PALAEONTOLOGICAL EXAMINATION OF DRILL CUTTINGS AND SIDE WALL CORES FROM SUNBIRD-1 ONSHORE

BONAPARTE GULF, NORTHERN TERRITORY, AUSTRALIA

Prepared for:

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INTRODUCTION

A total of 101 samples consisting of drill cuttings and side wall cores from 2265 to 3324 metres in Sunbird-1 well drilled in the Bonaparte Gulf, Northern Territory, Australia, were examined for foraminifera. The results of these examinations are set out in Appendix 1.

All of the samples of drill cuttings and most of the side wall cores were examined as washed residues while the sidewall cores from 2265, 2273 and 2552 metres were examined in thin section. The side wall cores from 2265 and 2273 metres were of limestones while that from 2552 metres was an indurated shale. The shales throughout the well were found to be very indurated and difficult to break down but reasonable breakdown was obtained. Based on the thin section of the one sidewall core of indurated shale and the very careful examination of the residues it is believed that most of the samples are barren of foraminifera and there was sufficent breakdown to have freed the fossils if present.

The reason for the absence of foraminifera could not be determined but it could have been that most of the sediments were deposited under non marine conditions but it may be because of unfavourable bottom conditions within a marine environment.

The preservation of the fossils was good in the limestone samples from 2265 and 2273 metres but was very poor in the other samples. Because of the very poor preservation the specimens from the cuttings could not be identified positively. Foraminifera are difficult to identify positively in random thin sections so not all of the specimens from the two limestone side wall cores could be identified positively.

All samples were examined because of the paucity of fauna. A computer generated sample list is included at the end of the report. The depths of the sidewall cores on this list are followed by the letter S so that the computer could separate them from the depths of the cuttings.

AGE DETERMINATIONS

The presence of Forschia sp. in samples from 2265 and 2273 metres and Eostaffella sp. from 2273 metres indicate a Late Carboniferous (Early Visean to Namurian) age based on their occurrences in the Bonaparte Gulf (Belford, 1967). Haplophragmella and Mediocris which are also present are restricted to the Late Carboniferous so their occurrences at 2273 metres support the Carboniferous age.

The age of the section below 2273 metres cannot be determined because of the absence of fossils in most samples or the lack of positive identification of those fossils which are present. The presence of possible Mediocris in samples from 2550-2560 metres, 2650-2660 metres, 2670-2680 metres, 2730-2740 metres and 2890-

2900 metres would indicate a Late Carboniferous age if these specimens positively belonged to this genus.

The samples from 2265 and 2273 metres are equivalent to the section from 660 to 1842 feet in Bonaparte-1 and the section from 1740 to 1810 metres in Kingfisher-1 but it appears that most of the section in Sunbird-1 which is equivalent to the sections in Bonaparte-1 and Kingfisher-1 was not examined.

ENVIRONMENTS OF DEPOSITION

It is difficult to give precise environments of deposition based on the foraminifera since all forms are extinct and have no living relatives which would act as a guide. The foraminifera, however, can be taken to indicate a marine environment which is thought most likely to be under shallow water conditions.

Crinoids are marine organisms which therefore can be taken to indicate marine conditions. Ostracods can live in both marine and fresh water conditions but by their association with foraminifera and crinoids in this well they appear to indicate marine conditions.

The absence of marine fossils in many of the samples can be taken to indicate non-marine conditions but this is not always the case. The reason for the absence of fossils cannot be determined but could be due to the sandy nature of many of the samples because fossils are seldom preserved under sandy conditions. There may also have been a rapid rate of deposition which is not favourable for marine animals to occur.

Based on the fossil evidence and the above criteria the section from 2265 to 2273 metres was deposited under marine conditions, possibly shallow water, inner shelf.

It appears that there brief marine incursions within a predominately non-marine environment from 2500 to 3324 metres but it is possible that there was deposition within a marine environment with a rapid rate of sedimentation such as turbidity currents or unfavourable bottom conditions. The unfavourable bottom conditions could be reflected in the black colour of the sediments.

REFERENCES

BELFORD, D.J., 1967. Upper Devonian and Carboniferous Foraminifera, Bonaparte Gulf Basin, Northern Australia. Bull. Aust. Bur. Miner. Resour. Geol. Geophys., 108, 1-40.

MAMET, B.L. and BELFORD, D.J., 1968. Carboniferous Foraminifera, Bonaparte Gulf Basin, northwestern Australia. Micropal., 14 (3), 339-347.

APPENDIX 1

RESULTS OF THE EXAMINATION

The named species belong to the foraminifera. The letters a, c, f and r after the fossil name indicates respectively the fossil is abundant, commom, frequent or rare. A question mark in front of a fossil name indicates the identification is only tentative.

SWC 2265 metres

Tritaxia sp. (r)
Forschia sp. (r)
?Eostaffella sp. (r)
indeterminate benthics (r)
indeterminate fossils (r)
crinoid stem (r)
ostracods (r)
echinoid (r)

SWC 2273 metres

Haplophragmella sp. (r)
?Nodosaria sp. (r)
Mediocris sp. (r)
Eostaffella sp. (r)
Forschia sp. (r)
indeterminate benthics (r)
indeterminate fossils (r)
echinoid (r)
crinoid stem (r)
gastropods (r)

2500-2510 metres

Barren

SWC 2507.5S metres

Barren

2510-2520 metres

Barren

2520-2530 metres

Barren

2530-2540 metres

crinoid stem (r)
indeterminate fossils (r)

2540-2550 metres

Barren

2550-2560 metres

?Mediocris sp. (r)

SWC 2552 metres

Barren

2560-2570 metres

crinoid stem (r)

2570-2580 metres

Barren

2580-2590 metres

Barren

2590-2600 metres

Barren

2600-2610 metres

Barren

2610-2620 metres

Barren

2620-2630 metres

Barren

2630-2640 metres

Barren

2640-2650 metres

Barren

2650-2660 metres

?Mediocris sp. (r)

2660-2670 metres

Barren

SWC 2660 metres

Barren

2670-2680 metres

?Mediocris sp. (r)

2680-2690 metres

Barren

SWC 2680 metres

Barren

2690-2700 metres

Barren

2700-2710 metres

Barren

SWC 2705 metres

Barren

2710-2720 metres

Barren

2720-2730 metres

Barren

2730-2740 metres

?Mediocris sp. (r)
crinoid stem (r)

2740-2750 metres

Barren

2750-2760 metres

Barren

2760-2770 metres

Barren

2770-2780 metres

Barren

SWC 2775 metres

Barren

2780-2790 metres

Barren

2790-2800 metres

Barren

2800-2810 metres

Barren

2810-2820 metres

Barren

2820-2830 metres

Barren

2830-2840 metres

Barren

2840-2850 metres

Barren

SWC 2850 metres

Barren

2850-2860 metres

Barren

2860-2870 metres

Barren

2870-2880 metres

Barren

2880-2890 metres

Barren

SWC 2890 metres

Barren

2890-2900 metres

?Mediocris sp. (r)

2900-2910 metres

Barren

2910-2920 metres

?Mediocris sp. (r)

2920-2930 metres

Barren

SWC 2920 metres

Barren

2930-2940 metres

Barren

2940-2950 metres

Barren

2950-2960 metres

Barren

2960-2970 metres

Barren

2970-2980 metres

Barren

SWC 2970 metres

Barren

2980-2990 metres

Barren

2990-3000 metres

Barren

3000-3010 metres

Barren

3010-3020 metres

Barren

SWC 3010 metres

Barren

3020-3030 metres

Barren

3030-3040 metres

Barren

3040-3050 metres

Barren

3050-3060 metres

Barren

3060-3070 metres

Barren

SWC 3065 metres

Barren

3070-3080 metres

Barren

3080-3090 metres

Barren

3090-3100 metres

Barren

3100-3110 metres

Barren

3110-3120 metres

Barren

SWC 3112.5 metres

Barren

3120-3130 metres

Barren

3130-3140 metres

Barren

3140-3150 metres

Barren

3150-3160 metres

Barren

3160-3170 metres

Barren

3170-3180 metres

Barren

SWC 3180 metres

Barren

3180-3190 metres

Barren

3190-3200 metres

Barren

3200-3210 metres

Barren

SWC 3210 metres

Barren

3210-3220 metres

Barren

3220-3230 metres

Barren

3230-3240 metres

Barren

3240-3250 metres

Barren

3250-3260 metres

Barren

3260-3270 metres

Barren

SWC 3265 metres

Barren

3270-3280 metres

Barren

3280-3290 metres

Barren

3290-3300 metres

Barren

3300-3310 metres

Barren

3310-3320 metres

Barren

3320-3324 metres

Barren

14 November, 1994

FOSSIL RECORDING SYSTEM

GEOTECHNICAL SERVICES

SAMPLES SUMMARY

WELL NAME: SUNBIRD-1

ITEM NO	SAMPLE DEPTH	BARREN (Y/N)	SAMPLE TYPE
1	2265S	N	S.W.C.
2	2273S	N	S.W.C.
3	2500-2510	Y	CUTTING
4	2507.5S	Y	S.W.C.
5	2510-2520	Y	CUTTING
6	2520-2530	Y	CUTTING
7	2530-2540	N	CUTTING
8	2540-2550	Y	CUTTING
9	2550-2560	N	CUTTING
10	2552S	Y	S.W.C.
11	2560-2570	N	CUTTING
12	2570-2580	Y	CUTTING
13	2580-2590	Y	CUTTING
14	2590-2600	Y	CUTTING
15	2600-2610	Y	CUTTING
16	2610-2620	Y	CUTTING
17	2620-2630	Y	CUTTING
18	2630-2640	Y	CUTTING
19	2640-2650	Y	CUTTING
20	2650-2660	N	CUTTING
21	2660-2670	Y	CUTTING
22	2660S	Y	S.W.C.
23	2670-2680	N	CUTTING
24	2680-2690	Y	CUTTING
25	2680S	Y	S.W.C.
26	2690-2700	Y	CUTTING
27	2700-2710	Y	CUTTING
28	2705S	Y	S.W.C.
29	2710-2720	Y	CUTTING
30	2720-2730	Y	CUTTING
31	2730-2740	N	CUTTING
32	2740-2750	Y	CUTTING
33	2750-2760	Y	CUTTING
34	2760-2770	Y	CUTTING
35	2770-2780	Y	CUTTING
36	2775S	Y	S.W.C.
37	2780-2790	Y	CUTTING
38	2790-2800	Y	CUTTING
39	2800-2810	Y	CUTTING
40	2810-2820	Y	CUTTING
41	2820-2830	Y	CUTTING
42	2830-2840	Y	CUTTING
43	2840-2850	Y	CUTTING
44	2850S	Y	S.W.C.
45	2850-2860	Y	CUTTING
46	2860-2870	Y	CUTTING
47	2870-2880	Y	CUTTING
48	2880-2890	Y	CUTTING

FOSSIL RECORDING SYSTEM
14 November, 1994

GEOTECHNICAL SERVICES

SAMPLES SUMMARY

WELL NAME: SUNBIRD-1

ITEM NO	SAMPLE DEPTH	BARREN (Y/N)	SAMPLE TYPE
49	2890S	Y	S.W.C.
50	2890-2900	N	CUTTING
51	2900-2910	Y	CUTTING
52	2910-2920	N	CUTTING
53	2920-2930	Y	CUTTING
54	2920S	Y	S.W.C.
55	2930-2940	Y	CUTTING
56	2940-2950	Y	CUTTING
57	2950-2960	Y	CUTTING
58	2960-2970	Y	CUTTING
59	2970-2980	Y	CUTTING
60	2970S	Y	S.W.C.
61	2980-2990	Y	CUTTING
62	2990-3000	Y	CUTTING
63	3000-3010	Y	CUTTING
64	3010-3020	Y	CUTTING
65	3010S	Y	S.W.C.
66	3020-3030	Y	CUTTING
67	3030-3040	Y	CUTTING
68	3040-3050	Y	CUTTING
69	3050-3060	Y	CUTTING
70	3060-3070	Y	CUTTING
71	3065S	Y	S.W.C.
72	3070-3080	Y	CUTTING
73	3080-3090	Y	CUTTING
74	3090-3100	Y	CUTTING
75	3100-3110	Y	CUTTING
76	3110-3120	Y	CUTTING
77	3112.5S	Y	S.W.C.
78	3120-3130	Y	CUTTING
79	3130-3140	Y	CUTTING
80	3140-3150	Y	CUTTING
81	3150-3160	Y	CUTTING
82	3160-3170	Y	CUTTING
83	3170-3180	Y	CUTTING
84	3180S	Y	S.W.C.
85	3180-3190	Y	CUTTING
86	3190-3200	Y	CUTTING
87	3200-3210	Y	CUTTING
88	3210S	Y	S.W.C.
89	3210-3220	Y	CUTTING
90	3220-3230	Y	CUTTING
91	3230-3240	Y	CUTTING
92	3240-3250	Y	CUTTING
93	3250-3260	Y	CUTTING
94	3260-3270	Y	CUTTING
95	3265S	Y	S.W.C.
96	3270-3280	Y	CUTTING

FOSSIL RECORDING SYSTEM

GEOTECHNICAL SERVICES

SAMPLES SUMMARY

WELL NAME: SUNBIRD-1

ITEM NO	SAMPLE DEPTH	BARREN (Y/N)	SAMPLE TYPE
97	3280-3290	Y	CUTTING
98	3290-3300	Y	CUTTING
99	3300-3310	Y	CUTTING
100	3310-3320	Y	CUTTING
101	3320-3324	Y	CUTTING

Total No. of Samples in this Well: 101
Total No. of Fossils in this Well: 27

Total No. of Barren Samples : 91
Total No. of Non-Barren Samples : 10