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A COMPILATION OF GEOPHYSICAL SURVEYS

WITHIN E.L. 102/87

for

BHP-Utah Minerals International

by

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SUMMARY

E.L. 102/87 surrounds the Mt Lyell copper-gold mine and although the area has had a long history of exploration, there has been little application of modern deep-penetrating techniques. Indeed, a large proportion of the licence has had no geophysics and must be regarded as having potential for even relatively shallow mineralisation. The region holds potential for gold-only, copper-gold, as well as base metal mineralisation.

This report is a compilation of all of the previous geophysical surveys within E.L. 102/87. It shows that even those areas with a high density of data are still prospective for a deeper-seated deposit. In some regions, BHP's proposed blanket coverage TEM will encounter difficulties due to high-voltage power lines, conductive surface conditions, subsurface conductors (black shales) and steep topography. Only the first mentioned will preclude surveying and it is suggested that if a sufficiently large area is effected, then other methods be tried. In particular, it is recommended that the existing gravity and aeromagnetic coverage be used to help locate the Great Lyell Fault and its associated structures which, at Mt Lyell, are in close proximity to the higher grade copper bodies.



INTRODUCTION

E.L 102/87 surrounds the Mt Lyell copper-gold mine and contains a number of known mineral occurrences, including gold, copper and copper-lead-zinc. The region has had a long history of exploration: geophysical surveys over the mine itself commenced in the 1930's, with surveys in E.L. 102/87 starting in 1948. Despite this history, the area may still be regarded as highly prospective for a precious or base metal ore body. Particularly since there has been little exploration for deeply buried (ie, greater than ~100m) mineralisation.

This report has compiled the geophysical coverage onto two 1:10,000 scale sheets and included the data for all significant surveys. Each grid is discussed separately and the results evaluated.

E.L. BOUNDARIES

There is some doubt, at least in my mind, about E.L. 102/87's internal boundaries which surround the Mt Lyell Mine. The Mt Lyell Mine lease, ML30M/80, is apparently fixed though marked "not surveyed" on the Mines Dept's 1:20,000 mine lease plan. It is surrounded by a number of small M.L.'s and an Authority to Prospect (A to P) all held by Mt Lyell or RGC. Some of the former have, I understand, been recently relinquished. If so, the vacant land should logically be included within E.L. 102/87. These areas are indicated on Figure 1. And any grids falling within them have been included in this report.

On the 1:50,000 scale map of the licence supplied by BHP, the south east corner of the A to P lies on easting 385,000mE. On BHP's 1:10,000 scale maps (from which all of the plans in this report are based), this corner falls on 385,100mE.

EXPLORATION TARGETS AND GEOLOGIC SETTING

The central section of the licence is underlain by the Mt Read Volcanics and these are prospective for a copper-gold deposit similar to Mt Lyell or a Pb-Zn-Cu-Au-Ag deposit similar to Rosebery or Hellyer. They may also host a gold-only deposit in the style of the Henty Prospect some 20kms to the north. On the western edge of the licence there is a small area of Siluro-Devonian sediments which have largely been ignored (?), but which may be prospective for a sediment-hosted base metal deposit (eg, the 'Sandstone Hill' galena prospect within this area?). The Ordovician sediments on the eastern side have been similarly ignored, but could perhaps be host to (?) fault controlled gold deposits. A significant proportion of the licence has a cover of either glacial or Quaternary material.

The Mt Lyell mining field consists of numerous discrete deposits.



These include large tonnage, low-grade ore such as Prince Lyell and small, high-grade deposits which may be deeply buried (eg, Twelve West: a 6% Cu orebody at ~300m below surface). The low grade deposits may not be very conductive and some experimental TEM surveys on the sub-economic Western Tharsis deposit have failed to respond (in strong contrast to a CSAMT survey; see Bishop and Lewis, 1988a). Whilst it is unlikely that any new economic copper deposit would be non-conductive, relatively resistive gold-copper mineralisation could well occur.

Following the success of UTEM in locating the Hellyer deposit, fixed-loop TEM is now the favoured technique for locating a buried base metal deposit in western Tasmania (see Bishop and Lewis, 1988b). It should be equally, if not more, applicable for moderate to high-grade copper bodies (ie, 2%+ Cu). Regions where the technique may have difficulty include the Comstock valley where conductive glacial cover and conductive units within the Gordon Limestone (Williams, 1969) may mask any response to mineralisation. Elsewhere (eg, West Sedgwick) the presence of graphitic shales will give rise to spurious anomalies. In many places the steep topography will require some consideration for the best positioning of transmitter loops.

Any gold-only deposit within the volcanics may be associated with disseminated sulphides and IP surveys are probably the most appropriate technique for this style of deposit. Very early-time responses from the TEM may assist in mapping faults and contacts, which are possible loci for gold mineralisation. It is also possible that the existing gravity and aeromagnetic data may be similarly useful (see further discussion below).

GEOPHYSICAL SURVEYS

The geophysical surveys which have been carried out, or partly carried out, within E.L. 102/87 are described below under their grid names. The location accuracy of the grids varies considerably: some were surveyed in with theodolite and have straight, parallel lines as shown; others have been approximated by crooked lines in roughly the right position and still others are somewhere in between. Figure 1 shows the grid locations at 1:50,000 scale and Figure 2, at 1:10,000 scale, is the base sheet for the geophysical coverage and anomaly plans; Figures 3 & 4. The surveys have been listed in Table 2 and the references given on the Figures are listed in Table 3. Drill-holes locations are included on these plans, but I have not verified that all holes are plotted.

Results from the more significant surveys have been included with this report. Contour plans have all been reduced to 1:10,000 scale. Several of the figures are indistinct or of poor quality having been copied from faded prints or poor photo-copies.



REGIONAL

Aeromagnetics

All of E.L. 102/87 has been covered by the 1981 Mines Dept survey. This had a nominal line separation of 500m and terrain clearance of 135m. At least some of this area was infilled for Mt Lyell during the survey, giving a 250m line spacing. Despite heavy filtering, the published contour maps show some strong corrugations around Mt Owen due to different flight directions on adjacent lines. To be most useful, the data needs relocating and correcting, however it appears that a record of the raw data, apart from the analogs, no longer exists.

Gravity

Western Tasmania has been surveyed with a regional gravity coverage of 1 station per square km. However there has been considerable detailing around Mt Lyell. This data is available on tape or disc from the Mines Dept. It should be particularly useful for locating the faulted Ordovician-Cambrian contacts beneath the glacial cover in the Comstock Valley and possibly to help determine structure elsewhere on the licence. The Comstock Valley is a most prospective region, since not only does it contain the important Comstock base metal deposits, but may also be host to high-grade copper bodies such as occur in close proximity to the Great Lyell Fault and associated structures.

Airborne Electromagnetics

A trial Input survey of three lines was flown over Mt Lyell in 1975 (Butt, 1975). The survey successfully detected the Prince Lyell ore body and also responded to conductors in the Comstock valley. (See later under Comstock Valley grid.)

There have been three Dighem surveys which lie partially within E.L. 102/87. The eastern boundary of the Henty-Yolande survey (Fraser (1980) and Bishop (1981)) was approximately the Lake Margaret power transmission wires which lie along the north-west boundary of the licence. Most, if not all, flight lines responded to the wires, but no significant anomalies were recorded (see Figure 16). It is worth

* The survey was flown by Geoex; a company which has since folded. I understand that CRA bought Geoex's tape library and they may have a tape of gridded (and filtered) data, as may RGC. (The original data from the survey had been interpreted by Getty Oil which was in joint venture with Mt Lyell. Getty's interests were bought by Little River Gold, but I have been unsuccessful in obtaining other Getty geophysical data from that company.)



noting that the NNE trending line of cultural responses which crosses into E.L. 102/87 at ~5,345,000mN, defines a buried telephone line, evidence of which may not be visible on the ground.

The Lynch Creek survey was also flown at this time (same references), but this area, encompassing the old King River gold mine, was later covered by the Huxley survey.

The Huxley survey ((Peters and Dvorak (1982) and Bishop (1982)) covers the south-west corner of E.L. 102/87. Only one significant response (a 'grade 4' Dighem anomaly) was recorded, however the amplitude levels are very low and the response may be noise. (Bishop (1982) stated that the anomaly was located at ~383,100mE/5,335,600mN. This is somewhat displaced from the position shown in Figure 4 which was taken from a photomosaic. The anomaly lies just within the boundary of the earlier Lynch Creek survey which did not record any confirming response.) This anomaly has given its name to the local geography ('Dighem Ridge'), but has not been followed up geophysically on the ground. (At the time of writing this report, the only copy I have of this data is a dark paper print of a photo-mosaic with EM responses, which will not copy. I am attempting to obtain originals from the Mines Dept which, if successful, can be added to this report as Figure 17.) This early Dighem data has generally poor quality magnetics and the 900Hz signal does not give the same resistivity information as the later 7200Hz surveys.

BEATRICE GRID

This grid was apparently initiated in the early 1970's (Wells, 1972) and approximately two thirds of it lies within E.L. 102/87. The grid was surveyed with gradient array IP and magnetics in 1977 (Howland-Rose, 1977), with follow up surveys in 1979 and 1980 (Howland-Rose, 1979 and Street, 1980). Two separate anomalous zones were defined, one of which was associated with strong base metal geochemical anomalies. Five holes have been drilled which located sub-economic mineralisation: the best hole intersected two metres of ~7.5% combined Pb-Zn. Down-hole IP was carried out down three of the holes. An anomalous zone was recorded at depth (~250m) in DDH MS1 and a similar but shallower response (~70m) in MS2 (Howland-Rose, 1979).

This is an area of particular interest and all of the geophysical data has been included with this report (Figure 5). A deep-penetrating technique such as UTEM is clearly warranted and down-hole EM (DHEM) should be tried down any accessible holes. (The fact that down-hole geophysics has already been carried out gives some encouragement that some of the holes may have remained open.)



COMSTOCK (AMG) GRID

This grid was established for the 1981 gradient array IP and magnetic surveys of the Mt Lyell mine lease (Street, 1981). The northern and western extremities of the grid extend into E.L. 102/87. The broad chargeability anomalies shown on Figure 3 are probably due to weakly disseminated sulphides; whilst the more intense response in the north (to 50+mv/v) is in close proximity to the Zig Zag Hill anomaly (see below). Resistivities are mostly high (1000+ ohm-m), except around the Zig Zag Hill area.

The chargeability, resistivity and magnetic data for this grid are given in Figure 6.

COMSTOCK VALLEY GRID

This grid was surveyed in for the Bureau of Mineral Resources (BMR) in 1964-65, but prior to that the BMR had carried out some equipotential surveys within the Comstock Valley. (This technique 'discovered' three ore bodies at Mt Lyell; see Bishop, 1983a.) The survey coverage extends into E.L. 102/87 (Figure 4), but no anomalies were detected within this region (Webb, 1958).

In 1964-65, the BMR carried out SP, Turam and IP surveys (Williams 1965 & 1966). Large topographic effects were apparently recorded with the SP and this method was discontinued. A number of largely coincident IP and Turam anomalies were recorded. However drilling of three of the responses, which were covered by glacial till, revealed "carbonaceous material in limestone" (Williams, 1969). (These are presumably also the source of the Input responses.)

This area has potential for further Comstock-style base metal deposits, and also for North Lyell-style high grade copper bodies. The latter probably in close proximity to the faulted contact between the volcanics and Ordovician sediments. The conductive conditions revealed by the Turam survey will undoubtedly give rise to unwanted UTEM responses which may mask any real anomalies. Other methods, eg gravity and perhaps magnetics, will be required here to properly determine the structure and geology. Such a study should result in a few areas being defined for further exploration. 'Stratigraphic' drilling with DHEM follow-up may be the most effective approach.

* The Mines Dept does not require details of exploration work done within mine leases. Street (1981) comes under this category and it is unlikely that a copy has been lodged with the Dept.



COPPER ESTATES GRID

This grid, over the old Copper Estates workings, lies mainly within the Mt Lyell mine lease. It was gridded in 1982 for a Turam survey. Details of this survey are given in Bishop (1983b), which deals with mine lease exploration. No significant results were recorded within E.L. 102/87.

GORMANSTON GRID

This grid was established for the BMR to carry out surveys in 1948-49. SP, gravity and magnetics, as well as the equipotential technique were tried (Webb, 1958). Most of this area is underlain by a thick sequence of glacially derived material. A number of equipotential responses were obtained which have been attributed to thick sequences of clays in this area. Topographic effects(?) and/or the clays may be responsible for the SP responses, as indeed they may be for the gravity anomaly. None of these BMR responses are considered to be significant.

Some years ago Mt Lyell attempted a Sirotem survey in this area. Noise levels from the powerlines and from the communication cable to the repeater station on Mt Owen were too high and the survey was aborted. Together with the conductive clays which extend to the north and northeast and the steep slopes of pyritic boulders from the open cut mines, it may be difficult, if not impossible, to effectively survey a large proportion of this area with TEM.

HUXLEY GRIDS (OLD & NEW)

The original grid was cut in the early 1970's and mapped and surveyed with vertical field magnetics (Wells, 1972). Further mapping and sampling was carried out in the 1970's and '80's. The 1982 Dighem survey described above defined one anomaly of possible interest in this area (off the grid) but following a geological inspection which found unprospective looking rocks, this was not pursued.

In 1985 the new grid was cut in and a dipole-dipole IP survey carried out (Bishop, 1985). The results were disappointing, but one anomaly had associated geochemical interest and was drilled. A DHEM survey was carried out down this hole which intersected black shales in a pyritic epiclastic sequence and minor mineralisation (less than 1% combined Pb-Zn). Two samples of core sent for petrophysical measurement showed low resistivity (see Table 1), however they did not respond to the DHEM survey. The survey did respond to casing at the top of the hole, but no other responses were noted (Bishop, 1986).



The reason that an IP survey was carried out rather than TEM may have been that a gold deposit associated with disseminated sulphides may have been a tertiary target (after a North Lyell-style high grade copper deposit or a base metal massive sulphide deposit). The survey covered a large proportion of Ordovician sediments in case the sediments - volcanics contact had an easterly dip. Contours of the averaged chargeability and resistivity and the DHEM profile have been included with this report (Figure 7). It is interesting to note that the hematitic Owen Conglomerate has a generally higher background chargeability (here) than the volcanics.

The limited drilling on the Huxley grid has intersected prospective volcanics, a large proportion of which (at least on the gridded area) are covered by glacial material. The area is highly recommended for a TEM survey. (The rocks are resistive, the cover is thin and also resistive, but there may be a small power line running north-south through the area(?).) Like the IP, any TEM survey coverage should include a wide belt of Owen Conglomerate to adequately cover the possibility of an east-dipping fault. The steep topography will need to be considered when positioning the transmitter loops.

LITTLE OWEN GRID

This grid was established in 1974 (Brophy, 1975) when a gradient array IP survey was carried out (Howland-Rose, 1974). Further work was carried out the following year (Howland-Rose, 1975). Figure 3 shows chargeability anomalies in an area previously investigated by Pickands Mather (see under Roaring Meg grid) and within Mt Lyell's A to P. No zones of interest have been defined within BHP's licence. Results of the IP, resistivity and magnetic surveys over this grid are given in Figure 8.

It is noted that there appear to be no drill-holes or any deep-seated exploration in this area which lies immediately to the south of the Mt Lyell mine.

MINE LEASE (AMG) GRID

This grid was established for the 1981 gradient array and magnetic surveys of the Mt Lyell mine lease (Street, 1981: this report deals with the Mt Lyell mine lease and thus a copy has probably not been sent to the Mines Dept). The western extremities of the lines extend into E.L. 102/87 to the west of the East Queen River and at the northern end of the Roaring Meg grid. The broad, low value chargeability responses are probably due to disseminated pyrite within the volcanics. The higher responses immediately to the south of



E.L. 102/87 may be associated with the 'Burke' Ag-Pb prospect(?). The IP, resistivity and magnetic results are given in Figure 9.

MT ELLAN GRID

This grid was established in 1985 for geochemical sampling (FitzGerald & Pease, 1985). No geophysical surveys have been carried out.

NORTH QUEEN GRID

I have no reference for this grid. It may however have been wrongly labelled (in FitzGerald's 1:5,000 series of geophysical plans of the Mt Lyell mine lease). And it may be the West Queen grid referenced in FitzGerald & Cartwright (1986) -this has not been checked). Whatever, it has apparently had no geophysical surveys carried out over it.

NORTH QUEEN LINE

The North Queen line consists of one line of reconnaissance dipole-dipole IP, carried out for Pickands Mather in 1968 (Wuerch, 1971). Minor anomalies were recorded by the 152m (500ft) dipole spacing survey. The results are given in Figure 10.

ROARING MEG GRID

This large grid was established in the mid 1960's by Pickands Mather. The lines were mapped and sampled and surveyed with magnetics, EM and IP in 1966-67 (Smith, 1967). The five drill-holes within the area recommended for relinquishment(?) were Pickands Mather holes (see Figure 1).

The drilled area is apparently anomalous for IP. Smith (1967) refers to five lines of IP, but only three profiles have been found and presented here (Figure 11). Although there are some 'bumps' on the horizontal loop EM profiles, these are probably of little relevance to an area being re-surveyed with TEM and this data, together with the vertical field magnetics has not been included in this report.

ROARING MEG LINE

This long reconnaissance line of along-strike IP was carried out for Pickands Mather in 1968 (Wuerch, 1971). The line was located along the southern extension of the Great Lyell Fault, with Mt Lyell-style deposits, the exploration target. None of the IP anomalies marked on Figure 3 have



corresponding low resistivities* and thus none are considered to be caused by potentially economic sulphide bodies. However these results may be of interest for gold. (The accuracy of the Roaring Meg Line in tracing out the Great Lyell Fault, parts of which are covered by glacial till or scree, has not been checked.) The IP results are given in Figure 12.

TASMAN CROWN LYELL GRID

This grid was established by Rio Tinto Australia Exploration (RTAE) Ltd in about 1958 and is referred to in their reports as the Comstock or Lyell Comstock area. The name given here has been taken from a compilation by FitzGerald of Mt Lyell mine lease surveys. Part of the grid remains within that lease.

The grid has been surveyed with Turam, gravity and later, IP (McCarthy and Pinney, 1962). (McCarthy and Pinney give results for Turam and IP, but no reference for gravity. However gravity profiles are in RTAE plan no. T499.) Significant responses were recorded by the Turam: although no encouragement was obtained from the gravity, a number of lines were run with IP and this also produced some associated anomalies. This grid was later covered by the BMR's Comstock Valley grid (see above) and similar results were obtained with their Turam and IP surveys. The comments made about the Comstock Valley grid also apply here: the area is particularly prospective but difficulties may arise in interpretation of TEM surveys, possibly due to conductive surface conditions and certainly due to sub-surface conductors.

TOFFT GRID

This grid has had no geophysics, but was established in the mid 1980's for geochemical sampling (FitzGerald & Cartwright 1986).

SEDGWICK LINE

Like the Roaring Meg Line, this consists of a single line of along-strike dipole-dipole IP, carried out for Pickands Mather in the late 1960's to test for mineralisation along the northern end of the Great Lyell Fault (Wuerch, 1971). Pickands Mather maps indicate that IP was also carried out

* The early McPhar IP profiles commonly presented the data as a metal factor pseudosection ($=PFEx1000/\rho$) with a mirror-image resistivity pseudosection using units of (ohm-ft/ 2π). To convert to ohm-m, multiply by 1.92



on the orthogonal lines 63N and 93N, but I have not seen any results (data does exist for detailing of other lines further to the north). The IP profile for the Sedgwick Line is given in Figure 13 and like its southern counterpart, it contains a number of chargeability responses which are probably caused by disseminated pyrite. These may have some potential for a structurally controlled gold-pyrite deposit. The accuracy of this line relative to the Fault has not been checked, but if the lines of the Zig Zag Hill grid cross the Fault, then the Sedgwick Line may be some distance from it.

WEST SEDGWICK GRID

This grid was established by Mt Lyell in the early 1970's and has been surveyed with gradient array IP (Howland-Rose, 1973) with a number of extensions (Howland-Rose, 1975 and Howland-Rose, 1977). Down-hole IP has been carried out down DDH-WS3 (Howland-Rose, 1978). (WS3 intersected an unmineralised black shale -WS1 & 2 intersected minor pyrite). The chargeability, resistivity, down-hole IP and magnetic contours are given in Figure 14.

This grid overlies prospective volcanics which are partly covered by glacial till. Apart from limited drilling, there has been no deep exploration. As with other areas mentioned above, this region warrants a deep-penetrating survey such as UTEM and in common with the other areas, care must be taken when placing loops because of the steep topography and possibly conductive (and hence potentially shielding) black shales.

ZIG ZAG HILL GRID

This grid was put in by RTAE in the late 1950's and called the 'West Sedgwick' grid. It was renamed in FitzGerald's mine lease compilation to avoid confusion with Mt Lyell's subsequent grid of the same name. The grid covers the Great Lyell Fault with a series of across-strike lines. All of the grid was covered by Turam and two anomalous areas were covered with gravity, with disappointing results (Boniwell, 1958 and Boniwell, 1959). The larger Turam anomaly was later surveyed with IP, with close but non-coincident responses being observed (McCarthy and Pinney, 1962).

The major Turam anomaly was later re-surveyed by Gold Fields with fixed loop Sirotem using three lines of the Comstock (AMG) grid. Two weak responses were interpreted (Staltari, 1986) and these were drilled with disappointing results. The EM responses were ascribed to permeable zones of the Sedgwick Fault intersected by the hole (WS4). Due to the lack of any encouragement, no DHEM survey was carried out. The Sirotem profiles have been included in this report under Figure 15.



CONCLUSIONS AND RECOMMENDATIONS

This compilation of geophysical surveys within E.L. 102/87 has shown that there are a number of areas with a high density of data and other areas, of supposedly prospective host rocks, with little if any data. Some areas, eg the volcanics at the eastern end of Mt Lyell, have apparently received no attention at all. Apart from the very few areas with multiple drill-holes, no region has had more than the near-surface explored.

The aim of this compilation was not to ascertain whether all of the previous geophysics responses have been adequately explained (it is quite likely they haven't -but it is also likely that none are due to an undiscovered orebody). Rather, the study has shown which areas are of interest; eg, the chargeable areas within the Beatrice and West Sedgwick grids, and which areas are likely to prove difficult for further (thorough) exploration; eg, the Comstock and Linda Valleys. (The latter especially in the region around Gormanston.)

The Comstock Valley is of particular exploration interest, since it hosts the Comstock base metal deposits and is largely covered with glacial till. The north striking Great Lyell Fault and associated cross-faulting structures defining the contact between the Ordovician sediments and Cambrian volcanics have not been located at the eastern end of this valley. Since the richer Mt Lyell copper deposits occur in close proximity to this contact, their location and exploration should be given some priority.

I understand that BHP's main exploration strategy within the E.L. will be fixed loop TEM and make the following comments. I believe that covering all of the volcanics, rather than merely those areas perceived to be altered or of the 'right' rock type is worthwhile. Outcrop in western Tasmania is often poor; rock types cannot be extrapolated over long distances and structure is usually poorly understood, if at all. Thus overall coverage of a deep-penetrating exploration technique makes good sense. However, fixed loop TEM is unlikely to be effective everywhere. For example, there are a number of powerlines within the licence and these invariably have a ribbon of ground around them where no useful signal can be obtained. In places, responses from black shales will require 'opposite-side' loop positions to make sure that a massive sulphide deposit has not been shielded by the shales. I am not sure how much to make of the TEM tests mentioned at the beginning of this report (Bishop and Lewis, 1988a) where four fixed loop systems (EM37, Sirotem, UTEM and Zonge) failed to respond to sub-economic sulphides, but where CSAMT (and galvanic Turam) gave excellent results. In areas of multiple conductors, CSAMT may provide better resolution(?). If a significant proportion of the E.L. is too (electrically) noisy for TEM, then frequency domain EM (FEM) should be considered. Even five

* Given enough warning, the HEC is often able, and willing, to turn off these power lines.



frequency Turam systems of the early 1970's, going down to ~35Hz, though slow, are capable of good penetration. Other more recent developments (eg, Geoprobe) are capable of 500m+. (There may still be a region of 'no signal' beneath the powerline, but this should be much narrower than that for TEM.) In areas of particular interest (with or without TEM responses), a series of spaced, deep holes with follow-up DHEM surveys can be an effective and thorough exploration approach.

Returning to the previous geophysical surveys, the exploration strategy employed by RTAE; namely Turam over areas of geological or geochemical interest, with follow up by gravity was, I think, very sound. However the lack of any gravity responses from their surveyed areas (especially the Comstock Valley) should not be taken as conclusive evidence for the absence of massive sulphides since these surveys, which were almost certainly not terrain corrected, were mostly only designed to detect relatively shallow bodies. A thorough analysis of the recently acquired and properly corrected Mines Dept gravity data should provide answers to major structural problems which may provide a key to locating further Mt Lyell type deposits.

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REFERENCES

- Bishop, J.R., 1981. A reinterpretation of the Dighem surveys over the Henty-Yolande, Selina and Lynch Creek areas. Mitre Geophysics report MG81/07 for Mt Lyell.
- Bishop, J.R., 1982. A reinterpretation of the Dighem surveys over the Huxley and Bird River areas. Mitre Geophysics report MG82/09 for Mt Lyell.
- Bishop, J.R., 1983a. Geophysics of the Mt Lyell mining field. In: abstracts of the third ASEG conference, Brisbane.
- Bishop, J.R., 1983b. A report on the 1982 geophysical surveys of the Mt Lyell mining field. Mitre Geophysics report 83/06 for Mt Lyell.
- Bishop, J.R., 1985. Interpretation of the Huxley IP survey (EL 9/66). Mitre Geophysics report MG85/07 for Gold Fields.
- Bishop, J.R., 1986. Interpretation of DHEM surveys within E.L. 9/66. Mitre Geophysics report to Gold Fields.
- Bishop, J.R. and Lewis, R.J.G., 1988a. The application of geophysics on the west coast of Tasmania. ASEG conference abstracts: 19, 235-236.
- Bishop, J.R. and Lewis, R.J.G., 1988b. Geophysical signatures of west coast mineralisation. MRV project: Tas. Mines Dept report (in prep).
- Boniwell, J.B., 1958. Geophysical investigations -West Sedgwick area. RTAE report.
- Boniwell, J.B., 1959. Gravity survey, Lyell Sedgwick. Addendum to Geophysical surveys, West Sedgwick area (Boniwell, 1958).
- Brophy, P., 1975. Annual report on E.L. 10/69 (Dora-Huxley). Mt Lyell company report.
- Butt, G.R., 1975. Evaluation report, airborne electromagnetic test survey, Barringer 'Input' system in the Queenstown area. Geoterrex report (83-259) for Mt Lyell.
- FitzGerald, F.G. and Cartwright, A.J., 1986. E.L. 9/66 Tyndall area, annual report 1985-86 for parts 2, 3 & 4. Gold Fields company report.
- FitzGerald, F.G. and Pease, C.F.D., 1985. E.L. 9/66, Tyndall area, annual report 1984/85. Gold Fields company report.



- Fraser, D.C., 1981. Contour map presentation of dipole-dipole IP data. *Geophysical Prospecting* 29, 639-651.
- Howland-Rose, A.W., 1973. Final report on a gradient array electrical induced polarisation survey over the West Sedgwick (Lake Margaret) grid. Scintrex report Tas-018B for Mt Lyell (3 vols).
- Howland-Rose, A.W., 1974. Report on gradient and Schlumberger array electrical induced polarisation surveys over the Little Owen (Dora-Huxley) grid. Scintrex report Tas-018A for Mt Lyell.
- Howland-Rose, A.W., 1975. A report on extension electrical induced polarisation surveys over the West Sedgwick, Little Owen and Tyndall grids. Scintrex report Tas-025C for Mt Lyell.
- Howland-Rose, A.W., 1977a. A report on further extension to, and detail within the West Sedgwick (Lake Margaret) grid. Scintrex report Tas-035B for Mt Lyell.
- Howland-Rose, A.W., 1977b. A report on reconnaissance electrical induced polarisation and total field magnetic surveys over the Beatrice grid. Scintrex report Tas-035D for Mt Lyell (2 vols).
- Howland-Rose, A.W., 1978. Comments on "at-hole" down-hole EIP and resistivity logs down various drill holes. Scintrex report Tas-054E for Mt Lyell.
- Howland-Rose, A.W., 1979. A report on electrical geophysical surveys over the Beatrice grid. Scintrex report Tas-062A for Mt Lyell.
- McCarthy, E. and Pinney, R., 1962. IP survey, West Sedgwick in West Tasmania (pt 1). RTAE report.
- McCarthy, E. and Pinney, R., 1962. IP survey in Lyell Comstock area in West Tasmania (Pt 2). RTAE report.
- Smith, H.D., 1967. Exploration report. Geological investigations in the Queenstown area. Pickands Mather report.
- Staltari, G., 1986. Zig Zag Hill area Sirotem. GEC report for Gold Fields.
- Street, G.J., 1980. A report on electrical induced polarisation detail and magnetic surveys over the Beatrice grid. Scintrex report Tas-073C for Mt Lyell.
- Street, G.J., 1981. Report on electrical induced polarisation and magnetic field surveys over the Mine and Comstock grids. Scintrex report Tas-082 for Mt Lyell.



- Webb, J.E., 1958. Geophysical survey at Mt Lyell, Queenstown, 1948-49. BMR record 1958/111.
- Wells, K., 1972. Annual report on E.L. 10/69 (Dora-Huxley). Mt Lyell company report.
- Williams, J.P., 1965. Comstock area (Queenstown) geophysical survey, Tasmania, 1965. BMR preliminary record 1965/151.
- Williams, J.P., 1966. Comstock area geophysical survey, Queenstown, 1965. BMR record 1966/103.
- Williams, J.P., 1969. Comstock and Cape Horn areas, Queenstown, Tasmania -drilling results, bore logging and geophysical interpretation. BMR record 1969/121.
- Wuerch, H.V., 1971. Basin Lake Prospect, Tas E.L. 12/65. Pickands Mather report.



Table 1
HUXLEY GRID
PETROPHYSICAL MEASUREMENTS

Samples: Core from DDH HX1.

Measured by: Prof. D.W. Emerson, Uni. of Sydney.

Date: Feb., 1986.

SAMPLE No.	DEPTH (m)	MAGNETIC SUSCEPTIBILITY cgs x 10 ⁻⁶	POROSITY (%)	DRY BULK DENSITY t/c.m.	RESISTIVITY [*] ohm-m	RESISTIVITY [#] ohm-m	IP EFFECT [@] milliradians	PETROLOGY
23/1	139.3	30 - 40	0.5	2.78	4.8-6.2	151 ¹ 275 ²	25 ¹ 105 ²	black shales
23/2	176.1	15 - 40	0.5	2.80	3.1-9.2	88 ¹ 195 ²	7 ¹ 80 ²	black shales

Note the discrepancies between measuring the resistivity galvanically (ie, as in IP) and inductively (ie, as in EM).

* measured inductively at 2.5 MHz.

measured galvanically at 0.1 Hz.

@ The parameter measured is phase angle. 1mr is approximately equivalent to 1mv/v (and approximately equal to 1/6 PFE).

1 measured with a 4 electrode scan of sample surface.

2 repeat measurement with 4 electrode scan of core ends.



Table 2

SURVEY DETAILS

This table lists the geophysical surveys carried out within E.L. 102/87 and gives the references as written on the compilation plans.

REGIONAL

Gravity: covers all of E.L. -not shown on plans (data with Tas Mines Dept).

Aeromagnetics: covers all of E.L. -not shown on plans (data with Tas Mines Dept).

Input: Three test lines of Barringer Mark V Input EM (G.-'75).

Dighem: Three separate surveys (MG81/07, MG82/09).

BEATRICE GRID: IP, down-hole IP, magnetics and Schlumberger resistivity soundings (Tas-035D, Tas-062A, Tas-073C).

COMSTOCK (AMG) GRID: IP, magnetics (Tas-082).

COMSTOCK VALLEY GRID: Turam, IP, SP, EP (BMR-'58, BMR-'66).

COPPER ESTATES GRID: Turam (MG83/06).

GORMANSTON GRID: EP, SP, gravity (BMR-'58).

HUXLEY GRID (NEW): IP, DHEM (MG85/07, MG-'86).

LITTLE OWEN GRID: IP, magnetics (Tas-018A, Tas-025C).

MINE LEASE (AMG) GRID: IP, magnetics (Tas-082).

MT ELLEN GRID: no geophysical surveys.

NORTH QUEEN GRID: no geophysical surveys.

NORTH QUEEN LINE: IP (P.M.-'71).



ROARING MEG GRID: Horizontal loop EM, IP, magnetics (P.M.-'67).

ROARING MEG LINE: IP (P.M.-'71).

TASMAN CROWN LYELL GRID: Turam, gravity, IP (RTAE-'62, RTAE-59B).

TOFFT GRID: no geophysical surveys.

SEDGWICK LINE: IP (P.M.-'71).

WEST SEDGWICK GRID: IP, down-hole IP (Tas-018B, Tas-025C, Tas-035B, Tas-054E).

ZIG ZAG HILL GRID: Turam, gravity, IP, TEM (RTAE-'58, RTAE-'59A, RTAE-'62, GEC-'86).



Table 3

PLAN REFERENCES

This table lists the references given on the geophysical compilation plans for E.L. 102/87.

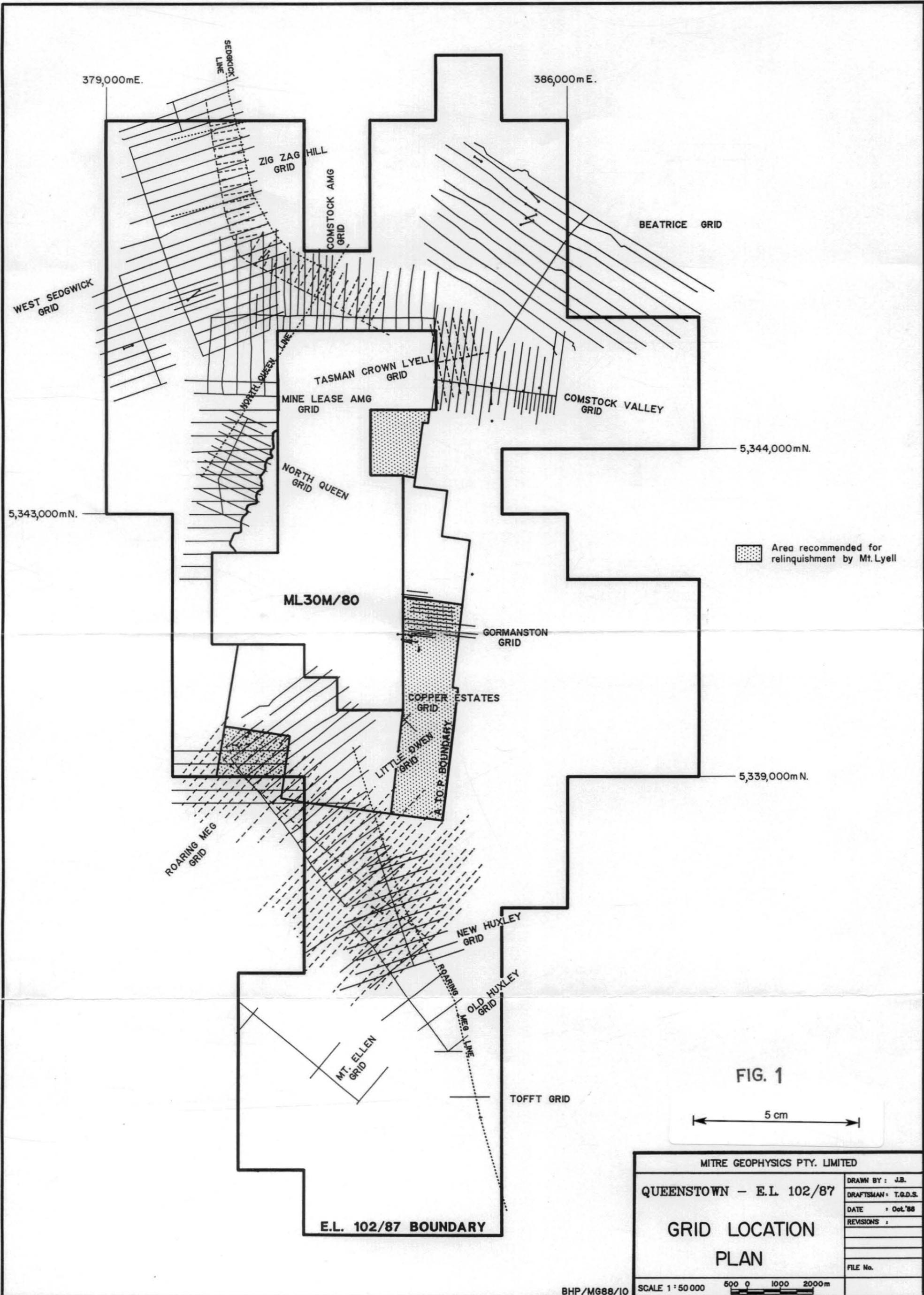
- BMR-'58:** Webb, J.E., 1958. Geophysical survey at Mt Lyell, Queenstown, 1948-49. BMR record 1958/111.
- BMR-'66:** Williams, J.P., 1966. Comstock area geophysical survey, Queenstown, 1965. BMR record 1966/103.
- G-'75:** Butt, G.R., 1975. Evaluation report, airborne electromagnetic test survey, Barringer 'Input' system in the Queenstown area. Geoterrex report (83-259) for Mt Lyell.
- GEC-'86:** Staltari, G., 1986. Zig Zag Hill area Sirotem. GEC report for Gold Fields.
- MG81/07:** Bishop, J.R., 1981. A reinterpretation of the Dighem surveys over the Henty-Yolande, Selina and Lynch Creek areas. Mitre Geophysics report MG81/07 for Mt Lyell.
- MG82/09:** Bishop, J.R., 1982. A reinterpretation of the Dighem surveys over the Huxley and Bird River areas. Mitre Geophysics report MG82/09 for Mt Lyell.
- MG83/06:** Bishop, J.R., 1983. A report on the 1982 geophysical surveys of the Mt Lyell mining field. Mitre Geophysics report MG83/06 for Mt Lyell.
- MG85/07:** Bishop, J.R., 1985. Interpretation of the Huxley IP survey (EL 9/66). Mitre Geophysics report MG85/07 for Gold Fields.
- MG-'86:** Bishop, J.R., 1986. Interpretation of DHEM surveys within E.L. 9/66. Mitre Geophysics report to Gold Fields.



- P.M.-'67:** Smith, H.D., 1967. Exploration report. Geological investigations in the Queenstown area. Pickands Mather report.
- P.M.-'71:** Wuerch, H.V., 1971. Basin Lake Prospect, Tas E.L. 12/65. Pickands Mather report.
- RTAE-'58:** Boniwell, J.B., 1958. Geophysical investigations - West Sedgwick area. RTAE report.
- RTAE-'59A:** Boniwell, J.B., 1959. Gravity survey, Lyell Sedgwick. Addendum to Geophysical surveys, West Sedgwick area (Boniwell, 1958).
- RTAE-59B:** Gravity profiles Comstock area (Tasman Crown Lyell grid). RTAE map no. T499.
- RTAE-'62A:** McCarthy, E. and Pinney, R., 1962. IP survey, West Sedgwick in West Tasmania (pt 1). RTAE report.
- RTAE-'62B:** McCarthy, E. and Pinney, R., 1962. IP survey in Lyell Comstock area in West Tasmania (Pt 2). RTAE report.
- Tas-018A:** Howland-Rose, A.W., 1974. Report on gradient and Schlumberger array electrical induced polarisation surveys over the Little Owen (Dora-Huxley) grid. Scintrex report Tas-018A for Mt Lyell.
- Tas-018B:** Howland-Rose, A.W., 1973. Final report on a gradient array electrical induced polarisation survey over the West Sedgwick (Lake Margaret) grid. Scintrex report Tas-018B for Mt Lyell (3 vols).
- Tas-025C:** Howland-Rose, A.W., 1975. A report on extension electrical induced polarisation surveys over the West Sedgwick, Little Owen and Tyndall grids. Scintrex report Tas-025C for Mt Lyell.
- Tas-035B:** Howland-Rose, A.W., 1977. A report on further extension to, and detail within the West Sedgwick (Lake Margaret) grid. Scintrex report Tas-035B for Mt Lyell.



- Tas-035D:** Howland-Rose, A.W., 1977. A report on reconnaissance electrical induced polarisation and total field magnetic surveys over the Beatrice grid. Scintrex report Tas-035D for Mt Lyell (2 vols).
- Tas-054E:** Howland-Rose, A.W., 1978. Comments on "at-hole" down-hole EIP and resistivity logs down various drill holes. Scintrex report Tas-054E for Mt Lyell.
- Tas-062A** Howland-Rose, A.W., 1979. A report on electrical geophysical surveys over the Beatrice grid. Scintrex report Tas-062A for Mt Lyell.
- Tas-073C:** Street, G.J., 1980. A report on electrical induced polarisation detail and magnetic surveys over the Beatrice grid. Scintrex report Tas-073C for Mt Lyell.
- Tas-082:** Street, G.J., 1981. Report on electrical induced polarisation and magnetic field surveys over the Mine and Comstock grids. Scintrex report Tas-082 for Mt Lyell.



Area recommended for relinquishment by Mt. Lyell

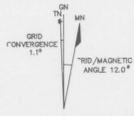
FIG. 1

5 cm

MITRE GEOPHYSICS PTY. LIMITED	
QUEENSTOWN - E.L. 102/87	DRAWN BY : J.B.
GRID LOCATION PLAN	DRAFTSMAN : T.G.D.S.
	DATE : Oct '88
	REVISIONS :
	FILE No.

BHP/M688/10 SCALE 1 : 50 000 500 0 1000 2000m

693026



693027
5 cm

MITRE GEOPHYSICS PTY. LIMITED	
QUEENSTOWN - E.L. 102/87 (NORTH)	
LOCATION PLAN GEOPHYSICAL GRIDS	
SCALE 1 : 10000	FIG. 2A
DRAWN BY : DRAFTSMAN : T.G.D.S. DATE : Oct, '88 REVISIONS : FILE No.	02_4798 <small>A Company of Geophysical Surveys with E.L. BHP-Utah Minerals International, Mine Geophysics Pty. Limited, Brisbane, Q.L.D.</small>

THE MOUNT LYELL MINING & RAILWAY COMPANY LIMITED
ML30M/80

GORMANSTON
GRID

COPPER ESTATES
GRID

MINE LEASE
AMG GRID

LITTLE OWEN
GRID

ROARING MEG
GRID

NEW HUXLEY
GRID

OLD HUXLEY
GRID

MT. ELLEN
GRID

TOFFT GRID

E.L. 102/87 BOUNDARY

69302S

5 cm

MITRE GEOPHYSICS PTY. LIMITED	
QUEENSTOWN - E.L. 102/87 (SOUTH)	
LOCATION PLAN GEOPHYSICAL GRIDS	DRAWN BY : DRAFTSMAN : T.G.D.S. DATE : Oct 88 REVISIONS : FILE No.
SCALE 1 : 10000	FIG. 2B

02_4798

A Corporation of Geophysical Surveys within E.L.
102/87
102/87
Borough of J.R.
E.L.102/87

LEGEND (WEST SEDGWICK GRID)

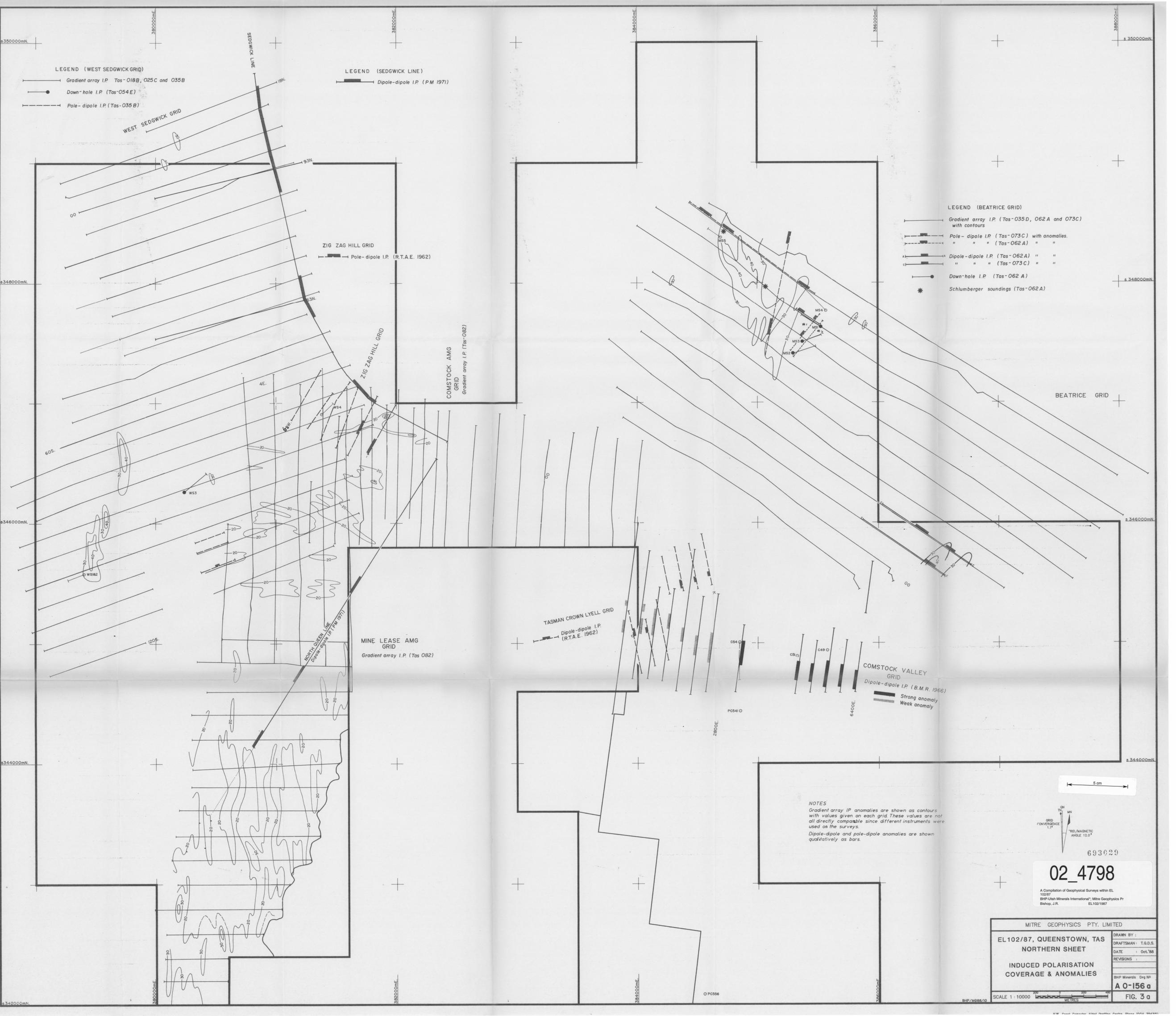
- Gradient array I.P. (Tas-018B, 025C and 035B)
- Down-hole I.P. (Tas-054E)
- - - Pole-dipole I.P. (Tas-035B)

LEGEND (SEGWICK LINE)

- Dipole-dipole I.P. (P.M. 1971)

LEGEND (BEATRICE GRID)

- Gradient array I.P. (Tas-035D, 062A and 073C) with contours
- Pole-dipole I.P. (Tas-073C) with anomalies
- Pole-dipole I.P. (Tas-062A) " "
- Dipole-dipole I.P. (Tas-062A) " "
- Dipole-dipole I.P. (Tas-073C) " "
- Down-hole I.P. (Tas-062A)
- * Schlumberger soundings (Tas-062A)



ZIG ZAG HILL GRID
Pole-dipole I.P. (R.T.A.E. 1962)

COMSTOCK AMG
GRID
Gradient array I.P. (Tas-062)

NORTH QUEEN LINE
Dipole-dipole I.P. (P.M. 1971)

MINE LEASE AMG
GRID
Gradient array I.P. (Tas 082)

TASMAN CROWN LYELL GRID
Dipole-dipole I.P. (R.T.A.E. 1962)

COMSTOCK VALLEY
GRID
Dipole-dipole I.P. (B.M.R. 1966)
Strong anomaly
Weak anomaly

NOTES
Gradient array IP anomalies are shown as contours with values given on each grid. These values are not all directly comparable since different instruments were used on the surveys.
Dipole-dipole and pole-dipole anomalies are shown qualitatively as bars.



02_4798

A Compilation of Geophysical Surveys within EL 102/87 BHP-Utah Minerals International, Mitre Geophysics Pty Bishop, J.R. EL102/1967

MITRE GEOPHYSICS PTY. LIMITED	
EL 102/87, QUEENSTOWN, TAS NORTHERN SHEET	
INDUCED POLARISATION COVERAGE & ANOMALIES	
SCALE 1 : 10000	FIG. 3 a
DRAWN BY :	DRAFTSMAN - T.G.D.S.
DATE : Oct '88	REVISIONS :
BHP Minerals Drg No	A 0-156 a

THE MOUNT LYELL MINING & RAILWAY COMPANY LIMITED
ML30M/80

MINE LEASE AMG GRID
Gradient array I.P.
Tas-082

MINE LEASE
AMG GRID

ROARING MEG
GRID
Dipole-dipole I.P.
(PM - 1967)

LITTLE OWEN
GRID
Gradient array I.P. (Tas OIBA @ 025C)

NEW HUXLEY GRID
Dipole-dipole I.P. (MG B5/07)
Contours are averaged chargeabilities

ROARING MEG LINE
Dipole-dipole I.P. (PM 1967)

E.L. 102/87 BOUNDARY

A TO P BOUNDARY

NOTES
Gradient array IP anomalies are shown as contours
with values given on each grid. These values are not
all directly comparable since different instruments were
used on the surveys.
The Huxley dipole-dipole IP anomalies are shown as
averaged chargeabilities, the remaining dipole-dipole
responses are shown qualitatively as bars.

693630

5 cm

02_4798

A Compilation of Geophysical Surveys with EL
102/87
BHP-Utah Minerals International, Mitre Geophysics Pt
Bishop, J.R. EL102/1987

MITRE GEOPHYSICS PTY. LIMITED

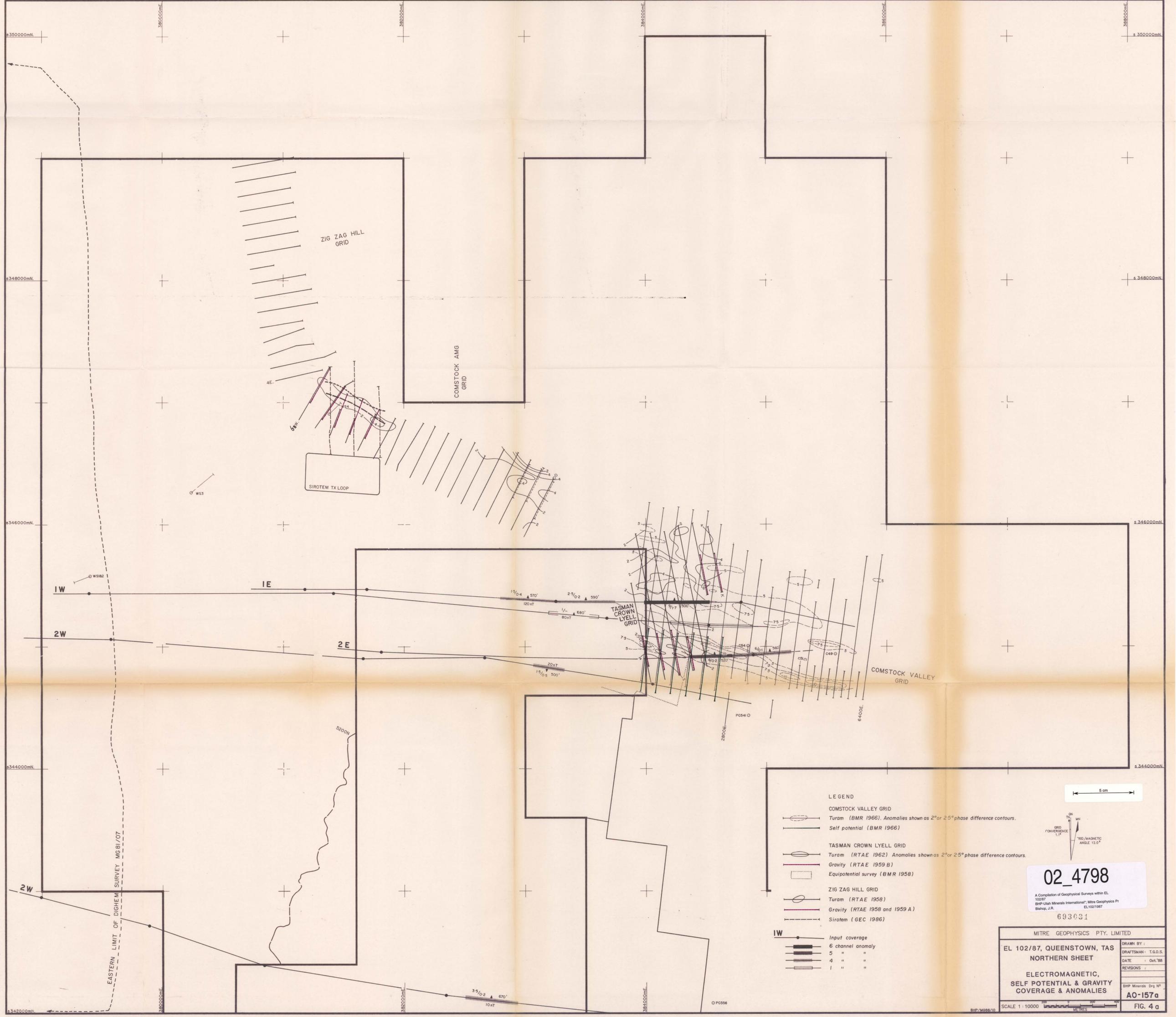
EL 102, QUEENSTOWN, TAS
SOUTHERN SHEET

INDUCED POLARISATION
COVERAGE & ANOMALIES

SCALE 1:10000

0 200 400 METRES

DRAWN BY :
DRAFTSMAN : T.G.D.S.
DATE : Oct '88
REVISIONS :
BHP Minerals Drg No
AO-156 b
FIG. 3 b



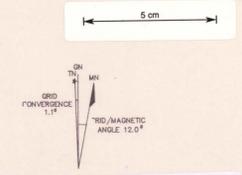
LEGEND

COMSTOCK VALLEY GRID
 Turam (BMR 1966). Anomalies shown as 2° or 2.5° phase difference contours.
 Self potential (BMR 1966)

TASMAN CROWN LYELL GRID
 Turam (RTAE 1962) Anomalies shown as 2° or 2.5° phase difference contours.
 Gravity (RTAE 1959 B)
 Equipotential survey (BMR 1958)

ZIG ZAG HILL GRID
 Turam (RTAE 1958)
 Gravity (RTAE 1958 and 1959 A)
 Sirotem (GEC 1986)

IW
 Input coverage
 6 channel anomaly
 5 " "
 4 " "
 1 " "



02_4798
 A Compilation of Geophysical Surveys within EL 102/87
 BHP-Utah Minerals International, Mitre Geophysics Pr
 Bishop, J.R.
 693031

MITRE GEOPHYSICS PTY. LIMITED

**EL 102/87, QUEENSTOWN, TAS
 NORTHERN SHEET**

**ELECTROMAGNETIC,
 SELF POTENTIAL & GRAVITY
 COVERAGE & ANOMALIES**

SCALE 1:10000

DRAWN BY :
 DRAFTSMAN : T.G.O.S.
 DATE : Oct '88
 REVISIONS :
 BHP Minerals Drg No
AO-157a
FIG. 4a

THE MOUNT LYELL MINING & RAILWAY COMPANY LIMITED
ML30M/80

GORMANSTON
GRID

- LEGEND
- Self potential (BMR 1958) with 100 mV contour.
 - Gravity (BMR 1958) with 1 mgal residual contour.
 - Equipotential survey boundary (BMR 1958) with anomalies.

COPPER ESTATES
GRID
Turam (MG 83/06)

A TO P BOUNDARY

M1 Owen

ROARING MEG
GRID
Horizontal loop EM
(PM 1967)

Drill hole EM
(MG 1986)

LIMIT OF LYNCH CREEK DIGHEM SURVEY MG 81/07

(DIGHEM ANOMALY MG 82/09)

EASTERN LIMIT
HUXLEY DIGHEM SURVEY
MG 82/09

E.L. 102/87 BOUNDARY

NOTES

Turam response shown as 2.5° phase difference contour.
Self potential responses shown as -100mV contours.
Gravity response shown as 1mgal residual contour.
Equipotential anomalous areas are circled.
Horizontal loop EM (Roaring Meg Grid) responses not shown.
DigheM anomaly from Huxley Survey.

693032

5 cm

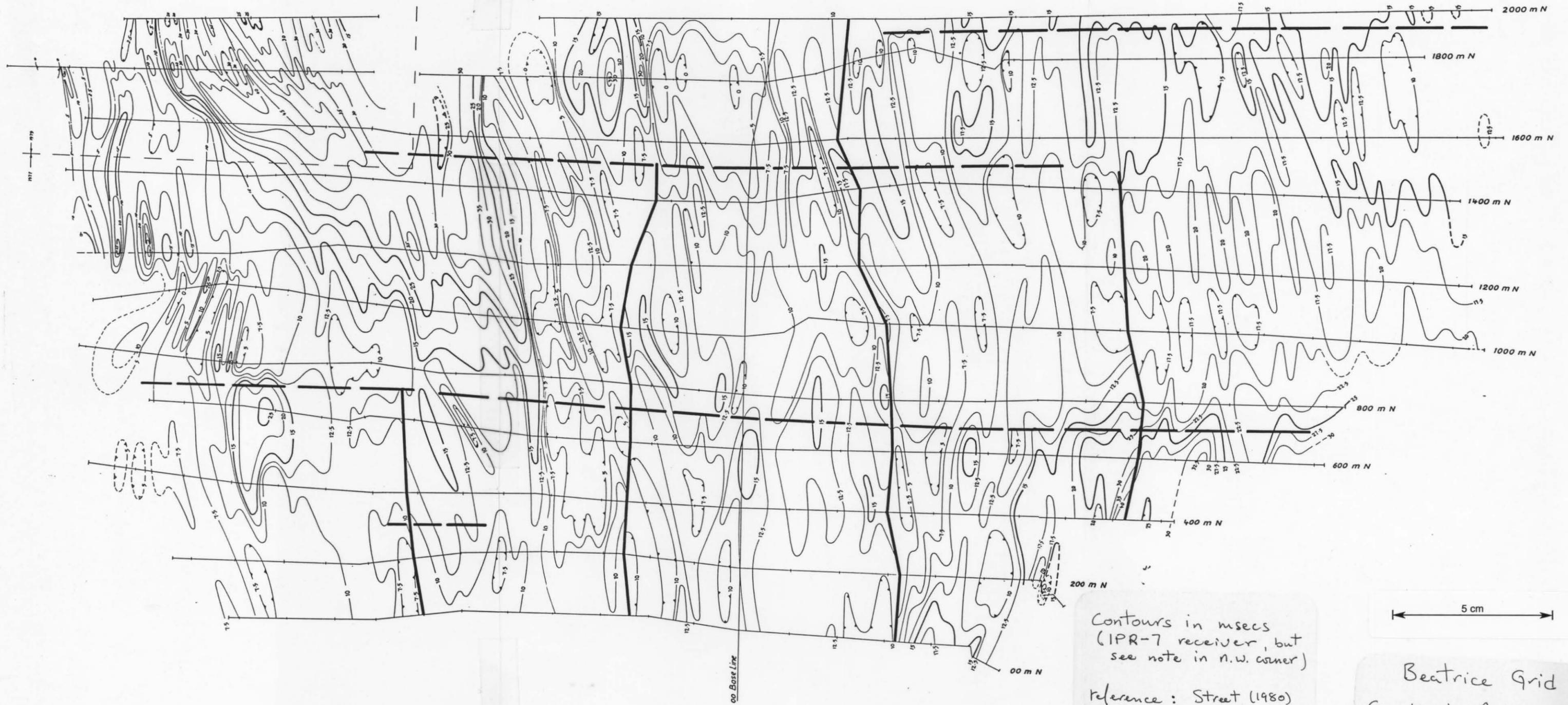
02_4798

A Compilation of Geophysical Surveys within EL
102/87
BHP-Utah Minerals International, Mitre Geophysics Pty
Bishop, J.R. EL102/1987

MITRE GEOPHYSICS PTY. LIMITED	
EL102/87, QUEENSTOWN, TAS SOUTHERN SHEET	DRAWN BY: DRAFTSMAN: T.G.D.S. DATE: Oct '88 REVISIONS:
ELECTROMAGNETIC, SELF POTENTIAL & GRAVITY COVERAGE & ANOMALIES	BHP Minerals Drp No AO-157b
SCALE 1:10000	FIG. 4b

(1980)
NOTE: 1979 work read in millivolts per volt
but adjusted to correspond with
original contours (in milliseconds)

1979
1980



Contours in msec
(IPR-7 receiver, but
see note in n.w. corner)

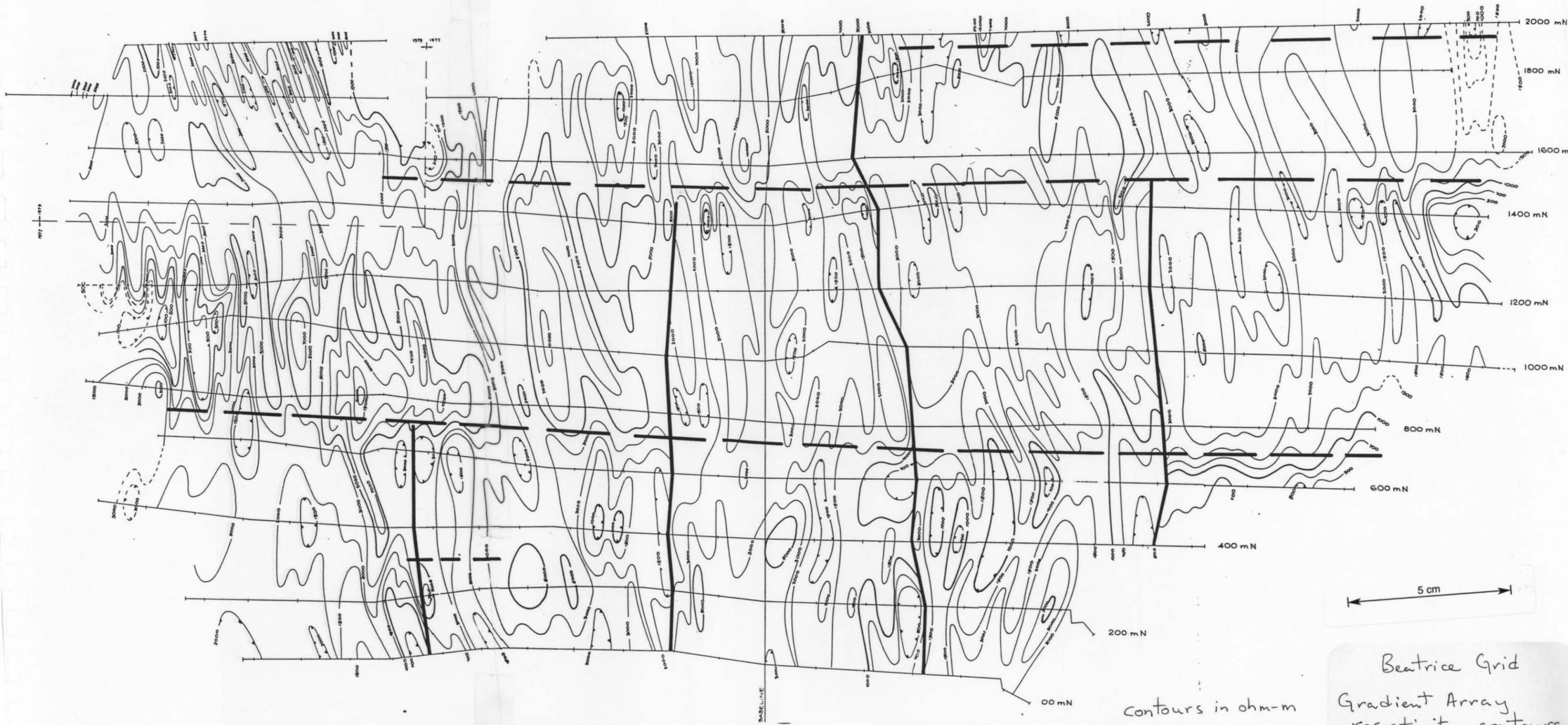
reference: Street (1980)
Tas-073c

5 cm

Beatrice Grid
Gradient Array
chargeability contours

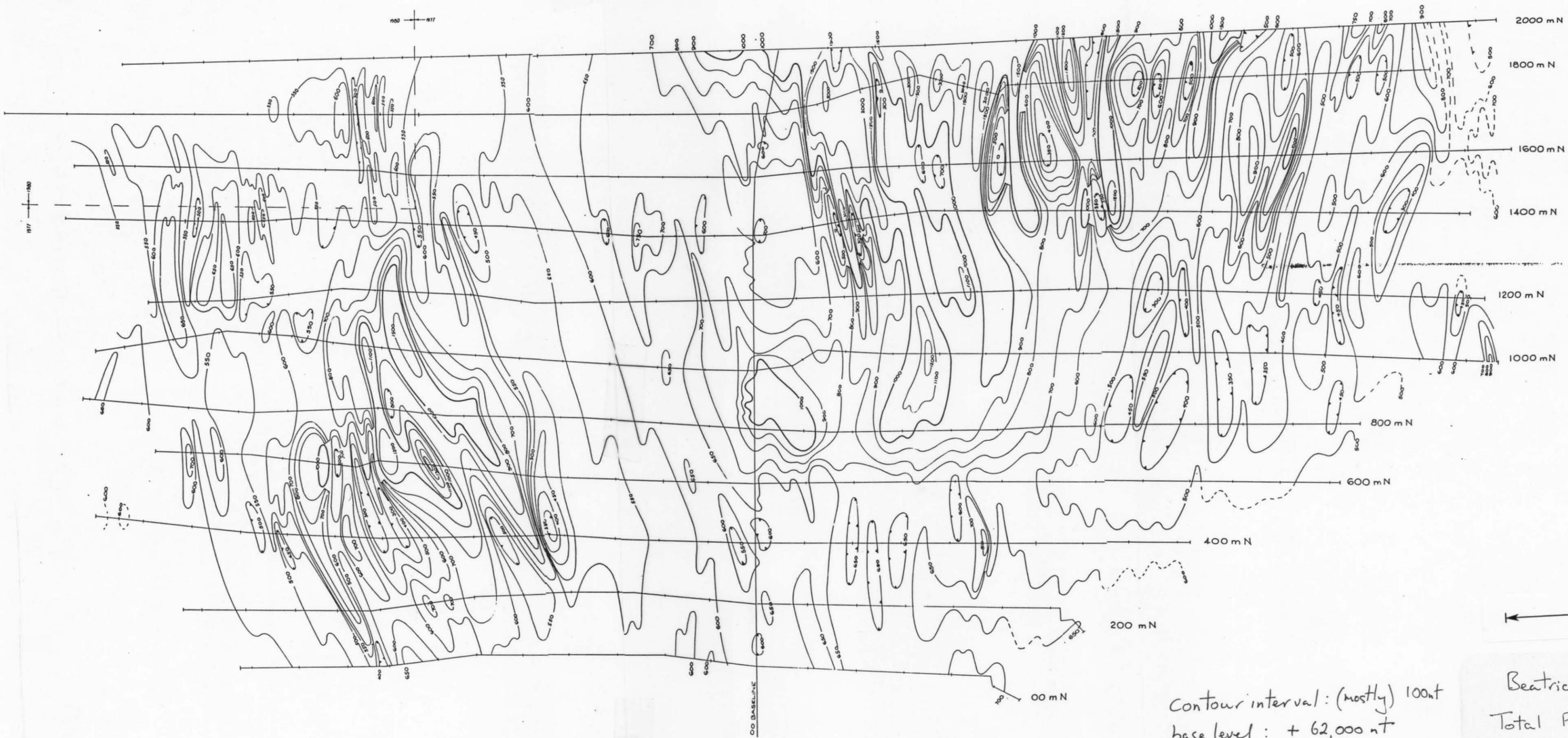
scale ~1:10,000 Fig 5a

BHP/MG88/10



contours in ohm-m
 reference: Street (1980)
 Tas-073C

Beatrice Grid
 Gradient Array
 resistivity contours
 scale ~1:10,000 Fig 5b.



Beatrice Grid
 Total Field Magnetics
 scale ~1:10,000 Fig 5c



SCINTREX PTY. LTD.

INDUCED POLARIZATION AND RESISTIVITY SURVEY
POLE - DIPOLE ARRAY

DATE 18-12-78

PLOTTED BY R.A.B.

PULSE 2 Sec.

Rx. IPR-8

DIPOLE SPACING 20 m

LINE No. 1.

PROSPECT BEATRICE

JOB No. TAS-062

320N 300N 280N 260 240N 220N 200N 180N 160N 140N 120N 100N 80N 60N 40N 20N 0

RESISTIVITY $\Omega m.$

RESISTIVITY $\Omega m.$



CHARGEABILITY

CHARGEABILITY



Beatrice Grid
Pole-dipole IP

5 cm

Fig 5d

1-79
 R.A.B.
 2 Sec. Rx.
 20m

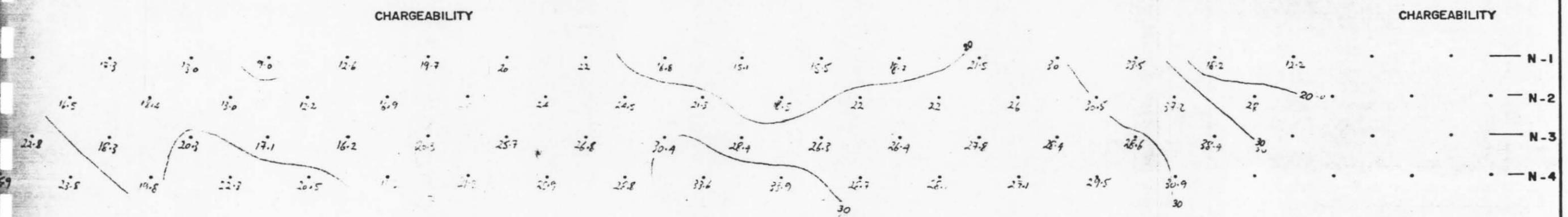
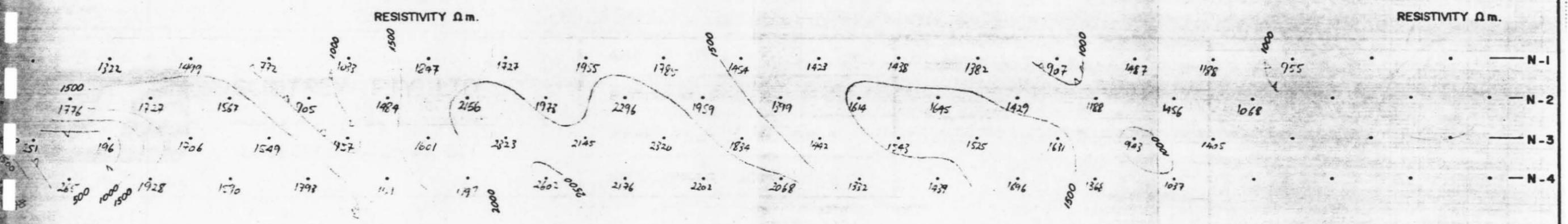


SCINTREX PTY. LTD.
 INDUCED POLARIZATION AND RESISTIVITY SURVEY
 POLE - DIPOLE ARRAY

DATE 8-1-79
 PLOTTED BY R.A.B.
 PULSE 2 Sec Rx.
 DIPOLE SPACING 20 M

LINE No. 2
 PROSPECT BEATRICE
 JOB No. TAS-062

340N 320N 300N 280N 260N 240N 220N 200N 180N 160N 140N 120N 100N 80N 60N 40N 20N



Beatrice Grid
 Pole-dipole IP

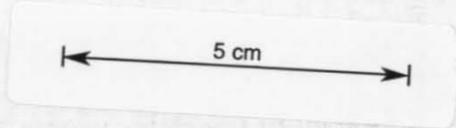


Fig 5e



SCINTREX PTY. LTD.

INDUCED POLARIZATION AND RESISTIVITY SURVEY

DIPOLE - DIPOLE ARRAY

DATE 20-12-78

PLOTTED BY RAB

PULSE 2Sec

Rx. IPR-8

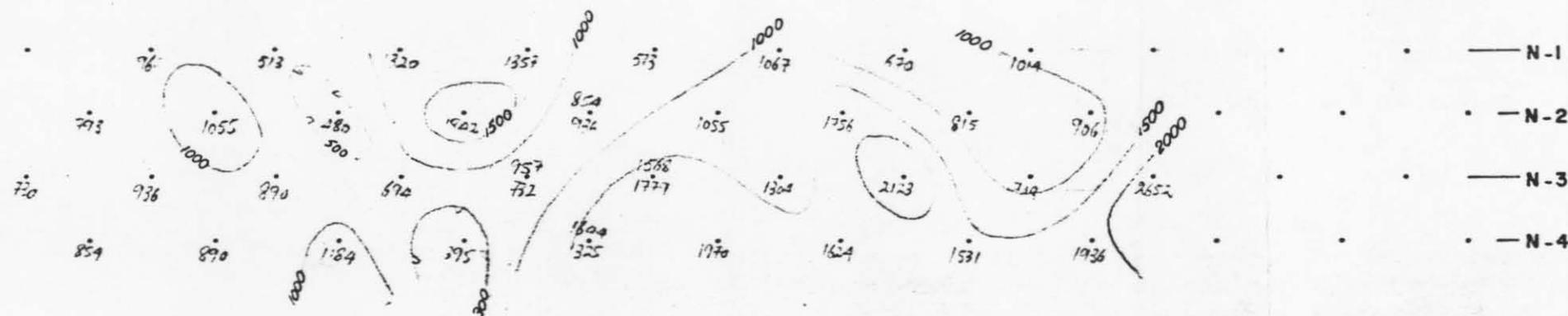
DIPOLE SPACING 20 M

LINE No. 16 N

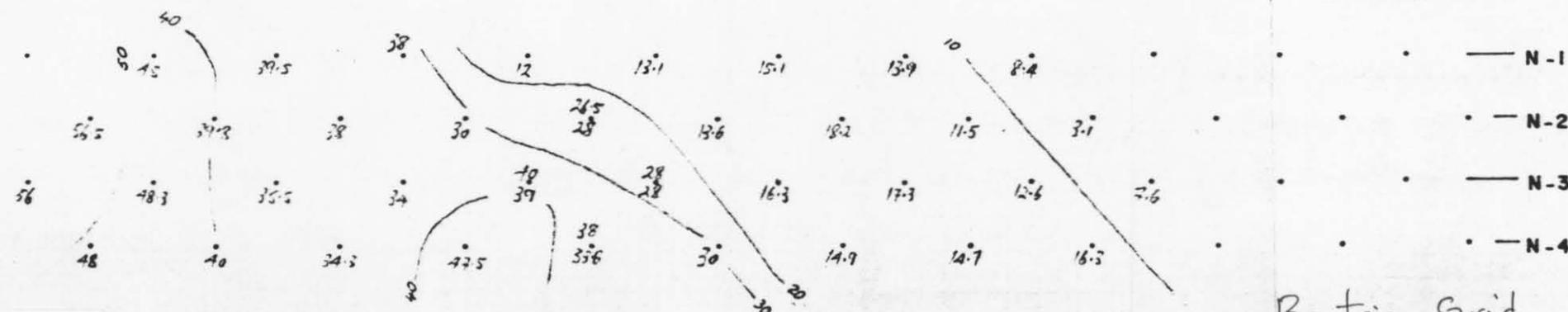
PROSPECT BEATRICE

JOB No. TAS-062

960W 940W 920W 900W 880W 860W 840W 820W 800W

RESISTIVITY $\Omega m.$ 

CHARGEABILITY



5 cm

Beatrice Grid
dipole-dipole IP

Fig 5F

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

DATE _____
 PLOTTED BY _____
 PULSE _____ Rx. _____
 DIPOLE SPACING _____

LINE No. _____
 PROSPECT _____
 JOB No. _____



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

DATE _____
 PLOTTED BY _____
 PULSE _____ Rx. _____
 DIPOLE SPACING _____

LINE No. _____
 PROSPECT _____
 JOB No. _____



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

DATE _____
 PLOTTED BY _____
 PULSE _____ Rx. _____
 DIPOLE SPACING _____

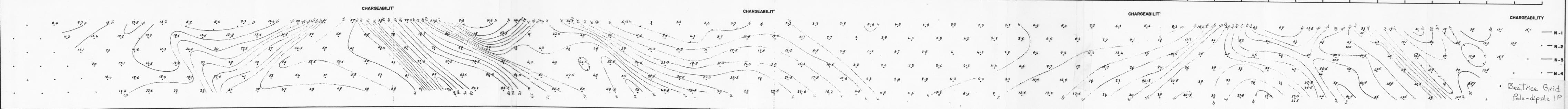
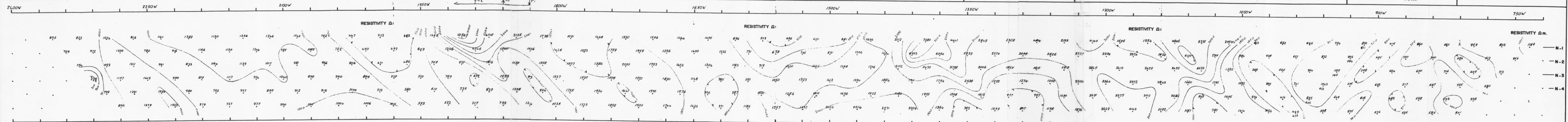
LINE No. _____
 PROSPECT _____
 JOB No. _____



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

DATE 8,11,15,16,18,19-12-79 & 5-1-80
 PLOTTED BY B.E. & R.M.
 PULSE 2 sec. Rx. _____
 DIPOLE SPACING 30 m.

LINE No. 18 N
 PROSPECT BEATRICE
 JOB No. TAS-073

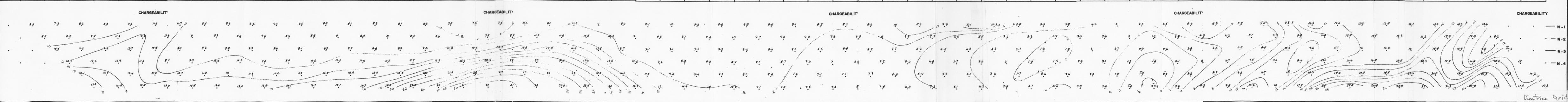
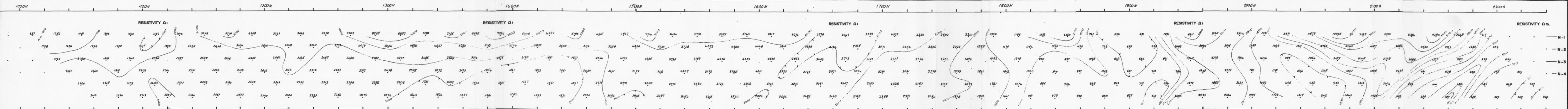


Beatrice Grid
 Pole-dipole IP

5 cm

Fig. 59.

DATE	LINE No.	DATE 4.6.7-12-1979	LINE No. WALKING TRACK						
PLOTTED BY	PROSPECT	PLOTTED BY B.E.	PROSPECT BEATRICE						
PULSE Rx.		PULSE Rx.		PULSE Rx.		PULSE Rx.		PULSE 2 sec. Rx.	
DIPOLE SPACING	JOB No.	DIPOLE SPACING 20 m.	JOB No. TAS-073						



5 cm

Beatrice Grid
Pole-dipole IP
Fig 5H.



SCINTREX PTY. LTD.

INDUCED POLARIZATION AND RESISTIVITY SURVEY
DIPOLE - DIPOLE ARRAY

DATE 30-5-80

PLOTTED BY A.J

PULSE 2 Sec Rx. 311147

DIPOLE SPACING 30m

SCINTREX PTY. LTD.

INDUCED POLARIZATION AND RESISTIVITY SURVEY
DIPOLE - DIPOLE ARRAY

DATE 2-6-80

PLOTTED BY A.J

PULSE 2 Sec Rx. 708103

DIPOLE SPACING 30m

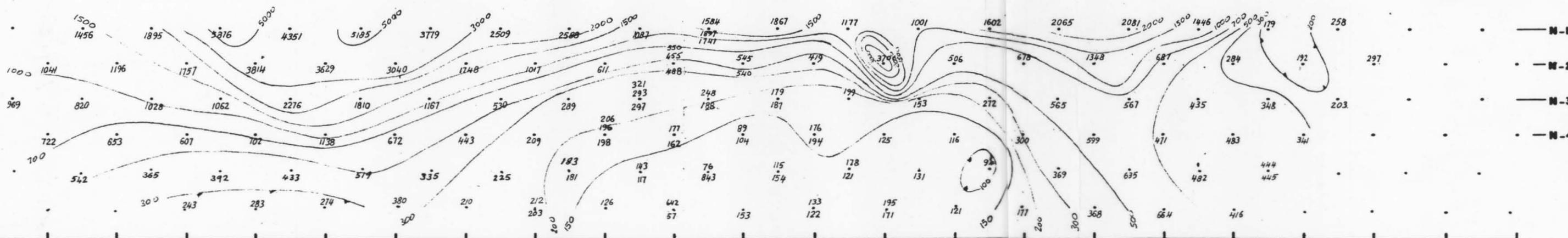
LINE No. 400N

PROSPECT BEATRICE

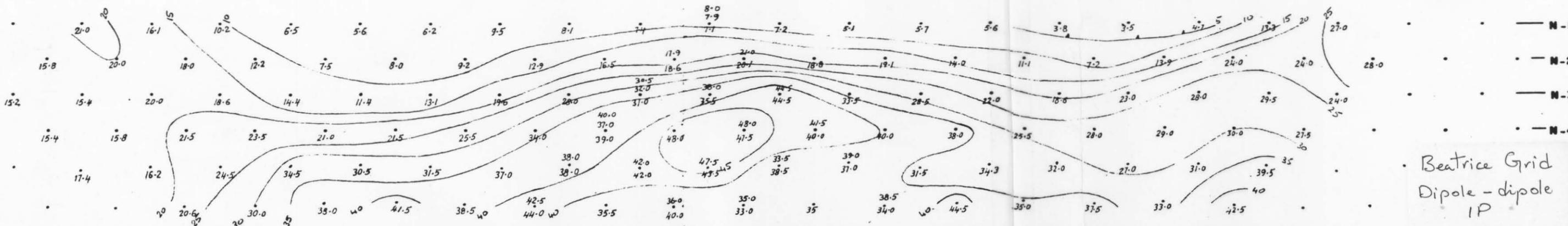
JOB No. TAS-073

840E 870E 900E 930E 960E 990E 1020E 1050E 1080E 1110E 1140E 1170E 1200E 1230E 1260E 1290E 1320E 1350E 1380E 1410E 1440E 1470E 1500E 1530E

RESISTIVITY Ωm



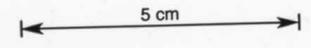
CHARGEABILITY



Beatrice Grid
Dipole - dipole
IP

5 cm

Fig 5I



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

DATE 20-5-80
 PLOTTED BY A.J.
 PULSE 2 Sec Rx. 311147
 DIPOLE SPACING 30m

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

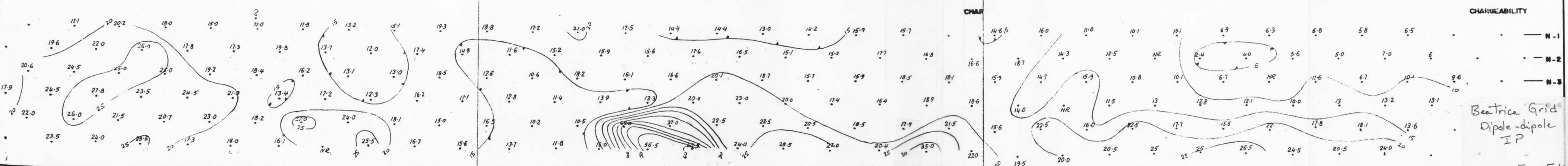
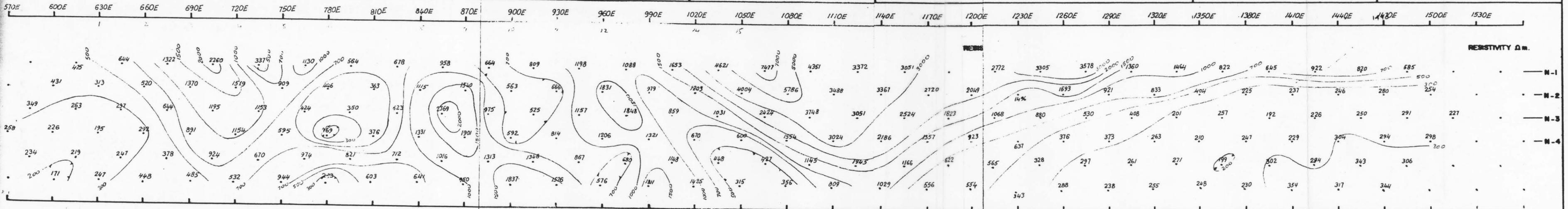
DATE 26-5-80
 PLOTTED BY A.J.
 PULSE 2 Sec Rx. 708103
 DIPOLE SPACING 30m

LINE No.
 PROSPECT
 JOB No.

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

DATE 28-5-80
 PLOTTED BY A.J.
 PULSE 2 Sec Rx. 311147
 DIPOLE SPACING 30m

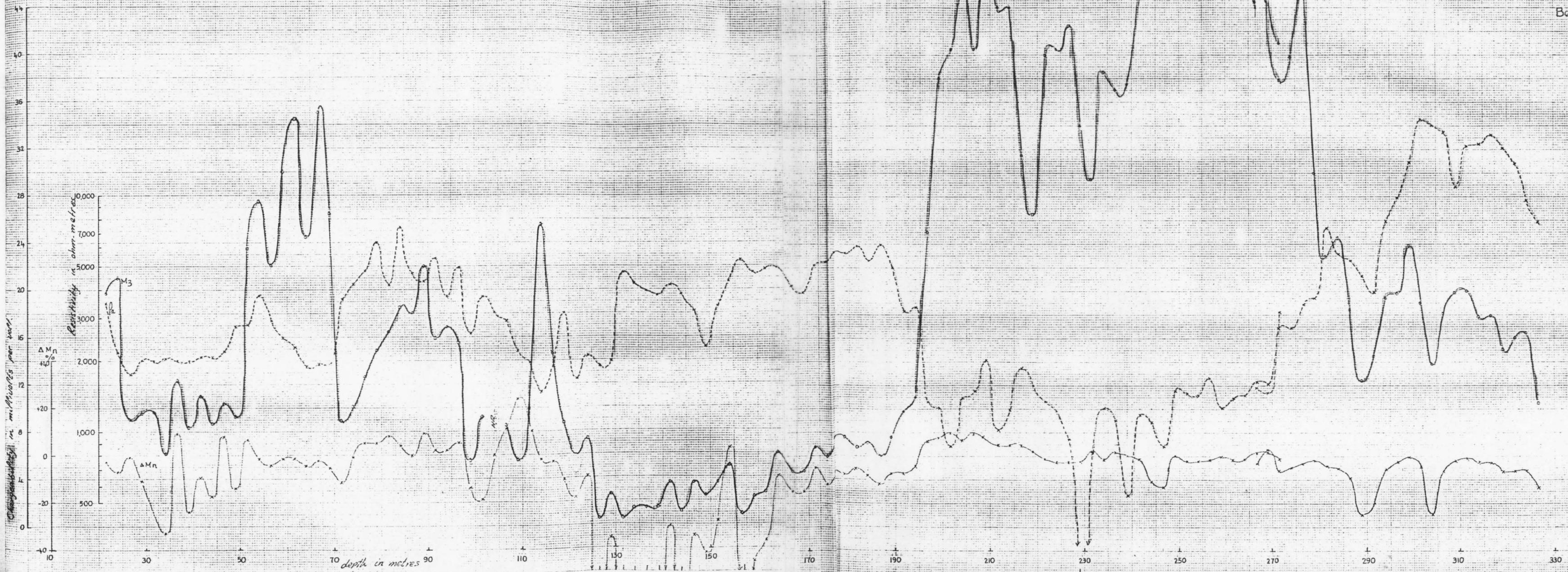
LINE No. 600N
 PROSPECT BEATRICE
 JOB No. TAS-073-C



Beatrice Grid
 Dipole-dipole
 IP

Fig 5K

DH #: MS-1
Beatrice Area
TAS-062

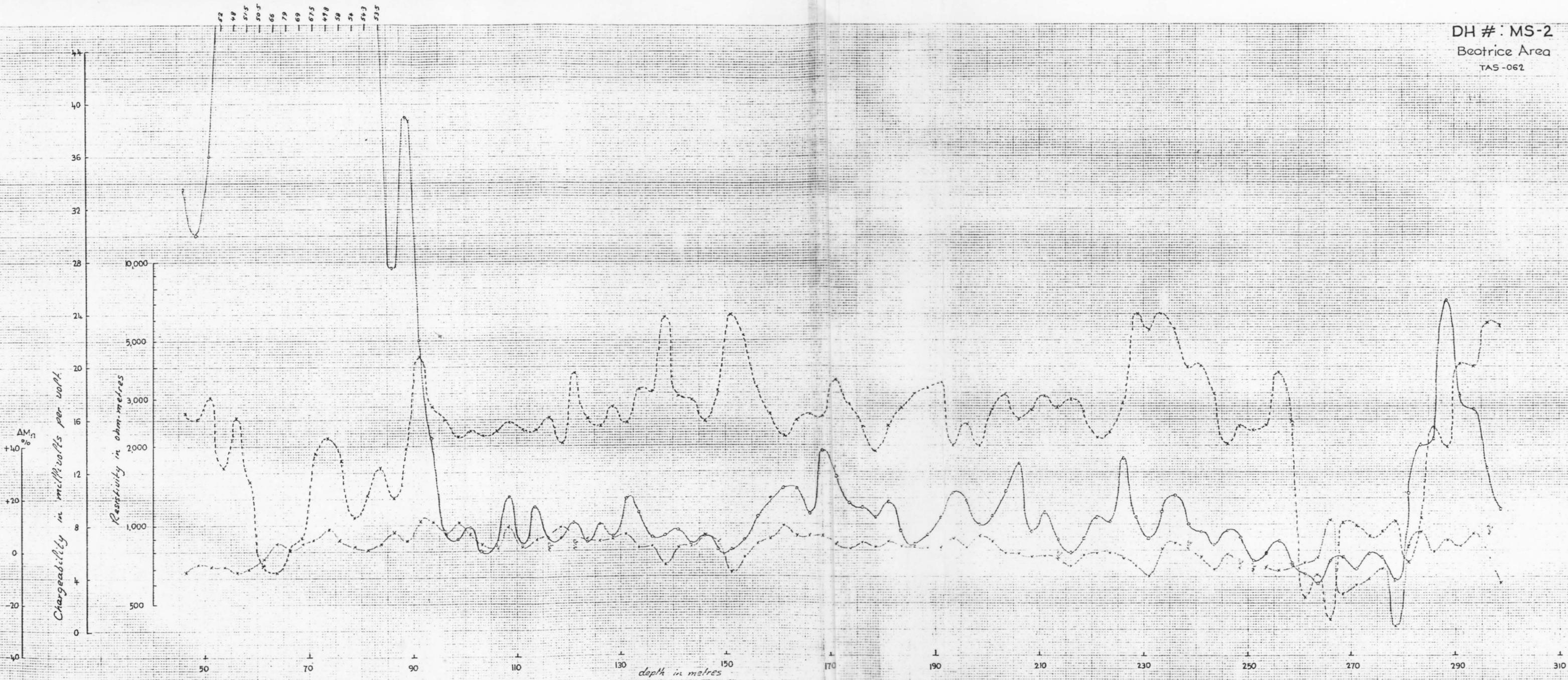


5 cm

Beatrice Grid
Down-hole IP
DDH - MS1

Fig 5L

DH #: MS-2
Beatrice Area
TAS-062

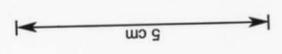


5 cm

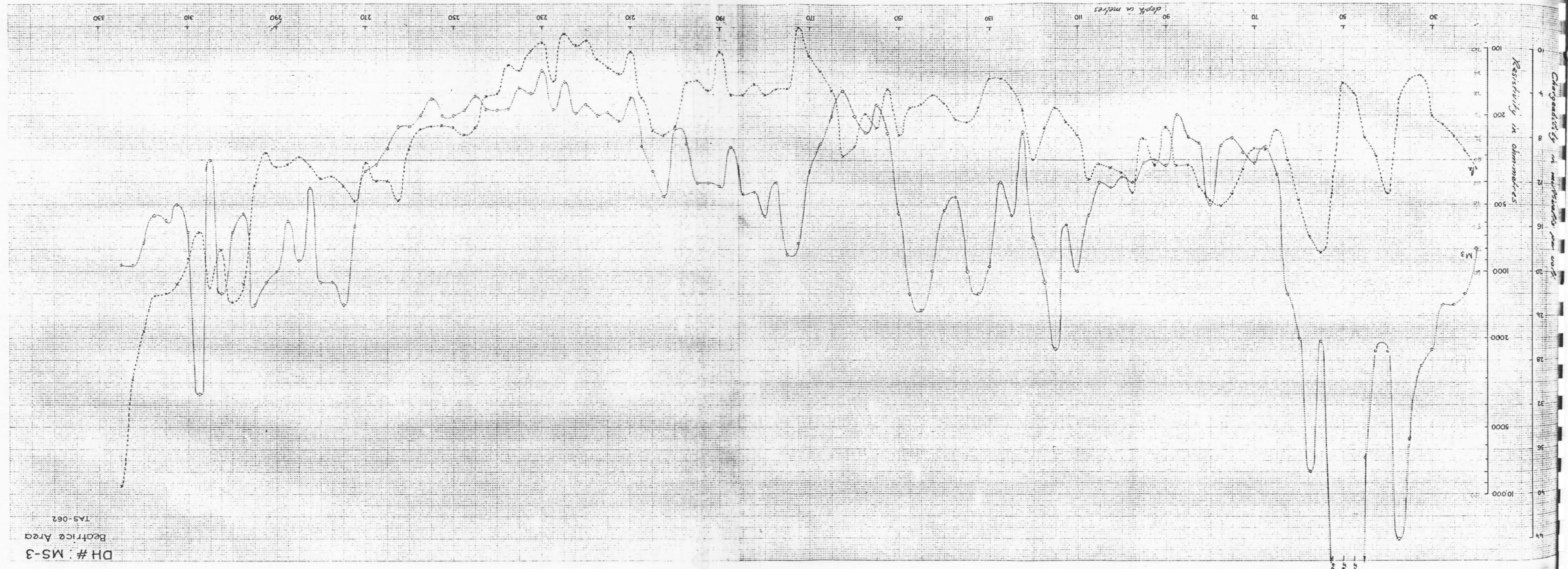
Beatrice Grid
Down-hole IP
DDH-MS2

Fig 5M

Fig 5N



Beatrice Grid
Down-hole IP
DDH - MS3



DH # : MS-3
Beatrice Area
TAS-062

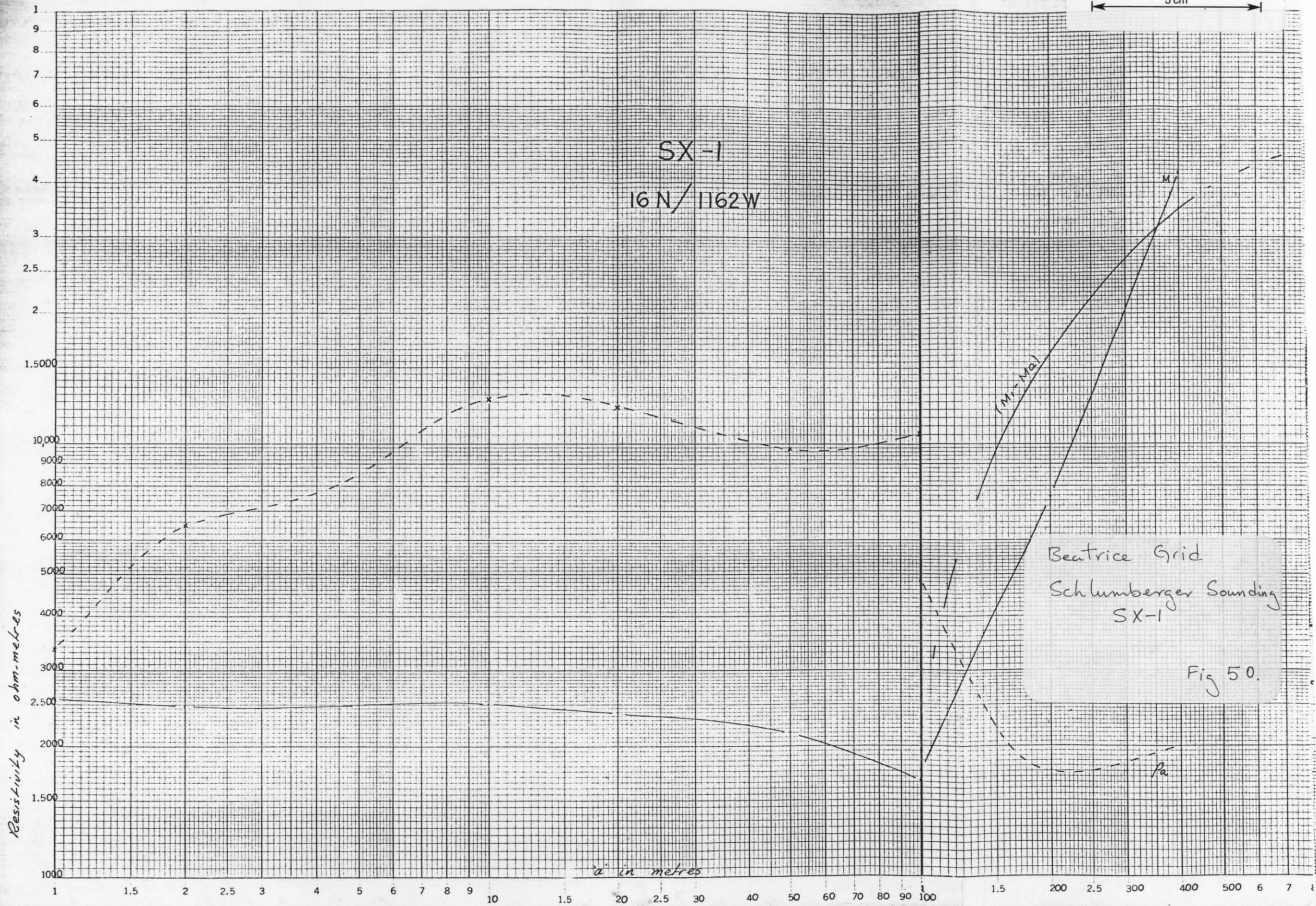
43 IP10

Resistivity in ohm-metres
Chargeability in millifarads per 100 ft

depth in metres

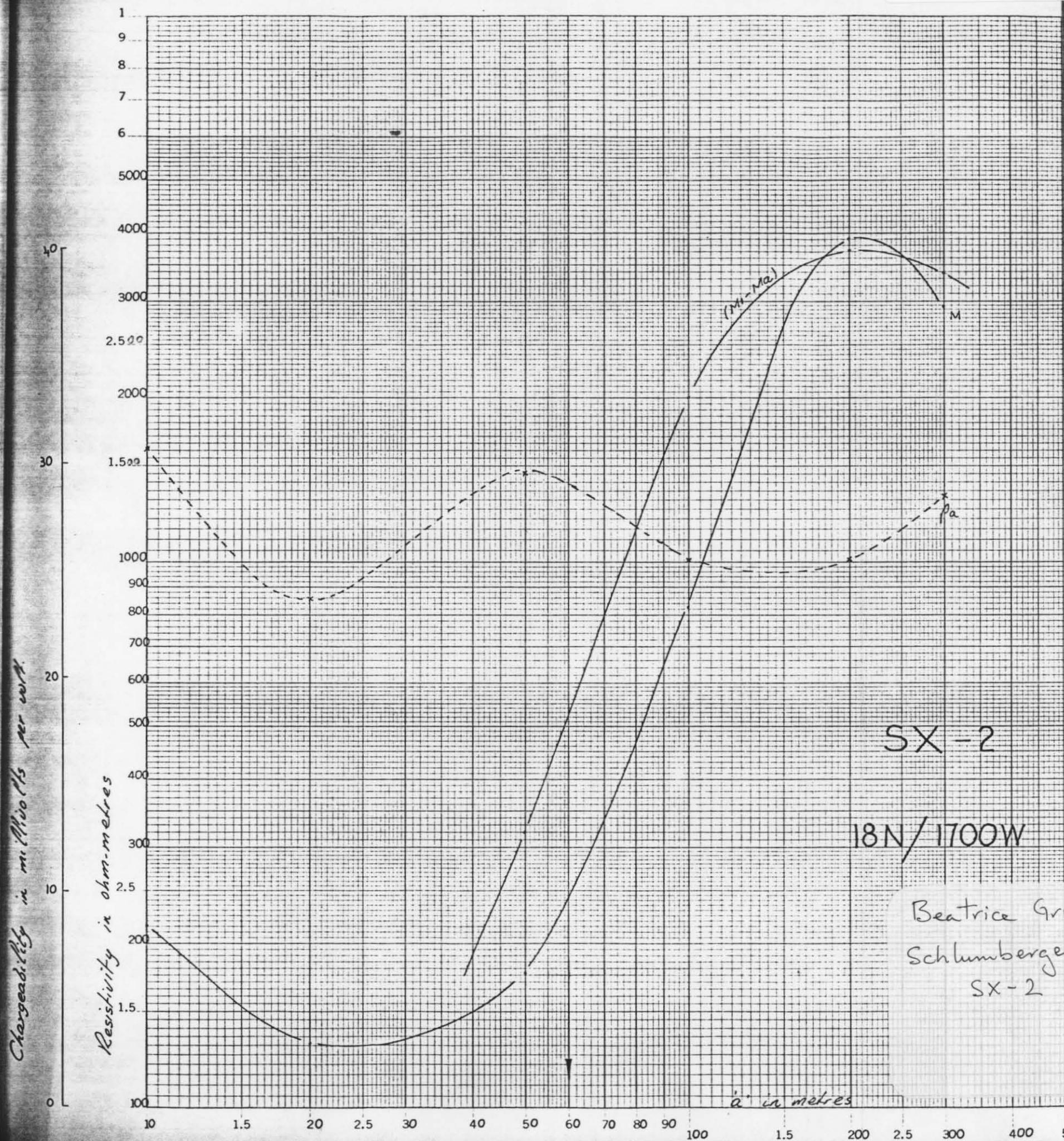
5 cm

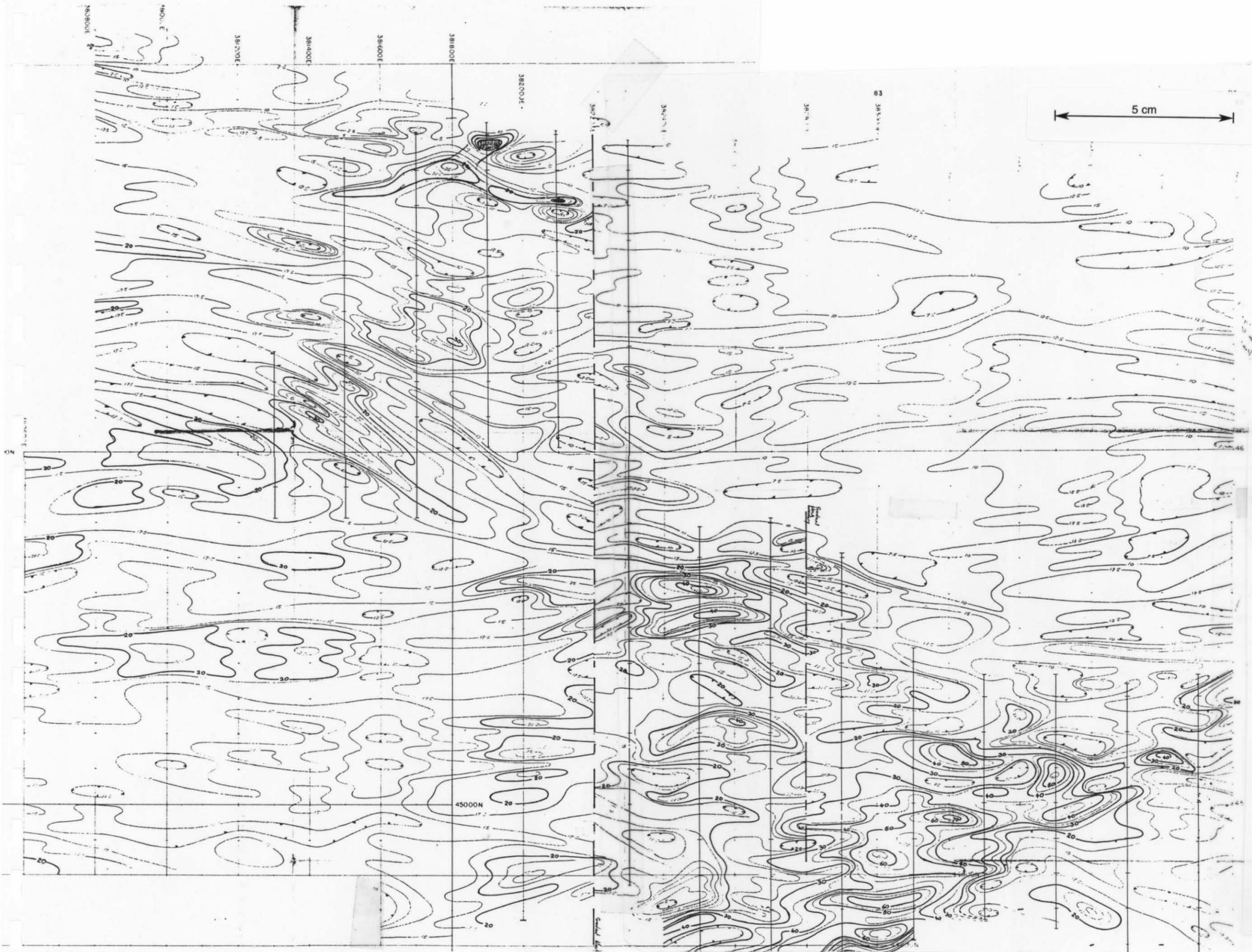
SX-1
16 N / 1162 W



Beatrice Grid
Schlumberger Sounding
SX-1

Fig 50.





5 cm

693049

5 cm

contour interval: 2.5 mV/V
(IPR-8 & IPR-10 receivers)

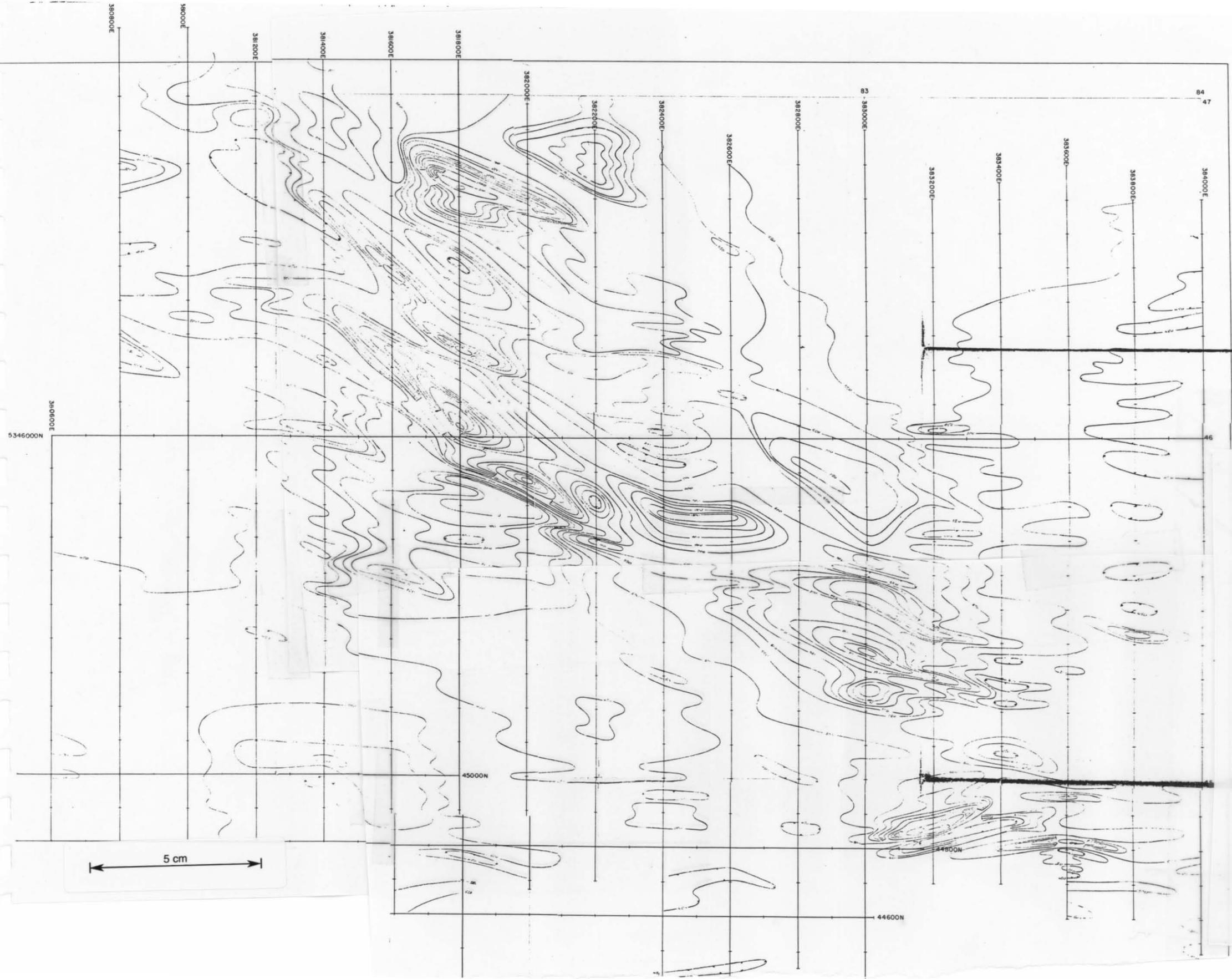
reference: Street (1981)

Tas-082

BHP/M688/10

Comstock (AMG) Grid
Gradient Array
chargeability contours

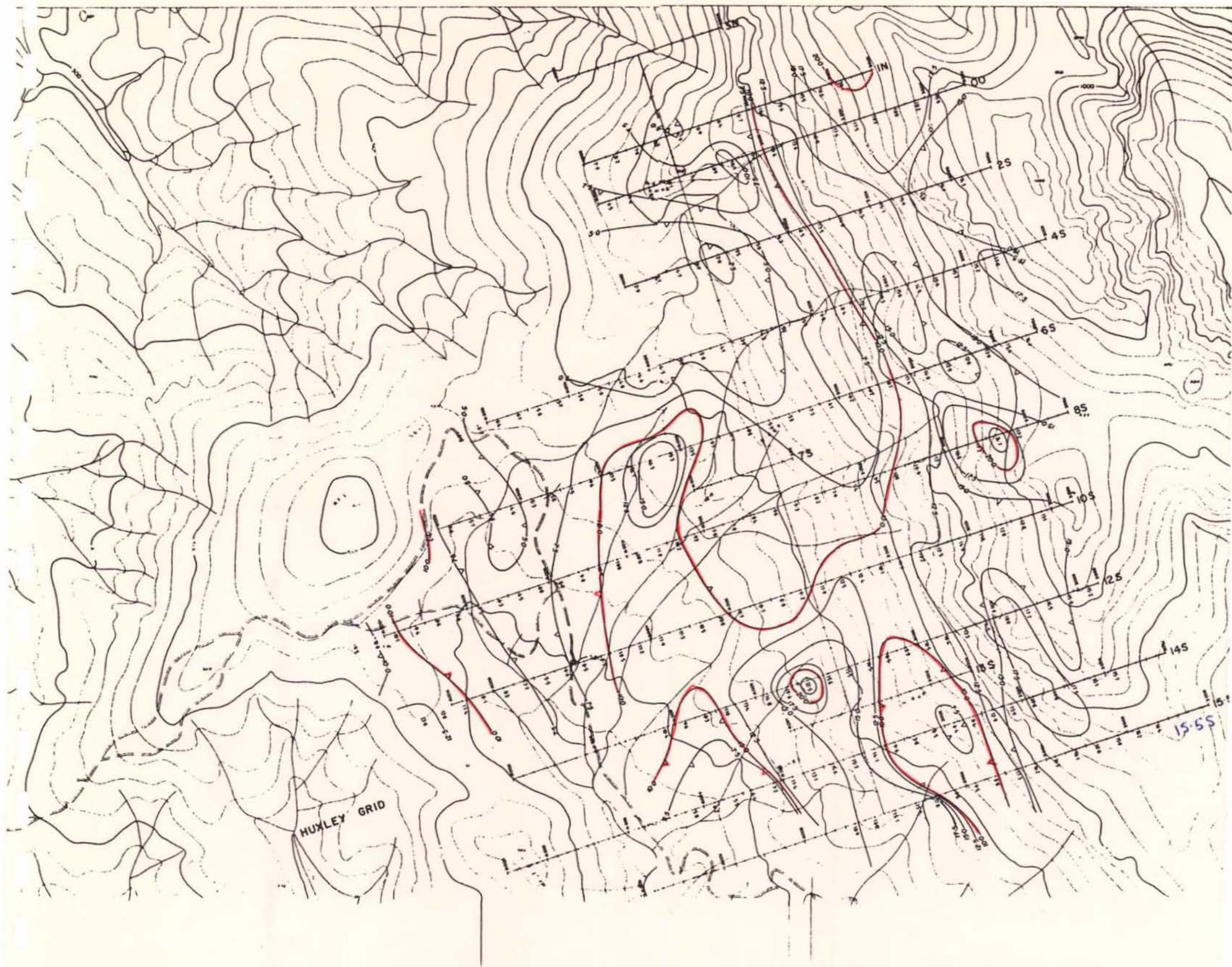
scale ~1:10,000 Fig. 6a



693051

Contour interval 50nt
 base level + 62,000 nt
 reference Street (1981)
 Tas-082
 BHP/MG88/10

Comstock (AMG) Grid
 Total Field Magnetics
 scale ~ 1:10,000 Fig.6c.



693052

Huxley Grid
Dipole-dipole IP
Averaged Chargeabilities

scale ~1:10,000 Fig. 7a.

5 cm

Contours are averaged
M6 window of IPR-11
receiver
Filtering after Fraser (1981)
reference: Bishop (1985)
GF/MG85/07

BHP/MG88/10



HUXLEY GRID

Contours are averaged
resistivities in ohm-m.
Filtering after Fraser (1981).

reference: Bishop (1985)

GF/MG85/07

Huxley Grid

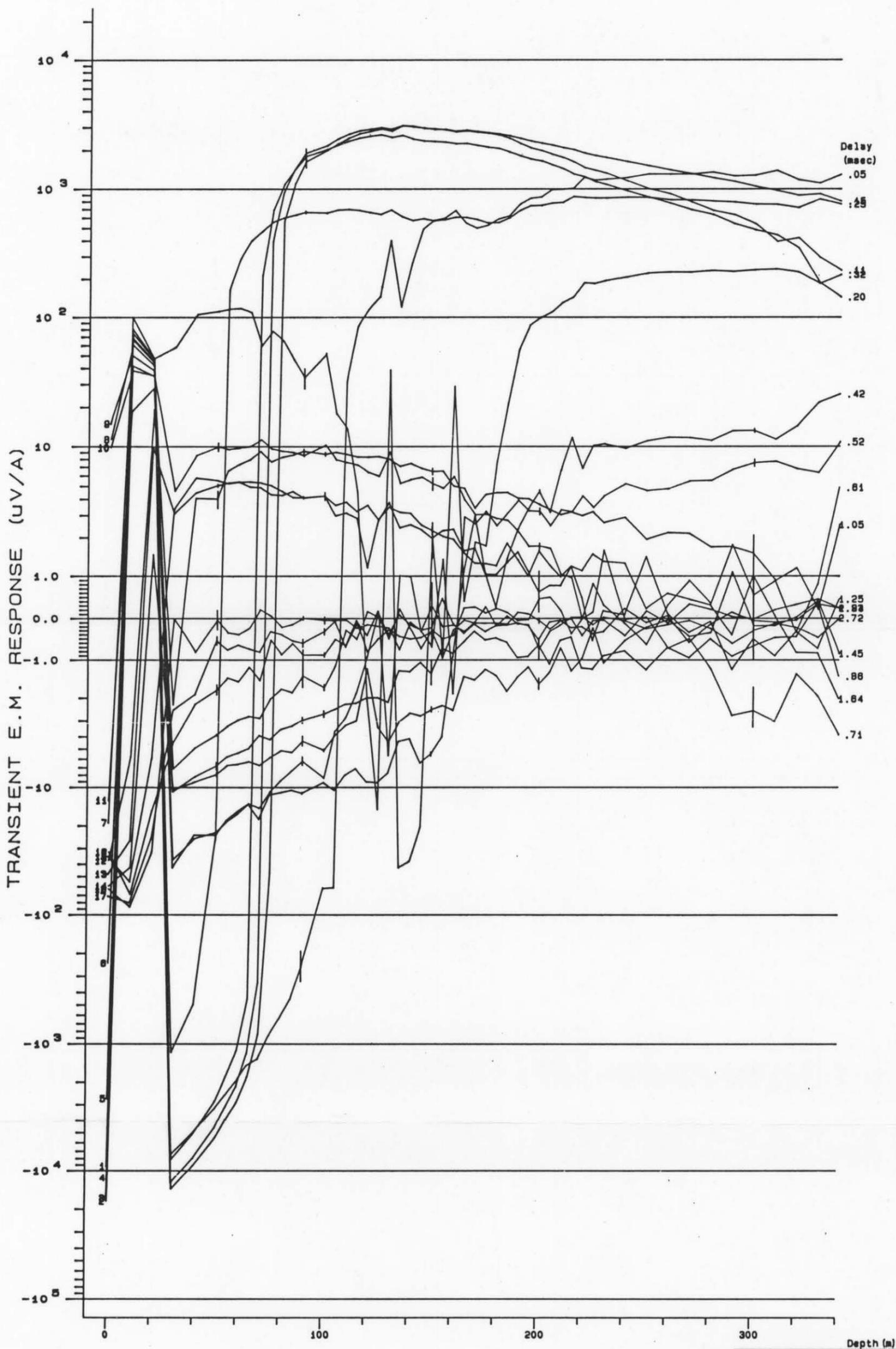
Dipole - dipole Array
Averaged Resistivity

Scale ~1:10,000 Fig. 7b.

5 cm

BHP/MG 88/10

5 cm

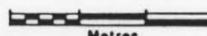


GOLDFIELDS EXPLORATION PTY.LTD.
 QUEENSTOWN, TASMANIA
 HUXLEY (JOB NO.813A)
 HOLE HX-1 14.0 AMPS
 SIROTEM Survey by SOLO Geophysics & Co. 15/ 2/86
 SOLO hole ref.502 Reading interval 5.0 m
 SCALE 1 : 2000 Loop size : 150 m
 LOOP configuration : Drill hole
 Plotted : 3:07 PM 27/ 5/86

GOLD FIELDS EXPLORATION PTY. LIMITED	
Huxley (E.L.9/66) DHEM SURVEY Hx1 : log-lin plot	DRAWN BY :
	DRAFTSMAN
	DATE
	REVISIONS
	FILE NO.

SOLO

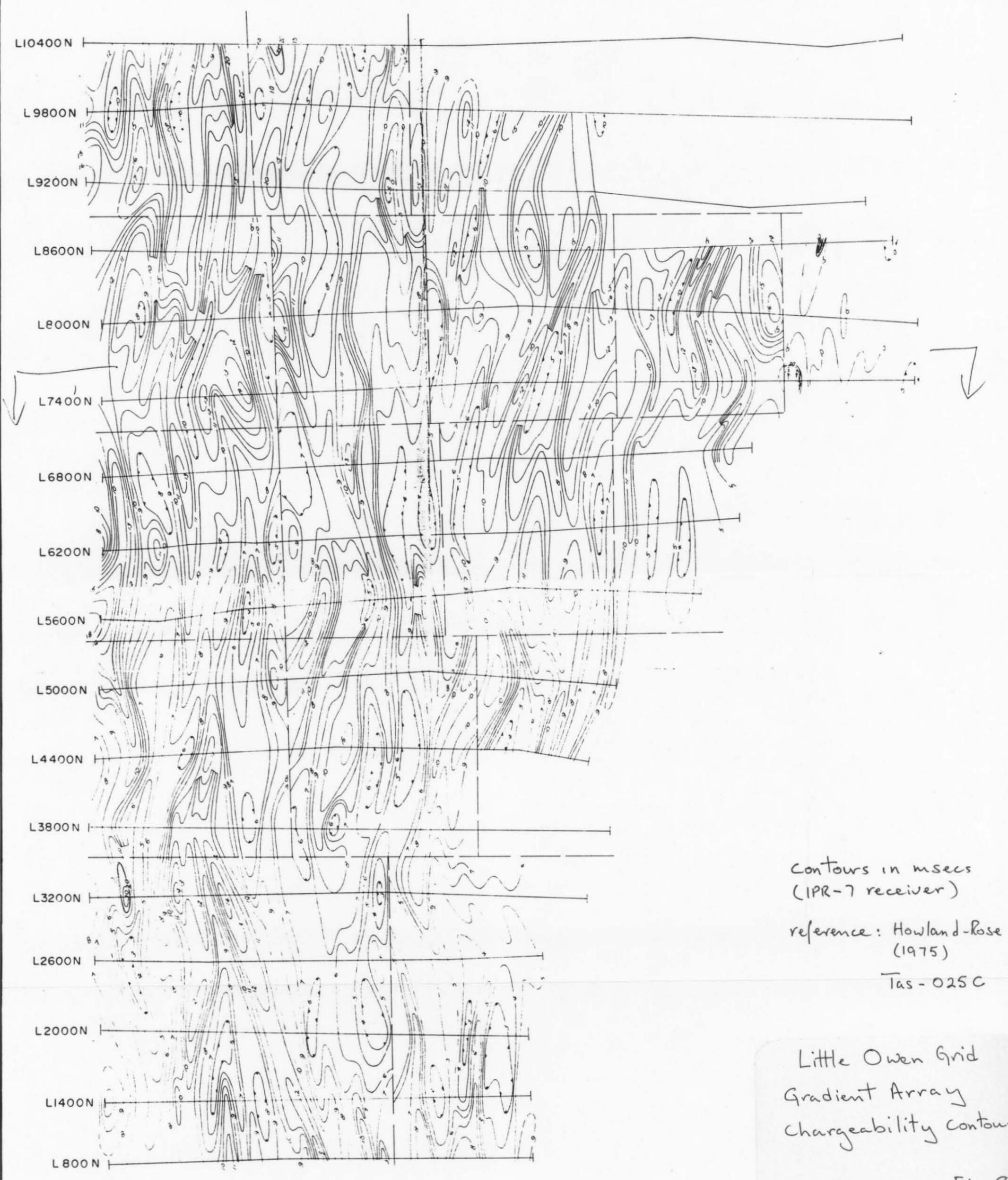
SCALE 1:2000



BHP/M688/10

Fig 7c

693054



Contours in msec
 (IPR-7 receiver)
 reference: Howland-Rose
 (1975)
 Tas-025C

Little Owen Grid
 Gradient Array
 Chargeability contours
 scale ~1:10,000 Fig 8a

BHP/M688/10

693055

L10400N

L9800N

L9200N

L8600N

L8000N

L7400N

L6800N

L6200N

L5600N

L5000N

L4400N

L3800N

L3200N

L2600N

L2000N

L1400N

L800N

5 cm

BHP/MG88/10

contours: ohm-m x1000

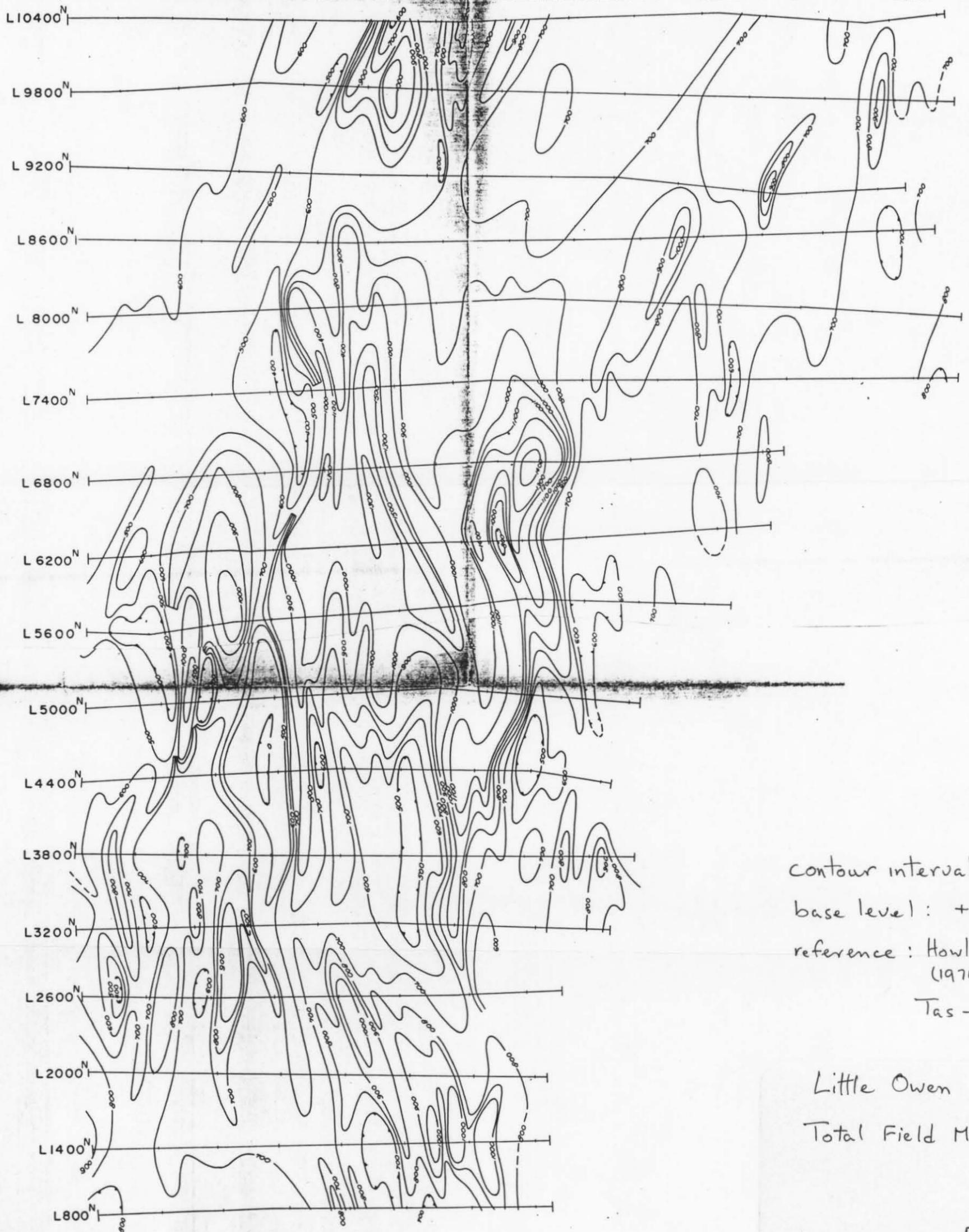
reference: Howland-Rose
(1975)

Tas-025C

Little Owen Grid
Gradient Array
Resistivity Contours

scale ~ 1:10,000 Fig 8b.

693056



contour interval: 100 nT
 base level: +62,000 nT
 reference: Howland-Rose
 (1974)
 Tas-018A

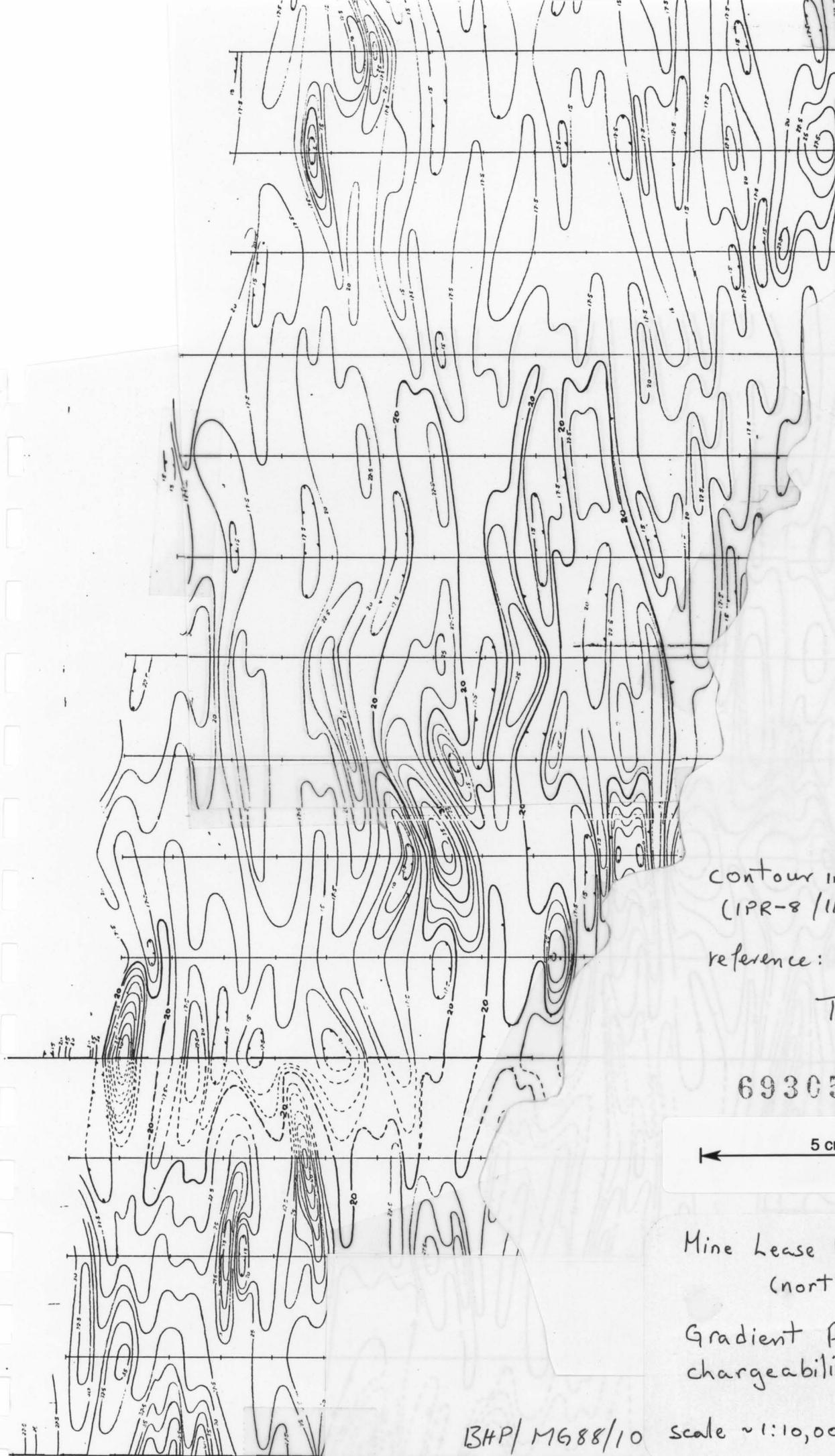
Little Owen Grid
 Total Field Magnetics

scale 1:10,000 Fig 8c

5 cm

BHP/MG88/10

693057

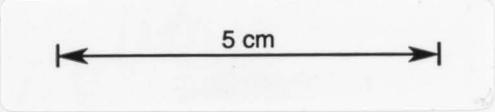


Contour interval: 2.5mV/v
(IPR-8 / IPR-10 receivers)

reference: Street (1981)

Tas-082

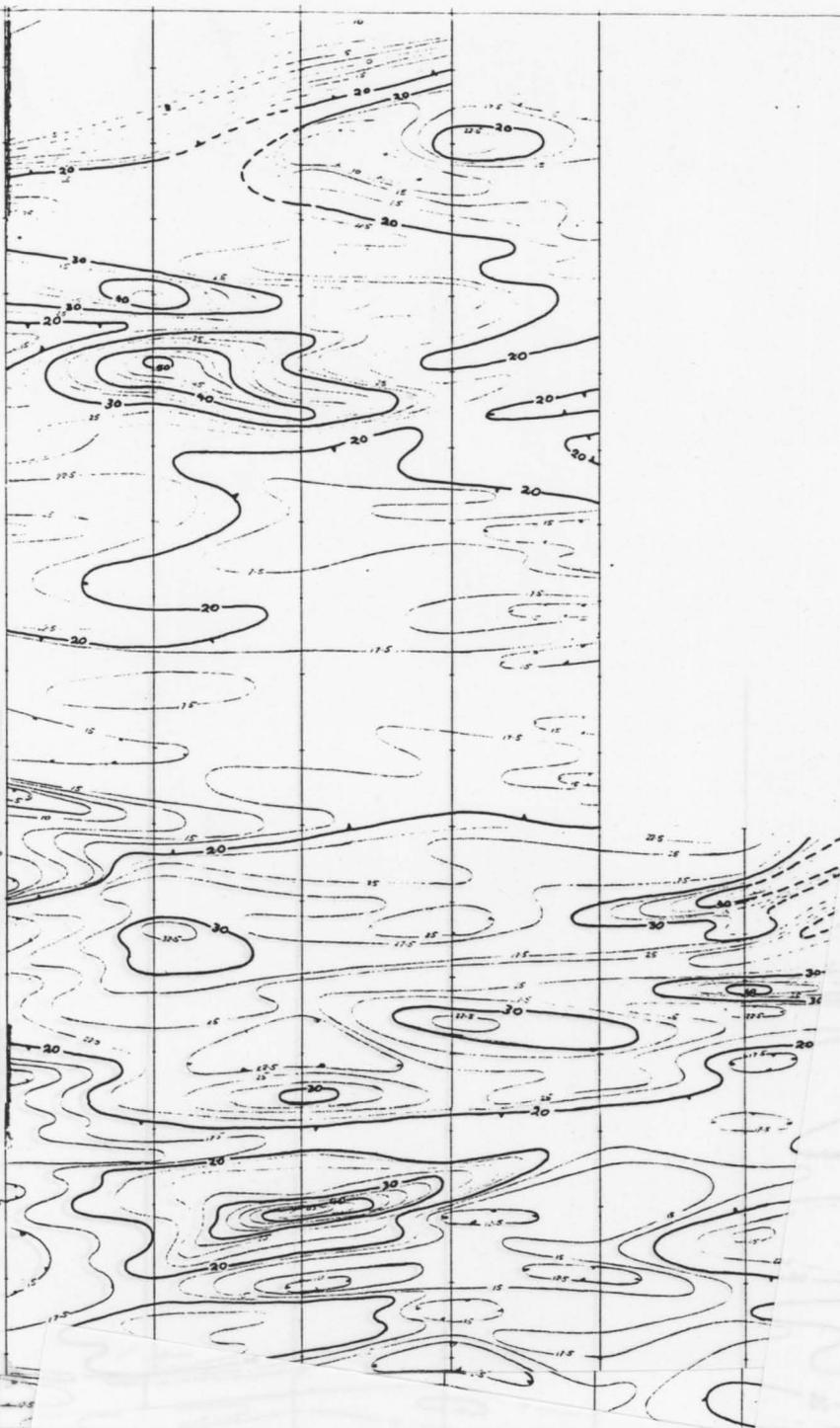
693058



Mine Lease (AMG) Grid
(north)

Gradient Array
chargeability contours

BHP/M688/10 scale ~ 1:10,000 Fig 9a(i)



North →

Contour interval: 2.5mv/v
(IPR-8/IPR-10 receivers)

reference: Street (1981)

Tas - 082

381800E

5 cm

13HP/MG88/10

693059

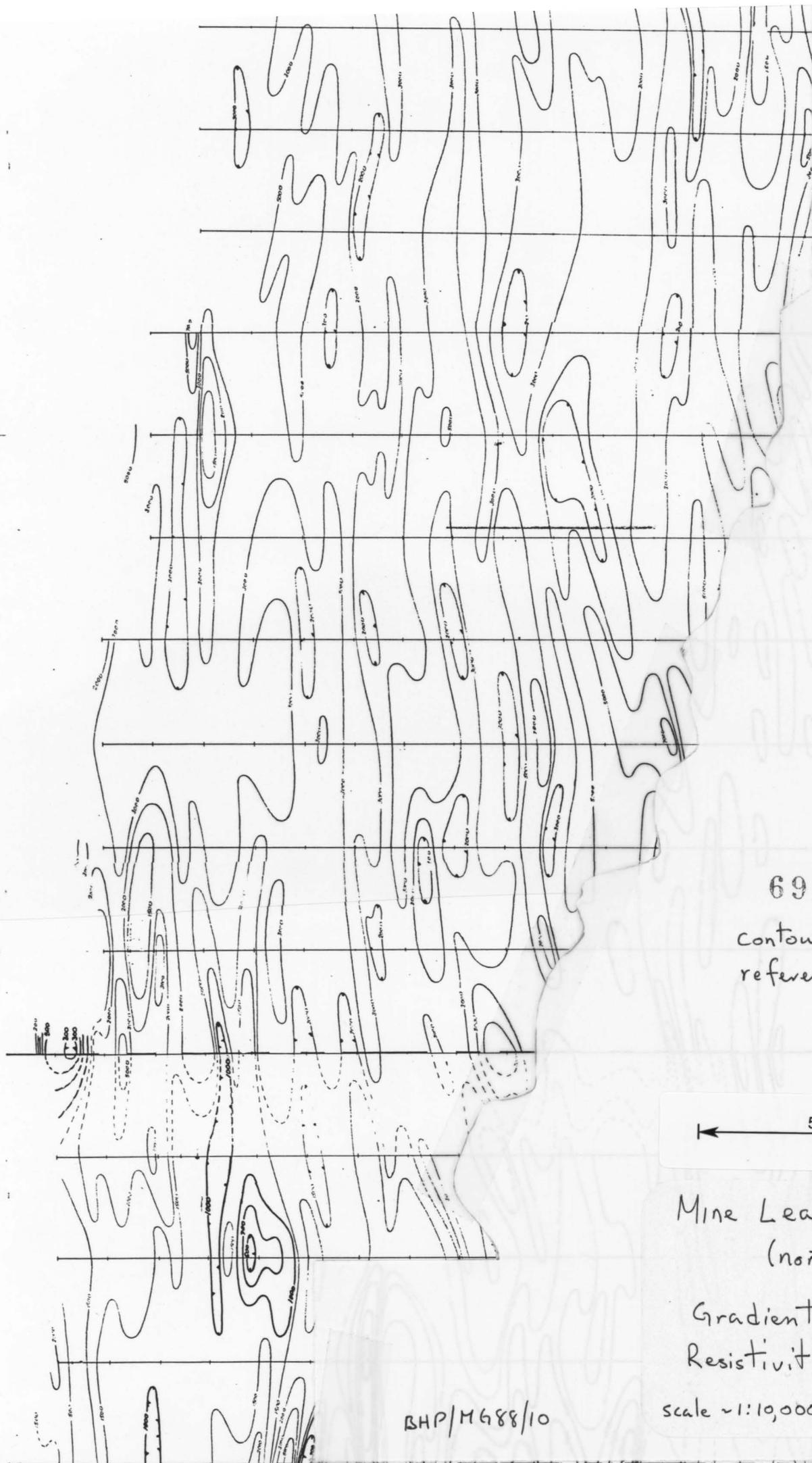
Mine Lease (AMG) Grid
(south)

Gradient Array
Chargeability contours

scale ~ 1:10,000 Fig 9a(ii)

44

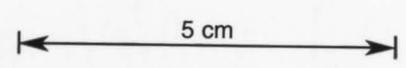
43



693060

Contours: ohm-m
reference: Street (1981)

Tas-082



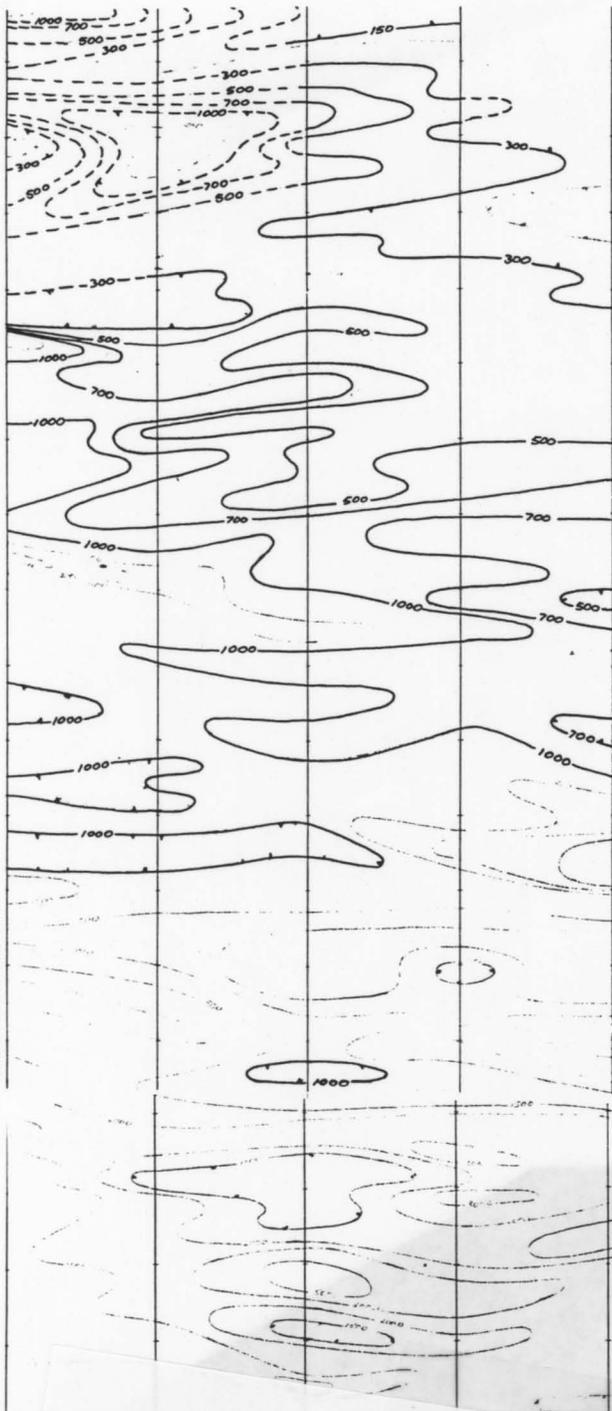
Mine Lease (AMG) Grid
(north)

Gradient Array
Resistivity Contours

scale ~1:10,000

Fig 9b(i)

BHP/M688/10



North
→

contours: ohm-m

reference: Street (1981)

Tas-082

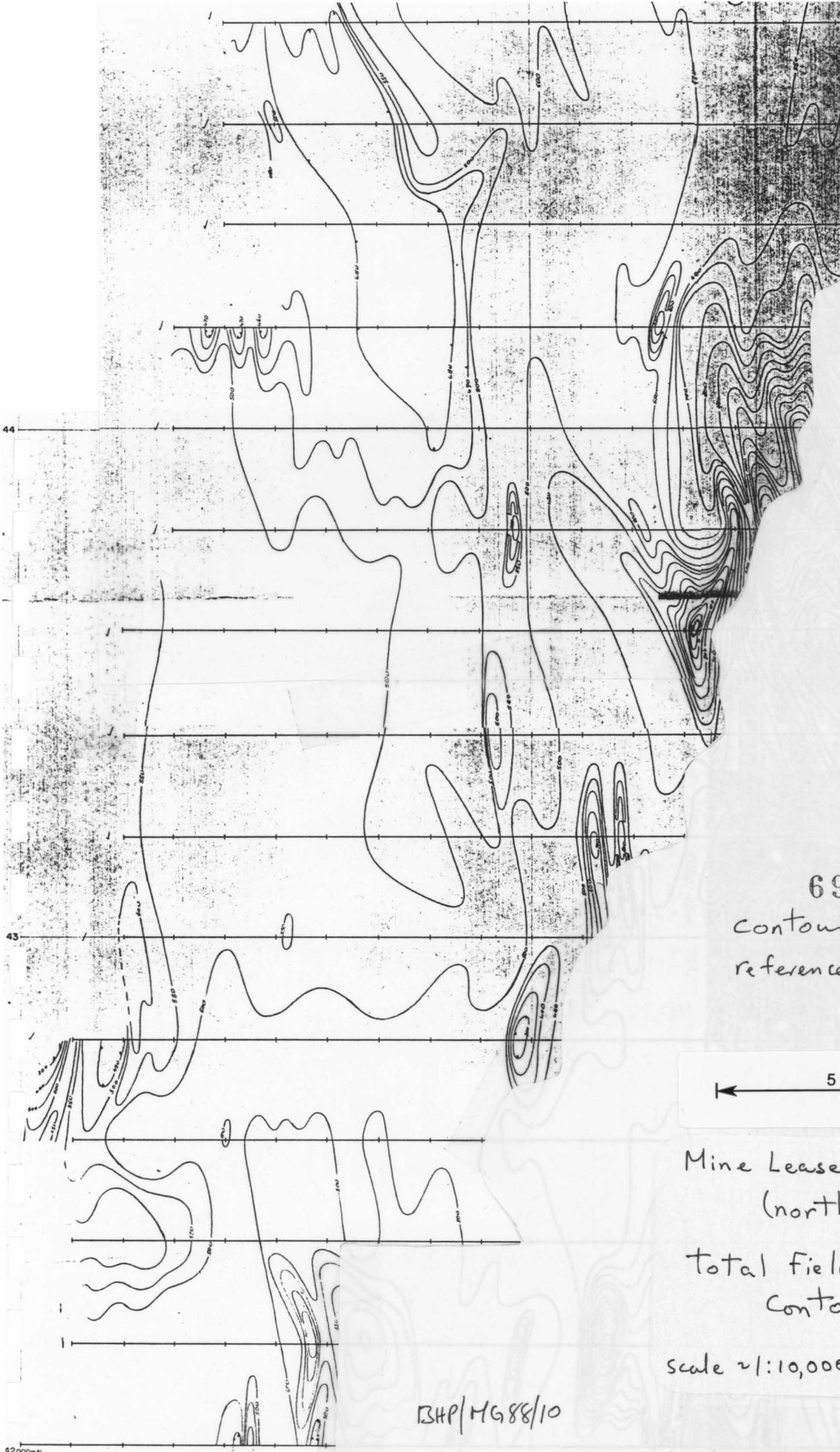
693001

5 cm

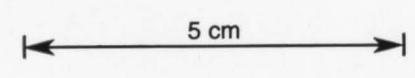
Mine Lease (AMG) Grid
(south)
Gradient Array Resistivity
Contours

13HP/MG88/10

scale ~ 1:10,000 Fig 9b(ii)



693002
contour interval: 50m
reference: Street (1981)
Tas-082



Mine Lease (AMG) Grid
(north)

Total Field Magnetic
Contours

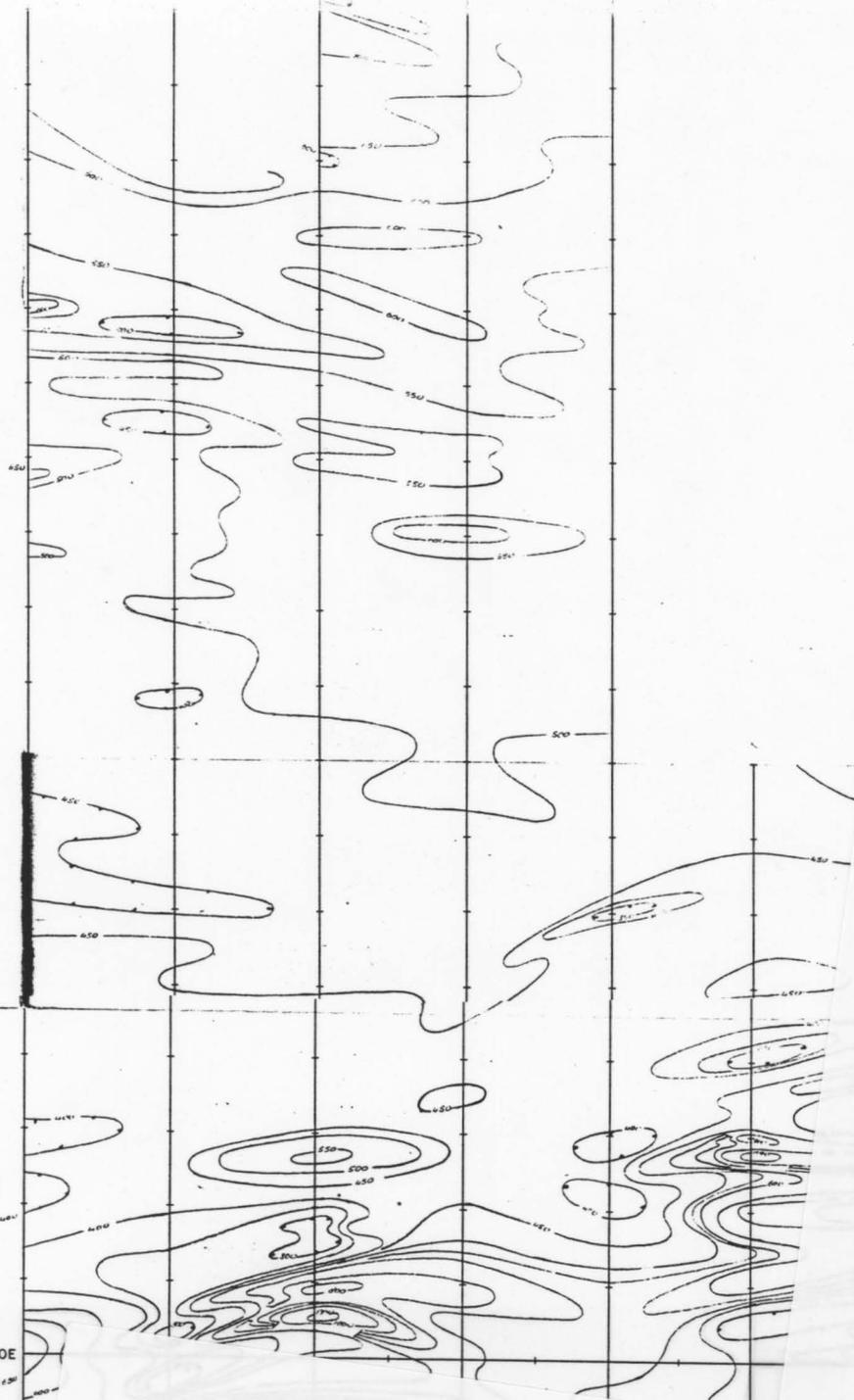
scale ~1:10,000 Fig 9(cii)

BHP/MG88/10

4200mN
3000mE

81

38800E



381800E

BHP/MG88/10

North

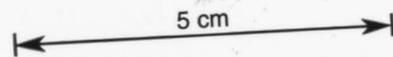


contour interval: 50nt
base level +62,000nt

reference: Street (1981)

Tas-082

693003



Mine Lease (AMG) Grid
(south)

Total Field Magnetic
Contours

scale: ~1:10,000

Fig. 9c(ii)

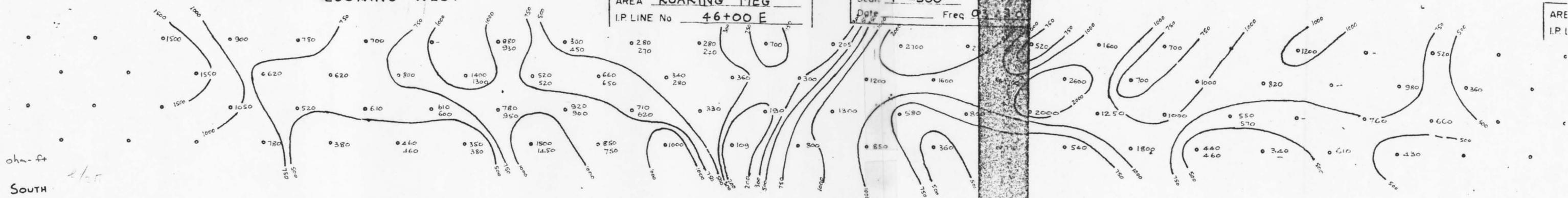
LOOKING WEST

AREA ROARING MEG
I.P. LINE No 46+00 E

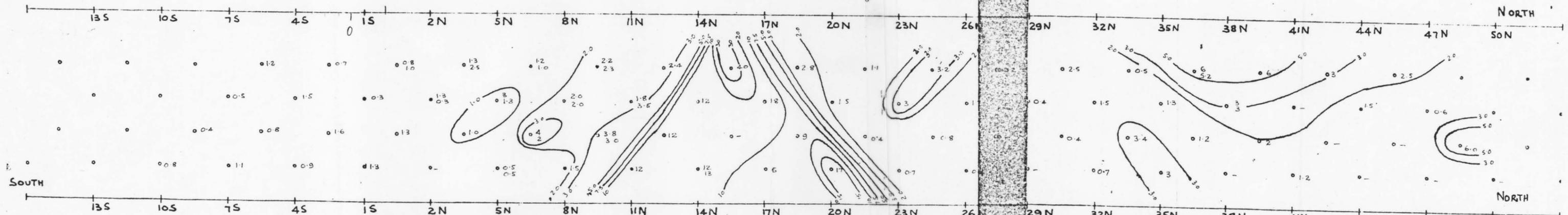
Scale 1" = 300'
Date _____ Freq 0.30

ARE I.P.L. *(initials)*

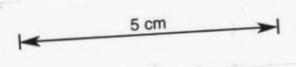
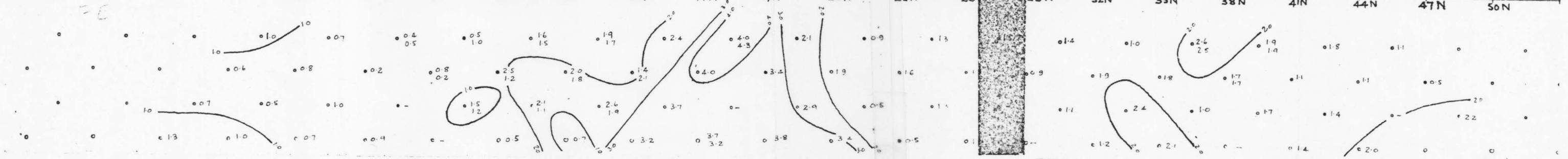
R/211 ohm-ft
SOUTH



M.F.



F.E.



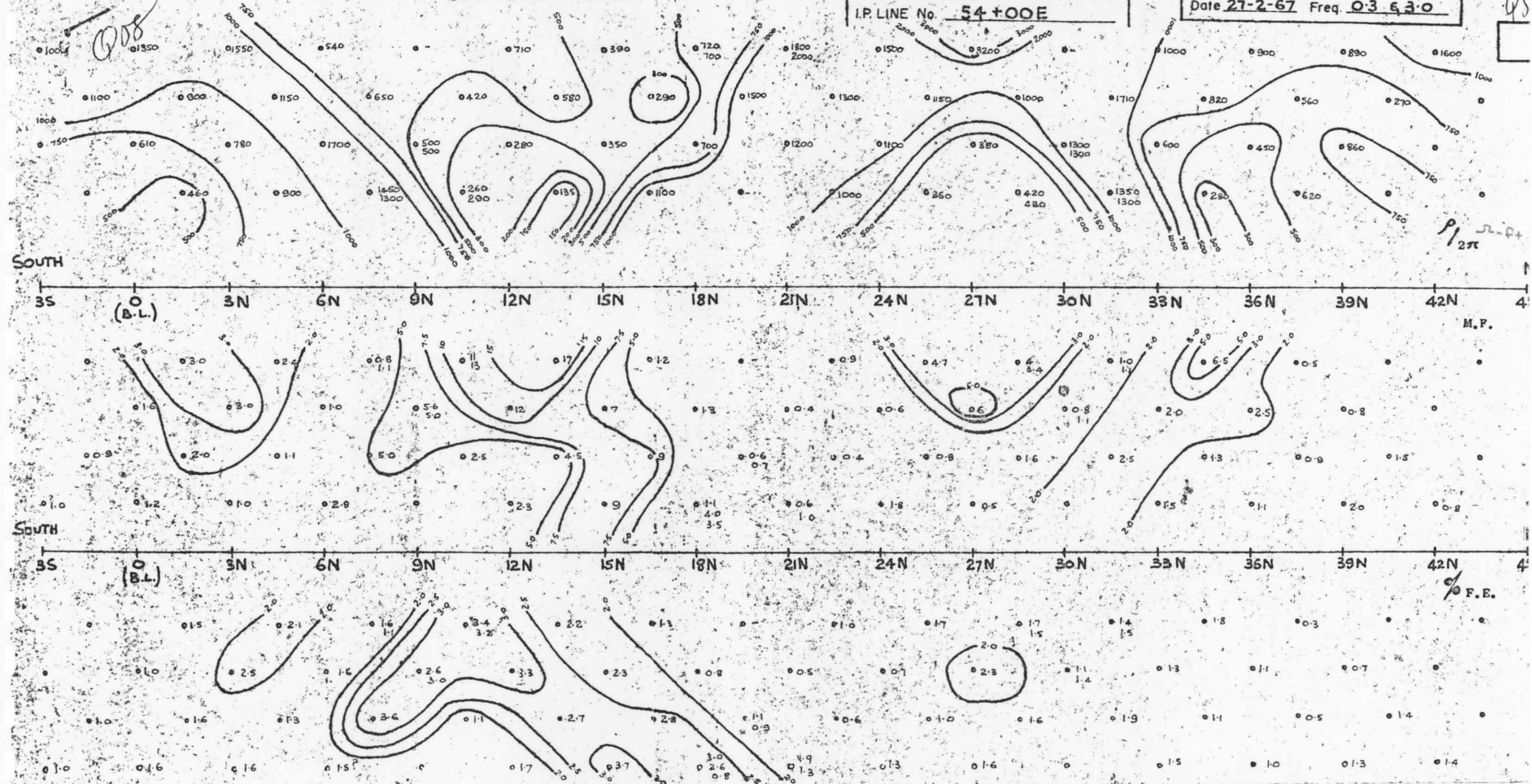
Roaring Meg Grid
Dipole - dipole IP
Pseudosection
Line 46E
Fig 11a

BHP/M688/10

LOOKING WEST

AREA ROARING MEG
I.P. LINE No. 54+00E

Scale 1" = 300'
Date 27-2-67 Freq. 0.3 & 3.0



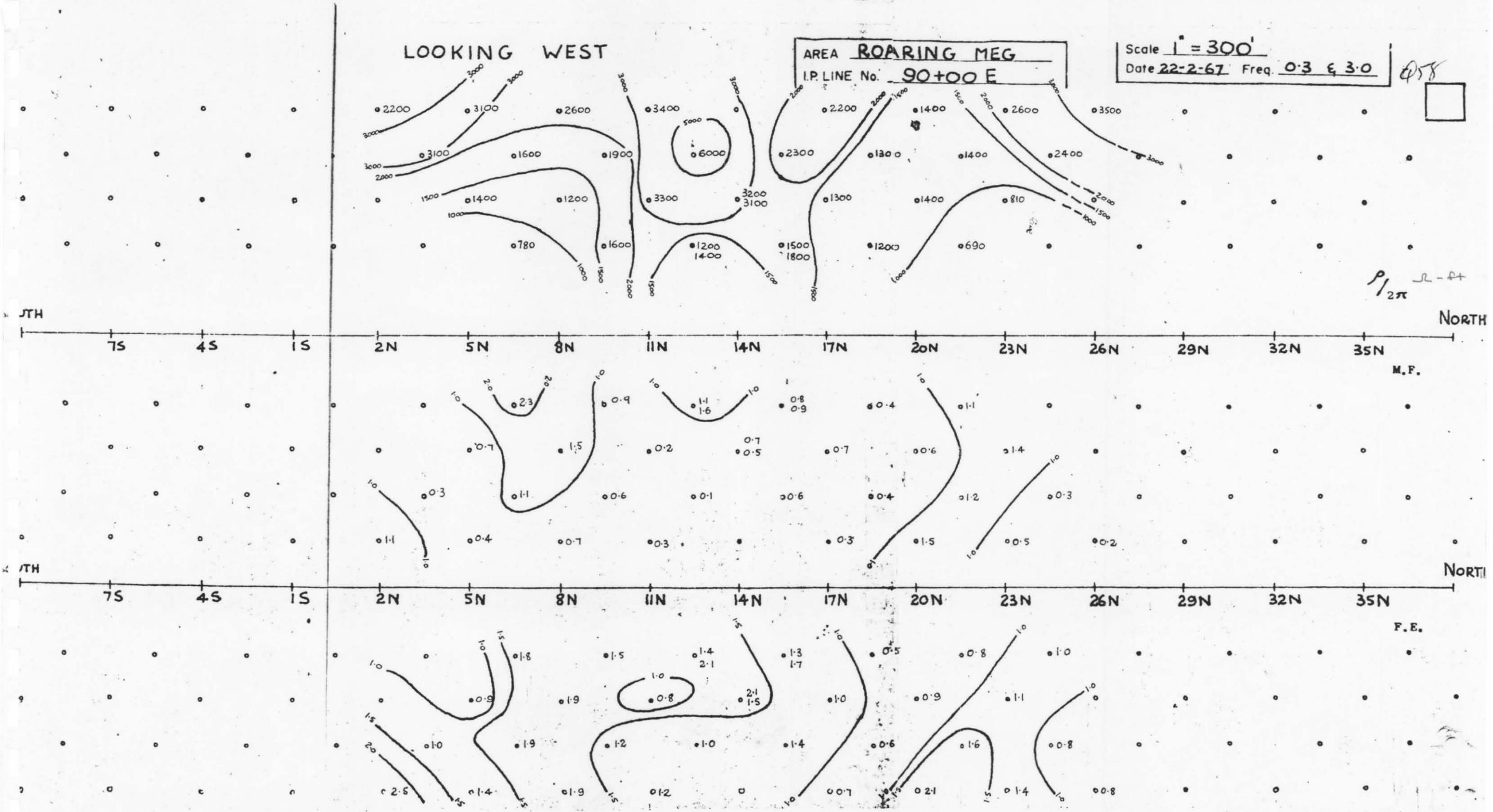
Roaring Meg Grid
Dipole - dipole IP
Pseudosection
Line 54E

LOOKING WEST

AREA **ROARING MEG**
I.P. LINE No. **90+00 E**

Scale $1'' = 300'$
Date **22-2-67** Freq. **0.3 & 3.0**

Q58



$\frac{P}{2\pi} \text{ } \mu\text{-ft}$

NORTH

M.F.

NORTH

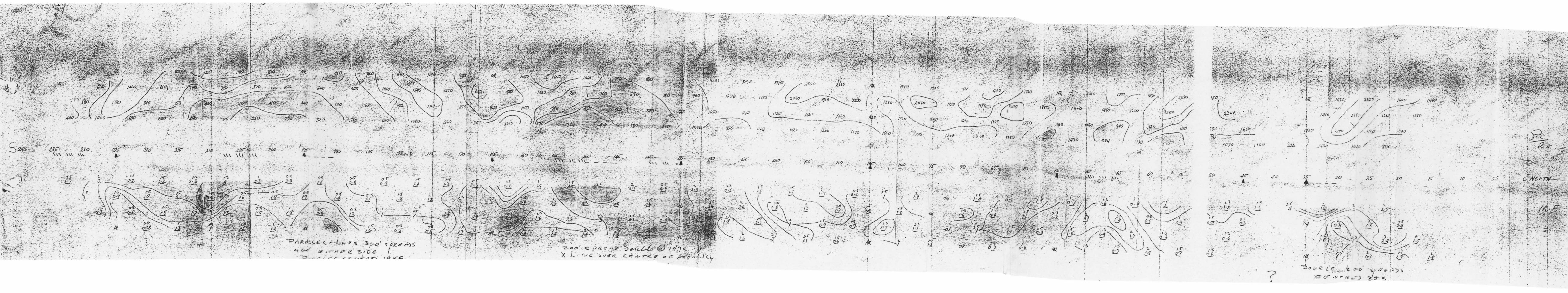
F.E.

Roaring Meg Grid
Dipole-dipole IP
Pseudosection
Line 90E

BHP/MG88/10

Fig 11c.





PARALLEL LINES 300' SPREADS
400' EITHER SIDE
DIPOLING 1965

200' SPREAD DOUBLE @ 1475
X LINE OVER CENTRE OF ANOMALY

DOUBLE 200' SPREADS
CENTRE @ 325

-1 MAY 1968

CLIENT	PICKLAND MATHER
Area	QUEENSBURY
Line	ROARING MEG
Spread	500 FT
Frequency	2.5 AND 0.3 CPS
Electrode	SINGLE ALFOIL
Mode	S-Z
Measured by	N.T.
Date	24-11-68

5 cm

CHECKED
INTERPRETED
DISTRIBUTED

1" = 500' 69306
Client: Picklands Mather
Area: Roaring Meg Line
dipole spacing: 500ft
date: 1968

BHP/MG88/10 Fig 12

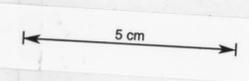
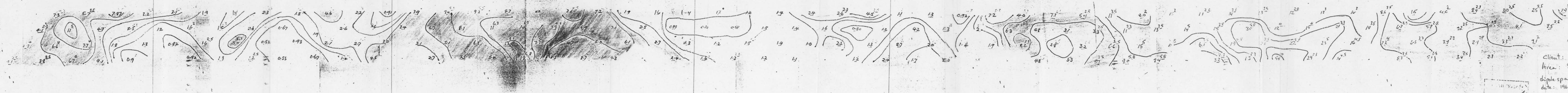
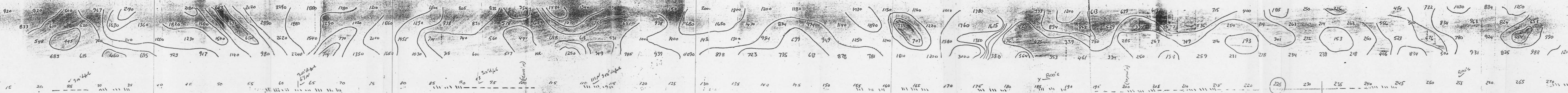
693069

Pa/2T

M.F.

< 200
200-300
300-500
500-750
750-1000
1000-1500

> 10
10-7.5
7.5-5
5-3
3-2
2-1.5



Client: Pickands Mather
 Area: Sedgwick Line
 dip spacing: 500 ft
 date: 1968
 BHP/M488/10 Fig 13



693070

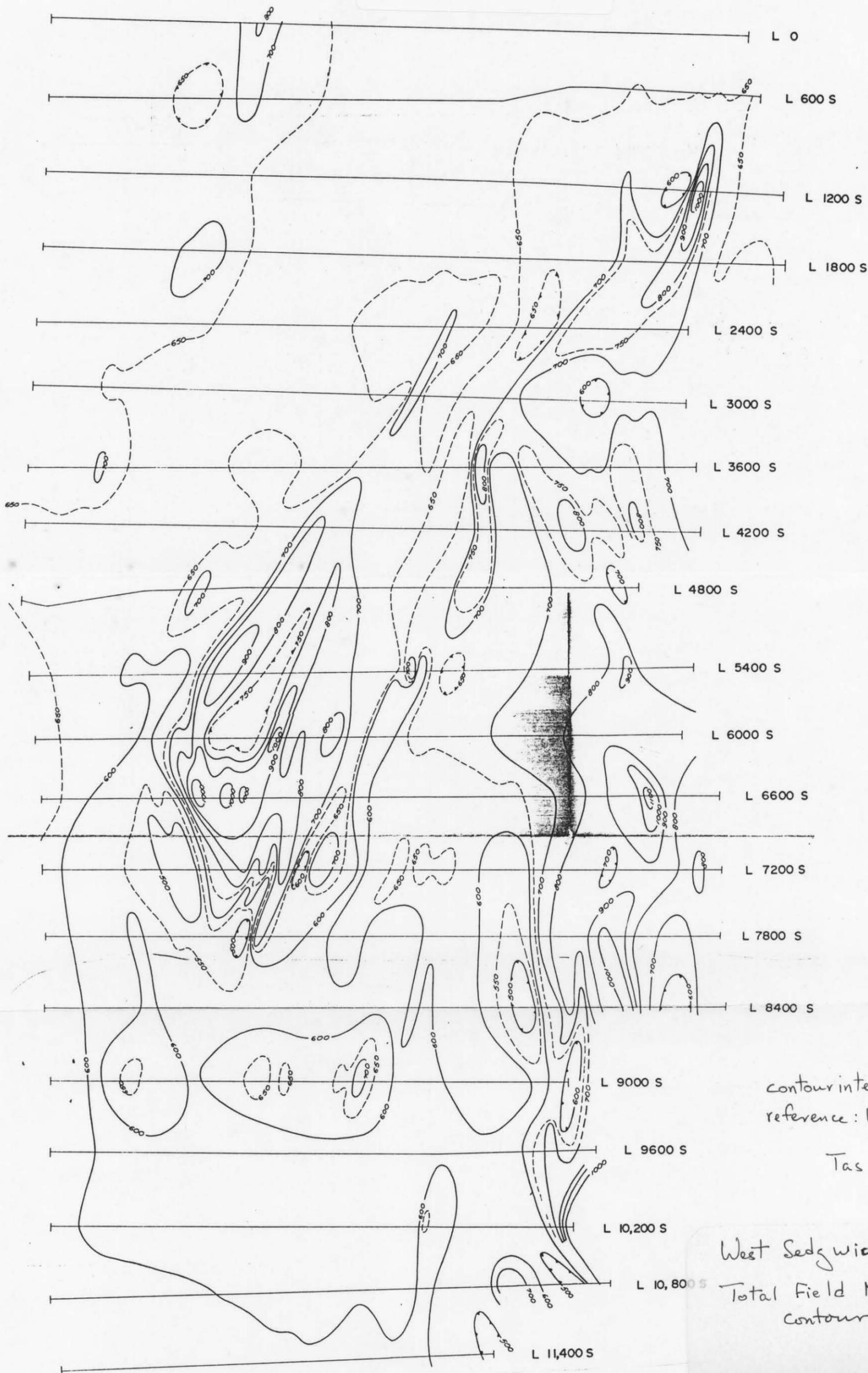
5 cm

Contour interval: 2.5ms
 (IPR-7 receiver)
 reference: Howland-Rose (1977)
 Tas-035B

West Sedgwick Grid
 Gradient Array
 chargeability contours
 scale ~1:10,000 Fig 14a

BHP/M988/10

5 cm



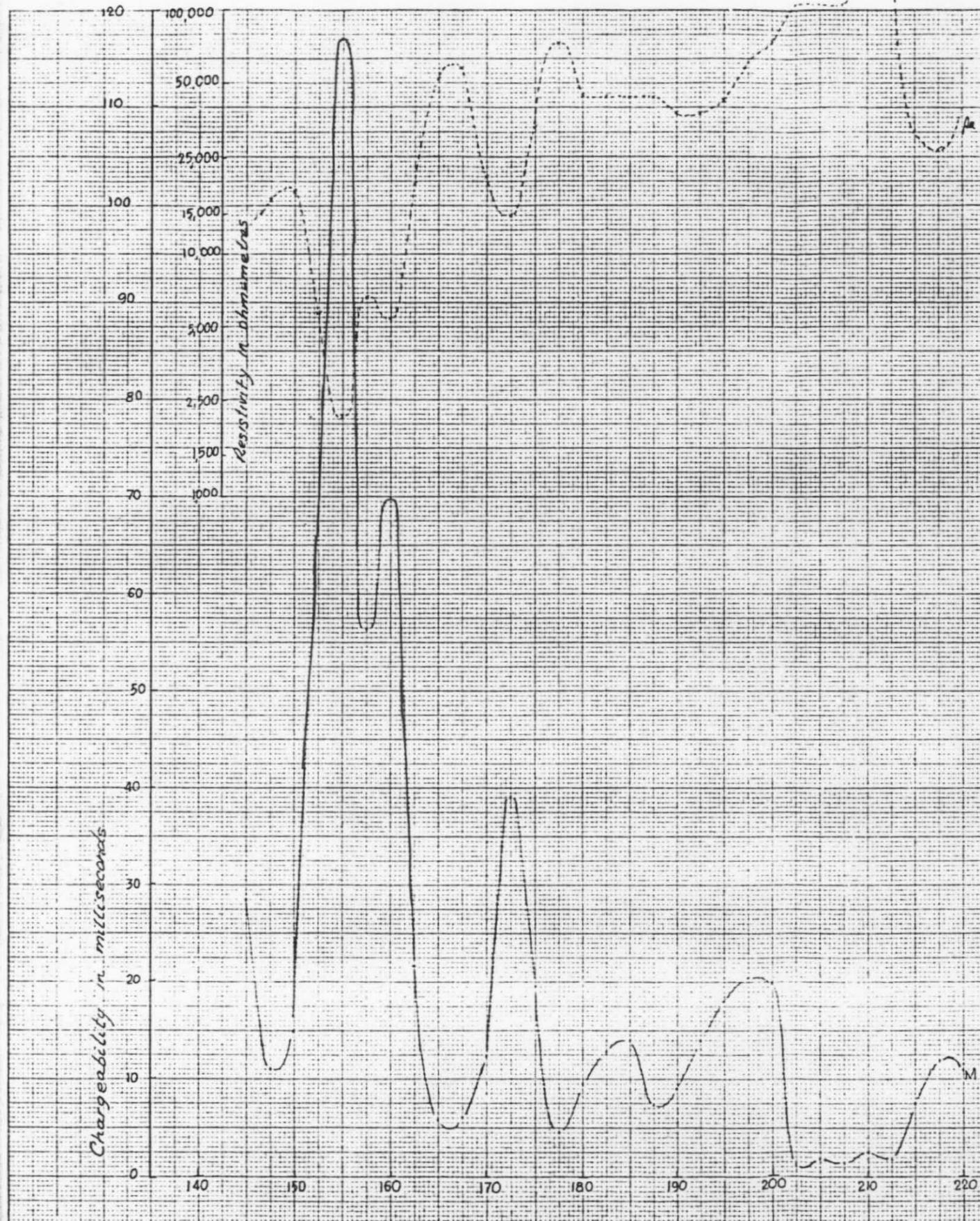
contour interval: 50 nt
reference: Howland-Rose
(1973)

Tas-018B

West Sedgwick Grid
Total Field Magnetic
Contours

scale ~1:10,000 Fig 14c

D.H. 3
West Sedgwick
Down hole I.P.
3 array
TAS-054-E

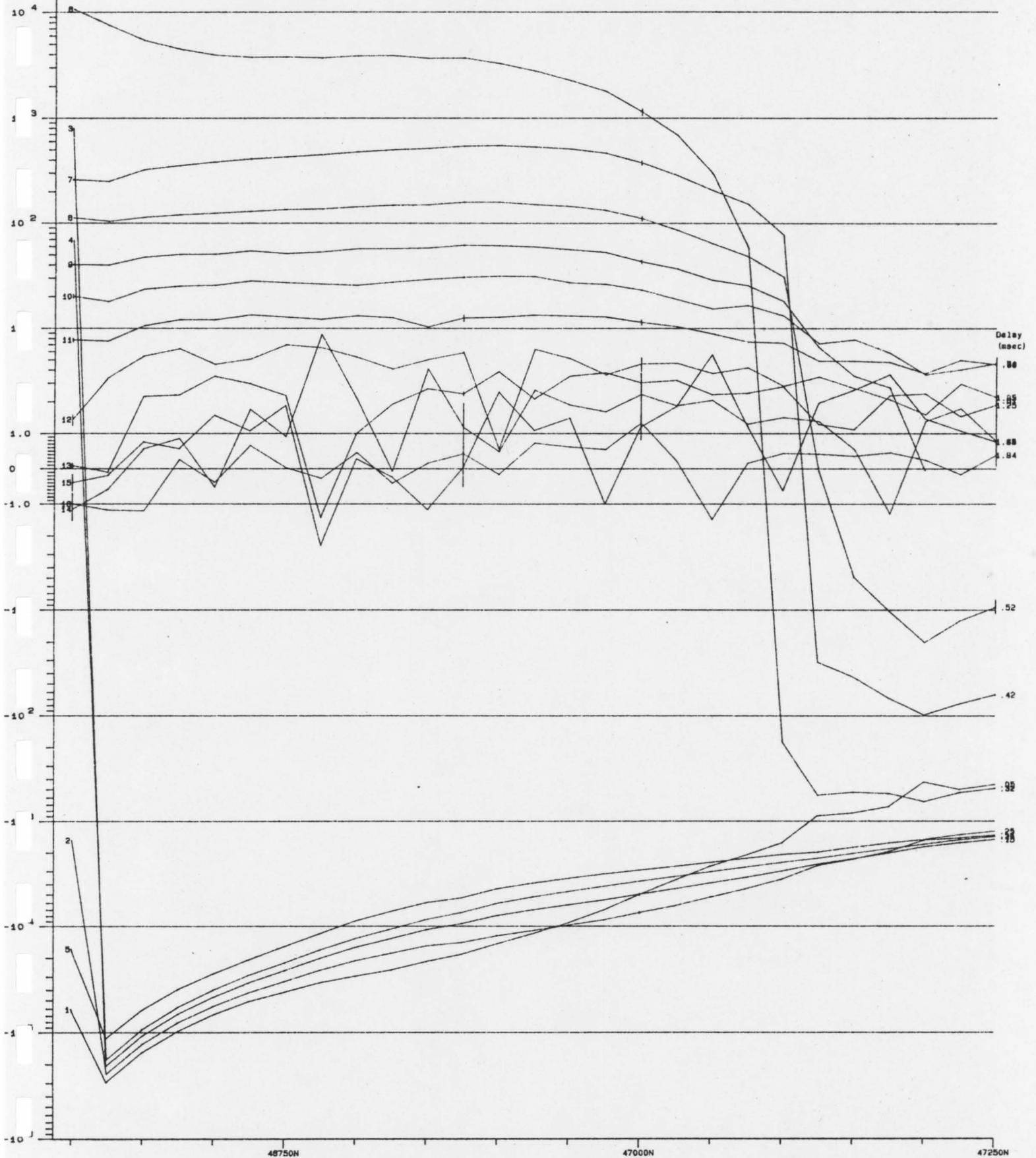


5 cm

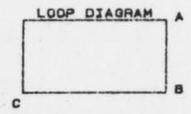
reference: Howland-Rose
(1978)

Tas-054E

West Sedgwick Grid
Down-hole IP
DDH-WS3



GOLDFIELDS EXPLORATION PTY.LTD.
 SEDGWICK (JOB NO.612K)
 ZIG-ZAG, EARLY TIMES
 LINE 381400E 700X300M 7.6AMPS
 SIROTEM Survey by SOLO Geophysics & Co. 9/ 5/86
 LINE : 1400 EAST Reading interval 25.0 m
 SCALE Loop size : 300 m
 LOOP configuration : Fixed loop
 Plotted : 2: 23 PM 23/ 6/86



- A = (46525N, 381800E)
- B = (46225N, 381800E)
- C = (46225N, 381200E)

Zig-Zag Hill Area
 Sirotem Profile
 Line 381400E



reference: Staltari (1986)

BHP/MG88/10

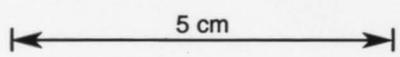
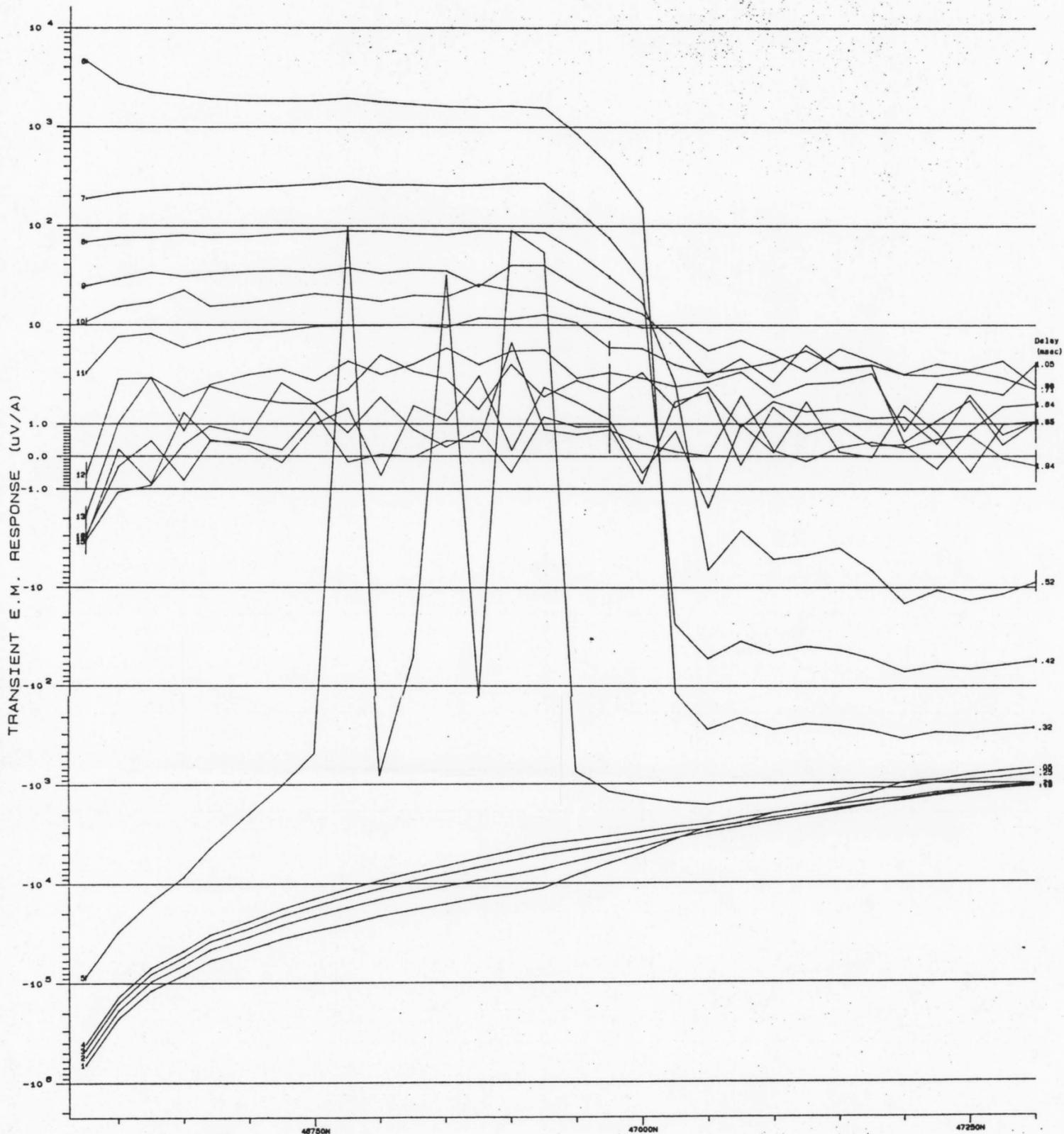
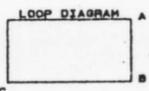


Fig 15a

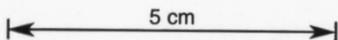


GOLDFIELDS EXPLORATION PTY.LTD.
 SEDGWICK (JOB NO.012K)
 ZIG-ZAG, EARLY TIMES
 LINE 381600E 700X300M 7.8AMPS
 SIROTEM Survey by SOLO Geophysics & Co. 8/ 5/88
 LINE : 1800 EAST Reading interval 25.0 m
 SCALE Loop size : 300 m
 LOOP configuration : Fixed loop
 Plotted : 2:29 PM 23/ 8/88

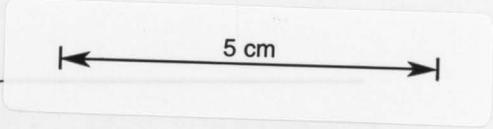


A = (46822N, 381600E)
 B = (46822N, 381800E)
 C = (46822N, 381200E)

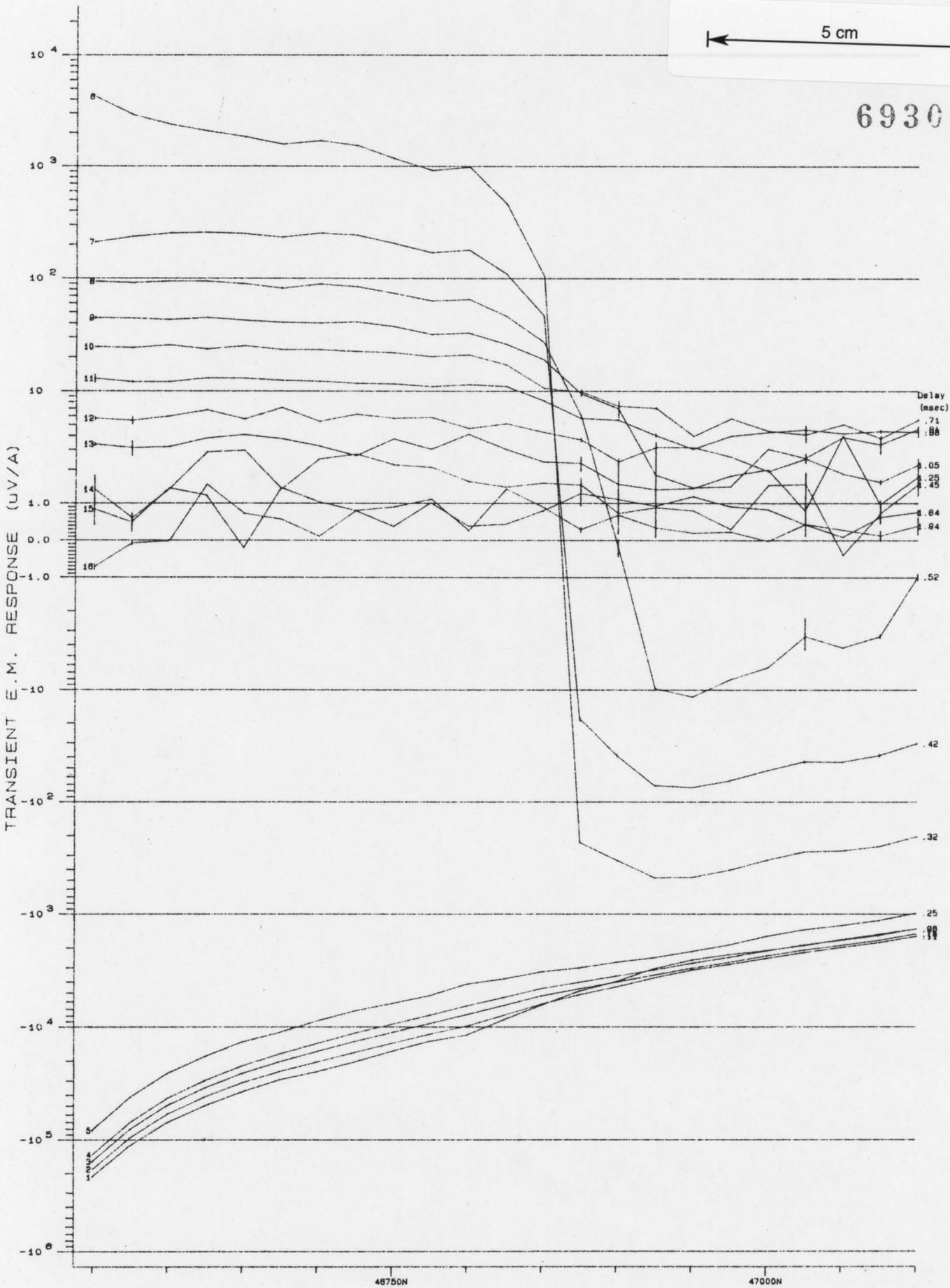
SOLO



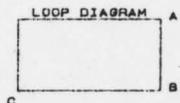
reference : Staltari (1986)
 Zig-Zag Hill Area
 SiroteM Profile
 Line 381600E



693076



GOLDFIELDS EXPLORATION PTY.LTD.
 SEDGWICK (JOB NO.812K)
 ZIG-ZAG, EARLY TIMES
 LINE 381800E 700X300M 7.5AMPS
 SIROTEM Survey by SOLO Geophysics & Co. 8/ 5/86
 LINE : 1800 EAST Reading interval 25.0 m
 SCALE Loop size : 300 m
 LOOP configuration : Fixed loop
 Plotted : 2:37 PM 23/ 8/86



A - (46525N, 381800E)
 B - (46225N, 381800E)
 C - (46225N, 381200E)

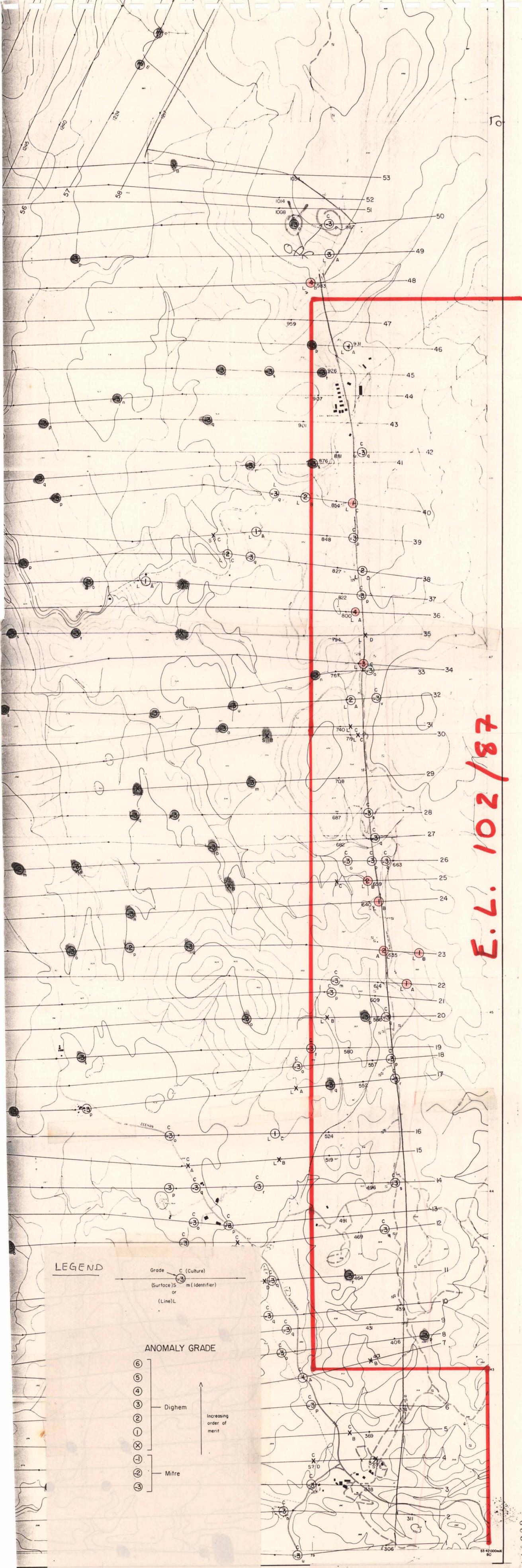


Zig-Zag Hill Area
 Sirotem Profile
 Line 381800E

reference : Staltari (1986)

BHP/M688/10

Fig 15c.



E.L. 102.787

LEGEND

Grade C (Culture)
 (Surface) S or (Line) L
 m (Identifier)

ANOMALY GRADE

6
5
4
3 — Dighem
2
1
0
-1
-2 — Mitre
-3

↑
Increasing order of merit

5 cm

Reference: Bishop (1981)
 ML/MG 81/07

DIGHEM REINTERPRETATION
 HENTY-YOLANDE
 DIGHEM AND MITRE ANOMALIES

BHP/MG 88/10

Fig. 16

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