PROSPECTING - TIN - NORTHEAST TASMANIA.

REPORT ON

RECONNAISSANCE PROSPECTING OF OFFSHORE EXPLORATION LICENCE (E.L. 5/65)

by

W.S. Chesnut

MELBOURNE MARCH, 1966.

AMG REFERENCE POINTS ADDED

002

222004 MELBOURNE OFFICE

CONTENTS

LOCATION MAP – E.L. 5/65.

NORTH EAST TASMANIA

SCALE 0 8 16 24 MILES

Mathinna beds.

Devonian Granite.

Auriferous area

Alluvial tin deposit.

Lode tin deposit

5 cm

AMG REFERENCE POINTS ADDED

TRIM LINE

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SUMMARY.

A brief reconnaissance geological mapping and sampling programme was carried out during February 1966 along about 80 miles of the shoreline of the north-east coast of Tasmania which forms the boundary of the Company's offshore Exploration Licence Number 5/65.

The primary object of the survey was testing the fore-beach zone for the presence of heavy minerals, in particular cassiterite, to provide information of offshore conditions. As a secondary object geological mapping was carried out to locate basement as an aid in appraising results of proposed geophysical surveys.

The results of the geological mapping appear to indicate that only one possible drowned river valley can exist - in the southeast Ringarooma Bay area. However, a number of small coastal lagoon type features are present on the east coast.

The results of the sampling programme have shown that tin is present in almost all the beaches, and much of the fore-dunes, of the coastline east of the mouth of the Ringarooma. Only minor occurrences of tin were found west of this area.

Information concerning water depths, thickness of sediments etc. and bedrock profiles in the offshore zone as background is required for evaluation of any sampling or drilling techniques.

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A. TITLES.

The Company was granted an Exploration Licence covering an offshore area one mile wide along the coast of northeast Tasmania extending for some 80 miles from Croppies Point in the north to St. Helen's Point in the east. The defined boundary of the licence is high water mark around the shoreline and includes Georges Bay (St. Helens).

The licence is current until 4th May 1966.

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B. GEOLOGY.

In broad terms the geology of the north eastern quadrant of Tasmania consists of an extensive series of granitic masses intruding generally fine grained sediments. The sediments have been regionally metamorphosed and locally contact metamorphosed during the emplacement process.

Many of the granites, and parts of their contact aureole, are tin bearing, and weathering of these have formed extensive alluvial tin deposits on the land surface. Many of these form deep leads with between 60 and 300 feet of alluvium overlying the old channel.

This may indicate that at the time of the formation of these leads sea level, relative to the land surface, was lower than at present. The position and tin content of old downstream leads is conjectural, for leads have only been worked in upstream areas.

Thus in considering the offshore potential for tin deposits in this area three basic types can be considered:

i) Buried deep lead type placers, consisting of the inferred drowned lower valleys of the ancient streams draining this area.

ii) Deposits laid down from the mouths of the drainage streams following the drowning epoch.

iii) Deposits formed by marine erosion and the possible action of currents in the near-shore area of the north east coastline where some of the granites contain accessory cassiterite.

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C. PROSPECTING ACTIVITIES

During February and early March 1966 the writer and L.G. Hollingworth carried out a reconnaissance geological and sampling survey of the entire coastal section of the Exploration Licence.

This reconnaissance comprised:

1. Surface geological mapping of outcrop rocks, principally with a view to locating the basement margins of fossil drainage channels.

2. Sampling of visible surface black sand concentrations with a view to determining the mineral composition of the heavy fraction.

3. Digging of small pits in selected areas in order to locate "preserved" heavy mineral deposits occurring as bands within the beach profile or associated with shingle deposits near headlands, which act as major beach "traps".

The methods used in and the results of these activities are discussed in the following section. The composition and grades of the various heavy mineral fractions detected during the survey are discussed later.

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... where absence of mapping by Tas. Geol. Survey

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D. RESULTS

1. Geological Mapping:

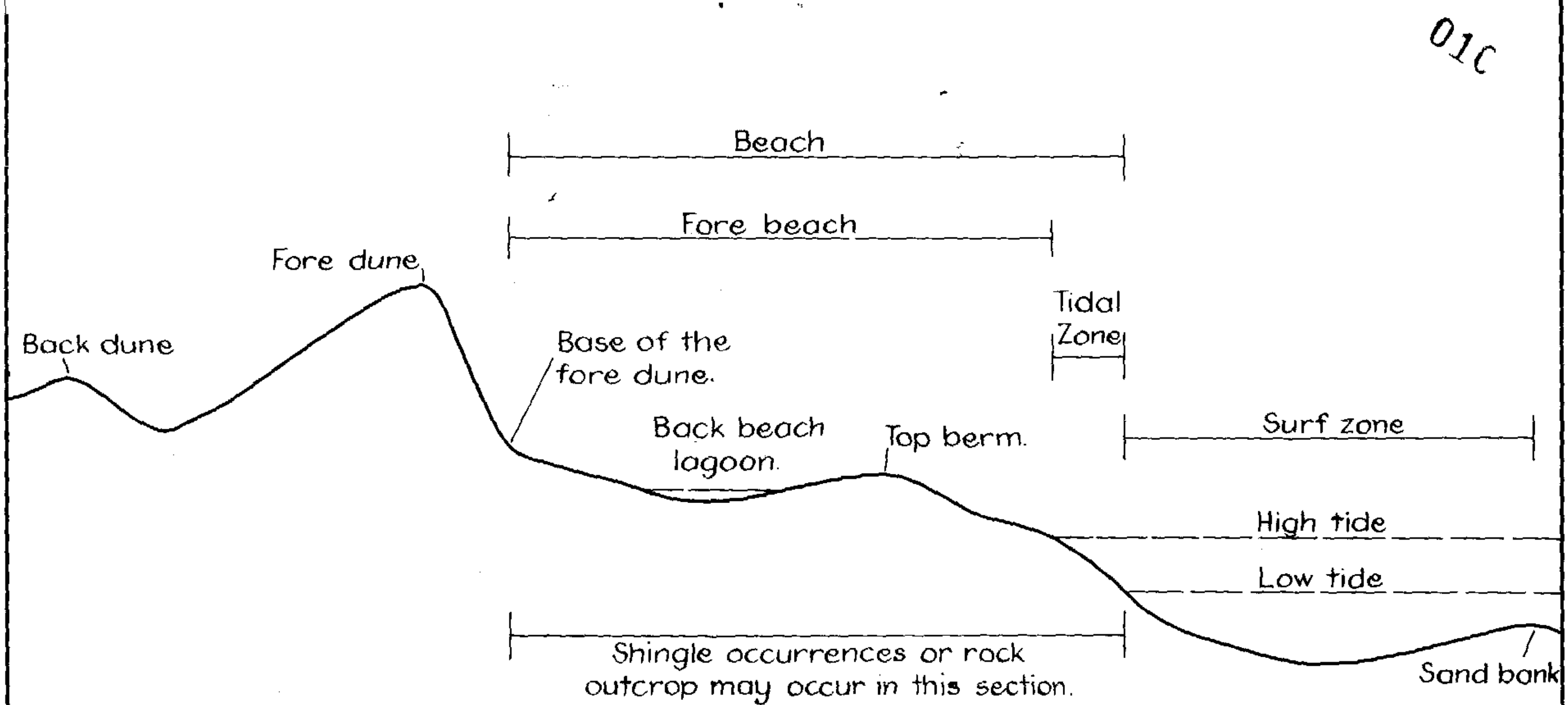
The results of the geological mapping are shown on the attached plans, Figs. 1 and 2, which comprise photoscale compilations of the Exploration Licence.

The major feature which becomes apparent from the plans is that the only possible location for a major drowned valley is in the south eastern side of Ringarooma Bay in an area around the present mouth of the Ringarooma River.

Other minor drowned valleys probably exist on the east coast at Little Mussel Roe, Mussel Roe, Ansons and George Bays.

Depending on the requirements of future work it may be necessary to make detailed petrological examination of rocks within many of the areas shown on the plans as undifferentiated Jurassic Dolerite and Tertiary Basalt in order to guard against possible hidden deposits being excluded from appraisal. This is perhaps most important in the Cape Portland area where absence of mapping by the Tasmanian Geological Survey has indicated dolerite whereas the writer's impression of much of the scoriaceous and vesicular material in the coastal section is that it is basalt. This factor could influence the appraisal of the tin-bearing shingle and gravel deposits located on the northern shore of the Portland Peninsula.

Evidence, in the form of shingle and shell deposits above the present beach zone, indicates recent minor fluctuations in the sea level. The writer however, does not consider these to



SKETCH OF
TYPICAL BEACH PROFILE

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be of great importance in the formation or removal of economic shoreline deposits. By far the most important controls are the effects of the major sea level fluctuations in recent geologic time - since and including the relative rise in sea level which led to the formation of the deep leads.

(2) Sampling of Surface Black Sands:

During the reconnaissance survey it became apparent that local concentration of the heavy mineral fraction of beach sand takes place:

i) At the base and on the face and sides of the mobile fore-dune.

ii) On the beach at and near high water mark.

In the fore-dune concentration appears to be a result of light winds removing the silica and shell fraction of the dune so allowing the heavy mineral fraction to rill down the face of the dune. Strong winds move both the light and heavy minerals.

With the gentle wave "swish" near top tide level the heavy mineral fraction becomes concentrated as a surface layer. Apparently this occurs most commonly when the local wave action on the beach is in the form of a semi-circular sweep - in which erosion takes place on the up-beach sweep; separation, concentration and deposition of the heavy minerals occurring during the lateral sweep and removal of the light weight fraction during the down-beach sweep.

This same process can occur during storm action when the top wave flow overflows the top berm and runs down the land side of the beach berm to a back beach lagoon. In this event the heavy mineral is concentrated at and slightly on the land side of the peak of the beach berm.

Many examples of both of these types of surface black sand concentrations were observed during the survey - see plans. There does not appear to be any overriding control as to where such deposits occur but rather they result from a suitable beach profile and gentle wind or wave action.

Specimens of surface concentrates were collected for petrological examination, some dune and beach concentrates being collected in very close proximity. Results of examination of these specimens are not yet available. They may indicate whether the mineral assemblage in the dunes differs from that in the present beach sands.

(3) Shallow Pitting of Shoreline Areas:

(1) Shingle Deposits:

During the reconnaissance survey areas were observed in which shingle deposits were exposed at or near low tide mark which suggests that, about this level shingle buried under sand would exist alongside traps or barriers such as rock outcrops at headlands.

Pits were dug in the sand at random, although generally in the more favourable places, in an attempt to locate buried shingle.

These pits were generally less than three feet deep and when shingle was not encountered the usual cut-off point was the water table.

Samples of the shingle materials up to boulder size and of penetrated sand and wash sections were panned for heavy minerals. Almost all samples contained some heavy minerals.

(ii) <u>Sand Profiles</u>:

Numerous sample pits were also sunk in areas where there was little likelihood of intersecting shingle but where concentrations of black minerals were observed in erosion banks and on the beach surface.

Many additional pits were sunk on random beach sites. In these pits water table was the usual cut off and the deepest pit was about 6 feet. Bands of black sands from a "single grain" layer to several inches were often encountered along with grit, shell and thin pebble horizons and possibly old dune materials of grey, brown and black stained sands. Panning of selected and bulk samples of the penetrated materials generally yielded some heavy minerals.

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E. APPRAISAL OF RESULTS.

(a) Heavy Mineral Assemblage:

As a result of the preliminary field examination of the various heavy mineral fraction obtained during the reconnaissance it appears that, dependent on the type of local outcropping rock which considerably affect the amounts and composition of the associated detrital heavy minerals, the typical economic heavy minerals in order of abundance are:

Ilmenite	-	20-60%
Rutile	-	20-50%
Zircon	-	20-50%
Cassiterite	-	1-50%
Monazite	-	generally minor

Near outcropping granites the principal heavy minerals are:

Garnet) extremely abundant on the east coast
Topaz)
Hornblende
Spinel
Corundum

Near outcropping basalt or dolerite the principal heavy minerals are:

Magnetite
Olivine
Augite
Gold, platinium, osmiridium (minor specks in few localities)

Petrological examination of a set of twenty type specimens should provide information about some of the following points:

i) Whether the economic heavy minerals throughout the area have a common source.

ii) Whether any definable differentiation in mineral content exists which may be a result of current or long shore movement.

iii) The degree of chemical and physical weathering of the various grains to indicate whether the grains are part of the present or a past erosion cycle.

It was evident during field examination of the heavy mineral concentrates that the cassiterite grains were often considerably finer than grains of other minerals, with the occasional exception of some zircon and monazite.

(b) Estimated Grades of the Heavy Mineral Fraction:

Although sampling was not designed to determine grades, rough visual estimates of the amount of concentrate obtained from panning in plastic pans were made at a few apparently "rich" locations.

The amount of heavy minerals recovered from panning typical beach sand material (i.e. no black sand visible) is of the order of ½ to ¾ lb. per cubic yard.

Samples of shingle contained about 20-40% by volume of fines (-3/16 inches) and these contained a heavy mineral fraction of 3-5% of the original unseived sample.

Most surface black sands were composed of heavy minerals only.

The presence of cassiterite could not be detected in any concentrate and it was therefore necessary to "acid" the concentrates on a zinc dish, frequently with an excess of acid. Commonly a black flocculent was formed, and sometimes the reaction produced small stable bubbles to which the concentrate grains clung.

Specks of gold in panned concentrates containing cassiterite and other heavy minerals were observed at four positions around the coast. The origin of this gold is not known but tin dredging operations in the Ringarooma Valley yield some gold.

By far the greatest concentration of cassiterite detected was in the shingle wash on the northeastern side of Cape Portland Peninsula where the grade of a five feet section sampled was estimated to be about 4 oz. of cassiterite per cubic yard with a trace of gold and about 4 oz. of other heavy minerals per cubic yard.

The only other occurrence of high concentrations was the 18 inch thick shingle bed northwest of Eddystone the grade of which was estimated to be 1½ lbs. per cubic yard of heavy mineral, the concentrate containing about 30-40% cassiterite.

Generally the cassiterite content of the heavy mineral fraction is in the range 1% to 10% and the average is probably between 2% and 5%.

From the plans it can be seen that almost without exception minor amounts of cassiterite are present in all the beaches from the South Cape Portland area eastwards around the coast to St. Helens. This could result from two processes:

(a) Movement of cassiterite eastwards from Ringarooma Bay, which may represent a drowned valley.

(b) Derivation of cassiterite from the outcropping granites of the east coast by normal marine erosion, and subsequent movement north westerly around the coast.

Whether the origin of the minor cassiterite occurrences west from the mouth of the Ringarooma can be explained by current action within Ringarooma Bay is doubtful. An alternative explanation is that local zones in the granite contained cassiterite and erosion of minor alluvial or eluvial deposits gave rise to the detected occurrences in localized areas.

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F. ASSESSMENT OF POTENTIAL.

1. Potential for Tin Bearing Deposits:

In view of the known tin-bearing potential of the main land area, it is considered (by the writer) possible that offshore tin deposits could exist.

The three main sources of tin likely to exist - their relative importance, however, being subject to conjecture - are:

a) Buried deep leads representing the pre-basalt river valleys when sea level was considerably lower than at present. In this regard it is considered that some 200 feet of partly consolidated sediments will overlie any placer concentrations. Depending on the rate of change of sea level, such places may or may not have been disturbed. The most important such lead is likely to be the ancient Ringarooma River, with minor channels associated with the Great Forrester, Tomahawk, Great Mussel Roe, Ansons and Georges Rivers. Some considerable doubt exists as to whether these old channels carry placer deposits at the shoreline margins of their fossil land channels.

b) Overcarry in present streams which drain the tin-bearing areas. This assumes that not all the tin is deposited at the base of the mountain gradient and appears to be confirmed by the existence of the various dredging areas on the Ringarooma River where the tin grades decrease downstream. The probable main source streams are the Ringarooma-Boobyalla, Great Mussel Roe, Ansons-Great Frazer and Georges Rivers.

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c) Derived from erosion of the shoreline outcrops of tin-bearing granites and meta-sediments. This factor covers the shoreline weathering processes over a long period of time during numerous different sea level positions and the importance of this factor may be dependent on elucidation of old shoreline positions and possible stability of ocean currents.

2. Practicability Factors:

In considering the likelihood of offshore tin deposits being economic, a number offactors are apparent:

a) Depth of water existing over the exploration licence. In this regard examination of the bathymetric profile would seem to indicate that the east coast section from near Cape Naturaliste southwards is very steep and the depth of water approaches 200 feet rapidly. The profile in the northern section appears much flatter and water depths are less than 100 feet for a considerable distance offshore.

b) Thickness of possible unconsolidated tin-bearing materials existing on the shelf. These having been derived mainly from factors 1(b) and 1(c) and from 1(a) if redistribution of the old channels has taken place. In considering this factor, it is impossible to determine by visual means what thickness of material exists. However, from aerial inspections it appears that virtually no sediment exists on the east coast section south of the Mussel Roe area, despite the presence of numerous offshore rocks and reefs. Major sand banks exist in the northern areas from Cape Waterhouse to Mussel Roe.

c) Thickness of possible, partly consolidated overburden overlying inferred drowned valleys. These may in turn be overlain by the unconsolidated sediments above. From previous company operations on the land sections, the thickness of these partly consolidated materials is likely to be of the order of 100-200 feet.

d) The stability of the "resultant" of the currents which have affected the offshore sedimentation processes over the long period discussed in section 1(c). Visual and recorded evidence of major current directions appear to indicate a northward movement up the east coast and an eastward movement along the north coast with a maze of cross currents in the interference zone.

3. <u>Nature of Occurrence of Possible Offshore Placers</u>:

Two major modes of occurrence of any tin placers are inferred:

a) A disseminated tin content in large quantities of unconsolidated sands and silts derived from factors 1(b) and 1(c). These type of deposits are likely to be of the same nature as beach deposits in which minor truly disseminated tin occurs, but where most of the tin is concentrated into thin bands or lenses which are irregularly developed throughout the bulk of the material.

b) Concentrated deposits must be considered as being of two modes:

i) fossil deep leads;

ii) concentrations of the heavy mineral fraction as a result of the winnowing action of ocean currents. This factor involves the assumption that a resultant current direction exists by means of which the light fraction is carried over, leaving a heavy mineral "tail". It is conceivable that a fossil deposit of this nature could occur - having been formed at a given sea level and then preserved by burying due to a subsequent rise in sea level.

4. <u>Conclusions:</u>

a) The small drowned valleys represented by Little Mussel Roe, Mussel Roe and Ansons Bay appear to be individually too small to be of interest to the Company. The Georges Bay and river estuary (St. Helens) is the only area of suitable size to be of interest as a normal dredging proposition.

b) The apparently strong northward current action on the east coast would appear to preclude the development of other than a concentrated tail of heavy mineral. Any such deposit occurring perhaps nearer the northern end of the coastal stretch, swept clean of sand.

c) The ancient Ringarooma channel appears to be the only major possible deep lead type placer deposit existing within the area.

d) Ringarooma Bay appears to be the only major area of possible disseminated type deposits.

e) The coastal zone from Cape Portland to Mussel Roe appears to be the area of major interest for possible minor (but perhaps enriched) associated disseminated and concentrated type deposits resulting from various current actions.

f) It is evident that the evaluation of the various possible types of deposit will involve considerable sampling difficulties especially in (a) the tidal and surf zones where continuous large scale sand movements take place, and (b) in the offshore sand banks where considerable thicknesses of loose sand exist in both fixed and mobile conditions.

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G. RECOMMENDATIONS

From the results of the reconnaissance survey it is considered by the writer that no method of shallow sediment sampling of the sands of the intertidal or surf zones around the coastline would effectively evaluate the "tin potential" of the area. A similar position will arise in future offshore testing unless the cassiterite content is shown to be uniformly distributed through the offshore sediments.

In considering the future programme it is considered essential that some form of marine underwater survey of the entire area should be made in an endeavour to obtain as much information as possible on:

i) The depth of water from a chosen tidal position.

ii) The thickness of the unconsolidated sediment layer (presumably Recent sand and silt).

iii) The thickness of the partly consolidated sediments infilling buried valleys.

iv) The bedrock topography, if possible.

Such information would be of assistance in defining areas of lesser interest due to economic considerations, e.g. excessive depths of water or sediment.

The information would be of considerable value when choosing techniques for sea-bed sampling; but it is doubtful whether it would be of assistance in locating favourable areas, except perhaps in determining the positions of deep channels.

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MELBOURNE
WSC/HH - 25.3.1966.

W. S. Chesnut.

APPENDIX:

PETROLOGICAL REPORT M. 3/66

TIN IN BEACH CONCENTRATES FROM NORTHEAST TASMANIA

M. Apthorpe

Melbourne: March, 1966.

INTRODUCTION

Beach and dune deposits on the coast of northeast Tasmania were sampled by W. S. Chesnut in February-March, 1966, and 20 panned concentrates were sent to Melbourne for assessment of tin content, and general mineralogical examination.

Quantitative examination showed significant amounts of cassiterite in two samples, and small amounts in most of the remainder. Grain counts were carried out on all samples, and a summary of the results is set out below.

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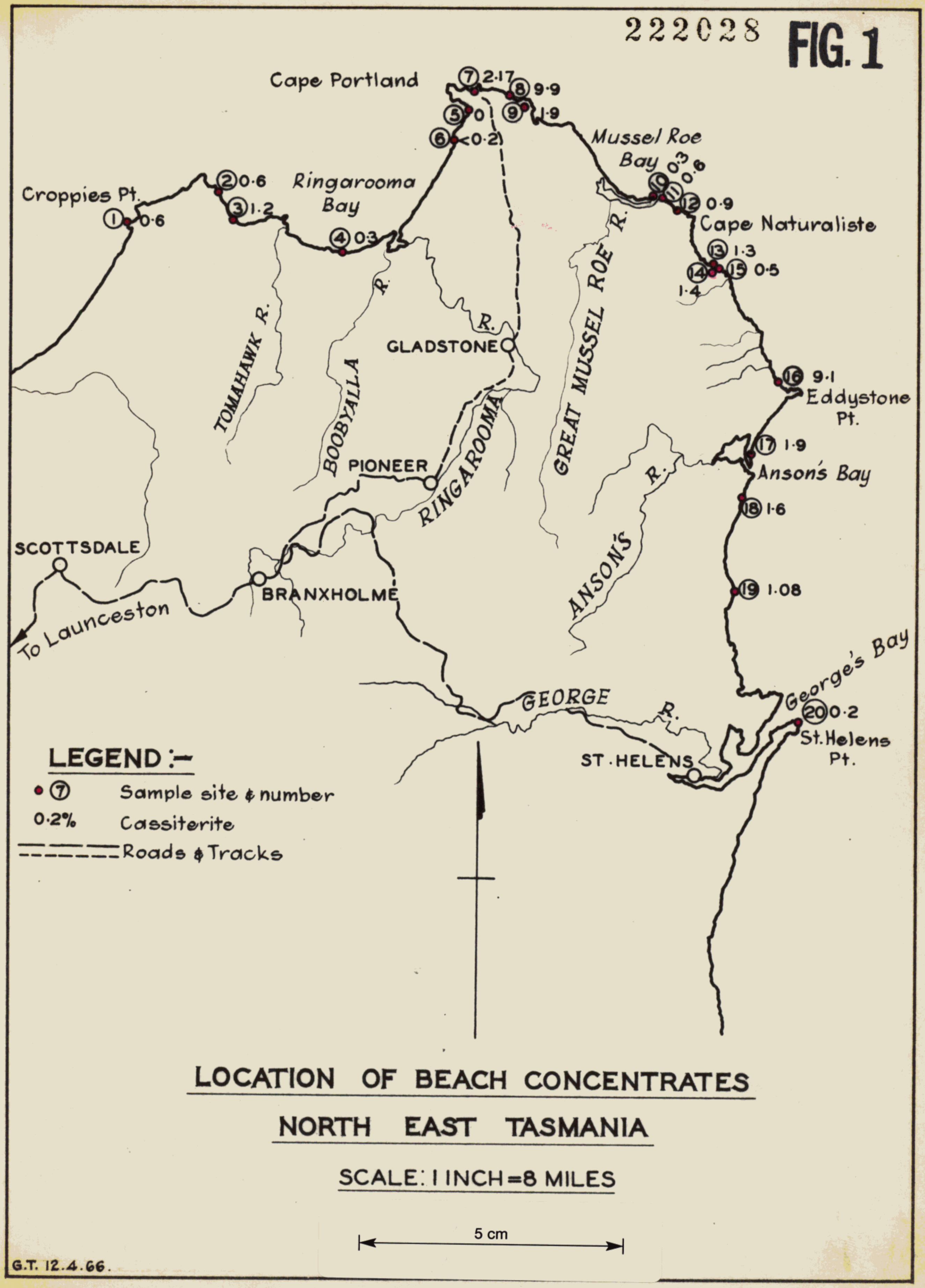

LOCATION OF BEACH CONCENTRATES
NORTH EAST TASMANIA
SCALE: 1 INCH = 8 MILES

RESULTS

A. MINERALOGY:

The concentrates consist largely of ilmenite, zircon and garnet, with lesser amounts of topaz, pyroxene and monazite. Tourmaline and rutile percentages are consistently low.

Cassiterite content varies widely from nearly 10% (Samples 8 and 16) to virtually zero (Sample 5). The usual values range between 0.5% and 1.8%. It should be emphasized, however, that these figures are based only on a grain count. As the cassiterite is generally finer-grained than all other constituents, the weight percentage and volume percentage of cassiterite present would differ from these values. (See Table 1).

The position of samples is shown on Figure 1 and approximate cassiterite percentages marked. It can be seen that the greatest concentrations of cassiterite are in the extreme north, east of Cape Portland (Samples 7 and 8), and also just north of Eddystone Point (Sample 16). In these samples the cassiterite is coarser-grained and much less abraded than in all other samples examined, and local derivation from cassiterite-rich pockets in the granite is indicated.

The coarsest material is 0.3 mm. in diameter, but most is much finer, averaging 0.1-0.15 mm. in diameter. Other samples show a propressive decline in tin content from these maximum values, and this is coupled with a decrease in grain size. No relationship between percentages of cassiterite and other heavy minerals is evident.

B. DISTRIBUTION:

The distribution of cassiterite along the coast is irregular, and the high concentrations appear to be derived from the weathering of local cassiterite-rich zones in the granite.

B. Distribution (contd.)

Samples from Ringarooma Bay contain almost no tin, and this examination gave no reason to suppose that the Ringarooma River is the source of the tin in the beach deposits. The samples from the eastern shore of the bay (Nos. 5 and 6) were largely derived from locally outcropping Jurassic dolerite, and were very little influenced by current action.

Contrasted with these are the relatively rich samples east of Cape Portland (7, 8 and 9). While No. 7 (with 2.17% tin) contains substantial pyroxene from local dolerite, No. 8 (9.9% tin, taken from a beach shingle) is granitic in type. Convergence of currents may be responsible for the concentration of some of the (well-rounded) tin in this sample, as suggested by W. S. Chesnut. (This report, Section F).

Samples further to the south are mainly granitic in origin. Most are derived from several cycles of erosion. Zircon and garnet in the same sample show all stages of abrasion from fresh euhedral crystals to well-rounded frosted and pitted grains.

Samples taken from the same locality but at different points in the beach profile (e.g., Nos. 13, 14 and 15) show some variation in mineral content, including cassiterite.

Much more detailed sampling and study would be required to assess the significance of modern beach as compared with older dune deposits.

The distribution of tin offshore may be unrelated to present onshore concentrations.

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CONCLUSIONS:

(1) Long shore currents do not appear to influence general heavy mineral or tin distribution to any great extent. Heavy mineral assemblages are largely representative of the outcropping rock types, with only limited amounts of "foreign" minerals.

(2) Local erosion of tin granite appears to be responsible for the high values of samples 16 (Eddystone Point) and 8 (east of Cape Portland). Convergence of conflicting currents may play a minor part in the latter.

(3) Beach shingle deposits have the highest tin values, and act as traps for locally eroding tin.

(4) No evidence was found to support the theory that the Ringarooma River is the source of the tin in beach deposits.

TABLE I.

% CONSTITUENTS - GRAIN COUNT

Sample No.	Cassiterite	Ilmenite	Zircon	Garnet	Topaz and Monazite	Pyroxene and Olivene	Rutile	Tourmaline	Other
1.	0.672	62.6	14.58	12.96	3.13	5.82	1.34	2.692	1.3
2.	0.68	56.7	16.65	10.71	.51	8.16	5.1	1.02	.34
3.	1.277	58.7	20.41	8.19	.85	7.23	2.27	.566	.284
4.	0.328	67.7	16.5	7.98	.34	2.99	2.97	.171	.8
5.	-	12			Figures approximate	44			
6.	0.278	39.8	27.3	3.9	1.67	24.5	1.95	v. rare	
7.	2.17	44.9	14.55	4.47	1.15	28.5	2.68	1.15	.255
8.	9.98	46.3	30.8	5.7	2.85	2.5	.178	1.605	.89
9.	1.95	55.6	19.88	3.195	7.1	6.74	2.48	1.95	1.064
10.	0.383	48.7	33.3	11.1	.638	3.06	1.53	.127	
11.	0.63	52.2	29.5	13.75	1.135	1.26	.755	.504	
12.	0.98	60.7	15.5	8.41	7.57	3.79	.824	.824	1.32
13.	1.3	64.75	20.4	5.42	3.04	.433	.433	.651	3.465
14.	1.48	42.8	36.1	11.6	1.48	3.635	1.885	.806	
15.	0.577	56.5	16.15	8.86	13.0	4.32	.288	.577	.288
16.	9.14	62.8	14.71	4.33	1.39	4.48	.619	1.24	1.2
17.	1.935	70.5	18.12	5.1	1.935	.703	-	.88	.7
18.	1.61	57.4	26.75	7.75	3.07	1.17	.438	1.318	.292
19.	1.08	66.8	23.00	6.78	.772	1.079	.154	.154	.154
20.	0.212	48.0	22.0	14.6	2.54	4.44	.846	6.76	.634

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RECONNAISSANCE GEOLOGICAL MAP
EXPLORATION LICENCE (E.L.5/65)
NORTH EAST TASMANIA
SHEET I.
APPROX. SCALE OF MILES
0 1 2 3 4
Compiled from uncontrolled aerial photographs
by W.S. Chesnut 15-3-66
5 cm
Legend:
Fore beach. Zone between base of fore dune and H.W mark
Undifferentiated Jurassic dolerite/Tertiary basalt.
Undifferentiated Granites.
Undifferentiated Mathinna Meta.Seds.
Approx. outer limit E.L.5/65
I mile wide strip from H.W. mark.
Roads.
Tracks.
H.M. Heavy Mineral
M.H.M. Minor Heavy Mineral ≈ 1 lb./c.yd.
A.H.M. Abundant Heavy Mineral > 1 lb./c.yd.
V.M.H.M. Very Minor Heavy Mineral < 1 lb./c.yd.
Sn. Tin.
Au. Gold.
M.Sn. Minor Tin. 1-5% Sn.
V.M.Sn. Very Minor Tin. Trace
V.V.M.H.M. Very Very Minor Heavy Mineral - Trace
L.T.M. Low Tide Mark.
H.T. High Tide
L.T. Low Tide
WATERHOUSE IS.
LITTLE WATERHOUSE IS.
BARRET ROCK
Herbies Landing
WATERHOUSE PT.
CROPPIES PT.
CROPPIES BAY
STH. CROPPIES PT.
ANDERSON BAY
CROPPIES REEFS
Blackman's Lagoon
Micro Wave Repeater
Ransons Beach
TOMAHAWK IS.
Tomahawk Beach
Boobyalla Beach
RINGAROOMA BAY
Ringarooma Beach
RINGAROOMA RIVER
CAPE PORTLAND
East Boat Hr.
West Boat Hr.
Lemons Boat Hr.
FOSTER IS.
LITTLE SWAN IS.
SWAN IS.
LITTLE MUSSEL ROE BAY
TREE PT.
MUSSEL ROE BAY
MUSSEL ROE PT.
C. NATURALISTE
GREAT MUSSEL ROE RIVER
RUSHY LAGOON
"Tuckers"
To Gladstone
To Icena
SHEET 2
Areas of surface shingle
Surface black sands at base of foredune. A.H.M with Sn. Spec. 3
Contact between S/S and overlying Dol./Basalt
Contact zone hybrids
Unworked residual shows sparce pebble horizon with H.M.entirely of Sn.
Only V.M.H.M No Sn.
Area of old workings
Weathered granite. Surface soil carrying Sn.
5·66 Ac
222033

Legend:

Fore beach.	Zone between base of fore dune and H.W. mark.
	Undifferentiated Jurassic dolerite/Tertiary basalt.
	Undifferentiated Granites.
	Undifferentiated Mathinna Meta. Seds.
	Approx. outer limit E.L. 5/65 1 mile wide strip from H.W. mark.
H.M.	Heavy Mineral.
M.H.M.	Minor Heavy Mineral. ≈ 1 lb./c.yd
A.H.M.	Abundant Heavy Mineral. > 1 lb./c.yd
V.M.H.M.	Very Minor Heavy Mineral. < 1 lb./c.yd
Sn.	Tin.
Au.	Gold.
M.Sn.	Minor Tin. 1-5 % Sn
V.M.Sn.	Very Minor Tin. - Trace
	Roads.
	Tracks.
V.V.M.H.M.	Very Very Minor Heavy Mineral - Trace
L.T.M.	Low Tide Mark
H.T.	High Tide
L.T.	Low Tide

RECONNAISSANCE GEOLOGICAL MAP
EXPLORATION LICENCE (E.L.5/65)
NORTH EAST TASMANIA
SHEET 2

APPROX. SCALE OF MILES

1 0 1 2 3 4

5 cm

Compiled from uncontrolled aerial photographs by W.S. Chesnut 15-3-66

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5.5.66 A.Cz

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