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COOPER BASIN

SOURCE ROCK STUDIES

REPORTS AND DATA

Submitted by

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RESTRICTED CIRCULATION

RESTRICTED INVESTIGATION REPORT 620R

CSIRO

MINERALS RESEARCH LABORATORIES

DIVISION OF MINERALOGY

PETROGRAPHIC COMPOSITION OF COALS FROM GIDEALPA NO.3, INNAMINCKA NO.1 AND TINGA TINGANA NO.1 WELLS, COOPER BASIN, SOUTH AUSTRALIA

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MAY 1974

CSIRO

MINERALS RESEARCH LABORATORIES

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P.O. BOX 136, NORTH RYDE, N.S.W., AUST. 2113. *SITUATED DELHI ROAD, NORTH RYDE.* TELEPHONE 888 1666. TELEGRAMS *MINRES NORTH RYDE*

TO: Delhi International Oil Corporation

Errors in IR 620R - depths in Table 1 should be:

Gidgealpa No. 3

622 - 631	U. Cret.
686 - 695	U. Cret.
869 - 878	U. Cret.
2054 - 2070	
2179 - 2195	Permian
2234 - 2249	Permian
2280 - 2292	Permian

Tinga Tingana No. 1

247 - 265	U. Cret.
509 - 527	U. Cret.
1420 - 1426	Permian
1480	Permian
1500 - 1515	Permian
1634 - 1649	Permian
1750 - 1759	Permian

Innamincka No. 1

85 - 91	U. Cret.
137 - 152	U. Cret.
290 - 311	U. Cret.
521 - 530	
899 - 914	
2097 - 2100	Permain
2176 - 2188	Permain
2256 - 2271	

... probably from about 1530m

M. Smyth

INTRODUCTION

Many ditch cutting samples from Gidgealpa No.3, Innamincka No.1 and Tinga Tingana No.1 wells, covering a wide geological succession (Permian to Cretaceous) were supplied to CSIRO by Delhi International Oil Corporation.

The samples were originally requested for reflectance measurements, the results of which have been reported to the company in IR 524R and IR 577R. These samples have also been used to make the petrographic analyses which form the subject of the present report.

It is not certain whether coal samples obtained from ditch cuttings by gravity separation represent the average composition of the original coal seams. However, all samples were treated similarly and processed by the same preparation technique. Results are therefore expected to give some information about the stratigraphical variation of the petrographic composition of the coal seams. The fact that all these wells show a very similar tendency supports this assumption.

In order to investigate the potential of rocks as hydrocarbon sources, not only the coals, but also the organic material dispersed in interseam sediments should be studied. (This work is in progress).

In this preliminary report, only the results of petrographic analysis of the coals, completed to date, are given. These results could give information about the sedimentary history of this basin.

SAMPLE PREPARATION

See Restricted Investigation Report 577R

RESULTS

To date analyses have been carried out on coals from the Cretaceous to the Permian in three wells: Gidgealpa No.3, Innamincka No.1 and Tinga Tingana No.1. Results of the petrographic analyses are shown in Table 1 and in Fig. 1.

There are distinct differences in the vitrinite content between the Cretaceous coals and the Permo-Triassic coals. Furthermore among the Cretaceous coals a clear upwards increase in vitrinite occurs in all three cases.

The Permain coals show fluctuations in their vitrinite contents. The lower two coals from Innamincka No.1 (2343-2356 m and 2428-2444 m) are supposed to be of Devonian age according to the well log. However, reflectance measurements of the sample from 2428-2444 m indicate that it is a caving. Both of these "Devonian" coals are probably cavings.

DISCUSSION

The vitrinite content of a coal could be regarded as giving an indication of the type of sedimentary environment in which the coal accumulated. Vitrinite-rich coals are thought to have accumulated in rapidly subsiding, unstable conditions, whilst vitrinite-poor coals have accumulated in more slowly subsiding, stable environments. Where coal measures are thick the coal seams tend to be rich in vitrinite, where coal measures are thin the coal seams tend to be poor in vitrinite. Thus the petrographic composition of coal seams appears to reflect the rate of deposition (or subsidence) as a whole. (Shibaoka and Smyth, 1973).

From Fig. 1 it appears that the Cooper Basin in Permian times was fluctuating between slowly and more rapidly subsiding conditions. From the Triassic or Jurassic onwards, the rate of subsidence of the basin might have increased steadily, as shown by the progressive increase in the quantity of vitrinite in the coals, although there are wide gaps between sampled points in the profile from the Jurassic to the Lower Cretaceous. The changes in coal composition suggest that at any given time until the end of the Upper Cretaceous, the rate of subsidence was similar in Innamincka No.1 and Tinga Tingana No.1 and slower in Gidgealpa No.3, but that the acceleration of the subsidence rate during the Cretaceous was greater in Gidgealpa No.3

CONCLUSIONS

Coals from the Permian in the three wells have variable petrographic compositions, but tend to be vitrinite-poor, whilst coals from the Cretaceous are vitrinite-rich. There is a continuous upward increase in vitrinite content, shown very clearly in the Upper Cretaceous coals.

If vitrinite content may be taken as an indication of the rate of subsidence, the Cooper Basin subsided more and more rapidly from the Permain to the end of the Cretaceous.

REFERENCES

Shibaoka, M. and Smyth, Michelle. 1973. "Coal petrology and formation of coal seams in some Australian sedimentary basins". 45th ANZAAS Congress, Perth. Abstracts Section 3, pp 140-142.

TABLE 1

Maceral analyses of coals from the Cooper Basin (mineral matter free)

AGE	DEPTH, m	VITRINITE	EXINITE	MICRINITE	SEMIFUSINITE	FUSINITE	Inertinite
GIDGEALPA NO. 3							
Upper Cretaceous	669-679 (10)	90	2	1	7	-	8
	738-748 (10)	83	7	4	5	1	10
	935-945 (10)	70	4	6	19	1	26
Middle-Lower Jurassic	2211-2228 (7)	27	20	21	31	1	53
Permian	2346-2362 (16)	17	9	48	24	2	74
	2405-2421 (6)	60	11	13	14	2	29
	2454-2467 (13)	30	9	34	27	tr	61
INNAMINCKA NO.1							
Upper Cretaceous	92-98 (6)	98	-	-	2	tr	2
	148-164 (16)	95	2	tr	3	tr	3
	312-335 (23)	88	9	1	2	-	3
Lower Cretaceous	561-571 (10)	83	3	5	8	1	14
	968-984 (6)	77	2	2	18	1	21
Permian	2257-2261 (4)	55	5	15	22	3	40
Devonian	2343-2356 (13)	44	11	28	15	2	45
	~~2428-2444*~~	69	21	4	2	4	10
TINGA TINGANA NO.1							
Upper Cretaceous	266-285	95	1	-	4	tr	4
	548-568	85	5	5	5	tr	10
Permian	1529-1535	63	13	13	10	1	24
	1594	75	9	8	4	4	16
	1614-1631	50	3	17	26	4	47
	1759-1775	28	6	24	39	3	66
	1883-1893	61	5	15	17	2	34

* from reflectance measurements this appears to be a caving, probably from about 1650 m.

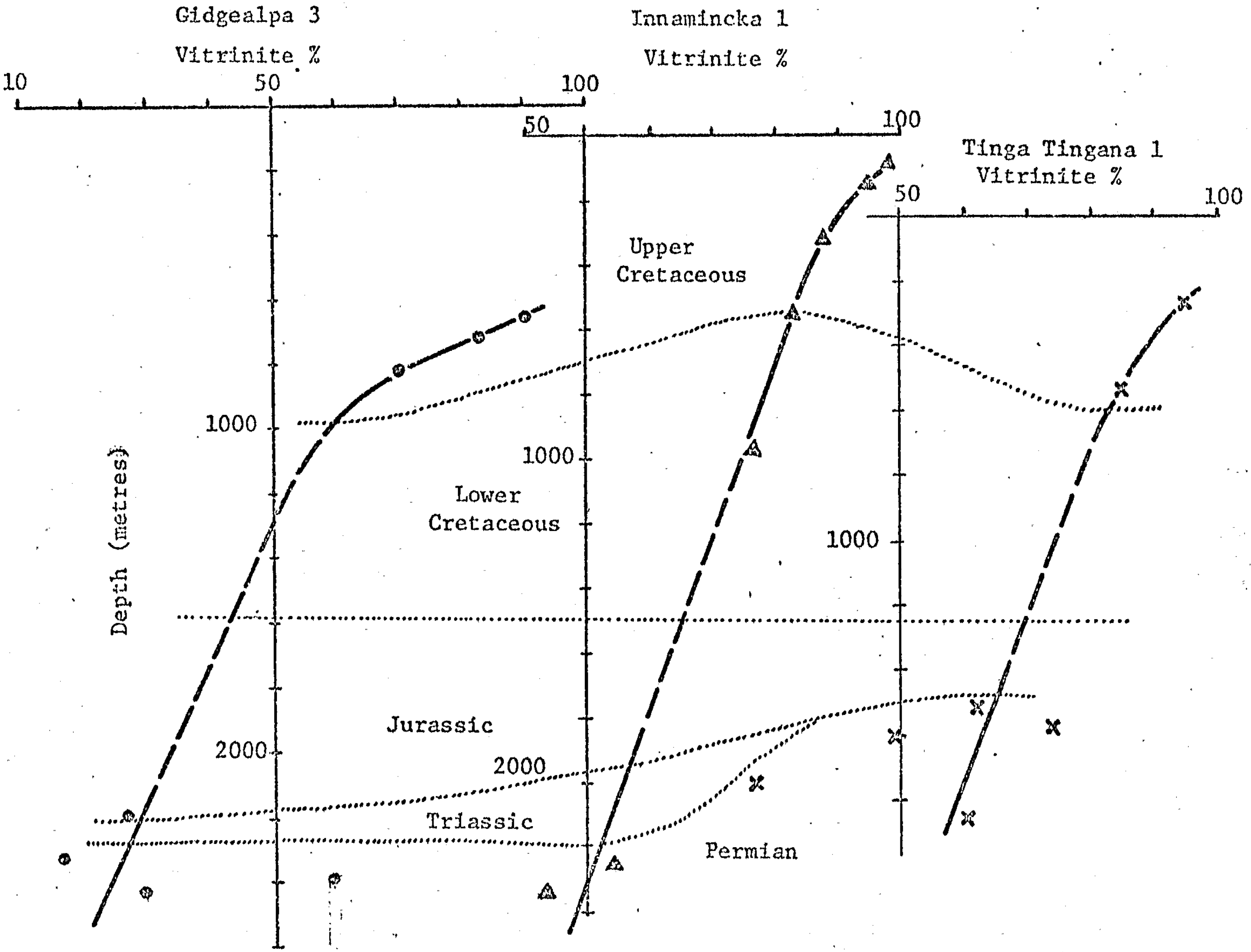

Fig. 1. Stratigraphical variation of vitrinite content in some Cooper Basin coals.

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