicles are variable in shape (round to irregular and elongate) and size (~0.5-26 mm). Pieces 12-14 have 10-40 mm wide patches of <1-mm vesicles. Most vesicles are filled with clay and zeolite; multiple generations of zeolite are evident in Pieces 3-14.

COLOR: Pieces 1-3 are dark gray to pale greenish gray; Pieces 4-14 are pale gray.

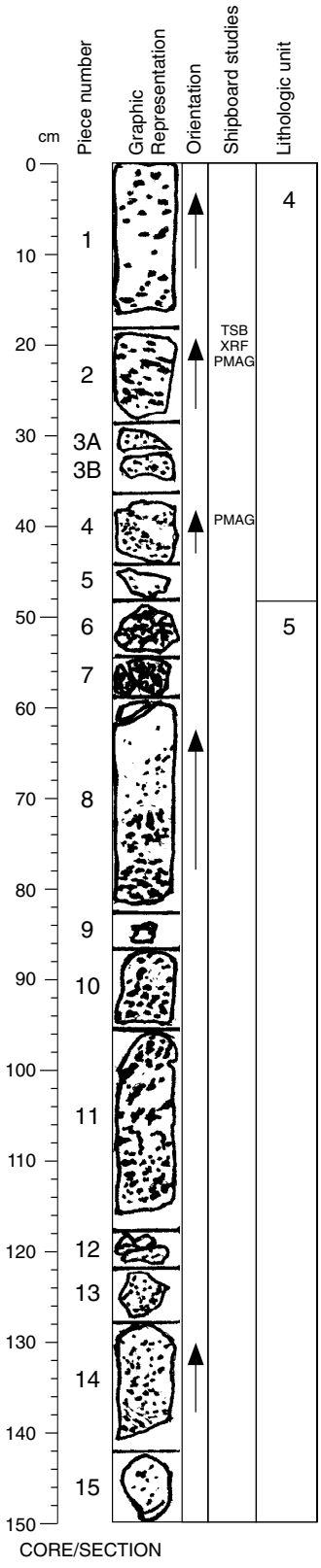
STRUCTURE: Pieces 1 and 2 are brecciated; the clasts are difficult to discern because of the high level of alteration. Pieces 3-14 are massive, and have a weak horizontal banding produced by uneven distribution of glassy mesostasis.

ALTERATION: Complete in Pieces 1 and 2; moderate in Pieces 3-9 (mainly vesicle filling); slight in Pieces 10-14.

VEINS/FRACTURES: None in Pieces 1 and 2. Pieces 3-14 contain numerous clay- and zeolite-filled veins, <1 mm wide.

COMMENTS: The breccia in Pieces 1 and 2 has <<1% plagioclase phenocrysts, whereas the massive portion of the section is sparsely porphyritic.

Core Photo



183-1138A-80R-3 **Section top: 749.20 (mbsf)**

UNIT 4: SPARSELY PLAGIOCLASE-PHYRIC BASALT

Pieces: 1-5

CONTACTS: Not recovered; the contact between Units 4 and 5 is inferred to be between Pieces 5 and 6 at ~48 cm.

PHENOCRYSTS:	**%**	**Grain Size (mm):**			
	Mode	**Max**	**Min**	**Avg.**	**Shape/Habit**
Plagioclase:	0-4	9	2	3	Round glomerocrysts (clots) with clinopyroxene

GROUNDMASS: Very fine grained.

VESICLES: Moderately to highly vesicular; vesicles are ≤8 mm, spherical to irregular, and filled with green clay and zeolite. Patches in Pieces 1 and 2 contain abundant small vesiclesin different orientations.

COLOR: Pale gray to medium grayish green.

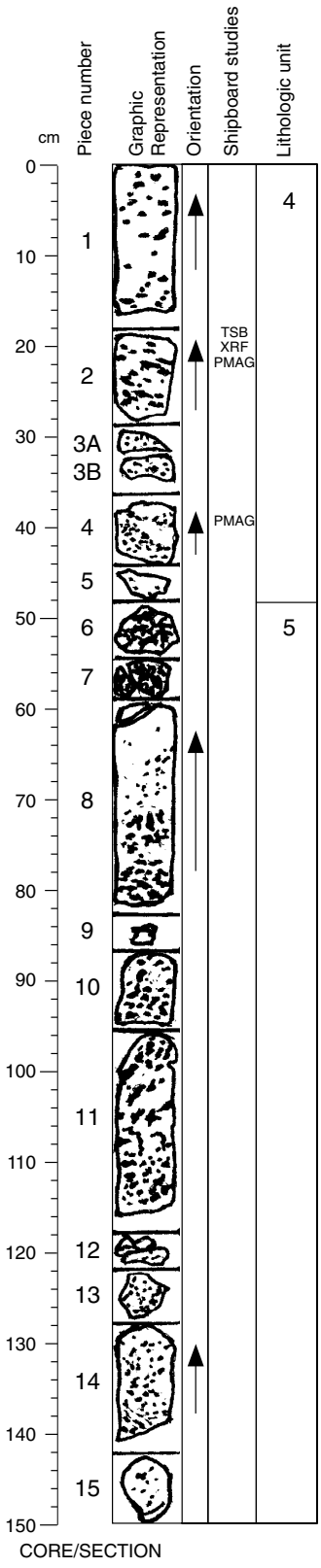
STRUCTURE: Massive.

ALTERATION: Moderate overall, slight in the groundmass.

VEINS/FRACTURES: A few <1-mm-wide veins filled with clay and zeolite are present.

COMMENTS: Patches of variable vesicularity are interpreted as welded fragments of aa-basal crust.

Core Photo



183-1138A-80R-3 **Section top: 749.20 (mbsf)**

UNIT 5: APHYRIC BASALTIC BRECCIA AND BASALT

Pieces: 6-15

CONTACTS: Not recovered; the contact between Units 4 and 5 is inferred to be between Pieces 5 and 6 at ~48 cm.

PHENOCRYSTS: None.

GROUNDMASS: Aphanitic to fine grained.

VESICLES: Moderately to highly vesicular. Vesicles are filled with blue-green clay and zeolite, vary in size from <1 mm to 15 mm, are irregular in shape, and have a highly variable distribution. Pieces 8-15 have 1-20-mm-wide vesicle-rich zones.

COLOR: Black and white in Pieces 6 and 7; pale gray and green in Pieces 8-15.

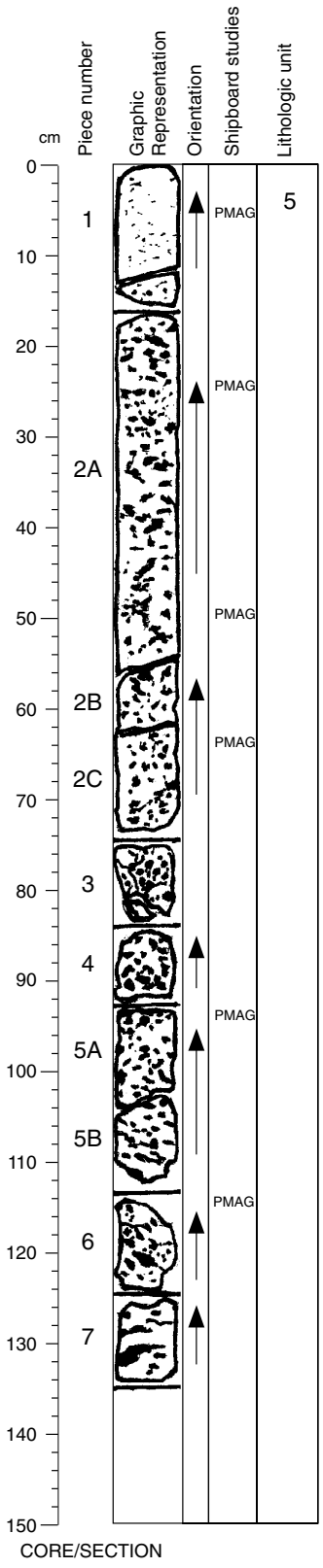
STRUCTURE: Pieces 6 and 7 are brecciated; Pieces 8-15 are massive.

ALTERATION: Complete in Pieces 6 and 7; the breccia clasts are altered to black clay in a white matrix. Slight to moderate in Pieces 8-15.

VEINS/FRACTURES: One 0.5-mm-wide clay- and zeolite-filled vein is in Piece 8.

COMMENTS: Piece 6 has rare ~3 mm plagioclase phenocrysts.

Core Photo



183-1138A-80R-4 **Section top: 750.70 (mbsf)**

UNIT 5: APHYRIC BASALT

Pieces: 1-7

CONTACTS: None.

PHENOCRYSTS: None.

GROUNDMASS: Fine grained.

VESICLES: Moderately vesicular. Vesicles are spherical to highly irregular, filled with green clay and zeolite, and have a wide range of sizes, from <1 mm to 50 mm.

COLOR: Pale gray with dark grayish green vesicle fill.

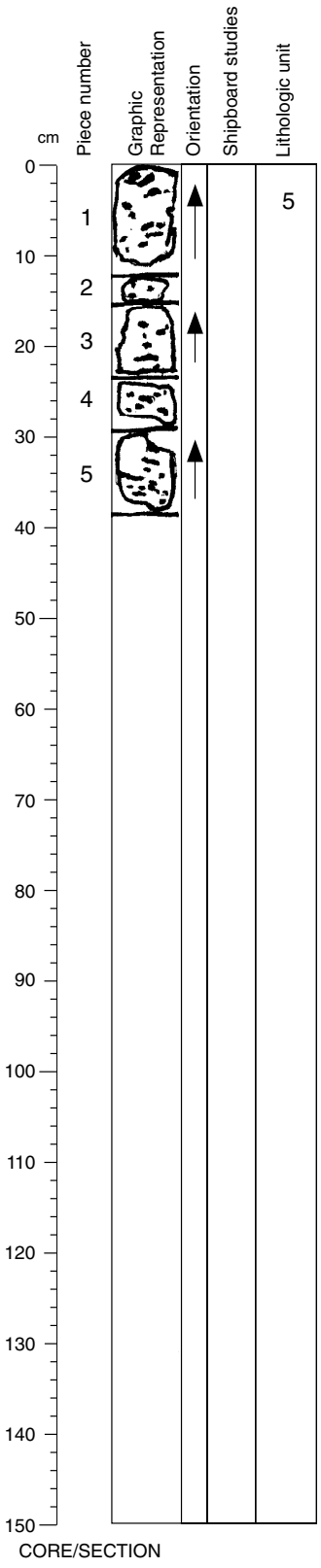
STRUCTURE: Massive; mesostasis-rich wisps inclined at 20° from horizontal are present in Piece 5.

ALTERATION: Moderate, because of vesicle fillings. Groundmass is generally only slightly altered.

VEINS/FRACTURES: Thin clay-filled veins occur in Pieces 6 and 7.

COMMENTS:

Core Photo



183-1138A-80R-5 **Section top: 752.04 (mbsf)**

UNIT 5: APHYRIC BASALT

Pieces: 1-5

CONTACTS: None.

PHENOCRYSTS: None.

GROUNDMASS: Fine grained. Piece 1 has mesostasis-rich wisps, dipping ~15°.

VESICLES: Sparsely vesicular; vesicles are elongate, subhorizontal, and clay-filled.

COLOR: Pale gray.

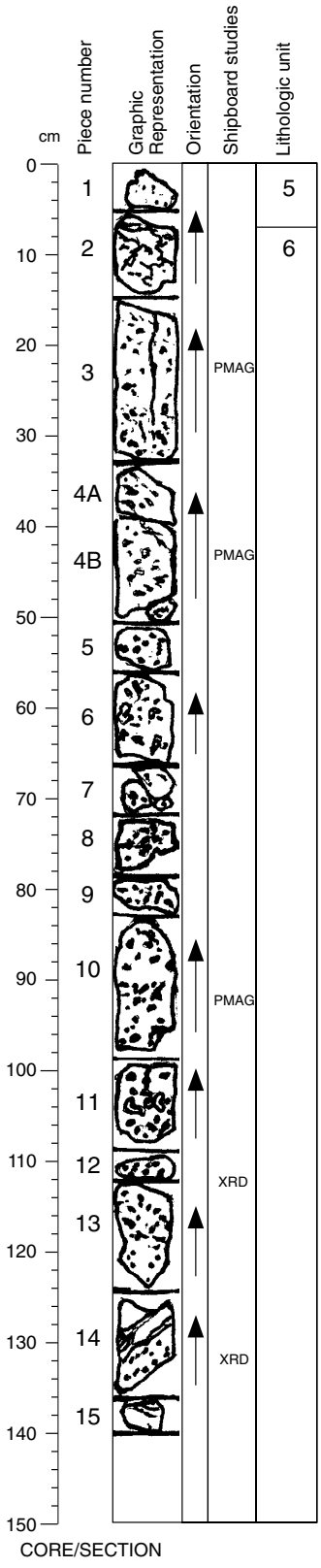
STRUCTURE: Massive.

ALTERATION: Slight to moderate.

VEINS/FRACTURES: Several <0.5-mm-wide clay-filled veins are present.

COMMENTS: A subangular microgabbro xenolith, ~0.6 x 1 cm, is present in Piece 5.

Core Photo



183-1138A-81R-1 **Section top: 755.90 (mbsf)**

UNIT 5: SPARSELY PLAGIOCLASE-PHYRIC BASALT

Pieces: 1, 2

CONTACTS: The contact between Units 5 and 6 is at 6 cm, in the top of Piece 2.

PHENOCRYSTS:	**% Mode**	**Grain Size (mm): Max**	**Min**	**Avg.**	**Shape/Habit**
Plagioclase:	1-2	3	0.5	1	Subhedral, blocky
Clinopyroxene:	trace?				

GROUNDMASS: Fine grained; aphanitic at contact. Groundmass contains dark, ≤0.2 mm, needle-like crystals and radiating, acicular plagioclase, which may be a quench feature.

VESICLES: Moderately vesicular at contact, sparsely vesicular elsewhere. Vesicles are 1-2 mm, filled with variously colored clay and zeolite; most are green and black, some are rust-colored.

COLOR: Pale grayish green, darkening to pinkish brown at contact.

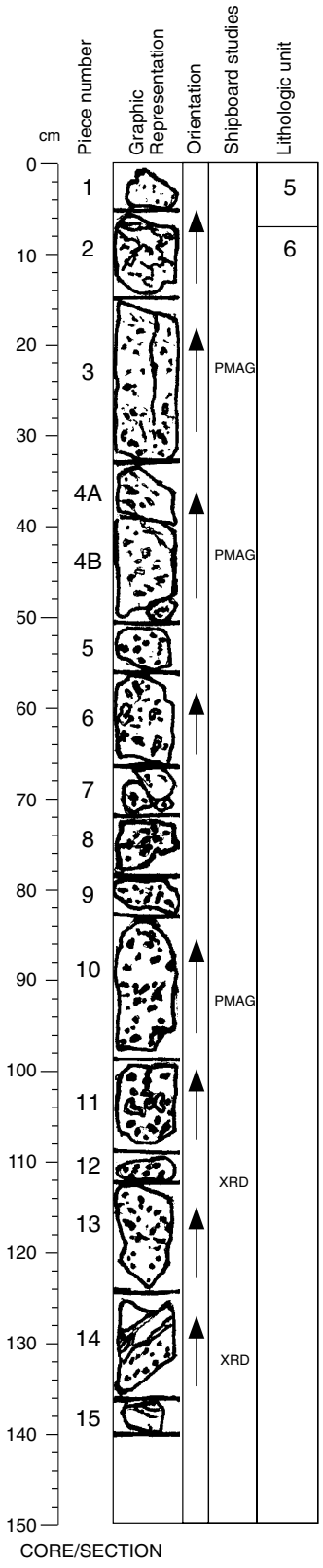
STRUCTURE: Massive.

ALTERATION: High.

VEINS/FRACTURES: Networked with hairline veinlets filled with dark green clay and zeolite.

COMMENTS: Basal chill preserved in Piece 2.

Core Photo



183-1138A-81R-1 **Section top: 755.90 (mbsf)**

UNIT 6: APHYRIC BASALT

Pieces: 2-15

CONTACTS: The contact between Units 5 and 6 is at 6 cm, in the top of Piece 2.

PHENOCRYSTS: None.

GROUNDMASS: Fine grained. In Piece 2, acicular plagioclase is in radiating clusters, indicative of quench texture.

VESICLES: Pieces 2 and 3 are highly vesicular, with very irregular, 1-5 mm vesicles. Vesicularity decreases to slight below Piece 3; vesicle size is larger with less variation, and shapes are rounder. Amount of filling varies, especially in Pieces 2-9. Fill is clay and several types of zeolite.

COLOR: Pieces 2-6 are reddish brown; Pieces 7-15 are gray.

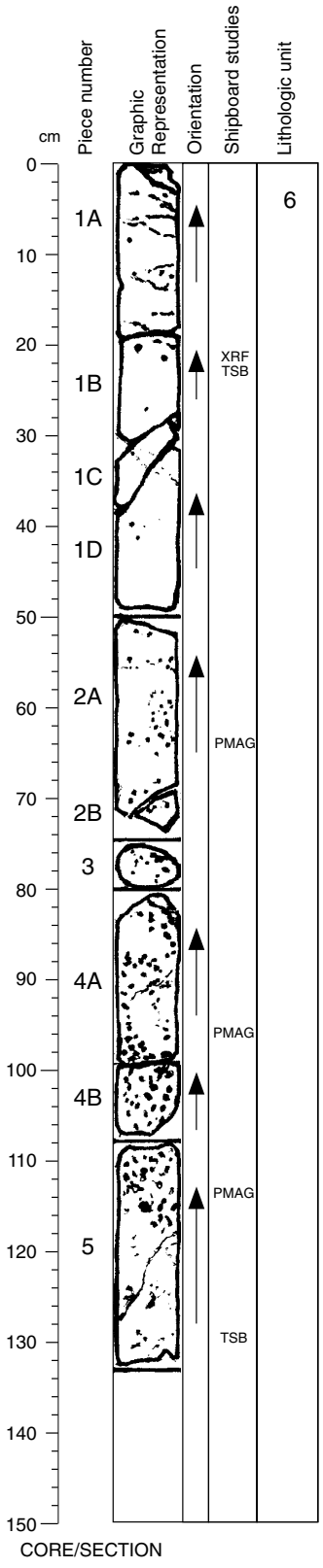
STRUCTURE: Massive.

ALTERATION: High in Piece 2, where oxidation of groundmass is variable, decreasing to slight down section.

VEINS/FRACTURES: Irregular zeolite- and clay-filled veins, ≤8 mm wide are present; narrower veins connect vesicles.

COMMENTS: Piece 2-6 are interpreted as an oxidized flow top. Parts of Piece 2 are sparsely clinopyroxene-plagioclase-phyric.

Core Photo



183-1138A-81R-2 **Section top: 757.31 (mbsf)**

UNIT 6: APHYRIC BASALT

Pieces: 1-5

CONTACTS: None.

PHENOCRYSTS: None.

GROUNDMASS: Fine grained.

VESICLES: Piece 1 is sparsely vesicular, with 1-2 mm vesicles. In the interval from 50-115 cm, the vesicles are 1-7 mm, and vesicularity is moderate to high. Below ~115 cm, the vesicles are <1 to 5 mm, and vesicularity is moderate. Vesicles are mostly round and are filled with dark green to black clay and zeolite.

COLOR: Medium gray.

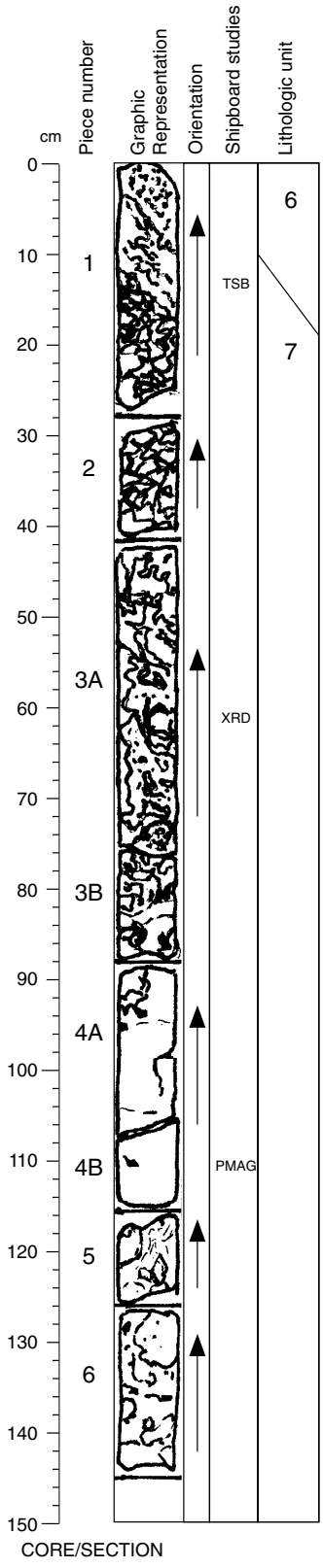
STRUCTURE: Massive.

ALTERATION: Slight to moderate; main alteration is vesicle filling.

VEINS/FRACTURES: Numerous veins and fractures (<1 mm wide) are filled with clay and zeolite.

COMMENTS:

Core Photo



183-1138A-81R-3 **Section top: 758.65 (mbsf)**

UNIT 6: SPARSELY CLINOPYROXENE-PHYRIC BASALT

Pieces: 1

CONTACTS: The contact between Units 6 and 7 runs diagonally from 11 cm to 17 cm, within Piece 1.

PHENOCRYSTS:	% Mode	Grain Size (mm): Max	Min	Avg.	Shape/Habit
Plagioclase:	trace	1	<0.1		Acicular; most pseudomorphed by black and green clays; one anhedral grain appears fresh
Clinopyroxene:	1-2	0.5	<0.1	0.2	Euhedral to anhedral; some skeletal and lath shapes

GROUNDMASS: Grades from fine grained at top to aphanitic at contact, where acicular (quenched) crystals of plagioclase are present.

VESICLES: Highly vesicular; vesicles are round to irregular, ≤8 mm and, except in the lowermost 1 cm above the contact, filled with clay and zeolite.

COLOR: Bluish gray. An 8-10-mm-wide, reddish brown band is present above the contact from 6.5-7.5 cm.

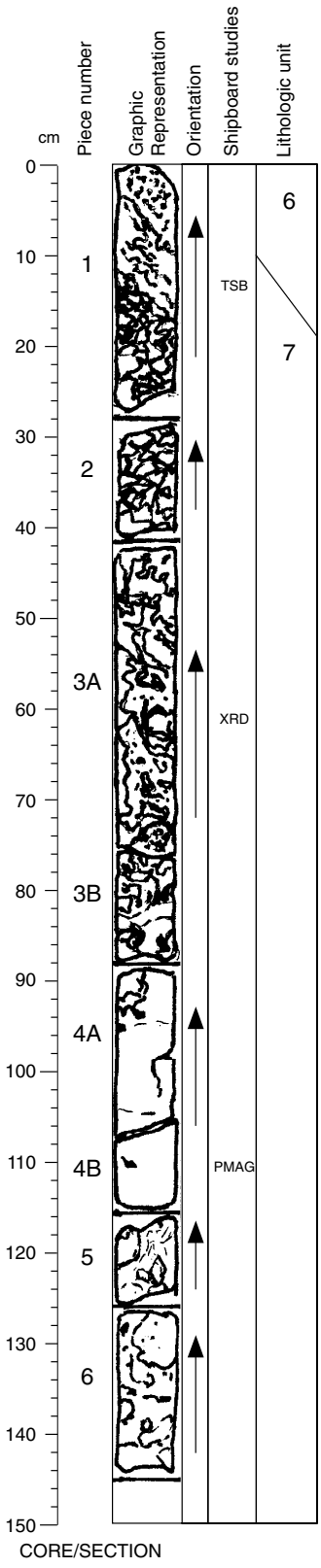
STRUCTURE: Massive; the basal 6 cm above the contact is fractured but originally coherent.

ALTERATION: Moderate to high.

VEINS/FRACTURES: None.

COMMENTS: Pahoehoe flow base.

Core Photo



183-1138A-81R-3 **Section top: 758.65 (mbsf)**

UNIT 7: SPARSELY PLAGIOCLASE-PHYRIC BASALTIC BRECCIA

Pieces: 1-6

CONTACTS: The contact between Units 6 and 7 is at 11-17 cm, within Piece 1.

PHENOCRYSTS IN CLASTS:	% Mode	Grain Size (mm): Max	Min	Avg.	Shape/Habit
Plagioclase:	1	6	1		Subhedral laths and round clots
Olivine:	≤1	0.5	0.1		Subhedral laths and anhedral; some skeletal

GROUNDMASS: Aphanitic, except for a large fine-grained clast in Piece 4. Acicular plagioclase is present.

VESICLES: Sparsely to moderately vesicular, depending on clast; vesicles are generally <1 mm, irregular, and filled with dark clay.

COLOR: Reddish brown; reddish gray in Pieces 4A and 4B.

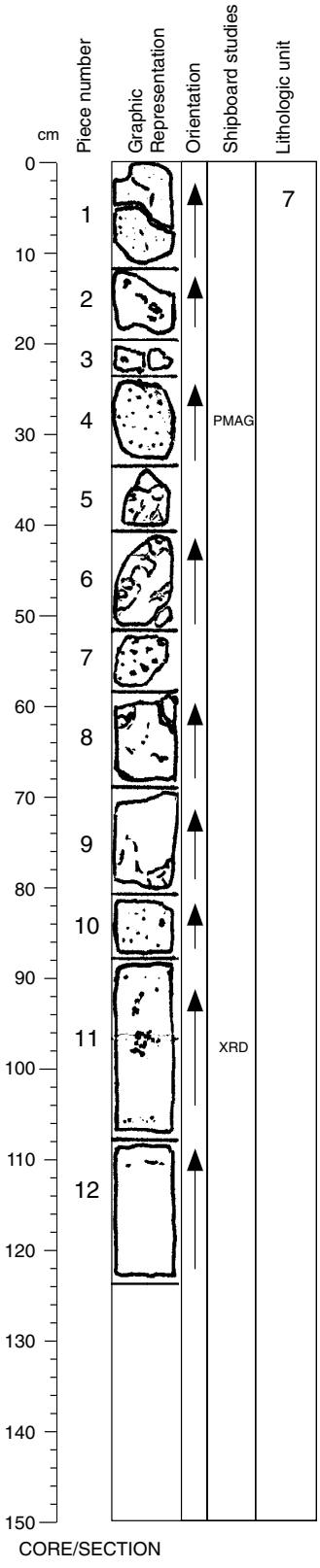
STRUCTURE: Brecciated. Several patches with ≤15-mm-wide interclast void spaces, now filled with white zeolite, are present. Piece 2 (28-40 cm) and Piece 4A (88-100 cm) contain vug-bearing zones, which are most evident on back sides of core.

ALTERATION: Moderate.

VEINS/FRACTURES: Several irregular hairline veinlets are filled with zeolite and minor clay.

COMMENTS: Two kinds of breccia are present: (1) a finer breccia with <5-mm clasts cemented by vein material (Pieces 1, 2, and 5); (2) breccia with clasts embedded in irregular patches (several cm across) of massive, brown clay. The basalt clasts in the second type are round to subround, and variably oxidized. Many clasts have well-developed chill margins.

Core Photo



183-1138A-81R-4 **Section top: 760.11 (mbsf)**

UNIT 7: MODERATELY PLAGIOCLASE-PHYRIC BASALTIC BRECCIA AND BASALT

Pieces: 1-12

CONTACTS: None.

PHENOCRYSTS:	**%**	**Grain Size (mm):**			
	Mode	**Max**	**Min**	**Avg.**	**Shape/Habit**
Plagioclase:	2-3	4	1	2	Laths and round clots

GROUNDMASS: Aphanitic to fine grained. Contains minor disseminated sulfide.

VESICLES: Moderately vesicular; vesicles are <1 mm and filled with clay and zeolite. A 2-cm vug is present at 97 cm)

COLOR: Medium brownish gray (breccia) and pale gray (massive).

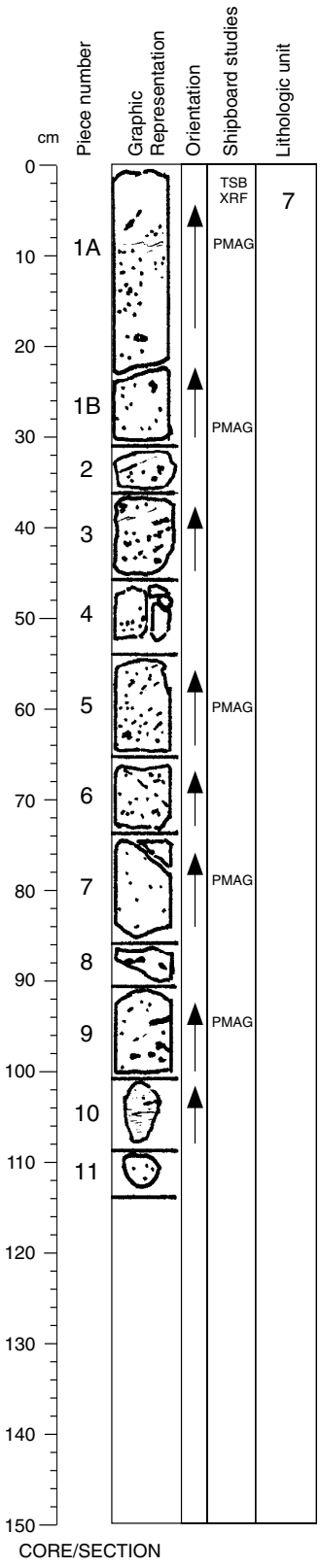
STRUCTURE: Pieces 1-5 are breccia, Pieces 6-8 are welded breccia, and Pieces 9-12 are massive.

ALTERATION: Moderate to high in breccia; slight to moderate in massive regions.

VEINS/FRACTURES: One <0.5-mm-wide clay-filled vein.

COMMENTS: Difficult to estimate percentage of phenocrysts because they look similar to filled vesicles. Possible olivine phenocrysts in Piece 1. Tranisition from brecciated flow top into massive interior.

Core Photo



183-1138A-81R-5 **Section top: 761.36 (mbsf)**

UNIT 7: MODERATELY PLAGIOCLASE-PHYRIC BASALT

Pieces: 1-11

CONTACTS: Not recovered; the contact between Units 7 and 8 is inferred to be between Sections 81R-5 and 82R-1.

PHENOCRYSTS:	% Mode	Grain Size (mm): Max	Min	Avg.	Shape/Habit
Plagioclase:	2	5	0.5	1	Laths and subhedral clots
Clinopyroxene:	<1	0.3	0.1		Subhedral

GROUNDMASS: Fine grained. Piece 10 contains horizontal wisps of mesostasis.

VESICLES: Pieces 1-9 are moderately vesicular; vesicles are ≤17 mm, irregular in shape, and evenly disseminated, except in Piece 1, where vesicle distribution is patchy. Pieces 10 and 11 are sparsely vesicular; Piece 10 contains horizontal vesicle trains. Vesicles are filled with green clay and zeolite.

COLOR: Pale gray.

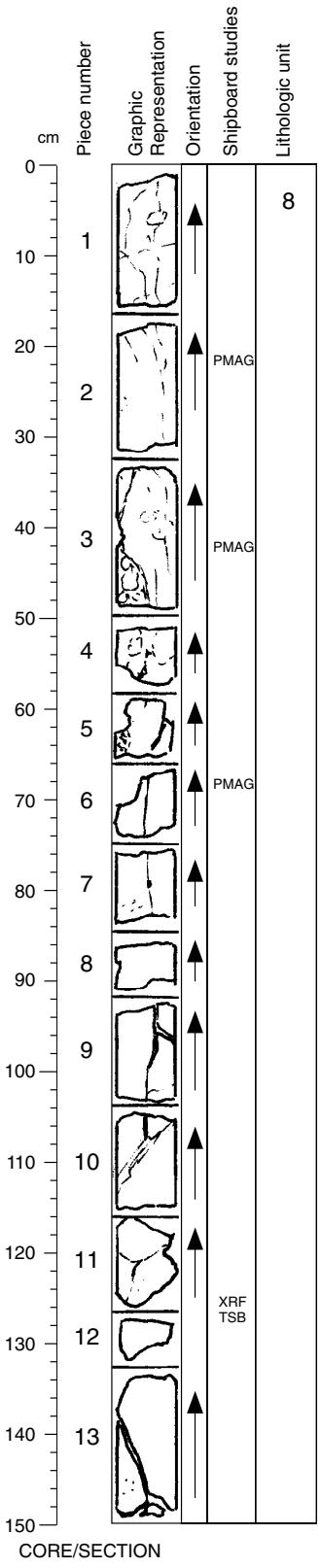
STRUCTURE: Massive.

ALTERATION: Moderate (slight in groundmass).

VEINS/FRACTURES: Sparse, <1 mm thick, slightly inclined, and filled with clay and zeolite.

COMMENTS:

Core Photo



183-1138A-82R-1 **Section top: 765.60 (mbsf)**

UNIT 8: SPARSELY PLAGIOCLASE-PHYRIC BASALTIC BRECCIA AND BASALT

Pieces: 1-13

CONTACTS: Not recovered; the contact between Units 7 and 8 is inferred to be between Sections 81R-5 and 82R-1.

PHENOCRYSTS:	**% Mode**	**Grain Size (mm): Max**	**Min**	**Avg.**	**Shape/Habit**
Plagioclase:	2	1-2	0.8	1	Subhedral
Clinopyroxene:	trace				Subhedral to anhedral; altered to clay

GROUNDMASS: Fine grained to aphanitic.

VESICLES: Pieces 1-5 are highly vesicular; vesicle abundance is sparse in Pieces 6-9 and moderate in Pieces 10-13. Filled with green clay or white zeolite. Vesicle trails in Pieces 10-13 dip ~45°.

COLOR: Pieces 1-5 are light brownish gray. Pieces 6-13 are medium gray to light gray.

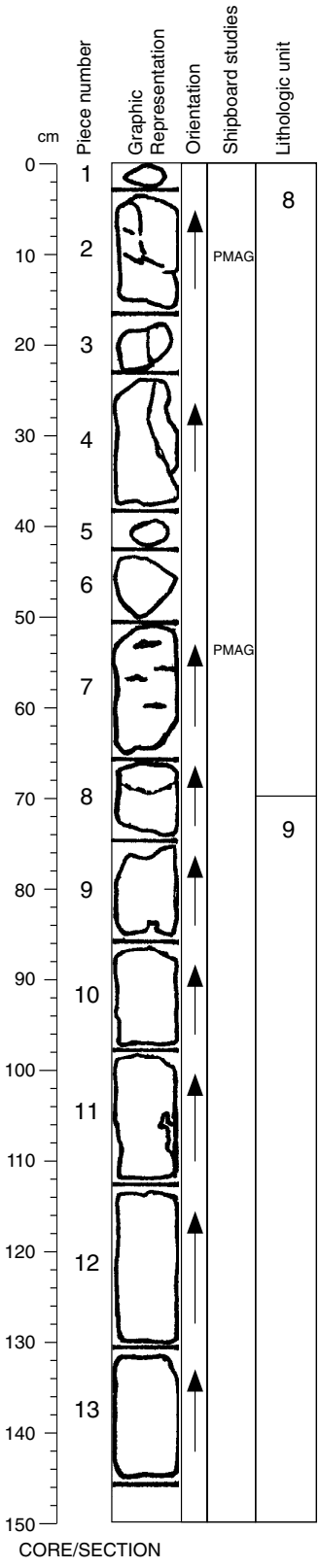
STRUCTURE: Vesicular breccia (Pieces 1-5) to massive (Pieces 6-13).

ALTERATION: Pieces 1-5 are moderately to highly altered. Pieces 6-13 are slightly to moderately altered.

VEINS/FRACTURES: Clay- and zeolite-filled veins are abundant in Pieces 1-5 and moderately abundant to sparse in Pieces 6-13.

COMMENTS: Altered clinopyroxene is difficult to distinguish from filled vesicles of the same color.

Core Photo



183-1138A-82R-2 **Section top: 767.10 (mbsf)**

UNIT 8: APHYRIC BASALT

Pieces: 1-8

CONTACTS: The contact between Units 8 and 9 is at ~70 cm, within Piece 8.

PHENOCRYSTS:

	% Mode	Grain Size (mm): Max	Min	Avg.	Shape/Habit
Plagioclase:	<1	1	0.5	1	Anhedral
Clinopyroxene:	trace				

GROUNDMASS: Fine grained.

VESICLES: Moderately vesicular. Vesicles have irregular shapes, are aligned in trains dipping ~20°, and filled with dark and light green clay and at least two generations of zeolite. Vesicle trains and larger irregular pore spaces at the top of the section become smaller, rounded, and more numerous toward the contact.

COLOR: Light gray. Piece 8 is dark reddish gray.

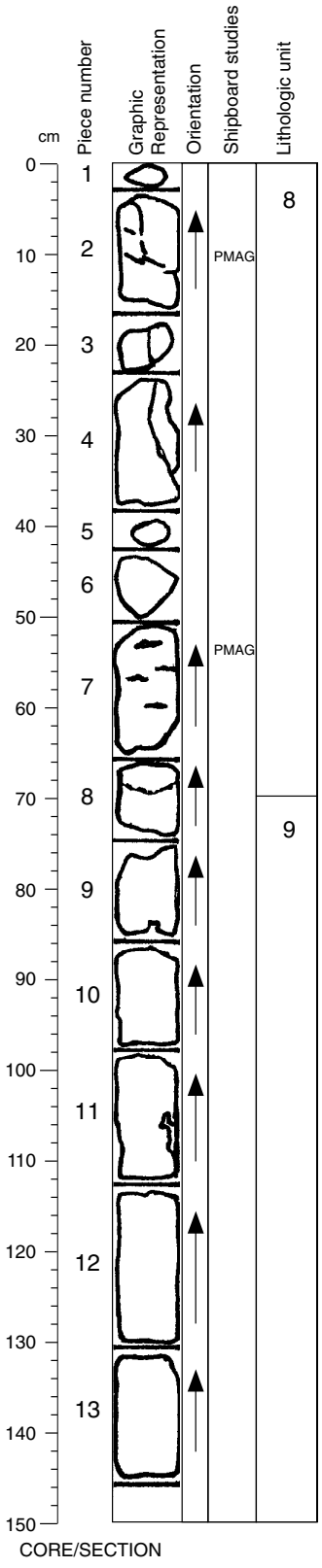
STRUCTURE: Massive.

ALTERATION: Slight to moderate. Piece 8, which contains the contact, is somewhat oxidized.

VEINS/FRACTURES: Several small veins and fractures are present, including a subvertical, 1-2 mm thick vein, and smaller veins and fractures oriented the same as the vesicle trains (dipping ~20°). The fractures are filled with dark green clay and zeolite.

COMMENTS:

Core Photo



183-1138A-82R-2 **Section top: 767.10 (mbsf)**

UNIT 9: APHYRIC BASALTIC BRECCIA

Pieces: 8-13

CONTACTS: The contact between Units 8 and 9 is at ~70 cm depth, within Piece 8.

PHENOCRYSTS:	**% Mode**	**Grain Size (mm): Max**	**Min**	**Avg.**	**Shape/Habit**
Plagioclase:	<1				Subhedral to anhedral
Clinopyroxene:	trace				

GROUNDMASS: Fine grained and largely replaced with reddish brown clay. Microlites of euhedral feldspar are apparent in fresher clasts.

VESICLES: Moderately vesicular; vesicles are irregular in shape and vary in size from 0.5-5 mm. Partly filled with zeolite and black clay.

COLOR: Reddish gray to brownish red.

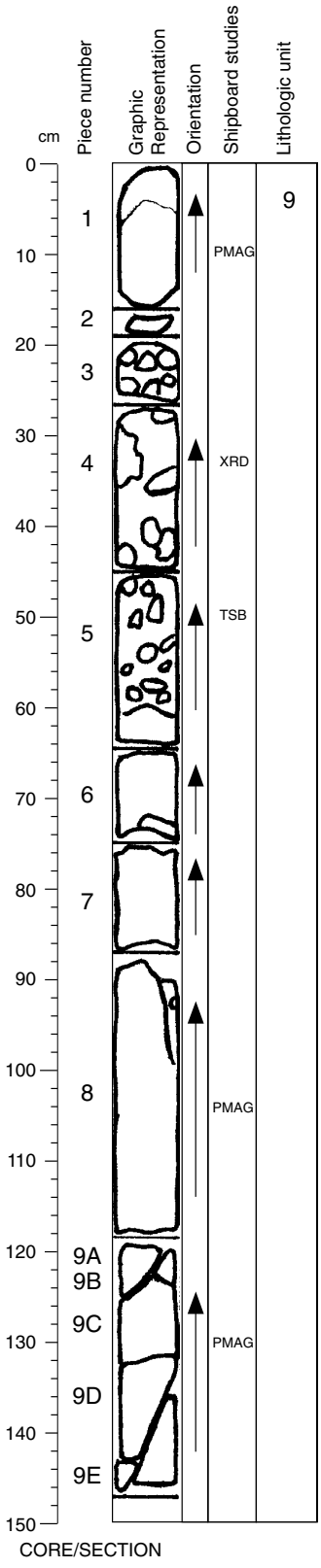
STRUCTURE: Brecciated. Clasts near the contact are highly fragmented, angular, and cemented with clay; with increasing depth below the contact, rounder clasts and lobes with massive interiors are more common.

ALTERATION: High to complete in Pieces 8-11; moderate to high in Pieces 12 and 13.

VEINS/FRACTURES: None.

COMMENTS: Interpreted as the disrupted slab pahoehoe top of the Unit 9 flow.

Core Photo



183-1138A-82R-3 **Section top: 768.57 (mbsf)**

UNIT 9: MODERATELY PLAGIOCLASE-PHYRIC BASALTIC BRECCIA AND BASALT

Pieces: 1-9

CONTACTS: None.

PHENOCRYSTS:	**%**	**Grain Size (mm):**			
	Mode	**Max**	**Min**	**Avg.**	**Shape/Habit**
Plagioclase:	2-5	0.8	0.2	0.4	Subhedral laths
Clinopyroxene:	trace				

GROUNDMASS: Fine grained.

VESICLES: Pieces 1-7 are highly vesicular; vesicles are rounded, ≤2 mm, and filled with clay, zeolite, and amorphous silica. Pieces 8 and 9 are moderately to highly vesicular; vesicles are <1 mm, form trains, and are filled with clay and some zeolite.

COLOR: Pieces 1-7 are light brownish gray to brownish gray. Pieces 8 and 9 are light gray.

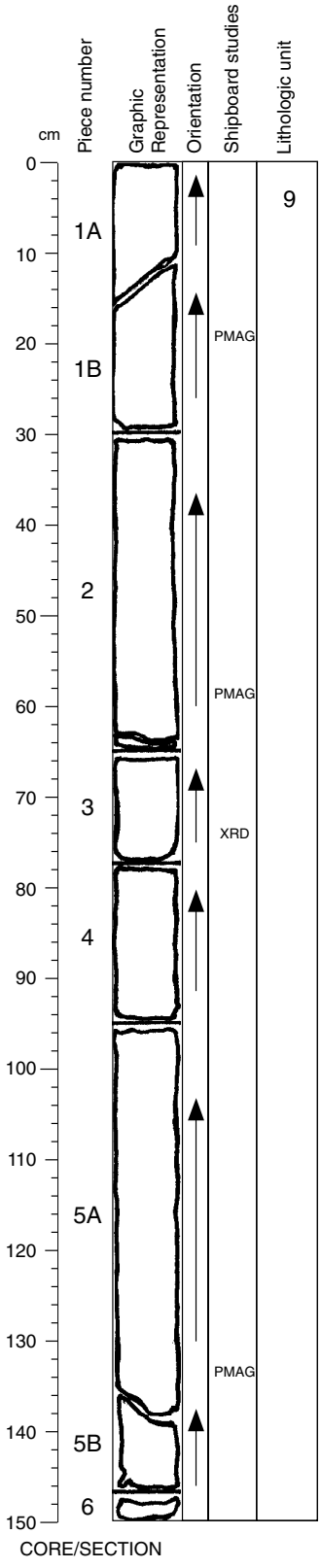
STRUCTURE: Pieces 1-7 and the upper part of Piece 8 are brecciated; Piece 9 and the lower part of Piece 8 are massive.

ALTERATION: High in Pieces 1-7; moderate in Pieces 8 and 9.

VEINS/FRACTURES: None in Pieces 1-7; several <1-mm-wide clay-filled veins in Pieces 8 and 9.

COMMENTS: Pieces 1-7 and the upper part of Piece 8 are interpreted as the heavily brecciated flow topof Unit 9. Clasts are subangular to subround, and ≤4 cm (1-2 cm, average); fine-grained volcanic sand forms the matrix. Piece 1 contains either a very large clast (9 cm) or a flow lobe; a similar structure is present at the base of Piece 5. Piece 9 contains rare plagioclase-rich glomerocrysts (2-3 mm) with possible reaction rims.

Core Photo



183-1138A-82R-4 **Section top: 770.04 (mbsf)**

UNIT 9: MODERATELY PLAGIOCLASE-PHYRIC BASALT

Pieces: 1-6

CONTACTS: None.

PHENOCRYSTS:	**% Mode**	**Grain Size (mm): Max**	**Min**	**Avg.**	**Shape/Habit**
Plagioclase:	2-5	1-2	0.24		Subhedral to anhedral laths; rare, round glomerocrysts (with clinopyroxene?) ≤1.5 mm
Clinopyroxene:	trace				In glomerocrysts; replaced by clay

GROUNDMASS: Fine grained to aphanitic.

VESICLES: Pieces 1-4, 5B, and 6 are moderately to highly vesicular, with vesicles ≤1.5 cm. Piece 5A is sparsely vesicular. Vesicles are filled by green clay, zeolite, and amorphous silica. Vesicles are aligned subhorizontally in Piece 2 and dip ~30° in Pieces 3-5B.

COLOR: Medium gray to light gray.

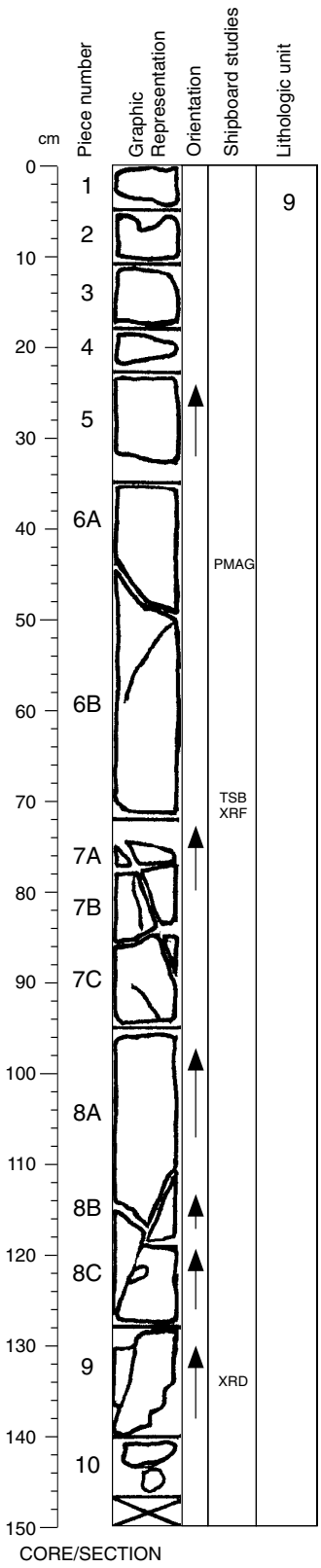
STRUCTURE: Massive.

ALTERATION: Moderate.

VEINS/FRACTURES: A few small (<1 mm) veins filled with dark green clay and zeolite are present.

COMMENTS:

Core Photo



183-1138A-82R-5 **Section top: 771.54 (mbsf)**

UNIT 9: APHYRIC BASALT

Pieces: 1-10

CONTACTS: None.

PHENOCRYSTS:	**%**	**Grain Size (mm):**			
	Mode	**Max**	**Min**	**Avg.**	**Shape/Habit**
Plagioclase:	<1				Rare glomerocrysts

GROUNDMASS: Fine grained. Streaks of originally glassy groundmass are present in Pieces 1-3.

VESICLES: Moderately vesicular, most abundant in Pieces 1, 2, 9, 10. Vesicles are round and filled with clay and zeolite; size varies considerably (≤10 mm), and vesicles in the 5-10 mm range are conspicuous. Geopetal structures are present. Piece 9 contains part of a large irregular cavity (~5 cm).

COLOR: Light gray.

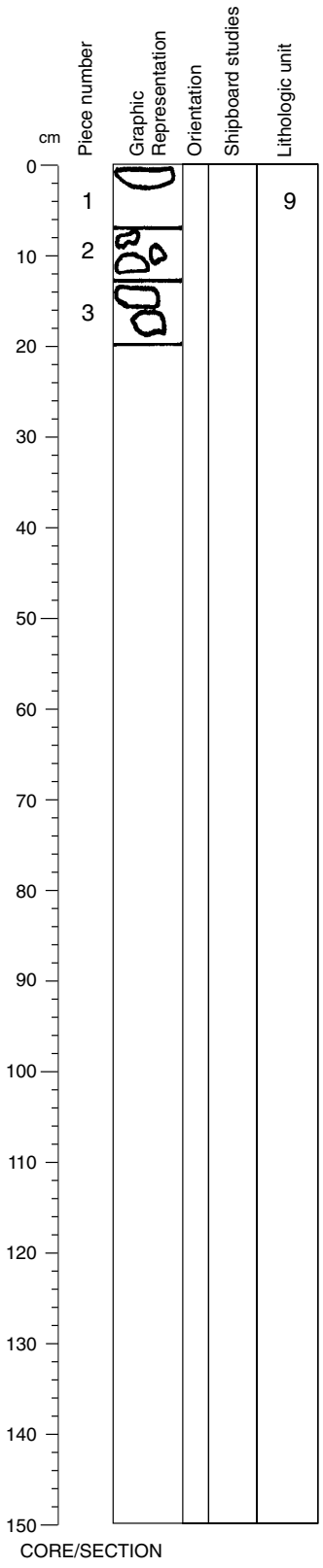
STRUCTURE: Massive.

ALTERATION: Slight to moderate.

VEINS/FRACTURES: Pervasive in Pieces 1-6, forming an interlocking network of <1-mm-wide veins filled with dark green clay and zeolite. Veins are more widely spaced in the rest of the section.

COMMENTS:

Core Photo



183-1138A-82R-6 **Section top: 773.04 (mbsf)**

UNIT 9: APHYRIC BASALT

Pieces: 1-3

CONTACTS: Not recovered; the contact between Units 9 and 10 is inferred to be between Sections 82R- 6 and 83R-1.

GROUNDMASS: Fine grained.

VESICLES: Sparsely to moderately vesicular; vesicles are 0.5-5 mm and filled with zeolite and multiple generations of light and dark green clay.

COLOR: Medium gray to greenish gray.

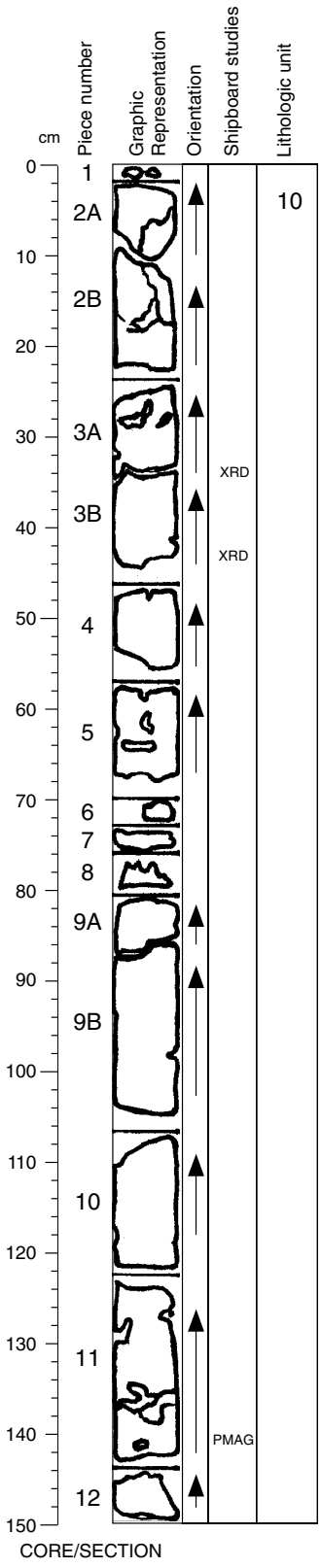
STRUCTURE: Massive.

ALTERATION: Slight to moderate. Groundmass is largely replaced with clay.

VEINS/FRACTURES: A few zeolite- and clay-filled veins (<0.5 mm wide) are present.

COMMENTS:

Core Photo



183-1138A-83R-1 **Section top: 775.20 (mbsf)**

UNIT 10: APHYRIC BASALTIC BRECCIA AND BASALT

Pieces: 1-12

CONTACTS: Not recovered; the contact between Units 9 and 10 is inferred to be between Sections 82R-6 and 83R-1.

PHENOCRYSTS:	% Mode	Grain Size (mm): Max	Min	Avg.	Shape/Habit
Plagioclase:	<1	1.5	0.6	1	Subhedral laths

GROUNDMASS: Fine grained.

VESICLES: Highly vesicular; vesicles are 0.5-50 mm, irregular, and filled with dark green clay or white zeolite.

COLOR: Olive gray to medium gray in Pieces 2-10; light to medium-light gray in Pieces 11 and 12; breccia matrix is pinkish brown in some areas, greenish in others.

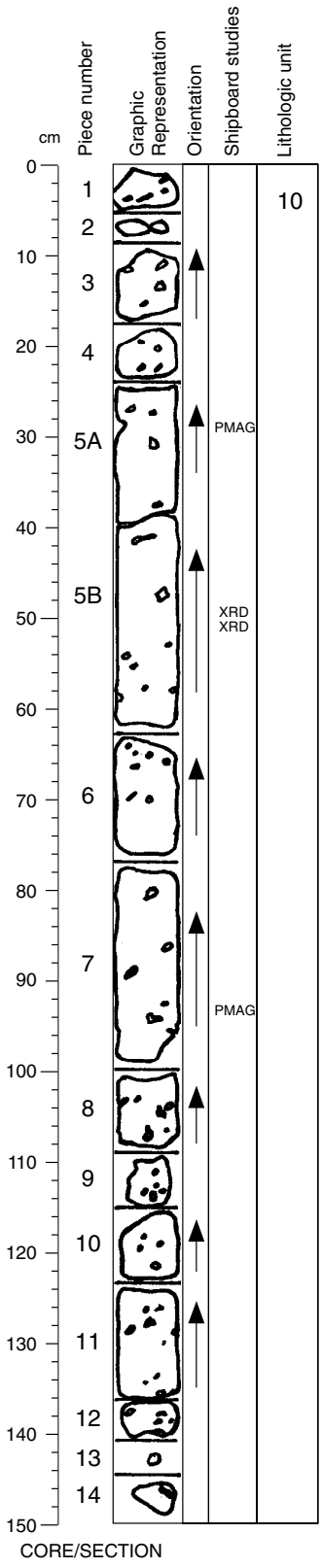
STRUCTURE: Brecciated in Pieces 2-10; massive in Pieces 11 and 12.

ALTERATION: High in Pieces 1-10; moderate in Pieces 11 and 12.

VEINS/FRACTURES: A few zeolite-filled veins (<1 mm wide) are present.

COMMENTS: The change from brecciated to massive structure is marked by a 0.5-1 mm oxidation rind. Piece 1 is massive and dissimilar to other pieces in this section; it may have come from a stratigraphically higher region in Hole 1138A and dropped into this core during drilling.

Core Photo



183-1138A-83R-2 **Section top: 776.70 (mbsf)**

UNIT 10: SPARSELY PLAGIOCLASE-PHYRIC BASALT

Pieces: 1-14

CONTACTS: None.

PHENOCRYSTS:

	% Mode	Grain Size (mm): Max	Min	Avg.	Shape/Habit
Plagioclase:	1	3	0.4	0.8	Subhedral lath

GROUNDMASS: Fine grained; clinopyroxene and plagioclase are apparent under the binocular microscope.

VESICLES: Moderately vesicular. Vesicles are ≤2 cm and filled by dark green clay and, rarely, zeolite. Some subhorizontal vesicle trails are present.

COLOR: Light gray.

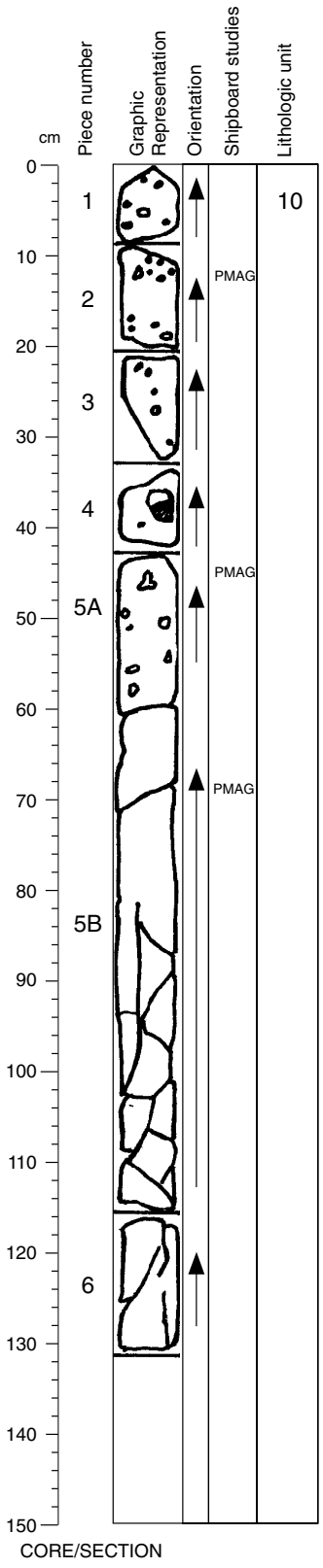
STRUCTURE: Massive.

ALTERATION: Moderate.

VEINS/FRACTURES: Very rare, <0.5 mm wide, and filled with clay and zeolite.

COMMENTS:

Core Photo



183-1138A-83R-3 **Section top: 778.16 (mbsf)**

UNIT 10: APHYRIC BASALT

Pieces: 1-6

CONTACTS: None.

PHENOCRYSTS:

	% Mode	Grain Size (mm): Max	Min	Avg.	Shape/Habit
Plagioclase:	<1	1.2	0.5	0.6	Subhedral laths
Clinopyroxene:	<<1	0.6	0.5	0.5	Subhedral prisms

GROUNDMASS: Fine grained.

VESICLES: Moderately vesicular, except Pieces 5 and 6, which are sparsely vesicular. Subvertical vesicle trains are present in Pieces 2 and 3. Vesicle fillings include green clay, zeolite, and amorphous silica. The large (2 x 2.5 cm) vesicle in Piece 4 contains solidified lava overlain by dark clay, which is overlain by agate.

COLOR: Light gray.

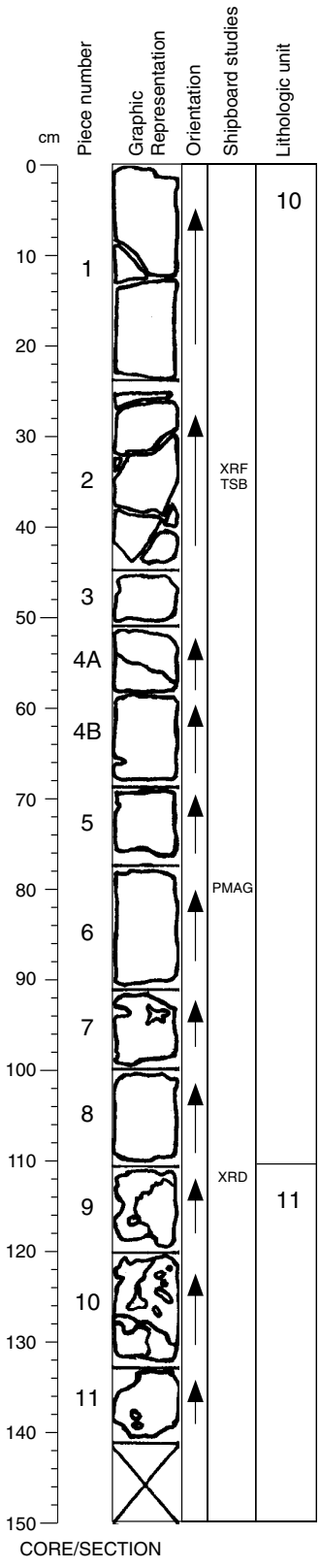
STRUCTURE: Massive. Some subhorizontal streaks of altered glass are present.

ALTERATION: Slight to moderate.

VEINS/FRACTURES: Pieces 5B and 6 have networks of veins (<0.5 mm wide) filled with dark green clay and zeolite.

COMMENTS: The abundance of phenocrysts decreases down section. The bottom of the section contains very rare clinopyroxene phenocrysts.

Core Photo



183-1138A-83R-4 **Section top: 779.51 (mbsf)**

UNIT 10: APHYRIC BASALT

Pieces: 1-8

CONTACTS: Not recovered; the contact between Units 10 and 11 is inferred to be between Pieces 8 and 9.

PHENOCRYSTS:	**%**	**Grain Size (mm):**			
	Mode	**Max**	**Min**	**Avg.**	**Shape/Habit**
Plagioclase:	<1				Subhedral laths
Clinopyroxene:	trace?				Subhedral; replaced by clay

GROUNDMASS: Fine grained; very fine grained around the vesicle trails in Piece 4A.

VESICLES: Highly vesicular, except for Pieces 1 and 4A, which are sparsely vesicular. Vesicles are ≤8 mm and filled with dark green clay and white zeolite. Pieces 1 and 4A have small vesicle trails. Vesicles become smaller and more abundant toward the base of the section.

COLOR: Pieces 1-6 are medium light gray to light gray; Pieces 7 and 8 are brownish gray.

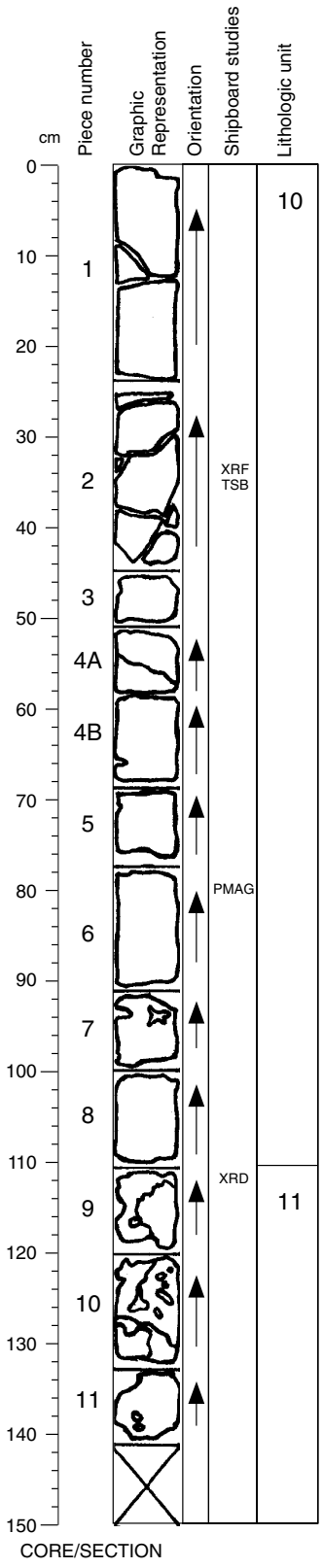
STRUCTURE: Pieces 1-6 are massive; Pieces 7 and 8 are welded breccia.

ALTERATION: Moderate in less vesicular areas. High in the lower half of Piece 6 and all of Pieces 7 and 8. Pieces 7 and 8 are oxidized.

VEINS/FRACTURES: Numerous <0.5-mm-wide clay- and zeolite-filled veins are present.

COMMENTS: The total phenocryst content is <1 %.

Core Photo



183-1138A-83R-4 **Section top: 779.51 (mbsf)**

UNIT 11: APHYRIC BASALT

Pieces: 9-11

CONTACTS: Not recovered; the contact between Units 10 and 11 is inferred to be between Pieces 8 and 9.

PHENOCRYSTS:	**% Mode**	**Grain Size (mm): Max**	**Min**	**Avg.**	**Shape/Habit**
Plagioclase:	<1	1	0.5		Euhedral to subhedral laths
Clinopyroxene:	trace?	1.0			Subhedral to anhedral pseudomorphs

GROUNDMASS: Fine grained to aphanitic.

VESICLES: Highly vesicular; vesicles are 1-20 mm, round to vertically elongated, and partially filled with green clay and zeolite.

COLOR: Reddish gray to greenish gray.

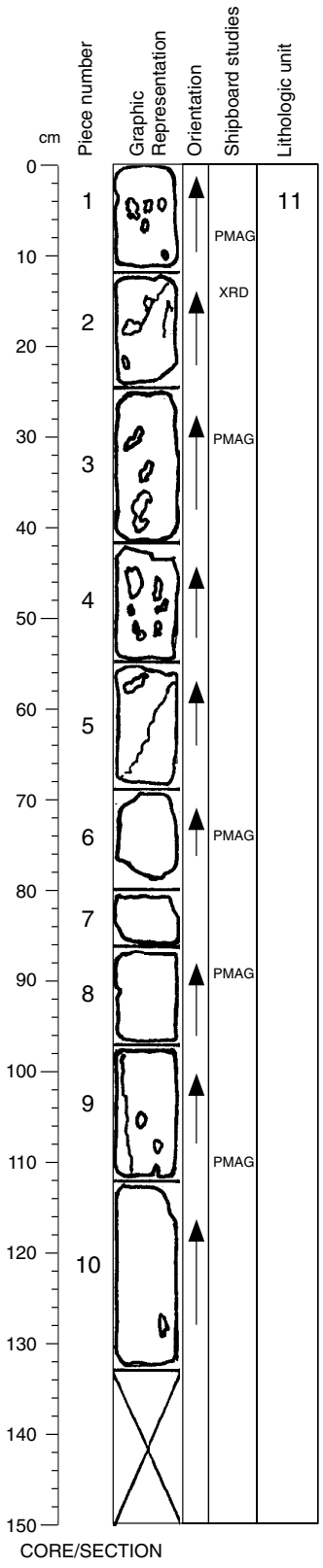
STRUCTURE: Massive.

ALTERATION: Moderate to high. Groundmass is partially replaced by green clay and zeolite.

VEINS/FRACTURES: Clay- and zeolite-filled veins and fractures are <1 mm wide.

COMMENTS: A glassy chilled zone is present at the top of Piece 9.

Core Photo



183-1138A-83R-5 **Section top: 780.93 (mbsf)**

UNIT 11: APHYRIC BASALT

Pieces: 1-10

CONTACTS: None.

PHENOCRYSTS:	**% Mode**	**Grain Size (mm): Max**	**Min**	**Avg.**	**Shape/Habit**
Plagioclase:	<<1	0.5			Euhedral to subhedral laths
Clinopyroxene:	trace?	1.0			Subhedral to anhedral pseudomorphs

GROUNDMASS: Fine grained to aphanitic.

VESICLES: Highly vesicular; vesicles are 1-35 mm, round to vertically elongated, and partially filled with green clay and zeolite. Vesicles tend to be smaller and highly irregular in the lower part of the section.

COLOR: Reddish gray to greenish gray.

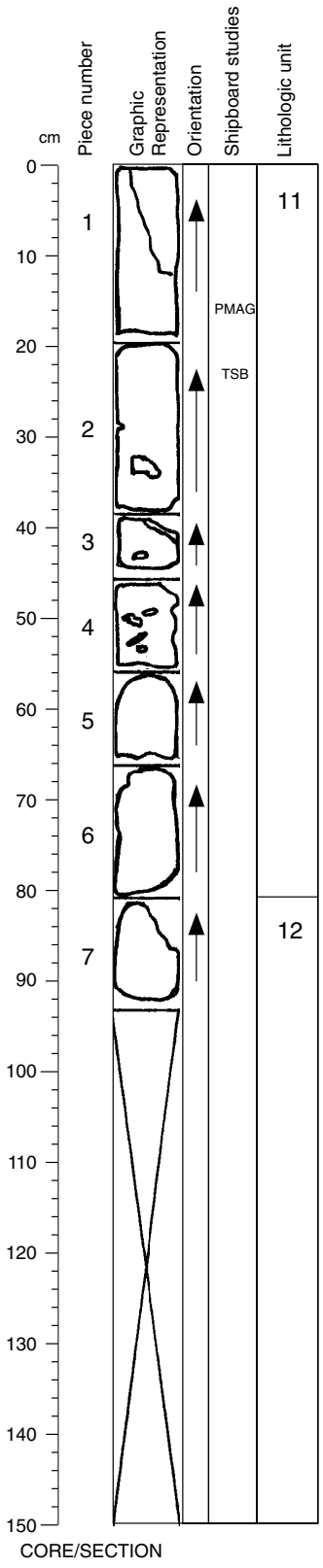
STRUCTURE: Massive.

ALTERATION: Moderate to high. Groundmass is partially replaced by green clay and zeolite.

VEINS/FRACTURES: Clay- and zeolite-filled veins and fractures are <1 mm wide.

COMMENTS:

Core Photo



183-1138A-83R-6 **Section top: 782.26 (mbsf)**

UNIT 11: APHYRIC BASALT

Pieces: 1-6

CONTACTS: Not recovered; the contact between Units 11 and 12 is inferred to be between Pieces 6 and 7 (for description of Piece 7, see comments below).

PHENOCRYSTS:	**%**	**Grain Size (mm):**			
	Mode	**Max**	**Min**	**Avg.**	**Shape/Habit**
Plagioclase:	<1	1	0.5		Euhedral laths

GROUNDMASS: Fine grained to aphanitic.

VESICLES: Moderately vesicular. Vesicles are irregular to round and elliptical, 1-20 mm. The distribution changes from random in Piece 1 to subhorizontal segregations in Piece 4. Filled with dark green clay and zeolite.

COLOR: Greenish gray to light gray.

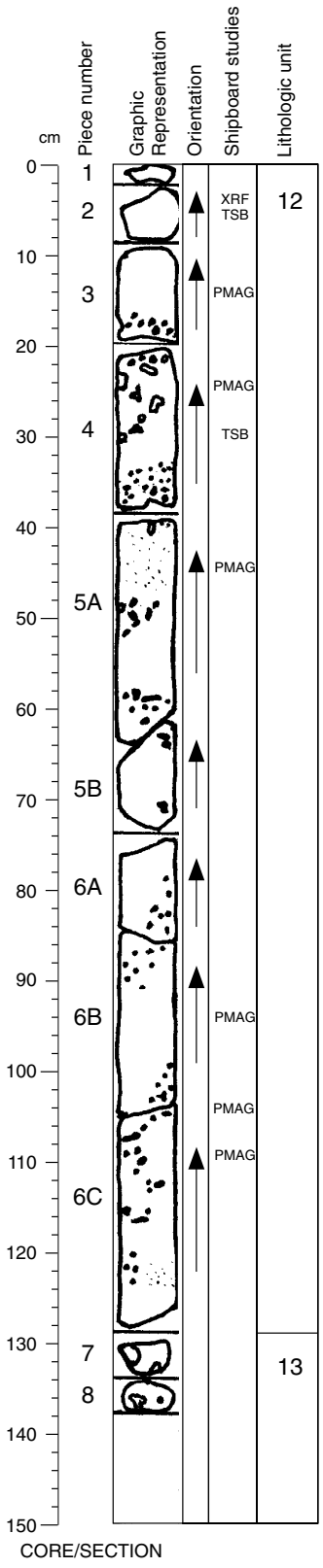
STRUCTURE: Massive

ALTERATION: Moderate. Groundmass is partially replaced by dark green and black clay.

VEINS/FRACTURES: Sparse, subvertical, 1-2 mm wide, clay- and zeolite-filled veins.

COMMENTS: Piece 7 is interpreted to be the top of Unit 12. It is brecciated, highly altered, and moderately vesicular; the clasts are dark gray to black, generally <2 cm, angular to subrounded, and cemented with white zeolite. Microfractures separate the clasts. See next section for a description of Unit 12.

Core Photo



183-1138A-84R-1 **Section top: 784.80 (mbsf)**

UNIT 12: APHYRIC BASALT

Pieces: 1-6

CONTACTS: Not recovered; the contact between Units 12 and 13 is inferred to be between Pieces 6 and 7.

PHENOCRYSTS:	**%**	**Grain Size (mm):**			
	Mode	**Max**	**Min**	**Avg.**	**Shape/Habit**
Plagioclase:	<1	0.1			Euhedral to subhedral; zeolitized

GROUNDMASS: Aphanitic.

VESICLES: Highly vesicular. Vesicles are subangular to subrounded, ≤10 mm (mostly <2 mm) and concentrated in patches. Filled with clay and zeolite.

COLOR: Medium gray.

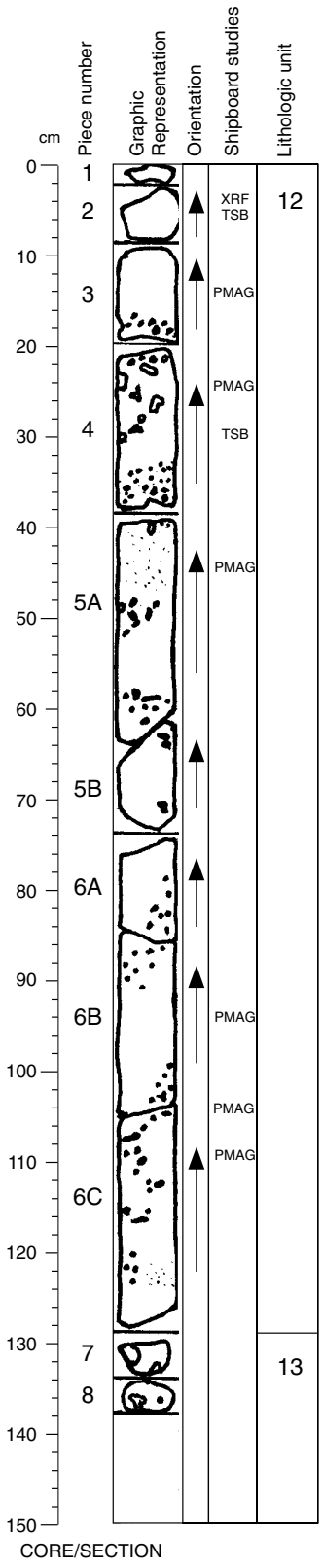
STRUCTURE: Massive.

ALTERATION: Moderate. Groundmass is partially replaced by dark green and black clay.

VEINS/FRACTURES: A vein at 64-72 cm in Piece 5B is filled with clay and zeolite.

COMMENTS: This section appears to be a mass of welded pahoehoe lobes. A plagioclase glomerocryst is present in Piece 2.

Core Photo



183-1138A-84R-1 **Section top: 784.80 (mbsf)**

UNIT 13: SPARSELY PLAGIOCLASE-PHYRIC BASALTIC BRECCIA

Pieces: 7, 8

CONTACTS: Not recovered; the contact between Units 12 and 13 is inferred to be between Pieces 6 and 7 (see comments below).

PHENOCRYSTS:	% Mode	Grain Size (mm): Max	Min	Avg.	Shape/Habit
Plagioclase:	1-2	0.5	0.25	0.2	Euhedral

GROUNDMASS: Fine grained.

VESICLES: Highly vesicular; vesicles are 1-10 mm and filled by green and white zeolite.

COLOR: Light to medium pinkish gray.

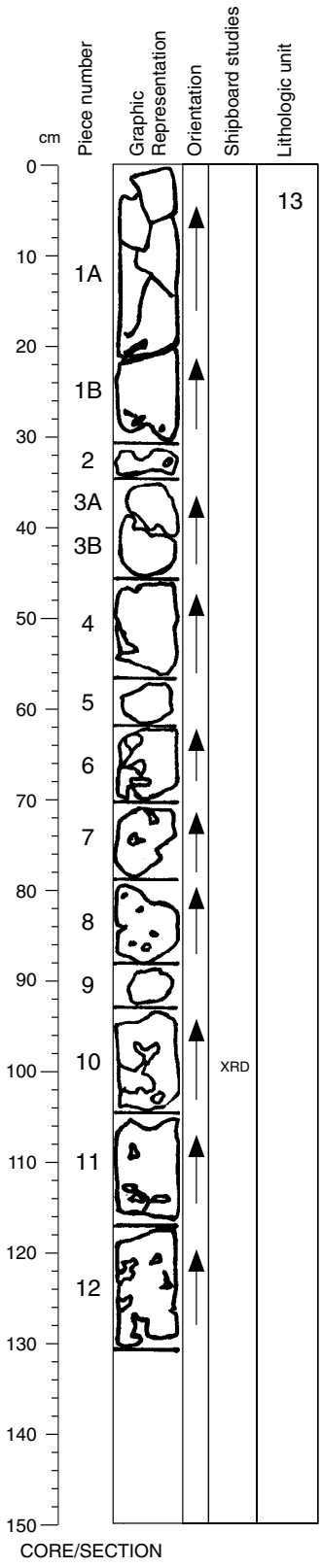
STRUCTURE: Brecciated.

ALTERATION: High. Green clay replaces much of the groundmass.

VEINS/FRACTURES: None.

COMMENTS: Piece 7 contains a narrow chill zone (~1 cm wide) with abundant, small, dark gray, zeolite- filled vesicles and reddish oxidation. This could be part of the contact between Units 12 and 13.

Core Photo



183-1138A-84R-2 **Section top: 786.18 (mbsf)**

UNIT 13: APHYRIC BASALTIC BRECCIA

Pieces: 1-12

CONTACTS: None.

PHENOCRYSTS:	**% Mode**	**Grain Size (mm): Max**	**Min**	**Avg.**	**Shape/Habit**
Plagioclase:	<1	0.2		0.2	Euhedral
Clinopyroxene	<1	0.2			Euhedral

GROUNDMASS: Fine-grained, with abundant plagioclase microlites.

VESICLES: Highly vesicular; vesicles are 1-30 mm (most are <2 mm) and filled with green and white zeolite.

COLOR: Medium gray to dark reddish gray.

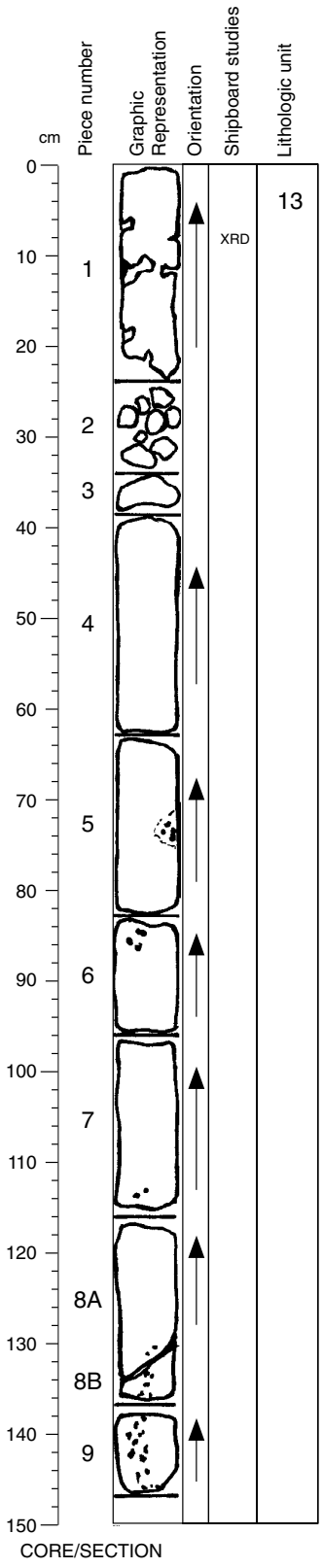
STRUCTURE: Brecciated.

ALTERATION: Moderate to high. Green clay replaces much of the groundmass.

VEINS/FRACTURES: Several thin (<1 mm) veins filled with zeolite and clay are present.

COMMENTS: Piece 1 contains a folded pahoehoe slab; clasts in other pieces are a mixture of pahoehoe fragments and aa clinkers.

Core Photo



183-1138A-84R-3 **Section top: 787.50 (mbsf)**

UNIT 13: SPARSELY PLAGIOCLASE-PHYRIC BASALTIC BRECCIA

Pieces: 1-9

CONTACTS: None.

PHENOCRYSTS IN MASSIVE PART:	% Mode	Grain Size (mm): Max	Min	Avg.	Shape/Habit
Plagioclase:	2	1.2	0.5	0.7	Subhedral.
Clinopyroxene	<1	0.6	0.4	0.5	Subhedral.

GROUNDMASS: Fine grained, with abundant plagioclase microlites.

VESICLES: Highly vesicular toward the top. Vesicles are 0.1-6 mm, round to flattened; filled by green and white zeolite.

COLOR: Varies from greenish black to light reddish brown to olive gray.

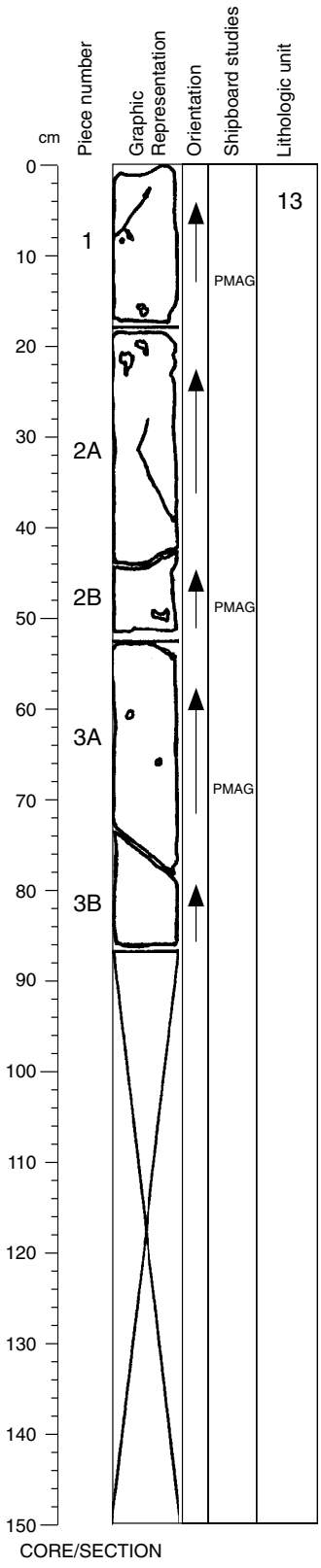
STRUCTURE: Brecciated (Pieces 1-8) to massive (Piece 9).

ALTERATION: High. Green clay replaces much of the groundmass.

VEINS/FRACTURES: Several thin, clay- and zeolite-filled veins have developed from coalesced vesicles.

COMMENTS: Pieces 1 and 2 are heavily brecciated.

Core Photo



183-1138A-84R-4 **Section top: 788.97 (mbsf)**

UNIT 13: APHYRIC BASALT

Pieces: 1-3

CONTACTS: None.

PHENOCRYSTS:

	% Mode	Grain Size (mm): Max	Min	Avg.	Shape/Habit
Clinopyroxene	<<1	2	0.5	2	Euhedral, altered

GROUNDMASS: Fine-grained.

VESICLES: Moderately vesicular. Vesicles are flattened, <1-10 mm, and filled with dark green clay and zeolite. Vesicles in Piece 1 are vertically elongated. Pieces 2 and 3 have vesicle trains that vary from subhorizontal to dipping 30°.

COLOR: Light gray.

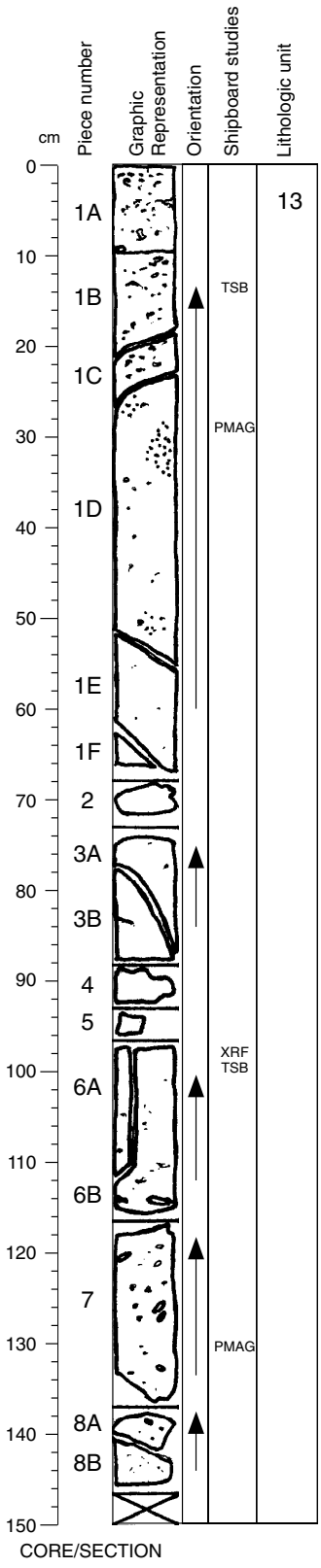
STRUCTURE: Massive.

ALTERATION: Moderate.

VEINS/FRACTURES: Rare thin veins (<1 mm wide) are filled with dark green clay and, to a lesser extent, zeolite.

COMMENTS:

Core Photo



183-1138A-84R-5 **Section top: 789.83 (mbsf)**

UNIT 13: APHYRIC TO SPARSELY PLAGIOCLASE-PHYRIC BASALT

Pieces: 1-8

CONTACTS: None.

PHENOCRYSTS:	**%**	**Grain Size (mm):**			
	Mode	**Max**	**Min**	**Avg.**	**Shape/Habit**
Plagioclase	0-2	2	0.4	0.6	Subhedral laths

GROUNDMASS: Fine-grained.

VESICLES: Moderately vesicular from 0 to 35 cm; sparsely vesicular from 35 to 145 cm. Vesicles are ≤10 mm, round to flattened, and filled with green clay.

COLOR: Light gray.

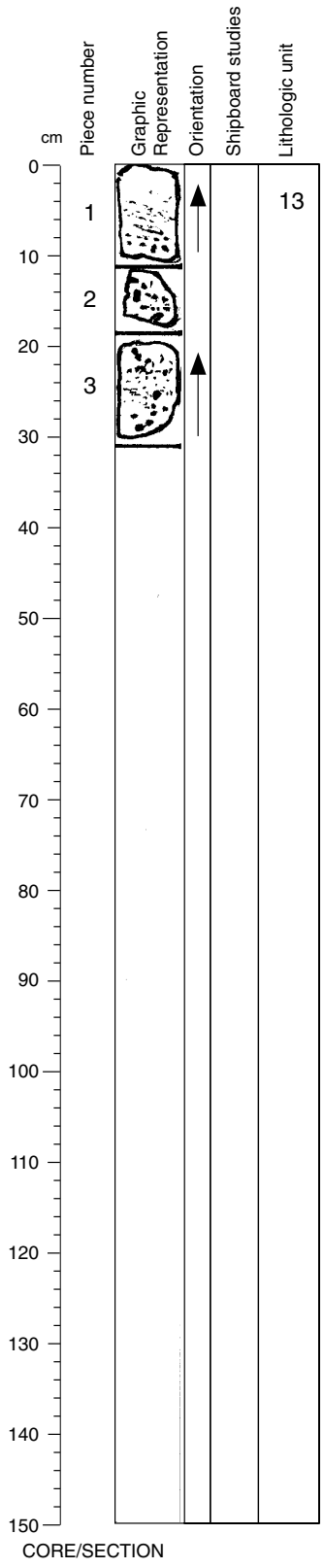
STRUCTURE: Massive.

ALTERATION: Moderate.

VEINS/FRACTURES: Numerous thin veins (<1 mm wide) are filled with dark green clay.

COMMENTS: Vesicular pods could be entrained and partially resorbed breccia clasts.

Core Photo



183-1138A-84R-6 **Section top: 791.30 (mbsf)**

UNIT 13: APHYRIC BASALT

Pieces: 1-3

CONTACTS: Not recovered; the contact between Units 13 and 14 is inferred to be between Sections 84R-6 and 85R-1.

PHENOCRYSTS: None.

GROUNDMASS: Fine-grained.

VESICLES: Highly vesicular. Vesicles are ≤6 mm, flattened into subhorizontal or subvertical trains, and filled with dark green clay and, to a minor extent, zeolite.

COLOR: Light gray to brownish gray.

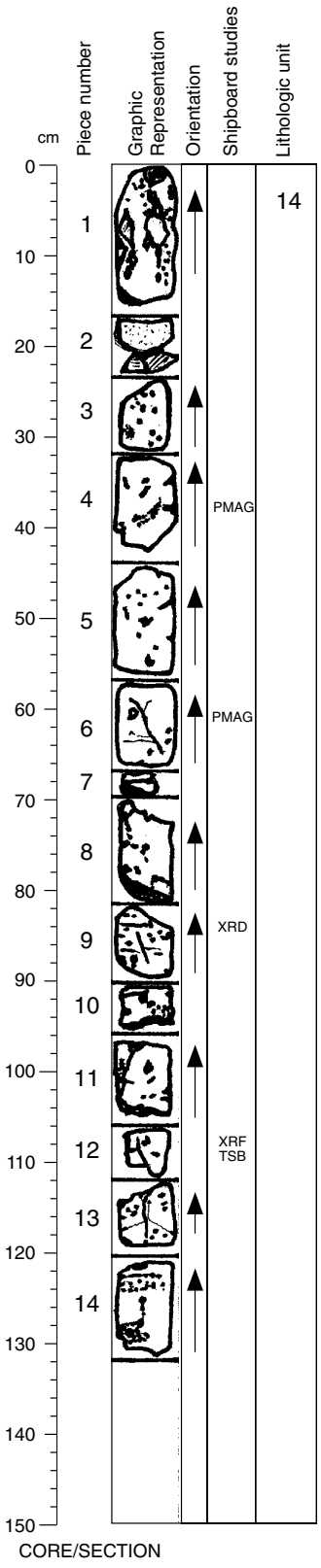
STRUCTURE: Massive.

ALTERATION: Moderate.

VEINS/FRACTURES: A 0.5-mm-wide clay- and zeolite-filled vein is present.

COMMENTS: Welded clasts or lobes are present in Piece 3, probably representing a basal breccia.

Core Photo



183-1138A-85R-1 **Section top: 794.50 (mbsf)**

UNIT 14: APHYRIC BASALT

Pieces: 1-14

CONTACTS: Not recovered; the contact between Units 13 and14 is inferred to be between Sections 84R- 6 and 85R-1.

PHENOCRYSTS: None.

GROUNDMASS: Fine grained. Piece 1 has aphanitic patches.

VESICLES: Moderately vesicular. Vesicles vary considerably in size (≤15 mm, except for irregular cavities in Piece 1, which are as large as 25 mm), shapes (round to irregular), and abundance (sparse in patches), both within and between pieces. Most vesicles are filled with dark green clay and, to a lesser extent, white zeolite. Vugs in Pieces 4-8 and 10-14 contain well-formed zeolite crystals.

COLOR: Light gray.

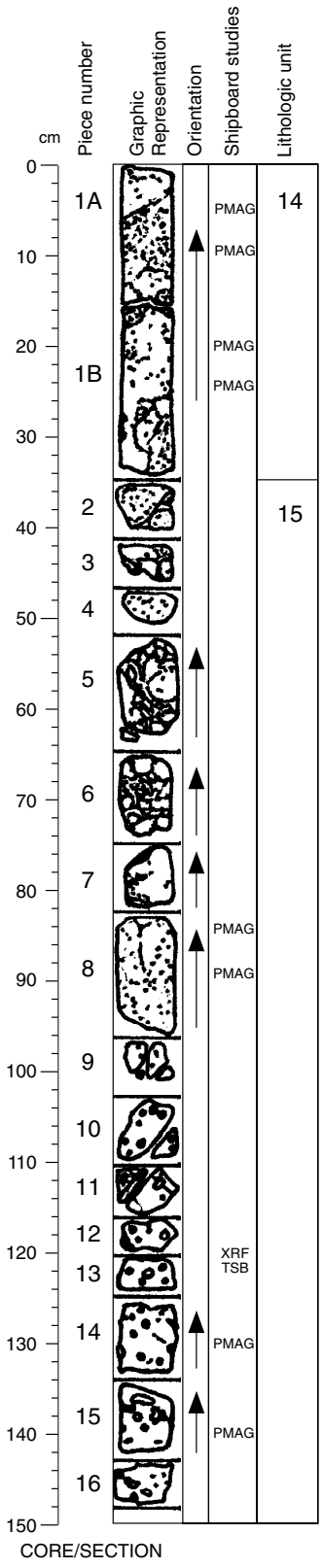
STRUCTURE: Massive in Pieces 2-14; Piece 1 is brecciated.

ALTERATION: High in Piece 1; slight to moderate in Pieces 2-14. Alteration is mainly in vesicle fill and narrow zones near veinlets.

VEINS/FRACTURES: Numerous zeolite- and clay-filled veins and fractures are present.

COMMENTS: Surface of Piece 1 has a cauliflower-like appearance, with irregular lobes of lava rimmed with white and green zeolites.

Core Photo



183-1138A-85R-2 **Section top: 795.83 (mbsf)**

UNIT 14: APHYRIC BASALT

Pieces: 1

CONTACTS: Not recovered; the contact between Units 14 and 15 is placed between Pieces 1B and 2. The location of the contact between the lava flows is uncertain.

PHENOCRYSTS: None.

GROUNDMASS: Fine grained.

VESICLES: Moderately to highly vesicular, with zeolite-filled vugs (similar to those in Section 85R-1). Patches of variable vesicularity correspond to different lava lobes that are now welded. Clay and zeolite fill vesicles.

COLOR: Red to black.

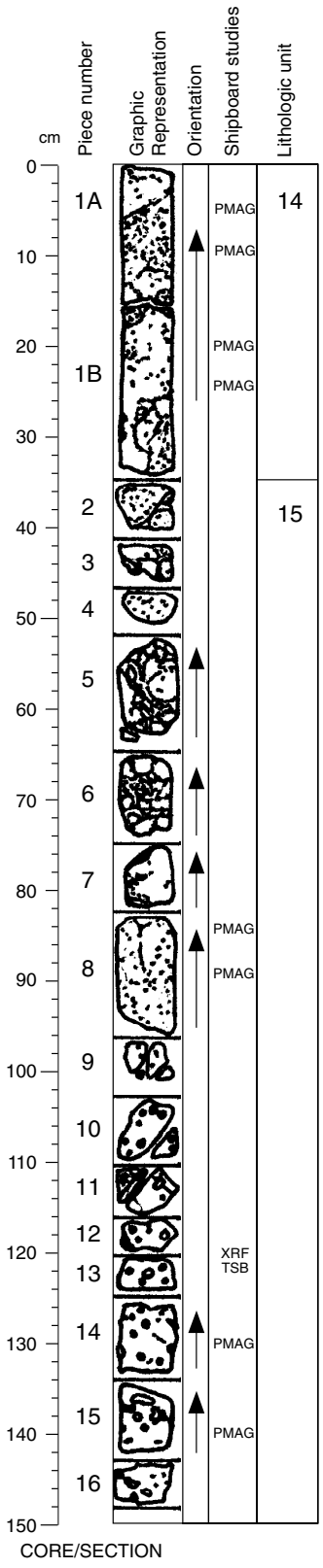
STRUCTURE: Massive, grading to brecciated at base of Piece 1B.

ALTERATION: Moderate; alteration is largely vesicle fill. Bottom part of Piece 1B is more oxidized than top of Piece 1.

VEINS/FRACTURES: Bottom of Piece 1B is cut by a network of zeolite-filled veinlets, <1 mm wide.

COMMENTS: Pieces 1A and 1B are interpreted to be a welded breccia of aphyric basalt.

Core Photo



183-1138A-85R-2 **Section top: 795.83 (mbsf)**

UNIT 15: APHYRIC BASALTIC BRECCIA AND BASALT

Pieces: 2-16

CONTACTS: Not recovered; the contact between Units 14 and 15 isplaced between Pieces 1 and 2, but the location of the contact betweenthe flows is uncertain.

PHENOCRYSTS:	% Mode	Grain Size (mm): Max	Min	Avg.	Shape/Habit
Plagioclase:	<1	1.5	0.5		Euhedral to subhedral
Clinopyroxene:	<<1	0.5			Subhedral

GROUNDMASS: Fine grained.

VESICLES: Pieces 1-8 are highly vesicular. Vesicles are <5 mm and have variable shapes; most are filled with green clay and white, yellow, or green zeolite. Several irregular vugs, ≤30 mm, are present in Pieces 2-6. Pieces 8-16 have fewer small (<2 mm) vesicles; larger (3-20 mm) rounded and irregular vesicles are moderately abundant. Most vesicles in Pieces 9-13 are filled with green clay; vesicles in Pieces 14-16 are filled with zeolite.

COLOR: Pieces 1-6 are dark gray, with a white zeolite matrix and patches of red oxidation that are most prominent in Pieces 2 and 3. Pieces 7-16 are gray, with 1-2 cm patches ofdarker gray.

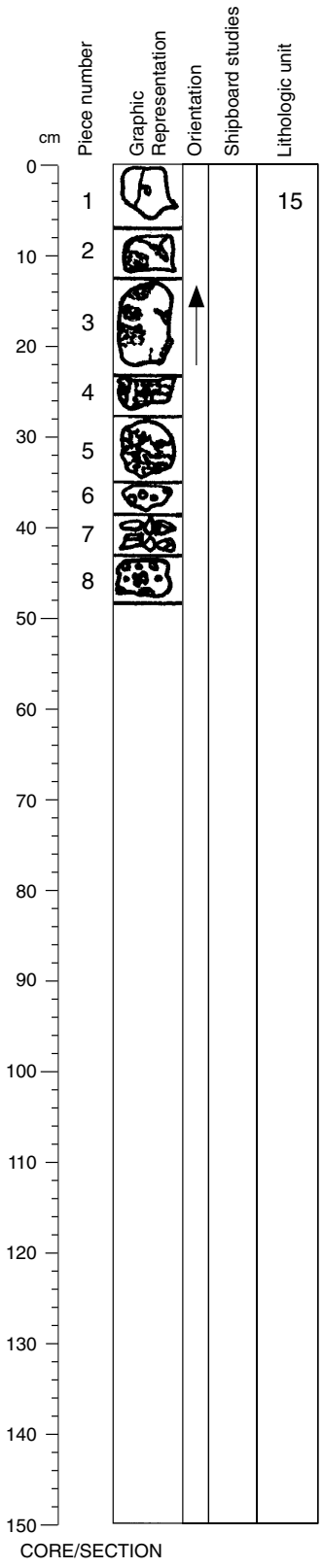
STRUCTURE: Pieces 2-6 are brecciated. Clasts (≤10 cm) have rounded to very irregular, angular outlines. Spaces between large clasts are filled with small clasts (some in a "jigsaw" arrangement) set in a zeolite matrix. Pieces 7-16 are massive.

ALTERATION: High in Pieces 2-6; slight to moderate (mostly vesicle fill) in Pieces 7-16.

VEINS/FRACTURES: None in Pieces 2-6. Pieces 7-9, 11, 12, 14, and 15 have irregular <1-mm-wide veinlets filled with dark green clay and, rarely, zeolite.

COMMENTS: Piece 4 appears to be a single large (2.5 x 5 cm) rounded clast. It is unclear how many lava flows are within Unit 15.

Core Photo



183-1138A-85R-3 **Section top: 797.33 (mbsf)**

UNIT 15: APHYRIC BASALT

Pieces: 1-3 (For description of Pieces 4-8, see comments below.)

CONTACTS: Not recovered; the inferred contact between Units 15 and 16 is between Sections 85R-3 and 86R-1.

PHENOCRYSTS:	**% Mode**	**Max**	**Grain Size (mm) Min**	**Avg.**	**Shape/Habit**
Plagioclase:	<1	1.5	0.5		Euhedral to subhedral
Clinopyroxene:	<<1	0.5			Subhedral

GROUNDMASS: Fine grained.

VESICLES: Moderately vesicular; vesicles are irregular and ≤3 mm. Patches of 1-3 mm vesicles occur in gray areas. Vesicles are filled with green clay and a range of zeolites (white, yellow, and green).

COLOR: Mottled pale green and gray.

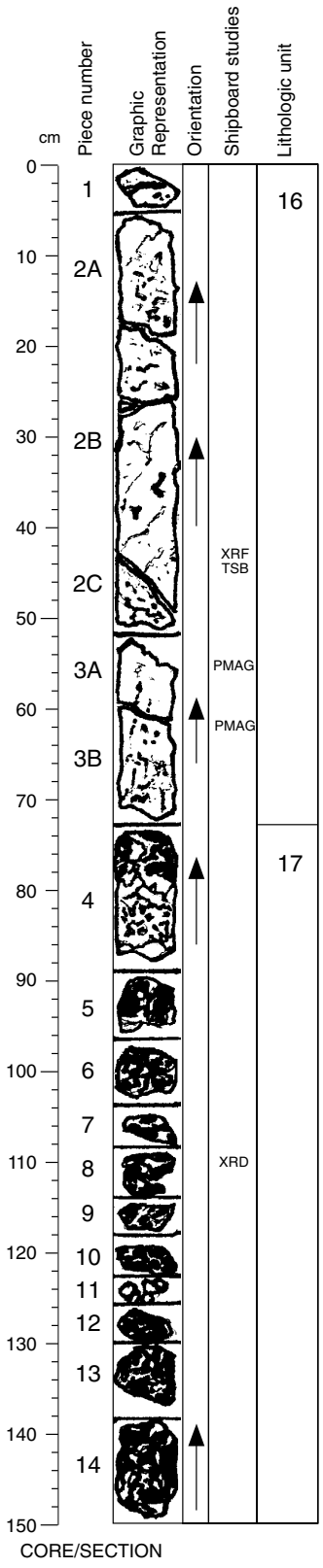
STRUCTURE: Massive.

ALTERATION: High. Groundmass contains many dark green, clay-rich areas.

VEINS/FRACTURES: Pieces 1 and 2 are cut by a ~1-mm-thick white vein.

COMMENTS: Pieces 4-8 are small pieces that may be out of place; alternatively, they may represent the only material recovered from a flow between Units 15 and 16. Pieces 4 and 5 are volcanic breccia similar to that seen in Section 85R-2. Pieces 6 and 8 are similar to Pieces 14-16 in Section 85R-2. Piece 7 comprises seven small pebbles similar to clasts seen in breccias higher in the hole.

Core Photo



183-1138A-86R-1 **Section top: 804.10 (mbsf)**

UNIT 16: APHYRIC BASALT

Pieces: 1-3

CONTACTS: Not recovered; the contact between Units 16 and 17 is inferred to be between Pieces 3 and 4, at 73 cm.

PHENOCRYSTS: None.

GROUNDMASS: Aphanitic.

VESICLES: Nonvesicular to moderately vesicular; vesicles are ≤5 mm, spherical to irregular, and filled with clay and zeolite.

COLOR: Pale grayish green.

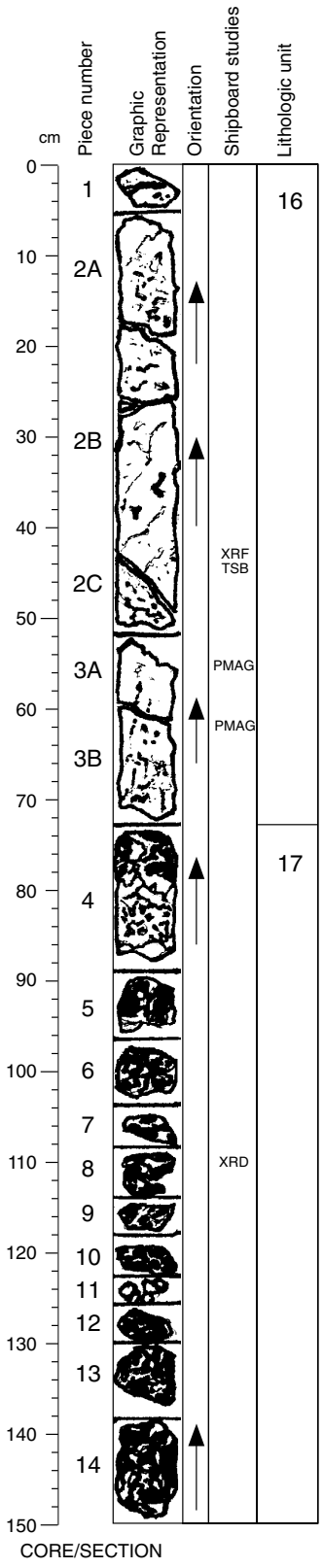
STRUCTURE: Massive; appears to have been brecciated during alteration.

ALTERATION: Moderate to high.

VEINS/FRACTURES: Sparse, short veins, mostly <1 mm wide, are filled with zeolite and clay.

COMMENTS: Post-magmatic processes have brecciated and recemented this rock. Note that the contact between Units 15 and 16 represents a change in recovery and might not reflect a change in lava flows.

Core Photo



183-1138A-86R-1 **Section top: 804.10 (mbsf)**

UNIT 17: APHYRIC BASALTIC BRECCIA

Pieces: 4-14

CONTACTS: Not recovered; the contact between Units 16 and 17 is inferred to be between Pieces 3 and 4, at 73 cm.

PHENOCRYSTS: None.

GROUNDMASS: Aphanitic.

VESICLES: Nonvesicular to highly vesicular; vesicles are <1 mm and located in breccia fragments; vesicles are filled with zeolite and clay.

COLOR: Dark brownish green fragments in a pale brown matrix.

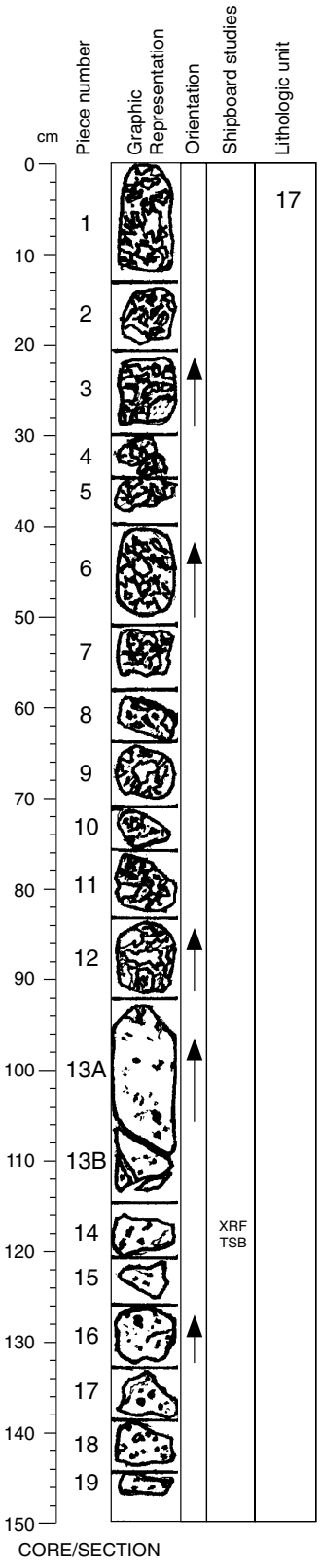
STRUCTURE: Brecciated; fragments are angular to irregular with rounded protrusions (≤4 cm) in a zeolitized matrix.

ALTERATION: High to complete.

VEINS/FRACTURES: None.

COMMENTS: Margins of some fragments may be broken “ropes” of pahoehoe.

Core Photo



183-1138A-86R-2 **Section top: 805.60 (mbsf)**

UNIT 17: APHYRIC BASALTIC BRECCIA AND BASALT

Pieces: 1-19

CONTACTS: None.

PHENOCRYSTS: None.

GROUNDMASS: Aphanitic.

VESICLES: Pieces 1-12 are nonvesicular to highly vesicular; vesicles are <1 mm, located in breccia fragments, and filled with zeolite and clay. Pieces 13-19 are sparsely vesicular; vesicles are <15 mm, spherical to irregular, and filled with zeolite, clay, and a small amount of calcite.

COLOR: Brown to black fragments in a light brownish white matrix.

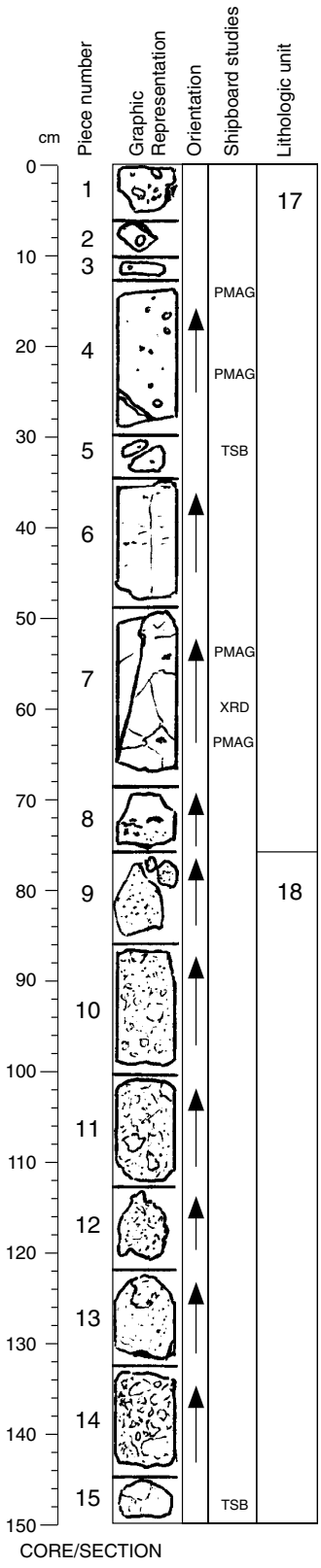
STRUCTURE: Pieces 1-12 are brecciated; fragments are angular to irregular with rounded protrusions (40 mm) in a zeolitized matrix. Pieces 13-19 are massive.

ALTERATION: High to complete in Pieces 1-12; moderate in Pieces 13-19.

VEINS/FRACTURES: None in Pieces 1-12; a few <1-mm clay- and zeolite-filled veins in Pieces 13-19.

COMMENTS: Pieces 1-12 are interpreted as the brecciated top of the Unit 17 flow, and Pieces 13-19 as the massive interior.

Core Photo



183-1138A-86R-3 **Section top: 807.10 (mbsf)**

UNIT 17: APHYRIC BASALT

Pieces: 1-8

CONTACTS: Not recovered; the contact between Units 17 and 18 is inferred to be between Pieces 8 and 9, at 76 cm.

PHENOCRYSTS:	% Mode	Grain Size (mm): Max	Min	Avg.	Shape/Habit
Plagioclase:		<1	1.5	1	Anhedral

GROUNDMASS: Fine grained to aphanitic.

VESICLES: Sparsely to moderately vesicular. Vesicles are spherical to irregular, ≤8 mm, and filled with zeolite and clay.

COLOR: Medium greenish gray.

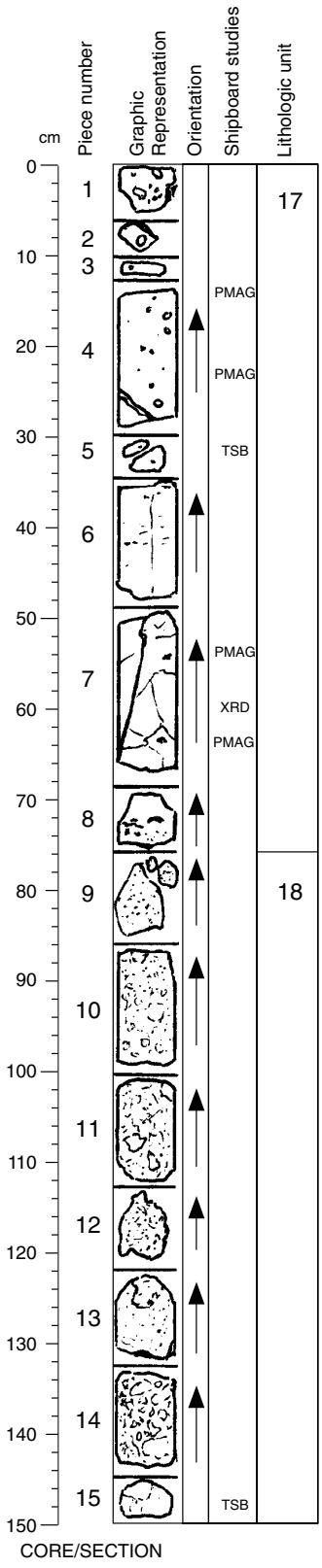
STRUCTURE: Massive.

ALTERATION: Moderate.

VEINS/FRACTURES: Subvertical veins in Pieces 6 and 7 are ≤1 mm wide and filled with zeolite and clay.

COMMENTS:

Core Photo



183-1138A-86R-3 **Section top: 807.10 (mbsf)**

UNIT 18: APHYRIC BASALTIC BRECCIA

Pieces: 9-15

CONTACTS: Not recovered; the contact between Units 17 and 18 is inferred to be between Pieces 8 and 9, at 76 cm.

PHENOCRYSTS: None.

GROUNDMASS: Aphanitic; fine grained in Piece 15.

VESICLES: Nonvesicular to moderately vesicular; vesicles are <1 mm, clay- or zeolite-filled, and mainly in breccia fragments.

COLOR: Medium brownish gray, except Piece 15, which is pale greenish gray. Some breccia fragments show reddish oxidation.

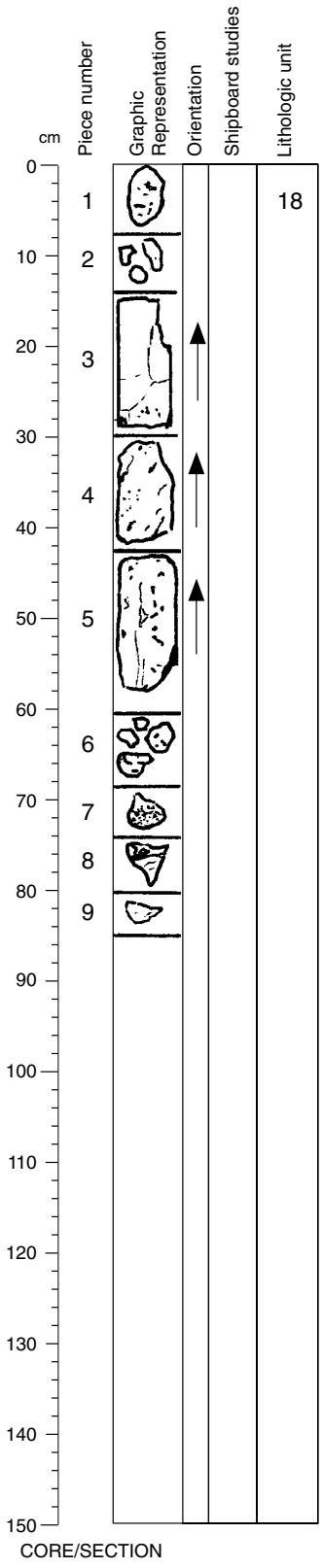
STRUCTURE: Pieces 9-14 are brecciated; clasts (1 mm to 30 mm) are angular to irregular with rounded protrusions. Piece 15 is massive.

ALTERATION: High in Pieces 9-14; moderate in Piece 15.

VEINS/FRACTURES: None.

COMMENTS:

Core Photo



183-1138A-86R-4 **Section top: 808.60 (mbsf)**

UNIT 18: APHYRIC BASALT

Pieces: 1-9

CONTACTS: Not recovered; the contact between Units 18 and 19 is inferred to be between Sections 86R-4 and 87R-1.

PHENOCRYSTS: None.

GROUNDMASS: Aphanitic.

VESICLES: Pieces 1-6 are sparsely to moderately vesicular; Pieces 7-9 are nonvesicular. Vesicles are <2 mm, irregular, and filled with clay or zeolite.

COLOR: Medium greenish gray.

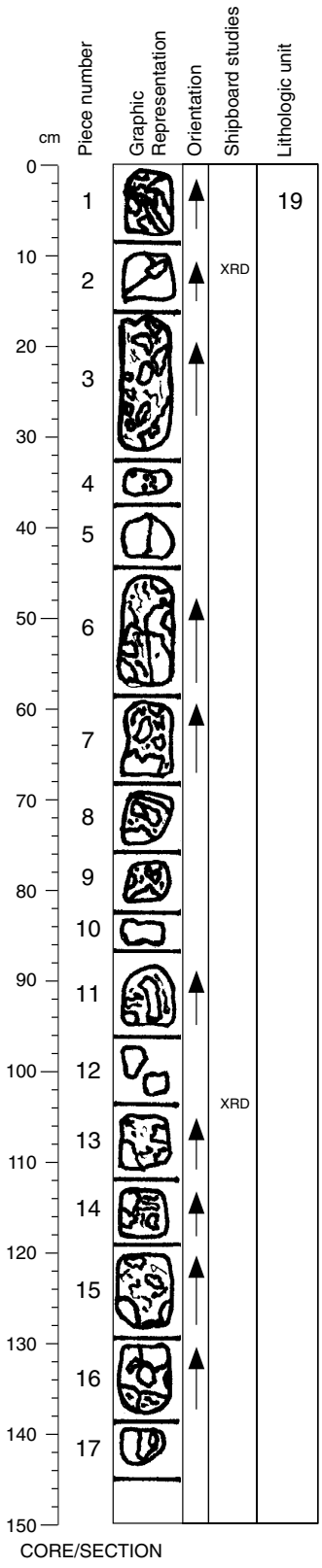
STRUCTURE: Massive.

ALTERATION: Moderate.

VEINS/FRACTURES: Some <1-mm-wide, clay- and zeolite-filled veins are present.

COMMENTS:

Core Photo



183-1138A-87R-1 **Section top: 813.70 (mbsf)**

UNIT 19: SPARSELY-PLAGIOCLASE-PHYRIC BASALTIC BRECCIA

Pieces: 1-17

CONTACTS: Not recovered; the contact between Units 18 and 19 is inferred to be between Sections 86R-4 and 87R-1.

PHENOCRYSTS:	% Mode	Grain Size (mm): Max	Min	Avg.	Shape/Habit
Plagioclase:	2	0.5	0.2		Euhedral to subhedral
Clinopyroxene:	<1	0.2	0.1		Subhedral to anhedral

GROUNDMASS: Fine grained to aphanitic.

VESICLES: Pieces 1-16 are nonvesicular to moderately vesicular; Piece 17 is highly vesicular. Vesicles are ≤1 mm in Pieces 1-16 and ≤7 mm in Piece 17. Vesicles are empty or filled with zeolite or dark green clay.

COLOR: Dark green to dark brownish gray fragments in a white matrix.

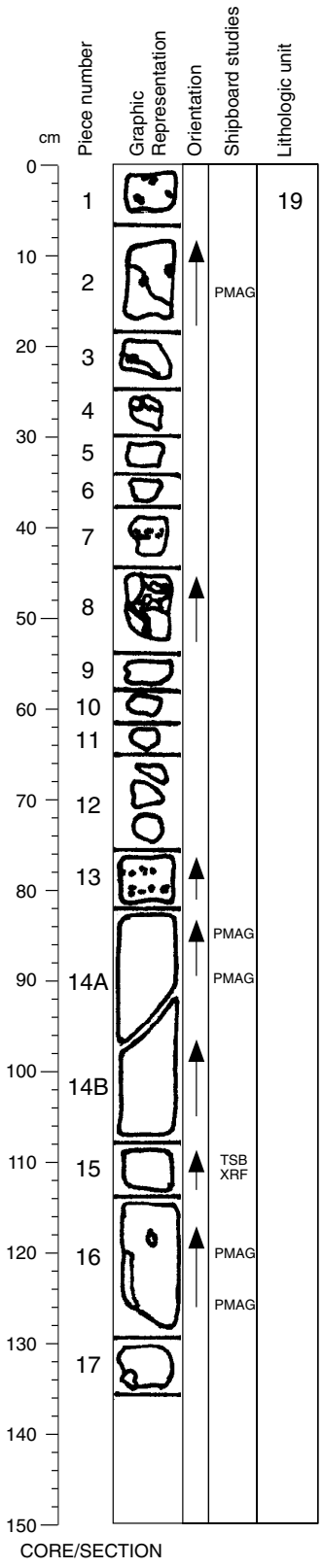
STRUCTURE: Brecciated; fragments are ≤6 cm, massive, angular to subrounded, and lie within a zeolite matrix.

ALTERATION: Complete in Pieces 1-16; high in Piece 17.

VEINS/FRACTURES: None.

COMMENTS: Piece 17 may be part of the massive portion of the flow, or a large breccia clast. Plagioclase laths with preferred orientation are visible in some fragments.

Core Photo



183-1138A-87R-2 **Section top: 815.16 (mbsf)**

UNIT 19: SPARSELY PLAGIOCLASE-PHYRIC BASALT

Pieces: 1-17

CONTACTS: None.

PHENOCRYSTS:	**%**	**Grain Size (mm):**			
	Mode	**Max**	**Min**	**Avg.**	**Shape/Habit**
Plagioclase:	2	0.5	0.2		Euhedral to subhedral
Clinopyroxene:	<1	0.2	0.1		Subhedral to anhedral

GROUNDMASS: Fine grained.

VESICLES: Sparsely vesicular. Vesicles are round to slightly flattened, 1-15 mm (averaging 2-3 mm), and evenly distributed. Most are lined with dark green clay and filled with lighter green clay; a few have white zeolite fill. Irregular, 1-2 cm cavities and vugs lined with zeolites are in the bottom of Piece 17.

COLOR: Gray.

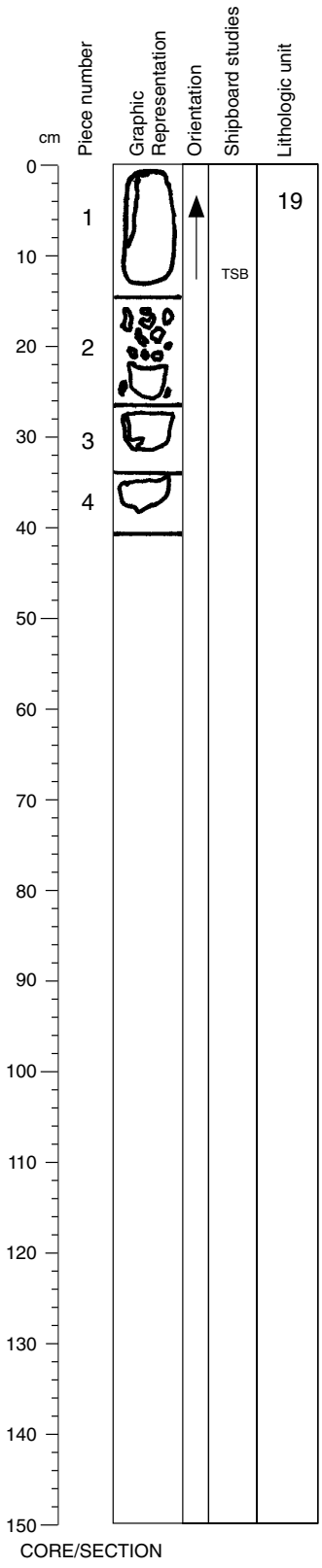
STRUCTURE: Massive.

ALTERATION: Slight to moderate; mostly vesicle fill. Groundmass contains wisps and irregular patches of glassy mesostasis, completely altered to clay.

VEINS/FRACTURES: Irregular, hairline width to 3 mm; the thinner veins are filled with dark green clay, and the thicker veins with zeolite and green clay.

COMMENTS:

Core Photo



183-1138A-87R-3 **Section top: 816.52 (mbsf)**

UNIT 19: SPARSELY PLAGIOCLASE-PHYRIC BASALT

Pieces: 1-4

CONTACTS: None recovered; the contact between Units 19 and 20 is inferred to be between Sections 87R-3 and 88R-1.

PHENOCRYSTS:	% Mode	Grain Size (mm): Max	Min	Avg.	Shape/Habit
Plagioclase:	2	0.6	0.1	0.3	Laths in loose clusters with clinopyroxene
Clinopyroxene:	<1	0.2	0.1		Subhedral to anhedral

GROUNDMASS: Fine grained.

VESICLES: Moderately vesicular. Vesicles are 1-12 mm, round and elongate; some form interconnected trains as long as 30 mm. Vesicles are filled mainly with dark green clay; some larger vesicles have a core of white zeolite; the interconnected vesicles contain both zeolite and green clay.

COLOR: Medium gray; reddish gray patch in Piece 1.

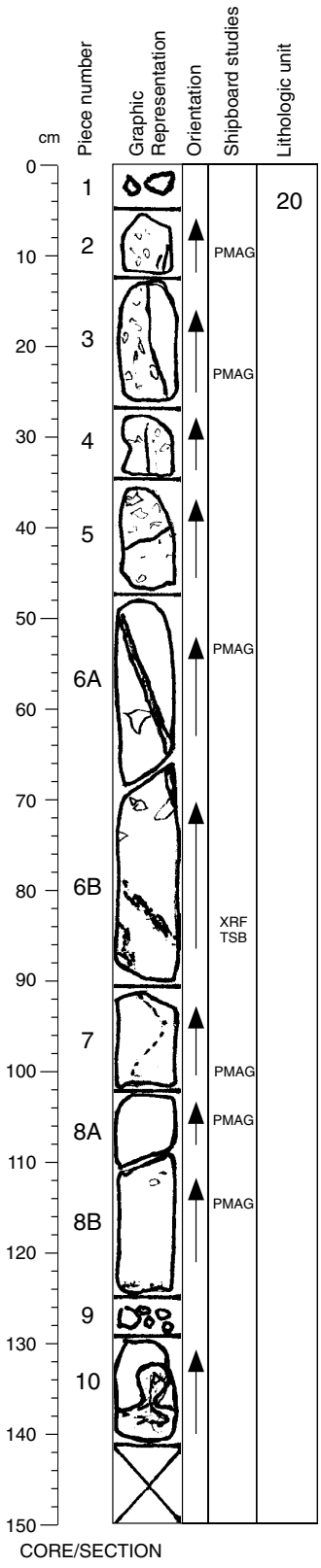
STRUCTURE: Massive.

ALTERATION: Slight. Moderate in reddish gray patch in Piece 1.

VEINS/FRACTURES: Rare veins are filled with dark green clay and zeolite.

COMMENTS: Piece 2 is composed of eight fragmented vesicular pebbles from a breccia that are difficult to interpret.

Core Photo



183-1138A-88R-1 **Section top: 823.40 (mbsf)**

UNIT 20: APHYRIC BASALT

Pieces: 1-10

CONTACTS: The contact between Units 20 and 21 is at 136 cm, within Piece 10.

PHENOCRYSTS: None.

GROUNDMASS: Fine grained.

VESICLES: Pieces 1-6A are moderately to highly vesicular; vesicles are round to flattened (2-10 mm), and filled with dark green clay or zeolite. Piece 6B is sparsely vesicular; Pieces 7 and 8 are moderately vesicular, with round, <1-mm vesicles.

COLOR: Medium light gray to medium gray.

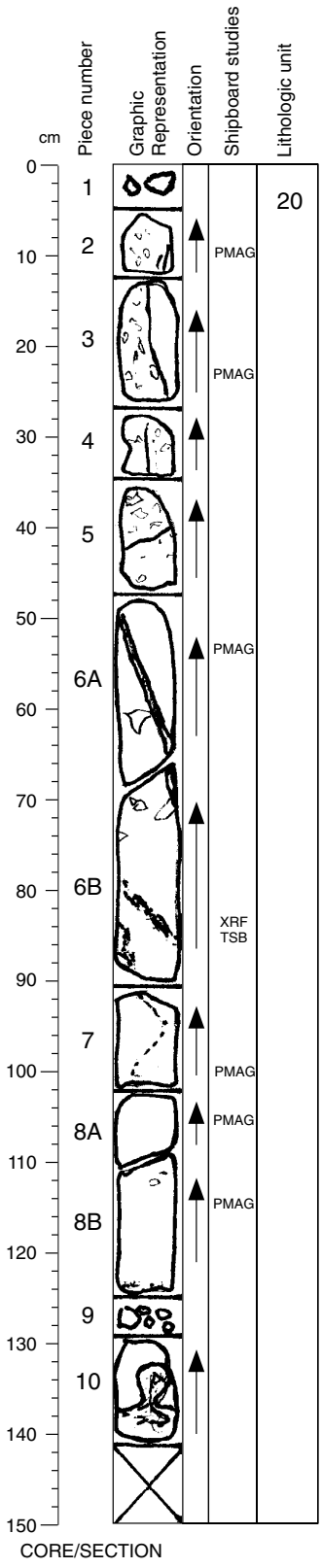
STRUCTURE: Massive.

ALTERATION: Moderate in vesicle-poor areas; high elsewhere.

VEINS/FRACTURES: Clay- and zeolite-filled veins (<1 mm wide) are present in Pieces 2-6.

COMMENTS: The contact within Piece 10 contains a basal chill zone. Vesicle patterns suggest that this may be a spiracle (where steam has blasted through the lava flow).

Core Photo



183-1138A-88R-1 **Section top: 823.40 (mbsf)**

UNIT 21: APHYRIC BASALTIC BRECCIA

Pieces: 10

CONTACTS: The contact between Units 20 and 21 is within Piece 10, at 136 cm.

PHENOCRYSTS: None.

GROUNDMASS: Fine grained.

VESICLES: Sparsely vesicular; vesicles <2 mm and mostly unfilled.

COLOR: Medium light gray to medium gray.

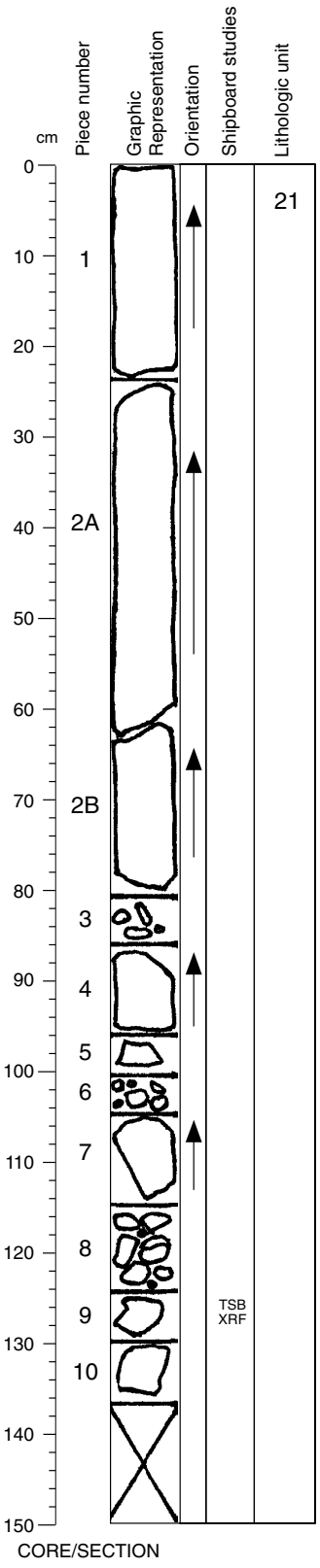
STRUCTURE: Brecciated.

ALTERATION: High.

VEINS/FRACTURES: None.

COMMENTS:

Core Photo



183-1138A-88R-2 **Section top: 824.81 (mbsf)**

UNIT 21: APHYRIC BASALTIC BRECCIA AND BASALT

Pieces: 1-10

CONTACTS: None.

PHENOCRYSTS:	**% Mode**	**Grain Size (mm): Max**	**Min**	**Avg.**	**Shape/Habit**
Plagioclase:	<1	1.3	0.3		Euhedral laths
Clinopyroxene:	<1	0.6	0.1		Subhedral

GROUNDMASS: Fine grained.

VESICLES: Sparsely vesicular (Pieces 5-10 are locally moderately vesicular). Vesicles are <1-mm in breccia clasts, and 1-5 mm and coalesced in more massive pieces. Vesicles are filled with dark green and black clay and zeolite.

COLOR: Medium gray, with white veining.

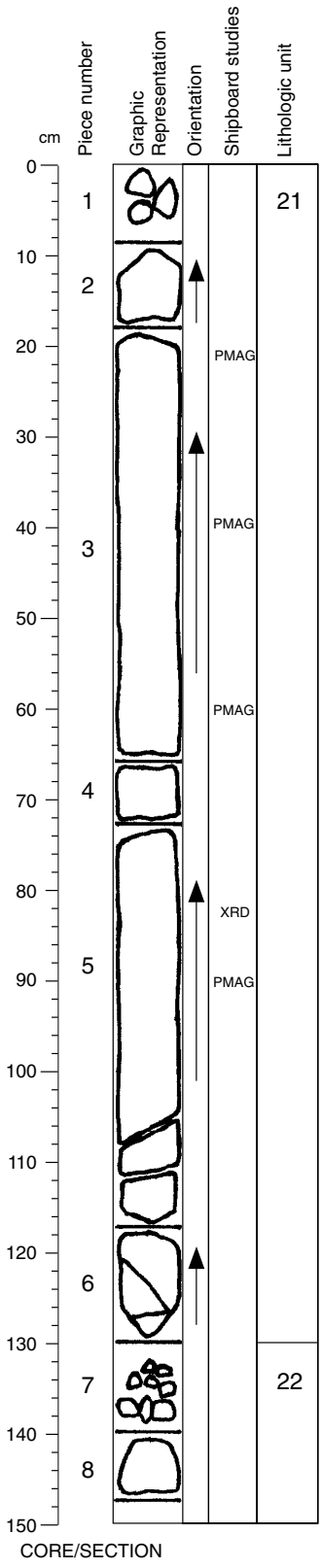
STRUCTURE: Brecciated (Pieces 1-4) to massive (Pieces 5-10).

ALTERATION: High to complete in Pieces 1-4; moderate in Pieces 5-10. Clay fills vesicles and partially replaces groundmass; zeolite fills pore space around breccia clasts.

VEINS/FRACTURES: None.

COMMENTS:

Core Photo



183-1138A-89R-1 **Section top: 833.10 (mbsf)**

UNIT 21: APHYRIC BASALTIC BRECCIA AND BASALT

Pieces: 1-6

CONTACTS: The contact between Units 21 and 22 is inferred to be between Pieces 6 and 7.

PHENOCRYSTS: None.

GROUNDMASS: Fine grained. Plagioclase microlites decrease in abundance and freshness in the massive zone (Piece 5, 98-127 cm).

VESICLES: Moderately vesicular. Vesicles in Pieces 1-3 are angular and <1-mm. Below 62 cm in Piece 3 (below an interval with welded texture), vesicles are rounded and <10 mm (mostly 2-4 mm). Clay and zeolite fill vesicles.

COLOR: Mottled medium gray.

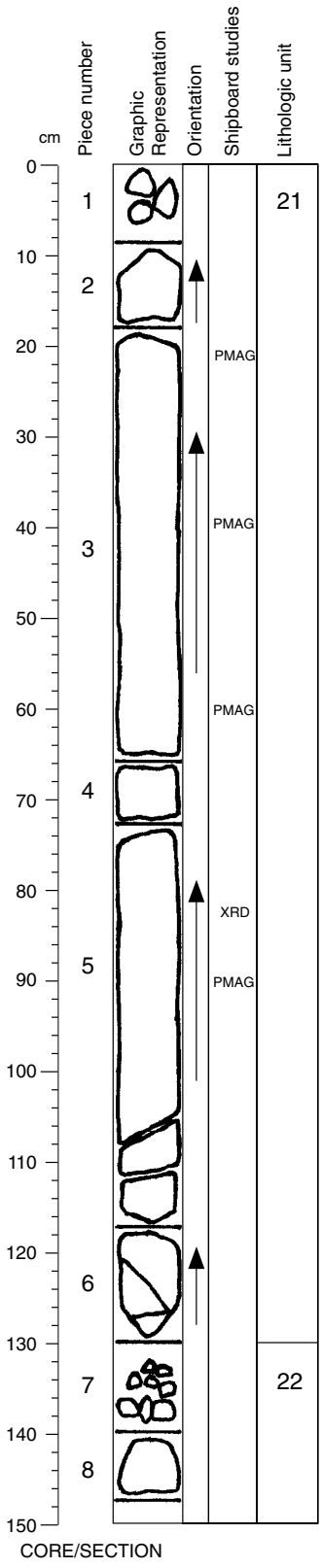
STRUCTURE: Mostly brecciated in Pieces 1-4; massive in Piece 5 from 98-127 cm.

ALTERATION: High.

VEINS/FRACTURES: Numerous clay- and zeolite-filled veins and fractures are present.

COMMENTS:

Core Photo



183-1138A-89R-1 **Section top: 833.10 (mbsf)**

UNIT 22: APHYRIC BASALTIC BRECCIA

Pieces: 7, 8

CONTACTS: The contact between Units 21 and 22 is inferred to be between Pieces 6 and 7.

PHENOCRYSTS:	**% Mode**	**Grain Size (mm): Max**	**Min**	**Avg.**	**Shape/Habit**
Plagioclase:	< 1	2	0.2		Anhedral

GROUNDMASS: Fine grained. Contains plagioclase microlites; a subhedral mineral replaced by gray clays is possibly altered clinopyroxene.

VESICLES: Highly vesicular. Vesicles (<2 mm) are filled with white and green zeolite and clay.

COLOR: Medium to dark gray.

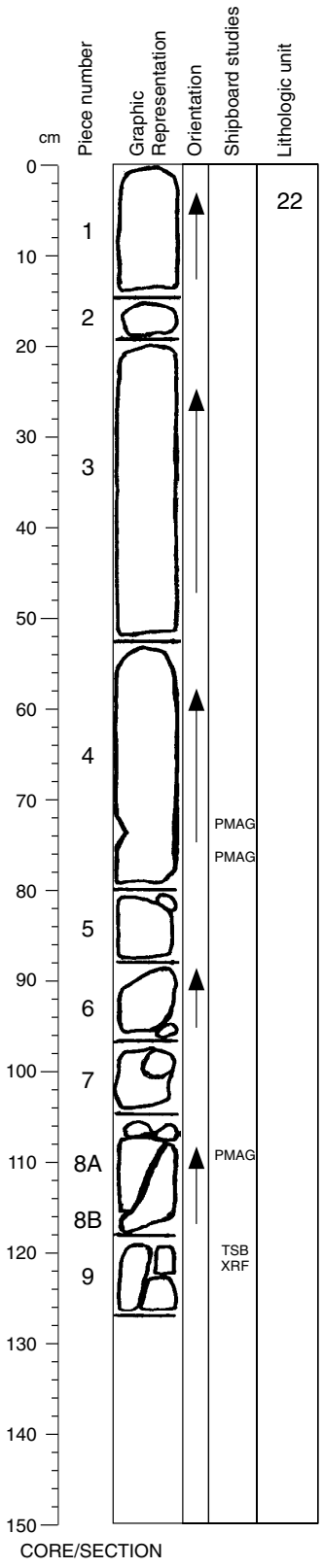
STRUCTURE: Brecciated.

ALTERATION: High.

VEINS/FRACTURES: None.

COMMENTS: Piece 8 has a >4-cm lobe with chilled margins.

Core Photo



183-1138A-89R-2 **Section top: 834.58 (mbsf)**

UNIT 22: APHYRIC BASALTIC BRECCIA AND BASALT

Pieces: 1-9

CONTACTS: None.

GROUNDMASS: Fine grained.

PHENOCRYSTS: None.

VESICLES: Highly vesicular from Piece 1 to Piece 4, ~65 cm. Moderately vesicular to from Piece 4, ~65 cm, to Piece 7, ~102 cm. Sparsely vesicular from Piece 7, ~102 cm, to bottom of Piece 9. Vesicle size increases from 1-2 mm to 5-15 mm near base of section. Vesicles are round to flattened; filled by dark green clay and zeolite.

COLOR: Medium light gray, medium gray, and brownish gray.

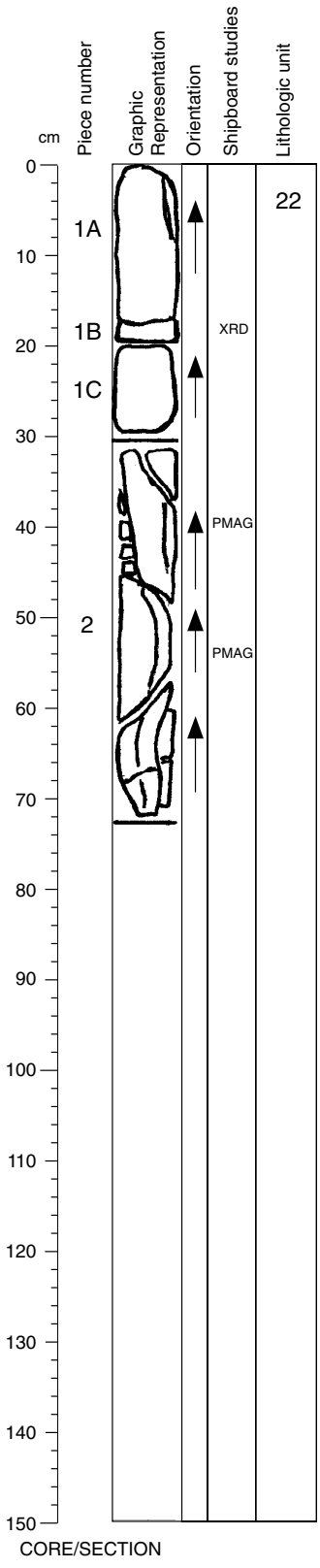
STRUCTURE: Brecciated from Piece 1 to midway through Piece 4. Massive from lower half of Piece 4 through Piece 9.

ALTERATION: High from Piece 1 to Piece 4 (~65 cm), which has zeolite filling the matrix between clasts. Moderate from Piece 4, ~65 cm, to Piece 9.

VEINS/FRACTURES: Top part of section is highly veined; massive part has a few, <1-mm-wide veins filled with dark green clay and zeolite.

COMMENTS:

Core Photo



183-1138A-89R-3 **Section top: 835.86 (mbsf)**

UNIT 22: APHYRIC BASALT

Pieces: 1-2

CONTACTS: None.

PHENOCRYSTS: None.

GROUNDMASS: Fine grained.

VESICLES: Sparsely vesicular, with rare 5-20 mm, ovoid to flattened vesicles, filled by green clay or white zeolite.

COLOR: Medium light gray.

STRUCTURE: Massive.

ALTERATION: Moderate to high.

VEINS/FRACTURES: Contains a pervasive network of fine veins (<1 mm wide), especially in Piece 2, which is oxidized in patches. Filled with white zeolite and dark clay.

COMMENTS: Piece 1 is visibly less altered and less fractured.

Sample									Texture			Mineral									Biogenic											Rock						Other		
Leg	Site	H	Cor	CT	Sct	Top	Depth	Lithology	Sand	Silt	Clay	Clay	Feldspar	Glauconite	Palagonite	Pyrite	Pyroxene	Quartz	Volcanic Glass	Zeolite	Benthic Forams	Calcispheres	Diatoms	Discoaster	Foraminifers	Nannofossils	Plant Debris	Radiolarians	Silicoflagellates	Skeletal Debris	Sponge Spicules	Basalt Fragments	Calcareous Fragments	Carbonate Particles	Packstone Clast	Silt	Volcanic Fragments	Rad/Diatom/Dino Spines	Unknown	Comments
183	1138	A	1	R	1	66	0.66	D		P	D	P											D						P								R			
183	1138	A	1	R	1	148	1.48	D	R	C	D												D					P	R								R			
183	1138	A	1	R	2	128	2.78	D		R	D	R											D			R			P											
183	1138	A	1	R	4	7	4.57	D			D										R		D		P				P											
183	1138	A	1	R	CC	14	8.51	D		P	D												D		P			P	P		R									
183	1138	A	2	R	4	30	11.41	D			D												D		C			P	P								R			
183	1138	A	2	R	4	37	11.48	M			D	C	P										D		P			P	P		R						C			
183	1138	A	3	R	1	22	17.32	D			D												D		P			C	P		R						R			
183	1138	A	3	R	2	50	19.1	D		P	D		R										D		P			C	P											
183	1138	A	3	R	4	17	21.77	D			D	C	P	P		C							A		P			P	*	*	P									
183	1138	A	4	R	1	35	26.85	D			D												D		P			P	P											
183	1138	A	4	R	3	25	29.75	D			D												A		P			P	P	C										
183	1138	A	4	R	3	124	30.74	D			D	C											D		C			P			*						P			
183	1138	A	4	R	4	90	31.9	D			D												D		P			C			R									
183	1138	A	4	R	5	40	32.9	D			D												D		C			P	P		*									
183	1138	A	5	R	3	10	39.1	D			D	P		*									D		P			P	R		R						P			
183	1138	A	5	R	4	84	41.34	D			D	C											D		P			R	P										P	
183	1138	A	5	R	6	5	43.55	D			D	P											D		P			P	C		*									
183	1138	A	6	R	2	56	47.46	D			D	P											D		P			P	C		R								*	
183	1138	A	6	R	2	56	47.46	D																																
183	1138	A	6	R	3	37	48.77	D			D	P											D		R			R	P								R			
183	1138	A	6	R	3	37	48.77	D																																
183	1138	A	6	R	3	88	49.28	D			D												D					R	A											
183	1138	A	6	R	3	88	49.28	D																																
183	1138	A	7	R	1	93	55.73	D			D	P											D		P			P	C		P						P			
183	1138	A	7	R	1	100	55.8	D			D	C											D		P			P	C								R		*	
183	1138	A	7	R	3	59	58.39	D			D	P	C	R			R						D					P									C			
183	1138	A	7	R	5	95	61.75	D			D	P		R									D		P			P	R		P						R			
183	1138	A	8	R	2	72	66.52	D			D	P	P										D		R			P	R								R			
183	1138	A	8	R	4	42	69.22	D			D	C	R										D								P						P			
183	1138	A	8	R	5	20	70.5	D			D	P	P				*						D		P			A			R						*			
183	1138	A	9	R	1	60	74.3	D			D		C				*						D					P	R		R									
183	1138	A	9	R	1	90	74.6	D			D	R	C										D		P			P									R			
183	1138	A	9	R	4	70	78.9	D			D	P	P										A		R			P									P			
183	1138	A	10	R	2	80	85.4	D			D												D		P			P	R											
183	1138	A	10	R	3	120	87.3	M			D		C										D						R								C			
183	1138	A	11	R	6	13	100.33	D			D		R										D		C				R								R			
183	1138	A	11	R	6	68	100.88	M			D												D		P				R		R									
183	1138	A	12	R	1	65	102.95	D		P	D												D			R		C	P								R			
183	1138	A	12	R	3	6	105.36	M			D		R										A			R		R	R		R						C			
183	1138	A	12	R	3	113	106.43	D		C	D												C		P	A		C									P			
183	1138	A	13	R	1	22	112.22	D		R	D	A											C			A		P	P								R			
183	1138	A	13	R	1	22	112.22																																	
183	1138	A	13	R	2	6	113.56	M			D	P											C		R	D														
183	1138	A	13	R	2	65	114.15	D			D	A											C		C	C		R												
183	1138	A	13	R	5	19	118.19	D		P	D	A											C		C	A		P												
183	1138	A	14	R	1	15	121.75	D		P	D												C		R	A		R												
183	1138	A	14	R	1	70	122.3	D		P	D												P		P	A											R			
183	1138	A	14	R	2	70	123.8	D			D												C			A			P											

Sample									Texture			Mineral									Biogenic											Rock						Other		
Leg	Site	H	Cor	CT	Sct	Top	Depth	Lithology	Sand	Silt	Clay	Clay	Feldspar	Glauconite	Palagonite	Pyrite	Pyroxene	Quartz	Volcanic Glass	Zeolite	Benthic Forams	Calcispheres	Diatoms	Discoaster	Foraminifers	Nannofossils	Plant Debris	Radiolarians	Silicoflagellates	Skeletal Debris	Sponge Spicules	Basalt Fragments	Calcareous Fragments	Carbonate Particles	Packstone Clast	Silt	Volcanic Fragments	Rad/Diatom/Dino Spines	Unknown	Comments
183	1138	A	15	R	1	72	131.92	M			D		P					P								P											D			
183	1138	A	15	R	1	102	132.22	D			D				P								C			P														
183	1138	A	15	R	2	65	133.35	D			D	P	P										C	*	R	D		C									P			
183	1138	A	16	R	1	123	142.03	D			D												C		P	D		P			C									
183	1138	A	16	R	3	120	145	D			D												C		C	D		P			P						R			
183	1138	A	16	R	4	23	145.53	D			D		R										P		P	D		R			R									
183	1138	A	17	R	1	70	151.2	D			D												C		R	A		C	R		R									
183	1138	A	18	R	2	103	162.63	D			D												C		P	D		R			R						*			
183	1138	A	18	R	3	40	163.5	D			D												C			D		P												
183	1138	A	18	R	4	50	165.1	D			D												C			D		R			*									
183	1138	A	19	R	1	110	170.8	D			D		P										P														D			
183	1138	A	19	R	2	25	171.45	D			D						*						C		A	D		P			R						R			
183	1138	A	20	R	1	135	180.65	D			D		R										R		P	D		R	*		P						R			
183	1138	A	20	R	3	53	182.83	D			D												P		P	D		P	*		R									
183	1138	A	21	R	1	57	189.57	D			D											R	P		P	D		P		P										
183	1138	A	22	R	2	110	201.2	D			D												P		C	D		R			R									
183	1138	A	24	R	1	132	219.12	D			D														P	D		R			*								C	
183	1138	A	25	R	1	18	227.58	D			D		P				R						P		C	D		P												
183	1138	A	26	R	2	80	239.4	D			D		*										R		C	D		P												
183	1138	A	27	R	1	120	247.9	D			D		R												*	D											R			
183	1138	A	28	R	3	6	259.46	D			D		P												C	D		P												
183	1138	A	29	R	1	105	266.95	D			D														C	D		P											R	
183	1138	A	30	R	2	43.5	277.44	D			D		C										P		P	A		P			R						P			
183	1138	A	31	R	1	55	285.65	D			D															D														
183	1138	A	31	R	1	59	285.69	D			D														P	D		P									C			
183	1138	A	32	R	1	73	295.43	D			D					P	P									C		R			R						A		P	
183	1138	A	33	R	1	26	304.66	D			D															D		P			R						P			
183	1138	A	34	R	2	57	316.17	D			D												P	*	R	D		P			P						C		P	
183	1138	A	34	R	2	90	316.5	D			D												R		P	D		P									C		R	
183	1138	A	35	R	2	20	325.4	D			D												R		R	D					R									
183	1138	A	35	R	4	30	328.5	D			D															D		P			R						C			
183	1138	A	36	R	3	80	336.8	D			D														P	D								C						
183	1138	A	36	R	6	43	340.43	M		C	D	C	R													D										C				
183	1138	A	37	R	4	55	347.65	D		C	D														C	D								C						
183	1138	A	38	R	3	52	355.72	D		C	D													P	C	D							C							
183	1138	A	39	R	3	75	365.55	D		P	D													P	P	D		*					P							
183	1138	A	40	R	1	75	372.25	D			D													P	P	D							C							
183	1138	A	41	R	1	45	381.65	D			D														P	D							A							
183	1138	A	42	R	3	40	394.2	D			D															D							C							
183	1138	A	43	R	1	115	401.55	D			D															C							D							
183	1138	A	53	R	1	105	497.45	D		R	D											P			C	C													R	
183	1138	A	54	R	1	20	505.8	D			D											R	R		C	C													D	
183	1138	A	54	R	2	45	507.55	D			D												A		C	D		*											C	
183	1138	A	69	R	5	50	656.07	D		P	D	D		R		P			P	A						R						A								
183	1138	A	69	R	6	20	657.27	D		D	P			D											P	C														
183	1138	A	70	R	2	52	661.62	D		D																								C	D					

THIN SECTION:	**183-1138A-70R-2, 46-50**	**Unit V**	**OBSERVER:** **LM, DR**
ROCK NAME:	**Bioclastic packstone**		
WHERE SAMPLED:	**In the central part of the bioclastic packstone to show representative range of components.**		
GRAIN SIZE:	**Fine to medium sand with larger fossil fragments as much as 3 mm (bivalve shells and worm tubes).**		
TEXTURE:	**Massive, moderately well-sorted fine-grained biogenic sand with 5-10% coarse sand-sized fossil fragments.**		

PRIMARY CLASTS	**PERCENT Category**	**PERCENT Item**	**SIZE (mm) min.**	**max.**	**av.**	**APPROX. COMP.**	**MORPHOLOGY**	**COMMENTS**
MINERAL	5							
Glauconite		2			0.2			Pale green and translucent.
Alkali feldspar		2			0.2			Partially altered, rare simple twins.
Opaque grains		1			0.2			Subrounded shapes, possibly includes some lithic fragments.
LITHIC	3							
Brown translucent grains		3			0.2			Oxidized glauconite and/or altered mafic volcanic glass.
BIOCLASTS	73							
Serpulid worm tubes		15		3.5	2.5			Spectacular perpendicular and oblique sections through worm tubes, showing concentric banding.
Bivalves		20		2	0.5			Some prisms still visible within larger bivalve shell fragments.
Crinoid columnals		3			0.3			Whole fragment goes to extinction at once.
Echinoid spines		2			0.3			Whole fragment goes to extinction at once. The echinoderms have syntaxial overgrowths.
Echinoid plate fragments		20			0.3			Whole fragment goes to extinction at once. The echinoderms have syntaxial overgrowths.
Benthic foraminifers		5			0.3			
Ostracods		3			0.3			
Bryozoans		5			0.3			
MATRIX	18	18						Extremely fine-grained calcite.

CEMENT			**SIZE (mm) min.**	**max.**	**av.**	**REPLACING / FILLING**	**COMMENTS**
Hematite/goethite	1	1					Many of the glauconite grains have brown oxidized rims.

COMMENTS: This packstone is relatively well sorted, and preserves spectacular examples of serpulid worm tubes.

THIN SECTION:	**183-1138A-71R-2, 93-95**	**Unit V**	**OBSERVER:** **LM, DR**
ROCK NAME:	**Ferruginous bioclastic sandstone.**		
WHERE SAMPLED:	**Middle of orangish-brown laminated bed.**		
GRAIN SIZE:	**Very fine to fine sand-sized, with granules at top.**		
TEXTURE:	**Massive, moderately well-sorted sandstone. Rare aligned clusters of clasts.**		

PRIMARY CLASTS	PERCENT Category	PERCENT Item	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	APPROX. COMP.	MORPHOLOGY	COMMENTS
					0.1			
MINERAL	7							
Glauconite		5						Round green grains.
Pyroxene(?)		1	0.5	1.5				One large (1 mm) grain of brown clay(?) with relict clinopyroxene(?) cleavage.
Black opaque grains								
Iron ooids		1						Some have magnetite(?) crystal cores.
LITHIC	53							
Volcanic rocks		23						Granule-sized, rounded grains of highly altered plagioclase-phyric basalt.
Brown translucent grains		30						Sand-sized, rounded grains may be oxidized glauconite pellets.
BIOCLASTS	10							
Ostracods		2						Most are reworked, partially rounded and broken fragments.
Pectinid bivalve shells		2						Most are reworked, partially rounded and broken fragments. One large (3 mm x 2 mm) fragment at top.
Benthic foraminifers		2						Most are reworked, partially rounded and broken fragments.
Echinoderms		2						Most are reworked, partially rounded and broken fragments. Grains are recrystallized and do not show uniform extinction in polarized light.
Bryozoans		2						Most are reworked, partially rounded and broken fragments.

CEMENT	30		SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.		COMMENTS
Hematite/goethite		30					Brown, oxidized rims on glauconite; also replaces clay(?) matrix.

COMMENTS : Severely clouded by dark brown, semi-opaque hematite/goethite overprint. Aligned grains may correspond with megascopically observed lamination.

THIN SECTION:	**183-1138A-73R-1, 24-28**					**Unit VI**	**OBSERVER:**	**LM, DR**
ROCK NAME:	**Pebbly Sandstone.**							
WHERE SAMPLED:	**Middle of sandstone interval.**							
GRAIN SIZE:	**Medium to very coarse sand (<5 mm).**							
TEXTURE:	**Moderately well sorted, well-rounded pebbles, subangular sand grains, bed is massive .**							

PRIMARY CLASTS	**PERCENT Category**	**PERCENT Item**	**SIZE (mm) min.**	**max.**	**av.**	**APPROX. COMP.**	**MORPHOLOGY**	**COMMENTS**
LITHIC	95							
Lava		70		30	2		Well-rounded	Plagioclase phyric (basalt?)
Other		25		4	2		Well-rounded to subangular.	

CEMENT	5		**SIZE (mm) min.**	**max.**	**av.**		**REPLACING / FILLING**	**COMMENTS**
Calcite		5			0.1		Equicrystalline mosaic fills pore spaces.	

COMMENTS : The pebbles and coarse sand grains are volcanic and are mostly from lavas, with abundant lath-shaped plagioclase microlites. The pebbles are predominantly well-rounded, but some of the smaller grains are subangular. This sandstone is moderately well-sorted and cemented with calcite.

THIN SECTION:	**183-1138A-74R-1, 27-29, Piece 4**					**Unit 1**	**OBSERVER:**	**MSP**
ROCK NAME:	**Aphyric, massive dacite.**							
WHERE SAMPLED:	**Freshest cobble in Unit 1.**							
GRAIN SIZE:	**Fine grained phenocrysts (rare), microcrystalline groundmass.**							
TEXTURE:	**Porphyritic with a microcrystalline, subtrachytic groundmass.**							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**APPROX. COMP.**	**MORPHOLOGY**	**COMMENTS**
PHENOCRYSTS								
Sanidine	<1	<1		1			Euhedral to subhedral, equant to laths	Rare, slightly altered along cleavage surfaces; sanidine more abundant than plagioclase.
Plagioclase	<1	<1		1		An30-40	Euhedral to subhedral laths	Rare, slightly altered along cleavage surfaces.
GROUNDMASS								
Feldspar	70+	80			<.05			Both plagioclase and alkali-feldspar.
Mafic phases	10+	20			<.04			Mainly clinopyroxene? Rare oxidized grains may have been olivine.
Glass	0	<10						Flow-banding, macroscopic 'spherulites' not as conspicuous in thin section.
Opaques	3	3			0.01		Subhedral equant	Very fine grained.

SECONDARY MINERALOGY	**PERCENT**	**SIZE (mm) min.**	**max.**	**av.**	**REPLACING / FILLING**	**COMMENTS**
Pale clays	**<20**				Glass, pyyroxene, feldspar	
Fe- oxide/hydroxide + brown clay						Patchy distribution in concentric weathering bands and layers 0.5 to several mm wide; not counted in the visual mode estimate.

VESICLES/ CAVITIES	**PERCENT**	**LOCATION**	**SIZE (mm) min.**	**max.**	**av.**	**FILLING / MORPHOLOGY**	**COMMENTS**

COMMENTS : Flow-banding, 'spherulites' visible in hand sample not as conspicuous in thin section; mode estimate for freshest parts of the section, center third of thin section.
Photomicrograph #:
1138A-1 = Sanidine microphenocryst in subtrachytic groundmass (x10 objective, xpl).

THIN SECTION:	**183-1138A-75R-1, 5-6 Piece 1**					**Unit 1**	**OBSERVER:**	**MSP**
ROCK NAME:	**Aphyric dacite(?).**							
WHERE SAMPLED:	**Cobble in Unit 1.**							
GRAIN SIZE:	**Glassy.**							
TEXTURE:	**Porphrytic with a holohyaline, flow-banded groundmass.**							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**APPROX. COMP.**	**MORPHOLOGY**	**COMMENTS**
PHENOCRYSTS								
Plagioclase	~0	<1				~An40	Euhedral, equant to laths	Very rare, only some cores left.
GROUNDMASS								
Glass	~0	~100						

SECONDARY MINERALOGY	**PERCENT**	**SIZE (mm) min.**	**max.**	**av.**	**REPLACING / FILLING**	**COMMENTS**
Clay and zeolite	100				Groundmass	Originally glassy rock now seems to have completely devitrified to dark bands of opaque clay 'microspherulites' and lighter layers of zeolite.

VESICLES/ CAVITIES	**PERCENT**	**LOCATION**	**SIZE (mm) min.**	**max.**	**av.**	**FILLING / MORPHOLOGY**	**COMMENTS**
Vesicles	0						

COMMENTS : Macroscopic observation: fine-grained (glassy), flow-banded with purple and red layers.

THIN SECTION:	**183-1138A-77R-2, 139-142**	**Unit 2D**	**OBSERVER:** **LM**
ROCK NAME:	**Lithic breccia with pumice.**		
WHERE SAMPLED:	**In the centre of an indurated part of the lithic breccia in order to make a comparison with the pumice lithic breccia below (183-1138A-78R-2, 50-54 cm).**		
GRAIN SIZE:	**Medium sand to granule sized volcanic breccia.**		
TEXTURE:	**Poorly sorted, lithic breccia with a dominantly pumice matrix.**		

PRIMARY CLASTS	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	APPROX. COMP.	MORPHOLOGY	COMMENTS
LITHICS	35		0.2	10	1.5			
CRYSTALS								
Feldspar	5		0.05	0.2	0.1			Broken subhedral to euhedral crystals.
Accessories	2		0.01	0.1	0.05			Dominated by iron oxides associated with lithic fragments.
GLASS/PUMICE	50		0.1	5	1		Tube pumice.	Attenuated and flattened but not welded.

SECONDARY MINERALOGY	PERCENT	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	REPLACING / FILLING	COMMENTS
Clay minerals	8				Replacing lithic clasts and matrix pumice, infilling voids in lithic clasts.	

COMMENTS : This sample was taken to show the internal texture of the lithic breccia and to determine whether it differs from the pumice lithic breccias in the succession (e.g., 78R-2, 50-54). This breccia shows a range of enclosed clast types from feldspar phyric basalt to equigranular, oxide-rich altered clasts and vesicular, aphyric basalt. The matrix is dominated by pumice clasts and disaggregated pumice fragments. Pumice fragments are partially altered to clay minerals. There is a great deal more pumice in the thin-section than is suspected from hand specimen.

THIN SECTION:	**183-1138A-78R-2, 36-39, Piece 2**					**Unit 1**	**OBSERVER:**	**NTA, CRN**
ROCK NAME:	**Highly plagioclase-clinopyroxene?-phyric basalt.**							
WHERE SAMPLED:	**Clast at top of conglomerate.**							
GRAIN SIZE:	**Coarse phenocrysts in a fine-grained groundmass.**							
TEXTURE:	**Glomerophyric with an intersertal intergranular groundmass.**							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**APPROX. COMP.**	**MORPHOLOGY**	**COMMENTS**
PHENOCRYSTS								
Plagioclase	15	20	0.5	10	2		Subhedral laths, commonly clustered in glomerocrysts	Loose glomeroporphyritic clusters with completely altered clinopyroxene. Plagioclase is slightly to moderately altered. Zonation observed in the largest phenocrysts along with continuous overgrowth rims. Sieve textures occasionally present.
Clinopyroxene	0	2?	0.1	0.2	0.15		Uncertain	Patches of clay in glomerocrysts are interpreted as clinopyroxene grains.
GROUNDMASS								
Plagioclase	25	35	0.05	0.3	0.2		Laths	Moderately altered.
Clinopyroxene	0	?		0.1?			Anhedral equant	Completely altered to crystalline, very fine-grained crud.
Titanomagnetite	3	3	0.01	0.4	0.1		Slender blades and rare equant grains	Largely intersertal. Skeletal (acicular) forms only. No maghemite exsolution.
Mesostasis		25					Intersertal pools	

SECONDARY MINERALOGY	**PERCENT**	**SIZE (mm) min.**	**max.**	**av.**	**REPLACING / FILLING**	**COMMENTS**
Clays, goethite	40				Mesostasis, clinopyroxene and plagioclase.	Very fine-grained but crystalline, pale brown to green, high birefringence clay? Goethite (opaque but low reflectivity) fills centers of vesicles and glass patches.

VESICLES/ CAVITIES	**PERCENT**	**LOCATION**	**SIZE (mm) min.**	**max.**	**av.**	**FILLING / MORPHOLOGY**	**COMMENTS**
Vesicles	2		0.5	3		Light brown clay at margins, white bladed zeolite and goethite in interiors.	

COMMENTS : Clinopyroxene has completely altered to fine-grained secondary material identical to that which replaces the mesostasis. The proportion and grain size can only be inferred from the size of interstices between plagioclase laths.
In marked contrast to the clinopyroxene, the plagioclase is only slightly to moderately altered.
Trace chalcopyrite associated with alteration.

THIN SECTION:	**183-1138A-78R-2, 50-54**				**Unit 2G**	**OBSERVER:**	**LM**	
ROCK NAME:	**Pumice lithic breccia.**							
WHERE SAMPLED:	**In central part of core to show representative internal texture in pumice lithic breccia.**							
GRAIN SIZE:	**Medium sand to small pebble size.**							
TEXTURE:	**Clastic with granules and pebbles of pumice and lithic fragments and some crystals in a pumice-rich medium to coarse sand matrix.**							

PRIMARY CLASTS	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**APPROX. COMP.**	**MORPHOLOGY**	**COMMENTS**
LITHIC FRAGMENTS	10		0.1	4	0.5		Subangular to subrounded	See comments below.
CRYSTALS								
Feldspar	5		0.1	0.5	0.2			Broken subhedral to euhedral crystals.
Accessories	2		0.05	0.1	0.05			Dominated by iron oxides associated with lithic fragments.
GLASS/PUMICE	75		0.1	12	2			Broken and attenuated, but not welded.

SECONDARY MINERALOGY	**PERCENT**	**SIZE (mm) min.**	**max.**	**av.**	**REPLACING / FILLING**	**COMMENTS**
Clay minerals	8				Replacing lithic clasts, filling voids in lithic clasts and replacing matrix pumice. Clay alteration within pumice clasts.	

VESICLES/ CAVITIES	**PERCENT**	**LOCATION**	**SIZE (mm) min.**	**max.**	**av.**	**FILLING / MORPHOLOGY**	**COMMENTS**
Vesicles in pumice clasts						Tube vesicles	Some filled by secondary clay minerals.

COMMENTS : This sample was taken to show the internal texture of the pumice lithic breccia and to determine whether it differs from the lithic breccias in the succession (e.g., 77R-2, 139-142). This breccia shows a range of enclosed clast types from feldspar phyric basalt to equigranular, oxide-rich altered clasts and aphyric basalt. Free crystals are mostly simple twinned feldspar (alkali-feldspar?). The matrix is dominated by pumice clasts and disaggregated pumice fragments. Pumice fragments are partially altered to clay minerals.

THIN SECTION:	**183-1138A-78R-4, 23-26**	**Unit 2G**	**OBSERVER:** **LM**
ROCK NAME:	**Pumice lithic breccia.**		
WHERE SAMPLED:	**In central part of core to show representative internal texture in pumice lithic breccia.**		
GRAIN SIZE:	**Medium sand to small pebble size.**		
TEXTURE:	**Clastic with granules and pebbles of pumice and lithic fragments and some crystals in a pumice-rich medium to coarse sand matrix.**		

PRIMARY CLASTS	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	APPROX. COMP.	MORPHOLOGY	COMMENTS
LITHIC FRAGMENTS	10		0.1	2	1		Subangular to subrounded	See comments below.
CRYSTALS								
Feldspar	5		0.1	0.5	0.2			Broken subhedral to euhedral crystals.
Accessories	2		0.05	0.1	0.05			Dominated by iron oxides associated with lithic fragments.
GLASS/PUMICE	75		0.1	10	1			Broken and attenuated, but not welded.

SECONDARY MINERALOGY	PERCENT	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	REPLACING / FILLING	COMMENTS
Clay Minerals	8				Replacing lithic clasts, filling voids in lithic clasts and replacing matrix pumice.	

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	FILLING / MORPHOLOGY	COMMENTS
Vesicles in pumice clasts						Tube veiscles	Some filled by secondary clay minerals.

COMMENTS : This sample was taken to show the internal texture of the pumice-lithic breccia and whether it differs from the lithic breccias in the succession (e.g., 77R-2, 139-142). This breccia shows a range of enclosed clast types from feldspar phyric basalt to equigranular, oxide-rich altered clasts and aphyric basalt. Free crystals are mostly simple twinned feldspar (alkali-feldspar?). The matrix is dominated by pumice clasts and disaggregated pumice fragments. Pumice fragments are partially altered to clay minerals.

THIN SECTION:	**183-1138A-79R-3, 43-46**					**Unit 2L**	**OBSERVER:**	**LM**
ROCK NAME:	**Pyroclastic ash (accretionary lapilli seen in hand specimen but not sectioned).**							
WHERE SAMPLED:	**At the base of the graded ash layer, near the contact with underlying Unit 2M volcanic clay.**							
GRAIN SIZE:	**Fine to medium silty sand.**							
TEXTURE:	**Moderate to well sorted fine to medium silty sand.**							

PRIMARY	**PERCENT**	**PERCENT**	**SIZE (mm)**			**APPROX.**		
CLASTS	**PRESENT**	**ORIGINAL**	**min.**	**max.**	**av.**	**COMP.**	**MORPHOLOGY**	**COMMENTS**
LITHIC FRAGMENTS	10	15	0.01	2	0.2		Subangular to subrounded.	
CRYSTALS								
Feldspar	5	10	0.01	0.5	0.2		Broken , euhedral	
Accessories	2	5	0.01	0.1	0.1		Subhedral Fe-Ti oxides	
GLASS/PUMICE	0	70	0.01	0.5	0.2		Glass shards?	

SECONDARY			**SIZE (mm)**				
MINERALOGY	**PERCENT**		**min.**	**max.**	**av.**	**REPLACING / FILLING**	**COMMENTS**
Clay minerals	80	0				Replacing glass shards in matrix, filling veins	
Zeolite	3	0				Late phase vein fill	Blades and laths growing into voids, (clinoptilolite?).

VESICLES/			**SIZE (mm)**				
CAVITIES	**PERCENT**	**LOCATION**	**min.**	**max.**	**av.**	**FILLING / MORPHOLOGY**	**COMMENTS**
Vesicles in pumice clasts							Some filled by secondary clay minerals.

COMMENTS : This fine to medium silty sand no longer preserves glassy textures, and is now pervasively altered to clay material with relict crystals and lithic fragments. Cross cutting veinlets contain clay and zeolite minerals. Some grading through the section is reflected in the change in relict clast size. Accretionary lapilli were not sectioned in this slide. The contact with the underlying Unit 2M clay was lost during thin section preparation.

THIN SECTION:	**183-1138A-80R-1, 52-56, Piece 8**					**Unit 3**	**OBSERVER:**	**CRN**
ROCK NAME:	**Highly plagioclase-phyric basalt.**							
WHERE SAMPLED:	**Interior of Unit 3.**							
GRAIN SIZE:	**Medium-grained phenocrysts in a fine-grained groundmass.**							
TEXTURE:	**Porphyritic with an intergranular to intersertal, sometimes trachytic groundmass.**							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**APPROX. COMP.**	**MORPHOLOGY**	**COMMENTS**
PHENOCRYSTS								
Plagioclase	10	10	0.8	5	2	An60-65	Subhedral to anhedral	These are described as phenocrysts, but technically most are glomerocrysts. Rounded to subangular masses of 2-3 plagioclase crystals are seen with discrete phenocrysts. Larger ones are zoned with micron-sized inclusion trails following the zoning patterns. Overgrowths of plagioclase are conspicuous on some crystals; in rare cases small clinopyroxene are totally enclosed by the overgrowth. Others appear to be reacting with the groundmass and have melt inclusions.
GROUNDMASS								
Plagioclase	20	25	0.02	0.15	0.1		Subhedral laths	Slightly altered. Occasionally with a preferred orientation.
Clinopyroxene	35	40	0.01	0.15	0.08		Anhedral	Slightly altered.
Titanomagnetite	5	5	0.01	0.1	0.05		Subhedral to anhedral	Mixture of tabular (stubby octahedra) and acicular (skeletal) grains.
Glass	0	20						Randomly distributed throughout the slide. Completely altered to brown clay. Rare maghemite exsolution.

SECONDARY MINERALOGY	**PERCENT**	**SIZE (mm) min.**	**max.**	**av.**	**REPLACING / FILLING**	**COMMENTS**
Brown clay	30				Glass, groundmass phases, fills vesicles	

VESICLES/ CAVITIES	**PERCENT**	**LOCATION**	**SIZE (mm) min.**	**max.**	**av.**	**FILLING / MORPHOLOGY**	**COMMENTS**
Vesicles	1		2	5	3	Flattened, ovoid filled with brown clay	Totally filled; thin section preparation has removed some fill material.

COMMENTS : Macroscopic observation: vesicles and phenocrysts evident. Section has a brown hue.
Olivine may be present, but moderate alteration makes positive identification of altered olivine extremely difficult.
Photomicrograph #:
1138A-4 = Overgrowth on plagioclase phenocryst (x10 objective, xpl).
1138A-5 = Major overgrowth on plagioclase phenocryst (x10 objective, xpl).

THIN SECTION:	**183-1138A-80R-2, 101-103, Piece 11**					**Unit 4**	**OBSERVER:**	**CRN**
ROCK NAME:	**Moderately plagioclase-phyric basalt.**							
WHERE SAMPLED:	**Interior of Unit 4; region with glomerocrysts and phenocrysts.**							
GRAIN SIZE:	**Medium-grained phenocrysts in a fine-grained groundmass.**							
TEXTURE:	**Porphyritic with an intergranular to intersertal, hypocrystalline, occasionally trachytic groundmass.**							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**APPROX. COMP.**	**MORPHOLOGY**	**COMMENTS**
PHENOCRYSTS								
Plagioclase	2	3	1	5	2.5	An65	Subhedral	Technically these are glomerocrysts for the most part, being masses of more than one plagioclase crystal. Some appear to be reacting with the magma, others have a narrow (< 0.01 mm) overgrowth. The crystals appear to be altered, but this is due to the plucking that occurred during thin section preparation.
GROUNDMASS								
Plagioclase	25	30						Moderately unaltered.
Clinopyroxene	35	40						Moderately unaltered.
Titanomagnetite	2	2						Tabular forms only (stubby octahedra). Most exhibit extremely fine (a few microns) maghemite exsolution. This gives the mineral a bluer-than-usual look.
Glass	0	25					Intersertal pools	

SECONDARY MINERALOGY	**PERCENT**	**SIZE (mm) min.**	**max.**	**av.**	**REPLACING / FILLING**	**COMMENTS**
Zeolite	2				Glass, clinopyroxene, plagioclase, fills vein and vesicles	
Brown clay	35					

VESICLES/ CAVITIES	**PERCENT**	**LOCATION**	**SIZE (mm) min.**	**max.**	**av.**	**FILLING / MORPHOLOGY**	**COMMENTS**
Vesicles	<1		0.5	3	1	Round to flattened-ovoid filled with brown clay and zeolite	
Vein	2		0.1	0.6		Brown clay, zeolite	

COMMENTS : Macroscopic observation: vein runs through center of the section. Phenocrysts/glomerocrysts are visible. Section has a greenish-brown hue. No sulfides observed.

THIN SECTION:	**183-1138A-80R-3, 18-22 Piece 2**					**Unit 4**	**OBSERVER:**	**RD, CRN**
ROCK NAME:	**Moderately plagioclase-phyric basalt.**							
WHERE SAMPLED:	**Flow interior.**							
GRAIN SIZE:	**Medium-grained phenocrysts in a fine-grained groundmass.**							
TEXTURE:	**Porphyritic with an intergranular to intersertal, occasionally trachytic groundmass.**							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**APPROX. COMP.**	**MORPHOLOGY**	**COMMENTS**
PHENOCRYSTS								
Plagioclase	3	3	1	3	2	An62	Subhedral to anhedral	Zoned, corroded interiors, trains of small melt inclusions.
GROUNDMASS								
Plagioclase	30	30	0.05	0.2	0.1	An50	Euhedral laths	Longer crystals are sub-parallel.
Clinopyroxene	20	35	0.05	0.1			Anhedral, stubby grains	
Olivine	0	2	0.05	0.1			Euhedral to subhedral	Identifed by habit; totally replaced by green clay.
Titanomagnetite	3	3	0.05	0.1			Subhedral to anhedral	Mostly tabular forms. Occasional maghemite exsolution.
Mesostasis	10	25					Intersertal pools	Partially replaced by light and dark brown clay.

SECONDARY MINERALOGY	**PERCENT**	**SIZE (mm) min.**	**max.**	**av.**	**REPLACING / FILLING**	**COMMENTS**
Clay	35				Clinopyroxene, olivine and groundmass	Light and dark brown varieties.

VESICLES/ CAVITIES	**PERCENT**	**LOCATION**	**SIZE (mm) min.**	**max.**	**av.**	**FILLING / MORPHOLOGY**	**COMMENTS**
Vesicles	**5**		2	10		Dark brown-green and gray clay	Flattened and sub-parallel; clay plucked during polishing.

COMMENTS : This is a compact, fine-grained rock with few but large vesicles aligned in sub-parallel trains. The medium-grained phenocrysts of plagioclase did not crystallize in this matrix, but do not look grossly out of equilibrium with it. The basaltic groundmass has minor olivine pseudomorphs and a large proportion of glassy mesostasis which has been partially replaced by clays.
No sulfide observed.

THIN SECTION:	**183-1138A-80R-5, 17-20, Piece 3**					**Unit 5**	**OBSERVER:**	**RD, CRN**
ROCK NAME:	**Aphyric basalt.**							
WHERE SAMPLED:	**Flow interior, Unit 5.**							
GRAIN SIZE:	**Fine-grained.**							
TEXTURE:	**Intergranular to intersertal.**							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**APPROX. COMP.**	**MORPHOLOGY**	**COMMENTS**
GROUNDMASS								
Plagioclase	25	30	0.1	0.5	0.2		Euhedral laths	Interlocking.
Clinopyroxene	30	40	<0.01	0.1	0.05		Anhedral	
Olivine	0	3	0.01	0.05			Euhedral to subhedral	Identified from habit; totally replaced by green and brown clay.
Titanomagnetite	2	2	<0.01	0.01	0.01		Anhedral	Largely intersertal. Predominantly tabular forms. Ubiquitous maghemite exsolution.
Mesostasis	20	30					Intersertal pools	Partially replaced with dark green and brown clay.

SECONDARY MINERALOGY	**PERCENT**	**SIZE (mm) min.**	**max.**	**av.**	**REPLACING / FILLING**	**COMMENTS**
Clay	20				Groundmass clinopyroxene, olivine and mesostasis	Dark green and brown varieties.

VESICLES/ CAVITIES	**PERCENT**	**LOCATION**	**SIZE (mm) min.**	**max.**	**av.**	**FILLING / MORPHOLOGY**	**COMMENTS**
Vesicles	4					Dark green and light brown clay	Large and flattened, filling plucked during polishing.

COMMENTS : No sulfide observed
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THIN SECTION:	**183-1138A-81R-2, 26-27, Piece 1B**					**Unit 6**	**OBSERVER:**	**RD, CRN**
ROCK NAME:	**Aphyric basalt.**							
WHERE SAMPLED:	**Flow interior of Unit 6.**							
GRAIN SIZE:	**Fine-grained.**							
TEXTURE:	**Intergranular to intersertal.**							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**APPROX. COMP.**	**MORPHOLOGY**	**COMMENTS**
PHENOCRYSTS								
Plagioclase	<1	<1	1	3			Subhedral	Largely replaced with green clay.
GROUNDMASS								
Plagioclase	40	45	0.1	1	0.5		Euhedral laths	Interlocking.
Clinopyroxene	30	30	0.1	0.5	0.2		Anhedral	Relatively unaltered.
Olivine	0	1	0.1	0.5			Euhedral to subhedral	Identified by habit; totally replaced by clay and distinguished by parallel growth of olive green clay.
Titanomagnetite	2	2	<0.01	0.1			Anhedral to acicular	Largely intersertal, dendritic crystals. Equal proportion of tabular and acicular forms. Rare maghemite exsolution.
Mesostasis	10	25					Intersertal pools	Patchy, partial replacement with dark green and brown clay; some areas are well-crystallized and remarkably unaltered.

SECONDARY MINERALOGY	**PERCENT**	**SIZE (mm) min.**	**max.**	**av.**	**REPLACING / FILLING**	**COMMENTS**
Clay	20				Groundmass feldspar, olivine and mesostasis	Predominantly green-brown; clay replacing plagioclase phenocrysts is olive green. Some of the clay replacing olivine is well-crystallized, pleochroic, yellow-brown to dark brown.

VESICLES/ CAVITIES	**PERCENT**	**LOCATION**	**SIZE (mm) min.**	**max.**	**av.**	**FILLING / MORPHOLOGY**	**COMMENTS**
Vesicles	<1						

COMMENTS : This compact, fine-grained, aphyric basalt from the interior of Unit 6 contains a few relict plagioclase phenocrysts that are fragmented and almost totally replaced by clay.
Trace sulfides (chalcopyrite?) associated with alteration.
Photomicrograph #:
1138A-8 = Dendritic/skeletal titanomagnetites (x10 objective, reflected light).

THIN SECTION:	**183-1138A-81R-2, 129-132, Piece 5**					**Unit 6**	**OBSERVER:**	**RD, CRN**
ROCK NAME:	**Aphyric basalt.**							
WHERE SAMPLED:	**Chilled base of Unit 6.**							
GRAIN SIZE:	**Fine-grained.**							
TEXTURE:	**Intergranular to intersertal.**							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**APPROX. COMP.**	**MORPHOLOGY**	**COMMENTS**
PHENOCRYSTS								
Plagioclase	<1	1	0.5	1			Subhedral to anhedral	Partially replaced with dark green to black clays.
GROUNDMASS								
Plagioclase	30	35	0.1	0.5	0.2		Subhedral laths	Interlocking.
Clinopyroxene	20	25	0.1	0.5	0.2		Anhedral	Relatively unaltered.
Olivine	0	2	0.1	0.2			Euhedral to subhedral	Equant, totally replaced by olive green clays.
Titanomagnetite	<1	<1	<0.01	0.1			Anhedral to acicular	Largely intersertal and skeletal. No maghemite exsolution.
Mesostasis	10	25					Intersertal pools	Patchy, partial replacement with dark green and brown clays; some areas are well-crystallized and remarkably unaltered.

SECONDARY MINERALOGY	**PERCENT**	**SIZE (mm) min.**	**max.**	**av.**	**REPLACING / FILLING**	**COMMENTS**
Clays	40				Groundmass feldspar, olivine and mesostasis	Predominantly green-brown; those replacing plagioclase phenocrysts are olive green.

VESICLES/ CAVITIES	**PERCENT**	**LOCATION**	**SIZE (mm) min.**	**max.**	**av.**	**FILLING / MORPHOLOGY**	**COMMENTS**
Vesicles	10		1	10		Clay margins, zeolite interiors	Irregular, coalesced, anastamosing trains.
Veins					1	Sinuous, filled with dark green and black clay	

COMMENTS : This compact, fine-grained, aphyric basalt from the chilled base of Unit 6 contains a few relict plagioclase phenocrysts that are fragmented and almost totally replaced by clay. Groundmass olivine replaced by green clay.
Trace of primary sulfide (< 0.01 mm) - pyrite? pentlandite?

THIN SECTION: 183-1138A-81R-3, 13-15 Piece 1 — **Unit 6** — **OBSERVER:** JB
ROCK NAME: Volcanic breccia (the Unit 6 clast is a plagioclase-phyric basalt).
WHERE SAMPLED: Contact between Unit 6 and Unit 7.
GRAIN SIZE: Glassy.
TEXTURE: Porphyritic.
NOTE: Texture, morphology and mineral abundances for Unit 7 are described separately in 81-3, 13-15B

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	APPROX. COMP.	MORPHOLOGY	COMMENTS
PHENOCRYSTS								
Plagioclase	0	15	0.03	1	0.2		High aspect ratio laths and equant	Low birefringence, simple zoning but mottled extinction, rare simple twins, parallel or near parallel extinction. Replaced by zeolites(?).
Olivine	0	2	0.05	0.3	0.15		Euhedral to subhedral, stubby laths, equant	Totally pseudomorphed by golden to dark brown pleochroic parallel extinguishing, high birefringence clay. Original olivine basal parting is marked by a colorless, low birefringence mineral. In classic euhedral diamond shaped olivine cross-sections the replacing clay is golden brown, only slightly pleochroic and partings are absent. Unevenly distributed in thin section.
Clinopyroxene	tr.	tr.	0.05	0.15	0.08		Subhedral to anhedral	
GROUNDMASS								
Glass	0	85						Completely replaced by golden brown, low birefringence clay which typically occurs in frond-like bundles.

SECONDARY MINERALOGY	PERCENT	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	REPLACING / FILLING	COMMENTS
Clay	85				Glass and olivine	Light brown.
Zeolite	15				Plagioclase	Colorless.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	FILLING / MORPHOLOGY	COMMENTS
Vesicles	25					Zeolite and clay	Vesicles have irregular morphology.
Breccia matrix						Zeolite and clay	

COMMENTS : The identical and distinctive phenocryst assemblage found in the clasts both above and below the proposed Unit 6/Unit 7 contact suggests that this thin section is of an internal chill within the Unit 7 flow top breccia.

THIN SECTION: 183-1138A-81R-3, 13-15, Piece 1 — **Unit 7** — **OBSERVER:** JB, CRN
ROCK NAME: Volcanic breccia (clast is plagioclase-phyric basalt)
WHERE SAMPLED: Contact between Unit 6 and Unit 7.
GRAIN SIZE: Fine grained.
TEXTURE: Porphyritic with an intersertal groundmass.
NOTE: The general features of this thin section and texture, morphology and mineral abundances for Unit 6 are desribed separately in 81-3, 13-15A.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	APPROX. COMP.	MORPHOLOGY	COMMENTS
PHENOCRYSTS								
Plagioclase	1	10	0.2	4	1		Bimodal. Large: stubby laths, equant often rounded. Small: high aspect ratio laths.	Low birefringence, simple zoning but mottled extinction, rare simple twins, parallel or near parallel extinction. Large grains: altered to green-brown clays along fractures, forms several large monomineralic glomerocrysts (2 - 5 mm) but also occurs as individual rounded grains. Small grains: occurs as loose glomerocrysts together with olivine as well as single grains.
Olivine	0	1	0.1	0.4	0.15		Subhedral, stubby laths, equant	Totally pseudomorphed by golden to dark brown pleochroic parallel extinguishing, high birefringence clay. Original olivine basal prting is marked by a colourless, low birefringence mineral. In classic euhedral diamond shaped olivine cross-sections the replacing clay is golden brown, only slightly pleochroic and partings are absent.
Clinopyroxene	tr.	tr.	0.05	0.1	0.07		Anhedral.	
GROUNDMASS								
Plagioclase	35	35	0.02	0.25	0.1		Laths.	Slightly flow aligned.
Clinopyroxene	5	30	0.01	0.05	0.02		Stubby laths, equant	Pseudomorphed by low relief, low birefringence clay.
Mesostasis	0	20					Intersertal	
Titanomagnetite	3	3					Equant	Single digit micron-size.

SECONDARY MINERALOGY	PERCENT	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	REPLACING / FILLING	COMMENTS
Clay	20				Mesostasis and olivine.	Brown clay. Also along fractures in plagioclase.
Clay	25				Clinopyroxene	Very pale brown.
Zeolite	10				Plagioclase	

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	FILLING / MORPHOLOGY	COMMENTS
Vesicles	15					Zeolite and clay.	

COMMENTS : The percentage of opaques is probably higher because many are below the surface and cannot be seen in reflected light.

THIN SECTION:	**183-1138A-81R-5, 2-5 Piece 1A**					**Unit: 7**	**OBSERVER:**	**MSP, CRN**
ROCK NAME:	**Moderately plagioclase-phyric basalt.**							
WHERE SAMPLED:	**Flow interior; Unit 7.**							
GRAIN SIZE:	**Medium-grained phenocrysts in a microcrystalline groundmass.**							
TEXTURE:	**Seriate, porphyritic with originally intergranular to subtrachytic groundmass.**							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**APPROX. COMP.**	**MORPHOLOGY**	**COMMENTS**
PHENOCRYSTS								
Plagioclase	2	5	0.4	2.5	0.8		Subhedral	Both isolated and in glomercrysts, moderately altered, patchy, un-mixing textures. Sieve textures are seen. 2V < 10-20 deg 20 (-), feldspar cleavage, relief lower than mounting medium, only simple twins observed; albitized (or replaced by zeolites) calcic plagioclase.
GROUNDMASS								
Clinopyroxene	30	40	0.02	0.1	0.05	0.03	subhedral equant	
Feldspar	25	30			0.1	~An55	suhedral laths to equant	Variable, wide range in size, difficult to distinguish plagioclase and alkali-feldspar (9 microlites measured for composition by Michel-Levy).
Titanomagnetite	5	5	<0.01	0.1	0.05		subhedral equant	Occasional maghmeite exsolution features.
Glass	0	20						

SECONDARY MINERALOGY	**PERCENT**	**SIZE (mm) min.**	**max.**	**av.**	**REPLACING / FILLING**	**COMMENTS**
Pale clay	40				Glass, clinopyroxene and feldspar	

VESICLES/ CAVITIES	**PERCENT**	**LOCATION**	**SIZE (mm) min.**	**max.**	**av.**	**FILLING / MORPHOLOGY**	**COMMENTS**
Vesicles	10	random			1	Ovoid to very irregular, lined with clay, filled with zeolite	Smaller vesicles filled mainly with clay.

COMMENTS : Possibly altered olivine microphenocrysts - alteration makes a positive identification difficult.
No sulfides observed.
Photomicrograph #:
1138A-2 = Altered plagioclase glomerocryst demonstrating zeolite replacement that preserves only the Carlsbad twinning (x2.5 objective, ppl);
1138A-3 = As above but xpl.

THIN SECTION: 183-1138A-82R-1, 126-128, Piece 12 — **Unit 8** — **OBSERVER:** RD, CRN
ROCK NAME: Aphyric basalt.
WHERE SAMPLED: Flow interior of Unit 8.
GRAIN SIZE: Fine-grained.
TEXTURE: Intergranular to intersertal.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	APPROX. COMP.	MORPHOLOGY	COMMENTS
PHENOCRYSTS								
Plagioclase	<1	<1	0.2	2			Laths	Only three phenocrysts present. The largest is more than 50% replaced by dark brown clay.
Clinopyroxene	0	1	0.1	0.5				Subhedral outlines only, replaced with dark and light brown-green clay.
GROUNDMASS								
Plagioclase	35	40	0.05	0.2	0.1		Laths	
Clinopyroxene	25	30	0.01	0.1	0.05		Anhedral equant	Groundmass crystals are unaltered.
Olivine	0	5	0.05	0.2	0.1		Euhedral to subhedral	Microphenocrysts with euhedral shapes, completely replaced by green-brown and black clay.
Titanomagnetite	3	3	<0.01	0.15	0.05		Anhedral to subhedral, equant grains	Largely intersertal. Predominantly tabular forms. Very few acicular (skeletal) crystals. No maghemtite exsolution.
Mesostasis	15	25					Intersertal pools	Cryptocrystalline, very little glassy matrix.

SECONDARY MINERALOGY	PERCENT	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	REPLACING / FILLING	COMMENTS
Clay	25				Mesostasis, clinopyroxene, olivine and plagioclase	Golden brown and dark brown.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	FILLING / MORPHOLOGY	COMMENTS
Vesicles	1		0.5	0.5		Clay and zeolite.	Rounded, similar filling as replaced mafic phenocrysts.
Veins	1		0.2	1		Zeolite and clay.	One vein (averaging 0.5 mm wide) runs sinuously through the section and is filled with clay margins and zeolite interior.

COMMENTS : This rock contains a significant fraction (~5%) of euhedral to subhedral olivine microphenocrysts that are now completely altered to dark green and brown clay, and some rare larger phenocrysts of plagioclase, also replaced.
Photomicrograph #:
1138A-6 = Altered olivines in the groundmass with oxide alteration around three crystals (x10 objective, ppl).

THIN SECTION:	**183-1138A-82R-3, 49-51**	**Unit 9**	**OBSERVER:** **LM**
ROCK NAME:	**Contact between moderately plagioclase-phyric basalt and altered vitric silty sand (now brown clay).**		
WHERE SAMPLED:	**Breccia at top of lava flow (Unit 9).**		
GRAIN SIZE:	**Fine grained basalt and sediment.**		
TEXTURE:	**Sparsely vesicular, intergranular to intersertal basalt and massive silty sand, now altered to brown clay.**		

PRIMARY CLASTS	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	APPROX. COMP.	MORPHOLOGY	COMMENTS
PHENOCRYSTS								
Clinopyroxene	0	5						Wholly altered.
Plagioclase	5	10	0.4	0.5	0.45		Subhedral laths	Partially altered.
Accessory Minerals	1	3						
GROUNDMASS								
Mesostasis	0	85						Altered to brown and red clay.

SECONDARY MINERALOGY	PERCENT	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	REPLACING / FILLING	COMMENTS
Clay minerals	85				Replacing mafic (clinopyroxene?) phenocrysts, glass, filling bottoms of voids.	Brown and brick red clay minerals stained with iron-oxides.
Quartz and zeolite	10				Void filling after clay minerals.	
Hematite/goethite					Staining clay minerals.	

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	FILLING / MORPHOLOGY	COMMENTS
Vesicles	20		2	4		Brown clay at bottom overlain by zeolite. In part geopetally infilled.	Round and isolated

COMMENTS : This is the contact between a moderately plagioclase-phyric basalt and a volcanic silty sand (now altered to brown clay). In hand specimen there is evidence of this basalt quenching against the sediment, and evidence of reworking of earlier formed clasts in the breccia. That is, not all clasts in the breccia are the product of in situ quenching of the basalt against the sediment. The thin section was taken to show the relationships between the clast margins and the sediment. Primary textures in the sediment are no longer preserved. Sharp margins (that cross-cut vesicles) on basaltic clasts and aphanitic groundmass within clasts, are consistent with quenching. In situ brecciation textures are not well preserved, and there is evidence of short-distance transport of brecciated material along the surface of clasts, indicating limited reworking.

THIN SECTION:	**183-1138A-82R-5, 69-71, Piece 6B**					**Unit 9**	**OBSERVER:**	**RD, CRN**
ROCK NAME:	**Aphyric basalt.**							
WHERE SAMPLED:	**Flow interior of Unit 9.**							
GRAIN SIZE:	**Fine-grained.**							
TEXTURE:	**Sparsely vesicular, intergranular to intersertal.**							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**APPROX. COMP.**	**MORPHOLOGY**	**COMMENTS**
GLOMEROCRYSTS								
Clinopyroxene	1	1	2	4	3		Subrounded masses	Subhedral crystals of clinopyroxene with occasional plagioclase crystals. Possibly altered olivine in one glomerocryst (see Photo 1138A-10).
PHENOCRYSTS								
Clinopyroxene	<1	<1	0.2	0.3	0.25		Subhedral prisms	Reasonably unaltered.
Plagioclase	<1	<1	0.4	0.5	0.45		Subhedral laths	Partially altered.
GROUNDMASS								
Plagioclase	35	40	0.1	0.3	0.2		Subhedral laths	Interlocking.
Clinopyroxene	30	35	0.05	0.1	0.08		Anhedral	Equant, granular.
Olivine	0	<1	0.05	0.1			Euhedral to subhedral	Identified by habit; totally replaced by golden brown clay.
Titanomagnetite	1	1	0.01	0.2	0.1		Anhedral to subhedral	Predominantly tabular forms with subordinate acicular (skeletal) crystals. No maghemite exsolution observed.
Mesostasis	15	25					Intersertal pools	Partially altered to brown and red clay.

SECONDARY MINERALOGY	**PERCENT**	**SIZE (mm) min.**	**max.**	**av.**	**REPLACING / FILLING**	**COMMENTS**
Clay	20				Poorly crystallized mesostasis, olivine; filling vesicles	Patchy replacement of mesostasis by brown and brick-red clay.

VESICLES/ CAVITIES	**PERCENT**	**LOCATION**	**SIZE (mm) min.**	**max.**	**av.**	**FILLING / MORPHOLOGY**	**COMMENTS**
Vesicles	2		2	3		Brown and green clay	Round and isolated

COMMENTS : This sparsely vesicular, fine-grained, aphyric basalt from the interior of Unit 9 contains few relict plagioclase phenocrysts. The groundmass is well-crystallized and partially altered.
No sulfides observed.
Photomicrograph #:
1138A-10 = Clinopyroxene glomerocryst with subordinate plagioclase and altered olivine (x5 objective, ppl).

THIN SECTION:	**183-1138A-83R-4, 34-37, Piece 2**					**Unit 10**	**OBSERVER:**	**RD, CRN**
ROCK NAME:	**Aphyric basalt.**							
WHERE SAMPLED:	**Flow interior of Unit 10.**							
GRAIN SIZE:	**Fine-grained.**							
TEXTURE:	**Intergranular to intersertal.**							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**APPROX. COMP.**	**MORPHOLOGY**	**COMMENTS**
PHENOCRYSTS								
Plagioclase	<1	1	0.5	1.5			Euhedral to subhedral	Partially replaced with dark brown to black clay, preserving euhedral shape.
Clinopyroxene	<<1	<<1	0.2	0.2			Anhedral	Single grain in clot with rare plagioclase.
GROUNDMASS								
Plagioclase	40	40	0.1	0.5	0.2		Subhedral laths	Interlocking
Clinopyroxene	30	35	0.1	0.5	0.2		Anhedral	Slightly altered.
Olivine	0	2	0.1	0.5			Euhedral to subhedral	Identified by habit; totally replaced by brown clay.
Titanomagnetite	1	1	0.1	0.2	0.1		Anhedral to subhedral	Largely intersertal. Predominantly tabular forms, occasionally acicular (skeletal). Extremely fine maghemite exsolution features seen in several grains.
Mesostasis	10	25					Intersertal pools	Aligned, 1 mm-wide, 1 cm-spaced, glassy pools, which exhibit alteration features. Otherwise, patchy, partial replacement with dark brown and black clay; some areas are well-crystallized and remarkably unaltered.

SECONDARY MINERALOGY	**PERCENT**	**SIZE (mm) min.**	**max.**	**av.**	**REPLACING / FILLING**	**COMMENTS**
Clay	**20**				Groundmass clinopyroxene, olivine and glassy mesostasis	Predominantly green-brown; those replacing plagioclase phenocrysts are olive green.

VESICLES/ CAVITIES	**PERCENT**	**LOCATION**	**SIZE (mm) min.**	**max.**	**av.**	**FILLING / MORPHOLOGY**	**COMMENTS**
Vesicles	<1		0.5	0.5		Clay margins and interiors	Single, rounded occurrence.
Veins			0.1	0.2	0.1	Sinuous, dark brown and black clay	

COMMENTS : This compact, fine-grained, aphyric basalt from the interior of Unit 10 contains a few relict plagioclase phenocrysts that are either partially replaced with black clay or in reaction with the groundmass.
Trace of chalcopyrite associated with alteration.
Photomicrograph #:
1138A-7 = Glassy mesostasis train (x5 objective, ppl).

THIN SECTION:	**183-1138A-83R-6, 22-23, Piece 2**				**Unit 11**	**OBSERVER:**	**RD, CRN**	
ROCK NAME:	**Aphyric basalt.**							
WHERE SAMPLED:	**Flow interior of Unit 11.**							
GRAIN SIZE:	**Fine-grained.**							
TEXTURE:	**Moderately vesicular, intergranular to intersertal, occasionally trachytic.**							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**APPROX. COMP.**	**MORPHOLOGY**	**COMMENTS**
PHENOCRYSTS								
Plagioclase	<1	<1	0.5	1.5	1		Euhedral laths	Corroded centers. Replaced by zeolite.
GROUNDMASS								
Plagioclase	35	35	0.05	0.2	0.1		Subhedral laths	Interlocking.
Clinopyroxene	35	40	0.05	0.2	0.1		Anhedral	Equant, granular.
Olivine	0	2	0.05	0.1			Anhedral to subhedral	Granular, replaced by light green, olive and black clay.
Titanomagnetite	1	1	0.01	0.05			Anhedral to subhedral	Intersertal, exsolution lamellae of maghemite observed.
Mesostasis	15	25					Intersertal pools	Partially altered to brown and red clay.

SECONDARY MINERALOGY	**PERCENT**	**SIZE (mm) min.**	**max.**	**av.**	**REPLACING / FILLING**	**COMMENTS**
Clay	15				Poorly crystallized mesostasis, groundmass mafic crystals and vesicle filling	Patchy replacement of mesostasis.

VESICLES/ CAVITIES	**PERCENT**	**LOCATION**	**SIZE (mm) min.**	**max.**	**av.**	**FILLING / MORPHOLOGY**	**COMMENTS**
Vesicles	10		1	5		Brown and green clay and white zeolite	Round, flattened and irregular isolated cavities.

COMMENTS : This is a moderately vesicular, fine-grained, aphyric basalt with occasional plagioclase phenocrysts from the interior of Unit 11. The groundmass appears to have contained granular olivine, now completely replaced by green clay.
No sulfides observed.

THIN SECTION:	**183-1138A-84R-1, 7-8 Piece 2**					**Unit 12**	**OBSERVER:**	**RD, CRN**
ROCK NAME:	**Aphyric basalt.**							
WHERE SAMPLED:	**Contact between two lobes in Unit 12.**							
GRAIN SIZE:	**Fine-grained.**							
TEXTURE:	**Highly vesicular, intergranular to intersertal, occasionally trachytic.**							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**APPROX. COMP.**	**MORPHOLOGY**	**COMMENTS**
PHENOCRYSTS								
Plagioclase	0	<1			1		Subhedral lath	One example seen, highly altered and replaced with dark (opaque) clay.
GROUNDMASS								
Plagioclase	30	30	<0.01	0.1	0.05		Subhedral to anhedral laths	Interlocking, partially altered.
Clinopyroxene	15	20	<0.01	0.05	0.04		Anhedral	Equant, granular.
Olivine								
Titanomagnetite	7	7	<0.01	0.02	0.02		Subhedral	Predominantly tabular forms. Very fine maghemite exsolution seen in the larger crystals. Some vesicles are rimmed with titanomagnetites,
Mesostasis	0	30					Intersertal pools	Altered to brown clay.

SECONDARY MINERALOGY	**PERCENT**	**SIZE (mm) min.**	**max.**	**av.**	**REPLACING / FILLING**	**COMMENTS**
Clay	30				Plagioclase, cpx, mesostasis, lining vesicles	
Zeolite	20					

VESICLES/ CAVITIES	**PERCENT**	**LOCATION**	**SIZE (mm) min.**	**max.**	**av.**	**FILLING / MORPHOLOGY**	**COMMENTS**
Vesicles	20	Random	0.5	10	5	Flattened, rounded, and ovoid; lined with clay, filled with zeolite	Isolated cavities, totally filled although thin section preparation appears to have plucked some material out of the vesicles.

COMMENTS : This is a moderately vesicular, fine-grained, aphyric basalt from the interior of Unit 12 with occasional corroded and rounded plagioclase phenocrysts. The groundmass is extremely fine grained with a high proportion of glassy mesostasis.
No sulfides observed.

THIN SECTION: 183-1138A-84R-5, 13-15, Piece 1B — **Unit 13** — **OBSERVER:** RD, CRN
ROCK NAME: Aphyric basalt.
WHERE SAMPLED: Flow interior of Unit 13; vesicular region.
GRAIN SIZE: Fine-grained.
TEXTURE: Vesicular, intergranular to intersertal.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	APPROX. COMP.	MORPHOLOGY	COMMENTS
PHENOCRYSTS								
Plagioclase	<1	<1	1	1.5			Euhedral to subhedral	Almost totally replaced with dark brown to black clay, preserving euhedral shape.
Clinopyroxene	<<1	<<1	0.2	0.2			Anhedral	Based on euhedral to subhedral shapes, now totally clay.
GROUNDMASS								
Plagioclase	25	25	0.1	0.6	0.3		Subhedral laths	Interlocking.
Clinopyroxene	25	25	0.1	0.5	0.2		Anhedral	Microphenocrystic (0.1-0.5 mm) and groundmass (<0.1 mm), unaltered.
Titanomagnetite	1	1	<0.1	0.2	0.1		Anhedral to subhedral	Largely intersertal. No maghemite exsolution.
Mesostasis	5	25					Intersertal pools	Largely altered to brown and black clay.

SECONDARY MINERALOGY	PERCENT	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	REPLACING / FILLING	COMMENTS
Clay	20				Groundmass clinopyroxene and glassy mesostasis	Predominantly green-brown; those replacing plagioclase phenocrysts are olive green.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	FILLING / MORPHOLOGY	COMMENTS
Vesicles	6	random	0.5	0.5		Brown, then black clay margins in botryoidal habit, succeded by bladed, fibrous zeolite interiors	Shapes vary from rounded to irregular, flattened, coalesced.

COMMENTS : This compact, fine-grained, aphyric basalt from the interior of Unit 13 contains a very few relict plagioclase phenocrysts that are almost totally replaced with black clay. The groundmass is, in places, well-crystallized and unaltered.
No sulfides observed.

THIN SECTION:	**183-1138A-84R-5, 100-101, Piece 6B**					**Unit 13**	**OBSERVER:**	**RD, CRN**
ROCK NAME:	**Aphyric basalt.**							
WHERE SAMPLED:	**Flow interior of Unit 13.**							
GRAIN SIZE:	**Fine-grained.**							
TEXTURE:	**Intergranular to intersertal.**							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**APPROX. COMP.**	**MORPHOLOGY**	**COMMENTS**
PHENOCRYSTS								
Plagioclase	<1	<1	1	1.5			Subhedral to anhedral	Corroded edges and cleavage planes; zoned.
GROUNDMASS								
Plagioclase	40	40	0.1	0.6	0.3		Subhedral laths	Interlocking.
Clinopyroxene	35	35	0.05	0.2	0.1		Anhedral	Unaltered.
Titanomagnetite	5	5	0.1	0.2	0.1		Anhedral to subhedral	Largely intersertal. Predominantly tabular forms. No maghemite exsolution.
Mesostasis	10	20					Intersertal pools	Partially altered to brown and black clay.

SECONDARY MINERALOGY	**PERCENT**	**SIZE (mm) min.**	**max.**	**av.**	**REPLACING / FILLING**	**COMMENTS**
Clay	15				Poorly crystallized mesostasis	Patchy replacement of mesostasis by light brown and dark brown-black clay.

VESICLES/ CAVITIES	**PERCENT**	**LOCATION**	**SIZE (mm) min.**	**max.**	**av.**	**FILLING / MORPHOLOGY**	**COMMENTS**
Vesicles	<1		0.5	0.5		Brown clay	Round.

COMMENTS : This compact, fine-grained, aphyric basalt from the interior of Unit 13 contains a very few relict plagioclase phenocrysts that are in reaction with the groundmass. The groundmass is, in places, well-crystallized and unaltered.

THIN SECTION:	**183-1138A-85R-1, 107-110, Piece 12**					**Unit 14**	**OBSERVER:**	**RD, CRN**
ROCK NAME:	**Aphyric basalt.**							
WHERE SAMPLED:	**Flow interior of Unit 14.**							
GRAIN SIZE:	**Fine-grained.**							
TEXTURE:	**Intergranular to intersertal, occasionally trachytic.**							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**APPROX. COMP.**	**MORPHOLOGY**	**COMMENTS**
GROUNDMASS								
Plagioclase	25	30	0.05	0.2	0.1		Laths	
Clinopyroxene	25	30	0.01	0.1			Anhedral equant	Granular, unaltered crystals.
Olivine	0	3	0.05	0.1	0.06		Subhedral	Identifed on habit and complete replacement by olive green clay.
Titanomagnetite	3	3	<0.01	0.15	0.05		Anhedral to subhedral, equant grains	Largely intersertal. Predominantly tabular forms with no maghemite exsolution.
Mesostasis	10	20					Intersertal pools	Cryptocrystalline, very little glassy matrix.

SECONDARY MINERALOGY	**PERCENT**	**SIZE (mm) min.**	**max.**	**av.**	**REPLACING / FILLING**	**COMMENTS**
Clay	20				Mesostasis, clinopyroxene and plagioclase	Golden brown and dark brown.

VESICLES/ CAVITIES	**PERCENT**	**LOCATION**	**SIZE (mm) min.**	**max.**	**av.**	**FILLING / MORPHOLOGY**	**COMMENTS**
Vesicles	15		0.5	20		Light brown clay margins and white bladed zeolite interiors	Flattened, aligned and coalesced into anastamosing trains.

COMMENTS : This rock contains a significant fraction (~3%) of subhedral groundmass olivine that is now completely altered to olive green clay. Otherwise, the groundmass is very fine grained and in remarkably unaltered condition, relative to other units. Many large irregular veins formed from coalesced vesicles, now filled with zeolite.

THIN SECTION:	**183-1138A-85R-2, 123-124, Piece 13**					**Unit 15**	**OBSERVER:**	**RD, CRN**
ROCK NAME:	**Aphyric basalt.**							
WHERE SAMPLED:	**Flow interior of Unit 15.**							
GRAIN SIZE:	**Fine-grained.**							
TEXTURE:	**Sparsely vesicular, intergranular to intersertal, occasionally trachytic.**							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**APPROX. COMP.**	**MORPHOLOGY**	**COMMENTS**
PHENOCRYSTS								
Plagioclase	<1	<1	0.5	1	0.6		Euhedral to subhedral laths, tabular	Generally highly altered (cores are corroded). Several with reaction rims. Alteration precludes determination of anorthite content.
GROUNDMASS								
Plagioclase	40	40	0.05	0.1			Subhedral to anhedral laths	Interlocking, reasonably unaltered.
Clinopyroxene	35	40	0.01	0.05			Anhedral	Equant, granular. Reasonably unaltered.
Olivine	0	1	0.05	0.1			Subhedral	Identification uncertain, based on granular shape and total replacement by light green and olive clay. Present in the groundmass but always away from the pools of glass.
Titanomagnetite	5	5	0.01	0.05			Anhedral to subhedral	Intersertal, dendritic. Predominantly tabular forms, subordinate acicular (skeletal) crystals. Occasionally maghemite exsolution is seen, but is not extensive.
Glass	0	15					Intersertal pools	Completely altered to brown and golden clay.

SECONDARY MINERALOGY	**PERCENT**	**SIZE (mm) min.**	**max.**	**av.**	**REPLACING / FILLING**	**COMMENTS**
Clay	20				Mesostasis, groundmass mafic crystals and vesicle filling	Patchy replacement of mesostasis with dark and golden brown clay.
Zeolite	1				Vesicles, plagioclase	Altered plagioclase phenocrysts have very low birefringence similar to some zeolite.

VESICLES/ CAVITIES	**PERCENT**	**LOCATION**	**SIZE (mm) min.**	**max.**	**av.**	**FILLING / MORPHOLOGY**	**COMMENTS**
Vesicles	2	Random	0.5	2	1	Round and rimmed with brown clay	Thin section preparation has removed much of the vesicle fill.

COMMENTS : Macroscopic observation: fine grained basalt with several vesicles (up to 4 mm). Section has a brown hue.
This is a sparsely vesicular, fine-grained, aphyric basalt from the interior of Unit 15 with rare corroded plagioclase phenocrysts. The groundmass is extremely fine grained but well-crystallized.
Olivine in the groundmass.
Trace sulfide (pyrite? pentlandite?) present - very small (<< 0.01 mm) associated with titanomagnetite and alteration.

THIN SECTION:	**183-1138A-86R-1, 44-46, Piece 2B**					**Unit: 16**	**OBSERVER:**	**JB, CRN**
ROCK NAME:	**Aphyric basalt.**							
WHERE SAMPLED:	**Flow interior of Unit 16.**							
GRAIN SIZE:	**Fine grained.**							
TEXTURE:	**Intergranular, intersertal, occasionally trachytic.**							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**APPROX. COMP.**	**MORPHOLOGY**	**COMMENTS**
PHENOCRYSTS								
Plagioclase	<1	<1	0.2	0.6	0.3		Laths	Rare microphenocrysts up to 0.3 mm.
Clinopyroxene	<1	<1	0.1	0.3	0.25		Subhedral, stubby laths	Rare microphenocrysts up to 0.3 mm. Typically in monomineralic glomerocrysts, occasionally including plagioclase.
GROUNDMASS								
Plagioclase	50	50	0.03	0.15	0.08		Laths	Slight flow alignment.
Clinopyroxene	35	35	0.02	0.1	0.05		Subhedral, stubby laths	
Olivine	0	<1	0.05	0.1	0.08		Subhedral	Very rare brown clay pseudomorphs after olivine.
Titanomagnetite	5	5	<0.01	0.05	0.02		Euhedral to subhedral, equant	No maghemite exsolution.
Glass/mesostasis	0	10						

SECONDARY MINERALOGY	**PERCENT**	**SIZE (mm) min.**	**max.**	**av.**	**REPLACING / FILLING**	**COMMENTS**
Brown clay	10				Glass, mesostasis, olivine	

VESICLES/ CAVITIES	**PERCENT**	**LOCATION**	**SIZE (mm) min.**	**max.**	**av.**	**FILLING / MORPHOLOGY**	**COMMENTS**
Vesicles	10					Elongate, irregular, filled with clay and zeolite	A few small vesicles (< 2 mm) and two large ones (10 and 15 mm). Lined with golden brown clay, filled with zeolite.
Vein						Clay, zeolite	1 mm wide, bifurcates. Cross-cuts largest vesicle and is lined and filled in continuity with vesicle lining and filling.

COMMENTS :

THIN SECTION:	**183-1138A-86R-2, 115-118, Piece 14**					**Unit 17**	**OBSERVER:**	**CRN**
ROCK NAME:	**Aphyric basalt.**							
WHERE SAMPLED:	**Interior of Unit 17.**							
GRAIN SIZE:	**Fine-grained.**							
TEXTURE:	**Hypocrystalline, intergranular to intersertal, occasionally trachytic.**							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**APPROX. COMP.**	**MORPHOLOGY**	**COMMENTS**
PHENOCRYSTS								
Plagioclase	<1	<1	0.2	0.5	0.3		Subhedral	Microphenocrysts. Larger ones are totally altered to zeolite(?).
Clinopyroxene	<1	<1	0.2	0.3	0.25		Subhedral	Microphenocrysts. Reasonably unaltered prisms.
GROUNDMASS								
Plagioclase	15	25						Moderately altered.
Clinopyroxene	35	40	<0.01	0.05	0.02		Anhedral	Reasonably unaltered.
Titanomagnetite	3	3					Subhedral	Tabular forms only (stubby octahedra). Maghemite exsolution is difficult to see with x50 objective. It is present, but is extremely fine (a few microns).
Glass	0	35						Even distributed through the section. Totally altered to brown clay.
Chalcopyrite	Trace	Trace			<0.01		Anhedral	As inclusions in primary phase and associated with the groundmass.

SECONDARY MINERALOGY	**PERCENT**	**SIZE (mm) min.**	**max.**	**av.**	**REPLACING / FILLING**	**COMMENTS**
Zeolite	2				Plagioclase(?), fills vesicles	
Brown clay	45				Glass, clinopyroxene.	

VESICLES/ CAVITIES	**PERCENT**	**LOCATION**	**SIZE (mm) min.**	**max.**	**av.**	**FILLING / MORPHOLOGY**	**COMMENTS**
Vesicles	1	Random	0.4	5	2	Round to flattened-ovoid; clay lined, zeolite or amorphous clay fill	Most of the fill appears to have been removed during thin section preparation.

COMMENTS : Macroscopic observation: fine grained basalt with a few flattened vesicles. Section has a greenish-brown hue
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THIN SECTION:	**183-1138A-86R-3, 32-34, Piece 5**					**Unit 17**	**OBSERVER:**	**RD, CRN**
ROCK NAME:	**Aphyric basalt.**							
WHERE SAMPLED:	**Interior of Unit 17.**							
GRAIN SIZE:	**Fine-grained.**							
TEXTURE:	**Sparsely vesicular, intergranular to intersertal, occasionally trachytic.**							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**APPROX. COMP.**	**MORPHOLOGY**	**COMMENTS**
PHENOCRYSTS								
Plagioclase	<1	<1	1	1.5	1.1		Subhedral to anhedral	Corroded edges and cleavage planes; zoned.
Clinopyroxene	<1	<1	0.2	0.4	0.25		Subhedral	Prisms and basal sections.
GROUNDMASS								
Plagioclase	35	35	0.1	0.5	0.3		Subhedral laths	Flow-aligned, parallel to vesicle trains.
Clinopyroxene	30	30	0.05	0.3	0.1		Anhedral	Unaltered.
Titanomagnetite	2	2	0.05	0.1	0.08		Anhedral to subhedral	Largely intersertal. Very fine maghemite exsolution seen in several grains, but not extensive.
Mesostasis	10	25					Intersertal pools	Partially altered to brown and black clay.

SECONDARY MINERALOGY	**PERCENT**	**SIZE (mm) min.**	**max.**	**av.**	**REPLACING / FILLING**	**COMMENTS**
Clay	15				Poorly crystallized mesostasis	Patchy replacement of mesostasis by light brown and dark brown-black clay.

VESICLES/ CAVITIES	**PERCENT**	**LOCATION**	**SIZE (mm) min.**	**max.**	**av.**	**FILLING / MORPHOLOGY**	**COMMENTS**
Vesicles	2		0.5	0.5		Brown clay	Flattened and aligned.
Veins	5		1	5		Light green and brown clay	Coalesced vesicles?

COMMENTS : This sparsely vesicular, fine-grained, aphyric basalt from the interior of Unit 17 contains very few relict plagioclase phenocrysts. The groundmass is flow-aligned and, in places, well-crystallized and unaltered. Trace of chalcopyrite in altered mesostasis and between primary grains; very small (<< 0.01 mm).

THIN SECTION:	**183-1138A-86R-3, 148-149 Piece 15**					**Unit 18**	**OBSERVER:**	**RD, CRN**
ROCK NAME:	**Vesicular aphyric basalt.**							
WHERE SAMPLED:	**Flow interior of Unit 18.**							
GRAIN SIZE:	**Fine-grained to aphanitic.**							
TEXTURE:	**Hypocrystalline, intergranular to intersertal, occasionally trachytic.**							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**APPROX. COMP.**	**MORPHOLOGY**	**COMMENTS**
GROUNDMASS								
Plagioclase	25	25	0.01	0.05			Euhedral to subhedral	Interlocking.
Clinopyroxene	15	20	0.01	0.03			Anhedral	Granular.
Titanomagnetite	10	10	0.01	0.02			Subhedral	Equant, stubby blocks. Maghemite exsolution features may be present - difficult to positively identify.
Glass	15	25					Intersertal pools	Partially replaced by light brown clay.

SECONDARY MINERALOGY	**PERCENT**	**SIZE (mm) min.**	**max.**	**av.**	**REPLACING / FILLING**	**COMMENTS**
Clay	30				Groundmass clinopyroxene and glass, and vesicle margins	
Zeolite	15				Vesicle centers	Several large (3 mm), low relief, low birefringent laths with parallel cleavage in large vesicle.

VESICLES/ CAVITIES	**PERCENT**	**LOCATION**	**SIZE (mm) min.**	**max.**	**av.**	**FILLING / MORPHOLOGY**	**COMMENTS**
Vesicles	25		0.1	5	1	Clay, zeolite	Irregular, coalesced, filled with light and dark brown clay, then white zeolite.

COMMENTS : Rich in titanomagnetite. No sulfides observed.
Grain size differences seen in the section - see photomicrograph
Photomicrograph #:
1138A-9 = Euhedral zeolites in a vesicle (x5 objective, xpl);
1138A-11 = Grain size differences within the aphyric basalt (x5 objective, ppl).

THIN SECTION:	**183-1138A-87R-2, 110-113, Piece 15**					**Unit 19**	**OBSERVER:**	**NTA, CRN**
ROCK NAME:	**Sparsely to moderately plagioclase-clinopyroxene-olivine-phyric basalt.**							
WHERE SAMPLED:	**Flow interior of Unit 19.**							
GRAIN SIZE:	**Medium-grained phenocrysts in a fine-grained groundmass.**							
TEXTURE:	**Porphyritic with an intergranular to intersertal, occasionally trachytic groundmass.**							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**APPROX. COMP.**	**MORPHOLOGY**	**COMMENTS**
PHENOCRYSTS								
Plagioclase	1	2	1	1.5	1.2		Subhedral to anhedral	Corroded edges and cleavage planes; zoned.
Clinopyroxene	1	1	0.1	0.2	0.15			Occurs as glomerocrystic clots, occasionally with plagioclase.
Olivine	0	1	0.08	0.2	0.1			Completely altered and replaced by brown clay.
GROUNDMASS								
Plagioclase	35	35	0.1	0.5	0.3		Subhedral laths	Flow-aligned, parallel to vesicle trains.
Clinopyroxene	30	30	0.05	0.3	0.1		Anhedral	Unaltered.
Titanomagnetite	6	6	<0.01	0.1	0.03		Anhedral to subhedral	Extremely fine-grained. Skeletal grains predominate. No maghemite exsolution. Much of this is below the surface of the section, so a low modal abundance is estimated in reflected light. Mode estimated in transmitted ppl.
Glass	0	25					Intersertal pools	Partially altered to brown and black clay.

SECONDARY MINERALOGY	**PERCENT**	**SIZE (mm) min.**	**max.**	**av.**	**REPLACING / FILLING**	**COMMENTS**
Clay	27				Poorly crystallized mesostasis	Patchy replacement of mesostasis by light brown and dark brown-black clay.

VESICLES/ CAVITIES	**PERCENT**	**LOCATION**	**SIZE (mm) min.**	**max.**	**av.**	**FILLING / MORPHOLOGY**	**COMMENTS**
Vesicles	2		0.5	0.5		Brown clay	Flattened and aligned.
Veins	5		1	5		Light green and brown clay	Coalesced vesicles?

COMMENTS : No sulfide observed.

THIN SECTION:	**183-1138A-87R-3, 10-13 Piece 1**					**Unit 19**	**OBSERVER:**	**CRN**
ROCK NAME:	**Moderately plagioclase-clinopyroxene-olivine-(micro)phyric, moderately vesicular basalt.**							
WHERE SAMPLED:	**Taken to assess lithology change between 87R2 and 87R3.**							
GRAIN SIZE:	**Fine-grained.**							
TEXTURE:	**Microporphyritic with an intersertal, occasionally trachytic groundmass.**							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**APPROX. COMP.**	**MORPHOLOGY**	**COMMENTS**
PHENOCRYSTS								
Plagioclase	0	4	0.3	0.5	0.4		Subhedral laths	Microphenocrysts, highly altered.
Clinopyroxene	2	2	0.1	0.3	0.25		Subhedral to euhedral	Microphenocrysts, reasonably unaltered.
GROUNDMASS								
Plagioclase	10	20	<0.01	0.1	0.08		Subhedral to anhedral laths	Moderately altered.
Clinopyroxene	10	20	<0.01	0.05	0.02		Anhedral	Moderately altered.
Olivine	0	3	0.1	0.2	0.15		Subhedral to euhedral	Microphenocrysts. Completely altered and replaced by green-brown clay.
Titanomagnetite	3	3			<0.01		Anhedral	Groundmass contains a myriad of tiny titanomagnetite grains just starting to form. They exhibit a hint of an acicular (skeletal) habit. Grains are less than 10 microns.
Glass	0	49						Completely altered to brown (opaque) clay.

SECONDARY MINERALOGY	**PERCENT**	**SIZE (mm) min.**	**max.**	**av.**	**REPLACING / FILLING**	**COMMENTS**
Zeolite	20				Plagioclase(?), fills vesicles	
Green clay	5				Groundmass, fills vesicles	
Brown clay	50				Glass, clinopyroxene, fills vesicles	

VESICLES/ CAVITIES	**PERCENT**	**LOCATION**	**SIZE (mm) min.**	**max.**	**av.**	**FILLING / MORPHOLOGY**	**COMMENTS**
Vesicles	10	Oriented in trails through-out	0.6	8	3	Round to ovoid and flattened, clay lined, zeolite fill	Totally filled.

COMMENTS : Macroscopic observation: vesicular basalt with oriented, flattened vesicles. Section appears opaque.
Clots of clinopyroxene and plagioclase phenocrysts are present.
It is assumend that the altered “olivines” are in fact olivines rather than clinopyroxene based on the fact that fresh clinopyroxene is present.
No sulfide observed.

THIN SECTION:	**183-1138A-88R-1, 87-89, Piece 6B**					**Unit: 20**	**OBSERVER:**	**NTA, CRN**
ROCK NAME:	**Aphyric basalt.**							
WHERE SAMPLED:	**Flow interior, Unit 20.**							
GRAIN SIZE:	**Fine-grained.**							
TEXTURE:	**Intergranular to intersertal, subtrachytic in patches.**							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**APPROX. COMP.**	**MORPHOLOGY**	**COMMENTS**
GROUNDMASS								
Plagioclase	35	35	0.05	0.15	0.1		Subhedral laths	Appears relatively unaltered. Weak preferred orientation in places.
Clinopyroxene	42	45	0.01	0.1	0.05		Anhedral to subhedral.	Appears relatively unaltered.
Titanomagnetite	5	5	<0.01	0.1	0.8		Subhedral	Mostly tabular forms (stubby octahedra). Extensive exsolution of maghemite such that the original titanomagnetite crystals have a bluish hue to them under reflected light. Occasional grains are present without any maghemite exsolution.
Glass	0	15					Intersertal pools	Replaced by pale brown clay.

SECONDARY MINERALOGY	**PERCENT**	**SIZE (mm) min.**	**max.**	**av.**	**REPLACING / FILLING**	**COMMENTS**
Clay	18				Glass, clinopyroxene, plagioclase, fills vesicles	

VESICLES/ CAVITIES	**PERCENT**	**LOCATION**	**SIZE (mm) min.**	**max.**	**av.**	**FILLING / MORPHOLOGY**	**COMMENTS**
Vesicles	3	Random	0.1	6	0.25	Round to flattened-ovoid, clay filled	Vesicle fill has been removed during thin section preparation.

COMMENTS : Macroscopic observation: one large circular 5 mm vesicle present. Smaller vesicle trails present. Aphyric basalt with brown hue. No sulfides observed.

THIN SECTION:	**183-1138A-88R-2, 126-129 Piece 9**					**Unit: 21**	**OBSERVER:**	**JB, CRN**
ROCK NAME:	**Aphyric basalt.**							
WHERE SAMPLED:	**Interior of flow, Unit 21.**							
GRAIN SIZE:	**Fine grained**							
TEXTURE:	**Intergranular to intersertal, occasionally trachytic.**							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**APPROX. COMP.**	**MORPHOLOGY**	**COMMENTS**
PHENOCRYSTS								
Plagioclase	<1	<1	0.25	1.3	0.5		Laths	All but the largest grains are microphenocrysts similar in morphology to groundmass plagioclase but often occurring together with clinopyroxene in loose glomerocrysts. The large grains have a more tabular morphology and are almost totally altered to dark brown clays; they occur together in a single glomerocryst.
Clinopyroxene	<1	<1	0.08	0.55	0.25		Subhedral	All but the largest grain are microphenocrysts with a more elongate morphology than is typical of the groundmass. Typically occur in loose glomerocrysts, often together with plagioclase. The large grain is a fragment with more equant morphology. It has anomalous extinction, irregular zoning (possibly poorly developed sector zoning) and a narrow (20 micron) rim.
GROUNDMASS								
Plagioclase	45	45	0.04	0.5	0.15		Laths	
Clinopyroxene	35	40	<0.01	0.1	0.03		Subhedral to anhedral, equant	
Titanomagnetite	7	7	<0.01	0.06	0.03		Euhedral to subhedral, equant	Predominantly tabular forms. Maghemite exsolution evident in some crystals.
Glass	0	7						

SECONDARY MINERALOGY	**PERCENT**	**SIZE (mm) min.**	**max.**	**av.**	**REPLACING / FILLING**	**COMMENTS**
Clay	12				Mesostasis, clinopyroxene and plagioclase	

VESICLES/ CAVITIES	**PERCENT**	**LOCATION**	**SIZE (mm) min.**	**max.**	**av.**	**FILLING / MORPHOLOGY**	**COMMENTS**
Vesicles	<1					Round, clay fill	

COMMENTS : Trace of chalcopyrite associated with primary phases.

THIN SECTION:	**183-1138A-89R-2, 119-122, Piece 9**					**Unit 22**	**OBSERVER:**	**JB, CRN**
ROCK NAME:	**Aphyric basalt.**							
WHERE SAMPLED:	**Flow interior, Unit 22.**							
GRAIN SIZE:	**Fine-grained.**							
TEXTURE:	**Sparsely vesicular, intergranular to intersertal, occasionally trachytic.**							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**APPROX. COMP.**	**MORPHOLOGY**	**COMMENTS**
PHENOCRYSTS								
Plagioclase	<1	<1	0.2	2			Laths	Only three phenocrysts present. The largest is more than 50% replaced by dark brown clay.
GROUNDMASS								
Plagioclase	20-40	40	0.05	0.2	0.1		Laths	
Clinopyroxene	25-50	50	0.01	0.05	0.03		Anhedral equant	
Titanomagnetite	5	5	<0.01	0.15	0.05		Anhedral to subhedral, laths and equant	Predominantly tabular forms. No maghemite exsolution features.
Mesostasis	0	5						

SECONDARY MINERALOGY	**PERCENT**	**SIZE (mm) min.**	**max.**	**av.**	**REPLACING / FILLING**	**COMMENTS**
Clay	5 to 45				Mesostasis, clinopyroxene and plagioclase.	Golden brown and dark brown.

VESICLES/ CAVITIES	**PERCENT**	**LOCATION**	**SIZE (mm) min.**	**max.**	**av.**	**FILLING / MORPHOLOGY**	**COMMENTS**
Vesicles						Round, clay(?) filled	Only two vesicles present. One is empty, the other may have contained clays removed during polishing.
Veins						Zeolite and clay(?).	One vein (0.8 mm wide) is present within the thin section, this may have contained clays removed during polishing. One zeolite lined vein wall (0.3 mm wide) is present along one edge of the thin section.

COMMENTS : Alteration haloes are present around the veins and vesicles. Elsewhere the degree of alteration varies with no apparent relationship to features present in the thin section.
Trace of very small (<< 0.01 mm) sulfide (chalcopyrite?) associated with the alteration.