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DEPARTMENT OF MINES
SOUTH AUSTRALIA

GEOLOGICAL SURVEY

IRON EXPLORATION SECTION

EXPLORATION

Report on

HEAVY MINERAL SANDS

MR's 9548, 9549, SEC. 16, HD. HAWKER, CO. JERVOIS

(R. P. Smith & J. Kearns)

by

Graham Whitten
Senior Geologist

5th September, 1961

D.M. 582/61

RB 53/60

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CONTENTS

APPENDIX

MAP REFERENCES

No.	Title	Scale
61-633	Beach Sand Deposit	1" = 60 chains
	MR[t]s 9548, 9549, R. P. Smith & J. Kearns. Sec. 16, Hd. Hawker Co. Jervois.	1" = 100[t]

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Department of Mines
South Australia

Report on

HEAVY MINERAL SANDS

MR's 9548, 9549, SEC. 16, HD. HAWKER, CO. JERVOIS

(R. P. Smith & J. Kearns)

ABSTRACT

MR's 9548, 9549 contain sand dunes migrating over outwash clays and gravels which rest on Archaean pegmatites and gneisses. Heavy minerals occur on the beach as the result of storm action and in the dunes as the result of wind concentration.

Tonnage and grade are too small to warrant exploitation and mining would be difficult.

1. INTRODUCTION

In April 1961 a request was made by R. P. Smith to register 2 claims (MR's 9548, 9549) for beach sand in Sec. 16, Hd. Hawker. MR 9548 was in the name of R. P. Smith, Cowell, and MR 9549 in the name of Jack Kearns, Whyalla.

As Hd. Hawker is reserved from the operations of the Mining Act a geological inspection was made to determine what reserves of heavy mineral sand exist in the area.

The inspection was carried out by the writer accompanied by G. R. Heath (Geologist) on the afternoon of Saturday 13/5/61, when lease pegs were located and the area inspected. On the morning of Sunday 14/5/61 the area was mapped and sampled.

From the plan accompanying this report it will be seen that the area actually pegged is only a very small portion of the area shown on the application, changes in vegetation giving the appearance of section boundaries. The area pegged was examined in detail, the remainder being inspected only.

Samples were submitted to the Australian Mineral Development Laboratories for grain counts. Their report is included as an appendix to this report. Weighting, to relate "Heavy Fraction" Percentages to the total, was carried out by the writer.

2. PREVIOUS INVESTIGATIONS

No occurrence of heavy mineral sands from this locality is recorded in Departmental Files.

The area is part of the Arno one mile sheet. This sheet was one covered by a high level (1500' by one-mile spacing) aeromagnetic survey carried out in 1953-55 by the Bureau of Mineral Resources and reduced by them. The Arno 1M Aeromagnetic Sheet 1/53/8/803 was published in 1957.

Geological mapping of the area was carried out on 60 chain aerial photographs by R. K. Johns of this department and published at one mile scale in 1957 (See Geological Atlas, 1 Mile Series, R. K. Johns, 1957).

Bulletin 37 "Geology and Mineral Resources of Southern Eyre Peninsula" by R. K. Johns, Senior Geologist, also covers this area. It is in print and will shortly be available as a Geological Survey of South Australia Bulletin.

The area was reserved from operation of the Mining Act to facilitate Departmental investigations of the aeromagnetic anomalies disclosed during the aerial survey.

One of these anomalies runs just west of Franklin Harbour towards Pt. Gibbon. Quartz magnetite gneiss was found outcropping on MR 9549.

3. REGIONAL GEOLOGY

The major part of Eyre Peninsula is underlain by Archaean metasediments which contain numerous (usually small) metalliferous occurrences. Iron formations, however, form a very significant proportion of outcrop, more especially to the north in the Middleback Ranges.

On the Arno Sheet quartz felspar gneisses, metasediments with minor quartzites, schists, and amphibolite occur with interbedded dolomites near the base. Migmatites-pegmatites are abundant. Faulting sub parallel to the coast has resulted in a coastal plain underlain at shallow depths by Archaean metasediments with outcropping Archaean formation in the hilly country to the west.

The plain is covered by alluvium soils, clays, sands and gravels of drainage lines (thin) and outwash clays and gravels of the coastal plain (thickness unknown) capped by travertine in parts. Sand dunes occur on the coast.

4. DETAILED GEOLOGY

4.1 Archaen

Outcropping on Point Gibbon itself are Archaean quartz-orthoclase pegmatites striking E-W and quartz biotite gneisses with coarse quartz-orthoclase lenses. The more south-easterly exposures are below high water level; elsewhere they are up to 3'-4' above high water mark.

Between the dunes is quartz-magnetite gneiss with well preserved bedding striking NS and dipping 80°W. This outcrop is 6-10' above high water mark suggesting that the old coastal bedrock platform existed at 10' above present high water level. It is thought that discontinuous suboutcrops of Archaean metasediments and pegmatites are likely to underlie all the area inspected.

Profile 1 shows the relation of the Archaean metasediments etc. to sea level and later sediments.

4.2 Quaternary

Bordering the coast especially to the north are cliffs ranging to approximately 20' high. These are horizontally bedded sands, clays and gravels, the eastern edge of the coastal plain. It is thought that these Quaternary sands, clays and gravels immediately overlie the Archaean rocks over the whole area inspected.

Profile 2 shows the relation of the Quaternary sediments to sea level, while Profile 1 shows their relation to the Archaean metasediments and the sand dunes.

4.3 Recent

The present cycle of erosion has 2 physiographic expressions, the beaches and the sand dunes. On the east coast of Sec. 16 the beach is of limited width, varying from 20' to a maximum of 100' in width. Effective wave action is slight as the beach is sheltered by Pt. Gibbon while the Quaternary sands, clays and gravels form cliffs to 20' necessitating much erosion for little advance.

On the south coast the beach is wider as wind erosion assists wave action so that dunes have been formed to heights in excess of 100' above sea level. These dunes are gradually migrating northwards, overlapping the coastal plain and damming stream runoff inland from them. The common boundary of MR's 9548 and 9549 is very close to the eastern end of this overlap.

5 HEAVY SANDS

5.1 East Beach

The immediate source of all the sand in the area is from the sea from which, following erosion of the cliffs, it is deposited to form a beach.

On the east coast this beach is from 20' to a maximum of 100' wide. After storms, as a result of wave action removing a greater proportion of quartz grains, concentrations of heavy minerals remain forming distinct bands in the sand profile. A pit near the NE corner of MR 9548 showed three such bands in 1', each band being ¼" to ½" thick and containing approximately 10% dark mineral. This is equivalent to 1-2% dark mineral. After a storm when a band may be left on the surface of the beach the impression is that of a beach of solid heavy minerals.

5.2 The Dunes

Heavy sands also occur as rare grains in the sand dunes where they may be concentrated at the surface by wind action. These dunes are formed by reworking of the south beach and are thought to rest on Quaternary and Archaean sediments. Therefore they are unlikely to be continuous to below sea level as in the Queensland deposits. Consequently the use of dredges or similar "wet" methods of mining is not likely to succeed.

Considering the overall grade of the dunes, which is many times less than that of the beach, treatment of them could not be considered economic.

5.3 Sampling

Three samples were taken as under:-

(1) PGW61/1, P227/61

3' vertical channel sample of dune 100 yards South of NE corner of MR 9549.

(2) PGW61/2, P228/61

Vertical sample 50 yards South of NE corner of MR 9549

(3) PGW61/4, P229/61

18" vertical channel sample 200 yards north of NE corner of MR 9549 (ie. SE corner of MR 9548)

All samples were taken at high water mark.

All three samples were split into heavy and light fractions using a heavy liquid of SG2.85-2.9 and grain counts made for each split.

The light fraction averaged 97.5% of the samples and in each case consisted almost wholly of quartz with accessory calcite, shell fragments and in one case biotite (black mica).

The heavy fraction averaged 2.5% of the whole sample, the opaque portion being 70-82% of the fraction equivalent to 1.7 to 2.2% of the whole. It is thought that this is mainly ilmenite.

Tourmaline, zircon, garnet, hornblende and hypersthene make up the remainder of the fraction, namely 0.5% to 0.8% of the whole.

5.4 Reserves

The east boundary of the leases approximates 900 yards of which perhaps 600 yards comprises the sheltered easterly beach likely to contain heavy sands. Assuming an average storm width of enrichment of 40' reserves would be 500 tons per foot of depth of which 5 to 10 tons would be black mineral.

Current Australian prices (3/7/61) are:-

Ilmenite £3. 17. 6. - £4. 0. 0. per ton

Zircon £11 - £13 per ton assay 66-67% ZrO_2

6. CONLUSIONS

MR's 9548 and 9549 form an area containing Recent sand dunes migrating over Quaternary horizontal sand and gravels which rest on Archaean pegmatites and gneisses. The quartz-magnetite gneisses are related to the aeromagnetic anomalies in the area. Heavy minerals exist as rare grains in the sand dunes and as thin low grade bands on the narrow eastern beach.

The tonnage on the beach is too small to warrant exploitation and the grade is low. The dunes while containing larger tonnages are a great deal lower grade and as they lie above the Quaternary sands and gravels can not be worked by large scale dredging methods.

It is thought that development of the claims for heavy sands is not warranted.

Graham Whitten

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Senior Geologist
IRON EXPLORATION SECTION

GFW:CERF
5/9/61

APPENDIX

PETROLOGICAL REPORT (GRAIN COUNTS)

AUSTRALIAN MINERAL DEVELOPMENT LABORATORIES

REPORT ON INVESTIGATION

YOUR REFERENCE: P227/4 - P229/4

MATERIAL: Samples of sand

LOCALITY: Hd. of Hawker, Sect. 16

DATE RECEIVED: 23/5/61

INFORMATION REQUIRED: Composition determination

RESULTS

The samples were separated into heavy and light fractions and the compositions determined by counting.

SG. of liquid 2.85-2.9

P227/4: P9 W61/1

Light fraction: 97.4%	Quartz	85%	
	Calcite	5%	
	Shell fragments	7%	
	Biotite	3%	
Heavy fraction: 2.6%	Opaques	70%	= 1.8%
	Tourmaline	10%	
	Zircon	10%	
	Garnet	6%	
	Hornblende	4%	

P228/4: P9 W61/2

Light fraction: 97.3%	Quartz	90%	
	Calcite	5%	
	Shell fragments	5%	
Heavy fraction: 2.7%	Opaques	82%	= 2.2%
	Garnet	4%	
	Zircon	4%	
	Tourmaline	6%	
	Hornblende	3%	
	Hypersthene	1%	

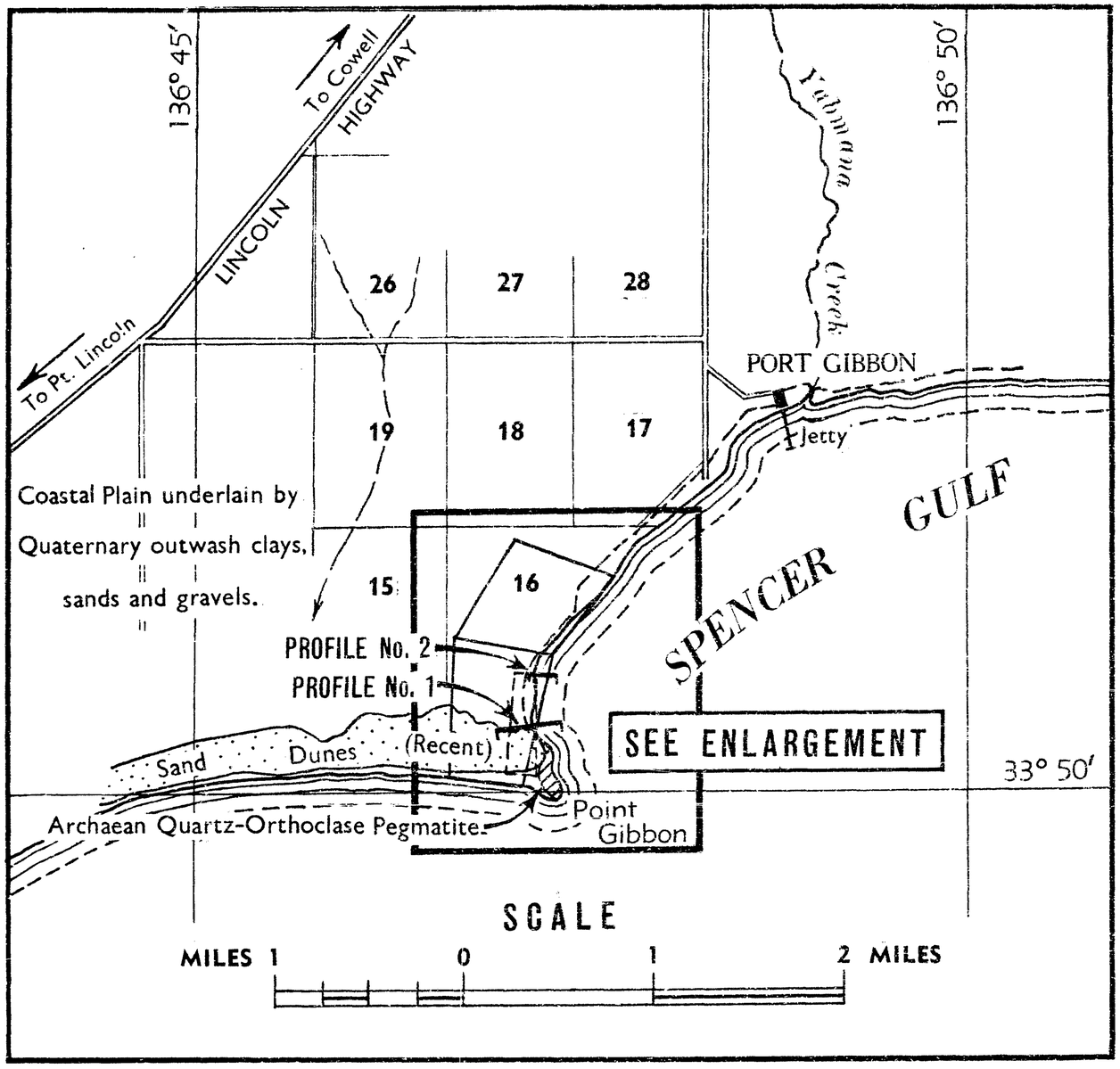
P229/4: P9 W61/3

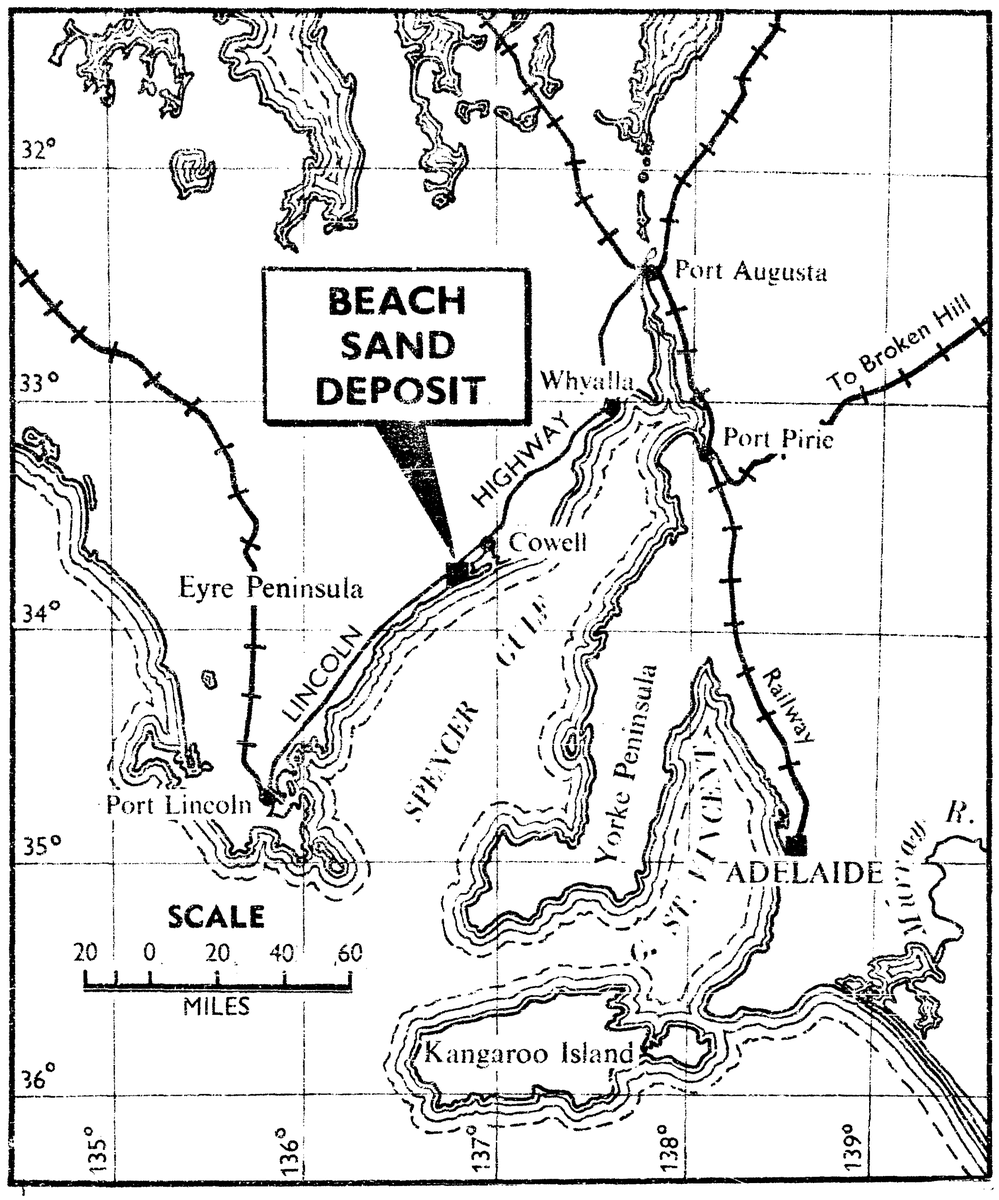
Light Fraction: 97.7%	Quartz	95%	
	Shell fragments	5%	
Heavy fraction: 2.3%	Opaques	72%	= 1.7%
	Garnet	8%	
	Zircon	8%	
	Hornblende	5%	
	Tourmaline	5%	
Quartz and shell fragments carried down from light fraction		2%	

Investigated by: P. J. Sweeney

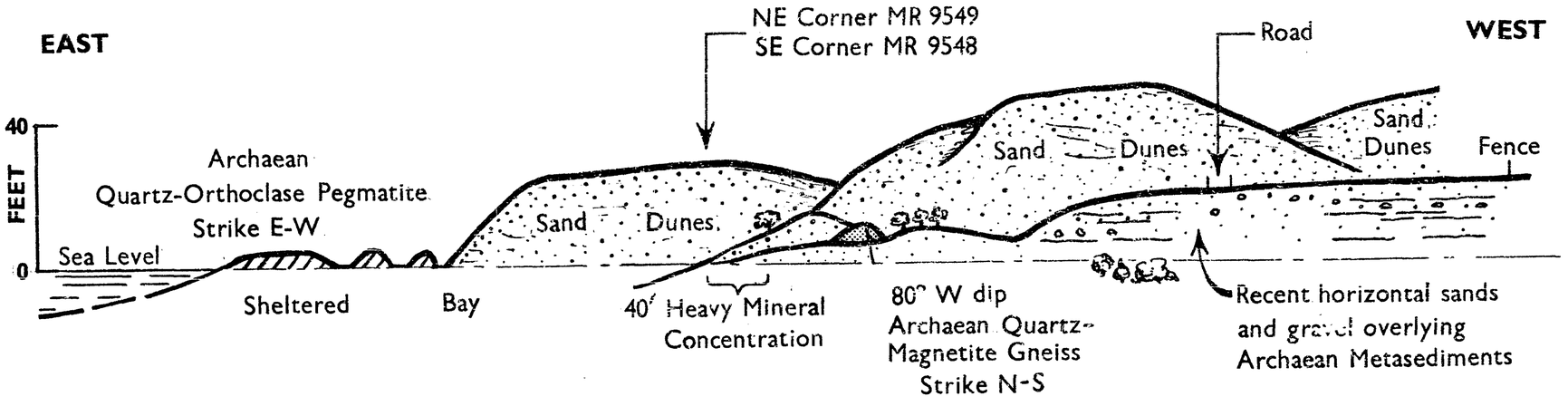
O.I.C. Min. & Pet. Section: H. W. Fander

L. Wallace Coffer
DIRECTOR



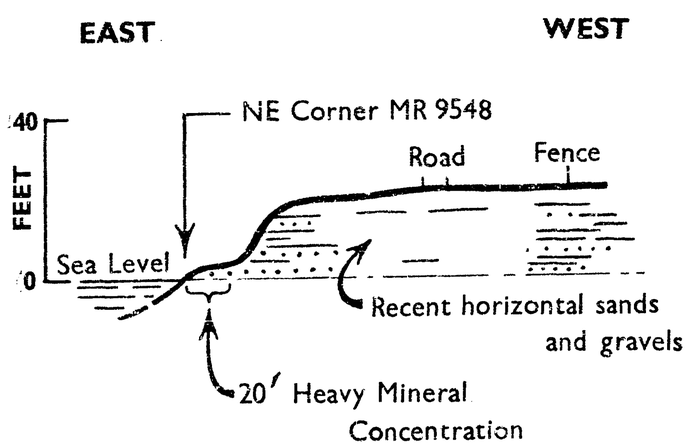


LOCALITY MAP



PROFILE No. 1

Looking South



PROFILE No. 2

Looking South

SCALE

FEET 100 0 100 200 300 400 500 FEET

61-633

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S.A. Dept. of Mines