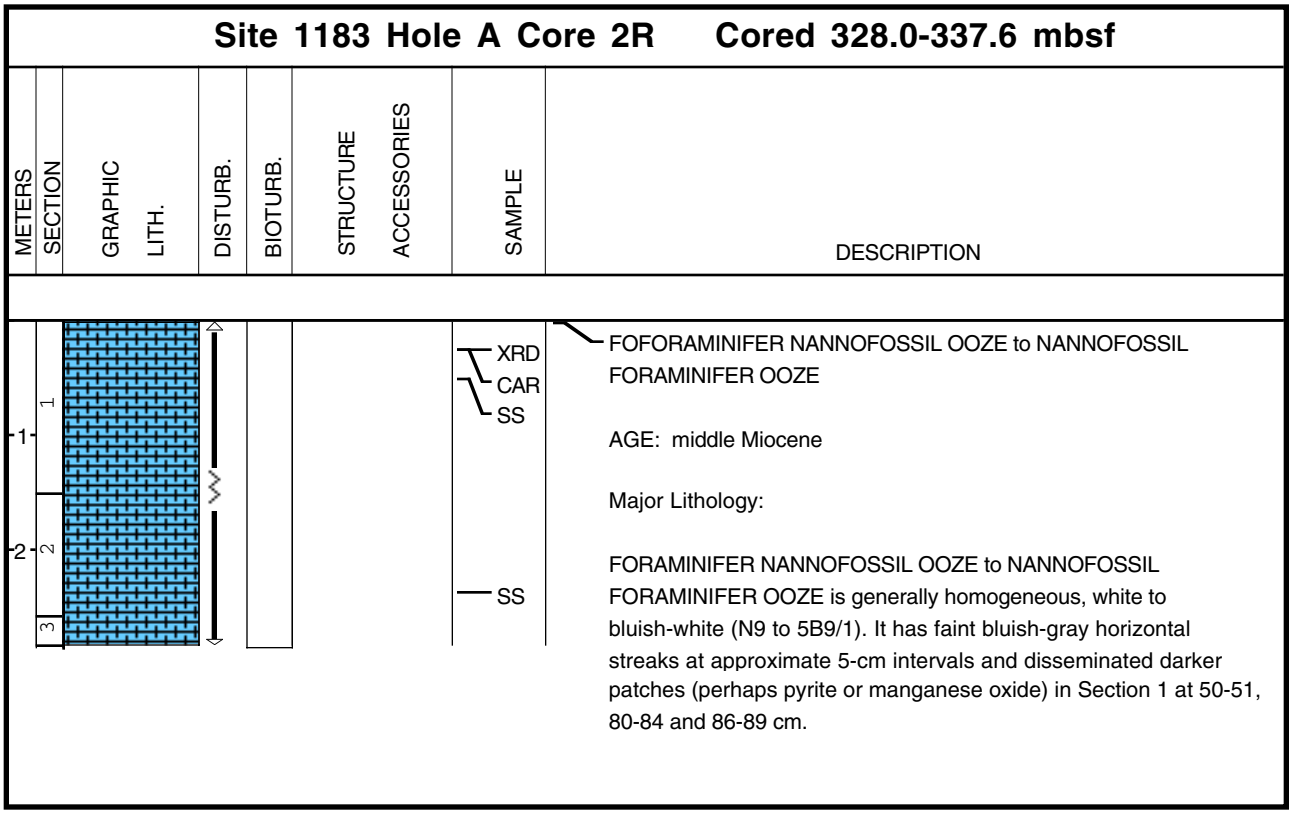
Core Photo

1183A-1W WASH CORE



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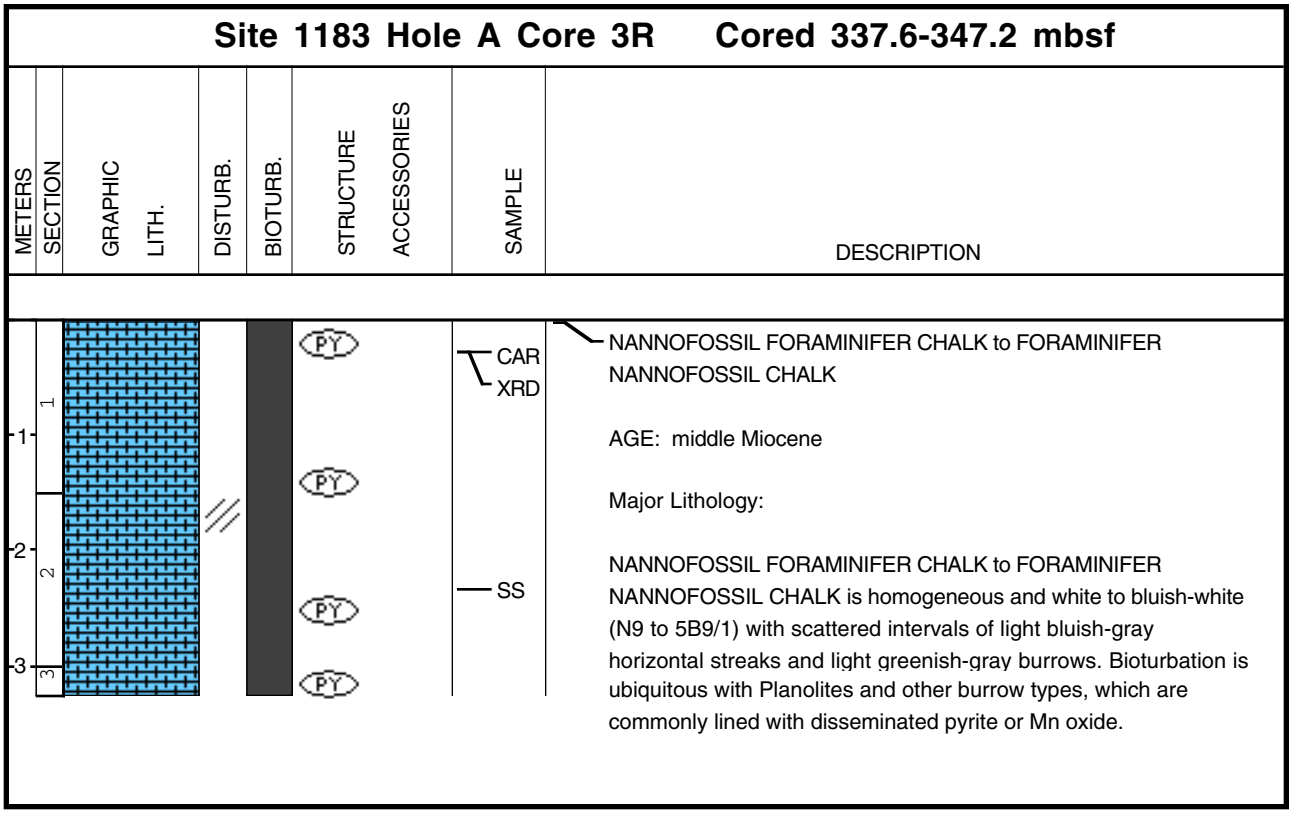
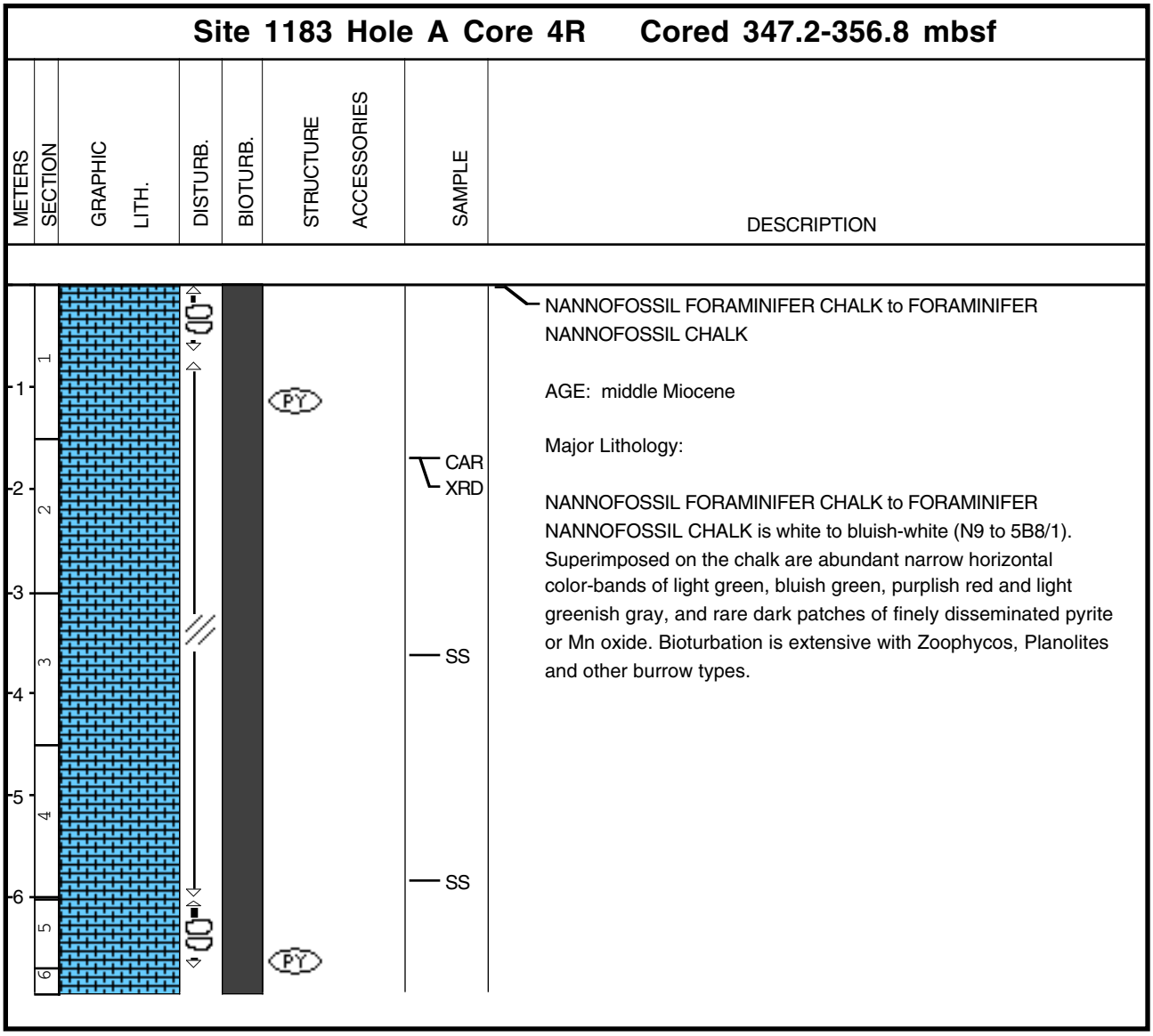

Site 1183 Hole A Core 3R Cored 337.6-347.2 mbsf
METERS
SECTION
GRAPHIC LITH.
DISTURB.
BIOTURB.
STRUCTURE
ACCESSORIES
SAMPLE
DESCRIPTION
1
2
3
PY
PY
PY
PY
CAR
XRD
SS
NANNOFOSSIL FORAMINIFER CHALK to FORAMINIFER NANNOFOSSIL CHALK
AGE: middle Miocene
Major Lithology:
NANNOFOSSIL FORAMINIFER CHALK to FORAMINIFER NANNOFOSSIL CHALK is homogeneous and white to bluish-white (N9 to 5B9/1) with scattered intervals of light bluish-gray horizontal streaks and light greenish-gray burrows. Bioturbation is ubiquitous with Planolites and other burrow types, which are commonly lined with disseminated pyrite or Mn oxide.

Core Photo


Site 1183 Hole A Core 4R Cored 347.2-356.8 mbsf
METERS
SECTION
GRAPHIC LITH.
DISTURB.
BIOTURB.
STRUCTURE
ACCESSORIES
SAMPLE
DESCRIPTION
1
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PY
PY
CAR
XRD
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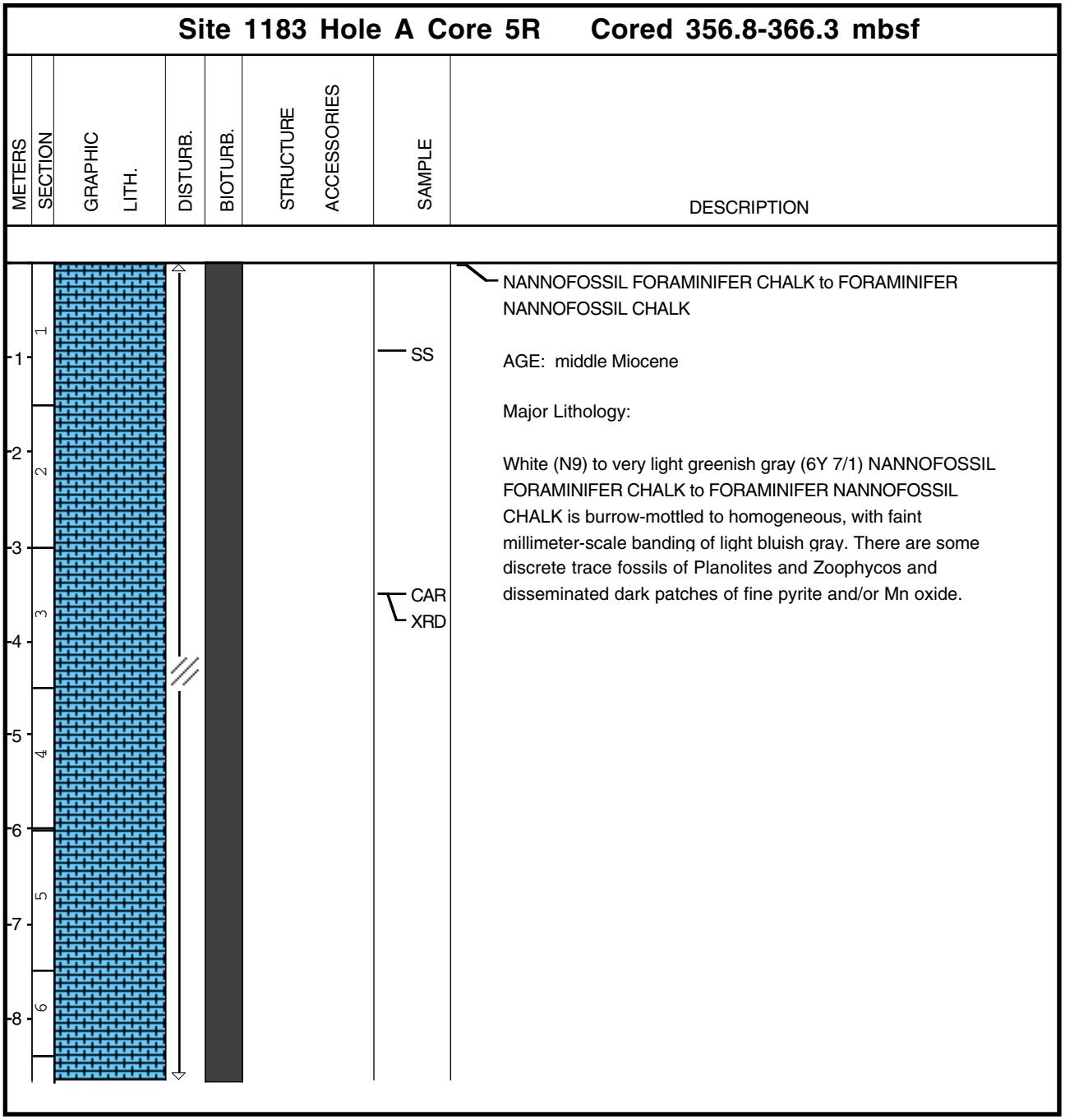
SS
NANNOFOSSIL FORAMINIFER CHALK to FORAMINIFER NANNOFOSSIL CHALK
AGE: middle Miocene
Major Lithology:
NANNOFOSSIL FORAMINIFER CHALK to FORAMINIFER NANNOFOSSIL CHALK is white to bluish-white (N9 to 5B8/1). Superimposed on the chalk are abundant narrow horizontal color-bands of light green, bluish green, purplish red and light greenish gray, and rare dark patches of finely disseminated pyrite or Mn oxide. Bioturbation is extensive with Zoophycos, Planolites and other burrow types.

Core Photo


Site 1183 Hole A Core 5R Cored 356.8-366.3 mbsf
METERS
SECTION
GRAPHIC LITH.
DISTURB.
BIOTURB.
STRUCTURE
ACCESSORIES
SAMPLE
DESCRIPTION
1
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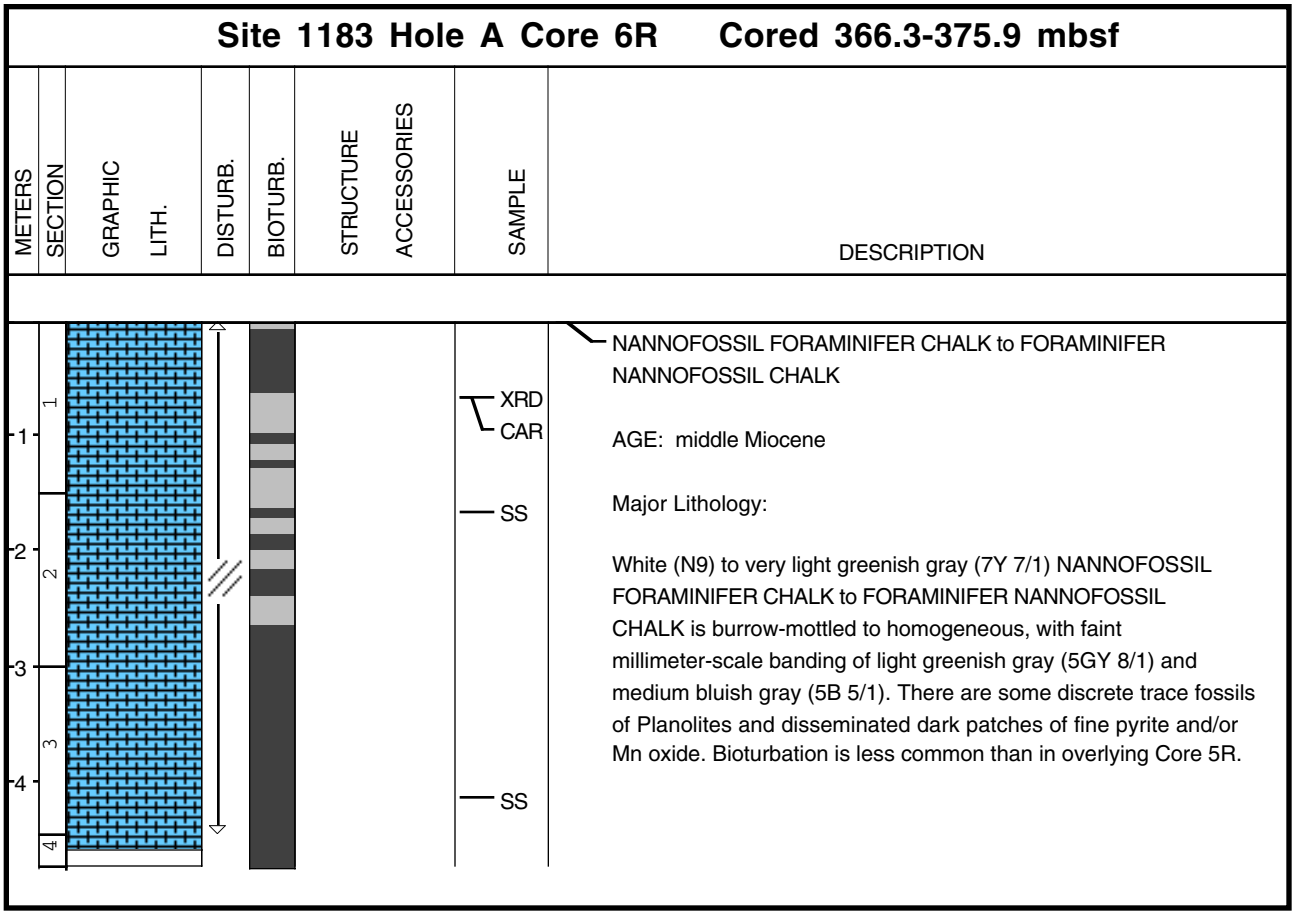
4
5
6
-1
-2
-3
-4
-5
-6
-7
-8
SS
CAR
XRD
NANNOFOSSIL FORAMINIFER CHALK to FORAMINIFER NANNOFOSSIL CHALK
AGE: middle Miocene
Major Lithology:
White (N9) to very light greenish gray (6Y 7/1) NANNOFOSSIL FORAMINIFER CHALK to FORAMINIFER NANNOFOSSIL CHALK is burrow-mottled to homogeneous, with faint millimeter-scale banding of light bluish gray. There are some discrete trace fossils of Planolites and Zoophycos and disseminated dark patches of fine pyrite and/or Mn oxide.

Core Photo


Site 1183 Hole A Core 6R Cored 366.3-375.9 mbsf
METERS
SECTION
GRAPHIC LITH.
DISTURB.
BIOTURB.
STRUCTURE
ACCESSORIES
SAMPLE
DESCRIPTION
1
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XRD
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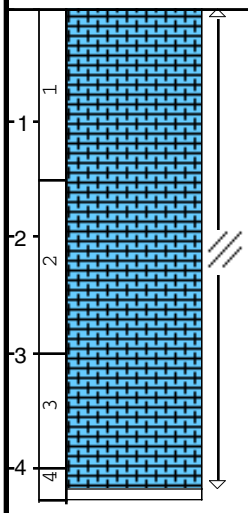
SS
SS
NANNOFOSSIL FORAMINIFER CHALK to FORAMINIFER NANNOFOSSIL CHALK
AGE: middle Miocene
Major Lithology:
White (N9) to very light greenish gray (7Y 7/1) NANNOFOSSIL FORAMINIFER CHALK to FORAMINIFER NANNOFOSSIL CHALK is burrow-mottled to homogeneous, with faint millimeter-scale banding of light greenish gray (5GY 8/1) and medium bluish gray (5B 5/1). There are some discrete trace fossils of Planolites and disseminated dark patches of fine pyrite and/or Mn oxide. Bioturbation is less common than in overlying Core 5R.

Core Photo

Site 1183 Hole A Core 7R Cored 375.9-385.5 mbsf



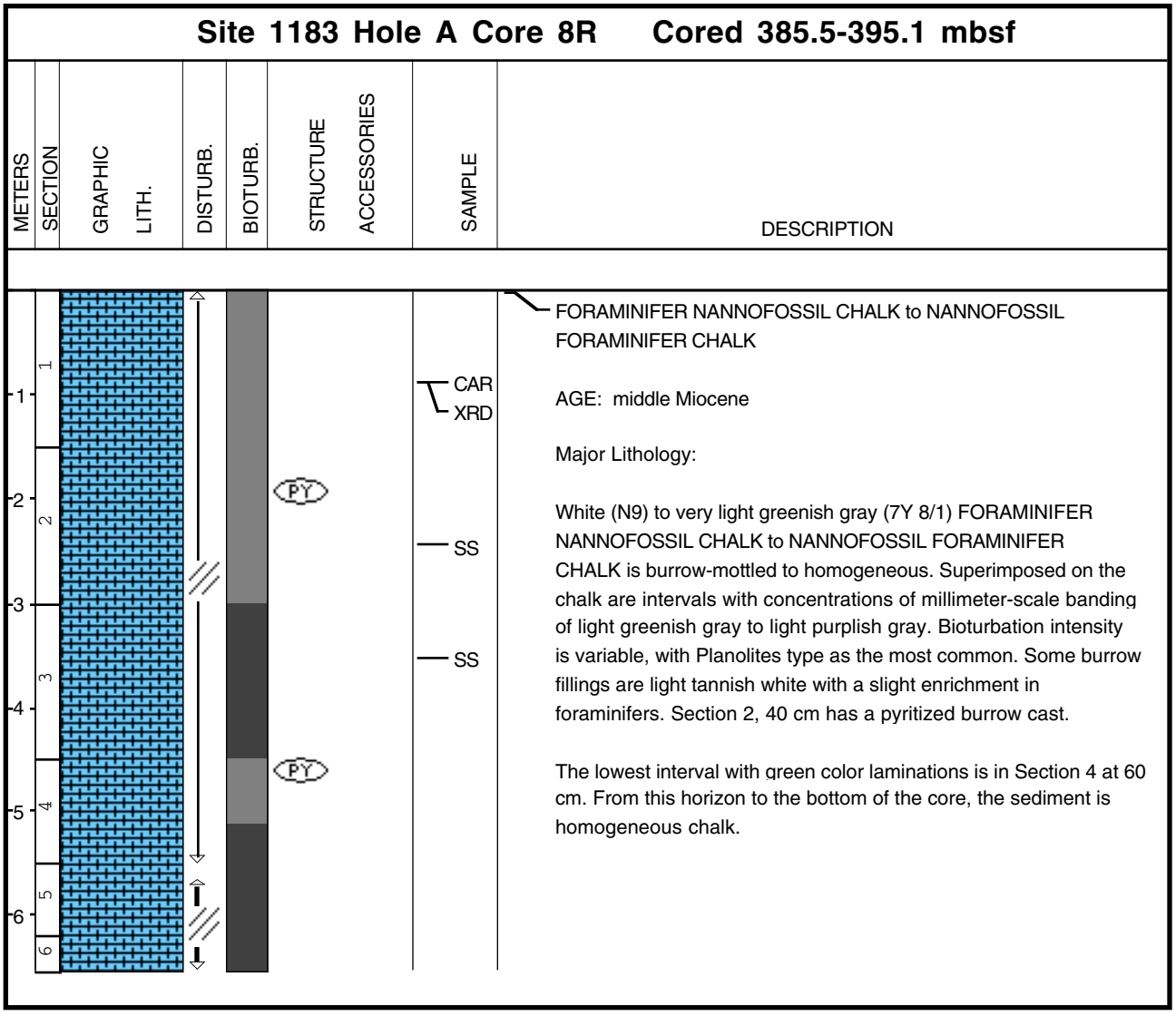
FORAMINIFER NANNOFOSSIL CHALK to NANNOFOSSIL FORAMINIFER CHALK

AGE: middle Miocene

Major Lithology:

White (N9) to very light greenish gray (7Y 8/1) FORAMINIFER NANNOFOSSIL CHALK to NANNOFOSSIL FORAMINIFER CHALK is burrow-mottled to homogeneous. Superimposed on the chalk are intervals with millimeter-scale banding of light greenish gray to greenish gray. Section 1, 100-120 cm displays an upward color change from darker to lighter. Bioturbation intensity is variable, with Planolites type as the most common. Some burrow fillings are light tannish white with apparent enrichment in foraminifers and surrounded by redox halos.

Core Photo


Site 1183 Hole A Core 8R Cored 385.5-395.1 mbsf
METERS
SECTION
GRAPHIC LITH.
DISTURB.
BIOTURB.
STRUCTURE
ACCESSORIES
SAMPLE
DESCRIPTION
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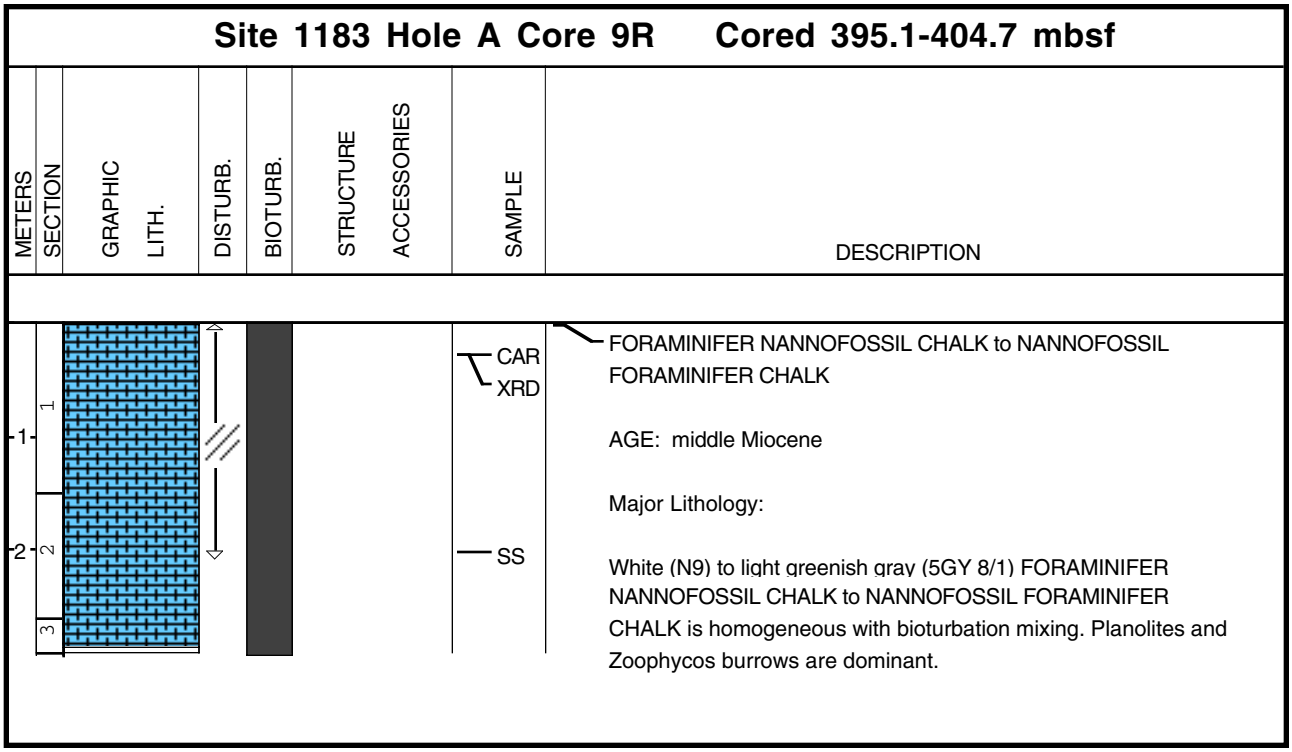
FORAMINIFER NANNOFOSSIL CHALK to NANNOFOSSIL FORAMINIFER CHALK
AGE: middle Miocene
Major Lithology:
White (N9) to very light greenish gray (7Y 8/1) FORAMINIFER NANNOFOSSIL CHALK to NANNOFOSSIL FORAMINIFER CHALK is burrow-mottled to homogeneous. Superimposed on the chalk are intervals with concentrations of millimeter-scale banding of light greenish gray to light purplish gray. Bioturbation intensity is variable, with Planolites type as the most common. Some burrow fillings are light tannish white with a slight enrichment in foraminifers. Section 2, 40 cm has a pyritized burrow cast.
The lowest interval with green color laminations is in Section 4 at 60 cm. From this horizon to the bottom of the core, the sediment is homogeneous chalk.

Core Photo


Site 1183 Hole A Core 9R Cored 395.1-404.7 mbsf
METERS
SECTION
GRAPHIC LITH.
DISTURB.
BIOTURB.
STRUCTURE
ACCESSORIES
SAMPLE
DESCRIPTION
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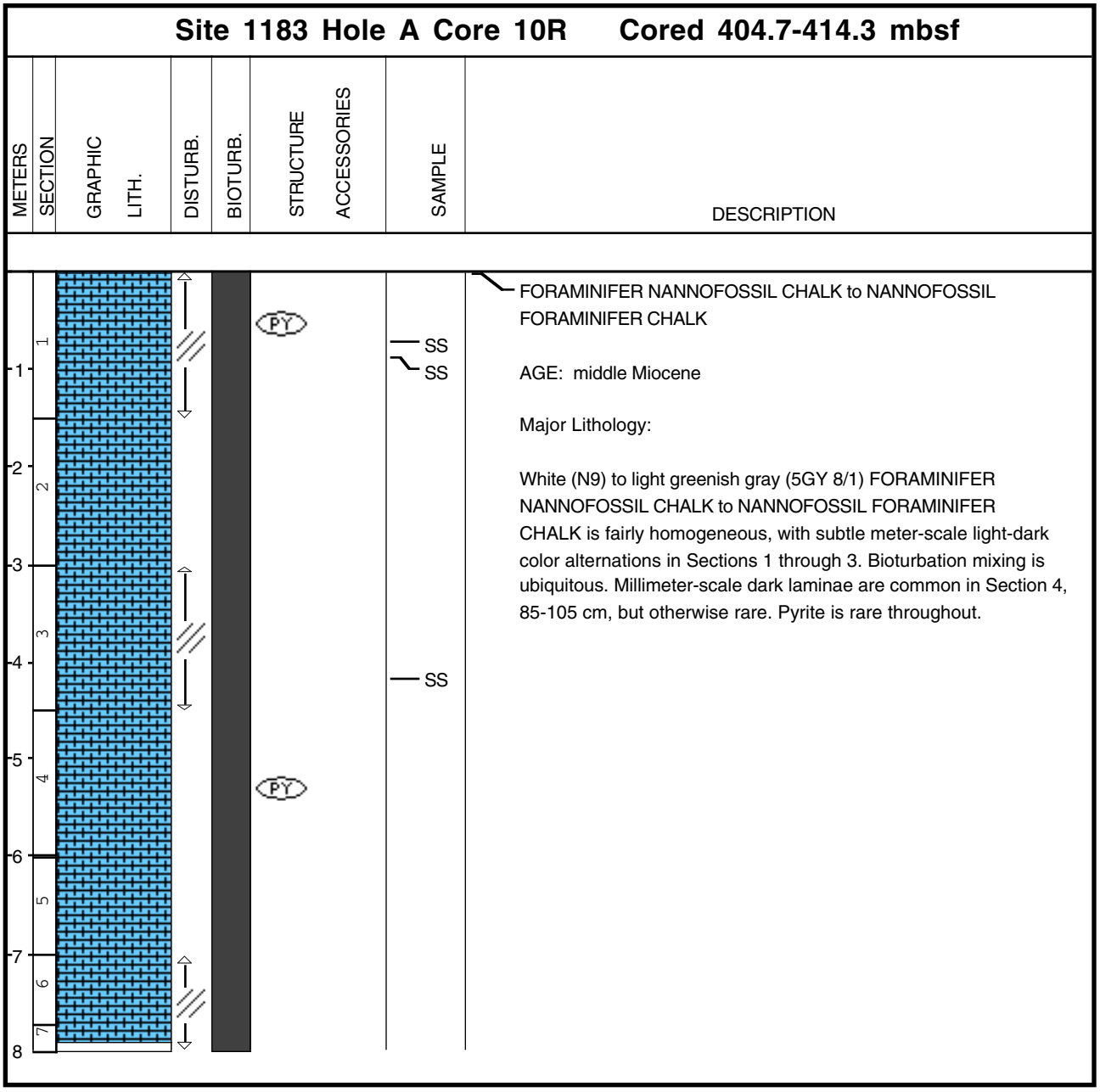
FORAMINIFER NANNOFOSSIL CHALK to NANNOFOSSIL FORAMINIFER CHALK
AGE: middle Miocene
Major Lithology:
White (N9) to light greenish gray (5GY 8/1) FORAMINIFER NANNOFOSSIL CHALK to NANNOFOSSIL FORAMINIFER CHALK is homogeneous with bioturbation mixing. Planolites and Zoophycos burrows are dominant.

Core Photo


Site 1183 Hole A Core 10R Cored 404.7-414.3 mbsf
METERS
SECTION
GRAPHIC LITH.
DISTURB.
BIOTURB.
STRUCTURE
ACCESSORIES
SAMPLE
DESCRIPTION
PY
PY
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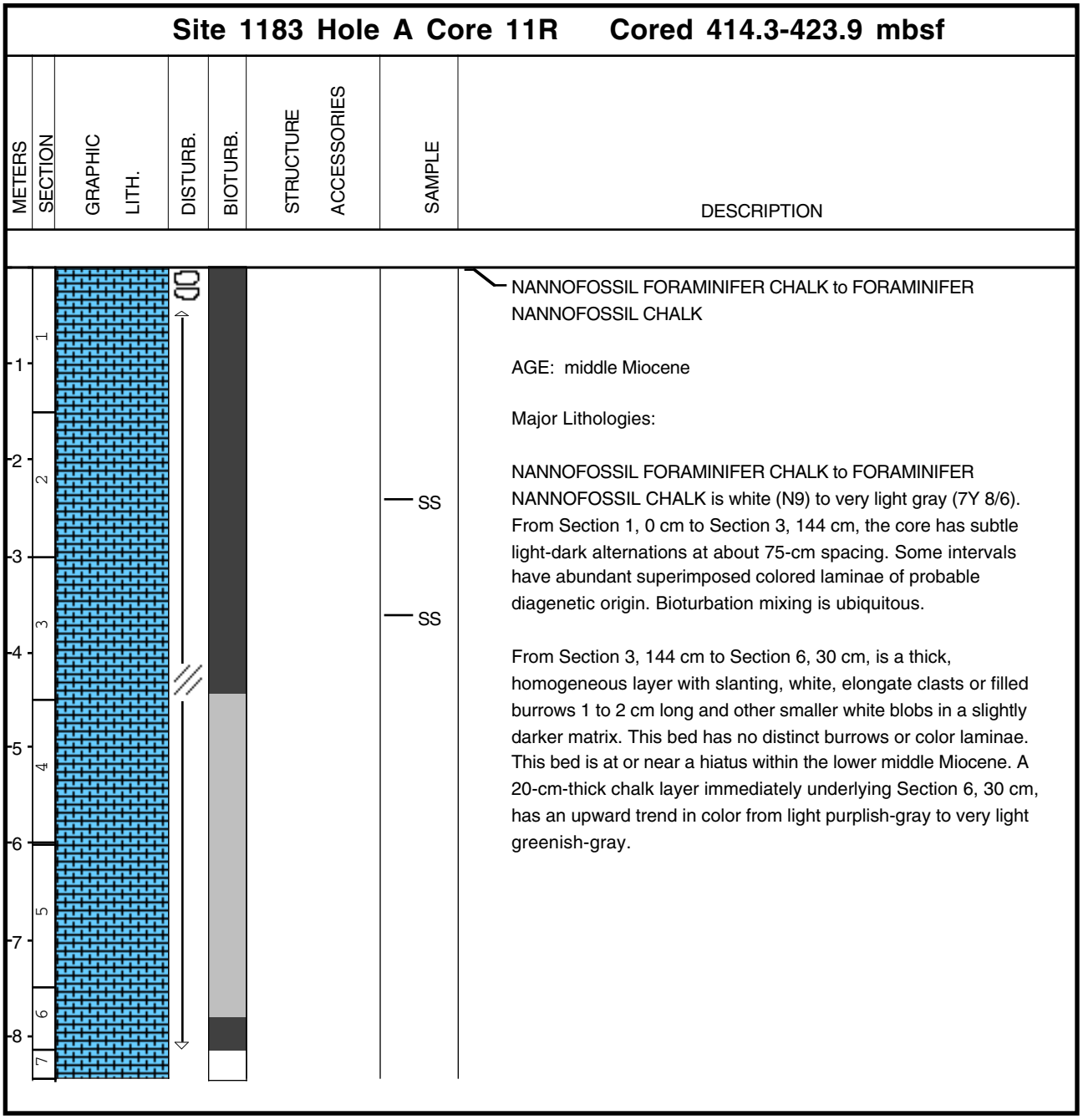
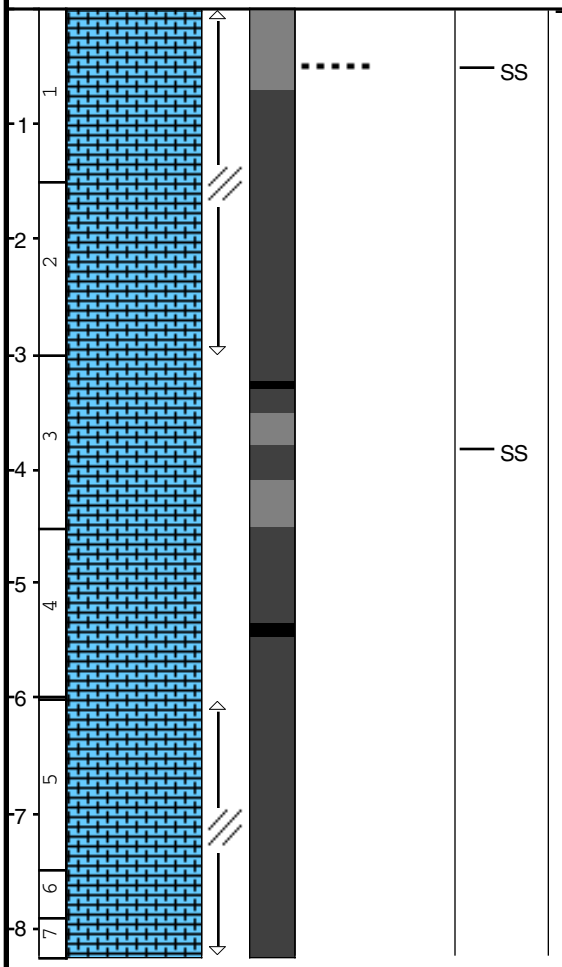
SS
FORAMINIFER NANNOFOSSIL CHALK to NANNOFOSSIL FORAMINIFER CHALK
AGE: middle Miocene
Major Lithology:
White (N9) to light greenish gray (5GY 8/1) FORAMINIFER NANNOFOSSIL CHALK to NANNOFOSSIL FORAMINIFER CHALK is fairly homogeneous, with subtle meter-scale light-dark color alternations in Sections 1 through 3. Bioturbation mixing is ubiquitous. Millimeter-scale dark laminae are common in Section 4, 85-105 cm, but otherwise rare. Pyrite is rare throughout.

Core Photo


Site 1183 Hole A Core 11R Cored 414.3-423.9 mbsf
METERS
SECTION
GRAPHIC LITH.
DISTURB.
BIOTURB.
STRUCTURE
ACCESSORIES
SAMPLE
DESCRIPTION
SS
SS
NANNOFOSSIL FORAMINIFER CHALK to FORAMINIFER NANNOFOSSIL CHALK
AGE: middle Miocene
Major Lithologies:
NANNOFOSSIL FORAMINIFER CHALK to FORAMINIFER NANNOFOSSIL CHALK is white (N9) to very light gray (7Y 8/6). From Section 1, 0 cm to Section 3, 144 cm, the core has subtle light-dark alternations at about 75-cm spacing. Some intervals have abundant superimposed colored laminae of probable diagenetic origin. Bioturbation mixing is ubiquitous.
From Section 3, 144 cm to Section 6, 30 cm, is a thick, homogeneous layer with slanting, white, elongate clasts or filled burrows 1 to 2 cm long and other smaller white blobs in a slightly darker matrix. This bed has no distinct burrows or color laminae. This bed is at or near a hiatus within the lower middle Miocene. A 20-cm-thick chalk layer immediately underlying Section 6, 30 cm, has an upward trend in color from light purplish-gray to very light greenish-gray.

Core Photo

Site 1183 Hole A Core 12R Cored 423.9-433.5 mbsf



NANNOFOSSIL FORAMINIFER CHALK to FORAMINIFER NANNOFOSSIL CHALK

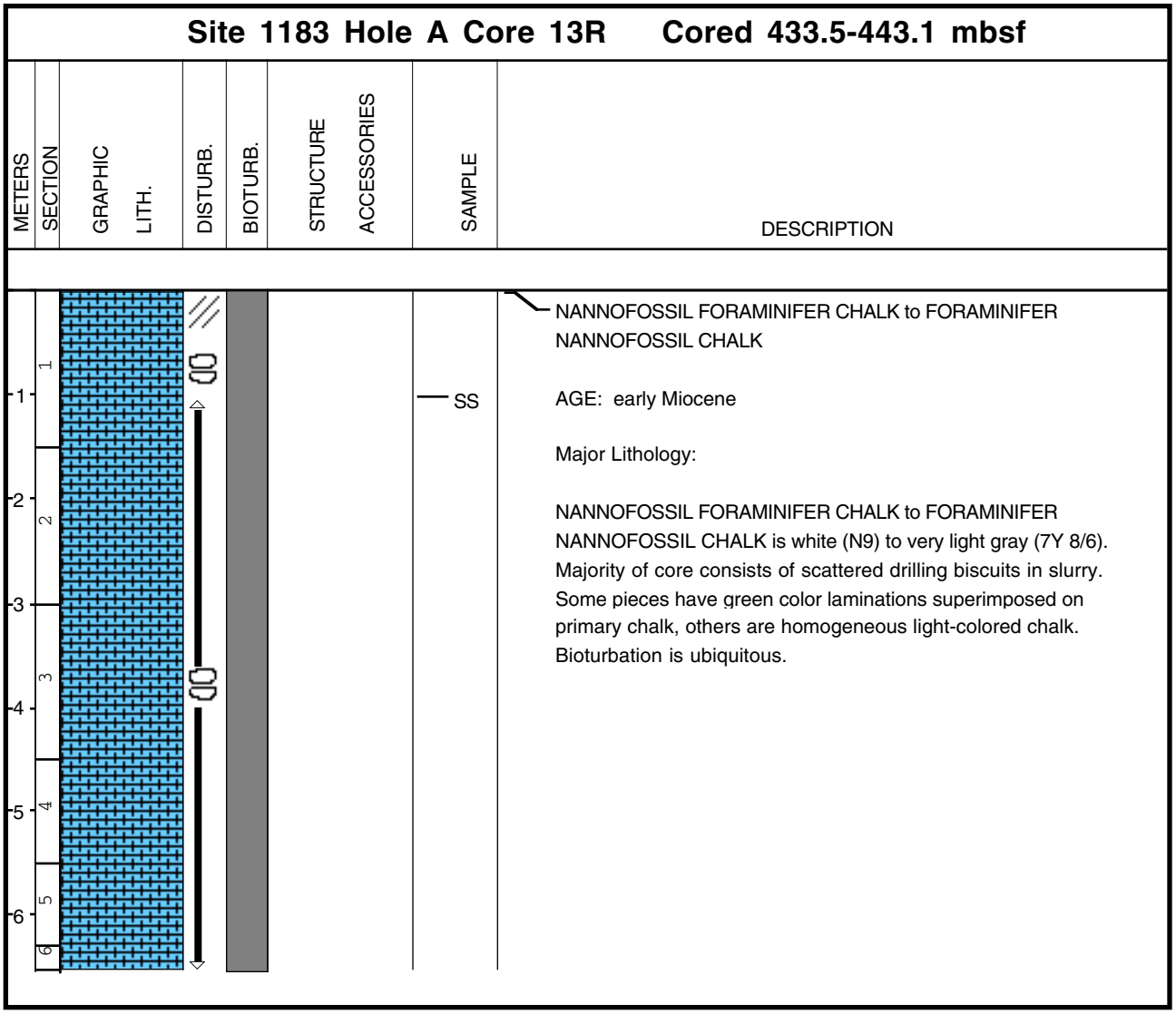
AGE: middle to early Miocene

Major Lithology:

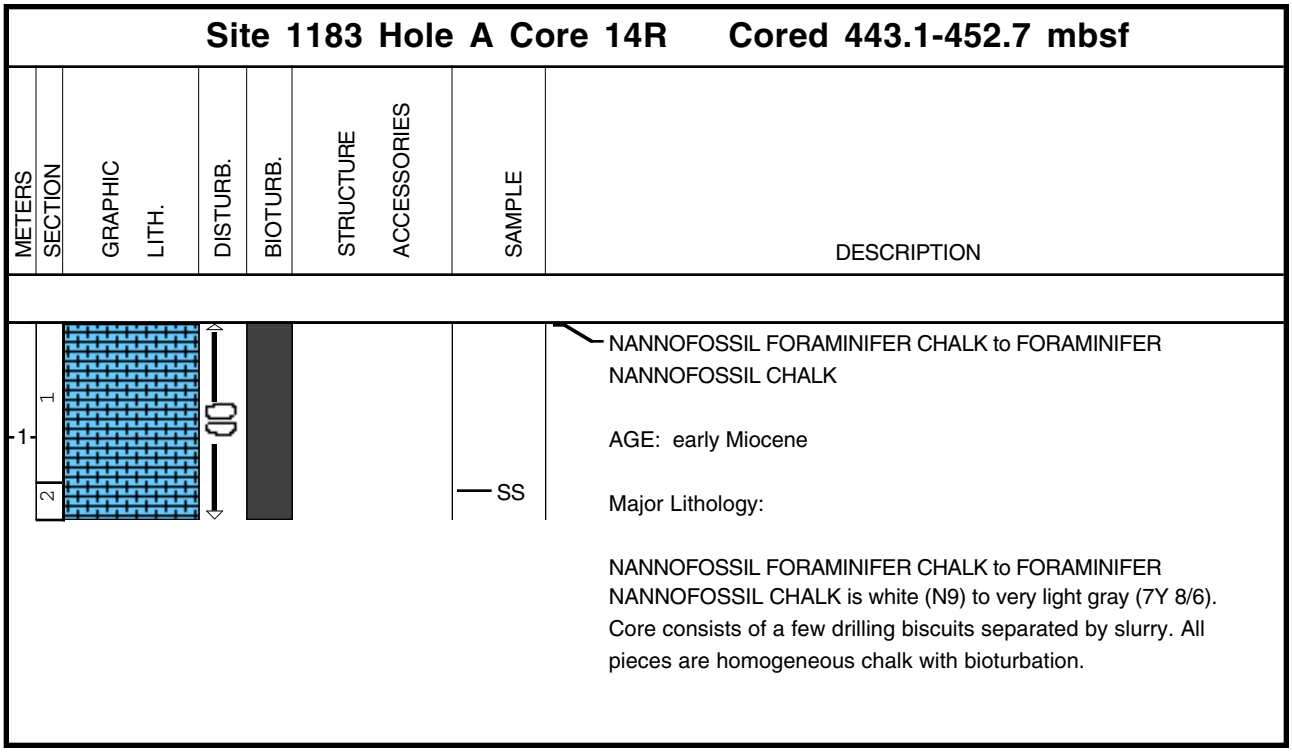
NANNOFOSSIL FORAMINIFER CHALK to FORAMINIFER NANNOFOSSIL CHALK is white (N9) to very light gray (7Y 8/6). Some intervals have subtle light-dark alternations or lightening-upward trends. Some intervals have abundant superimposed colored laminae of probable diagenetic origin, and other intervals are very homogeneous. The homogeneous intervals have white cm-scale blobs or filled burrows within the very light gray matrix.

A dark green lamina at Section 1, 49 cm, has pyritized radiolarians in chalk matrix.

Core Photo


Site 1183 Hole A Core 13R Cored 433.5-443.1 mbsf
METERS
SECTION
GRAPHIC LITH.
DISTURB.
BIOTURB.
STRUCTURE
ACCESSORIES
SAMPLE
DESCRIPTION
SS
NANNOFOSSIL FORAMINIFER CHALK to FORAMINIFER NANNOFOSSIL CHALK
AGE: early Miocene
Major Lithology:
NANNOFOSSIL FORAMINIFER CHALK to FORAMINIFER NANNOFOSSIL CHALK is white (N9) to very light gray (7Y 8/6). Majority of core consists of scattered drilling biscuits in slurry. Some pieces have green color laminations superimposed on primary chalk, others are homogeneous light-colored chalk. Bioturbation is ubiquitous.

Core Photo


Site 1183 Hole A Core 14R Cored 443.1-452.7 mbsf
METERS
SECTION
GRAPHIC LITH.
DISTURB.
BIOTURB.
STRUCTURE
ACCESSORIES
SAMPLE
DESCRIPTION
1
1
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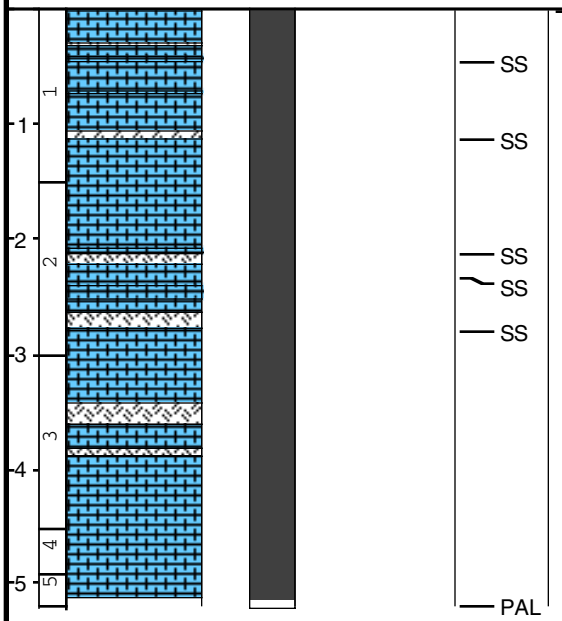
SS
NANNOFOSSIL FORAMINIFER CHALK to FORAMINIFER NANNOFOSSIL CHALK
AGE: early Miocene
Major Lithology:
NANNOFOSSIL FORAMINIFER CHALK to FORAMINIFER NANNOFOSSIL CHALK is white (N9) to very light gray (7Y 8/6). Core consists of a few drilling biscuits separated by slurry. All pieces are homogeneous chalk with bioturbation.

Core Photo

Site 1183 Hole A Core 15R Cored 752.0-761.1 mbsf



FORAMINIFER NANNOFOSSIL CHALK

AGE: latest Oligocene to earliest Miocene

Major Lithology:

FORAMINIFER NANNOFOSSIL CHALK, white (N9), is bioturbated throughout. Burrows are generally faint but include Zoophycos and Planolites. Greenish gray banding is faint to distinct and commonly cuts across burrows.

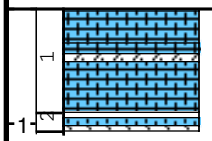
Minor Lithologies:

NANNOFOSSIL CHALK WITH FORAMINIFERS AND SILICEOUS MICROFOSSILS, light grayish green (5Y 8/1), is finer grained relative to major lithology, and typically is above ash layers. Wavy fabric is attributed to bioturbation.

VITRIC ASH, dark gray, is present as 2- to 5-cm-thick layers. The ash is bioturbated and may be piped downwards or upwards in filled burrows. Grain size of glass shards is fine sand to silt.

Core Photo

Site 1183 Hole A Core 16R Cored 761.1-770.8 mbsf



FORAMINIFER NANNOFOSSIL CHALK to NANNOFOSSIL CHALK WITH SILICEOUS MICROFOSSILS

AGE: late Oligocene

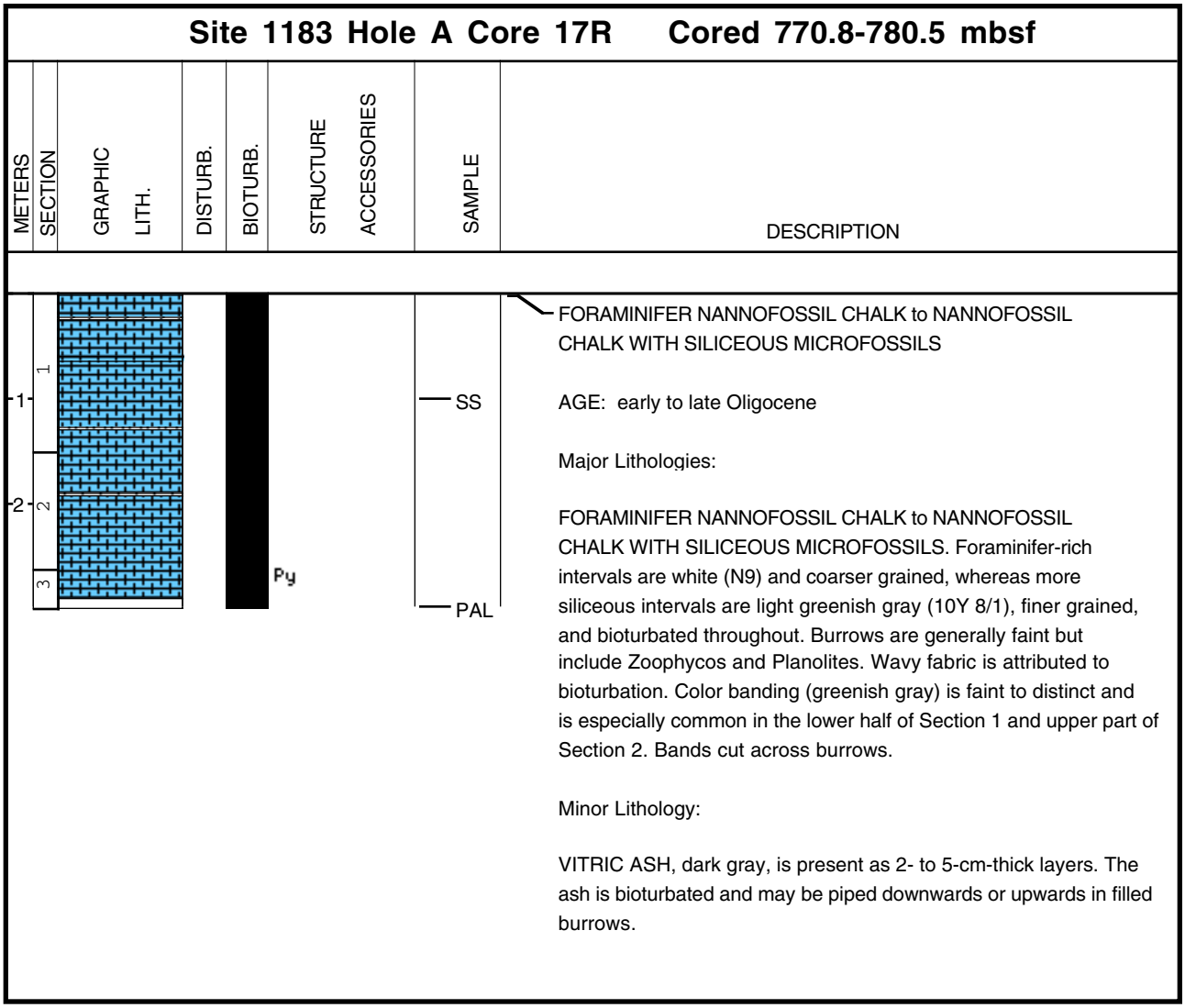
Major Lithologies:

FORAMINIFER NANNOFOSSIL CHALK to NANNOFOSSIL CHALK WITH SILICEOUS MICROFOSSILS. Foraminifer-rich intervals are white (N9) and coarser grained; whereas more siliceous intervals are light greenish gray (10Y 8/1), finer grained, and bioturbated throughout. Burrows are generally faint but include Chondrites, Zoophycos and Planolites.

Minor Lithology:

VITRIC ASH, dark gray, is present as 2- to 5-cm-thick layers. The ash is bioturbated and may be piped downwards or upwards in filled burrows. Coarse fraction of ash in core catcher contains both glass and glassy lithic fragments.

Core Photo


Site 1183 Hole A Core 17R Cored 770.8-780.5 mbsf
METERS
SECTION
GRAPHIC LITH.
DISTURB.
BIOTURB.
STRUCTURE
ACCESSORIES
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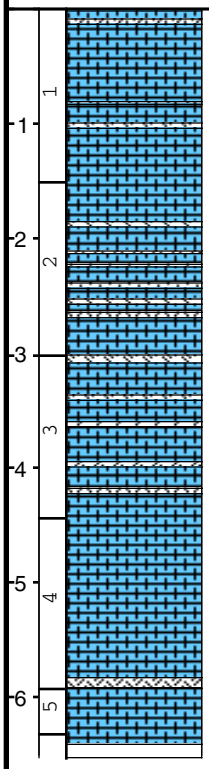
FORAMINIFER NANNOFOSSIL CHALK to NANNOFOSSIL CHALK WITH SILICEOUS MICROFOSSILS
AGE: early to late Oligocene
Major Lithologies:
FORAMINIFER NANNOFOSSIL CHALK to NANNOFOSSIL CHALK WITH SILICEOUS MICROFOSSILS. Foraminifer-rich intervals are white (N9) and coarser grained, whereas more siliceous intervals are light greenish gray (10Y 8/1), finer grained, and bioturbated throughout. Burrows are generally faint but include Zoophycos and Planolites. Wavy fabric is attributed to bioturbation. Color banding (greenish gray) is faint to distinct and is especially common in the lower half of Section 1 and upper part of Section 2. Bands cut across burrows.
Minor Lithology:
VITRIC ASH, dark gray, is present as 2- to 5-cm-thick layers. The ash is bioturbated and may be piped downwards or upwards in filled burrows.

Core Photo

Site 1183 Hole A Core 18R Cored 780.5-790.1 mbsf



FORAMINIFER NANNOFOSSIL CHALK to NANNOFOSSIL CHALK WITH SILICEOUS MICROFOSSILS

AGE: early Oligocene

Major Lithologies:

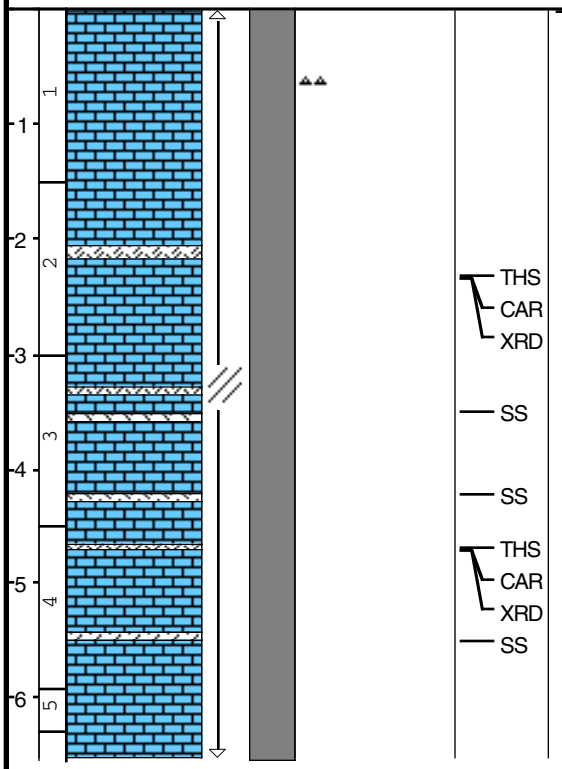
FORAMINIFER NANNOFOSSIL CHALK is white (N9) and relatively coarser grained. NANNOFOSSIL CHALK WITH SILICEOUS MICROFOSSILS is light greenish gray (10Y 8/1) and relatively finer grained. Pervasive bioturbation. Burrows are generally faint but include Zoophycos, Planolites and unidentified horizontal and vertical burrows. Wavy fabric is attributed to bioturbation. Color banding (greenish gray) is faint to distinct throughout core.

Minor Lithology:

VITRIC ASH, dark gray, is present as 2- to 5-cm-thick layers. The ash is bioturbated and may be piped downwards or upwards in filled burrows.

Core Photo

Site 1183 Hole A Core 19R Cored 790.1-799.7 mbsf



DESCRIPTION

FORAMINIFER NANNOFOSSIL LIMESTONE

Age: early Oligocene

Major Lithology:

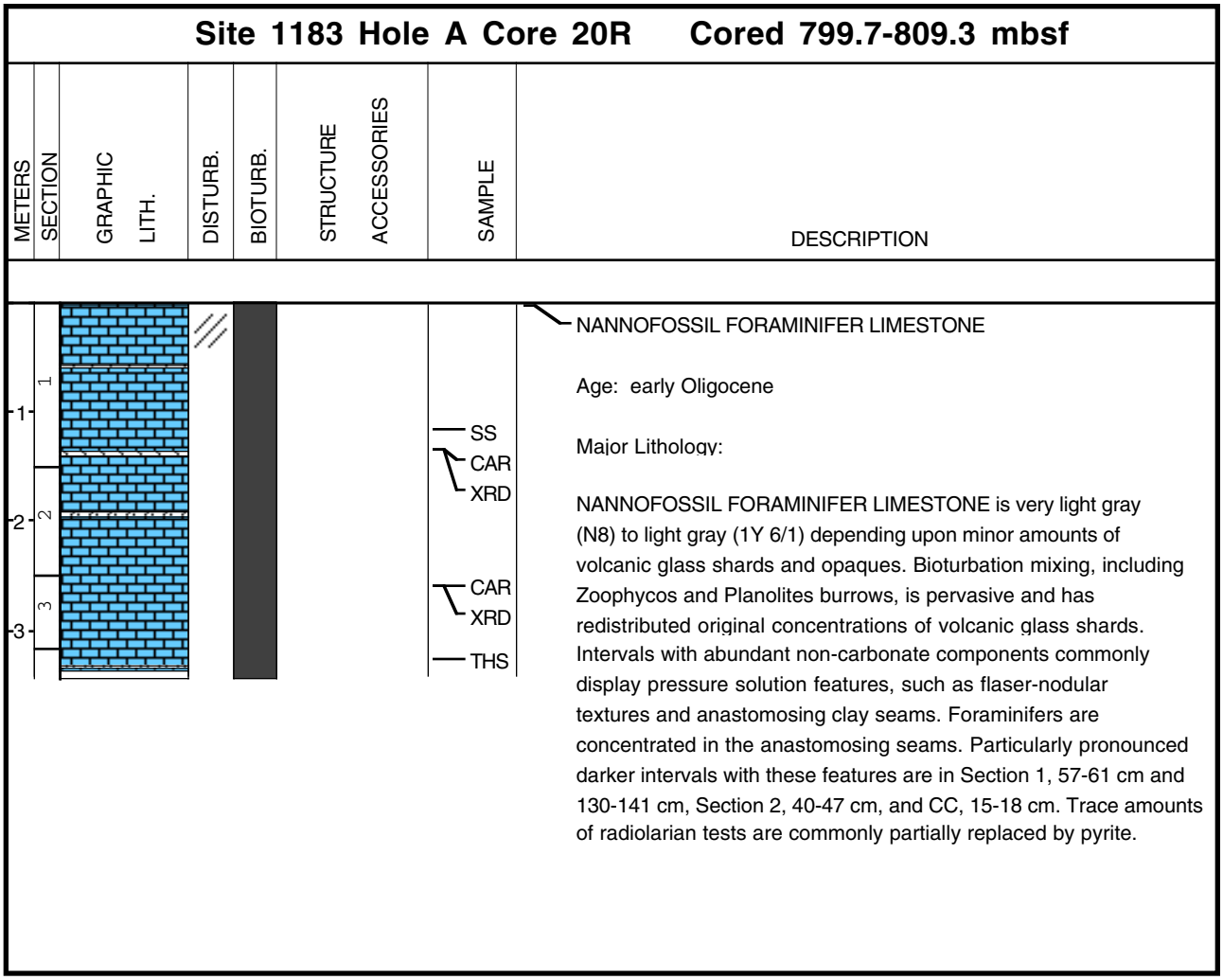
FORAMINIFER NANNOFOSSIL LIMESTONE is white (N9) and commonly bioturbation-mottled with light gray. Texture varies from homogeneous to flaser-nodular, depending upon amount of intermixed volcanic ash. Bioturbation is pervasive and includes Zoophycos and Planolites burrows.

Minor Lithologies:

VITRIC ASH layers are gray (N4-N5) with variable degrees of bioturbation. Thicker layers are discrete bands with approximately 50% carbonate, but thinner ones are commonly dispersed into the chalk as diffuse zones with flaser-like to anastomosing clay seam pressure-solution features. Foraminifers and radiolarians are concentrated in the anastomosing seams. The thickest layers are in Section 2, 57-69 cm, in Section 3, 32-34 cm, and in Section 4, 16-22 and 97-102 cm.

CHERT-filled sub-horizontal burrow in Section 1 at 58 cm is light gray to light greenish-gray (N7-5GY 7/1), 1-cm diameter and more than 4 cm long.

Core Photo


Site 1183 Hole A Core 20R Cored 799.7-809.3 mbsf
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DISTURB.
BIOTURB.
STRUCTURE
ACCESSORIES
SAMPLE
DESCRIPTION
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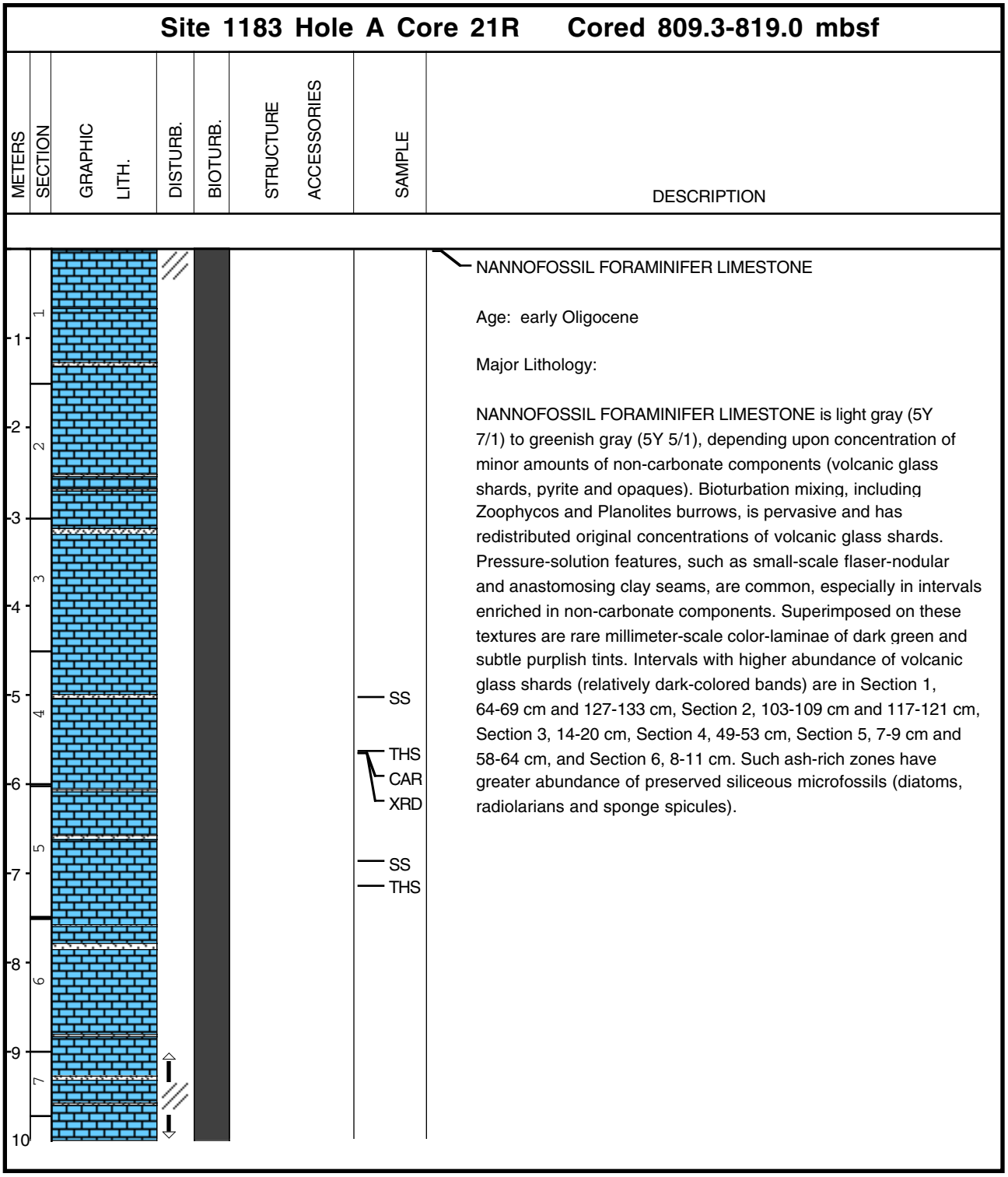
THS
NANNOFOSSIL FORAMINIFER LIMESTONE
Age: early Oligocene
Major Lithology:
NANNOFOSSIL FORAMINIFER LIMESTONE is very light gray (N8) to light gray (1Y 6/1) depending upon minor amounts of volcanic glass shards and opaques. Bioturbation mixing, including Zoophycos and Planolites burrows, is pervasive and has redistributed original concentrations of volcanic glass shards. Intervals with abundant non-carbonate components commonly display pressure solution features, such as flaser-nodular textures and anastomosing clay seams. Foraminifers are concentrated in the anastomosing seams. Particularly pronounced darker intervals with these features are in Section 1, 57-61 cm and 130-141 cm, Section 2, 40-47 cm, and CC, 15-18 cm. Trace amounts of radiolarian tests are commonly partially replaced by pyrite.

Core Photo


Site 1183 Hole A Core 21R Cored 809.3-819.0 mbsf
METERS
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DISTURB.
BIOTURB.
STRUCTURE
ACCESSORIES
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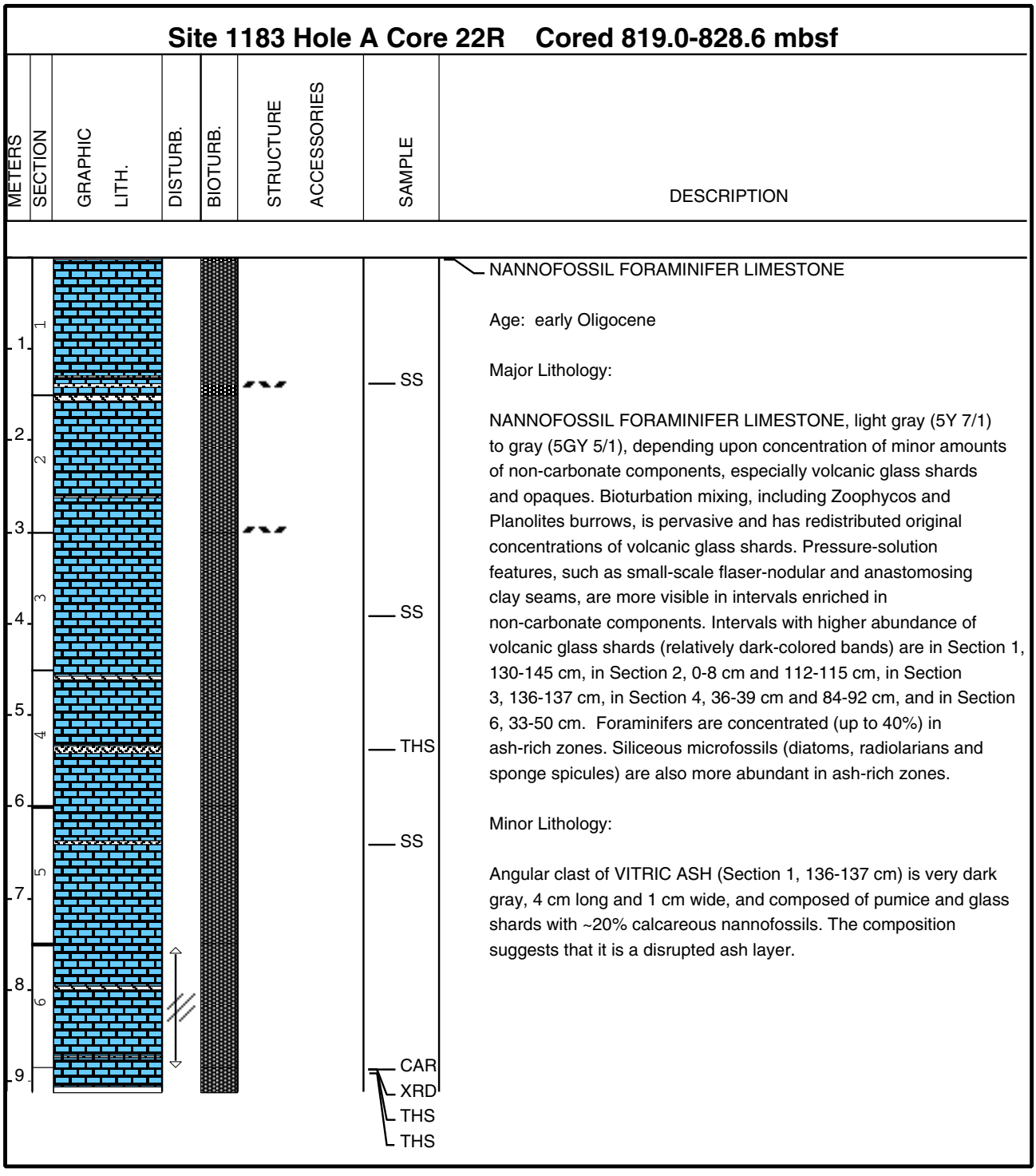
NANNOFOSSIL FORAMINIFER LIMESTONE
Age: early Oligocene
Major Lithology:
NANNOFOSSIL FORAMINIFER LIMESTONE is light gray (5Y 7/1) to greenish gray (5Y 5/1), depending upon concentration of minor amounts of non-carbonate components (volcanic glass shards, pyrite and opaques). Bioturbation mixing, including Zoophycos and Planolites burrows, is pervasive and has redistributed original concentrations of volcanic glass shards. Pressure-solution features, such as small-scale flaser-nodular and anastomosing clay seams, are common, especially in intervals enriched in non-carbonate components. Superimposed on these textures are rare millimeter-scale color-laminae of dark green and subtle purplish tints. Intervals with higher abundance of volcanic glass shards (relatively dark-colored bands) are in Section 1, 64-69 cm and 127-133 cm, Section 2, 103-109 cm and 117-121 cm, Section 3, 14-20 cm, Section 4, 49-53 cm, Section 5, 7-9 cm and 58-64 cm, and Section 6, 8-11 cm. Such ash-rich zones have greater abundance of preserved siliceous microfossils (diatoms, radiolarians and sponge spicules).

Core Photo


Site 1183 Hole A Core 22R Cored 819.0-828.6 mbsf
METERS
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GRAPHIC LITH.
DISTURB.
BIOTURB.
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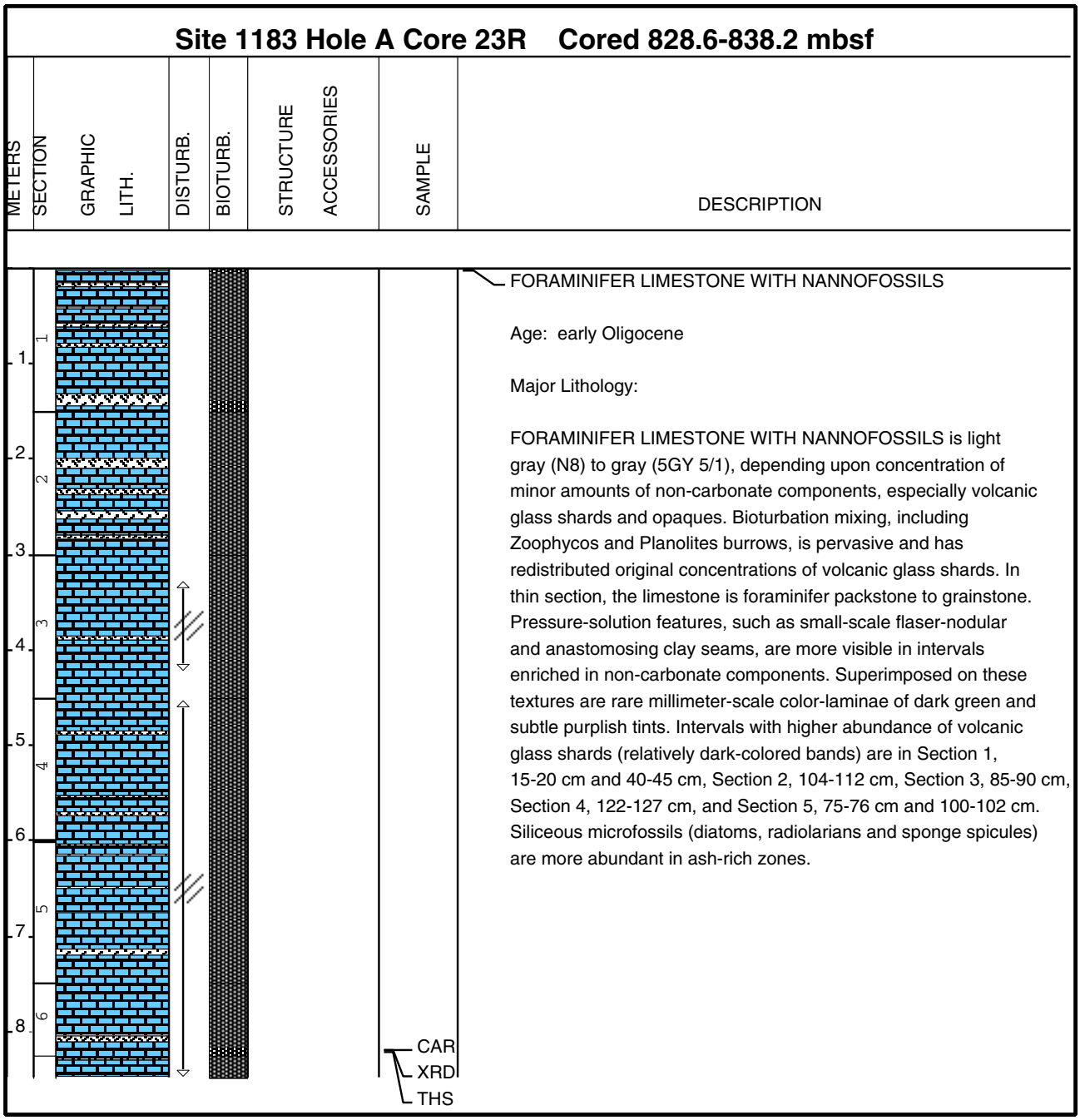
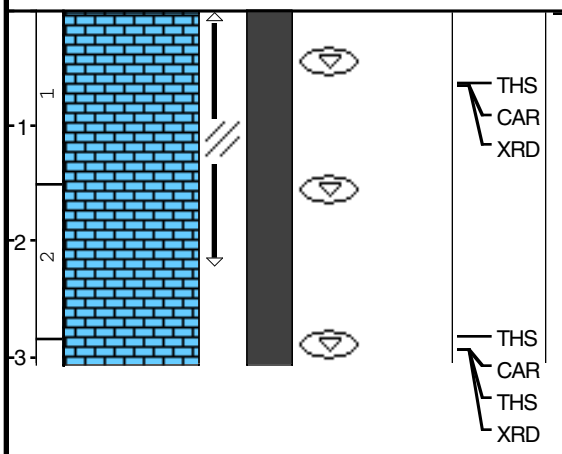
THS
NANNOFOSSIL FORAMINIFER LIMESTONE
Age: early Oligocene
Major Lithology:
NANNOFOSSIL FORAMINIFER LIMESTONE, light gray (5Y 7/1) to gray (5GY 5/1), depending upon concentration of minor amounts of non-carbonate components, especially volcanic glass shards and opaques. Bioturbation mixing, including Zoophycos and Planolites burrows, is pervasive and has redistributed original concentrations of volcanic glass shards. Pressure-solution features, such as small-scale flaser-nodular and anastomosing clay seams, are more visible in intervals enriched in non-carbonate components. Intervals with higher abundance of volcanic glass shards (relatively dark-colored bands) are in Section 1, 130-145 cm, in Section 2, 0-8 cm and 112-115 cm, in Section 3, 136-137 cm, in Section 4, 36-39 cm and 84-92 cm, and in Section 6, 33-50 cm. Foraminifers are concentrated (up to 40%) in ash-rich zones. Siliceous microfossils (diatoms, radiolarians and sponge spicules) are also more abundant in ash-rich zones.
Minor Lithology:
Angular clast of VITRIC ASH (Section 1, 136-137 cm) is very dark gray, 4 cm long and 1 cm wide, and composed of pumice and glass shards with ~20% calcareous nannofossils. The composition suggests that it is a disrupted ash layer.

Core Photo


Site 1183 Hole A Core 23R Cored 828.6-838.2 mbsf
METERS
SECTION
GRAPHIC LITH.
DISTURB.
BIOTURB.
STRUCTURE
ACCESSORIES
SAMPLE
DESCRIPTION
1
2
3
4
5
6
7
8
CAR
XRD
THS
FORAMINIFER LIMESTONE WITH NANNOFOSSILS
Age: early Oligocene
Major Lithology:
FORAMINIFER LIMESTONE WITH NANNOFOSSILS is light gray (N8) to gray (5GY 5/1), depending upon concentration of minor amounts of non-carbonate components, especially volcanic glass shards and opaques. Bioturbation mixing, including Zoophycos and Planolites burrows, is pervasive and has redistributed original concentrations of volcanic glass shards. In thin section, the limestone is foraminifer packstone to grainstone. Pressure-solution features, such as small-scale flaser-nodular and anastomosing clay seams, are more visible in intervals enriched in non-carbonate components. Superimposed on these textures are rare millimeter-scale color-laminae of dark green and subtle purplish tints. Intervals with higher abundance of volcanic glass shards (relatively dark-colored bands) are in Section 1, 15-20 cm and 40-45 cm, Section 2, 104-112 cm, Section 3, 85-90 cm, Section 4, 122-127 cm, and Section 5, 75-76 cm and 100-102 cm. Siliceous microfossils (diatoms, radiolarians and sponge spicules) are more abundant in ash-rich zones.

Core Photo

Site 1183 Hole A Core 24R Cored 838.2-847.4 mbsf



FORAMINIFER LIMESTONE WITH NANNOFOSSILS, NANNOFOSSIL FORAMINIFER LIMESTONE, and CHERT

Age: late Eocene

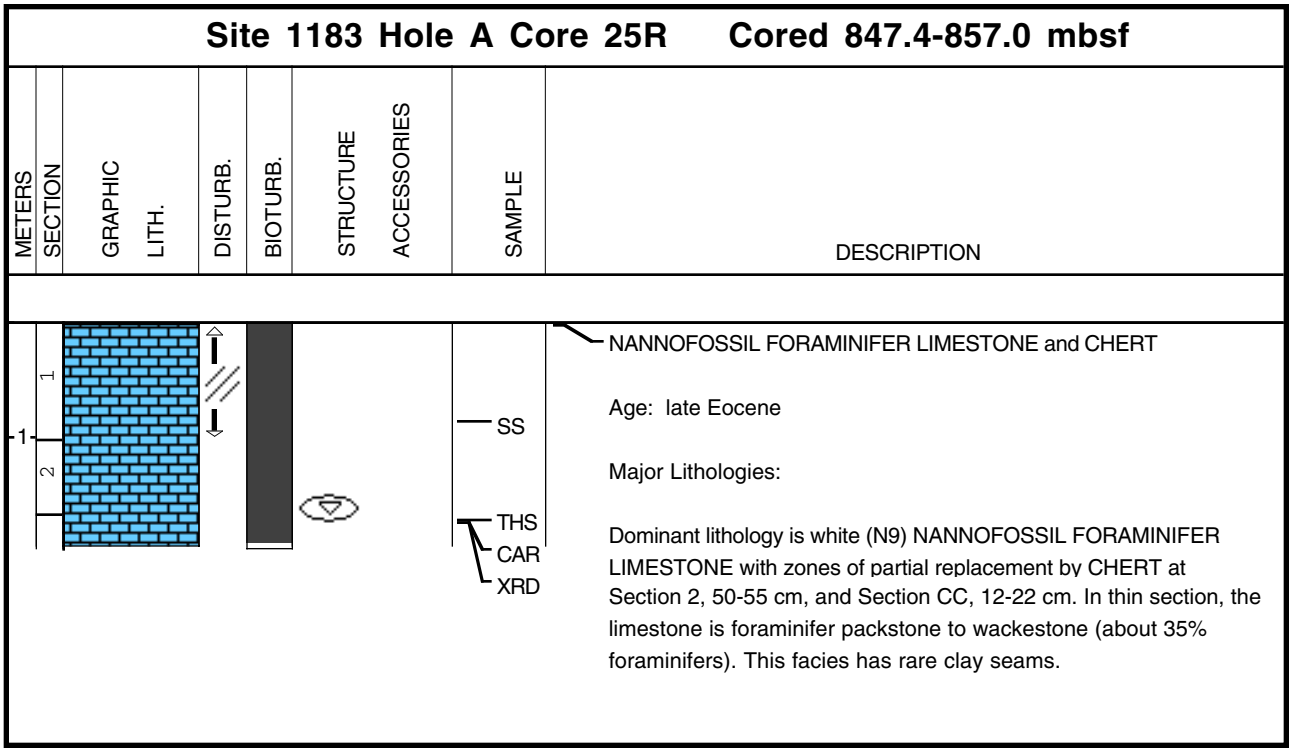
Major Lithologies:

From Section 1, 0 cm to Section 2, ~90 cm, the core consists of light gray (N8) FORAMINIFER LIMESTONE WITH NANNOFOSSILS speckled with spots and short streaks of medium bluish gray (disseminated pyrite?) and contains thin anastomosing clay seams and stylolites. In thin section, the limestone is foraminifer packstone to grainstone. Zones partially replaced by CHERT, light olive gray (5Y 6/1) to olive gray (5Y 4/1), have retained the speckled texture. CHERT replacements are at Section 1, 43-46 cm, and Section 2, 3-20 cm.

From Section 2, ~90 cm through Section CC, the core consists of white (N9) NANNOFOSSIL FORAMINIFER LIMESTONE. In thin section, the limestone is foraminifer packstone to wackestone (about 30-40% foraminifers). CHERT replacement zones are at Section 2, 122-135 cm, and Section CC, 10-15 cm. This facies has n apparent clay seams or speckling.

There is a relatively sharp transition between these two limestone facies at Section 2, 90 cm.

Core Photo


Site 1183 Hole A Core 25R Cored 847.4-857.0 mbsf
METERS
SECTION
GRAPHIC LITH.
DISTURB.
BIOTURB.
STRUCTURE
ACCESSORIES
SAMPLE
DESCRIPTION
1
1
2
SS
THS
CAR
XRD
NANNOFOSSIL FORAMINIFER LIMESTONE and CHERT
Age: late Eocene
Major Lithologies:
Dominant lithology is white (N9) NANNOFOSSIL FORAMINIFER LIMESTONE with zones of partial replacement by CHERT at Section 2, 50-55 cm, and Section CC, 12-22 cm. In thin section, the limestone is foraminifer packstone to wackestone (about 35% foraminifers). This facies has rare clay seams.

Core Photo

Site 1183 Hole A Core 26R Cored 857.0-866.6 mbsf

METERS	SECTION	GRAPHIC LITH.	DISTURB.	BIOTURB.	STRUCTURE	ACCESSORIES	SAMPLE	DESCRIPTION
	1						THS CAR XRD	NANNOFOSSIL FORAMINIFER LIMESTONE and CHERT

Age: late Eocene

Major Lithologies:

The core consists of pieces of white (N9) NANNOFOSSIL FORAMINIFER LIMESTONE and fractured, dark olive (5Y 3/4) CHERT with white rinds. In thin section, the limestone is foraminifer packstone to wackestone (about 40% foraminifers) with no siliceous microfossils.

Core Photo

Site 1183 Hole A Core 27R Cored 866.6-876.2 mbsf

METERS	SECTION	GRAPHIC LITH.	DISTURB.	BIOTURB.	STRUCTURE	ACCESSORIES	SAMPLE	DESCRIPTION
	1						PAL CAR XRD THS THS	NANNOFOSSIL FORAMINIFER LIMESTONE and CHERT Age: late Eocene Major Lithologies: The core consists of pieces of white (N9) NANNOFOSSIL FORAMINIFER LIMESTONE and fractured, dark olive (5Y 3/4) CHERT with white rinds. In thin section, the limestone is foraminifer wackestone (about 25% foraminifers) with no siliceous microfossils. Chertification has partially replaced this foraminifer wackestone.

Core Photo

Site 1183 Hole A Core 28R Cored 876.2-885.9 mbsf

METERS	SECTION	GRAPHIC LITH.	DISTURB.	BIOTURB.	STRUCTURE	ACCESSORIES	SAMPLE	DESCRIPTION
	1							FORAMINIFER NANNOFOSSIL LIMESTONE and CHERT

Age: middle to late Eocene

Major Lithologies:

The core consists of fractured dark olive (5Y 3/4) CHERT, and white (N9) partially silicified FORAMINIFER NANNOFOSSIL LIMESTONE (two small pieces).

Core Photo

Site 1183 Hole A Core 29R Cored 885.9-895.5 mbsf

METERS	SECTION	GRAPHIC LITH.	DISTURB.	BIOTURB.	STRUCTURE	ACCESSORIES	SAMPLE	DESCRIPTION
							THS PAL	FORAMINIFER NANNOFOSSIL LIMESTONE and CHERT

Age: middle Eocene

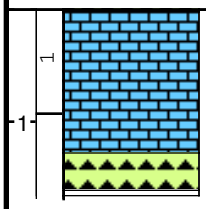
Major Lithologies:

The core consists of pieces of white FORAMINIFER NANNOFOSSIL LIMESTONE and fractured, dark olive (5Y 3/4) CHERT with white rinds. In thin section, the limestone is foraminifer packstone to wackestone (about 35% foraminifers) with no siliceous microfossils.

Core Photo

Site 1183 Hole A Core 30R Cored 895.5-905.1 mbsf

METERS | SECTION | GRAPHIC LITH. | DISTURB. | BIOTURB. | STRUCTURE | ACCESSORIES | SAMPLE | DESCRIPTION



THS
CAR
XRD
SS
THS
PAL

NANNOFOSSIL FORAMINIFER LIMESTONE and CHERT

Age: middle Eocene

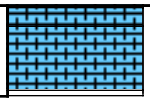
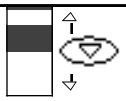
Major Lithologies:

NANNOFOSSIL FORAMINIFER LIMESTONE is white (N9) to light yellowish gray (5Y 9/1). Faint burrow mottles are present throughout, and wavy clay-rich (?) partings are at Section 1, 30, 75 and 85 cm and at Section 2, 35 cm. Microfacies in thin section ranges from foraminifer packstone (60% foraminifers) to foraminifer wackestone (40% foraminifers).

CHERT is dark olive (5Y 3/4) and is most abundant in Section 2, 40-70 cm. It has white splotches in places and grades into silicified limestone. In thin section, the chert is observed to be a replacement of foraminifer packstone to wackestone.

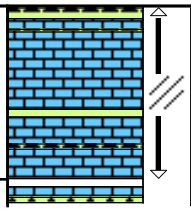
Core Photo

Site 1183 Hole A Core 31R Cored 905.1-914.7 mbsf

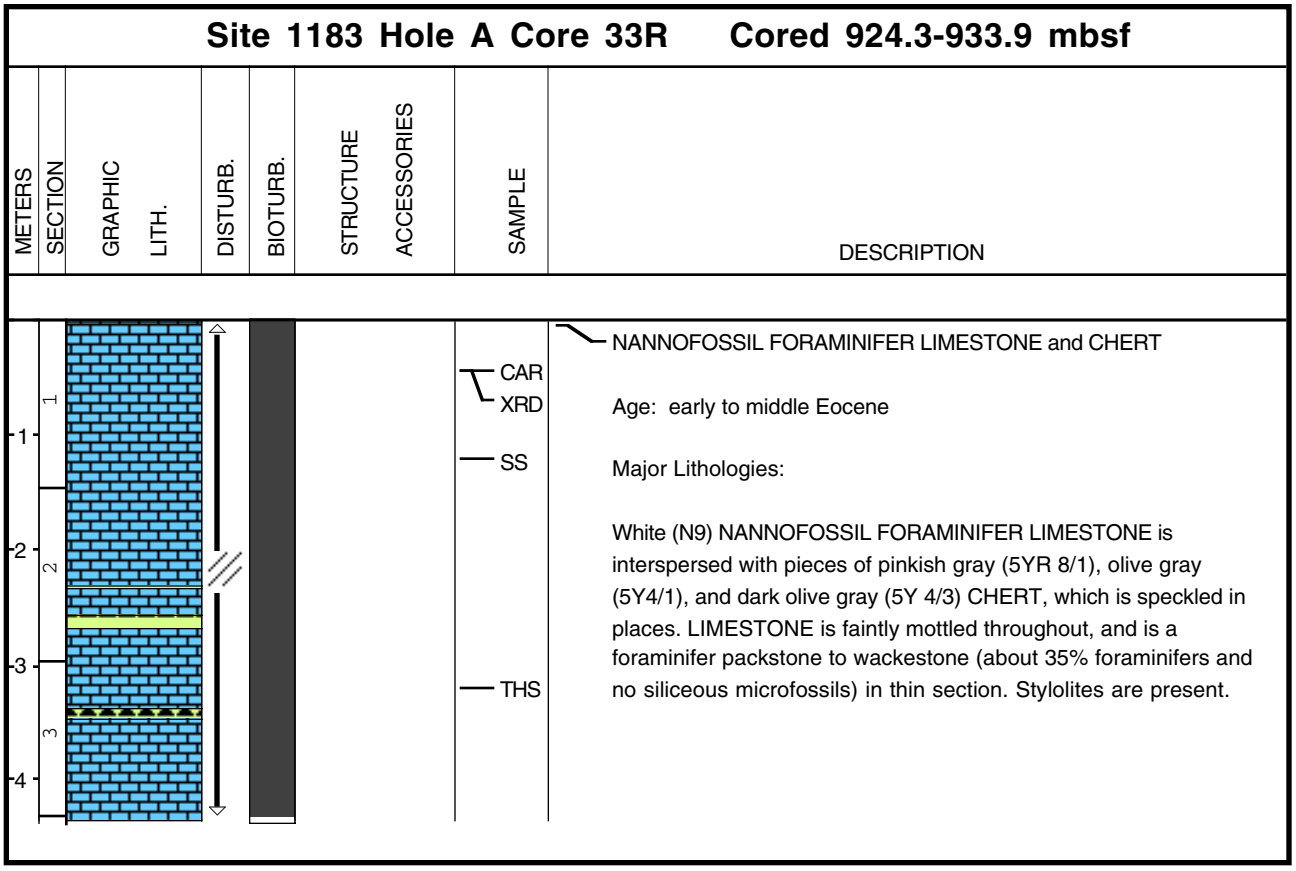
METERS	SECTION	GRAPHIC LITH.	DISTURB.	BIOTURB.	STRUCTURE	ACCESSORIES	SAMPLE	DESCRIPTION
	1						CAR XRD THS PAL	FORAMINIFER NANNOFOSSIL LIMESTONE and CHERT Age: middle Eocene Major Lithologies: The core consists of white FORAMINIFER NANNOFOSSIL LIMESTONE and fractured, dark olive (5Y 3/4) CHERT with white rinds. Microfacies of the limestone in thin section is a foraminifer wackestone (20-30% foraminifers).

Core Photo

Site 1183 Hole A Core 32R Cored 914.7-924.3 mbsf

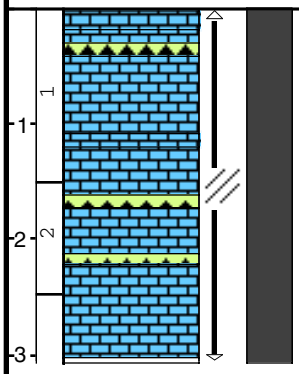
METERS	SECTION	GRAPHIC LITH.	DISTURB.	BIOTURB.	STRUCTURE	ACCESSORIES	SAMPLE	DESCRIPTION
1	1						THS XRD CAR SS PAL	NANNOFOSSIL FORAMINIFER LIMESTONE and CHERT Age: middle Eocene Major Lithologies: White (N9) NANNOFOSSIL FORAMINIFER LIMESTONE is interspersed with pieces of pinkish gray (5YR 8/1), olive gray (5Y4/1), and dark olive gray (5Y 4/3) CHERT, which is speckled in places. LIMESTONE is faintly mottled throughout, and is a foraminifer packstone to wackestone (about 30% foraminifers and no siliceous microfossils) in thin section.

Core Photo


Site 1183 Hole A Core 33R Cored 924.3-933.9 mbsf
METERS
SECTION
GRAPHIC LITH.
DISTURB.
BIOTURB.
STRUCTURE
ACCESSORIES
SAMPLE
DESCRIPTION
1
2
3
-1
-2
-3
-4
CAR
XRD
SS
THS
NANNOFOSSIL FORAMINIFER LIMESTONE and CHERT
Age: early to middle Eocene
Major Lithologies:
White (N9) NANNOFOSSIL FORAMINIFER LIMESTONE is interspersed with pieces of pinkish gray (5YR 8/1), olive gray (5Y4/1), and dark olive gray (5Y 4/3) CHERT, which is speckled in places. LIMESTONE is faintly mottled throughout, and is a foraminifer packstone to wackestone (about 35% foraminifers and no siliceous microfossils) in thin section. Stylolites are present.

Core Photo

Site 1183 Hole A Core 34R Cored 933.9-943.5 mbsf



NANNOFOSSIL FORAMINIFER LIMESTONE and CHERT

Age: late Paleocene to early Eocene

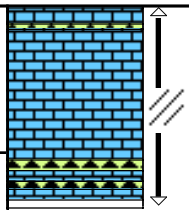
Major Lithologies:

White (N9) NANNOFOSSIL FORAMINIFER LIMESTONE is faintly burrow mottled throughout, contains stylolites, and is silicified in portions of Section 1. Silicified portions are light gray (N8) with speckles and bands of medium bluish gray (5G 7/1).

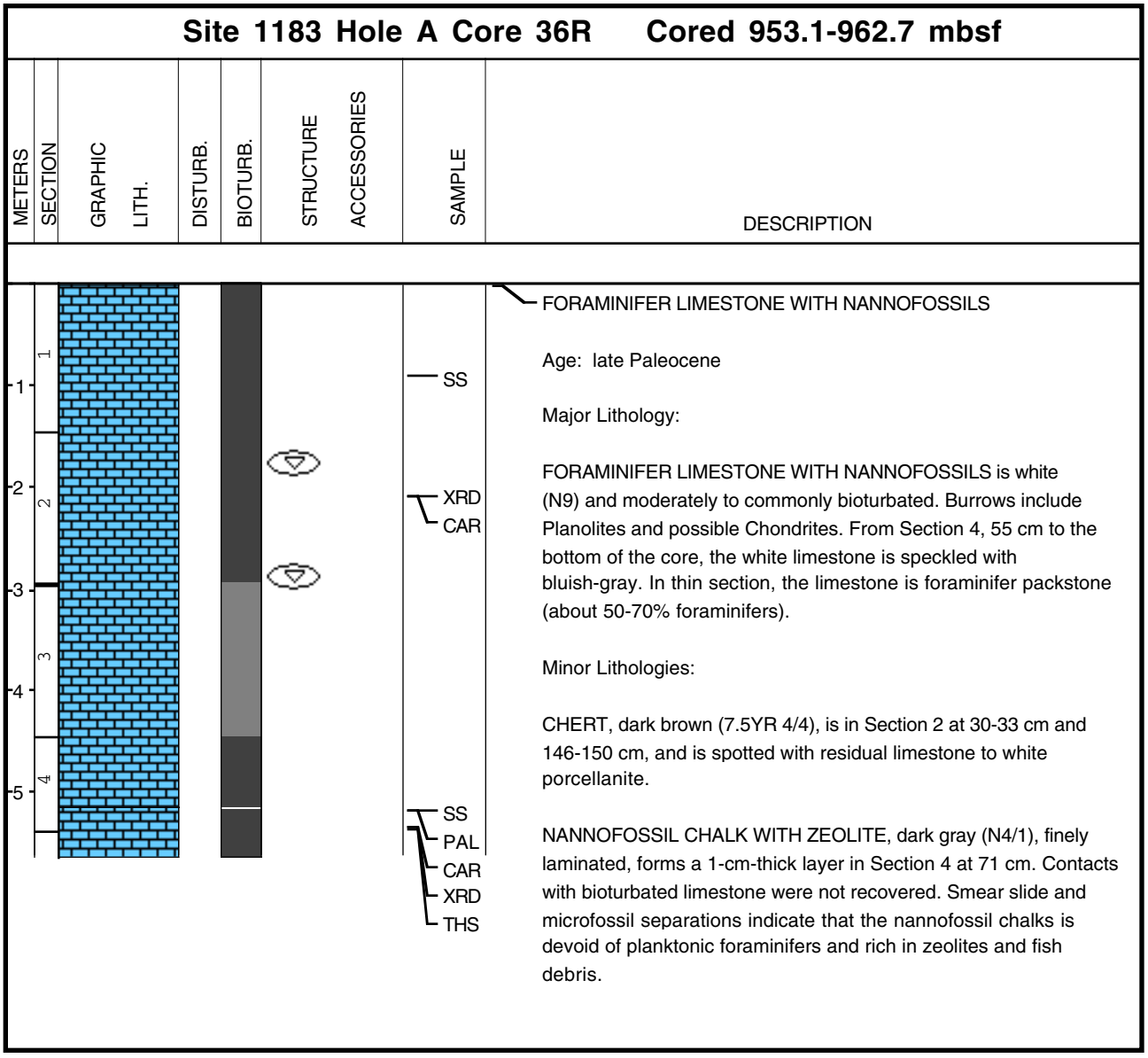
CHERT is gray (5Y 8/1) to olive (5Y 5/3) and variously mottled and speckled with yellowish gray and red.

Core Photo

Site 1183 Hole A Core 35R Cored 943.5-953.1 mbsf

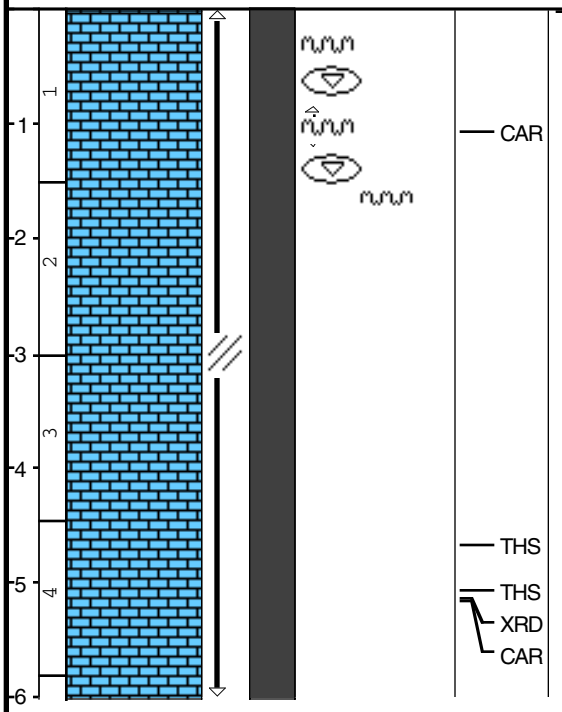
METERS	SECTION	GRAPHIC LITH.	DISTURB.	BIOTURB.	STRUCTURE	ACCESSORIES	SAMPLE	DESCRIPTION
1	1						THS XRD CAR SS PAL	FORAMINIFER LIMESTONE WITH NANNOFOSSILS and CHERT Age: late Paleocene to early Eocene Major Lithologies: White (N9) FORAMINIFER LIMESTONE WITH NANNOFOSSILS is faintly burrow mottled throughout. In thin section, the limestone is foraminifer packstone (about 60% foraminifers) with no siliceous microfossils. CHERT is olive (5Y 5/4) to dark brown (5YR 4/3) and variously mottled and speckled with yellowish gray, light gray and red.

Core Photo


Site 1183 Hole A Core 36R Cored 953.1-962.7 mbsf
METERS
SECTION
GRAPHIC LITH.
DISTURB.
BIOTURB.
STRUCTURE
ACCESSORIES
SAMPLE
DESCRIPTION
1
2
3
4
5
SS
XRD
CAR
SS
PAL
CAR
XRD
THS
FORAMINIFER LIMESTONE WITH NANNOFOSSILS
Age: late Paleocene
Major Lithology:
FORAMINIFER LIMESTONE WITH NANNOFOSSILS is white (N9) and moderately to commonly bioturbated. Burrows include Planolites and possible Chondrites. From Section 4, 55 cm to the bottom of the core, the white limestone is speckled with bluish-gray. In thin section, the limestone is foraminifer packstone (about 50-70% foraminifers).
Minor Lithologies:
CHERT, dark brown (7.5YR 4/4), is in Section 2 at 30-33 cm and 146-150 cm, and is spotted with residual limestone to white porcellanite.
NANNOFOSSIL CHALK WITH ZEOLITE, dark gray (N4/1), finely laminated, forms a 1-cm-thick layer in Section 4 at 71 cm. Contacts with bioturbated limestone were not recovered. Smear slide and microfossil separations indicate that the nannofossil chalks is devoid of planktonic foraminifers and rich in zeolites and fish debris.

Core Photo

Site 1183 Hole A Core 37R Cored 962.7-972.4 mbsf



DESCRIPTION

FORAMINIFER LIMESTONE WITH NANNOFOSSILS

Age: late Paleocene

Major Lithology:

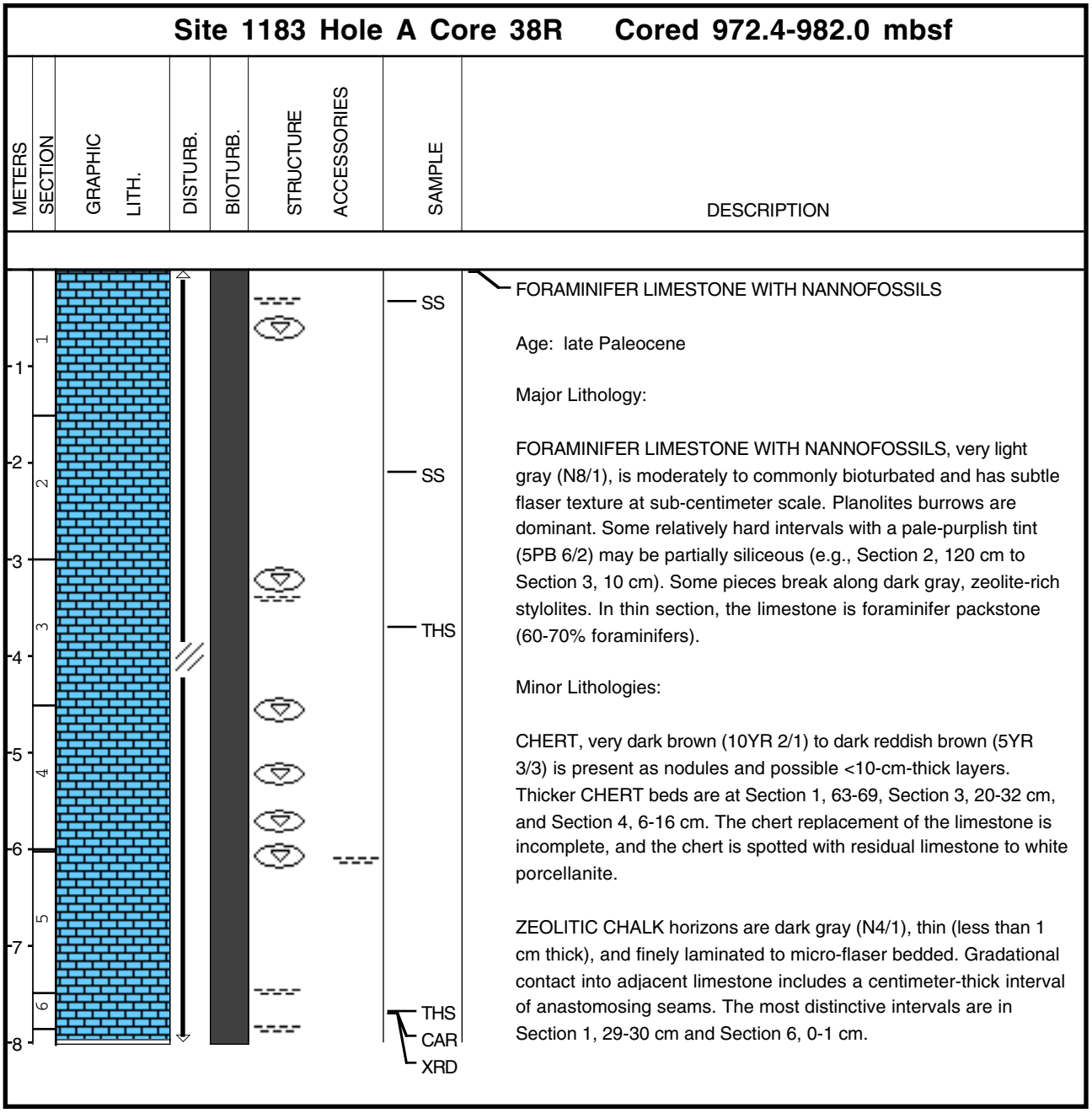
FORAMINIFER LIMESTONE WITH NANNOFOSSILS, white (N9) to very light gray (N8/1), is moderately to commonly bioturbated. Planolites burrows are dominant, and Zoophycos and vertical burrows are common. Undersides of bioturbation within Section 3, 135 cm, through Section 4, 50 cm, have been outlined with bluish-gray (10B 6/1). Several pieces have broken along very-dark-gray zeolite-rich stylolites. A few intervals display a diagenetic micro-flaser texture adjacent to concentrations of gray laminae that are enriched in volcanic ash. In thin section, the limestone is dense foraminifer wackestone (about 50% foraminifers) and is foraminifer grainstone (80% foraminifers) in zones with microflasers and anastomosing seams.

Minor Lithologies:

CHERT, dark brown (7.5YR 4/4), is in Section 1, 60-68 cm and 130-136 cm, and is spotted with residual limestone to white porcellanite.

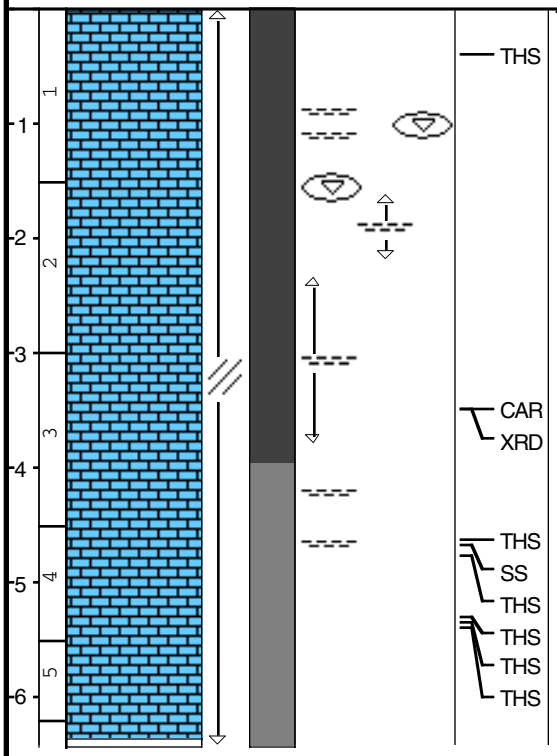
ZEOLITIC CHALK WITH VITRIC SHARDS, gray (N5/1). Texture is finely laminated where thicker than 0.5 cm; otherwise the layers are a seam or group of seams in an anastomosing pattern with gradational contacts into adjacent limestone. The most distinctive intervals are in Section 4, 55-60 cm and 95-97 cm.

Core Photo


Site 1183 Hole A Core 38R Cored 972.4-982.0 mbsf
METERS
SECTION
GRAPHIC LITH.
DISTURB.
BIOTURB.
STRUCTURE
ACCESSORIES
SAMPLE
DESCRIPTION
SS
SS
THS
THS
CAR
XRD
FORAMINIFER LIMESTONE WITH NANNOFOSSILS
Age: late Paleocene
Major Lithology:
FORAMINIFER LIMESTONE WITH NANNOFOSSILS, very light gray (N8/1), is moderately to commonly bioturbated and has subtle flaser texture at sub-centimeter scale. Planolites burrows are dominant. Some relatively hard intervals with a pale-purplish tint (5PB 6/2) may be partially siliceous (e.g., Section 2, 120 cm to Section 3, 10 cm). Some pieces break along dark gray, zeolite-rich stylolites. In thin section, the limestone is foraminifer packstone (60-70% foraminifers).
Minor Lithologies:
CHERT, very dark brown (10YR 2/1) to dark reddish brown (5YR 3/3) is present as nodules and possible <10-cm-thick layers. Thicker CHERT beds are at Section 1, 63-69, Section 3, 20-32 cm, and Section 4, 6-16 cm. The chert replacement of the limestone is incomplete, and the chert is spotted with residual limestone to white porcellanite.
ZEOLITIC CHALK horizons are dark gray (N4/1), thin (less than 1 cm thick), and finely laminated to micro-flaser bedded. Gradational contact into adjacent limestone includes a centimeter-thick interval of anastomosing seams. The most distinctive intervals are in Section 1, 29-30 cm and Section 6, 0-1 cm.

Core Photo

Site 1183 Hole A Core 39R Cored 982.0-991.7 mbsf



DESCRIPTION

FORAMINIFER LIMESTONE WITH NANNOFOSSILS to FORAMINIFER NANNOFOSSIL CHALK

Age: late Maastrichtian to middle Paleocene

Major Lithologies:

There is a downward transition in Section 3, 78 to 120 cm, from light gray FORAMINIFER LIMESTONE WITH NANNOFOSSILS characterized by micro-flaser texture and abundant seams of ZEOLITIC CHALK downward to white NANNOFOSSIL FORAMINIFER CHALK.

Upper facies of FORAMINIFER LIMESTONE WITH NANNOFOSSILS, very light gray (10YR 7/1) in Section 1, 0-100 cm, and light gray (N6.5 to 5Y 6.5/1) from Section 1, 100 cm, to Section 3, 100 cm. Pervasive bioturbation, but few distinct large burrows. Texture at sub-centimeter scale is microflaser. Average color is slightly darker than the similar facies in Core 38R. Horizons or pressure-solution seams of ZEOLITIC CHALK are common, especially in Section 2 and Section 3, 0-78 cm, where they are spaced at 5 to 10 cm intervals. Seams are dark greenish gray (10Y 4/1) and 1-5 mm in width. In thin section, the limestone is foraminifer packstone (60-70% foraminifers).

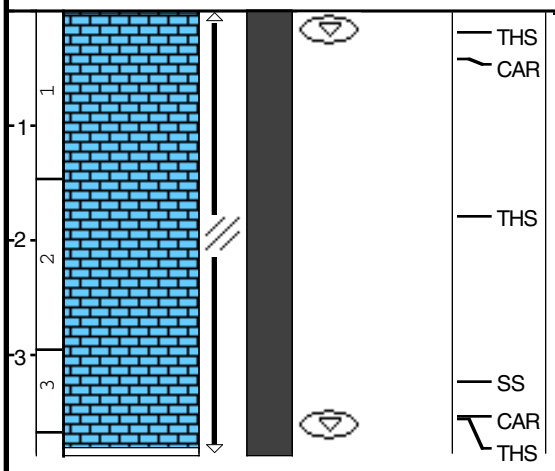
Lower facies is FORAMINIFER NANNOFOSSIL LIMESTONE to CHALK, white (10Y 9/1 to N9), with moderate bioturbation and a few larger distinct burrows. Lithification is intermediate between chalk and limestone. Beds of ZEOLITIC CHALK are rare, in contrast to the abundance in the overlying facies. The lowest bed of ZEOLITE CHALK (Section 4, 14-15 cm) is unusually thick (1 cm), greenish gray (10Y 5/1), and faintly laminated. Contacts with adjacent limestone were not recovered, but it appears that greenish-colored material from this layer is piped downward in burrows. In thin section, the limestone ranges from foraminifer wackestone (20% foraminifers) to foraminifer packstone-grainstone (40% foraminifers).

Minor Lithologies:

Rare CHERT nodules are greenish gray (10Y 5/1).

Core Photo

Site 1183 Hole A Core 40R Cored 991.7-1001.4 mbsf



DESCRIPTION

NANNOFOSSIL FORAMINIFER CHALK

Age: late Maastrichtian

Major Lithology:

NANNOFOSSIL FORAMINIFER CHALK, white (N9) to very light gray (N8), has common bioturbation and scattered black stylolites. Lithification is intermediate between chalk and limestone. Burrows are filled by white finer-grained limestone. Planolites-type and vertical burrows are dominant. The microfacies in thin section is foraminifer packstone to wackestone with about 30-40% foraminifers.

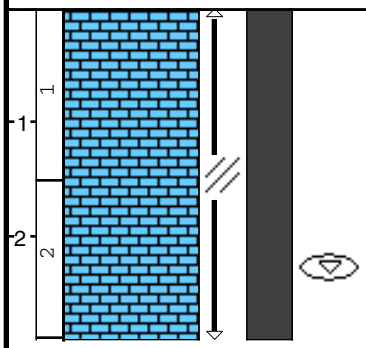
Minor Lithology:

CHERT, moderate reddish brown (10R 4/6) to dark brown (10YR 3/6), is present as rare replacement nodules and possible wider bands or lenses that are recovered as an interval of chert fragments. A thin section (Sample 40R-1, 18-19 cm) indicates that the silicification replaced a foraminifer packstone and that the color is derived from finely disseminated reddish minerals which are probably iron oxide.

Core Photo

Site 1183 Hole A Core 41R Cored 1001.4-1011.1 mbsf

METERS | SECTION | GRAPHIC LITH. | DISTURB. | BIOTURB. | STRUCTURE | ACCESSORIES | SAMPLE | DESCRIPTION



FORAMINIFER NANNOFOSSIL LIMESTONE

Age: late Maastrichtian

Major Lithology:

FORAMINIFER NANNOFOSSIL LIMESTONE, white (N9), has common bioturbation and scattered black stylolites. Burrows are filled by finer-grained white sediment, and Planolites are dominant. The microfacies in thin section is foraminifer wackestone with about 20% foraminifers.

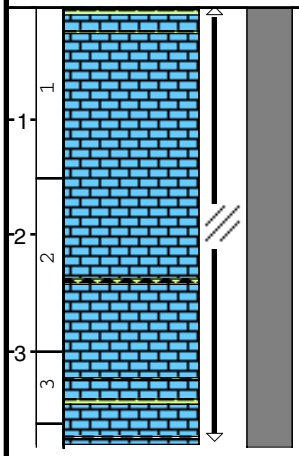
Minor Lithology:

CHERT nodules, moderate reddish brown (10R 4/6), are in Section 2 at 75 cm and 100 cm.

Core Photo

Site 1183 Hole A Core 42R Cored 1011.1-1020.8 mbsf

METERS | SECTION | GRAPHIC LITH. | DISTURB. | BIOTURB. | STRUCTURE | ACCESSORIES | SAMPLE | DESCRIPTION



THS
CAR
XRD
SS

FORAMINIFER NANNOFOSSIL LIMESTONE

Age: late Maastrichtian

Major Lithology:

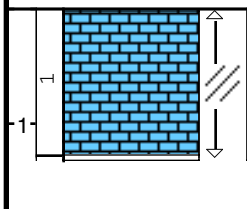
FORAMINIFER NANNOFOSSIL LIMESTONE, white (N9), has common bioturbation and scattered stylolites. Burrows are filled by finer-grained light gray sediment, are predominantly parallel to bedding, and are dominated by Planolites types. The microfacies in thin section is foraminifer wackestone with about 20-25% foraminifers.

Minor Lithology:

There are rare horizons of CHERT nodules of moderate reddish brown (10R 4/6).

Core Photo

Site 1183 Hole A Core 43R Cored 1020.8-1030.4 mbsf



FORAMINIFER NANNOFOSSIL LIMESTONE

Age: late Maastrichtian

Major Lithology:

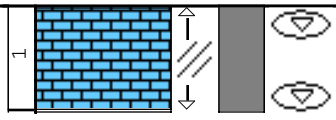
FORAMINIFER NANNOFOSSIL LIMESTONE, white (N9), has common bioturbation and scattered stylolites. Burrows are filled by finer-grained light greenish gray or white sediment. Burrows are not dominantly bedding parallel but concentrations of foraminifers are present as stringers. Stylolites are present in Section 1 at 22 and 73 cm. The microfacies in thin section is foraminifer wackestone with about 20-25% foraminifers.

Minor Lithology:

Nodule of CHERT, reddish brown (2.5YR 3/6), is at Section 1, 10-13 cm.

Core Photo

Site 1183 Hole A Core 44R Cored 1030.4-1040.0 mbsf



FORAMINIFER NANNOFOSSIL LIMESTONE

Age: early to late Maastrichtian

Major Lithology:

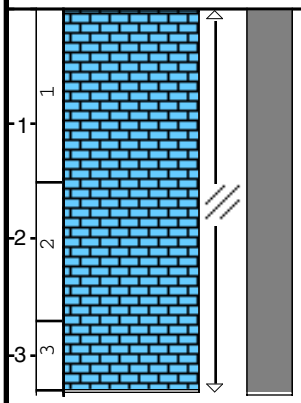
FORAMINIFER NANNOFOSSIL LIMESTONE, white (N9) with common bioturbation and scattered stylolites. Burrows are filled by finer-grained light greenish gray or white sediment.

Minor Lithology:

Pieces of CHERT, reddish brown (2.5YR 3/6), are in Section 1 at 1-5 cm and 80-90 cm.

Core Photo

Site 1183 Hole A Core 45R Cored 1040.0-1049.6 mbsf



NANNOFOSSIL LIMESTONE

Age: early Maastrichtian

Major Lithology:

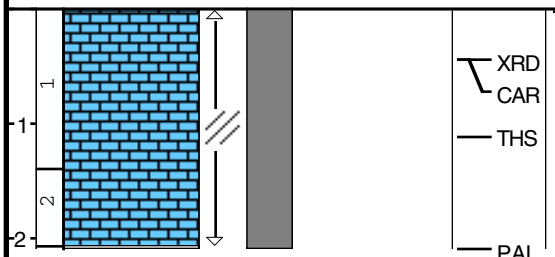
NANNOFOSSIL LIMESTONE, white (N9), alternates with 5- to 10-cm thick beds of light yellow (10YR 8/2) NANNOFOSSIL LIMESTONE. The light yellow (10YR 8/2) NANNOFOSSIL LIMESTONE intervals are in Section 1 at 3-10 cm, 42-46 cm, 93-95 cm, and 110-114 cm, in Section 2 at 4-10 cm, 72-75 cm, 92-98 cm, ar 112-116 cm, and in Section 3 at 50-60 cm. The white micritic limestor contains about 10-15% foraminifers in thin section, and the light yellow micritic limestone contains less than 5% foraminifers in thin section. Both facies have common bioturbation and scattered stylolites. Burrows are filled by finer-grained light greenish gray or white sediment. The white limestone alternates with 5 to 10 cm thick light yellow (10YR 8/2) limestone. The white micritic limestone contains about 10-15% foraminifers in thin section.

Minor Lithology:

Pieces of CHERT, reddish brown (2.5YR 3/6), are in Section 3 at 32-35 cm and 80-90 cm.

Core Photo

Site 1183 Hole A Core 46R Cored 1049.6-1059.2 mbsf



DESCRIPTION

NANNOFOSSIL LIMESTONE

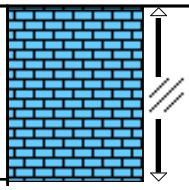
Age: late Campanian to early Maastrichtian

Major Lithology:

NANNOFOSSIL LIMESTONE, white (N9), alternates with 5- to 10-cm thick beds of light yellow (10YR 8/2) NANNOFOSSIL LIMESTONE. The light yellow (10YR 8/2) NANNOFOSSIL LIMESTONE intervals are in Section 2 at 33-37 cm, 57-63 cm and 93-95 cm. Burrows are filled by finer-grained light greenish gray or white sediment. There are scattered stylolites. The white micritic limestone contains about 10% foraminifers in thin section.

Core Photo

Site 1183 Hole A Core 47R Cored 1059.2-1068.8 mbsf

METERS	SECTION	GRAPHIC LITH.	DISTURB.	BIOTURB.	STRUCTURE	ACCESSORIES	SAMPLE	DESCRIPTION
1	1						XRD CAR	NANNOFOSSIL LIMESTONE

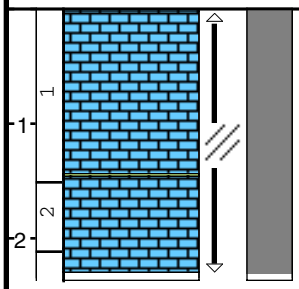
Age: late Campanian

Major Lithology:

NANNOFOSSIL LIMESTONE, white (N9), alternates with 5- to 10-cm thick beds of light yellow (10YR 8/2) NANNOFOSSIL LIMESTONE. The light yellow (10YR 8/2) NANNOFOSSIL LIMESTONE intervals are in Section 1 at 5-7 cm, 40-43 cm, 52-55 cm, 63-67 cm, 120-130 cm, and 142-145 cm. Burrows are filled by finer-grained light greenish gray or white sediment.

Core Photo

Site 1183 Hole A Core 48R Cored 1068.8-1078.5 mbsf



NANNOFOSSIL LIMESTONE

Age: late Campanian

Major Lithology:

NANNOFOSSIL LIMESTONE, white (N9), alternates with 5- to 10-cm thick beds of light yellow (10YR 8/2) NANNOFOSSIL LIMESTONE. The light yellow (10YR 8/2) NANNOFOSSIL LIMESTONE intervals are in Section 1 at 16-26 cm, 40-44 cm, 53-56 cm, 63-67 cm, 93-97 cm, 110-114 cm and 123-135 cm, in Section 2 at 10-18 cm and 40-50 cm, and in Section 3 at 12-16 cm. The light yellow micritic limestone contains about 5% foraminifers in thin section.Burrows are filled by finer-grained light greenish gray or white sediment.

Minor Lithology:

A piece of CHERT, reddish brown (2.5YR 3/6), is in Section 1 at 144-148 cm.

Core Photo

Site 1183 Hole A Core 49R Cored 1078.5-1088.2 mbsf

METERS	SECTION	GRAPHIC LITH.	DISTURB.	BIOTURB.	STRUCTURE	ACCESSORIES	SAMPLE	DESCRIPTION
	1						XRD CAR PAL	NANNOFOSSIL LIMESTONE

Age: late Campanian

Major Lithology:

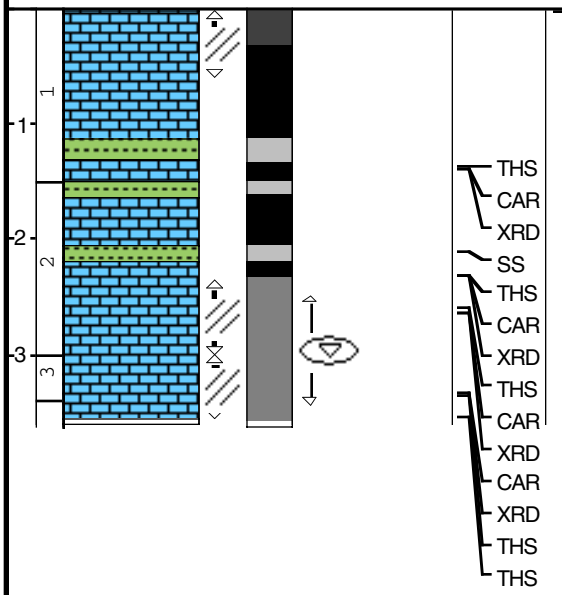
NANNOFOSSIL LIMESTONE, white (N9), alternates with 5- to 10-cm thick beds of light yellow (10YR 8/2) NANNOFOSSIL LIMESTONE. Burrows are filled by finer-grained light greenish gray or white sediment.

Minor Lithology:

Piece of CHERT, reddish brown (2.5YR 3/6), is in Section 1 at 0-5 cm.

Core Photo

Site 1183 Hole A Core 50R Cored 1088.2-1097.9 mbsf



DESCRIPTION

NANNOFOSSIL LIMESTONE and CALCAREOUS CLAYSTONE

Ages: late Albian, Coniacian, Santonian, and early Campanian

This core contains three distinct lithologic groups. Contacts between the groups were not recovered.

Major Lithologies:

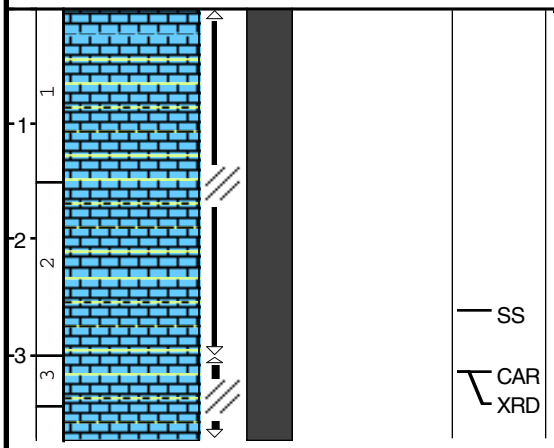
Section 1, 0-60 cm
NANNOFOSSIL LIMESTONE, in Section 1, 0-25 cm, is white (5YR 8/1) and darkens downward to pinkish white (5YR 3/2). It is intensely bioturbated with high diversity of trace fossils.

Section 1, 60 cm to Section 2, 87 cm
NANNOFOSSIL LIMESTONE, pink (5YR 5/6) to dark reddish brown (5YR 3/2), is intensely bioturbated with Planolites, Skolithos and other types. In thin section, the micritic limestone contains less than 3% foraminifers.
CALCAREOUS CLAYSTONE is dark reddish brown (5YR 3/2). There are three main intervals centered at approximately Section 1, 125 cm, and Section 2, 10 cm and 63 cm. Bioturbation is rare, and appears to originate from overlying limestone facies. In thin section (Sample 50R-2, 61-64 cm), the calcareous claystone contains about 20% nannofossils, 5-10% volcanic glass, and up to 10% opaque particles that may be Fe- and/or Mn-oxides. Claystone-rich intervals appear to be about 10 cm thick, with gradula transitions due to bioturbation. Sharp redox fronts (Mn oxide staining?) are superimposed upward and downward onto the bioturbated limestone facies from the claystone facies, as evidenced by color fronts crossing individual burrows.

Section 2, 87 cm through Section CC
NANNOFOSSIL LIMESTONE, very light gray (N8) to medium gray (N5), has moderate to low bioturbation and a variable abundance of stylolites. In contrast to overlying facies, there are no large burrows (>1 cm length) or significant vertical trace fossils.
CHERT, very dark gray (N2) to dark reddish brown (5YR 2/2), is present as thin stringers to nodules. Darker and grayish coloration of limestone and chert are partially staining superimposed on an original lighter and pinkish-tan coloration. The micritic limestone in thin section contains 2-5% foraminifers.

Core Photo

Site 1183 Hole A Core 51R Cored 1097.9-1107.5 mbsf



DESCRIPTION

NANNOFOSSIL LIMESTONE

Age: late Albian

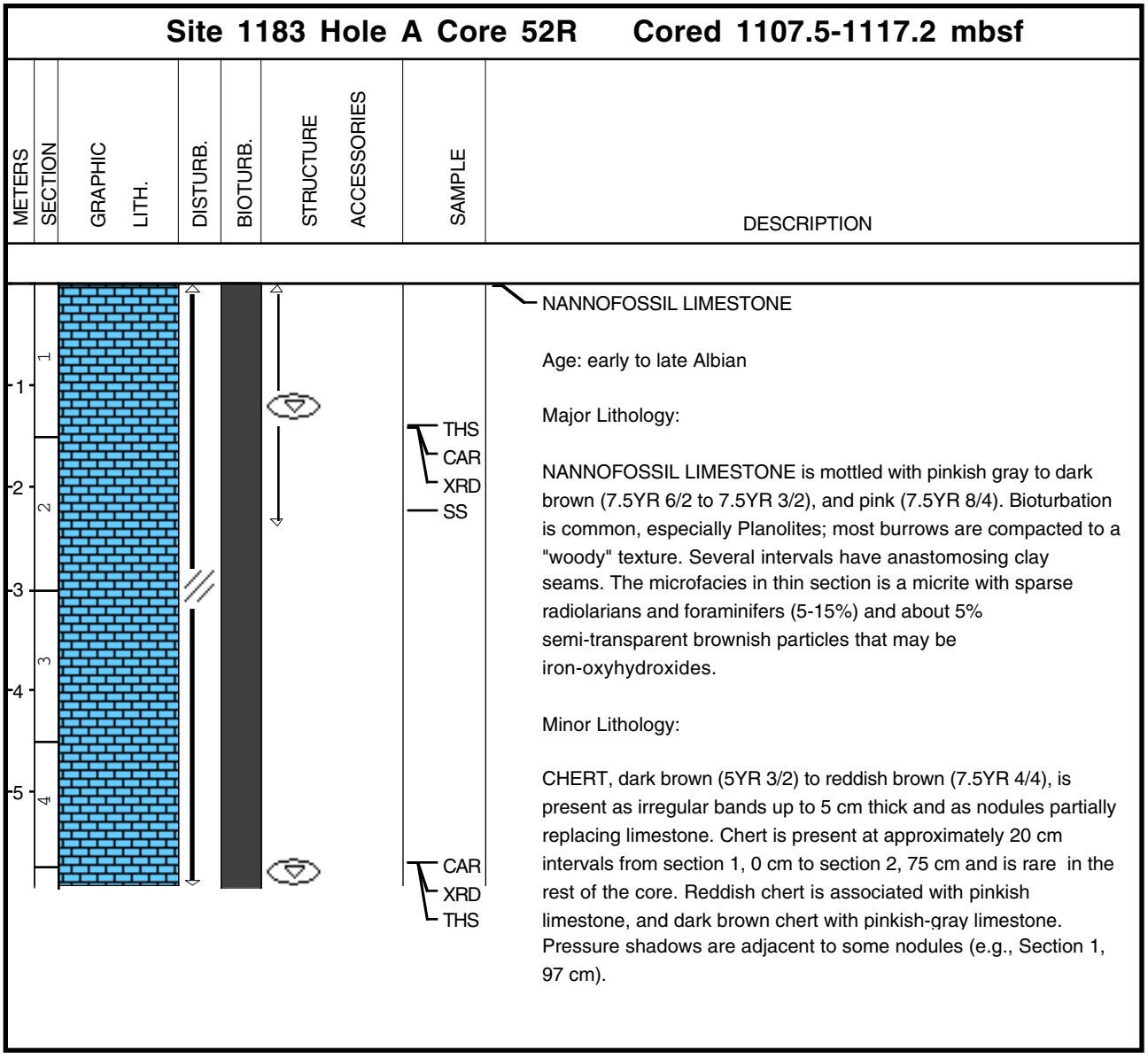
Major Lithology:

NANNOFOSSIL LIMESTONE is very light yellowish gray (2.5Y 8/2) to light yellowish gray (2.5Y 6/2), with thin bands (<0.5 cm) and lenticular patches of pinkish white (7.5YR 8/2) to white (N9). Small (<0.5 cm) burrows are common, especially Planolites. Discrete stylolites and anastomosing clay seams are abundant. The micritic limestone contains about 5% foraminifers and 2-3% calcified radiolarians in thin section.

Minor Lithology:

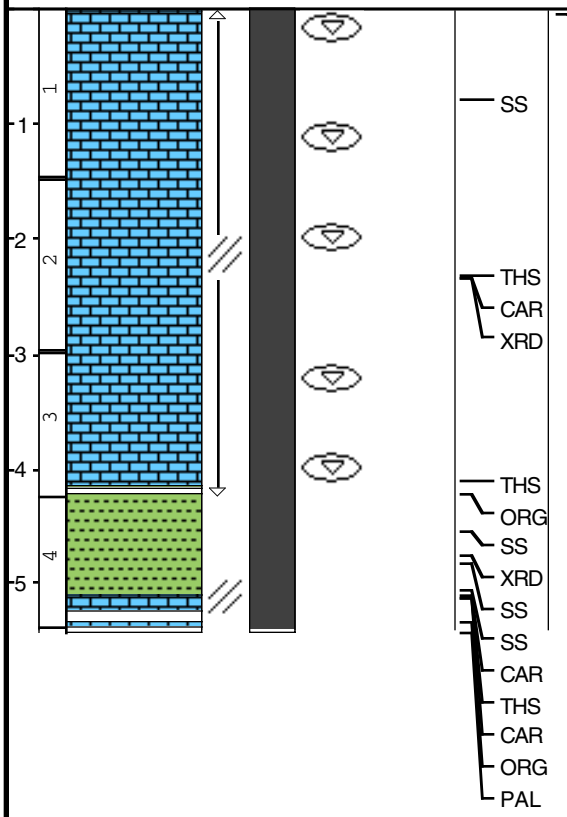
CHERT, dark brown (5YR 3/2) to black (5YR 2/1), is present as irregular bands up to 5 cm thick and as nodules partially replacing limestone. In thin section, the silicification is observed to replace radiolarian wackestone limestone.

Core Photo


Site 1183 Hole A Core 52R Cored 1107.5-1117.2 mbsf
METERS
SECTION
GRAPHIC LITH.
DISTURB.
BIOTURB.
STRUCTURE
ACCESSORIES
SAMPLE
DESCRIPTION
1
2
3
4
-1
-2
-3
-4
-5
THS
CAR
XRD
SS
CAR
XRD
THS
NANNOFOSSIL LIMESTONE
Age: early to late Albian
Major Lithology:
NANNOFOSSIL LIMESTONE is mottled with pinkish gray to dark brown (7.5YR 6/2 to 7.5YR 3/2), and pink (7.5YR 8/4). Bioturbation is common, especially Planolites; most burrows are compacted to a "woody" texture. Several intervals have anastomosing clay seams. The microfacies in thin section is a micrite with sparse radiolarians and foraminifers (5-15%) and about 5% semi-transparent brownish particles that may be iron-oxyhydroxides.
Minor Lithology:
CHERT, dark brown (5YR 3/2) to reddish brown (7.5YR 4/4), is present as irregular bands up to 5 cm thick and as nodules partially replacing limestone. Chert is present at approximately 20 cm intervals from section 1, 0 cm to section 2, 75 cm and is rare in the rest of the core. Reddish chert is associated with pinkish limestone, and dark brown chert with pinkish-gray limestone. Pressure shadows are adjacent to some nodules (e.g., Section 1, 97 cm).

Core Photo

Site 1183 Hole A Core 53R Cored 1117.2-1126.8 mbsf



NANNOFOSSIL LIMESTONE WITH FORAMINIFERS and FERRUGINOUS CALCAREOUS CLAYSTONE

Age: late Aptian to early Albian

Major Lithology:

NANNOFOSSIL LIMESTONE WITH FORAMINIFERS has interbedding of white to light orange pink (N9 - 5YR 8/3) and gray (N8 - 2.5Y 8/2) with common bioturbation throughout. Pink intervals appear more massive and contain Planolites whereas gray intervals commonly contain well defined Chondrites filled with lighter colored sediment. Color boundaries are variously sharp or gradational over a few cm and can cut across primary fabric or are present as isolated patches. Color alternations are more closely spaced in Section 2 than in Section 1. Anastomosing clay seams are present in both colors but are more prevalent in gray intervals. Microfacies range from foraminifer wackestone (20% foraminifers in Sample 53R-2, 83-86 cm) to nannofossil micritic limestone with sparse foraminifers (Sample 53R-4, 86-88 cm).

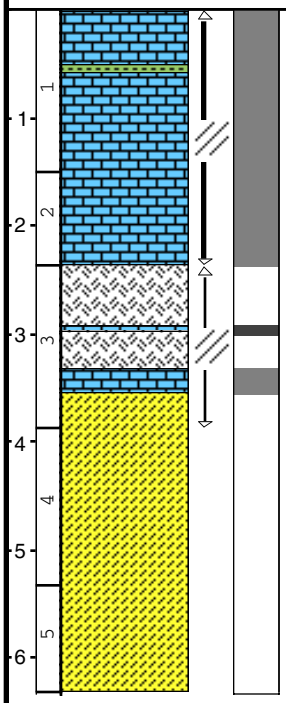
FERRUGINOUS CALCAREOUS CLAYSTONE (Section 3, 115 cm to Section 4, 85 cm) is reddish brown (5YR 4/3) to black (5YR 2/1) and is laminated with stringers and lenses composed of sand to silt-sized foraminifers and radiolarians. Interval is darker colored in basal 6 cm. Sand and silt laminae are more abundant toward base of interval but are not present in basal 6 cm. A thin section from the top of this bed is ferruginous calcareous claystone with foraminifers and opaque minerals.

Minor Lithologies:

CHERT, speckled reddish brown (5YR 4/4) to dark reddish brown (5YR 3/2), is present as isolated pieces.

Core Photo

Site 1183 Hole A Core 54R Cored 1126.8-1136.5 mbsf



LIMESTONE WITH FORAMINIFERS, RADIOLARIAN LIMESTONE, and BASALTIC LITHIC SANDSTONE

Age: early to late Aptian

Major Lithologies:

LIMESTONE WITH FORAMINIFERS to RADIOLARIAN LIMESTONE is multi-colored, including white (N9), gray (N7), yellow (2.5YR 7/6), pink (7.5YR 9/1), reddish brown (5YR 4/4) and olive brown (2.5 Y 4/4). Color transitions are either gradual or sharp and usually subhorizontal but also are present as isolated patches. Faintly burrow mottled throughout including Planolites. Dark filled Chondrites are present from Section 1, 20 cm to Section 2, 90 cm but are most common in Section 1, 100-150 cm. The dark color seems to be a diagenetic stain that continues as a faint halo beyond burrow edges. Halos are elongate parallel to bedding. Anastomosing clay seams are common and are present in gray, olive, and reddish intervals. Particularly thick intervals are in Section 1 at 23-30 cm, in Section 2 at 30-35 cm, and in Section 3 at 105-107 cm. Microfacies in thin section include foraminifer wackestone (Sample 54R-2, 28-31 cm) and calcified-radiolarian packstone with few planktonic foraminifers (Sample 54R-3, 59-62 cm).

BASALTIC LITHIC SANDSTONE, olive gray (5Y 5/2) to reddish brown (2.5YR 5/3), is fine-grained to medium-grained. Grains are dominantly nonvesicular, partly glassy, basaltic rock fragments within zeolite cement. Thin beds represent at least 8 depositional units with a thin interbed of limestone in Section 3, 55-63 cm. Quartz (?) filled burrows at 17, 43, 71, and 89 cm. Depositional units are normally graded. The uppermost unit is the thickest (Section 3, 0-33 cm) and includes a graded interval (33-27 cm), a parallel-laminated interval (27-23 cm) and a cross-laminated interval (23 -10 cm) suggesting deposition by a turbidity current.

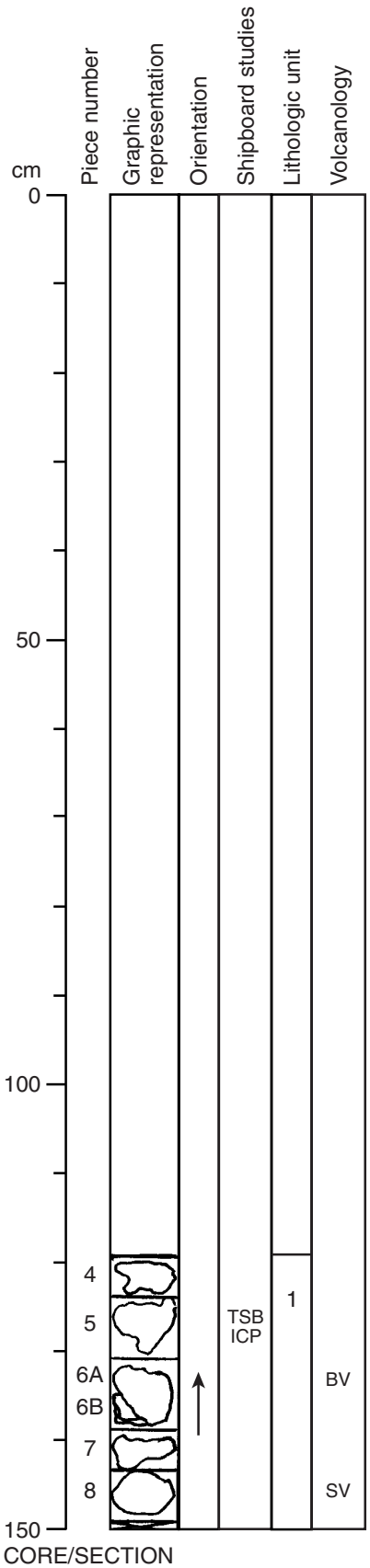
Top of recovered BASALT is at Section 3, 107 cm. Contact with overlying limestone was not recovered.

Minor Lithologies:

CLAYSTONE (Section 1, 50-60 cm) dark reddish brown (5YR 3/2) is laminated with rare stringers of fine-grained sand-size to coarse-grained silt-size material which may be recrystallized foraminifers, and contains rare burrows.

Within the basalt, a thin interbed of LIMESTONE, light yellow (2.5Y 8/6), is present in Section 4, Piece 2A, 6-10 cm.

Core Photo



192-1183A-54R-3 **Section Top: 1129.17 mbsf**

UNIT 1: APHYRIC BASALT

Pieces: 4–8

CONTACTS: Not recovered. The contact between Unit 1 and the overlying limestone is inferred to be between Pieces 3 and 4.

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

GROUNDMASS: Aphanitic.

VESICLES: Generally nonvesicular, but sparsely vesicular in fine grained areas (0.1–0.5 mm). Rare irregular elongate vesicles are oriented with the long axis in the direction of groundmass grain size variations.

COLOR: Medium light gray (N6).

STRUCTURE: Massive. No glassy margins observed, but inferred to be the interiors of pillows on the basis of elongate vesicle orientation and subtle changes in groundmass grain size seen in Pieces 5–8.

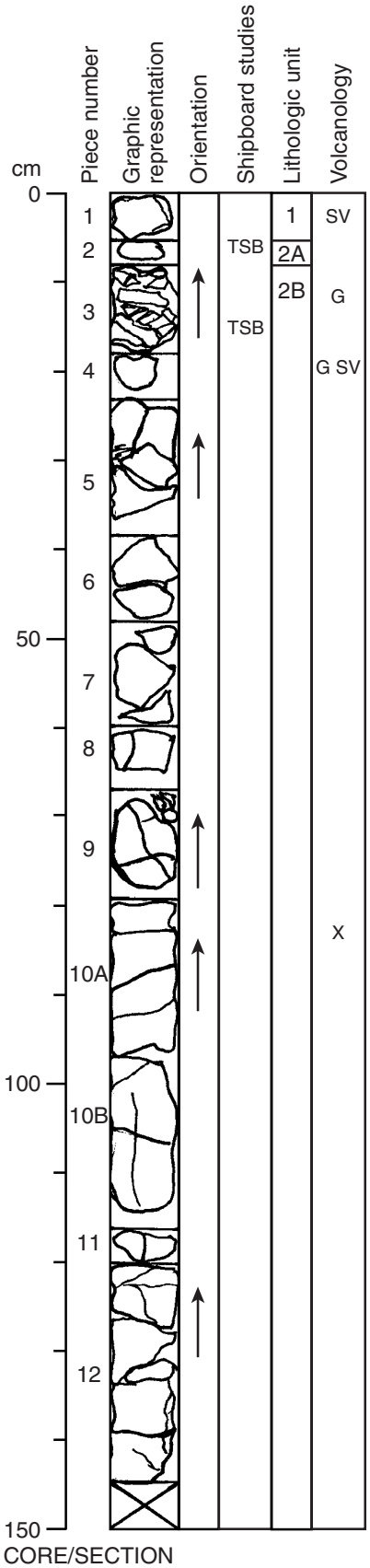
ALTERATION: Slight. Olivine phenocrysts are completely replaced by green and brown clay.

VEINS/FRACTURES: Sparse veined. Veins are <1-2 mm wide and are filled with carbonate and clay minerals; they have associated oxidation fronts.

Description of thin section at 125-127 cm.

Whole-rock ICP-AES data

Core Photo



192-1183A-54R-4 **Section Top: 1130.67 mbsf**

UNIT 1: APHYRIC BASALT

Piece: 1

CONTACTS: Not recovered. The contact between Units 1 and 2A is inferred to be between Pieces 1 and 2.

PHENOCRYSTS:

	%	Grain Size (mm):			
	Mode	Max	Min	Avg.	Shape/Habit
Olivine:	<1	1.5	1	1	Euhedral

GROUNDMASS: Aphanitic.

VESICLES: Sparsely vesiclular. Vesicles (0.1-0.8 mm) are irregular in shape and are filled with green and brown clay.

COLOR: Medium gray (N5) to medium dark gray (N4).

STRUCTURE: Massive.

ALTERATION: Moderate. Olivine phenocrysts are replaced by brown clay.

VEINS/FRACTURES: Sparsely veined. Veins are <1-2 mm wide and are filled with green and brown clay; they have associated oxidation fronts.

UNIT 2A: LIMESTONE

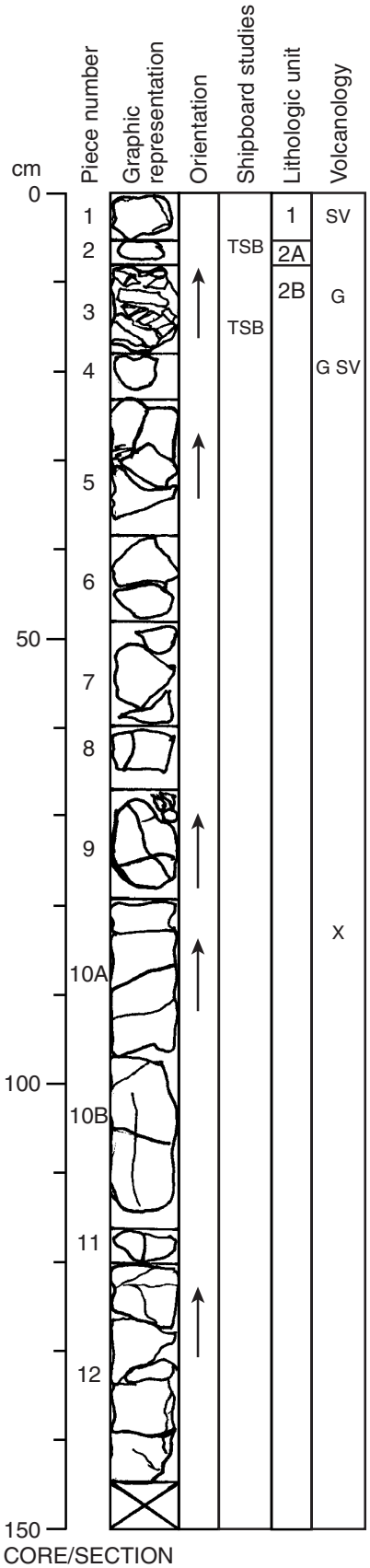
Piece: 2

CONTACTS: Not recovered. The contact between Units 1 and 2A is inferred to be between Pieces 1 and 2. The contacts between Units 2A and 2B is inferred to be between Pieces 2 and 3.

COLOR: Very pale brown (10YR 7/4).

COMMENTS: Interbedded between pillow basalts.

Core Photo



192-1183A-54R-4 **Section Top: 1130.67 mbsf**

UNIT 2B: APHYRIC BASALT AND HYALOCLASTITE

Pieces: 3–12

CONTACTS: Not recovered. The contact between Units 2A and 2B is inferred to be between Pieces 2 and 3.

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

GROUNDMASS: Aphanitic to fine grained; contains plagioclase, clinopyroxene, and black oxides.

VESICLES: Generally nonvesicular; sparsely vesicular in the aphanitic regions. Vesicles are filled with concentric clay layers.

COLOR: Medium gray (N5) to medium light gray (N6).

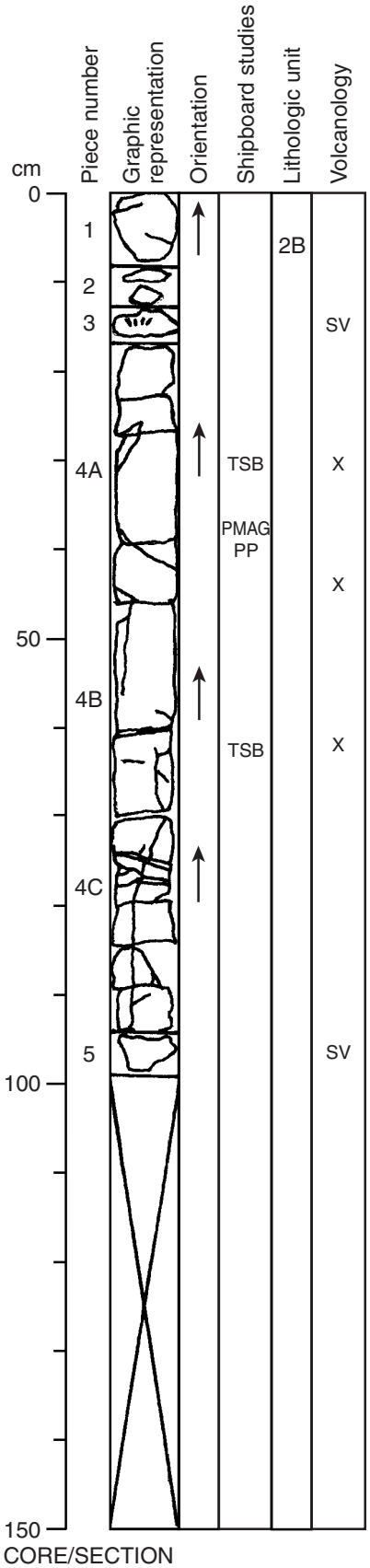
STRUCTURE: Pillowed. Pillows inferred from the presence of a hyaloclastite flow top (Piece 3), vesicle orientation and distribution, and groundmass grain size variations.

ALTERATION: Moderate. Olivine phenocrysts are completely replaced by green and brown clay. Piece 3 contains unaltered to moderately altered glass which is replaced by green clay. The limestone clasts in Piece 3 are brown to red in color.

VEINS/FRACTURES: Sparsely veined. Veins are <1-3 mm wide and are filled with carbonate and clay.

COMMENTS: Piece 3 is a hyaloclastite containing polygonal aphanitic basalt, glass and limestone clasts.

Core Photo



192-1183A-54R-5 **Section Top: 1132.13 mbsf**

UNIT 2B: APHYRIC BASALT

Pieces: 1–5

CONTACTS: None.

PHENOCRYSTS:

	% Mode	Grain Size (mm): Max	Min	Avg.	Shape/Habit
Olivine:	<1	1	0.5	0.8	Subhedral to euhedral

GROUNDMASS: Aphanitic in pillow margins and fine grained in pillow interiors; contains clinopyroxene, plagioclase, and black oxides.

VESICLES: Sparsely vesicular. Vesicles (1 mm) are elongated perpendicular to pillow margins and filled with concentric layers of clay.

COLOR: Aphanitic pillow margins are medium gray (N5); fine-grained pillow interiors are medium light gray (N6).

STRUCTURE: Pillowed. Pillows are inferred based on presence of glass, grain size variations, and elongation of vesicles (Piece 4B).

ALTERATION: Moderate. Olivine phenocrysts are completely replaced by green and brown clay.

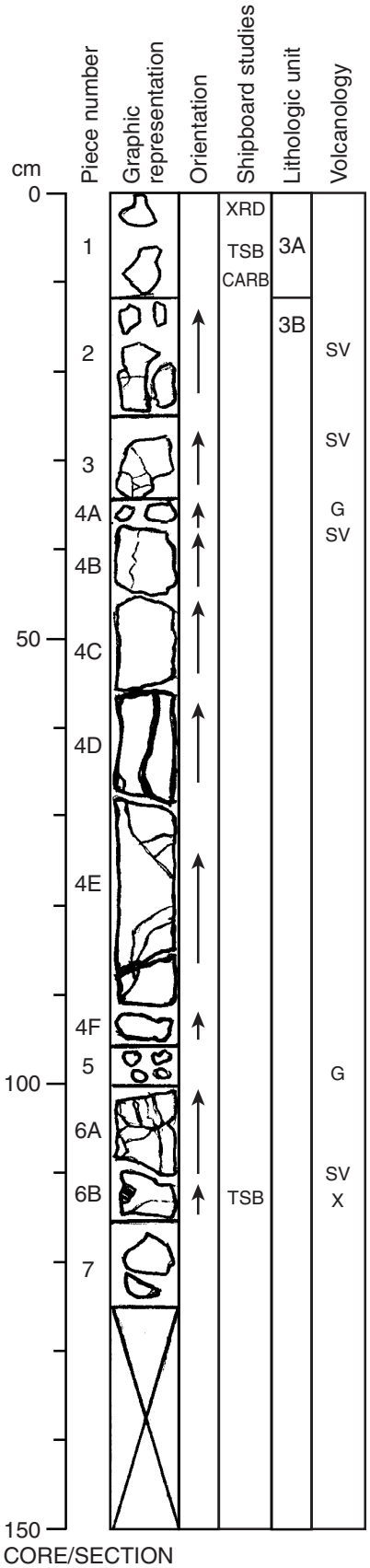
VEINS/FRACTURES: Sparsely veined. Vertical veins are < 1 mm wide; subhorizontal veins are 5 mm wide and filled with zeolite, clay, and calcite. Veins have associated oxidation fronts.

COMMENTS: Xenoliths are present in Pieces 4A and 4B. Xenolith 1 (Piece 4A, 32.5–34 cm): plagioclase (65%) and clinopyroxene (35%); grain size 1-2 mm; layering apparent; iron staining affects ~60 % of the plagioclase.
Xenolith 2 (Piece 4A, 42.5–43.5 cm): probable plagioclase megacryst; ~1 cm in diameter.
Xenolith 3 (Piece 4B, 64–66 cm): plagioclase (60%) and clinopyroxene (40%); 2 x 3 cm; grain size 1-2 mm; layering apparent; minor iron staining. Fractures from the host basalt penetrate this xenolith.
No change in grain size of basalt is observed adjacent to any of the xenoliths.

Description of thin section at 32-35 cm

Description of thin section at 64-66 cm

Core Photo



192-1183A-55R-1 **Section Top: 1136.5 mbsf**

UNIT 3A: LIMESTONE

Piece: 1

CONTACTS: Not recovered. The contact between Units 2B and 3A is inferred to be at the top of this section. The contact between Units 3A and 3B is inferred to be between Pieces 1 and 2.

TEXTURE: Fine grained.

COLOR: Very pale brown (10YR 8/2).

UNIT 3B: APHYRIC BASALT

Pieces: 2–7

CONTACTS: None.

PHENOCRYSTS:

	%	Grain Size (mm):			
	Mode	Max	Min	Avg.	Shape/Habit
Olivine:	<1	<1			Subhedral to euhedral

GROUNDMASS: Aphanitic.

VESICLES: Generally nonvesicular. Rare vesicles (0.1–0.5 mm) are subround to irregular.

COLOR: Medium light gray (N6) to medium gray (N5).

STRUCTURE: Pillowed. Pillows inferred from decrease in groundmass grain size towards the upper portion of the section, vertically aligned vesicles, and minor glass.

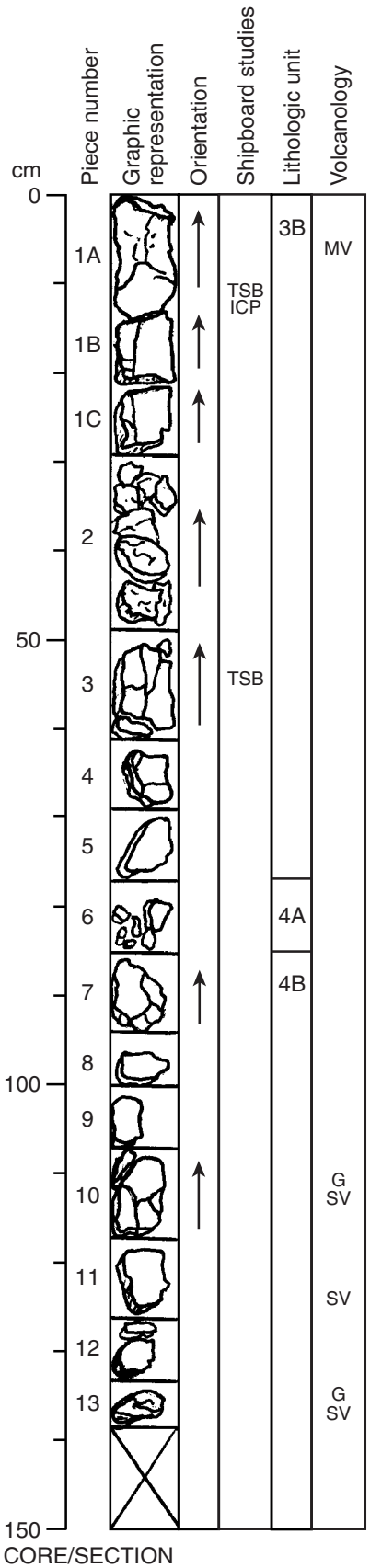
ALTERATION: Slight to moderate. Olivine phenocrysts are totally replaced by green clay.

VEINS/FRACTURES: Sparsely veined. Veins (<1-2 mm wide) decrease in abundance away from pillow margins and are filled with carbonate, green clay, or Fe oxyhydroxide; alteration halos are common.

COMMENTS: Piece 6B (113–115; split face) contains a 1.5 cm subround xenolith with a subhedral granular texture composed of ~80% plagioclase and ~20% clinopyroxene; the xenolith is slightly to moderately altered.

Description of thin section at 111-113 cm

Core Photo



192-1183A-55R-2 **Section Top: 1137.75 mbsf**

UNIT 3B: APHYRIC BASALT

Pieces: 1A–5

CONTACTS: Not recovered. The contact between Units 3B and 4A is inferred to be between Pieces 5 and 6.

PHENOCRYSTS:

	%	Grain Size (mm):			
	Mode	Max	Min	Avg.	Shape/Habit
Olivine:	<1	1.5	0.5	<1	Subhedral to euhedral.

GROUNDMASS: Aphanitic to fine grained; contains plagioclase, clinopyroxene, and black oxides.

VESICLES: Generally nonvesicular. Subround to irregular vesicles (<1-2 mm) occur locally. Piece 1A has the highest concentration of vesicles (2–3%), which are filled mainly with carbonate.

COLOR: Medium light gray (N6) to medium gray (N5).

STRUCTURE: Massive. No glassy margins observed, but grain size variations suggest that recovered material may be massive pillow interiors.

ALTERATION: Slight to moderate near veins.

VEINS/FRACTURES: Sparsely veined. Veins are <1-5 mm wide (Pieces 1A and 3) and are filled with clay, carbonate, and/or Fe oxyhydroxide; the wider veins have faint dark gray halos.

UNIT 4A: LIMESTONE

Piece: 6

CONTACTS: Not recovered. The contact between Units 3B and 4A is inferred to be between Pieces 5 and 6. The contact between Units 4A and 4B is inferred to be between Pieces 6 and 7.

TEXTURE: Fine grained.

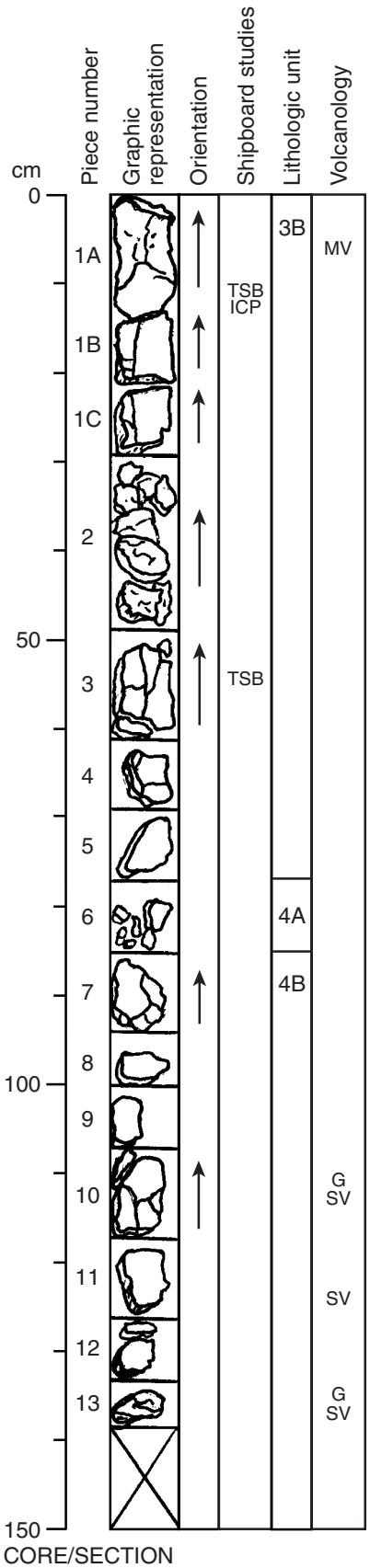
COLOR: Very pale brown (10YR 8/3) to pale brown (10YR 6/3).

Description of thin section at 12-15 cm

Description of thin section at 54-57 cm

Whole-rock ICP-AES data

Core Photo



192-1183A-55R-2 **Section Top: 1137.75 mbsf**

UNIT 4B: APHYRIC BASALT

Pieces: 7–13

CONTACTS: Not recovered. The contact between Units 4A and 4B is inferred to be between Pieces 6 and 7.

PHENOCRYSTS:	% Mode	Grain Size (mm): Max	Min	Avg.	Shape/Habit
Olivine:	<1	0.8	0.1	0.4	Subhedral to euhedral

GROUNDMASS: Aphanitic to fine grained; contains plagioclase, clinopyroxene and black oxides. Some glass is present.

VESICLES: Generally nonvesicular. Rare subround vesicles (≤3 mm) are filled with carbonate (e.g., Piece 10) and irregular vesicles (0.5–1.5 mm) are filled with green clay.

COLOR: Medium gray (N5) to medium light gray (N6).

STRUCTURE: Pillowed. Pillows are inferred based on presence of glass (top of Pieces 10 and 13) and variations in groundmass grain size.

ALTERATION: Moderate. Olivine phenocrysts are completely replaced by yellow-brown clay and Fe oxyhydroxide.

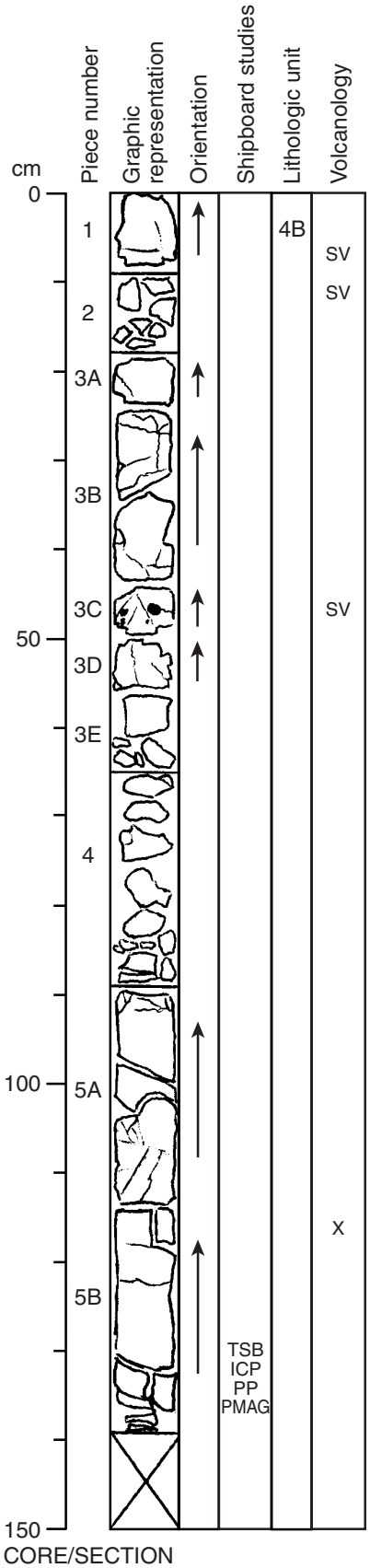
VEINS/FRACTURES: Sparsely veined. Veins (<1 mm) are filled with brown clay and are more abundant in finer grained areas (e.g., Pieces 10 and 13).

Description of thin section at 12-15 cm

Description of thin section at 54-57 cm

Whole-rock ICP-AES data

Core Photo



192-1183A-55R-3 **Section Top: 1139.14 mbsf**

UNIT 4B: APHYRIC BASALT

Pieces: 1–5B

CONTACTS: None.

PHENOCRYSTS:

	%	Grain Size (mm):			
	Mode	Max	Min	Avg.	Shape/Habit
Olivine:	<1	1.5	<1	~1	Subhedral to euhedral

GROUNDMASS: Aphanitic to fine grained; contains plagioclase and clinopyroxene.

VESICLES: Generally nonvesicular. Rare vesicles (<0.1–2 mm) are subround to irregular.

COLOR: Light gray (N7) to medium gray (N5).

STRUCTURE: Pillowed. A glass rim occurs on one of the fragments of Piece 2.

ALTERATION: Slight to moderate.

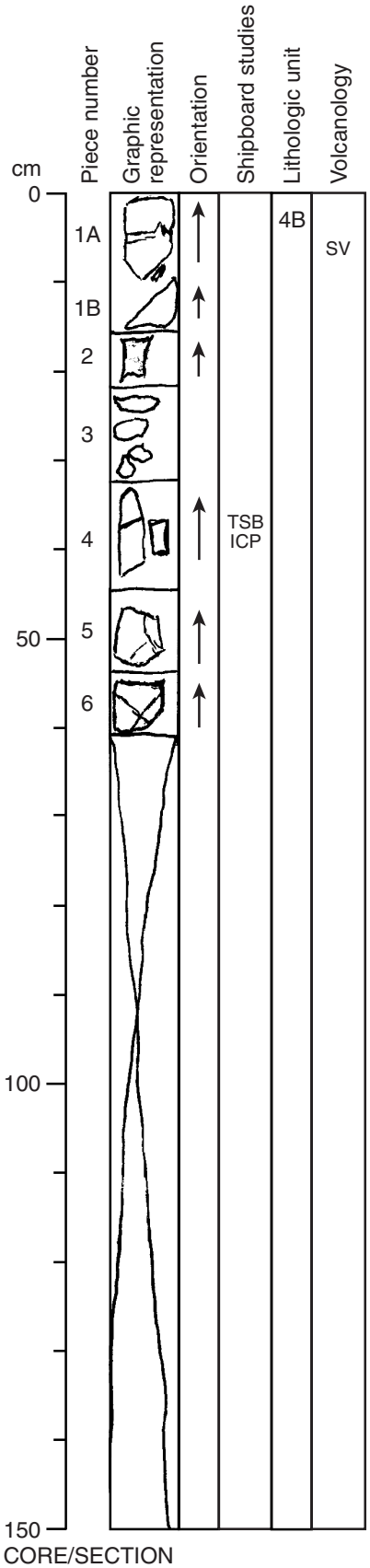
VEINS/FRACTURES: Sparsely veined. Veins are <1-3 mm wide and are filled with clay and Fe oxyhydroxide.

COMMENTS: A subround xenolith in Piece 5B (116–117 cm; split face) is 8 mm in diameter and contains ~80% plagioclase and ~20% clinopyroxene; it has a subhedral granular texture.

Description of thin section at 128-129 cm

Whole-rock ICP-AES data

Core Photo



192-1183A-55R-4 **Section Top: 1140.53 mbsf**

UNIT 4B: APHYRIC BASALT

Pieces: 1A–6

CONTACTS: None.

PHENOCRYSTS:

	% Mode	Grain Size (mm): Max	Min	Avg.	Shape/Habit
Olivine:	<1	1.5	<1	~1	Subhedral to euhedral

GROUNDMASS: Aphanitic to fine grained; contains plagioclase, clinopyroxene, and black oxides.

VESICLES: Generally nonvesicular. Rare vesicles (0.1–0.5 mm) are subround to irregular.

COLOR: Medium gray (N5) to light gray (N7).

STRUCTURE: Massive. No glassy margins observed, but grain size variations suggest that recovered material may be massive pillow interiors.

ALTERATION: Slight to moderate.

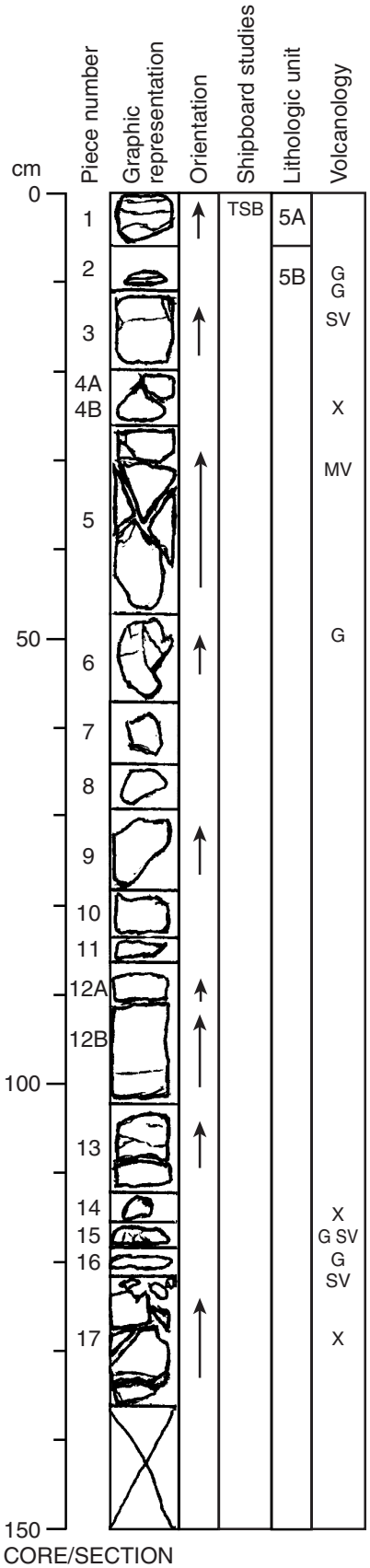
VEINS/FRACTURES: Sparsely veined. Veins are <1-5 mm wide and are filled with green clay and Fe oxyhydroxide. A large vein in Piece 1A has a halo.

COMMENTS: Piece 1B contains a 10 x 6 mm plagioclase xenolith (13–14 cm; outer surface).

Description of thin section at 38-41 cm

Whole-rock ICP-AES data

Core Photo



192-1183A-56R-1 **Section Top: 1146.10 mbsf**

UNIT 5A: RECRYSTALLIZED LIMESTONE

Piece: 1

CONTACTS: Not recovered. The contact between Units 4B and 5A is inferred to be at the top of this section. The contact between Units 5A and 5B is inferred to be between Pieces 1 and 2.

TEXTURE: Medium to coarse grained.

COLOR: Layered; from top to bottom, white (N9), greenish gray (5G 6/1), brown (10YR 4/3), and greenish gray (5G 6/1).

UNIT 5B: APHYRIC BASALT

Pieces: 2–17

CONTACTS: Not recovered. The contact between Units 5A and 5B is inferred to be between Pieces 1 and 2.

PHENOCRYSTS:

	%	Grain Size (mm):			
	Mode	Max	Min	Avg.	Shape/Habit
Olivine:	<1	1	0.2	0.5	Subhedral to euhedral

GROUNDMASS: Aphanitic to fine grained; contains plagioclase, clinopyroxene, and black oxides.

VESICLES: Variable in abundance. Moderately vesicular ~1 cm below glassy rim in Piece 5; vesicularity decreases towards the interior of pillows. Most pieces are nonvesicular, but rare vesicles (0.1–0.5 mm) are subround to irregular and filled with clay.

COLOR: Light gray (N7) to medium gray (N5).

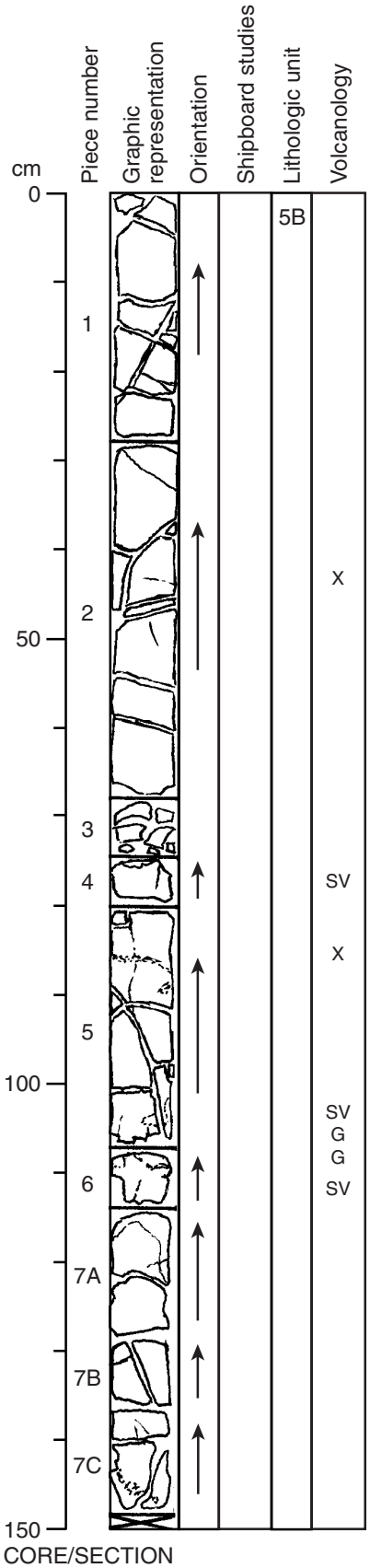
STRUCTURE: Pillowed. Three individual pillows can be distinguished by glassy rims and variations in grain size: Pillow 1 in Pieces 2–5; Pillow 2 in Pieces 6–15; Pillow 3 in Pieces 16–17.

ALTERATION: Slight; moderate near veins. Olivine phenocrysts are totally replaced by green clay.

VEINS/FRACTURES: Sparsely veined. Veins are more abundant close to pillow margins; veins are <1 to 3 mm wide and are filled with carbonate, clay, Fe oxyhydroxide, and brown clay (Piece 7).

COMMENTS: Hyaloclastite occurs at the top of Unit 5B (Piece 2) and at the bottom of the section (Piece 16).

Core Photo



192-1183A-56R-2 **Section Top: 1147.45 mbsf**

UNIT 5B: APHYRIC BASALT

Pieces: 1–7C

CONTACTS: None.

PHENOCRYSTS:

	% Mode	Grain Size (mm): Max	Min	Avg.	Shape/Habit
Olivine:	<<1	1.5	<1	~1	Subhedral to euhedral

GROUNDMASS: Predominantly fine grained; contains plagioclase, clinopyroxene and black oxides; locally subophitic texture observed. Pieces 1, 2, and 7 are fine grained; Piece 5 is fine grained to aphanitic; Pieces 3 and 4 are aphanitic; Piece 6 is aphanitic to glassy.

VESICLES: Generally nonvesicular; sparsely vesicular near glassy margins. Vesicles are randomly oriented, 0.5–2 mm in diameter, and irregular to subround with a dark gray clay filling.

COLOR: Medium gray (N5) to medium light gray (N6).

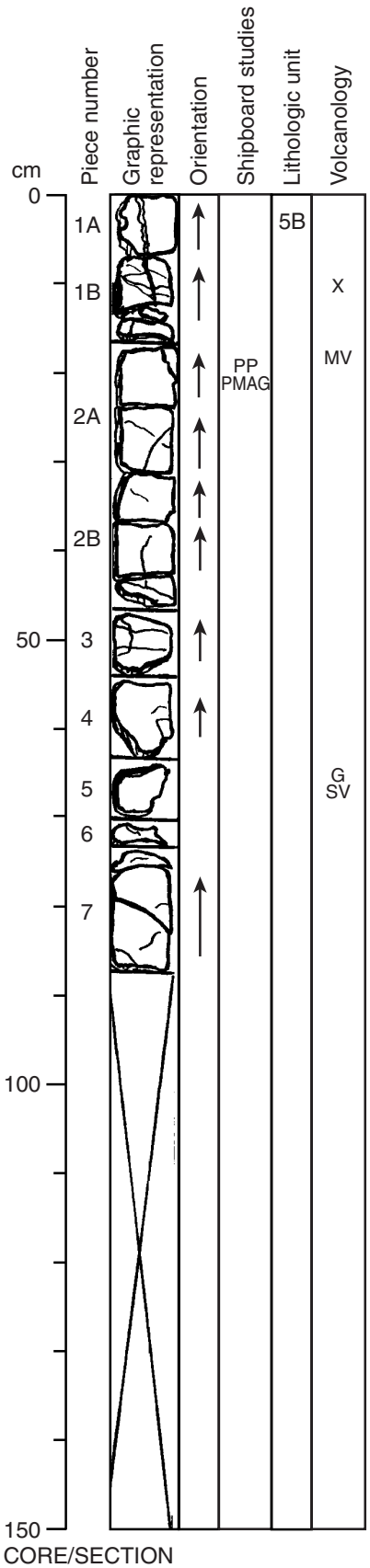
STRUCTURE: Pillowed. Pieces 1 and 7 are massive, but others show grain size variation consistent with whole section being part of pillowed sequence. Three different pillows are present: Pillow 1 in Pieces 1–3; Pillow 2 in Pieces 4–5; Pillow 3 in Pieces 6–7.

ALTERATION: Moderate to slight.

VEINS/FRACTURES: Sparsely to moderately veined. Veins are <1-10 mm wide and are filled predominantly with carbonate and less abundant green clay and Fe oxyhydroxide. Piece 1 has a thick green carbonate + clay vein; Pieces 4, 5, 6, and 7C have thick, white carbonate veins with green clay and Fe oxyhydroxide; Piece 7C contains a pyrite vein.

COMMENTS: A subround, 1.5-cm plagioclase xenolith is present in Piece 7A (119.5–121 cm; outer surface). The glassy top of Piece 6 is brecciated and cemented by carbonate.

Core Photo



192-1183A-56R-3 **Section Top: 1148.93 mbsf**

UNIT 5B: APHYRIC BASALT

Pieces: 1–7

CONTACTS: None.

PHENOCRYSTS:

	%	Grain Size (mm):			
	Mode	Max	Min	Avg.	Shape/Habit
Olivine:	<1	1	<0.5	0.5	Subhedral to euhedral

GROUNDMASS: Aphanitic to fine grained; contains plagioclase, clinopyroxene, and black oxides.

VESICLES: Generally nonvesicular. Rare vesicles (0.1–2 mm) are subround to irregular, and are most abundant near the moderately vesicular top of Piece 2A.

COLOR: Medium gray (N5); light gray (N7) near pillow margins.

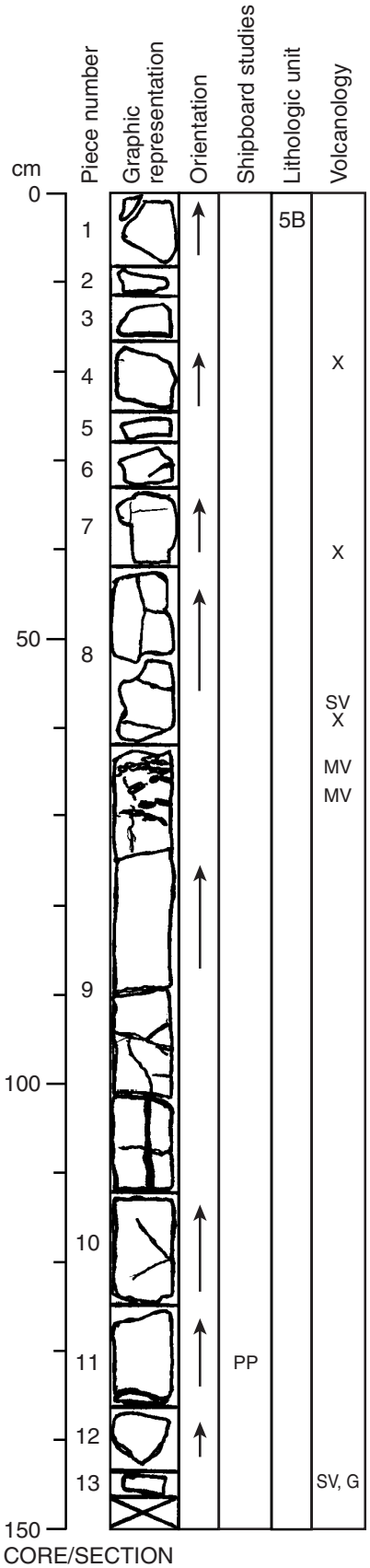
STRUCTURE: Pillowed. Aphanitic or glassy margins are observed at the bottom of Piece 4 and the top of Piece 5; pillow margins grade inward from a glassy rim to an aphanitic light gray zone to a fine grained medium gray interior. The glassy rims are palagonitized and fragmented, with fractures filled by carbonate.

ALTERATION: Slight; moderate near veins and at the top of Piece 2A, coinciding with the zone of increased vesicularity.

VEINS/FRACTURES: Sparsely veined. In Pieces 1A and 1B, veins (<1-2 mm) are filled with carbonate, clay, and Fe oxyhydroxide.

COMMENTS: Piece 5 contains a glassy margin (cut by numerous calcite veins) at the top.

Core Photo



192-1183A-57R-1 **Section Top: 1151.00 mbsf**

UNIT 5B: SPARSELY OLIVINE-PHYRIC BASALT

Pieces: 1–13

CONTACTS: None.

PHENOCRYSTS:	% Mode	Grain Size (mm): Max	Min	Avg.	Shape/Habit
Olivine:	1-2	1.2	0.8	1	Euhedral

GROUNDMASS: Aphanitic to fine grained; composed of clinopyroxene and plagioclase.

VESICLES: Sparsely vesicular. Large elongate, coalesced vesicles filled with green clay and carbonate occur in bands at the bottom of Piece 8 and the top of Piece 9. Small (1–2 mm) elongate, clay-filled vesicles are more abundant in aphanitic pillow rims.

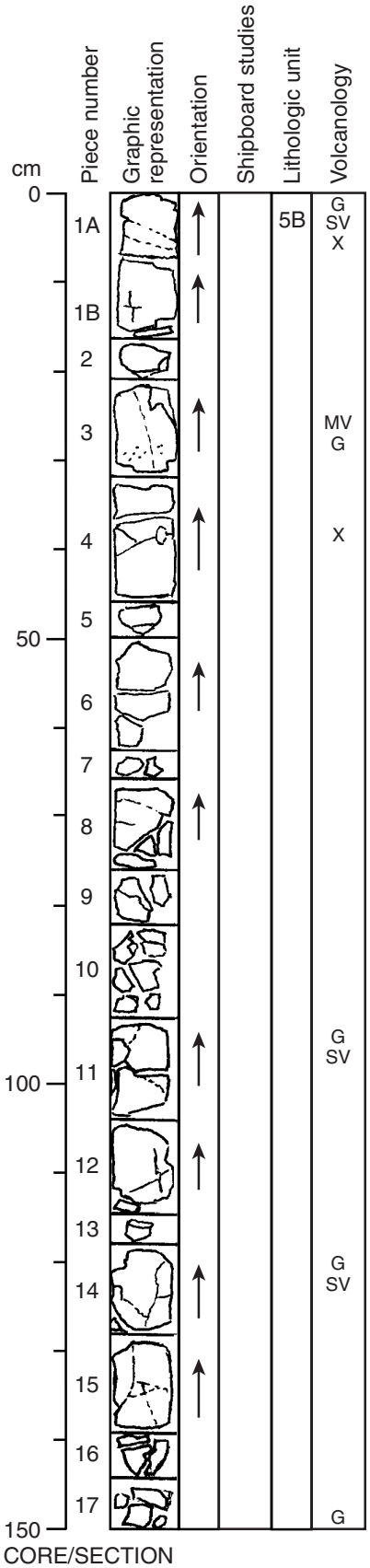
COLOR: Medium gray (N5) to medium light gray (N6).

STRUCTURE: Pillowed. Pillows are inferred from the variation in grain size from fine grained to aphanitic and vesicle orientation and alignment (e.g., Piece 8).

ALTERATION: Moderate. Olivine phenocrysts are totally replaced by black, green, and brown clay.

VEINS/FRACTURES: Sparsely veined. Veins are <1-2 mm wide and are filled with clay and carbonate.

Core Photo



192-1183A-57R-2 **Section Top: 1152.45 mbsf**

UNIT 5B: SPARSELY OLIVINE-PHYRIC BASALT

Pieces: 1–17

CONTACTS: None.

PHENOCRYSTS:

	% Mode	Grain Size (mm): Max	Min	Avg.	Shape/Habit
Olivine:	1–2	1	0.6	0.8	Euhedral

GROUNDMASS: Aphanitic to fine grained; contains plagioclase and clinopyroxene.

VESICLES: Sparsely vesicular. Vesicles are irregular and elongate and filled with brown and green clay and calcite. Some elongate vesicles are orientated perpendicular to glassy pillow margins. Abundance of vesicles is variable in Pieces 1A, 3, 11, 14.

COLOR: Light gray (N7) medium light gray (N6).

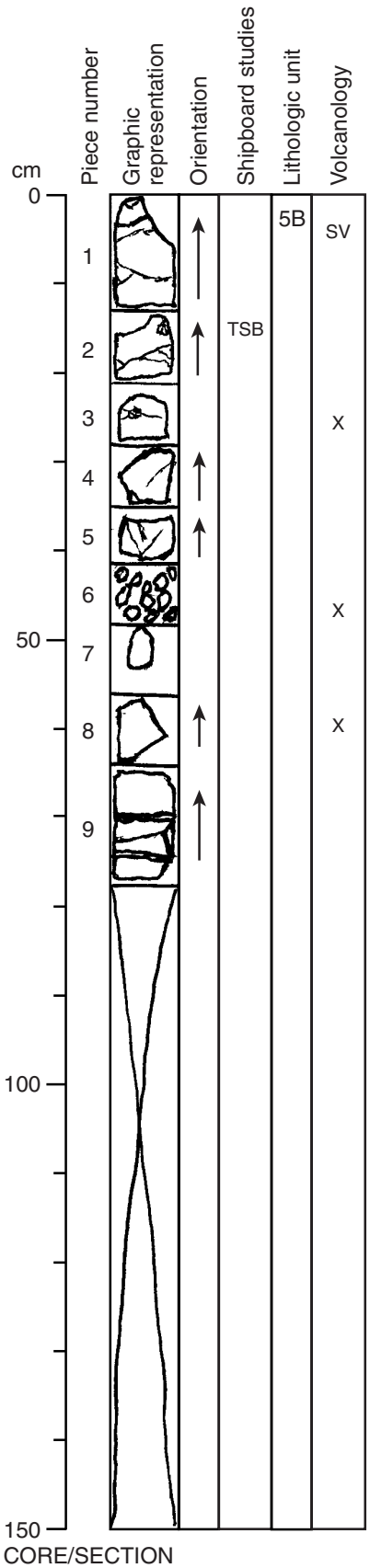
STRUCTURE: Pillowed. Glass is present at the tops of Pieces 1A, 11, 13, 14, and 17. Texture of Piece 3 varies from glassy to aphanitic to fine grained.

ALTERATION: Moderate. Olivine is totally replaced by green and brown clay. The clinopyroxene appears to be partially altered to clay.

VEINS/FRACTURES: Sparse to moderately veined. Veins are ~1 mm wide and are filled with carbonate and green and brown clay; some have associated oxidation fronts.

COMMENTS: Two xenoliths are found in Pieces 1A (3–6 cm) and 4 (36–38 cm). Xenolith 1 (Piece 1A) is 3 x 6 mm in size and contains stained or altered plagioclase. Xenolith 2 (Piece 4) is 10 x 8 mm in size and contains a colorless mineral, possibly unaltered plagioclase.

Core Photo



192-1183A-57R-3 **Section Top: 1153.95 mbsf**

UNIT 5B: SPARSELY OLIVINE-PHYRIC BASALT

Pieces: 1–9

CONTACTS: None.

PHENOCRYSTS:

	%	Grain Size (mm):			
	Mode	Max	Min	Avg.	Shape/Habit
Olivine:	2	0.5	0.1	0.2	Euhedral

GROUNDMASS: Aphanitic.

VESICLES: Sparsely vesicular. Vesicles (<1 mm) are irregular and are filled with dark greenish gray clay.

COLOR: Medium gray (N5).

STRUCTURE: Pillowed. Pillows are inferred on the basis of grain size variations that are similar to those in sections containing glassy pillow margins (e.g., 192-1183A-57R-2).

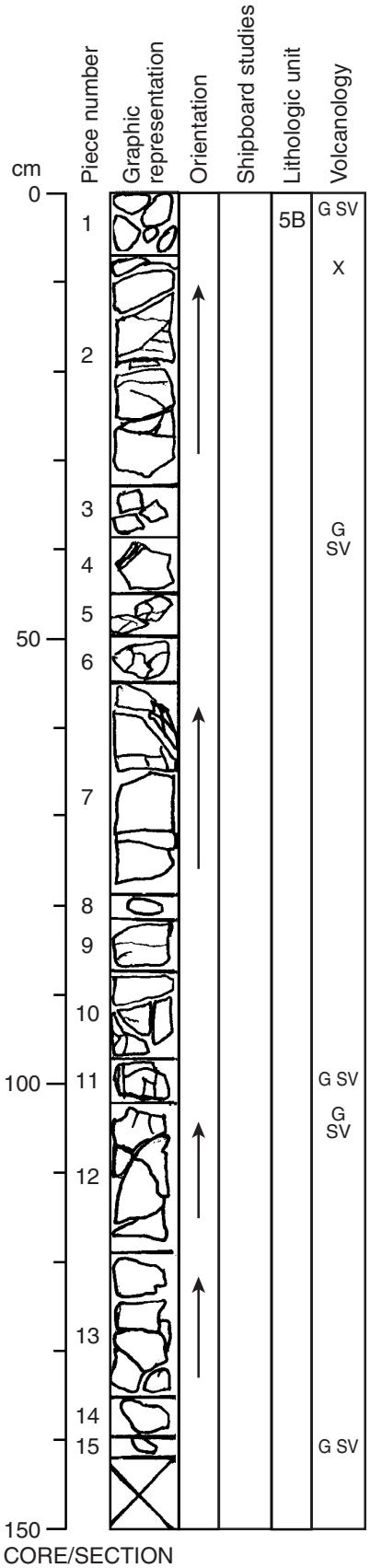
ALTERATION: Slight. Olivine phenocrysts are totally replaced by green clay.

VEINS/FRACTURES: Sparsely veined (Pieces 1–5 and 9). The average vein width is ~1 mm.

COMMENTS: Xenoliths are present in Pieces 2 and 3. Piece 2 contains two xenoliths, one in the interval 17–17.5 cm (~5 mm in diameter) and another in the interval 15-17 cm (12 mm in diameter). Both xenoliths contain plagioclase (60%), clinopyroxene (30%) and an anhedral mineral (10%) that has been totally replaced by clay. Piece 3 contains one xenolith in the interval 25-26 cm (10 mm diameter). This xenolith contains 90% plagioclase and 10% green clay.

Description of thin section at 15-17 cm

Core Photo



192-1183A-58R-1 **Section Top: 1155.80 mbsf**

UNIT 5B: MODERATELY OLIVINE-PHYRIC BASALT

Pieces: 1–15

CONTACTS: None.

PHENOCRYSTS:	% Mode	Grain Size (mm): Max	Min	Avg.	Shape/Habit
Olivine:	1-4	2	0.5	1.5	Euhedral to subhedral

GROUNDMASS: Aphanitic to fine grained; contains clinopyroxene, plagioclase, and trace black oxides.

VESICLES: Nonvesicular, except near pillow margins where the basalt is sparsely vesicular. Vesicles (~1 mm) are subround to irregular and are filled with green clay and carbonate.

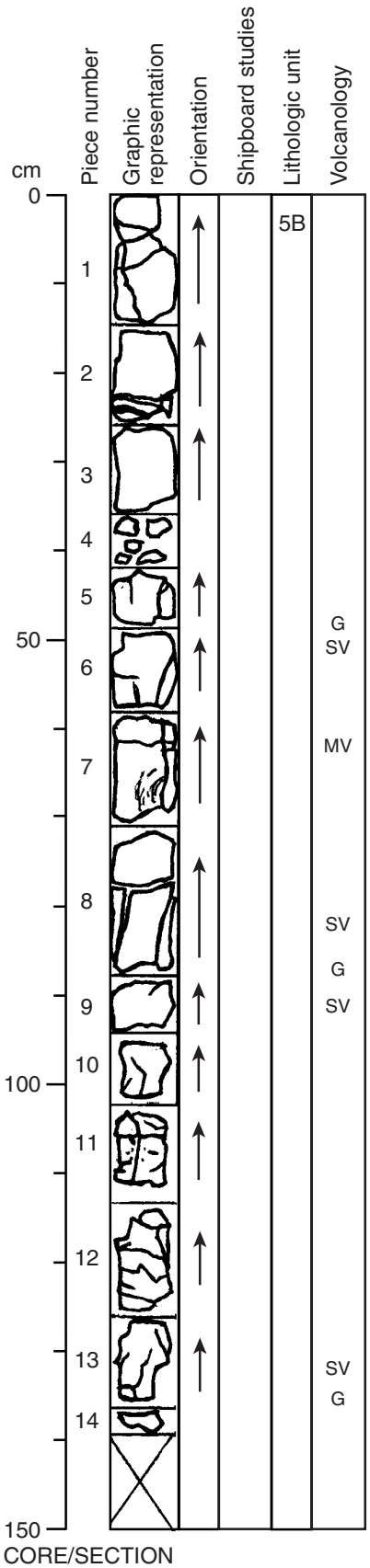
COLOR: Medium gray (N5) to medium light gray (N6).

STRUCTURE: Pillowed. Glassy rinds of pillows are present on Pieces 1, 4, 11, 12, and 15.

ALTERATION: Moderate. Olivine phenocrysts are replaced by dark green clay. Near pillow rims the olivine phenocrysts are also replaced by an orange-brown mineral, possibly iddingsite. Carbonate veins are present parallel to the glassy pillow margins.

VEINS/FRACTURES: Sparsely to moderately veined. The largest vein is at the top of Piece 7 (7 mm wide) and is filled with green clay and carbonate. Oxidation fronts are associated with some veins.

Core Photo



192-1183A-58R-2 **Section Top: 1157.22 mbsf**

UNIT5B: SPARSELY TO MODERATELY OLIVINE-PHYRIC BASALT

Pieces: 1–14

CONTACTS: None.

PHENOCRYSTS:	% Mode	Grain Size (mm): Max	Min	Avg.	Shape/Habit
Olivine:	1–4	1.2	0.6	1	Euhedral to subhedral

GROUNDMASS: Aphanitic at the pillow margins to fine grained in the pillow interiors; contains plagioclase, clinopyroxene, and trace black oxides.

VESICLES: Sparsely vesicular. Areas adjacent to glassy margins range from sparsely to moderately vesicular. Larger vesicles (2–3 mm in length) are filled by carbonate in some pillow interiors; irregular vesicles are filled with carbonate and trace green and brown clay.

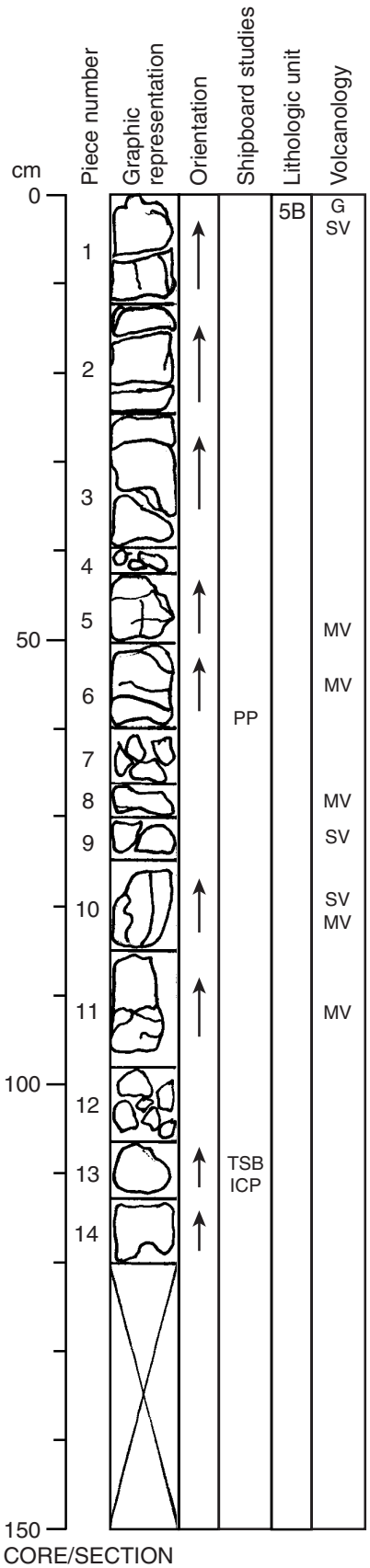
COLOR: Medium light gray (N6) to medium gray (N5).

STRUCTURE: Pillowed. Glassy rinds are present at the top of Pieces 6 and 9 and at the bottom of Pieces 8 and 13. Pieces with glass also show groundmass grain size gradation from glassy to aphanitic to fine grained.

ALTERATION: Moderate. Olivine phenocrysts are completely replaced by green clay; fractures within the olivine are filled with orange-brown clay. In some pillow interiors, filling of vesicles by clay results in a mottled appearance.

VEINS/FRACTURES: Moderately to sparsely veined. Veins are generally 1–3 mm wide and are filled with brown and green clay and carbonate. Piece 2 contains a slightly larger vein (5 mm wide).

Core Photo



192-1183A-58R-3 **Section Top: 1158.61 mbsf**

UNIT 5B: SPARSELY TO MODERATELY OLIVINE-PHYRIC BASALT

Pieces: 1–14

CONTACTS: None.

PHENOCRYSTS:

	% Mode	Grain Size (mm): Max	Min	Avg.	Shape/Habit
Olivine:	1–4	2	0.5	0.6	Euhedral to subhedral

GROUNDMASS: Aphanitic to fine grained; contains plagioclase, clinopyroxene, and trace black oxides.

VESICLES: Sparsely vesicular to moderately vesicular. Pillow interiors have a spotty appearance resulting from vesicles filled with clay and carbonate.

COLOR: Medium light gray (N6) to medium gray (N5).

STRUCTURE: Pillowed. Glass is present at the top of Piece 10 and altered glass is present in Piece 1. Grain size variations are found adjacent to the glassy margins.

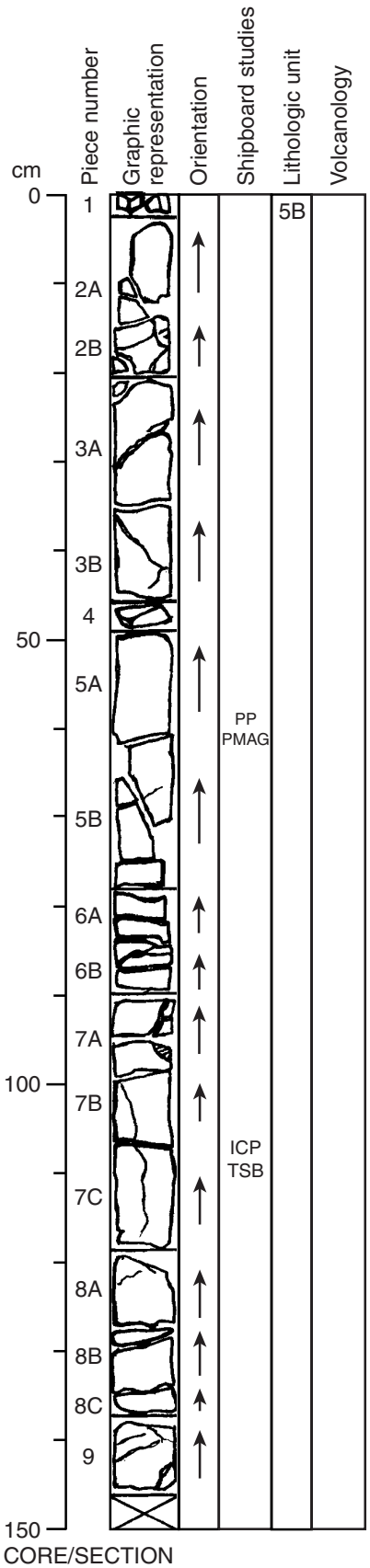
ALTERATION: Moderate.

VEINS/FRACTURES: Sparsely veined. Veins are filled with carbonate, Fe oxyhydroxide and rare native copper.

Description of thin section at 109-112 cm

Whole-rock ICP-AES data

Core Photo



192-1183A-59R-1 **Section Top: 1160.60 mbsf**

UNIT 5B: APHYRIC TO SPARSELY OLIVINE-PHYRIC BASALT

Pieces: 1–9

CONTACTS: None.

PHENOCRYSTS:	% Mode	Grain Size (mm): Max	Min	Avg.	Shape/Habit
Olivine:	≤1	1.5	<0.5	0.5	Subhedral to euhedral

The majority of the section is aphyric, except the top of Piece 2 and the bottom of Piece 9, which are sparsely olivine phyric.

GROUNDMASS: Fine grained, consisting of plagioclase, clinopyroxene, and trace black oxides. Locally aphanitic.

VESICLES: Nonvesicular. Rare angular vesicles (<1 mm) concentrated near apparent pillow margins are filled with green clay.

COLOR: Light gray (N7) to medium light gray (N6).

STRUCTURE: Pillowed. Although glassy rims are not observed, aphanitic areas at the tops of Pieces 2A and 3A and the bottom of Piece 9 indicate proximity of pillow margins.

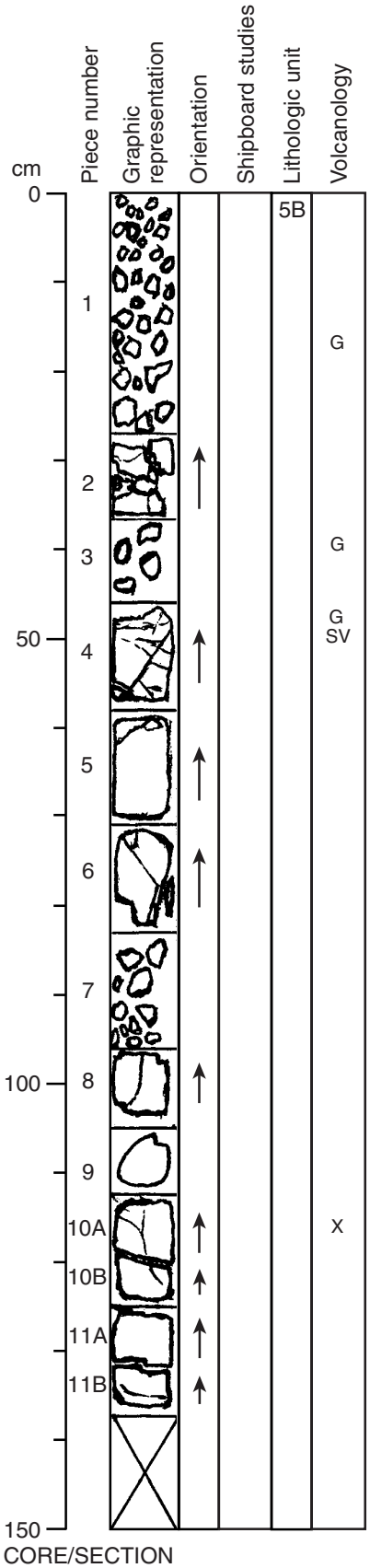
ALTERATION: Slight to moderate near veins. Olivine phenocrysts are replaced by clay.

VEINS/FRACTURES: Sparsely veined. Veins are <1-3 mm wide and are filled with green clay, carbonate, and Fe oxyhydroxide.

Description of thin section at 107-109 cm

Whole-rock ICP-AES data

Core Photo



192-1183A-59R-2 **Section Top: 1162.05 mbsf**

UNIT 5B: APHYRIC TO SPARSELY OLIVINE-PHYRIC BASALT

Pieces: 1–11B

CONTACTS: None.

PHENOCRYSTS:

	% Mode	Grain Size (mm): Max	Min	Avg.	Shape/Habit
Olivine:	≤1	1	0.1	0.5	Subhedral to euhedral

Pieces 4, 5, 10A, and 10B are sparsely olivine phyric.

GROUNDMASS: Aphanitic to fine grained; contains plagioclase, clinopyroxene and trace black oxides.

VESICLES: Generally nonvesicular. Sparsely vesicular towards the upper margin of Piece 4, where vesicles are elongate perpendicular to the margin.

COLOR: Light gray (N7) to medium gray (N5).

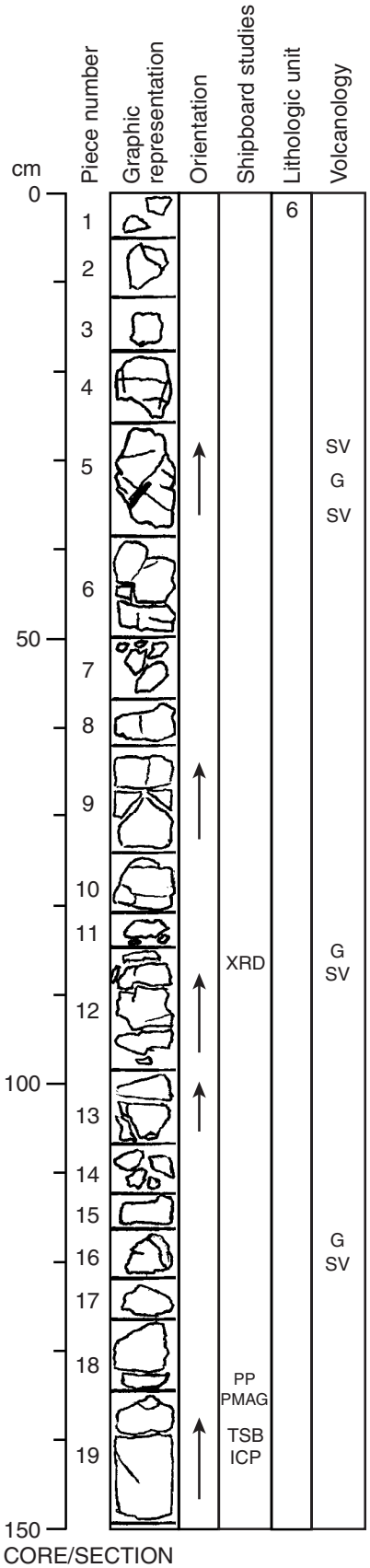
STRUCTURE: Pillowed. Three pillows are evident based on textural variations: Pillow 1 in Pieces 1–2; Pillow 2 in Pieces 3–6; Pillow 3 in Pieces 7–11. An altered glass rim is present in Piece 3.

ALTERATION: Slight.

VEINS/FRACTURES: Sparsely veined. Veins are <1-2 mm wide.

COMMENTS: A subround xenolith (3 x 2 cm) is present in Piece 10 (115–118 cm; outer surface of working half). It consists of ~90% plagioclase and ~5–10% clinopyroxene. In Piece 3 of the working half, a pinkish mineral (iron-stained carbonate – possibly recrystallized limestone?) truncates the altered hyaloclastite.

Core Photo



192-1183A-60R-1 **Section Top: 1166.50 mbsf**

UNIT 6: APHYRIC BASALT

Pieces: 1–19

CONTACTS: Not recovered. The contact between Units 5B and 6 is inferred to be at the top of this section.

PHENOCRYSTS:

	%	Grain Size (mm):			
	Mode	Max	Min	Avg.	Shape/Habit
Olivine:	<1	~1	<0.5	0.5	Subhedral to euhedral

GROUNDMASS: Aphanitic to fine grained; grain size varies from rim to center of pillow. Groundmass contains clinopyroxene, plagioclase, and trace black oxides.

VESICLES: Generally nonvesicular; sparsely vesicular close to pillow rims. Vesicles are elongate and <1 mm.

COLOR: Light gray (N7) to medium light gray (N6)

STRUCTURE: Pillowed. Three pillows are defined on the basis of glassy rims: Pillow 1 in Pieces 1–10; Pillow 2 in Pieces 11–13; Pillow 3 in Pieces 14–19.

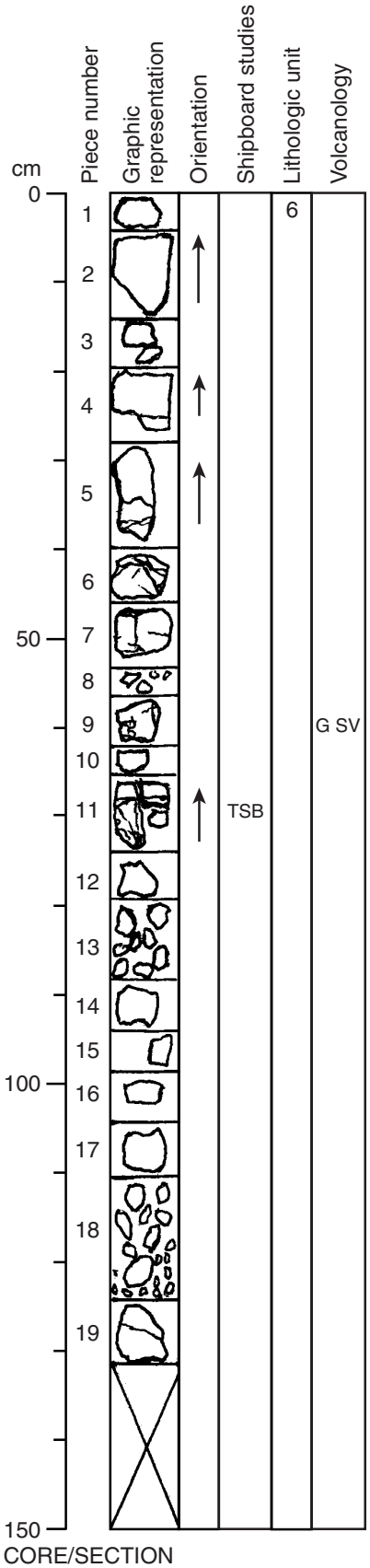
ALTERATION: Slight to moderate.

VEINS/FRACTURES: Moderately veined. Veins are <1 to 2 mm wide.

Description of thin section at 139-144 cm

Whole-rock ICP-AES data

Core Photo



192-1183A-60R-2 **Section Top: 1167.98 mbsf**

UNIT 6: APHYRIC TO SPARSELY OLIVINE-PHYRIC BASALT

Pieces: 1–19

CONTACTS: None.

PHENOCRYSTS:

	% Mode	Grain Size (mm): Max	Min	Avg.	Shape/Habit
Olivine:	<1	1.5	<0.5	0.5	Subhedral to euhedral

Pieces 6, 7, 9, 14, and 16 are sparsely olivine phyric.

GROUNDMASS: Aphanitic to fine grained; contains clinopyroxene, plagioclase and trace black oxides. Pieces 1-4 are fine grained; Pieces 5-9 are aphanitic; the bottom of Piece 9 has an 8 mm-thick glass rim. Pieces 14 and 16 are also aphanitic, but do not contain glass.

VESICLES: Generally nonvesicular. Rare vesicles (0.5–1 mm) are equant and subround.

COLOR: Light gray (N7) to medium light gray (N6)

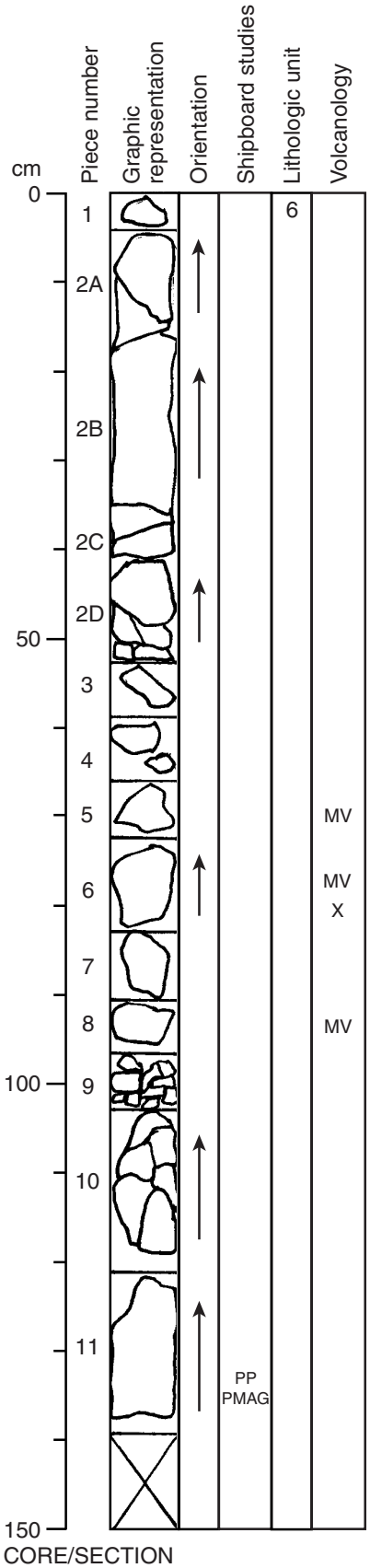
STRUCTURE: Pillowed.

ALTERATION: Slight; moderate adjacent to some veins (e.g., Pieces 6 and 11). Olivine phenocrysts are replaced by green clay and Fe oxyhydroxide.

VEINS/FRACTURES: Sparsely veined. Veins are <1-10 mm wide and are filled with green clay, carbonate, and Fe oxyhydroxide.

Description of thin section at 71-74 cm

Core Photo



192-1183A-61R-1 **Section Top: 1176.2 mbsf**

UNIT 6: SPARSELY TO MODERATELY OLIVINE-PHYRIC BASALT

Pieces: 1–11

CONTACTS: None.

PHENOCRYSTS:	% Mode	Grain Size (mm): Max	Min	Avg.	Shape/Habit
Olivine:	1–5	1.5	0.6	1	Euhedral to subhedral

GROUNDMASS: Aphanitic to fine grained; contains plagioclase, clinopyroxene, and trace black oxides (identifiable in fine-grained pillow interiors).

VESICLES: Generally nonvesicular. Rare subround to irregular vesicles (≤5 mm) in Pieces 5 and 8 are partially filled with green clay and sulfide. Vesicles in Piece 6 are 3-5 mm and are totally filled with green clay, sulfide, and carbonate.

COLOR: Medium gray (N5) to medium light gray (N6).

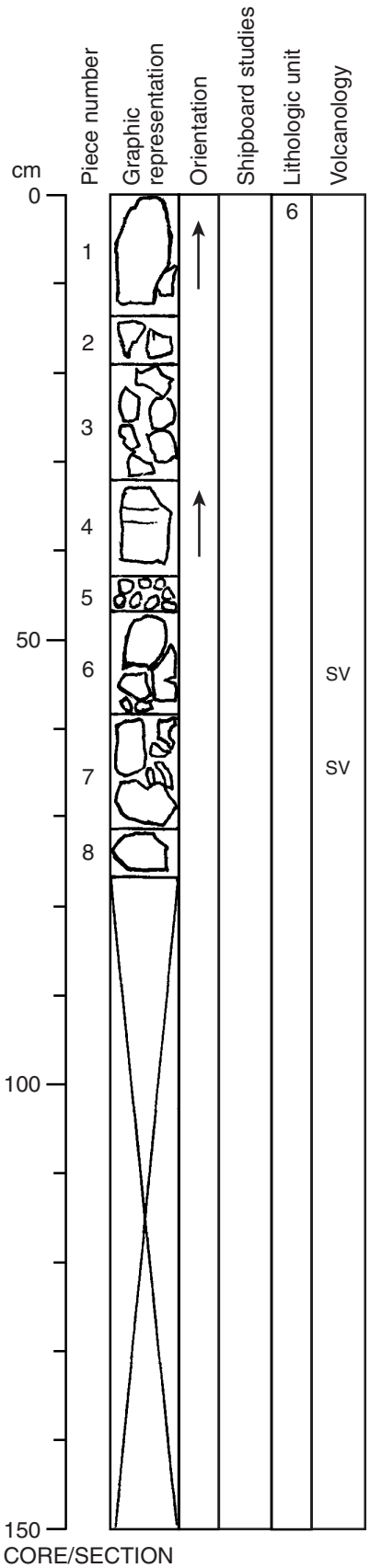
STRUCTURE: Pillowed. Pillows are inferred on the basis of changes in groundmass grain size and vesicle distribution.

ALTERATION: Slight to moderate. Olivine phenocrysts are totally replaced by green clay.

VEINS/FRACTURES: Sparsely veined. Veins are ≤2 mm wide and are filled with dark greenish black clay and carbonate.

COMMENTS: Fine-grained pillow interiors have variolitic texture (e.g., Piece 11). Olivine pseudomorphs are most abundant in Piece 6.

Core Photo



192-1183A-61R-2 **Section Top: 1177.48 mbsf**

UNIT 6: MODERATELY OLIVINE-PHYRIC BASALT

Pieces: 1–8

CONTACTS: None.

PHENOCRYSTS:

	% Mode	Grain Size (mm): Max	Min	Avg.	Shape/Habit
Olivine:	2–5	1.5	0.5	1	Subhedral

GROUNDMASS: Aphanitic (Pieces 6 and 7) to fine grained (Pieces 1, 2, 3, 4, 5 and 8); contains plagioclase and clinopyroxene.

VESICLES: Sparsely vesicular. Vesicles are irregular in shape and are concentrated in the more aphanitic areas.

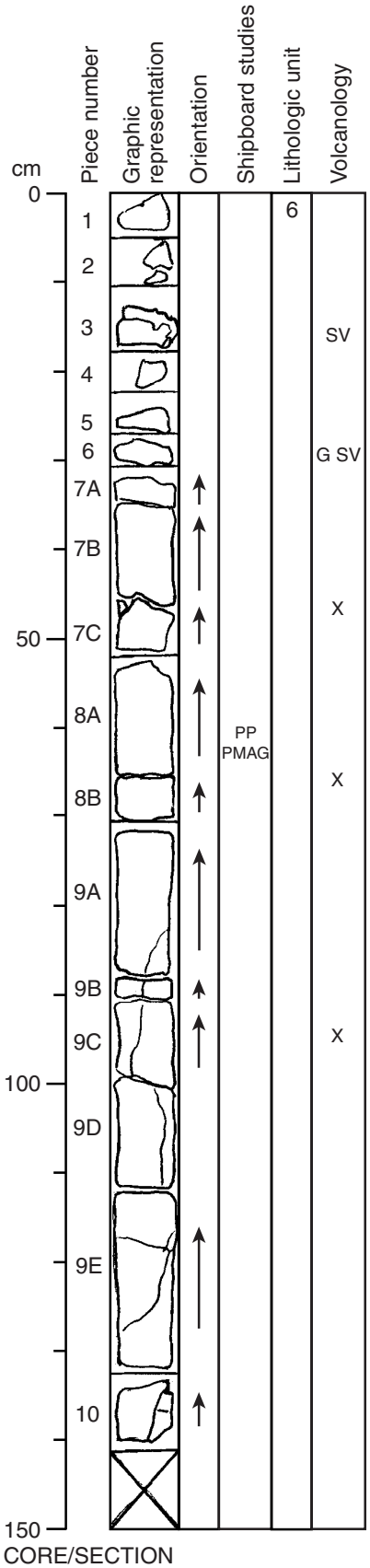
COLOR: Medium light gray (N6).

STRUCTURE: Pillowed. Pillows are inferred on the basis of groundmass grain size changes, but no glassy margins are present.

ALTERATION: Slight to moderate. Olivine phenocrysts are completely replaced by clay.

VEINS/FRACTURES: Sparsely veined. One vein is 1 mm wide and is filled with carbonate. Pieces 4, 6 and 7 contain rare veins <1 mm wide.

Core Photo



192-1183A-62R-1 **Section Top: 1181.00 mbsf**

UNIT 6: APHYRIC BASALT

Pieces: 1–10

CONTACTS: None.

PHENOCRYSTS:

	% Mode	Grain Size (mm): Max	Min	Avg.	Shape/Habit
Olivine:	<1	1.0	<0.5	0.5	Subhedral

GROUNDMASS: Aphanitic to fine grained; contains plagioclase, clinopyroxene, and trace black oxides.

VESICLES: Nonvesicular; sparsely vesicular close to glass rim on Piece 6.

COLOR: Medium light gray (N6) to medium gray (N5).

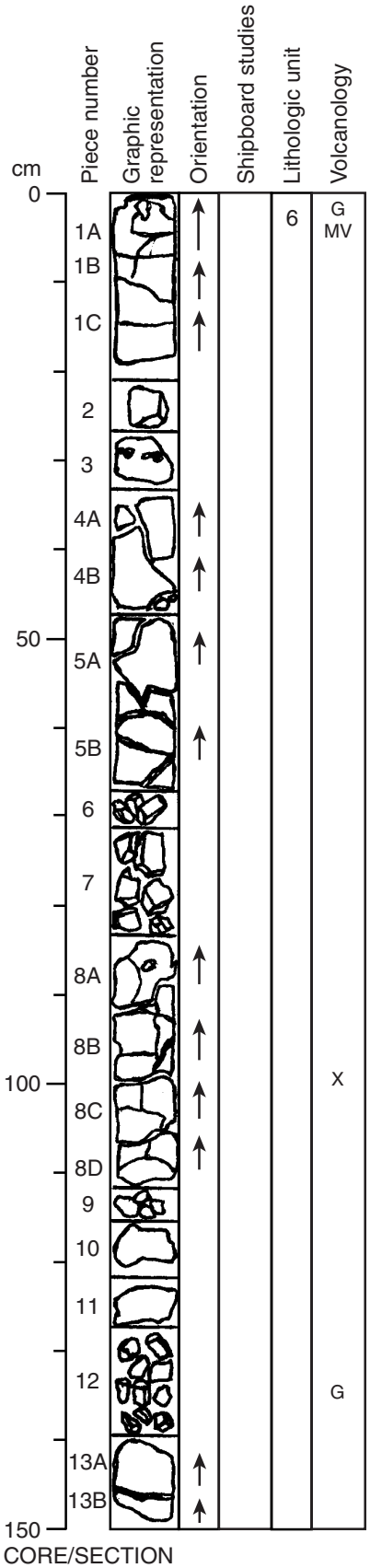
STRUCTURE: Pillowed. Glassy rim observed on Piece 6.

ALTERATION: Slight.

VEINS/FRACTURES: Sparsely veined. Veins are ≤1 mm wide and are filled with clay and carbonate.

COMMENTS: Subround (5 mm diameter) plagioclase xenolith present in Piece 7B.

Core Photo



192-1183A-62R-2 **Section Top: 1182.40 mbsf**

UNIT 6: APHYRIC TO MODERATELY OLIVINE-PHYRIC BASALT

Pieces: 1A–13B

CONTACTS: None.

PHENOCRYSTS:	% Mode	Grain Size (mm): Max	Min	Avg.	Shape/Habit
Olivine:	<1–2	2	~0.2	0.5	Subhedral to euhedral

Moderately olivine-phyric areas are present locally (e.g., Piece 8D).

GROUNDMASS: Aphanitic to fine grained; contains plagioclase, clinopyroxene, and trace black oxides. Pieces 1-5 grade from glassy at the top of Piece 1A to aphanitic to fine grained. Pieces 6 to 13B are aphanitic.

VESICLES: Generally nonvesicular. A 7 mm thick moderately vesicular band occurs ~1 cm below (and parallel to) the glassy rind of Piece 1A. The irregular vesicles (<1-2 mm) are filled with green clay and carbonate.

COLOR: Medium light gray (N6) in Pieces 1–5; medium gray (N5) to medium light gray (N6) in Pieces 6–13.

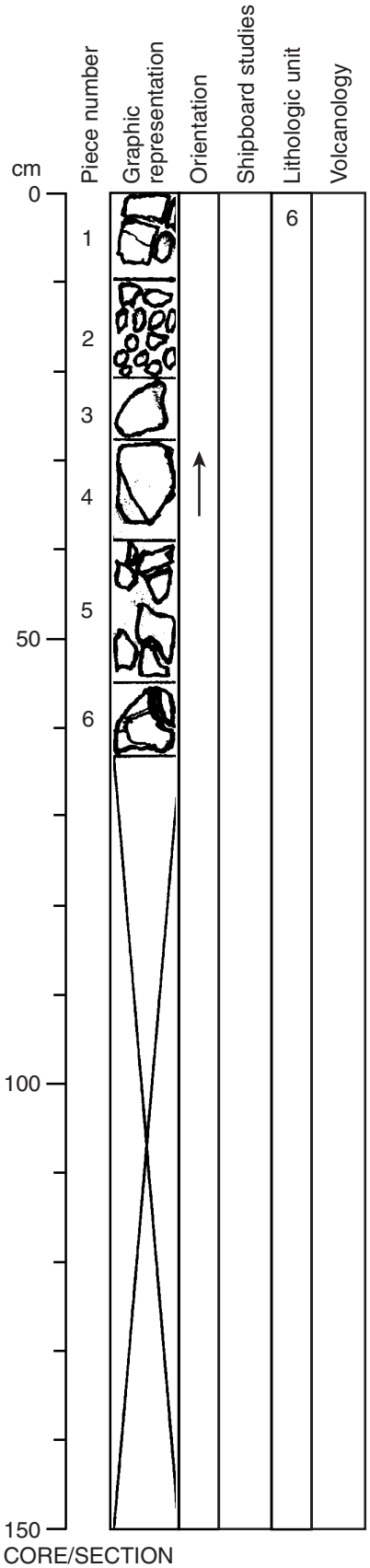
STRUCTURE: Pillowed. Glass present at the top of Piece 1A and in two fragments of Piece 12.

ALTERATION: Slight, except near veins, where alteration is moderate and dark halos are observed. Olivine phenocrysts are totally replaced by greenish black clay.

VEINS/FRACTURES: Sparsely to moderately veined. Veins are <1–2 mm wide and are filled with black and green clay and Fe oxyhydroxide.

COMMENTS: A subround 4 x 3 mm miarolitic cavity in Piece 8A is lined with botryoidal dark green clay. Miarolitic cavities (1–7 mm) also occur in Piece 3.

Core Photo



192-1183A-62R-3 **Section Top: 1183.90 mbsf**

UNIT 6: APHYRIC TO SPARSELY OLIVINE-PHYRIC BASALT

Pieces: 1–6

CONTACTS: None.

PHENOCRYSTS:

	% Mode	Grain Size (mm): Max	Min	Avg.	Shape/Habit
Olivine:	<1–2	1	~0.1	~0.5	Eubhedral to subhedral

Predominantly aphyric. Pieces 1 and 6 are sparsely olivine phyric.

GROUNDMASS: Aphanitic to fine grained; contains plagioclase, clinopyroxene and trace black oxides.

VESICLES: Nonvesicular.

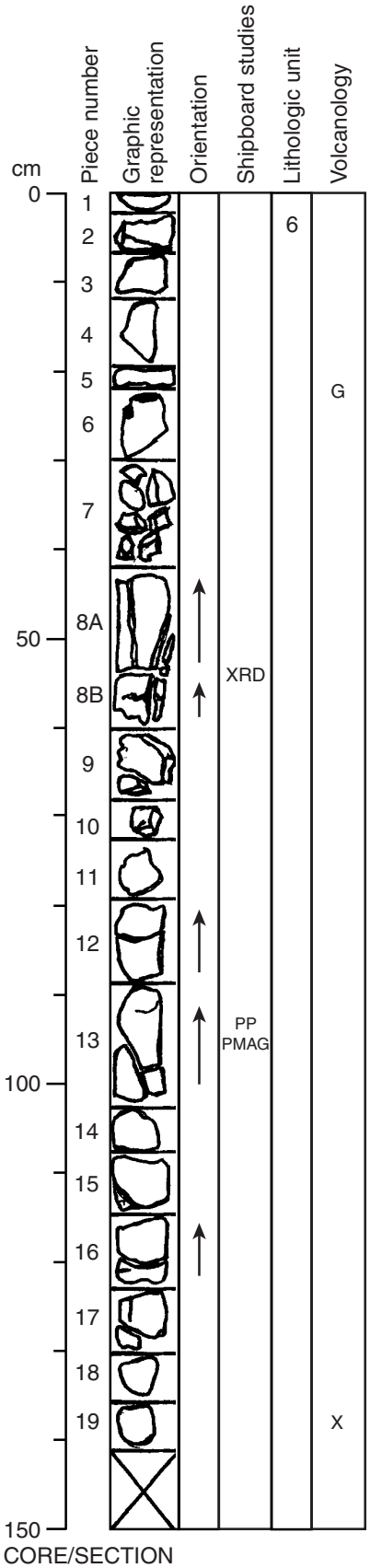
COLOR: Light gray (N7) to medium gray (N5).

STRUCTURE: Massive. Grain size variations suggest that recovered material may represent massive interiors of pillows.

ALTERATION: Slight. Olivine phenocrysts are completely replaced by greenish black clay and/or white carbonate (e.g., Piece 4).

VEINS/FRACTURES: Sparsely veined. Veins are ≤1 mm wide and are filled with white carbonate, greenish black clay, Fe oxyhydroxide, and/or pyrite.

Core Photo



192-1183A-63R-1 **Section Top: 1185.80 mbsf**

UNIT 6: APHYRIC TO MODERATELY OLIVINE-PHYRIC BASALT

Pieces: 1-19

CONTACTS: None.

PHENOCRYSTS:

	% Mode	Grain Size (mm): Max	Min	Avg.	Shape/Habit
Olivine:	<1–3	~1	<0.5	0.5	Euhedral to subhedral

GROUNDMASS: Mainly aphanitic; fine grained in Pieces 12–14. There is a gradual transition from aphanitic to fine grained in Pieces 8 and 11.

VESICLES: Nonvesicular.

COLOR: Medium light gray (N6).

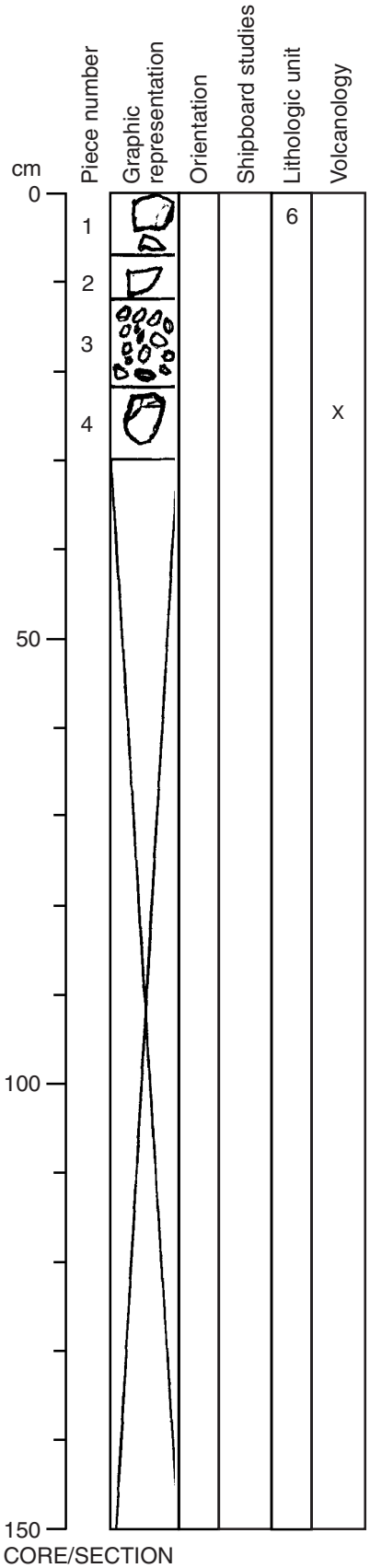
STRUCTURE: Pillowed. Pillows are inferred from textural variation along the section and presence of glass in Piece 6.

ALTERATION: Slight. In Piece 8B, a fracture and a large miarolitic cavity (0.7 x 2 cm) are both filled with clay minerals.

VEINS/FRACTURES: Sparsely veined. Veins are <1 to 2 mm wide.

COMMENTS: Piece 8B contains two subround xenoliths, 5 mm in diameter, consisting of plagioclase with ~10% Fe oxyhydroxide. Piece 6 has a small (2 x 3 mm) xenolith containing plagioclase and minor black oxides.

Core Photo



192-1183A-63R-2 **Section Top: 1187.20 mbsf**

UNIT 6: APHYRIC BASALT

Pieces: 1–4

CONTACTS: None.

GROUNDMASS: Fine grained; contains plagioclase, clinopyroxene, and trace black oxides.

VESICLES: Nonvesicular.

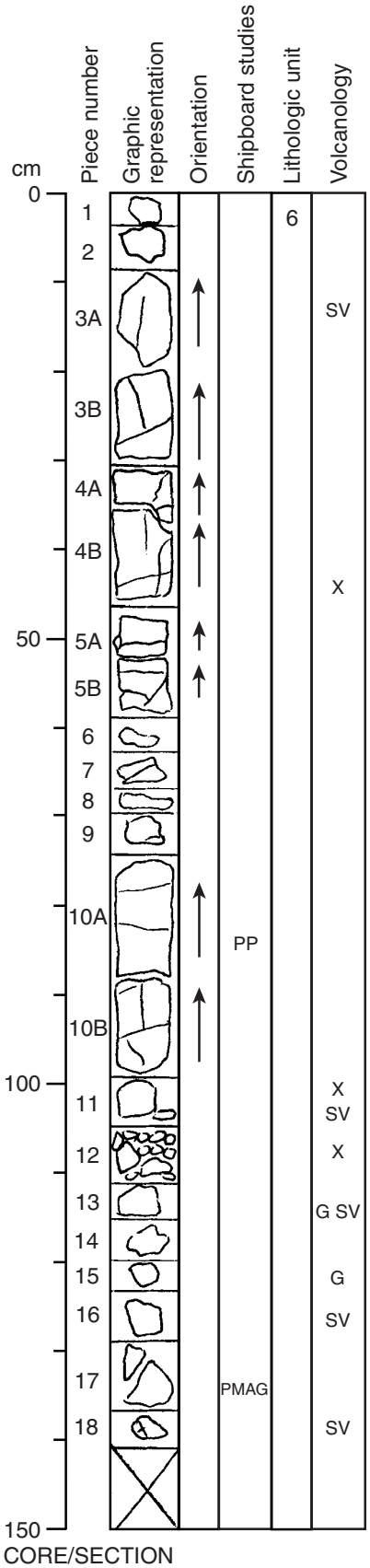
COLOR: Medium light gray (N6) to medium gray (N5).

STRUCTURE: Massive.

ALTERATION: Slight.

VEINS/FRACTURES: Sparsely veined. Veins are <1 mm wide and are filled with dark greenish black clay or Fe oxyhydroxide.

Core Photo



192-1183A-64R-1 **Section Top: 1190.60 mbsf**

UNIT 6: APHYRIC TO SPARSELY OLIVINE-PHYRIC BASALT

Pieces: 1–18

CONTACTS: None.

PHENOCRYSTS:

	% Mode	Grain Size (mm): Max	Min	Avg.	Shape/Habit
Olivine:	<1–2	1	<0.5	0.5	Subhedral to euhedral

Predominantly sparsely olivine phyric in aphanitic areas; aphyric in fine grained areas (e.g., Pieces 3A, 3B, 4A, and 4B). Olivine glomerocysts are present in Piece 17.

GROUNDMASS: Glassy to aphanitic to fine grained; contains plagioclase, clinopyroxene, and trace black oxides.

VESICLES: Generally nonvesicular, although Pieces 3A, 13, 16, and 18 are sparsely vesicular near the pillow margins. The vesicles are subround and equant to angular and elongate, and are filled with black and green clay and Fe oxyhydroxide.

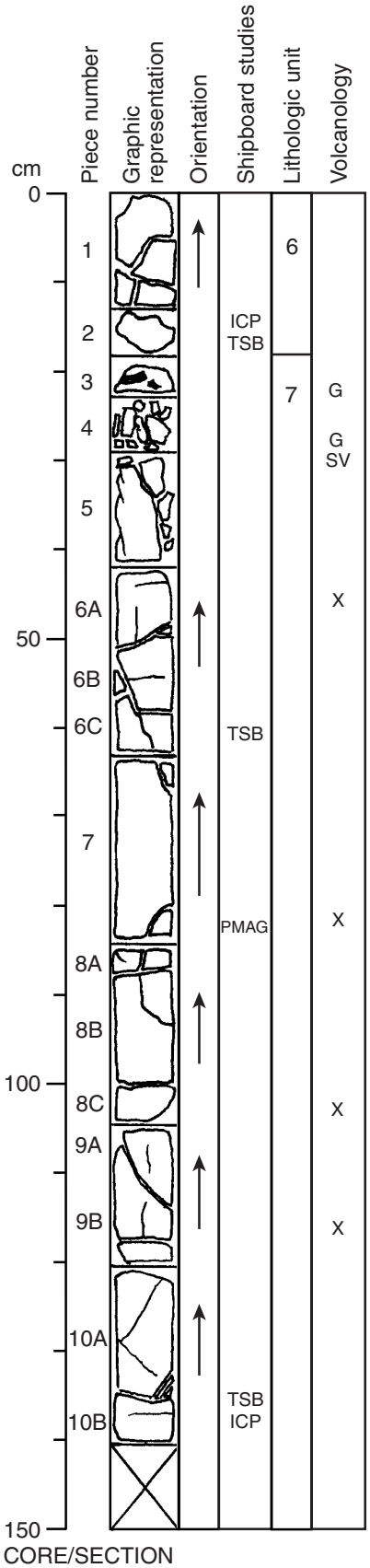
COLOR: Light gray (N7) to medium gray (N5)

STRUCTURE: Pillowed. Glassy pillow margins are present in Pieces 13 and 15.

ALTERATION: Slight; moderate near veins and fractures. Olivine phenocrysts are completely replaced by dark green clay.

VEINS/FRACTURES: Sparsely to moderately veined. Veins are <1-1.5 mm wide (e.g., Pieces 10A and 10B) and are filled with black and dark green clays (e.g., Pieces 3B, 10A and 10B), yellow-brown Fe oxyhydroxide, and sulfides.

Core Photo



192-1183A-64R-2 **Section Top: 1192.00 mbsf**

UNIT 6: SPARSELY OLIVINE-PHYRIC BASALT

Pieces: 1–2

CONTACTS: Not recovered. The contact between Units 6 and 7 is inferred to be between Pieces 2 and 3.

PHENOCRYSTS:	% Mode	Grain Size (mm): Max	Min	Avg.	Shape/Habit
Olivine:	1–2	1	~0.1	~0.5	Euhedral to subhedral

GROUNDMASS: Aphanitic.

VESICLES: Nonvesicular.

COLOR: Light gray (N7) to medium light gray (N6).

STRUCTURE: Massive. The aphanitic groundmass suggests proximity to a chilled margin.

ALTERATION: Slight. Olivine phenocrysts are replaced by dark green clay.

VEINS/FRACTURES: Sparsely veined. Veins are ≤1 mm wide and are filled with green and black clay and Fe oxyhydroxide.

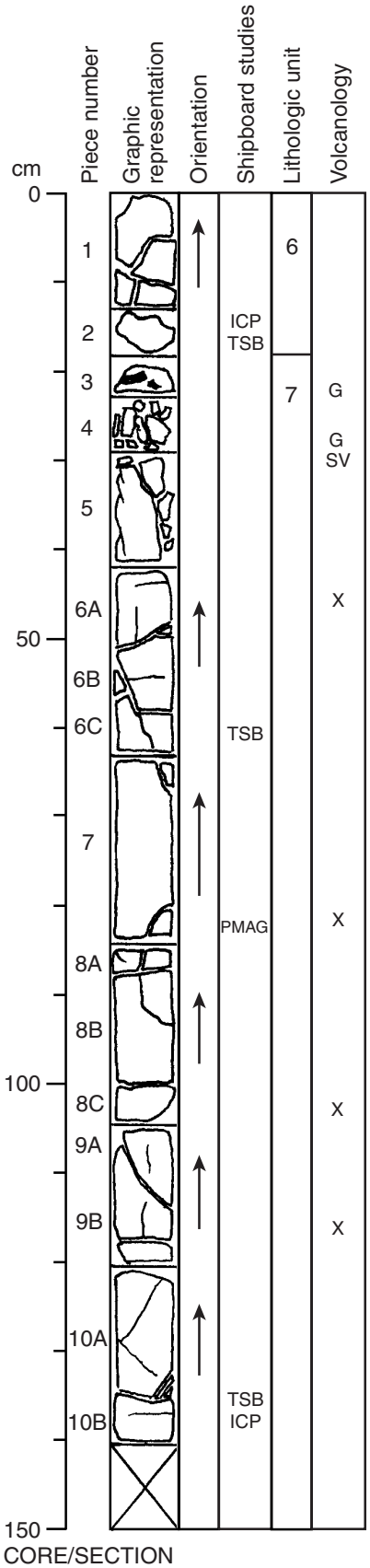
Description of thin section at 15-17 cm

Description of thin section at 59-62 cm

Description of thin section at 136-138 cm

Whole-rock ICP-AES data

Core Photo



192-1183A-64R-2 **Section Top: 1192.00 mbsf**

UNIT 7: APHYRIC TO SPARSELY OLIVINE-PHYRIC BASALT

Pieces: 3–10B

CONTACTS: Not recovered. The contact between Units 6 and 7 is inferred to be between Pieces 2 and 3; the top of Unit 7 is an interflow sediment above glass fragments (possibly pieces of pillow rims) in Piece 4.

PHENOCRYSTS:	% Mode	Grain Size (mm): Max	Min	Avg.	Shape/Habit
Olivine:	<1–2	2	<0.5	0.5	Euhedral to subhedral

GROUNDMASS: Predominantly fine grained; contains plagioclase, clinopyroxene, and trace black oxides. Piece 5 is glassy to aphanitic; Piece 6 is aphanitic (Piece 6A) to fine grained (Piece 6B).

VESICLES: Nonvesicular to sparsely vesicular in Piece 5 below the glassy rim, where the vesicles (<1–2 mm) are mainly elongate and angular.

COLOR: Interpillow sediment has multiple colors. The matrix is white (8/), light bluish gray (5B 7/1), moderate red (5B 4/6), grayish green (5G 4/2); the glass cemented by the sediment is black (N1). The basalt beneath the sediment is medium light gray (N6) to light gray (N7).

STRUCTURE: Pillowed. The top of one pillow is recognized, defined by the glassy rim at the top of Piece 5 (and one of the fragments of Piece 4 in the working half). Pieces 7 to 10 are massive.

ALTERATION: Slight to moderate. Olivine phenocrysts are replaced by black and green clay.

VEINS/FRACTURES: Sparsely veined. Veins are <1–1.5 mm wide and are filled with black and green clay, carbonate, and sulfide.

COMMENTS: The sediment at the top of Unit 7 consists of pillow rim glass fragments encased by recrystallised carbonate, and possibly grading into the pillow rim downcore. Veins within the glass contain coarser and whiter recrystallised calcite than is observed in the rest of the recrystallized sediment.

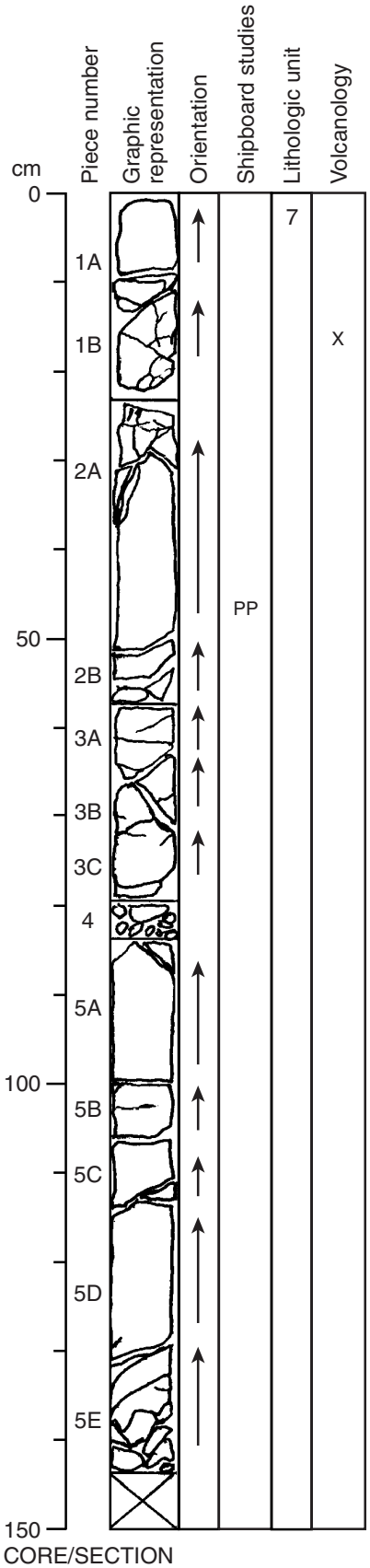
Description of thin section at 15-17 cm

Description of thin section at 59-62 cm

Description of thin section at 136-138 cm

Whole-rock ICP-AES data

Core Photo



192-1183A-65R-1 **Section Top: 1195.4 mbsf**

UNIT 7: APHYRIC TO SPARSELY OLIVINE-PHYRIC BASALT

Pieces: 1A–5E

CONTACTS: None.

PHENOCRYSTS:

	% Grain Size (mm): Mode	Max	Min	Avg.	Shape/Habit
Olivine:	<1–2	1.2	0.5	1	Euhedral

GROUNDMASS: Fine grained; contains clinopyroxene, plagioclase, and trace black oxides.

VESICLES: Nonvesicular.

COLOR: Medium light gray (N6).

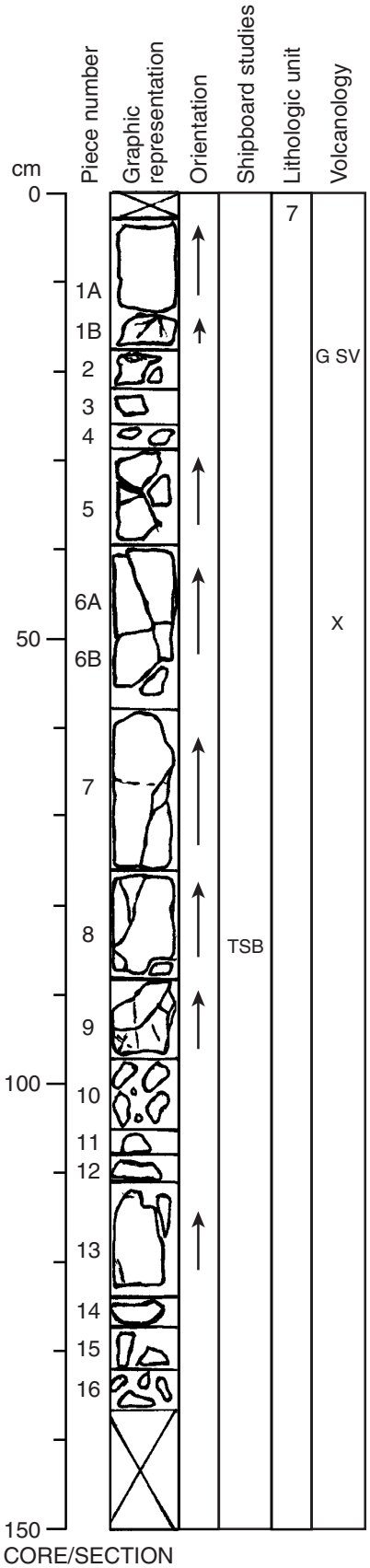
STRUCTURE: Massive. A fining of the groundmass grain size can be seen in Piece 5B (no glassy margins observed), which could indicate proximity to a pillow margin.

ALTERATION: Slight. Olivine phenocrysts are completely replaced by green clay.

VEINS/FRACTURES: Sparsely to moderately veined. Veins are 1-2 mm wide and are filled with greenish black clay, sulfide, and carbonate.

COMMENTS: Piece 1B contains a subround xenolith (10 x 15 mm) consisting of several plagioclase crystals.

Core Photo



192-1183A-65R-2 **Section Top: 1196.80 mbsf**

UNIT 7: APHYRIC TO SPARSELY OLIVINE-PHYRIC BASALT

Pieces: 1–16

CONTACTS: None.

PHENOCRYSTS:

	% Mode	Grain Size (mm): Max	Min	Avg.	Shape/Habit
Olivine:	<1–2	1.5	0.5	0.8	Euhedral

GROUNDMASS: Aphanitic to fine grained. Pieces 1–5 and 9–12 are aphanitic.

VESICLES: Generally nonvesicular. Sparsely vesicular areas are present adjacent to glassy or aphanitic areas. All of the vesicles are irregular in shape.

COLOR: Medium light gray (N6) to medium gray (N5).

STRUCTURE: Pillowed. Glass is present on the top of Piece 2, and grain size variations are consistent with a pillowed sequence.

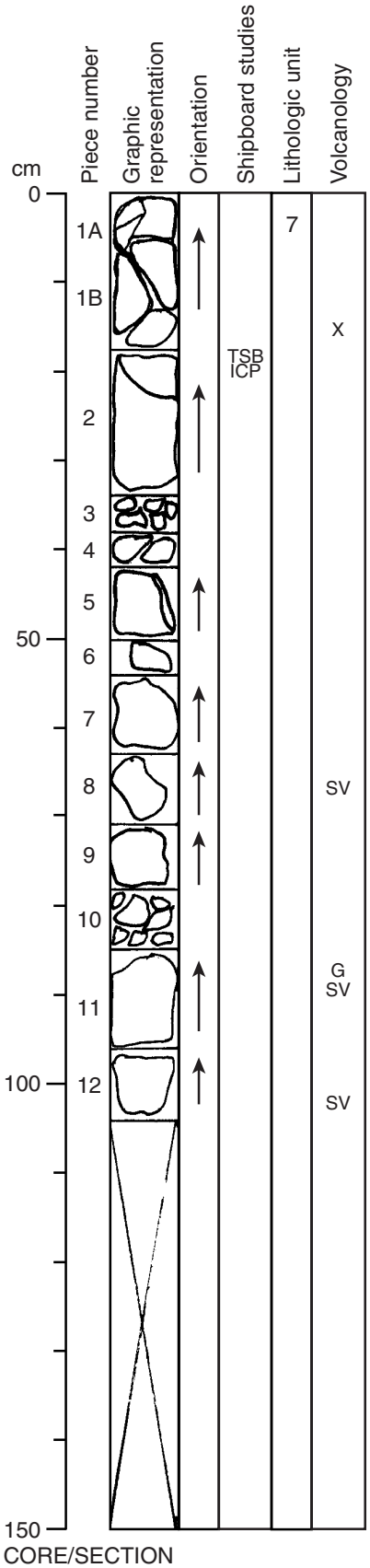
ALTERATION: Slight. Olivine phenocrysts are completely replaced by green clay.

VEINS/FRACTURES: Sparsely veined. Veins are <1–2 mm wide and are filled with green clay and carbonate. Rare brown oxidation halos are present.

COMMENTS: Piece 2 has a brecciated upper margin. The breccia contains angular aphanitic basalt and glass in a carbonate matrix. The carbonate continues from this breccia into veins within Piece 2. In Piece 15 there is a subround plagioclase xenolith (10 x 12 mm).

Description of thin section at 84-88 cm

Core Photo



192-1183A-65R-3 **Section Top: 1198.16 mbsf**

UNIT 7: SPARSELY OLIVINE-PHYRIC BASALT

Pieces: 1A–12

CONTACTS: None.

PHENOCRYSTS:

	% Grain Size (mm): Mode	Max	Min	Avg.	Shape/Habit
Olivine:	1–2	1	0.5	0.8	Subhedral to euhedral

GROUNDMASS: Aphanitic (Pieces 4–7, 10, and 11) to fine grained.

VESICLES: Sparsely vesicular. Vesicles (0.5–1 mm) are irregular in shape.

COLOR: Medium light gray (N6).

STRUCTURE: Pillowed. Pillows are inferred from the presence of a glassy margin (Piece 11) and grain size variations are consistent with a pillowed sequence.

ALTERATION : Moderate. Olivine phenocrysts are completely replaced by green clay.

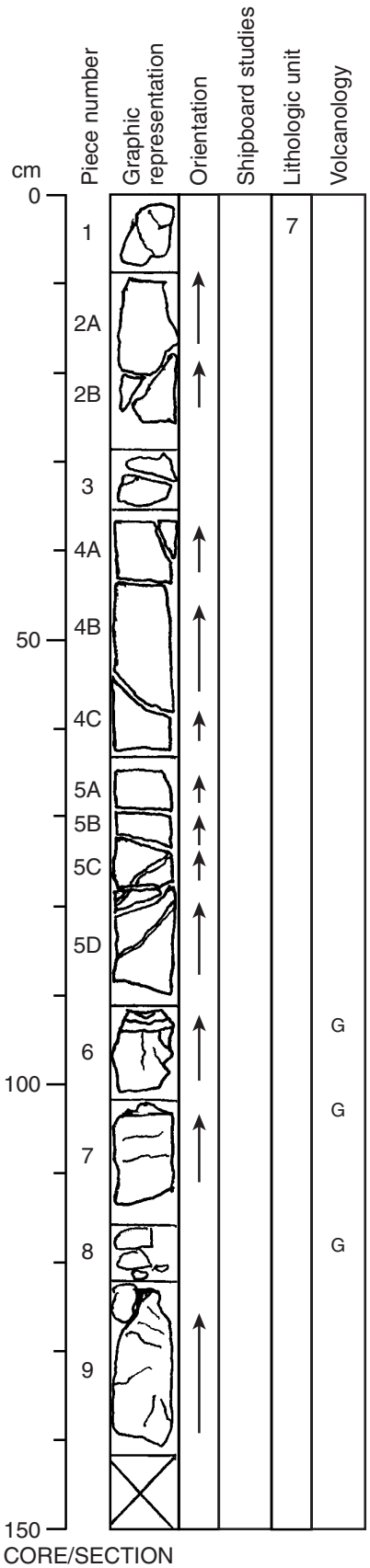
VEINS/FRACTURES: Sparsely veined. A large vein (10 mm thick) on the side of Piece 5 is filled with carbonate. An irregular vein on the top Piece 8 is filled with carbonate and green clay.

COMMENTS: A xenolith (1.5 x 1.5 cm) is found on the outer surface of Piece 1B. The xenolith contains plagioclase only.

Description of thin section at 18-19 cm

Whole-rock ICP-AES data

Core Photo



192-1183A-66R-1 **Section Top: 1200.10 mbsf**

UNIT 7: APHYRIC TO SPARSELY OLIVINE-PHYRIC BASALT

Pieces: 1–9

CONTACTS: None.

PHENOCRYSTS:

	%	Grain Size (mm):			
	Mode	Max	Min	Avg.	Shape/Habit
Olivine:	<1–2	1.5	0.2	0.9	Euhedral

Olivine phenocrysts become concentrated (>5%) at the bottom of Piece 9.

GROUNDMASS: Aphanitic (pillow margins) to fine grained (pillow interiors); contains clinopyroxene, plagioclase, and trace black oxides.

VESICLES: Generally nonvesicular. Piece 5D contain a few irregular miarolitic cavities (2 mm) that are filled with carbonate.

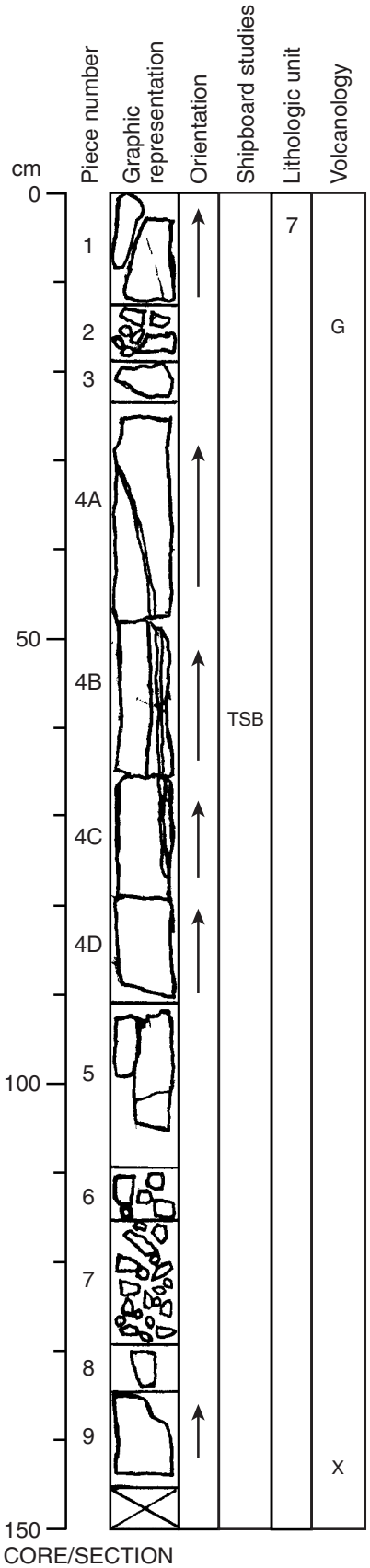
COLOR: Medium gray (N5) to medium light gray (N6).

STRUCTURE: Pillowed. Glassy rinds are present on Pieces 6–8.

ALTERATION : Slight. Olivine phenocrysts are completely replaced by greenish black clay, carbonate, and sulfide. Disseminated sulfide is present in Piece 9.

VEINS/FRACTURES: Sparsely veined. Pieces 5B–5D contain the most veins, but the widest vein is between the glassy margin and aphanitic areas of Pieces 6 and 7. Veins are filled with greenish black clay and carbonate.

Core Photo



192-1183A-66R-2 **Section Top: 1201.50 mbsf**

UNIT 7: MODERATELY OLIVINE-PHYRIC BASALT

Pieces: 1–9

CONTACTS: None.

PHENOCRYSTS:

	% Mode	Grain Size (mm): Max	Min	Avg.	Shape/Habit
Olivine:	5	1	0.5	1	Subhedral

GROUNDMASS: Fine grained; contains plagioclase, clinopyroxene, and trace black oxides.

VESICLES: Sparsely vesicular. Vesicles are irregular and are filled with carbonate and minor clay (Pieces 1, 3, and 4A–4B).

COLOR: Medium light gray (N6) to medium gray (N5).

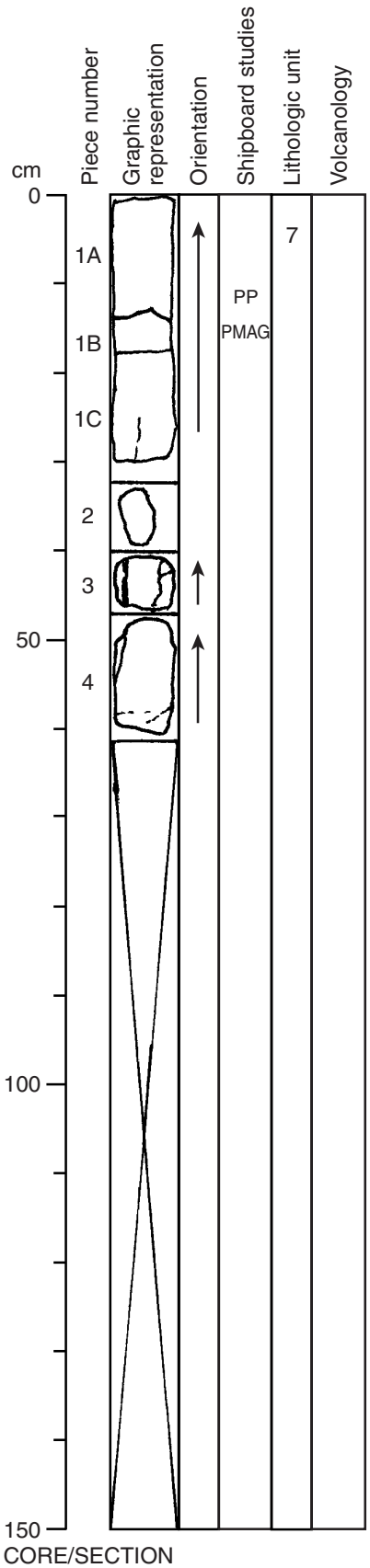
STRUCTURE: Massive.

ALTERATION: Slight. Olivine phenocrysts are completely replaced by clay.

VEINS/FRACTURES: Sparsely veined. Piece 4 contains a large vein (~50 x ~4 mm) which is filled with carbonate and green clay.

Description of thin section at 60-66 cm

Core Photo



192-1183A-66R-3 **Section Top: 1202.94 mbsf**

UNIT 7: SPARSELY TO MODERATELY OLIVINE-PHYRIC BASALT

Pieces: 1A–4

CONTACTS: None.

PHENOCRYSTS:

	% Mode	Grain Size (mm): Max	Min	Avg.	Shape/Habit
Olivine:	1-3	1.2	0.8	1	Subhedral to euhedral

GROUNDMASS: Aphanitic to fine grained; contains plagioclase, clinopyroxene, and trace black oxides.

VESICLES: Nonvesicular. Miarolitic cavities (1–2 mm) are common and are filled with carbonate and green-black clay.

COLOR: Medium light gray (N6).

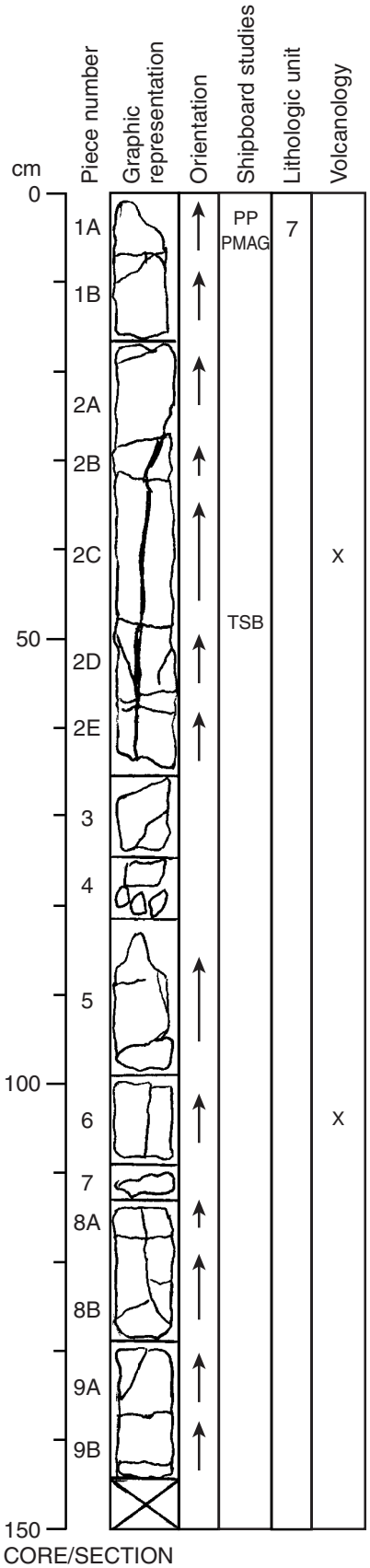
STRUCTURE: Massive. Some groundmass grain size variations are present, but no glassy margins are present.

ALTERATION : Slight. Olivine phenocrysts are completely replaced by green clay, or by sulfide when adjacent to a sulfide-filled vein.

VEINS/FRACTURES: Sparsely veined. Veins range in size from <1-3 mm wide and are filled with carbonate, green and brown clays, and sulfides. The widest vein (in Piece 3) is filled with carbonate and green clay. Some veins link the miarolitic cavities.

COMMENTS: Three xenoliths are present in Pieces 3 and 4. The two xenoliths in Piece 3 are on the outer surface at 43 cm, and both contain plagioclase crystals. Xenolith 1 (10 mm x 13 mm) and Xenolith 2 (5 mm x 12 mm) are both subround. Xenolith 3 (Piece 4) is at 54–55 cm on the split face. It is 8 mm x 5 mm in size, skeletal in shape, and contains plagioclase crystals. A vein filled with sulfide cuts this xenolith.

Core Photo



192-1183A-67R-1 **Section Top: 1204.90 mbsf**

UNIT 7: APHYRIC TO SPARSELY OLIVINE-PHYRIC BASALT

Pieces: 1–9B

CONTACTS: None.

PHENOCRYSTS:	% Mode	Grain Size (mm): Max	Min	Avg.	Shape/Habit
Plagioclase:	<<1	2.5	–	–	Subhedral, stubby lath
Olivine:	≤1	1.5	0.5	1	Subhedral to euhedral; commonly in glomerocrysts

The aphanitic top of the section is aphyric, whereas the fine-grained areas further down the section contains up to 1% pseudomorphs after olivine phenocrysts. A single equant subhedral plagioclase phenocryst (2.5 mm long) is present in Piece 1B at 11 cm.

GROUNDMASS: Aphanitic (Piece 1A) to fine grained; contains plagioclase, clinopyroxene, and trace black oxides.

VESICLES: Generally nonvesicular, but highly variable. Rare round vesicles (<1 mm) are filled with carbonate, green clay, or sulfides. A small (1–1.5 mm) irregular miarolitic cavity filled with dark green clay and carbonate is present in Piece 2C.

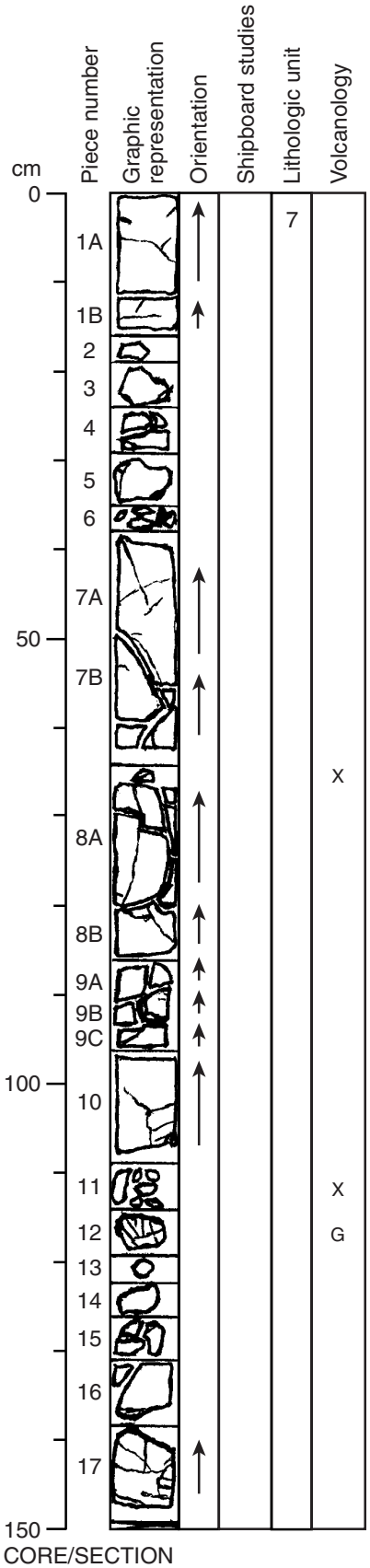
COLOR: Light gray (N7) to medium light gray (N6).

STRUCTURE: Massive. Piece 1A grades downward from aphanitic to fine grained.

ALTERATION: Slight; moderate near veins where halos are present. Olivine phenocrysts are totally replaced by carbonate, green clay, or sulfide.

Description of thin section at 46-48 cm

Core Photo



192-1183A-67R-2 **Section Top: 1206.35 mbsf**

UNIT 7: APHYRIC TO MODERATELY OLIVINE-PHYRIC BASALT

Pieces: 1A–17

CONTACTS: None.

PHENOCRYSTS:

	% Mode	Grain Size (mm): Max	Min	Avg.	Shape/Habit
Olivine:	<1–3	1.5	<0.5	0.5	Subhedral to euhedral

The highest concentration of olivine in this section occurs at the bottom of Piece 10, possibly reflecting crystal accumulation. Pseudomorphs after olivine phenocrysts are more visible in aphanitic areas (e.g., Pieces 9A and 10) and significantly more visible within zones of alteration near veins and fractures.

GROUNDMASS: Aphanitic to fine grained; contains plagioclase, clinopyroxene, and trace black oxides.

VESICLES: Generally nonvesicular, although vesicle abundance varies, with more vesicles in aphanitic areas near pillow rims. The vesicles (<1 mm) are subround to angular, and are filled with green clay and carbonate ± sulfide and Fe oxyhydroxide.

COLOR: Light gray (N7) to medium light gray (N6).

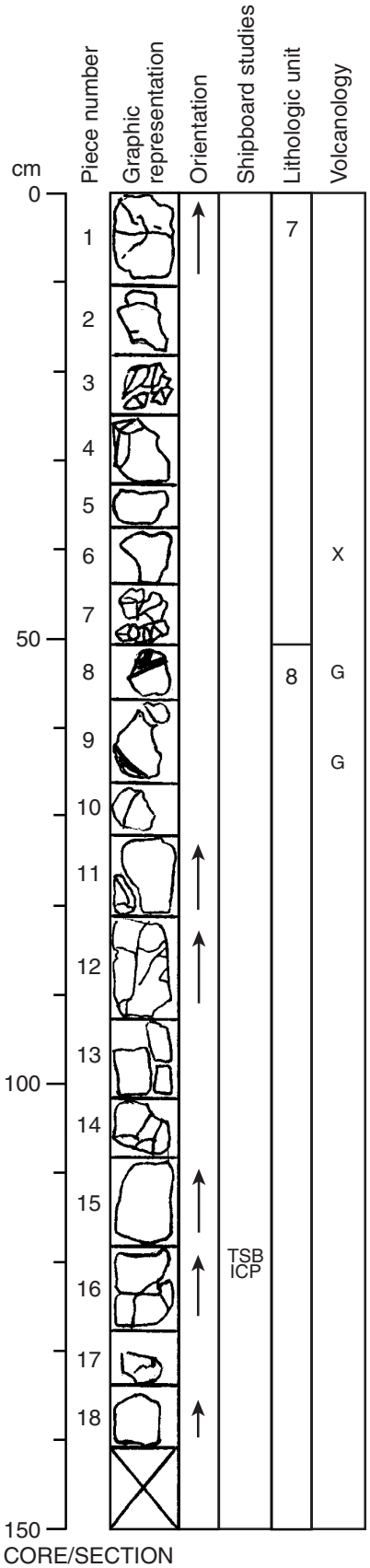
STRUCTURE: Pillowed. Several pieces are aphanitic (Pieces 4, 5, 9A–9C, 10 and the bottom of 12); the top of Piece 12 has a thin (~5 mm) cap of palagonitized glass. Pieces 9A and 10 represent the top and bottom (respectively) of a pillow.

ALTERATION: Slight to moderate near veins. Yellowish brown stains (iron hydroxides) occur on top of Pieces 4 and 5. Olivine phenocrysts are completely replaced by dark green clay and carbonate.

VEINS/FRACTURES: Sparsely to moderately veined. Pieces 7B–C, 8A–B and 9A–C are highly veined.

COMMENTS: Piece 8A contains a plagioclase xenolith at 67 cm.

Core Photo



192-1183A-67R-3 **Section Top: 1207.84 mbsf**

UNIT 7: SPARSELY TO MODERATELY OLIVINE-PHYRIC BASALT

Pieces: 1–7

CONTACTS: Not recovered. The contact between Units 7 and 8 is inferred to be between Pieces 7 and 8.

PHENOCRYSTS:	% Mode	Grain Size (mm): Max	Min	Avg.	Shape/Habit
Olivine:	~2	1	<0.5	~0.5	Euhedral to subhedral; rarely in glomerocrysts

GROUNDMASS: Aphanitic.

VESICLES: Nonvesicular.

COLOR: Light gray (N7) to medium light gray (N6).

STRUCTURE: Massive. Aphanitic groundmass suggests proximity to a chilled margin.

ALTERATION: Slight to moderate near veins and fractures. Olivine phenocrysts are completely replaced by black clay, white carbonate, and/or Fe oxyhydroxide.

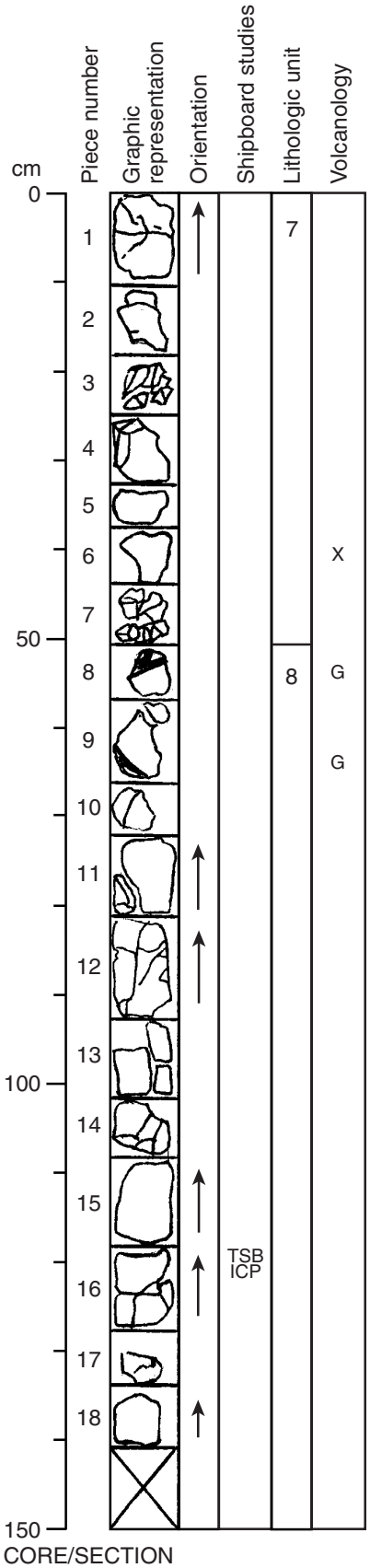
VEINS/FRACTURES: Sparsely veined. Veins are ≤1 mm wide and are filled with green and black clay and/or Fe oxyhydroxides and trace white carbonate.

COMMENTS: Plagioclase-rich xenoliths are present in Piece 4 (5 mm diameter) and Piece 6 (6 mm diameter).

Description of thin section at 118.5-119.5 cm

Whole-rock ICP-AES data

Core Photo



192-1183A-67R-3 **Section Top: 1207.84 mbsf**

UNIT 8: APHYRIC TO SPARSELY OLIVINE-PHYRIC BASALT

Pieces: 8–18

CONTACTS: Not recovered. The contact between Units 7 and 8 is inferred to be between Pieces 7 and 8. The distinction between the two units is based on the presence of a thin (15 mm) layer of recrystallized limestone at the top of Piece 8. The interpillow sediment is in sharp contact with an 8-mm-thick glass layer in Piece 8, interpreted as the top of a pillow.

PHENOCRYSTS:

	% Mode	Grain Size (mm): Max	Min	Avg.	Shape/Habit
Plagioclase:	<<1	1	0.8	0.9	Equant, stubby
Olivine:	<1	1.5	<0.5	0.5	Subhedral to euhedral

Plagioclase phenocrysts are present mainly in the glassy and aphanitic top of Unit 8.

GROUNDMASS: Glassy to aphanitic to fine grained, containing plagioclase, clinopyroxene, and trace black oxides.

VESICLES: Generally nonvesicular, except in aphanitic pieces near pillow rims, where subrounded vesicles (<<1 mm) are filled with green clay, carbonate, and Fe oxyhydroxide. One subround equant vesicle (4 mm), in Piece 8 below the glassy rim, is filled with carbonate and green clay, and stained with Fe oxyhydroxide.

COLOR: Medium light gray (N6) to olive gray (5Y 4/1).

STRUCTURE: Pillowed. Piece 9 has an 8-mm-thick glassy rim, followed by an aphanitic zone and then a fine grained interior.

ALTERATION: Slight to moderate near veins. Olivine phenocrysts are completely replaced by green clay and carbonate, and are more visible near veins; plagioclase phenocrysts appear unaltered.

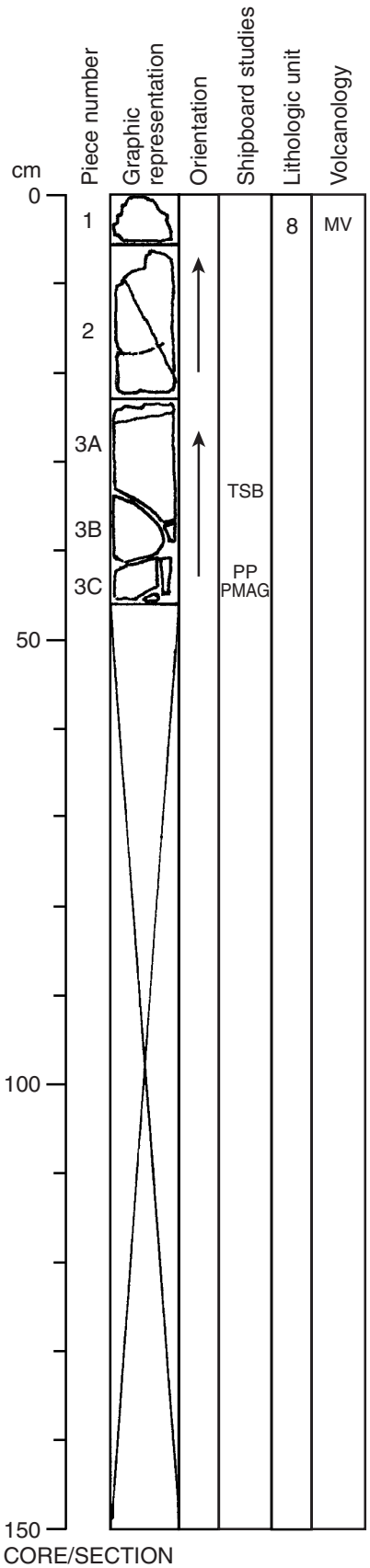
VEINS/FRACTURES: Sparsely to moderately veined. Veins are <1–1.5 mm wide and are filled with carbonate, green clay, sulfide, and Fe oxyhydroxide (e.g., Piece 12).

COMMENTS: The interpillow sediment comprises a few glassy basaltic clasts (olive gray [5Y 4/1] to black [N1]) up to 10 x 20 mm in size, set in a recrystallized carbonate matrix (grayish green [5/2], very light gray [N8] and dark greenish gray [5GY 4/1]). The basaltic clasts are mainly unaltered glass, and have sparse plagioclase and olivine phenocrysts. A piece of the interpillow sediment is also found attached to the glassy margin of Piece 9 at 60 cm.

Description of thin section at 118.5-119.5 cm

Whole-rock ICP-AES data

Core Photo



192-1183A-68R-1 **Section Top: 1209.70 mbsf**

UNIT 8: APHYRIC TO MODERATELY OLIVINE-PLAGIOCLASE-PHYRIC BASALT

Pieces: 1–3C

CONTACTS: None

PHENOCRYSTS:	% Mode	Grain Size (mm): Max	Min	Avg.	Shape/Habit
Plagioclase:	≤1	~0.2	<0.1	~0.1	Subhedral tabular
Olivine:	<1–2	1	<0.5	0.5	Subhedral to euhedral; rarely in glomerocrysts

Phenocrysts are unevenly distributed. Plagioclase phenocrysts are visible in aphanitic areas (e.g., Piece 3C).

GROUNDMASS: Aphanitic to fine grained, containing plagioclase, clinopyroxene, and trace black oxides.

VESICLES: Nonvesicular.

COLOR: Medium light gray (N6) to medium gray (N5).

STRUCTURE: Massive. Piece 3 becomes aphanitic downwards, indicating proximity to the margin of this cooling unit. The lower part of Piece 3A and the upper part of Piece 3B have undulating layers, 5–10 mm wide, defined by changes in groundmass grain size from aphanitic to fine grained. These are interpreted as successive chilled margins possibly formed during pillow inflation.

ALTERATION: Slight to moderate near veins. Olivine is completely replaced by black clay and white carbonate with minor Fe oxyhydroxide.

VEINS/FRACTURES: Sparsely veined. Veins are <1-2 mm wide and are filled with dark green clay and white carbonate.

COMMENTS: Miarolitic cavities (≤3mm), sometimes filled with dark green clay and white carbonate, are present in the top of Piece 2.

Description of thin section at 32-35 cm

Site 1183 Smear Slides

Site	Hole	Core	Type	Sec	Top (cm)	Depth (mbsf)	Lithology	T-Sand	T-Silt	T-Clay	M-Biotite	M-Calcite	M-Carbonate	M-Clay	M-Feldspar	M-Glauconite	M-Opaques	M-Plagioclase	M-Pyrite	M-Pyroxene	M-Quartz	M-Unspecified Minerals	M-Volcanic Glass	M-Zeolite	B-Diatoms	B-Ebridians	B-Foraminifers	B-Nannofossils	B-Radiolarians	B-Siliceous Sponge Spicules	B-Silicoflagellates	B-Sponge Spicules	B-Organic debris	R-Lithic Fragments	Comments
1183	A	2	R	1	46	328.46	M	25	5	70													0				25	70	1	4					few grains of volc. glass, 1 pyroxene?
1183	A	2	R	2	83	330.33	D	55	5	40																	55	37	4	4					
1183	A	3	R	2	61	339.71	D	60	5	35																	58	40	0	2					
1183	A	3	R	2	90	340	D	55	10	35																	60	38	1	1					
1183	A	4	R	3	61	350.81	D	40	10	50															0		40	55	3	2					
1183	A	4	R	4	130	353	D	40	10	50																	45	50	3	2					
1183	A	5	R	1	93	357.73	D	40	10	50															0		50	48	1	1					
1183	A	s	R	2	12	367.92	M	45	5	50									10						5		40	40	3	2					dark is pyrite framb. in foram chamber
1183	A	6	R	3	118	370.48	D	60	10	30															0	1	60	35	2	2					
1183	A	7	R	3	97	379.87	D	40	10	50																	47	50	3						
1183	A	8	R	3	50	389	D	25	10	65																	34	65		1					SS prep displaced most Forams to edge
1183	A	8	R	2	93	387.93	M	35	15	50																	50	49		1					Burrow fill (light tan colored)
1183	A	9	R	2	50	397.1	D	50	10	40																	57	40	2	1					
1183	A	10	R	1	84	405.54	M	50	10	40																	60	37	2	1					Greenish gray part
1183	A	10	R	1	69	405.39	D	40	10	50																	45	52	2	1					White part
1183	A	10	R	3	117	408.87	M	20	5	75																	25	75							Burrow fill (white colored)
1183	A	11	R	2	90	416.7	D	40	10	50																	50	44	4	2					
1183	A	11	R	3	61	417.91	M	55	15	30									35								32	30	2	1					1cm layer rich in dark sand-sized grains
1183	A	12	R	3	80	427.7	D	50	10	40																	55	41	3	1					
1183	A	12	R	1	50	424.4	M	40	10	50									4								45	46	4	1					Dark green lamina has pyritized radiolarians
1183	A	13	R	1	100	434.5	D	20	20	60																	37	60	3						
1183	A	14	R	CC	5	444.55	D	20	10	70																	29	70	1						
1183	A	15	R	1	44	752.44	M	10	10	80				5													15	70	3	7					
1183	A	15	R	1	111	753.11	M	70	30							1	2			0	1		95					1						ash, least bioturbated
1183	A	15	R	2	63	754.13	M	10	20	70															0		10	75	7	8	0				
1183	A	15	R	2	80	754.3	D	25	15	60																	40	57	1	2					
1183	A	15	R	2	125	754.75	M	20	30	50							1						10				25	53	1	10					"bioturbated ash"
1183	A	16	R	CC	18	762.16	M	10	80	10				5	1		10				1		30		0			1		2				50	dark, lithic ash
1183	A	16	R	1	18	761.28	D	30	10	60															0		40	50	5	5	0				
1183	A	16	R	1	37	761.47	M	10	20	70															0		10	80	5	5	0				
1183	A	16	R	1	42	761.52	M	20	10	70													8		0		10	60	10	10	0			2	bioturbated ash
1183	A	17	R	1	98	771.78	D	20	10	70																	30	65	2	3					
1183	A	18	R	2	78	782.78	D	20	10	70																	27								
1183	A	18	R	3	63	784.13	M	20	15	65																			1	3					bioturbated ash
1183	A	18	R	3	116	784.66	M	25	10	65													3				33	60	3	1					bioturbated ash
1183	A	18	R	3	98	784.48	M	10	10	80													6				12	80	1	1					bioturbated ash
1183	A	18	R	2	78	782.78	D	20	10	70																			1						
1183	A	18	R	3	63	784.13	M	20	15	65													9				25	62							bioturbated ash
1183	A	18	R	2	78	782.78	D	20	10	70																		68		4					
1183	A	19	R	4	98	795.58	M	20	40	40																	17								Dark ash layer
1183	A	19	R	3	120	794.3	M	25	10	65																	33	62	2	3					Gray layer
1183	A	19	R	3	56	793.66	D	25	10	65																	32	62	4	2					
1183	A	19	R	4	98	795.58	M	20	40	40									5				33					38	6	1					Dark ash layer
1183	A	20	R	1	114	800.84	D	20	10	70																	25	70	1	4					
1183	A	20	R	2	46	801.66	M	16	7	77							7										13	74	5	1					
1183	A	21	R	4	51	814.31	M	10	20	70							10						10		5			62	10	3					Darkest ash layer spot
1183	A	21	R	5	83	816.13	D	20	10	70													3		1		25	65	5	1					

Site 1183 Smear Slides

Site	Hole	Core	Type	Sec	Top (cm)	Depth (mbsf)	Lithology	T-Sand	T-Silt	T-Clay	M-Biotite	M-Calcite	M-Carbonate	M-Clay	M-Feldspar	M-Glauconite	M-Opaques	M-Plagioclase	M-Pyrite	M-Pyroxene	M-Quartz	M-Unspecified Minerals	M-Volcanic Glass	M-Zeolite	B-Diatoms	B-Ebridians	B-Foraminifers	B-Nannofossils	B-Radiolarians	B-Siliceous Sponge Spicules	B-Silicoflagellates	B-Sponge Spicules	B-Organic debris	R-Lithic Fragments	Comments
1183	A	22	R	1	136	820.36	M	20	50	30					10		10			1			20		5		3	25	20	1				5	pumice fragments and vesicular glass
1183	A	22	R	3	90	822.9	D	15	13	72													5				20	72	3						
1183	A	22	R	5	40	825.4	M	15	25	60							10						5				21	60	2	2					
1183	A	23	R	4	60	833.7	D	35	23	42																	50	42	2	6					
1183	A	23	R	5	76	835.36	M	20	35	45							18						9				13	45	12	3					Dark ash layer
1183	A	24	R	1	10	838.3	D	15	46	39																	60	39	0	1					
1183	A	25	R	1	95	848.35	D	21	15	64																	35	64	0	1					
1183	A	30	R	1	43	895.93	D	25	25	50			50														30	20							unid carb. former nannos?
1183	A	32	R	1	134	916.04	D	15	30	55			60														20	20							
1183	A	33	R	1	116	925.46	D	10	60	30			70														15	15							
1183	A	36	R	4	72	958.27	M	2	25	73	1		20				4							10				65							
1183	A	36	R	1	90	954	D	10	15	75			38															60	1	1					
1183	A	37	R	2	16	964.36	M	10	14	76			14				10							60				16							Stylorite part
1183	A	37	R	2	100	965.2	D	15	15	70			45															50	5						
1183	A	37	R	4	97	968.14	M	15	25	60	1		42				1							23				32		1					Zeolitic nannofossil chalk
1183	A	38	R	1	30	972.7	M	10	25	65			47											20				33							Zeolitic nannofossil chalk
1183	A	38	R	2	56	974.46	D	10	15	75			75											5				20							
1183	A	39	R	4	13	986.63	M	0	70	30			30											30				40							Zeolitic nannofossil chalk
1183	A	41	R	1	19	1001.59	D	7	8	85	5						10				2				3			80							
1183	A	42	R	2	81	1013.41	D	10	20	70			20														15	65	0						foraminifer nannofossil limestone
1183	A	43	R	1	29	1021.09	D	15	20	65																	20	80	0						
1183	A	44	R	1	53	1030.93	D	20	15	65			10														25	65	0						
1183	A	45	R	1	50	1040.5	D	15	15	70			10														20	70	0						
1183	A	47	R	1	99	1060.19	D	5	10	85																	5	95	0						
1183	A	48	R	1	92	1069.72	D	0	20	80			10															90	0						but from drilling paste
1183	A	50	R	2	60	1090.3	M	0	10	90			23	45										12				20							
1183	A	50	R	2	147	1091.17	D	0	10	90			65											10				25							
1183	A	50	R	1	63	1088.83	D	0	15	85			33	4														63							
1183	A	51	R	2	110	1100.5	D	0	5	95			25															75							
1183	A	52	R	CC	14	1113.37	D	5	5	90				10													5	75	10						Clay may be present in higher ones also
1183	A	52	R	2	70	1109.7	D	0	10	90			15											8				77							
1183	A	53	R	1	79	1117.99	D	5	10	85			5											10			5	80							
1183	A	53	R	4	29	1121.73	D	5	10	85				2			5							13				80							
1183	A	53	R	4	81	1122.25	D		5	95							5				1			5			3	41					45		
1183	A	53	R	4	57	1122.01	D	0	15	85			10	2			3				1			3			1	70					10		
1183	A	54	R	1	57	1127.37	M	0	5	95			3				2							1				4					90		

Site 1183 Sediment Thin Section Descriptions

Hole	Core	Sec	cm	Location	% Carb	Facies name	Preliminary description and notes	Figure number or Photomicrograph ID#	Microfossils and environmental interpretation
							NOTE ON ABUNDANCES: In the estimates of foraminifer abundance, we are ignoring what is filling or half-replacing the tests => actual "foraminifers" would only the be test walls, hence a rather small percent of the current rock. However, it is the foraminifer packing that indicates the original texture. Similarly, assuming that the matrix was originally nannofossils (as indicated by smear slides, etc.), we generally lump "micrite" with nannofossils.		
Subunit IC -- Ash beds within chalk Lower Oligocene									
1183A	19R	2	79-82	Typical Limestone	93.90%	Foraminifer Nannofossil Limestone	Well-preserved foraminifers (25%) and radiolarians (5% -- excellent preservation) in a micrite matrix. Stylolites are present. Foraminifer chambers are often unfilled and sometimes contain chert. Radiolarians occur in 19R, but rarely below, suggesting a higher productivity, or else enhanced preservation.	See photomicrograph **1183AS-72**	The larger region of the slide is composed of a planktonic foraminifer/ nannofossil wackestone with no evident bioclasts other than some radiolarian fragments. Distribution is chaotic and the size distribution is wide, indicating an autochthonous pelagic deposit. Stylolites do not flank high concentrations of dissolved bioclasts possibly suggesting a relatively short dissolution span. Gray colored recrystallized cement has replaced the micrite matrix in a patchy pattern marking the initiation of chertification. The sample is very similar to the 23R-6, 68-72 cm interval: a densely fossiliferous planktonic foraminifer/ nannofossil wackestone that exhibits some rare, muddier zones, indicative of burrows. Planktonic foraminifer diversity is high and preservation is good.
									This sample differs, however, by the continued common occurrence of radiolarians that characterizes the younger Rupelian section of Hole 1183A. The most common species of planktonic foraminifer remain *Chiloguembelina cubensis*, *G. euapertura* and *G. venezuelana* with rare occurrences of *Globgerina ampliapertura* and *G. angiporoides*.
1183A	19R	4	16-19	Top is Limestone with seams, Bottom is Flaser.	bottom is 49.26%, but this rich is not apparent in TS	Foraminifer Nannofossil Limestone	Thick TS. TOP OF SLIDE -- Well-preserved foraminifers are observed in nannofossil matrix (moderate wackestone). BASEOF SLIDE -- Foraminifers and spicules are enriched in pressure-solution seams, and relatively sparse in flaser-nodules. Some excellent-preserved Radiolarians (e.g., 3-D balls at (5,82, when 0 is base of slide). A lot of siliceous spines are also present -- Radiolarian spines or Sponge spicules? About 10% volcanic glass (hence preserved radiolarians?) and some phosphate and glauconite (traces).	See photomicrographs **1183AS-35**, **1183AS-36**, **1183AS-37**	The sample is very similar in facies to the 22R-4, 84-88cm sample; a planktonic foraminifer/nannofossil wackestone rich in volcaniclastic debris. In this sample, the volcaniclasts are largely composed of needle-like ash particles. The ash-rich layers contain relatively few planktonic foraminifer but are interlaminated with wackestone layers nearly free of ash and rich in well-preserved microfossils. The ash-rich layers become more common towards the top of the thin section. Laminal disruption due to bioturbation is less than in the 22R-4, 84-88cm sample, although one clearly defined burrow is evident in the ash-rich upper portion of the thin-section, probably an escape structure. This evidence indicates that volcaniclastic debris flows remained intermittent, although probably more frequent than during deposition of the 22R-4, 84-88cm sample.
							Some burrows penetrate into flasers (implying these layers are partly primary, not solely diagenetic features)-- inside of burrows are filled by fine-grained matrix, but outside "wall" are composed of fragmented foraminifers and radiolarians.		Radiolarians are abundant overall, but much more so in the ash-rich layers than in the wackestone laminae. This association further supports the hypothesis that radiolarian influxes in the Oligocene section of Hole 1183A are tied to silica-enhancement in surface water due to volcanic activity. The planktonic foraminifer remain dominated by a middle Rupelian assemblage characterized by *Globigerina euapertura*, *G. venezuelana*, *G. ampliapertura* and *Chiloguembelina cubensis*.
1183A	20R	CC	2	More "marly facies" limestone than typical in core. "Subtle flaser-pressure solution, especially bottom of slide"		Nannofossil Foraminifer Limestone	Poor-quality thin section. About 50% foraminifers (packstone to dense wackestone; large variety of types and sizes), which locally becomes nearly a grainstone texture. Contains microstylolites that cut some foraminifers (and maybe concentrate others). Can not tell nannofossil from clay (if any), and the fact that "microstylolites" are on one side of slide, but not the other is suspicious (= artifact?). Origin of dark/light patches are probably artifact of non-cover-slipped thick slide.	See **Chapter 3, Figure F32** (1183AS-1), **Figure F8** (1183AS-2)	The sample shows two different textures indicative of different depositional environments separated by a highly irregular zone of dissolution marked by a stylolite. The larger region of the slide is composed of a planktonic foraminifer/nannofossil wackestone with no other evident bioclasts other than very rare radiolarians and a single fragment of a large hyaline benthic foraminifer. Distribution is chaotic and the size distribution is wide, indicating an autochthonous pelagic deposit. The smaller area delineated by the stylolite is characterized by grading of planktonic foraminifer bioclasts. The graded laminae are perpendicular, for the most part, to the stylolite, although the latter makes a 90° turn at both ends of the thin-section to circumscribe a roughly polygonal area.

Site 1183 Sediment Thin Section Descriptions

Hole	Core	Sec	cm	Location	% Carb	Facies name	Preliminary description and notes	Figure number or Photomicrograph ID#	Microfossils and environmental interpretation
							NOTE ON ABUNDANCES: In the estimates of foraminifer abundance, we are ignoring what is filling or half-replacing the tests => actual "foraminifers" would only the be test walls, hence a rather small percent of the current rock. However, it is the foraminifer packing that indicates the original texture. Similarly, assuming that the matrix was originally nannofossils (as indicated by smear slides, etc.), we generally lump "micrite" with nannofossils.		
									The thin-section marks a dissolution surface between pelagic autochthonous chalk and fine-grained turbidites. Species evident include *Globigerina euapertura*, *G. sellii*, *G. venezuelana* and *Chiloguembelina cubensis*.
1183A	21R	4	111-116	Typical Limestone	90.10%	Nannofossil Foraminifer Limestone	Thin-section is too thick. Contains microstylolites that cut some foraminifers, can not tell nannofossil from clay. Foraminifer packstone to wackestone (patchy changes in abundance). Rare radiolarians (nice 3-D one at (14, 71; when UP is toward 0). CARB implies 10% clay-silica-ash; so I arbitrarily split equally.	See photomicrograph **1183AS-3**	The thin-section for this sample is cut too thick, obscuring most of the microfossils. Nevertheless, it appears to be a planktonic foraminifer/ nannofossil wackestone very similar to that of the 22R-CC, 1-4cm sample. Planktonic foraminifer are abundant and evidence a wide size distribution and chaotic arrangement, indicative of an autochthonous pelagic deposit. Radiolarians are frequent. Only a small minority of total specimens is identifiable, but of those that are, the most common species are once again *Globigerina euapertura*, *G. venezuelana* and *Chiloguembelina cubensis*.
1183A	22R	4	84-88	Ash-rich Limestone		Ash-rich Foraminifer Limestone	Partly dissolved foraminifers (40%) occur aligned along micrite intervals which contain stylolites. Nannoplankton appears to constitute a minor fraction (5%). Radiolarian tests are occasionally present, and concentrated in flaser-seams. Ash fragments comprise transparent, vesicular, (sub)angular, sand-sized glass (10%), and angular red colored grains (5%); and are concentrated in "anastomosing seam" zones.	See photomicrograph **1183AS-73**	The sample is a planktonic foraminifer/nannofossil wackestone that is marked by a high degree of dissolution and contains abundant volcanic glass and rare plagioclase grains. Volcaniclastic grain density varies between layers of varying definition. It is likely that the volcaniclastic rich and poor zones were originally well layered, but were then subjected to limited bioturbation. However, bioturbation did not proceed to the extent of obliterating all of the original texture, indicating that volcaniclastic debris flows were intermittent but frequent. A thicker layer of glass-free wackestone towards the top of the slide represents a longer period of quiescence in volcanic eruptions.
									Radiolarians are abundant, possibly reflecting greater productivity of siliceous microfossils in silica-enriched waters due to volcanic activity. This effect may have been relatively long lived and explanative of the frequent radiolarians found in the 22R-CC, 1-4cm sample as well. In addition to abrasion experienced by microfossils enveloped by the flows, extensive diagenetic dissolution also characterizes the sample, so that preservation is poor and most planktonic foraminifer are unidentifiable. Of those species that are identifiable, the most common are typical of the Oligocene section of Hole 1183A; i.e., *Globigerina euapertura*, *G. venezuelana* and *Chiloguembelina cubensis*.
1183A	22R	CC	2-6	Typical Limestone	89.70%	Nannofossil Foraminifer Limestone	Poor-quality preparation (too thick) => obscures matrix. Foraminifer packstone to dense wackestone (about 60% foraminifers). Brown stains (in patches) = limonite?, slight overgrowths on interior of big foraminifers. transparent light-brown assumed to be volcanic glass shards. CARB = 10% non-carbonate => probably 8% clay and volcanic ash.	See photomicrograph **1183AS-4**	A planktonic foraminifer/nannofossil wackestone evidences bioclasts of wide size distribution and chaotic arrangement, indicating an autochthonous pelagic deposit. Zones of extensive dissolution occur, however, which concentrate the bioclasts into dense linear zones parallel to bedding. No concentration due to primary depositional sorting is evident. Planktonic foraminifer are again dominant, but overall abundance is less than in the older Oligocene section. Small radiolarians are also common and a single benthic foraminifer (*Cibicidoides* sp.) is noted. Some planktonic foraminifer evidence silica infilling, but no major areas of silicification are evident. Most common planktonic species include *Globigerina euapertura*, *G. venezuelana* and *Chiloguembelina cubensis*.
1183A	23R	6	70-74	Typical Limestone	95.20%	Foraminifer Limestone	Well-preserved foraminifers (85%? = grainstone to packstone). Content of nannofossil matrix is very low (less than 10%).	See photomicrograph **1183AS-38**	A very densely fossiliferous planktonic foraminifer/nannofossil wackestone/packstone continues the Oligocene trend for high bioclast density. This sample, however, does exhibit some rare, muddier zones, possibly indicative of burrows. Planktonic foraminifer diversity rises relative to the 24R-1, 59-62cm sample, indicating a more typical paleoecology in the pelagic zone. Most common species are *Chiloguembelina cubensis*, *Globigerina ampliapertura*, *G. euapertura* and *G. venezuelana*.

Site 1183 Sediment Thin Section Descriptions

Hole	Core	Sec	cm	Location	% Carb	Facies name	Preliminary description and notes	Figure number or Photomicrograph ID#	Microfossils and environmental interpretation
							NOTE ON ABUNDANCES: In the estimates of foraminifer abundance, we are ignoring what is filling or half-replacing the tests => actual "foraminifers" would only the be test walls, hence a rather small percent of the current rock. However, it is the foraminifer packing that indicates the original texture. Similarly, assuming that the matrix was originally nannofossils (as indicated by smear slides, etc.), we generally lump "micrite" with nannofossils.		
Subunit IIA -- Limestone and chert Upper Eocene									
1183A	24R	1	60-62	Typical Limestone (upper facies), with stylolite	95.00%	Foraminifer Limestone with nannofossils	Foraminifer (85%?) packstone to grainstone. Although burrows accumulate nannofossils, their percentage is less than 10%. Stylolite penetrates foraminifers.	See photomicrographs **1183AS-39**, **1183AS-40**, **1183AS-41**	A very densely fossiliferous planktonic foraminifer/nannofossil packstone equals or exceeds the bioclast density of the Paleocene to middle Eocene high productivity zone (sections 33R-3 through 39R-1). The upper part of the slide exhibits a zone of stylolitic dissolution parallel to bedding. Although abundant, planktonic foraminifer exhibit a low diversity, strongly dominated by *Globigerina euapertura* and *Chiloguembelina cubensis*.
									The dominance may reflect some stress in the paleoecology of the pelagic zone. The nature of the stress is unclear, but unlikely to be related to cool water temperature because the Tethyan species *Globigerina venezuelana* is relatively frequent. The only other species of significant abundance is *Globigerina ampliapertura*.
1183A	24R	2	129-132	Chert replacement		Partially chertified, Nannofossil Foraminifer Limestone	Foraminifer packstone to wackestone (outside chert-replaced areas); with highest packing probably diagenetic. Foraminifer (40%) are mostly well preserved, but smaller ones are becoming ghosts. Calcareous fragments (8%). Silicification is quite patchy. Micrite composition can not be determined, but probably was nannofossils originally.	See photomicrograph **1183AS-74**	A densely fossiliferous planktonic foraminifer/nannofossil wackestone is very similar to that in the 24R-CC, 6-9cm sample except for extensive replacement by chert. The replacement was progressing roughly parallel to bedding, but the surviving wackestone texture shows no evident laminae that could serve as a preferred pathways for silicification. Planktonic foraminifer species composition is nearly identical to the 24R-CC, 6-9cm sample except that late Eocene species are now limited to *Hantkenina primitiva*.
1183A	24R	CC	6-9	Typical Limestone (lower facies)	94.70%	Nannofossil Foraminifer Limestone	Foraminifer packstone (about 50%), with abundant small forms. Close-packed.	See photomicrograph **1183AS-75**	A densely fossiliferous planktonic foraminifer/nannofossil wackestone is marked by a large increase in planktonic foraminifer abundance relative to the underlying older late Eocene section. This marks the beginning of a transition back to very high productivity pelagic deposition previously observed lower in Hole 1183A in the Paleocene to lower middle Eocene section.
									This sample also takes on a more "Oligocene-like" character to the foraminifer assemblage with the joining of Globigerina ouachitaensis and abundant *G. euapertura* with continuing common occurrence of *G. ampliapertura*. Late Eocene species are now limited to Tuborotalia cerroazulensis cerroazulensis and *Hantkenina primitiva*.
1183A	25R	CC	2-5	Typical Limestone	96.90%	Nannofossil Foraminifer Limestone	Foraminifer packstone to dense-wackestone (about 35% foraminifers), with local variability to wackestone. Fan of seams is at one end, but can't tell composition of insoluble (apparently averaging just 3% of lithology, according to CARB). Large range of foraminifer types. As in adjacent thin-sections, half of foraminifers are almost ghosts.	See photomicrograph **1183AS-76**	A very fossiliferous nannofossil/planktonic foraminifer wackestone essentially identical in biofacies to sample 26R-CC, 14-17cm. This sample is slightly younger in the late Eocene, however, with no Globigerinatheka index but continuing *Globigerina ampliapertura*, *G. praeturritulina* and *Tuborotalia cerroazulensis cunialensis*.
1183A	26R	CC	14-17	Typical Limestone	96.70%	Nannofossil Foraminifer Limestone	Foraminifer packstone (about 45% foraminifers). Locally closest-packed (diagenetic, or winnowed?), Rare small shell fragments	See photomicrograph **1183AS-77**	A very fossiliferous nannofossil/planktonic foraminifer wackestone is indicative of a mesotrophic, pelagic, autochthonous mud with a relatively normal species composition for the Tethyan late Eocene. Common species include *Globigerinatheka index*, *Globigerina ampliapertura*, *G. praeturritulina* and *Tuborotalia cerroazulensis cunialensis*.
1183A	27R	CC	19-21	Typical Limestone	96.10%	Foraminifer Nannofossil Limestone	Foraminifer wackestone (about 25% foraminifers), variety of sizes, open to micro-spar infilling	See photomicrograph **1183AS-78**	A very fossiliferous nannofossil/planktonic foraminifer wackestone continues the evolution of the planktonic assemblage to a more normal Tethyan species composition for the middle Eocene. Acarinina species are now much reduced and *Morozovella* and *Globigerinatheka* species are common. A tropical, mesotrophic, pelagic, autochthonous mud is indicated. Taxa present include *Morozovella lehneri*, *Globigerinatheka kugleri*, *Globigerinapsis beckmanni*, *Tuborotalia cerroazulensis cerroazulensis* and *Globigerina senni*.

Site 1183 Sediment Thin Section Descriptions

Hole	Core	Sec	cm	Location	% Carb	Facies name	Preliminary description and notes	Figure number or Photomicrograph ID#	Microfossils and environmental interpretation
							NOTE ON ABUNDANCES: In the estimates of foraminifer abundance, we are ignoring what is filling or half-replacing the tests => actual "foraminifers" would only the be test walls, hence a rather small percent of the current rock. However, it is the foraminifer packing that indicates the original texture. Similarly, assuming that the matrix was originally nannofossils (as indicated by smear slides, etc.), we generally lump "micrite" with nannofossils.		
1183A	27R	CC	34-37	Partial silicification		Partly chertified Foraminifer Nannofossil Wackestone	Original texture was about 35% foraminifers (dense wackestone to packstone), now much of matrix is micrite to microspar. Chertification progression is fascinating -- one can observe many stages and partial texture-replacements	See photomicrograph **1183AS-79**	
Middle Eocene (approx.)									
1183A	29R	CC	0-3	Typical Limestone		Foraminifer Nannofossil Limestone	Foraminifer dense wackestone to packstone (variable concentrations, perhaps due to diagenesis). Many foraminifer ghosts and tiny forms, so original abundance was perhaps 35%. Just above middle-center is a "clast" or residual flaser of micrite sparse-wackestone that is bordered by foraminifer concentrations (probably diagenetic packing).	See photomicrograph **1183AS-80**	A very fossiliferous nannofossil/planktonic foraminifer wackestone. Similar in texture to the 32R-1, 32-33cm sample, although planktonic foraminifer are somewhat more abundant. The sample is indicative of a mesotrophic autochthonous pelagic mud. Water paleotemperature is more typical of the Tethyan middle Eocene, with less Acarinina dominance and frequent *Tuborotalia* species. Species include *Acarinina spinuloinflata*, *Turorotalia cerroazulensis cerroazulensis*, *Globigerinatheka kugleri* and *Globigerina frontosa*.
1183A	30R	1	33-36	Typical Limestone	97.50%	Nannofossil Foraminifer Limestone	Foraminifer packstone (half of slide; 60% foraminifers, partly crushed together) to Foraminifer dense wackestone (other half; 40% foraminifers). Matrix is partially micro-spar recrystallized (originally nannofossil micrite).		A very fossiliferous planktonic foraminifer/nannofossil wackestone, the sample is very similar to the 29R-CC, 0-3cm thin-section. A relatively normal, tropical marine Eocene, autochthonous pelagic deposit is indicated. Foraminifer density is much higher than in the Acarinina-dominated, cooler water assemblages in Sections 31R-1 and 32R-1. The most common species are *Acarinina spinuloinflata*, *Tuborotalia cerroazulensis cerroazulensis* and *Subbotina eocaena*.
1183A	30R	2	64-65	Dark-olive Chert piece		Chert (silicified foram-rich Limestone)	Chert, but originally was a foraminifer-packstone to dense wackestone texture. Walls of foraminifers are often more coarsely-crystalline silica than the replacement of matrix, as if chertification was grain-for-grain silicification.	See photomicrograph **1183AS-81**	The sample is a chert replacement of a moderately fossiliferous nannofossil/planktonic wackestone very similar to that in the 32R-1, 32-33cm sample. One small area of wackestone is only partially silicified. Numerous planktonic foraminifera "ghosts" are evident and frequent specimens are present which are only partially replaced. There is sufficient remaining morphology to the foraminifera to identify them as species of the genus *Acarinina* as well as the taxon *Globigerina senni*. The sample was thus originally a middle Eocene mesotrophic, cool water, pelagic mud deposit.
1183A	31R	1	31-32	Typical Limestone	96.80%	Foraminifer Nannofossil Limestone	Foraminifer wackestone (about 25% forams), variety of sizes, open to micro-spar infilling		The sample, a moderately fossiliferous nannofossil/planktonic foraminifer wackestone, is very similar in foraminifer species composition with that of the 32R-1, 32-33cm thin section. It differs texturally by evidencing a diffuse laminal grading of bioclasts, suggesting either sporadic winnowing by weak bottom currents or deposition via minor, low volume, turbidity currents. Whatever the mechanism, it was intermittent, allowing for burrowing, which disrupts the laminae. Continued dominance by *Acarinina* species indicates relatively cool surface water temperatures. The most common taxa are *Acarinina primitiva*, *A. spinuloinflata*, *Globigerina senni* and *Truncatulinoides rohri*.
1183A	32R	1	32-33	Typical Limestone		Nannofossil Foraminifer Limestone	Dense wackestone to packstone, with about 35% foraminifers. (commonly dissolving into microspar & micrite). Wide variety of foraminifer sizes.	See photomicrograph **1183AS-82**	A moderately fossiliferous nannofossil/planktonic foraminifera wackestone. A major change from the underlying high-density pelagic facies in that planktonic foraminifera are much less numerous, although still abundant overall. An autochthonous mesotrophic pelagic mud deposit is indicated. The planktonic foraminifer species composition is much different from the older Paleogene section as well, with *Acarinina* species dominant and keeled genera, such as *Morozovella*, extremely rare. Such a species composition indicates much cooler water temperatures, either throughout the pelagic water column or at least in the deeper pelagic zone (>50m water depth).
									Most common species include *Acarinina primitiva*, *A. spinuloinflata*, *Globigerina senni* and *G. eocaena*.

Site 1183 Sediment Thin Section Descriptions

Hole	Core	Sec	cm	Location	% Carb	Facies name	Preliminary description and notes	Figure number or Photomicrograph ID#	Microfossils and environmental interpretation
							NOTE ON ABUNDANCES: In the estimates of foraminifer abundance, we are ignoring what is filling or half-replacing the tests => actual "foraminifers" would only the be test walls, hence a rather small percent of the current rock. However, it is the foraminifer packing that indicates the original texture. Similarly, assuming that the matrix was originally nannofossils (as indicated by smear slides, etc.), we generally lump "micrite" with nannofossils.		
Lower Eocene									
1183A	33R	3	20-22	Typical Limestone		Nannofossil Foraminifer Limestone	Half of slide preparation is too thick. Rest is 35% foraminifers (packstone to dense wackestone), but over half are now micrite and microspar ghosts.	See photomicrograph **1183AS-83**	A densely fossiliferous planktonic foraminifer wackestone. Preservation of planktonic foraminifera is generally poor, reflecting some dissolution but not to the extent of the 35R-1, 41-43cm sample. No bioclast other than planktonic foraminifera are evident. A high productivity autochthonous mud is once again indicated, this sample marking the highest stratigraphic occurrence of the high-density pelagic facies. Species present include *Acarinina soldadoensis*, *Planorotalites palmerae*, *Pseudohastigerina micra* and *Morozovella quetra*. A major **unconformity** between the latest early Eocene and much earlier Eocene (nannofossil zone NP11) is present between this sample and sample 33R-CC.
Upper Paleocene (approx)									
1183A	35R	1	41-43	Typical Limestone		Nannofossil Foraminifer Limestone	Foraminifer packstone to nearly grainstone, with variable packing (maybe diagenetic). Half of tests are spar-filled, rest are incompletely open. Inter-foram space was probably originally nannofossils, now mainly micrite to microspar.	See photomicrograph **1183AS-84**	A densely fossiliferous planktonic foraminifer packstone. Planktonic foraminifera are the only bioclasts evident and exhibit extensive dissolution and poor preservation. It is unclear whether this dissolution is diagenetic or primary, the latter caused from long exposure on the ocean floor resulting from slow depositional rates or after a period of winnowing of fines. High productivity is indicated. The co-occurrence of the species *Morozovella velascoensis* and *Parasubbotina varianta* together with *Morozovella edgari* and *M. quetra* indicates a **very latest Paleocene age**.
Subunit IIB -- Limestone and zeolite-rich chalk									
1183A	36R	4	88-91	Typical Limestone	97.50%	Nannofossil Foraminifer Limestone	Foraminifer packstone to nearly grainstone (about 60% forams), wide size range of forminifers. More large-sized foraminifers than underlying thin-sections from 37R-39R.	See photomicrograph **1183AS-85**	A densely fossiliferous planktonic foraminifera/nannofossil wackestone. Very similar to the 37R-4, 17-20cm sample in that planktonic foraminifera are dominant, composing about 70% of the thin-section area, but are mud-supported. No areas of dissolution are evident in this sample, however. Once again, a very high productivity paleoenvironment and autochthonous mud deposit are indicated. Dominant species include *Morozovella velascoensis*, *M. occlusa* and *Subbotina triangularis*.
1183A	37R	4	17-20	Siliceous Limestone with odd blue-gray-colored dishes at bases of bioturbation	maybe 94.8%	Nannofossil Foraminifer Limestone	About 60% foraminifers (almost grain-supported), can not tell type of matrix, but assume it is nannofossils (no convincing indication that the "siliceous" in the original "core description" name is correct). Origin of dark/light patches are probably artifact of non-cover-slip and thick slide because such parts have different focus points from usual part.	See photomicrograph **1183AS-5**	A densely fossiliferous planktonic foraminifera/nannofossil wackestone. Similar in texture to the underlying packstone interval, but not grain-supported and not exhibiting matrix recrystallization (although the thin-section is very thick). Benthic foraminifera are absent. The sample likely is indicative of a autochthonous pelagic mud deposited under very high surface water productivity. Species present include *Morozovella aequa*, *M.velascoensis* and *Globanomalina pseudomenardii*. Very slight admixture of austral species are also noted, including *Globanomalina australiformis* and *Acarinina subsphaerica*.
1183A	37R	4	57-60	Clay-seam/ Microflaser zone		Foraminifer Limestone with nannofossils (and zeolites?)	Grain-supported foraminifers. Nearly crushed together. Clay seam is darker, but micrite (not packed forams). Some zeolite (clear, contrasting birefringence to calcite), but difficult to identify, and more concentrated "identifiable grains" in seam. Can't quite call "clay," because a preferred extinction wave along such "clay" seams are lacking.	See photomicrograph **1183AS-86**	A densely fossiliferous planktonic foraminifera/nannofossil packstone. Planktonic foraminifera compose 80% of the thin-section area, although carbonate mud remains in the interclastic areas. The sample exhibits numerous areas of dissolution marked by concentration of insoluble minerals. Some winnowing of fines may have occurred but the sample is indicative of very high productivity in an otherwise autochthonous deposit. Most abundant species include *Morozovella velascoensis*, *M. occlusa* and *Parasubbotina varianta*.

Site 1183 Sediment Thin Section Descriptions

Hole	Core	Sec	cm	Location	% Carb	Facies name	Preliminary description and notes	Figure number or Photomicrograph ID#	Microfossils and environmental interpretation
							NOTE ON ABUNDANCES: In the estimates of foraminifer abundance, we are ignoring what is filling or half-replacing the tests => actual "foraminifers" would only the be test walls, hence a rather small percent of the current rock. However, it is the foraminifer packing that indicates the original texture. Similarly, assuming that the matrix was originally nannofossils (as indicated by smear slides, etc.), we generally lump "micrite" with nannofossils.		
1183A	38R	3	68-70	Typical Limestone		Foraminifer Limestone with nannofossils	Almost all part are composed of grain-supported foraminifers. Dark patches are artifact of poor slide preparation.	See photomicrograph **1183AS-6**	The interval marks the uppermost sampled section of the recrystallized planktonic foraminifera packstone that continues downhole to at least Core 39R-1. Recrystallization of the mud matrix is extensive. The interval is indicative of high productivity and low sedimentation in a condensed zone or concentration of larger bioclasts through winnowing of fines. Biostratigraphic indexes include *Acarinina nitida*, *Morozovella angulata*, *M. velascoensis* and *Globanomalina pseudomenardii*.
1183A	38R	6	15-18	Typical Limestone	94.30%	Foraminifer Limestone with nannofossils	Grain-supported foraminifers limestone. Recristalized calcite can be observed in foraminifer (Photo 1183AS-7). Carb => 6% non-carbonate.	See photomicrographs **1183AS-7**, **1183AS-8**	A planktonic foraminifera packstone, very similar to that in Core 39R-1 except exhibiting less matrix recrystallization. The sample may represent continued high productivity and low sedimentation in a condensed zone or concentration of larger bioclasts through winnowing of fines. Species present include *Acarinina nitida*, *Morozovella angulata*, *S. velascoensis* and *Igorina albeari*.
K/T interval of top Subunit IIIA -- White limestone Middle Paleocene (approx)									
1183A	39R	1	37-39	Typical Silicified-Limestone		Foraminifer Limestone with nannofossils	Grain-supported foraminifers limestone with opaques (1183AS-9). Texture is probably diagenetically enhanced during compaction.	See **Chapter 3, Figure F11** (1183AS-10) See photomicrograph **1183AS-9**	A recrystallized planktonic foraminifera packstone. The sample shows a grain-supported texture with carbonate mud largely recrystallized to a finely-crystalline sparry matrix. The sample may be indicative of a highly-productive, condensed interval with possibly incipient hardground formation. Another possibility is that the coarser bioclasts have been concentrated by removal of the fine-grained material through current action. Identifiable species in this **late Selandian** sample include *Acarinina nitida*, *Morozovella angulata*, *Subbotina cancellata*, *S. velascoensis* and *S. triloculinoides*.
Lower Paleocene									
1183A	39R	4	9-13	Limestone		Nannofossil Foraminifer Limestone	Foraminifer packstone (about 60%), with variety of sizes (compared to 39R-4, 25cm). Quite a reduction in abundance of foraminifers compared to the underlying grainstone texture of thin-section 39R-1	See photomicrograph **1183AS-11**	A very fossiliferous, recrystallized planktonic foraminifer wackestone with frequent Cretaceous reworking. Fragmentation is less severe than in Danian samples lower in the section and overall size distribution is broader. The interval represents a bioturbated zone under mesotrophic conditions. Specimens include *Globoconusa daubjergensis*, *Parasubbotina pseudobulloides* and *Subbotina eobulloides*. Reworked Cretaceous species include *Heterohelix globulosa* and *Globigerinelloides prairiehillensis*.
									Benthic species present include *Nuttallides truempyi*, *Tappanina selmensis* and *Stensioina beccariformis*, indicating middle to lower slope paleobathymetry.
1183A	39R	4	25-29	Limestone		Foraminifer Nannofossil Limestone	Poor-quality thin-section. Sizes of foraminifers are very small, and texture is between a packstone and wackestone (maybe 30% foraminifers?)	See photomicrographs **1183AS-12**, **1183AS-13**	A moderately fossiliferous, recrystallized planktonic foraminifer wackestone with frequent Cretaceous reworking. Fragmentation is pervasive and very small specimens predominate. The interval may represent a sediment flow rich in reworked Cretaceous material diluting and mixing with more minor amounts of Danian pelagic mud. Identifiable specimens are very rare but include *Globoconusa daubjergensis* and *Subbotina eobulloides*. The Cretaceous species, *Heterohelix globulosa*, is frequent.
1183A	39R	4	77-81	Limestone		Foraminifer Limestone with nannofossils	Grain-supported foraminifers. That was quite a quick recovery from the K/T! Looks very winnowed, followed by diagenetic compaction. Foraminifer limestone, with minor (!) nannos.	See photomicrograph **1183AS-14**	A densely fossiliferous recrystallized planktonic foraminifer wackestone/packstone with chaotic distribution and no preferred orientation to the bioclasts. The sample represents a highly productive pelagic depositional environment in the **early Danian**. Species present include *Globoconusa daubjergensis*, *Parasubbotina pseudobulloides* and *Subbotina eobulloides*.

Site 1183 Sediment Thin Section Descriptions

Hole	Core	Sec	cm	Location	% Carb	Facies name	Preliminary description and notes	Figure number or Photomicrograph ID#	Microfossils and environmental interpretation
							NOTE ON ABUNDANCES: In the estimates of foraminifer abundance, we are ignoring what is filling or half-replacing the tests => actual "foraminifers" would only the be test walls, hence a rather small percent of the current rock. However, it is the foraminifer packing that indicates the original texture. Similarly, assuming that the matrix was originally nannofossils (as indicated by smear slides, etc.), we generally lump "micrite" with nannofossils.		
1183A	39R	4	83-85	Limestone		Foraminifer Nannofossil Limestone	Only very tiny foraminifer types -- quite unlike the underlying lithology (thin-section 39R-4, 87-90cm)! Most foraminifers are ghosts or nearly ghosts, but originally perhaps 20%? (now micritized). The tiny ones are G. cretacea, the survivor of the K/T extinction. This is Foraminifer Zone P0.		A moderately fossiliferous planktonic foraminifer wackestone. The sample is characterized by tiny planktonic foraminifera, dominated by *Guembelitria cretacea*. Oblong fecal pellets from 1-1.5mm are present, sometimes recrystallized, sometimes marked by a concentration of larger planktonic foraminifera (mainly *Heterohelix globulosa* and *Hedbergella holmsdelensis*). A burrow at the top(?) of the thin-section is densely filled with planktonic foraminifera indicative of a younger age (zone **P1a**). The size distribution of the foraminifera in the matrix is strongly skewed to less than 100 microns, but likely is characteristic of the size distribution of the living assemblage, rather than reflecting any depositional sorting. Basal Danian zone **P0** is indicated.
Upper Maastrichtian									
1183A	39R	4	87-90	Limestone		Nannofossil Foraminifer CHALK	Foraminifer packstone (about 40% forams). Locally closest-packed (diagenetic, or winnowed?).. Many foraminifer chambers are still voids => nearly a Chalk lithiifcation (as was noted at Sites 288 and 289 for late Maastrichtian facies). This is the top of the Maastrichtian in Hole 1183A.		A densely fossiliferous planktonic foraminifera/nannofossil wackestone. Most of the slide is marked by diffuse lamination between very densely fossiliferous lenses of planktonic foraminifera and more muddy layers. A poorly to moderately developed latitudinal orientation is evidenced by the bioclasts. The diffuse quality to the orientation and lamination partly reflects the nature of deposition, with evidence of both grading of bioclasts and more chaotic distribution indicative of flow turbulence. The deposit likely represents a transitional flow regime between turbidity currents and mudflows. Orientation and lamination was then further degraded by horizontal burrowing, with some burrows into muddier layers showing infilling of densely packed bioclasts from the overlying fossil-rich layer. The lower portion of the section also bisects a high angle **burrow** that is infilled with **basal Danian** sediment (planktonic foraminifer Zone **P0**).
									Thus, the **Maastrichtian** sediment evident here represents a truncated section **exposed in the earliest Danian** to burrowing. The Maastrichtian portion of the slide is very diverse, with the most common species including *Globotruncanita stuartiformis*, *G. conica*, *Contusotruncana contusa*, *Gansserina gansseri*, *Globotruncanella havanensis*, *Rugoglobigerina rugosa*, *Racemiguembelina fructicosa* and possible *Abathomphalus intermedia*. The Danian burrow is densely filled with very small *Guembelitria cretacea*, *Heterohelix globulosa*, *Hedbergella holmsdelensis* and *Woodringina hornertownensis*. The edges of the burrow incorporate some rare Maastrichtian bioclasts, indicating that the older material was at least partially incompetent at the time of burrowing.
Main Subunit IIIA -- White limestone									
1183A	40R	1	18-19	Red chert		Chert (silicified foram-rich Limestone)	Ghosts of forams common filled with radial quartz. Very fine to moderate-sized reddish-amber grains distributed among foram ghosts. Portion of slide has relict texture of foraminifer packstone (now ghosts of foraminifers) in "micrite", which is now silicified. Essentially, the original facies was much like adjacent limestones.	See photomicrographs **1183AS-29**, **1183AS-30**	The sample is a red chert, the color derived from finely disseminated as well as rarer larger particles of an opaque material assumed to be iron oxide. Two small areas of moderately altered planktonic foraminifera/nannofossil wackestone survive, although all bioclasts contained therein have been silicified with only outline views remaining. The quartz crystals replacing the bioclasts are relatively large and marked by a radial pattern. Similar crystal patterns are commonly distributed throughout most of the chert and are indicative of bioclast distribution in the completely replaced wackestone. The only exception is a burrow-like region bisecting the section in which microcrystalline chert dominates and bioclasts may have been originally rare. This zone is also much poorer in iron oxide than the rest of the chert.

Site 1183 Sediment Thin Section Descriptions

Hole	Core	Sec	cm	Location	% Carb	Facies name	Preliminary description and notes	Figure number or Photomicrograph ID#	Microfossils and environmental interpretation
							NOTE ON ABUNDANCES: In the estimates of foraminifer abundance, we are ignoring what is filling or half-replacing the tests => actual "foraminifers" would only the be test walls, hence a rather small percent of the current rock. However, it is the foraminifer packing that indicates the original texture. Similarly, assuming that the matrix was originally nannofossils (as indicated by smear slides, etc.), we generally lump "micrite" with nannofossils.		
									A speculation is that the region may actually represent a burrow in which bioclasts were rare or in which planktonic foraminifera were heavily fragmented. Intact chambers that could act as sites of coarser-grained quartz precipitation were therefore rare. Enhanced organic content in the burrow may have inhibited iron oxygenation in this area. Overall, the sample clearly represents a zone of wholesale replacement of a very fossiliferous wackestone by silica.
1183A	40R	2	30-33	Upper Limestone facies (same as CARB at 40R-1, 40cm)	Carb at 40R-1, 40 = 100% !	Nannofossil Foraminifer CHALK	This is a poor quality thin-section preparation, and original micrite-limestone texture is only preserved at edges (a little) and pocket in middle. Estimated about 40% foraminifer, packed together! Nearly a foraminifer grainstone with nannofossils filling the spaces; and many foraminifer chambers are still voids => a chalk in lithification (as noted for late Maastrichtian at Sites 288 and 289).	See photomicrograph **1183AS-87**	The sample is a planktonic foraminifera/nannofossil wackestone/ packstone, densely fossiliferous. Microfossil packing often nears a grain-supported texture, although much interclastic mud remains. The interval marks the lowermost sampled section representative of the highly indurated limestone section that continues upsection into the Paleocene. Microfossil density throughout this section is uniformly dense. Major foraminifer assemblage changes also delineate this sample from the older Campanian/Maastrichtian. Rare benthic foraminifera make their first reappearance upsection since the 44R-CC sample. The benthic species are indicative of middle slope paleodepths or deeper. The planktonic foraminifer assemblage shows a wide-size distribution and chaotic distribution characteristic of an autochthonous deposit.
									However, the species composition differs from autochthonous muds lower in the Campanian/Maastrichtian section by exhibiting a strong dominance of heterohelicids, the absence of *Globotruncana ventricosa* and only few *Globotruncanita* species. Such a change in an autochthonous deposit likely indicates a change in water temperature caused either by a regional paleoceanographic change (e.g., surface current shifts) or a local upwelling event. Even in this heterohelicid-dominated sample, the most Tethyan-restricted hetereohelicid species are very rare (e.g., *Pseudoguembelina palpebra*) or absent (e.g., *Racemiguembelina fructicosa*). The most common species present are *Pseudoguembelina costulata* and *Heterohelix globulosa*.
1183A	40R	3	58-61	Lower Limestone facies	98.60%	Foraminifer Nannofossil Limestone	Foraminifer-wackestone to packstone (variable concentration of foraminifers, with about 30% average). Concentrations are locally aligned => either current or dagenetic effects. There appears to be an abundance of broken foraminifer walls scattered within the matrix.	See photomicrograph **1183AS-88**	A planktonic foraminifer/nannofossil wackestone. Planktonic foraminifera are abundant and diverse, showing a wide size variation and no significant preferred orientation. An autochthonous mud deposited under high productivity conditions is indicated. Most common species noted include *Globotruncanita stuartiformis*, *Globotruncana ventricosa*, *Pseudoguembelina palpebra* and *Heterohelix globulosa*.
1183A	41R	1	43-46	Typical Limestone		Foraminifer Nannofossil Limestone	Foraminifer-rich (20%) micrite. Wackestone texture. Foraminifers commonly retain voids within the tests, and foraminifer abundance varies in bands from about 10 to 30% => maybe variable current winnowing? Odd that these layers are not mixed by bioturbation, so perhaps these are also just diagenetic condensation horizons, rather than original differences.	See photomicrograph **1183AS-89**	A foraminiferal/nannofossil wackestone, the sample exhibits graded size sorting and a diffuse preferred latitudinal orientation. Thin turbidites are indicated. The planktonic foraminifer assemblage is enriched in heterohelicids and *Globotruncanella* spp. and depleted in larger *Globotruncanita* spp. and *Globotruncana ventricosa* relative to autochthonous samples in the late Campanian to Maastrichtian section in Hole 1183A. Although such population changes could reflect a deterioration in paleoecologic conditions in the deep pelagic zone (50-100m), in this case the change likely is related to size sorting.
									Most common species noted include *Pseudoguembelina palpebra*, *P. costulata*, *Pseudotextularia elegans*, *Heterohelix globulosa* and *Globtruncanella citae*.

Site 1183 Sediment Thin Section Descriptions

Hole	Core	Sec	cm	Location	% Carb	Facies name	Preliminary description and notes	Figure number or Photomicrograph ID#	Microfossils and environmental interpretation
							NOTE ON ABUNDANCES: In the estimates of foraminifer abundance, we are ignoring what is filling or half-replacing the tests => actual "foraminifers" would only the be test walls, hence a rather small percent of the current rock. However, it is the foraminifer packing that indicates the original texture. Similarly, assuming that the matrix was originally nannofossils (as indicated by smear slides, etc.), we generally lump "micrite" with nannofossils.		
1183A	42R	1	78-81	Typical Limestone		Foraminifer Nannofossil Limestone	Foraminifer-rich (25%) micrite (slightly higher foraminifer abundance than in 43R-1). Wackestone texture. Foraminifers are not sorted, with a range of types; and are both calcite-filled and open.	See photomicrograph **1183AS-90**	A planktonic foraminifer/nannofossil wackestone. Planktonic foraminifera are abundant and diverse, showing a wide size variation and no significant preferred orientation. An autochthonous mud deposited under high productivity conditions is indicated. Species noted include *Globotruncanita stuarti*, *G. conica*, *Globotruncanella havanensis*, *Globotruncana ventricosa*, *G. linneiana*, *Pseudoguembelina excolata* and *Contusotruncana contusa*.
1183A	43R	1	67-70	Typical Limestone		Foraminifer Nannofossil Limestone	Foraminifer-rich (20%) micrite. Wackestone texture. Foraminifers are not sorted, with a range of types; and are both calcite-filled and open.	See photomicrograph **1183AS-91**	A very fossiliferous planktonic foraminifera/nannofossil wackestone. Planktonic foraminifera are abundant and diverse, showing a wide size variation and no significant preferred orientation. The circular latitudinal cross sections of a few large burrows are evident by a concentration of bioclasts, probably living burrows.
									A high productivity, authochthonous mud of moderate to slow sedimentation is indicated. Most common species include *Globotruncanita stuartiformis*, *Contusotruncana contusa* and *Psuedoguembelina excolata*.
Lower Maastrichtian									
1183A	45R	1	18-20	Typical Limestone (tan facies)		Nannofossil Limestone	This thin-section preparation is very thick. About 95% is micritic limestone (probably nannofossils), and 5% is elongated forams. Short micro-stylolites are present. If this pair from Core 45R is typical, then: White-colored facies = foraminifer-rich (10%) plus 5% other bioclast fragments, Yellow-colored facies = foraminifer-poor (5%) and perhaps more non-carbonate (need more CARB analyses of adjacent facies).	See **Chapter 3, Figure F17** (1183AS-15) See photomicrograph **1183AS-16**	A nannofossil mudstone, nearly barren of microfossils. Very rare planktonic foraminifera and a single deep-water agglutinated benthic foraminifer (Lituotuba lituiformis) are the only evident bioclasts. Highly altered, needle-like mineral grains are also present. The forams and mineral grains evidence a moderately well-developed latitudinal preferred orientation. The sample is likely indicative of a mudflow deposit composed of winnowed mud transported a significant distance from its source area. Species present include *Hedbergella holmdelensis*, *Globotruncana lapparenti*, *G. linneiana* and *Globotruncanita stuartiformis*.
1183A	45R	2	20-23	Typical Limestone (white facies)	98.90%	Nannofossil Limestone	About 10-15% foraminifers and ghosts, plus about 2% small spines in micrite.	See photomicrograph **1183AS-92**	A nannofossil/planktonic foraminifera wackestone with common microfossils composed almost entirely of planktonic foraminifera. Extensive burrowing largely obliterates a poorly defined preferred latitudinal orientation of the planktonic foraminifera. Burrows can be discerned in zones of fine-grained planktonic foraminifer debris and probably are indicative of feeding traces. The sample is indicative of a fine-grained sediment flow deposit (turbidite or mudflow) that was subsequently bioturbated. The most common species present include *Globotruncanita stuartiformis*, *Contusotruncana fornicata* and *Globotruncana lapparenti*.
Upper Campanian									
1183A	46R	1	108-109	Typical Limestone (white facies)		Nannofossil Limestone with foraminifers	Nannofossil limestone with foraminifers (about 10%) => wackestone texture. Very-fine opaques are dispersed in matrix, and seem to form dendritic features at slide edges (real, or artifact of slide? -- I think these are artifacts, hence we estimate 0% opaques).		A nannofossil/planktonic foraminifera wackestone with common microfossils composed entirely of planktonic foraminifera. Microfossils show diffuse size sorting and a strong preferred latitudinal orientation. This texture marks the primary depositional arrangement of bioclasts because a burrow towards the center of the thin-section disrupted these layers. Minor, intermittent turbidite deposition is indicated.
									Many of the larger planktonic foraminifer species which characterize most of the Campanian/Maastrichtian assemblage in Hole 1183A (e.g., *Globotruncana ventricosa*, *Globotruncanita* spp.) have been sorted out of this interval. Instead, smaller taxa such as *Pseudoguembelina costulata*, *Hedbergella holmsdelensis* and *Globigerinelloides* spp. dominate.

Site 1183 Sediment Thin Section Descriptions

Hole	Core	Sec	cm	Location	% Carb	Facies name	Preliminary description and notes	Figure number or Photomicrograph ID#	Microfossils and environmental interpretation
							NOTE ON ABUNDANCES: In the estimates of foraminifer abundance, we are ignoring what is filling or half-replacing the tests => actual "foraminifers" would only the be test walls, hence a rather small percent of the current rock. However, it is the foraminifer packing that indicates the original texture. Similarly, assuming that the matrix was originally nannofossils (as indicated by smear slides, etc.), we generally lump "micrite" with nannofossils.		
1183A	48R	1	37-39	Typical Limestone (tan facies)	99.00%	Nannofossil Limestone	About 95% is micritic limestone (probably nannofossils), with sparse (5-10%) foraminifers, especially some elongated forms. Short micro-stylolites are often observed.	See photomicrograph **1183AS-17**	A nannofossil/planktonic foraminifera wackestone, poorly fossiliferous for microfossils. Planktonic foraminifera are relatively rare and dominated by small species such as *Globigerinelloides messinae* and *heterohelicids*. Larger globotruncanids are rare, but evenly distributed across the samples. Rare benthic foraminifera characteristic of the lower half of the slope are also present. Bioclasts concentration varies though diffuse areas of concentration and scarcity, reflecting intense burrowing. One fecal pellet is also evident.
									The sample is indicative of an oligotrophic environment of slow sedimentation, intensely bioturbated. Such a paleoenvironment is in marked contrast to the very fossiliferous planktonic foraminifer residues derived from samples 48R-CC and 47R-CC and indicates that productivity varied during deposition of this middle Campanian section.
Transition to Subunit IIIB Lower Campanian									
1183A	50R	1	133-136	Red marly chalk with Mn redox front at top	70.1% at 138cm (marly chalk)	Top = Calcareous Claystone bearing glass shards; Lower = Clayey Micritic Limestone	The redox front (color change) is also a change in clay content (as seen by waves of preferential extinction of background); but the main darkening is a great increase in background opaques (Mn,Fe?). Top = opaque-rich calcareous claystone (10,10,70 in order) with 10% glass. Upper Micrite (below redox) = (5,80,10; and 5% respectively, plus about 1% foram). Downward burrow carried clay into micrite. Implication is that an ash event (degraded to clay?) was overlying and mixed by bioturbation into micrite. Deposition was below foraminifer lysocline?		The sample is identical to the interval from 50R-2, 37-40cm.
							Then, lower part of thin section appears to be another clay, highly bioturbed with micrite (downward micrite-rich burrows). Nice small-scale burrows! Perhaps some clay is due to CCD-dissolution of carbonate sediment, hence leaving non-carbonate background sedimentation?		
Upper Santonian									
1183A	50R	2	37-40	Limestone passing downward to Claystone		Top = Micrite Limestone; Lower = intermixed Calcareous Claystone and Micrite Limestone, both bearing vitric glass shards and opaques	Lower portion is claystone with same texture and relative shard-opaque composition as 50R-2, 61-64cm. Clay-rich patches are easily seen by waves of preferential extinction. Upper portion is micrite (maybe with 10% clay, 2-3% fine opaques) with sparse microfossils (about 3%), and about 2-3% glass shards, probably mixed by bioturbation from below.		The sample is very similar to the interval from 50R-2, 61-64cm, although the mineral grains are less frequent and less obviously oriented. Microfossil recovery is also somewhat higher with frequent, highly recrystallized planktonic and hyaline benthic foraminifera, as well as a single agglutinated species (*Gaudryina pulvina*). A volcanic ash deposit which has been more extensively reworked is indicated. Paleoecologic mixing is indicated by the presence of a nodosariid species, suggesting that penecontemporaneous transportation may have been extensive.

Site 1183 Sediment Thin Section Descriptions

Hole	Core	Sec	cm	Location	% Carb	Facies name	Preliminary description and notes	Figure number or Photomicrograph ID#	Microfossils and environmental interpretation
							NOTE ON ABUNDANCES: In the estimates of foraminifer abundance, we are ignoring what is filling or half-replacing the tests => actual "foraminifers" would only the be test walls, hence a rather small percent of the current rock. However, it is the foraminifer packing that indicates the original texture. Similarly, assuming that the matrix was originally nannofossils (as indicated by smear slides, etc.), we generally lump "micrite" with nannofossils.		
Lower Santonian (then Coniacian in underlying 10-cm interval)									
1183A	50R	2	61-64	Claystone interbed		Calcareous claystone bearing vitric glass shards and opaques	Flaser diagentic texture, essentially non-fossiliferous. Rich in clay (compacted, horizontal extinction of background) = 60%? Therefore nannofossils aer about 20%. Clear grains, elongate to slightly curved, comprise 5-10% -- low birefringence, maybe vitric glass shards and zeolites? Black opaques = about 10% (based on total non-carb), with range in sizes and textures from possible pyrite-replacement casts to micrite-sized background (about half of total; maybe Mn?); No "semi-opaque brown" types of Apt-Alb claystones.		The sample is a dark reddish-brown claystone with numerous elongate mineral grains with a preferred orientation. Microfossil content is limited to three agglutinated benthic foraminifera of the species *Gaudryina pulvina* and *Dorothia oxycona*. It is probable that the sample represents an altered, reworked volcanic ash deposit. The agglutinated foraminifera are likely allochthonous, enveloped by the reworked flow.
							Spotty fine-grained opaque clusters are Mn or Fe, these look like redox effects superimposed on main texture. Much of flasers are relative concentrations of micrite (but still no forams) => below Foraminifer lysocline?		
Upper Albian									
1183A	50R	2	78-80	Light gray chalk, low bioturbation	95.60%	Nannofossil Limestone	About 97% is micritic limestone (probably nannofossils), and 3% is elongated foraminifers. Black clusters of fine-particles are artifacts? Seems quite similar in texture and composition to the 'light red' of the underlying 50R-2, 108-111. Seams and fanning pressure-solution features are present, but the brownish-color component is too fine-grained to tell composition (and doesn't have extinction waves, like clay, in seam orientation). However, Carbonate conent (96%) => probably Clay. Thin-section preparation is rather thick.	See photomicrograph **1183AS-24**	A nannofossil mudstone with few, tiny planktonic foraminifera, the latter mainly *Hedbergella* and *Globigerinelloides* spp. The only other microfossil bioclast evident are rare sponge spicule fragments. Although the size distribution is strongly skewed to bioclasts under 100 microns, this probably reflects surface water paleoecology (i.e., low nutrient conditions) rather than any depositional sorting. Identifiable species include *Globigerinelloides bentonensis*, indicating an age no older than **late Albian**.
1183A	50R	2	108-111	Light red chalk, heavy bioturbation	97.40%	Nannofossil Limestone	Micrite with about 2% microfossils (equal amounts of foraminifers and calcite-replaced radiolarians) and 2% fine-grained opaques. Trace of phosphate fish debris. Essentially homogenous.		A nannofossil mudstone. Microfossils are nearly absent, represented by a few, very small planktonic foraminifera and some indeterminate agglutinated benthic species. The sample represents either a severely oligotrophic environment or highly winnowed fines from which the sand and most of the silt fraction has been removed.
1183A	50R	3	34-36	Semi-laminated Chalk	94.60%	Nannofossil Limestone	Thick slide (terrible preparation) -- presume dense background is largely composed of nannofossils. Minor amounts of mostly small foraminifera with calcite infilling (only about 5%), may be aligned but micro-stylolites impart a fabric that may cause a bias in the appearance. Stylolite seams are concentrations of the fine-grained semi-opaque particles (which are relatively rare in the main limestone).	See photomicrograph **1183AS-31**	A nannofossil/planktonic foraminifer mudstone. Microfossils are rare, dominated by very small planktonic foraminifera of low diversity (chiefly *Hedbergella delrioensis* and *H. planispira*). Very rare spherical radiolarians and deep-water benthic foraminifera are also present. Benthic species in washed residues from Core 50R indicate an abyssal environment. The planktonic species composition of this sample indicates deposition above the foraminifer lysocline under oligotrophic surface water depleted in nutrients, conditions frequently occurring over abyssal water depths.
									Size distribution is strongly skewed to bioclasts under 100microns, but probably reflects surface water paleoecology (i.e., low nutrient conditions) rather than any depositional sorting. Most of the very rare benthic foraminifera and spherical radiolarians are large in size. An autochthonous abyssal mud deposit is indicated.

Site 1183 Sediment Thin Section Descriptions

Hole	Core	Sec	cm	Location	% Carb	Facies name	Preliminary description and notes	Figure number or Photomicrograph ID#	Microfossils and environmental interpretation
							NOTE ON ABUNDANCES: In the estimates of foraminifer abundance, we are ignoring what is filling or half-replacing the tests => actual "foraminifers" would only the be test walls, hence a rather small percent of the current rock. However, it is the foraminifer packing that indicates the original texture. Similarly, assuming that the matrix was originally nannofossils (as indicated by smear slides, etc.), we generally lump "micrite" with nannofossils.		
1183A	50R	CC	13-16	Very light-tan Chalk, uppermost Albian		Nannofossil (micrite) Limestone	About 5% microfossils (mainly foraminifers of various sizes) in micrite. Concentration of foraminifers is greatest (about 10%) in upper slide, and rather sparse (about 3%) in lower slide -- these concentration differences form broad bands, suggesting an original compositional layering. As in rest of underlying Apt-Alb, there is a minor amount (less than 5%) of fine-grained semi-opaques, which are concentrated locally to form the streaky textures. This slide has a relatively low abundance of these particles, and associated flasers.		A nannofossil/planktonic foraminifera mudstone. Poorly fossiliferous interval for microfossils, composed of very small, size-sorted planktonic foraminifera with a preferred orientation. The interval likely is indicative of mudflow deposits of fine-grained, winnowed material. A single specimen of *Rotalipora appenninica* is noted, indicating an age no older than **latest Albian**.
Subunit IIIB -- Mottled pink and gray limestone									
1183A	51R	2	85-88	Chert and underlying Limestone		Nannofossil (micrite) Limestone with Radiolarians, and silica-replaced Limestone with radiolarians	Radiolarian-rich (10%; now silica-filled balls or ghosts) limestone with silicification front to similar radiolarian-rich texture, but micrite is nearly fully silica-replaced (but still "micritic" texture). Only minor amount of foraminifers. This seems to imply that the chert-replaced levels also correspond partially to a higher initial radiolarian content than elswhere in the limestone (see the next lower and higher thin sections). Perhaps these radiolarian-rich zones act as a sponge for the silica from the less-radiolarian-rich facies.		
1183A	51R	3	13-15	Typical clay-rich Limestone	95.40%	Nannofossil (micrite) Limestone	Micro-stylolite-rich, sparse microfossil (about 5% foraminifers, and 2-3% calcite-filled radiolarians). Perhaps 5% very-fine (micrite-sized) non-carbonate particles within main limestone, which are concentrated in the streaky seams of microflasers. In this slide, and above, the "brownish semi-opaques" of Aptian are no longer significant; indeed, they are not really found above the claystone. This corresponds to a drop in average magnetic susceptibility relative to the Aptian. Therefore, perhaps these represent Fe-enrichment from the underlying basalt and volcaniclastic alteration?		A nannofossil/radiolarian mudstone. Spherical radiolarians are frequent. Foraminifera are rare and mainly composed of very small *Hedbergella* spp., none over 125 microns, and evidence a preferred orientation. The interval likely is indicative of mudflow deposits of fine-grained, winnowed material.
Lower Albian									
1183A	52R	1	139-142	Light-tan Limestone end-member	87.40%	Nannofossil (micrite) Limestone	Thick slide -- micrite texture is obscurd. Sparse (about 10-15%) small foraminifera with calcite infilling (and Paul Sikora says many are rads) and ghosts. Microstylolites/wispy micoflaser common imparts parallel fabric and causes darker and lighter bands -- the darker bands are concentrations of very fine (micrite-size) semi-transparent brownish particles, perhaps clay and/or other non-carbonate. Microfossils are concentrated in the darker bands. Note that non-carbonate is 13% => may have significant clay or zeolite content, that is not visible in thin section.	See photomicrograph **1183AS-32**	A nannofossil/radiolarian mudstone, with frequent benthic foraminifera and very rare, small planktonic foraminifera. Microfossil content is low, mainly composed of small, sphaerical, calcified radiolarians. Benthic foraminifera are also frequent as well as diverse and evidence a wide-size distribution. Assemblage composition is similar to that observed from washed residues in Sections 2 and 3 as well as the core catcher in Core 52R, indicating a middle to possibly low slope paleobathymetry. Abundance is much lower, however. Bioclasts and elongate mineral grains are marked by a preferred orientation parallel to the short dimension of the slide (the "up" direction is not indicated). As there is no evident sorting of bioclasts, a very muddy debris flow is indicated.
									Planktonic foraminifer species are *Hedbergella delrioensis*, *H. planispira* and a questionable *Favusella hiltermanni*, the last indicating the upper half of the upper Albian if actually present. Benthic species include *Eggerellina mariae*, *Gaudryina dividens*, *Dorothia trochus*, *Gavelinella intermedia* and *Gyroidinoides infracretacea*.

Site 1183 Sediment Thin Section Descriptions

Hole	Core	Sec	cm	Location	% Carb	Facies name	Preliminary description and notes	Figure number or Photomicrograph ID#	Microfossils and environmental interpretation
							NOTE ON ABUNDANCES: In the estimates of foraminifer abundance, we are ignoring what is filling or half-replacing the tests => actual "foraminifers" would only the be test walls, hence a rather small percent of the current rock. However, it is the foraminifer packing that indicates the original texture. Similarly, assuming that the matrix was originally nannofossils (as indicated by smear slides, etc.), we generally lump "micrite" with nannofossils.		
1183A	52R	4	117-120	Brownish-gray Limestone end-member	93.80%	Nannofossil (Micrite) Limestone	About 5% foraminifers in micrite. Rare (1% max) angular bioclasts (foraminifer-sized) of echinoderms (calcite, with near-uniform extinction, apparently broken? -- bottom fauna source, with bioturbation breakage?). About 5-10% very-fine opaques and semi-opaques, which become concentrated in micro-flaser streaks.		Poorly fossiliferous nannofossil/planktonic foraminifera mudstone. Bioclasts are largely composed of planktonic foraminifera, the most common subsidiary component being sometimes coarse-grained echinoid debris. No appreciable sorting or preferred orientation is noted. However, the bracketing of this sample by section yielding bathyal assemblages in washed residue (e.g., 52R-CC and 52R-3 107-108cm) indicates that this mixture of macrofossil debris and pelagic components is likely indicative of a very muddy debris flow. Planktonic foraminifera are dominated by *Hedbergella delrioensis*, with much rarer ***H. rischi***. Very rare bathyal benthic species present include *Gaudryina dividens*.
1183A	53R	2	83-86	Gray Limestone	95.40%	Foraminifer Nannofossil Limestone	Relatively high (20%) foraminifer and broken foraminifer-wall abundance in micrite. Minor amounts (1%) of echinoderm fragments and small mollusc shells and ostracod. Paul Sikora considers these other shells to indicate a shallow paleodepth, or partial derivation from shallower. No significant brown opaques, just 1% black. CARB analyses => 4% clay.		Very fossiliferous nannofossil/planktonic foraminifera wackestone. Signs of dissolution are subtle, but frequent, marked by concentrations of an orange-brown material likely composed of iron oxides. Planktonic foraminifera are abundant, but poorly diverse, dominated by *Hedbergella delrioensis* and *H. trochoidea*. Subsidiary bioclasts include macrofossil debris (mollusc and echinoid) and agglutinated and hyaline slope benthic foraminifera. A diffuse size grading and preferred latitudinal orientation of the bioclasts are evident.
									Although some of this texture may be due to dissolution, when combined with paleoecologic mixing of relatively frequent macrofossil debris and slope foraminifera, transportation of shallower-water sediments into deeper water depths is indicated.
Upper Aptian									
1183A	53R	3	112-114	Laminated calcareous 'CLAYSTONE' (top of bed)	53R-4, 84cm (base of Clay, below this TS) = 40.9%	Nannofossil Limonite (or "ferruginous") Claystone with Foraminifers and Opaques	Matrix are composed of nannofossils, clay (non-birefringent "light brown" background with grain sizes too small to be resolved, dominant especially in some bands), and brown colored minerals (XRD data suggest they are limonite or goethite -- maybe originally pyrite). These silt-sized "semi-opaque brown particles" are essentially identical to those in the inter-basalt micrite limestone), and streaky concentrations contribute to the fabric. Foraminifers, phosphate grains (fish debris?), and opaques are common. Some elongate opaques contribute to the fine-scale streaky fabric. Opaques are occasionally developed in foraminifers or replace foraminifer walls (1183AS-18), and one has the impression from the shapes that most true opaques originated in this connection. All opaques are now probably limonite or goethite. Laminated fabric is frequently observed (1183AS-19). Foraminifer lamina exists (1183AS-20).	See **Chapter 3, Figure F25** (1183AS-18), **Figure F26** (1183AS-21) See photomicrographs **1183AS-19**, **1183AS-20**	A laminated, oxidized marl/claystone. Planktic foraminifer bioclasts are abundant, but concentrated in dissolution laminae and largely reduced to very fine-grained debris. The sample may represent a highly oligotrophic, low sedimentation depositional environment. The low sedimentation environment was characterized by concentration of clay minerals, probably the primary source of the iron oxide now abundant in the layers. The fossil content of the iron-rich layers is very poor, reflecting the oligotrophic nature of the paleoenvironment. These (originally) clay-rich seams originally alternated with more marly laminae, one of which survives on the lower portion of thin-section, clearly evident by its reduced iron oxide content. However, most of the marly laminae have been reduced via secondary dissolution to very thin laminae of planktonic foraminifer hash. Frequently, the overlying and underlying clay-rich laminae have been welded around lense-like remnants of these marly layers.

Site 1183 Sediment Thin Section Descriptions

Hole	Core	Sec	cm	Location	% Carb	Facies name	Preliminary description and notes	Figure number or Photomicrograph ID#	Microfossils and environmental interpretation
							NOTE ON ABUNDANCES: In the estimates of foraminifer abundance, we are ignoring what is filling or half-replacing the tests => actual "foraminifers" would only the be test walls, hence a rather small percent of the current rock. However, it is the foraminifer packing that indicates the original texture. Similarly, assuming that the matrix was originally nannofossils (as indicated by smear slides, etc.), we generally lump "micrite" with nannofossils.		
							[Caution -- this is not the main and more friable 'claystone' bed, but a more cemented basal piece, therefore these observations may not always apply to the main bed of claystone We need a thin section of the main bed = shore-based effort.]		The marly laminae may represent periods of somewhat higher productivity and sedimentation with the overall interval exhibiting a cyclic stratigraphy. However, the surviving marly lamina shows a strong preferred orientation to the bioclasts. This may be largely due to discontinuous dissolution horizons which riddle the layer. Nevertheless, if some of this orientation reflects the original depositional texture, the marly horizons may represent allochthonous layers of carbonate mud transported into a carbonate-poor environment. Identified species include frequent *Blefuscuiana daminae*, as well as rare *B. hispaniae*, *Globigerinelloides ferreolensis* and *G. aptiense*.
1183A	53R	4	86-88	Beige Limestone below reddish brown claystone	94.80%	Nannofossil Micrite Limestone with sparse Foraminifers	Miserable thin-section. About 10% foraminifers (insignificant radiolarians) in micrite (presumably nannofossils originally). Opaques are rare. Microstylolites (anastomosing seams) are in half of the slide.	See photomicrograph **1183AS-23**	A nannofossil/planktonic foraminifer wackestone. Very small planktonic foraminifera are common. Fragmentation is common. The size distribution is skewed so that most specimens evident are smaller than 125 microns, possibly indicating sorting. Superficially, a preferred latitudinal orientation and some concentration of bioclasts is evident, but upon closer examination, result from numerous, but relatively inconspicuous zones of dissolution. Planktic foraminifera are relatively diverse with several species of *Blefuscuiana evident*.
									Nodosariid benthic foraminifers are very rarely present. Paleoenvironment is uncertain, but may represent a mesotrophic open marine platform assemblage very similar to that from Core 54R-2, but altered by extensive post-depositional dissolution.
1183A	54R	2	28-31	Brownish-gray limestone	93.70%	Nannofossil Limestone	Nannofossil limestone with foraminifers (about 10%) and insignificant radiolarians. Short brown micro-stylolites are observed. Rich (about 5%) in silt-sized "semi-opaque brown particles" which seem to give the brownish coloration. Rare (1%) silica spicules.	See photomicrograph **1183AS-22**	A nannofossil/planktonic foraminifer wackestone. Small planktonic foraminifera are common, composed chiefly of species of *Blefuscuiana* and *Gubkinella*. Very rare, larger Globigerinelloides are present, as well as, very rare nodosariid benthic foraminifera. Size distribution is normal for the Aptian and no preferred orientation is evident. The sample is indicative of a mesotrophic open marine platform with a paleobathymetry on the order of 50 to 150m. Species present include *Gubkinella graysonensis*, *Blefuscuiana daminiae*, *B. aptiana orientalis*, *Globigerinelloides algerianus* and *G. ferreolensis*.
1183A	54R	3	48-51	Volcaniclastic Sandstone		Volcaniclasti c Sandstone	Maybe originally a medium-grained volcaniclast sand, but now completely dominated by clay replacements. Only a few un-altered phenocrysts of feldspar and other minerals, plus perhaps some volcanic glass particles remain semi-intact. Many fine-grained lithic clasts and glass shards. Generally rounded, but some angular. LEAVE EXACT COMPOSITION FOR IGNEOUS PETROLOGY TEAM.		
1183A	54R	3	59-62	Limestone with flaser texture		Nannofossil Radiolarian Limestone with Foraminifers	Spherical radiolarians (now recrystallized to calcite) and radiolarian ghosts were originally packed, with micrite matrix. Rare planktonic foraminfer and elongate grains (spicules?). Common phosphate particles. Rare quartz(?), common amber and opaque grains. "Packstone" texture! Nearly a grainstone originally? Void space largely filled with sparry calite. Faint bedding parallel fabric accentuated by microstylolites and wispy flaser fabric. Radiolaria+Phosphate=> high productivity?	See photomicrographs **1183AS-25**, **1183AS-26**	A densely fossiliferous radiolarian/nannofossil wackestone with few planktonic foraminifera. The sample is very similar to the 54R-3, 96-99 cm sample except the radiolaria are even more abundant and diverse. The radiolaria are completely calcified. This and the subsequent sample may be indicative of a local rise in sea level allowing an influx of radiolaria. The sample is argillaceous and contains numerous golden-brown mineral clasts that may be iron oxide.

Site 1183 Sediment Thin Section Descriptions

Hole	Core	Sec	cm	Location	% Carb	Facies name	Preliminary description and notes	Figure number or Photomicrograph ID#	Microfossils and environmental interpretation
							NOTE ON ABUNDANCES: In the estimates of foraminifer abundance, we are ignoring what is filling or half-replacing the tests => actual "foraminifers" would only the be test walls, hence a rather small percent of the current rock. However, it is the foraminifer packing that indicates the original texture. Similarly, assuming that the matrix was originally nannofossils (as indicated by smear slides, etc.), we generally lump "micrite" with nannofossils.		
Top of Lower Aptiam									
1183A	54R	3	96-99	Limestone		Nannofossil Micritic Limestone with Radiolarians and Foraminifers	Thick slide, and we presume dense matrix is largely nannofossils. Radiolarian nannofossil limestone with common foraminifera. Most coarser micros filled with calcite, Rare amber grains (in contrast to underlying), faint fabric parallel to short axis of slide, Shakonina-like foram near center of slide-- ? Leupoldina cabri ? that Paul Sikora mentions?	See photomicrographs **1183AS-27**, **1183AS-28**	A nannofossil/radiolarian wackestone with common planktonic foraminifera. Radiolarians are abundant and diverse but poorly preserved, exhibiting relatively coarsely-crystalline calcification. Planktonic foraminifera are chiefly composed of a low-diversity *Blefuscuiana* assemblage dominated by *B. daminae*. A single specimen of the **late early Aptian** index, *Leupoldina cabri*, is also present. The bioclast size distribution is wide and no preferred orientation or sorting is noted, indicating an autochthonous pelagic deposit.
									The major influx of radiolarians, nearly absent in the carbonate intercalated with the upper basalt flows, likely indicates a rapid increase in paleobathymetry to nearly 200m by the time basalt extrusion had ended. The absence of benthic species may indicate low oxygen conditions under highly productive surface water.
Unit IV -- Recrystallized limestone between basalt Middle Lower Aptiam									
1183A	54R	4	7-9	Recrystallized Limestone, brownish-yellow		Micritic Limestone with ferruginous particles, Radiolarians and rare Foraminifers	Thick slide. Igneous "Piece 2". Limestone with radiolarians and rare foraminifera. Common amber and semi-opaque particles (as in Cores 55R-56R). Silicified(??), generally recrystallized to microspar; faint fabric runs diagonally across slide.	See photomicrographs **1183AS-33**, **1183AS-34**	The sample is of a thermally altered limestone, taken from a layer intercalated with basalt. Very finely-crystalline spar composes much of the sample with coarsely-crystalline spar filling a large fracture (or altered styolite) that bisects the thin-section. Some silicification is also evident. Frequent calcified and/or silicified spherical bioclasts are noted, which may be altered spherical radiolarians or globigerinid foraminifer chamber fragments with irregular crystalline growths extending from the test wall.
									Very rare, whole, recrystallized planktonic foraminifera are also evident, including a globular, four-chambered form with a low, slit-like aperture that is very likely the early Aptian index, *Praehedbergella sigali* s.s. If the identification is correct, the sample is consistent with the limestone section higher in Core 54R, indicating the *L. cabri* zone. Paleoenvironment is questionable due to sample alteration, but probably is similar to that represented by the Core 54R-2 sample.
1183A	54R	4	115-118	Altered Hyaloclastite		NO SEDIMENT	Interesting volcanic textures, but pelagic components are not apparent.		
1183A	55R	1	7-9	Inter-basalt Sediment	94.40%	ferruginous Micritic Limestone with Foraminifers	Micrite with foraminifers and foram ghosts, and maybe a few radiolarians (round calcite clusters) and calcite-replaced spicules. Perhaps some lithic-clasts of versions of same composition (difficult to tell). There is a background of abundant fine-grained opaques, some of which seems to be the "brown semi-opaques" silt-sized particles (diagenetic Fe-enrichment?) and micrite. Much like Core 56R.		The sample is of a thermally altered limestone that is the stratigraphically lowest non-metamorphic carbonate recovered from Hole 1183A. Overall, it is similar to the limestone from Core 54R-4, but evidences more extensive and slightly more coarsely crystalline replacement. There are also numerous elongate coarse sparry zones (healed fractures?) bisecting the section at a 45°angle (the "up" direction is not indicated on the slide). Bioclast composition is essentially the same as in Core 54R-4, although more poorly preserved. Spherical bioclasts (radiolarians?) are now frequently preserved as vaguely round patches of coarsely-crystalline quartz.
									Surviving planktonic foraminifera are very rare, but composed of the same two species as in core 54R section 4; i.e., *Praehedbergella sigali* s.s. and *Blefuscuiana daminae*.

Site 1183 Sediment Thin Section Descriptions

Hole	Core	Sec	cm	Location	% Carb	Facies name	Preliminary description and notes	Figure number or Photomicrograph ID#	Microfossils and environmental interpretation
							NOTE ON ABUNDANCES: In the estimates of foraminifer abundance, we are ignoring what is filling or half-replacing the tests => actual "foraminifers" would only the be test walls, hence a rather small percent of the current rock. However, it is the foraminifer packing that indicates the original texture. Similarly, assuming that the matrix was originally nannofossils (as indicated by smear slides, etc.), we generally lump "micrite" with nannofossils.		
1183A	56R	1	0-3	Recrystallized Limestone		ferruginous Micritic Limestone	The main 'sediment' is a 1-cm band of packed 'brown semi-opaque' silt-sized rounded particles (like in the Core 53 claystone) with background cement of micrite. No clay, no streaks. Rare patches of carbonate crystals may be former foraminifers? This band is bordered by more calcite-recrystallized bands with some greenish patches (Fe-clays?). Perhaps the name "ferruginous micrite" is appropriate?		

TS# 56 192-1183A-54R-3, 125-127 cm, Piece 5 | **Unit 1** | **OBSERVER:** | **SPI, CRN, TS, PC, RVW, JH**

ROCK NAME: **Moderately olivine-plagioclase-phyric basalt.**
WHERE SAMPLED: **Close to pillow rim.**
GRAIN SIZE: **Aphanitic.**
TEXTURE: **Glomerophyric (plagioclase and olivine), vesicular, spherulitic in an aphanitic groundmass.**

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	APPROX. COMP.	MORPHOLOGY	COMMENTS
PHENOCRYSTS								
Olivine	0	3	0.2	0.6	0.2		Euhedral	Completely replaced by green smectite, goethite ± celadonite.
Plagioclase	2	2	0.1	0.5	0.2		Euhedral, elongate tabular	Exists both alone and with olivine in glomerocrysts.
GROUNDMASS								
Mesostasis	57	85	-	-	-			Devitrified spherulites (~0.15 mm in diameter).
Plagioclase	5	5	0.01	0.1	0.03		Microlitic	Minor replacement by saponite in cores.
OPAQUE MINERALS								
Titanomagnetite	1	1						Interstitial only; finely disseminated (<5 µm).
Sulfide	Trace	Trace						

SECONDARY MINERALOGY	PERCENT	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	REPLACING / FILLING	COMMENTS
Brown smectite	22	0			Glass and mesostasis	
Green smectite	12	0			Replacing olivine and mesostasis; filling vesicles	
Goethite	1	0			Olivine	

VESICLES/ CAVITIES	PERCENT	PERCENT	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	FILLING / MORPHOLOGY	COMMENTS
Irregular vesicles and/or miarolitic cavities	0	4	0.2	4	0.5	From wall to center: green smectite ± celadonite => goethite => light brown smectite	

VEINS	LOCATION	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	FILLING / MORPHOLOGY	COMMENTS
Sparse				<0.05	Green smectite	

COMMENTS : Olivine phenocrysts are euhedral. Plagioclase crystallized with olivine, forming glomerocrysts. The groundmass is extremely fine grained and predominantly composed of spherulites, indicating that rapid cooling took place upon eruption. The plagioclase appears unaltered. Rare sulfide blebs (≤5 µm diameter) are seen as inclusions in plagioclase crystals.
See **Chapter 3, Figure F44**

TS# 58 192-1183A-54R-5, 32-35 cm, Piece 4A, Groundmass (See **TS# 58 Xenolith**) **Unit 2B** **OBSERVER:** **TS, CRN, PC, SPI, RVW, JH**

ROCK NAME: **Aphyric basalt.**
WHERE SAMPLED: **Pillow interior.**
GRAIN SIZE: **Hypocrystalline.**
TEXTURE: **Intersertal and locally subtrachytic.**

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	APPROX. COMP.	MORPHOLOGY	COMMENTS
PHENOCRYSTS								
Olivine	0	<1	0.1	0.8	0.3		Subhedral to euhedral	Completely replaced by brown and green smectite and goethite.
GROUNDMASS								
Plagioclase	35	38	0.01	0.05	0.02		Microlitic; acicular	Mostly unaltered; a few are replaced by brown smectite.
Clinopyroxene	15	20	0.01	0.05	0.03		Subhedral to anhedral; axiolitic	Sometimes as isolated crystals, but typically with plagioclase in bow-tie structure.
Glass/mesostasis	28	40						Replaced by brown smectite.
OPAQUE MINERALS								
Titanomagnetite	2	2	<0.01	0.02	0.01		Skeletal (needle)	Unaltered.
Sulfide	Trace	Trace					Blebs	Inclusions (<5 µm) in plagioclase.

SECONDARY MINERALOGY	PERCENT	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	REPLACING / FILLING	COMMENTS
Brown and green smectite	18				Olivine and mesostasis	Filling groundmass interstices and inside altered plagioclase.
Goethite	2				Olivine	

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	FILLING / MORPHOLOGY	COMMENTS
Miarolitic cavities	<1					Green smectite	

VEINS	LOCATION	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	FILLING / MORPHOLOGY	COMMENTS
	Middle	-	-	0.1	Green and brown smectite	Veins cut across groundmass and xenolith.

COMMENTS : One 1.5 mm subhedral clinopyroxene phenocryst has edges that are full of small inclusions.
Chapter 3, Figure F56

TS# 58 192-1183A-54R-5, 32-35 cm, Piece 4A, Xenolith (See **TS# 58 Groundmass**) **Unit 2B** **OBSERVER:** **TS, CRN, PRC, RVW, JH**

ROCK NAME: **Plagioclase-rich xenolith in aphanitic basalt.**
WHERE SAMPLED: **Massive pillow interior.**
GRAIN SIZE: **Holocrystalline; coarse grained.**
TEXTURE: **Subhedral granular.**

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	APPROX. COMP.	MORPHOLOGY	COMMENTS
Plagioclase	97	97	1	10	8		Anhedral to subhedral	Fine-scale oscillatory zoning and mainly Carlsbad twinning; some resorption of plagioclase.
Interstitial glass	0	3						Filling interstices between plagioclase.

OPAQUE MINERALS

SECONDARY MINERALOGY	PERCENT		SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.		REPLACING / FILLING	COMMENTS
Green smectite	1	0					Interstitial glass and minor fractures in plagioclase	
Goethite	2	0					Interstitial glass and minor fractures in plagioclase	

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

VEINS		LOCATION	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	FILLING / MORPHOLOGY	COMMENTS
		Middle	-	-	0.1	Green and brown smectite	Veins cut across roundmass nad xenolith

COMMENTS : There is no change in grain size of the basalt adjacent to the xenolith.
See **Chapter 3, Figure F56**

TS# 59 192-1183A-54R-5, 64-66 cm, Piece 4B, Groundmass (See **TS# 59 Xenolith**) **Unit 2B** **OBSERVER:** **SPI, CRN, PRC, TS, RVW, WJC, MG, NRB**

ROCK NAME: **Aphyric basalt.**
WHERE SAMPLED: **Pillow interior adjacent to margin of xenolith.**
GRAIN SIZE: **Aphanitic; hypocrystalline.**
TEXTURE: **Intersertal to subophitic.**

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	APPROX. COMP.	MORPHOLOGY	COMMENTS
PHENOCRYSTS								
Olivine	0	<1						Completely replaced by brown and green smectite and goethite.
GROUNDMASS								
Plagioclase	47	48	0.1	0.4	0.3		Microlitic	Variolitic texture with clinopyroxene; resorbed.
Clinopyroxene	30	30	0.05	0.1	0.1		Subhedral	Mostly in bow-tie structure with plagioclase; minor replacement by brown smectite.
Mesostasis	13	17					Interstitial	
OPAQUE MINERALS								
Titanomagnetite	5	5	0.01	0.05	0.03		Subhedral to euhedral (rhombs and rectangles)	In groundmass.

SECONDARY MINERALOGY	PERCENT	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	REPLACING / FILLING	COMMENTS
Green and brown smectite	3	0	<0.05	<0.05	<0.05	Olivine, glass/mesostasis and plagioclase	
Calcite	2	0	0.05	0.1	0.08	Glass/mesostasis and plagioclase	
Goethite	<1	0				Olivine	

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

VEINS	LOCATION	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	FILLING / MORPHOLOGY	COMMENTS
				<0.5	Goethite (where vein cuts basalt)	Vein cuts xenolith and host basalt.

COMMENTS : The glass is devitrified and slightly altered. Sulfides are rare: a <5µm bleb occurs as an inclusion in plagioclase. The degree of alteration is estimated at ~15%.
See **Chapter 3, Figure F58**

TS# 59 192-1183A-54R-5, 64-66 cm, Piece 4B, Xenolith (See **TS# 59 Groundmass**) **Unit 2B** **OBSERVER:** **SPI, CRN, PRC, TS, RVW, WJC, NRB**

ROCK NAME: **Plagioclase-rich xenolith in aphyric basalt.**
WHERE SAMPLED: **Massive pillow interior.**
GRAIN SIZE: **Coarse grained.**
TEXTURE: **Anhedral granular.**

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	APPROX. COMP.	MORPHOLOGY	COMMENTS
Plagioclase	90	90	0.3	10	2		Anhedral	Complex oscillatory zoning; Carlsbad and albite twinning.
Interstitial glass and/or crystallites	2	10					Interstitial	Represents host magma; contains crystallites of plagioclase, clinopyroxene and titanomagnetite, or is altered to green and brown smectite and goethite.

OPAQUE MINERALS

SECONDARY MINERALOGY	PERCENT		SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	REPLACING / FILLING	COMMENTS
Goethite	1	0				Interstitial material	
Green and brown smectite	7	0				Interstitial material and fractures in plagioclase	

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

VEINS		LOCATION	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	FILLING / MORPHOLOGY	COMMENTS
					<0.5	Green smectite (where vein cuts xenolith)	Vein cuts xenolith and host basalt.

COMMENTS : Magma has partially resorbed this xenolith, suggesting disequilibrium. Where melt has penetrated the xenolith, the melt has been altered to green and brown smectite and goethite. The interstitial material exhibits radiating growth patterns from the margins.
See **Chapter 3, Figure F58**

TS# 63 192-1183A-55R-1, 111-113 cm, Piece 6B, Groundmass (See **TS# 63 Xenolith**) **Unit 3B** **OBSERVER:** **RVW, LMC, CRN, TS, NRB**

ROCK NAME: **Sparsely olivine-phyric basalt.**
WHERE SAMPLED: **Pillow interior.**
GRAIN SIZE: **Fine grained; hypocrystalline.**
TEXTURE: **Subtrachytic; intergranular.**

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	APPROX. COMP.	MORPHOLOGY	COMMENTS
PHENOCRYSTS								
Olivine	0	~1	0.1	0.3	0.15		Subhedral to euhedral	Completely replaced by calcite or calcite + green smectite + celadonite.
Plagioclase	<<1	<<1	0.1	0.2	0.1		Euhedral to subhedral	Untwinned or Carlsbad twins; albite twins rare.
GROUNDMASS								
Plagioclase	45	50	<0.01	0.03	0.01	An50-60	Subhedral to euhedral; acicular; skeletal	Albite twins; zones to Na-rich rims.
Clinopyroxene	40	40	0.03	0.06	0.04		Subhedral to anhedral; equant	Some concentric zoning; minor brown smectite replacement.
Mesostasis/glass	5	9						Feathery plagioclase and clinopyroxene intergrowths; glass altered to green and brown smectite and goethite.
OPAQUE MINERALS								
Titanomagnetite	<1	<1	<0.01	0.02	0.01		Equant	Concentrated in brown areas of mesostasis.
Sulfide	Trace	Trace					Blebs	Inclusions <2 µm in groundmass plagioclase crystals.

SECONDARY MINERALOGY	PERCENT	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	REPLACING / FILLING	COMMENTS
Brown smectite	3				Glass, groundmass plagioclase cores and clinopyroxene	
Green smectite	5				Olivine and veins	
Goethite	3				Mesostasis glass	
Calcite	<1				Olivine	
Celadonite	<1				Olivine and veins	

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

VEINS	LOCATION	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	FILLING / MORPHOLOGY	COMMENTS
Irregular	Lower part	0.01	0.1		Green smectite and celadonite	Veins cut groundmass and link replaced olivine phenocrysts.

COMMENTS : Plagioclase phenocrysts have oscillatory zoning. Plagioclase in groundmass locally shows subtrachytic alignment and preferential alteration of cores. Local accumulations of olivine (and minor plagioclase) crystals are present. Bow-tie structures occur between plagioclase and clinopyroxene in the groundmass. Slight fining of grain size is present in the basalt in a 100-200 µm band around the xenolith.

See **Chapter 3, Figure F59**; see photomicrograph **1183A-011**

TS# 63 192-1183A-55R-1, 111-113 cm, Piece 6B, Xenolith (See **TS# 63 Groundmass**) **Unit 3B** **OBSERVER:** **RVW, LMC, CRN, TS, NRB**

ROCK NAME: **Plagioclase xenolith in sparsely olivine-plagioclase-phyric basalt.**
WHERE SAMPLED: **Pillow interior.**
GRAIN SIZE: **Medium grained.**
TEXTURE: **Subhedral granular.**

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	APPROX. COMP.	MORPHOLOGY	COMMENTS
Plagioclase	95	95	0.3	6	2		Subhedral to anhedral; subequant	Oscillatory zoning on <0.1 mm scale, with truncation of zones suggesting resorption.
Interstitial glass	0	5						See comments section, below.

OPAQUE MINERALS

SECONDARY MINERALOGY	PERCENT	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	REPLACING / FILLING	COMMENTS
Green smectite	<1				Fractures in plagioclase	
Brown smectite	4				Interstitial patches and plagioclase	

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

VEINS	LOCATION	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	FILLING / MORPHOLOGY	COMMENTS

COMMENTS : The zoned rim and minor resorption suggests that the plagioclase was not in equilibrium with the erupted melt. The xenolith contains irregular angular brown patches which are interstitial to the plagioclase and concentrated in the center of the xenolith. Plagioclase crystals have euhedral to subhedral morphology adjacent to the patches, contrasting with the anhedral to subhedral morphology where plagioclase crystals are next to one another. The patches are filled with brown smectite. Remanent feathery crystallites (clinopyroxene ± plagioclase, replaced by brown smectite) radiate from the plagioclase walls towards the centers of the patches, and alteration to brown smectite exploits some crystallographic orientations in the adjacent plagioclase. Amorphous brown smectite is also present in the centers of the larger patches.
See **Chapter 3, Figure F59**; see photomicrograph **1183A-011**

TS# 64 192-1183A-55R-2, 12-15 cm, Piece 1A | **Unit 3B** | **OBSERVER:** | **TS, CRN, PC, LMC, WJC, RVW, JH**

ROCK NAME: **Sparsely olivine-phyric basalt.**
WHERE SAMPLED: **Massive pillow interior.**
GRAIN SIZE: **Hypocrystalline.**
TEXTURE: **Intersertal to variolitic.**

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	APPROX. COMP.	MORPHOLOGY	COMMENTS
PHENOCRYSTS								
Olivine	0	1	0.2	0.3	0.25		Euhedral to subhedral	Completely replaced by green smectite, celadonite and brown smectite.
Plagioclase	<<1	<<1	0.2	0.3	0.2		Subhedral	More stubby than groundmass plagioclase and some are zoned; relatively fresh.
GROUNDMASS								
Plagioclase	45	45	0.01	0.1	0.05		Microlitic to acicular	
Clinopyroxene	30	30	0.02	0.1	0.05		Subhedral to anhedral	Bow-tie texture with plagioclase or in a fibrous intergrowth.
Glass	0	22					Interstitial	Replaced by celadonite and green and brown smectite.
OPAQUE MINERALS								
Titanomagnetite	2	2	<0.01	0.05	0.02		Rhomb to needle (skeletal)	Finely disseminated in groundmass.
Sulfide	Trace	Trace			<0.02		Blebs	Only present as inclusions in plagioclase.

SECONDARY MINERALOGY	PERCENT		SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	REPLACING / FILLING	COMMENTS
Green smectite	9	0				Olivine and glass	
Brown smectite	9	0				Olivine and glass	
Celadonite	5	0				Olivine	

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	FILLING / MORPHOLOGY	COMMENTS
Miarolitic cavities	<1					Green and brown smectite and celadonite	

VEINS		LOCATION	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	FILLING / MORPHOLOGY	COMMENTS
Sparse					<0.05	Green smectite	Diffuse vein.

COMMENTS : Alternating glass-rich (variolitic) and well-crystallized (intersertal) patches. There are three alteration zones: (1) black halo with green smectite; (2) transition with tan smectite; (3) gray interior with tan to colorless smectite.
See **Chapter 3, Figure F52**

TS# 65 192-1183A-55R-2, 54-57 cm, Piece 3 **Unit 3B** **OBSERVER:** **LMC, TS, CRN, PRC, WJC, RVW, NRB**

ROCK NAME: **Moderately olivine-plagioclase-phyric basalt.**
WHERE SAMPLED: **Massive interior of pillow.**
GRAIN SIZE: **Fine grained to hypocrystalline.**
TEXTURE: **Variolitic and intergranular; locally intersertal.**

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	APPROX. COMP.	MORPHOLOGY	COMMENTS
PHENOCRYSTS								
Olivine	0	2	0.2	0.3	0.2		Euhedral to subhedral	Totally replaced by green smectite (larger grains also contain celadonite); some totally replaced by calcite with minor green smectite and goethite.
Plagioclase	1	2	0.2	0.3	0.2		Euhedral to subhedral	Tabular; some zonation and resorption.
Clinopyroxene	<<1	<<1	0.1	0.2	0.2		Subhedral to anhedral	Three crystals found; all have irregular margins.
GROUNDMASS								
Plagioclase	39	39	0.01	0.05	0.03		Bladed to skeletal acicular	Variolitic texture with clinopyroxene; feathered ends.
Clinopyroxene	23	25	0.02	0.08	0.05		Anhedral to subhedral; equant grains	Rarely elongate.
Glass/mesostasis	10	29					Interstitial	Replaced by green smectite and goethite.
OPAQUE MINERALS								
Titanomagnetite	3	3	<0.01	0.02	0.01		Skeletal and trellis	

SECONDARY MINERALOGY	PERCENT	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	REPLACING / FILLING	COMMENTS
Green smectite	15	0			Olivine and mesostasis	
Brown smectite	4	0			Mesostasis in brown halo	
Celadonite	3				Olivine (larger grains only)	
Goethite	2				Olivine and mesostasis	
Calcite	<1				Olivine	

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

VEINS	LOCATION	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	FILLING / MORPHOLOGY	COMMENTS
Early					Goethite => green smectite => celadonite => brown smectite => calcite	Goethite rims vein and has vermicular habit in center.
Late					Brown smectite => calcite	

COMMENTS : Olivine phenocrysts have a patchy distribution. Clinopyroxene phenocrysts are mantled by alteration and appear slightly resorbed along some crystal faces. Some large clinopyroxene crystals with irregular margins appear to be coarsened groundmass crystals. A brown alteration halo contains goethite and brown and green smectite.

TS# 66 192-1183A-55R-3, 128-129 cm, Piece 5B — **Unit 4B** — **OBSERVER:** **PRC, CRN, LMC, TS, JH**

ROCK NAME: **Sparsely olivine-phyric basalt.**
WHERE SAMPLED: **Pillow interior.**
GRAIN SIZE: **Hypocrystalline to fine grained.**
TEXTURE: **Subophitic to intersertal.**

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	APPROX. COMP.	MORPHOLOGY	COMMENTS
PHENOCRYSTS								
Olivine	0	2	0.2	0.7	0.5		Subhedral to euhedral	Completely replaced by brown smectite.
Plagioclase	<<1	<<1	0.2	0.4	0.2		Anhedral to subhedral	Wider and more tabular than the groundmass plagioclase.
Clinopyroxene	<<1	<<1	-	0.6	0.6		Anhedral	Two pieces found; very irregular in shape and highly zoned; partially replaced by brown smectite.
GROUNDMASS								
Plagioclase	47	50	0.1	0.6	0.3	An36-52	Feathery/skeletal; subhedral	Minor alteration to brown smectite.
Clinopyroxene	30	30	0.05	0.2	0.15		Granular; subhedral	
Glass	0	10					Mesostasis	Replaced by brown smectite.
OPAQUE MINERALS								
Titanomagnetite	10	8	<0.05	0.2	0.1		Equant euhedral to elongate	
Sulfide	Trace	Trace					Blebs less than 5 mm in size	In groundmass (rare) and as inclusions in plagioclase.

SECONDARY MINERALOGY	PERCENT		SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	REPLACING / FILLING	COMMENTS
Brown smectite	13	0				Glass, olivine, plagioclase and clinopyroxene	

VESICLES/ CAVITIES	PERCENT	PERCENT	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	FILLING / MORPHOLOGY	COMMENTS
Vesicles	<<1	<<1	0.05	0.2	0.1	Subround and equant; filled with clay	

VEINS		LOCATION	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	FILLING / MORPHOLOGY	COMMENTS
None							

COMMENTS :

See **Chapter 3, Figure F45**

TS# 67 192-1183A-55R-4, 38-41 cm, Piece 4 **Unit 4B** **OBSERVER:** **LMC, CN, TS, PC, SPI, JH**

ROCK NAME: **Sparsely olivine-phyric basalt.**
WHERE SAMPLED: **Flow interior adjacent to a vein.**
GRAIN SIZE: **Fine grained, hypocrystalline.**
TEXTURE: **Variolitic to intersertal.**

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	APPROX. COMP.	MORPHOLOGY	COMMENTS
PHENOCRYSTS								
Olivine	0	1	0.2	0.8	0.6		Euhedral to subhedral	Completely replaced by green smectite, celadonite and goethite.
Plagioclase	<<1	<<1	0.2	0.4	0.4		Subhedral	More tabular than the groundmass plagioclase.
GROUNDMASS								
Glass/mesostasis	30	35					Quenched; feathery	Glass is devitrified; branching (comb texture) with unidentifiable minerals.
Plagioclase	32	35	0.3	0.8	0.5		Subhedral to feathery	Variolitic texture with clinopyroxene.
Clinopyroxene	22	25	0.05	0.25	0.1		Subhedral	Variolitic to bow-tie texture with plagioclase.
OPAQUE MINERALS								
Titanomagnetite	4	4	0.004	0.005	0.0004		Skeletal	Unaltered.
Sulfide	Trace	Trace					Blebs	Inclusions in plagioclase.

SECONDARY MINERALOGY	PERCENT		SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.		REPLACING / FILLING	COMMENTS
Green smectite	8	0					Glass and olivine	Some alteration of plagioclase and clinopyroxene occurs where adjacent to olivine pseudomorphs.
Celadonite	1						Olivine	
Goethite	1						Olivine	

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	FILLING / MORPHOLOGY	COMMENTS
Miarolitic cavities	<1		0.03	0.4	0.2	Green smectite => brown smectite in centers	Irregular to subround in shape.

VEINS	LOCATION	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	FILLING / MORPHOLOGY	COMMENTS
Hairline				<0.05	Goethite	Brown halos.
Large		2	4		Goethite => celadonite	Yellow to brown halos along both sides of vein; olivine phenocrysts replaced by green and brown smectite in halo; plagioclase and clinopyroxene are stained yellow in halo.

COMMENTS : There is less than 10% total alteration away from the vein. The order of crystallization is olivine, oxide, plagioclase, clinopyroxene.
See **Chapter 3, Figure F46**

TS# 68 192-1183A-57R-3, 15-17 cm, Piece 2, Groundmass (See **TS# 68 Xenolith**) **Unit 5B** **OBSERVER:** **MG, SPI, CRN, TS, JH**

ROCK NAME: **Sparsely olivine-plagioclase phyric basalt.**
WHERE SAMPLED: **Close to the top of a pillow.**
GRAIN SIZE: **Hypohyaline.**
TEXTURE: **Intersertal; subtrachytic to variolitic.**

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	APPROX. COMP.	MORPHOLOGY	COMMENTS
PHENOCRYSTS								
Plagioclase	2	2	0.15	0.3	0.2		Subhedral to euhedral	Generally exists alone, but two glomerocrysts with clinopyroxene observed (see below).
Olivine	0	2	0.05	0.4	0.1		Subhedral to euhedral	Completely replaced by green smectite and celadonite in black halo; replaced by brown smectite elsewhere.
Clinopyroxene	<1	1	0.6	0.8	0.8		Anhedral	In two clusters with plagioclase; strained.
GROUNDMASS								
Plagioclase	20	25	0.02	0.1	0.02		Acicular or dendritic	Subtrachytic flow texture around olivine phenocrysts and some concentration in parallel bands.
Clinopyroxene	15	20	0.02	0.04	0.02		Anhedral	
Mesostasis	35	50	-	-	-		Interstitial	
OPAQUE MINERALS								
Titanomagnetite	<1	<1	0.001	0.01	0.001		Interstitial	Skeletal
Sulfide	Trace	Trace					Bleb	Inclusions (<3 µm) in plagioclase; looks primary.

SECONDARY MINERALOGY	PERCENT		SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	REPLACING / FILLING	COMMENTS
Green smectite	10	0	-	-	-	Olivine	
Brown smectite	10	0	-	-	-	Olivine and mesostasis	
Celadonite	5	0				Olivine	

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	FILLING / MORPHOLOGY	COMMENTS
None							

VEINS		LOCATION	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	FILLING / MORPHOLOGY	COMMENTS
One large		near base			2	Goethite => celadonite => green smectite ± goethite	Cuts groundmass and xenolith.
One medium	subhorizontal	near base			0.2	Brown smectite	Other filling has been plucked from the section.
Several finer	subhorizontal	throughout	0.1	0.2	0.15	Brown smectite	Originate from large vein.

COMMENTS : Some of the clinopyroxene "phenocrysts" and vein fill material have been plucked from the thin section. The clinopyroxene crystals are located adjacent to the plagioclase-rich xenolith. The strained nature of the clinopyroxene crystals suggests that they are probably xenocrysts. Olivine and plagioclase glomerocrystic accumulations are present. Pyrite is present in the vein fill and as a finely disseminated phase in the middle of the section. There is a black halo along the large vein: olivine in the halo is replaced by green smectite and celadonite.
See **Chapter 3, Figure F57**, **Figure F60**, **Figure F76**

TS# 68 192-1183A-57R-3, 15-17 cm, Piece 2, Xenolith (See **TS# 68 Groundmass**) **Unit 5B** **OBSERVER:** **SPI, CRN, TS, PRC, RVW, JH**

ROCK NAME: **Plagioclase-rich xenolith**
WHERE SAMPLED: **Xenolith within basalt, close to the top of a pillow.**
GRAIN SIZE: **Coarse grained (phaneritic).**
TEXTURE: **Cumulus.**

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	APPROX. COMP.	MORPHOLOGY	COMMENTS
Plagioclase	92	95	0.4	5	2		Anhedral	Most display oscillatory zoning and are fractured and resorbed along edges in contact with the groundmass.
Clinopyroxene	1	2	0.2	0.6	0.4		Anhedral	Two twinned grains located in interstices between plagioclase crystals; resorbed (in disequilibrium) and fractured.
Interstitial glass	0	3	<0.1	0.9	0.4		Elongate to irregular	Fills interstices between plagioclase crystals

OPAQUE MINERALS

SECONDARY MINERALOGY	PERCENT		SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	REPLACING / FILLING	COMMENTS
Brown smectite	4	0	-	-	-	Fractures in plagioclase and clinopyroxene	Replacement of the intercumulus material.
Green smectite	3	0	-	-	-	Fractures in plagioclase and clinopyroxene	Replacement of the intercumulus material.

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

VEINS		LOCATION	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	FILLING / MORPHOLOGY	COMMENTS

COMMENTS : The basalt groundmass is finer next to the xenolith. Some plagioclase crystals have discontinuous zonation. Crystallites emanating from the plagioclase crystals grow into the interstitial areas.
See **Chapter 3, Figure F57**, **Figure F60**, **Figure F76**

TS# 69 192-1183A-58R-3, 109-112 cm, Piece 13 — **Unit 5B** — **OBSERVER:** **SPI, CRN, TS, LMC, WJC, JH**

ROCK NAME: **Sparsely olivine-plagioclase-phyric basalt.**
WHERE SAMPLED: **Pillow interior.**
GRAIN SIZE: **Fine grained; hypohyaline.**
TEXTURE: **Subtrachytic.**

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	APPROX. COMP.	MORPHOLOGY	COMMENTS
PHENOCRYSTS								
Olivine	0	2	0.2	0.6	0.3		Subhedral to euhedral	Completely replaced by celadonite or brown smectite.
Plagioclase	1	1	0.1	0.2	0.1		Subhedral to euhedral	Locally replaced by green smectite; occasionally occurs as glomerocrysts.
GROUNDMASS								
Plagioclase	15	15	0.01	0.05	0.03		Microlites	Highly variable abundance; Subtrachytic texture evident.
Mesostasis	70	80					Spherulitic	Nucleating from plagioclase microlites; locally totally replaced by celadonite.
Clinopyroxene	<1	<1					Interstitial	Tiny spots with high birefringence are probably clinopyroxene.
OPAQUE MINERALS								
Titanomagnetite	2				<0.05		Granular	
Sulfide	Trace				<0.05		Blebs	Rare inclusions in plagioclase.

SECONDARY MINERALOGY	PERCENT	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	REPLACING / FILLING	COMMENTS
Green smectite	5				Olivine	
Celadonite	5				Olivine, mesostasis and vesicles	
Brown smectite	1				Olivine	

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	FILLING / MORPHOLOGY	COMMENTS
Vesicles	1		0.05	1	0.1	Irregularly shaped; filled with celadonite	Located in one isolated area near upper right margin.

VEINS	LOCATION	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	FILLING / MORPHOLOGY	COMMENTS

COMMENTS : Plagioclase microlites in the groundmass are large enough to define a flow texture. Variable abundance of plagioclase microlites in groundmass also suggests flow texture, as they seem to be concentrated in subparallel zones, separated by thicker concentrations of mesostasis. Secondary pyrite in mesostasis is in the top right of the section. Light and dark gray zones exist that do not appear to be related to alteration; rather they seem to represent original textural changes.

See **Chapter 3, Figure F47**, **Figure F51**

TS# 71 192-1183A-59R-1, 107-109 cm, Piece 7C **Unit 5B** **OBSERVER:** **SPI, CRN, PRC, RVW, WJC, JH**

ROCK NAME: **Moderately olivine-plagioclase phyric basalt.**
WHERE SAMPLED: **Massive interior.**
GRAIN SIZE: **Fine grained to hypocrystalline.**
TEXTURE: **Intersertal to subophitic; locally variolitic.**

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	APPROX. COMP.	MORPHOLOGY	COMMENTS
PHENOCRYSTS								
Olivine	0	2	0.2	0.6	0.4		Euhedral to subhedral	Replaced by brown smectite.
Plagioclase	2	2	0.1	0.2	0.1		Subhedral tabular laths	Some tabular crystals are zoned; minor replacement by brown smectite.
GROUNDMASS								
Plagioclase	35	35	<0.01	0.1	0.01		Skeletal acicular to anhedral	Feathery unstable edges; minor replacement to brown smectite.
Clinopyroxene	25	25	<0.01	0.01	0.01		Anhedral to subhedral	Equant to fibrous clinopyroxene in bowtie structures with plagioclase; minor replacement to brown smectite.
Mesostasis	25	33	-	-	0.05		Interstitial	Feathery varioles of plagioclase and clinopyroxene.
OPAQUE MINERALS								
Titanomagnetite	3	3	<0.01	0.01	-		Anhedral to skeletal	
Sulfide	<1	<1		<<.01			Blebs	Generally as inclusions in groundmass phases; some interstitial sulfide observed.

SECONDARY MINERALOGY	PERCENT	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	REPLACING / FILLING	COMMENTS
Brown smectite	10	-	-	-	Olivine, groundmass phases and mesostasis	

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	FILLING / MORPHOLOGY	COMMENTS
Miarolitic cavities	<<1					Brown smectite	

VEINS	Orientation	LOCATION	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	FILLING / MORPHOLOGY	COMMENTS
Vein 1	sub-vertical	right side	-	-	0.02	Brown smectite	
Vein 2	vertical	right side	-	-	0.1	Brown smectite and calcite	

COMMENTS : There is a higher proportion of primary sulfide than in the other thin sections from Hole 1183A.

TS# 72 192-1183A-60R-1, 139-141 cm, Piece 19 — **Unit 6** — **OBSERVER:** **PRC, MG, TS, CRN, NRB**

ROCK NAME: **Moderately olivine-plagioclase-phyric basalt.**
WHERE SAMPLED: **Interior of pillow.**
GRAIN SIZE: **Fine grained, hypocrystalline.**
TEXTURE: **Subophitic to slightly intersertal.**

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	APPROX. COMP.	MORPHOLOGY	COMMENTS
PHENOCRYSTS								
Olivine	0	4	0.05	0.3	0.1		Subhedral to euhedral	Replaced by brown smectite ± goethite.
Plagioclase	1	1	0.1	0.3	0.2		Rectangular elongated laths	Highly oscillatorily zoned; crystal boundaries are more regular than for groundmass plagioclase.
GROUNDMASS								
Plagioclase	35	35	0.005	0.05	0.025	An46-56	Skeletal to acicular laths	Many are cut by clinopyroxene.
Clinopyroxene	40	40	0.01	0.125	0.08		Anhedral to subhedral grains	Also elongated prisms; unaltered.
Glass	0	15					Mesostasis	Devitrified; altered to brown smectite and goethite.
OPAQUE MINERALS								
Titanomagnetite	5	5	0.01	0.1	0.05		Skeletal to elongated angular	Many small, unaltered crystals are present in the groundmass.
Sulfide	Trace						Blebs	Inclusions (<2 µm) in plagioclase and clinopyroxene.

SECONDARY MINERALOGY	PERCENT	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	REPLACING / FILLING	COMMENTS
Brown smectite	15				Olivine and glass	
Goethite	4				Olivine and glass	

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	FILLING / MORPHOLOGY	COMMENTS
None	0						

VEINS	LOCATION	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	FILLING / MORPHOLOGY	COMMENTS
None						

COMMENTS : A plagioclase phenocryst contains glass inclusions.
See **Chapter 3, Figure F48**, **Figure F53**

TS# 73 192-1183A-60R-2, 71-74 cm, Piece 11 | **Unit 6** | **OBSERVER:** | **WJC, MG, LMC, CRN, JH**

ROCK NAME: **Moderately olivine-plagioclase-phyric basalt.**
WHERE SAMPLED: **Massive pillow interior.**
GRAIN SIZE: **Fine grained; hypohyaline.**
TEXTURE: **Porphyritic; subophitic; subtrachytic; locally variolitic.**

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	APPROX. COMP.	MORPHOLOGY	COMMENTS
PHENOCRYSTS								
Olivine	0	2	0.1	0.4	0.2		Euhedral to subhedral	Replaced by green smectite and celadonite in black halos, by brown smectite elsewhere.
Plagioclase	1	1	0.1	0.2	~0.1		Euhedral to subhedral; tabular	Some are zoned and resorbed.
GROUNDMASS								
Mesostasis	15	50						Replaced by green smectite and celadonite in black halos, by brown smectite elsewhere.
Plagioclase	20	20	0.01	0.07	0.04			Plagioclase and clinopyroxene have bow-tie textures.
Clinopyroxene	23	25	0.04	0.1	0.06			
OPAQUE MINERALS								
Titanomagnetite	2	2						
Sulfide	Trace	Trace					Blebs	Inclusions in plagioclase and clinopyroxene.

SECONDARY MINERALOGY	PERCENT	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	REPLACING / FILLING	COMMENTS
Green smectite	5				Olivine and mesostasis	
Brown smectite	30				Olivine and mesostasis	
Celadonite	2				Olivine and mesostasis	
Calcite					Veins	
Goethite					Veins	

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	FILLING / MORPHOLOGY	COMMENTS
Miarolitic cavities	<1					Green smectite, celadonite and goethite.	

VEINS	LOCATION	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	FILLING / MORPHOLOGY	COMMENTS
Veins 1 and 2		1	4		Goethite => green smectite + celadonite + goethite => calcite	Green smectite and celadonite have spherulitic texture; goethite has botryoidal texture.

COMMENTS : Percentages of minerals refer to basalt portion of the slide only (the remainder is taken up by veins). Black halos contain green smectite in miarolitic cavities, and olivine phenocrysts replaced by green smectite and celadonite. Within brown halos, plagioclase and clinopyroxene are stained brown adjacent to veins and miarolitic voids contain celadonite and goethite.

See **Chapter 3, Figure F77**

TS# 76 192-1183A-64R-2, 15-17 cm, Piece 2 **Unit 6** **OBSERVER:** **PRC, TS, CRN, WJC, JH**

ROCK NAME: **Moderately plagioclase-olivine phyric basalt.**
WHERE SAMPLED: **Interior of pillow.**
GRAIN SIZE: **Cryptocrystalline to fine grained.**
TEXTURE: **Subspherulitic to variolitic; slightly glomerophyric; slightly trachytic.**

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	APPROX. COMP.	MORPHOLOGY	COMMENTS
PHENOCRYSTS								
Plagioclase	~2	~2	0.1	0.2	0.15		Skeletal to anhedral or subhedral laths	More regular edges than groundmass plagioclase; crystals are isolated or glomerophyric with olivine.
Olivine	0	2	<.05	0.8	0.2		Anhedral, subhedral or euhedral	Replaced by celadonite and brown and green smectite; some are glomerophyric with plagioclase.
GROUNDMASS								
Plagioclase	10	10	<.01	0.4	0.04		Skeletal to acicular laths	Solitary with unstable, fibrous edges.
Clinopyroxene	4	4	<.01	0.5	0.3		Anhedral grains	Unaltered.
Mesostasis	60	81					Cryptocrystalline	Glass devitrified to feathers of plagioclase and clinopyroxene.
OPAQUE MINERALS								
Titanomagnetite	~1	~1	-	-	<.05		Skeletal to anhedral grains	Concentrated between variolitic plagioclase.
Sulfide	Trace	Trace					Blebs	Inclusions in primary phases.

SECONDARY MINERALOGY	PERCENT		SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	REPLACING / FILLING	COMMENTS
Brown smectite	10	0				Olivine and glass	
Celadonite	6	0				Olivine	
Green smectite	6	0				Olivine	
Sulfide	<1	0				Present in vein, mesostasis and olivine	

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	FILLING / MORPHOLOGY	COMMENTS
None	0						

VEINS		LOCATION	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	FILLING / MORPHOLOGY	COMMENTS
Hairline					<0.05	Green smectite and minor pyrite	Groundmass plagioclase along vein locally replaced by green smectite; pyrite is present, scattered in groundmass near veins.

COMMENTS : Plagioclase is seriate, ranging from feathery to skeletal to elongated laths; it is not straightforward to differentiate phenocrysts from groundmass laths, except that the phenocrysts tend to have more regular edges whereas the groundmass plagioclase crystals tend to have feathery edges. Toward the top of the section (close to a pillow margin?), olivine appears to be resorbed. Black halos contain celadonite + green smectite; brown halos contain mainly brown smectite. A single glomerocryst of clinopyroxene and plagioclase is present.
See **Chapter 3, Figure F49**, **Figure F74**, **Figure F75**

TS# 77 192-1183A-64R-2, 59-62 cm, Piece 6C **Unit 7** **OBSERVER:** **RVW, CRN, PRC, WJC, JH**

ROCK NAME: **Sparsely olivine-plagioclase-phyric basalt.**
WHERE SAMPLED: **Pillow interior (with vein).**
GRAIN SIZE: **Hypocrystalline; fine grained.**
TEXTURE: **Intersertal to subophitic.**

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	APPROX. COMP.	MORPHOLOGY	COMMENTS
PHENOCRYSTS								
Olivine	0	1	0.15	0.5	0.3		Subhedral to euhedral	Completely replaced by calcite or brown smectite.
Plagioclase	<1	<1		0.15	0.1		Subhedral; tabular	Normal zoning; albite twins.
GROUNDMASS								
Plagioclase	50	50	<0.01	0.05	0.02		Subhedral, acicular	Feathered ends; sometimes skeletal; Carlsbad or albite twins; zoned.
Clinopyroxene	37	37	0.05	0.15	0.1		Subhedral to anhedral; subequant	Shows bow-tie structure with plagioclase.
Mesostasis	0	10					Cryptocrystalline	Altered to brown smectite.
OPAQUE MINERALS								
Titanomagnetite	2-3	2-3	<0.01	0.03	0.02		Skeletal; mainly equant	Concentrated in mesostasis; occasionally elongate (trellis).
Sulfide	Trace	Trace			<<0.01			Inclusions in groundmass phases; very rare.

SECONDARY MINERALOGY			SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	REPLACING / FILLING	COMMENTS
Brown smectite	11	0				Mesostasis, olivine and filling vein	
Calcite	<1	0				Olivine and vein	

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

VEINS		LOCATION	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	FILLING / MORPHOLOGY	COMMENTS
Vein 1					1.5	Brown smectite => fibrous calcite => finely-fibrous tan calcite => brown very fine-grained clay?	Radial feathery textures nucleating from vein wall; walls of vein partly replaced by brown smectite.
Vein 2					<0.05	Colorless calcite	

COMMENTS : Clinopyroxene and plagioclase show bow-tie structures.

TS# 78 192-1183A-64R-2, 136-138 cm, Piece 10B **Unit 7** **OBSERVER:** **WJC, CRN, TS, JH**

ROCK NAME: **Sparsely olivine-phyric basalt.**
WHERE SAMPLED: **Interior of pillow.**
GRAIN SIZE: **Fine grained; hypocrystalline.**
TEXTURE: **Subophitic; porphyritic.**

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	APPROX. COMP.	MORPHOLOGY	COMMENTS
PHENOCRYSTS								
Olivine	0	1	0.1	0.5	0.3		Euhedral to subhedral	Completely altered to brown smectite.
GROUNDMASS								
Plagioclase	45	50	0.01	0.2	0.05		Laths to acicular; feathery	Partially (10%) replaced by brown smectite.
Clinopyroxene	35	35	0.02	0.3	0.15		Subhedral to anhedral	Bow-tie structures, some enclosing ends of plagioclase.
Mesostasis	0	10						Altered to brown smectite.
OPAQUE MINERALS								
Titanomagnetite	3	3	<0.01	0.05	0.02		Skeletal and tabular	
Sulfide	<1	<1		<0.01			Blebs	Occurs as inclusions in groundmass and mesostasis.

SECONDARY MINERALOGY	PERCENT	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	REPLACING / FILLING	COMMENTS
Brown smectite	16	0.1	0.5	0.3	Olivine, plagioclase and mesostasis	

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

VEINS	LOCATION	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	FILLING / MORPHOLOGY	COMMENTS
		0.01	0.05	0.02	Brown smectite	Single vein; connects some olivine pseudomorphs.

COMMENTS :

See **Chapter 3, Figure F70**; see photomicrograph **1183A-035**

TS# 79 192-1183A-65R-2, 84-88 cm, Piece 8 | **Unit 7** | **OBSERVER:** | **SPI, LMC, CRN, PRC, TS, JH**

ROCK NAME: **Aphyric basalt.**
WHERE SAMPLED: **Top of pillow(?); selected for alteration and veins.**
GRAIN SIZE: **Microcrystalline.**
TEXTURE: **Variolitic to intersertal.**

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	APPROX. COMP.	MORPHOLOGY	COMMENTS
PHENOCRYSTS								
Olivine	0	<1	0.05	0.2	0.1		Subhedral to euhedral	One pseudomorph present.
Plagioclase	<1	<1	-	0.1	0.1		Subhedral laths	Slightly more tabular than groundmass; zoned; some resorption around grain boundaries.
GROUNDMASS								
Clinopyroxene	25	25	<0.01	0.01	0.01		Anhedral or interstitial	
Plagioclase	28	30	<0.01	0.05	0.01		Acicular to subhedral laths	
Mesostasis	37	42	-	-	-		Microcrystalline	Devitrified glass and variolitic plagioclase and clinopyroxene; altered to green smectite away from veins and to goethite close to veins.
OPAQUE MINERALS								
Titanomagnetite	3	3	-	-	<0.01		Anhedral	Interstitial.
Sulfide	Trace	Trace			<<0.01		Blebs	Mostly inclusions in groundmass minerals.

SECONDARY MINERALOGY	PERCENT	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	REPLACING / FILLING	COMMENTS
Celadonite	3				Olivine	
Goethite	3				Olivine and mesostasis	
Green smectite	1				Mesostasis	

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	FILLING / MORPHOLOGY	COMMENTS
None							

VEINS	orientation	LOCATION	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	FILLING / MORPHOLOGY	COMMENTS
Vein 1	diagonal	center			<0.05	Goethite => celadonite	Brown halo with Fe oxyhydroxides
Vein 2	diagonal	center			<0.05	Brown smectite or Fe oxyhydroxides	

COMMENTS : Areas of slightly coarser-grained basalt display the same texture. There is a trace of secondary pyrite in a small vein in the bottom left corner of the section. Brown halos are present near veins; there are no black halos.
See **Chapter 3, Figure F78**

TS# 80 192-1183A-65R-3, 18-19 cm, Piece 2						**Unit 7**	**OBSERVER:**	**JGF, CRN, PRC, RVW, JH**
ROCK NAME:	**Sparsely olivine-plagioclase-phyric basalt.**							
WHERE SAMPLED:	**Pillow interior.**							
GRAIN SIZE:	**Fine grained to hypocrystalline.**							
TEXTURE:	**Subophitic; intersertal.**							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**APPROX. COMP.**	**MORPHOLOGY**	**COMMENTS**
PHENOCRYSTS								
Olivine	0	1	0.1	0.8	0.3		Equant; subhedral	Altered to brown smectite + calcite in center.
Plagioclase	1	1	<0.1	0.2	0.1	An60	Tabular; euhedral	Zoned.
GROUNDMASS								
Clinopyroxene	40	40	0.05	0.2	0.1		Anhedral; equant	Clusters of 3 or 4 crystals; many show bow-tie structure with plagioclase, and partially enclose them.
Plagioclase	33	33	<0.01	0.2	0.05	An40	Laths	Some zoning.
Mesostasis	0	20					Interstitial	Devitrified and/or altered to brown smectite.
OPAQUE MINERALS								
Titanomagnetite	5	5	<0.01	0.02	0.01		Skeletal to elongated/trellis	Small granules in glass; interstitial; unaltered.
Sulfide	Trace	Trace			<0.01		Blebs	Pentlandite? Inclusions in silicate minerals and interstitial phase.

SECONDARY MINERALOGY	**PERCENT**		**SIZE (mm) min.**	**max.**	**av.**	**REPLACING / FILLING**	**COMMENTS**
Brown smectite	18	0	0.05	0.5	0.1	Olivine and mesostasis	
Calcite	3	0				Olivine	

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

VEINS		**LOCATION**	**SIZE (mm) min.**	**max.**	**av.**	**FILLING / MORPHOLOGY**	**COMMENTS**
None							

COMMENTS : Primary sulfide content is high compared to other thin sections from Hole 1183A, but is still <1%.
See **Chapter 3, Figure F50**, **Figure F71**; see photomicrograph **1183A-024**

TS# 81 192-1183A-66R-2, 60-64 cm, Piece 4B **Unit 7** **OBSERVER:** **MG, CRN, WJC, PRC, JH**

ROCK NAME: **Sparsely olivine-phyric basalt.**
WHERE SAMPLED: **Massive interior of pillow.**
GRAIN SIZE: **Fine grained.**
TEXTURE: **Subophitic to intersertal with variolitic patches.**

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	APPROX. COMP.	MORPHOLOGY	COMMENTS
PHENOCRYSTS								
Olivine	0	2	0.05	0.6	0.4		Subhedral to euhedral	Replaced by brown and green smectite and minor calcite.
Plagioclase	<<1	<<1					Elongated subhedral laths	
GROUNDMASS								
Plagioclase	45	47	0.02	0.08	0.03		Acicular to laths	Feathery in variolitic areas.
Clinopyroxene	31	33	0.06	0.2	0.1		Anhedral	
Mesostasis	0	10						Altered to brown smectite and minor calcite.
OPAQUE MINERALS								
Titanomagnetite	3	3			<0.01		Skeletal to elongated trellis	Interstitial; unaltered.
Sulfide	Trace	Trace			<<0.01		Blebs	Inclusions in groundmass and in mesostasis.

SECONDARY MINERALOGY	PERCENT	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	REPLACING / FILLING	COMMENTS
Brown smectite	10				Olivine and mesostasis	
Green smectite	6				Olivine	
Calcite	<1				Vein, olivine and mesostasis	
Chalcedony	<1				Vein center	
Quartz	<<1				Vein center	

VESICLES/ CAVITIES	PERCENT	ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	FILLING / MORPHOLOGY	COMMENTS
Miarolitic cavities	5	5	0.5	1.8	0.5	Equant and angular to elongated	Completely filled with green smectite and calcite, or calcite only.

VEINS	LOCATION	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	FILLING / MORPHOLOGY	COMMENTS
One present					Brown smectite => calcite => chalcedony => quartz	Thin halo in wall of vein contains brown smectite.

COMMENTS : Elongated miarolitic cavities are approximately perpendicular to the vein that cuts the thin section. Only one equant angular cavity is observed; it is close to the vein and filled with a bluish mineral (possibly chalcedony) in addition to the green smectites that fill the other miarolitic cavities. Pyrite is finely disseminated in some areas of the thin section.
See **Chapter 3, Figure F80**, **Figure F81**, **Figure F86**; see photomicrograph **1183A-033**

TS# 82 192-1183A-67R-1, 46-48 cm, Piece 2C | **Unit 7** | **OBSERVER:** | **PRC, WJC, CRN, JH**

ROCK NAME: **Moderately olivine-plagioclase-phyric basalt.**
WHERE SAMPLED: **Massive interior of pillow.**
GRAIN SIZE: **Fine grained.**
TEXTURE: **Subophitic to slightly intersertal with variolitic patches.**

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	APPROX. COMP.	MORPHOLOGY	COMMENTS
PHENOCRYSTS								
Olivine	0	2	<0.01	0.75	0.2		Subhedral to euhedral	Altered to green smectite.
Plagioclase	<<1	<<1		0.4			Subhedral, tabular lath	Strongly zoned.
GROUNDMASS								
Plagioclase	50	50	<0.01	0.1	0.04		Skeletal acicular to subhedral laths	Feathery in variolitic zone.
Clinopyroxene	35	35	~0.01				Anhedral to subhedral grains	Occurs with plagioclase in the variolitic zone.
Mesostasis	0	10					Interstitial	Altered to green and brown smectite and calcite.
OPAQUE MINERALS								
Titanomagnetite	3	3	<0.01	0.06	0.02		Skeletal to long (~0.2 mm) trellis morphology	Mainly between plagioclase and clinopyroxene in the groundmass; also inside olivine pseudomorphs.
Sulfide	Trace	0	<0.01				Blebs	

SECONDARY MINERALOGY	PERCENT	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	REPLACING / FILLING	COMMENTS
Green smectite	6				Olivine and mesostasis	
Brown smectite	6				Mesostasis	
Calcite	<<1				Olivine, mesostasis and vein	
Celadonite	<<1				Vein	
Chalcedony	<<1				Vein	

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	FILLING / MORPHOLOGY	COMMENTS
Vesicles	Trace		<0.01			Green smectite ± goethite ± calcite	

VEINS	LOCATION	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	FILLING / MORPHOLOGY	COMMENTS
Present					Brown smectite => calcite => celadonite => brown fine-grained clay? => chalcedony	

COMMENTS : Variolitic patches impart a megascopic subhorizontal banding in the core. A 7-mm thick black halo contains olivine replaced by green smectite; olivine is replaced by brown smectite in wall-rock near vein.
See **Chapter 3, Figure F54**, **Figure F69**, **Figure F82**, **Figure F83**; see photomicrograph **1183A-015**

TS# 83 192-1183A-67R-3, 118.5-119.5 cm, Piece 16 **Unit 8** **OBSERVER:** **TS, LMC, CRN, PRC, RVW, JH**

ROCK NAME: **Moderately olivine-plagioclase phyric basalt.**
WHERE SAMPLED: **Top of pillow.**
GRAIN SIZE: **Fine grained to slightly hypocrystalline.**
TEXTURE: **Subophitic to intergranular; some variolitic patches.**

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	APPROX. COMP.	MORPHOLOGY	COMMENTS
PHENOCRYSTS								
Olivine	0	3	0.15	0.4	0.25		Euhedral to subhedral	Completely replaced by brown smectite and minor calcite; sometimes concentrated in patches/clusters of 4-5 crystals.
Plagioclase	1	1	0.1	0.2	0.15		Subhedral	Carlsbad and albite twinning; some zoned.
GROUNDMASS								
Plagioclase	40	40	0.005	0.04	0.02		Laths; some skeletal	
Clinopyroxene	35	40	0.02	0.08	0.05		Anhedral to subhedral	Minor alteration to brown smectite.
Mesostasis	0	15					Interstitial	Completely altered to brown smectite.
OPAQUE MINERALS								
Titanomagnetite	1	1	0.01	0.02	0.02		Skeletal to angular	Many are concentrated in the altered mesostasis.
Sulfide	Trace	Trace		<0.01			Elongated angular	Inclusion in groundmass plagioclase.

SECONDARY MINERALOGY	PERCENT		SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	REPLACING / FILLING	COMMENTS
Brown smectite	23	0				Olivine and mesostasis; rarely clinopyroxene	
Calcite	<1	0				Olivine centers	Calcite in olivine centers and brown smectite around edges.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	FILLING / MORPHOLOGY	COMMENTS
None							

VEINS		LOCATION	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	FILLING / MORPHOLOGY	COMMENTS
None							

COMMENTS :

TS# 84 192-1183A-68R-1, 32-35 cm, Piece 3A **Unit 8** **OBSERVER:** **RVW, SPI, LMC, CRN, WJC, PRC, JH**

ROCK NAME: **Sparsely olivine-plagioclase-phyric basalt.**

WHERE SAMPLED: **Area with grain size variation adjacent to vein.**

GRAIN SIZE: **Variable and banded; fine grained to aphanitic; hypocrystalline to hypohyaline.**

TEXTURE: **Variolitic to intersertal; subtrachytic.**

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	APPROX. COMP.	MORPHOLOGY	COMMENTS
PHENOCRYSTS								
Olivine	0	2	0.2	0.4	0.3		Subhedral to euhedral	Completely replaced, usually by calcite or calcite + brown smectite.
Plagioclase	1	1	0.1	0.2	0.15		Subhedral laths	Zoned.
GROUNDMASS								
Plagioclase	30	30	<0.01	0.05	0.02		Microlitic; acicular	Skeletal; variolitic; flow alignment around olivine phenocrysts.
Clinopyroxene	28	30	<0.01	0.08	0.05		Anhedral, interstital	Intergranular; rarely altered to brown smectite.
Mesostasis	28	32	-	-	-		Interstitial	Altered glass with clinopyroxene + plagiocase crystallites.
OPAQUE MINERALS								
Titanomagnetite	5	5	-	-	0.01		Subhedral; skeletal	
Sulfide	Trace							

SECONDARY MINERALOGY	PERCENT		SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	REPLACING / FILLING	COMMENTS
Calcite	6	0	-	-	-	Olivine, mesostasis and miarolitic cavities	
Brown smectite	2	0	-	-	-	Olivine, clinopyroxene and mesostasis	
Green smectite	<1	0					
Celadonite	<1	0					

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	FILLING / MORPHOLOGY	COMMENTS
Miarolitic cavities	<1					Calcite	

VEINS		LOCATION	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	FILLING / MORPHOLOGY	COMMENTS
None							

COMMENTS : This section is markedly heterogeneous in grain size. The proportions of phenocrysts, groundmass phases and mesostasis are highly variable, depending on location. The textures suggest that both olivine and plagioclase were liquidus phases and that some parts of this rock were quenched, while others cooled more slowly and developed intersertal or intergranular texture in the groundmass. Very localized areas (~1 mm across) of subtrachytic plagioclase alignment are present. The banding is interpreted to be due to differential cooling rates during repeated pillow inflation. One olivine glomerocryst is replaced by green smectite (60%), calcite (30%) and celadonite (10%); the adjacent groundmass is altered to the same assemblage.

See **Chapter 3, Figure F55**