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REPORT NO. 5/90

EL 51/86

Annual Report on Exploration Completed in the Marrawah  
Area of North-Western Tasmania to 15.6.90.

Report Prepared for National Mineral Sands Pty. Ltd.

**OPEN FILE**

A. Dove  
May, 1990

90-3133.

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## SYNOPSIS

### 1. AIM

To examine the Tasmanian northwest coast in the Marrawah area for economic heavy mineral sand occurrences.

### 2. REASON

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

### 3. SUMMARY AND CONCLUSIONS

- 3.1 EL 51/86 originally covered 145km<sup>2</sup> on the west coast of Tasmania between Marrawah and Woolnorth.
- 3.2 The licence was reduced to 63km<sup>2</sup> following exploration activities carried out in the 12 month period to 15.6.88, and further reduced to 17km<sup>2</sup> following work in the 12 month period to 15.6.89.
- 3.3 No field work has been undertaken since 15.6.89.
- 3.4 Assay results from holes drilled along M-Line 3 and M-Line 4 in the 12 month period to 15.6.89, became available during the 12 month period to 15.6.90.
- 3.5 Assay results for M-Line 3 show heavy mineral grades in excess of 1.5%, over a width of 80m.
- 3.6 Some holes in thick sand showed assays in excess of 2%, and were open at depth.
- 3.7 Assay results from M-Line 4 were all under 1.5%.

- 3.8 Heavy mineral concentrations occur in the frontal dunes, extending approximately 3.25km along the beach.
- 3.9 The drilling results give an Indicated and Inferred heavy mineral resource in the order of 200000 tonnes.
- 3.10 Application for renewal of the Exploration Licence 51/86 was forwarded to the Department on 15.5.90 for 1 year.

#### 4. RECOMMENDATIONS

- 4.1 Further mineralogical studies should be made of the heavy mineral concentrates available from past drilling and testing.
- 4.2 An examination of resource quality and individual economic mineral contents, should be made.
- 4.3 A preliminary feasibility investigation should be undertaken.
- 4.4 No further drilling should be conducted until the above work is complete.

REPORT5. INTRODUCTION

A program of exploration was carried out by Peter H. Stitt & Associates Pty. Ltd. on behalf of National Mineral Sands Pty. Ltd. (formerly Butlers No. 27 Pty. Ltd.) along Ann Bay near Marrawah, on the north west coast of Tasmania.

Exploration was directed at examining the coastal sands for heavy mineral concentrations, and determining the content of the economic minerals: rutile, leucoxene, ilmenite (TiO<sub>2</sub> raw materials), zircon and monazite.

A review of reports by previous title holders has shown that a resource in the order of 100,000t of contained heavy mineral has been identified at Ann Bay; with various grades of rutile, zircon, leucoxene and cassiterite.

Investigations carried out during the first year of exploration by the Company has confirmed the existance of significant heavy mineral concentrations in the southern end of the sand body at Ann Bay. No other heavy mineral concentration has been located within the exploration licence area, and as a result the area north and east of Ann Bay has now been relinquished, as shown on Figure 1.

Results of investigations carried out within the title area are recorded in Peter H. Stitt & Associates Pty. Ltd. Report No. 10/88 and Report No. 9/89.

This report details results obtained during the third year of the title.

6. TENEMENT INFORMATION

Exploration Licence 51/86 is held by National Mineral Sands Pty. Ltd. (formally Butlers No. 27 Pty.Ltd.) and originally covered an area of 145 km<sup>2</sup> on the north west coast of Tasmania, see Figure 1.

Areas of 5.3 km<sup>2</sup> and 0.5 km<sup>2</sup> were excluded from the original application as they contained the Mt. Cameron West Aboriginal Site and Commonwealth land respectively.

Following exploration work carried out during the 12 months to 15.6.88 the licence was reduced to 63 km<sup>2</sup>; after the 82 km<sup>2</sup> relinquished by the Company was deemed unprospective following the initial work. The relinquished area covered the land to the north of Australian Map Grid Line 5 480 000 mN.

Further work during the 12 months to 15.6.89 led to a reduction in the size of the tenement during 1989. At present the licence is 17 km<sup>2</sup>, with only the area around Ann Bay now deemed prospective.

## 7. RESULTS

As was reported in the previous annual report (Report No. 9/89 by Peter H. Stitt & Associates Pty. Ltd.), two traverse lines, M-Line 3 and M-Line 4 were drilled and sampled. Drill traverse lines with end-hole numbers marked are shown on Figure 2. Assay results for the drillhole intervals however, were unavailable at the time of the preparation of that report. These assay results have since become available and are recorded in Appendix 1 of this report. These results have enabled the northern extent of mineralization at Ann Bay to be better defined. Comments relevant to the results obtained for each traverse are set out below.

### 7.1 TRAVERSE M-LINE 3. (Figure 3)

The traverse line was situated 1 km north of M-Line 1 and heavy mineral was usually noted in most drill hole intervals.

The assay results indicate heavy mineral, grades (>1.5%) starting approximately 120 metres inland from the high water mark, and traverse the frontal dunes for approximately 80 metres. The grades in the frontal dunes are evident for depths of up to 10 metres, but once the dunes are traversed, the grades are only encouraging for the top 2 metres.

It should be noted that in areas of thicker sand, some drillholes were terminated at 10 metres depth (the limit of the drilling equipment available) with heavy mineral grades >2%. Sand was still present below 10m in some of these holes, so the thickness of the mineralised zone may be greater than 10 metres.

### 7.2 TRAVERSE M-LINE 4. (Figure 4).

The traverse line was situated 1 kilometre north of M-Line 3, however the assay results were not very

encouraging, as no drillhole interval returned greater than 1.5% heavy mineral.

8. DISCUSSION

The heavy mineral concentrations occur in the frontal dunes extending approximately 3.25 kilometres along the beach. Some low grade mineralisation occurs in the back beach area, however the depth of the mineralisation is usually 2.0m or less.

Incorporating the latest results, a preliminary estimation of the resource can be calculated. The resource has been divided into four blocks, each centred on the traverse line (see Figure 2) noted in the brackets below:

Block 2 (Line 2)

Av. depth of sand	=	1.9m
Av. Grade @ 2% cutoff	=	4.2%
Width of Block	=	80m
Strike Length of Block	=	500m
		3192m <sup>3</sup>

Using 1.6 t/m<sup>3</sup> = 5107t of H.M.

Block 0 (Line 0)

Av. depth of sand	=	3.0m
Av. Grade @ 2% cutoff	=	9.0%
Width of Block	=	200m
Strike Length of Block	=	1000m
		54000m <sup>3</sup>

Using 1.6 t/m<sup>3</sup> = 86400t of H.M.

Block 1 (Line 1)

Av. depth of sand	=	6.0m
Av. Grade @ 2% cutoff	=	4.9%
Width of Block	=	200m
Strike Length of Block	=	1000m
		58800m <sup>3</sup>

Using 1.6 t/m<sup>3</sup> = 94080t of H.M.

Block 3 (Line 3)

Av. depth of sand	=	10m
Av. Grade @ 2% cutoff	=	2.69%
Width of Block	=	80m
Strike Length of Block	=	750m
		16140m <sup>3</sup>

Using 1.6 t/m<sup>3</sup> = 25824t of H.M.

**TOTAL RESOURCE = 211411 tonnes (say 200000t  
Indicated and Inferred).**

9. PROPOSED WORK

At this stage the proposed programme for the forthcoming year will comprise:

- . Further mineralogical study of heavy mineral concentrates available from past drilling and testing.
- . Examination of resource quality and individual economic mineral contents.
- . Preliminary feasibility investigation.

At the present time no further drilling is proposed within this exploration licence until the above work is complete. A decision will be made as to whether to undertake further drilling during the currency of the licence.

10. CONCLUSIONS

The drilling to date at Ann Bay has defined an Indicated and Inferred heavy mineral resource in the order of 200000 tonnes.

Application for renewal of the Exploration Licence 51/86 was forwarded to the Department on 15.5.90 for 1 year.

APPENDIX 1

Drillhole Logs with Heavy Mineral contents.

CLIENT : NATIONAL MINERAL SANDS PTY LTD

TITLE No. : EL 51/86

AREA : MARRAWAH

LINE No. : 3

LOGGED BY : A. DOVE

HOLE No. : M-8

METHOD : HAND

DRILL DATE: 4-4-89

INTERVAL (m)	DRY Wt. (kg)	DESCRIPTION	SLIMES %	+600um %	H.M. %
0-2.0	4.40	SAND, medium grained, amber, abundant fine shell.	0.54	0.33	0.69
2.0-4.0	4.40	As Above.	0.65	0.22	0.80
4.0-6.0	5.20	SAND, fine to medium grained, amber, grades to dark grey.	1.37	0.02	3.73
6.0-8.0	4.75	SAND, fine to medium grained, grey. Grades to light grey then white. Hit water table 7.5m, started sludging.	0.95	0.17	2.34
8.0-9.5	3.60	SAND, fine to medium grained, white. Hit indurated layer. Hard at base.  E.O.H. 9.5m.	1.66	0.04	0.35
DOWN HOLE AVERAGE					
0-8.0		DEPTH & GRADE TO 1.5% CUTOFF			1.65 1.89

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CLIENT : NATIONAL MINERAL SANDS PTY LTD

TITLE No. : EL 51/86

AREA : MARRAWAH

LINE No. : 3

LOGGED BY : A. DOVE

HOLE No. : M-12

METHOD : HAND

DRILL DATE: 4-4-89

INTERVAL (m)	DRY Wt. (kg)	DESCRIPTION	SLIMES %	+600um %	H.M. %
0-2.0	4.60	SAND, fine-medium grained, light grey grading to amber. H.M. >1%.	1.30	0.22	3.44
2.0-4.0	4.20	SAND, fine - medium grained, amber. H.M. >1%.	0.31	0.01	3.94
4.0-6.0	3.70	As Above. H.M. >1%.	0.23	0.01	3.17
6.0-8.0	4.25	As Above. H.M. >1%.	0.26	0.01	2.64
8.0-10.0	3.60	As Above. H.M. >1%.	0.35	0.01	2.42
		E.O.H. 10.0m.			
		DOWN HOLE AVERAGE			3.12
0-10.0		DEPTH & GRADE TO 1.5% CUTOFF			3.12

483017  
13

CLIENT : NATIONAL MINERAL SANDS PTY LTD

TITLE No. : EL 51/86

AREA : MARRAWAH

LINE No. : 3

LOGGED BY : A. DOVE

HOLE No. : M-16

METHOD : HAND

DRILL DATE: 4-4-89

INTERVAL (m)	DRY Wt. (kg)	DESCRIPTION	SLIMES %	+600um %	H.M. %
0-2.0	4.05	SAND, fine-medium grained, brown grading to amber.	2.03	0.28	1.47
2.0-4.0	4.20	SAND, fine-medium grained, amber. H.M. 1%.	0.72	0.02	2.59
4.0-6.0	4.20	As Above.	0.33	0.01	2.79
6.0-8.0	4.00	As Above. H.M. 1%.	0.31	0.01	2.11
8.0-10.0	4.70	As Above. H.M. >1%.	0.48	0.02	2.33
		E.O.H. 10.0m.			
		DOWN HOLE AVERAGE			2.26
0-10.0		DEPTH & GRADE TO 1.5% CUTOFF			2.26

483018  
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CLIENT : NATIONAL MINERAL SANDS PTY LTD

TITLE No. : EL 51/86

AREA : MARRAWAH

LINE No. : 3

LOGGED BY : A. DOVE

HOLE No. : M-20

METHOD : HAND

DRILL DATE: 6-4-89

INTERVAL (m)	DRY Wt. (kg)	DESCRIPTION	SLIMES %	+600um %	H.M. %
0-2.0	3.70	SAND, fine to medium grained, amber. H.M. 1%.	0.71	0.33	0.66
2.0-4.0	4.10	As Above.	1.36	0.13	0.61
4.0-6.0	4.55	As Above.	0.76	0.10	0.71
6.0-8.0	4.90	As Above.	0.64	0.11	0.52
8.0-10.0	4.50	As Above.	0.77	0.20	0.53

E.O.H. 10.0m.

DOWN HOLE AVERAGE  
DEPTH & GRADE TO 1.5% CUTOFF

0.61

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483019  
15

CLIENT : NATIONAL MINERAL SANDS PTY LTD

TITLE No. : EL 51/86

AREA : MARRAWAH

LINE No. : 3

LOGGED BY : A. DOVE

HOLE No. : M-24

METHOD : HAND

DRILL DATE: 6-4-89

INTERVAL (m)	DRY Wt. (kg)	DESCRIPTION	SLIMES %	+600um %	H.M. %
0-2.0	2.90	SAND, fine to medium grained, amber. Hit Water Table. Grades to grey.	1.23	0.32	0.85
2.0-2.4	2.10	SAND, fine to medium grained, grey. Hit rock. E.O.H. 2.4m. Rock.	0.39	0.32	0.50
DOWN HOLE AVERAGE DEPTH & GRADE TO 1.5% CUTOFF					0.79

483020  
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CLIENT : NATIONAL MINERAL SANDS PTY LTD

TITLE No. : EL 51/86

AREA : MARRAWAH

LINE No. : 3

LOGGED BY : A. DOVE

HOLE No. : M-28

METHOD : HAND

DRILL DATE: 6-4-89

INTERVAL (m)	DRY Wt. (kg)	DESCRIPTION	SLIMES %	+600um %	H.M. %
0-1.0	2.90	SAND, medium to coarse grained, amber. Hit rock.  E.O.H. 1.0m. Rock.	0.33	2.16	0.44
DOWN HOLE AVERAGE DEPTH & GRADE TO 1.5% CUTOFF					0.44

483021  
17

CLIENT : NATIONAL MINERAL SANDS PTY LTD.

TITLE No. : E.L.51/86

AREA : MARRAWAH

LINE No. : 3

LOGGED BY : A.DOVE

HOLE No. : M-4

METHOD : HAND

DRILL DATE: 4-4-89

INTERVAL (m)	DRY Wt. (kg)	DESCRIPTION	SLIMES %	+600um %	H.M. %
0-2.0	4.25	SAND, fine to medium grained, grey-brown mottle. Hit water table 1.5m, started sludging. H.M. present.	2.40	0.38	3.59
2.0-4.0	8.90	SAND, fine to medium grained, grey, organic, grades to light grey. Difficult to turn casing.  E.O.H. 4.0m Jammed.	2.86	0.09	0.51
0-2.0		DOWN HOLE AVERAGE DEPTH & GRADE TO 1.5% CUTOFF			2.05 3.59

483022  
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CLIENT : NATIONAL MINERAL SANDS PTY LTD

TITLE No. : EL 51/86

AREA : MARRAWAH

LINE No. : 3

LOGGED BY : A. DOVE

HOLE No. : M-(4E)

METHOD : HAND

DRILL DATE: 4-4-89

INTERVAL (m)	DRY Wt. (kg)	DESCRIPTION	SLIMES %	+600um %	H.M. %
0-2.0	2.95	SAND , fine to medium grained, dark grey to brown, organic.		0.74	2.43
2.0-4.0	5.60	SAND, fine to medium grained, brown. Clay rich.		0.78	0.59
4.0-5.4	4.20	As Above. Grades to grey with abundant shell. Hit light grey clay.  E.O.H. 5.4m. Clay.		1.28	1.16
0-2.0		DOWN HOLE AVERAGE DEPTH & GRADE TO 1.5% CUTOFF			1.42 2.43

CLIENT : NATIONAL MINERAL SANDS PTY LTD

TITLE No. : EL 51/86

AREA : MARRAWAH

LINE No. : 4

LOGGED BY : A. DOVE

HOLE No. : M-4

METHOD : HAND

DRILL DATE: 8-4-89

INTERVAL (m)	DRY Wt. (kg)	DESCRIPTION	SLIMES %	+600um %	H.M. %
0-2.0	3.40	SAND, medium grained, amber, abundant fine shell. Hit Water Table 0.5m, started sludging 1.0m. Grades to dark brown, silty, hit wood.	3.39	0.42	1.01
2.0-2.15	1.25	SAND, fine to medium grained, dark brown, silty, hit indurated layer.  E.O.H. 2.15m Indurated.	5.11	0.18	0.36
DOWN HOLE AVERAGE					0.97

483025  
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CLIENT : NATIONAL MINERAL SANDS PTY LTD

TITLE No. : EL 51/86

AREA : MARRAWAH

LINE No. : 4

LOGGED BY : A. DOVE

HOLE No. : M-8

METHOD : HAND

DRILL DATE: 8-4-89

INTERVAL (m)	DRY Wt. (kg)	DESCRIPTION	SLIMES %	+600um %	H.M. %
0-2.0	3.65	SAND, medium grained, amber, abundant fine shell. H.M. present.	0.42	0.05	1.33
2.0-4.0	4.00	As Above. H.M. present.	0.38	0.03	1.28
4.0-6.0	3.85	As Above. H.M. present.	0.25	0.01	1.23
6.0-8.0	4.15	As Above. H.M. present.	0.35	0.01	1.21
8.0-10.0	4.10	As Above, hit Water Table at 9.6m, grades to grey.  E.O.H. 10.0m.	0.46	0.02	0.96
DOWN HOLE AVERAGE					1.20

483026  
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CLIENT : NATIONAL MINERAL SANDS PTY LTD

TITLE No. : EL 51/86

AREA : MARRAWAH

LINE No. : 4

LOGGED BY : A. DOVE

HOLE No. : M-12

METHOD : HAND

DRILL DATE: 8-4-89

INTERVAL (m)	DRY Wt. (kg)	DESCRIPTION	SLIMES %	+600um %	H.M. %
0-2.0	5.15	SAND, medium grained, amber, abundant fine shell. Hit Water Table 1.5m, started sludging. Grades to grey. H.M. present.	1.14	0.17	1.15
2.0-3.5	4.00	SAND, fine to medium grained, dark brown, silty, hit wood at 3.0m. Hit indurated layer at 3.5m.  E.O.H. 3.5m Indurated.	4.05	0.38	0.51
DOWN HOLE AVERAGE					0.88

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482027

CLIENT : NATIONAL MINERAL SANDS PTY LTD

TITLE No. : EL 51/86

AREA : MARRAWAH

LINE No. : 4

LOGGED BY : A. DOVE

HOLE No. : M-16

METHOD : HAND

DRILL DATE: 8-4-89

INTERVAL (m)	DRY Wt. (kg)	DESCRIPTION	SLIMES %	+600um %	H.M. %
0-2.0	4.20	SAND, medium to coarse grained, amber, abundant fine shell. Hit Water table, started sludging. H.M. present.	1.04	0.25	1.16
2.0-3.1	2.90	SAND, fine to medium grained, dark brown, silty. Hit indurated layer.  E.O.H. 3.1m Indurated.	4.64	0.29	0.79
DOWN HOLE AVERAGE					1.02

483028

CLIENT : NATIONAL MINERAL SANDS PTY LTD

TITLE No. : EL 51/86

AREA : MARRAWAH

LINE No. : 4

LOGGED BY : A. DOVE

HOLE No. : M-20

METHOD : HAND

DRILL DATE: 8-4-89

INTERVAL (m)	DRY Wt. (kg)	DESCRIPTION	SLIMES %	+600um %	H.M. %
0-2.0	4.20	SAND, fine to medium grained, amber, abundant fine shell. H.M. 1%.	0.64	0.08	1.24
2.0-4.0	5.00	As Above. Hit Water Table. H.M. 1%.	0.41	0.07	1.13
4.0-6.0	4.10	SAND, medium grained, light grey, abundant fine shell. Started sludging 4.5m, grades to dark brown silty, clay rich. Hit dark brown clay at base.  E.O.H. 6.0m clay.	1.65	0.73	1.26
DOWN HOLE AVERAGE					1.21

483029  
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CLIENT : NATIONAL MINERAL SANDS PTY LTD

TITLE No. : EL 51/86

AREA : MARRAWAH

LINE No. : 4

LOGGED BY : A. DOVE

HOLE No. : M-24

METHOD : HAND

DRILL DATE: 8-4-89

INTERVAL (m)	DRY Wt. (kg)	DESCRIPTION	SLIMES %	+600um %	H.M. %
0-2.0	4.20	SAND, medium grained, amber, abundant fine shell. H.M. 1%.	0.69	0.13	1.13
2.0-4.0	4.45	As Above. H.M. 1%.	0.36	0.02	1.19
4.0-6.0	3.50	As Above. Hit Water Table 4.5m, started sludging 5.0m. Grades to grey, slightly indurated.	1.99	0.05	0.93
6.0-8.0	9.05	SAND, fine to medium grained, dark brown, silty.	3.09	0.02	0.40
8.0-10.0	6.25	As Above.	0.99	0.11	0.19
		E.O.H. 10.0m.			
DOWN HOLE AVERAGE					0.77

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26

CLIENT : NATIONAL MINERAL SANDS PTY LTD

TITLE No. : EL 51/86

AREA : MARRAWAH

LINE No. : 4

LOGGED BY : A. DOVE

HOLE No. : M-28

METHOD : HAND

DRILL DATE: 7-4-89

INTERVAL (m)	DRY Wt. (kg)	DESCRIPTION	SLIMES %	+600um %	H.M. %
0-2.0	4.40	SAND, medium to coarse grained, amber, abundant fine shell. Hit thin brown layer at 1.5m. H.M. 1%.	0.72	0.32	0.90
2.0-4.0	4.45	SAND, medium grained, amber, abundant fine shell. Hit Water Table, started sludging. H.M. 1%.	0.29	0.04	1.05
4.0-6.0	5.15	As Above, grades to grey then into brown, silty.	1.59	0.08	0.85
6.0-6.5	1.75	As Above, hit hard indurated layer, couldn't penetrate.  E.O.H. 6.5m Indurated.	2.99	0.02	0.43
DOWN HOLE AVERAGE					0.90

483031  
27

CLIENT : NATIONAL MINERAL SANDS PTY LTD

TITLE No. : EL 51/86

AREA : MARRAWAH

LINE No. : 4

LOGGED BY : A. DOVE

HOLE No. : M-32

METHOD : HAND

DRILL DATE: 7-4-89

INTERVAL (m)	DRY Wt. (kg)	DESCRIPTION	SLIMES %	+600um %	H.M. %
0-2.0	4.50	SAND, medium grained, amber, abundant fine shell. H.M. >1%.	0.69	0.21	1.10
2.0-4.0	3.95	As Above, Hit Water Table at 3.5m, started sludging. Grades to dark brown at base.	1.19	0.07	1.04
4.0-6.0	3.80	SAND, fine to medium grained, brown, slightly indurated, silty.	2.60	0.06	0.63
6.0-8.0	7.15	As Above, becoming slighty coarser with depth.	0.91	0.01	0.26
8.0-10.0	3.60	As Above, very silty.	1.42	0.04	0.09
E.O.H. 10.0m.					
DOWN HOLE AVERAGE					0.62

483032  
28

CLIENT : NATIONAL MINERAL SANDS PTY LTD

TITLE No. : EL 51/86

AREA : MARRAWAH

LINE No. : 4

LOGGED BY : A. DOVE

HOLE No. : M-36

METHOD : HAND

DRILL DATE: 7-4-89

INTERVAL (m)	DRY Wt. (kg)	DESCRIPTION	SLIMES %	+600um %	H.M. %
0-2.0	4.55	SAND, fine to medium grained, amber, abundant fine shell. H.M. present.	0.59	0.21	1.14
2.0-4.0	3.65	As Above. H.M. >1%.	0.71	0.08	0.96
4.0-6.0	5.65	As Above. Hit Water Table at 5.3m, started sludging. Grades to dark grey.	1.36	0.27	1.36
6.0-8.0	7.45	SAND, medium grained, light grey to white, grades to brown-grey at base.	0.29	0.05	0.29
8.0-10.0	6.20	SAND, medium grained brown, slightly indurated, silty.	0.21	0.11	0.21
		E.O.H. 10.0m.			
DOWN HOLE AVERAGE					0.79

CLIENT : NATIONAL MINERAL SANDS PTY LTD

TITLE No. : EL 51/86

AREA : MARRAWAH

LINE No. : 4

LOGGED BY : A. DOVE

HOLE No. : M-40

METHOD : HAND

DRILL DATE: 7-4-89

INTERVAL (m)	DRY Wt. (kg)	DESCRIPTION	SLIMES %	+600um %	H.M. %
0-2.0	5.00	SAND, fine to medium grained, amber, abundant fine shell. H.M.>1%.	0.40	0.07	1.06
2.0-4.0	3.80	As Above. H.M.>1%.	0.37	0.05	1.14
4.0-6.0	3.60	As Above. H.M.>1%.	0.36	0.03	0.92
6.0-8.0	4.60	As Above, becomes coarser with depth, hit dark grey layer. H.M.>1%.	0.84	0.02	1.03
8.0-10.0	5.65	SAND, medium to coarse grained, grey, abundant fine shell. Hit Water Table 8.5m, started sludging. Grades to brown-grey.  E.O.H. 10.0m.	0.77	0.03	1.40
DOWN HOLE AVERAGE					1.11

483034  
30

CLIENT : NATIONAL MINERAL SANDS PTY LTD

TITLE No. : EL 51/86

AREA : MARRAWAH

LINE No. : 4

LOGGED BY : A. DOVE

HOLE No. : M-44

METHOD : HAND

DRILL DATE: 7-4-89

INTERVAL (m)	DRY Wt. (kg)	DESCRIPTION	SLIMES %	+600um %	H.M. %
0-2.0	2.90	SAND, fine to medium grained, amber, abundant fine shell. H.M. 1%	0.57	0.32	1.04
2.0-4.0	3.50	As Above, grades to medium grained. H.M.>1%	NA	0.11	1.22
4.0-6.0	4.40	As Above, hit dark grey layer. H.M.>1%.	1.10	0.05	1.14
6.0-8.0	4.50	SAND, medium grained, amber, abundant fine shell. H.M.>1%.	0.53	0.05	0.81
8.0-10.0	4.90	SAND, fine to medium grained, light grey. Hit Water Table 8.3m. No mineral visible below water table. Started sludging, grades to brown-grey.  E.O.H. 10.0m.	NA	0.10	0.27
DOWN HOLE AVERAGE					0.90

CLIENT : NATIONAL MINERAL SANDS PTY LTD

TITLE No. : EL 51/86

AREA : MARRAWAH

LINE No. : 4

LOGGED BY : A. DOVE

HOLE No. : M-48

METHOD : HAND

DRILL DATE: 7-4-89

INTERVAL (m)	DRY Wt. (kg)	DESCRIPTION	SLIMES %	+600um %	H.M. %
0-2.0	3.40	SAND, fine to medium grained, amber, abundant fine shell. H.M. 1%	0.72	0.24	0.86
2.0-4.0	4.00	As Above. H.M. >1%.	NA	0.03	0.84
4.0-6.0	3.75	As Above, went through dark brown layer. H.M. >1%.	1.20	0.13	0.95
6.0-8.0	4.35	SAND, medium to coarse grained, amber, abundant fine shell, orange at 7.7m. Hit Water Table, grades to grey.	NA	0.11	1.02
8.0-10.0	4.25	SAND, medium to coarse grained, grey, abundant fine shell. Started sludging, grades to brown.  E.O.H. 10.0m.	3.22	0.05	0.44
DOWN HOLE AVERAGE					0.82

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482036  
32

CLIENT : NATIONAL MINERAL SANDS PTY LTD

TITLE No. : EL 51/86

AREA : MARRAWAH

LINE No. : 4

LOGGED BY : A. DOVE

HOLE No. : M-52

METHOD : HAND

DRILL DATE: 7-4-89

INTERVAL (m)	DRY Wt. (kg)	DESCRIPTION	SLIMES %	+600um %	H.M. %
0-2.0	3.20	SAND, fine to medium grained, amber, abundant fine shell. H.M. >1%.	0.37	0.11	0.79
2.0-4.0	4.60	As Above. H.M. >1%.	0.29	0.07	0.91
4.0-6.0	4.50	As Above. H.M. >1%	0.28	0.06	0.80
6.0-8.0	5.20	As Above. Grades to coarse grained. H.M. >1%. H.M. rich at base.	NA	0.08	0.64
8.0-9.5	2.90	SAND, medium to coarse grained, amber. Hit dark brown layer at 8.9m. Some coarse shell. Hit water table at 9.0m. Grades to grey and dark grey.  E.O.H. 9.5m. Too wet.	1.27	0.15	0.80
DOWN HOLE AVERAGE					0.79

483037  
33

CLIENT : NATIONAL MINERAL SANDS PTY LTD

TITLE No. : EL 51/86

AREA : MARRAWAH

LINE No. : 4

LOGGED BY : A. DOVE

HOLE No. : M-56

METHOD : HAND

DRILL DATE: 7-4-89

INTERVAL (m)	DRY Wt. (kg)	DESCRIPTION	SLIMES %	+600um %	H.M. %
0-2.0	4.10	SAND, medium to coarse grained, amber, abundant fine shell. H.M. present.	0.68	0.43	1.00
2.0-2.4	0.70	As Above. Hit rock at water table.  E.O.H. 2.4m. Rock.	NA	0.85	0.94
DOWN HOLE AVERAGE					0.99

482068  
34

CLIENT : NATIONAL MINERAL SANDS PTY LTD

TITLE No. : EL 51/86

AREA : MARRAWAH

LINE No. : 4

LOGGED BY : A. DOVE

HOLE No. : M-60

METHOD : HAND

DRILL DATE: 7-4-89

INTERVAL (m)	DRY Wt. (kg)	DESCRIPTION	SLIMES %	+600um %	H.M. %
0-1.1	3.80	SAND, medium to coarse grained, amber, abundant fine shell. Hit Water Table 0.6m, started sludging. Hit rock. H.M. present.  E.O.H. 1.1m. Rock.	0.49	0.28	0.89
DOWN HOLE AVERAGE					0.89

483039<sub>35</sub>

APPENDIX 2

Laboratory Heavy Mineral Assay Results.

## R.I.L. LABORATORY HEAVY MINERAL SEPARATION

HOLE NUMBER	DEPTH	TOTAL WEIGHT KB	% + 2mm	% +600u	% -600u	% SLIME	% HEAVY MINERAL
EL. 51/86 MARRAWAH LINE 3							
M-0	0-2.0	3.60	0.1122	0.08	99.92	4.02	2.57
M-0	2.0-3.6	7.25	0.0000	0.06	99.94	2.69	0.35
M-4	0-2.0	4.25	0.1849	0.19	99.81	2.40	3.59
M-4	2.0-4.0	8.90	0.0044	0.09	99.91	2.86	0.51
M-8	0-2.0	4.40	0.1270	0.20	99.80	0.54	0.69
M-8	2.0-4.0	4.40	0.0123	0.21	99.79	0.65	0.80
M-8	4.0-6.0	5.20	0.0000	0.02	99.98	1.37	3.73
M-8	6.0-8.0	4.75	0.0152	0.15	99.85	0.95	2.34
M-8	8.0-9.5	3.60	0.0000	0.04	99.96	1.66	0.35
M-12	0-2.0	4.60	0.1402	0.08	99.92	1.30	3.44
M-12	2.0-4.0	4.20	0.0000	0.01	99.99	0.31	3.94
M-12	4.0-6.0	3.70	0.0000	0.01	99.99	0.23	3.17
M-12	6.0-8.0	4.25	0.0014	0.01	99.99	0.26	2.62
M-12	8.0-10.0	3.60	0.0000	0.01	99.99	0.35	2.42
M-16	0-2.0	4.05	0.1620	0.12	99.88	2.03	1.47
M-16	2.0-4.0	4.20	0.0062	0.01	99.99	0.72	2.59
M-16	4.0-6.0	4.20	0.0000	0.01	99.99	0.33	2.79
M-16	6.0-8.0	4.00	0.0000	0.01	99.99	0.31	2.11
M-16	8.0-10.0	4.70	0.0066	0.01	99.99	0.48	2.33
M-20	0-2.0	3.70	0.2122	0.12	99.88	0.71	0.66
M-20	2.0-4.0	4.10	0.0095	0.12	99.88	1.36	0.61
M-20	4.0-6.0	4.55	0.0000	0.10	99.90	0.76	0.71
M-20	6.0-8.0	4.90	0.0090	0.10	99.90	0.64	0.52
M-20	8.0-10.0	4.50	0.0116	0.19	99.81	0.77	0.53
M-24	0-2.0	2.90	0.1062	0.21	99.79	1.23	0.85
M-24	2.0-2.4	2.10	0.0248	0.29	99.71	0.39	0.50
M-26	0-1.0	2.90	0.0800	2.08	97.92	0.33	0.44
M-(4E)	0-2.0	2.95	0.2190	0.52	99.48	5.03	2.43
M-(4E)	2.0-4.0	5.60	0.0111	0.77	99.23	N/A	0.59
M-(4E)	4.0-5.4	4.20	0.5086	0.77	99.23	5.07	1.16

## R.H.F. LABORATORY HEAVY MINERAL SEPARATION

HOLE NUMBER	DEPTH	TOTAL WEIGHT KG	% + 2mm	% +600u	% -600u	% SLIME	% HEAVY MINERAL
MARRAWAH LINE 4							
M-4	0-2.0	3.40	0.2568	0.16	99.84	3.39	1.01
M-4	2.0-2.15	1.25	0.0224	0.16	99.84	5.11	0.36
M-8	0-2.0	3.65	0.0384	0.01	99.99	0.42	1.33
M-8	2.0-4.0	4.00	0.0000	0.03	99.97	0.38	1.28
M-8	4.0-6.0	3.85	0.0000	0.01	99.99	0.25	1.23
M-8	6.0-8.0	4.15	0.0019	0.01	99.99	0.35	1.21
M-8	8.0-10.0	4.10	0.0000	0.02	99.98	0.46	0.96
M-12	0-2.0	5.15	0.1012	0.07	99.93	1.14	1.15
M-12	2.0-3.5	4.00	0.1663	0.21	99.79	4.05	0.51
M-16	0-2.0	4.00	0.1148	0.13	99.87	1.04	1.16
M-16	2.0-3.15	2.90	0.0724	0.22	99.78	4.64	0.79
M-20	0-2.0	4.20	0.0310	0.05	99.95	0.64	1.24
M-20	2.0-4.0	5.00	0.0104	0.06	99.94	0.41	1.13
M-20	4.0-6.0	4.10	0.2329	0.50	99.50	1.65	1.26
M-24	0-2.0	4.20	0.0595	0.07	99.93	0.69	1.13
M-24	2.0-4.0	4.45	0.0000	0.02	99.98	0.36	1.19
M-24	4.0-6.0	3.50	0.0000	0.05	99.95	1.99	0.93
M-24	6.0-8.0	9.05	0.0040	0.02	99.98	3.09	0.40
M-24	8.0-10.0	6.25	0.0011	0.11	99.89	0.99	0.19
M-28	0-2.0	4.40	0.2064	0.11	99.89	0.72	0.90
M-28	2.0-4.0	4.45	0.0126	0.03	99.97	0.29	1.05
M-28	4.0-6.0	5.15	0.0184	0.06	99.94	1.59	0.85
M-28	6.0-6.5	1.75	0.0000	0.02	99.98	2.99	0.43
M-32	0-2.0	4.50	0.1322	0.08	99.92	0.69	1.10
M-32	2.0-4.0	3.95	0.0144	0.06	99.94	1.19	1.04
M-32	4.0-6.0	3.80	0.0137	0.05	99.95	2.60	0.63
M-32	6.0-8.0	7.15	0.0000	0.01	99.99	0.91	0.26
M-32	8.0-10.0	3.60	0.0025	0.04	99.96	1.42	0.09
M-36	0-2.0	4.55	0.1347	0.07	99.93	0.59	1.14
M-36	2.0-4.0	3.65	0.0000	0.08	99.92	0.71	0.96
M-36	4.0-6.0	5.65	0.1579	0.11	99.89	4.89	1.36
M-36	6.0-8.0	7.45	0.0000	0.05	99.95	0.38	0.29
M-36	8.0-10.0	6.20	0.0000	0.11	99.89	1.08	0.21

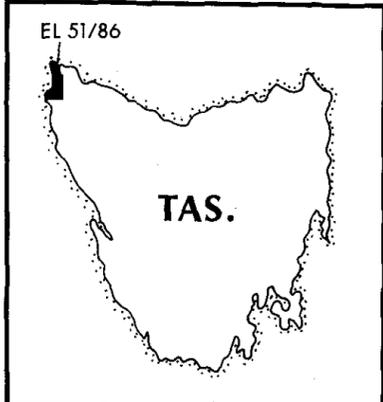
## R.H.F. LABORATORY HEAVY MINERAL SEPARATION

HOLE NUMBER	DEPTH	TOTAL WEIGHT KG	% + 2mm	% +600u	% -600u	% SLIME	% HEAVY MINERAL
M-40	0-2.0	5.00	0.0436	0.03	99.97	0.40	1.06
M-40	2.0-4.0	3.80	0.0000	0.05	99.95	0.37	1.14
M-40	4.0-6.0	3.60	0.0000	0.03	99.97	0.36	0.92
M-40	6.0-8.0	4.60	0.0000	0.02	99.98	0.84	1.03
M-40	8.0-10.0	5.65	0.0039	0.03	99.97	0.77	1.40
M-44	0-2.0	2.90	0.2524	0.07	99.93	0.57	1.04
M-44	2.0-4.0	3.50	0.0511	0.06	99.94	N/A	1.22
M-44	4.0-6.0	4.40	0.0102	0.04	99.96	1.10	1.14
M-44	6.0-8.0	4.50	0.0000	0.05	99.95	0.53	0.81
M-44	8.0-10.0	4.90	0.0118	0.09	99.91	N/A	0.27
M-48	0-2.0	3.40	0.1835	0.06	99.94	0.72	0.86
M-48	2.0-4.0	4.00	0.0083	0.02	99.98	N/A	0.84
M-48	4.0-6.0	3.75	0.0293	0.10	99.90	1.20	0.95
M-48	6.0-8.0	4.35	0.0011	0.11	99.89	N/A	1.02
M-48	8.0-10.0	4.25	0.0038	0.05	99.95	3.22	0.44
M-52	0-2.0	3.20	0.0472	0.06	99.94	0.37	0.79
M-52	2.0-4.0	4.60	0.0050	0.06	99.94	0.29	0.91
M-52	4.0-6.0	4.50	0.0000	0.06	99.94	0.28	0.80
M-52	6.0-8.0	5.20	0.0121	0.07	99.93	N/A	0.64
M-52	8.0-9.5	2.90	0.0600	0.09	99.91	1.27	0.80
M-56	0-2.0	4.10	0.1983	0.23	99.77	0.68	1.00
M-56	2.0-2.4	0.70	0.1943	0.66	99.34	N/A	0.94
M-60	0-1.1	3.80	0.0242	0.26	99.74	0.49	0.89

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RUBBING IS.

RI-0	0-2.0	3.80	0.0568	0.48	99.52	12.24	0.13
RI-0	2.0-3.5	7.10	0.0000	0.06	99.94	1.38	0.26
RI-50	0-1.4	2.70	1.2193	1.56	98.44	6.61	0.20
RI-100	0-1.3	2.30	1.1396	2.26	97.74	5.81	0.16
RI-150	0-1.3	2.75	0.2327	1.08	98.92	7.04	0.18
RI-200	0-2.0	5.00	0.2688	0.69	99.31	5.66	0.17
RI-200	2.0-3.0	1.95	0.0000	0.81	99.19	9.06	0.10
RI-250	0-1.7	3.30	0.4142	0.94	99.06	3.86	0.18
RI-300	0-2.0	4.20	0.4095	0.89	99.11	N/A	0.12

9360



WOOLNORTH POINT

WOOLNORTH

5 490 000 mN

Woolnorth Road

Smithton

AREA OF

RELINQUISHMENT

STUDLAND BAY

LINE 1

LINE 2

5 480 000 mN

MOUNT CAMERON WEST ABORIGINAL SITE

ANN BAY

EL 51/86

5 470 000 mN

Green Point

Point

Road

MARRAWAH

Arthur River

Smithton

N

483044

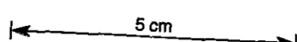
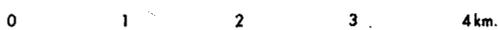
NATIONAL MINERAL SANDS

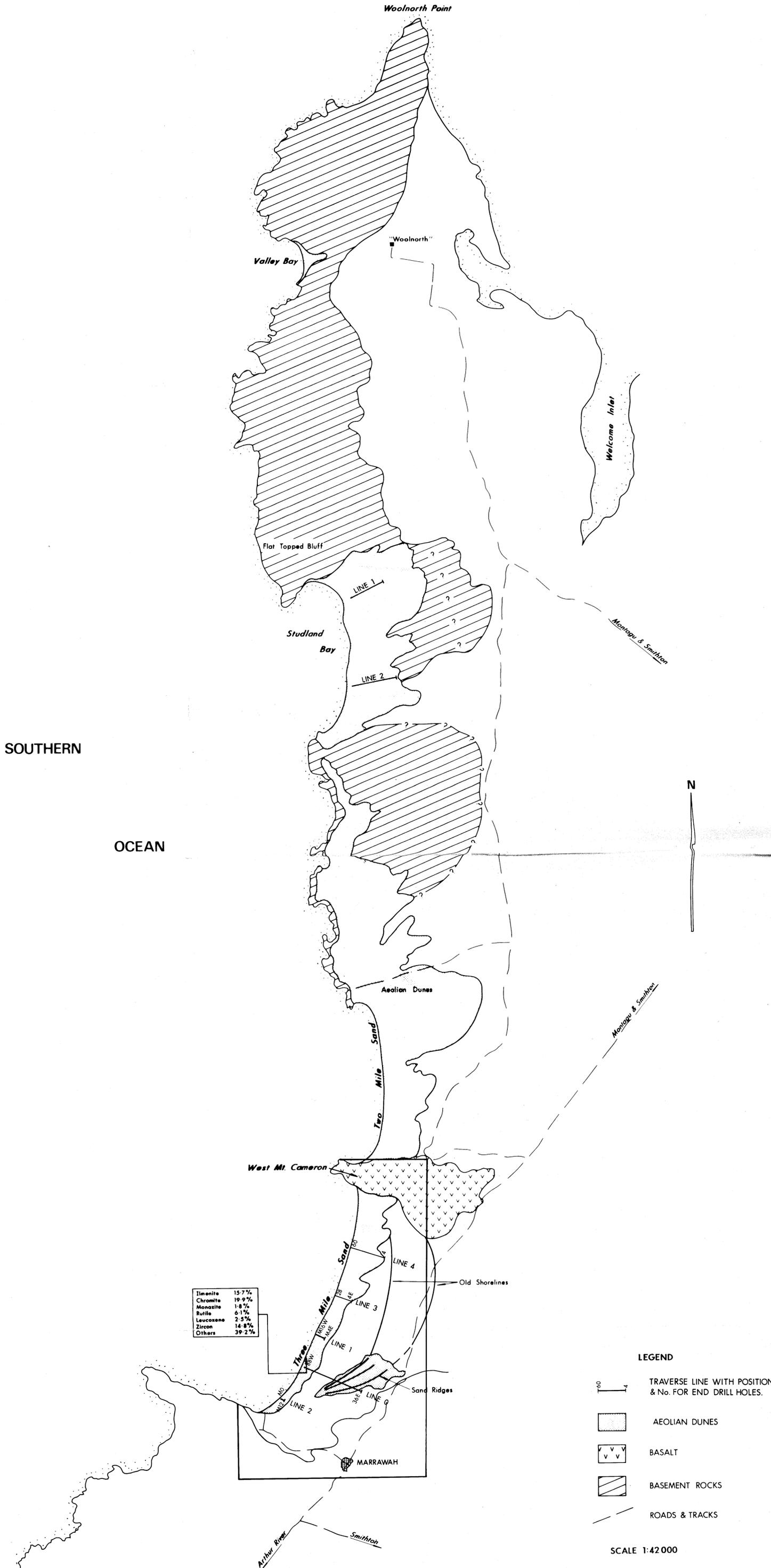
EL 51/86

AREA OF RELINQUISHMENT

Author: A.DOVE Date: NOV '88 Fig.No.: 1

SCALE 1: 50000





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**NATIONAL MINERAL SANDS**

EL 51/86 TASMANIA

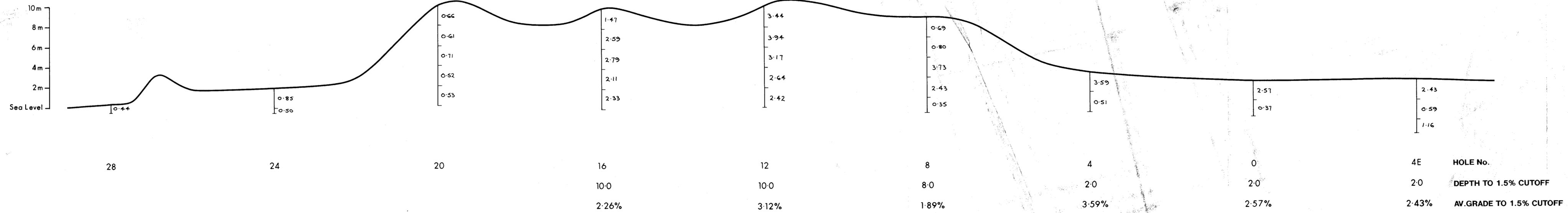
**AIR PHOTO INTERPRETATION**

**MURRUMBIDGEE TO WOOLNORTH**

5 cm

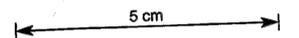
Author: G. LEE | Date: JUNE '89 | Fig: 2

9362



90-3133.

HORIZONTAL SCALE 1:500  
VERTICAL SCALE 1:200



483046

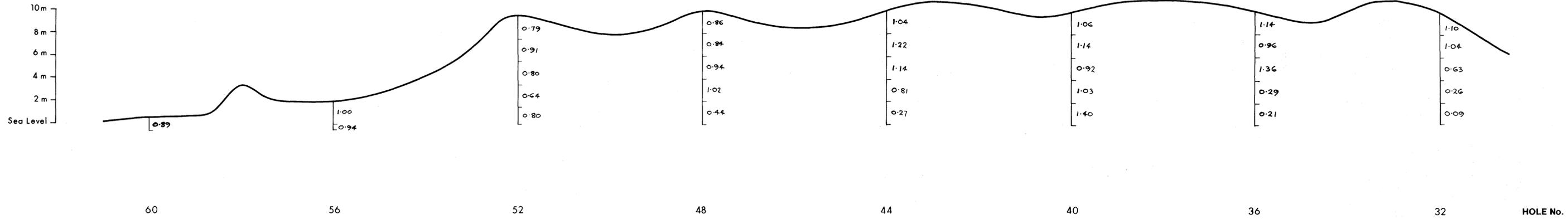
NATIONAL MINERAL SANDS P/L

EL 51/86  
MARRAWAH

**LINE 3**  
**CROSS-SECTION**

Author: A.DOVE | Date: MAY '90 | Fig.No.: 3

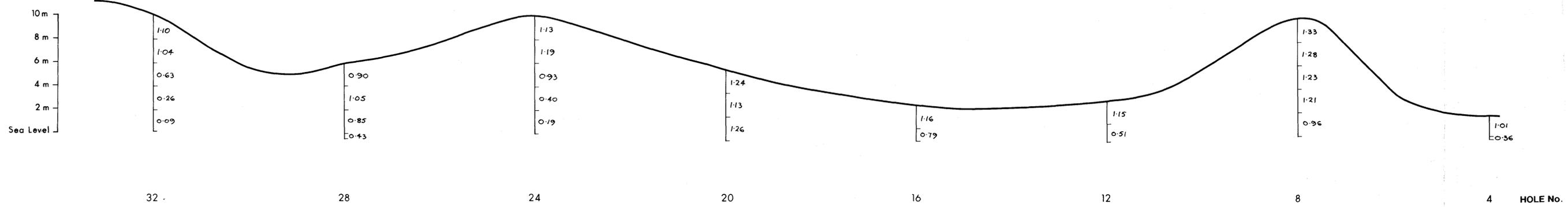
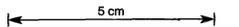
9363



90-3133.

HORIZONTAL SCALE 1:500  
VERTICAL SCALE 1:200

483047



<b>NATIONAL MINERAL SANDS P/L</b>		
EL 51/86		
MARRAWAH		
<b>LINE 4</b>		
<b>CROSS-SECTION</b>		
Author: A.DOVE	Date: MAY '90	Fig.No.: 4