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SOME COMMENTS ON FURTHER ELECTRICAL GEOPHYSICAL SURVEYS OVER SWEENEY'S MINE, TRIAL HARBOUR ROAD, NEAR ZEEHAN, TASMANIA ON BEHALF OF RENISON LIMITED

BY

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SYDNEY, N.S.W.

MARCH, 1978

TAS-052B

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GEOPHYSICAL CONSULTANTS AND CONTRACTORS

SUMMARY

Further surface gradient array electrical induced polarization traverses have better defined the body.

Both the surface and down hole applied potential data strongly suggest an east to east-south-east pitch to the body to pass under the bottom half of SWY-17

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SOME COMMENTS ON FURTHER ELECTRICAL GEOPHYSICAL SURVEYS OVER SWEENEY'S MINE, TRIAL HARBOUR ROAD, NEAR ZEEHAN, TASMANIA ON BEHALF OF RENISON LIMITED

INTRODUCTION

Extensions to the gradient array electrical induced polarization surface surveys (including the checking of earlier data), down hole induced polarization and resistivity three array surveys in holes 16 and 17, together with a surface applied potential and applied chargeability survey, were carried out on 5.75 production days between 10th and 15th February, 1978. The inclement weather somewhat slowed operations during the programme.

These surveys were requested by Mr. K. Wells, Senior Exploration geologist for Renison Limited, while Mr. P. Stevenson carried out the necessary geological supervision.

The initial work is discussed in Scintrex report TAS-047 dated September, 1977, while extensions to that programme are discussed in report TAS-050 dated October, 1977.

The objectives of the present survey were threefold, namely:- (i) to verify some gradient array data and tie this in to the main gradient array survey. (ii) to execute down hole surveys

on SWY-16 and SWY-17 at, and around hole, and (iii) to execute an applied potential and applied chargeability survey working from the sulphide intersection in hole SWY-15.

DISCUSSION OF RESULTS

I - ADDITIONAL GRADIENT ARRAY SURVEY

The gradient array survey data has been re-contoured to include the data surveyed on line 40S from 200W to 00, and line 150N from 185W to285W. The former was checked against the Upper Road line by resurveying that line between 010W and 160W. All the data profiles are plotted at the scale of 1:1000, while the contour map is presented on the Sweeney's Mine standard sheet at the scale of 1:500. As can be readily seen, the data on line 40S defines the southern most extent of the *major* response (above 25 millivolts/volt), while the data on lines 80S and 130S infer a continuation of the anomalism in that direction across 090(±20)W and 180E ±25 metres respectively. This *may* infer the continuation of the chargeable source beneath and within the 15 millivolts/volt contour, particularly when the background chargeabilities of less than 5 millivolts/volt within the barren granites are considered.

II - DOWN-HOLE PHYSICAL PROPERTY LOGS

The data is presented at a down hole scale of 1:500 with resistivity on a 5 centimetre log cycle in ohm-metres and chargeability (M_3) at 1 centimetre = 5 millivolts/volt. The ΔM ($M_5 - M_1$) is shown at a scale of 1 centimetre = 2 millivolts/volt.

DDR-SWY-16 ..... This hole was logged using a 5 metres and 20 metres three array log for both chargeability and resistivity and decay forms. Both spacings are presented on the same data profile.

The observed chargeability background is about 5 millivolts/volt on both spacings. These backgrounds appear to be the characteristics of the white granite units, regardless of the grain size of the granite.

The overall resistivities observed in the hole range between 500 and 8000 ohm-metres, with the background on the 20 metre spacing being about 500 to 1000 ohm-metres which is considerably less than those observed within barren granites elsewhere.

Between about 110 metres and 155 metres, resistivities fall from 4000 - 6000 ohm-metres on the 5 metre spacing, to 300-400 ohm-metres on the 20 metre spacing. Coincident with these changes, the chargeability rises up to 10 millivolts/volt above background on the 5 metre spacing and up to 15 millivolts/volt above the background on the 20 metre spacing.

The interpretation of these observations is that the resistivity is lowered and the chargeability increases *away from* the hole between 110 metres and 155 metres. The variable nature of the profiles makes an accurate distance from the hole difficult to gauge, but assuming a two layer infinite contrast situation, the range is estimated to be between 5 to 8 metres at the closest. It is

significant that this zone is coincident with the highest potential in the applied potential survey.

DDH-SWY-17 ..... This hole was logged at three separate three-array spacings, namely, 2½ metres, 10 metres and 20 metres. The 2½ metre log shows considerable detail relating to the change in rock type. For instance, between 103 metres and 115 metres, resistivities are in excess of 100,000 ohm-metres. Often these features do not persist on the larger spacings, nor are they relatable to noted features on the Dip Profile section geological data.

The resistivities generally *decrease* with *increasing* electrode separation, inferring less resistive rocks away from the hole than recorded within it.

The most significant responses recorded are between 180 and 225 metres, where "at hole" 2½ metre spacing shows a dramatic fall from in excess of 50,000 ohm-metres above and below, to 500 ohm-metres and less between these points. The 10 metre spacing shows a much subdued contrast. The 20 metre profile on the other hand shows resistivities *which are higher*, which *may* infer a lessening of importance of the zone out from the hole to 20 metres.

Particularly low resistivities and higher chargeabilities were noted between 175 metres to 195 metres, and between 200 metres to 210 metres. Both sections show the presence of green altered

granite. If these two high chargeability zones are related to the two significant chargeability peaks seen on the 20 metre spacing at 185 metres and 220 metres, the inferred sources are at 'X' and 'Y' as shown on the relevant dip section.

The whole form of the profiles suggests a shallow to moderate dip of the sources to the hole.

III - APPLIED POTENTIAL SURVEY

Potential Data ..... In this method, a current electrode (C_1) was emplaced in the mineralisation in SWY-15 with two distant electrodes, (C_2 and C_2') of the same pole, and placed across the strike of the chargeability response (as shown on Plate 1). The resultant potential field was then surveyed using a stationary pot near the collar of SWY-17. The effect of the two current electrodes C_2 and C_2', is to "pull the current out" from the body as if the distant electrodes were at infinity. The enclosed diagram illustrates this set-up.

Should the mineralisation be essentially a small pod, then the contours of equal potential will be circular and concentric about the emplaced electrode.

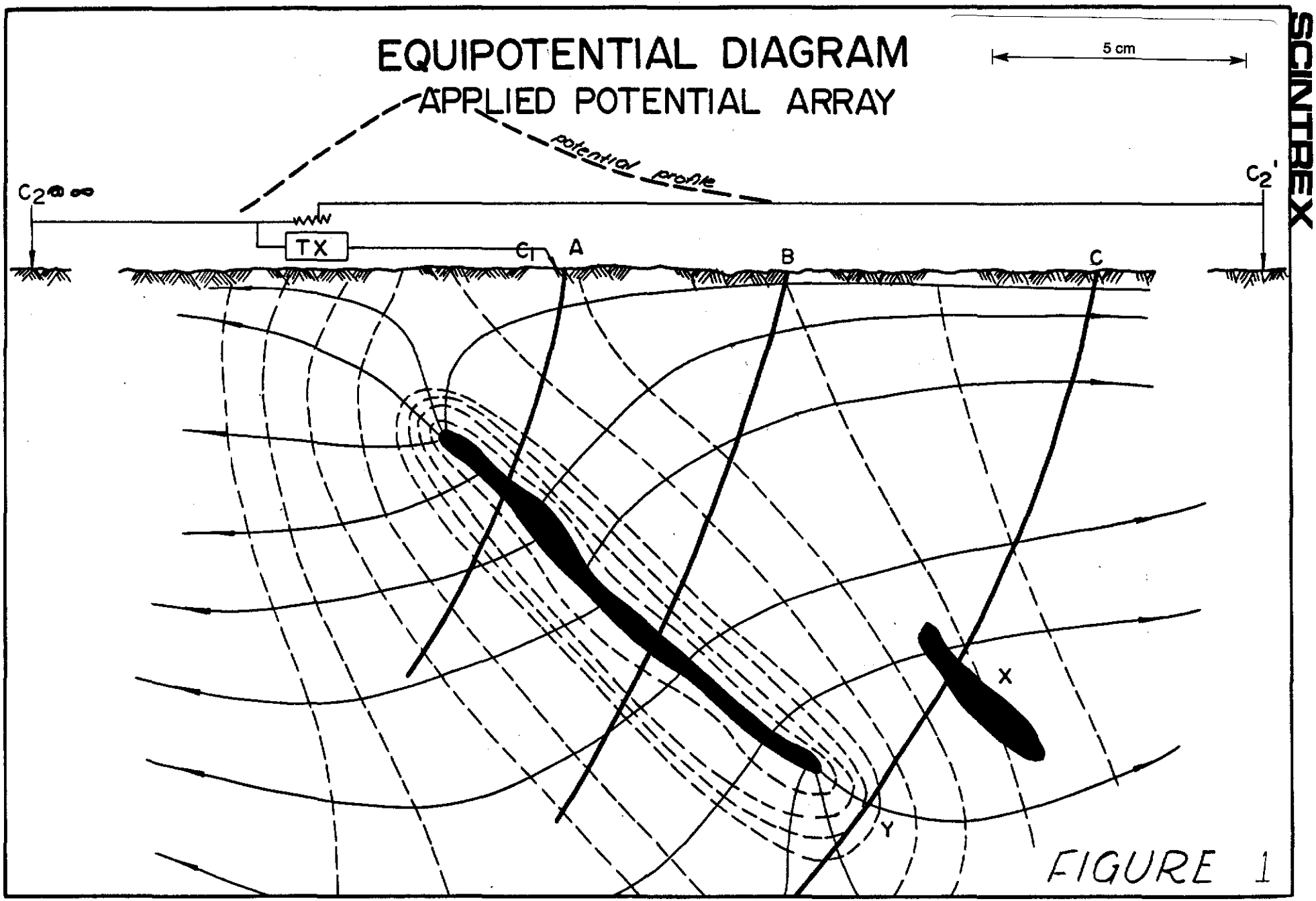
The surface contours are shown in Plate 2. The circular applied potential "low" is a function of the position of the stationary potential electrode as the enclosed Diagram 2 will illustrate. (a) shows the geological section , (b) shows the Vp readings

observed, which show a high over the body and also as the electrodes C_1 and C_2' are approached.

It is important to realise that the reference pot will be the zero equipotential contour *wherever* it is placed in the field, and the resultant "low" will not represent a physical property. This is because when the moving potential electrode passes to the one side of the zero contour, the current will move in one sense, and when on the other, it will be in the opposite sense. Diagram 2c is a reconstruction of the profile form when the *sense* of the current flow with respect to the reference pot is taken into account. As can be seen, this situation appears to be the interpretation of the Sweeney's Mine area.

The contour map shows the equipotential to be elongated along the strike of the body. Across line 40S the contours infer a north-west/south-east strike to the source. Towards line 80S the contours veer to magnetic east west. This infers a change in direction of the source with depth. In the vicinity of SWY-4/5 on the turn-off of the Upper Road, the equipotential contours show rapid change, while to the east they show a more gradual change. This infers a pitch to the source in that direction.

In addition to the surface surveys, diamond drill holes SWY-16 and SWY-17 were surveyed with a single potential against the same reference pot used for the surface survey. (Placed near collar of SWY-17). Onto 1:1000 sections of these drill holes


EQUIPOTENTIAL DIAGRAM
APPLIED POTENTIAL ARRAY
5 cm
potential profile
C2 @ ∞
C2'
TX
C1
A
B
C
X
Y
SCINTREX
FIGURE 1

SCINTREX

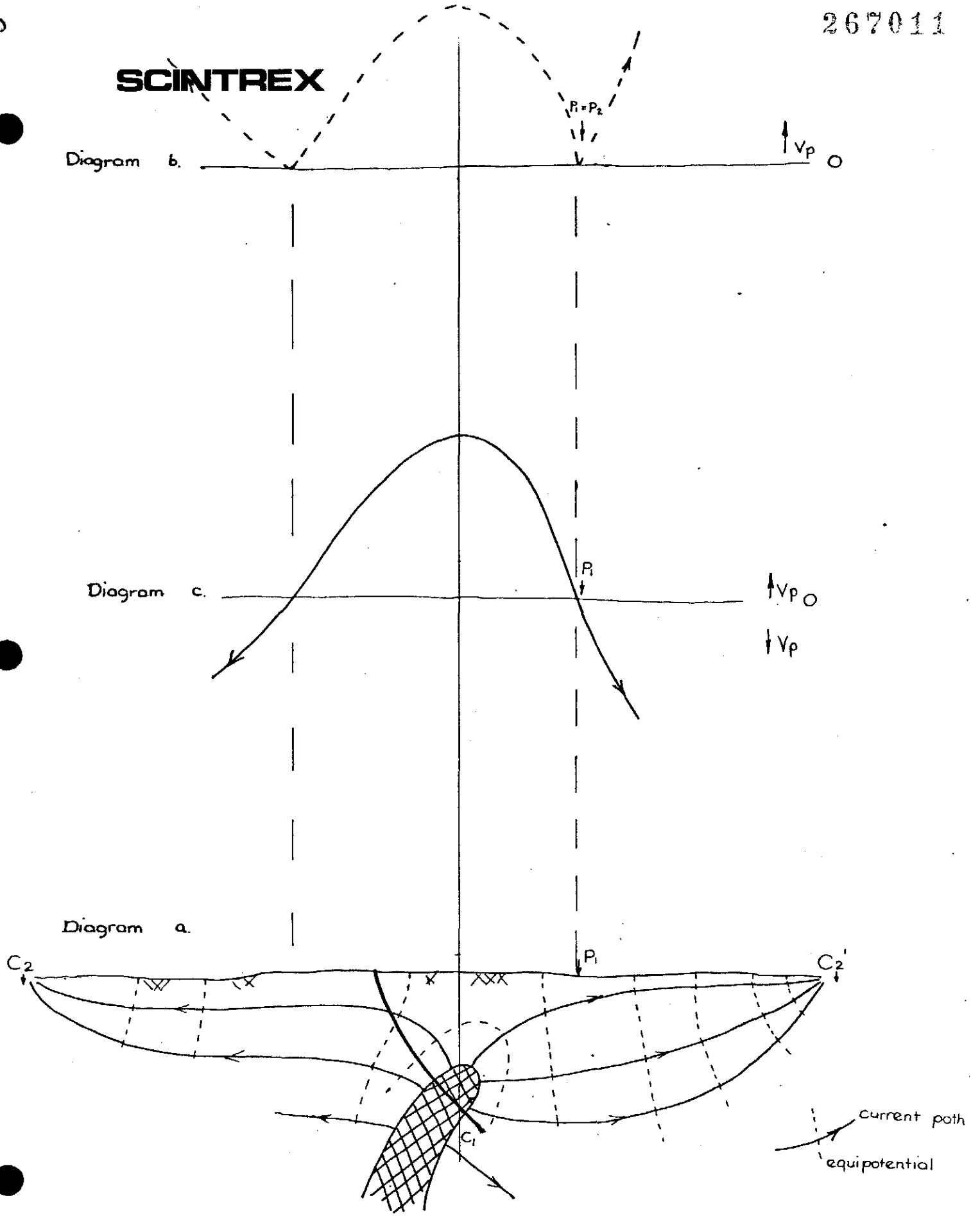


Figure 2

provided by Renison Limited the surface equipotential fields were projected from the contour map along the surface trace of each hole, and the resultant section contoured. In both cases the source lies *under* and/or in part, lateral to the hole. A comparison of the surface contour map and down hole sections gives a clear impression of the source moving from near surface on line 40S over the 450 millivolts contour, to pass under SWY-17 below 100 metres.

The higher equipotential values will wrap themselves around the source in which the C_1 electrode was placed, so it follows that the 450 millivolts contour on line 40S is probably as close to the source below that line as the same contour is down hole SWY-17.

Chargeability Data ..... Plate 3 displays the contour data from the applied chargeability survey. At this stage the meaning of this data, and that recorded down drill holes SWY-16 and SWY-17 is not fully understood.

CONCLUSIONS

1 - The additional gradient array chargeability data, particularly on line 40S, has defined the main chargeability anomaly between lines Lower Road traverse extended, and line 40S.. The inferred strike is about magnetic north-south.

2 - The 15 millivolts/volt contour *suggests* a swing to the zone to trend south-east across line 130S at about 200E.

3 - The down hole logs of SWY-16 show chargeability rising and resistivity falling away from the hole between 110 metres and 115 metres. A minimum distance from the hole of 5 to 8 metres is estimated, but the magnitude of the response is not known.

4 - The down hole logs of SWY-17 show a correlation between altered green granites, high chargeability and low resistivity on the 2½ metre spacing at 175 metres to 195 metres and 200 metres to 210 metres. The form of the larger 20 metre spacing suggests the source dips away from the hole at the relatively moderate anomalies (see 'X' and 'Y' on relevant section.)

5 - From the applied potential survey it is concluded that the more conductive sections of the body energised via SWY-15, strike south-east below line 40S some 40 metres south of the gradient array EIP maxima, and pitch in an east-south-east direction to pass below the bottom half of SWY-17.

The author considers that further in depth discussions on the above data together with input from the existing drill hole data, and working with the model constructed by Renison, will lead to a more complete understanding of the structure of the body.

Respectfully submitted on behalf of:

SCINTREX PTY. LTD.

A.W. HOWLAND-ROSE, MSc, DIC, AMAusIMM, FGS

GEOPHYSICIST

013

267014

LINE 150 N

Sweeney's Mine

E1P Gradient Array

IAS-052-B

ΔM

+4

0

-4

ΔM

3000

2000

1000

500

200

100

ρ_a

M_3

CHARGEABILITY IN MILLIVOLTS PER VOLT

16

12

8

4

0

RESISTIVITY IN OHM-METRES

300W

250W

200W

5 cm

K&E KEUFFEL & ESSER CO. MADE IN U.S.A.

014

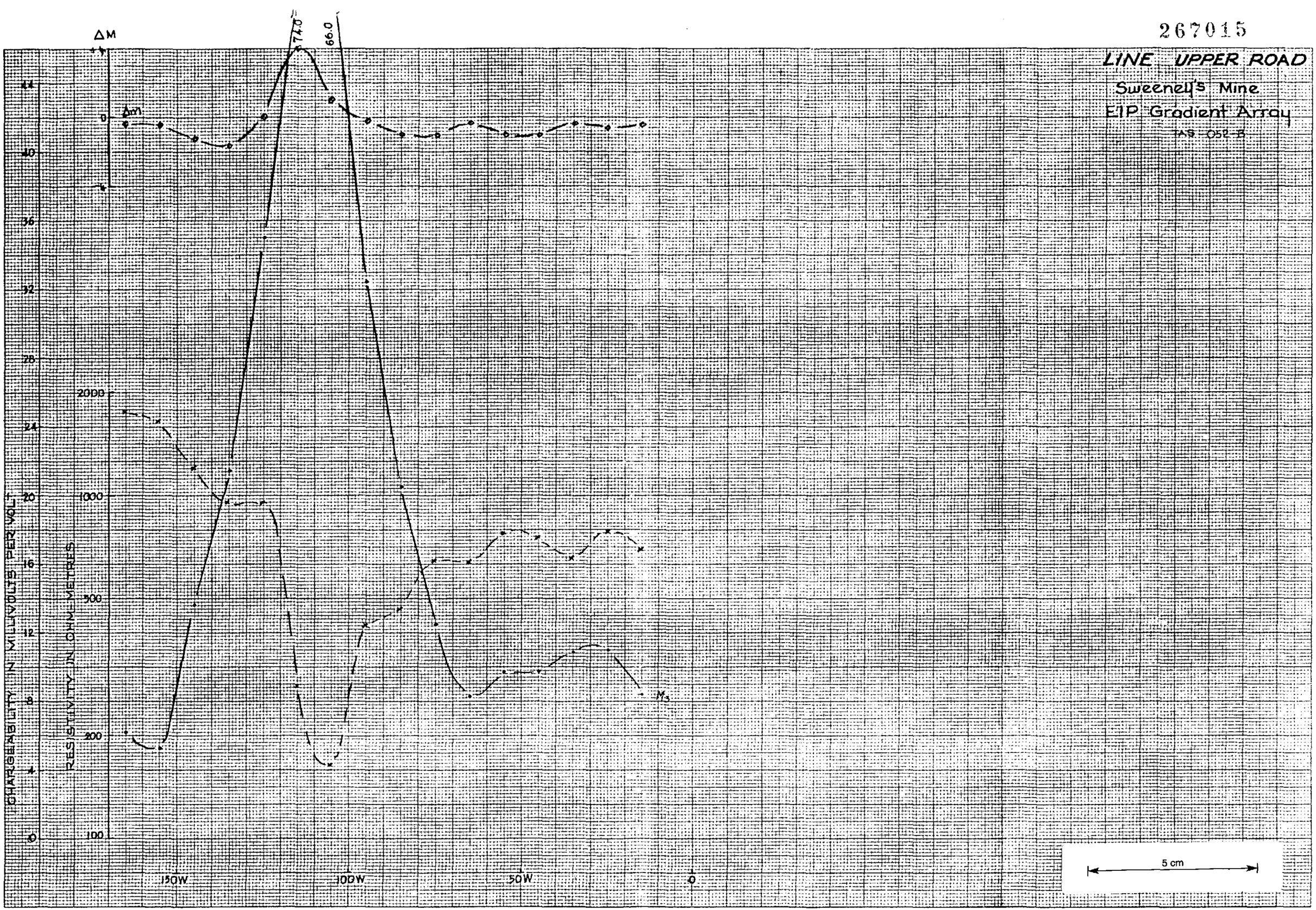
267015

LINE UPPER ROAD

Sweeney's Mine

E1P Gradient Array

TAS 052-B



KE
10 X 10 TO THE CENTIMETER 46 1510
MADE IN U.S.A.

121 17

015

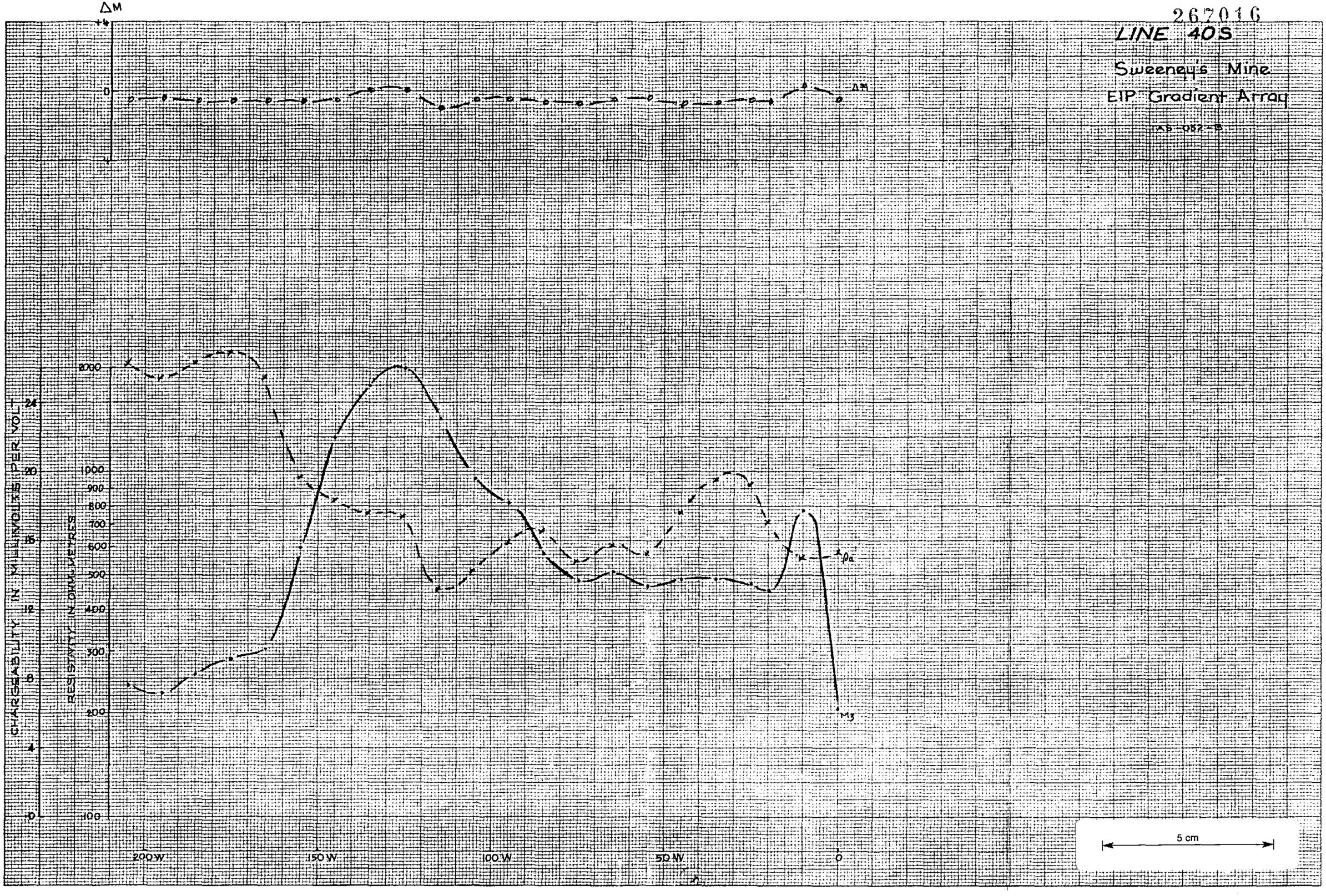
267016

LINE 40S

Sweeney's Mine

EIP Gradient Array

AB-052-B



K&E 10 X 10 TO THE CENTIMETER • 25 X 25 CM
KEUFFEL & ESSER CO. MADE IN U.S.A.

267017

HOLE 16

Sweeney's Mine

Down Hole Survey

TAB-092-15

ΔM

+4

0

-4

Δm

(Δm 20 m not shown)

5m

RESISTIVITY IN OHM-METRES

10,000

5,000

2000

1000

500

200

100

20m

5 cm

40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230

017

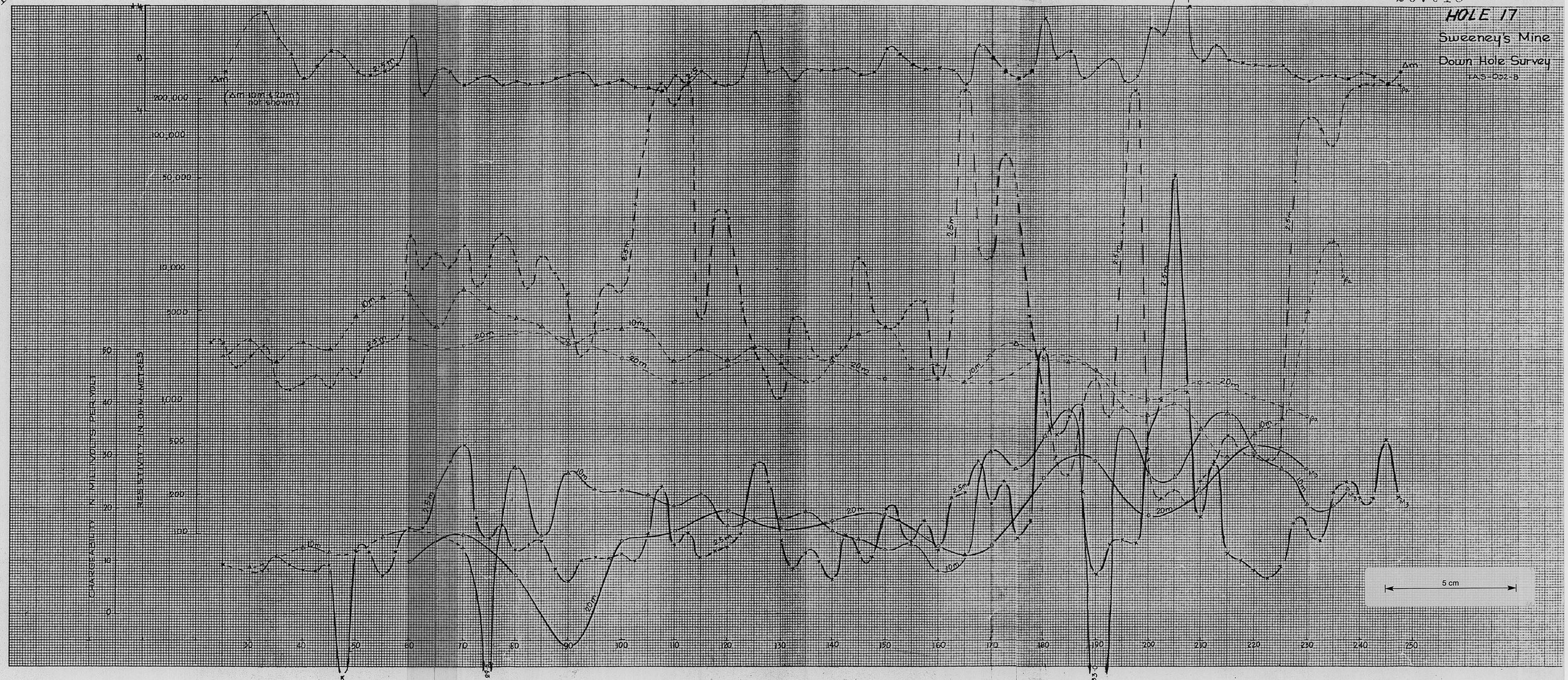
267018

HOLE 17

Sweeney's Mine

Down Hole Survey

FAS-052-B



Legend.

- Set-up no 1
- Set-up no 1 ext.
- Set-up no 2
- Set-up no 2 ext.
- Set-up no 3
- Set-up no 4
- Set-up no 4 ext.
- Set-up no 5
- Set-up no 5 ext.
- C_1-C_2=3 Current dipole positions
- ( ) Set-up no 6
- Set-up no 7

E.I.P GRADIENT ARRAY CHARGEABILITY CONTOUR PLAN

SURVEYED & COMPILED BY

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JOB No TAS-047/050/052.B for Revised - Feb 78.

RENISON LIMITED

SWEENEY'S MINE

GEOLOGIST : K. WELLS	SCALE 1:500 METRES
DRAUGHTSMAN : J. MATTHEWS	10 0 10 20
DATE : AUG 1977	
REVISIONS: 5 cm	DRAWING No. 1198

SCINTREX PLATE 1

78-1259

207019

9611

LINE 150 N

LINE 125 N

LINE 95 N

LOWER ROAD

SWY 1

SWY 6

SWY 4

SWY 5

SWY 12

SWY 16

SWY 9

SWY 8

SWY 17

SWY 3

SWY 19

SWY 2

SWY 18

SWY 15

LINE 65 S

LINE 95 S

LINE 170 S

ACCESS ROAD

LINE 220 S

APPLIED POTENTIAL SURVEY
(ENERGISED VIA. SWY-15)
SURVEYED & COMPILED BY
SCINTREX PTY. LTD.

TAS-092.B for FEB '78

RENISON LIMITED

SWEENEY'S MINE

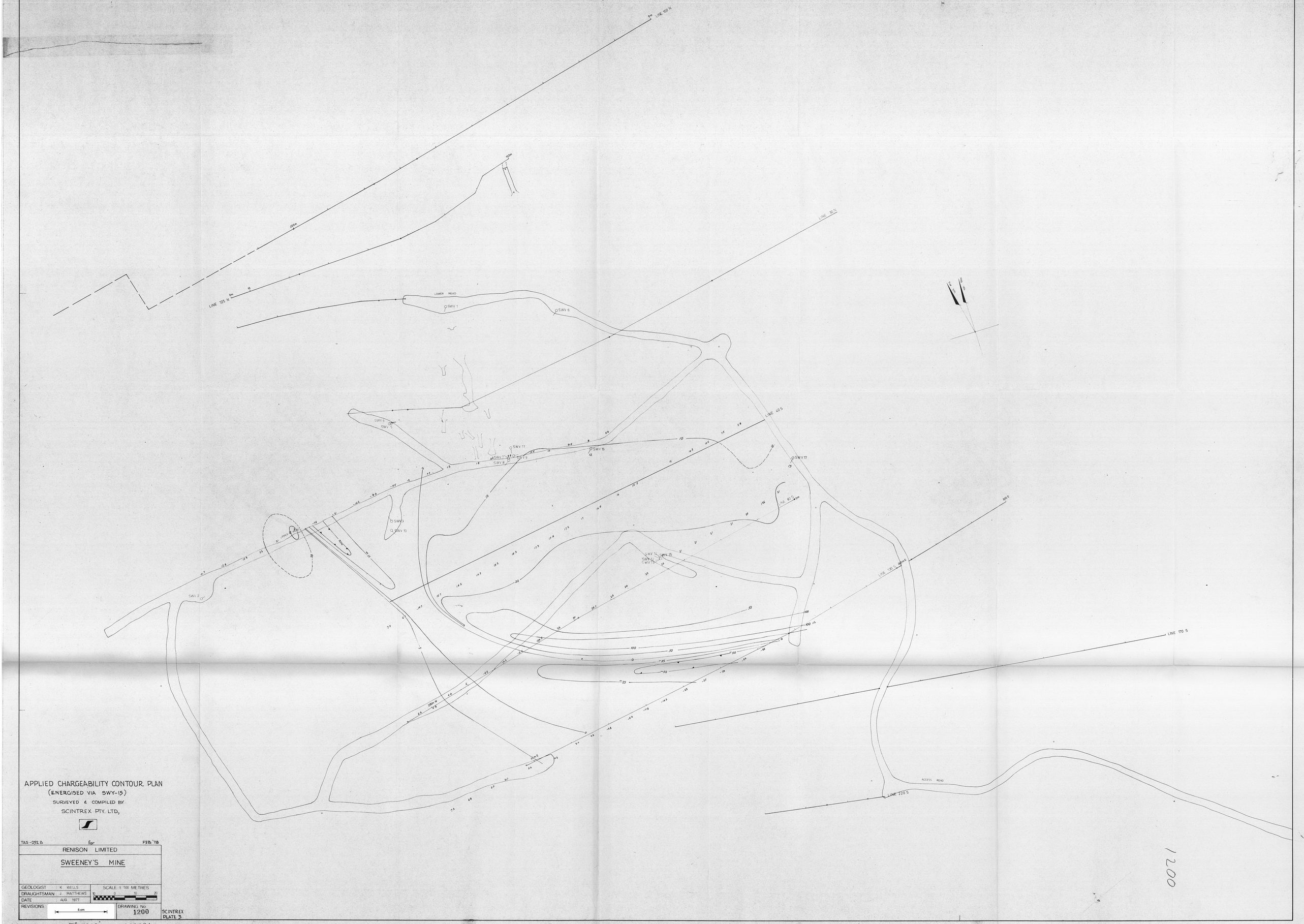
GEOLOGIST : K. WELLS	SCALE 1:500 METRES
DRAUGHTSMAN : J. MATTHEWS	10 0 10 20
DATE : AUG 1977	
REVISIONS	DRAWING No. 1199

5 cm

SCINTREX PLATE 2

78-1859 267020

1199



APPLIED CHARGEABILITY CONTOUR PLAN
(ENERGISED VIA SWY-15)
SURVEYED & COMPILED BY
SCINTREX PTY. LTD,

TAS-092.B for FEB '78

RENISON LIMITED

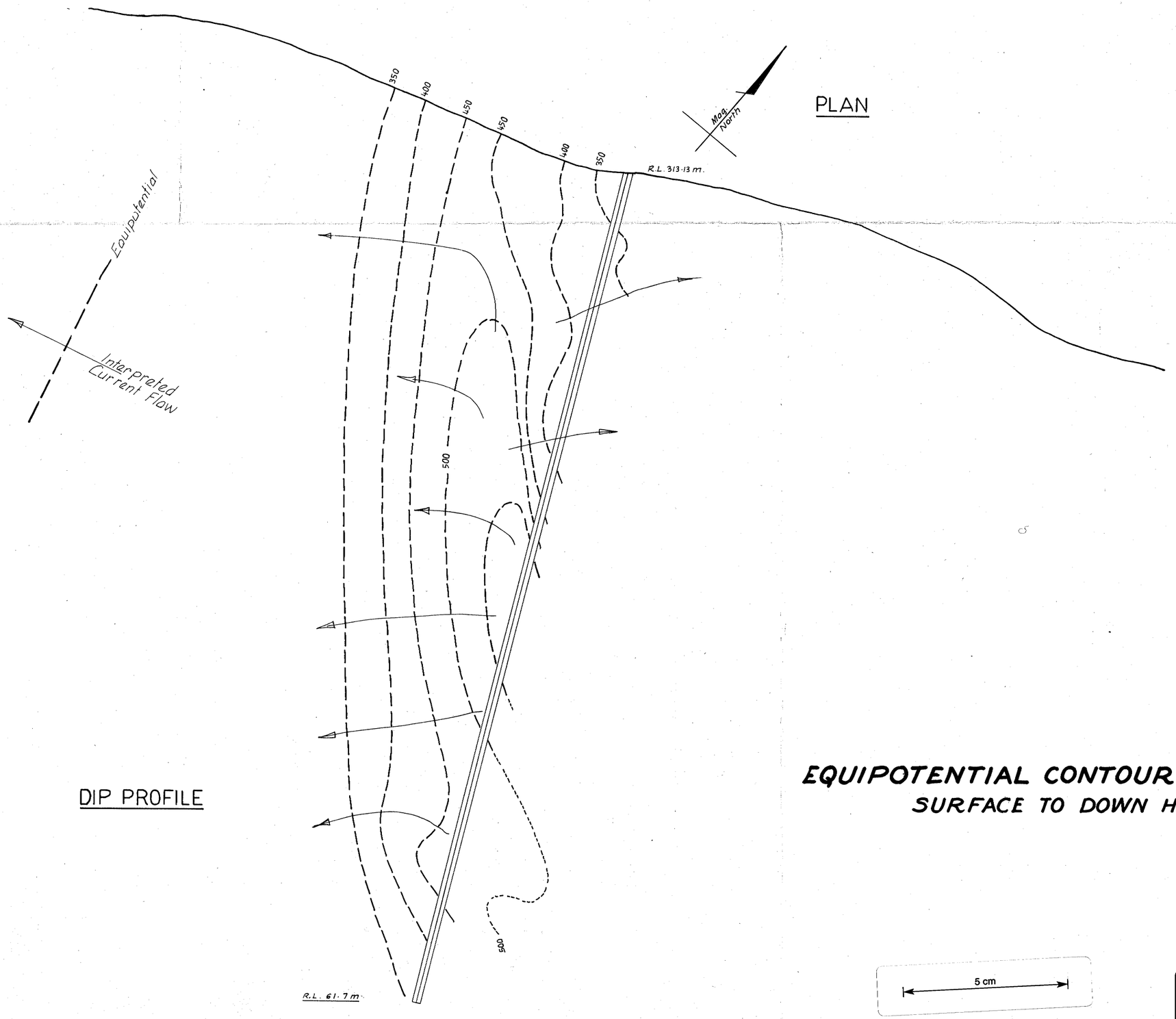
SWEENEY'S MINE

GEOLOGIST : K. WELLS	SCALE 1:500 METRES
DRAUGHTSMAN : J. MATTHEWS	10 0 10 20
DATE : AUG. 1977	
REVISIONS	DRAWING NO. 1200

5 cm

SCINTREX PLATE 3

78-1259 . 26.021



EQUIPOTENTIAL CONTOUR SECTIONS
SURFACE TO DOWN HOLE

5 cm

267022

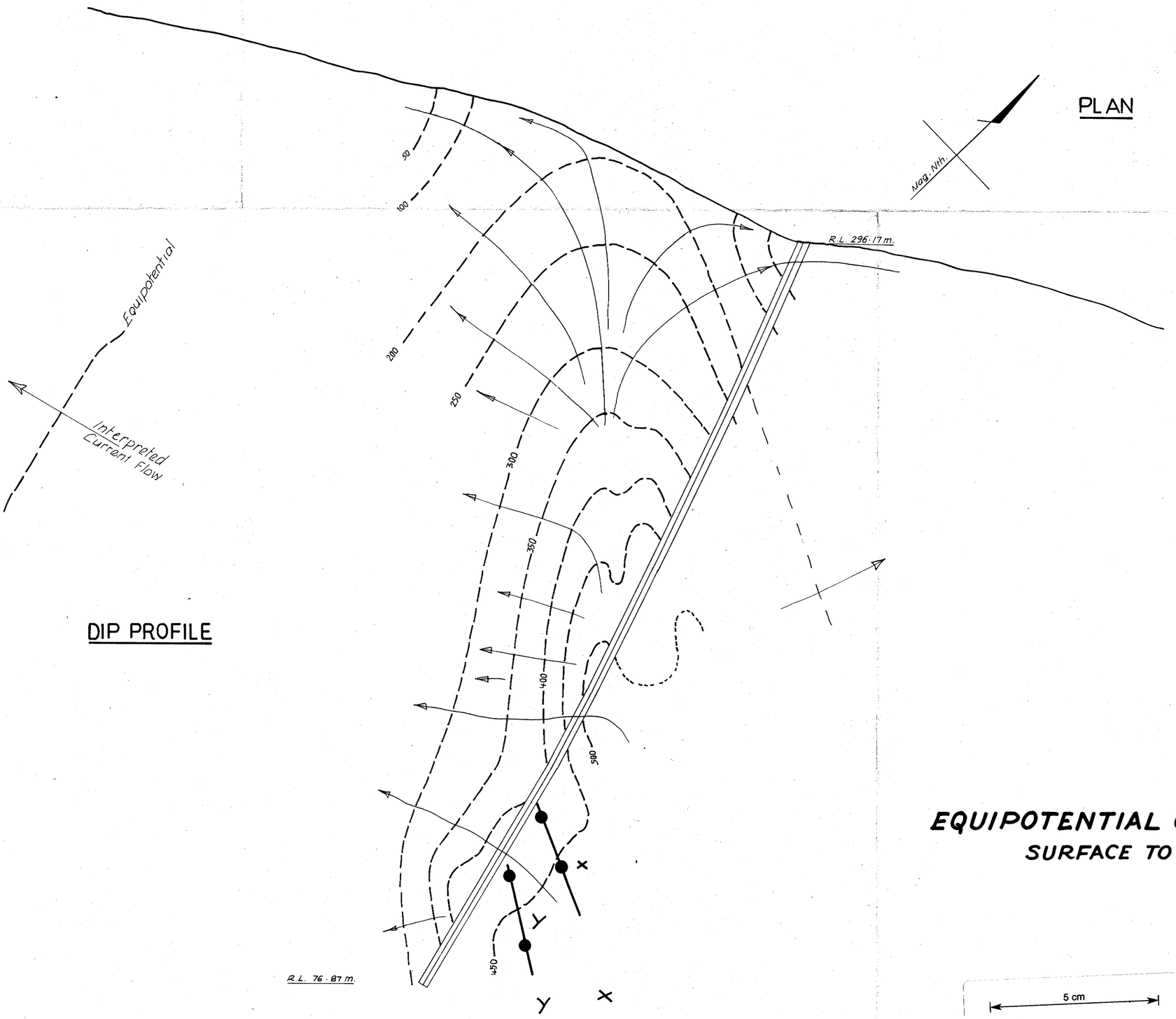
RENISON LTD.	
SCALE	1:1000
DRAWN	SCINTREX
DATE	Mar. '78
TITLE	D.D.H. SWY 16

SCINTREX
PLATE 4

78-1259

1201

PLAN



Equipotential

Interpreted Current Flow

DIP PROFILE

EQUIPOTENTIAL CONTOUR SECTIONS
SURFACE TO DOWNHOLE

5 cm

267023

RENISON LTD.	
SCALE	1 : 1000
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DATE	Mar. '78.
TITLE	D.D.H. SWY. 17

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PLATE 5

78-1259

1202