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ANNUAL REPORT

E.Ls 92/87 RINGAROOMA BAY and 42/88 BOOBYALLA

for

HARGUN PTY. LTD.

11 October 1989

Vic Threader & Associates Pty. Ltd.
Kingston Beach.

CONTENTS

FIGURES

Introduction

This report is the result of a literature search relating to the geology of the northeast tinfields and their exploration with particular reference to the Boobyalla Plain and Ringarooma Bay. These two areas are held under exploration licences 42/88 and 92/87 (figs. 2 & 3) by Mineral Holdings Australia Pty. Ltd. and the purpose of the report is to serve as a basis for future exploration in these areas by that company and its partners.

The Tinfields of Northeastern Tasmania

These can be subdivided into: 1) Primary mineralisation

2) Secondary (placer) deposits

a) The Deep Leads

b) Terrace deposits and including the Coastal Plains

1) Primary

Tin and tin-tungsten mineralisation shows a close spatial relationship to the muscovite - biotite granite bodies. The mineralisation occurs as Quartz-wolframite-cassiterite veins and stockworks in Mathinna Beds and as both steeply dipping veins and pipes and flat lying greisens in granite. (Groves 1977)

The unroofing of the greisenised granite and associated vein systems in the granite and host Mathinna Beds led to the deposition of cassiterite bearing gravels in streams flowing off the Blue Tier Batholith - figs. 4 & 5.

2) Secondary

The placer cassiterite occurs in Cainozoic sediments in the valleys of the Boobyalla, Ringarooma, Great Musselroe and George Rivers (only the first two river systems are relevant to this report).

2a) Braid plain deposits of pre basalt age constitute over 90% of the recovered alluvial tin from the Ringarooma Valley. The richest of these were Briseis, Arba, Valley, Pioneer and Endurance Leads which formed along the northerly flank of the main mass of the Blue Tier Batholith between Branxholm and South Mt. Cameron (fig 4).

It was generally believed that the ancestral Ringarooma River had an outlet to Bass Strait either by way of the Boobyalla Lead i.e. under the Winnaleah basalt plateau or around the western edge of Mt. Cameron. Brown (1978) considers neither alternative to be valid on the basis of "new field mapping, geophysical and drill hole

data as well as the re-interpretation of primary data from previous workers". Brown's view is that the Ringarooma Lead ended in a land locked basin south of Mt. Cameron i.e. it had no outlet to the sea. Morrison (1989) points out that post late Oligocene faulting is known at Pioneer and there is clear evidence of Miocene faulting in seismic sections through the Bass Basin. It is conceivable therefore that "bodies of Tertiary sediment now mapped as land locked basins between these areas were probably isolated by tectonic movements which began in the Miocene." It is argued also that the area south of Mt. Cameron area was probably the source of Bass Basin sediments and so could not have been land locked.

2b) Many of these deposits were reworked in later Tertiary times and formed terraces of the present drainage system. The Dorset Flats at South Mt. Cameron which were dredged during the period 1944-1963 is of this type.

To the North of Mt. Cameron is an extensive Coastal Plain which includes the Great Northern Plain, Fosters Marsh and the Boobyalla Plain (fig. 6). These areas contain an economic resource of alluvial cassiterite and are one of the most extensively prospected areas in the entire tinfield if not in the state.

Some of this tin was probably shed from primary deposits on Mt. Cameron, and some of it would be recycled from the leads south of Mt. Cameron - the area is outside EL 42/88.

The Boobyalla Plains lie to the west of the Ringarooma River and within E.L.42/88. A deep lead has been traced by B.M.R. using seismic and gravity methods (figs. 7 & 8) from the Upper Boobyalla area and has been assumed to continue across the coastal plain to Ringarooma Bay but to date no economic values have been obtained from drilling in it (fig.9) and no basal wash was intersected on basement.

The extensive placer deposits of the coastal plains are unlikely to have come solely from local sources (Mt. Cameron) and so a palaeo-channel linking them with the leads south of Mt. Cameron seems plausible. It is noted that Tertiary sediments in the Gladstone area occur up to 30m above the Ringarooma River and it is possible that the original lead connecting the alluvial tin fields north and south of Mt. Cameron has been removed by erosion.

Telakowska (1984) proposed a churn drill programme in E.L. 1/83 3-4 km S of E.L. 42/88 which was designed to intersect tributaries to the Boobyalla Lead between the Boobyalla and Little Boobyalla Rivers south of their confluence. The work was not implemented.

Telakowska suggests that marine transgressions during late Tertiary-Quarternary times reached as far inland as this confluence which is 6 km from the coast and 20m ASL., resulting in the reworking of the stanniferous gravels and impoverishment of the leads. As a consequence alluvial tin is found now only in tributaries to the leads above the level of marine incursion. Moore (in press) has found marine terraces up to 40MASL in the Scottsdale-Bridport area which accords with the BHP exploration on Vicarys Ck below Monarch Mine where a reserve of 3 x $10^6 m^3$ of 220.4 g/m^3 (70%Sn) was proven at or above the 40m contour.

This downgrades Boobyalla Plain as an alluvial prospect but it is also noted that Fosters Marsh, east of the Ringarooma River, is probably no more than 10m ASL but is considered to be a potential dredging area. See later (Prospects).

Much of the area of E.L.42/88 (Boobyalla) lies within a steep fault bounded trough of Cretaceous sediments known as the Boobyalla Sub-basin which is the southeasterly extremity of the Bass Basin (Moore et al 1984) (fig.10). The sediments are biostratigraphic equivalents of and represent a near source facies of the Eastern View Coal Measures which were intersected in Durroon 1 drilled in Bass Strait 60km N.W. of Boobyalla Plains. The sediments consist of poorly sorted boulder conglomerate and sandstone probably of local derivation such as Ringarooma (dolerite) Tier.

B.H.2(BPD1,) drilled by the Shell Company to test the sequence for oil shale was continued to 310m by the Dept. of Mines. B.H.1 was drilled to 491m by D.O.M. Both holes penetrated Palaeocene and late Cretaceous sediments. (See Fig.6 for Borehole locations)

This sequence has no relevance to the prospectivity of Boobyalla Plains as any placer tin would occur in overlying mid Tertiary-Quaternary sediments. It is noted that exploration drilling between Fosters Marshes and Bowlers Lagoon penetrated depths of wash to 20m with values up to 200gm/m^3 at locations 1 km inside the sub-basin. Unfortunately the top 13m of BH2 was not logged; it would be useful to know if Tertiary "drift" was present in this hole.

Ringarooma Bay, or that part of it which is of interest in this report, is the drowned portion of the coastal plain and contains a continuation of the Boobyalla and Ringarooma leads (fig.11) as low gradient anastamosing channels. Exploration was conducted there in 1966 by the Tasmanian Offshore Exploration Co. (TOEC) joint venture (E.L. 6/65) and the lead was traced northerly and northwesterly over a distance of 13km - and continuing. (Fig.12)

Mineral Assemblage

TOEC reported a resource of tin, rutile, zircon, chromiferous ilmenite and lesser amounts of gold and monazite.

Yim et al (1980 & 1985) identified 3 heavy mineral associations in Cenozoic sediments in Tasmania:

1) Cassiterite - almandine - pleonaste - corundum - topaz and zircon occurred in sub-basalt deep leads (Briseis etc.)
2) Cassiterite - topaz - fine enhedral zircon which occurred in gravels of streams draining Mt. Cameron
3) Cassiterite - gold - pleonaste - corundum - topaz - zircon which is mainly restricted to the flood plain of the Ringarooma River such as the Great Northern Plains.

Zircons were found to be of 2 ages: fine (.1 - .3mm), euhedral grains with an age of $367^{\pm}$ 15Ma linking them with Devonian granites and coarse (2-5mm), rounded grains with an age of $46.7^{\pm}0.6$Ma linking them with the Blue Tier basalts. The association, No.1, has a mineral assemblage derived from the Blue Tier Granite and basalt; No.2 from the Mt. Cameron granite massif and No.3 from both sources. The presence of gold in this association, the author suggests, is due to the erosion of primary deposits in the Alberton and New River goldfields which is presumed to have taken place after the outpouring of the Ringarooma Valley basalts in the Middle Miocene.

Gold was produced from tin dredging at the Dorset Flats, South Mt. Cameron and gold was recorded from the T.O.E.C. exploration holes in Ringarooma Bay. It is presumed therefore that gold is also present in the alluvial workings of the Great Northern Plain - Fosters Marsh etc., it was however not recorded and is not mentioned in any of the exploration company reports or drilling records of the Dept. of Mines. There is a primary gold source in the Gladstone area which could have contributed to the heavy mineral assemblages of Tertiary drifts in the coastal plain including the offshore area.

The Prospects

1) Ringarooma Bay (Fig.13) Summary of data from T.O.E.C. - J.V. Report

Seabed gradient 1 : 900

Offshore river bed gradient 1 : 500

Length of offshore river bed 13km tested

Depth of water 18–33m over length of known channel

Drilling Data: Depth of sediment 6m drilled

Borehole spacing 300m - 2000

No. of boreholes 138

No. of holes with significant values 27

No. of holes with grade of 2oz/yd^3 tin metal (74g/m^3) 16

No. of holes with values up to 10oz/yd^3 (370g/m^3) 6

The T.O.E.C. drilling results are summarised by Santos thus:

≥ 100 g/m^3 Sn over ≥2m	10 Holes
≥ 100 g/m^3 Sn over < 2m	19 holes
34 - 99 g/m^3 Sn over ≥2m	8 holes
34 - 99 g/m^3 Sn over <2m	28 holes
< 34 g/m^3	62 holes
	127

(The number of holes was 138 but records of locations and results of 11 are missing from the T.O.E.C. report)

Reserves:

Volume 30 x 10^6 yd^3 (23 x 10^6 m^3)

Grade 4oz/yd^3 (148 g/m^3) = 3404t (tinmetal)

3oz/yd^3 (111 g/m^3) = 2553t (Zr metal)

1.5oz/yd^3 (55g/m^3) = 1265t (Ti metal in rutile)

(plus smaller amounts of chromiferous ilmenite, monazite and gold)

Status of Reserves: Indicated Resource Estimate (by A.I.M.M. nomenclature)

Dredging of the Dorset Flats and Dorset Extended Flats north of Gladstone during 1944–1963 produced 2555t of 75% tin metal from 23.1 x 10^6 m^3 which is 110g/m^3, it also produced 6900oz gold or 10mg/m^3.

No determination of rare earths was done at the time but some T.O.E.C stores samples were subsequently tested at the D.O.M. laboratory. They represented peripheral material but were tested for yttrium cerium and P_2O_5. The calculated head grade was: yttrium 1.5ppm cerium 2.3ppm, P_2O_5 3.4ppm, corresponding to Xenotime and monazite contents of 6 and 7 ppm (respectively), the P_2O_5 content is marginally low for these contents.

The Hellyer/Santos assessment of the area was favourable in 1982 notwithstanding the grade, so far as is known, being below economic cut-off. The channel infill and the "plateau" in the north central area were rated as "highly prospective targets". Hellyer/Santos withdrew from the J.V. in 1983 without implementing the proposed exploration programme on the grounds that a dredging operation would be uneconomic unless the tin price rose to $16 500/t or unless a recovery rate of at least 335 g/m^3 was achieved at the (then) tin price of $12 500/t. The company thought neither of these was a realistic expectation in the foreseeable future.

Dickson and Clementson for C.R.A. (1983) critised the T.O.E.C. reserve estimate on the grounds that:

1) There were inaccuracies inherent in the scale of plans used, the ore reserve calculation and the sample thicknesses.
2) Cut off grade too low. T.O.E.C. (1966): 2oz/yd^3 (75 g/m^3). Hellyer used 300 gm/m^3 in 1983.
3) Reserve estimate was distorted by excluding low value holes.
4) Reserve estimate distorted by very high values in two holes.
5) SG of sediments assumed to be 2gm/cc.

They reduced the reserve to a probable 14 x 10x10^{6}m^3 of 202 g/m^3 Sn=2808t. The area was acquired by Blaxand Seadredge P.L as E.L.42/80 and joint ventured with Hellyer/Santos. A bathymetric survey was conducted over the previously defined channels by TOEC and an appraisal of the TOEC data and interpretation was made.

It was estimated that an irregularly shaped dendritic broad and shallow channel system had been outlined by TOEC measuring 20Mm^3 with a grade of 208 g/m^3, but there was scope for an increase in both volume and grade. A grade of 200-250 g/m^3 was thought by Hellyer to be a reasonable expectation. The cut-off grade was put at 300 g/m^3 and further exploration was recommended. A programme of 80 holes was seen as the minimum requirement to assess the potential of the E.L. These were to be drilled at 400m intervals on seismic lines 1 km apart.

This programme would give better coverage of the target area and resolve differences between the early TOEC bathymetry and that conducted for Hellyer/Santos by Hydrosets. In particular it would examine a possible near shore sediment wedge and additional channels which the latter survey had delineated.

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Comparative Reserve Calculations

	Volume x $10m^6m^3$	Grade gm/m^3	Tonnes Tin	
T.O.E.C. (1966)	30 ? 23	148	3 404	
Hellyer (1982)	20	208	4 160	
C.R.A.	21.27	174	3 701	All holes in main body above cut off
	15.59	206	3 216	Marginal holes excluded
	13.9	202	2 808	As above & sample th. of holes 103 & 89 reduced by 50%

An assessment by Santos of the T.O.E.C. exploration found that boreholes were too widely spaced and their locations not accurately known. There were no location records or results for 11 of the holes and 7 were not bottomed.

2) Boobyalla Plains. This area is poorly mineralised and has not attracted the attention of explorers as has the Great Northern Plain - Fosters Marsh - Bowlers Lagoon area to the east of the Ringarooma River. The Boobyalla Lead has been proven by geophysics (seismic and gravity) but subsequent drilling did not find a basal drift or alluvial tin; bedrock was intersected at 23-26m. This work was done south of E.L.42/88 but the offshore investigation by T.O.E.C. suggests that the gutter continued northwards through the E.L. area (Fig. 5) Several lines of shallow holes (mostly with a hand boring plant) have failed to locate any more than trace amounts of alluvial tin even though there were once two small alluvial mines, Dugards (or Dobsons) and Delta, on the southern boundary of the licence area (fig.3). In the deep drilling by Shell Co. (BH.2) the top 13m was not recovered and so the Tertiary drift, if present, was not recorded. BH.1 was drilled at the junction of Boobyalla and Tomahawk Roads and started in Palaeocene/Cretaceous sediments. The Boobyalla Plain has an undetermined and probably variable cover of Quaternary sand and probably some Tertiary sediments over the Cretaceous but has not been recorded. At Fosters Marsh on the Eastern side of the Ringarooma River the Department of Mines put down a diamond drill hole to locate the eastern rim of the Boobyalla Sub-basin (No.3 on fig.6). This hole went into Palaeocene/Cretaceous sediments at or near surface (P.B. Baillie - pers. comm.) This area has been

extensively drilled for alluvial tin and there is, according to drill records, a 20-30m thick dredging prospect over a width of 1 km within the limits of the Boobyalla Sub-basin. It is thought to be an estuarine or marine terrace of alluvial tin, reworked from older leads (Clementson in Dickson 1983). A similar deposit on the western margin of Boobyalla Plain is therefore a possibility, but available evidence suggests that the Fosters Marsh deposit may have formed at the expense of an earlier Boobyalla Plains alluvial tin deposit. If the late Tertiary/ Quaternary sea level was 40m above present S.L. then Boobyalla Plain, Fosters Marsh, Great Northern Plain and also alluvial tin mining areas around Gladstone (Bells Flat, Edina Flat, Ogilvies Flat) would have been inundated causing reworking of their contained tin gravels. Under the influence of a predominant westerly current in Bass Strait, the retreating sea would have worked the tin gravels of the coastal plain on to its eastern margin against Ringarooma Tier, thus creating the (false) impression of a lead. This theory, if correct, would explain why Boobyalla Plains has been relatively unproductive, yet lies at the distal end of a proven lead which drained from a known tinfield.

Future Exploration

Ringarooma Bay

1) Closer spaced drilling
2) Deeper drilling to ensure holes are bottomed.
3) More peripheral drilling to search for other leads or buried strand lines.
4) Evaluation of minor constituents: Monazite, xenotime, corundum, gold and aggregates.

It should be noted that if these minerals are present in the offshore sediments then they must also be present in the onshore alluvials and in greater abundance, a matter that could easily be ascertained. Yim's study of mineral assemblages was aimed at providing "a better understanding of the genesis of stanniferous placers". Continuation of this line of enquiry could provide a useful exploration tool for the future.

Boobyalla Plain

From the preceding discussion, this area has low prospectivity. The possibility of a marine terrace left by the retreating sea (Fosters

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Marsh type deposit) on the western margin of the plain could be explored by an auger programme, which would also test the above theory.

Exploration in Commonwealth Waters

State governments only have jurisdiction over waters within three miles (4.8km) of the coast and the current licence is therefore restricted to 72km^2 (fig.2). The original application covered 159km^2 but the Commonwealth Government has deferred granting the additional 87 km^2 until the Minerals (Submerged Lands) Act 1981 has been proclaimed. Nargun Pty. Ltd. has petitioned the Government for an early decision on the matter.

Offshore Seismic Survey by B.M.R.

The B.M.R. geophysical surveys in Bass Strait were aimed at deep, possibly petroleum-bearing structures and are incapable of resolving relatively shallow buried river channels such as the target area in Ringarooma Bay. Recent correspondence with B.M.R. indicates that their seismic survey, when combined with gravity data, may provide some information on deep structures but is unlikely to show anything in the shallow part of the section. The B.M.R. survey was conducted north of Ringarooma Bay (fig.15). B.M.R. has also recommended the use of their vibrocorer method of drilling which, they claim, has been used for offshore mineral exploration previously with satisfactory results. Its applicability to Ringarooma Bay should be assessed.

Conclusion

The T.O.E.C. survey is considered deficient in many respects: borehole location, borehole spacing, non-bottoming of some holes, scale of plans, reserves calculation, length of offshore lead surveyed and evaluation of minor constituents (rutile, ilmenite, monazite, xenotime, corundum [sapphire], gold and aggregates).

The 80 hole programme recommended by Hellyer/Santos should correct some of these deficiencies by infill drilling and improved surveying and drilling techniques. This drilling programme was estimated to cost $180 000 - $200 000 in 1983 and would need recosting at today's prices. The vibrocorer method could effect a significant cost saving and provide a more reliable sampling method.

The Hellyer/Santos cash flow evaluation indicated that a gross mineral value of around $50 000 000 would be required to make it

a viable operation. It allowed for a gold recovery of 2mg/m^3 (a value of \$1.18 x 10^6 in 30 x $10^6 m^3$ at the current price of gold) but for no other mineral constituents of the gravels.

The tin price is now 30% lower than it was in 1983 but production quotas no longer apply - a factor which must have had a strong influence on the company's decision to quit.

In summary, the viability of a dredging operation at this time rests on obtaining:

1) more data on the mineral content of the gravels, and

2) access to the full extent of the offshore lead.

Programme

E.L. 92/87

1) An assessment of sizing analyses of offshore samples for silica sand content (suitable for concrete, glass making etc.)

2) Assessment of total mineral content of onshore tin gravels (under the control of the parent company) as an indicator of that offshore.

3) A preliminary vibrocorer programme to test the applicability of the method.

4) It should be possible to start on the drilling programme to reassess the target area in Ringarooma Bay during this year of tenure after items 1 to 3 are completed.

E.L. 42/88

An auger drill programme to search for reworked tin gravels along the western margin of Boobyalla Plain is not promising if the theory of westerly currents is correct but a test auger programme is warranted before relinquishment.

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APPENDIX 1.

E.L. 92/87

576017

Enquiries: J.G. Oakes
Phone: 30 8362
Your ref:
Our file: JG05.90:KAC

15 MAY 1990

Vic Threader & Associates Pty Ltd
43 Kingston Heights
KINGSTON BEACH TAS 7050

Dear Vic

NARGUN PTY LTD
EL's 92/87, 42/88

Reference is made to the report TCR89-3031. The question of the surrender of these exploration licences is being examined.

The final paragraph on page 5 of the report refers to rare earths. Please advise us by 30 May 1990 of the locations, depths, intervals and analysis details of each sample.

Yours sincerely

J.G. Oakes
EXECUTIVE OFFICER

R/S G Oakes
16.5.90

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As reported to you previously, when samples of Ringarooma Bay sediments were investigated for Ocean Mining, the procedures exhausted the total samples submitted/

It is fortuitous that we have have the ones which are the subject of this report, as, when Ocean Mining quit the project, some samples were sent here for safe keeping.

It is perhaps unfortunate that the samples reported on herein are, I believe, peripheral to the Ringarooma River Delta. Samples further inshore may have shown more encouraging results.

Yours faithfully,

(P.L. James)
Chief Chemist & Metallurgist.

576019

Req. No 881249 (Old Number 670648) Description N.E. 1011

Product	Percent Mass	Percent P_2O_5	Grams/t Y	Grams/t Ce	Grams/t Au
+ 2.0 mm	5.2				
+ 0.5 mm	48.8				
- 0.5 mm Table Tail	37.8				
- 0.5 mm Table Conc	8.2				
Total	100.0				
T/C M/A 1 - 3	0.02				
T/C M/A 4	0.14	0.15	420	1250	
T/C N	8.04				<0.03
Total T/C	8.2				

Req. No 881250 (Old Number 670671) Description N.E. 1034

Product	Percent Mass	Percent P_2O_5	Grams/t Y	Grams/t Ce	Grams/t Au
+ 2.0 mm	0.5				
+ 0.5 mm	57.1				
- 0.5 mm Table Tail	31.9				
- 0.5 mm Table Conc	10.5				
Total	100.0				
T/C M/A 1 - 3	0.18				
T/C M/A 4	1.85	0.14	64	195	
T/C N	8.47				<0.03
Total T/C	10.5				

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[redacted] Ra [redacted] ac [redacted] ity [redacted] s [redacted] ect [redacted] in [redacted] M/ [redacted] pr [redacted]

576020

Reg. No 881247 (Old Number 670526) Description N.E. 889

Product	Percent Mass	Percent P_2O_5	Grams/t Y	Grams/t Ce	Grams/t Au
+ 2.0 mm	0.9				
+ 0.5 mm	12.0				
- 0.5 mm Table Tail	78.6				
- 0.5 mm Table Conc	8.5				
Total	100.0				
T/C M/A 1 - 3	0.01				
T/C M/A 4	0.14	0.20	400	1000	
T/C N	8.35				<0.03
Total T/C	8.50				

Reg. No 881248 (Old Number 670567) Description N.E. 930

Product	Percent Mass	Percent P_2O_5	Grams/t Y	Grams/t Ce	Grams/t Au
+ 2.0 mm	8.5				
+ 0.5 mm	27.4				
- 0.5 mm Table Tail	50.0				
- 0.5 mm Table Conc	14.1				
Total	100.0				
T/C M/A 1 - 3	0.03				
T/C M/A 4	0.25	0.16	190	550	
T/C N	13.82				<0.03
Total T/C	14. .				

0510

Product	Percent		Grams/t		
	Mass	P_2O_5	Y	Ce	Au
+ 2.0 mm	8.3				
+ 0.5 mm	21.8				
- 0.5 mm Table Tail	58.4				
- 0.5 mm Table Conc	11.5				
Total	100.0				
T/C M/A 1-3	0.03				
T/C M/A 4	0.17	0.18	870	1350	
T/C N	11.30				<0.03
Total T/C	11.50				

576022

DEPARTMENT OF MINES

TASMANIA

RECEIVED
15 JUL 1988
Ans'd.....

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

Enquiries:
Phone:
Your ref.:
Our file:

13th July 1988

Nargum Pty Ltd,
C/- Mr. N. Thomas,
2nd Floor
100 Collins Street,
Melbourne 3000

Attention Mr. N. Thomas

Ringarooma Bay Sediments

Dear Sir,

The test work on your nominated samples of this material is now complete and the results are as follows:-

Procedure

1. Each sample was screened on 2.0 mm and 0.5 mm screens. The two screens oversize fractions were not further treated.

2. The minus 0.5 mm fractions were concentrated by tabling to a low grade concentrate which should retain all or most of the "heavies".

3. The table concentrate was dried and subjected to high intensity magnetic separation.

   Two magnetic products were made, i.e. high and moderately magnetic, (one product, a combination of magnets 1 to 3) and a feebly magnetic fraction (magnet 4). The magnet 4 product should contain any monazite or xenotime present in the samples.

4. The M/A fractions were examined for radio-activity, and assayed for Yttrium, Cerium and Phosphorus.

5. The non magnetic fractions were assayed for gold, using a 50 gram fire assay and AAS flame finish.

Test Results

Reg. No 881245 (Old Number 670448)

Description N.E. 856.

0154

576023

Vic Threader & Associates Pty. Ltd.

CONSULTING GEOLOGIST

43 KINGSTON HEIGHTS,
KINGSTON BEACH TAS. 7050
TELEPHONE: (002) 29 5277

Mr. J.G. Oakes,
Executive Officer,
Dept. of Resources & Energy,
Division of Mines & Mineral Resources,
P.O. Box 56,
ROSNY PARK 7018.

Your ref.: JG05.90KAC

17th May, 1990.

Dear Gil,

Nargun Pty. Ltd. EL's 92/87, 42/88

Thank you for your letter of 15th May on the subject of rare earth minerals in Ringarooma Bay.

The reference in my report, TCR89-3031, of rare earth minerals in the sediments of Ringarooma Bay was to a Department of Mines laboratory report dated 13th July, 1988, a copy of which is attached.

The original samples of the TOEC drilling programme were analysed for cassiterite, zircon and rutile but most of the sample was used up in these tests. Some samples, which were not all used up and were retained were, at the request of Nargun Pty. Ltd., analysed for Ce, Y and P_2O_5. Unfortunately the holes represented were peripheral to the main palaeochannels but it can therefore be assumed that values in the main channels would be higher and are therefore significant.

I am unable to give locations and depths as requested in your letter but the references given, viz.:

New no.	Old no.	Location
881245	670448	NE 856
881247	670526	NE 889
881248	670567	NE 930

should allow you to obtain this information from the open file report by Ocean Mining A.G. (for TOEC).

I hope this information is satisfactory.

Yours sincerely,

Vic

Copies of Folios 92, 93 [illegible] inserted in TCR 3031
GO 22/5/90

c.c. Nargun P/L

Enc.

8

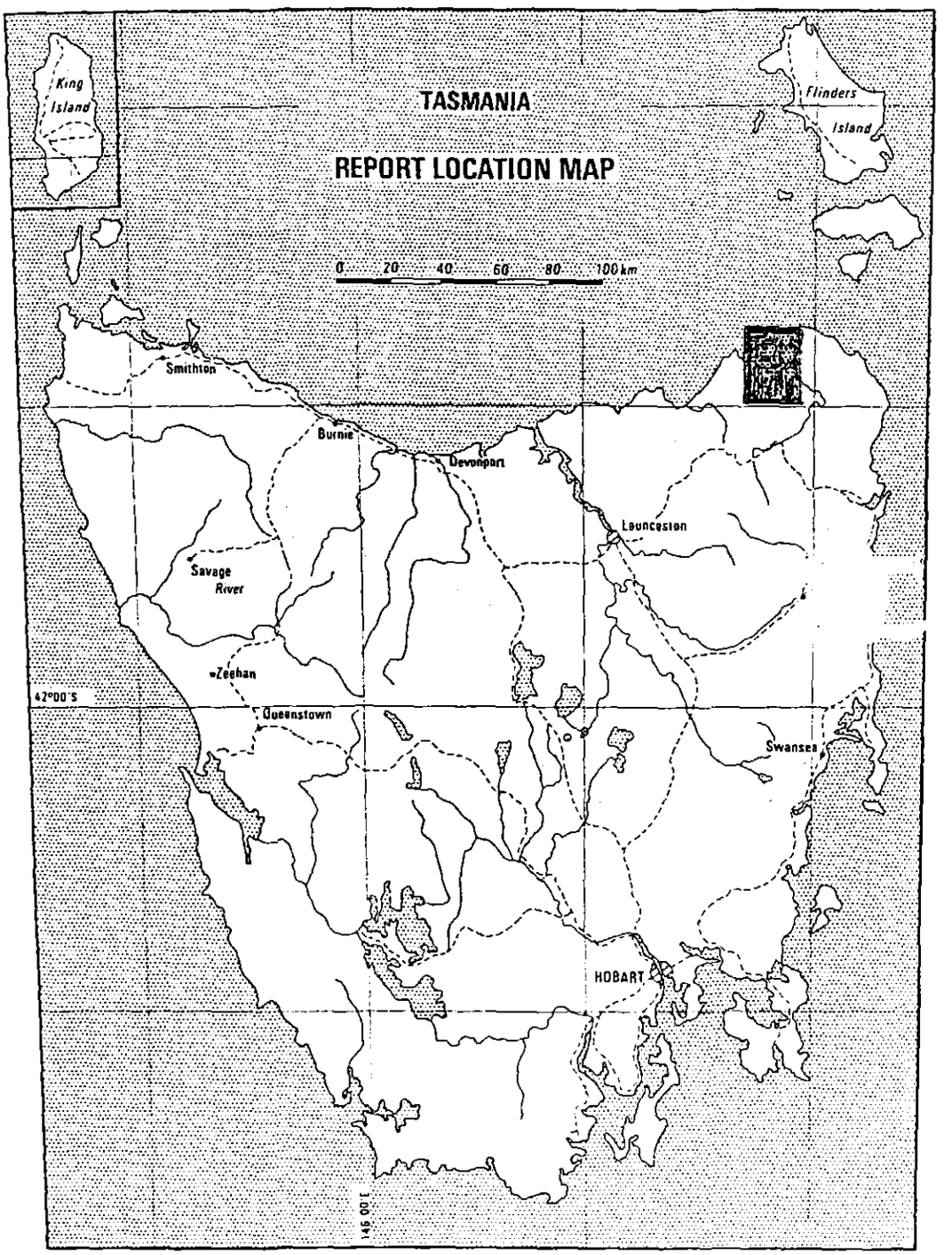


Figure 1. *Location map*

5 cm

17

576025

Figure 2

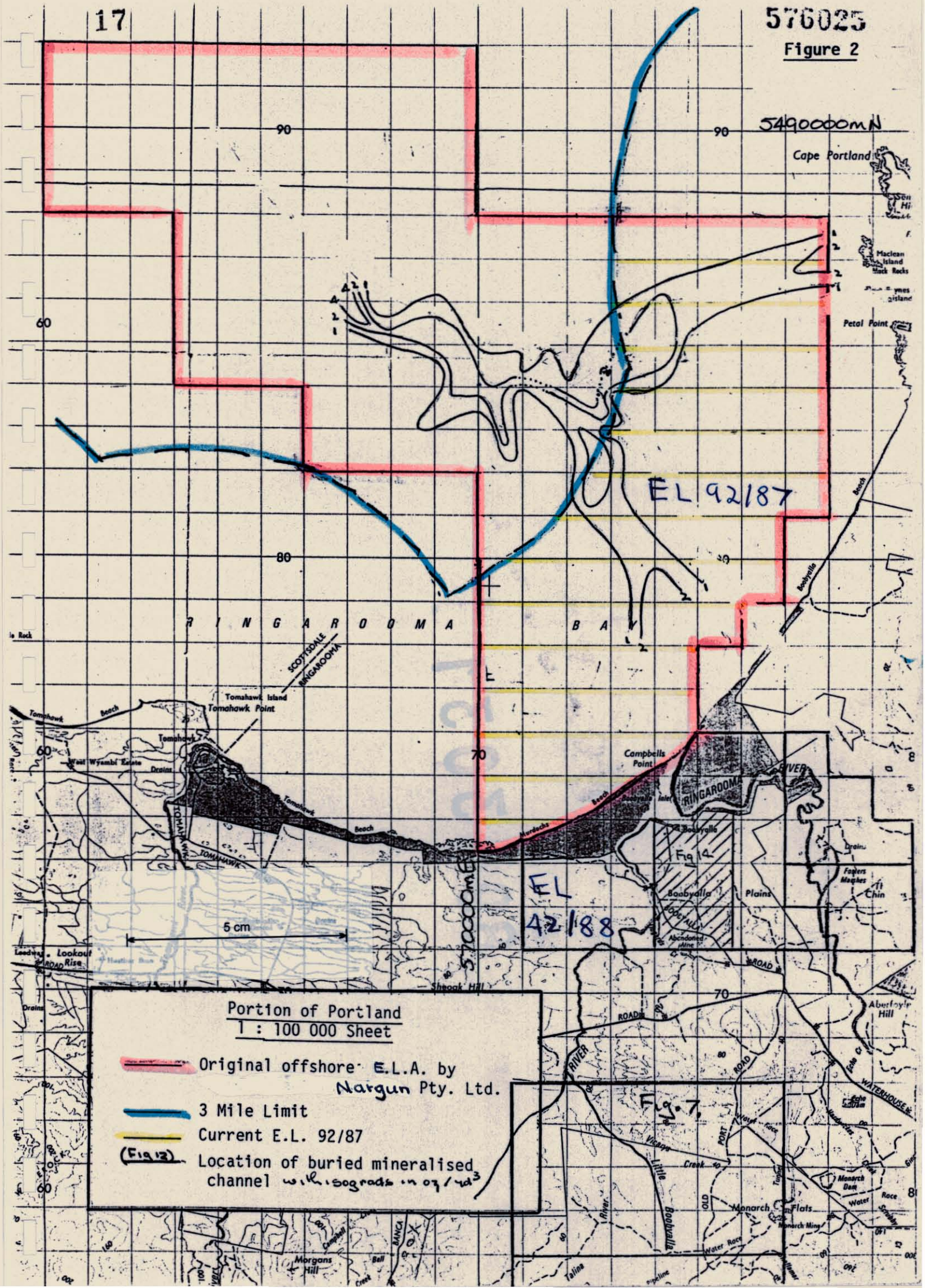
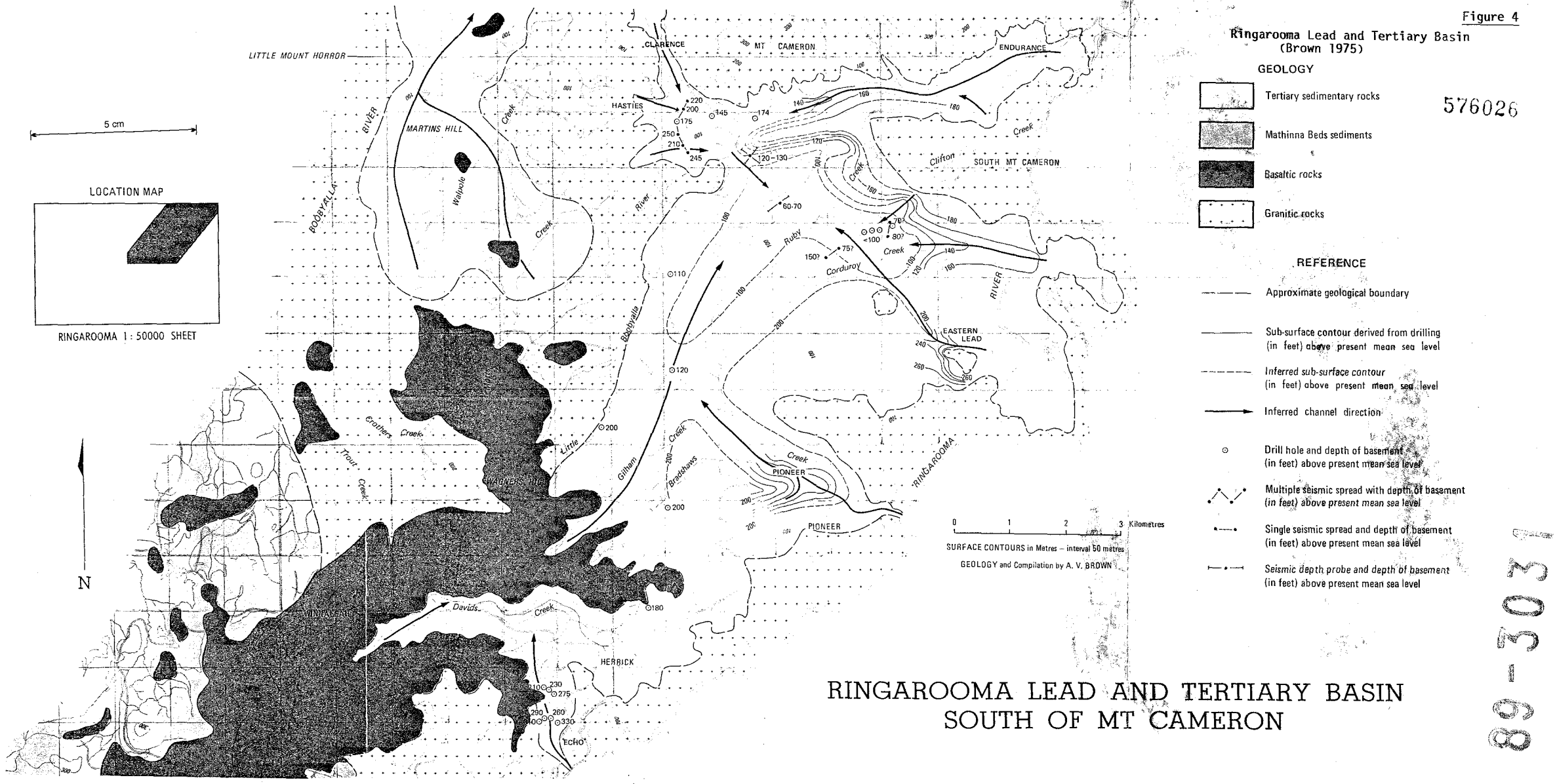


Figure 4

Ringarooma Lead and Tertiary Basin
(Brown 1975)



GEOLOGY

- Tertiary sedimentary rocks
- Mathinna Beds sediments
- Basaltic rocks
- Granitic rocks

REFERENCE

- Approximate geological boundary
- Sub-surface contour derived from drilling (in feet) above present mean sea level
- *Inferred sub-surface contour* (in feet) above present mean sea level
- Inferred channel direction
- Drill hole and depth of basement (in feet) above present mean sea level
- Multiple seismic spread with depth of basement *(in feet)* above present mean sea level
- Single seismic spread and depth of basement (in feet) above present mean sea level
- *Seismic depth probe and depth of basement* (in feet) above present mean sea level

576026

RINGAROOMA LEAD AND TERTIARY BASIN SOUTH OF MT CAMERON

89-30-5

19 576027

Figure 5

Pre Tertiary Geology

Boobyalla Lead

Ringarooma Leads South of Mt.Cameron

Present Drainage

E.L.42/88 Boobyalla

Scale 1:50 000

5 cm

See Figure 7

See Figure 8

5450000

5690000

5680000

Figure 7

Seismic Survey Boobyalla Deep Lead

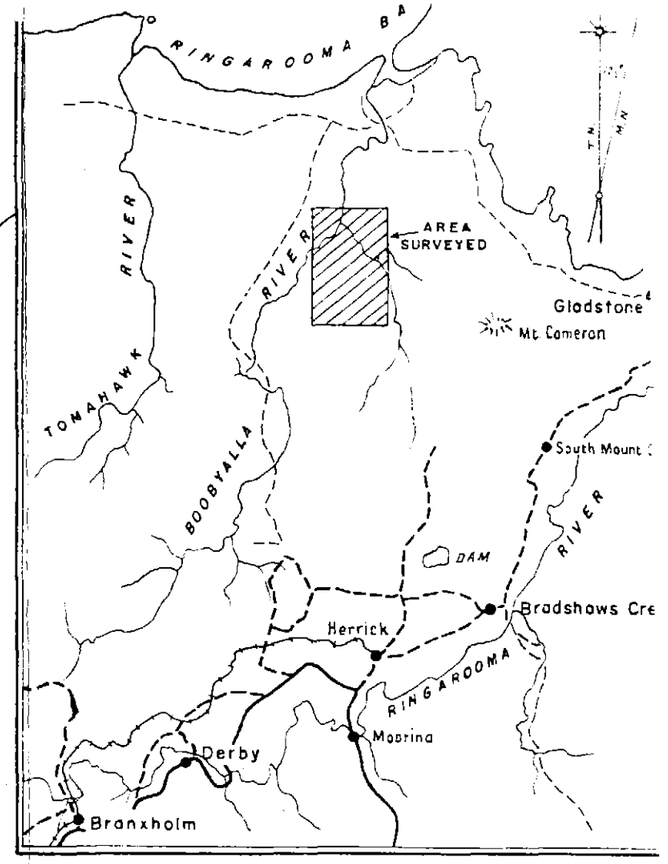
Pre Tertiary Geology

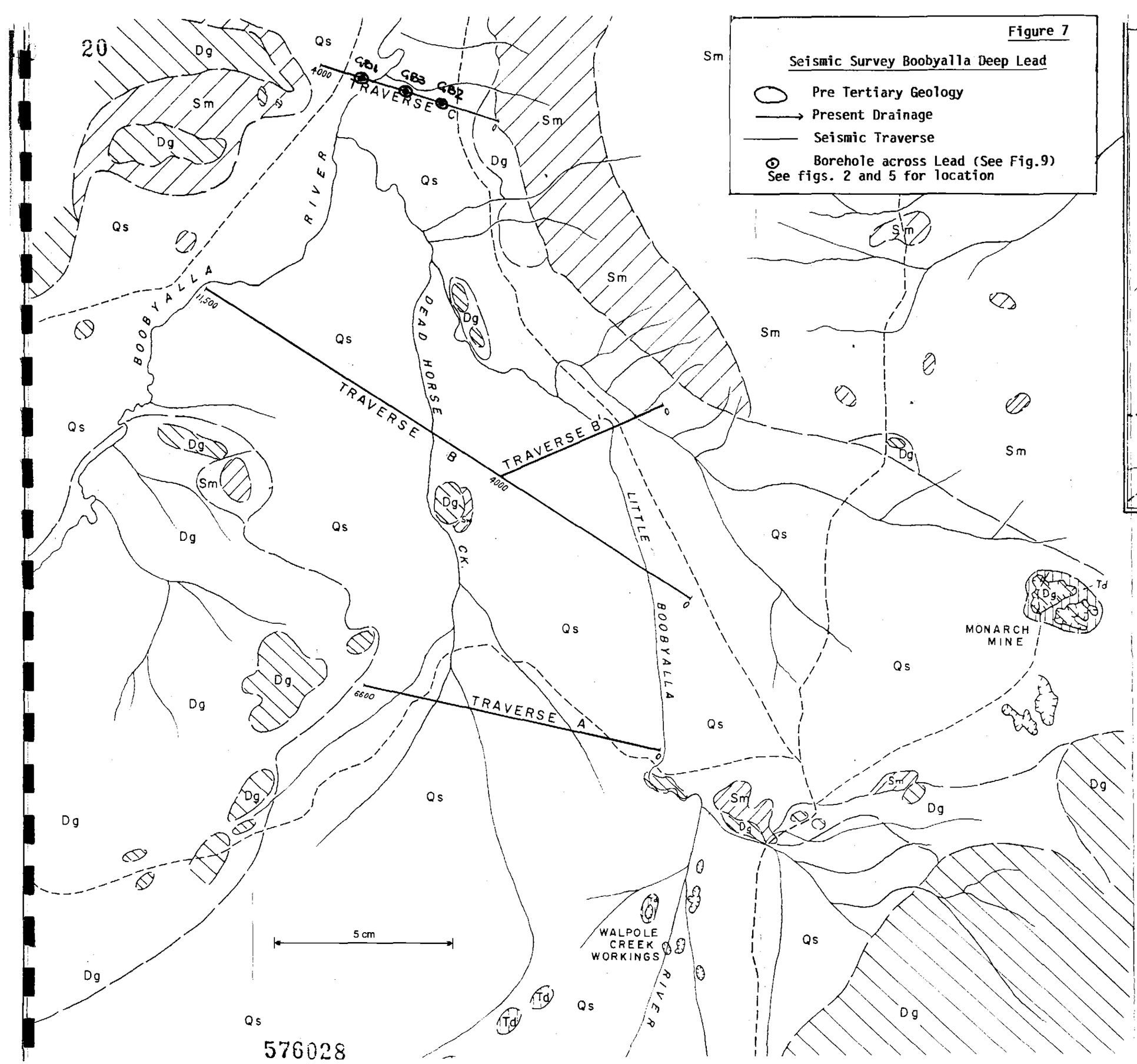
Present Drainage

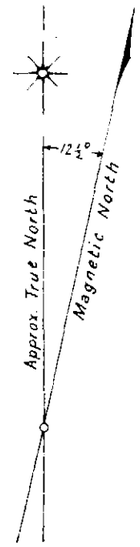
Seismic Traverse

Borehole across Lead (See Fig.9)

See figs. 2 and 5 for location







LEGEND

GEOLOGICAL BOUNDARY

Qs SEDIMENTS

Sm SILURIAN MUDSTONES *Inferred*

Sm SILURIAN MUDSTONES *Outcropping*

APPROX. SCALE IN

30 0 30

SEISMIC REFRACT
OF TH
~~RINGAROOMA DEEP L~~
BOOBYALLA DEEP LEAD
GEOLOGY AND SEISM

Figure 8

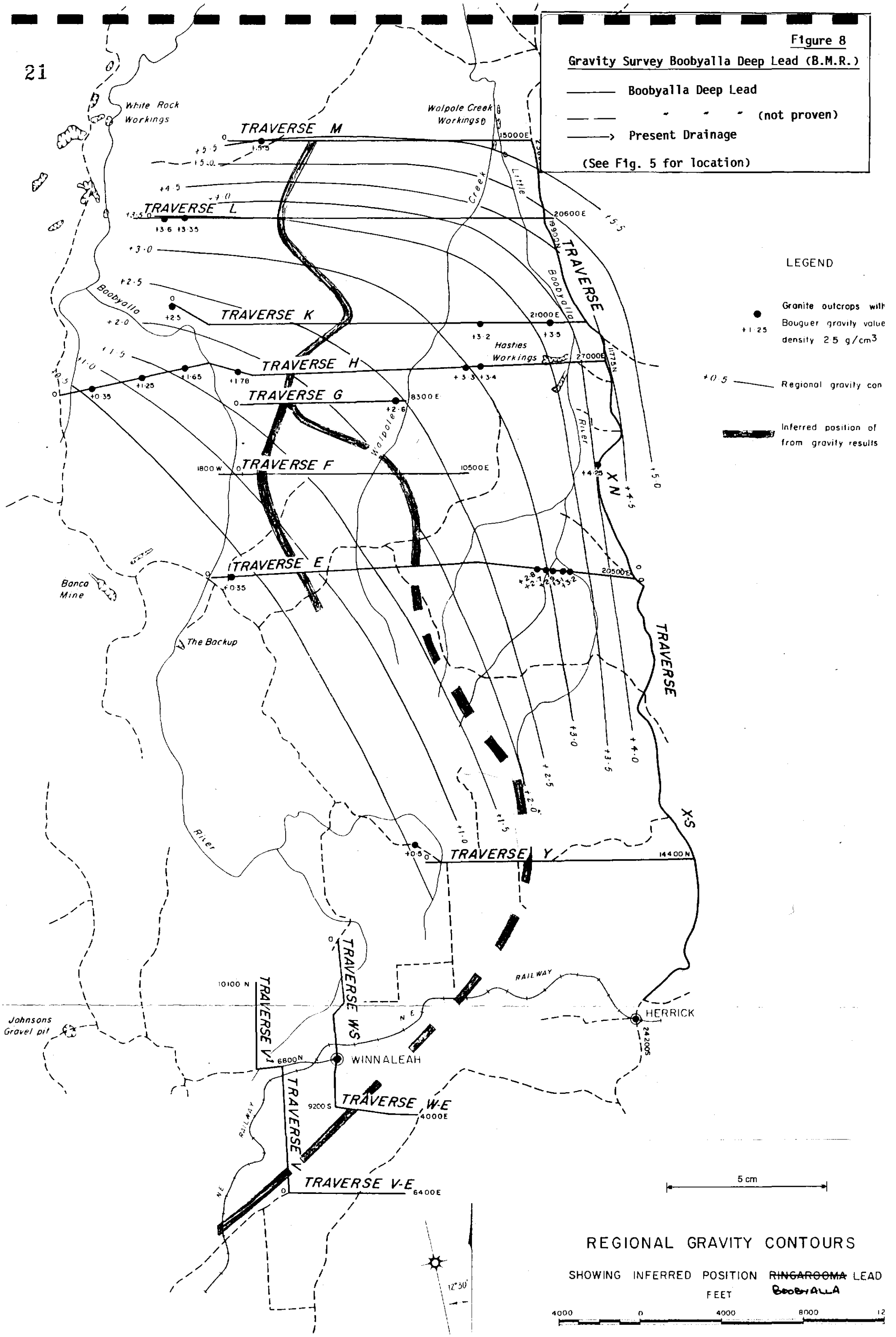
Gravity Survey Boobyalla Deep Lead (B.M.R.)

——— Boobyalla Deep Lead

— — — (not proven)

———→ Present Drainage

(See Fig. 5 for location)



LEGEND

● +1·25 Granite outcrops with Bouguer gravity value density 2·5 g/cm³

+0·5 ——— Regional gravity con

Inferred position of from gravity results

5 cm

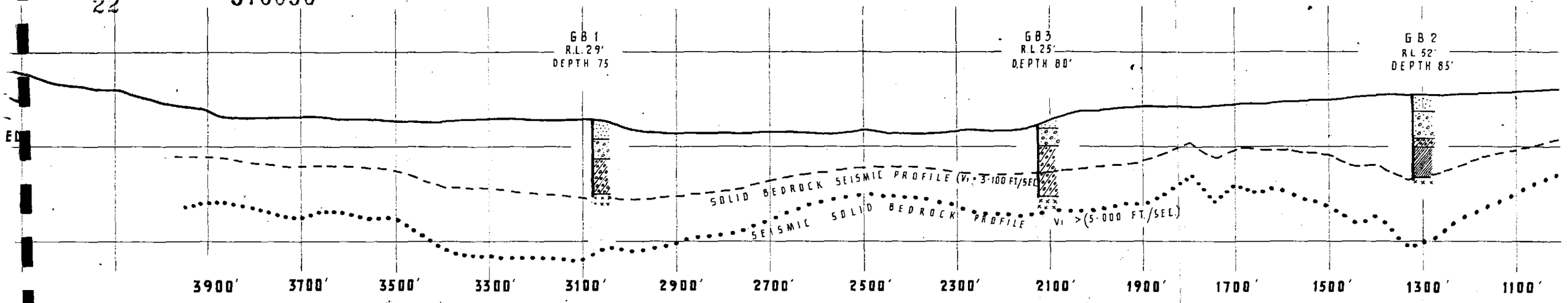
REGIONAL GRAVITY CONTOURS

SHOWING INFERRED POSITION ~~RINGAROOMA~~ BOOBYALLA LEAD

FEET

4000 0 4000 8000 12

22 576030



SECTION ALONG SEISMIC TRAVERSE C ILLUSTRATING BORE SECTIONS AS COMPARED WITH SEISMIC PROFILES

Horizontal Scale : 1 inch = 200 feet ~ Vertical Scale : 1 inch = 100 feet

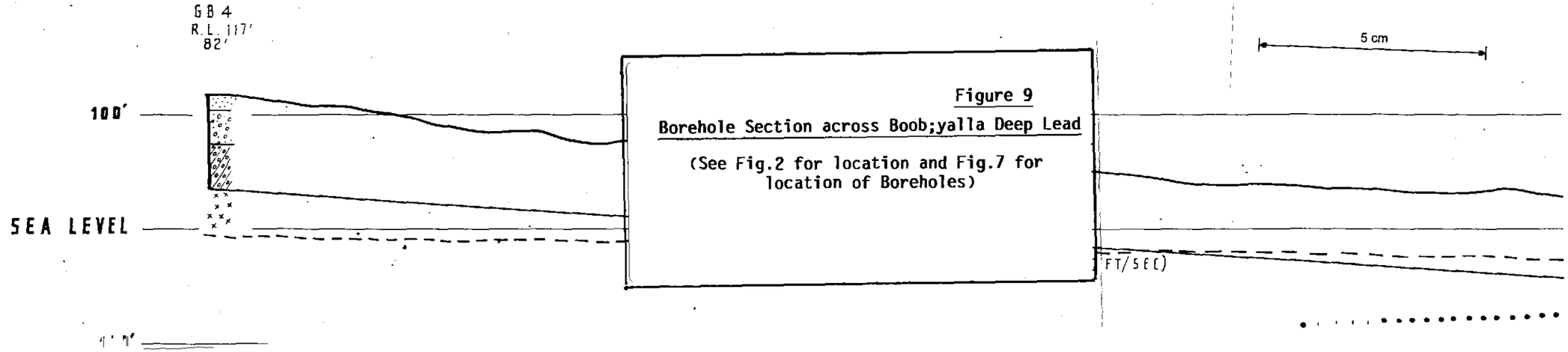


Figure 9

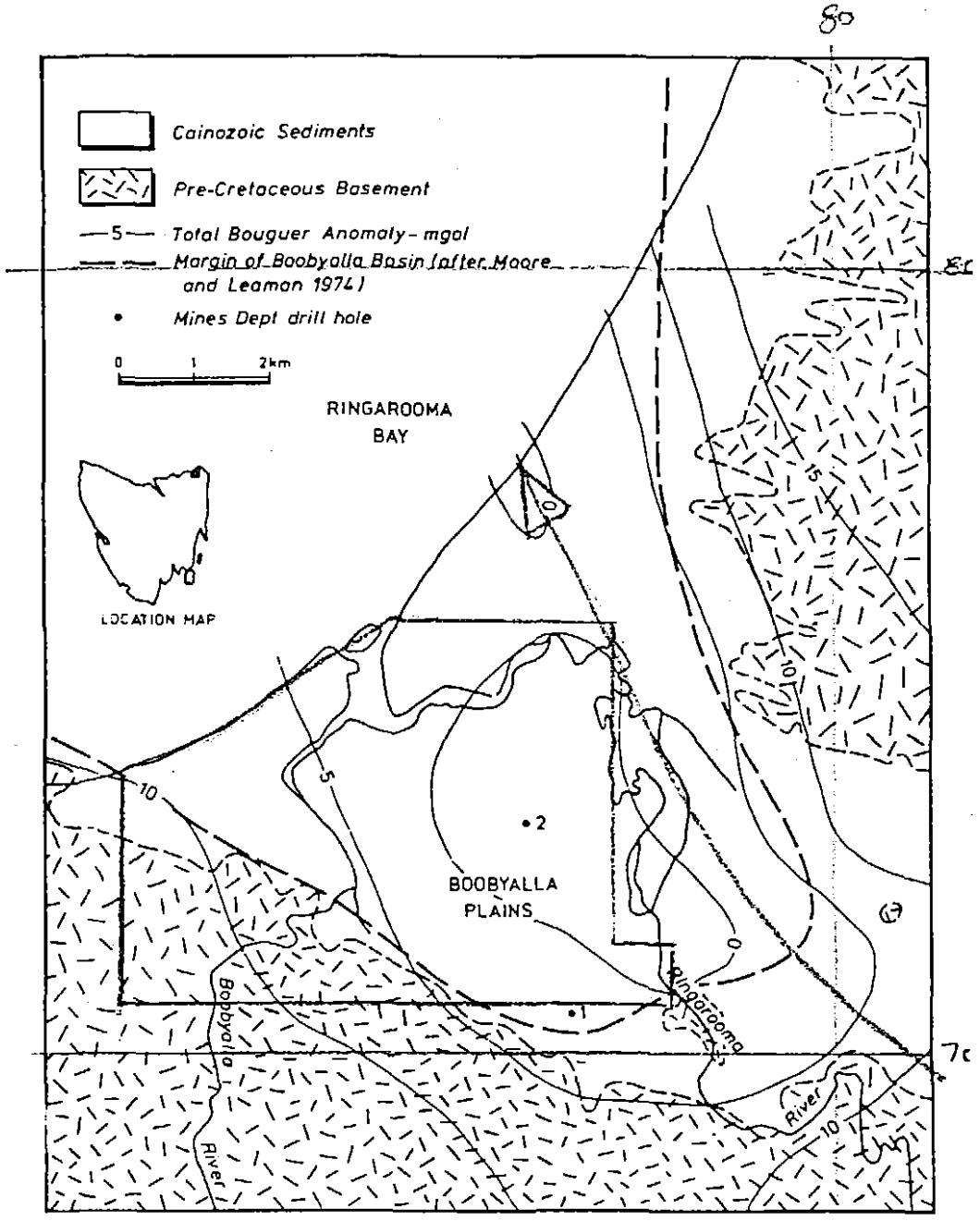
Borehole Section across Boob;yalla Deep Lead

(See Fig.2 for location and Fig.7 for location of Boreholes)

Figure 10

Boobyalla Sub-Basin

(Moore et al 1984)



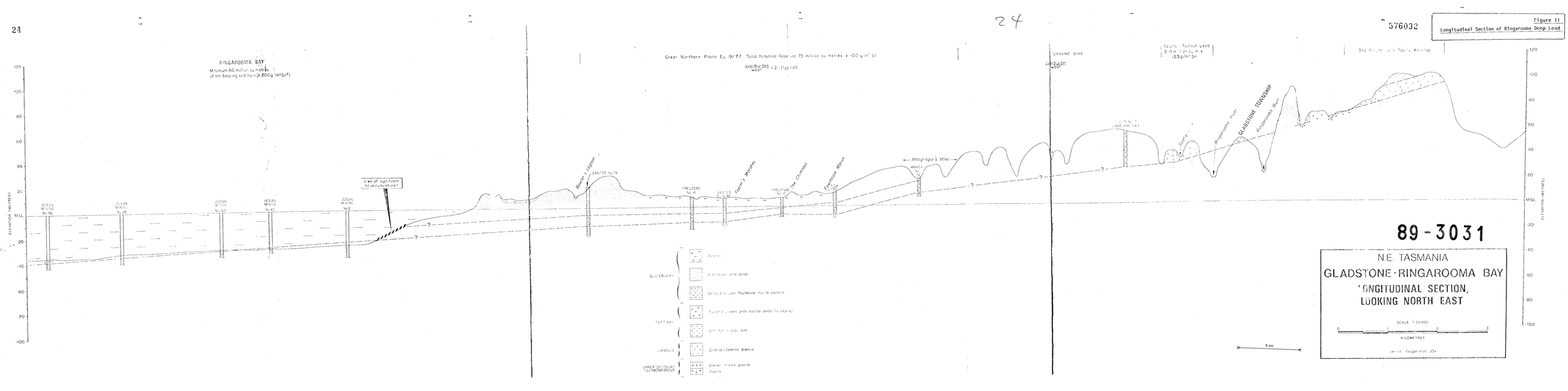
Geological map of the Boobyalla Plains area (after Baillie *et al.*, 1979) also showing Total Bouguer Anomaly (after Leaman, 1973).

5 cm

24

576032

Figure 11
Longitudinal Section of Ringarooma Deep Lead



89-3031

N.E. TASMANIA

GLADSTONE-RINGAROOMA BAY

LONGITUDINAL SECTION,
LOOKING NORTH EAST

SCALE 1:25000

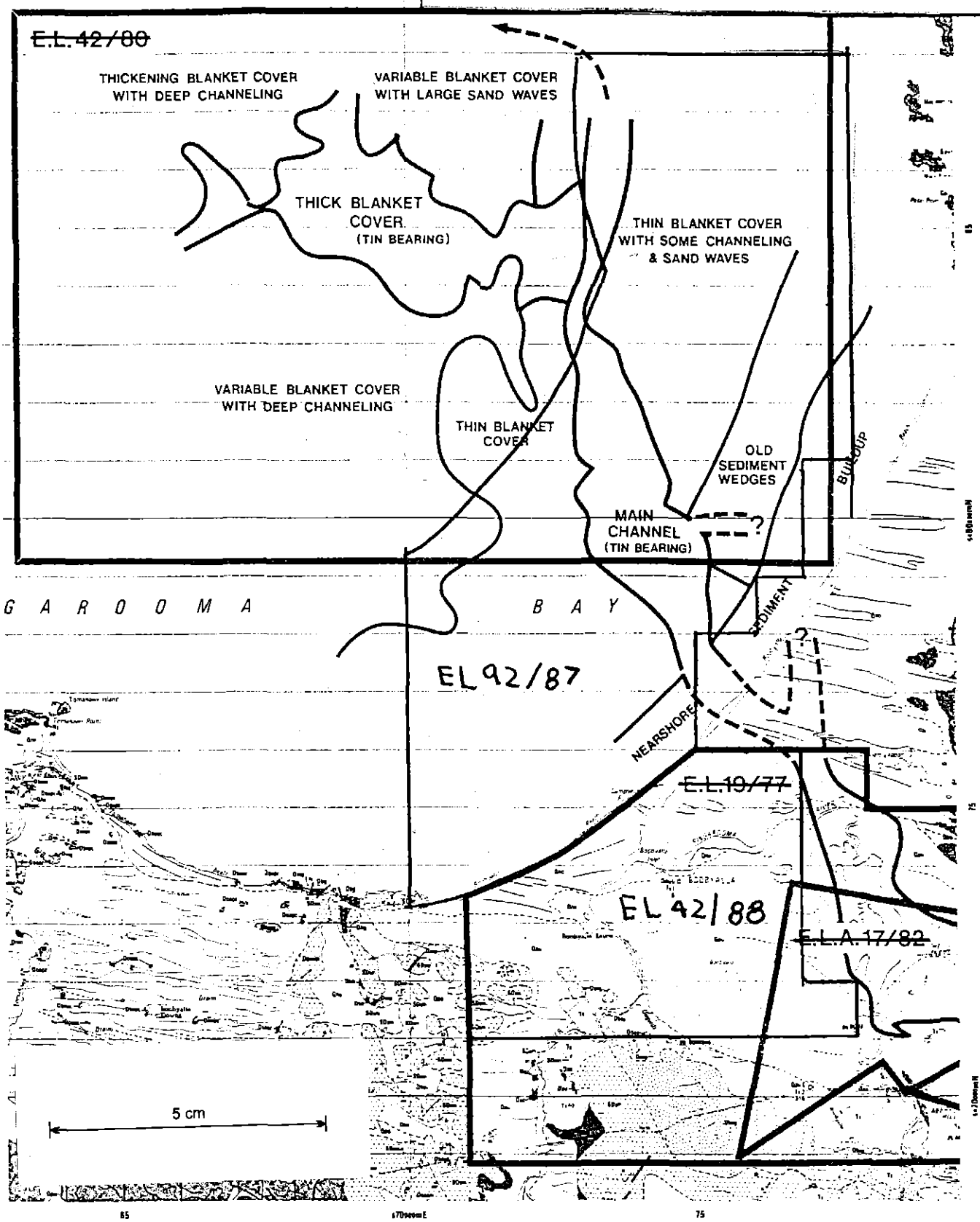
0 1 2 3

KILOMETRES

Metres Exaggeration 25x

Figure 12

Offshore/onshore Ringarooma Deep Lead



HELLYER MINING & EXPLORATION PTY. LTD.

NORTH EAST TASMANIA

RINGAROOMA BAY PROJECT

GEOLOGY & TREND OF MINERALIZATION

SCALE

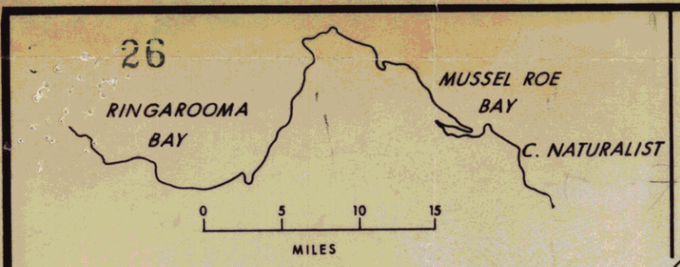
2 0 2 4 6

KILOMETRES

HELLYER MINING & EXPLORATION PTY. LTD.

576034 Figure 13

T.O.E.C. Map of Offshore Lead and Tin Values



N

KEY

- 2 — Bathymetric Contours (fathoms)
- 2 — 2 — Tin Isograds (oz./yd.^{3})
- Drill Hole Sites
- Between 1 and 2 oz./yd.^{3}
- Over 2 oz./yd.^{3} and Less than 4 oz./yd.^{3}
- Over 4 oz./yd.^{3}

TOMAHAWK PT.

5 cm

Pancontinental Mining Limited

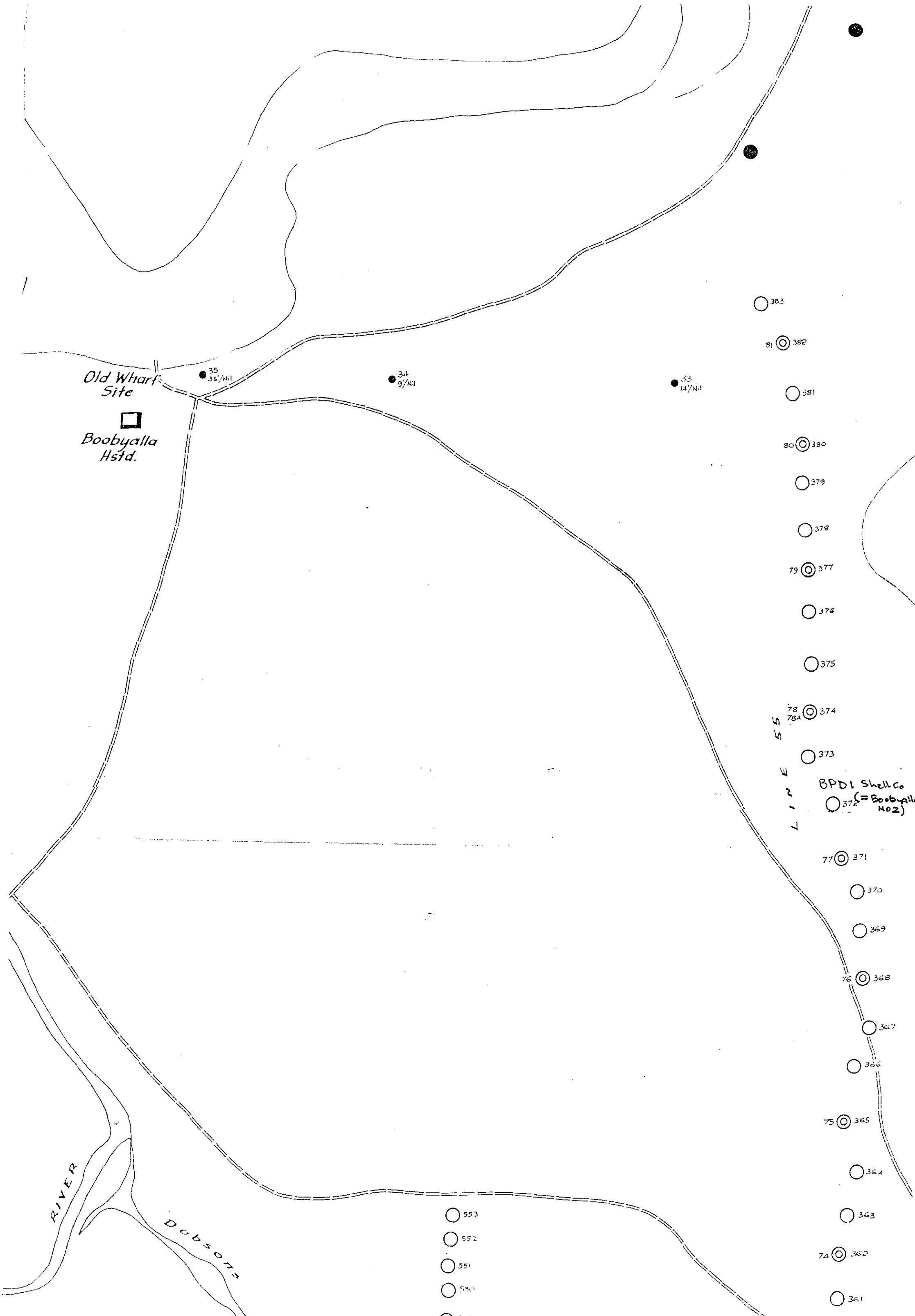
Ringarooma Bay

TIN ISOGRADS

Ocean Mining A.G. - Feb. '69

Scale 1:60 000

May '80



Scale: 10 chains = 1 inch
1 : 7920

Figure 14

Previous drilling Boobyalla Plain

(See Fig.2 for location)

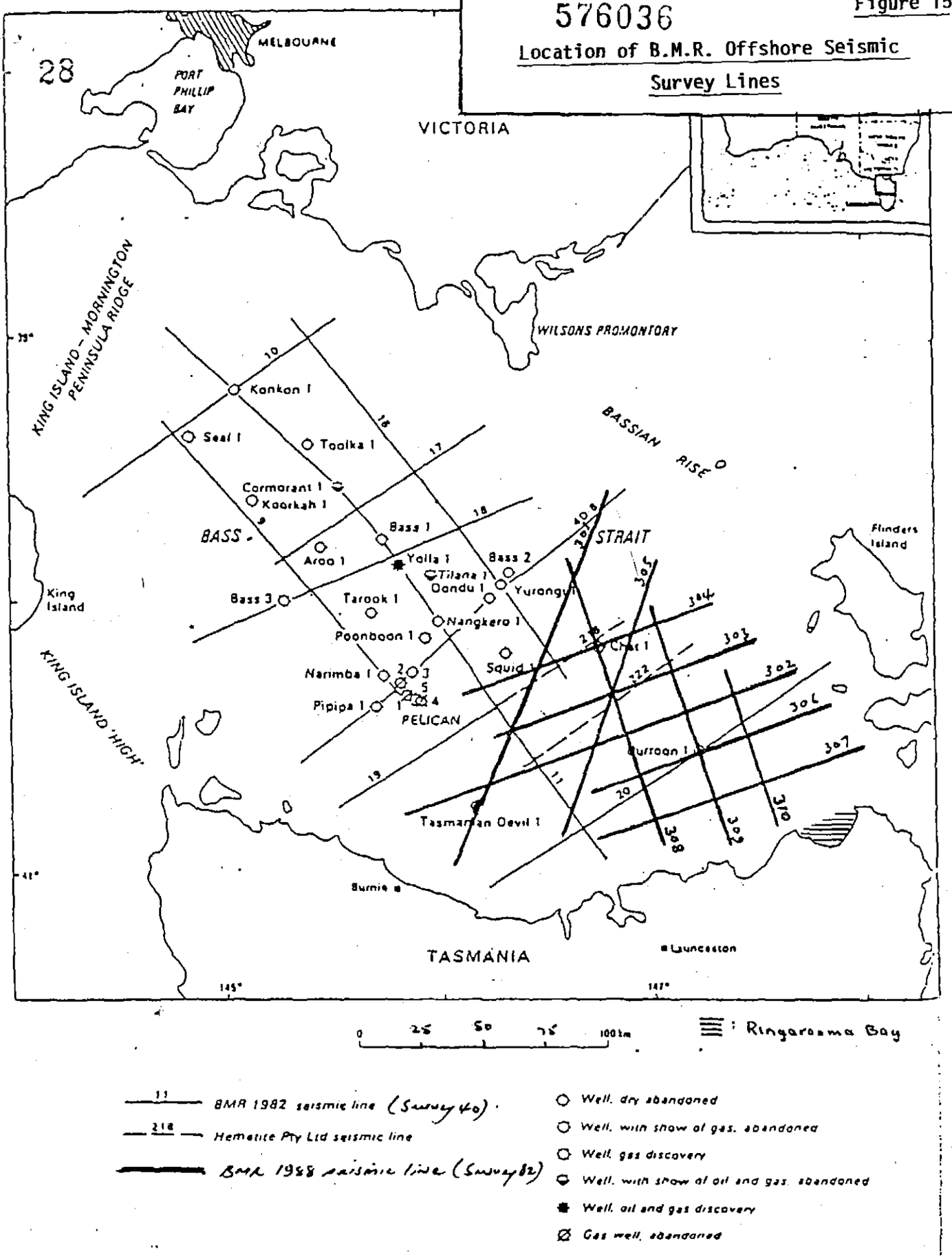
89-2031

5760350

576036

Figure 15

Location of B.M.R. Offshore Seismic Survey Lines



Location of Survey 82 Bass Basin lines in relation to petroleum exploration wells and BMR's 1982 (Survey 40) lines.

5 cm

8395

BOOBYALLA – DELTA

COUNTY OF DORSET

Figure 3

Official tenement map (Dept. of Mines)

1 : 15 840

5 cm

89-3031

8395

8394

576000mE 577 578 579 580 581 582

476 475 474 473 472 471 470 469000mN

E.L. 19/77

E.L. 17/82

E.L. 42/88

BOWLERS LAGOON

RIVER

RINGAROOMA

RINGAROOMA TIER

Fosters Marshes

Braithwaites

MacGregors

DELTA WORKINGS

SCOLOCH LEAD

MAYFIELD

GOVT RESERVOIR

SANTOS STORE

C.M.L.42M/76

BL1 BL2 BL3 BL5 BL6 BL7 BL8 BL9 BL10 BL11 BL12 BL13 BL14 SB

BT-1 BT-2

CDH1 CDH2 CDH4 CDH5 CDH7 CDH9 CDH B (?)

MG1 MG2 & CDH6 MG3 IMG

Not Drilled

Hole Abandoned

2 3

Figure 6

Hellyer Drill Hole Data

E.L.42/88 (eastern portion)

Boobyalla Sub-Basin (eastern margin)

1, 2 Boobyalla Boreholes

3 DDH to examine margin of Sub-Basin (position approximate)

5 cm

BULK SAMPLE HOLE LOCATION

20 SANTOS

PI2 PREUSSAG

WANEX

TASMANIAN DEPT. MINES

BURMA MALAY TIN LTD
STOREY'S Ck. TIN MINING Co N.L. } 1932-1963
DORSET TIN DREDGING

11.3 / 158 — DEPTH TO BOTTOM OF WASH (METRES) / AVERAGE GRADE TO BOTTOM (g/cu.m Sn)

LITHOLOGY

Quaternary alluvium

Tertiary alluvium

Pre-Tertiary (Undifferentiated)

LOCALITY

RINGAROOMA BAY

TASMANIA

E.L. 19/77

C.M.L. 42M/76

HELLYER MINING & EXPL. PTY. LTD.

NORTH EAST TASMANIA

GREAT NORTHERN PLAIN

DRILL HOLE DATA

576038

89-3031

SCALE 1:10000

0 200 400 600 800 1000 METRES

FIGURE 2

8394