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EL 49/86

Annual Report on Exploration Completed in the
Pieman River-Sandy Cape Area
West Coast of Tasmania
to 15/6/88

Report Prepared for National Mineral Sands Pty. Ltd.

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May, 1988



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File, Peter H. Stitt & Associates Pty. Ltd.

LIST OF FIGURES

- FIGURE 1 Location Map
- FIGURE 2 Air Photo Interpretation, Sandy Cape-Pieman
River-Ahrberg Bay
- FIGURE 3 Line 1, Ahrberg Bay
- FIGURE 4 Line 2, Ahrberg Bay

CONTENTS

| | | Page |
|----------|--|------|
| SYNOPSIS | | |
| 1. | AIM | 1 |
| 2. | REASON | 1 |
| 3. | SUMMARY & CONCLUSIONS | 1 |
| 4. | RECOMMENDATION | 2 |
| REPORT | | |
| 5. | INTRODUCTION | 3 |
| 6. | TENEMENT INFORMATION | 5 |
| 7. | AERIAL PHOTOGRAPHY INTERPRETATION | 6 |
| 8. | FIELD INVESTIGATIONS | 7 |
| | 8.1 Survey | 7 |
| | 8.2 Drilling | 7 |
| | 8.3 Traverse Line Summaries | 8 |
| 9. | LABORATORY INVESTIGATION | 9 |
| 10. | DISCUSSION | 11 |
| | APPENDIX 1 - Drill Hole Logs Ahrberg Bay | 13 |
| | APPENDIX 2 - Results of Laboratory Heavy Mineral Separations | 41 |
| | APPENDIX 3 - Mineralogical results | 44 |

SYNOPSIS

1. AIM

To examine the Tasmanian west coast between Ahrberg Bay and Sandy Cape 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 has given impetus to examination of areas previously considered to be unattractive.

3. SUMMARY & CONCLUSIONS

- 3.1 EL 49/86 covers 127 km² of the Tasmanian west coast between Ahrberg Bay and Sandy Cape.
- 3.2 A study of aerial photographs covering the licence area was completed and is shown as Figure 2 of this report.
- 3.3 Initially five scout hand auger holes were drilled to water table giving mineralogical results for the heavy mineral suite of: rutile 1%, zircon <1%, leucoxene 2%, monazite <1%, as shown in Appendix 3.
- 3.4 Additional field investigations concentrated on hand augering and hand operated cased sludging 27 drill holes along two traverse lines, to sample below water table.
- 3.5 Heavy mineral results are recorded in Appendices 1 and 2 shown in cross section and Figures 3 and 4.
- 3.6 Heavy mineral contents ranged between 0.33 and 4.89%.

3.7 The greatest concentrations of mineral occur at depths below water table along Line 2.

3.8 Considering the results to date, the licence is not a high priority target.

4. RECOMMENDATION

It is recommended that no further work be undertaken until the remaining mineralogical results become available, and that the situation be reviewed later in 1988 before further field work is undertaken.

REPORT

5. INTRODUCTION

A programme of exploration was carried out by Peter H. Stitt & Associates on behalf of National Mineral Sands Pty. Ltd. (formerly Butlers No. 27) on the west coast of Tasmania in the Ahrberg Bay area.

Exploration was directed at testing the coastal sands for heavy mineral sand deposits, containing economic minerals; particularly rutile, leucoxene, ilmenite (TiO_2 raw materials), zircon and monazite. In addition exploration was to be carried out in order to recognise any other detrital minerals if they occurred in economic quantities.

During the past two 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.

6. TENEMENT INFORMATION

Exploration Licence 49/86 is held by National Mineral Sands Pty. Ltd. It covers an area of 129 square kilometres on the west coast of Tasmania between Ahrberg Bay and Sandy Cape (Figure 1).

The area comprises:

- 93 km² Arthur River Protected Area
- 6 km² Private Property
- 4 km² State Forest
- 26 km² Crown Land

The area includes Interview Rock Art and part of Norfolk Range; Australian Heritage Act Registered Entries.

The area excludes 1 km² Pieman River State Reserve. Also excluded is 18 km² of non-titled land, that was EL 64/83 held by Abignano Constructions Pty. Ltd., but has since been relinquished.

7. AERIAL PHOTOGRAPHY INTERPRETATION

Aerial photography interpretation using the most recently available black and white photography from the Tasmanian department of Lands was carried out over the EL. Details are as follows:

Scale: 1:42,000

Date: 6.11.84

Run: 14 Nos 124-128

Run: 15 Nos 118-121

Run: 16 Nos. 21-23

Run: 17 Nos 24-26

Run: 18 Nos 79-81

Run: 19 Nos. 83-86

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

The following points are noteworthy:

- . Sand deposits within this EL are aeolian dunes which are generally lightly to non-vegetated, and for the most part are therefore mobile.
- . The geomorphology at the coastline indicates that strandline development for the most part is unlikely, with the exception of small areas in the north end of Ahrberg Bay and the mouth of the Pieman River.
- . It is possible that the aeolian dunes overlies older beach deposits, which may contain strandlines with heavy mineral concentration.

8. FIELD INVESTIGATIONS

8.1 Survey

Initially five (5) scout hand auger holes were located on the southern end of the Ahrberg Bay beach. These holes were preliminary reconnaissance holes drilled to water table, and since heavy mineral grades were increasing with depth it was considered necessary to follow up with additional drill holes penetrating beneath the water table.

Two lines of holes were then located:

- . across the north end of Ahrberg Bay beach, 560m. long.
- . across the south end of Ahrberg Bay beach, 360m. long.

Each line commenced at high water mark and proceeded in a direction generally at right angles to the coastline, towards the east.

All drill holes were surveyed by tape, compass and abney hand level. Holes were spaced 40m. apart along each line, with two (2) additional holes 100m. apart on the eastern end of Line 1.

8.2 Drilling

All drilling in the current programme has been by hand augering and hand operated cased sludging. The drilling was carried out using a Tasmanian field crew, with a total of 27 holes and 105.65m. drilled for 64 samples.

Samples were collected at 1 or 2 metre intervals and bagged. The hand sludged samples were weighed in the field so that the drilling crew could maintain a check on weight variation per metre drilled and take steps to remain within acceptable limits.

Holes were drilled to a maximum depth of 10 metres, however most holes finished shallower, due to basement, either rock or clay, with occasional

drilling difficulties preventing further progress.

A brief descriptive log is prepared for each drill hole and where relevant includes heavy mineral assay data. These borehole logs are presented in Appendix 1 of this report. Cross sections for both traverse lines 1 and 2 are included as figures 3 and 4.

8.3 Traverse Line Summaries

Line 1 (north end)

Twelve (12) holes were drilled for a total of 36.9m. All holes were terminated before 10m. depth as clay, basement or wood was encountered. A number of holes contained visible heavy mineral concentrations.

Line 2 (south end)

Ten (10) holes were drilled for a total of 54.15m. A number of holes on this line reached the planned total depth of 10m. with the rest encountering basement rock, clay + gravel or wood at the end of the hole. A number of holes contained visible heavy mineral concentrations.

9. LABORATORY INVESTIGATION

Those samples that have been assayed for heavy minerals during this period were treated by either the Tasmanian Mines Department, Metallurgical Laboratories, Launceston, or RHF Laboratories in Smithton using the procedure outlined below.

1. Dry samples as received.
2. Weigh and record weight.
3. Screen on a coarse sieve (say 2 mm.) to break up agglomerated lumps.
4. Riffle split approximately 100 gm working sample.
5. Re-pack balance of sample.
6. Weigh working sample.
7. Screen on 600 micron sieve (or coarser sieve as directed) and weigh plus 600 micron fraction.
8. Using TBE, separate heavy minerals.
9. Dry and weigh heavy minerals.
10. Calculate heavy minerals as a percentage of the sample weighed in Step 6 above.
11. Package heavies for despatch.

Results are reported in Appendix 2.

The heavy minerals from the 5 scout holes AB1 to AB5 have been bulked together to form one composite sample. Mineralogical analysis was carried out on this composite sample by Applied Petrographic Services, Sydney, N.S.W.

The method adopted for mineralogical study was:

1. Magnetically separate the heavy concentrate into:
 - . hand magnetics
 - . 0.5 amp Frantz magnetics
 - . 1.0 amp Frantz magnetics
 - . 1.6 amp Frantz magnetics
 - . 1.6 amp Frantz non-magnetics

G13

using a Frantz magnetic Separator with forward slope of 20°
and side tilt of 12.5° .

2. Weigh each magnetic fraction.
3. Optically identify mineral grains and point count a minimum 400 points for each magnetic fraction.

Results are discussed in Chapter 10, and the detailed mineralogical analyses are presented in Appendix 3 of this report.

10. DISCUSSION

Heavy mineral separations carried out on the original five drillholes from the southern end of Ahrberg Bay resulted in contents between 0.3 and 1.3 wt.%. The heavy minerals obtained from the five drillholes were subsequently bulked together for mineralogical examination with the results recorded in Appendix 3.

The economic minerals noted amongst the heavy mineral suite were:

| | |
|-----------|-----|
| Zircon | <1% |
| Rutile | 1% |
| Leucoxene | 2% |
| Monazite | <1% |

All other minerals in the sample were of no economic interest.

It should be pointed out however, that these samples were obtained from above the water table. The mineralogy may be considerably different for those heavy mineral concentrations occurring at depths below which hand augering was able to penetrate, since strandline deposits may be encountered.

The subsequent drilling programme involved both hand augering and hand cased sludging for depths below water table. Heavy mineral separations have been carried out on all samples from Line 1 and Line 2.

Line 1 (situated at the northern end of Ahrberg Bay) has an average heavy mineral content of 0.9 wt.%. Generally the top two metres contain the greatest heavy mineral grades, ranging up to 2.35 wt.%, while the remaining intervals range up to 1.21 wt.%.

The opposite is the case for Line 2 (southern end of Ahrberg Bay), not only are the depth of the holes greater, but the heavy mineral grades are generally greater than 1 wt.%, with the intervals above water table ranging up to 1.31 wt.% and

those below water table ranging up to 4.89 wt.%.

Mineralogical studies are presently being carried out on samples from Line 1 and Line 2. However for this exploration licence to become a viable target, the amount of saleable minerals (rutile, zircon and leucoxene) would have to increase to a minimum of 20% within the heavy mineral suite. This is unlikely however, unless the heavy mineral suite below water table is markedly different to that of above.

During the forthcoming period, it is suggested that no further work be undertaken on EL 49/86 until such time as the remaining mineralogical results become available. The situation can then be reviewed during October or November, 1988 with a view to what, if any, further work should be undertaken during the next summer field season.

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APPENDIX 1

Drill Hole Logs Ahrberg Bay

CLIENT: NATIONAL INDUSTRIAL MINERALS

TITLE NO: E.L. 49/86

AREA: PIEMAN RIVER - SANDY CAPE

LINE NO: HOLE NO: AB 1

LOGGED BY: ANDREW DOVE

DATE DRILLED: October, 1987

017

| Interval (m) | Wet Wt. (kg) | Description | % Slime | % +600 um | % H.M. |
|--------------|--------------|--|---------|-----------|--------|
| 0 - 1 | | SAND, fine to medium grained, amber, contains fine shell. H.M. | | 0.1 | 0.7 |
| 1 - 1.6m | | AS ABOVE | | 0.1 | 0.8 |
| | | HIT ROCK | | | |
| | | Average | | | 0.74 |

14

778018

CLIENT: NATIONAL INDUSTRIAL MINERALS

TITLE NO: E.L. 49/86

AREA: PIEMAN RIVER - SANDY CAPE

LINE NO: HOLE NO: AB 2

LOGGED BY: ANDREW DOVE

DATE DRILLED: October, 1987

| Interval (m) | Wet Wt. (kg) | Description | % Slime | % +600 um | % H.M. |
|--------------|--------------|--|---------|-----------|--------|
| 0 - 1 | | SAND, fine to medium grain, amber, contains fine shell. H.M. | | 0.3 | 0.3 |
| 1 - 2 | | As above for top 30m then hit dark grey organic layer. | | | |
| 2 - 3 | | SAND, fine to medium grained, light brown, abundant fine shell. H.M. | | 0.3 | 0.3 |
| 3 - 4 | | AS ABOVE, slightly browner. | | | |
| | | END OF HOLE, 4.0m. Water | | | |
| | | | Average | | 0.3 |

0.2

15

778019

CLIENT: NATIONAL INDUSTRIAL MINERALS

TITLE NO: E.L. 49/86

AREA: PIEMAN RIVER - SANDY CAPE

LINE NO: HOLE NO: AB 3

LOGGED BY: ANDREW DOVE

DATE DRILLED: October, 1987

019

| Interval (m) | Wet Wt. (kg) | Description | % Slime | % +600 um | % H.M. |
|-----------------|-----------------|---|---------|-----------|--------|
| 0 - 1 | | SAND, fine to medium grained, grey, organic. | | 0.2 | 0.4 |
| 1 - 2 | | SAND, fine to medium grained, brown, abundant shell. H.M. traces. | | | |
| 2 - 3 | | AS ABOVE. H.M. traces. | | 0.2 | 0.4 |
| 3 - 4 | | AS ABOVE. H.M. traces. | | | |
| | | END OF HOLE 4.0m. Water. | | | |
| | | Average | | | 0.4 |

16

778020

CLIENT: NATIONAL INDUSTRIAL MINERALS

TITLE NO: E.L. 49/86

AREA: Pieman River - Sandy Cape

LINE NO: HOLE NO: AB 5

LOGGED BY: ANDREW DOVE

DATE DRILLED: October, 1987

021

| Interval (m) | Wet Wt. (kg) | Description | % Slime | % +600 um | % H.M. |
|--------------|--------------|---|---------|-----------|--------|
| 0 - 1 | | SAND, medium grained, amber, abundant fine shell. H.M. Traces. | | 0.2 | 1.3 |
| 1 - 2 | | AS ABOVE | | | |
| | | END OF HOLE 2m. Water | | | |
| | | Average | | | 1.3 |

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: 49/86

022

AREA: AHRBERG BAY

LINE NO: 1 HOLE NO: ABO

LOGGED BY: ANDREW DOVE

DATE DRILLED: MARCH, 1988

| Interval (m) | Wet Wt. (kg) | Description | % -600 um | % +600 um | % H.M. |
|--------------|--------------|---|-----------|-----------|--------|
| 0 - 2.0 | | SAND, fine to medium grained, amber to grey. H.M. present >1% Started sludging 1m. | 99.90 | 0.10 | 1.20 |
| 2.0 - 3.0 | | SAND, fine to medium grained, grey. H.M. present >1% Shell at base | 95.68 | 4.32 | 0.57 |
| 3.0 - 4.0 | | SAND, fine to medium grained, grey, abundant coarse shell. Hit rock END OF HOLE 4.0m. ROCK | | | |
| | | Average | | | 0.89 |

023

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: 49/86

AREA: AHRBERG BAY

LINE NO: 1 HOLE NO: AB4

LOGGED BY: ANDREW DOVE

DATE DRILLED: MARCH, 1988

| Interval (m) | Wet Wt. (kg) | Description | % =600 um | % +600 um | % H.M. |
|--------------|--------------|---|-----------|-----------|--------|
| 0 - 2 | | SAND, fine to medium grained, grey, H.M. present >1%. Shell at base. | 96.23 | 3.77 | 2.35 |
| | | Started sludging 1m. | | | |
| 2 - 2.8 | | SAND, medium grained, brown, some very coarse grains. Hit rock | 89.22 | 10.78 | 0.85 |
| | | END OF HOLE 2.8m. | | | |
| | | Average | | | 1.92 |

20

778024

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: 49/86

AREA: AHRBERG BAY

LINE NO: 1 HOLE NO: AB8

LOGGED BY: ANDREW DOVE

DATE DRILLED: MARCH, 1988

024

| Interval (m) | Wet Wt. (kg) | Description | % -600 um | % +600 um | % H.M. |
|-----------------|-----------------|---|-----------|-----------|--------|
| 0 - 2.0 | | <p>SAND, fine to medium grained, light grey. H.M. traces. Sand lighter from 1-2m. also most of H.M. occurs. Coarser at base. Hit wood and rock.</p> <p>END OF HOLE 2m.</p> <p style="text-align: center;">Average</p> | 97.79 | 2.21 | 1.08 |

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: 49/86

AREA: AHRBERG BAY

LINE NO: 1

HOLE NO: AB12

LOGGED BY: ANDREW DOVE

DATE DRILLED:

MARCH, 1988

025

| Interval (m) | Wet Wt. (kg) | Description | % -600 um | % +600 um | % H.M. |
|--------------|--------------|---|-----------|-----------|--------|
| 0 - 1.0 | | SAND, fine to medium grained, light grey-brown mottle Started sludging | 99.94 | 0.06 | 0.74 |
| 1.0 - 2.0 | | SAND, fine to medium grained, light grey. H.M. present, contains some wood. | 99.59 | 0.41 | 0.90 |
| 2.0 - 3.0 | | AS ABOVE, contains abundant wood END OF HOLE 3.0m. Clay | 99.37 | 0.63 | 0.78 |
| | | Average | | | 0.81 |

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: 49/86

AREA: AHRBERG BAY

LINE NO: 1

HOLE NO: AB16

LOGGED BY: ANDREW DOVE

DATE DRILLED:

MARCH, 1988

626

| Interval (m) | Wet Wt. (kg) | Description | % -600 um | % +600 um | % H.M. |
|--------------|--------------|--|-----------|-----------|--------|
| 0 - 1.0 | | SAND, fine to medium grained, brown. Started sludging | 99.35 | 0.65 | 1.07 |
| 1.0 - 2.0 | | SAND, fine to medium grained, light grey, contains wood fragments. | 99.67 | 0.33 | 0.82 |
| 2.0 - 3.0 | | AS ABOVE, abundant wood fragments. | 99.58 | 0.42 | 0.61 |
| 3.0 - 3.5 | | AS ABOVE END OF HOLE 3.5m. Wood | | | |
| | | Average | | | 0.80 |

23

778027

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: 49/86

AREA: AHRBERG BAY

LINE NO: 1 HOLE NO: AB20

LOGGED BY: ANDREW DOVE

DATE DRILLED: MARCH, 1988

027

| Interval (m) | Wet Wt. (kg) | Description | % -600 um | % +600 um | % H.M. |
|--------------|--------------|--|-----------|-----------|--------|
| 0 - 1.0 | | SAND, fine to medium grained, brown to dark brown. Started sludging | 99.96 | 0.04 | 0.48 |
| 1.0 - 2.0 | | SAND, fine to medium grained, light grey. Contains wood fragments. | | | |
| 2.0 - 3.0 | | AS ABOVE, abundant wood. | 99.87 | 0.13 | 0.63 |
| 3.0 - 3.5 | | AS ABOVE END OF HOLE 3.5m. Wood | | | |
| | | Average | | | 0.54 |

24

778028

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: 49/86

AREA: AHRBERG BAY

LINE NO: 1 HOLE NO: AB24

LOGGED BY: ANDREW DOVE

DATE DRILLED: MARCH, 1988

028

| Interval (m) | Wet Wt. (kg) | Description | % -600 um | % +600 um | % H.M. |
|--------------|--------------|---|-----------|-----------|--------|
| 0 - 1.0 | | SAND, fine to medium grained, light grey H.M. traces. Started sludging | 99.36 | 0.64 | 0.34 |
| 1.0 - 2.0 | | AS ABOVE, H.M. present | | | |
| 2.0 - 3.0 | | AS ABOVE, H.M. traces, contains abundant wood fragments. | 99.36 | 0.64 | 0.43 |
| 3.0 - 4.0 | | AS ABOVE END OF HOLE 4.0m. Wood | | | |
| | | Average | | | 0.39 |

25

778029

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: 49/86

AREA: AHRBERG BAY

LINE NO: 1

HOLE NO: AB28

LOGGED BY: ANDREW DOVE

DATE DRILLED: MARCH, 1988

029

| Interval (m) | Wet Wt. (kg) | Description | % -600 um | % +600 um | % H.M. |
|--------------|--------------|---|-----------|-----------|--------|
| 0 - 2.0 | | SAND, fine to medium grained, light grey to grey. Started sludging | 99.91 | 0.09 | 0.58 |
| 2.0 - 3.0 | | SAND, fine to medium grained, light grey, contains wood fragments. | 99.83 | 0.17 | 0.40 |
| 3.0 - 4.0 | | AS ABOVE | | | |
| 4.0 - 5.0 | | AS ABOVE | 99.70 | 0.30 | 0.54 |
| | | END OF HOLE 5.0m. Wood | | | |
| | | Average | | | 0.5 |

26

778030

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: 49/86

030

AREA: AHRBERG BAY

LINE NO: 1

HOLE NO: AB32

LOGGED BY: ANDREW DOVE

DATE DRILLED: MARCH, 1988

| Interval (m) | Wet Wt. (kg) | Description | % -600 um | % +600 um | % H.M. |
|--------------|--------------|---|-----------|-----------|--------|
| 0 - 1.0 | | SAND, fine to medium grained light grey with black organics. Started sludging | 98.20 | 1.80 | 0.85 |
| 1.0 - 2.0 | | SAND, fine to very fine grained, dark brown, organics. | | | |
| 2.0 - 3.0 | | AS ABOVE, contains wood fragments. Hit black mud. END OF HOLE Black mud | 99.55 | 0.45 | 0.55 |
| | | Average | | | 0.75 |

27

778031

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: 49/86

AREA: AHRBERG BAY

LINE NO: 1

HOLE NO: AB36

LOGGED BY: ANDREW DOVE

DATE DRILLED:

MARCH, 1988

001

| Interval (m) | Wet Wt. (kg) | Description | % -600 um | % +600 um | % H.M. |
|-----------------|-----------------|--|-----------|-----------|--------|
| 0 - 2.0 | | SAND, fine to medium grained, light brown, contains black organics Started sludging | 99.98 | 0.02 | 1.67 |
| 2.0 - 2.1 | | SAND, fine grained, light grey, contains organics. END OF HOLE 2.1m. Casing jammed | 99.62 | 0.38 | 1.21 |
| | | Average | | | 1.65 |

28

778032

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: 49/86

AREA: AHRBERG BAY

LINE NO: 1

HOLE NO: AB 46

LOGGED BY: ANDREW DOVE

DATE DRILLED:

MARCH, 1988

002

| Interval (m) | Wet Wt. (kg) | Description | % -600 µm | % +600 µm | % H.M. |
|--------------|--------------|--|-----------|-----------|-----------------|
| 0 - 2.0 | | SAND, fine to medium grained, light grey. Contains organics. Started sludging | 99.32 | 0.68 | 1.08 |
| 2.0 - 3.0 | | AS ABOVE, became coarser with depth. END OF HOLE 3.0m. Gravel | 90.40 | 9.60 | 0.33 |
| | | | | | Average 0.83 |

29

778033

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: 49/86

AREA: AHRBERG BAY

LINE NO: 1 HOLE NO: AB56

LOGGED BY: ANDREW DOVE

DATE DRILLED: MARCH, 1988

003

| Interval (m) | Wet Wt. (kg) | Description | % -600 um | % +600 um | % H.M. |
|--------------|--------------|--|-----------|-----------|--------|
| 0 - 1.0 | | SAND, fine to medium grained, light grey, contains organics, coarser at base. END OF HOLE 1.0m. Gravel | 98.48 | 1.52 | 0.58 |
| | | Average | | | 0.58 |

CLIENT: NATIONAL MINERAL SANDS
 AREA: AHRBERG BAY (south end of beach)
 LOGGED BY: ANDREW DOVE

TITLE NO: 49/86
 LINE NO: 2 HOLE NO: ABO
 DATE DRILLED: MARCH, 1988

004

| Interval (m) | Wet Wt. (kg) | Description | % -600 um | % +600 um | % H.M. |
|--------------|--------------|---|-----------|-----------|--------|
| 0 - 2.0 | | SAND, medium to coarse grained, amber, abundant shell, H.M. present Started sludging | 94.22 | 5.78 | 0.69 |
| 2.0 - 3.0 | | AS ABOVE | 98.67 | 1.33 | 0.40 |
| 3.0 - 3.2 | | AS ABOVE END OF HOLE 3.2m. Hit rock | | | |
| | | Average | | | 0.58 |

31

778035

CLIENT: NATIONAL MINERAL SANDS
 AREA: AHRBERG BAY (south end of beach)
 LOGGED BY: ANDREW DOVE

TITLE NO: 49/86
 LINE NO: 2 HOLE NO: AB4
 DATE DRILLED: MARCH, 1988

005

| Interval (m) | Wet Wt. (kg) | Description | % -600 um | % +600 um | % H.M. |
|--------------|--------------|---|-----------|-----------|--------|
| 0 - 2.0 | | SAND, medium to coarse grained, amber. Abundant coarse shell, H.M. present. | 99.52 | 0.48 | 0.58 |
| | | Started sludging | | | |
| 2.0 - 2.5 | | AS ABOVE | 99.84 | 0.16 | 4.89 |
| | | END OF HOLE Hit rock | | | |
| | | Average | | | 1.44 |

CLIENT:

NATIONAL MINERAL SANDS

TITLE NO: 49/86

AREA:

AHRBERG BAY (south end of beach)

LINE NO: 2

HOLE NO: AB12

LOGGED BY:

ANDREW DOVE

DATE DRILLED:

MARCH, 1988

007

| Interval (m) | Wet Wt. (kg) | Description | % -600 um | % +600 um | % H.M. |
|-----------------|-----------------|--|-----------|-----------|--------|
| 0 - 2.0 | | <p>SAND, medium to coarse grained, amber with abundant shell, H.M. present. Clayey at base.</p> <p>END OF HOLE 2.0m. Gravel and clay</p> | 98.98 | 1.02 | 1.31 |
| Average | | | | | 1.31 |

34

778038

CLIENT:

NATIONAL MINERAL SANDS

TITLE NO: 49/86

AREA:

AHRBERG BAY (south end of beach)

LINE NO: 2

HOLE NO: AB 16

LOGGED BY:

ANDREW DOVE

DATE DRILLED:

MARCH, 1988

008

| Interval (m) | Wet Wt. (kg) | Description | % -600 um | % +600 um | % H.M. |
|-----------------|-----------------|--|-----------|-----------|--------|
| 0 - 2.0 | | SAND, medium to coarse grained, amber. Abundant shell present, H.M. present. | 99.61 | 0.39 | 1.09 |
| 2.0 - 4.0 | | AS ABOVE | 99.86 | 0.14 | 1.27 |
| 4.0 - 5.25 | | AS ABOVE - hit black mud then white clay. | 94.79 | 5.21 | 1.55 |
| | | END OF HOLE 5.25m. | | | |
| | | Average | | | 1.27 |

35

778039

CLIENT: NATIONAL MINERAL SANDS
 AREA: AHRBERG BAY (south end of beach)
 LOGGED BY: ANDREW DOVE

TITLE NO: 49/86
 LINE NO: 2 HOLE NO: AB 20
 DATE DRILLED: MARCH, 1988

009

| Interval (m) | Wet Wt. (kg) | Description | % -600 μ m | % +600 μ m | % H.M. |
|--------------|--------------|--|----------------|----------------|--------|
| 0 - 2.0 | | SAND, medium to coarse grained, amber. Some organics, abundant shell, H.M. present | 99.44 | 0.56 | 0.58 |
| 2.0 - 4.0 | | SAND, fine to medium grained, amber. Abundant shell. H.M. present. | 99.94 | 0.06 | 0.95 |
| | | Started sludging at 3m. | | | |
| 4.0 - 5.0 | | AS ABOVE, slightly lighter. | 99.98 | 0.02 | 1.49 |
| 5.0 - 6.0 | | AS ABOVE. | | | |
| 6.0 - 7.0 | | AS ABOVE. | | | |
| 7.0 - 8.0 | | AS ABOVE. | 99.87 | 0.13 | 1.89 |
| 8.0 - 9.0 | | AS ABOVE. | | | |
| 9.0 - 10.0 | | AS ABOVE | 99.96 | 0.04 | 2.02 |
| | | END OF HOLE 10.0m. | | | |
| | | Average | | | 1.39 |

36

778040

CLIENT: NATIONAL MINERAL SANDS
 AREA: AHRBERG BAY (south end of beach)
 LOGGED BY: ANDREW DOVE

TITLE NO: 49/86
 LINE NO: 2 HOLE NO: AB24
 DATE DRILLED: MARCH, 1988

640

| Interval (m) | Wet Wt. (kg) | Description | % -600 um | % +600 um | % H.M. |
|--------------|--------------|--|-----------|-----------|--------|
| 0 - 2.0 | | SAND, medium to coarse grained, amber, abundant shell. H.M. present. | 99.35 | 0.65 | 0.61 |
| 2.0 - 4.0 | | AS ABOVE | 99.27 | 0.73 | 0.54 |
| 4.0 - 6.0 | | AS ABOVE. Hit wood, and black mud at base. END OF HOLE 6.0m. Wood, auger wouldn't turn | 99.06 | 0.94 | 0.60 |
| | | Average | | | 0.58 |

37

778041

CLIENT: NATIONAL MINERAL SANDS
 AREA: AHRBERG BAY (south end of beach)
 LOGGED BY: ANDREW DOVE

TITLE NO: 49/86

LINE NO: 2 HOLE NO: AB28

DATE DRILLED: MARCH, 1988

041

| Interval (m) | Wet Wt. (kg) | Description | % -600 um | % +600 um | % H.M. |
|--------------|--------------|--|-----------|-----------|--------|
| 0 - 2.0 | | SAND, medium grained, amber, abundant shell. H.M. present. | 99.37 | 0.63 | 0.52 |
| 2.0 - 4.0 | | AS ABOVE, went through a number of black organic layers. | 99.79 | 0.21 | 0.43 |
| 4.0 - 6.0 | | SAND, medium to coarse grained, brown to dark brown (podsol). Slightly organic. Started sludging. | 99.69 | 0.31 | 0.61 |
| 6.0 - 7.0 | | SAND, medium grained, light grey, shell and H.M. present. Some wood fragments. | 99.89 | 0.11 | 1.24 |
| 7.0 - 7.3 | | AS ABOVE Hit wood. END OF HOLE 7.3m. Wood | | | |
| | | Average | | | 0.65 |

38

778042

CLIENT: NATIONAL MINERAL SANDS
 AREA: AHRBERG BAY (south end of beach)
 LOGGED BY: ANDREW DOVE

TITLE NO: 49/86
 LINE NO: 2 HOLE NO: AB32
 DATE DRILLED: MARCH, 1988

042

| Interval (m) | Wet Wt. (kg) | Description | % -600 um | % +600 um | % H.M. |
|--------------|--------------|--|-----------|-----------|--------|
| 0 - 2.0 | | SAND, medium grained, amber. Abundant shell fragments H.M. present | 99.15 | 0.85 | 0.85 |
| 2.0 - 4.0 | | AS ABOVE | 99.31 | 0.69 | 0.71 |
| 4.0 - 6.0 | | AS ABOVE, hit black organic layer (podsol) at base. | 99.10 | 0.90 | 0.76 |
| 6.0 - 7.0 | | SAND, medium grained, light grey, some black organics, some wood fragments. | | | |
| | | Started sludging 6.5m. | 99.89 | 0.11 | 1.33 |
| 7.0 - 8.0 | | SAND, medium grained, light grey, contains wood fragments. | | | |
| | | END OF HOLE 8.0m. Rock | | | |
| | | Average | | | 0.91 |

39

778043

CLIENT: NATIONAL MINERAL SANDS
 AREA: AHRBERG BAY (south end of beach)
 LOGGED BY: ANDREW DOVE

TITLE NO: 49/86
 LINE NO: 2 HOLE NO: AB36
 DATE DRILLED: MARCH, 1988

043

| Interval (m) | Wet Wt. (kg) | Description | % -600 um | % +600 um | % H.M. |
|--------------|--------------|--|-----------|-----------|--------|
| 0 - 2.0 | | SAND, medium grained, amber. Abundant shell fragments H.M. present. | 99.37 | 0.63 | 0.53 |
| 2.0 - 4.0 | | AS ABOVE, went through wood layers. | 99.24 | 0.76 | 0.53 |
| 4.0 - 6.0 | | SAND, medium grained, grey brown, abundant shell fragments. Slightly organic. | 99.70 | 0.30 | 0.56 |
| | | Started sludging 5.5m. | | | |
| 6.0 - 7.0 | | SAND, medium grained, light grey. H.M. traces. | 99.92 | 0.08 | 1.36 |
| 7.0 - 8.0 | | AS ABOVE | | | |
| 8.0 - 8.6 | | AS ABOVE | 99.69 | 0.31 | 1.78 |
| | | END OF HOLE 8.6m. White clay | | | |
| | | Average | | | 0.82 |

40

778044

APPENDIX 2

Results of Laboratory Heavy Mineral Separations.

- . Scout auger holes AB1 to AB5
- . Line 1 auger and sludged holes ABO to AB56
- . Line 2 auger and sludged holes ABO to AB36

DEPARTMENT OF MINES—TASMANIA

778046



TELEPHONES:

| | |
|----------------------------------|--------------------------|
| Metallurgical Research | } 44 2431-2 (2 lines) |
| Laboratory | |
| Mines Inspection | |
| Explosives & Inflammable Liquids | |

TELEX 58764

LAUNCESTON OFFICES
287 WELLINGTON STREET
SOUTH LAUNCESTON 7249

10th Nov'87

Peter Stitt & Assoc Pty Ltd,
5th Floor
York House
32 York Street
Sydney 2000

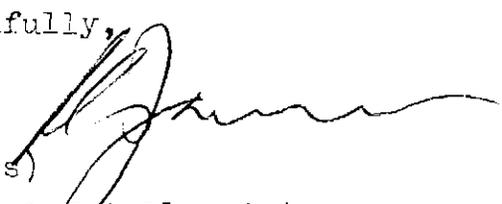
Reg. No 875754-62

Dear Sir,

Please find below results of samples submitted to this laboratory and stated to be from Ahrberg Bay.

| <u>Reg. No</u> | | <u>Description</u> | <u>% + 600 μm</u> | <u>% Heavy Mineral</u> |
|----------------|------|--------------------|----------------------------------|------------------------|
| 875754 | AB 1 | 0 - 1 | 0.1 | 0.7 |
| 755 | | 1 - 1.6 | 0.1 | 0.8 |
| 756 | AB 2 | 0 - 2 | 0.3 | 0.3 |
| 757 | | 2 - 4 | 0.3 | 0.3 |
| 758 | AB 3 | 0 - 2 | 0.2 | 0.4 |
| 759 | | 2 - 4 | 0.2 | 0.4 |
| 760 | AB 4 | 0 - 1 | 1.3 | 1.2 |
| 761 | | 2 - 3 | 3.6 | 0.5 |
| 762 | AB 5 | 0 - 2 | 0.2 | 1.3 |

Yours faithfully,



(P.L. James)

Acting Chief Chemist & Metallurgist

Analyses by...



Sample No.

wt%+600u

wt%-600u

wt% of H.M.

AHRBERG BAY (Line 1)

| | | | | |
|-------|--------|-------|-------|------|
| AB-0 | 0-2m | 0.10 | 99.90 | 1.20 |
| | 2-4m | 4.32 | 95.68 | 0.57 |
| AB-4 | 0-2m | 3.77 | 96.23 | 2.35 |
| | 2-2.8m | 10.78 | 89.22 | 0.85 |
| AB-8 | 0-2m | 2.21 | 97.79 | 1.08 |
| AB-12 | 0-1m | 0.06 | 99.94 | 0.74 |
| | 1-2m | 0.41 | 99.59 | 0.90 |
| | 2-3m | 0.63 | 99.37 | 0.78 |
| AB-16 | 0-1m | 0.65 | 99.35 | 1.07 |
| | 1-2m | 0.33 | 99.67 | 0.82 |
| | 2-3.5m | 0.42 | 99.58 | 0.61 |
| AB-20 | 0-2m | 0.04 | 99.96 | 0.48 |
| | 2-3.5m | 0.13 | 99.87 | 0.63 |
| AB-24 | 0-2m | 0.64 | 99.36 | 0.34 |
| | 2-4m | 0.64 | 99.36 | 0.43 |
| AB-28 | 0-2m | 0.09 | 99.91 | 0.58 |
| | 2-4m | 0.17 | 99.83 | 0.40 |
| | 4-5m | 0.30 | 99.70 | 0.54 |
| AB-32 | 0-2m | 1.80 | 98.20 | 0.85 |
| | 2-3m | 0.45 | 99.55 | 0.55 |
| AB-36 | 0-2m | 0.02 | 99.98 | 1.67 |
| | 2-2.1m | 0.38 | 99.62 | 1.21 |
| AB-46 | 0-2m | 0.68 | 99.32 | 1.08 |
| | 2-3m | 9.60 | 90.40 | 0.33 |
| AB-56 | 0-1m | 1.52 | 98.48 | 0.58 |

AHRBERG BAY (Line 2)

| | | | | |
|-------|---------|------|-------|------|
| AB-0 | 0-2m | 5.78 | 94.22 | 0.69 |
| | 2-3.2m | 1.33 | 98.67 | 0.40 |
| AB-4 | 0-2m | 0.48 | 99.52 | 0.58 |
| | 2-2.5m | 0.16 | 99.84 | 4.89 |
| AB-8 | 0-1.3m | 1.03 | 98.97 | 0.85 |
| AB-12 | 0-2m | 1.02 | 98.98 | 1.31 |
| AB-16 | 0-2m | 0.39 | 99.61 | 1.09 |
| | 2-4m | 0.14 | 99.86 | 1.27 |
| | 4-5.25m | 5.21 | 94.79 | 1.55 |
| AB-20 | 0-2m | 0.56 | 99.44 | 0.58 |
| | 2-4m | 0.06 | 99.94 | 0.95 |
| | 4-6m | 0.02 | 99.98 | 1.49 |
| | 6-8m | 0.13 | 99.87 | 1.89 |
| | 8-10m | 0.04 | 99.96 | 2.02 |
| AB-24 | 0-2m | 0.65 | 99.35 | 0.61 |
| | 2-4m | 0.73 | 99.27 | 0.54 |
| | 4-6m | 0.94 | 99.06 | 0.60 |
| AB-28 | 0-2m | 0.63 | 99.37 | 0.52 |
| | 2-4m | 0.21 | 99.79 | 0.43 |
| | 4-6m | 0.31 | 99.69 | 0.61 |
| | 6-7.3m | 0.11 | 99.89 | 1.24 |
| AB-32 | 0-2m | 0.85 | 99.15 | 0.85 |
| | 2-4m | 0.69 | 99.31 | 0.71 |
| | 4-6m | 0.90 | 99.10 | 0.76 |
| | 6-8m | 0.11 | 99.89 | 1.33 |
| AB-36 | 0-2m | 0.63 | 99.37 | 0.53 |
| | 2-4m | 0.76 | 99.24 | 0.53 |
| | 4-6m | 0.30 | 99.70 | 0.56 |
| | 6-8m | 0.08 | 99.92 | 1.36 |
| | 8-8.6m | 0.31 | 99.69 | 1.78 |

APPENDIX 3

Mineralogical results for composite of heavy minerals
from scout auger holes AB1 to AB5.

APPLIED PETROGRAPHIC SERVICES

SPECIALIZING IN PETROGRAPHIC ANALYSIS OF GEOLOGICAL AND INDUSTRIAL SAMPLES

P.O. Box 257
Strawberry Hills
Sydney, N.S.W. 2012

20 Holdsworth Street
Newtown
Sydney, N.S.W. 2042

Phone: (02) 516 4808
(02) 909 8741

CLIENT: Peter H. Stitt & Assoc. Pty Ltd

APS REPORT NO.: M114

ATTENTION Mr. G. Lee

DATE: 12.4.88

SAMPLE DETAILS: AB 1 to 5 Composite

| | TOTAL | HAND MAGS | 0.5A MAGS | 0.9A MAGS | 1.2A MAGS | 1.2A NON-MAGS |
|-------------------|-------|--------------|--------------|--------------|--------------|------------------|
| MAGNETITE | 1% | 100% | - | - | - | - |
| OTHER BLACK OPS. | 11 | - | 40% | 9% | 1% | - |
| GARNET | 5 | - | 39 | 1 | 4 | - |
| TOURMALINE | 14 | - | 1 | 17 | 16 | 3 |
| ALUMINO-SILICATES | 2 | - | - | <1 | <1 | 29 |
| OTHER SILICATES | 60 | - | 19 | 69 | 76 | 2 |
| SHELL | <1 | - | - | - | - | 2 |
| QUARTZ | 1 | - | - | - | - | 20 |
| IRON OXIDES | 3 | - | 1 | 4 | 1 | - |
| ZIRCON | <1 | - | - | - | - | 5 |
| RUTILE | 1 | - | - | - | - | 9 |
| LEUCOXENE | 2 | - | - | <1 | 2 | 30 |
| NO. OF POINTS | - | - | 523 | 580 | 548 | 522 |
| SCHEELITE | - | - | - | - | - | - |
| MONAZITE | <1 | - | - | - | - | <1 |
| CASSITERITE | - | - | - | - | - | - |
| SAMPLE WEIGHT | 6.08g | 0.04g | 0.65g | 4.57g | 0.43g | 0.39g |
| % | 100 | 1 | 11 | 75 | 7 | 6 |



J. McNulty
(Manager)

Kenneth Bay

Sandy Cape

EL 49/86

Non Titled Land
Originally
EL 64/83
Held by
Abignano Constructions P/L.

Interview River

Rupert Point

Pieman River

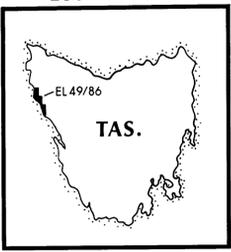
Pieman Head

Hardwicke Bay

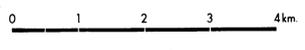
Conical Rocks Point

Ahrberg Bay

LOCATION MAP



SCALE 1:50 000



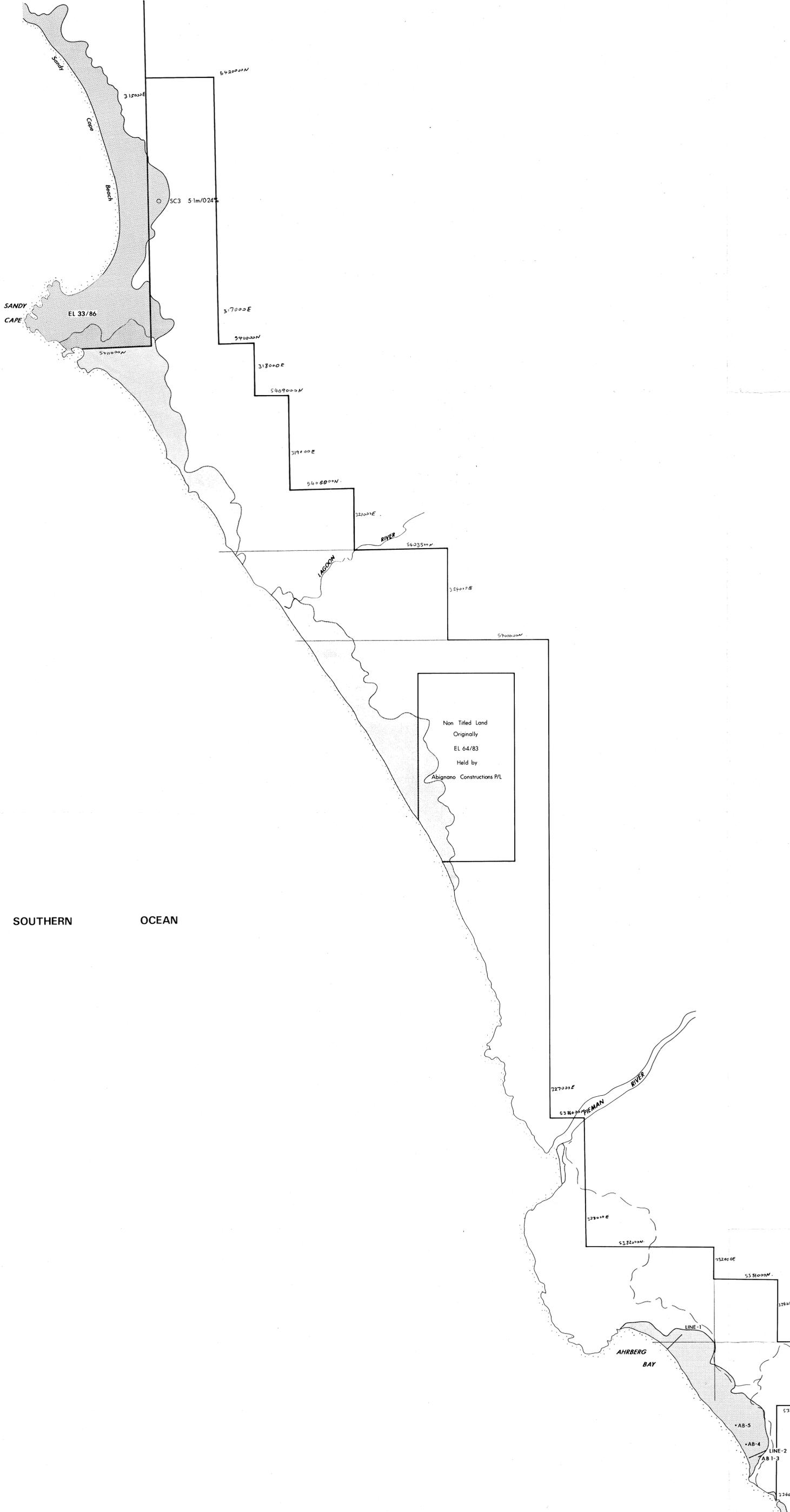
N

5 cm

| | | |
|-------------------------------|----------------|-------------|
| NATIONAL MINERAL SANDS | | |
| EL 49/86 | | |
| LOCATION MAP | | |
| 88-2813 | | |
| Author: A. DOVE | Date: JUNE '88 | Fig. No.: 1 |

7729

778050



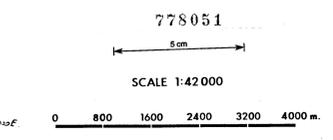
SOUTHERN OCEAN



Non Titled Land
Originally
EL 64/83
Held by
Abignano Constructions P/L

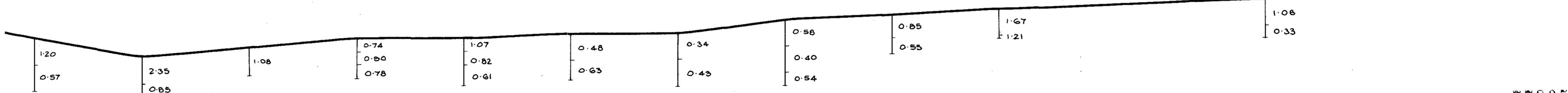
LEGEND

-  AEOLIAN DUNES
-  TRACK/ROAD
-  SAMPLE LOCATION



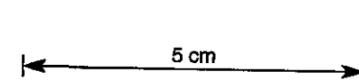
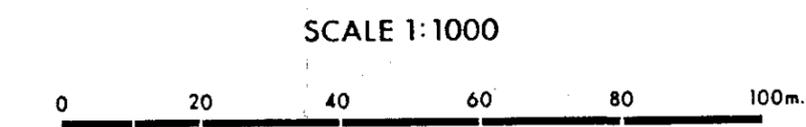
| | | |
|--|----------------|--------|
| NATIONAL MINERAL SANDS | | |
| EL 49/86 TASMANIA | | |
| AIR PHOTO INTERPRETATION | | |
| SANDY CAPE — PIEMAN RIVER | | |
| - AHRBERG BAY 88-28B | | |
| Prepared by Peter H. Sinn & Associates Pty. Ltd. | | |
| Author: G. LEE | Date: JUNE '88 | Fig: 2 |

AB-0 AB-4 AB-8 AB-12 AB-16 AB-20 AB-24 AB-28 AB-32 AB-36 AB-46 AB-56



Rock Rock Rock Clay Wood Wood Wood Wood Black Mud Casing Jammed Gravel

0.85% 1.52% 1.08% 0.81% 0.8% 0.54% 0.39% 0.5% 0.75% 1.65% 0.83%



$$\frac{V}{H} = \frac{1}{5}$$

778052

Gravel
0.58%

**NATIONAL
MINERAL SANDS**

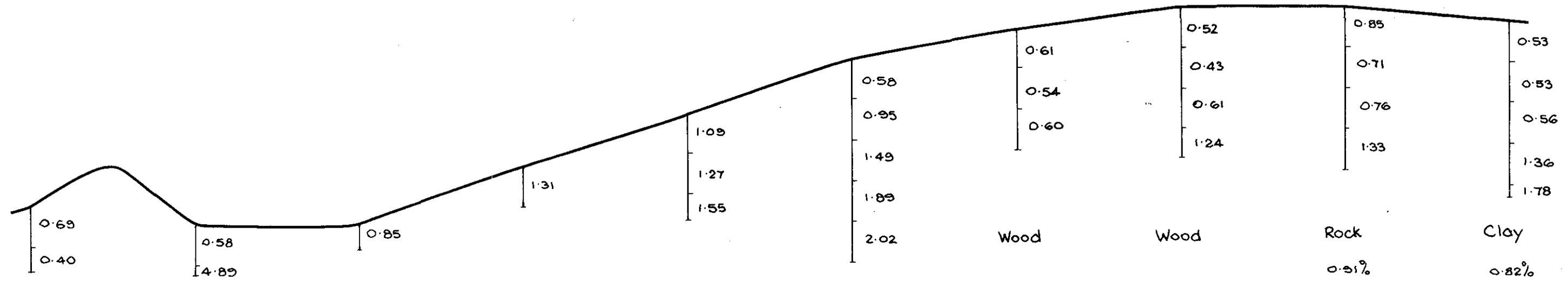
LINE 1

AHRBERG BAY

(Bearing 030°)

Author: A.DOVE Date: JUNE '88 Fig. No.: 3

AB-0 AB-4 AB-8 AB-12 AB-16 AB-20 AB-24 AB-28 AB-32 AB-36



778053

**NATIONAL
MINERAL SANDS**

**LINE 2
AHRBERG BAY
(Bearing 040°)**

88-2813

Author: A.DOVE Date: JUNE '88 Fig. No.: 4



$$\frac{V}{H} = \frac{1}{5}$$

