

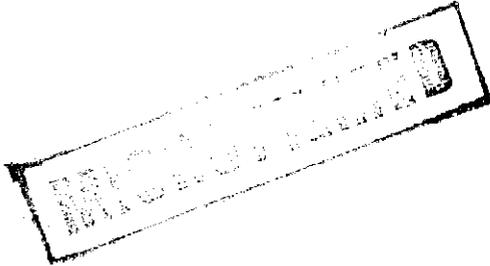
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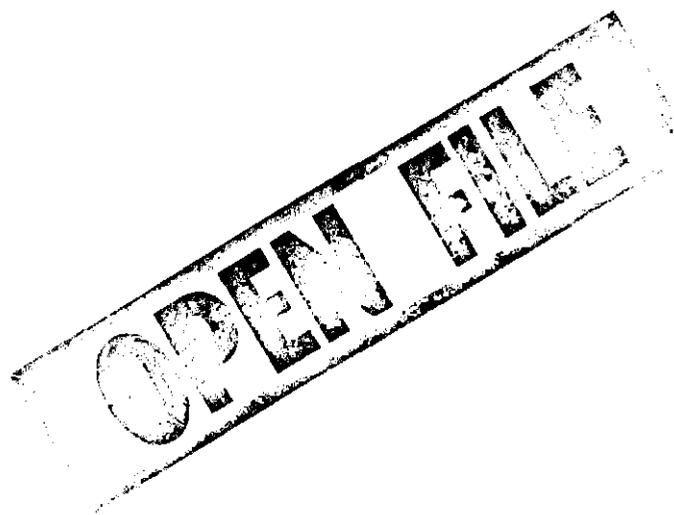
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REPORT NO. 10/88

EL 51/86

Annual Report on Exploration Completed
in the Marrawah-Woolnorth Areas of North-Western Tasmania
to 15.6.88

Prepared for National Mineral Sands Pty. Ltd.



A. Dove
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May, 1988

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SYNOPSIS

1. AIM

To examine the Tasmanian north west coast between Woolnorth and Marrawah 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.

3. SUMMARY & CONCLUSIONS

- 3.1 EL 51/86 covers 145 km² on the Tasmanian west coast between Marrawah and Woolnorth.
- 3.2 A review of previous work has shown that investigations have indicated in the order of 100,000 t of contained heavy mineral with various grades of rutile, zircon, leucoxene and cassiterite at Ann Bay near Marrawah.
- 3.3 A study of aerial photographs covering the licence area was completed and shown as Figure 2 of this report.
- 3.4 Field investigations were carried out near Marrawah (Ann Bay) and Woolnorth (Studland Bay) with three traverse lines drilled in each area, using hand drilling methods.
- 3.5 Results for Woolnorth are recorded in:
Appendix 1 - Drillhole logs with % heavy mineral.
Appendix 3 - Laboratory test results (% heavy mineral)
Appendix 4 - Mineralogical results for heavy mineral composite
- 3.6 Heavy mineral grades in the north of Studland Bay range from 0.11 to 1.23% and average approximately 0.5 %. In the south of Studland Bay grades range from 0.12 to 0.73% and average approximately 0.20%.
- 3.7 Mineralogy of 1 sample, comprising a composite of 3 drillholes, from the south of Studland Bay has yielded Zircon 2%, rutile 1%, leucoxene 14% monazite <1%.
- 3.8 Results for Marrawah are recorded in:
Appendix 2 - Drillhole logs with % heavy mineral.
Appendix 3 - Laboratory test results (% heavy mineral)
Appendix 5 - Mineralogical results for heavy mineral composite

3.9 Significant mineralisation was encountered on all three lines drilled near Marrawah, over a strike length exceeding 2 km.

3.10 Mineralisation extends over widths of up to 200m.

3.11 Heavy mineral grades range up to 45% in one sample interval of 1.0m.

3.12 Mineralogical examinations were completed on 5 samples.

3.13 Rutile grades range from 4 to 8% of the total heavy mineral.

Zircon grades range from 5 to 18% of the total heavy mineral.

Leucoxene grades range from 4 to 11% of the total heavy mineral.

Monazite grades range from < to 1.8% of the total heavy mineral.

3.14 A minimum 20% economic heavy mineral is contained in the heavy mineral suite of each sample examined.

4. RECOMMENDATION

4.1 For the time being no further work should be undertaken in the Studland Bay (Woolnorth) area.

4.2 Further work should be directed at delineating the mineralised sand body at Marrawah (Ann Bay).

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 Pty. Ltd.) on the north west coast of Tasmania between Woolnorth and Marrawah.

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.

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

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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 51/86 is held by National Mineral Sands Pty. Ltd. and covers an area of 145 square kilometres on the north-west coast of Tasmania, see Figure 1.

The area comprises 145 km² of private property, which includes the whole of the Marrawah-Woolnorth Point; Australian Heritage Act Registered Entry. Areas of 5.3 km² and 0.5 km² were excluded from the original application as they contained the Mt. Cameron West Aboriginal Site and Commonwealth land respectively.

7. PREVIOUS WORK

During 1967 it was found that the beaches of Ann Bay contained interesting amounts of cassiterite. A drilling programme was carried out by Pickands Mather to determine the extent of the mineral-bearing sands. Results showed that a belt of recent sand dunes immediately above the high water mark contained the richest material. The area of interest was about 6000 ft long and from 250 ft to 1000 ft. in width with the dunes in the order of 30 - 40 ft. in height above sea level.

As a result of the investigation, Pickands Mather stated reserves as:

Heavy Mineral Sands

Sand	3,000,000 cubic yards
Average heavy mineral content	3.6%

Heavy Mineral Concentrates

Total	108,000 tons
Rutile 2.5% in H.M.	2,700 tons
Zircon 5% in H.M.	5,400 tons
Cassiterite 0.098% in H.M.	103 tons (80 tons Sn)

Overall grade of 20 ppm Sn

In 1970 the E.Z. Company examined the deposit. Their aim was to achieve a higher average grade. E.Z. used a cut off grade resulting in an average of 5.3 percentage H.M., instead of 3.6 percent as used by Pickands Mather. EZ results are as follows:

Heavy Mineral Sand Deposits:

Sand 2.5 million tons

Average heavy mineral content 5.3%

Heavy Mineral Concentrate:

Total 100,000 tons

Rutile 2.8% in H.M. 2800 tons

Zircon 6.3% in H.M. 6300 tons

Cassiterite 0.43% in H.M. 430 tons (334 tons Sn)

An overall grade of 134 ppm Sn

As part of the E.Z. investigation, D. James working for Mineral Deposits Ltd., carried out a mineralogical study on a sample of heavy concentrates after attritioning, wet table separation, electrostatic and magnetic separation.

The heavy mineral suite was shown to comprise:

Ilmenite-chromite	37.9%
Others	37.1%
Rutile	7.2%
Zircon	13.9%
Leucoxene	3.9%

Monazite was observed but included with the "others". Rutile and Zircon grades obtained by James are higher than other workers and consistent with those obtained as part of the current investigation.

In 1979 Aberfoyle commenced evaluation of the Ann Bay Heavy Mineral deposit by hand auger/cased sludging techniques. The intention was to expand the cassiterite potential of the known 2.5 million ton mineral deposits reported by E.Z. Results confirmed the presence of cassiterite at about 10-20 ppm Sn raw sand grade. It was concluded that the original evaluation by Pickands Mather (20 ppm Sn overall) was fairly accurate and that the higher values (134 ppm overall) reported by E.Z. could not be confirmed.

8. 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 E.L. Details are:

Scale 1:42,000

Date: January 1983

Run 1 Nos 107 to 113

Run 1A Nos 172 to 175

Run 2 Nos 181 to 188

Run 3 Nos 79 to 85

Run 4 Nos 70 to 76

Run 5 Nos 90 to 97

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:

- . The most prospective area for mineral concentration would be Three Mile Sand, Two Mile Sand and Studland bay.
- . In these areas aeolian dunes may overlies strandline development.
- . The mineralogy for a sample from Three Mile Sand is shown on Figure 2.

9. FIELD INVESTIGATIONS9.1 Survey

Drillholes were located on traverse lines generally orientated east-west and perpendicular to the coastline so as to cross any strandlines which may be present.

All traverse lines were surveyed by tape and compass, with abney level determination of surface topography. The surface topography has been plotted on cross-sections showing drillholes and heavy mineral contents. For the most part holes were spaced 40m. apart, however at Marrawah holes along lines 1 and 2 were at 20 metres apart.

In the Studland Bay area traverse lines were located in topographically low areas to avoid drilling high aeolian sand dunes. The expectation was that significant concentrations of heavy minerals would occur in strandlines underlying aeolian dunes.

The location of the traverse lines is shown on Figure 2. The exploration concentrated upon two areas within the exploration licence, and so the traverse lines were designated:

Marrawah:	Line 0	M-Line 0
(Ann Bay)	Line 1	M-Line 1
	Line 2	M-Line 2
Woolnorth:	Line 1	W-Line 1
(Studland Bay)	Line 2	W-Line 2
	Line 2 redrill	W-Line 2, redrill

9.2 Drilling

All drilling for the main programme was by hand auger and hand operated cased sludging, using Dormer Engineering equipment. Holes were hand augered to water table using 50 mm. diameter hand auger. When water table was reached 50 mm. casing was inserted into the hole and the hole was advanced by sludging using a whistle top sludger on aluminium extension rods.

Drilling was completed at rock basement, pebbles, thick clay or thick peat layers. Where there was no impediment to drilling, holes were terminated at 10m. depth, since hand drilling below this depth becomes increasingly slow.

Samples from the drilling were bagged at 1 or 2 metre intervals. Where samples were obtained by sludging they were weighed in the field to check on weight variation due to sand boiling into the casing.

The drilling was carried out using a Tasmanian field crew. At Marrawah three traverse lines, for a total of fifty-two drill holes, were drilled. At Woolnorth, two traverse lines, one a redrill to obtain greater depths, plus a number of scattered scout holes, were drilled, for a total of forty-nine drill holes.

A brief descriptive log is prepared for each drill hole and where relevant, includes heavy mineral assay data. The Woolnorth borehole logs are presented in Appendix 1 and the Marrawah borehole logs in Appendix 2 of this report.

10. LABORATORY INVESTIGATIONS

Those samples that have been assayed for heavy minerals during this period were treated by R.H.F. Laboratories, Smithton, using the procedure outlined below:

1. Dry sample 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 3.

The heavy minerals for each interval have been bulked together to form composite samples for each drill hole. Mineralogical analysis was carried out on a number of these samples 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

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. 1.6 amp Frantz non-magnetics
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.
4. In the case of results obtained from a sample of beach concentrates
presented in figure 2, mineralogical determination was by electron
microprobe.

Mineralogical analyses are presented in Appendix 4 and 5 of this report
respectively for Studland Bay (Woolnorth) or Marrawah (Ann Bay).

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11. DISCUSSION11.1 Woolnorth (Studland Bay)

Originally one traverse line plus a number of scout holes were drilled in the southern end of Studland Bay. The traverse line extended over 560 metres incorporating 15 holes, with a maximum depth obtained of 8 metres. Another five holes were drilled in the frontal dunes north and south of the traverse line.

Heavy mineral separation was carried out on three selected drillholes based on the most encouraging results from field observations. The results ranged from 0.35 to 0.67 wt.%. The heavy minerals obtained from the three drillholes were subsequently bulked together for mineralogical examination with the results recorded in Appendix 4.

The economic minerals noted amongst the heavy mineral suite were:

Zircon	2%
Rutile	1%
Leucoxene	14%
Monazite	<1%

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.

Subsequent drilling involved both hand augering and hand cased sludging for depths below water table. Two traverse lines were drilled, Line 1 in the north of Studland Bay, and Line 2 in the south. Line 2 involved redrilling the previous traverse line,

so that samples below the water table were obtained. All samples in both lines had heavy mineral separations carried out, and the results are recorded in Appendix 3.

Line 1 extended 560 metres incorporating fifteen drillholes, with a maximum depth obtained of 9 metres and a minimum of 2.5 metres. All holes were terminated, due to either basement, peat layers or clay. Heavy mineral grades ranged from 0.11 to 1.23 wt.% with the average grade approximately 0.5 wt.%. The grades decrease from west to east.

Line 2 incorporated twelve drillholes over a distance of 440 metres, with all holes (except W-44) terminating at basement. Maximum depth obtained was 7.5 metres and the minimum 0.5 metres. The depths obtained using hand cased sludging were not much greater than those of hand augering. Hence it can be concluded that water table is close to the bottom of the sand. The heavy mineral grades range from 0.12 to 0.73 wt.% and average approximately 0.20%.

Mineralogical studies are presently being carried out on samples from Line 1 and Line 2 redrill. However for this area 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. Considering water table is close to the bottom of the sand, it would seem unlikely that the heavy mineral suite would change significantly with an increase in depth.

11.2 Marrawah (Ann Bay)

Originally traverse line M-Line 0 extending over 1240 metres, incorporating 34 drillholes, was drilled to the south of Ann Bay at Marrawah. Seven drillholes extending 200m. inland from high water mark showed heavy mineral grades of greater than 2%. The average grade over the 200m. area was 9.0%, using a 2% cut-off grade; and average depth of 3.0m. with intervals of sand containing grades up to 45.0 wt.%.

To delineate the extent of this mineralized zone two more traverse lines were drilled approximately 1 kilometre north and south of the original line. The northern traverse line M-Line 1 extended over 200 metres and good heavy mineral grades were found in all holes. The average grade is 4.9 wt.% heavy mineral, using 2% cut-off grade, with the average depth of approximately 6.0 metres. It should be noted that some holes were terminated at 10 metre depth with sand still present below, so the thickness of the mineralized zone in these holes will be greater than 10m.

The traverse line M-Line 2, to the south of the original line, encountered basement at very shallow depths, hence the mineralized zone was very narrow and shallow. Heavy mineral grades were delineated over a length of 80m., however the average depth was only 1.9m. and the average grade was 4.2 wt.% using 2% cut-off grade.

Cross sections of traverse lines 0, 1 and 2, showing heavy mineral grades are shown as Figure 3, 4 and 5 respectively.

Traverse line M-Line 2 represents the southernmost limit of the mineralized dune system. To the north, however, the limits of mineralizations have still not been defined. There is a possibility of the mineralization extending further north and also to greater depths.

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TABLE 1

Mineralogy of Heavy Mineral Concentrates - Marrawah
(M-Line 0)

Mineral	M87W 0 - 2.9m.	M84W 0 - 3.0m.	M80W 0 - 3.0m.	M76W 0 - 3.0m.	Beach Sample *
Magnetite]	29	51	40	32	15.7 19.9
Ilmenite]					
Chromite]					
Garnet	7	5	9	8	
Tourmaline	9	4	11	10	
Epidote	2	1	1	1	
Leucoxene	11	4	8	11	2.5
Rutile	8	8	4	5	6.1
Zircon	5	18	7	8	14.8
Shell	-	-	-	<1	
Quartz	<1	3	1	1	
Other Silicates	29	6	19	24	39.2
Cassiterite	ND	ND	ND	ND	
Monazite	1	1	1	<1	1.8
% 1.6A non mags	20	30	19	25	25 ⁺

* Determination by Electron Microprobe
+ 1.2A non mags.

021

To date mineralogical studies have only been carried out on five samples, 1 beach sample and four drillholes from the traverse line M-Line 0. The results have been very encouraging with all samples having a minimum of 20% saleable mineral (see Table 1); with most of this mineral concentrated into the 1.6 amp non-magnetic fraction, which contains in excess of 80% economic minerals. Further mineralogical work is presently being carried out on samples from traverse lines M-Line 1 and M-Line 2.

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

In the Marrawah area of the exploration licence, further work should be directed at delineating the extent of the mineralized zone. Work should include definition of the northern and eastern limit, further mineralogical study, quantification of resource and economic potential.

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APPENDIX 1

Drill hole descriptive logs

Studland Bay, Woolnorth - W.

W - Line 1

W - Line 2

W - Line 2 Redrill

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: 51/86

AREA: WOOLNORTH

LINE NO: 1 HOLE NO: WO

LOGGED BY: ANDREW DOVE

DATE DRILLED: March, 1988

023

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 2.0		SAND, fine to medium grained, amber. Abundant fine shell, becomes orange at 1.5m. H.M. present. Started sludging 1.0m.		0.05	0.93
2.0 - 2.5		SAND, fine to med. grained, orange. Abundant fine shell. H.M. present. END OF HOLE 2.5m. Rock		0.03	1.17
		Average			0.98

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777024

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: 51/86

AREA: WOOLNORTH

LINE NO: 1 HOLE NO: W4

LOGGED BY: ANDREW DOVE

DATE DRILLED: March, 1988

024

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 2.0		SAND, fine to medium grained, abmer, abundant fine shell, H.M. traces. Started sludging 2.0m.		0.02	0.65
2.0 - 3.0		SAND, fine to medium grained, orange, abundant fine shell. H.M. trace.			
3.0 - 4.0		AS ABOVE END OF HOLE 4.0m. Rock		0.49	0.58
		Average			0.62

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777025

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: 51/86

AREA: WOOLNORTH

LINE NO: 1

HOLE NO: W8

LOGGED BY: ANDREW DOVE

DATE DRILLED: March, 1988

025

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 2.0		SAND, fine to medium grained, amber, abundant fine shell.		0.10	0.56
2.0 - 4.0		AS ABOVE, becomes orange at base. Started sludging 2.6m. Went dark at base. END OF HOLE 4.0m. Rock		0.33	0.86
		Average			0.71

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777026

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: 51/86

AREA: WOOLNORTH

LINE NO: 1 HOLE NO: W12

LOGGED BY: ANDREW DOVE

DATE DRILLED: March, 1988

026

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 2.0		SAND, fine to medium grained, amber, abundant fine shell. Started sludging 1.5m.		0.07	0.63
2.0 - 3.0		SAND, fine to medium grained, orange borwn. Abundant fine shell.		0.02	0.55
3.0 - 4.0		SAND, fine to medium grained, light grey, abundant fine white shell, hit wood layer.		0.39	0.69
4.0 - 5.0		AS ABOVE		0.12	0.32
5.0 - 5.5		AS ABOVE			
		END OF HOLE 5.5m. Wouldn't turn			
		Average			0.55

23

777027

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: 51/86

AREA: WOOLNORTH

LINE NO: 1 HOLE NO: W16

LOGGED BY: ANDREW DOVE

DATE DRILLED: March, 1988

027

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 2.0		SAND, fine to medium grained, amber, abundant fine shell. Started sludging 2.0m.		0.10	0.46
2.0 - 3.0		SAND, fine to medium grained, light grey. Abundant fine white shell.			
3.0 - 4.0		AS ABOVE		0.01	0.73
4.0 - 5.0		AS ABOVE, darker			
5.0 - 5.4		AS ABOVE END OF HOLE 5.4m. Hit clay		0.40	0.36
		Average			0.53

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777028

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: 51/86

AREA: WOOLNORTH

LINE NO: 1 HOLE NO: W20

LOGGED BY: ANDREW DOVE

DATE DRILLED: March, 1988

028

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 2.0		SAND, fine to medium grained, amber, abundant fine shell.		0.05	0.29
2.0 - 4.0		AS ABOVE. Hit some wood layers. Started sludging		0.24	0.40
4.0 - 5.0		AS ABOVE, H.M. traces.			
5.0 - 6.0		AS ABOVE, becoming orange. H.M. trace.		0.01	1.23
6.0 - 7.0		AS ABOVE, becomes grey at base.			
7.0 - 8.0		SAND, fine grained, grey to dark grey. Abundant fine white shell.		0.12	0.65
8.0 - 9.0		SAND, fine to med. grained, light grey, abundant fine shell. END OF HOLE 9.0m. Rock		0.11	0.42
		Average			0.62

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777029

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: 51/86

AREA: WOOLNORTH

LINE NO: 1 HOLE NO: W24

LOGGED BY: ANDREW DOVE

DATE DRILLED: March, 1988

029

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 2.0		SAND, fine to medium grained, amber. Abundant fine shell.		0.10	0.25
2.0 - 4.0		AS ABOVE, went through black organic layers.		0.09	0.42
4.0 - 5.0		SAND, fine to med. grained, amber. Abundant fine shell. H.M. trace.			
		Started sludging 4.5m.			
5.0 - 6.0		AS ABOVE		0.02	0.79
6.0 - 7.0		AS ABOVE, becoming darker.			
7.0 - 8.0		SAND, fine to medium grained, brownish grey, abundant fine shell. H.M. trace.		0.22	0.46
8.0 - 8.6		AS ABOVE. Yellow brown. H.M. present		0.03	0.27
		END OF HOLE 8.6m. rock			
		Average			0.47

26

777030

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: 51/86

AREA: WOOLNORTH

LINE NO: 1 HOLE NO: W 28

LOGGED BY: ANDREW DOVE

DATE DRILLED: March, 1988

000

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 2.0		SAND, fine to medium grained, amber. Abundant fine shell. H.M. traces.		0.05	0.25
2.0 - 4.0		AS ABOVE, H.M. traces. Started sludging 4.0m.		0.16	0.25
4.0 - 5.0		AS ABOVE, darker at base. H.M. traces.		0.05	0.48
5.0 - 6.0		AS ABOVE, dark grey.			
6.0 - 7.0		AS ABOVE			
7.0 - 7.2		AS ABOVE END OF HOLE 7.2m. Clay		0.49	0.58
		Average			0.37

27

777031

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: 51/86

AREA: WOOLNORTH

LINE NO: 1 HOLE NO: W32

LOGGED BY: ANDREW DOVE

DATE DRILLED: March, 1988

001

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 2.0		SAND, fine to medium grained, amber. Grey at base. Abundant fine shell.		0.04	0.24
		Started sludging 2.0m.			
2.0 - 3.0		SAND, fine to medium grained, dark grey. Abundant fine white shell.		0.21	0.49
3.0 - 4.0		AS ABOVE, Hit brown clay at base.			
		END OF HOLE 4.0m. Clay and gravel			
		Average			0.37

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: 51/86

AREA: WOOLNORTH

LINE NO: 1 HOLE NO: W 36

LOGGED BY: ANDREW DOVE

DATE DRILLED: March, 1988

002

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 2.0		SAND, fine to medium grained, amber, grey at base, abundant fine shell Started sludging 2.0m.		0.07	0.20
2.0 - 3.0		SAND, fine to medium grained, light grey, abundant fine white shell.		0.44	0.57
3.0 - 3.2m.		AS ABOVE Hit clay and gravel END OF HOLE 3.2m.			
		Average			0.34

29

777033

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: 51/86

AREA: WOOLNORTH

LINE NO: 1 HOLE NO: W 44

LOGGED BY: ANDREW DOVE

DATE DRILLED: March, 1988

604

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 2.0		SAND, fine to med. grained, amber. Abundant fine shell. Started sludging 1.5m.		0.08	0.26
2.0 - 3.0		AS ABOVE. H.M. trace.		0.02	0.37
3.0 - 3.5		AS ABOVE, grey. END OF HOLE 3.5m. Hard, black organic layer.			
		Average			0.31

31

777035

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: 51/86

AREA: WOOLNORTH

LINE NO: 1 HOLE NO: W48

LOGGED BY: ANDREW DOVE

DATE DRILLED: March, 1988

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 2.0		SAND, fine to medium grained, amber. Abundant fine shell. Started sludging 1.5m.		0.01	0.29
2.0 - 3.0		AS ABOVE, grey at base. Hit dark hard organic layer.		0.52	0.42
3.0 - 3.2		AS ABOVE END OF HOLE 3.2m. Hard layer.			
		Average			0.34

605

32

777036

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: 51/86

AREA: WOOLNORTH

LINE NO: 1 HOLE NO: W56

LOGGED BY: ANDREW DOVE

DATE DRILLED: March, 1988

007

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 2.0		SAND, fine to medium grained, amber. Abundant fine shell.		0.30	0.30
2.0 - 4.0		AS ABOVE, went through dark grey organic layer.		0.29	0.26
4.0 - 6.0		SAND, fine to med. grained, amber. Abundant fine shell. Started sludging 5.0m.		0.06	0.11
6.0 - 7.0		AS ABOVE			
7.0 - 7.2		AS ABOVE, dark grey, hit dark layer. END OF HOLE 7.2m. Hard layer		0.01	0.23
		Average			0.22

34

777038

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: E.L. 51/86

AREA: WOOLNORTH

LINE NO: 2 HOLE NO: W-0

LOGGED BY: ANDREW DOVE

DATE DRILLED: October, 1987

008

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 1		SAND, fine to medium grained, amber, abundant fine shell, H.M. trace. Hit Water.			

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: E.L. 51/86

AREA: WOOLNORTH

LINE NO: 2 HOLE NO: W-4

LOGGED BY: ANDREW DOVE

DATE DRILLED: October, 1987

009

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 0.5		SAND, fine to medium grained, amber to orange brown, abundant shell, H.M. traces. END OF HOLE. 0.5m. Water.			

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: E.L. 51/86

AREA: WOOLNORTH

LINE NO: 2 HOLE NO: W 8

LOGGED BY: ANDREW DOVE

DATE DRILLED: October, 1987

040

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 1		SAND, fine to medium grained, light grey to grey, abundant shell. END OF HOLE 1.0m.			

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: E.L. 51/86

AREA: WOOLNORTH

LINE NO: 2 HOLE NO: W 12

LOGGED BY: ANDREW DOVE

DATE DRILLED: October, 1987

011

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 1		<p>SAND, fine to medium grained, amber, abundant shell. H.M. trace.</p> <p>END OF HOLE. 1.Cm. Water.</p>			

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: E.L. 51/86

AREA: WOOLNORTH

LINE NO: 2

HOLE NO: W 16

LOGGED BY: ANDREW DOVE

DATE DRILLED:

October, 1987

083

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 1		SAND, fine to medium grained, grey, abundant shell. END OF HOLE. 1.0m.			

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: E.L. 51/86

AREA: WOOLNORTH

LINE NO: 2 HOLE NO: W 20

LOGGED BY: ANDREW DOVE

DATE DRILLED: October, 1987

043

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 1		SAND, fine to medium grained, grey, abundant shell. END OF HOLE. 1.0m.			

40

777044

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: E.L. 51/86

AREA: WOOLNORTH

LINE NO: 2 HOLE NO: W 24

LOGGED BY: ANDREW DOVE

DATE DRILLED: October, 1987

CIA

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 1		<p>SAND, fine to medium grained, amber, abundant shell, H.M. trace.</p> <p>END OF HOLE. 1.0m. Water.</p>			

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: E.L. 51/86

AREA: WOOLNORTH

LINE NO: 2 HOLE NO: W 28

LOGGED BY: ANDREW DOVE

DATE DRILLED: October, 1987

045

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 -1		SAND, fine to medium grained, amber, abundant fine shell.			

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: E.L. 51/86

AREA: WOOLNORTH

LINE NO: 2 HOLE NO: W 32

LOGGED BY: ANDREW DOVE

DATE DRILLED: October, 1987

046

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 1		SAND, fine to medium grained, amber, abundant fine shell, H.M. trace. HIT ROCK.			

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: E.L. 51/86

AREA: WOOLNORTH

LINE NO: 2

HOLE NO: W 36

LOGGED BY: ANDREW DOVE

DATE DRILLED:

October, 1987

047

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 1		SAND, fine to medium grained, amber, abundant fire shell, H.M. Trace.			
1 - 2		AS ABOVE.		0.14	0.35
		END OF HOLE. 2.0m.			
		Average			0.35

44

777048

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: E.L. 51/86

AREA: WOOLNORTH

LINE NO: 2 HOLE NO: W 40

LOGGED BY: ANDREW DOVE

DATE DRILLED: October, 1987

048

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 1		SAND, fine to medium grained, amber at top then orange then grey at base, abundant fine shell.			
1 - 2		SAND, fine to medium grained, orange then grey, amber at base. (White sand at base contains shell p. H.M.?)			
2 - 3		SAND, fine to medium grained, amber, abundant shell, H.M. trace.			
HIT WATER. 3.0m.					

45

777049

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: E.L. 51/86

AREA: WOOLNORTH

LINE NO: 2 HOLE NO: W 44

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, amber, contains abundant shell.			
1 - 2		AS ABOVE			
2 - 3		AS ABOVE. H.M. Trace.			
3 - 4		SAND, fine to medium grained grey at top then orange, amber last 10 cm.			
4 - 5		SAND, fine to medium grained, amber, abundant fine shell, H.M. trace.			
		END OF HOLE. 5.0m. Water.			

46

777050

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: E.L. 51/86

AREA: WOOLNORTH

LINE NO: 2 HOLE NO: W 48

LOGGED BY: ANDREW DOVE

DATE DRILLED: October, 1987

050

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 1		SAND, fine to medium grained, amber, abundant fine shell.			
1 - 2		AS ABOVE, H.M. trace.			
2 - 3		AS ABOVE, H.M. trace.			
3 - 4		AS ABOVE, H.M. trace,			
4 - 5		SAND, fine to medium grained, mottled white and orange.			
5 - 6		SAND, fine to medium grained orange and amber mottle, fine abundant shell.			
6 - 7		SAND, fine to medium grained, amber, abundant fine shell, H.M. trace.			
		HIT WATER. 7.0m.			

47

777051

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: E.L. 51/86

AREA: WOOLNORTH

LINE NO: 2 HOLE NO: W 52

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 grained, amber, abundant fine shell.			
1 - 2		AS ABOVE, H.M. traces.		0.10	0.52
2 - 3		AS ABOVE, H.M. traces.			
3 - 4		AS ABOVE, H.M. trace, slightly darker at base.		0.09	0.45
4 - 5		SAND, fine to medium grained, amber, abundant fine shell, H.M. traces.		0.08	0.41
5 - 6		AS ABOVE, H.M. traces.			
6 - 7		AS ABOVE, reddish brown at base.		0.03	0.39
7 - 8		SAND, fine to medium grained, amber, red-brown mottle, abundant fine shell.			
		END OF HOLE. 8m. Kept caving in.			
		Average			0.44

CLIENT: NATIONAL MINERAL SANDS
 AREA: WOOLNORTH
 LOGGED BY: ANDREW DOVE

TITLE NO: E.L. 51/86
 LINE NO: 2 HOLE NO: W56
 DATE DRILLED: October, 1987

002

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 1		SAND, fine to medium grained, amber, abundant fine shell, H.M. traces.			
1 - 2		AS ABOVE.			
2 - 3		AS ABOVE.			
3 - 4		AS ABOVE.			
<p>END OF HOLE. 4m. Kept caving in.</p>					

49

777053

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: 51/86

AREA: WOOLNORTH

LINE NO: 2 HOLE NO: WO

LOGGED BY: ANDREW DOVE

Redrill
DATE DRILLED: March, 1988

003

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 2.0		SAND, fine to medium grained, amber. Abundant fine shell - orange-brown at base. Trace of H.M. END OF HOLE 2.0m. Rock		1.17	0.73

50
777054

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: 51/86

AREA: WOOLNORTH

LINE NO: 2 HOLE NO: W4

LOGGED BY: ANDREW DOVE

DATE DRILLED: ^{Redrill} March, 1988

004

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 0.5		SAND, fine to medium grained. Orange-grey. Abundant fine shell. END OF HOLE 0.5m. Rock		0.04	0.34

51

777055

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: 51/86

AREA: WOOLNORTH

LINE NO: 2 HOLE NO: W8
Redrill

LOGGED BY: ANDREW DOVE

DATE DRILLED: March, 1988

055

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 1.7		SAND, fine to medium grained, light grey to grey. Abundant fine shell - grey brown at base. END OF HOLE 1.7m. Dark brown layer.		0.04	0.22

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: 51/86

AREA: WOOLNORTH

LINE NO: 2 HOLE NO: W16
Redrill

LOGGED BY: ANDREW DOVE

DATE DRILLED: March, 1988

007

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 2.0		SAND, fine to medium grained, amber - grey at base. Abundant fine shell.		0.07	0.21
		Started sludging 1.5m.			
2.0 - 2.7		SAND, fine to medium grained, grey to dark grey. Abundant fine shell. Contains organics.		0.06	0.18
		END OF HOLE 2.7m. Hard black layer			
		Average			0.20

54

777058

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: 51/86

AREA: WOOLNORTH

LINE NO: 2 HOLE NO: W20

LOGGED BY: ANDREW DOVE

Redrill
DATE DRILLED: March, 1988

608

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 2.0		SAND, fine to medium grained, light grey. Abundant fine shell.		0.02	0.22
		Started sludging 1.0m.			
2 - 2.8m.		AS ABOVE. Dark brown at base.		0.01	0.22
		END OF HOLE 2.8m. Hard brown layer.			
		Average			0.22

55

777059

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: 51/86

AREA: WOOLNORTH

LINE NO: 2 HOLE NO: W32

LOGGED BY: ANDREW DOVE

Redrill
DATE DRILLED: March, 1988

001

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 2.0		SAND, fine to medium grained, amber. Abundant fine shell.		0.04	0.13
2.0 - 4.0		AS ABOVE, grey at base Started sludging 3.0m.		0.04	0.15
4.0 - 4.4		AS ABOVE END OF HOLE 4.4m. Hard dark layer		0.04	0.11
		Average			0.14

58

777062

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: 51/86

AREA: WOOLNORTH

LINE NO: 2 HOLE NO: W36
Redrill

LOGGED BY: ANDREW DOVE

DATE DRILLED: March, 1988

602

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 2.0		SAND, fine to medium grained, amber. Abundant fine shell, grey near base. Started sludging		0.21	0.12
2.0 - 3.0		SAND, fine to medium grained, grey. Abundant fine shell.			
3.0 - 3.7		SAND, fine to medium grained, dark grey. Hit dark layer.		0.28	0.12
		END OF HOLE 3.7m. Dark layer			
		Average			0.12

59

777063

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: 51/86

AREA: WOOLNORTH

LINE NO: 2 HOLE NO: W40
Redrill

LOGGED BY: ANDREW DOVE

DATE DRILLED: March, 1988

003

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 2.0		SAND, fine to medium grained, amber then grey at about 1.0m. then back into amber. Abundant fine shell.		0.09	0.29
2.0 - 4.0		SAND, fine to med. grained, amber. Some grey layers. Abundant fine shell.		0.08	0.12
4.0 - 4.5		Started sludging 4.0m. SAND, fine to med. grained, grey. Abundant fine shell. END OF HOLE 4.5m. Hard dark layer.		0.11	0.23
		Average			0.21

60

777064

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: 51/86

AREA: WOOLNORTH

LINE NO: 2 HOLE NO: W44
Redrill

LOGGED BY: ANDREW DOVE

DATE DRILLED: March, 1988

001

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 2.0		SAND, fine to medium grained, amber. Abundant fine shell.		0.09	0.21
2.0 - 4.0		AS ABOVE. Hit some grey layers.		0.04	0.21
4.0 - 6.0		AS ABOVE Started sludging		0.05	0.14
6.0 - 7.0		SAND, fine to medium grained, grey. Abundant shell fragments.			
7.0 - 7.4		AS ABOVE END OF HOLE 7.4m. Hard dark layer		0.16	0.12
			Average		0.17

61

777065

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: E.L. 51/86

600
500

AREA: WOOLNORTH

LINE NO: A HOLE NO: W 0

LOGGED BY: ANDREW DOVE

DATE DRILLED: October, 1987

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 0.7		SAND, fine to medium grained, amber at top then 20cm of dark grey, containing mineral then amber. END OF HOLE. 0.7. Water.			

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: E.L. 51/86

AREA: WOOLNORTH

LINE NO: A HOLE NO: W 4

LOGGED BY: ANDREW DOVE

DATE DRILLED: October, 1987

006

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 1		SAND, fine to medium grained, amber, contains abundant shell, H.M. traces.		0.2	0.67
1 - 2		AS ABOVE, grey at base.			
		END OF HOLE. 2m. Water.			
		Average			0.67

63

777067

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: E.L. 51/86

AREA: WOOLNORTH

LINE NO: B HOLE NO: W BEACH

LOGGED BY: ANDREW DOVE

DATE DRILLED: October, 1987

607

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 1		SAND, fine to medium grained, amber, abundant fine shell, H.M. traces. END OF HOLE. 1.0m.			

69

777068

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: E.L. 51/86

AREA: WOOLNORTH

LINE NO: B HOLE NO: W 0

LOGGED BY: ANDREW DOVE

DATE DRILLED: October, 1987

008

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 1		SAND, fine to medium grained, fine abundant shell, H.M. traces.			
1 - 2		AS ABOVE.			
2 - 3		AS ABOVE.			
3 - 3.3		AS ABOVE.			
		END OF HOLE 3.3M. CAVED IN.			

65

777069

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: E.L. 51/86

AREA: WOOLNORTH

LINE NO: B HOLE NO: W 4

LOGGED BY: ANDREW DOVE

DATE DRILLED: October, 1987

609

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 1		SAND, fine to medium grained, amber, abundant fine shell.			
1 - 2		AS ABOVE.			
2 - 3		AS ABOVE, became dark grey 30cm from top.			
3 - 4		SAND, fine to medium grained, greyish brown, abundant fine shell.			
4 - 5		AS ABOVE, amber at base.			
5 - 5.6		SAND, fine to medium grained, amber, abundant fine shell.			
		END OF HOLE. 5.6m. Caved in.			

66

777070

APPENDIX 2

Drill hole Descriptive Logs

Ann Bay, Marrawah - M.

M - Line 0

M - Line 1

M - Line 2

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: E.L. 51/86

AREA: MARRAWAH

LINE NO: 0 HOLE NO: M 88W

LOGGED BY: ANDREW DOVE

DATE DRILLED: October, 1987

077

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 1		SAND, fine to medium grained, light grey, abundant H.M. HIT ROCK.		0.64	22.10

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: E.L. 51/86

AREA: MARRAWAH

LINE NO: 0 HOLE NO: M 87W

LOGGED BY: ANDREW DOVE

DATE DRILLED: October, 1987

072

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 1		SAND, fine to medium grained, light grey, fine shell, H.M.		0.05	5.75
1 - 2		AS ABOVE. H.M.		0.04	11.83
2 - 2.9		AS ABOVE, abundant H.M. Hit hard calcrete layer		0.09	8.07
		END OF HOLE. 2.9m.			
		Average			8.57

69

777073

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: E.L. 51/86

AREA: MARRAWAH

LINE NO: 0 HOLE NO: M 84W

LOGGED BY: ANDREW DOVE

DATE DRILLED: October, 1987

017A

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 1		SAND, fine to medium grained white and amber colour, hit calcite, went through and hit abundant H.M.		0.17	14.14
1 - 2		SAND, fine to medium grained, light grey, abundant H.M. STARTED SLUDGING		0.13	45.00
2 - 2.5		SAND, fine to medium grained, grey, contains clay, H.M. END OF HOLE. 2.5m. Clay.		0.85	1.77
		Average			24.01

71

777075

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: E.L. 51/86

AREA: MARRAWAH

LINE NO: 0 HOLE NO: M 80W

LOGGED BY: ANDREW DOVE

DATE DRILLED: October, 1987

010

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 1		SAND, fine to medium grained, dark grey, organic.		0.18	9.43
1 - 2		SAND, fine to medium grained, dark grey.		0.04	9.42
		STARTED SLUDGING			
2 - 3		SAND, fine grained, light grey, contains H.M.		0.03	4.79
		END OF HOLE. 3.0m. Clay.			
		Average			7.88

72

777076

CLIENT: NATIONAL MINERAL SANDS

AREA: MARRAWAH

LOGGED BY: ANDREW DOVE

TITLE NO: E.L. 51/86

LINE NO: 0 HOLE NO: M 76W

DATE DRILLED: October, 1987

016

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 1		SAND, fine to medium grained, amber, contains fine shell.		0.31	4.82
1 - 2		SAND, fine to medium grained, amber then dark brown. STARTED SLUDGING		0.16	5.34
2 - 3		SAND, fine grained, dark brown, contains clay. END OF HOLE. 3m. Clay.		0.59	4.122
		Average			4.76

73

777077

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: E.L. 51/86

AREA: MARRAWAH

LINE NO: 0 HOLE NO: M 72W

LOGGED BY: ANDREW DOVE

DATE DRILLED: October, 1987

077

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 1		SAND, fine to medium grained, light grey, contains minor shell. STARTED SLUDGING		0.18	9.05
1 - 2		SAND, fine to medium grained, dark brown, organic, contains clay.		1.62	3.62
2 - 3		SAND, fine grained, dark brown, contains clay. END OF HOLE. 3.0m. Clay.		1.41	2.16
		Average			4.94

74

777078

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: E.L. 51/86

AREA: MARRAWAH

LINE NO: 0 HOLE NO: M 68W

LOGGED BY: ANDREW DOVE

DATE DRILLED: October, 1987

018

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
		STARTED SLUDGING			
0 - 1		SAND, fine to medium grained, dark brown, organic.		1.28	2.91
1 - 2		SAND, fine to medium grained, light grey, contains clay.		0.40	1.27
		END OF HOLE 2.0m. Clay.			
		Average			2.09

75

777079

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: E.L. 51/86

AREA: MARRAWAH

LINE NO: 0 HOLE NO: M 64W

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, dark grey, organic.		0.27	1.49
1 - 2		SAND, fine to medium grained, grey slight red tinge, contains clay. STARTED SLUDGING		0.18	0.95
2 - 3		SAND, fine to medium grained, grey.		0.08	0.74
3 - 4		AS ABOVE, contains clay, slightly darker, finer at base. END OF HOLE 4.0m. Clay.		0.19	1.28
		Average			1.12

76

777080

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: E.L. 51/86

AREA: MARRAWAH

LINE NO: 0

HOLE NO: M 60W

LOGGED BY: ANDREW DOVE

DATE DRILLED: October, 1987

030

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 1		SAND, fine to medium grained, dark grey, organics.			
1 - 2		SAND, fine to medium grained, brownish grey, contains clay. STARTED SLUDGING			
2 - 3		AS ABOVE, brownish-red colour and finer grained. END OF HOLE. 4m. Clay.			

77

777081

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: E.L. 51/86

AREA: MARRAWAH

LINE NO: 0 HOLE NO: M 56W

LOGGED BY: ANDREW DOVE

DATE DRILLED: October, 1987

001

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 1		SAND, fine to medium grained, grey, organic.			
1 - 2		SAND, fine to medium grained, grey, contains clay. STARTED SLUDGING			
2 - 3		SAND, fine to medium grained, grey, contains clay.			
3 - 4		AS ABOVE.			
		END OF HOLE. 4.0m. Clay.			

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: E.L. 51/86

AREA: MARRAWAH

LINE NO: 0 HOLE NO: M 52W

LOGGED BY: ANDREW DOVE

DATE DRILLED: October, 1987

003

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 1		SAND, fine to medium grained, dark grey, organic.			
1 - 2		SAND, fine to medium grained, grey, some organics. STARTED SLUDGING 1.5m.			
2 - 3		SAND, fine to medium grained, dark brown, contains clay, (smells of sulphur).			
3 - 7		AS ABOVE. END OF HOLE. 3.7m. Clay.			

79

777083

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: E.L. 51/86

AREA: MARRAWAH

LINE NO: 0 HOLE NO: M 48W

LOGGED BY: ANDREW DOVE

DATE DRILLED: October, 1987

003

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 1		SAND, fine to medium grained, grey, organic.			
1 - 2		SAND, fine to medium grained, red grey, some organics. STARTED SLUDGING 1.5m.			
2 - 3		SAND, fine grained, dark grey, contains clay. END OF HOLE. 3.0m. Clay.			

80

777084

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: E.L. 51/86

AREA: MARRAWAH

LINE NO: 0 HOLE NO: M 44W

LOGGED BY: ANDREW DOVE

DATE DRILLED: October, 1987

004

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 1		SAND, fine to medium grained, dark grey, organic.			
1 - 2		SAND, fine to medium grained, dark brown. Contains clay. STARTED SLUDGING.			
2 - 3		AS ABOVE			
3 - 3.5		AS ABOVE END OF HOLE 3.5 Clay.			

81

777085

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: E.L. 51/86

AREA: MARRAWAH

LINE NO: 0 HOLE NO: M 40W

LOGGED BY: ANDREW DOVE

DATE DRILLED: October, 1987

005

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 1		SAND, fine to medium grained, dark brown, organics.			
1 - 2		SAND, fine to medium grained, grey. STARTED SLUDGING 1.5m. Contains Clay.			
2 - 3		AS ABOVE. END OF HOLE. 3.0m. Clay.			

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: E.L. 51/86

AREA: MARRAWAH

LINE NO: 0 HOLE NO: M 36W

LOGGED BY: ANDREW DOVE

DATE DRILLED: October, 1987

006

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 1		SAND, fine to medium grained, dark grey, contains organics.			
1 - 2		SAND, fine to medium grained, light grey. STARTED SLUDGING 1.8m. Clayey. END OF HOLE 2.0m.			

83

777087

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: E.L. 51/86

AREA: MARRAWAH

LINE NO: 0 HOLE NO: M 32W

LOGGED BY: ANDREW DOVE

DATE DRILLED: October, 1987

007

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 1		SAND, fine to medium grained, light grey with dark brown organics. STARTED SLUDGING 1.0m.			
1 - 2		SAND, fine to medium grained, dark grey, contains clay.			
2 - 2.5		AS ABOVE END OF HOLE. 2.5m. Clay.			

84

777088

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: E.L. 51/86

AREA: MARRAWAH

LINE NO: 0 HOLE NO: M 28W

LOGGED BY: ANDREW DOVE

DATE DRILLED: October, 1987

608

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 1		SAND, fine to medium grained, grey to dark brown. STARTED SLUDGING.			
1 - 2		SAND, fine grained, dark brown, clayey. END OF HOLE. 2.0m. Clay.		0.93	0.55

85

777089

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: E.L. 51/86

AREA: MARRAWAH

LINE NO: 0

HOLE NO: M 24W

LOGGED BY: ANDREW DOVE

DATE DRILLED: October, 1987

609

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 1		SAND, fine to medium grained, light grey with dark brown organics.			
1 - 2		SAND, fine to medium grained, light grey, minor organics. STARTED SLUDGING 2.0m.		0.40	0.17
2 - 3		SAND, fine to medium grained, light grey, contains clay.			
3 - 4		SAND, fine to medium grained, dark brown, clay. END OF HOLE. 4m. Clay.		0.10	0.70
		Average			0.44

86

777090

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: E.L. 51/86

AREA: MARRAWAH

LINE NO: 0

HOLE NO: M 20W

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 grained, light grey with dark brown organics.			
1 - 2		SAND, fine to medium grained, reddish brown, with organics.		0.54	0.38
2 - 3		SAND, fine to medium grained, light brown then light grey. STARTED SLUDGING			
3 - 4		SAND, fine to medium grained, light grey contains black clay.		0.42	0.55
4 - 4.7		AS ABOVE. Hit Clay END OF HOLE. 4.7m.		0.11	0.51
		Average			0.47

000

87

777091

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: E.L. 51/86

AREA: MARRAWAH

LINE NO: 0

HOLE NO: M 16W

LOGGED BY: ANDREW DOVE

DATE DRILLED: October, 1987

1001

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 1		SAND, fine to medium grained, light grey, organic.			
1 - 2		SAND, fine to medium whit, yellow-red at base (podsol).		0.11	0.37
2 - 3		SAND, fine to medium grained, white to light grey. STARTED SLUDGING			
3 - 4		SAND, fine to medium grained, light grey, contains clay.		0.18	0.57
4 - 5		SAND, fine to medium grained, dark grey, contains clay. END OF HOLE. 5m. Clay.		0.02	0.76
		Average			0.53

88

777092

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: E.L. 51/86

AREA: MARRAWAH

LINE NO: 0 HOLE NO: M 12W

LOGGED BY: ANDREW DOVE

DATE DRILLED: October, 1987

002

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 1		SAND, fine to medium grained, grey organic.			
1 - 2		SAND, fine to medium grained, brownish red. STARTED SLUDGING		0.24	0.57
2 - 3		SAND, fine to medium grained, light grey, contains some wood.			
3 - 4		SAND, fine to medium grained, light grey, contains clay.		0.04	0.78
4 - 4.2		AS ABOVE. Hit Clay. END OF HOLE. 4.2m		0.04	0.81
		Average			0.68

68

999093

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: E.L. 51/86

AREA: MARRAWAH

LINE NO: 0

HOLE NO: M 8W

LOGGED BY: ANDREW DOVE

DATE DRILLED:

October, 1987

003

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 1		SAND, fine to medium grained, dark grey organic.			
1 - 2		SAND, fine to medium grained, reddish brown (podsol).		0.19	0.51
2 - 3		SAND, fine to medium grained, dark brown. HIT WATER at 3m. STARTED SLUDGING 3.0m.			
3 - 4		SAND, fine to medium grained, light grey, Hit some wood.		0.16	0.65
4 - 5		AS ABOVE.			
5 - 6		SAND, fine to medium grained, light grey, contains wood.		0.07	0.68
6 - 6.5		SAND, fine grained, light grey, contains clay. END OF HOLE 6.5m. Clay.		0.63	1.05
		Average			0.65

90

777094

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: E.L. 51/86

AREA: MARRAWAH

LINE NO: 0 HOLE NO: M 4W

LOGGED BY: ANDREW DOVE

DATE DRILLED: October, 1987

004

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 1		SAND, fine to medium grained, white, organic.			
1 - 2		SAND, fine to medium grained, white at top, brownish at base.		0.20	0.54
2 - 3		SAND, fine to medium grained, white and brown mottle.			
3 - 4		SAND, fine to medium grained, light grey		0.02	0.65
		STARTED SLUDGING 4.0m.			
4 - 5		AS ABOVE. Contains some clay.			
5 - 5.5		AS ABOVE. HIT CLAY.		0.02	0.74
		END OF HOLE. 5.5m. Clay.			
		Average			0.63

91

777095

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: E.L. 51/86

AREA: MARRAWAH

LINE NO: 0

HOLE NO: M 0

LOGGED BY: ANDREW DOVE

DATE DRILLED:

October, 1987

005

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 1		SAND, find to medium white, contains organics.			
1 - 2		SAND, fine to medium grain, brownish orange (podsol).		0.16	0.46
2 - 3		SAND, fine to medium grained, mottled colour, fawns to dark brown.			
3 - 4		SAND, fine to medium grained, mottled colour light grey to fawn.		0.10	0.64
4 - 5		AS ABOVE			
5 - 6		SAND, fine to medium grained, light grey. STARTED SLUDGING 5.7m.		0.02	0.73
6 - 7		AS ABOVE			
7 - 8		AS ABOVE. Hit clay at 8.0m. END OF HOLE 8m. Clay		0.03	0.77
		Average			0.65

92

777096

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: E.L. 51/86

AREA: MARRAWAH

LINE NO: 0 HOLE NO: M 4E

LOGGED BY: ANDREW DOVE

DATE DRILLED: October, 1987

906

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 1		SAND, fine to medium grained, white, organic.		0.50	0.50
1 - 2		SAND, fine to medium grained, white, organic at base, yellow brown at base.			
2 - 3		SAND, fine to medium grained, yellow brown, chocolate brown at base.		0.16	0.78
3 - 4		SAND, fine to medium grained, yellow-brown chocolate brown at top then yellow-brown.			
4 - 5		SAND, fine to medium grained, yellow brown at top then pale yellow.		1.70	0.60
5 - 6		SAND, fine to medium grained, pale yellow and yellow brown mottle.			
		STARTED SLUDGING 6.0m.			
6 - 7		SAND, fine to medium grained, light grey, becoming brown with depth.		0.01	0.83
7 - 8		SAND, fine to medium grained, light brown contains wood.			
8 - 8.9		AS ABOVE.		0.01	0.74
		END OF HOLE. 8.9m. Indurated.			
		Average			0.68

93

777097

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: E.L. 51/86

AREA: MARRAWAH

LINE NO: 0 HOLE NO: M 8E

LOGGED BY: ANDREW DOVE

DATE DRILLED: October, 1987

607

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 1		SAND, fine to medium grained, white with black organics.		0.16	0.58
1 - 2		SAND, fine to medium grained, white, brownish yellow at base.			
2 - 3		SAND, fine to medium grained, yellow brown.		0.03	0.21
3 - 4		AS ABOVE.			
4 - 5		AS ABOVE.		0.07	0.16
5 - 6		AS ABOVE.			
6 - 7		AS ABOVE.		0.05	0.38
7 - 8		AS ABOVE, chocolate brown at base.			
8 - 9		SAND, fine to medium grained, mottled yellow, light grey and orange.		0.05	0.91
9 - 9.5		SAND, fine to medium grained, grey.			
		END OF HOLE. 9.5m. Hit Water.			
		Average			0.42

94

777098

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: E.L. 51/86

AREA: MARRAWAH

LINE NO: 0

HOLE NO: M 16E

LOGGED BY: ANDREW DOVE

DATE DRILLED:

October, 1987

609

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 1		SAND, fine to medium grained, light grey, contains organics.		0.12	0.15
1 - 2		SAND, fine to medium grained, white, contains yellow-brown at base.			
2 - 3		SAND, fine to medium grained, yellow-brown went through thin dark brown layer.		0.04	0.15
3 - 4		SAND, fine to medium grained, yellow-brown.			
4 - 5		AS ABOVE, some dark brown.		0.06	0.10
5 - 6		SAND, fine to medium grained mottled dark brown, white, yellow-brown. Went through some hard indurated layers. STARTED SLUDGING 6.0m.			
6 - 6.5		SAND, fine to medium grained, light grey.		0.02	0.51
6.5 - 8		AS ABOVE, becoming muddier and clayier.			
8 - 9		AS ABOVE, hit clay. END OF HOLE. 9.0m. Clay.		0.09	0.59
		Average			0.27

96

777100

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: E.L. 51/86

AREA: MARRAWAH

LINE NO: 0 HOLE NO: M 20E

LOGGED BY: ANDREW DOVE

DATE DRILLED: October, 1987

100

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 1		SAND, fine to medium grained, light grey, contains organics.		0.29	0.42
1 - 2		SAND, fine to medium grained, mottled dark brown, yellow-brown, went through hard indurated layers.			
2 - 3		STARTED SLUDGING			
3 - 4		SAND, fine to medium grained, brown, contains clay and mud.		0.16	0.89
4 - 5		AS ABOVE.			
		AS ABOVE.		0.66	0.62
		END OF HOLE. 5m. Clay.			
		Average			0.65

97

777101

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: E.L. 51/86

AREA: MARRAWAH

LINE NO: 0

HOLE NO: M 24E

LOGGED BY: ANDREW DOVE

DATE DRILLED:

October, 1987

101

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 1		SAND, fine to medium grained, white, contains organics.			
1 - 2		SAND, fine to medium grained, yellow-brown mottle.		0.15	0.74
2 - 3		AS ABOVE, grey at base. STARTED SLUDGING 3.0m.			
3 - 4		SAND, fine to medium grained, light grey to light brown, contains clay. END OF HOLE. 4.0m. Clay.		0.04	0.96
		Average			0.85

98

777102

CLIENT: NATIONAL MINERAL SANDS

AREA: MARRAWAH

LOGGED BY: ANDREW DOVE

TITLE NO: E.L. 51/86

LINE NO: 0 HOLE NO: M 28E

DATE DRILLED: October, 1987

102

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 1		SAND, fine to medium grained, light grey, organic.			
1 - 2		SAND, fine to medium grained, white with red-yellow at base.			
2 - 3		SAND, fine to medium grained, yellow-orange, dark brown at base.			
3 - 4		START SLUDGING SAND, fine to medium grained, light grey, contains clay.			
4 - 5		AS ABOVE.			
		END OF HOLE. Hit Clay.			

99

777103

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: E.L. 51/86

AREA: MARRAWAH

LINE NO: 0 HOLE NO: M 32E

LOGGED BY: ANDREW DOVE

DATE DRILLED: October, 1987

103

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 1		SAND, fine to medium grained, light grey to dark grey, organic. STARTED SLUDGING			
1 - 2		SAND, fine to medium grained, brown muddy, indurated.			
2 - 3		AS ABOVE. END OF HOLE. 3.0m Indurated.			

100

777104

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: EL 51/86

AREA: MARRAWAH

LINE NO: 1 HOLE NO: MO

LOGGED BY: ANDREW DOVE

DATE DRILLED: MARCH, 1988

101

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 1.0		SAND, fine to very fine grained, light grey, organic.		0.17	6.85
1.0 - 2.0		SAND, fine to medium grained, light grey.			
2.0 - 3.0		AS ABOVE, dark grey to black. Started sludging		0.35	5.71
3.0 - 4.0		AS ABOVE, very fine grained.			
4.0 - 5.0		AS ABOVE		0.74	0.62
5.0 - 5.8		AS ABOVE Sludging material too fine to pour off water without losing sample. END OF HOLE 5.8m. Hit white clay, couldn't go through			
		Average			4.5%

101

777105

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: EL 51/86

AREA: MARRAWAH

LINE NO: 1 HOLE NO: M2

LOGGED BY: ANDREW DOVE

DATE DRILLED: MARCH, 1988

105

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 1.0		SAND, fine to medium grained, amber, fine shell		0.09	4.43
1.0 - 2.0		AS ABOVE			
2.0 - 3.0		AS ABOVE			
3.0 - 4.0		AS ABOVE		0.03	6.71
		Hole fell in itself, wouldn't hold up. Rods got jammed or bent.			
		END OF HOLE 4.0m.			
		On too steep a slope to drill properly			
		Average			5.6%

102

777106

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: EL 51/86

AREA: MARRAWAH

LINE NO: 1 HOLE NO: M4

LOGGED BY: ANDREW DOVE

DATE DRILLED: MARCH, 1988

103

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 1.0		SAND, fine grained, amber. Organics.		0.07	6.72
1.0 - 2.0		SAND, fine grained, amber. Abundant fine shell.			
2.0 - 3.0		AS ABOVE		0.02	4.91
3.0 - 4.0		AS ABOVE			
4.0 - 5.0		AS ABOVE		0.02	5.63
5.0 - 6.0		AS ABOVE, H.M. present >1%.			
6.0 - 7.0		SAND, fine grained, greyish brown, H.M. present >1%.		0.02	7.10
7.0 - 8.0		AS ABOVE			
8.0 - 9.0		AS ABOVE		0.01	6.61
9.0 - 10.0		AS ABOVE			
		END OF HOLE 10.0m.			
			Average		6.2%

103

777107

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: EL 51/86

AREA: MARRAWAH

LINE NO: 1 HOLE NO: M6

LOGGED BY: ANDREW DOVE

DATE DRILLED: MARCH, 1988

107

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 1.0		SAND, fine grained, grey, organic.			
1.0 - 2.0		AS ABOVE, grey to light brown, fine shell.		0.04	6.68
2.0 - 3.0		AS ABOVE, amber.			
3.0 - 4.0		AS ABOVE.		0.02	5.19
4.0 - 5.0		AS ABOVE, H.M. present		0.03	7.89
5.0 - 6.0		AS ABOVE, H.M. present.			
6.0 - 8.0		AS ABOVE. H.M. present.		0.01	6.66
8 - 10		AS ABOVE. H.M. present.		0.01	6.49
		END OF HOLE 10.0m. H.M. still present			
		Average			6.6%

104

777108

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: EL 51/86

AREA: MARRAWAH

LINE NO: 1 HOLE NO: M8

LOGGED BY: ANDREW DOVE

DATE DRILLED: MARCH, 1988

108

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 1.0		SAND, fine grained, light grey, organic.		0.09	5.25
1.0 - 2.0		SAND, fine grained, ambezz, abundant fine shell.			
2.0 - 3.0		AS ABOVE		0.01	6.66
3.0 - 4.0		SAND, fine grained, amber, fine shell. H.M. present >1%.			
4.0 - 6.0		SAND, fine grained, abundant, fine shell present. H.M. visible >1%.		0.01	5.26
6.0 - 8.0		AS ABOVE		0.01	4.00
8.0 - 10.0		AS ABOVE		0.01	5.55
		END OF HOLE 10.0m.			
		H.M. still present at 10m.			
		Average			5.3%

105

777109

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: EL 51/86

AREA: MARRAWAH

LINE NO: 1 HOLE NO: M10

LOGGED BY: ANDREW DOVE

DATE DRILLED: MARCH, 1988

109

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0.0-2.0		SAND, fine grained, grey, organic, fine shell fragments.		0.07	4.63
2.0 - 4.0		SAND, fine grained, amber, fine shell fragments, H.M. visible >1%.		0.05	4.47
4.0 - 6.0		AS ABOVE		0.05	5.09
6.0 - 8.0		AS ABOVE		0.02	5.11
8.0 - 8.5		AS ABOVE		0.02	3.72
		END OF HOLE 8.5m. Rock			
		Average			4.8%

106

777110

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: EL 51/86

AREA: MARRAWAH

LINE NO: 1 HOLE NO: 12

LOGGED BY: ANDREW DOVE

DATE DRILLED: MARCH, 1988

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 2.0		SAND, fine grained, light grey, organic. Contains fine shell fragments.		0.08	4.91
2.0 - 4.0		SAND, fine grained, light grey - amber mottle, fine shell fragments, H.M. visible.		0.08	3.89
4.0 - 6.0		SAND, fine grained amber, fine shell fragment, H.M. visible >1%.		0.04	3.84
6.0 - 7.9		AS ABOVE. At 7.8m. hit coarse shell, orange. No H.M.		0.09	3.15
		END OF HOLE 7.9m. Hit rock			
		Average			3.9%

107

9991111

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: EL 51/86

AREA: MARRAWAH

LINE NO: 1 HOLE NO: M14

LOGGED BY: ANDREW DOVE

DATE DRILLED: MARCH, 1988

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 2.0		SAND, fine to medium grained, orange. Abundant coarse shell.		0.60	2.76
2.0 - 3.5		AS ABOVE.		5.58	1.18
		END OF HOLE 2.5m. Rock			
		Average			2.1%

111

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: EL 51/86

AREA: MARRAWAH

LINE NO: 1 HOLE NO: M16

LOGGED BY: ANDREW DOVE

DATE DRILLED: MARCH, 1988

112

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 1.9		SAND, fine to medium grained orange, abundant coarse shell END OF HOLE 1.9m.		8.69	1.90
		Average			1.9%

109

777113

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: EL 51/86

AREA: MARRAWAH

LINE NO: 1 HOLE NO: M(-2)E

LOGGED BY: ANDREW DOVE

DATE DRILLED: MARCH, 1988

113

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 1.0		SAND, fine grained, organic, grey.		0.17	5.58
1.0 - 2.0		AS ABOVE, black.			
2.0 - 3.0		AS ABOVE			
3.0 - 4.0		Started sludging		0.09	2.43
4.0 - 5.0		AS ABOVE		0.78	0.63
		END OF HOLE 5.0m. Hit white clay			
		Average			3.3%

110

777114

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: EL 51/86

AREA: MARRAWAH

LINE NO: 1 HOLE NO: M(-4)E

LOGGED BY: ANDREW DOVE

DATE DRILLED: MARCH, 1988

114

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 1.0		SAND, fine grained, dark grey, organic.]		0.16	3.89
1.0 - 2.0		AS ABOVE]			
		Started sludging			
2.0 - 3.0		AS ABOVE]		0.08	0.97
3.0 - 4.0		AS ABOVE, slightly coarser and lighter.]			
		Hit white clay at 4.0m.			
		END OF HOLE 4.0m.			
		Average			2.9%

111

777115

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: EL 51/86

AREA: MARRAWAH

LINE NO: 2 HOLE NO: 115

LOGGED BY: ANDREW DOVE

DATE DRILLED: MARCH, 1988

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 0.5		SAND, fine to medium grained, light grey, abundant H.M. END OF HOLE 0.5m. Rock		0.01	4.44
		Average			4.4%

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: EL 51/86

AREA: MARRAWAH

LINE NO: 2 HOLE NO: M2

LOGGED BY: ANDREW DOVE

DATE DRILLED: MARCH, 1988

116

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 1.0		SAND, fine to medium grained, light grey. Contains abundant fine shall and H.M. trace.		0.11	5.68
		END OF HOLE Rock			
		Average			5.7%

113

799117

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: EL 51/86

118

AREA: MARRAWAH

LINE NO: 2 HOLE NO: M6

LOGGED BY: ANDREW DOVE

DATE DRILLED: MARCH, 1988

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 2.0		SAND, fine to medium grained, amber, abundant fine shell.		0.18	4.47
2.0 - 4.0		SAND, fine to medium grained, grey, abundant fine shell.		0.53	1.15
		END OF HOLE 4.0m.			
		Rock			
		Average			2.8%

115

777119

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: EL 51/86

AREA: MARRAWAH

LINE NO: 2 HOLE NO: M8

LOGGED BY: ANDREW DOVE

DATE DRILLED: MARCH, 1988

119

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 2.0		SAND, fine to medium grained, brown.		2.40	2.43
2.0 - 2.6		SAND, fine grained, greyish green, clayey. END OF HOLE 2.6m. Clay and rock		3.93	0.39
		Average			2.0%

116

777120

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: EL 51/86

AREA: MARRAWAH

LINE NO: 2 HOLE NO: M10

LOGGED BY: ANDREW DOVE

DATE DRILLED: MARCH, 1988

100

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 1.0		SAND, fine to medium grained, dark brown at top then hit greenish white clay. Hit rock 1m. END OF HOLE 1m.		15.58	1.39
		Average			1.4%

117
777121

CLIENT: NATIONAL MINERAL SANDS

TITLE NO: EL 51/86

AREA: MARRAWAH

LINE NO: 2 HOLE NO: M12

LOGGED BY: ANDREW DOVE

DATE DRILLED: MARCH, 1988

121

Interval (m)	Wet Wt. (kg)	Description	% Slime	% +600 um	% H.M.
0 - 2.0		SAND, fine to medium grained, brown to dark brown, organic.		0.16	0.98
2.0 - 2.5		SAND, fine to medium grained, light grey, clayey.		4.38	0.39
		END OF HOLE 2.5m. Clay			
			Average		0.9%

118

777122

122

APPENDIX 3

Results of Laboratory Heavy Mineral Separations

Sample No.		wt%of+600 μ	wt%of-600 μ	wt%ofH.M.
<u>WOOLNORTH(line 1)</u>				
W8	0-2m(A)	0.10	99.90	0.56
	0-2m(B)	0.07	99.93	0.63
	2-3m	0.02	99.98	0.55
	2-4m	0.33	99.67	0.86
W12	3-4m	0.39	99.61	0.69
	4-5.5m	0.12	99.88	0.32
W28	0-2m	0.05	99.95	0.25
	2-4m	0.16	99.84	0.25
	4-6m	0.05	99.95	0.48
	6-7.2m	0.49	99.51	0.58
W32	0-2m	0.04	99.96	0.24
	2-4m	0.21	99.79	0.49
W36	0-2m	0.07	99.93	0.20
	2-3.2m	0.44	99.56	0.57
W40	0-2m	0.04	99.96	0.39
	2-3.45m	0.02	99.98	0.48
W44	0-2m	0.08	99.92	0.26
	2-3.5m	0.02	99.98	0.37
W48	0-2m	0.01	99.99	0.29
	2-3.2m	0.52	99.48	0.42
W52	0-2m	0.27	99.73	0.28
	2-4m	0.12	99.88	0.31
	4-4.5m	0.66	99.34	0.16
W56	0-2m	0.30	99.70	0.30
	2-4m	0.29	99.71	0.26
	4-6m	0.06	99.94	0.11
	6-7.2m	0.01	99.99	0.23

RAW DATA DOCUMENTATION FOR HEAVY MINERAL SEPARATION

Sample No.		wt% of +600u	wt% of -600u	wt% of Heavy Mineral
<u>WOOLNORTH</u> (Line 2) Redrill				
W-0	0-2.0m	1.17	98.83	0.73
W-4	0-0.5m	0.04	99.96	0.34
W-8	0-1.7m	0.04	99.96	0.22
W-12	0-2.0m	0.08	99.92	0.21
	2.0-2.8m	0.12	99.88	0.22
W-16	0-2.0m	0.07	99.93	0.21
	2.0-2.7m	0.06	99.94	0.18
W-20	0-2.0m	0.02	99.98	0.22
	2.0-2.8m	0.01	99.99	0.22
W-24	0-2.0m	0.12	99.88	0.15
	2.0-4.0m	0.13	99.87	0.16
W-28	0-2.0m	0.03	99.97	0.12
	2.0-3.3m	0.06	99.94	0.18
W-32	0-2.0m	0.04	99.96	0.13
	2.0-4.0m	0.04	99.96	0.15
	4.0-4.4m	0.04	99.96	0.11
W-36	0-2.0m	0.21	99.79	0.12
	2.0-3.7m	0.28	99.72	0.12
W-40	0-2.0m	0.09	99.91	0.29
	2.0-4.0m	0.08	99.92	0.12
	4.0-4.5m	0.11	99.89	0.23
W-44	0-2.0m	0.09	99.91	0.21
	2.0-4.0m	0.04	99.96	0.21
	4.0-6.0m	0.05	99.95	0.14
	6.0-7.4m	0.16	99.84	0.12
<u>WOOLNORTH</u> (Line 1)				
W-0	0-2.0m	0.05	99.95	0.93
	2.0-2.5m	0.03	99.97	1.17
W-4	0-2.0m	0.02	99.98	0.65
	2.0-4.0m	0.49	99.51	0.58
██				
██				
██				
W-16	0-2.0m	0.10	99.90	0.46
	2.0-4.0m	0.01	99.99	0.73
	4.0-5.4m	0.40	99.60	0.36
W-20	0-2.0m	0.05	99.95	0.29
	2.0-4.0m	0.24	99.76	0.40
	4.0-6.0m	0.01	99.99	1.23
	6.0-8.0m	0.12	99.88	0.65
	8.0-9.0m	0.11	99.89	0.42
W-24	0-2.0m	0.10	99.90	0.25
	2.0-4.0m	0.09	99.91	0.42
	4.0-6.0m	0.02	99.98	0.79
	6.0-8.0m	0.22	99.78	0.46
	8.0-8.6m	0.03	99.97	0.27

125

Sample No.	Wt% of +600u	Wt% of -600u	Wt% of Heavy Mineral
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MARRAWAH (Line 0)

EL 51/86

M88W	0-1.0m	0.64	99.36	22.10
M87W	0-1.0m	0.05	99.95	5.75
"	1.0-2.0m	0.04	99.96	11.83
"	2.0-2.9m	0.09	99.91	8.07
M84S	0-1.0m	0.09	99.91	8.23
"	1-1.5m	0.02	99.98	16.12
M84W	0-1.0m	0.17	99.83	14.14
"	1.0-2.0m	0.13	99.87	45.00
"	2.0-3.0m	0.85	99.15	1.77
M80W	0-1.0m	0.18	99.82	9.43
"	1.0-2.0m	0.04	99.96	9.42
"	2.0-3.0m	0.03	99.97	4.79
M76W	0-1.0m	0.31	99.69	4.82
"	1.0-2.0m	0.16	99.84	5.34
"	2.0-3.0m	0.59	99.41	4.122

STUDLAND BAY

WOOLNORTH (Line 2)

EL 51/86

W-4 Line A	0-2.0m	0.2	99.80	0.67
W-36	0-2.0m	0.14	99.86	0.35
W-52	0-2.0m	0.10	99.9	0.52
"	2.0-4.0m	0.09	99.91	0.45
"	4.0-6.0m	0.08	99.92	0.41
"	6.0-8.0m	0.03	99.97	0.39

Sample No.		wt% of +600u	wt% of -600u	wt% of H.M.
<u>MARRAWAH (Line 1)</u>				
M-0	0-2m	0.17	99.83	6.85
	2-4m	0.35	99.65	5.71
	4-5.8m	0.74	99.26	0.62
M-2	0-2m	0.09	99.91	4.43
	2-4m	0.03	99.97	6.71
M-10	0-2m	0.07	99.93	4.63
	2-4m	0.05	99.95	4.47
	4-6m	0.05	99.95	5.09
	6-8m	0.02	99.98	5.11
	8-8.5m	0.02	99.98	3.72
M-14	0-2m	0.60	99.40	2.76
	2-3.5m	5.58	94.42	1.18
M(-2)E	0-2m	0.17	99.83	5.58
	2-4m	0.09	99.91	2.43
	4-5m	0.78	99.22	0.63
M(-4)E	0-2m	0.16	99.84	3.89
	2-4m	0.08	99.92	0.97

MARRAWAH (Line 2)

M-0	0-0.5m	0.01	99.99	4.44
M-2	0-1m	0.11	99.89	5.68
M-4	0-2m	0.03	99.97	4.47
	2-4m	0.26	99.74	3.81
	4-5m	0.45	99.55	0.78
M-6	0-2m	0.18	99.82	4.47
	2-4m	0.53	99.47	1.15
M-8	0-2m	2.40	97.60	2.43
	2-2.6m	3.93	96.07	0.39
M-10	0-1m	15.58	84.42	1.39
M-12	0-2m	0.16	99.84	0.98
	2-2.5m	4.38	95.62	0.39

Sample No.		wt%+600u	wt%-600u	wt% of H.M.
<u>MARRAWAH (Line 1)</u>				
M-4	0-2m	0.07	99.93	6.72
	2-4m	0.02	99.98	4.91
	4-6m	0.02	99.98	5.63
	6-8m	0.02	99.98	7.10
	8-10m	0.01	99.99	6.61
M-6	0-2m	0.04	99.96	6.68
	2-4m	0.02	99.98	5.19
	4-6m	0.03	99.97	7.89
	6-8m	0.01	99.99	6.66
	8-10m	0.01	99.99	6.49
M-8	0-2m	0.09	99.91	5.25
	2-4m	0.01	99.99	6.66
	4-6m	0.01	99.99	5.26
	6-8m	0.01	99.99	4.00
	8-10m	0.01	99.99	5.55
M-12	0-2m	0.08	99.92	4.91
	2-4m	0.08	99.92	3.89
	4-6m	0.04	99.96	3.84
	6-7.9m	0.09	99.91	3.15
M-16	0-1.9m	8.69	91.31	1.90

RAW DATA DOCUMENTATION FOR HEAVY MINERAL SEPARATION

777129

Sample No.		wt% of +600u	wt% of -600u	wt% of Heavy Mineral
MARRAWAH (Line 0)				
M72W	0-1.0m	0.18	99.82	9.05
	1.0-2.0m	1.62	98.38	3.62
	2.0-3.0m	1.41	98.59	2.16
M68W	0-1.0m	1.28	98.72	2.91
	1.0-2.0m	0.40	99.60	1.27
M64W	0-1.0m	0.27	99.73	1.49
	1.0-2.0m	0.18	99.82	0.95
	2.0-3.0m	0.08	99.92	0.74
	3.0-4.0m	0.19	99.81	1.28
M28W	0-2.0m	0.93	99.07	0.55
M24W	0-2.0m	0.40	99.60	0.17
	2.0-4.0m	0.10	99.90	0.70
M20W	0-2.0m	0.54	99.46	0.38
	2.0-4.0m	0.42	99.58	0.55
	4.0-4.7m	0.11	99.89	0.51
M16W	0-2.0m	0.11	99.89	0.37
	2.0-4.0m	0.18	99.82	0.57
	4.0-5.0m	0.02	99.98	0.76
M12W	0-2.0m	0.24	99.76	0.57
	2.0-4.0m	0.04	99.96	0.78
	4.0-5.0m	0.04	99.96	0.81
M8W	0-2.0m	0.19	99.81	0.51
	2.0-4.0m	0.16	99.84	0.65
	4.0-6.0m	0.07	99.93	0.68
	6.0-6.5m	0.63	99.37	1.05
M4W	0-2.0m	0.20	99.80	0.54
	2.0-4.0m	0.02	99.98	0.65
	4.0-5.5m	0.02	99.98	0.74
M00	0-2.0m	0.16	99.84	0.46
	2.0-4.0m	0.10	99.90	0.64
	4.0-6.0m	0.02	99.98	0.73
	6.0-8.0m	0.03	99.97	0.77
M4E	0-2.0m	0.50	99.50	0.50
	2.0-4.0m	0.16	99.84	0.78
	4.0-6.0m	1.70	98.30	0.60
	6.0-8.0m	0.01	99.99	0.83
M8E	8.0-8.9m	0.01	99.99	0.74
	0-2.0m	0.16	99.84	0.58
	2.0-4.0m	0.03	99.97	0.21
	4.0-6.0m	0.07	99.93	0.16
M12E	6.0-8.0m	0.05	99.95	0.38
	8.0-9.5m	0.05	99.95	0.91
	0-2.0m	0.11	99.89	0.31
	2.0-4.0m	0.03	99.97	0.32
M16E	4.0-5.0m	0.05	99.95	0.18
	0-2.0m	0.12	99.88	0.15
	2.0-4.0m	0.04	99.96	0.15
	4.0-6.0m	0.06	99.94	0.10
	6.0-8.0m	0.02	99.98	0.51
M20E	8.0-9.0m	0.09	99.91	0.59
	0-2.0m	0.29	99.71	0.42
	2.0-4.0m	0.16	99.84	0.89
	4.0-5.0m	0.66	99.34	0.62
M24E	0-2.0m	0.15	99.85	0.74
	2.0-4.0m	0.04	99.96	0.96

APPENDIX 4

Mineralogical results for composite of heavy minerals from Woolnorth.

W - Line 2 Hole W4

Hole W36

Hole W52

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: WB 4, 36, 52 Composite (APS 114/2)

	TOTAL	HAND MAGS	0.5A MAGS	0.9A MAGS	1.2A MAGS	1.2A NON-MAGS
MAGNETITE	1%	100%	-	-	-	-
OTHER BLACK OPS.	10	-	68%	10%	4%	-
GARNET	1	-	17	1	-	-
TOURMALINE	14	-	1	18	18	1%
ALUMINO-SILICATES	2	-	-	-	3	12
OTHER SILICATES	41	-	12	52	62	-
SHELL	<1	-	<1	-	-	1
QUARTZ	<1	-	-	-	-	2
IRON OXIDES	14	-	2	19	8	-
ZIRCON	2	-	-	-	-	8
RUTILE	1	-	-	-	-	4
LEUCOXENE	14	-	-	-	5	72
NO. OF POINTS	-	-	586	591	514	557
SCHEELITE	-	-	-	-	-	-
MONAZITE	<1	-	-	-	-	<1
CASSITERITE	-	-	-	-	-	-
SAMPLE WEIGHT	1.44g	0.01g	0.06g	1.02g	0.08g	0.27g
%	100	1	4	71	5	19



J. McNulty

(Manager)

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APPENDIX 5

Mineralogical results of heavy mineral concentrates for Marrawah.

M - Line 0 Hole M87W

Hole M84W

Hole M80W

Hole M76W

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 JOB NO.: M 109

ATTENTION: Mr. G. Lee

DATE: 11.2.58

SAMPLE DETAILS: M 87 W, D - 2.9m (APS 109/4)

	TOTAL	0.5A MAG	1.0A MAG	1.5A MAG	1.6A NON MAG
MAGNETITE } ILMENITE } CHROMITE }	29	32	68	26	-
GARNET	7	4	10	9	-
TOURMALINE	9	4	4	13	-
EPIDOTE	2	1	1	2	-
LEUCOXENE	11	1	-	2	46
RUTILE	8	<1	-	7	21
ZIRCON	5	1	<1	1	23
SHELL	-	-	-	1	-
QUARTZ	<1	-	-	-	2
OTHER SILICATES	29	7	17	40	7
<u>TIN TEST</u>					
CASSITERITE	ND	ND	ND	ND	ND
<u>UV LIGHT</u>					
SCHAEFLITE	ND	ND	ND	ND	ND
MONAZITE	1	1 - 2	1	1 - 2	1 - 2
WEIGHT	24.67g	1.74g	2.35g	15.68g	4.90g
%	100	7	9	64	20
POINTS COUNTED		546	566	507	537

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 JOB NO.: M 109

ATTENTION: Mr. G. Lee

DATE: 11.2.88

SAMPLE DETAILS: M 84 W, D - 3m (APS 109/3)

	TOTAL	0.5A MAG	1.0A MAG	1.5A MAG	1.6A NON MAG
MAGNETITE					
ILMENITE	51	91	81	39	-
CHROMITE					
GARNET	5	5	9	5	-
TOURMALINE	4	1	4	17	<1
EPIDOTE	1	<1	1	2	-
LEUCOSPIRE	4	-	-	3	11
RUTILE	8	-	-	13	20
ZIRCON	18	1	-	2	59
SHELL	-	-	-	-	-
QUARTZ	3	-	-	-	9
OTHER SILICATES	6	2	5	19	1
<u>TIN TEST</u>					
CASSITERITE	ND	ND	ND	ND	ND
<u>UV LIGHT</u>					
SCHEELITE	ND	ND	ND	ND	ND
MONAZITE	1	1 - 2	<1	1 - 2	1 - 2
WEIGHT	49.46g	10.79g	15.00g	9.06g	14.61g
%	100	22	30	18	30
POINTS COUNTED		521	550	524	516

APPLIED PETROGRAPHIC SERVICES

SPECIALIZING IN PETROGRAPHIC ANALYSIS OF GEOLOGICAL AND INDUSTRIAL SAMPLES

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CLIENT: Peter H. Stitt & Assoc. Pty Ltd

APS JOB NO.: M 109

ATTENTION: Mr. G. Lee

DATE: 11.2.88

SAMPLE DETAILS: M 00 W, D - 3m (APS 109/2)

	TOTAL	0.5A MAG	1.0A MAG	1.5A MAG	1.6A NON MAG
MAGNETITE					
ILMENITE	40	87	57	8	-
CHROMITE					
BARNET	9	7	15	1	<1
TOURMALINE	11	1	8	35	1
EPIDOTE	1	<1	2	1	<1
LEUCOXENE	8	1	<1	3	41
RUTILE	4	<1	<1	3	19
ZIRCON	7	1	1	1	31
SHELL	-	-	-	-	-
QUARTZ	1	-	-	-	4
OTHER SILICATES	19	3	17	48	4
<u>TIN TEST</u>					
CASSITERITE	ND	ND	ND	ND	ND
<u>UV LIGHT</u>					
SCHEELITE	ND	ND	ND	ND	ND
NONAZITE	1	<1	<1	1 - 2	1 - 2
WEIGHT	22.15g	1.85g	12.07g	4.03g	4.20g
%	100	8	55	18	19
POINTS COUNTED		535	554	520	542

APPLIED PETROGRAPHIC SERVICES

SPECIALIZING IN PETROGRAPHIC ANALYSIS OF GEOLOGICAL AND INDUSTRIAL SAMPLES

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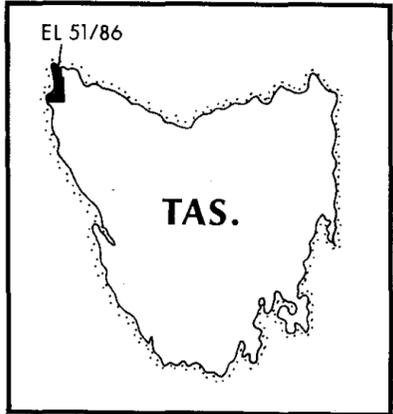
APS JOB NO.: M 109

ATTENTION: Mr. G. Lee

DATE: 11.2.88

SAMPLE DETAILS: M 76 W, D - 3m (APS 109/1)

	TOTAL	0.5A MAG	1.0A MAG	1.6A MAG	1.6A NON MAG
MAGNETITE } ILMENITE } CHROMITE }	32	74	43	-	-
GARNET	8	13	14	1	-
TOURMALINE	10	2	10	34	1
EPIDOTE	1	-	2	1	-
LEUCOXENE	11	-	-	7	39
RUTILE	5	-	-	3	17
ZIRCON	8	1	-	<1	30
SHELL	<1	-	-	-	<1
QUARTZ	1	-	-	-	5
OTHER SILICATES	24	10	31	54	7
<u>TIN TEST</u>					
CASSITERITE	ND	ND	ND	ND	ND
<u>UV LIGHT</u>					
SCHEELITE	ND	ND	ND	ND	ND
MONAZITE	<1	<1	<1	<1	1 - 2
WEIGHT	11.16g	2.67g	3.77g	1.96g	2.76g
%	100	24	34	17	25
POINTS COUNTED		526	506	513	538



WOOLNORTH POINT

WOOLNORTH

Woolnorth
Road

EL 51/86

LINE 1

STUDLAND
BAY

LINE 2

Smithton

MOUNT CAMERON
WEST
ABORIGINAL SITE

ANN BAY

LINE 1

LINE 0

LINE 2

Green
Point

Road

MARRAWAH

Smithton &
Arthur River

N

777137

5 cm

NATIONAL MINERAL SANDS

EL 51/86

LOCATION MAP

88-2814

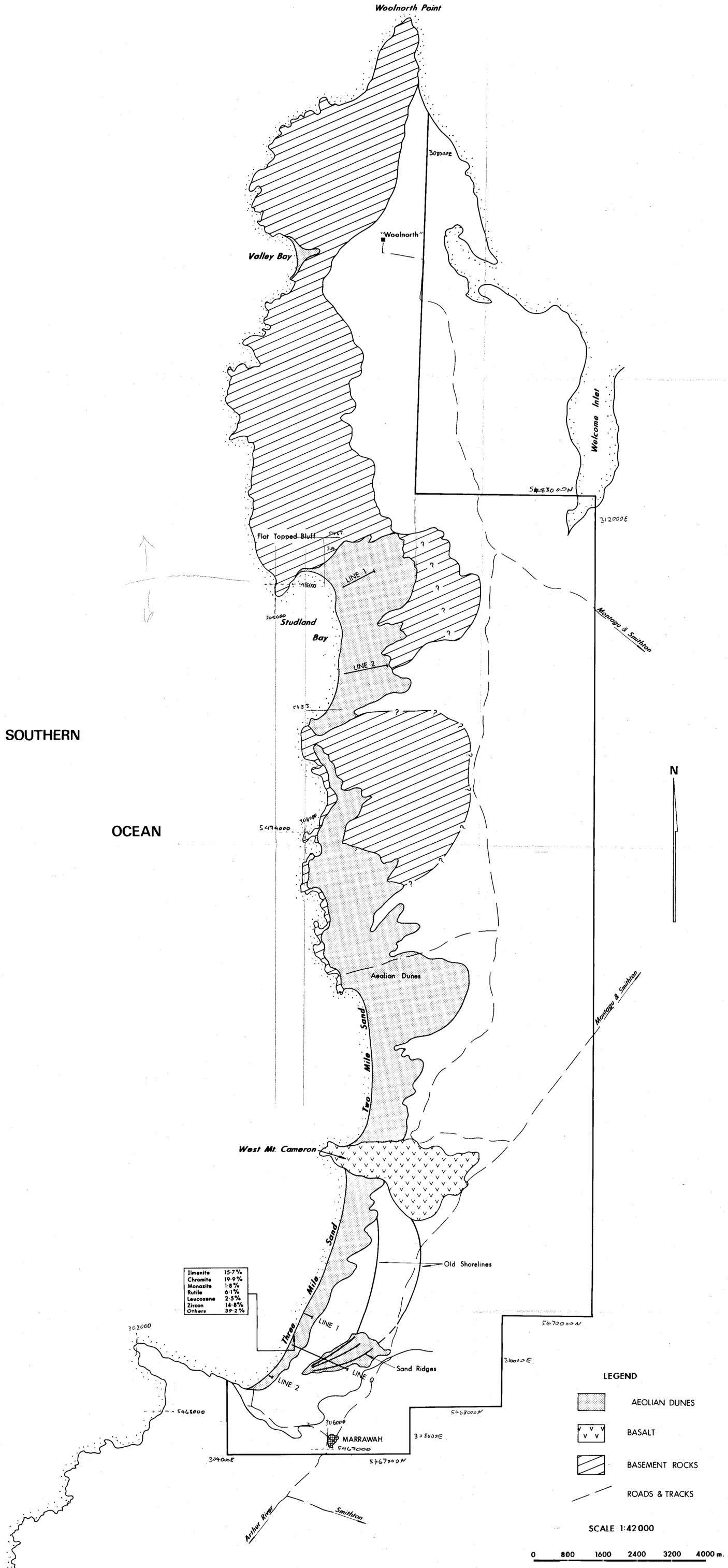
Author: A.DOVE

Date: JUNE '88

Fig.No.: 1

SCALE 1:50000

0 1 2 3 4 km.



Ilmenite	15.7%
Chromite	19.9%
Monazite	1.8%
Rutile	0.1%
Leucosene	2.5%
Zircon	14.8%
Others	39.2%

- LEGEND**
- AEOLIAN DUNES
 - BASALT
 - BASEMENT ROCKS
 - ROADS & TRACKS

SCALE 1:42 000

0 800 1600 2400 3200 4000 m.

5 cm

NATIONAL MINERAL SANDS

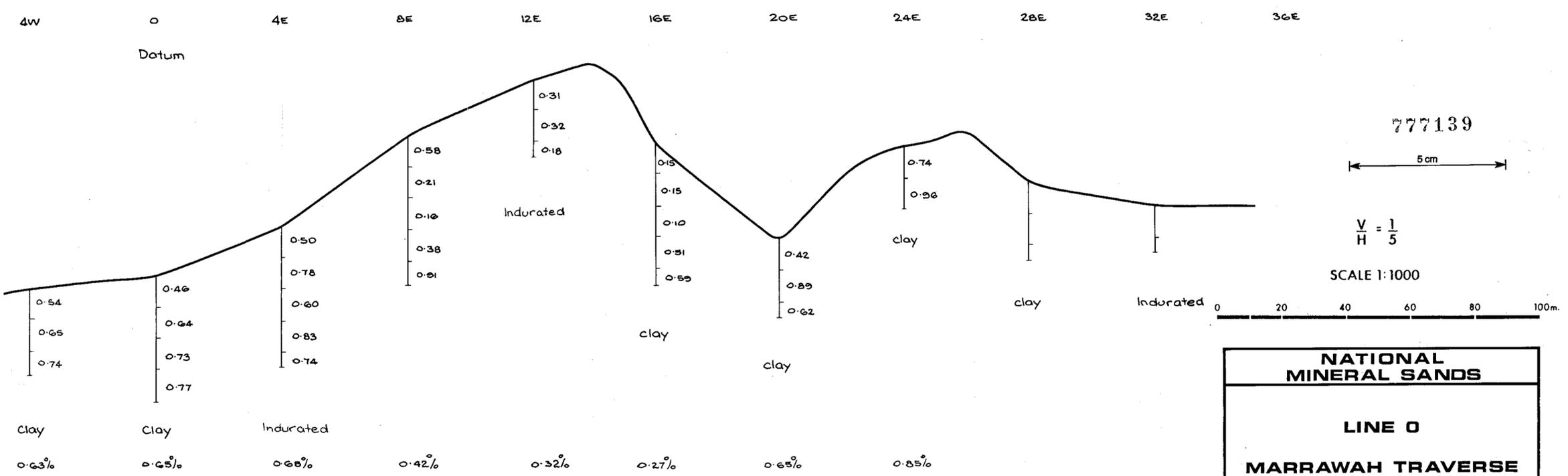
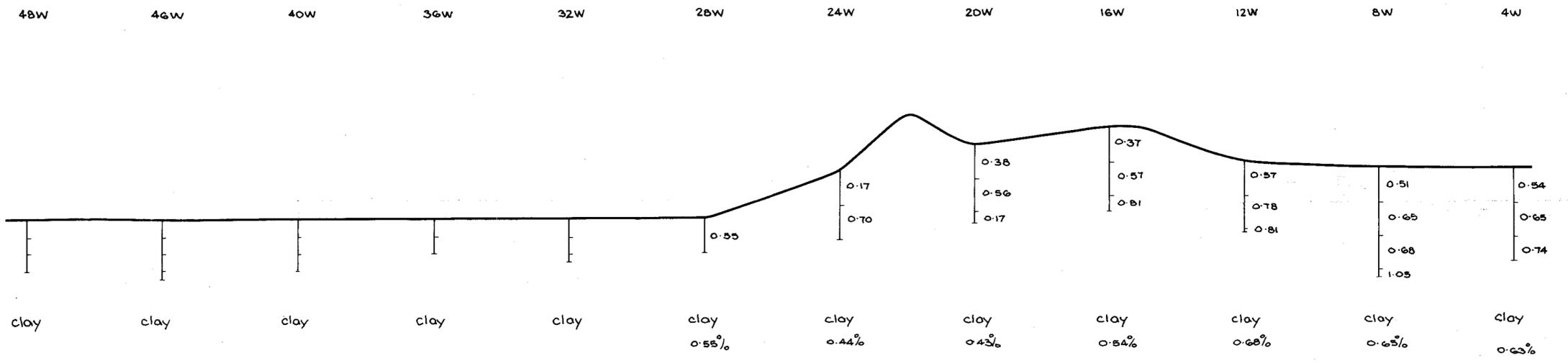
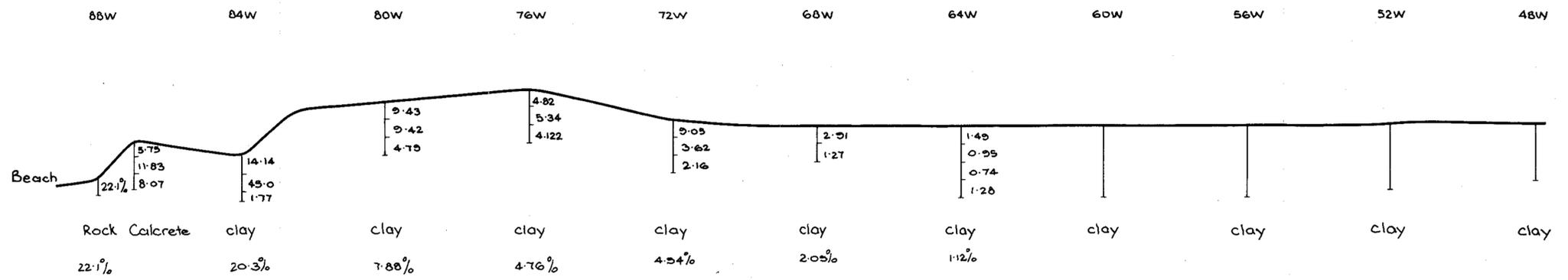
EL 51/86 TASMANIA

AIR PHOTO INTERPRETATION

MURRUMBIGEE TO WOOLNORTH

88-2814

Author: G. LEE Date: JUNE '88 Fig: 2



777139

5cm

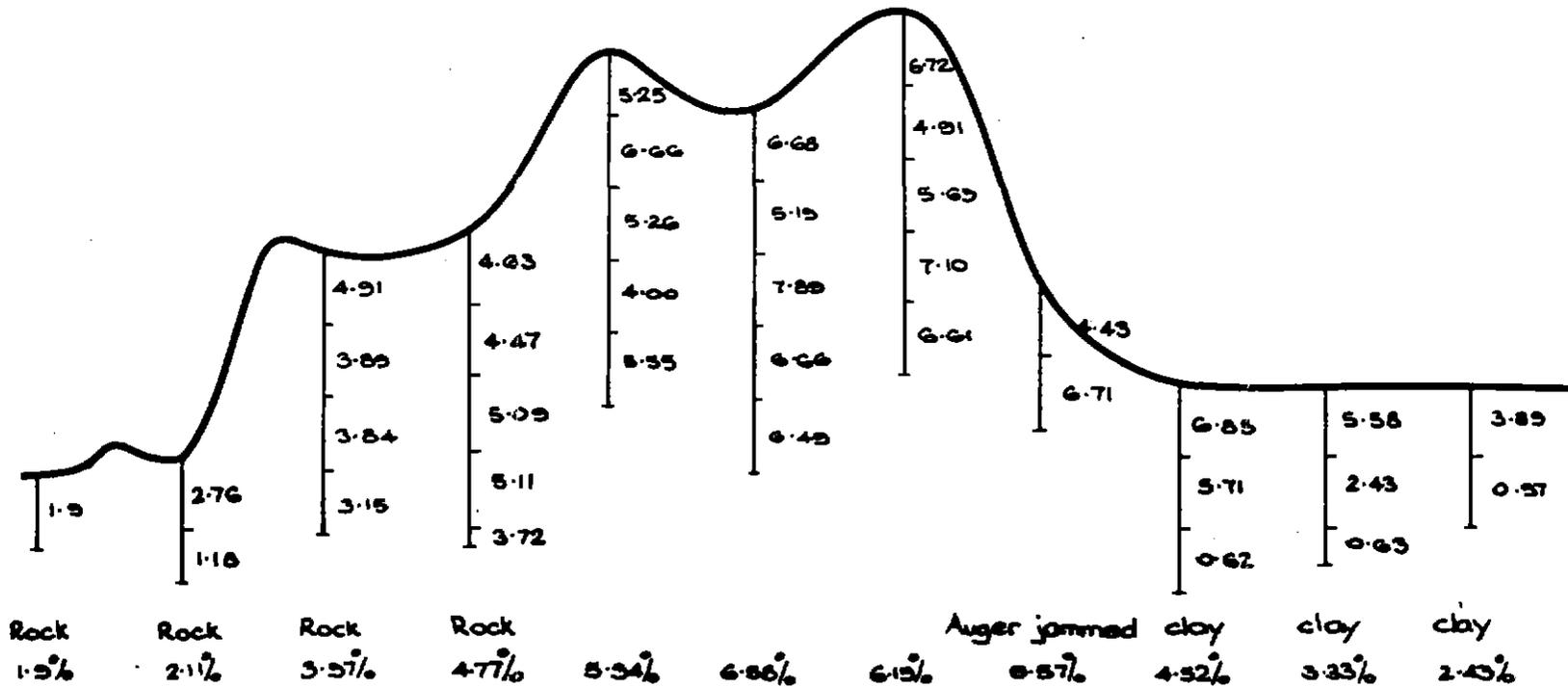
$$\frac{V}{H} = \frac{1}{5}$$

SCALE 1:1000

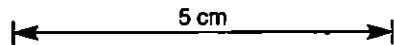
0 20 40 60 80 100m

NATIONAL MINERAL SANDS		
LINE 0		
MARRAWAH TRAVERSE		
88-2814		
Author: A.DOVE	Date: JUNE '88	Fig.No: 3

M16W M14W M12W M10W M8W M6W M4W M2W M0 M2E M4E



SCALE 1:1000



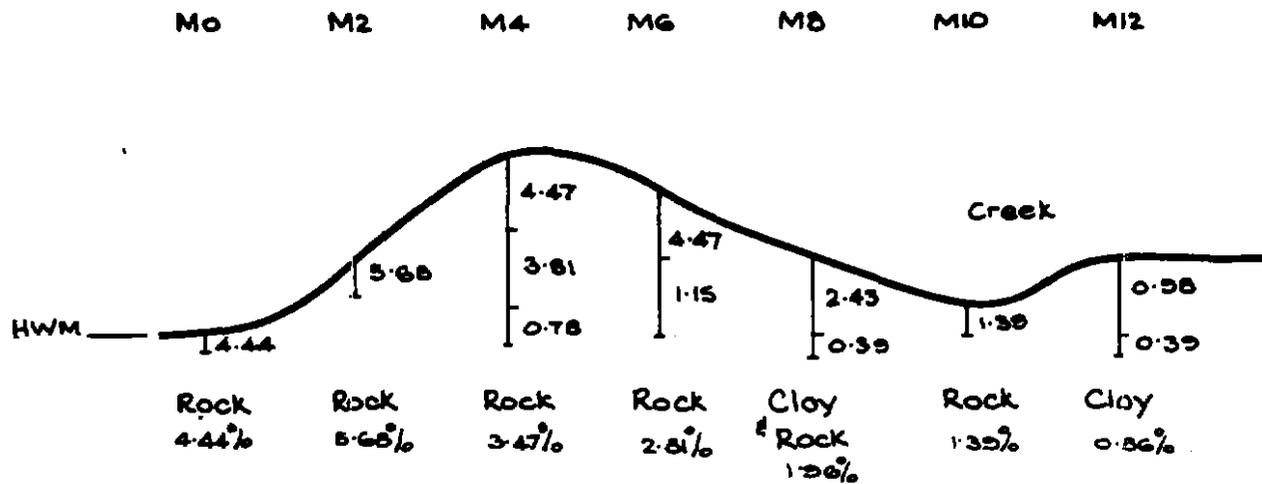
$$\frac{V}{H} = \frac{1}{5}$$

**NATIONAL
MINERAL SANDS**

**LINE 1
MARRAWAH**

88-2814

Author: ADOVE	Date: JUNE '88	Fig. No.: 4
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SCALE 1:1000

0 20 40 60 80 100m.

5 cm

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

NATIONAL MINERAL SANDS		
LINE 2		
MARRAWAH		
88-2814		
Author: A.DOVE	Date: JUNE '88	Fig. No.: 5