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A REPORT ON

DETAILED ELECTRICAL INDUCED POLARIZATION SURVEYS  
USING DIPOLE-DIPOLE, POLE-DIPOLE, AND GRADIENT ARRAYS  
OVER THE FEDERATION GRID  
EL 11/76, NEAR ZEEHAN, TASMANIA

ON BEHALF OF *JRS*

RENISON LIMITED

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OVER THE FEDERATION GRID  
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ON BEHALF OF  
RENISON LIMITED

BY

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SYDNEY, N.S.W.

DECEMBER, 1980

TAS-081B

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GEOPHYSICAL CONSULTANTS AND CONTRACTORS

## SUMMARY

*A series of detailed pole-dipole, dipole-dipole and gradient arrays were carried out over a series of zones of interest located in a gradient array reconnaissance survey executed on the Federation grid, near Zeehan, in 1979.*

*The characteristic geophysical signatures observed over alteration/mineralised zones in the area are resistivities in the range 250 to 500 ohm-metres, and higher chargeabilities of 15 to 20 millivolts/volt, not necessarily in sympathy. The detailed work has shown a number of zones having these characteristics, the most significant of which occurs on lines 1600W to 1700W at about 920S.*

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*INTRODUCTION*

A series of dipole-dipole, pole-dipole and gradient array surveys were carried out over selected targets previously surveyed using gradient reconnaissance arrays which were carried out in late 1977 and late 1979, and described in Scintrex reports TAS-052 and TAS-074D by the author.

These surveys were carried out at the request of Mr. L.A. Newnham, Chief Geologist for Renison Limited. On-site geological supervision was carried out by Mr. P. Roberts, B.Sc., Project Geologist for Renison. Mr. G.J. Street, MSc, DIC, of Scintrex was the on-site geophysicist, and acted as crew leader for a portion of the survey. Mr. I. Newby acted as crew leader during the latter stage of the field work.

The work was undertaken over about 15 days between 8th November and 5th December, 1980.

*DATA PRESENTATION*

Both the pole-dipole and dipole-dipole data is presented in standard pseudo-section

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format, while the detailed gradient arrays are shown as profiles at a horizontal scale of 1:2000, and vertical scales of 1 centimetre = 2 millivolts/volt, with resistivity on a 10 centimetre log cycle. The decay form is not presented as no material changes were observed other than those referred to in the text.

## SCOPE OF SURVEY

Gradient Array (a = 10 metres C1C2 = 800 metres)

Lines 1600W, 1650W, 1700W between 1250S and 550S

Pole-Dipole (a = 30 metres, n = 1 to 5)

Line 50E 1500S - 1140S

Line 00 1500S - 1200S

Line 50W 1440S - 1170S

Dipole-Dipole (a = 30 metres, n = 1 to 5/6)

<u>Line</u>	<u>Transmitter at</u>
300W	1620S
350W	1560S
400W	1600S
1100W	00
1100W	660S
1150W	630S
1200W	630S
1250W	630S
1300W	990S
1350W	630S

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<u>Line</u>	<u>Transmitter at</u>
1400W	630S
1600W	930S
1650W	900S
1650W	1020S
1700W	930S

Gradient executed on these lines (see above)

## DISCUSSION OF RESULTS

Each group of detailed arrays is discussed separately by area below.

### A - Lines 50E, 00, 50W at 1350S+

These were designed to further investigate the gradient array anomalies located at 1450S(+30 metres) and 1290S(+20 metres) designated as zones 11 and 12 in the Scintrex report TAS-074D. The original comments were:-

*ZONES 11 and 12 ..... On line 00 generally higher chargeabilities by about 4 to 6 millivolts/volt were observed between about 1400S and 1500S (zone 11) and between 1260S and 1320S (zone 12). Both these weak increases in chargeability are associated with high resistivity of 2500 to 3000 ohm-metres which indicates a disseminated source which the decay form infers to be fine grained. Both are most likely due to formation change only, and as such are of tertiary interest at best. Some continuation to the east is also inferred but is very weak.*

*Zone 11 .... The pole-dipole on line 00 confirms the main conclusions reached after a study of the gradient data. The source comes within 20 metres of surface, is centred at 1440S and has a source width of the order of two dipoles(ie 60 metres).*

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The general resistivities observed over the induced polarization high are a high 4000 ohm-metres with some indications of narrow zones of significantly lower resistivities. However, the source is considered to be disseminated chargeable material. The amplitude of the anomaly could be explained by a variation of mafic mineral content in the granite, as well as to disseminated sulphides. The higher overall resistivity suggests only minimal alteration within the granites.

To the west, on line 50W, a higher  $n = 1$  reading of 15 millivolts/volt at about 1400S, and an  $n = 2$  reading of 16 millivolts/volt at 1440S, imply a continuation of zone 11 across this line. Generally *slightly* higher background chargeabilities of 13 millivolts/volt (+) as against 9 millivolts/volt (+), were defined between 1440S and 1350S. With the exception of the  $n = 1$  reading at 1400S, the  $n = 1$  values are lower than those at depth, indicating a less chargeable surface area. Overall, the resistivities are high, although a shallow, less resistive section was recorded at about 1400S.

To the east of the 00 line, generally higher values of chargeability of the order of 13 millivolts/volt as against a background of 11 to the south and 8 to the north, were recorded between 1425S and 1500S. Distinctly higher chargeabilities were noted for  $n = 1$  of 17 millivolts/volt at 1455S. Again an essentially disseminated source is interpreted due to the high accompanying resistivity. The source looks, however, to be more significant on the shallower spacings which implies a lack of continuity with depth.

Zone 12 ..... The comments in the original report on this anomaly are given above.

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The pole-dipole data on line 00 shows only a minor increase in chargeability from a 9 millivolts/volt(+) background to 12 to 14 millivolts/volt centred at about 1280S. The at depth resistivities reach a relatively low 1600 ohm-metres at  $n = 2$  against a local background of about 4000 to 5000 ohm-metres. This may imply some minor alteration to be present, however, the overall picture of the anomaly on this line is not impressive.

To the west on line 50W, no significant response was recorded, however, to the east on line 50E, 14 millivolts/volt on  $n = 1$  was recorded at 1275S, which is inferred to extend to depth. This 14 millivolts/volt reading is about 50% above background, and is accompanied by high resistivities of the order of 3800 ohm-metres(+) and is thus interpreted as being due to a disseminated source, which comes within 15 metres(+) of surface.

*IN SUMMARY zone 11 is confirmed as being present within 20 metres of surface on line 00, predominantly on or very close to surface on line 50E, and for the most part, deeper than 20 metres on line 50W. The source is interpreted to be disseminated chargeable material within a resistive host, but with some narrow, less resistive (but not conductive) zone contained therein. While disseminated sulphides are a possible source, the low amplitudes of the anomalous polarization suggests that granites of higher mafic mineral content could also explain the anomalies seen. The generally high accompanying resistivities certainly suggest a lack of pervasive alteration.*

*Zone 12 is confirmed as a weak disseminated chargeable zone on line 00, while to the west, no evidence of its presence is seen. To the east, however, a disseminated chargeable zone was defined within 15 to 20 metres of surface centred*

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at 1305S. The nature of the source is considered to be similar to zone 11.

The detailed work has not enhanced the interest of this zone which remains tertiary to secondary at best.

B - Lines 300W, 350W, 400W at 1650S±

A series of higher induced polarization responses was defined on the 1979 survey and described in the report by the author as follows:-

ZONE 10 ..... A single sharp chargeability anomaly was recorded centred at 1635S(±5 metres)/3W on the less resistive south side of a material resistivity contrast which shows a ten fold change. (This anomaly is similar for the current dipole on 00 at 6W). The absolute level of chargeability is about 8 millivolts/volt above background, with the maximum depth to source being about 20 metres and the width 10 metres or so. The decay form is fast. The source is considered to be finely disseminated sulphides (and/or an increase in mafic minerals) within a less resistive host.

The dipole-dipole data on line 300W confirms the response referred to above. Within a broad zone of lower apparent resistivities of less than 300 ohm-metres between 1710S and 1650S, as against twice this level to the north and south, a relatively high anomaly was defined between 1650S and 1620S at a maximum depth of less than 20 metres. The southern leg of the resistivity "double peak" anomaly is clear to see, but the northern leg is more complex, but nevertheless present. The high value of 18.1 millivolts/volt on the southern leg at  $n = 5$  does not imply an increase in anomaly amplitude with depth, but is due to a further chargeable source at, or to the south of 1830S.

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The higher chargeability noted on the gradient array between 1490S and 1600S was also confirmed on the dipole-dipole data. Their source lies within slightly lower resistivity backgrounds of 1700 ohm-metres(+) as against 2000 ohm-metres below, and within 30 metres of surface. Their source is inferred to be disseminated, and confined to a surface zone.

On line 350W the trace of anomaly 10 is clearly seen as a broad resistivity low between about 1680S and 1560S centred at 1600S ( $n = 1$ ). The source lies within 15 to 20 metres of surface, and produces a wide double peak anomaly. The accompanying chargeabilities are broadly higher over the entire width of the resistivity low, being 14 millivolts/volt (+1) as against the 11 to 12 millivolts/volt background. The significant increase in chargeability occurs on the northern flank of the response at 1500S, and further north still at 1425S and 1365S, particularly the latter. The accompanying resistivities are high, and in a general sense there is a decrease in chargeability and an increase in resistivity with depth over the entire section north of 1500S. A disseminated source within 30 metres of surface must exist over this section, particularly at 1500S(+), 1425S(+) and 1365S(+).

On line 400W the lowest resistivities were recorded centred for  $n = 1$  at 1575S, and then extending to depth and to the north and south for 30 to 60 metres. This confirms the very sharp drop in apparent resistivity seen to the west of 1530S on the gradient array where an 80% fall in resistivity was recorded. While the 14 to 15 millivolts/volt background is contained within the resistivity low, the highest chargeabilities are associated with the flanks of the resistivity low, both to the north and south. To the south, the amplitude increases slightly with depth, while to the north, the higher chargeabilities are greater for the  $n = 1$  and

2 spacings, in a similar fashion to those seen on line 350W.

IN SUMMARY anomaly 10 as seen on line 300W has the characteristics of a broad zone (60 metres+) of significantly lower resistivities than background, with higher overall chargeabilities, and with a single relatively high zone at 1635S from a source whose depth is less than 20 metres. On line 350W broadly lower resistivities of 300 to 200 ohm-metres were recorded between 1680S and 1560S, with slightly higher than background chargeabilities throughout. On line 400W the centre of lower resistivity was at 1590S extending north and south by 60 metres. The accompanying chargeabilities at 15 millivolts/volt(+), while being above background for the local area, were not really high. (This picture confirms the gradient results observed on this line). The low apparent resistivities seen on lines 300W, 350W and 400W and their accompanying higher than background chargeabilities (although still of low amplitude), are reminiscent of the signature seen over the eastern workings and over Waxman and Weston. Thus the geophysical interest of this zone is enhanced.

C - Line 1100W centred at 00

The 1979 report described the single line gradient response as follows:-

ZONE 7 ..... Another single significant anomaly of 12 millivolts/volt above the abnormally low 8 millivolts/volt background was defined at 035S on line 11W. The resistivity is also a low 600 ohm-metres against the local 1000 ohm-metres background. The location of this response could marginally have influenced or exaggerated the amplitude of the anomaly due to array "end effect", however, a lack of this effect on the end line of the array infers the anomaly to be genuine. The decay form observed is again fast at  $\Delta m_n = -15\%$ , inferring a fine grain size.

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*The depth to source is about 20 metres. Of primary geophysical interest. The anomaly is not seen to the east or west.*

The dipole-dipole data confirms a source which yields an anomaly of 17 millivolts/volt from a source situated between 00 and 30S, confirming the gradient anomaly. The maximum depth to source is of the order of 20 metres. The accompanying resistivities at 500 to 600 ohm-metres are one-third to one half of background. The gradient array data *suggests* a north dip to the source, as does the dipole-dipole data. An enhancement on the  $n = 5$  spacing on the northern leg of the double peak anomaly is not due to an implied increase in amplitude with depth, but to a further chargeable source situated between 150N and 180N. It is suggested that this source also should be further investigated.

*IN SUMMARY the dipole-dipole data has confirmed the primary geophysical interest of the significant, if low amplitude, response defined on line 1100W at 035S. The source is less resistive than the enclosing rocks, and the form of the anomaly suggests a north dip.*

D - Lines 1100W - 1400W at 660S±

An increased internal polarization response was noted on lines 12W and 13W and was described in the 1979 report as follows:-

ZONE 4 ..... Within a broad resistivity low of 1500 ohm-metres(+) as against a background of 2000 ohm-metres(±), a broad increase in chargeability from the 14 millivolts/volt background to as high as 22 millivolts/volt was noted between 560S and 700S on line 12W. Individual sources are inferred at 675S and 635S. The absolute value above background of 4 to 6 millivolts/volt is minor, and the

depths inferred are shallower at 20 metres. On the adjacent line to the west (13W), between 550S and 680S, higher chargeabilities of 2 to 4 millivolts/volt above the 16 millivolts/volt background were recorded. To the east at 710S and 635S on line 11W, sharp minor chargeability highs of 2 to 4 millivolts/volt above background may also be related. Overall the anomaly located probably represents a compositional change in the underlying granite, and as such is of tertiary interest.

On line 1100W a zone of lower apparent resistivities was defined as a weak double peak anomaly centred at 675S as an  $n = 1$  value of about 400 ohm-metres. The background for the area would appear to be some 4 to 8 times this level. The overall level of chargeability over the entire section from 720S to 570S ranged between 14 and 16 millivolts/volt (high for the area as a whole), however, no truly significant induced polarization response was recorded within this high level. One interesting feature was defined at 675S, within 20 metres of surface, and coincident with the resistivity low. The source has an *abnormally low* chargeability, and forms a double peak anomaly. This zone must then be due to alteration and/or oxidation, which acts to reduce the chargeable material within the host - a common feature on the mainland, but most rare on the west coast.

Fifty metres west on line 1150W, the zone of lower resistivities is significantly greater and extends from about 660S to 570S, with the lowest values being seen within 20 metres of 615S. While the overall chargeabilities remain a high 15 millivolts/volt (for the area), unlike line 1100W, values *within* the resistivity low are now 2 to 3 millivolts/volt higher, the highest values occurring on the southern contact of the resistivity low, within 30 metres of surface centred at 660S.

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On line 12W, the original gradient array survey defined the highest chargeabilities between 560S and 700S, while the dipole-dipole data implies them to lie between 540S and 660S. Higher than local background (15 millivolts/volt) chargeabilities of 20 to 22 millivolts/volt are associated with the resistivity low, but particularly between 720S and 600S where values reach 25 millivolts/volt( $\pm$ ) on the  $n = 1$  spacings. The maximum value indicates a source at 675S which agrees well with the gradient peak at the same coordinate.

Fifty metres west on line 1250W, the zone of lower resistivities is much broader, extending from 750S to 510S on the  $n = 1$  spacing, but with the lowest section (500 ohm-metres) being between 720S and 600S. Over this section the resistivity progressively increases with increasing  $n$  spacings, as evidenced by the semi-horizontal contour lines. The highest induced polarization values were defined between about 720S and 570S, with particularly high values centred at about 600S $\pm$  to  $n = 3$ . While these higher chargeability values are associated with lower apparent resistivities, the resistivities are *higher* than those seen to the south. The features observed are interpreted as being due to a more chargeable/less resistive section close to surface (30 to 60 metres) which becomes less chargeable and more resistive with increasing depth.

On line 1300W the picture changes from that seen on the lines discussed to the east (1100W-1250W). On this line lower resistivities were defined north of 510S (and are open), and to the south of 660S. On the latter, the central low was centred at 750S, well south of that seen on 1250W. It is suggested that that seen on line 1250W in fact closes to the east, and that centred at 750S on this line, closes to the west. The highest chargeability values, however, *do* lie along strike of the resistivity low centred at approximately 660S on

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line 1250W, with the highest values on line 1300W being at 600S ( $n = 1$  and  $2$ ). This anomaly is accompanied by high 1000 to 1300 ohm-metres resistivities, about 2 to  $2\frac{1}{2}$  times those seen to the immediate north and south. The gradient array data on this line confirms the general observations made on the dipole-dipole data. *Slightly* higher chargeabilities were defined between about 550S and 670S, and higher resistivities between 560S and 605S.

The source of the higher chargeabilities between 660S and 570S is disseminated chargeable material within a resistive host, and comes within 20 metres, and probably closer, to surface.

On line 1350W the general form of the resistivity data is similar to that seen on line 1400W. Lower apparent resistivities were defined south of about 645S together with slightly higher chargeabilities of 14 millivolts/volt ( $\pm$ ) as against the lower ( $11\frac{1}{2}$  millivolts/volt) chargeabilities seen within the resistive unit to the immediate north.

The central section is the most interesting, with higher apparent resistivities of  $2000 \pm 250$  ohm-metres being reached on the  $n = 1$  (and often  $n = 2$  also) values below 630S and 570S. At 570S, for  $n = 4$  and  $5$ , the resistivity is less than 700 ohm-metres allied with higher chargeabilities just above and just below 20 millivolts/volt. This feature can be interpreted as a broad near surface (within 30 metres) resistive layer of higher than average chargeability, underlain by a less resistive layer. The alternative explanation which is less likely, is that the surface resistivity layer forms a 'double peak' response, so 'creating' the deeper resistivity low by geometric effect.

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The marked difference in profile form between 1300W and this line should be noted. The southern resistivity low/higher chargeability is common to both lines, but the implied near surface resistivity high underlain by lower resistivity is not seen on line 1300W, although a broadly lower resistivity unit of 1100  $\pm$ 100 ohm-metres *may* be related.

On line 1400W the southern resistivity low is confirmed south of 660S, and is accompanied by low background resistivities of 400 to 500 ohm-metres. No evidence of the northernmost resistivity low was seen.

A major feature was a resistivity low observed at 570S for  $n = 2$  to 5. This resistivity low has a more resistive layer of the order of 20 to 30 metres thick close to surface. The surface and near-surface chargeability as seen on  $n = 1$  and 2 between 630S and 580S (18 to 19 millivolts/volt), is higher than the 14 millivolts/volt background, which implies a weak disseminated sulphide *above* the resistivity low. However, in whole, or in part, it is possible that this resistivity low represents a function of the resistivity "double peak" anomaly generated by the near surface high resistivities between 550S and 610S.

The original gradient array showed a 6 millivolts/volt( $\pm$ ) high superimposed on a 14 millivolts/volt background between about 550S and 670S which correlates well with the dipole-dipole data. The resistivity data shows a distinct relative low between 440S and 540S and between 600S and 720S. This also correlates well with the dipole-dipole data. The implied resistivity low beneath the higher chargeabilities is, however, *not* seen from the gradient data.

*IN SUMMARY the series of anomalies defined between 1100W and 1400W to the north*

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and south of coordinate 630S, have the following characteristics:-

- a) Between lines 1100W and 1250W they show lower resistivity of 400 to 500 ohm-metres, and show higher chargeabilities (except on line 1100W). On line 1300W the zone appears to end as a higher chargeability centred at 660S(±) associated with high resistivity of 1200 ohm-metres, as opposed to less than half this to the east.
- b) On line 1300W and 1350W, and to a lesser extent on line 1400W, a low resistivity zone was recorded on the northern flank of the array which is associated with lower background chargeabilities.
- c) The gradient array response seen on line 1400W between 550S and 680S, is also confirmed on the dipole-dipole data, however, the accompanying high resistivity may be underlain by lower resistivity typical of the resistivities seen over the known alteration zones, (but see text above).

Some of these lower resistivity/moderate chargeability events may represent targets of possible alteration zones.

E - Line 1300W at 990S

This anomaly was designated #3 in the 1979 report, and the comments made were as follows:-

ZONE 3 .....On the southern flanks of lines 14W, 13W and 12W, a marked fall-off in resistivity was noted south of about 920S, 955S and 970S respectively from 3000 ohm-metres to the north to 1200 ohm-metres to the south. On line 13W at

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980S a well defined induced polarization response of 6 millivolts/volt above the local 14 millivolts/volt background was recorded which shows a markedly fast decay form of  $\Delta M_n = -10\%$ . This infers the source to be finely disseminated material while the form of the anomaly suggests a maximum depth of 30 metres, and a south dip. The anomaly is not clearly seen to the east and may merge into zone 1 to the west.

The dipole-dipole data shows the absolute resistivities within the low referred to above to be of the order of 250 ohm-metres, and within 20 metres of surface at 990S  $\pm 30$  metres. An excellent double peak anomaly was defined. The chargeability data shows a chargeable source centred at 975S of about 50% ( $\pm$ ) above background. The source depth is 20 metres.

*IN SUMMARY* the secondary to tertiary importance assessed in the gradient array analysis has been upgraded to secondary or better, as the zone, although only 60 metres or so wide, has the characteristics of the eastern workings.

F - Lines 1600W to 1700W at 930S $\pm$

The anomaly designated #1 on the initial gradient array survey was described in the original 1979 report as follows:-

*ZONE 1* ..... The most westerly manifestation was on line 16W. Here, three distinct sources are inferred at 945S, 925S and 900S with chargeabilities of 9, 8 and 4 millivolts/volt above background. The estimated maximum depths to source on the former and latter are respectively 40 metres and 15 metres. The decay form is markedly fast which indicates a fine grained disseminated source. A distinct resistivity low of 1500 ohm-metres ( $\pm$ ) as against backgrounds of 3000 to 5000 ohm-

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metres was noted between about 840S and 960S. Only the southern edge (or 'contact') is chargeable. The anomaly is open to the west, and is much reduced in amplitude to the east where it is centred at 885S±50 metres as a 4 millivolts/volt ±2 millivolts/volt. The overall resistivity is about 2500 ohm-metres over the anomaly to 3500 ohm-metres either side. A slight increase in chargeability of 5 millivolts/volt above background of 16 millivolts/volt is recorded at 935S on line 14W (Zone 1s) and is also associated with a decrease in resistivity to 2000 ohm-metres(±) from 4000 ohm-metres(±). The zone is of secondary interest on line 15W.

Dipole-dipole data and detailed gradient using a smaller (800 metres) current dipole than the 1745 metres gradient used in the original survey, were surveyed on lines 1600W, 1650W and 1700W.

On line 1600W the form and amplitude of the anomaly located on the gradient array was similar to that seen on the original gradient survey. The dipole-dipole data confirms the anomaly source location at 930S(±), and shows an increase in amplitude from 18 millivolts/volt on the  $n = 1$  to 4 readings to 24 and 22 millivolts/volt on the  $n = 5$  data points which are not due to interference patterns from other sources, and thus suggest an increase in importance with depth. The maximum depth to the top of the source is less than 20 metres. The associated resistivity is of the order of 500 ohm-metres (bulk).

Some 50 metres to the west on line 1650W, the gradient array shows a very sharp resistivity low between 865S and 950S, accompanied by a most significant above background induced polarization response of 12 to 14 millivolts/volt. The maximum depth to source is estimated at less than 10 metres on the northern flank, and

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20 metres on the southern flank, while the dip to the source is suggested to be steep north. The dipole-dipole data reveals an excellent double peak anomaly which reveals a broad source centred at 945S, within 20 metres of surface and accompanied by low bulk resistivities of 250 to 400 ohm-metres.

The most substantial response was defined on the most westerly line surveyed, line 1700W. A gradual build-up in chargeability from 20 millivolts/volt backgrounds at 1000S(±) to over 16 millivolts/volt above background at 905S, and then to background at 860S, makes this one of the most significant anomalies located in the present survey. While the gradient array data shows a 50% fall in resistivity to 1300 ohm-metres, the dipole-dipole data shows the bulk resistivities within the low to be of the order of 350 to 500 ohm-metres. The chargeability on the dipole-dipole data shows values to 29 to 30 millivolts/volt from larger  $n$  spacings, and somewhat less near surface, implying an increase in significance with depth. The maximum depth to source at 915S is interpreted as less than 20 metres.

A further series of anomalies was located on the southern flanks of lines 1600W, 1650W and 1700W centred at 1210S, 1200S and 1220S respectively. On the former and latter the anomalous response reaches some 12 to 14 millivolts/volt above background, while on the line between, only about 8 millivolts/volt above background. These higher internal polarization values are associated with significantly lower resistivities of the order of 1000 ohm-metres as against 2000 ohm-metres. The anomalies are open to the south, east and west. It is recommended that further work be carried out to delineate this anomaly.

*IN SUMMARY it is concluded that the anomaly on line 1700W is one of the most*

significant encountered in the entire area. It combines lower bulk resistivities and higher chargeabilities. Additional work would be required to close off the source to the west. While the responses on lines 1650W and 1600W are less significant, they are nevertheless of primary to secondary interest in view of their being along strike to that at 905S± which is considered of prime interest as a drilling target.

A further zone of interest was delineated on the southern flanks of lines 1600W, 1650W and 1700W centred at about 1220S. This response is open to the east, west and south. As the characteristics are higher chargeability and lower resistivity, similar to that seen over the 'type' deposits, further work is recommended to delineate the extent of the anomalism.

#### GENERAL CONCLUSIONS

- 1 - A detailed study of Waxman and Weston and the eastern workings (report TAS-081A) showed that while both prospects had low bulk resistivities and higher chargeabilities, these did not necessarily coincide, or indeed correlate (where data was available), with mineralisation. These conditions have been defined in a number of the anomalies detailed in the present survey.
- 2 - A number of the areas detailed showed higher chargeabilities on the flanks of the resistivity lows, or *along strike*, or even *above* the low (e.g. lines 1100W to 1400W). This perhaps suggests that the more resistive rocks may represent sulphides from oxidation(?), or alteration(?), which may occur slightly later in the formation of the feature.
- 3 - Undoubtedly the anomaly located on the area 1600W to 1700W centred at 900S

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or south thereof, is the most significant anomaly located and detailed on this survey. Should no surface information be available, a diamond drill hole is certainly warranted here.

Respectfully submitted on behalf of:

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A.W. HOWLAND-ROSE, MSc, DIC, AMAus IMM, FGS.

GEOPHYSICIST

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INDUCED POLARIZATION AND RESISTIVITY SURVEY

POLE - DIPOLE ARRAY

DATE 16-11-80

PLOTTED BY L.K.

PULSE 2 Sec

Rx. 311147

DIPOLE SPACING 30m

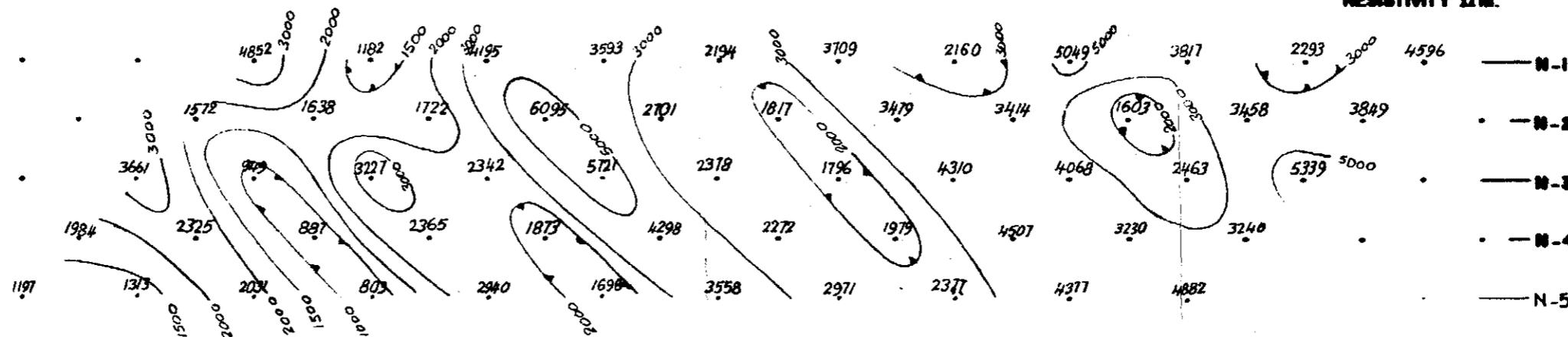
LINE No. 00

PROSPECT FEDERATION

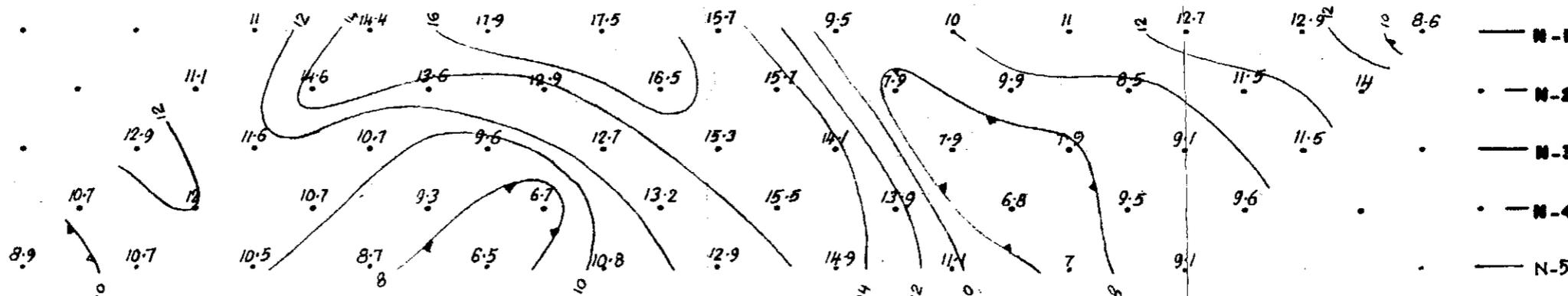
JOB No. TAS-081B

1560S 1530S 1500S 1470S 1440S 1410S 1380S 1350S 1320S 1290S 1260S 1230S 1200S

RESISTIVITY  $\Omega m$



CHARGEABILITY



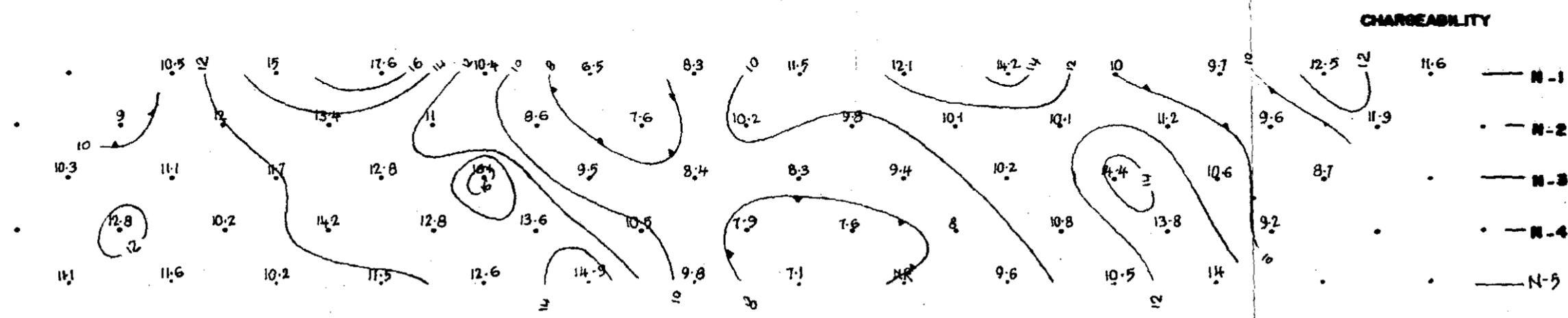
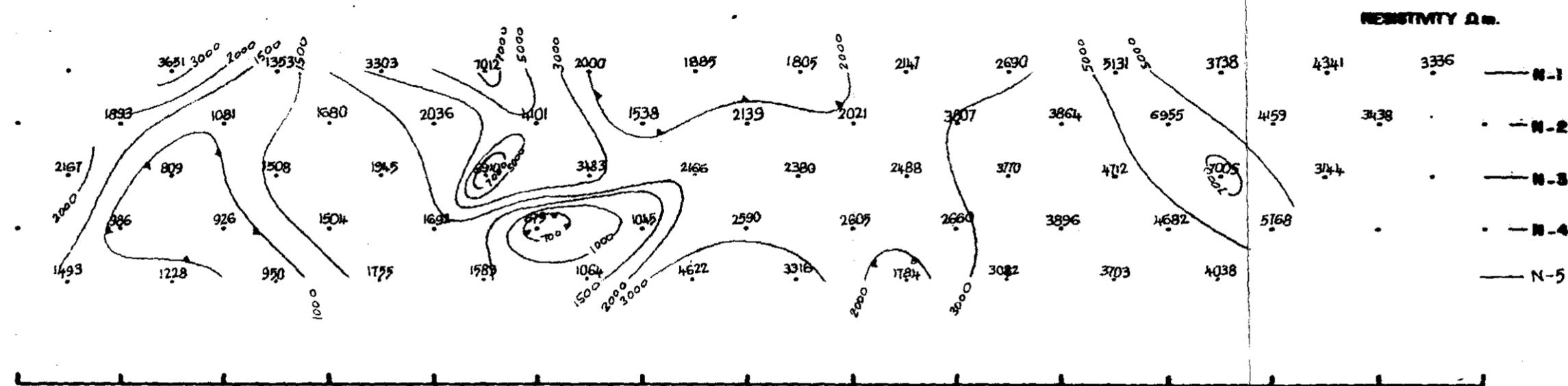
022



**SCINTREX PTY. LTD.**  
 INDUCED POLARIZATION AND RESISTIVITY SURVEY  
 POLE - DIPOLE ARRAY

DATE 15-11-80		LINE No. 50E
PLOTTED BY L.K.		PROSPECT FEDERATION
PULSE 2 Sec	RL 311147	
DIPOLE SPACING 30m		JOB No. TAS-081B

1560S 1530S 1500S 1470S 1440S 1410S 1380S 1350S 1320S 1290S 1260S 1230S 1200S 1170S 1140S



024



SCINTREX PTY. LTD.

INDUCED POLARIZATION AND RESISTIVITY SURVEY

POLE - DIPOLE ARRAY

DATE 17-NOV-80

PLOTTED BY L.K.

PULSE 2 Sec

Rx. 311147

DIPOLE SPACING 30m

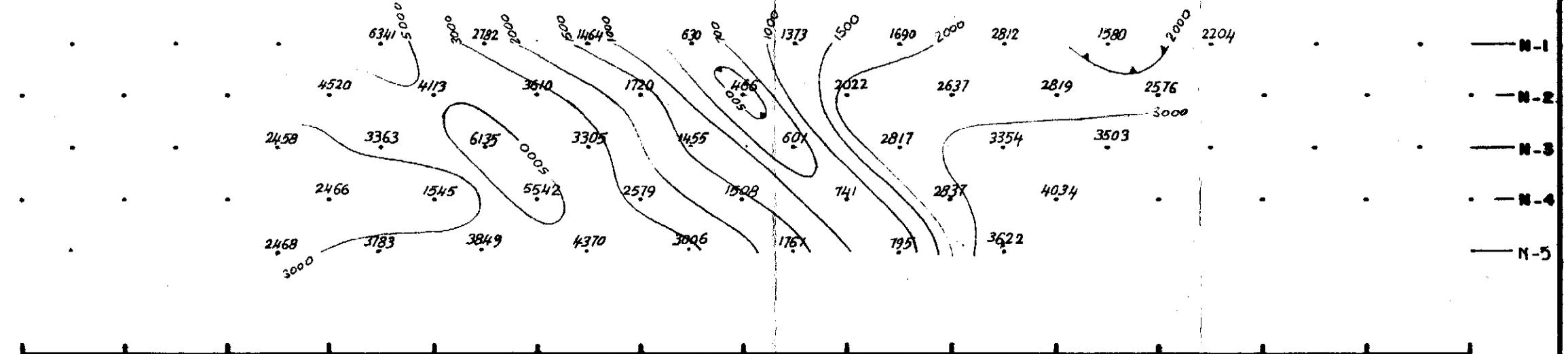
LINE No. 50W

PROSPECT FEDERATION

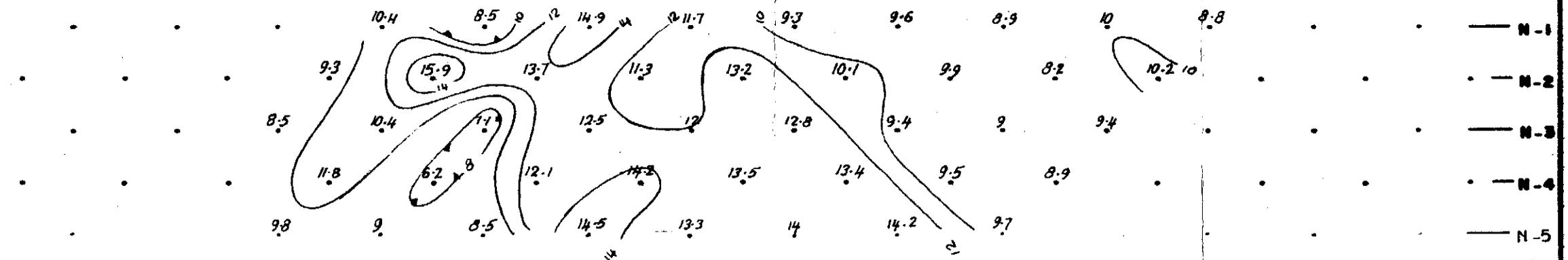
JOB No. TAS-081B

1560S 1530S 1500S 1470S 1440S 1410S 1380S 1350S 1320S 1290S 1260S 1230S 1200S 1170S 1140S

RESISTIVITY  $\Omega m$



CHARGEABILITY

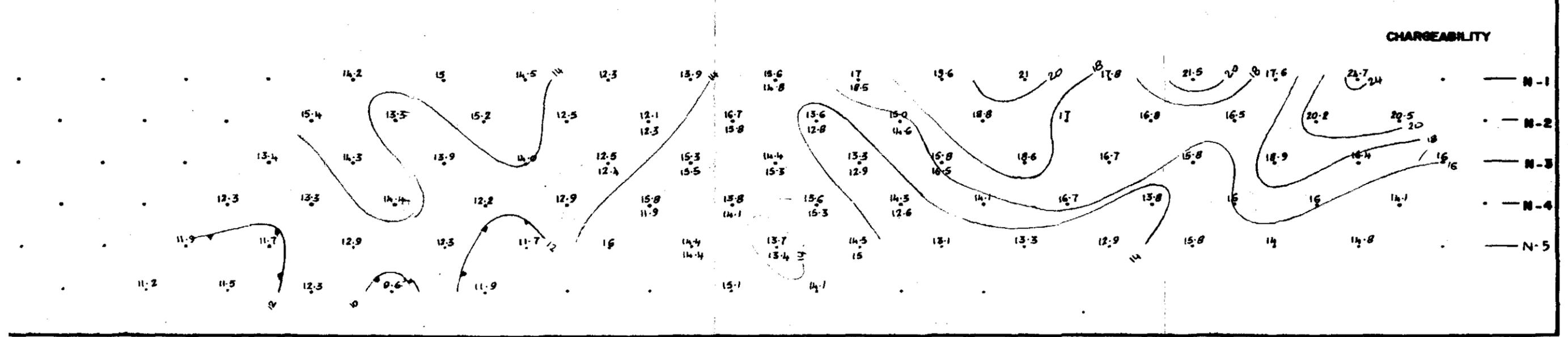
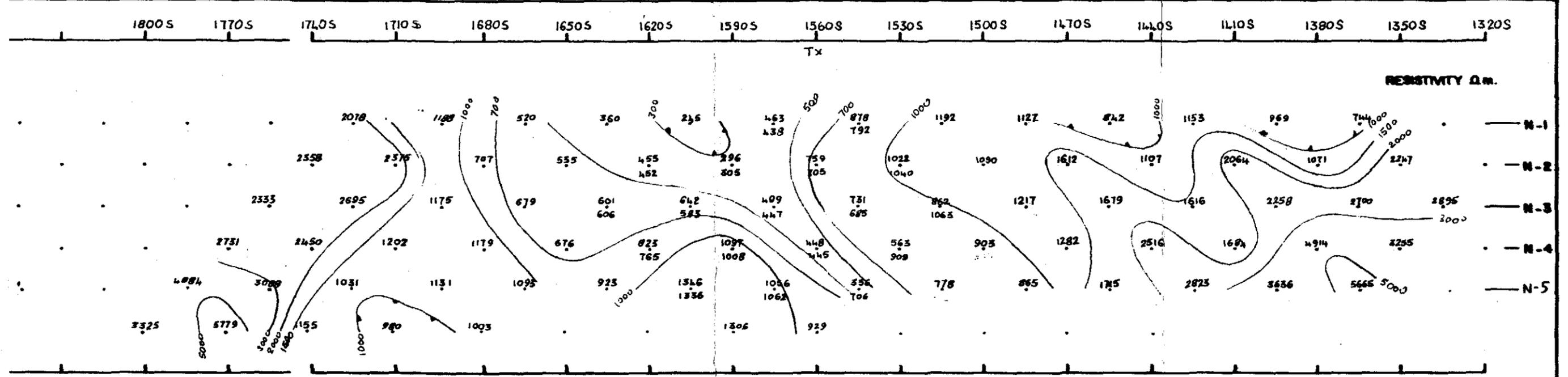




026

012028

LINE No.	 <b>SCINTREX PTY. LTD.</b> INDUCED POLARIZATION AND RESISTIVITY SURVEY <b>DIPOLE - DIPOLE ARRAY</b>	DATE 8/9-11-80	LINE No. 350 W
PROSPECT		PLOTTED BY L.K.	PROSPECT FEDERATION
JOB No.		PULSE 2 Sec. Rx. 311147	JOB No. TAS-081B
		DIPOLE SPACING 30m.	





023

012030



SCINTREX PTY. LTD.

INDUCED POLARIZATION AND RESISTIVITY SURVEY

DIPOLE - DIPOLE ARRAY

DATE 13-11-80

PLOTTED BY L.K.

PULSE 2 Sec

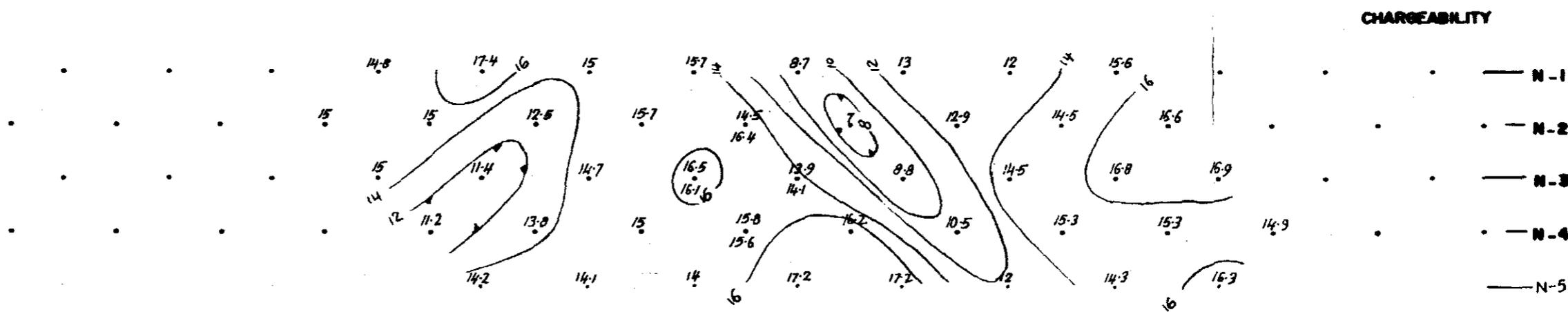
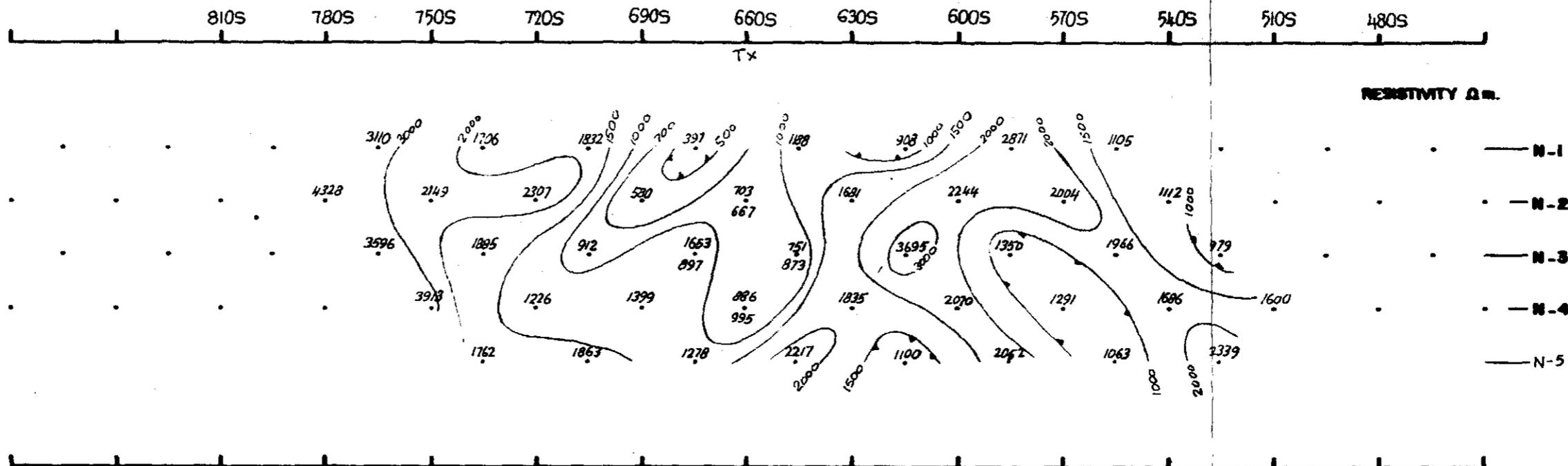
Rx. 311147

DIPOLE SPACING 30m

LINE No. 1100W

PROSPECT FEDERATION

JOB No. TAS-081B









032



SCINTREX PTY. LTD.

INDUCED POLARIZATION AND RESISTIVITY SURVEY  
DIPOLE - DIPOLE ARRAY

DATE 11-11-80

LINE No. 1250W

PLOTTED BY L.K.

PROSPECT FEDERATION

PULSE 2 Sec

Rx. 311147

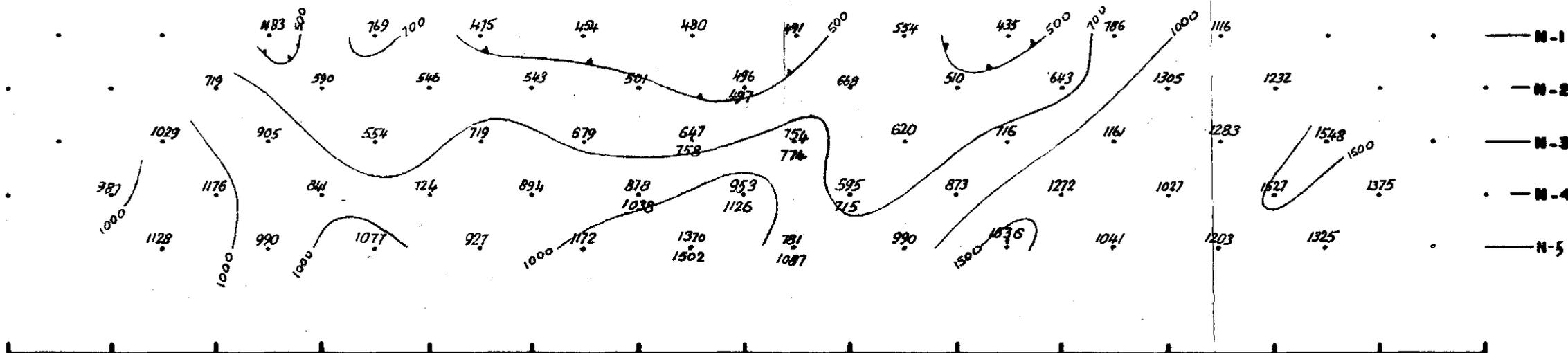
DIPOLE SPACING 30m

JOB No. TAS-081 B

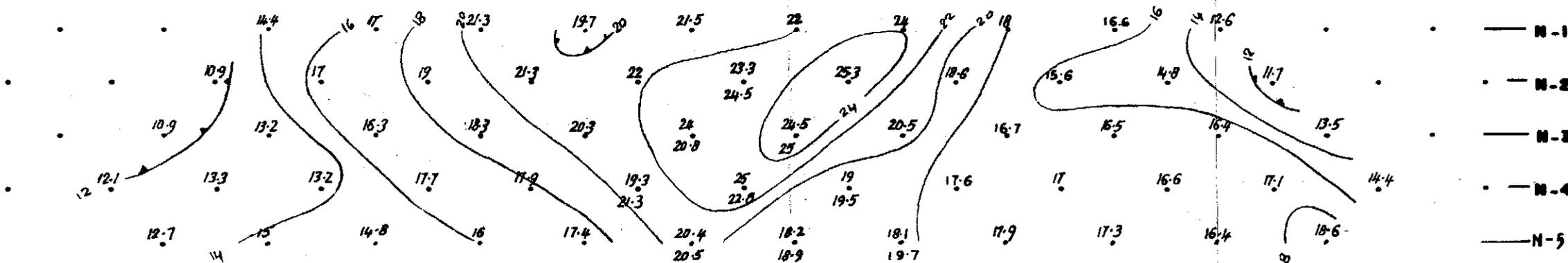
840S 810S 780S 750S 720S 690S 660S 630S 600S 570S 540S 510S 480S 450S 420S

Tx

RESISTIVITY  $\Omega m$



CHARGEABILITY



036



SCINTREX PTY. LTD.

INDUCED POLARIZATION AND RESISTIVITY SURVEY

DIPOLE - DIPOLE ARRAY

DATE 14-11-80

PLOTTED BY L.K.

PULSE 2 Sec

Rx. 311147

DIPOLE SPACING 30m

LINE No. 1300W SHT 1.

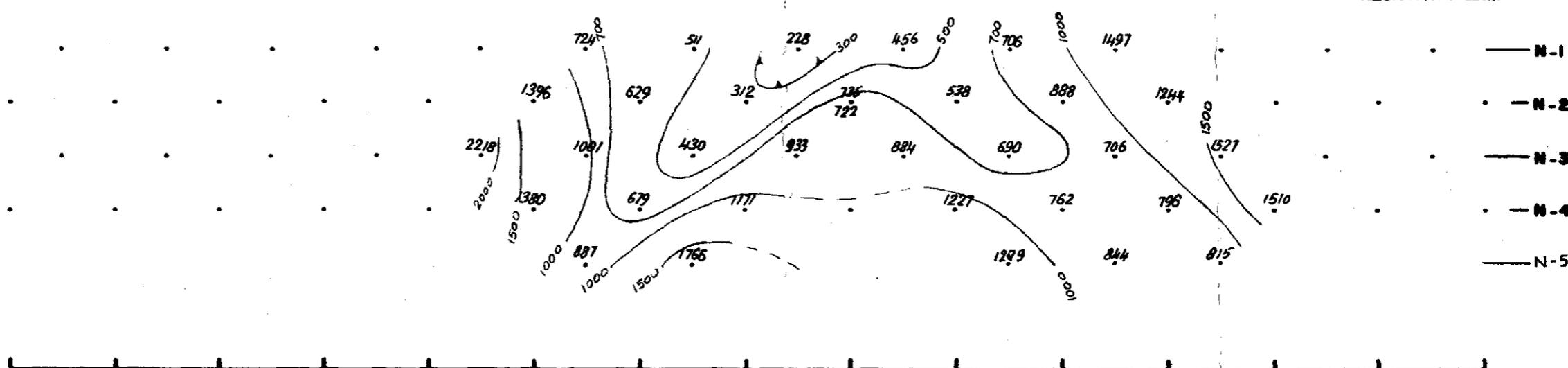
PROSPECT FEDERATION

JOB No. TAS-081-B

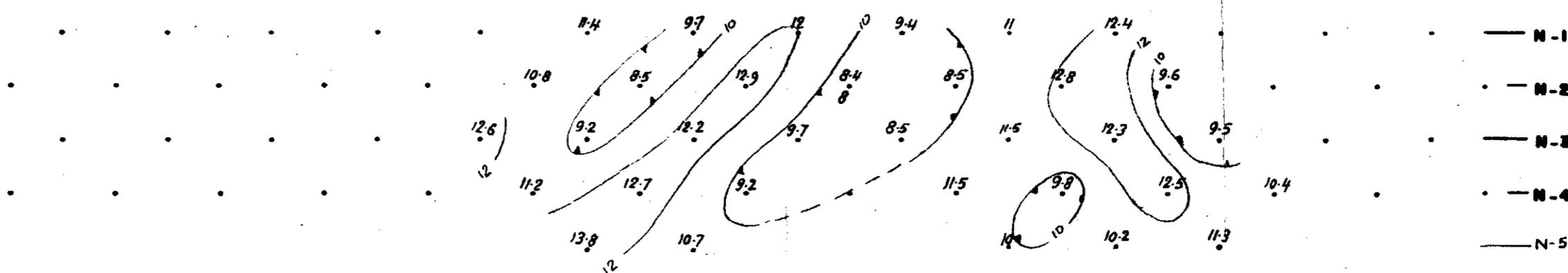
1170S 1140S 1110S 1080S 1050S 1020S 990S 960S 930S 900S 870S 840S 810S

Tx

RESISTIVITY  $\Omega m.$



CHARGEABILITY



- N-1
- — N-2
- N-3
- — N-4
- N-5

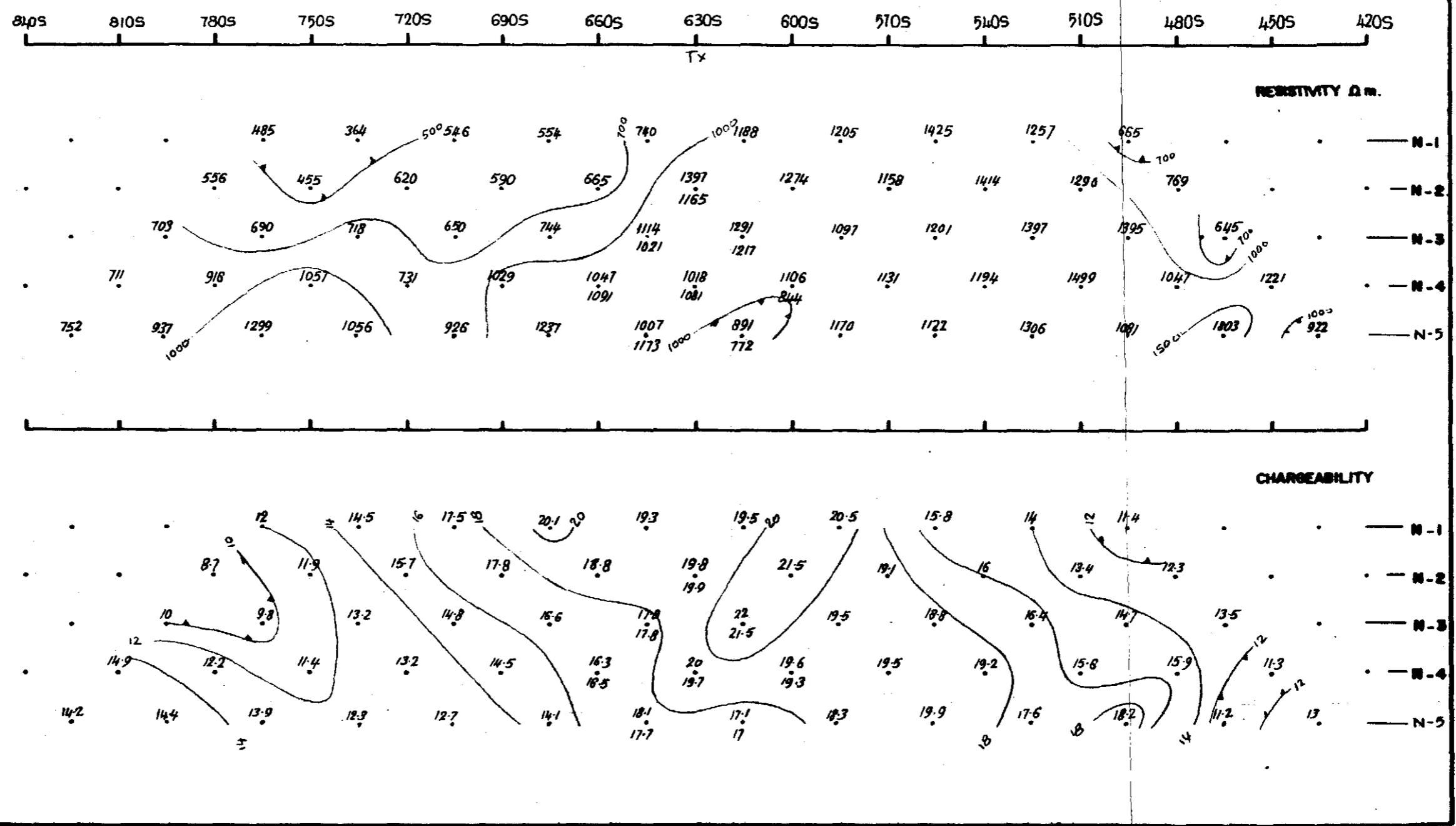
033

012036



**SCINTREX PTY. LTD.**  
 INDUCED POLARIZATION AND RESISTIVITY SURVEY  
 DIPOLE - DIPOLE ARRAY

DATE 11-11-1980		LINE No. 1300W
PLOTTED BY L.K.		SHT. 2
PULSE 2. Sec	Rx. 311147	PROSPECT FEDERATION
DIPOLE SPACING 30m		JOB No. TAS-081-B



034

012037

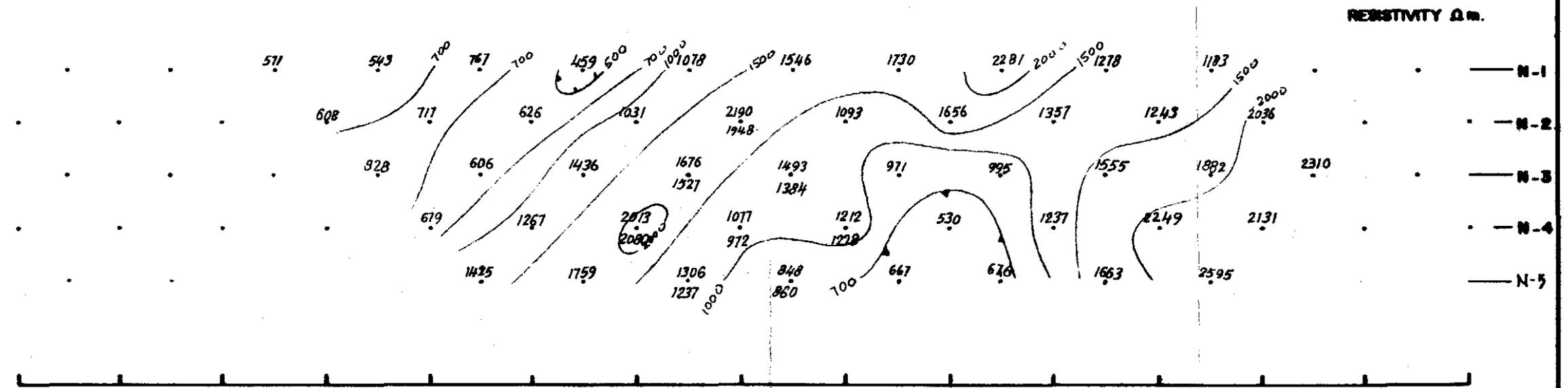


**SCINTREX PTY. LTD.**  
 INDUCED POLARIZATION AND RESISTIVITY SURVEY  
 DIPOLE - DIPOLE ARRAY

DATE 13-11-80  
 PLOTTED BY L.K.  
 PULSE 2 Sec Rx. 311147  
 DIPOLE SPACING

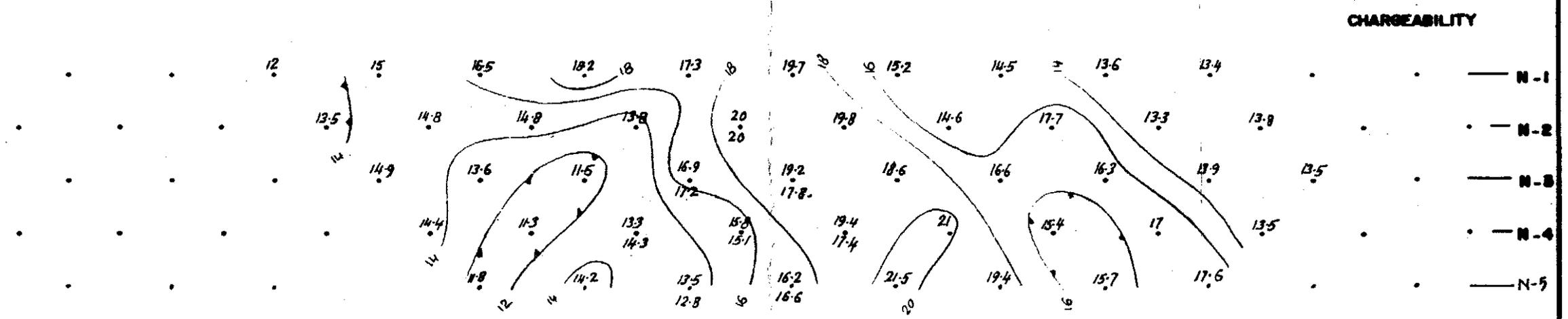
LINE No. 1350W  
 PROSPECT FEDERATION  
 JOB No. TAS-081B

8405 8105 7805 7505 7205 6905 6605 6305 6005 5705 5405 5105 4805 4505 4205  
 Tx



RESISTIVITY  $\Omega m.$

— N-1  
 — N-2  
 — N-3  
 — N-4  
 — N-5



CHARGEABILITY

— N-1  
 — N-2  
 — N-3  
 — N-4  
 — N-5



037



SCINTREX PTY. LTD.

INDUCED POLARIZATION AND RESISTIVITY SURVEY

DIPOLE - DIPOLE ARRAY

DATE 25-11-80

PLOTTED BY L.K

PULSE 2 Sec

Rx. 311147

DIPOLE SPACING 30m

LINE No. 1600 W

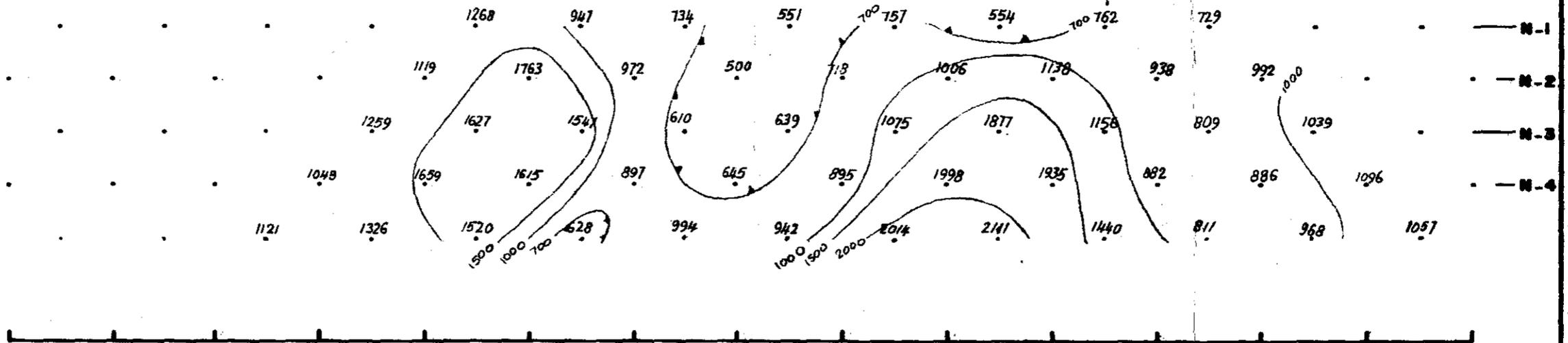
PROSPECT FEDERATION

JOB No. TAS-081 B

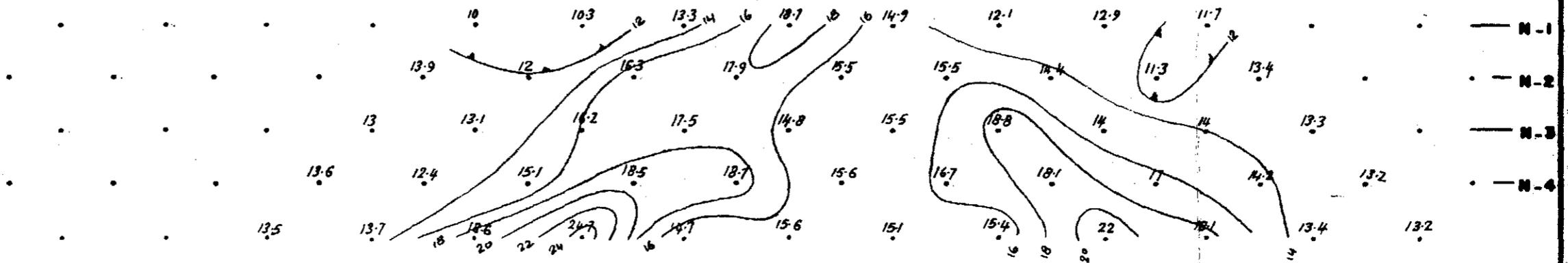
1170S 1140S 1110S 1080S 1050S 1020S 990S 960S 930S 900S 870S 840S 810S 780S 750S

Tx

RESISTIVITY  $\Omega m$



CHARGEABILITY





039



SCINTREX PTY. LTD.

INDUCED POLARIZATION AND RESISTIVITY SURVEY

DIPOLE - DIPOLE ARRAY

DATE 29-11-80

PLOTTED BY L.K

PULSE 2 Sec.

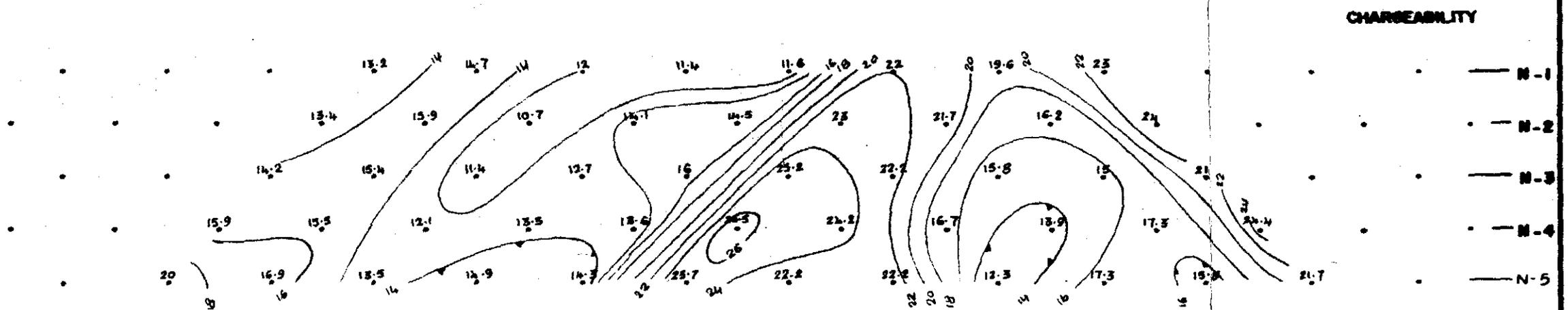
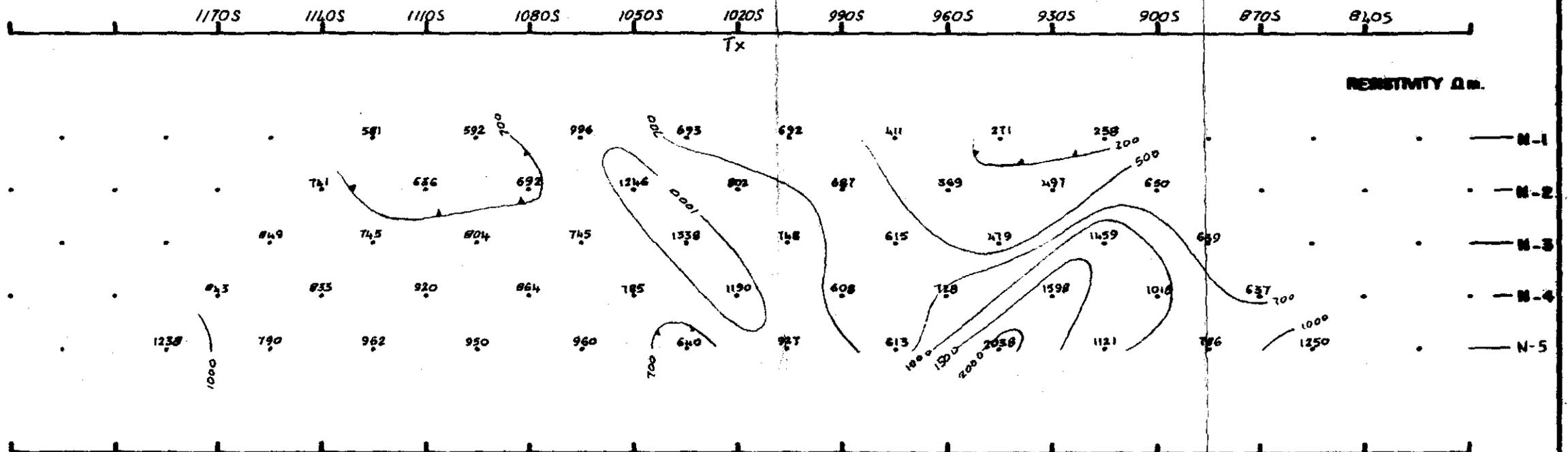
Rx. 7909273

DIPOLE SPACING 30m.

LINE No. 1650 W

PROSPECT FEDERATION

JOB No. TAS-0818





041

012043

LINE 1600W  
FEDERATION  
GRADIENT ARRAY  
TAS-081B



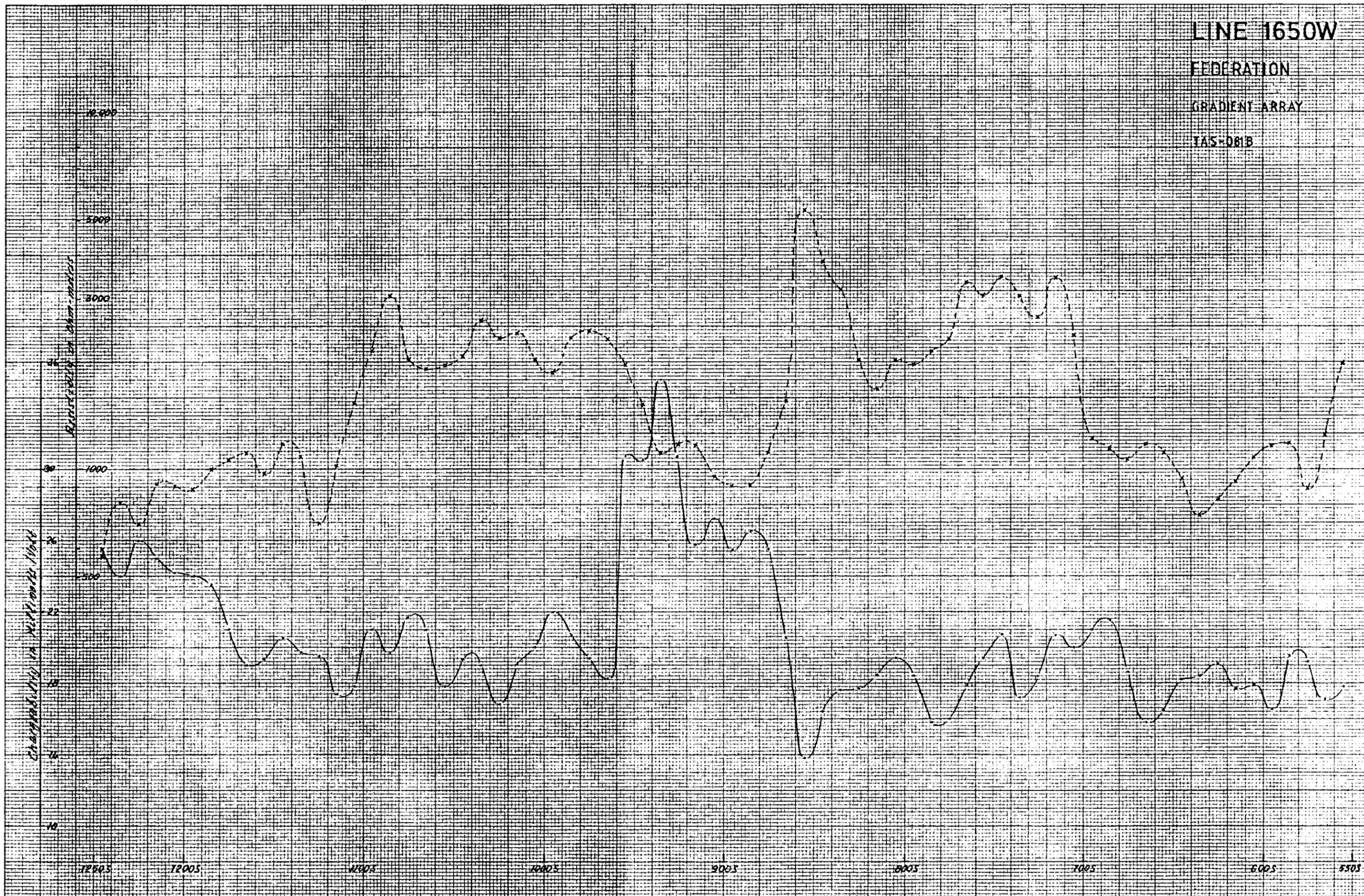
K-E  
15 X 15 TO LINE DIMENSIONS X X CM

43 1211

042

012044

LINE 1650W  
FEDERATION  
GRADIENT ARRAY  
TAS-081B



K.E. 10 X 10 TO THE CENTIMETER 30 X 30 CM

41 1213

LINE 1700W

FEDERATION

GRADIENT ARRAY

TAS-0818

