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EXPLORATION LICENCE EL 60/87 - CAPE BARREN ISLAND

ANNUAL REPORT : YEAR 1

W.C. CROMER

May 1989

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TENEMENT INFORMATION

EL 60/87 is a 39 km^2 tenement on the east coast of Cape Barren Island (Figure 1, Plan 1).

EXPLORATION PHILOSOPHY & OBJECTIVES

The aim of the proposed programme was to test the extensive accumulation of beach and aeolian sands along the east coast of Cape Barren 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 east coast of Cape Barren 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 the island were viewed as attractive targets for placer mineralisation of the type sought by this programme. In addition, placer gold is known from beach sands in the area, presumably sourced from mineralised Siluro-Devonian Mathinna Beds. Gold, if present, would be a valuable addition to the granite-derived heavy mineral suite.

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.

Figure 1. Location Map - EL 60/87, Cape Barren

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.

REGIONAL SURVEYS

Review of Previous Exploration

Blake (1947) described the alluvial and hard-rock tin workings on Cape Barren Island. Production had been sporadic and small-scale since the 1880's. He reported briefly on the Modder and Rook River alluvial fields, and recommended further investigation of the former. Minor gold occurrences were also recorded (p 97) : the Lowery Reef is a quartz-arsenopyrite-pyrite-gold vein hosted in Mathinna Beds, and cropping out at sea level about 4km east of the Dover River mouth. Ilmenite, cassiterite and minor gold have been reported from beach sands west of the Dover River mouth.

Several exploration companies held licences over all or part of Cape Barren Island in the 1960's and early 1970's. Utah Development Company explored for alluvial tin on EL 2/65 which originally covered Flinders, Cape Barren and Clarke Islands. Most of the work (Slater & Phipps, 1967) was directed at Recent shallow marine sediments in Franklin Sound and Banks Strait, where numerous cores and samples were taken. Uneconomic concentrations of heavy minerals including cassiterite were found to be widespread, particularly in Deep Bay offshore from the Lee River on the central north west of Cape Barren Island.

Subsequently, Scamander Mining Corporation explored for heavy minerals on EL 12/68 which covered the same area as Utah's EL 2/65. Wales' (1969) rather general report described reconnaissance sampling and aerial survey, but provided no assay results. The work was mainly discouraging but he recommended follow-up auger drilling of beach sands on Cape Barren Island.

Stannard, (1970 - 1972) summarised tin exploration on BMI Mining's EL 18/70 which included all of Cape Barren Island. No other minerals were targeted. The island was mapped at reconnaissance level. In an appendix, Cocker described the distribution and gross mineralogy of the tin and non-tin granites of the area. Stannard (1972) recommended drilling in the alluvial tin fields of the Modder, Rooks and Lee Rivers, mainly as a follow-up to Utah's earlier work.

The east coast of Cape Barren Island covered by Yttrium Corporation's present EL 60/87 has thus been subjected to no work other than cursory exploration for heavy minerals.

Sand Facies Mapping

Reconnaissance mapping and photo interpretation were combined to produce the sand facies map (Plan 2) at a scale of 1:50,000.

Two main associations of coastal sand landforms have been recognised. The older, provisionally inferred to be Late Pleistocene (Sutherland & Kershaw, 1971; Kershaw & Sutherland, 1972; Colhoun, 1989, p 17) comprise aeolian sand-sheets and linear dunes draped over granitic and sedimentary basement and extending several kilometres inland. Dominant wind direction is from the east or east-south-east. The sands are characterised by local development of deflation lagoons and parasitic parabolic dunes on the longitudinal dunes.

Younger Holocene sand barrier systems overlie the Late Pleistocene deposits, and extend up to 1km inland. The Holocene association includes present beaches, stabilised and migrating foredunes, wave-aligned beach ridges and swales, and estuarine or land-locked lagoons. Examples of various Holocene sand facies are shown in Plates 1, 2 and 3.

The processes producing beach berms, barrier dune systems, tidal channel bars, sand spits and linear 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 below.

Plate 1. Looking northwest from near Thirsty Point. Little Thirsty Lagoon in left middle distance.

Plate 2. Looking southeast from Burgess Bay to Cape Barren. Migrating dunes in right background.

SPECIFIC SURVEYS

Sand Sampling

The principal aim of the reconnaissance sampling was to establish the presence of heavy minerals in various Holocene sand facies, and the mineralogy of each heavy fraction, rather than attempting to estimate overall abundances. Accordingly, samples were preferentially collected wherever local heavy mineral accumulations were observed, in no systematic manner. In several localities however, back-up channel or grab samples were collected.

Heavy mineral accumulations were more commonly observed as dark bands exposed at the rear of present beaches in eroded foredunes (Plates 3, 4 & 5) and less commonly as banding in tidal channel sands (Plate 6) as surface lags on beaches, or in the troughs of ripples on foredune surfaces.

Plate 3. Looking east towards headland 2km west of Harleys Point. Samples CB 9 and CB 10 collected from eroded foredune in middle distance.

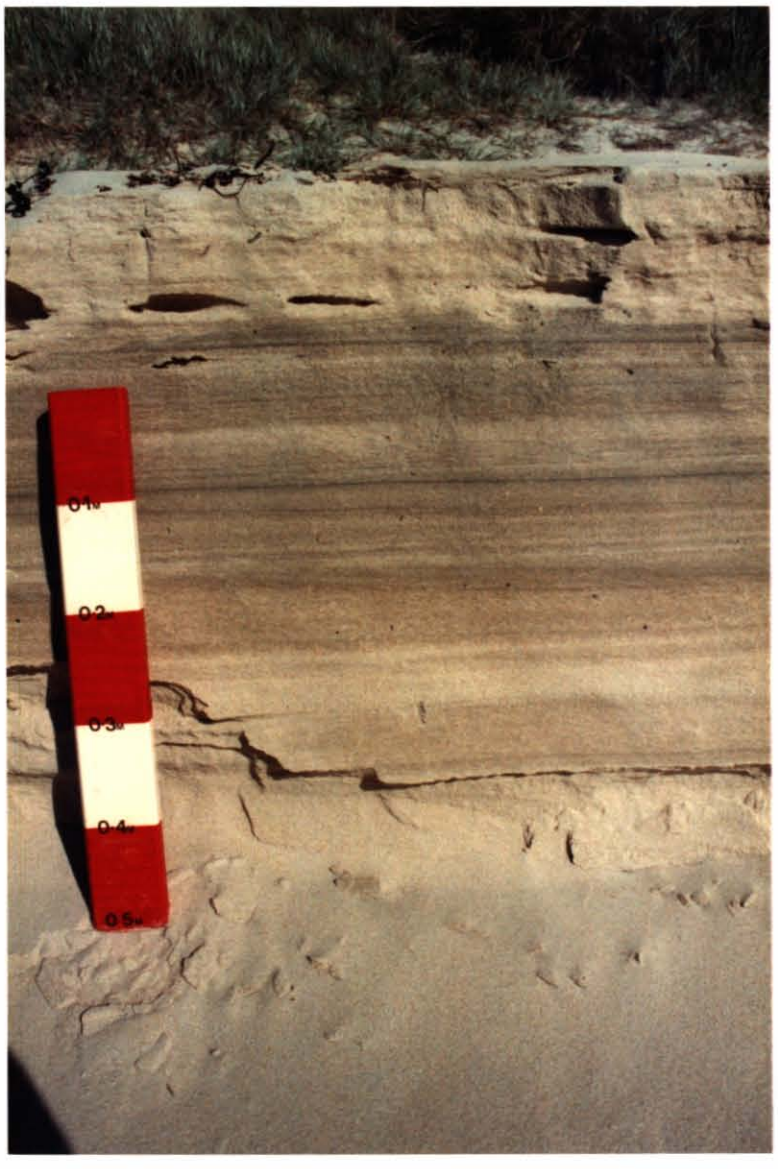

Plate 4. Detail of heavy mineral banding in eroded predune shown in Plate 3. Samples CB 9 (selected heavy mineral sands) and CB 10 (2*1* x 0.8m channel sample) were collected here. Scale is 0.5m long.

Heavy mineral accumulations in the eroded foredunes appear to be the result of both beach (Plate 4) and aeolian (Plate 5) processes.

Twenty samples were collected (Plan 2) and submitted to the Department of Mines Launceston Laboratory for analysis.

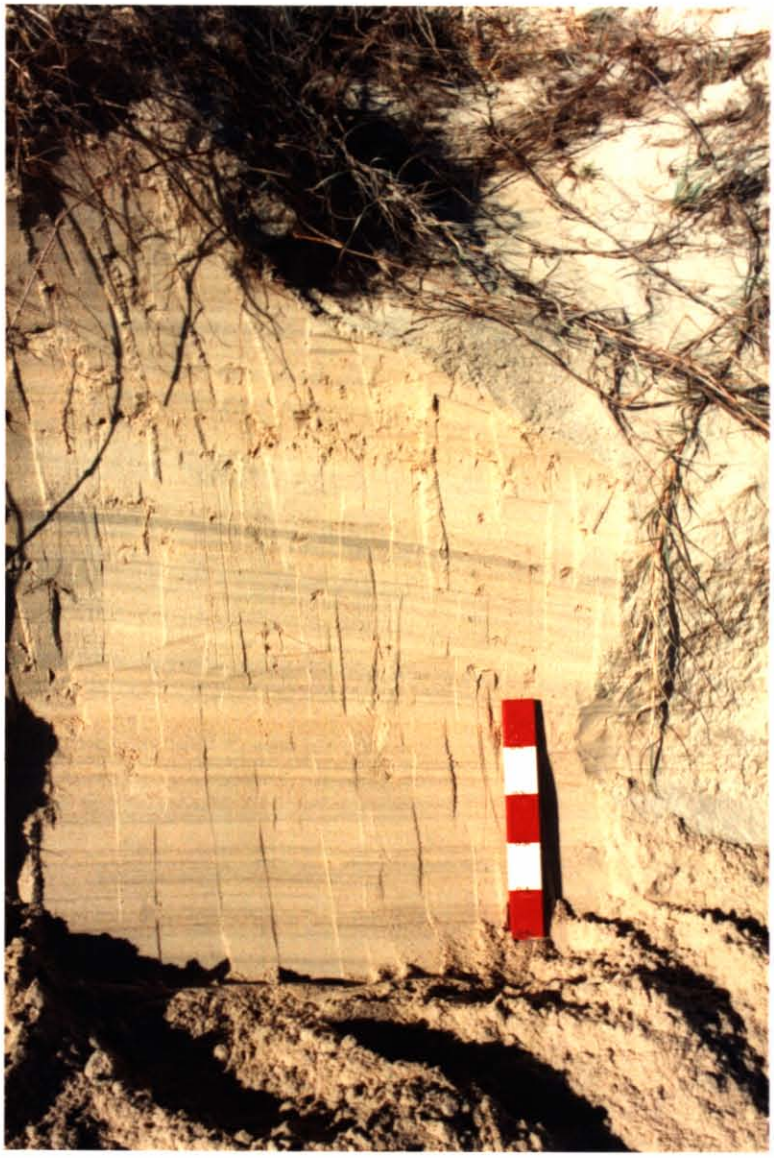

Plate 5. Detail of heavy mineral banding in eroded foredune 200m west of Thirsty Point. Sample CB 15 (2*l* x 0.7m channel sample) collected here. Scale is 0.5m long.

Plate 6. Heavy mineral banding in tidal channel sands at mouth of estuary 3km west of Harleys Point. Sample CB 11 (100 gm selected heavy mineral sands) collected here.

Samples collected comprised either +/- 2*l* grab or channel, or <500g grab, channel or hand-picked samples (Table 1). All large samples were subsequently panned in the field down to +/- 300g pan concentrates. In the laboratory, all twenty samples underwent (a) heavy liquid separation (SG = 3.0) and (b) magnetic separation with five standard fractions (M/A 1-4, non-magnetic).

Table 1. Sample descriptions.

No:	AMG Grid	Sample type	Sand facies
CB 5	[168328]	2*l* channel	foredune
CB 6	[168328]	2*l* grab	beach
CB 7	[183316]	600g, selected dark lag	beach
CB 8	[182316]	2*l* channel	foredune
CB 9	[203797]	200g, selected dark bands	eroded foredune
CB 10	[202296]	2*l* channel	eroded foredune
CB 11	[200296]	100g, selected dark bands	tidal channel
CB 12	[195295]	2*l* channel	lagoonal sand
CB 13	[225290]	2*l* channel	eroded foredune
CB 14	[223288]	230g grab	tidal channel
CB 15	[233255]	2*l* channel	eroded foredune
CB 16	[228259]	365g grab	dune
CB 17	[230256]	360g grab	dune
CB 18	[229258]	395g channel	fine gravel beach
CB 19	[232253]	368g channel	behind foredune
CB 20	[236247]	200g selected dark lag	beach
CB 21	[240235]	375g channel	behind foredune
CB 22	[246231]	375g channel	behind foredune
CB 23	[245224]	2*l* channel	behind foredune
CB 24	[232226]	2*l* channel	eroded foredune

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Results of heavy liquid separation are shown in Appendix 1, and the mass% (of submitted sample) of the various magnetic fractions are summarised in Table 2.

Table 2. Results of magnetic separation of heavy mineral concentrates (sums may not total due to rounding off).

Field No:	Lab No:	Sample wt(g)	Mass % Magnetic Fraction M/A1	M/A2	M/A3	M/A4	Mass % Non-mag	Total
CB 5	893371	278	Tr	Tr	Tr	Tr	Tr	0.1
CB 6	893372	369	Tr	Tr	Tr	Tr	0.1	0.2
CB 7	893373	597	1.1	0.3	10.8	1.7	7.0	20.9
CB 8	893374	574	Tr	Tr	0.3	0.2	0.3	0.8
CB 9	893375	193	0.5	Tr	7.5	1.9	4.2	14.2
CB 10	893376	399	0.2	0.1	1.9	0.5	1.9	4.6
CB 11	893377	91	1.1	0.05	9.3	0.9	5.9	17.5
CB 12	893378	515	Tr	Tr	0.2	0.2	0.2	0.5
CB 13	893379	329	Tr	Tr	0.1	0.1	0.2	0.4
CB 14	893380	230	Tr	Tr	0.1	Tr	0.1	0.2
CB 15	893381	292	0.2	Tr	2.6	0.5	2.6	6.0
CB 16	893382	365	Tr	Tr	0.4	0.2	1.5	2.1
CB 17	893383	361	Tr	Tr	0.6	0.2	1.1	2.0
CB 18	893384	395	Tr	Tr	0.3	0.1	1.0	1.3
CB 19	893385	368	Tr	Tr	0.1	Tr	0.2	0.4
CB 20	893386	204	0.3	0.1	11.2	0.6	27.5	39.7
CB 21	893387	373	Tr	Tr	0.1	Tr	0.2	0.3
CB 22	893388	376	Tr	Tr	0.7	0.1	0.9	1.7
CB 23	893389	288	Tr	Tr	0.6	0.1	0.7	1.4
CB 24	893390	376	Tr	Tr	0.1	Tr	Tr	0.1

Preliminary identification by the Department of Mines using binocular microscope showed that the various heavy mineral fractions of all samples generally comprised the following mineralogy:

Magnetic

M/A1	ilmenite
M/A2	ilmenite
M/A3	garnet, spinel (ilmenite), (biotite)
M/A4	garnet, spinel, (biotite)

Non magnetic

zircon, rutile, topaz, cassiterite, (gold)

Gold was visually identified in four samples (Table 3.)

Table 3. Placer gold descriptions.

Sample No:	Lab No:	Sand facies	Size (mm)	No. of samples	Mass (g)	*CRA (g/t)
CB 5	893371	dune	-400 + 200	1	0.0001	0.3
CB 7	893373	beach	-500 + 200	5		
			-200 + 1000	4	0.0006	1.0
			-100	12		
CB 10	893376	eroded foredune	-100	3	-	<0.1
CB 11	893377	tidal channel	-1000 + 500	1	0.0003	3.3

*CRA = calculated recovered assay of submitted sample

All samples have been submitted to the Department of Mines mineralogist, Mr R. Bottrill, for further mineral identification and estimations of relative mineral abundances, with particular reference to the non-magnetic fractions. Reports were not available at the time of writing.

CONCLUSIONS

1. Heavy mineral and magnetic separation of twenty beach, dune and tidal channel sand samples from EL 60/87 show a heavy mineral suite mainly comprising ilmenite, garnet, spinel, biotite, topaz, rutile, zircon, cassiterite and gold. The non-magnetic fraction ranges from 30-50% of the total heavy minerals.

2. Heavy mineral grade ranges from 0.1 - 6.0% in bulk channel sand samples, and from 14.2 - 39.7% in hand picked samples of dark banding or beach lag.

3. Heavy mineral concentrations occur in all Holocene sand facies recognised : beach, dune, and tidal channel / estuarine.

4. Placer gold, recognised previously on the central west coast of Cape Barren Island, has been identified in four samples over a 5km stretch of coast. Calculated recovered grades vary from <0.1 - 3.3 g/t, averaging 1.2 g/t. The gold occurs in beach, dune and tidal channel sand facies.

5. Preliminary examination of the mon-magnetic heavy mineral fractions show that both zircon and rutile occur in proportions encouraging enough to warrant further exploration, especially with gold, and possibly cassiterite, as bonus minerals.

PROPOSED YEAR 2 EXPLORATION

Year 1 reconnaissance work has been sufficiently encouraging to warrant further surveys. Detailed planning depends to some extent on the results of mineralogical studies currently in progress, but the Year 2 programme is likely to consist of:-

(a) Detailed sand facies and bedrock mapping.

(b) Systematic hand-augering and sand sampling on transects through the various sand facies.

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APPENDIX 1

RESULTS OF HEAVY LIQUID SEPARATION

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DEPARTMENT OF MINES

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TASMANIA

Launceston Office:
Chemical and Metallurgical Laboratory,
287 Wellington Street,
LAUNCESTON 7249

Enquiries:
Phone:
Your ref.:
Our file:

Yttrium Corporation Pty Ltd,
C/- K.C. Morrison.
190 Macquarie Street,
Hobart 7000

5.5.89

Reg. nos 893367-90

Dear Sir,

Please find below results of Heavy Liquid separation submitted to this laboratory.

Reg. No	Description	Mass g	Heavy Minerals %
893371	CB 5	278	0.1
893372	CB 6	369	0.2
893373	CB 7	597	20.9
893374	CB 8	574	0.8
893375	CB 9	192.8	14.2
893376	CB 10	399	4.6
893377	CB 11	91.0	17.5
893378	CB 12	515	0.5
893379	CB 13	329	0.4
893380	CB 14	230	0.2
893381	CB 15	292	6.0
893382	CB 16	365	2.1
893383	CB 17	361	2.0
893384	CB 18	395	1.3
893385	CB 19	368	0.4
893386	CB 20	204	39.7
893387	CB 21	373	0.3
893388	CB 22	376	1.7
893389	CB 23	288	1.4
893390	CB 24	376	0.1

Metallurgist

Fee 24 x $20 - $480

(P.L. James)
Chief Chemist & Metallurgist

Telephone (003) 44 2431 Fax (003) 44 6565

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Doris Hill
Little Creek
Shag Rocks
Big Stony Hill
River
Harleys Point
Thirsty Lagoon
Little Thirsty Lagoon
Rices River
She Oak Scrub
Albans
Karford
Hogans Hill
GULL ISLAN WILDLIFE SANCTUAR
CAPE BARREN
Jamiesons Bay
BAY
Christmas Beach
Jamiesons Point
Crystal Lagoon
Crows Beach
Petticoat Bay
Cone Point
SEA LION NARROW
Passage Point
SANCTUARY (for birds)
Forsyth Island
Passage Island

5516000mN
609000mE

LEGEND

2000 1000 500 0 metres — 2 4 6 8 kilometres

SCALE 1:50,000
1 millimetre represents 25 metres

Caravan park; Camping ground
Rubbish disposal area; Cemetery
Trigonometric station; Spot elevation
Contour with value; Depression contour
Quarry or open cut mine
Broken rocky surface
Dense forest; Medium forest
Low dense vegetation; Distinctive grass
Orchard; Pine plantation

Windbreak
Swamp; Land subject to flooding
Waterfall; Rapids
Indefinite shoreline or floodbank; Levee
Tidal rocks or ledge; Offshore rock
Lighthouse; Exposed wreck
Sand; Tidal reef
Saline coastal flat; Tidal flats
Jetty; Launching ramp

Built-up area with commercial centre
Roads maintained for continuous public use: Primary road; Secondary road; Bridge; Minor road
Roads of restricted use or access: Other roads; Vehicular track; Gate
Walking track; Bridge
Railway; Station
Light railway
Power transmission line and pylon positions
Building; Feature of special interest; Ruin; Mine
Post office; Police station; Fire station; School

sealed unsealed

Karoola
Entally House

BOUNDARIES shown on this map are **NOT** authoritative. For full particulars please consult the Registrar-General's Department or the Lands Department.
Property and land parcel boundaries are shown as at September 1981.
Areas within proclaimed towns or less than two hectares are not depicted. To give a land parcel reference, prefix parcel number with municipal number.

Municipality name
Municipality number
Municipality boundary
Ward name
Ward boundary
Town boundary
Reserve boundary
Property boundary; Land parcel boundary and number

LILYDALE
55
JETSON
0371

PROJECTION: Universal Transverse Mercator (UTM).
HORIZONTAL DATUM: Australian Geodetic Datum 1966.
VERTICAL DATUM: Australian Height Datum (Tasmania) excepting offshore islands whose datum is mean sea level.
GRID: 1000 metre intervals of the Universal Transverse Mercator Grid, Zone 55 (Australian Map Grid), Australian National Spheroid. Grid values are shown in full at the south west corner of the map.
CONTOUR INTERVAL: 10 metres with 50 metre index contours.

WORLD GEODETIC SYSTEM 1972: To convert co-ordinates from this system to Australian Geodetic Datum 1966, increase the value of latitudes by 5.3" and decrease the value of longitudes by 4.2". To obtain heights decrease satellite heights by 3 metres.

MAGNETIC VARIATION: True, Grid and Magnetic North are shown diagrammatically for the centre of this map. Magnetic North is correct for 1981 and moves easterly about 0.1° every three years.

GN
TN MN
GRID CONVERGENCE 0.7°
GRID / MAGNETIC ANGLE 14.1°

MEAN TEMPERATURE RAINFALL
For temperatures at higher elevations subtract 1°C for every 100 metres above station.
°C 40 30 20 10 0
J F M A M J J A S O N D
mm 160 120 80 40 0

LOCATION MAP

633022

5 cm

89-2965

YTTRIUM CORPORATION PTY LTD

EL 60/87 - CAPE BARREN

COMPILED	JMT
DRAWN	JMT
DATE	JAN. 1989
SCALE	1 : 50,000
FIGURE	PLAN 1

PLAN 1

022

Doris Hill

Little Creek

CB5 CB6 CB7 CB8 CB9 CB10 CB11 CB12 CB13 CB14 CB15 CB16 CB17 CB18 CB19 CB20 CB21 CB22 CB23 CB24

Shag Rocks

Harleys Point

Thirsty Lagoon

Little Thirsty Lagoon

Thirsty Point

Burgess Bay

Big Stony Hill

Mount Strzelecki

Hogans Hill

Karoola

She Oak Scrub

CAPE BARREN ISLAND

GULL ISLAND WILDLIFE SANCTUARY

CAPE BARREN

Jamiesons Bay

Tinker's Gut

Jamiesons Point

Christmas Beach

Crystal Lagoon

Crows Beach

Petticoat Bay

Cone Point

Passage Point

SEA LION NARROWS

BAY

River

Rices River

SANCTUARY (for birds)

Forsyth Island

Passage Island

5516000mN

609000mE

LEGEND

2000 1000 500 0 metres — 2 4 6 8 kilometres

SCALE 1:50,000

1 millimetre represents 25 metres

Caravan park; Camping ground

Rubbish disposal area; Cemetery

Trigonometric station; Spot elevation

Contour with value; Depression contour

Quarry or open cut mine

Broken rocky surface

Dense forest; Medium forest

Low dense vegetation; Distinctive grass

Orchard; Pine plantation

Windbreak

Swamp; Land subject to flooding

Waterfall; Rapids

Indefinite shoreline or floodbank; Levee

Tidal rocks or ledge; Offshore rock

Lighthouse; Exposed wreck

Sand; Tidal reef

Saline coastal flat; Tidal flats

Jetty; Launching ramp

Built up area with commercial centre

Roads maintained for continuous public use: Primary road; Secondary road; Bridge; Minor road

Roads of restricted use or access: Other roads; Vehicular track; Gate

Walking track; Bridge

Railway; Station

Light railway

Power transmission line and pylon positions

Building; Feature of special interest; Ruin; Mine

Post office; Police station; Fire station; School

sealed unsealed

Entally House

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Property and land parcel boundaries are shown as at September 1981.
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Municipality name

Municipality number

Municipality boundary

Ward name

Ward boundary

Town boundary

Reserve boundary

Property boundary; Land parcel boundary and number 0371

LILYDALE 55 JETSAM

KEY (from reconnaissance mapping and photo-interpretation)

HOLOCENE

- Modern beach sand
- Stabilised foredune
- Wave-aligned beach ridgesand swales
- Migrating non-vegetated æolian dune
- Estuarine barrier lagoon
- Wind-deflated lagoon

LATE PLEISTOCENE?

- Mainly low-relief longitudinal æolian dune
- Mainly low-relief, thin sand sheets over bedrock

DEVONIAN

- Granite (Dg)

SILURO-DEVONIAN

- Mathinna Beds (Sm)

SAMPLE LOCATION & NUMBER

- Panned concentrate from 2L channel or grab sample
- ±300gm channel, grab or lag sample

PROJECTION: Universal Transverse Mercator (UTM).
HORIZONTAL DATUM: Australian Geodetic Datum 1966.
VERTICAL DATUM: Australian Height Datum (Tasmania) excepting offshore islands whose datum is mean sea level.
GRID: 1000 metre intervals of the Universal Transverse Mercator Grid, Zone 55 (Australian Map Grid), Australian National Spheroid. Grid values are shown in full at the south west corner of the map.
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GN TN MN

GRID CONVERGENCE 0.7°

GRID / MAGNETIC ANGLE 14.1°

MEAN TEMPERATURE RAINFALL

For temperatures at higher elevations subtract 1°C for every 100 metres above station

J F M A M J J A S O N D

°C 40 30 20 10 0 — mm 160 120 80 40 0

LOCATION MAP

5 cm

89-2965

633023

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EL 60/87 - CAPE BARREN

SAND FACIES & SAMPLE LOCATIONS

COMPILED	WCC
DRAWN	TKD
DATE	May 1989
SCALE	1:50,000

PLAN 2