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GREAT NORTHERN PLAIN

(E.L. 19/77, C.M.L. 42M/76 & E.L.A. 17/82)

GEOLOGICAL SUMMARY REPORT

March, 1983

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CONTENTS

TABLES

003

LIST OF FIGURES

Transparancies (3–5)

004

1.0 INTRODUCTION

SANTOS Ltd. and its wholly owned subsidiary Hellyer Mining and Exploration Pty. Ltd. have acquired interests in three onshore tenements prospective for alluvial tin. The aim of the acquisitions was to establish sufficient reserves to support a dredging operation, desirably amounting to a contained reserve of the order of 10,000 tonnes tin metal.

This report summarizes the results of all drilling conducted during 1981 and 1982 by SANTOS together with the results of previous exploration in the area. Estimates of current reserves and the remaining potential within the tenements are made.

2.0 TENEMENT DETAILS

SANTOS Ltd. and Hellyer Mining and Exploration Pty. Ltd. hold a number of interests in northeastern Tasmania (see Figure 1).

SANTOS' initial interests in the alluvial area were acquired as the result of an agreement reached on 28-01-81 between Hellyer and Mineral Holdings Australia Pty. Ltd. whereby Hellyer obtained the right to earn a 90% interest in metallic minerals on Exploration Licence 19/77 and Consolidated Mineral Lease 42M/76 by the expenditure of $20,000 on exploration prior to 11-04-81. This interest has been earned and M.H.A. now has a 10% interest carried by Hellyer until completion of a definitive feasibility study.

The other tenement of direct interest to this report is Exploration Licence Application 17/82 (see Figure 1). This area, previously known as Special Reserve 32/70 (and also as Authority to Prospect number 4/80 to AMDEX Mining Ltd.) was offered for tender by the Department of Mines on 28-10-81. SANTOS tendered with a commitment of $400,000 (including a sum of $50,000 as reimbursement of past Department of Mines expenditure), nominally as the 1982 licence commitment, together with an undertaking to proceed to development within 18 months or relinquish title to the area.

SANTOS' tender was accepted on 23-12-81 and the Department advised on 31-03-82 that the previous reservations over the area had been rescined and that the area was thus available for marking out. However, the Australian Heritage Commission notified its intention to enter a major portion of the Great Northern Plain in the Register of the National Estate on 30-03-82. The A.H.C. prescribed zone (see Figure 1) includes a substantial part of the tender area and the ultimate intentions of the Heritage Commission have yet to be defined.

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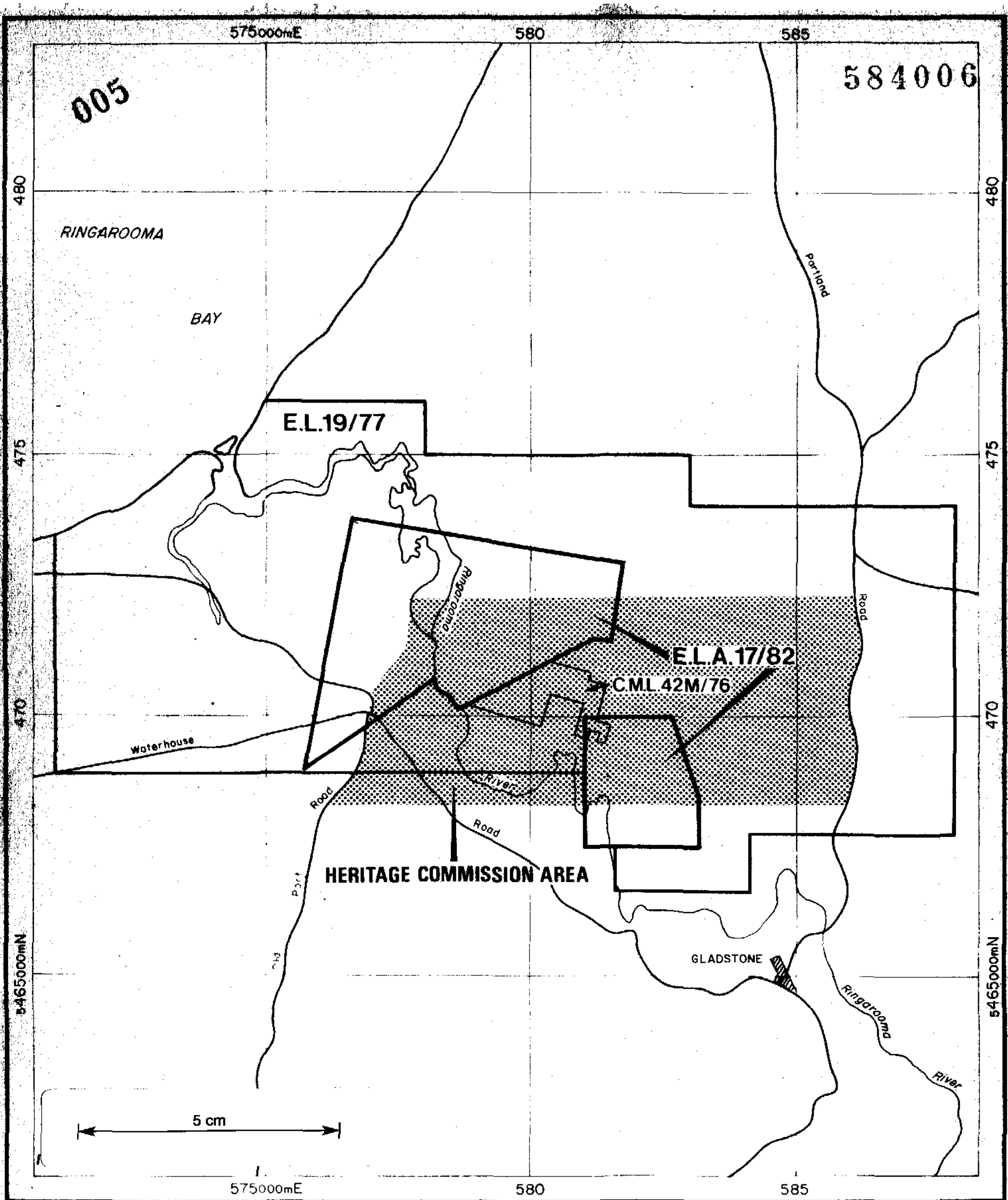

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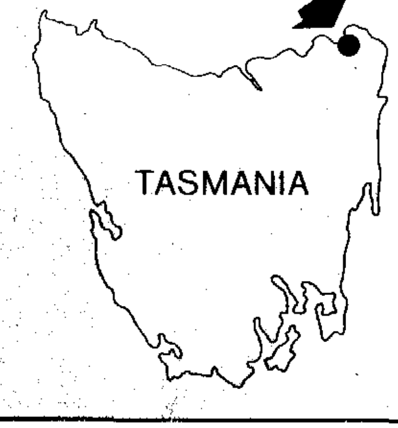

SANTOS LIMITED

NORTH EAST TASMANIA

TENEMENT LOCATION MAP

SCALE 1:100000

0 2 4 6

KILOMETRES

APRIL 1982

FIGURE 1

SANTOS made formal application for an exploration licence over the tender area on 25-05-82, on the understanding that the original intention of the Department of Mines was to grant to SANTOS an Authority to Prospect until the implications of the Heritage Commission's proposal were clarified. The situation remains unresolved.

In addition, a substantial portion of the potential dredging zone is privately owned land where the mineral rights are vested with the owner. Clearly, it would have to be determined that SANTOS is capable of being granted a mining lease over the area before development could be contemplated.

In summary, the tenements which are the specifically referred to in this report are:

1. <u>E.L. 19/77 Great Northern Plain</u>

Area:	115 sq km
Title Holder:	Hellyer
Interest:	90% interest in metallic minerals
Commitment:	Nominal $23,000 per annum to 10-4-83, then $57,500 per annum to 10-4-88 (10th year of tenure).

2. <u>C.M.L. 42M/76 MacGregors</u>

Area:	153 ha
Title Holder:	Hellyer
Interest:	90 interest in metallic minerals
Commitment:	No formal expenditure commitment subject to labour covenant. Lease expires 31-10-97.

3. <u>E.L.A. 17/82 Ringarooma River</u>

Area:	20.8 sq km
Applicant	SANTOS (100%)
Status:	E.L. Application is withheld pending clarification of implications of Heritage Commission proposal and determination of private ownership of mineral rights.

Commitment: $400,000 in the first 12 months of tenure and an undertaking to proceed to development or relinquish title after 18 months tenure.

3.0 GEOLOGY AND PREVIOUS MINING/EXPLORATION ACTIVITY

3.1 GEOLOGY

The alluvial deposits of the Great Northern Plain area are among a number of alluvial cassiterite concentrations closely spatially related to partially unroofed stanniferous muscovite-biotite granites of the Blue Tier Batholith and Mount Cameron batholiths. The primary tin deposits located within the granite bodies and at granite/country rock contacts consist of greisen sheets and veins, quartz cassiterite veins and cassiterite stockworks.

The granitic rocks are of Devenion age and have intruded lower Palaeozoic (? Silurian) quartzites and slates (Mathinna Group). Gold mineralisation also occurs within the Mathinna Group, usually in quartz ± sulfide veins in the slaty members.

Apart from the Tertiary-Recent cover, only small isolated outcrops of Permian sandstone and apparently sill-like intrusions of Jurassic dolerite occur in the region.

The Plain covers an area of Tertiary-Recent sediments deposited in a Tertiary graben structure located along the lower course of the Ringarooma River which, together with the Boobyalla River, drains the area.

The alluvial sequence comprises -

(i) Lower Tertiary fluviatile gravels and wash progressively (both up sequence and coastwards) buried by lacustrine, estuarine and marine sediments. This material was deposited during a period of subsidence (transgression). Most tin is associated with the gravel/wash although the lacustrine and estuarine strata occasionally contain some tin formed by dispersion and reconcentration of cassiterite from the course alluvials; and

(ii) Upper Tertiary - Pleistocene deposits formed by stripping and reworking of the lower Tertiary sediments as the land surface started to emerge (regression) and by deposition of estuarine deposits near the coast. At about the close of the period of subsidence basalts were extruded, filling valleys and covering many areas of lower Tertiary sediments. Some of the basalt flows have been subsequently eroded. The regression caused some major deviations of river courses, notably of the Ringarooma River which moved from the western side of the Mount Cameron massif to its present course past the eastern end of Mount Cameron. Tin has been concentrated in some fluviatile and marine shingle terraces and some sections of the Pleistocene estuarine deposits.

The Great Northern Plain alluvium mostly comprises a relatively thick (up to at least 24 metres) sequence of mixed alluvial (largely estuarine) and marine deposits of late Tertiary - Pleistocene age. Shingle beds along the Ringarooma River are of Pleistocene - Recent age. Stream gradients are below 4m/km and the coastal section of the Ringarooma River is subject to winter flooding.

Individual lithologies are markedly lenticular in form and poorly consolidated apart from minor, locally developed silicified/ferruginized or marcasite-rich bands. The local stratigraphy typically comprises a distinct overburden of sand, silt and clay overlying a thinner shingle wash containing most of the tin. The dominant cassiterite-bearing shingle wash horizon known to occur in the Fosters Marshes region and the overlying sand/silt/clay are generally regarded as being of Quaternary age. Bedrock consists of grey-green clay ("marine bottom") which often contains weathered pebbles, or of weathered mudstone/shale/sandstone, with occasional weathered granite and dolerite. The bedrock surface is generally gently undulating and soft, forming a good alluvial bottom for cleaning-up by dredging.

Figure 13 is a longitudinal section, extending from the Gladstone area to Ringarooma Bay, showing the general geometry of the Great Northern Plain alluvial mineralisation.

3.2 PREVIOUS MINING

Tin was discovered in the Great Northern Plain area in the 1870's. Jennings (1975) has reported that some 26% of total Tasmanian tin production has derived from alluvial mining, of which approximately 75% has been won from the Ringarooma River tributary system.
Numerous small workings were developed in the southeastern part of the area, the largest producers being located on the northern bank of the Ringarooma River before the turn of the century. Several types of deposit were worked, including deep leads, esturarine wash beds and alluvial terraces; the principal workings included (from S.E. to N.W.). Lochaber, Scotia, Vulcan, Doone, Black Duck, Richardson, Roy, Canary, Taylor, Beltz, MacGregor, Aberfoyle, Echo, Delta and Dugard.

The majority of the workings were sluicing operations using water from a branch of the Mount Cameron water race, but water supply was a perennial problem. They were shallow operations, generally less than 15 metres deep, and total production probably has not exceeded 5000 tonnes of concentrates. Past mining and production records are poor or non-existent.

The northern part of the Plain (referred to as the Foster's Marshes area - see Figure 2) was not available for mining, due to the attitude of a landowner, until the passing of the current Mining Act in 1929. This area is also remote from the Mount Cameron water race.

More recently, the Dorset Dredge was operated by the Commonwealth Government and by Storey's Creek Tin Mining N.L. in the South Mount Cameron area (Dorset Flats) between 1944 and 1963 where the average grade of material treated is reported to have been 0.13 lb metallic tin per cubic yard (ca. 77g Sn per cu metre). The dredge was then moved to the north of Gladstone where it mined out the majority of the Recent alluvial flats along the Ringarooma River between 1964 and 1971.

The average grade of ground worked along the Ringarooma River was approximately 72g Sn per cu. metre. The dredge ceased operating in 1971 due to falling tin prices and lack of easily accessible ground and is still in the area, but it has fallen into a state of disrepair (probably beyond restoration).

The Pioneer Mine was operated by Amdex Mining Ltd. from 1978 but was closed down in 1982 due to falling tin prices and lack of accessible pay zone. The Clifton (Endurance) Mine is still being worked on a small scale.

3.3 PREVIOUS EXPLORATION

Exploration of various parts of the Great Northern Plain for its alluvial tin potential have been undertaken over the last 25 years by a number of companies, in particular Rio Tinto Australian Exploration Pty. Ltd. (1958), Utah Development Co. (1965-1966), Portland Holdings Pty. Ltd. (1969), B.M.I. Limited (1971-1973), Wanex Mining Ltd. (1972-1973) and Preussag Australia Pty. Ltd. (1979). Summaries of the work completed by these companies are given below. The Department of Mines also conducted a boring campaign in the so-called Braithwaites area on the Great Northern Plain during the late 1960's.

Prior to this, Dorset Tin Dredging and various joint venture partners such as Burma Malay Tin, and also the Mines Department carried out exploration over certain areas from the early 1900's. Records of this drilling are very scant or non-existent.

Reviews of previous exploration and/or assessment of the geological potential of various parts of the Great Northern Plain have been conducted by the Department of Mines (1932, 1962, 1975), Rio Tinto Australian Exploration (1958), Utah Development (1963), Renison Ltd. (1978) and Pancontinental Mining (1980). The results of previous drilling within the present area of interest can be summarised as follows:

(a) Pre 1960's

Several exploration programmes have been conducted since the turn of the century. The most useful work appears to have been done by Dorset Tin Dredging (and partners), Delta Tin Mines and the Department of Mines.

No detailed records of drilling conducted prior to the 1960's has been located. Known results are shown on Figure 2, although it is suspected that the drillhole locations indicated are often approximate only.

Several drilling programmes were undertaken in the Fosters Marshes area immediately east and north of the Delta workings. Delta Tin Mines N.L. put down 33 randomly located holes totalling 1938ft. (591m) in the southern section of Fosters Marshes, but exact hole locations are unknown. Summary results are:

Depth range of bores:	32-74 ft. (9.8-22.6m)
Average depth:	53ft. (16.2m)
Area covered:	250 acres (101ha)
Maximum ? payzone value:	1.96 lb/cu. yd (?70% SnO_2) (814 g/m^3 Sn)
Average ? payzone value:	0.7 lb/cu. yd (?70% SnO_2) (291 g/m^3 Sn)
Payzone thickness range:	3 inches-21 ft. (0.08-6.4m).

Utah (Appleby & McEwan, 1966) state that the average value of all 33 holes was 279g/cu. metre Sn to a depth of 18 metres.

Subsequently, Burma (Austral) Malay Tin Ltd. is reported to have drilled 50 holes in the same general area in about 1935. Utah (1966) record that all "stanniferous" holes averaged 89 g/cu. metre Sn to 14.3 metres and that all 50 holes averaged 77 g/cu. metre Sn to an average depth of 15.2m (range 6.7 - 26.5m) but no details seem to be available. Preussag (Dunne, 1978) has suggested that the field values were heavily reduced following check assays on sample concentrates.

The Dorset Tin Division of Storeys Creek Tin Mining N.L. (Aberfoyle) then conducted a programme of 37 holes in 1955/56 using a 16 inch Conrad plant which partially covered but was somewhat north of the Delta Tin drilling. Again detailed records are not available but summary results are reported to be:

Depth range of bores:	33-77.5 ft (10-23.6m)
Average depth:	51 ft. (15.5m)
Maximum value (? total depth):	0.47 lb/cu. yd. (?Sn O_2) (195g/m^3 Sn)
Average value (? total depth):	0.133lb/cu. yd (? Sn O_2) (55g/m^3 Sn)
Average payzone value:	0.6 lb/cu. yd. (? Sn O_2) (249g/cu. metre
Payzone thickness range:	0-22ft. (0-6.7m) Av. 13ft. (4m).

The data are difficult to interpret because reported "values" do not specify the related interval or units (Sn or Sn O_2) and in fact different authors quote some conflicting results for supposedly the same drilling.

It is possible that the Delta samples were "salted" or that the Dorset bores failed to penetrate a central channel containing generally thicker wash with better values.

(b) Utah Development Co.

UDC undertook widespread investigations for alluvial tin in N.E. Tasmania and also the Furneaux Group islands in 1965/66. Areas examined extended from the southern Ringarooma valley between Branxholm and Derby to sections of the Mussel Roe River system in the northeast. Two of the 12 (mainland) test areas were located within the current SANTOS/Hellyer tenements:

(i) Lochaber - Scotia: The proposal was to test for tributary drainage into the Scoloch lead (see section c (i) below) from the south and west. A total of 45 reconnaissance auger holes were drilled along 5 lines and showed that the majority of the area is underlain by "Mathinna" metasediments at depths of mostly less than 10ft (3m). Only one small tributary containing approximately 4ft of wash beneath 80ft of overburden was located and no sample drilling was undertaken.

(ii) Delta/Dugard: This area lies immediately west of the main zone currently being tested by SANTOS, being bounded by the Ringarooma and Boobyalla Rivers on the east and west respectively and by granite outcrop to the south. Two small mines, Delta and Dugard, were operated on the eastern and southern edges of the area.

Utah completed 100 reconnaissance auger holes (mostly at 120m spacing) totalling 1163m on 3 major and 4 minor lines, followed by 27 widely spaced (typically 150-300m) cable tool holes totalling 459m. Stanniferous wash seems to occur as highly irregular and discontinuous "pods" or "runs". Using a sphere of influence calculation, Utah estimated possible reserves of 1,311,212 cu. metres grading 83g/cu. metre Sn and state (Appleby & McEwan, 1966) that they believed the maximum resource potential of the area to be 23 million cu. metres grading no more than 118 g/cu. metre Sn. Utah do not state how they arrive at this potential resource figure and based upon the results of Utah's work, the writer feels the resource potential is more of the order of 4 million cu. metres grading 95g/cu. metre Sn.

(c) Tasmanian Department of Mines

The Department has conducted numerous boring and geophysical campaigns on the Great Northern Plain. All known drilling results are summarized on Figure 2. The two most significant and relatively well documented programmes are as follows:

(i) Scoloch Lead. The Scoloch lead refers to extensions of the previously worked Scotia and Lochaber leads located on higher ground on the eastern side of the Great Northern Plain. During the period 1935-1944, 855 holes totalling 23,827 metres were drilled over a total length of approximately 6.5km. Cassiterite was found concentrated in basal wash typically 3 to 9 metres thick beneath overburden 15 to 25 metres thick within relatively narrow (30-90 metres wide) channels.

Six relatively closely-drilled blocks within the total area were estimated to contain 3,351,200 cu. metres grading 202g/cu. metre Sn and total possible reserves were estimated to be 8.4 million cu. metres grading 133g/cu. metre Sn.

(ii) Braithwaites Deposit. Around 1967, 49 bores were drilled in an area north of the old MacGregor workings and southeast of Fosters Marshes (see Figure 2). The holes are on a 152 x 183 metre grid and indicate that the mineralisation is located on an uneven terrace which is mostly located above the level of the main Fosters Marshes wash zone and thus appears to be a remnant of a higher wash horizon. Possible reserves were estimated (Braithwaite, 1977) at 6.16 million cubic metres grading 136g/cu. metre Sn to an average depth of 14 metres.

(d) Portland Holdings Pty. Ltd.

The Company undertook a variety of sampling, including channel sampling, costeaning, hand boring and percussion drilling in several areas, principally some of the old workings (Beltz, Canary, Higgs, Richardson, Sea Shell, Aberfoyle Hill and Boomerang). No detailed records appear to have been retained. Several channel samples from the old workings returned values between 150 and 1200 g/cu. metre ? SnO_2 while the most interesting percussion drillhole results were 4 holes located southeast of the Government Reservoir (see Figure 2) which averaged approximately 145 g/cu. metre ? SnO_2 to an average depth of 6.5 metres.

(e) Wanex Mining Pty. Ltd.

The Dorset Tin Division completed an intensive programme of percussion drilling during 1972/73 in the area surrounding the old Higgs, MacGregor, Beltz, Taylor and Canary workings which is now largely covered by C.M.L. 42M/76. The holes were mostly drilled on a 88 x 88 metre (4 chain) grid. Proven reserves were estimated to be 1.53 million cu. metres grading 133g/cu. metre tin

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metal. It was also established that a channel of the order of 200m wide extended northwestwards towards the Fosters Marshes/Braithwaites area (see Figures 2 and 12) with all bores (maximum depth 30m) in the channel unbottomed.

(f) Preussag Australia Pty. Ltd.

Preussag undertook a scout-drilling programme of 23 holes totalling 470.5 metres in 1978/79 designed to assess the potential of the "Chimneys" (Fosters Marshes) area. The Company was particularly keen to test for tin-bearing wash zones below the main band previously detected (base generally at about 54ft) and the target sought was potential for 100 million cu. yards to a depth of 150ft. with an overall grade of 0.3 lb/cu. yard (70% SnO_2) i.e. 75 million cu. metres to a depth of 46 metres grading 125g/cu. metre tin metal. Drilling utilized a reverse circulation rig equipped with 7 inch external diameter casing and $3^7/_8$ inch annular casing, which experienced serious problems with large boulders although core recovery was stated to be generally good. Samples were taken every 3 metres. Most holes were at 400 metre spacing on lines 800 metres apart and averaged less than 0.10lb/cu.yd. (72% Sn) (43g/cu. m. Sn) to an average depth of 16.7 metres. Preussag (Wong, 1979) concluded that the area did not warrant further testing although their work covered only a part of the area and their drilling methods were probably subject to serious errors.

4.0 PHOTOGRAPHY AND SURVEY

Colour aerial photography covering the whole zone of potential interest at scales of 1:20,000 and 1:10,000 was flown in January 1982. An array of ground control targets was surveyed in prior to photography with the original aim of facilitating detailed topographic mapping from the aerial photography at 1:2,000 scale in selected areas. This detailed mapping has not been undertaken.

The 1:10,000 scale basemap used for plotting drillhole locations and calculation of potential resource estimates (Figures 2 and 5) was prepared from a 1:10,000 scale photomosaic in conjunction with a plot of 14 of the control points which could be located on the aerial photographs. The basemap is not totally reliable due to photographic distortion and the low density of control points.

Topographic heights have mostly been otained from the published 1:25,000 map series (1981). These maps have stated vertical accuracies of 5 metres for 90% of elevations. Some elevations have been derived from field estimates of relative heights and the major portion of the Fosters Marshes area is assumed to be flat at approximately 5 metres above mean sea level.

Drilling (grid) lines were installed by a professional surveyor using a theodolite and, where possible, tied in to nearby photographic control points (see Figure 2). Drill holes are generally spaced at 100 or 200 metre intervals on lines 200m apart.

5.0 DRILLING

SANTOS began drilling in February 1981 using a conventional "Goldfields" churn drilling rig equiped with 6 inch (15cm) diameter casing and a drive pump (bailer). The samples were washed on site using a small "cradle" or "rocker box" and then panned to produce a concentrate generally containing less than 10% tin metal, although some higher grade samples contained up to 50% tin, necessitating the use of wet chemical assay techniques. Samples were assayed at the Department of Mines' Launceston Laboratories (mostly by XRF) during 1981.

Initial reconnaissance holes were drilled at approximately 200m spacing (depending on ground conditions) - see lines BL2, BL3, BL5 - and 58 holes totalling 1381 metres were completed in 1981.

Churn drilling resumed in January, 1982 with a total of 97 holes completed by the end of August for an aggregate of 1882 metres. Towards the end of this programme (hole BL13-02S), a switch was made from a drive pump to a "sand" suction pump for sampling and a more sophisticated sample collection apparatus was employed. The suction pump was used in an attempt to improve recovery of heavy minerals, to increase volume recovery and to recover a less disturbed sample. The suction pump should also cause less migration of cassiterite (tin values) down the hole than the drive pump. Oversize volumes (greater than 1 cm) in several of the later holes (1982) were also measured using the water volume displacement method. Concentrates were assayed at AMDEX's Pioneer laboratory during 1982 using an AMDEL XRF Mineral Analyser.

Sampling intervals were typically 1 to 2 metres in overburden, 0.5 metre in payzone (wash) and 1 metre in bottom material.

Drillers' logs are available at SANTOS' office. All hole locations are plotted on Figure 2. Summary details, including total depth, volume recovery, overburden depth and grade, payzone depth and grade and total interval (to base of payzone) depth and grade of all holes are listed in Table I overleaf. All grades are reported in grams tin metal per cubic metre.

Formation boundaries were selected with regard to both the driller's lithological description and the assay results so that the upper and lower boundaries of the payzone are intended to represent realistic payzone dredging boundaries rather than strict lithological contacts.

By defining boundaries in this way, volume and grade estimates are thus more likely to give a closer indication of recoverable (dredgeable) reserves as distinct from in situ reserves.

It is considered that many holes are undervalued, principally due to one or more of the following reasons:

(a) failure to properly "bottom" the hole;

(b) low volume recoveries (many holes achieved less than 60% volume recovery); and

(c) low assay values.

Indications of the order of magnitude of the possible errors contributed by these factors are as follows:

(a) two adjacent drill lines BL5 and BL6 (see Figure 2) are located 200m apart and have been drilled at the relatively close hole spacing of 100m.

In view of the "blanket" style of the mineralisation in this area, the average value along these lines could reasonably be expected to be similar. The average payzone grade from 10 adjacent holes on BL5, where 6 of the holes are though not to have properly bottomed, is 194 g/m^3 Sn. The average grade from the corresponding 10 adjacent holes on BL6, where all holes appear to have penetrated bottom, is 255g/m^3 Sn, representing an increase of 31%.

(b) Many holes achieved less than 60% volume recovery and most recovered less than 85%. Where these losses were sustained in the payzone, a similar order of magnitude tin recovery could be expected.

TABLE I

CHURN DRILLING DATA

1981 Hole No.	Date Drilled	T.D. (m)	Vol. Rec(%)	Overburden m	Overburden g/m^3(Sn)	Pzone m	Pzone g/m^3(Sn)	Total m	Total g/m^3(Sn)	Comments
GNP 3	6-7/4	10	44.0	-	-	4	0.6	4.0	0.6	Low recovery.
4	7-8/4	8	35.3	8	0.7	-	-	-	-	Low recovery.
5	9-9/4	12	47.0	8	0.6	4	0.4	12.0	0.6	Low recovery.
6	10-10/4	8	64.5	2	0.9	4	116.2	6.0	77.8	
9	18-19/2	17	84.9	-	-	17	5.8	17.0	5.8	Two wash/gravel bands.
10	6-12/2	20	85.1	12	4.3	8	37.1	20.0	17.4	
11	5-6/2	7.5	68.5	2	2.6	4	2.8	6.0	2.7	
12	13-17/2	22	72.1	10	2.9	10	6.5	20.0	4.7	
13	23/2-3/3	33	49.2	10	2.6	16	183.0	26.0	113.6	Sampling unreliable and low recovery.
15A	18-20/3	14	51.9	6	10.6	8	265.2	14.0	156.1	Not bottomed?
16	12-17/3	26	45.5	6	4.7	8	711.9	14.0	408.8	Low recovery.
17	23-25/3	26	48.7	10	2.6	10	172.9	20.0	87.7	Low recovery.
20	30/4-4/5	26	84.0	22	3.8	4	103.0	26.0	19.0	Not bottomed?
20A	6-15/8	29	-	16	7.8	10	92.8	26.0	40.5	Hole sampled in bulk.
21	5-8/5	30	76.7	20	5.8	8	159.2	28.0	49.6	Two wash bands.
22	29-30/6	56	87.3	24	49.8	12	157.2	36.0	85.6	Two wash bands.
23	27-29/4	20	68.7	14	1.7	6	175.0	20.0	53.7	Not bottomed.
24	22-24/4	20	50.4	14	6.6	6	147.5	20.0	48.9	Bot bottomed ? low recovery.
25	15-21/4	18	52.8	8	5.7	8	44.7	16.0	25.2	

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1981 Hole No.	Date Drilled	T.D. (m)	Vol. Rec(%)	Overburden m	Overburden g/m³(Sn)	Pzone m	Pzone g/m³(Sn)	Total m	Total g/m³(Sn)	Comments
30	31/3-1/4	8	-	2	0.1	4	50.5	6.0	33.7	Theoretical volume calc.
31	1-2/4	8	-	8	1.3	-	-	8.0	1.3	Theoretical volume calc.
32	11-12/5	20	65.1	12	2.2	6	121.1	18.0	41.8	
33	20-22/5	19	69.7	12	1.2	7	201.1	19.0	74.9	Not bottomed.
34	22-26/5	18	66.0	12	1.7	4	220.6	16.0	56.5	
35	17-22/6	34	72.7	12	2.3	18	19.7	30.0	12.7	Two wash bands.
36	23-26/6	15.5	80.9	10	1.0	5.5	2.3	15.5	1.4	Not bottomed?
37	16-19/5	24	82.5	14	6.8	8	277.0	22.0	105.1	
38	28/5-2/6	24	82.7	14	3.2	6	25.2	20.0	9.8	
39	13-15/5	20	68.4	12	0.8	6	66.6	18.0	22.7	
40	3-10/6	24	80.8	12	4.1	6	126.9	18.0	45.0	
41	1-5/7	16	72.9	10	1.5	4	5.2	14.0	2.6	Not bottomed (2 wash bands?)
42	8-10/7	22	74.1	16	0.3	6	344.8	22.0	94.2	Not bottomed?
43	11-15/7	24	77.4	16	0.6	4	158.6	20.0	32.2	
44	16-21/7	28	73.6	14	3.4	8	110.0	22.0	42.2	
45	11-16/6	46	87.3	16	2.7	14	93.3	30.0	45.0	Two wash bands.
46	22-28/7	36	75.1	14	1.2	16	45.5	30.0	24.8	
47	31/7-5/8	30	75.7	12	0.6	8	37.1	20.0	15.2	True bottom at 26m?
48	16-22/8	30	64.1	16	0.5	12	230.3	28.0	99.0	Not bottomed?
49	23-28/8	28	62.4	16	1.1	6	239.8	22.0	66.2	
50	31/8-3/9	36	69.2	24	1.2	6	81.6	30.0	17.3	
51	4-6/9	20	61.6	10	0.9	6	5.9	16.0	2.8	
52	7-9/9	20	52.8	6	0.4	14	4.8	20.0	3.5	Not bottomed.

1981 Hole No.	Date Drilled	T.D. (m)	Vol. Rec(%)	Overburden m	Overburden g/m³(Sn)	Pzone m	Pzone g/m³(Sn)	Total m	Total g/m³(Sn)	Comments
61	10-11/9	7	-	2	-	4	-	6.0	-	NO ASSAYS.
62	14-15/9	20	76.0	16	4.9	3	245.5	19.0	42.9	Two wash bands.
63	16-21/9	36	86.1	30	1.7	6	45.3	36.0	9.0	Two wash bands.
64	22-23/9	16	-	1	-	14	-	15.0	-	NO ASSAYS. Two wash bands.
65	24-25/9	10	-	4	-	5	-	9.0	-	NO ASSAYS.
66	28/9	12	49.8	12	0.3	-	-	12.0	0.3	Low recovery.
67	29-30/9	24	49.3	8	1.4	2	48.8	10.0	10.9	Low recovery.
68	4-8/10	26	67.4	8	1.0	16	4.6	24.0	3.4	Two wash bands.
69	12-18/10	36	78.6	26	0.5	4	91.9	30.0	12.7	
70	19-23/10	33	84.5	22	1.7	5.5	155.9	27.5	32.6	
71	26-30/10	33	83.2	26	0.4	3	274.5	29.0	28.8	
72	3-9/11	29	86.5	20	1.0	3	43.1	23.0	6.5	
73	10-17/11	26	83.6	20	0.6	4	215.3	24.0	36.3	
74	18-23/11	38	82.6	22	0.6	9.5	192.5	31.5	58.5	
75	23/11-2/12	40	91.0	24	2.4	8	124.0	32.0	32.8	
76	3-17/12	42	-	29	-	10	-	39.0	-	NO ASSAYS.
1982										
77	11-14/1	18	-	11	-	7	-	18.0	-	NO ASSAYS.
78	17-19/1	18	75.3	6	6.3	8	251.2	14.0	146.2	Two wash bands?
79	19-21/1	22	-	15	3.7	3	9.7	18.0	4.2	Theoretical volume calc.
80	22-25/1	22.2	110.6	12.5	2.3	6	255.8	18.5	84.5	
81	25-27/1	20	79.5	14.5	3.6	3.5	149.2	18.0	31.9	

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1982 Hole No.	Date Drilled	T.D. (m)	Vol. Rec(%)	Overburden m	Overburden g/m³(Sn)	Pzone m	Pzone g/m³(Sn)	Total m	Total g/m³(Sn)	Comments
82	28/1-2/2	21.3	73.8	13.5	2.7	7.8	205.8	21.3	77.1	Not bottomed.
83	4-8/2	25	93.6	14.5	3.8	6.5	153.2	21.0	50.0	
84	(1-4/2)	22	86.5	12.5	2.9	7.0	182.0	19.5	67.2	
85	9-11/2	22	78.6	14.5	4.6	5.5	281.2	20.0	80.7	
86	(4-8/2)	10.5	79.6	6	13.3	3.5	152.1	9.5	64.4	
87	9-15/2	20	75.6	18	3.7	2	228.0	20.0	26.1	Not bottomed? Assays unreliable.
88	11-15/2	22	87.9	15	2.6	6	186.5	21.0	55.2	
89	15-17/2	20.5	97.3	17	1.6	2.5	57.2	19.5	8.7	
90	18-22/2	21	94.5	15	0.0	6	418.2	21.0	119.5	Not bottomed. No samples 0-15m.
91	23-25/2	18.5	96.3	14	1.1	4	188.3	18.0	42.7	
92	25/2-2/3	20	96.7	14.5	0.9	5.5	201.3	20.0	56.0	Not bottomed.
93	3-4/3	19	58.1	15	5.7	4	151.6	19.0	36.4	Not bottomed?
94	4-10/3	19.5	62.5	12	4.3	7.5	152.5	19.5	61.3	Not bottomed?
95	18-22/3	19	54.7	13	6.4	6	81.9	19.0	30.2	Low recovery.
110	16-26/2	21.3	46.3	14.5	13.2	4	77.1	18.5	27.0	Unreliable drilling.
111	28/2-2/3	20.5	68.4	16.5	7.6	2	143.8	18.5	22.3	
112	3-5/3	22.7	71.8	12	17.3	8.5	360.5	20.5	159.6	
114	9-11/3	22.5	66.7	16	10.1	5	212.9	21.0	58.4	
115	12-14/3	22	71.5	14	13.1	6.5	353.1	20.5	120.9	
116	15-16/3	23	63.7	14	6.4	7.5	200.2	21.5	74.0	
117	17-19/3	22.5	83.1	14	6.1	6.5	152.7	20.5	52.6	
118	19-25/3	22	89.8	13.5	6.0	6	338.3	19.5	108.2	
119	25-27/3	20.5	85.3	12.5	10.2	5.5	201.3	18.0	68.6	
120	27-29/3	21	92.2	12.5	6.3	6	502.2	18.5	167.1	
121	30-31/3	20	70.6	14.5	9.5	3.5	81.0	18.0	23.4	

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1982 Hole No.	Date Drilled	T.D. (m)	Vol. Rec(%)	Overburden m	Overburden g/m³(Sn)	Pzone m	Pzone g/m³(Sn)	Total m	Total g/m³(Sn)	Comments
122	6-7/4	21	69.6	15.5	6.9	5	44.5	20.5	16.1	
123	8-14/4	19	70.6	14.5	3.7	2	37.3	16.5	7.8	
BL2 08	5-7/4	22.5	100.7	12.5	7.6	9	51.6	21.5	26.0	
BL7 00	23-27/4	23.5	47.7	12	2.9	9	138.7	21.0	61.1	Two wash bands.
02	27-28/4	21	44.8	16	2.3	4	233.9	20.0	48.6	Low recovery.
04	29-30/4	21	46.5	17	5.0	3	251.0	20.0	41.9	Low recovery.
06	2-3/6	21	71.2	14	2.2	6	69.0	20.0	22.2	
BL8 00	HOLE ABANDONED (FLOOD)									
02	30/4-4/5	18	64.5	11	4.8	3.5	174.7	14.5	45.8	
04	5-6/5	20	76.6	11	4.2	8.5	72.0	19.5	33.8	Not bottomed? (boulder).
06	7-11/5	19	64.9	12	2.2	6	11.3	18.0	5.2	
BL9 03	12-13/5	16	61.1	14	2.3	2	96.7	16.0	14.1	Not bottomed. Unreliable drilling.
05	14-17/5	18	75.0	14	4.6	4	251.5	18.0	59.5	Not bottomed.
07	8-9/6	17.5	64.1	12	2.6	5.5	198.1	17.5	64.1	Not bottomed.
BL10 00	17-18/4	18.5	75.5	8	7.9	8.5	139.8	16.5	75.8	Two wash bands.
02	19-20/4	19	64.8	13.5	6.6	4	182.5	17.5	46.8	
04	21-22/4	18	54.3	12	3.5	4.5	201.7	16.5	57.5	
06	22-23/4	18	37.5	14	3.5	3.5	184.5	17.5	39.7	Low recovery.
08	27-29/4	19	36.3	15	3.8	3	245.9	18.0	44.2	Low recovery.
10	29/4-1/5	19.5	46.4	12	4.2	6	281.2	18.0	96.5	Low recovery.
12	2-3/5	20	37.4	12	3.8	6.5	236.4	18.5	85.5	Low recovery.

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1982 Hole No.	Date Drilled	T.D. (m)	Vol. Rec(%)	Overburden m	Overburden g/m³(Sn)	Pzone m	Pzone g/m³(Sn)	Total m	Total g/m³(Sn)	Comments
BL10 14	-	NOT DRILLED								
16	4-8/6	20	58.7	15	1.9	4.5	189.4	19.5	45.2	
BL11 02	3-4/5	17	63.2	10	2.8	5.5	138.0	15.5	50.8	
04	4-5/5	17	48.3	12	4.2	5	268.7	17.0	82.0	Not bottomed.
06	6-7/5	21	54.3	14	2.8	5.5	162.1	19.5	47.7	Low recovery.
08	10-12/5	20.5	64.3	14	11.9	5.5	324.0	19.5	99.9	
10	13-14/5	19	63.9	14	2.6	5	103.7	19.0	29.2	Not bottomed (boulder).
12	17-17/5	16.5	63.1	14	2.1	2	14.3	16.0	3.6	Not bottomed (boulder).
13	18-20/5	18	78.7	14	1.4	3	697.1	17.0	124.2	
14	26-27/5	20.5	63.2	12	1.8	8	522.0	20.0	209.9	Not bottomed?
16	27-28/5	21.5	79.2	14	5.4	6.5	189.8	20.5	63.8	
18	31/5-1/6	17	75.1	12	1.9	3.5	77.5	15.5	19.0	
BL12 02	1-2/4	19.5	45.8	14	15.5	5.5	273.9	19.5	88.3	Low recovery. Not bottomed?
04	8-15/4	21	67.7	11	8.2	8	125.0	19.0	57.4	
05	15-19/4	20	66.6	10.5	8.6	7.5	201.9	18.0	89.1	
06	19-20/4	18.5	45.9	14	4.6	3.5	193.6	17.5	42.4	Low recovery.
07	20-21/4	16	44.6	10	5.9	4	256.7	14.0	77.6	Low recovery.
08	21-23/4	16	45.6	12.5	2.0	2	171.0	14.5	25.3	Low recovery.
13	5-11/5	21	60.7	13	7.9	7	137.7	20.0	53.3	
15	4-5/5	16	61.6	11	11.9	4	173.1	15.0	54.9	
17	3-4/5	17	44.7	8	4.1	7.5	140.7	15.5	70.2	Low recovery.
12S	28-29/7	18.5	63.9	14	16.8	3	334.9	17.0	72.9	
BL13 00	10-11/6	17	50.6	14	5.1	3	11.9	17.0	6.3	Not bottomed? Unreliable drilling.
02S	14-16/6	22	94.4	15	5.2	5	113.4	20.0	32.3	Two wash bands.
04S	21-28/6	24.5	74.9	16	5.9	6.5	302.0	22.5	91.4	Two wash bands.

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Hole No.	Drilled	(m)	Rec(%)	m	g/m³(Sn)	m	g/m³(Sn)	m	g/m³(Sn)	
BL13 06S	29-30/6	15	64.4	6	2.5	7.5	29.4	13.5	17.4	Two wash bands.
08S	1-2/7	15	51.2	4	1.3	9	70.6	13.0	49.2	Two wash bands. Low recovery.
10S	15-19/7	19	90.0	4	7.0	13	8.4	17.0	8.1	Two wash bands.
12S	20-23/7	19.5	81.1	12	7.0	4.5	437.5	16.5	124.4	
13S	23-27/7	20.5	93.5	10	2.9	6.5	206.5	16.5	83.1	
BL14 10	19-19/5	14.5	50.9	4	4.2	9	13.8	13.0	10.9	Low recovery. Not bottomed?
12	16-18/5	18	50.4	6	23.8	12	56.7	18.0	45.8	Not bottomed. Two wash bands.
14	13-16/5	18	53.4	7	20.3	9.5	56.3	16.5	41.0	Two wash bands.
16	11-12/5	22	53.5	16	16.6	5.5	331.1	21.5	97.1	Low recovery.
18	7-10/5	16.5	52.8	6	3.4	10	70.5	16.0	45.3	Not bottomed. Two wash bands.
20	4-6/5	17.5	70.7	10	3.9	6.5	117.6	16.5	48.7	
SB 1	14-19/5	30.5	63.5	12	1.7	16.5	161.6	28.5	94.3	Two wash bands.
2	19-24/5	27.5	59.0	18	3.1	7.5	166.5	25.5	51.2	Not bottomed?
3	25-27/5	33	54.5	22	3.2	9	145.5	31.0	44.5	Low recovery. Not bottomed?
4	28/1-2/6	28	52.3	20	2.7	8	6.9	28.0	3.9	Not bottomed?
MG 1	?	8	98.6	-		8	44.6	8.0	44.6	Not bottomed? No log - assays only.
2	22-24/3	11	37.1	-		9	53.5	9.0	53.5	Low recovery. False bottom?
3	24-30/3	25	70.9	15	10.7	10	23.2	25.0	15.7	Not bottomed? Two wash bands.
BT 15A	30-31/3	7.5	65.2	4	11.5	1.5	176.1	5.5	56.4	
16	31/3-1/4	11.5	50.5	2	14	8.5	446.6	10.5	364.2	Low recovery. Two wash bands.
17	2-2/4	6.5	57.5	2	23.4	2.5	110.8	4.5	72.0	
18	5-5/4	9.5	41.0	7	7.2	1.5	130.2	8.5	28.9	Low recovery.
19	6-8/4	25.5	53.9	14	7.1	10	166.7	24.0	73.6	

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(c) Duplicate assays were made on samples collected during bulk sample drilling (see section 6 for more detailed discussion). A comparison of the results shows that the AMDEX derived values, where all 1982 churn drilling samples were also processed, averaged approximately 28% less than the values derived from AMDEL/Readings assays.

Thus, several holes are probably undervalued by the order of 20% and in a few cases where compound errors have occurred, the undervaluation may be at least 50%.

All known drillholes on the Great Northern Plain area are shown on Figure 2. This Figure also indicates depth to base of payzone (where known) in metres and average grade to base of payzone (including overburden) in grams tin metal per cubic metre. Cross-sections as depicted on Figure 2 are contained in Figures 6 to 12. Overlays showing contours of depth to base of payzone (metres) and payzone thickness (metres) are included as Figures 3 and 4 respectively. Figures 3 and 4 have been derived using SANTOS drilling data only and do not refer to previous drilling results.

The cassiterite concentrations are always associated with wash and/or gravel horizons and, as expected, higher grades show some correlation with wash-filled channels and (in particular) thicker sections of wash. However, there are numerous exceptions to this generalisation and the mineralisation generally does not exhibit strong continuity from one section to the next. Thus, while high tin values do occur in some channels (e.g. BL2/48, BL3/13, BL11/14, BL12/02 and BT1), even higher grades have sometimes been intersected on the channel "banks" (e.g. BL6/120, BL8/02, BL11/13 and BL12/12) and some channels are relatively barren (e.g. BL2/46, BL6/122 and BL8/04-06). Also, a very deep channel has been located in the eastern part of the area which circumscribes the prominent Ringarooma Tier dolerite outcrops (see Figure 2). Any casserite concentrations in this channel appear to have been diluted by rapid deposition of large volumes of sediment.

In some places, tin concentrations are found in "perched" positions or "terrace" situations, the best examples being holes 78 to 17 on line BL3 and the northwestern portions of the mineralisation at "Braithwaites" (see Figures 2, 11 and 12). Other examples are BL2/42 and BL12/07.

There is usually only one wash horizon (payzone). The principal exceptions are the deep "Ringarooma Tier" (see above) eastern channel which contains several wash lenses (see BL3,BL5 and BL8), a western "upper" wash band intersected in BL7/00 and BL10/00 and a complex zone in the southern part of the Fosters Marshes area where up to 3 wash horizons appear to be present (see BL13 and BL14).

In summary, the casserite mineralisation is rather eratically distributed with no clearly defined trends extending throughout the mineralised area. The tin was clearly deposited over a period of time by a system of meandering streams, which have apparently caused some localised reworking and erosion of tin-bearing horizons. Figure 5 indicates the main zones of mineralisation which can be inferred from the currently available information. Some inaccuracies undoubtedly exist in the present interpretation due to lack of drilling coverage, poor records of previous drilling and errors in topographic detail.

6.0 BULK SAMPLING

Eight bulk sample holes were drilled during February/March 1982 using a Calweld 200B rig equipped with specially prepared 30 inch diameter interlocking casing. Where permitted by the ground conditions, the casing was always driven ahead of the sampling bucket in an attempt to procure an uncontaminated and representative sample of the alluvium. Sample intervals were mostly around 1 metre and the sample material was loaded into 200 litre drums and processed using a small treatment plant set-up by SANTOS. The plant comprised a small rotating trommel (8mm diameter holes) and a two-hutch jig (steel ragging). Sample volumes were measured at the drill site and prior to processing. The resultant concentrates generally contained less than 15% tin metal although a few samples assayed up to 30% tin.

Jig concentrates were split into two samples, one of which was routinely assayed at AMDEX. The remaining splits from the payzone intervals in holes CDH2, 4, 5 and 6 were sent to AMDEL (CDH 4 and 5) and Readings of Lismore (CDH 2 and 6) for check assaying and metallurgical analysis. The metallurgical results will not be discussed in this report.

A comparison of the assay results shows that, on average, the AMDEL/Readings values were 27.7% higher than the corresponding AMDEX values, suggesting that the local (AMDEX) assays may be low overall.

Measurements of oversize (greater than 8mm) volume (water displacement method) indicate an average oversize proportion of 17.8% (range 9.8% to 32.9%) for the payzone material from all 7 of the holes where measurements were taken.

The Calweld holes were located adjacent to previously completed churn drill holes so as to obtain bulk samples from a spread of geographical locations and over a range of (expected) grades within the mineralised zone. Locations are indicated on Figure 2 and summary results, including volume recovery, overburden depth and grade, payzone depth and grade and total depth and average grade to the base of the payzone, are contained in Table II overleaf. The table also lists similar data from the corresponding churn drill holes. Drillers' logs are available at SANTOS' offices.

Comparison of the Calweld and churn drill hole results indicates a close stratigraphic relationship between adjacent holes (as expected), the exceptions being CDH2 where interpretation of the driller's log for adjacent hole GNP13 is uncertain and CDH8 which is probably <u>not</u> located as close to churn drillhole L17-20 as intended. However, there are large discrepancies between the grade determinations obtained from the bulk samples and adjacent churn drill samples which are difficult to understand.

The low result obtained from CDH1 is possibly not significant because this was the first Calweld hole drilled and sampling was very inaccurate and involved considerable loss of sample material. Also CDH8 and L17-20 are probably <u>not</u> comparable as the exact location of L17-20 is not known.

7.0 RESERVES

7.1 WITHIN SANTOS TENEMENTS

Reserves delineated within the tenements are indicated on Figure 5. They are as follows:

<u>Fosters Marshes</u> (SANTOS drilling): A possible reserve has been outlined between lines BL3 and BL14 as shown on Figure 5. The grade calculation has been made on a line-by-line basis and drillhole grades and depths are assumed to vary linearly between holes along a line and between lines. The reserve is regarded as potentially recoverable (dredgeable) but in-fill drilling is required to verify the existence of the outlined high grade

TABLE II

BULK SAMPLE DRILLING DATA

HOLE NO.	VOL. REC.	OVERBURDEN m	OVERBURDEN g/m³(Sn)	PAYZONE m	PAYZONE g/m³(Sn)	TOTAL m	TOTAL g/m³(Sn)	COMMENTS
CDH1	(100.0)	0.6	0.0	6-13.8	212.6	0-13.8	120.2	Very unreliable drilling (first hole)
GNP16	45.5	0-6	4.7	6-14	711.9	0-14	408.8	Low recovery.
CDH2	114.5	0-14.1	0.5	14.1-20.54	80.2	0-20.54	25.5	
GNP13	49.2	0-10	2.6	10-26	183.0	0-26	113.6	Sampling may be unreliable. Low recovery.
CDH4	69.2	0-7.5	5.5	7.5-16.7	130.1	0-16.7	74.2	
GNP25	52.8	0-8	5.7	8-16	44.7	0-16	25.2	Low recovery.
CDH5	68.0	0-11.5	0.8	11.5-17.9	148.1	0-17.9	53.5	
GNP33	69.7	0-12	1.2	12-19	201.1	0-19	74.9	Not properly bottomed.
CDH6	84.1	-		-		0-8.6	29.2	
MG-2	37.1	-		-		0-9.0	53.5	Just bottomed. Very low recovery.
CDH7	85.5	0-7	17.7	7-8	167.0	0-8	36.4	
GNP86	79.6	0-6	13.3	6-9.5	152.1	0-9.5	64.4	
CDH8	92.0	0-15.5	6.4	15.5-18.5	456.5	0-18.5	79.4	
L17-20	?	0-7.6	5.4	7.6-16.8	300.9	0-16.8	167.2	Dept. Mines drilling. Hole location not known exactly.
CDH9	63.2	0-12	1.0	12-19	173.3	0-19	64.5	
GNP95	54.7	0-13	6.4	13-19	81.9	0-19	30.2	Just bottomed. Low recovery.

trend. The zone contains possible reserves of 19,386,802 cubic metres grading 99.1 g/cu metre tin metal. Average depth to base of payzone is 18.7 metres.

Braithwaites (Department of Mines drilling): The Department of Mines has conducted drilling on a 152m x 183m grid as shown on Figure 2. Braithwaite (1977) has calculated possible reserves of 6,160,000 cubic metres grading 136g/cu. metre tin metal at an average depth of 14 metres. This reserve may be regarded as a potentially dredgeable rather than an in situ figure.

MacGregors (WANEX drilling): Wanex Mining Pty. Ltd. conducted a relatively intensive drilling programme mostly on a 88m x 88m grid, in the area surrounding the old MacGregor, Higgs, Beltz and Taylors workings in 1972/73 (see Figure 2). Proven in situ reserves were estimated to be 3,820,000 cubic metres grading 83 g/cu. metre tin metal and SANTOS calculations indicate a probable recoverable high grade zone of 1,515,815 cubic metres grading 109 g/cu. metre tin metal within the lower grade reserve.

Potential Resources:

The potential tin-bearing areas and resource blocks inferred to exist outside the above reserve areas are also shown on Figure 5. The boundaries marked by a thin line enclose areas where tin concentrations appear likely to exist on the basis of existing drillhole data (generally, a total thickness average grade cutoff of 50g/cu. metre Sn has been used) and taking into consideration payzone thickness trends and bottom contour trends (see Figures 3 and 4).

Within these potentially mineralised areas, seven blocks of ground have been delineated (marked by thick lines) as potential dredging areas on the basis of:

(a) drillhole grades (greater than 50g/cu. metre Sn overall),

(b) relative drillhole density (where possible),

(c) a minimum width of section of approximately 200 metres, and

(d) continuity both with themselves and with the three probable/possible reserve blocks previously outlined.

The combined configuration of the 3 reserve blocks and the 7 potential resource blocks is thus intended to represent the most likely possible dredging paths which could exist in the area. Clearly, further drilling may prove or disprove the presence of potentially dredgeable stanniferous alluvium in the various blocks and the ultimate dredging plan would be determined accordingly.

The lack of drilling data in the zones, outlined on Figure 5, which connect the southern end of the Fosters Marshes reserve, the northwestern side of the Braithwaites reserve and the southern end of resource block 1B places great uncertainty on the existence of potentially dredgeable zones in this region. Accordingly, no definition of possible resource blocks has been attempted within these areas and no resource calculations have been made.

Volume estimates for the potential dredging areas have been made using a planimeter and available depth data. Calculation of an average grade, as indicated by the existing drillholes within each resource block, would be virtually meaningless due to the paucity and/or unknown reliability of the available data. However, when compared to the drilling results obtained from within the three reserve blocks, the typical range of values (see Figure 2) within most of the resource blocks suggests that the overall grade of the potential dredging zones may be similar. An overall minimum grade of 100 g/cu. metre tin metal is assumed for all resource blocks at this stage.

Table III overleaf summarizes volume and grade estimates for all the inferred dredging zones so far outlined:

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Table III

INFERRED RESERVES.

Block	Status	Volume (million cu. metres)	Grade (g/cu. metre Sn)
Fosters Marshes	Possible/dredgeable	19.4	99.1
Braithwaites	Possible/dredgeable	6.2	136.0
MacGregors	Proven/in situ	3.8	83.0
	Probable/dredgeable	1.5	109.0
Resource Block 1A	Potential/dredgeable	12.2	100.0
" " 1B	" /in situ	19.1	100.0
" " 2	" /dredgeable	6.5	100.0
" " 3A	" /in situ	4.9	100.0
" " 3B	" /dredgeable	2.7	100.0
" " 3C	" /in situ	1.9	100.0
" " 4	" /in situ	2.1	100.0

	Proven	Probable	Possible	Potential	TOTAL
Dredgeable	-	1.5	25.6	21.4	48.5
In situ	3.8	-	-	28.0	31.8

Total proven/probable/possible (dredgeable) reserves:

27.1 million cu. metres grading 108g/cu. m Sn

Total potential resources:

49.4 million cu. metres grading 100g/cu. m Sn.

Total inferred mineralization (reserves + resources):

76.5 million cu. metres grading in excess of 100g/cu. m Sn.

7.2 EXTENSIONS OUTSIDE TENEMENTS

The principal known and inferred extensions of mineralisation outside the area of E.L. 19/77 are as follows:

(a) Ringarooma River

Several small areas of mineralisation still exist at various locations along the Ringarooma River south of the present tenements. A small volume of relatively low grade material (less than a million cu. metres grading no more than 125g/cu. metre Sn ?) probably exists south of C.M.L. 42M/76 between the old Roy and Richardson workings. Small areas of higher-grade alluvium occur further to the west, notably in the vicinity of the old Sea Shell and Dry Gut workings where Portland Holdings have collected samples grading up to 5.6lbs/cu. yd. (approximately 3000 g/cu. metre). However, the volumes involved are probably too small or the material is too bouldery (notably in the Dry Gut area) to warrant consideration of a dredging operation.

(b) Scoloch Lead

As discussed in section 3.3 (c), Department of Mines drilling has indicated reserves of 8.4 million cu. metres grading 133g/cu. metre tin metal. The deposit is assumed to continue northwestwards into the Fosters Marshes area, probably in the vicinity of SANTOS drillholes GNP64 and BT16, although it is quite likely that the lead divides into several small channels passing near BT16, south of GNP86 and north of BT17 (see Figures 2, 5 and 11).

The Scoloch "lead" itself is relatively narrow (less than 90m) and deep (average aprroximately 33m) and may not be easily dredged although it is reported to contain significant gold values (up to 2oz per cu. yard? - Wells, 1978) and a dredging section at least 200m wide may be possible.

(c) Bowlers Lagoon

The main trends of mineralisation clearly extend north(west)wards from the northern border of E.L. 19/77, approximately through SANTOS drillholes GNP76 and 69 (see Figures 2 and 6). The mineralisation in this area is covered by up to 20 metres of aeolian sand (dunes) and this thickness of overburden reduces overall grades to sub-economic levels.

(d) Delta-Dugards

Mineralisation has been intersected to the northeast of the old Delta workings and it appears to form part of the Fosters Marshes "sheet" of mineralisation. Drilling to the west of the Delta mine, chiefly by Utah Development (see section 3.3 (b)), has outlined some very patchy, generally low grade mineralisation.

It appears that the relatively uniform main wash horizon which contains virtually all of the cassiterite in the Fosters Marshes region does not extend far to the west of the present Ringarooma River. The cassiterite concentrations in the vicinity of the Dugard workings occur in several apparently discontinuous wash zones mostly located above the level of the main Fosters Marshes wash zone and the patchy nature of the mineralisation would require a substantial drilling programme to accurately determine if any significant (dredgeable) reserves existed.

(e) Great Northern Plain

The area extending northwestwards from the old Scotia and Lochaber workings, roughly between the Scoloch Lead and the Ringarooma River (see figures 2 and 13) may contain tin-bearing alluvium. However, the auger drilling conducted by Utah (Warin & Appleby, 1965) in 1965 has considerably downgraded the potential of this area and it seems likely that bedrock

(Mathinna metasediments) lies at shallow depths (less than 3m) beneath most of this area.

8.0 SUMMARY AND CONCLUSIONS

SANTOS/Hellyer has acquired an interest in tenements with a total area of approximately 137km^2 which have the potential to host an alluvial tin dredging development, subject to delineation of a sufficient volume of economically viable mineralisation, resolution of potential environmental conflict and determination of private ownership of mineral rights.

The Company has completed 155 churn drillholes totalling 3263 metres and eight 76cm. diameter bulk sample holes (together with preliminary metallurgical, engineering and environmental work) in the Great Northern Plain region during 1981/82.

The main potentially dredgeable body of mineralisation comprises a single payzone of Quaternary age having a blanket-like morphology within which casiterite concentrations appear to be irregularly distributed. This payzone extends from the old MacGregors area in the southeast to the coast of Ringarooma Bay in the northwest and is essentially confined to the eastern side of the present Ringarooma River. Overburden ratios typically range from less than 1:1 in the south to greater than 2.5:1 in the north and gradients are generally less than 2m/km (see Figure 13). Closely associated with the blanket type mineralisation centered on the Fosters Marshes area is the so-called Braithwaites mineralisation which appears to represent a partially preserved terrace deposit (see Figure 2).

Total possible dredgeable reserves are estimated to be 27.1 million cu. metres grading 108g/cu. metre tin metal and a total potential resource amounting to an additional 49.4 million cu. metres, anticipated to grade at least 100g/cu. metre tin metal, have been outlined.

The only other known potentially dredgeable reserve of significant size in the region is the so-called Scoloch Lead, estimated to contain possible reserves of 8.4 million cu. metres grading 133 g/cu. metre tin metal. Should the Company wish to continue its involvement in the region, an attempt to secure title over this zone is recommended.

On the basis of the present drilling and bulk sampling results, previous drilling results and the average recoveries obtained by the Dorset Dredge, the Great Northern Plain deposits can generally be expected to contain average payzone grades of around 250g/cu. metre tin metal and average total grades of around 75g/cu metre tin metal when large blocks of ground are considered. However drilling to date has indicated that higher grade zones do occur within the area and the aim of exploration has been to delineate total reserves of approximately 50 million cu. metres grading between 100 and 150g/cu. metre tin metal.

Due to the generally good bottom conditions, typical looseness of the alluvium, low-lying nature of the area and reasonable access, the prospect represents an excellent dredging proposition if adequate reserves can be located.

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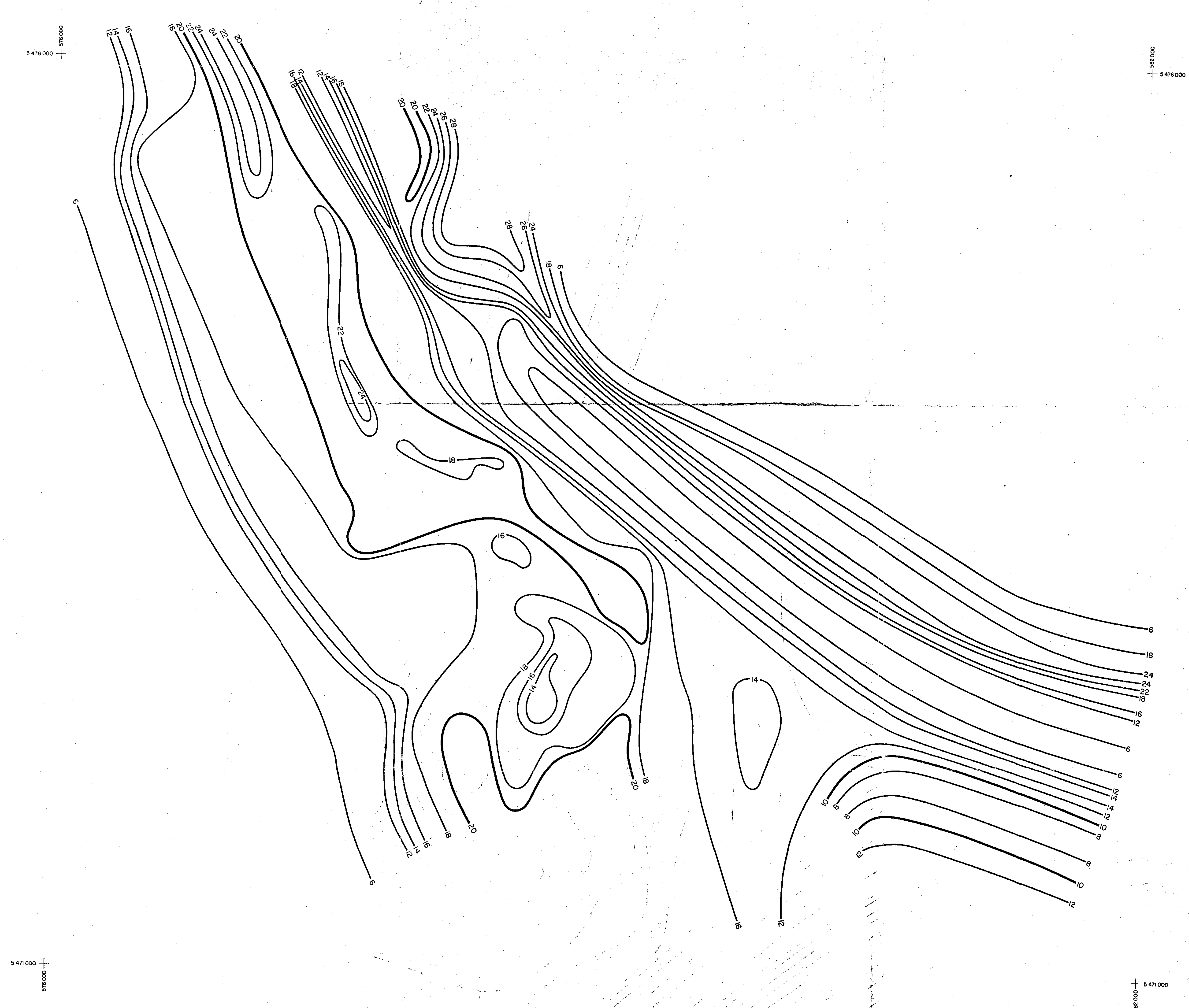
E.L.19/77
E.L.17/82
C.M.L.42M/76
BOWLERS LAGOON
RINGAROOMA RIVER
RINGAROOMA TIER
Fosters Marshes
Braithwaites
MacGregors
DELTA WORKINGS
GOVT RESERVOIR
SANTOS STORE
SCOLOCH LEAD
MAYFIELD
576000mE
577
578
579
580
581
582
469000mN
470
471
472
473
474
475
476
BULK SAMPLE HOLE LOCATION
SANTOS
PREUSSAG
WANEX
TASMANIAN DEPT. MINES
BURMA MALAY TIN LTD
STOREY'S Ck. TIN MINING Co N.L.
DORSET TIN DREDGING
1932-1963
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
584038
HELLYER MINING & EXPL. PTY. LTD.
6672
NORTH EAST TASMANIA
GREAT NORTHERN PLAIN
DRILL HOLE DATA
83-1966 copy 1
5 cm
SCALE 1:10000
METRES
FIGURE 2

6672



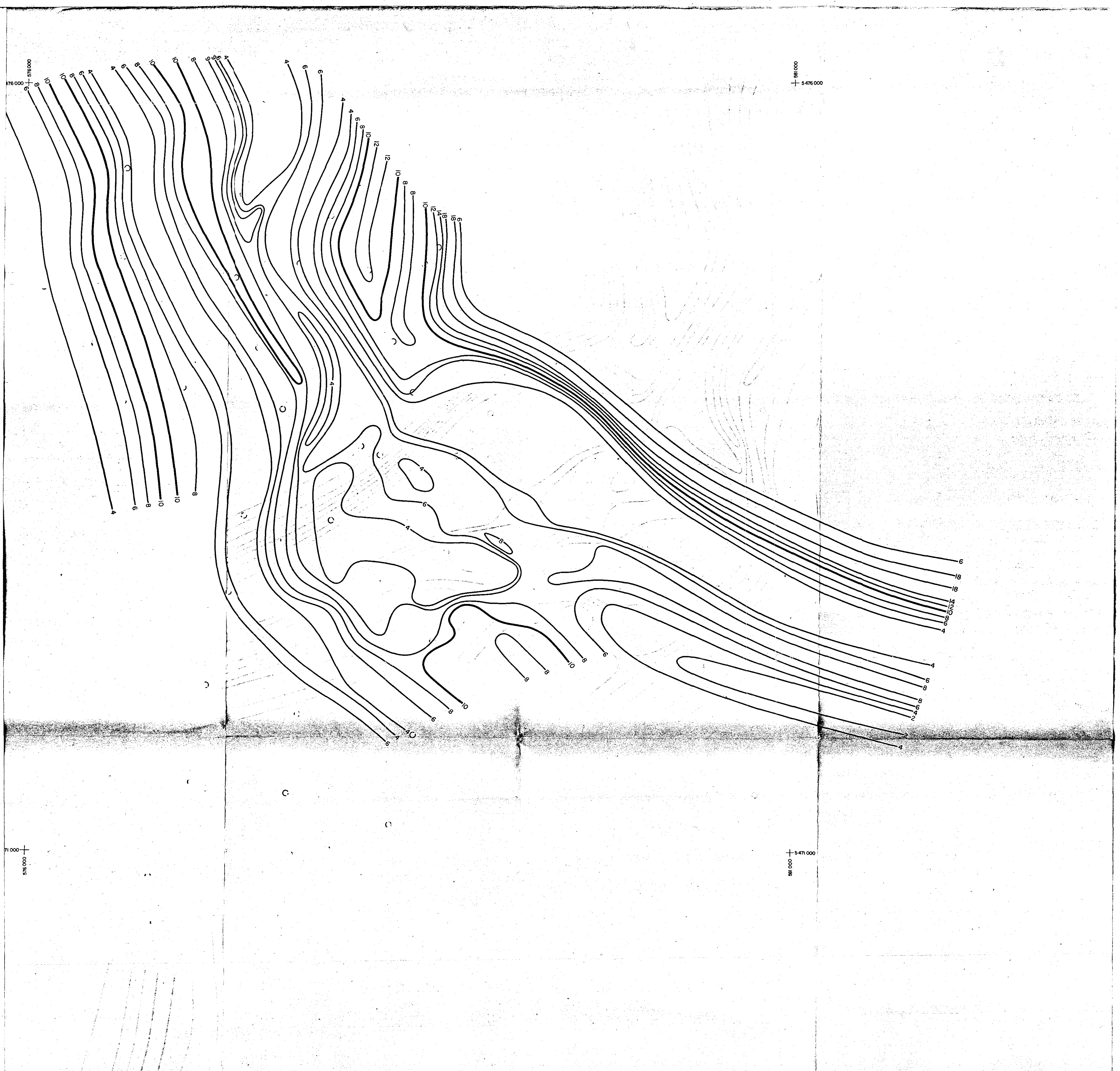
584039

CONTOURS OF DEPTH TO BASEMENT (DREDGING BOTTOM)

CONTOUR VALUES IN METRES

FIGURE 3

6-P2



584040

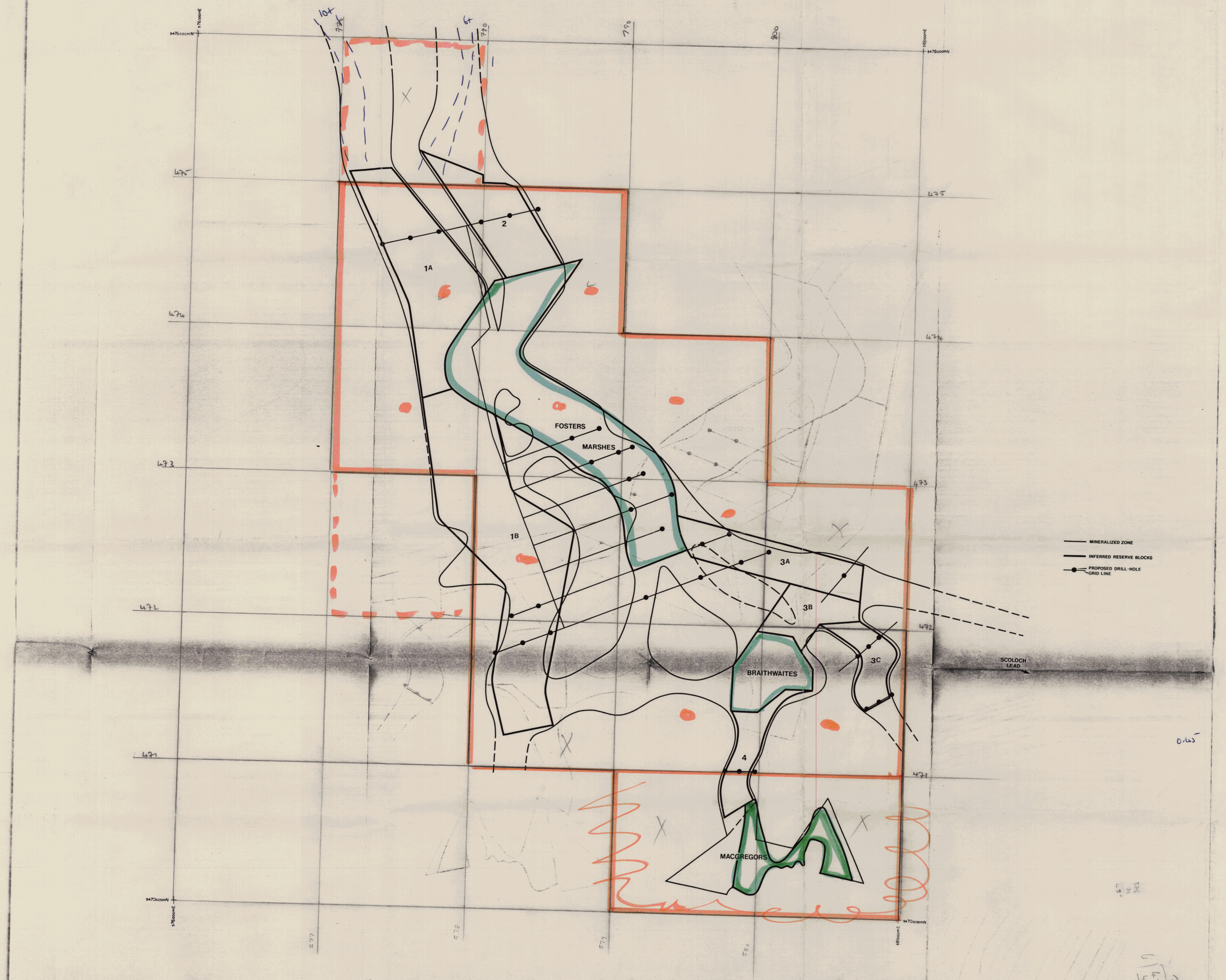
CONTOURS OF PAYZONE
(DREDGING) THICKNESS

CONTOUR VALUES IN METRES

FIGURE 4

83-1966 copy 2

6674



584041

POTENTIAL ORE RESERVES & PROPOSED DRILLING

FIGURE 5

6675

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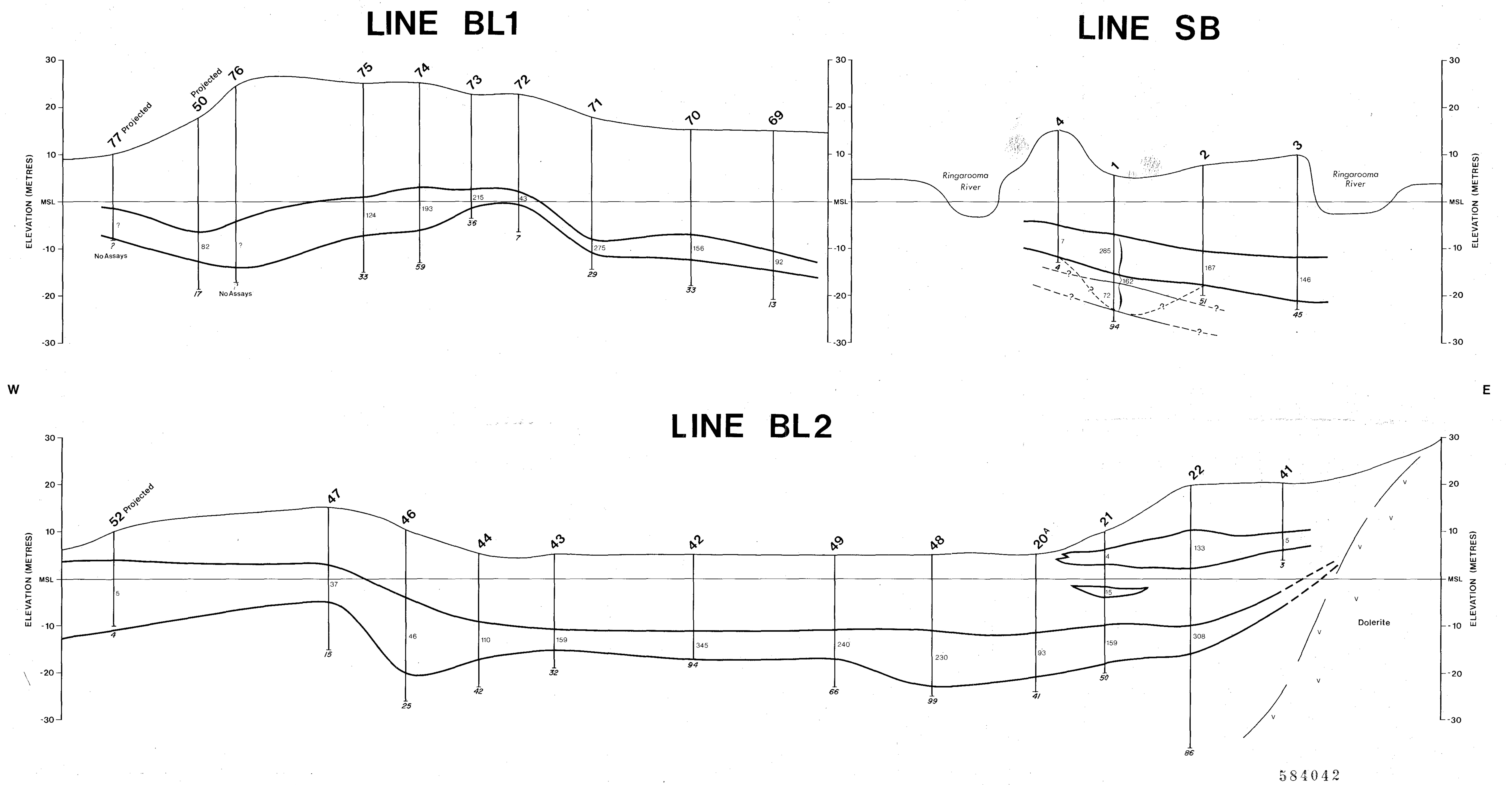

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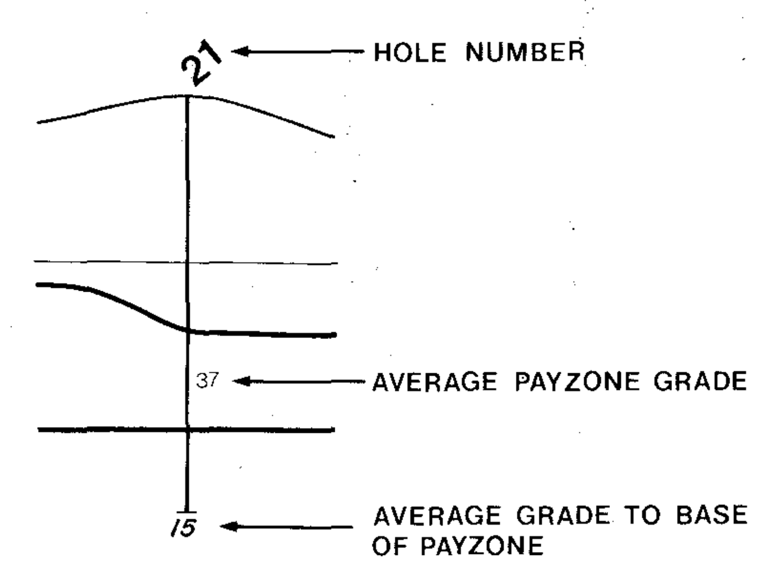

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GREAT NORTHERN PLAIN

N.E. TASMANIA

GEOLOGICAL CROSS SECTIONS - LINES BL1, SB, BL2

5 cm

SCALE 1:5000

0 100 200 300 400 500

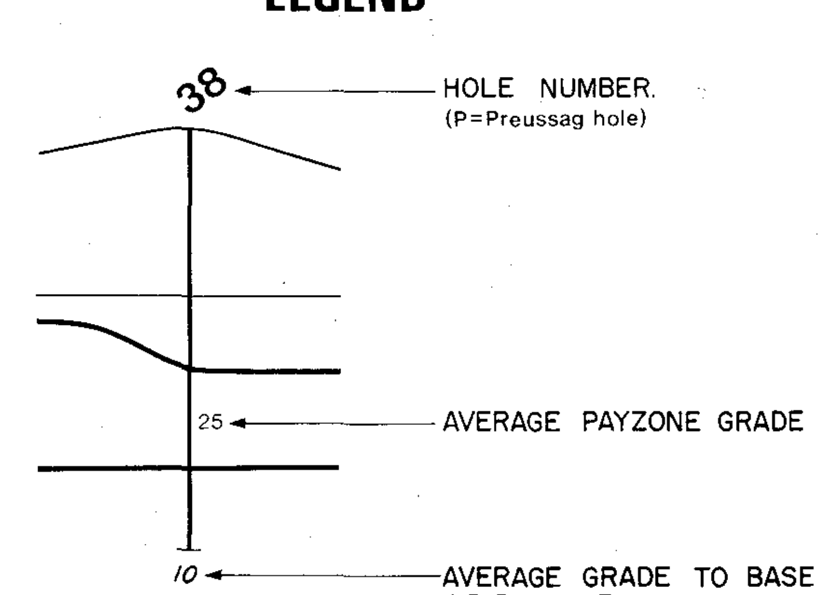
METRES

VERTICAL EXAGGERATION 10×

FIGURE 6

83-1966 Copy 1 6676

LEGEND



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GREAT NORTHERN PLAIN

N.E. TASMANIA

GEOLOGICAL CROSS SECTIONS — LINES BL3, BL5, BL6

SCALE 1:5 000

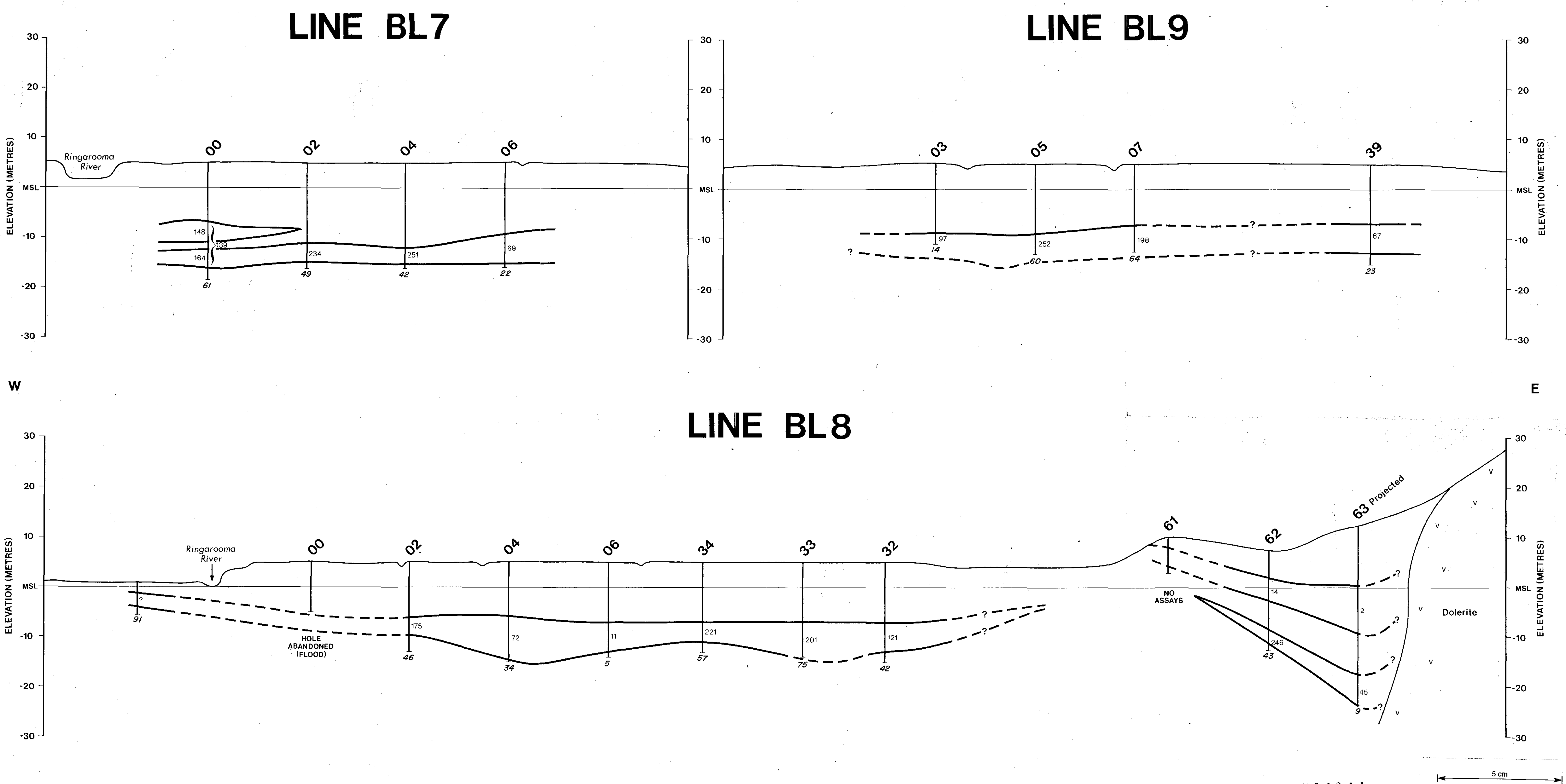
0 100 200 300 400 500

METRES

VERTICAL EXAGGERATION 10x

FIGURE 7

83-1966 Copy 1 6677



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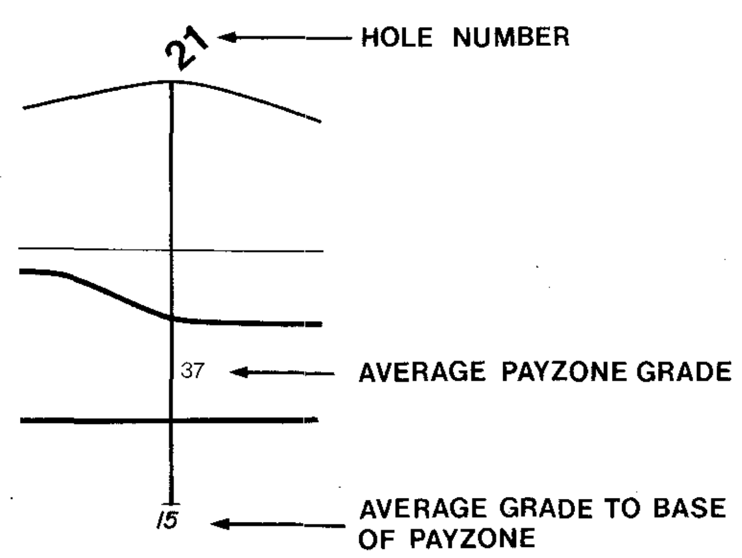

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GREAT NORTHERN PLAIN

N.E. TASMANIA

GEOLOGICAL CROSS SECTIONS LINES BL7,8,9

83-1966 copy 1

SCALE 1:5000

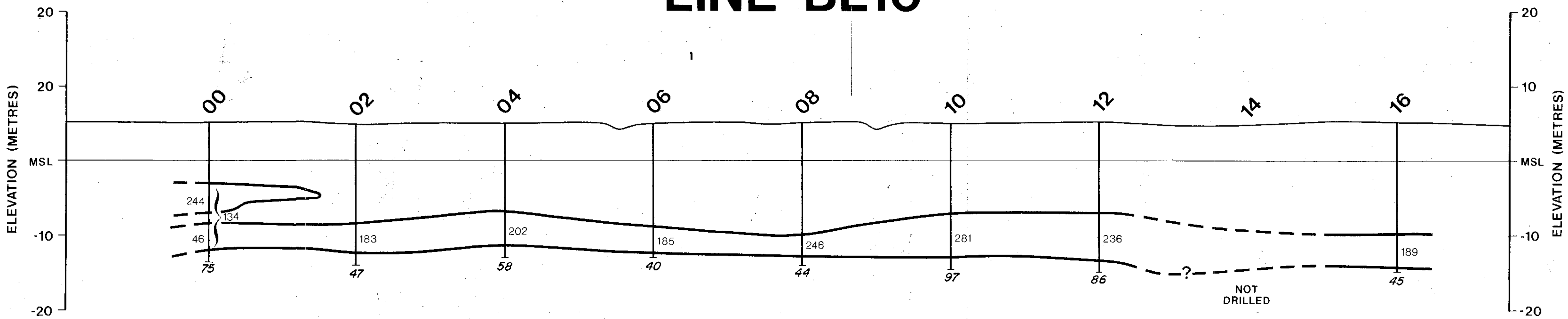
0 100 200 300 400 500

METRES

VERTICAL EXAGGERATION 10x

FIGURE 8

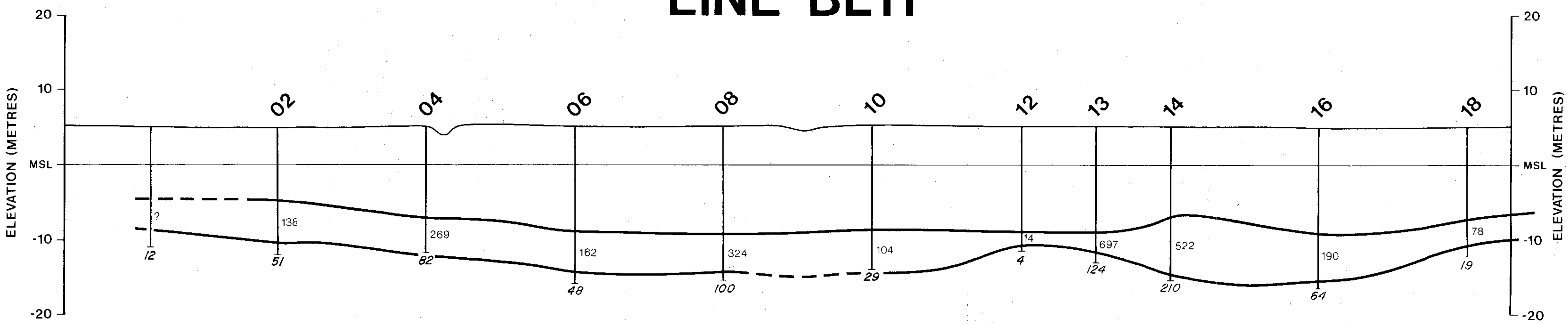
LINE BL10



W

E

LINE BL11



5 cm

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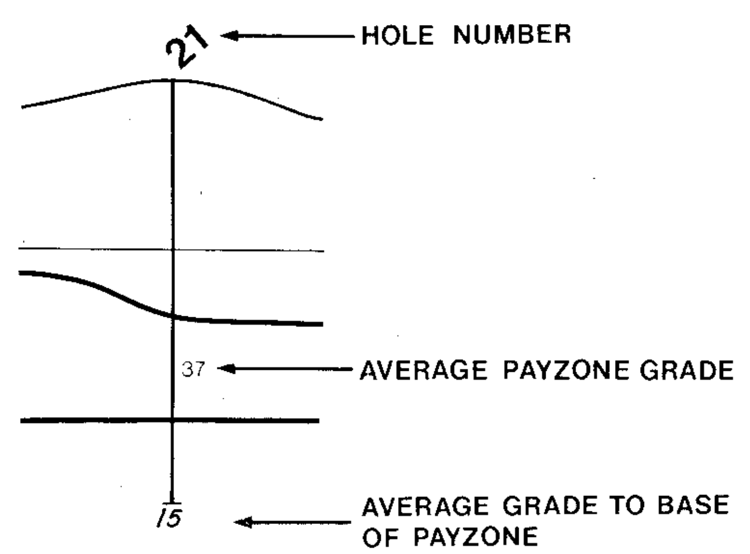

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GREAT NORTHERN PLAIN

N.E. TASMANIA

GEOLOGICAL CROSS SECTIONS LINES BL10,11

584045 83·1966 Copy1

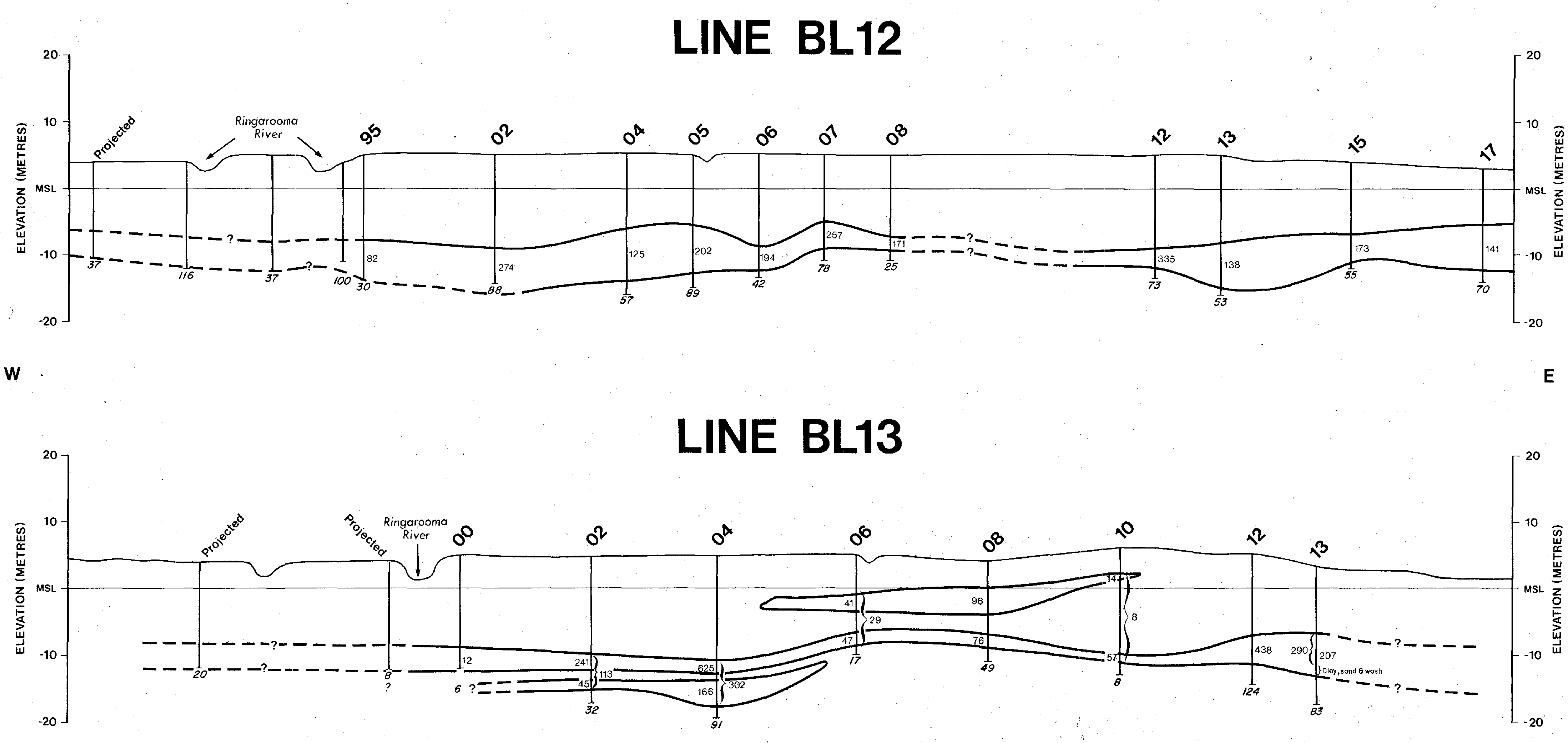
SCALE 1:5000.

0 100 200 300 400 500

METRES

VERTICAL EXAGGERATION 10x

FIGURE 9



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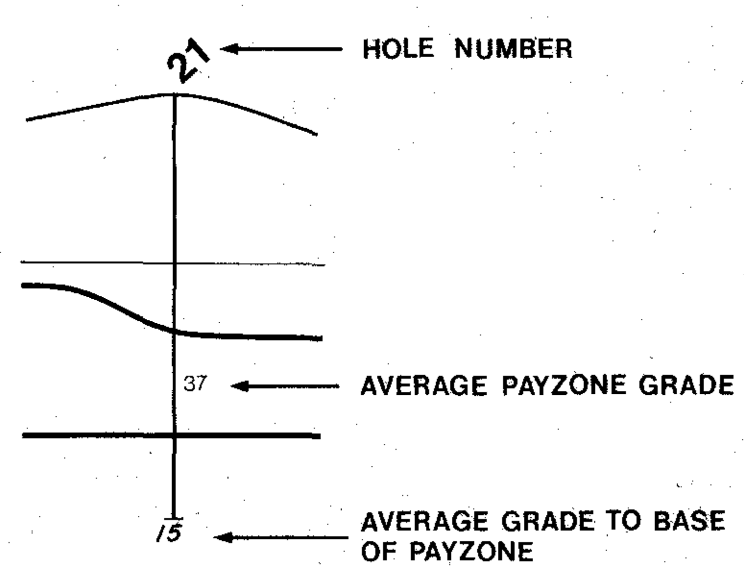

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GREAT NORTHERN PLAIN

N.E. TASMANIA

GEOLOGICAL CROSS SECTIONS
LINES BL12,13

5 cm

SCALE 1:5000

0 100 200 300 400 500

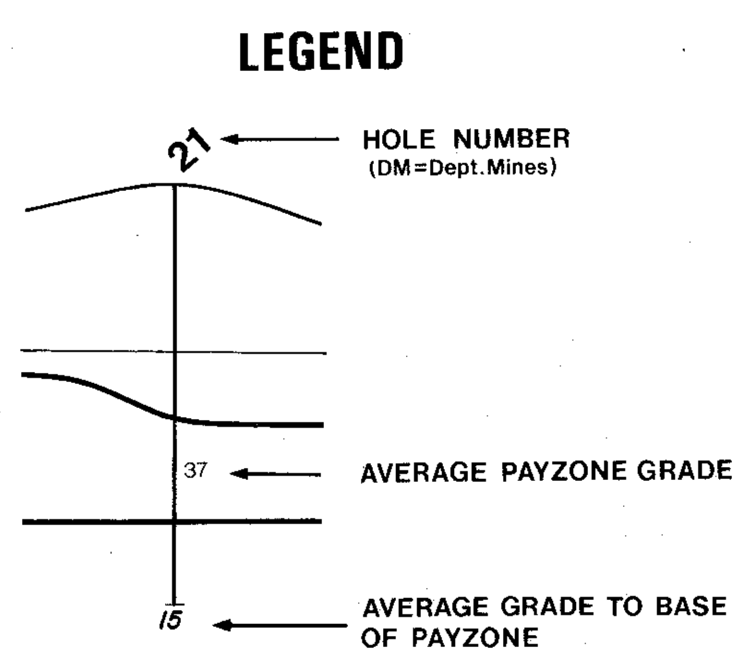
METRES

VERTICAL EXAGGERATION 10x

584046

FIGURE 10

6680



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GREAT NORTHERN PLAIN

N.E. TASMANIA

GEOLOGICAL CROSS SECTIONS LINES BL14, BT-1, MAYFIELD

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SCALE 1:5000

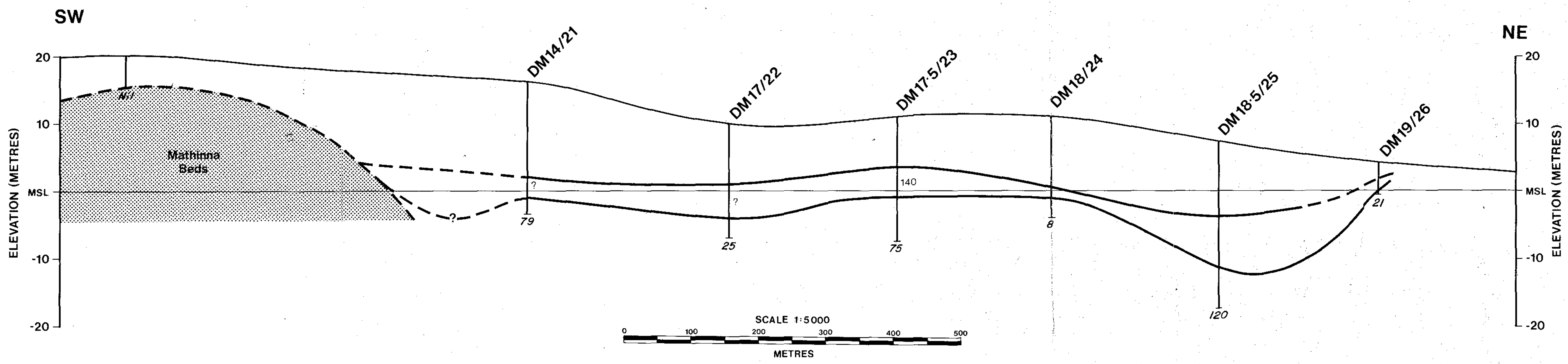
0 100 200 300 400 500

METRES

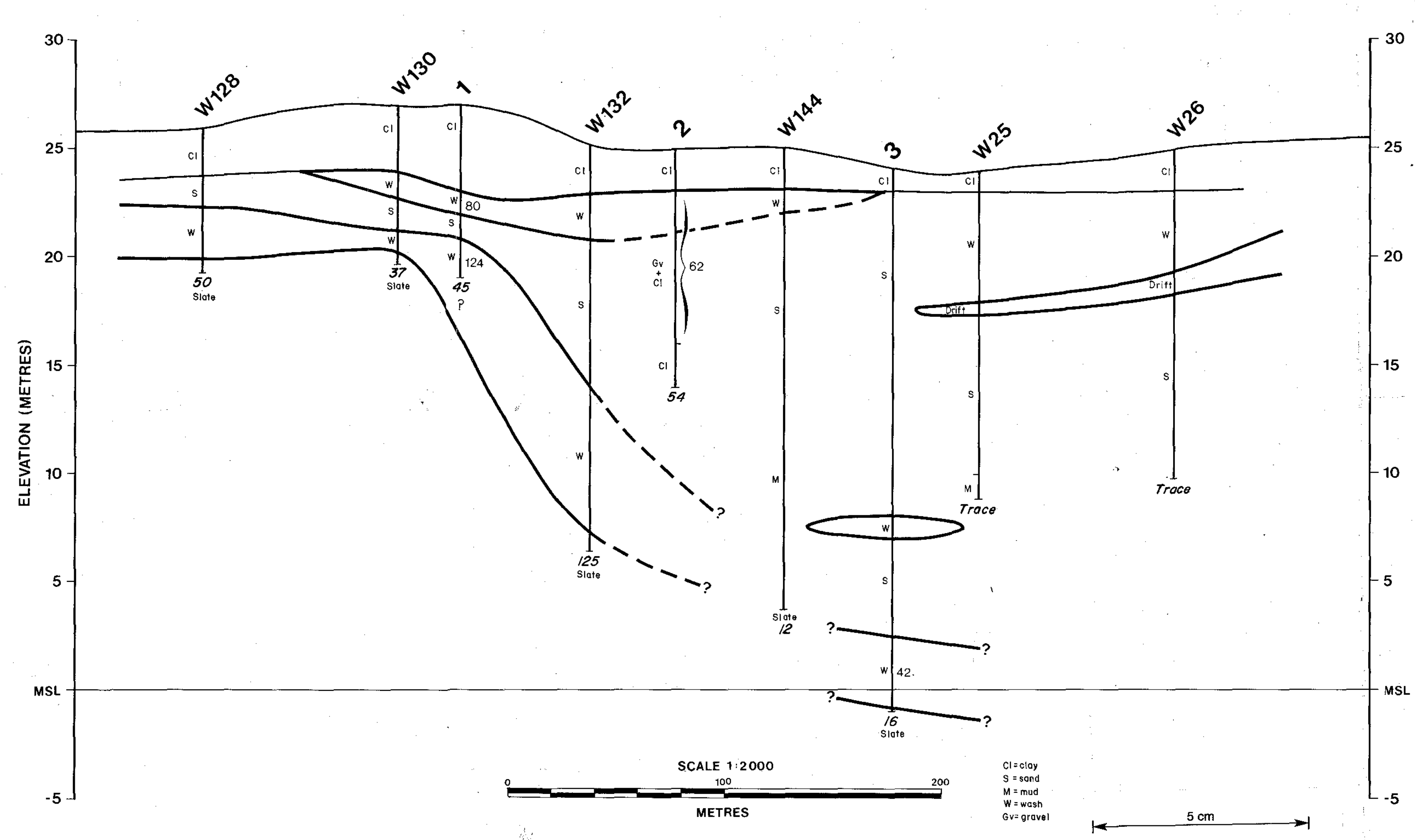
VERTICAL EXAGGERATION 10x

FIGURE 11

LINE BT-2



LINE MG



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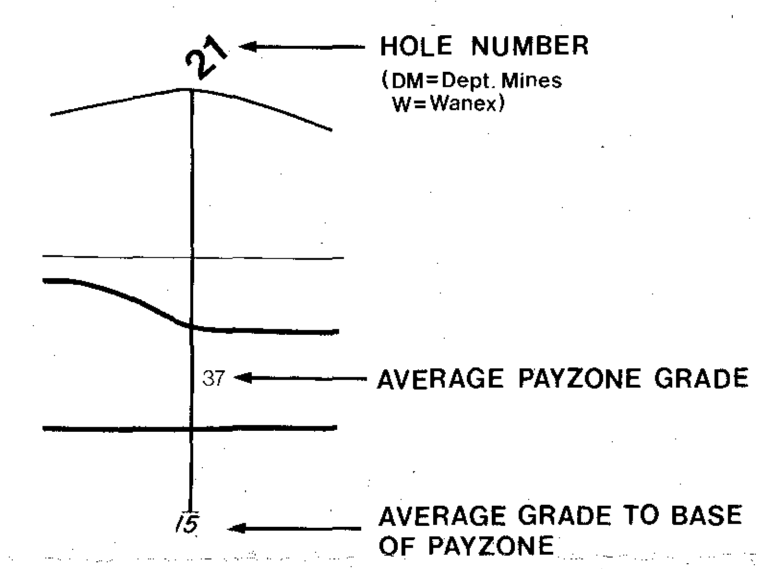

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GREAT NORTHERN PLAIN

N.E. TASMANIA

GEOLOGICAL CROSS SECTIONS LINES BT-2, MG

584048

VERTICAL EXAGGERATION 10x

83-1966

COPY 1

FIGURE 12

6682

6683

584049

N.E. TASMANIA

GLADSTONE - RINGAROOMA BAY

LONGITUDINAL SECTION, LOOKING NORTH EAST

SCALE 1:25 000

0 1 2 3 KILOMETRES

Vertical Exaggeration 25x

83-1966 Copy 1.

FIGURE

6683