SITE 879 HOLE A CORE 1R CORED 0.0 - 6.0 mbsf

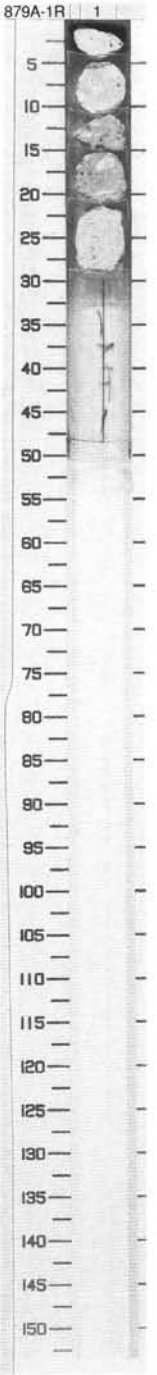
Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color
.1		1	late Aptian–Albian ?				10YR 8/3
.2							10YR 6/3

DESCRIPTION

MOLLUSK RUDSTONE

Major Lithology:
Section 1, 0–4 cm: Very pale brown to white (10YR 8/3 to 8/2) GASTROPOD RUDSTONE with very fine-grained packstone (peloidal?) matrix. Porosity is moldic and vuggy; some molds are lined with fine-bladed to equant calcite crusts, some are lined with geopetal fill. One geopetal is stained orange. Gastropods, up to 2 cm, are bored. Some gastropod and other mollusk shell fragments have a micritized periphery up to 1 mm thick. Chambers of one gastropod are filled with a coarse packstone with micritic envelopes. Section 1, 4–21 cm: Pale brown (10YR 6/3) MOLLUSK RUDSTONE with mollusk-fragment grainstone matrix. Probably was originally a coquina. Gastropods are common, and there may be some rudist fragments present. Molds of gastropods and small bivalve fragments are abundant. Most grains and molds (all sizes) are lined with pale brown isopachous cement (?) coating, up to 2 mm thick. Both the coating and shell fragments are bored in places (e.g. in 4–10 cm). Intergranular pores and borings are filled by very pale brown (10YR 8/3), fine peloid packstone. A few molds are lined with clear (rarely yellow), fine- to medium-grained, clear, equant and bladed crusts of calcite cement. Section 1, 21–29 cm: MOLLUSK RUDSTONE with coarse peloid grainstone matrix. Shell fragments and molds (some gastropod, possible rudist) are up to 2 cm. There is some moldic porosity; intergranular porosity has been filled by calcite cement. Manganese? staining and micronodules occur in some molds.

General Description:
Cylinders: Section 1, 21–29 cm; Rollers: Section 1, 0–21 cm.



SITE 879 HOLE A CORE 2R CORED 6.0 - 15.5 mbsf

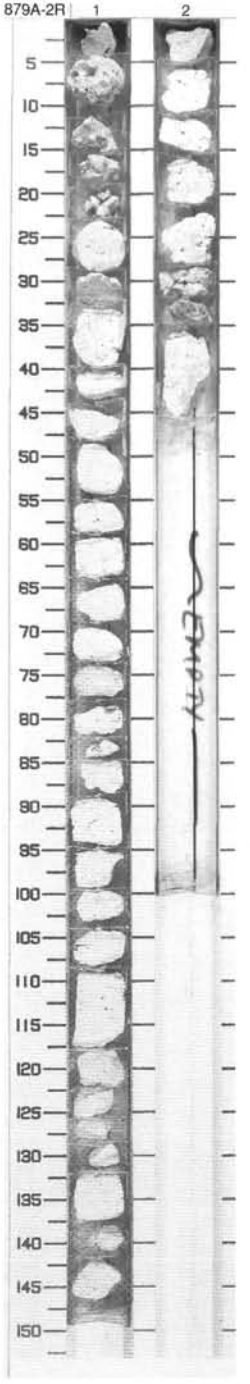
Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color
		1	late Aptian–Albian ?				10YR 8/2
		2					

DESCRIPTION

MOLLUSK RUDSTONE, BIVALVE FLOATSTONE, MOLLUSK PACKSTONE, and CORAL FLOATSTONE

Major Lithologies:
Section 1, 0–23 cm: White (10 YR 8/2) BIVALVE RUDSTONE with a mud-poor packstone matrix. Sorting is poor at Section 1, 0–4 cm, but it is good at Section 1, 4–23 cm. Grains are rounded and fine sand (1/4 mm) size. Constituents include common bivalves; common codiacean algae (or Ortonella), especially at Section 1, 0–11 cm; common peloids; many dasyclad algae; many coated grains, especially at Section 1, 15–19 cm; few encrusting codiacean algae; and rare to many gastropods. Most grains have micrite envelopes. Bivalves are thick walled (e.g., at Section 1, 11–23 cm), oyster-like, but with thick aragonitic (recrystallized) inner layer; fluted calcite outer layer; wall to 10 mm thick. Nautiloid mold identified at Section 1, 11–15 cm. Dasycladacean algae with excellent preservation occurs at Section 1, 19–23 cm. Porosity is ~18%. Vast majority of the porosity is moldic. Intraparticle cement is sparse (1%) and bladed (PB5C). Many of the bivalves are neomorphosed (NE5). Trace Manganese stains are dispersed throughout Section 1. Section 1, 23–150 cm: White (10YR 8/1) MOLLUSK RUDSTONE in a muddy packstone matrix. Minor lithologies include: mollusk floatstone, Section 1, 40–48 cm; algal-mollusk rudstone, Section 1, 109–126 cm. Minor manganese stains occur throughout, many as microdendrites adjacent to pores; small flecks in pores; and tiny domes in molds (e.g. Section 1, 74–78 cm and 123–126 cm). Brownish yellow stains (10YR 6/6) on shells and internal sediment, 55–64 cm, is probably phosphate. Coated skeletal grains common throughout, and are probably micritic coats. Biota, in decreasing abundance are few to abundant bivalves, thick and thin walled (especially oysters at Section 1, 23–28 cm, 69–78 cm, 95–104 cm, and 129–150 cm); few to common gastropods; few to many codiacean algae (some are likely Ortonella); rare to many dasycladacean algae; many to abundant encrusting coralline algae, especially at Section 1, 23–40 cm; many to absent corals; corals encrust bivalves, especially at Section 1, 64–118 cm; branching coral at Section 1, 55–58 cm; calcisponge at Section 1, 64–69 cm; red algal rhodolith (squamariacean) at Section 1, 48–55. Bivalve umbos are 3 mm thick x 40 mm at Section 1, 55–58 cm. Other biotic constituents include few cerithid gastropods; nerineid gastropod at Section 1, 142–150 cm; external shell color pattern visible in mold at Section 1, 78–82 cm. Evidence of boring is common, especially in bivalves, but also in corals. Fish fragment occurs at Section 1, 132–139 cm. Echinoid spine occurs at Section 1, 123–126 cm. Dasycladacean green algae, with 180° crescent bend in axis, occurs at Section 1, 129–132 cm. Porosity is ~ 7%, and is mostly moldic. Other locally important porosity types are interparticle, shelter. Intraparticle, vugs (Section 1, 40–44 cm), and boring (Section 1, 74–82 cm). Cements are mostly bladed (PB4C) in interparticle and moldic pores. Locally cement is isopachous. At Section 1, 59–64 cm the early cement in interparticle porosity is isopachous, inclusion-rich, fibrous crust (PF3C); it is overlain by brownish-yellow (10YR 6/6) carbonate silt (crir BP). Section 2, 0–5 cm: White (N9) BIVALVE FLOATSTONE in a matrix of skeletal wackestone. Skeletal components include abundant bivalve fragments (few rudist ? fragments with borings); many red algae; rare gastropods (nerineid); rare larger foraminifer; and very rare green algae. Porosity is 16%, mostly moldic and solution-enlarged interparticle. Calcite cement is many, mostly PB3C. Black, rounded manganese (?) micronodules (~<0.2 mm). Section 2, 5–21 cm: White (N9) MOLLUSK PACKSTONE. Skeletal components inlcude abundant to many bivalve fragments, many with borings; few to rare red algae; rare calcisponge; and rare peloids. Porosity varies from 12%–16%, and includes moldic, solution-enlarged interparticle, and possible fenestrae. Calcite cement is few (PB3C). Small (<0.1 mm), black, round manganese (?) micronodules are rare. Section 2, 21–46 cm: White (N9) and yellowish gray (5Y 8/1) CORAL FLOATSTONE with mollusk wackestone matrix. Corals, ranging in size from ~ 1 cm to ~ 7 cm, are abundant. A few of the corals are bored and encrusted. Thin-shelled bivalves are few to many; rudist (?) fragments are many to very rare; gastropods are few to rare green; algae (dasyclads) are very rare. Porosity is ~12%, mostly solution-enlarged intraparticle, solution-enlarged interparticle, and moldic. Cement is few, mostly PB3C. Grayish orange (10YR 7/4) sediment (?) or microcrystalline cement (?) occurs at Section 1, 21–28 cm.

General Description:
Cylinders: Section 1, 33–40 cm, 89–95 cm, 109–118 cm, 132–139 cm; Section 2, 35–46 cm. Rollers: Section 1, 4–19 cm, 23–33 cm, 40–82 cm, 85–89 cm, 95–109 cm, 118–123 cm; Section 2, 0–28 cm. Drilling pebbles: 0–4 cm, 19–23 cm, 82–85 cm, 123–132 cm, 139–150 cm; Section 2, 28–35 cm.



SITE 879 HOLE A CORE 3R CORED 15.5 - 25.0 mbsf

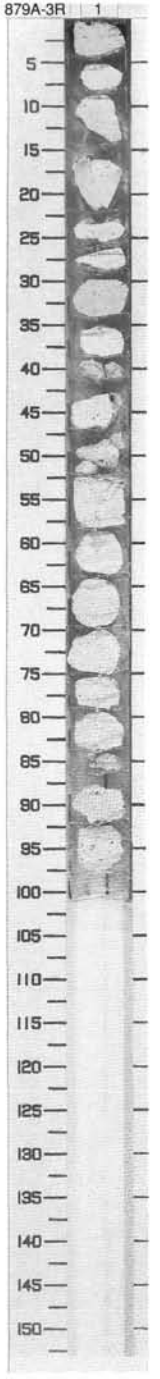
Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color
.5		1	late Aptian–Albian ?	R			10YR 8/1

DESCRIPTION

COATED-GRAIN GRAINSTONE, ALGAL-MOLUSK FLOATSTONE, MOLLUSK RUDSTONE, and SKELETAL BINDSTONE

Major Lithologies:
Section 1, 0–14 cm: White (10YR 8/1), poorly sorted, medium sand-size COATED-GRAIN GRAINSTONE. Most grains are coated by micrite which appears to be additive, but micrite envelopes are also prevalent. Few grains are identifiable. Larger components are many bivalves and gastropods, few probable codiacean algae, and rare corals. Coated grains are abundant and intraclasts are very rare. Porosity is 10%–15%. About 50% of the porosity is moldic and 50% is interparticle. Calcite cement is coarsely crystalline and equant. Some of the cements have a slight manganese stain (e.g., flecks on pore walls and microdendrites at pore margins). Section 1,14–26 cm: White (10YR 8/1) ALGAL-MOLLUSK FLOATSTONE with clean packstone matrix. Large grains are bivalves, gastropods, codiacean algae (or Ortonella). Encrusting red algae are many. Coated grains are abundant in the matrix. Ovoid peloids, possibly fecal pellets, are packed within large bivalve molds. Porosity is 10% and is moldic with minor intraparticle. Section 1, 26–41 cm: White (10YR 8/1), poorly sorted, medium sand-size COATED-GRAIN PACKSTONE. Large grains include common coated grains, few bivalves and gastropods, rare large benthic foraminifers, locally abundant pellets. Vague circular concentrations of mud, 1/2–1 mm diameter, occur at Section 1, 29–34 cm. These are probably lined burrows. Porosity is ~8% and is moldic with minor interparticle. Pelletal pebbles (Section 1, 38–41 cm) have 25% interparticle porosity. Minor manganese stains occurs in pores. Section 1, 41–86 cm. White (10YR 8/1) MOLLUSK RUDSTONE with matrix of muddy packstone. Matrix is fine and medium sand-size. Mostly coated skeletal (?) grains occur at the top, whereas thinner micrite envelopes become dominant toward the base. Larger components are dominantly bivalves. Larger grains are thick-walled forms, with inner recrystallized layer (former aragonite?), and an outer calcite layer. These bivalves have 2 subequal valves, ergo they are not rudists; if the inner layer was aragonite, they are probably not oysters. Thin bivalve shells, many broken and micrite coated, are also common. Few to many gastropods are exclusively preserved as molds. Codiacean algae are locally common (e.g., at Section 1, 63–69 cm), but are few elsewhere. Encrusting corals and red algae are few, as are coral fragments. Large benthic foraminifers are many, especially at Section 1, 79–84 cm. Shells, especially bivalves, are extensively bored. The shape and size of these bores suggests sponge borers. Porosity is ~10%, mostly moldic. Vugs, bores, and interparticle pores are minor. Cement is bladed, medium crystalline crusts (PB4C). Section 1, 86–98 cm. White (10YR 8/1) SKELETAL BINDSTONE. Major binder is not identified; it consists of small, irregular calcite chambers in irregular clusters and possibly in tubes (Bacinella ?). Other encrusters/ binders include corals; red algae, both codiacean and squamariaceans; worms?, and foraminifers?. Gastropods are many, thin-shelled bivalves few, and large bivalve molds rare. Matrix is skeletal packstone. Micrite envelopes probably are more common than coatings of micrite. Porosity is 20% with. ~15% being moldic. The remaining porosity is vuggy and interparticle. Cement is thin, inclusion rich crusts (PE?3C).

General Description:
Cylinders: Section 1, 52–58 cm; Rollers: Section 1, 0–38 cm, 41–47 cm, 58–84 cm, and 86–98 cm; Drilling pebbles: 38–41 cm; 47–52 cm; 84–86 cm.



879A-1R CORED 0.0–6.0 mbsf

Meter	Graphic Lith.	Section	Age	Calc. nanno.	Plank. foram.	Larger foram.	Structure	Disturb.	Sample	Color
.1 .2		1	late Aptian–Albian ?	B	B	late Aptian–Albian ?				10YR 8/3 10YR 6/3

879A-2R CORED 6.0–15.5 mbsf

Meter	Graphic Lith.	Section	Age	Calc. nanno.	Plank. foram.	Larger foram.	Structure	Disturb.	Sample	Color
1		1 2	late Aptian–Albian ?	B	B	F/P	late Aptian–Albian ?			10YR 8/2

879A- 3R CORED 15.5–25.0 mbsf

Meter	Graphic Lith.	Section	Age	Calc. nanno.	Plank. foram.	Larger foram.	Structure	Disturb.	Sample	Color
.5		1	late Aptian–Albian ?	B	B	R/P	late Aptian–Albian ?			10YR 8/1

SITE 879 HOLE A CORE 4R CORED 25.0 - 34.6 mbsf

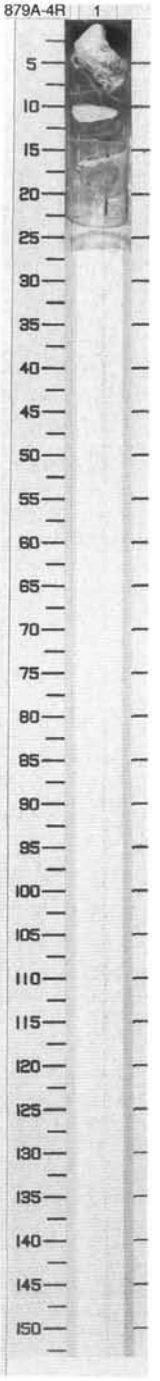
Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color
.1	F F F F F F F F F F F F G G G G G G G G G G G G P P P P P P	1					N9 10YR 7/3

DESCRIPTION

OYSTER FLOATSTONE, PELOID GRAINSTONE, and SKELETAL PACKSTONE

Major Lithologies:
Section 1, 0–9 cm: White (N9) OYSTER FLOATSTONE with pelod wackestone matrix. Largest dimensions of the single oyster specimen is 7 cm long by 6 cm wide. Porosity is ~3%. Calcite cement is many and includes grayish orange (10YR 7/4) needle fibrous, bladed (PB4C), and equant (PE56) morphologies. Small (<0.2 mm), round, black manganese micronodules are few. Section 1, 9–13 cm: Very pale brown (10YR 7/3) PELOID GRAINSTONE. Skeletal components include abundant peloids, few bivalves, rare green algae, rare gastropds, and very rare calcisponge. All grains have a micritic coating around them. Porosity is 4%, mostly cement-reduced moldic (crMO) and cement-reduced interparticle (crBP). Calcite cement is bladed (PB3C) and few. Section 1, 13–19 cm: Very pale brown (10YR 7/3) SKELETAL PACKSTONE. Skeletal components include few thin-shelled bivalves, few bored rudists (?), few green algae, few gastropods, and rare peloids. Many of the grains are micritized. Porosity is 7%, mostly cement-reduced moldic (crMO) and cement-reduced interparticle (crBP). Calcite cement is bladed (PB3C) and few.

General Description:
Rollers: Section 1, 0–9 cm and 9–13 cm; Drilling pebbles: Section 1, 13–19 cm.



SITE 879 HOLE A CORE 5R CORED 34.6 - 44.3 mbsf

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color
.5		1	late Aptian–Albian ?				10YR 8/2
							10YR 5/4
							10YR 8/2

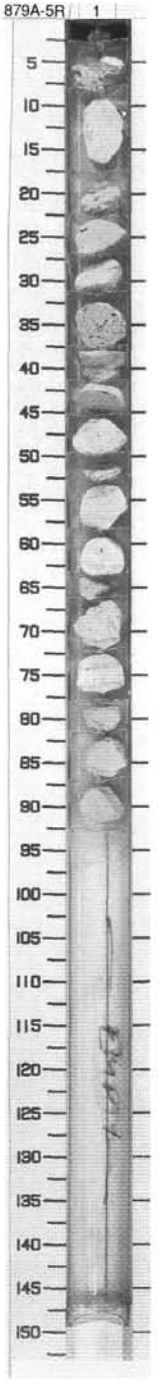
DESCRIPTION

FORAMINIFER GRAINSTONE

Major Lithology:
Section 1, 37–81 cm: White (10YR 8/2) ONCOID FORAMINIFER GRAINSTONE in which sorting is poor and grains are well rounded. Oncoids are many, but smaller than at Section 1, 23–37 cm (i.e., maximum size is 0.5 cm in size). Benthic foraminifers are abundant and include orbitolinids, cuneolina, miliolids, and uniserial and biserial forms. Other components include rare to few fragments of calcisponge; few cyanobacterial bushes (Ortonella); few leached gastropods; and few bivalve fragments. Micritization of grains is extensive. At Section 1, 45–52 cm, there is an intraclast of foraminifer wackestone, 0.7 mm in size, displaying many borings. At Section 1, 66–72 cm, there is a large fragment of a bivalve, probably a rudist, that is bored and coated with micrite. In the same interval, a bivalve has its two valves in connection. Yellowish brown (10YR 5/4) dendritic accretion or stains, similar to those observed at Section 1, 23–37 cm, occur in pores or may partly replace the grains. Porosity is 1%–2%, mostly intraparticle.

Minor Lithologies:
Section 1, 0–3 cm: White (10YR 8/2) FENESTRAL WACKESTONE. Fenestrae are small tubules with no preferred orientation. Porosity is vuggy. The wackestone is overlain by a yellowish brown (10YR 5/4) silicified and phosphatic(?) crust, 0.5 cm thick. Section 1, 0–3 cm: The same silt-size sediment partly covers the phosphatic (?) crust. Section 1, 3–8 cm: White (10YR 8/1) ONCOID WACKESTONE. Oncoids are 0.5 cm to 1 cm in size. Other components include peloids, fragments of oysters (white, lamellar shell fragments), small bivalves, small gastropods, and coral fragments. Some intergranular pores remain unfilled. Section 1, 8–18 cm: White (10YR 8/2) BIVALVE RUDSTONE in which sorting is poor and grains are well rounded. Components include fragments of bivalve shells (including possibly rudists ?), peloids, benthic foraminifers (orbitolinids), intraclasts, and possible coral fragments. Grains are micritized and usually coated by micrite. Intraparticle pore space (e.g., cavities of bivalves) may exhibit geopetal infillings. Porosity averages 1%–3%, mostly cement-reduced intraparticle (crWP), cement-reduced interparticle (crBP). Calcite cement types include bladed (PB4C) and equant (PE4C). Section 1, 18–23 cm: White (10YR 8/2) SKELETAL GRAINSTONE in which sorting is poor, and grains are well rounded. Grain size ranges from medium to very coarse sand. Components include abundant bivalves (fragments and whole shells), common benthic foraminifers (orbitolinids), few gastropods, and peloids. Porosity averages 10% and is cement-reduced intraparticle (crWP), cement-reduced interparticle (crBP). Calcite cement type is bladed (PB3C). Section 1, 23–37 cm: White (10YR 8/2) SKELETAL ONCOID FLOATSTONE. Grains are poorly sorted. Oncoids are abundant, and average 0.6–0.7 mm in size. However, some of these grains are up to 2 cm in size. Nucleus of oncoids consist of cyanobacterial bushes (Ortonella) and skeletal fragments (e.g., bivalves). Cortex of oncoids is irregular. "Matrix" is a peloid-orbitolinid packstone with micritized skeletal fragments. Skeletal components include gastropods, bivalves (including possible fragments of radiolitid rudists), and benthic foraminifers (miliolids). Micritization of grains is extensive. Rounded fenestrae are common in the matrix. Porosity is <1%, with interparticle, fenestral, and moldic pores filled by isopachous crusts of bladed calcite (PB4C) and equant calcite (PE4C); in primary pores these cements overlie an isopachous crust of cloudy calcite (PF?4C). At Section 1, 31–37 cm, some intergranular and moldic pores remain open; porosity is ~15%; 2% moldic and 13% interparticle. Black specks or dots are disseminated in the floatstone and the yellowish brown (10YR 5/4) dendritic accretions or stains. The latter occur in pores or may partly replace the grains. Section 1, 81–92 cm: White (10YR 8/2) FORAMINIFER SKELETAL GRAINSTONE in which sorting is poor and grains are well rounded. Grain size varies from fine to coarse sand. Components include abundant benthic foraminifers including orbitolinids, textularids, miliolids, and cuneolina; many bivalve fragments; many gastropods; few green algae (dasycladaceans), few oncoids; and rare lithoclast. Micritization of grains is extensive. Porosity is 0–1%, and is mostly interparticle (BP). Calcite cement is very rare and includes bladed (PB4C) and equant (PE4C) types.

General Description:
Rollers: Section 1, 8–50 cm, 52–63 cm, 66–78 cm, and 81–92 cm; Drilling pebbles: Section 1, 0–8 cm, 50–52 cm, 63–66 cm, and 78–81 cm.



SITE 879 HOLE A CORE 6R CORED 44.3 - 53.9 mbsf

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color
.1 .2	W W W W W W G G G G G G W W W W W W P P G G G G P P P P P P	1	late Aptian–Albian ?	◑			10YR 8/1 To 10YR 8/2

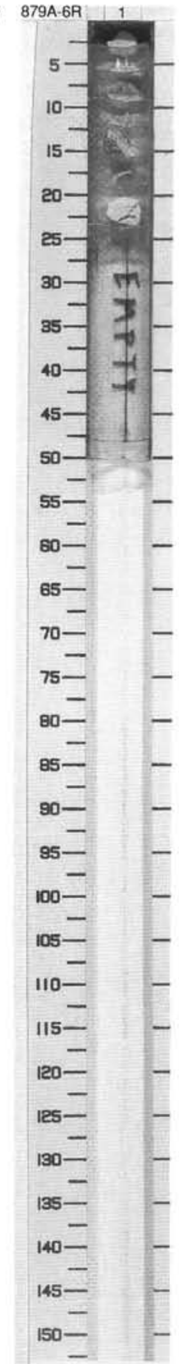
DESCRIPTION

SKELETAL WACKESTONE, MOLLUSK WACKESTONE, FORAMINIFER SKELETAL GRAINSTONE, and FORAMINIFER PACKSTONE

Major Lithologies:
Section 1, 0–6 cm: White (10YR 8/1) SKELETAL WACKESTONE. Components include benthic foraminifers (e.g., cuneolina, textularids); rare green algae (dasycladaceans); and leached, unidentified skeletal fragments. Fenestrae are small canalicules. Porosity is 5% and is vuggy. Section 1, 6–9 cm and 15–19 cm: White (10YR 8/2) MOLLUSK WACKESTONE. Components include few to many cyanobacterial bushes; few bivalve fragments; and rare gastropods. Porosity is 3%, and is mostly moldic. Section 1, 9–12 cm: Only recovery is a fragment of a bivalve shell. Section 1, 12–15 cm and 19–20 cm: White (10YR 8/2) FORAMINIFER SKELETAL GRAINSTONE. Very coarse sand, with large intraclasts to 2 mm, occurs at the top of this interval. Cementation is poor. Porosity is 15%, mostly interparticle. The base of this interval is comprised by benthic foraminifers (e.g., textularids and cuneolina) and recrystallized skeletal fragments. Porosity is 3%, and is mostly interparticle. Section 1, 19–23 cm: A contact between a FORAMINIFER PACKSTONE, at the base, and a FORAMINIFER-SKELETAL GRAINSTONE occurs within this interval. Grains in the latter are well rounded, and very fine to fine sand size. Components include abundant benthic foraminifers; mostly miliolids; gastropods; and unidentified skeletal fragments. Micritization of grains is extensive.

General Description:
Drillling pebbles: Section 1, 0–23 cm.

879A 7R THROUGH 9R NO RECOVERY



879A-4R CORED 25.0–34.6 mbsf

Meter	Graphic Lith.	Section	Age	Calc. nanno.	Plank. foram.	Larger foram.	Structure	Disturb.	Sample	Color
.1		1		B	B	B				N9 / 10YR 7/3

879A-5R CORED 34.6–44.3 mbsf

Meter	Graphic Lith.	Section	Age	Calc. nanno.	Plank. foram.	Larger foram.	Structure	Disturb.	Sample	Color
.5		1	late Aptian–Albian ?	B	B	R/P				10YR 8/2 / 10YR 5/4 / 10YR 8/2

879A- 6R CORED 44.3–53.9 mbsf

Meter	Graphic Lith.	Section	Age	Calc. nanno.	Plank. foram.	Larger foram.	Structure	Disturb.	Sample	Color
.1 .2		1	late Aptian–Albian ?	B	B	late Aptian–Albian ? R/P				10YR 8/1 To 10YR 8/2

879A 7R THROUGH 9R NO RECOVERY

SITE 879 HOLE A CORE 10R CORED 82.9 - 92.5 mbsf

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color
.1	F F F F F F F F F F F F W W W W P P W W W W P P G G G G G G	1	?	✪			10YR 7/2
.2	G G G G G G G G G G G G G G G G G G G G G G G G G G G G G G			◆ ⊘			10YR 8/2
.3	G G G G G G						

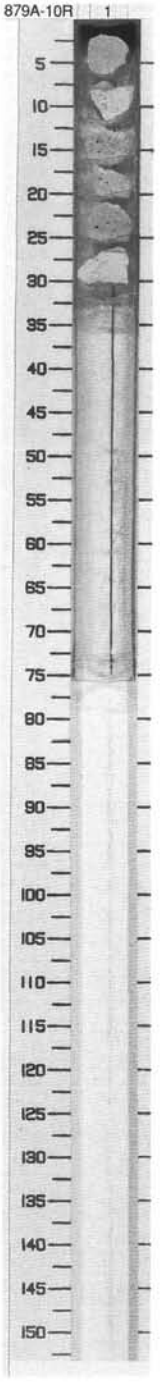
DESCRIPTION

SKELETAL GRAINSTONE

Major Lithology:
Section 1, 11–32 cm: White (10YR 8/2) SKELETAL GRAINSTONE. Sorting of grains is poor. Grains are well rounded. Grain size ranges from fine to coarse sand. Components include bivalve fragments, coral fragments, gastropods, and benthic foraminifers (miliolids). Many skeletal grains are unidentifiable because of the extensive micritization that has occurred. Many grains are micrite coated. A lithoclast of fenestral wackestone is observed at Section 1, 16–20 cm. At Section 1, 20–25 cm, there is a large bivalve fragment, that is probably an oyster. Porosity ranges from 5%–15%, and is mostly interparticle, intraparticle, and vuggy. Calcite cement crusts are isopachous and bladed (PB3C). Porosity at Section 1, 25–32 cm averages 20%, and is mostly interparticle and vuggy.

Minor Lithology:
Section 1, 0–6 cm: Fragment of a light gray (10YR 7/2), coral colony (CORAL FLOATSTONE ?), 4 cm by 3 cm in size. Borings are observed in the outer edge of the colony. The encasing sediment is skeletal packstone with bivalve and coral fragments. Porosity is 10%, and is mostly moldic to vuggy. Section 1, 6–11 cm: White (10YR 8/2) SKELETAL WACKESTONE-PACKSTONE. The wackestone forms the base of the interval (~ 1 cm). The two limestone textures are separated by an undulate contact. Components include coral fragments, gastropods, bivalve fragments, cyanobacterial bushes (Ortonella), and benthic foraminifers (miliolids, textularids).

General Description:
Rollers: 0–32 cm.



SITE 879 HOLE A CORE 11R CORED 92.5 - 102.1 mbsf

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color
.1 .2	P P P P P P / R R R R R R	1	late Aptian	6			10YR 8/2

DESCRIPTION

SKELETAL RUDSTONE

Major Lithology:
Section 1, 5–23 cm: White (10YR 8/2), moderately sorted SKELETAL RUDSTONE. Skeletal constituents include gastropods (especially nerineids), various ornamented bivalves, and worm tubes (?). Some of the mollusk shells are up to 4 cm in size. Matrix is fine-grained packstone. Some of the vugs are developed after mollusk shells and are infilled by peloid packstone. Other molds are lined with bladed (PB3C) calcite cement. Porosity is 7% and it is primarily interparticle (BP).

Minor Lithologies:
Section 1, 0–5 cm: White (10YR 8/2), fine-grained SKELETAL PACKSTONE. Components of the packstone include intraclasts, some up to 1 mm in size; molds of nerineid gastropods, some up to 2 cm in length; and very rare benthic foraminifers. Packstone is extensively micritized, thus many skeletal (?) grains are unrecognizable. Porosity is 5% and is mostly vuggy.
Section 1, 23–29 cm: White (10YR 8/2) MUDSTONE with a few molds of mollusk shells. Porosity is 3% and vuggy.

General Description:
Drilling pebbles: 0–5 cm; 20–23 cm.
Rollers: 5–11 cm; 23–29 cm.
Cylinder: 11–20 cm.

879A 12R NO RECOVERY

SITE 879 HOLE A CORE 13R CORED 111.8 - 121.5 mbsf

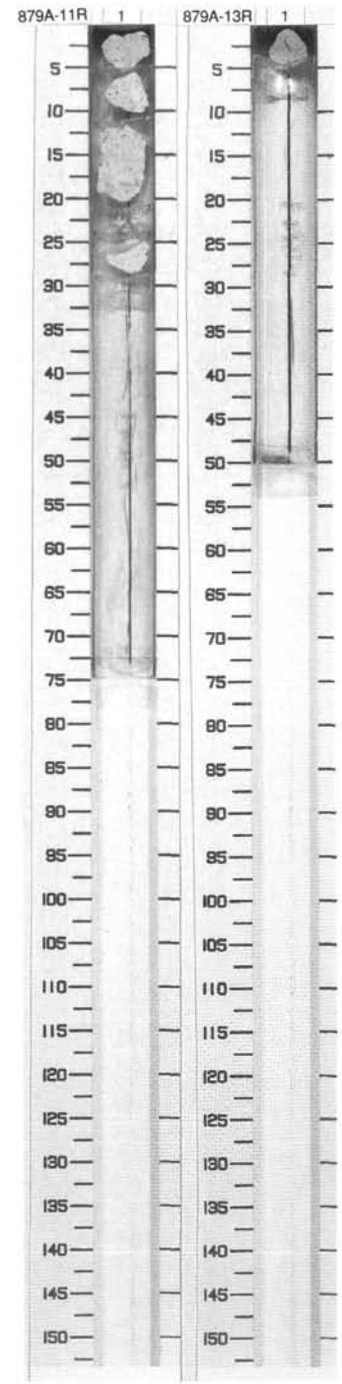
Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color
.4	P P P P P P	1	late Aptian				10YR 7/3

DESCRIPTION

FORAMINIFER PACKSTONE

Major Lithology:
The entire core consists of a single drilling pebble of very pale brown (10YR7/3) FORAMINIFER PACKSTONE. Grain size is very fine sand. Sorting of grains is moderate (i.e., 40–350 microns range, with a few larger clasts). Constituents include many foraminifers, especially miliolids and coiled, planispiral forms; possible spicules; and many unidentified skeletal fragments. One surface has striated surfaces, with parallel grooves ~0.25 mm wide, arrayed in terraces ~1.25 mm square. These do not appear to be slickensides or the result of drilling disturbance. Porosity is 5% and moldic or vuggy. No cement is visible. Elongate black flecks, 5–40 microns, ~1%, may be manganese or organic carbon, but appear metallic. Molds are stained yellow (10YR7/6), possibly by phosphate?, and contain 0.35 mm manganese micronodules.

General Description:
Rollers: 0–4 cm.



879A-10R CORED 82.9–92.5 mbsf

Meter	Graphic Lith.	Section	Age	Calc. nanno.	Plank. foram.	Larger foram.	Structure	Disturb.	Sample	Color
.1		1	?	B	B	B				10YR 7/2
.2										10YR 8/2
.3										

879A-11R CORED 92.5–102.1 mbsf

Meter	Graphic Lith.	Section	Age	Calc. nanno.	Plank. foram.	Larger foram.	Structure	Disturb.	Sample	Color
.1		1	late Aptian	B	B	late Aptian R/P				10YR 8/2
.2										

879A-12R NO RECOVERY

879A-13R CORED 111.8–121.5 mbsf

Meter	Graphic Lith.	Section	Age	Calc. nanno.	Plank. foram.	Larger foram.	Structure	Disturb.	Sample	Color
.4		1	late Aptian	B	B	R/P late Aptian				10YR 7/3

SITE 879 HOLE A CORE 14R CORED 121.5 - 131.1 mbsf

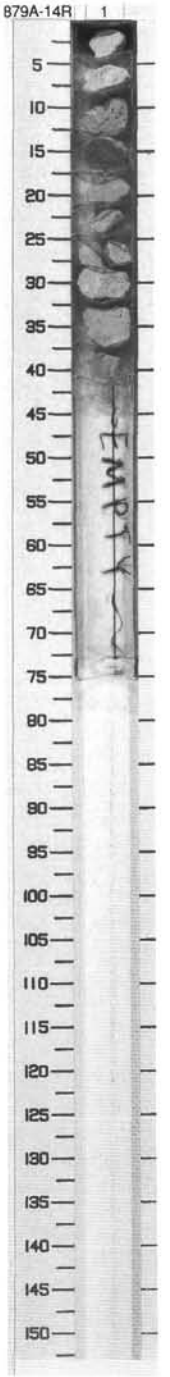
Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color
.1		1	late Aptian				10YR 8/2
.2							10YR 6/3
.3							10YR 7/3

DESCRIPTION

SKELETAL WACKESTONE, SKELETAL RUDSTONE, SKELETAL FLOATSTONE, and PELOID AND SKELETAL PACKSTONE

Major Lithologies:
Section 1, 0–4 cm: White (10YR 8/2) SKELETAL WACKESTONE with mollusk fragments, Vercorsella-type foraminifers, and few gastropod molds. Moldic porosity is less than 1%. Most vugs are less than 0.15 mm and are less than 2% in abundance. Burrows, up to 5 mm diameter, are filled with peloid packstone. Section 1, 4–8 cm: White (10YR 8/2) MOLLUSK RUDSTONE with peloid packstone matrix. Mollusk shells (possibly some rudist) are up to 3 cm. The matrix is mostly fine peloids, bivalve fragments, and few small gastropods. Section 1, 8–17 cm: Pale brown (10YR 6/3) SKELETAL FLOATSTONE with skeletal packstone matrix (at Section 1, 8–12 cm) to SKELETAL PACKSTONE (at Section 1, 12–17 cm). Large clasts are mollusk shells and molds and oncoliths, some with mollusk fragments and whole gastropods as nucleii. Matrix consists of peloids, small mollusk fragments, and miliolids. Porosity is moldic and vuggy, up to 10%. *Cement is mostly fine to medium bladed and equant* crusts, some clear and some amber to yellow. Section 1, 17–24 cm: Very pale brown (10YR 7/3) PELOID (LITHOCLAST?) PACKSTONE. Grains are difficult to discern, they could be lithoclasts or soft, packed peloids. Some irregular wisps of fine, white sediment, up to 2 mm thick, cut across samples, between grains. Thin, abundant fenestrae, not oriented, are lined with fine, clear, equant calcite (some stained yellow). 24–37 cm; very pale brown (10YR 7/3) SKELETAL RUDSTONE with skeletal packstone matrix, biturbated. Mollusks (fragments of bivalve and whole gastropods) have up to 2 mm isopachous, laminated coatings; these are probably oncoliths with mollusk nucleii. Matrix has abundant bivalve (some rudist) and gastropod fragments, few foraminifers (Versorsella-type and a possible Orbitolina), and at least one cyanobacterial bush (Ortonella). Some grains may be lithoclasts. Other *grains not identied. Burrows(?) up to .5 by 1.5 cm in* cross section have surfaces stained gray and then are filled by a very pale brown (10YR 8/3) fine packstone. One has geopetal fill with surface stained yellow. Porosity is mostly moldic, cements are pore filling and crusts of clear to amber, bladed to equant calctie. Some gastropods comletely replaced. 37–41 cm is a single piece of recrystallized coral.

General Description:
Rollers: 4–20 cm, 28–37 cm. Drilling Pebbles: 0–4 cm, 20–28 cm, 37–41 cm.



SITE 879 HOLE A CORE 15R CORED 131.1 - 140.8 mbsf

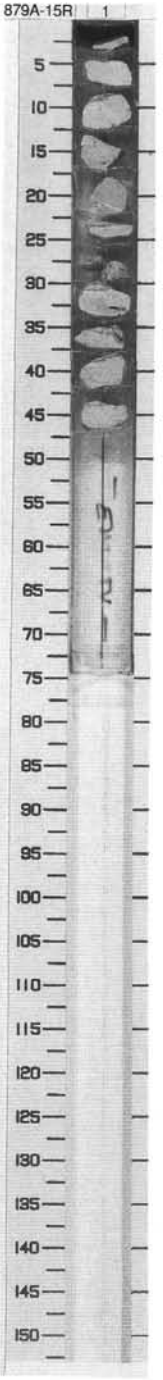
Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color
	P P P P P P P P P P P P P P P P P P P P P P P P P P P P P P P P P P P P P P P P P P P P P P P P P P P P P P P P P P P P P P P P P P P P P P P P P P P P P P P P P P P P	1					10YR 8/2 10YR 7/3

DESCRIPTION

PELOID PACKSTONE-WACKESTONE and PACKSTONE

Major Lithologies:
Section 1, 0–22 cm: Very fine-grained, dense, white (10YR 8/2) PELOID PACKSTONE. Grains are mainly densely packed peloids. Grain size is 0.1 mm. Other constituents are nerineid gastropod molds (7% of skeletal components), bivalve shell debris, and one small coral fragment cast at Section 1, 20 cm. Color changes to very pale brown (10YR 7/3) at Section 1, 22 cm. Porosity is 5% and vuggy. Section 1, 22–47 cm: Very fine-grained, dense, very pale brown (10YR 7/3) PACKSTONE. Grains are unidentifiable, altered, rod-shaped, skeletal grains, 1 cm in size. There are also a few molds of gastropods and bivalve fragments. Burrows are mostly open, stained yellowish, and are sprinkled with manganese micronodules (0.3 mm in diameter). A burrow at Section 1, 33 cm is stained dark gray.

General Description:
Drilling pebbles: 26–30 cm.
Rollers: 0–26 cm; 30–47 cm.



SITE 879 HOLE A CORE 16R CORED 140.8 - 150.4 mbsf

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color
1		1	late Aptian				

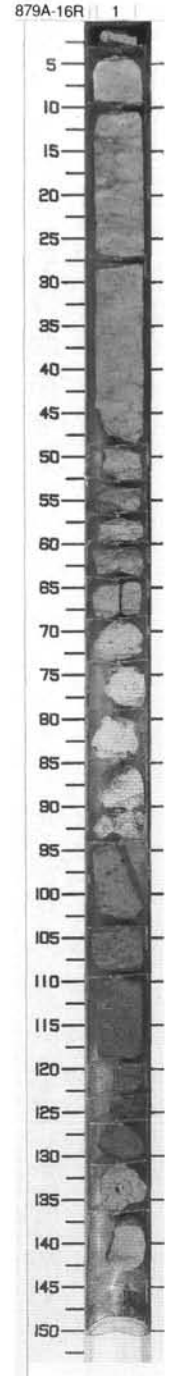
DESCRIPTION

SKELETAL WACKESTONE

Major Lithology:
Section 1, 3–68 cm: Light gray (10YR 7/1), gray (2.5YR N5), yellow (10YR 7/6) to light yellowish brown (2.5Y 6/4), conspicuously mottled SKELETAL WACKESTONE. The matrix is probably partly argillaceous. Major components include small thin-shelled bivalve fragments; small gastropods; and benthic foraminifers (especially textularids). Fragments of rudists (compact layers of radiolitids ?) occur at Section 1, 3–10 cm and 60–64 cm. Fragments of fibrous and prismatic layers of bivalves occur at Section 1, 52–56 cm. Stromatoporoid fragment occurs at Section 1, 22 cm, and a coral fragment occurs at Section 1, 52–56 cm. Grains are extensively micritized and coated by micrite. Burrows are filled with coarse packstone sediment, especially at Section 1, 3–10 cm. Section 1, 3–68 cm: This packstone contains many oncoids and recrystallized bioclasts. Red (10R 4/6) grains are altered basalt, and are especially abundant at Section 1, 10–27 cm. Porosity is 0–3% and is mostly moldic, after foraminifers and mollusk fragments, and vuggy. Section 1, 68–94 cm: Pale yellow (2.5Y 7/4), white (10YR 8/2) or light gray (10YR 7/2) FORAMINIFER WACKESTONE, with patches of yellow (10YR 8/6) and yellowish brown (10YR 5/6) argillaceous infillings of cavities. Components include benthic foraminifers (miliolids and textularids) and rare skeletal fragments, especially well-rounded, recrystallized bivalve fragments. Small cavities, elongated or rounded and 0.25 mm–1.0 mm in diameter, are abundant. Such features are probably burrows. Moreover, these burrows (?) are usually stained yellow, or infilled by yellowish brown (10YR 5/6) or light olive gray (5Y 6/2) argillaceous and/or silt-sized sediments. At Section 1, 84–90 cm, the wackestone contains coarse bivalve fragments. Black manganese dendritic accretions occur around cavities at Section 1, 73–79 cm. Section 1, 94–131 cm: Gray (7.5YR N4-N5) SKELETAL WACKESTONE. Sorting is poor and grains are well rounded. Components include leached or recrystallized gastropods, especially abundant at Section 1, 104–123 cm; bivalve fragments, including thin-shelled forms, ambered fragments, and fragments of the compact layer of radiolitids (e.g., Section 1, 126–131 cm); many small benthic foraminifer; skeletal wackestone intraclast; and very rare coral fragment. Volcanic grains are many in this wackestone and are moderate blue green (5BG 4/6; altered basalt ?) and gray (7.5YR N6) in color. Black fragments at Section 1, 104–119 cm may be woody material. Pyrite is abundant throughout the core and occurs as scattered grains, irregular laminae, and in cavities. Porosity is about 5% and is mostly moldic and intraparticle. Porosity is moderately reduced by bladed crusts of coarse crystalline calcite (MOcrPB5C). Section 1, 131–136 cm: Mottled SKELETAL WACKESTONE that is variably colored from light gray (10YR 7/1), gray (2.5YR N5), and yellow (10YR 7/6) to yellowish brown (2.5Y 6/4). Bivalve fragments are many to abundant and include fragments of thin-shelled forms and fragments of the compact layer of radiolitids. Other components include few to many benthic foraminifers, especially textularids; rare coral fragments; and few red (10R 4/6) altered basalt grains. Section 1, 136–144 cm: Very pale brown (10YR 7/3), poorly sorted SKELETAL ONCOID PACKSTONE. Oncoids are up to 1 cm in size. Nucleus of oncoids may consist of coral fragments, extensively bored bivalve fragments, gastropods, and echinoid spines. Other skeletal components of the packstone include bivalve fragments, especially thin-shelled forms and radiolitids, and benthic foraminifers (miliolids). Porosity is about 5% and is mostly intraparticle.

Minor Lithology:
Section 1, 0–3 cm: White (10YR 8/2) SKELETAL PACKSTONE, with red (2.5YR 5/8) and reddish yellow (5YR 6/8) patches. Components include abundant oncoids and bivalve fragments (with some radiolitid fragments); many gastropod fragments; and few echinoids. Grains are extensively micritized and coated by micrite. Porosity is 1%–5% and is mostly moldic and intraparticle.

General Description:
Drilling pebbles: 0–3 cm; 64–68 cm; 90–94 cm; 119–126 cm.
Rollers: 68–90 cm; 126–144 cm.
Cylinders: 3–64 cm; 94–119 cm.



879A-14R CORED 121.5–131.1 mbsf

Meter	Graphic Lith.	Section	Age	Calc. nanno.	Plank. foram.	Larger foram.	Structure	Disturb.	Sample	Color
.1		1	late Aptian	B	B	late Aptian R/P				10YR 8/2
.2										10YR 6/3
.3										10YR 7/3

879A-15R CORED 131.1–140.8 mbsf

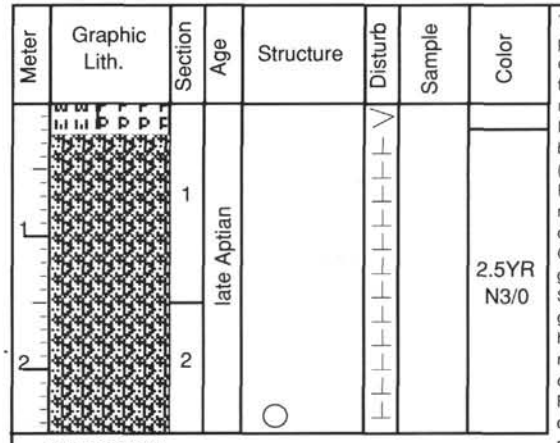
Meter	Graphic Lith.	Section	Age	Calc. nanno.	Plank. foram.	Larger foram.	Structure	Disturb.	Sample	Color
.1		1	late Aptian	B	B	late Aptian R/P				10YR 8/2
.2										
.3										10YR 7/3
.4										

879A- 16R CORED 140.8 –150.4 mbsf

Meter	Graphic Lith.	Section	Age	Calc. nanno.	Plank. foram.	Larger foram.	Structure	Disturb.	Sample	Color
1		1	late Aptian	B	? R/M	late Aptian R/P				

SITE 879 HOLE A CORE 17R

CORED 150.4 - 160.1 mbsf



DESCRIPTION

PELOID SKELETAL PACKSTONE, SKELETAL WACKESTONE, ARGILLACEOUS LIMESTONE, and ORGANIC-RICH CLAY

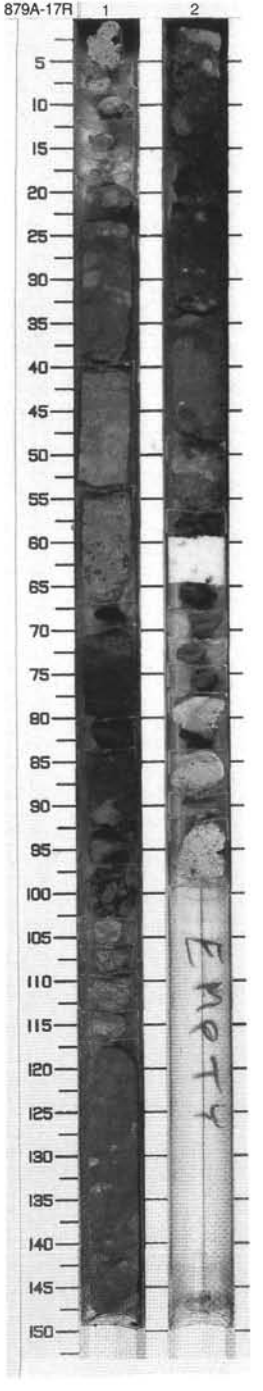
Major Lithologies:

Section 1, 0–8 cm: Interval is comprised of PELOID SKELETAL PACKSTONE. The color is very pale brown (10YR 7/4) with red (2.5YR 5/8) to reddish yellow (5YR 6/8) patches and stains, especially at the edge of moldic cavities. Sorting is good; grains are well rounded. Components include benthic foraminifers (miliolids, Cuneolina, textularids), bivalve fragments (including probable radiolitid rudists), gastropods (abundant; to 1 cm in diameter; some of them are probably Turritella) and peloids. Micritization of grains is extensive. Red (2.5YR 5/8) grains correspond to altered basalt. Porosity is 2%–5%, mostly moldic to vuggy with some intragranular pores. Section 1, 8–18 cm: Interval consists of light gray (5Y 7/1) SKELETAL WACKESTONE with bivalve fragments, gastropods, benthic foraminifers, and coral molds. Red (2.5YR 5/8) grains of altered basalt are many. Cavities in the wackestone are stained reddish yellow (5YR 6/8). A burrow is infilled by very pale brown (10YR 7/4) PELOID SKELETAL PACKSTONE similar to that at Section 1, 0–8 cm, but also including oncoids and fragments of corals. Section 1, 18–40 cm: Very dark gray (2.5YR N3) ARGILLACEOUS LIMESTONE. Section 1, 18–40 cm: Components include bivalves (thin-shelled bivalves are abundant; few fragments of probable compact layer of radiolitid rudist), small gastropods and rounded recrystallized grains (unidentified), coral at 18–20 cm. Cyanobacterial bushes (Ortonella) are rare. Black fragments of woody material are many at Section 1, 25–39 cm. Volcanic elements are abundant and include moderate blue-green (5BG 4/6) grains and clasts to 1 mm in size, red (2.5YR 5/8) grains, and dark flakes (glassy material). Pyrite is abundant and disseminated in the matrix (grains and seams). Skeletal fragments increase in abundance at Section 1, 33–39 cm. Bioturbations are few to many. Porosity is nil. Section 1, 40–67 cm: Dark gray (2.5YR N4) SKELETAL PACKSTONE. Composition is similar to that at Section 1, 18–40 cm, but grains are more abundant. Bivalve fragments are abundant. They consist of dark gray pyritized shell fragments and few probable fragments of radiolitid rudists. Bioturbation is extensive. At Section 1, 54–67 cm, there are many coral fragments (large fragment at Section 1, 63–67 cm) coated by micrite. Fragments of thin-shelled bivalves are dominant. Most of skeletal fragments and their micritic coatings have been pyritized. Millimeter size clasts of moderate blue-green (5BG 4/6) volcanic elements occur at Section 1, 54–67 cm. Porosity is intragranular and vuggy (large vugs related to a network of cavities at Section 1, 60–62 cm). Section 1, 67–93 cm: Interval is comprised of black (2.5YR N2.5/0) ORGANIC-RICH ARGILLACEOUS SANDSTONE. Volcanic grains are abundant and are similar to those reported at Section 1, 18–40 cm, with other brownish yellow (10YR 6/8) grains. Quartz grains are few to many. Several layers of horizontal bioclasts 70–73 cm. Skeletal components are recrystallized, and include bivalve fragments (white fragments of thin-shelled bivalves) and probable coral fragments (rare). Fine crystals and grains (0.3 mm in size) of pyrite are disseminated in the matrix; pyrite also forms seams in the matrix. Woody material is abundant (especially in Section 1, 80–93 cm) and is usually partly pyritized. At Section 1, 71 cm is 15 mm lens of pyrite. At Section 1, 80–93 cm, volcanic grains increase in abundance. At Section 1, 88–90 cm, there are clasts or burrows of argillaceous limestone (more calcareous than the matrix) that contain pyrite and bivalve fragments; they show compaction at the margins and drape of the matrix. Section 1, 93–117 cm: Gray (2.5YR N5) ARGILLACEOUS LIMESTONE with common woody material. Skeletal fragments are recrystallized and unidentified. Benthic foraminifers are very rare (textularids). Volcanic elements are similar to those reported in previous intervals, but are less abundant. Small gastropods are observed at Section 1, 114–117 cm. "Intraclasts' at Section 1, 109–114 cm, are probably flattened burrows, some containing fecal pellets, and thin-shelled bivalve molds, articulated, but broken by compaction. They locally impart a nodular aspect to the rock. Flakes of organic-rich clay are observed. Pyrite is abundant throughout and consists of scattered seams and grains in the matrix (especially at Section 1, 109–114 cm); skeletal fragments and their micritic coating are frequently pyritized. Section 1, 117–150 cm: Interval consists of burrowed ARGILLACEOUS LIMESTONE. The color is dark gray (5Y 4/1) with olive (5Y 5/3) patches. Volcanic grains are abundant and are similar to those reported in previous intervals; volcanic glassy material also occurs. Skeletal fragments consist mostly of thin-shelled bivalves (common). Woody material is common, especially at Section 1, 138–150 cm, and it is partly pyritized. Few flakes of organic-rich clay are observed. Burrow mottles ~7 mm in diameter are common. Section 2, 0–24 cm: VOLCANIC CONGLOMERATE in a matrix of volcaniclastic and carbonate sand and carbonate mud. Clasts are various shades of gray. Matrix is gray (10YR 5/1) with mottles of light gray (10YR 6/1). Clasts are as large as 2 cm, subrounded to well rounded. Texture (crystal size) and composition are varied. Some of the clasts may be sedimentary, rare, or deeply weathered volcanics. Matrix is a mixture of unidentified carbonate and volcanic particles, including pyroxene crystals. Unbroken or slightly crushed bivalve shells and gastropod molds are many. Burrow mottles about 1 cm wide occur in zones with lower clast concentration. A carbonate-rich domain with subangular outline may be a clast, essentially recycled matrix, or it may be a deformed burrow. Section 2, 24–88 cm: Dark gray (10YR 4/1) pebbly CALCAREOUS SANDSTONE. Varying percentages of volcanic pebbles (never > 5%) and carbonate. Grain size varies from very coarse sand to silt. At Section 2, 24–37 cm, lenticular, medium-grained, SANDSTONE to SILSTONE. Highly altered basalt pebbles comprise ~ 3% of sediment and are as large as 10 mm. Calcareous sandstone comprises the matrix, especially in the coarser and lighter colored lenses. Many burrow mottles are observed, they are flattened by about 50%. Bivalve fragments are many. Many of the bivalves are compacted and, in some cases, they are broken. Worm tubes, 0.5–1 mm in diameter, with walls to 0.25 mm thick, encrust the bivalves and occur as fragments in the matrix. A single coral polyp, 0.5 mm in diameter, occurs at Section 2, 27 cm. Several steinkerns of low-spired, smooth-shelled gastropods occur 33–35 cm; some are as large as 30 mm. At Section 2, 36–38 cm, a wavy contact with the underlying finer sandstone, with 2 cm relief, is marked by drape and a coarse sand lens above. At Section 2, 37–48 cm is a dense, calcareous, very fine-grained SANDSTONE. This sandstone has fewer pebbles, skeletal fragments, and burrows than above. At Section 2, 48–76, is a coarse-sand-sized CALCAREOUS SANDSTONE, very dark gray (10YR 3/1). This sandstone has burrow mottles, volcanic clasts (~4%), pyrite and carbonized plant fragments, cylindrical shrimp (?) pellets (0.5 X 3 mm with longitudinal perforations), bivalves (rare), and gastropods (none below 56 cm). Two subangular, 40 mm in diameter, basalt clasts occur at Section 2, 67–74 cm. Basalt is coarse grained with mats of feldspar laths surrounding pyroxenes; ~1% phenocrysts of pyroxene and a clear colorless mineral (possibly a vesicle filling). Pyrite is abundant, disseminated and in lenses to 1 mm in diameter. Lower piece has strong planar fabric from wavy, discontinuous fractures; a second weakly developed fracture set is at ~ 300 to main set. Very fine sandstone, with rock fragments <2 mm occurs at Section 2, 74–76 cm. Wisps of carbonized wood are common. Section 2, 76–88 cm: Two coral heads, 60 mm in diameter. These were probably clasts in the sandstone; silt has filled peripheral polyps of the corals. Coarser sand grains fill an etched fracture (sx ir lms FR). Coral margins are deeply etched and blackened, probably by pyrite. Pyrite nodules to 2 mm occur in sandstone. Coarse bladed calcite (PB5C) cement fills leached parts of coral. Section 2, 88–99 cm: INTRACLAST/COATED-GRAIN RUDSTONE. White (10YR 7/2) to gray (10YR 5/1). Matrix is silty packstone, fine sand sized, very poorly sorted, rounded. Particles are mollusks, coated grains, possible echinoderms, and peloids. Coatings are up to 1 mm thick, micritic and unlaminated. Nuclei are bivalve fragments, calcisponge, coral, and intraclasts. Intraclasts are identical to matrix. Intraclasts and large coated grains are rimmed by pyrite in adjacent matrix. Porosity is moldic, 2% at top, 30% at base. Cement is bladed, coarsely crystalline calcite (PB45C), crusts line molds.

General Description:

Drilling pebbles: Section 1, 5–18 cm; 67–69 cm; 97–109 cm; Section 2, 56–77 cm. Rollers: Section 1, 0–5 cm, 80–83 cm, 109–117 cm, Section 2, 77–89 cm.

Cylinders: Section 1, 18–67 cm; 69–80 cm; 83–97 cm; 117–150 cm; Section 2, 0–56 cm.



SITE 879 HOLE A CORE 18R CORED 160.1 - 169.7 mbsf

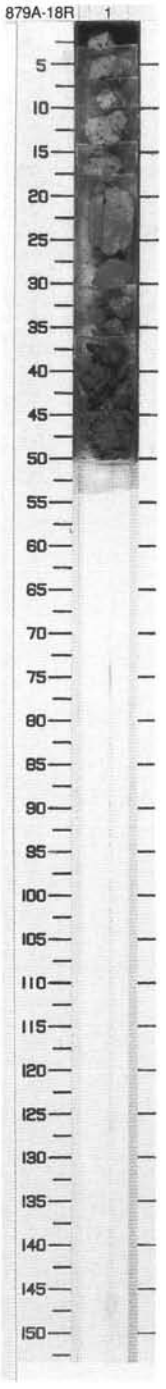
Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color
.1	RRRRRR RRRRRR RRRRRR RRRRRR RRRRRR RRRRRR	1	late Aptian	6			10YR 7/4
.2							10YR 6/1
.3							
.4							
.5							

DESCRIPTION

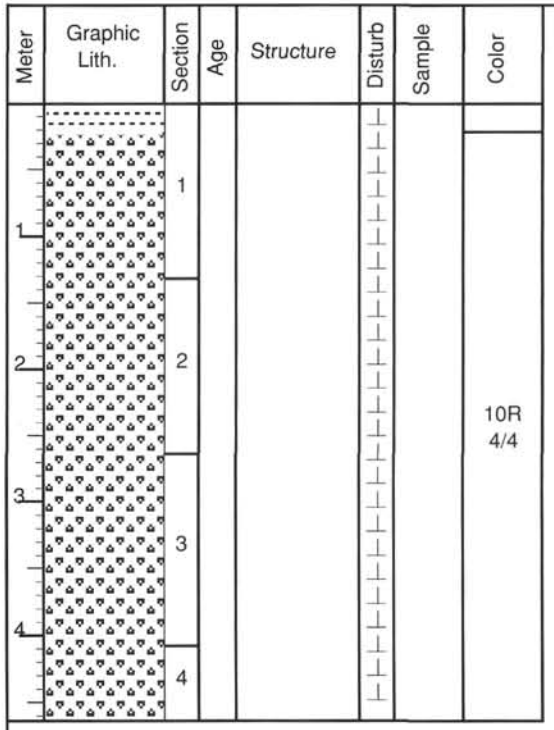
GASTROPOD RUDSTONE and SANDSTONE

Major Lithologies:
Section 1, 0–18 cm: Very pale brown (10YR 7/4), extensively bioturbated GASTROPOD RUDSTONE. Gastropod molds, including nerineids, some up to 0.5 cm in diameter are common, especially at Section 1, 6–18 cm. Most large gastropods are coated by micrite and encrusted by worms? and foraminifers. Holes, probably solution-enlarged burrows (sx BU), also occur in the rudstone. Burrows also form mottles in ths matrix. Dark-gray lime mud lines the walls of these holes and comprises the adjacent carbonate. Some of the burrows are coated by a thin, greenish, soft layer of sediment. Leaching of gastropod shells results in fabric-selective, solution-enlarged intraparticle (sx WP) or moldic porosity, that averages 15%. Matrix is skeletal peloid packstone. Very few grains are discernable in the matrix. Section 1, 18–50 cm: Gray (10YR 6/1), medium-grained, clay-rich, friable, and highly bioturbated SANDSTONE. The sandstone is comprised by a mixture of abundant volcanic grains, carbonate grains, coal-rich grains, and unidentifiable black minerals. Matrix is silt-size mixture of clay, volcanic and carbonate grains. Clay abundance increases in the drilling breccia at Section 1, 37–50 cm.

General Description:
Drilling pebbles: 0–6 cm; 6–10 cm; 30–50 cm.
Rollers: 10–30 cm.



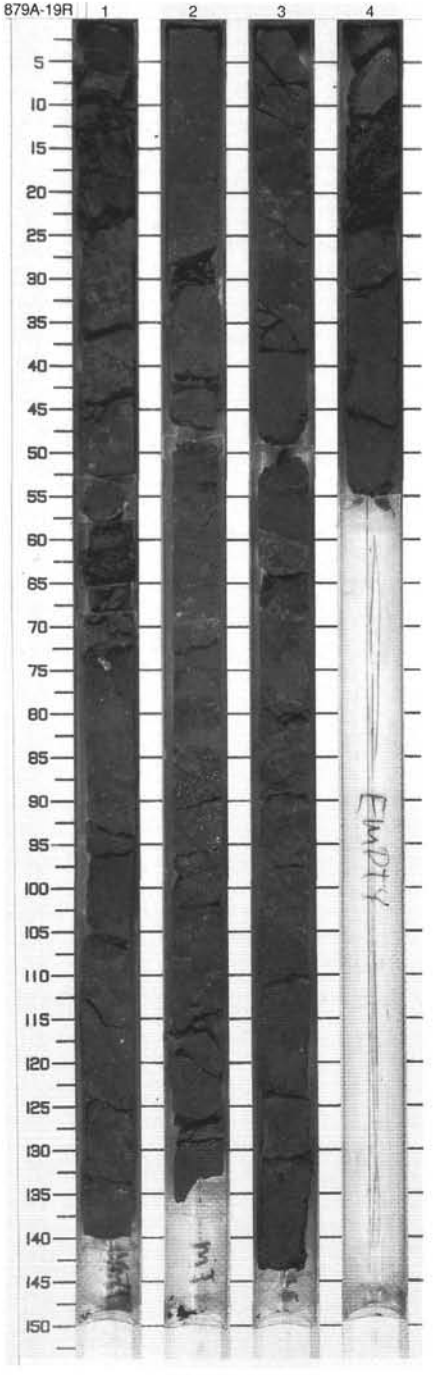
SITE 879 HOLE A CORE 19R CORED 169.7 - 179.4 mbsf

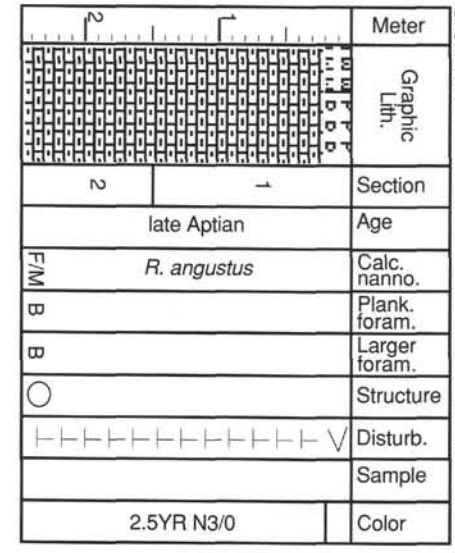


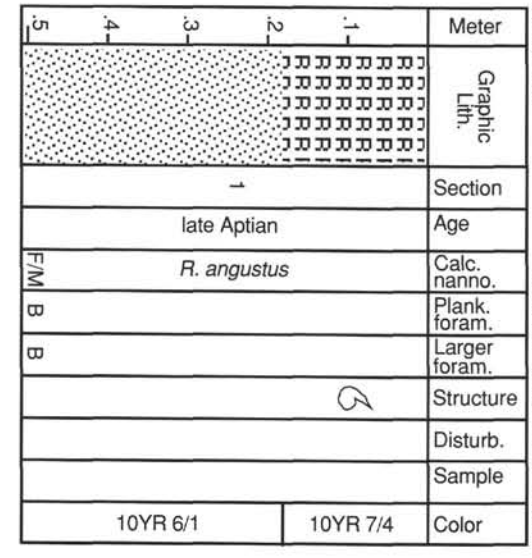
DESCRIPTION

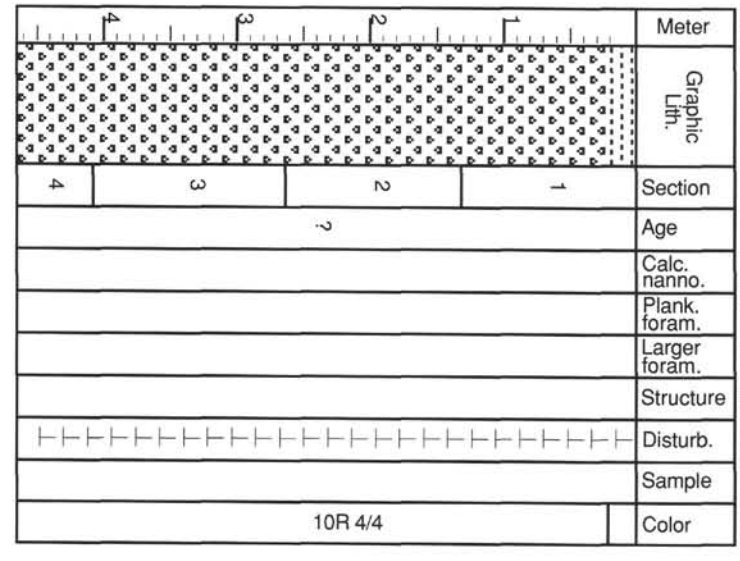
CLAY and VOLCANIC BRECCIA

Major Lithologies:
Section 1, 0–18 cm consists of dusky red (10R 2.5/2) CLAY with pyrite seams at the top. Volcanic clasts are occur in Section 1, 6–18 cm. Section 1, 18–53 cm is comprised of VOLCANIC BRECCIA. Matrix is weak red (10R 4/4). Volcanic clasts are typically 1 cm in size, up to 2–3 cm. All clasts are petrographically similar basalt (slightly plagioclase, phyric, with variable amounts of olivine) but differ in texture and in degree of alteration. Two end members are observed: 1) Pale yellow (2.5Y 7/4) clasts, presumably more glassy. They are highly vesicular (30%–40%) with spherical vesicles of 0.03–0.08 mm size and large irregular vesicles, about 1 mm in size. Most of these vesicles are filled by zeolites. This basalt contains 1% of plagioclase phenocrysts (max. 1 mm, euhedral), 2% of olivine microphenocrysts (<0.03 mm, euhedral, altered to red-brown iddingsite); one clast has large (1.25 mm) euhedral olivine phenocryst. Groundmass contains abundant plagioclase laths (0.03–0.1 mm) with poorly developed flow alignments. 2) very dusky red (10R 2.5/2) to dark gray (5YR 4/1) clasts with less than 10% vesicles in most. Vesicles are spherical to irregular-shaped, large (about 1 mm) and zeolite filled; filling zeolite is stained red in many cases. These clasts contain 1%–2% plagioclase phenocrysts (euhedral, up to 0.75 mm), 1% olivine (euhedral, up to 0.25 mm, altered to red or brown iddingsite). Groundmass with abundant plagioclase laths (up to 0.25 mm). Margins of clasts are altered to bright red; smaller clasts are mostly of this type. Section 1, 53–95 cm consists of very dark gray (2.5YR N3) CLAY with volcanic clasts (Section 1, 72–96 cm is a large clast of basalt). This clasts are plagioclase phyric basalt with 3% of plagioclase phenocrysts (euhedral, up to 1.5 mm size). Groundmass includes abundant red to brown grains, probably iddingsitized olivine. 5% large (up to 2 mm) irregular vesicles are zeolite filled; zeolites are red stained in parts. Section 1, 95–134 cm is comprised of VOLCANIC BRECCIA with large clasts of basalt, up to 10 cm in size. The matrix is reddish brown (2.5YR 5/3). Clasts are similar to those in Section 1, 18–25 cm. Pale yellow (2.5Y 7/4) clasts are few; the dominant type consists of very dusky red (10R 2.5/2) clasts. In Section 1, 113–124 cm, a large clast is slightly more phyric, with about 5% of euhedral plagioclase laths (0.25 mm in size) and about 5% of iddingsitized olivine microphenocrysts (up to 0.05 mm). Section 1, 134–142 cm is probably a clast of basalt. The color is dark reddish gray (10R 3/1) to olive gray (5Y 4/2) at the base. Zeolites fill vesicles.

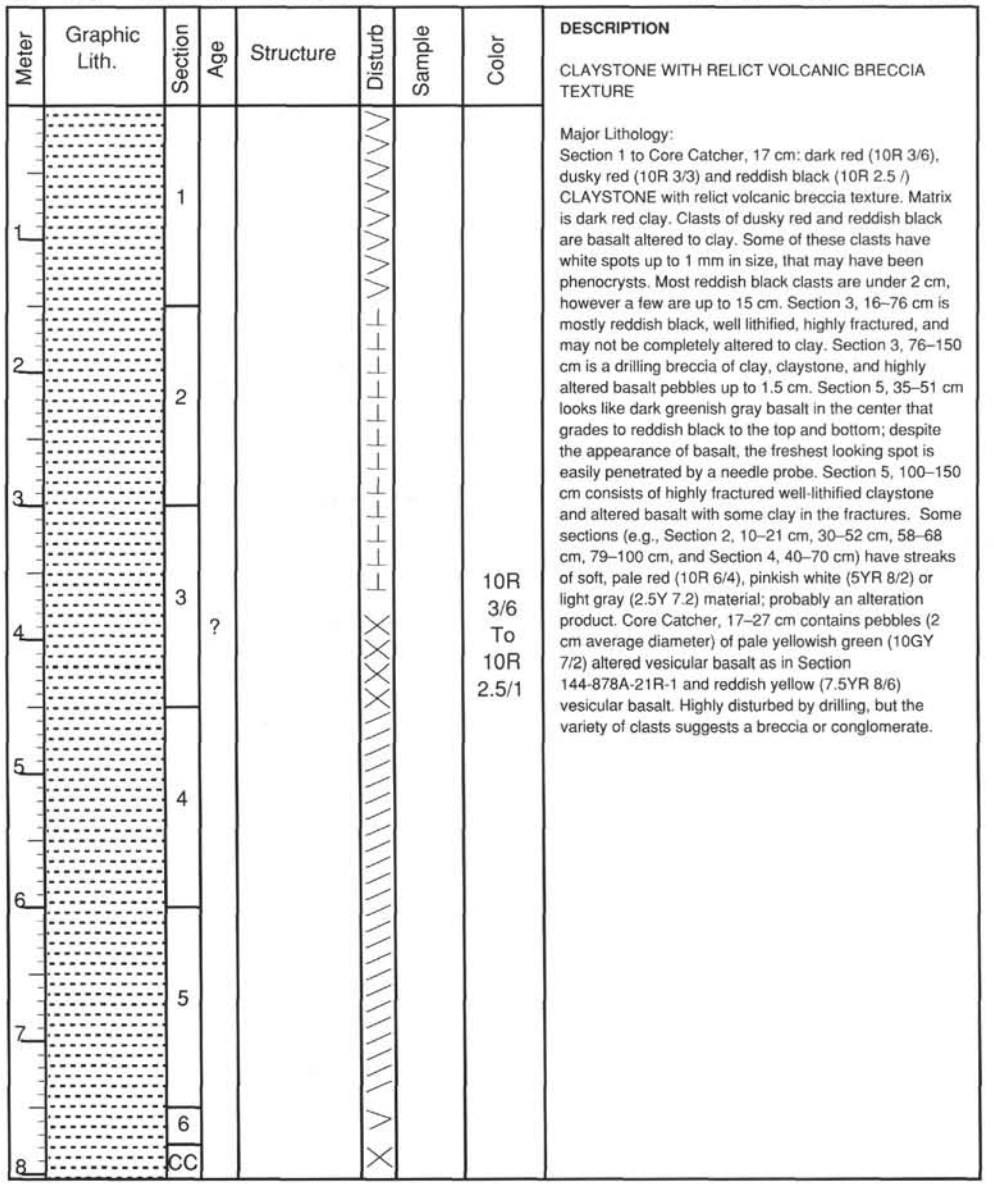



879A-17R
CORED 150.4–160.1 mbsf
Meter
Graphic Lith.
Section
Age
Calc. nanno.
Plank. foram.
Larger foram.
Structure
Disturb.
Sample
Color
2
1
late Aptian
R. angustus
F/M
B
B
2.5YR N3/0


879A-18R
CORED 160.1–169.7 mbsf
Meter
Graphic Lith.
Section
Age
Calc. nanno.
Plank. foram.
Larger foram.
Structure
Disturb.
Sample
Color
.5
.4
.3
.2
.1
1
late Aptian
R. angustus
F/M
B
B
10YR 6/1
10YR 7/4


879A-19R
CORED 169.7–179.4 mbsf
Meter
Graphic Lith.
Section
Age
Calc. nanno.
Plank. foram.
Larger foram.
Structure
Disturb.
Sample
Color
4
3
2
1
?
10R 4/4

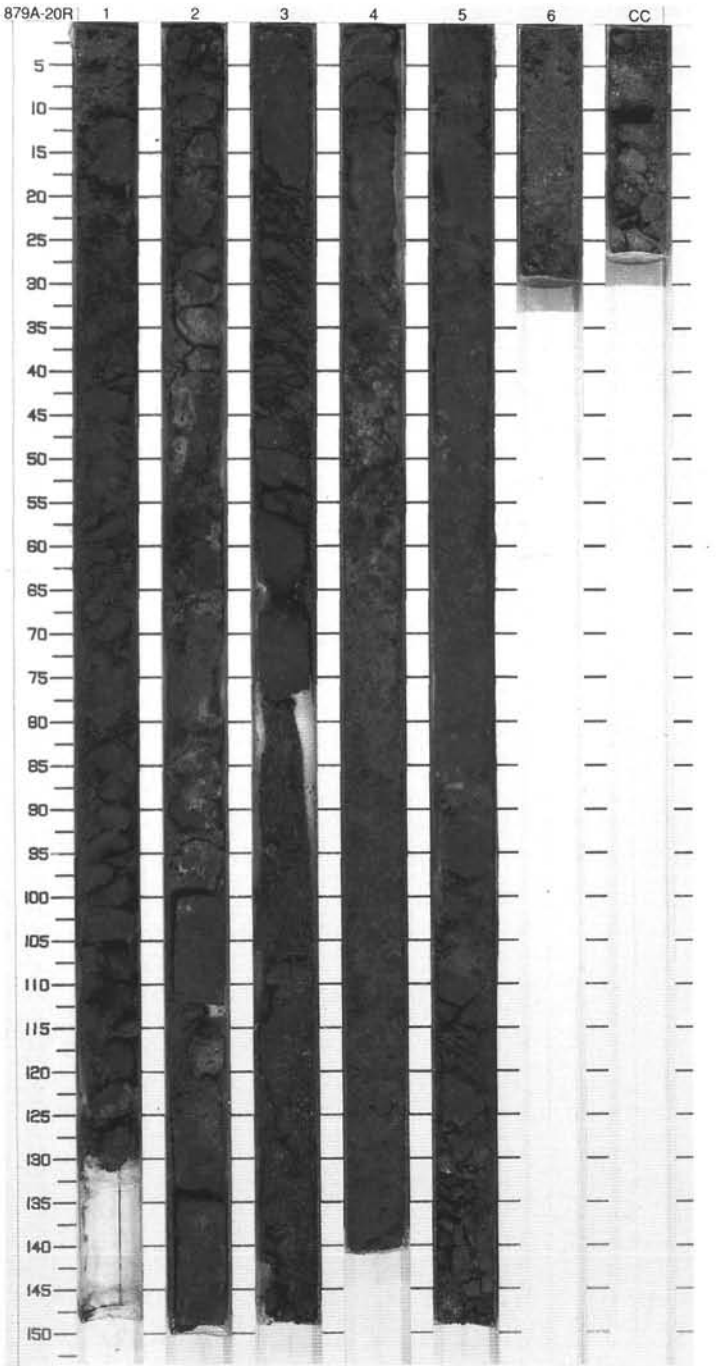
SITE 879 HOLE A CORE 20R CORED 179.4 - 188.7 mbsf



DESCRIPTION

CLAYSTONE WITH RELICT VOLCANIC BRECCIA TEXTURE

Major Lithology:
Section 1 to Core Catcher, 17 cm: dark red (10R 3/6), dusky red (10R 3/3) and reddish black (10R 2.5 /) CLAYSTONE with relict volcanic breccia texture. Matrix is dark red clay. Clasts of dusky red and reddish black are basalt altered to clay. Some of these clasts have white spots up to 1 mm in size, that may have been phenocrysts. Most reddish black clasts are under 2 cm, however a few are up to 15 cm. Section 3, 16–76 cm is mostly reddish black, well lithified, highly fractured, and may not be completely altered to clay. Section 3, 76–150 cm is a drilling breccia of clay, claystone, and highly altered basalt pebbles up to 1.5 cm. Section 5, 35–51 cm looks like dark greenish gray basalt in the center that grades to reddish black to the top and bottom; despite the appearance of basalt, the freshest looking spot is easily penetrated by a needle probe. Section 5, 100–150 cm consists of highly fractured well-lithified claystone and altered basalt with some clay in the fractures. Some sections (e.g., Section 2, 10–21 cm, 30–52 cm, 58–68 cm, 79–100 cm, and Section 4, 40–70 cm) have streaks of soft, pale red (10R 6/4), pinkish white (5YR 8/2) or light gray (2.5Y 7.2) material; probably an alteration product. Core Catcher, 17–27 cm contains pebbles (2 cm average diameter) of pale yellowish green (10GY 7/2) altered vesicular basalt as in Section 144-878A-21R-1 and reddish yellow (7.5YR 8/6) vesicular basalt. Highly disturbed by drilling, but the variety of clasts suggests a breccia or conglomerate.



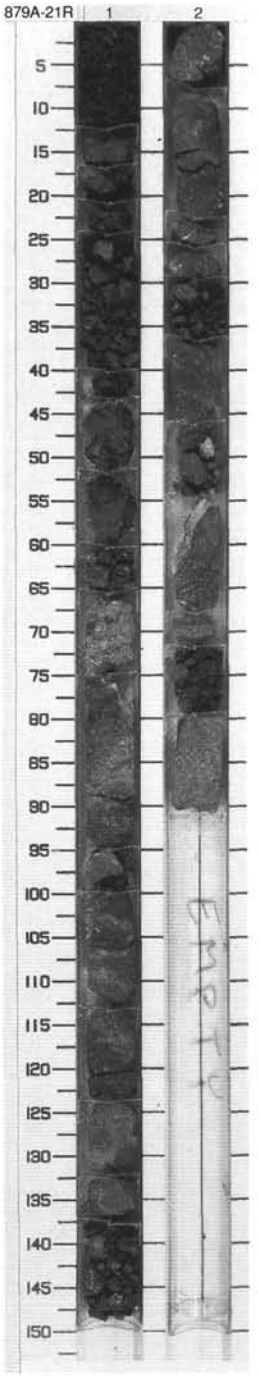
SITE 879 HOLE A CORE 21R CORED 188.7 - 198.1 mbsf

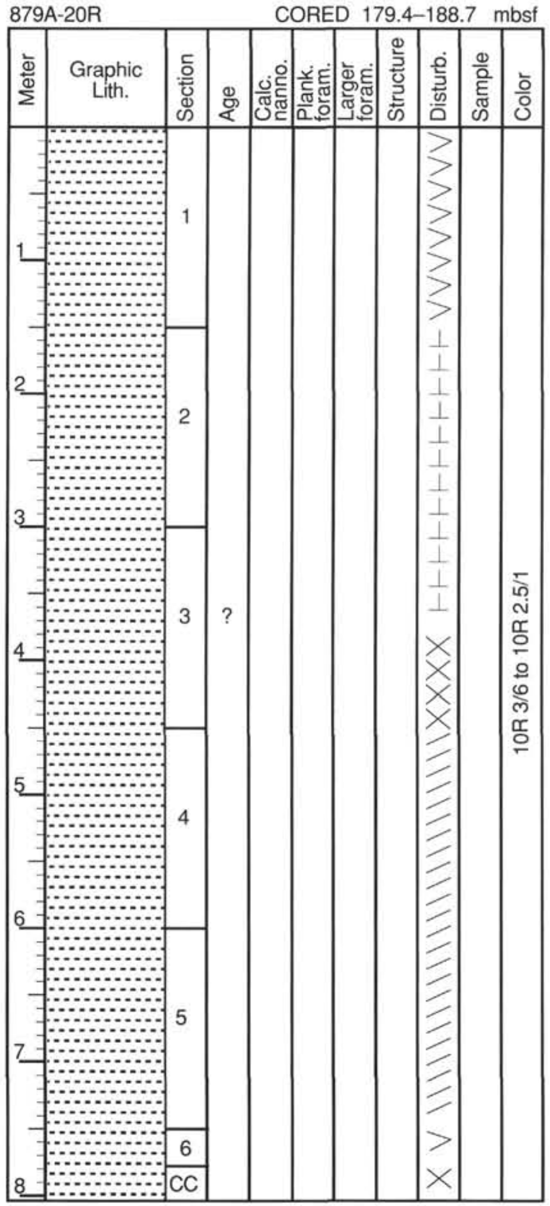
Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color
1		1					10YR 3/3
2		2					10YR 6/6

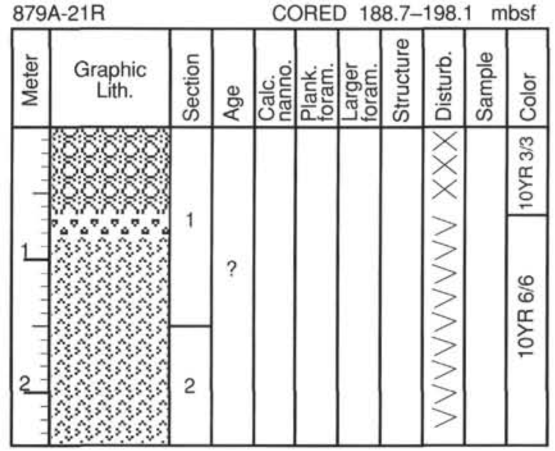
DESCRIPTION

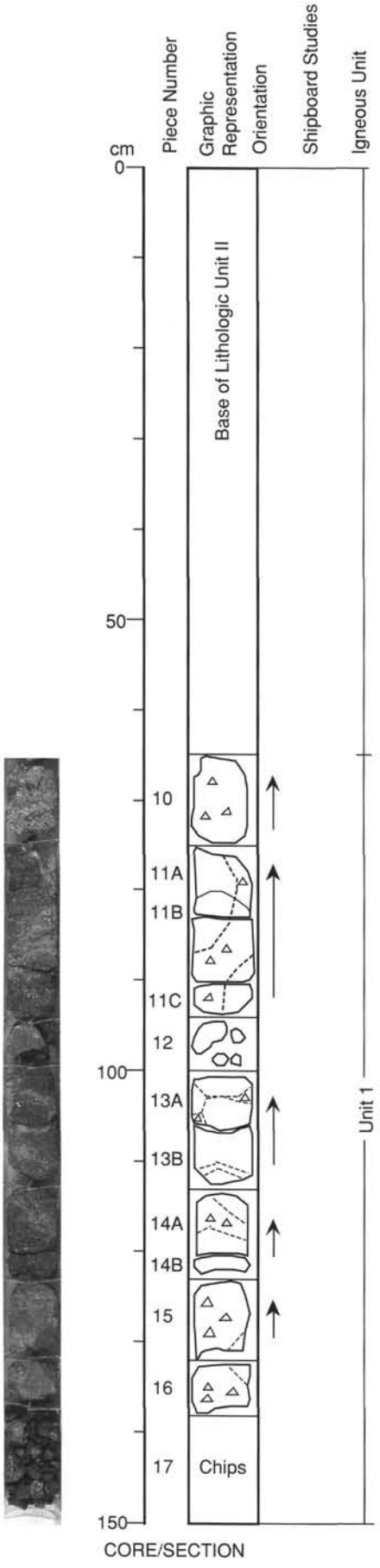
CONGLOMERATE, VOLCANIC BRECCIA and BASALT

Major Lithologies:
Section 1, 0–66 cm. Conglomerate, matrix supported, dark brown (10YR 3/3). Conglomerate is disaggregated by drilling into isolated pebbles and sandy matrix. Pebbles are in average 0.5 mm to 1 cm size at the top of conglomerate; at 25 cm, size of pebbles gradually increases to 1–1.5 cm with largest pebble 4 cm across. Pebbles are subangular, some subrounded, rarely angular. Pebbles are composed by aphyric basalt, highly vesicular. These are weathered orange and yellow brown (10YR 6/6). Some of the clasts show multiple color zonation as caused by weathering. Matrix is coarse volcanic sand cemented in places with interparticle voids filled by calcite. Even though the conglomerate texture is clearly visible, all conglomerate is altered into waxy claystone matter. Contact at 66 cm between the basal conglomerate and underlying pale yellowish green volcanic breccia is sharp. Thin laminae of completely altered (?) glass fragments underlies the contact and is in turn underlain by a bed of volcanic breccia (66–76 cm). Clasts are 2 mm in size . Most of the clasts are sharp edged vesicular "glass"; rare 1 cm clast of dark gray basalt in greenish, waxy clay matrix. This is underlain by probably pillow basalt.




879A-20R
CORED 179.4–188.7 mbsf
Meter
Graphic Lith.
Section
Age
Calc. nanno.
Plank. foram.
Larger foram.
Structure
Disturb.
Sample
Color
1
2
3
4
5
6
7
8
1
2
3
4
5
6
CC
?
10R 3/6 to 10R 2.5/1


879A-21R
CORED 188.7–198.1 mbsf
Meter
Graphic Lith.
Section
Age
Calc. nanno.
Plank. foram.
Larger foram.
Structure
Disturb.
Sample
Color
1
2
1
2
?
10YR 3/3
10YR 6/6



144-879A-21R-1

UNIT 1A: VOLCANIC BRECCIA

Pieces 10–17

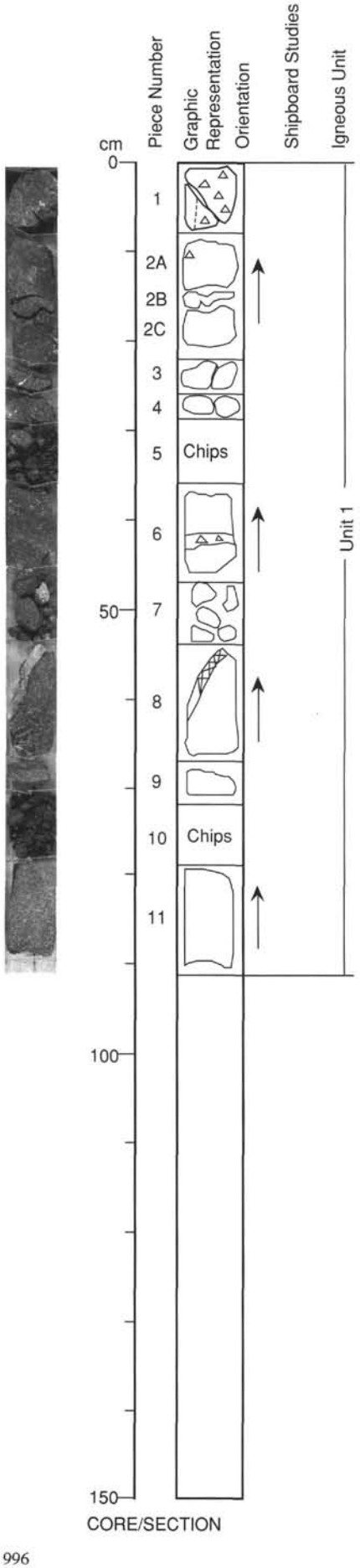
CONTACTS: Interspersed with Subunit 1B.
PHENOCRYSTS: None.
GROUNDMASS: Clasts: Type 1, 50%–60%, angular, highly vesicular, glassy basalt, 3–10 mm; Type 2, 40%, mixed basalt clasts, generally microcrystalline, some plagioclase microphyric, some sparsely vesicular, 3–10 mm. Matrix: 90%, <1 mm shards of Type 1 clast material replaced by pale yellowish green (10GY 7/2) zeolite or clay; 10%, <1 mm fragments of Type 2 clasts.
VESICLES: Type 1 clasts have 50%, 0.1–0.3 mm, round vesicles. Some Type 2 clasts are sparsely vesicular.
COLOR: Type 1 clasts are pinkish white (5YR 8/2) to light reddish brown (5YR 6/4). Type 2 clasts are reddish yellow (5YR 6/8) to light reddish brown (5YR 6/3) to medium gray (N5).
STRUCTURE: Volcanogenic breccia into which the basalt of Subunit 1B intruded.
ALTERATION: Clasts have been bleached and are soft, suggesting extensive alteration to clay and zeolite minerals.
VEINS/FRACTURES: None.
ADDITIONAL COMMENTS: 65–150 cm, basalt pieces of Subunit 1B are separated by 2–3 cm intervals of breccia.

UNIT 1B: PLAGIOCLASE BASALT

Pieces 10–17

CONTACTS: Interspersed with Subunit 1A.
PHENOCRYSTS:
Plagioclase - 20%; 0.5–8 mm; Generally subhedral prisms, but occasionally anhedral or euhedral. Larger grains commonly have dark inclusions. Fresh and translucent in places, but generally stained in various shades of reds and greens.
Olivine - 1%; 1 mm; Altered to dark reddish brown (2.5YR 3/4) iddingsite.
GROUNDMASS: Microcrystalline.
VESICLES: None.
COLOR: Medium gray (N5) where fresh, but mostly dark reddish gray (10R 3/1), stained reddish brown (2.5 YR 4/4) near fractures and yellowish red (5YR 5/8) along margins, especially in smaller pieces.
STRUCTURE: Occurs as irregular pillow-like bodies, 1 cm to 1 m in size, with chilled margins defined by subtle changes in matrix color and phenocryst size and abundance. Narrow yellowish red (5YR 5/8) bands along many margins appear to be altered glass selvages.
ALTERATION: Olivine is iddingsitized, plagioclase is partially replaced by clay or zeolite, and the groundmass has been oxidized and weathered and, presumably, has been partially replaced by clay.
VEINS/FRACTURES: None.
ADDITIONAL COMMENTS: 65–150 cm, basalt pieces with 5–10 cm diameters are separated by 2–3 cm intervals of breccia (Subunit 1A).

△ Breccia
------ Pillow/breccia boundary



144-879A-21R-2

UNIT 1A: VOLCANIC BRECCIA (continued)

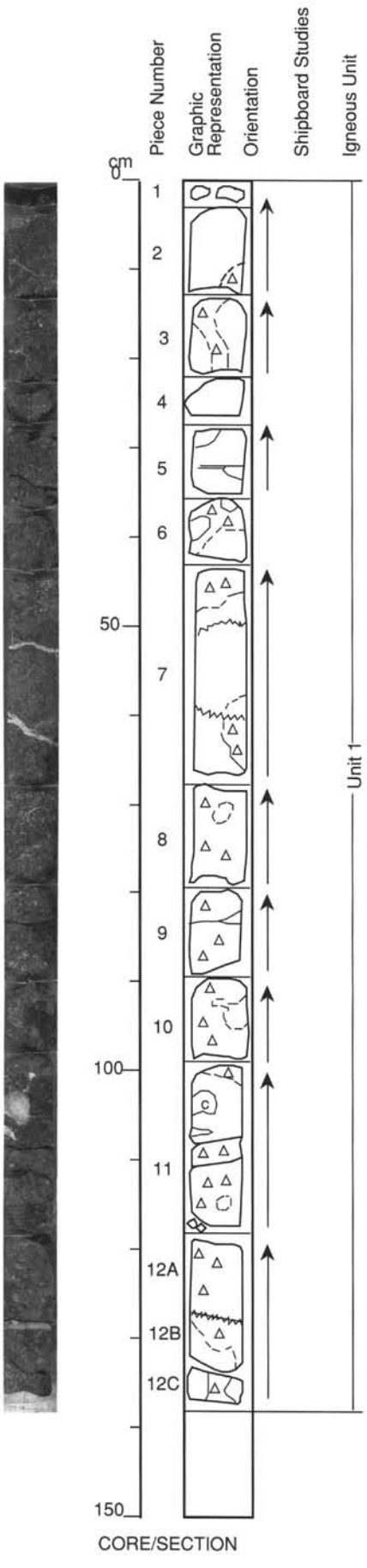
Pieces 1–11

CONTACTS: Interspersed with Subunit 1B.
PHENOCRYSTS: None.
GROUNDMASS: Clasts: Type 1, 50%–60%, angular, highly vesicular, glassy basalt, 3–10 mm; Type 2, 40%, mixed basalt clasts, generally microcrystalline, some plagioclase microphyric, some sparsely vesicular, 3–10 mm. Matrix: 90%, <1 mm shards of Type 1 clast material replaced by pale yellowish green (10GY 7/2) zeolite or clay; 10%, <1 mm fragments of Type 2 clasts.
VESICLES: Type 1 clasts have 50%, 0.1–0.3 mm, round vesicles. Some Type 2 clasts are sparsely vesicular.
COLOR: Type 1 clasts are pinkish white (5YR 8/2) to light reddish brown (5YR 6/4). Type 2 clasts are reddish yellow (5YR 6/8) to light reddish brown (5YR 6/3) to medium gray (N5).
STRUCTURE: Volcanogenic breccia into which the basalt of Subunit 1B intruded.
ALTERATION: Clasts have been bleached and are soft, suggesting extensive alteration to clay and zeolite minerals.
VEINS/FRACTURES: None.
ADDITIONAL COMMENTS: 0–54 cm, 1–3 cm-wide areas of breccia between 5–10 cm basalt pieces. 54–91 cm, breccia is not present.

UNIT 1B: PLAGIOCLASE BASALT (continued).

Pieces 1–11

CONTACTS: Interspersed with Subunit 1A.
PHENOCRYSTS:
Plagioclase - 20%; 0.5–8 mm; Generally subhedral prisms, but occasionally anhedral or euhedral. Larger grains commonly have dark inclusions. Fresh and translucent in places, but generally stained in various shades of reds and greens.
Olivine - 1%; 1 mm; Altered to dark reddish brown (2.5YR 3/4) iddingsite.
GROUNDMASS: Microcrystalline.
VESICLES: None.
COLOR: Medium gray (N5) where fresh, but mostly dark reddish gray (10R 3/1), stained reddish brown (2.5 YR 4/4) near fractures and yellowish red (5YR 5/8) along margins, especially in smaller pieces.
STRUCTURE: Occurs as irregular pillow-like bodies, 1 cm to 1 m in size, with chilled margins defined by subtle changes in matrix color and phenocryst size and abundance. Narrow yellowish red (5YR 5/8) bands along many margins appear to be altered glass selvages.
ALTERATION: Olivine is iddingsitized, plagioclase is partially replaced by clay or zeolite, and the groundmass has been oxidized and weathered and, presumably, has been partially replaced by clay.
VEINS/FRACTURES: 5%; 1 mm; Numerous, irregular, calcite veins spaced about 1–2 cm apart.
ADDITIONAL COMMENTS: 0–54 cm, basalt pillows are 5–10 cm. 54–91 cm, basalt pieces are up to 10 cm, and directly contact one another with no interpillow breccia.



144-879A-22R-1

UNIT 1A: VOLCANIC BRECCIA (continued)

Pieces 1–12

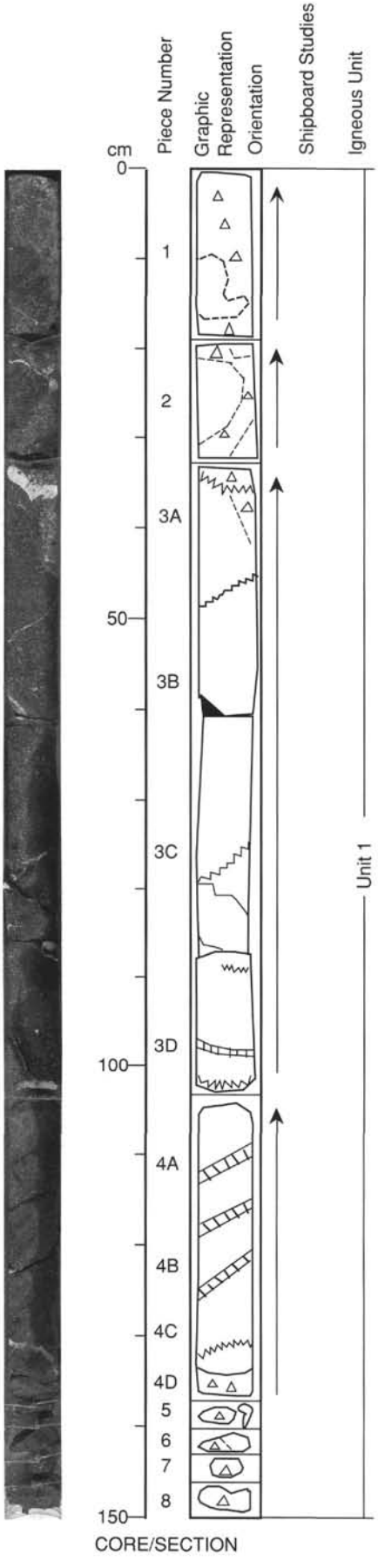
CONTACTS: Interspersed with Subunit 1B.
PHENOCRYSTS: None.
GROUNDMASS: Clasts: Type 1, 50%–60%, angular, highly vesicular, glassy basalt, 3–10 mm; Type 2, 40%, mixed basalt clasts, generally microcrystalline, some plagioclase microphyric, some sparsely vesicular, 3–10 mm. Matrix: 90%, <1 mm shards of Type 1 clast material replaced by pale yellowish green (10GY 7/2) zeolite or clay; 10%, <1 mm fragments of Type 2 clasts.
VESICLES: Type 1 clasts have 50%, 0.1–0.3 mm, round vesicles. Some Type 2 clasts are sparsely vesicular.
COLOR: Type 1 clasts are pinkish white (5YR 8/2) to light reddish brown (5YR 6/4). Type 2 clasts are reddish yellow (5YR 6/8) to light reddish brown (5YR 6/3) to medium gray (N5).
STRUCTURE: Volcanogenic breccia into which the basalt of Subunit 1B intruded.
ALTERATION: Clasts have been bleached and are soft, suggesting extensive alteration to clay and zeolite minerals.
VEINS/FRACTURES: None.
ADDITIONAL COMMENTS: 0–50 cm, irregular areas of breccia, 1–2 cm wide, around basalt pieces up to 5 cm in diameter. 50–66 cm, no breccia, just a single large basalt pillow. 66–137 cm, mostly breccia, with small (0.5–5 cm) pieces of basalt.

UNIT 1B: PLAGIOCLASE BASALT (continued).

Pieces 1–12C

CONTACTS: Interspersed with Subunit 1A.
PHENOCRYSTS:
Plagioclase - 20%; 0.5–8 mm; Generally subhedral prisms, but occasionally anhedral or euhedral. Larger grains commonly have dark inclusions. Fresh and translucent in places, but generally stained in various shades of reds and greens.
Olivine - 1%; 1 mm; Altered to dark reddish brown (2.5YR 3/4) iddingsite.
GROUNDMASS: Microcrystalline.
VESICLES: None.
COLOR: Medium gray (N5) where fresh, but mostly dark reddish gray (10R 3/1), stained reddish brown (2.5 YR 4/4) near fractures and yellowish red (5YR 5/8) along margins, especially in smaller pieces.
STRUCTURE: Occurs as irregular pillow-like bodies, 1 cm to 1 m in size, with chilled margins defined by subtle changes in matrix color and phenocryst size and abundance. Narrow yellowish red (5YR 5/8) bands along many margins appear to be altered glass selvages.
ALTERATION: Olivine is iddingsitized, plagioclase is partially replaced by clay or zeolite, and the groundmass has been oxidized and weathered and, presumably, has been partially replaced by clay.
VEINS/FRACTURES: None.
ADDITIONAL COMMENTS: 0–50 cm, basalt pieces to 5 cm in diameter. 50–66 cm, a single basalt pillow with chilled margins. 66–137 cm, small (0.5–5 cm) pieces of basalt.

Ⓒ Calcite blotches
Calcite veins



144-879A-22R-2

UNIT 1A: VOLCANIC BRECCIA (continued)

Pieces 1–8

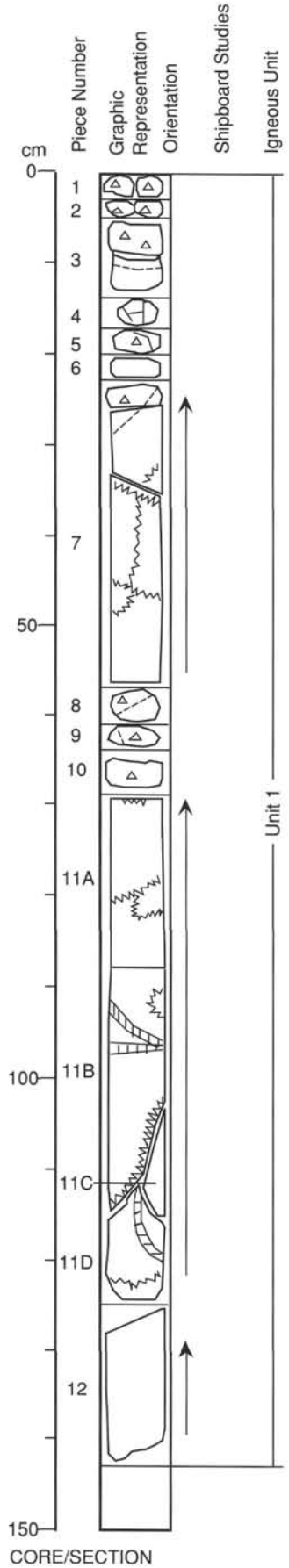
CONTACTS: Interspersed with Subunit 1B.
PHENOCRYSTS: None.
GROUNDMASS: Clasts: Type 1, 50%–60%, angular, highly vesicular, glassy basalt, 3–10 mm; Type 2, 40%, mixed basalt clasts, generally microcrystalline, some plagiocalse microphyric, some sparsely vesicular, 3–10 mm. Matrix: 90%, <1 mm shards of Type 1 clast material replaced by pale yellowish green (10G 7/2) zeolite or clay; 10%, <1 mm fragments of Type 2 clasts.
VESICLES: Type 1 clasts have 50%, 0.1–0.3 mm, round vesicles. Some Type 2 clasts are sparsely vesicular.
COLOR: Type 1 clasts are pinkish white (5YR 8/2) to light reddish brown (5YR 6/4). Type 2 clasts are reddish yellow (5YR 6/8) to light reddish brown (5YR 6/3) to medium gray (N50).
STRUCTURE: Volcanogenic breccia into which the basalt of Subunit 1B intruded.
ALTERATION : Clasts have been bleached and are soft, suggesting extensive alteration to clay and zeolite minerals.
VEINS/FRACTURES: At 34–37 cm, 49–53 cm, 76–78 cm, 87–88 cm, and 131–133 cm there are 2–15 mm calcite veins. At 60–62 cm and 82–87 cm, there are small veins of grayish green (10G 5/2) clay and calcite.
ADDITIONAL COMMENTS: 0–40 cm, breccia in 2–5 cm patches, about 50% by volume of the rock. 40–135 cm, no breccia. 135–150 cm, breccia predominant.

UNIT 1B: PLAGIOCLASE BASALT (continued).

Pieces 1–8

CONTACTS: Interspersed with Subunit 1A.
PHENOCRYSTS:
Plagioclase - 20%; 0.5–8 mm; Generally subhedral prisms, but occasionally anhedral or euhedral. Larger grains commonly have dark inclusions. Fresh and translucent in places, but generally stained in various shades of reds and greens.
Olivine - 1%; 1 mm; Altered to dark reddish brown (2.5YR 3/4) iddingsite.
GROUNDMASS: Microcrystalline.
VESICLES: None.
COLOR: Medium gray (N5) where fresh, but mostly dark reddish gray (10R 3/1), stained reddish brown (2.5 YR 4/4) near fractures and yellowish red (5YR 5/8) along margins, especially in smaller pieces.
STRUCTURE: Occurs as irregular pillow-like bodies, 1 cm to 1 m in size, with chilled margins defined by subtle changes in matrix color and phenocryst size and abundance. Narrow yellowish red (5YR 5/8) bands along many margins appear to be altered glass selvages.
ALTERATION: Olivine is iddingsitized, plagioclase is partially replaced by clay or zeolite, and the groundmass has been oxidized and weathered and, presumably, has been partially replaced by clay.
VEINS/FRACTURES: At 34–37 cm, 49–53 cm, 76–78 cm, 87–88 cm, and 131–133 cm, there are 2–15 mm calcite veins. At 60–62 cm and 82–87 cm there are small veins of grayish green (10G 5/2) clay and calcite.
ADDITIONAL COMMENTS: 0–40 cm, basalt pieces are 1–5 cm and about 50% by volume. 40–135 cm, just basalt and the top margin is chilled. 135–150 cm, breccia is predominant but there is a 3 cm basalt piece at 140–143.

Calcite vein
Clay vein



144-879A-22R-3

UNIT 1A: VOLCANIC BRECCIA (continued)

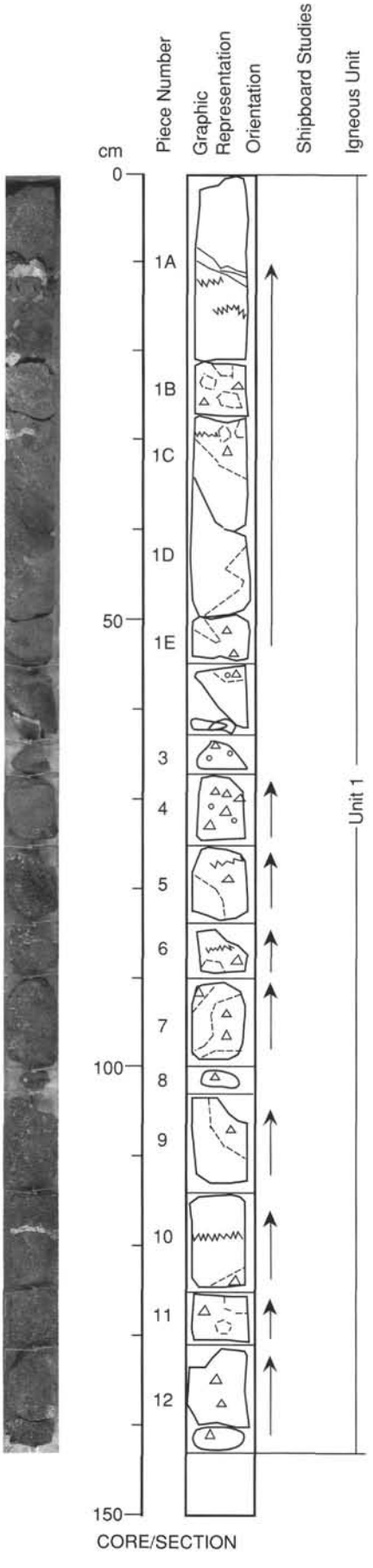
Pieces 1–12

CONTACTS: Interspersed with Subunit 1B.
PHENOCRYSTS: None.
GROUNDMASS: Clasts: Type 1, 50%–60%, angular, highly vesicular, glassy basalt, 3–10 mm; Type 2, 40%, mixed basalt clasts, generally microcrystalline, some plagioclase microphyric, some sparsely vesicular, 3–10 mm. Matrix: 90%, <1 mm shards of Type 1 clast material replaced by pale yellowish green (10GY 7/2) zeolite or clay; 10%, <1 mm fragments of Type 2 clast.
VESICLES: Type 1 clasts have 50%, 0.1–0.3mm, round vesicles. Some Type 2 clasts are sparsely vesicular.
COLOR: Type 1 clasts are pinkish white (5YR 8/2) to light reddish brown (5YR 6/4).
STRUCTURE: Volcanigenic breccia into which the basalt of Subunit 1B intruded.
ALTERATION: Clasts have been bleached and are soft, suggestiong extensive alteration to clay and zeolite mineral.
VEINS/FRACTURES: 1 cm-wide calcite veins at 34–36 cm, 45–49 cm, 78–82 cm and 103–113 cm. 3 mm-wide calcite veins at 35–45 cm, 88–90 cm, and 121–122 cm. Fine (<1 mm), anastomozing veins at 26–67 cm and 80–98 cm.
ADDITIONAL COMMENTS: 0–24 cm, breccia predominates, with 3 cm-wide pieces of basalt at 11–16 cm. 24–143 cm, basalt only except at 56–566 cm where a small amount of breccia is in 1 cm bands.

UNIT 1B: PLAGIOCLASE BASALT (continued)

Pieces 1–12

CONTACTS: Interspersed with Subunit 1A.
PHENOCRYSTS:
Plagioclas-20%; 0.5–8 mm; Generally subhedral prisms, but occasionally anhedral or euhedral. Larger grains commonly have dark inclusions. Fresh and translucent in places, but generally stained in various shades of reds and greens.
Olivine - 1 %; 1 mm; Altered to dark reddish brown (2.5YR 3/4) iddingsite.
GROUNDMASS: Microcrystalline.
VESICLES: None
COLOR: Medium gray (N5) where fresh, but mostly dark reddish gray (10 3/1), stained reddish brown (2.5 YR 4/4) near fracture and yellowish red (5YR 5/8) along margins, especially in smaller pieces.
STRUCTURE: Occurs as irregular pillow-like bodies, 1 cm to 1 m in size, with chilled margins defined by subtle changes in matrix color and phenocryst size and abundance. Narrow yellowish red (5YR 5/8) bands along many margins apppear to be altered glass selvages.
ALTERATION : Olivine is iddingsitized, plagioclase is partially replaced by clay or zeolite, and the groundmass has been oxidozed and weathered and, presumably, has been partially replaced by clay.
VEINS/FRACTURES: 1 cm-wide calcite veins at 34–36 cm, 45–49 cm, 78–82 cm, and 103–113 cm. 3 mm-wid calcite veeins at 35–45 cm, 88–90 cm and 1221–122 cm. Fine (<1 mm), anastomozing veins at 26–67 cm and 80–98 cm.
ADDITONAL COMMENTS: 11–126 cm, with 3 cm-wide pieces of basalt. 24–143 cm, almost entirely basalt.



144-879A-22R-4

UNIT 1A: VOLCANIC BRECCIA (continued)

Pieces 1–12

CONTACTS: Interspersed with Subunit 1B.
PHENOCRYSTS: None.
GROUNDMASS: Clasts: Type 1, 50%–60%, angular, highly vesicular, glassy basalt, 3–10 mm; Type 2, 40%, mixed basalt clasts, generally microcrystalline, some plagioclase microphyric, some sparsely vesicular, 3–10 mm. Matrix: 90%, <1 mm shards of Type 1 clast material replaced by pale yellowish green (10GY 7/2) zeolite or clay; 10%, <1 mm fragments of Type 2 clasts.
VESICLES: Type 1 clasts have 50%, 0.1–0.3 mm, round vesicles. Some Type 2 clasts are sparsely vesicular.
COLOR: Type 1 clasts are pinkish white (5YR 8/2) to light reddish brown (5YR 6/4). Type 2 clasts are reddish yellow (5YR 6/8) to light reddish brown (5YR 6/3) to medium gray (N5).
STRUCTURE: Volcanogenic breccia into which the basalt of Subunit 1B intruded.
ALTERATION: Clasts have been bleached and are soft, suggesting extensive alteration to clay and zeolite minerals.
VEINS/FRACTURES: 1 cm-wide calcite veins at 10–11 cm, 29–30 cm and 118–119 cm. 3 mm-wide calcite veins at 62 cm and 86 cm.
ADDITIONAL COMMENTS: Breccia is predominant throughout this section, with large, 5–20 cm, pieces of basalt at 0–20 cm, 35–45 cm, 55–61 cm, and 103–124 cm.

UNIT 1B: PLAGIOCLASE BASALT (continued).

Pieces 1–12

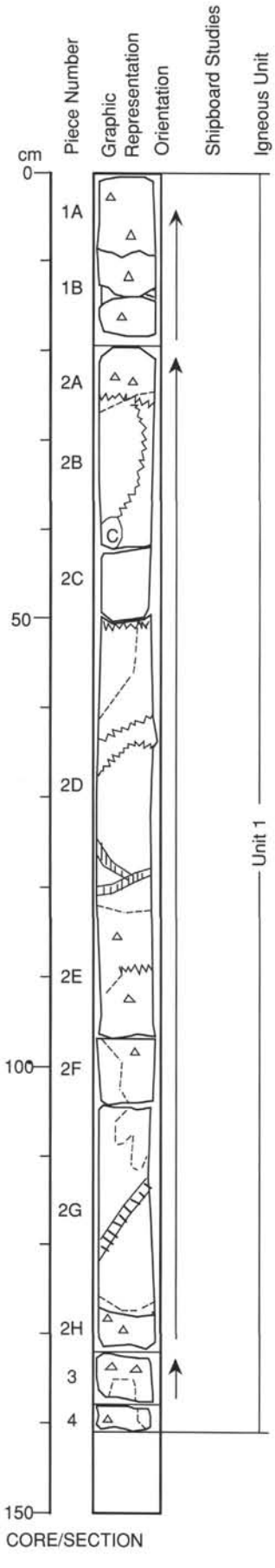
CONTACTS: Interspersed with Subunit 1A.
PHENOCRYSTS:
Plagioclase - 20%; 0.5–8 mm; Generally subhedral prisms, but occasionally anhedral or euhedral. Larger grains commonly have dark inclusions. Fresh and translucent in places, but generally stained in various shades of reds and greens.
Olivine - 1%; 1 mm; Altered to dark reddish brown (2.5YR 3/4) iddingsite.
GROUNDMASS: Microcrystalline.
VESICLES: None.
COLOR: Medium gray (N5) where fresh, but mostly dark reddish gray (10R 3/1), stained reddish brown (2.5 YR 4/4) near fractures and yellowish red (5YR 5/8) along margins, especially in smaller pieces.
STRUCTURE: Occurs as irregular pillow-like bodies, 1 cm to 1 m in size, with chilled margins defined by subtle changes in matrix color and phenocryst size and abundance. Narrow yellowish red (5YR 5/8) bands along many margins appear to be altered glass selvages.
ALTERATION: Olivine is iddingsitized, plagioclase is partially replaced by clay or zeolite, and the groundmass has been oxidized and weathered and, presumably, has been partially replaced by clay.
VEINS/FRACTURES: 1 cm-wide calcite veins at 10–11 cm, 29–30 cm and 118–119 cm. 3 mm-wide calcite veins at 62 and 86 cm.
ADDITIONAL COMMENTS: Large (5–20 cm) basalt pieces at 0–20 cm, 35–45 cm, 55–61 cm, and 103–124 cm. Small (1–3 cm) basalt pieces mixed with breccia at 20–40 cm and 124–142 cm.

Volcanic sandstone

UNIT 1C: VOLCANIC SANDSTONE

Pieces 1D–4

CONTACTS: Irregular contacts with Subunit 1B.
PHENOCRYSTS: None.
GROUNDMASS: Clasts: Type 1, 50%–60%, angular, highly vesicular, glassy basalt, sand-sized; Type 2, 40%, mixed basalt microcrystalline clasts, sand-sized. Matrix: moderate yellowish green (10GY 6/2) clay.
VESICLES: Type 1 clasts are highly vesicular.
COLOR: Type 1 clasts are pinkish white (5YR 8/2) to light reddish brown (5YR 6/4). Type 2 clasts are reddish yellow (5YR 6/8) to light reddish brown (5YR 6/3) to medium gray (N5).
STRUCTURE: Volcanic sandstone into which the basalt of Subunit 1B intruded.
ALTERATION: Clasts have been bleached and are soft, suggesting extensive alteration to clay and zeolite minerals. Sparse matrix of authigenic clay.
VEINS/FRACTURES: 1 cm-wide calcite veins at 10–11 cm, 29–30 cm, and 118–119 cm. 3 mm-wide calcite veins at 62 cm and 86 cm.
ADDITIONAL COMMENTS: Only from 42–65 cm. Finer-grained, well-sorted, reworked equivalent of Subunit 1A breccia.



144-879A-22R-5

UNIT 1A: VOLCANIC BRECCIA (continued)

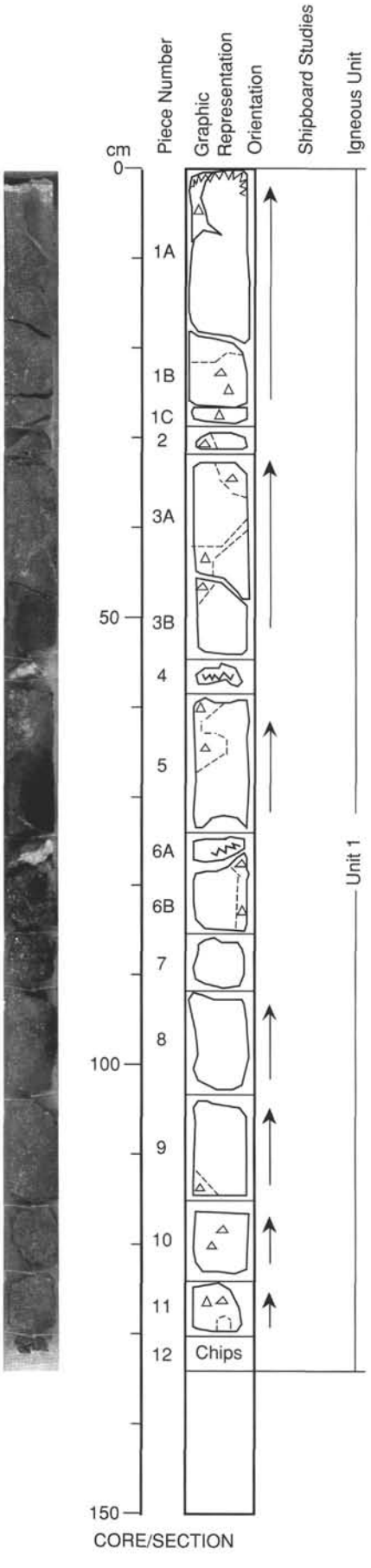
Pieces 1–4

CONTACTS: Interspersed with Subunit 1B.
PHENOCRYSTS: None.
GROUNDMASS: Clasts: Type 1, 50%–60%, angular, highly vesicular, glassy basalt, 3–10 mm; Type 2, 40%, mixed basalt clasts, generally microcrystalline, some plagioclase microphyric, some sparsely vesicular, 3–10 mm. Matrix: 90%, <1 mm shards of Type 1 clast material replaced by pale yellowish green (10GY 7/2) zeolite or clay; 10%, <1 mm fragments of Type 2 clasts.
VESICLES: Type 1 clasts have 50%, 0.1–0.3 mm, round vesicles. Some Type 2 clasts are sparsely vesicular.
COLOR: Type 1 clasts are pinkish white (5YR 8/2) to light reddish brown (5YR 6/4). Type 2 clasts are reddish yellow (5YR 6/8) to light reddish brown (5YR 6/3) to medium gray (N5).
STRUCTURE: Volcanogenic breccia into which the basalt of Subunit 1B intruded.
ALTERATION: Clasts have been bleached and are soft, suggesting extensive alteration to clay and zeolite minerals.
VEINS/FRACTURES: Calcite veins at 23 cm (1 cm wide), 32–41 cm (1–5 mm, meshwork), 49–50 cm (1 cm wide) and 93–94 cm (1 cm wide). Several calcite and grayish green (5G 5/2) clay veins at 109–117 cm (2–3 mm wide and irregular) and at 64 cm, 71 cm, and 77 cm (1 mm wide and irregular).
ADDITIONAL COMMENTS: Breccia is dominant at 1–25 cm, 25–62 cm, 90–110 cm, and 126–142 cm.

UNIT 1B: PLAGIOCLASE BASALT (continued).

Pieces 1–4

CONTACTS: Interspersed with Subunit 1A.
PHENOCRYSTS:
Plagioclase - 20%; 0.5–8 mm; Generally subhedral prisms, but occasionally anhedral or euhedral. Larger grains commonly have dark inclusions. Fresh and translucent in places, but generally stained in various shades of reds and greens.
Olivine - 1%; 1 mm; Altered to dark reddish brown (2.5YR 3/4) iddingsite.
GROUNDMASS: Microcrystalline.
VESICLES: None.
COLOR: Medium gray (N5) where fresh, but mostly dark reddish gray (10R 3/1), stained reddish brown (2.5 YR 4/4) near fractures and yellowish red (5YR 5/8) along margins, especially in smaller pieces.
STRUCTURE: Occurs as irregular pillow-like bodies, 1 cm to 1 m in size, with chilled margins defined by subtle changes in matrix color and phenocryst size and abundance. Narrow yellowish red (5YR 5/8) bands along many margins appear to be altered glass selvages.
ALTERATION: Olivine is iddingsitized, plagioclase is partially replaced by clay or zeolite, and the groundmass has been oxidized and weathered and, presumably, has been partially replaced by clay.
VEINS/FRACTURES: Calcite veins at 23 cm (1 cm wide), 32–41 cm (1–5 mm wide and meshwork), 49–50 cm (1 cm wide), and 93–94 cm (1 cm wide). Several calcite and grayish green (5G 5/2) clay at 109–117 cm (2–3 mm wide and irregular) and at 64 cm, 71 cm, and 77 cm (1 mm wide and irregular).
ADDITIONAL COMMENTS: Large pieces of basalt with chilled margins at 24–49 cm, 62–92 cm, and 110–127 cm.



144-879A-22R-6

UNIT 1A: VOLCANIC BRECCIA (continued)

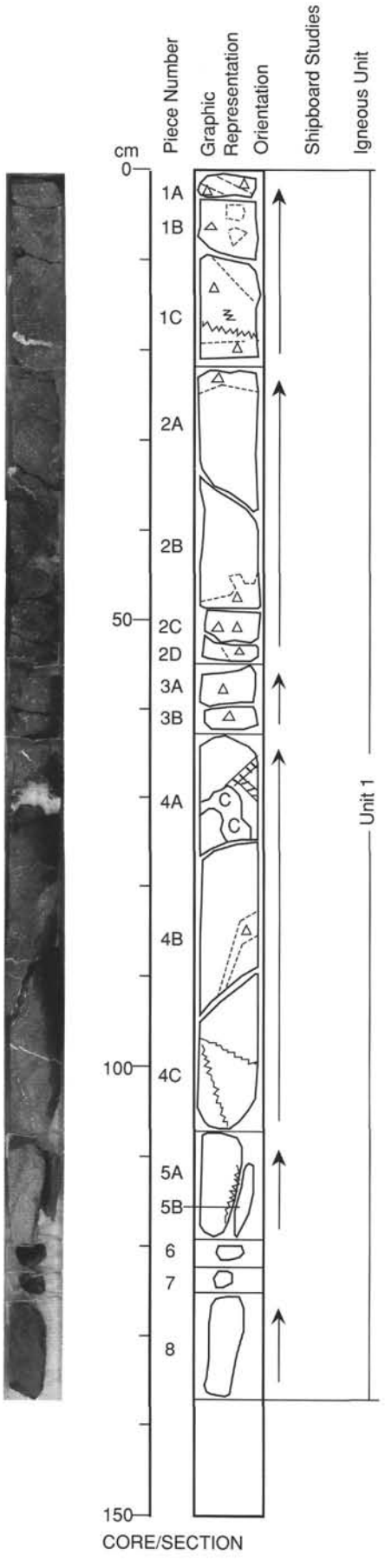
Pieces 1–12

CONTACTS: Interspersed with Subunit 1B.
PHENOCRYSTS: None.
GROUNDMASS: Clasts: Type 1, 50%–60%, angular, highly vesicular, glassy basalt, 3–10 mm; Type 2, 40%, mixed basalt clasts, generally microcrystalline, some plagioclase microphyric, some sparsely vesicular, 3–10 mm. Matrix: 90%, <1 mm shards of Type 1 clast material replaced by pale yellowish green (10GY 7/2) zeolite or clay; 10%, <1 mm fragments of Type 2 clasts.
VESICLES: Type 1 clasts have 50%, 0.1–0.3 mm, round vesicles. Some Type 2 clasts are sparsely vesicular.
COLOR: Type 1 clasts are pinkish white (5YR 8/2) to light reddish brown (5YR 6/4). Type 2 clasts are reddish yellow (5YR 6/8) to light reddish brown (5YR 6/3) to medium gray (N5).
STRUCTURE: Volcanogenic breccia into which the basalt of Subunit 1B intruded.
ALTERATION: Clasts have been bleached and are soft, suggesting extensive alteration to clay and zeolite minerals.
VEINS/FRACTURES: 0–47 cm and 79–115 cm, irregular meshwork veins, 1 mm wide, spaced 1–3 cm apart and filled with calcite and minor grayish green (5G 5/2) clay. 1 cm-wide calcite veins at 0–2 cm and 75–76 cm.
ADDITIONAL COMMENTS: Patches, 2–5 cm-wide, of breccia at 11–13 cm, 19–21 cm, 33–34 cm, and 58–65 cm. 115–134 cm, only breccia.

UNIT 1B: PLAGIOCLASE BASALT (continued).

Pieces 1–12

CONTACTS: Interspersed with Subunit 1A.
PHENOCRYSTS:
Plagioclase - 20%; 0.5–8 mm; Generally subhedral prisms, but occasionally anhedral or euhedral. Larger grains commonly have dark inclusions. Fresh and translucent in places, but generally stained in various shades of reds and greens.
Olivine - 1%; 1 mm; Altered to dark reddish brown (2.5YR 3/4) iddingsite.
GROUNDMASS: Microcrystalline.
VESICLES: None.
COLOR: Medium gray (N5) where fresh, but mostly dark reddish gray (10R 3/1), stained reddish brown (2.5 YR 4/4) near fractures and yellowish red (5YR 5/8) along margins, especially in smaller pieces.
STRUCTURE: Occurs as irregular pillow-like bodies, 1 cm to 1 m in size, with chilled margins defined by subtle changes in matrix color and phenocryst size and abundance. Narrow yellowish red (5YR 5/8) bands along many margins appear to be altered glass selvages.
ALTERATION: Olivine is iddingsitized, plagioclase is partially replaced by clay or zeolite, and the groundmass has been oxidized and weathered and, presumably, has been partially replaced by clay.
VEINS/FRACTURES: 0–47 cm and 79–115 cm, irregular calcite veins, about 1 mm wide with a 1–3 cm spacing, filled with calcite and minor grayish green (5G 5/2) clay. 1 cm-wide calcite veins at 0–2 and 75–76 cm.
ADDITIONAL COMMENTS: 0–115 cm, basalt is almost continuous with patches, 2–5 cm wide, of breccia at 11–13 cm, 19–21 cm, 33–34 cm, and 58–65 cm. 115–134 cm, no basalt.



144-879A-22R-7

UNIT 1A: VOLCANIC BRECCIA (continued)

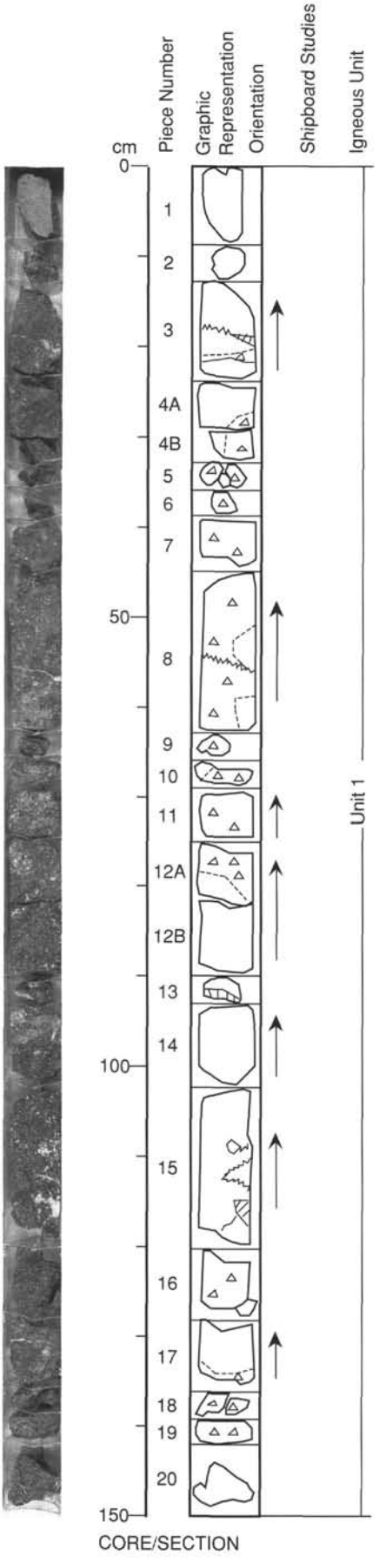
Pieces 1–8

CONTACTS: Interspersed with Subunit 1B.
PHENOCRYSTS: None.
GROUNDMASS: Clasts: Type 1, 50%–60%, angular, highly vesicular, glassy basalt, 3–10 mm; Type 2, 40%, mixed basalt clasts, generally microcrystalline, some plagioclase microphyric, some sparsely vesicular, 3–10 mm. Matrix: 90%, <1 mm shards of Type 1 clast material replaced by pale yellowish green (10GY 7/2) zeolite or clay; 10%, <1 mm fragments of Type 2 clasts.
VESICLES: Type 1 clasts have 50%, 0.1–0.3 mm, round vesicles. Some Type 2 clasts are sparsely vesicular.
COLOR: Type 1 clasts are pinkish white (5YR 8/2) to light reddish brown (5YR 6/4). Type 2 clasts are reddish yellow (5YR 6/8) to light reddish brown (5YR 6/3) to medium gray (N5).
STRUCTURE: Volcanogenic breccia into which the basalt of Subunit 1B intruded.
ALTERATION: Clasts have been bleached and are soft, suggesting extensive alteration to clay and zeolite minerals.
VEINS/FRACTURES: 18–19 cm, 1 cm-wide calcite vein. 30–37 cm, 1–3 mm-wide calcite and grayish green (5G 5/2) clay veins. 68–72 cm, 3 cm-wide calcite vein. 98–99 cm, 2 mm-wide calcite vein. 109–118 cm, 4 parallel veins, each 1 mm wide, in a zone 1 cm wide, calcite and grayish green (5G 5/2) clay.
ADDITIONAL COMMENTS: 0–24 cm and 45–63 cm, breccia predominates.

UNIT 1B: PLAGIOCLASE BASALT (continued).

Pieces 1–8

CONTACTS: Interspersed with Subunit 1A.
PHENOCRYSTS:
Plagioclase - 20%; 0.5–8 mm; Generally subhedral prisms, but occasionally anhedral or euhedral. Larger grains commonly have dark inclusions. Fresh and translucent in places, but generally stained in various shades of reds and greens.
Olivine - 1%; 1 mm; Altered to dark reddish brown (2.5YR 3/4) iddingsite.
GROUNDMASS: Microcrystalline.
VESICLES: None.
COLOR: Medium gray (N5) where fresh, but mostly dark reddish gray (10R 3/1), stained reddish brown (2.5 YR 4/4) near fractures and yellowish red (5YR 5/8) along margins, especially in smaller pieces.
STRUCTURE: Occurs as irregular pillow-like bodies, 1 cm to 1 m in size, with chilled margins defined by subtle changes in matrix color and phenocryst size and abundance. Narrow yellowish red (5YR 5/8) bands along many margins appear to be altered glass selvages.
ALTERATION: Olivine is iddingsitized, plagioclase is partially replaced by clay or zeolite, and the groundmass has been oxidized and weathered and, presumably, has been partially replaced by clay.
VEINS/FRACTURES: 18–19 cm, 1 cm-wide calcite vein. 30–37 cm, 1–3 mm-wide irregular calcite and grayish green (5G 5/2) veins. 68–72 cm, 3 cm-wide calcite vein. 109–118 cm, 4 parallel veins, each <1 mm wide, in a zone 1 cm wide, of calcite and grayish green (5G 5/2) clay.
ADDITIONAL COMMENTS: Large basalt pieces at 24–46 cm and 64–137 cm.



144-879A-23R-1

UNIT 1A: VOLCANIC BRECCIA (continued)

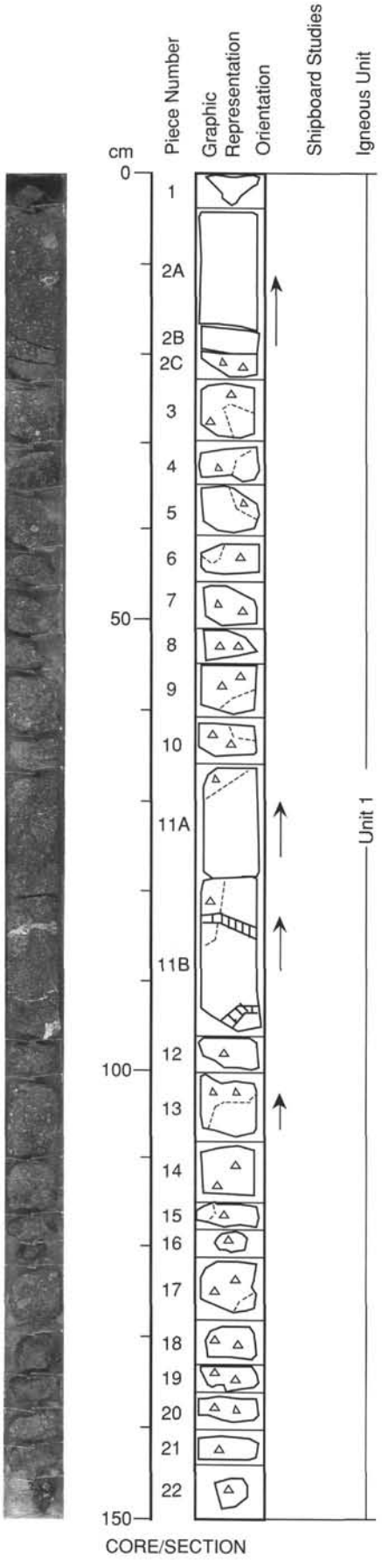
Pieces 1–20

CONTACTS: Interspersed with Subunit 1B.
PHENOCRYSTS: None.
GROUNDMASS: Clasts: Type 1, 50%–60%, angular, highly vesicular, glassy basalt, 3–10 mm; Type 2, 40%, mixed basalt clasts, generally microcrystalline, some plagioclase microphyric, some sparsely vesicular, 3–10 mm. Matrix: 90%, <1 mm shards of Type 1 clast material replaced by pale yellowish green (10GY 7/2) zeolite or clay; 10%, <1 mm fragments of Type 2 clasts.
VESICLES: Type 1 clasts have 50%, 0.1–0.3 mm, round vesicles. Some Type 2 clasts are sparsely vesicular.
COLOR: Type 1 clasts are pinkish white (5YR 8/2) to light reddish brown (5YR 6/4). Type 2 clasts are reddish yellow (5YR 6/8) to light reddish brown (5YR 6/3) to medium gray (N5).
STRUCTURE: Volcanogenic breccia into which the basalt of Subunit 1B intruded.
ALTERATION: Clasts have been bleached and are soft, suggesting extensive alteration to clay and zeolite minerals.
VEINS/FRACTURES: 56–57 cm, 1 mm-wide, irregular, calcite vein. 109–118 cm, irregular, patchy calcite, 2–10 mm.
ADDITIONAL COMMENTS: Breccia predominates at 33–81 cm and 127–142 cm.

UNIT 1B: PLAGIOCLASE BASALT (continued).

Pieces 1–20

CONTACTS: Interspersed with Subunit 1A.
PHENOCRYSTS:
Plagioclase - 20%; 0.5–8 mm; Generally subhedral prisms, but occasionally anhedral or euhedral. Larger grains commonly have dark inclusions. Fresh and translucent in places, but generally stained in various shades of reds and greens.
Olivine - 1%; 1 mm; Altered to dark reddish brown (2.5YR 3/4) iddingsite.
GROUNDMASS: Microcrystalline.
VESICLES: None.
COLOR: Medium gray (N5) where fresh, but mostly dark reddish gray (10R 3/1), stained reddish brown (2.5 YR 4/4) near fractures and yellowish red (5YR 5/8) along margins, especially in smaller pieces.
STRUCTURE: Occurs as irregular pillow-like bodies, 1 cm to 1 m in size, with chilled margins defined by subtle changes in matrix color and
phenocryst size and abundance. Narrow yellowish red (5YR 5/8) bands along many margins appear to be altered glass selvages.
ALTERATION: Olivine is iddingsitized, plagioclase is partially replaced by clay or zeolite, and the groundmass has been oxidized and weathered and, presumably, has been partially replaced by clay.
VEINS/FRACTURES: 56–57 cm, 1 mm-wide, irregular, calcite vein. 109–118 cm, irregular, patchy calcite, 2–10 mm.
ADDITIONAL COMMENTS: Large pieces of basalt at 0–33 cm and 81–127 cm.



144-879A-23R-2

UNIT 1A: VOLCANIC BRECCIA (continued)

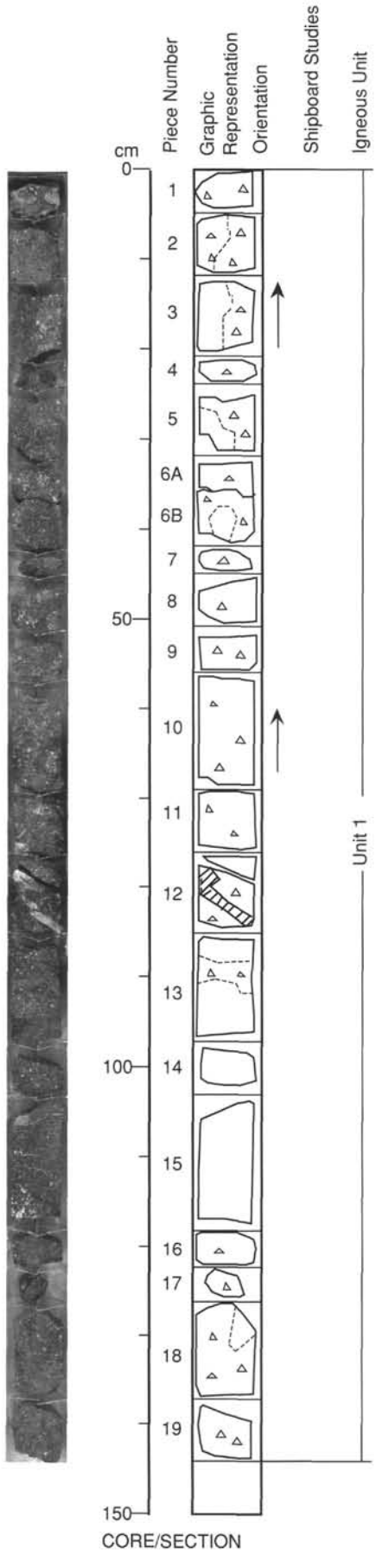
Pieces 1–22

CONTACTS: Interspersed with Subunit 1B.
PHENOCRYSTS: None.
GROUNDMASS: Clasts: Type 1, 50%–60%, angular, highly vesicular, glassy basalt, 3–10 mm; Type 2, 40%, mixed basalt clasts, generally microcrystalline, some plagioclase microphyric, some sparsely vesicular, 3–10 mm. Matrix: 90%, <1 mm shards of Type 1 clast material replaced by pale yellowish green (10GY 7/2) zeolite or clay; 10%, <1 mm fragments of Type 2 clasts.
VESICLES: Type 1 clasts have 50%, 0.1–0.3 mm, round vesicles. Some Type 2 clasts are sparsely vesicular.
COLOR: Type 1 clasts are pinkish white (5YR 8/2) to light reddish brown (5YR 6/4). Type 2 clasts are reddish yellow (5YR 6/8) to light reddish brown (5YR 6/3) to medium gray (N5).
STRUCTURE: Volcanogenic breccia into which the basalt of Subunit 1B intruded.
ALTERATION: Clasts have been bleached and are soft, suggesting extensive alteration to clay and zeolite minerals.
VEINS/FRACTURES: 1 cm-wide calcite veins at 82–83 cm and 93–94 cm.
ADDITIONAL COMMENTS: Breccia predominates at 19–69 cm and 95–150 cm.

UNIT 1B: PLAGIOCLASE BASALT (continued).

Pieces 1–22

CONTACTS: Interspersed with Subunit 1A.
PHENOCRYSTS:
Plagioclase - 20%; 0.5–8 mm; Generally subhedral prisms, but occasionally anhedral or euhedral. Larger grains commonly have dark inclusions. Fresh and translucent in places, but generally stained in various shades of reds and greens.
Olivine - 1%; 1 mm; Altered to dark reddish brown (2.5YR 3/4) iddingsite.
GROUNDMASS: Microcrystalline.
VESICLES: None.
COLOR: Medium gray (N5) where fresh, but mostly dark reddish gray (10R 3/1), stained reddish brown (2.5 YR 4/4) near fractures and yellowish red (5YR 5/8) along margins, especially in smaller pieces.
STRUCTURE: Occurs as irregular pillow-like bodies, 1 cm to 1 m in size, with chilled margins defined by subtle changes in matrix color and phenocryst size and abundance. Narrow yellowish red (5YR 5/8) bands along many margins appear to be altered glass selvages.
ALTERATION: Olivine is iddingsitized, plagioclase is partially replaced by clay or zeolite, and the groundmass has been oxidized and weathered and, presumably, has been partially replaced by clay.
VEINS/FRACTURES: 1 cm-wide calcite veins at 82–83 cm and 93–94 cm.
ADDITIONAL COMMENTS: Large basalt pieces at 0–19 cm and 69–95 cm.



144-879-23R-3

UNIT 1A: VOLCANIC BRECCIA (continued)

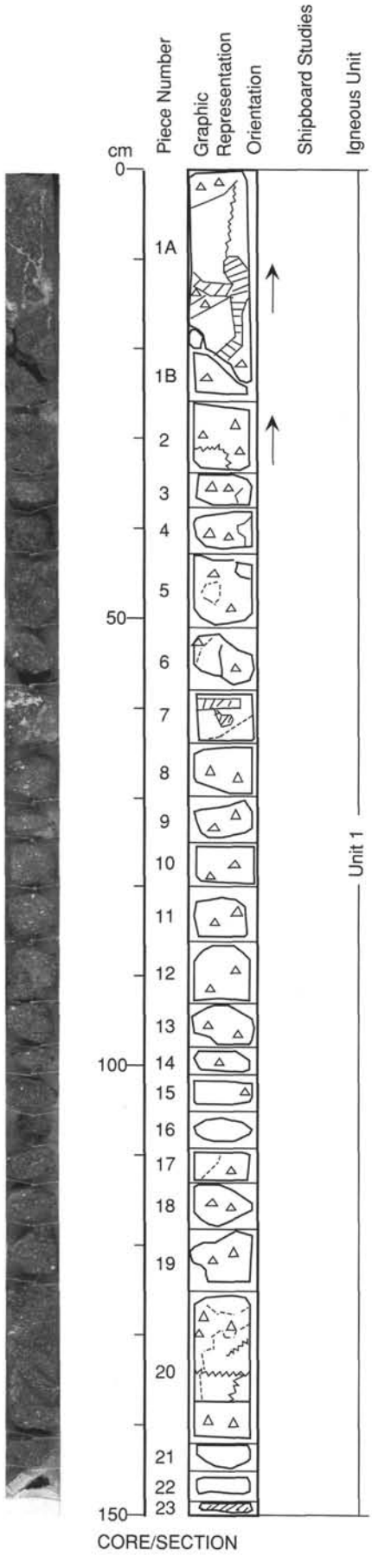
Pieces 1–19

CONTACTS: Interspersed with Subunit 1B.
PHENOCRYSTS: None.
GROUNDMASS: Clasts: Type 1, 50%–60%, angular, highly vesicular, glassy basalt, 3–10 mm; Type 2, 40%, mixed basalt clasts, generally microcrystalline, some plagioclase microphyric, some sparsely vesicular, 3–10 mm. Matrix: 90%, <1 mm shards of Type 1 clast material replaced by pale yellowish green (10GY 7/2) zeolite or clay; 10%, <1 mm fragments of Type 2 clasts.
VESICLES: Type 1 clasts have 50%, 0.1–0.3 mm, round vesicles. Some Type 2 clasts are sparsely vesicular.
COLOR: Type 1 clasts are pinkish white (5YR 8/2) to light reddish brown (5YR 6/4). Type 2 clasts are reddish yellow (5YR 6/8) to light reddish brown (5YR 6/3) to medium gray (N5).
STRUCTURE: Volcanogenic breccia into which the basalt of Subunit 1B intruded.
ALTERATION: Clasts have been bleached and are soft, suggesting extensive alteration to clay and zeolite minerals.
VEINS/FRACTURES: 78–84 cm, 1 cm-wide calcite vein. 82–84 cm, patchy calcite. 105–117 cm, meshwork of 1 mm-wide calcite veins, spaced about 1 cm apart.
ADDITIONAL COMMENTS: 0–90 cm and 117–144 cm, predominantly breccia with 1–10 cm basalt clasts.

UNIT 1B: PLAGIOCLASE BASALT (continued).

Pieces 1–19

CONTACTS: Interspersed with Subunit 1A.
PHENOCRYSTS:
Plagioclase - 20%; 0.5–8 mm; Generally subhedral prisms, but occasionally anhedral or euhedral. Larger grains commonly have dark inclusions. Fresh and translucent in places, but generally stained in various shades of reds and greens.
Olivine - 1%; 1 mm; Altered to dark reddish brown (2.5YR 3/4) iddingsite.
GROUNDMASS: Microcrystalline.
VESICLES: None.
COLOR: Medium gray (N5) where fresh, but mostly dark reddish gray (10R 3/1), stained reddish brown (2.5 YR 4/4) near fractures and yellowish red (5YR 5/8) along margins, especially in smaller pieces.
STRUCTURE: Occurs as irregular pillow-like bodies, 1 cm to 1 m in size, with chilled margins defined by subtle changes in matrix color and phenocryst size and abundance. Narrow yellowish red (5YR 5/8) bands along many margins appear to be altered glass selvages.
ALTERATION: Olivine is iddingsitized, plagioclase is partially replaced by clay or zeolite, and the groundmass has been oxidized and weathered and, presumably, has been partially replaced by clay.
VEINS/FRACTURES: 78–84 cm, 1 cm-wide calcite vein. 105–117 cm, meshwork of 1 mm-wide calcite veins, spaced about 1 cm apart. 82–84 cm, patchy calcite.
ADDITIONAL COMMENTS: 90–117 cm, single basalt piece. 0–90 cm and 117–144 cm, predominately breccia with 1–10 cm pieces of basalt.



144-879A-23R-4

UNIT 1A: VOLCANIC BRECCIA (continued)

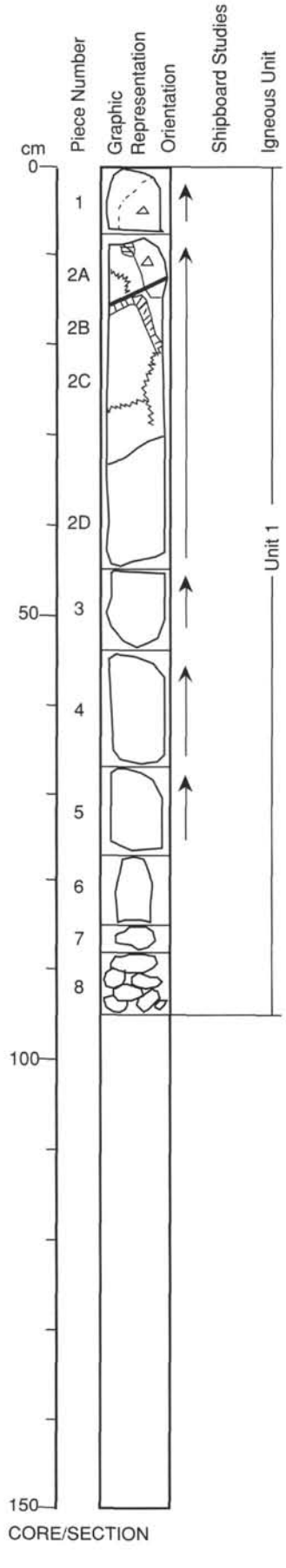
Pieces 1–23

CONTACTS: Interspersed with Subunit 1B.
PHENOCRYSTS: None.
GROUNDMASS: Clasts: Type 1, 50%–60%, angular, highly vesicular, glassy basalt, 3–10 mm; Type 2, 40%, mixed basalt clasts, generally microcrystalline, some plagioclase microphyric, some sparsely vesicular, 3–10 mm. Matrix: 90%, <1 mm shards of Type 1 clast material replaced by pale yellowish green (10GY 7/2) zeolite or clay; 10%, <1 mm fragments of Type 2 clasts.
VESICLES: Type 1 clasts have 50%, 0.1–0.3 mm, round vesicles. Some Type 2 clasts are sparsely vesicular.
COLOR: Type 1 clasts are pinkish white (5YR 8/2) to light reddish brown (5YR 6/4). Type 2 clasts are reddish yellow (5YR 6/8) to light reddish brown (5YR 6/3) to medium gray (N5).
STRUCTURE: Volcanogenic breccia into which the basalt of Subunit 1B intruded.
ALTERATION: Clasts have been bleached and are soft, suggesting extensive alteration to clay and zeolite minerals.
VEINS/FRACTURES: 10–20 cm, radiating calcite veins, 3–15 mm. 2 mm-wide calcite veins at 130 and 137 cm.
ADDITIONAL COMMENTS: Breccia predominates throughout the section.

UNIT 1B: PLAGIOCLASE BASALT (continued).

Pieces 1–23

CONTACTS: Interspersed with Subunit 1A.
PHENOCRYSTS:
Plagioclase - 20%; 0.5–8 mm; Generally subhedral prisms, but occasionally anhedral or euhedral. Larger grains commonly have dark inclusions. Fresh and translucent in places, but generally stained in various shades of reds and greens.
Olivine - 1%; 1 mm; Altered to dark reddish brown (2.5YR 3/4) iddingsite.
GROUNDMASS: Microcrystalline.
VESICLES: None.
COLOR: Medium gray (N5) where fresh, but mostly dark reddish gray (10R 3/1), stained reddish brown (2.5 YR 4/4) near fractures and yellowish red (5YR 5/8) along margins, especially in smaller pieces.
STRUCTURE: Occurs as irregular pillow-like bodies, 1 cm to 1 m in size, with chilled margins defined by subtle changes in matrix color and phenocryst size and abundance. Narrow yellowish red (5YR 5/8) bands along many margins appear to be altered glass selvages.
ALTERATION: Olivine is iddingsitized, plagioclase is partially replaced by clay or zeolite, and the groundmass has been oxidized and weathered and, presumably, has been partially replaced by clay.
VEINS/FRACTURES: 10–20 cm, radiating calcite veins, 3–15 mm. 2 mm-wide calcite veins at 130 cm and 137 cm.
ADDITIONAL COMMENTS: Large pieces of basalt at 0–14 cm and 130–140 cm. 1–3 cm clasts of basalt throughout the breccia. Well-preserved selvage 130–139 cm.



144-879A-23R-5

UNIT 1A: VOLCANIC BRECCIA (continued)

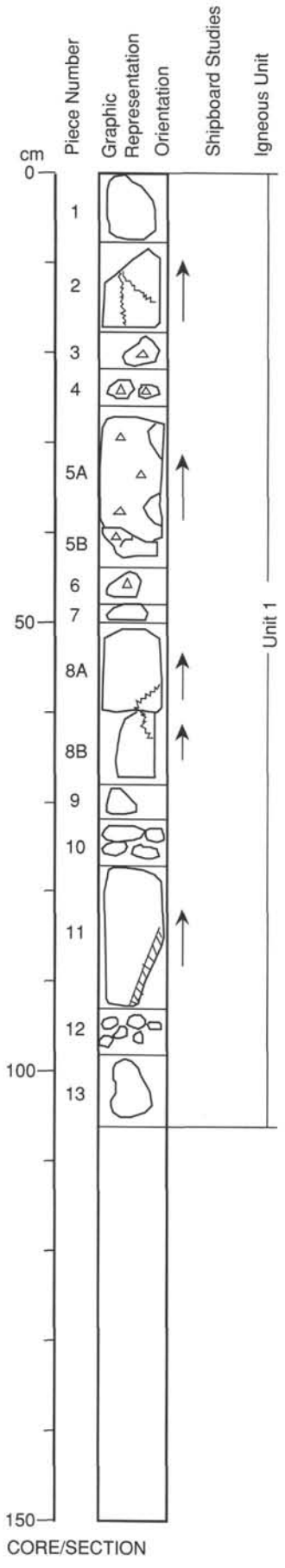
Pieces 1–8

CONTACTS: Interspersed with Subunit 1B.
PHENOCRYSTS: None.
GROUNDMASS: Clasts: Type 1, 50%–60%, angular, highly vesicular, glassy basalt, 3–10 mm; Type 2, 40%, mixed basalt clasts, generally microcrystalline, some plagioclase microphyric, some sparsely vesicular, 3–10 mm. Matrix: 90%, <1 mm shards of Type 1 clast material replaced by pale yellowish green (10GY 7/2) zeolite or clay; 10%, <1 mm fragments of Type 2 clasts.
VESICLES: Type 1 clasts have 50%, 0.1–0.3 mm, round vesicles. Some Type 2 clasts are sparsely vesicular.
COLOR: Type 1 clasts are pinkish white (5YR 8/2) to light reddish brown (5YR 6/4). Type 2 clasts are reddish yellow (5YR 6/8) to light reddish brown (5YR 6/3) to medium gray (N5).
STRUCTURE: Volcanogenic breccia into which the basalt of Subunit 1B intruded.
ALTERATION: Clasts have been bleached and are soft, suggesting extensive alteration to clay and zeolite minerals.
VEINS/FRACTURES: 13–20 cm, radiating calcite and grayish green (5G 5/2) clay veins, 3–5 mm.
ADDITIONAL COMMENTS: 0–12 cm, only; rest of the section is basalt.

UNIT 1B: PLAGIOCLASE BASALT (continued).

Pieces 1–8

CONTACTS: Interspersed with Subunit 1A.
PHENOCRYSTS:
Plagioclase - 20%; 0.5–8 mm; Generally subhedral prisms, but occasionally anhedral or euhedral. Larger grains commonly have dark inclusions. Fresh and translucent in places, but generally stained in various shades of reds and greens.
Olivine - 1%; 1 mm; Altered to dark reddish brown (2.5YR 3/4) iddingsite.
GROUNDMASS: Microcrystalline.
VESICLES: None.
COLOR: Medium gray (N5) where fresh, but mostly dark reddish gray (10R 3/1), stained reddish brown (2.5 YR 4/4) near fractures and yellowish red (5YR 5/8) along margins, especially in smaller pieces.
STRUCTURE: Occurs as irregular pillow-like bodies, 1 cm to 1 m in size, with chilled margins defined by subtle changes in matrix color and phenocryst size and abundance. Narrow yellowish red (5YR 5/8) bands along many margins appear to be altered glass selvages.
ALTERATION: Olivine is iddingsitized, plagioclase is partially replaced by clay or zeolite, and the groundmass has been oxidized and weathered and, presumably, has been partially replaced by clay.
VEINS/FRACTURES: 13–20 cm, radiating calcite and grayish green (5G 5/2) clay veins, 3–5 mm.
ADDITIONAL COMMENTS: 0–95 cm, almost entirely basalt. Well-preserved selvage at 8–12 cm.



144-879A-24R-1

UNIT 1A: VOLCANIC BRECCIA (continued)

Pieces 1–13

CONTACTS: Interspersed with Subunit 1B.
PHENOCRYSTS: None.
GROUNDMASS: Clasts: Type 1, 50%–60%, angular, highly vesicular, glassy basalt, 3–10 mm; Type 2, 40%, mixed basalt clasts, generally microcrystalline, some plagioclase microphyric, some sparsely vesicular, 3–10 mm. Matrix: 90%, <1 mm shards of Type 1 clast material replaced by pale yellowish green (10GY 7/2) zeolite or clay; 10%, <1 mm fragments of Type 2 clasts.
VESICLES: Type 1 clasts have 50%, 0.1–0.3 mm, round vesicles. Some Type 2 clasts are sparsely vesicular.
COLOR: Type 1 clasts are pinkish white (5YR 8/2) to light reddish brown (5YR 6/4). Type 2 clasts are reddish yellow (5YR 6/8) to light reddish brown (5YR 6/3) to medium gray (N5).
STRUCTURE: Volcanogenic breccia into which the basalt of Subunit 1B intruded.
ALTERATION: Clasts have been bleached and are soft, suggesting extensive alteration to clay and zeolite minerals.
VEINS/FRACTURES: 10–17 cm, branching, 1–2 mm, calcite veins. 60–68 cm and 86–92 cm, slickensides on fracture surfaces. Lined with pale yellowish green (10Y 7/2) to dark yellowish green (10GY 4/4) serpentine.
ADDITIONAL COMMENTS: 18–47 cm, predominantly breccia, with 1–3 cm pieces of basalt.

UNIT 1B: PLAGIOCLASE BASALT (continued).

Pieces 1–13

CONTACTS: Interspersed with Subunit 1A.
PHENOCRYSTS:
Plagioclase - 20%; 0.5–8 mm; Generally subhedral prisms, but occasionally anhedral or euhedral. Larger grains commonly have dark inclusions. Fresh and translucent in places, but generally stained in various shades of reds and greens.
Olivine - 1%; 1 mm; Altered to dark reddish brown (2.5YR 3/4) iddingsite.
GROUNDMASS: Microcrystalline.
VESICLES: None.
COLOR: Medium gray (N5) where fresh, but mostly dark reddish gray (10R 3/1), stained reddish brown (2.5 YR 4/4) near fractures and yellowish red (5YR 5/8) along margins, especially in smaller pieces.
STRUCTURE: Occurs as irregular pillow-like bodies, 1 cm to 1 m in size, with chilled margins defined by subtle changes in matrix color and phenocryst size and abundance. Narrow yellowish red (5YR 5/8) bands along many margins appear to be altered glass selvages.
ALTERATION: Olivine is iddingsitized, plagioclase is partially replaced by clay or zeolite, and the groundmass has been oxidized and weathered and, presumably, has been partially replaced by clay.
VEINS/FRACTURES: 10–17 cm, branching, 1–2 mm calcite veins. 60–68 and 86–92 cm, slickensides on fracture surfaces, lined with pale yellowish (10Y 7/2) to dark yellowish green (10GY 4/4) serpentine.
ADDITIONAL COMMENTS: 0–18 cm and 47–106 cm, large pieces of basalt. 18–47 cm, mostly breccia, but some 1–3 cm pieces of basalt.