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Report Title	Hale River No.1
DAR Number	DAR0290
Operator	Mines Administration Pty. Limited
Contractor	Western Mining Corporation Limited
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Confidentiality	
Comment	

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MINES ADMINISTRATION PTY. LIMITED

PALYNOLOGICAL LABORATORY

Report No. 185/4

Client: Western Mining Corporation Limited

Study: Hale River No. 1

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## I. INTRODUCTION

Three core samples from Hale River No. 1 were submitted for palynological examination. The sample from core 1/3844 - 3864 feet consisted of a white medium grained sandstone with coal clasts about 15 mm in diameter. Only the coal was processed from this sample as the sandstone was considered to be devoid of significant amounts of acid insoluble organic material.

## II. SUMMARY OF RESULTS

<u>Sample</u>	<u>Depth</u> (in feet)	<u>Age</u>	<u>Biostratigraphic</u> <u>Unit</u>	<u>Remarks</u>
Core 1	3844-64	Early Permian	Upper stage 4b	Assemblage derived from coal clasts.
Core 2	4170-85	Jurassic	No older J2-3	Reworked Permian forms common.
Core 3	4517-32	-	-	No identifiable forms recovered.

## III. OBSERVATIONS

A high yield of organic material was recovered from core 1/3844-64 ft. The unoxidized kerogen residue consisted almost entirely of opaque fragments. Too few spores were observed in the unoxidized residue to give an estimate of the maturity of the organic material based upon spore colour. With additional treatment a diverse assemblage of fairly well preserved miospore was recovered. Forms identified included:

*Alisporites* spp.

*Sulcatisporites* spp.

*Protohaploxypinus* spp.

*Striatopodocarpites* spp.

*Striatoabietites multistriates*

*Cycadopites* spp.

*Marsupipollentias triradiatus*

*Marsupipollentia striatus*  
*Praecolpatites sinuosus*  
*Retusotriletes diversiformis*  
*Leiotriletes directus*  
*Granulatisporites trisinus*  
*G. micronodosus*  
*Microbaculispora tentula*  
*M. villosus*  
*M. sp. cf. M. villosus*  
*M. sp. 310*  
*Clavaetriletes sp. 330*  
*Neoraistrictia ramosus*  
*Verrucosisporites sp. 191*  
*V. pseudoreticulatus*  
*V. sp. 207*  
*Krauselisporites spp.*  
*Laevigatosporites sp.*  
*Polyodioidites ciatricosus*  
*Haplocystia spp.*  
*Schizosporis spp.*  
*Circulisporites sp.*  
*Maculatasporites sp.*

Core 2/4170-4185 feet gave a moderate yield of organic residue composed dominantly of opaque detritus with approximately 10% cuticle and miospore fragments. The colour of the spores was yellowish-brown indicating a degree of thermal alteration equivalent to that at approximately 0.6 - 0.65%  $\bar{R}_o$  max. reflectance of vitrinite. Miospores identified included:

Mesozoic forms  
*Podocarpites spp.*  
*Indusiisporites parvisaccatus*  
*Podosporites sp.*  
*Classopollis classoides*  
*Inaperturopollenites turbatus*  
Inaperturate pollen  
*Tsugaepollenites segmentatus*  
*T. dampieri*  
*T. sp. cf. T. segmentatus*  
*T. trilobatus*  
*Araucariacites fissus*  
*Vitreisporites pallidus*

*Cyathidites* spp.  
*Neoraistrickia taylori*  
*N. elongata*  
*Dictyophyllidites mortoni*  
*Gleicheniidites* sp.  
*Anapiculatisporites dawsonensis*  
*Ischyosporites marburgensis*  
*Trilobosporites antiquus*  
Reworked Permian forms  
*Protohaploxylinus* spp.  
*Striatopodocarpites* spp.  
*Marsupipollenites striatus*  
*Apiculatisporis cornutus*  
*A. levis*  
*Granulatisporites trisinus*  
*Polyodiidites cicatricosus*  
*Peltacystia* sp.

An extremely low yield of acid insoluble organic material was recovered from core 3/4517-4532 ft. The residue consisted entirely of fairly divided opaque fragments and included no identifiable miospores.

#### IV. DISCUSSION

##### 1. Core 1/3844-3864 feet

The coal from core 1/3844-3864 ft. yielded an assemblage which, on the basis of the association of *Microbaculispora villosa*, *Polyodiidites cicatricosus*, *Praecolpatites sinuosus* and *Verrucosisporites pseudoreticulatus*, is assignable to upper stage 4b of Price (1976) and indicates an Early Permian age for the microflora. Such assemblages are unknown from the Permian sequence of the Pedirka Basin although some elements have been recovered as reworked forms from the Jurassic section in Poolawanna No. 1 (Price 1977) and Macumba No. 1 (Price 1978).

In the Cooper Basin upper stage 4b is widely distributed, being recovered from the Epsilon Formation and, in some parts of the Basin, the

basal part of the Roseneath Shale (see Price 1973). Thus the coal clasts from core 1/3844-3864 ft. are from some equivalent of this section. However, the time of deposition of the sediment in core 1/3844-3864 ft. is likely to be considerably younger as the underlying sample, core 2/4170-4185 ft., yielded a Jurassic assemblage. Assuming the sediments have not been interposed by faulting, the Permian assemblage (and hence the coal) has been derived from an earlier cycle of deposition and reworked into the Mesozoic section.

2. Core 2/4170-4185 ft.

The association of *Inaperturopollenites turbatus*, *Tsugaepollenites* spp. and *Classopollis classoides* in core 2/4170-4185 ft. indicates the sampled horizon is Jurassic in age and assignable to unit J2-3 of Evans (1966). However, the assemblage was impoverished and, on general character such as the low proportion of *Araucariacites fissus* relative to other inaperturate pollen, has much in common with the impoverished lower J5-6 assemblages recovered from Poolowanna No. 1 and Macumba No. 1 by Price (1977 & 1978). Thus the assemblage is best regarded as being no older than unit J2-3 and may be as young as the lower part of unit J5-6. As such the sampled horizon is from some part of the Hutton Sandstone, Birkhead Formation, Adori Sandstone or the lower part of the Westbourne Formation of the Western Eromanga Basin section. However, if a lower J5-6 age is accepted, the sampled horizon may be restricted to the upper Birkhead, Adori Sandstone or lower Westbourne Formation.

Reworked Permian forms were relatively common in the assemblage recovered from core 2/4170-4185 ft. The Permian association recovered is consistent with lower stage 4 assemblages of Paten (1969). Such assemblages have been recovered from the Patchawarra Formation of the Cooper Basin (see Paten, 1969 and Price, 1973) but have not been recovered in situ in the Pedirka Basin. The presence of these Permian taxa indicate that at least

some of the sediment clasts have been derived from a Permian source.

The yellowish brown colour of the spores equivalent to approximately 0.60% - 0.65% vitrinite reflectance from core 2/4170-4185 ft. indicates that the section is mature in terms of hydrocarbon generation and is within the liquid hydrocarbon "window". The yield of kerogen from this sample was moderate and consisted mostly (90%) of opaque fragments (vitrinite, micrinite etc.) with a low proportion (about 10%) of cuticle and miospore fragments. In view of the dominance of hydrogen deficient organic material the sampled horizon is more likely to source gas and condensate than liquid hydrocarbons.

3. Core 3/4517-4532 feet

As no identifiable palynomorphs were recovered from core 3/4517-4532 ft. no opinion as to the age or biostratigraphic affinities of the sampled horizon can be given on palynological evidence.

The extremely low yield of organic material recovered from the sampled horizon suggests that it is unlikely to be a source of hydrocarbons.

V. REFERENCES

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