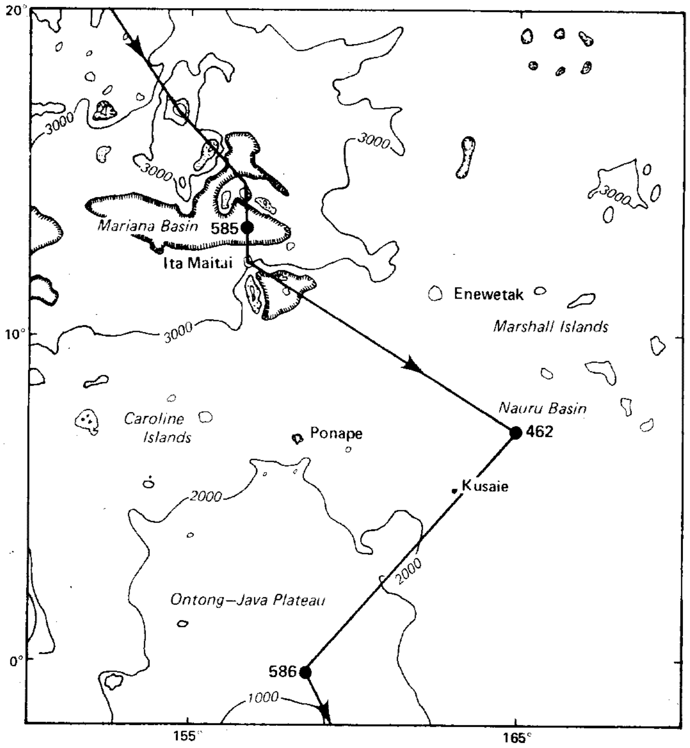
INITIAL CORE DESCRIPTIONS

DEEP SEA DRILLING PROJECT

LEG 89

THE MARIANA BASIN, THE NAHRU BASIN, AND THE ONTONG-JAVA PLATEAU



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Under Contract C-482
By the
UNIVERSITY OF CALIFORNIA
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Prime Contractor for the Project

UNIVERSITY OF CALIFORNIA, SAN DIEGO

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SCRIPPS INSTITUTION OF OCEANOGRAPHY
Deep Sea Drilling Project, A-031

LA JOLLA, CALIFORNIA 92093

April 15, 1983

Dear Colleague:

This document has been produced and distributed by the Deep Sea Drilling Project for the purpose of sample selection by interested earth scientists. Sample requests are honored two months after publication of the Initial Core Descriptions. It is an interim and informal document consisting of site data and sedimentologic and paleontologic data and interpretations as known six (6) months post-cruise. These data, while adequate for most sample selection needs, are subject to slight revision by the time of issue of the corresponding volume of the *Initial Reports* of the Deep Sea Drilling Project.

The information contained herein is preliminary and privileged, consequently this document is not to be cited or used as the basis of other publications. Data cited or used in a manuscript will be considered a breach of professional ethics.

Thank you for your interest in the Deep Sea Drilling Project.

Sincerely,

Yves Lancelot
Chief Scientist
Deep Sea Drilling Project

YL:eb

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DEEP SEA DRILLING PROJECT

LEG 89

THE MARIANA BASIN, THE NAHRU BASIN,
AND THE ONTONG-JAVA PLATEAU

OCTOBER 11–NOVEMBER 30, 1982

A Project Planned by and Carried Out With the Advice of the
JOINT OCEANOGRAPHIC INSTITUTIONS FOR DEEP EARTH SAMPLING (JOIDES)

MEMBER ORGANIZATIONS

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Lamont-Doherty Geological Observatory, Columbia University
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Bundesanstalt fur Geowissenschaften und Rohstoffe, Hannover
Ocean Research Institute, University of Tokyo
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EXPLANATORY NOTES

INTRODUCTION

This *Initial Core Description* is presented here to aid investigators in selecting samples for detailed study. Samples from this leg become available to the public about 8 months after the cruise, with the completion of this *Initial Core Description.*

Potential investigators who desire to obtain samples should refer to the DSDP-NSF Sample Distribution Policy. Sample request forms may be obtained from:

The Curator
Deep Sea Drilling Project, A-031
University of California, San Diego
La Jolla, California 92093

Requests must be as specific as possible: include site, core, section, interval within a section, and volume of sample required. The purpose of this publication is to aid interested investigators in understanding the (1) terminology, labeling, and numbering conventions used by the Deep Sea Drilling Project (DSDP); (2) sediment classification and biostratigraphic framework used; and in addition, (3) to present the preliminary lithologic and paleontologic data on core forms, so that sampling can be guided. However, the investigator should be aware that the data is subject to future revision.

NUMBERING OF SITES, HOLES, CORES, SAMPLES

DSDP drill sites are numbered consecutively from the first site drilled by *Glomar Challenger* in 1968. Site numbers are slightly different from hole numbers. A site number refers to one or more holes drilled while the ship was positioned over one acoustic beacon. These holes could be located within a radius as great as 900 meters from the beacon. Several holes may be drilled at a single site by pulling the drill pipe above the sea floor (out of one hole) and moving the ship 100 meters or more from the previous hole, and then begin drilling another hole.

The first (or only) hole drilled at a site takes the site number. A letter suffix distinguishes each additional hole at the same site. For example: the first hole takes only the site number; the second takes the site number with suffix A; the third takes the site number with suffix B, and so forth. It is important, for sampling purposes, to distinguish the holes drilled at a site, since recovered sediments or rocks from different holes usually do not come from equivalent positions in the stratigraphic column.

There are two types of coring systems used on the *Glomar Challenger*: (1) the standard DSDP rotary-coring system, which cuts ~9.5 meter-long cores and has been used since Leg 1; and (2) the Hydraulic Piston Coring (HPC) system, used since Leg 64.

HPC holes are not assigned a special letter designation. The HPC operates on the principle of a core barrel which is lowered inside the drill string, hydraulically ejected into the sediment and retrieved. The pipe is then lowered to the next interval and the procedure repeated. Disturbance can occur in the top 50—100 cm of HPC cores especially near the top of a hole. The standard DSDP rotary coring system typically disturbs the cores in the upper 100 meters of any hole, and generally half or more of each core is quite disturbed.

The cored interval is measured in meters below the sea floor. The depth interval of an individual core is the depth below sea floor that the coring operation began to the depth that the coring operation ended. For example, in the rotary-coring system, each coring interval is generally 9.5 meters long, which is the nominal length of a core barrel; however, the coring interval may be shorter or longer (rare). "Cored intervals" are not necessarily adjacent to each other, but may be separated by "drilled intervals". In soft sediment, the drill string can be "washed ahead" with the core barrel in place, but no recovering sediment, by pumping water down the pipe at high pressure to wash the sediment out of the way of the bit and up the space between the drill pipe and wall of the hole; however, if thin hard rock layers are present, then it is possible to get "spotty" sampling of these resistant layers within the washed interval, and thus have a cored interval greater than 9.5 meters. In drilling hard rock, a center bit may replace the core barrel if it is necessary to drill without core recovery.

Cores taken from a hole are numbered serially from the top of the hole downward. Core numbers and their associated cored interval in meters below the sea floor are normally unique for a hole; however, problems may arise if an interval is cored twice. When this situation occurs, the core number is assigned a suffix, such as "S"* for supplementary.

In the rotary-coring system, full recovery for a single core is normally 9.28 meters of sediment or rock, which is in a plastic liner (6.6 cm I. D.), plus about a 0.2 meter-long sample (without a plastic liner) in the Core-Catcher. The Core-Catcher is a device at the bottom of the core barrel which prevents the cored sample from sliding out when the barrel is being retrieved from the hole. The sediment-core, which is in the plastic liner, is then cut into 1.5 meter-long sections and numbered serially from the top of the sediment-core (Figure 1). When we obtain full recovery, the sections are numbered from 1 through 7 with the last section possibly being shorter than 1.5 meters. The Core-Catcher sample is placed below the last section when the core is described, and labeled Core-Catcher (CC): it is treated as a separate section.

When recovery is less than 100 percent, and if the sediment or rock is contiguous, the recovered sediment is placed in the top of the cored interval, and then 1.5 meter-long sections are numbered serially, starting with Section 1 at the top. There will be as many sections as are needed to accommodate the length of the core recovered (Figure 1); for example, 3 meters of core sample in plastic liners will be divided into two 1.5 meter-long sections. Sections are cut starting at the top of the recovered sediment, and the last section may be shorter than the normal 1.5 meter length.

This technique differs from the labeling systems used on Legs 1 through 45, which had a designation called "zero section". On Legs 1—45 there were seven sections labeled 0, 1, 2, 3, 4, 5, and 6. The new system used from Legs 46 to the present, has seven sections, but they are labeled 1, 2, 3, 4, 5, 6, and 7.

When recovery is less than 100 percent, the sediment's original stratigraphic position in the cored interval is unknown, so we employ the convention assigning the top of the sediment recovered to the top of the cored interval. This is done for convenience in data handling, and consistency. If recovery is less than 100 percent, and core fragments are separated, and if shipboard scientists believe the sediment was not contiguous, then sections are numbered serially and the intervening sections

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* Note that this designation has been used on previous legs as a prefix to the core number for sidewall core samples.

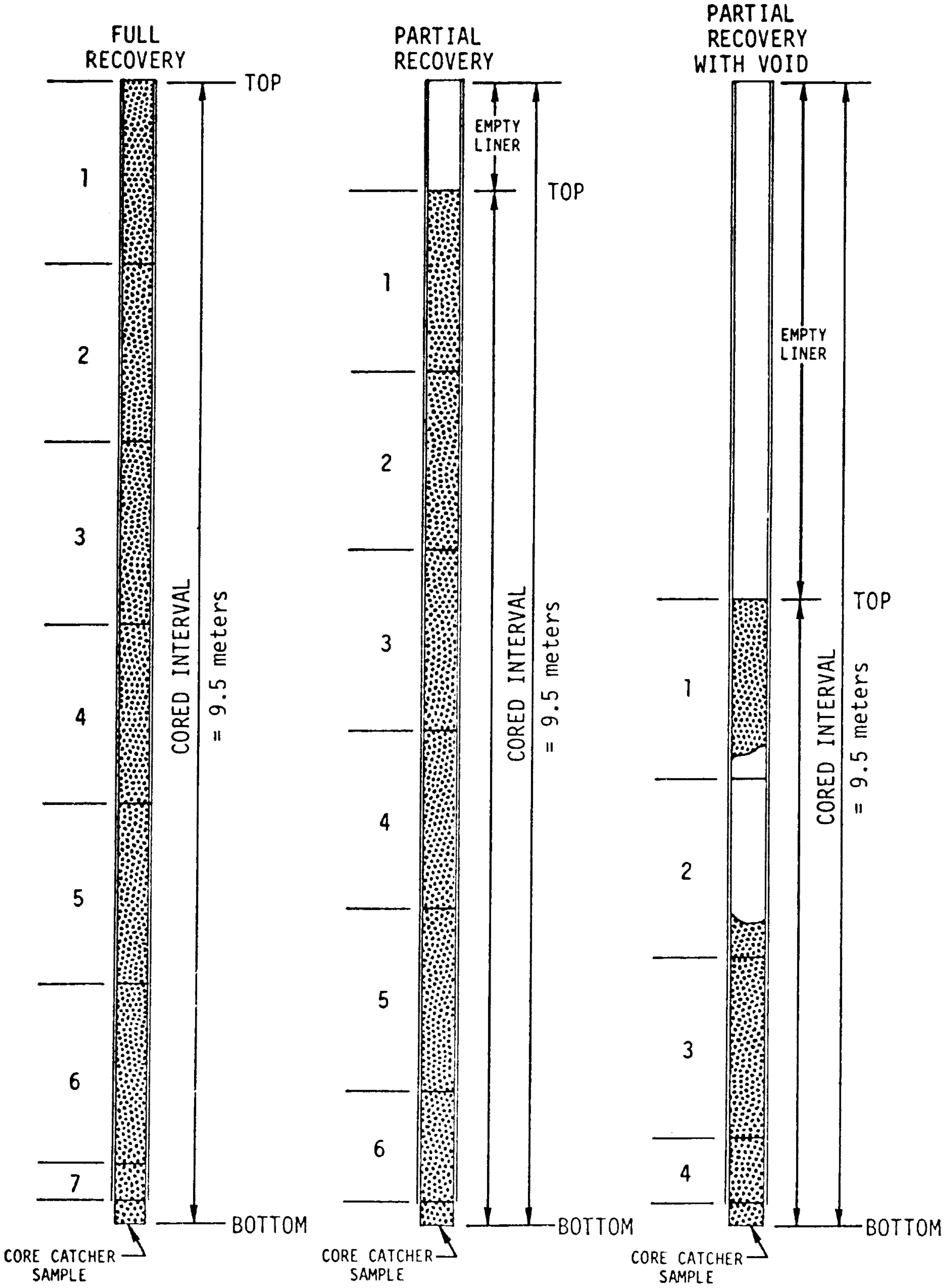

Figure 1. Diagram showing procedure in cutting and labeling of core sections.

are noted as void, whether it is contiguous or not. The Core-Catcher sample is described in the visual core descriptions beneath the lowest section.

Samples are designated by centimeter distances from the top of each section to the top and bottom of the sample in that section. A full identification number for a sample consists of the following information:

Leg
Site
Hole
Core Number
Interval in centimeters from the top of section

For example, a sample identification number of "75-531A-6-3, 12–14 cm" is interpreted as follows: 12–14 cm designates a sample taken at 12 to 14 cm from the top of Section 3 of Core 6, from the second hole drilled at Site 531 during Leg 75. A sample from the Core-Catcher of this core is designated as "75-531A-6, CC, 12–14 cm".

The depth below the seafloor for a sample numbered at "75-531A-6-3, 12–14 cm", is the summation of the following: (1) the depth to the top of the cored interval for Core 6, which is 430 meters; (2) plus 3 meters for Sections 1 and 2 (each 1.5 meters long); and plus the 12 cm depth below the top of Section 3. All of these variables add up to 433.21 meters*, which by convention is the sample depth below the sea floor.

HANDLING OF CORES CONTAINING SEDIMENTS

A core containing sediments is normally cut into 1.5 meter sections, sealed, and labeled; and then the sections are brought into the core laboratory for processing. The following determinations are normally made before the sections are split: gas analysis, and continuous wet-bulk density determinations using the Gamma Ray Attenuation Porosity Evaluation (GRAPE) as described in Boyce (1976).

The cores are then split longitudinally into "work" and "archive" halves**. Samples are extracted from the "work" half, including those for determination of grain-size distribution, mineralogy by x-ray diffraction, sonic velocity by the Hamilton Frame method as described in Boyce (1976), wet-bulk density by a static GRAPE technique (Boyce, 1976), water content by gravimetric analysis, carbon-carbonate analysis, percent calcium carbonate (Carbonate Bomb), geochemical analysis, paleontological studies, and others.

Smear slides or thin sections from each major lithology, and most minor lithologies, are prepared and examined microscopically. The archive half is then described and photographed. Physical disturbance by the drill bit, color, texture (for uncemented lithologies), and sedimentary and igneous structures and composition (±20%) of the various lithologies are noted on standard core description sheets.

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* Sample requests should refer to a specific interval within a core-section, rather than the level below sea floor.

** In the HPC system the cores are oriented relative to each other, thus, for example, all archive halves are on the same side of the hole. We do not know, however, their orientation relative to the Earth's magnetic north.

After the cores are sampled and described, they are maintained in cold storage aboard *Glomar Challenger* until they can be transferred to the DSDP repository. Core sections which are removed for organic geochemistry study are frozen immediately on board ship and kept frozen. Frozen cores are presently stored at the DSDP West Coast Repository (Scripps Institution of Oceanography).

These core descriptions, smear slide descriptions (plus occasional peels and thin sections) and carbonate bomb (% $CaCO_3$) determinations (all of these data are determined aboard ship) serve as the data for the visual core descriptions presented here. These samples, and their location in the core, are coded with a symbol on the core description sheets. The key to these codes, in order to identify the samples, is in Figures 2–6.

SPECIAL CORES AND SAMPLES

Occasionally, special cores or samples are recovered that require specific identification. These are designated as follows:

X = miscellaneous debris or out-of-sequence core material.

C = center bit samples; i. e., samples obtained upon removal of the center bit (a device to prevent core recovery while drilling or washing ahead for some interval).

S = side-wall core; i.e., a core taken in the side of the hole, usually to obtain a sample of material not recovered during previous coring.

H = a wash core; i. e., a core taken while washing ahead for an interval larger than 9.5 m (say, 50 m), but without the center bit in place. Such a core may sample at several places in the washed interval, but their depths cannot be specified within that interval.

B = bit material; i. e., material removed from core bits upon retrieval of the drill string following completion of a hole, or prior to re-entry with a new core bit.

Cores or samples of these types are designated X1, X2, H1, H2, etc., each type in the sequence they were obtained. Additional types of special samples may be designated by the shipboard party or cruise operations manager. The letter designation for these samples is chosen in consultation with the DSDP curatorial representative and laboratory officer, and is indicated on each core description form.

DESCRIPTION OF SEDIMENTS

The following is the sediment description and classification scheme devised by the JOIDES Sedimentary Petrology and Physical Properties Panel, and approved by the JOIDES Planning Committee in March, 1974. In the past, shipboard parties have, in some instances, found it necessary to modify or amend the classification for their particular situation. Any modifications to the classification for the cores described herein are presented in the section following the JOIDES classification.

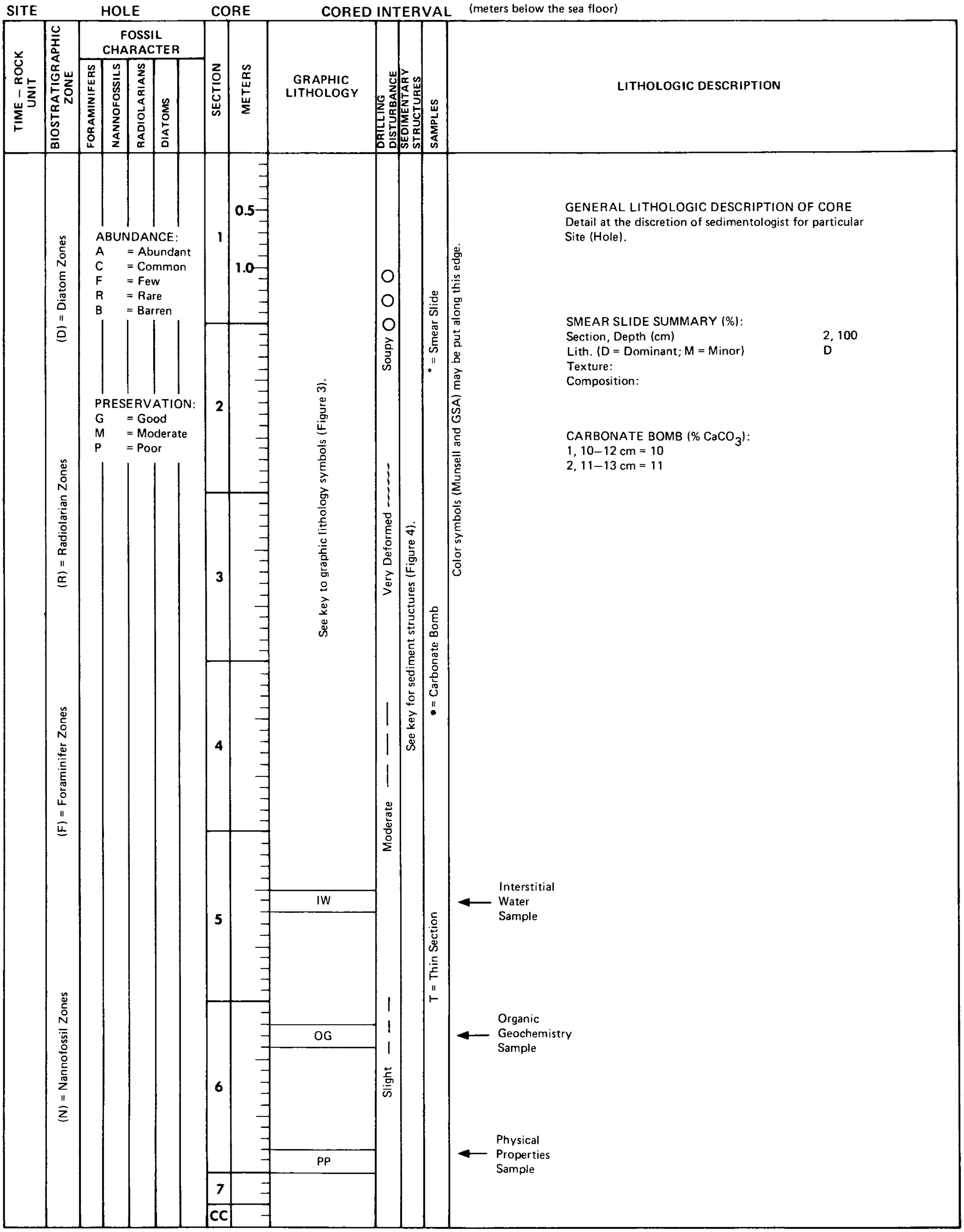


Figure 2. This is a typical sedimentary core description sheet, with the sediment deformation symbols, sample codes, and other general information.

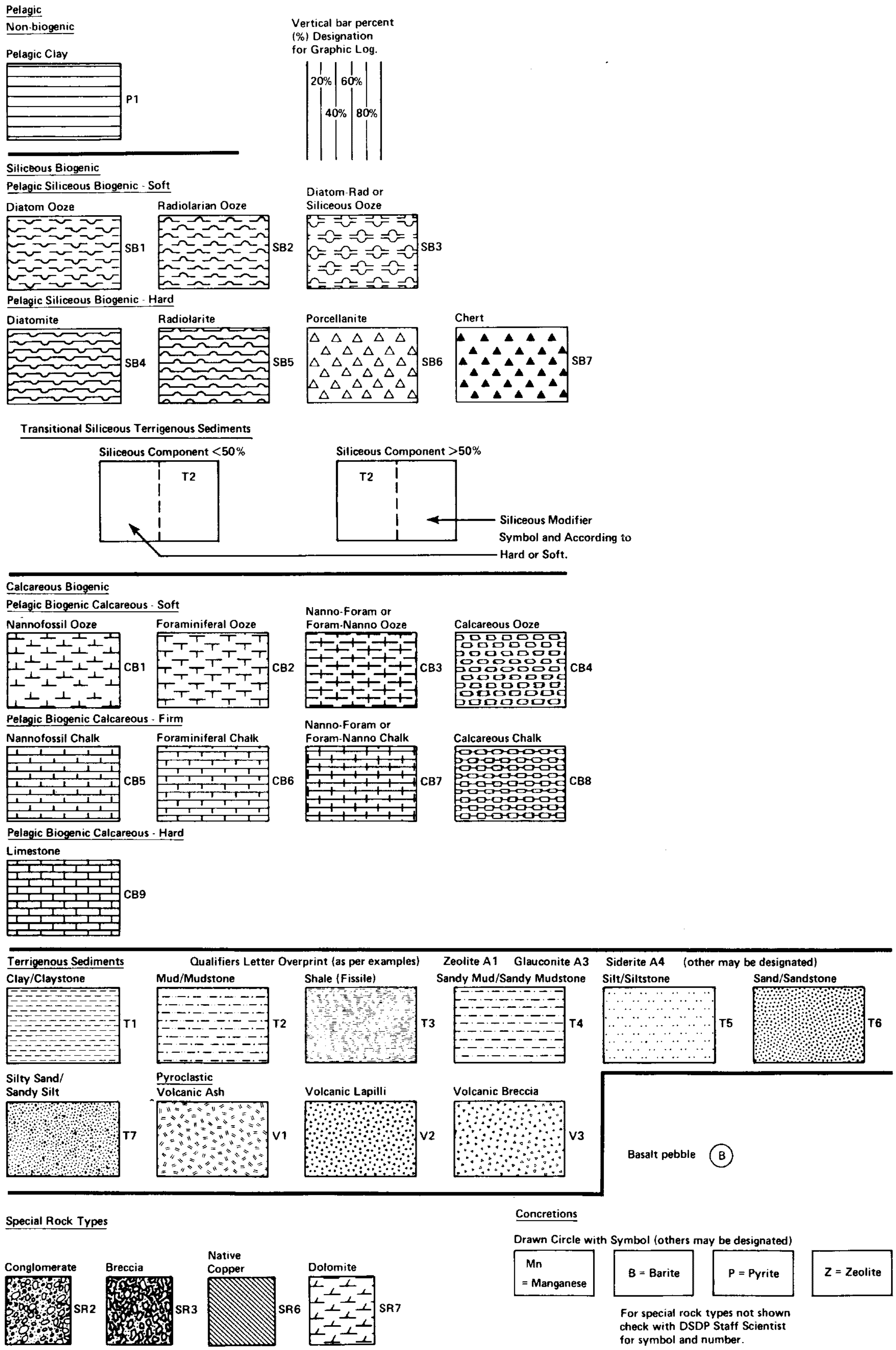


Figure 3. Graphic symbols corresponding to the lithologic visual core descriptions for sediment and sedimentary rocks.

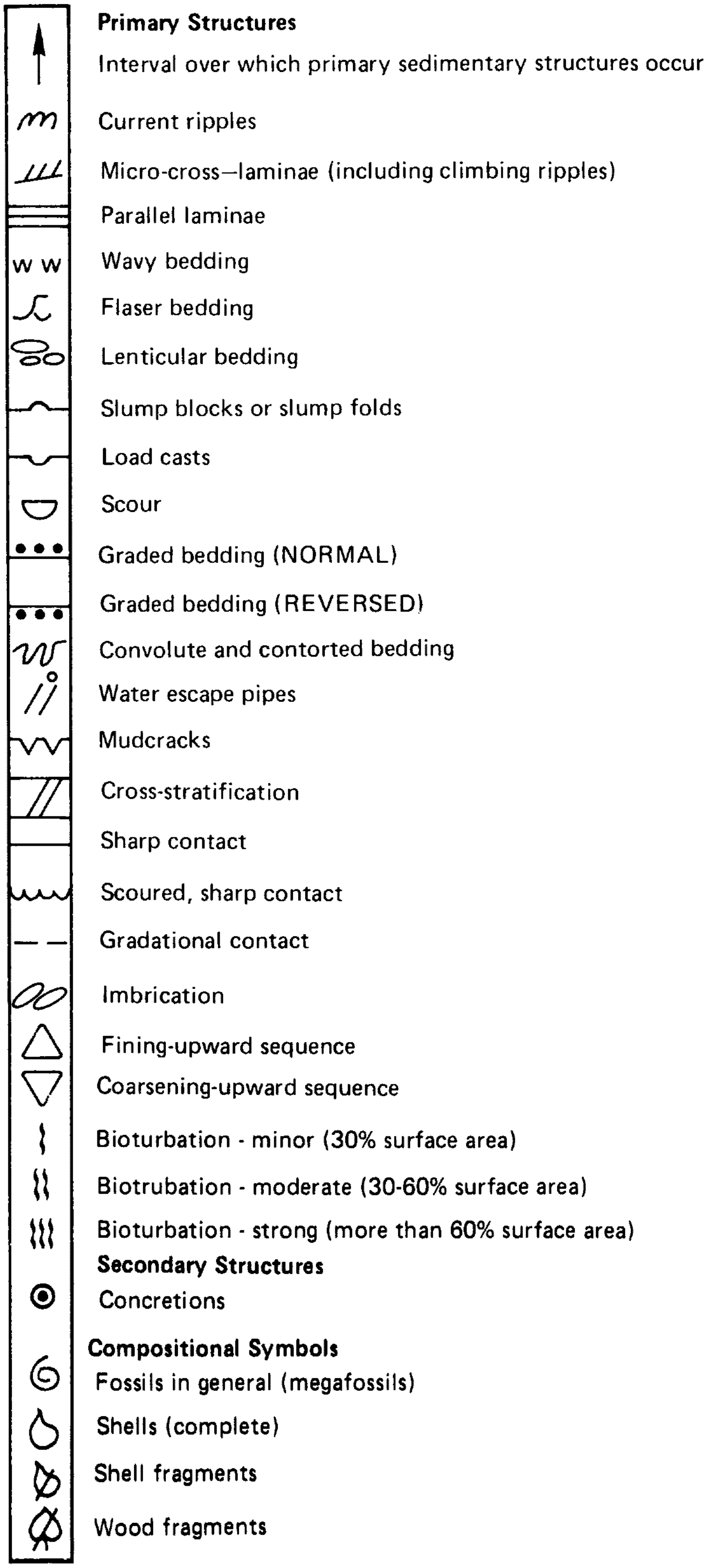


Figure 4. Structure symbol code for sediments.

	Millimeters		Phi (ϕ) units	Wentworth size class
	2.00	2	1.0	Granule
SAND	1.68		0.75	
	1.41		0.5	Very coarse sand
	1.19		0.25	
	1.00	1	0.0	
	0.84		0.25	
	0.71		0.5	Coarse sand
	0.59		0.75	
	0.50	1/2	1.0	
	0.42		1.25	
	0.35		1.5	Medium sand
	0.30		1.75	
	0.25	1/4	2.0	
	0.210		2.25	
	0.177		2.5	Fine sand
	0.149		2.75	
	0.125	1/8	3.0	
	0.105		3.25	
	0.088		3.5	Very fine sand
	0.074		3.75	
	0.0625	1/16	4.0	
SILT	0.053		4.25	
	0.044		4.5	Coarse silt
	0.037		4.75	
	0.031	1/32	5.0	
	0.0155	1/64	6.0	Medium silt
	0.0078	1/128	7.0	Fine silt
	0.0039	1/256	8.0	Very fine silt
MUD	0.0020		9.0	
	0.00098		10.0	Clay
	0.00049		11.0	
	0.00024		12.0	
	0.00012		13.0	
	0.00006		14.0	

Figure 5. Grade scales for terrigenous sediments.

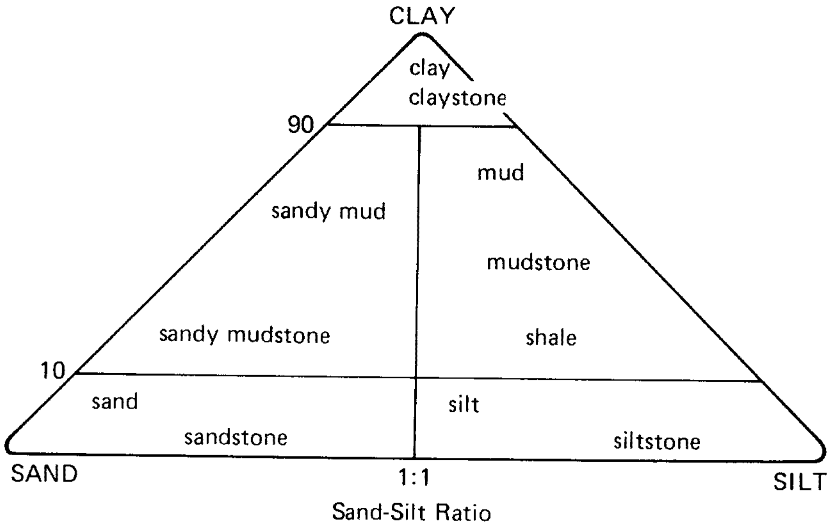


Figure 6. Class boundaries for terrigenous sediments.

CLASSIFICATION OF SEDIMENTS

Several lithologic classifications designed for the construction of the several graphic core and hole summaries have been used during the lifetime of the Deep Sea Drilling Project. The classification system described here has been devised by the JOIDES Panel on Sedimentary Petrology and Physical Properties and adopted for use by the JOIDES Planning Committee in March 1974.

Principles Used in Classification

1 This is a lithologic summary classification designed to generalize core descriptive material of greater detail into a form suitable for standard core and hole logs. Its systematic use will facilitate core to core and leg to leg comparisons.

2 The classification covers most of the lithologic types encountered so far but does not attempt to be comprehensive. A category "Special Rock Types" shows additional definitions and terminology at the discretion of the shipboard staff for rock types not covered.

3 Sediment names are those in common usage and have been defined within the limits of existing definitions.

4 Categories are based on sediment parameters measured on board ship. Refinement by shore laboratory data is possible but not necessary.

5 The classification is descriptive and genetic implications are not intended.

6 The degree of detail of the classification is scaled to the space limitations of printed graphic hole and core summaries.

Shipboard Parameters Measured

Sediment and rock names are defined solely on the basis of compositional and textural parameters. The compositional factors are most important for description of those deposits more characteristic of open marine conditions, with textural factors becoming more important for the classification of hemipelagic and near-shore facies. Sediment names are thus based solely upon these parameters as determined in smear slides aided by compositional and textural properties apparent to the naked eye or under the hand lens. Other descriptive parameters include: induration, sediment disturbance, sedimentary structures, and color. The determination of these parameters is as follows:

1) Composition – biogenic and mineral components are estimated in percent from smear slides. $CaCO_3$ content is estimated by using the carbonate bomb available on the ship. Even with rapid use, a value to ±5% is achievable.

2) Texture – visual estimates from smear slide examination.

3) Induration – The determination of induration is highly subjective, but field geologists have successfully made similar distinctions for many years. The categories suggested here are thought to be practical and significant. The criteria of Moberly and Heath (1971) are used for calcareous deposits; subjective estimate or behavior in core cutting for others. There are three classes for calcareous sediments; two for all others.

a) Calcareous sediments

(i) Soft: Oozes have little strength and are readily deformed under the finger or the broad blade of a spatula.

(ii) Firm: Chalks are partly indurated oozes: they are friable limestones that are readily deformed under the fingernail or the edge of a spatula blade. More indurated chalks are termed limestones (see below).

(ii) Hard: Limestones as a term should be restricted to cemented rocks.

b) The following criteria are recommended for all but calcareous sediments:

(i) If the material is low state of induration as to allow the core to be split with a wire cutter, the sediment name only is used (e. g., silty clay: mud).

(ii) If the core must be cut on the band saw or diamond saw, the suffix 'stone' is used (e. g., silty claystone: mudstone; or shale, if fissile.)

4) Sediment Disturbance – Deformational structures are generally of the type found in piston cores, and are usually simple to visualize and interpret.

a) Soft to firm sediment: The following categories are recommended.

(i) Slightly deformed – bedding contacts are slightly bent.

(ii) Moderately deformed – bedding contacts have undergone extreme bowing.

(iii) Very deformed – bedding is completely disturbed, sometimes showing symmetrical diapir-like structure.

(iv) Soupy – water saturated intervals which have lost all aspects of original bedding.

b) Hard sediments: There is also the need to indicate the degree of fracturing in hard sediments/rock. This is best accomplished with a written description in the Lithologic Description portion of the Core Form (Figure 2).

c) Drilling "Biscuits" – semi-indurated sediments are broken into flat 3–5 cm or so "biscuits" which internally are undeformed, but were rotated against each other resulting in lenses of soft, intensely deformed mud or ooze in-between. Description of this is also best accomplished using the Lithologic Description portion of the Core Form (Figure 2).

5) Sedimentary structures – in many cores it is extremely difficult to differentiate between natural and coring-induced structures. Consequently, the description of sedimentary structures is optional. The following approach is suggested as a guideline, but the specialist is encouraged to use his own preferred system and set of symbols.

a) Median grain size profile: For the sections of terrigenous sediments, with interbeds of varying textural characteristics, the construction of median grain size profile based on hand lens observations provides a rapid method for illustrating graded and non-graded beds, bed thickness, and size distribution.

b) Sedimentary structures: A set of suggested symbols is provided for categories shown on Figure 4.

6) Color – According to standard Munsell and GSA color charts.

Use of the Core Form

1) Mandatory Graphic Lithology Column – This graphic column is based on the above classification scheme. Completion of the column using the appropriate symboles (Figure 3) must be done for each site, and will be inclued in the *Initial Core Description* (*ICD*) and *Initial Report Volume*. The "Special Rock Type" category should be used for sediment types not in the classification.

a) Optional graphic column: If circumstances or the special skills and interests of the shipboard staff indicate an additional modified or different classification, another graphic column may be added to the right of the Mandatory Column using definitions, terminology, and symbols that, in the opinion of the shipboard staff, will increase the information yield. This Optional Column must not substitute for the Mandatory Column.

2) Sediment disturbance column – Completion of the sediment disturance column using symbols and distinctions given below is mandatory.

3) Sedimentary structure columns – Structures may be designated on the core form in the sedimentary structure column parallel to the sediment disturbance column, and/or on the median grain size profile (for the sections of terrigenous sediments, with interbeds of varying textural characteristics). The median grain size profile is located in the lithologic description portion of the core form. A set of suggested symbols for a few more common structures has been prepared by DSDP (Figure 4), but the shipboard geologist is free to use whatever additional symbols he may wish. These optional columns may not substitute for the mandatory sediment disturbance column and must be distinct from it.

4) Lithologic description column – Format, style, and terminology of the descriptive portion of the core sheets are not controlled by the mandatory column scheme, beyond the minimal name assignment which should be derived from this classification. However, colors and additional information on structure and textures should normally be included in the textural section of the core description.

Lithologic Classification Scheme

The following define compositional class boundaries and use of qualifiers in the lithologic classification scheme:

1) Compositional Class Boundaries

a) $CaCO_3$ content (determined by $CaCO_3$ bomb): 30% and 60%. With a 5% precision and given the natural frequency distribution of $CaCO_3$ contents in oceanic sediments, these boundaries can be reasonably ascertained.

b) Biogenic opal abundance (expressed as percent siliceous skeletal remains in smear slides): 10%, 30%, and 50%. Smear-slide estimates of identifiable siliceous skeletal material generally imply a significantly higher total opal abundance. The boundaries have been set to take this into account.

c) Abundance of authigenic components (zeolites, Fe, and Mn micronodules etc), fish bones, and other indicators of very slow sedimentation (estimated in smear slides); semiquantitative boundary: common 10%. These components are quite conspicuous and a semiquantitative estimate is adequate. Even a minor influx of calcareous, siliceous, or terrigenous material will, because of the large difference in sedimentation rate, dilute them to insignificance.

d) Abundance of terrigenous detrital material (estimated from smear slides): 30%.

e) Qualifiers: Numerous qualifiers are suggested; the options should be used freely. However, components of less than 5% (in smear slide) should not be used as a qualifier except in special cases. The most important component should be the last qualifier. No more than two qualifiers should be used.

Description of Sediment Types

1) Pelagic clay – Principally authigenic pelagic deposits that accumulate at very slow rates. The class is often termed brown clay, or red clay, but since these terms are confusing, they are not recommended.

a) Boundary with terrigenous sediments: Where authigenic components (Fe/Mn micronodules, zeolites), fish debris, etc., become common in smear slides. NOTE: Because of large discrepancy in accumulation rates, transitional deposits are exceptional.

b) Boundary with siliceous biogenic sediments: <30% identifiable siliceous remains.

c) Boundary with calcareous biogenous sediments: Generally the sequence is one passing from pelagic clay through siliceous ooze to calcareous ooze, with one important exception: at the base of many oceanic sections, black, brown, or red clays occur directly on basalt, overlain by or grading up into calcareous sediments. Most of the basal clayey sediments are rich in iron, manganese and metallic trace elements. For proper identification they require more elaborate geochemical work than is available on board. These sediments are placed in the "Special Rock" category, but care should be taken to distinguish them from ordinary pelagic clays.

2) Pelagic siliceous biogenic sediments – These are distinguished from the previous category because they have more than 30% identifiable siliceous microfossils. They are distinguished from the following category by a $CaCO_3$ content of less than 30%. There are two classes: *Pelagic biogenic siliceous sediments* (containing less than 30% silt and clay); and *transitional biogenic siliceous sediments* (containing more than 30% silt and clay and more than 10% diatoms).

a) Pelagic biogenic siliceous sediments:

soft: Siliceous ooze (radiolarian ooze, diatom ooze, depending on dominant component).

hard:	radiolarite	porcellanite
	diatomite	chert

(i) Qualifiers:

Radiolarians dominant: radiolarian ooze or radiolarite.

Diatoms dominant: diatom ooze or diatomite.

Where uncertain: siliceous (biogenic) ooze, or chert or porcellanite, when containing >10% $CaCO_3$, qualifiers are as follows:

indeterminate carbonate:	calcareous - -
or	
nannofossils only:	nannofossil - -
foraminifers only:	foraminifer - -
nannofossil-foraminifer - -	depending on dominant component
foraminiferal-nannofossil - -	

b) Transitional biogenic siliceous sediments:

Diatoms <50%	diatomaceous mud:	soft
	diatomaceous mudstone:	hard
Diatoms >50%	muddy diatom ooze:	soft
	muddy diatomite:	hard

Radiolarian equivalents in this category are rare and can be specifically described.

3) Pelagic biogenous calcareous sediments – These are distinguished from the previous categories by a $CaCO_3$ content in excess of 30%. There are two classes: Pelagic biogenic calcareous sediments (containing less than 30% silt and clay); and transitional biogenic calcareous sediments (containing more than 30% silt and clay).

a) Pelagic biogenic calcareous sediments:

soft: calcareous ooze
firm: chalk
hard: indurated chalk

The term *limestone* should preferably be restricted to *cemented rocks*.

(i) Compositional Qualifiers ⩽–

Principal components are: nannofossils and foraminifers.

One or two qualifiers may be used, for example:

Foram %	Name
<10	Nannofossil ooze, chalk, limestone
10–25	Foraminiferal-nannofossil ooze
25–50	Nannofossil-foraminifer ooze
>50	Foraminifer ooze

Calcareous sediment containing more than 10–20% identifiable siliceous fossils carry the qualifier radiolarian, diatomaceous, or siliceous depending on the quality of the identification. For example, radiolarian-foraminifer ooze.

b) Transitional biogenic calcareous sediments

(i) $CaCO_3$ = 30–60%: marly calcareous pelagic sediments

soft: marly calcareous (or nannofossil, foraminifer, etc.), ooze (see below)
firm: marly chalk
hard: marly limestone

(ii) $CaCO_3$ >60%: Calcareous pelagic sediments.

soft: calcareous (or nannofossil, foraminifer, etc.), ooze (see below)
firm: chalk
hard: limestone

NOTE: Sediments containing 10–30% $CaCO_3$ fall in other classes where they are denoted with the adjective "calcareous." Less than 10% $CaCO_3$ is ignored.

4) Terrigenous sediments

a) Sediments falling in this portion of the classification scheme are subdivided into textural groups on the basis of the relative preportions of three grain size constituents, i. e., clay, silt, and sand. Rocks coarser than sand size are treated as "Special Rock Types." The size limits for these constituents are those defined by Wentworth (1922) (Figure 5).

Five major textural groups are recognized on the accompanying triangular diagram (Figure 6). These groups are defined according to the abundance of clay (> 90%, 90–10%, < 10%) and the ratio of sand to silt (>1 or <1).

The terms *clay, mud, sandy mud, silt,* and *sand* are used for the soft or unconsolidated sediments which are cut with a wire in the shipboard core splitting process. The hard or unconsolidated equivalents for the same textural groups are *claystone, mudstone* (or shale, if fissile), *sandy mudstone, siltstone,* and *sandstone.* Sedimentary rocks falling into the consolidated category include those which must generally be cut with the band saw or diamond saw. Sands medium-, coarse-, or very coarse-grained sands and sandstones according to their median grain size.

(i) Qualifiers — In this group numerous qualifiers are possible, usually based on minor constituents, for example: glaconitic, pyritic, feldspathic. In the sand and sandstone category, conventional divisions such as arkose, graywacke, etc., are, of course, acceptable, providing the scheme is properly identified. Clays, muds, silts, and sands containing 10—30% $CaCO_3$ shall be called calcareous.

b) Volcanogenic sediments

Pyroclastic rocks are described according to the textural and compositional scheme of Wentworth and Williams (1932). The textural groups are:

Volcanic breccia >32 mm

Volcanic lapilli <32 mm

Volcanic ash (tuff, indurated) <4 mm

Compositionally, these pyroclastic rocks are described as vitric (glass), crystal or lithic.

c) Clastic sediments of volcanic provenance are described in the same fashion as the terrigenous sediments, noting the dominant composition of the volcanic grains where possible.

5) Special rock types — The definition and nomenclature of sediment and rock types not included in the system described above are left to the discretion of shipboard scientists with the recommendation that they adhere as closely as practical to conventional terminology.

In this category fall such rocks as:

Intrusive and extrusive igneous rocks;
Evaporites, halite, anhydrite, gypsum (as a rock), etc.;
Shallow water limestone (biostromal, biohermal, coquina, oolite, etc.);
Dolomite;
Gravels, conglomerates, breccias;
Metalliferous brown clays;
Concretions, barite, iron-manganese, phosphorite, pyrite, etc.;
Coal, asphalt, etc.;
and many others.

The mandatory graphic lithology column should be completed by shipboard staff with appropriate symbols for intervals containing special rock types. It is imperative that symbols and rock nomenclature be properly defined and described by shipboard staff.

Basement Description Conventions

Core Forms

Initial core description forms for igneous and metamorphic rocks are not the same as those used for sediments. The sediment barrel sheets are substantially those published in previous *Initial Reports.* Igneous rock representation on barrel sheets is too compressed to provide adequate information for potential sampling. Consequently, Visual Core Description forms, modified from those used on board ship, are used for more complete graphic representation. All shipboard data per 1.5-meter section of core are listed on the modified forms as well as summary hand-specimen and thin-section descriptions. The symbols and a number of format conventions for igneous rocks are presented on Figure 7.

Igneous and metamorphic rocks are split using a rock saw with a diamond blade into archive and working halves. The latter is described and sampled on board ship. On a typical igneous rock description form (Figure 8), the left column is a visual representation of the working half using the symbols of Figure 7. Two closely spaced horizontal lines in this column indicate the location of styrofoam spacers taped between basalt pieces inside the liner. Each piece is numbered sequentially from the top of each section, beginning with the number 1. Pieces are labeled on the rounded, not the sawed surface. Pieces which could be fitted together before splitting are given the same number, but are consecutively lettered, as 1A, 1B, 1C, etc. Spacers are placed between pieces with different number, but not between those with different letters and the same number. In general, addition of spacers represents a drilling gap (no recovery). However, in cores where recovery is high, it is impractical to use spacers. In these cases, drilling gaps are indicated only by a change in numbers. All pieces have orientation arrows pointing to the top of the section, both on archive and working halves, provided the original unsplit piece was cylindrical in the liner and of greater length than the diameter of the liner. Special procedures are used to ensure that orientation is preserved through every step of the sawing and labeling process. All pieces suitable for sampling requiring knowledge of top from bottom are indicated by upward-pointing arrows to the left of the piece numbers on the description forms. Since the pieces are rotated during drilling, it is not possible to sample for declination studies.

Samples are taken for various measurements on board ship. The type of measurement and approximate location are indicated in the column headed "Sample" using the following notation:

X = X-ray fluorescence analysis
M = magnetics measurements
S = sonic velocity measurements
T = thin section
D = density measurements
P = porosity measurements

Up to seven such visual representations can be included on a single igneous rock core description sheet (Figure 9), which includes a summary core description, and petrographic and analytical data.

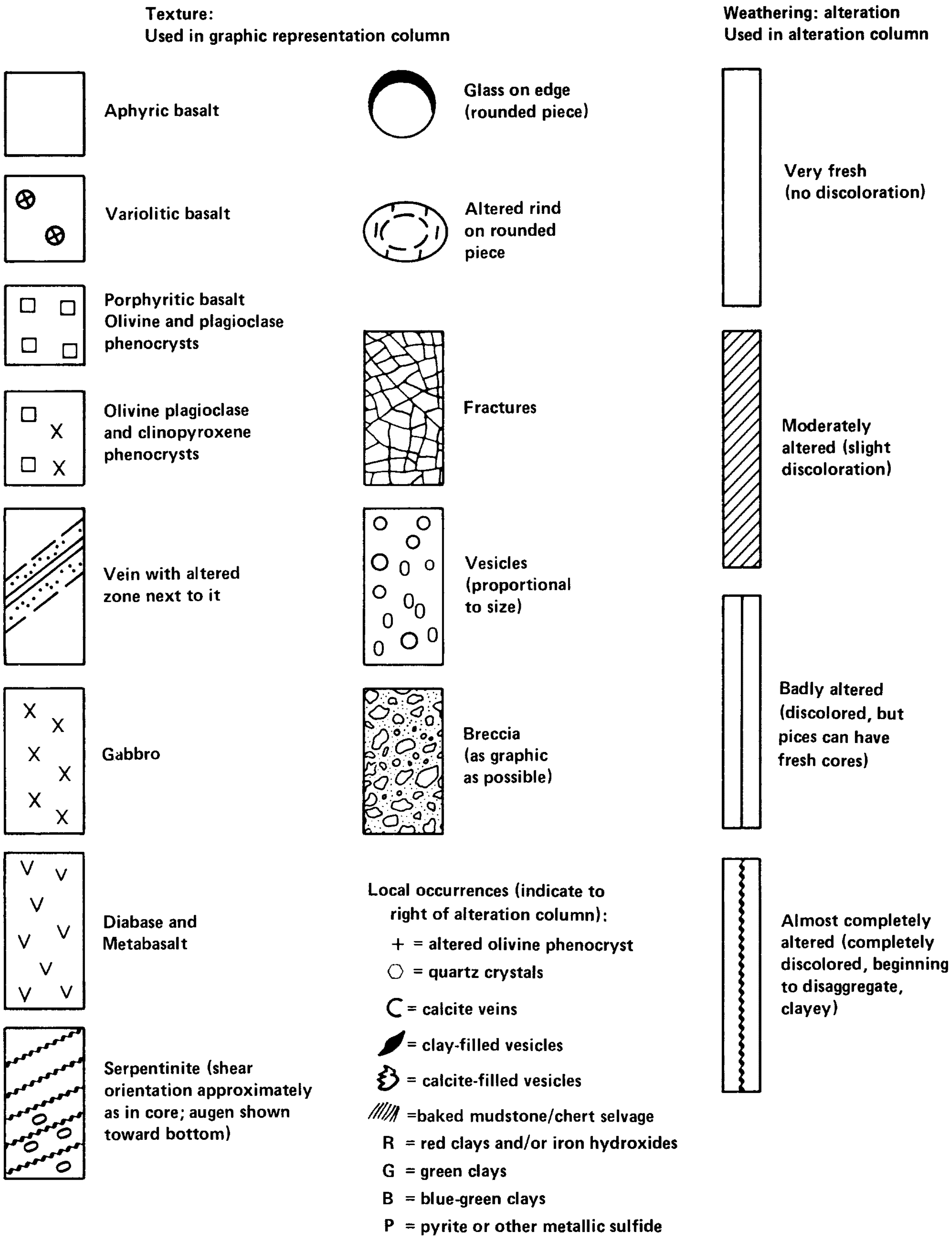
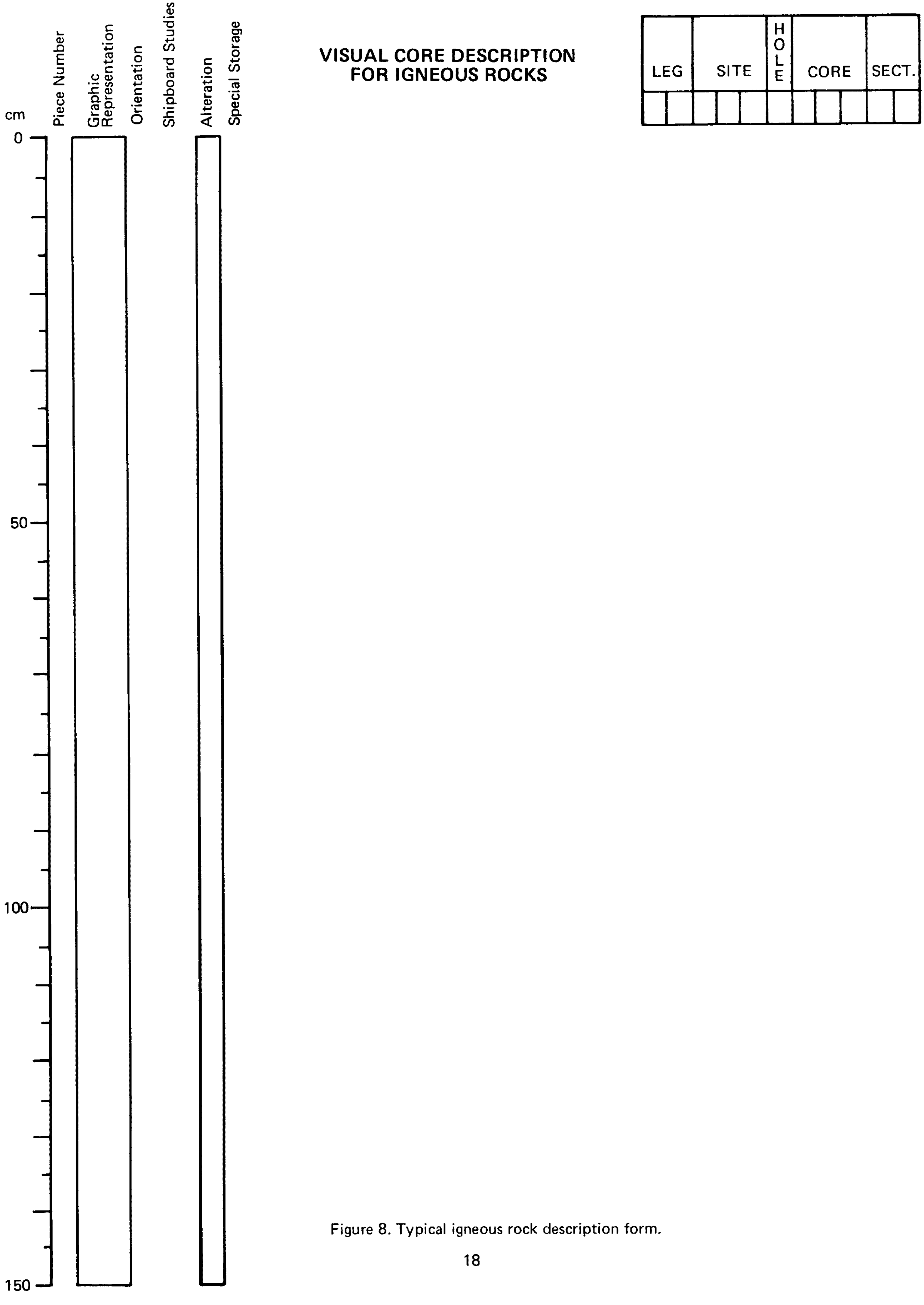


Figure 7. List of symbols for igneous rock description forms.



VISUAL CORE DESCRIPTION
FOR IGNEOUS ROCKS

LEG	SITE	HOLE	CORE	SECT.

cm

Piece Number

Graphic Representation

Orientation

Shipboard Studies

Alteration

Special Storage

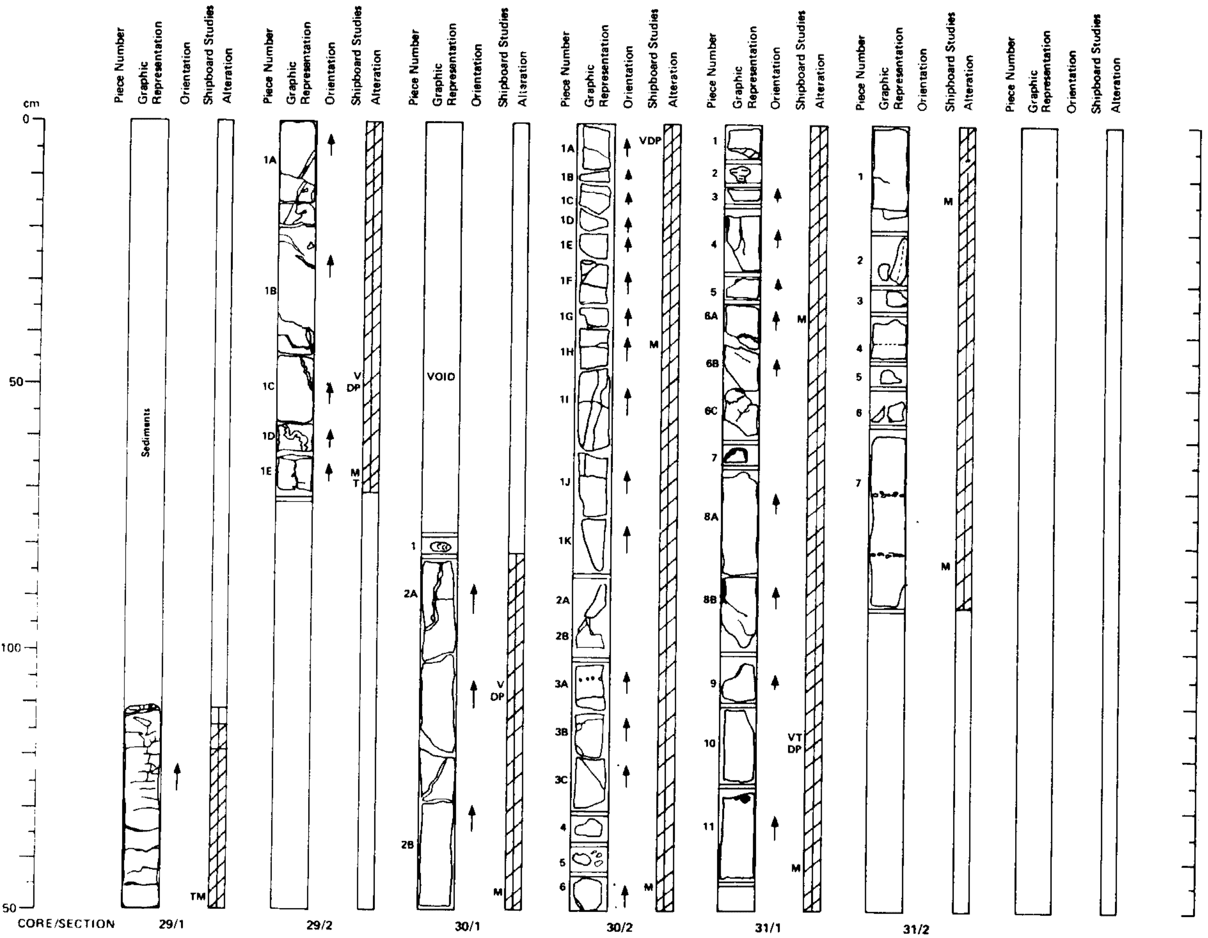
0

50

100

150

Figure 8. Typical igneous rock description form.



SITE 524, CORE 28, SECTION 3, 279.1–279.6 m

Macroscopic Description

See sediment description form

Thin Section Summaries

Contact Zone below claystone at 61 cm, Sec. 3: Dark brown glass with tiny (~0.01 mm and less) spinifex plagioclase (hollow skeletal, swallow tails) microlites rimmed with spherulitic mantles. Spherulite zone noted away from contact. Section too thick and glass too dark for detailed examination (problem with plucking).

Interior of pillow at 71 cm, Sec. 3: Slight phyric basalt with sparse (~1%) relatively large plagioclase phenocrysts (0.7–1.6 mm) set in a hyalopilitic spinifex matrix composed of Na rich (R. I. ~1.55), skeletal (hollow cores with smectite filling and crude swallow tails), elongate (0.04–0.5 mm, L/W ~ 1/3–1/35) plagioclase microlites, abundant ilmenite dendrite needles (0.001–0.004 mm thick and 0.04–0.2 mm long) in rectangular boxwork pattern, more sparse magnetite cubes and octahedra in two generations (first = 0.02–0.25 mm, second = 0.004–0.015 mm), skeletal pyroxene(?) anhedral (~0.006 mm); and hollow skeletal apatite euhedra (0.004–0.008 mm). All these in a mesostasis of pale green smectite or chlorite (devitrified glass ?). Plagioclase phenocrysts about half replaced by inclusion-filled albite and some smectite or chlorite. Approximate mode: plagioclase phenocrysts ~1, plagioclase microlites 30–40, ilmenite 10–15, magnetite 3–5, clinopyroxene 3–5, apatite 1–3, devitrified glass 40–50.

Shipboard Studies

Sample	D	P	$V_{\perp}$	$V_{\parallel}$	NRM1	NRM2	S. I.
Sec. 3, 71 cm	–	–	–	–	32.014	-38.6	-36
Sec. 3, 110 cm	–	–	–	–	24.443	-49.1	-45

SITE 524, CORE 29, SECTIONS 1–2, 286.1–287.2 m

MAJOR ROCK TYPES – BASALT (or DIABASE), CLAYSTONE, SANDSTONE

Macroscopic Description

Basalt (or Diabase) – Dark gray, aphyric. Sec. 1 has numerous calcite-filled veins arranged perpendicular to core axis and spaced every 2–3 cm. Calcite veins in Sec. 2 more irregular, some with green clay rims.

Sandstone and Claystone – see sediment description form.

Thin Section Summaries

Section 1, Piece 1: Fine- to medium coarse-grained aphyric olivine(?) basalt (or diasbase) with intergrown intersertal texture, composed of dominant tabular, weakly compositionally zoned plagioclase anhedra (0.05–0.3 mm, $An_{43-?}$, R. I. <1.55) and subordinate intergranular, mostly subhedra grains of clinopyroxene (0.006–0.1 mm), opaque minerals (0.006–0.35 mm) and apatite needles (0.01–0.15 mm, L/W ~1/12), with intersertal patches of greenish brown smectite. There are sparse smectite patches that appear to be pseudomorphs of small (0.05–0.1 mm) euhedral olivine grains. Note: Sparse (<1%) clinopyroxene microphenocrysts (0.15–0.25 mm). Approximate mode: plagioclase 35–45, clinopyroxene 15–20, opaques 15–20, devitrified glass (smectite) 15–20, apatite 1–2, olivine(?) 2–3.

Section 2, Core-Catcher: Coarse-grained to very coarse-grained basalt or diabase, composed of anhedral to subhedral, strongly zoned (An_{45-17}) plagioclase (0.09–0.95 mm) with intergranular clinopyroxene ($2V_z$~55–60) (0.01–0.15 mm) and opaques (magnetite 0.01–0.35 mm and illmenite) and intersertal olive brown smectite (high birefringence). Abundant (for this mineral) apatite (3–5%, 0.02–0.35 mm) of stubby to needle prismatic habit, often with hollow center. Apatite is euhedral and cuts across plagioclase. Ilmenite and magnetite are sometimes hollow skeletal.

Shipboard Studies

Sample	D	P	$V_{\perp}$	$V_{\parallel}$	NRM1	NRM2	S. I.
Sec. 1, Piece 1	–	–	–	–	53.485	-44.7	-74
Sec. 2, Piece 1C	2.70	14.0	4.33	4.65	–	–	–
Sec. 2, Piece 1E	–	–	–	–	52.067	-43.4	-71

SITE 524, CORE 30, SECTIONS 1–2, 289.0–292.0 m

MAJOR ROCK TYPE – BASALT (or DIABASE)
MINOR ROCK TYPE – CALCAREOUS CLAYSTONE

Macroscopic Description

Basalt (or Diabase) – Dark gray, aphyric, coarse-grained basalt or diabase. Even grained, massive with widely spaced fractures (2–10 cm). Fractures in Piece 2A–B (Sec. 1) filled with calcite and minor pyrite; some lined with green clay. Fractures in Pieces 1A, 1C, and 1I–K (Sec. 2) parallel lines of irregular vesicles. Pyrite or blue green clay lines vesicles.

Calcareous Claystone – Piece 1 (Sec. 1) is olive gray calcareous claystone with a large horizontal zoophycos burrow.

Shipboard Studies

Sample	D	P	$V_{\perp}$	$V_{\parallel}$	NRM1	NRM2	S. I.
Sec. 1, Piece 2A	2.73	11.0	4.57	4.76	–	–	–
Sec. 1, Piece 2B	–	–	–	–	55.769	-57.8	-76
Sec. 2, Piece 1A	2.74	11.2	4.64	5.15	–	–	–
Sec. 2, Piece 1H	–	–	–	–	32.663	-64.4	-79
Sec. 2, Piece 6	–	–	–	–	43.596	-49.4	-73

SITE 524, CORE 31, SECTIONS 1–2, 294.5–296.9 m

MAJOR ROCK TYPE – BASALT (or DIABASE)
MINOR ROCK – CALCAREOUS CLAYSTONE

Macroscopic Description

Basalt (or Diabase) – Dark gray, aphyric, coarse, even-grained basalt (or diabase) with rare fractures filled with green clay. Small pyrite crystals in fractures and in discolored zones. Moderate alteration.

Calcareous Claystone – Piece 2 (Sec. 1) is reddish brown calcareous claystone.

Thin Section Summary

Section 1, Piece 10: Rock is very similar in texture and mineralogy to Core 29, Sec. 2, Core-Catcher, but slightly coarser and plagioclase grains show beautifully developed epitaxial mantles of alkali feldspar or oligoclase, optics (Ax. Pl. + 010, $2V_x$ <60°) indicate 3 possibilities, in order of likelihood: 1) anorthoclase or Na-sanidine, 2) oligoclase, and 3) K-rich sanidine. Choice 1 is favored because of sharply defined mantle boundary, oligoclase should give more gradational transition, and smaller R. I. difference than would be expected with K-rich sanidine.

Shipboard Studies

Sample	D	P	$V_{\perp}$	$V_{\parallel}$	NRM1	NRM2	S. I.
Sec. 1, Piece 6A	–	–	–	–	28.924	-56.8	-66
Sec. 1, Piece 10	2.78	11.8	4.46	4.50	–	–	–
Sec. 1, Piece 11	–	–	–	–	26.664	-41.6	–
Sec. 2, Piece 1	–	–	–	–	29.817	-65.9	-66?
Sec. 2, Piece 7	–	–	–	–	30.548	-38.6	-50

Figure 9. Igneous rock description sheet.

Igneous Rock Classification

Igneous rocks are classified mainly on the basis of mineralogy and texture. Thin-section work in general adds little new information to the hand-specimen classification.

Basalts are termed aphyric, sparsely phyric, moderately phyric, or phyric, depending on the proportion of phenocrysts visible with the binocular microscope (~x 12). The basalts are called aphyric if phenocrysts are absent. For practical purposes, this means that if one piece of basalt is found with a phenocryst or two in a section where all other pieces lack phenocrysts, and no other criteria such as grain size or texture distinguish this basalt from the others, then it is described as aphyric. A note on the rare phenocrysts is included in the general description, however. This approach enables us to restrict the number of lithologic units to those that appear to be clearly distinct.

Sparsely phyric basalts are those with 1–2% phenocrysts present in almost every piece of a given core or section. Clearly contiguous pieces without phenocrysts are included in this category, again with the lack of phenocrysts noted in the general description.

Moderately phyric basalts contain 2–10% phenocrysts. Aphyric basalts within a group of moderately phyric basalts are separately termed aphyric basalts.

Phyric basalts contain more than 10% phenocrysts. No separate designation is made for basalts with more than 20% phenocrysts; the proportion indicated in the core forms should be sufficient to guide the reader.

The basalts are further classified by phenocryst type, preceding the terms phyric, sparsely phyric, etc. For example, a plagioclase-olivine moderately phyric basalt contains 2–10% phenocrysts, most of them plagioclase, but with some olivine.

Other rock types which are less commonly recovered, such as gabbro, serpentinite, andesites, granite, or metamorphic rocks, are classified using standard references such as Williams, et al. (1954) or Moorhouse (1959).

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LEG 89 – ADDITIONAL DATA

Lithologic Classification

Introduction

The sediment classification used on Leg 89 differs somewhat from that recommended by the JOIDES panel on Sedimentary Petrology and Physical Properties (SPPP), mainly in the naming of intermediate mixtures of nonbiogenic, siliceous biogenic, and (or) calcareous biogenic components. As a first approximation, we considered each sediment to be a mixture of these three components. The SPPP classification (described in its entirety in the Leg 42, Part 2 Initial Reports volume, Ross, Neprochnov, et al., 1974) provides specific guidelines for classifying nonbiogenic components and we have not modified this classification which is essentially that of Shepard (1954; Figure A). In our classification, the term clay is used for any material less than 4 µm in size without regard to composition or origin (hence, terms such as pelagic clay do not appear in our classification).

The SPPP classification provides inconsistent and somewhat vague guidelines for naming mixtures of all three components. Our modifications of the SPPP classification are aimed at: (1) making the naming of mixtures of nonbiogenic, siliceous biogenic, and calcareous biogenic components internally consistent, and (2) providing names for intermediate mixtures of these three components. Our classification of the three-component system of nonbiogenic, siliceous biogenic, and calcareous biogenic is shown in Figure B, using an example clay as the dominant nonbiogenic component, nannofossils as the dominant calcareous biogenic component, and diatoms as the dominant siliceous biogenic component.

Rules for using classification

1. 10–25% of a component qualifies it for minor-modifier ("-bearing") status.
2. 25–50% of a component qualifies it for major-modifier status. Major modifiers are:
   1) Nonbiogenic: silty, clayey, sandy, muddy, etc.
   2) Calcareous biogenic: nannofossil, foraminifer, or simply calcareous (but best to be more specific where possible).
   3) Siliceous biogenic: diatom (or diatomaceous), radiolarian, or siliceous (again, best to be as specific as possible).
3. 50% of a component or group of components (e.g., total siliceous biogenic or total calcareous biogenic) determines the main siliceous biogenic or total calcareous biogenic) determines the main name. Main names are:
   1) Nonbiogenic: If the total of nonbiogenic components is greater than 50%, the main name is determined by the dominant size(s) (Figure A). Examples of nonbiogenic main names are clay, silt, silty clay, sand, mud, etc.
   2) Biogenic: If the total of biogenic components is greater than 50%, the main name is ooze.
4. The most abundant component appears closest to the main name. Major and minor modifiers are listed in order of increasing abundance to the left of the main name. Some examples are:
   1) 60% nannofossils, 30% foraminifers, 5% radiolarians, 5% clay = foraminifer nannofossil ooze.
   2) 40% nannofossils, 35% foraminifers, 15% radiolarians, 10% clay = clay- and radiolarian-bearing foraminifer nannofossil ooze.
   3) 30% foraminifers, 15% radiolarians, 30% sand, 25% silt = radiolarian-bearing foraminifer silty sand;
   4) 40% diatoms, 30% nannofossils, 30% clay = clayey nannofossil diatom ooze or nannofossil clayey diatom ooze.

Other sediment types

The above classification covers the majority of unconsolidated sediment types likely to be found in deep-sea areas. A few less common sediment types are worth mentioning here.

Volcanogenic sediments: Volcanogenic sediments may consist of primary volcanic components (e.g., volcanic glass, feldspar, pyroxene, volcanic rock fragments, opaque minerals, etc.) or secondary minerals (e.g., smectites, palagonite, zeolites, palygorskite, celadonite, etc.) (Vallier and Kidd, 1977). Volcanogenic sediments are not usually found as distinct beds except when deposited by air-fall right after a large eruption, or, more commonly, when deposited by downslope transport (e.g., turbidity currents and debris flows) on volcanic edifices (e.g., Line Islands, Schlanger, Jackson, et al., 1976; Mid-Pacific Mountains, Vallier and Jefferson, 1981) and in adjacent basins (e.g., Nauru Basin, Moberly and Jenkyns, 1981; Mariana Basin, this volume). Most wind-borne volcanogenic sediments are masked by biogenic components and terrigenous components and are recognized mainly by the textures of the glass or altered glass, assisted by the presence of certain minerals (see above) in smear slides or, more commonly, on X-ray diffractograms.

Degree of induration

Recognizing stages in the degree of induration of a sediment can provide valuable insight into the processes of diagenesis and lithification. For carbonate sediments, a three-fold induration scale (soft, firm, hard, equivalent to ooze, chalk, and limestone) has been in use for many years (e.g., Moberly and Heath, 1971). No such scale exists for noncarbonate sediments; they are either sediment or rock. The general criteria for recognizing the three stages of induration in carbonate sediments are as follows:

Soft (ooze): Have little strength and are easily deformed with the blade of a spatula.

Firm (chalk): Partly indurated ooze; can be easily scratched or deformed with the edge of a spatula blade.

Hard (limestone): Completely cemented rock.

For nonbiogenic sediments (mostly silt and clay), it is probably sufficient to stick with the two-fold induration scale of (1) sediment and (2) rock, which is identified by the suffix -stone following the main sediment name.

For siliceous sediments, there may be a need for a classification of sediment of intermediate induration equivalent to chalk used for carbonate sediments. Diatomite is commonly used as a good working field term for a partly indurated, weakly cemented rock composed mainly of diatom frustules. The scientific party could not agree amongst the terms radiolaroid, radiolarite, and radiolarian earth for sediments containing abundant radiolarians and with the equivalent firmness of chalk. Hard, lithified siliceous sediments are porcellanite and chert. Porcellanite is usually dull, brown to white, fairly porous, and contains clay, zeolites, or carbonate. Chert, in contrast, is lustrous, has conchoidal fracture, and is much denser, and harder than porcellanite. These two siliceous rock types usually can be readily distinguished in hand specimen and are sufficent for shipboard descriptions. More detailed descriptions require detailed studies involving thin sections, scanning electron microscopy, X-ray diffraction, and chemical analyses (e.g., Heath and Moberly, 1971; Lancelot, 1973; Garrison and others, 1975; Kastner and others, 1977; Hein and others, 1978; von Rad and others, 1979; among others). In some of our descriptions of lithologies recovered on Leg 89, we have also used the genetic term silicified limestone to designate siliceous limestone or porcellanite that was once a carbonate ooze but has been partly cemented by silica into a very hard rock.

Igneous Rock Nomenclature

The terminology used in the igneous rock section is based mainly on mineralogy and texture, and comprises standard terms. Graphic symbols used for designating igneous rocks, degree of alteration, and miscellaneous other features are shown in Figure C.

Basaltic rocks are termed aphyric, sparsely phyric (1–2% phenocrysts), moderately phyric (>10% phenocrysts) based on examination with hand lens or binocular microscope (~10x). Glomerophyric is used to denote clusters of phenocrysts. If a few phenocrysts were found scattered throughout a section generally lacking phenocrysts the material is described as aphyric. This system allows the division of basalt sequences into units with distinctive or persistent visual differences. Basalts are further subdivided by phenocryst type, e.g. olivine moderately phyric bsalt.

As diabase was frequently encountered in the "flow-sill complex" it is given a separate symbol, as are special features that are present in a sill such as cumulate zones or granophyre patches.

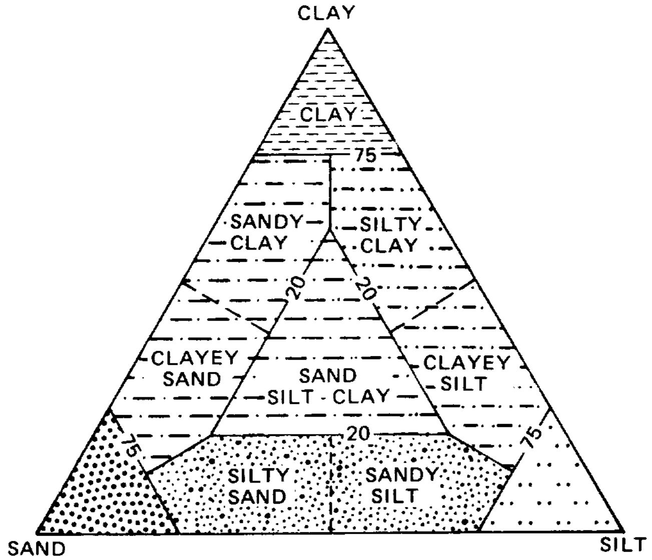


Figure A. Sediment classification after Shepard (1954) with the sand, silt, and clay size fractions based on the Wentworth (1922) Grade Scale; Sand, silt, and clay size particles having respective diameters of 2000 to 62.5 μm, 62.5 to 3.91 μm, and less than 3.91 μm. Shepard's (1954) sediment classification is a function of sand, silt, and clay size percentages and not composition.

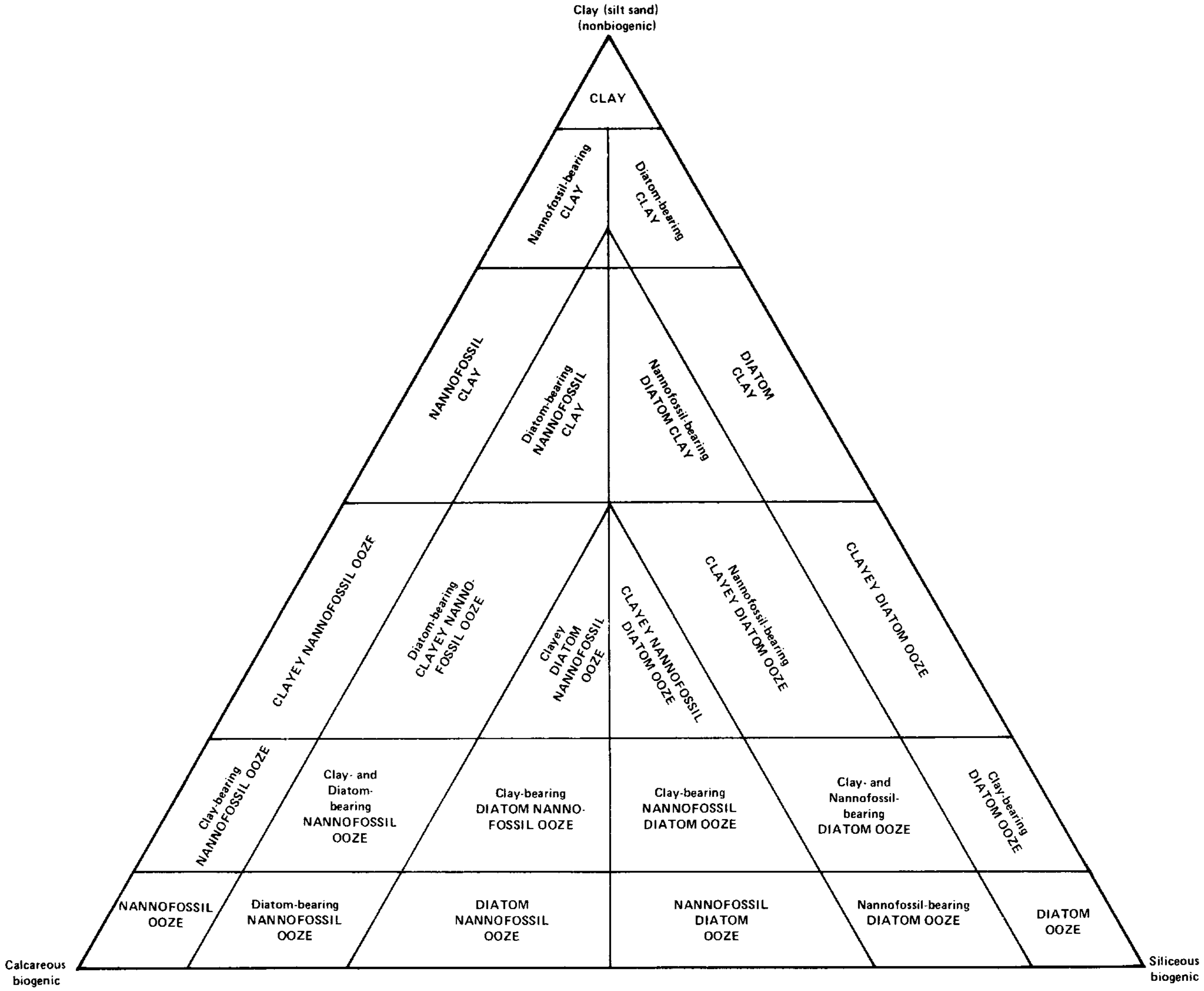
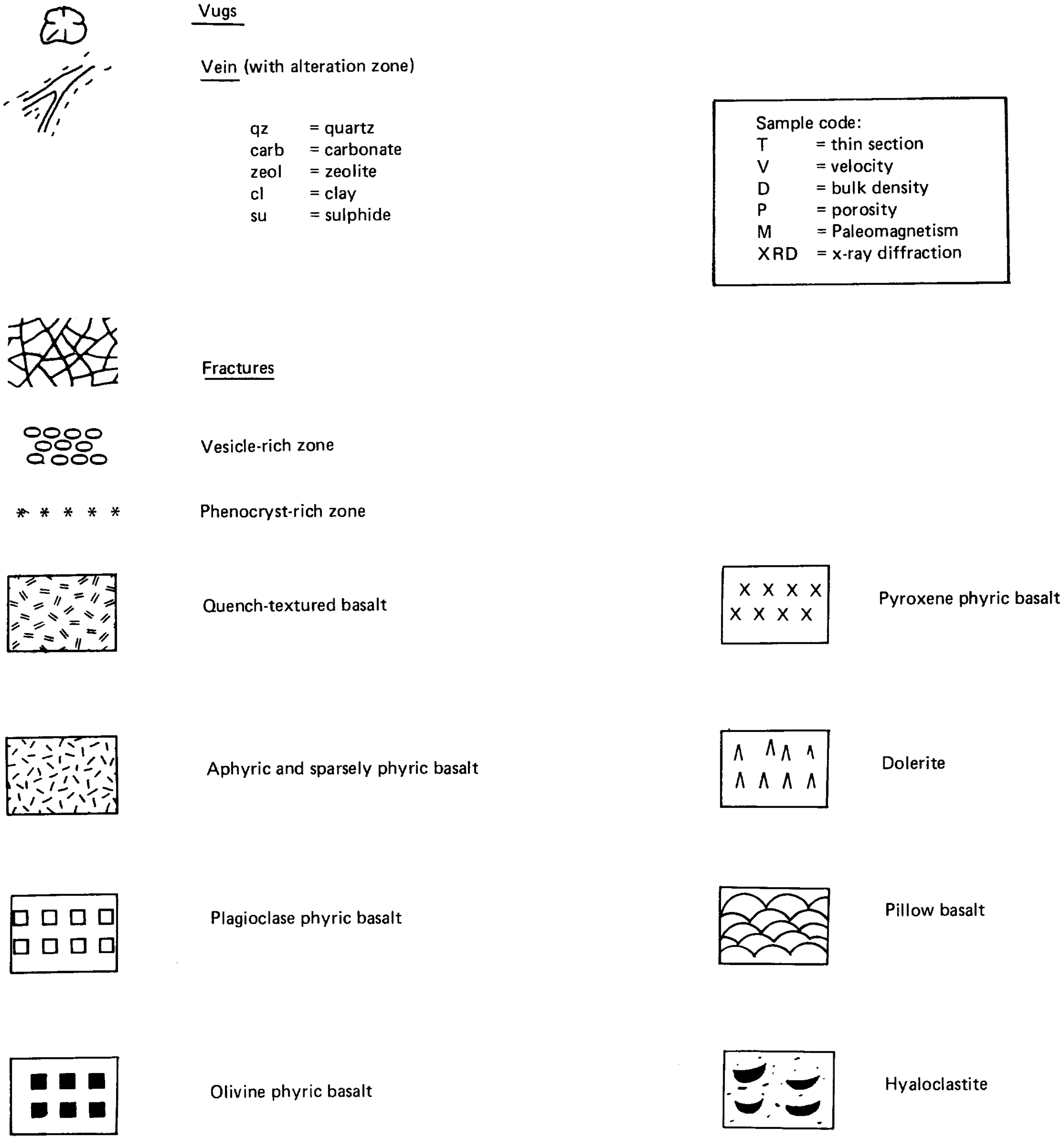


Figure B. Classification of the three-component system of nonbiogenic, siliceous biogenic, and calcareous biogenic.



qz = quartz
carb = carbonate
zeol = zeolite
cl = clay
su = sulphide

Sample code:
T = thin section
V = velocity
D = bulk density
P = porosity
M = Paleomagnetism
XRD = x-ray diffraction

Figure C. Igneous rocks — graphic symbols used on Leg 89.

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SAMPLE DISTRIBUTION POLICY

Deep Sea Drilling Project/International Phase of Ocean Drilling

Distribution of Deep Sea Drilling samples for investigation will be undertaken in order to (1) provide supplementary data to support *Glomar Challenger* scientists in achieving the scientific objectives of their particular cruise, and in addition to serve as a mechanism for contributions to the *Initial Reports;* (2) provide individual investigators with materials to conduct detailed studies beyond the scope of the *Initial Reports;* and (3) provide the reference centers where paleontologic materials are stored with samples for reference and comparison purposes.

The National Science Foundation has established a Sample Distribution Panel to advise on the distribution of core materials. This panel is chosen in accordance with usual Foundation practices, in a manner that will assure advice in the various disciplines leading to a complete and adequate study of the cores and their contents. Funding for the proposed research must be secured separately by the investigator. It cannot be provided through the Deep Sea Drilling Project.

The Deep Sea Drilling Project's Curator is responsible for distributing the samples and controlling their quality, as well as preserving and conserving core material. He also is responsible for maintaining a record of all samples that have been distributed, shipboard and subsequent, indicating the recipient and the natures of the proposed investigation. This information is made available to all investigators of DSDP materials as well as to other interested researchers on request.

The distribution of samples is made directly from one of the two existing repositories, Lamont-Doherty Geological Observatory and Scripps Institution of Oceanography, by the Curator or his designated representative.

1. Distribution of Samples for Research Leading to Contributions to *Initial Reports*

Any investigator who wishes to contribute a paper to a given volume of the *Initial Reports* may write to the Chief Scientist, Deep Sea Drilling Project (A-031), Scripps Institution of Oceanography, University of California at San Diego, La Jolla, California 92093, U. S. A., requesting samples from a forthcoming cruise. Requests for a specific cruise should be received by the Chief Scientist TWO MONTHS in advance of the departure of the cruise in order to allow time for the review and consideration of all requests and to establish a suitable shipboard sampling program. The request should include a statement of the nature of the study proposed, size and approximate number of samples required to complete the study, and any particular sampling technique or equipment that might be required. The requests will be reviewed by the Chief Scientist of the Project and the cruise co-chief scientists; approval will be given in accordance with the scientific requirements of the cruise as determined by the appropriate JOIDES Advisory Panel(s). If approved, the requested samples will be taken, either by the shipboard party if the workload permits, or by the curatorial staff shortly following the return of the cores to the repository. Proposals must be of a scope to ensure that samples can be processed and a contribution completed in time for publication in the *Initial Reports.* Except for rare, specific instances involving ephemeral properties, sampling will not exceed one-quarter of the volume of core recovered, with no interval being depleted and one-half of all core being retained as an archive. Shipboard sampling shall not exceed approximately 100 igneous samples per investigator; in all cases co-chief scientists are requested to keep sampling to a minimum.

The co-chief scientists may elect to have special studies of selected core samples made by other investigators. In this event the names of these investigators and complete listings of all materials loaned or distributed must be forwarded, if possible, prior to the cruise or, as soon as possible following the cruise, to the Chief Scientist through the DSDP Staff Science Representative for that particular cruise. In such cases, all requirements of the Sample Distribution Policy shall also apply.

If a dispute arises or if a decision cannot be reached in the manner prescribed, the NSF Sample Distribution Panel will conduct the final arbitration.

Any publication of results other than in the *Initial Reports* within twelve (12) months of the completion of the cruise must be approved and authored by the whole shipboard party and, where appropriate, shore-based investigators. After twelve months, individual investigators may submit related papers for open publication provided they have submitted their contributions to the *Initial Reports.* Investigations not completed in time for inclusion in the *Initial Reports* for a specific cruise may not be published in other journals until final publication of that *Initial Reports* for which it was intended. Notice of submittal to other journals and a copy of the article should be sent to the DSDP Associate Chief Scientist, Science Services.

2. Distribution of Samples for Research Leading to Publication Other Than in *Initial Reports*

A. Researchers intending to request samples for studies beyond the scope of the *Initial Reports* should first obtain sample request forms from the Curator, Deep Sea Drilling Project (A-031), Scripps Institution of Oceanography, University of California at San Diego, La Jolla, California 92093, U. S. A. On the forms the researcher is requested to specify the quantities and intervals of the core required, make a clear statement of the proposed research, state time required to complete and submit results for publication, and specify the status of funding and the availability of equipment and space foreseen for the research.

In order to ensure that all requests for highly desirable but limited samples can be considered, approval of requests and distribution of samples will not be made prior to 2 months after publication of the *Initial Core Descriptions (I. C. D.). ICD's* are required to be published within 10 months following each cruise. The only exceptions to this policy will be for specific instances involving ephemeral properties. Requests for samples can be based on the *Initial Core Descriptions*, copies of which are on file at various institutions throughout the world. Copies of original core logs and data are kept on file at DSDP and at the repository at Lamont-Doherty Geological Observatory, Palisades, New York. Requests for samples from researchers in industrial laboratories will be handled in the same manner as those from academic organizations, with the same obligation to publish results promptly.

B. (1) The DSDP Curator is authorized to distribute samples up to 50 ml per meter of core. Requests for volumes of material in excess of this amount will be referred to the NSF Sample Distribution Panel for review and approval. Experience has shown that most investigations can be accomplished with 10 ml sized samples or less. All investigators are encouraged to be as judicious as possible with regard to sample size and, especially, frequency within any given core interval. The Curator will not automatically distribute any parts of the cores which appear to be in particularly high demand; requests for such parts will be referred to the Sample Distribution Panel for review. Requests for samples from thin layers or important stratigraphic boundaries will also require Panel review.

(2) If investigators wish to study certain properties which may deteriorate prior to the normal availability of the samples, they may request that the normal waiting period not apply. All such requests must be reviewed by the curators and approved by the NSF Sample Distribution Panel.

C. Samples will not be provided prior to assurance that funding for sample studies either exists or is not needed. However, neither formal approval of sample requests nor distribution of samples will be made until the appropriate time (Item A). If a sample request is dependent, either wholly or in part, on proposed funding, the Curator is prepared to provide to the organization to whom the funding proposal has been submitted any information on the availability (or potential availability) of samples that it may request.

D. Investigators receiving samples are responsible for:

(1) publishing significant results; however, contributions shall not be submitted for publication prior to 12 months following the termination of the appropriate leg;

(2) acknowledging, in publications, that samples were supplied through the assistance of the U. S. National Science Foundation and others as appropriate;

(3) submitting five (5) copies (for distribution to the Curator's file, the DSDP repositories, the *Glomar Challenger's* library, and the National Science Foundation) of all reprints of published results to the Curator, Deep Sea Drilling Project (A-012), Scripps Institution of Oceanography, University of California at San Diego, La Jolla, California 92093, U. S. A.;

(4) returning, in good condition, the remainders of samples after termination of research, if requested by the Curator.

E. Cores are made available at repositories for investigators to examine and to specify exact samples in such instances as may be necessary for the scientific purposes of the sampling, subject to the limitations of B (1 and 2) and D, with specific permission of the Curator or his delegate.

F. Shipboard-produced smear slides of sediments and thin sections of indurated sediments and igneous and metamorphic rocks will be returned to the appropriate repository at the end of each cruise or at the publication of the *Initial Reports* for that cruise. These smear slides and thin sections will form a reference collection of the cores stored at each repository and may be viewed at the respective repositories as an aid in the selection of core samples.

G. The Deep Sea Drilling Project routinely processes by computer most of the quantitative data presented in the *Initial Reports.* Space limitations in the *Initial Reports* preclude the detailed presentation of all such data. However, copies of the computer readout are available for those who wish the data for further analysis or as an aid in selecting samples. A charge will be made to recover expenses in excess of $50.00 incurred in filling requests.

3. Other Records

Magnetics, seismic reflection, downhole logging, and bathymetric data collected by the *Glomar Challenger* will also be available for distribution at the same time samples become available.

Requests for data may be made to:

Associate Chief Scientist, Science Services
Deep Sea Drilling Project (A-031)
Scripps Institution of Oceanography
University of California at San Diego
La Jolla, California 92093

A charge will be made to recover the expenses in excess of $50.00 in filling individual requests. If required, estimated charges can be furnished before the request is processed.

4. Reference Centers

As a separate and special category, samples will be distributed for the purpose of establishing up to five reference centers where paleontologic materials will be available for reference and comparison purposes. The first of these reference centers has been approved at Basel, Switzerland.

Revised 8/1/80

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SCRIPPS INSTITUTION OF OCEANOGRAPHY
Deep Sea Drilling Project

LA JOLLA, CALIFORNIA 92093

The accompanying informal report is a summary of the scientific results of Leg 89 of the Deep Sea Drilling Project, prepared from the shipboard files by the scientists who participated in this cruise. The material contained herein is privileged proprietary information and cannot be used for publication or quotation.

This summary was assembled under time restrictions and is not to be considered a formal publication which incorporates final works or conclusions of the scientists.

The Deep Sea Drilling Project, undertaken on the advice of JOIDES, is managed by Scripps Institution of Oceanography under contract from the National Science Foundation.

Y Lancelot

Yves Lancelot
Chief Scientist

SUMMARY OF DEEP SEA DRILLING PROJECT, LEG 89

The scientific party aboard D/V Glomar Challenger for Leg 89 of the Deep Sea Drilling Project, International Phase of Ocean Drilling, consisted of:

Ralph Moberly (Hawaii Institute of Geophysics, Honolulu, Hawaii)
Co-Chief Scientist
Seymour O. Schlanger (Northwestern University, Evanston, Illinois)
Co-Chief Scientist
Miriam Baltuck (DSDP, Scripps Institution of Oceanography, La Jolla, California)
James A. Bergen (Florida State University, Tallahassee, Florida)
Walter Dean (U.S. Geological Survey, Denver, Colorado)
Peter A. Floyd (University of Keele, Keele, United Kingdom)
Naoyuki Fujii (Kobe University, Kobe, Japan)
Janet A. Haggerty (University of Tulsa, Tulsa, Oklahoma)
James G. Ogg (University of Wyoming, Laramie, Wyoming)
Isabella Premoli Silva (Istituto di Paleontologia, Milano, Italy)
Andre Schaaf (Institut de Geologie, Strasbourg, France)
Rainer G. Schaefer (Institut für Erdöl und Organishche Geochemie, Jülich, Federal Republic of Germany)
William V. Sliter (U.S. Geological Survey, Reston, Virginia)
Jill M. Whitman (Scripps Institution of Oceanography, La Jolla, California)

Attached is a brief summary of the scientific activities of Leg 89.

INTRODUCTION

The theme of DSDP-IPOD Leg 89 was the Mesozoic geologic history of the oldest remnant of seafloor in the Pacific. Jurassic-age crust and its overlying Jurassic and Cretaceous section were expected to provide a record of what in Mesozoic time was the world's "super-ocean," much larger than the present-day Pacific because the Atlantic and Indian oceans were narrow or nonexistent then.

Glomar Challenger left Yokohama, Japan, shortly after midnight on 11 October 1982 and arrived at Noumea, New Caledonia, on the evening of 29 November. Three sites approved by JOIDES were drilled (Fig. 1). The first two lie in deep water on Jurassic-age crust in the Western Pacific Ocean, where the purpose was to penetrate to basement to obtain a truly oceanic record back into the Jurassic. The third site, on an oceanic plateau in the western equatorial Pacific, was assigned to Leg 89 by JOIDES in order to reduce Leg 90's travel time. It is the northernmost of a set of Neogene sites to be traversed mainly by Leg 90.

SITE 585: MARIANA BASIN

Scientific and Operational Background

Western Pacific Site MZP-6, one of several MZP sites considered for the Mesozoic Pacific program of the JOIDES Ocean Paleoenvironment Panel, was selected on the basis of site surveys carried out by the

Hawaii Institute of Geophysics and the Scripps Institution of Oceanography. The general area occupied by the east Mariana Basin was considered a favorable one in which to reach Jurassic strata because the water depth and magnetic anomaly patterns indicated that the basin was underlain by 150 to 160 m.y. old lithosphere. DSDP Site 199 had been drilled 40 n.mi. to the west of proposed MZP-6 (now 585); Campanian limestone, underlain by lithified tuff, was cored there. Forty nautical miles south of MZP-6, DSDP Sites 200, 201, and 202 were drilled atop Ita Maitai Guyot. On Ita Maitai early Eocene to Recent foraminiferal ooze overlies hard oolitic limestone and lagoonal coraliferous mud of indeterminate age. In August 1981 dredge hauls taken from Ita Maitai Guyot by R/V *Kana Keoki* recovered *Inoceramus*-bearing limestones indicating that Ita Maitai Guyot was accumulating shallow-water sediment in, probably, Late Cretaceous time (S. Schlanger, unpublished HIG data).

The Campanian tuffs found at Site 199 were believed to be the product of Late Cretaceous edifice building volcanism which formed, among other seamounts that lie around the perimeter of the east Mariana Basin, Ita Maitai Guyot. The ubiquitous character of Cretaceous mid-plate volcanism in the western Pacific prepared us for encounters with volcanogenic sediments but the east Mariana Basin was, it seemed, the best bet for reaching the Jurassic objectives. On the basis of the site surveys and the Site 199 results, MZP-6 was predicted to have a 1200 m-thick sedimentary section over Jurassic-age crust, and would require multiple reentry to penetrate basement.

Recovery of the section between 800 and 1200 m at MZP-6 was by far the single most important objective of Leg 89.

The drilling program for the site was changed by DSDP when we arrived in Japan, to exclude re-entry, even though all JOIDES planning for MZP-6, and JOIDES communications with DSDP and DSDP scheduling had always been in terms of re-entry because of the thick and hard section that likely existed, and the uncertainties of weather and mechanical accidents. New engineering calculations, however, predicted that the drill string would be endangered by dynamic stresses at such depths. This surprising new limitation on operations led to telephone calls, to the effect that shortly before leaving Yokohama, we were assured that if we made a reasonable attempt to drill an extended pilot hole to bit destruction, we could commence a re-entry operation.

Except for a northeasterly gale as we left Tokyo Bay, and the edge of tropical storm Owen as we approached our first site, our passage southeast from Japan was smooth and without major incident. The standard DSDP geophysical gear was deployed as we crossed the Bonin Trench and Magellan Seamounts enroute to the Mariana Basin. At 1534L on 18 October we turned south, crossing a guyot of the Magellan Seamounts to approach the flat-floored Mariana Basin site at right angles to the reflection profile that had been used for site selection. We launched the beacon for MZP-6, which then became Site 585, at 2122 hr. The depth of water was determined to be 6112 m.

Because JOIDES Planning Committee realized that the deep Lower Cretaceous and Jurassic section was the principal objective, and because the upper sedimentary section was expected to be made of turbidites emplaced well below the CCD, the Planning Committee had decided that its standing policy of continuously coring all holes could be waived for the post-Eocene section. After a jet-in test for the re-entry hole we expected to drill, we washed to 255.9 m, where firm sediments including fragments of porcellaneous chert in a spot core forced us to commence continuous coring.

We obtained fair to poor recoveries of Paleogene chalks, cherts, and mudstones, and Latest Cretaceous zeolitic mudstones and cherts, to about 485 m. Recovery of Middle Cretaceous mudstones with radiolarian-rich layers was good to 560 m, but poor below that. The lowest lithologic unit encountered, of hyaloclastite debris with admixtures of shallow-water skeletal debris, yielded poor recoveries to 630 m and then good recovery to total depth of the hole. Significant features of the sediments and their fossils, geochemistry, paleomagnetism, and physical properties is in the following section and summarized in Figure 2.

After retrieving Core 55 during the morning of 26 October, the next core barrel dropped into the drill string wedged into the liner of a poorly machined landing subassembly. It was impossible to circulate, and although four runs of the sand line were attempted to pull the barrel from the liner, we were unsuccessful. Pull on the sand line was limited because of the weight of the line itself at these depths.

As there was no re-entry cone set, the hole had to be abandoned at a total depth of 6886 m of drill string, 763.7 m below the seafloor. The drilling crews tripped out of the hole, having the last of the bottom-hole assembly (BHA) on board at 0410 hr. on 27 October. Thus, 8 days, 6 hr., 43 min. were expended drilling this hole. The core barrel was cut from the assembly and examined, confirming the cause of wedging.

The bit was also examined closely. It had been in use 29 hr. 53 min. Few teeth showed more than modest wear. Seals of two sets of bearings were still good, one seal was leaking, but the fourth seal and bearings had failed. The cone using those bearings was wobbly.

During the time of tripping the drill string out of the water we received a DSDP message that re-entry must not be attempted at this site. After weighing the highest leg priority of reaching Jurassic sediment and crust at this site versus the chance of reaching those objectives in another single-bit attempt, versus the other leg objectives, and in consideration of the interests of the scientific party, we decided to try a single-bit hole here again. We planned to wash and drill to the old total depth as rapidly as possible, with strong pumping, removing core barrels with the sand line wherever drilling characteristics indicated they may be full. Some spot cores would be taken in the probable intervals of most scientific value.

During the trip into Hole 585A on 27 October the seas and weather remained excellent, with light airs to 6-knot winds, 3-ft. swells, and rolls and pitch of 2°. By 0313 on 28 October we had washed to 363.7 m and pulled the first wash-core, a rubble of broken pieces of mudstone with some short cored pieces of gray mudstone and chalk. We alternated washing and taking groups of spot cores to 772 m, one joint of pipe beyond the total depth of Hole 585. At that point near noon on 30 October, the bit had already rotated 20 hr. 20 min. From that point, excepting for one washed interval of 9 m, we cored continuously to the total depth of Hole 585A.

Cores 585A-11 through -22 remained in a dominantly volcaniclastic section that generally resembled the lower part of 585. These firm sandstones, mudstones, and breccias were cored slowly, especially below 800 m depth, but gave good recovery, compared to most of Hole 585 and the upper part of 585A. Our average recovery was 70.2%, obtained at an average penetration of 7.2 m/hr. A slower drilling rate below 800 m may identify that depth as being equal to the 9.0 s reflector in the site survey seismic-reflection profile (Fig. 3). Further petrographic work ashore, on cements or composition or other aspects of these rocks, can test that possible explanation. Alternatively, perhaps 800 m is the depth at which the bit began to fail to cut well.

During 31 October the ship's motion increased in a rising wind and swell. Occasional excursions of the drill string weight to the operating limits named for this site resulted from the 6970 m of drill string and the ship's motion. After Core 585A-17 was recovered at 1122 hr. on 31 October, the drill string was raised from 848 m to about 243 m, to remove sufficient weight for the safety of the drill string. By the early morning of 1 November the swell and wind diminished to a degree that we lowered the drill string and commenced coring again. We cut the final six cores on 1 November.

Two events took place simultaneously late on 1 November. Penetration while cutting Core 585A-22 stopped at 7.7 of the planned 9.2 m and the drilling crew reported that the torquing or rotational behavior of the drill string indicated to them that the bit had failed. Meanwhile the swell and wind had increased, and because it was night the ship's officers could not observe the direction of the swell to attempt to improve the heave by trying a better ship's heading. Loss of the bit already meant that Hole 585A would have to be abandoned, but we could not at that moment ready ourselves for logging by dropping the bit at the total depth of 892.8 m, because the core barrel with Core 585-22 was still within the lower subassembly of the bottom-hole assembly. The increased ship's motion which exposed the drill string to its posted limit would not allow the drilling crew the time to run the sand line to recover the barrel. Rather, the ship's motion resulted again in a decision to pull the drill string up several hundred meters to 280 m, to lessen its weight. Core 585A-22 was retrieved only after the string had been shortened. Decreased diameter of the core in 585A-22 was additional evidence that the bit had failed.

We intended to wait until the weather improved in order to rerun pipe to drop the bit at the bottom of the hole so we could then pull up and log. We could not pull out to drop the bit on the seafloor because there was no cone to allow re-entry, nor could we leave for a nearby site of low priority such as Ita Maitai Guyot, and drill there until the weather cleared and return and re-enter 585A to deepen or log.

We did not believe that dropping the bit while high in the hole would be successful. Almost certainly the bit and its release sub would wedge at one of the harder ledges part way down and thus block the logging runs. By noon on 2 November we reviewed the forecasts for sea state and weather. No significant change, except possibly a worsening, could be expected in the 5-ft. swells and 20-knot winds for the next 48 hr. The oceanographic atlases gave scant hope for any general improvement in November. Without such a limit as was imposed on our string length, which reached 7015.1 m at total depth, one might have characterized the weather and sea as mild. A current estimated by the Master as up to 2 knots was now running from the southeast, and as the 5-ft. swell was now from the northeast, maintenance of position in the current would put the swell on the beam. That configuration, in fact, caused us to pull up an additional 115 m closer to the seafloor shortly before noon. Faced with a delay of at least 48 hr. and no good chance of improvement even after that, we reluctantly decided to leave the site without logging. Also, we could not waste additional JOIDES time waiting to attempt yet another futile single-bit hole at this site. Thus we neither accomplished our primary leg objective of penetrating Lower Cretaceous and Jurassic sedimentary rocks and oceanic crust in the Mariana Basin, nor one of our lesser objectives, of logging there.

Geology of Site 585

The sedimentary section recovered at Site 585 was divided into six lithologic units, as follows:

Unit I: 0-7 m nannofossil ooze and brown clay (Pleistocene)

Unit II: 256-399 m nannofossil chalk, siliceous limestone, chert, and zeolitic claystone (middle Eocene to Maestrichtian)

Unit III: 399-426 m Zeolitic claystone, with nannofossil claystone, chalk, and chert (Maestrichtian and upper Campanian)

Unit IV: 426-485 m Chert and zeolitic claystone (Campanian)

Unit V: 485-590 m Claystone, locally with significant zeolites, graded radiolarian fine sands, thin laminae rich in organic carbon, and carbonate (Campanian to middle Albian)

Unit VI: 590-893 m Volcanogenic sandstones, mudstones, and breccias, with admixtures of shallow-water debris (middle Albian to upper Aptian)

Unit I

A core at the seafloor recovered pelagic clay with layers of redeposited carbonate ooze of mixed ages. We interpreted the assemblage to be the distal parts of turbidites carried to the basin floor, which lies below the CCD.

Unit II

Most material recovered from Unit II consists of white to light-gray nannofossil chalk showing varying degrees of diagenesis by $CaCO_3$ and SiO_2 towards chalk, limestone, siliceous limestone and chert. Interbeds of brown zeolite-bearing claystone are common, and increase in abundance below about 360 m.

Diagenetic silicification of carbonate ooze has resulted in a highly variable percentage of $CaCO_3$ which ranges from less than 20% in siliceous limestone to at least 85% in chalks. X-ray diffraction results from samples of zeolitic claystones show that the most abundant minerals identified are smectite, clinoptilolite, quartz, and calcite; less abundant minerals identified are celadonite, siderite, and nontronite(?). Small pieces of native copper were observed in a sample of claystone from Core 585-13. This thin zeolitic claystone may be the product of an Eocene ash fall.

Unit III

The dominant lithology of Unit III is dark-brown zeolite-bearing to zeolitic claystone with variable amounts of $CaCO_3$ as nannofossils and unspecified carbonate that presumably is present as cement. Grading is apparent in many of the units but it is usually very subtle. The bases of several carbonate-rich layers have thin laminae of silty, redeposited hyaloclastic material. XRD results from samples of brown claystone show that the most abundant minerals are quartz, clinoptilolite, smectite, celadonite, calcite, and siderite.

Unit IV

The most common material interbedded with the chert is brown zeolite-bearing claystone. Textures and fabrics observed in the larger chert fragments suggest that some chert formed by silicification of graded carbonate grainstones. A contrast in burrow preservation is taken as evidence that silicification of the limestone took place before the host chalks were significantly compacted. Further, microfossils in the silicified limestone appear to be less crushed than the fossils in the chalk. The percentage of $CaCO_3$ in the silicified limestones varies widely as in Unit II; petrographic observations of these $CaCO_3$-rich silicified limestones suggest that silica is added to the limestone as a pore filling rather than as a pervasive replacement. Silicification and chertification are commonly associated with current-worked laminae or with the basal parts of graded sequences, probably because the greater porosity of these coarser sediments allows easier access to pore fluid circulation.

The upper part of Unit IV, with turbidite bedding, contains crystal, altered vitric and lithic fragments, as well as abundant zeolite. Crystal fragments are generally small (less than 4 mm) and are composed of broken feldspar, An_{60-70} (up to 50%), pale brown titanaugite, smectite-pseudomorphed olivine and rare euhedral apatite. Lithic fragments can make up to 25-30% and are largely plagioclase-phyric (now highly oxidized) glass with or without plagioclase microlites, together with a granular plagioclase-clinopyroxene (augite) basalt. Vesicular glass fragments (largely replaced by brown smectite and palagonite) have sharp points and cuspate margins typical of hyaloclastite deposits. At about 680 m depth are two reworked hyaloclastite layers within a turbidite sequence. The lower layer is distinguished by containing a variety of relatively large subrounded and angular basaltic clasts, ranging in size from 7-40 mm. Some of the more angular clasts exhibit a thin dark glassy rim, although others (more rounded) have only a portion of glassy margin or none at all. Most basalts are poorly or nonvesicular, and variably olivine-, clinopyroxene-, or plagioclase-phyric.

Unit V

The dominant lithology of Unit V is claystone, with varying amounts of zeolites, calcite, and radiolarians. Unit V was subdivided on the basis of color and the relative abundances of these three components.

The upper subunit consists of dark reddish-brown and olive-black zeolite-bearing claystone that is very low in carbonate content. Other minor components include feldspar, altered volcanic glass, and iron oxides. Plant fragments were found in a foraminifer preparation of a sample of a 0.5-cm dark band in Core 585-27-3, 138 cm. The claystone is mostly massive-appearing, but some is moderately bioturbated. Silty laminae form the bases of graded sequences.

The middle subunit consists mainly of dark gray claystone with variable concentrations of recrystallized radiolarians, calcite, nannofossils, and zeolites. The recrystallized radiolarians usually are concentrated in sandy layers, lenses, or stringers. Some fining-upward graded sequences are evident, one being over 3 m thick.

In Cores 585-32 and 585A-8 dark gray claystone contains common black flakes of organic-rich material (plant debris?) that are oriented parallel to stratification. A 2-cm thick black pyritic silty claystone containing about 5.4% organic carbon in Core 585, 32 cm occurs at the top of a fining-upward graded sequence, just above bioturbated claystone, and just below parallel- and cross-laminated siltstone of the overlying graded sequence. Near the base of Core 585A-8 is a 3-mm thick band of black sandstone consisting mainly of coated recrystallized radiolarians and flecks of black organic matter. This black layer contains 1.4% organic carbon, and clearly represents a single pulse or influx of both radiolarians and organic debris. The influx of organic debris then continued but at a much reduced rate, manifested as black flecks mixed with the overlying siltstone that decrease in abundance upward for 1 cm. The nature and origin of these organic carbon-rich layers are discussed below in reference to the Cenomanian-Turonian Oceanic Anoxic Event.

The lowest subunit consists of claystone with abundant but highly variable concentrations of radiolarians and calcite, as a result of interbedding of dark gray claystone, red nannofossil-bearing claystone and clayey limestone, radiolarian-bearing limestone and clayey limestone. Parallel laminations are common, and several graded units are apparent. These structures are interpreted as indicating that these rocks are distal turbidites.

Unit VI

Unit VI is a thick section of volcaniclastic sediments in fining-upward graded sequences that may be more than several meters thick, and commonly have bases of coarse sandstone or breccia. The bases of a few of the graded sequences consist of sand-size carbonate clasts or interlaminated or mixed carbonate and volcanogenic clasts. Most of the graded sequences grade upwards into fine-grained tops of mudstone. The Albian section in Hole 585 contains scattered skeletal debris of echinoids, molluscs and ostracods in addition to individual ooids. The Aptian section in Hole 585A in contrast contains an abundance of ooids in association with fragments of calcareous algae, rudists, bryozoans, small gastropods and tests of orbitolinid foraminifers. In addition to the individual ooids and skeletal fragments, the coarse volcaniclastic units contain fragments of calcite-cemented, sorted, ooid- and orbitolinid-bearing limestone. Although many of the ooids are severely micritized, some can be seen to have cores of volcanic rock fragments suggesting that a subaerial volcanic edifice was being eroded when the ooids were forming. Other common components include altered volcanic glass, zeolites, celadonite, clay minerals, and volcanic lithic and crystal fragments.

Many of the graded sequences in Unit VI show well-developed and relatively complete Bouma turbidite sequences. The bases of many of the coarser sandstone beds at the bottom of graded sequences are scoured into the underlying bed or have load casts. We conclude that the graded sequences as deep as Hole 585A, Core 16 are turbidites.

Below that, the unsorted nature of the clasts, their extreme size range up to boulder-size clasts that have been truncated by the core, and the heterogeneity of clast composition, ranging from volcanic fragments, shallow-water carbonate debris, and subrounded fragments of siltstone and claystone suggest that this material is part of one or more debris-flow deposits.

From 700 to 850 m is a turbidite sequence of volcaniclastic mudstone to breccia, containing crystal and lithic fragments. The crystal fragment content is highly variable from about 20 to 80% and is composed of feldspar, altered olivine and some clinopyroxene. Basaltic clasts are angular, fine-grained (size range, 2 to 10 mm) and generally plagioclase- or olivine-phyric. Some are probably alkali basalts with pale purple titanaugite forming much of the groundmass. Highly feldspathic and Fe-ore-rich trachytes are also common. Glass fragments are oxidized, highly vesicular and commonly contain large augite and olivine phenocrysts.

Next deepest in Unit VI is a relatively coarse volcaniclastic sediment featuring grayish red tabular fine-grained sediment clasts (1-6 cm long) in a dark green sandstone matrix. Apart from the usual glassy fragments, the unit is also characterized by variably sized basaltic clasts (usually less than 10 mm) that can also reach cobble dimensions; one large clast measured 15 cm across and was terminated by the core diameter. As the large volcanic and sediment clasts are poorly sorted and matrix supported, they probably represent a debris flow. At the base of Hole 585A are pieces of reworked, poorly vesicular, hyaloclastite, altered to dark-green smectite.

Throughout Unit IV, both the vesicular and nonvesicular glass fragments are characteristic of submarine hyaloclastite deposits. Vesicles are generally small (less than 0.5 mm) and indicate relatively deep water for the hyaloclastite formation. They were transported to their resting place on the floor of the mid-Cretaceous Mariana Basin by turbidity currents and debris flows.

Other components of the volcanogenic section include rounded and angular basalt and trachyte clasts near 700 m, which were probably the transported products of differentiated alkaline volcanism. The rare occurrence of a lower amphibolite facies amphibolite at about that depth may indicate turbidity current sampling of a submarine fault scarp exposing metamorphosed (Jurassic?) oceanic crust. Zeolite veining and zeolite-rimmed vugs are relatively common below 820 m depth. Analcite and phillipsite have been found in the upper layers and heulandite at greater depth.

Fossil assemblages recovered reflect the turbiditic nature of the sediments: the majority of sediments recovered from Site 585 are transported and reworked deposits. Indeed, few intervals of autochthonous pelagic clay were recovered throughout the cored sequence. Younger aged material typically is masked by the influx of older, often better preserved fossil material, thus commonly obscuring the biostratigraphic signal. Consequently, the ages reported must be considered maximum ages and many may in fact be considerably younger.

Sorting by shape and size are characteristic attributes of the foraminiferal and radiolarian assemblages. The recovered specimens are small-sized adults and juveniles that range in size from 45 to 149µm. Deposition below the CCD also has strongly altered the character of the calcareous and siliceous fossils due to dissolution and recrystallization. Biostratigraphic assignments for the cored sections are shown on Figure 2.

A synthesis of the biostratigraphic events in Hole 585 based on the three fossil groups, namely calcareous nannoplankton, foraminifers both planktonics and benthics, and radiolarians shows that some stratigraphic intervals could not be identified. That does not imply that the succession is not continuous. The generally poor recovery, the fact that the autochthonous sediments are devoid of age-diagnostic species, and the turbiditic character of the other sediments which contain index species prevent any sort of biostratigraphic refinement. In particular, there is no evidence for the presence of most of the Paleocene: the few nannofossil and planktonic foraminiferal zonal assemblages recorded were either reworked into the Eocene sequence or mixed with younger zones within the Paleocene. Moreover, late and middle Maestrichtian assemblages occur only mixed within the Tertiary sequence. The Cretaceous/Tertiary boundary is tentatively placed between Cores 16 and 17 of Hole 585 and in 3 of 585A. Cores 585-29 and -30 seem to span the interval from Santonian through late Turonian. The Cenomanian/Turonian boundary is placed within Core 585-32 and in 585A-9. The early Cenomanian and late Albian interval may be located between Cores 585-15 and -16 and 585A-9 and -10, but the poor recovery prevents further resolution. Cores 585A-11 to -22 are dated as late Aptian.

The most complete intervals recorded are from:

- early middle Eocene to latest Paleocene,
- Campanian, and
- early late Albian to late Aptian.

Benthic foraminifers recovered from sediments of Site 585 consist of three groups: (1) autochthonous abyssal species, (2) transported bathyal species, and (3) transported neritic and shallow-water species. The autochthonous group consists of agglutinated species that are interpreted to be most characteristic of water depths between 5000 and 6000 m or closely analogous to the present water depth of the East Mariana Basin. This assemblage is found in the reddish brown zeolitic claystones that represent pelagic sedimentation between turbiditic episodes, and is associated solely with fish debris and recrystallized radiolarians. The abyssal assemblage is found in Cores 585-15 to -54 which indicates that the entire sequence from the late Aptian to the Recent was deposited at abyssal water depths.

A bathyal foraminiferal assemblage consists of small, size-sorted specimens that are characteristic of water depths above 2500 m. The assemblage is found predominantly in the laminated intervals and coarse basal units of graded sequences that represent distal, gravity-flow deposits. In intervals devoid of shallow-water material, the assemblage is associated with size-sorted radiolarians, planktonic foraminifers, and sponge spicules. The bathyal assemblage is found throughout Hole 585. Of special interest are the occurrences of transported bathyal species in Core 585-32-2 and -4, that flank the organic-carbon-rich layer in Section 3.

The third group consists of benthic species characteristic of neritic or shallow-water environments. Included are neritic species of genera such as *Patellina*, *Textularia*, and species of miliolids, polymorphinids and nodosariids. Also included in this group are specimens of larger, shallow-water foraminifers such as *Orbitolina*, complex agglutinated forms such as *Cuneolina*, and some attached agglutinated species. The neritic or shallow-water forms occur typically in the coarser basal layers of turbiditic sequences that also contain debris of shallow-water origin such as echinoid fragments and spines, ostracodes, bivalve fragments, sponge spicules, fecal pellets and very rare algal fragments in addition to ooids. Neritic species and shallow-water fossil debris are particularly noticeable in the middle Albian sequence of clastic carbonates and volcaniclastic turbidites (Fig. 3). Noticeably lacking however, are *Inoceramus* prisms, thick-shelled bivalve and rudist fragments, and shallow-water algal debris typical of reefal environments and recovered from both Cenozoic and Mesozoic sediments of Leg 61 in the Nauru Basin. In Hole 585A-11 to -20 do contain rudist fragments in association with neritic and shallow-water foraminifers, algal fragments, bryozoans, bivalve fragments, echinoid debris and ooids.

In summary, the late Aptian Cores 585A-18 to -20 contain the greatest abundance of shallow-water material in association with volcaniclastic debris flows. This material decreases in abundance, diversity and coarseness through the late Aptian-early Albian section of Hole 585 from total depth up to Core 585-48. In Cores 585-36 to -44 of middle and late Albian age the transported material is predominantly neritic in nature, small-sized including the rare macrofossil fragmented material and indicative of distal turbidite deposits. Cores 585-29 to -34 of Cenomanian through Santonian age in Hole 585 contain transported foraminifers that are bathyal in nature. Abyssal foraminifers are particularly in evidence in the Maestrichtian to Paleocene Cores 585-15 to -20 of Hole 585 characterized by zeolitic claystones and chert.

Four pulses of sedimentation separated by apparent unconformities or reductions in sedimentation are recorded in the sedimentary section at Site 585. These four are from late Aptian to late Albian, from middle Cenomanian to Turonian, from Campanian to early Paleocene, and from latest Paleocene to middle Eocene time. Sedimentation rates for the Cenomanian to Eocene pulses range from about 5 to 10 m/m.y. and apparently reflect the lessening of volcanogenic sediment transported into the basin or the waning of major edifice building volcanism. Unconformities or much reduced rates of sedimentation are apparent during the late Albian to early Cenomanian, the Coniacian to Santonian and the middle and late Paleocene. The rapidly deposited section represented by the 303 m of volcaniclastic turbidites and debris flows of Unit VI accumulated at a rate of approximately 40 m/m.y. during late Aptian to late Albian time. This is a minimum rate because the base of the late Aptian was not reached.

Preliminary NRM measurements show the Paleocene-Maestrichtian chalks and zeolitic claystones have mixed polarity with a strong normal overprint. The early Campanian reversal-polarity interval is tentatively identified in the gray volcanogenic claystones of Cores 585-28 and 585A-5. Underlying Turonian claystones in both holes yield an average paleolatitude of 2.3°S ±3.0°. Middle and early Albian volcaniclastic turbidites yield a paleolatitude of 8.2°S ±2.5°; the late Aptian volcaniclastic turbidites yield a paleolatitude of 11.7°S ±1.5°. A mixed polarity interval in Cores 585A-14 and -15 (late Aptian) is tentatively correlated to reversal clusters at other DSDP sites and land sections and to an unnamed marine magnetic anomaly, and is provisionally called M"-1." Compilation of Cretaceous paleomagnetic data from DSDP Sites 289, 462, and 585 indicates that the western Central Pacific had a 4.5 cm/yr. northward component of motion (relative to the magnetic dipole or spin axis) between the Aptian and Campanian.

Measurements made of cores from Holes 585 and 585A include wet bulk density, water content, porosity, and compressional sonic velocity. A somewhat systematic variation in velocity and density with depth allowed the division of the drilled section into acoustic units which further allowed a correlation to be made between the seismic profiles and the lithology of the section (Fig. 3). Closely spaced velocity and density measurements made throughout a single, thick volcaniclastic turbidite unit that spanned Cores 585A-17 through -20 gave velocities at the top of the unit of approximately 3.0 km/s whereas those at the base of the unit approach 4.0 km/s. At 800 m depth in Hole 585A a marked increase in velocity and density result in a calculated reflection coefficient of 0.142 at 8.96 s two-way travel time. We therefore interpret the "9 s" reflector of the site survey to be a high velocity layer in the Aptian volcaniclastic section rather than a reflection produced by the predicted Mesozoic pelagic sediment section.

A combination of paleontologic, lithologic and organic geochemical data indicates that the Cenomanian-Turonian Oceanic Anoxic Event left its record in the sediments cored at Site 585. In Core 585-32-3, a 2-cm thick band of black, pyritic silty claystone lies within a turbidite sequence. The sediments directly below the black band are bioturbated claystone; directly above the black band, in very sharp contact (assuming no missing section) are 1 cm of plane-laminated siltstone overlain by a 2-cm thick bed of cross-laminated siltstone. Organic carbon percentages from samples studied in Hole 585 are all well below 1.0% except for two replicate analyses of the black band at 72 to 73 cm in Core 585-32-3 which yielded C_{org} values of 5.6 and 5.1%. Rock-Eval data from this interval showed the following:

S_1 = 0.042 mg hydrocarbon/g

S_2 = 51.5 mg hydrocarbon/g

S_3 = 1.78 mg CO_2/g

HI = 954 mg hydrocarbon/g C_{org}

OI = 33 mg CO_2/g C_{org}.

The HI (Hydrogen Index) and OI (Oxygen Index) values plotted on a van Krevelen diagram show that this sample falls exactly on the initial part of the type-I kerogen evolution path; the rock is a typical sapropelic oil shale. The organic carbon in the black band is of marine algal origin. Paleontological data show that in Cores 585-32-2 and -32-4, sections which lie directly above and below Core 585-32-3, transported bathyal species are found. The C_{org}-rich black band in Core 585-32-3 is in the *W. archeacretacea* Zone that straddles the Cenomanian/Turonian boundary.

A second C_{org}-rich layer of somewhat different character was cored in Hole 585A. In Core 585A-8,CC a thin layer, 1 cm thick of a black sediment composed of recrystallized radiolarians coated and encased in a matrix of dark material lies at the base of a light gray section of radiolarian-rich sediment marked by flecks of black, presumably organic matter. The black lamina in Core 585A-8,CC contains 1.45% C_{org}. Rock-Eval data for this sample showed the following:

S_1 = 0.018 mg hydrocarbon/g

S_2 = 11.7 mg hydrocarbon/g

S_3 = 0.83 mg CO_2/g

HI = 807 mg hydrocarbon/g C_{org}

OI = 57 mg CO_2

The C_{org} in Core 585A-8,CC is also an immature, marine algal-derived type-I kerogen. This layer, being composed largely of radiolarians, may represent a reworked deposit which was originally similar to the black band in Core 585-32-3 or it may represent a second manifestation of preservation of algal kerogen. In Hole 585A the Cenomanian/Turonian boundary is placed at the level of Core 585A-9-1, 50 cm (i.e.,50 cm below the C_{org}-rich radiolarian lamina).

The occurrence of these algal kerogen-rich layers at or very close to the Cenomanian/Turonian boundary indicates that they are a product of the preservation of organic carbon during the short-lived but global Cenomanian-Turonian "Oceanic Anoxic Event" now known to have left its record in sections from the Atlantic basin, the Tethys, the U.S. Western Interior Basin, the northern European shelf, and west African marginal basins as well as the Pacific basin.

In summary, drilling Holes 585 and 585A resulted in a maximum penetration of 763.7 m in 585; a misfit core barrel sub resulted in loss of the hole. Hole 585A was terminated at 892.8 m due to complete bit failure. Fifty-five cores were taken from Hole 585 and 22 from 585A.

The sedimentary section that was recovered is dominated by redeposited volcanogenic material in middle Cretaceous strata and redeposited fossils in Upper Cretaceous and Neogene strata. Compared to most open ocean sites the rocks are relatively unfossiliferous and the faunal and floral diversity is low. The intensive reworking and general paucity of the autochthonous fossils made the task of assigning a precise zone to each core difficult. Many biostratigraphic zones were recognized and it appears that the section is largely complete from middle Eocene to late Aptian with minor hiatuses although evidence for the presence of most of the Paleocene is lacking and late and middle Maestrichtian assemblages occur only redeposited within Tertiary strata.

Although the Jurassic objectives were not reached, information derived from Holes 585 and 585A revealed the following:

1. Benthic foraminiferal faunas indicate that the east Mariana Basin was at abyssal depths from Aptian time to the present.

2. Intense edifice-building volcanism took place in the area during Aptian through middle Albian time. The timing of the onset of volcanism is not known.

3. Volcanic edifices around the basin reached to or above sea level and were capped or fringed by carbonate reefs and banks in Aptian-Albian time.

4. The growth of these edifices provided the bathymetric relief needed for the delivery to the abyssal Mariana Basin of the numerous and thick turbidite sequences that dominate the sedimentary section.

5. Organic carbon-rich sediments formed in the basin at, or very close to, the Cenomanian/Turonian boundary; these carbonaceous sediments are the local record of a global oceanic anoxic event.

6. The Pacific plate moved from a paleolatitude of 11.7°S in late Aptian time, through 8.2°S in Albian time and 2.3°S in Turonian time before reaching its present latitude of 13.5°N at Site 585.

7. The "acoustic basement" in the east Mariana Basin is mid-plate volcaniclastic strata of Aptian age--this state of affairs may hold true for much of the western Pacific.

SITE 462: NAURU BASIN

Scientific and Operational Background

Hole 462A, which was terminated on 27 July 1978 due to time limitations on Leg 61, had bottomed at a total depth of 1068.5 m in basalt sheet flows. Within the sill and flow complex that occupied the interval between 563 and 1068.5 m several intercalations of sediment had been cored. The deepest of these sediment layers recovered in Core 462A-80 was interpreted on the basis of radiolarians as being Barremian in age. The sediment is a red-brown siltstone containing radiolarians, fish debris and agglutinated benthic foraminifers representative of faunas from bathyal to abyssal depths. The Nauru Basin was then thought to have been perhaps 5 km deep during Barremian time. The presence of this Barremian sediment was taken as indicating that the sill flow complex was not the basement, if we take basement to mean the lithospheric plate generated at a ridge crest approximately 150,000,000 Ma: the age predicted for the plate below the Nauru Basin as based on the position of Site 462 on the older boundary of Anomaly M-26.

After leaving the eastern Mariana Basin and Site 585 on 2 November 1982 at 1709Z, Glomar Challenger proceeded south across Ita

Maitai Guyot and then southeastward through the western Marshall Islands and their associated seamounts, towards Site 462. We passed between Enewetak and Ujelang atolls and over the lower flank of Heezen Guyot as we entered the Nauru Basin. Our final approach was nearly over the approach during Leg 61, and was controlled well by satellite-navigation fixes.

At 1832 (0732Z) on 5 November we crossed the dead-reckoning location of Hole 462A, at 7°14.495'N, 165°01.898'E, and dropped an acoustic beacon. A series of fixes showed that the beacon was about 1035 m northwest of Hole 462A's recorded position. We maneuvered closer and dropped a second beacon. Water depth, corrected to sea level, was 5177 m as determined during the Leg 61 drilling.

Our initial operation after a successful re-entry with a logging and clean-out bit was to lower a temperature-logging tool as deeply into the old hole as possible. It met with very slight obstructions at 470 and 515 m depth, and was blocked at 521 m. The tool was retrieved, and the drill string used to clean out the hole down into the basalt sills below 560 m. No difficulty was encountered, and so the drill string was tripped from the hole. A regular BHA and bit was run down on the drill string. The hole was reentered and pipe was then run to the bottom of the hole, flushing out carefully en route, until the bit reached bottom. The total depth at the end of Leg 61 was 1068.5 m; the drillers now reported a depth of 1071.7 m. The 3.2-m discrepancy must have resulted from a mismeasurement of pipe during either Leg 61 or this leg or both. So as not to have to change all the records of Leg 61 cores, yet to be able to use the length of the present drill string from drill floor to bit for present measurements, the first core (Core 93) would be cut less than the usual 9 m, and any discrepancy put within the amount of recovered versus not-recovered rock.

Eight cores were cut with the bit. They were almost entirely of basalt sheet flows. Some softer volcanogenic zeolitic mudstone was recovered in a few of the cores. During the cutting of the lower part of Cores 99 and 100, behavior of the drill string indicated bit damage. The string was pulled and the bit was on board at 0334 hr. of 11 November. Evidently the bit was pulled just before complete failure. It had lasted 31 hr., 40 min. The bit was replaced and the drill string was run from the ship for our third re-entry.

Coring then continued on 12 and 13 November in hard sheet-flow basalts and probably some pillowed basalts. After retrieving the third core of the new bit (number 103), the drillers noted an abnormally high pump pressure, indicating an obstruction at the bit. A heavy chisel-ended rod was pumped down the drill stem ahead of a core barrel, and apparently cleared the obstruction. Cores 103 and 104 cut slowly and their recovery was poor, indicating probable bit damage. The bit was brought up on the drill string, arriving at the drill floor at 2115 hr. of 13 November. It had been used for 25.6 hr. and penetrated only 35.8 m. Bearing wear was nearly as bad as for the first bit and tooth breakage was somewhat worse.

For a few hours on 13 November before the drill string was pulled from the hole, a second train of swells, coupled with wind gusts to 28 knots caused the ship to roll to a maximum of 5°. The weight indicator for the drill string reached the new operating limits imposed for Leg 89 on two or three occasions. With that exception, roll was mainly less than 3° under what can best be described as an excellent environment that lasted through our several day occupation of Site 462, namely winds from 0 to 18 knots, seas rippled to 2 ft., and 3 to 5 ft. swell.

A new bit of the same type was added to the BHA and the round trip and fourth re-entry completed quickly. The final five cores were cut slowly but with good recovery, with two exceptions. After some problems in the seating of the core barrel, Core 107 was cut but only one piece of basalt a few centimeters in length was recovered. Core 109, the last core of the bit and of Leg 89's occupation of the site, drilled very slowly for the first 2 m and faster thereafter, and with more torque. Only basalt was recovered, and it is not known what it was that was not recovered.

At 1209 m total depth the hole was abandoned, clean of junk and awaiting further re-entry after a change in engineering capabilities. The third bit had been used nearly 24 hr. and penetrated 38.7 m. Although its bearings were in fair condition, it had lost as many teeth as the first two bits. All in all we cored 137.3 m and recovered 74.43 m (54%) average), mainly of sheet flow basalt with minor sedimentary rock and pillows. At 1654 hr. on 16 November, Glomar Challenger got under way on a southwest course towards our last site of the leg, SW-9, which is at DSDP 289 on the northeastern edge of the Ontong-Java Plateau.

Geologic History

The volcanic sequence cored in this 140.5 m interval is composed of an alternating series of aphyric and moderately phyric flow basalts containing various proportions of clinopyroxene, plagioclase and olivine as phenocryst phases. The basalt flows represent the continuation downwards of the lower flows (type B basalts) found during Leg 61, the lowest of which was designated as Unit 44, and are divided into 11 volcanic units, 45 through 56. The thicker volcanic units commonly are aphyric holocrystalline or glassy basalts and in some cases represent a packet of rapidly extruded smaller cooling units. The thinner volcanic units are often quench-textured throughout and represent individual flows. Except for a questionable occurrence of pillow structures in Unit 51 (Core 462A-104) all of the units are apparently sheet flows.

Although glass and olivine are characteristically replaced by brownish smectites throughout the basaltic pile, the degree of alteration is generally low. No fresh glass remains, although palagonite is present in a few cases. Alteration took place in the lower zeolite facies under slightly acid to mildly alkaline, low CO_2-activity, reducing conditions.

In Core 462A-99-1 a few centimeters of zeolitic hyaloclastitic sediment was recovered in contact with a chilled, glassy margin of a basalt flow. Radiolarians from this sediment include Holocryplocapsa hindei which has a range from latest Jurassic to earliest Aptian.

Shipboard revision of radiolarian-based age determinations of Cores 462A-46 and -80 is significant but needs to be checked ashore. Core 462A-46 was thought to be Aptian-Barremian in age. It is now thought that the sediment is Aptian in age but contains a reworked Berriasian fauna. Core 462A-80 was thought to be Barremian but now is interpreted to be of late early Aptian age; the sediment also contains a reworked lower Cretaceous (pre-early Hauterivian) radiolarian fauna. These revisions are important because they show that older sediments are in the vicinity.

Paleomagnetic data were obtained from 35 minicores which were analyzed using progressive alternating field (AF) demagnetization. A steep positive inclination (probably an artifact of the drilling and exposure to the highly magnetic drill pipe) was overprinted on a primary negative inclination in every sample. As the site was south of the equator during the Cretaceous, this implies that the entire basalt flow complex is of normal polarity. The inclinations are tightly grouped within individual flow units and these cluster means range from -51.2° (±1.5°) to -10.7° (±1.5°).

The mean inclination of the magnetic units which could be distinctly identified is -35.9° (±7°), implying a paleolatitude of 19.9°S (±5°). This is comparable to the paleolatitude of the overlying basaltic complex drilled on Leg 61 of 20.6°S (±2.4°) (recalculated from Steiner, 1981). The two nearly identical mean paleolatitudes imply that northward movement of the site was insignificant during the emplacement of the igneous complex. Resetting of the thermal remanent magnetism at the tops of some units to match that of the overlying unit is good evidence, along with the chilled margins, that these layers are flows, not sills.

A temperature log was run in Hole 462A for several reasons: (1) the hole had remained undisturbed for 4¼ yr. since Leg 61 and presumably was at thermal equilibrium, (2) there was some uncertainty in the interpretation of the logs run in 1978, and (3) there remains the question whether heat flow values become constant with age or decrease as a "root-t" trend. The results of the temperature log run on Leg 89 showed that seawater is flowing down into the hole at a rate of about 2800 l/hr. This drawdown flow condition is similar to that described at DSDP holes in young crust. At Site 462 the downward flow is interpreted as a forced convention due to pore-fluid underpressure in the sediment column above the basalt sill-flow complex and not due to hydrothermally driven circulation. This raises the interesting question as to the origin of underpressure in deep sea sediment sections.

Although Jurassic sediments were not reached at this site the hole remains clean, the re-entry cone is easily seen on the re-entry scanning tool and the sediment layers in the sill-flow complex show that there are older sediments than Aptian in the Nauru Basin; conditions are propitious for a return to the site when a longer drill string can be deployed.

SITE 586: ONTONG-JAVA PLATEAU

Scientific and Operational Background

A traverse of shallow-water sites from the equator to New Zealand was planned in order to recover Neogene calcareous oozes deemed valuable for paleoceanographic studies in the Southwest Pacific. Most of those sites will be cored with the hydraulic piston corer during Leg 90. To reduce the total amount of Leg 90 travel time, the northernmost site was assigned to Leg 89. This site is on the Ontong-Java Plateau at Site 289. A hole drilled there during Leg 30 indicated there were no major discontinuities in the post-early Oligocene section.

The principal aim at Site 586 was to obtain piston cores to about 250 m depth. We also intended to log a hole to give the opportunity to relate the petrography and laboratory-determined physical properties of specimens with downhole measurements of their geophysical parameters.

We approached old Site 289 from the northeast and dropped an acoustic beacon at the dead reckoning position of the site at 0527 hr. on 19 November. The PDR, mudline cores in two holes, and the gamma ray log runs gave different depths to the seafloor. We decided to use as datums for all holes the gamma ray measurement of 2218 m from the drill floor (2208 from sea level), which was close to the 2207 PDR determination corrected to sea level, and the filled second mud line core which indicated the seafloor to be above 2219.4 from drill floor, but which is shallower than the 2223.1 mud line determined in the first hole.

The first hole was cored with the HPC to 44.4 m and had to be abandoned there when the inner core barrel holding what would have been Core 6 broke off while extended below the bit. We started Hole 586A by washing to 44.4 m and continuously coring. We reached 305.3 m total depth, with 98.5% recovery. The 586 and 586A cores were split, described, and sampled. A second set of continuous HPC cores was taken to 240.3 m in Hole 586B, with 97.8% recovery. This set was stored unsplit, along with the earlier split cores, for Leg 90's use.

Hole 586C was rotary drilled to 623.1 m, with one spot core at its total depth, to provide a borehole for logging. An excellent suite of Schlumberger sonic velocity, spontaneous potential, induction, density, gamma ray and caliper logs was obtained. The logging equipment and drill string was brought on board and the *Glomar Challenger* was under way at 0810 hr. on 23 November. After a brief survey over the site, including three failed attempts to launch a working sonobuoy, we proceeded south towards Noumea, New Caledonia.

Geologic History

The 305 m-section recovered is of Quaternary to late Miocene age and consists of foraminifer-nannofossil ooze which became chalky below about 260 m. The fossil content and the type of preservation of the foraminifers suggest that these sediments are not the result of a purely pelagic "rain." Allochthonous shallow-water faunal elements and mixtures of abraded specimens with specimens having delicate structures preserved occur throughout the cored section.

Most of the studies of the HPC cores from Site 586 will be by Leg 90 personnel and will appear in the Leg 90 volume.

LEG 89 CORING SUMMARY

HOLE	DATES (1982)	LATITUDE	LONGITUDE	WATER DEPTH*	PENETRATION	NO OF. CORES	METERS CORED	METERS RECOVERED	PERCENT OF RECOVERY
585	18-26 October	13°29.00'N	156°48.91'E	6109 m	763.7 m	55	514.6	164.50	32
585A	26 Oct.-2 Nov.	13°29.00'N	156°48.91'E	6109 m	892.8 m	22	208.8	101.50	49
462A	5-16 November	07°14.50'N	165°01.90'E	5177 m	1209.0 m	17	137.3	74.40	54
586	19 November	00°29.84'S	158°29.89'E	2207 m	44.4 m	5	44.4	38.98	88
586A	19-20 November	00°29.84'S	158°29.89'E	2207 m	305.4 m	31	260.9	257.03	99
586B	20-22 November	00°29.84'S	158°29.89'E	2207 m	240.3 m	25	235.2	234.93	98
586C	22-23 November	00°29.84'S	158°29.89'E	2207 m	623.1 m	1	9.6	2.18	23
						156	1410.8	873.52	62

* water depth from sea level, PDR, corrected.

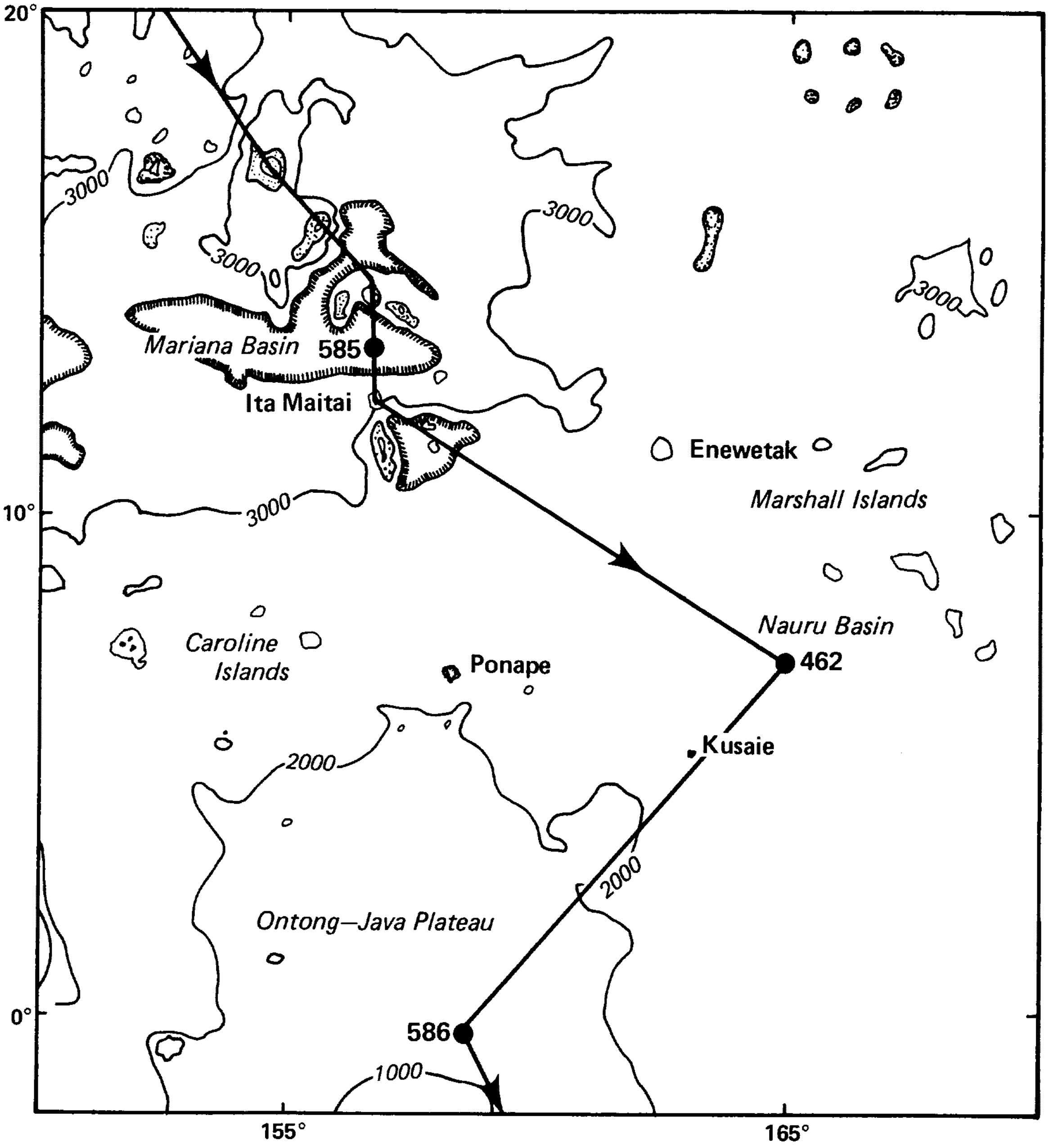


Figure 1. Sites drilled during DSDP Leg 89. Site 585, in the eastern Mariana Basin, lies in 6109 m of water. Site 462, in the Nauru Basin at 5177 m, was first drilled on Leg 61; re-entry Hole 462A was re-entered. Site 586, on the northeast slope of the Ontong-Java Plateau at 2208 m, is at Site 289, drilled on Leg 30.

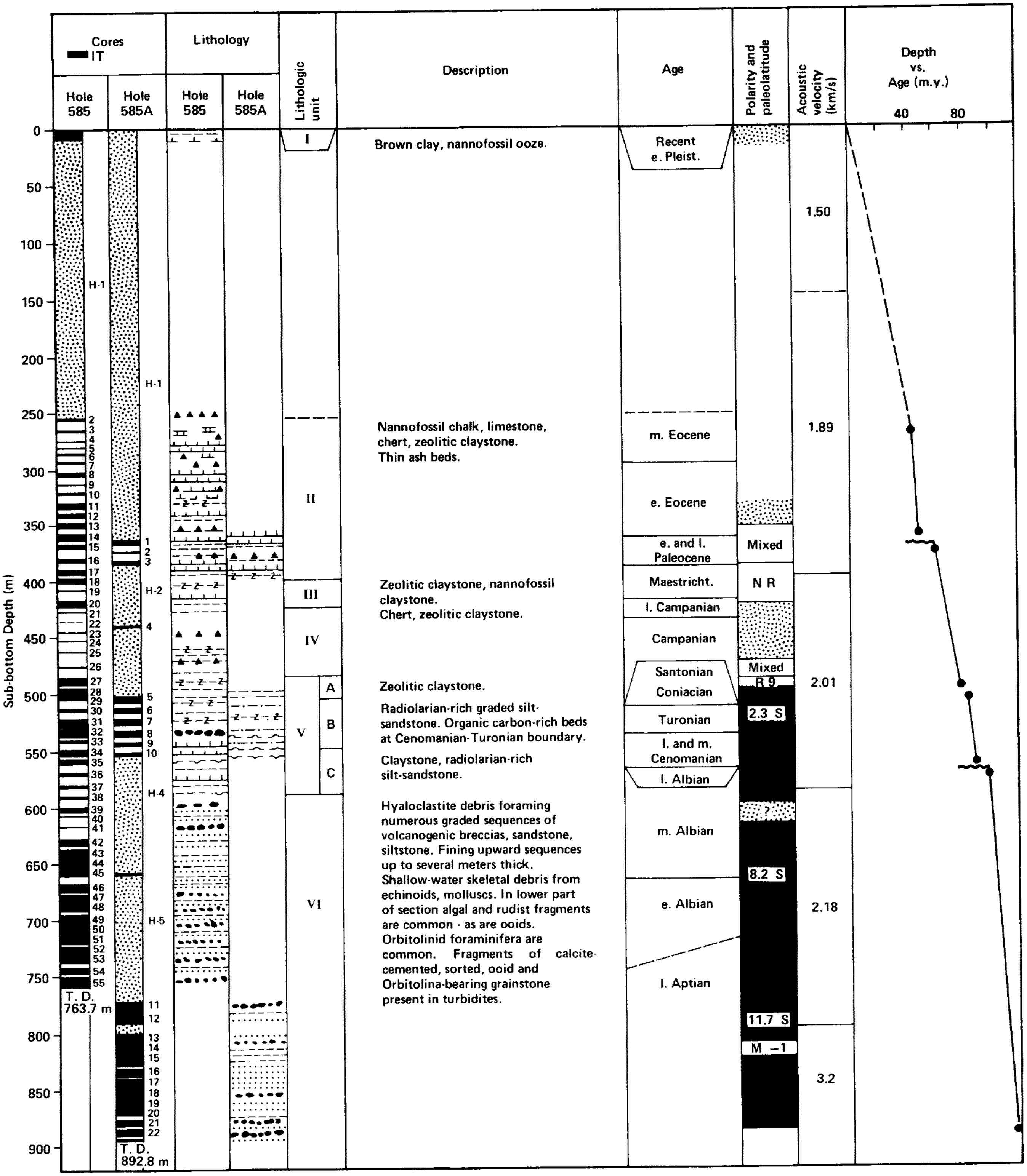


Figure 2. Sedimentary section and graphic display of main drilling results at DSDP Site 585, Mariana Basin.

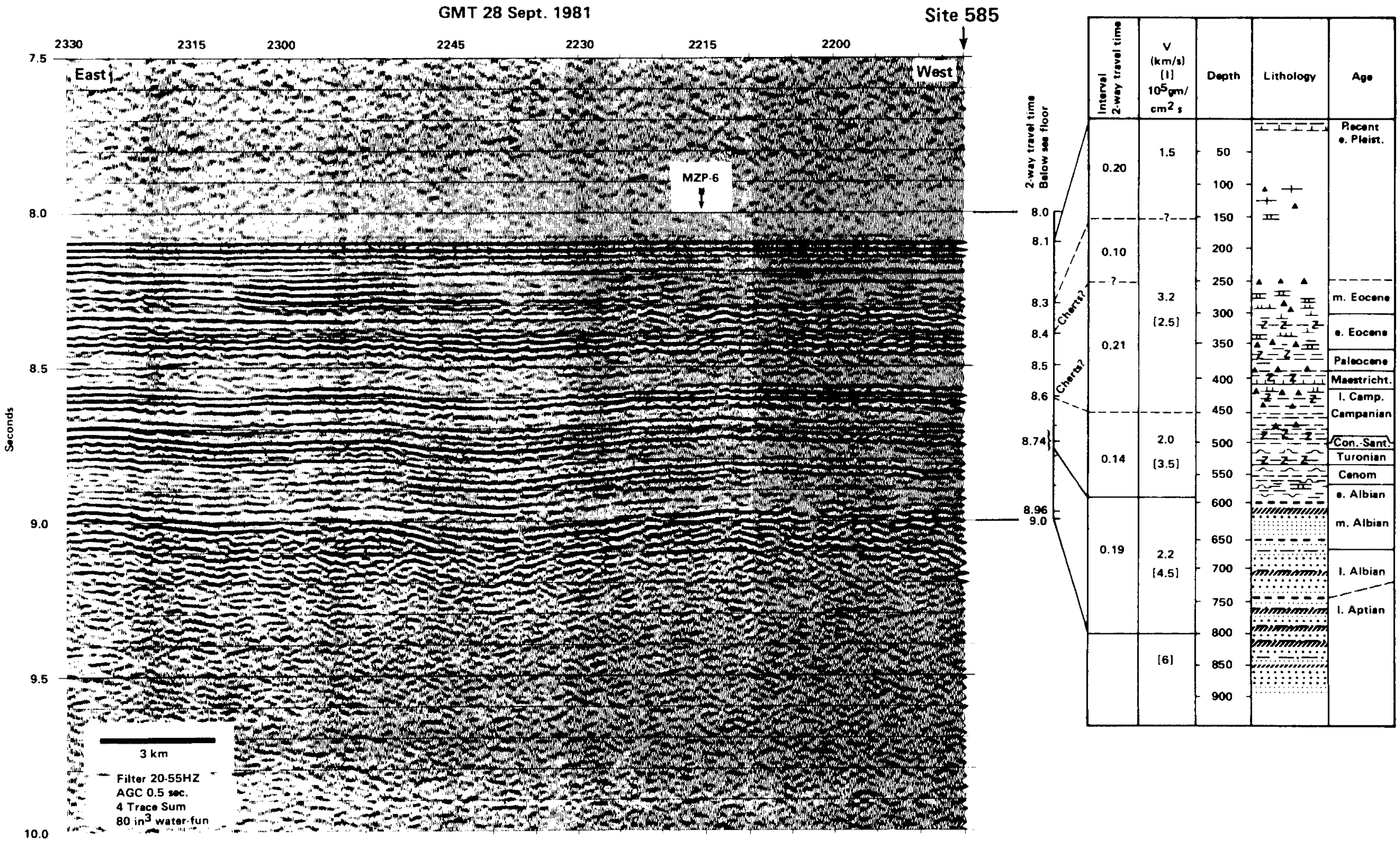
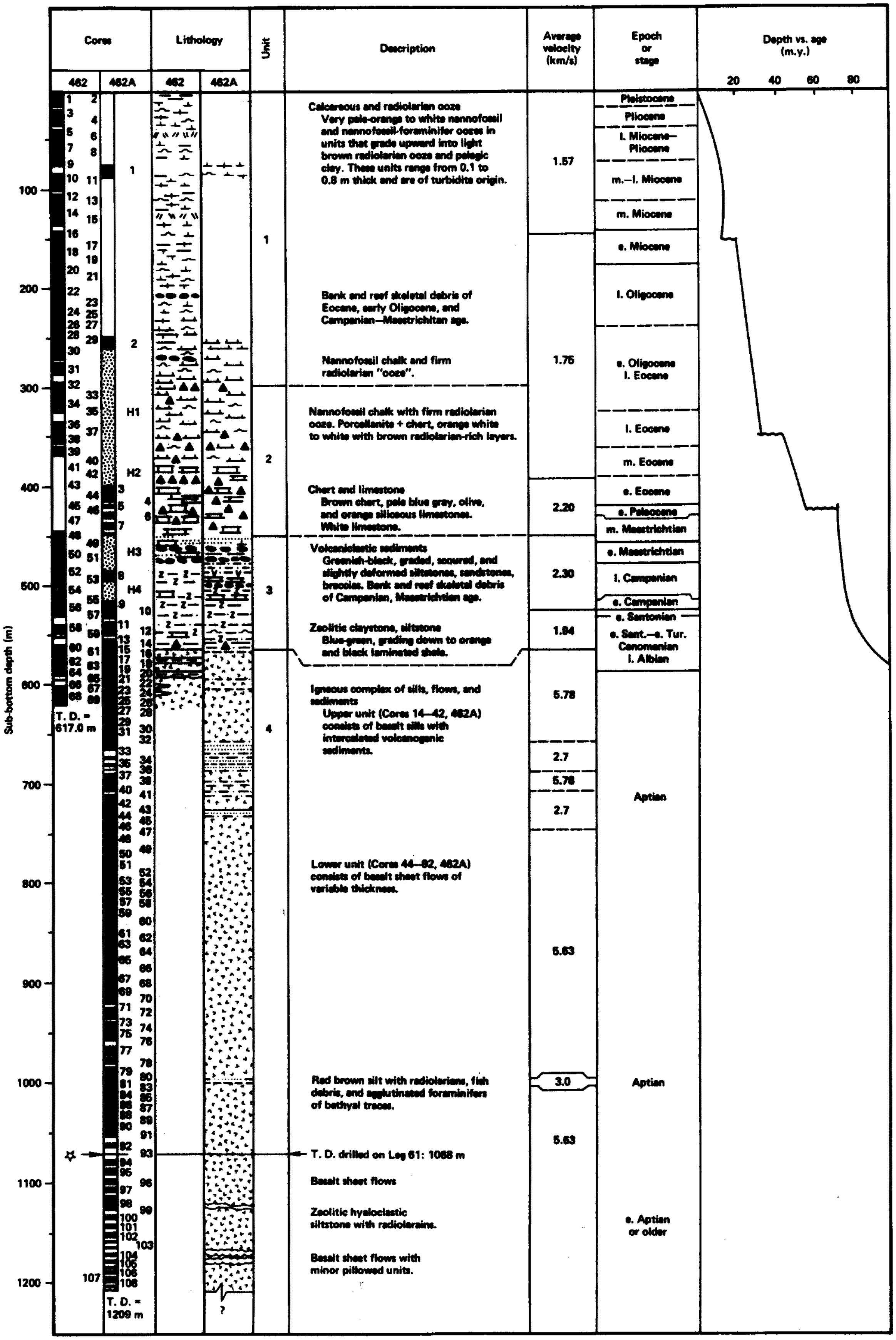


Figure 3. Correlation of seismic profile with the drilled section and shipboard physical properties data at Site 585.


Calcareous and radiolarian ooze
Very pale-orange to white nannofossil and nannofossil-foraminifer oozes in units that grade upward into light brown radiolarian ooze and pelagic clay. These units range from 0.1 to 0.8 m thick and are of turbidite origin.

Bank and reef skeletal debris of Eocene, early Oligocene, and Campanian—Maestrichitan age.

Nannofossil chalk and firm radiolarian "ooze".

Nannofossil chalk with firm radiolarian ooze. Porcellanite + chert, orange white to white with brown radiolarian-rich layers.

Chert and limestone
Brown chert, pale blue gray, olive, and orange siliceous limestones. White limestone.

Volcaniclastic sediments
Greenish-black, graded, scoured, and slightly deformed siltstones, sandstones, breccias. Bank and reef skeletal debris of Campanian, Maestrichtian age.

Zeolitic claystone, siltstone
Blue-green, grading down to orange and black laminated shale.

Igneous complex of sills, flows, and sediments
Upper unit (Cores 14—42, 462A) consists of basalt sills with intercalated volcanogenic sediments.

Lower unit (Cores 44—92, 462A) consists of basalt sheet flows of variable thickness.

Red brown silt with radiolarians, fish debris, and agglutinated foraminifers of bathyal traces.

T. D. drilled on Leg 61: 1068 m

Basalt sheet flows

Zeolitic hyaloclastic siltstone with radiolarains.

Basalt sheet flows with minor pillowed units.

Figure 4. Section and graphic display of main drilling results at DSDP Site 462, Nauru Basin. Below the point marked *, data from Leg 89 has been added to the results of Leg 61.

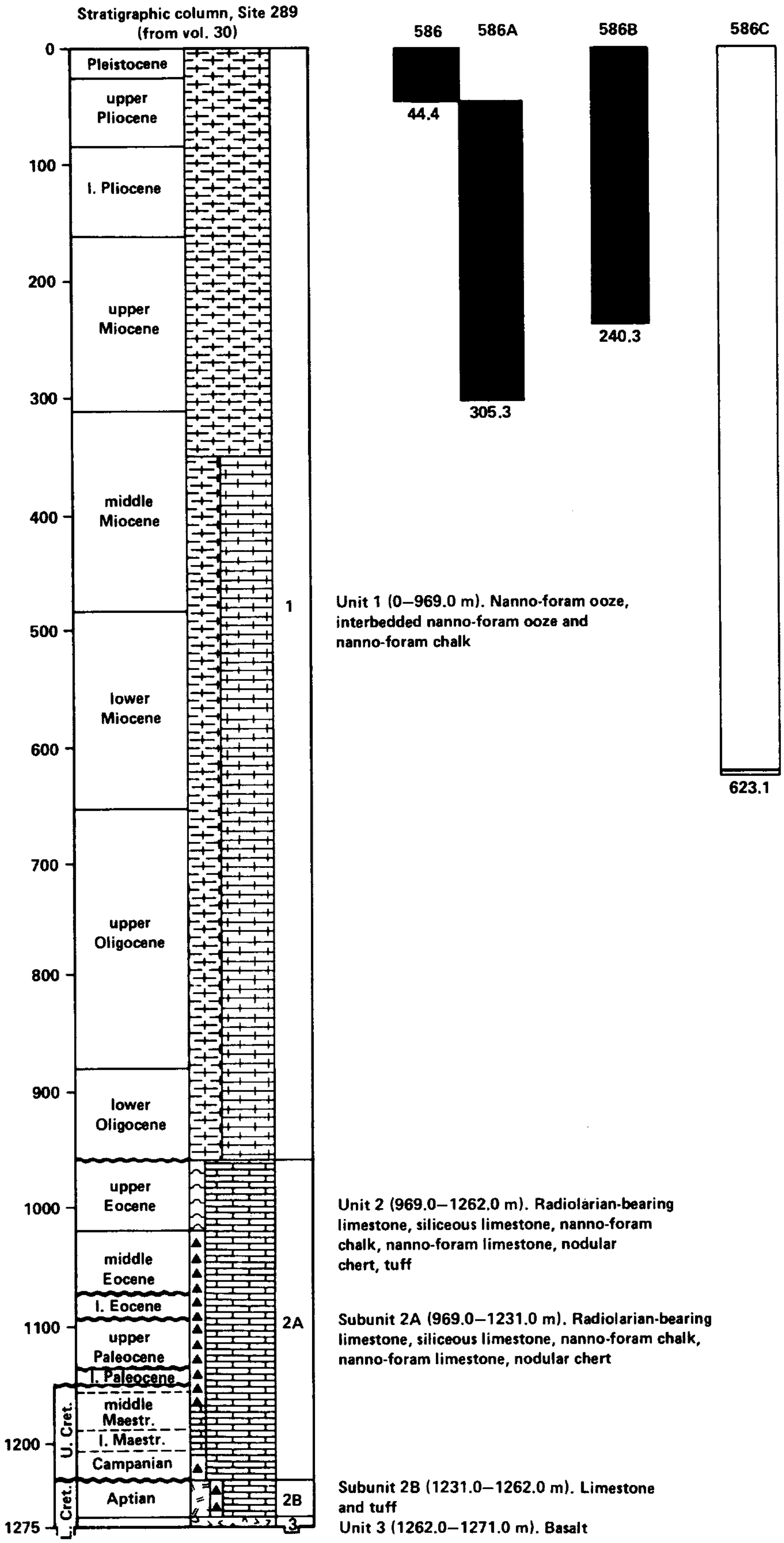


Figure 5. Main drilling results, northeast Ontong-Java Plateau. Site 289, Leg 30, was rotary-cored to basement. Holes 586, 586A, and 586B were HPC-cored. Hole 586C was drilled for logging.

SITE 585

HOLE 585

Date Occupied: 1122Z 18 October 1982

Date Departed: 1805Z 26 October 1982

Time on Hole: 8 days, 6 hr., 43 min.

Position (latitude; longitude): 13°29.00'N; 156°48.91'E

Water depth (sea level; corrected m, echo-sounding): 6109

Water depth (rig floor; corrected m, echo-sounding): 6119

Bottom felt (m, drill pipe): 6122.3

Penetration (m): 763.7

Number of cores: 55

Total length of cored section (m): 514.6

Total core recovered (m): 164.5

Core recovery (%): 32

Oldest sediment cored:

Depth sub-bottom (m): 763.7

Nature: Volcanogenic turbidites

Age: Late Aptian

Measured velocity (km/s): 2.5

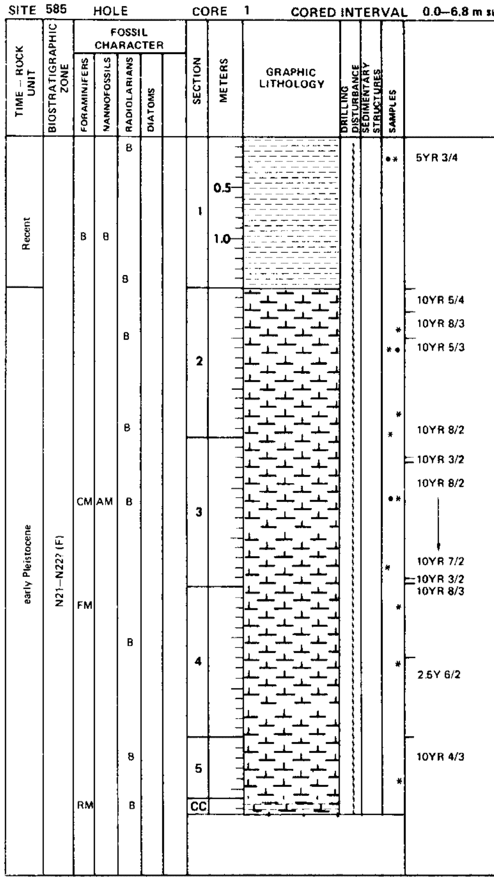
Basement:

Depth sub-bottom (m): -

Nature: -

Velocity range (km/s): -

SITE 585 HOLE CORE 1 CORED INTERVAL 0.0–6.8 m sub-bottom; 6122.3–6129.1 m below rig floor



LITHOLOGIC DESCRIPTION

NANNOFOSSIL OOZE AND CLAY-BEARING NANNOFOSSIL OOZE (>150 cm)

Mostly shades of light yellowish brown to brown interbedded; stiff to soft CLAY brown to moderate brown (0–150 cm and several thin beds in nannofossil ooze); soupy; homogeneous.

SMEAR SLIDE SUMMARY (%):

	1, 20	2, 42	2, 60	2, 127	2, 148
	D	D	D	D	D
Texture:					
Sand	2	3	–	–	–
Silt	10	5	2	25	1
Clay	88	92	98	75	99
Composition:					
Feldspar	1	–	–	–	2
Heavy minerals	2	–	–	1	–
Clay	88	43	10	63	–
Volcanic glass	–	–	–	<1	–
Micronodules	–	–	<1	8	–
Zeolite	4	–	1	13	–
Carbonate unspec.	1	50	–	–	–
Foraminifers	–	2	<1	–	–
Calc. nannofossils	3	5	88	5	98
Radiolarians	–	<1	–	–	<1
Hematite	1	–	<1	–	–

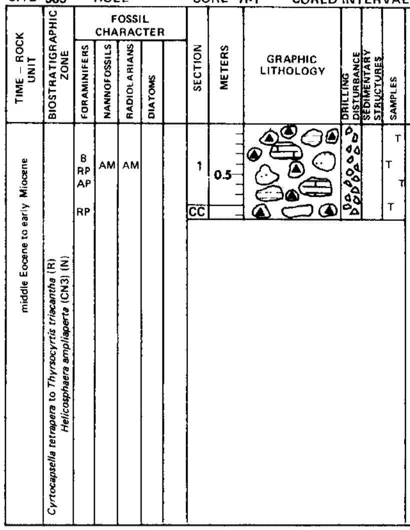
SMEAR SLIDE SUMMARY (%):

	3, 60	3, 130	4, 20	4, 80	5, 40
	D	D	D	D	D
Texture:					
Sand	–	–	2	–	–
Silt	5	35	8	1	1
Clay	96	65	90	99	99
Composition:					
Feldspar	–	–	–	1	1
Heavy minerals	–	–	–	1	–
Clay	<1	10	2	10	10
Micronodules	<1	–	2	2	2
Zeolite	–	3	1	–	2
Carbonate unspec.	–	20	85	–	–
Foraminifers	2	2	–	–	–
Calc. nannofossils	98	55	10	86	84
Radiolarians	–	8	–	–	–
Sponge spicules	–	<1	–	–	–
Hematite	–	–	–	–	1

ORGANIC CARBON AND CARBONATE (%):

	1, 21	2, 61	3, 61
Organic carbon	0.11	0.11	0.07
Carbonate (bomb)	1	52	83

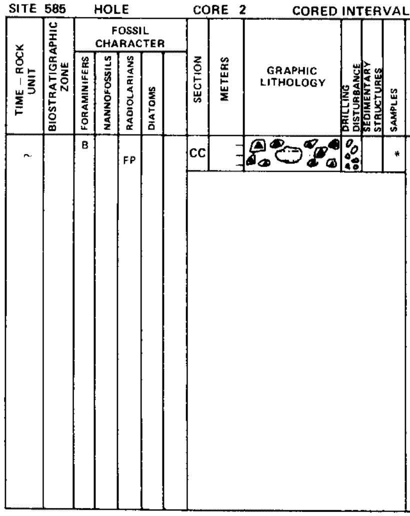
SITE 585 HOLE CORE H-1 (Wash core) CORED INTERVAL 6.8–255.9 m sub-bottom; 6129.1–6373.2 m below rig floor



LITHOLOGIC DESCRIPTION

Drilling breccia of fragments of LIMESTONE (grayish orange pink [5YR 7/2]), SILTSTONE and CLAYSTONE (medium dark gray [7.5YR 4/0]), and multicolored fragments of CHERT.

SITE 585 HOLE CORE 2 CORED INTERVAL 255.9–265.5 m sub-bottom; 6378.2–6387.8 m below rig floor



LITHOLOGIC DESCRIPTION

Drilling breccia consisting mainly of multicolored chips (<1 cm) and larger fragments (several cm) of CHERT. Dominant colors of chert are dark yellow brown (10YR 4/2), gray brown (10YR 5/2), and very pale brown (10YR 7/3).

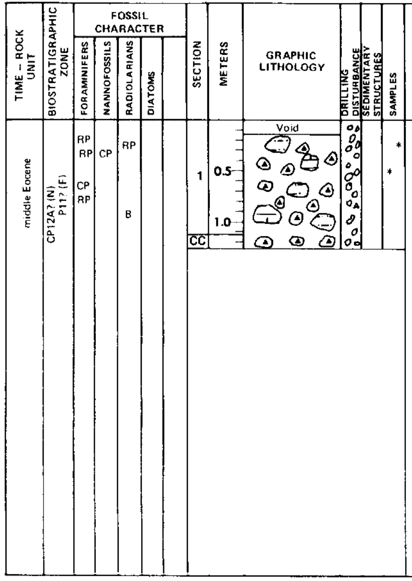
One fragment of gray green NANNO-BEARING, ZEOLITIC MUDSTONE.

Several of the large chert fragments have partial rims of very pale orange (10YR 8/2) PORCELLANITE. Some of smaller fragments also consist of same material.

SMEAR SLIDE SUMMARY (%):

	CC
	M
Texture:	
Sand	–
Silt	20
Clay	80
Composition:	
Feldspar	2
Clay	80
Zeolite	16
Calc. nannofossils	2

SITE 585 HOLE CORE 3 CORED INTERVAL 265.5–275.1 m sub-bottom; 6387.8–6397.4 m below rig floor



LITHOLOGIC DESCRIPTION

Drilling breccia consisting mainly of multicolored chips (< 0.5 cm) and larger fragments (several cm) of CHERT. Dominant colors of chert are reddish brown (5YR 5/3–4/4), light reddish brown (5YR 5/6), and grayish orange (10YR 7/4). Most of the large chert fragments have partial rims of white porcellanite, which also comprises about 25% of smaller chips.

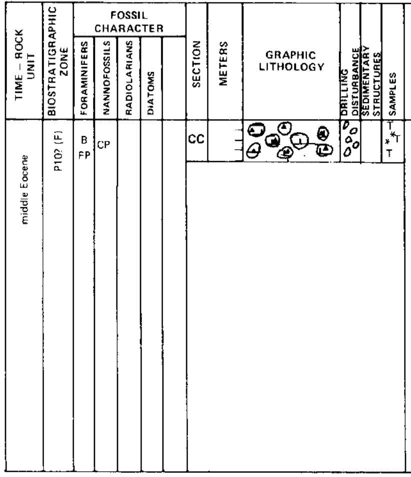
About 15% of smaller chips and several larger fragments are of ZEOLITE-BEARING CLAYSTONE (dusky blue green [5BG 3/2]).

One large fragment (~ 5 cm) and about 10% of smaller chips consist of NANNOFOSSIL CHALK.

SMEAR SLIDE SUMMARY (%):

	1, 21	1, 50
	D	D
Texture:		
Sand	–	–
Silt	15	2
Clay	85	98
Composition:		
Quartz	1	–
Feldspar	2	1
Clay	85	–
Glauconite?	1	–
Micronodules	2	–
Zeolite	4	<1
Foraminifers	1	–
Calc. nannofossils	4	98
Radiolarians	<1	–

SITE 585 HOLE CORE 4 CORED INTERVAL 275.1–279.1 m sub-bottom; 6397.4–6401.4 m below rig floor



LITHOLOGIC DESCRIPTION

Fragments (several cm) and chips (< 0.5 cm) of CHERT[1]. Several fragments of chert have partial rims of white (N9) PORCELLANITE. Dominant color is light gray[1] (10YR 8/1) with several dark brown (10YR 3/2).

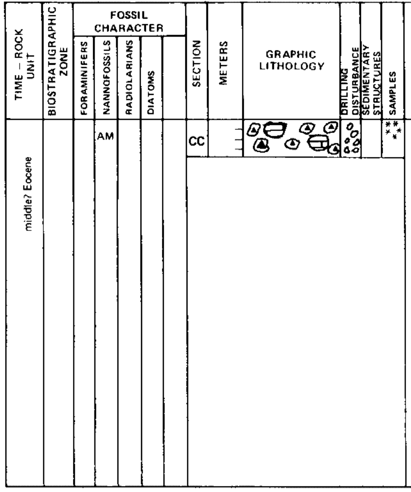
[1] The light gray chert is clearly SILICIFIED LIMESTONE and is "peppered" with sand-size silicified foraminifers "porcellanites" appears to be incompletely silicified limestone.

One fragment of white NANNOFOSSIL CHALK.

SMEAR SLIDE SUMMARY (%):

	CC	CC
	M	M
Texture:		
Sand	–	–
Silt	–	1
Clay	–	99
Composition:		
Quartz	1	–
Feldspar	–	<1
Zeolite	–	<1
Carbonate unspec.	24	–
Calc. nannofossils	75	99

SITE 585 HOLE CORE 5 CORED INTERVAL 279.1–284.6 m sub-bottom; 6401.4–6406.9 m below rig floor



LITHOLOGIC DESCRIPTION

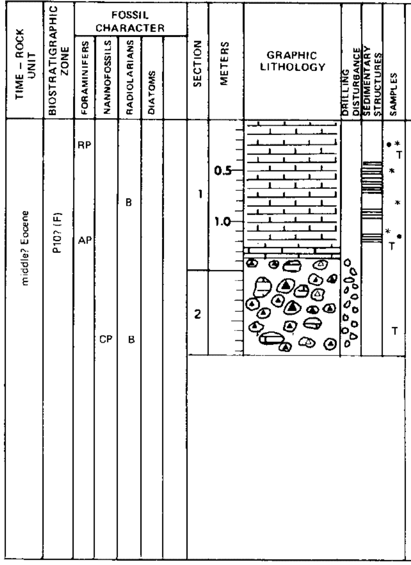
0–15 cm: 1 piece white (10YR 9/1) nannofossil limestone with 0.5–1 cm cap of dark yellowish brown (10YR 3/4) CHERT; 1 piece of white (N9) NANNOFOSSIL CHALK; 1 piece of very pale yellowish brown (10YR 7/2) CLAY-BEARING NANNOFOSSIL LIMESTONE.

15–35 cm: drilling breccia of chips (< 0.5 cm) of yellow brown (10YR 7/2) to dark yellowish brown (10YR 4/2) CHERT; white (N9) to very pale yellowish brown (10YR 7/2) LIMESTONE; dark yellowish brown (10YR 4/4) CALCAREOUS CLAYSTONE; dark green gray (10G 3/2) CLAYSTONE.

SMEAR SLIDE SUMMARY (%):

	CC, 5	CC, 8	CC, 11	CC, 13	CC, 20
	D	D	D	D	D
Texture:					
Sand	–	–	–	–	–
Silt	60	50	65	50	15
Clay	40	50	35	50	85
Composition:					
Clay	5	10	20	10	80
Zeolite	–	–	–	–	1
Carbonate unspec.	20	10	15	25	5
Calc. nannofossils	75	80	65	65	8

SITE 585 HOLE CORE 6 CORED INTERVAL 284.6–293.7 m sub-bottom; 6406.9–6416.0 m below rig floor



LITHOLOGIC DESCRIPTION

NANNOFOSSIL CHALK AND LIMESTONE; SILICIFIED LIMESTONE AND CHERT

Dominantly white (10YR 8/1) limestone with varying degree of diagenesis chalk to limestone to silicified limestone. Some faint laminations.

Numerous chips (< 1 cm) of multicolored CHERT (~ 58%), dark yellowish brown (10YR 3/4) and brown (7.5YR 5/6); NANNOFOSSIL LIMESTONE (35%) white; and PORCELLANITE (7%), light gray (10YR 7/2) chips mostly in intervals 135–150 cm, Section 1 and 0–50 cm Section 2; 50–83 cm, Section 2 consists of larger (>2 cm) fragments of brown chert and white limestone and chalk.

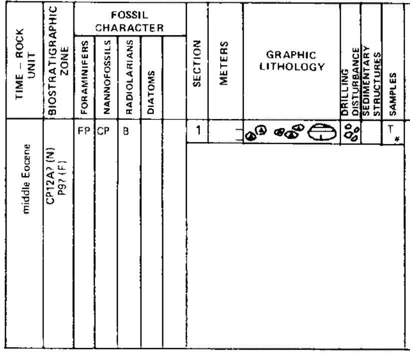
SMEAR SLIDE SUMMARY (%):

	1, 50	1, 85	1, 110	1, 21
Texture:				
Clay	100	100	100	100
Composition:				
Clay	3	–	2	–
Carbonate unspec.	20	15	43	35
Calc. nannofossils	77	85	55	65

ORGANIC CARBON AND CARBONATE (%):

	1, 28–32	1, 119–120
Organic carbon	0.01	0.03
Carbonate	63	29

SITE 585 HOLE CORE 7 CORED INTERVAL 293.7–302.9 m sub-bottom; 6416.0–6425.2 m below rig floor



LITHOLOGIC DESCRIPTION

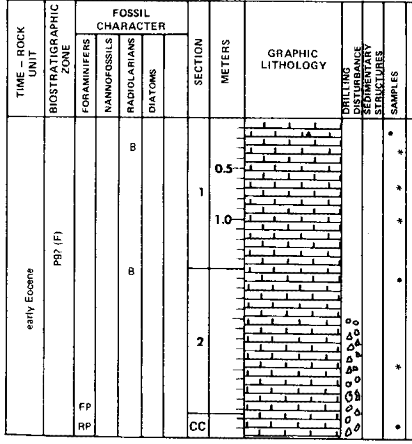
Five fragments (several cm each) of dark yellowish brown (10YR 3/4) CHERT with partial rims of white (N9) PORCELLANITE.

One fragment (3x5 cm) of white (N9) NANNOFOSSIL CHALK.

SMEAR SLIDE SUMMARY (%):

	1, 20
	D
Texture:	
Clay	100
Composition:	
Clay	5
Carbonate unspec.	5
Calc. nannofossils	90

SITE 585 HOLE CORE 8 CORED INTERVAL 302.9–312.0 m sub-bottom; 6425.2–6434.3 m below rig floor



LITHOLOGIC DESCRIPTION

NANNOFOSSIL CHALK

White (N9); massive below 65 cm, Section 2. Recovery consist of fragments mostly >2 cm.

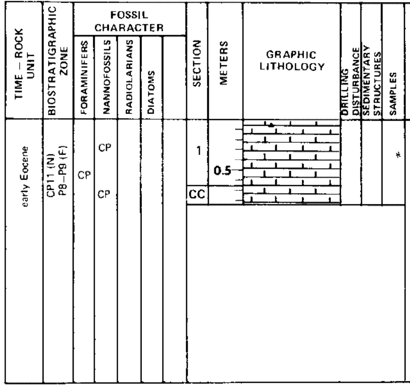
SMEAR SLIDE SUMMARY (%):

	1, 31	1, 70	1, 102	2, 96
	D	D	D	D
Texture:				
Clay	100	100	100	100
Composition:				
Feldspar	3	2	2	1
Clay	–	–	–	4
Carbonate unspec.	10	8	13	10
Calc. nannofossils	87	90	85	85
Fish remains	–	<1	–	–

ORGANIC CARBON AND CARBONATE (%):

	1, 16–17	2, 12–14	CC
Organic carbon	0.04	0.01	0.02
Carbonate	64	57	56

SITE 585 HOLE CORE 9 CORED INTERVAL 312.0–321.2 m sub-bottom; 6434.3–6443.5 m below rig floor



LITHOLOGIC DESCRIPTION

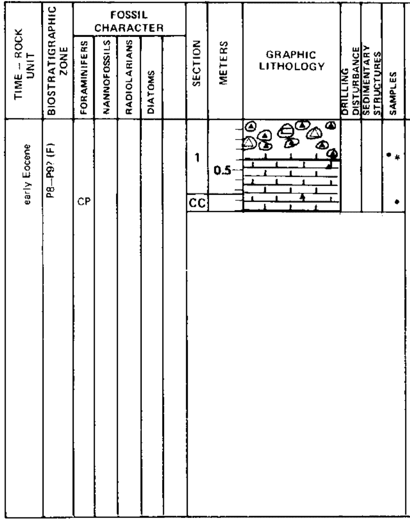
NANNOFOSSIL CHALK

White (N8); massive below 45 cm, Section 1, recovery consists of fragments, mostly>2 cm.

SMEAR SLIDE SUMMARY (%):

	1, 33
	D
Texture:	
Clay	100
Composition:	
Feldspar	1
Clay	3
Carbonate unspec.	8
Calc. nannofossils	88

SITE 585 HOLE CORE 10 CORED INTERVAL 321.2–330.3 m sub-bottom; 6443.5–6452.6 m below rig floor



LITHOLOGIC DESCRIPTION

0–40 cm = chips (<˂ 0.5 cm) of: 1) white (N8) to light gray (5Y 7/1) SILICIFIED LIMESTONE (~ 35%), 2) brown (10YR 5/6 and 10YR 3/4) CHERT (~ 63%), and 3) green CLAYSTONE (2%). These chips also are packed around larger fragments below 40 cm.

40 cm through Core-Catcher = larger fragments (several cm) of white (N9) NANNOFOSSIL CHALK and 2 fragments of light gray (5Y 7/1) SILICIFIED LIMESTONE.

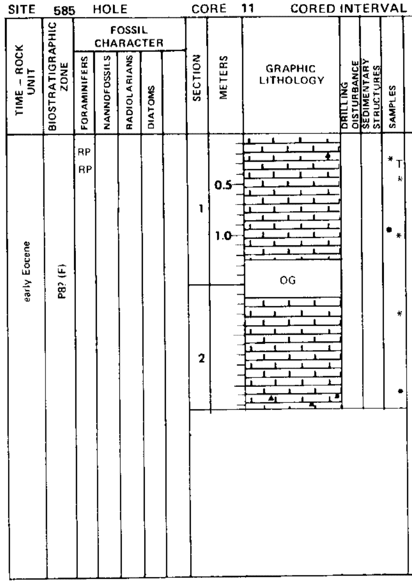
SMEAR SLIDE SUMMARY (%):

	1, 40
	D
Texture:	
Sand	–
Silt	1
Clay	99
Composition:	
Feldspar	<1
Carbonate unspec.	10
Calc. nannofossils	89

ORGANIC CARBON AND CARBONATE (%):

	1, 39–42	CC, 3–5
Organic carbon	0.02	0.01
Carbonate	77	32

SITE 585 HOLE CORE 11 CORED INTERVAL 330.3–339.5 m sub-bottom; 6452.6–6461.8 m below rig floor



LITHOLOGIC DESCRIPTION

NANNOFOSSIL CHALK
Massive; white (N9)

Several fragments of SILICIFIED LIMESTONE, the core of one (25–28 cm, Section 1) consists of zeolite-bearing clay.

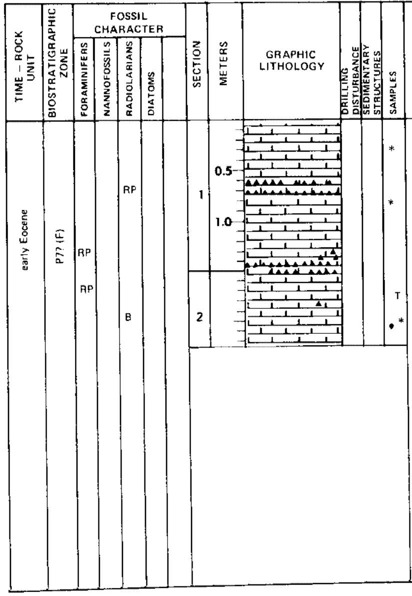
SMEAR SLIDE SUMMARY (%):

	1, 25	1, 27	1, 50	1, 100	2, 30
	D	M			
Texture:					
Sand	–	–	–	–	–
Silt	–	5	1	3	2
Clay	100	95	99	97	98
Composition:					
Feldspar	–	<1	–	2	1
Clay	10	80	–	2	1
Volcanic glass	–	<1	–	–	–
Zeolite	–	10	<1	–	–
Carbonate unspec.	15	–	10	25	10
Foraminifers	–	–	–	2	1
Calc. nannofossils	25	5	90	65	85
Radiolarians	–	<1	–	2	1
Silicoflagellates	–	<1	–	–	–
Fish remains	–	<1	–	–	–
Silica unspec.	50	–	–	2	1

ORGANIC CARBON AND CARBONATE (%):

	1, 98–100	2, 110–112
Organic carbon	0.02	0.06
Carbonate	78	34

SITE 585 HOLE CORE 12 CORED INTERVAL 339.5–348.6 m sub-bottom; 6461.8–6470.9 m below rig floor



LITHOLOGIC DESCRIPTION

NANNOFOSSIL CHALK
Very light gray (5Y 7.5/1); massive with thin whisps and lenses of ZEOLITIC CLAY.

Forams present throughout mostly concentrated in zone (up to 10% estimated on core surface), but no distinct grading is noticeable.

Light gray (5Y 7/1) SILICIFIED LIMESTONE in several zones; some pieces contain subspherical cores of zeolitic clay, implying that silicification preceeded compaction (which resulted in lenses of zeolitic clay in chalk).

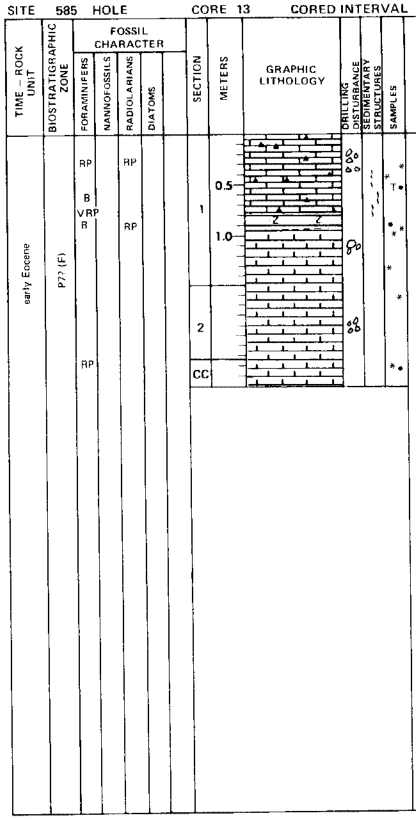
SMEAR SLIDE SUMMARY (%):

	1, 30	2, 50	1, 83
	D	D	M
Texture:			
Sand	–	–	–
Silt	2	2	2
Clay	98	98	98
Composition:			
Feldspar	–	–	1
Clay	–	–	57
Zeolite	<1	<1	40
Carbonate unspec.	10	10	–
Foraminifers	1	2	–
Calc. nannofossils	89	88	2

ORGANIC CARBON AND CARBONATE (%):

	2, 57–58
Organic carbon	0.18
Carbonate	83

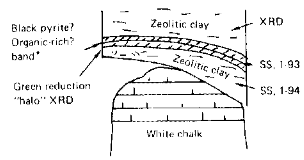
SITE 585 HOLE CORE 13 CORED INTERVAL 348.6–357.8 m sub-bottom; 6470.9–6480.1 m below rig floor



LITHOLOGIC DESCRIPTION

93 cm (5.1) to base of Core-Catcher = NANNOFOSSIL CHALK
Massive with a few thin, small lenses of ZEOLITIC CLAY; white (N9).

ZEOLITIC CLAY bed (82–94 cm); olive gray (5Y 4/2) containing black, organic?-rich clavey nannofossil chalk band with green reduction "halo" for 0.5 cm on either side of black band.



*A few grains of native Cu found in this band

Chalk above zeolitic clay bed has been silicified and is now silicfied limestone (0–82 cm); light gray (5Y 6/1); massive brown chert nodule at 16–21 cm.

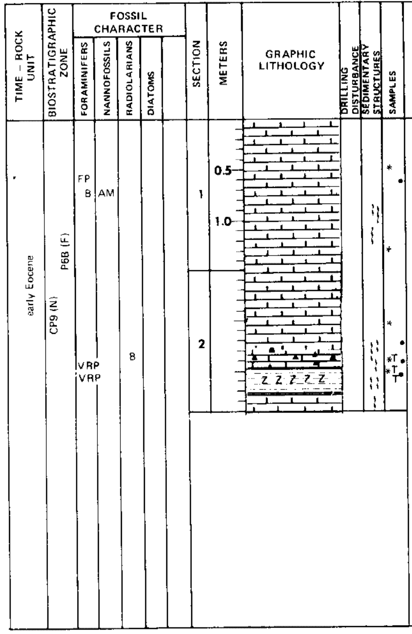
SMEAR SLIDE SUMMARY (%):

	1, 43	1, 93	1, 94	1, 130	2, 15	CC	1, 31
	D	M	M	D	D	D	M
Texture:							
Sand	–	–	–	–	–	–	–
Silt	2	20	70	2	–	–	–
Clay	98	80	30	98	–	–	–
Composition:							
Clay	–	5	28	–	–	–	77
Volcanic glass	–	–	20	–	–	–	1
Zeolite	–	15	50	1	1	<1	2
Carbonate unspec.	10	–	–	10	10	7	5
Foraminifers	–	–	–	–	1	1	–
Calc. nannofossils	80	70	2	88	82	85	10
Radiolarians	<1	–	–	1	1	2	–
Plant debris?	–	10	–	–	–	–	5
Silica unspec.	10	–	–	–	5	5	–

ORGANIC CARBON AND CARBONATE (%):

	1, 94–95	CC, 3–7	1, 53–56
Organic carbon	0.1	0.07	0.09
Carbonate	0	74	52

SITE 585 HOLE CORE 14 CORED INTERVAL 357.8–366.9 m sub-bottom; 6480.1–6489.2 m below rig floor



LITHOLOGIC DESCRIPTION

NANNOFOSSIL CHALK

Very light gray (5Y 7.5/1) massive appearing but peppered with coarser grains (= recrystallized radiolarians? and foraminifers?).

Minor lithologies:

1. SILICIFED NANNOFOSSIL LIMESTONE – light gray (5Y 7/1–7/2) (79–102 cm, Section 2); bioturbated at base.
2. ZEOLITIC CLAYSTONE – very dark grayish brown (2.5Y 3/2); moderately bioturbated with reduction halos around some burrows (102–110 cm, Section 2).

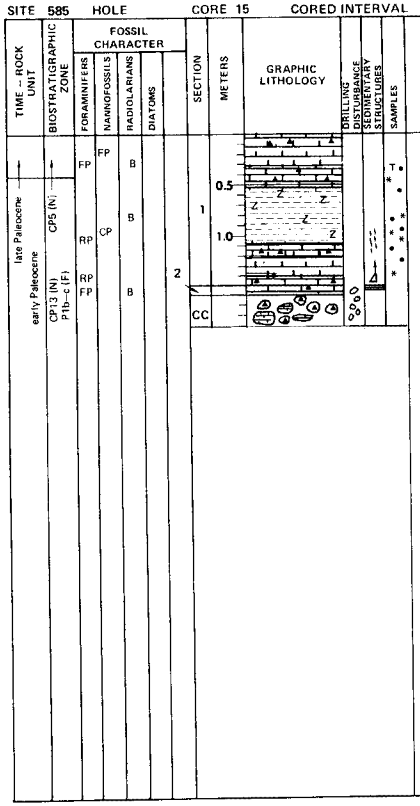
SMEAR SLIDE SUMMARY (%):

	1, 50	1, 130	2, 60	2, 89	2, 95	2, 102	2, 106
	D	D	D	D	M	M	M
Texture:							
Sand	–	–	–	–	–	–	–
Silt	5	3	5	20	6	55	25
Clay	95	97	95	80	95	45	75
Composition:							
Feldspar	–	–	–	<1	2	1	–
Clay	–	–	–	–	38	44	48
Volcanic glass	–	–	–	–	1	–	–
Zeolite	1	1	<1	–	4	50	40
Carbonate unspec.	5	5	5	60	25	–	5
Foraminifers	2	2	2	–	–	–	–
Calc. nannofossils	90	91	88	25	10	1	2
Radiolarians	2	1	2	–	–	4	–
Fish remains	–	–	–	–	–	–	<1
Recry. silica	–	–	2	10	–	–	–

ORGANIC CARBON AND CARBONATE (%):

	1, 64–67	2, 75–79	2, 92–94	2, 105–108
Organic carbon	0.08	0.12	0.10	0.12
Carbonate	76	77	53	0

SITE 585 HOLE CORE 15 CORED INTERVAL 366.9–380.4 m sub-bottom; 6489.2–6502.7 m below rig floor



LITHOLOGIC DESCRIPTION

NANNOFOSSIL CHALK AND SILICIFED LIMESTONE AND BROWN ZEOLITIC MUDSTONE

0–52 cm: NANNOFOSSIL CHALK AND SILICIFIED LIMESTONE; mostly light gray (10YR 6.5/1), pale brown (10YR 6/3) and zeolite-bearing at base; brown CHERT at several horizons.

52–95 cm: ZEOLITIC CLAYSTONE (dark brown [10YR 4/3]); harder at base than at top.

95–103 cm: ZEOLITIC CLAYSTONE soft; brown (7.5YR 4/4).

103 cm–base Section 2: NANNOFOSSIL CHALK AND SILICIFIED LIMESTONE; pinkish white (7.5YR 7.5/2); some bioturbation at top visible where silicified.

Core-Catcher: drilling breccia, mainly of pinkish white LIMESTONE and brown CHERT, with several larger clasts of pinkish gray (7.5YR 7/2) CHALK.

SMEAR SLIDE SUMMARY (%):

	1, 49	1, 86	1, 100	1, 104	1, 143
	D	D	D	D	D
Texture:					
Sand	–	–	–	–	–
Silt	20	10	5	–	10
Clay	80	90	95	100	90
Composition:					
Feldspar	–	–	–	3	–
Heavy minerals	–	<1	–	–	–
Clay	–	84	20	–	–
Volcanic glass	–	<1	<1	–	–
Micronodules	–	<1	–	–	–
Zeolite	8	15	80	–	4
Carbonate unspec.	30	–	–	34	66
Calc. nannofossils	60	<1	<1	55	30
Radiolarians	–	<1	–	–	–
Other	2	–	–	4	–

ORGANIC CARBON AND CARBONATE (%):

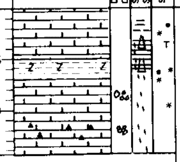
	1, 34–36	1, 61–62	1, 86–88	1, 98–100
Organic carbon	0.06	0.09	0.08	0.11
Carbonate	18	0	0	0

	1, 113–114	1, 129–130
Organic carbon	0.04	0.03
Carbonate	41	85

SITE 585 HOLE CORE 16 CORED INTERVAL 380.4–389.5 m sub-bottom; 6502.7–6511.8 m below rig floor

TIME – ROCK UNIT	BIOSTRATIGRAPHIC ZONE	FOSSIL CHARACTER: FORAMINIFERS	FOSSIL CHARACTER: NANNOFOSSILS	FOSSIL CHARACTER: RADIOLARIANS	FOSSIL CHARACTER: DIATOMS	SECTION	METERS
early Paleocene	CP1A CP1B *Micula mura* P1A? (F)	CP CP CP FP	CP AM	B B		1	0.5 1.0

GRAPHIC LITHOLOGY / DRILLING DISTURBANCE / SEDIMENTARY STRUCTURES / SAMPLES



LITHOLOGIC DESCRIPTION

Dominant lithologies:

0–54 cm: NANNOFOSSIL CHALK AND CLAYEY NANNOFOSSIL CHALK (mostly white [N9] to light brown [5YR 6/4]); some faint, indistinct laminations; some coarser layers with foraminifer(?) and radiolarians(?); some indication of bioturbation.

54–78 cm: ZEOLITIC CLAYSTONE; brown (7.5YR 5/4), some bioturbation.

78–90 cm: drilling breccia with mixed lithologies – mostly zeolitic claystone and nannofossil chalk.

90–108 cm: NANNOFOSSIL OOZE; white (10YR 8/2); some bioturbation with burrows filled with brown zeolitic clay.

108–113 cm: dark brown (10YR 4/3) chert.

113–144 cm: NANNOFOSSIL CHALK; mostly light brown to very pale brown (5YR 6/4–10YR 7/4) clayey at base; some bioturbation.

SMEAR SLIDE SUMMARY (%):

	1, 24 D	1, 63 D	1, 73 D	1, 98 D
Texture:				
Clay	100	100	100	100
Composition:				
Feldspar	2	1	–	3
Clay	30	60	69	4
Volcanic glass	–	3	3	–
Zeolite	4	3	20	6
Carbonate unspec.	30	2	2	47
Calc. nannofossils	25	1	5	40
Radiolarians	3	–	–	–
Recrystal. SiO_2	6	–	–	–

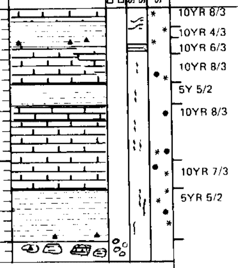
ORGANIC CARBON AND CARBONATE (%):

	1, 22–23	1, 69–70
Organic carbon	0.04	0.16
Carbonate	49	0

SITE 585 HOLE CORE 17 CORED INTERVAL 389.5–398.7 m sub-bottom; 6511.8–6521.0 m below rig floor

TIME – ROCK UNIT	BIOSTRATIGRAPHIC ZONE	FOSSIL CHARACTER: FORAMINIFERS	FOSSIL CHARACTER: NANNOFOSSILS	FOSSIL CHARACTER: RADIOLARIANS	FOSSIL CHARACTER: DIATOMS	SECTION	METERS
Maestrichtian	?	VRP RP CP	CP AM	RP FM B B		1 2 CC	0.5 1.0

GRAPHIC LITHOLOGY / DRILLING DISTURBANCE / SEDIMENTARY STRUCTURES / SAMPLES



LITHOLOGIC DESCRIPTION

Dominant lithologies:

Section 1, 0–12 cm: NANNOFOSSIL CHALK.

Section 1, 12–27 cm: dark brown zeolitic claystone; black, whispy laminations throughout.

Section 1, 27–42 cm: pale brown ZEOLITIC CLAYSTONE, very hard.

Section 1, 42–75 cm: NANNOFOSSIL CHALK AND LIMESTONE (silicified?); highly variable degree of induration; very sharp contact with overlying and underlying claystones.

Section 1, 75–96 cm: pale brown CLAYSTONE; soft at top, very hard at base.

Section 1, 96–150 cm and Section 2, 0–30 cm: NANNOFOSSIL CHALK and (silicified?) LIMESTONE; faint hints of bioturbation.

Section 2, 30–80 cm: CLAYSTONE; mostly pale brown with several greenish gray bands; some bioturbation.

Core-Catcher: drilling breccia consisting mainly of green and brown claystone and pink chalk.

SMEAR SLIDE SUMMARY (%):

	1, 8 D	1, 22 D	1, 31 D	1, 71 D	1, 141 D	2, 16 D	2, 34 D	2, 41 D	2, 69 D
Texture:									
Sand	–	–	–	–	–	–	–	–	–
Silt	–	–	–	2	1	–	1	–	8
Clay	–	100	100	98	99	100	99	100	92
Composition:									
Feldspar	1	–	–	–	2	2	2	1	–
Clay	–	66	81	–	4	7	50	–	85
Volcanic glass	–	2	3	–	–	1	3	–	1
Palagonite	–	–	1	–	–	–	–	–	–
Micronodules	–	–	<1	<1	–	–	–	–	<1
Zeolite	2	30	15	3	3	5	35	2	–
Carbonate unspec.	72	1	–	50	54	48	3	60	5
Foraminifers	–	–	–	2	–	–	–	–	–
Calc. nannofossils	25	<1	–	45	35	37	3	35	2
Radiolarians	–	1	1	–	–	–	–	<1	–
Sponge spicules	–	–	–	–	–	–	–	–	<1
Fish remains	<1	–	–	–	–	–	–	–	<1
Recrystal. SiO_2	–	–	–	–	–	–	4	1	–

ORGANIC CARBON AND CARBONATE (%):

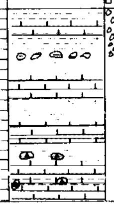
	1, 67–73	1, 104–105	1, 140–141	2, 7–9
Organic carbon	0.07	0.10	0.06	0.04
Carbonate	72	36	60	83

	2, 18–23	2, 52–53
Organic carbon	0.07	0.12
Carbonate	51	0

SITE 585 HOLE CORE 18 CORED INTERVAL 398.7–407.8 m sub-bottom; 6521.0–6530.1 m below rig floor

TIME – ROCK UNIT	BIOSTRATIGRAPHIC ZONE	FORAMINIFERS	NANNOFOSSILS	RADIOLARIANS	DIATOMS	SECTION	METERS
Maestrichtian	?	AP	FP			1	0.5
		CP		B			1.0
		RP		B			
		FP	FP	B		2	

GRAPHIC LITHOLOGY



LITHOLOGIC DESCRIPTION

Pale green (5G 7/2)

Drill breccia

10G 8/2 beds and mottling in 10YR 7/3 (dominant color)

Interbedded red and green CALCAREOUS CLAYSTONE with minor ZEOLITIC CLAYSTONE and CLAYEY NANNOFOSSIL CHALK.

Thin interbeds of dark brown (10YR 3/3) ZEOLITIC CLAYSTONE and pale green (10G 4/2) CLAYEY CHALK

Brown (5YR 3/4) CHERT nodules

Interbedded brown (10YR 4/2; 10YR 6/2; 10YR 8/1; 10G 6/2) ZEOLITIC CLAYSTONE and pale green CALCAREOUS CLAYSTONE with several brown CHERT nodules

SMEAR SLIDE SUMMARY (%):

	1, 30 D	1, 60 D	1, 84 M	1, 104 M	1, 116 M	1, 120 M	1, 124 M	1, 128 M	2, 6 M	2, 34 D
Texture:										
Sand				–	–	–	–	–	–	–
Silt	–	–	–	–	10	–	–	–	–	–
Clay	100	100	100	100	90	100	100	100	100	100
Composition:										
Feldspar	–	–	–	–	<1	–	–	–	–	1
Heavy minerals	–	–	–	–	–	–	–	–	–	2
Clay	65	60	55	70	71	25	52	92	87	78
Volcanic glass	<1	–	–	–	–	–	–	3	3	5
Zeolite	<1	–	1	–	15	–	3	5	–	12
Carbonate unspec.	30	35	25	25	2	15	15	–	10	2
Calc. nannofossils	5	5	20	5	3	60	30	–	–	–
Radiolarians	<1	–	–	–	<1	–	–	–	–	–
Silicoflagellates	–	–	–	–	<1	–	–	–	–	–
Fish remains	–	–	–	–	<1	–	–	–	–	–

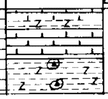
ORGANIC CARBON AND CARBONATE (%):

	1, 13–15	1, 53–56
Organic carbon	0.06	0.07
Carbonate	27	43

SITE 585 HOLE CORE 19 CORED INTERVAL 407.8–417.0 m sub-bottom; 6530.1–6539.3 m below rig floor

TIME – ROCK UNIT	BIOSTRATIGRAPHIC ZONE	FORAMINIFERS	NANNOFOSSILS	RADIOLARIANS	DIATOMS	SECTION	METERS
Maestrichtian?	?	B	CP	B		1	0.5
		CM		B			

GRAPHIC LITHOLOGY



LITHOLOGIC DESCRIPTION

5G 7/2

10YR 4/2; 10G 4/2

10YR 7/1–8/1

5G 7/2

Interbedded brown and green (10YR 4/3 and 5G 7/2) claystones

Interbedded brown, green, and tan ZEOLITIC CLAYSTONE and NANNOFOSSIL CHALK. A few brown CHERT nodules.

SMEAR SLIDE SUMMARY (%):

	1, 3 M	1, 12 D	1, 18 M	1, 23 M	1, 50 M
Texture:					
Sand	–	–	–	–	–
Silt	–	1	–	–	–
Clay	100	99	100	100	–
Composition:					
Feldspar	1	1	3	1	–
Clay	4	78	42	2	–
Volcanic glass	–	5	9	2	–
Zeolite	3	15	41	–	7
Carbonate unspec.	51	–	–	56	63
Foraminifers	–	–	–	1	–
Calc. nannofossils	40	–	1	40	30
Radiolarians	–	1	<1	–	<1
Fish remains	–	–	<1	–	–

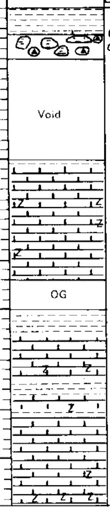
ORGANIC CARBON AND CARBONATE (%):

	1, 38–40	1, 48–49	1, 56–57
Organic carbon	0.15	0.01	0.10
Carbonate	57	76	0

SITE 585 HOLE CORE 20 CORED INTERVAL 417.0–426.1 m sub-bottom; 6539.3–6548.4 m below rig floor

TIME – ROCK UNIT	BIOSTRATIGRAPHIC ZONE	FORAMINIFERS	NANNOFOSSILS	RADIOLARIANS	DIATOMS	SECTION	METERS
Maestrichtian	*Tetralithus trifidus?* (N)	VRP AP	CP	RP		1	0.5 1.0
		RP B				2	
		B		RP			
late Campanian	*Quadrum gothicum* (N)	CP	AM	B		3	
		FP VRP					
		RP CP VRP		B		4	

GRAPHIC LITHOLOGY



LITHOLOGIC DESCRIPTION

10YR 7/4

10YR 7/4

5YR 3/4

Interbedded dark brown (7.5YR 4/4) ZEOLITIC CLAYSTONE and light brown (7.5YR 6/4) ZEOLITE-BEARING CALCAREOUS CLAYSTONE, and, in extreme, NANNOFOSSIL CLAYSTONE or CLAYEY NANNOFOSSIL CHALK (pinkish white (7.5YR 8/2)).

Many of the units some grading apparent but very subtle. The bases of several $CaCO_3$-rich beds have thin laminae of silty, ashy material (see smear slide 3, 60) which usually are accompanied by thin green reduction "halos" around the laminae.

Interbedded 7.5YR 4/4 and

7.5YR 8/2

7.5YR 6/4

Interbedded brown (7.5YR 4/4) and pinkish white (7.5 8/2)

7.5YR 4/4

7.5YR 6/4

Interbedded brown (7.5YR 4/4) and pinkish white (7.5 8/2)

Mostly pinkish white (7.5YR 8/2)

Mostly 7.5YR 4/4

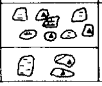
SMEAR SLIDE SUMMARY (%):

	1, 11 D	2, 23 M	2, 50 M	3, 57 M	3, 60 M
Texture:					
Sand	–	–	–	–	–
Silt	–	4	1	7	60
Clay	–	96	99	93	40
Composition:					
Feldspar	–	2	–	–	–
Clay	81	44	71	71	20
Volcanic glass	–	4	1	2	60
Palagonite	–	–	–	1	–
Zeolite	3	44	10	7	5
Carbonate unspec.	5	2	8	–	10
Foraminifers	–	–	–	<1	–
Calc. nannofossils	10	4	10	13	5
Radiolarians	1	–	–	–	–
Fish remains	–	–	–	<1	–
Other	–	–	–	3	–

ORGANIC CARBON AND CARBONATE (%):

	1, 8–16	2, 12–18	3, 20–26
Organic carbon	0.02	0.09	0.03
Carbonate	66	0	79

SITE 585 HOLE CORE 21 CORED INTERVAL 426.1–435.8 m sub-bottom; 6548.4–6557.6 m below rig floor

TIME – ROCK UNIT	BIOSTRATIGRAPHIC ZONE	FOSSIL CHARACTER FORAMINIFERS	FOSSIL CHARACTER NANNOFOSSILS	FOSSIL CHARACTER RADIOLARIANS	FOSSIL CHARACTER DIATOMS	SECTION	METERS	GRAPHIC LITHOLOGY	DRILLING DISTURBANCE	SEDIMENTARY STRUCTURES	SAMPLES
late Campanian	*Ceratolithoides aculeus* (N)	B	FP			1					*
						CC	0.5				*

LITHOLOGIC DESCRIPTION

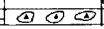
Fragments of dark brown (7.5YR 4/4) CLAYSTONE, light brown (7.5YR 4/4) SILICIFIED(?) CHALK, and pale green (5G 8/2) CHERT.

SMEAR SLIDE SUMMARY (%):

	1, 20 D	CC D
Texture:		
Sand	–	–
Silt	2	2
Clay	98	98
Composition:		
Clay	–	92
Zeolite	1	<1
Carbonate unspec.	54	–
Calc. nannofossils	5	–
Radiolarians	–	1
Sponge spicules	–	1
Recrystal. SiO_2	40	5

Core 22: 435.3–444.4 m sub-bottom (6557.6–6566.7 mbrf): No recovery.

SITE 585 HOLE CORE 23 CORED INTERVAL 444.4–453.6 m sub-bottom; 6566.7–6575.9 m below rig floor

TIME – ROCK UNIT	BIOSTRATIGRAPHIC ZONE	FOSSIL CHARACTER FORAMINIFERS	FOSSIL CHARACTER NANNOFOSSILS	FOSSIL CHARACTER RADIOLARIANS	FOSSIL CHARACTER DIATOMS	SECTION	METERS	GRAPHIC LITHOLOGY	DRILLING DISTURBANCE	SEDIMENTARY STRUCTURES	SAMPLES
?		RP	B			CC					TT

LITHOLOGIC DESCRIPTION

Three fragments of CHERT (silicified bioclastic limestone).

SITE 585 HOLE CORE 24 CORED INTERVAL 453.6–462.7 m sub-bottom; 6575.9–6585.0 m below rig floor

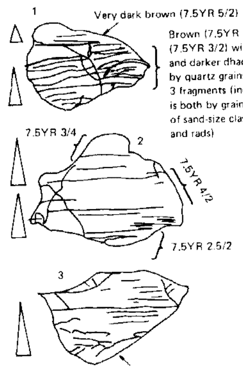
TIME – ROCK UNIT	BIOSTRATIGRAPHIC ZONE	FOSSIL CHARACTER FORAMINIFERS	FOSSIL CHARACTER NANNOFOSSILS	FOSSIL CHARACTER RADIOLARIANS	FOSSIL CHARACTER DIATOMS	SECTION	METERS	GRAPHIC LITHOLOGY	DRILLING DISTURBANCE	SEDIMENTARY STRUCTURES	SAMPLES
?		B	B			CC					

LITHOLOGIC DESCRIPTION

Four fragments of CHERT.

Lenticular laminations with mixing of various shades of brown: brown (10YR 4/3); yellowish brown (10YR 3/4), dark brown (10YR 3/3) plus intermediate shades.

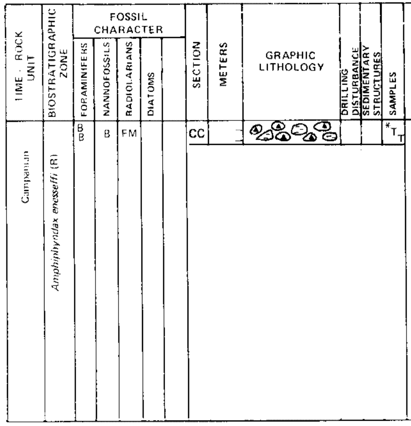
Texture suggests that the chert formed by silicification of bioclastic granular limestone with fine lenticular banding.



Brown (7.5YR 5/4) and dark brown (7.5YR 3/2) with slightly lighter and darker dhades; nodule is cut by quartz grains. Grading in all 3 fragments (indicated △) is both by grain size and number of sand-size clasts (forams and rads)

Brown (10YR 4.5/3) with darker quartz grains and laminae. There appears to be some stylolitization? Subparallel to laminae.

SITE 585 HOLE CORE 25 CORED INTERVAL 462.7–476.3 m sub-bottom m; 6585.0–6598.6 m below rig floor



LITHOLOGIC DESCRIPTION

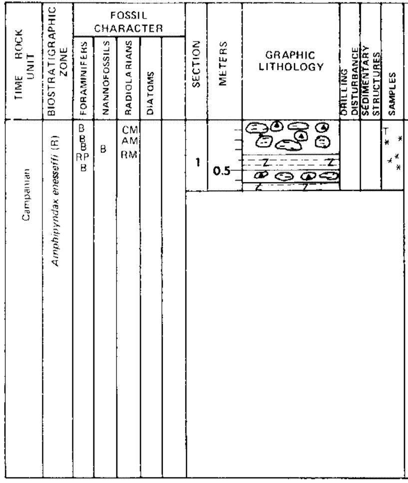
Five fragments of CHERT; brown (7.5YR 4/6 to 7.5YR 5/4); laminated, parallel to wavy; some size-grading evident in several pieces.

Four fragments of ZEOLITIC CLAYSTONE.

SMEAR SLIDE SUMMARY (%):

	CC
	D
Texture:	
Sand	–
Silt	15
Clay	85
Composition:	
Clay	58
Palagonite	1
Micronodules	1
Zeolite	40
Radiolarians	<1

SITE 585 HOLE CORE 26 CORED INTERVAL 476.3–485.4 m sub-bottom; 6598.6–6607.7 m below rig floor



LITHOLOGIC DESCRIPTION

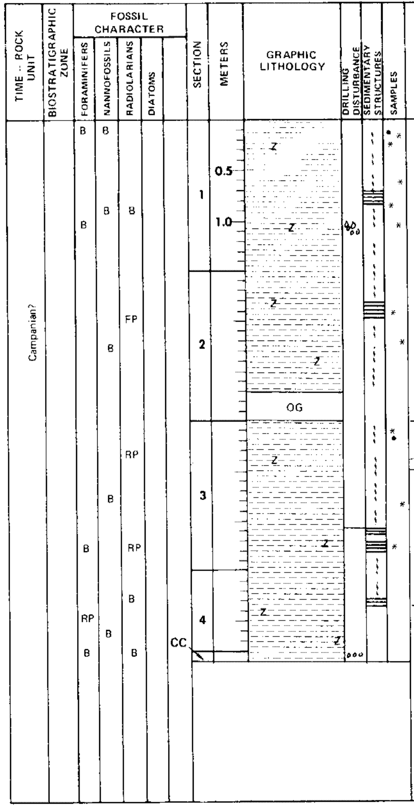
Fragments of dark brown (7.5YR 4/4) and light olive gray (5Y 5/2) CHERT.

ZEOLITIC AND ZEOLITE-BEARING CLAYSTONE; mostly dark brown (7.5YR 3/2–4/2).

SMEAR SLIDE SUMMARY (%):

	1, 20	1, 23	1, 36	1, 39	1, 44
	M	M	M	M	M
Texture:					
Sand	–	–	–	–	–
Silt	3	65	2	2	–
Clay	97	35	98	98	–
Composition:					
Feldspar	–	1	–	–	–
Heavy minerals	–	2	5	4	–
Clay	50	10	71	68	50
Volcanic glass	2	65	3	–	25
Zeolite	–	15	30	25	25
Carbonate unspec.	–	2	–	–	–
Calc. nannofossils	–	5	–	~1	–
Radiolarians	–	<1	–	–	–
Other	1	–	1	–	–

SITE 585 HOLE CORE 27 CORED INTERVAL 485.4–494.6 m sub-bottom; 6607.7–6616.9 m below rig floor



LITHOLOGIC DESCRIPTION

5YR 2.5/2 (dominant)

(5G 7/4)

(5G 7/4)

5Y 2/1 (dominant)

10G 4/2

(5G 7/4)

Interbedded moderate brown (5YR 3/4) and grayish green (5G 5/2) CLAYSTONE

Dominant lithology is ZEOLITE-BEARING CLAYSTONE Mostly dark reddish brown (5YR 2.5/2) in Sections 1 and 2 and olive black (5Y 2/1) in rest of core.

Zones of fine laminations of light green (5G 7/4) claystone occur throughout.

Plant fragments appear in foram-preparations from a dark band (~0.5 cm) at Section 3, 128 cm.

Claystone is moderately bioturbated throughout; most burrows are flattened and subparallel to bedding. Burrows are commonly filled with more-reduced claystone (usually green or black).

SMEAR SLIDE SUMMARY (%):

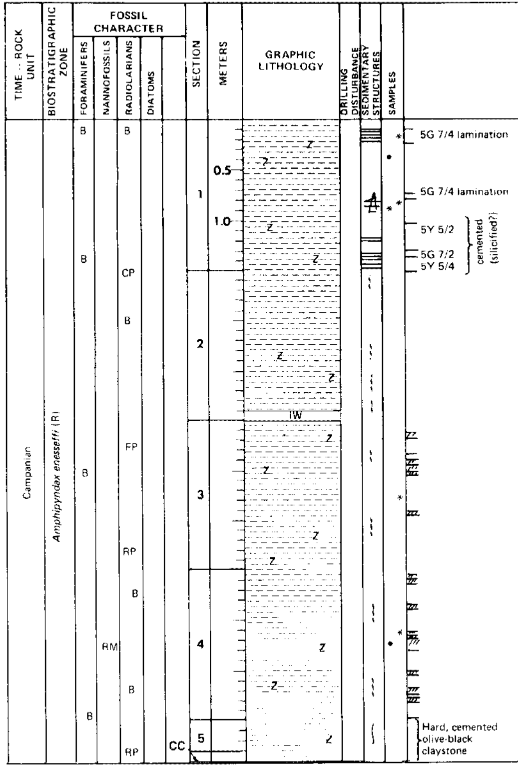
	1, 15	1, 27	1, 67	1, 82	1, 109
	D	M	M	M	M
Texture:					
Sand	–	–	–	–	–
Silt	12	11	1	20	1
Clay	88	89	99	80	99
Composition:					
Feldspar	2	2	1	1	1
Heavy minerals	–	–	–	2	–
Clay	88	89	99	80	99
Volcanic glass	3	4	–	10	<1
Zeolite	3	2	<1	3	<1
Fe-oxides	4	2	–	2	–

	2, 42	2, 79	3, 16	3, 85	3, 123
	M	D	D	D	D
Texture:					
Sand	–	–	–	–	–
Silt	7	5	3	5	14
Clay	93	95	97	95	86
Composition:					
Feldspar	2	1	2	2	4
Heavy minerals	–	1	1	–	–
Clay	93	91	92	91	86
Volcanic glass	2	2	3	2	2
Zeolite	3	5	2	3	5
Fe-oxides	–	1	–	2	2

ORGANIC CARBON AND CARBONATE (%):

	1, 13–19	3, 20–24
Organic carbon	0.09	0.14
Carbonate	1	2

SITE 585 HOLE CORE 28 CORED INTERVAL 494.6–503.7 m sub-bottom; 6616.9–6626.0 m below rig floor



LITHOLOGIC DESCRIPTION

Dominant lithology is ZEOLITE-BEARING CLAYSTONE
Mostly olive black (5Y 2/1); other colors as indicated.

Some bioturbation throughout but most is massive-appearing.

Laminations of light green (5G 7/4) occur at several horizons. Some appear to be bases of turbidites. Mottles and indistinct thin beds of pale green (10G 6/2) occur in Sections 3 and 4 (indicated to right of column as ∕∕∕∕).

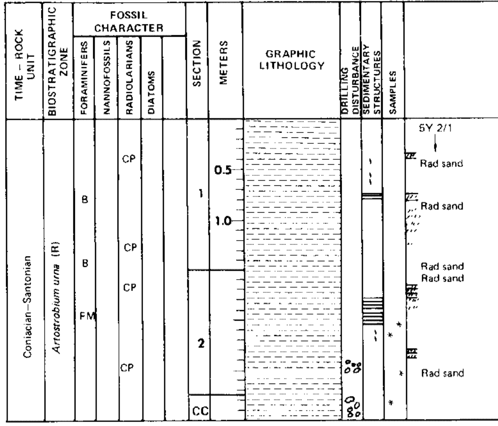
SMEAR SLIDE SUMMARY (%):

	1, 18 M	1, 82 M	1, 85 M	3, 80 D	4, 62 M
Texture:					
Sand	–	–	–	–	–
Silt	9	7	7	2	4
Clay	91	93	93	98	96
Composition:					
Feldspar	2	–	–	–	–
Heavy minerals	–	1	–	3	1
Clay	91	72	95	76	86
Volcanic glass	3	10	–	4	1
Zeolite	2	15	5	10	8
Carbonate unspec.	–	–	–	1	2
Calc. nannofossils	–	–	–	6	2
Radiolarians	–	1	–	–	–

ORGANIC CARBON AND CARBONATE (%):

	1, 38–40	4, 76–78
Organic carbon	0.02	0.15
Carbonate	0	2

SITE 585 HOLE CORE 29 CORED INTERVAL 503.7–512.9 m sub-bottom; 6626.0–6635.2 m below rig floor



LITHOLOGIC DESCRIPTION

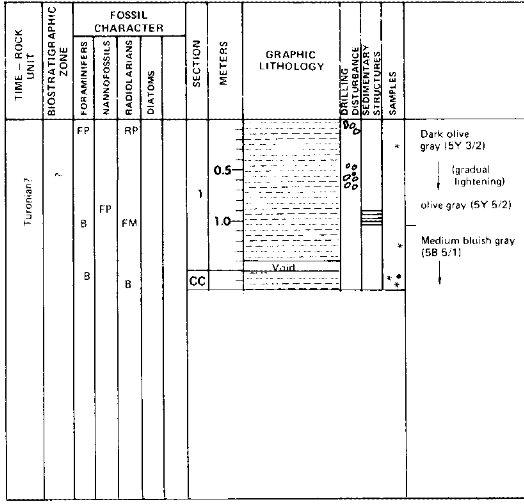
Dominant lithology is olive black (5Y 2/1) CLAYSTONE
Some faint laminations; minor bioturbation; several intervals of radiolarian "sandstone" (indicated as "rad sand").

Pale green (10G 6/2) beds throughout indicated as ∕∕∕∕.

SMEAR SLIDE SUMMARY (%):

	2, 56 M	2, 62 D	2, 101 M	CC, 5 M
Texture:				
Clay	–	100	100	100
Composition:				
Heavy minerals	1	1	2	2
Clay	86	93	88	82
Volcanic glass	2	1	–	–
Zeolite	7	3	9	6
Carbonate unspec.	–	1	–	1
Calc. nannofossils	3	1	–	7
Radiolarians	<1	–	1	1

SITE 585 HOLE CORE 30 CORED INTERVAL 512.9–522.0 m sub-bottom; 6635.2–6644.3 m below rig floor



LITHOLOGIC DESCRIPTION

Dominant lithology is dark olive gray CLAYSTONE

Other colors as indicated.

Some indications of bioturbation, but most is massive-appearing.

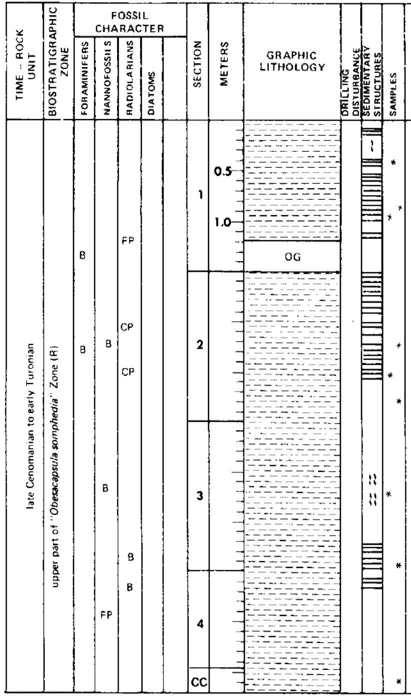
SMEAR SLIDE SUMMARY (%):

	1, 30 D	1, 124 M	CC D	CC D
Texture:				
Sand	–	–	–	3
Silt	–	–	5	10
Clay	100	100	95	87
Composition:				
Feldspar	–	–	–	<1
Heavy minerals	2	2	–	–
Clay	89	82	88	78
Zeolite	4	9	3	2
Carbonate unspec.	2	2	2	3
Calc. nannofossils	7	4	5	10
Polyxln. $CaCO_3$	–	–	–	10

ORGANIC CARBON AND CARBONATE (%):

	CC, 19–21
Organic carbon	0.07
Carbonate	6

SITE 585 HOLE CORE 31 CORED INTERVAL 522.0–531.2 m sub-bottom; 6644.3–6653.5 m below rig floor



LITHOLOGIC DESCRIPTION

Dominant lithology is dark greenish gray CLAYSTONE (5GY 4/1).

Abundant fine laminations throughout most of core (see sediment structure column).

Pale green (10G 6/2) laminae, thin beds, and burrow fill.

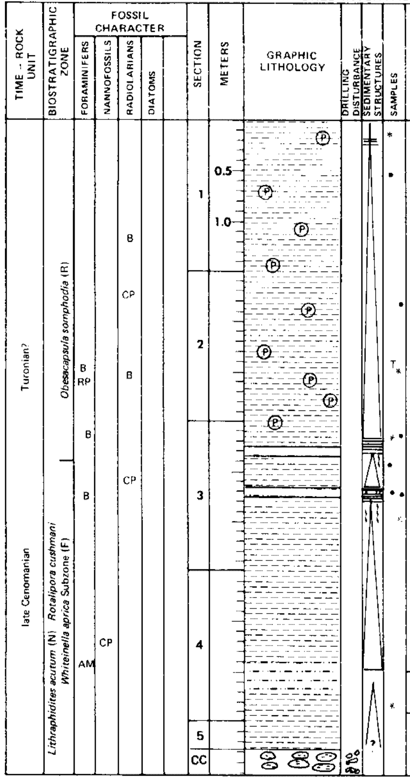
Several coarser, radiolarian-rich layers (mostly light gray [5Y 6/1]).

White calcite vein in Section 2, 21 cm, dipping at 75°.

SMEAR SLIDE SUMMARY (%):

	1, 40	1, 89	1, 94	2, 76	2, 101	2, 130	3, 75	3, 147	CC, 15
	D	D	M	M	M	D	D	D	D
Texture:									
Sand	—	—	3	2	20	—	—	—	—
Silt	10	10	10	8	10	10	5	2	10
Clay	90	90	87	90	70	90	95	98	90
Composition:									
Quartz	<1	<1	—	—	1	—	—	—	—
Feldspar	<1	—	<1	—	1	<1	—	—	<1
Heavy minerals	—	—	—	—	3	—	<1	—	—
Clay	87	85	84	85	70	87	91	95	70
Volcanic glass	—	—	—	—	2	2	4	1	—
Pyrite	—	—	—	—	1	—	—	—	—
Zeolite	7	1	8	7	7	10	2	2	30
Carbonate unspec.	—	1	—	1	—	—	—	—	<1
Calc. nannofossils	—	1	<1	—	—	—	2	—	—
Radiolarians	3	1	5	5	15	1	1	2	—
Sponge spicules	—	—	1	—	—	—	—	—	—

SITE 585 HOLE CORE 32 CORED INTERVAL 531.2–540.3 m sub-bottom; 6653.5–6662.6 m below rig floor



LITHOLOGIC DESCRIPTION

CLAYSTONE

Dark gray (5Y 4/1; 5Y5.5/1; 2.5Y 4.5/2); slightly calcareous; forams and radiolarians in more or less distinct layers; black, pyritized flecks (plant fragments?) scattered throughout subparallel to stratification; black flecks increase in size (<1 to 3 mm) and abundance downward within a depositional unit; one fining-upwards depositional unit (probably turbidite) extends from Section 3, 33 cm through Section 1! Units usually have a siltstone at base.

Enlargement of 69–74 cm, Section 3:

Cross-laminated bed sandwiched between parallel laminated units, and overlying black (N1), coarse, pyritic silty claystone layer

SMEAR SLIDE SUMMARY (%):

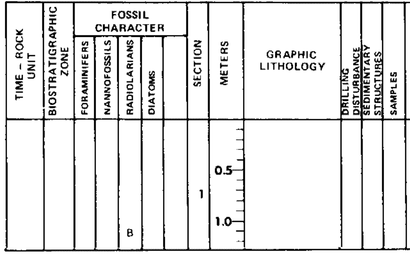
	1, 12	2, 100	3, 17	3, 100	4, 130
	D	D	D	D	D
Texture:					
Sand	—	—	—	—	—
Silt	—	5	6	1	1
Clay	—	95	94	99	99
Composition:					
Feldspar	1	1	1	<1	<1
Clay	90	91	91	98	99
Zeolite	3	2	2	1	<1
Foraminifers	<1	<1	1	—	—
Calc. nannofossils	1	1 —	1	1	—
Radiolarians	5	5	5	—	—

ORGANIC CARBON AND CARBONATE (%):

	1, 57–59	2, 35–39	3, 41–48
Organic carbon	0.13	0.33	0.22
Carbonate	6	12	7
	3, 13–18	3, 73–74	3, 72–73
Organic carbon	0.24	0.13	5.59
Carbonate	11	0	2

XRD: 2, 140 cm = celadonite, smectite (minor), clinoptilolite, common christobalite, some quartz and calcite.

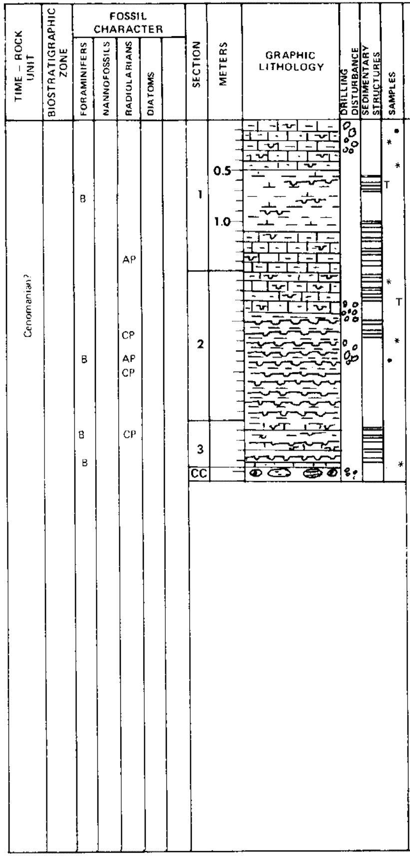
SITE 585 HOLE CORE 33 CORED INTERVAL 540.3–549.5 m sub-bottom; 6667.6–6671.8 m below rig floor



LITHOLOGIC DESCRIPTION

Fragments of gray (5Y 5/1) CLAYSTONE with drilling breccia (chips <1 cm) in between composed of gray (5Y 5/1) claystone, very dark grayish brown (10YR 3/2) chert, dark brown (10YR 3/3) claystone, pinkish gray (7.5YR 6/2) calcareous claystone, and dark gray (5Y 4/1) claystone.

SITE 585 HOLE CORE 34 CORED INTERVAL 549.5–558.6 m sub-bottom; 6671.5–6680.9 m below rig floor



LITHOLOGIC DESCRIPTION

Interbedded CLAY-RADIOLARIAN-, and NANNOFOSSIL-BEARING LIMESTONE, CLAYEY RADIOLARITE, and NANNOFOSSIL-BEARING CLAYSTONE – multicolored.

Section 1, 0–57 cm: pale red (10R 6/2–5R 6/2) NANNOFOSSIL-BEARING CLAYEY LIMESTONE.

Section 1, 57–100 cm: pale red (5R 6/2) NANNOFOSSIL-BEARING CLAYSTONE with continuous, parallel laminations; several light greenish gray (5G 8/1) bands very rich in radiolarians.

Section 1, 100–150 cm: NANNOFOSSIL-BEARING CLAYEY LIMESTONE – reddish purple (5RP 6/2) and gray (N5–N7) with highly variable content of radiolarians.

Section 2, 0–38 cm: light gray (N7) CLAY-, RAD-, and NANNO-BEARING LIMESTONE with thin continuous laminations.

Section 2, 38–150 cm: grayish brown (10YR 5/2, 4/2, 4/1) CLAYEY RADIOLARITE; some zone very rich in radiolaria (see smear slide 2, 71). Several thin beds burrow fillings, and reduction halos along fractures of light greenish gray (5G 8/1).

Section 3, 0–45 cm: CLAYEY RADIOLARITE AND RADIOLARIAN-BEARING LIMESTONE with some fine, parallel laminations; multicolored but mostly shades of brown (10YR); zones with highly varying degrees of richness in rads.

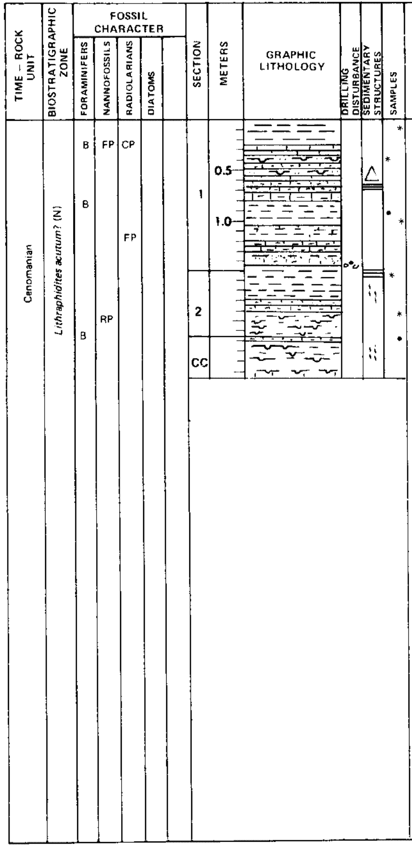
SMEAR SLIDE SUMMARY (%):

	1, 21	1, 41	2, 17	2, 71	3, 43
	D	D	D	M	M
Texture:					
Sand	–	5	–	–	10
Silt	5	55	80	–	50
Clay	95	40	20	–	40
Composition:					
Quartz	–	–	3	–	–
Clay	88	28	10	30	30
Volcanic glass	2	–	–	–	–
Pyrite	1	–	–	–	–
Zeolite	2	2	–	–	–
Carbonate unspec.	3	40	45	2	20
Foraminifers	1	–	–	–	–
Calc. nannofossils	1	20	15	–	39
Radiolarians	1	7	15	50	10
Plant debris	–	–	–	1	–
Recrystal. SiO_2	–	–	–	18	–

ORGANIC CARBON AND CARBONATE (%):

	1, 11–12	2, 92–93
Organic carbon	0.06	0.05
Carbonate	29	0

SITE 585 HOLE CORE 35 CORED INTERVAL 558.6–572.1 m sub-bottom; 6680.9–6694.4 m below rig floor



LITHOLOGIC DESCRIPTION

Mostly interbedded CALCAREOUS CLAYSTONE and CLAYEY LIMESTONE and RADIOLARIAN CLAY

Section 1, 0–12 cm: CLAYSTONE, dark gray (N4), massive-appearing.

Section 1, 12–17 cm: CHERT, yellow brown (10YR 5/4).

Section 1, 17–65 cm: CLAYEY LIMESTONE, mostly pale blue green (5BG 7/2) with several interbeds of yellow brown (10YR 6/2) rad-rich SANDY SILTSTONE.

Section 1, 65–80 cm: yellow brown (10YR 6/2) clayey limestone.

Section 1, 80–100 cm: CLAYSTONE, dark gray (N3), hard, massive-appearing.

Section 1, 100–130 cm: CLAYEY LIMESTONE or CALCAREOUS CLAYSTONE.

Section 1, 130–150 cm: CALCAREOUS SANDY SILTSTONE, rad-rich in some zone.

Section 2 and Core-Catcher: dominantly RADIOLARIAN CLAYSTONE, pale yellow brown (10YR 6/2), mostly massive-appearing with only slight bioturbation; faint laminations in upper part.

Several beds of CLAYEY LIMESTONE, light grayish green (5G 8/1).

SMEAR SLIDE SUMMARY (%):

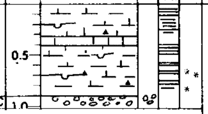
	1, 4	1, 45	1, 103	2, 6	2, 45
	D	D		D	D
Texture:					
Sand	–	3	50	10	–
Silt	5	3	10	5	2
Clay	95	94	40	85	98
Composition:					
Feldspar	<1	<1	1	–	–
Clay	87	43	–	85	48
Volcanic glass	2	–	–	<1	1
Glauconite	–	–	<1	–	–
Pyrite	3	1	3	1	–
Zeolite	2	–	–	–	5
Carbonate unspec.	–	25	3	2	25
Foraminifers	–	–	–	1	–
Calc. nannofossils	3	25	2	1	–
Radiolarians	–	5	50	10	1

ORGANIC CARBON AND CARBONATE (%):

	1, 91–92	CC, 3–5
Organic carbon	0.05	0.04
Carbonate	6	32

SITE 585 HOLE CORE 36 CORED INTERVAL 572.1–581.2 m sub-bottom; 6694.4–6703.5 m below rig floor

TIME – ROCK UNIT	BIOSTRATIGRAPHIC ZONE	FOSSIL CHARACTER FORAMINIFERS	NANNOFOSSILS	RADIOLARIANS	DIATOMS	SECTION
late Albian	*Tic. breggiensis/praeticinensis* (F)	RP		CP		1
				CP		
		B				CC



LITHOLOGIC DESCRIPTION

Most of material recovered is CALCAREOUS CLAYSTONE ± radiolarians. Most colors are various shades of yellow brown (2,5Y) with some thin beds of pale yellowish green (10GY 7/2); laminations are common throughout.

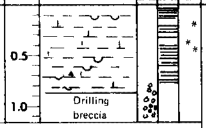
Note: recovery from Core 36 consisted of a jumbled series of poker-chip-like fragments in liner so there is no real or implied sequence or continuity of lithologies.

SMEAR SLIDE SUMMARY (%):

	1, 67 M	1, 72 M	1, 81 M
Texture:			
Clay	100	–	100
Composition:			
Clay	–	10	100
Zeolite	–	–	<1
Carbonate unspec.	25	<1	–
Radiolarians	10	30	–
Sponge spicules	–	–	<1
Fish remains	–	–	<1
Recrystal. SiO_2	65	60	–

SITE 585 HOLE CORE 37 CORED INTERVAL 581.2–590.4 sub-bottom; 6703.5–6712.7 m below rig floor

TIME – ROCK UNIT	BIOSTRATIGRAPHIC ZONE	FOSSIL CHARACTER FORAMINIFERS	NANNOFOSSILS	RADIOLARIANS	DIATOMS	SECTION
middle Albian	*Acaeniotyle umbilicata* (R)			CP		1
				CP		



LITHOLOGIC DESCRIPTION

Fragments of CLAYSTONE highly variable in color and composition.

Most colors are shades of yellow brown (2.5Y) with mottles, thin beds, and reduction halos around fractures of pale green (10G 8/2).

Variable carbonate and radiolarian contents.

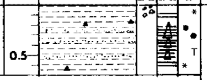
No significance in stratigraphic sequence or continuity because fragments were completely jumbled in liner.

SMEAR SLIDE SUMMARY (%):

	1, 19 M	1, 35 M	1, 42 M
Texture:			
Clay	100	100	100
Composition:			
Feldspar	<1	–	–
Clay	–	99	15
Volcanic glass	99	–	–
Zeolite	1	1	–
Radiolarians	–	–	25
Sponge spicules	<1	<1	–
Fish remains	<1	<1	–
Recrystal. SiO_2	–	–	60

SITE 585 HOLE CORE 38 CORED INTERVAL 590.4–599.5 m sub-bottom; 6712.7–6721.8 m below rig floor

TIME – ROCK UNIT	BIOSTRATIGRAPHIC ZONE	FOSSIL CHARACTER FORAMINIFERS	NANNOFOSSILS	RADIOLARIANS	DIATOMS	SECTION
?		B	FP			1
		B				



LITHOLOGIC DESCRIPTION

CALCAREOUS CLAYSTONE in smaller fragments in upper and lower parts of recovered section. Dominant color is grayish brown (2,5Y 5/2).

22–47 cm = CALCAREOUS CLAYSTONE and SANDY CALCAREOUS CLAYSTONE with shallow-water debris in graded sequences (coarser debris includes oolites, benthic and planktonic forams, radiolarians, volcanogenic sand, and glauconite); fine-grained matrix contains volcanic glass altered to celladonite(?) or glauconite(?). Dominant color is grayish brown (2.5Y 5/2).

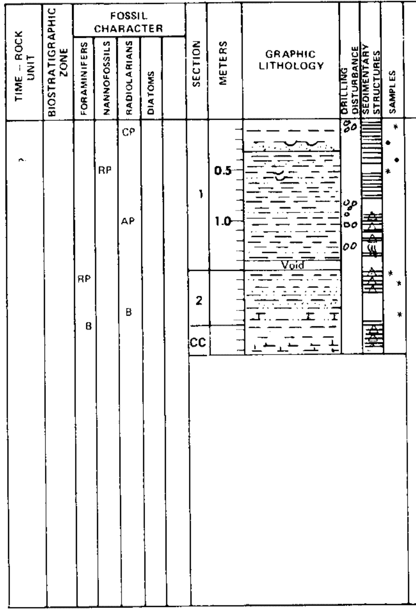
SMEAR SLIDE SUMMARY (%):

	1, 9 M	1, 62 M
Texture:		
Sand	–	–
Silt	3	<1
Clay	97	99
Composition:		
Feldspar	<1	<1
Heavy minerals	2	–
Clay	97	75
Volcanic glass	–	<1
Zeolite	<1	<1
Carbonate unspec.	–	25
Radiolarians	–	<1

ORGANIC CARBON AND CARBONATE (%):

	1, 24–28	1, 32–38
Organic carbon	0.04	0.03
Carbonate	25	9

SITE 585 HOLE CORE 39 CORED INTERVAL 599.5–608.7 m sub-bottom; 6721.8–6731.0 m below rig floor



LITHOLOGIC DESCRIPTION

Fining-upward sequences, usually with very pale brown (10YR 7/3) CLAY-BEARING RADIOLARITE grading upward into dark brown (7.5YR 3/2) CLAYSTONE.

Other lithologies: white (N9) = CALCAREOUS SILTSTONE; dark gray (10YR 4/1) = SILTY CLAYSTONE; these lithologies also form the bases of fining-upward sequences.

Sequence contains several excellent examples of interlaminated coarse and fine material at the bases of fining-upward sequences, particularly in Section 2 and Core-Catcher.

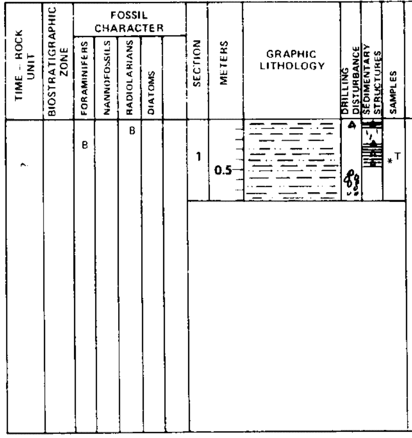
SMEAR SLIDE SUMMARY (%):

	1, 2	1, 57	2, 17	2, 1	2, 43
	M	M	M	M	M
Texture:					
Sand	–	–	–	–	–
Silt	80	60	85	–	60
Clay	20	40	15	100	40
Composition:					
Heavy minerals	–	–	–	1	–
Clay	16	16	–	95	40
Volcanic fragments	–	–	20	1	35
Palagonite	–	20	–	<1	–
Zeolite	4	–	–	3	5
Carbonate unspec.	–	–	80	–	–
Radiolarians	80	60	–	–	–
Fish remains	–	4	–	–	–

ORGANIC CARBON AND CARBONATE (%):

	1, 25–27	1, 42–44
Organic carbon	0.05	0.07
Carbonate	3	0

SITE 585 HOLE CORE 40 CORED INTERVAL 608.7–617.8 m sub-bottom; 6731.0–6740.1 m below rig floor



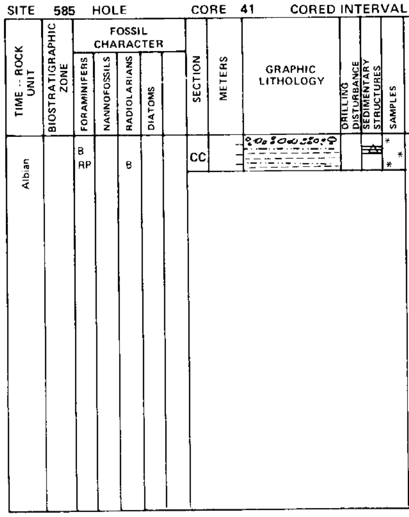
LITHOLOGIC DESCRIPTION

Fining-upward sequences consisting mainly of white (N9) coarse CLAYEY CALCAREOUS siltstone bases with many thin laminae, which decrease in frequency and thickness upward as the sediment gets darker and finer. Grading into gray (5Y 6/1) CLAYSTONE.

SMEAR SLIDE SUMMARY (%):

	1, 40
Texture:	
Sand	–
Silt	12
Clay	88
Composition:	
Heavy minerals	1
Clay	86
Volcanic glass	4
Zeolite	<1
Radiolarians	8

SITE 585 HOLE CORE 41 CORED INTERVAL 617.8–627.0 m sub-bottom; 6740.1–6749.3 m below rig floor



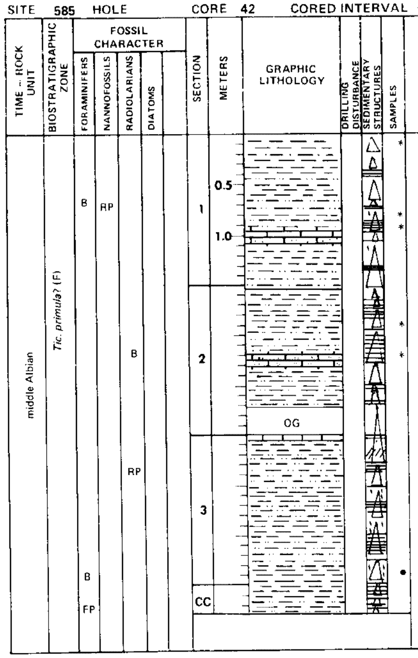
LITHOLOGIC DESCRIPTION

Graded sequences consisting of interlayered dark gray (2.5Y 4/0 CLAYSTONE, light gray (2.5Y 7/0) SILTY CLAYSTONE, dark greenish gray (5G 4/1) CLAYSTONE, and coarse basal beds of white (2.5Y 8/0) CARBONATE GRAINSTONE and CONGLOMERATIC VOLCANICLASTIC SANDSTONE with clasts up to 6 mm.

SMEAR SLIDE SUMMARY (%):

	CC, 6	CC, 22	CC, 32
	M	M	M
Texture:			
Sand	70	20	–
Silt	15	70	–
Clay	15	10	–
Composition:			
Feldspar	3	–	–
Heavy minerals	–	1	1
Clay	–	–	96
Volcanic glass	60	–	–
Glauconite	4	–	–
Zeolite	2	–	<1
Carbonate unspec.	4	89	–
Foraminifers	5	–	–
Radiolarians	2	–	1

SITE 585 HOLE CORE 42 CORED INTERVAL 627.0–636.1 m sub-bottom; 6749.3–6758.4 m below rig floor



LITHOLOGIC DESCRIPTION

Graded sequences that consist dominantly of dark gray (N4) SILTY CLAYSTONE or CLAYEY SILTSTONE that contain abundant volcanogenic material. As basal units grading up into dark gray (N4) CLAYSTONE, and, finally, in several sequences, into bioturbated greenish gray (5G 6/1; 5Y 6/1) CLAYSTONE or CALCAREOUS CLAYSTONE or LIMESTONE. The coarse basal layer may be massive or laminated; coarser laminae consist of an interlamination of N4 siltstone and dark greenish gray (5G 4/1) siltstone. Most basalt units of graded sequences are N4 siltstone, but a few are white (N9) limestone.

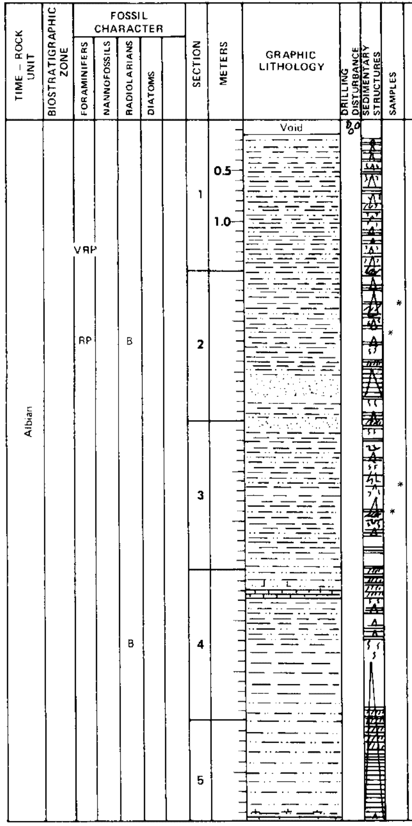
SMEAR SLIDE SUMMARY (%):

	1, 10	1, 80	1, 99	2, 41	2, 70
	M	D	M	D	M
Texture:					
Sand	2	–	–	–	40
Silt	10	8	1	10	40
Clay	88	92	99	90	20
Composition:					
Feldspar	1	1	–	1	2
Heavy minerals	3	3	1	2	–
Clay	86	89	3	88	–
Volcanic glass	3	–	1	1	35
Zeolite	2	3	<1	3	10
Carbonate unspec.	–	–	95	1	–
Foraminifers	–	–	–	–	30
Calc. nannofossils	–	–	–	<1	–
Radiolarians	3	2	–	4	3
Pyroxene	2	–	–	–	–

ORGANIC CARBON AND CARBONATE (%):

	3, 140–142
Organic carbon	0.06
Carbonate	34

SITE 585 HOLE CORE 43 CORED INTERVAL 636.1–645.3 m sub-bottom; 6758.4–6767.6 m below rig floor



LITHOLOGIC DESCRIPTION

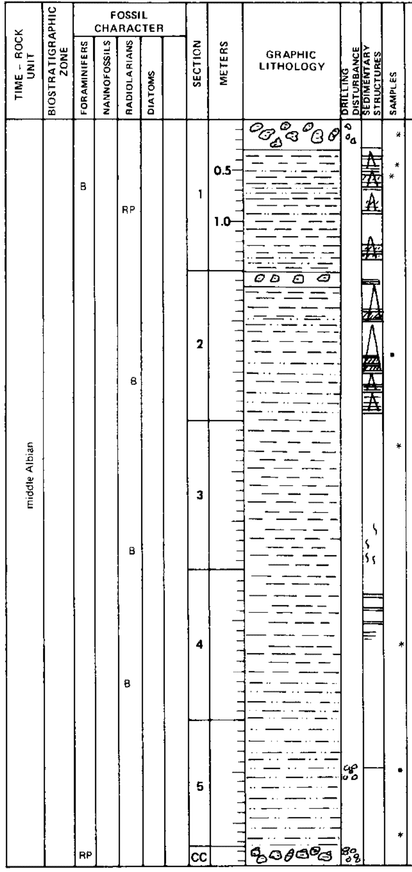
Numerous graded sequences of olive black (5Y 2/1) to dark olive gray (5Y 3/1), CLAYEY SILTSTONE to CLAYSTONE. Bases of graded sequences common and are massive, sandy (granular), laminated, an (or) cross-laminated. The finer-grained tops of the sequences commonly are bioturbated, calcareous, and olive gray (5Y 4/1).

As in the previous 10± cores, all laminae have an apparent dip of about 4–6°.

SMEAR SLIDE SUMMARY (%):

	2, 33 M	2, 68 D	3, 66 M	3, 94 M
Texture:				
Sand	–	–	–	–
Silt	25	20	22	–
Clay	75	80	78	–
Composition:				
Quartz	1	–	2	–
Mica	–	–	1	1
Heavy minerals	3	7	9	9
Clay	66	78	–	–
Volcanic glass	–	–	–	2
Zeolite	2	10	6	–
Carbonate unspec.	20	2	1	77
Calc. nannofossils	5	1	–	2
Radiolarians	3	–	3	3

SITE 585 HOLE CORE 44 CORED INTERVAL 645.3–654.4 m sub-bottom; 6767.6–6776.7 m below rig floor



LITHOLOGIC DESCRIPTION

Graded sequences of dark greenish gray (5G 4/1) SILTSTONE and CLAYEY SILTSTONE bases and dusky brown (5YR 2/2), reddish black (10R 2.5/1), or black (2.5YR 2.5/0) CLAYSTONE tops.

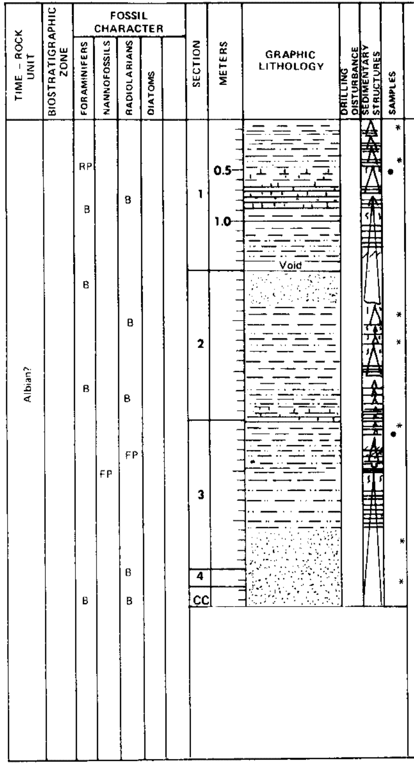
SMEAR SLIDE SUMMARY (%):

	1, 16 M	1, 48 M	1, 55 M	3, 25 D	4, 72 D	5, 115 D
Texture:						
Sand	–	–	–	–	–	10
Silt	–	–	25	–	–	50
Clay	100	100	75	–	100	40
Composition:						
Quartz	–	–	2	–	–	–
Feldspar	–	1	–	–	–	1
Mica	–	–	1	–	–	–
Heavy minerals	2	–	–	–	–	4
Clay	–	5	68	18	26	30
Volcanic glass	3	–	–	–	2	–
Palagonite	–	90	–	–	9	–
Zeolite	18	4	3	5	–	48
Carbonate unspec.	–	–	18	2	3	8
Calc. nannofossils	–	–	5	–	<1	–
Radiolarians	<1	–	2	–	–	7
Sponge spicules	–	–	–	1	–	–
Fish remains	–	–	1	–	–	–
Volcanic material	3	–	–	74	50	–

ORGANIC CARBON AND CARBONATE (%):

	2, 84–85	5, 50–51
Organic carbon	0.08	0.06
Carbonate	5	3

SITE 585 HOLE CORE 45 CORED INTERVAL 654.4–667.8 m sub-bottom; 6776.7–6790.1 m below rig floor



LITHOLOGIC DESCRIPTION

Graded sequences of dark gray (N4) siltstone-claystone with a few carbonate-rich graded units. Bases of graded sequences are mostly SILTY CLAYSTONE or CLAYEY SILTSTONE (N4) grading upward into CLAYSTONE (N4 or, in extreme cases, olive gray (5Y 4/1), in the upper, usually bioturbated, part of a graded unit (Bauma "E"). Several units show well developed Bauma sequences, particularly laminated (B and D) and ripple laminated (C) units of an ideal sequence. Several graded units are $CaCO_3$-rich with COARSE CLASTIC LIMESTONE grading up into CLAYEY MICRITIC LIMESTONE. The base of one unit is a sandstone (top Section 2).

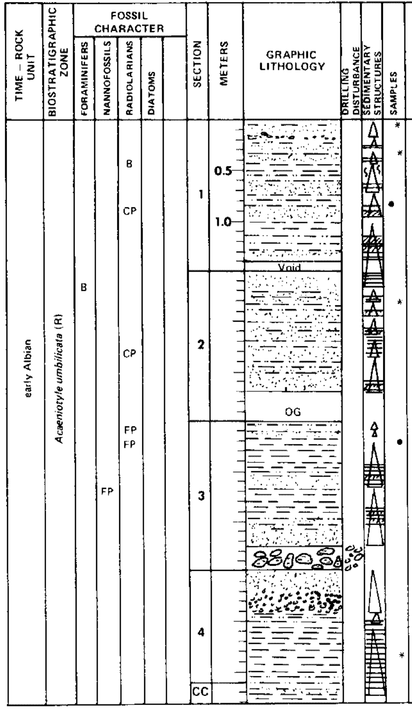
SMEAR SLIDE SUMMARY (%):

	1, 9	1, 46	2, 49	2, 77	3, 9	3, 128	4, 12
	D	D	D	D	D	D	D
Texture:							
Sand	–	75	5	–	5	35	–
Silt	5	15	5	–	50	45	100
Clay	95	10	90	–	45	20	–
Composition:							
Quartz	–	<1	<1	<1	–	1	–
Feldspar	<1	1	1	2	1	3	–
Mica	–	–	–	1	–	–	–
Heavy minerals	–	3	–	–	5	8	–
Clay	76	10	75	50	50	20	–
Volcanic glass	7	3	9	14	15	20	86
Glauconite	1	1	2	1	2	2	–
Micronodules	–	–	–	2	–	2	–
Zeolite	7	2	10	7	9	7	–
Carbonate unspec.	–	80	2	–	–	20	7
Foraminifers	–	–	–	–	–	2	–
Calc. nannofossils	1	–	–	2	–	–	–
Radiolarians	–	–	1	15	15	15	–
Sponge spicules	–	–	–	1	–	1	–
Volcanic fragments	–	–	–	–	–	–	7

ORGANIC CARBON AND CARBONATE (%):

	1, 54–55	3, 18–19
Organic carbon	0.08	0.07
Carbonate	3	0

SITE 585 HOLE CORE 46 CORED INTERVAL 667.8–676.9 m sub-bottom; 6790.1–6799.2 m below rig floor



LITHOLOGIC DESCRIPTION

Graded sequences with bases mostly of dark greenish gray (5GY 4/1) or greenish black (5GY 2/1) volcanogenic SILTSTONE or SANDSTONE grading up into very dark gray (N4 or 5Y 4.5/1), brownish-gray (5YR 4/1), or dark greenish gray (5GY 4/1) MUDSTONE. Several sequences are complete Bauma (A–E) sequences. Fine to coarse parallel- and current-ripple-lamination are common. Bioturbation of uppermost fine top of a sequence is rare. Bases of several sequences have pebble-size clasts (up to 6 cm) rounded and flattened. Several water escape structures also are present. Volcanogenic components in units include volcanic lithic and crystal fragments, celadonite, and altered volcanic glass.

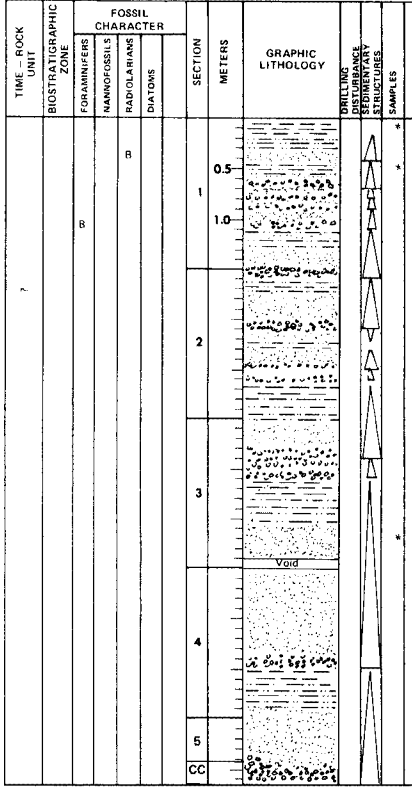
SMEAR SLIDE SUMMARY (%):

	1, 2	1, 35	2, 30	4, 85
	M	M	D	D
Texture:				
Sand	–	–	–	–
Silt	–	85	3	–
Clay	100	15	97	100
Composition:				
Feldspar	–	–	–	1
Heavy minerals	–	< 1	2	1
Clay	9	5	81	74
Volcanic glass	<.1	–	–	2
Zeolite	5	7	–	5
Carbonate unspec.	1	1	9	4
Calc. nannofossils	<1	–	–	–
Volcanic fragments	3	–	3	5
Celadonite	–	85	4	2

ORGANIC CARBON AND CARBONATE (%):

	1, 82–83	3, 24–25
Organic carbon	0.12	0.10
Carbonate	5	3

SITE 585 HOLE CORE 47 CORED INTERVAL 676.9–686.1 m sub-bottom; 6799.2–6808.4 m below rig floor



LITHOLOGIC DESCRIPTION

VERY COARSE VOLCANICLASTICS in graded sequences grading from COARSE SANDSTONE (usually conglomeratic, with fragments up to several cm but most are several mm) to SILTSTONE. Larger clasts are angular to rounded, but most are subrounded to rounded. Volcanic debris comprises most of all lithologies, and includes volcanic lithic and crystal fragments, celadonite, and highly altered volcanic glass.

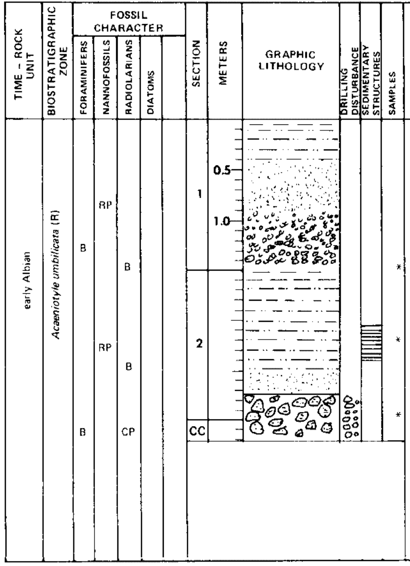
Dominant colors of coarser bases of graded sequences are grayish green (10G 4/2) and dusky green (5G 3/2), and of finer tops are grayish green (10G 4/2), very dark gray (5Y 3/1), and dark grayish brown (10YR 3/2).

Veins of white (N9) calcite occur at several horizons.

SMEAR SLIDE SUMMARY (%):

	1, 10 M	1, 50 D	3, 120 D
Texture:			
Sand	–	75	91
Silt	–	25	9
Clay	–	–	–
Composition:			
Feldspar	1	1	–
Clay	–	10	9
Volcanic glass	2	1	–
Palagonite	–	1	–
Carbonate unspec.	6	2	–
Fish remains	<1	–	–
Volcanic fragments	3	35	20
Celadonite	5	–	62

SITE 585 HOLE CORE 48 CORED INTERVAL 686.1–695.2 m sub-bottom; 6808.4–6817.5 m below rig floor



LITHOLOGIC DESCRIPTION

Thick graded sequences of volcaniclastics grading from conglomeratic sandstone bases, grading up into very coarse sandstone, sandstone, siltstone, and claystone.

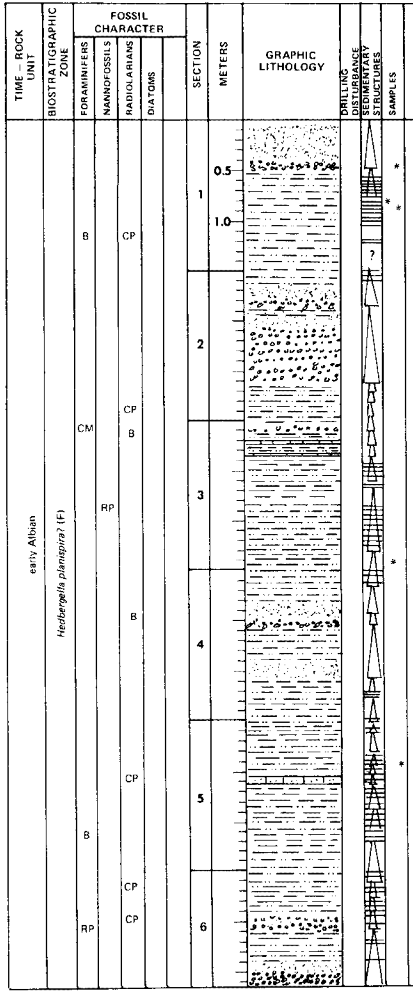
Dominant colors are dusky green (5G 3/2) (= most), dark greenish gray (5G 4/1), grayish green (10G 4/2), olive gray (5Y 4/2), and grayish olive (GY 3/2) (= finer upper parts of graded sequences).

Larger clasts (up to 5 cm) at bases of units are subrounded to angular.

SMEAR SLIDE SUMMARY (%):

	1, 149 M	2, 70 D	2, 149 M
Texture:			
Sand	–	–	–
Silt	15	–	10
Clay	85	–	90
Composition:			
Heavy minerals	1	2	5
Clay	50	–	–
Zeolite	2	3	–
Carbonate unspec.	45	9	81
Calc. nannofossils	<1	–	–
Radiolarians	–	–	<1
Sponge spicules	–	–	3
Volcanic fragments	–	50	10
Celadonite	3	5	–

SITE 585 HOLE CORE 49 CORED INTERVAL 695.2–704.4 m sub-bottom; 6817.5–6826.7 m below rig floor



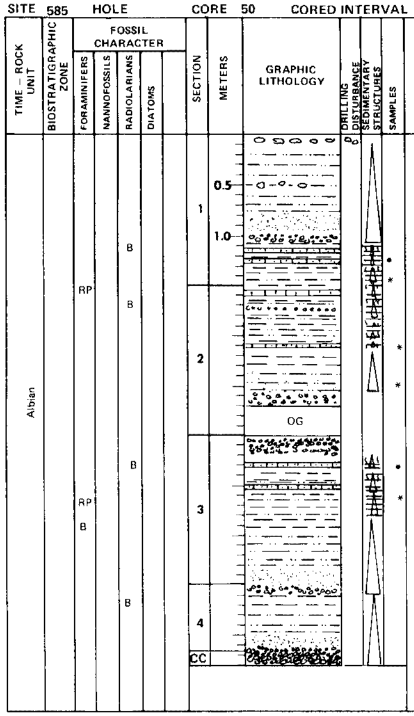
LITHOLOGIC DESCRIPTION

Graded sequences of volcaniclastics consisting of greenish black (5GY 2/1) SANDSTONE grading upward into SILTSTONE, and finally (but not in all sequences) into dark grayish brown (2.5Y 4/2) CLAYSTONE. Some sequences have CLASTIC LIMESTONE bases (white, N9) that grade upward into dark grayish brown (2.5Y 4/2) CLAYSTONE.

SMEAR SLIDE SUMMARY (%):

	1, 49	1, 81	1, 88	3, 143	5, 46
		D	M	D	D
Texture:					
Sand	–	20	–	5	5
Silt	10	50	10	20	20
Clay	90	30	90	75	75
Composition:					
Feldspar	2	1	–	1	1
Heavy minerals	2	2	2	3	2
Clay	87	30	88	75	75
Volcanic glass	8	30	4	10	10
Glauconite	–	3	–	1	–
Zeolite	–	5	5	–	–
Carbonate unspec.	1	–	–	–	–
Calc. nannofossils	–	–	1	–	–
Radiolarians	<1	4	4	<1	2
Sponge spicules	–	–	–	<1	–
Volcanic fragments	–	24	–	–	11

SITE 585 HOLE CORE 50 CORED INTERVAL 704.4–713.5 m sub-bottom; 6826.7–6835.8 m below rig floor



LITHOLOGIC DESCRIPTION

Graded sequences of volcaniclastics, with COARSE SANDSTONES and CONGLOMERATIC SANDSTONES grading upward into SILTSTONES and finally CLAYSTONES; or CLASTIC LIMESTONES grading upward into CALCAREOUS CLAYSTONES (much less common). Claystones at the tops of graded sequences commonly are bioturbated.

Dominant colors are: greenish black (5GY 2/1) and olive black (5Y 2/1) for coarse basal layers; dark grayish brown (2.5Y 4/2) for top claystones; white (2.5Y 8/2) and light gray (2.5Y 7/2) for clastic limestones.

SMEAR SLIDE SUMMARY (%):

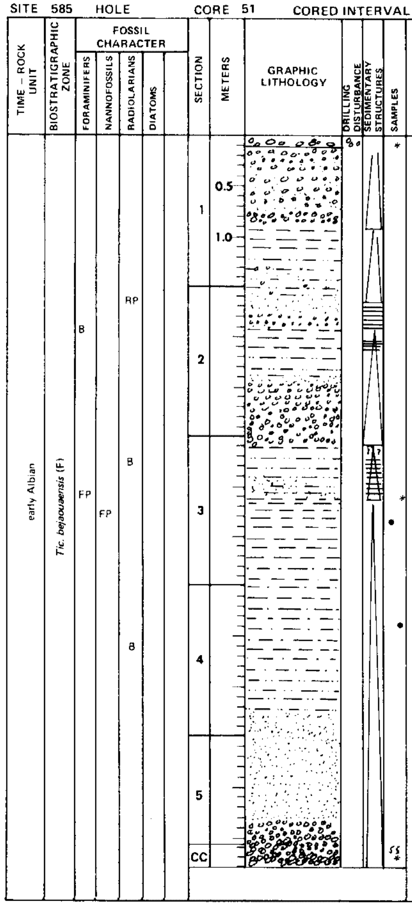
	1, 142	2, 62	2, 99	3, 65
	D	M	M	D
Texture:				
Sand	10	–	–	20
Silt	30	15	50	40
Clay	60	85	50	40
Composition:				
Feldspar	3	<1	–	1
Heavy minerals	5	3	1	2
Clay	–	85	–	40
Volcanic glass	25	5	–	15
Glauconite	<1	<1	<1	<1
Zeolite	7	7	–	2
Carbonate unspec.	–	–	96	–
Calc. nannofossils	–	–	<1	–
Radiolarians	<1	<1	–	<1
Volcanic fragments	–	–	–	40

ORGANIC CARBON AND CARBONATE (%):

	1, 128–130	3, 31–32
Organic carbon	0.10	0.10
Carbonate	3	3

This unit probably continues into top of Core 51

SITE 585 HOLE CORE 51 CORED INTERVAL 713.5–722.7 m sub-bottom; 6835.8–6845.0 m below rig floor



Base of this graded unit continues into Core 52

LITHOLOGIC DESCRIPTION

Graded sequences of VOLCANICLASTICS with COARSE SANDSTONES and CONGLOMERATIC SANDSTONES grading upward into SILTSTONES and finally CLAYSTONES. Bases of a few graded sequences are clastic limestones that grade upward into calcareous claystones.

Dominant colors are: SANDSTONES AND SILTSTONES – greenish black (5GY 2/1) and greenish gray (5G 2/1 and 5G 4/1), CLAYSTONES – greenish black (5GY 2/1) and dark greenish gray (5GY 4/1), and CARBONATES – white (2.5Y 8/2).

Conglomeratic sandstone at top of core probably is base of graded sequence at bottom of Core 50.

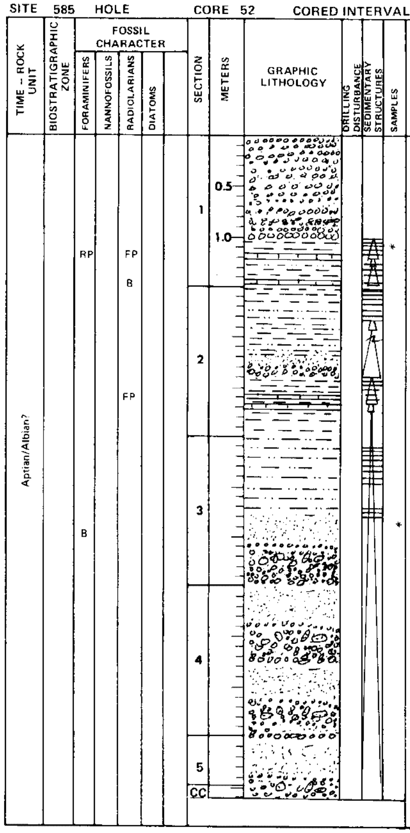
SMEAR SLIDE SUMMARY (%):

	1, 7	3, 61	CC, 21
	D	D	D
Texture:			
Sand	–	30	35
Silt	5	30	30
Clay	95	40	35
Composition:			
Quartz	–	3	–
Feldspar	–	<1	1
Clay	78	40	35
Volcanic glass	5	3	7
Glauconite	<1	–	65
Zeolite	3	–	–
Carbonate unspec.	15	52	–
Radiolarians	–	3	2
Volcanic fragments	–	3	–

ORGANIC CARBON AND CARBONATE (%):

	3, 81–88	4, 37–38
Organic carbon	0.09	0.08
Carbonate	5	4

SITE 585 HOLE CORE 52 CORED INTERVAL 722.7–731.8 m sub-bottom; 6845.0–6854.1 m below rig floor



Base of this graded sequence continues in Core 53

LITHOLOGIC DESCRIPTION

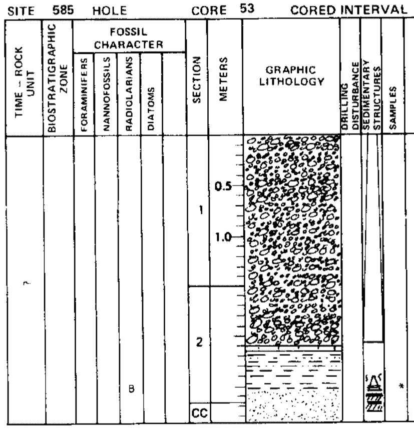
Graded sequences of volcaniclastics with coarse sandstones and conglomeratic sandstones (greenish black [5GY 2/1] and dark greenish gray [5GY 4/1]) grading upward into siltstones and finally claystones (very dark gray [5Y 3/1] and very dark grayish brown [10YR 3/2]). Bases of a few graded sequences are clastic limestones (light gray [2.5Y 7/2] and white [10YR 2/2]) that grade upward into claystone.

Top of core is probably the basal part of graded sequence at bottom of Core 51.

SMEAR SLIDE SUMMARY (%):

	1, 112	3, 88
	D	D
Texture:		
Sand	–	20
Silt	5	40
Clay	95	40
Composition:		
Feldspar	–	<1
Clay	50	40
Volcanic glass	1	10
Glauconite	<1	<1
Zeolite	–	3
Carbonate unspec.	44	6
Calc. nannofossils	2	–
Radiolarians	<1	1
Volcanic fragments	3	40

SITE 585 HOLE CORE 53 CORED INTERVAL 731.8–741.0 m sub-bottom; 6854.1–6863.3 m below rig floor



LITHOLOGIC DESCRIPTION

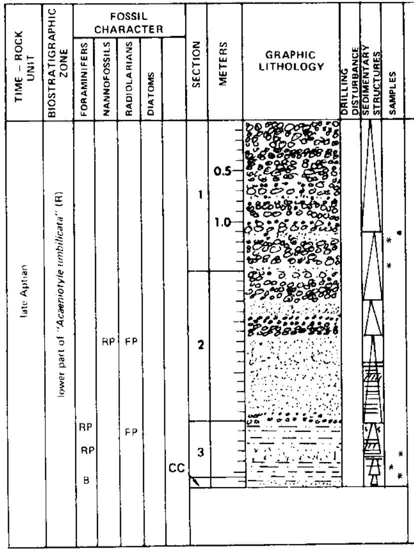
Graded sequences of VOLCANICLASTICS. COARSE SANDSTONE in Core 53, Section 1 to Section 2, 65 cm is the base of a graded sequence that started in Core 52, Section 2, 120 cm.

Rest of recovered section consists of CLASTIC LIMESTONE (light olive gray [5Y 7/1]), VOLCANICLASTIC SILTSTONE and SANDSTONE (greenish black [5GY 2/1]) and CLAYSTONE (dark greenish gray [5G 4/1] and olive black [5Y 4/1]).

ORGANIC CARBON AND CARBONATE (%):

	2, 105–106
Organic carbon	0.06
Carbonate	7

SITE 585 HOLE CORE 54 CORED INTERVAL 741.0–750.1 m sub-bottom; 6863.3–6872.4 m below rig floor



LITHOLOGIC DESCRIPTION

Graded sequences of volcaniclastics, mostly coarse sandstone and volcanic-rock-fragment conglomerates that grade up into siltstones.

Dominant colors are greenish black (5GY 2/1 and 5G 2/1).

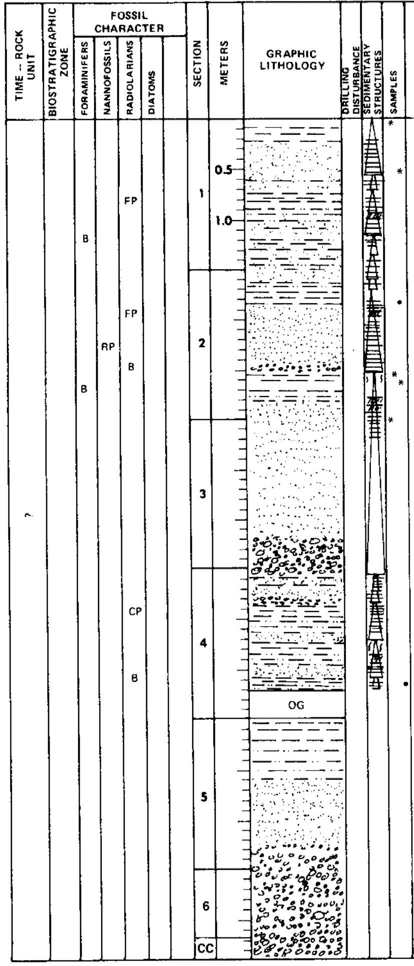
SMEAR SLIDE SUMMARY (%):

	1, 144	1, 114	3, 35	3, 48	CC, 2
	D	M	M	M	M
Texture:					
Sand	60	15	–	–	–
Silt	40	85	–	–	–
Clay	–	–	100	100	100
Composition:					
Heavy minerals	–	–	–	–	1
Clay	–	–	91	–	22
Palagonite	–	–	1	3	1
Zeolite	9	9	–	8	7
Carbonate unspec.	2	–	–	11	5
Calc. nannofossils	< 1	–	–	–	<1
Volcanic fragments	24	15	8	6	63
Celadonite	65	75	–	–	–
Recrystallized SiO_2	–	–	–	73	–

ORGANIC CARBON AND CARBONATE (%):

	1, 119–120
Organic carbon	0.05
Carbonate	5

SITE 585 HOLE CORE 55 CORED INTERVAL 750.1–763.7 m sub-bottom; 6872.4–6886.0 m below rig floor



LITHOLOGIC DESCRIPTION

Graded sequences of greenish black (5GY 2/1 and 5G 2/1) VOLCANOGENIC COARSE-GRAINED SANDSTONES grading upward into FINER SANDSTONES and, in some sequences, SILTY CLAYSTONE (brownish gray [5YR 4/1]).

SMEAR SLIDE SUMMARY (%):

	1, 5	1, 59	2, 107	2, 113	3, 1
	M	M	M	M	D
Texture:					
Sand	–	–	–	–	–
Silt	–	–	–	–	95
Clay	100	100	100	100	5
Composition:					
Heavy minerals	4	–	4	–	–
Clay	86	9	68	40	6
Volcanic glass	–	–	–	–	4
Palagonite	1	–	2	–	–
Zeolite	2	9	5	37	5
Carbonate unspec.	5	–	1	2	–
Celadonite	2	2	4	–	30
Volcanic fragments	–	80	7	20	55

ORGANIC CARBON AND CARBONATE (%):

	2, 36–37	4, 119–120
Organic carbon	0.04	0.04
Carbonate	6	18

SITE 585

HOLE 585A

Date Occupied: 1805Z 26 October 1982

Date Departed: 1709Z 2 November 1982

Time on Hole: 6 days, 23 hr., 4 min.

Position (latitude; longitude): 13°29.00'N; 156°48.91'E

Water depth (sea level; corrected m, echo-sounding): 6109

Water depth (rig floor; corrected m, echo-sounding): 6119

Bottom felt (m, drill pipe): 6122.3

Penetration (m): 892.8

Number of cores: 22

Total length of cored section (m): 208.8

Total core recovered (m): 101.5

Core recovery (%): 48.6

Oldest sediment cored:

Depth sub-bottom (m): 892.8

Nature: Volcanogenic turbidites

Age: Late Aptian

Measured velocity (km/s): 3.2-3.5

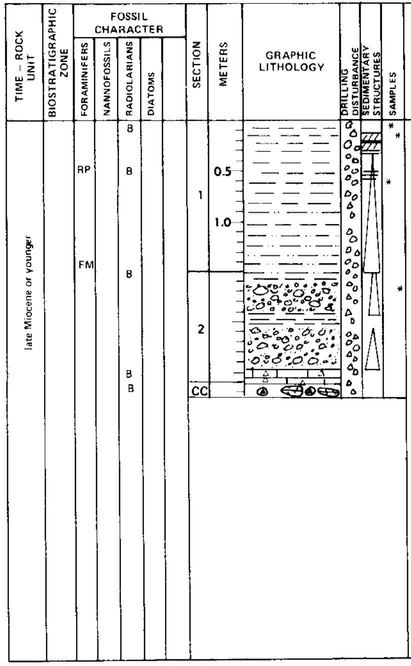
Basement:

Depth sub-bottom (m): -

Nature: -

Velocity range (km/s): -

SITE 585 HOLE A CORE H-1 (Wash core) CORED INTERVAL 0.0–363.7 m sub-bottom; 6122.3–6486.0 m below rig floor



LITHOLOGIC DESCRIPTION

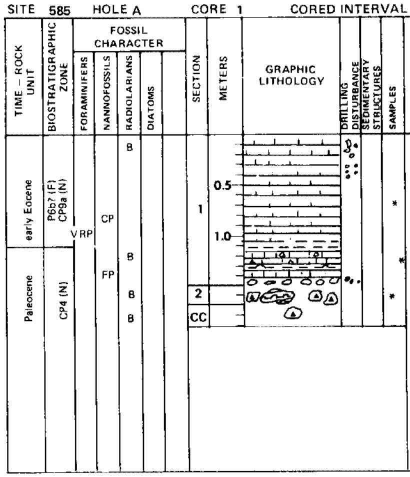
Mostly drilling breccia, but recovered fragments from Section 1, 5–150 cm appear to be from the same graded sequence, grading from dusky green (5G 3/2) SILTSTONE to dusky green nannofossil-, radiolarian-, and zeolite-bearing CLAYSTONE.

Section 2 contains fragments of green (5GY 4/1) CLAYSTONE at top. Recovered fragments from 13–50 cm appear to be from the same graded unit, grading from a CONGLOMERATE with pebbles of ZEOLITE-BEARING CLAYSTONE up to 3 cm in diameter at base to 1 mm in diameter at top of unit. A similar graded unit occurs from 60–95 cm. 95–110 cm consists of SILICIFIED NANNOFOSSIL LIMESTONE. The Core Catcher contains fragments of SILICIFIED NANNOFOSSIL LIMESTONE and CHERT.

SMEAR SLIDE SUMMARY (%):

	1,5	1,20	1, 66	2, 29
	M	D	D	M
Texture:				
Sand	5	–	–	–
Silt	75	–	15	–
Clay	20	–	85	–
Composition:				
Quartz	15	–	–	–
Heavy minerals	5	10	2	5
Clay	20	40	62	70
Glauconite	10	5	3	–
Zeolite	40	20	7	18
Carbonate unspec.	–	2	6	–
Foraminifers	–	–	<1	–
Calc. nannofossils	–	–	4	1
Diatoms	–	10	Tr	–
Radiolarians	15	11	5	6
Sponge spicules	–	–	Tr	–
Silicoflagellates	–	–	Tr	–
Celadonite	–	–	4	–

SITE 585 HOLE A CORE 1 CORED INTERVAL 363.7–373.3 m sub-bottom; 6486.0–6495.6 m below rig floor



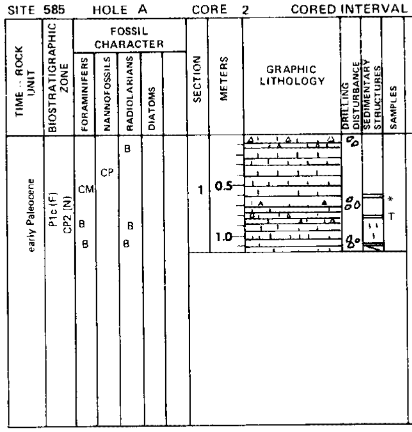
LITHOLOGIC DESCRIPTION

White (N9) NANNOFOSSIL CHALK, pinkish gray (5YR 7/2) SILICIFIED LIMESTONE, brown (5YR 4/1) RADIOLARIAN CLAYSTONE, and pinkish gray (5YR 7/2) SILICEOUS-BEARING CLAYEY LIMESTONE and, oh yes, the ever-present pale yellowish brown (10YR 6/2) CHERT.

SMEAR SLIDE SUMMARY (%):

	1, 57	1, 126	2, 12
	D	M	D
Texture:			
Sand	–	–	–
Silt	95	50	50
Clay	5	50	50
Composition:			
Heavy minerals	–	<1	–
Clay	5	50	45
Volcanic glass	–	<1	–
Carbonate unspec.	5	<1	20
Calc. nannofossils	90	–	25
Radiolarians	–	–	10
Sponge spicules	–	49	–

SITE 585 HOLE A CORE 2 CORED INTERVAL 373.3–382.8 m sub-bottom; 6495.6–6505.1 m below rig floor



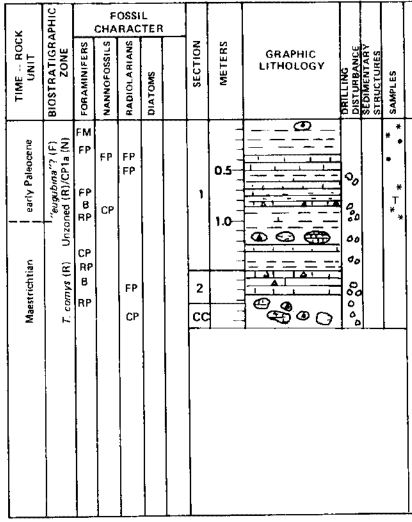
LITHOLOGIC DESCRIPTION

Pinkish gray (5YR 8/1), massive, micritic CHALK, moderate orange pink (5YR 8/4) SILICIFIED LIMESTONE, light brown (5YR 6/4) CLAYEY CHALK and CHERT.

SMEAR SLIDE SUMMARY (%):

	1, 64
Texture:	
Sand	–
Silt	60
Clay	40
Composition:	
Clay	30
Zeolite	10
Carbonate unspec.	15
Calc. nannofossils	42
Radiolarians	3

SITE 585 HOLE A CORE 3 CORED INTERVAL 382.8–392.3 m sub-bottom; 6505.1–6514.6 m below rig floor



LITHOLOGIC DESCRIPTION

Interbedded light moderate brown (5YR 5/4) ZEOLITIC CLAY and very pale orange (10YR 8/2) CLAYEY NANNOFOSSIL CHALK. Some intervals of chalk have been silicifed, one fragment of moderate brown (5YR 3/4) CHERT was recovered in the Core Catcher, and at several horizons in Section 1.

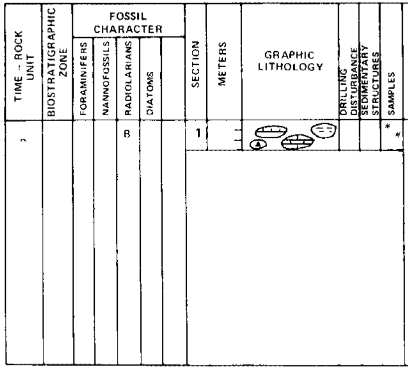
SMEAR SLIDE SUMMARY (%):

	1, 10	1, 18	1, 70	1, 90	1, 101
	D	M	M	M	D
Texture:					
Clay	100	100	–	–	–
Composition:					
Heavy minerals	–	3	–	1	<1
Clay	50	47	–	50	50
Zeolite	50	47	1	49	50
Carbonate unspec.	–	–	3	–	–
Foraminifers	–	–	<1	–	–
Calc. nannofossils	–	–	96	–	–
Hematite?	–	3	–	–	–

ORGANIC CARBON AND CARBONATE (%):

	1, 40–43	1, 21–26
Organic carbon	.05	.11
Carbonate	29	0

Wash core
SITE 585 HOLE A CORE H-2 CORED INTERVAL 392.3–438.2 m sub-bottom; 6514.6–6560.5 m below rig floor



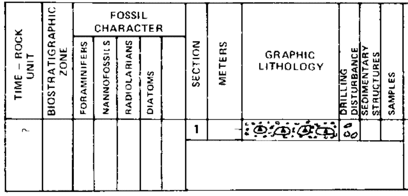
LITHOLOGIC DESCRIPTION

Drilling breccia consisting of fragments of bioturbated NANNOFOSSIL CHALK, SILICIFIED LIMESTONE, CLAYEY NANNOFOSSIL CHALK, CLAYSTONE, and CHERT.

SMEAR SLIDE SUMMARY (%):

	1, 1	1, 14
	M	M
Texture:		
Clay	100	100
Composition:		
Heavy minerals	<1	–
Clay	25	50
Carbonate unspec.	70	15
Calc. nannofossils	5	–

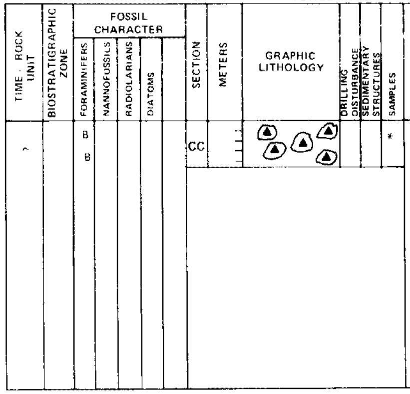
SITE 585 HOLE A CORE 4 CORED INTERVAL 438.2–447.7 m sub-bottom; 6560.5–6570.0 m below rig floor



LITHOLOGIC DESCRIPTION

Four lovely fragments of dark brown (10YR 4/3) chert set in a matrix of chips (<1 cm) of chert, silicified limestone, and claystone.

Wash core
SITE 585 HOLE A CORE H-3 CORED INTERVAL 447.7–502.6 m sub-bottom; 6570.0–6624.9 m below rig floor



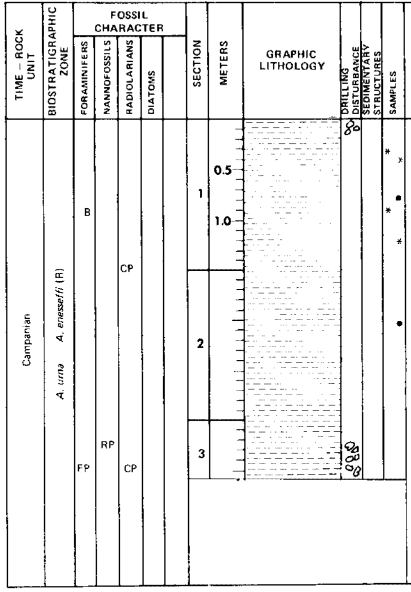
LITHOLOGIC DESCRIPTION

Drilling breccia consisting mainly of CHERT fragment in various shades of dark brown, with one interval of clay (brownish gray and dark yellowish brown). Chert is laminated, graded, bioturbated, and cut by veins of drusy quartz crystals growing into vugs.

SMEAR SLIDE SUMMARY (%):

	CC, 17
	M
Texture:	
Silt	4
Clay	96
Composition:	
Heavy minerals	2
Clay	95
Zeolite	1
Radiolarians	2

SITE 585 HOLE A CORE 5 CORED INTERVAL 502.6–511.8 m sub-bottom; 6624.9–6634.1 m below rig floor



LITHOLOGIC DESCRIPTION

Interbedded greenish gray (5G 5/2) and greenish black (5GY 2/1) (= "light and dark" green) CLAYSTONE with minor beds of yellowish brown (10YR 2/2) and light olive gray (5Y 6/1) CLAYSTONE.

All units are hard and massive with only slight hints of bioturbation. Contacts between different-colored lithologies are fairly sharp.

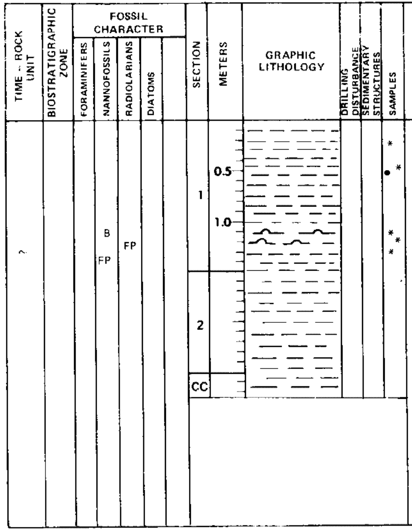
SMEAR SLIDE SUMMARY (%):

	1, 35	1, 49	1, 98	1, 120
	D	D	M	M
Texture:				
Sand	–	–	10	–
Silt	1	1	60	1
Clay	99	99	30	99
Composition:				
Quartz	–	–	60	–
Heavy minerals	1	1	–	<1
Clay	94	95	30	96
Volcanic glass	<1	–	–	–
Zeolite	2	3	2	2
Carbonate unspec.	1	–	4	<1
Calc. nannofossils	1	1	<1	1
Radiolarians	1	1	2	–
Sponge spicules	–	–	<1	–

ORGANIC CARBON AND CARBONATE (%):

	1, 80–81	2, 59–60
Organic carbon	.01	.07
Carbonate	3	7

SITE 585 HOLE A CORE 6 CORED INTERVAL 511.8–520.9 m sub-bottom; 6634.1–6643.2 m below rig floor



LITHOLOGIC DESCRIPTION

Dominant lithology is dark gray CLAYSTONE (2.5YR 3/0) with numerous mottles and several beds of grayish green (5G 5/2) CLAYSTONE.

One layer of olive gray (5Y 4/1) radiolarian-bearing.

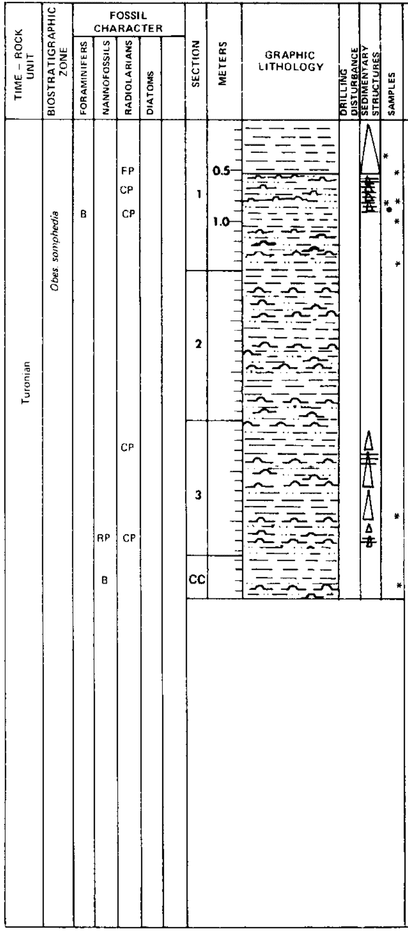
SMEAR SLIDE SUMMARY (%):

	1, 25	1, 50	1, 114	1, 115	1, 132
Texture:	D	M			
Sand	–	2	–	2	<1
Silt	2	10	1	12	3
Clay	98	88	99	86	97
Composition:					
Heavy minerals	1	1	<1	<1	1
Clay	93	85	97	83	90
Zeolite	3	2	2	2	2
Carbonate unspec.	1	<1	–	–	1
Calc. nannofossils	1	<1	–	<1	3
Radiolarians	–	12	<1	15	–
*Fish remains	–	–	<1	<1	–
Recryst. SiO_2	1	–	–	–	–

ORGANIC CARBON AND CARBONATE (%):

	1, 54–57
Organic carbon	.48
Carbonate	10

SITE 585 HOLE A CORE 7 CORED INTERVAL 520.9–532.4 m sub-bottom; 6643.2–6654.7 m below rig floor



LITHOLOGIC DESCRIPTION

Dominant lithology is massive dark gray (N4) ZEOLITE CLAYSTONE, with a RADIOLARIAN CLAYEY SILTSTONE-laminated medium gray (N5) SILTY CLAYSTONE (light olive gray [5Y 6/1]) series of graded sequences between 58 and 85 cm, Section 1 (probably corresponds to greenish laminated interval in 585-31-2, 73–104 cm). A 2-cm bed of gypsiferous(?) SILICEOUS SILTSTONE occurs at the base of this series (83–85 cm; see smear slide 1, 83).

Graded sequences of gray (N6) silty claystone and N5 claystone are well developed in Section 3.

SMEAR SLIDE SUMMARY (%):

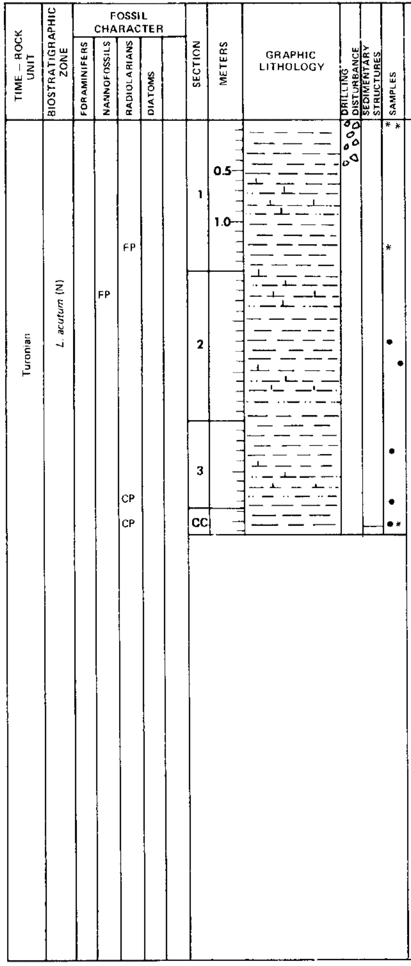
	1, 35	1, 56	1, 83	1, 105	1, 86
	D	M	M	D	M
Texture:					
Sand	–	–	–	–	–
Silt	2	50	93	–	–
Clay	98	50	7	100	–
Composition:					
Heavy minerals	–	–	–	1	4
Clay	72	55	–	60	85
Palagonite	–	–	–	–	11
Zeolite	13	–	–	35	–
Carbonate unspec.	9	5	–	–	–
Calc. nannofossils	<1	–	–	–	–
Radiolarians	–	38	30	–	–
Recryst. silica	–	–	50	–	–
Fish remains	–	–	<1	1	
Gypsum?	<1	1	20	2	–
Barite?	2	–	–	–	–
Celadonite	2	–	–	1	–
Hematite	2	1	–	–	–

	1, 140	3, 95	CC, 31
	M	M	M
Texture:			
Sand	–	–	–
Silt	–	55	–
Clay	100	45	100
Composition:			
Heavy minerals	2	–	–
Clay	61	36	64
Volcanic glass	–	–	1
Zeolite	10	2	1
Carbonate unspec.	20	36	–
Radiolarians	–	18	–
Recryst. SiO_2	7	5	20
Gypsum	<1	3	1
Celadonite	–	–	13

ORGANIC CARBON AND CARBONATE (%):

	1, 94–100
Organic carbon	.41
Carbonate	0

SITE 585 HOLE A CORE 8 CORED INTERVAL 532.4–543.5 m sub-bottom; 6654.7–6665.8 m below rig floor



LITHOLOGIC DESCRIPTION

Thick (about 1 m) graded sequences of medium gray (N5) SILTSTONE grading into a SLIGHTLY CALCAREOUS SILTY CLAYSTONE or CLAYSTONE most of the material contains black flecks or flakes that are oriented parallel to stratification. Coarser bases of some graded sequences contain concentrations of radiolarians and foraminifera. Some parallel laminations are present but most of the material is massive-appearing.

Top 50 cm of core consists of drilling breccia of dusky yellowish brown (10YR 2/2) CLAYSTONE.

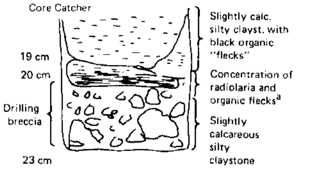
SMEAR SLIDE SUMMARY (%):

	1, 3	1, 8	1, 125	CC, 19
	M	D	D	M
Texture:				
Sand	–	–	–	–
Silt	–	–	10	100
Clay	100	100	90	100 –
Composition:				
Feldspar	–	33	2	–
Heavy minerals	1	4	–	–
Clay	50	50	86	–
Volcanic glass	–	–	2	–
Palagonite	–	2	–	–
Zeolite	49	–	–	–
Carbonate unspec.	–	–	10	–
Calc. nannofossils	–	–	7	–
Radiolarians	–	–	–	100
Fish remains	–	–	<1	–
Celadonite	–	1	–	–
Gypsum?	–	–	1	–
Recryst. SiO_2	–	9	–	–

ORGANIC CARBON AND CARBONATE (%):

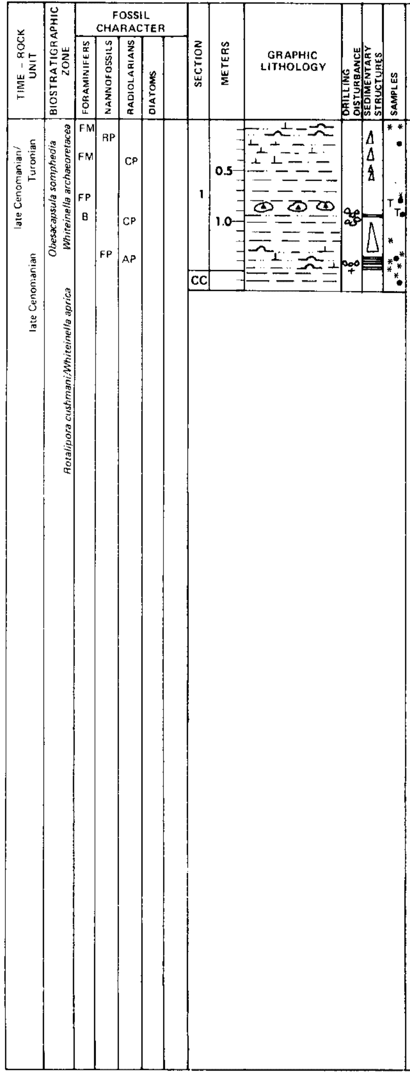
	2, 75–76	2, 95–96	3, 32–33
Organic carbon	.33	.04	.43
Carbonate	21	13	15

	3, 80–81	CC, 19–20
Organic carbon	.09	1.45
Carbonate	8	1



[a] Black band consists almost entirely of black flecks of organic matter and radiolarite

SITE 585 HOLE A CORE 9 CORED INTERVAL 543.5–552.6 m sub-bottom; 6665.8–6674.9 m below rig floor



LITHOLOGIC DESCRIPTION

Dominant lithologies include slightly calcareous SILICEOUS SILTSTONE and SILICEOUS CLAYSTONE or SILTY CLAYSTONE, mostly in shades of greenish gray (5GY 5/1–5GY 4/1), in which the coarser material occurs at the base of an upward-fining graded sequence, or as lenses, beds, or stringers within finer lithologies (especially in the upper 15 cm of Section 1). The coarser material contains abundant recrystallized radiolarians. Overall, the dominant lithology is toward the finer size range, i.e. CLAYSTONE. All lithologies contain abundant silica cement and are quite hard.

An interesting sequence of multicolored chert and laminated radiolarian-bearing siltstone occurs between 80–100 cm, Section 1. Three chert fragments recovered are brightly-colored shades of red, brown, and yellow. They all contain abundant blebs and lenses of pyrite. The laminated rad-bearing siltstone underlying the chert contains a thin (about 2 mm) band of organic matter, which is overlain by multicolored laminae of green, yellow, gray, and tan siltstone.

The Core Catcher contains interbedded reddish brown (5YR 5/3) and light greenish gray (5G 7/1) CLAYSTONE.

SMEAR SLIDE SUMMARY (%):

	1, 6	1, 10	1, 79	1, 120	1, 130
	M	M	M	D	M
Texture:					
Sand	–	–	5	–	–
Silt	–	15	10	1	–
Clay	–	85	85	99	100
Composition:					
Feldspar	<1	9	–	–	–
Heavy minerals	<1	1	–	–	–
Clay	14	10	83	99	100
Zeolite	1	–	5	1	<1
Carbonate unspec.	5	6	–	<1	–
Foraminifers	–	1	–	–	–
Calc. nannofossils	<1	<1	–	–	–
Radiolarians	–	–	12	–	–
Fish remains	–	<1	–	–	–
Gypsum	<1	1	–	–	–
Recryst. SiO_2	80	72	–	–	–
Celadonite	1	1	–	–	–

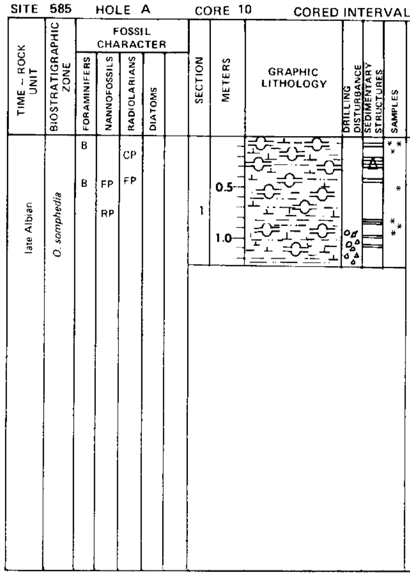
	1, 137	1, 147	CC, 1	CC, 6
	D	D	D	D
Texture:				
Sand	–	5	–	–
Silt	1	50	–	–
Clay	99	45	100	100
Composition:				
Heavy minerals	–	1	–	–
Clay	50	44	100	100
Volcanic glass	–	2	–	–
Zeolite	–	<1	<1	<1
Carbonate unspec.	50	2	–	–
Calc. nannofossils	–	1	–	–
Recryst. SiO_2	–	50	–	–

ORGANIC CARBON AND CARBONATE (%):

	1, 27–29	1, 82–83	1, 93–94
Organic carbon	.04	.01	.22
Carbonate	14	0	4

	1, 140–141	CC, 17–19
Organic carbon	.1	.06
Carbonate	14	21

SITE 585 HOLE A CORE 10 CORED INTERVAL 552.6–561.8 m sub-bottom; 6674.9–6684.1 m below rig floor



LITHOLOGIC DESCRIPTION

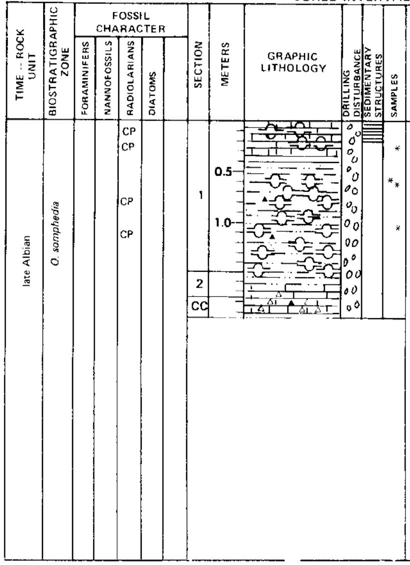
Interbedded dark brown (10YR 4/1) SILICEOUS CLAYSTONE, light to medium brown (10YR 6/2–5/2) CALCITE-BEARING SILICEOUS CLAYSTONE, light greenish gray (5G 7/1) CALCAREOUS AND SILICEOUS CLAYSTONE, with some coarsening to CLAYEY SILTSTONE and SILTSTONE in some layers.

One definite fining-upward sequence is apparent, but most of the core is too brecciated to identify graded sequences.

SMEAR SLIDE SUMMARY (%):

	1, 3	1, 9	1, 12	1, 55	1, 82	1, 89	1, 97
	D	M	M	M	M	M	M
Texture:							
Sand	–	–	–	–	–	–	–
Silt	–	–	5	–	2	–	40
Clay	100	100	95	100	98	100	60
Composition:							
Feldspar	–	<1	–	<1	–	–	–
Heavy minerals	1	1	<1	–	–	–	–
Clay	69	79	–	–	–	–	–
Carbonate unspec.	–	–	20	24	49	.	–
Foraminifers	–	–	–	<1	–	–	–
Calc. nannofossils	–	–	1	<1	1	–	–
Radiolarians	–	<1	<1	–	2	–	10
Fish remains	1	<1	–	–	–	–	–
Gypsum	<1	<1	–	–	–	–	–
Recryst. SiO_2	29	20	79	76	48	60	60

SITE 585 HOLE A Wash core CORE H-4 CORED INTERVAL 561.8–658.0 m sub-bottom; 6684.1–6780.3 m below rig floor



LITHOLOGIC DESCRIPTION

Fragments of:

Section 1, 0–40 cm: very light bluish gray (5B 8/1) clayey SILICEOUS LIMESTONE; some fine laminations.

Section 1, 40–150 cm: olive gray (5Y 4/1) to bluish gray (5B 6/1) SILICEOUS SILTY CLAYSTONE and minor brownish gray (5YR 4/1) CHERT.

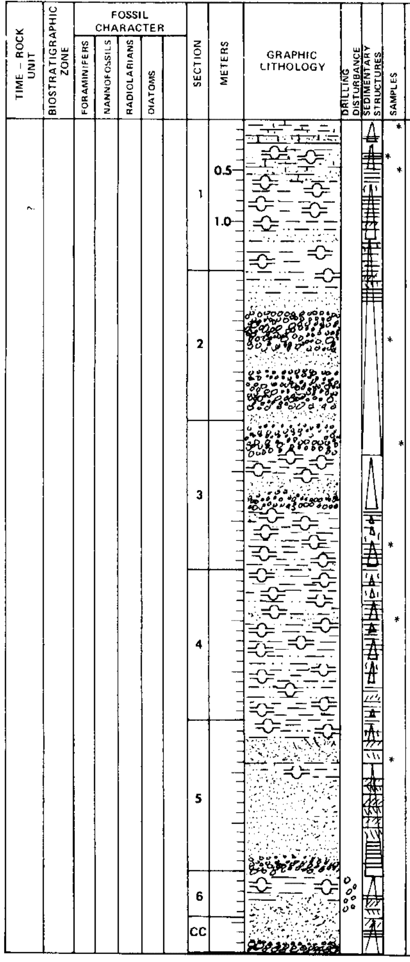
Section 2: greenish black (5GY 2/1) VOLCANICLASTIC SILTSTONE and light gray (N7.5) coarse CLASTIC LIMESTONE.

Core Catcher: medium brownish gray (5YR 5/1) to yellowish gray (5Y 8/1) SILICEOUS LIMESTONE and brownish gray (5YR 4/1) CHERT.

SMEAR SLIDE SUMMARY (%):

	1, 26	1, 61	1, 62	1, 107
	M	M	M	M
Texture:				
Sand	5	1	–	–
Silt	65	69	40	25
Clay	30	30	60	75
Composition:				
Quartz	–	–	1	–
Heavy minerals	3	3	3	1
Clay	25	29	60	75
Zeolite	–	1	2	6
Carbonate unspec.	30	5	4	10
Calc. nannofossils	20	2	1	3
Radiolarians	–	60	–	–
Recryst. SiO_2	25	–	29	5

SITE 585 HOLE A CORE Wash core H-5 CORED INTERVAL 658.0–772.1 m sub-bottom; 6780.3–6894.4 m below rig floor



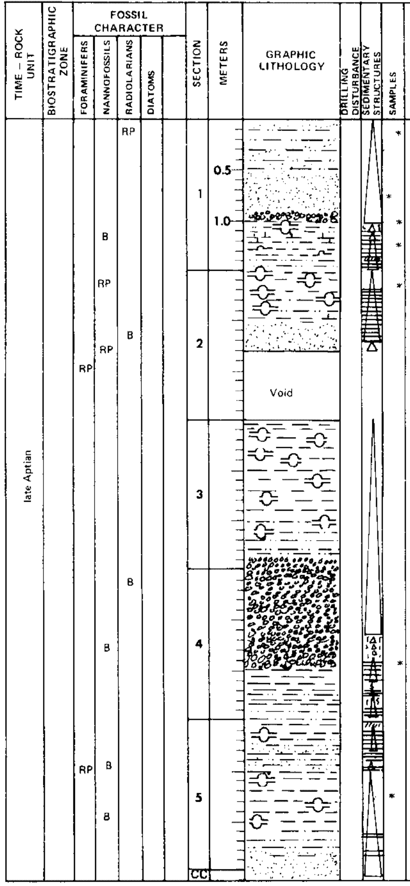
LITHOLOGIC DESCRIPTION

Graded sequences of volcaniclastic and carbonate. Finer-grained tops of sequences are mostly medium gray (N4) CLAYSTONE, massive, laminated, or sometimes bioturbated. Coarser bases of graded sequence are mainly very coarse volcaniclastic debris with clasts up to 1 cm, usually dark greenish gray (5GY 4/1), greenish black (5GY 2/1), or dark gray (N3). Some coarser units consist of interlaminated volcaniclastic and coarse carbonate debris.

SMEAR SLIDE SUMMARY (%):

	1, 8	1, 38	1, 46	2, 70	3, 25	3, 126	4, 50	5, 40
	M	M	M	M	M	M		
Texture:								
Sand	–	–	–	20	–	–	–	–
Silt	–	–	10	80	100	2	55	95
Clay	100	100	90	–	–	98	45	5
Composition:								
Feldspar	1	–	1	5	5	–	3	7
Heavy minerals	2	3	1	–	3	2	–	3
Clay	53	65	5	8	5	40	30	43
Volcanic glass	–	–	–	7	–	–	6	20
Zeolite	7	–	–	9	4	–	9	9
Carbonate unspec.	–	1	78	8	9	1	3	4
Calc. nannofossils	<1	<1	–	–	–	–	–	–
Radiolarians	<1	3	–	–	–	5	–	<1
Sponge spicules	–	7	–	–	–	–	<1	–
Fish remains	1	–	–	–	–	–	–	–
Celadonite	2	–	–	9	54	–	–	–
Hematite	–	–	–	–	–	1	–	<1
Gypsum	1	–	–	–	–	1	–	–
Recryst. SiO_2	33	20	15	34	20	50	9	–
Volc. xl. fr.	–	–	–	–	–	–	–	5

SITE 585 HOLE A CORE 11 CORED INTERVAL 772.1–781.3 m sub-bottom; 6894.4–6903.6 m below rig floor



LITHOLOGIC DESCRIPTION

Graded sequences of volcaniclastic and coarse carbonate debris. Finer-grained tops are mostly very dark gray (10YR 3/1) laminated, massive, or bioturbated.

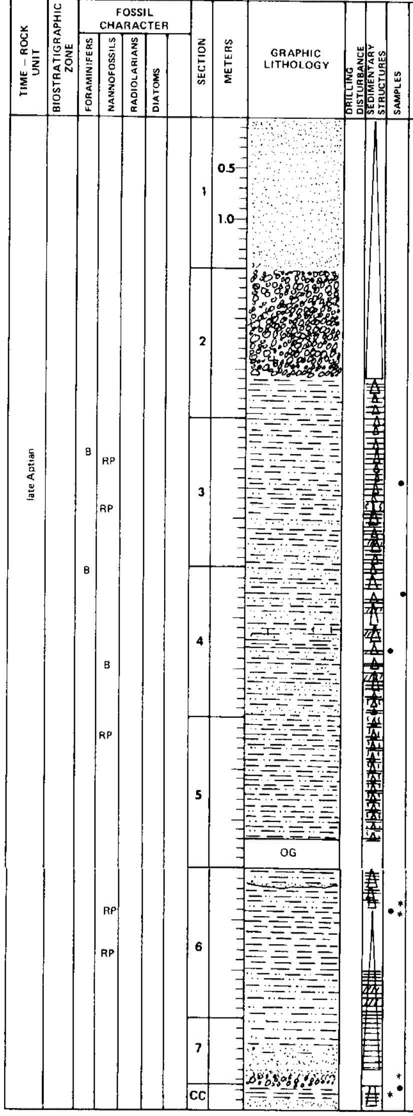
SMEAR SLIDE SUMMARY (%):

	1, 13	1, 80	1, 102	1, 124	2, 20	4, 92	5, 76
	M	D	M	M	D	D	D
Texture:							
Sand	–	–	–	–	–	–	–
Silt	–	99	–	100	–	–	5
Clay	100	1	100	–	100	100	95
Composition:							
Feldspar	6	–	3	4	1	2	6
Heavy minerals	4	–	3	2	2	–	2
Clay	50	–	72	–	78	81	80
Volcanic glass	5	5	–	8	–	–	–
Palagonite	–	–	<1	1	–	–	–
Zeolite	–	9	–	–	–	2	6
Carbonate unspec.	–	5	–	72	8	3	3
Calc. nannofossils	–	–	–	<1	<1	–	<1
Radiolarians	–	–	–	–	<1	–	–
Hematite	2	–	1	–	–	1	–
Recryst. SiO_2	30	31	–	–	9	9	–
Volc. frags.	3	5	–	13	–	–	3
Celadonite	–	45	2	–	2	–	–

ORGANIC CARBON AND CARBONATE (%):

	4, 84–86
Organic carbon	.25
Carbonate	1

SITE 585 HOLE A CORE 12 CORED INTERVAL 781.3–790.4 m sub-bottom; 6903.6–6912.7 m below rig floor



LITHOLOGIC DESCRIPTION

Graded sequences of very dark brown (5YR 3/1) CLAYSTONE at top, coarsening downward to greenish gray (5GY 2/1) VOLCANICLASTIC FINE SANDSTONE and SILTSTONE, and occasionally coarsening downward into an interlamination of dark volcaniclastic sandstone and light gray CLASTIC CARBONATE. The sandstone base of one graded sequence, that includes all of Section 1 and 110 cm of Section 2, is conglomeratic with clasts up to 2 cm.

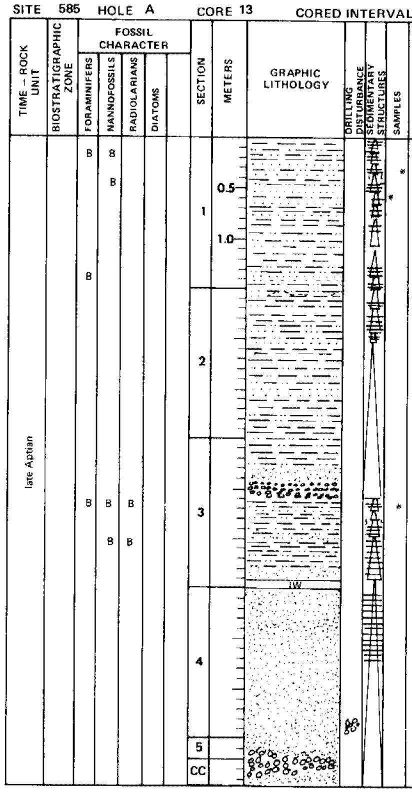
SMEAR SLIDE SUMMARY (%):

	6, 49	4, 57	CC, 12	6, 31
	D	D	D	M
Texture:				
Silt	2	5	–	–
Clay	98	95	100	100
Composition:				
Heavy minerals	3	5	–	–
Clay	93	87	98	99
Volcanic glass	–	<1	–	–
Palagonite	<1	1	–	–
Zeolite	3	5	2	1
Calc. nannofossils	–	–	<1	–
Hematite	<1	<1	–	–
Celadonite	<1	2	–	–

ORGANIC CARBON AND CARBONATE (%):

	3, 68–74	4, 27–28	4, 84–85	6, 42–43	CC, 3–4
Organic carbon	.09	.11	.25	.25	.44
Carbonate	13	8	1	3	3

SITE 585 HOLE A CORE 13 CORED INTERVAL 799.6–808.7 m sub-bottom; 6921.9–6931.0 m below rig floor



LITHOLOGIC DESCRIPTION

Graded sequences of olive black (5Y 2/1) VOLCANICLASTIC SILTSTONE and FINE- to MEDIUM-GRAINED SANDSTONE grading up into dark reddish brown (5YR 3/2) SLIGHTLY CALCAREOUS CLAYSTONE that is variously laminated, cross-bedded, scoured, and sometimes bioturbated. Basal contacts of coarser beds often contain concentrations of coarse celadonite.

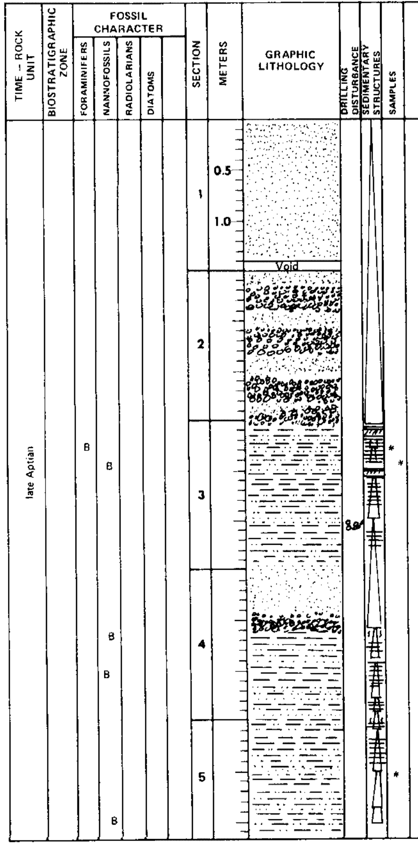
Several zones are cemented by $CaCO_3$.

Several graded sequences with conglomeratic sandstone bases at the bottom of the core (Sections 4, 5, and Core Catcher).

SMEAR SLIDE SUMMARY (%):

	1, 38	1, 60	1, 69
	D	D	D
Texture:			
Sand	–	–	–
Silt	–	–	5
Clay	–	–	95
Composition:			
Clay	83	95	93
Volcanic glass	12	1	2
Zeolite	3	3	3
Carbonate unspec.	1	1	2
Fish remains	–	<1	–
Celadonite	1	–	–

SITE 585 HOLE A CORE 14 CORED INTERVAL 808.7–817.9 m sub-bottom; 6931.0–6940.2 m below rig floor



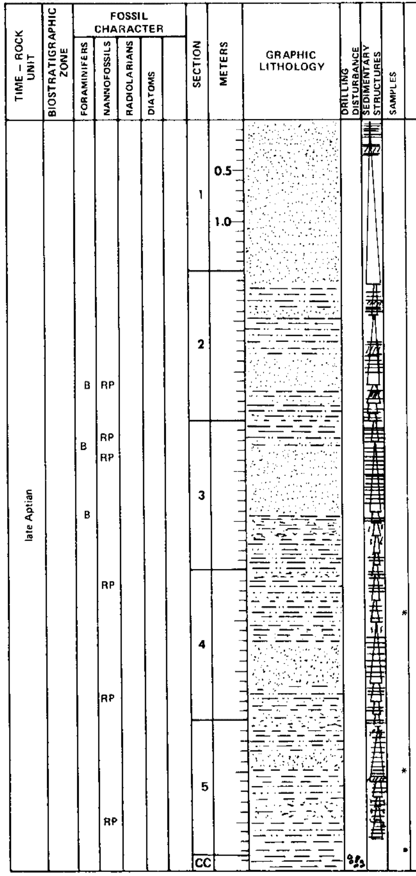
LITHOLOGIC DESCRIPTION

Graded sequences of volcaniclastics, with coarse clastic greenish black (5GY 2/1) SANDSTONE bases (two of which are conglomeratic) grading upward into dark green gray (10G 4/1) CLAYSTONE and, in a few cases, very dark gray (10YR 3/1) or dark reddish gray (5YR 4/2) CLAYSTONE.

SMEAR SLIDE SUMMARY (%):

	3, 31	3, 49	5, 54
	D	D	D
Texture:			
Silt	5	10	5
Clay	95	90	95
Composition:			
Clay	95	90	94
Volcanic glass	1	5	1
Zeolite	<1	–	1
Calc. nannofossils	<1	<1	1
Radiolarians	–	–	<1
Sponge spicules	–	<1	–
Volc. frags.	4	3	3

SITE 585 HOLE A CORE 15 CORED INTERVAL 817.9–827.0 m sub-bottom; 6940.2–6949.3 m below rig floor



LITHOLOGIC DESCRIPTION

Graded sequences of volcaniclastic SANDSTONE and CLAYSTONE. The whole core is, in general, more homogeneous in texture than above (overlying) cores in that the coarse bases of sequences are not so coarse, and the claystone tops are more often silty claystone.

The dominant overall color is greenish black (5GY 2/1).

Basal contacts of many graded sequences are scoured.

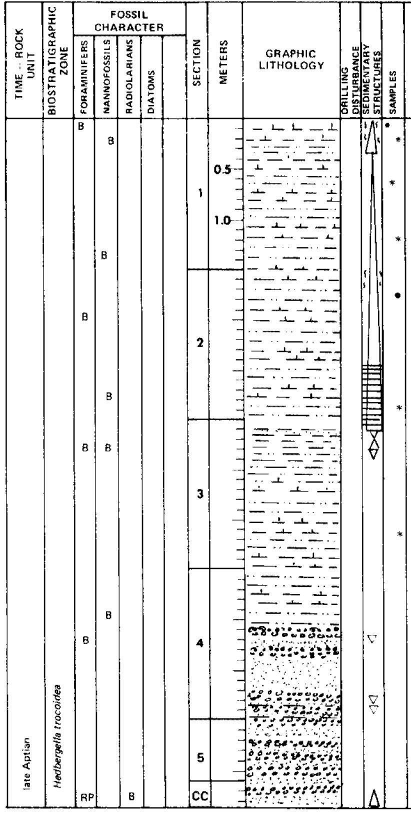
SMEAR SLIDE SUMMARY (%):

	4, 43	5, 50
	M	M
Texture:		
Clay	100	100
Composition:		
Feldspar	1	1
Clay	91	70
Volcanic glass	<1	9
Zeolite	7	–
Carbonate unspec.	–	9
Calc. nannofossils	–	<1
Celadonite	–	10

ORGANIC CARBON AND CARBONATE (%):

	5, 135–137
Organic carbon	.10
Carbonate	14

SITE 585 HOLE A CORE 16 CORED INTERVAL 827.0–838.6 m sub-bottom; 6949.3–6960.9 m below rig floor



LITHOLOGIC DESCRIPTION

Graded sequences of volcaniclastics, mainly fine-grained sandstone, siltstone, and silty, calcareous claystone.

Silicified burrows are common throughout, but especially in Section 2.

Layer, lenses, and stringers rich in celadonite are common in the lower part of the recovered section.

Many of the units are quite hard and appear to be well cemented with silica cement.

There appear to be several fining-downward graded sequences, particularly in Section 4.

Calcareous material seems to be mostly from carbonate golds in with volcanigenic debris.

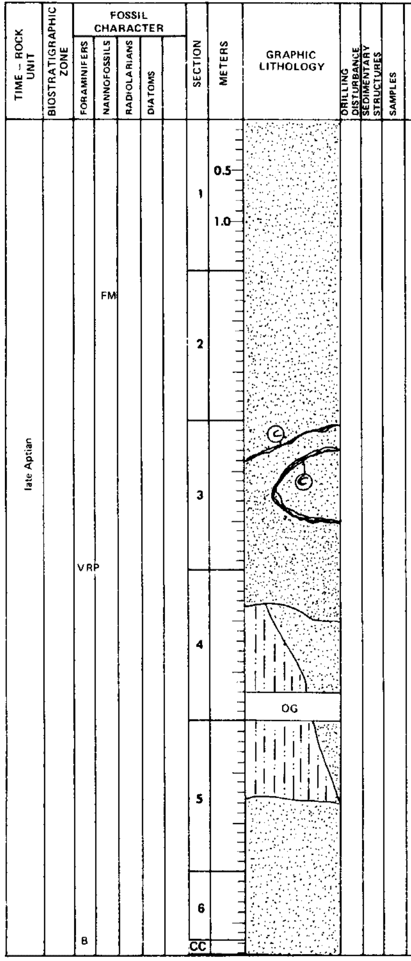
SMEAR SLIDE SUMMARY (%):

	1, 20	1, 65	1, 120	2, 140	3, 116
	M	M	D	D	D
Texture:					
Silt	–	15	1	5	85
Clay	100	85	99	95	15
Composition:					
Feldspar	<1	<1	<1	1	–
Mica	–	–	–	–	1
Heavy minerals	1	–	<1	1	3
Clay	69	50	80	50	10
Glauconite	–	–	–	–	5
Zeolite	–	1	1	5	10
Carbonate unspec.	30	9	18	–	5
Calc. nannofossils	–	–	1	<1	<1
Radiolarians	–	–	1	<1	–
Sponge spicules	–	–	–	<1	–
Fish remains	–	–	<1	–	–
Recryst. SiO_2	–	40	–	43	56

ORGANIC CARBON AND CARBONATE (%):

	1, 8–9	2, 31–34
Organic carbon	.16	.16
Carbonate	15	7

SITE 585 HOLE A CORE 17 CORED INTERVAL 838.6–847.6 m sub-bottom; 6960.9–6970.1 m below rig floor



LITHOLOGIC DESCRIPTION

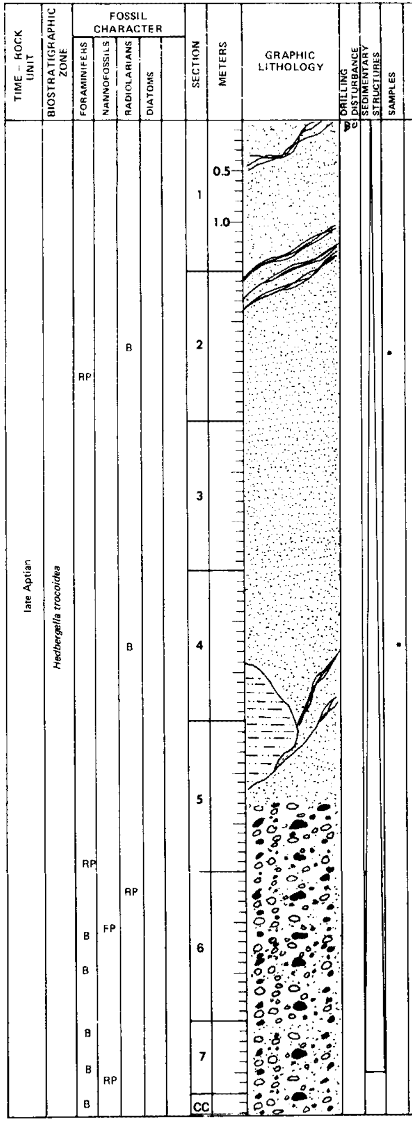
A single very gradually fining-upward sequence of volcaniclastic sandstone, grading from medium-size sand at the base to fine sand at the top. What appears to be a slice of a vertical "vein" of siltstone that cuts across sandstone in Sections 4 and 5.

Thin calcite veins cut core in Section 3 (indicated " ⓒ " on graphic column).

Dominant color is dark greenish gray (5G 4/1).

Carbonate ooids observed along with volcaniclastics on cut surface of core.

SITE 585 HOLE A CORE 18 CORED INTERVAL 847.6–857.8 m sub-bottom; 6970.1–6980.1 m below rig floor



LITHOLOGIC DESCRIPTION

Entire core is part of a graded sequence that consists of MEDIUM-SIZED SANDSTONE of volcaniclastics and carbonate ooids at the top of the core grading downward into COARSE SANDSTONE becoming CONGLOMERATIC and poorly sorted (debris flow?) by Section 5 with clasts up to 5 cm of VOLCANICS, CLAYSTONE, and SILTY CLAYSTONE, and also coarse carbonate fragments (mainly rudistid fragments and benthic foram Orbitalina) in addition to the ooids which are present throughout.

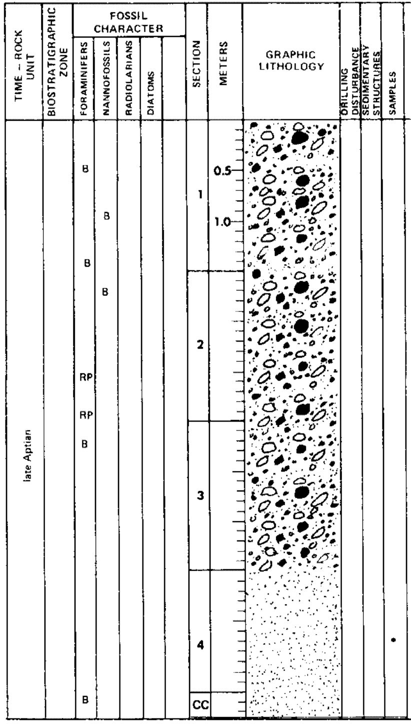
= "veins" of finer material (siltstone) cut across the sandstone as almost vertical anastomosing stringers at several places and as a thicker "dike?", truncated by the core, in Sections 4 and 5.

Dominant color throughout is greenish black (5GY 2/1).

ORGANIC CARBON AND CARBONATE (%):

	2, 81–82	4, 79–80
Organic carbon	.21	.23
Carbonate	16	21

SITE 585 HOLE A CORE 19 CORED INTERVAL 857.8–866.9 m sub-bottom; 6980.1–6989.2 m below rig floor



LITHOLOGIC DESCRIPTION

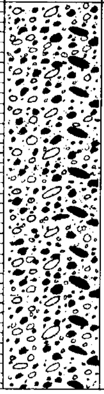
Entire core is a CONGLOMERATIC, COARSE-SAND VOLCANICLASTIC SANDSTONE with some clasts larger than the diameter of the core consisting of claystone, siltstone, basalt, and limestone. Many of the larger clasts are rounded to sub-rounded although most of the volcaniclastic debris is angular with green reaction rims (celadonite). Matrix clasts consist mainly of basalt, volcanic glass, red lithic fragments, and carbonate debris (ooids, benthic forams, and rudistids).

The unsorted nature of the clasts and rounding of many of the mudstone clasts suggest that this material is part of a debris-flow deposit.

ORGANIC CARBON AND CARBONATE (%):

	4, 71–72
Organic carbon	.26
Carbonate	6

SITE 585 HOLE A CORE 20 CORED INTERVAL 866.9–876.1 m sub-bottom; 6989.2–6998.4 m below rig floor

TIME – ROCK UNIT	BIOSTRATIGRAPHIC ZONE	FOSSIL CHARACTER: FORAMINIFERS	FOSSIL CHARACTER: NANNOFOSSILS	FOSSIL CHARACTER: RADIOLARIANS	FOSSIL CHARACTER: DIATOMS	SECTION	METERS	GRAPHIC LITHOLOGY	DRILLING DISTURBANCE	SEDIMENTARY STRUCTURES	SAMPLES
late Aptian		B B RP B B RP RP B B B B	B B B B	RP		1 2 3	0.5 1.0				* • * •

LITHOLOGIC DESCRIPTION

Entire core consists of a VOLCANICLASTIC SANDSTONE matrix with larger clasts (up to at least[a] 5 cm) of SILTSTONE, CLAYSTONE, BASALT, VOLCANIC GLASS and LITHIC FRAGMENTS, and SHALLOW-WATER CARBONATE DEBRIS (benthic forams, ooids, rudistid fragments). Many of the larger clasts, especially claystone and siltstone, are sub-rounded to rounded.

Overall color of sandstone matrix is greenish black (5GY 2/1).

Vugs in clasts at base of Section 2 lined with zeolites (henlandite?).

One 15-cm piece? clast? of amigoaloidal basalt.

Most volcanic fragments are rimmed by celadonite.

[a] Some clasts are truncated by core but are probably boulders.

SMEAR SLIDE SUMMARY (%):

	1, 60	3, 30
	M	M
Texture:		
Silt	15	10
Clay	85	90
Composition:		
Clay	83	90
Volcanic glass	15	2
Zeolite	2	–
Carbonate unspec.	1	–
Volc. frags.	4	–
Celadonite	1	–

ORGANIC CARBON AND CARBONATE (%):

	2, 102–103	3, 67–68
Organic carbon	.19	.18
Carbonate	3	3

SITE 585 HOLE A CORE 21 CORED INTERVAL 876.1–885.2 m sub-bottom; 6998.4–7007.5 m below rig floor

TIME – ROCK UNIT	BIOSTRATIGRAPHIC ZONE	FOSSIL CHARACTER: FORAMINIFERS	FOSSIL CHARACTER: NANNOFOSSILS	FOSSIL CHARACTER: RADIOLARIANS	FOSSIL CHARACTER: DIATOMS	SECTION	METERS	GRAPHIC LITHOLOGY	DRILLING DISTURBANCE	SEDIMENTARY STRUCTURES	SAMPLES
late Aptian		B	B RP			1 CC	0.5 1.0				* * •

LITHOLOGIC DESCRIPTION

Debris-flow deposit consisting mainly of a coarse greenish black (5GY 2/1) SANDSTONE matrix with poorly sorted, angular to sub-rounded fragments of SILTSTONE, CLAYSTONE, and BASALT. Matrix contains grains of red lithic fragments, volcanic glass, and basalt. No carbonate grains. Some clasts are actually boulders >10 cm in diameter truncated by core. Many volcanic fragments in matrix have a celadonite alteration rim.

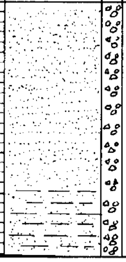
SMEAR SLIDE SUMMARY (%):

	1, 82	1, 87
	M	M
Texture:		
Silt	15	5
Clay	85	95
Composition:		
Heavy minerals	1	1
Clay	85	89
Volcanic glass	<1	8
Zeolite	7	2
Carbonate unspec.	1	1
Pyroxene	3	–
Celadonite	3	–

ORGANIC CARBON AND CARBONATE (%):

	CC, 10–11
Organic carbon	0.1
Carbonate	0

SITE 585 HOLE A CORE 22 CORED INTERVAL 885.2–892.9 m sub-bottom; 7007.5–7015.2 m below rig floor

TIME – ROCK UNIT	BIOSTRATIGRAPHIC ZONE	FOSSIL CHARACTER: FORAMINIFERS	FOSSIL CHARACTER: NANNOFOSSILS	FOSSIL CHARACTER: RADIOLARIANS	FOSSIL CHARACTER: DIATOMS	SECTION	METERS	GRAPHIC LITHOLOGY / DRILLING DISTURBANCE	SEDIMENTARY STRUCTURES	SAMPLES
late Aptian						1 2 CC	0.5 1.0			

LITHOLOGIC DESCRIPTION

Section 1, 0–95 cm: fine drill cuttings, mostly of chert, claystone, and chalk.

Section 1, 95–150 cm: greenish black (5GY 2/1 to 5GY 3/1) coarse VOLCANICLASTIC SANDSTONE; poorly sorted with pebble-sized clasts in a sand matrix.

Core Catcher: 62 cm of greenish black (5GY 2/1) volcaniclastic silty sandstone and coarse sandstone.

SITE 462

HOLE 462A

Date Occupied: 5 November 1982

Date Departed: 16 November 1982

Time on Hole: 10 days, 22 hours, 22 minutes

Position (latitude; longitude): 7°14.50'N; 165°01.90'E

Water depth (sea level; corrected m, echo-sounding): 5177

Water depth (rig floor; corrected m, echo-sounding): 5187

Bottom felt (m, drill pipe): reentry into cone set in 1978 (Leg 61)

Penetration (m): 1209.0

Number of cores: 17

Total length of cored section (m): 137.3

Total core recovered (m): 74.43

Core recovery (%): 54.2%

Oldest sediment cored:

Depth sub-bottom (m): 1123

Nature: volcaniclastic, zeolitic mudstone

Age: Early Aptian or older

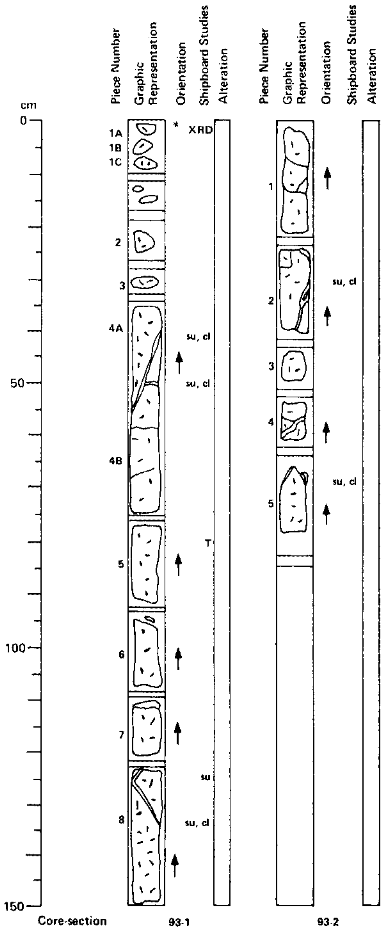
Measured velocity (km/s): not determined

Basement:

Depth sub-bottom (m): 1209.0

Nature: basalt sheet-flows (post-basement)

Velocity range (km/s): 5.6 to 5.7



89-462A-93 Depth: 1071.7–1076.6 m

Section 1:

Macroscopic description:

1. Medium bluish gray (5B 5/1) homogeneous aphyric granular textured basalt (relatively medium-grained throughout, grains ∼1 mm). Possible microglomerophyric olivine/pyroxene occur as dark spots (especially in Piece 2).
2. Poorly developed conjugate set of 2–4 mm wide pyrite ± dark clay veins in Pieces 4 and 8 (pyritized minor fractures). Veins dip at ∼60° to horizontal.

Pieces 1A, B, and C sediment pieces are cavings, Pieces 2 and 3 possible cavings. 10–15 cm: two pieces of brown (5YR 4/4 and 10YR 3/2) zeolitic claystone.

* All pieces represent one cooling unit – Unit 45 (following Leg 61); possible lava flow?

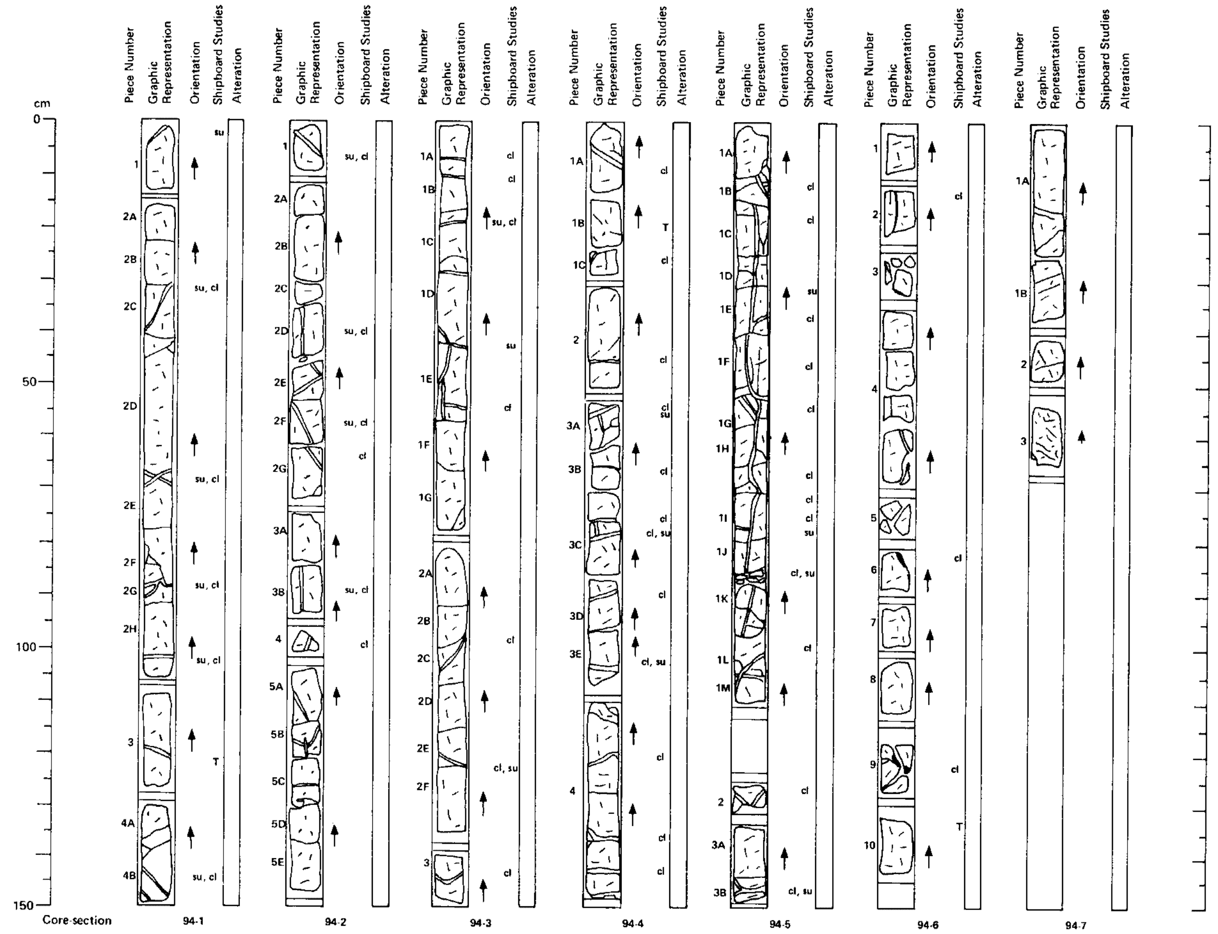
XRD: Confirms that dark green clay-like vein infilling B saponite.

Section 2:

Macroscopic description:

1. Continuation of above, part of Unit 45; some cooling unit as no obvious internal junctions.
2. Medium bluish gray (5B 5/1) homogeneous sparsely to moderately pyroxene microphyric basalt.
3. Pyrite and clay veins in Pieces 2 and 5. Spasmodic very thin pyrite veins only seen under binocular microscope in most pieces.

Possibility of exchange between Pieces 3 and 4.



89-462A-94

Depth: 1076.6–1085.7

Section 1:

Macroscopic description:

1. Medium bluish gray (5B 5/1) homogeneous sparsely to moderately pyroxene microphyric basalt. Some slight variation in (a) density of phenocrysts and (b) ratio of feloics to mafics (Piece 3 is more feloic than others).
2. Pyrite and clay veins, some irregular fractures. Thin (1 mm) felspathic vein in Piece 3.

Same cooling unit as before (Unit 45).

Section 2:

Macroscopic description:

1. Medium bluish-gray (5B 5/1) homogeneous aphyric to sparsely pyroxene microphyric basalt (relatively coarse for a basalt).
2. Little variation, except relative proportion of mafics to feloics and then very minor, and similar to Section 1. Same cooling unit as before (Unit 45).
3. Numerous pyrite-bearing veins, generally steep, some subhorizontal.

Section 3:

Macroscopic description:

Medium bluish gray (5B 5/1) homogeneous sparsely pyroxene microphyric basalt – as before (still Unit 45). Very minor changes in grain size, presence or absence of phenocrysts and mafic/feloic ratio e.g. Piece 2F.

Dark green soft 'clay' of veins may be chlorite or smectite (XRD suggest saponite, see Core 93, Section 1).

Slickensides on clay in vein in Pieces 2C and slickensides in Piece 2E.

Section 4:

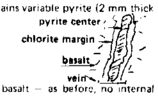
Macroscopic description:

1. Homogeneous medium bluish gray (5B 5/1) sparsely pyroxene microphyric basalt. Same as previous sections, Unit 45 continued; no internal junctions.
2. Pyrite-saponite veinlets – largely infilling fractures.

Section 5:

Macroscopic description:

1. Homogeneous bluish-gray (5B 5/1) sparsely phyric pyroxene microphyric basalt. Continuation of Unit 45.
2. Vertical saponite vein from 14–84 cm and continued 87–97 cm interval contains variable pyrite (2 mm thick in Piece 1D).



Section 6:

Macroscopic description:

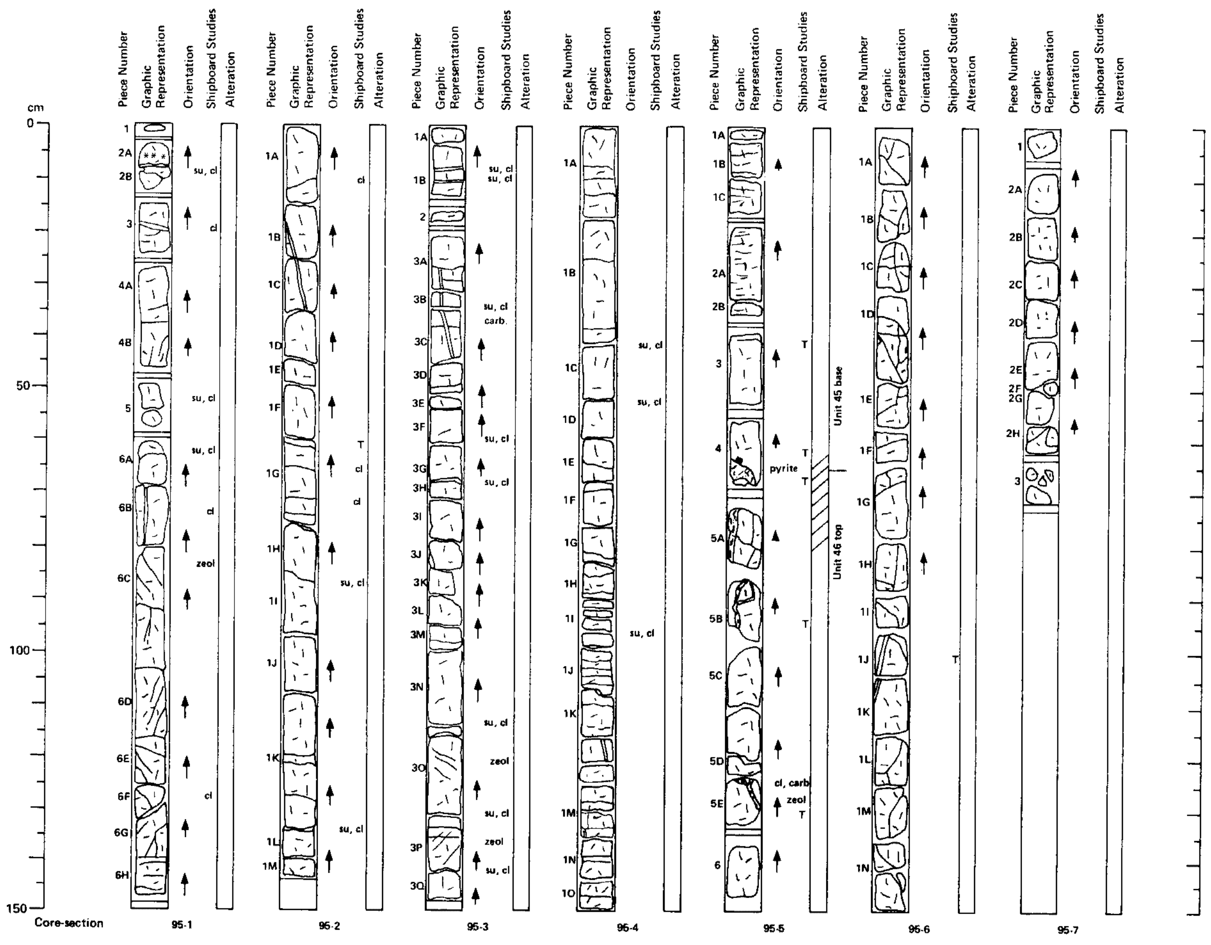
1. Medium bluish gray (5B 5/1) homogeneous sparsely pyroxene microphyric basalt – as before, no internal junctions, part of Unit 45.
2. Minor 'clay' (sapönite?) ± pyrite veining.

Section 7:

Macroscopic description:

1. Homogeneous medium bluish gray (5B 5/1) sparsely pyroxene microphyric basalt; phenocrysts randomly distributed (Unit 45).
2. Numerous veinlets and infilled fractures with dark saponite ± pyrite.

Whole core is microfractured and veined, increases downwards to a maximum in Section 5. Most are relatively steeply dipping (50° to vertical), cut by a later set of subhorizontal fractures (no pyrite).



89-462A-95

Depth: 1085.7–1094.9 m

Section 1:

Macroscopic description:

1. Homogeneous medium bluish gray (5B 5/1) aphyric to sparsely pyroxene microphyric basalt. Similar to Core 94 – continuation of Unit 45.
2. Numerous very thin (< 0.5 mm) saponite ± pyrite veinlets. Majority form a steep dipping conjugate set, together with a few subhorizontal veinlets. At 80—90 cm soft white zeolite(?) veinlets.
3. Piece 2A – 2 mm pyroxene-rich layer (subhorizontal).

Section 2:

Macroscopic description:

1. Homogeneous medium bluish gray (5B 5/1) aphyric to sparsely pyroxene microphyric basalt (Unit 45) (less phyric than Section 1).
2. Pyrite-saponite veinlets mainly subhorizontal and thinner in this core relative to Core 94.

Section 3:

Macroscopic description:

1. Homogeneous medium bluish gray (5B 5/1) aphyric to sparsely pyroxene microphyric basalt. Still Unit 45. Some variation in phenocryst density.
2. Most pyrite-saponite veinlets are subhorizontal. On broken surface pyrite cubes scattered in dark soft chlorite flakes. Conjugate zeolite(?) veinlets in Pieces 3O and 3P.

Section 4:

Macroscopic description:

1. Homogeneous medium bluish gray (5B 5/1) aphyric to sparsely pyroxene microphyric basalt (still Unit 45).
2. Most subhorizontal fractures are infilled with pyrite and saponite (not all worked graphically as veins). Increase in density of subhorizontal fractures down core and this section, e.g. top of section: 1 or 2 per 10 cm, at base of section: 5 per cm. Steep and vertical veinlets less in evidence.

Section 5:

Macroscopic description:

1. 0–64 cm homogeneous medium bluish gray (5B 5/1) aphyric to sparsely pyroxene microphyric basalt. Phenocryst density marked decreases in 55–64 cm interval and basalt marginally finer grained. Represents chilled base to Unit 45.
2. 64–110 cm chilled upper flow top to next unit (Unit 46) – fine-grained olivine-pyroxene glomerophyric basalt with vertical hyaloclastite zone (green smectite – replaced spalled shards in carbonate matrix). To base of section thin smectite, carbonate ± zeolite infilled fractures in homogeneous sparsely pyroxene microphyric basalt.

Piece 1C: numerous horizontal closely spaced fractures.

Section 6:

Macroscopic description:

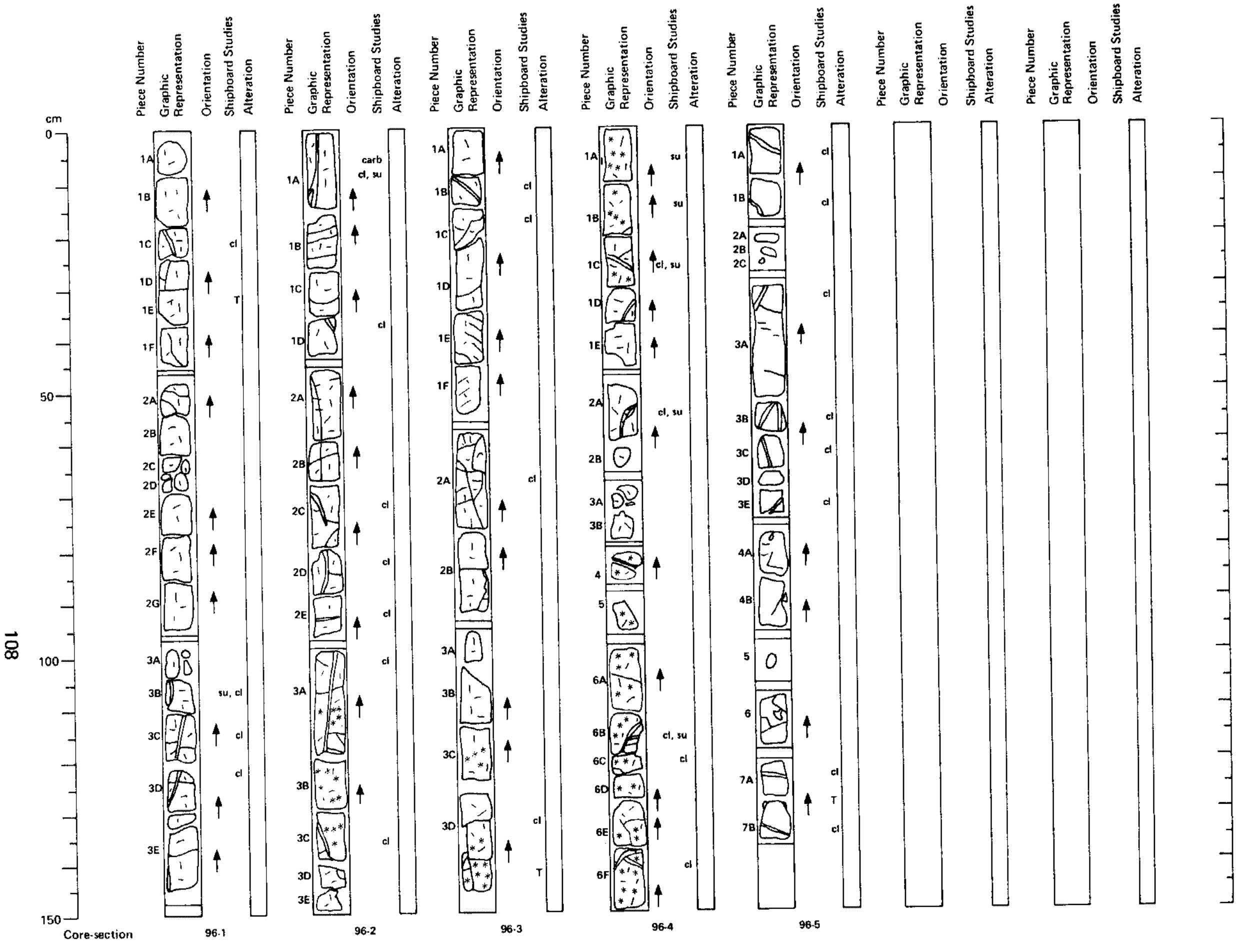
1. Homogeneous medium bluish gray (5B 5/1) sparsely olivine pyroxene phyric and ahpyric basalt. Marginally finer grained than in Unit 45. Random and patchy distribution of phenocrysts.
2. Horizontal and steep infilled (pyrite and saponite) fractures throughout.
3. Near vertical brecciated zone between 97–109 cm.

Brecciated zone with dark margin and green smectite fragments, some carbonate (Piece 1J).

Section 7:

Macroscopic description:

1. As Section 6 above: Unit 46 basalt.



89-462A-96

Depth: 1094.9–1104.0 m

Section 1:

Macroscopic description:

1. Homogeneous bluish gray (5B 6/1) sparsely olivine-pyroxene microphyric basalt throughout.
2. Steep, curving (60–70° to the horizontal) saponite-pyrite ± carbonate-infilled fractures, generally ~ 1 mm wide.

Section 2:

Macroscopic description:

As Section 1 – Unit 46. Sparsely olivine-pyroxene microphyric basalt.

110–137 cm: Irregular layering and patchy concentration of pyroxene phenocrysts.

Section 3:

Macroscopic description:

As in Section 1, same unit – 46. Sparsely olivine-pyroxene microphyric basalt.
Poorly layered, patchy development of pyroxene phenocrysts (glomerophyric patches) at 120–146 cm.

Piece 2A: Very fractured.

Section 4:

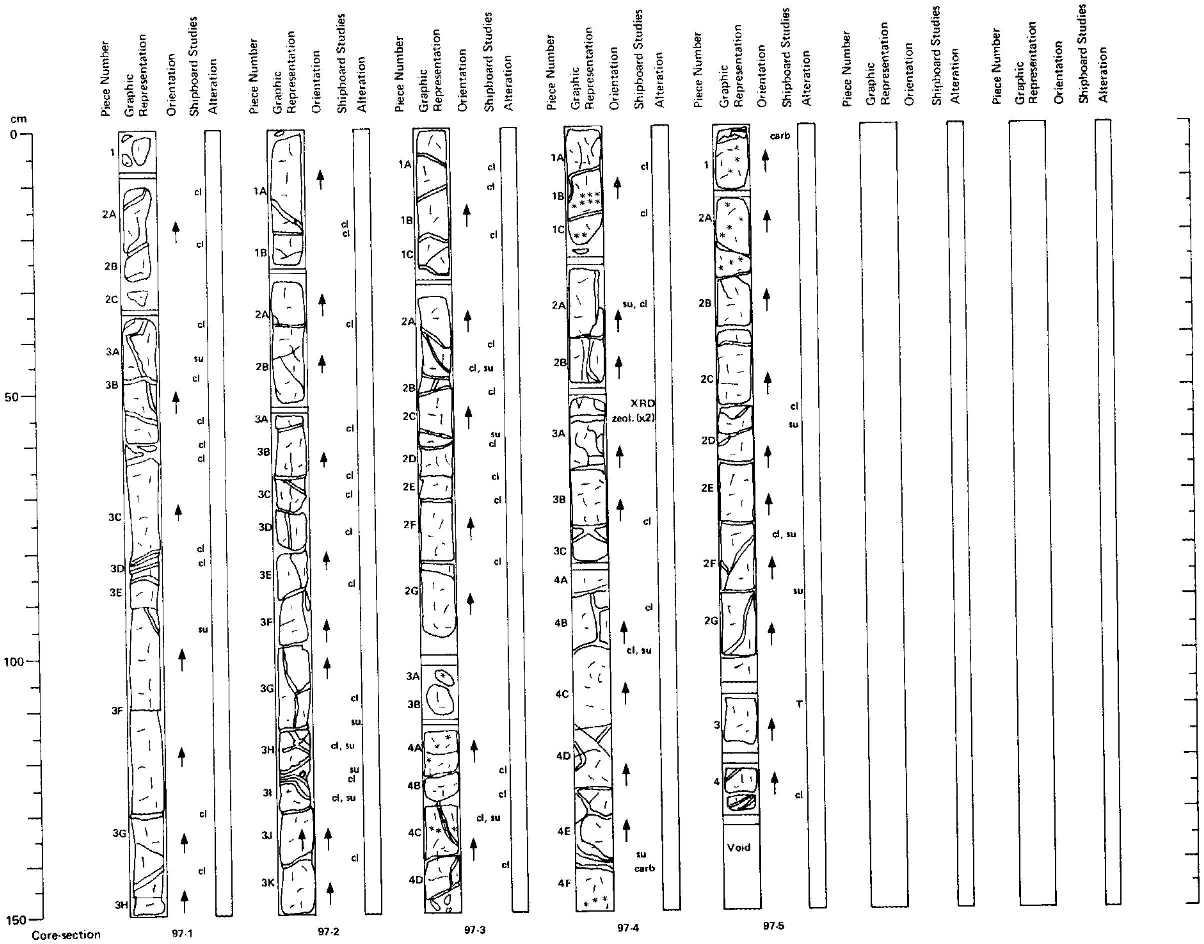
Macroscopic description:

As in Section 1, still Unit 46. Homogeneous sparsely olivine-pyroxene microphyric basalt, except irregular layers and patches of pyroxene – glomerophyric throughout most of section. "Layers" from subhorizontal to 25° dip; sulphide (pyrite) may be associated (e.g. Pieces 1A and B) in matrix as well as in veinlets.

Section 5:

Macroscopic description:

As before, Section 1, still Unit 46. Sparsely olivine-pyroxene microphyric basalt.
Veinlets, many infilled with saponite, lack of pyrite.
En echelon set of microfractures in Piece 3A.



89-462A-97

Depth: 1104.0–1113.2 m

Section 1:

Macroscopic description:

Homogeneous bluish gray (5B 6/1) aphyric and sparsely-olivine pyroxene microphyric basalt. Pyrite-saponite veins – pyrite forms radiate plumose crystals (still Unit 46).

Section 2:

Macroscopic description:

As before, still Unit 46. Sparsely olivine-pyroxene microphyric basalt. Irregular masses of pyrite in matrix and associated with steep veins in Piece 3H.

Section 3:

Macroscopic description:

As before, Section 1, Unit 46. Sparsely olivine-pyroxene microphyric basalt. Pyroxene layers and patches in Piece 4 – not true layering.

Section 4:

Macroscopic description:

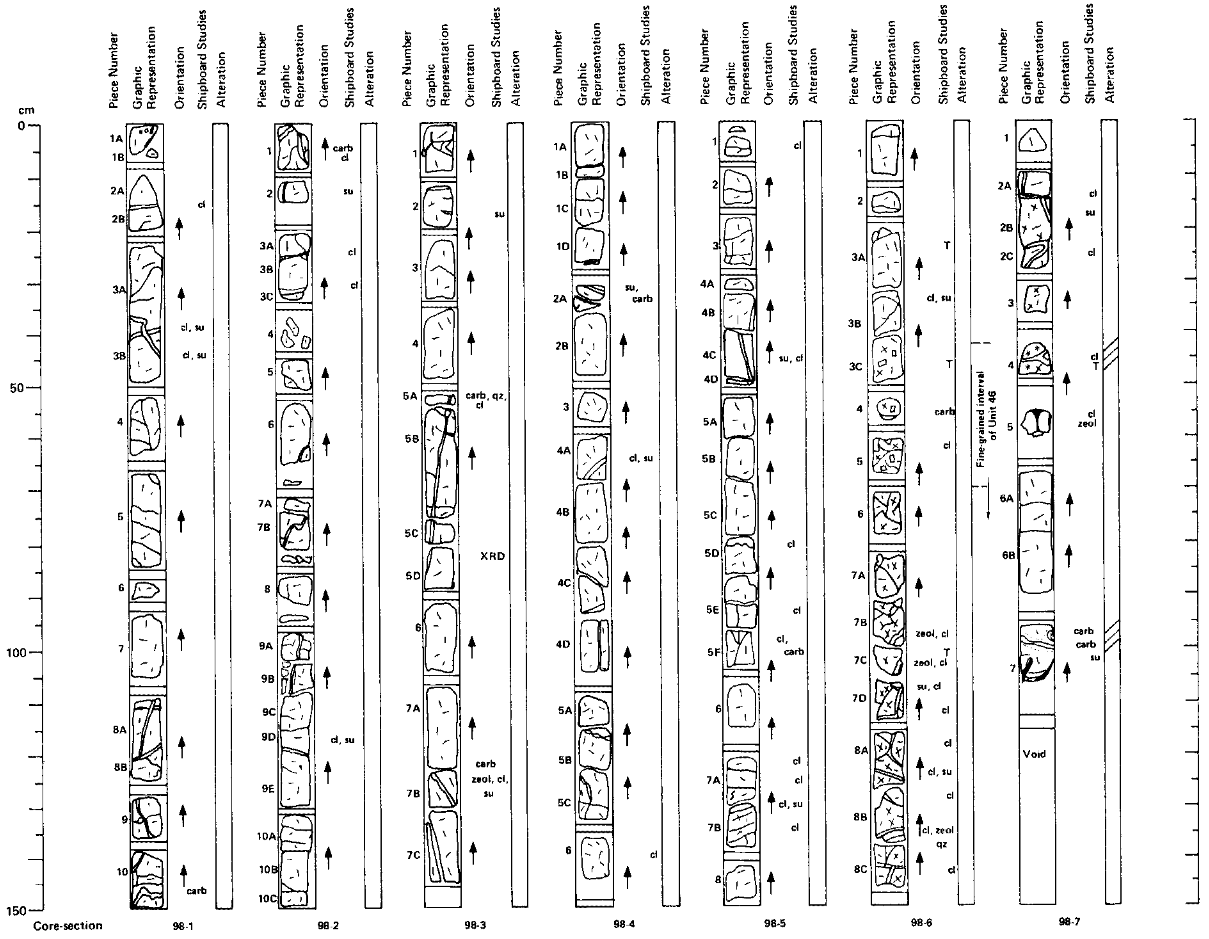
As Section 1, Unit 46. Sparsely olivine-pyroxene microphyric basalt. Vein at 55 cm contains two zeolites (white and prismatic; grayish white radiate masses).

XRD: Heulandite, minor phillipsite and milky white quartz.

Section 5:

Macroscopic description:

As before, Section 1, Unit 46. Sparsely olivine-pyroxene microphyric basalt. Veinlets rich in pyrite in Pieces 2F and 2G.



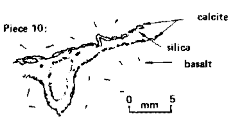
89-462A-98 Depth: 1113.2–1122.3 m

Section 1:

Macroscopic description:

1. Homogeneous bluish gray (5B 6/1) aphyric and sparsely olivine-pyroxene microphyric basalt (Unit 46).
2. Veinlets are (a) saponite ± pyrite or (b) fine-grained silica, sometimes colored green by smectite, with a white carbonate (calcite) on margins and within vein center.

e.g. Piece 10:



Section 2:

Macroscopic description:

As Section 1, Unit 46. Sparsely olivine-pyroxene microphyric basalt. Veinlets again contain calcite.

Section 3:

Macroscopic description:

As Section 1, Unit 46. Sparsely olivine-pyroxene microphyric basalt. Calcite-quartz plus saponite vein in Piece 5, dips 70° relative to the horizontal.

XRD: Calcite plus quartz only, no zeolite. Pyrite sometimes associated in zeolite-bearing veins (e. g. Piece 7B).

Section 4:

Macroscopic description:

As Section 1, Unit 46. Aphyric and sparsely pyroxene-olivine microphyric basalt. Pyrite-saponite veinlets still common, ±carbonate.

Section 5:

Macroscopic description:

As Section 1, Unit 46. Aphyric and sparsely olivine-pyroxene microphyric basalt. Subhorizontal fractures towards base of section.

Section 6:

Macroscopic description:

1. 0–42 cm: Homogeneous bluish gray sparsely olivine-pyroxene microphyric basalt.
2. At about 42 cm interval, decrease in grain-size and incoming of sparse plagioclase phenocrysts – gradual, no junction defined. Dark bluish gray (5B 4/1) fine-grained moderately olivine-pyroxene-plagioclase-phyric basalt (Piece 4 is pyroxene-plagioclase glomerophyric).
3. At 70 cm becomes coarser again and plagioclase phenocrysts disappear; moderately olivine-pyroxene-phyric basalt from 70–150 cm.

All core still Unit 46.

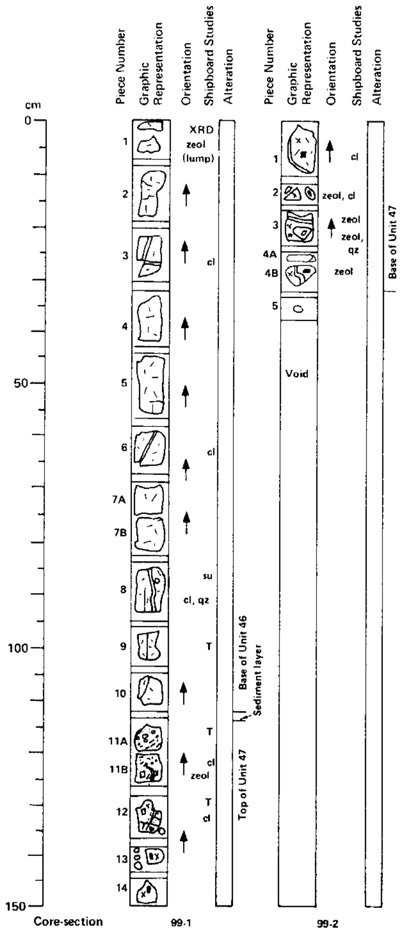
Section 7:

Macroscopic description:

Dominantly, sparsely to moderately olivine-pyroxene microphyric basalt.

30–50 cm: marginally finer grained with altered pyroxene(?) glomerocrysts.

Piece 4: Dark pyroxene/olivine clots to green clay?



89-462A-99 Depth: 1122.3—1131.5 m

Section 1:

Macroscopic description:

1. 0–110 cm: Homogeneous sparsely olivine-pyroxene microphyric basalt.
2. 113–119 cm: Sediment layer, Piece 11A, composed of purple sedimentary clasts (1–7 mm), silt-sized fragments, pyroxene crystals and smectite-replaced glass shards(?) – represents boundary to Units 46 and 47 (see sediment Visual Core Description).
3. 121–150 cm: Fine-grained moderately pyrozene-plagioclase-olivine(?) phyric basalt (Unit 47). Top of unit represented by black spalled glass shards in green smectite and zeolite matrix (zone 5 mm thick). A fine-grained zone extends to about 140 cm. Then coarser again to base. Plagioclase phenocrysts also decrease with depth.

Zeolite is stilbite (XRD) (dark green spheres of acicular crystals within stilbite tablets) = epidote? or pumpellyite?

Section 2:

Macroscopic description:

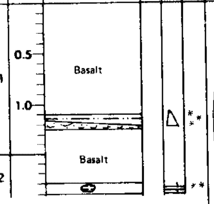
0–32 cm: Moderately pyroxene-olivine ± plagioclase phyric basalt veined by zeolites with saponite margins.

Piece 5: Purple and pale green laminated fine-grained claystone – smectite and crystal fragments? (alteration zone of flow top, unmetamorphosed)?.

Base of Unit 47 placed above (see sediment Visual Core Description).

SITE 462 HOLE A CORE 99 CORED INTERVAL 1122.3–1131.5 m sub-bottom; 6308.3–6317.5 m below rig floor

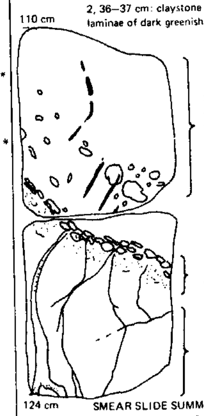
TIME ROCK UNIT	BIOSTRATIGRAPHIC ZONE	FOSSIL CHARACTER				SECTION
		FORAMINIFERS	NANNOFOSSILS	RADIOLARIANS	DIATOMS	
Late Jurassic to early Aptian				RP		1
						2



LITHOLOGIC DESCRIPTION

1, 110–124 cm: silty claystone as detailed in figure below.

2, 36–37 cm: claystone and silty claystone in wispy, burrowed(?) laminae of dark greenish gray (5G 6/1) and grayish blue green (5BG 6/2).



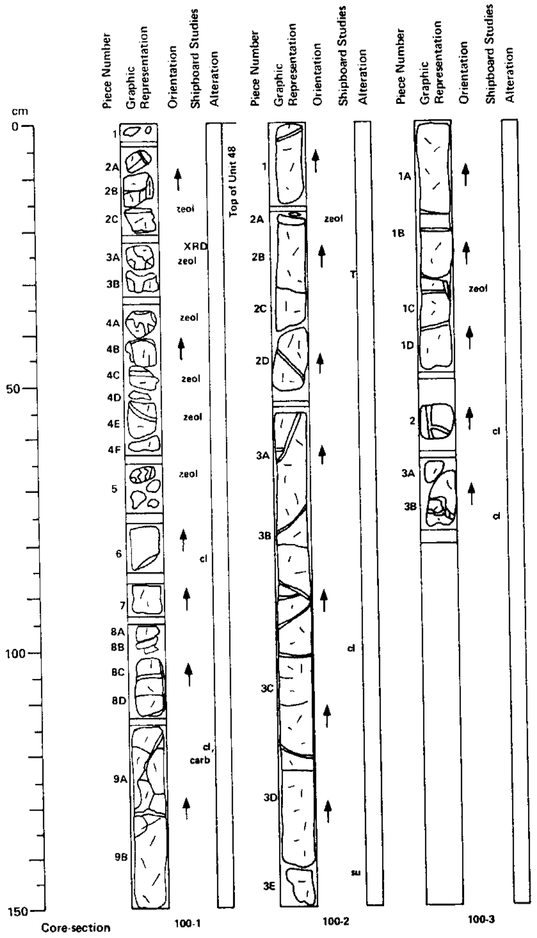
SILTY CLAYSTONE, dark greenish gray (5GY 4/1) with olive gray (5Y 4/1) sediment clasts at base with zeolite-filled veins (designated by black)

GLASSY BASALT MARGIN, dark greenish black (5G 2/1)

BASALT, medium dark gray (N4) with pyrite, zeolite, and diagenetic clay-filled veins and fractures

SMEAR SLIDE SUMMARY (%):

	1, 116 M	1, 112 M	2, 36 M	2, 36 M	1, 117 M
Texture:					
Silt	1	–	7	30	–
Clay	99	100	93	70	100
Composition:					
Feldspar	Tr	Tr	Tr	Tr	–
Heavy minerals	–	–	–	Tr	–
Clay	98	96	93	69	97
Volcanic glass	1	3	7	30	1
Zeolite	1	1	Tr	1	2
Radiolarians	–	Tr	Tr	Tr	Tr
Fish remains	Tr	Tr	Tr	Tr	Tr



89-462A-100 Depth: 1131.5–1134.5 m

Section 1:

Macroscopic description:

1. Homogeneous bluish gray (5B 6/1) aphyric to sparsely olivine-pyroxene microphyric basalt. Bright green smectite flakes partly replace olivine.
2. Considerable zeolite veining in Pieces 2–5.

XRD: Zeolite is stilbite.

Section 2:

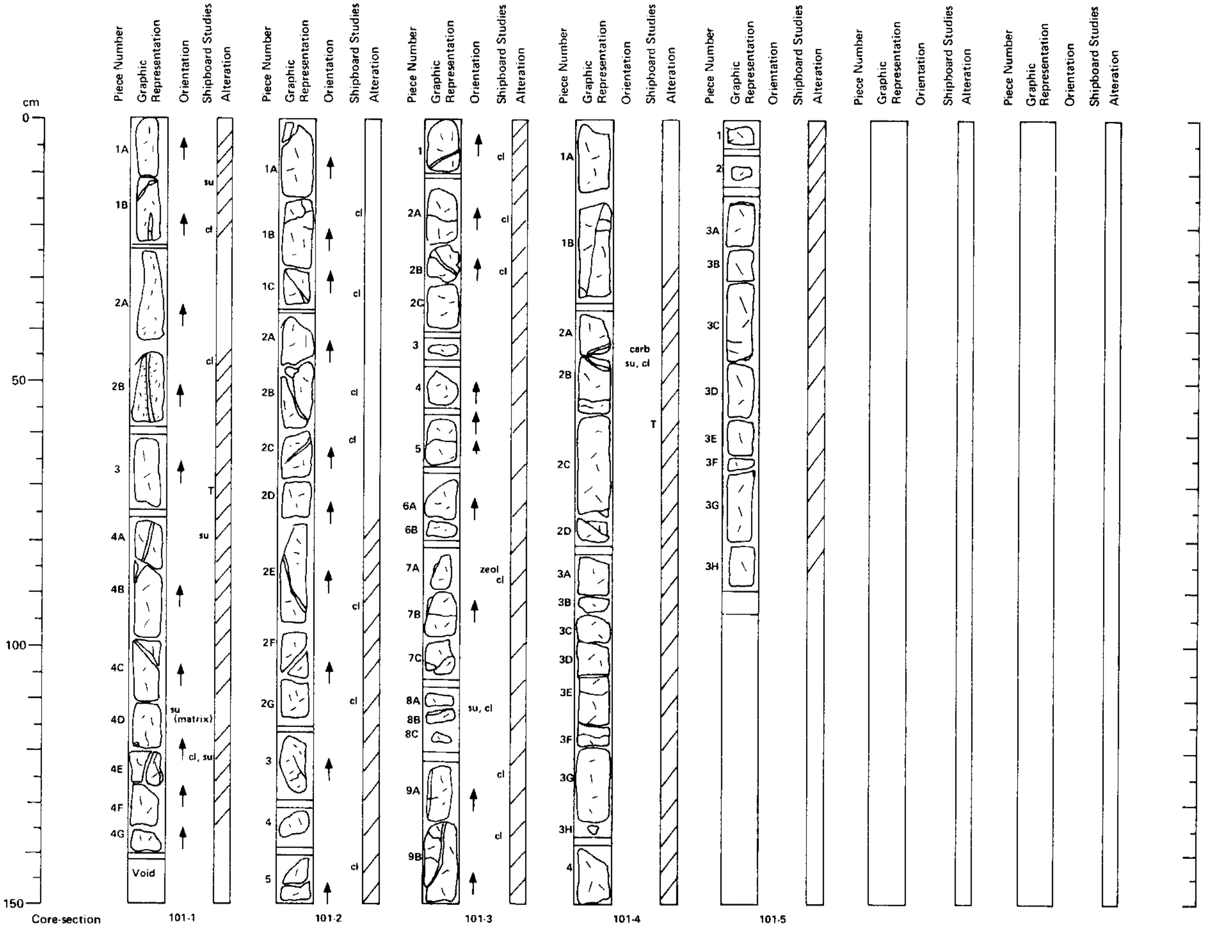
Macroscopic description:

Continuation of Unit 48 — aphyric and sparsely olivine microphyric basalt. Green smectite in matrix and replacing olivine.

Section 3:

Macroscopic description:

Homogeneous aphyric to sparsely pyroxene microphyric basalt (Unit 48). Olivine and smectite have disappeared relative to Section 2; some pyroxene phenocrysts appear to be large subophitic pyroxene pools than true phenocrysts.



89-462A-101

Depth: 1134.5–1142.9 m

Section 1:

Macroscopic description:

1. Relatively homogeneous bluish gray (5B 6/1) aphyric basalt – relatively coarse-grained for basalt.
2. Considerable development of green smectite patches. Disseminated pyrite in matrix and veins.

Unit 48.

Section 2:

Macroscopic description:

As Section 1, continuation of Unit 48. Aphyric basalt (granular texture). Blue green and dark green smectite common in matrix and veins.

Section 3:

Macroscopic description:

Aphyric basalt (Unit 48).
Granular texture, smectite patches throughout.

Marginally finer-grained than Sections 2 and 4, increasing in grain-size towards base (fine-grained section 12–106 cm).

Section 4:

Macroscopic description:

Aphyric basalt (Unit 48).

Coarser grained again relative to Section 3.

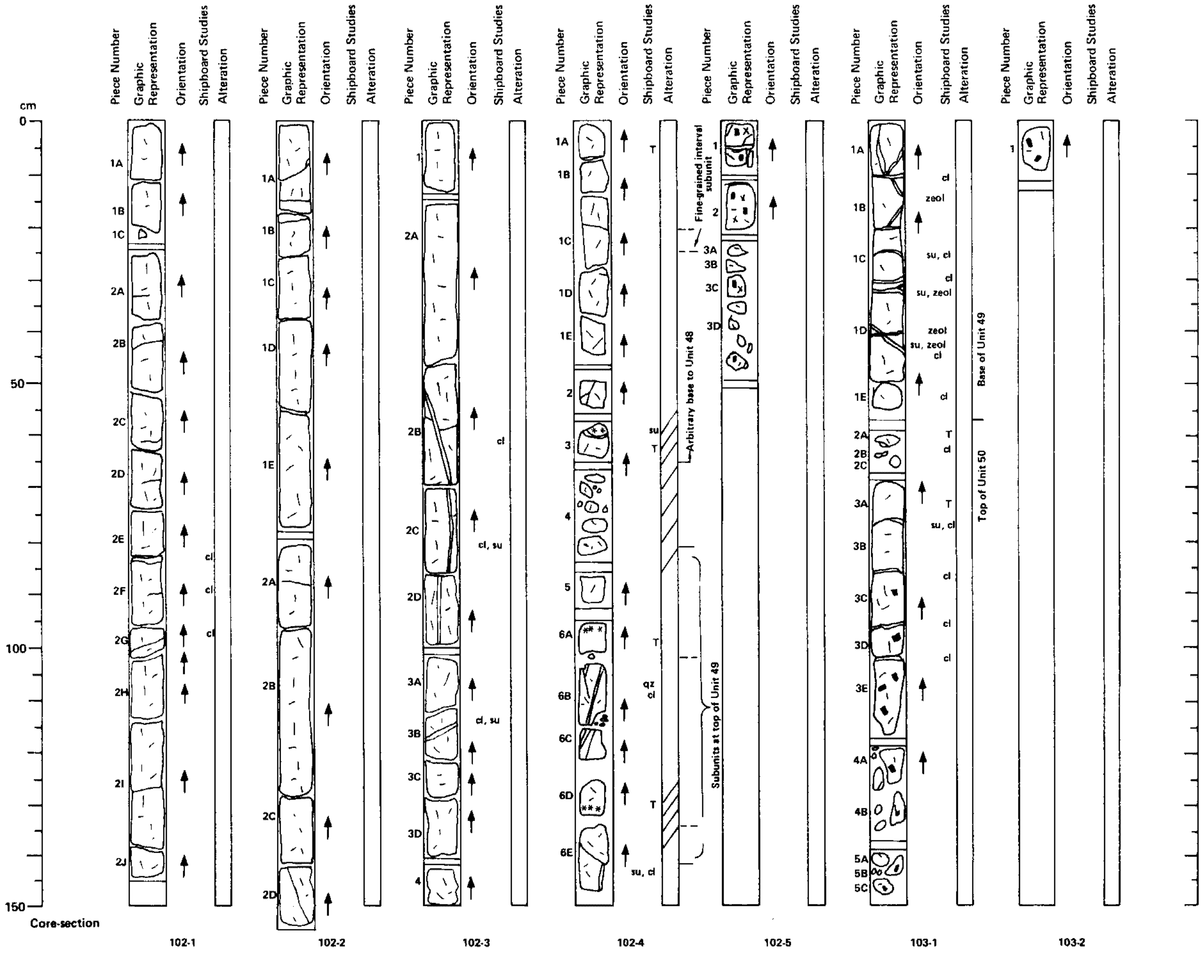
Green smectite patches and veins throughout.

Section 5:

Macroscopic description:

Aphyric basalt (Unit 48).

Patchy smectite alteration throughout.



89-462A-102 Depth 1142.9–1152.0 m

Section 1:

Macroscopic description:

Homogeneous medium bluish gray (5B 5/1) sparsely to moderately olivine-pyroxene-plagioclase phyric basalt (Unit 48). Few horizontal smectite-filled fractures.

Section 2:

Macroscopic description:

Homogeneous sparsely olivine(?) or pyroxene phyric basalt (Unit 48). Phenocrysts replaced by green smectite as probably olivine.

Section 3:

Macroscopic description:

Homogeneous sparsely olivine or pyroxene phyric basalt (Unit 48) – similar to Sections 1 and 2 above.

Section 4:

Macroscopic description:

1. 0–43 cm: Homogeneous sparsely olivine and pyroxene phyric basalt, becoming finer towards base. Also a fine-grained interval subunit at 21–23 cm.
2. 43–150 cm: Very fine-grained (quench textured?) pyroxene-plagioclase glomerophyric ± olivine phyric basalt.
3. Within 43–150 cm interval are 3 olivine-rich layers (at 58, 96, and 132 cm) – possibly represent bases of 3 subunits.

Arbitrary base to Unit 48 placed at 66 cm below olivine layer – from then on glomerophyric texture decreases and grain-size increases towards base.

Section 5:

Macroscopic description:

Homogeneous fine-grained moderately olivine-pyroxene phyric basalt – possibly top of a new unit(?) Unit 49.

89-462A-103 Depth 1152.0–1161.2 m

Section 1:

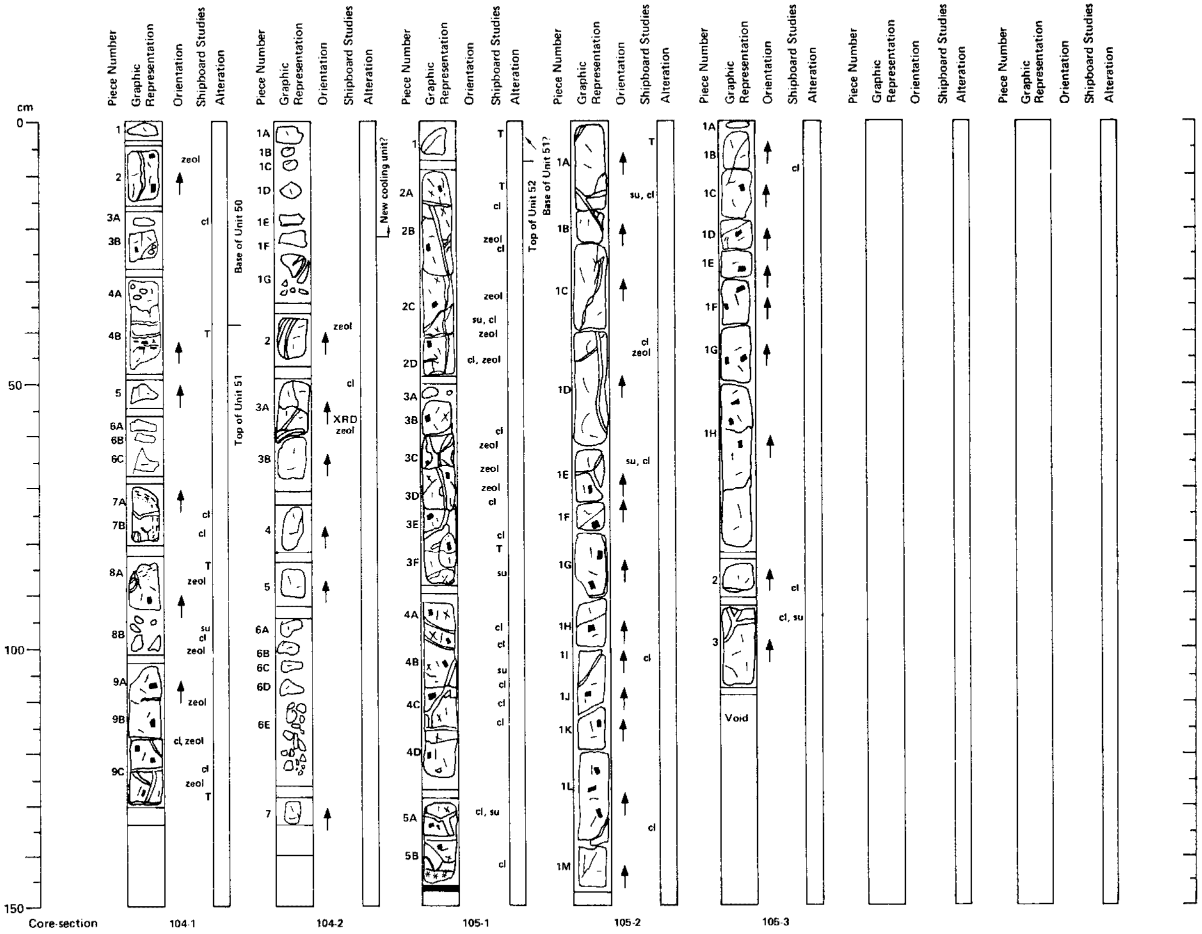
Macroscopic description:

1. Homogeneous fine-grained bluish gray (5B 6/1) sparsely olivine-pyroxene glomerophyric basalt. Unit 49 (basal section to about 55 cm).
2. Very fine-grained or glassy basalt at 60 cm (Piece 2) (top of new unit [Unit 50]) becomes olivine phyric with depth.

Section 2:

Macroscopic description:

Moderately olivine phyric (and pyroxene glomerophyric?) basalt (Unit 50) coarser than majority of Section 1.



89-462A-104

Depth: 1161.2–1170.3 m

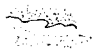
Section 1:

Macroscopic description:

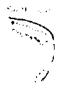
1. 0–41 cm: Homogeneous medium bluish gray (5B 5/1) moderately olivine phyric basalt, vesicular between 24–33 cm interval (infilled with pale and dark green smectite ± pyrite) = basal Unit 50.
2. 41–130 cm: Fine-grained pillowed olivine phyric basalt. Only 2 thin cooling units with curved glassy margins seen – unit increases in massiveness and grain size with depth from about 90 cm = top of Unit 51 (olivine now green smectite).

Granular top of unit may be a contact metamorphosed and recrystallized hyalopilitic textured clinopyroxene phyric glassy basalt.

Piece 4B:



Piece 7A and B:



Piece 8A:

Section 2:

Macroscopic description:

Continuation of Unit 51 with possible base to cooling unit (in base of Section 1) at about 20 cm. Sparsely to moderately olivine phyric basalt that varies considerably in grain-size (fine-grained to medium-grained basalt) down section – from piece to piece = pillowed basalt sequence(?).

XRD: Zeolite is stilbite. Although chilled margins missing – removed during drilling.

89-462A-105

Depth: 1170.3–1174.3 m

Section 1:

Macroscopic description:

1. 0–6 cm: Homogeneous coarse-grained aphyric basalt (Unit 51 base)?
2. 8–145 cm: Moderately olivine ± pyroxene phyric (possibly glomerophyric) basalt decreasing marginally in grain size down section (Unit 52). Olivine (now green smectite) rich layer at 143 cm; basalt below is finer-grained (near base of flow unit?).

Piece 4D: Abundant pyrite on working half.

Olivine-rich layer at bottom of Piece 5B.

Section 2:

Macroscopic description:

Continuation of Unit 52? or a subunit. Bluish gray (5B 6/1) sparsely to moderately olivine phyric basalt. Distribution of phenocrysts very variable, concentrated more towards base of section. Increase in grain-size also towards base.

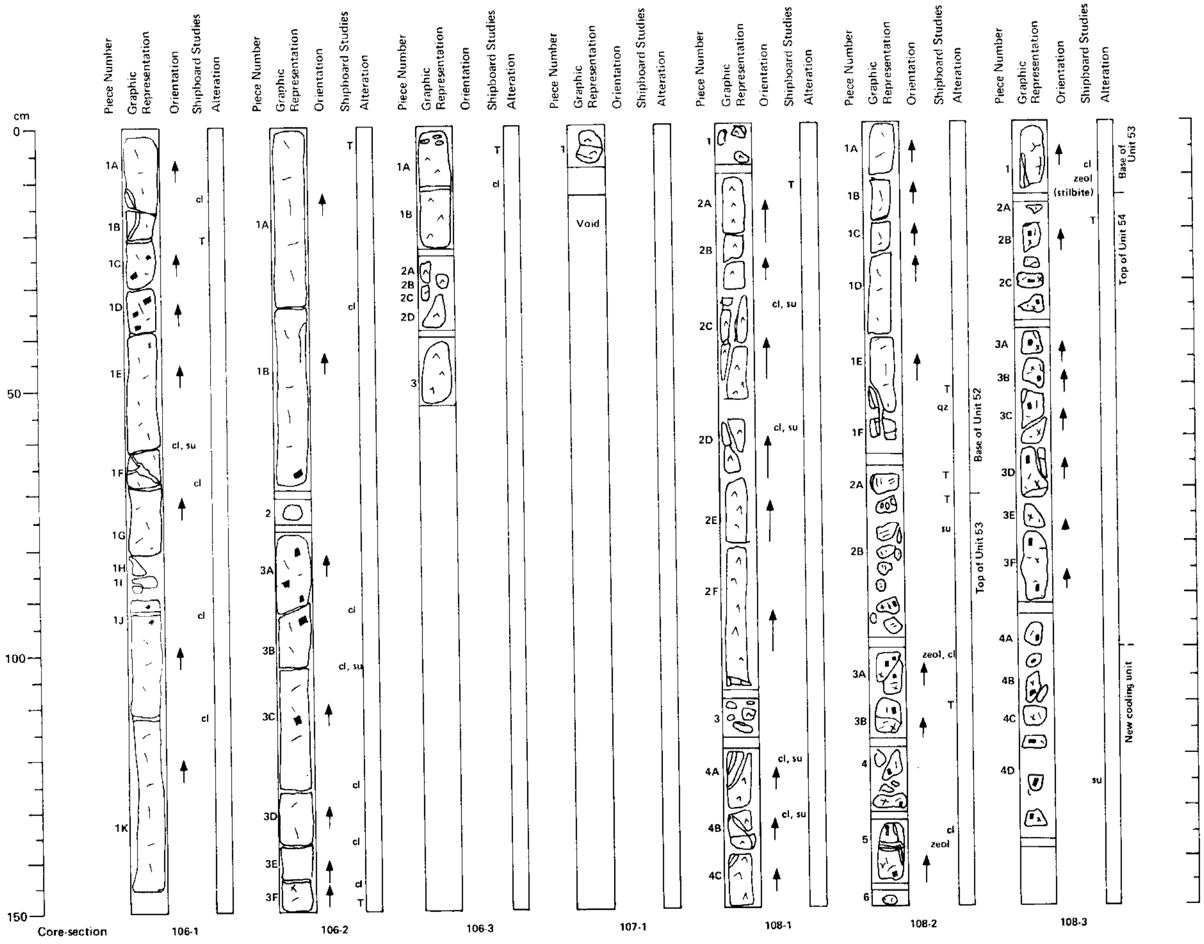
Section 3:

Macroscopic description:

Continuation of Unit 52. Sparsely to moderately olivine phyric basalt. Relatively coarse-grained throughout.

Saw cut at 9 cm.

107 cm: Bottom of section.



89-462A-106 Depth: 1174.3–1180.4 m

Section 1:

Macroscopic description:

Probably continuation of Unit 52. Homogeneous, relatively coarse-grained, bluish gray (5B 6/1) aphyric to sparsely olivine phyric basalt. (Phenocryst concentration from about 15–40 cm.)

Section 2:

Macroscopic description:

Continuation of Unit 52. Aphyric to sparsely olivine phyric basalt; slight increase in grain-size at base of section. Whole section relatively coarse for a basalt.

Section 3:

Macroscopic description:

1. Aphyric to sparsely olivine phyric fine-grained dolerite. Coarser-grained than previous sections with grains about 1 mm or greater in size.
2. 0–3 cm: Few vugs, some lined with smectite.

89-462A-107 Depth: 1180.4–1189.5 m

Section 1:

Macroscopic description:

Homogeneous fine-grained aphyric olivine dolerite (still Unit 52).

89-462A-108 Depth: 1189.5–1198.7 m

Section 1:

Macroscopic description:

Continuation of Unit 52. Homogeneous, bluish gray (5B 6/1) fine-grained aphyric olivine dolerite.

Marginally finer grained at base of section than at top.

Few scattered olivine phenocrysts and disseminated pyrite. Concentration of olivine at about 38–50 cm interval.

Section 2:

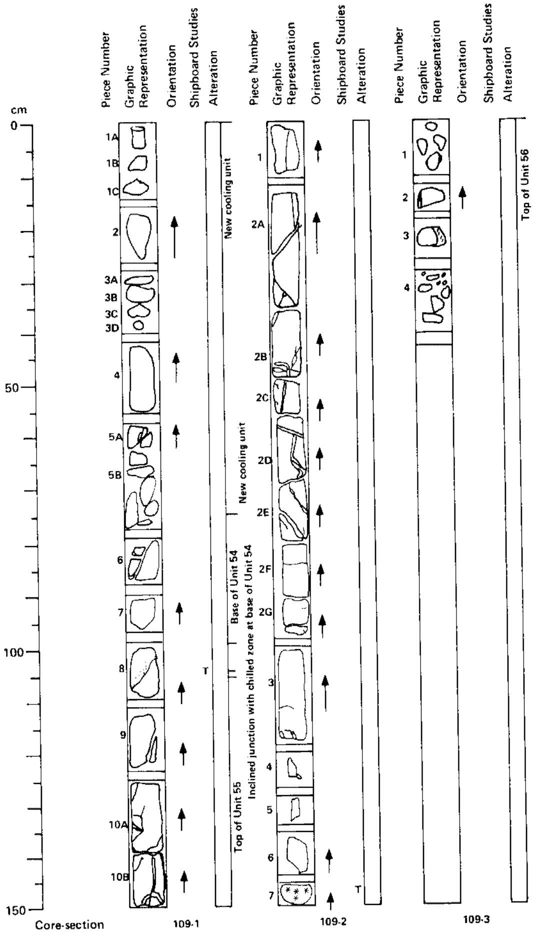
Macroscopic description:

1. 0–62 cm: Aphyric to sparsely olivine phyric coarse-grained basalt, decreasing in grain size downwards.
2. 65–71 cm (Piece 2A): Olivine-pyroxene phyric very fine-grained basalt (= basal chilled margin to Unit 52).
3. 72–75 cm (Piece 2B): Green altered glass with olivine phenocrysts coating very fine-grained (quenched?) olivine phyric basalt (= top of Unit 53). Pillow breccia?
4. 76–150 cm: Olivine-pyroxene phyric fine-grained basalt, increasing in grain-size downwards. Quenched basalt below Piece 2B, becoming holocrystalline with depth (pillow?).

Section 3:

Macroscopic description:

1. 0–12 cm (Piece 1): Moderately olivine-pyroxene phyric basalt (Unit 53).
2. 15–135 cm: Moderately phyric to olivine-pyroxene phyric basalt (clinopyroxene–glomerophyric) – dark chilled zone on Piece 2B, grain-size then increases downwards to 10 cm (Piece 4A); followed by a decrease (Piece 4B) with fine-grained phyric basalt (= Unit 54 composed of a number of cooling units having same phenocryst composition throughout.) Pillow lava sequence? (including Units 53 and 54).



89-462A-109

Depth 1198.7–1209.0 m

Section 1:

Macroscopic description:

1. 0–104 cm (to Piece 8): Olivine-pyroxene phyric basalt – bluish gray (5B 6/1). Varies in grain size from fine to slightly coarser down section (fine-graned portions at 8–12 and 73–76 cm). Probably 2 small cooling units as in Core 108; continuation of Unit 54.
2. At ~ 101–106 cm (Piece 8): Inclined junction (45° to horizontal) and represents boundary between Units 54 and 55. Junction is microscopically irregular, although Unit 54 chills against Unit 55 below (whitish zone 3 mm wide).
3. From Piece 8 to base Unit 55 (similar to Unit 54) -- olivine-pyroxene phyric basalt.

Section 2:

Macroscopic description:

Continuation of Unit 55. Moderately olivine-pyroxene phyric basalt. Accumulation of olivine phenocrysts at base of unit (now altered to green smectite).

Section 3:

Macroscopic description:

Moderately olivine-pyroxene phyric basalt, varying in grain-size from fine to coarse and back again. Phenocryst content and distribution, together with grain size variation similar to Unit 54 – probably a series of thin flows (or intrusions chilling against each other?).

SITE 586

HOLE 586

Date Occupied: 19 November 1982

Date Departed: 19 November 1982

Time on Hole: 15 hr., 52 min.

Position (latitude; longitude): 00°29.84'S; 158°29.89'E

Water depth (sea level; corrected m, echo-sounding): 2207

Water depth (rig floor; corrected m, echo-sounding): 2217

Bottom felt (m, drill pipe): 2223.1 Note: water depth of 2218 m from rig floor from 586C logs used as site datum.

Penetration (m): 44.4

Number of cores: 5

Total length of cored section (m): 44.4

Total core recovered (m): 38.98

Core recovery (%): 87.8

Oldest sediment cored:

Depth sub-bottom (m): 44.4

Nature: foraminifer-bearing nannofossil ooze

Age: Latest Pliocene

Measured velocity (km/s): not measured

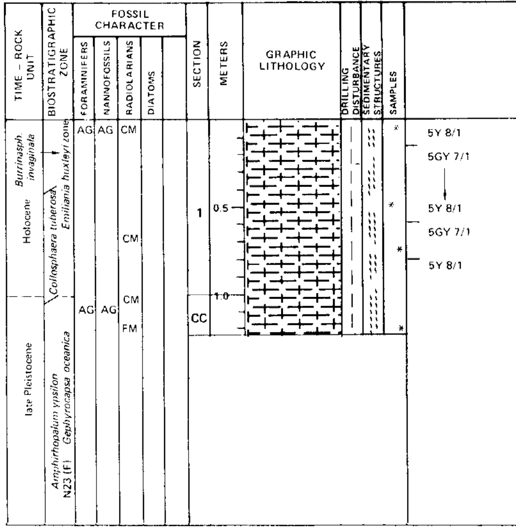
Basement: Not encountered

Depth sub-bottom (m):

Nature:

Velocity range (km/s):

SITE 586 HOLE CORE (HPC) 1 CORED INTERVAL 0.0–6.4 m sub-bottom; 2218.0–2224.4 m below rig floor



LITHOLOGIC DESCRIPTION

FORAMINIFER NANNOFOSSIL and NANNOFOSSIL FORAMINIFER OOZE

Oxidized (pale brown) top 15 cm; shades of pale green.

Dark gray (N3) mottles scattered throughout.

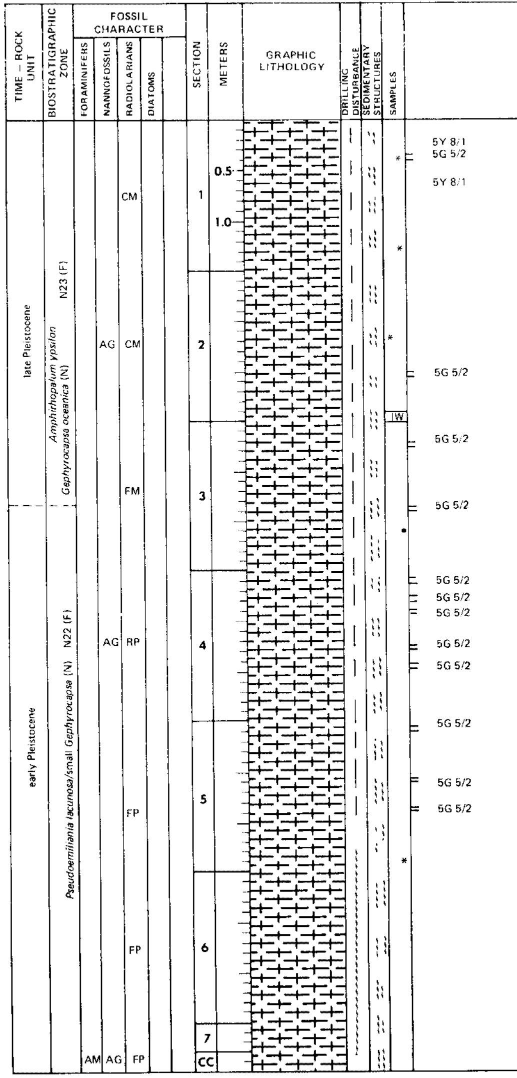
SMEAR SLIDE SUMMARY (%):

	1, 6	1, 50	1, 75	CC, 23
	D	D	D	D
Texture:				
Sand	35	10	30	10
Silt	30	40	30	40
Clay	35	50	40	50
Composition:				
Volcanic glass	–	–	<1	–
Zeolite	–	<1	–	–
Foraminifers	65	50	60	50
Calc. nannofossils	35	50	40	50
Radiolarians	–	<1	<1	<1
Sponge spicules	<1	<1	<1	<1
Silicoflagellates	–	<1	–	<1

ORGANIC CARBON AND CARBONATE (%):

	1, 31–32
Organic carbon	0.36
Carbonate	84

SITE 586 HOLE CORE 2 CORED INTERVAL 6.4–15.9 m sub-bottom; 2224.4–2233.9 m below rig floor



LITHOLOGIC DESCRIPTION

FORAMINIFER-NANNOFOSSIL OOZE with minor NANNOFOSSIL-FORAMINIFER OOZE

Mostly shades of pale green; dominant color = white (5Y 8/1); several brighter green (grayish green [5G 5/2]) bands as indicated; dark gray (N3) mottles throughout; darker, greener (5G 5/2) bands generally coarser, more foraminifer-rich.

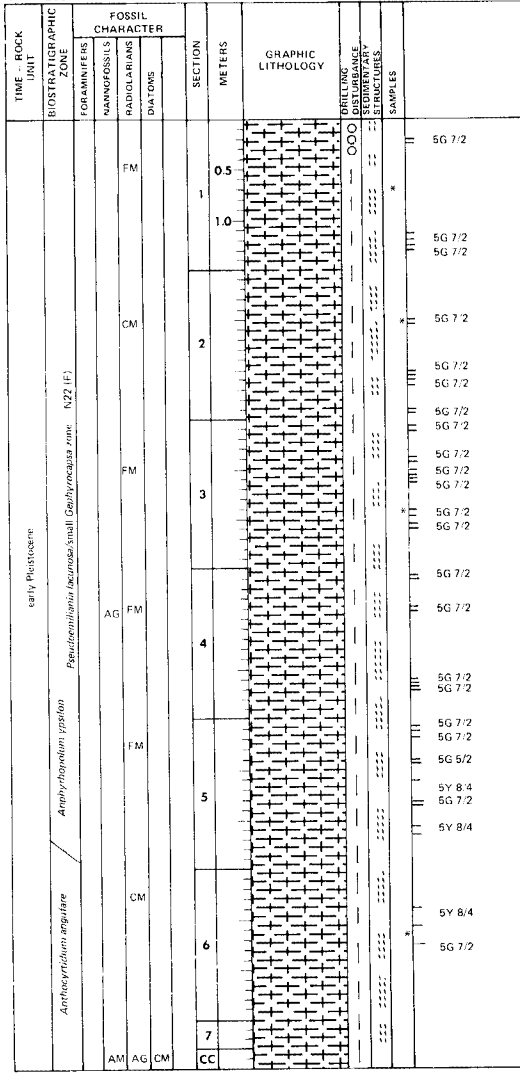
SMEAR SLIDE SUMMARY (%):

	1, 44	1, 130	2, 68	5, 140
	M	D	M	D
Texture:				
Sand	15	2	7	2
Silt	40	30	45	28
Clay	45	68	48	70
Composition:				
Volcanic glass	<1	<1	2	<1
Zeolite	<1	–	–	–
Carbonate unspec.	–	15	–	3
Foraminifers	55	15	50	27
Calc. nannofossils	45	69	46	70
Radiolarians	–	<1	2	–
Sponge spicules	<1	–	<1	<1
Silicoflagellates	–	–	<1	–

ORGANIC CARBON AND CARBONATE (%):

	3, 110–111
Organic carbon	–
Carbonate	78

SITE 586 HOLE CORE 3 CORED INTERVAL 15.9–25.4 m sub-bottom; 2233.9–2243.4 m below rig floor



LITHOLOGIC DESCRIPTION

FORAMINIFER-NANNOFOSSIL OOZE with minor NANNOFOSSIL FORAMINIFER OOZE

Dominant color is white (5Y 8/1) with faint, coarser greener layers (pale green [5G 7/2]) as indicated and minor layers and mottles of yellow gray (5Y 7/2) and grayish yellow (5Y 8/4) which also are coarser than the dominant white (5Y 8/1).

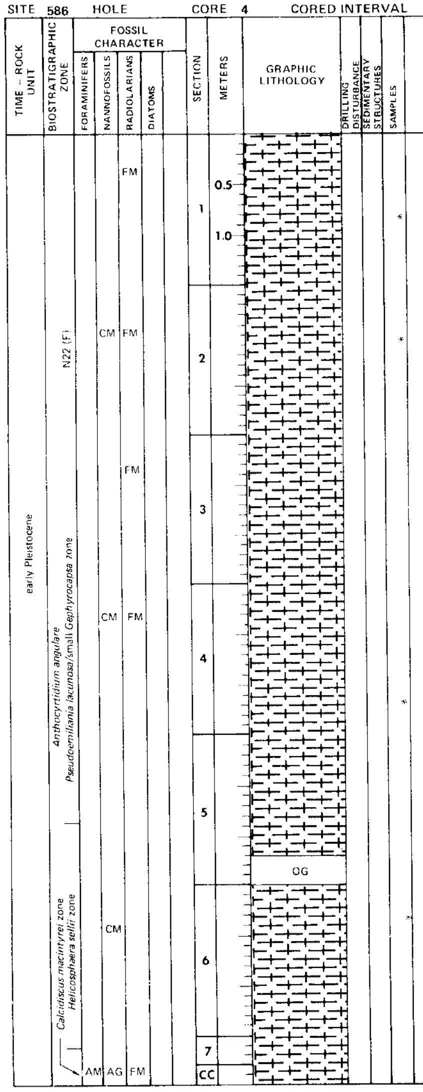
SMEAR SLIDE SUMMARY (%):

	1, 70	2, 51	3, 91	6, 57
	D	M	M	M
Texture:				
Sand	5	15	10	12
Silt	35	35	25	15
Clay	60	50	65	83
Composition:				
Volcanic glass	1	<1	1	–
Pyrite	–	–	–	12
Carbonate unspec.	2	10	5	–
Foraminifers	35	40	28	5
Calc. nannofossils	60	50	65	83
Radiolarians	2	<1	1	<1
Sponge spicules	<1	<1	–	<1

ORGANIC CARBON AND CARBONATE (%):

	3, 76–77
Organic carbon	–
Carbonate	88

SITE 586 HOLE CORE 4 CORED INTERVAL 25.4–34.9 m sub-bottom; 2243.4–2252.9 m below rig floor



LITHOLOGIC DESCRIPTION

FORAMINIFER-NANNOFOSSIL OOZE

Dominant color is white (5Y 8/1) with mottles of pale yellow (5Y 9/3); thin beds (<1 cm) of pale green (5G 7/2) occur throughout; many are very faint and appear mainly as greener tinges; 5G 7/2 and 5Y 7/3 layers and mottles are somewhat coarser; blebs and small mottles (mostly <1 cm) of dark gray (N3) pyrite-bearing material are common throughout.

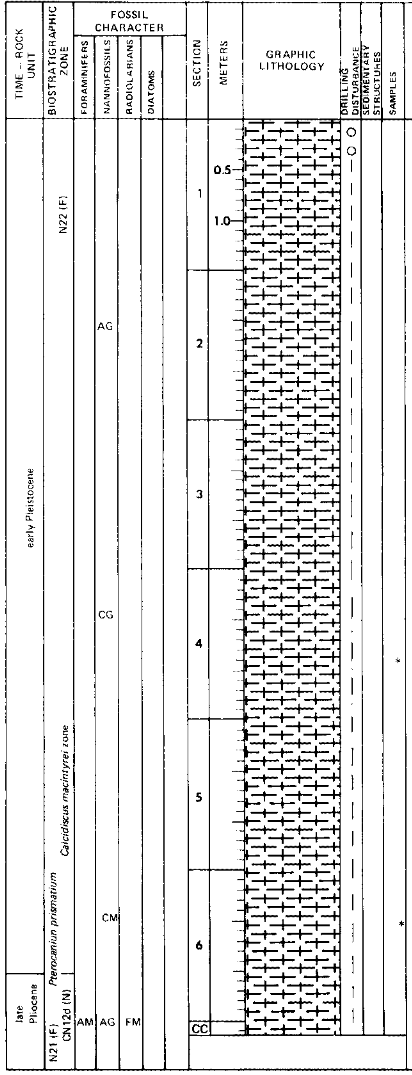
SMEAR SLIDE SUMMARY (%):

	1, 83	2, 58	4, 116	6, 32
	M	D	M	D
Texture:				
Sand	1	15	2	3
Silt	15	35	13	25
Clay	84	50	85	72
Composition:				
Zeolite	–	<1	–	–
Foraminifers	16	50	15	28
Calc. nannofossils	84	50	85	72
Diatoms	<1	–	–	–
Radiolarians	–	–	<1	<1
Sponge spicules	<1	<1	<1	–
Silicoflagellates	<1	–	–	–
Pteropod	<1	–	–	–

ORGANIC CARBON AND CARBONATE (%):

	4, 92–94
Organic carbon	–
Carbonate	89

SITE 586 HOLE CORE 5 CORED INTERVAL 34.9–44.4 m sub-bottom; 2252.9–2262.4 m below rig floor



LITHOLOGIC DESCRIPTION

FORAM-BEARING NANNOFOSSIL OOZE

Dominant color appears as very pale green (about white [5Y 8/1] to pale greenish yellow [10Y 8/2]) with mottles of pale yellow (5Y 7/3); thin layers (most <1 cm) of darker green (pale green [5G 7/2] to grayish green [5G 5/2]) occur throughout – most are very faint and appear as more or less distinct color tinges in paler green background ooze. Dark gray (N3) blebs and small mottles (<1 cm) also occur throughout and probably represent burow fills.

SMEAR SLIDE SUMMARY (%):

	4, 90	6, 53
	D	M
Texture:		
Sand	2	1
Silt	18	18
Clay	80	81
Composition:		
Pyrite	–	2
Zeolite	<1	<1
Foraminifers	20	17
Calc. nannofossils	80	81
Radiolarians	<1	<1
Sponge spicules	–	<1
Pteropods	<1	–

ORGANIC CARBON AND CARBONATE (%):

	2, 105–106
Organic carbon	0.29
Carbonate	89

SITE 586

HOLE 586A

Date Occupied: 19 November 1982

Date Departed: 20 November 1982

Time on Hole: 1 day, 3 hr., 46 min.

Position (latitude; longitude): 00°29.84'S; 158°28.89'E

Water depth (sea level; corrected m, echo-sounding): 2207

Water depth (rig floor; corrected m, echo-sounding): 2217

Bottom felt (m, drill pipe): Not felt; water depth of 2218 m from rig floor from 586C logs used as site datum.

Penetration (m): 305.3

Number of cores: 31

Total length of cored section (m): 260.9

Total core recovered (m): 257.03

Core recovery (%): 98.5

Oldest sediment cored:

Depth sub-bottom (m): 305.3

Nature: Nannofossil ooze and minor nannofossil chalk

Age: Earliest late Miocene

Measured velocity (km/s): 1.6

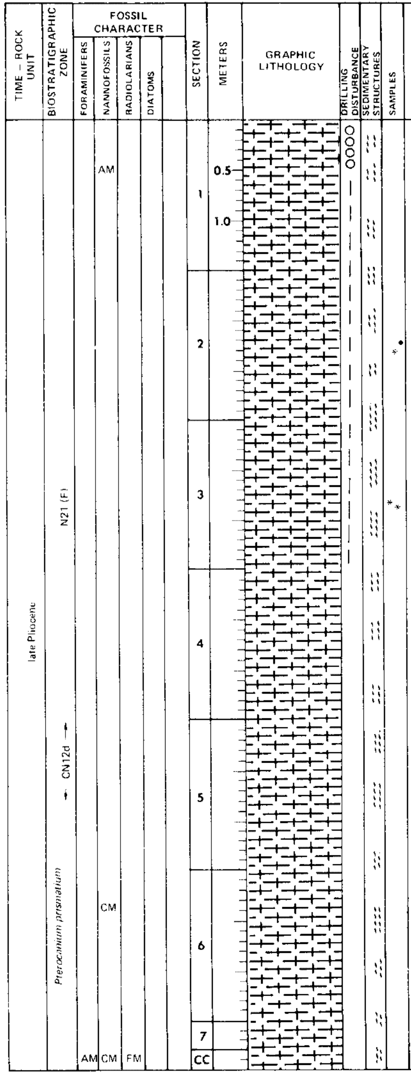
Basement: Not encountered

Depth sub-bottom (m):

Nature:

Velocity range (km/s):

SITE 586 HOLE A CORE 1 CORED INTERVAL 44.4–54.0 m sub-bottom; 2262.4–2272.0 m below rig floor



LITHOLOGIC DESCRIPTION

FORAMINIFER-BEARING NANNOFOSSIL OOZE

Dominant color is white (5Y 8/1) and pale greenish gray (10Y 8/2) with very indistinct layers of light greenish gray (5GY 8/1); gray burrow mottles (slightly pyritiferous) N7–N3 throughout.

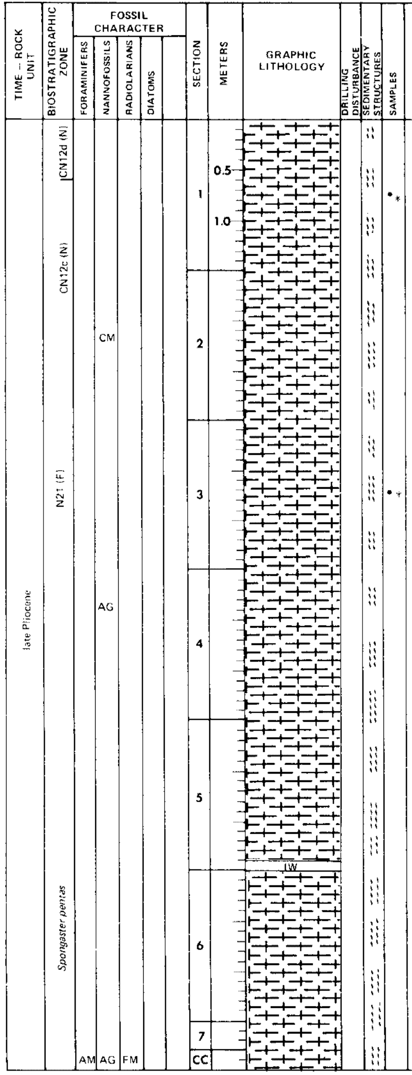
SMEAR SLIDE SUMMARY (%):

	2, 80	3, 88	3, 82
	D	M	M
Texture:			
Sand	8	3	12
Silt	12	10	3
Clay	80	87	85
Composition:			
Volcanic glass	–	<1	–
Pyrite	–	1	–
Foraminifers	10	10	15
Calc. nannofossils	86	89	82
Diatoms	1	<1	1
Radiolarians	2	<1	1
Sponge spicules	<1	–	1
Silicoflagellates	<1	–	1

ORGANIC CARBON AND CARBONATE (%):

	2, 79–80
Organic carbon	0.29
Carbonate	88

SITE 586 HOLE A CORE 2 CORED INTERVAL 54.0–63.6 m sub-bottom; 2272.0–2281.6 m below rig floor



LITHOLOGIC DESCRIPTION

FORAMINIFER-BEARING NANNOFOSSIL OOZE

Dominant color is "pale green" – approximately white (5Y 8/1) to light greenish gray (5GY 8/1).

Mottles of pale yellow (5Y 7/3) occur throughout.

Dark gray (N3) burrow mottles scattered throughout.

Thin (<1 cm) beds of pale green (5G 7/2) occur throughout. Only a few are very distinct; most are very faint and appear mainly as slightly greener tinges in pale green dominant ooze.

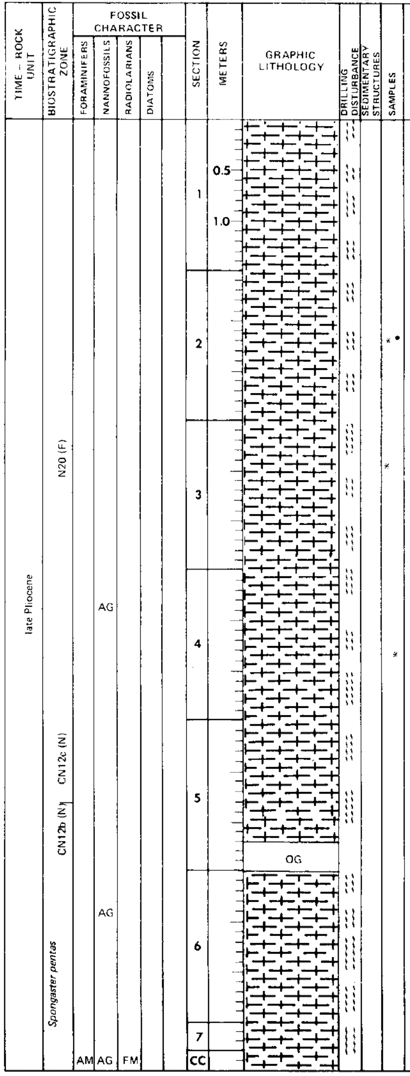
SMEAR SLIDE SUMMARY (%):

	1, 75	2, 50	3, 70
	M	M	D
Texture:			
Sand	18	13	5
Silt	2	5	3
Clay	80	78	92
Composition:			
Volcanic glass	<1	<1	–
Carbonate unspec.	1	1	1
Foraminifers	20	15	10
Calc. nannofossils	78	83	85
Diatoms	<1	<1	1
Radiolarians	<1	1	1
Sponge spicules	–	<1	2
Silicoflagellates	<1	<1	<1

ORGANIC CARBON AND CARBONATE (%):

	1, 75–76	3, 70–71
Organic carbon	–	0.24
Carbonate	88	88

SITE 586 HOLE A CORE 3 CORED INTERVAL 63.6–73.2 m sub-bottom; 2281.6–2291.2 m below rig floor



LITHOLOGIC DESCRIPTION

FORAMINIFER-BEARING NANNOFOSSIL OOZE

Dominant color is white (5Y 8/1) to light greenish gray (5GY 8/1). Mottles of pale yellow (5Y 7/3) throughout. Burrow mottles, dark gray (N3) throughout.

Very, very faint beds (<1 cm) of pale green (5G 7/2) occur throughout; most appear as only slightly greener tinges in dominant 'pale green' ooze.

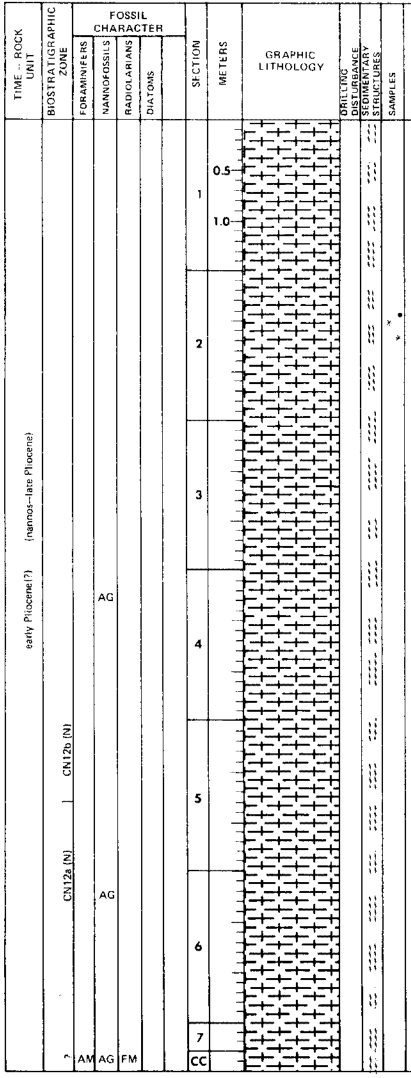
SMEAR SLIDE SUMMARY (%):

	2, 70	3, 46	4, 87
	D	M	M
Texture:			
Sand	12	8	12
Silt	5	5	5
Clay	83	87	83
Composition:			
Heavy minerals	–	<1	–
Volcanic glass	–	–	<1
Pyrite	–	<1	–
Carbonate unspec.	3	5	<1
Foraminifers	12	11	12
Calc. nannofossils	81	83	86
Diatoms	<1	–	–
Radiolarians	3	1	1
Sponge spicules	1	<1	<1
Plant debris	–	<1	–

ORGANIC CARBON AND CARBONATE (%):

	2, 69–70
Organic carbon	–
Carbonate	86

SITE 586 HOLE A CORE 4 CORED INTERVAL 73.2–82.8 m sub-bottom; 2291.2–2300.8 m below rig floor



LITHOLOGIC DESCRIPTION

FORAMINIFERA-BEARING NANNOFOSSIL OOZE

Dominant color is white (5Y 8/1) to light greenish gray (5GY 8/1). Mottles of pale yellow (5Y 7/3) occur throughout. Burrow mottles of dark gray (N3) common throughout.

Thin beds (mostly <1 cm) of pale green (5G 7/2) material throughout; most appear as slightly greener material in light green ooze that is dominant lithology.

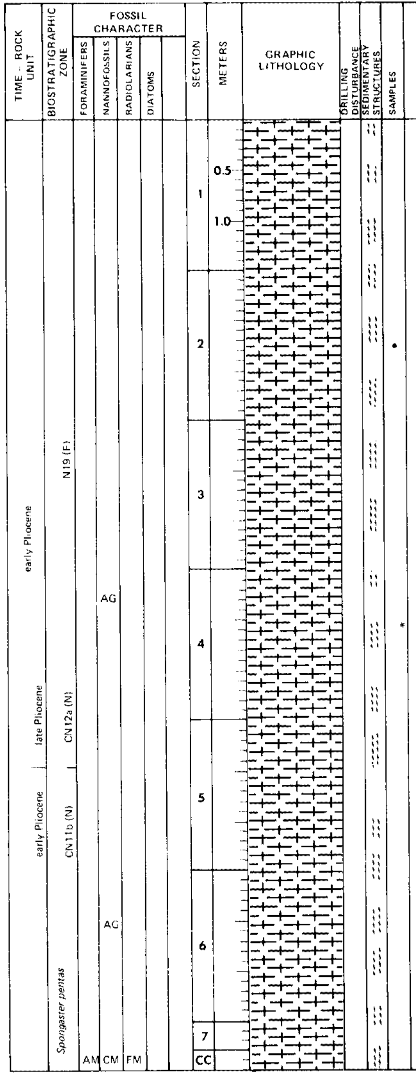
SMEAR SLIDE SUMMARY (%):

	2, 51	2, 70
	D	M
Texture:		
Sand	12	9
Silt	4	3
Clay	84	88
Composition:		
Volcanic glass	–	<1
Pyrite	–	<1
Carbonate unspec.	1	3
Foraminifers	11	10
Calc. nannofossils	87	85
Diatoms	–	<1
Radiolarians	1	<1
Fish remains	–	<1

ORGANIC CARBON AND CARBONATE (%):

	2, 48–49
Organic carbon	–
Carbonate	89

SITE 586 HOLE A CORE 5 CORED INTERVAL 82.8–92.4 m sub-bottom; 2300.8–2310.4 m below rig floor



LITHOLOGIC DESCRIPTION

FORAMINIFERA-BEARING NANNOFOSSIL OOZE
Dominant color is white (5Y 8/1) to light greenish gray (5GY 8/1).

Mottles of pale yellow (5Y 7/3) occur throughout. Burrow mottles of dark gray (N3) common throughout.

Thin beds (mostly<1 cm) of pale green (5G 7/2) material throughout; most appear as slightly greener material in light green ooze that is dominant lithology.

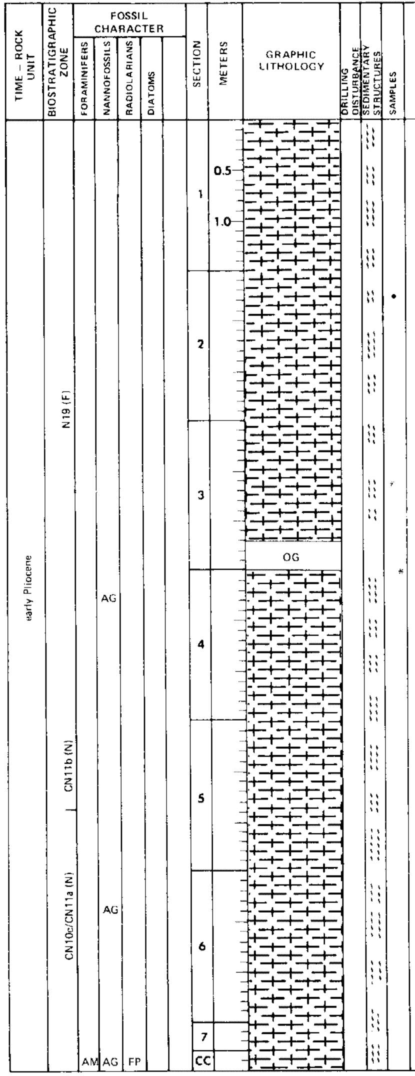
SMEAR SLIDE SUMMARY (%):

	4, 59
	D
Texture:	
Sand	10
Silt	3
Clay	87
Composition:	
Carbonate unspec.	3
Foraminifers	11
Calc. nannofossils	84
Diatoms	Tr
Radiolarians	2
Fish remains	Tr

ORGANIC CARBON AND CARBONATE (%):

	2, 75–76
Organic carbon	0.28
Carbonate	90

SITE 586 HOLE A CORE 6 CORED INTERVAL 92.4–102.0 m sub-bottom; 2310.4–2320.0 m below rig floor



LITHOLOGIC DESCRIPTION

FORAMINIFER-BEARING NANNOFOSSIL OOZE
Dominant color is white (5Y 8.1) to light greenish gray (5GY 8/1) with mottles of pale yellow (5Y 7/3) throughout.

Burrow mottles of dark gray (N3) throughout.

Thin beds (mostly <1 cm) of pale green (5G 7/2) occur throughout, but most are too faint to clearly distinguish and appear mostly as slightly darker green tinges in pale green ooze that makes up dominant lithology. Pale green layers appear to be slightly coarser than background ooze.

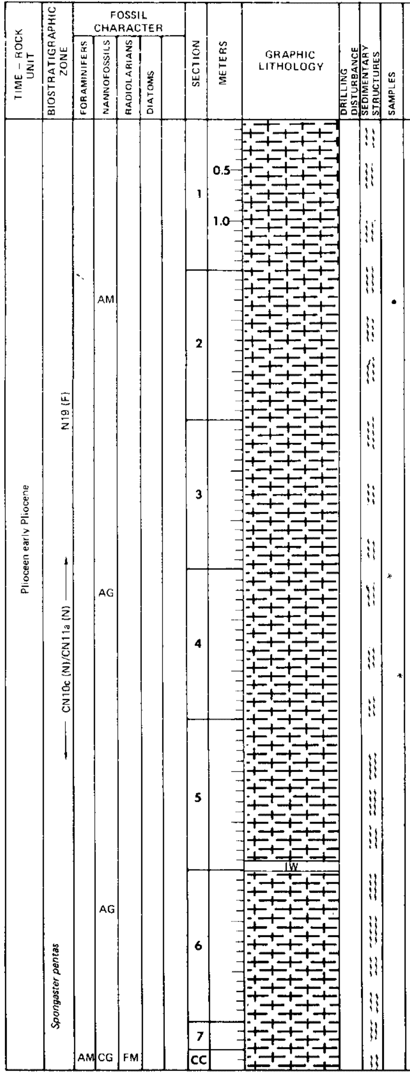
SMEAR SLIDE SUMMARY (%):

	3, 62	4, 4
	D	M
Texture:		
Sand	8	11
Silt	9	9
Clay	83	80
Composition:		
Carbonate unspec.	5	4
Foraminifers	10	14
Calc. nannofossils	84	82
Radiolarians	1	<1

ORGANIC CARBON AND CARBONATE (%):

	2, 29–30
Organic carbon	–
Carbonate	90

SITE 586 HOLE A CORE 7 CORED INTERVAL 102.0–111.6 m sub-bottom; 2320.0–2329.6 m below rig floor



LITHOLOGIC DESCRIPTION

FORAMINIFER-BEARING NANNOFOSSIL OOZE
Dominant color is white (5Y 8/1) to light greenish gray (5GY 8/1) with abundant mottles of pale yellow (5Y 7/3) and burrow mottles of dark gray (N3) throughout.

Thin beds of pale green (5G 7/2) are present throughout but most are too faint to distinguish.

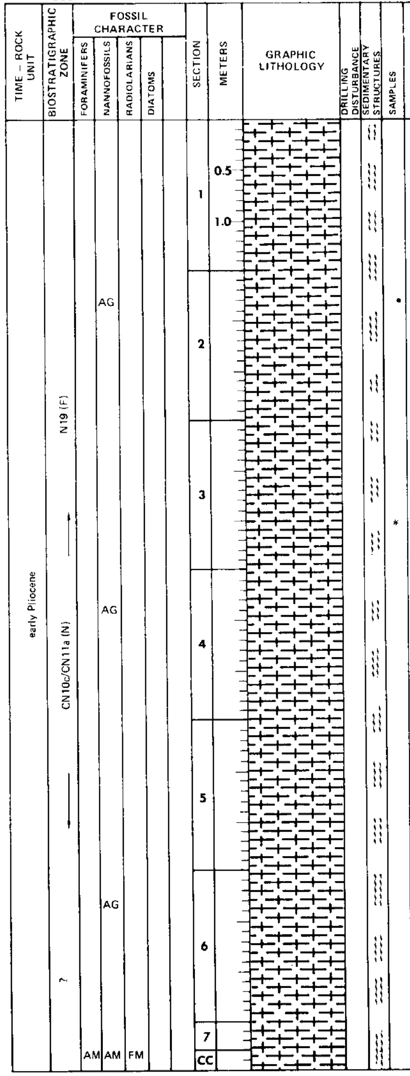
SMEAR SLIDE SUMMARY (%):

	4, 10	4, 105
	M	D
Texture:		
Sand	14	8
Silt	5	7
Clay	81	85
Composition:		
Carbonate unspec.	4	2
Foraminifers	16	10
Calc. nannofossils	78	86
Radiolarians	2	2
Sponge spicules	<1	–

ORGANIC CARBON AND CARBONATE (%):

	2, 35–36
Organic carbon	–
Carbonate	94

SITE 586 HOLE A CORE 8 CORED INTERVAL 111.6–121.2 m sub-bottom; 2329.6–2339.6 m below rig floor



LITHOLOGIC DESCRIPTION

FORAMINIFER-BEARING NANNOFOSSIL OOZE
Dominant color is white (5Y 8/1) to light greenish gray (5GY 8/1), with abundant mottles of pale yellow (5Y 7/3) and burrow mottles of dark gray (N3) throughout. Thin beds of slightly darker pale green (5G 7/2) occur throughout dominant ooze but most are too faint to distinguish clearly.

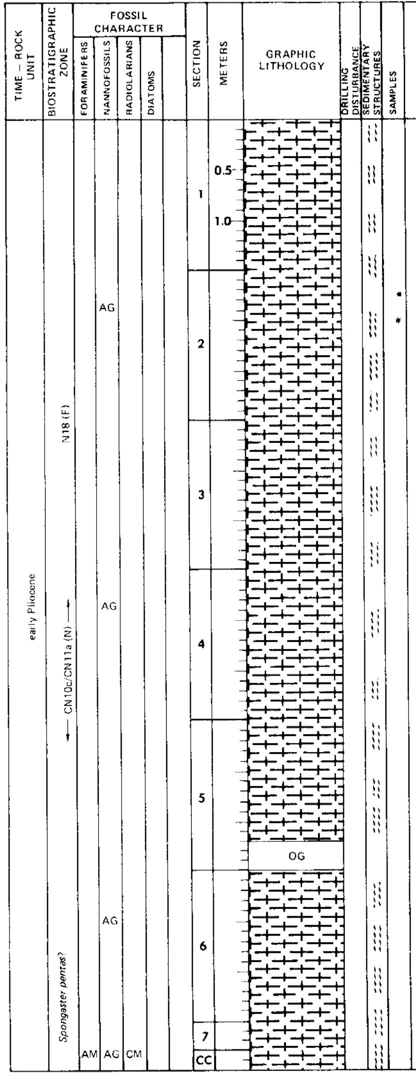
SMEAR SLIDE SUMMARY (%):

	3, 102
	D
Texture:	
Sand	17
Silt	3
Clay	80
Composition:	
Carbonate unspec.	2
Foraminifers	20
Calc. nannofossils	77
Radiolarians	1
Sponge spicules	<1

ORGANIC CARBON AND CARBONATE (%).

	2, 31–32
Organic carbon	0.62
Carbonate	85

SITE 586 HOLE A CORE 9 CORED INTERVAL 121.2–130.8 m sub-bottom; 2339.6–2348.8 m below rig floor



LITHOLOGIC DESCRIPTION

FORAMINIFER-BEARING NANNOFOSSIL OOZE
Dominant color is white (5Y 8/1) to light greenish gray (5GY 8/1) with mottles of dark gray (N3) material as burrow fill and larger mottles of pale green (5G 7/2) and pale yellow (5Y 7/3).

Thin beds (most <1 cm) of paler green (5G 7/2) material occur throughout although most are too faint to distinguish clearly.

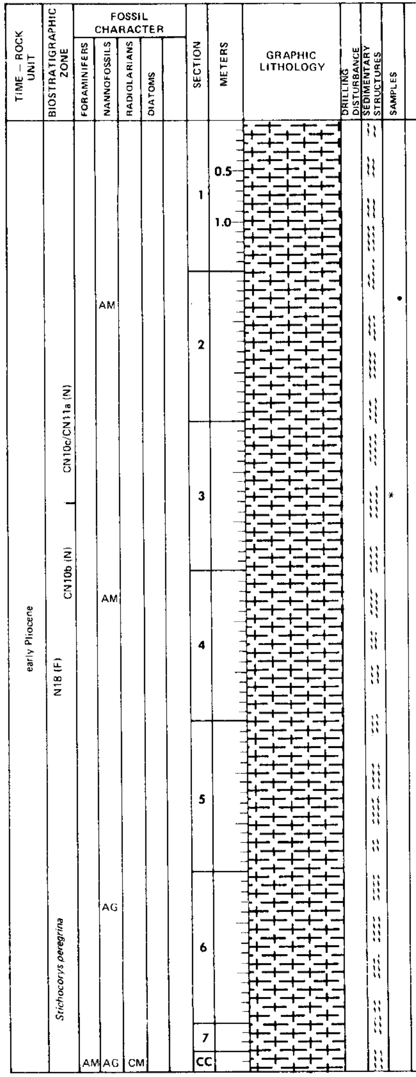
SMEAR SLIDE SUMMARY (%):

	2, 55
	D
Texture:	
Sand	6
Silt	15
Clay	80
Composition:	
Carbonate unspec.	2
Foraminifers	23
Calc. nannofossils	75
Radiolarians	<1
Sponge spicules	<1

ORGANIC CARBON AND CARBONATE (%):

	2, 27–28
Organic carbon	0.007
Carbonate	99

SITE 586 HOLE A CORE 10 CORED INTERVAL 130.8–140.4 m sub-bottom; 2348.8–2358.4 m below rig floor



LITHOLOGIC DESCRIPTION

FORAMINIFER-BEARING NANNOFOSSIL OOZE
Dominant color is white (N8 and 5Y 8/1) to light greenish gray (5GY 8/1) with mottles of pale yellow (5Y 7/3) and burrow mottles of dark gray (N3) common throughout. Thin layers of pale green (5G 7/2) material (slightly coarser) occur throughout but most are too faint to be clearly distinguished and appear mainly as faint, slightly darker green tinges and mottles in dominant white to pale green ooze.

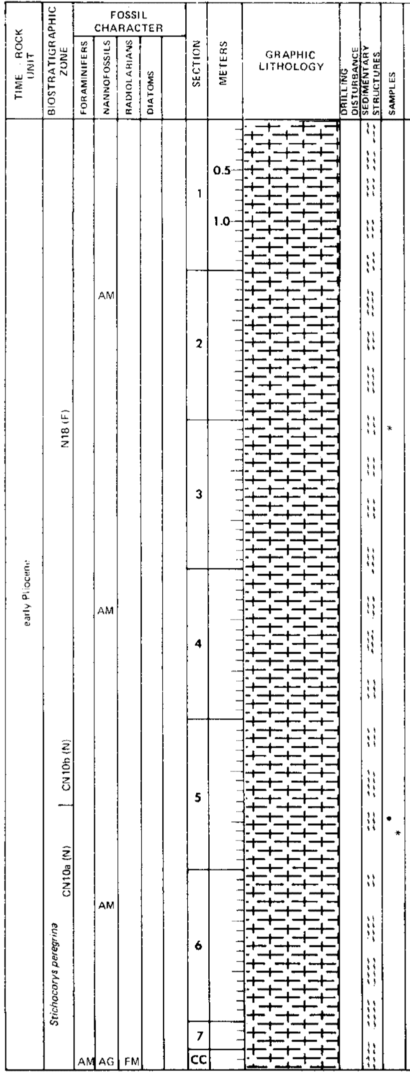
SMEAR SLIDE SUMMARY (%):

	3, 74
Texture:	
Sand	14
Silt	4
Clay	82
Composition:	
Pyrite	<1
Carbonate unspec.	3
Foraminifers	18
Calc. nannofossils	77
Diatoms	<1
Radiolarians	2
Sponge spicules	<1

ORGANIC CARBON AND CARBONATE (%):

	2, 30–32
Organic carbon	—
Carbonate	95

SITE 586 HOLE A CORE 11 CORED INTERVAL 140.4–150.0 m sub-bottom; 2358.4–2368.0 m below rig floor



LITHOLOGIC DESCRIPTION

FORAMINIFER-BEARING NANNOFOSSIL OOZE

Section 1 to Section 5, 35 cm: dominant color is white (5Y 8/1) to light greenish gray (5GY 8/1). Material is entirely bioturbated with burrow mottles of medium gray (N5) and slightly darker shades of pale green (about 5G 7/2) than dominant "pale green" ooze. There are no clearly distinguishable beds of green material.

Section 5, 35 cm to bottom: homogeneous white (N8 to 5Y 8/1) ooze.

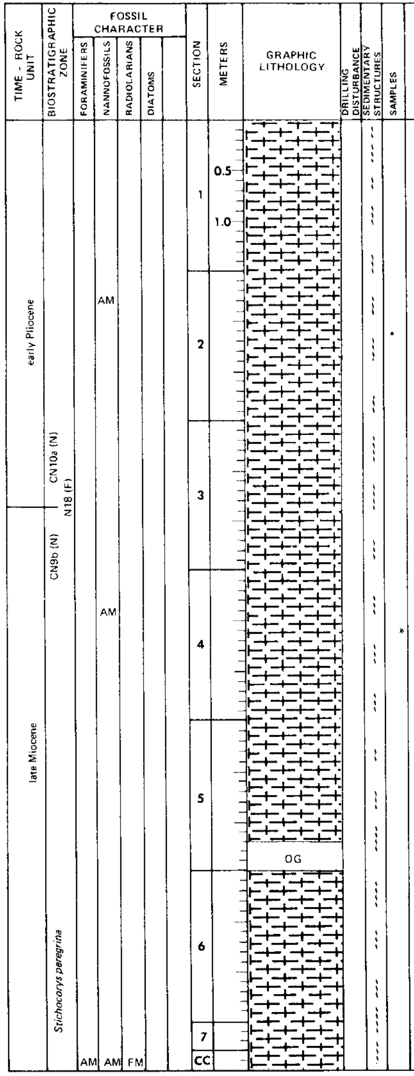
SMEAR SLIDE SUMMARY (%):

	3, 10	5, 112
	M	D
Texture:		
Sand	15	12
Silt	4	7
Clay	81	81
Composition:		
Pyrite	<1	<1
Carbonate unspec.	2	2
Foraminifers	19	17
Calc. nannofossils	77	79
Diatoms	<1	–
Radiolarians	2	2
Sponge spicules	<1	<1

ORGANIC CARBON AND CARBONATE (%):

	5, 100–101
Organic carbon	–
Carbonate	97

SITE 586 HOLE A CORE 12 CORED INTERVAL 150.0–159.6 m sub-bottom; 2368.0–2377.6 m below rig floor



LITHOLOGIC DESCRIPTION

FORAMINIFER-BEARING NANNOFOSSIL OOZE

Dominant color is white (5Y 8/1) to light greenish gray (5GY 8/1). Entirely bioturbated with burrow mottles of medium gray (N5) and slightly darker pale green (5G 7/2) than the dominant pale green ooze. There are no clearly distinguishable beds.

SMEAR SLIDE SUMMARY (%):

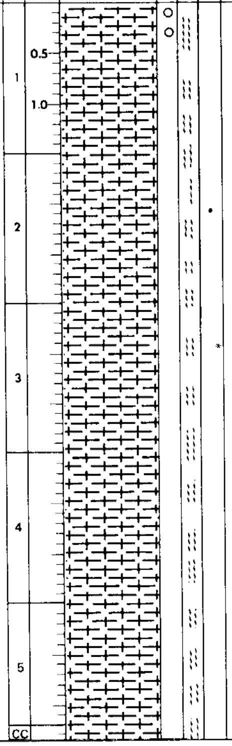
	4, 65
	D
Texture:	
Sand	2
Silt	8
Clay	90
Composition:	
Volcanic glass	<1
Foraminifers	10
Calc. nannofossils	90
Radiolarians	<1
Sponge spicules	<1

ORGANIC CARBON AND CARBONATE (%):

	2, 64–65
Organic carbon	0
Carbonate	96

SITE 586 HOLE A CORE 13 CORED INTERVAL 159.6–166.9 m sub-bottom; 2377.6–2384.9 m below rig floor

TIME – ROCK UNIT	BIOSTRATIGRAPHIC ZONE	FORAMINIFERS	NANNOFOSSILS	RADIOLARIANS	DIATOMS	SECTION
late Miocene	CN9b (N) N17 (F)	AM	AM AG AG	FP		1 2 3 4 5 CC



LITHOLOGIC DESCRIPTION

FORAM-BEARING NANNOFOSSIL OOZE

Dominant color is white (5Y 8/1) to light greenish gray (5GY 8/1). Extensively bioturbated with burrow fill material of medium gray (N5) and slightly darker shades of pale green (5G 7/2) than the dominant "pale green" background ooze. No clearly distinguishable beds.

SMEAR SLIDE SUMMARY (%):

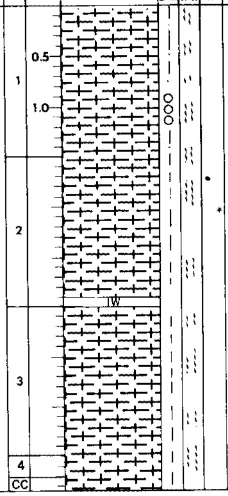
	3, 45
	D
Texture:	
Sand	3
Silt	10
Clay	87
Composition:	
Carbonate unspec.	2
Foraminifers	12
Calc. nannofossils	85
Radiolarians	1
Sponge spicules	<1
Silicoflagellates	<1

ORGANIC CARBON AND CARBONATE (%):

	2, 60–61
Organic carbon	–
Carbonate	99

SITE 586 HOLE A CORE 14 CORED INTERVAL 166.9–171.8 m sub-bottom; 2384.9–2389.8 m below rig floor

TIME – ROCK UNIT	BIOSTRATIGRAPHIC ZONE	FORAMINIFERS	NANNOFOSSILS	RADIOLARIANS	DIATOMS	SECTION
late Miocene	CN9b (N) N17 (F)	AM	AG	FM		1 2 3 4 CC



LITHOLOGIC DESCRIPTION

FORAMINIFER-BEARING NANNOFOSSIL OOZE

Dominant color is white (5Y 8/1) with burrow mottling of light to medium gray (N5–N5) and very slightly darker pale green and pale yellow (5Y 7/3).

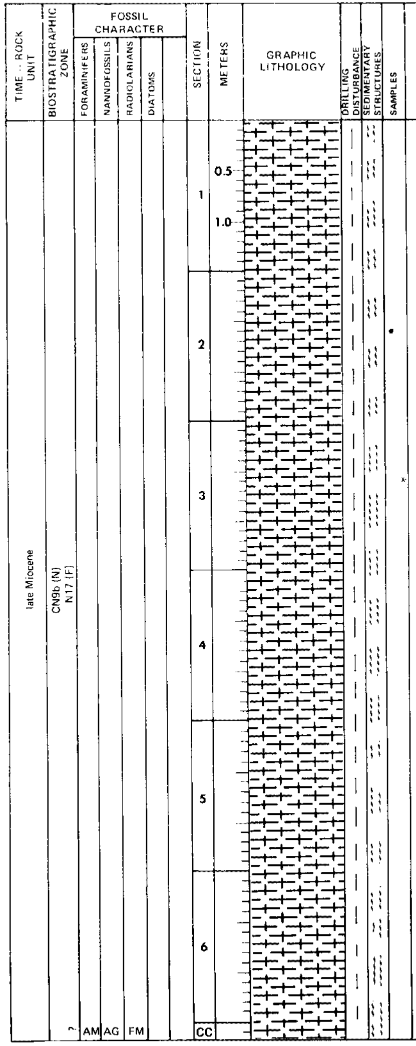
SMEAR SLIDE SUMMARY (%):

	2, 57
	D
Texture:	
Sand	1
Silt	9
Clay	90
Composition:	
Zeolite	<1
Foraminifers	10
Calc. nannofossils	90
Radiolarians	<1
Sponge spicules	<1
Silicoflagellates	<1

ORGANIC CARBON AND CARBONATE (%):

	2, 24–25
Organic carbon	–
Carbonate	95

SITE 586 HOLE A CORE 15 CORED INTERVAL 171.8–180.8 m sub-bottom; 2389.8–2398.8 m below rig floor



LITHOLOGIC DESCRIPTION

FORAMINIFER-BEARING NANNOFOSSIL OOZE
Dominant color is white (5Y 8/1) with light to medium gray (N7–N5), pale yellow, and pale green burrow mottles throughout. Outlines of burrow mottles are indistinct.

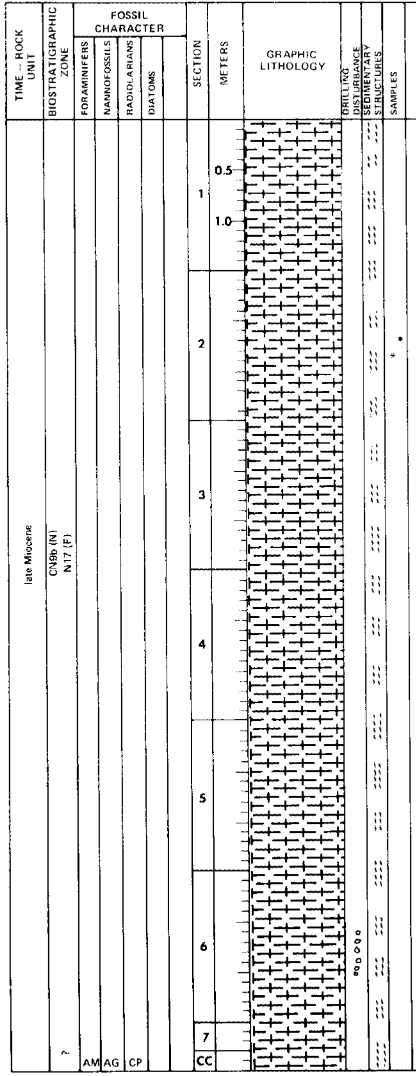
SMEAR SLIDE SUMMARY (%):

	3, 60
	D
Texture:	
Sand	2
Silt	10
Clay	88
Composition:	
Zeolite	<1
Foraminifers	12
Calc. nannofossils	88
Radiolarians	<1
Sponge spicules	<1

ORGANIC CARBON AND CARBONATE (%):

	2, 60–61
Organic carbon	0.02
Carbonate	98

SITE 586 HOLE A CORE 16 CORED INTERVAL 180.8–190.4 m sub-bottom; 2398.8–2408.4 m below rig floor



LITHOLOGIC DESCRIPTION

FORAMINIFER-BEARING NANNOFOSSIL OOZE
Dominant color is white (N9 and 5Y 8/1) and light greenish gray (5GY 8/1). Intensely bioturbated throughout with burrow mottles of pale yellow (5Y 7/3), medium gray (N5) and pale green (5G 7/2) material.

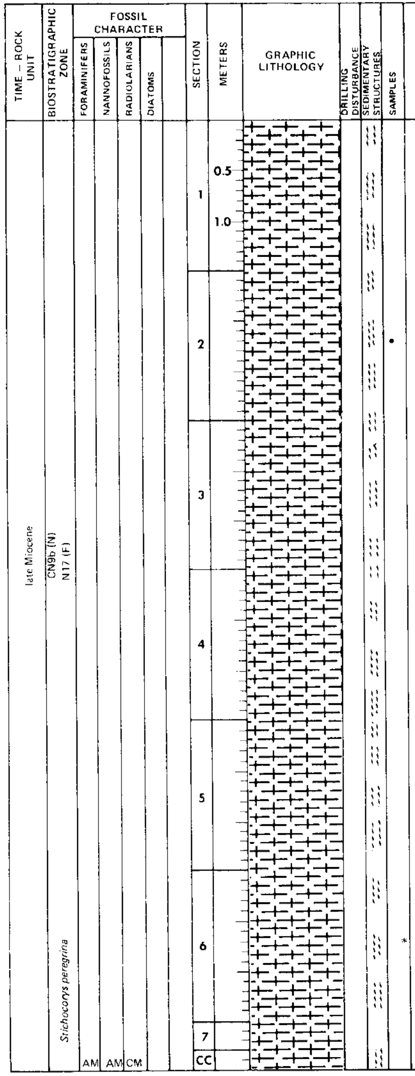
SMEAR SLIDE SUMMARY (%):

	2, 85
	D
Texture:	
Sand	2
Silt	10
Clay	88
Composition:	
Volcanic glass	<1
Carbonate unspec.	2
Foraminifers	12
Calc. nannofossils	86
Radiolarians	<1

ORGANIC CARBON AND CARBONATE (%):

	2, 70–71
Organic carbon	–
Carbonate	96

SITE 586 HOLE A CORE 17 CORED INTERVAL 190.4–200.0 m sub-bottom; 2408.4–2418.0 m below rig floor



LITHOLOGIC DESCRIPTION

FORAMINIFER-BEARING NANNOFOSSIL OOZE
Dominant color is white (N9) to bluish white (5B 9/1) with burrow mottlings of pale yellow (5Y 7/3), medium gray (N5), and pale green (5G 7/2) abundant throughout.

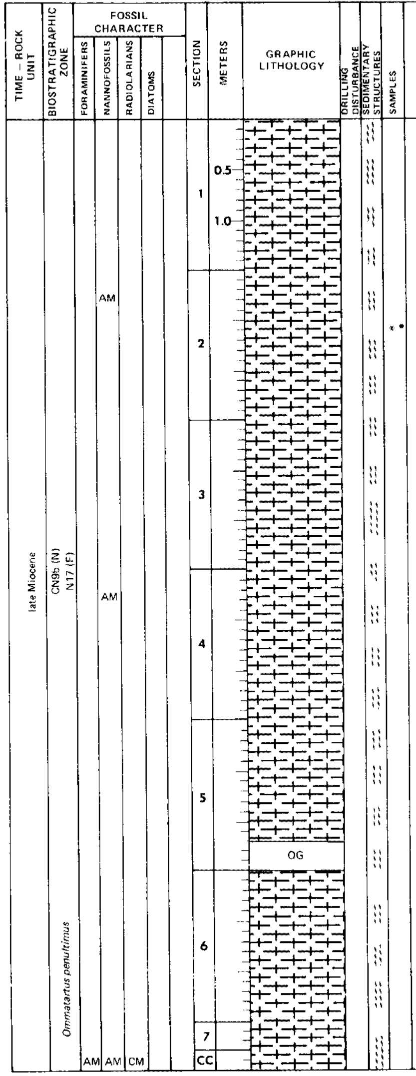
SMEAR SLIDE SUMMARY (%):

	6, 70
	D
Texture:	
Sand	2
Silt	10
Clay	88
Composition:	
Volcanic glass	<1
Carbonate unspec.	3
Foraminifers	10
Calc. nannofossils	87
Sponge spicules	<1

ORGANIC CARBON AND CARBONATE (%):

	2, 70–71
Organic carbon	–
Carbonate	99

SITE 586 HOLE A CORE 18 CORED INTERVAL 200.0–209.6 m sub-bottom; 2418.0–2427.6 m below rig floor



LITHOLOGIC DESCRIPTION

FORAMINIFER-BEARING NANNOFOSSIL OOZE
Dominant color is white (N9) to bluish white (5B 9/1) with abundant burrow mottlings of pale yellow (5Y 7/3), medium gray (N5), and pale green (5G 7/2) material throughout.

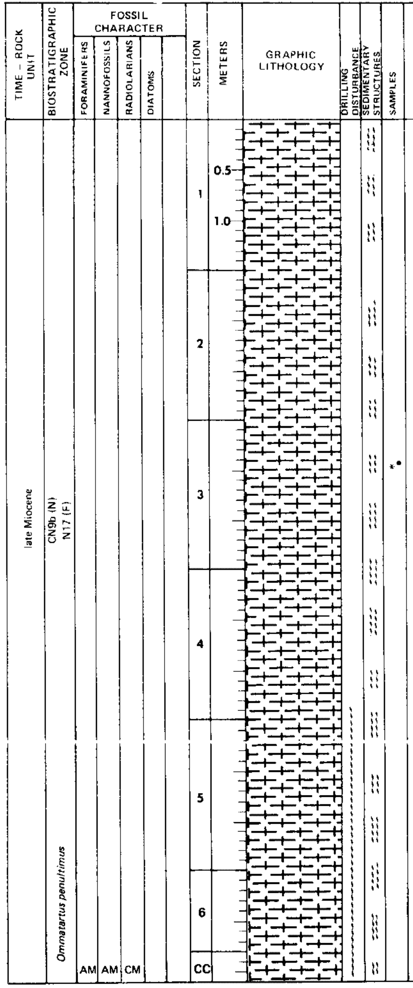
SMEAR SLIDE SUMMARY (%):

	2, 60
	D
Texture:	
Sand	8
Silt	12
Clay	80
Composition:	
Carbonate unspec.	5
Foraminifers	15
Calc. nannofossils	79
Diatoms	<1
Radiolarians	1
Sponge spicules	<1

ORGANIC CARBON AND CARBONATE (%):

	2, 60–61
Organic carbon	0.01
Carbonate	99

SITE 586 HOLE A CORE 19 CORED INTERVAL 209.6–218.1 m sub-bottom; 2427.6–2436.1 m below rig floor



LITHOLOGIC DESCRIPTION

FORAMINIFER-BEARING NANNOFOSSIL OOZE
Dominant color is white (N9) to bluish white (5B 8/1). Intense bioturbation throughout with burrow mottling of pale yellow (5Y 7/3), medium gray (N5), and pale green (5G 7/2).

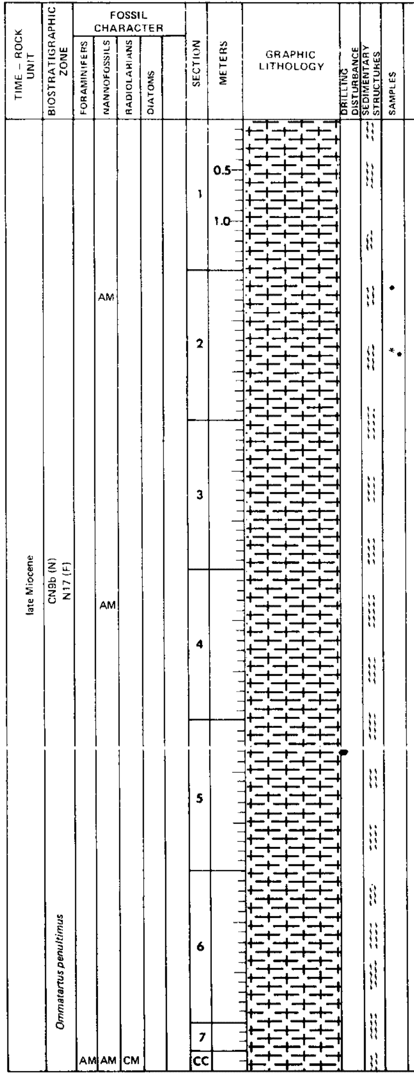
SMEAR SLIDE SUMMARY (%):

	3, 50
	D
Texture:	
Sand	8
Silt	10
Clay	82
Composition:	
Carbonate unspec.	2
Foraminifers	10
Calc. nannofossils	87
Diatoms	<1
Radiolarians	1
Sponge spicules	<1

ORGANIC CARBON AND CARBONATE (%):

	3, 49–50
Organic carbon	–
Carbonate	96

SITE 586 HOLE A CORE 20 CORED INTERVAL 218.1–227.7 m sub-bottom; 2436.1–2445.7 m below rig floor



LITHOLOGIC DESCRIPTION

FORAMINIFER-BEARING NANNOFOSSIL OOZE
Dominant color is white (N9) to bluish white (5B 9/1). Intensely bioturbated throughout with burrow mottles of pale yellow (5Y 7/3), medium gray (N5), and pale green (5G 7/2).

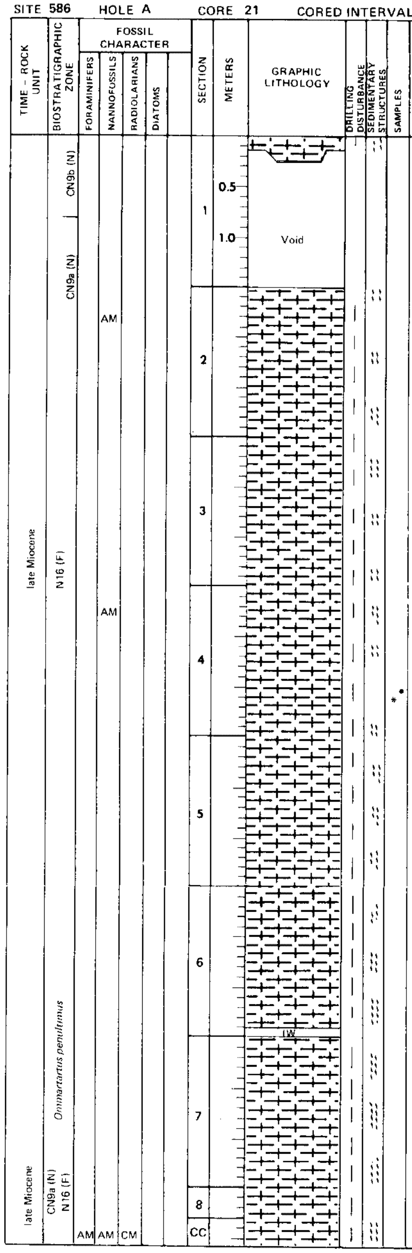
SMEAR SLIDE SUMMARY (%):

	2, 80
	D
Texture:	
Sand	3
Silt	12
Clay	85
Composition:	
Volcanic glass	<1
Carbonate unspec.	3
Foraminifers	12
Calc. nannofossils	83
Radiolarians	1
Sponge spicules	1
Silicoflagellates	<1

ORGANIC CARBON AND CARBONATE (%):

	2, 20–21	2, 82–83
Organic carbon	0.01	–
Carbonate	98	93

SITE 586 HOLE A CORE 21 CORED INTERVAL 227.7–237.2 m sub-bottom; 2445.7–2455.3 m below rig floor



LITHOLOGIC DESCRIPTION

FORAMINIFER-BEARING NANNOFOSSIL OOZE

Dominant color is white (N9) to bluish white (5B 9/1). Intense bioturbation throughout, with burrow mottles of pale yellow (5Y 7/3), light to medium gray (N5–N5), and pale green (5G 7/2).

Note: Section 1 is an extra piece found in the barrel after the liner had been removed and sectioned. It was added on as Section 1.

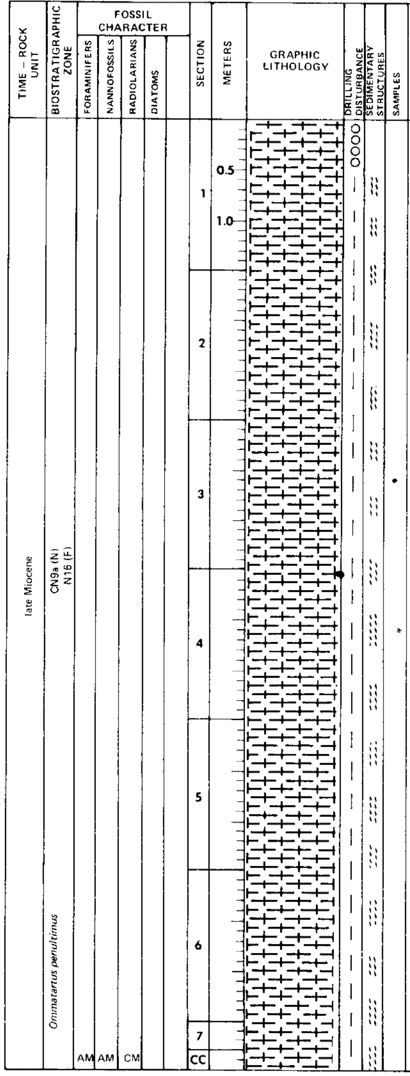
SMEAR SLIDE SUMMARY (%):

	4, 110
	D
Texture:	
Sand	2
Silt	10
Clay	88
Composition:	
Zeolite	<1
Foraminifers	12
Calc. nannofossils	88
Radiolarians	<1
Sponge spicules	<1
Silicoflagellates	<1

ORGANIC CARBON AND CARBONATE (%):

	4, 108–109
Organic carbon	0.03
Carbonate	95

SITE 586 HOLE A CORE 22 CORED INTERVAL 237.3–246.9 m sub-bottom; 2455.3–2464.9 m below rig floor



LITHOLOGIC DESCRIPTION

FORAMINIFER-BEARING NANNOFOSSIL OOZE

0–50 cm: soupy; flow-in; homogeneous white (N9 to 5B 9/1) ooze.

Rest of core: dominant color is white (N9) to bluish white (5B 9/1). Intensely bioturbated throughout with burrow mottles of pale yellow (5Y 7/3) and some pale green (5G 7/2) and light to medium gray (N7–N5) material.

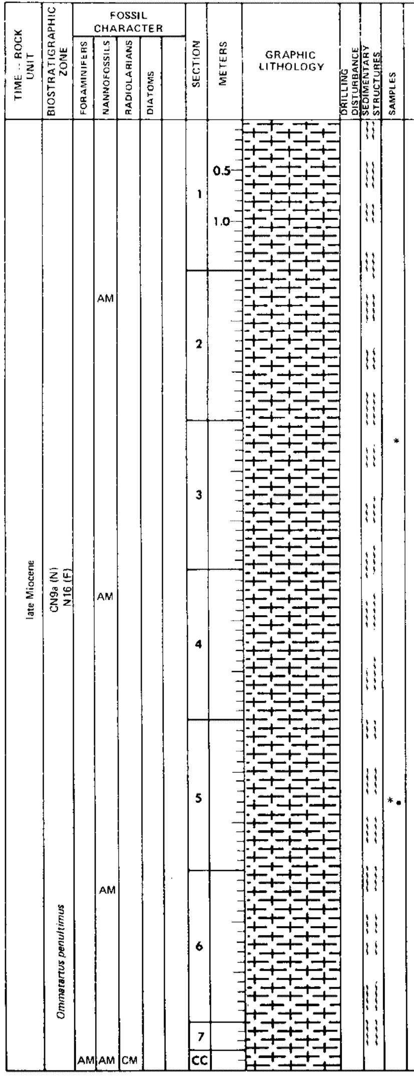
SMEAR SLIDE SUMMARY (%):

	4, 60
	D
Texture:	
Sand	2
Silt	12
Clay	86
Composition:	
Zeolite	<1
Foraminifers	14
Calc. nannofossils	86
Radiolarians	<1
Sponge spicules	<1
Silicoflagellates	<1

ORGANIC CARBON AND CARBONATE (%):

	3, 60–61
Organic carbon	–
Carbonate	92

SITE 586 HOLE A CORE 23 CORED INTERVAL 256.5–266.1 m sub-bottom; 2464.9–2474.5 m below rig floor



LITHOLOGIC DESCRIPTION

FORAMINIFER-BEARING NANNOFOSSIL OOZE

Dominant color is white (N9) to bluish white (5B 9/1). Intensely bioturbated throughout with burrow mottles of light to medium gray (N7–N3), pale green (5G 7/2) and pale yellow (5Y 7/3), latter being most abundant and forms dominant material in a few parts of core (see SS 3, 20).

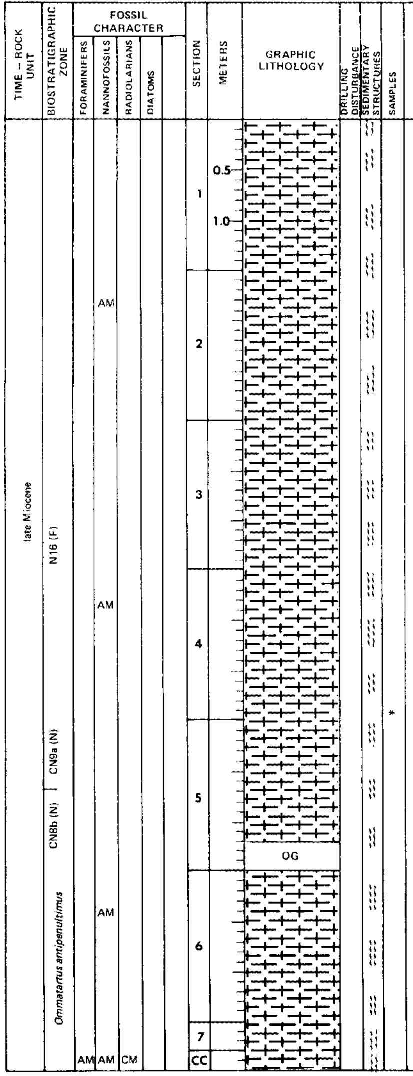
SMEAR SLIDE SUMMARY (%):

	3, 20 M	5, 80 D
Texture:		
Sand	2	2
Silt	14	14
Clay	84	84
Composition:		
Volcanic glass	<1	–
Pyrite	<1	–
Zeolite	–	<1
Foraminifers	15	16
Calc. nannofossils	84	84
Radiolarians	1	<1
Sponge spicules	<1	<1
Silicoflagellates	<1	–

ORGANIC CARBON AND CARBONATE (%):

	5, 82–83
Organic carbon	0
Carbonate	97

SITE 586 HOLE A CORE 24 CORED INTERVAL 256.5–266.1 m sub-bottom; 2474.5–2484.1 m below rig floor



LITHOLOGIC DESCRIPTION

FORAMINIFER-BEARING NANNOFOSSIL OOZE

Dominant color is white (N9) to bluish white (5B 9/1). Intensely bioturbated throughout with burrow mottles of light to medium gray (N7 to N5), pale green (5GY 8/1), and pale yellow (5Y 8/3) materials.

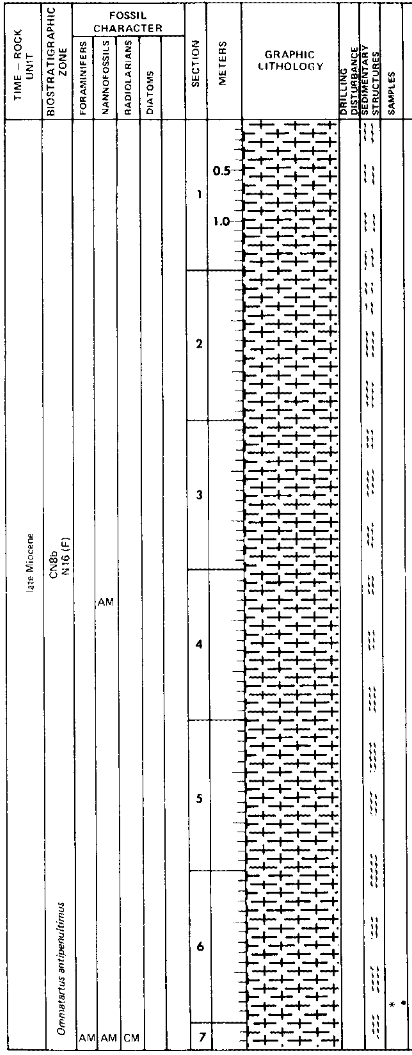
SMEAR SLIDE SUMMARY (%):

	4, 145 M	6, 145 D
Texture:		
Sand	4	1
Silt	12	12
Clay	84	87
Composition:		
Pyrite	30	–
Zeolite	1	<1
Carbonate unspec.	1	1
Foraminifers	10	13
Calc. nannofossils	58	86
Radiolarians	–	<1

ORGANIC CARBON AND CARBONATE (%):

	6, 145–146
Organic carbon	–
Carbonate	99

SITE 586 HOLE A CORE 25 CORED INTERVAL 266.1–275.7 m sub-bottom; 2484.1–2493.7 m below rig floor



LITHOLOGIC DESCRIPTION

FORAMINIFER-BEARING NANNOFOSSIL OOZE
Dominant color is white (N9) to bluish white (5B 9/1). Intensely bioturbated throughout, with burrow mottling of light to medium gray (N7–N5), pale yellow (5Y 8/3), and pale green (5GY 8/1) material.

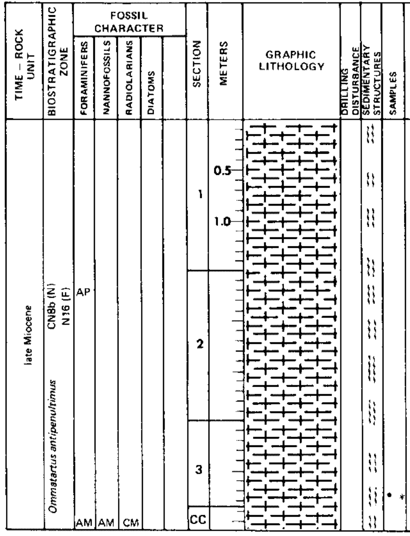
SMEAR SLIDE SUMMARY (%):

	6, 137
	D
Texture:	
Sand	1
Silt	10
Clay	89
Composition:	
Zeolite	<1
Carbonate unspec.	1
Foraminifers	10
Calc. nannofossils	88
Diatoms	<1
Radiolarians	1
Sponge spicules	<1
Silicoflagellates	<1

ORGANIC CARBON AND CARBONATE (%):

	6, 137–138
Organic carbon	–
Carbonate	94

SITE 586 HOLE A CORE 26 CORED INTERVAL 275.7–281.7 m sub-bottom; 2493.7–2499.7 m below rig floor



LITHOLOGIC DESCRIPTION

FORAMINIFER-BEARING NANNOFOSSIL OOZE
Dominant color is white (N9) to bluish white (5B 9/1). Bioturbated throughout with burrow mottling of light-gray (N7–N5), pale yellow (5Y 8/1), and light greenish gray (5GY 8/1) material.

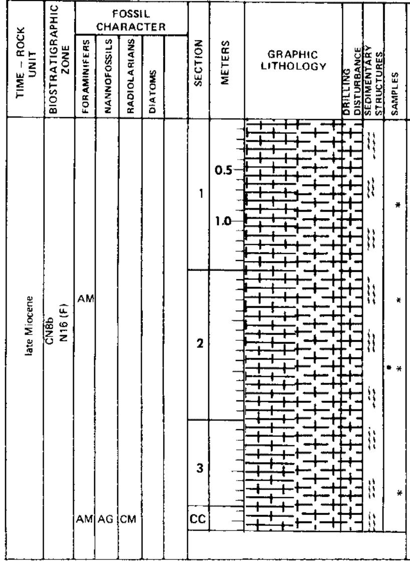
SMEAR SLIDE SUMMARY (%):

	3, 75
	D
Texture:	
Sand	1
Silt	10
Clay	89
Composition:	
Zeolite	<1
Carbonate unspec.	10
Foraminifers	11
Calc. nannofossils	79
Diatoms	<1
Radiolrians	<1
Sponge spicules	<1
Silicoflagellates	<1

ORGANIC CARBON AND CARBONATE (%):

	3, 75–76
Organic carbon	0
Carbonate	93

SITE 586 HOLE A CORE 27 CORED INTERVAL 281.7–285.9 m sub-bottom; 2499.7–2503.4 m below rig floor



LITHOLOGIC DESCRIPTION

FORAMINIFER-BEARING NANNOFOSSIL STIFF OOZE TO CHALK
Sections 1 and 2 are mostly ooze. By Section 3, chalk "nodules" occur about every 15–20 cm with firm ooze between.

Dominant color is white (N9) to bluish white (5B 9/1).

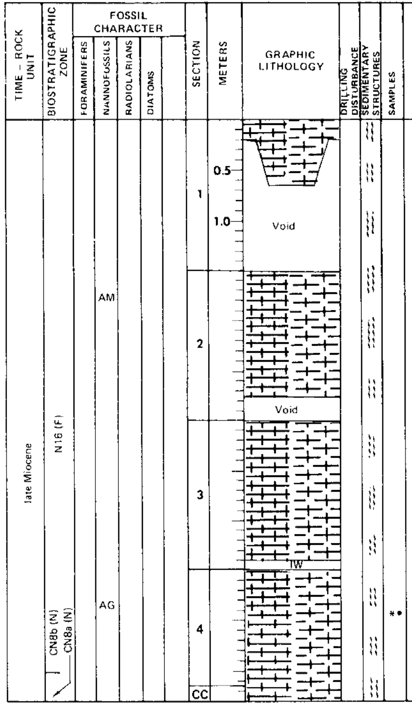
SMEAR SLIDE SUMMARY (%):

	1, 83	2, 34	2, 108	3, 74	CC, 8
	D	M	D	M	D
Texture:					
Sand	8	5	10	13	10
Silt	5	3	2	5	3
Clay	87	92	88	82	87
Composition:					
Clay	–	6	–	–	3
Volcanic glass	–	–	–	<1	<1
Pyrite	<1	–	<1	–	–
Carbonate unspec.	5	7	7	10	9
Foraminifers	12	10	13	15	15
Calc. nannofossils	80	66	74	72	67
Diatoms	<1	1	–	<1	1
Radiolarians	3	4	4	3	5
Sponge spicules	<1	7	2	<1	–
Silicoflagellates	–	1	–	–	–

ORGANIC CARBON AND CARBONATE (%):

	2, 105–106
Organic carbon	–
Carbonate	93

SITE 586 HOLE A CORE 28 CORED INTERVAL 285.9–290.3 m sub-bottom; 2503.9–2508.3 m below rig floor



LITHOLOGIC DESCRIPTION

FORAMINIFER-BEARING NANNOFOSSIL FIRM OOZE AND CHALK
Dominant color is white (N9) to bluish white (5B 9/1).

Bioturbated throughout but not as much as above cores. Burrow mottles of light to medium gray (N7–N5), pale yellow (5Y 8/1), and light greenish gray (5GY 8/1) are common, but distinguishable, continuous layers of these colors also are common.

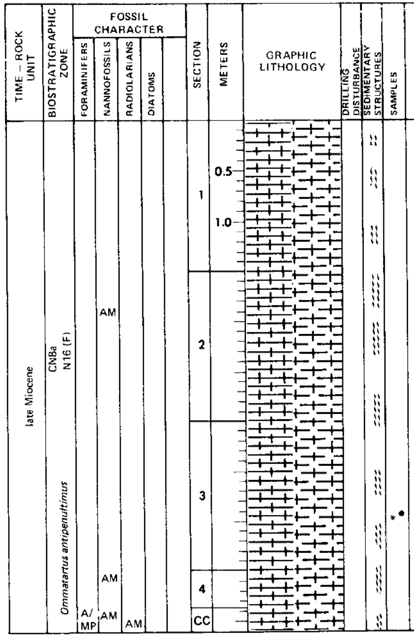
SMEAR SLIDE SUMMARY (%):

	4, 45
	D
Texture:	
Sand	10
Silt	3
Clay	87
Composition:	
Carbonate unspec.	3
Foraminifers	10
Calc. nannofossils	85
Diatoms	<1
Radiolarians	2

ORGANIC CARBON AND CARBONATE (%):

	4, 45–46
Organic carbon	0
Carbonate	99

SITE 586 HOLE A CORE 29 CORED INTERVAL 290.3–295.3 m sub-bottom; 2508.3–1513.3 m below rig floor



LITHOLOGIC DESCRIPTION

FORAMINIFER-BEARING NANNOFOSSIL STIFF OOZE AND CHALK
Dominant color is white (N9) to bluish white (5B 9/1).

Bioturbated throughout. Burrow mottles of light to medium gray (N7–N5), pale yellow (10Y 8/2), and greenish gray (5G 6/1) are common. Continuous layers of gray and greenish gray also are common.

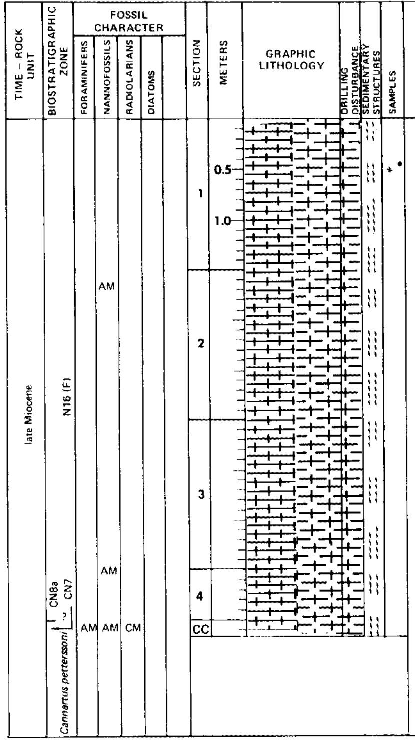
SMEAR SLIDE SUMMARY (%):

	3, 100
	D
Texture:	
Sand	15
Silt	4
Clay	81
Composition:	
Carbonate unspec.	4
Foraminifers	12
Calc. nannofossils	78
Diatoms	<1
Radiolarians	6
Fish remains	<1

ORGANIC CARBON AND CARBONATE (%):

	3, 99–100
Organic carbon	–
Carbonate	96

SITE 586 HOLE A CORE 30 CORED INTERVAL 295.3–300.3 m sub-bottom; 2513.3–2518.3 m below rig floor



LITHOLOGIC DESCRIPTION

FORAMINIFER-BEARING NANNOFOSSIL STIFF OOZE AND CHALK

Dominant color is white (N9) to bluish white (5B 9/1).

Bioturbated throughout, with burrow mottles of light to medium gray (N7–N5), pale greenish yellow (5Y 8/2), and greenish gray (5G 6/1). Continuous layers of greenish gray and gray also are common.

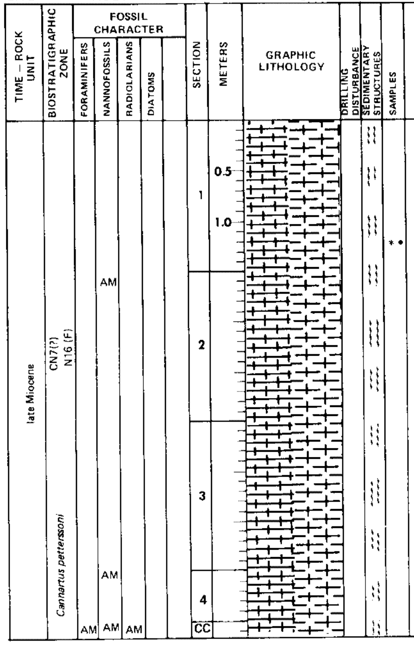
SMEAR SLIDE SUMMARY (%):

	1, 55
	D
Texture:	
Sand	13
Silt	4
Clay	83
Composition:	
Carbonate unspec.	2
Foraminifers	12
Calc. nannofossils	83
Diatoms	<1
Radiolarians	3
Sponge spicules	<1

ORGANIC CARBON AND CARBONATE (%):

	1, 54–55
Organic carbon	0
Carbonate	96

SITE 586 HOLE A CORE 31 CORED INTERVAL 300.3–305.3 m sub-bottom; 2518.3–2523.3 m below rig floor



LITHOLOGIC DESCRIPTION

FORAMINIFER-BEARING NANNOFOSSIL STIFF OOZE AND CHALK

Dominant color is white (N9) to bluish white (5B 9/1). Bioturbated throughout but not as much as above cores. Burrow mottles of light to medium gray (N7–N5), pale greenish yellow (10Y 6/1), and greenish gray (5G 6/1) material are common. Continuous layers of gray, and greenish gray also are common.

SMEAR SLIDE SUMMARY (%):

	1, 120
	D
Texture:	
Sand	15
Silt	4
Clay	81
Composition:	
Carbonate unspec.	2
Foraminifers	15
Calc. nannofossils	77
Diatoms	<1
Radiolarians	6

ORGANIC CARBON AND CARBONATE (%):

	1, 121–122
Organic carbon	–
Carbonate	98

SITE 586

HOLE 586B

Note: Hole 586B — cores were not opened during Leg 89.

Date Occupied: 20 November 1982

Date Departed: 22 November 1982

Time on Hole: 1 day, 1 hr., 3 min.

Position (latitude; longitude): 00°29.84'S; 158°29.89'E

Water depth (sea level; corrected m, echo-sounding): 2207

Water depth (rig floor; corrected m, echo-sounding): 2217

Bottom felt (m, drill pipe): At or above 2219.4; water depth of
Penetration (m): 240.3 2218 m from rig floor from 586C logs
Number of cores: 25 used as site datum.

Total length of cored section (m): 240.3

Total core recovered (m): 234.93

Core recovery (%): 97.8

Oldest sediment cored:

Depth sub-bottom (m):

Nature:

Age:

Measured velocity (km/s):

Basement: Not encountered

Depth sub-bottom (m):

Nature:

Velocity range (km/s):

SITE 586

HOLE 586C

Date Occupied: 22 November 1982

Date Departed: 23 November 1982

Time on Hole: 1 day, 8 hr., 2 min.

Position (latitude; longitude): 00°29.84'S; 158°29.89'E

Water depth (sea level; corrected m, echo-sounding): 2207

Water depth (rig floor; corrected m, echo-sounding): 2217

Bottom felt (m, drill pipe): Not felt; 2218 m by gamma logs

Penetration (m): 623.1

Number of cores: 1

Total length of cored section (m): 9.6

Total core recovered (m): 2.18

Core recovery (%): 23

Oldest sediment cored:

Depth sub-bottom (m): 623.1

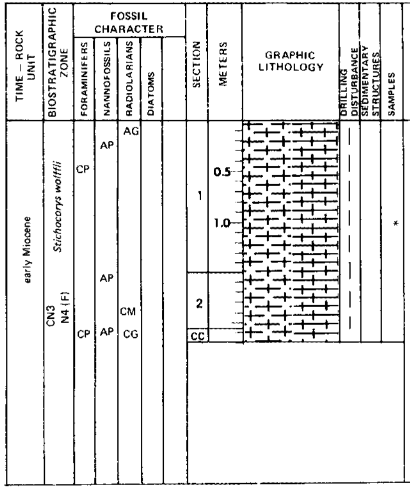
Nature: Nannofossil chalk and ooze

Age: Early Miocene

Measured velocity (km/s): -

Basement: Not encountered

SITE 586 HOLE C CORE 1 CORED INTERVAL 613.5–623.1 m sub-bottom; 2831.5–2841.1 m below rig floor



LITHOLOGIC DESCRIPTION

FORAMINIFER-BEARING NANNOFOSSIL OOZE AND MINOR CHALK

Dominant color is white (N9) to bluish white (5B 9/1) and is homogeneous throughout.

Chalk occurs mainly as nodules and brecciated pieces that undoubtedly were continuous layers that were broken during the drilling process.

SMEAR SLIDE SUMMARY (%):

	1, 100
	D
Texture:	
Sand	10
Silt	2
Clay	88
Composition:	
Pyrite	<1
Carbonate unspec.	9
Foraminifers	10
Calc. nannofossils	81
Radiolarians	<1
Sponge spicules	<1