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THE FORAMINIFERAL SEQUENCE in OMEO # 1, GIPPSLAND BASIN.

for: AUSTRALIAN AQUITAINE PETROLEUM PTY. LTD.

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May 5, 1983.

David Taylor, 23 Ballast Point Road, Birchgrove 2041 AUSTRALIA (02) 82 5643

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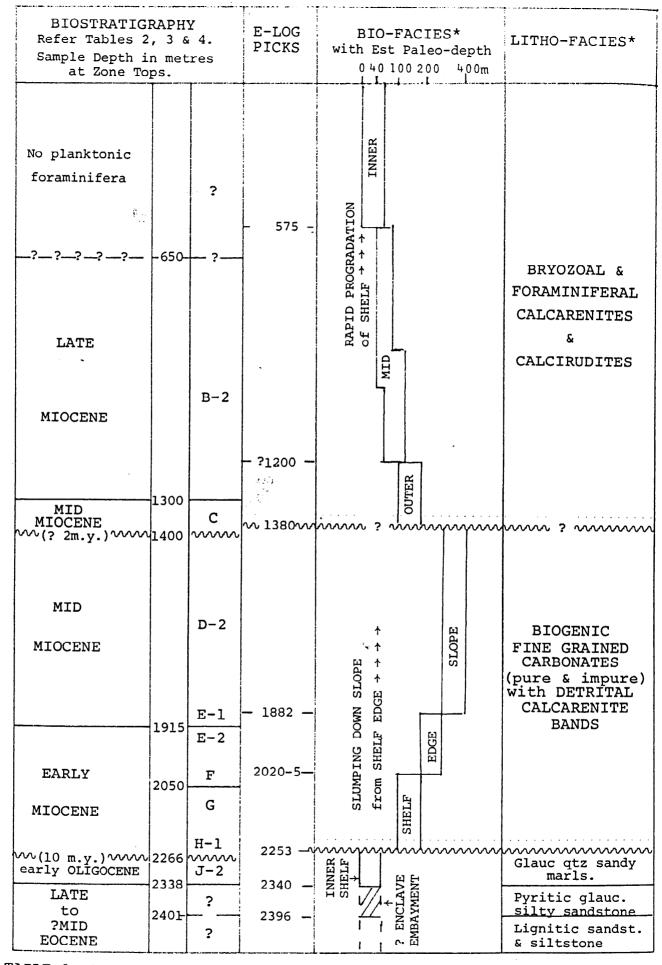


TABLE 1: INTERPRETED FORAMINIFERAL SEQUENCE for OMEO # 1 on Ditch Cutting Samples only.

Note offset between sample depth & E-log picks vvv(10 m.y.) vvv Hiatus with *refer Factual Data - Table 5. time span David Taylor, May 5, 1983.

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INTRODUCTION.

Forty two samples of ditch cuttings were submitted for examination from OMEO # 1. Unfortunately, no sidewall cores were available, so all interpretations had to be based on first appearances downhole (= range tops). Downhole contamination increased with depth, due not only to cavings but also to the fact that the fine grained Miocene carbonates of the Gippsland Basin are readily incorporated in the mud. This mud contamination shows a cyclity of appearance in ditch cutting samples which could be correlated with circulation rate. For instance, the spherical planktonic foraminifera Orbulina universa and O. suturalis occur sporadically below 1915m; this depth is interpreted as being the base of range of these forms (compare Factual Distribution Chart of Table 4 with Interpreted Biostratigraphy of Table 2).

The biostratigraphy presented on Table 2, was abstracted from the factual data (Table 4), by applying the known sequence of range tops for Gippsland as well as documentation by Jenkins (1971), Kennett (1980) and Srinivasan & Kennett (1981) for the Tasman Sea Region. Range tops of benthonic foraminifera and other fossil indicators were utilized in designating facies units and estimating paleo-depths. Accumulated data from fossil and extant Gippsland facies sequences were applied for those interpretations as well as information from the Tasman Sea Region published by Hornibrook (1968) and Hayward & Buzas (1979). Depths cited for significant facies changes were adjusted after perusal of E-logs; compare Factual Data of Table 5 with the Interpretation of Table 1. The poignant features of the sequence are briefly discussed below in ascending, time-stratigraphic order.

EOCENE - 2340m to 2396m to ? from E-logs; 2401m to 2569m from samples. A distinctly Eocene assemblage was first encountered in ditch cuttings at 2401m and a biostratigraphic position in the vicinity of the Mid/Late Eocene boundary was confirmed by the presence of *Globigerinatheka barri* and *Globorotalia turgida* at 2455m. These assemblages are mixed with obvious downhole contaminants, but the Eocene faunas may in fact be cavings, as these faunas are associated with lignitic sands rather than their anticipated host lithology of pyritic, glauconitic silty sandstones, which were present immediately above 2340m. Distinctly Eocene benthonic

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TABLE 2 : INTERPRETED BIOSTRATIGRAPHY - OMEO # 1

As only DITCH CUTTINGS available, range tops of selected planktonic foraminiferal species were utilized. Refer TABLE 4 (back of report) for FACTUAL DISTRIBUTION CHART. Range tops = first appearance downhole in ditch cuttings.

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assemblages could not be designated as all species were present above the Eocene planktonic range tops.

Alas, this inability to deduce the nature and extent of the marine Eocene sediments is inauspicious, as the Omeo # 1 samples contain the best examples of Late/Mid Eocene planktonic faunas yet seen in the Gippsland Basin. The planktonic specimens appear to be more numerous and specifically more diverse than those in recognised developments of Late/Mid Eocene sediments in adjacent wells (e.g. the Bream and Gurnard These observations would suggest that Omeo # 1 was in the wells). most marine location, being axially situated in a depression. Edina # 1 was probably on the extreme margins of such a facies regime. Similar depressions formed enclaves for Eocene deposition elsewhere in Southern Australia and New Zealand. A feature of such enclave is the traceable facies progression from shallow to deeper water, such as in the Otway Basin (Taylor, 1971). So not only were the sediments preserved structurally, but originally sedimentation was controlled by structural configuration and not merely the response to the eustatic sea level high which occurred at the Mid/Late Eocene boundary (refer Loutit & Kennett, 1951).

EARLY OLIGOCENE - 2253m to 2340m from E-logs; 2266m to 2338m from samples.

Typical early Oligocene (Zone J-2) *Globigerina* assemblages, without associated deep water *Globorotalia* spp. (e.g. *G. gemma*). The shallow water aspect is confirmed by the benthonic fauna and the glauconitic, quartz sandy marl lithology.

No comment can be made regarding the relationship with the underlying Mid/Late Eocene faunas.

EARLY to MID MIOCENE - 1380m to 2253m from E-logs; 1400m to 2260m from samples.

The total absence of late Oligocene forms as well as the close proximity of Zone H-l assemblage *range tops* above Zone J-2 *range tops* indicate a hiatus during the Oligocene which has been identified in many other Gippsland offshore sections. Deposition deepened with obvious slumping of outer shelf accumulation, down slope.

4.

MID to LATE MIOCENE - ? to 1380m from E-logs; ? to 1300m from samples.

The short time span, occupied by Zone D-1 of the Mid Miocene, appears to be missing. Rapid progradation of the continental shelf was evident at the resumption of deposition. Planktonic foraminifera were either sparse or absent above 650m, where the robust nature of the bryozoal skeleton indicates high energy conditions. It could not be determined whether Pliocene was present.

REFERENCES.

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- HAYWARD, B.W. & BUZAS, M.A., 1979 Taxonomy and Paleoecology of Early Miocene Benthic Foraminifera of Northern New Zealand and the North Tasman Sea. Smithsonian Conts. to Paleobiology, 36; 1-154.
- HORNIBROOK. N. de B., 1968 A Handbook on New Zealand Microfossils (Foraminifera and Ostracoda). N.Z. Dept. SIR. 7-137.
- JENKINS, D.G., 1971 New Zealand Cenozoic Planktonic Foraminifera. N.Z. Geol. Surv. Paleont. Bull. 42.
- KENNETT, J.P., 1980 Paleoceanographic and Biogeographic Evolution of the Southern Ocean during the Cenozoic, and Cenozoic Microfossil Datums. Palaeogeog., Palaeoclimatol., Palaeoecol., 31(2-4); 123-152.

LOUTIT, T.S. & KENNETT, J.P., 1981b - New Zealand and Australian Cenozoic Sedimentary Cycles and Global Sea-Level Changes. AAPG Bull. 65(9); 1586-1601.

- SRINIVASAN, M.S. & KENNETT, J.P., 1981 Neogene Planktonic Foraminiferal Biostratigraphy and Evolution: Equatorial to Subantarctic, South Pacific. Marine Microp. 6; 499-533.
- TAYLOR, D.J., 1971 Foraminifera and the Cretaceous and Tertiary Depositional History in the Otway Basin in Victoria. in The Otway Basin of Southeastern Australia. Spec. Bull. Geol. Survs. South Aust. & Vict; 217-233.

TABLE 3

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MICROPALEONTOLOGICAL DATA SHEET

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