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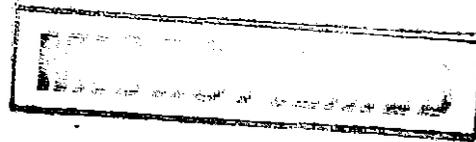
YTTRIUM CORPORATION PTY. LTD.

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EXPLORATION LICENCE 61/87 - SELLARS LAGOON



YEAR 1 & FINAL REPORT

89-2921

K.C. MORRISON

V. HOFTO

March 1989

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TENEMENT INFORMATION

EL 61/87 is a 145 km² tenement on the NE coast of Flinders Island in the vicinity of Sellars Lagoon (Figure 1, Plan 1). Year 2 renewal is due on March 14, 1989.

EXPLORATION PHILOSOPHY & OBJECTIVES

The aim of the proposed programmes was to test the extensive accumulation of beach sands along the NE margin of Flinders Island for the presence of heavy mineral deposits, in particular deposits of minerals containing rare earths and certain transition metals.

The exploration philosophy is based on a combination of two principals, one economic and one geological.

There is a predicted increase in the demand for and price of rare earths and transition metals such as zirconium, titanium, niobium and tantalum. Consumption of these materials is increasing due to innovations in the use of chemical catalysts, superconductors, ceramic metal substitutes and temperature resistant metal alloys.

These elements are commonly found in the dense accessory minerals of granitic rocks and when liberated from the rock will form placer deposits if the geomorphic and tectonic conditions are appropriate. The north east margin of Flinders Island appears to carry large volumes of beach sands which would largely have been derived from the granitic highlands of the island. The granites correlate with the Devonian-Carboniferous granites of NE Tasmania which are known to source heavy minerals such as cassiterite, ilmenite, monazite, zircon, topaz, tourmaline and garnet. Therefore the beach sands on Flinders Island were viewed as attractive targets for placer mineralisation of the type sought by this programme.

The Year 1 objective was to scout prospect the EL recording the major geomorphic sand units and evidence for placer mineralisation in the facies represented in the present barrier beach systems. Samples of natural heavy mineral enrichment were analysed to determine the proportions of ore minerals.

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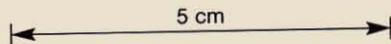
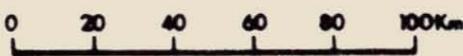
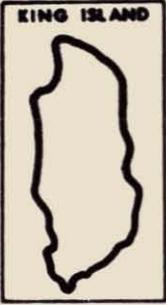


Figure 1. Location Map - EL.61/87, Sellars Lagoon

SUMMARY OF WORK COMPLETED IN YEAR 1

The major sand facies associations were determined by a combination of airphoto interpretation, field inspection and literature review. Previous exploration work was reviewed and samples were collected from sites of likely heavy mineral concentration in the present day barrier beach systems.

No evidence was found in either the previous or present work for significant placer accumulations. Zircon is the only saleable heavy mineral present in significant proportions and overall, heavy mineral grades in the areas observed are very low.

The company considers that Year 2 expenditure is not warranted and consequently the EL is being submitted for relinquishment.

REGIONAL SURVEYS

Geomorphology of EL 61/87

The Cainozoic geology and Quaternary geomorphology of Flinders Island are described by Sutherland & Kershaw (1970) and Kershaw and Sutherland (1972). The coastal plains of the island are sub divided into a dominantly calcareous Western Plain and a dominantly siliceous Eastern Plain (Kershaw & Sutherland, 1972). EL 61/87 covers a large part of the Eastern Plain, described by Kershaw and Sutherland as a surface characterised by dune and lagoon topography, mostly less than 30 feet above Mean Low Water Stand.

The sands within the EL have been divided into genetic units at a gross scale, by a combination of air photo interpretation and field observation. The results are shown on Plan 2 and in Plates 1 - 3 (pp 4 & 5). The degree of dune stabilisation and masking of the depositional fabric of the sand bodies appears to indicate relative age, with the parabolic dune fields inferred as intermediate in age between the present beach barrier system (younger) and the undifferentiated unit (older) further inland. The estuarine facies at Patriach Inlet and Foochow Inlet appear to be underfit remnants of what may have been marine embayments at some time in the Cainozoic. Kershaw & Sutherland (1972) recognised possible palaeo sea levels on the Flinders Island coastal plains at 60-75; 30-37; 18-21; 7.5-9 and 3-4.5 metres above MLWS.



Plate 1. Looking west from the western side of Red Bluff. Behind the shore face are parallel ridges of dunes, with partly stabilised low dunes in front (seaward) of higher dunes vegetated with *Boobyalla* scrub. The estuary at Patriarch Inlet is shown at centre right with stabilised estuarine/lagoonal sediments occupying the low land at centre left.



Plate 2. Sand spit at Sellars Point, looking NE to Babel Island. A large area of unstable dunes exists landward of the spit.



Plate 3. The tidal channel and migrating sand spit at Cameron Inlet, looking south.

The processes producing beach berms, barrier dunes, tidal channel bars, sand spits, lunettes and parabolic dunes will have different potentials for concentrating and preserving heavy mineral accumulations. All these depositional environments are represented in the EL and the Year 1 aim was to scan the present beach barrier system, where vegetation and the effects of soil formation are minimal, for evidence of natural heavy mineral enrichment. The results of the selective sampling on such sites are described in a later section.

Review of Previous Exploration

In 1969 Scamander Mining NL searched the beaches of Cape Barren and Flinders Islands for placer mineralisation (Wales, 1969). No analytical data are provided but the conclusion from visual inspection is that generally there are no obvious beach placers on Flinders Island. Further exploration is recommended for two targets on the NE coast of Flinders Island - one at Cameron Inlet and one at the northern end of Foochow Beach.

In 1971, Samedan Australia Ltd. tested beaches on Flinders Island and some small Furneaux islands (Farquar, 1971). Several of their auger traverses were located inside the area now held in EL 61/87. Heavy mineral concentrates were recovered from -30 mesh screened fractions. -30 mesh generally accounted for >90% total sand recovered. The heavy mineral grades in the -30 mesh fraction generally varied from <0.1% to 13.8% but were mainly <<1%. Microscopic grain counts of concentrates taken at Sellars Point gave the following proportions (Table 1):

Table 1. Microscopic grain counts of heavy mineral concentrates, Sellars Point.

	Sellars Point (beach) %	Sellars Point (transgressive dune) %
Ilmenite	19.0	29.0
Magnetite	tr	0.5
Monazite	2.0	0.5
Rutile	3.0	13.0
Zircon	tr	9.5
Cassiterite	-	-
Garnet	11.5	21.5
Tourmaline	12.0	16.0
Topaz	52.5	10.0

Composite samples from Foochow Inlet and Patriarch Inlet carried erratic but mainly minor ilmenite (2 - 10.5%), rutile (trace - 15.5%) and only trace zircon. Topaz, tourmaline, garnet and amphibole were the main heavy minerals.

SPECIFIC SURVEYS

Sampling

Sixteen sites on the beach face and in the barrier dunes were sampled where there was either direct evidence of heavy minerals (Plates 4 & 5, P 8) or evidence of direct winnowing by wind or water producing lag deposits of coarse grained and/or dense clastic material. Approximately 2 litres of sample was taken at each site, panned down to approximately 0.5 litre and submitted to Analabs laboratories, Burnie, for heavy liquid separation and then optical/S.E.M. mineral identification of the sink fractions. Sample sites are shown on Plan 2 and mineral identifications are enclosed as Appendix 1.



Plate 4. Local heavy mineral enrichment in tidal channel sands at Cameron Inlet (see Sample F6).

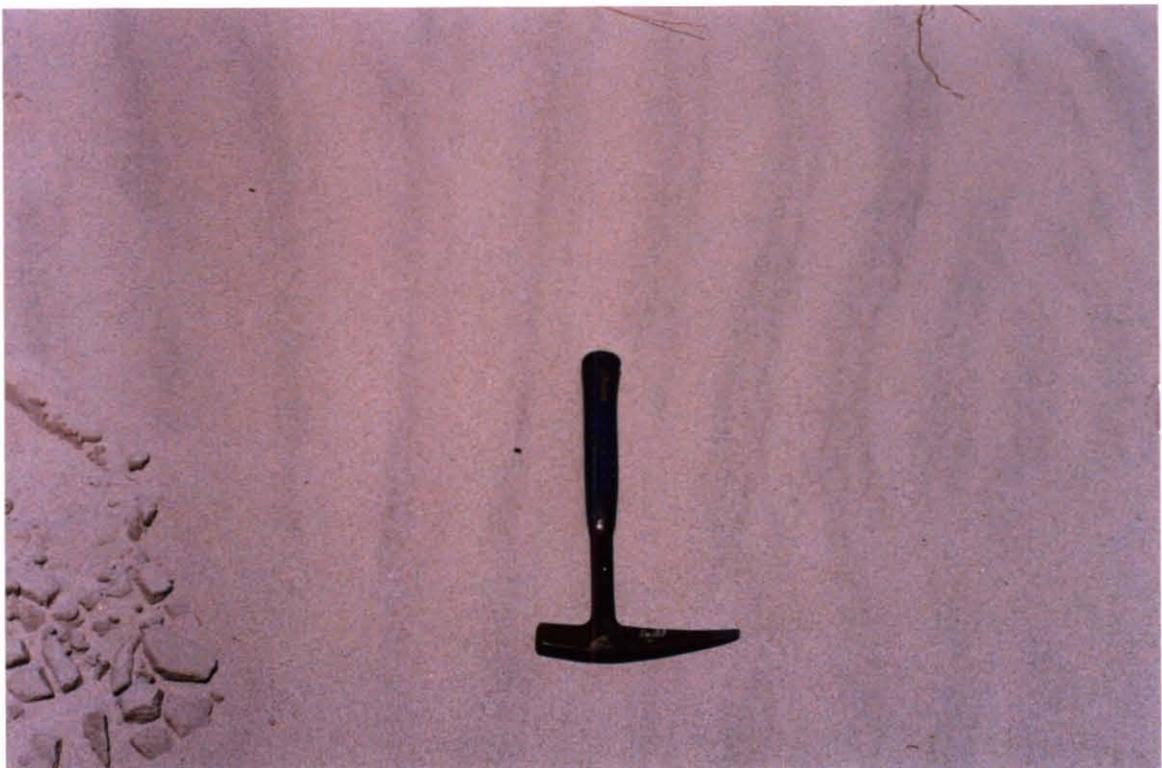


Plate 5. Local heavy mineral enrichment in the troughs of ripples on dune surfaces, Red Bluff (see Sample 4).

The results confirmed the field observations that heavy minerals in significant concentration are rare on the present beach system. Only three pan concentrates (F5, F6, F13) showed TBE sink fractions > 1%. Of these only F6 carried a reasonable heavy mineral content (Plate 4, p 8), i.e. 10.4%. A summary of the mean and range values for the minerals identified is presented in Table 2.

Table 2. Summary of sink fraction heavy mineral composition.

Mineral	Mean wt %	Range	No. of samples
Rutile	1.6	0.3 - 6.1	10
Ilmenite	10.9	2.5 - 23.0	9
Altered ilmenite	17.6	12.2 - 28.9	11
Leucoxene	2.6	1.3 - 5.1	8
Chrome spinel	5.6	0.4 - 22.6	7
Zircon	13.3	2.2 - 31.2	12
Monazite	1.0	0.4 - 1.7	5
Topaz	21.3	2.9 - 57.4	12
Garnet	6.5	1.1 - 11.5	11
Quartz/feldspar	14.0	0.5 - 51.3	12

The sink-float work did not effectively separate quartz, feldspar and fossil fragments from heavy minerals in some samples, particularly, F1, F7, F8 and F16 and any accurate estimation of heavy fraction composition needs to account for the over representation of these light fractions. Most samples were so lean in heavy minerals that that determination of mineral proportions is difficult. Considering the three samples with >2% heavy mineral, the mean proportions of one species is as follows:

Rutile	1.0
Ilmenite and leucoxene	26.1
Zircon	19.2
Monazite	1.2

Most of the titanium oxide group is ilmenite and altered ilmenite, with leucoxene only contributing between 1.3 and 2.9% of total heavy minerals. Although the zircon content is substantial, rutile and monazite are very low.

CONCLUSIONS

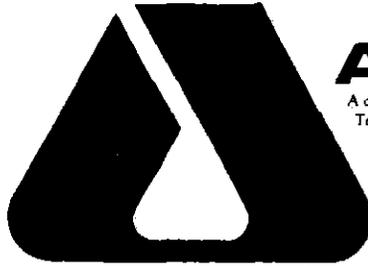
1. Reconnaissance field inspection and sampling of sands in the present day beach barrier systems indicates a general paucity of heavy mineral concentration.
2. The composition of heavy minerals in the richest areas sampled shows that zircon plus the ilmenite group account for 45% of the heavy fraction. Rutile plus monazite account for only 2%. On this basis, further work would be aimed primarily at finding a zircon deposit.
3. On balance, a drilling programme to explore the vegetated sands behind the barrier dunes cannot be justified. The EL will be submitted for relinquishment.

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- FARQUAR, P., 1971. Flinders Island Project, EL 6/71, *Department of Mines, Tasmania, Open File Report 71-821*.
- KERSHAW, R & SUTHERLAND, L., 1972. Quaternary Geomorphology of Flinders Island. *Records of the Queen Victoria Museum No. 43*.
- SUTHERLAND, L. & KERSHAW, R., 1970. The Cainozoic Geology of Flinders Island, Bass Strait. *Papers & Proceedings of the Royal Society of Tasmania*, Volume 105.
- WALES, D., 1969. Field investigation - detrital heavy minerals in Furneaux Group of Islands, Tasmania. *Department of Mines Tasmania, Open File Report 69-575*.

APPENDIX 1

MINERAL ANALYSIS OF SAND SAMPLES

**ANALABS**

A division of Inchcape Inspection and
Testing Services, Australia Pty. Ltd.

Perth Head Office:

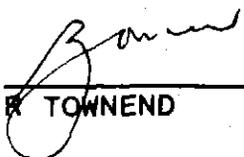
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23rd February 1989

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OUR REF : 1000.0.07.690

**TBE SEPARATION OF 16 SANDS.
MINERAL ANALYSIS OF 16 TBE SINKS.**


R TOWNEND

Introduction

Sixteen sands received were dried and separated in TBC liquid with results as shown. Because of the low weight of some of the sinks, only eight were analysed completely, using polished sections. Of the remainder, four (F1, F2, F7, F16) had their opaques partly identified by SEM/EDS. The other four sinks (F3, F14, F15, and F8) opaques were reported as altered ilmenite, but probably also contain iron oxides.

Results

Note that the results of the low weight samples with significant quartz, should be considered semi-quantitative.

Mj = Major, Ac = Accessory, Mn = Minor

Tr = Trace

Others includes cassiterite in F7.

HEAVY MINERAL SEPARATION - STATIC

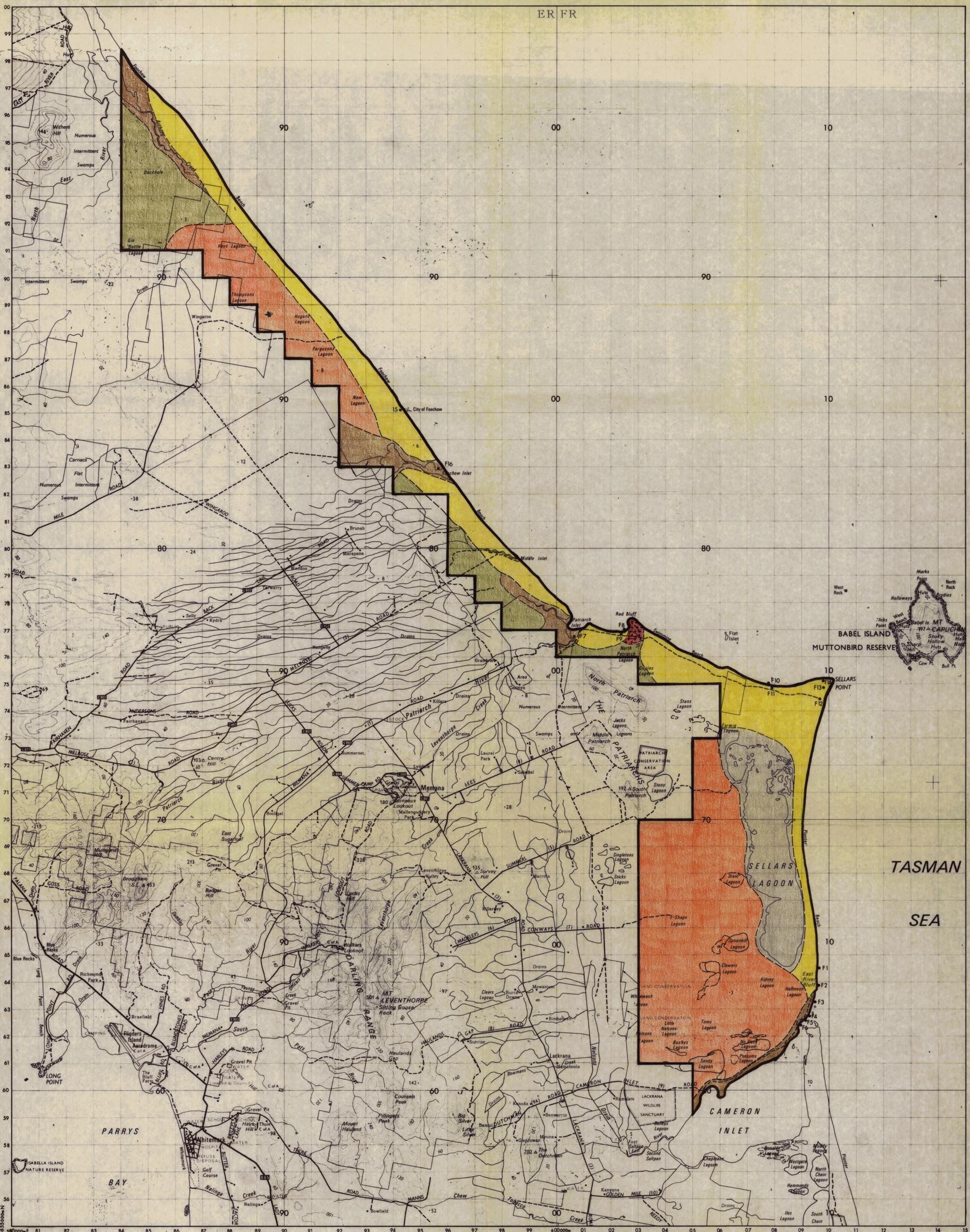
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SAMPLE NUMBER	TOTAL WEIGHT (g)	SINKS		FLOATS	
		WEIGHT (g)	% (%)	WEIGHT (g)	% (%)
F1	36.64	0.03	0.1	36.61	99.9
F2	89.40	0.10	0.1	89.30	99.9
F3	109.0	0.03	-	108.97	100.0
F4	143.8	0.19	0.1	143.61	99.9
F5	126.7	2.55	2.0	124.15	98.0
F6	54.5	5.67	10.4	48.83	89.6
F7	102.9	0.02	-	102.88	100.0
F8	80.2	0.02	-	80.18	100.0
F9	102.8	0.96	0.9	101.84	99.1
F10	150.3	1.15	0.8	149.15	99.2
F11	133.4	0.43	0.3	132.97	99.7
F12	92.4	0.77	0.8	91.63	99.2
F13	45.5	2.20	4.8	43.30	95.2
F14	115.8	0.01	-	115.79	100.0
F15	58.2	0.03	0.1	58.17	99.9
F16	99.1	0.16	0.2	98.94	99.8



Wgt%

	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13	F14	F15	F16
Rutile	1.2			0.4	0.3	2.3			4.1	0.4	0.4	6.1	0.4			0.4
Ilmenite				4.0	2.4	21.4	3.5		17.2	5.2	18.7	23.0	2.5			
Altered ilmenite	15.1	MN	Ac?	12.2	14.1	18.9	23.1	28.9	12.2	13.0		20.3	12.9	Ac?	Ac?	23.3
Leucosene				1.4	1.8	1.3	2.0		3.1		3.5	5.1	2.9			
Chrome Spinel				0.4	22.6	2.1	1.4		0.7			1.4	10.4			
Magnetite						0.8			0.4							
Hematite	28.0			5.6	0.4		2.8			3.2						
Limonite				19.6	-							0.3				
Zircon	0.5	Tr	Tr	17.8	13.6	31.2	15.3	15.4	25.2	2.2	2.2	12.5	12.9	Tr	Ac	11.2
Monazite				0.4	1.5		0.9	0.4			Tr	Tr	1.7			Tr
Topaz	4.1		Ac	16.6	26.5	4.0	17.7	10.5	17.1	57.4	51.8	5.9	40.8	Acc		2.9
Garnet	-	Ac	Tr	8.1	10.2	9.2	1.1	4.1	10.7	1.1	1.9	11.5	6.3	Tr	Ac	7.5
Clinopyroxene	0.4		Tr	0.6	1.4	0.5	2.0		2.8		2.2	5.7	0.9	Tr	Ac	1.0
Titanaugite	0.4	Tr		1.7		1.3	0.4	1.5	0.8	0.3	0.3	1.3	0.3		Tr	0.4
Tourmaline	0.7	Tr	Acc	1.1	1.1	2.4	0.3	0.3	2.6	13.5	10.0	3.1	6.0			1.3
Spinel				0.7		0.6			0.7	1.8	1.1	0.3	0.7			
Quartz/feldspar	37.3	MJ	MJ	8.7	3.7	2.5	22.7	30.2	1.5	1.9	7.3	0.6	0.5	MJ	MJ	51.3
Others (including fossil material)	10.4			1.1	1.4		4.5	8.2	0.5		0.6	2.9	0.8	Mn	Ac	
Pyrite	1.9									Tr						



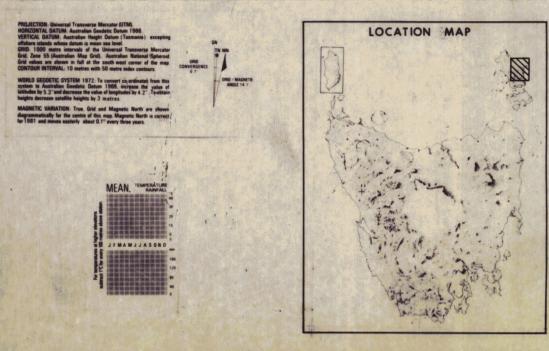
TASMAN SEA

LEGEND

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Coastline	Coastline	Coastline	Coastline	Coastline	Coastline	Coastline	Coastline	Coastline	Coastline
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LEGEND

- Barrier beach ridges and dunes
- Barrier lagoon
- Esturine sediments
- Parabolic dunes and deflation lagoons
- Stabilised undifferentiated sediments
- Granite
- F 15 Pan concentrate sample location



89-2921

675021

YTRIUM CORPORATION PTY LTD	
EL 61/87 - SELLARS LAGOON	
SAND FACIES MAP & SAMPLE LOCATIONS (FROM AIRPHOTO & FIELD INTERPRETATION)	
COMPILED	JMT
DRAWN	JMT
DATE	JAN. 1989
SCALE	1:50,000
PLAN 2	