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MT BISCHOFF TIN PROSPECT
EXPLORATION LICENCE 13/79
RETENTION LICENCE APPLICATION
GEOLOGICAL REPORT
REPORT NO. 232002

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TABLE OF CONTENTS

SUMMARY

1.0 INTRODUCTION

2.0 GEOLOGICAL INVESTIGATIONS

3.0 REGIONAL GEOLOGY

- 3.1 REGIONAL GEOLOGICAL CUTTING
- 3.2 STRATIGRAPHY

4.0 LOCAL GEOLOGY

- 4.1 THE MOUNT BISCHOFF BEDS
- 4.2 CAMBRO - ORDOVICIAN SEDIMENTS
- 4.3 TERTIARY AND QUATERNARY SEDIMENTS
- 4.4 IGNEOUS ACTIVITY
  - 4.4.1 The Quartz-Porphyry Dykes
- 4.5 STRUCTURE

5.0 TIN MINERALISATION AT MT BISCHOFF

- 5.1 INTRODUCTION
- 5.2 DSL - DOLOMITE ORE
- 5.3 QP - QUARTZ PORPHYRY ORE
- 5.4 MINERALISATION IN RHEOMORPHIC SEDIMENTS
- 5.5 VEIN-TYPE MINERALISATION

6.0 ORE RESERVES

7.0 CONCLUSION/RECOMMENDATION

APPENDICES

I MAP RETENTION LICENSE AREA APPLIED FOR
II 1982 ORE RESERVE CALCULATIONS
III 1983 ORE RESERVE CALCULATIONS
IV SURFACE PLAN OF THE KNOWN ORE RESERVE AREA JANUARY 1982
V SELECTION OF CROSS-SECTION AND PLANS USED IN THE ORE RESERVE CALCULATIONS

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SUMMARY

The geological ore reserves at Mt Bischoff are split into two categories based on their occurrence (DSL - Dolomite Sulphide Lode and QP-Quartz Porphyry). The density for each ore type was determined from testwork at Amdel and is 3.5 g/cc ad 3.0 g/cc respectively. The ore reserves were calculated using the polygonal cross-section method and are:-

DSL (at 0.3% SN cut-off)

%SN	TONNES	CATEGORY
1.12	53800	Proven
1.05	1053800	Probable
0.76	221260	Possible
0.52	99240	PP
0.87	1428100	TOTAL

QP (at 0.2% SN cut-off)

%SN	TONNES	CATEGORY
0.47	3325500	Probable
0.50	76300	Possible
0.33	120100	PP
0.47	3521900	TOTAL
0.58	4950000	GRAND TOTAL

1.0 INTRODUCTION

The Mt Bischoff Joint Venture comprising Comstaff, Preussag and M.E.L. commenced fieldwork on the Mt Bischoff Project in June 1987. Prior to this date the Mt Bischoff region and more particularly the mine area had been explored by prospectors, the government and a series of joint venturers.

This report briefly describes the work undertaken by the present joint venturers, the regional and local geology together with the ore reserve calculations for the deposit.

2.0 GEOLOGICAL INVESTIGATIONS

Trenching, auger and rock chip sampling, aeromagnetic and ground magnetic studies were integrated with geological mapping to generate drill targets in the proposed 6km^2 Retention License area surrounding the old tin workings. Diamond, percussion and reverse circulation drilling on both a 20m x 20m grid (Dolomite Sulphite Lode - DSL) and 40m x 40m grids (Quartz Porphyry - QP) enabled detailed structural, stratigraphic and ore distribution (grade) information to be obtained. This was used to generate cross-sections, bench plans and longitudinal sections which enabled proved (5m x 5m drilling), probable and possible ore reserves to be calculated using the polygonal cross-section method. These calculations are detailed in section 6.0 and Appendices II and III of this report.

3.0 REGIONAL GEOLOGY

3.1 Regional Geological Setting

The Mt Bischoff-Waratah district is characterised by a south-west trending inlier of upper Pre-Cambrian sediments forming an anticlinoriom whose flanks are overlain by a thick sequence of Cambro-Ordovician sediments and Silurian igneous rocks. These are in turn unconformably overlain by Tertiary sediments and lavas. Felsic igneous rocks of Devonian age locally intrude the Pre-Devonian rock sequences. The Mt Bischoff inlier is located between two major Pre-Cambrian structural units: the Rocky Cape geo-anticline to the north-west and the Tyennan geo-anticline to the south-east. Flanking the Tyennen anticline, towards the Mt Bischoff side, is the Mt Reid volcanic arc with its felsic volcanites and minor intrusives. Upper Cambrian and Ordovician marine sediments overlie the volcanics and occur mostly on large synclinal structures. Cambrian sediments, volcanics and ultramafics occur around and to the north-west of Mt Bischoff and adjacent to the south-east margin of the Rocky Cape geo-anticline. About 32 kilometres to the north-east and 8-16 kilometres to the south-west respectively, are the Housetop and Meredith granite batholiths, both of Devonian age.

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Tectonic movements in the north-west of Tasmania associated with a Devonian orogeny produced broad NNE trending faults parallelling the NNE margin of the Tyennen geo-anticline. (Solomon and Groves 1963). Stress patterns caused the development of east and north-east folding in the Waratah area of which the main structural feature produced is the Mt Bischoff anticlinorium.

3.2 Stratigraphy

The basal rocks in the area are the Upper (?) Proterozoic Mt Bischoff beds which consist of sands, silts and marls.

In Cambro-Ordovician times sedimentation occurred again resulting in the deposition of a thick succession of grey wacke, mudstone and sandstone. Volcanic activity took place and produced tuffs, breccias and spilites. (Dundas series of Reid 1923). Ophiolite type rocks of possible Silurian age intrude these early Palaeozoic sequences.

A major orogeny occurred between the lower and middle Devonian and resulted in the arcuate NNE trending folds characteristic of NW Tasmania. Following this folding period and marking the end of the Palaeozoic geological events, is the intrusion into structural highs of granitic batholiths such as the Meredith and the Housetop granites.

At Mt Bischoff a narrow granitic "cupola" probably protruding from the Meredith batholith, is postulated to have intruded the crest of the Mt Bischoff anticlinorium. Tensional stresses in the sediments, due to the uplift produced by the intrusion, resulted in the familiar triple point failure pattern. Quartz-porphyry dykes genetically related to the proposed "cupola" were emplaced along fractures related to the brittle deformational event.

The Tertiary period was heralded by peneplanation and subsequent deposition of conglomerates,gravels, siltstones and lignitic clay. Outpouring of basaltic lavas followed.

Below is the lithostratigraphic sequence adapted after Solomon and Groves (1963), Chapple (1971) and Reid (1923).

ERA	PERIOD	LITHOLOGY
Caenozoic	Quaternary	Gravels and alluvium
	Tertiary	Basalts & tuffs (15-45m thick), siltstone, gravels, lignite seams, lignific clays. Basal conglomerate contains Permian boulders and Sn0).

MESOZOIC	Jurassic	Dolerite dykes
	Permo-Carboniferous	No deposition or eroded?
	Devonian (F-Sn and Pb/Zn-Ag mineralising event)	Quartz-felspar porphyry Granodiorite and adamellite intrusive into both the Bischoff series and Cambrian rocks.
	?Silurian?	Ultrabasic and basic intrusives (?)
		Sandstone, shale, limestones
	?Cambrian?	Pyroxenite, peridotite serpentinite, gabbros-Magnetite dyke (albeit-porphyrite)
	Cambro-Ordovician (Dundas series) or (Waratah R. Sequence) + 3050 m)	Laminated to massive sandstone greywacke, cherts, breccia, sandstone - lavas and pyroclastic (basalts)
	*** UNCONFORMITY ***	
PRECAMBRIAN	Upper(?) Proterozoic E-W inlier Mt. Bischoff series or Beds + 1220 m)	Alternating quartzites sheared shales &
		Dolomite and dolomitic shales.
		Mt. Bischoff area: Black shale sequence (+610m thick)
		Dolomite and dolomitic shales (+60m thick)
		Grey shale sequence (+610m thick).

4.0 LOCAL GEOLOGY

4.1 The Mount Bischoff Beds

Rocks of the Mt Bischoff beds occupy an EW trending zone of about 20 square kilometres between the Magnet Mine to the south-west and Deep Creek to the north-east, and Waratah township to the south. The beds consist of alternating quartzite, siltstone, shale and argillite. A dolomite horizon is present at roughly mid position in the sequence.

In the mine area the succession is as follows:-

Black Shale Sequence +610m

Black carboniferous shale and argillite, interbedded quartzites and grey shales.

? sedimentary break ?

Dolomite and Dolomitic Shale Sequence -60m

Grey Shale Sequence +550m

Grey shale, argillite, quartzite and minor carbonaceous shale and argillite.

Argillaceous rocks of the Black Shale Sequence are commonly sheared and thinly bedded although some massive units have been observed. These are fine grained (0.03 - 0.01 mm size grains) and are made up of muscovite, sericite, and quartz. Framboidal pyrite has been observed. Carbonaceous material is present and imparts the dark colouring to these rocks.

Quartzite and sandstone of the Black Shale Sequence are thinly bedded to massive. They consist mainly of quartz and muscovite ranging from 0.1 - 0.5 mm in diameter. Disseminated pyrite also occurs. Accessory minerals include zircon, rutile and tourmaline. The dolomite horizon reaches a maximum thickness of 75m at Mt Bischoff and is 30m thick some 3.2 kilometers north of the mountain. the dolomite rock is creamy to pale grey when fresh, brown when weathered. Some banding is visible in places and is thought to represent bedding.

Rocks of the Grey Shale Sequence, which are shale, argillite, siltstone, are finely laminated with quartz and muscovite as the predominant grains in a matrix made up of sericite and quartz. No carbonaceous matter was noted, although thin and discontinous lenticular beds of carbonaceous shale may be present in places. Tourmaline is found locally. Muscovite and sericite are much more dominant in the fine shales than in siltstone.

4.2 Cambro-Ordovician Sediments

The Cambro-Ordovician sediments unconformably overlie the Mt Bischoff Beds. The major sedimentary lithologies are fine grained such as mudstone, greywackes, chert and sandstone.

4.3 Tertiary and Quaternary Sediments

Conglomerates, gravels, silstones and lenses of lignite form a sequence some 15 - 20m thick. Some cassiterite was found in the basal beds, and was mined on the southern flank of Don Hill.

Recent gravel and alluvium are well developed in the Waratah River valley especially at the confluence with Cliff Creek.

4.4 Igneous Activity

In the Waratah district, five periods of igneous activity are represented. These are as follows:-

(i)	Proterozoic	-	Felsic pyroclastic rocks
(ii)	Cambrian (?)	-	(a) Basaltic lavas and tuffs (b) Mafic and ultramafic rocks of ophiolitic association
(iii)	Devonian	-	Intrusion of felsic igneous rocks including granodiorite and adamellite batholiths with related quartz-felspar porphyry dykes
(iv)	Jurassic	-	Dolerite dykes
(v)	Tertiary	-	Plateau basalts and tuffs

This report will concentrate on the quartz-porphyry dykes. They are the most prominent feature in the area and host a significant part of the Mt Bischoff tin resource.

4.4.1 The Quartz-Porphyry Dykes

The dykes are from 4 - 30 metres in width and up to 1200 metres long, with preferential EW, NW and NE trends, dips are steep to the north and the west, or vertical. The porphyries were dated at 349 +/- 4 million years (Brookes 1966).

Local pre intrusion breccias occur along the walls of the dykes and vary from 0.5m to 6m in thickness.

Close to the contacts flow banding may be present. Unaltered specimens of porphyry consist of large orthoclase and quartz phenocrysts set in a fine grained ground mass of orthoclase, quartz and minor plagioclase.

Within the category of the quartz-porphyry dykes are several varieties which however, depend on the subsequent hydrothermal and pneumatolitic alteration of a primary porphyry rather than variations within the parent magma. This alteration is so extensive in places that the original texture of the rock no longer exists. The altered porphyries consist of a fine grained groundmass of quartz and topaz with sporadic sericite and talc. Fluorite and tourmaline are locally present. Sulphides are generally abundant and occur as fine specks or as lath-shaped aggregates which replace felspars.

4.5 Structure

The ENE-WSW trending Mt. Bischoff anticlinorium constitutes the main structural feature in the area and affects the pre-Cambrian rocks only. The anticlinorium has a wavelength of about 8 km and an amplitude of 3.2 km. It has the overall shape of a dome and is interpreted as a double plunging structure. The overall structure is distorted by numerous drag folds, and folds of latter generations superimposed over the anticlinorium.

Devonian faults are of tensional character and have W or NNW trends. An important fault of this age displaces minor westerly folds of the Mt. Bischoff Anticlinorium. Faults of post intrusive age are seen to cut the porphyry dykes and are mineralised.

5.0 TIN MINERALISATION AT MT. BISCHOFF

5.1 Introduction

The Mt. Bischoff tin mineralisation is limited to an area of 610 metres radius with its centre situated in the Brown Face open cut (Appendix IV). This mineralisation is contained in three distinct lithological units; these are;-

i) dolomite (dolomite-ore)
ii) quartz-porphyry (porphyry-ore)
iii) rheomorphic sediments

5.2 DSL - Dolomite Ore

This is a replacement of the dolomite bed in the Mt. Bischoff Beds at Mt. Bischoff. This bed, probably folded before the mineralising event, was locally altered and mineralised. Distribution of mineralisation within the body is irregular, some portions having massive sulphides while others are sulphide free. However, sulphides show a rough zonal arrangement whereby in sulphide-rich zones, pyrrhotite occurs in the centre with pyrite and sphalerite at the periphery. Replacement mineralisation of the dolomite bed was confined to a small area pervaded by a fracture system.

The dolomite-ore can be divided into three dominant types:-

(i) The carbonate-sulphide ore consisting of carbonates with veinlets of pyrrhotite, pyrite and arsenopyrite. Cassiterite occurs in coarse carbonate and is locally coated with stannite.

ii) Massive pyrrhotite-pyrite ore - This is made up of masses of pyrrhotite, pyrite, marcasite with traces of stannite and chalcopyrite.

iii) The talc ore shows pyrrhotite bands with rare cassiterite crystals.

A study of polished sections from mineralised dolomite showed that the most common ore minerals are represented by pyrite, pyrrhotite, marcasite and sphalerite. Variable amounts of cassiterite and stannite are associated with these sulphides. Chalcopyrite occurs locally. Fluorite and sellaite are common.

Pyrite occurs as subhedral to euhedral grains or polygonal aggregrates. Grain size ranges from 40 to 500 and its relative abundance by volume is in the range of 20% to 85%.

Pyrrhotite may occur as inclusion in pyrite or elsewhere as anhedral aggregates up to 750 in size. It is usually replaced by marcasite and its relative abundance is between 5% and 40%.

Marcasite occurs as alteration product of both pyrite and pyrrhotite, more commonly the latter. In places it is colloform whereas in others it shows it typical twinning. Its percentage by volume is in the order of 5 to 40.

Sphalerite is seen in relative abundances of between traces to 10%. It is either enclosed in non-opaques or as marginal to pyrite-pyrrhotite aggregates. It may contain inclusion of stannite, pyrite or pyrrhotite.

Cassiterite has a relative abundance of between traces to 4% of the total volume. It usually occurs as trains of discrete grains or as patches marginal to pyrite-pyrrhotite aggregates.

Stannite occurs as traces, or locally up to 1% of the total volume. It is usually either in isolated grains or marginal to sulphides. It may occur as small agreggates in gangue.

Chalcopyrite, tremolite and arsenopyrite occur in small traces or locally as inclusions in sphalerite.

Fluorite (CaF^2) and sellaite (MgF^2) were detected by XRD in two specimens. These minerals may account for the high F values (up to 11% in the mineralised dolomite.

10

5.3 QP - Quartz-Porphyries Ore

Mineralisation in the quartz-porphyry dykes includes topaz, tourmaline, fluorite, pyrite, pyrrhotite, cassiterite, stannite, sphalerite and wolframite. These minerals generally pseudomorph, felspar and/or quartz. Cassiterite crystals associated with quartz and tourmaline also occur along joint planes within the porphyry. A study of polished sections from mineralisation porphyry revealed the following:-

Pyrite forms between 5% and 90% of the total volume of ore minerals. It occurs as euhedral to anhedral aggregates, locally replaced by marcasite. There are two distinct generations of pyrite. One is after pyrrhotite and can be distinquished by its lamellar structure. The other is older, is skeletal and replaces silicates.

Pyrrhotite makes up from 1% to 80% of the ore minerals volumes. This sulphide is often replaced by marcasite. It occurs as discrete grains or aggregates locally marginal to pyrite.

Marcasite occurs always associated to and is in fact derived from pyrite and pyrrhotite. It may be colloform, and its relative abundance ranges from 1% to 10% of the total.

Stannite occurs as irregular patches or grains marginal to pyrite or pyrrhotite. Stannite is usually present from traces up to 3% of the total ore minerals volume. In places it rims equant grains of cassiterite.

Cassiterite makes up from traces up to, in one case, 90% of total ore minerals content. It occurs as very fine grains aggregates, isolated crystals or as irregular patches.

Sphalerite is found in traces and it forms small isolated grains or as inclusions in pyrite or pyrrhotite.

Wolframite occurs as rare isolated crystals.

Fluorite, topaz and tourmaline are locally abundant

5.4 Mineralisation in Rheomorphic Sediments

Near and around the summit are heavily contorted argillite and siltstones which in the vicinity of porphyry dykes have quartz-cassiterite veins filling tension fractures. The intensity of fractures as well as mineralisation decreases away from the dykes.

11

5.5 Vein-type mineralisation

A fourth category is the vein type tin mineralisation which fills fractures through both porphyries and country rocks and is considered a later mineralising event. The veins have NNW to WNW trends and strike lengths of up to 760 metres with pinch and swell structures, and an average width of 0.6 - 1.0 metres. They were traced down dip for a little over 305 metres. Minerals comprise cassiterite, pyrite, pyrrhotite, sphalerite, chalcopyrite, galena, stannite, wolframite, fluorite and topaz.

6.0 ORE RESERVES

The Ore Reserve calculation for the Mt. Bischoff Tin Deposit were undertaken by Douglas McKenna and Partners Pty Ltd on two separate occasions (1982, 1983). The 1982 work was restricted to a portion of the deposit between Section 920E and 1300E and provided ore reserves at 0.4%, 0.3% and 0.2% Sn Cut offs for the DSL ore and 0.3% ad 0.2% Sn cut offs for the QP ore. This report is located in Appendix II of this report. The 1983 work covers the remainder of the Mt. Bischoff deposit and completes the ore reserve calculations (Appendix III).

The ore reserve calculations were based on geological data obtained from cross-sections, long-sections and 10 metre level plans prepared by the Mt. Bischoff Joint Venture (M.B.J.V.) [Volume 2 of this report].

Initially the footwall of the dolomite, and the hangingwall and footwall of the quartz porphyry were contour plotted, using drill-hole and surface data. Contour plotting was found necessary because many drill holes, especially prior to the M.B.J.V., do not fall on the metric sections, and are only projected onto the sections.

From the contour plans, the cross-sections & long-sections the 10 metre level plans were compiled, ensuring that the three sets correlated.

Appendix II details the full parameters used in the ore reserve calculations. Specific gravity values of 3.5 g/cc and 3.0 g/u were used for the DSL and QP ore types respectively. These were determined from testwork carried out at Amdel. Later work done by Douglas Mckenna and Associates on core (Appendix III) has suggested that these S.G. values may be slightly low.

12

The ore reserves at Mt. Bischoff for DSL and QP ore are:-

DSL at 0.3% sN cut-off

% Sn	Tonnes	Category
1.12	53800	Proven
1.05	1053800	Probable
0.76	221260	Possible
0.52	99240	PP
0.87	1428100	Total

QP at 0.2% Sn cut-off

% Sn	Tonnes	Category
0.47	3325500	Probable
0.50	76300	Possible
0.33	120100	PP
0.47	3521900	Total

Note: PP - this represents the near surface mineralisation relying heavily on surface hand auger sampling. This mineralisation is below the "possible" category and is designated on the sections and calculation sheets as "PP".

7.0 CONCLUSIONS/RECOMMENDATIONS

The major conclusion to be drawn from the above is that no more premining geological work needs to be carried out until the orebody can be economically mined. At that stage infill grade drilling and geological mapping etc. would be required to ensure that the correct feed were delivered to the concentrator plant.

APPENDIX I

PLAN RETENTION LICENCE

AREA APPLIED FOR

(DRAWING No. M1-004-LA)

APPENDIX II

1982 ORE RESERVE CALCULATIONS

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MT. BISCHOFF TIN PROJECT
GEOLOGICAL INTERPRETATION
AND
ORE RESERVES
FOR
C.R.A. SERVICES

April 1972

SUMMARY

Douglas McKenna and Partners Pty. Ltd. have been requested to geologically interpret and calculate ore reserves of part of the Mt. Bischoff tin deposit, Tasmania. Five sets of reserves have been calculated for different cut-off grades and ore types.

This report is a neutral and impartial assessment.

The parameters used in calculating the reserve are stated.

The reserve calculations are tabulated under Calculated Ore Reserves. The totals for each calculation are as follows:

Type	Cut-off Grade %Sn	Tonnes	Grade %Sn	Contained Tin (tonnes)
DSL	0.4	1,100,000	1.1	12,000
DSL	0.3	1,300,000	1.0	13,000
DSL	0.2	1,400,000	0.93	13,500
QP	0.3	1,100,000	0.55	5,800
QP	0.2	1,500,000	0.46	7,000

Each reserve was calculated separately on sectional and level basis. The variance between sectional and level total calculations was between 2% and 3%.

Further reserves exist outside the scope of the calculations.

Further checking on the density factors used is recommended.

CONTENTS

	Page
SUMMARY	1.
INTRODUCTION	1.
GEOLOGICAL INTERPRETATION	1/4.
ORE RESERVE PARAMETERS	4.
CALCULATED ORE RESERVES	4/5.
COMMENTS	

APPENDICES

Memo 3rd May 1982: Guidelines for Geological Ore Reserve Preparation and Presentation

Working Calculation Sheets

Accompanying Plans:-

D.S.L.:	Sections 920E to 1300E			
	Level Plans	Sheet 8	Sheet 9	Sheet 13
	RL	670 - 530	650 - 580	630 - 530
Q.P.:	Sections 920E to 1300E			
	Level Plans	Sheet 8	Sheet 9	Sheet 13
	RL	650 - 530	675 - 570	630 - 530

Longitudinal Sections: 1740N to 2020N

Level Plans: Sheet 14 RL 630 - 540

19

INTRODUCTION:

Douglas McKenna and Partners Pty. Ltd. were requested to geologically interpret and calculate ore reservesof part of the Mt. Bischoff tin deposit, Tasmania. The part involved comprises the main Dolomite Sulphide Lode (D.S.L.) horizon between Greisen Face and White Face. The White Face Quartz Porphyry (Q.P.) Dyke has intruded this zone.

It is intended to use the ore-blocks outlined in this report for open-pit planning.

GEOLOGICAL INTERPRETATION:

The data used for this report were taken from cross-sections, long-sections and 10 metre level plans prepared by the Mt. Bischoff Joint Venture (M.B.J.V.). (Folder 2)

Initially the footwall of the dolomite, and the hangingwall and footwall of the quartz porphyry were contour plotted, using drill-hole and surface data. Contour plotting was found necessary because many drill holes, especially prior to the M.B.J.V., do not fall on the metric sections, and are only projected onto the sections.

From the contour plans, the cross-sections, long-sections and 10 metre level plans were compiled, ensuring that the three sets correlated.

ORE RESERVE PARAMETERS:

The basic parameters used for calculating the ore reserves are set out in a memo dated 3rd May 1982:

20

"Guidelines for Geological Ore Reserve Preparation and Presentation" (see Appendix). These guidelines were followed fairly rigidly except as follows:

1.4/1.5 Core recoveries have not been highlighted at the D.D.H. collar since this could not be represented on the level plans. Instead the letter "P" has been recorded with each block number to show those blocks that have been designated to the "Possible" category. Core recoveries are recorded on the working calculation sheets. The following holes were not used in the ore reserve assessment: H1, H2, H3A, D4, D5, L1. The records of these old holes and their locations are suspect.

1.17 Suffixes "P" and "L" have not been used since the Porphyry and D.S.L. are on separate sheets.

2.3 The 0.3%Sn and 0.4%Sn D.S.L. reserves are shown on the same sheets with the 0.3% Sn envelope circumscribing the 0.4%Sn envelope.

3.1 It was decided later that no reserves would be drawn up for the 0.1%Sn Q.P. cut-off.

3.3 The 0.2%Sn and 0.3%Sn Q.P. reserves are on the same sheets as in 2.3 above.

The categories for the reserve blocks have been assigned as follows:

"Proven": D.S.L. only in the closely spaced drilled position around section 980E. This area was drilled on a 5 metre pattern

"Probable": All diamond drill holes in which recovery was greater than 50%. Also in those diamond drill holes with

recovery of 25% to 50% and reverse circulation and percussion holes where ore can be geologically expected. These locations are adjacent to the porphyry contact and on the footwall of the dolomite where other holes with grade occur. "Possible": All surface sampling and trenching. Also all reverse circulation and percussion holes and diamond drill holes with less than 50% recovery outside the description for "Probable". Small reserve blocks in this category were only included if there was continuity eg. between sections.

The areas of the ore blocks were measured using the C.R.A. "digitizer" planimeter. For the sections, the influence of each block is taken as half-way between the sections unless there is a geological reason for terminating the block sooner. For the level plans the area of each block has been combined with that of the one 5 metres above and averaged to obtain the volume. Where there is no ore block 5 metres above, the influence has been taken geologically. A specific gravity of 3.5 has been used for the D.S.L. and 3.0 for the Q.P. (see later under Comments) to convert the volumes to tonnes.

The working calculation sheets for each of the five ore reserves are appended to this report. The reserve blocks referred to in the tables are shown on the section or levels. Individual block numbers for the different cut-off grades have been kept the same. Where two reserves are shown on the same drawing, new block numbers for the lower cut-off grade are in thinner script. Grade boundaries (envelopes) are shown as dots and dashes, with each dot representing 0.1%Sn (i.e. dash-4 dots-dash represents 0.4% cut-off boundary). Solid lines represent influence boundaries

between drill holes (or surface).

The calculated reserves are of a geological nature, and do not incorporate any mining criteria.

CALCULATED ORE RESERVES:

The actual calculated ore reserves are set out in the accompanying table. They may be summarized as follows:

Type	Cut-off Grade %Sn	Proven Tonnes	Proven Grade	Probable Tonnes	Probable Grade	Possible Tonnes	Possible Grade	Total Tonnes	Total Grade
DSL	0.4%	40,000	1.5%	910,000	1.1%	150,000	0.89%	1,100,000	1.1%
DSL	0.3%	55,000	1.1%	1,000,000	1.0%	200,000	0.80%	1,300,000	1.0%
DSL	0.2%	58,000	1.1%	1,100,000	0.98%	290,000	0.69%	1,400,000	0.93%
QP	0.3%	-	-	1,000,000	0.54%	29,000	0.63%	1,000,000	0.55%
QP	0.2%	-	-	1,500,000	0.46%	50,000	0.51%	1,500,000	0.46%

These reserves are in conformity with the Australasian Institute of Mining and Metallurgy's recommendations. They have been compiled by a "competent company" whose partners are Corporate Members of the Institute.

It should be noted that they do not constitute the whole of the ore reserves at Mt. Bischoff, but are confined to the grid co-ordinates set out in the memo of 3rd May 1982 (1.20).

COMMENTS:

The ore reserves have been calculated both by section and by level. The variance in the totals for each reserve is of the order of 2% to 3%. The individual categories

have slightly more variance due to the changing of categories between level plans. As for most ore bodies, the drilling has been carried out on sections, and thus there is more definitive information on the sections than the level plans. The level plans only have a small hole passing through them, whereas the sections have the complete length of hole from top to bottom. So the boundaries of categories between levels are not so well defined.

The ore reserves calculated in this report are confined to specific co-ordinates (1700N to 2040N, 940E to 1300E, and surface to RL 530 metres). This volume covers the main D.S.L. occurrence which is the objective of calculating these reserves. Further reserves may be found in D.S.L. Slaughteryard Face, Brown Face etc., and in Q.P. to the west of 940E, at depth, in Stanhope Dyke, Queen Dyke etc..

The density (specific gravity), especially of the D.S.L. ore, has been taken basically from AMDEL'S work on metallurgical samples treated in 1980. Their average density for D.S.L. ore in 4"bulk" samples was 3.5. However, an ore that contains 50% pyrrhotite may be expected to have a density of 3.75, or nearly 10% higher than the reserves calculated in this report. As a result it is suggested that further studies be performed on this factor in collaboration with the metallurgist. Drill log observations and weights of samples despatched will be of assistance in such an investigation.

Douglas McKenna + Partners P.L.

Douglas McKenna and Partners P.L.
16th July 1982

24

File 5863.01
MHW/ISC

3rd May, 1982

Memorandum to : File No.

From : M.H. Woffenden

Copies to : M.D. Laverty
D. Simpson
G. Bujtor
A. Jannink

Subject : GUIDELINES FOR GEOLOGICAL ORE RESERVE PREPARATION AND PRESENTATION.

1. GENERAL FOR DSL AND PORPHYRY MINERALISATION

1.1 G.O.R. to be calculated by cross-section and by plan

1.2 Where there is waste inclusion bounded by mineralization either side not greater than 2 m true thickness in ore zones then that waste is to be included as internal dilution.

1.3 Where there is doubt concerning the validity of survey or assay data then that data is not to be used in determining the G.O.R.

1.4 Where the assay information from a DDH is not used in G.O.R. calculation or there is poor core recovery from the hole the fact(s) is/are to be highlighted at the DDH collar on the cross-section drawings.

1.5 Total ore reserves for DSL and porphyry ore types are to be specified in proven, probable or possible catagories. Mention is to be made of the tonnage ascribed to holes where core recovery is less than 25% and between 50% and 25%.

1.6 Minimum intersected thickness of greater than cut-off grade that is to be described as ore is 1.5 metres.

1.7 Tin assay results greater than 4% ore to be reduced to 4% for the purpose of ore grade and contained tin calculations.

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1.8 In poor core recovery zones the assay results are to be used but with over-riding consideration of geological interpretation of surrounding data.

1.9 The results of the surface trenching and current reverse circulation drilling programme are to be included, when available, in the total ore reserve calculation.

1.10 Cross section intervals are to be in accordance with the DDH drilling sections. Drawings are to be at a scale of 1:500 and presented as sepia originals.

1.11 Cross sections ore to show DDH traces, Sn assay grades, rock type information, DSL zones and the prescribed tin mineralization zones.

1.12 For cross section ore block calculations, the grade is to be determined on a weighted area of influence basis from the relevant DDH's.

1.13 Tabulation of G.O.R. by section for the DSL and porphyry is to be separate; each is to detail section number, block reference, area (m2), ascribed tonnage and grade, tonnage x grade and DDH reference.

1.14 Plan intervals to be 5 m.

1.15 Plans are to be named according to the R.L. of the plan and refer to the volume above the plan.

1.16 Plans are to show DDH intercept points, major rock types and DSL zones (except on the '5' m levels) and the tin mineralization by block, and to indicate mineralised material in the plan volume where there is no intersection of the plan plane. Scale to be 1:500 with presentation as sepia originals.

1.17 Plan blocks to be numbered on basis of

Plan level - sequential block number,
with suffix of 'P' for Porphyry
" " " 'L' for DSL
with a further suffix '1' to indicate that the block is not full depth of plan

1.18 Porphyry and DSL plan blocks for each level to be shown on separate sheets.

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26

1.19 Tabulation of G.O.R. by plan for DSL and porphyry to be separate, each to detail plan level, block no., area, tonnage, grade, tonnage x grade and relevant DDH.

1.20 Priority is to be given to the DSL and porphyry reserves in the area bounded by 1700N to 2040N and 940E to 1300E and a lower R.L. of 530 metres.

1.21 The ore reserves presentation is to include illustrative long sections.

2. DSL SPECIFICATION

2.1 The mineralization grade boundaries are to be 0.2% Sn, 0.3% Sn and 0.4% Sn.

2.2 Priority must be given to the 0.3% Sn and 0.4% Sn profiles.

2.3 Separate cross sections, plans and reserves tabulations are to be prepared for each grade boundary.

3. PORPHYRY SPECIFICATION

3.1 The mineralization grade boundaries are to be 0.1% Sn, 0.2% Sn and 0.3% Sn.

3.2 Priority must be given to the 0.2% Sn and 0.3% Sn profiles.

3.3 Separate cross sections, plans and reserve tabulations are to be prepared for each grade boundary.

MHW.

M.H. Woffenden

766028

APPENDIX III

1983 ORE RESERVE CALCULATIONS

766029

28

M E M O

TO: G. MOTTERAM DATE: 10TH JUNE, 1983

FROM: A. JANNINK

SUBJECT: MT. BISCHOFF - DSL RESERVES

Further calculations have been made of the Geological DSL Reserves (excluding Slaughteryard Face) without the constraints of the parameters imposed on the reserves calculated in July 1982.

The calculation sheets accompany this memo. The new ore blocks are pencilled on the 0.3% Sn cut-off cross sections used for the July 1982 reserves.

Most of the new blocks relate to near surface mineralization relying heavily on surface hand auger samples. This mineralization is below the "possible" catagory and designated (on the sections and calculation sheets) "pp".

A. JANNINK

N.B. Slaughteryard Face reserves had been calculated to be:

Probable		Possible		Total	
Tonnes	Grade	Tonnes	Grade	Tonnes	Grade
7000	0.48%	35000	1.0%	42000	0.91%

MT. BISCHOFF

ADDITIONAL RESERVES AT 0.3% Sn CUT-OFF

SECTION	BLOCK	DRILL HOLE ETC	INTERCEPT TO	INTERCEPT FROM	RECOVERY	GRADE %Sn	AREA	INFLUENCE	TONNES	TONNES & GRADE	CATEGORY
940E	17	Surface				0.36	80	20	5600	2016	PP
960E	15	MBD 110				0.49	45	20	3150	1544	Probable
	16	MBD 110				0.38	28	20	1960	745	Probable
	17	Surface 610L.				0.49	116	20	8120	3979	PP
970	5	Surface				0.80	90	7.5	2363	1890	PP
975	6	Surface				0.80	136	5	2380	1904	PP
980	28	MBD 85				0.59	41	20	2870	1693	Probable
	29	MBD 29a				0.89	15	20	1050	935	Probable
	30	MBD 47				0.44	8	5	140	62	Proven
985	9	MBD 97				0.43	16	5	280	120	Proven
	10	Surface				0.91	164	5	2870	2612	PP
990	7	Surface				0.91	96	7.5	2520	2293	PP
1000	23	MBD 81/AAB5/Surface				0.66	30	20	2100	1386	Possible
	24	Surface				0.59	45	20	3150	1859	PP
	25	B12/AAB5				0.72	29	20	2030	1462	Probable
1020	20	Surface				0.48	249	20	17430	8366	PP
	21	Surface				0.46	50	20	3500	1610	PP
1040	12	Surface				0.44	319	20	22330	9825	PP
	13	Surface				0.51	26	20	1820	928	PP
1060	17	MBD 53/54				0.32	100	20	7000	2240	PP
1080	21	MBD 82				3.60	30	20	2100	7560	Probable
1100	13	MBD 53/54,B21,MBR17				0.37	95	20	6650	2461	PP
	14	MBD 117				0.82	33	20	2310	1894	Probable
1120	6	MBD 117				0.82	19	20	1330	1091	Probable

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SECTION	BLOCK	DRILL HOLE ETC	INTERCEPT TO	INTERCEPT FROM	RECOVERY	GRADE %Sn	AREA	INFLUENCE	TONNES	TONNES & GRADE	CATEGORY
	[illegible]	MBD 53/54,B21,MBR17				0.37	85	20	5950	2202	PP
1140	5	MBD 30,Trench				0.55	66	20	4620	2541	Possible
	6	AAB3				0.82	21	20	1470	470	PP
1200	[illegible]	MBR 11,Surface				0.73	22	20	1540	1124	PP
	3	B33				0.57	35	20	2450	1397	Possible
1240	2	MBR 5,Surface				1.06	12	20	840	890	PP
1280	1	Surface				1.43	9	20	630	901	PP
1300	1	Surface				1.20	44	20	3080	3696	PP
						0.43			420	182	Proven
						1.01			16800	16924	Probable
						0.58			9170	5324	Possible
						0.52			99243	51266	PP
						0.59			125633	73696	TOTAL
								PREVIOUS RESERVES			
						1.13			53380	59955	Proven
						1.05			1037003	1086876	Probable
						0.77			212099	163852	Possible
						1.01			1302482	1310683	TOTAL
								GRAND TOTAL RESERVES			
						1.12			53800	60137	Proven
						1.05			1053803	1103800	Probable
						0.76			221269	169176	Possible
						0.52			99243	51266	PP
						0.[illegible]			1428115	1384379	TOTAL
								Density Used: 3.5			

30

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31

M E M O

TO: G. MOTTERAM DATE: 10TH JUNE 1983

FROM: A. JANNINK

SUBJECT: MT. BISCHOFF - DSL DENSITIES

All samples split from diamond drill holes after MBD46 were weighed on site prior to despatch for assay.

A study has now been made of the density of DSL ore using the 0.3% Sn cut-off grade, by relating the weights of the samples to their volumes.

The diameters and "radii" of split core were measured at Mt. Bischoff by MEL. The average figures for DSL were:

Core Size	Diameter	Radius
1/2 HQ	6.31952 cm	2.98958 cm
1/2 NQ	4.73456 cm	2.24113 cm

From these figures the volumes per lineal meter were calculated, and compared with the theoretical volumes:

Core Size	Theoretical Volume (m3)	Measured Volume (m3)	Factor
1/2 HQ	1.58346 x 10 -3	1.46075 x 10 -3	1.084
1/4 HQ	0.79173 x 10 -3	0.679498 x 10 -3	1.165
1/2 NQ	0.88976 x 10 -3	0.820551 x 10 -3	1.084
1/2 BQ	0.52 x 10 -3	-	-

The following densities were obtained from the core samples:

Core Size	No of Samples	Cumulative Theoretical Density	Theoretical Density	Measured Density
1/2 HQ	136	441.8	3.25	3.52
1/4 HQ	80	276.98	3.46	4.03
1/2 NQ	233	800.67	3.44	3.73
1/2 BQ	5	15.73	3.15	-

The average density for 1/2 HQ and 1/2 NQ is:

Theoretical: 3.37
Measured : 3.65

(1/4 HQ figures are considered unreliable due to difficulty in sawing the core.)

At present the density used for DSL reserves is 3.5, thus this may be increased by a factor of 1.043.

ATG zil

A. JANNINK

766034

53

M E M O

TO: G. MOTTERAM DATE: 20TH JUNE, 1983

FROM: A. JANNINK

SUBJECT: MT BISCHOFF - QUARTZ PORPHYRY RESERVES, 0.2% Sn CUT-OFF

Further calculations have been made of the Geological Q.P. Reserves without the constraints of the parameters imposed on the reserves calculated in July 1982.

The calculation sheets accompany this memo. The new ore blocks are pencilled on the following cross-sections:

Sections	Sheets
820E-900E	Stage 3
920E-1160E	Stage 4
1180E-1500E	Stage 3
1560E-1680E	None

The last four sections cover percussion drilling (and MBD8) of the Stanhope Extended Dyke, and are estimates only.

As for the DSL reserves, some mineralisation is below the "possible" catagory and is designated "pp".

The density used for the calculations was 3.0.

A. JANNINK

[redacted] ADDITIONAL [redacted] RESERVES [redacted]

SHEET	SECTION	BLOCK	DRILL HOLE ETC	INTERCEPT FROM	INTERCEPT TO	RECOVERY	GRADE % Sn	AREA	INFLUENCE	TONNES	TONNES X GRADE	CATEGORY
age 3	820E	1	MBD 57	70	77	85%	0.34	183	20	10980	3733	Probable
		2	MBD 44	78.7	82.7	100%	0.31	205	20	12300	3813	"
	840E	1	MBD 25	104.7	132.7	~100%	0.67	404	20	24240	16241	"
		2	MBD 57	70	77	85%	0.34	454	20	27240	9262	"
		3	MBD 41/44	85	86.8	100%	0.32	53	20	3180	1018	"
				78.7	82.7	100%						
	860E	1	MBD 90	174.8	187.8	~ 90%	0.45	380	20	22800	10260	"
		2	MBD 25	104.7	132.7	~100%	0.67	1625	20	97500	65325	"
	880E	1	MBD 90	174.8	187.8	~ 90%	0.45	525	20	31500	14175	"
		2	B 38	88.7	103.9	90%	0.50	630	20	37800	18900	"
	900E	1	MBD 26/90	188.8	194.8	100%	0.45	350	20	21000	9450	"
				174.8	187.8	~ 90%						
		2	MBD 24/B38	92.5	94.5	100%	0.47	425	20	25500	11985	"
				88.7	103.9	90%						
tage 4	920E	1	MBD 26	188.8	194.8	100%	0.45	263	20	15780	7101	"
		2	MBD 43	93.6	101.2	100%	0.38	80	20	4800	1824	"
		3	MBD 24	92.5	94.5	100%	0.27	110	20	6600	1782	"
		4	MBD 70	57.0	71.0	100%	0.44	125	20	7500	3300	"
		5	MBD 83	55.0	60.0	100%	0.56	212	20	12720	7123	"
	940E	1	MBD 43	93.6	101.2	100%	0.38	391	10	11730	4457	"
		2	B 22	56.1	63.7	50%	0.28	188	10	5640	1579	"
		3/5	MBD 70	57.0	71.0	100%	0.44	527	10	15810	6956	"
		4	MBD 83	55.0	60.0	100%	0.56	148	10	4440	2486	"
		6	MBD 26/B 26	188.8	194.8	100%	0.47	213	20	12780	6007	"
				111.9	127.1	~90%						
	960E	6	B 26	111.9	127.1	~90%	0.48	75	20	4500	2160	"
	980E	6	B 26	111.9	127.1	~90%	0.48	48	20	2880	1382	"
	1000E	6	B 9	97.5	157.0	~80%	0.53	86	20	5160	2735	"
	1020E	6	B 9	97.5	157.0	~80%	0.53	150	20	9000	4770	"
	1040E	8	MBD 72	99.5	115.5	~100%	0.43	264	20	15840	6811	"
	1060E	9	MBD 4/MBD 72	200.8	204.8	100%	0.42	242	20	14520	6098	"
				99.5	115.5	~100%						
		10	Surface				0.48	72	20	4320	2074	PP
	1080E	13	MBD 4	200.8	204.8	100%	0.37	244	20	14640	5417	Probable
		14	Surface				0.49	82	20	4920	2411	Possible
		15	Surface				0.32	76	20	4560	1459	PP

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SHEET	SECTION	BLOCK	DRILL HOLE ETC	INTERCEPT FROM	INTERCEPT TO	RECOVERY	GRADE % Sn	AREA	INFLUENCE	TONNES	TONNES X GRADE	CATEGORY
tage 4	1100E	7	MBD 28	124.8	130.0	100%	0.36	46	20	2760	994	Probable
		8	MBD 28	112.8	118.8	100%	0.23	42	20	2520	580	Probable
		9	Surface				0.56	55	20	3300	1848	PP
		10	Surface				0.41	101	20	6060	2485	PP
	1120E	6	MBD 28	124.8	130.0	100%	0.36	67	20	4020	1447	Probable
		7	Surface				0.40	48	20	2880	1152	PP
	1140E	8	B 58	109.4	115.5	~100%	0.96	63	20	3780	3629	Probable
	1160E	10	B 58	109.4	115.5	~100%	0.96	140	20	8400	8064	"
		11	B 58	121.6	124.6	~ 90%	0.23	42	20	2520	580	"
tage 3	1180E	7	B 58	109.4	115.5	~100%	0.96	73	20	4380	4205	"
		e	MBD 36				0.30	226	20	13560	4068	"
		f	MBD 5				0.44	52	20	3120	1373	"
	1200E	6	MBD 36/MBD 124				0.31	203	20	12180	3776	"
		e	MBD 36				0.30	298	20	17880	5364	"
		f	MBD 5				0.44	429	20	25740	11326	"
	1220E	6	MBD 88				0.21	190	20	11400	2394	"
		7	MBD 5/MBD 88				0.36	192	20	11520	4147	Possible
		f	MBD 5				0.44	500	20	30000	13200	Probable
	1240E	7	MBD 37				0.39	282	20	16920	6599	"
	1260E	4	MBD 37				0.39	650	20	39000	15210	"
	1280E	b	B 48				0.17	224	20	13440	2285	"
		c	MBD 37				0.39	484	20	29040	11326	"
		d	MBD 38				0.29	410	20	24600	7134	"
		a	MBP 37/MBP 38				0.25	94	20	5640	1410	"
	1300E	a	MBD 80				0.41	408	20	24480	10037	"
		b	MBD 80				0.41	60	20	3600	1476	"
		c	B 48				0.17	184	20	11040	1877	"
		d	MBD 38				0.29	580	20	34800	10092	"
	1320E	a	MBP 35				0.32	212	20	12720	4070	"
		b	MBD 14				0.28	246	20	14760	4133	"
		c	MBD 125				0.62	174	20	10440	6473	"
		d	MBD 125				0.62	144	20	8640	5357	"
		e	MBD 38				0.29	592	20	35520	10301	"
	1340E	a	MBP 33, MBP 34				0.34	66	20	3960	1346	"
		b	MBP 33, MBP 34				0.34	260	20	15600	5304	"
		c	MBD 14				0.28	448	20	26880	7526	"

ADDITIONAL QP RESERVES AT 0.2% Sn CUT-OFF

ON SHEET	SECTION	BLOCK	DRILL HOLE ETC	INTERCEPT FROM	INTERCEPT TO	RECOVERY	GRADE % Sn	AREA	INFLUENCE	TONNES	TONNES x GRADE	CATEGORY
Stage 3	1340E	d	MBD 125				0.62	342	20	20520	12722	Probable
	Cont.	e	MBD 125				0.62	154	20	9240	5729	"
		f	MBD 3				0.37	498	20	29880	11056	"
	1360E	a	MBP 33, MBP 34				0.34	140	20	8400	2856	"
		b	MBP 33, MBP 34				0.34	479	20	28740	9772	"
		c	MBD 14				0.28	180	20	10800	3024	"
		d	MBD 126				0.38	248	20	14880	5654	"
		e	MBD 125				0.62	229	20	13740	8519	"
		f	MBD 91				1.09	169	20	10140	11053	"
		g	MBD 3				0.56	234	20	14040	7862	"
		h	MBD 3				0.37	590	20	35400	13098	"
	1380E	a	MBP 21				0.20	272	20	16320	3264	"
		b	MBD 79				0.51	544	20	32640	16646	"
		c	MBD 126				0.38	496	20	29760	11309	"
		d	MBD 91				1.09	500	20	30000	32700	"
		e	MBD 3, MBD 127				0.58	450	20	27000	15660	"
		f	MBD 3				0.37	416	20	24960	9235	"
	1400E	a	MBP 21				0.20	234	20	14040	2808	"
		b	MBP 21				0.20	316	20	18960	3792	"
		c	MBD 79				0.51	112	20	6720	3427	"
		d	MBD 39				0.38	248	20	14880	5654	"
		e	MBD 126				0.38	180	20	10800	4104	"
		f	MBD 129				0.43	162	20	9720	4180	"
		g	MBD 91				1.09	196	20	11760	12818	"
		h	MBD 127				0.59	806	20	48360	28532	"
	1420E	a	MBP 19, 20, 21				0.20	102	20	6120	1224	"
		b	MBP 19, 20, 21				0.20	132	20	7920	1584	"
		c	MBD 39				0.38	540	20	32400	12312	"
		d	MBD 129				0.43	270	20	16200	6966	"
		e	MBD 40				0.83	942	20	56520	46912	"
	1440E	a	MBP 19, 20				0.20	116	20	6960	1392	"
		b	MBD 74				0.73	184	20	11040	8059	"
		c	MBD 39				0.38	306	20	18360	6977	"
		d	MBD 129				0.43	210	20	12600	5418	"
		e	MBD 95				0.64	248	20	14880	9523	"
		f	MBD 40				0.83	772	20	46320	38446	"

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ADDITIONAL QP RESERVES AT 0.2% Sn CUT-OFF

ON SHEET	SECTION	BLOCK	DRILL HOLE ETC	INTERCEPT FROM	INTERCEPT TO	RECOVERY	GRADE % Sn	AREA	INFLUENCE	TONNES	TONNES x GRADE	CATEGORY
Stage 3	1460E	a	MBD 74				0.73	736	20	44160	32237	Probable
		b	MBD 95				0.64	928	20	55680	35635	"
	1480E	a	MBP 17				0.28	322	20	19320	5410	"
		b	MBD 74				0.73	108	20	6480	4730	"
		c	MBD 131				0.18	246	20	14760	2657	"
		d	MBD 95				0.64	374	20	22440	14362	"
	1500E	a	MBP 17				0.28	94	20	5640	1579	"
Nil	1560E		MBP 14	16	20		0.49	100	40	12000	5880	PP
	1600E		MBP 13	20	24		0.28	100	40	12000	3360	PP
	1640E		MBP 12	28	32		0.28	100	40	12000	3360	PP
			MBD 8	98.6	104.6		0.25	150	40	18000	4500	PP
	1680E		MBP 11	14	29		0.31	375	40	45000	13950	PP
			ADDITIONAL RESERVES									
							0.48			1841220	890003	Probable
							0.40			16440	6558	Possible
							0.33			120120	40068	PP
							0.47			1977780	936629	TOTAL
			PREVIOUS RESERVES									
							0.46			1484280	678145	Probable
							0.53			59880	31574	Possible
							0.46			1544160	709719	TOTAL
			GRAND TOTAL RESERVES									
							0.47			3325500	1568148	Probable
							0.50			76320	38132	Possible
							0.33			120120	40068	PP
							0.47			3521940	1646348	TOTAL

DENSITY USED: 3.0

1646348

38

766039

M E M O

TO: G MOTTERAM
FROM: A JANNINK

DATE: 21ST JUNE, 1983

SUBJECT: MT. BISCHOFF - Q.P. DENSITIES

Further to the memo of 10th June, 1983 regarding DSL density, a study has now been made of The Quartz Porphyry density using the 0.2% Sn cut-off grade.

Measurements of the diameters and "radii" of split core at Mt. Bischoff are suspect since one of the radii is greater than 1/2 diameter. The increasing density factors above the theoretical density (ie. if there were no loss of core in drilling and splitting) are 1.024 for 1/2 BQ and 1.021 for 1/2 NQ.

The following densities were obtained from the core samples:

Core Size	No. of Samples	Cumulative Theoretical Density	Theoretical Density	Measured Density
1/4 HQ	16	43.52	2.72	
1/2 NQ	242	692.64	2.86	2.92
1/2 BQ	88	258.65	2.94	3.01

The average density for 1/2 NQ and 1/2 BQ is:

Theoretical : 2.88
Measured : 2.94

At present the density used for Q.P. reserves is 3.0. This figure appears to be correct since it is felt that the measured density of 2.94 should be upgraded by 2% to 3.00 due to the suspect diameter and radius measurements.

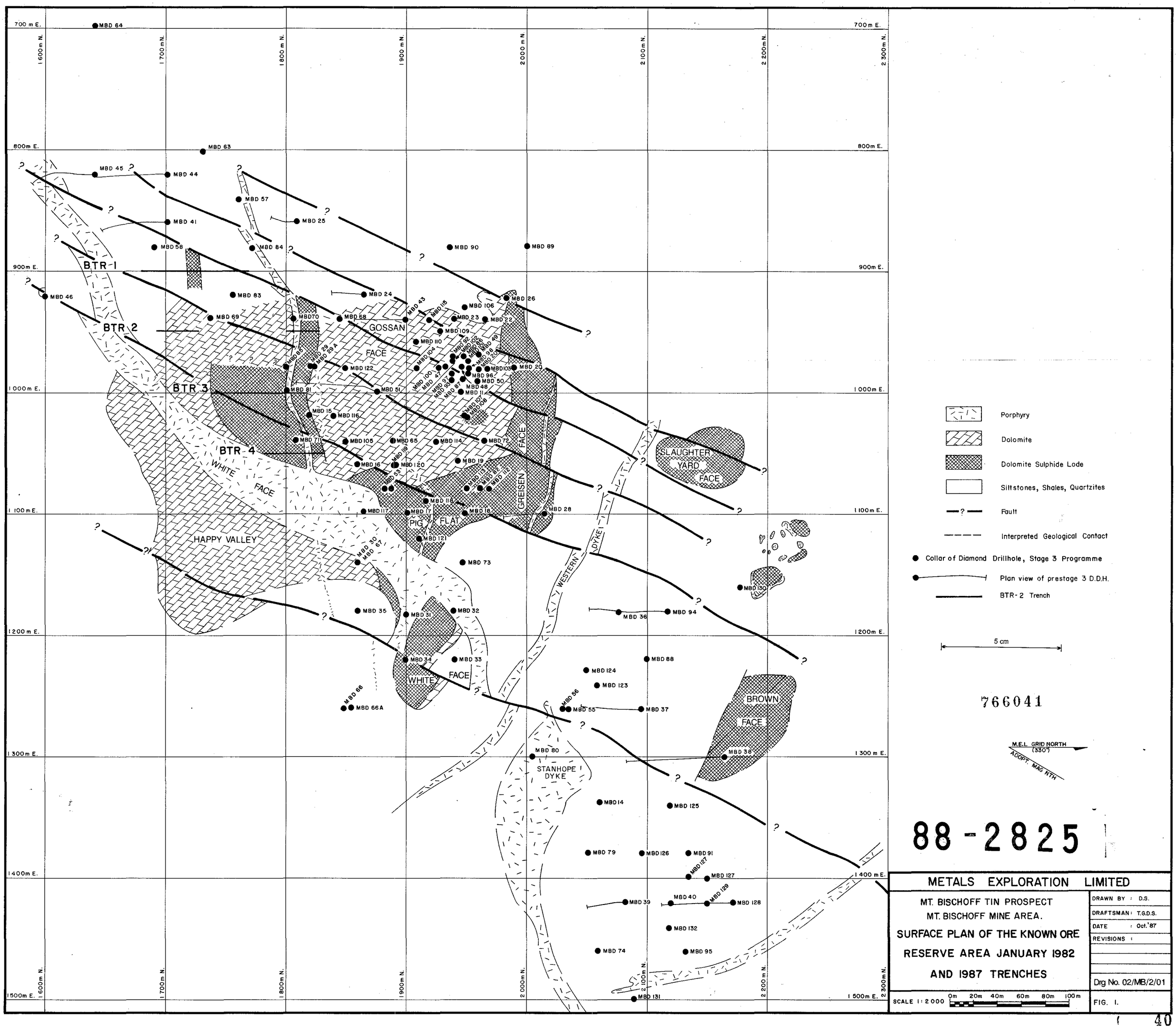
A. JANNINK

APPENDIX IV

SURFACE PLAN OF THE KNOWN ORE

RESERVE AREA JANUARY 1982 AND

1987 TRENCHES ORE No. 02/MB/2/0



METALS EXPLORATION LIMITED

MT. BISCHOFF TIN PROSPECT
MT. BISCHOFF MINE AREA.
SURFACE PLAN OF THE KNOWN ORE RESERVE AREA JANUARY 1982 AND 1987 TRENCHES

DRAWN BY : D.S.
DRAFTSMAN: T.G.D.S.
DATE : Oct.'87
REVISIONS :

Drg No. 02/MB/2/01

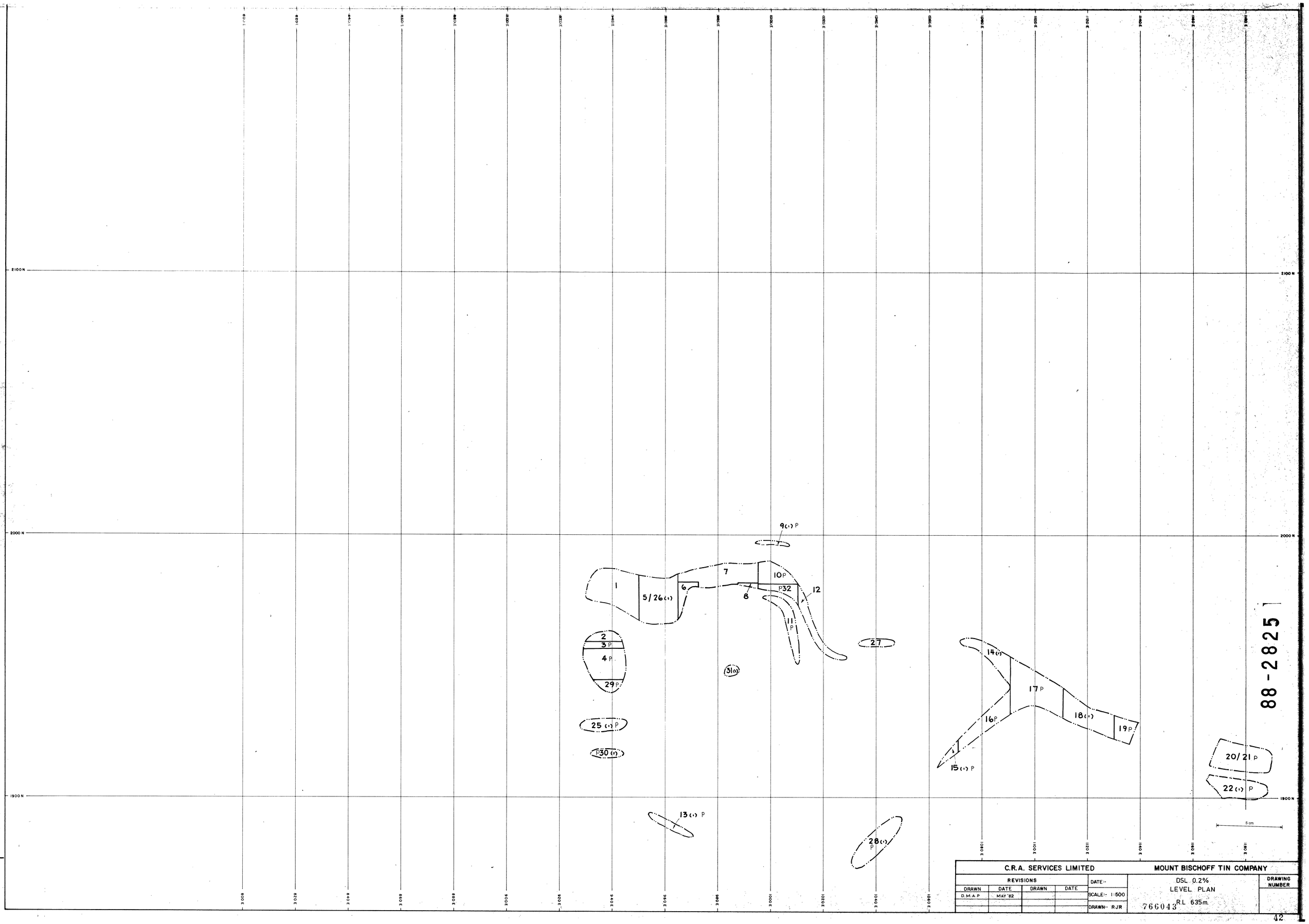
SCALE 1:2000 0m 20m 40m 60m 80m 100m

FIG. 1.

766042

APPENDIX V

A SELECTION OF PLANS AND CROSS-SECTIONS USED IN THE ORE RESERVE CALCULATIONS


2100 N
2000 N
1900 N
3008
3028
3048
3068
3088
3006
3026
3046
3066
3086
3001
3021
3041
3061
3081
1081
1101
1121
1141
1161
1181
1201
1221
1241
1261
1281
1301
1321
1341
1361
1381
1401
1421
1441
1461
1481
1501
1521
1541
1561
1581
1601
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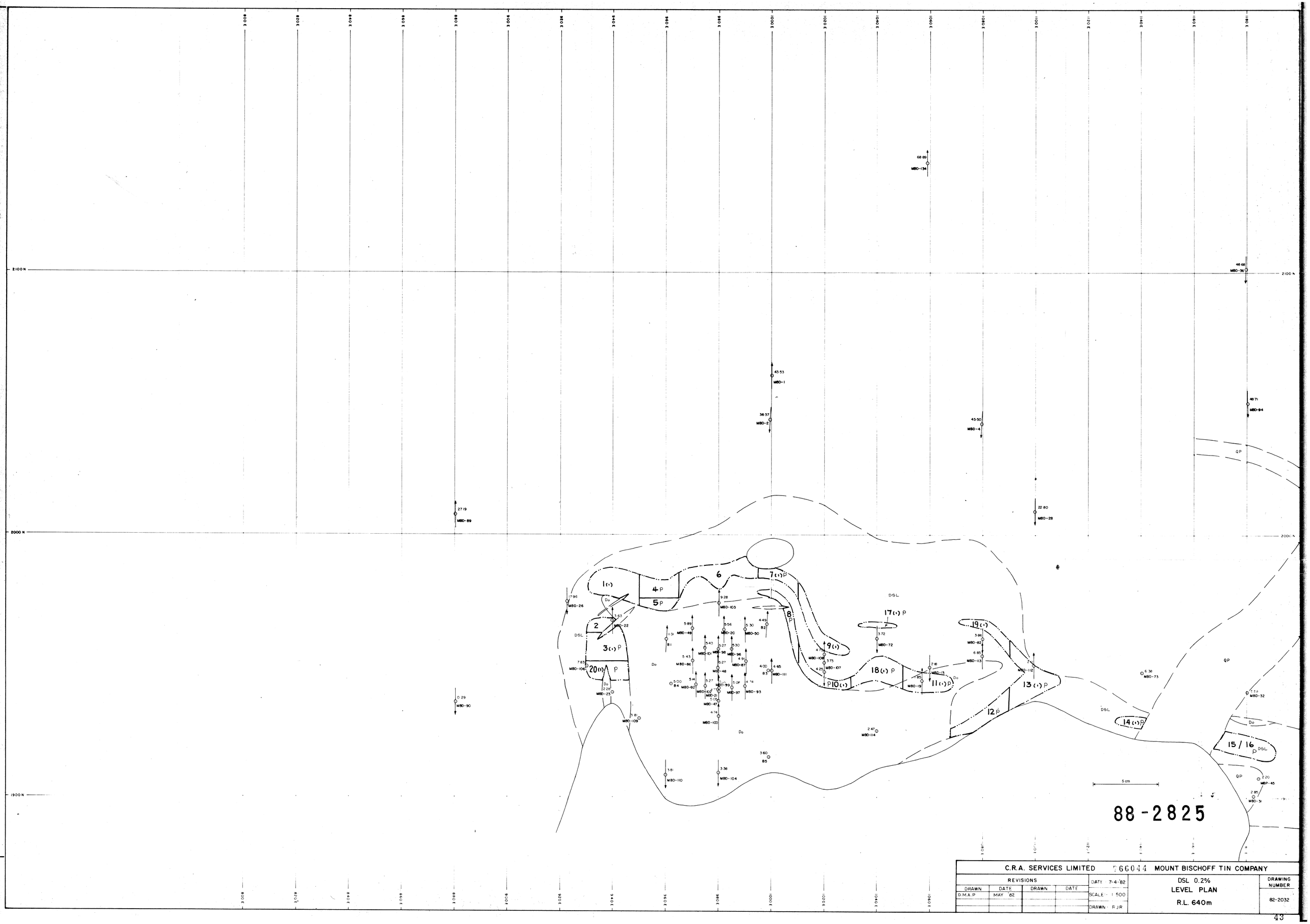
1721
1741
1761
1781
1801
1821
1841
1861



88-2825

C.R.A. SERVICES LIMITED				T 66044 MOUNT BISCHOFF TIN COMPANY		
REVISIONS				DATE 7-4-82	DSL 0.2% LEVEL PLAN R.L. 640m	DRAWING NUMBER
DRAWN	DATE	DRAWN	DATE			
D.M.A.P	MAY 82			SCALE 1:500		82-2032
				DRAWN R.J.R		

2100 N

2000 N

1900 N

9 P

2 (1) P

1 (1)

3 P

4 (1)

5 (1) P

10 (1) P

6 (1) P

11 (1) P

7 (1)

8 (1) P

5 cm

766045

88-2825

C.R.A. SERVICES LIMITED					MOUNT BISCHOFF TIN COMPANY	
REVISIONS				DATE:-	DSL 0.2% (PLAN A) LEVEL PLAN R.L. 645m	DRAWING NUMBER
DRAWN	DATE	DRAWN	DATE			
D.M.A.P	MAY '82			SCALE:- 1:500		
				DRAWN:- RJR		

7947

N 1700N

N 1800N

N 1900N

N 2000N

RL 700m

RL 600m

RL 500m

RL 400m

19P

18P

17P

16P

15P

6P

3P

1P

4

2

20

16

15

14

13

12

11

10

9

8

7

22

21

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MAY 1982

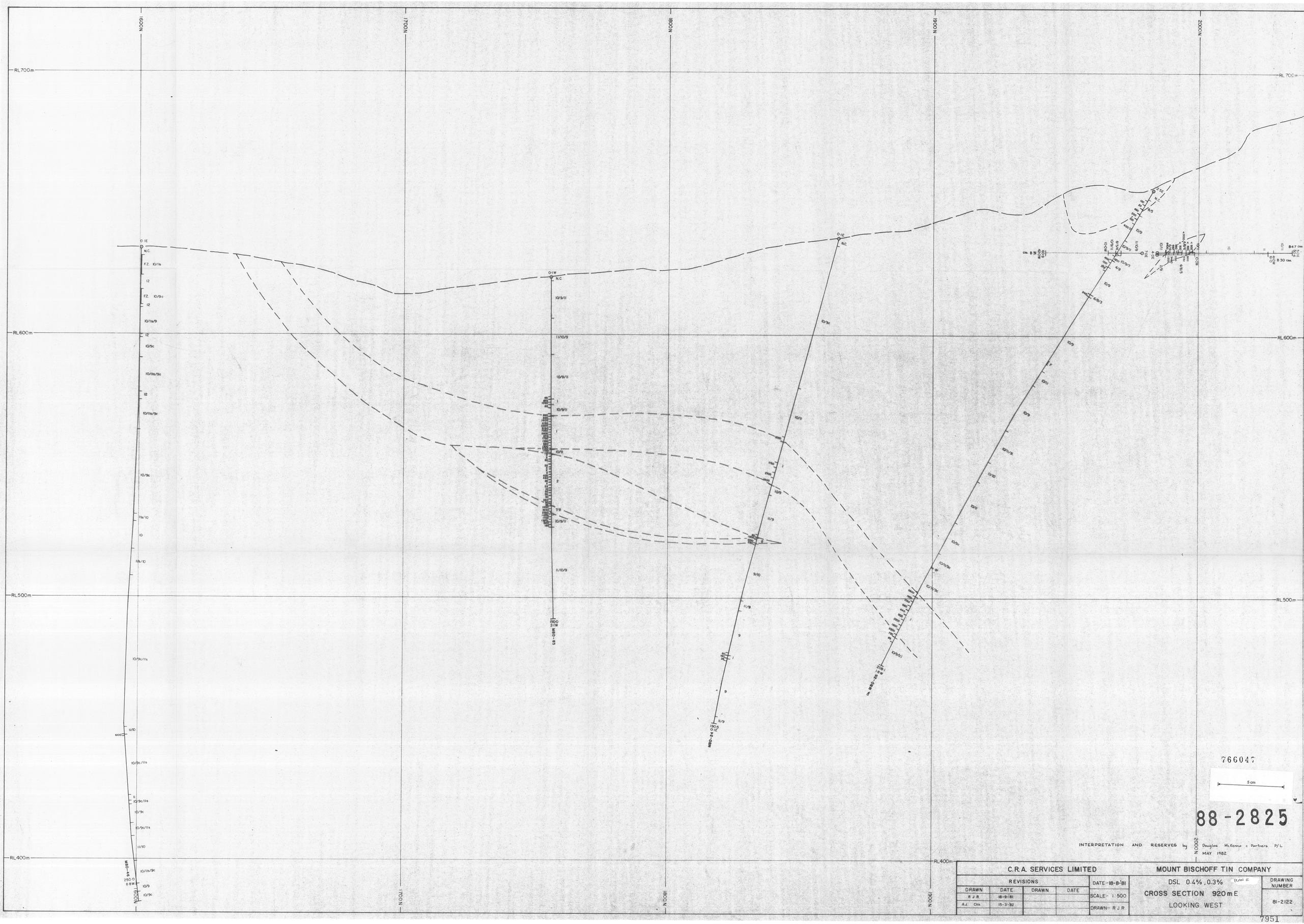
766046

5 cm

88-2825

C.R.A. SERVICES LIMITED					MOUNT BISCHOFF TIN COMPANY	
REVISIONS				DATE - 17-8-81	DSL 0.2% PLAN B	DRAWING NUMBER
DRAWN	DATE	DRAWN	DATE			
R J R	15-9-81			SCALE - 1 500	CROSS SECTION 1000mE LOOKING WEST	81-2117
A J Chk	16-3-82			DRAWN - R J R		

7948


1600N
1700N
1800N
1900N
2000N
RL700m
RL600m
RL500m
RL400m
0-1E
N.C.
FZ. 10/11s
12
FZ. 10/9c
10/11s/9
10/9c
10/11s/9c
10/9c/11s
11/10
10/11s/9c
10/9
10/9c
11/10/9
10/9/11
1900
2-1W
MBD-65
0-1E
N.C.
10/9c
10/9
11/9
9/10
MBD-24
190.5
0-1E
0-1E
N.C.
10/9
10/9c
10/11/9c
MBD-25
202.1
0-1E
N.C.
10/9
10/11/9c
B 30 cms
B 47 cms
B 30 cms
B 30 cms
B 30

88-2825

7954

MOUNT BISCHOFF TIN COMPANY

7 6 0 4 S

22-3-82

82-2028

QP 0.3% 0.2% (Pink)

LEVEL PLAN

RL 620m

D.M.A.P. MAY 82

5 cm

2100 N

2000 N

1900 N

1100 E

1000 E

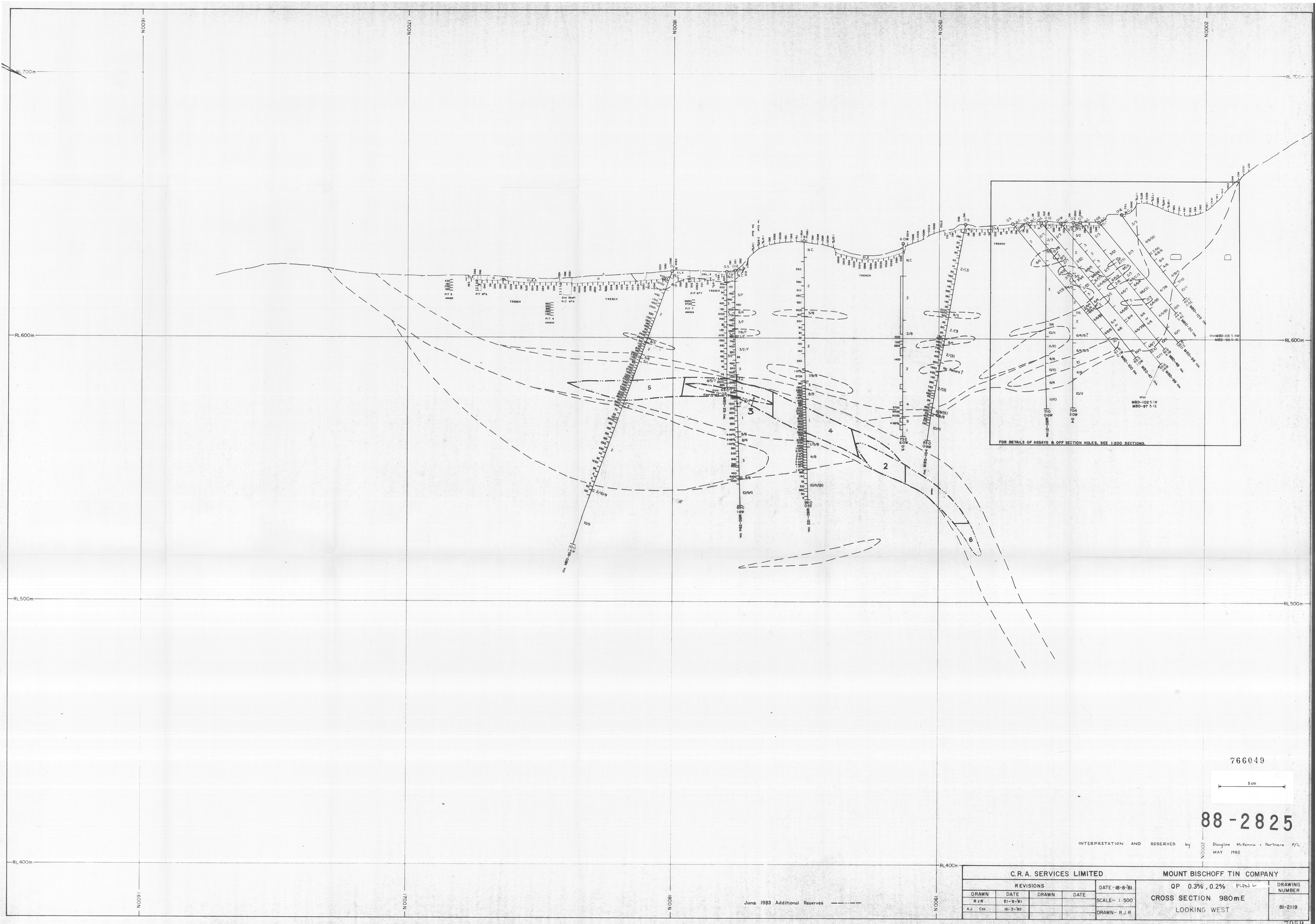
900 E

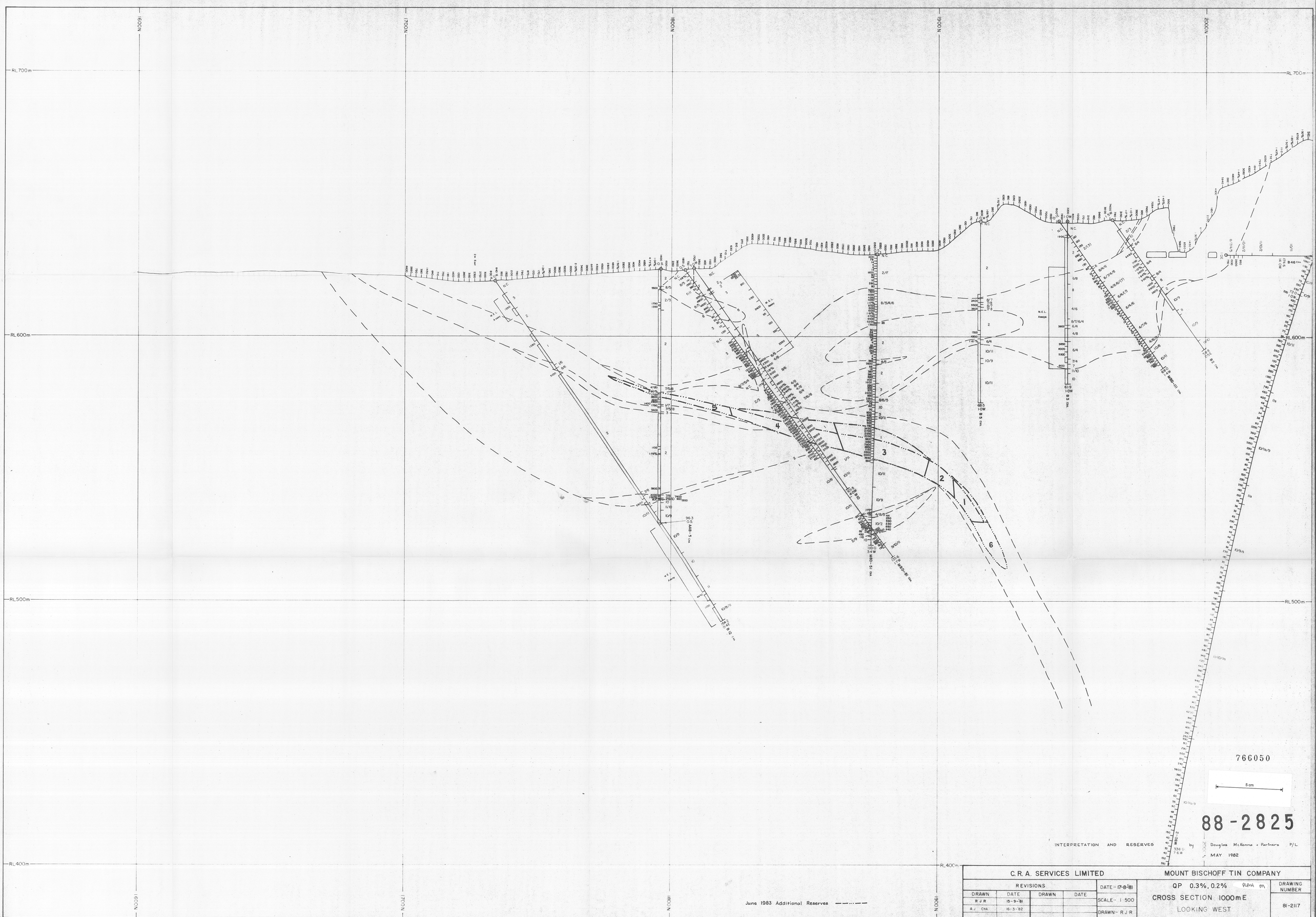
800 E

QP

Do

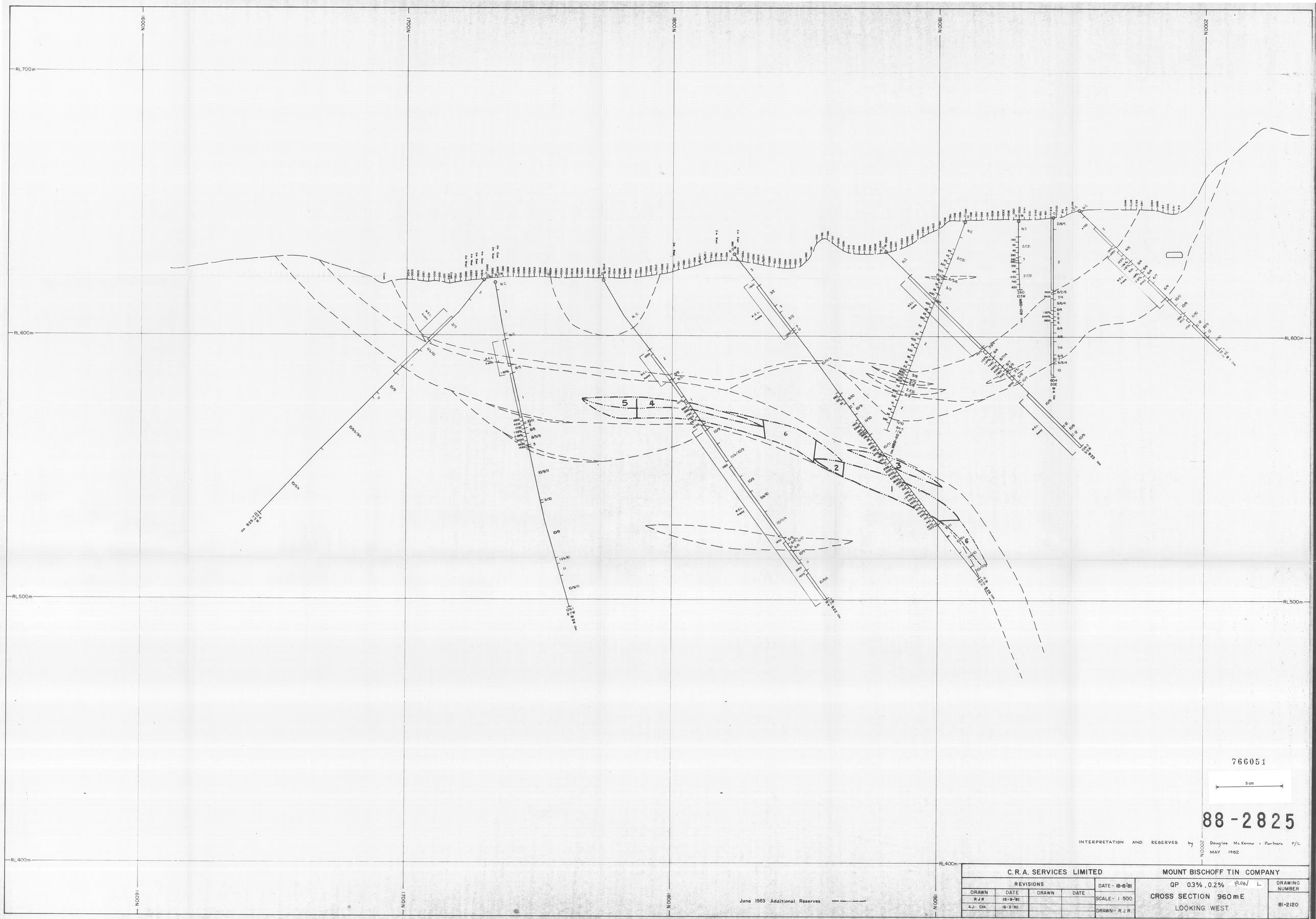
DSL


1600N
1700N
1800N
1900N
2000N
RL 700m
RL 600m
RL 500m
RL 400m
TRENCH
PIT N°5
PIT N°6
PIT N°7
PIT 5
PIT 6
PIT 7
PIT 4
N.C.
0.5
0.1E
6.0W
5
4
3
2
1
6
MBD-25 Ckn
MBD-29 Ckn
MBD-100 Ckn
MBD-48 Ckn
MBD-47 Ckn
MBD-99 Ckn
MBD-20 Ckn
MBD-103 Ckn
MBD-102 5-1W
MBD-97 5-1E
also MBD-101 5-4W
MBD-96 5-1E
MBD-104 Ckn
MBD-12 Ckn
MBD-22 Ckn
MBD-23 Ckn
MBD-24 Ckn
MBD-26 Ckn
MBD-27 Ckn
MBD-28 Ckn
MBD-30 Ckn
MBD-31 Ckn
MBD-32 Ckn
MBD-33 Ckn
MBD-34 Ckn
MBD-35 Ckn
MBD-36 Ckn
MBD-37 Ckn
MBD-38 Ckn
MBD-39 Ckn
MBD-40 Ckn
MBD-41 Ckn
MBD-42 Ckn
MBD-43 Ckn
MBD-44 Ckn
MBD-45 Ckn
MBD-46 Ckn
MBD-49 Ckn
MBD-50 Ckn
MBD-51 Ckn
MBD-52 Ckn
MBD-53 Ckn
MBD-54 Ckn
MBD-55 Ckn
MBD-56 Ckn
MBD-57 Ckn
MBD-58 Ckn
MBD-59 Ckn
MBD-60 Ckn
MBD-61 Ckn
MBD-62 Ckn
MBD-63 Ckn
MBD-64 Ckn
MBD-65 Ckn
MBD-66 Ckn
MBD-67 Ckn
MBD-68 Ckn



C.R.A. SERVICES LIMITED				MOUNT BISCHOFF TIN COMPANY	
REVISIONS				DATE - 17-8-81	QP 0.3%, 0.2% RAM m	DRAWING NUMBER
DRAWN	DATE	DRAWN	DATE	SCALE - 1:500	CROSS SECTION 1000mE	81-2117
R J R	15-9-81			DRAWN - R J R	LOOKING WEST	
A J Chk	16-3-82					

7960



766051

5 cm

88-2825

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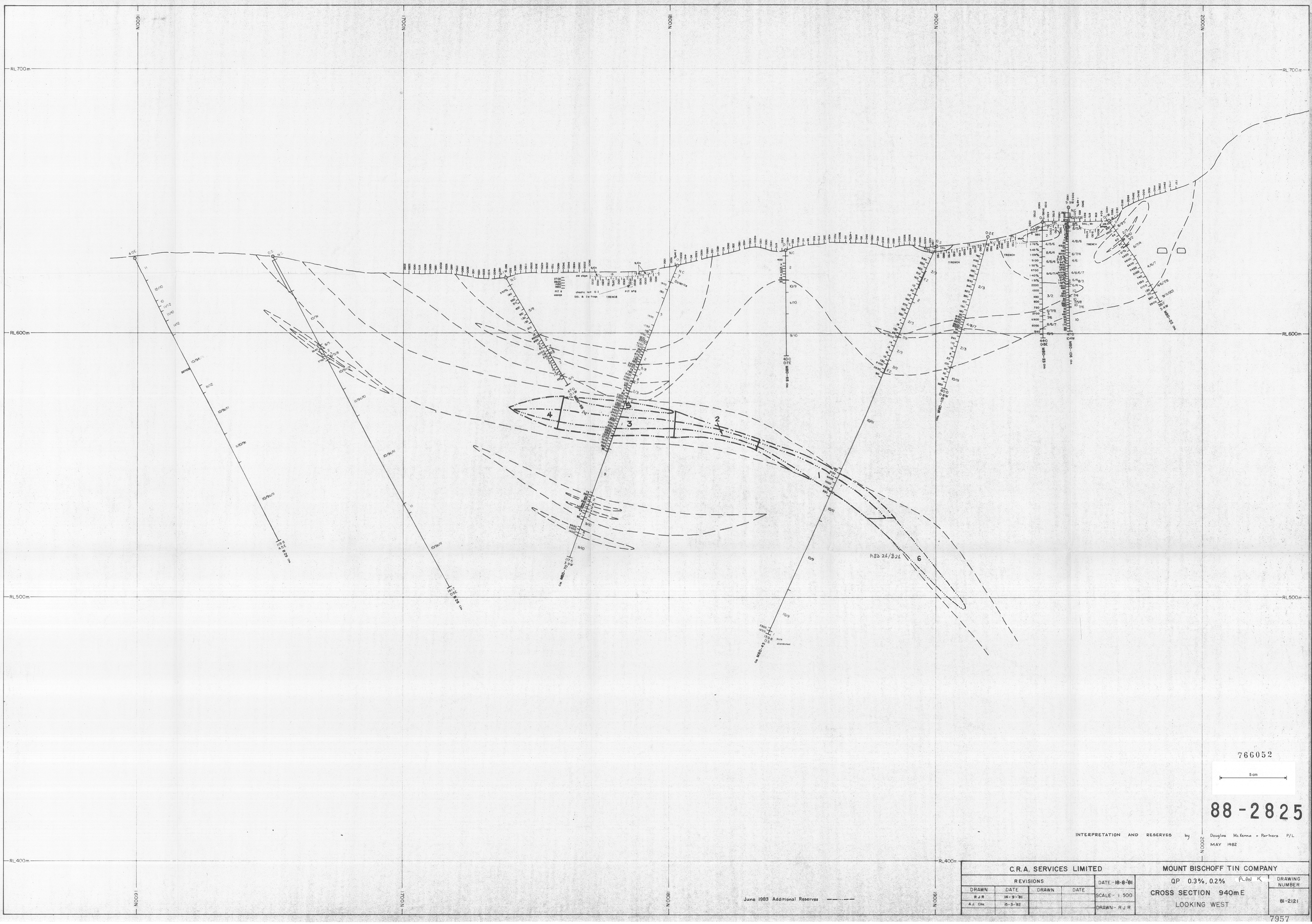
MAY 1982

C.R.A. SERVICES LIMITED				MOUNT BISCHOFF TIN COMPANY	
REVISIONS				DATE - 18-8-81	QP 0.3%, 0.2% RDN L	DRAWING NUMBER
DRAWN	DATE	DRAWN	DATE	SCALE - 1 500	CROSS SECTION 960mE	81-2120
R J R	15-9-81			DRAWN - R J R	LOOKING WEST	
A.J. Chk.	16-3-82					

7958



766052

5 cm

88-2825

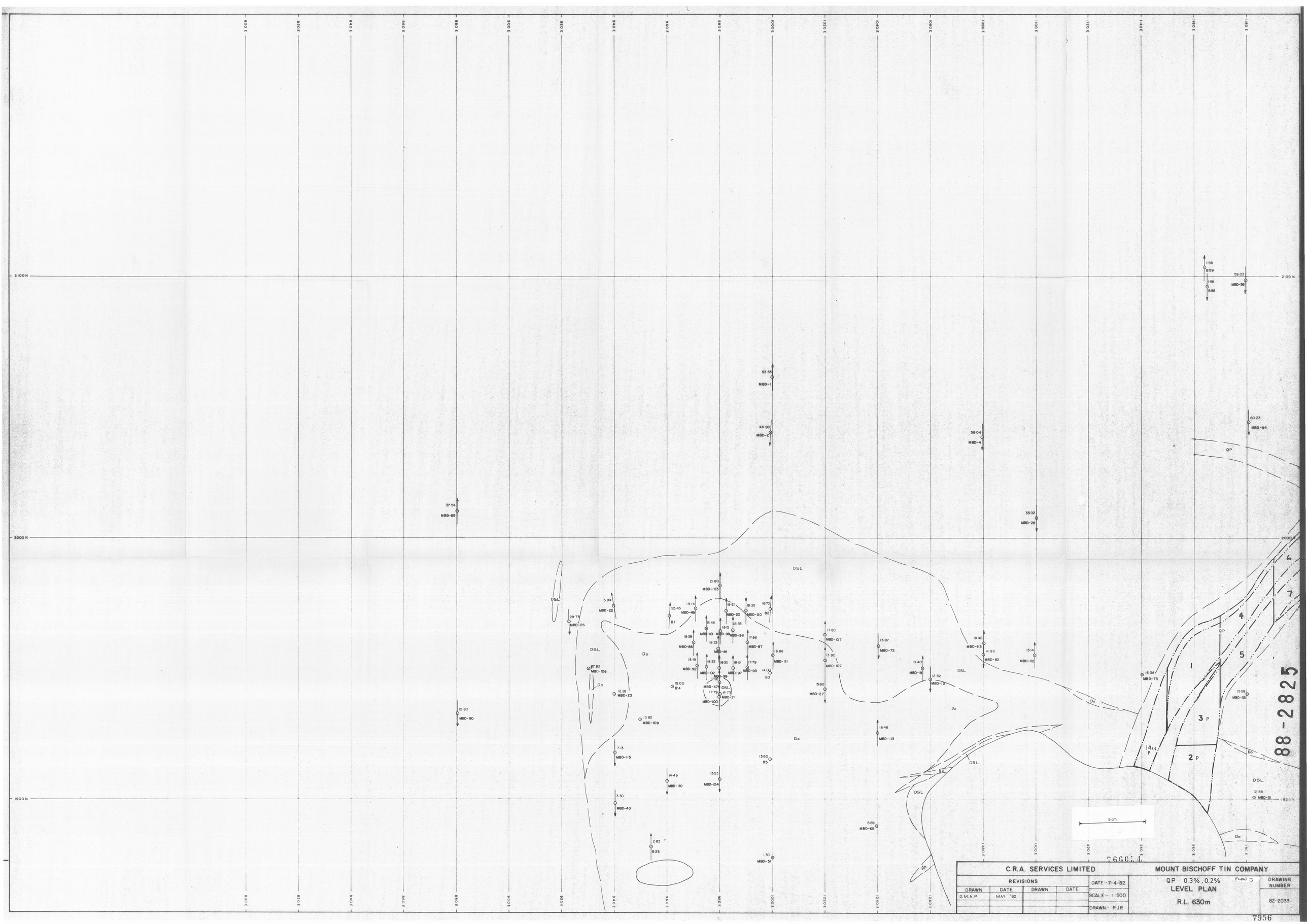
INTERPRETATION AND RESERVES by Douglas McKenna + Partners P/L
MAY 1982

C.R.A. SERVICES LIMITED					MOUNT BISCHOFF TIN COMPANY	
REVISIONS				DATE - 18-8-81	QP 0.3%, 0.2% PLAN K	DRAWING NUMBER
DRAWN	DATE	DRAWN	DATE			
R J R	14-9-81			SCALE - 1 500	CROSS SECTION 940mE	81-2121
A J Cha	15-3-82			DRAWN - R J R	LOOKING WEST	

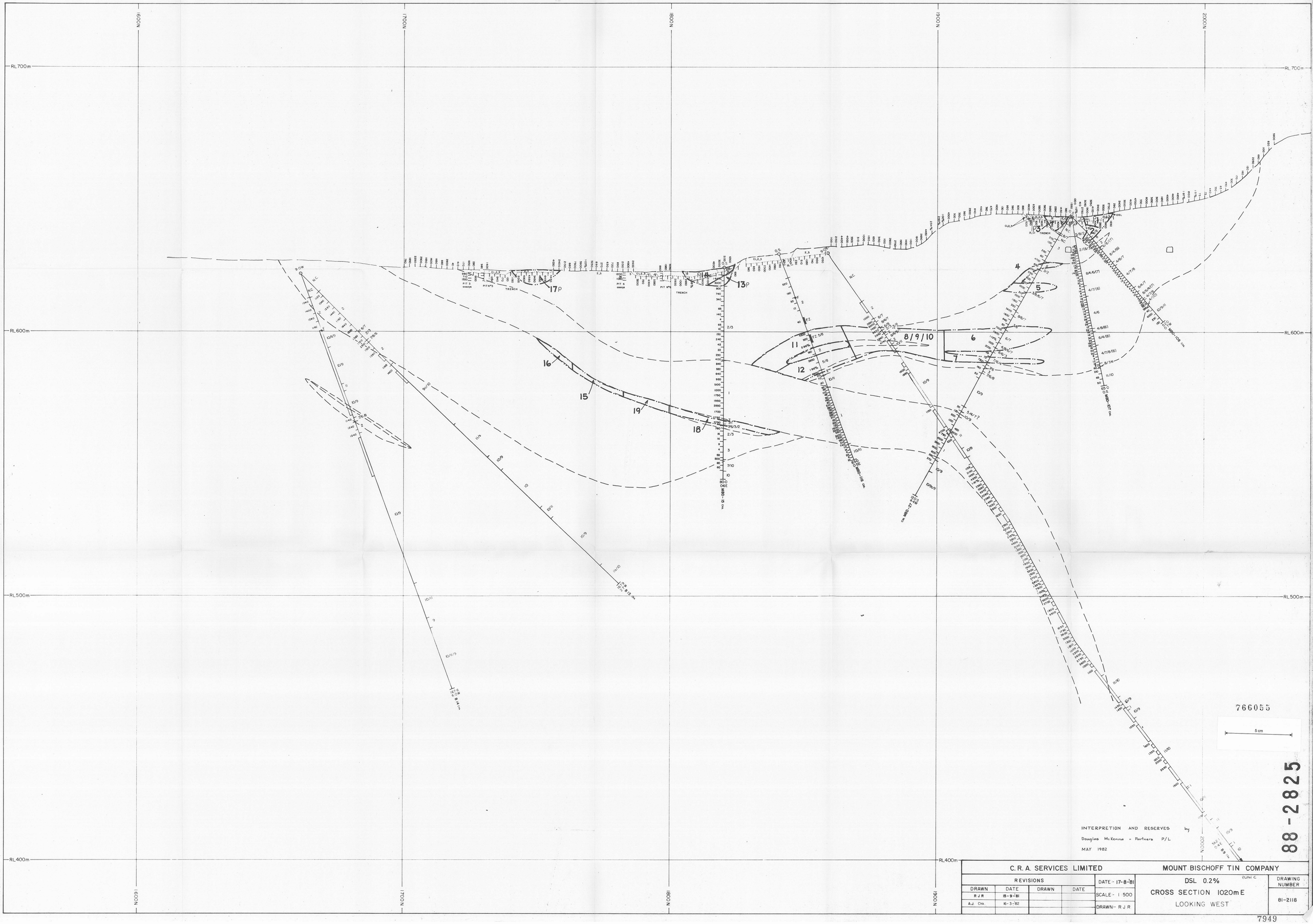
7957

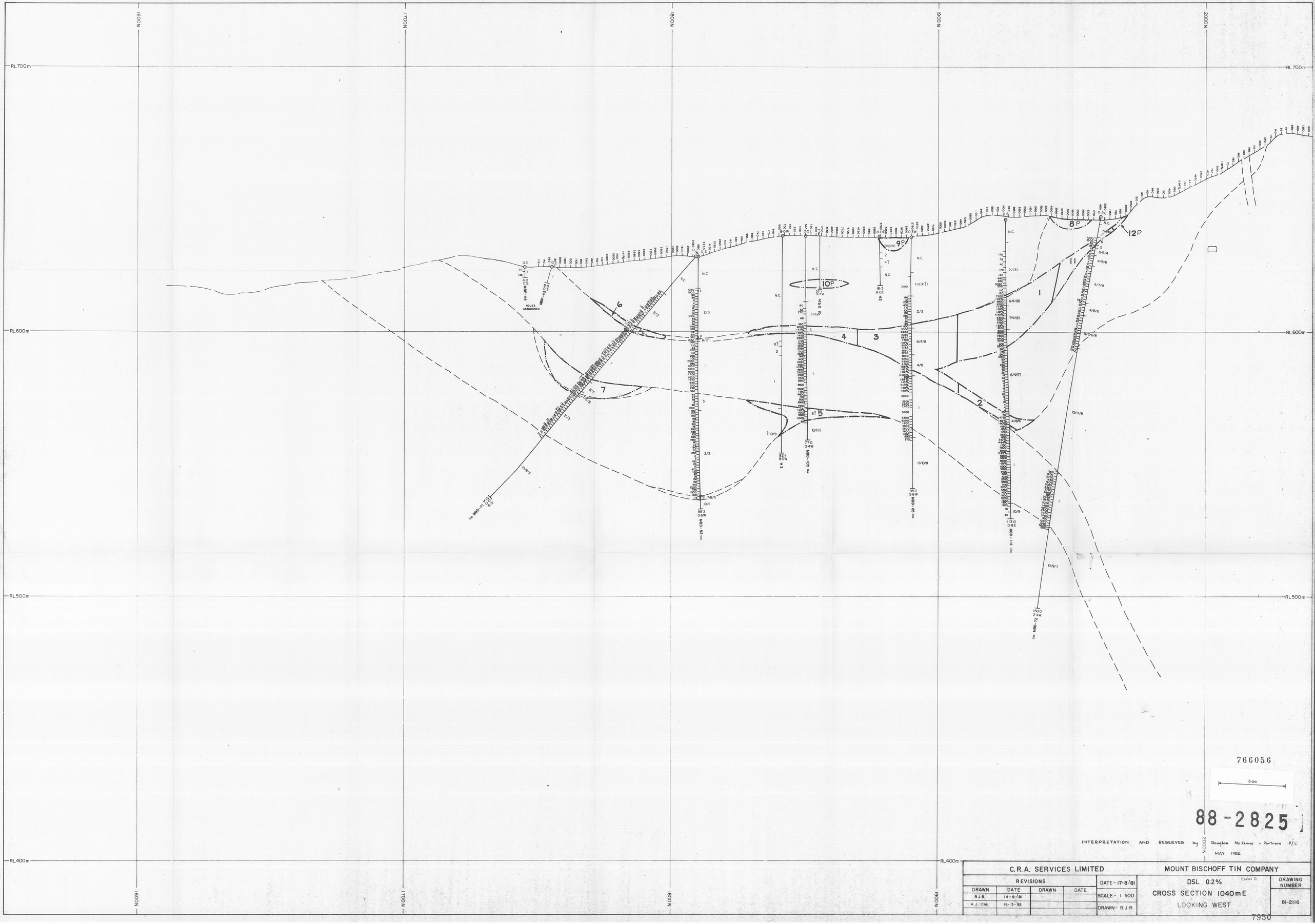
C.R.A. SERVICES LIMITED					MOUNT BISCHOFF TIN COMPANY	
REVISIONS				DATE -	QP 0.3%, 0.2% Plan I	DRAWING NUMBER
DRAWN	DATE	DRAWN	DATE	SCALE - 1:500	LEVEL PLAN	
D.M.A.P	MAY '82			DRAWN - R.J.R	RL. 625 m	

7955



C.R.A. SERVICES LIMITED					MOUNT BISCHOFF TIN COMPANY	
REVISIONS				DATE - 7-4-82	QP 0.3%, 0.2% LEVEL PLAN	DRAWING NUMBER
DRAWN	DATE	DRAWN	DATE	SCALE - 1:500	R.L. 630m	82-2033
D.M.A.P	MAY '82			DRAWN - RJR		


N.0091
N.0071
N.0081
N.0061
N.0002
RL.700m
RL.600m
RL.500m
RL.400m
13p
14
15
16
17p
18
19
8/9/10
11
12
1
2
3
4
5
6
7
D1
D2
D3
766055
5 cm
88-2825
INTERPRETION AND RESERVES
Douglas McKenna + Partners P/L
MAY 1982
C. R. A. SERVICES LIMITED
MOUNT BISCHOFF TIN COMPANY
REVISIONS
DRAWN | DATE | DRAWN | DATE
R J R | 15-9-81
A.J. Cha | 16-3-82
DATE - 17-8-81
SCALE - 1 500
DRAWN - R J R
DSL 0.2%
CROSS SECTION 1020m E
LOOKING WEST
DRAWING NUMBER
81-2118
7949



766056

5 cm

88-2825

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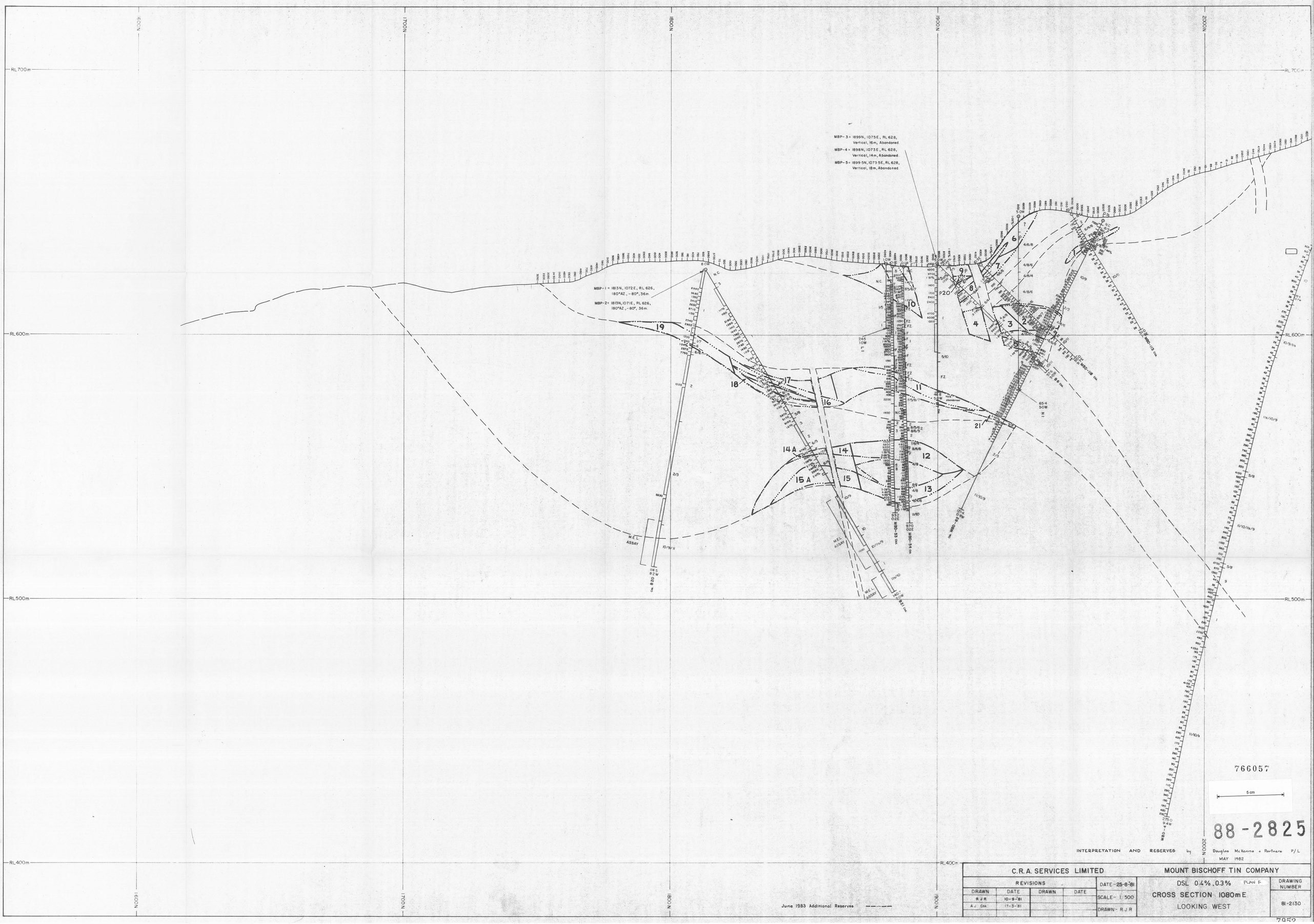
MAY 1982

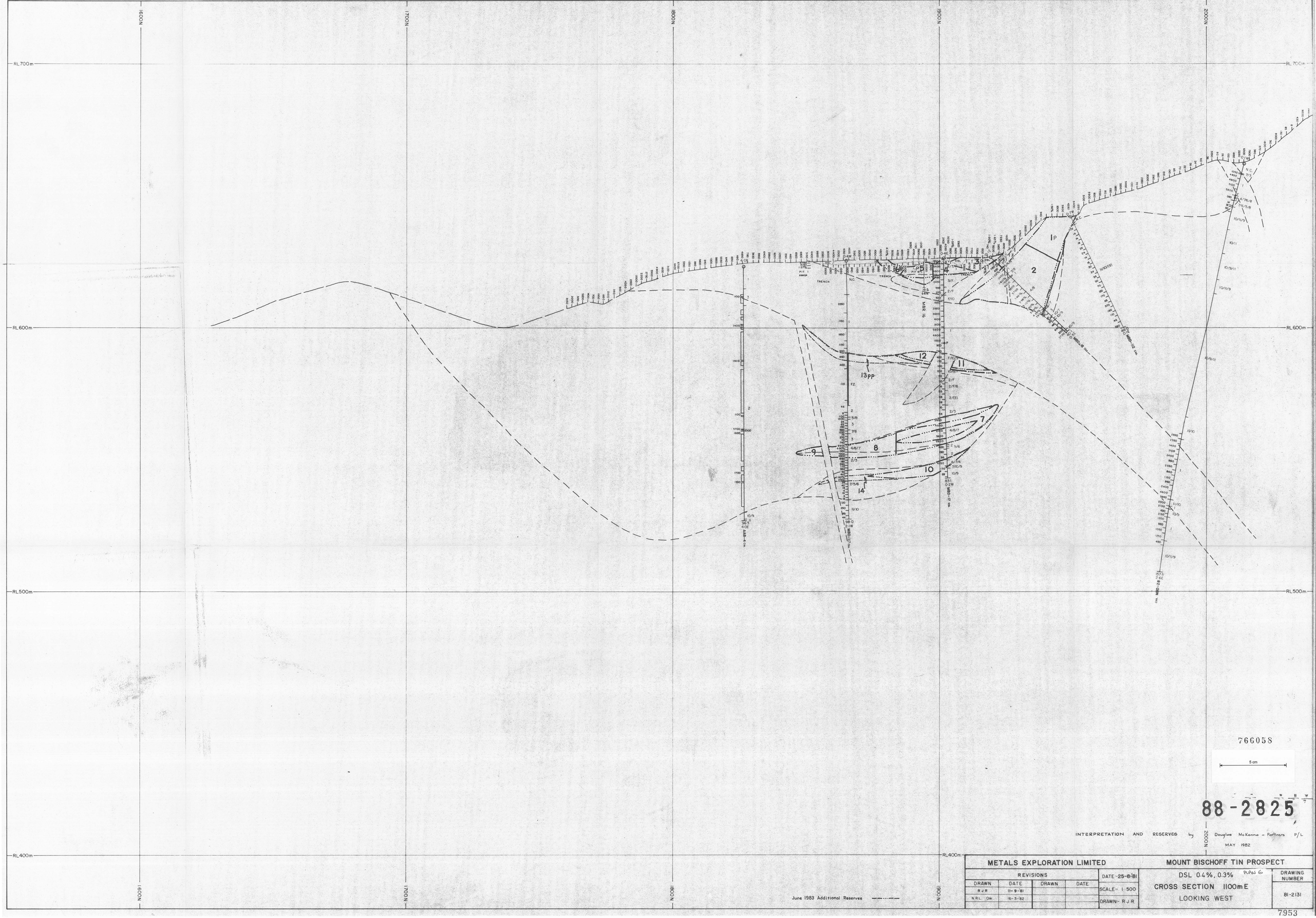
C.R.A. SERVICES LIMITED					MOUNT BISCHOFF TIN COMPANY	
REVISIONS				DATE - 17-8-81	DSL 0.2% PLAN D	DRAWING NUMBER
DRAWN	DATE	DRAWN	DATE	SCALE - 1 500	CROSS SECTION 1040mE LOOKING WEST	81-2116
R.J.R.	14-9-81			DRAWN - R.J.R.		
A.J. Chk.	16-3-82					

7950



C.R.A. SERVICES LIMITED				MOUNT BISCHOFF TIN COMPANY	
REVISIONS				DATE-25-8-81	DSL 0.4%, 0.3% PLAN F.
DRAWN	DATE	DRAWN	DATE	SCALE- 1:500	CROSS SECTION 1080mE LOOKING WEST
R J R	10-9-81			DRAWN- R J R	DRAWING NUMBER 81-2130
A J Cnk	17-3-81				

7952



766058

5 cm

88-2825

INTERPRETATION AND RESERVES by Douglas McKenna + Partners P/L
MAY 1982

METALS EXPLORATION LIMITED					MOUNT BISCHOFF TIN PROSPECT	
REVISIONS				DATE - 25-8-81	DSL 0.4%, 0.3% PLAN G	DRAWING NUMBER
DRAWN	DATE	DRAWN	DATE	SCALE - 1 500	CROSS SECTION 1100mE	81-2131
RJR	11-9-81			DRAWN - RJR	LOOKING WEST	
N.R.L. Ckd	16-3-82					

7953