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E.L. 40/87 Tasmania

Annual Report on Exploration Completed in the
Bridport - Anderson Bay Area of North-Eastern Tasmania

Report Prepared for Bach Holdings Pty. Ltd.
and
Pennant Holdings Ltd.

G. Lee
A. Dove
March 1989

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AMG REFERENCE POINTS ADDED

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SYNOPSIS

1. AIM

To examine the Tasmanian north-east coast between Bridport and Anderson Bay for economic heavy mineral sand occurrences.

2. REASON

Recent increases in the price of mineral sand commodities, particularly rutile and zircon, has been caused by shortages of supply. Price rises combined with technological advances have given impetus to examination of areas previously considered to be unattractive.

Parts of E.L. 40/87 have previously been examined, however much of this work was of a reconnaissance nature and was restricted to the occurrences of tin.

3. SUMMARY & CONCLUSIONS

3.1 Exploration Licence 40/87 covers an area of 243 km² between Bridport and Anderson Bay on the north-eastern coast of Tasmania.

3.2 Previous work by the S.F.L.W.L. Syndicate indicated heavy mineral grade in the range of 0.9 - 1.4% in the Noland Bay area.

3.3 B.M.I. examined part of Waterhouse Beach, with the most significant result obtained from their work being the observation of traces of cassiterite and gold.

3.4 An Airphoto interpretation study was carried out over the area covered by this licence.

3.5 Three exploration targets with large sand tonnages were identified, at Waterhouse Beach, St. Albans Bay-East Sandy Point and East of Noland Bay between Little Pipers River and West Sandy Point.

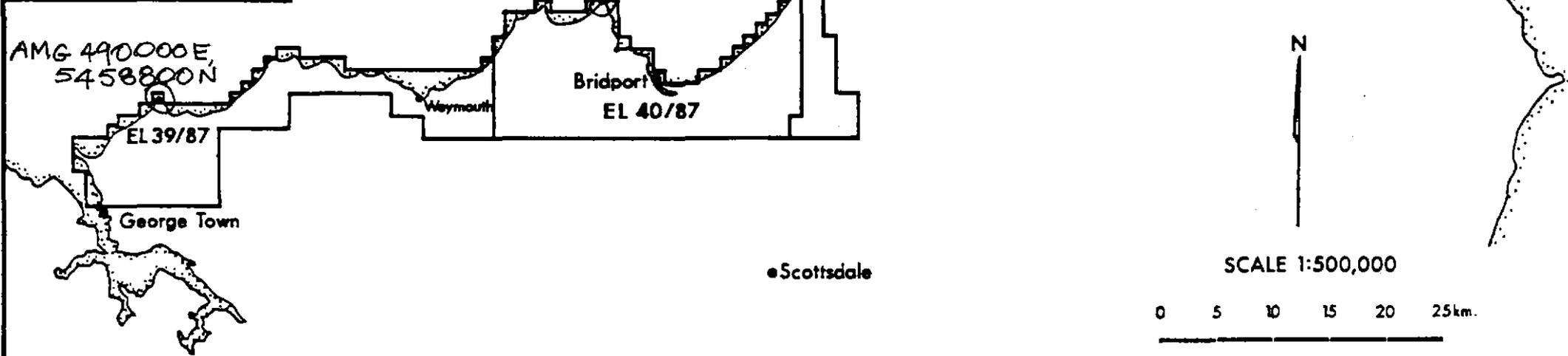
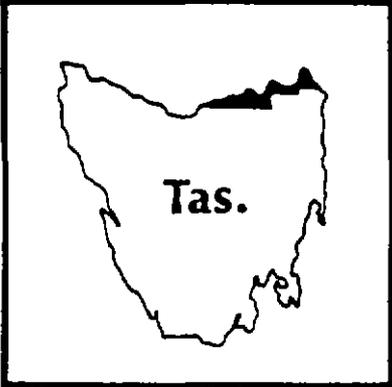
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3.6 Examination of heavy mineral concentrate obtained during reconnaissance investigation of the area indicates the presence of rutile and zircon at levels between 5 - 15%.

4. RECOMMENDATIONS

An initial reconnaissance sampling programme should be undertaken, focussing on the three major sand bodies within the licence. One traverse line with drill holes spaced 40m. apart should be drilled in each of these areas: Aeolian dunes east of Noland Bay, Aeolian dunes and strandlines in the St. Albans Bay area and the Aeolian dunes on the southern end of Waterhouse Beach.

05



SCALE 1:500,000

0 5 10 15 20 25km.

5 cm

AMG REFERENCE POINTS ADDED

LAUNCESTON

BACH/PENNANT HOLDINGS LTD.

LOCATION OF TENEMENTS IN N.E. TASMANIA

Author: A. DOVE Date: MAR. '89 Fig. No: 1

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R E P O R T

5. INTRODUCTION

Preliminary exploration was carried out by Peter H. Stitt & Associates Pty. Ltd. on behalf of Bach Holdings Pty. Ltd. on their E.L. 40/87 located on the north-east coast of Tasmania.

Exploration is aimed at the testing of sands for heavy mineral sand deposits, containing economic minerals; particularly rutile, leucoxene, ilmenite (TiO_2 raw materials), zircon and monazite.

During the past three years the world market has been dominated by a short fall in supply to meet the demand, particularly for TiO_2 pigment minerals, zircon and rare earth heavy minerals. As a consequence the price for these minerals has risen to historically high levels. Predictions for the future supply and price of titanium and zirconium raw materials is one of buoyancy.

Recent advances in technology and understanding of heavy mineral deposits has caused a re-evaluation of prospective areas. Chief points of advancement are:

- . Lower grade deposits are now economic.
- . Exploration methods have been developed particularly with regard to quantitative assessment of low grade areas.
- . Mineralogical determinations have seen the employment of the scanning electron microscope to identify minerals difficult to optically identify; particularly distinguishing black rutile from other black opaque minerals and identification of rare earth element minerals.
- . Mining technology has advanced, for example in dredging and dredge cutters, to lower costs and to make difficult areas now mineable.
- . Metallurgical treatment has seen the development of new spirals with higher throughput and suited to lower grade ore. Magnetic separators are now capable of more finely tuned separations to upgrade ilmenite

and chromite products which have been rejected in the past.

. Overall efficiency of the industry has advanced in order to meet market requirements.

The initial programme was based on the study of topographic maps, aerial photographs and previous work.

In addition to this exploration licence the Company holds E.Ls 39/87, 43/87 and 41/87. These four exploration licences cover most of the coastal strip from the Tamar Estuary in the west to Musselroe Point in the east.

6. TENEMENT INFORMATION

Exploration Licence 40/87 was issued to Bach Holdings Pty. Ltd. and Minproc Mining (Tasmania) Pty. Ltd. It covers an area of 243 km² of the north-eastern coastal area of Tasmania in the Land District of Dorset in the vicinity of Bridport. The licence location is shown in Figure 1.

The area comprises:

52.8 km ² Crown Land
10.2 km ² Waterhouse Protected Area
178.6 km ² Private Land
0.8 km ² State Forest

and excludes:

7.6 km ² Reserves

Some of the coastal Crown reservations within the licence are subject to the Mining Act 1929.

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7. PREVIOUS WORK

A review of available literature and reports of past exploration work was completed for the coastal areas from the Tamar River mouth in the west to Musselroe Point in the east. Information summarised in this section covers all of the four (4) exploration licences held by the Company.

In 1965 B.H.P. reported occurrences of cassiterite in several areas along the coastline in the north eastern part of the State.

Between February, 1966 and March, 1967, Ocean Mining A.G., conducted an intensive exploration programme for alluvial tin, rutile and zircon in Bass Strait, off the north coast of Tasmania.

An evaluation of the results of the programme indicated several areas of potential interest and one in particular, Ringarooma Bay, showed considerable promise. Ringarooma Bay and several other potential targets were subjected to further exploration.

The report (Ocean Mining 1969) indicated reserves within Ringarooma Bay of 23 million m³ (30 million yds³) containing 148 gm/m³ (4oz/yd³) of tin metal; equivalent to 0.009% Sn in raw sand. Zircon indicated to be present at 0.014% of raw sand and rutile 0.006%; after conversion from the quoted ounces/yd³. Significant ilmenite content was noted, but contained chromium contents between 0.1 and 0.3%. Traces of gold and minor monazite occur. These deposits were identified as occurring in old alluvial deposits (Pleistocene interglacials) filling the old Ringarooma River course which is now off shore and below modern sea level.

Planet Gold Ltd. (McMahon 1968) during 1967 examined an area from Low Head on the Tamar entrance to Stony Head as part of a more extensive

programme including areas west of the Tamar. Eight (8) of the holes drilled are within El 39/87, the locations are shown on Figure 2. Three (3) of these eight (8) holes, all located on or near the present day beaches, contained greater than 1% heavy mineral as tabulated below:

PLANET GOLD DRILLHOLES CONTAINING >1% HEAVY MINERAL

<u>Hole</u>	<u>Depth (m)</u>	<u>% Heavy Mineral</u>
25S	0 - 1.5	1.45
	1.5 - 3.0	0.98
	3.0 - 4.5	1.82
	4.5 - 5.8	1.05
		1.34% Average
30S	0 - 1.5	1.05
	1.5 - 3.0	1.11
	3.0 - 4.0	0.93
		1.04% Average
34S	0 - 1.5	1.42
	1.5 - 3.0	3.28
	3.0 - 4.5	2.36
	4.5 - 5.6	1.92
		2.27% Average

Mineralogy results are not given for individual drill holes but are stated overall as:- "The mineral fractions were mineralogically examined and found to contain only 6 - 8% rutile, traces of zircon, and 7½ to 16½ % ilmenite, with the balance being mainly amphiboles, garnet, topaz-andalusite, tourmaline and iron oxides."

B.M.I. Mining (Kociumbas 1971) examined an area east of Bridport, the exact location of which is not apparent from their map. Holes were drilled on four (4) lines spaced 800m. (½ mile) apart and at right angles to the beach, with the holes spaced at 122m. (400 ft.) intervals. In all twenty three (23) holes were drilled.

Samples were panned to give approximately the same quantity for each interval. Insufficient data is recorded to fully assess the results. However, the following trends appear from information available:-

Ilmenite	in	raw	sand	generally	< 0.1%
Rutile	"	"	"	"	< 0.02%
Zircon	"	"	"	"	< 0.05%

Monazite and leucoxene were observed along with traces of cassiterite and gold. The results also indicate an overall trend of decreasing heavy mineral content towards the north east.

The S.F.L.W.L. Syndicate (Lockhart 1972) carried out investigations along the coastal areas between Weymouth and Bridport between 1970 and 1972. Reported are summary results for bulk composite samples tested. A summary of results is tabulated below:-

S.F.L.W.L. SYNDICATE HEAVY MINERAL CONTENTS

<u>Area</u>	<u>Line</u>	<u>Depth (m)</u>	<u>Average % H.M.</u>
East Double Sandy Point	SC1	0 - 9.0 (max)	0.55
Noland Bay (Little Pipers River)	NB3	0 - 1.5	1.40
		1.5 - 4.5	0.93
Anderson Bay (Great Forester River)	WH	0 - 4.5 (max)	0.28
		0 - 7.5	0.77

The location of these traverses is shown on Figure 2 of the Report for EL 40/87.

Mineralogy of the heavy mineral suite is given as:

Rutile	8.00%
Ilmenite	25.35%
Zircon	12.10%
Magnetite	2.30%
Others	51.23%
Leucoxene	1.02%

No comment is made as to the origin of the sample subjected to mineralogical examination.

Maps accompanying the S.F.L.W.L. Syndicate Report indicate that additional drilling was carried out in the West Sandy Point area, but no results are stated.

In 1975 an exploration licence was granted south of Musselroe Point to C.C.J. Blacklow. The objective of exploration was to find silica sand in the -20 +30 mesh size of high quality and sufficient quantity, and also any other mineral sands of commercial value.

Blacklow (1983) reporting on the work has shown that interesting heavy mineral grades occur on the beach to the south of Musselroe Point. The beach width varies from 20 to 26 metres wide and was drilled by auger on 5 traverse lines orientated perpendicular to the coast line. Individual hole depths ranged between 1.1m. (3.5ft.) and 2.1m. (7.0ft.) Heavy mineral grades for the traverse lines ranged from 1.4% to 4.2%, with tin values of 0.004% to 0.065% in the raw sand.

While Blacklow mentions rutile and zircon as being present along with tin he does not indicate how the "recoverable grades" stated were determined. Furthermore he states: "..... the ilmenite present in the H.M. assemblage was quoted as containing 0.65% CrO" No mention is made about the ilmenite quantity.

The licence was held to at least November, 1982, but due to delays in renewal, and objections by the Australian Conservation Foundation, and the Department of Mines, the granting of mining lease was denied for tin. A Miners Right and Easement Licence was kept current in case sample lots of silica sand were required by potential customers.

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In 1976 Minsands Exploration Pty. Ltd. was granted an exploration licence in the vicinity of Ringarooma Bay (Benussi 1976). The objective of the company was to carry out exploratory drilling with the view of locating economic deposits of mineralised sand to the east of Boobyalla Beach. A total of 80 holes were drilled using a hand auger with holes terminating at the water table. They concluded that the mineralization was of too low a grade to be of any economic value. While heavy mineral grades are typically less than 0.5%, the evaluation failed to test sand deposits beneath the water table. As well the mineralogical study was based on XRF determinations on which "several problems were encountered".

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8. AERIAL PHOTOGRAPHY INTERPRETATION

Aerial photography interpretation using the most recently available black and white photography from the Tasmania Department of Lands was carried out over the E.L. Details are as follows:

Scale: 1:42 000
Date: 18.10.84
Run 6: Nos. 38 to 46
Run 7: Nos. 29 to 34

The interpretation map (Figure 2) shows sufficient geographic features to enable location using the 1:100,000 topographic series. Distortion between photographs created some problems in preparing the composite and is reflected by variation in the angle and the length of some tenement boundaries shown.

The following points are noteworthy:

- . There are three main sand bodies within the licence. They occur at the southern end of Waterhouse Beach, East Sandy Point/St. Albans Bay and south from West Sandy Point.
- . It is possible that these Aeolian dunes overlie older mineralized strandline systems.
- . Within St. Albans Bay between East Sandy Point and West Sandy Point a minor strandline system occurs.

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9. HEAVY MINERAL DETERMINATION

Two samples of surface concentrations of heavy minerals were collected during a reconnaissance trip to E.L. 40/87 in December 1988. The samples were collected from Lades Beach and from Pier Beach near Bridport and were submitted for heavy mineral determination and semi-quantitative modal analysis.

Quantitative heavy mineral separation (by heavy liquid sink - float) was carried out with the following results:

<u>Sample No. & Location</u>	<u>Heavy Mineral</u> %
3. (Lades Beach)	7.1
4. (Pier Beach)	14.4

Sample No. 4 and sample No. 6 (taken from Tomahawk Beach in E.L. 41/87) were bulked together and separated by the Frantz Magnetic Separator. These two samples were collected from the most prospective areas in terms of potential quantities of heavy mineral bearing sands. The fractions were then optically identified with the following results:

<u>Frantz Setting</u> Amps	<u>Fraction</u> Grams	<u>Percent</u>	<u>Minerals in Order of Abundance</u>
0.2	0.24	2.14	Ilmenite/Magnetite
0.5	2.37	21.14	Garnet/Ilmenite/Chromite/Amphiboles
0.75	3.46	30.86	Tourmaline/Chromite/Topaz/Silicates/Staurolite/Monazite
1.0	1.93	17.22	Topaz/Silicates/Tourmaline/Chromite/Monazite
1.5	0.33	2.94	Topaz/Silicates/Tourmaline/Spinel/Leucoxene.
Non Mag	2.88	25.69	Topaz/Rutile/Zircon

The 25.69 percent non-magnetics comprise 10.2% Topaz, 9.0% Rutile and 6.5% Zircon.

The remaining heavy mineral fraction (sample No. 3) was bulked together with samples from E.L's 39/87, 40/87 and 43/87 and the heavy mineral fractions

examined optically. They were found to contain high topaz with a combined rutile and zircon fraction of between 5 to 15%. Other potential economic minerals such as ilmenite were present in the range of 5 to 15%, chromite in the range 5 to 15% and monazite in the range 0.05 to 0.5%. Cassiterite, a mineral likely to be associated with topaz, was not detected, however no effort was made at this preliminary stage to examine the concentrates for cassiterite.

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10. DISCUSSION

Early photographic interpretation in Section 8 of this report has outlined three exploration targets with large sand tonnages. These are:

- . East of Noland Bay between Little Pipers River and West Sandy Point, a large Aeolian dune system.
- . St Albans Bay - East Sandy Point. A medium Aeolian dune system with a strandline deposited on the southern shore of St. Albans Bay.
- . Waterhouse Beach. A large Aeolian dune system.

In addition, there are several smaller sand bodies, the most significant of which is Barnbogle Beach which is the south-western end of Waterhouse Beach, and Adams Beach, north-west of Bridport. It is possible that beach strandline deposition occurs below the Aeolian dunes within the exploration licence area. From geomorphological studies, Barnbogle Beach would be a prospective area for such a depositional sequence.

Previous exploration within the area was carried out by the S.F.L.W.L. Syndicate in 1972. The most significant result of their exploration was heavy mineral grades in the range 0.9 - 1.4% contained in the Noland Bay area on their traverse line designated "NB3". Unfortunately their test work utilised an unusual method of compositing samples, that being in vertical depths down the hole rather than drill hole by drill hole, thus samples designated 0 - 1.5m. from all drill holes were bulked together, as was the underlying intervals 1.5 - 4.5m. Mineralogy determined as a result of this exploration indicated rutile of 8%, zircon 12%, ilmenite 25%.

B.M.I. in their work of 1971 examined part of Waterhouse Beach. Unfortunately their exploration methods utilising panning of drill hole samples and mineralogical examination of the concentrates, must be regarded as giving very qualitative results to the programme. Their grades in the raw sand for recoverable minerals should therefore be treated with caution. Probably the

most significant result obtained from their work was the observation of traces of cassiterite and gold.

Recent mineralogical examination from two samples obtained within the licence tends to confirm the mineralogy work of the S.F.L.W.L. Syndicate, particularly with respect to the rutile, zircon and ilmenite percentages in the heavy mineral suite. The presence of topaz and its frequent association with cassiterite tends to confirm the observation of cassiterite by B.M.I.

From information currently available, it would appear that the exploration licence has a number of prospective targets for a heavy mineral suite containing rutile, zircon, cassiterite and minor gold. Ilmenite may be saleable if the chromite associated with it can be separated during beneficiation. From previous work it would appear that the Noland Bay area has potential for heavy mineral grades greater than 1%.

Exploration work should proceed with a reconnaissance drilling programme focussing on the three major target sand bodies within the licence. These targets are:

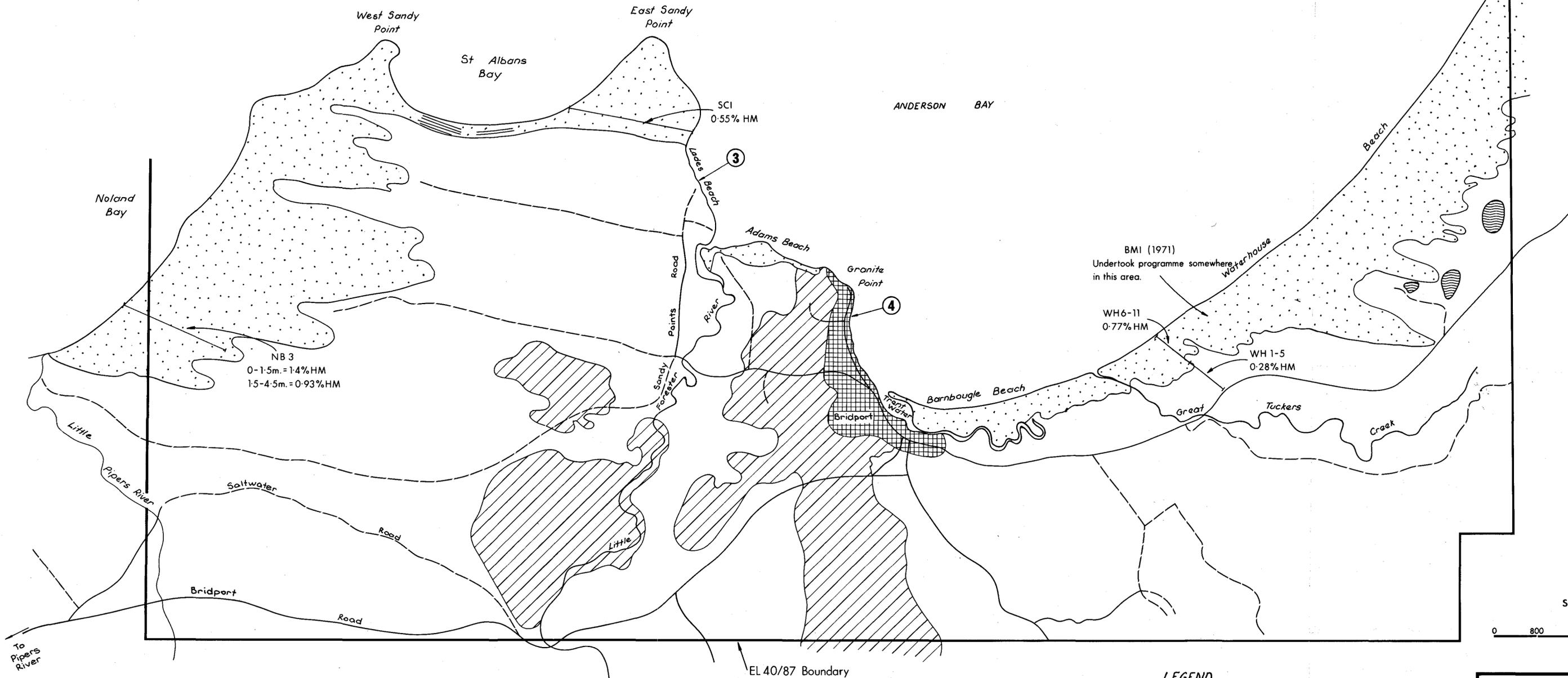
- . The Aeolian dunes east of Noland Bay.
- . The Aeolian dunes and strandlines in the St. Albans Bay area.
- . The Aeolian dunes on the southern end of Waterhouse Beach.

One traverse line with drill holes spaced 40m. apart has previously been proposed for these three areas.

11. REFERENCES

- Benussi, G. 1976
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Final Report
EL 17/75
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Exploration Programme near Bridport.
EL 19/70
- Lockhart, R.D. 1972
Final Report on EL 5/70. Noland Bay
Tasmania. Held by S.F.L.W.L. Syndicate.
- McMahon, K. & Partners 1968
Mineral Sands Exploration
EL 13/67
Northern Tasmania. Planet Gold Ltd.
- Ocean Mining, A.G. 1969
TOE - JV Summary. Ringarooma Bay
Tasmania.

BASS STRAIT



NB 3
0-1.5m. = 1.4% HM
1.5-4.5m. = 0.93% HM

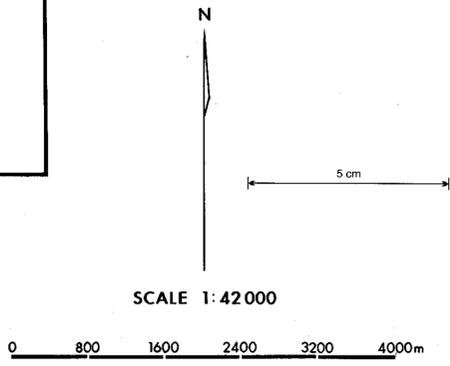
SCI
0.55% HM

BMI (1971)
Undertook programme somewhere
in this area.

WH6-11
0.77% HM

WH 1-5
0.28% HM

EL 40/87 Boundary



LEGEND

-  Aeolian
-  Basement
-  Lake or Lagoon
-  Strand Lines
-  Road
-  Track or Road
-  SFLWL Syndicate traverse line & H.M. averages.

⑥ 1988 SAMPLING SITE

89-2936

061021

BACH/PENNANT HOLDINGS LTD.

EL 40/87 TASMANIA

AIR PHOTO INTERPRETATION

BRIDPORT - ANDERSON BAY

Author: A. DOVE Date: JAN. '89 Fig. No.: 2