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GOLD FIELDS EXPLORATION PTY. LIMITED

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MEMORANDUM

PH/as

To P. Roberts

From P. Holyland

Subject LITTLE HENTY BEACH SANDS

Date 24th May, 1983

Introduction

This summary report is based on, a photo interpretation of the Ocean Beach area from the Little Henty river to Sorrell Peninsula in the South, and various reports mentioned in the text.

Geomorphic Development of the Ocean Beach area

The Ocean Beach area lies within a Tertiary basinal feature known as the Macquarie Harbour Basin. The basin extends from Trial Harbour southwards along an approximately north north-west -south south east trending belt as far south as the Wanderer River. The Tertiary sediments within this basin are non-marine clays, silts, gravels, lignites and poorly consolidated sands. Although the presence of these sediments at some locations in the Macquarie Harbour area at over 350 metres above sea level indicates considerable post depositional fault movement (Williams 1967), generally they are horizontal or only very gently folded (Clementson 1981).

Post Pleistocene rise of sea level transgressed across this near horizontal Tertiary surface reworking the offshore Tertiary into the present beach and dune systems. It is likely that the heavy mineral content of the dunes is in large part related to this reworking of Tertiary deposits. In contrast the present equilibrium beach is probably dominated by material whose provenance is determined by longshore drift.

The present beach is the only one which can be identified on airphotos. Any older beach systems if present are now masked

AMG REFERENCE POINTS ADDED

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by the transgressive dune systems. The horizontal or near horizontal nature of the Tertiary substrate means that the present beach is not a product of a prograding beach system since the transgression would have found its equilibrium longshore profile immediately without the need for infill and erosion due to wave refraction effects. This indicates that although Ocean Beach superficially resembles the zetaform beaches of Western Australia, it was in fact formed by a different (non-progradational) mechanism.

The second factor which points to the geomorphic dominance of the present beach is that the entire dune system is related to it. The present development cycle of massive transgressive parabolic dunes (see Fig 1) began in the 19th Century as a result of burning and/or stocking of dune country (Davies 1965). The dunes have been formed by blowouts on the foredunes and the present dunes are deflation parabolics in which from the initial blow-out, a convex nose of sand has advanced downwind leaving paired wings on which vegetation may resume its hold. A sequence of at least five (A - E) overlapping parabolics has developed north of Strahan and at least 4 south of Strahan.

The orientation of this dune system is WNW-ESE which is consistent with the longshore drift movement from North to South; however in addition to these parabolic dunes, a smaller set of transverse dunes also occurs. These are overlapping wave forms normal to a wind direction of NE-SE. Some refraction in the wind direction is seen within the lee of the parabolic dunes to a more WSW-ENE direction.

The dominant wind direction from WNW which has produced the parabolic dune system in also responsible for the longshore drift direction from North to South along Ocean Beach. Spits occur at the mouths of the Little and Big Henty Rivers and a recurved or hooked spit also occurs at the entrance to Macquarie Harbour.

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Potential for Beach Sand Mineralisation

In a review of heavy mineral deposits along the coasts of Victoria, Tasmania and South Australia J.E. Gardiner considers that four factors control the distribution; these are provenance, climatic, oceanographic and coastal geomorphology.

Provenance :

The principal sources of nearshore sediments for most coastal areas are the streams; in addition in non equilibrium beaches, offshore sources may be important.

Present day additions of heavy minerals are from stream sources. The potential for a cassiterite rich heavy mineral deposit derived from the Heemskirk granite is dependant on a) the hydraulics of the Little Henty River b) other minor drainages off the Heemskirk to the North of the Little Henty.

The rain fall in the Little Henty drainage basin is approximately 1250 mm, and the area of the drainage affecting the Heemskirk granite is $10km^2$. Using a relationship derived by Langbein and Schumm an estimate of the sediment discharge per annum may be made. This is approximately $2400m^3/yr$. For the 7000 yrs since the Holocene trangression a total sediment influx of 16.8 million m^3 has occurred. If the cassiterite content of the Heemskirk marginal zone (5 x 2kms) is taken to be 80 ppm then for an economic grade deposit (400 ppm) to form a concentration factor of 5 must have occurred. This is quite possible in the beach environment. If all of the cassiterite was delivered to the beach the resulting deposit would have a volume of 3.5 million m^3 containing 2300 tonne of Tin.

On the present beach using the dimensions of heavy mineral concentrations further to the south (E.H. Macdonald 1970) the

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deposit would be 2 x 50 x 35000m. The length of present beach held under E.L. is approximately 7kms which at 400 ppm would contain 476 tons of tin. The quantity of Sn contained in the backdune parabolic system is likely to be small due to its high specific gravity and hence poor transport potential in aeolian system.

Other possible sources of heavy minerals are longshore drift and onshore movement of shelf sands.

The longshore drift of sediment is quantitatively difficult to estimate, although it is occurring as evidenced by the production of the Big and Little Henty Spit, the quantity of material involved may not be all that large due to the almost perpendicular aspect of the modern beach to the dominant wind direction.

Sampling by Harvey on the Little Henty Spit indicates no concentration of heavy minerals. The sand of the spit would have been derived from the Heemskirk and north. From these results it appears likely that longshore drift is not contributing heavy minerals from extra basinal sources. Oceanographic Longshore sorting of heavies occurs in the Strahan deposits (Macdonald).

Mineral:	Longshore Drift N → S
Ilmenite	Increases
Chromite	Increases
Rutile	Increases
Zircon	Increases
Cassiterite	Decreases
Weakly magnetic silicates	Decreases

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This sorting arrangement indicates that higher wave power occurs to the south along Ocean Beach and hence a good concentration of heavy minerals is unlikely to occur on the northern reaches of the beach between the Little and Big Henty Rivers. The sorting of cassiterite in the opposite sense to the rest of the heavies is due to its much higher specific gravity. The tin content is probably decreasing away from the source river mouths.

Conclusions

1. The heavy mineral deposits at Ocean Beach occur in the Holocene beach and dunes and particularly in the present day beach.

2. There is little evidence for former strand lines and hence a zetaform prograding coast as in the West Australian deposits probably does not exist.

3. Quantities of cassiterite introduced to the beach during the Holocene are probably insufficient to form a viable deposit.

4. Longshore sorting of heavy minerals has separated cassiterite from other heavy minerals and hence a compound deposit of economic proportions is unlikely between the Little and Big Henty Rivers at the northern end of Ocean Beach.

5. Maximum concentration of the 'typical' beach sand suite of heavy minerals which is dependant on wave power has probably occurred to the south of the E.L. and has been tested by Union Oil etc.

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E. Williams 1967 in Geology and Mineral Resources of Tasmania Geol Bull 50, Tas Mines Dept.

T. Clementson 1981 Report on the drilling program, Strahan Coal E.L. 47/80 CRA Report.

Davies J.L. 1965 Atlas of Tasmania

J. Gardiner 1976 Heavy mineral deposits along the coasts of Victoria, Tasmania and South Australia BMR Report 1976/42

Langbein & Schumm 1958 Yield of sediment in relation to mean annual precipitation. Trans. Am. Geophys. Union 39.1076-84

E. Macdonald 1970 Preliminary Evaluation Programme Beach Sands at Strahan and Ann Bay.

SOUTHERN OCEAN

Henty R.

Little Henty River

Big Henty River

HARBOUR

MACQUARIE

SORELL PENINSULA

STRAHAN

AMG
351200E
5351700N

AMG
348500E
5326500N

N

LEGEND

E, D, C, B, A	Transgressive Parabolic Dune System.
T	Tertiary Basin.
PT	Pre Tertiary.
BHS	Big Henty Spit.
LHS	Little Henty Spit.
S	Present beach.
Qa	Scroll Bars of Fossil Big Henty River.
	Lakes.
	Margin of Tertiary Basin.
	Transverse dunes.
	Parabolic dunes.
M	Mobile dunes.

AMG REFERENCE POINTS ADDED

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REVISIONS	GOLD FIELDS EXPLORATION PTY. LIMITED	
	GEOLOGIST:	P.W.H.
	DRAWN:	G.G.
	DATE:	MAY '83
	CHECKED:	
	1:250,000 Reference.	SK 55-5

83-1992.

OCEAN BEACH. TASMANIA.

PHOTO INTERPRETATION.

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(PHOTO) SCALE: 1:40 000 800 400 0 800 1600 2400m