INITIAL CORE DESCRIPTIONS

DEEP SEA DRILLING PROJECT

LEG 42A

MEDITERRANEAN

Prepared for the
NATIONAL SCIENCE FOUNDATION
National Ocean Sediment Coring Program
Under Contract C-482
By the
UNIVERSITY OF CALIFORNIA
Scripps Institution of Oceanography
Prime Contractor for the Project

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Dear Colleague:

This document has been printed and distributed by the Deep Sea Drilling Project for the purpose of sample selection by interested earth scientists, sample requests being honored one year after completion of the cruise on which the samples were collected. It is an interim and informal document consisting of site data and sedimentologic and paleontologic data as known six (6) months post-cruise. These data, while completely adequate for almost all sample selection needs, will be subject to possible slight change by the time of issue of the formal cruise report, 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,

N. Terence Edgar
Chief Scientist
Deep Sea Drilling Project

INITIAL CORE DESCRIPTION
(ICD)
DEEP SEA DRILLING PROJECT

LEG 42A

April 14, 1975 — May 21, 1975

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

MEMBER ORGANIZATIONS

Lamont-Doherty Geological Observatory, Columbia University
Rosenstiel School of Marine and Atmospheric Science, University of Miami
Scripps Institution of Oceanography, University of California
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INITIAL CORE DESCRIPTIONS - LEG 42A

SYNOPSIS

The GLOMAR CHALLENGER sailed from Malaga, Spain 14 April and arrived at Istanbul, Turkey 21 May after drilling ten holes at eight sites (Figures 1 and 2, and Table 1).

Our objectives were to gather information on:

(1) the tectonic history of the Mediterranean's deep basins;

(2) the sedimentary history of these basins with particular emphasis on the Messinian salinity crisis; and

(3) the geothermal history of the region.

Geologic interest in the tectonics of the Mediterranean is motivated by a need to understand the origin of small ocean basins, which have been proposed as one of the actualistic models of ancient geosynclines. We recognized that the modern Mediterranean is a composite of two main regions: the western Balearic and Tyrrhenian basins, and the eastern Ionian, Sirte, and Levantine Basins. The eastern basins appear to be old, dating back perhaps to the Mesozoic, whereas the western basins are commonly believed to have been created during Tertiary time. Presently available drilling techniques dictated that we should concentrate our efforts on the Balearic and Tyrrhenian basins, where we had hope of sampling the oldest sediments or even the basement.

Site 372 was drilled on the East Menorca Rise on the western edge of the Balearic Abyssal Plain.

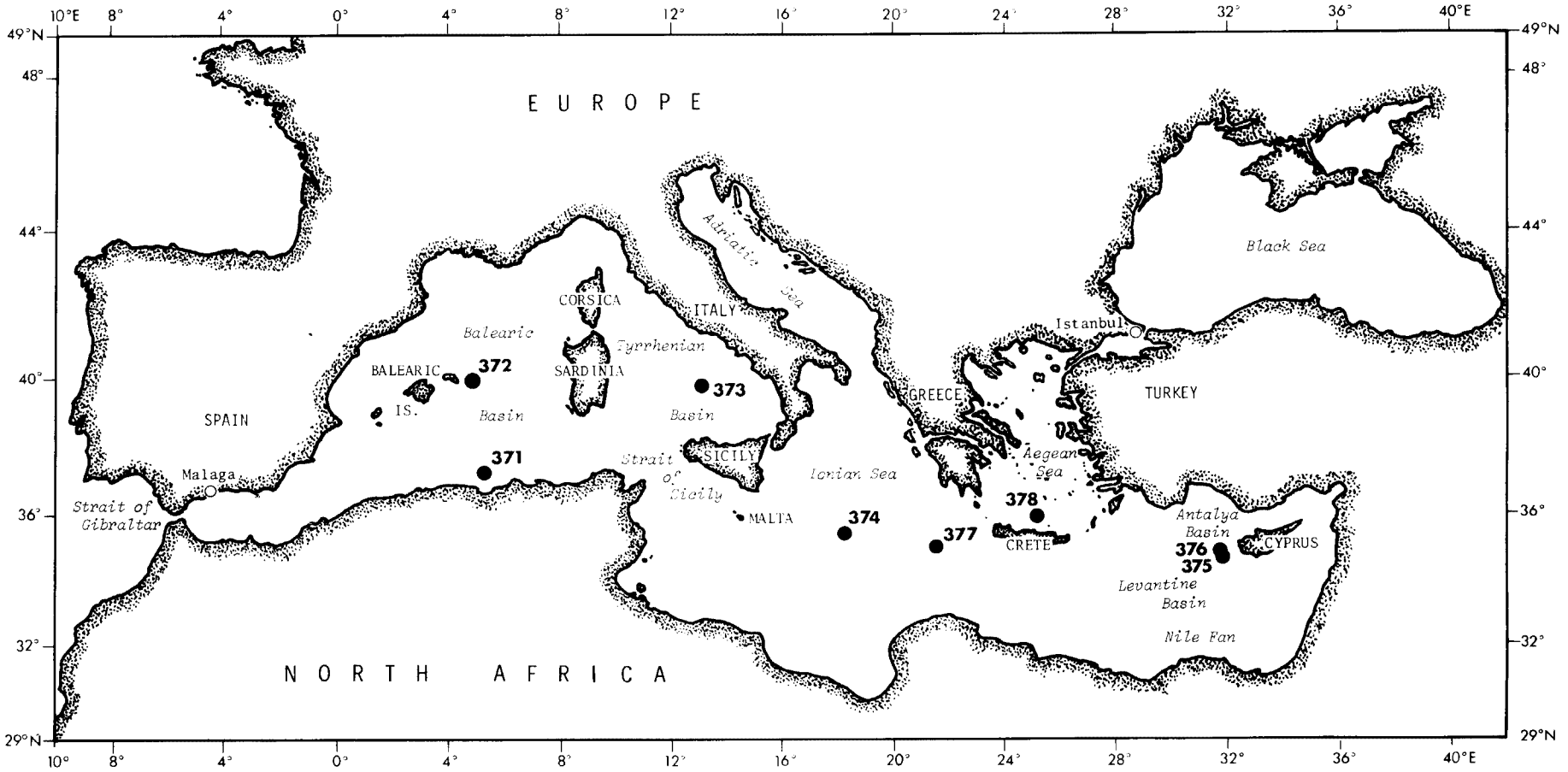


Figure 1. Leg 42A Drill Sites

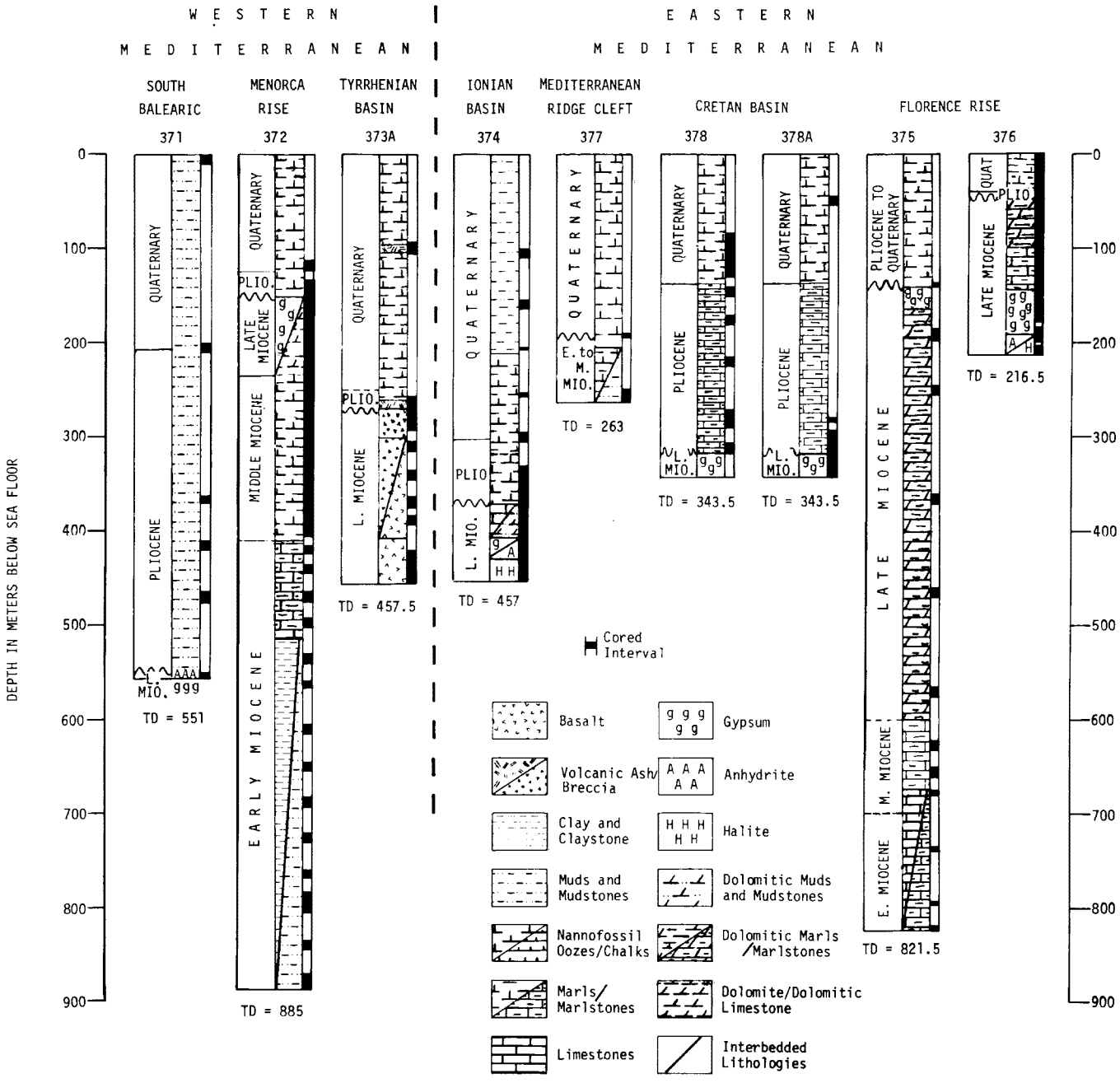


Figure 2. Leg 42A Lithologic Columns.

Table 1. Leg 42A - Coring Summary

Hole	Dates (1975)	Latitude	Longitude	Water Depth (m)	Penetration (m)	No. of Cores	Meters Cored	Meters Recovered	% Recovery	Oldest Sediment
371	Apr. 16-18	37°35.88'N	05°14.55'E	2792	551.0	8	62.0	43.3	70.0	upper Miocene
372	Apr. 19-24	40°01.86'N	04°47.79'E	2699	885.0	46	431.0	315.9	73.3	lower Miocene
372A	Apr. 14-25	40°01.90'N	04°47.79'E	2695	154.5	0	Drilled for Heat Flow			
373	----------	----------	----------	----------	Not Drilled	----------	----------	----------	----------	----------
373A	Apr. 27-29	39°43.68'N	12°59.56'E	3517	457.5	12	114.0	27.5	24.1	lower Pliocene
374	May 1-4	35°50.87'N	18°11.78'E	4078	457.0	24	153.5	77.2	50.3	upper Miocene
375	May 7-10	34°45.74'N	31°45.58'E	1900	821.0	13	73.0	66.9	91.6	lower Miocene
376	May 10-12	34°52.32'N	31°48.45'E	2101	216.5	23	202.5	76.4	37.7	upper Miocene
377	May 15-16	35°09.25'N	21°25.86'E	3718	263.0	4	10.0	8.2	82.0	middle Miocene
378	May 17-18	35°55.67'N	25°06.97'E	1835	312.0	11	100.2	34.8	34.7	lower Pliocene
378A	May 18-19	35°55.67'N	25°06.97'E	1835	343.5	9	46.0	20.0	43.5	upper Miocene
				TOTALS	4461.0	150	1192.2	670.2	56.2	

Seismic reflection profiles indicated that the sediments under the abyssal plain could be divided into 3 units:

(1) Quaternary and Pliocene, up to 1 or 1.5 km thick;

(2) the Messinian, Mediterranean Evaporite, with a 0.6 km thick upper unit overlying a main salt unit up to 1.2 km thick; and

(3) a pre-evaporite formation, up to 3 or 4 km thick.

All formations become thinner toward the margin. Under the Menorca Rise the total sediment thickness was recorded as only about 1.2 km, here divisible into 5 units including a middle to upper Miocene transgressive unit, and a lower unit of possible Oligocene sediments.

Drilling at Site 372 showed that the structural evolution of the Balearic margin was similar to that established for margins of Atlantic type. The deposition of the first (Oligocene? and lower Miocene) sediments was controlled by horst and graben tectonics indicating rifting prior to the lowest Miocene. The margin structure was then covered by a sedimentary transgression through upper Burdigalian to Tortonian time. Studies of benthonic foraminifera suggest that the Menorca Rise area was already at bathyal depths (1000-2500 m) during this transgressive phase. Continued subsidence of the Balearic Basin, especially in the central abyssal plain province, permitted the accumulation of thick evaporitic and Plio-Quarternary sequences. This subsidence could be related to mantle cooling and/or to isostatic subsidence associated with the Messinian event (to be dealt with later).

It had been suggested before our cruise that the Balearic

Basin was formed after lower and middle Miocene orogenic deformations of the nearby Balearic islands. Our drilling results made this hypothesis untenable.

Some of our shipboard scientists thought that a rifting with foundering of sialic crust could account for the genesis of the Balearic Basin. Others were inclined to adopt a modified spreading model, which offers an explanation of the synchroneity of the Balearic rifting and the Miocene folding of the circum-Mediterranean orogenic belt.

Acoustic basement was reached at Site 373A under the Tyrrhenian Abyssal Plain. After drilling through a Plio-Quaternary sequence of marls, tuffs, and zeolitic sediments on the flank of a seamount, we penetrated 200 meters of basalt breccias, with a limestone matrix, overlying porphyritic and aphyric basalt flows. This sequence bears a general resemblance to that encountered by Leg 37 on the Mid-Atlantic Ridge. We concluded that basalt volcanism played a significant role in the genesis of the Tyrrhenian Basin, but that shore-based work, now in progress, would be necessary before any far reaching conclusions could be drawn.

The eastern Mediterranean basement is ubiquitously covered by a thick sedimentary sequence, including flysch-type deposits, as young as upper Miocene. At Site 375 west of Cyprus we established a tentative correlation of our drilled pre-evaporite sequence with Cyprus land sections.

At Site 377 in a cleft in the Mediterranean Ridge, lower and middle Miocene flysch-like sediments were found below Serravaillian

marls. We found no evidence that the one hundred meters of pre-Messinian sediments penetrated here are an olistrostrome or tectonic melange. This is in opposition to one theory proposed for the origin of this ridge. The sediments are similar to pelitic flysch known from Alpine areas and were probably deposited in a basin- or continental-rise environment prior to a pre-Quaternary uplift.

At Site 378 in the Aegean Sea we identified a strong regional reflector as the equivalent of Horizon M known throughout the Mediterranean and recognized as the top of the Messinian evaporite formation. The last deformation of the Cretan Basin, related to active subduction under the Hellenic Trench, was shown to have occurred in the lower to middle Quaternary.

Another objective of GLOMAR CHALLENGER'S second Mediterranean cruise was to obtain more complete information on the beginning and the end of the Messinian salinity crisis, first identified by the Leg 13 drilling in 1970.

Pre-Messinian sediments were recovered at Sites 372, 375, and 377. Directly underlying the Messinian evaporites at all these sites are hemipelagic marls. Turbiditic sediments were recognized at different stratigraphic levels in the sequences below: lower Miocene on the Balearic Margin and Mediterranean Ridge (Sites 372 and 377, respectively), and upper Miocene at the Florence Rise site (375). Accumulation rates calculated for the drilled pre-Messinian sequences vary greatly, from 25 m/m.y. to 100 m/m.y.. Nowhere did we penetrate sediments older than Miocene.

The onset of the salinity crisis was strikingly recorded as a change occurring within one 1.5 meter section of Core 9 at Site 372. The sediments beneath the 57-cm level in this section yielded an open marine upper Miocene fauna, but those above were characterized by an *Ammonia beccarii* fauna, typical of shallow environments.

The Messinian Mediterranean evaporite formation was cored at all sites except 373 and 377. The evaporitic rocks recovered include gypsum and anhydrite in various structural forms (Sites 371, 374, and 376) and halite at the basinal Sites 374 and 376. Many of these rock types had been found during the initial Leg 13 drilling, but a number of other evaporitic facies were recognized for the first time on this cruise. For example, coarsely crystalline selenitic gypsum was recovered at Site 378 and is thought to be a very early diagenetic product. Gypsiferous rocks also occur in striking decimeter- to meter-thick cyclic units at Site 374. The anhydrite recovered ranges from banded types with wavy bedding to those with nodular "chicken-wire" structure and well-developed enterolithic folds. These anhydritic rocks generally lie stratigraphically below gypsiferous rocks but at Site 371 they are interbedded. Also, the crystalline clear halite recovered at Sites 374 and 376 has thin interlayers of gypsum and anhydrite. Below the anhydrite at Site 371 a terrigenous, dark brown, unfossiliferous mudstone is present.

Our scientific staff has not yet reached a consensus on the interpretation of these evaporitic rocks. There is general

agreement that at the deep penetration sites, 372 and 375, the evaporites lie stratigraphically between nannofossil marls of pelagic facies and that basins with depths of at least 1000-2500 meters already existed prior to the Messinian crisis of salinity. Most of us interpret the evaporitic rocks as relatively shallow water deposits. Some of us consider that the Leg 13 investigations provided strong evidence of sabkha environments and that the findings of this cruise, such as anhydrite with "chicken-wire", enterolithic folds, and (possibly algal) stromatolitic structures support this conclusion.

Lower Pliocene sediments, which span a time interval (5.2 to 3.3 m.y.) when open marine faunas and floras were eventually re-introduced to the Mediterranean basins after the Messinian event, were recovered at all Leg 42A sites other than Site 377. They are represented by biogenic oozes, hemipelagic marls or nannofossil-dolomitic marls yielding benthonic foraminifera of lower middle bathyal (1500-2500 m) to upper middle bathyal habitat (500-1500 m). A correlation between present-day depths and the estimated lower Pliocene paleodepths was evident; the deepest paleodepths were recorded at the presently deepest locations and vice versa.

Although at the western Mediterranean sites the Miocene/Pliocene contact appears to mark a transgressive event, in the eastern Mediterranean (Sites 374 and 376) we recognized a less sharp change in facies. A relatively thick succession of upper Miocene dolomitic marls and marlstones, with graded sandstone and siltstone beds, was discovered interspersed between the

Messinian evaporites and the open marine Pliocene nannofossil marls. At Site 376 these dolomitic sediments contain abundant nannofossils together with distinctive *Cyprideis pannonica/Ammonia beccarii* faunas. Biometric analyses suggest that these faunas are autochthonous, and that some of the marls, at least, were deposited in a shallow euryhaline environment. Some of the shipboard party, however, suggest that this fauna was entirely displaced from a shallow to a basinal setting. While all agreed that there existed at this time a "lac mer" or "lago mare" type environment in the eastern Mediterranean region, at least three varying interpretations as to its extent and nature were proposed and others seem possible.

A lively debate continues within the shipboard party on paleoenvironmental models of the entire Messinian event. One model envisaging shallow water evaporite deposition in a shallow Mediterranean basin has been discounted. Two others remain under discussion:

(1) the desiccated deep basin mode, as proposed following the Leg 13 drilling, with the evaporites deposited in salt lakes and playas thousands of meters below, and isolated from the Atlantic; and

(2) a barred basin model with Atlantic communication maintained, deposition of evaporites in the basins under conditions different from those on their margins and onshore, with major subsidence after the Messinian.

Dark, carbon-rich sapropelic layers interpreted as the sedimentary expression of stagnant cycles were recovered at all drill sites from the Ionian, Levantine, and Cretan Basins of the

eastern Mediterranean. Sapropels of lower Pliocene age in the Ionian, Cretan and in the Antalya Basins were a new discovery of this cruise. These older sapropels might have an origin different from that of the younger Quaternary sapropels.

We made nineteen reliable down-hole temperature measurements at depths ranging from 26.5 to 306 meters below the sea floor. Figure 3 shows that at every site except 376, the thermal gradient between the sea floor and 100 meters subbottom is higher than the gradient determined over deeper intervals.

Heat flow values in the Balearic Basin (Site 372A) and Tyrrhenian Sea (Site 373A) are well above the global average, and are in general agreement with nearby heat flow values determined using near-surface measurement techniques. These values support the idea that the western Mediterranean is a young ocean basin.

Measurements in the Ionian Basin (Site 374) yielded a heat flow value about one-half the global average and on the Florence Rise (Site 376) values were considerably lower. These observations can perhaps be most easily understood in terms of a model in which this part of the eastern Mediterranean is undergoing low-angle regional underthrusting, thereby depressing the isotherms and causing a reduction in the surface heat flow.

The well-determined Aegean heat flow value (Site 372) is higher than the world average, and is typical of values in marginal seas behind active island arcs.

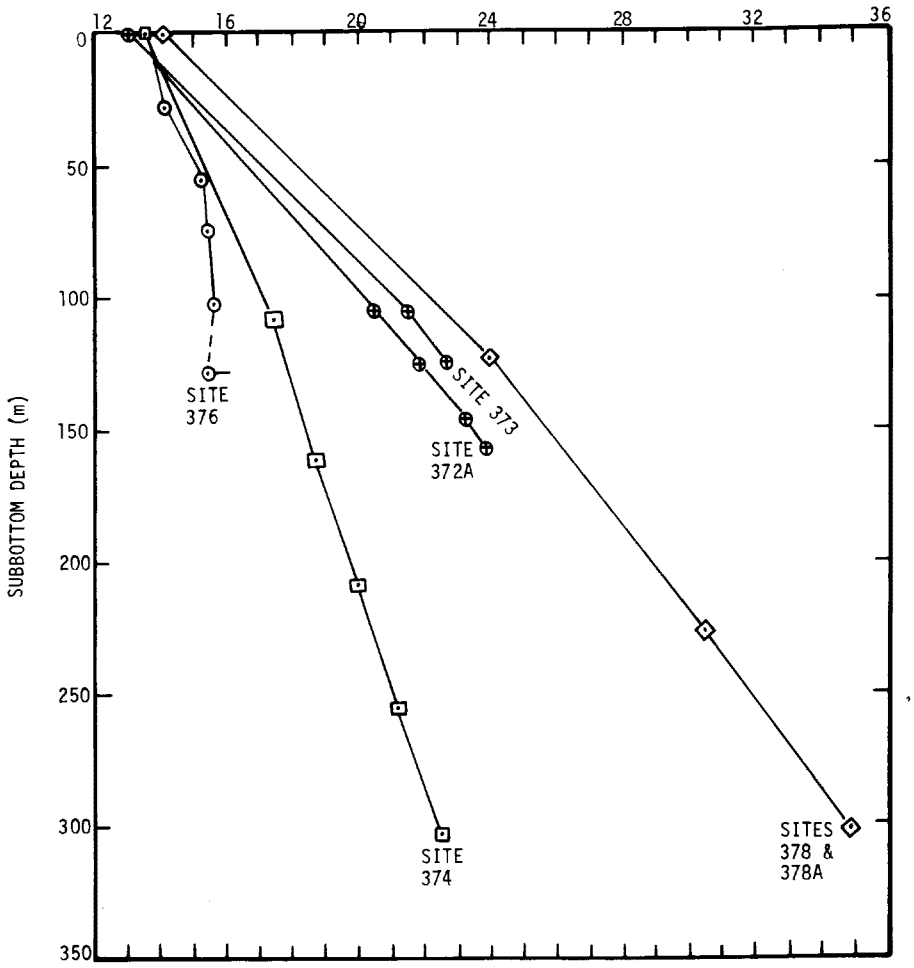


Figure 3. Leg 42A Downhole Heat Flow Measurements

Table 2. Downhole Heat Flow Measurements

Site	Number of Measurements	Mean Thermal Gradient (°C/m)	Mean Thermal Conductivity (mcal/cm sec °C)	Heat Flow (10^{-6} cal/cm^2 sec)
372A	4	0.0730	3.14	2.29 ± 0.10
373A	2	0.0775	(2.75)	2.1 ± 0.5
374	5	0.0259	2.77	0.72 ± 0.04
376	3	0.0044	2.77	0.12 ± 0.02
378, 378A	3	0.0607	3.01	1.83 ± 0.10

EXPLANATORY NOTES

Introduction

Samples recovered by Leg 42A became available on May 22, 1975, to investigators planning subsequent studies other than those scheduled to appear in Volume 42A of the Initial Reports of the Deep Sea Drilling Project. Persons wishing to obtain samples are directed to the DSDP-NSF sample distribution policy (reproduced herein). Sample requests must be submitted on standard DSDP request forms which may be obtained from:

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

The following material is intended as an aid in understanding:

(1) the terminology, labeling, and numbering conventions used by the Deep Sea Drilling Project;

(2) the sediment classification and biostratigraphic framework used on Leg 42A; and

(3) the presentation of the lithologic and paleontologic data on the core forms which make up much of this publication.

Numbering of Sites, Holes, Cores, Samples

Drill site numbers run consecutively from the first site drilled by GLOMAR CHALLENGER in 1968; thus the site number is unique. A site refers to the hole or holes drilled from one acoustic positioning beacon. Several holes may be drilled at a single locality by pulling the drill string above the sea floor

("mud line") and offsetting the ship some distance (usually 100 meters or more) from the previous hole.

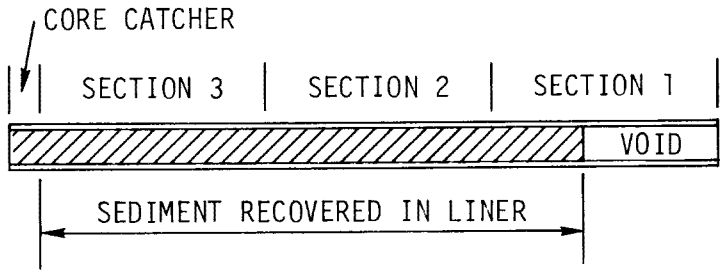
The first (or only) hole drilled at a site takes the site number. Additional holes at the same site are further distinguished by a letter suffix. The first hole has only the site number; the second has the site number with suffix A; the third has the site number with suffix B; and so forth. It is important,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

Cores are numbered sequentially from the top down. In the ideal case, they consist of 9 meters of sediment or rock in a plastic liner of 6.6 cm diameter. In addition, a short sample is obtained from the core catcher (a multi-fingered device at the bottom of the core barrel which prevents cored materials from sliding out during core-barrel recovery). This usually amounts to about 20 cm of sediment and is stored separately. This sample, from each core, represents the lowest stratum recovered in the particular cored interval. The core catcher sample is designated by CC (e.g., 378-4-CC, in the core catcher sample of the fourth core taken at Site 378).

The cored interval is the interval in meters below the sea floor measured from the point at which coring for a particular core was started to the point at which it was terminated. This interval is generally 9.5 meters (nominal length of a core barrel) but may be shorter if conditions dictate. Cores and

cored intervals need not be contiguous. In soft sediment, the drill string can be "washed ahead" without recovering core by applying sufficiently high pump pressure to wash sediment out of the way of the bit. In a similar manner, a center bit, which fills the opening in the bit face, can replace the core barrel if drilling ahead without coring is necessary.

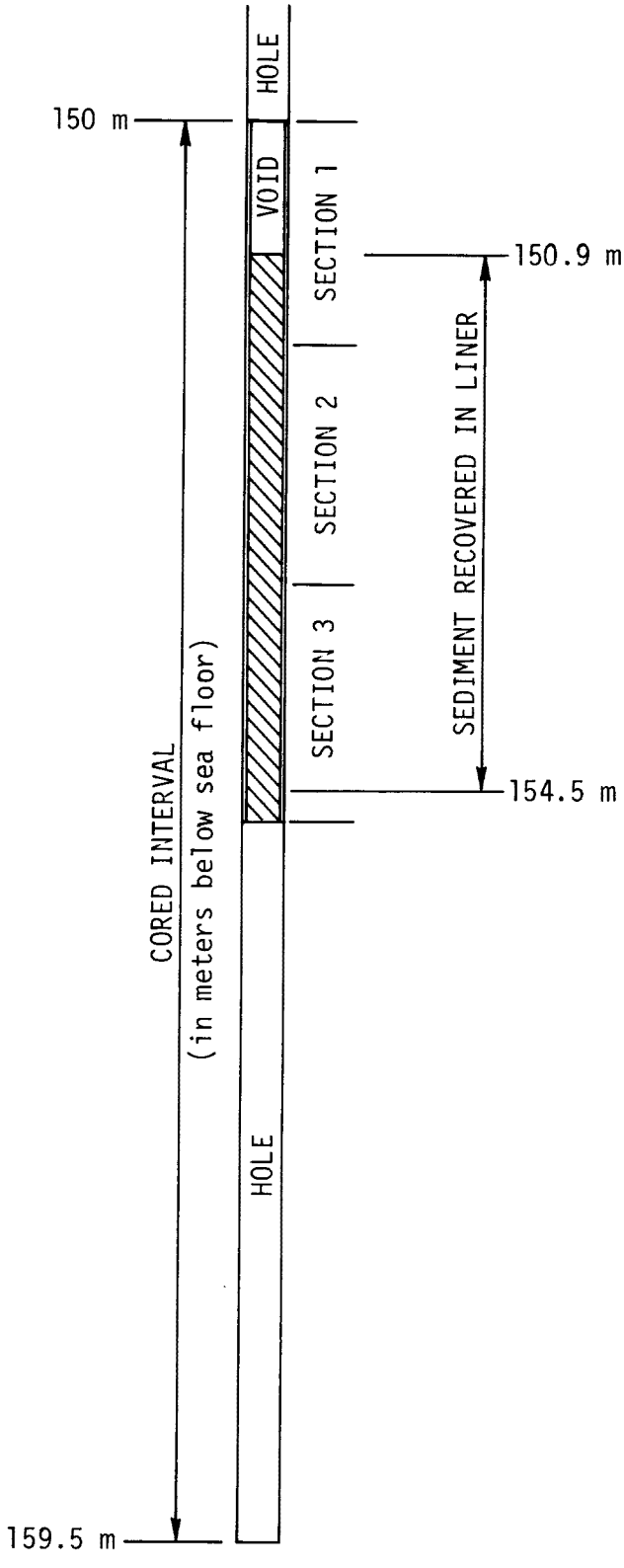
When a core is brought aboard the GLOMAR CHALLENGER it is labeled and the plastic liner and core cut into 1.5-meter sections. A full, 9-meter core would thus consist of six sections, numbered from the top down, 1 to 6. (The discrepancy between the 9-meter core and 9.5-meter cored interval is discussed below.) Generally, something less than 9 meters is recovered. In this case, the sections are still numbered starting with one at the top, but the number of sections is the number of 1.5-meter intervals needed to accommodate the length of core recovered; this is illustrated below:



Thus, as shown, recovery of 3.6 meters of sediment would result in a core with 3 sections, with a void of 0.9 meters at the top of the first section. By convention, and for convenience in routine data handling at the Deep Sea Drilling Project, if a core contains a length of material less than the length of the cored interval, the

recovered material is placed in the top of the cored interval, with the top of Section 1, rather than the top of the sediment, equal to the top of the cored interval. This is shown below for the core in the above example. Thus, the depth below the sea floor of the top of the sediment of this hypothetical core would lie at 150.9 meters (not 150.0 m) and the bottom at 154.5 meters (the core catcher sample is regarded as being dimensionless).

It was noted above that a discrepancy exists between the usual coring interval of 9.5 meters and the 9-meter length of core recovered. The core liners used are actually 9.28 meters in length, and the core catcher accounts for another 0.2 meters. In cases where the core liner is recovered full to the top, the core is still cut



into six 1.5-meter sections, measured from the bottom of the liner, and the extra 0.28-meter section at the top is designated Section 0, or the "Zero Section". The Zero Section is ignored in calculations of depth below the sea floor of cores or levels within cores.

In the core laboratory on the GLOMAR CHALLENGER, after routine processing, the 1.5-meter sections of sediment core and liner are split in half lengthwise. One half is designated the "archive" half, which is described by the shipboard geologists, and photographed; and the other is the "working" half, which is sampled by the shipboard sedimentologists and paleontologists for further shipboard and shore-based analysis. Almost all Zero Sections recovered on Leg 42A were split and described.

On this cruise basalts and evaporite rocks were also split in half lengthwise and great care was taken to maintain relative superposition of the sequences. Each piece of rock was numbered separately and arrows were drawn showing the uphole direction on both sides prior to splitting. Furthermore, after description, photography and sampling each half section was tightly encased in plastic tubing.

Samples taken from core sections are designated by the interval in centimeters from the top of the core section from which the sample was extraced; the sample size, in cc, is also given. Thus, a full sample designation would consist of the following information:

Leg (Optional)
Site (Hole, if other than first hole)
Core Number
Section Number
Interval in centimeters from top of section.

Site 378A-1-3, 122-124 cm (10 cc) designates a 10 cc sample taken from Section 2 of Core 1 from the second hole drilled at Site 378. The depth below the sea floor for this sample would then be the depth to the top of the cored interval (46 meters in the example above) plus 3 meters for Sections 1 and 2, plus 122 cm (depth below the top of Section 3), or 50.2 meters. (Note, however, that subsequent sample requests should refer to a specific interval within a core section (in centimeters) rather than level [meters] below sea floor).

Samples taken for smear slide, carbonate bomb, grain size or X-ray analysis are displayed on the core forms in a column using symbols (see Sample Core Form, Figure 4).

Core Disturbance

The rotary drill-coring technique quite often results in a high degree of disturbance of the cored sediments. This is especially true of the softer unconsolidated sediments. A qualitative estimate of the degree of deformation is given as a symbol on the core logs (see Sample Core Form, Figure 4).

Smear Slides (*)

Smear slides are the basic means of mineral identification for sediments on-board ship, although thin sections are used in studies of basalts and other hard rocks.

Smear slide estimates of mineral abundances were based on area of the smear slide covered by each component. Past experience has shown that accuracy may approach a percent or so for very distinctive

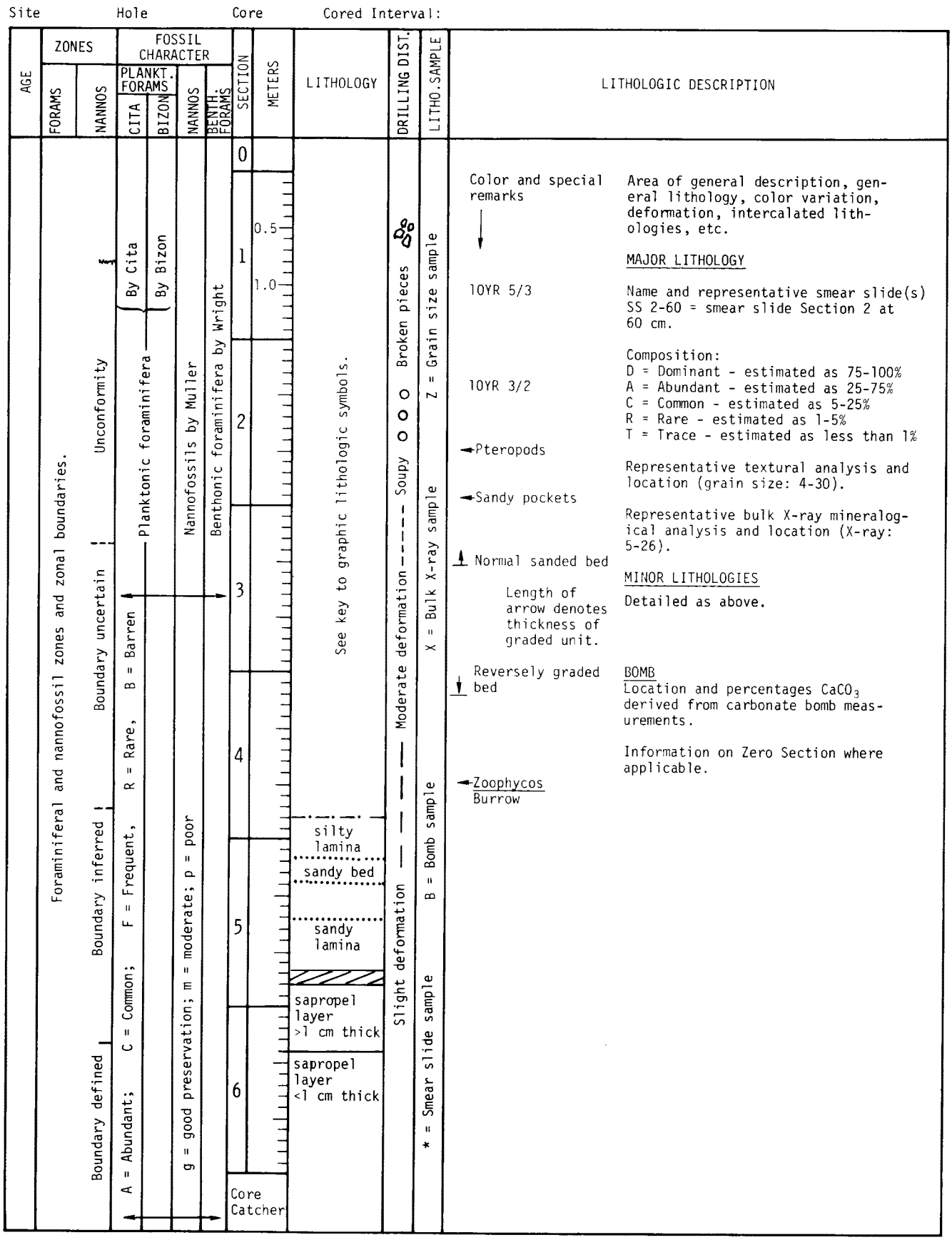


Figure 4. Sample Core Form

minor constituents but that, for major constituents, accuracy of ±10% is considered very good. The accuracy of this technique is much enhanced when employed in conjunction with carbonate bomb measurements (see below).

Of more importance than absolute accuracy to the sedimentologist are relative changes in component abundance. Consequently although absolute percentages are required in the operation of the JOIDES classification scheme only relative abundances are reported in the composition section of the Leg 42A core forms, thus:

D = Dominant estimated as 75% to 100% of the total sediment
A = Abundant estimated as 25% to 75% of the total sediment
C = Common estimated as 5% to 25% of the total sediment
R = Rare estimated as 1% to 5% of the total sediment
T = Trace estimated as less than 1% of the total sediment.

Frequently sediment components from the same sample fall in the same abundance categories. On the core forms the listings of components from smear slides were ordered in descending order of estimated abundance.

Carbonate Data (B)

During Leg 42A, extensive use was made of the carbonate bomb device as an aid in sediment classification. Total carbonate percentages are recorded on the core summary forms, as are levels of sampling (B). Accuracy to within ±5% total carbonate has been quoted for the device. However, post-cruise shore-base studies suggest that it may be somewhat less accurate than this when being used for complex mixtures of sedimentary components and it is probably considerably less accurate where dolomitic sediments are encountered. This fact, on the other hand, can be expected to

make, at most, only slight differences to sediment names as given on-board ship.

Samples were taken for DSDP shore-base carbon-carbonate analysis by the Leco 70-second Analyser. These are of well known precision but were not yet available for the compilation of this volume.

Independent organic carbon measurements were available for some of the Leg 42A sites. These were used to classify individual dark colored sediment layers thus:

0-0.5% Organic Carbon - Normal marine sediment (classified using the JOIDES scheme)
0.5% to 2.0% Organic Carbon - Sapropelic sediment (term 'Sapropelic' prefixes sediment name)
2.0% and over organic carbon - Sapropel.

Grain Size Analyses (Z)

The DSDP shore-based grain size analyses presented on these core logs were derived by standard sieve and pipette techniques, as described in detail in Appendix III of Volume IV of the Initial Reports (p. 745), with modified settling times as in Volume IX.

Bulk X-ray Mineralogical Analyses (X)

Bulk X-ray mineralogical analyses were completed at the laboratory of the University of Paris IV. Measurements were made with an interval standard on material dried at 40°C, without further processing such as washing in distilled water. The data are computed in percent of the crystalline fraction. Precision is considered to be ±10%. Trace amounts refer to percentages of less than 0.5%. "Opal" percentages refer to OPAL CT in the sense of Jones and Segnit (1971), a disordered mixture of α cristobolite and α tridymite.

In a number of cases sediment names have been modified from those given on-board ship to take account of these shore-base results.

Sediment Classification

The sediment classification used here was devised by the JOIDES Panel on Sedimentary Petrology and Physical Properties, and adapted for use by the JOIDES Planning Committee in March 1974. As allowed by the general nature of the classification, the Leg 42A sedimentologists adopted additional descriptive terms and symbols to take account of the greater complexity of the Mediterranean sediments in relation to those of the larger ocean basins.

The principal modification was to the "Transitional Biogenic Calcareous Sediments" category of the JOIDES classification; that is, the marls and marlstones. The existing single symbol/category was split into five and now includes: marls, marlstones, dolomitic marls, dolomitic marlstones, and dolomitic muds and mudstones.

Figure 5 displays the set of lithological symbols which accompany the classification including the modifications used for Leg 42A core summary forms.

Core Forms

The basic lithologic data are contained on the core summary forms which make up much of this volume. As far as possible the data are presented in the following order:

Sediment or rock name
Sediment disturbance
Color name and Munsell or GSA number

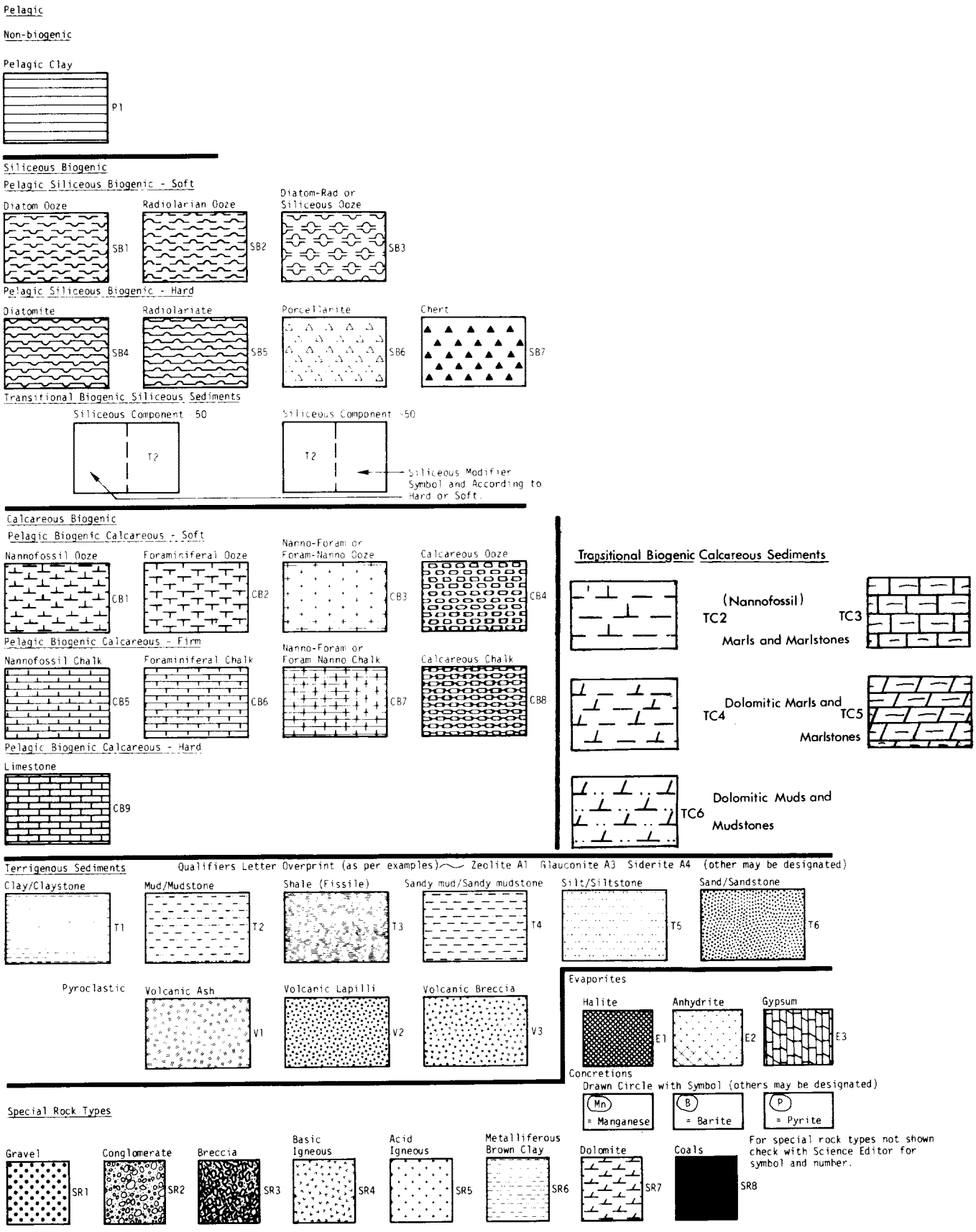


Figure 5. Graphic Symbols to Accompany the Lithologic Classification Scheme.

Sedimentary Structures and other special features
(The reader is advised that colors recorded in core barrel summaries were determined during shipboard examination immediately after splitting core sections. Experience with carbonate sediments shows that many of the colors will fade or disappear with time after opening and storage. Colors particularly susceptible to rapid fading are purple, light and medium tints of blue, light bluish gray, dark greenish black, light tints of green, and pale tints of orange. These colors change to white or yellowish white or pale tan.)
Composition from smear slides and bulk X-ray analysis
Grain size and carbonate data.

Many cores contain minor important lithologies as well as a basic lithology. The description of the basic lithology is so indicated in most cases; however, descriptive information for minor lithologies is included wherever possible.

A sample core form (Figure 4) precedes the site-by-site presentation of the cores. On this sample core form are contained all legend and explanatory notes as an aid in understanding the core forms.

Biostratigraphy

At the time of this compilation, biostratigraphic studies of Leg 42A cores are still in progress. However no major changes in age assignments are expected as a result of this detailed work; therefore, considerable adjustments to the principal boundaries are unlikely.

Determination of the nannoplankton zones for the Quaternary and Neogene sequences during Leg 42A was based on the standard nannoplankton zonation (Martini, 1971). Because of the particular development and history of the Mediterranean, some difficulty can

be encountered in determining zones in the middle and lower Miocene.

Planktonic foraminiferal zonation for the Pliocene was by reference to the recent publication of Ryan, et al. (1974), while the corresponding zonation for the Miocene follows as nearly as possible the zonation for tropical areas (Bolli and Premoli Silva, 1973).

sample-distribution policy

Distribution of Deep Sea Drilling samples will be undertaken in order to (1) provide supplementary data for inclusion in the appropriate Initial Report to support *Glomar Challenger* scientists in achieving the scientific objectives of their particular cruise, and (2) provide individual investigators with material to conduct detailed studies beyond the scope of the Initial Reports.

The National Science Foundation has established a Sample Distribution Panel to advise on distribution of core material. 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 core and related materials. Funding for the proposed research is handled separately by the investigator, not through the Deep Sea Drilling Project.

Distribution of samples for contributions to Initial Reports

Any investigator who wishes to contribute a paper to a given volume of the Initial Reports may write to the Curator, Deep Sea Drilling Project, Scripps Institution of Oceanography, University of California at San Diego, La Jolla, 92037, requesting samples from a forthcoming cruise. The request should include the nature of the study, and type, size, number of samples, particular sampling techniques or equipment that might be required, and an estimate of the time required to complete the study. The requests will be reviewed by shipboard scientists, and, if they are deemed suitable and pertinent to the objectives of the leg, and shipboard workload permits, the requested samples will be taken during the cruise (provided, of course, material suitable to the investigation is obtained during the drilling). In the case of multiple requests to perform the same investigation, selection of investigator will be made by the shipboard scientific party.

Proposals should be of a scope appropriate to complete the sampling and study in time for publication in the Initial Reports. Studies deemed acceptable will be referred to the Curator who will, with the consent of the NSF Sample Distribution Panel, authorize distribution of the samples. The Sample Distribution Panel and the Deep Sea Drilling Project will strive to ensure a reasonable degree of continuity in the investigations among the various cruises, that the studies are pertinent to goals of the cruise, and that they are consistent with the publication policy for the Initial Reports. Subject to these same provisions, the shipboard scientific party may elect to have special studies of selected core samples of its recently completed cruise made by other investigators.

Investigations not completed in time for inclusion in the Initial Report may not be published in other journals until publication of the Initial Report for which it was intended.

Distribution of samples for publication other than in Initial Reports

1. Researchers intending to request samples for studies beyond the scope of the Initial Reports should first obtain a sample request form from the Curator. Requests should specify the quantities and intervals of the core required, a statement of the proposed research, the possibility of returning residue to the Curator, the estimated time required to complete and publish the results, and the availability or need of funding and availability of equipment and space foreseen for the research.

In order to ensure that requests for highly desirable but limited samples can all be considered, approval of requests and distribution of samples will not be made prior to 12 months after date of completion of the cruise that collected the cores. Prior to publication of an Initial Report, requests for samples from a cruise can be based on the preliminary shipboard core logs. Copies of these logs will be kept on open file at Scripps and other designated institutions. The only exceptions will be for specific instances involving ephemeral properties.

Requests for samples from researchers in industrial laboratories will be handled in the same manner as those from academic organizations, and there will be the same obligation to publish results promptly. Requests from foreign scientists or organizations will also be considered.

2. The Curator has the responsibility for distributing samples, controlling quality of samples, and preserving core material. He also has the responsibility for maintaining a record of requests for samples that have been processed and filled indicating the investigator and subjects to be studied. This record will be available to investigators.

The distribution of samples will be made directly from the two repositories at Lamont-Doherty Geological Observatory and Scripps by the Curator or his designated representative.

3. (a) Samples up to 10 cc/m of core length can be automatically distributed by the Curator, Deep Sea Drilling Project or his authorized representative to any qualified investigator who requests them. The Curator will refrain from making automatic distribution of any parts of the cores which appear to be in particularly high demand, and any requests for these parts of the cores will be referred to the Sample Distribution Panel for review. Requests for samples from thin layers or important stratigraphic boundaries will generally require Panel review.

(b) All requests for samples in excess of 3(a) above will be referred to the Sample Distribution Panel.

(c) If, in the opinion of scientific investigators, certain properties they wish to study may deteriorate prior to the normal availability of the samples, such investigators may request that the normal waiting period not apply. All such requests must be approved by the Sample Distribution Panel.

4. 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 1). If a sample request is dependent, either wholly or in part, on proposed funding, the Curator will 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.

5. Investigators receiving samples are responsible for:

i) promptly publishing significant results.

ii) acknowledging, in publications, that samples were supplied through the assistance of the National Science Foundation.

iii) submitting 4 copies of all reprints of published results to the Curator.

iv) notifying the Curator of any work done on the samples that is additional to that stated in the original request for samples.

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

6. Cores will be made available at repositories for investigators to examine and specify exact samples in such instances as this may be necessary for the scientific purposes of the sampling, subject to the limitations of 3 (a), (b), (c), and 5, above, and with the specific permission of the Curator or his delegate.

7. Cores of igneous and metamorphic rocks will also remain at the repositories where they will be available for observation and description and where selected samples may be taken for thin-section preparation and other work.

8. The Deep Sea Drilling Project routinely processes by computer most of the quantitative data presented in the Initial Reports. Space limits in the Initial Reports preclude 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.

Magnetics, seismic-reflection and bathymetric data collected under way by the *Glomar Challenger* will also be available for distribution 12 months after completion of the cruise.

Requests for these data may be made to the Coordinating Staff Geologist of the Deep Sea Drilling Project, at Scripps.

A charge will be made to recover the expenses of responding to individual requests. Estimated charges can be furnished before the request is processed, if required.

9. This policy has the approval of the National Science Foundation and is designed to help ensure that the greatest possible scientific benefit is gained from the materials obtained, and that samples will be made widely available to interested geologists.

(Slightly condensed from the official sample distribution policy of the Deep Sea Drilling Project.)

REFERENCES

Bolli, H. M. and Paremoli Silva, I., 1973. Oligocene to Recent Planktonic Foraminifera and Stratigraphy of the Leg 15 Sites in the Caribbean. Initial Reports of the Deep Sea Drilling Project, v. 15, Washington (U. S. Government Printing Office), fig. 15, p. 475-498.

Jones, J. B. and Segnit, E. R., 1971. The nature of opal: In Nomenclature and constituent phases. J. Geol. Soc., Australia, 18, p. 57-68.

Martini, E., 1971. Standard Tertiary and Quaternary calcareous nannoplankton zonation. Proc. II Planktonic Conference (Roma 1970), pl. 4, table 5, p. 739-785, Roma.

Ryan, W. B. F., Cita, M. B., Dreyfus, Rawson M., Burkle, L. H., and Saito, T., 1974. A Paleomagnetic Assignment of Neogene Stage Boundaries and the Development of Isochronous Datum Planes between the Mediterranean, the Pacific and Indian Oceans in order to investigate the response of the World Ocean to the Mediterranean "Salinity Crisis", Riv. Ital. Paleont., v. 80, n. 4, p. 631-688, Milano.

DEEP SEA DRILLING PROJECT

LEG 42A SITE 371

SITE SUMMARY SHEET

POSITION: Latitude: 37°35.8'N Longitude: 05°14.55'E

Water depth (sea level): 2792 corrected meters, echo sounding

Bottom felt at: 2826 meters, drill pipe Penetration: 551 meters

Number of holes: 1 Number of cores: 8

Total core recovered: 43.3 meters Percentage core recovery: 70.0%

OLDEST SEDIMENT CORED:

Depth subbottom: 551 meters Nature: Dolomitic mudstone

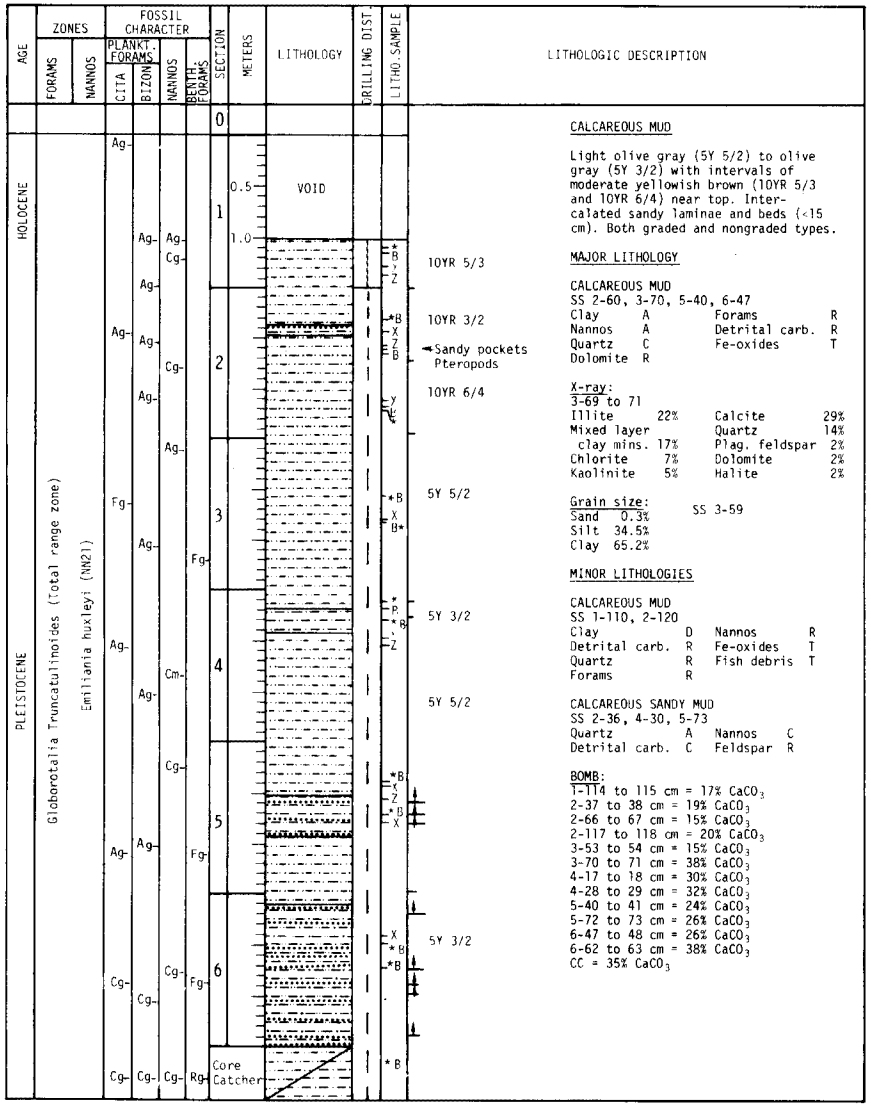
Age: Upper Miocene

BASEMENT: Not reached

PRINCIPAL RESULTS:

The primary objective was to obtain basement samples on the flank of a positive structural feature in the south Balearic Basin. Unfortunately, a thin veneer of evaporite was present above basement, and the hole was terminated in accordance with a ruling of the JOIDES Safety Panel. Two major stratigraphic units were penetrated: A Plio-Quaternary sequence of calcareous muds and mudstones with sandy intercalations overlies the upper Miocene evaporites. The muds and mudstones appear to have been deposited on a knoll which has stood slightly above the surrounding abyssal plain since the lower Pliocene. The intercalated sands are distal turbidites and deposits reworked by contour currents. The depositional environment appears to have remained in the middle bathyal (1500-2500 meters) range from the lower Pliocene to Holocene. The lowest Pliocene is absent on the paleotopographic high. The Messinian includes a probable sand deposit at its top, which is underlain by stromatolitic carbonates, nodular anhydrite, and dolomitic sandy mud.

Site 371 Hole Core 1 Cored Interval: 0.0-9.5 m



CALCAREOUS MUD

Light olive gray (5Y 5/2) to olive gray (5Y 3/2) with intervals of moderate yellowish brown (10YR 5/3 and 10YR 6/4) near top. Intercalated sandy laminae and beds (<15 cm). Both graded and nongraded types.

MAJOR LITHOLOGY

CALCAREOUS MUD
SS 2-60, 3-70, 5-40, 6-47

Clay	A	Forams	R
Nannos	A	Detrital carb.	R
Quartz	C	Fe-oxides	T
Dolomite	R		

X-ray:
3-69 to 71

Illite	22%	Calcite	29%
Mixed layer clay mins.	17%	Quartz	14%
Chlorite	7%	Plag. feldspar	2%
Kaolinite	5%	Dolomite	2%
		Halite	2%

Grain size:
SS 3-59

Sand	0.3%
Silt	34.5%
Clay	65.2%

MINOR LITHOLOGIES

CALCAREOUS MUD
SS 1-110, 2-120

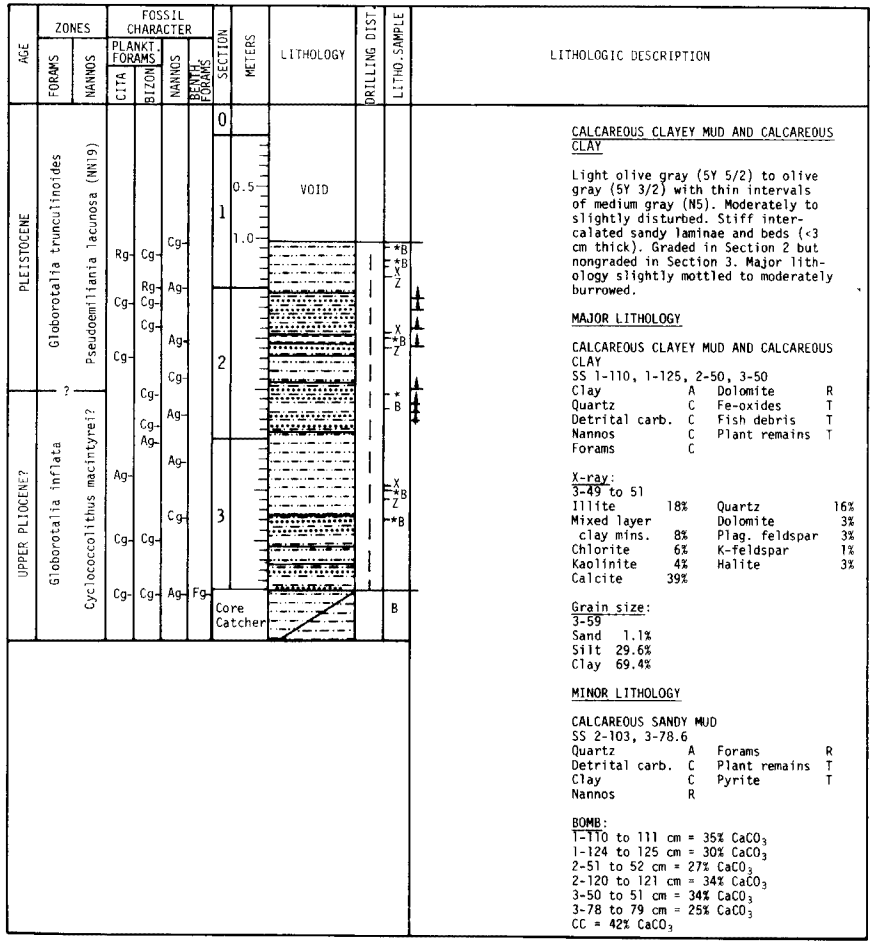
Clay	D	Nannos	R
Detrital carb.	R	Fe-oxides	T
Quartz	R	Fish debris	T
Forams	R		

CALCAREOUS SANDY MUD
SS 2-36, 4-30, 5-73

Quartz	A	Nannos	C
Detrital carb.	C	Feldspar	R

BOMB:
1-114 to 115 cm = 17% $CaCO_3$
2-37 to 38 cm = 19% $CaCO_3$
2-66 to 67 cm = 15% $CaCO_3$
2-117 to 118 cm = 20% $CaCO_3$
3-53 to 54 cm = 15% $CaCO_3$
3-70 to 71 cm = 38% $CaCO_3$
4-17 to 18 cm = 30% $CaCO_3$
4-28 to 29 cm = 32% $CaCO_3$
5-40 to 41 cm = 24% $CaCO_3$
5-72 to 73 cm = 26% $CaCO_3$
6-47 to 48 cm = 26% $CaCO_3$
6-62 to 63 cm = 38% $CaCO_3$
CC = 35% $CaCO_3$

Site 371 Hole Core 2 Cored Interval: 199.5-209.0



CALCAREOUS CLAYEY MUD AND CALCAREOUS CLAY

Light olive gray (5Y 5/2) to olive gray (5Y 3/2) with thin intervals of medium gray (N5). Moderately to slightly disturbed. Stiff intercalated sandy laminae and beds (<3 cm thick). Graded in Section 2 but nongraded in Section 3. Major lithology slightly mottled to moderately burrowed.

MAJOR LITHOLOGY

CALCAREOUS CLAYEY MUD AND CALCAREOUS CLAY
SS 1-110, 1-125, 2-50, 3-50

Clay	A	Dolomite	R
Quartz	C	Fe-oxides	T
Detrital carb.	C	Fish debris	T
Nannos	C	Plant remains	T
Forams	C		

X-ray:
3-49 to 51

Illite	18%	Quartz	16%
Mixed layer clay mins.	8%	Dolomite	3%
Chlorite	6%	Plag. feldspar	3%
Kaolinite	4%	K-feldspar	1%
Calcite	39%	Halite	3%

Grain size:
3-59

Sand	1.1%
Silt	29.6%
Clay	69.4%

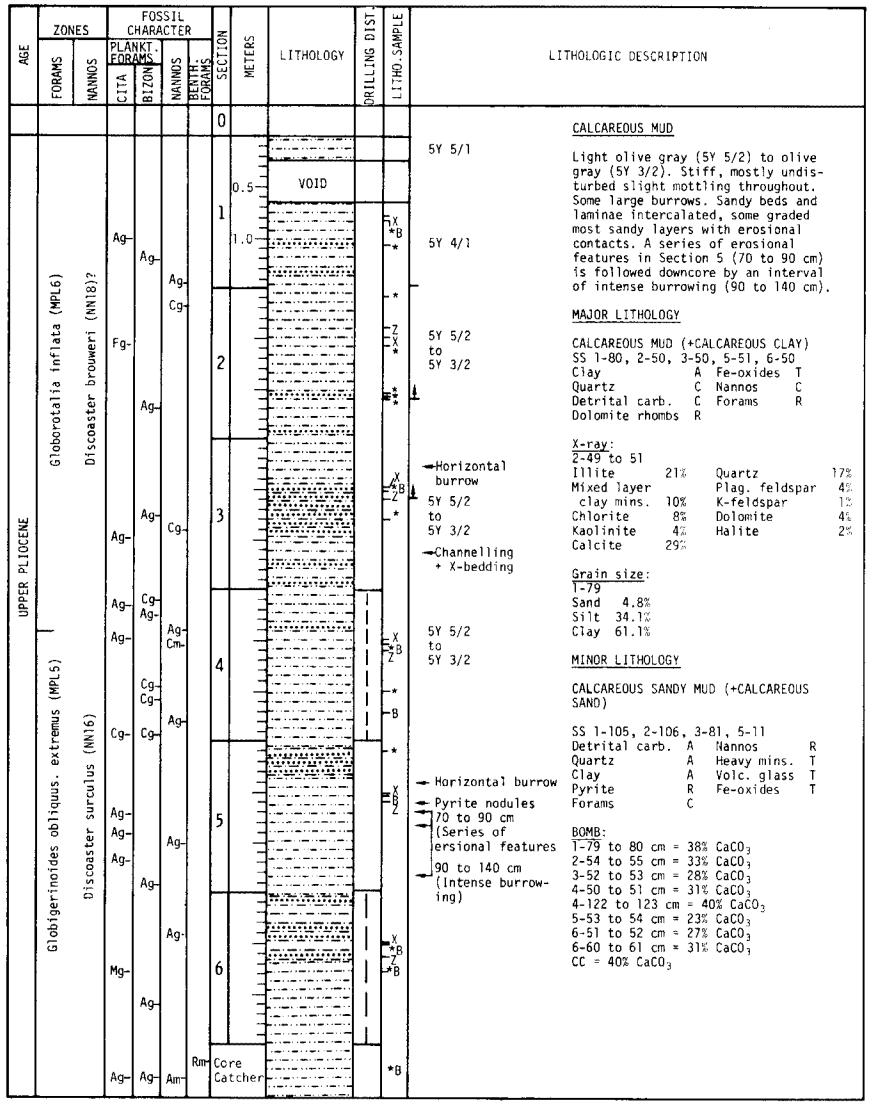
MINOR LITHOLOGY

CALCAREOUS SANDY MUD
SS 2-103, 3-78.6

Quartz	A	Forams	R
Detrital carb.	C	Plant remains	T
Clay	C	Pyrite	T
Nannos	R		

BOMB:
1-110 to 111 cm = 35% $CaCO_3$
1-124 to 125 cm = 30% $CaCO_3$
2-51 to 52 cm = 27% $CaCO_3$
2-120 to 121 cm = 34% $CaCO_3$
3-50 to 51 cm = 34% $CaCO_3$
3-78 to 79 cm = 25% $CaCO_3$
CC = 42% $CaCO_3$

Site 371 Hole Core 3 Cored Interval: 361.0-370.0 m



CALCAREOUS MUD

Light olive gray (5Y 5/2) to olive gray (5Y 3/2). Stiff, mostly undisturbed slight mottling throughout. Some large burrows. Sandy beds and laminae intercalated, some graded most sandy layers with erosional contacts. A series of erosional features in Section 5 (70 to 90 cm) is followed downcore by an interval of intense burrowing (90 to 140 cm).

MAJOR LITHOLOGY

CALCAREOUS MUD (+CALCAREOUS CLAY)
SS 1-80, 2-50, 3-50, 5-51, 6-50

Clay	A	Fe-oxides	T
Quartz	C	Nannos	C
Detrital carb.	C	Forams	R
Dolomite rhombs	R		

X-ray:
2-49 to 51

Illite	21%	Quartz	17%
Mixed layer clay mins.	10%	Plag. feldspar	4%
Chlorite	8%	K-feldspar	1%
Kaolinite	4%	Dolomite	4%
Calcite	29%	Halite	2%

Grain size:
1-79
Sand 4.8%
Silt 34.1%
Clay 61.1%

MINOR LITHOLOGY

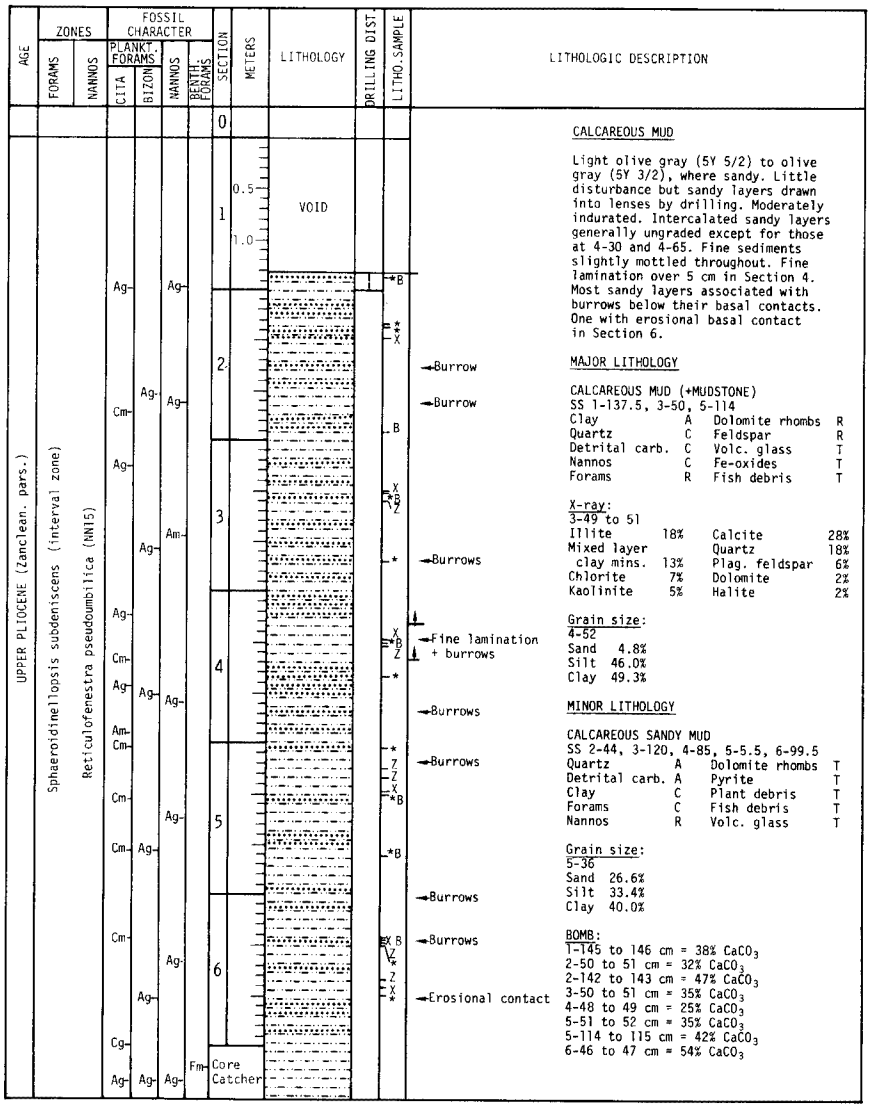
CALCAREOUS SANDY MUD (+CALCAREOUS SAND)

SS 1-105, 2-106, 3-81, 5-11

Detrital carb.	A	Nannos	R
Quartz	A	Heavy mins.	T
Clay	A	Volc. glass	T
Pyrite	R	Fe-oxides	T
Forams	C		

BOMB:
1-79 to 80 cm = 38% $CaCO_3$
2-54 to 55 cm = 33% $CaCO_3$
3-52 to 53 cm = 28% $CaCO_3$
4-50 to 51 cm = 31% $CaCO_3$
4-122 to 123 cm = 40% $CaCO_3$
5-53 to 54 cm = 23% $CaCO_3$
6-51 to 52 cm = 27% $CaCO_3$
6-60 to 61 cm = 31% $CaCO_3$
CC = 40% $CaCO_3$

Site 371 Hole Core 4 Cored Interval: 408.5-418.0 m



CALCAREOUS MUD

Light olive gray (5Y 5/2) to olive gray (5Y 3/2), where sandy. Little disturbance but sandy layers drawn into lenses by drilling. Moderately indurated. Intercalated sandy layers generally ungraded except for those at 4-30 and 4-65. Fine sediments slightly mottled throughout. Fine lamination over 5 cm in Section 4. Most sandy layers associated with burrows below their basal contacts. One with erosional basal contact in Section 6.

MAJOR LITHOLOGY

CALCAREOUS MUD (+MUDSTONE)
SS 1-137.5, 3-50, 5-114

Clay	A	Dolomite rhombs	R
Quartz	C	Feldspar	R
Detrital carb.	C	Volc. glass	T
Nannos	C	Fe-oxides	T
Forams	R	Fish debris	T

X-ray:
3-49 to 51

Illite	18%	Calcite	28%
Mixed layer clay mins.	13%	Quartz	18%
Chlorite	7%	Plag. feldspar	6%
Kaolinite	5%	Dolomite	2%
		Halite	2%

Grain size:
4-52
Sand 4.8%
Silt 46.0%
Clay 49.3%

MINOR LITHOLOGY

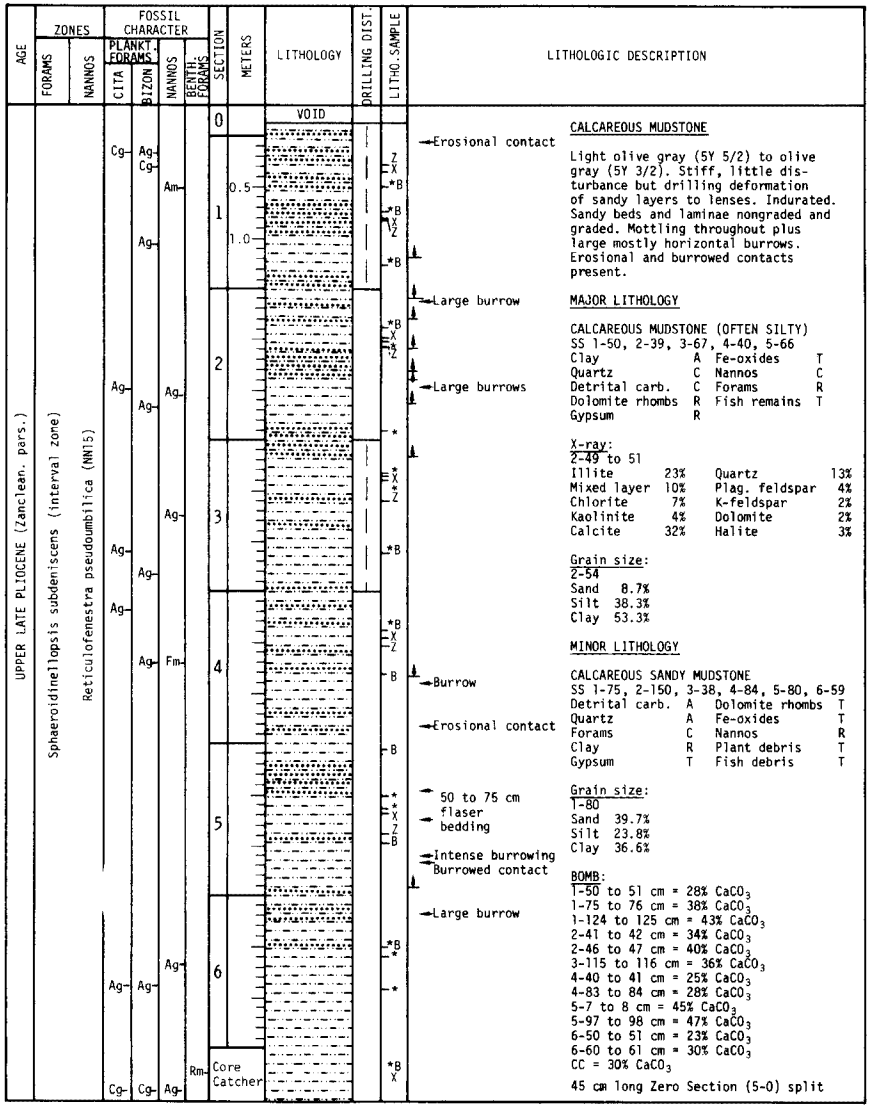
CALCAREOUS SANDY MUD
SS 2-44, 3-120, 4-85, 5-5.5, 6-99.5

Quartz	A	Dolomite rhombs	T
Detrital carb.	A	Pyrite	T
Clay	C	Plant debris	T
Forams	C	Fish debris	T
Nannos	R	Volc. glass	T

Grain size:
5-36
Sand 26.6%
Silt 33.4%
Clay 40.0%

BOMB:
1-145 to 146 cm = 38% $CaCO_3$
2-50 to 51 cm = 32% $CaCO_3$
2-142 to 143 cm = 47% $CaCO_3$
3-50 to 51 cm = 35% $CaCO_3$
4-48 to 49 cm = 25% $CaCO_3$
5-51 to 52 cm = 35% $CaCO_3$
5-114 to 115 cm = 42% $CaCO_3$
6-46 to 47 cm = 54% $CaCO_3$

Site 371 Hole Core 5 Cored Interval: 465.5-475.0 m



Erosional contact

CALCAREOUS MUDSTONE

Light olive gray (5Y 5/2) to olive gray (5Y 3/2). Stiff, little disturbance but drilling deformation of sandy layers to lenses. Indurated. Sandy beds and laminae nongraded and graded. Mottling throughout plus large mostly horizontal burrows. Erosional and burrowed contacts present.

Large burrow

MAJOR LITHOLOGY

CALCAREOUS MUDSTONE (OFTEN SILTY)
SS 1-50, 2-39, 3-67, 4-40, 5-66

Clay	A	Fe-oxides	T
Quartz	C	Nannos	C
Detrital carb.	C	Forams	R
Dolomite rhombs	R	Fish remains	T
Gypsum	R		

Large burrows

X-ray:
2-49 to 51

Illite	23%	Quartz	13%
Mixed layer	10%	Plag. feldspar	4%
Chlorite	7%	K-feldspar	2%
Kaolinite	4%	Dolomite	2%
Calcite	32%	Halite	3%

Grain size:
2-54

Sand	8.7%
Silt	38.3%
Clay	53.3%

MINOR LITHOLOGY

CALCAREOUS SANDY MUDSTONE
SS 1-75, 2-150, 3-38, 4-84, 5-80, 6-59

Detrital carb.	A	Dolomite rhombs	T
Quartz	A	Fe-oxides	T
Forams	C	Nannos	R
Clay	R	Plant debris	T
Gypsum	T	Fish debris	T

Burrow

Erosional contact

50 to 75 cm flaser bedding

Grain size:
1-80

Sand	39.7%
Silt	23.8%
Clay	36.6%

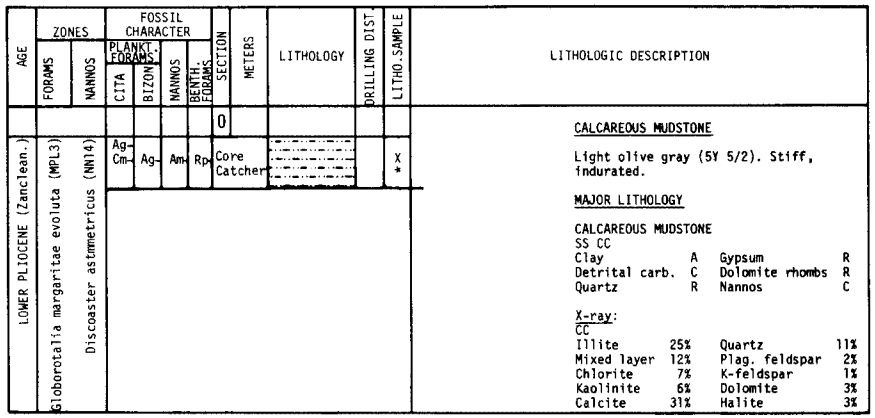
Intense burrowing
Burrowed contact

Large burrow

BOMB:
1-50 to 51 cm = 28% $CaCO_3$
1-75 to 76 cm = 38% $CaCO_3$
1-124 to 125 cm = 43% $CaCO_3$
2-41 to 42 cm = 34% $CaCO_3$
2-46 to 47 cm = 40% $CaCO_3$
3-115 to 116 cm = 36% $CaCO_3$
4-40 to 41 cm = 25% $CaCO_3$
4-83 to 84 cm = 28% $CaCO_3$
5-7 to 8 cm = 45% $CaCO_3$
5-97 to 98 cm = 47% $CaCO_3$
6-50 to 51 cm = 23% $CaCO_3$
6-60 to 61 cm = 30% $CaCO_3$
CC = 30% $CaCO_3$

45 cm long Zero Section (5-0) split

Site 371 Hole Core 6 Cored Interval: 513.0-518.0 m



CALCAREOUS MUDSTONE

Light olive gray (5Y 5/2). Stiff, indurated.

MAJOR LITHOLOGY

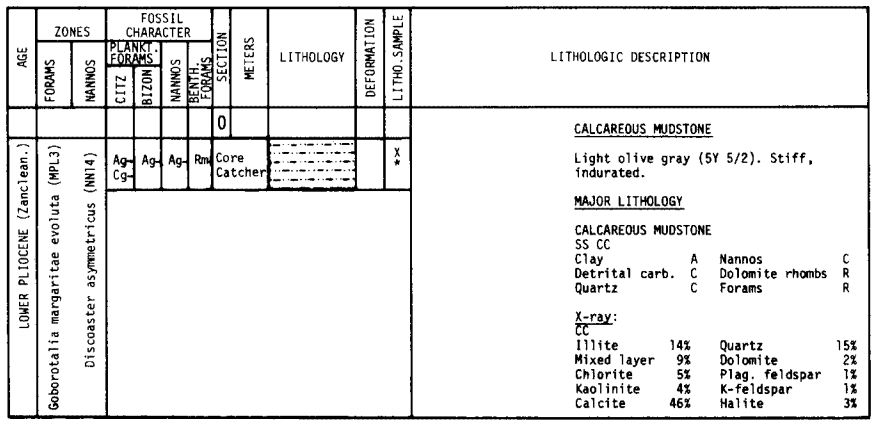
CALCAREOUS MUDSTONE
SS CC

Clay	A	Gypsum	R
Detrital carb.	C	Dolomite rhombs	R
Quartz	R	Nannos	C

X-ray:
CC

Illite	25%	Quartz	11%
Mixed layer	12%	Plag. feldspar	2%
Chlorite	7%	K-feldspar	1%
Kaolinite	6%	Dolomite	3%
Calcite	31%	Halite	3%

Site 371 Hole Core 7 Cored Interval: 522.5-527.0 m



CALCAREOUS MUDSTONE

Light olive gray (5Y 5/2). Stiff, indurated.

MAJOR LITHOLOGY

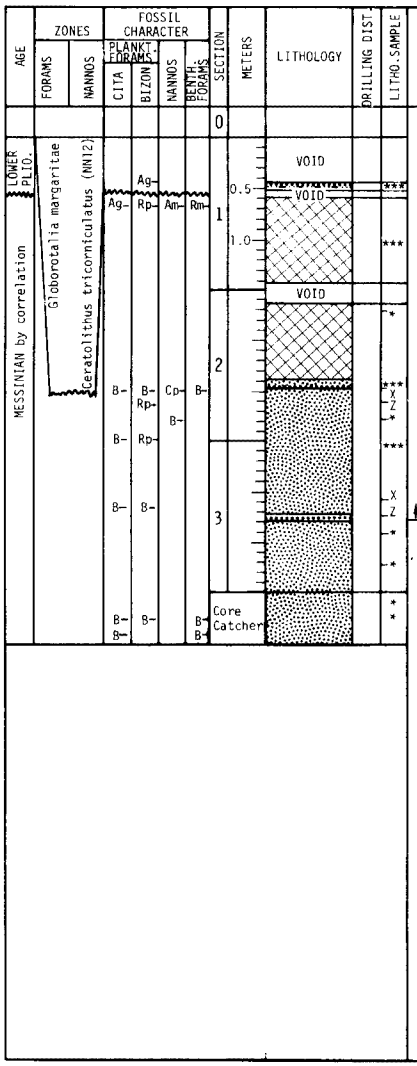
CALCAREOUS MUDSTONE
SS CC

Clay	A	Nannos	C
Detrital carb.	C	Dolomite rhombs	R
Quartz	C	Forams	R

X-ray:
CC

Illite	14%	Quartz	15%
Mixed layer	9%	Dolomite	2%
Chlorite	5%	Plag. feldspar	1%
Kaolinite	4%	K-feldspar	1%
Calcite	46%	Halite	3%

Site 371 Hole Core 8 Cored Interval: 546.0-551.0 m



LITHOLOGIC DESCRIPTION

ANHYDRITE (1-45 cm to 2-95 cm) ABOVE GYPSIFEROUS MUDSTONE

White (N9), hard, fragmented laminated 55-80 cm (Section 1) and 70-91 cm (Section 2). "Chicken wire' structure 1-80 cm to 2-70 cm.

SANDY AND SILTY DOLOMITIC, GYPSIFEROUS MUDSTONE (2-95 cm to 3-150 cm and CC)

Dusky yellowish brown (10YR 2/2) to dark yellowish brown (10YR 4/2). Stiff to hard, indurated, sandy layers washed by drilling. Also anhydrite layers 2-3 cm thick.

MAJOR LITHOLOGIES

ANHYDRITE (1-45 cm to 2-95 cm)

SANDY AND SILTY DOLOMITIC, GYPSIFEROUS MUDSTONE (2-95 cm to 3-150 cm and CC)
SS 2-100, 3-17, 3-125.5

Clay	A	Dolomite rhombs	C
Quartz	R	Gypsum	C
Detrital carb.	C	Fe-oxides	R

X-ray:
3-59 to 61

Illite	9%	Calcite	15%
Mixed layer	11%	Dolomite	13%
Chlorite	11%	Plag. feldspar	7%
Kaolinite	4%	K-feldspar	3%
Quartz	27%	Halite	3%

MINOR LITHOLOGIES

ABOVE ANHYDRITE:
CALCAREOUS MUDSTONE SS 1-46, 1-52

Clay	A	Nannos	C
Detrital carb.	C	Forams	R
Dolomite rhombs	R	Fe-oxides	R
Gypsum	R		

CALCAREOUS SAND SS 1-48

Detrital carb. (R.F.)	A	Nannos	C
Gypsum	C	Forams	R
Dolomite rhombs	C		

LAYERS AND SEAMS WITHIN ANHYDRITE (LAYERS MAY BE EMPLACED BY DRILLING):
DOLOMITIC MUDSTONE SS 1-70, 2-23

Clay	D	Gypsum	R
Dolomite	C	Forams	R
Detrital carb.	R	Plant debris	T
Fe-oxides	R	Pyrite	T
Anhydrite	R		

BELOW ANHYDRITE:
DOLOMITIC SANDY MUD SS 2-93.5

Dolomite	A	Fe-oxides	R
Clay	C	Quartz	R
Detrital carb.	R	Forams	R
Gypsum	R		

DEEP SEA DRILLING PROJECT

LEG 42A SITE 372 (HOLES 372A)

SITE SUMMARY SHEET

POSITION: Latitude: 40°01.86'N Longitude: 04°47.79'E (Site 372)
40°01.90'N 04°47.79'E (Site 372A)

Water depth (sea level): 2699 (Site 372) corrected meters, echo sounding
2695 (Site 372A) corrected meters, echo sounding

Bottom felt at: 2734 meters, drill pipe Penetration: 885 (Site 372) meters
154.5 (Site 372A) meters

Number of Holes: 2 Number of cores: 46 (all Site 372)

Total core recovered: 315.9 meters Percentage core recovery: 73.3%

OLDEST SEDIMENT CORED:

Depth subbottom: 885.0 meters Nature: Mudstone

Age: Lower Miocene

BASEMENT: Not reached

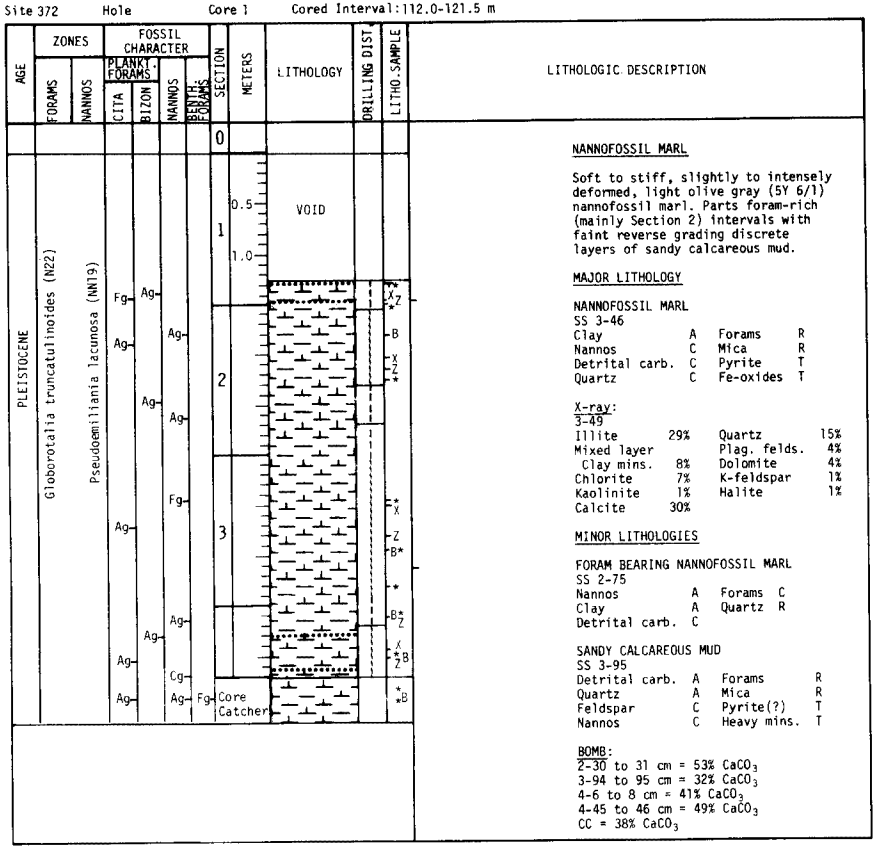
PRINCIPAL RESULTS:

Site 372 on the East Menorca Rise penetrated four lithologic units. They are:

Unit 1. Plio-Quaternary marls
Unit 2. Upper Miocene gypsum and dolomitic marls
Unit 3. Lower to middle Miocene marlstones to marls
Unit 4. Lower Miocene mudstones

Although basement was not reached, extrapolation on the basis of sedimentation-rate suggests that the earliest sediments deposited on the Menorca Rise should be lowermost Miocene to Oligocene in age. The mudstones and marls of Units 1, 3, and 4 are marine in type. All except perhaps the lowest sediments yielded benthonic foraminifera indicative deposition at mid-bathyal depths (generally greater than 1000 meters). A remarkable faunal transition (over less than one meter) from normal marine bathyal to shallow lagoonal sediments (300-500 meters depth) occurs at the base of Unit 2. The evaporites were deposited in (possibly even shallower) restricted subaqueous environments. Conditions returned to normal marine (bathyal) in the lower Pliocene Unit 1. The Site 373A offset drilled for heat flow measurements only showed that heat flow through the Balearic Basin is about 1.5 times the mean global heat flux.

Site 372 Hole Core 1 Cored Interval:112.0-121.5 m



NANNOFOSSIL MARL

Soft to stiff, slightly to intensely deformed, light olive gray (5Y 6/1) nannofossil marl. Parts foram-rich (mainly Section 2) intervals with faint reverse grading discrete layers of sandy calcareous mud.

MAJOR LITHOLOGY

NANNOFOSSIL MARL
SS 3-46

Clay	A	Forams	R
Nannos	C	Mica	R
Detrital carb.	C	Pyrite	T
Quartz	C	Fe-oxides	T

X-ray:
3-49

Illite	29%	Quartz	15%
Mixed layer clay mins.	8%	Plag. felds.	4%
Chlorite	7%	Dolomite	4%
Kaolinite	1%	K-feldspar	1%
Calcite	30%	Halite	1%

MINOR LITHOLOGIES

FORAM BEARING NANNOFOSSIL MARL
SS 2-75

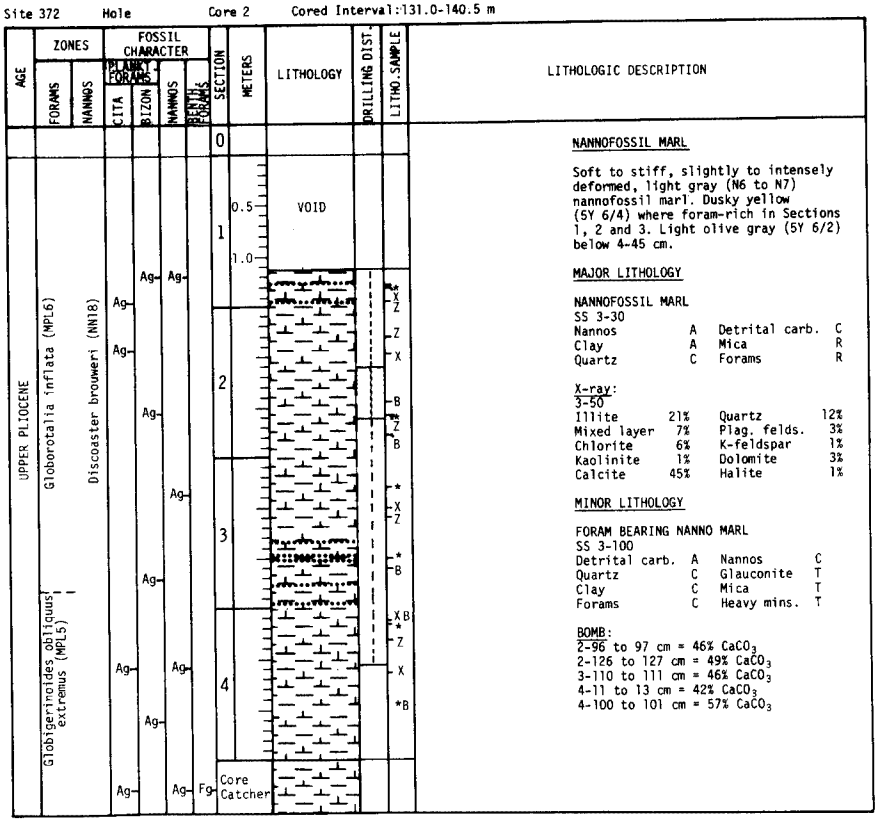
Nannos	A	Forams	C
Clay	A	Quartz	R
Detrital carb.	C		

SANDY CALCAREOUS MUD
SS 3-95

Detrital carb.	A	Forams	R
Quartz	A	Mica	R
Feldspar	C	Pyrite(?)	T
Nannos	C	Heavy mins.	T

BOMB:
2-30 to 31 cm = 53% $CaCO_3$
3-94 to 95 cm = 32% $CaCO_3$
4-6 to 8 cm = 41% $CaCO_3$
4-45 to 46 cm = 49% $CaCO_3$
CC = 38% $CaCO_3$

Site 372 Hole Core 2 Cored Interval:131.0-140.5 m



NANNOFOSSIL MARL

Soft to stiff, slightly to intensely deformed, light gray (N6 to N7) nannofossil marl. Dusky yellow (5Y 6/4) where foram-rich in Sections 1, 2 and 3. Light olive gray (5Y 6/2) below 4-45 cm.

MAJOR LITHOLOGY

NANNOFOSSIL MARL
SS 3-30

Nannos	A	Detrital carb.	C
Clay	A	Mica	R
Quartz	C	Forams	R

X-ray:
3-50

Illite	21%	Quartz	12%
Mixed layer	7%	Plag. felds.	3%
Chlorite	6%	K-feldspar	1%
Kaolinite	1%	Dolomite	3%
Calcite	45%	Halite	1%

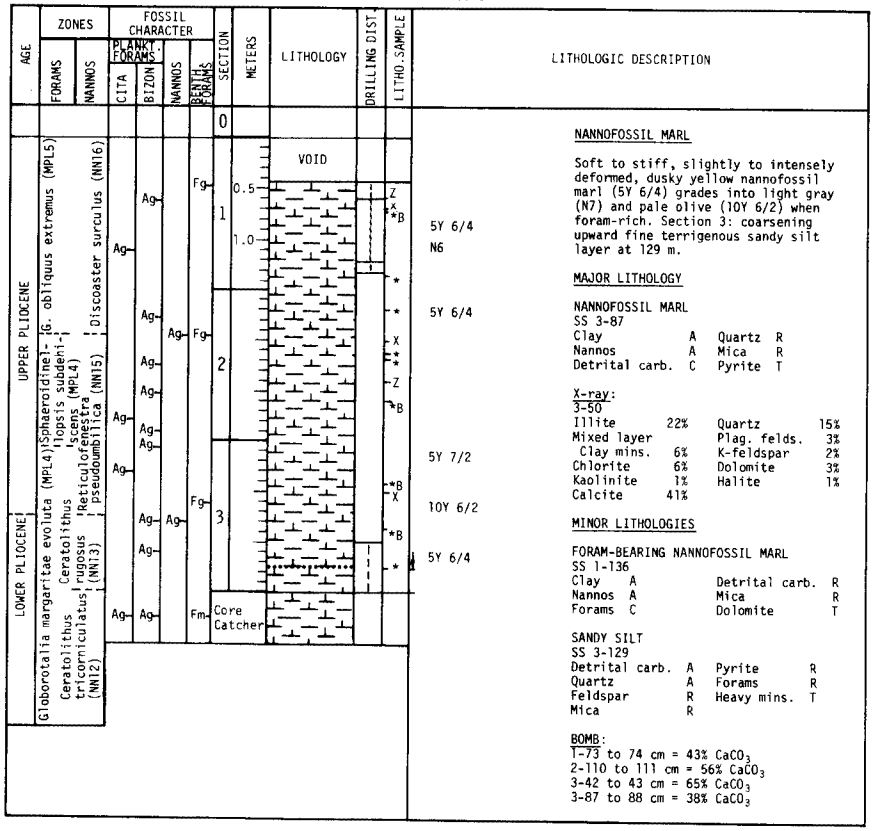
MINOR LITHOLOGY

FORAM BEARING NANNO MARL
SS 3-100

Detrital carb.	A	Nannos	C
Quartz	C	Glauconite	T
Clay	C	Mica	T
Forams	C	Heavy mins.	T

BOMB:
2-96 to 97 cm = 46% $CaCO_3$
2-126 to 127 cm = 49% $CaCO_3$
3-110 to 111 cm = 46% $CaCO_3$
4-11 to 13 cm = 42% $CaCO_3$
4-100 to 101 cm = 57% $CaCO_3$

Site 372 Hole Core 3 Cored Interval: 140.5-150.0 m



LITHOLOGIC DESCRIPTION

NANNOFOSSIL MARL

Soft to stiff, slightly to intensely deformed, dusky yellow nannofossil marl (5Y 6/4) grades into light gray (N7) and pale olive (10Y 6/2) when foram-rich. Section 3: coarsening upward fine terrigenous sandy silt layer at 129 m.

MAJOR LITHOLOGY

NANNOFOSSIL MARL
SS 3-87

Clay	A	Quartz	R
Nannos	A	Mica	R
Detrital carb.	C	Pyrite	T

X-ray:
3-50

Illite	22%	Quartz	15%
Mixed layer Clay mins.	6%	Plag. felds.	3%
Chlorite	6%	K-feldspar	2%
Kaolinite	1%	Dolomite	3%
Calcite	41%	Halite	1%

MINOR LITHOLOGIES

FORAM-BEARING NANNOFOSSIL MARL
SS 1-136

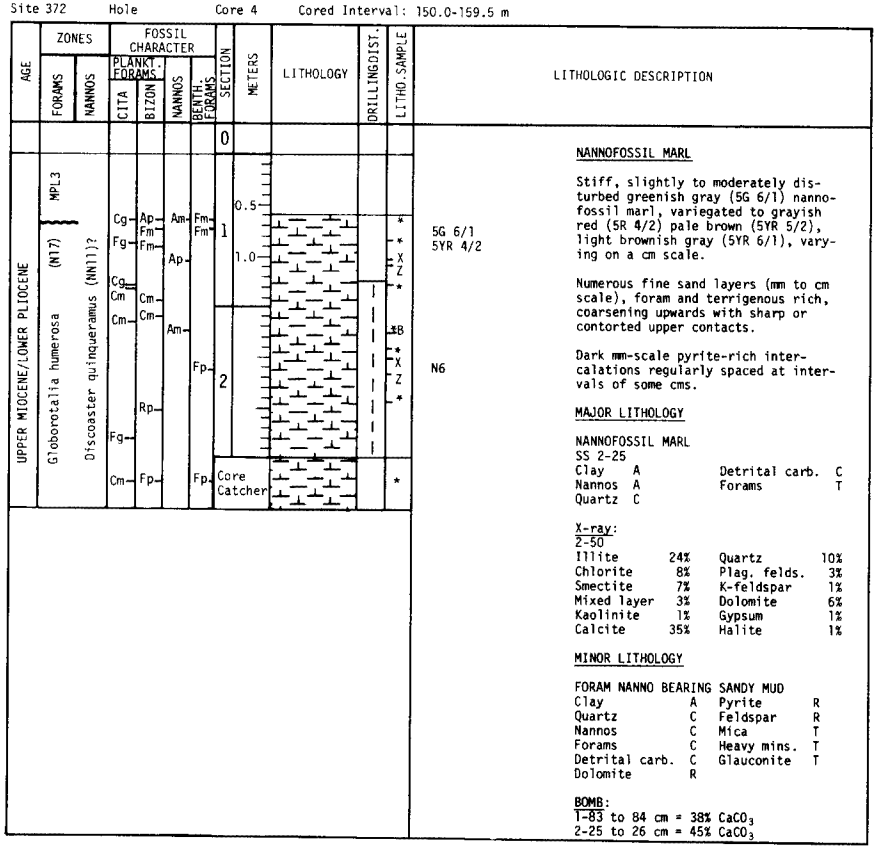
Clay	A	Detrital carb.	R
Nannos	A	Mica	R
Forams	C	Dolomite	T

SANDY SILT
SS 3-129

Detrital carb.	A	Pyrite	R
Quartz	A	Forams	R
Feldspar	R	Heavy mins.	T
Mica	R		

BOMB:
1-73 to 74 cm = 43% $CaCO_3$
2-110 to 111 cm = 56% $CaCO_3$
3-42 to 43 cm = 65% $CaCO_3$
3-87 to 88 cm = 38% $CaCO_3$

Site 372 Hole Core 4 Cored Interval: 150.0-159.5 m



LITHOLOGIC DESCRIPTION

NANNOFOSSIL MARL

Stiff, slightly to moderately disturbed greenish gray (5G 6/1) nannofossil marl, variegated to grayish red (5R 4/2) pale brown (5YR 5/2), light brownish gray (5YR 6/1), varying on a cm scale.

Numerous fine sand layers (mm to cm scale), foram and terrigenous rich, coarsening upwards with sharp or contorted upper contacts.

Dark mm-scale pyrite-rich intercalations regularly spaced at intervals of some cms.

MAJOR LITHOLOGY

NANNOFOSSIL MARL
SS 2-25

Clay	A	Detrital carb.	C
Nannos	A	Forams	T
Quartz	C		

X-ray:
2-50

Illite	24%	Quartz	10%
Chlorite	8%	Plag. felds.	3%
Smectite	7%	K-feldspar	1%
Mixed layer	3%	Dolomite	6%
Kaolinite	1%	Gypsum	1%
Calcite	35%	Halite	1%

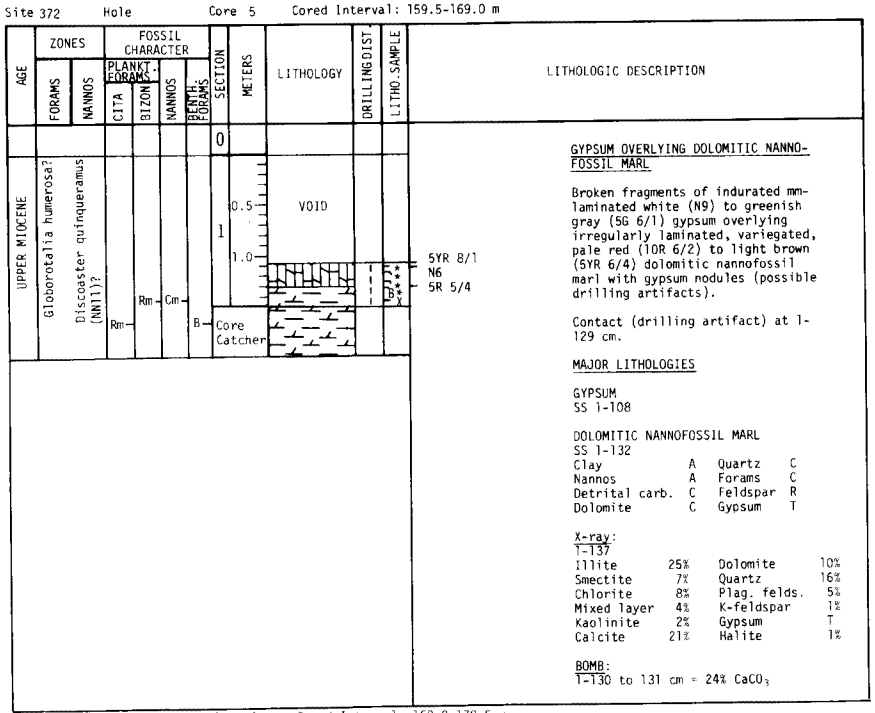
MINOR LITHOLOGY

FORAM NANNO BEARING SANDY MUD

Clay	A	Pyrite	R
Quartz	C	Feldspar	R
Nannos	C	Mica	T
Forams	C	Heavy mins.	T
Detrital carb.	C	Glauconite	T
Dolomite	R		

BOMB:
1-83 to 84 cm = 38% $CaCO_3$
2-25 to 26 cm = 45% $CaCO_3$

Site 372 Hole Core 5 Cored Interval: 159.5-169.0 m



GYPSUM OVERLYING DOLOMITIC NANNOFOSSIL MARL

Broken fragments of indurated mm-laminated white (N9) to greenish gray (5G 6/1) gypsum overlying irregularly laminated, variegated, pale red (10R 6/2) to light brown (5YR 6/4) dolomitic nannofossil marl with gypsum nodules (possible drilling artifacts).

Contact (drilling artifact) at 1-129 cm.

MAJOR LITHOLOGIES

GYPSUM
SS 1-108

DOLOMITIC NANNOFOSSIL MARL
SS 1-132

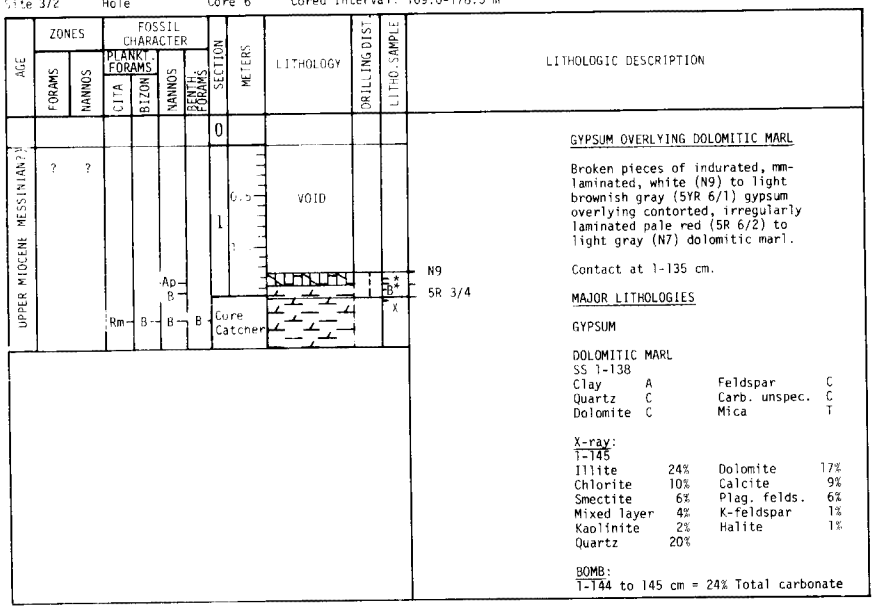
Clay	A	Quartz	C
Nannos	A	Forams	C
Detrital carb.	C	Feldspar	R
Dolomite	C	Gypsum	T

X-ray:
1-137

Illite	25%	Dolomite	10%
Smectite	7%	Quartz	16%
Chlorite	8%	Plag. felds.	5%
Mixed layer	4%	K-feldspar	1%
Kaolinite	2%	Gypsum	T
Calcite	21%	Halite	1%

BOMB:
1-130 to 131 cm = 24% $CaCO_3$

Site 372 Hole Core 6 Cored Interval: 169.0-178.5 m



GYPSUM OVERLYING DOLOMITIC MARL

Broken pieces of indurated, mm-laminated, white (N9) to light brownish gray (5YR 6/1) gypsum overlying contorted, irregularly laminated pale red (5R 6/2) to light gray (N7) dolomitic marl.

Contact at 1-135 cm.

MAJOR LITHOLOGIES

GYPSUM

DOLOMITIC MARL
SS 1-138

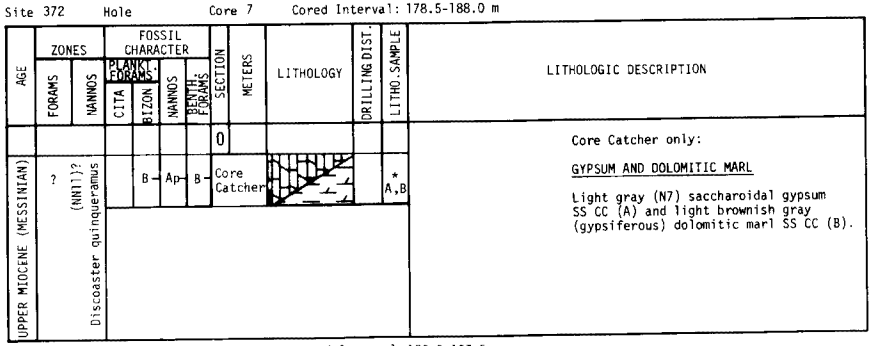
Clay	A	Feldspar	C
Quartz	C	Carb. unspec.	C
Dolomite	C	Mica	T

X-ray:
1-145

Illite	24%	Dolomite	17%
Chlorite	10%	Calcite	9%
Smectite	6%	Plag. felds.	6%
Mixed layer	4%	K-feldspar	1%
Kaolinite	2%	Halite	1%
Quartz	20%		

BOMB:
1-144 to 145 cm = 24% Total carbonate

Site 372 Hole Core 7 Cored Interval: 178.5-188.0 m

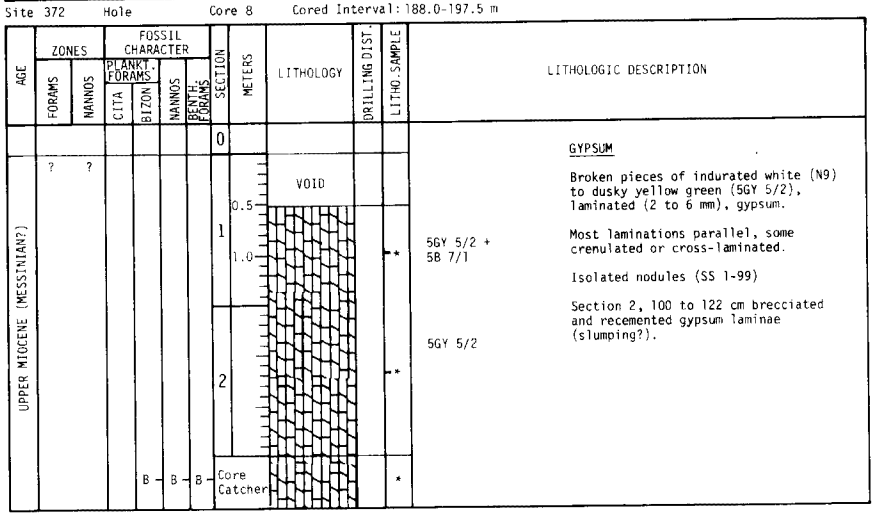


Core Catcher only:

GYPSUM AND DOLOMITIC MARL

Light gray (N7) saccharoidal gypsum SS CC (A) and light brownish gray (gypsiferous) dolomitic marl SS CC (B).

Site 372 Hole Core 8 Cored Interval: 188.0-197.5 m



GYPSUM

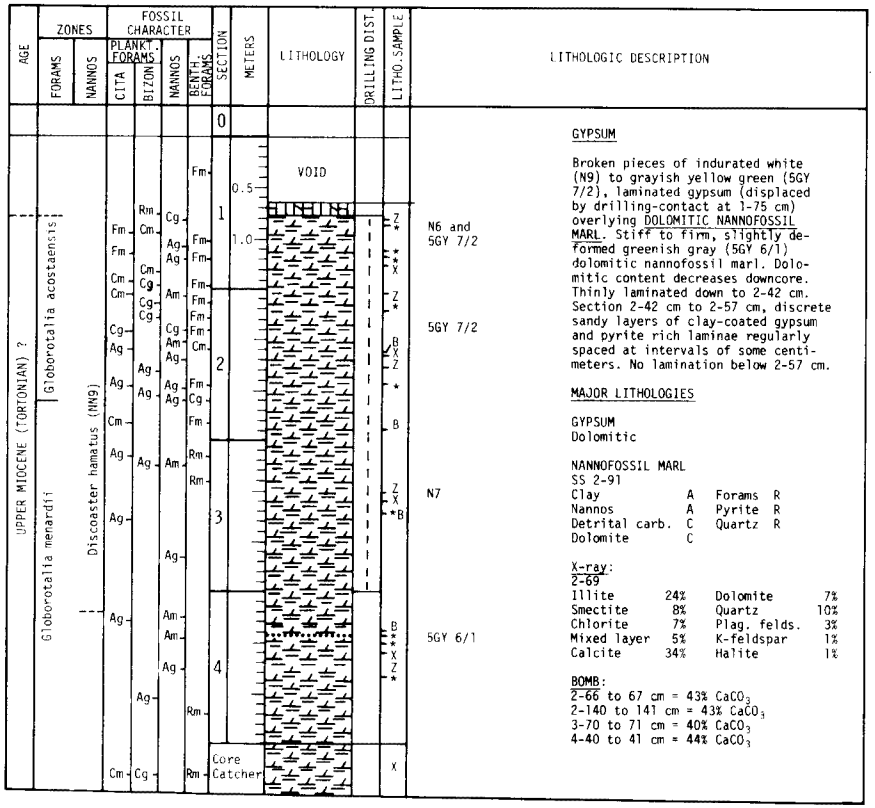
Broken pieces of indurated white (N9) to dusky yellow green (5GY 5/2), laminated (2 to 6 mm), gypsum.

Most laminations parallel, some crenulated or cross-laminated.

Isolated nodules (SS 1-99)

Section 2, 100 to 122 cm brecciated and recemented gypsum laminae (slumping?).

Site 372 Hole Core 9 Cored Interval: 197.5-207.0 m



LITHOLOGIC DESCRIPTION

GYPSUM

Broken pieces of indurated white (N9) to grayish yellow green (5GY 7/2), laminated gypsum (displaced by drilling-contact at 1-75 cm) overlying DOLOMITIC NANNOFOSSIL MARL. Stiff to firm, slightly deformed greenish gray (5GY 6/1) dolomitic nannofossil marl. Dolomitic content decreases downcore. Thinly laminated down to 2-42 cm. Section 2-42 cm to 2-57 cm, discrete sandy layers of clay-coated gypsum and pyrite rich laminae regularly spaced at intervals of some centimeters. No lamination below 2-57 cm.

MAJOR LITHOLOGIES

GYPSUM
Dolomitic

NANNOFOSSIL MARL
SS 2-91

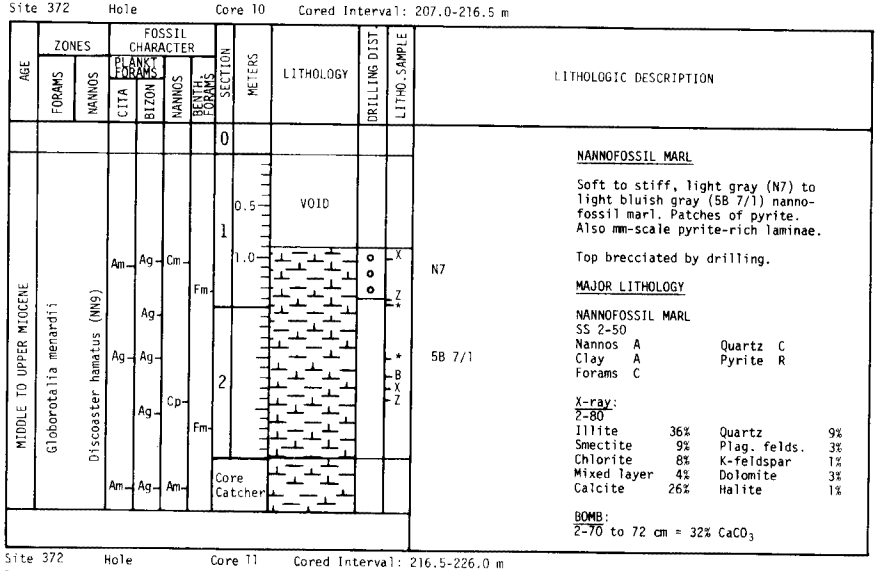
Clay	A	Forams	R
Nannos	A	Pyrite	R
Detrital carb.	C	Quartz	R
Dolomite	C		

X-ray:
2-69

Illite	24%	Dolomite	7%
Smectite	8%	Quartz	10%
Chlorite	7%	Plag. felds.	3%
Mixed layer	5%	K-feldspar	1%
Calcite	34%	Halite	1%

BOMB:
2-66 to 67 cm = 43% $CaCO_3$
2-140 to 141 cm = 43% $CaCO_3$
3-70 to 71 cm = 40% $CaCO_3$
4-40 to 41 cm = 44% $CaCO_3$

Site 372 Hole Core 10 Cored Interval: 207.0-216.5 m



LITHOLOGIC DESCRIPTION

NANNOFOSSIL MARL

Soft to stiff, light gray (N7) to light bluish gray (5B 7/1) nannofossil marl. Patches of pyrite. Also mm-scale pyrite-rich laminae.

Top brecciated by drilling.

MAJOR LITHOLOGY

NANNOFOSSIL MARL
SS 2-50

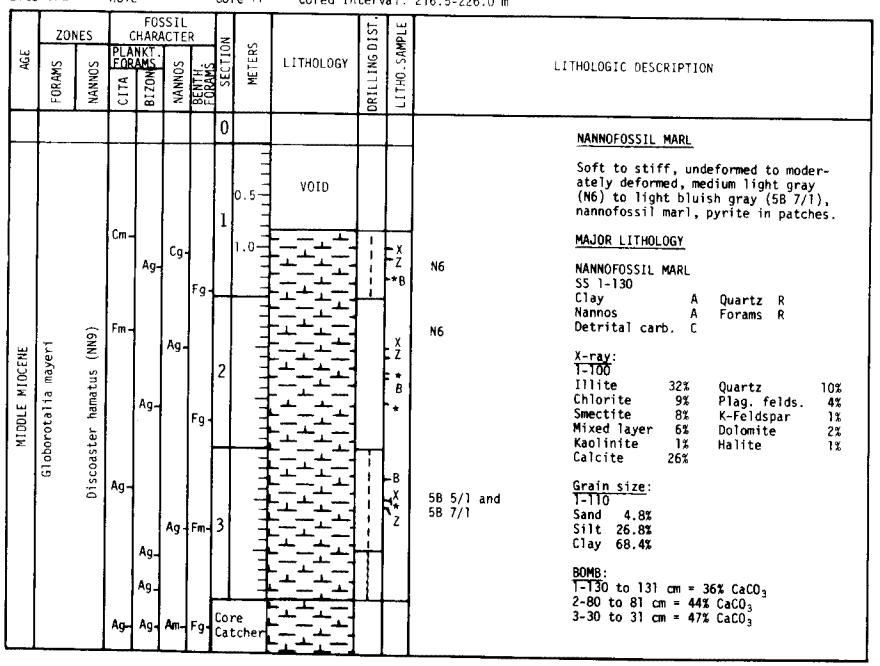
Nannos	A	Quartz	C
Clay	A	Pyrite	R
Forams	C		

X-ray:
2-80

Illite	36%	Quartz	9%
Smectite	9%	Plag. felds.	3%
Chlorite	8%	K-feldspar	1%
Mixed layer	4%	Dolomite	3%
Calcite	26%	Halite	1%

BOMB:
2-70 to 72 cm = 32% $CaCO_3$

Site 372 Hole Core 11 Cored Interval: 216.5-226.0 m



LITHOLOGIC DESCRIPTION

NANNOFOSSIL MARL

Soft to stiff, undeformed to moderately deformed, medium light gray (N6) to light bluish gray (5B 7/1), nannofossil marl, pyrite in patches.

MAJOR LITHOLOGY

NANNOFOSSIL MARL
SS 1-130

Clay	A	Quartz	R
Nannos	A	Forams	R
Detrital carb.	C		

X-ray:
1-100

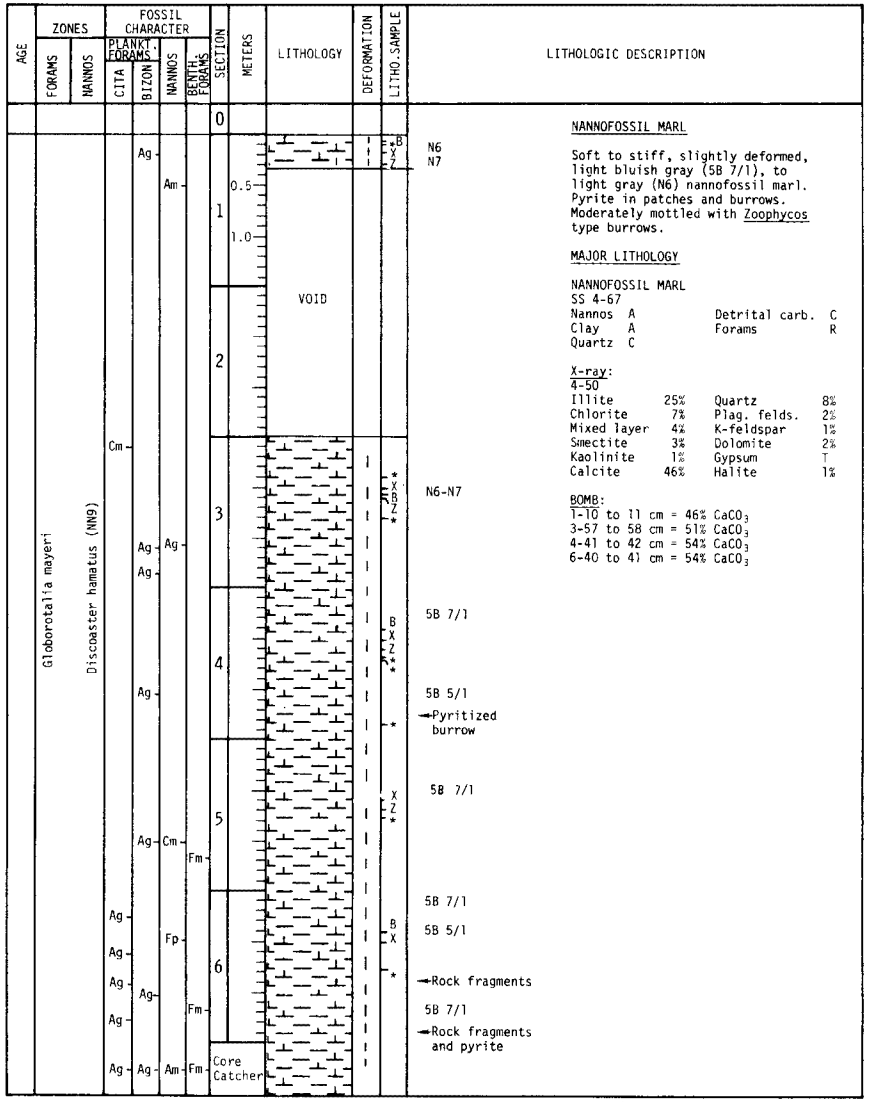
Illite	32%	Quartz	10%
Chlorite	9%	Plag. felds.	4%
Smectite	8%	K-Feldspar	1%
Mixed layer	6%	Dolomite	2%
Kaolinite	1%	Halite	1%
Calcite	26%		

Grain size:
1-110

Sand	4.8%
Silt	26.8%
Clay	68.4%

BOMB:
1-130 to 131 cm = 36% $CaCO_3$
2-80 to 81 cm = 44% $CaCO_3$
3-30 to 31 cm = 47% $CaCO_3$

Site 372 Hole Core 12 Cored Interval: 226.0-235.5 m



NANNOFOSSIL MARL

Soft to stiff, slightly deformed, light bluish gray (5B 7/1), to light gray (N6) nannofossil marl. Pyrite in patches and burrows. Moderately mottled with Zoophycos type burrows.

MAJOR LITHOLOGY

NANNOFOSSIL MARL
SS 4-67

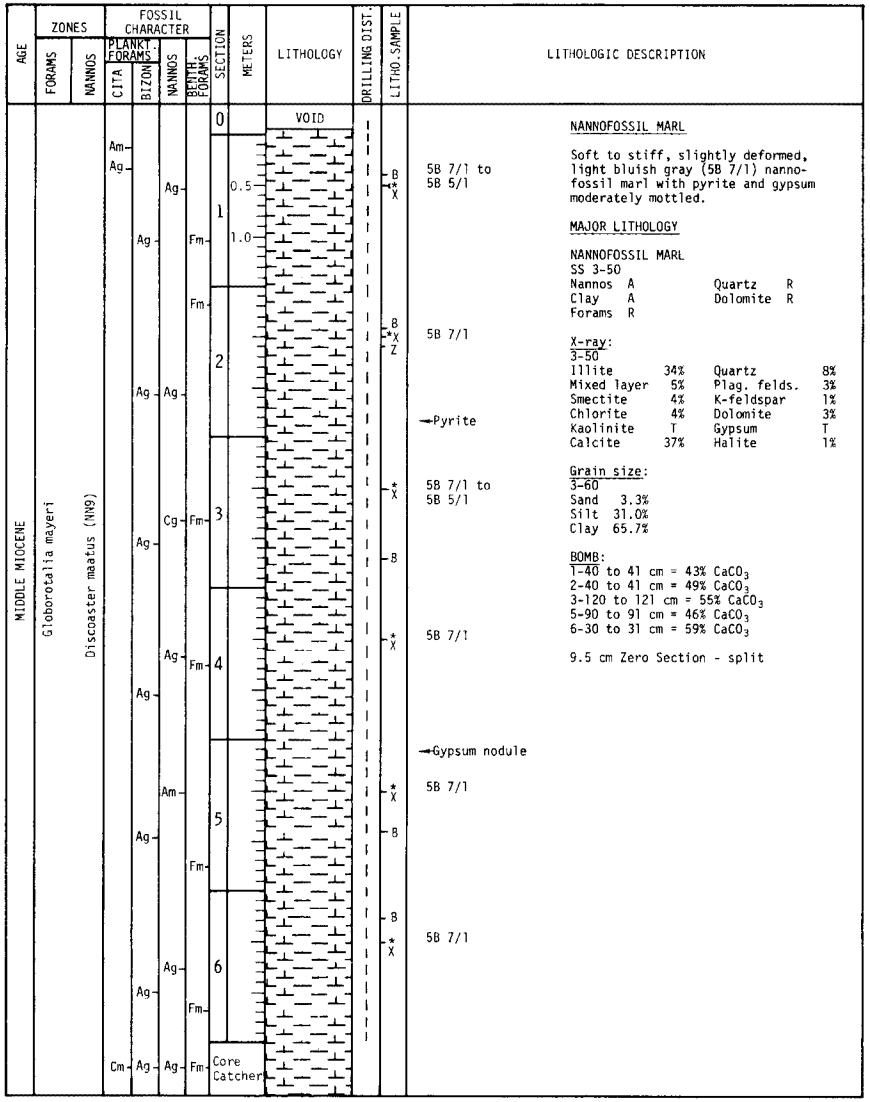
Nannos	A	Detrital carb.	C
Clay	A	Forams	R
Quartz	C		

X-ray:
4-50

Illite	25%	Quartz	8%
Chlorite	7%	Plag. felds.	2%
Mixed layer	4%	K-feldspar	1%
Smectite	3%	Dolomite	2%
Kaolinite	1%	Gypsum	T
Calcite	46%	Halite	1%

BOMB:
1-10 to 11 cm = 46% $CaCO_3$
3-57 to 58 cm = 51% $CaCO_3$
4-41 to 42 cm = 54% $CaCO_3$
6-40 to 41 cm = 54% $CaCO_3$

Site 372 Hole Core 13 Cored Interval:



NANNOFOSSIL MARL

Soft to stiff, slightly deformed, light bluish gray (5B 7/1) nannofossil marl with pyrite and gypsum moderately mottled.

MAJOR LITHOLOGY

NANNOFOSSIL MARL
SS 3-50

Nannos	A	Quartz	R
Clay	A	Dolomite	R
Forams	R		

X-ray:
3-50

Illite	34%	Quartz	8%
Mixed layer	5%	Plag. felds.	3%
Smectite	4%	K-feldspar	1%
Chlorite	4%	Dolomite	3%
Kaolinite	T	Gypsum	T
Calcite	37%	Halite	1%

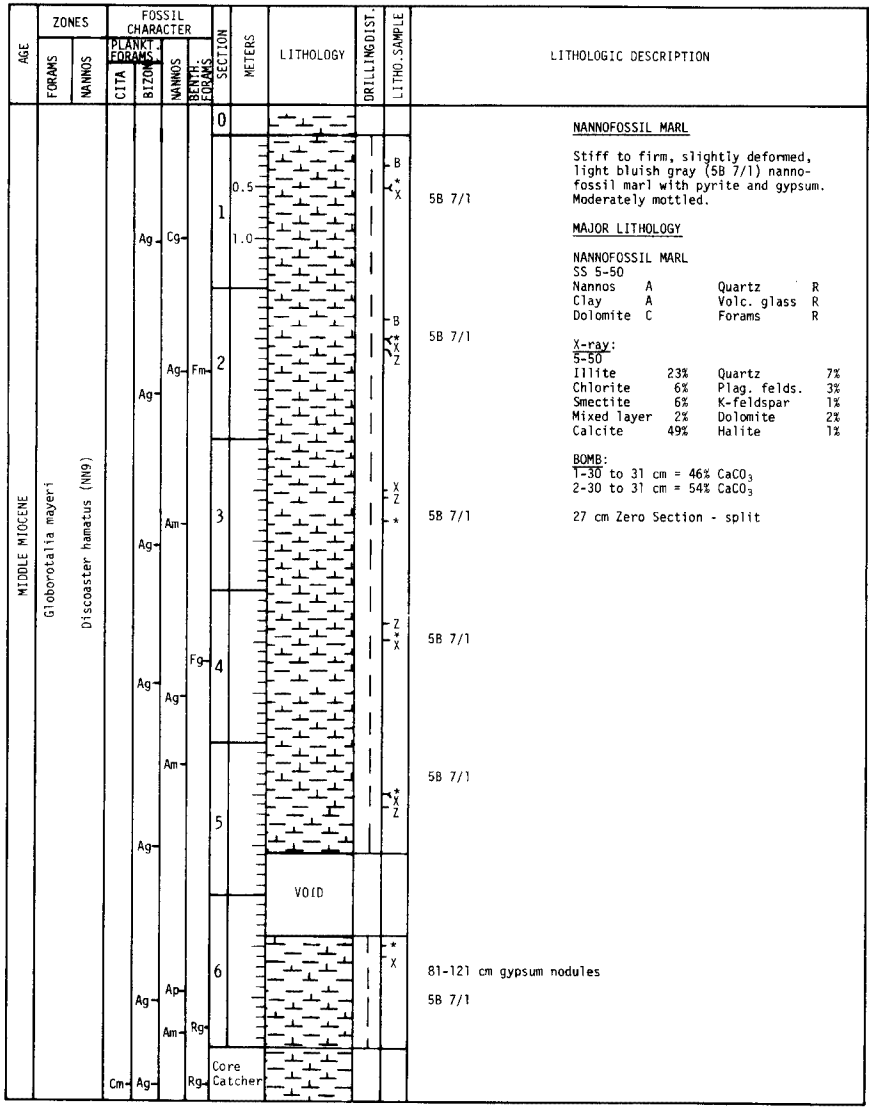
Grain size:
3-60

Sand	3.3%
Silt	31.0%
Clay	65.7%

BOMB:
1-40 to 41 cm = 43% $CaCO_3$
2-40 to 41 cm = 49% $CaCO_3$
3-120 to 121 cm = 55% $CaCO_3$
5-90 to 91 cm = 46% $CaCO_3$
6-30 to 31 cm = 59% $CaCO_3$

9.5 cm Zero Section - split

Site 372 Hole Core 14 Cored Interval: 245.0-254.5 m



NANNOFOSSIL MARL

Stiff to firm, slightly deformed, light bluish gray (5B 7/1) nannofossil marl with pyrite and gypsum. Moderately mottled.

MAJOR LITHOLOGY

NANNOFOSSIL MARL
SS 5-50

Nannos	A	Quartz	R
Clay	A	Volc. glass	R
Dolomite	C	Forams	R

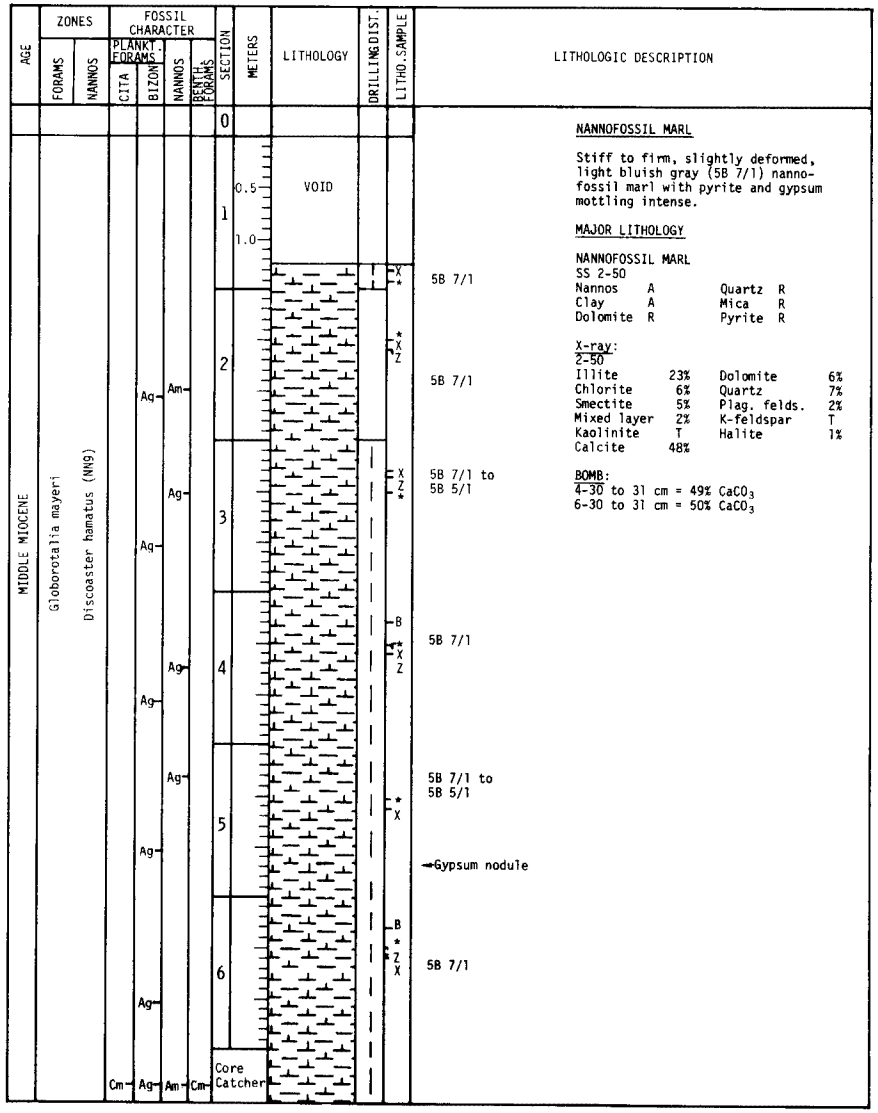
X-ray:
5-50

Illite	23%	Quartz	7%
Chlorite	6%	Plag. felds.	3%
Smectite	6%	K-feldspar	1%
Mixed layer	2%	Dolomite	2%
Calcite	49%	Halite	1%

BOMB:
1-30 to 31 cm = 46% $CaCO_3$
2-30 to 31 cm = 54% $CaCO_3$

27 cm Zero Section - split

Site 372 Hole Core 15 Cored Interval: 254.5-264.0 m



NANNOFOSSIL MARL

Stiff to firm, slightly deformed, light bluish gray (5B 7/1) nannofossil marl with pyrite and gypsum mottling intense.

MAJOR LITHOLOGY

NANNOFOSSIL MARL
SS 2-50

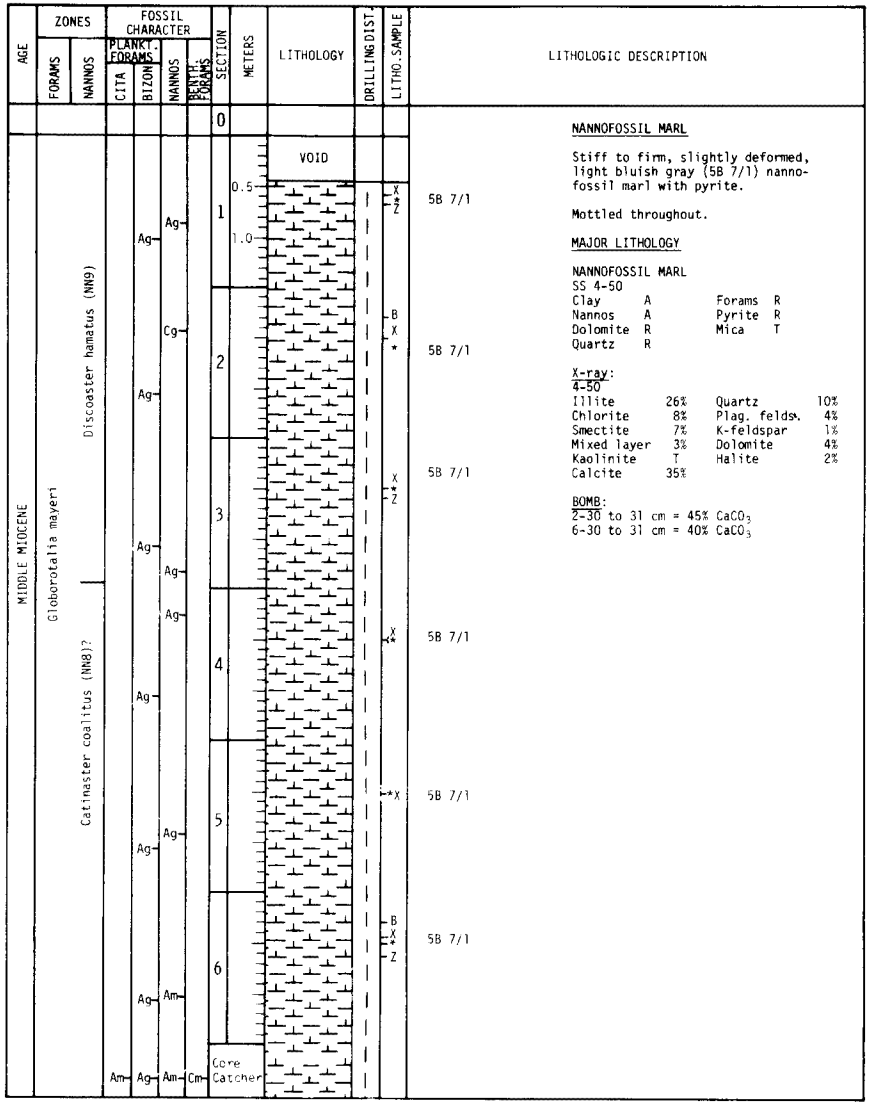
Nannos	A	Quartz	R
Clay	A	Mica	R
Dolomite	R	Pyrite	R

X-ray:
2-50

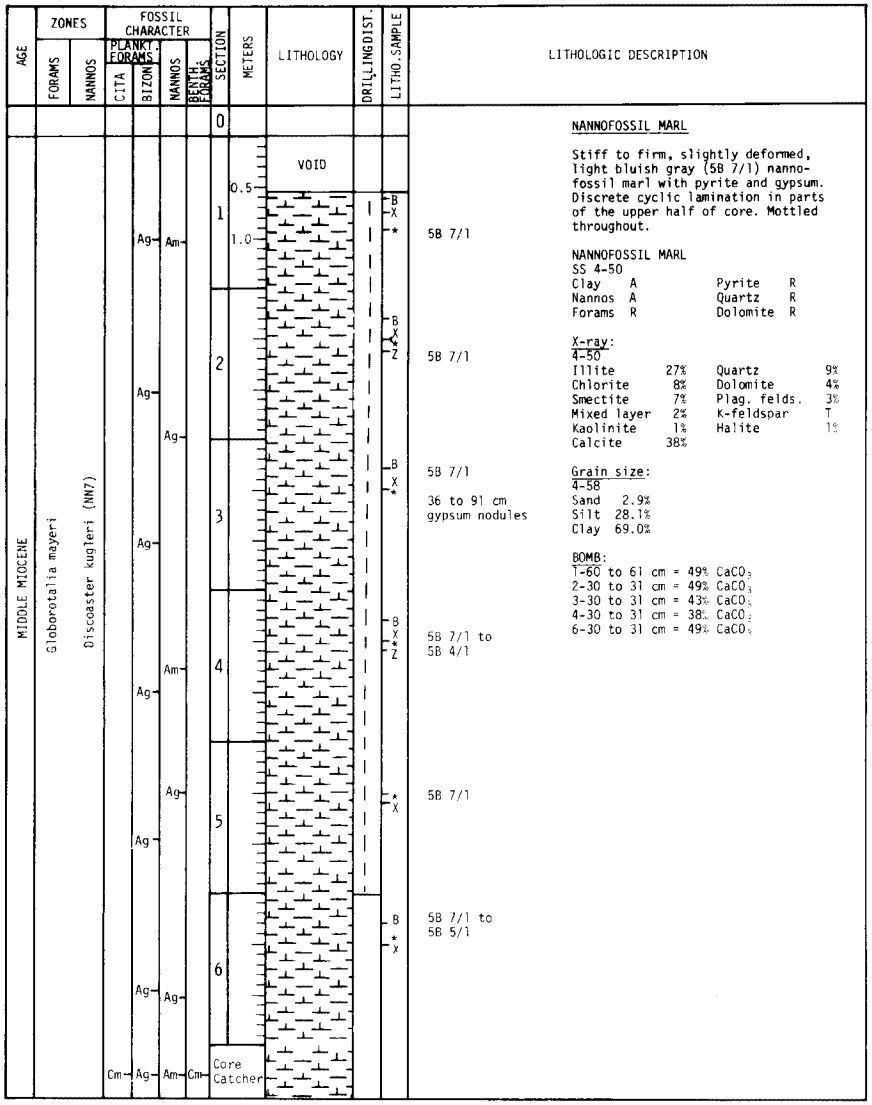
Illite	23%	Dolomite	6%
Chlorite	6%	Quartz	7%
Smectite	5%	Plag. felds.	2%
Mixed layer	2%	K-feldspar	T
Kaolinite	T	Halite	1%
Calcite	48%		

BOMB:
4-30 to 31 cm = 49% $CaCO_3$
6-30 to 31 cm = 50% $CaCO_3$

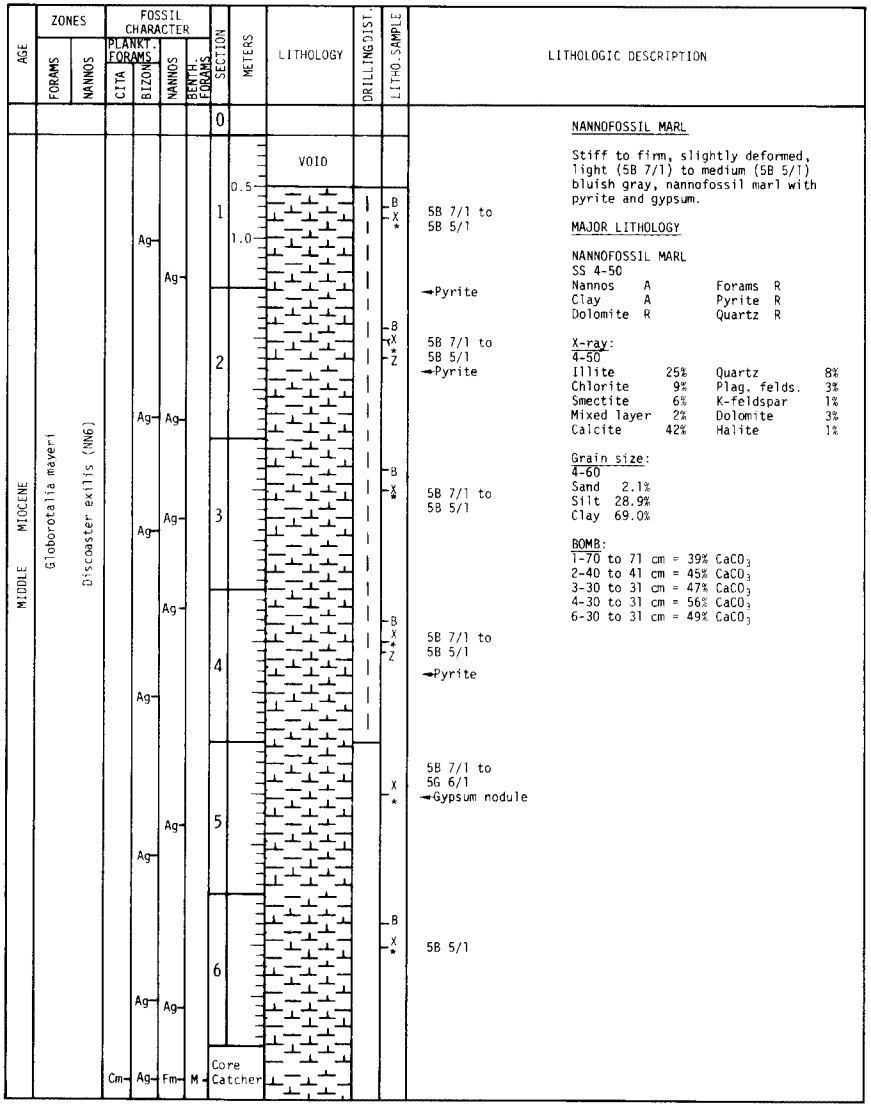
Site 372 Hole Core 16 Cored Interval: 264.0-273.5 m



Site 372 Hole Core 17 Cored Interval: 273.5-283.0 m



Site 372 Hole Core 18 Cored Interval: 283.0-292.5 m



NANNOFOSSIL MARL

Stiff to firm, slightly deformed, light (5B 7/1) to medium (5B 5/1) bluish gray, nannofossil marl with pyrite and gypsum.

MAJOR LITHOLOGY

NANNOFOSSIL MARL
SS 4-50

Nannos	A	Forams	R
Clay	A	Pyrite	R
Dolomite	R	Quartz	R

X-ray:
4-50

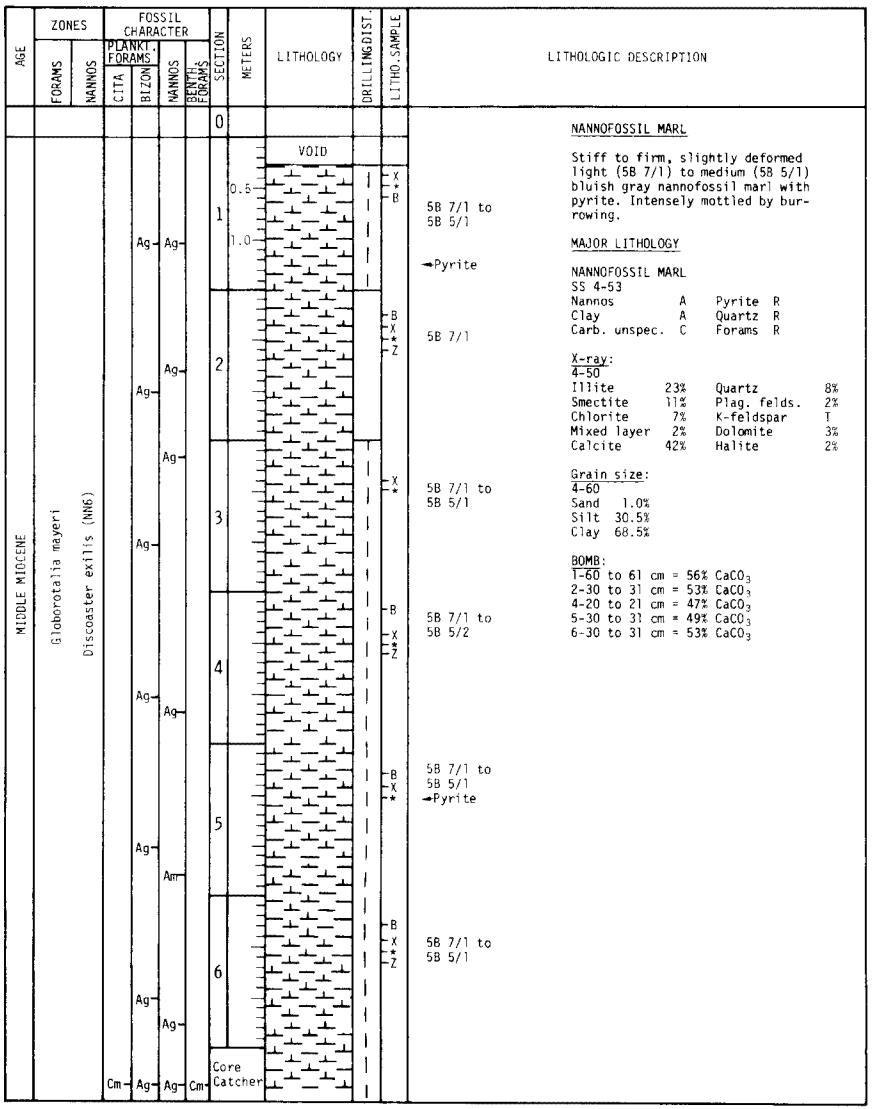
Illite	25%	Quartz	8%
Chlorite	9%	Plag. felds.	3%
Smectite	6%	K-feldspar	1%
Mixed layer	2%	Dolomite	3%
Calcite	42%	Halite	1%

Grain size:
4-60

Sand	2.1%
Silt	28.9%
Clay	69.0%

BOMB:
1-70 to 71 cm = 39% $CaCO_3$
2-40 to 41 cm = 45% $CaCO_3$
3-30 to 31 cm = 47% $CaCO_3$
4-30 to 31 cm = 56% $CaCO_3$
6-30 to 31 cm = 49% $CaCO_3$

Site 372 Hole Core 19 Cored Interval: 292.5-302.0 m



NANNOFOSSIL MARL

Stiff to firm, slightly deformed light (5B 7/1) to medium (5B 5/1) bluish gray nannofossil marl with pyrite. Intensely mottled by burrowing.

MAJOR LITHOLOGY

NANNOFOSSIL MARL
SS 4-53

Nannos	A	Pyrite	R
Clay	A	Quartz	R
Carb. unspec.	C	Forams	R

X-ray:
4-50

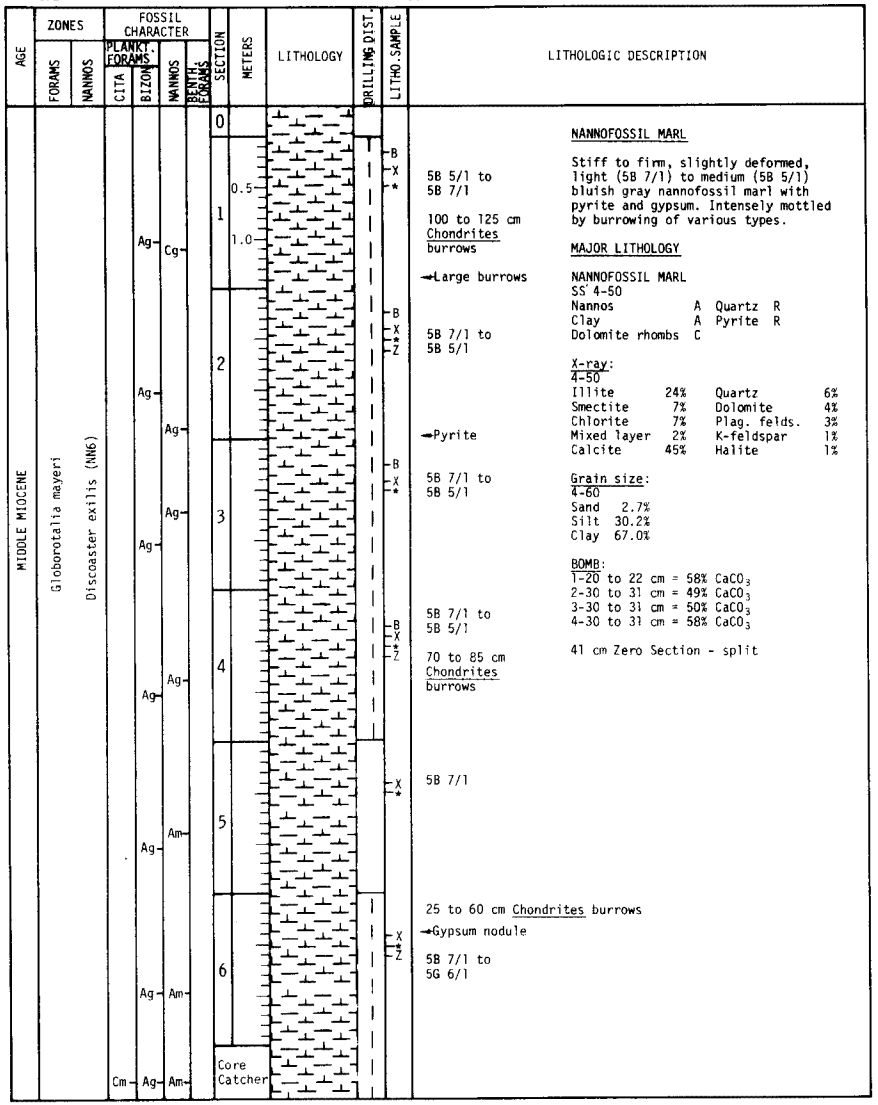
Illite	23%	Quartz	8%
Smectite	11%	Plag. felds.	2%
Chlorite	7%	K-feldspar	T
Mixed layer	2%	Dolomite	3%
Calcite	42%	Halite	2%

Grain size:
4-60

Sand	1.0%
Silt	30.5%
Clay	68.5%

BOMB:
1-60 to 61 cm = 56% $CaCO_3$
2-30 to 31 cm = 53% $CaCO_3$
4-20 to 21 cm = 47% $CaCO_3$
5-30 to 31 cm = 49% $CaCO_3$
6-30 to 31 cm = 53% $CaCO_3$

Site 372 Hole Core 20 Cored Interval: 302.0-311.5 m



NANNOFOSSIL MARL

Stiff to firm, slightly deformed, light (5B 7/1) to medium (5B 5/1) bluish gray nannofossil marl with pyrite and gypsum. Intensely mottled by burrowing of various types.

MAJOR LITHOLOGY

NANNOFOSSIL MARL
SS 4-50

Nannos	A	Quartz	R
Clay	A	Pyrite	R
Dolomite rhombs	C		

X-ray:
4-50

Illite	24%	Quartz	6%
Smectite	7%	Dolomite	4%
Chlorite	7%	Plag. felds.	3%
Mixed layer	2%	K-feldspar	1%
Calcite	45%	Halite	1%

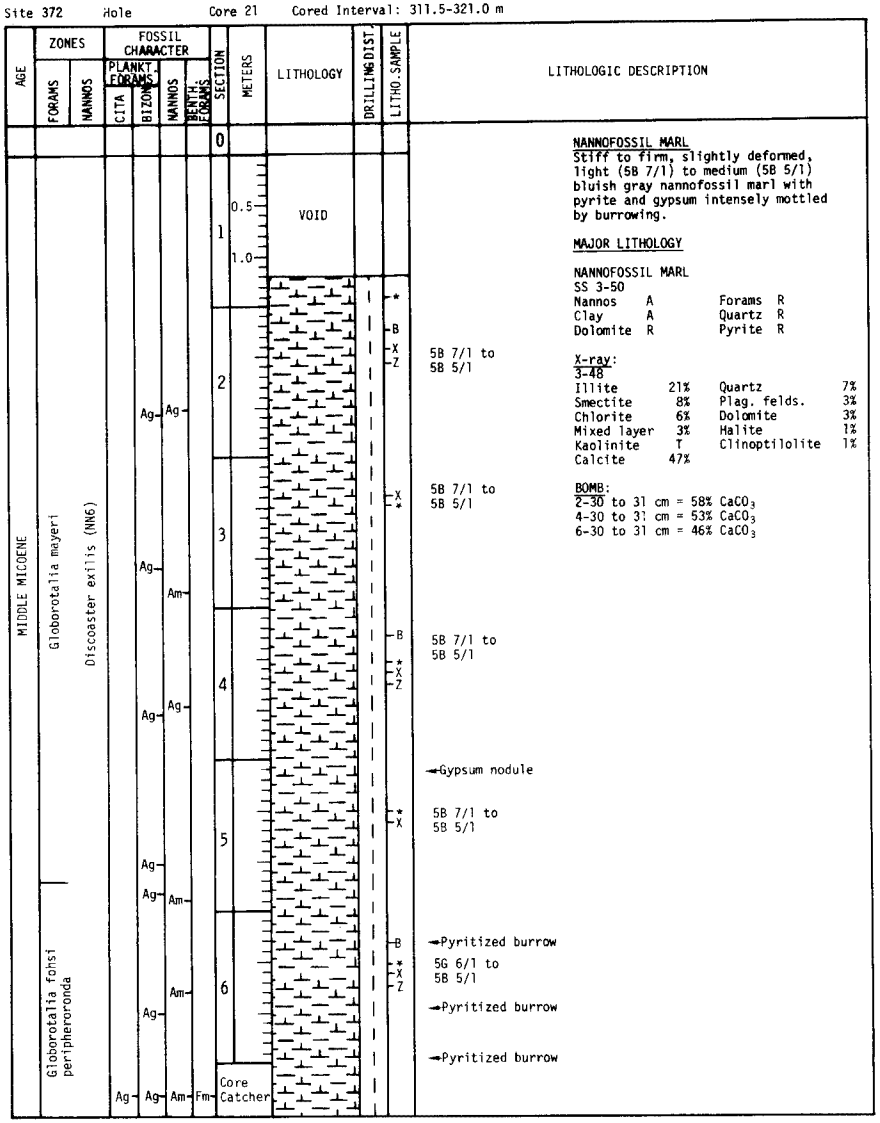
Grain size:
4-60

Sand	2.7%
Silt	30.2%
Clay	67.0%

BOMB:
1-20 to 22 cm = 58% $CaCO_3$
2-30 to 31 cm = 49% $CaCO_3$
3-30 to 31 cm = 50% $CaCO_3$
4-30 to 31 cm = 58% $CaCO_3$

41 cm Zero Section - split

Site 372 Hole Core 21 Cored Interval: 311.5-321.0 m



NANNOFOSSIL MARL
Stiff to firm, slightly deformed, light (5B 7/1) to medium (5B 5/1) bluish gray nannofossil marl with pyrite and gypsum intensely mottled by burrowing.

MAJOR LITHOLOGY

NANNOFOSSIL MARL
SS 3-50

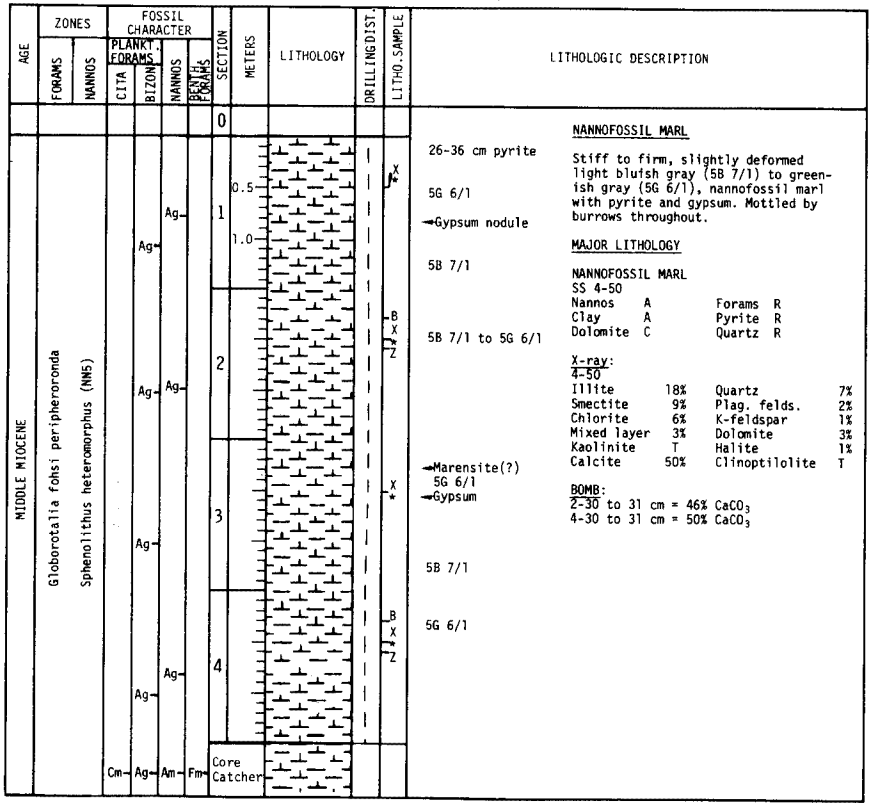
Nannos	A	Forams	R
Clay	A	Quartz	R
Dolomite	R	Pyrite	R

X-ray:
3-48

Illite	21%	Quartz	7%
Smectite	8%	Plag. felds.	3%
Chlorite	6%	Dolomite	3%
Mixed layer	3%	Halite	1%
Kaolinite	T	Clinoptilolite	1%
Calcite	47%		

BOMB:
2-30 to 31 cm = 58% $CaCO_3$
4-30 to 31 cm = 53% $CaCO_3$
6-30 to 31 cm = 46% $CaCO_3$

Site 372 Hole Core 22 Cored Interval: 321.0-330.5 m



NANNOFOSSIL MARL

Stiff to firm, slightly deformed light bluish gray (5B 7/1) to greenish gray (5G 6/1), nannofossil marl with pyrite and gypsum. Mottled by burrows throughout.

MAJOR LITHOLOGY

NANNOFOSSIL MARL
SS 4-50

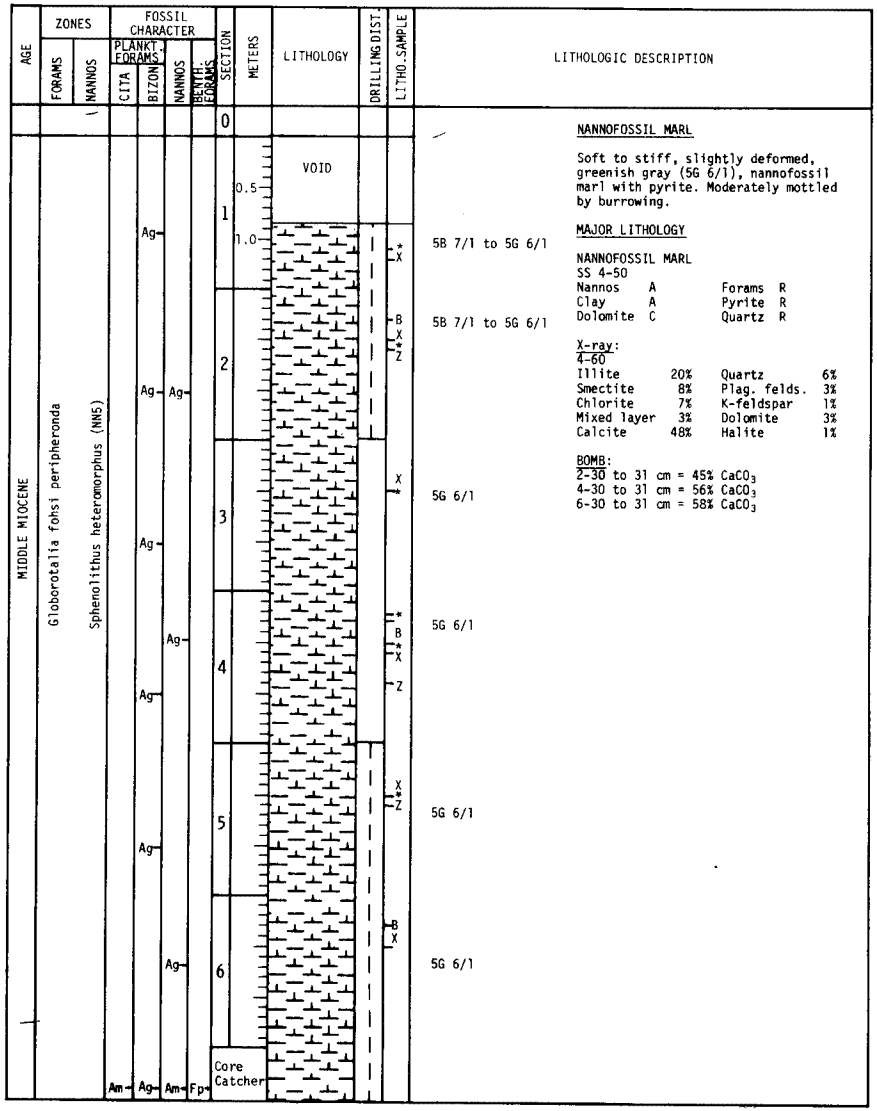
Nannos	A	Forams	R
Clay	A	Pyrite	R
Dolomite	C	Quartz	R

X-ray:
4-50

Illite	18%	Quartz	7%
Smectite	9%	Plag. felds.	2%
Chlorite	6%	K-feldspar	1%
Mixed layer	3%	Dolomite	3%
Kaolinite	T	Halite	1%
Calcite	50%	Clinoptilolite	T

BOMB:
2-30 to 31 cm = 46% $CaCO_3$
4-30 to 31 cm = 50% $CaCO_3$

Site 372 Hole Core 23 Cored Interval: 330.5-340.0 m



NANNOFOSSIL MARL

Soft to stiff, slightly deformed, greenish gray (5G 6/1), nannofossil marl with pyrite. Moderately mottled by burrowing.

MAJOR LITHOLOGY

NANNOFOSSIL MARL
SS 4-50

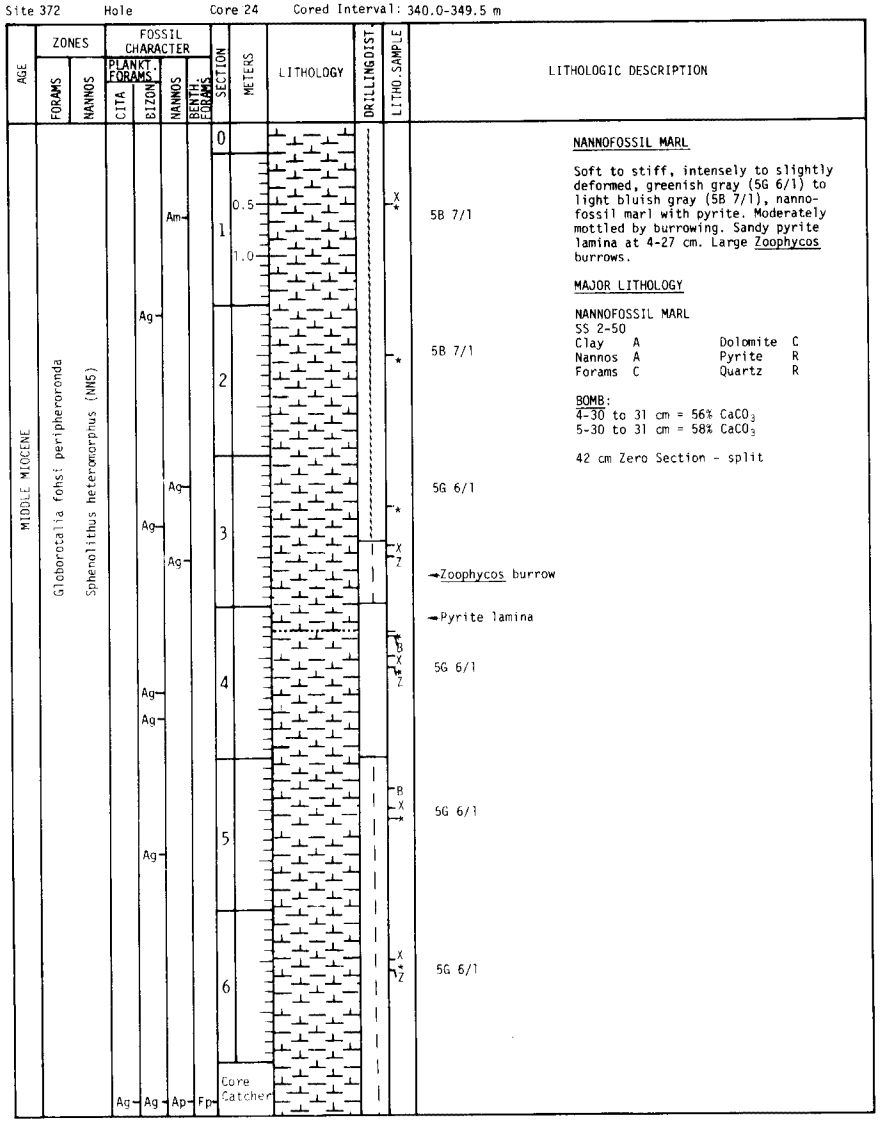
Nannos	A	Forams	R
Clay	A	Pyrite	R
Dolomite	C	Quartz	R

X-ray:
4-60

Illite	20%	Quartz	6%
Smectite	8%	Plag. felds.	3%
Chlorite	7%	K-feldspar	1%
Mixed layer	3%	Dolomite	3%
Calcite	48%	Halite	1%

BOMB:
2-30 to 31 cm = 45% $CaCO_3$
4-30 to 31 cm = 56% $CaCO_3$
6-30 to 31 cm = 58% $CaCO_3$

Site 372 Hole Core 24 Cored Interval: 340.0-349.5 m



NANNOFOSSIL MARL

Soft to stiff, intensely to slightly deformed, greenish gray (5G 6/1) to light bluish gray (5B 7/1), nannofossil marl with pyrite. Moderately mottled by burrowing. Sandy pyrite lamina at 4-27 cm. Large Zoophycos burrows.

MAJOR LITHOLOGY

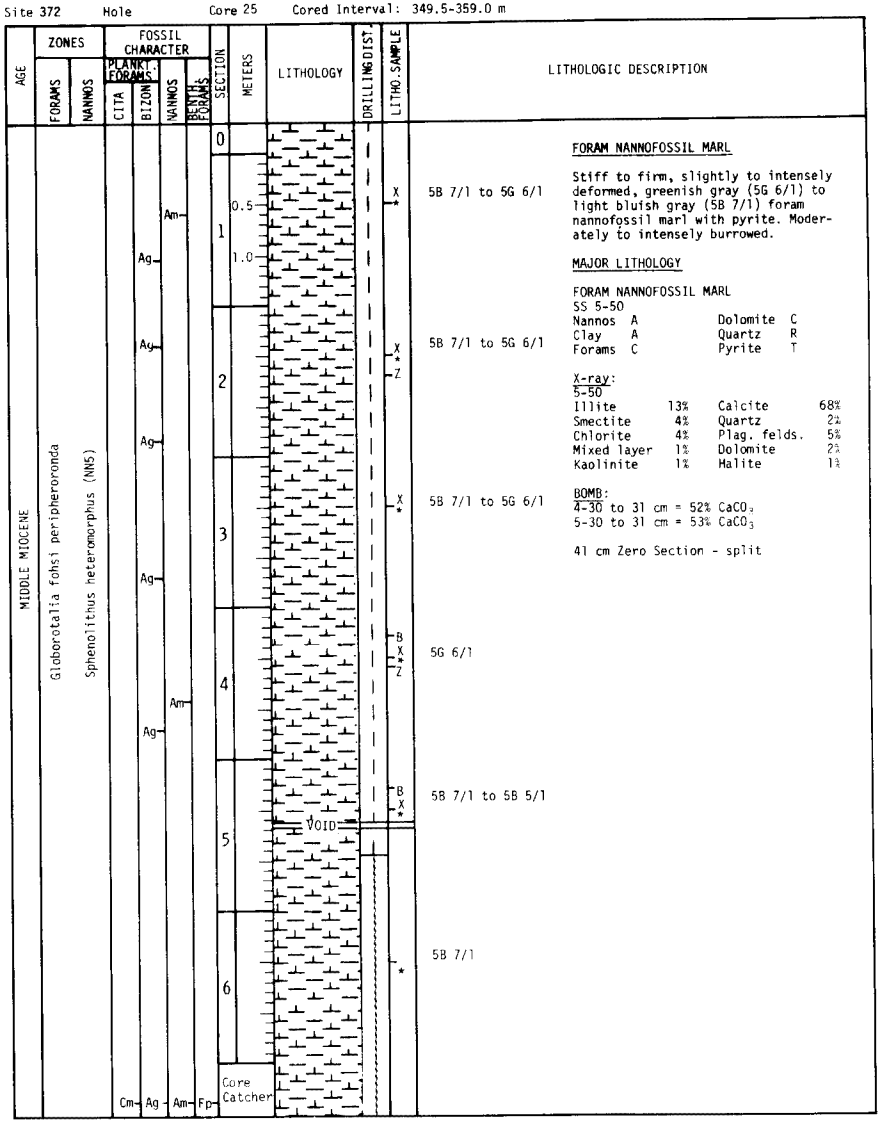
NANNOFOSSIL MARL
SS 2-50

Clay	A	Dolomite	C
Nannos	A	Pyrite	R
Forams	C	Quartz	R

BOMB:
4-30 to 31 cm = 56% $CaCO_3$
5-30 to 31 cm = 58% $CaCO_3$

42 cm Zero Section - split

Site 372 Hole Core 25 Cored Interval: 349.5-359.0 m



FORAM NANNOFOSSIL MARL

Stiff to firm, slightly to intensely deformed, greenish gray (5G 6/1) to light bluish gray (5B 7/1) foram nannofossil marl with pyrite. Moderately to intensely burrowed.

MAJOR LITHOLOGY

FORAM NANNOFOSSIL MARL
SS 5-50

Nannos	A	Dolomite	C
Clay	A	Quartz	R
Forams	C	Pyrite	T

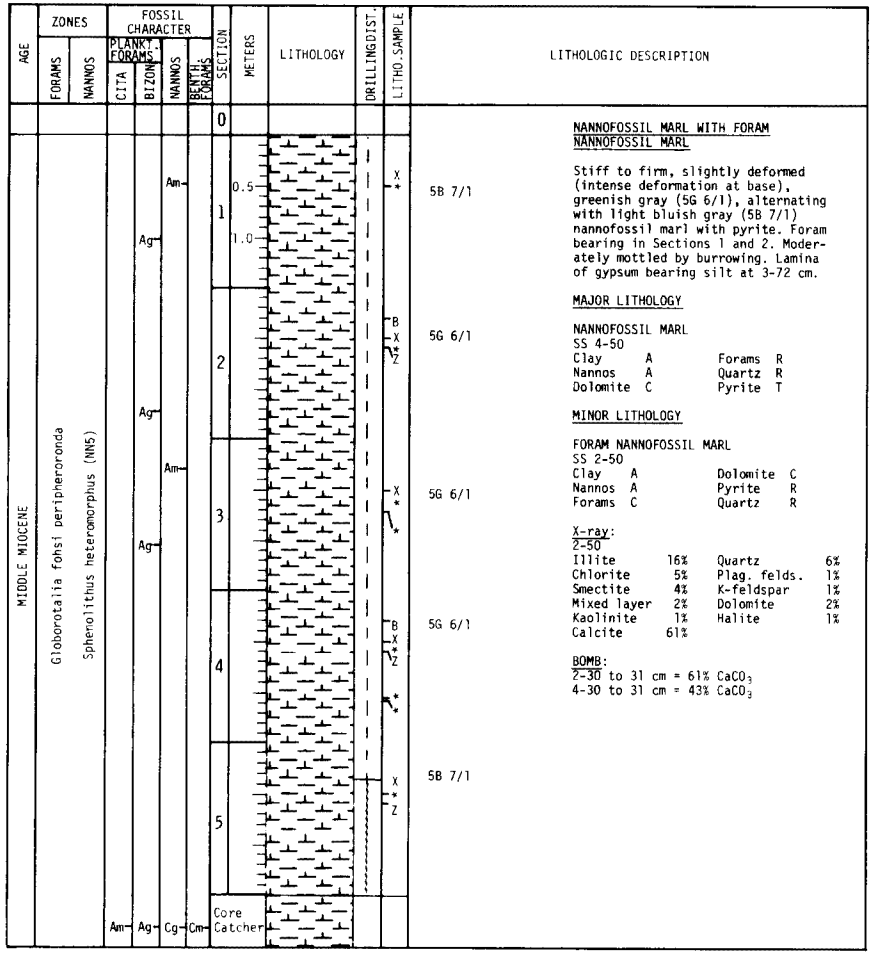
X-ray:
5-50

Illite	13%	Calcite	68%
Smectite	4%	Quartz	2%
Chlorite	4%	Plag. felds.	5%
Mixed layer	1%	Dolomite	2%
Kaolinite	1%	Halite	1%

BOMB:
4-30 to 31 cm = 52% $CaCO_3$
5-30 to 31 cm = 53% $CaCO_3$

41 cm Zero Section - split

Site 372 Hole Core 26 Cored Interval: 359.0-368.5 m



LITHOLOGIC DESCRIPTION

NANNOFOSSIL MARL WITH FORAM NANNOFOSSIL MARL

Stiff to firm, slightly deformed (intense deformation at base), greenish gray (5G 6/1), alternating with light bluish gray (5B 7/1) nannofossil marl with pyrite. Foram bearing in Sections 1 and 2. Moderately mottled by burrowing. Lamina of gypsum bearing silt at 3-72 cm.

MAJOR LITHOLOGY

NANNOFOSSIL MARL
SS 4-50

Clay	A	Forams	R
Nannos	A	Quartz	R
Dolomite	C	Pyrite	T

MINOR LITHOLOGY

FORAM NANNOFOSSIL MARL
SS 2-50

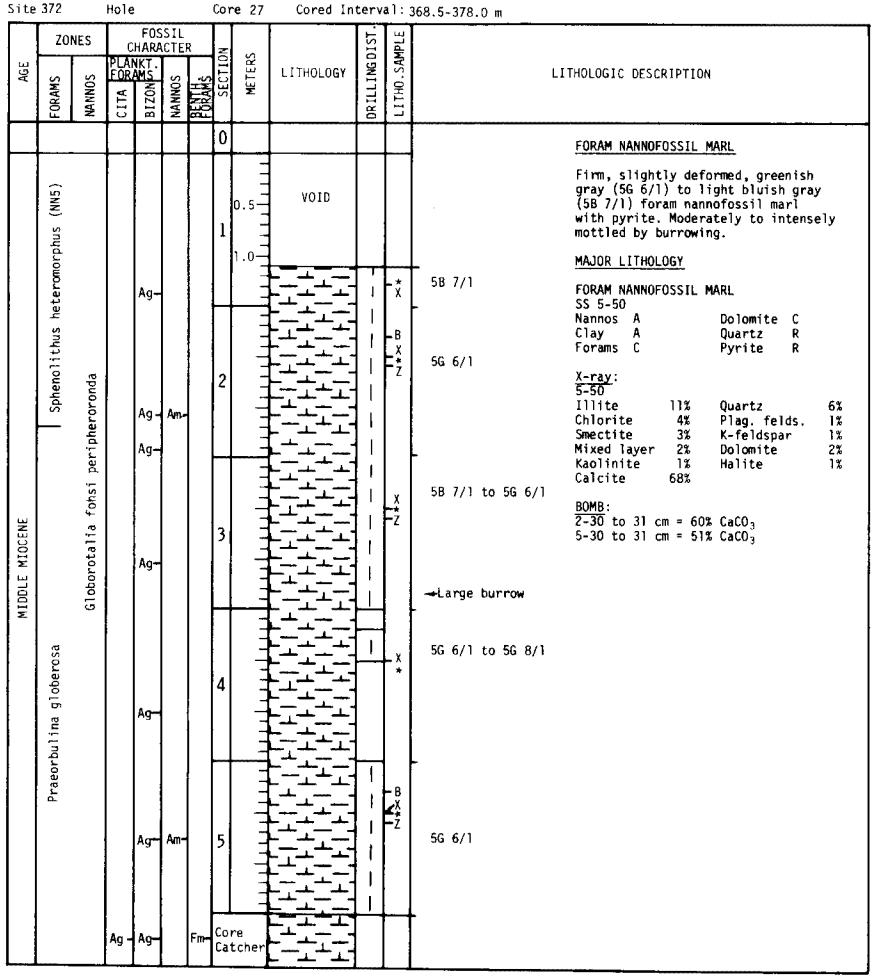
Clay	A	Dolomite	C
Nannos	A	Pyrite	R
Forams	C	Quartz	R

X-ray:
2-50

Illite	16%	Quartz	6%
Chlorite	5%	Plag. felds.	1%
Smectite	4%	K-feldspar	1%
Mixed layer	2%	Dolomite	2%
Kaolinite	1%	Halite	1%
Calcite	61%		

BOMB:
2-30 to 31 cm = 61% $CaCO_3$
4-30 to 31 cm = 43% $CaCO_3$

Site 372 Hole Core 27 Cored Interval: 368.5-378.0 m



FORAM NANNOFOSSIL MARL

Firm, slightly deformed, greenish gray (5G 6/1) to light bluish gray (5B 7/1) foram nannofossil marl with pyrite. Moderately to intensely mottled by burrowing.

MAJOR LITHOLOGY

FORAM NANNOFOSSIL MARL
SS 5-50

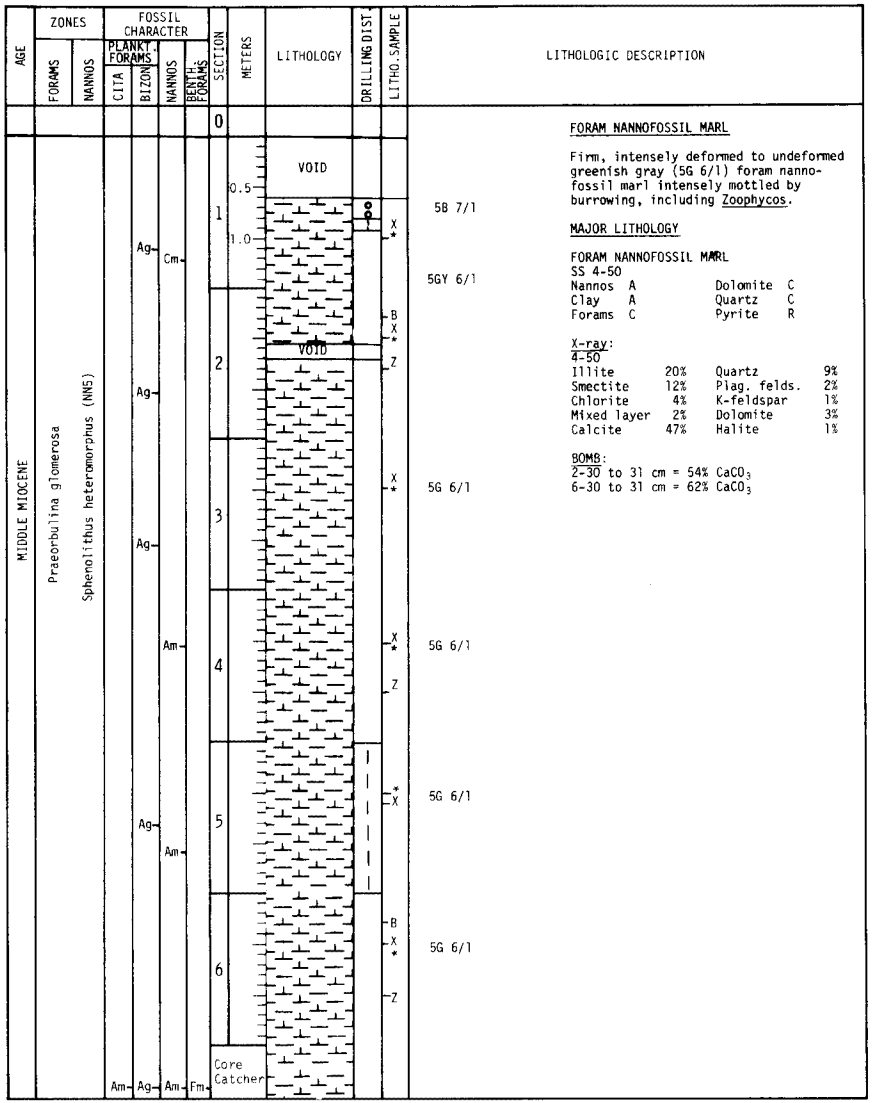
Nannos	A	Dolomite	C
Clay	A	Quartz	R
Forams	C	Pyrite	R

X-ray:
5-50

Illite	11%	Quartz	6%
Chlorite	4%	Plag. felds.	1%
Smectite	3%	K-feldspar	1%
Mixed layer	2%	Dolomite	2%
Kaolinite	1%	Halite	1%
Calcite	68%		

BOMB:
2-30 to 31 cm = 60% $CaCO_3$
5-30 to 31 cm = 51% $CaCO_3$

Site 372 Hole Core 28 Cored Interval: 378.0-387.5 m



FORAM NANNOFOSSIL MARL

Firm, intensely deformed to undeformed greenish gray (5G 6/1) foram nannofossil marl intensely mottled by burrowing, including Zoophycos.

MAJOR LITHOLOGY

FORAM NANNOFOSSIL MARL
SS 4-50

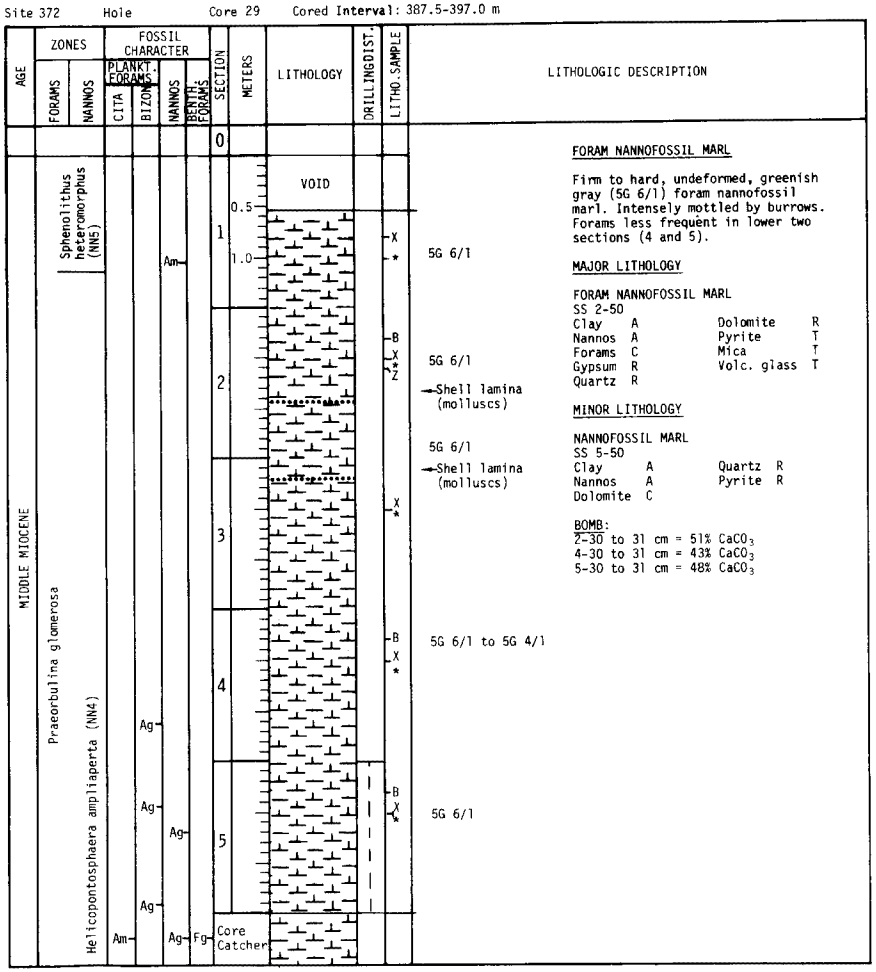
Nannos	A	Dolomite	C
Clay	A	Quartz	C
Forams	C	Pyrite	R

X-ray:
4-50

Illite	20%	Quartz	9%
Smectite	12%	Plag. felds.	2%
Chlorite	4%	K-feldspar	1%
Mixed layer	2%	Dolomite	3%
Calcite	47%	Halite	1%

BOMB:
2-30 to 31 cm = 54% $CaCO_3$
6-30 to 31 cm = 62% $CaCO_3$

Site 372 Hole Core 29 Cored Interval: 387.5-397.0 m



FORAM NANNOFOSSIL MARL

Firm to hard, undeformed, greenish gray (5G 6/1) foram nannofossil marl. Intensely mottled by burrows. Forams less frequent in lower two sections (4 and 5).

MAJOR LITHOLOGY

FORAM NANNOFOSSIL MARL
SS 2-50

Clay	A	Dolomite	R
Nannos	A	Pyrite	T
Forams	C	Mica	T
Gypsum	R	Volc. glass	T
Quartz	R		

→Shell lamina (molluscs)

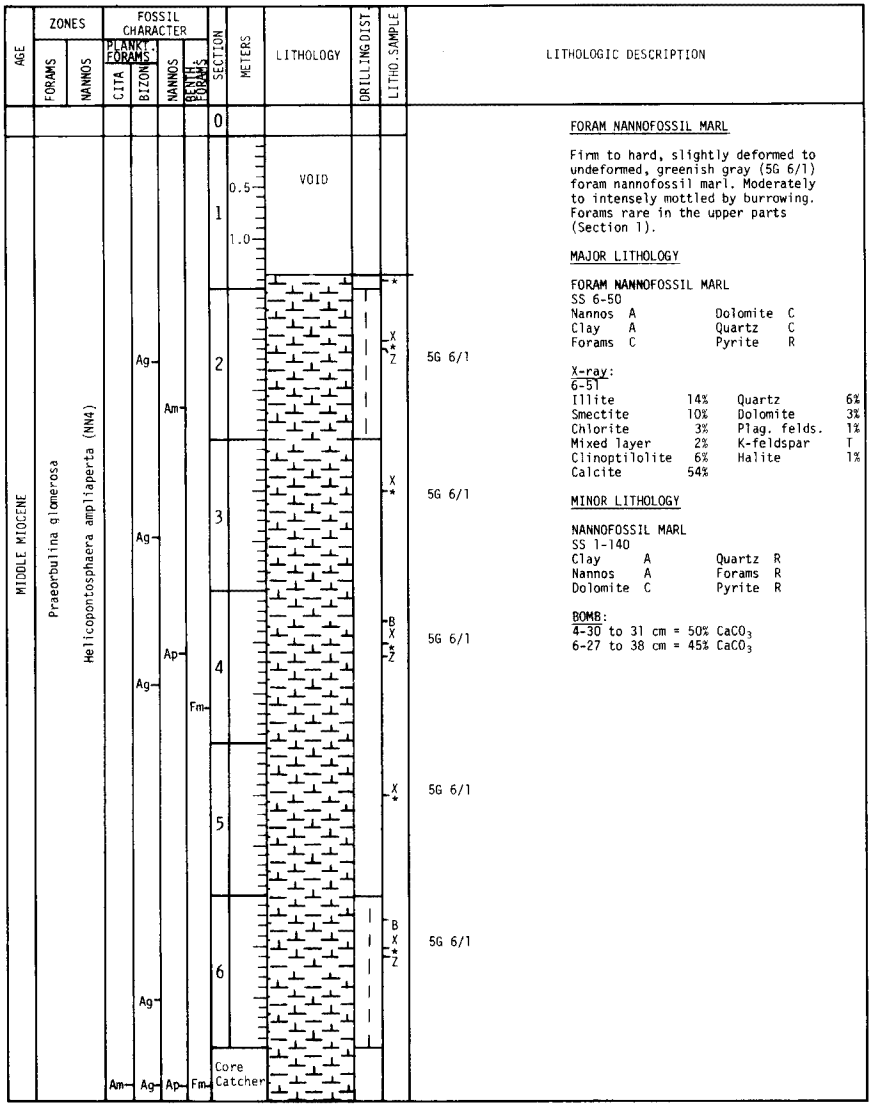
MINOR LITHOLOGY

NANNOFOSSIL MARL
SS 5-50

Clay	A	Quartz	R
Nannos	A	Pyrite	R
Dolomite	C		

BOMB:
2-30 to 31 cm = 51% $CaCO_3$
4-30 to 31 cm = 43% $CaCO_3$
5-30 to 31 cm = 48% $CaCO_3$

Site 372 Hole Core 30 Cored Interval: 397.0-406.5 m



LITHOLOGIC DESCRIPTION

FORAM NANNOFOSSIL MARL

Firm to hard, slightly deformed to undeformed, greenish gray (5G 6/1) foram nannofossil marl. Moderately to intensely mottled by burrowing. Forams rare in the upper parts (Section 1).

MAJOR LITHOLOGY

FORAM NANNOFOSSIL MARL
SS 6-50

Nannos	A	Dolomite	C
Clay	A	Quartz	C
Forams	C	Pyrite	R

X-ray:
6-51

Illite	14%	Quartz	6%
Smectite	10%	Dolomite	3%
Chlorite	3%	Plag. felds.	1%
Mixed layer	2%	K-feldspar	T
Clinoptilolite	6%	Halite	1%
Calcite	54%		

MINOR LITHOLOGY

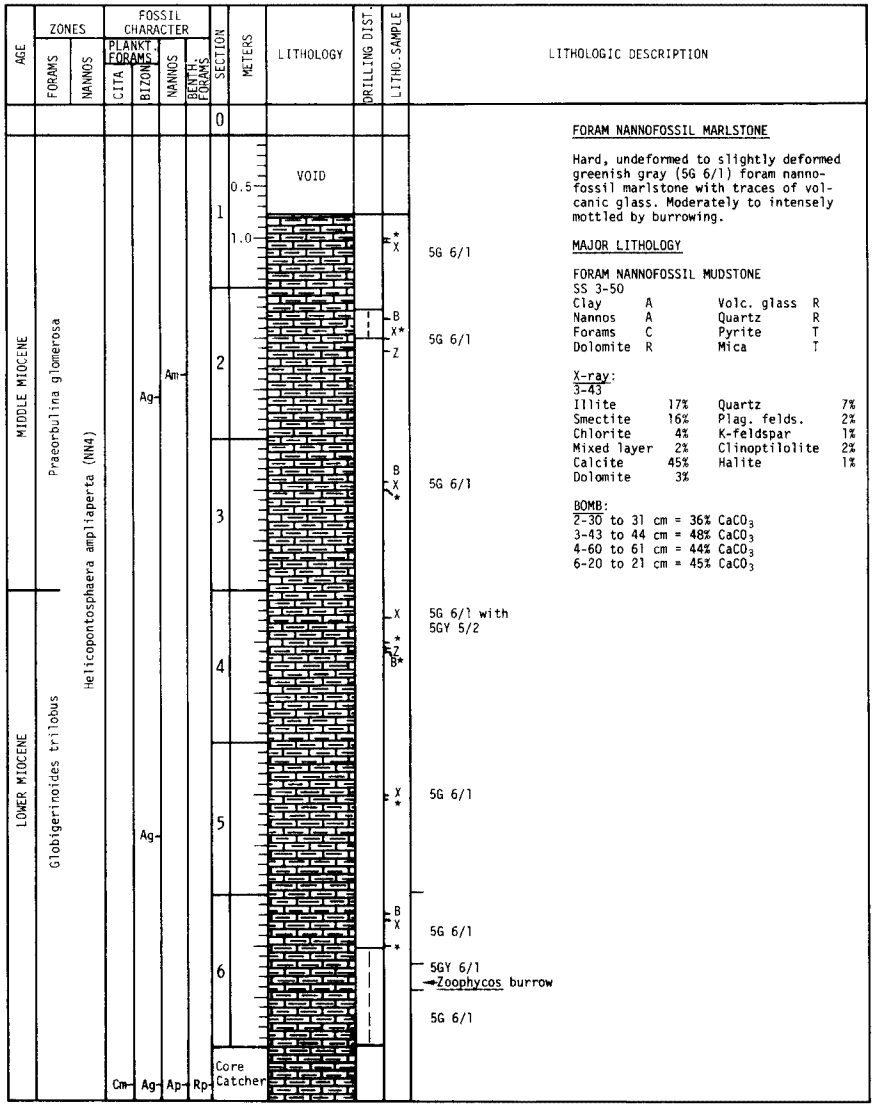
NANNOFOSSIL MARL
SS 1-140

Clay	A	Quartz	R
Nannos	A	Forams	R
Dolomite	C	Pyrite	R

BOMB:
4-30 to 31 cm = 50% $CaCO_3$
6-27 to 38 cm = 45% $CaCO_3$

5G 6/1
5G 6/1
5G 6/1
5G 6/1

Site 372 Hole Core 31 Cored Interval: 416.0-425.5 m



LITHOLOGIC DESCRIPTION

FORAM NANNOFOSSIL MARLSTONE

Hard, undeformed to slightly deformed greenish gray (5G 6/1) foram nannofossil marlstone with traces of volcanic glass. Moderately to intensely mottled by burrowing.

MAJOR LITHOLOGY

FORAM NANNOFOSSIL MUDSTONE
SS 3-50

Clay	A	Volc. glass	R
Nannos	A	Quartz	R
Forams	C	Pyrite	T
Dolomite	R	Mica	T

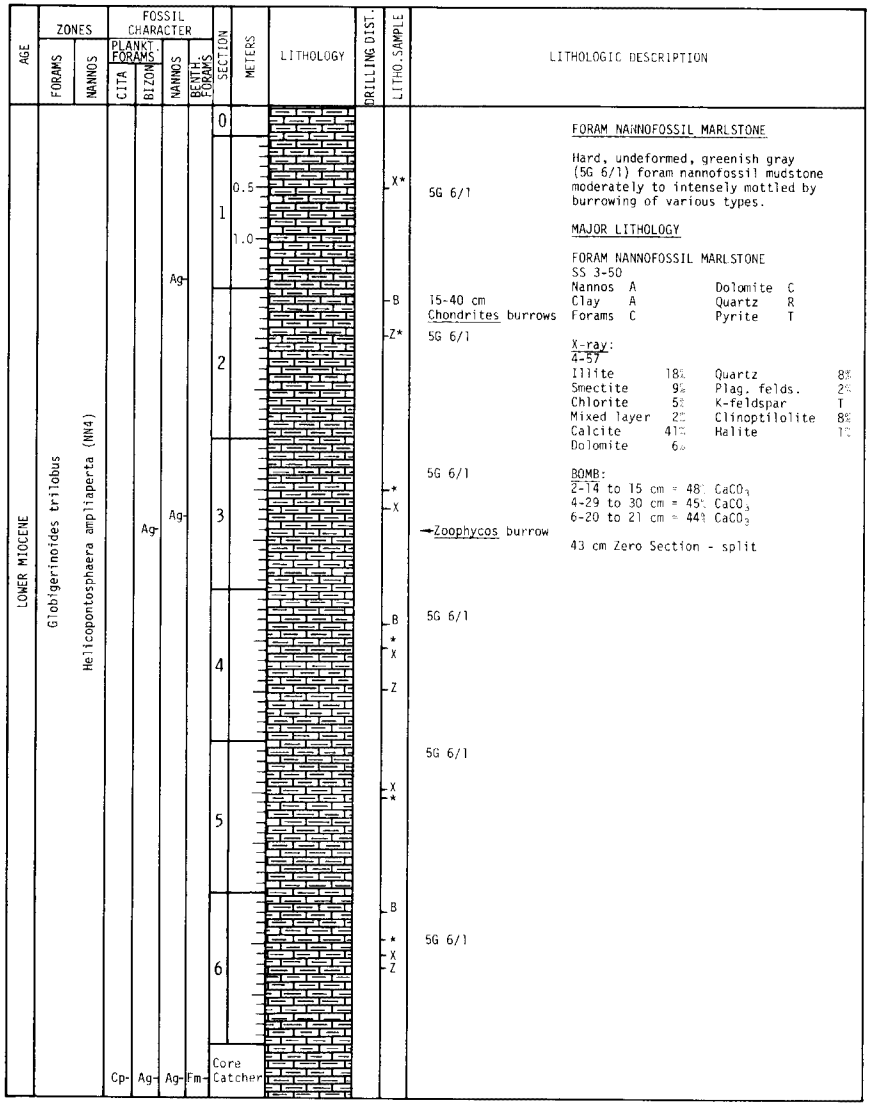
X-ray:
3-43

Illite	17%	Quartz	7%
Smectite	16%	Plag. felds.	2%
Chlorite	4%	K-feldspar	1%
Mixed layer	2%	Clinoptilolite	2%
Calcite	45%	Halite	1%
Dolomite	3%		

BOMB:
2-30 to 31 cm = 36% $CaCO_3$
3-43 to 44 cm = 48% $CaCO_3$
4-60 to 61 cm = 44% $CaCO_3$
6-20 to 21 cm = 45% $CaCO_3$

5G 6/1
5G 6/1
5G 6/1
5G 6/1 with 5GY 5/2
5G 6/1
5G 6/1
5GY 6/1
→Zoophycos burrow
5G 6/1

Site 372 Hole Core 32 Cored Interval: 435.0-444.5 m



LITHOLOGIC DESCRIPTION

FORAM NANNOFOSSIL MARLSTONE

Hard, undeformed, greenish gray (5G 6/1) foram nannofossil mudstone moderately to intensely mottled by burrowing of various types.

5G 6/1

MAJOR LITHOLOGY

FORAM NANNOFOSSIL MARLSTONE
SS 3-50

Nannos	A	Dolomite	C
Clay	A	Quartz	R
Forams	C	Pyrite	T

15-40 cm Chondrites burrows

5G 6/1

X-ray:
4-57

Illite	18%	Quartz	8%
Smectite	9%	Plag. felds.	2%
Chlorite	5%	K-feldspar	T
Mixed layer	2%	Clinoptilolite	8%
Calcite	41%	Halite	1%
Dolomite	6%		

5G 6/1

BOMB:
2-14 to 15 cm = 48% $CaCO_3$
4-29 to 30 cm = 45% $CaCO_3$
6-20 to 21 cm = 44% $CaCO_3$

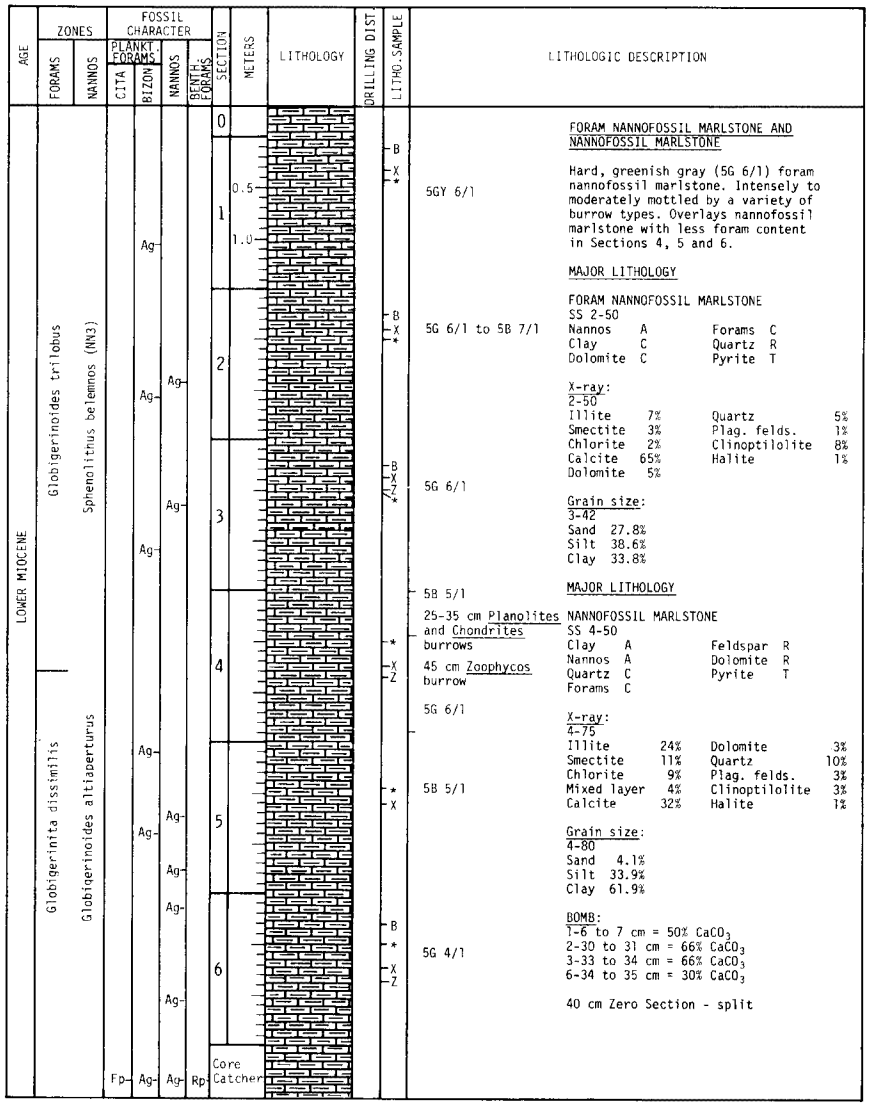
→Zoophycos burrow

43 cm Zero Section - split

5G 6/1

5G 6/1

Site 372 Hole Core 33 Cored Interval: 463.5-473.0 m



LITHOLOGIC DESCRIPTION

FORAM NANNOFOSSIL MARLSTONE AND NANNOFOSSIL MARLSTONE

Hard, greenish gray (5G 6/1) foram nannofossil marlstone. Intensely to moderately mottled by a variety of burrow types. Overlays nannofossil marlstone with less foram content in Sections 4, 5 and 6.

5GY 6/1

MAJOR LITHOLOGY

FORAM NANNOFOSSIL MARLSTONE
SS 2-50

Nannos	A	Forams	C
Clay	C	Quartz	R
Dolomite	C	Pyrite	T

5G 6/1 to 5B 7/1

X-ray:
2-50

Illite	7%	Quartz	5%
Smectite	3%	Plag. felds.	1%
Chlorite	2%	Clinoptilolite	8%
Calcite	65%	Halite	1%
Dolomite	5%		

5G 6/1

Grain size:
3-42
Sand 27.8%
Silt 38.6%
Clay 33.8%

5B 5/1

MAJOR LITHOLOGY

25-35 cm Planolites and Chondrites burrows

45 cm Zoophycos burrow

NANNOFOSSIL MARLSTONE
SS 4-50

Clay	A	Feldspar	R
Nannos	A	Dolomite	R
Quartz	C	Pyrite	T
Forams	C		

5G 6/1

X-ray:
4-75

Illite	24%	Dolomite	3%
Smectite	11%	Quartz	10%
Chlorite	9%	Plag. felds.	3%
Mixed layer	4%	Clinoptilolite	3%
Calcite	32%	Halite	1%

5B 5/1

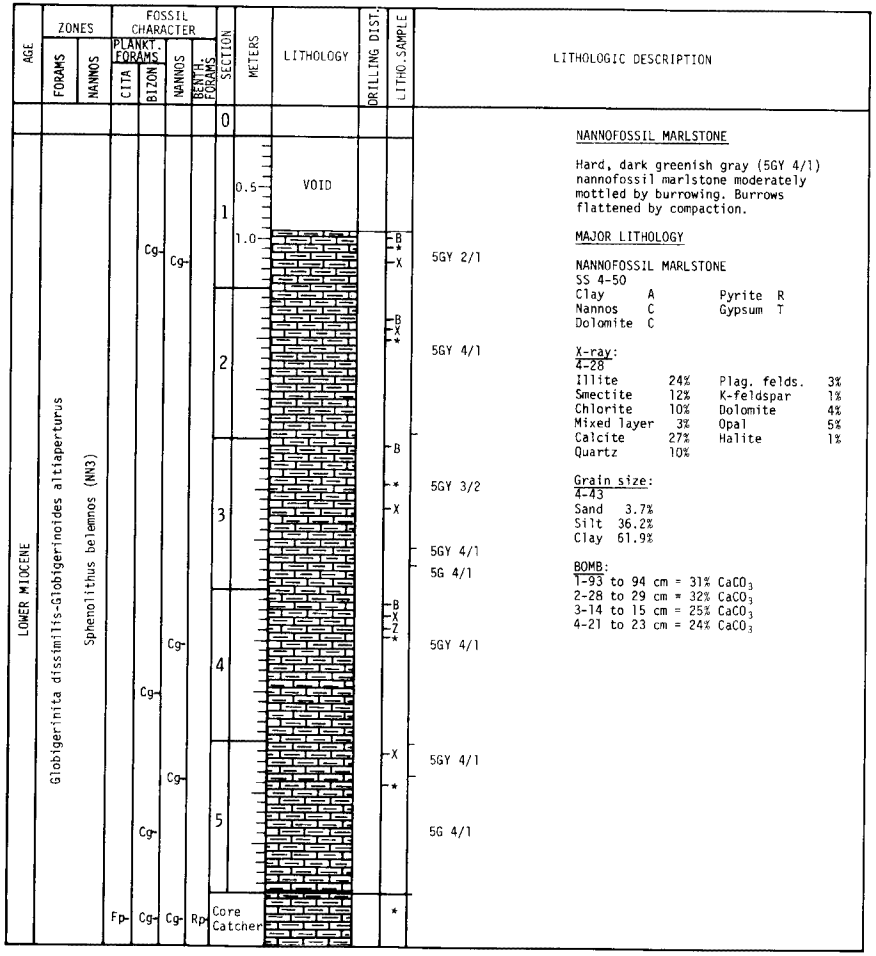
Grain size:
4-80
Sand 4.1%
Silt 33.9%
Clay 61.9%

BOMB:
1-6 to 7 cm = 50% $CaCO_3$
2-30 to 31 cm = 66% $CaCO_3$
3-33 to 34 cm = 66% $CaCO_3$
6-34 to 35 cm = 30% $CaCO_3$

5G 4/1

40 cm Zero Section - split

Site 372 Hole Core 34 Cored Interval: 492.0-501.5 m



NANNOFOSSIL MARLSTONE

Hard, dark greenish gray (5GY 4/1) nannofossil marlstone moderately mottled by burrowing. Burrows flattened by compaction.

MAJOR LITHOLOGY

NANNOFOSSIL MARLSTONE
SS 4-50

Clay	A	Pyrite	R
Nannos	C	Gypsum	T
Dolomite	C		

X-ray:
4-28

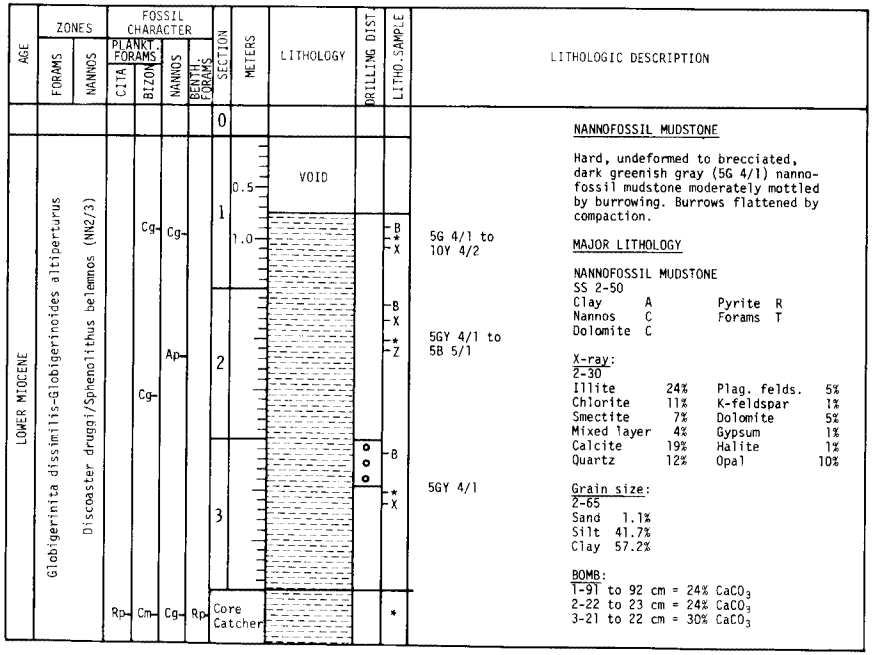
Illite	24%	Plag. felds.	3%
Smectite	12%	K-feldspar	1%
Chlorite	10%	Dolomite	4%
Mixed layer	3%	Opal	5%
Calcite	27%	Halite	1%
Quartz	10%		

Grain size:
4-43

Sand	3.7%
Silt	36.2%
Clay	61.9%

BOMB:
1-93 to 94 cm = 31% $CaCO_3$
2-28 to 29 cm = 32% $CaCO_3$
3-14 to 15 cm = 25% $CaCO_3$
4-21 to 23 cm = 24% $CaCO_3$

Site 372 Hole Core 35 Cored Interval: 529.0-538.5 m



NANNOFOSSIL MUDSTONE

Hard, undeformed to brecciated, dark greenish gray (5G 4/1) nannofossil mudstone moderately mottled by burrowing. Burrows flattened by compaction.

MAJOR LITHOLOGY

NANNOFOSSIL MUDSTONE
SS 2-50

Clay	A	Pyrite	R
Nannos	C	Forams	T
Dolomite	C		

X-ray:
2-30

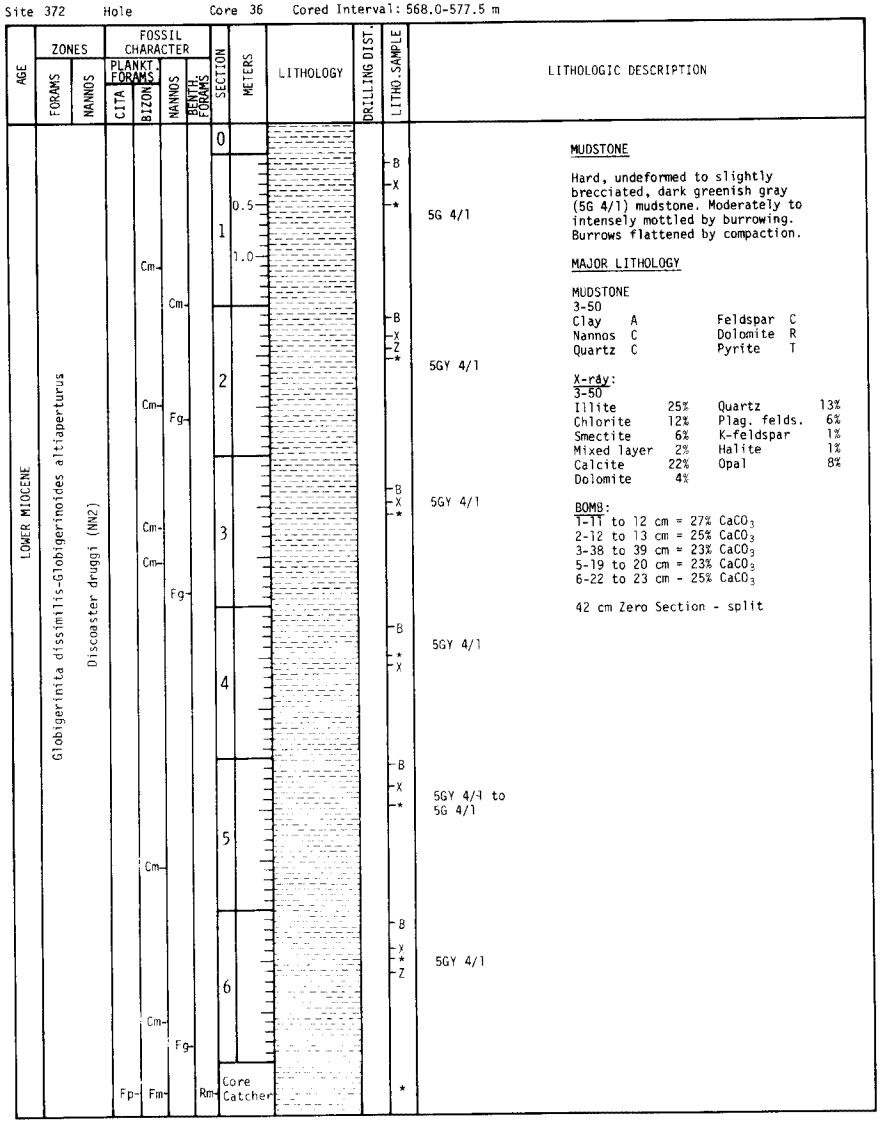
Illite	24%	Plag. felds.	5%
Chlorite	11%	K-feldspar	1%
Smectite	7%	Dolomite	5%
Mixed layer	4%	Gypsum	1%
Calcite	19%	Halite	1%
Quartz	12%	Opal	10%

Grain size:
2-65

Sand	1.1%
Silt	41.7%
Clay	57.2%

BOMB:
1-91 to 92 cm = 24% $CaCO_3$
2-22 to 23 cm = 24% $CaCO_3$
3-21 to 22 cm = 30% $CaCO_3$

Site 372 Hole Core 36 Cored Interval: 568.0-577.5 m



MUDSTONE

Hard, undeformed to slightly brecciated, dark greenish gray (5G 4/1) mudstone. Moderately to intensely mottled by burrowing. Burrows flattened by compaction.

MAJOR LITHOLOGY

MUDSTONE
3-50

Clay	A	Feldspar	C
Nannos	C	Dolomite	R
Quartz	C	Pyrite	T

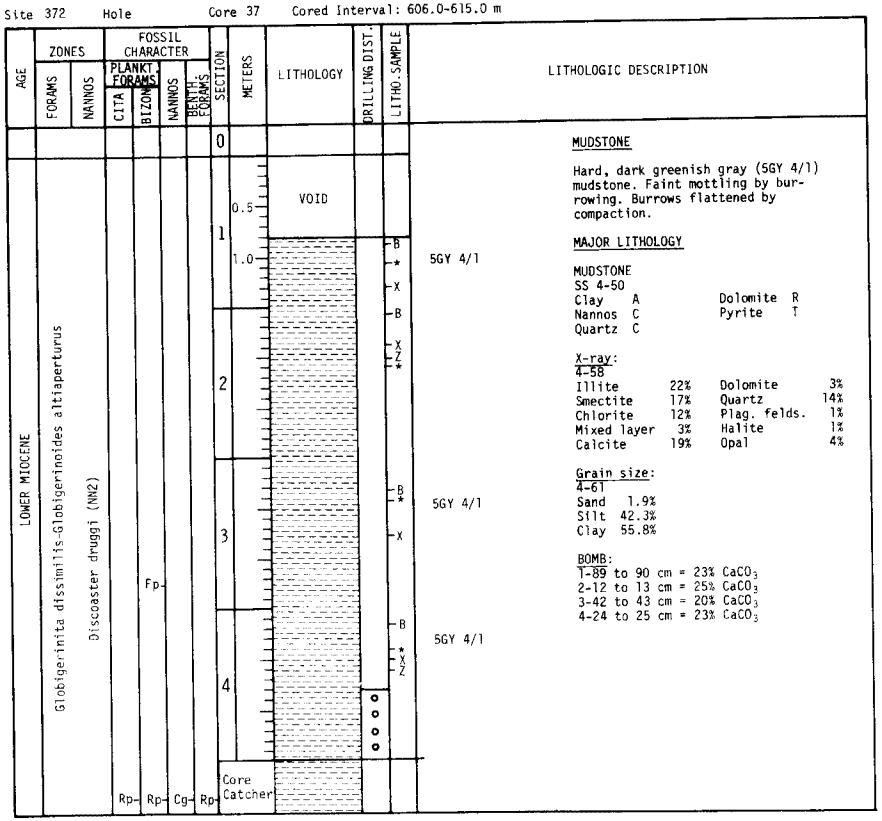
X-ray:
3-50

Illite	25%	Quartz	13%
Chlorite	12%	Plag. felds.	6%
Smectite	6%	K-feldspar	1%
Mixed layer	2%	Halite	1%
Calcite	22%	Opal	8%
Dolomite	4%		

BOMB:
1-11 to 12 cm = 27% $CaCO_3$
2-12 to 13 cm = 25% $CaCO_3$
3-38 to 39 cm = 23% $CaCO_3$
5-19 to 20 cm = 23% $CaCO_3$
6-22 to 23 cm - 25% $CaCO_3$

42 cm Zero Section - split

Site 372 Hole Core 37 Cored Interval: 606.0-615.0 m



MUDSTONE

Hard, dark greenish gray (5GY 4/1) mudstone. Faint mottling by burrowing. Burrows flattened by compaction.

MAJOR LITHOLOGY

MUDSTONE
SS 4-50

Clay	A	Dolomite	R
Nannos	C	Pyrite	T
Quartz	C		

X-ray:
4-58

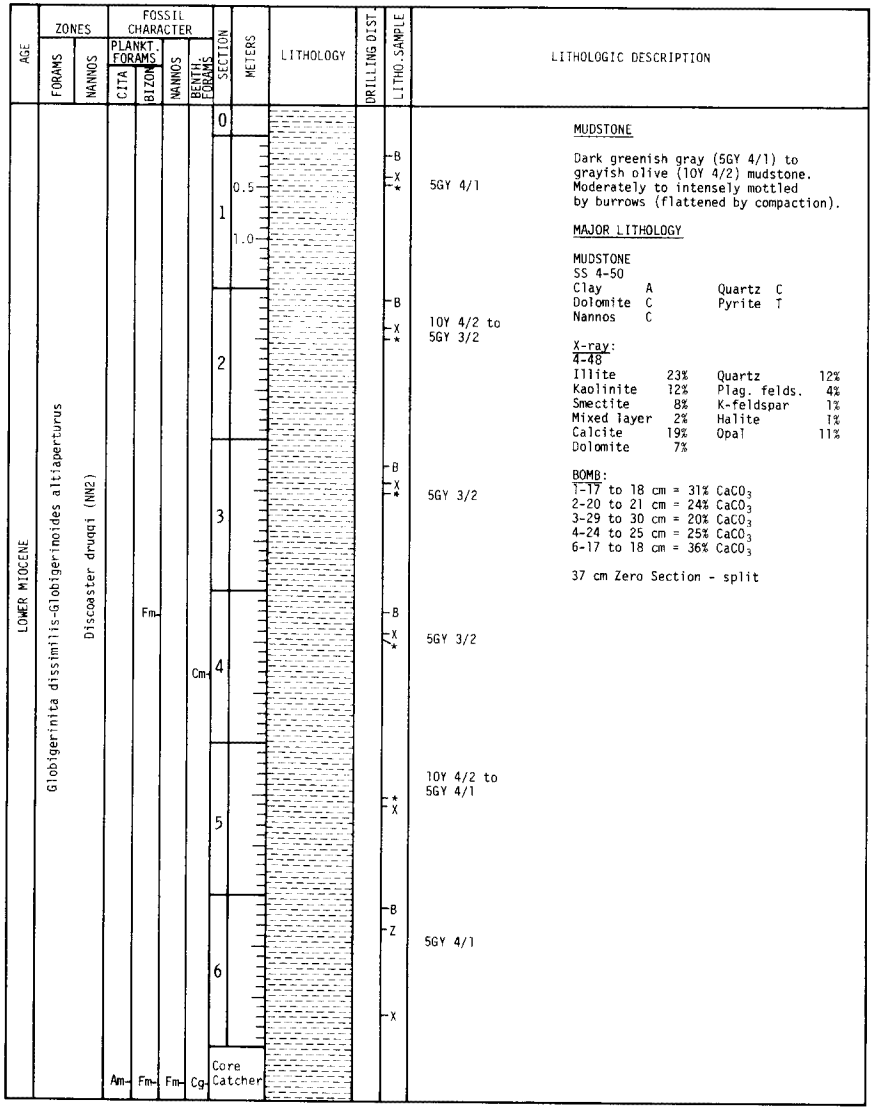
Illite	22%	Dolomite	3%
Smectite	17%	Quartz	14%
Chlorite	12%	Plag. felds.	1%
Mixed layer	3%	Halite	1%
Calcite	19%	Opal	4%

Grain size:
4-61

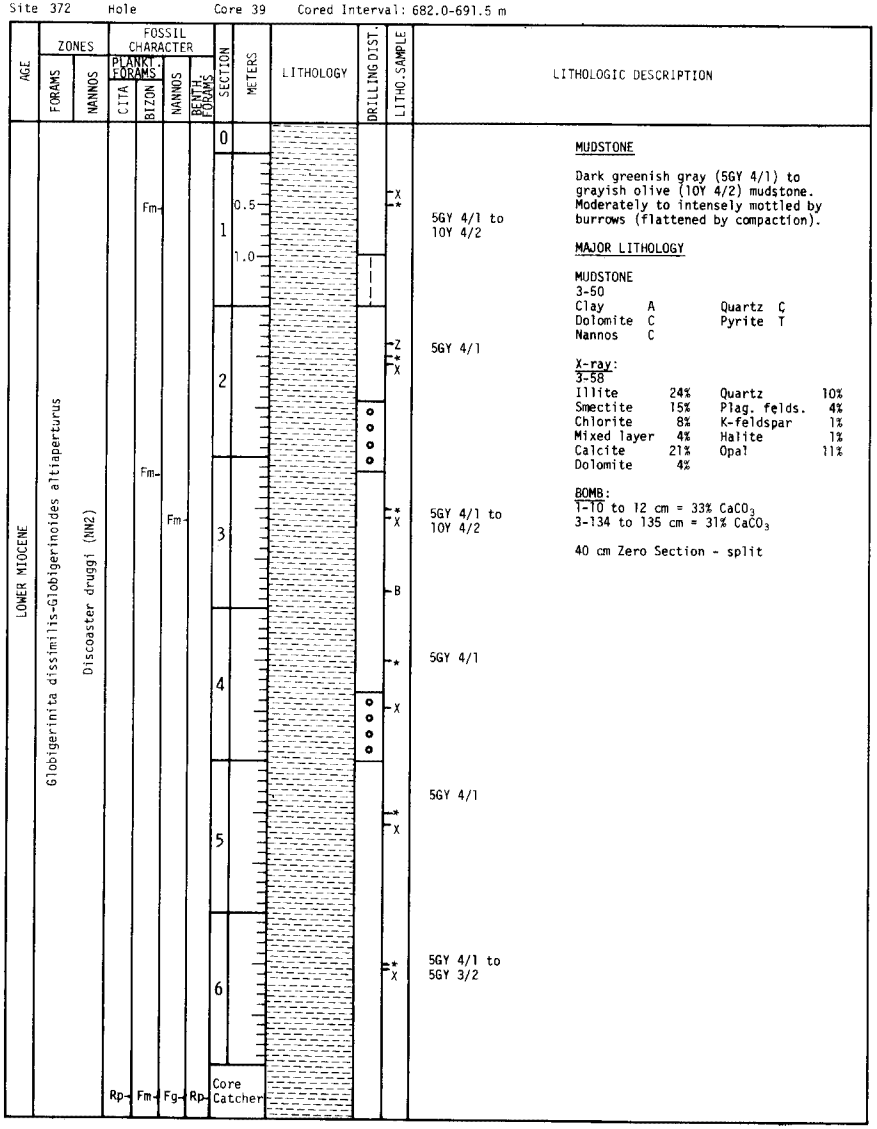
Sand	1.9%
Silt	42.3%
Clay	55.8%

BOMB:
1-89 to 90 cm = 23% $CaCO_3$
2-12 to 13 cm = 25% $CaCO_3$
3-42 to 43 cm = 20% $CaCO_3$
4-24 to 25 cm = 23% $CaCO_3$

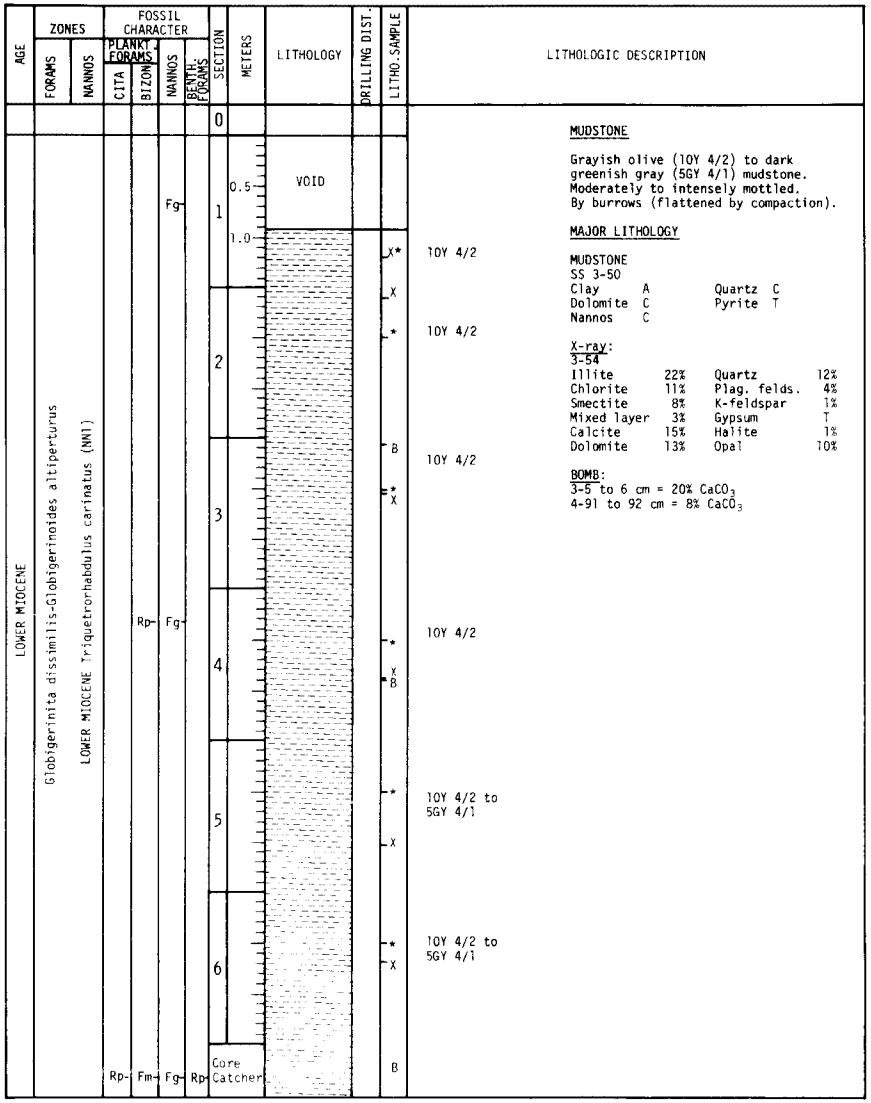
Site 372 Hole Core 38 Cored Interval: 644.0-653.5 m



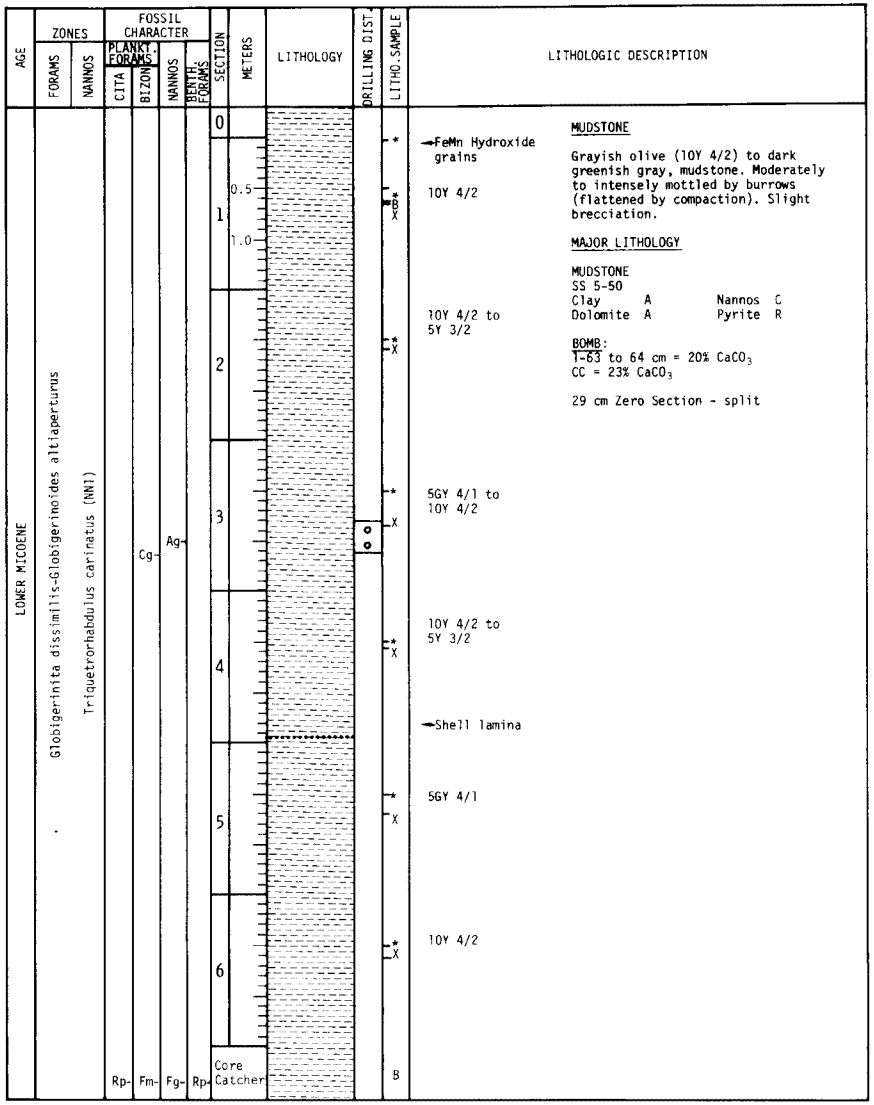
Site 372 Hole Core 39 Cored Interval: 682.0-691.5 m



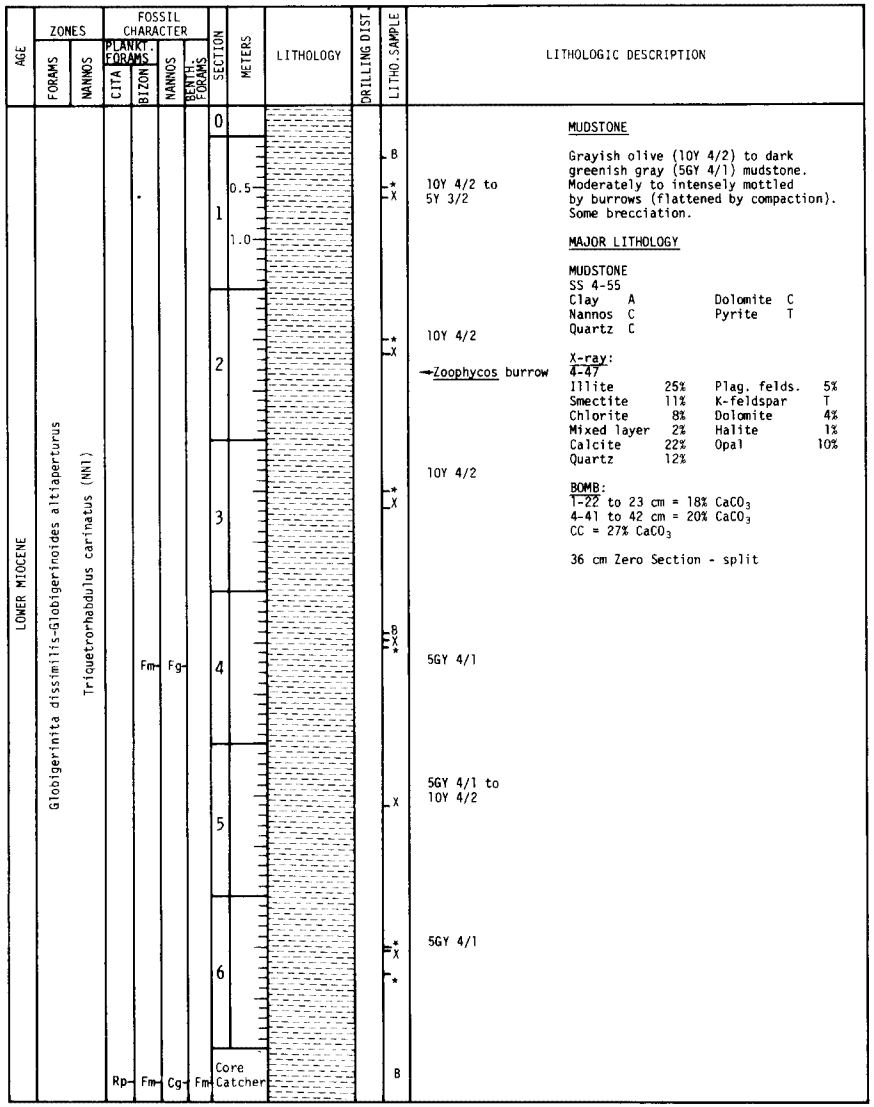
Site 372 Hole Core 40 Cored Interval: 720.0-729.5 m



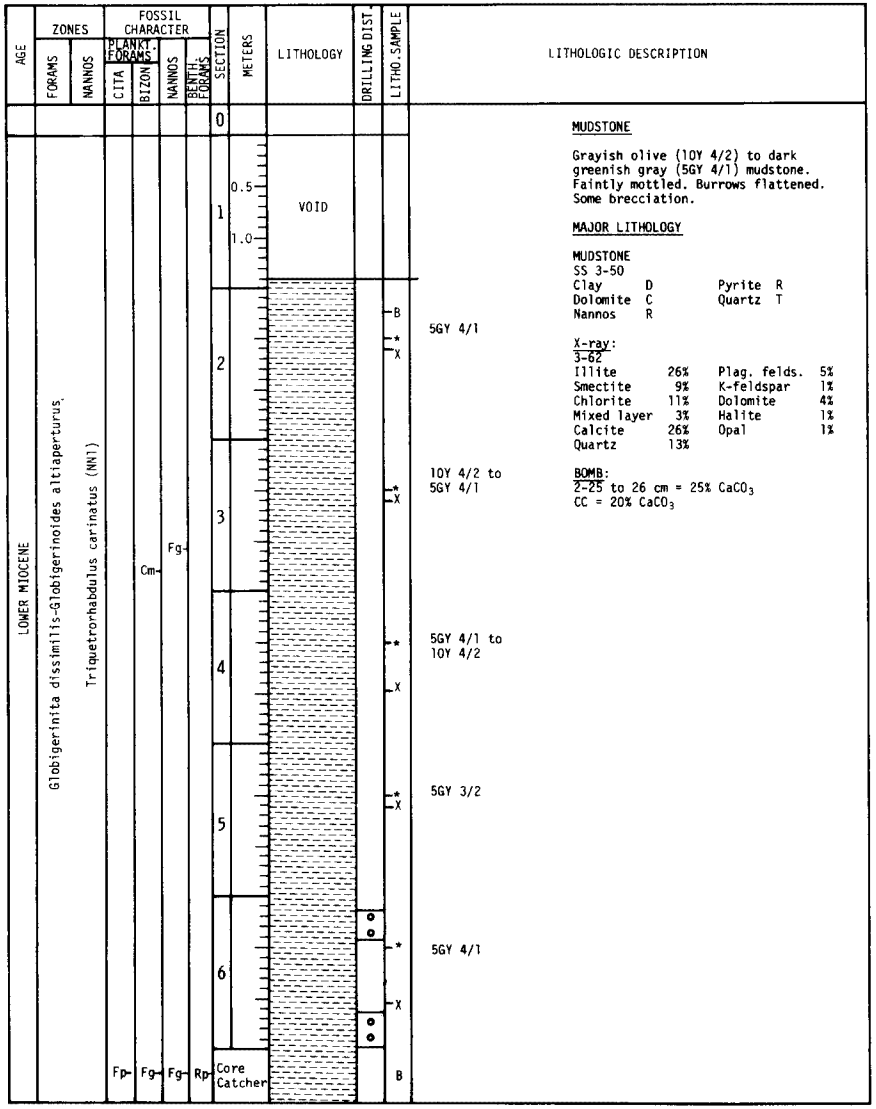
Site 372 Hole Core 41 Cored Interval: 758.0-767.5 m



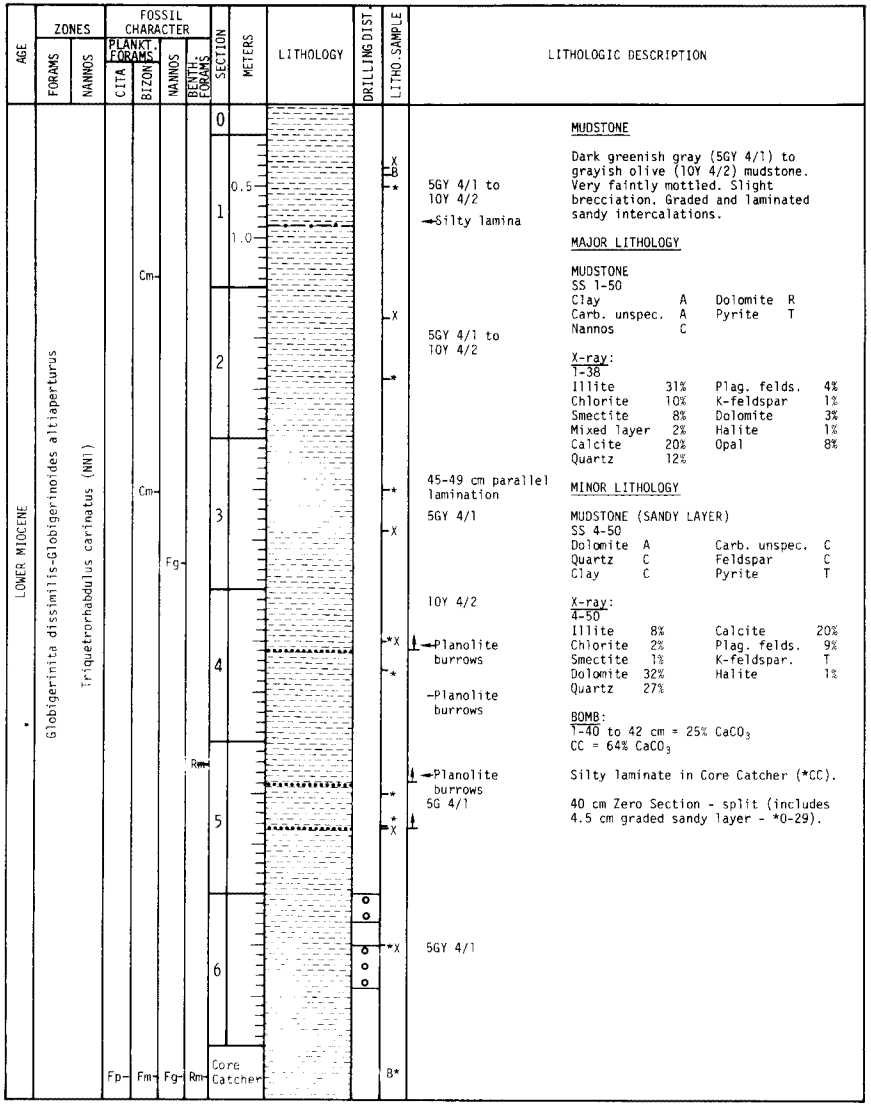
Site 372 Hole Core 42 Cored Interval: 786.5-796.0 m



Site 372 Hole Core 43 Cored Interval: 796.0-805.5 m



Site 372 Hole Core 44 Cored Interval: 834.0-843.5 m



MUDSTONE

Dark greenish gray (5GY 4/1) to grayish olive (10Y 4/2) mudstone. Very faintly mottled. Slight brecciation. Graded and laminated sandy intercalations.

5GY 4/1 to 10Y 4/2

Silty lamina

MAJOR LITHOLOGY

MUDSTONE
SS 1-50

Clay	A	Dolomite	R
Carb. unspec.	A	Pyrite	T
Nannos	C		

5GY 4/1 to 10Y 4/2

X-ray:
1-38

Illite	31%	Plag. felds.	4%
Chlorite	10%	K-feldspar	1%
Smectite	8%	Dolomite	3%
Mixed layer	2%	Halite	1%
Calcite	20%	Opal	8%
Quartz	12%		

45-49 cm parallel lamination

MINOR LITHOLOGY

5GY 4/1

MUDSTONE (SANDY LAYER)
SS 4-50

Dolomite	A	Carb. unspec.	C
Quartz	C	Feldspar	C
Clay	C	Pyrite	T

10Y 4/2

X-ray:
4-50

Illite	8%	Calcite	20%
Chlorite	2%	Plag. felds.	9%
Smectite	1%	K-feldspar.	T
Dolomite	32%	Halite	1%
Quartz	27%		

Planolite burrows

Planolite burrows

BOMB:
1-40 to 42 cm = 25% $CaCO_3$
CC = 64% $CaCO_3$

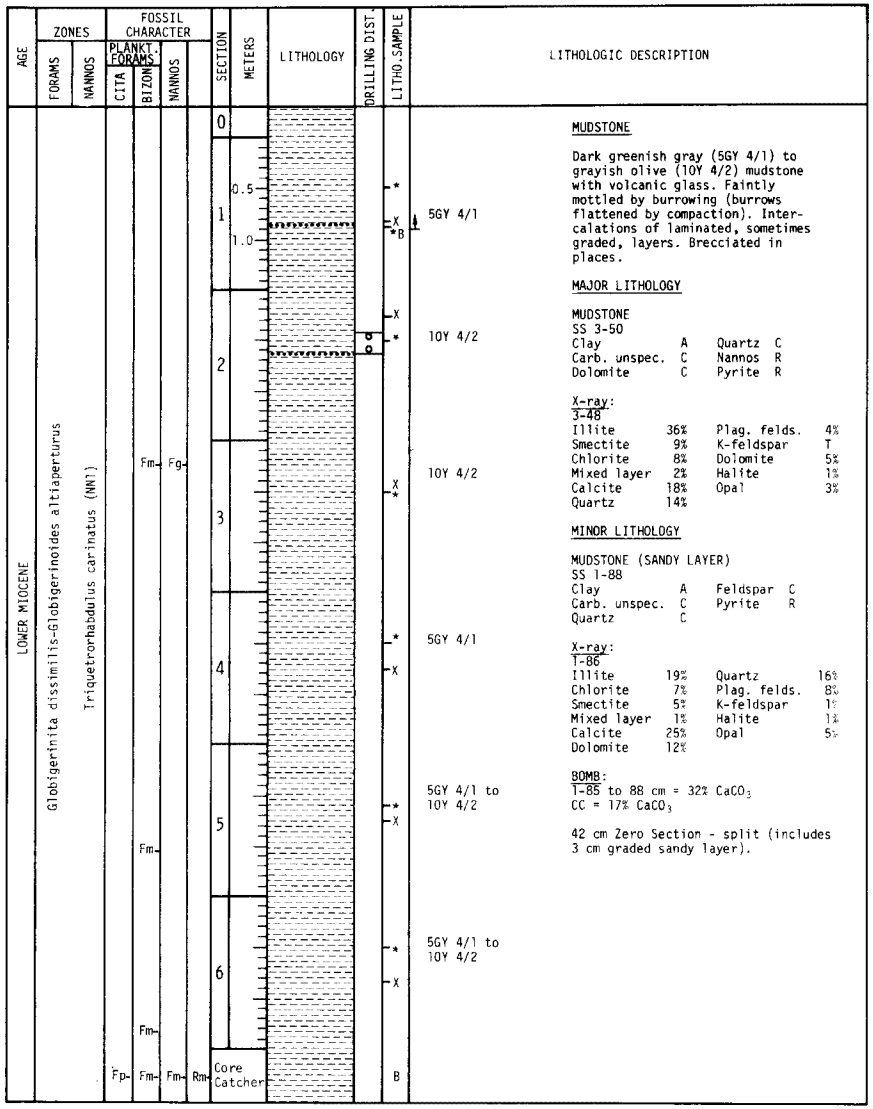
Planolite burrows
5G 4/1

Silty laminate in Core Catcher (*CC).

40 cm Zero Section - split (includes 4.5 cm graded sandy layer - *0-29).

5GY 4/1

Site 372 Hole Core 45 Cored Interval: 872.0-881.5 m



MUDSTONE

Dark greenish gray (5GY 4/1) to grayish olive (10Y 4/2) mudstone with volcanic glass. Faintly mottled by burrowing (burrows flattened by compaction). Intercalations of laminated, sometimes graded, layers. Brecciated in places.

5GY 4/1

MAJOR LITHOLOGY

MUDSTONE
SS 3-50

Clay	A	Quartz	C
Carb. unspec.	C	Nannos	R
Dolomite	C	Pyrite	R

10Y 4/2

X-ray:
3-48

Illite	36%	Plag. felds.	4%
Smectite	9%	K-feldspar	T
Chlorite	8%	Dolomite	5%
Mixed layer	2%	Halite	1%
Calcite	18%	Opal	3%
Quartz	14%		

10Y 4/2

MINOR LITHOLOGY

MUDSTONE (SANDY LAYER)
SS 1-88

Clay	A	Feldspar	C
Carb. unspec.	C	Pyrite	R
Quartz	C		

5GY 4/1

X-ray:
1-86

Illite	19%	Quartz	16%
Chlorite	7%	Plag. felds.	8%
Smectite	5%	K-feldspar	1%
Mixed layer	1%	Halite	1%
Calcite	25%	Opal	5%
Dolomite	12%		

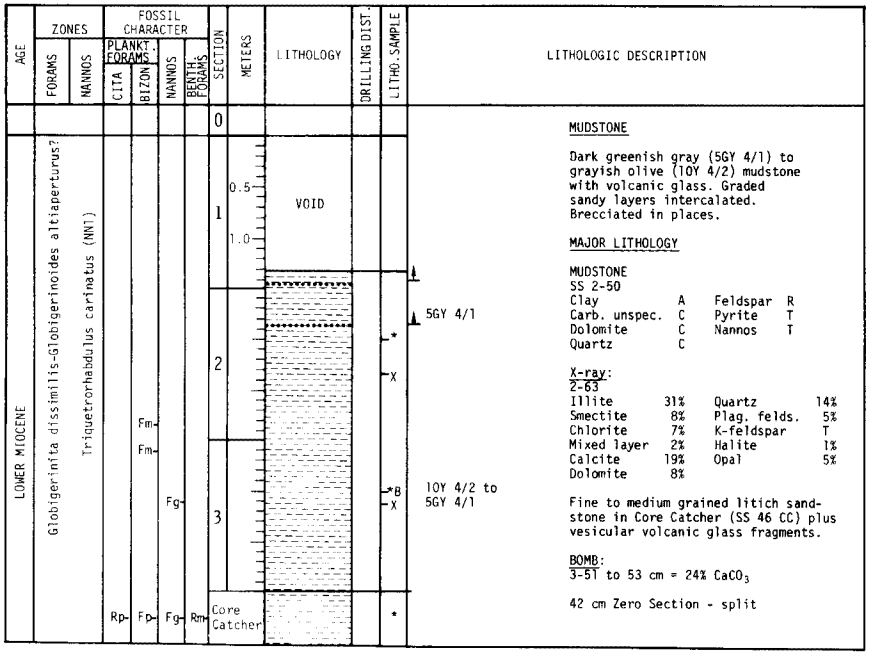
BOMB:
1-85 to 88 cm = 32% $CaCO_3$
CC = 17% $CaCO_3$

5GY 4/1 to 10Y 4/2

42 cm Zero Section - split (includes 3 cm graded sandy layer).

5GY 4/1 to 10Y 4/2

Site 372 Hole Core 46 Cored Interval: 881.5-885.0 m



MUDSTONE

Dark greenish gray (5GY 4/1) to grayish olive (10Y 4/2) mudstone with volcanic glass. Graded sandy layers intercalated. Brecciated in places.

MAJOR LITHOLOGY

MUDSTONE
SS 2-50

Clay	A	Feldspar	R
Carb. unspec.	C	Pyrite	T
Dolomite	C	Nannos	T
Quartz	C		

X-ray:
2-63

Illite	31%	Quartz	14%
Smectite	8%	Plag. felds.	5%
Chlorite	7%	K-feldspar	T
Mixed layer	2%	Halite	1%
Calcite	19%	Opal	5%
Dolomite	8%		

Fine to medium grained litich sandstone in Core Catcher (SS 46 CC) plus vesicular volcanic glass fragments.

BOMB:
3-51 to 53 cm = 24% $CaCO_3$

42 cm Zero Section - split

DEEP SEA DRILLING PROJECT

LEG 42A SITE 373A

SITE SUMMARY SHEET

POSITION: Latitude: 39°43.68'N Longitude: 12°59.56'E

Water depth (sea level): 3517 corrected meters, echo sounding

Bottom felt at: 3507 meters, drill pipe Penetration: 457.5 meters

Number of holes: 1 Number of cores: 12

Total core recovered: 27.5 meters Percentage core recovery: 24.1%

OLDEST SEDIMENT CORED:

Depth subbottom: 270 meters Nature: Marl

Age: Lower Pliocene

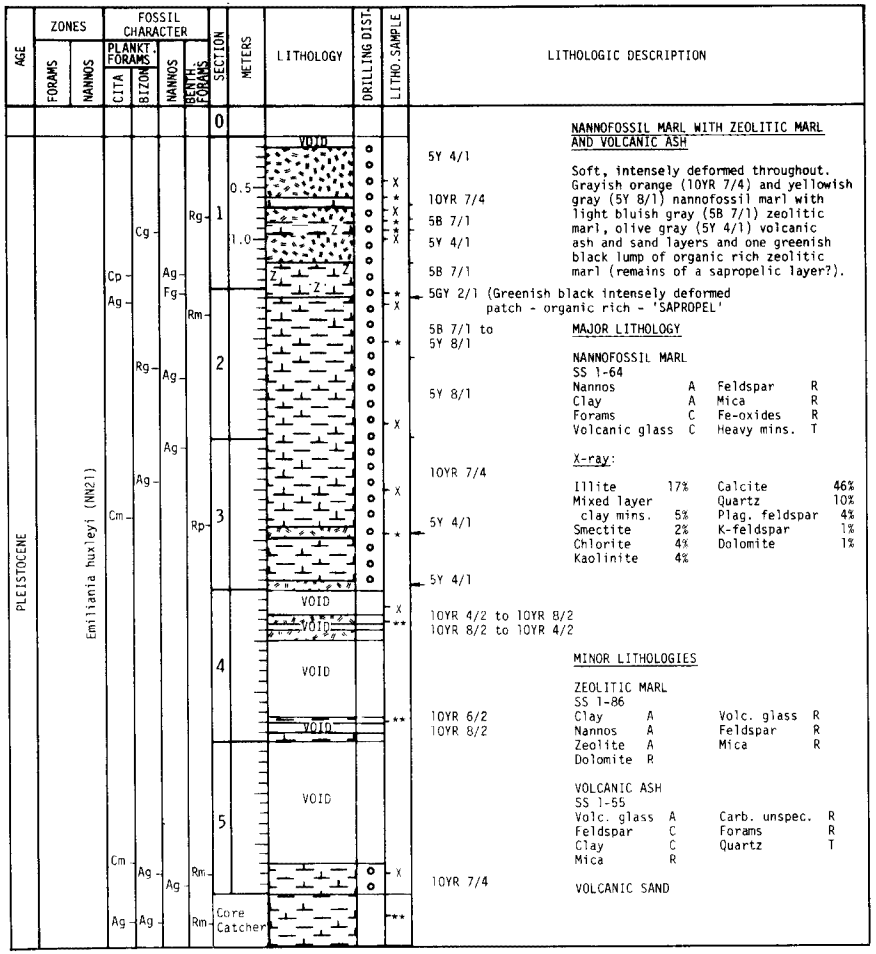
BASEMENT:

Depth subbottom: 270-457 meters Nature: Basalt breccias and flows

PRINCIPAL RESULTS:

Site 373 was located on the flank of a seamount in the central Tyrrhenian Abyssal Plain and its prime objective was to sample the basement. The original hole was positioned too high on the flank and the bottom-hole assembly could not be stabilized. Site 373A was an 800-meter offset to the west, where acoustic basement was encountered at 270 meters and the hole was terminated in basalt at 452 meters. A Plio-Quaternary sequence of nannofossil marls, zeolite marls and volcanic ashes and sands overlies a basaltic basement complex of calcareously cemented basalt breccia and flow basalts. The limestone matrix of the basaltic breccias contain foraminifera dated as not older than middle Miocene. The flow basalts were extensively altered despite a penetration almost 200 meters beyond the top of basement. This basement sequence complex bears a general resemblance to that encountered in drilling in the Mid-Atlantic Ridge. Basalt volcanism undoubtedly played a role in the genesis of the Tyrrhenian Basin.

Site 373 Hole A Core 1 Cored Interval: 96.5-106.0 m



NANNOFOSSIL MARL WITH ZEOLITIC MARL AND VOLCANIC ASH

Soft, intensely deformed throughout. Grayish orange (10YR 7/4) and yellowish gray (5Y 8/1) nannofossil marl with light bluish gray (5B 7/1) zeolitic marl, olive gray (5Y 4/1) volcanic ash and sand layers and one greenish black lump of organic rich zeolitic marl (remains of a sapropelic layer?).

5Y 4/1
10YR 7/4
5B 7/1
5Y 4/1
5B 7/1
5GY 2/1 (Greenish black intensely deformed patch - organic rich - 'SAPROPEL'
5B 7/1 to 5Y 8/1
5Y 8/1
10YR 7/4
5Y 4/1
5Y 4/1
10YR 4/2 to 10YR 8/2
10YR 8/2 to 10YR 4/2
10YR 6/2
10YR 8/2
10YR 7/4

MAJOR LITHOLOGY

NANNOFOSSIL MARL
SS 1-64

Nannos	A	Feldspar	R
Clay	A	Mica	R
Forams	C	Fe-oxides	R
Volcanic glass	C	Heavy mins.	T

X-ray:

Illite	17%	Calcite	46%
Mixed layer clay mins.	5%	Quartz	10%
Smectite	2%	Plag. feldspar	4%
Chlorite	4%	K-feldspar	1%
Kaolinite	4%	Dolomite	1%

MINOR LITHOLOGIES

ZEOLITIC MARL
SS 1-86

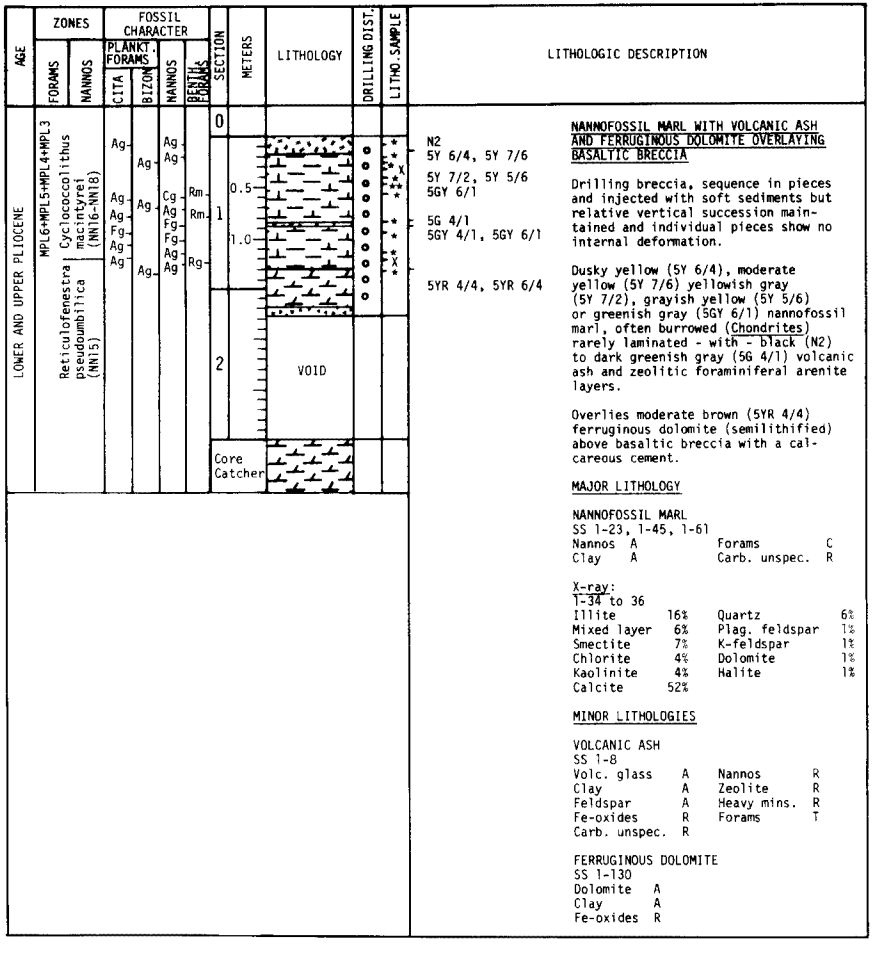
Clay	A	Volc. glass	R
Nannos	A	Feldspar	R
Zeolite	A	Mica	R
Dolomite	R		

VOLCANIC ASH
SS 1-55

Volc. glass	A	Carb. unspec.	R
Feldspar	C	Forams	R
Clay	C	Quartz	T
Mica	R		

VOLCANIC SAND

Site 373 Hole A Core 2 Cored Interval: 267.5-277.0 m



N2
5Y 6/4, 5Y 7/6
5Y 7/2, 5Y 5/6
5GY 6/1
5G 4/1
5GY 4/1, 5GY 6/1
5YR 4/4, 5YR 6/4

NANNOFOSSIL MARL WITH VOLCANIC ASH AND FERRUGINOUS DOLOMITE OVERLAYING BASALTIC BRECCIA

Drilling breccia, sequence in pieces and injected with soft sediments but relative vertical succession maintained and individual pieces show no internal deformation.

Dusky yellow (5Y 6/4), moderate yellow (5Y 7/6) yellowish gray (5Y 7/2), grayish yellow (5Y 5/6) or greenish gray (5GY 6/1) nannofossil marl, often burrowed (Chondrites) rarely laminated - with - black (N2) to dark greenish gray (5G 4/1) volcanic ash and zeolitic foraminiferal arenite layers.

Overlies moderate brown (5YR 4/4) ferruginous dolomite (semilithified) above basaltic breccia with a calcareous cement.

MAJOR LITHOLOGY

NANNOFOSSIL MARL
SS 1-23, 1-45, 1-61

Nannos	A	Forams	C
Clay	A	Carb. unspec.	R

X-ray:
1-34 to 36

Illite	16%	Quartz	6%
Mixed layer	6%	Plag. feldspar	1%
Smectite	7%	K-feldspar	1%
Chlorite	4%	Dolomite	1%
Kaolinite	4%	Halite	1%
Calcite	52%		

MINOR LITHOLOGIES

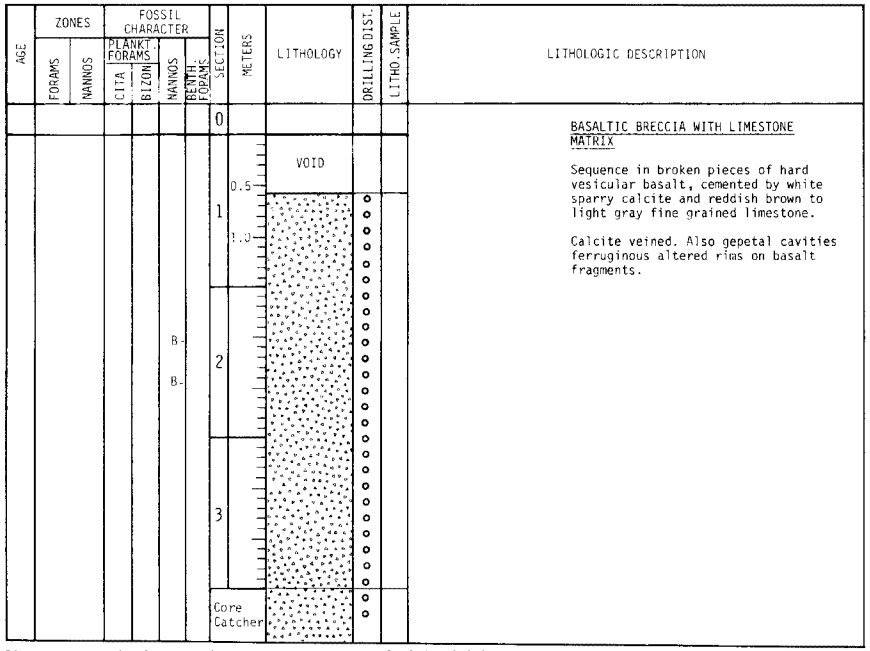
VOLCANIC ASH
SS 1-8

Volc. glass	A	Nannos	R
Clay	A	Zeolite	R
Feldspar	A	Heavy mins.	R
Fe-oxides	R	Forams	T
Carb. unspec.	R		

FERRUGINOUS DOLOMITE
SS 1-130

Dolomite	A
Clay	A
Fe-oxides	R

Site 373 Hole A Core 3 Cored Interval: 277.0-286.5 m

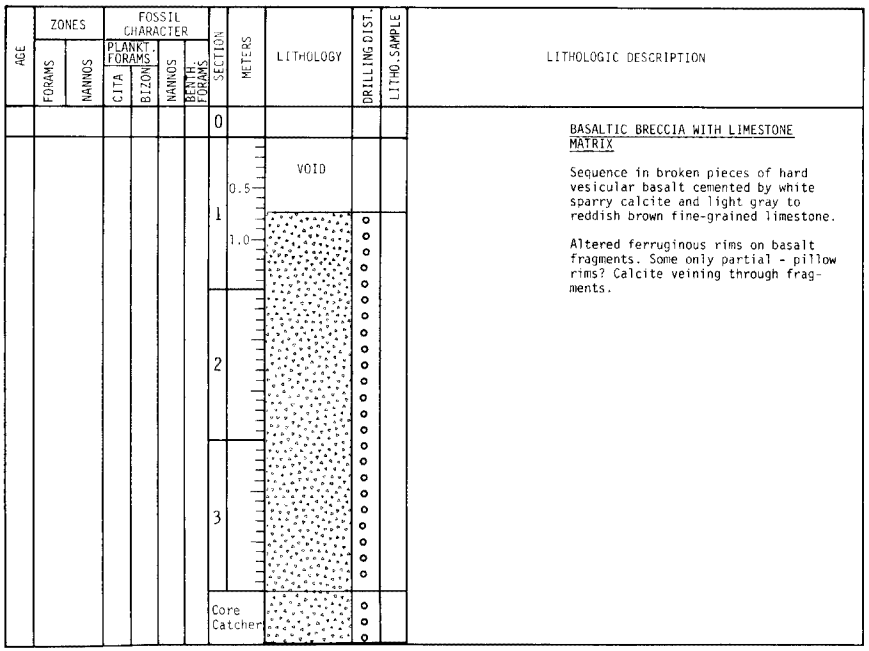


BASALTIC BRECCIA WITH LIMESTONE MATRIX

Sequence in broken pieces of hard vesicular basalt, cemented by white sparry calcite and reddish brown to light gray fine grained limestone.

Calcite veined. Also gepetal cavities ferruginous altered rims on basalt fragments.

Site 373 Hole A Core 4 Cored Interval: 286.5-296.0 m

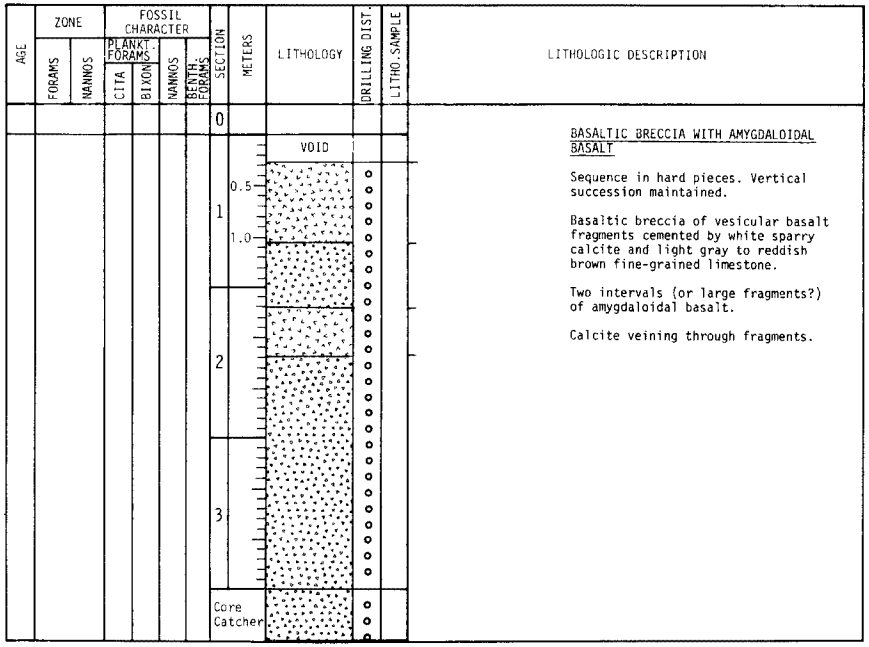


BASALTIC BRECCIA WITH LIMESTONE MATRIX

Sequence in broken pieces of hard vesicular basalt cemented by white sparry calcite and light gray to reddish brown fine-grained limestone.

Altered ferruginous rims on basalt fragments. Some only partial - pillow rims? Calcite veining through fragments.

Site 373 Hole A Core 5 Cored Interval: 308.5-315.0 m



BASALTIC BRECCIA WITH AMYGDALOIDAL BASALT

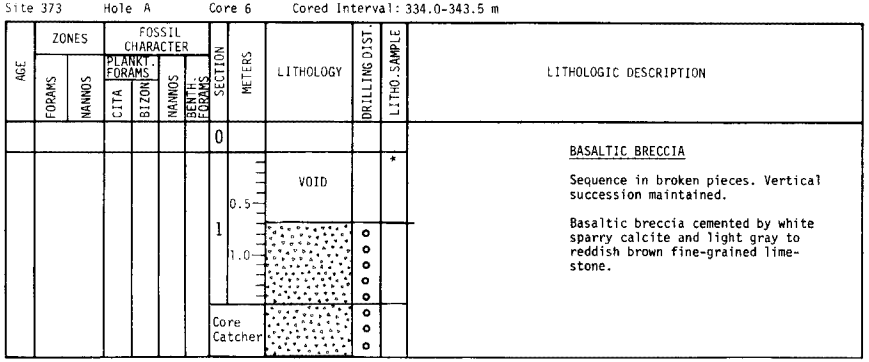
Sequence in hard pieces. Vertical succession maintained.

Basaltic breccia of vesicular basalt fragments cemented by white sparry calcite and light gray to reddish brown fine-grained limestone.

Two intervals (or large fragments?) of amygdaloidal basalt.

Calcite veining through fragments.

Site 373 Hole A Core 6 Cored Interval: 334.0-343.5 m

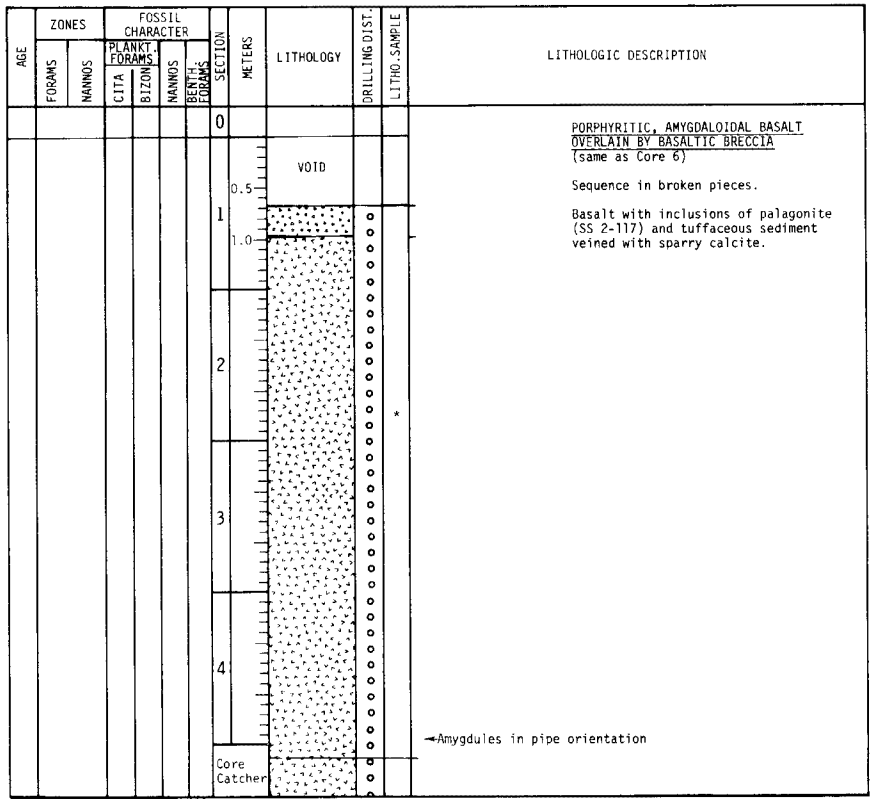


BASALTIC BRECCIA

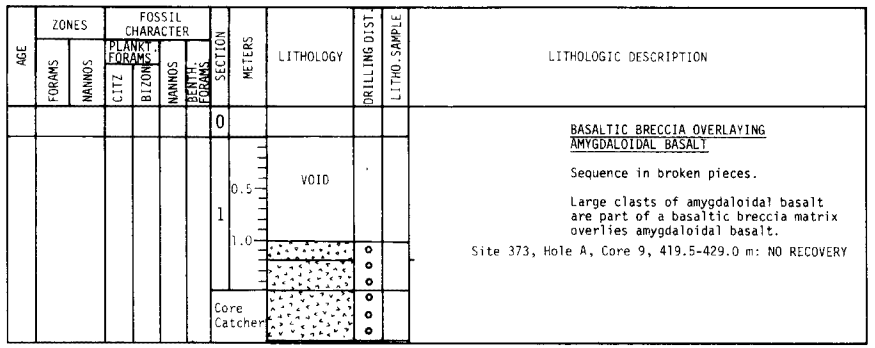
Sequence in broken pieces. Vertical succession maintained.

Basaltic breccia cemented by white sparry calcite and light gray to reddish brown fine-grained limestone.

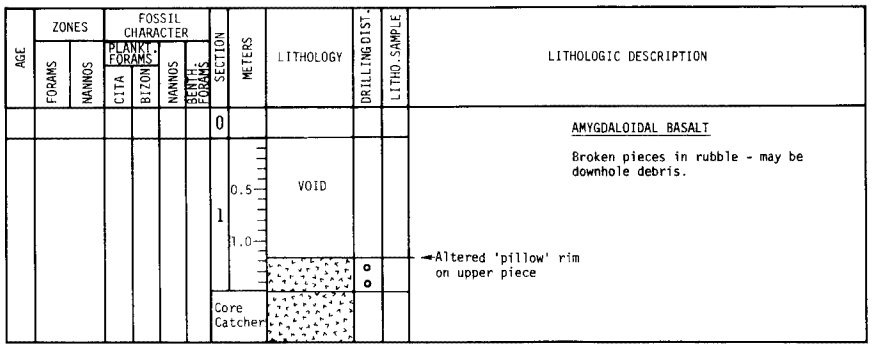
Site 373 Hole A Core 7 Cored Interval: 362.5-372.0 m



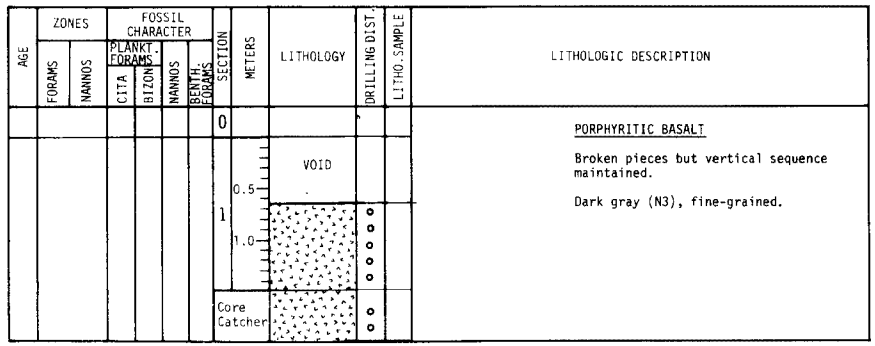
Site 373 Hole A Core 8 Cored Interval: 381.5-391.0 m



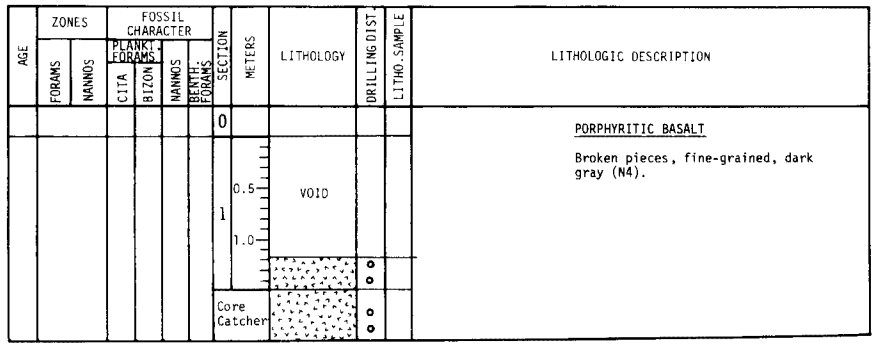
Site 373 Hole A Core 10 Cored Interval: 429.0-438.5 m



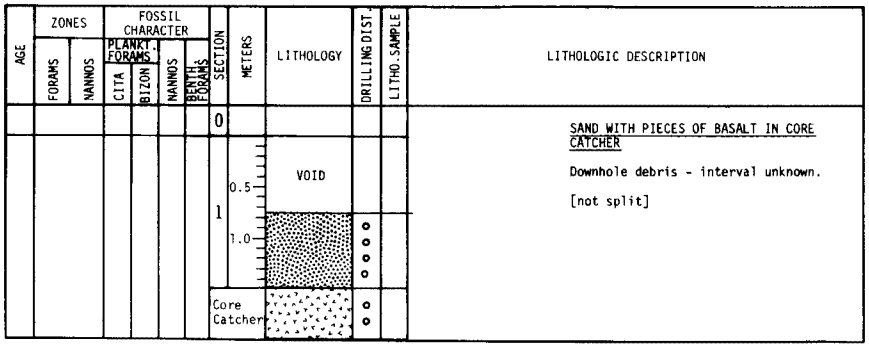
Site 373 Hole A Core 11 Cored Interval: 438.5-448.0 m



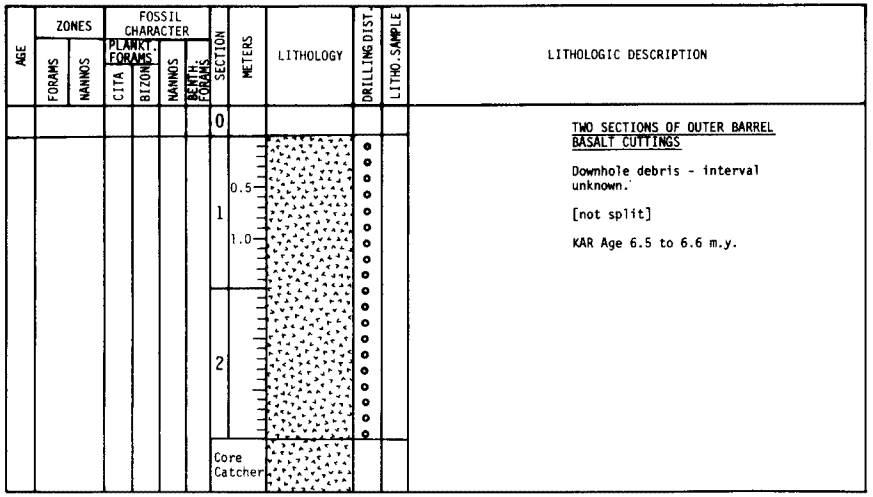
Site 373 Hole A Core 12 Cored Interval: 448.0-457.5 m



Site 373 Hole A Core 13 Cored Interval: ?



Site 373 Hole A Core O.B. Cored Interval: ?



DEEP SEA DRILLING PROJECT

LEG 42A SITE 374

SITE SUMMARY SHEET

POSITION: Latitude: 35°50.87'N Longitude: 18°11.78'E

Water depth (sea level): 4078 corrected meters, echo sounding

Bottom felt at: 4088 meters, drill pipe Penetration: 457.0 meters

Number of holes: 1 Number of cores: 24

Total core recovered: 77.2 meters Percentage core recovery: 50.3%

OLDEST SEDIMENT CORED:

Depth subbottom: 457 meters Nature: Halite

Age: Upper Miocene

BASEMENT: Not reached

PRINCIPAL RESULTS:

Site 374 in the central Ionian Abyssal Plain penetrated over 80 meters into the upper part of the Mediterranean Evaporite Formation and revealed cycles of evaporite deposition within this section.

The Plio-Quaternary sequence which overlies the upper Miocene (Messinian) evaporites are hemipelagic nannofossil muds, marls and oozes interspersed with sapropels and sapropelic marls which were deposited when the basin was stagnant. Upward increase in the frequency of sand and silt layers decrease in carbonate content and increase in sedimentation rate together show a trend towards more terrigenous influx to the basin in the upper Quaternary, related to orogenic movements in Sicily and Calabria. The site has remained at bathyal depths since the lower Pliocene. Repopulation of benthonic faunas (after the Messinian salinity crisis) took place gradually. This suggests the existence of a shallow sill between the eastern and western Mediterranean in the lowest Pliocene.

The upper Miocene evaporites drilled, by comparison with seismic profiles, must belong to the "Upper Evaporite" member of the Mediterranean Evaporite Formation. Dolomitic mudstones overlay a sequence of mudstone-gypsum cycles and these in turn overlay anhydrite and halite. The dolomitic mudstones are generally barren of fossils but rare occurrences of radiolaria and sponge spicules are evidence of marine incursions. An idealized cycle in the sequence below is, in descending order:

D. crenulated gypsum;

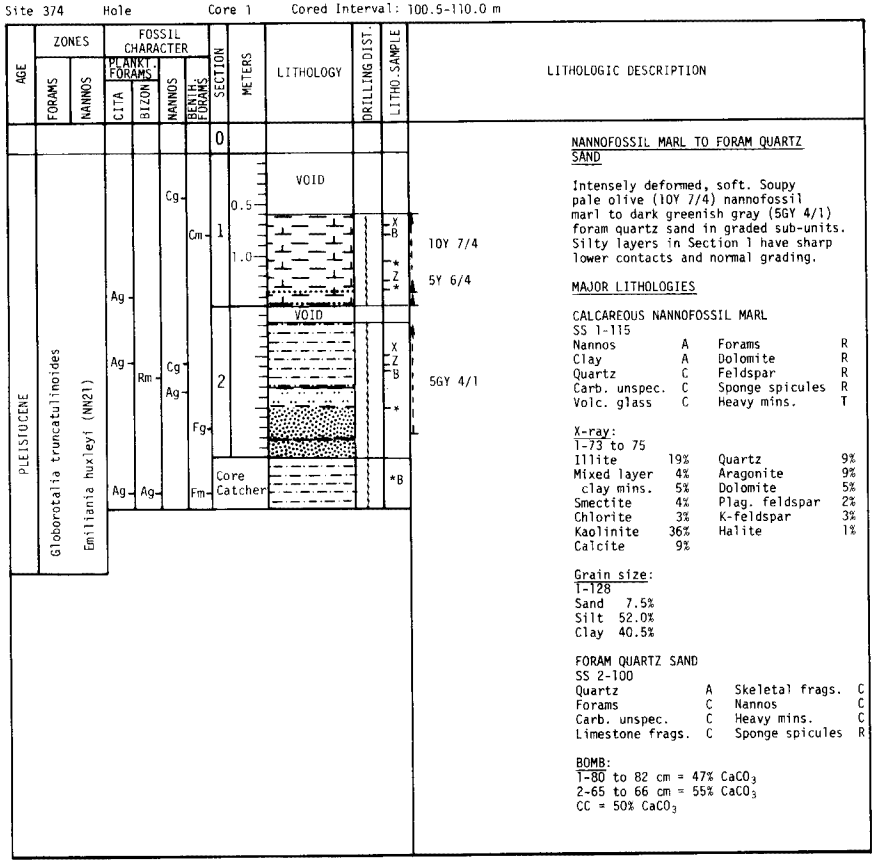
C. evenly laminated gypsum;

B. laminated mudstone (stromatotitic), more or less diatomaceous, and organic rich; and

A. dolomitic mudstone with small gypsum nodules.

Nodular anhydrite occurs below this sequence of cycles and the hole eventually penetrated halite. More highly soluble potash and magnesium salts are suspected as having been washed by the drilling from the interval between the anhydrite and the halite.

Site 374 Hole Core 1 Cored Interval: 100.5-110.0 m



NANNOFOSSIL MARL TO FORAM QUARTZ SAND

Intensely deformed, soft. Soupy pale olive (10Y 7/4) nannofossil marl to dark greenish gray (5GY 4/1) foram quartz sand in graded sub-units. Silty layers in Section 1 have sharp lower contacts and normal grading.

MAJOR LITHOLOGIES

CALCAREOUS NANNOFOSSIL MARL
SS 1-115

Nannos	A	Forams	R
Clay	A	Dolomite	R
Quartz	C	Feldspar	R
Carb. unspec.	C	Sponge spicules	R
Volc. glass	C	Heavy mins.	T

X-ray:
1-73 to 75

Illite	19%	Quartz	9%
Mixed layer clay mins.	4% 5%	Aragonite Dolomite	9% 5%
Smectite	4%	Plag. feldspar	2%
Chlorite	3%	K-feldspar	3%
Kaolinite	36%	Halite	1%
Calcite	9%		

Grain size:
1-128

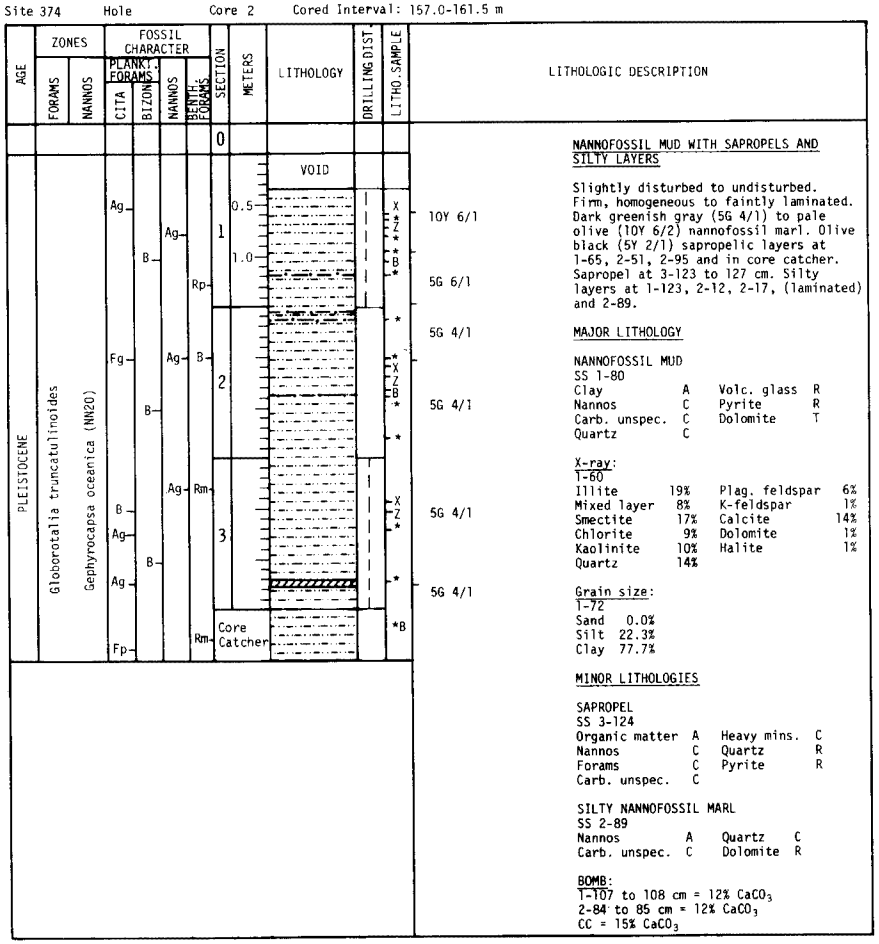
Sand	7.5%
Silt	52.0%
Clay	40.5%

FORAM QUARTZ SAND
SS 2-100

Quartz	A	Skeletal frags.	C
Forams	C	Nannos	C
Carb. unspec.	C	Heavy mins.	C
Limestone frags.	C	Sponge spicules	R

BOMB:
1-80 to 82 cm = 47% $CaCO_3$
2-65 to 66 cm = 55% $CaCO_3$
CC = 50% $CaCO_3$

Site 374 Hole Core 2 Cored Interval: 157.0-161.5 m



NANNOFOSSIL MUD WITH SAPROPELS AND SILTY LAYERS

Slightly disturbed to undisturbed. Firm, homogeneous to faintly laminated. Dark greenish gray (5G 4/1) to pale olive (10Y 6/2) nannofossil marl. Olive black (5Y 2/1) sapropelic layers at 1-65, 2-51, 2-95 and in core catcher. Sapropel at 3-123 to 127 cm. Silty layers at 1-123, 2-12, 2-17, (laminated) and 2-89.

MAJOR LITHOLOGY

NANNOFOSSIL MUD
SS 1-80

Clay	A	Volc. glass	R
Nannos	C	Pyrite	R
Carb. unspec.	C	Dolomite	T
Quartz	C		

X-ray:
1-60

Illite	19%	Plag. feldspar	6%
Mixed layer	8%	K-feldspar	1%
Smectite	17%	Calcite	14%
Chlorite	9%	Dolomite	1%
Kaolinite	10%	Halite	1%
Quartz	14%		

Grain size:
1-72

Sand	0.0%
Silt	22.3%
Clay	77.7%

MINOR LITHOLOGIES

SAPROPEL
SS 3-124

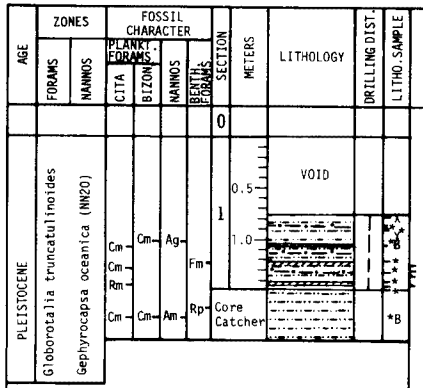
Organic matter	A	Heavy mins.	C
Nannos	C	Quartz	R
Forams	C	Pyrite	R
Carb. unspec.	C		

SILTY NANNOFOSSIL MARL
SS 2-89

Nannos	A	Quartz	C
Carb. unspec.	C	Dolomite	R

BOMB:
1-107 to 108 cm = 12% $CaCO_3$
2-84 to 85 cm = 12% $CaCO_3$
CC = 15% $CaCO_3$

Site 374 Hole Core 3 Cored Interval: 208.0-209.0 m



5G 4/1

NANNOFOSSIL MUD WITH SAPROPELS AND SILTY LAYERS

Slightly disturbed, firm, dark greenish gray (5G 4/1) nannofossil mud. Sapropel layers at 1-103 to 105 cm; 1-121 to 122 plus 1-125 to 129 cm (multiple); 1-140 to 143 cm and sapropelic sediment in Core Catcher. Mottling 1-95 to 100 cm. Silty layers at 85 cm, 119 cm and 133.5 cm.

MAJOR LITHOLOGY

NANNOFOSSIL MUD
SS 1-88

Clay	A	Volc. glass	R
Nannos	C	Dolomite	R
Carb. unspec.	C	Forams	T
Quartz	C		

X-ray:
1-80

Illite	23%	Plag. feldspar	3%
Smectite	17%	K-feldspar	1%
Mixed layer	10%	Calcite	13%
Chlorite	8%	Dolomite	2%
Kaolinite	8%	Aragonite	T
Quartz	13%	Halite	2%

Grain size:
1-78

Sand	0.2%
Silt	30.8%
Clay	69.0%

MINOR LITHOLOGIES

SAPROPEL
SS 1-122

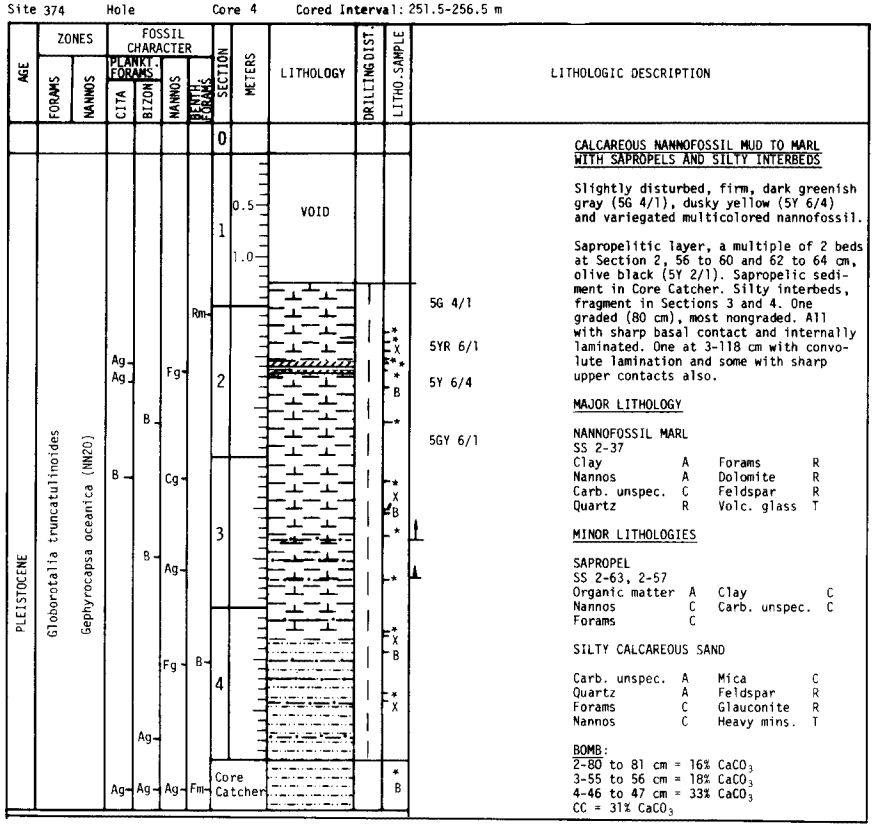
Organic matter	A	Clay	C
Nannos	C	Quartz	C
Forams	C	Dolomite	R
Carb. unspec.	C		

SILTY CARCAREOUS SAND
SS 1-85

Quartz	A	Heavy mins.	R
Carb. unspec.	A	Forams	R
Feldspar	R	Nannos	R
Mica	R	Glauconite	T

BOMB:
1-109 to 110 cm = 10% $CaCO_3$
CC = 19% $CaCO_3$

Site 374 Hole Core 4 Cored Interval: 251.5-256.5 m



5G 4/1
5YR 6/1
5Y 6/4
5GY 6/1

CALCAREOUS NANNOFOSSIL MUD TO MARL WITH SAPROPELS AND SILTY INTERBEDS

Slightly disturbed, firm, dark greenish gray (5G 4/1), dusky yellow (5Y 6/4) and variegated multicolored nannofossil.

Sapropelitic layer, a multiple of 2 beds at Section 2, 56 to 60 and 62 to 64 cm, olive black (5Y 2/1). Sapropelic sediment in Core Catcher. Silty interbeds, fragment in Sections 3 and 4. One graded (80 cm), most nongraded. All with sharp basal contact and internally laminated. One at 3-118 cm with convolute lamination and some with sharp upper contacts also.

MAJOR LITHOLOGY

NANNOFOSSIL MARL
SS 2-37

Clay	A	Forams	R
Nannos	A	Dolomite	R
Carb. unspec.	C	Feldspar	R
Quartz	R	Volc. glass	T

MINOR LITHOLOGIES

SAPROPEL
SS 2-63, 2-57

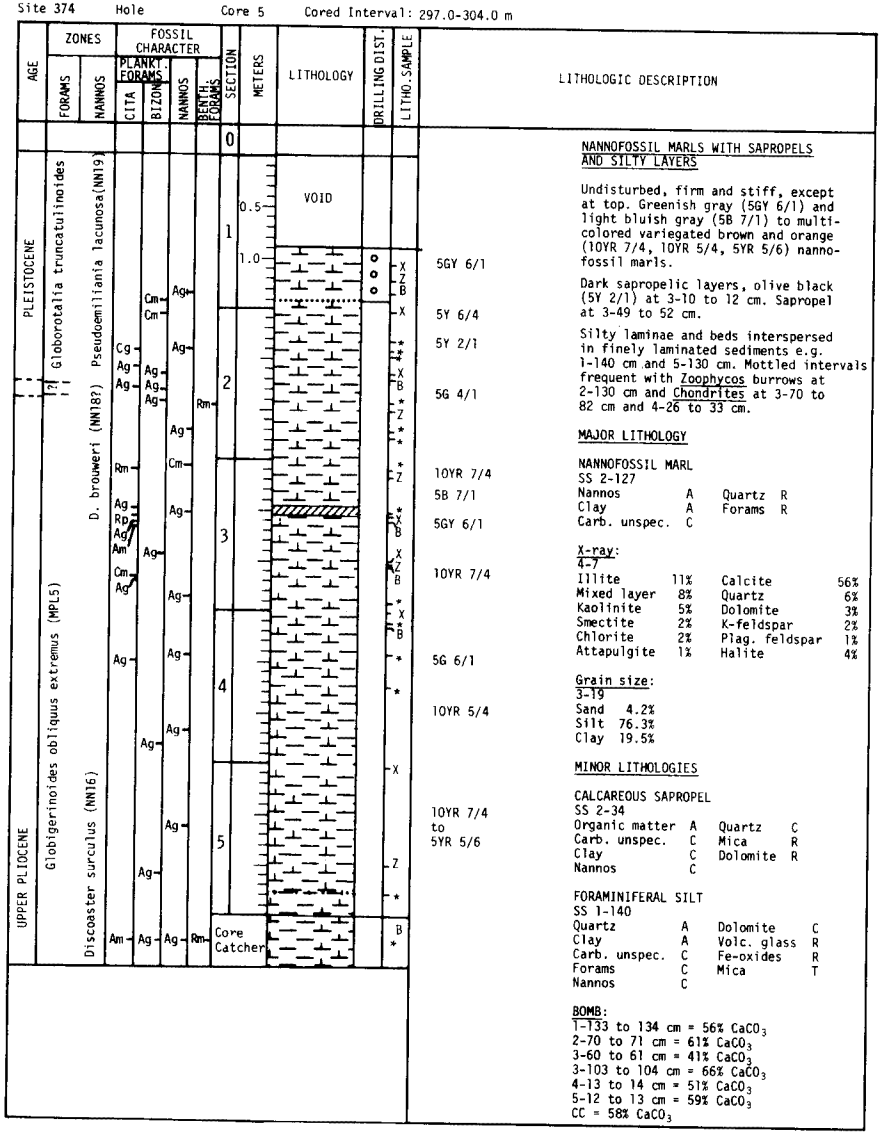
Organic matter	A	Clay	C
Nannos	C	Carb. unspec.	C
Forams	C		

SILTY CALCAREOUS SAND

Carb. unspec.	A	Mica	C
Quartz	A	Feldspar	R
Forams	C	Glauconite	R
Nannos	C	Heavy mins.	T

BOMB:
2-80 to 81 cm = 16% $CaCO_3$
3-55 to 56 cm = 18% $CaCO_3$
4-46 to 47 cm = 33% $CaCO_3$
CC = 31% $CaCO_3$

Site 374 Hole Core 5 Cored Interval: 297.0-304.0 m



LITHOLOGIC DESCRIPTION

NANNOFOSSIL MARLS WITH SAPROPELS AND SILTY LAYERS

Undisturbed, firm and stiff, except at top. Greenish gray (5GY 6/1) and light bluish gray (5B 7/1) to multi-colored variegated brown and orange (10YR 7/4, 10YR 5/4, 5YR 5/6) nannofossil marls.

Dark sapropelic layers, olive black (5Y 2/1) at 3-10 to 12 cm. Sapropel at 3-49 to 52 cm.

Silty laminae and beds interspersed in finely laminated sediments e.g. 1-140 cm and 5-130 cm. Mottled intervals frequent with Zoophycos burrows at 2-130 cm and Chondrites at 3-70 to 82 cm and 4-26 to 33 cm.

MAJOR LITHOLOGY

NANNOFOSSIL MARL
SS 2-127

Nannos	A	Quartz	R
Clay	A	Forams	R
Carb. unspec.	C		

X-ray:
4-7

Illite	11%	Calcite	56%
Mixed layer	8%	Quartz	6%
Kaolinite	5%	Dolomite	3%
Smectite	2%	K-feldspar	2%
Chlorite	2%	Plag. feldspar	1%
Attapulgite	1%	Halite	4%

Grain size:
3-19

Sand	4.2%
Silt	76.3%
Clay	19.5%

MINOR LITHOLOGIES

CALCAREOUS SAPROPEL
SS 2-34

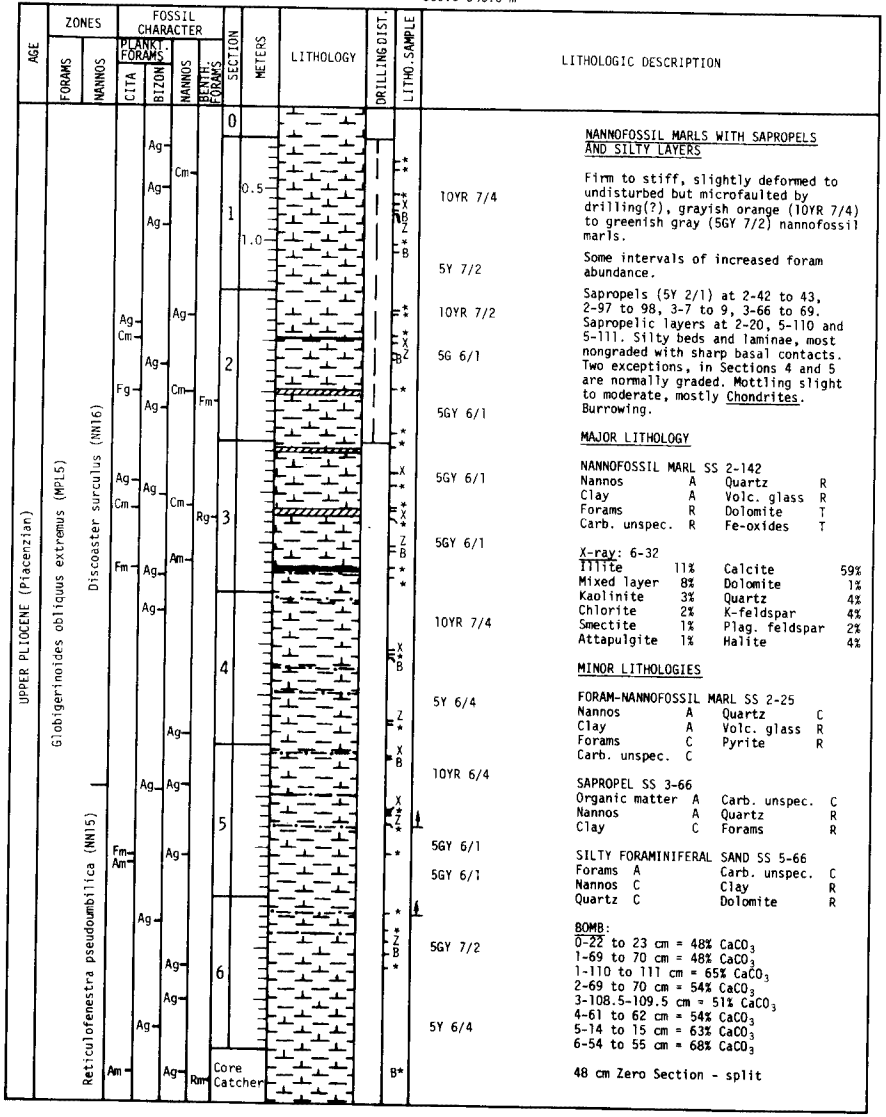
Organic matter	A	Quartz	C
Carb. unspec.	C	Mica	R
Clay	C	Dolomite	R
Nannos	C		

FORAMINIFERAL SILT
SS 1-140

Quartz	A	Dolomite	C
Clay	A	Volc. glass	R
Carb. unspec.	C	Fe-oxides	R
Forams	C	Mica	T
Nannos	C		

BOMB:
1-133 to 134 cm = 56% $CaCO_3$
2-70 to 71 cm = 61% $CaCO_3$
3-60 to 61 cm = 41% $CaCO_3$
3-103 to 104 cm = 66% $CaCO_3$
4-13 to 14 cm = 51% $CaCO_3$
5-12 to 13 cm = 59% $CaCO_3$
CC = 58% $CaCO_3$

Site 374 Hole Core 6 Cored Interval: 330.5-340.0 m



LITHOLOGIC DESCRIPTION

NANNOFOSSIL MARLS WITH SAPROPELS AND SILTY LAYERS

Firm to stiff, slightly deformed to undisturbed but microfaulted by drilling(?), grayish orange (10YR 7/4) to greenish gray (5GY 7/2) nannofossil marls.

Some intervals of increased foram abundance.

Sapropels (5Y 2/1) at 2-42 to 43, 2-97 to 98, 3-7 to 9, 3-66 to 69. Sapropelic layers at 2-20, 5-110 and 5-111. Silty beds and laminae, most nongraded with sharp basal contacts. Two exceptions, in Sections 4 and 5 are normally graded. Mottling slight to moderate, mostly Chondrites. Burrowing.

MAJOR LITHOLOGY

NANNOFOSSIL MARL SS 2-142

Nannos	A	Quartz	R
Clay	A	Volc. glass	R
Forams	R	Dolomite	T
Carb. unspec.	R	Fe-oxides	T

X-ray: 6-32

Illite	11%	Calcite	59%
Mixed layer	8%	Dolomite	1%
Kaolinite	3%	Quartz	4%
Chlorite	2%	K-feldspar	4%
Smectite	1%	Plag. feldspar	2%
Attapulgite	1%	Halite	4%

MINOR LITHOLOGIES

FORAM-NANNOFOSSIL MARL SS 2-25

Nannos	A	Quartz	C
Clay	A	Volc. glass	R
Forams	C	Pyrite	R
Carb. unspec.	C		

SAPROPEL SS 3-66

Organic matter	A	Carb. unspec.	C
Nannos	A	Quartz	R
Clay	C	Forams	R

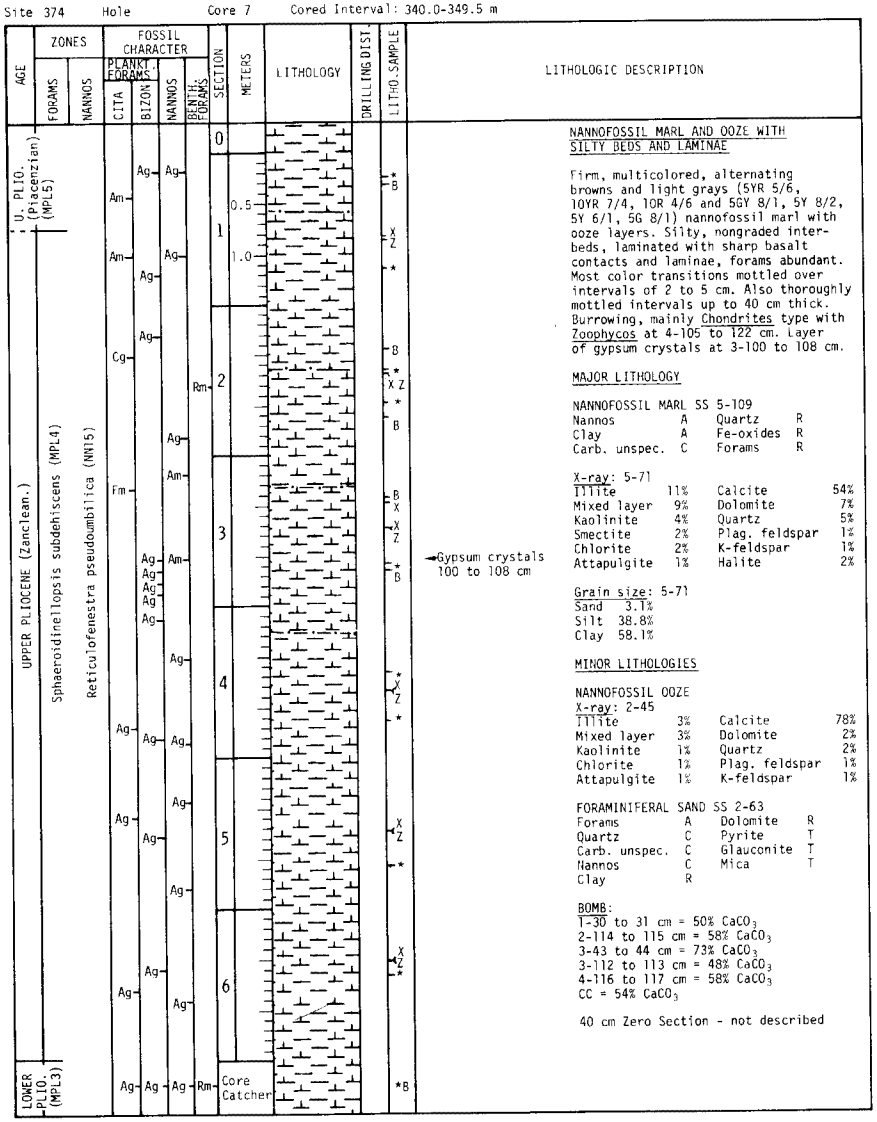
SILTY FORAMINIFERAL SAND SS 5-66

Forams	A	Carb. unspec.	C
Nannos	C	Clay	R
Quartz	C	Dolomite	R

BOMB:
0-22 to 23 cm = 48% $CaCO_3$
1-69 to 70 cm = 48% $CaCO_3$
1-110 to 111 cm = 65% $CaCO_3$
2-69 to 70 cm = 54% $CaCO_3$
3-108.5-109.5 cm = 51% $CaCO_3$
4-61 to 62 cm = 54% $CaCO_3$
5-14 to 15 cm = 63% $CaCO_3$
6-54 to 55 cm = 68% $CaCO_3$

48 cm Zero Section - split

Site 374 Hole Core 7 Cored Interval: 340.0-349.5 m



LITHOLOGIC DESCRIPTION

NANNOFOSSIL MARL AND OOZE WITH SILTY BEDS AND LAMINAE

Firm, multicolored, alternating browns and light grays (5YR 5/6, 10YR 7/4, 10R 4/6 and 5GY 8/1, 5Y 8/2, 5Y 6/1, 5G 8/1) nannofossil marl with ooze layers. Silty, nongraded interbeds, laminated with sharp basalt contacts and laminae, forams abundant. Most color transitions mottled over intervals of 2 to 5 cm. Also thoroughly mottled intervals up to 40 cm thick. Burrowing, mainly Chondrites type with Zoophycos at 4-105 to 122 cm. Layer of gypsum crystals at 3-100 to 108 cm.

MAJOR LITHOLOGY

NANNOFOSSIL MARL SS 5-109

Nannos	A	Quartz	R
Clay	A	Fe-oxides	R
Carb. unspec.	C	Forams	R

X-ray: 5-71

Illite	11%	Calcite	54%
Mixed layer	9%	Dolomite	7%
Kaolinite	4%	Quartz	5%
Smectite	2%	Plag. feldspar	1%
Chlorite	2%	K-feldspar	1%
Attapulgite	1%	Halite	2%

Grain size: 5-71

Sand	3.1%
Silt	38.8%
Clay	58.1%

MINOR LITHOLOGIES

NANNOFOSSIL OOZE

X-ray: 2-45

Illite	3%	Calcite	78%
Mixed layer	3%	Dolomite	2%
Kaolinite	1%	Quartz	2%
Chlorite	1%	Plag. feldspar	1%
Attapulgite	1%	K-feldspar	1%

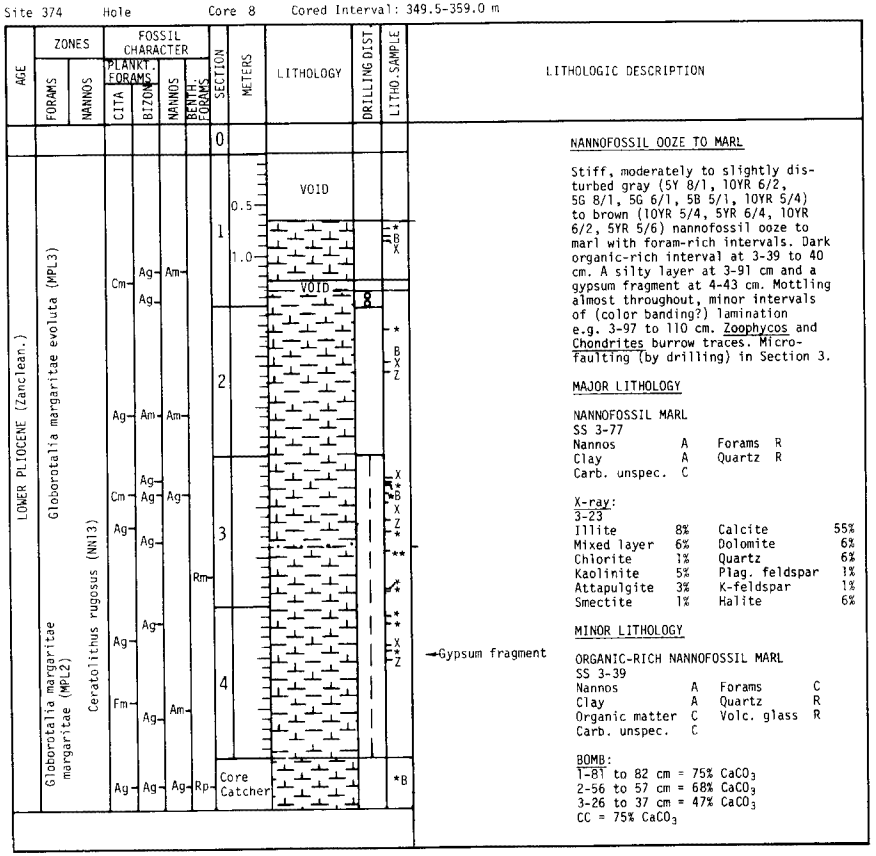
FORAMINIFERAL SAND SS 2-63

Forams	A	Dolomite	R
Quartz	C	Pyrite	T
Carb. unspec.	C	Glauconite	T
Nannos	C	Mica	T
Clay	R		

BOMB:
1-30 to 31 cm = 50% $CaCO_3$
2-114 to 115 cm = 58% $CaCO_3$
3-43 to 44 cm = 73% $CaCO_3$
3-112 to 113 cm = 48% $CaCO_3$
4-116 to 117 cm = 58% $CaCO_3$
CC = 54% $CaCO_3$

40 cm Zero Section - not described

Site 374 Hole Core 8 Cored Interval: 349.5-359.0 m



LITHOLOGIC DESCRIPTION

NANNOFOSSIL OOZE TO MARL

Stiff, moderately to slightly disturbed gray (5Y 8/1, 10YR 6/2, 5G 8/1, 5G 6/1, 5B 5/1, 10YR 5/4) to brown (10YR 5/4, 5YR 6/4, 10YR 6/2, 5YR 5/6) nannofossil ooze to marl with foram-rich intervals. Dark organic-rich interval at 3-39 to 40 cm. A silty layer at 3-91 cm and a gypsum fragment at 4-43 cm. Mottling almost throughout, minor intervals of (color banding?) lamination e.g. 3-97 to 110 cm. Zoophycos and Chondrites burrow traces. Microfaulting (by drilling) in Section 3.

MAJOR LITHOLOGY

NANNOFOSSIL MARL SS 3-77

Nannos	A	Forams	R
Clay	A	Quartz	R
Carb. unspec.	C		

X-ray: 3-23

Illite	8%	Calcite	55%
Mixed layer	6%	Dolomite	6%
Chlorite	1%	Quartz	6%
Kaolinite	5%	Plag. feldspar	1%
Attapulgite	3%	K-feldspar	1%
Smectite	1%	Halite	6%

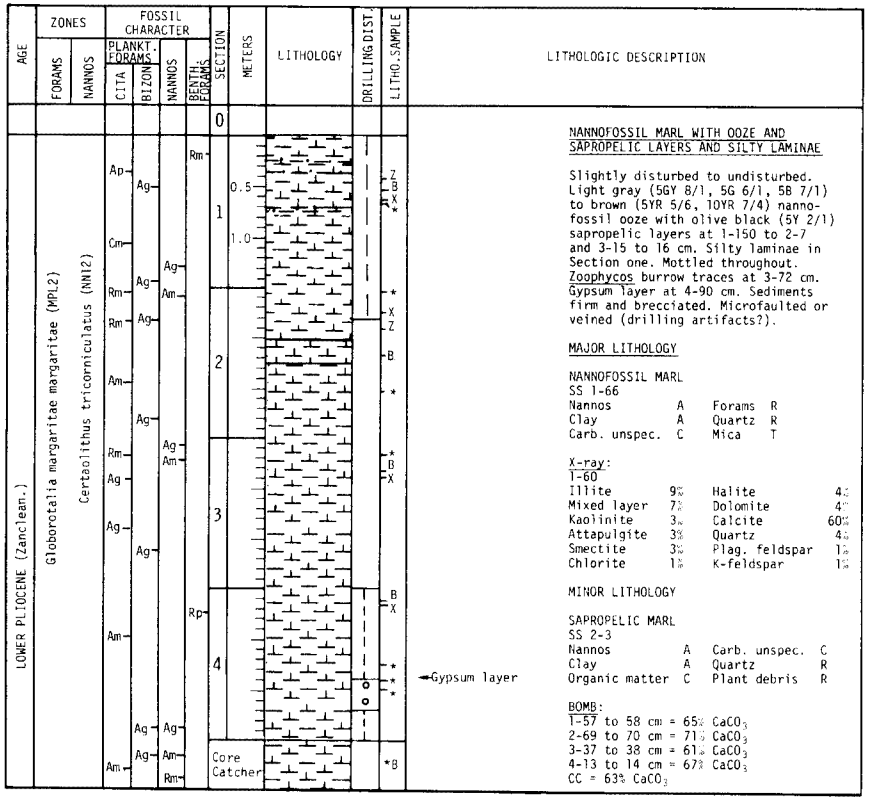
MINOR LITHOLOGY

ORGANIC-RICH NANNOFOSSIL MARL SS 3-39

Nannos	A	Forams	C
Clay	A	Quartz	R
Organic matter	C	Volc. glass	R
Carb. unspec.	C		

BOMB:
1-81 to 82 cm = 75% $CaCO_3$
2-56 to 57 cm = 68% $CaCO_3$
3-26 to 37 cm = 47% $CaCO_3$
CC = 75% $CaCO_3$

Site 374 Hole Core 9 Cored Interval: 359.0-368.5 m



LITHOLOGIC DESCRIPTION

NANNOFOSSIL MARL WITH OOZE AND SAPROPELIC LAYERS AND SILTY LAMINAE

Slightly disturbed to undisturbed. Light gray (5GY 8/1, 5G 6/1, 5B 7/1) to brown (5YR 5/6, 10YR 7/4) nannofossil ooze with olive black (5Y 2/1) sapropelic layers at 1-150 to 2-7 and 3-15 to 16 cm. Silty laminae in Section one. Mottled throughout. Zoophycos burrow traces at 3-72 cm. Gypsum layer at 4-90 cm. Sediments firm and brecciated. Microfaulted or veined (drilling artifacts?).

MAJOR LITHOLOGY

NANNOFOSSIL MARL
SS 1-66

Nannos	A	Forams	R
Clay	A	Quartz	R
Carb. unspec.	C	Mica	T

X-ray:
1-60

Illite	9%	Halite	4%
Mixed layer	7%	Dolomite	4%
Kaolinite	3%	Calcite	60%
Attapulgite	3%	Quartz	4%
Smectite	3%	Plag. feldspar	1%
Chlorite	1%	K-feldspar	1%

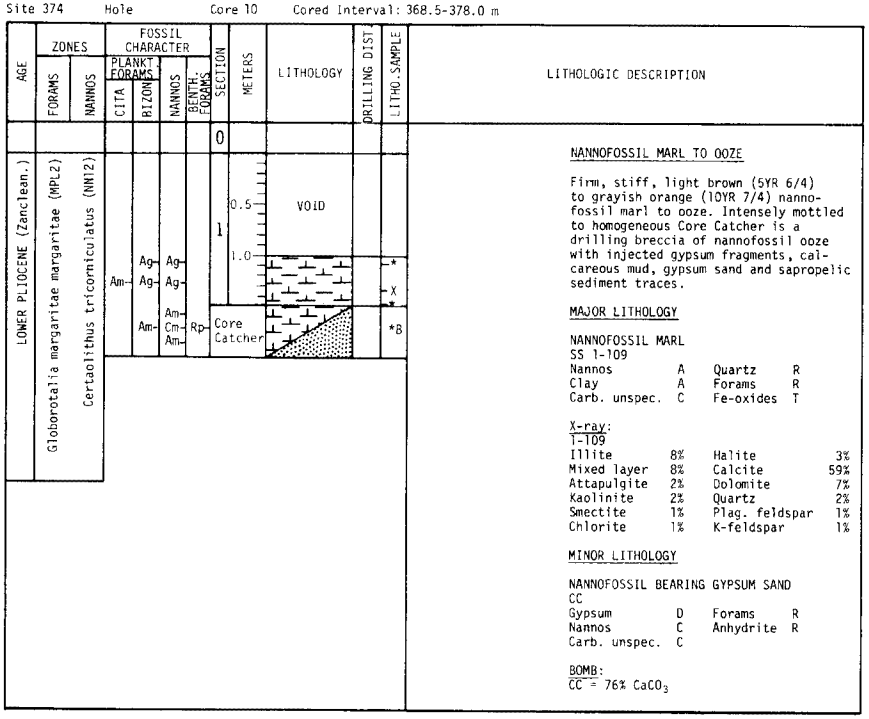
MINOR LITHOLOGY

SAPROPELIC MARL
SS 2-3

Nannos	A	Carb. unspec.	C
Clay	A	Quartz	R
Organic matter	C	Plant debris	R

BOMB:
1-57 to 58 cm = 65% $CaCO_3$
2-69 to 70 cm = 71% $CaCO_3$
3-37 to 38 cm = 61% $CaCO_3$
4-13 to 14 cm = 67% $CaCO_3$
CC = 63% $CaCO_3$

Site 374 Hole Core 10 Cored Interval: 368.5-378.0 m



LITHOLOGIC DESCRIPTION

NANNOFOSSIL MARL TO OOZE

Firm, stiff, light brown (5YR 6/4) to grayish orange (10YR 7/4) nannofossil marl to ooze. Intensely mottled to homogeneous Core Catcher is a drilling breccia of nannofossil ooze with injected gypsum fragments, calcareous mud, gypsum sand and sapropelic sediment traces.

MAJOR LITHOLOGY

NANNOFOSSIL MARL
SS 1-109

Nannos	A	Quartz	R
Clay	A	Forams	R
Carb. unspec.	C	Fe-oxides	T

X-ray:
1-109

Illite	8%	Halite	3%
Mixed layer	8%	Calcite	59%
Attapulgite	2%	Dolomite	7%
Kaolinite	2%	Quartz	2%
Smectite	1%	Plag. feldspar	1%
Chlorite	1%	K-feldspar	1%

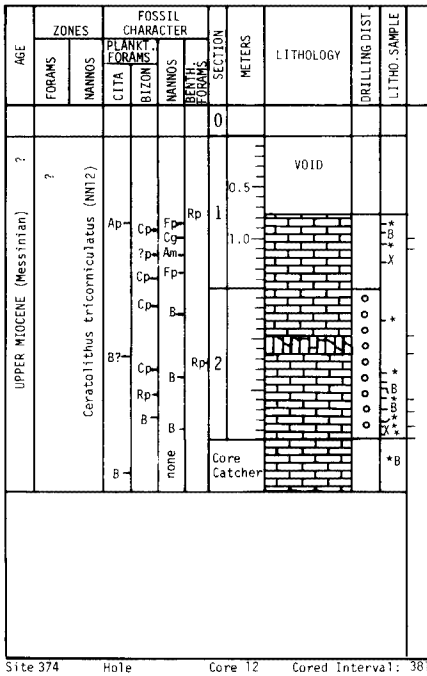
MINOR LITHOLOGY

NANNOFOSSIL BEARING GYPSUM SAND
CC

Gypsum	D	Forams	R
Nannos	C	Anhydrite	R
Carb. unspec.	C		

BOMB:
CC = 76% $CaCO_3$

Site 374 Hole Core 11 Cored Interval: 378.0-381.5 m



LITHOLOGIC DESCRIPTION

DOLOMITIC LIMESTONE WITH SAPROPELIC LAYERS

Indurated, broken by drilling, microfaulted (drilling artifact?), light olive gray (5Y 6/1), dark greenish gray (5G 6/1) and medium bluish gray (5B 5/1) limestones, anhydritic, gypsiferous and sapropelic types. Broken, laminated gypsum layer at 2-48 to 64 cm. Sapropelic limestone at 2-137 to 150 cm and in Core Catcher. Associated Zoophycos and Chondrites burrow traces. Generally sediments moderately to intensely mottled.

MAJOR LITHOLOGY

DOLOMITIC LIMESTONE
SS 2-30

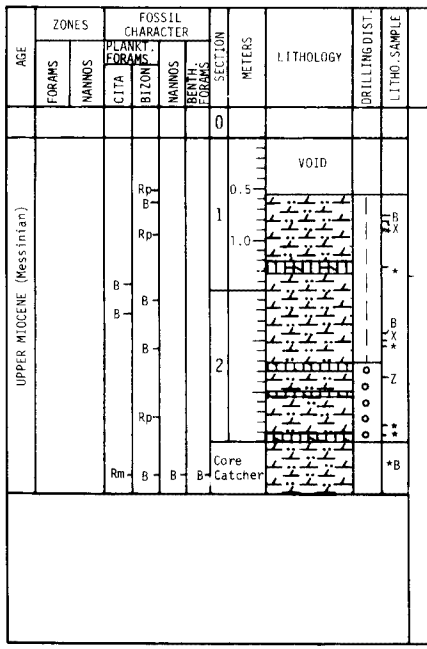
Dolomite	A	Clay	C
Gypsum	C	Mica	T

X-ray:
1-124

Illite	5%	Dolomite	42%
Mixed layer	5%	Calcite	14%
Attapulgite	3%	Quartz	3%
Kaolinite	3%	Halite	4%
Smectite	1%	Unidentified	20%

BOMB:
1-93 to 94 cm = 80% total carbonate
2-91 to 92 cm = 68% total carbonate
2-112 to 113 cm = 78.6% total carbonate
CC = 65% total carbonate

Site 374 Hole Core 12 Cored Interval: 381.5-387.5 m



LITHOLOGIC DESCRIPTION

DOLOMITIC MUDSTONE WITH GYPSUM LAYERS

Slightly deformed to broken, mottled and indurated dark greenish gray dolomitic mudstone with gypsum layers and nodules.

MAJOR LITHOLOGY

DOLOMITIC MUDSTONE
SS 1-90

Clay	A	Anhydrite	R
Dolomite	C	Pyrite	R
Gypsum	R		

X-ray:
1-80

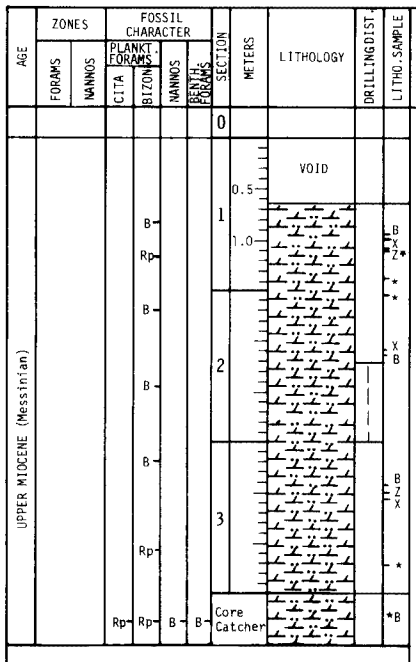
Illite	22%	Quartz	13%
Smectite	6%	Plag. feldspar	2%
Mixed layer	16%	K-feldspar	1%
Chlorite	7%	Halite	6%
Kaolinite	7%	Unidentified	1%
Dolomite	19%		

Grain size:
2-88

Sand	0.1%
Silt	91.4%
Clay	8.5%

BOMB:
1-78 to 79 cm = 15% total carbonate
2-48 to 49 cm = 21% total carbonate
CC = 18% total carbonate

Site 374 Hole Core 13 Cored Interval: 387.5-392.5 m



→Pyrite nodule

LITHOLOGIC DESCRIPTION

GYPSIFEROUS DOLOMITIC MUDSTONE

Slightly disturbed to undisturbed, homogeneous and laminated, dark greenish gray (5G 4/1) gypsiferous dolomitic mud. Pyrite nodule at 1-135 cm Mg-phosphate balls in Section 3.

MAJOR LITHOLOGY

GYPSIFEROUS DOLOMITIC MUDSTONE
SS 3-121

Clay	A	Quartz	C
Dolomite	C	Volc. glass	T
Gypsum	C	Plant debris	T

X-ray:
3-56

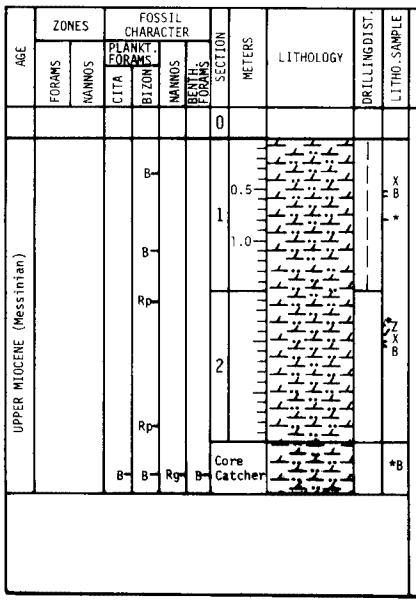
Illite	20%	Quartz	14%
Smectite	14%	Plag. feldspar	2%
Mixed layer	11%	K-feldspar	1%
Chlorite	8%	Halite	6%
Kaolinite	7%	Unidentified	1%
Dolomite	16%		

Grain size:
3-50

Sand	0.0%
Silt	91.5%
Clay	8.5%

BOMB:
1-95 to 96 cm = 18% total carbonate
2-64 to 65 cm = 21% total carbonate
3-48 to 49 cm = 21% total carbonate
CC = 21% total carbonate

Site 374 Hole Core 14 Cored Interval: 392.5-397.0 m



LITHOLOGIC DESCRIPTION

DOLOMITIC MUDSTONE

Slightly deformed to undisturbed, homogeneous, dark greenish gray (5G 4/1) dolomitic mudstone, speckled with spherical white Mg-phosphate balls. Bituminous odor on cutting.

MAJOR LITHOLOGY

DOLOMITIC MUDSTONE
SS 1-80

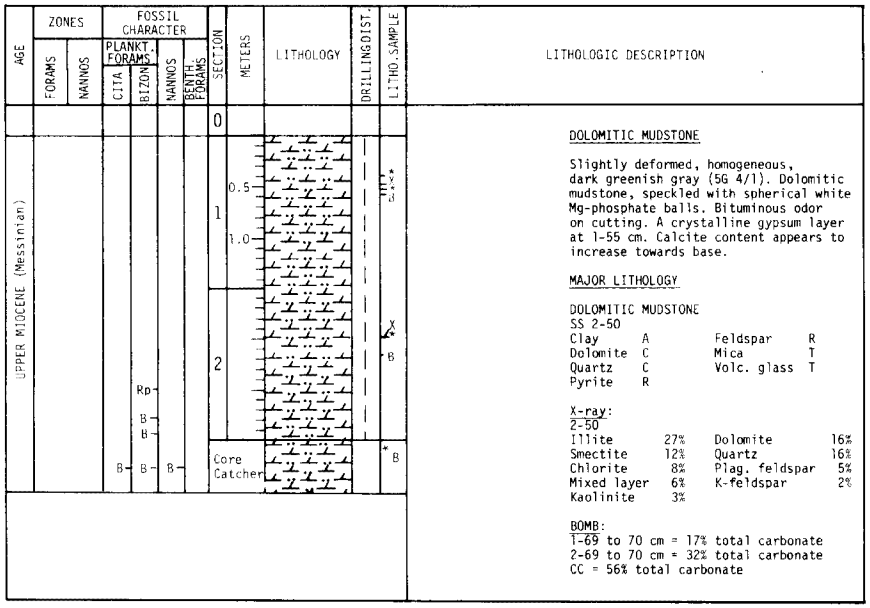
Clay	A	Quartz	C
Dolomite	C	Pyrite	R
Gypsum	R	Volc. glass	T

X-ray:
1-50

Illite	21%	Quartz	16%
Smectite	16%	Plag. feldspar	2%
Mixed layer	14%	K-feldspar	1%
Chlorite	5%	Halite	6%
Kaolinite	4%	Unidentified	2%
Dolomite	13%		

BOMB:
1-57 to 58 cm = 18% total carbonate
2-57 to 58 cm = 18% total carbonate
CC = 27% total carbonate

Site 374 Hole Core 15 Cored Interval: 397.0-406.5 m



DOLOMITIC MUDSTONE

Slightly deformed, homogeneous, dark greenish gray (5G 4/1). Dolomitic mudstone, speckled with spherical white Mg-phosphate balls. Bituminous odor on cutting. A crystalline gypsum layer at 1-55 cm. Calcite content appears to increase towards base.

MAJOR LITHOLOGY

DOLOMITIC MUDSTONE
SS 2-50

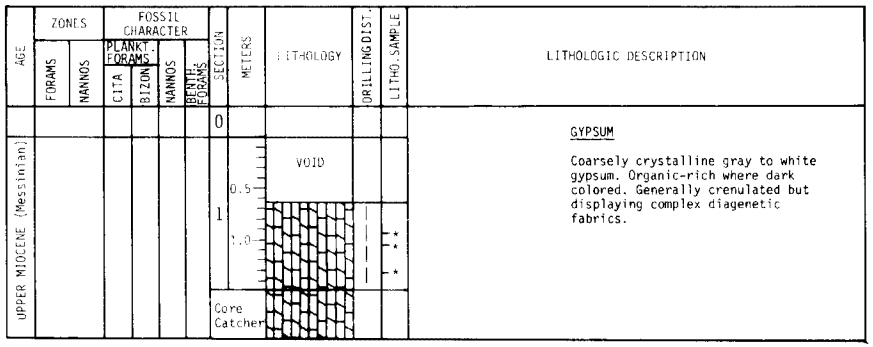
Clay	A	Feldspar	R
Dolomite	C	Mica	T
Quartz	C	Volc. glass	T
Pyrite	R		

X-ray:
2-50

Illite	27%	Dolomite	16%
Smectite	12%	Quartz	16%
Chlorite	8%	Plag. feldspar	5%
Mixed layer	6%	K-feldspar	2%
Kaolinite	3%		

BOMB:
1-69 to 70 cm = 17% total carbonate
2-69 to 70 cm = 32% total carbonate
CC = 56% total carbonate

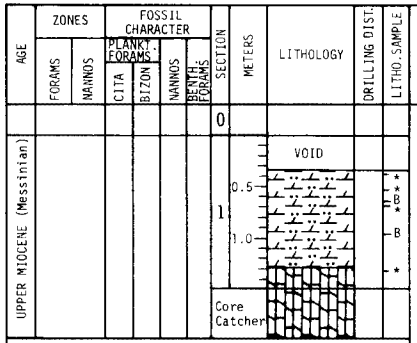
Site 374 Hole Core 16 Cored Interval: 406.5-411.0 m



GYPSUM

Coarsely crystalline gray to white gypsum. Organic-rich where dark colored. Generally crenulated but displaying complex diagenetic fabrics.

Site 374 Hole Core 17 Cored Interval: 411.0-416.0 m



DOLOMITIC MUDSTONE OVERLAYING GYPSUM

21-33 cm: Black very coarsely crystalline. Gypsum.
33-67 cm: Olive gray to black dolomitic mudstone, laminated. Laminae in places show low amplitude crenulations (stromatolitic?); others are deformed by secondary gypsum crystal growth.
67-84 cm: Dolomitic mudstone is diatomaceous and faintly laminated (organic-rich).
84-97 cm: Breccia of mudstone pieces.
128-150 cm: Coarsely crystalline white gypsum with thin irregular layers of dark yellowish brown mudstone; alternations on a cm to mm scale.

Gypsum veining at 45.0 to 47.5 m.

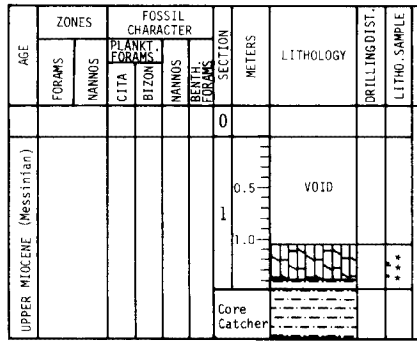
MINOR LITHOLOGY

DIATOMACEOUS ORGANIC-RICH MUDSTONE
SS 1-69

Diatoms	A	Plant spores	R
Organic matter	A	Dolomite	R
Clay	C	Pyrite	R
Gypsum and anhydrite(?)	C		

BOMB:
1-67 to 68 cm = 36.5% total carbonate
1-97 to 98 cm = 0.0% total carbonate

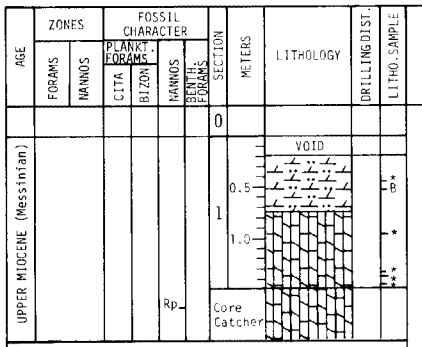
Site 374 Hole Core 18 Cored Interval: 416.0-418.0 m



GYPSUM OVERLAYING DOLOMITIC MUDSTONE

105-131 cm: Banded white gypsum and anhydrite with thin interlayers of brown dolomitic mudstone which are crenulated.
131-137.5 cm: Evenly laminated alternations of white and brown to black gypsum only very slight disturbance of the laminae.
137.5-150 cm: As above but laminae highly deformed and brecciated with extensive recrystallization.

Site 374 Hole Core 19 Cored Interval: 418.0-420.0 m



LITHOLOGIC DESCRIPTION

DOLOMITIC MUDSTONE OVERLAYING GYPSUM

20-73 cm: Soft dolomitic mudstone with large (neomorphic) gypsum crystals and elongate nodules. Brecciated.
73-88 cm: Coarsely crystalline gypsum with a few irregular patches (relics?) of dolomitic mudstone.
88-134.5 cm: Evenly laminated white and brown gypsum and anhydrite.
134.5-150 cm: Laminated dolomitic mudstones, deformed, brecciated and recemented by (neomorphic) coarse-grained gypsum.

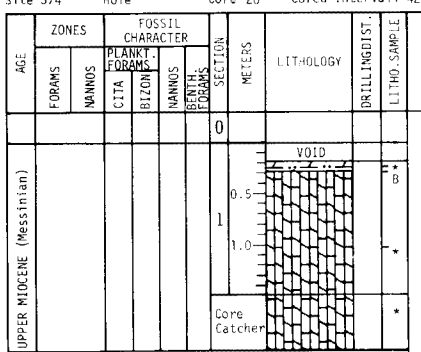
MAJOR LITHOLOGY

DOLOMITIC MUDSTONE
SS 1-46

Dolomite	A	Pyrite	R
Clay	A	Anhydrite	R
Gypsum	C	Plant debris	R
Organic matter	C		

BOMB:
1-52 to 53 cm = 25% total carbonate

Site 374 Hole Core 20 Cored Interval: 420.0-425.5 m



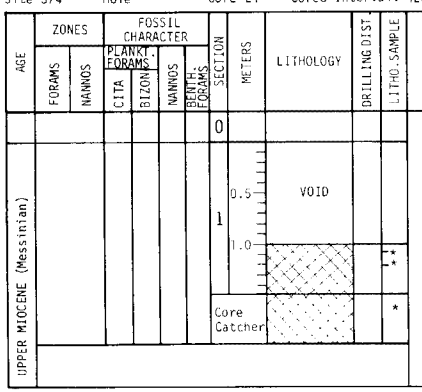
LITHOLOGIC DESCRIPTION

DOLOMITIC MUDSTONE OVERLAYING GYPSUM

20-23 cm: Laminated dolomitic mudstone, highly deformed and brecciated, with large gypsum nodules.
23-61 cm: Interlayered coarse gypsum and thin irregular, crenulated dolomitic mudstone laminae. Gypsum becomes increasingly recrystallized downwards. Mudstone very organic-rich at top.
61-150 cm: Laminated gypsum with thin mudstone laminae. Modified by crystal growth.

BOMB:
1-24 to 25 cm = 10% total carbonate

Site 374 Hole Core 21 Cored Interval: 425.5-435.0 m

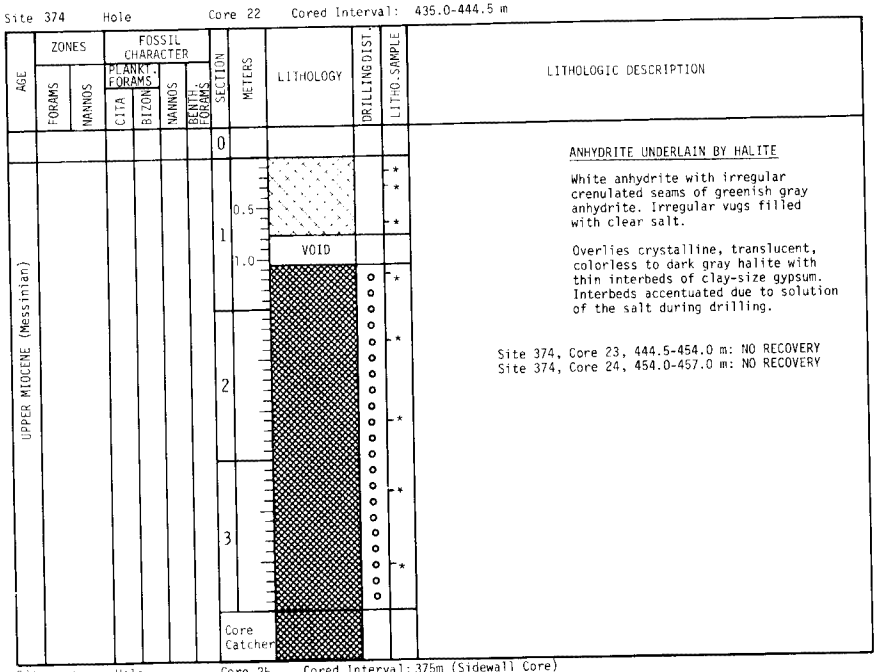


LITHOLOGIC DESCRIPTION

ANHYDRITE

99.5-113 cm: Light olive gray anhydrite with laminae of dolomitic mudstone.
113-116 cm: Soft mudstone with gypsum nodules.
116 to 135 cm: Anhydrite, vuggy, strongly corroded to thinly laminated with vugs filled with salt.
135-143 cm: Banded brown to gray anhydrite.
143-150 cm: White anhydrite with vugs filled by clear salt.

Site 374 Hole Core 22 Cored Interval: 435.0-444.5 m



LITHOLOGIC DESCRIPTION

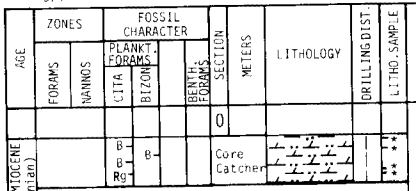
ANHYDRITE UNDERLAIN BY HALITE

White anhydrite with irregular crenulated seams of greenish gray anhydrite. Irregular vugs filled with clear salt.

Overlies crystalline, translucent, colorless to dark gray halite with thin interbeds of clay-size gypsum. Interbeds accentuated due to solution of the salt during drilling.

Site 374, Core 23, 444.5-454.0 m: NO RECOVERY
Site 374, Core 24, 454.0-457.0 m: NO RECOVERY

Site 374 Hole Core 25 Cored Interval: 375m (Sidewall Core)



LITHOLOGIC DESCRIPTION

42 cm long sidewall core

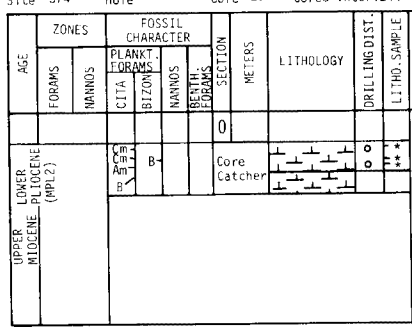
DOLOMITIC MUD WITH PIECES OF UNIDENTIFIED GYPSUM-LIKE MINERAL

Sediment organic-rich at 35 cm.

X-ray:

Dolomite	55%	Attapulgite	1%
Mixed layer clay mins.	4%	Smectite	T
Illite	1%	Halite	7%
Kaolinite	1%	Quartz	1%

Site 374 Hole Core 26 Cored Interval: 370.5-371.0 m (Sidewall core)



LITHOLOGIC DESCRIPTION

30 cm long sidewall core

NANNOFOSSIL OOZE WITH INTERMIXED PIECES OF GYPSUM AND UNIDENTIFIED MINERAL

X-ray:

Illite	4%	Dolomite	7%
Kaolinite	3%	Quartz	4%
Mixed layer	3%	K-feldspar	1%
Attapulgite	2%	Halite	3%
Chlorite	1%	Unidentified	6%
Calcite	65%		

DEEP SEA DRILLING PROJECT

LEG 42A SITE 375

SITE SUMMARY SHEET

POSITION: Latitude: 34°45.74'N Longitude: 31°45.58'E

Water depth (sea level): 1900 corrected meters, echo sounding

Bottom felt at: 1914 meters, drill pipe Penetration: 821.0 meters

Number of holes: 1 Number of cores: 13

Total core recovered: 66.9 meters Percentage core recovery: 91.6%

OLDEST SEDIMENT CORED:

Depth subbottom: 821 meters Nature: Marlstone

Age: Lower Miocene

BASEMENT: Not reached

PRINCIPAL RESULTS:

Sites 375 and 376 were located on the Florence Rise, west of Cyprus. Site 375, near the top of the rise intermittently cored a drilled sediment sequence, Burdigalian to Quaternary in age. Site 376, on the Antalya basin flank of the rise, almost continuously cored a Messinian to Holocene sequence. The sites complement each other and combined, provide a standard section for correlation with sequences described on land in Cyprus.

The Quaternary nannofossil marls contain tephra and sapropelic layers indicative of volcanic events and periods of basin stagnation respectively. The Pliocene nannofossil marls, also containing sapropelic layers, have extremely low sedimentation rates due to numerous hiatuses and are complicated by sediment slumping.

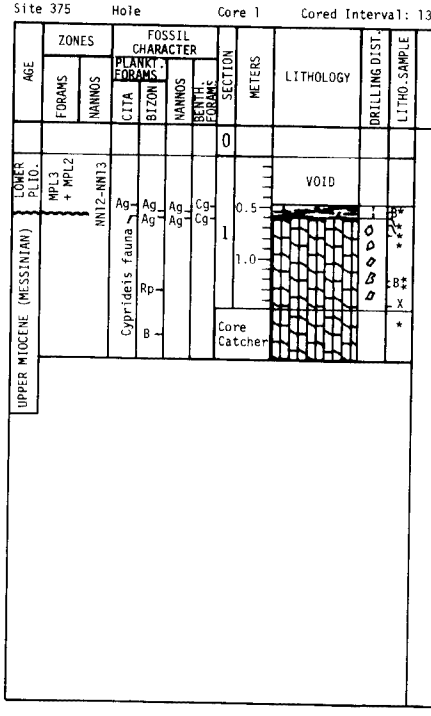
Nannofossil marlstones and dolomitic marlstones of upper Miocene age overlay a gypsum with marlstone evaporite sequence. Siltstones and sandstones within this upper unit are interpreted as turbidites. Faunas, believed to be autochthenous, contain *Ammonia beccarii* and *Cyprideis pannonica* indicative of a shallow euryhaline environment. Two interpretations of this sequence have been proposed.

1. It is a marine basinal hypersaline deposit transitional from evaporite to open marine in environment.

2. It was deposited in a shallow hyposaline "lac-mer" within a deep partially dessicated basin.

The gypsum with marlstone evaporites are followed downwards by anhydrite and halite in Site 376 and are collectively recognized as the upper part of the Mediterranean Evaporite Formation. The pre-evaporite sequence of Site 375 comprises 400 meters of flysch-like sediments, including sapropelic layers, overlying over 200 meters of hemipelagic marlstones with distal turbidites, having at their base intercalated limestones which constitute the acoustic basement.

Site 375 Hole Core 1 Cored Interval: 137.5-139.5 m



LITHOLOGIC DESCRIPTION

GYPSUM OVERLAIN BY NANNOFOSSIL AND DOLOMITIC MARLS

1-48 to 57 cm: Brown (5YR 6/4 to 5YR 4/4) and gray (laminated) nannofossil marl 57 to 60 cm olive gray (5Y 5/2) and pale blue green dolomitic marl.

1-60 cm to base: Gypsum. Broken pieces, dusky yellow green (5GY 5/2) to grayish yellow green (5GY 7/2) to very light gray (N8).

1-60 to 125 cm: Large elongate gypsum crystals in matrix of green dolomitic marl and dolomitic marl.

1-125 to 150 cm. Relatively pure and coarsely crystalline.

MINOR LITHOLOGIES

NANNOFOSSIL MARL
SS 1-54

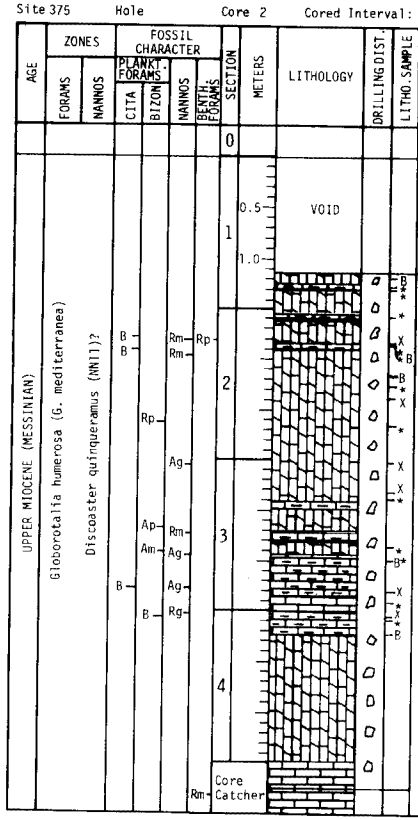
Nannos	A	Forams	R
Clay	A	Quartz	T
Carb. unspec.	R	Mica	T
Pyrite	R		

DOLOMITIC MARL
SS 1-60

Dolomite	A	Nannos	C
Clay	A	Pyrite	R
Gypsum	C		

BOMB:
1-50 to 51 cm = 42% $CaCO_3$
1-123 to 124 cm = 23% $CaCO_3$

Site 375 Hole Core 2 Cored Interval: 189.5-194.5 m



LITHOLOGIC DESCRIPTION

GYPSUM WITH INTERBEDDED DOLOMITIC AND NANNOFOSSIL MARLSTONES

Coarse crystalline gypsum, light gray (N8) to yellowish gray (5Y 7/2). Crystals usually elongate, parallel or perpendicular to bedding, often zoned. Gypsum evenly laminated below 3-80 cm, gray with dark thin laminae of marlstone. Marlstones often sandy, greenish gray (5G 6/1), mottled. Interbeds 2-5 cm thick. Varying percentages of nannofossil carbonate.

MAJOR LITHOLOGIES

MARLSTONE
SS 4-7

Clay	A	Nannos	C
Carb. unspec.	A	Pyrite	R

NANNOFOSSIL MARLSTONE
SS 4-3

Smectite	15%	Calcite	36%
Mixed layer	7%	Dolomite	8%
Illite	9%	Quartz	8%
Attapulgite	4%	Plag. felds.	3%
Chlorite	4%	Gypsum	3%
Kaolinite	2%	Halite	1%

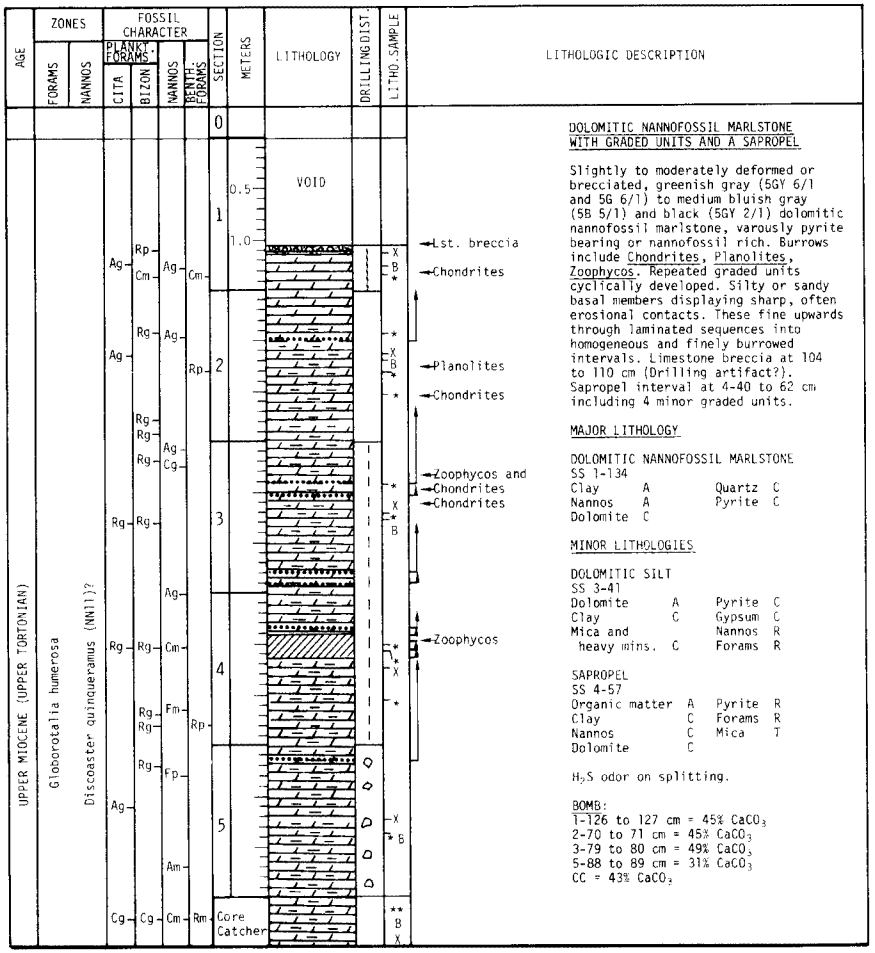
Indurated. Broken pieces but succession appears stratigraphically correct.

Section 5 exuded H_2S odor on splitting.

BOMB:
1-119 to 120 cm = 2% $CaCO_3$
2-39 to 40 cm = 15% $CaCO_3$
3-65 to 66 cm = 1% $CaCO_3$
3-96 to 100 cm = 3.5% $CaCO_3$
4-23 to 24 cm = 27% $CaCO_3$

Site 375, Core 3, 194.5-197.5 m: NO RECOVERY

Site 375 Hole Core 4 Cored Interval: 245.5-252.0 m



DOLOMITIC NANNOFOSSIL MARLSTONE WITH GRADED UNITS AND A SAPROPEL

Slightly to moderately deformed or brecciated, greenish gray (5GY 6/1 and 5G 6/1) to medium bluish gray (5B 5/1) and black (5GY 2/1) dolomitic nannofossil marlstone, varously pyrite bearing or nannofossil rich. Burrows include Chondrites, Planolites, Zoophycos. Repeated graded units cyclically developed. Silty or sandy basal members displaying sharp, often erosional contacts. These fine upwards through laminated sequences into homogeneous and finely burrowed intervals. Limestone breccia at 104 to 110 cm (Drilling artifact?). Sapropel interval at 4-40 to 62 cm including 4 minor graded units.

MAJOR LITHOLOGY

DOLOMITIC NANNOFOSSIL MARLSTONE
SS 1-134

Clay	A	Quartz	C
Nannos	A	Pyrite	C
Dolomite	C		

MINOR LITHOLOGIES

DOLOMITIC SILT
SS 3-41

Dolomite	A	Pyrite	C
Clay	C	Gypsum	C
Mica and heavy mins.	C	Nannos	R
		Forams	R

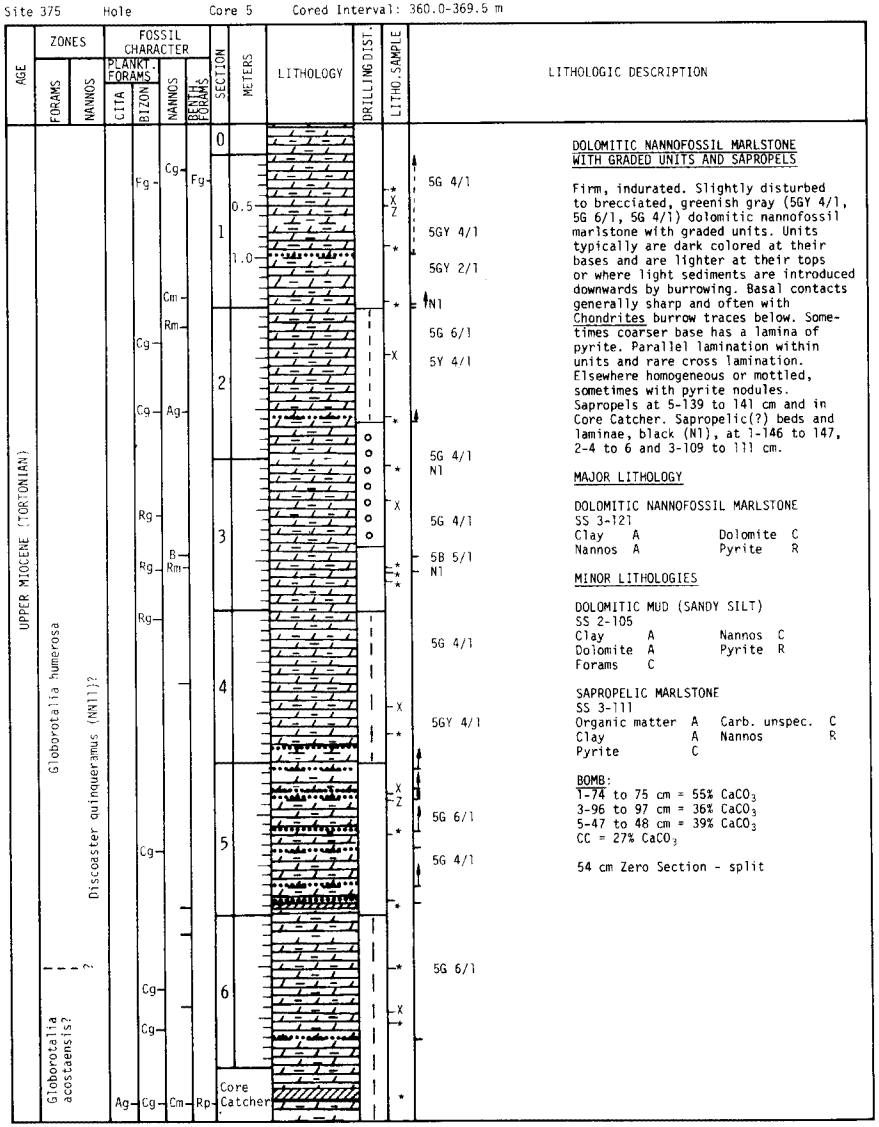
SAPROPEL
SS 4-57

Organic matter	A	Pyrite	R
Clay	C	Forams	R
Nannos	C	Mica	T
Dolomite	C		

H_2S odor on splitting.

BOMB:
1-126 to 127 cm = 45% $CaCO_3$
2-70 to 71 cm = 45% $CaCO_3$
3-79 to 80 cm = 49% $CaCO_3$
5-88 to 89 cm = 31% $CaCO_3$
CC = 43% $CaCO_3$

Site 375 Hole Core 5 Cored Interval: 360.0-369.5 m



DOLOMITIC NANNOFOSSIL MARLSTONE WITH GRADED UNITS AND SAPROPELS

Firm, indurated. Slightly disturbed to brecciated, greenish gray (5GY 4/1, 5G 6/1, 5G 4/1) dolomitic nannofossil marlstone with graded units. Units typically are dark colored at their bases and are lighter at their tops or where light sediments are introduced downwards by burrowing. Basal contacts generally sharp and often with Chondrites burrow traces below. Sometimes coarser base has a lamina of pyrite. Parallel lamination within units and rare cross lamination. Elsewhere homogeneous or mottled, sometimes with pyrite nodules. Sapropels at 5-139 to 141 cm and in Core Catcher. Sapropelic(?) beds and laminae, black (N1), at 1-146 to 147, 2-4 to 6 and 3-109 to 111 cm.

MAJOR LITHOLOGY

DOLOMITIC NANNOFOSSIL MARLSTONE
SS 3-121

Clay	A	Dolomite	C
Nannos	A	Pyrite	R

MINOR LITHOLOGIES

DOLOMITIC MUD (SANDY SILT)
SS 2-105

Clay	A	Nannos	C
Dolomite	A	Pyrite	R
Forams	C		

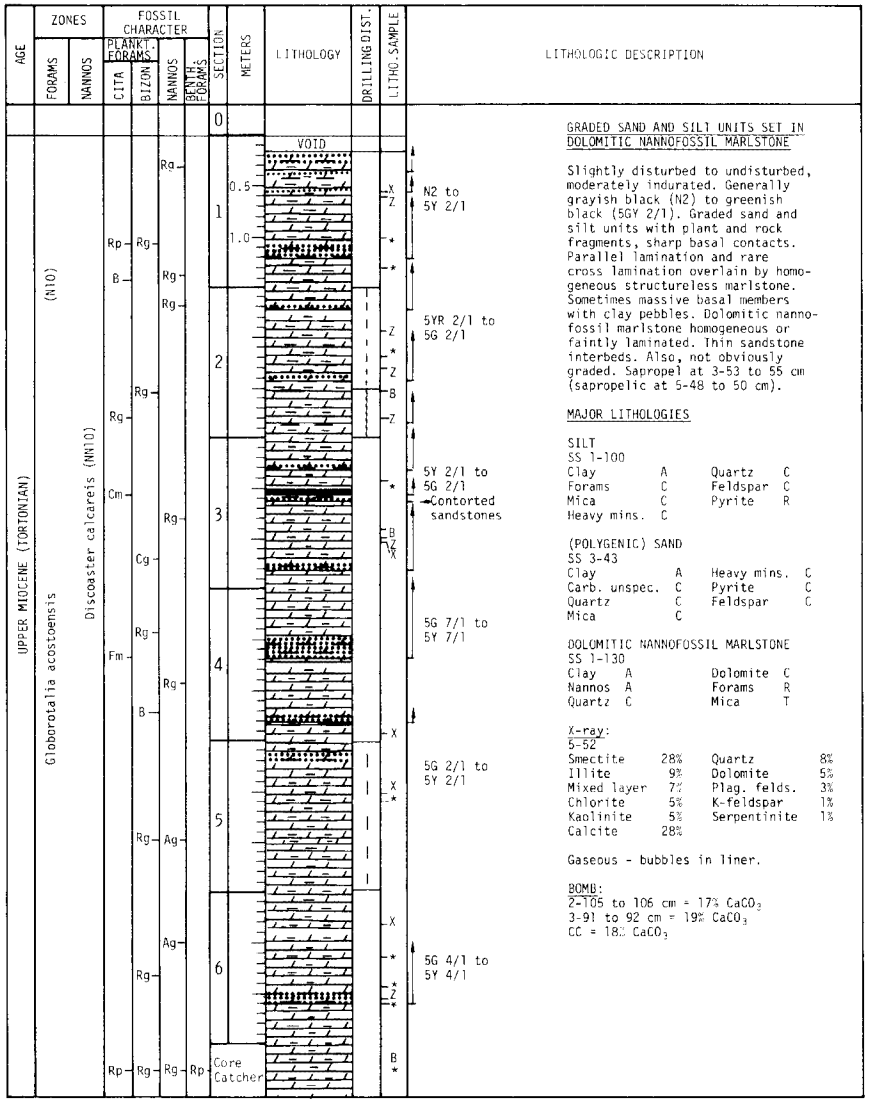
SAPROPELIC MARLSTONE
SS 3-111

Organic matter	A	Carb. unspec.	C
Clay	A	Nannos	R
Pyrite	C		

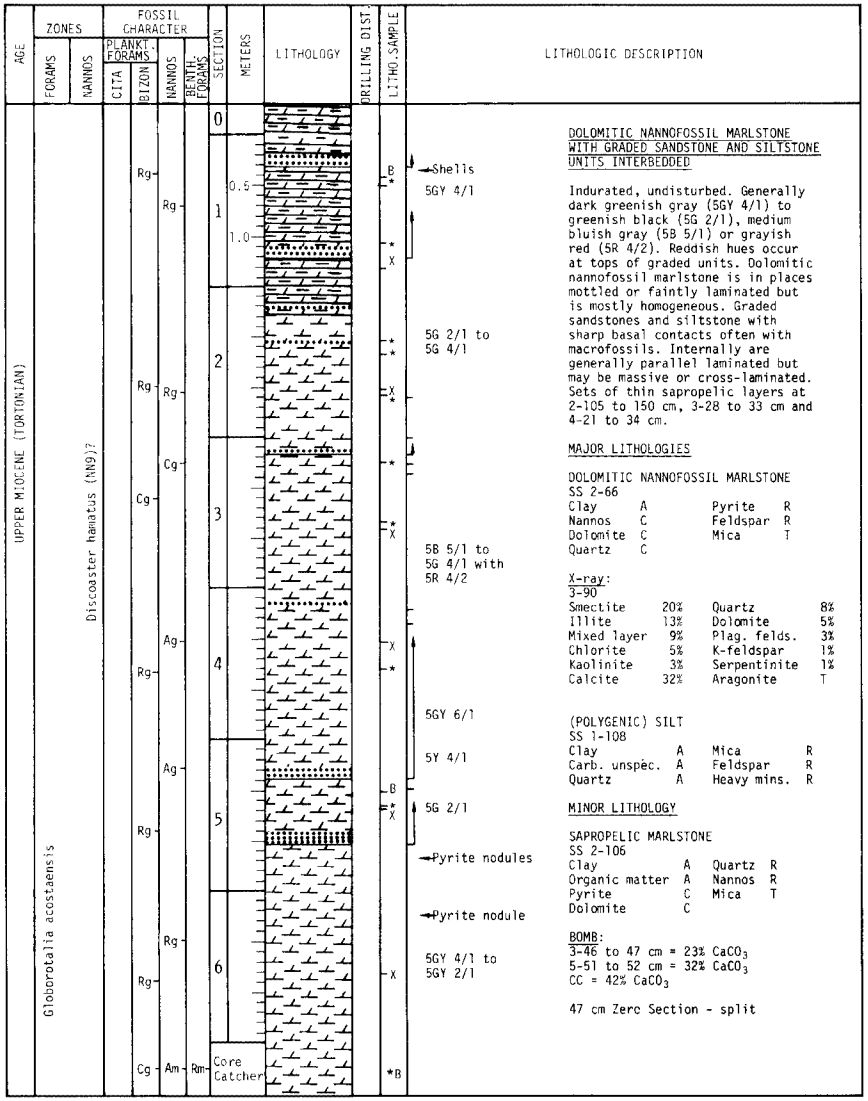
BOMB:
1-74 to 75 cm = 55% $CaCO_3$
3-96 to 97 cm = 36% $CaCO_3$
5-47 to 48 cm = 39% $CaCO_3$
CC = 27% $CaCO_3$

54 cm Zero Section - split

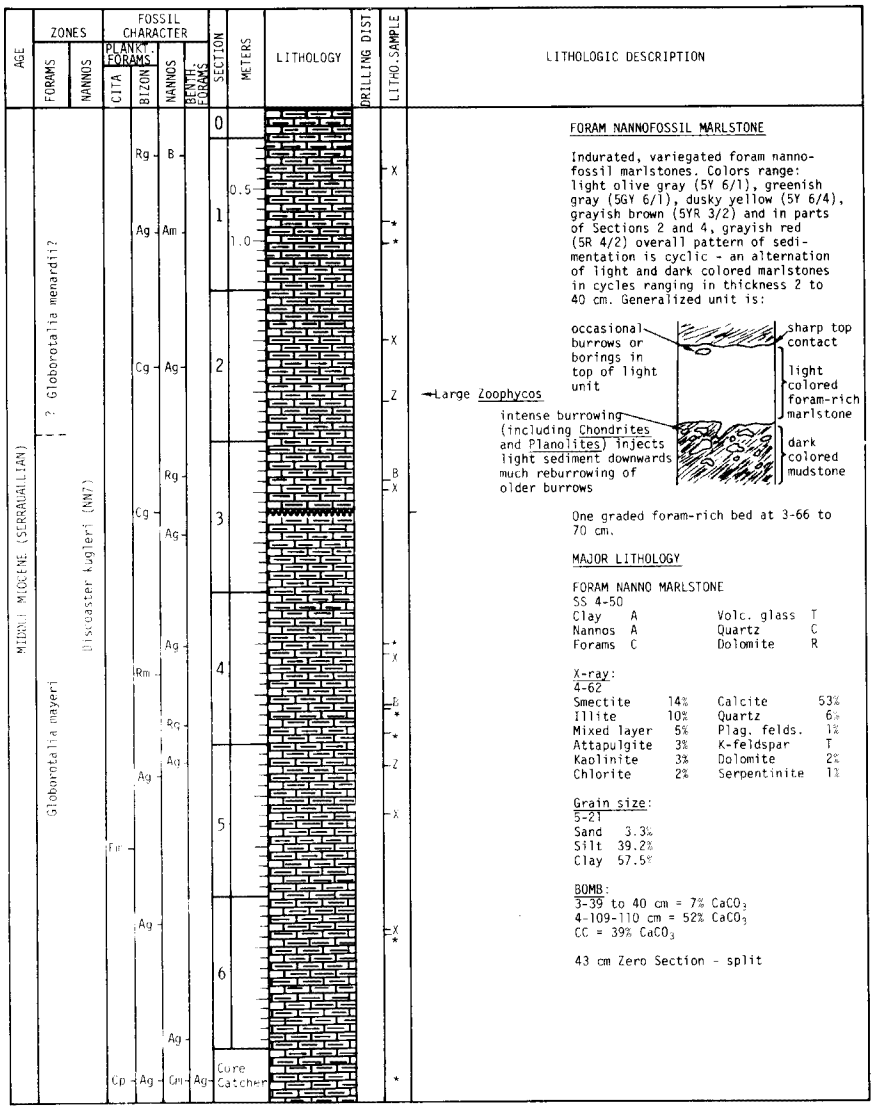
Site 375 Hole Core 6 Cored Interval: 461.0-470.0 m



Site 375 Hole Core 7 Cored Interval: 565.0-574.5 m



Site 375 Hole Core 8 Cored Interval: 622.0-631.5 m



FORAM NANNOFOSSIL MARLSTONE

Indurated, variegated foram nannofossil marlstones. Colors range: light olive gray (5Y 6/1), greenish gray (5GY 6/1), dusky yellow (5Y 6/4), grayish brown (5YR 3/2) and in parts of Sections 2 and 4, grayish red (5R 4/2) overall pattern of sedimentation is cyclic - an alternation of light and dark colored marlstones in cycles ranging in thickness 2 to 40 cm. Generalized unit is:

One graded foram-rich bed at 3-66 to 70 cm.

MAJOR LITHOLOGY

FORAM NANNO MARLSTONE
SS 4-50

Clay	A	Volc. glass	T
Nannos	A	Quartz	C
Forams	C	Dolomite	R

X-ray:
4-62

Smectite	14%	Calcite	53%
Illite	10%	Quartz	6%
Mixed layer	5%	Plag. felds.	1%
Attapulgite	3%	K-feldspar	T
Kaolinite	3%	Dolomite	2%
Chlorite	2%	Serpentinite	1%

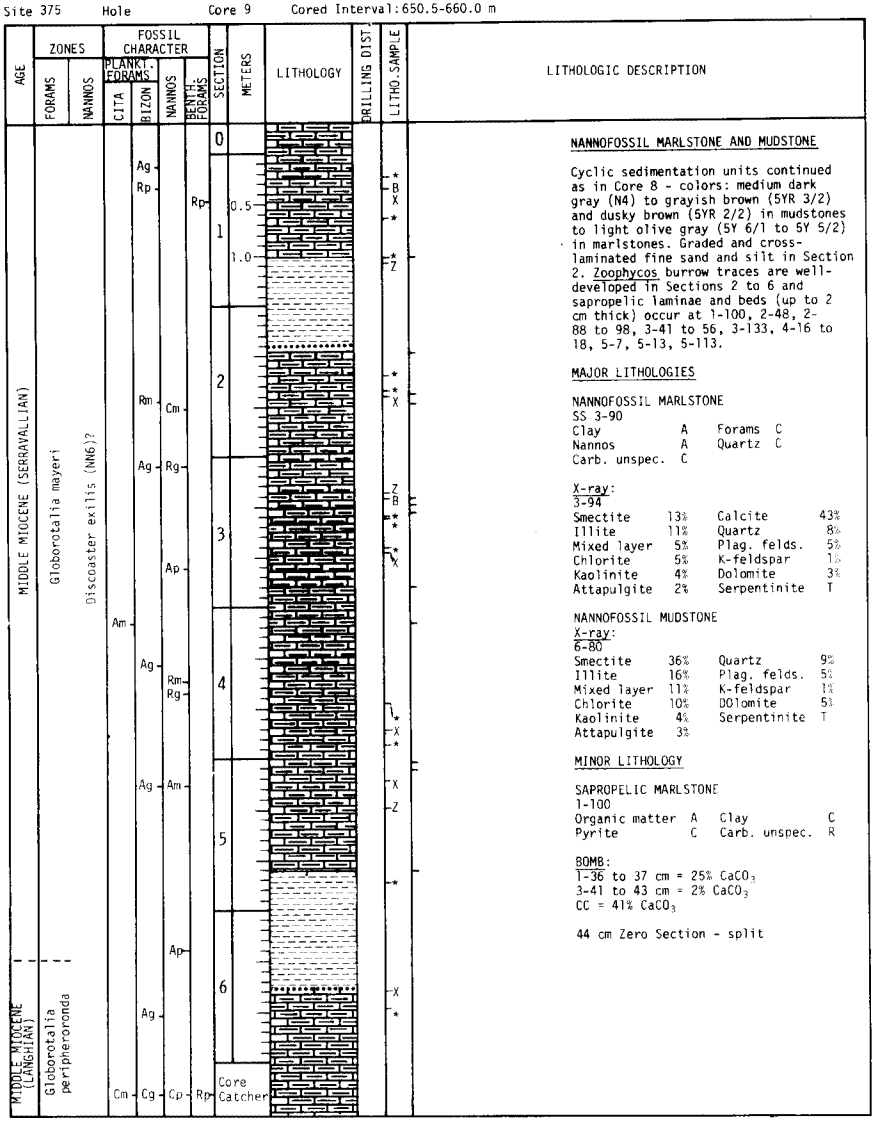
Grain size:
5-21

Sand	3.3%
Silt	39.2%
Clay	57.5%

BOMB:
3-39 to 40 cm = 7% $CaCO_3$
4-109-110 cm = 52% $CaCO_3$
CC = 39% $CaCO_3$

43 cm Zero Section - split

Site 375 Hole Core 9 Cored Interval: 650.5-660.0 m



NANNOFOSSIL MARLSTONE AND MUDSTONE

Cyclic sedimentation units continued as in Core 8 - colors: medium dark gray (N4) to grayish brown (5YR 3/2) and dusky brown (5YR 2/2) in mudstones to light olive gray (5Y 6/1 to 5Y 5/2) in marlstones. Graded and cross-laminated fine sand and silt in Section 2. Zoophycos burrow traces are well-developed in Sections 2 to 6 and sapropelic laminae and beds (up to 2 cm thick) occur at 1-100, 2-48, 2-88 to 98, 3-41 to 56, 3-133, 4-16 to 18, 5-7, 5-13, 5-113.

MAJOR LITHOLOGIES

NANNOFOSSIL MARLSTONE
SS 3-90

Clay	A	Forams	C
Nannos	A	Quartz	C
Carb. unspec.	C		

X-ray:
3-94

Smectite	13%	Calcite	43%
Illite	11%	Quartz	8%
Mixed layer	5%	Plag. felds.	5%
Chlorite	5%	K-feldspar	1%
Kaolinite	4%	Dolomite	3%
Attapulgite	2%	Serpentinite	T

NANNOFOSSIL MUDSTONE
X-ray:
6-80

Smectite	36%	Quartz	9%
Illite	16%	Plag. felds.	5%
Mixed layer	11%	K-feldspar	1%
Chlorite	10%	Dolomite	5%
Kaolinite	4%	Serpentinite	T
Attapulgite	3%		

MINOR LITHOLOGY

SAPROPELIC MARLSTONE
1-100

Organic matter	A	Clay	C
Pyrite	C	Carb. unspec.	R

BOMB:
1-36 to 37 cm = 25% $CaCO_3$
3-41 to 43 cm = 2% $CaCO_3$
CC = 41% $CaCO_3$

44 cm Zero Section - split

Site 375 Hole Core 10 Cored Interval: 675.5-679.0 m

AGE: MIDDLE MIOCENE (LANGHIAN)
ZONES: FORAMS: Globorotalia fohsi peripheronda; NANNOS: Sphenolithus heteromorphus (NN5)
FOSSIL CHARACTER: PLANKT. FORAMS: CITA: Ap, Ag, Ap, Cm, Cm, Ap; BIZON: Am, Ag, Cm, Ap; NANNOS: Rp, Rp, Rp, Rp; BENTH. FORAMS
SECTION: 0, 1, 2, 3, Core Catcher
METERS: 0.5, 1.0
LITHOLOGY: VOID
DRILLING DIST.
LITHO. SAMPLE

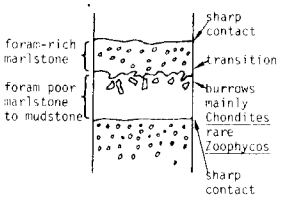
LITHOLOGIC DESCRIPTION

DOLOMITIC (FORAM) NANNOFOSSIL MARLSTONE WITH LIMESTONE LAYERS

Dark reddish brown (10R 3/4) and moderate brown (5YR 4/4) to dark greenish gray (5GY 4/1) dolomitic nannofossil marlstone with varying foraminiferal content.

Basic sedimentation pattern is an alternation of foram-rich and foram poor cycles with selective burrowing as in:

superimposed on this are occasional thin layers of limestone-hard, light gray, foram-rich, often graded, laminated to rippled; at intervals varying from 5-35 cm thick.



MAJOR LITHOLOGY

DOLOMITIC NANNOFOSSIL MARLSTONE
SS 2-64

Clay	A	forams	R
Nannos	C	Quartz	R
Dolomite	C	Pyrite	T

BOMB:
2-22 to 24 cm - 49 $CaCO_3$
2-24 to 25 cm - 66 $CaCO_3$

Site 375 Hole Core 11 Cored Interval: 733.0-736.0 m

AGE: LOWER MIOCENE (UPPER BURDIGALIAN)
ZONES: FORAMS: Praeorbulina glomerosa (N8); NANNOS: Sphenolithus heteromorphus (NN5)
FOSSIL CHARACTER: PLANKT. FORAMS: CITA: Ag, Ag, Ag, Ag; BIZON: Rm, Rm, Ap, Rp; NANNOS: Kq, Am, Rm, Ap; BENTH. FORAMS
SECTION: 0, 1, 2, Core Catcher
METERS: 0.5, 1.0
LITHOLOGY: VOID
DRILLING DIST.
LITHO. SAMPLE

LITHOLOGIC DESCRIPTION

INTERBEDDED MARLSTONES AND LIMESTONES

Indurated, broken into pieces but succession appears correct. Chondrites burrow traces throughout.

Three MAJOR LITHOLOGIES

Grayish blue green (5BG 5/2) to greenish gray (5G 6/1) MARLSTONE, generally foram-poor and homogeneous to slightly burrowed contains scattered pyrite nodules and laminae of pyritized foram shells.

Dark reddish brown (10R 3/4) to moderate reddish brown (10R 4/6) MARLSTONE, foram-rich to foram-poor.

Bluish white (5B 9/1) to pale blue (5PB 7/2) hard laminated LIMESTONE of well sorted densely packed planktonic forams with stylolites.

Two MINOR LITHOLOGIES

White foram-rich LIMESTONE in thin 0.25 to 0.5 cm laminated layers.

Thin greenish black (5G 2/1) laminae within blue green MARLSTONES.

Thicknesses of major lithology layers range 2 cm to 10 cm but limestone intervals may be thicker - up to 20 cm.

BOMB:
1-132 to 134 cm = 91% $CaCO_3$
2-51 to 55 cm = 52% $CaCO_3$
2-157 to 158 cm = 61% $CaCO_3$

Site 375 Hole Core 12 Cored Interval: 792.0-793.0 m

AGE: LOWER MIOCENE ?
ZONES: FORAMS: ?; NANNOS: ?
FOSSIL CHARACTER: PLANKT. FORAMS: CITA: B; BIZON: Ap; NANNOS: Rp; BENTH. FORAMS
SECTION: 0, Core Catcher
LITHOLOGY
DRILLING DIST.
LITHO. SAMPLE

LITHOLOGIC DESCRIPTION

Core Catcher only - LIMESTONE.

Marly nannofossil limestone.

BOMB:
CC = 65% $CaCO_3$

Site 375 Hole Core 13 Cored Interval: 819.5-821.5 m

AGE: UPPER MIOCENE (BURDIGALIAN)
ZONES: FORAMS: Globigerinita - Globigerinoides dissimilis - altiaperturus; NANNOS: Discoaster druggii (NN2)
FOSSIL CHARACTER: PLANKT. FORAMS: CITA: Rp, Ag, Ag; BIZON: Ag, Ap, Ag; NANNOS: B; BENTH. FORAMS
SECTION: 0, 1, Core Catcher
METERS: 0.5, 1.0
LITHOLOGY: VOID
DRILLING DIST.
LITHO. SAMPLE

LITHOLOGIC DESCRIPTION

DRILLING BRECCIA plus Core Catcher pieces only - MUDSTONE, MARLSTONE AND LIMESTONE

Greenish black (5GY 2/1) to greenish gray (5GY 6/1) nannofossil mudstone to marlstone with dark greenish gray (5GY 4/1) foram-rich nannofossil limestone. These are apparently interbedded since one piece has a burrowed contact between marlstone and limestone which looks part of a cycle as described further uphole.

BOMB:
CC = 0% $CaCO_3$

DEEP SEA DRILLING PROJECT

LEG 42A SITE 376

SITE SUMMARY SHEET

POSITION: Latitude: 34°52.32'N Longitude: 31°48.45'E

Water depth (sea level): 2101 corrected meters, echo sounding

Bottom felt at: ? meters, drill pipe Penetration: 216.5 meters

Number of holes: 1 Number of cores: 23

Total core recovered: 76.4 meters Percentage core recovery: 37.7%

OLDEST SEDIMENT CORED:

Depth subbottom: 2165 meters Nature: Anhydrite/Halite

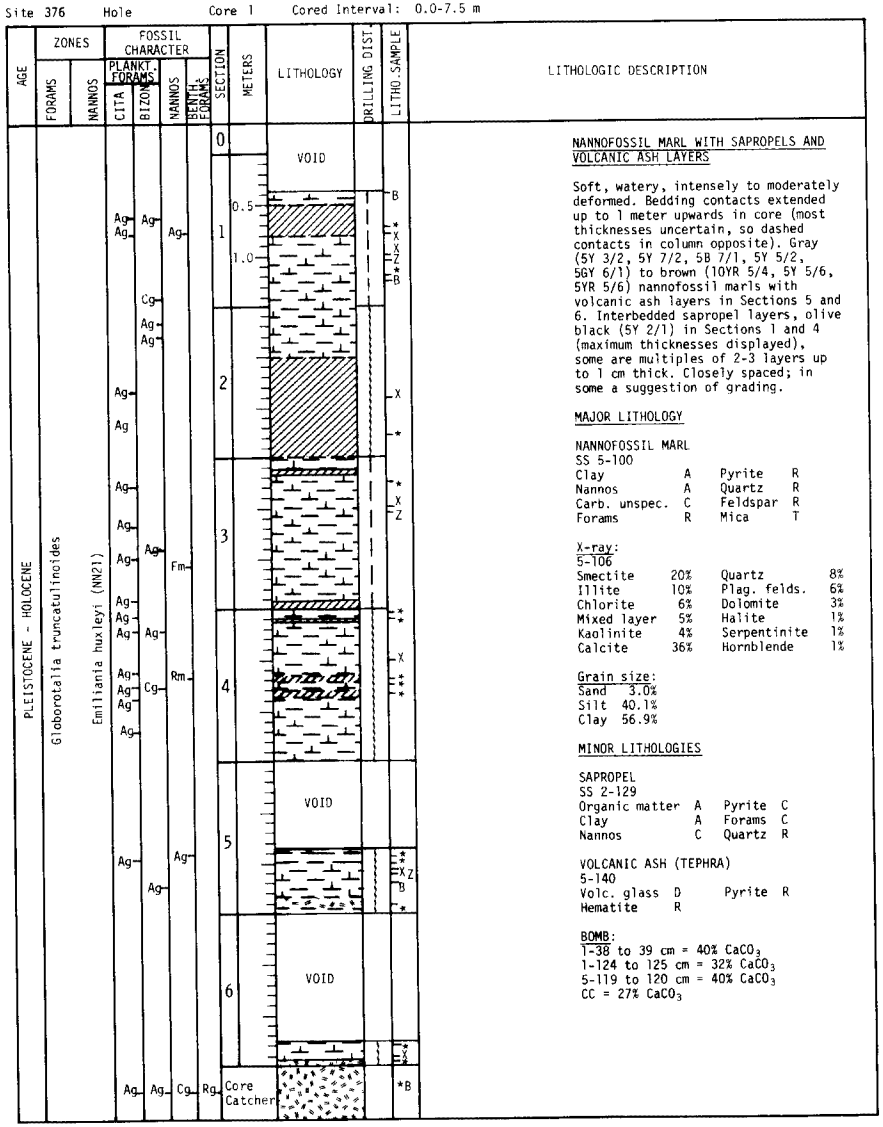
Age: Upper Miocene

BASEMENT: Not reached

PRINCIPAL RESULTS:

(See Site 375 Summary Sheet.)

Site 376 Hole Core 1 Cored Interval: 0.0-7.5 m



LITHOLOGIC DESCRIPTION

NANNOFOSSIL MARL WITH SAPROPELS AND VOLCANIC ASH LAYERS

Soft, watery, intensely to moderately deformed. Bedding contacts extended up to 1 meter upwards in core (most thicknesses uncertain, so dashed contacts in column opposite). Gray (5Y 3/2, 5Y 7/2, 5B 7/1, 5Y 5/2, 5GY 6/1) to brown (10YR 5/4, 5Y 5/6, 5YR 5/6) nannofossil marls with volcanic ash layers in Sections 5 and 6. Interbedded sapropel layers, olive black (5Y 2/1) in Sections 1 and 4 (maximum thicknesses displayed), some are multiples of 2-3 layers up to 1 cm thick. Closely spaced; in some a suggestion of grading.

MAJOR LITHOLOGY

NANNOFOSSIL MARL
SS 5-100

Clay	A	Pyrite	R
Nannos	A	Quartz	R
Carb. unspec.	C	Feldspar	R
Forams	R	Mica	T

X-ray:
5-106

Smectite	20%	Quartz	8%
Illite	10%	Plag. felds.	6%
Chlorite	6%	Dolomite	3%
Mixed layer	5%	Halite	1%
Kaolinite	4%	Serpentinite	1%
Calcite	36%	Hornblende	1%

Grain size:

Sand	3.0%
Silt	40.1%
Clay	56.9%

MINOR LITHOLOGIES

SAPROPEL
SS 2-129

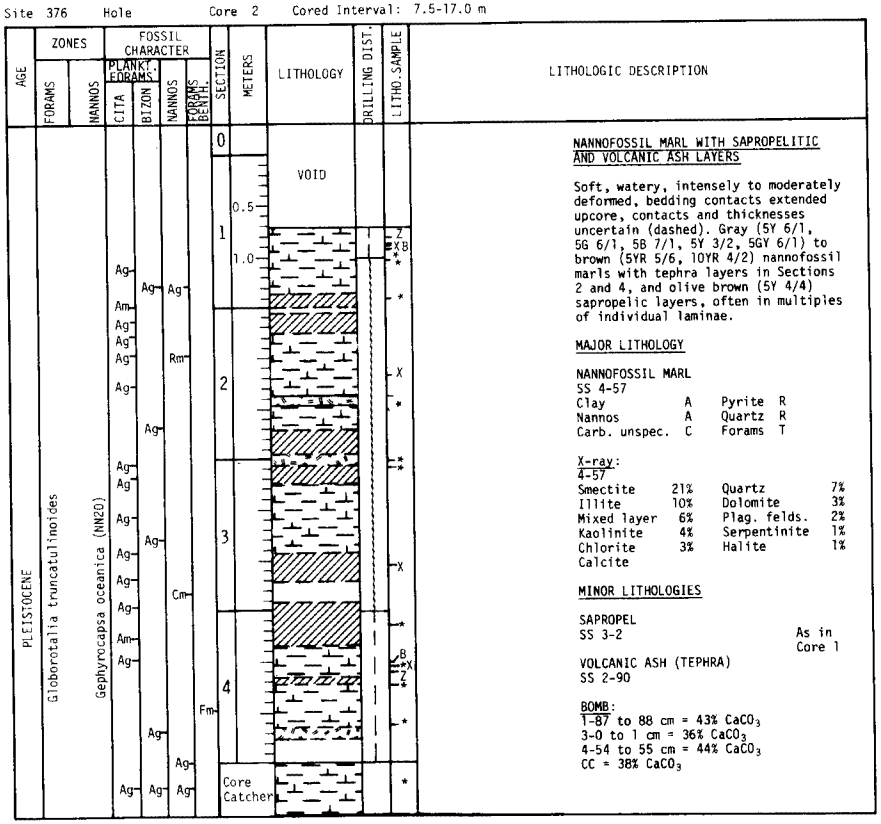
Organic matter	A	Pyrite	C
Clay	A	Forams	C
Nannos	C	Quartz	R

VOLCANIC ASH (TEPHRA)
5-140

Volc. glass	D	Pyrite	R
Hematite	R		

BOMB:
1-38 to 39 cm = 40% $CaCO_3$
1-124 to 125 cm = 32% $CaCO_3$
5-119 to 120 cm = 40% $CaCO_3$
CC = 27% $CaCO_3$

Site 376 Hole Core 2 Cored Interval: 7.5-17.0 m



LITHOLOGIC DESCRIPTION

NANNOFOSSIL MARL WITH SAPROPELITIC AND VOLCANIC ASH LAYERS

Soft, watery, intensely to moderately deformed, bedding contacts extended upcore, contacts and thicknesses uncertain (dashed). Gray (5Y 6/1, 5G 6/1, 5B 7/1, 5Y 3/2, 5GY 6/1) to brown (5YR 5/6, 10YR 4/2) nannofossil marls with tephra layers in Sections 2 and 4, and olive brown (5Y 4/4) sapropelic layers, often in multiples of individual laminae.

MAJOR LITHOLOGY

NANNOFOSSIL MARL
SS 4-57

Clay	A	Pyrite	R
Nannos	A	Quartz	R
Carb. unspec.	C	Forams	T

X-ray:
4-57

Smectite	21%	Quartz	7%
Illite	10%	Dolomite	3%
Mixed layer	6%	Plag. felds.	2%
Kaolinite	4%	Serpentinite	1%
Chlorite	3%	Halite	1%
Calcite			

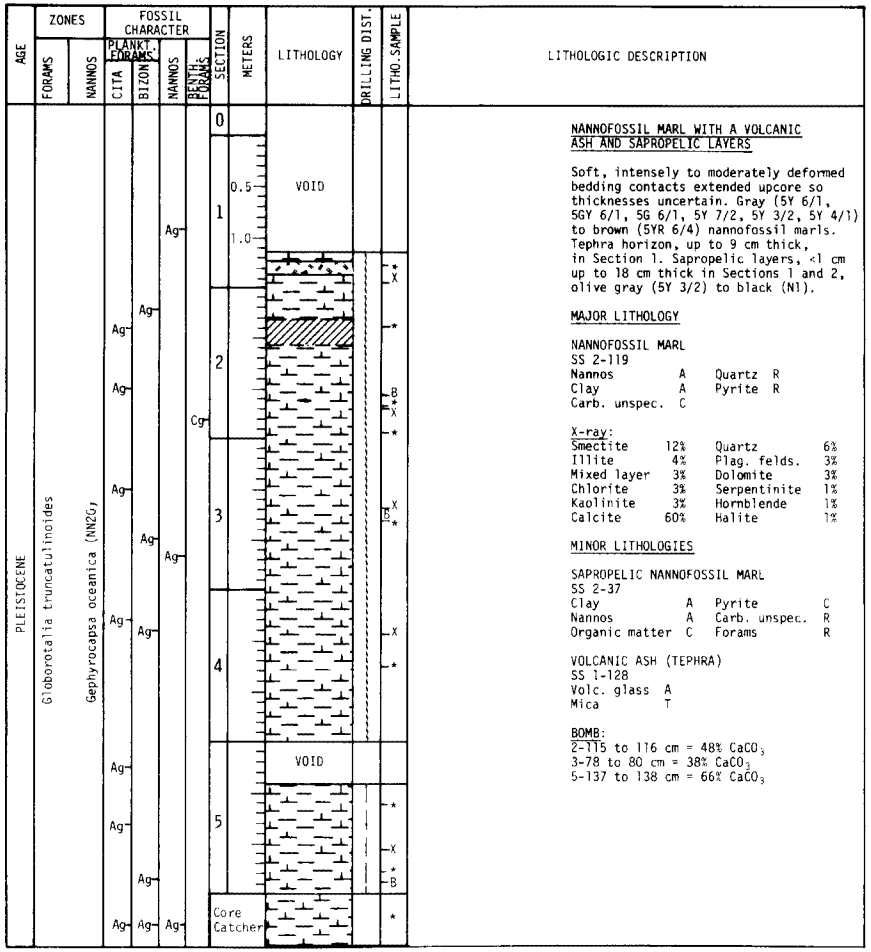
MINOR LITHOLOGIES

SAPROPEL
SS 3-2 — As in Core 1

VOLCANIC ASH (TEPHRA)
SS 2-90

BOMB:
1-87 to 88 cm = 43% $CaCO_3$
3-0 to 1 cm = 36% $CaCO_3$
4-54 to 55 cm = 44% $CaCO_3$
CC = 38% $CaCO_3$

Site 376 Hole Core 3 Cored Interval: 17.0-26.5 m



LITHOLOGIC DESCRIPTION

NANNOFOSSIL MARL WITH A VOLCANIC ASH AND SAPROPELIC LAYERS

Soft, intensely to moderately deformed bedding contacts extended upcore so thicknesses uncertain. Gray (5Y 6/1, 5GY 6/1, 5G 6/1, 5Y 7/2, 5Y 3/2, 5Y 4/1) to brown (5YR 6/4) nannofossil marls. Tephra horizon, up to 9 cm thick, in Section 1. Sapropelic layers, <1 cm up to 18 cm thick in Sections 1 and 2, olive gray (5Y 3/2) to black (N1).

MAJOR LITHOLOGY

NANNOFOSSIL MARL
SS 2-119

Nannos	A	Quartz	R
Clay	A	Pyrite	R
Carb. unspec.	C		

X-ray:

Smectite	12%	Quartz	6%
Illite	4%	Plag. felds.	3%
Mixed layer	3%	Dolomite	3%
Chlorite	3%	Serpentinite	1%
Kaolinite	3%	Hornblende	1%
Calcite	60%	Halite	1%

MINOR LITHOLOGIES

SAPROPELIC NANNOFOSSIL MARL
SS 2-37

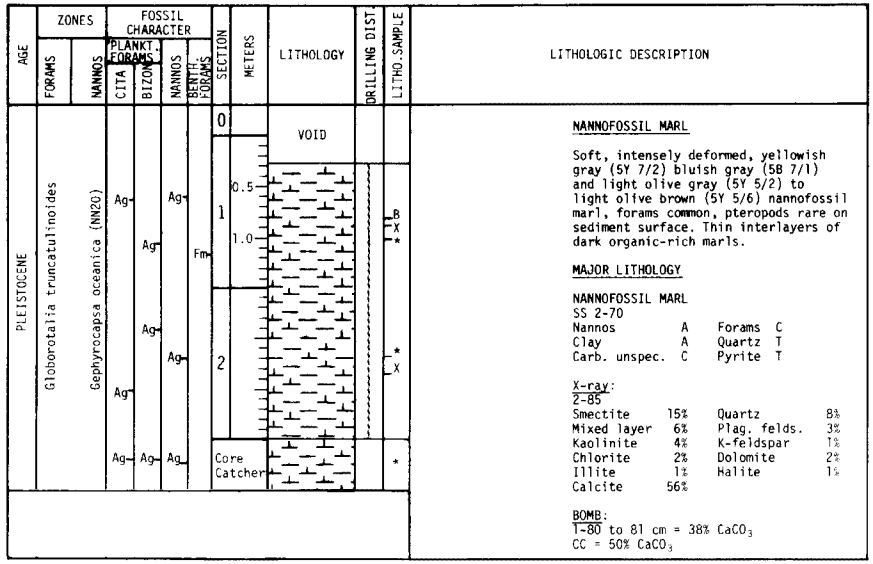
Clay	A	Pyrite	C
Nannos	A	Carb. unspec.	R
Organic matter	C	Forams	R

VOLCANIC ASH (TEPHRA)
SS 1-128

Volc. glass	A
Mica	T

BOMB:
2-115 to 116 cm = 48% $CaCO_3$
3-78 to 80 cm = 38% $CaCO_3$
5-137 to 138 cm = 66% $CaCO_3$

Site 376 Hole Core 4 Cored Interval: 26.5-36.0 m



LITHOLOGIC DESCRIPTION

NANNOFOSSIL MARL

Soft, intensely deformed, yellowish gray (5Y 7/2) bluish gray (5B 7/1) and light olive gray (5Y 5/2) to light olive brown (5Y 5/6) nannofossil marl, forams common, pteropods rare on sediment surface. Thin interlayers of dark organic-rich marls.

MAJOR LITHOLOGY

NANNOFOSSIL MARL
SS 2-70

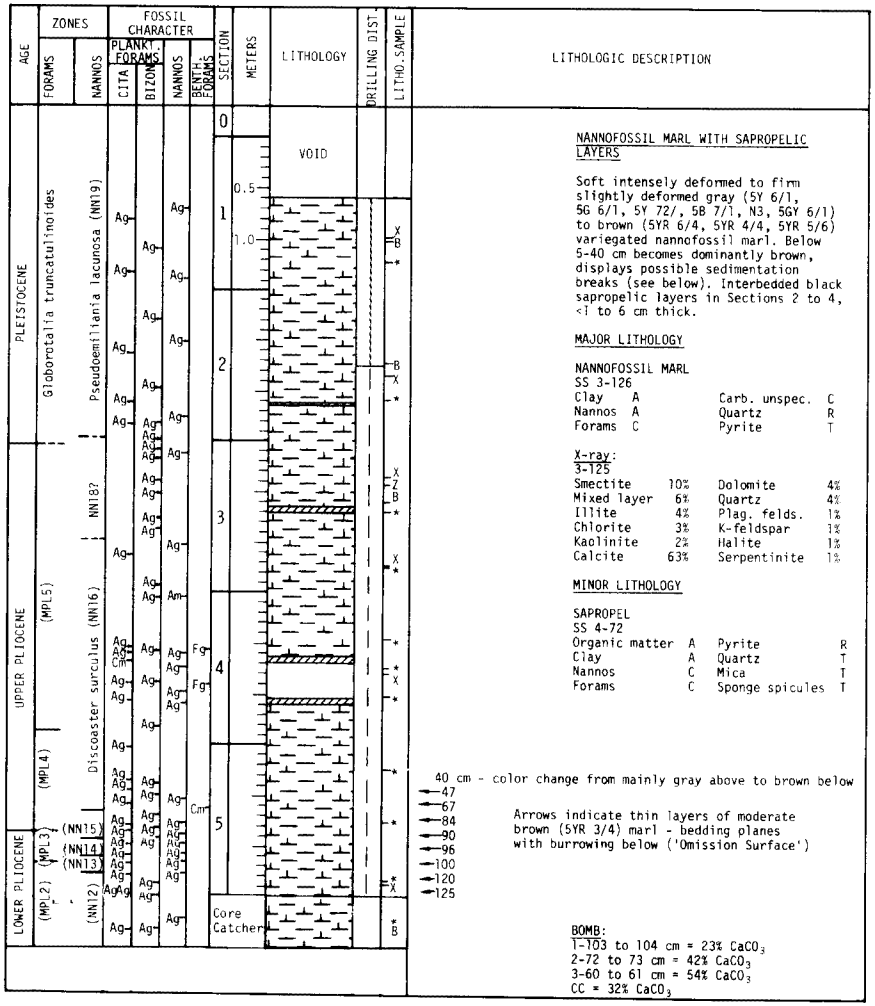
Nannos	A	Forams	C
Clay	A	Quartz	T
Carb. unspec.	C	Pyrite	T

X-ray:
2-85

Smectite	15%	Quartz	8%
Mixed layer	6%	Plag. felds.	3%
Kaolinite	4%	K-feldspar	1%
Chlorite	2%	Dolomite	2%
Illite	1%	Halite	1%
Calcite	56%		

BOMB:
1-80 to 81 cm = 38% $CaCO_3$
CC = 50% $CaCO_3$

Site 376 Hole Core 5 Cored Interval: 36.0-45.5 m



LITHOLOGIC DESCRIPTION

NANNOFOSSIL MARL WITH SAPROPELIC LAYERS

Soft intensely deformed to firm slightly deformed gray (5Y 6/1, 5G 6/1, 5Y 72/, 5B 7/1, N3, 5GY 6/1) to brown (5YR 6/4, 5YR 4/4, 5YR 5/6) variegated nannofossil marl. Below 5-40 cm becomes dominantly brown, displays possible sedimentation breaks (see below). Interbedded black sapropelic layers in Sections 2 to 4, <1 to 6 cm thick.

MAJOR LITHOLOGY

NANNOFOSSIL MARL
SS 3-126

Clay	A	Carb. unspec.	C
Nannos	A	Quartz	R
Forams	C	Pyrite	T

X-ray:
3-125

Smectite	10%	Dolomite	4%
Mixed layer	6%	Quartz	4%
Illite	4%	Plag. felds.	1%
Chlorite	3%	K-feldspar	1%
Kaolinite	2%	Halite	1%
Calcite	63%	Serpentinite	1%

MINOR LITHOLOGY

SAPROPEL
SS 4-72

Organic matter	A	Pyrite	R
Clay	A	Quartz	T
Nannos	C	Mica	T
Forams	C	Sponge spicules	T

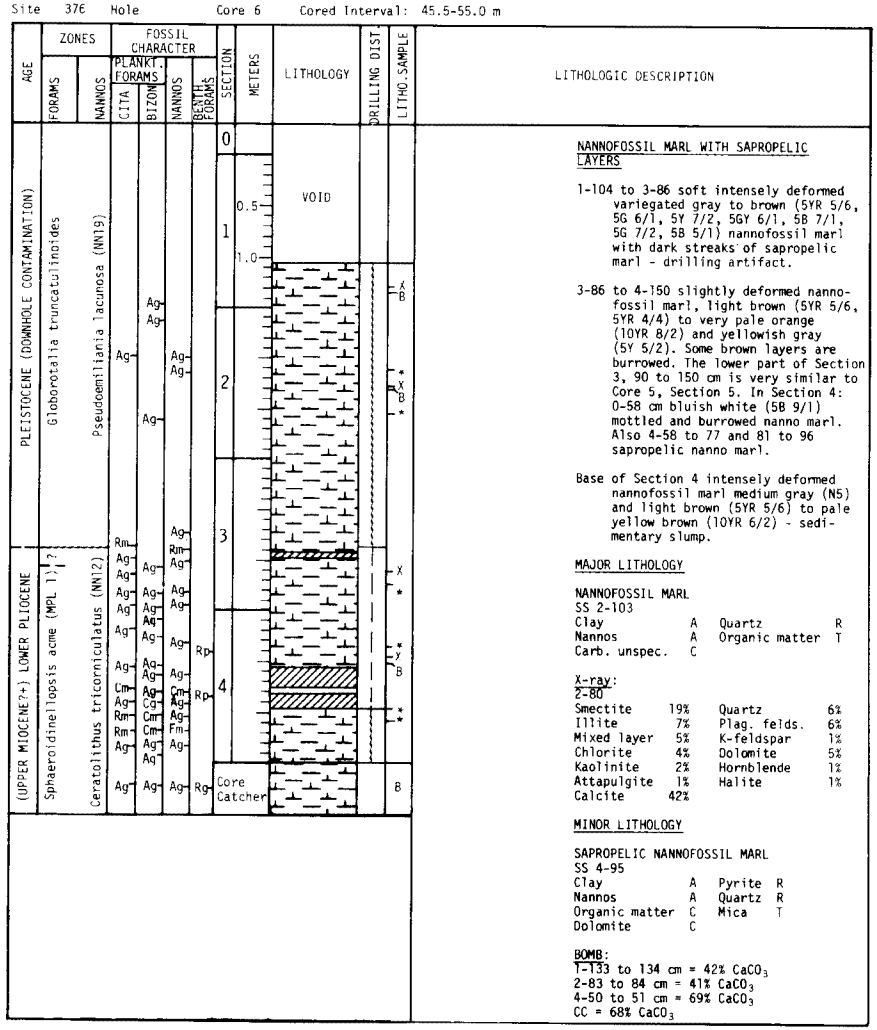
40 cm - color change from mainly gray above to brown below

47
67
84
90
96
100
120
125

Arrows indicate thin layers of moderate brown (5YR 3/4) marl - bedding planes with burrowing below ('Omission Surface')

BOMB:
1-103 to 104 cm = 23% $CaCO_3$
2-72 to 73 cm = 42% $CaCO_3$
3-60 to 61 cm = 54% $CaCO_3$
CC = 32% $CaCO_3$

Site 376 Hole Core 6 Cored Interval: 45.5-55.0 m



LITHOLOGIC DESCRIPTION

NANNOFOSSIL MARL WITH SAPROPELIC LAYERS

1-104 to 3-86 soft intensely deformed variegated gray to brown (5YR 5/6, 5G 6/1, 5Y 7/2, 5GY 6/1, 5B 7/1, 5G 7/2, 5B 5/1) nannofossil marl with dark streaks of sapropelic marl - drilling artifact.

3-86 to 4-150 slightly deformed nannofossil marl, light brown (5YR 5/6, 5YR 4/4) to very pale orange (10YR 8/2) and yellowish gray (5Y 5/2). Some brown layers are burrowed. The lower part of Section 3, 90 to 150 cm is very similar to Core 5, Section 5. In Section 4: 0-58 cm bluish white (5B 9/1) mottled and burrowed nanno marl. Also 4-58 to 77 and 81 to 96 sapropelic nanno marl.

Base of Section 4 intensely deformed nannofossil marl medium gray (N5) and light brown (5YR 5/6) to pale yellow brown (10YR 6/2) - sedimentary slump.

MAJOR LITHOLOGY

NANNOFOSSIL MARL
SS 2-103

Clay	A	Quartz	R
Nannos	A	Organic matter	T
Carb. unspec.	C		

X-ray:
2-80

Smectite	19%	Quartz	6%
Illite	7%	Plag. felds.	6%
Mixed layer	5%	K-feldspar	1%
Chlorite	4%	Dolomite	5%
Kaolinite	2%	Hornblende	1%
Attapulgite	1%	Halite	1%
Calcite	42%		

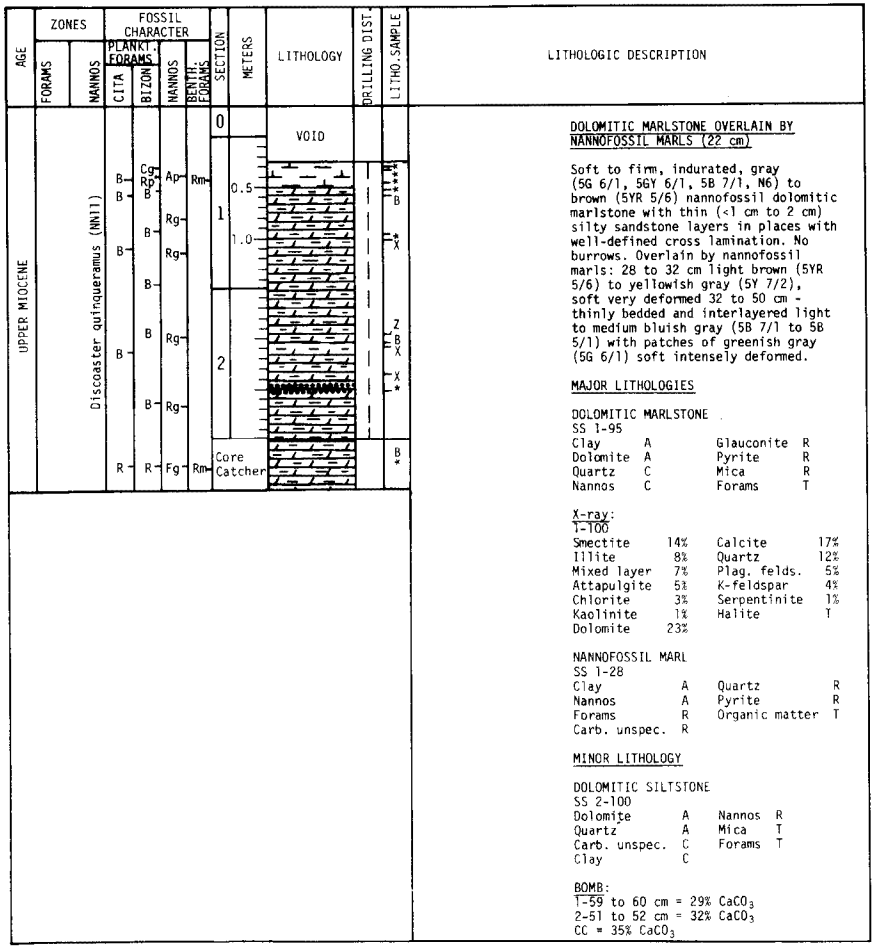
MINOR LITHOLOGY

SAPROPELIC NANNOFOSSIL MARL
SS 4-95

Clay	A	Pyrite	R
Nannos	A	Quartz	R
Organic matter	C	Mica	T
Dolomite	C		

BOMB:
1-133 to 134 cm = 42% $CaCO_3$
2-83 to 84 cm = 41% $CaCO_3$
4-50 to 51 cm = 69% $CaCO_3$
CC = 68% $CaCO_3$

Site 376 Hole Core 7 Cored Interval: 55.0-64.5 m



DOLOMITIC MARLSTONE OVERLAIN BY NANNOFOSSIL MARLS (22 cm)

Soft to firm, indurated, gray (5G 6/1, 5GY 6/1, 5B 7/1, N6) to brown (5YR 5/6) nannofossil dolomitic marlstone with thin (<1 cm to 2 cm) silty sandstone layers in places with well-defined cross lamination. No burrows. Overlain by nannofossil marls: 28 to 32 cm light brown (5YR 5/6) to yellowish gray (5Y 7/2), soft very deformed 32 to 50 cm - thinly bedded and interlayered light to medium bluish gray (5B 7/1 to 5B 5/1) with patches of greenish gray (5G 6/1) soft intensely deformed.

MAJOR LITHOLOGIES

DOLOMITIC MARLSTONE
SS 1-95

Clay	A	Glauconite	R
Dolomite	A	Pyrite	R
Quartz	C	Mica	R
Nannos	C	Forams	T

X-ray:
1-100

Smectite	14%	Calcite	17%
Illite	8%	Quartz	12%
Mixed layer	7%	Plag. felds.	5%
Attapulgite	5%	K-feldspar	4%
Chlorite	3%	Serpentinite	1%
Kaolinite	1%	Halite	T
Dolomite	23%		

NANNOFOSSIL MARL
SS 1-28

Clay	A	Quartz	R
Nannos	A	Pyrite	R
Forams	R	Organic matter	T
Carb. unspec.	R		

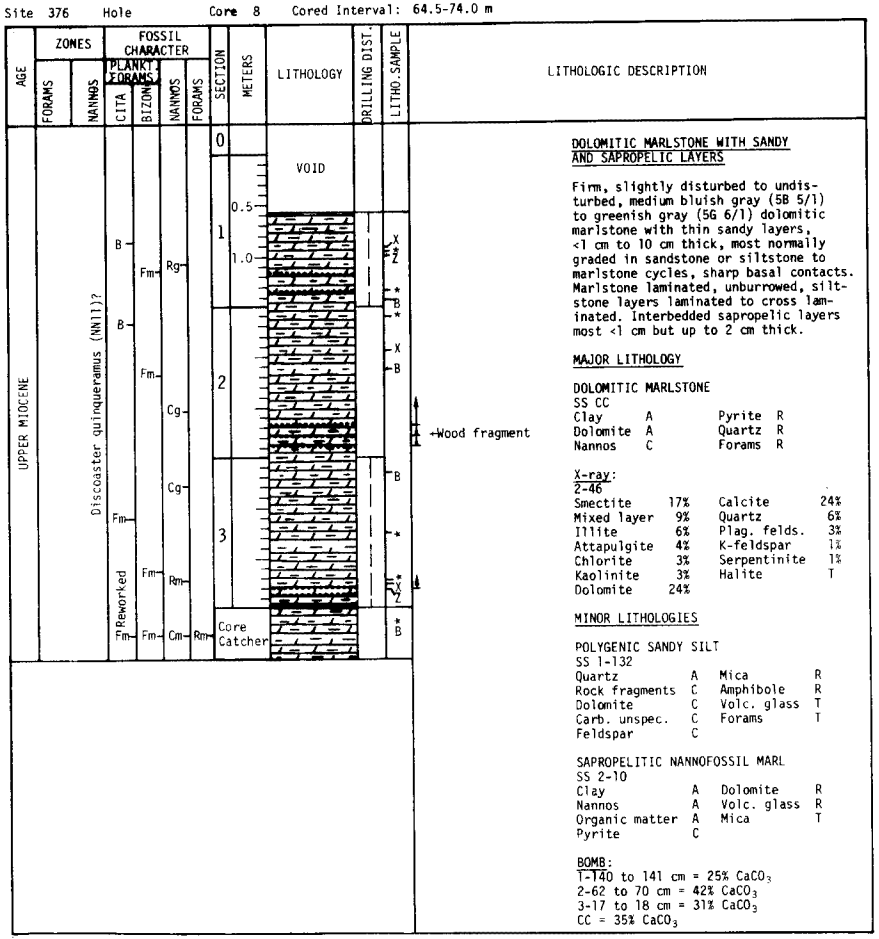
MINOR LITHOLOGY

DOLOMITIC SILTSTONE
SS 2-100

Dolomite	A	Nannos	R
Quartz	A	Mica	T
Carb. unspec.	C	Forams	T
Clay	C		

BOMB:
1-59 to 60 cm = 29% $CaCO_3$
2-51 to 52 cm = 32% $CaCO_3$
CC = 35% $CaCO_3$

Site 376 Hole Core 8 Cored Interval: 64.5-74.0 m



DOLOMITIC MARLSTONE WITH SANDY AND SAPROPELIC LAYERS

Firm, slightly disturbed to undisturbed, medium bluish gray (5B 5/1) to greenish gray (5G 6/1) dolomitic marlstone with thin sandy layers, <1 cm to 10 cm thick, most normally graded in sandstone or siltstone to marlstone cycles, sharp basal contacts. Marlstone laminated, unburrowed, siltstone layers laminated to cross laminated. Interbedded sapropelic layers most <1 cm but up to 2 cm thick.

MAJOR LITHOLOGY

DOLOMITIC MARLSTONE
SS CC

Clay	A	Pyrite	R
Dolomite	A	Quartz	R
Nannos	C	Forams	R

X-ray:
2-46

Smectite	17%	Calcite	24%
Mixed layer	9%	Quartz	6%
Illite	6%	Plag. felds.	3%
Attapulgite	4%	K-feldspar	1%
Chlorite	3%	Serpentinite	1%
Kaolinite	3%	Halite	T
Dolomite	24%		

MINOR LITHOLOGIES

POLYGENIC SANDY SILT
SS 1-132

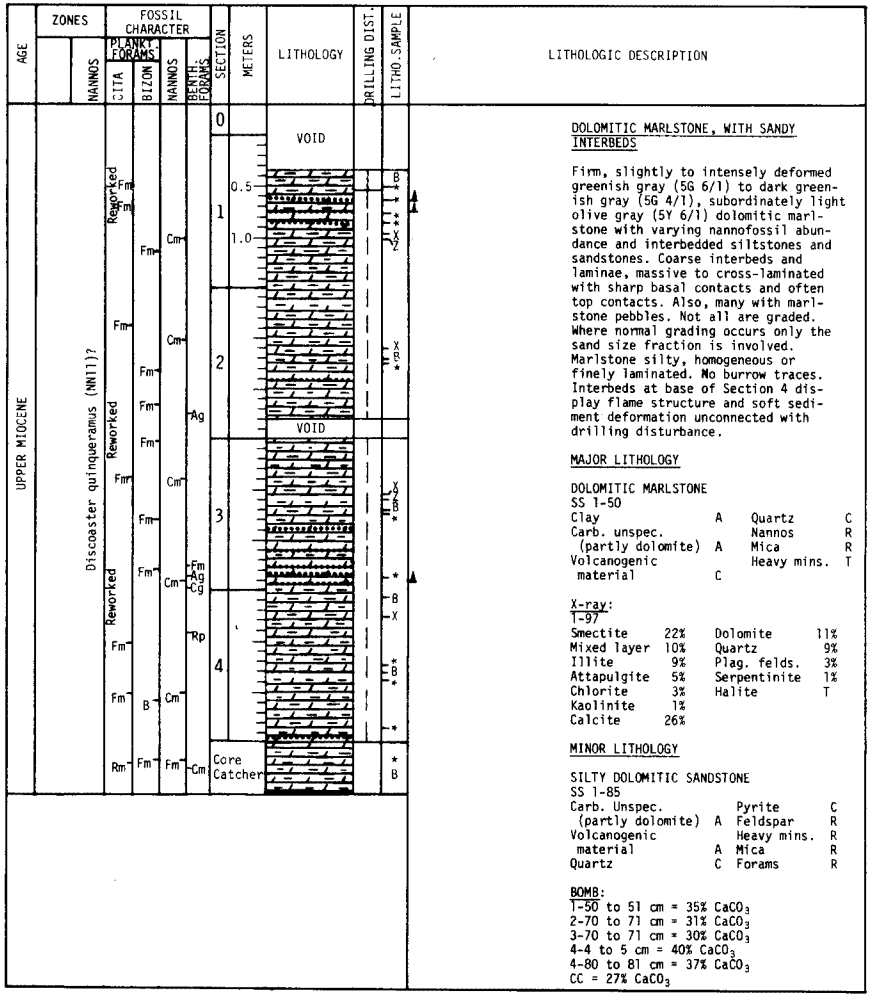
Quartz	A	Mica	R
Rock fragments	C	Amphibole	R
Dolomite	C	Volc. glass	T
Carb. unspec.	C	Forams	T
Feldspar	C		

SAPROPELITIC NANNOFOSSIL MARL
SS 2-10

Clay	A	Dolomite	R
Nannos	A	Volc. glass	R
Organic matter	A	Mica	T
Pyrite	C		

BOMB:
1-140 to 141 cm = 25% $CaCO_3$
2-62 to 70 cm = 42% $CaCO_3$
3-17 to 18 cm = 31% $CaCO_3$
CC = 35% $CaCO_3$

Site 376 Hole Core 9 Cored Interval: 74.0-83.5 m



DOLOMITIC MARLSTONE, WITH SANDY INTERBEDS

Firm, slightly to intensely deformed greenish gray (5G 6/1) to dark greenish gray (5G 4/1), subordinately light olive gray (5Y 6/1) dolomitic marlstone with varying nannofossil abundance and interbedded siltstones and sandstones. Coarse interbeds and laminae, massive to cross-laminated with sharp basal contacts and often top contacts. Also, many with marlstone pebbles. Not all are graded. Where normal grading occurs only the sand size fraction is involved. Marlstone silty, homogeneous or finely laminated. No burrow traces. Interbeds at base of Section 4 display flame structure and soft sediment deformation unconnected with drilling disturbance.

MAJOR LITHOLOGY

DOLOMITIC MARLSTONE
SS 1-50

Clay	A	Quartz	C
Carb. unspec. (partly dolomite)	A	Nannos	R
		Mica	R
Volcanogenic material	C	Heavy mins.	T

X-ray:
1-97

Smectite	22%	Dolomite	11%
Mixed layer	10%	Quartz	9%
Illite	9%	Plag. felds.	3%
Attapulgite	5%	Serpentinite	1%
Chlorite	3%	Halite	T
Kaolinite	1%		
Calcite	26%		

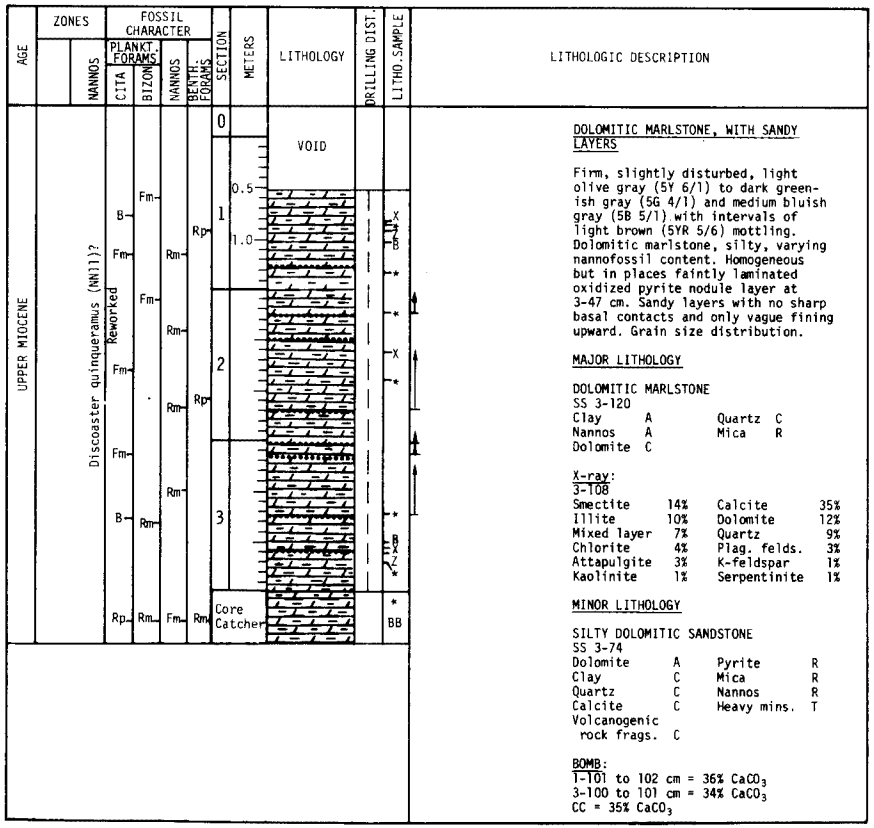
MINOR LITHOLOGY

SILTY DOLOMITIC SANDSTONE
SS 1-85

Carb. Unspec. (partly dolomite)	A	Pyrite	C
		Feldspar	R
Volcanogenic material	A	Heavy mins.	R
		Mica	R
Quartz	C	Forams	R

BOMB:
1-50 to 51 cm = 35% $CaCO_3$
2-70 to 71 cm = 31% $CaCO_3$
3-70 to 71 cm = 30% $CaCO_3$
4-4 to 5 cm = 40% $CaCO_3$
4-80 to 81 cm = 37% $CaCO_3$
CC = 27% $CaCO_3$

Site 376 Hole Core 10 Cored Interval: 83.5-93.0 m



DOLOMITIC MARLSTONE, WITH SANDY LAYERS

Firm, slightly disturbed, light olive gray (5Y 6/1) to dark greenish gray (5G 4/1) and medium bluish gray (5B 5/1) with intervals of light brown (5YR 5/6) mottling. Dolomitic marlstone, silty, varying nannofossil content. Homogeneous but in places faintly laminated oxidized pyrite nodule layer at 3-47 cm. Sandy layers with no sharp basal contacts and only vague fining upward. Grain size distribution.

MAJOR LITHOLOGY

DOLOMITIC MARLSTONE
SS 3-120

Clay	A	Quartz	C
Nannos	A	Mica	R
Dolomite	C		

X-ray:
3-108

Smectite	14%	Calcite	35%
Illite	10%	Dolomite	12%
Mixed layer	7%	Quartz	9%
Chlorite	4%	Plag. felds.	3%
Attapulgite	3%	K-feldspar	1%
Kaolinite	1%	Serpentinite	1%

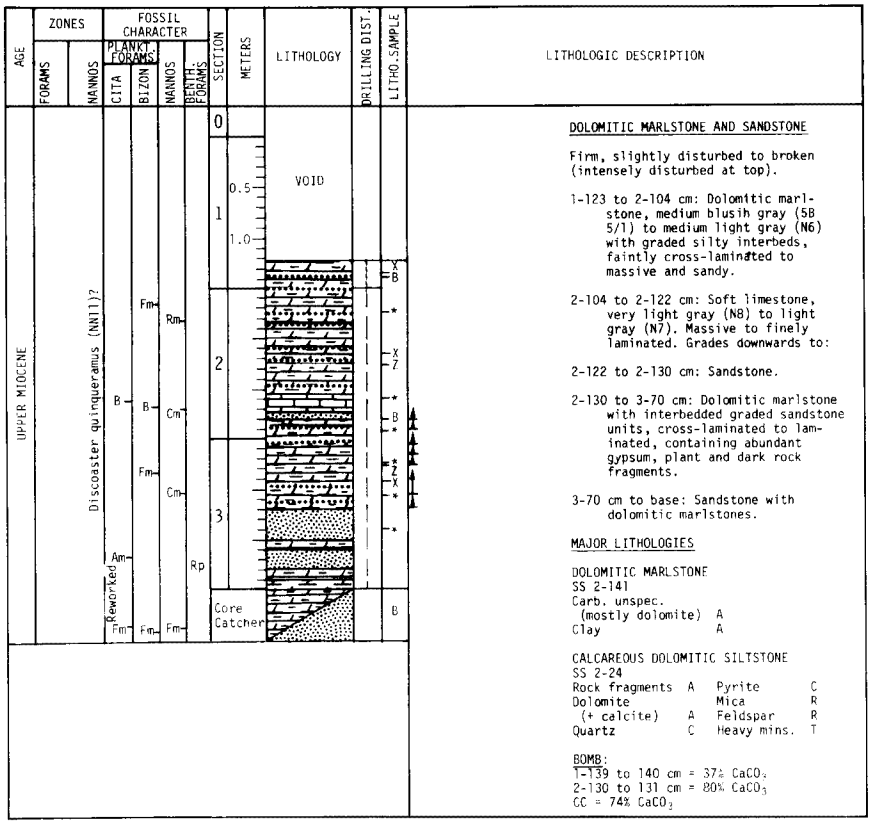
MINOR LITHOLOGY

SILTY DOLOMITIC SANDSTONE
SS 3-74

Dolomite	A	Pyrite	R
Clay	C	Mica	R
Quartz	C	Nannos	R
Calcite	C	Heavy mins.	T
Volcanogenic rock frags.	C		

BOMB:
1-101 to 102 cm = 36% $CaCO_3$
3-100 to 101 cm = 34% $CaCO_3$
CC = 35% $CaCO_3$

Site 376 Hole Core 11 Cored Interval: 93.0-102.5 m



DOLOMITIC MARLSTONE AND SANDSTONE

Firm, slightly disturbed to broken (intensely disturbed at top).

1-123 to 2-104 cm: Dolomitic marlstone, medium blusih gray (5B 5/1) to medium light gray (N6) with graded silty interbeds, faintly cross-laminated to massive and sandy.

2-104 to 2-122 cm: Soft limestone, very light gray (N8) to light gray (N7). Massive to finely laminated. Grades downwards to:

2-122 to 2-130 cm: Sandstone.

2-130 to 3-70 cm: Dolomitic marlstone with interbedded graded sandstone units, cross-laminated to laminated, containing abundant gypsum, plant and dark rock fragments.

3-70 cm to base: Sandstone with dolomitic marlstones.

MAJOR LITHOLOGIES

DOLOMITIC MARLSTONE
SS 2-141

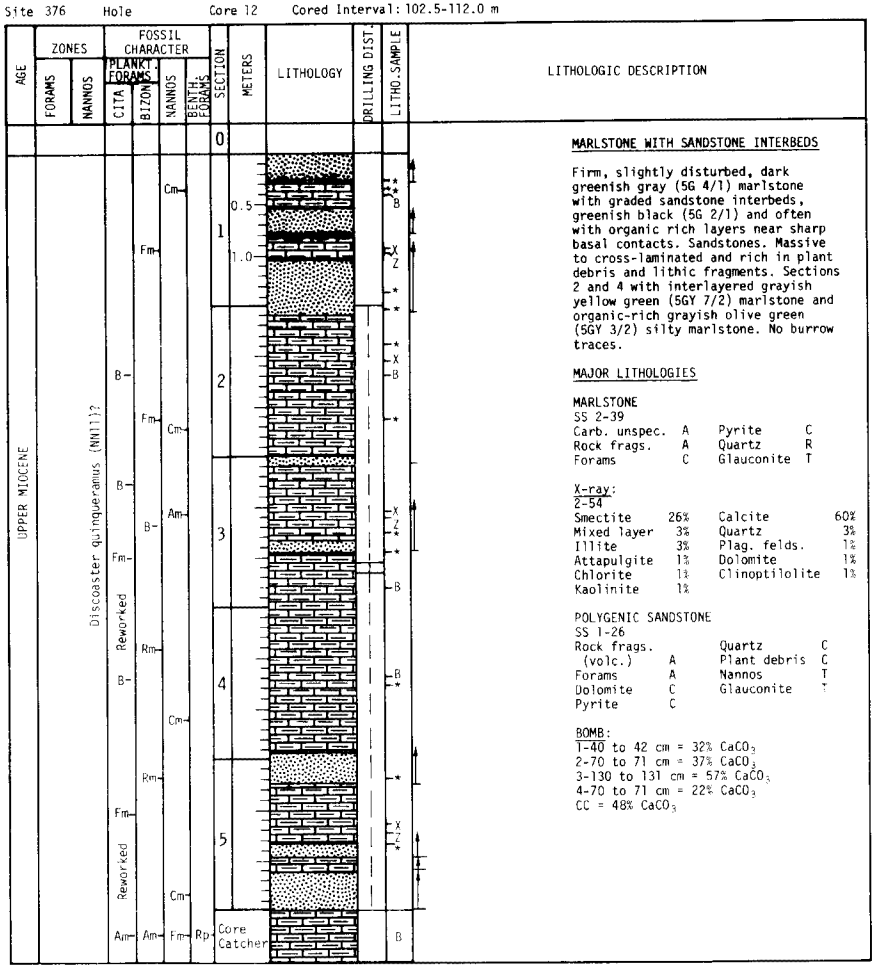
Carb. unspec. (mostly dolomite)	A		
Clay	A		

CALCAREOUS DOLOMITIC SILTSTONE
SS 2-24

Rock fragments	A	Pyrite	C
Dolomite (+ calcite)	A	Mica	R
Quartz	C	Feldspar	R
		Heavy mins.	T

BOMB:
1-139 to 140 cm = 37% $CaCO_3$
2-130 to 131 cm = 80% $CaCO_3$
CC = 74% $CaCO_3$

Site 376 Hole Core 12 Cored Interval: 102.5-112.0 m



MARLSTONE WITH SANDSTONE INTERBEDS

Firm, slightly disturbed, dark greenish gray (5G 4/1) marlstone with graded sandstone interbeds, greenish black (5G 2/1) and often with organic rich layers near sharp basal contacts. Sandstones. Massive to cross-laminated and rich in plant debris and lithic fragments. Sections 2 and 4 with interlayered grayish yellow green (5GY 7/2) marlstone and organic-rich grayish olive green (5GY 3/2) silty marlstone. No burrow traces.

MAJOR LITHOLOGIES

MARLSTONE
SS 2-39

Carb. unspec.	A	Pyrite	C
Rock frags.	A	Quartz	R
Forams	C	Glauconite	T

X-ray:
2-54

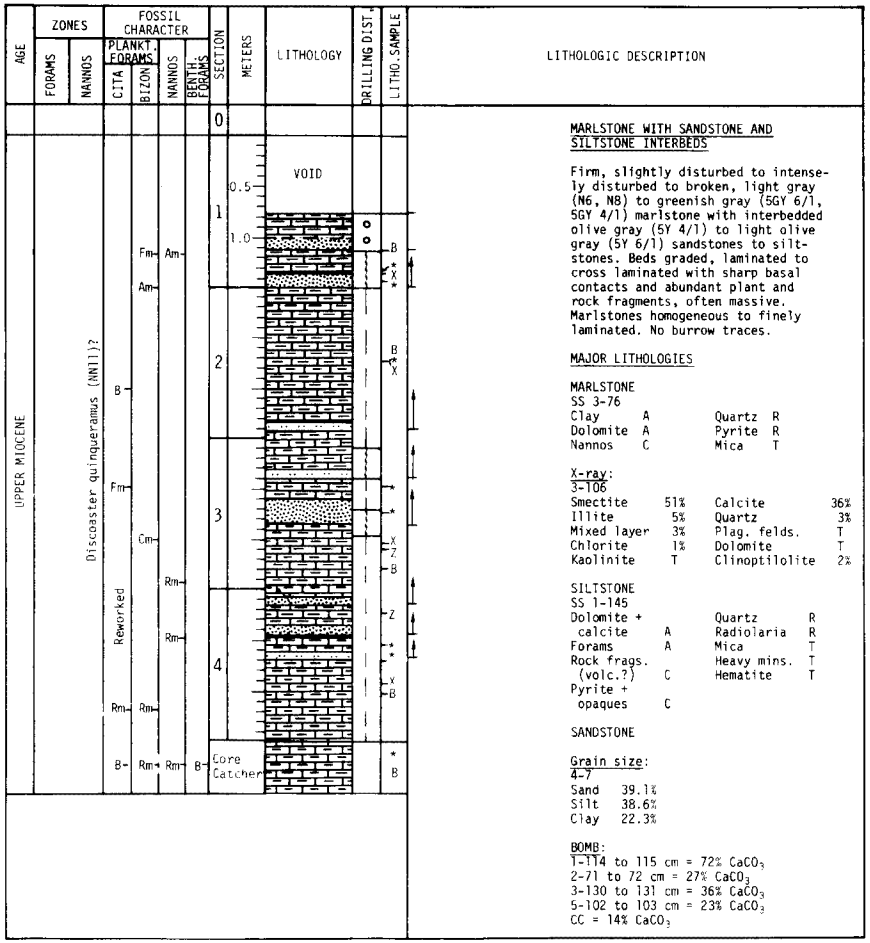
Smectite	26%	Calcite	60%
Mixed layer	3%	Quartz	3%
Illite	3%	Plag. felds.	1%
Attapulgite	1%	Dolomite	1%
Chlorite	1%	Clinoptilolite	1%
Kaolinite	1%		

POLYGENIC SANDSTONE
SS 1-26

Rock frags. (volc.)	A	Quartz	C
Forams	A	Plant debris	C
Dolomite	C	Nannos	T
Pyrite	C	Glauconite	T

BOMB:
1-40 to 42 cm = 32% $CaCO_3$
2-70 to 71 cm = 37% $CaCO_3$
3-130 to 131 cm = 57% $CaCO_3$
4-70 to 71 cm = 22% $CaCO_3$
CC = 48% $CaCO_3$

Site 376 Hole Core 13 Cored Interval: 112.0-121.5 m



MARLSTONE WITH SANDSTONE AND SILTSTONE INTERBEDS

Firm, slightly disturbed to intensely disturbed to broken, light gray (N6, N8) to greenish gray (5GY 6/1, 5GY 4/1) marlstone with interbedded olive gray (5Y 4/1) to light olive gray (5Y 6/1) sandstones to siltstones. Beds graded, laminated to cross laminated with sharp basal contacts and abundant plant and rock fragments, often massive. Marlstones homogeneous to finely laminated. No burrow traces.

MAJOR LITHOLOGIES

MARLSTONE
SS 3-76

Clay	A	Quartz	R
Dolomite	A	Pyrite	R
Nannos	C	Mica	T

X-ray:
3-106

Smectite	51%	Calcite	36%
Illite	5%	Quartz	3%
Mixed layer	3%	Plag. felds.	T
Chlorite	1%	Dolomite	T
Kaolinite	T	Clinoptilolite	2%

SILTSTONE
SS 1-145

Dolomite + calcite	A	Quartz	R
Forams	A	Radiolaria	R
Rock frags. (volc.?)	C	Mica	T
Pyrite + opaques	C	Heavy mins.	T
		Hematite	T

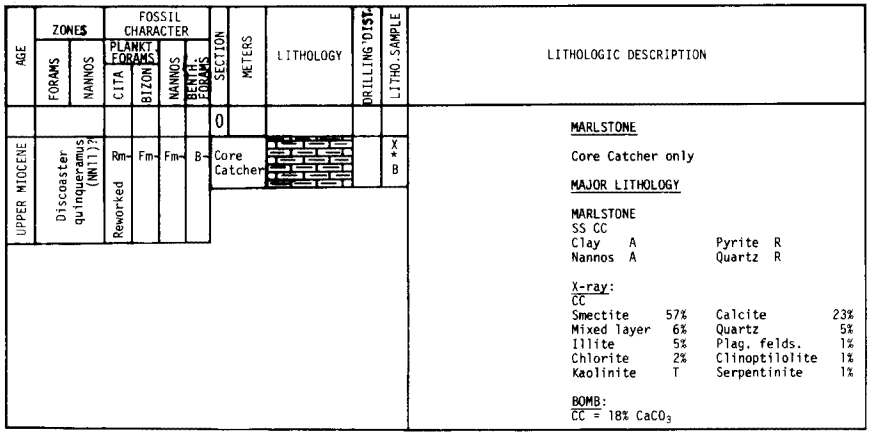
SANDSTONE

Grain size:
4-7

Sand	39.1%
Silt	38.6%
Clay	22.3%

BOMB:
1-114 to 115 cm = 72% $CaCO_3$
2-71 to 72 cm = 27% $CaCO_3$
3-130 to 131 cm = 36% $CaCO_3$
5-102 to 103 cm = 23% $CaCO_3$
CC = 14% $CaCO_3$

Site 376 Hole Core 14 Cored Interval: 121.5-131.0 m



MARLSTONE

Core Catcher only

MAJOR LITHOLOGY

MARLSTONE
SS CC

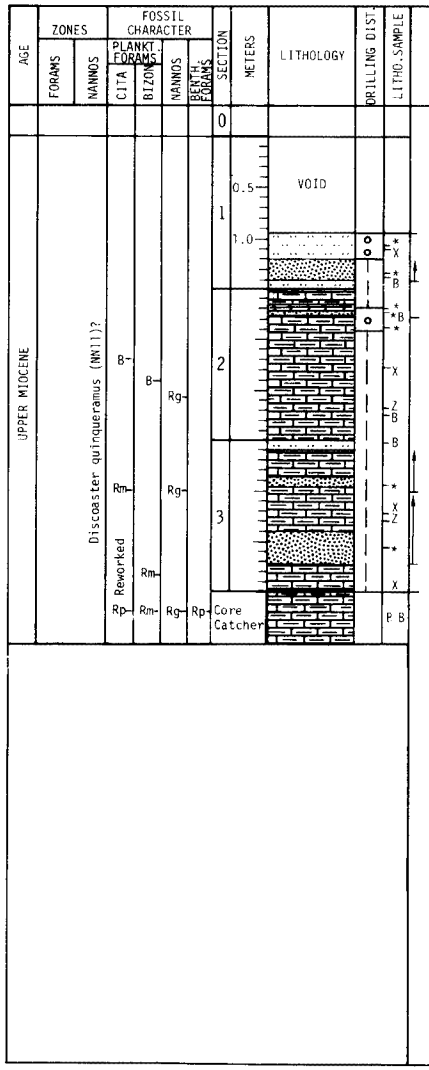
Clay	A	Pyrite	R
Nannos	A	Quartz	R

X-ray:
CC

Smectite	57%	Calcite	23%
Mixed layer	6%	Quartz	5%
Illite	5%	Plag. felds.	1%
Chlorite	2%	Clinoptilolite	1%
Kaolinite	T	Serpentinite	1%

BOMB:
CC = 18% $CaCO_3$

Site 376 Hole Core 15 Cored Interval: 131.0-140.5 m



LITHOLOGIC DESCRIPTION

MARLSTONE WITH GYPSIFEROUS SANDSTONES AND SILTSTONES

Indurated, slightly disturbed to broken silty, green and gray (10G 6/2, 5B 5/1, N8) mottled with light olive brown (5Y 5/6), nannofossil marlstone with interbedded graded gypsiferous sandstone and siltstone layers. Beds have sharp erosional basal contacts, best displayed in Section 3. Contain marlstone pebbles and dark rock fragments coarsely crystalline white gypsum at 2-18 to 23 cm.

MAJOR LITHOLOGIES

MARLSTONE
SS 2-39

Clay	A	Quartz	C
Carb. unspec.	A	Feldspar	R
Nannos	C		

X-ray:
2-38

Smectite	22%	Calcite	26%
Illite	17%	Quartz	8%
Mixed layer	8%	Plag. felds.	4%
Chlorite	6%	K-feldspar	1%
Attapulgite	2%	Dolomite	4%
Kaolinite	1%	Serpentinite	1%

GYPSIFEROUS SANDSTONE
SS 2-21

Gypsum	A		
Rock frags. (volc.?)	C		
Nannos	C		

SILTSTONE
SS 1-105

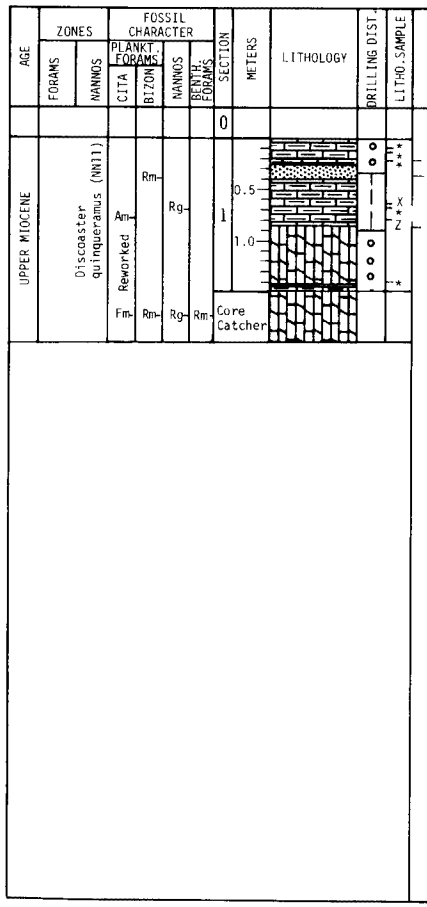
Clay	A	Quartz	C
Nannos	C	Dolomite	R
Rock frags.	C	Mica	R
Gypsum	C	Pyrite	R
Feldspar	C		

X-ray:
1-108

Smectite	20%	Plag. felds.	11%
Illite	6%	K-feldspar	7%
Mixed layer	4%	Quartz	10%
Attapulgite	1%	Gypsum	14%
Chlorite	1%	Hornblende	1%
Kaolinite	T	Serpentinite	1%
Calcite	18%	Clinoptilolite	T
Dolomite	5%		

BOMB:
1-137 to 138 cm = 53% $CaCO_3$
2-35 to 36 cm = 54% $CaCO_3$
2-125 to 126 cm = 33% $CaCO_3$
3-2 to 3 cm = 46% $CaCO_3$
CC = 44% $CaCO_3$
CC = 35% $CaCO_3$ Rim of gypsum

Site 376 Hole Core 16 Cored Interval: 140.5-150.0 m



LITHOLOGIC DESCRIPTION

MARLSTONE WITH GYPSIFEROUS SANDSTONE AND SILTSTONE, AND COARSELY CRYSTALLINE GYPSUM

Drilling breccias top and bottom of section with slightly disturbed interval between.

Strongly disturbed transition between Cores 15 and 17.

0-20 cm: Coarsely crystalline, banded, recrystallized gypsum (selenite).

20-25 cm: Sandy green marlstone with very fine-grained gypsum.

25-36 cm: Coarse sandstone with gypsum fragments.

36-87 cm: Greenish gray (5G 6/1) silty to silty marlstone with thin sandstone layers containing dark rock fragments and detrital gypsum.

SILTY MARLSTONE
X-ray:
1-68

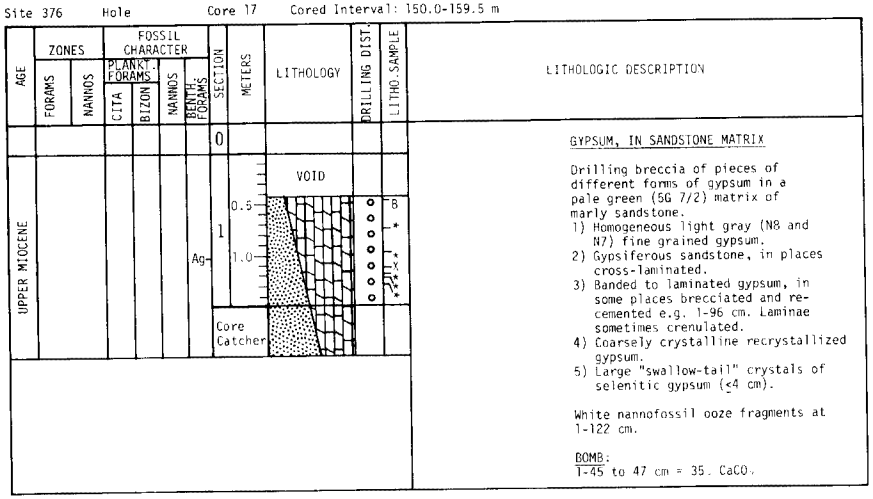
Smectite	27%	Dolomite	2%
Illite	7%	Gypsum	6%
Mixed layer	4%	Quartz	6%
Attapulgite	2%	Plag. felds.	4%
Chlorite	2%	Hornblende	1%
Kaolinite	1%	Serpentinite	1%
Calcite	38%		

Grain size:
1-72

Sand	3.2%
Silt	47.9%
Clay	49.0%

87-50 cm: Gypsum, 4 types:
1) Fine-grained, homogeneous, light olive gray (5Y 6/1) to white;
2) crystalline, crudely layered, white;
3) layered, crenulated;
4) coarse selenite.
Set in matrix of greenish gray silty marlstone.

Site 376 Hole Core 17 Cored Interval: 150.0-159.5 m



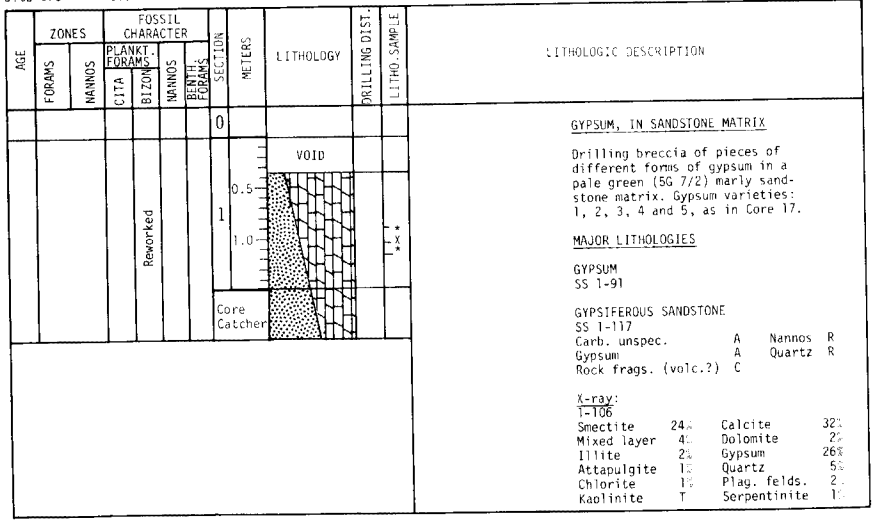
GYPSUM, IN SANDSTONE MATRIX

Drilling breccia of pieces of different forms of gypsum in a pale green (5G 7/2) matrix of marly sandstone.
1) Homogeneous light gray (N8 and N7) fine grained gypsum.
2) Gypsiferous sandstone, in places cross-laminated.
3) Banded to laminated gypsum, in some places brecciated and re-cemented e.g. 1-96 cm. Laminae sometimes crenulated.
4) Coarsely crystalline recrystallized gypsum.
5) Large "swallow-tail" crystals of selenitic gypsum (≤4 cm).

White nannofossil ooze fragments at 1-122 cm.

BOMB:
1-45 to 47 cm = 35. $CaCO_3$

Site 376 Hole Core 18 Cored Interval: 159.5-169.0 m



GYPSUM, IN SANDSTONE MATRIX

Drilling breccia of pieces of different forms of gypsum in a pale green (5G 7/2) marly sandstone matrix. Gypsum varieties: 1, 2, 3, 4 and 5, as in Core 17.

MAJOR LITHOLOGIES

GYPSUM
SS 1-91

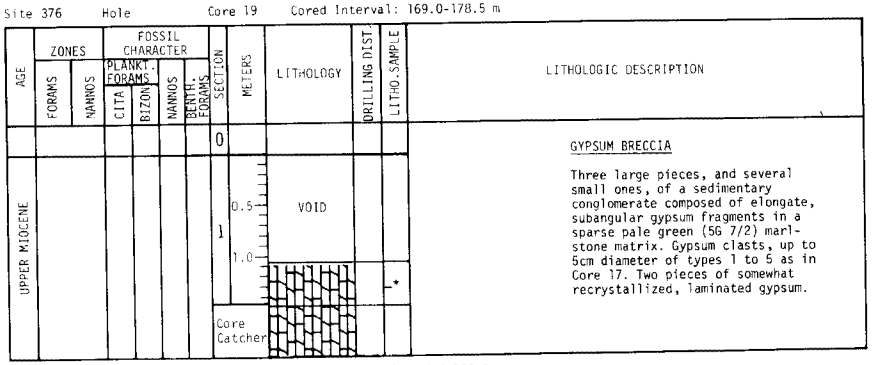
GYPSIFEROUS SANDSTONE
SS 1-117

Carb. unspec.	A	Nannos	R
Gypsum	A	Quartz	R
Rock frags. (volc.?)	C		

X-ray:
1-106

Smectite	24%	Calcite	32%
Mixed layer	4%	Dolomite	2%
Illite	2%	Gypsum	26%
Attapulgite	1%	Quartz	5%
Chlorite	1%	Plag. felds.	2%
Kaolinite	T	Serpentinite	1%

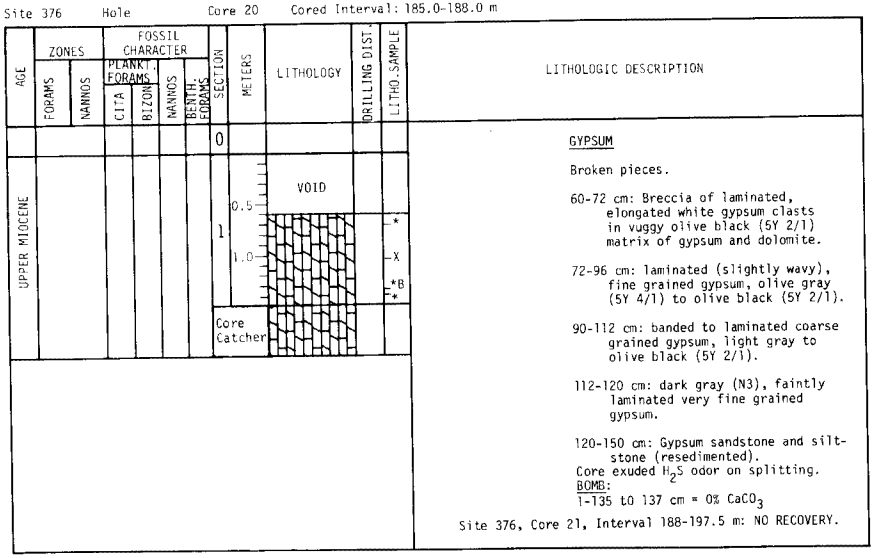
Site 376 Hole Core 19 Cored Interval: 169.0-178.5 m



GYPSUM BRECCIA

Three large pieces, and several small ones, of a sedimentary conglomerate composed of elongate, subangular gypsum fragments in a sparse pale green (5G 7/2) marlstone matrix. Gypsum clasts, up to 5cm diameter of types 1 to 5 as in Core 17. Two pieces of somewhat recrystallized, laminated gypsum.

Site 376 Hole Core 20 Cored Interval: 185.0-188.0 m



GYPSUM

Broken pieces.

60-72 cm: Breccia of laminated, elongated white gypsum clasts in vuggy olive black (5Y 2/1) matrix of gypsum and dolomite.

72-96 cm: laminated (slightly wavy), fine grained gypsum, olive gray (5Y 4/1) to olive black (5Y 2/1).

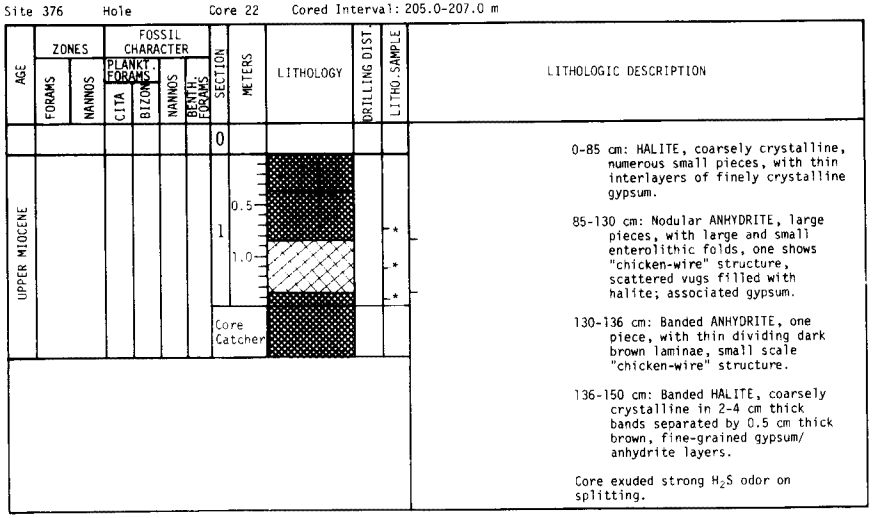
90-112 cm: banded to laminated coarse grained gypsum, light gray to olive black (5Y 2/1).

112-120 cm: dark gray (N3), faintly laminated very fine grained gypsum.

120-150 cm: Gypsum sandstone and siltstone (resedimented).
Core exuded H_2S odor on splitting.
BOMB:
1-135 to 137 cm = 0% $CaCO_3$

Site 376, Core 21, Interval 188-197.5 m: NO RECOVERY.

Site 376 Hole Core 22 Cored Interval: 205.0-207.0 m



0-85 cm: HALITE, coarsely crystalline, numerous small pieces, with thin interlayers of finely crystalline gypsum.

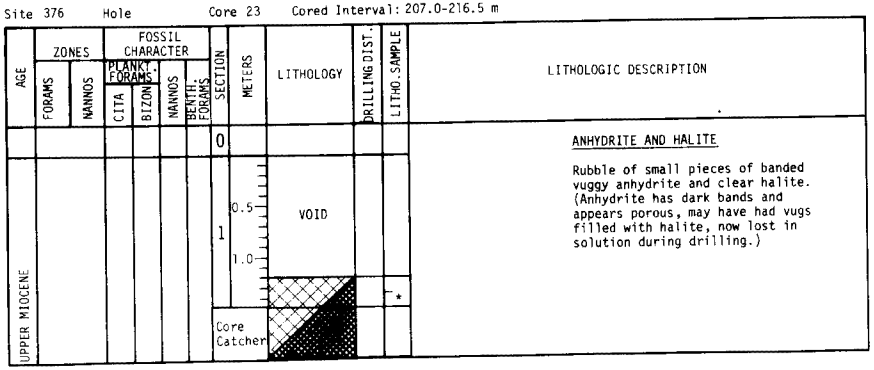
85-130 cm: Nodular ANHYDRITE, large pieces, with large and small enterolithic folds, one shows "chicken-wire" structure, scattered vugs filled with halite; associated gypsum.

130-136 cm: Banded ANHYDRITE, one piece, with thin dividing dark brown laminae, small scale "chicken-wire" structure.

136-150 cm: Banded HALITE, coarsely crystalline in 2-4 cm thick bands separated by 0.5 cm thick brown, fine-grained gypsum/anhydrite layers.

Core exuded strong H_2S odor on splitting.

Site 376 Hole Core 23 Cored Interval: 207.0-216.5 m



ANHYDRITE AND HALITE

Rubble of small pieces of banded vuggy anhydrite and clear halite. (Anhydrite has dark bands and appears porous, may have had vugs filled with halite, now lost in solution during drilling.)

DEEP SEA DRILLING PROJECT

LEG 42A SITE 377

SITE SUMMARY SHEET

POSITION: Latitude: 35°09.25'N Longitude: 21°25.86'E

Water depth (sea level): 3718 corrected meters, echo sounding

Bottom felt at: 3719 meters, drill pipe Penetration: 263.0 meters

Number of holes: 1 Number of cores: 4

Total core recovered: 8.2 meters Percentage core recovery: 82.0%

OLDEST SEDIMENT CORED:

Depth subbottom: 263 meters Nature: Mudstone

Age: Middle Miocene

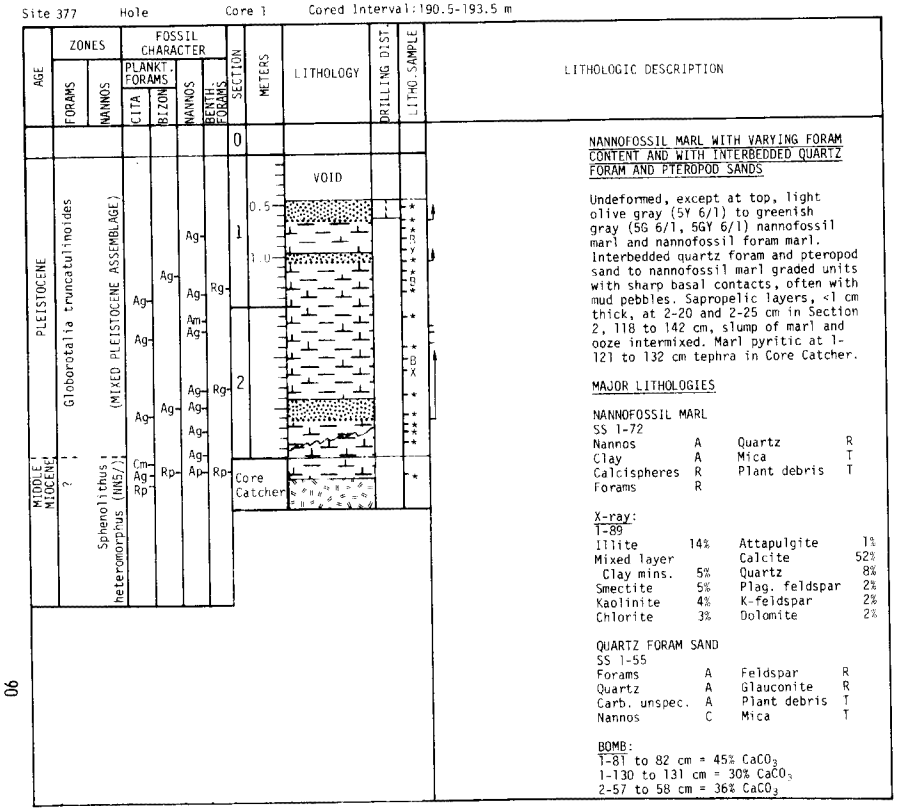
BASEMENT: Not reached

PRINCIPAL RESULTS:

Site 377 was located in a cleft on the Mediterranean Ridge, previously drilled by Leg 13 (Site 126). Its objective was to penetrate further a pre-Messinian section known to be present beneath the Quaternary valley-fill. The hole penetrated 100 meters into the pre-Messinian but was terminated at 263 meters subbottom because of an unproductive drilling rate.

In this hole a middle Miocene marl was encountered underlain by a flysch-like terrigenous sequence of siltstones, sandstone, and dark gray mudstones. These sediments were deposited on a continental rise or in a basinal setting prior to their uplift by pre-Quaternary of tectonic deformation. The poorly preserved benthonic faunas were nevertheless sufficient to demonstrate a bathyal depth here in the middle Miocene.

Site 377 Hole Core 1 Cored Interval: 190.5-193.5 m



LITHOLOGIC DESCRIPTION

NANNOFOSSIL MARL WITH VARYING FORAM CONTENT AND WITH INTERBEDDED QUARTZ FORAM AND PTEROPOD SANDS

Undeformed, except at top, light olive gray (5Y 6/1) to greenish gray (5G 6/1, 5GY 6/1) nannofossil marl and nannofossil foram marl. Interbedded quartz foram and pteropod sand to nannofossil marl graded units with sharp basal contacts, often with mud pebbles. Sapropelic layers, <1 cm thick, at 2-20 and 2-25 cm in Section 2, 118 to 142 cm, slump of marl and ooze intermixed. Marl pyritic at 1-121 to 132 cm tephra in Core Catcher.

MAJOR LITHOLOGIES

NANNOFOSSIL MARL
SS 1-72

Nannos	A	Quartz	R
Clay	A	Mica	T
Calcispheres	R	Plant debris	T
Forams	R		

X-ray:
1-89

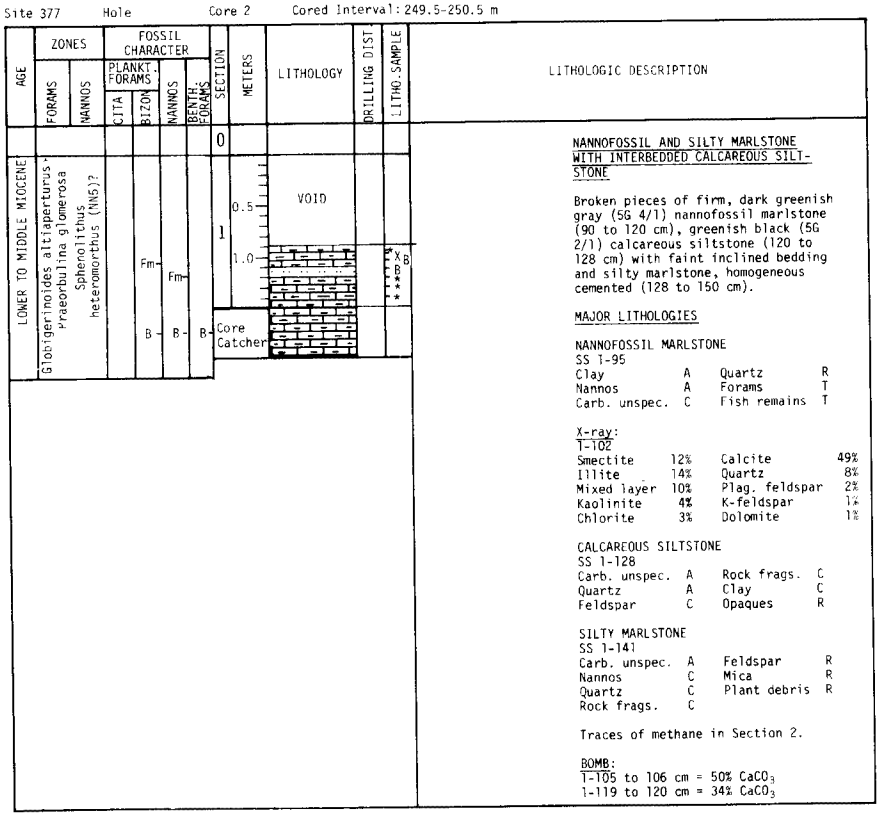
Illite	14%	Attapulgite	1%
Mixed layer Clay mins.	5%	Calcite	52%
		Quartz	8%
Smectite	5%	Plag. feldspar	2%
Kaolinite	4%	K-feldspar	2%
Chlorite	3%	Dolomite	2%

QUARTZ FORAM SAND
SS 1-55

Forams	A	Feldspar	R
Quartz	A	Glauconite	R
Carb. unspec.	A	Plant debris	T
Nannos	C	Mica	T

BOMB:
1-81 to 82 cm = 45% $CaCO_3$
1-130 to 131 cm = 30% $CaCO_3$
2-57 to 58 cm = 36% $CaCO_3$

Site 377 Hole Core 2 Cored Interval: 249.5-250.5 m



LITHOLOGIC DESCRIPTION

NANNOFOSSIL AND SILTY MARLSTONE WITH INTERBEDDED CALCAREOUS SILTSTONE

Broken pieces of firm, dark greenish gray (5G 4/1) nannofossil marlstone (90 to 120 cm), greenish black (5G 2/1) calcareous siltstone (120 to 128 cm) with faint inclined bedding and silty marlstone, homogeneous cemented (128 to 150 cm).

MAJOR LITHOLOGIES

NANNOFOSSIL MARLSTONE
SS 1-95

Clay	A	Quartz	R
Nannos	A	Forams	T
Carb. unspec.	C	Fish remains	T

X-ray:
1-102

Smectite	12%	Calcite	49%
Illite	14%	Quartz	8%
Mixed layer	10%	Plag. feldspar	2%
Kaolinite	4%	K-feldspar	1%
Chlorite	3%	Dolomite	1%

CALCAREOUS SILTSTONE
SS 1-128

Carb. unspec.	A	Rock frags.	C
Quartz	A	Clay	C
Feldspar	C	Opaques	R

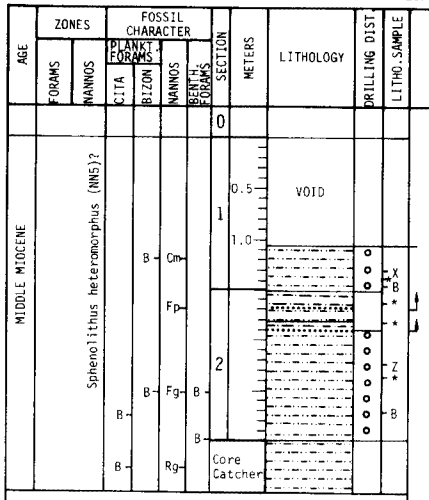
SILTY MARLSTONE
SS 1-141

Carb. unspec.	A	Feldspar	R
Nannos	C	Mica	R
Quartz	C	Plant debris	R
Rock frags.	C		

Traces of methane in Section 2.

BOMB:
1-105 to 106 cm = 50% $CaCO_3$
1-119 to 120 cm = 34% $CaCO_3$

Site 377 Hole Core 3 Cored Interval: 257.0-260.0 m



LITHOLOGIC DESCRIPTION

MUDSTONE WITH GRADED SANDY BEDS

Mostly drilling breccia but undisturbed over 0-40 cm in Section 2. Dark gray (N3) to greenish black claystone and siltstone with sandy interbeds, graded, sharp basalt and transitional upper contacts, parallel to cross-laminated, light olive gray (5Y 5/2) to dark gray (N3).

MAJOR LITHOLOGY

MUDSTONE
SS 1-142

Clay	A	Organic matter	R
Quartz	C	Plant debris	R
Feldspar	C	Nannos	T
Pyrite	R		

X-ray:
1-141

Smectite	45%	Quartz	8%
Kaolinite	13%	Plag. felds.	8%
Illite	9%	K-feldspar	4%
Chlorite	5%	Calcite	2%
Attapulgite	2%	Dolomite	T
Mixed layer Clay mins.	T	Pyrite	4%

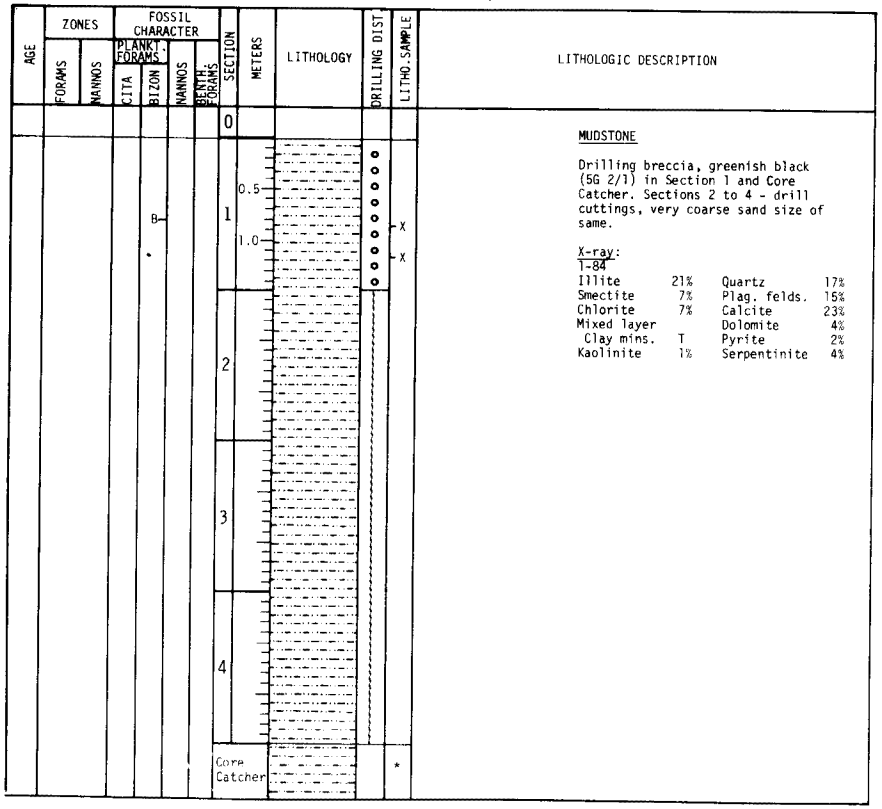
Grain size:
2-64

Sand	0.3%
Silt	53.6%
Clay	46.1%

H_2S odor on splitting.

BOMB:
1-148 to 149 cm = 0% CaCO
2-129 to 130 cm = 0% CaCO

Site 377 Hole Core 4 Cored Interval: 260.0-263.0 m



LITHOLOGIC DESCRIPTION

MUDSTONE

Drilling breccia, greenish black (5G 2/1) in Section 1 and Core Catcher. Sections 2 to 4 - drill cuttings, very coarse sand size of same.

X-ray:
1-84

Illite	21%	Quartz	17%
Smectite	7%	Plag. felds.	15%
Chlorite	7%	Calcite	23%
Mixed layer		Dolomite	4%
Clay mins.	T	Pyrite	2%
Kaolinite	1%	Serpentinite	4%

DEEP SEA DRILLING PROJECT

LEG 42A SITE 378 (HOLES 378A)

SITE SUMMARY SHEET

POSITION: Latitude: 35°55.67'N Longitude: 25°06.97'E (Site 378)
35°55.67'N 25°06.97'E (Site 378A)

Water depth (sea level): 1835 corrected meters, echo sounding (Site 378)
1835 corrected meters, echo sounding (Site 378A)

Bottom felt at: 1845 meters, drill pipe Penetration: 312.0 (Site 378) meters
343.5 (Site 378A) meters

Number of holes: 2 Number of cores: 11 (Site 378)
9 (Site 378A)

Total core recovered: 34.8 meters (Site 378) Percentage core recovery: 34.7%
20.0 meters (Site 378A) 43.5%

OLDEST SEDIMENT CORED:

Depth subbottom: 312 meters Nature: Marlstone (Site 378)
343.5 meters Gypsum (Site 378A)

Age: Lower Pliocene (Site 378)
Upper Miocene (Site 378A)

BASEMENT: Not reached

PRINCIPAL RESULTS:

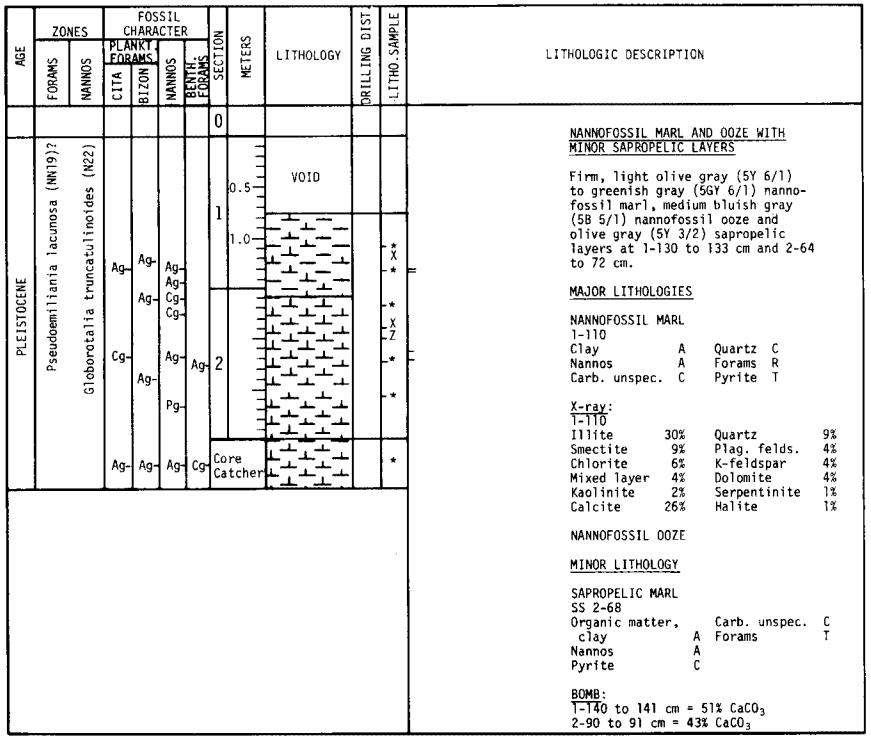
Site 378 (Holes 378 and 378A) was located in the North Cretan Basin and its maximum penetration was 343.5 meters terminating in Messinian gypsum. Its objectives were to investigate: the close of evaporite deposition, the paleooceanography of the Plio-Quaternary and the age of the last deformation of this marginal basin.

The Quaternary sequence consisted of nannofossil marls and ooze with a few sapropels and was deposited at a high sedimentation rate (200 m/m.y.). The more compacted and slightly cemented Pliocene nannofossil marlstones contained numerous sapropels and burrows. At their base the sedimentation rate decreases sharply to 20 m/m.y. The upper Miocene evaporites are represented mainly by coarse selenitic gypsum with a limestone.

LEG 42A SITE 378 (HOLES 378A)
SITE SUMMARY SHEET, con't.

The last deformation event in the Cretan Basin was in the lower middle Quaternary and is well recognized by paleoecological studies. It was related to still active subduction under the Hellenic Trench. Numerous stagnation events were recorded in the Plio-Pleistocene section.

Site 378 Hole Core 1 Cored Interval: 84.0-93.5 m



LITHOLOGIC DESCRIPTION

NANNOFOSSIL MARL AND OOZE WITH MINOR SAPROPELIC LAYERS

Firm, light olive gray (5Y 6/1) to greenish gray (5GY 6/1) nannofossil marl, medium bluish gray (5B 5/1) nannofossil ooze and olive gray (5Y 3/2) sapropelic layers at 1-130 to 133 cm and 2-64 to 72 cm.

MAJOR LITHOLOGIES

NANNOFOSSIL MARL
1-110

Clay	A	Quartz	C
Nannos	A	Forams	R
Carb. unspec.	C	Pyrite	T

X-ray:
1-110

Illite	30%	Quartz	9%
Smectite	9%	Plag. felds.	4%
Chlorite	6%	K-feldspar	4%
Mixed layer	4%	Dolomite	4%
Kaolinite	2%	Serpentinite	1%
Calcite	26%	Halite	1%

NANNOFOSSIL OOZE

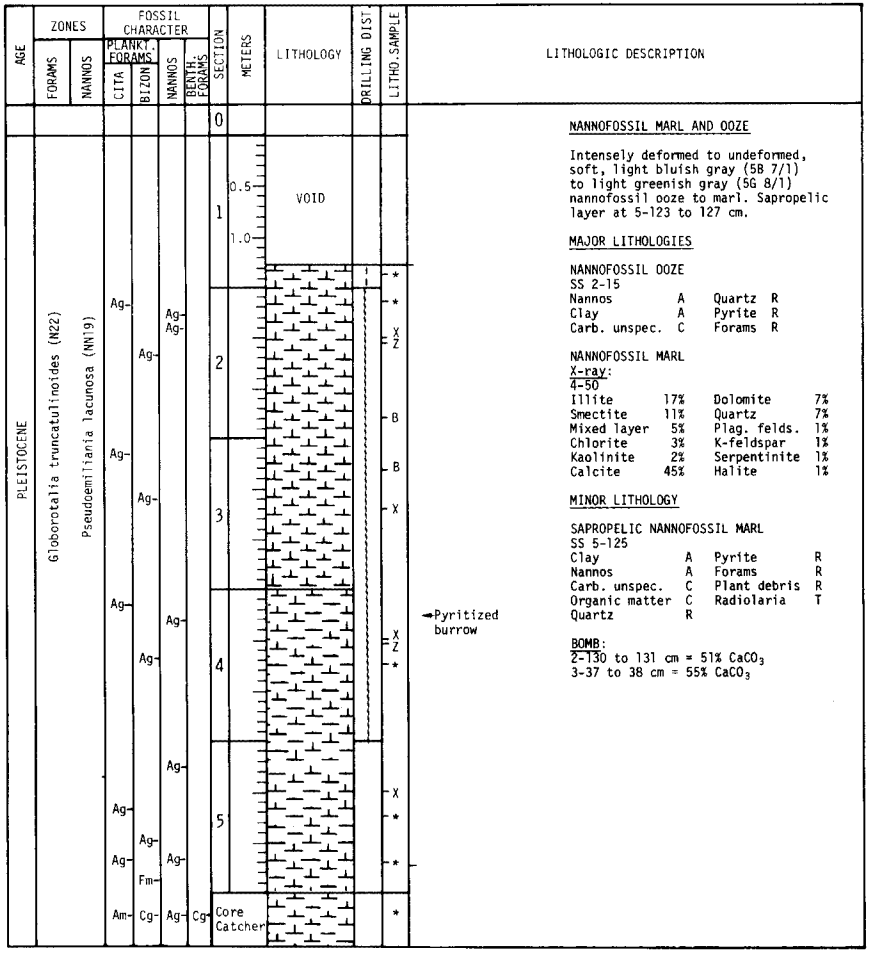
MINOR LITHOLOGY

SAPROPELIC MARL
SS 2-68

Organic matter, clay	A	Carb. unspec.	C
Nannos	A	Forams	T
Pyrite	C		

BOMB:
1-140 to 141 cm = 51% $CaCO_3$
2-90 to 91 cm = 43% $CaCO_3$

Site 378 Hole Core 2 Cored Interval: 93.5-103.0 m



LITHOLOGIC DESCRIPTION

NANNOFOSSIL MARL AND OOZE

Intensely deformed to undeformed, soft, light bluish gray (5B 7/1) to light greenish gray (5G 8/1) nannofossil ooze to marl. Sapropelic layer at 5-123 to 127 cm.

MAJOR LITHOLOGIES

NANNOFOSSIL OOZE
SS 2-15

Nannos	A	Quartz	R
Clay	A	Pyrite	R
Carb. unspec.	C	Forams	R

NANNOFOSSIL MARL
X-ray:
4-50

Illite	17%	Dolomite	7%
Smectite	11%	Quartz	7%
Mixed layer	5%	Plag. felds.	1%
Chlorite	3%	K-feldspar	1%
Kaolinite	2%	Serpentinite	1%
Calcite	45%	Halite	1%

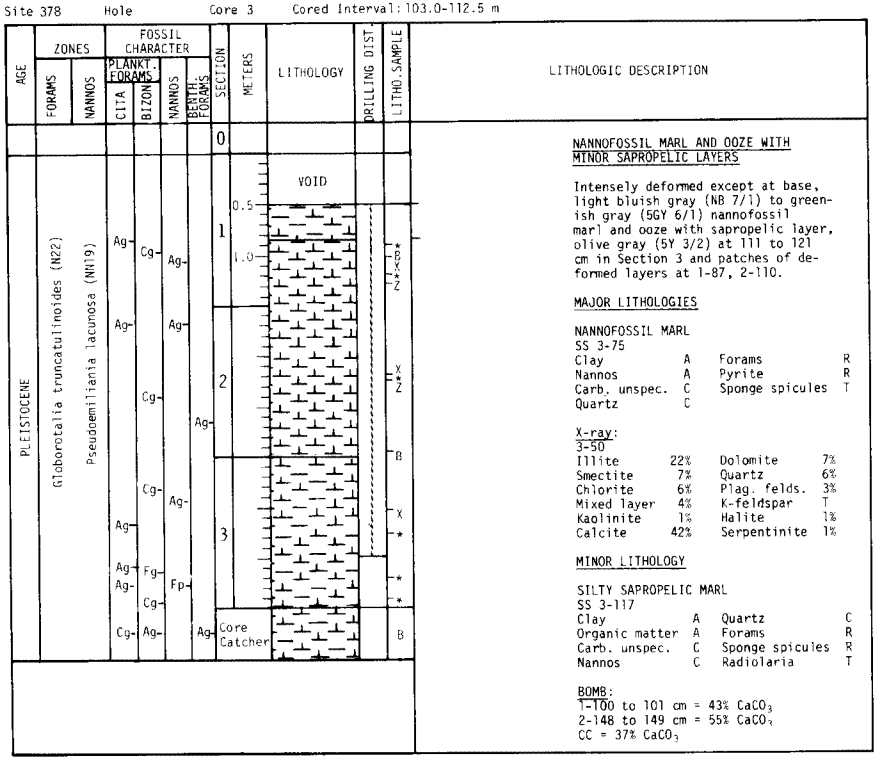
MINOR LITHOLOGY

SAPROPELIC NANNOFOSSIL MARL
SS 5-125

Clay	A	Pyrite	R
Nannos	A	Forams	R
Carb. unspec.	C	Plant debris	R
Organic matter	C	Radiolaria	T
Quartz	R		

BOMB:
2-130 to 131 cm = 51% $CaCO_3$
3-37 to 38 cm = 55% $CaCO_3$

Site 378 Hole Core 3 Cored Interval: 103.0-112.5 m



NANNOFOSSIL MARL AND OOZE WITH MINOR SAPROPELIC LAYERS

Intensely deformed except at base, light bluish gray (NB 7/1) to greenish gray (5GY 6/1) nannofossil marl and ooze with sapropelic layer, olive gray (5Y 3/2) at 111 to 121 cm in Section 3 and patches of deformed layers at 1-87, 2-110.

MAJOR LITHOLOGIES

NANNOFOSSIL MARL
SS 3-75

Clay	A	Forams	R
Nannos	A	Pyrite	R
Carb. unspec.	C	Sponge spicules	T
Quartz	C		

X-ray:
3-50

Illite	22%	Dolomite	7%
Smectite	7%	Quartz	6%
Chlorite	6%	Plag. felds.	3%
Mixed layer	4%	K-feldspar	T
Kaolinite	1%	Halite	1%
Calcite	42%	Serpentinite	1%

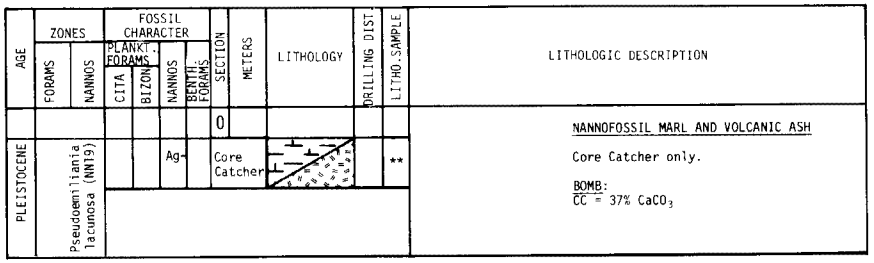
MINOR LITHOLOGY

SILTY SAPROPELIC MARL
SS 3-117

Clay	A	Quartz	C
Organic matter	A	Forams	R
Carb. unspec.	C	Sponge spicules	R
Nannos	C	Radiolaria	T

BOMB:
1-100 to 101 cm = 43% $CaCO_3$
2-148 to 149 cm = 55% $CaCO_3$
CC = 37% $CaCO_3$

Site 378 Hole Core 4 Cored Interval: 112.5-122.0 m

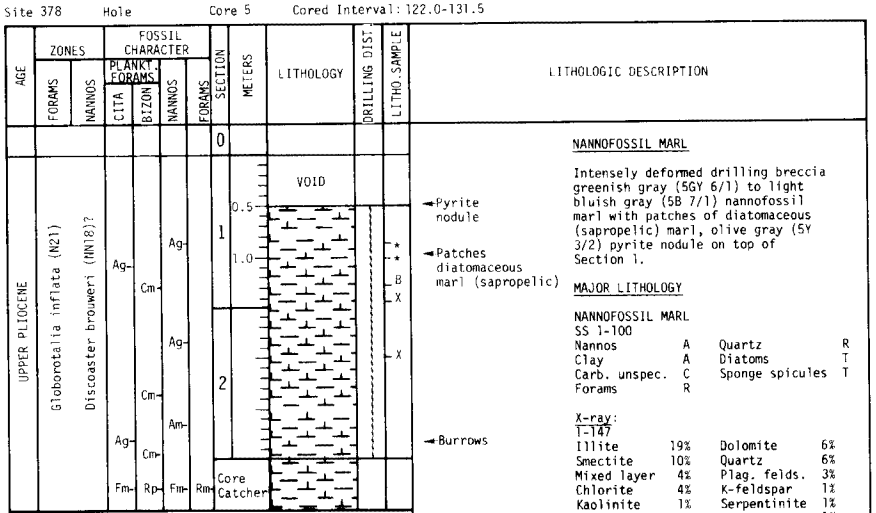


NANNOFOSSIL MARL AND VOLCANIC ASH

Core Catcher only.

BOMB:
CC = 37% $CaCO_3$

Site 378 Hole Core 5 Cored Interval: 122.0-131.5



NANNOFOSSIL MARL

Intensely deformed drilling breccia greenish gray (5GY 6/1) to light bluish gray (5B 7/1) nannofossil marl with patches of diatomaceous (sapropelic) marl, olive gray (5Y 3/2) pyrite nodule on top of Section 1.

MAJOR LITHOLOGY

NANNOFOSSIL MARL
SS 1-100

Nannos	A	Quartz	R
Clay	A	Diatoms	T
Carb. unspec.	C	Sponge spicules	T
Forams	R		

X-ray:
1-147

Illite	19%	Dolomite	6%
Smectite	10%	Quartz	6%
Mixed layer	4%	Plag. felds.	3%
Chlorite	4%	K-feldspar	1%
Kaolinite	1%	Serpentinite	1%
Calcite		Halite	1%

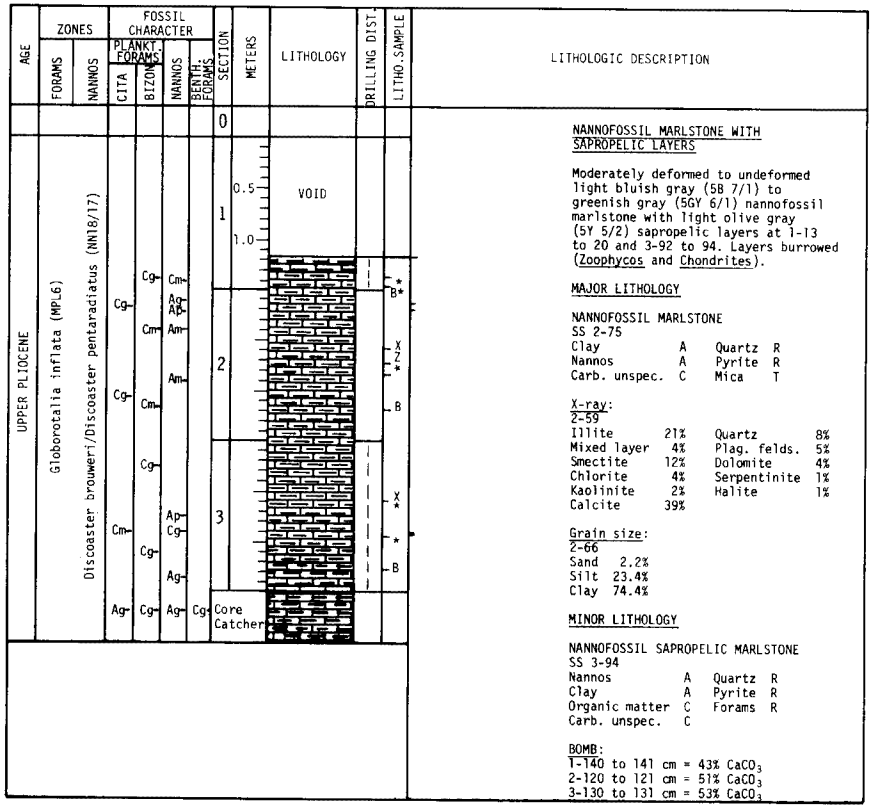
MINOR LITHOLOGY

DIATOMACEOUS (SAPROPELIC) NANNOFOSSIL MARL
SS 1-83

Nannos	A	Pyrite	R
Clay	A	Radiolaria	R
Diatoms	C	Sponge spicules	R
Organic matter	C	Silicoflagellates	R
Quartz	C		

BOMB:
1-130 to 131 cm = 46% $CaCO_3$

Site 378 Hole Core 6 Cored Interval: 141.0-150.5 m



LITHOLOGIC DESCRIPTION

NANNOFOSSIL MARLSTONE WITH SAPROPELIC LAYERS

Moderately deformed to undeformed light bluish gray (5B 7/1) to greenish gray (5GY 6/1) nannofossil marlstone with light olive gray (5Y 5/2) sapropelic layers at 1-13 to 20 and 3-92 to 94. Layers burrowed (Zoophycos and Chondrites).

MAJOR LITHOLOGY

NANNOFOSSIL MARLSTONE
SS 2-75

Clay	A	Quartz	R
Nannos	A	Pyrite	R
Carb. unspec.	C	Mica	T

X-ray:
2-59

Illite	21%	Quartz	8%
Mixed layer	4%	Plag. felds.	5%
Smectite	12%	Dolomite	4%
Chlorite	4%	Serpentinite	1%
Kaolinite	2%	Halite	1%
Calcite	39%		

Grain size:
2-66

Sand	2.2%
Silt	23.4%
Clay	74.4%

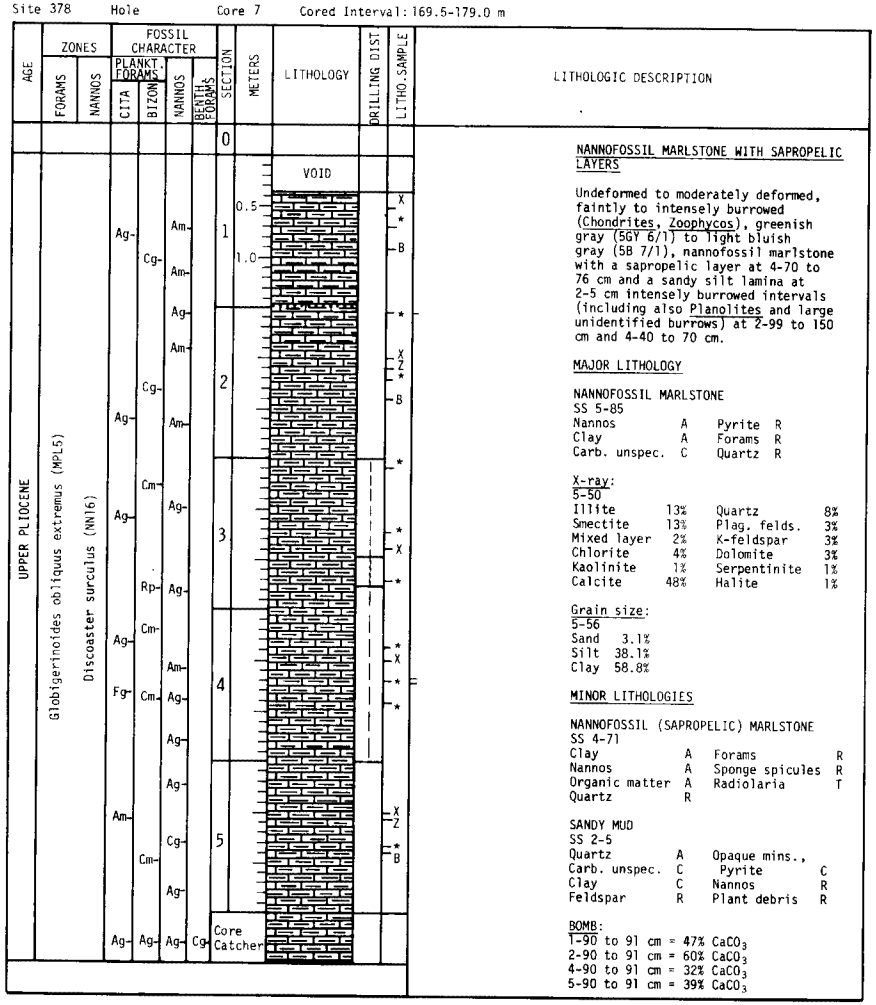
MINOR LITHOLOGY

NANNOFOSSIL SAPROPELIC MARLSTONE
SS 3-94

Nannos	A	Quartz	R
Clay	A	Pyrite	R
Organic matter	C	Forams	R
Carb. unspec.	C		

BOMB:
1-140 to 141 cm = 43% $CaCO_3$
2-120 to 121 cm = 51% $CaCO_3$
3-130 to 131 cm = 53% $CaCO_3$

Site 378 Hole Core 7 Cored Interval: 169.5-179.0 m



LITHOLOGIC DESCRIPTION

NANNOFOSSIL MARLSTONE WITH SAPROPELIC LAYERS

Undeformed to moderately deformed, faintly to intensely burrowed (Chondrites, Zoophycos), greenish gray (5GY 6/1) to light bluish gray (5B 7/1), nannofossil marlstone with a sapropelic layer at 4-70 to 76 cm and a sandy silt lamina at 2-5 cm intensely burrowed intervals (including also Planolites and large unidentified burrows) at 2-99 to 150 cm and 4-40 to 70 cm.

MAJOR LITHOLOGY

NANNOFOSSIL MARLSTONE
SS 5-85

Nannos	A	Pyrite	R
Clay	A	Forams	R
Carb. unspec.	C	Quartz	R

X-ray:
5-50

Illite	13%	Quartz	8%
Smectite	13%	Plag. felds.	3%
Mixed layer	2%	K-feldspar	3%
Chlorite	4%	Dolomite	3%
Kaolinite	1%	Serpentinite	1%
Calcite	48%	Halite	1%

Grain size:
5-56

Sand	3.1%
Silt	38.1%
Clay	58.8%

MINOR LITHOLOGIES

NANNOFOSSIL (SAPROPELIC) MARLSTONE
SS 4-71

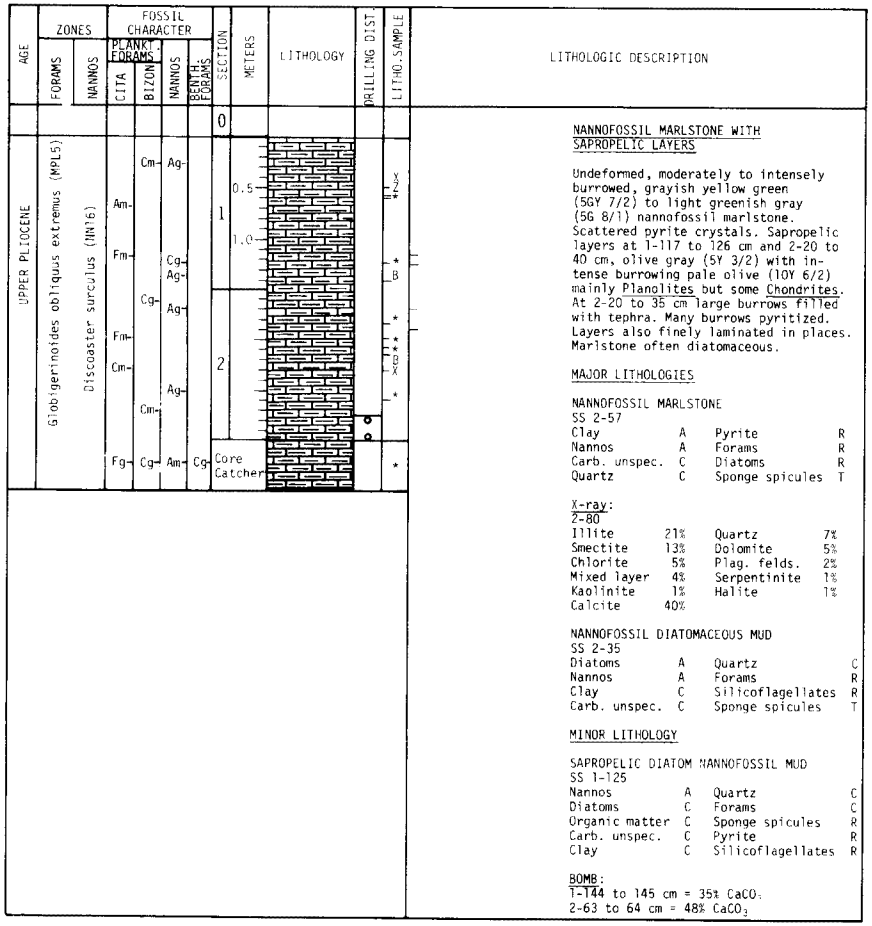
Clay	A	Forams	R
Nannos	A	Sponge spicules	R
Organic matter	A	Radiolaria	T
Quartz	R		

SANDY MUD
SS 2-5

Quartz	A	Opaque mins.,	
Carb. unspec.	C	Pyrite	C
Clay	C	Nannos	R
Feldspar	R	Plant debris	R

BOMB:
1-90 to 91 cm = 47% $CaCO_3$
2-90 to 91 cm = 60% $CaCO_3$
4-90 to 91 cm = 32% $CaCO_3$
5-90 to 91 cm = 39% $CaCO_3$

Site 378 Hole Core 8 Cored Interval: 217.0-226.5 m



NANNOFOSSIL MARLSTONE WITH SAPROPELIC LAYERS

Undeformed, moderately to intensely burrowed, grayish yellow green (5GY 7/2) to light greenish gray (5G 8/1) nannofossil marlstone. Scattered pyrite crystals. Sapropelic layers at 1-117 to 126 cm and 2-20 to 40 cm, olive gray (5Y 3/2) with intense burrowing pale olive (10Y 6/2) mainly Planolites but some Chondrites. At 2-20 to 35 cm large burrows filled with tephra. Many burrows pyritized. Layers also finely laminated in places. Marlstone often diatomaceous.

MAJOR LITHOLOGIES

NANNOFOSSIL MARLSTONE
SS 2-57

Clay	A	Pyrite	R
Nannos	A	Forams	R
Carb. unspec.	C	Diatoms	R
Quartz	C	Sponge spicules	T

X-ray:
2-80

Illite	21%	Quartz	7%
Smectite	13%	Dolomite	5%
Chlorite	5%	Plag. felds.	2%
Mixed layer	4%	Serpentinite	1%
Kaolinite	1%	Halite	1%
Calcite	40%		

NANNOFOSSIL DIATOMACEOUS MUD
SS 2-35

Diatoms	A	Quartz	C
Nannos	A	Forams	R
Clay	C	Silicoflagellates	R
Carb. unspec.	C	Sponge spicules	T

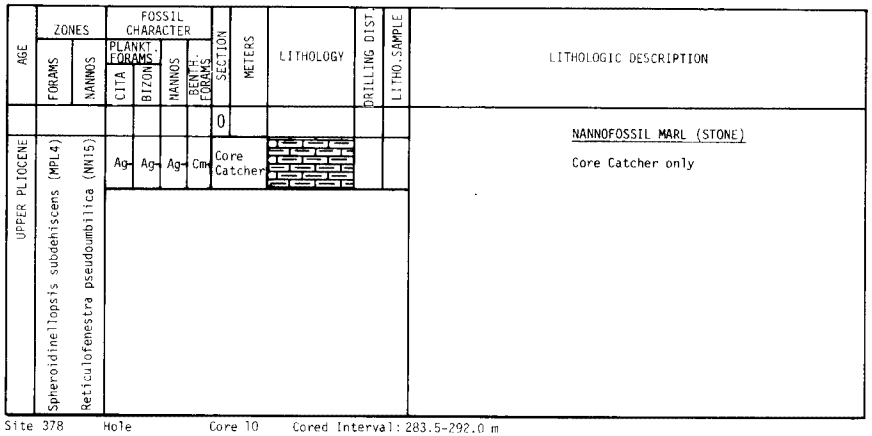
MINOR LITHOLOGY

SAPROPELIC DIATOM NANNOFOSSIL MUD
SS 1-125

Nannos	A	Quartz	C
Diatoms	C	Forams	C
Organic matter	C	Sponge spicules	R
Carb. unspec.	C	Pyrite	R
Clay	C	Silicoflagellates	R

BOMB:
1-144 to 145 cm = 35% $CaCO_3$
2-63 to 64 cm = 48% $CaCO_3$

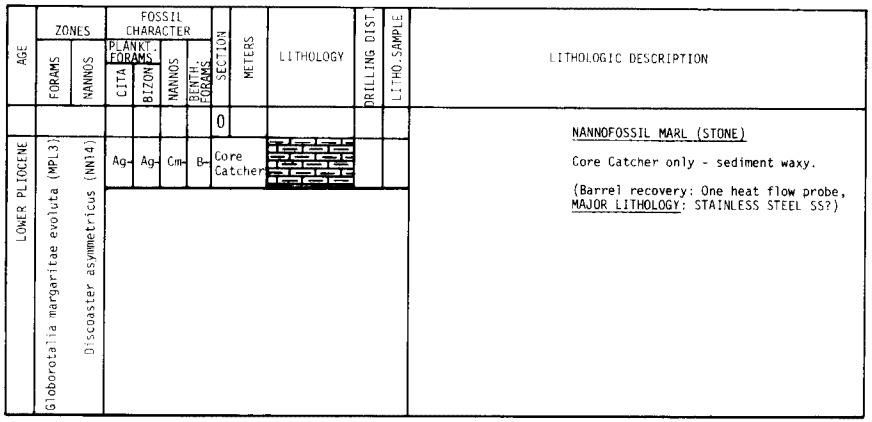
Site 378 Hole Core 9 Cored Interval: 274.0-283.5 m



NANNOFOSSIL MARL (STONE)

Core Catcher only

Site 378 Hole Core 10 Cored Interval: 283.5-292.0 m

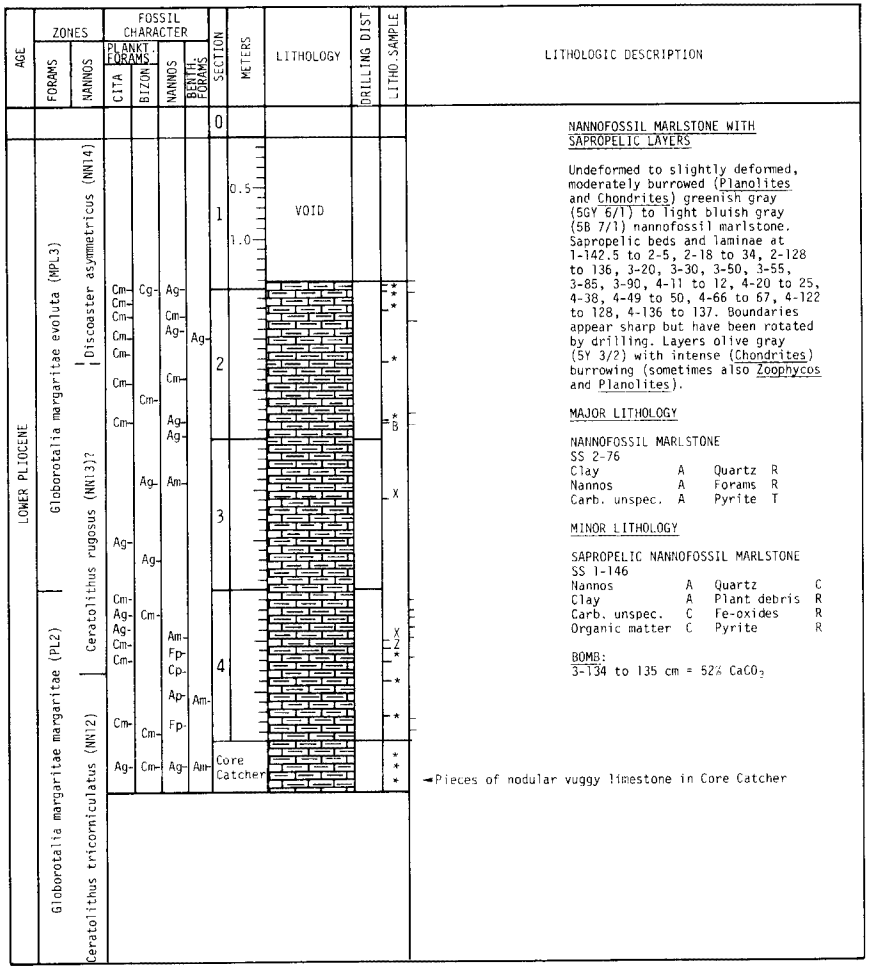


NANNOFOSSIL MARL (STONE)

Core Catcher only - sediment waxy.

(Barrel recovery: One heat flow probe, MAJOR LITHOLOGY: STAINLESS STEEL SS?)

Site 378 Hole Core 11 Cored Interval: 302.5-312.0 m



NANNOFOSSIL MARLSTONE WITH SAPROPELIC LAYERS

Undeformed to slightly deformed, moderately burrowed (Planolites and Chondrites) greenish gray (5GY 6/1) to light bluish gray (5B 7/1) nannofossil marlstone. Sapropelic beds and laminae at 1-142.5 to 2-5, 2-18 to 34, 2-128 to 136, 3-20, 3-30, 3-50, 3-55, 3-85, 3-90, 4-11 to 12, 4-20 to 25, 4-38, 4-49 to 50, 4-66 to 67, 4-122 to 128, 4-136 to 137. Boundaries appear sharp but have been rotated by drilling. Layers olive gray (5Y 3/2) with intense (Chondrites) burrowing (sometimes also Zoophycos and Planolites).

MAJOR LITHOLOGY

NANNOFOSSIL MARLSTONE
SS 2-76

Clay	A	Quartz	R
Nannos	A	Forams	R
Carb. unspec.	A	Pyrite	T

MINOR LITHOLOGY

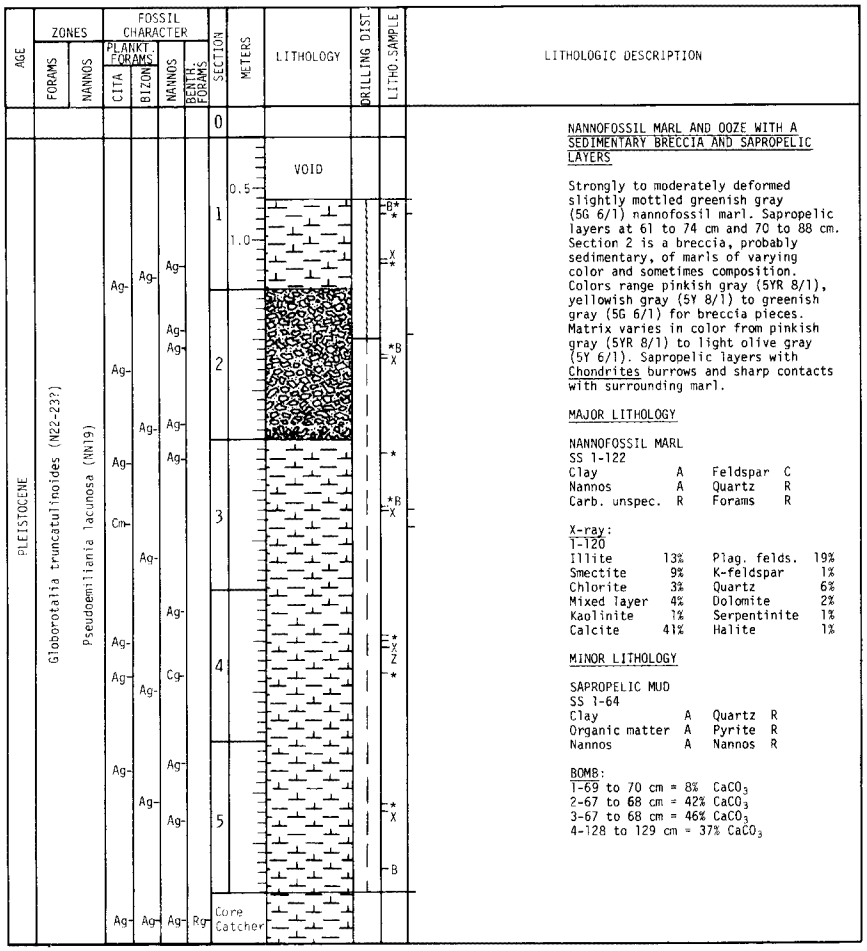
SAPROPELIC NANNOFOSSIL MARLSTONE
SS 1-146

Nannos	A	Quartz	C
Clay	A	Plant debris	R
Carb. unspec.	C	Fe-oxides	R
Organic matter	C	Pyrite	R

BOMB:
3-134 to 135 cm = 52% $CaCO_3$

◄Pieces of nodular vuggy limestone in Core Catcher

Site 378 Hole A Core 1 Cored Interval: 46.0-55.5 m



NANNOFOSSIL MARL AND OOZE WITH A SEDIMENTARY BRECCIA AND SAPROPELIC LAYERS

Strongly to moderately deformed slightly mottled greenish gray (5G 6/1) nannofossil marl. Sapropelic layers at 61 to 74 cm and 70 to 88 cm. Section 2 is a breccia, probably sedimentary, of marls of varying color and sometimes composition. Colors range pinkish gray (5YR 8/1), yellowish gray (5Y 8/1) to greenish gray (5G 6/1) for breccia pieces. Matrix varies in color from pinkish gray (5YR 8/1) to light olive gray (5Y 6/1). Sapropelic layers with Chondrites burrows and sharp contacts with surrounding marl.

MAJOR LITHOLOGY

NANNOFOSSIL MARL
SS 1-122

Clay	A	Feldspar	C
Nannos	A	Quartz	R
Carb. unspec.	R	Forams	R

X-ray:
1-120

Illite	13%	Plag. felds.	19%
Smectite	9%	K-feldspar	1%
Chlorite	3%	Quartz	6%
Mixed layer	4%	Dolomite	2%
Kaolinite	1%	Serpentinite	1%
Calcite	41%	Halite	1%

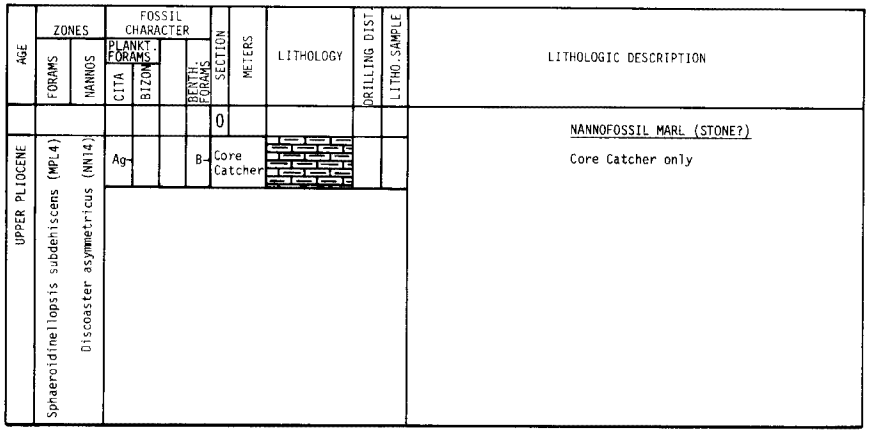
MINOR LITHOLOGY

SAPROPELIC MUD
SS 1-64

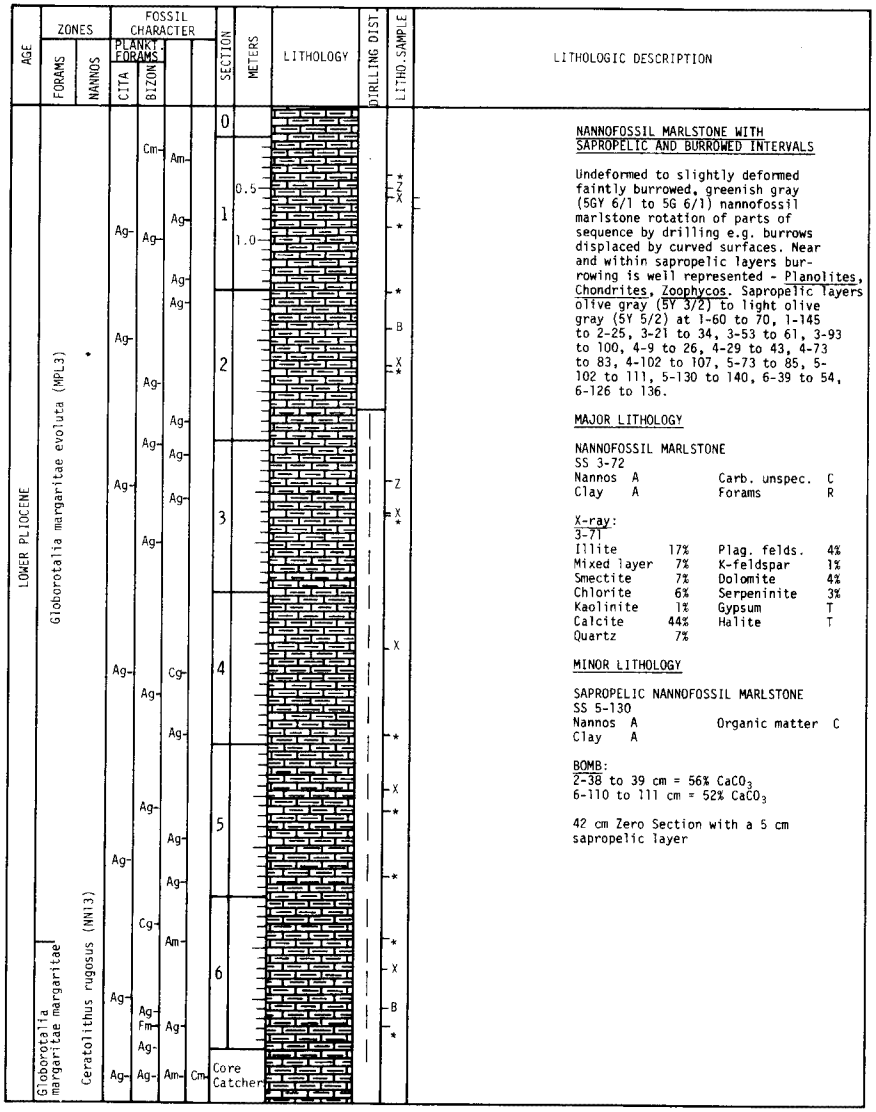
Clay	A	Quartz	R
Organic matter	A	Pyrite	R
Nannos	A	Nannos	R

BOMB:
1-69 to 70 cm = 8% $CaCO_3$
2-67 to 68 cm = 42% $CaCO_3$
3-67 to 68 cm = 46% $CaCO_3$
4-128 to 129 cm = 37% $CaCO_3$

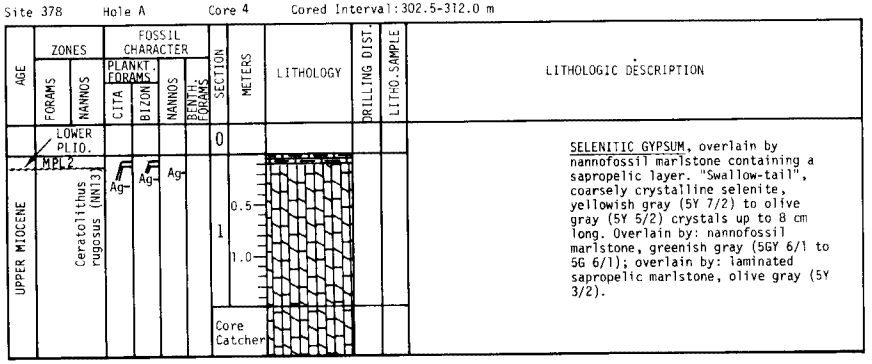
Site 378 Hole A Core 2 Cored Interval: 280.5-290.0 m



Site 378 Hole A Core 3 Cored Interval: 293.0-302.5 m

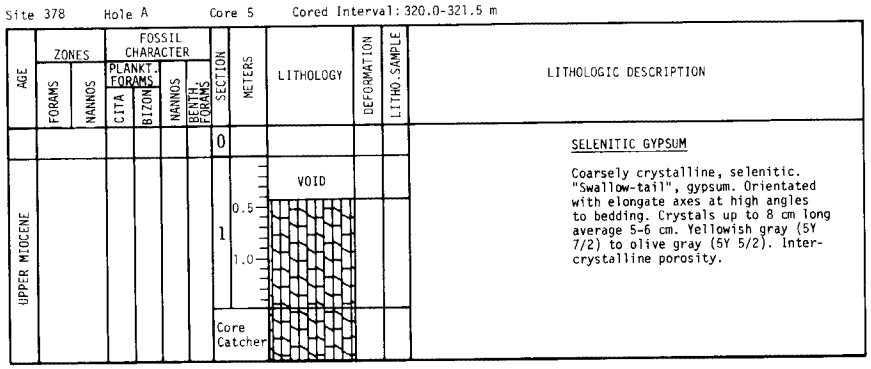


Site 378 Hole A Core 4 Cored Interval: 302.5-312.0 m



SELENITIC GYPSUM, overlain by nannofossil marlstone containing a sapropelic layer. "Swallow-tail", coarsely crystalline selenite, yellowish gray (5Y 7/2) to olive gray (5Y 5/2) crystals up to 8 cm long. Overlain by: nannofossil marlstone, greenish gray (5GY 6/1 to 5G 6/1); overlain by: laminated sapropelic marlstone, olive gray (5Y 3/2).

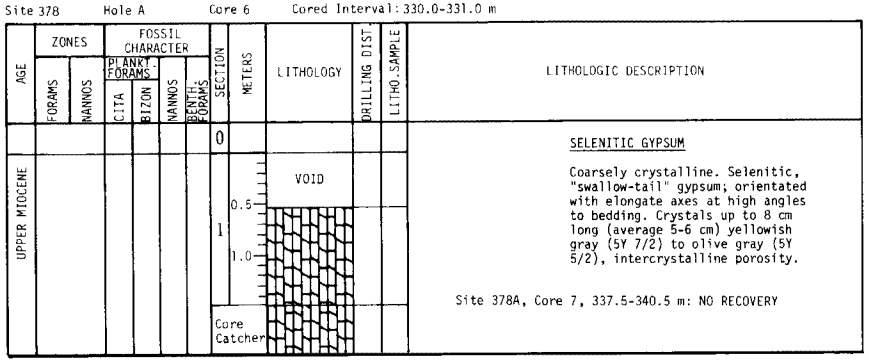
Site 378 Hole A Core 5 Cored Interval: 320.0-321.5 m



SELENITIC GYPSUM

Coarsely crystalline, selenitic. "Swallow-tail", gypsum. Orientated with elongate axes at high angles to bedding. Crystals up to 8 cm long average 5-6 cm. Yellowish gray (5Y 7/2) to olive gray (5Y 5/2). Intercrystalline porosity.

Site 378 Hole A Core 6 Cored Interval: 330.0-331.0 m

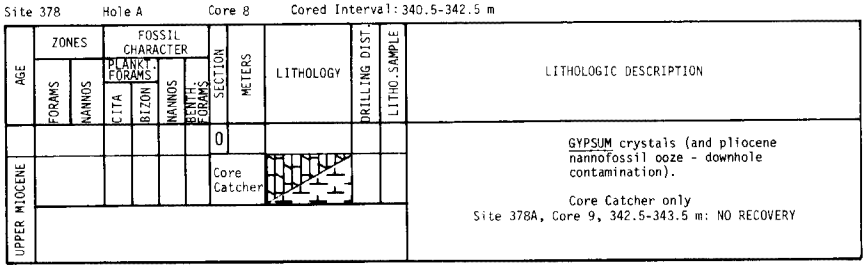


SELENITIC GYPSUM

Coarsely crystalline. Selenitic, "swallow-tail" gypsum; orientated with elongate axes at high angles to bedding. Crystals up to 8 cm long (average 5-6 cm) yellowish gray (5Y 7/2) to olive gray (5Y 5/2), intercrystalline porosity.

Site 378A, Core 7, 337.5-340.5 m: NO RECOVERY

Site 378 Hole A Core 8 Cored Interval: 340.5-342.5 m



GYPSUM crystals (and pliocene nannofossil ooze - downhole contamination).

Core Catcher only

Site 378A, Core 9, 342.5-343.5 m: NO RECOVERY