324001

RENISON ASSOCIATED TIN MINES

GEOLOGICAL REPORT

on the

SPECIAL PROSPECTING LEASE

by

A M McKenzie

5th August 1960

60_324

LIST OF PLATES

026

RENISON ASSOCIATED TIN MINES N.L. 324003

Notes on the Renison Bell Tin Field.

Situation and History.

The Renison Bell Tin Field is situated 11 miles from Zeehan and 7 miles from Rosebery on the Emu Bay Railway. Mining was started in the area in the early 1890's and the first report published on the area was by A. Montgomery in 1895. Initially, interest was centered in alluvial tin. Shallow workings revealed stanniferous gossans, oxidised sulphides and beneath , massive sulphides.

The first mill was erected by the Boulder Tin Mining Co. in 1907. The succes of this venture led to the erection of numerous small mills by Companies interested in the sluicing of alluvials and the treatment of gossans and the oxidised ore. As these sources of ore were depleted, the mills closed. No treatment could be found for the plentiful sulphide ores.

General.

The present Company holds leases over a wide area and treats the sulphide-cassiterite ore exclusively. The ore is mined near the site of the original mill and is hauled 2½ miles by motor lorry to the present mill. Production is approximately 400 tons per week from the Battery Mine.

Geology.

General. Host rocks are unfossiliferous shallow water sediments, predominately shales, siltstones, sandstones and argillaceous siltstones . A well defined marked horizon with red cherts, conglomerates, mudstones and red, coares grained sandstones, approximately 80' thick, is of considerable importance in mining and diamond drilling correlation.

The age of the sediments is thought to be Upper Proterozoic to Lower Cambrian. Overall, the area is gently folded with the mine area situated on the gently N.E. dipping limb of an anticline. Faulting occurs with two main trends: approximately N.W. - S.E. and N.E. - S.W. All observed faults indicate normal displacements of from 10' to 100' in general.

Economics. Lodes structures fall into two main categories.

(i) "Sill" Type Lodes. These are pyrrhotite, quartz, pyrite, pistomesite, cassiterite bodies with thickness varying between 15' and 30'. Lying conformably with the bedding, the "sills" are found at three distinct horizons. The upper one is immediately above the marker horizon, the second immediately below it. The third is approximately 120' below this again.

These bodies have apparently replaced calcareous sediments over a wide area giving abundent carbonate gangue within, or about, the ore. Replacement is not complete and there are areas which are unmineralised.

Substantially all mining of the sulphides to date has been concentrated on the second sill horizon. Mining and geological interpretation of these flat lying bodies has been greatly confused by the abundance of small faults with approximately 10' to 30' normal throw.

(ii) Fissure Lodes. These are found in two types.

(a) The pyrrhotite, quartz, pyrite, pistomesite, cassiterite lodes. These are replacement bodies on two major fault lines trending N.W. - S.E. The vertical extent is apparently large. Strike lengths are of the order of 1000' and the width varies from 10' to 30' with a maximum approaching 100' in places. These bodies have been major producers in the past because of the depth of oxidation,

(b) The Quartz-Cassiterite Lodes. These are found mainly in the Pine Hill area and appear to be related to the quartz porphyry in that area. Small workings are to be found on them, but so far, these have not proved payable.

(2)

have not proved payable.

Ore Reserves. Reserves quoted by the Company in August 1960:

Battery Mine,	183,000 tons	1.23% Sn.
Exploration Area,	1,000,000 tons	0.60% Sn.

Future.

The problem today is the same as it was 60 years ago: the extraction of very fine grained cassiterite from massive sulphides. In parallel with metallurgical research, geological exploration of a large area is continuing.

Present metallurgical extraction of the cassiterite involves the flotation and rejection of the sulphides and the concentration of the flotation sink-product on tables. It is anticipated that the installation of vanners in both mill and dressing plants will lead to greatly increased recoveries of the fine sizes.

Renison Bell,
5. 4. 1961.

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RENISON ASSOCIATED TIN MINES

Geological Report on the Special Prospecting Lease

Introduction

The aims of the geological study made of the Special Prospecting Lease during the period 2nd November, 1959 to 22nd July, 1960 were:

(a) To produce a geological map;

(b) To obtain a general structural picture;

(c) To form conclusions as to the value of the area and suggest which sections should be retained by the Company.

The work has been accomplished by traversing roads, railways, tracks, creeks and rivers and by cutting and traversing walking tracks into areas otherwise only accessible with difficulty. Air photos were used where possible for location and pacing-compass traverses recorded elsewhere.

The information acquired has been plotted on two 10 chain to one inch base maps. The topographic map (Plate 2) was enlarged from the Lands Department 20 chain photogrammetric topographic sheets, and this has been used as a base for plotting the geology on a separate map (Plate 3). Tracks and physical features have been recorded on the topographic map.

A grid has been constructed to cover the area based on magnetic north and all location and bearing references in this report are related to this grid which has no connection with the Mine grid. Approximate lease boundaries are the Pieman River to the north and grid lines 1000E, 1000N and 16,000E.

The Geological Map (Plate 3)

Sufficient work has been done to obtain a general geological map. The inferred boundaries on the map were interpolated either because of lack of outcrop or between known points where more detail was not warranted. It is most probable in these areas that faulting and folding displace and contort these generalised lines. The boundaries between the different units in the stratigraphic sequence are rather arbitrary in some places and may need to be modified as more detailed work is done in the mine areas.

In the area north and west of Casey's Camp, the rocks are similar to the Renison Bell Shales but may correlate in age with the argillites;

for this reason the area has been left uncoloured. As the Government geologists, now working on the Zeehan sheet, extend their mapping into the area west of the lease the picture may become clearer.

It is not possible to correlate the shales and conglomerate in the south east corner of the area with the general sequence but they are probably part of the argillite formation.

The accurate plotting of the boundary of the quartz porphyry mass at Pine Hill is not possible because of extensive scree cover, thick scrub and the complex nature of the boundary.

Plates 7 to 17 show some localities in greater detail plotted in most cases from uncorrected pacing-compass surveys.

Structure

The main structural feature of the area is an anticline, the axis of which trends in an arc concave to the south west (refer sections Plate 4). Superimposed on this fold is a structural lineation bearing approximately 135° and strongest in a belt passing between the Battery Workings (9000N, 10,000E) and Casey's Camp (6700N, 3400E). This lineation shows up well on the 50 chain aerial photographs.

The north-eastern half of the area forms a limb of a major fold with more or less uniform strike and dip. A plot of bedding strikes (Plate 6) indicates the main north-south trend but is not sufficiently representative of the whole area to be of real use. The fault trends approximate the grid of Vening Meinesz but a north-south trend is missing.

Geological History

The geological history represented by the rocks and structure in the area is thought to start in the Upper Proterozoic or Lower Cambrian time but the absence of fossils makes age correlation only tentative. The lowest member of the stratigraphic sequence exposed here has been named the Dalcoath Quartzites. These rocks are medium grained greywacke sandstones, for the most part coarsely bedded, ripple marked and in some places they exhibit mud-crack structures. These latter suggest a shallow water environment of deposition. Blisset and Quilline suggest, from their regional mapping in the Zeehan district, that these quartzites correlate

with the Conah Quartzites which are unconformable on Pre-Cambrian Schists. If this is correct the picture may well be that of a peneplained shelf of Pre-Cambrian rocks covered by shallow sea in which environment the sandstones were deposited.

The Renison Bell carbonaceous shales, fine sandstones and siltstones conformably overlying the Dalcoath Quartzites also suggest a relatively shallow environment not too far from the shore line. The Red Rock beds conformable on the Renison Bell Shales form a transition from these shallow water sediments to the massive argillites which suggest a deeper water environment further removed from the shore line. The dolomite beds of the Upper Renison Bell and Red Rock beds, with the sandstones and fine conglomerates, are more like the usual neritic environment marine rocks. It is possible that this change coincides with tectonic activity at some other place and that this activity resulted in the subsidence that must have taken place during this time (refer Plate 5).

Regional geology of the West Coast suggests that these rocks were compressed and folded at some time during the Upper Cambrian and again in the Upper Devonian. Following the Upper Cambrian folding it is reasonable to assume that the area formed a land surface and that erosion took place until the area subsided again in the Lower Ordovician time and sedimentation again occurred. I feel that it is most unlikely that this area was land during the Ordovician (Owen Conglomerate) to Devonian (Bell Shale) time. It is also possible that there was some marine transgression into this area during Permian time.

As the igneous type rocks and mineralisation of the area have not yet been aged by physical means, we can only form general ideas regarding the ages. We know that the diabase dykes are the youngest of these rocks and younger than the mineralisation and it is reasonable to assume they are of Jurassic age. The sulphide mineralisation appears to be younger than any tectonic movements in the area and is thus younger than the Upper Devonian folding. The ultrabasic rocks are generally considered to be Upper Cambrian in age and are probably post Cambrian folding. The field occurrence of these rocks suggests possible replacement of existing rocks rather than forceful intrusion. The structural lineation referred to previously would certainly be Upper Devonian or younger as it shows no

effects of any later tectonic movement.

Origin of the Mineralisation

There are two possible sources for the mineralisation:

(a) from older rocks;

(b) magmatic.

There is little doubt that the emplacement of the mineralisation was by hydrothermal solution or some similar vehicle and that the source was deeper than the present position of the ore bodies. Throughout the whole area traces of sulphide are visible in the rocks, especially the gabbros and argillites, suggesting that migration was through the rocks in general but with greater concentrations in the vicinity of major faults and like structures.

At Renison Bell, the near surface mineralisation is mainly concentrated in a belt trending north-north-west and in the Exe River area, the belt of mineralisation is also trending north-north-west.

It is possible that the only regional control is structural but it is also possible that the tin was concentrated by some prior process. If the tin were originally deposited as a heavy mineral in a sand, this would cause concentration in zones along an old shore line or in river beds. Subsequent migration would cause some redistribution and a tendency to re-concentration along structures.

If, as suspected, the Dalcoath Quartzites were shore line migration deposits on a Pre-Cambrian shelf, it is possible that tin was deposited as heavy mineral in these sands and subsequently migrated upwards by hydro-thermal solutions.

With present knowledge it appears that the main concentrations of tin are in the Upper Renison Bell, the Red Rock beds and as fissure bodies in the argillites. No concentrations have been found in the Dalcoath Quartzite. This may be because these rocks were unfavourable as a host or because the tin originated in these rocks and was replaced by another mineral during migration of hydrothermal solutions. The work of Edwards and others indicates that the cassiterite was in the first wave of mineralisation but this would probably be the case whatever the origin.

Prospects

A previous report has covered the Karlson-Riley Prospect and the P. O'Dea lease is dealt with in a report by Mr. J. Gilfillan. The other prospects mentioned in my progress report on 29th March will be mentioned below.

Renison Bell South (9000N, 6500E) These workings will need to be surveyed and for this purpose a line has been cut from Renison Bell Hill. It will also be necessary to clear away more scrub. Diamond drilling is needed to prospect this area and it is best left until the testing of areas closer to the present workings is completed. Further surface work here will be of no assistance at present.

The area between Montana (9000N, 9000E) and Dalcoath (7000N, 10,200E) lies within the Company's Mining lease and will no doubt be drilled as testing is extended from the Battery workings. This area is covered with thick scrub and soil and sub-soil mapping will probably have to be based on drilling results.

The Pine Hill (3200N, 12,000E) - Penzance (2700N, 11,200E) prospects are a different type mineralisation to that being treated at present. The tin is associated with quartz-tourmaline veining with little or no sulphides, also the tin is reported to be coarser in these occurrences. It would seem that testing of these occurrences could well wait until the prospecting for sulphide ores is in a much more advanced stage. Assays of samples from two faces in the Penzance Workings average 0.31% tin. These cannot be expected to represent the prospect as a whole but certainly should encourage the complete testing of this prospect. Samples Nos. 1 and 2 were chip channel samples over eleven and ten feet respectively and sample No. 3 was picked quartz-tourmaline vein material from the same location as No. 2 (see Plate 15).

The type of material that has been worked to date would take very little effort to mine being weathered altered rocks with quartz porphyry dykes and much quartz-tourmaline veining. Treatment of this material should be simpler than in the case of sulphide ores and it should be possible to work lower grades. Both these prospects would need costeaning and diamond drilling to test them. All along the boundary of the mass of quartz

porphyry warrants prospecting but this can best be done by expanding work from the known workings.

Casey's Camp Area (refer Plate 17) Additional work still leaves the correlation of the rocks in this area uncertain. It is possible that the rocks are part of the argillite unit though they have a similarity in appearance to the Renison Bell Shales, and contain quartzite beds in places. This area being relatively flat and swampy with timber cover would be ideal for geophysical prospecting. The use of the magnetometer for detecting ore at Renison Bell has proved useful only in a very broad sense and its reliability has been further reduced by the discovery by Professor Hill of magnetite in some of the Red Rock beds. If some reliable means of geophysical prospecting can be found, I should suggest that this area be surveyed. The prospects of finding ore in this area are not very promising.

The Airborne Geophysical Anomaly (14,000N, 7000E) is worthy of investigation and in this case the ground magnetometer could be of use. If a fissure similar to the Federal Lode exists beneath the gravels, the magnetometer should outline it sufficiently to give a target for drilling.

Fenton's Sluice Workings (9000N, 12,200E) These workings are in the Tertiary boulder fluviatile - probably fluvio-glacial - which caps a hill between Dalcoath Creek and the Ring River. The alluvial is capping weathered argillites.

A wall of approximately twelve feet high is exposed in the workings. The top eight feet consist of coarse boulder material with boulders of quartzite and quartz porphyry to 12 inches diameter; below this bed, which is coloured to some extent by limonite, is a blue grey, pebbly, vuggy clay band. A six inch limonite band in the lower section was sampled but contained no tin. Channel sampling is needed to test these gravels but I do not feel there will be any quantity of tin here.

Conclusions

At this stage, I cannot see that to continue this work will be of benefit. The next step is the testing of prospects, and as magnetometer surveys in some areas have proved difficult to interpret usefully, this would necessitate diamond drilling and underground investigation. Experience in the Battery workings demonstrates the advisability of

combining the underground development with diamond drilling.

It does not seem wise to divert money, labour and equipment from the development and testing at present in progress and I suggest that the Company consider reducing the size of the Special Prospecting Lease.

In my opinion, based on available evidence, the Company can safely reduce its holdings to the area outlined in green on Plate 2. The corner co-ordinates of this area are (00N, 11,000E)(15,000N, 2000E)(18,200N, 7300E)(3200N, 16300E).

This area totals roughly 2640 acres, and could well be taken up as a Consolidated Mining Lease for less expenditure than maintaining it as a Special Prospecting Lease.

The area comprises the O'Dea Lease (40 acres), the Mining Lease (880 acres less 25 acres outside the area) and 1760 acres now part of the Special Prospecting Lease. Rent on this area as a mine lease would be £1,320 per annum. The present mine lease must cost approximately £440, the increase in charge being £880. To hold the area outside the mine lease as a Special Prospecting Lease would cost 30/- per annum plus an expenditure covenant of £2 per acre or £3,530. In the case of holding the area as a mine lease the expenditure and labour covenants would be covered by the mine work at present in progress.

If the Company feels that more of this land should be held, I would recommend extending the boundaries further to the north-east and a lease covering the vicinity of Casey's Camp.

As an alternative I suggest that the areas shaded orange on Plate 2 are essential.

Acknowledgements

I wish to acknowledge the assistance given me by Mr. J. Gilfillan, Messrs. H. Blisset and B. Guilline of the Mines Department and Mr. M. Solomon and Professor P.A. Hill of the University.

A.M. McKenzie
Chief Geologist - Mt. Lyell
M. & R. Co. Ltd.

5th August, 1960.

REFERENCES

Ward, L.K. 1909 Boulder Tin Mining Co. N.L., North Dundas, Tasmania. Geological Survey Bulletin, No. 6.

Ward, L.K. 1909 The Tin Field of North Dundas. Report of the Secretary for Mines, December, 1909.

Ward, L.K. 1911 The X River Tin Field. Geological Survey Bulletin, No. 12.

Conder, H. 1918 The Tin Field of North Dundas. Geological Survey Bulletin, No. 26.

LIST OF SAMPLES ASSAYED

Assay No.	Location	Remarks	Assay %Sn
71	Near Casey's Camp (see Plate 17)	Siliceous Limonite	Trace (V)
72	Near Casey's Camp (see Plate 17)	Siliceous Limonite	0.04 (V)
73	Near Casey's Camp (see Plate 17)	Siliceous Limonite	Trace (V)
74	From fault in road cutting near Casey's Camo (see Plate 17)	Limonite	Nil (V)
75	Repeat assay for 72		0.05 (V) 0.09 (C)
92	From Owen Meredith tram, near junction with Dunkley's tram (near P118)	Limonite gossan	Trace (C)
205	Track S.W. of Dam (near P69)	Pyritic gossan	Nil (C)
223	Specimen P65 Confidence Siding (contains aluminium, phosphorus, ferrous iron; does not contain copper, nickel or chromium)	Pale blue mineral	Nil (C)
242	Collected by M. Solomon & P.A. Hill, University of Tasmania - quarry on road near old office (10,500N, 6100E)	Quartz porphyry dyke	Nil (C)
247	Renison Bell South (8700N, 6800E)	Pyrrhotite from dump	0.06 (C)
300	Karlson Riley Prospect (see previous report)	Sample (1)	0.06 (C)
401	As above	Sample (2)	0.05 (C)
403	As above	Sample (3)	0.04 (C)
404	As above	Sample (4)	0.03 (C)
405	As above	Sample (5)	0.04 (C)
414	Renison Bell South (9300N, 6000E)	Gossan	0.08 (C)
492	Road cutting in quartzite (8500N, 3500E)	6" gossan seam	Nil (C)
522	Fenton's Sluice Workings (9000N, 12,200E)	Limonite seam	Nil (C)
563	Penzance Workings (see Plate 15)	Sample (1)	0.30 (C)
564	As above	Sample (2)	0.39 (C)
565	As above	Sample (3)	0.24 (C)

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PLATE 1

LEGEND

STRATIGRAPHY

TERTIARY FLUVIATILE

CAMBRIAN? ARGILLITES
RED ROCK BEDS
RENISON BELL SHALES
DALCOATH QUARTZITES

IGNEOUS ROCKS

DIABASE DYKES
QUARTZ PORPHYRY
GABBRO & AMPHIBOLITE
SERPENTINITE

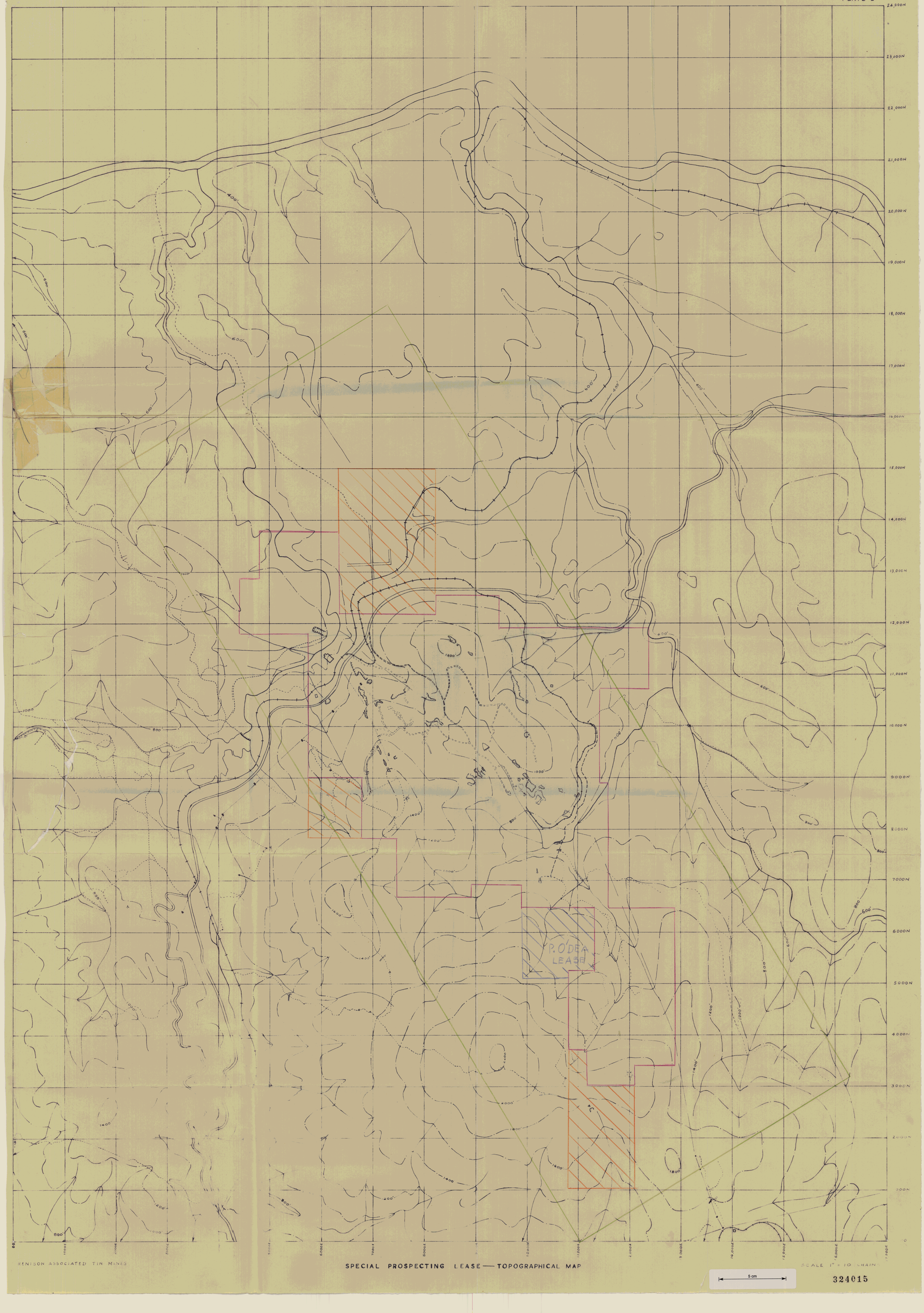
SYMBOLS

BEDDING STRIKE & DIP 50
JOINTS & VEINS STRIKE & DIP 20
FAULTS STRIKE & DIP 70
ROCK FORMATION BOUNDARIES
ROCK FORMATION BOUNDARIES INFERRED
SPECIMEN LOCATIONS P69
FAULTS EXTENDED OR INFERRED

DOLOMITE (SEDIMENTARY)

RENISON ASSOCIATED TIN MINES SPECIAL PROSPECTING LEASE

PLATE 2



RENISON ASSOCIATED TIN MINES

SPECIAL PROSPECTING LEASE — TOPOGRAPHICAL MAP

SCALE 1" = 10 CHAINS

324015

11

324016

PLATE 3

24 000 N
23 000 N
22 000 N
21 000 N
20 000 N
19 000 N
18 000 N
17 000 N
16 000 N
15 000 N
14 000 N
13 000 N
12 000 N
11 000 N
10 000 N
9 000 N
8 000 N
7 000 N
6 000 N
5 000 N
4 000 N
3 000 N
2 000 N
1 000 N

00
1 000 E
2 000 E
3 000 E
4 000 E
5 000 E
6 000 E
7 000 E
8 000 E
9 000 E
10 000 E
11 000 E
12 000 E
13 000 E
14 000 E
15 000 E
16 000 E
17 000 E

RENISON ASSOCIATED TIN MINES

SPECIAL PROSPECTING LEASE — GEOLOGICAL MAP

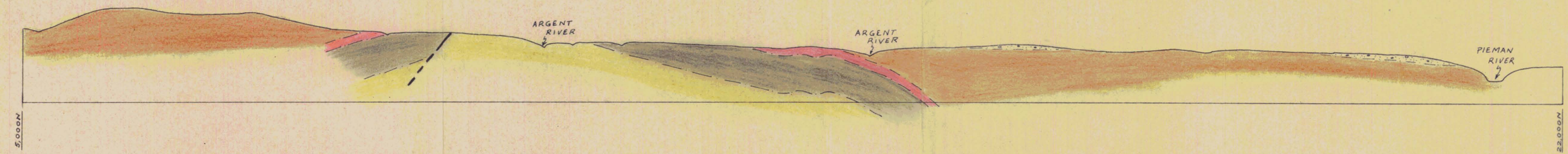
5 cm

1 INCH = 10 CHAINS

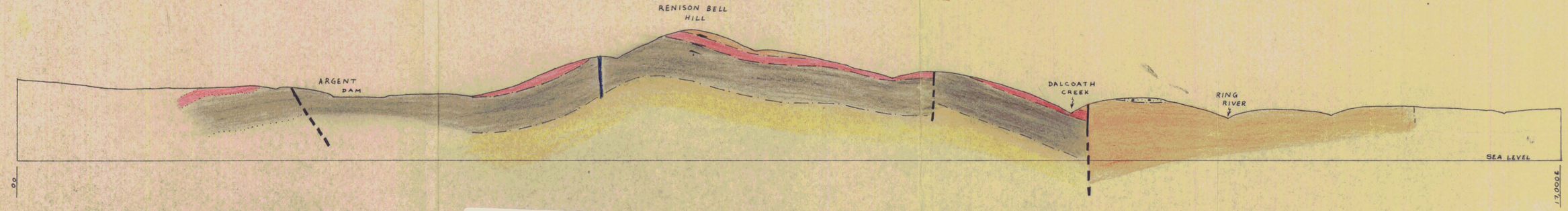
012

324017

PLATE 4



CROSS SECTION 5000 E, LOOKING WEST



5 cm

CROSS SECTION 9000 N, LOOKING NORTH

NATURAL SCALE 1 INCH = 10 CHAINS

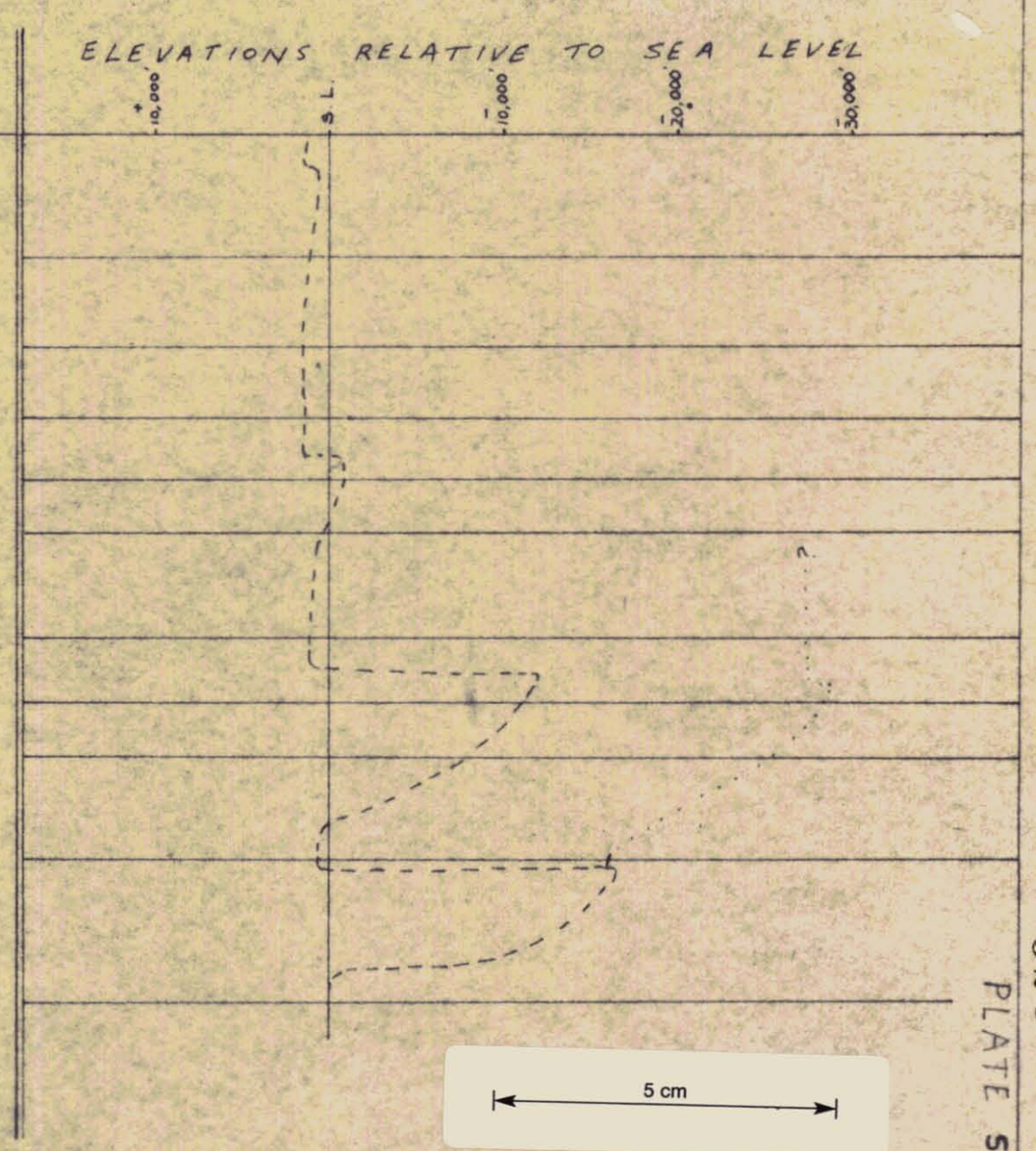
RENISON ASSOCIATED TIN MINES

SPECIAL PROSPECTING LEASE.

HISTORY COLUMN

APPROXIMATE SCALE 1" = 100 M. Yrs.

CENOZOIC	TERTIARY	
MESOZOIC	CRETACEOUS	
	JURASSIC	INTRUSION OF DIABASE DYKES
	TRIASSIC	
PALAEOZOIC	PERMIAN	
	CARBONIFEROUS	
	DEVONIAN	? INTRUSION OF QUARTZ PORPHYRY AND MINERALISATION FOLDING
	SILURIAN	
	ORDIVICIAN	? INTRUSION OF ULTA-BASIC ROCKS FOLDING
	CAMBRIAN	
PROTEROZOIC	PRE-CAMBRIAN	



RENISON ASSOCIATED TIN MINES

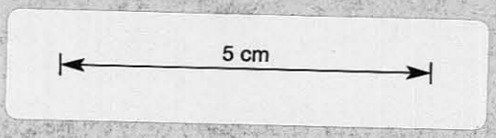
SPECIAL PROSPECTING LEASE

PLATE 5

013
324018

324019

PLATE 6



MAGNETIC NORTH

BEDDING STRIKES
(AREA PERCENT PLOT)

GENERALISED FAULT TRENDS

90°

180°

QUARTZ PORPHYRY AND DIABASE DYKES

STRUCTURE PATTERN

RENISON ASSOCIATED TIN MINES SPECIAL PROSPECTING LEASE

324020

PLATE 7

MAGNETIC NORTH

P108 40 57 P109 P110 30 50 RIVER 25 25 P111 P112 25 30 ARGENT 30 P113 30 22 55 33 40 WATER 35 55 RACE 40 CREEK 30 35 P98 30 P97 P143 CREEK 40 EMU BAY RAILWAY QUARTZ PORPHYRY DYKE QUARRY 30 80 10,500N ROAD 25 6000E POWER LINE 25

ARGENT RIVER & WATER RACE TRAVERSES

RENISON ASSOCIATED TIN MINES

5 cm

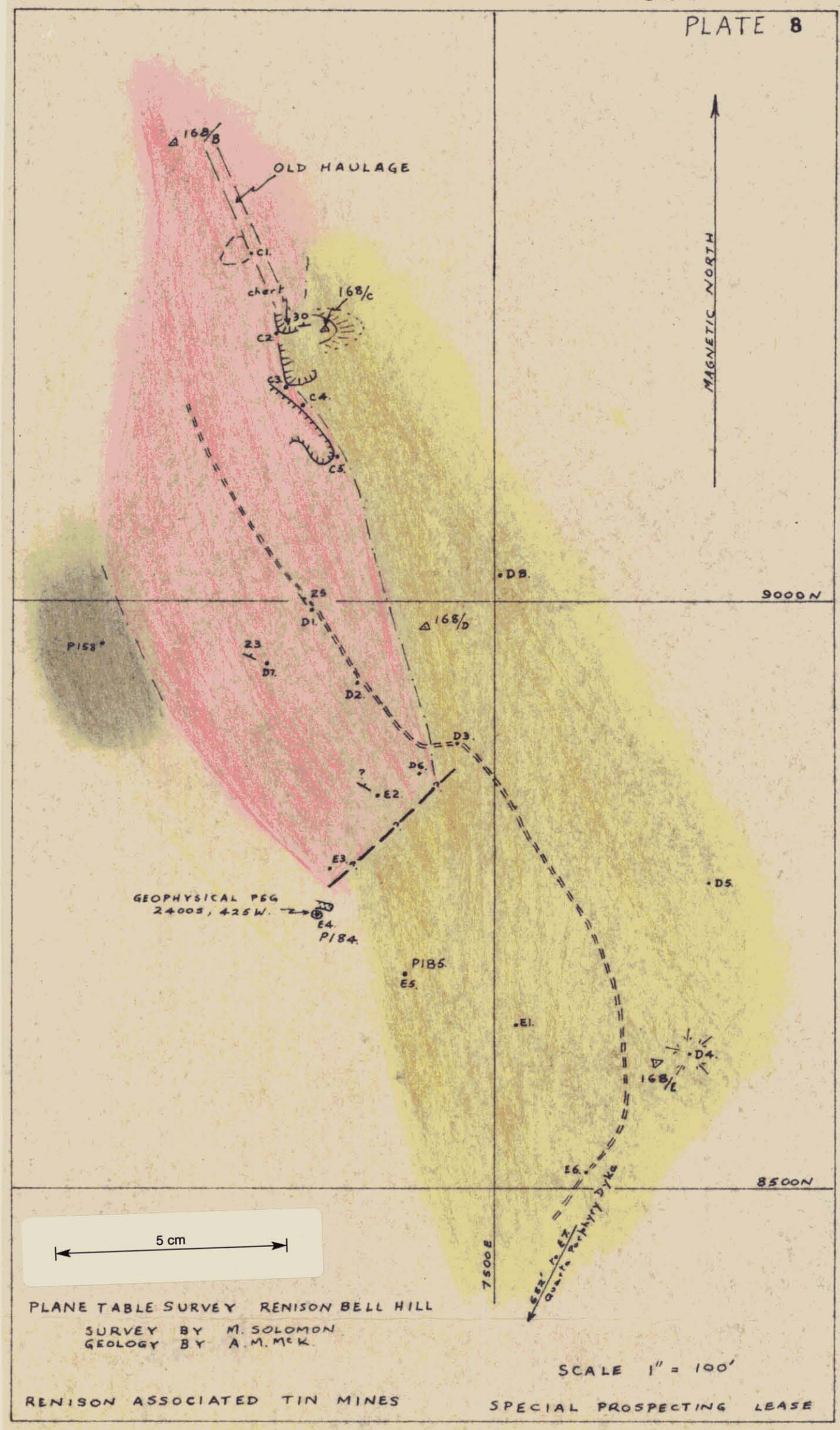
SCALE 1" = 100' (APPROX)

SPECIAL PROSPECTING LEASE

016

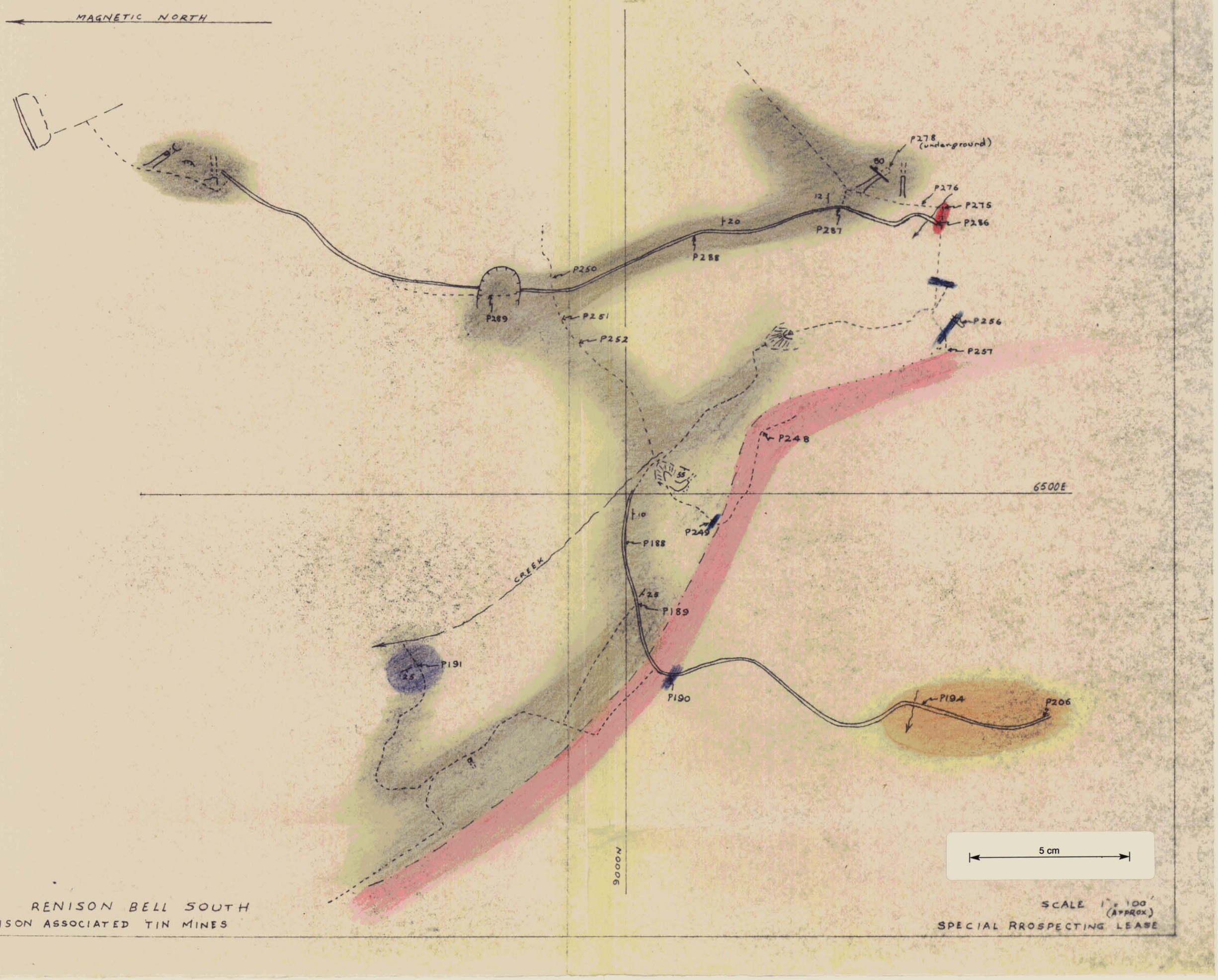
324021

PLATE 8



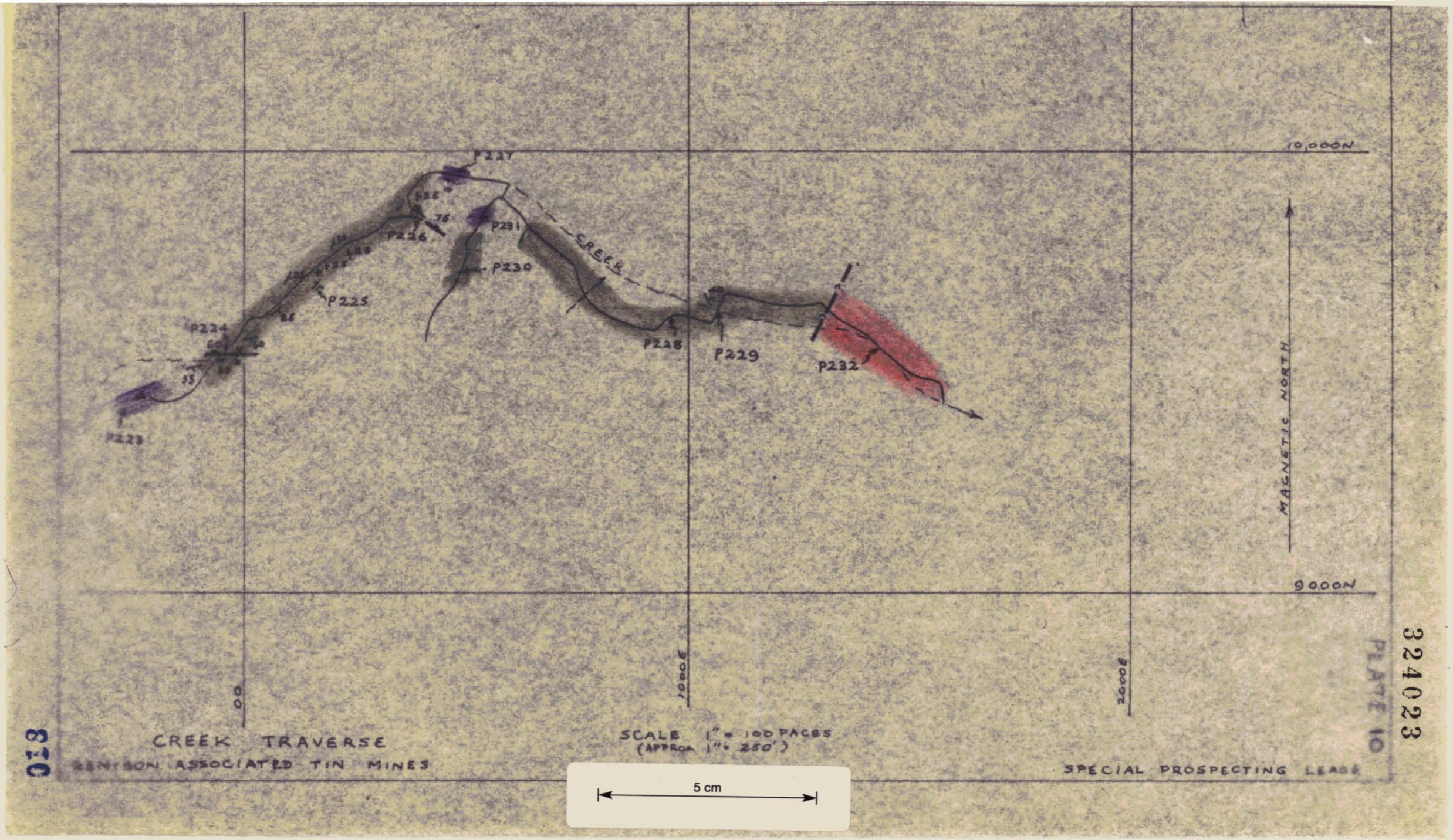
324022

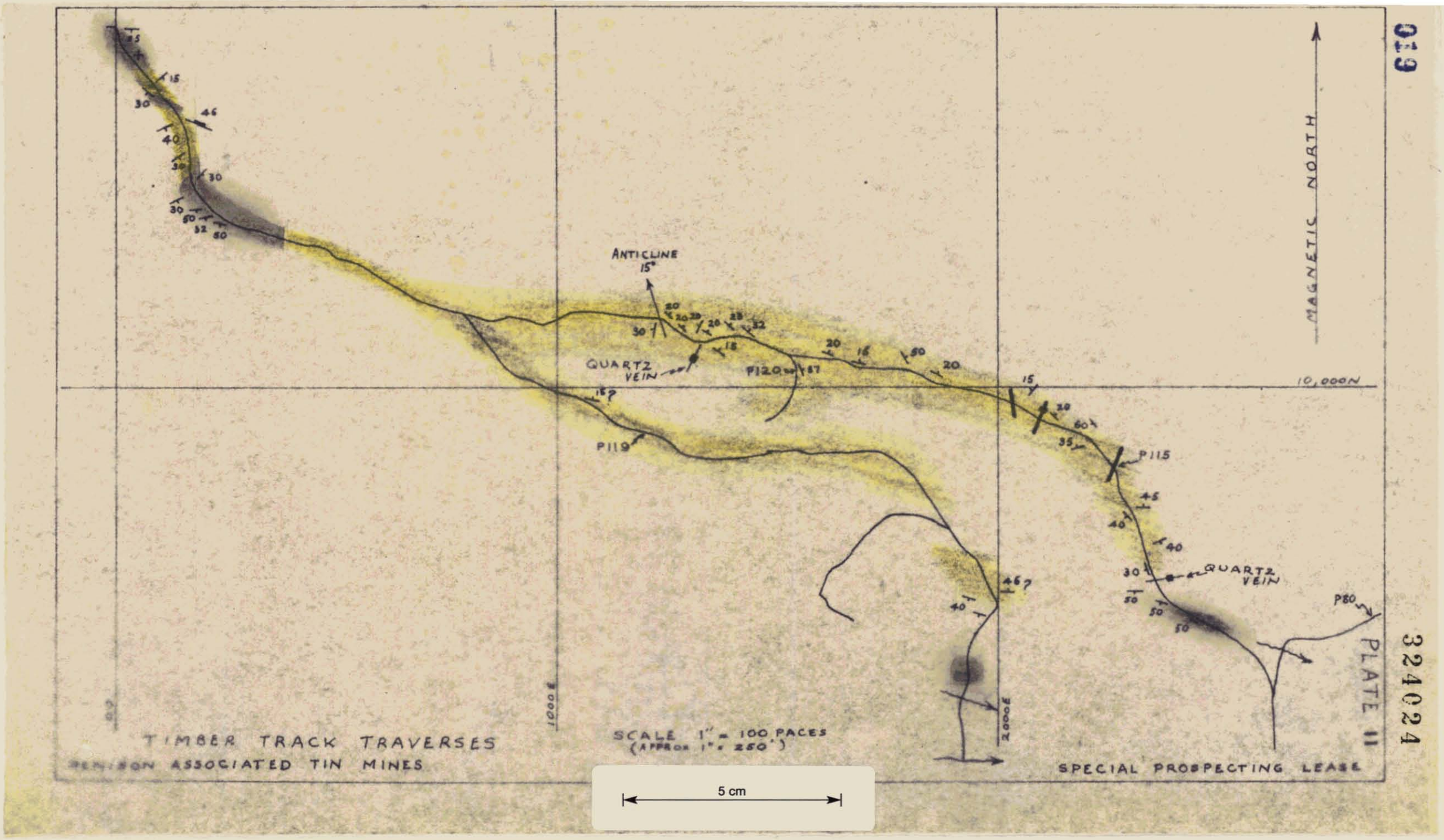
PLATE 9



RENISON BELL SOUTH
RENISON ASSOCIATED TIN MINES

SCALE 1" = 100' (APPROX)
SPECIAL PROSPECTING LEASE

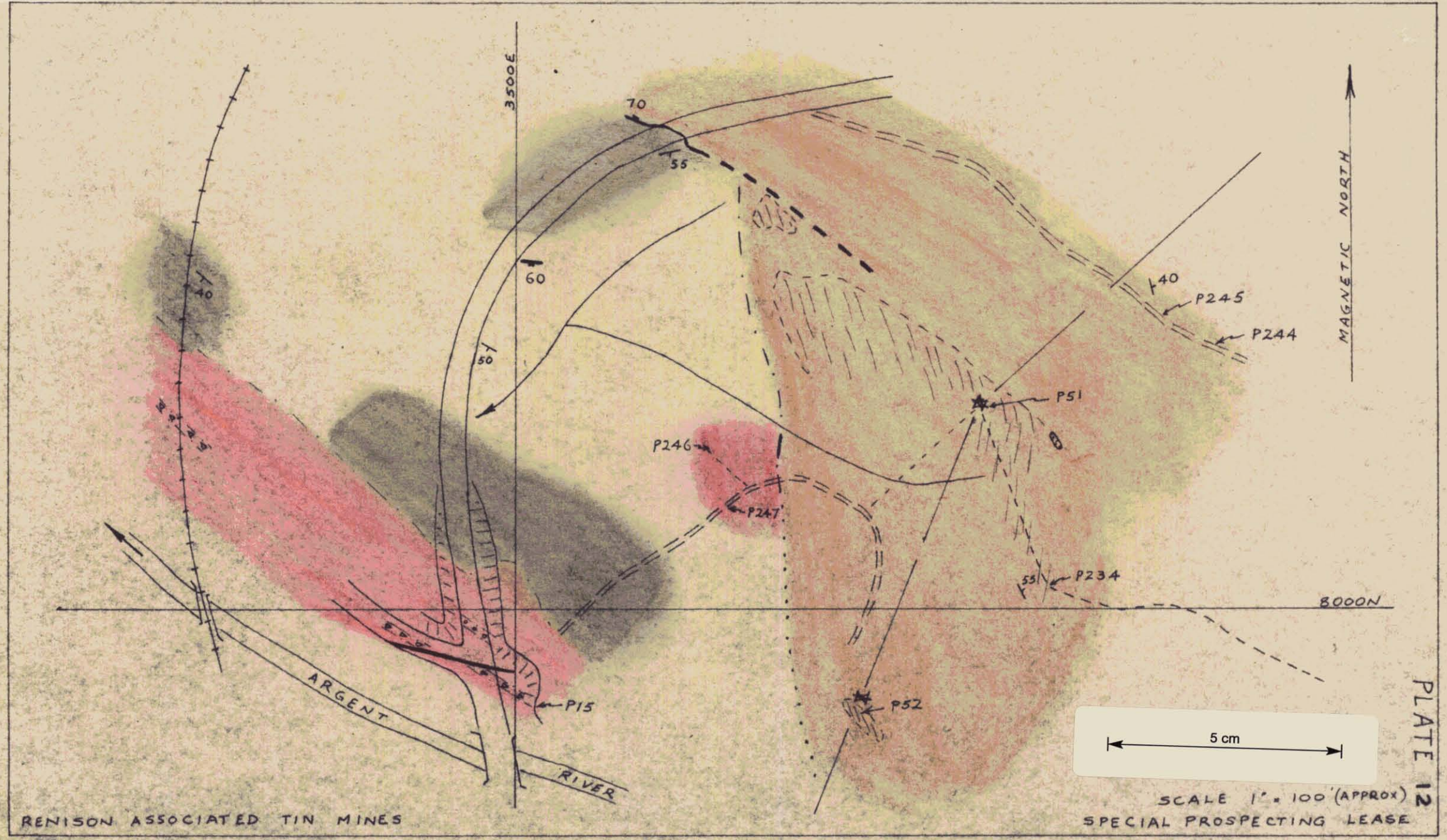

P227
P226
P231
CREEK
P230
P225
P224
P223
P228
P229
P232
10,000N
9000N
MAGNETIC NORTH
1000E
2000E
00
CREEK TRAVERSE
BENISON ASSOCIATED TIN MINES
SCALE 1" = 100 PACES
(APPROX 1" = 250')
5 cm
SPECIAL PROSPECTING LEASE
PLATE 10
3240023
018



019

324024

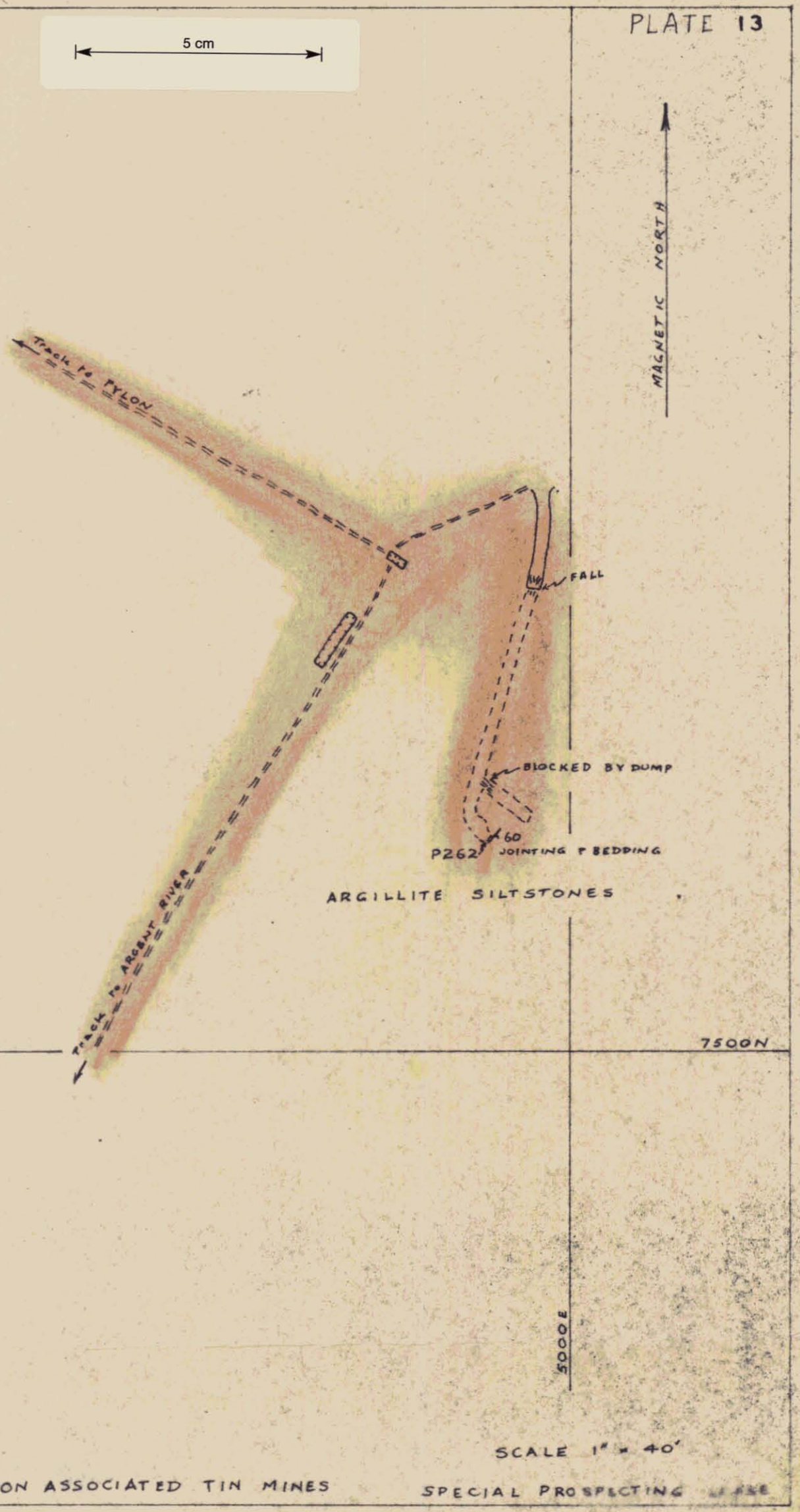
PLATE II


3500E
70
55
60
50
40
MAGNETIC NORTH
P245
P244
P51
P246
P247
P234
55
8000N
P52
P15
ARGENT
RIVER
5 cm
SCALE 1" = 100' (APPROX)
SPECIAL PROSPECTING LEASE
RENISON ASSOCIATED TIN MINES
PLATE 12

020

324025

PLATE 13



SCALE 1" = 40'

RENISON ASSOCIATED TIN MINES

SPECIAL PROSPECTING LEASE

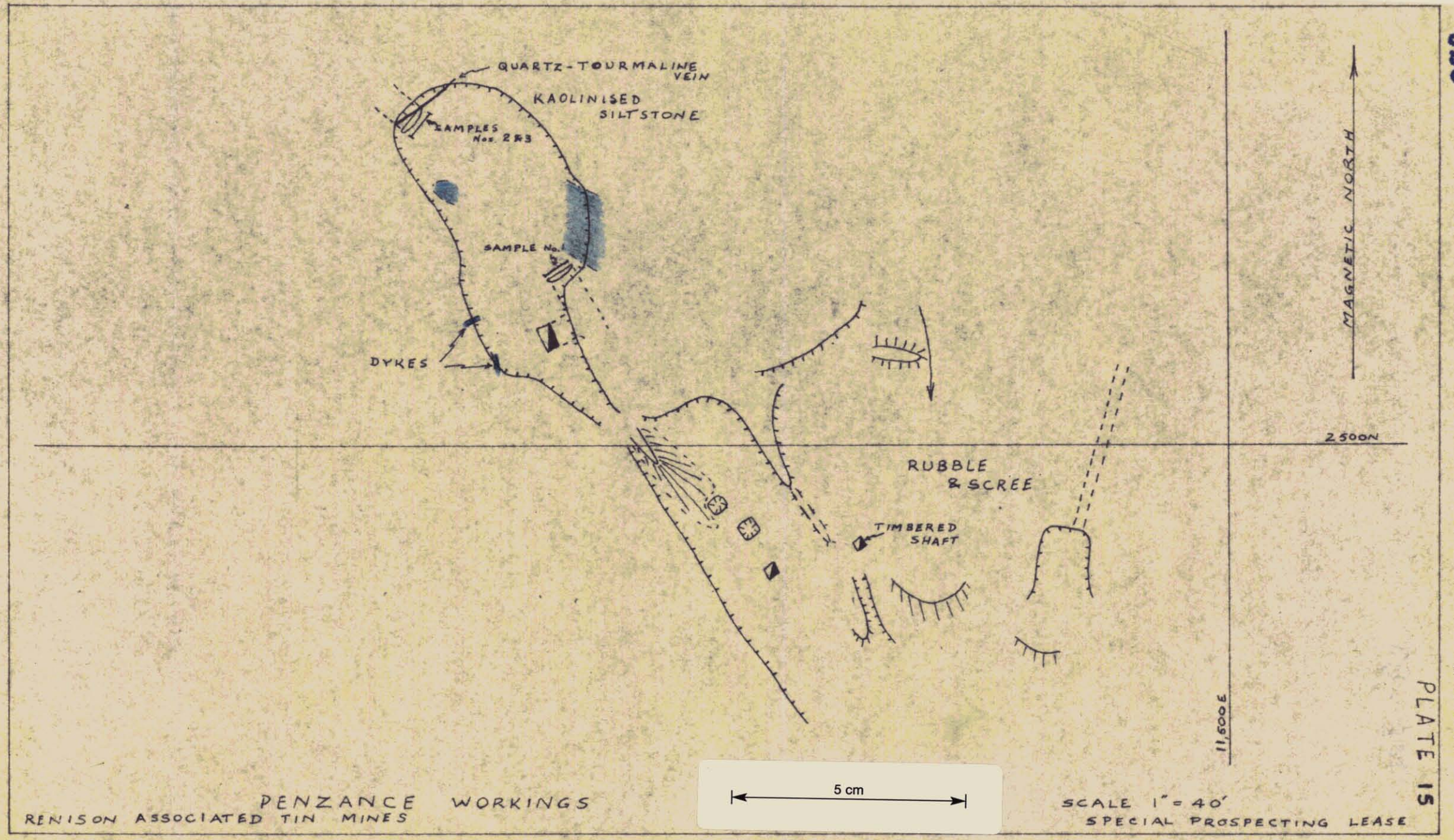
PLATE 14

KARLSON-RILEY PROSPECT

SCALE 1" = 100' (APPROX)

RENISON ASSOCIATED TIN MINES

SPECIAL PROSPECTING LEASE



PENZANCE WORKINGS

RENISON ASSOCIATED TIN MINES

SCALE 1" = 40'

SPECIAL PROSPECTING LEASE

PLATE 15

023

324028

324029

PLATE 16

GABBRO & AMPHIBOLITE

P157

BASIC DYKE

P153

1000N

POWER LINE

P65

GREY & DARK GREY SILTSTONES & SHALES

13,500E

CONFIDENCE SIDING AREA

RENISON ASSOCIATED TIN MINES

SCALE 1" = 100' (APPROX)

SPECIAL PROSPECTING LEASE

5 cm

025

324030

PLATE 17