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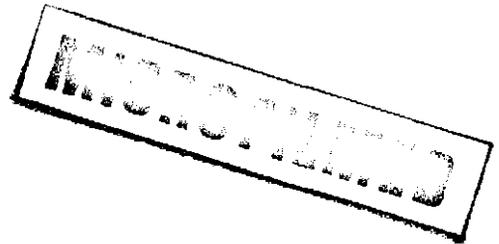
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PETER H. STITT & ASSOCIATES PTY. LTD.
MINING AND GEOLOGICAL CONSULTANTS

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E.L. 41/87 Tasmania

Annual Report On Exploration Completed in the
Waterhouse Point - Ringarooma Bay Area
of North-Eastern Tasmania

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



G. Lee
A. Dove
March, 1989

89-2937

AMG REFERENCE POINTS ADDED

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SYNOPSIS

1. AIM

To examine the Tasmanian north-east coast between Waterhouse Point and Ringarooma 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. 41/87 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 41/87 covers an area of 230 km² between Waterhouse Point and Ringarooma Bay on the north-eastern coast of Tasmania.
- 3.2 Previous work has been undertaken off-shore in Ringarooma Bay, with an alluvial deposit containing cassiterite, zircon and rutile outlined.
- 3.3 An air photo interpretation study was carried out over the area covered by this licence.
- 3.4 Four main prospective exploration targets with large sand tonnage were identified to the east of Waterhouse Beach, in the West Tomahawk Beach area, the Tomahawk Beach area and at Murdochs Beach.
- 3.5 Recent reconnaissance sampling from visible beach concentrates on Tomahawk Beach contained 6.6% heavy mineral and comprised 9% rutile and 6.5% zircon in the heavy mineral suite.

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4. RECOMMENDATION

An initial reconnaissance sampling programme should be undertaken, with traverse lines located at Waterhouse, West Tomahawk and Tomahawk Beaches.

05



AMG 490000E
54 62000N

EL 39/87

George Town

Weymouth

AMG 529000E
54 67600N

Bridport

EL 40/87

EL 41/87

Ringarooma Bay

EL 43/87



SCALE 1:500,000

0 5 10 15 20 25km.

● Scottsdale

5 cm

■ LAUNCESTON

AMG REFERENCE POINTS ADDED

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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. 41/87 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, 40/87 and 43/87. 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 41/87 was issued to Bach Holdings Pty. Ltd. and Minproc Mining (Tasmania) Pty. Ltd. It covers an area of 230 km² of the north eastern coastal area of Tasmania in the Land District of Dorset in the vicinity of Waterhouse Point. The licence location is shown in Figure 1.

The area comprises: 25.4 km² Crown Land
 545 km² Waterhouse Protected Area
 149.6 km² Private Land
and excludes: 5.5 km² of Reserves

The Waterhouse Point Australian Heritage Registered Entry (32 km²) is within the exploration licence.

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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 E1 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 |
| | WH | 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% |

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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".

8. AERIAL PHOTOGRAPHY INTERPRETATION

Aerial photograph 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 3: No. 126
- Run 4: Nos. 97 to 106
- Run 5: Nos. 85 to 87
- Run 6: Nos. 51 to 53

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 four main sand bodies situated within the E.L. These occur at Murdochs Beach and Tomahawk Beach to the east, West Tomahawk Beach, and a large Aeolian system extending south from Waterhouse Point along Waterhouse Beach.
- . It is possible that these Aeolian dunes are overlying older mineralised strandline systems.
- . The coastal area from Waterhouse Point south along Waterhouse Beach, is part of the Waterhouse Protected Area.

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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. 41/87 in December 1988. The samples were collected from South Croppies and Tomahawk Beach 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> % |
|----------------------------------|---------------------------|
| 5 (South Croppies) | 0.1 |
| 6 (Tomahawk) | 6.6 |

Sample NO. 6 and Sample No. 4 (taken from Pier Beach near Bridport in E.L. 40/87) 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/Leucosene |
| Non mag | 2.88 | 25.69 | Topaz/Rutile/Zircon |

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

The remaining heavy mineral fraction (sample No. 5) was bulked together with

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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

Airphoto interpretation in Section 8 of this report has outlined four prospective exploration targets with large sand tonnages. These are:

- . Aeolian dunes to the east of Waterhouse Beach.
- . The Aeolian dune system in the West Tomahawk Beach area.
- . Aeolian dunes in the Tomahawk Beach area.
- . Murdochs Beach Aeolian dunes.

It is possible that strandline deposits associated with beach deposition occur beneath Aeolian dunes in parts of the exploration licence. The most prospective areas from geomorphological studies are the Tomahawk Beach and West Tomahawk Beach deposits with some likelihood also in the Murdochs Beach area.

Previous exploration work was undertaken off-shore in Ringarooma Bay. Although this work was outside of the exploration licence area it is significant in that an alluvial deposit containing cassiterite, zircon and rutile was outlined. This deposit was formed by the Ringarooma River during the Pleistocene glacials when sea level was lower than to-day.

Recent reconnaissance sampling was undertaken within the licence. The most significant sample was taken from visible beach concentrations on Tomahawk Beach. This sample contained 6.6% heavy mineral and comprised 9% rutile and 6.5% zircon in the heavy mineral suite. Other minerals noted but not determined quantitatively were ilmenite, topaz and small amounts of monazite. Work carried out to date within the licence is consistent with the adjoining licence areas. The area is prospective for a heavy mineral suite containing rutile, zircon, cassiterite and minor gold. Ilmenite may be saleable if the associated chromite can be removed upon beneficiation.

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Exploration work should proceed with a reconnaissance hand drilling programme focussing on three of the larger sand bodies within the licence.

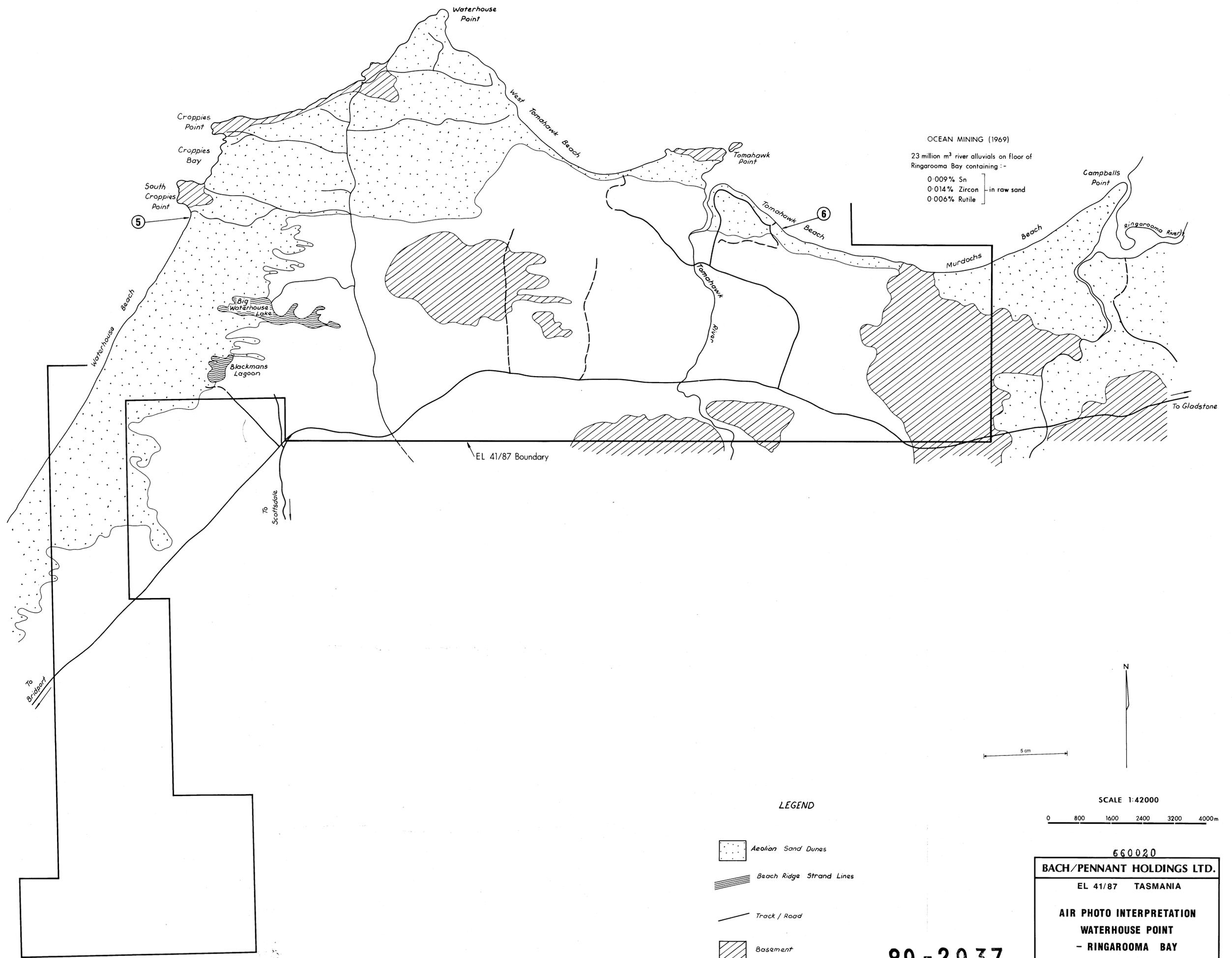
These are:

- . Waterhouse Beach.
- . West Tomahawk Beach.
- . Tomahawk Beach.

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

11. REFERENCES

- | | |
|-----------------------------|--|
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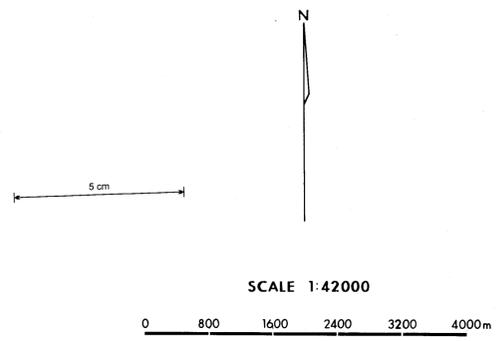
OCEAN MINING (1969)
 23 million m³ river alluvials on floor of Ringarooma Bay containing :-
 0.009% Sn
 0.014% Zircon
 0.006% Rutile
 } in raw sand

EL 41/87 Boundary

LEGEND

-  Aeolian Sand Dunes
-  Beach Ridge Strand Lines
-  Track / Road
-  Basement

⑥ 1988 SAMPLING SITE



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BACH/PENNANT HOLDINGS LTD.

EL 41/87 TASMANIA

AIR PHOTO INTERPRETATION

WATERHOUSE POINT

- RINGAROOMA BAY

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