APPENDIX III

PALAEONTOLOGICAL REPORT

SHELL/FROME HAWKESDALE NO. 1 WELL

by

Shell Development (Australia) Pty. Ltd.

Geological Laboratory

CONTENTS

1. SUMMARY

The Tertiary sequence in Hawkesdale-1 has been biostratigraphically zoned as follows:

? feet - approx 500 feet BDF	- Zonule D	Middle Miocene
approx 500 feet - 650 feet BDF	- Zonule E	Middle Miocene
650 feet - 720 feet BDF	- Zonule F	Lower Miocene
720 feet - approx 800 feet BDF	- Zonule G	Lower Miocene
approx 800 feet - 960 feet BDF	- Zonule H	Lower Miocene
960 feet - 1070 feet BDF	- Zonule I	Oligocene

No *in situ* foraminifera were found below 1070 feet.

2. INTRODUCTION

Selected cutting samples between 450 feet and 1070 feet in Hawkesdale-1 were analysed on foraminiferal content. The stratigraphically significant species are documented below. The zonation used is that of Taylor (1966) for the Gippsland, Bass and Otway Basins, which has been outlined in SDA Report 96.

Cutting samples were taken over 30 foot intervals above 1000 feet, and over 10 foot intervals below that depth. Mud contamination and downhole caving, together with the large sampling interval, produced mixing of faunas, and consequently time boundaries cannot be drawn with much accuracy, and some determinations remain doubtful.

No in situ foraminifera were found in random checks of the Otway group below 1070 feet.

3. THE FORAMINIFERAL SUCCESSION

Due to lost circulation, no samples were available above 400 feet.

430-480 feet: Zonule D: Middle Miocene. The planktonic fauna includes Orbulina universa, O. suturalis, Globigerina woodi, Globigerina bulloides, G. apertura, Biorbulina bilobata, and very rare Globigerinoides glomerosus circularis. The presence of O. universa in association with the last-named species indicates Zonule D (Middle Miocene).

570-600 feet: Zonule E: Middle Miocene. The fauna is dominated by Globigerinoides bisphericus, with Globigerinoides glomerosus glomerosus. Other significant forms are Biorbulina bilobata, Globigerinoides transitorius, Orbulina suturalis, Globorotalia conica and G. barisanensis.

630-660 feet: transitional Zonule E to Zonule F: Middle to Lower Miocene boundary. The boundary between the two zonules lies within this sample interval, and so material from both units is present. The Globigerinoides glomerosus group from Zonule E is still represented; Globigerinoides bisphericus, dominant in Zonule F, is numerous. Several varieties of Globigerinoides trilobus are present suggesting a Lower Miocene age for the fauna. Other species include Globigerinoides ruber, Globigerina woodi, Globigerina apertura, Globigerina cf. euapertura, and Carpenteria rotaliformis.

3. THE FORAMINIFERAL SUCCESSION (Cont'd)

690-720 feet: probably low in Zonule F: Lower Miocene. Globigerinoides bisphericus is less numerous than above, and Globigerina woodi, G. apertura and Globigerinoides immaturus appears. The Globigerinoides glomerosus is rare.

750-780 feet: Zonule G: Lower Miocene. Globigerinoides trilobus is abundant and Globigerinoides bisphericus rare, indicating Zonule G. Globigerina apertura and G. woodi are the only other abundant forms.

Zonules G and H, the lowest Miocene units, are defined and distinguished not on the highest appearance of an index species, but on the disappearance of Globigerinoides trilobus in Zonule H, with the continued presence of Globigerina woodi. Consequently Zonule H is difficult to identify in cuttings because Globigerinoides trilobus tends to cave from the zone above.

810-840 feet: probable Zonule H: Lower Miocene. Globigerina woodi is far more abundant than Globigerinoides trilobus, suggesting that the sample is in Zonule H. Globigerina apertura, and rare specimens of Globigerina cf. euapertura also occur.

870-900 feet: Zonule H: Lower Miocene. The dominance of Globigerina woodi and G. apertura, with only minor Globigerinoides trilobus, indicates H.

930-960 feet: probable Zonule H: Lower Miocene. A heavily contaminated fauna at this depth contains the same species as above, and is probably still within H.

960-1000 feet: Zonule I: Oligocene. Globigerina euapertura, the index species for Zonule I, is present in very small numbers. Globorotalia opima continuosa and Globorotalia cf. opima (after Bolli) occur rarely. Globigerina sp. cf. ciperoensis, a designation covering probably several small species in Zonule I, becomes fairly numerous in this and lower samples. Globigerina bulloides is more abundant. Globigerinoides trilobus and Globigerina woodi remain common, presumably due to caving.

1000-1010 feet. A fauna similar to that above, but with Globigerina bulloides becoming more abundant, and Globigerina euapertura present in small numbers.

1040-1050 feet: Zonule I: Oligocene. Globorotalia opima opima (after Jenkins, not Bolli) occurs in small numbers.

1060-1070 feet: Zonule I: Oligocene. Globorotalia "opima continuosa" (after Jenkins) and rare Globorotalia cf. kugleri occur, in a fauna dominated by Globigerina apertura and Globigerina bulloides, with a large amount of Miocene caving.

No in situ foraminifera were found below 1070 feet.

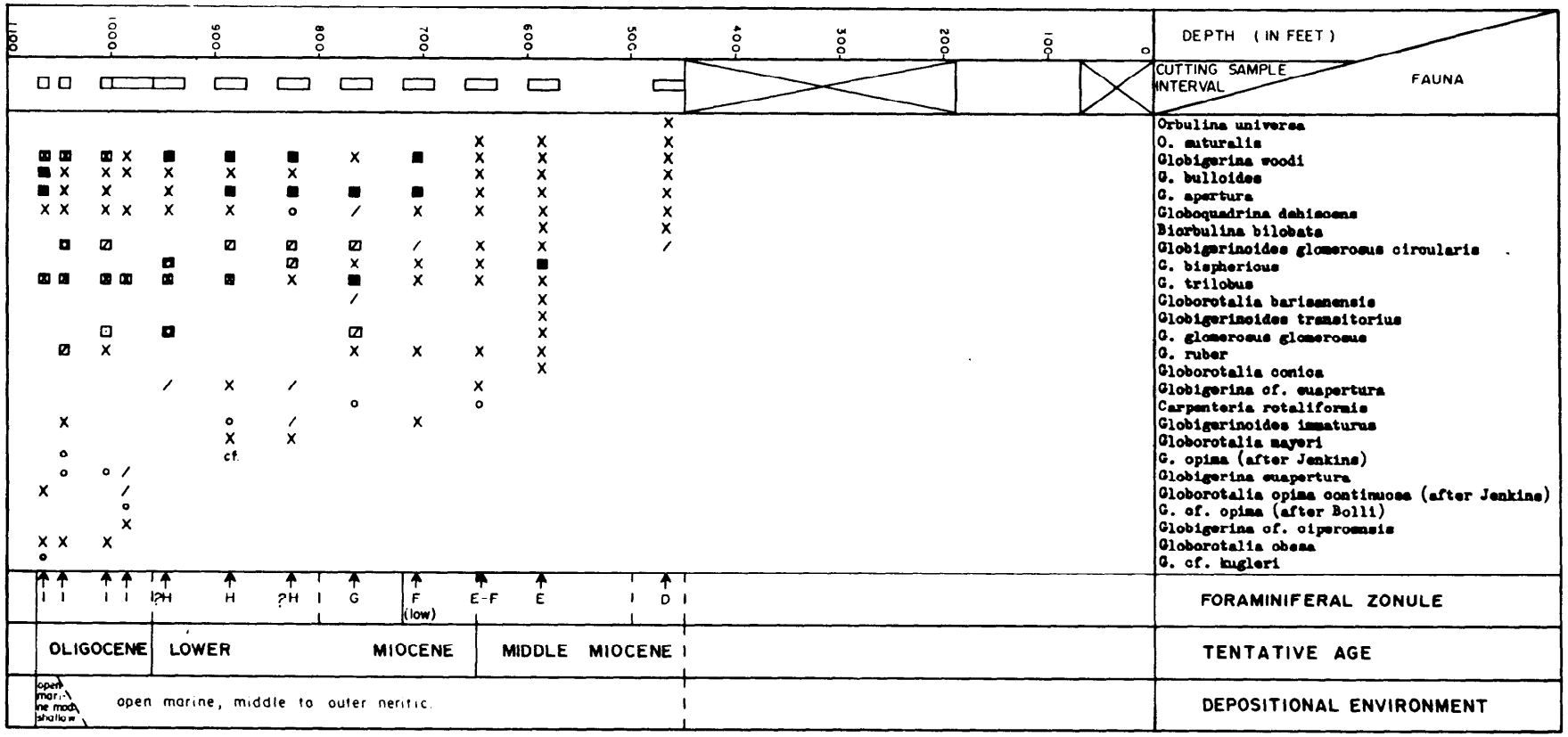
FOOTNOTE.

Taylor (personal communication January 1970) has recently indicated that Globorotalia kugleri is confined to Zonule H (Lower Miocene), and does not occur in Zonule I (Oligocene) as indicated by M.E. Wade (1964) and other workers. Consequently the presence of Globorotalia cf. kugleri in the sample at 1060-1070 feet may cast some doubt on the Zonule I determination, although other species support this determination.

4. CONCLUSIONS

The Heytesbury Group in Hawkesdale-1 consists of the normal Middle Miocene to Oligocene sequence found elsewhere in the Otway Basin. The Oligocene is approximately 100 feet thick in Hawkesdale-1 in contrast to Moyne Falls-1, in which no such Oligocene was recognized.

Because of the poor quality of the cuttings and the lack of other sample control, the zone boundaries given and the Oligocene determination should be treated with a certain amount of caution.



LEGEND

Specimen frequency

- • *1 specimen*
- / *2 - 5 specimens*
- o *6 - 20 specimens*
- ● *21 - 100 specimens*
- ■ *> 100 specimens*
- X *qualitative determination only*
- *cf. "comparable with"*
- □ *definite or probable caving*

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OTWAY BASIN

HAWKESDALE - 1

DISTRIBUTION OF FORAMINIFERA

Author M Apthorpe	Date March, 1970.
Report W C R	Fig. III-1 Drawing No 4123