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A BRIEF REPORT ON  
A TEST SURVEY AT QUE RIVER, WEST COAST TASMANIA  
ON BEHALF OF  
ELECTROLYTIC ZINC COMPANY OF AUSTRALASIA LIMITED

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A BRIEF REPORT ON  
A TEST SURVEY AT QUE RIVER, WEST COAST TASMANIA  
ON BEHALF OF  
ELECTROLYTIC ZINC COMPANY OF AUSTRALASIA LIMITED

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SYDNEY, N.S.W.

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TAS-056

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Data Profiles

This report is Appendix A of 78-1310

**SCINTREX PTY. LTD.**

GEOPHYSICAL CONSULTANTS AND CONTRACTORS

*SUMMARY*

*An electrical sounding carried out in the Que River Valley north of Rosebery, Tasmania, recorded an extremely thick (90 to 120 metres) layer showing low apparent resistivities of 20 to 27 ohm-metres with low accompanying chargeability of 3 to 4 millivolts/volt. These characteristics are similar to those observed in tertiary alluvial channels in north-east Tasmania and not to rocks of glacial material so far observed on the West Coast.*

*It is considered that as resistivities above and below the bulk intermediate figure of 20 to 27 ohm-metres would be expected within the section, it can be reasonably assumed that the Input anomaly observed arises from within this layer.*

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*INTRODUCTION*

At the request of Mr. G. Dunbar, Chief Geologist for West Coast Mines, a division of Electrolytic Zinc Company of Australasia Limited, Scintrex Pty. Ltd. performed an electrical sounding and a single gradient array line at Que River. The work was carried out by Mr. R. Bennett, Scintrex crew leader, with field assistants provided by the E.Z. Company. On site supervision and geological direction was provided by Mr. N. Hanson, Project Geologist for the Que River project. The excellent help and assistance received from the E.Z. Company and the field assistants provided by them, is gratefully acknowledged.

The work was undertaken on 3½ production days between 21st and 25th January, 1978.

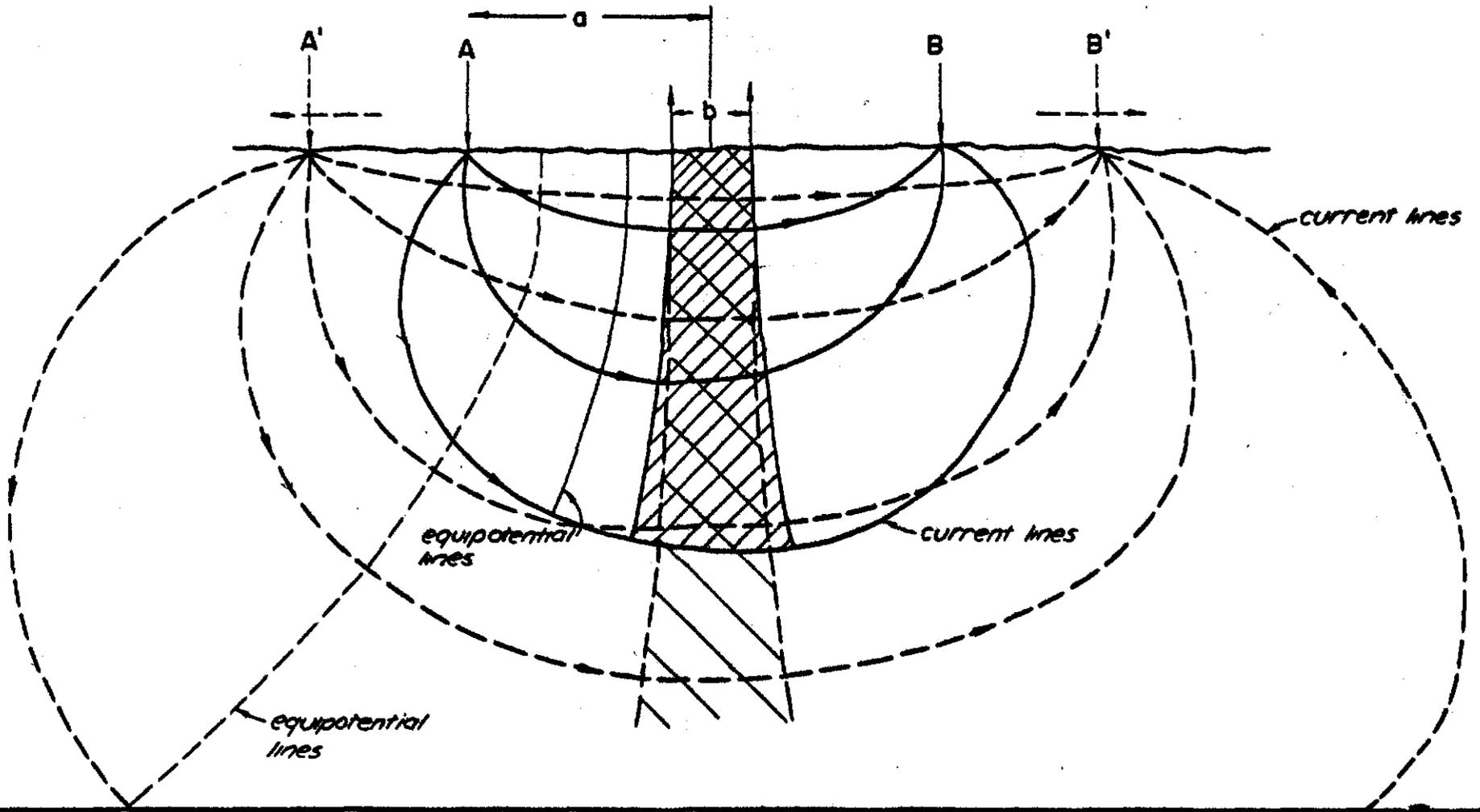
*BACKGROUND*

The Que River area was selected for further ground follow-up after an Input survey had revealed significant 4-5 channel anomalies over the area (#CS-27A).

The area is flat, swampy and covered with trees. Access to, and within the area is difficult. A large proportion of the effort

# EQUIPOTENTIAL DIAGRAM SCHLUMBERGER ELECTRICAL SOUNDING

5 cm



expended was in mobilisation to and from the area, and in setting out the arrays.

#### METHOD AND EQUIPMENT

The equipment used consisted of a Scintrex 3KW induced polarization transmitter powered by a 8HP Briggs & Stratton motor, and a Scintrex IPR-8 induced polarization receiver.

The Schlumberger array was employed to test the horizontal layering. The two potential electrodes, ( $P_1$ ,  $P_2$ ) are placed *between* the two current electrodes ( $C_1$ ,  $C_2$ ). The latter are then progressively moved out and progressively deeper volumes are sampled. Note that progressively larger *sideways* sampling *also* occurs. Thus lateral and longitudinal inhomogeneities can influence the results.

A comparison with standard curves will indicate horizontal layering and will be reliable *providing* (i) the layering *is* horizontal, (ii) there are no *lateral* inhomogeneities, and (iii) there are no *longitudinal* inhomogeneities. (i.e. along traverse lines).

The apparent chargeability ( $Ma$ ) is similarly acquired, and once the apparent resistivity has been studied,  $Ma$  can also be used to compute the depth to any chargeable layer.

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DISCUSSION OF RESULTS

The section across Que River is shown in the accompanying sketch supplied by Mr. N. Hanson of E.Z. The vertical scale is 1:1000, while the horizontal scale is 1:10,000.

The Schlumberger Electrical Sounding..... was centred at 19500E on line 20,160N as shown on the above diagram, and the a spacing extended east and west of this point to 700 metres. The potential and current dipole spacings employed were as follows.

<u>Potential Dipole</u>	<u>Current Dipole</u>
0.25 metres	0.5 metres
0.5 metres	1.0 metres
0.5 metres	2.0 metres
0.5 metres	5.0 metres
5.0 metres	10.0 metres
5.0 metres	20.0 metres
5.0 metres	50.0 metres
5.0 metres	70.0 metres
5.0 metres	100.0 metres
10.0 metres	100.0 metres
10.0 metres	200.0 metres
10.0 metres	500.0 metres
20.0 metres	500.0 metres
20.0 metres	700.0 metres

This data is appended to this report with both the current electrode

spacing  $a$  ( $\frac{1}{2}AB$ ) and the apparent resistivity being displayed on a five inch log cycle in metres and ohm-metres respectively, while the apparent chargeability is displayed on a vertical scale of 1 centimetre = 1 millivolt/volt.

The surface layer has variable resistivity from about 70 ohm-metres to 60 ohm-metres to about 12 metres depth, after which the resistivity is interpreted as being below *about* 20 to 27 ohm-metres to a depth of about 90 to 120 metres, after which the resistivity is increasingly influenced by a more resistive bedrock. The depth is difficult to judge due to the obvious inhomogeneity of the section, as is the absolute value of the resistivity within the third layer. The resistivity of the third layer is estimated to be of the order of 300 to 400 ohm-metres at most, which may in fact mean that the freshrock basement has still been penetrated at this point.

The apparent chargeabilities were an abnormally low 4 to 6 millivolts/volt (3 to 4½ milliseconds) down to  $a$  spacings of 200 metres. Chargeabilities as low as this are rare indeed on the west coast of Tasmania, where they have been recorded before they have been associated with resistive acid volcanics. The resistivity and chargeability characteristics observed here are more akin to the characteristics measured within the tertiary alluvium channels in north-eastern Tasmania, or of tropical/acid weathering encountered at Broken Hill, Cobar, or in the Kalgoorlie nickel belt. For north-western Tasmania then, this is quite obviously a highly anomalous

situation. The author suggests that a portion of the valley fill may be due to remnant tertiary weathering trapped below the tertiary basalts, prior to the stripping of the latter in recent times. The chargeabilities of recent alluvial valley fill, and of glacial material are generally 10 to 15 millivolts/volt, while resistivities are generally above 200 ohm-metres.

*The Gradient Array Traverse* ..... employed a 1.5 kilometres current dipole with current electrodes emplaced at 18750E and 20250E on 20160N. A 20 metre potential dipole was used. A three slice programme ( $M_1$ ,  $M_3$ ,  $M_5$ ) was employed to investigate the secondary potential field generated by the 2 second square wave energising cycle. The data is presented at a horizontal scale of 1:2500, while the resistivity is displayed on a 10 centimetre log cycle in terms of ohm-metres, and the chargeability is shown in millivolts/volt on an exaggerated scale of 1 centimetre = 1 millivolt/volt, with only  $M_3$  being displayed.

The apparent resistivity shows a gradual increase from 100 ohm-metres at 20000E to 300 ohm-metres at 19300E. The chargeability background throughout is about 3 - 4 millivolts/volt with local shallow source (20 metres) distortions to twice this background.

There are no significant chargeability or resistivity anomalies on this profile.

The low chargeabilities recorded are not a function of electromagnetic coupling as the decay forms recorded were fast to normal, but always regular. The causative grain size is therefore fine to normal.

#### CONCLUSIONS

- 1 - The depth of sediment below the point of the sounding is estimated to be at least 90 to 120 metres.
- 2 - The resistivity of the bulk of this section is estimated to be within the range 20 to 27 ohm-metres, and to have a chargeability background of 3 to 4 millivolts/volt.
- 3 - This material is considered of abnormally low resistivity and chargeability background for the region, and it is suggested that at least in part, the section may represent a tertiary alluvium filled valley perhaps preserved by the recently stripped tertiary basalts. The chargeabilities are 20% and the apparent resistivities 10% of those encountered from glacial or recent alluvial material in the region.
- 4 - While the *bulk* resistivity of the upper section (above 90 to 120 metres) is recorded as less than 30 ohm-metres, and interpreted as being between 20 and 27 ohm-metres, still lower and also higher resistivities would be expected within this zone. Thus it is concluded that the Input anomaly almost certainly arises from within this thick, low resistivity section.

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- 5 - The decay form varies from normal to fast indicating that:-
- a) The causative grain size is average to fine.
  - b) The low chargeability data is not caused by electromagnetic coupling.
- 6 - The author considers that the inferred 200 to 400 ohm-metres material beneath the 90 to 120 metres less resistive section, still does not represent bedrock, as few, if any rock types in the region have freshrock resistivities as low as this.
- 7 - The swamp conditions within the Que River Valley, together with vegetation, make geophysical surveying slow in the region. Therefore, should further work be contemplated, careful pre-planning of logistics will be required. These were excellently provided by the E.Z. Company in the present survey.

Respectfully submitted on behalf of:

SCINTREX PTY. LTD.



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

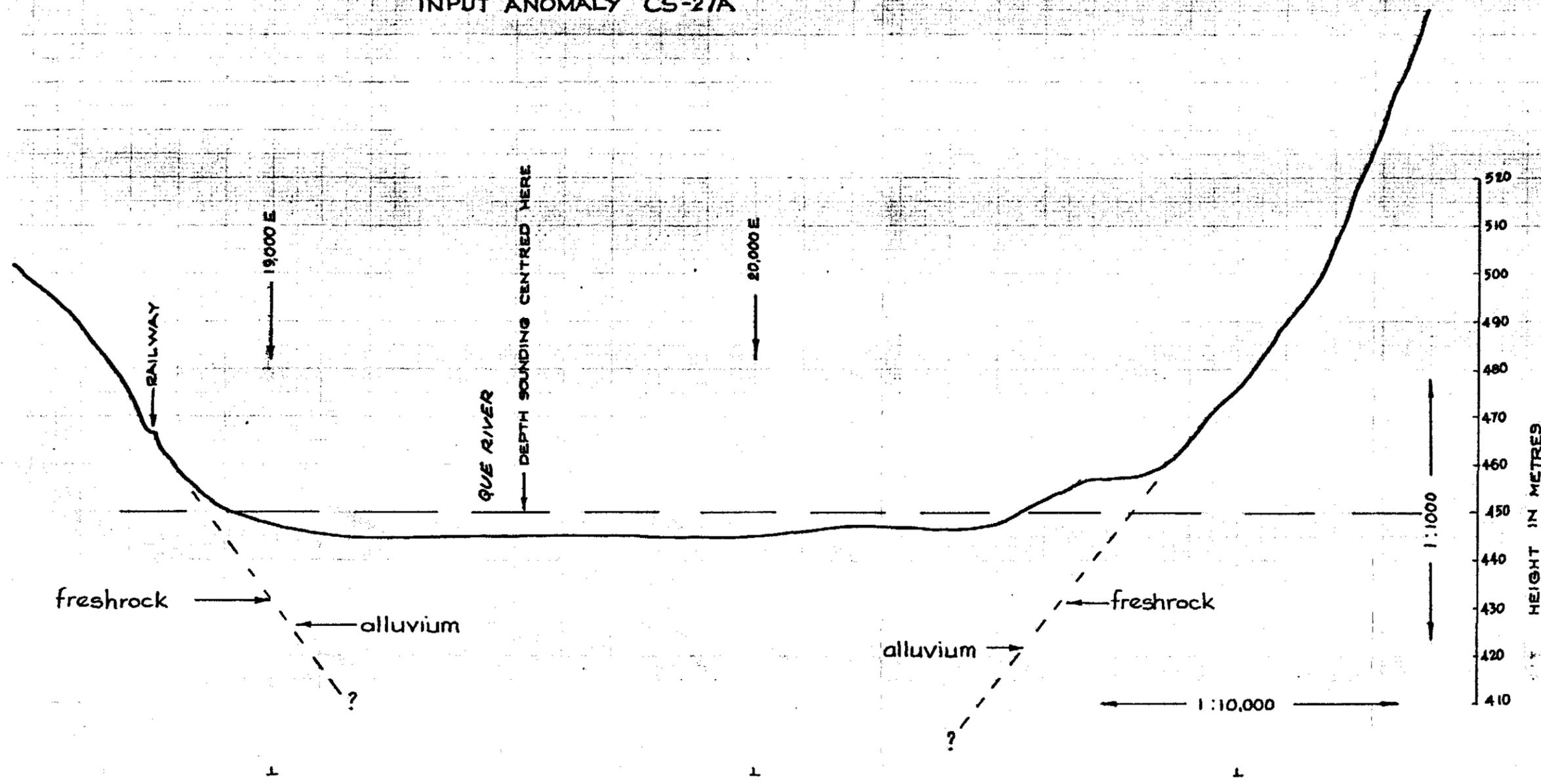
GEOPHYSICIST

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LINE 20,160N

Que River Grid

INPUT ANOMALY CS-27A



freshrock

alluvium

alluvium

freshrock

5 cm

520  
510  
500  
490  
480  
470  
460  
450  
440  
430  
420  
410  
HEIGHT IN METRES

1:10,000

1:1,000

013

269014

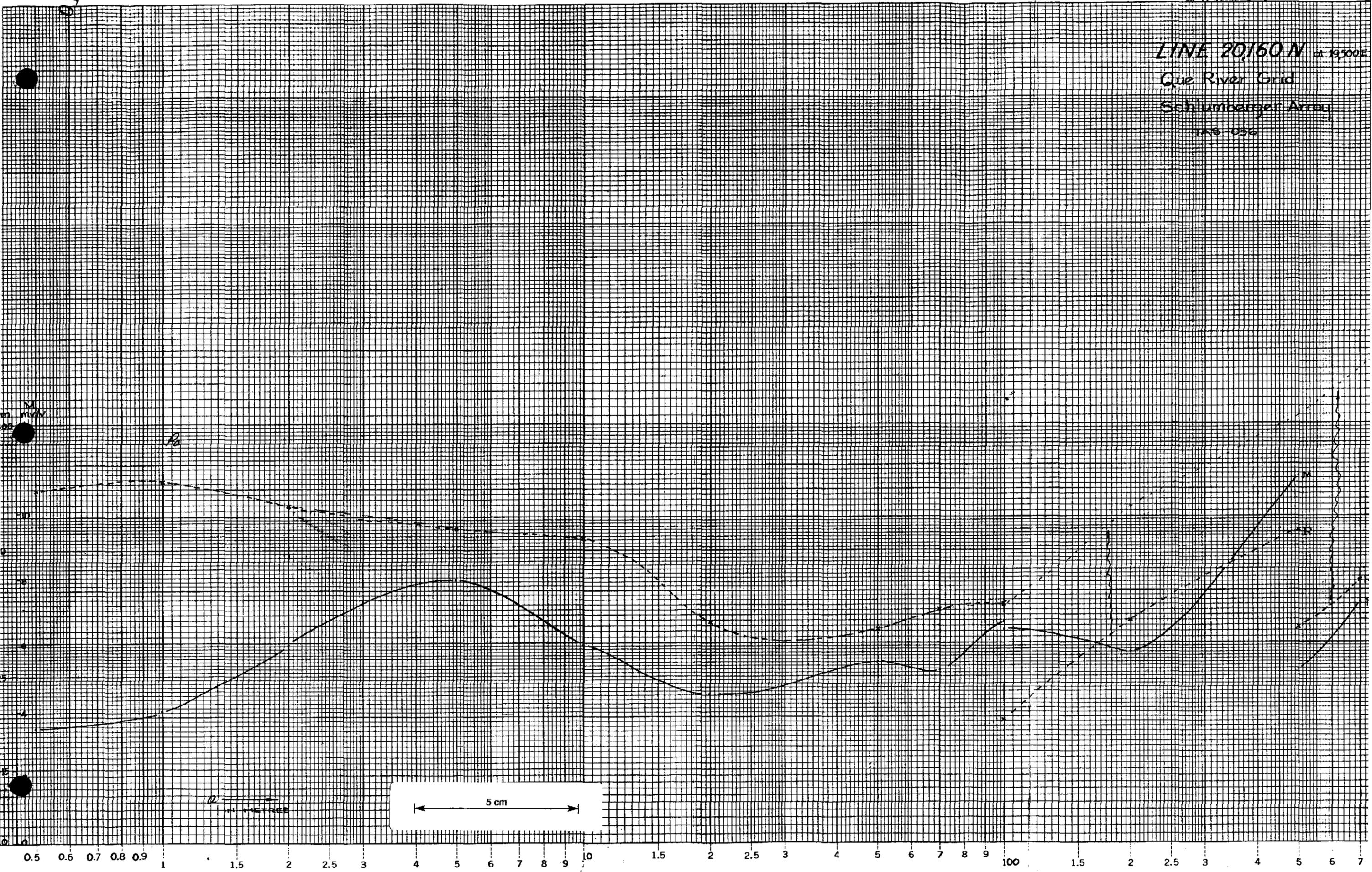
LINE 20/60 N  
Que River Grid  
Schlumberger Array  
195-050

M  
M  
M  
M

P<sub>0</sub>

0  
1  
2  
3  
4  
5  
6  
7  
8  
9  
10

5 cm



LINE 20,160 N  
Que River Grid  
Gradient Array EIP

TAS-056

