

479001

*DESC*

**MICROFILMED**

ELECTRICAL INDUCED POLARIZATION SURVEYS  
OVER THE CROSBY CREEK PROSPECTS  
EL 19/72, NORTHERN TASMANIA  
ON BEHALF OF  
C.R.A. EXPLORATION PTY. LIMITED

PRIVATE AND CONFIDENTIAL

ELECTRICAL INDUCED POLARIZATION SURVEYS  
OVER THE CROSBY CREEK PROSPECTS  
EL 19/72, NORTHERN TASMANIA  
ON BEHALF OF  
C.R.A. EXPLORATION PTY. LIMITED

BY

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

SYDNEY, N.S.W.

DECEMBER, 1975

TAS - 030A

## CONTENTS

Summary	
Introduction	Page 1
Method and Equipment	Page 2
Presentation of Results	Page 6
MAIN GRID	
Discussion of Results	Page 7
Conclusions and Recommendations	Page 21
EXTENSION GRID	
Discussion of Results	Page 25
Conclusions and Recommendations	Page 33
General Conclusions on Crosby Creek	Page 35
Plate 1 - Gradient Array and Magnetic Field Data Profiles, Main Grid	1-2 SHEETS
Plate 2 - Resistivity Contour Plan, Main Grid	
Plate 3 - Chargeability Contour Plan, Main Grid	
Plate 4 - Interpretation Plan, Main Grid	
Plate 5 - Detail Work, Data Profiles, Main Grid	
Plate 6 - Data Profiles, Extension Grid	

TRANSPARENCIES HELD.

**SCINTREX PTY. LTD.**

Formerly

**SEIGEL ASSOCIATES AUSTRALASIA PTY. LTD.**

GEOPHYSICAL CONSULTANTS AND CONTRACTORS

**SUMMARY**

*The electrical induced polarization survey carried out over the Crosby Creek grids, together with down-hole work, revealed that a number of the geological units in the area have high induced polarization backgrounds.*

*A number of the major induced polarization responses located appear on first examination to be related to significant lead soil geochemical anomalies, and therefore warrant further investigation by diamond drilling providing further consideration of the geological structure confirms their possible economic interest.*

*The definition of chargeable responses from non-economic sources does not detract from the merit of this prospect in any way. It does mean, however, that exceptional care must be exercised in selecting the drill targets.*

004

A REPORT ON  
GRADIENT ELECTRICAL INDUCED POLARIZATION SURVEYS  
OVER THE CROSBY CREEK PROSPECTS  
EL 19/72. NORTHERN TASMANIA  
ON BEHALF OF  
C.R.A. EXPLORATION PTY. LIMITED

---

*INTRODUCTION*

A Scintrex Pty. Ltd. field party under the leadership of Mr. S. Baggott, B.App.Sc. (Geophys.), undertook an electrical induced polarization survey over the Crosby Creek grid area on some 20 production days between 13th November and 9th December, 1975. Additional detail including down-hole logging, electrical soundings and pole-dipole was also carried out.

These surveys were performed at the request of Mr. G. Jenke (Geophysicist) and Mr. M. Kirton (Chief Geophysicist) of C.R.A. Exploration Pty. Limited. The former provided on site geophysical direction, while the overall geological direction was undertaken by Mr. T.M. Porter, Regional Geologist for the area. The author visited the area on 25th November, 1975.

The objective of the survey was to search for and map induced polarization responses typical of lead-zinc mineralisation, with the West Coast deposits being the "Type" deposits. The

main electrical characteristics expected will be that of chargeability, with *perhaps* some decrease in apparent resistivity. Lead-zinc deposits are typically not seen to be significantly more conductive than the enclosing host rocks, especially in areas subject to oxidation.

#### *METHOD AND EQUIPMENT*

The major components of the equipment used, consisted of two Scintrex IPR-7 induced polarization receivers and a Scintrex 2.5KW time domain transmitter.

A very simple explanation of the parameters measured in the gradient survey follows. This description is designed specifically for the geologist in order to give a *visual picture* of the parameters measured.

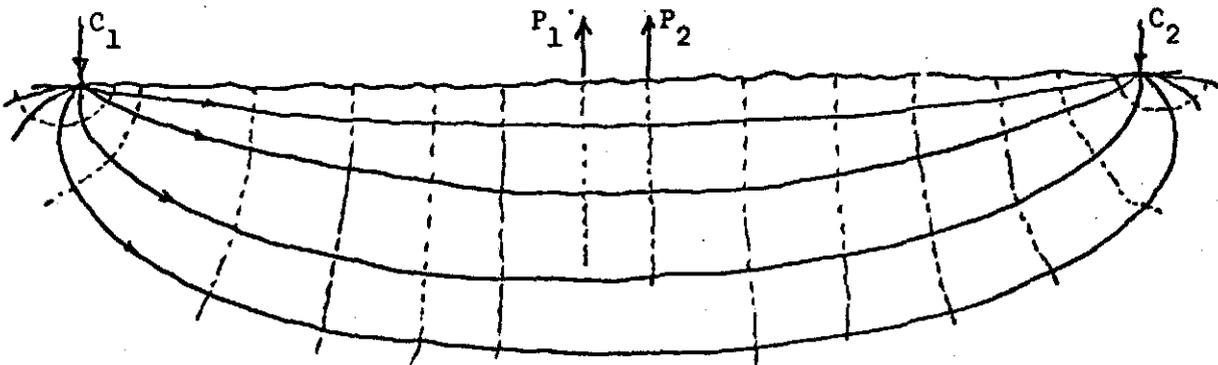
In the case of the gradient array, the potential dipole records the electrical properties of the material defined by the two equipotential *surfaces* tapped by the potential electrodes. This is diagrammatically illustrated in Figure 1(A). This diagram represents a *section*, however, it should be realised that the apparent resistivity measurements also record information *sideways*. For a three dimensional picture of the volume sampled, rotate the section *into* and *out of* the plane of the paper by 90°. Within the centre section of the array the data represents the characteristics of the

006

ELECTRICAL PARAMETERS MEASURED

(A) RESISTIVITY MEASUREMENT

(taken during current 'on' time)



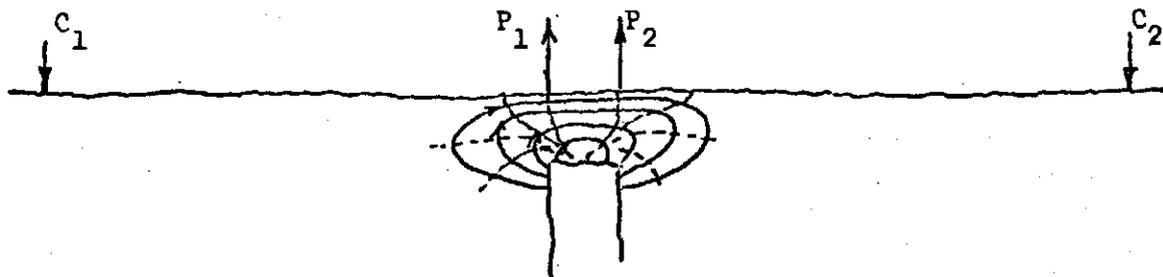
MEASUREMENT REPRESENTS:

*ease with which primary current moves through ground*

primary current flow  
 primary equipotential surface

(B) CHARGEABILITY (IP) MEASUREMENT

(taken during current 'off' time)



MEASUREMENT REPRESENTS:

*discharge of stored energy*

secondary current flow  
 secondary equipotential surface

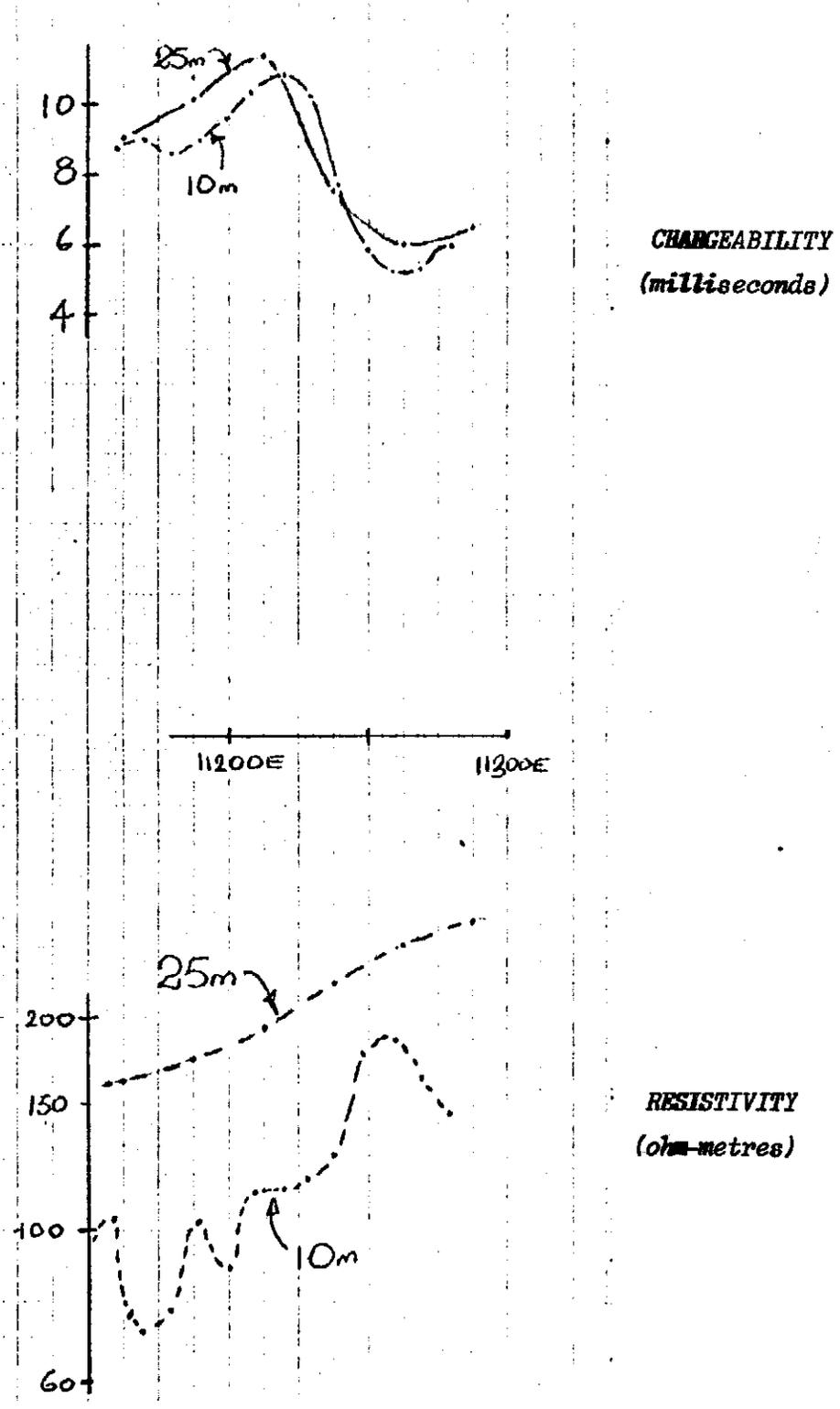
FIGURE 1

rock units *immediately below* and *immediately at right angles* to the survey line. The degree of *resolution* depends on the potential *dipole width*, the smaller the dipole the greater the resolution. Diagram 2 (the resistivity data) demonstrates the much improved resolution for a 10 metres dipole over that obtained from a 25 metre dipole over a sulphide occurrence whose characteristics will be similar to the target mineralisation. It is important to remember when examining the data that only the *gross* properties are "seen". The potential dipole cannot resolve units whose effective width is less than half the size of that dipole.

The criteria affecting the chargeability reading are somewhat different. In diagram 1(B) the decay of a chargeable section is shown. The passage of current during the *current-on* phase, during which the resistivity measurement was taken, carried some energy to be stored in the rocks (and sulphides etc.), through which it passed. On cessation of this imposed current flow, the energy so stored will discharge (IP). It will set up its own equipotential field as shown in Figure 1(B) which will be detected by the same two potentials which measured the resistivity. It should be noted that any chargeable source will have a width *greater than* the source due to the curvilinear nature of the discharge of the stored energy. It should be further noted that the volume defined by the *secondary potential field* caused by this discharge is *not necessarily*

008

IMPORTANCE OF RESOLUTION



**CHARGEABILITY**  
(milliseconds)

**RESISTIVITY**  
(ohm-metres)

FIGURE 2

*identical* to that defined by the primary equipotential field. Figure 2 shows the differences in resolution for *chargeability* (top profile) over a known sulphide occurrence. The *form* is similar, but the positional information is far superior due to the more frequent reading interval.

In the present survey, anomalous responses due to fences were clearly resolved using a 5 metre dipole in the vicinity of the fence, but appeared as valid responses on the 20 metre dipole. (See Plate 5).

This array has operational attributes which result in rapid coverage and excellent positional information. However, depth information is not well defined, it being possible only to assess "maximum depths".

With regard to the interpretation of the gradient array data the following comments may prove to be of assistance.

In the gradient array the source of the reading lies between the two equipotential surfaces tapped by the two potential pots employed. For the most part then, when working in the centre section of a gradient array, the source will be "immediately below" the potential dipole used. The reliability therefore of *positional information* with gradient array is excellent, however, the depth at which the response occurs

is difficult to assess with accuracy. The *maximum depth* can be estimated from a consideration of the profile shape, but the accuracy of this approach will depend on a minimal potential dipole length, and of course sharp boundaries to the body. The *resolution* therefore is not better than half of that dipole. Therefore maximum depth of the order of 10 metres may in fact either outcrop or sub-outcrop when a 20 metre potential dipole is used. Some moving source array would be required to obtain an *accurate depth estimate*.

Similarly the width of bodies is not easy to determine for zones having a width less than half the dipole spacing used. Thus, estimated maximum widths are educated guesses at best for narrow zones. However, wider bodies can be resolved more accurately.

The *attitude* of a chargeable zone can only really be gauged with any precision in the centre of the gradient array, and of course where the body has strongly contrasting chargeability and apparent resistivity to that of the enclosing rock units.

All field measurements were taken between slope distances along lines. This will, in steep areas, produce errors in the calculated apparent resistivity data. However, these errors will be arithmetic, and as significant changes in resistivity are logarithmic, this source of error is not

significant. In assessing the position of the source in areas of extreme terrain, it does not lie vertically below the plotted position, but *normal to the "local slope"*. All positions in the text refer to source positions normal to the local slope.

Each current dipole block should be considered separately. As would be expected, the continuity along strike is generally good, especially in the chargeability data. However, "end on" current dipole blocks cannot be expected to give identical data due to the different base levels of the current dipoles and, in zones close to the current poles, the data will not sample identical volumes on the overlap between current dipoles. This phenomenon will result in more extreme divergence of data as the current dipole is approached. However, these factors are entirely predictable.

#### PRESENTATION OF RESULTS

The data profiles are displayed at the following scales:-

Horizontal      1:2000 (nominal) pot holes used for the potential electrodes being the soil sample positions.

Vertical          The resistivity data is displayed on a five

centimetre log scale in ohm-metres, while the chargeability used a scale of 1 centimetre =  $2\frac{1}{2}$  milliseconds. As the L/M ratios were (with rare exceptions only) normal, these have not been plotted. The vertical magnetic field was displayed at the scale of 1 centimetre = 100 gammas.

Two grids were surveyed at Crosby Creek, the *Main Grid* being approximately magnetic north-south oriented, and the *Extension Grid* being approximately north-east/south-west oriented and situated on the north-west flank of the Main Grid. Each grid area is discussed separately.

## MAIN GRID

### DISCUSSION OF RESULTS

Plate 1 displays the data profiles while Plate 5 displays the detail work, including electrical soundings, down-hole log and pole-dipole.

The data on the Main Grid showed reasonably good correlation between adjacent lines in both chargeability and resistivity. This data has been contoured and is presented in Plates 2 and 3. Plate 4 represents an interpretation of the apparent resistivity and chargeability data on a geophysical basis,

and as such is presented as a guide to the production of a more complete geological map rather than presented as a unique solution.

The general strike of the area as ascertained from significant induced polarization and resistivity features is grid east-west. The background apparent resistivities range from 500 to 700 ohm-metres in the centre section while resistivity rises to over 2000 ohm-metres to the west and south. The background induced polarization varies between 4 and 6 milliseconds.

*The electrical properties in and around drill hole DD75 CC1*

Prior to discussing the area as a whole, it is wise to consider the geophysical properties in and around drill hole DD75 -CC1 which was drilled on section <sup>76/SE</sup> 75/5E at about 7340N on a zero magnetic azimuth to the north at  $-50^{\circ}$ .

On the gradient lines, a broad zone of anomalous induced polarization response of about 10 milliseconds above background was recorded over lines 75E and 76E between about 7300N and 7470N (Plate 1). An electrical sounding carried out on 76E at 7330N along the strike of the high chargeability zone (Plate 5) infers a resistive zone of about 4000 ohm-metres at a depth of about 20 metres under a more conductive (800 ohm-metres) surface layer. The layer of high chargeability appears to be quite shallow at this point, perhaps as shallow as 3 to 5 metres.

A three-array down-hole log was run from about 50 metres to 240 metres downhole. This log will record the properties of the rock for a radius of about 2 metres around the hole and for 1 metre above and below the plotting point. This log clearly shows two zones of high chargeability within the hole.

The first was centred at about 60 metres down hole and was recorded from within a resistive 4000 - 6000 ohm-metres source. This response arose from the diorite and no possible causative material can be identified within the diorite core. A second zone was located within the hole, also from a more resistive unit. The negative polarisation currents were observed between 240 metres to 270 metres and were seen by both the 5 metre and 20 metre logs. This anomalous section coincides with black shales.

crystal tuff (IP tuff)	202.5 - 263.4
black shale	263.4 - 266.9
fine green silic tuff	266.9 - 279.8

The above information is of vital importance in evaluating the data from this grid. The chargeable section some 10 metres or so in width from within the diorite unit, clearly demonstrates that although the entire diorite unit is not chargeable, (only 10% was), chargeability *can* arise from within this unit.

Secondly, although the chargeabilities recorded from within the shale unit were *negative*, the shale unit may in places also be chargeable. Now, with regard to the latter, the classic lead-zinc areas on the west contain black chargeable shale sequences in close proximity to lead-zinc deposits in most cases. Most often the chargeable material is finely disseminated

pyrite *and not* graphite that is the source.

The detailed data described above shows that *all* induced polarization responses in this grid area may be due to either a chargeable horizon within the diorite *or* within the shale zone. Therefore any drilling programme must be augmented by a logging device to ascertain the degree of chargeability down hole on a progressive basis or if this is not possible, core samples should be tested *on site* for chargeability on samples in the wet, undessicated state. These procedures will ensure that any induced polarization response drilled can be evaluated immediately. I would also suggest that should "*many*" of the induced polarization responses located be considered worthy of further investigation by diamond drilling by virtue of their associated geochemical haloes, then a greater number of shorter holes could be drilled until the source material is unambiguously identified (by core logging, or preferentially by down hole three-array logging).

With respect to the induced polarization response in the vicinity of the geochemical anomaly located down hole at about 120 metres, there was a clear, well defined response of about 6 milliseconds above background over this zone, and the L/M ratio tended to show some depression. The form would infer a bulk percent sulphide by volume of the order of  $\frac{1}{8}$  over this section, and a somewhat coarser than normal grain size. The 20 metre log tends to mirror this picture. From the two

it would appear that within 20 metres of the hole, the mineralisation is not significant. However, as a *single peak* was observed, it is also true to say that should significant mineralisation be present in the vicinity, it would be at a distance greater than 20 metres from the hole. Perhaps at a later date, three-array logs should be run just over this section at spacings *greater than 20 metres*.

In summary, the author considers that the existence of chargeable horizons whose sources are "*resistive*" and therefore capable of causing surface signatures similar to classic lead-zinc bodies, in no way detracts from the merit of this prospect. What it does mean is that the targets must be much more carefully selected, and that core or hole logging are essential to save unnecessary drilling, and to unambiguously define sources.

#### *The Contour Interpretations*

The procedure adopted in the construction of the chargeability and resistivity contour maps was by the matching of adjacent profiles. On the whole this worked well in the area. Those areas where adjacent profiles do not match, are interpreted as being due to faulting, folding or intrusives. Such discontinuities on these areas are marked as "*discontinuities*", as faults, folds and intrusives cannot be unambiguously differentiated.

The less resistive portions of the grid appear to coincide with the sections mapped as microdiorite, while the most resistive sections coincide with tuffaceous shales (Enls &  $\pi$ ) and the rhyolite tuff ( $\chi$ ) group. In the case of the more chargeable units, most appear to be within areas mapped as diorite, while some occur coincident with, or in close proximity to, shale (S) horizons. Thus, by a cursory investigation only, most, if not all, anomalies *could* be explained away by their proximity to zones known from the drill log to have chargeable sections.

*Description of significant induced polarization anomalies. These are displayed alphabetically on the interpretation plate.*

**ZONE 'A':-** This anomaly, seen on only the two most eastern lines, is open to the east. The anomaly peaks at 7660N on line 83E and 7665N on line 84E. Both occur over much reduced apparent resistivity zones, while on line 84E there is a single 2 to 3 times background geochemical value. This zone from a geophysical standpoint has the correct signature and is assessed to be of tertiary/secondary geophysical interest on line 84E, and on lines 83E is of secondary interest.

**ZONE 'B':-** A sharp 8 millisecond anomaly on line 83E at 7530N is correlated with a similar response at 7490N on line 84E. At both these locations there is a definite depression

in apparent resistivity. The mapped geology over this anomaly is diorite (X), therefore caution will have to be exhibited in assessing this anomaly. The maximum depth to the source on both lines is considered to be of the order of 40 metres. From a geophysical standpoint Zone 'B' is assessed to be of primary/secondary interest on line 83E and of secondary/tertiary importance on lines 84E.

The anomaly lies within a zone of high geochemistry (100ppm lead) but of perhaps far greater significance are the extremely high values of 340ppm and 500ppm which occur on strike to the west on lines 82/5E and 82E at about 7540N and 7550N respectively.

**ZONE 'C':-** Small responses of 2 to 3 milliseconds above a moderate background were observed on lines 84E and 83E at 7300N and 7290N respectively. Both are coincident with slight reductions in apparent resistivity. This minor response is within an area mapped as rhyodacite, but on lines 83E and 83/5E is coincident with somewhat higher than background geochemical indications (170 and 140ppm in lead, respectively). The maximum depths to the source could be as little as 30 metres.

**ZONE 'D':-** One of the most significant induced polarization anomalies located in the area was defined between 7010N and 7080N on line 84E. A very minor decrease in apparent resistivity was noted over this section. The response correlates with a

much reduced one at 7050N on line 83E. The maximum depths to the sources are estimated to be of the order of 30 to 40 metres. The area in the vicinity of the anomaly has been mapped as microdacite (X). The geochemical correlation of this response is excellent, with values of 500 - 800ppm lead in close proximity to the peak chargeabilities. This anomaly is strongly recommended as a possible drilling target.

**ZONE 'E':-** A major geophysical response was recorded between 6840N and 6940N on line 84E coincident with a reduced apparent resistivity. This has been correlated to similar, but slightly lesser, responses at 6910N on line 83E, also coincident with a reduction in apparent resistivity. The source of the former (on line 84E) is considered wide (say 30 metres). The maximum depths are of the order of 30 to 40 metres. The geology has been variously mapped as tuffaceous shale (S) and microdiorite (X), both of which *may* be the source of the chargeability. Unfortunately there is no geochemical data over this zone. Basalt.

**ZONE 'F':-** This geophysically significant induced polarization zone was recorded over lines 82E (perhaps), 81E, 80E, 79E, 78E, and 77E at 7590N, 7600N, 7630N, 7600N, 7610N and 7580N respectively, where their importance is judged to range between tertiary (line 82E) to primary (lines 81E and 80E). The maximum depths to source have been interpreted as varying from 30 to 45 metres. Invariably the increased chargeability is accompanied by a decrease in apparent resistivity. This reaches its greatest extent on line

80E where a reduction of about 90% to about 200 ohm-metres was recorded. From a geophysical point of view this zone has all the characteristics of a typical lead-zinc sulphide horizon. Of particular interest is the *much reduced* resistivity *combined with* high chargeability on line 80E. (In spite of the proximity of the fence at 7650N, the anomaly is considered valid at this point.

The general form of the anomaly suggests a south dip, particularly on line 80E, but this is subject to a number of variables.

(See section on method).

The geological mapping suggests a fault crosses Zone 'F' between lines 78E and 79E, while the chargeability data infers a similar dislocation, but at a different angle. If the displacement was substantial and sinistral then anomaly 'G' may be related to the easterly portion of "F", rather than as now interpreted.

Over most of this zone, microdiorites (X) have been mapped and thus caution will have to be exercised in the selection of drilling targets on this zone.

A substantial 460ppm soil response occurs some 50 metres west of the peak chargeability response at 7600N on line 81E, but *still within* the anomaly as a whole. On line 80E the best chargeability response was recorded for this zone, but

with no direct geochemical correlation, although much increased values were recorded along strike to the east and west.

On 78E the zone was only some 20 metres or so north of soil geochemical values of the order of 480ppm in lead.

In summary, this zone from a geophysical standpoint is one of the most interesting. Should the substantial sub-parallel lead soil geochemical values be able to be correlated via structure, this would be one of the best potential targets. The proximity of potentially chargeable microdiorite however, requires cautious assessment.

**ZONE 'G':-** This response was recorded on lines 79E, 78E and 77E at 7520N, 7500N and 7505N respectively. The most significant response was recorded on line 78E where a 8 millisecond anomaly within a high background is considered of primary interest. The depth to source is assessed to be of the order of 30 to 40 metres.

The geological mapping along the zone indicates the presence of microdiorite (X), a unit which potentially has chargeable horizons within it. On line 79E, high (560ppm) geochemical values were observed to the immediate south of the chargeability response, while on line 78E a substantial 470ppm soil value in lead was recorded to the immediate south of the peak. As the profile form suggests a north dip, this anomaly is considered worthy of consideration as a possible drilling target. On line

77E the anomaly is, from a geophysical point of view, considered of secondary interest only. However, the very marked 800 - 1000 ppm lead geochemistry marks this zone as of major potential economic interest.

**ZONE 'H':-** A significant chargeability zone was located on lines 79E and 80E and is open to the west and *may* be cut off to the east by a fault. (See Plate 4). The profile form is interpreted as two sub-parallel zones on line 79E at 7100N and at 7130N and on line 80E at 7130N and 7170N respectively. All are associated with a marked decrease in apparent resistivity, which in the case of the anomaly on line 80E at 7170E is 75% below background. The depth to the disseminated, or if massive, electrically discontinuous source is about 45 metres on line 79E and 25 metres on line 80E.

The mapped geology under these anomalies consists of tuffaceous shales (S) over the actual chargeability high, with microdiorite (X) being on the northern flank. The geochemical data shows high (200 - 500 ppm) lead coincident with this anomaly. Thus, the induced polarization response is strongly recommended as a possible drill target on the southern-most zone on *either* line 79E or line 80E.

**ZONE 'I':-** The source was recorded on line 78E at about 7180N and is associated with *increased* apparent resistivity. The

023

anomaly is open to the south and west and is cut off to the south by a proposed fault. Should this dislocation be dextral this anomaly *may* form part of Zone 'H'. Unlike Zone 'H' the mapped geology included rhyodacite ( $\pi$ ) in the area, although some shale (S) was recorded to the east along strike. The geochemistry coverage goes only as far west as 78E over this section, and no material response was seen on this line.

*geochem to west - 1/4*

**ZONES 'J' and 'K':-** These two zones form the northern and southern sections of a broad induced polarization high on lines 76E and 76.5E, while to the east and west they form distinct induced polarization highs. Both zones are "wide" and their sources are therefore of appreciable width. On most lines, reductions in apparent resistivity are seen, however, the source is considered to be weakly conductive at most. Zone 'J' is seen on lines 76.5E, 76E, 75E and 74E at 7380N, 7420N, 7410N and 7400N, and is considered to have secondary, secondary, tertiary and tertiary interest respectively. The depths to source range from 25 to 50 metres. Over the entire length of this anomaly, the mapped geology consists of microdiorite (X) which, in diamond drill hole DD75-CC1 has been identified as resistive chargeable material within the diorite unit. Unfortunately little detailed geochemistry is available over this section, and, what there is, is not encouraging. However, some 60 metres north, sub-parallel to Zone 'J', highly significant geochemistry was recorded. Only if the dip was shallow and to the south, could the two be related. The

geophysical data gives no indication of the dip of the source zone.

Zone 'K' is sub-parallel to and some 80 to 120 metres to the south of Zone 'J'. Over much of its length it cannot be resolved from Zone 'J'. The approximate centre of the wide anomaly was recorded on lines 77E, 76.5E, 76E, 75E and 74E at 7330N, 7320N(?), 7320N(?), 7340N and at 7310N & 7370N on line 74E, where their geophysical merit is assessed to be secondary, secondary, secondary/primary, secondary and secondary respectively. The estimated depth to source ranges from 25 to 40 metres. Only on line 74E at 7310N and 7370N does the anomaly have significant geochemical correlation of up to 500ppm lead. Further careful consideration will have to be given to this zone as microdiorite (X) has been mapped in the vicinity of the geochemical response also.

at) ZONE 'L':- On the northern flanks of lines 75E and 76E a 4 millisecond response with an associated 70% reduction in apparent resistivity was recorded centred at 7720N and 7750N respectively. The maximum depth to this disseminated source is considered to be of the order of 40 metres at most. This is the only induced polarization anomaly to be clearly associated with the rock unit mapped as Enlc - Agglomerate, ash flow, lapilli and crystal tuffs. No significant geochemical data is available over this section.

// IP tuff.  
- down hole  
results  
DB75CC1  
240-270.

025

**ZONE 'M':-** This zone was recorded on lines 69E, 70E, 71E and 72E at 7220N, 7220N, 7190N and 7190N where the geophysical merit of each anomaly was assessed to be secondary, secondary/primary, tertiary and tertiary respectively. The depth to source is considered to vary between 20 and 40 metres. Some low amplitude geochemical (75ppm) responses were recorded on the northern flank of this anomaly, however, on line 72E significant (200 -400 ppm) lead values were recorded. Careful follow-up is warranted. The entire unit occurs within the geologic unit mapped as rhyodacite.

**ZONE 'N':-** This zone, semi-parallel to Zone 'M' and some 60 to 80 metres north of Zone 'M', was recorded on lines 69E, 70E, 71E and 72E at 7275N, 7300N, 7250N and 7230N respectively, where their interest was assessed to be secondary for the most part. The entire zone appears to be in close proximity to fine rhyolitic tuff (fv). On line 70E the anomaly is of only tertiary geophysical interest, however, it coincides with a greater than 10 times (420-660ppm) background. Thus, this response is of possible economic significance on this line. On line 71E the coincident geochemical lead values reach a high 800 to 1000 ppm and therefore this anomaly is recommended for consideration as a drill target. On the most easterly line coincident geochemistry also occurs, but is of reduced amplitude.

**ZONE 'O':-** A small 3 millisecond response on line 70E at 7350N has been correlated to a more substantial (10 milliseconds)

response at 7350N on line 71E. On this latter line, some 60 metres to the south, geochemical values of up to 1100ppm were noted and may be related to this zone as on 70E the minor chargeability high was coincident with the same geochemical response.

**ZONE 'P':-** This is a broad zone, open to the west, is seen on four lines only and becomes increasingly wider to the east. The depth to source is estimated to be between 35 and 40 metres on all lines and the interest is considered secondary in all cases. Somewhat higher geochemical values were noted on the northern flanks of this anomaly on line 69E and 70E just north of 7500N. On line 71E the southern section of Zone 'P' is characterised by high background geochemical values only, however, a single response at 7510N is coincident with geochemical values of 400-600ppm and therefore warrants very careful follow-up, and perhaps even warrants a drill hole. The depth to source at this point is about 40 metres and the source is slightly conductive.

**ZONE 'Q':-** A small 5 milliseconds or so response from within a zone mapped as shale(S) was recorded at 7710N on line 70E. This response is of no material geophysical interest.

#### **CONCLUSIONS AND RECOMMENDATIONS**

- 1 - Some 16 to 17 induced polarization zones were defined on the main grid. All have essentially disseminated and/or

if massive, electrically discontinuous sources. These characteristics are as for the "typical" lead-zinc deposits on the West Coast.

- 2 - The work done down and around diamond drill hole DD75-CC1 clearly indicated that certain horizons within the diorite (10% in that hole), may be expected to be chargeable in places. Also, shale horizons may also be expected to show induced polarization effects in some sections.
- 3 - The location of induced polarization anomalies whose characteristics will not vary appreciably from those expected from lead-zinc mineralisation is not considered to detract from the merit of the property in any way. What it does mean is that each induced polarization zone must be very carefully assessed in the light of additional data such as geochemistry and rock outcrop prior to drilling the source. Further it means that on site core logging should be carried out ( and down hole logging also, if possible), to ensure that the source of each anomaly drilled is unambiguously located.
- 4 - The *size* of the induced polarization high *should not* be taken as being an indication of potential economic interest. It is only the associated geochemical data and geological structure which can decide this. In view of this, some 5 or 6 of the zones located stand out as warranting

028

investigation by diamond drilling in the authors opinion. These are Zones 'B', 'D', 'G', 'H', 'N' and perhaps 'P'. The particular line recommended is given in the table under (5) below.

5 - All significant anomalies are listed below.

- \* In proximity to geochemistry
- \*\* Coincident geochemistry
- \*\*\* Strong coincident geochemistry
- # Recommended for consideration as a drilling target

<u>Zone</u>	<u>Peaks</u>	<u>Depth</u>	<u>Geochemical Correlation</u>	<u>Geophysical Rating</u>
A	84E/7660N	40 metres	**	Ty/Sy
A	83E/7665N	30 metres	-	Sy
B	84E/7490N	40 metres	**	Sy/Ty
B#	83E/7530N	40 metres (25m)	***	Py/Sy#
C	84E/7300N	30 metres?	*	Ty
C	83E/7290N	30 metres?	*	Ty
D#	84E/7040N	30 metres	***	Py#
D	83E/7050N	40 metres	***	Sy
E	84E/6900N	40 metres	no data	Py/Sy
E	83E/6910N	30 metres	no data	Sy/Ty
F	82E/7590N	30 metres	**	Ty?
F	81E/7600N	45 metres	*	Py
F	80E/7630N	45 metres	*	Py
F	79E/7600N	50 metres	*	Sy

<u>Zone</u>	<u>Peaks</u>	<u>Depth</u>	<u>Geochemical Correlation</u>	<u>Geophysical Rating</u>
F	78E/7610N	40 metres	*	Sy
F	77E/7580N	40 metres (25m)	*	Sy
G	79E/7520N	30 metres		Sy/Ty
G#	78E/7500N	35 metres	***	Py#
G	77E/7505N	40 metres	***	Sy/Ty
H#	79E/7100N & 7130N	45 metres	***	Py&Sy#
H	80E/7130N & 7170N	25 metres	***	Py&Ty
I	78E/7180N	40-50metres	-	Sy/Py
J	76.5E/7380N	50 metres?	-	Sy
J	76E/7420N	?	-	Sy
J	75E/7410N	25 metres	-	Ty
J	74E/7400N	?	-	Ty
K	77E/7330N	40 metres	-	Sy
K	76.5E/7320N?	?	-	Sy
K	76E/7320N?	25 metres?	*	Sy
K	75E/7340N	40 metres	-	Sy
K	74E/7310N & 7370N	40 metres 30 metres	*** ***	Sy Sy
L	76E/7750N	?	no data	Ty/Sy
L	75E/7720N	40 metres	no data	Ty/Sy
M	69E/7220N	40 metres	no data	Sy
M	70E/7220N	30 metres	-	Sy/Py.
M	71E/7190N	20 metres	*	Ty
M	72E/7190N	20 metres?	***	Ty
N	69E/7275N	40 metres	no data	Sy

<u>Zone</u>	<u>Peaks</u>	<u>Depth</u>	<u>Geochemical Correlation</u>	<u>Geophysical Rating</u>
N	70E/7300N	40 metres?	***	Ty
N#	71E/7250N	40 metres	***	Sy#
N	72E/7230N	35 metres?	**	Sy
O	70E/7350N	?	**	Ty
O	71E/7350N	25 metres	*	Sy
P	69E/7470N	35 metres	no data	Sy
P	70E/7410N- 7500N	30-40 metres	-	Sy
P	71E/7400N- 7510N	40 metres	*	Sy
P	72E/7310N- 7420N	?	*	Sy
	particularly			
#?	71E/7110N	40 metres	***	Sy#?
Q	70E/7710N	20 metres	-	Ty

## EXTENSION GRID

## DISCUSSION OF RESULTS

This grid is situated to the north-west of the main grid and overlaps the most northerly sections of lines 69E to 71E. The lines are oriented north-east/south-west to cross the mapped geology at right angles. This was done to take account of the change in strike from east-west over the main grid to

north-west/south-east off the western section of the grid.

Although an approximate grid north-south strike can be inferred between some lines, on the whole the resistivity and chargeability data are not such as to permit an unambiguous contour interpretation. Therefore, suggested resistivity and chargeability correlations are made by numerals and letters respectively.

The reason for the non-correlation between lines is considered to be due to the limited strike length of each of the lenticular geological units on the grid, and their variable geophysical properties. In a number of cases the continuous zones suggested in the text may be *similar* sources which are semi-parallel and are of short strike length *e.g.* Zone 'A'.

Each line is discussed in detail below, but unfortunately no geochemical data is available to the author over this section, and thus reference is made only to the geology.

#### *LINE C800N*

West of about C850E, the background chargeabilities remain at about 12 to 15 milliseconds, while to the east of this point they remain around 7 to 8 milliseconds. This general form is seen on the lines to the north also. This zone is underlain by mapped rhyodacite which on line C1100N at C800E was noted to

dip steeply west.

*ZONE 'A':-* A sharp, up to 10 millisecond response, was recorded at C890E from a weakly conductive source whose maximum depth is considered to be of the order of 25 to 30 metres. The form of the anomaly *suggests* an east dip to the source. The geology in the vicinity of this zone is tuffaceous shales (S). This anomaly is of secondary interest and is also present on line C900N at C930E.

*ZONE 'B':-* A 5 millisecond anomaly with a very slight decrease in apparent resistivity was located at C1110E and is considered to be due to a disseminated sulphide or graphite source at that point. The maximum depth is about 25 metres and it is considered to be related to a similar response on line C900N at C1130E.

*ZONE 'C':-* A 5 millisecond anomaly at C730E coincides with a broad depression in apparent chargeability and indicates chargeable material within a weakly conductive source. The maximum depth is of the order of 25 to 30 metres. This anomaly within the microdiorite unit is considered of tertiary or secondary interest.

#### *LINE C900N*

The higher background chargeabilities west of C900E coincide with the microdiorite intrusive unit, while to the east of this

point the much lower backgrounds were observed over the tuffaceous shale(S) and fine rhyolitic units.

*ZONE 'A':-* A small 5 millisecond anomaly at C930E coincident with a 50% decrease in apparent resistivity is considered of tertiary/secondary interest only. This anomaly is probably related to that seen at C890E on C800N and C950E on C1000N.

*ZONE 'B':-* This anomaly of 4 milliseconds at C1130E is of tertiary interest only and is contained within a shale (S) unit of little geophysical interest.

*ZONE 'C':-* A more substantial 4 - 5 millisecond anomaly at C720E is considered to be due to a disseminated source within a weakly conductive host which the anomaly form suggests dips east. This response was seen on line C1000N at C770E.

*ZONE 'D':-* A single point 5 millisecond response at C650E over rhyodacite intrusives was also noted on line C1000N at C690E. This response is of tertiary interest only.

#### *LINE C1000N*

As on lines C900N and C800N, the background west of C900E over the microdiorite unit remains between 12 and 15 milliseconds, while to the east it varies about 7 milliseconds over the shales (S) and fine rhyolitic sediments (fv).

ZONE 'A':- A sharp anomaly at C950E may, in part, be due to the proximity of fence lines. However, if not, the anomaly is considered to be of secondary interest.

ZONE 'B':- seen at C1110E is of minor interest only.

ZONE 'C':- This is the most substantial anomaly located on this line and occurs centred at C770E where 5 - 7 millisecond responses are coincident with a very slight reduction in the high 2500 ohm-metres apparent resistivity background. The source is considered to be due to disseminated chargeable material within a resistive host rock. This response occurs coincident with mapped intrusive diorite, and is of secondary geophysical interest only.

ZONE 'D':- This sharp 5 to 6 millisecond response coincident with a slight decrease in apparent resistivity was noted at C690E within the unit mapped as rhyodacite intrusive. The source is considered to be disseminated chargeable material from within this unit. The maximum depth to source is interpreted to be about 25 metres, and is of tertiary to secondary interest only.

ZONE 'E':- This 5 millisecond anomaly from within a host being slightly less resistive than the enclosing rocks, was noted at C1040E. This appears to be coincident with a tuffaceous shale (S) horizon, and is of tertiary geophysical interest.

*LINE C1100N*

On this line the higher 10 - 13 millisecond backgrounds were noted west of C1000E, while the low 5 - 7 millisecond backgrounds were mapped to the east of this point. The only response of any note (Zone 'C') was located at C790E and is of tertiary geophysical interest only. This response was coincident with a outcrop mapped as rhyolitic tuffs (V)

*LINE C1200N*

Very high backgrounds of over 15 milliseconds were noted west of about C800E over microdiorite. The apparent resistivity shows very little variation over the entire western section of the line. The two "possible" anomalies are considered to be "formational" in origin.

*ZONE 'G':-* A broad 5 millisecond response superimposed on a 7 to 8 millisecond background was noted centred at C930E in close proximity to a fenceline which does not affect the anomaly. The broad anomaly occurs within mapped rhyolitic tuffs (y) which can be traced northwards, and is of tertiary interest only.

*ZONE 'H':-* A more substantial 7 - 8 millisecond anomaly centred at C1100E is somewhat distorted on the eastern flank by a fence line, but the main response is not due to the fence. Tuffaceous

shales have been mapped in the vicinity and chargeable material within them may be the source of this secondary/tertiary interest response.

*LINE C1300N*

A broad high, up to 17 milliseconds, between C700E and C800E clearly coincides with the mapped position of microdiorite (X). Obviously this unit is a chargeable unit. A second broad 12 millisecond response between C850E and C930E correlates with the mapped position of the tuffaceous shale (S) unit. This unit is also seen as high induced polarization background. On this line the rhyolitic tuff unit shows only normal (7 - 8 milliseconds) chargeability background.

Other than the "formational" anomalies there are no significant responses.

*LINE C1400N*

*ZONE 'I':-* Within the tuffaceous shale unit west of C800E a small 4 - 5 millisecond chargeability unit was recorded at C780E from a source whose maximum depth is assessed to be of the order of 30 metres. The source is certainly disseminated and is within a highly resistive rock unit.

*ZONE 'J':-* A broad zone of higher chargeability appears to

be coincident with the mapped position of rhyolitic tuffs between C920E and C950E and is of formational origin.

ZONE 'K':- A well defined response of 5 milliseconds above the 7 - 8 millisecond background was observed centred at C1050E. The response was from a unit mapped as fine rhyolitic tuffs (fv) and the source has a maximum depth of the order of 40 metres, but as the source has not got sharp contrast to the enclosing material, the depth estimated is clearly excessive. The source is certainly disseminated sulphides (or graphite) as there is no change in apparent resistivity.

ZONE 'L':- A small depression in the apparent resistivity data at C1150E is accompanied by a 3 - 4 millisecond increase in apparent chargeability at this point. This zone is again coincident with the mapped position of the fine rhyolitic tuffs (fv). The anomaly is of tertiary to secondary interest at most.

#### LINE C1500N

There are no truly significant anomalies on this line, however, it is possible that Zone 'I' extends north to C770E where it forms a 5 millisecond anomaly coincident with an *increase* in apparent resistivity to 1300 ohm-metres. The source is disseminated chargeable material within the tuffaceous shale unit.

## CONCLUSIONS AND RECOMMENDATIONS

- 1 - The higher background apparent resistivities observed over this area indicate either lesser conductive soil cover and/or less intense oxidation over much of this this area, and the north-western section of the main grid.

This lesser oxidation and/or cover afforded an opportunity to observe the characteristics of the mapped rock units more closely and from this point of view the survey data is of great interest. The *microdiorite* unit (X) is clearly seen to be both resistive and more importantly, chargeable. It can be expected to be so throughout the area. The *tuffaceous shale* unit (S) was likewise seen to be chargeable more often than not, while the *rhyolite tuff* unit (V) was, more often than not, *not* chargeable above background. As this area lies on strike with the main grid, these characteristics will obviously apply there also.

- 2 - The lack of coincidental geochemical sampling along lines precluded an evaluation of the geophysical indication from this angle. It is recommended that the anomalies located be evaluated on a geochemical basis as soon as the data is available.
- 3 - Although no anomalies of primary geophysical interest were

located in the extension grid, a number of anomalies of secondary interest may have their economic interest enhanced once the geochemical data is available.

A classification of the more significant anomalies follows:

<u>Line</u>	<u>Station</u>	<u>Zone</u>	<u>Maximum Depth</u>	<u>Geophysical Priority</u>
C800N	C890E	A	25-30 metres	Sy
C800N	C1110E	B	25 metres	Ty/Sy
C800N	C730E	C	25-30 metres	Ty/Sy
C900N	C930E	A	30 metres	Ty/Sy
C900N	C1130E	B	25 metres	Ty/Sy
C900N	C720E	C	30 metres	Ty/Sy
C900N	C650E	D	30 metres	Ty
C1000N	C950E	A	-	Sy
C1000N	C1110E	B	25 metres	Ty
C1000N	C770E	C	45 metres	Sy
C1000N	C690E	D	25 metres	Ty/Sy
C1000N	C870E	F	25-30 metres	Sy
C1000N	C1040E	E	-	Ty
C1100N	C790E	C	40 metres?	Ty
C1200N	C930E	G	50 metres?	Ty
C1200N	C1100E	H	40 metres	Sy/Ty
C1300N	No significant anomalies			
C1400N	C780E	I	30 metres	Ty/Sy

<u>Line</u>	<u>Station</u>	<u>Zone</u>	<u>Maximum Depth</u>	<u>Geophysical Priority</u>
C1400N	C920E-C950E	J	?	Ty
C1400N	C1050E	K	40 metres	Ty/Sy
C1400N	C1150E	L	-	Ty/Sy
C1500N	C770E	I	30 metres	Ty

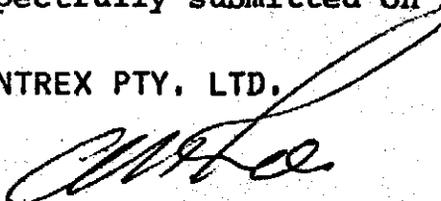
#### GENERAL CONCLUSIONS ON CROSBY CREEK

A detailed study of the data clearly indicated that some of the volcanogenic and sedimentary units show high induced polarization responses. This necessitates extremely careful selection of drilling targets, and the induced polarization logging of the core to unambiguously identify the anomaly source, which, in the light of the work from DD75-CC1, shows that the chargeability source *may not* be readily apparent.

The chargeable nature of certain of the units at Crosby Creek, while making the selection of targets difficult, *does not* detract from the merit of the property which is assessed to be considerable

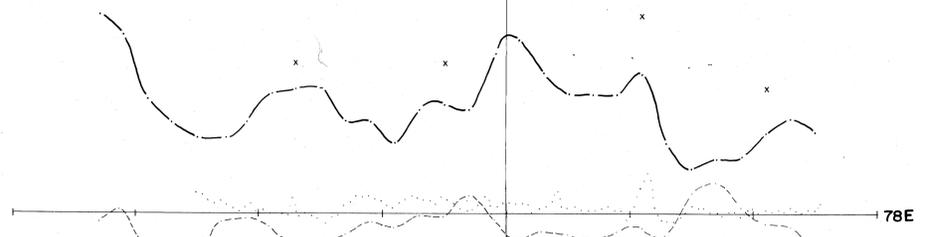
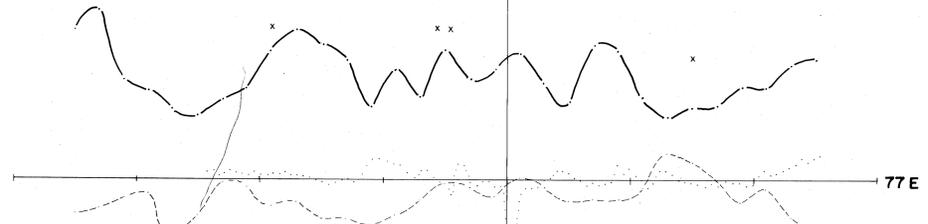
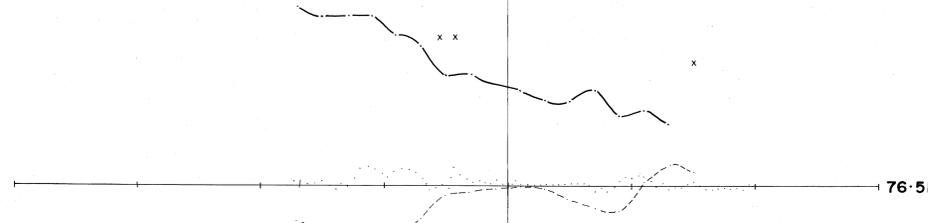
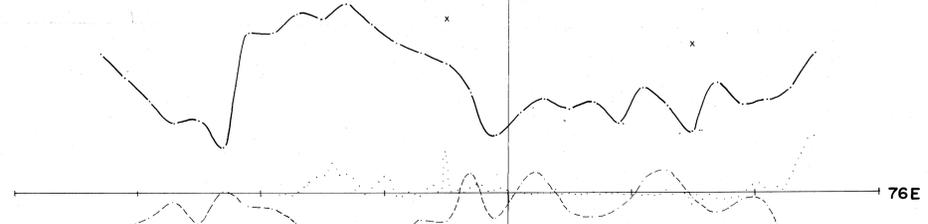
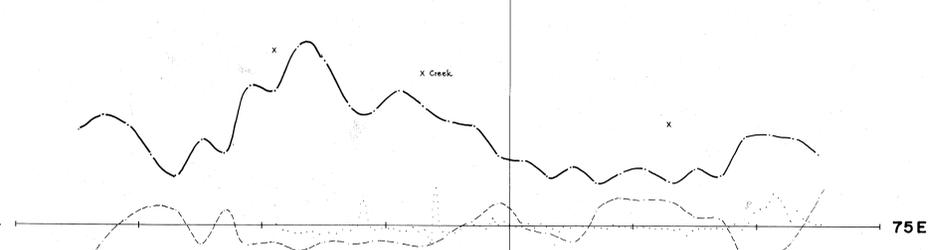
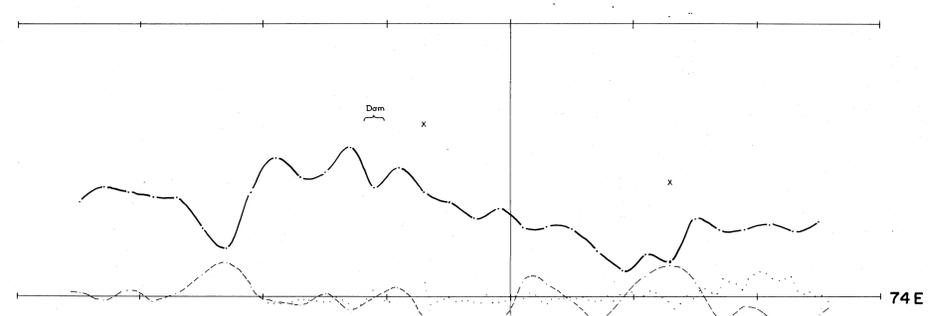
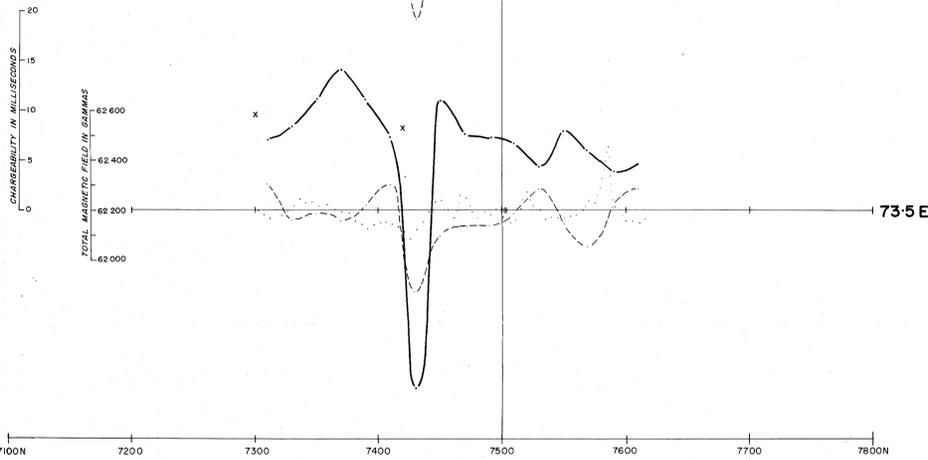
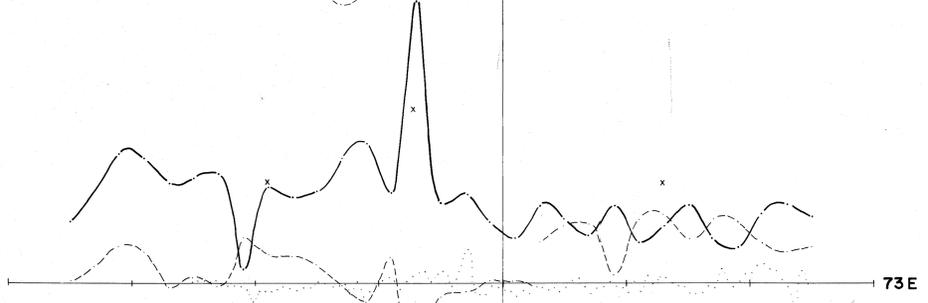
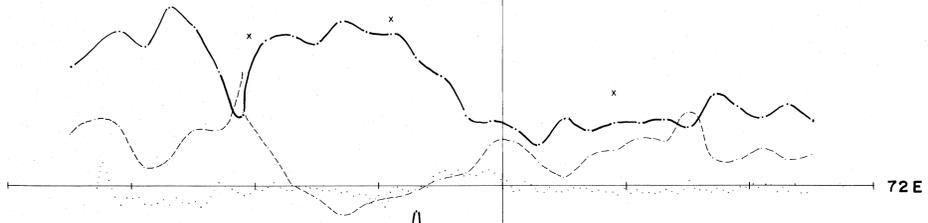
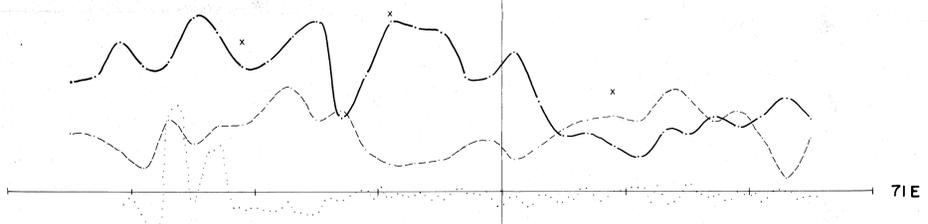
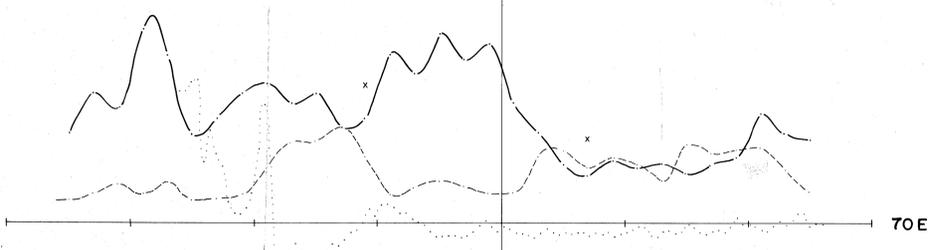
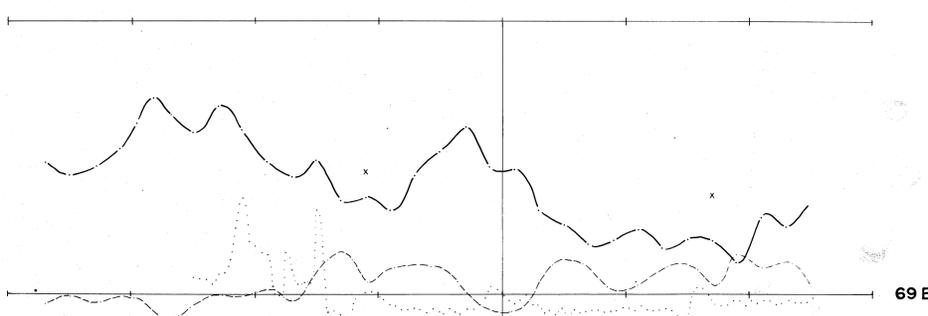
Respectfully submitted on behalf of:

SCINTREX PTY. LTD.



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

GEOPHYSICIST



APPARENT RESISTIVITY IN OHM-METRES

CHARGEABILITY IN MILLISECONDS

TOTAL MAGNETIC FIELD IN GAMMAS

LEGEND

- Magnetics, 1cm = 100 gammas
- Base level = 62 200 gammas
- Symbol = - - - - -
  
- Chargeability, 2cms = 5 milliseconds
- Base level = 0
- Symbol = ————
  
- Resistivity, 5cms = 1 logarithmic cycle
- Base level = 1000 ohm-metres
- Symbol = - - - - -
  
- x = fence

C.R.A. EXPLORATION PTY LIMITED  
 CROSBY CREEK (EAST GRID)  
 E.L. 19/72  
 NORTHERN TASMANIA  
 GRADIENT ARRAY  
 ELECTRICAL INDUCED POLARIZATION  
 SURVEY  
 DATA PROFILES

SURVEYED AND COMPILED BY  
 SCINTREX PTY. LTD.  
 NOV. 1975

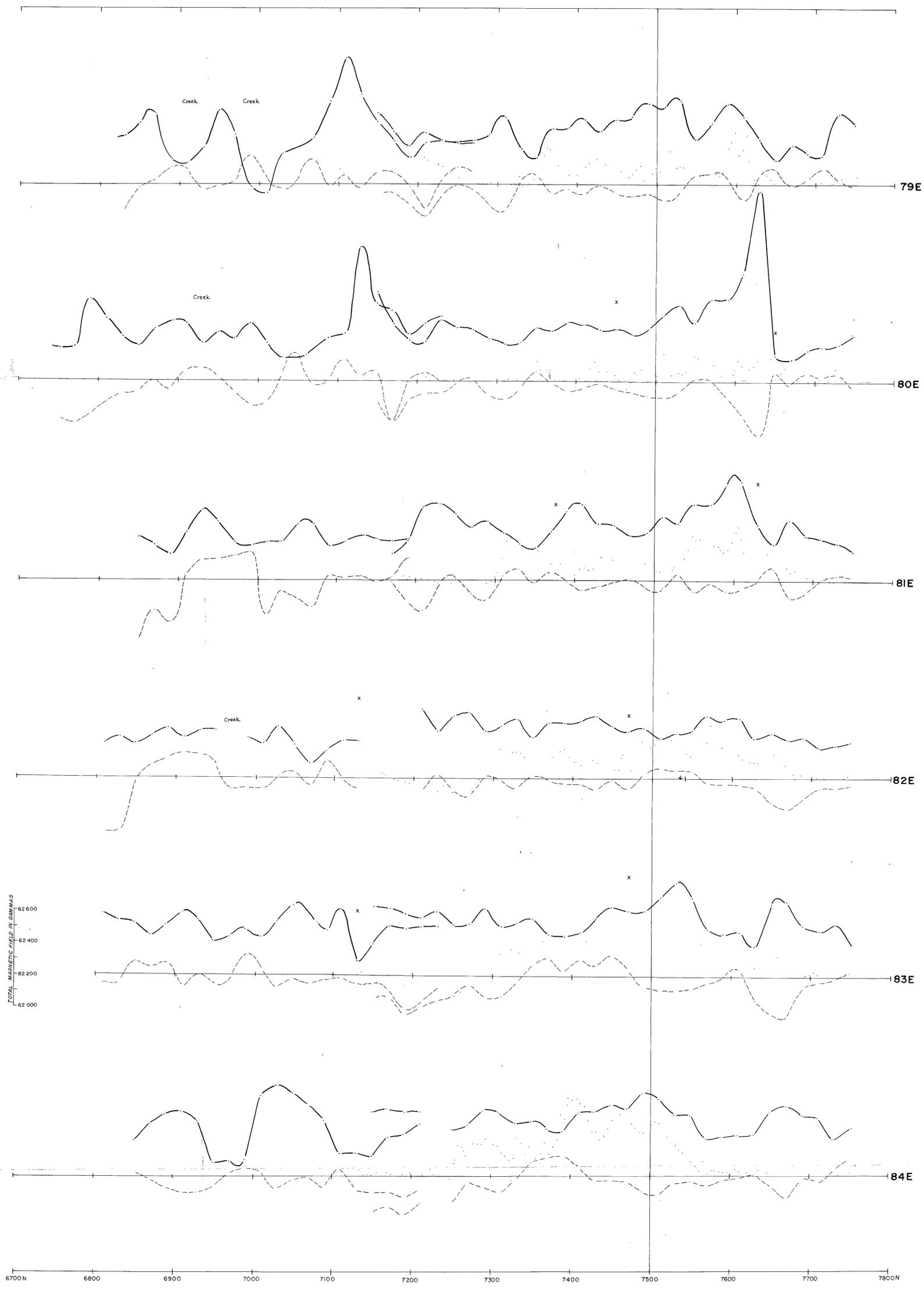


75-1143



1:2000

479042



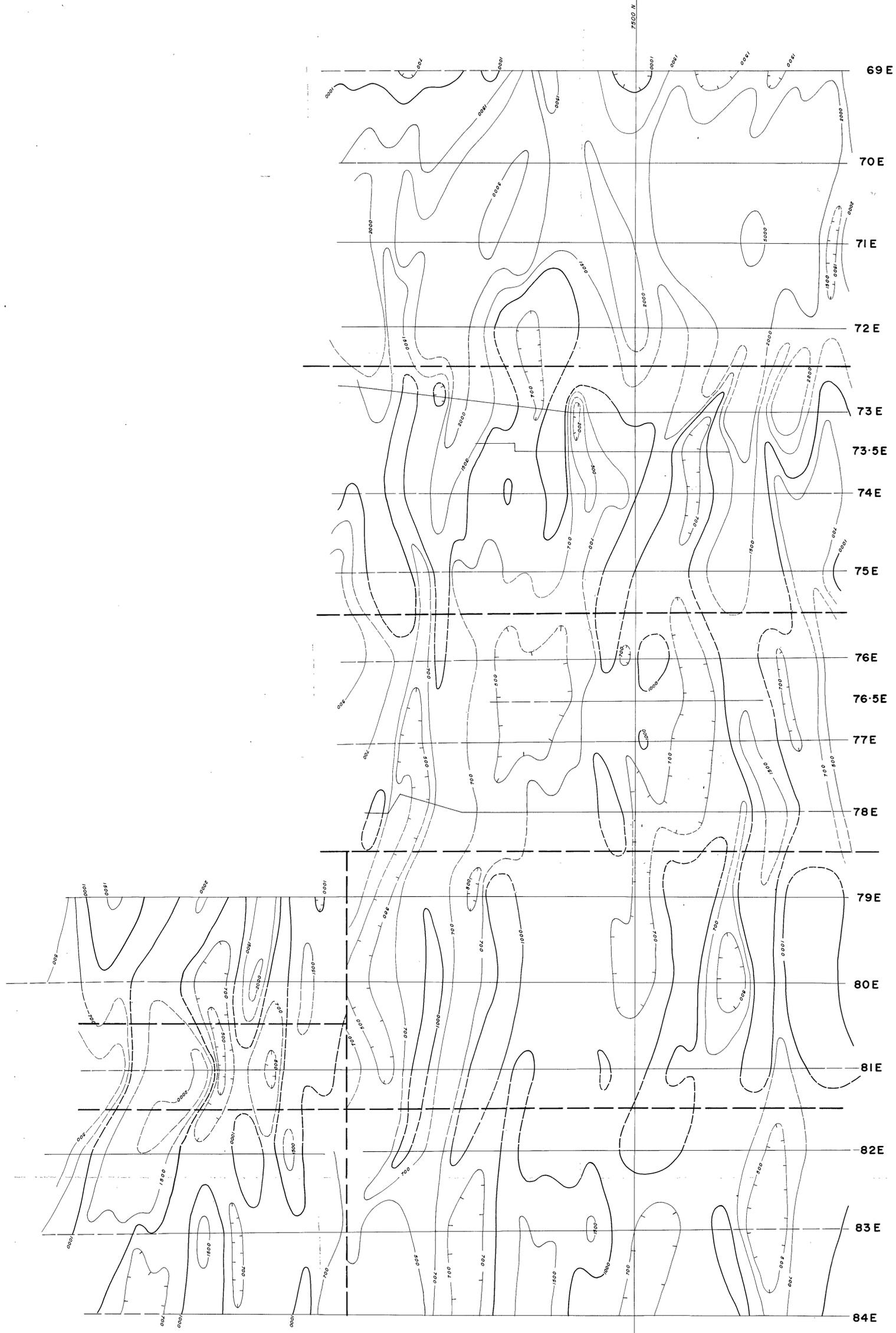
APPARENT RESISTIVITY IN OHM METRES  
 2000  
 1000  
 800  
 600  
 400  
 300  
 200

CHARGEABILITY IN MILLISECONDS  
 20  
 15  
 10  
 5  
 0  
 TOTAL MAGNETIC FIELD IN GAMMAS  
 62600  
 62400  
 62200  
 62000

LEGEND

- Magnetics, 1cm = 100 gammas  
 Base level = 62200 gammas  
 Symbol = - - - -
- Chargeability, 2cm = 5 milliseconds  
 Base level = 0  
 Symbol = — — — —
- Resistivity, 5cm = 1 logarithmic cycle  
 Base level = 1000 ohm metres  
 Symbol = . . . . .
- x = fence





LEGEND

- Gradient Block boundaries
- 78E Traverse lines
- Resistivity contours in ohm-metres

C.R.A. EXPLORATION PTY LIMITED  
 CROSBY CREEK (EAST GRID)  
 E.L. 19/72  
 NORTHERN TASMANIA  
 GRADIENT ARRAY  
 ELECTRICAL INDUCED POLARIZATION  
 SURVEY  
 RESISTIVITY CONTOUR MAP

SURVEYED AND COMPILED BY  
 SCINTREX PTY. LTD.  
 NOV. 1975

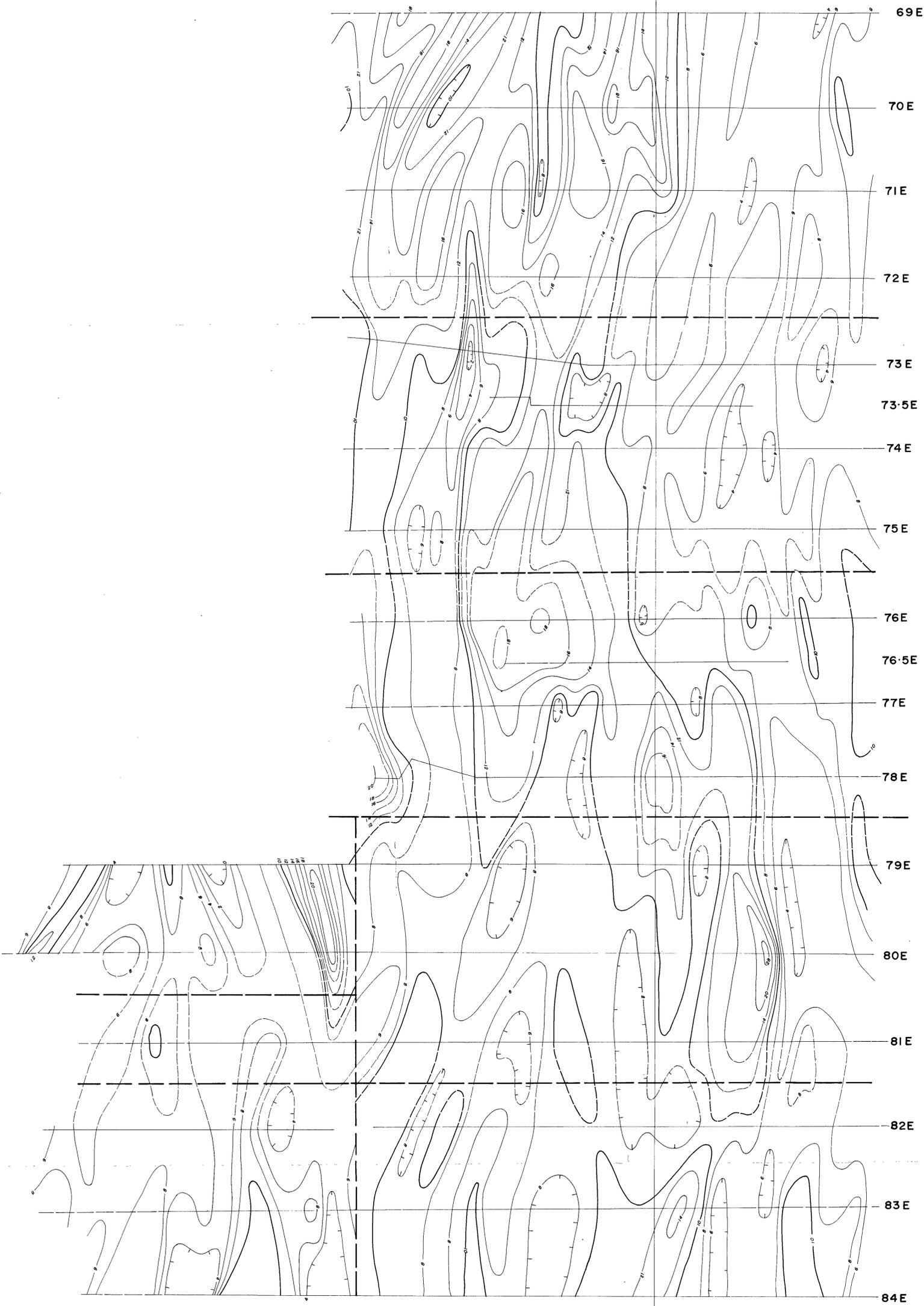


75-1143



479044





LEGEND

- Gradient Block boundaries
- 78E Traverse lines
- Chargeability contours in milliseconds

C.R.A. EXPLORATION PTY. LIMITED

CROSBY CREEK (EAST GRID)  
E.L. 19/72  
NORTHERN TASMANIA

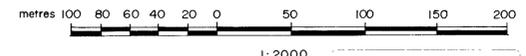
GRADIENT ARRAY  
ELECTRICAL INDUCED POLARIZATION  
SURVEY

CHARGEABILITY CONTOUR MAP

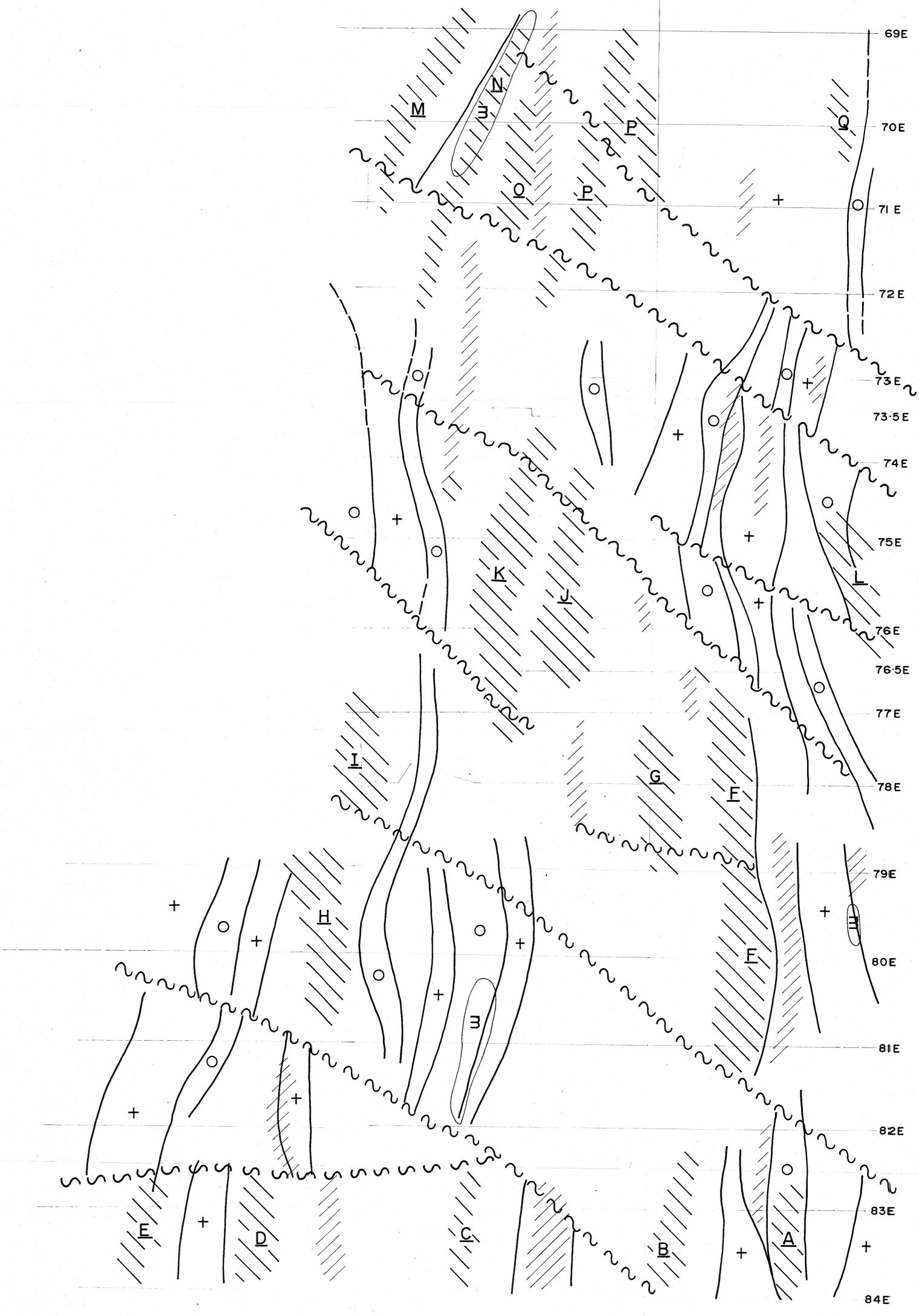
SURVEYED AND COMPILED BY  
SCINTREX PTY. LTD.  
NOV. 1975



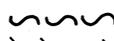
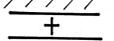
75-1143



479045



LEGEND

- Discontinuity 
- I.P. high 
- I.P. low 
- Resistivity high 
- Resistivity low 
- Magnetic high 

C.R.A. EXPLORATION PTY. LIMITED  
 CROSBY CREEK (EAST GRID)  
 E.L. 19/72  
 NORTHERN TASMANIA  
 GRADIENT ARRAY  
 ELECTRICAL INDUCED POLARIZATION  
 SURVEY  
 INTERPRETATION PLAN

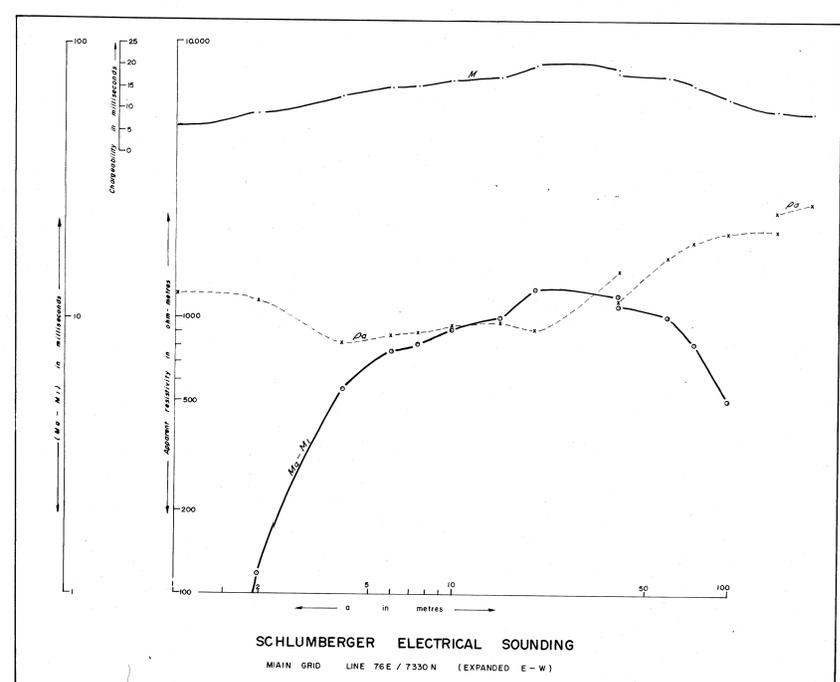
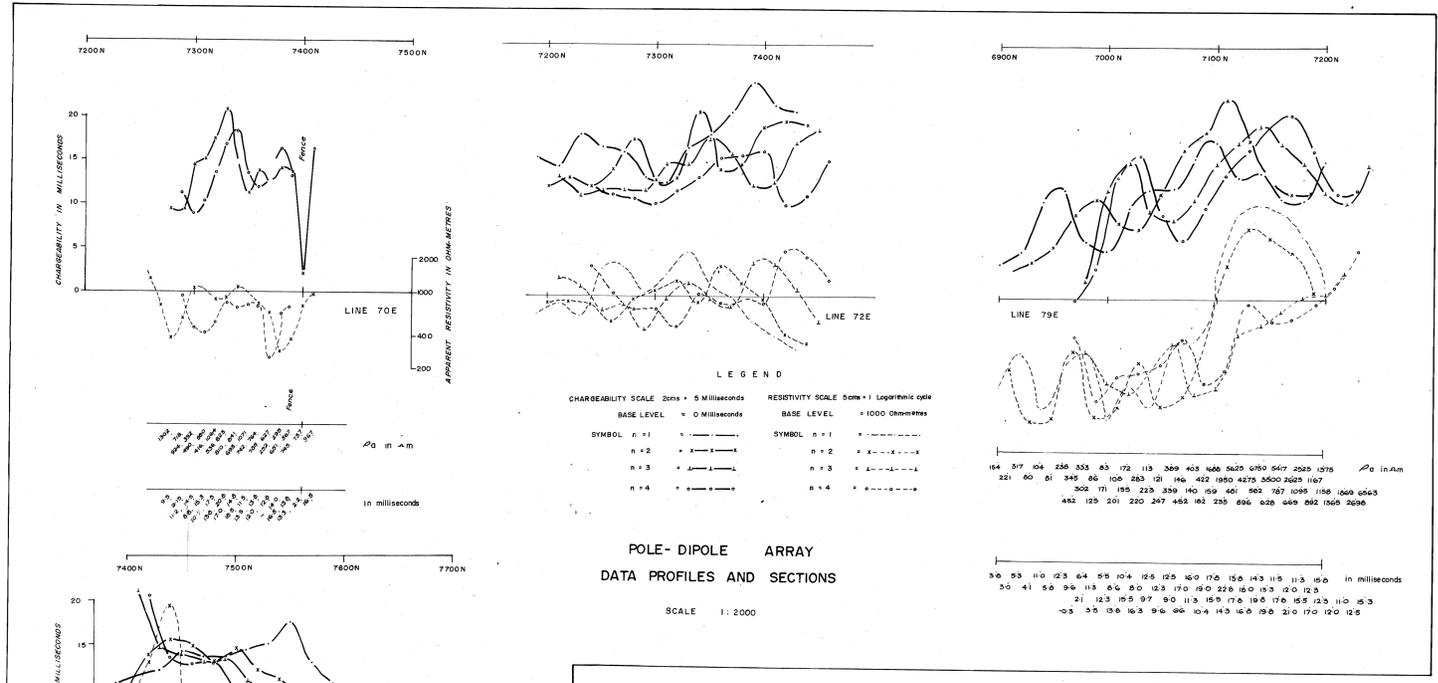
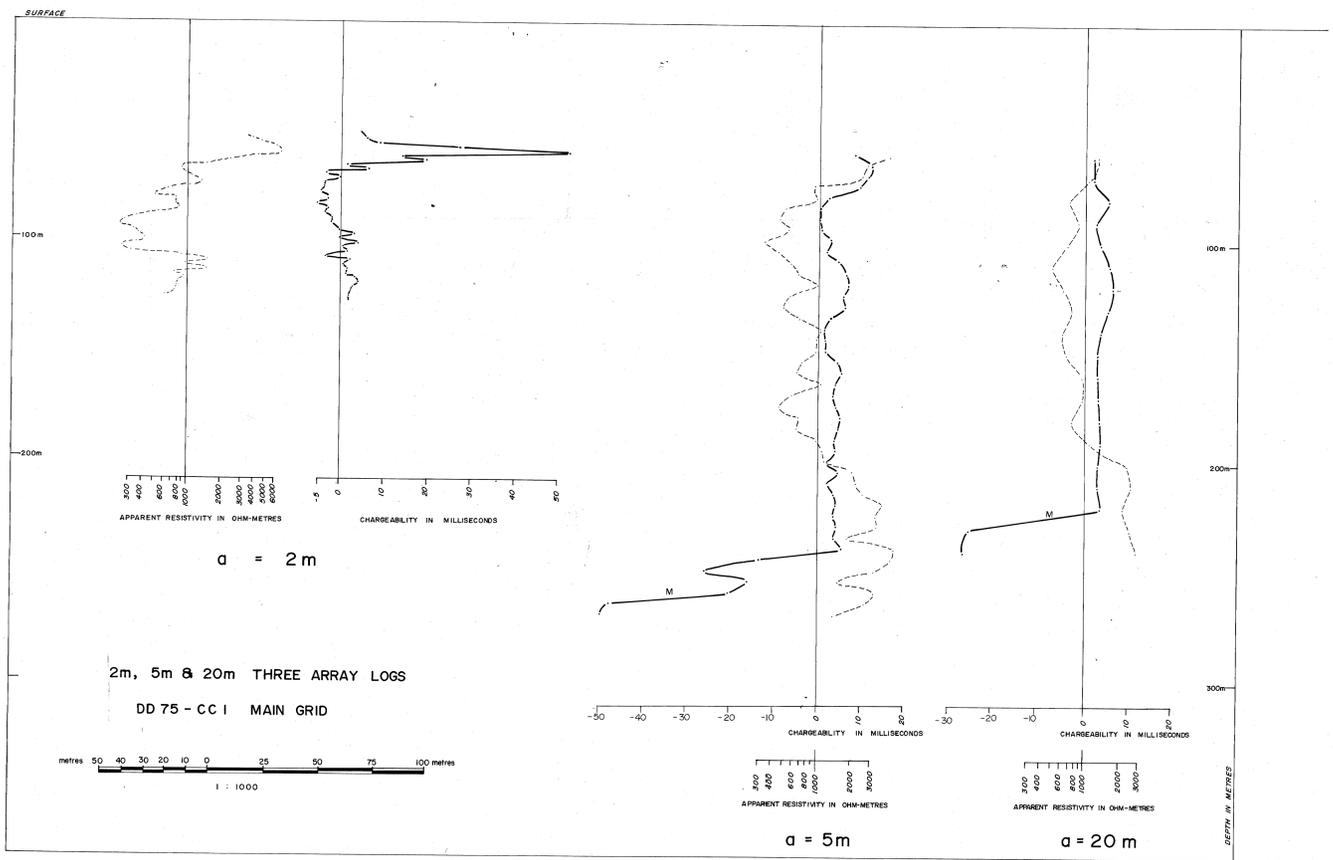
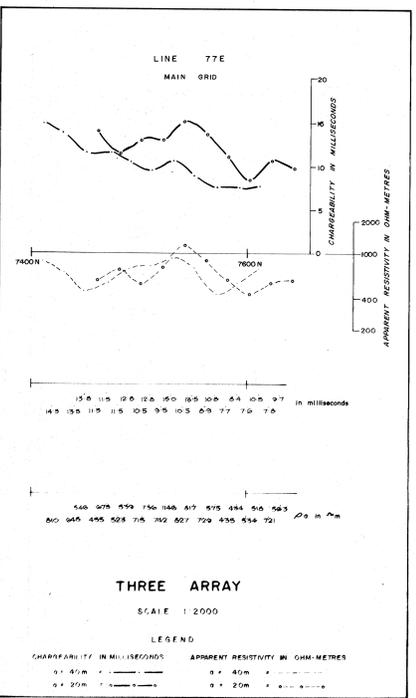
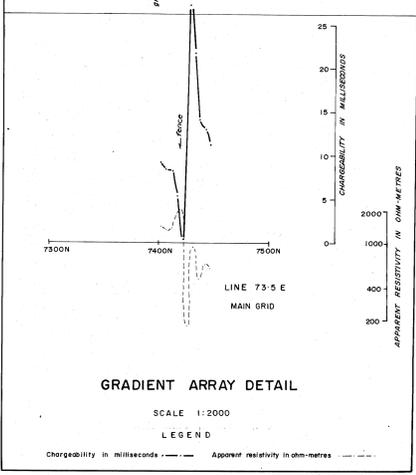
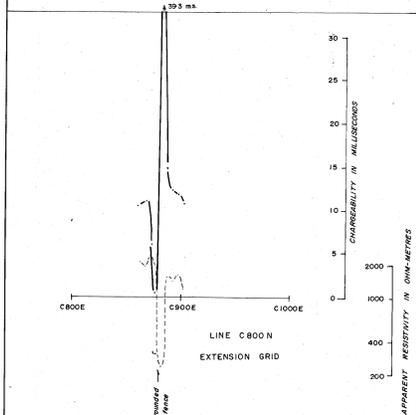
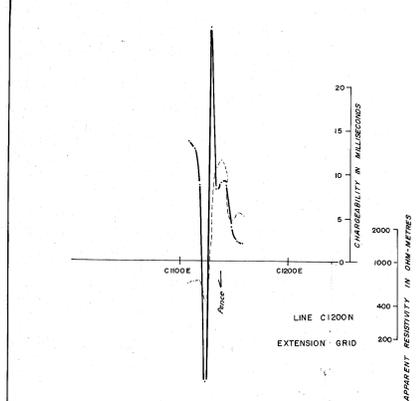
SURVEYED AND COMPILED BY  
 SCINTREX PTY. LTD.  
 NOV. 1975



75-1143



1:2000  
 479016 1651



C.R.A. EXPLORATION PTY. LIMITED

CROSBY CREEK  
E.L. 19/72  
NORTHERN TASMANIA

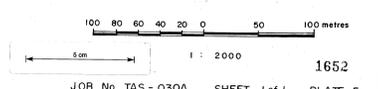
DETAILED ELECTRICAL INDUCED  
POLARIZATION SURVEY

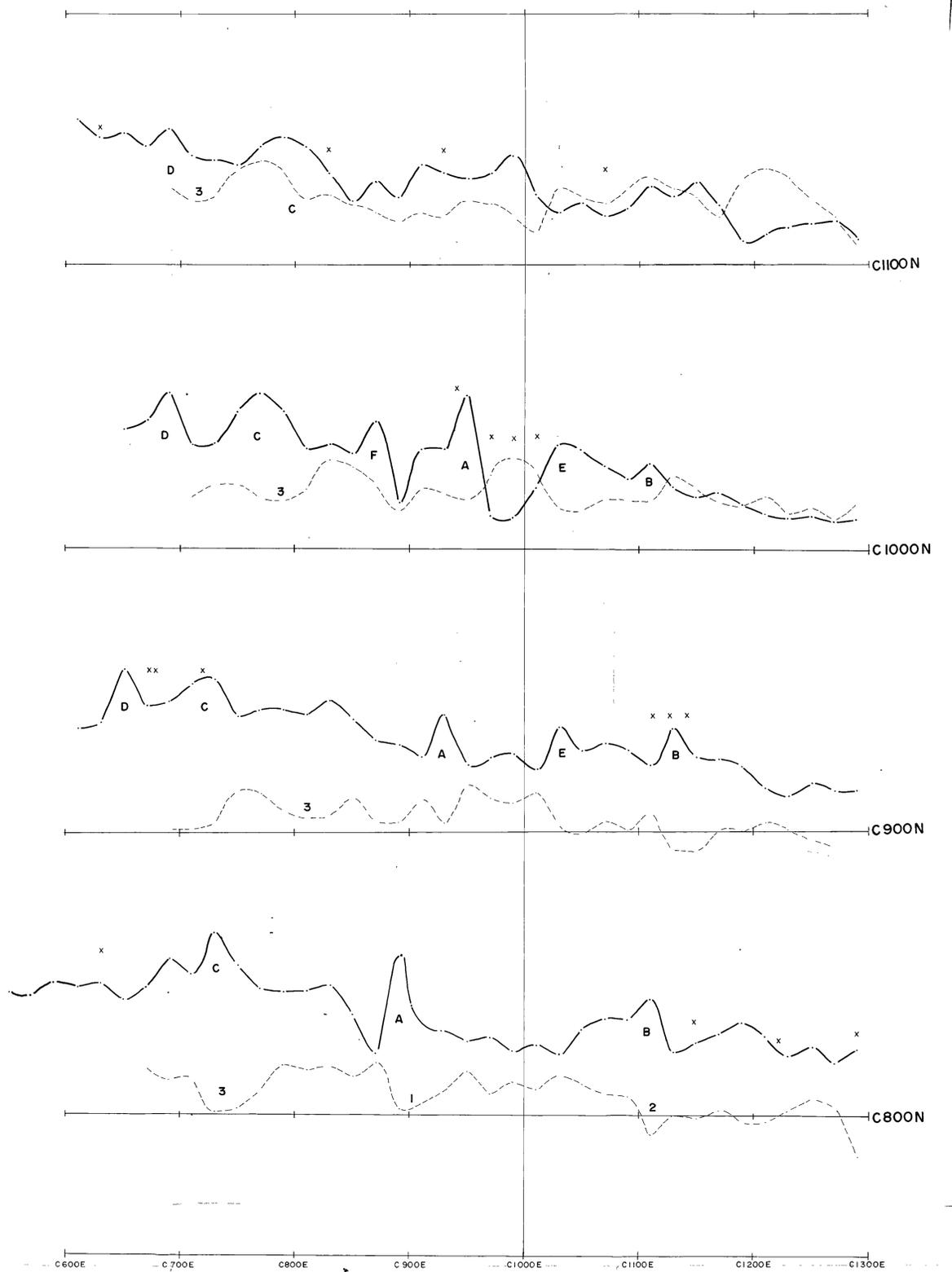
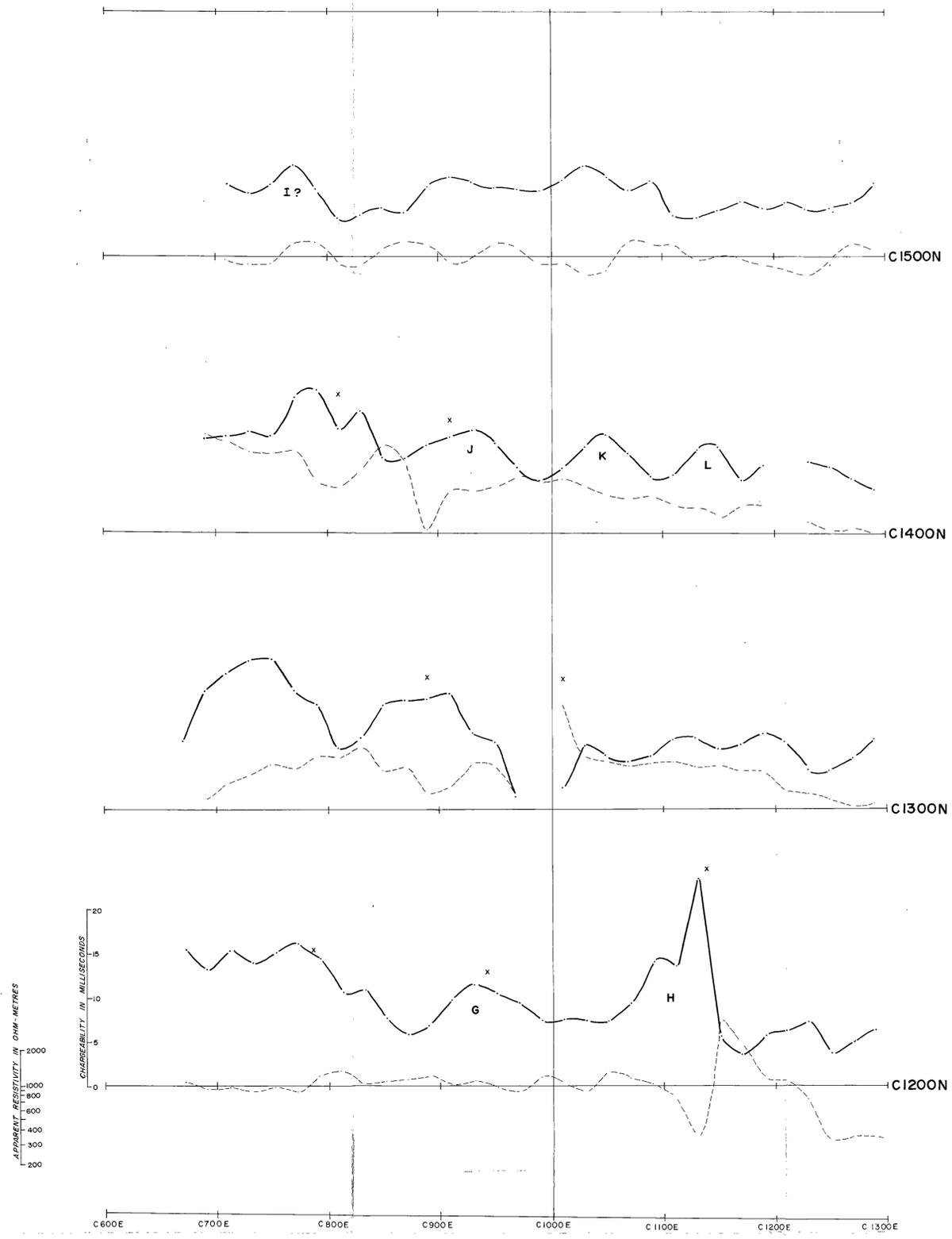
DATA PROFILES

SURVEYED AND COMPILED BY  
SCINTREX PTY. LTD.  
NOV. 1975    479047



75-1143





LEGEND

Chargeability, 2cms = 5 milliseconds  
 Base level = 0  
 Symbol = — — — — —

Resistivity, 5 cms = 1 logarithmic cycle  
 Base level = 1000 ohm metres  
 Symbol = - - - - -

X = fence

C.R.A. EXPLORATION PTY. LIMITED

CROSBY CREEK (EXTENSION GRID)  
E.L. 19/72  
NORTHERN TASMANIA

GRADIENT ARRAY  
ELECTRICAL INDUCED POLARIZATION  
SURVEY

DATA PROFILES

SURVEYED AND COMPILED BY  
SCINTREX PTY. LTD.  
NOV. 1975



75-1143  
479018



I: 2000