# APPENDIX 5: A GEOPHYSICAL REPORT ON INDUCED POLARIZATION SURVEYING

to accompany

1990 SUMMARY REPORT

on the

UNUK RIVER PROJECT
(Unuk, Coul, Icey, Knip, Bou and Irv Claim Groups)

SKEENA MINING DIVISION
NTS 104B/9 & 104B/10
56°35' Lat., 130°20' Long.



Operator:
GRANGES INC.
2300 - 885 WEST GEORGIA STREET
VANCOUVER, B.C.
V6C 3E8

DECEMBER 20, 1990

B.E. GABOURY
P.Eng. (Man.)
B.Sc. (Hons), M.Sc.

PETER E. WALCOTT & ASSOC. LTD.

# A GEOPHYSICAL REPORT

ON

# INDUCED POLARIZATION SURVEYING

Unuk River Area, B.C.
56° 35'N, 130° 20'W
N.T.S. 104B/9 & 10

FOR

G R A N G E S  INC.

Vancouver, British Columbia

BY

PETER E. WALCOTT & ASSOCIATES LIMITED

Vancouver, British Columbia

DECEMBER 1990

*GEOPHYSICAL SERVICES*

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## APPENDIX



## ACCOMPANYING MAPS - Scale 1:2000

MAP POCKET

### AP & Zone 1 Grids

| | | | |
|---|---|---|---|
| CONTOURS OF APPARENT CHARGEABILITY | a=25m | n=1 | W-474-1 |
| " " " " | a=25m | n=2 | W-474-2 |
| " " " " | 10 pt. | avg. | W-474-3 |
| CONTOURS OF APPARENT RESISTIVITY | a=25m | n=1 | W-474-4 |
| " " " " | a=25m | n=2 | W-474-5 |
| " " " " | 10 pt. | avg. | W-474-6 |

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R Grid.

INTRODUCTION.

Between July 18th and August 25th, 1990, Peter E. Walcott & Associates Limited carried out induced polarization surveying over parts of a large property, located in the Eskay Creek - Unuk River area of British Columbia, for Granges Inc.

The surveying was carried out over four grids, namely the AP, Zone 1, R and U2 grids, established by personnel from Granges Inc. and/or by linecutters under contract to them.

Measurements (first to maximum sixth, minimum fourth separation) of apparent chargeability (the I.P. response parameter) and resistivity were made every 25 metres along the lines where possible using the pole-dipole method of surveying with a 25 metre dipole.

The I.P. data are presented in contour form on individual pseudosections bound in this report. In addition the first, second and ten point moving average (filter) chargeability and resistivity results for the AP, Zone 1 and R grids are shown in contour form on Maps W-474-1 to 12 that accompany this report.

The progress of the survey was severely hampered by rough terrain and by adherence to a tight helicopter schedule.

PROPERTY, LOCATION & ACCESS.

The property is located in the Skeena Mining Division of British Columbia and consists of the Unuk, Coul, Icey, Knip, Bou and Irv claim groups.

It is situated on either side of the Unuk River between Storie and Sulphurets Creeks some 80 kilometres north northwest of the town of Stewart, British Columbia. It is characterized by alpine conditions with glaciers and icefields at higher elevations - up to 2300 metres - and steep vegetation covered slopes - up to 1200 metres from the 240 metre elevation of the camp on the river.

Access was gained by helicopter from the outpost of Bell II some 50 kilometres to the east on the Stewart-Cassiar Highway.

## PREVIOUS WORK.

Previous work on the property consisted of prospecting, geological mapping, soil and rock sampling, airborne electromagnetic and magnetic surveying, ground magnetic and VLF electromagnetic surveying, trenching and diamond drilling, the results of which are documented in reports held by Granges Inc.

GEOLOGY.

The property area is underlain by a thick volcanic-sedimentary succession of Upper Triassic to Middle Jurassic age overlain by marine basin sediments of Middle to Upper Jurassic age, cut and intruded by a variety of plutons spanning late Triassic to Tertiary time.

For more detailed information the reader is referred to the many published and unpublished reports on the area, and in particular to the 1990 summary report on the property by B.E. Gaboury, P.Eng.

PURPOSE.

The purpose of the survey was to try and locate the presence of sulphides - either stratabound as in the Calpine deposit or structurally related as in the Brucejack deposit- with the I.P. method that could occur along with gold mineralization in an effort, combined with the results of other exploration methods,to define targets of the latter.

SURVEY SPECIFICATIONS.

The induced polarization (I.P.) survey was conducted using a pulse type system, the principal components of which are manufactured by Huntec Limited of Metropolitan Toronto, Ontario, and BRGM Instruments of Orleans, France.

The system consists basically of three units, a receiver (BRGM), a transmitter and a motor generator (Huntec). The transmitter, which provided a maximum of 7.5 kw d.c. to the ground, obtains its power from a 7.5 kw 400 c.p.s. three phase alternator driven by a gasoline engine. The cycling rate of the transmitter is 2 seconds "current-on" and 2 seconds "current-off" with the pulses reversing continuously in polarity. The data recorded in the field consists of careful measurements of the current (I) in amperes flowing through the current electrodes $C_1$ and $C_2$, the primary voltages (V) appearing between any two potential electrodes, $P_1$ through $P_6$, during the "current-on" part of the cycle, and the apparent chargeability ($M_a$) presented as a direct readout in millivolts per volt using a 240 millisecond delay and a 1600 millisecond sample window by the receiver, a digital receiver controlled by a micro-processor - the sample window is actually the total of ten individual windows of 160 millisecond widths.

The apparent resistivity ($\rho_a$) in ohm metres is proportional to the ratio of the primary voltage and the measured current, the proportionality factor depending on the geometry of the array used. The chargeability and resistivity are called apparent as they are values which that portion of the earth sampled would have if it were homogeneous. As the earth sampled is usually inhomogeneous the calculated apparent chargeability and resistivity are functions of the actual chargeability and resistivity of the rocks.

The survey was carried out using the "pole-dipole" method of surveying. In this method the current electrode $C_1$, and the potential electrodes, $P_1$ through $P_6$, are moved in unison along the survey lines at a spacing of "a" (the dipole) apart, while the second current electrode $C_2$ is kept constant at "infinity". The distance, "na" between $C_1$ and the nearest potential electrode generally controls the depth to be explored by the particular separation, "n", traverse.

DISCUSSION OF RESULTS cont'd.

Unfortunately towards the end of the coverage on the R grid the transmitter started to malfunction and had to be replaced with a 2.5 kw unit of the same manufacture and similar specifications.

In all some 21.4 kilometres of surveying were carried out using a 25 metre dipole.

DISCUSSION OF RESULTS.

It should be mentioned here that the writer is discussing the I.P. results without the benefit of the geological maps and results from previous work.

As the survey was conducted in three different areas the results from each will be discussed on a grid basis.

AP & Zone 1 Grids.

The I.P. survey was commenced on the AP grid to determine the response (if any) of the favourable mineralization found in the 1989 trenches with a view to using the same to assess the potential of the grids vis-à-vis possible structurally controlled gold deposition.

Unfortunately the trenches were located on the flank of a strong chargeability response positioned for the most to the east of the 1989 drill hole collars and undefined to the east due to the steep drop-off to the creek below as can be seen on the respective pseudosections - it should be noted that the zones illustrated on the pseudosections will be necessarily wider than in reality as the I.P. measurements are made perpendicular to the ground surface.

Better coverage could have been obtained if the current electrode - the pole - would have been to the east but the survey was laid out to cover the trenches and to get around the glacier and solid rock to the west.

A strong resistivity low - conductivity high - was obtained coincident with (a) the western flank of the higher chargeability readings and (b) the location of a northerly trending gully on Lines 1550 and 1650 N respectively, presumably indicative of a similarly trending shear.

Low chargeabilities and high resistivities were observed over the outcropping diabase to the west.

The survey over the larger Zone 1 grid to the north showed the rocks there to exhibit a low to moderate chargeability background above which five complex zones of

DISCUSSION OF RESULTS cont'd.

higher chargeability are clearly discernible on the contour plans of the same - Maps W-474-1 to 3 - and on the individual pseudo-sections.

These Zones are listed as "A", "B", "C", "D" & "E" on Map W-474-3, the ten point average chargeability contour plan, and are best discussed individually.

It should be noted here that the I.P. measurements were plotted in dipole increments from the baseline when it was crossed or failing that from the smallest westerly station number. Adjustments in positioning were made in the case of short or long chaining, and given the number of the former coupled with the chainage errors it is conceivable that the rectilinear I.P. plans could be considerably different from the rectilinearly plotted geological maps.

Zone "A". This is a zone of moderate to strong chargeability striking northeastwards across Lines 600 and 700 N respectively. Although undefined in both directions it would appear to be the extension of the stronger similarly trending AP Zone to the southwest.

Zone "B". A zone of moderate chargeability on Lines 700 and 900 N striking in a northerly direction. Fill-in lines would be necessary for a further definition of this zone.

Zone "C". A zone of moderate to strong chargeability apparently striking northeasterly across Lines 1200, 1300 and 1400 N corresponding to a large surface zone of sulphide mineralization at the contact of a large altered diabase body.

Zone "D". A zone of strong chargeability striking somewhat northeasterly across Lines 1400, 1500, 1600 & 1700 N and open to the north, coincident with a large gossanous pyritic area, and presumably related to the contact of the large diabase intrusive.

Zones C & D can be seen as two separate anomalies of TL 800 W which runs along the western edge of Zone D.

DISCUSSION OF RESULTS cont'd.

Zone "E. A zone of moderate to strong chargeability extending from Line 1200 N to Line 1700 and open to the northeast. Its northeasterly projection along strike coincides with the location of the anomalous geochemical results from Line 1800 N. The zone broadens on Line 1500 and 1600 N which could be related to mineralization as a result of cross cutting dykes - the projected contours joining the highs at the bottom and at the top of the cliff on Line 1600 N should be ignored here. Again this zone appears to be related to an intrusive diabase body shown as a resistivity high on Maps W-474-4 to 6.

A strong resistivity low feature presumably related to faulting is evident at the base of the cliffs between 1300 and 1700 N.

Plots of Cole-Cole parameters - spectral I.P.- calculated from the chargeability results on Line 1500 N on both grids showed little variation in the time constant over the entire lengths of the lines.

Thus, on the basis of the geophysics alone, it would seem that the sulphide mineralization is related to northeasterly trending structures. Furthermore it would appear that the AP zone and Zone A structure could be related to that of Zone E offset by a large northerly trending structure, the expression of which is the large cliff face.

R Grid.

Ten lines on this grid were covered by I.P. surveying to search for sulphide mineralization in tuffaceous mudstones, the presence of which were indicated by the favourable results in the 1989 drilling on the Creek Zone.

The results showed the area surveyed to exhibit a low chargeability background above which one strongly anomalous zone, one moderately anomalous zone - both of appreciable strike length - and several smaller zones of poor to moderate response, mostly shallow and of limited depth extent, as illustrated by their "pant leg" character on the peudosections, are discernible on the plan maps of the apparent chargeability - Maps W-474-7 to

DISCUSSION OF RESULTS cont'd

9 - and the respective pseudosections.

The main zones - "A" & "B" on Map W-474-9 - strike north northeasterly and would appear at first glance to be one and the same offset by faulting/folding. However examination of their character on the respective pseudosections and their accompanying resistivities suggest a different causative source.

The resistivity results, as depicted on the contour plans - Map W-474- 10 to 12 - showed a series of north-easterly highs and lows trending across the grid reflecting the various ridges and gullies traversing the property, and also suggested, as mentioned above, a break along the creek between Lines 0 and 200 N.

Unfortunately coverage was not requested on the line which could have shed more light on this subject, namely Line 0.

No identifiable I.P. signature was evident over the Creek Zone drilled in 1989.

Drilling of Zone "A" on Line 100 S determined its causative source to be a thick sequence of graphitic argillites. However spectral parameters from Lines 200 S and 200 N indicated uniform time constants throughout with some drop off at the extremity of the latter, in fact similar values to those seen on the AP and Zone I grids - various researchers have suggested time constants for sulphides in the order of tenths of a second while those for graphite in order of hundreds of seconds.

U 2 GRID.

Four lines were surveyed on this grid in an effort to investigate the source of two airborne E.M. anomalies.

The results from Line 2700 N - the longest line-showed most of the line to be underlain by rocks exhibiting high chargeability and low resistivity, bounded either end by those showing low chargeabilities and high resistivities.

DISCUSSION OF RESULTS cont'd

Of particular interest is the coincident higher chargeability lower resistivity feature centred around 1775 E, best emphasized on the filtered metal factor profile plot.

A similar though less pronounced phenomenon is observed on the eastern contact.

Again the time constant was fairly uniform across the line although the western contact is clearly depicted by a marked decrease in tau unlike the eastern one.

The western contact and the strong anomaly are both observed on Lines 2600 & 2000 N - partial coverage only- with the former suggesting a northwesterly trend, and the latter some easterly offset or a parallel zone.

Line 1 E, run obliquely to the strike of the others and further northwards, also gave higher chargeability readings over most of its length with a smaller resistivity low near its northern extremity.

## SUMMARY, CONCLUSIONS & RECOMMENDATIONS.

Between July 18th and August 25th, 1990, Peter E. Walcott & Associates Limited carried out induced polarization (I.P.) surveying on three areas on parts of a large property in the Eskay Creek area of British Columbia for Granges Inc.

The surveys located the presence of a number of anomalous zones on the various grids as described in the previous section, some of which were subsequently subjected to borehole investigation, the results of which are not fully known to the writer.

Thus before investigating any more I.P. anomalies by borehole investigation he suggests that the survey results be further studied in conjunction with those of the geology and geochemical surveys, the ground magnetic surveys and the airborne work where applicable in particular to determine

(1) the outline of the diabase intrusions and larger across cutting dykes by magnetics - Zone 1 Grid

(2) the geochemical signature of Zone "B" on the R Grid

(3) the nature of the rock unit mapped by the fairly uniform high chargeability on the U 2 Grid.

Respectfully submitted,

PETER E. WALCOTT & ASSOCIATES LTD.

Peter E. Walcott, P.Eng.
Geophysicist

Vancouver,
British Columbia

DECEMBER 1990

# A P P E N D I X

COST OF SURVEY.

Peter E. Walcott & Associates Limited undertook the survey on a daily basis. Mobilization and reporting charges were extra so that the total cost of services provided was $58,935.11.

PERSONNEL EMPLOYED ON SURVEY.

| Name | Occupation | Address | Dates |
|---|---|---|---|
| Peter E. Walcott | Geophysicist | Peter E. Walcott & Assoc. 605 Rutland Court, Coquitlam, B.C. V3J 3T8 | Jul.21-Aug.3, Oct.24-25th, Dec.27-30th,90 |
| M. Andrews | " | " | Jul.30th-Aug.25 1990 |
| A. Walcott | Geophysical Operator | " | Jul.18th-Aug.24 1990 |
| C. Smedley | Geophysical Assistant | " | Jul.19th-Aug.23 1990 |
| G. Karacunte | " | " | Jul.19th-Aug.25 1990 |
| M. Epneris | " | " | Jul.18th-28th 1990 |
| A. Hobler | " | " | Jul.30th-Aug.25 1990 |
| J. Walcott | Typing | " | Dec.31st, 1990 |

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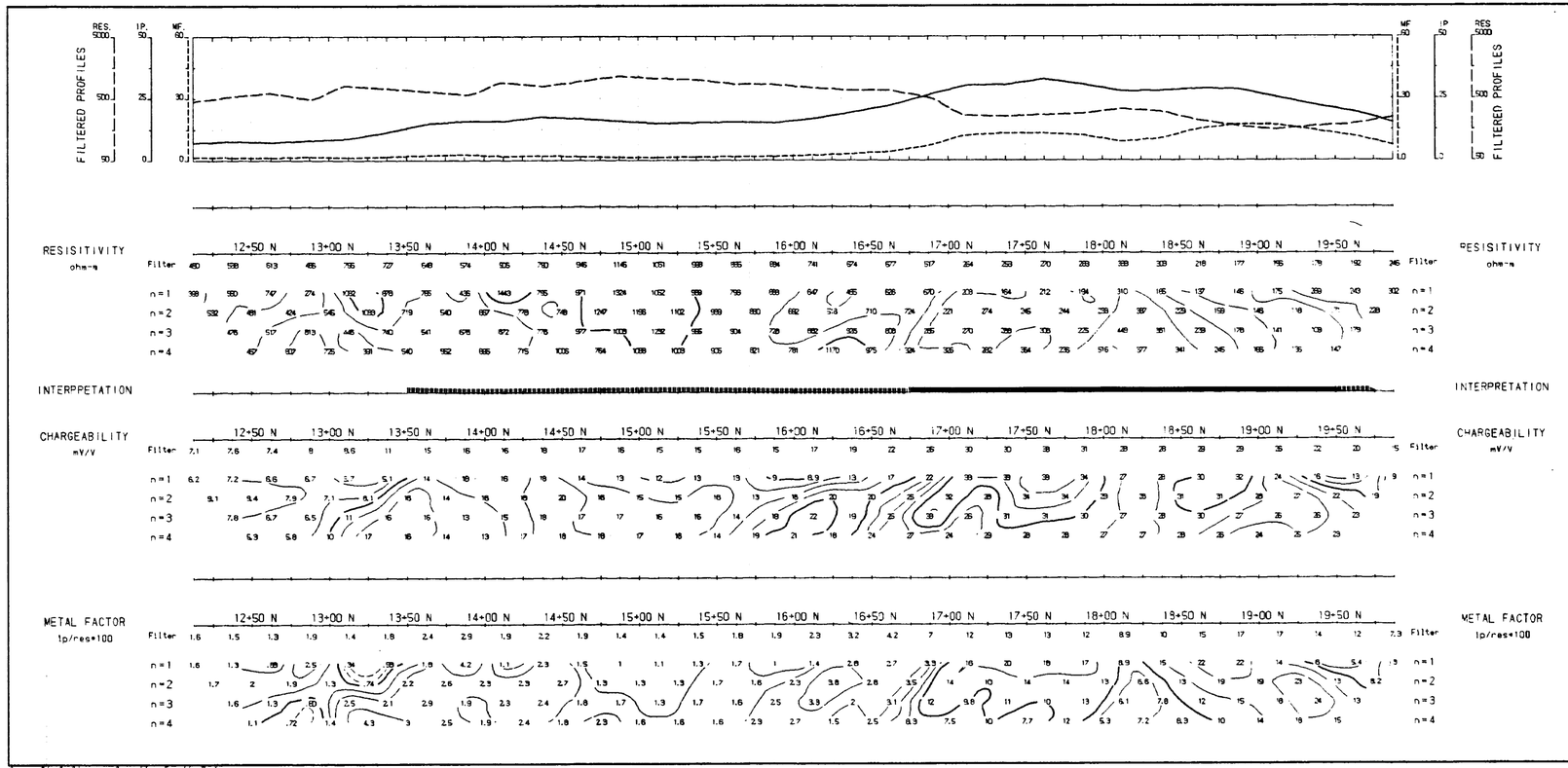
App. 5

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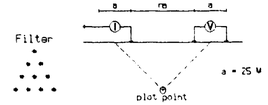
# Line 1 E

## Pole-Dipole Array

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Frequency: .125 Hz.
Operators: A.W., M.A.

Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10....

INTERPPETATION

Well defined, strong increase in polarization with or without marked decrease in resistivity.

Fairly well defined moderate increase in polarization.

Poorly defined polarization increase.

Resistivity feature.

Scale 1:2000

25 0 25 50 75 100 125 (metres)

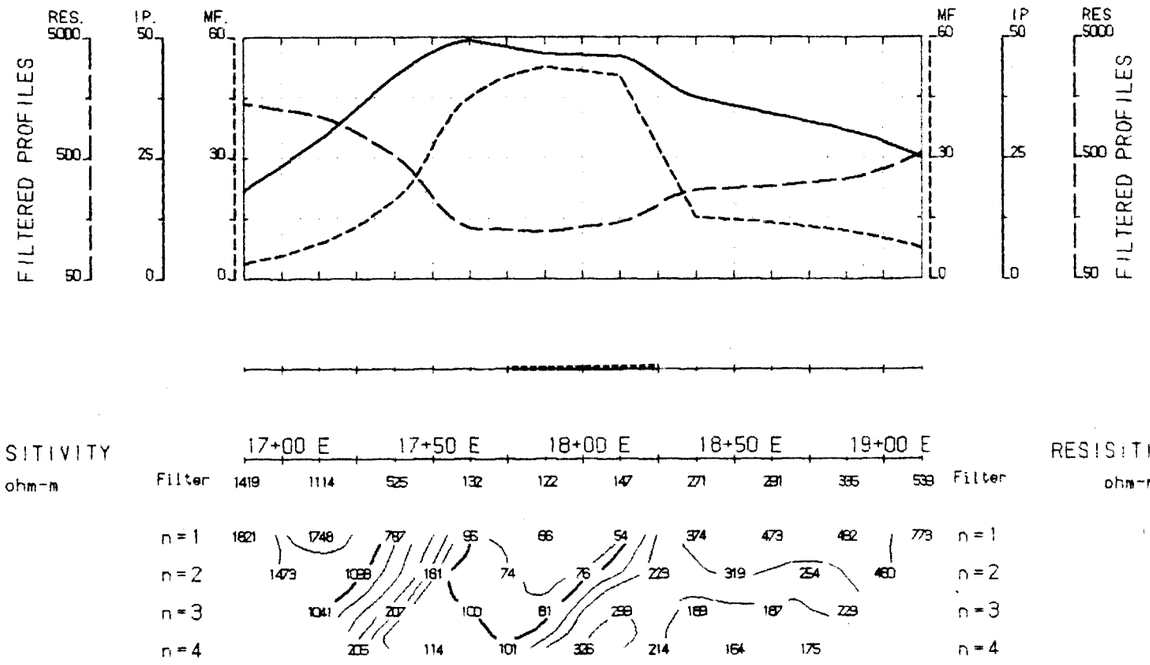
pg. 21

**GRANGES INC.**

INDUCED POLARIZATION SURVEY
UNUK RIVER PROJECT
UZ GRID

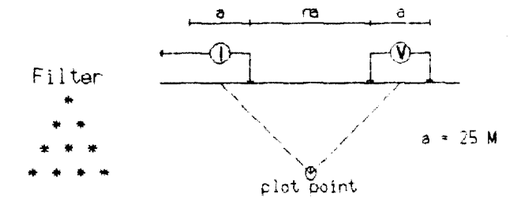
Survey Date: July-Aug. 1990 N.T.S.: 104 B/9W
Interpretation: P.E.W.

**PETER E. WALCOTT & ASSOC. LTD.**




# Line 2800 N

## Pole-Dipole Array




Instrument: Huntec 7.5 kw Tx. BRGM IP6 Rx.
Frequency: .125 Hz.
Operators: A.W., M.A.

Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10,...

### INTERPRETATION

**———** Well defined, strong increase in polarization with or without marked decrease in resistivity.

Fairly well defined moderate increase in polarization.

Poorly defined polarization increase.

**.....** Resistivity feature.

Scale 1:2000

25 0 25 50 75 100 125
(metres)

Pg 22

## GRANGES INC.

INDUCED POLARIZATION SURVEY
UNUK RIVER PROJECT
U2 GRID

Survey Date: July-Aug. 1990 N.T.S.: 104 B/9W
Interpretation: P.E.W.

**PETER E. WALCOTT & ASSOC. LTD.**

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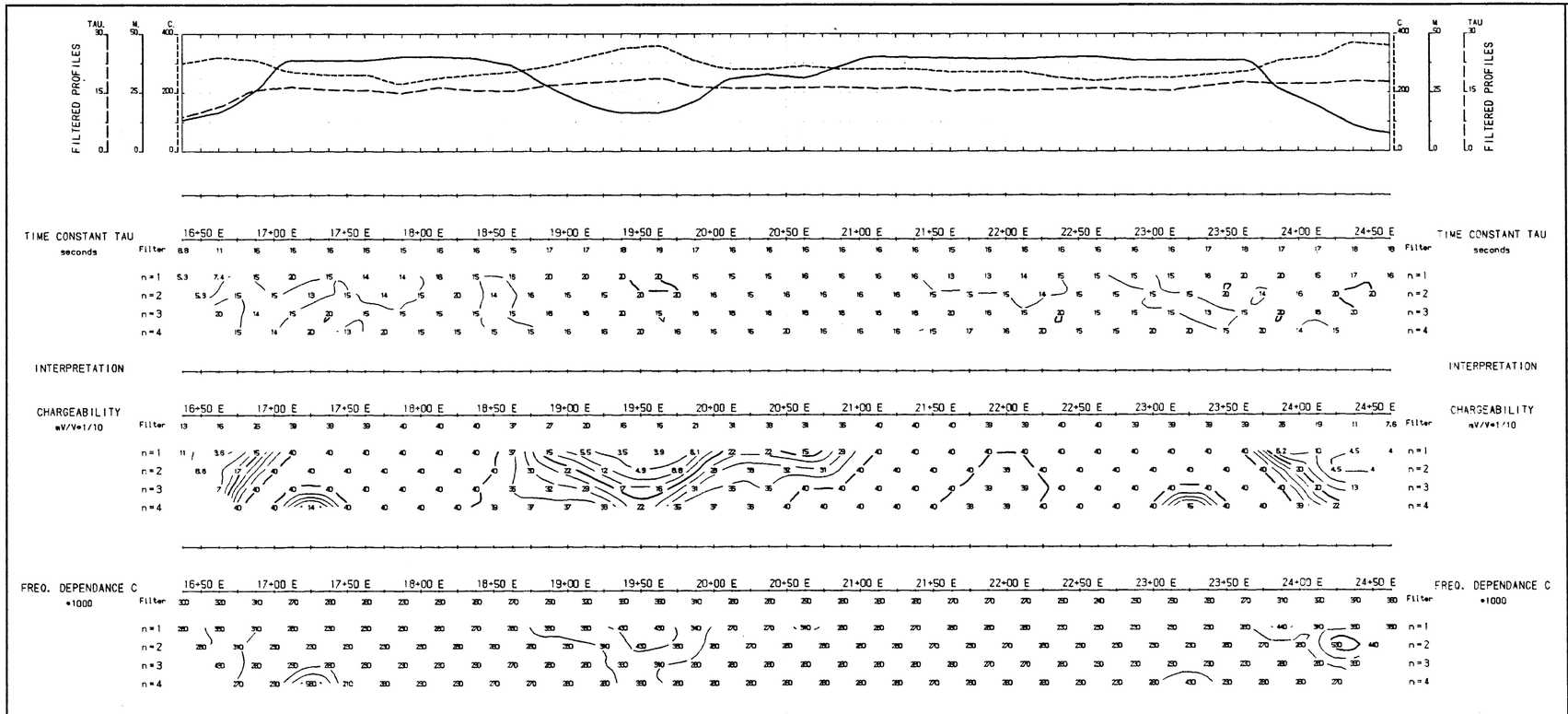
App 5

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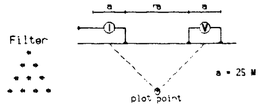
## Line 2700 N

### Pole-Dipole Array




Instrument: Huntec 7.5 kw Tx, BRGM IP6 Rx.
Frequency: 0.125 Hz.
Operators: A.W., M.A.

Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10....

INTERPRETATION

Well defined, strong increase in polarization with or without marked decrease in resistivity.

Fairly well defined moderate increase in polarization.

Poorly defined polarization increase.

Resistivity feature.

Scale 1:2000

25 0 25 50 75 100 125
(metres)

Pg 23

GRANGES INC.

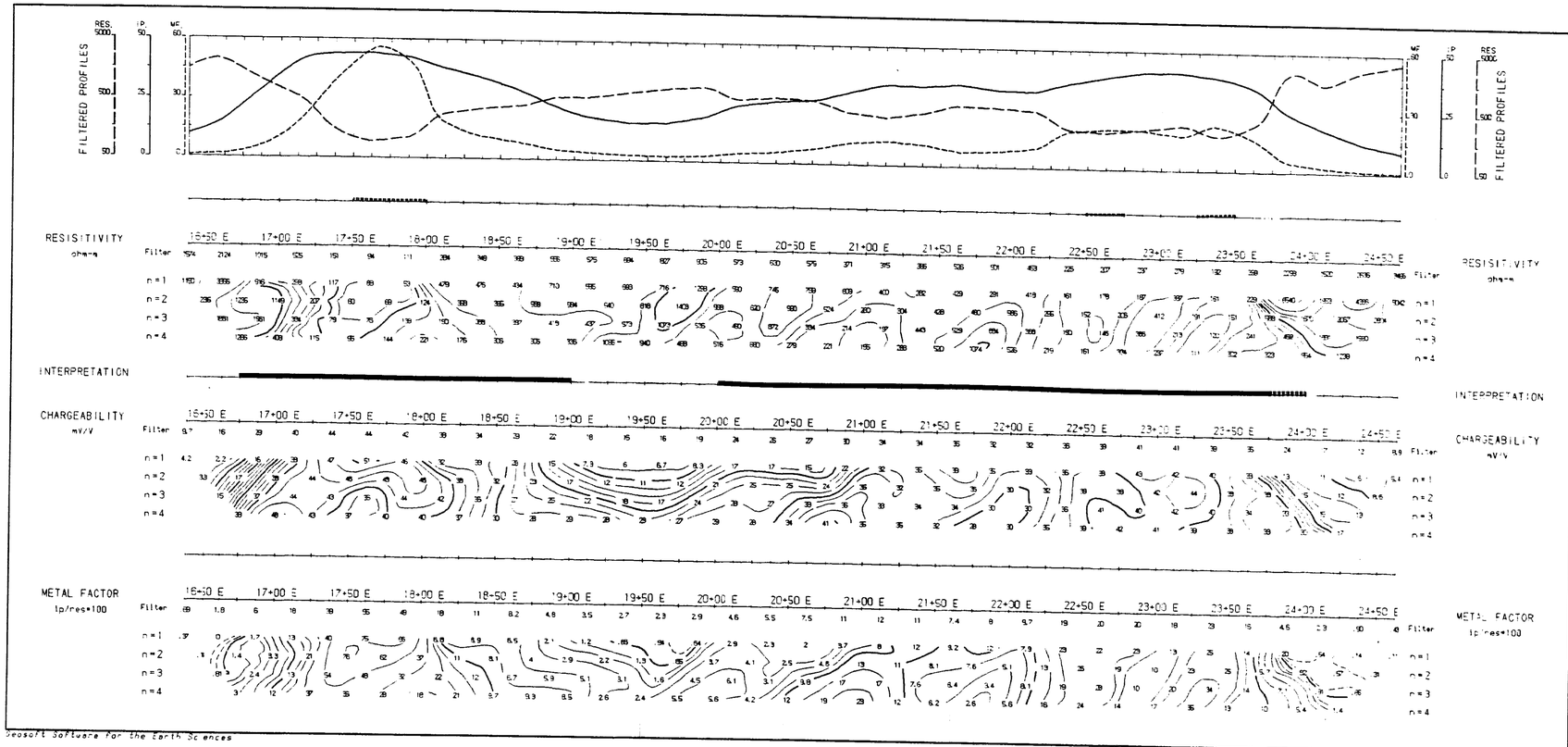
INDUCED POLARIZATION SURVEY
UNUK RIVER PROJECT
U2 GRID

Survey Date: July-Aug. 1990 N.T.S.: 104 B/8W
Interpretation: P.E.W.

PETER E. WALCOTT & ASSOC. LTD.

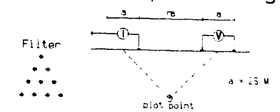
20993

App.5




## Line 2700 N

## Pole-Dipole Array

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Frequency: 0.125 Hz.
Operators: A.W., M.A.

Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10....

INTERPRETATION

Well defined, strong increase in polarization with or without marked decrease in resistivity.

Fairly well defined moderate increase in polarization.

Poorly defined polarization increase.

Resistivity feature.

Scale 1:2000

25 0 25 50 75 100 125 (metres)

P9.29

**GRANGES INC.**

INDUCED POLARIZATION SURVEY
UNUK RIVER PROJECT
UZ GRID

Survey Date: July-Aug. 1990 N.T.S.: 104 B/9W
Interpretation: P.E.W.

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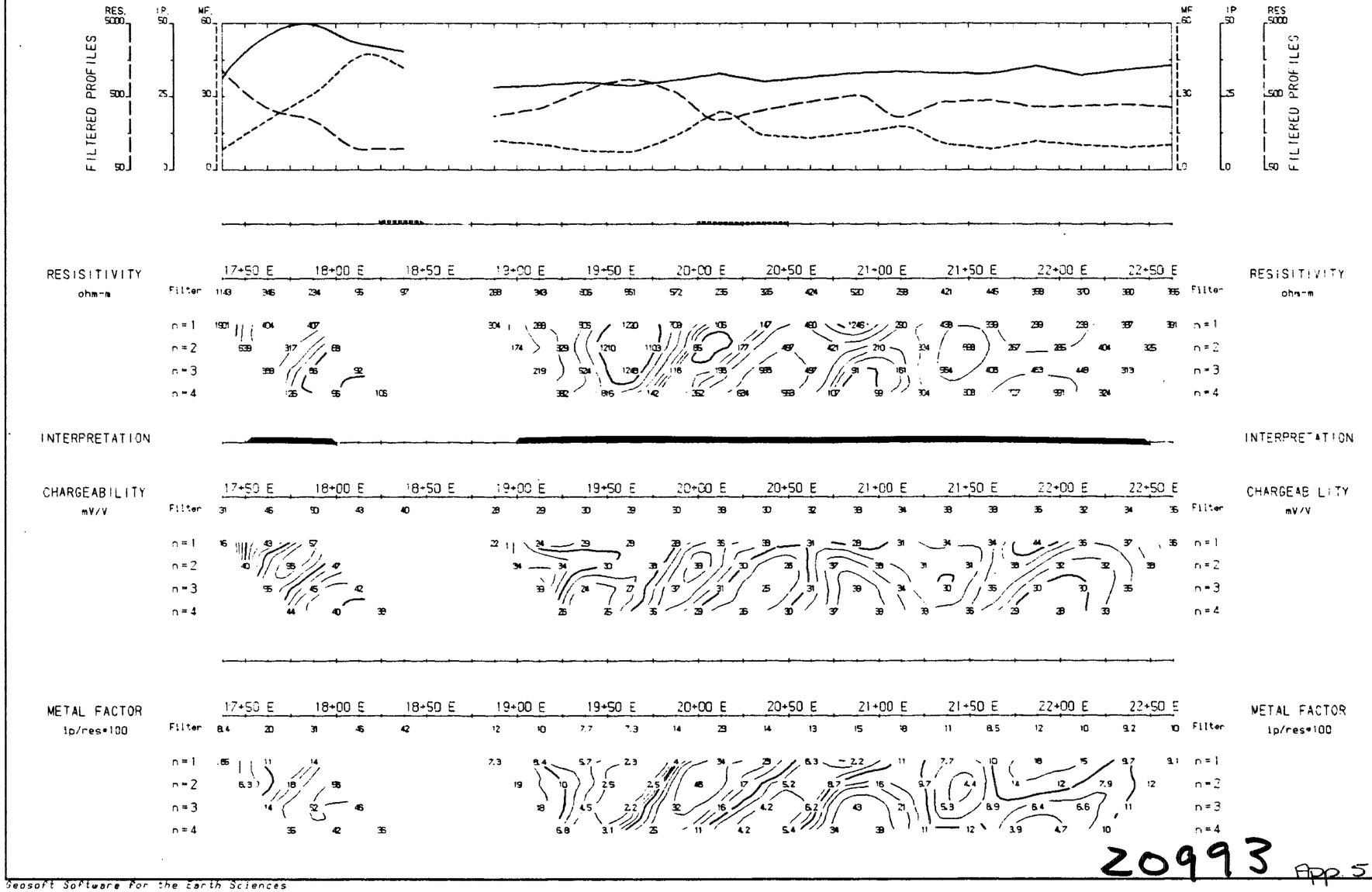
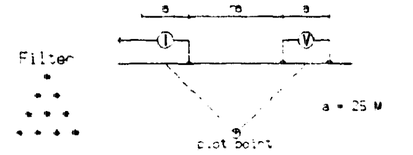



# Line 2600 N

## Pole-Dipole Array




Instrument: Huntec 7.5 kw Tx. BRGM IP5 Rx.
Frequency: 0.125 Hz.
Operators: A.W., M.A.

Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10,...

INTERPRETATION

Well defined, strong increase in polarization with or without marked decrease in resistivity.

Fairly well defined moderate increase in polarization.

Poorly defined polarization increase.

Resistivity feature.

Scale 1:2000

25 0 25 50 75 100 125
(metres)

Pg 25

## GRANGES INC.

INDUCED POLARIZATION SURVEY
UNUK RIVER PROJECT
U2 GRID

Survey Date: July-Aug. 1990 N.T.S.: 104 B/8W
Interpretation: P.E.W.

PETER E. MALCOTT & ASSOC. LTD.

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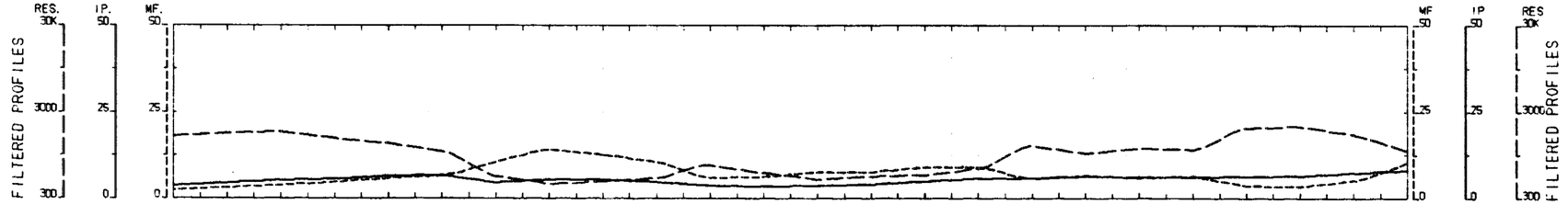


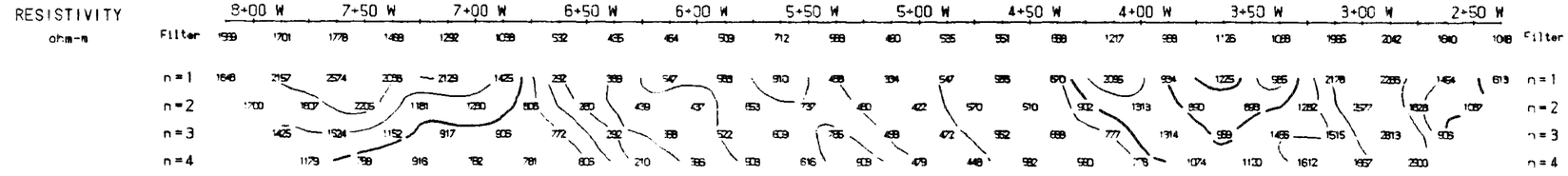


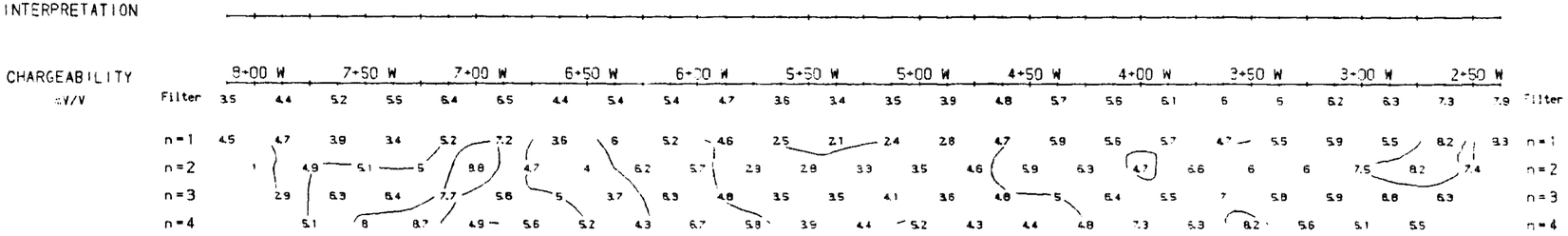


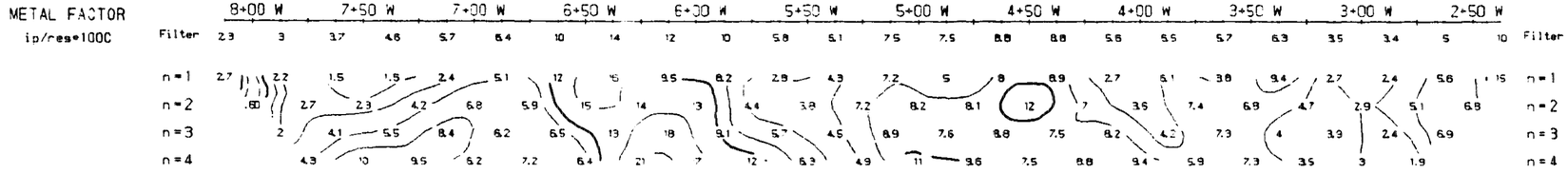


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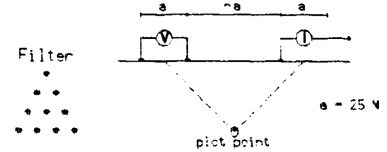
App. 5

# Line 800 N

## Dipole-Pole Array

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Frequency: .125 Hz.
Operators: A.W., M.A.

Logarithmic Contours : 1, 1.5, 2, 3, 5, 7.5, 10....

INTERPRETATION

Well defined, strong increase in polarization with or without marked decrease in resistivity.

Fairly well defined moderate increase in polarization.

Poorly defined polarization increase.

Resistivity feature.

Scale 1:2000

25 0 25 50 75 100 125
(metres)

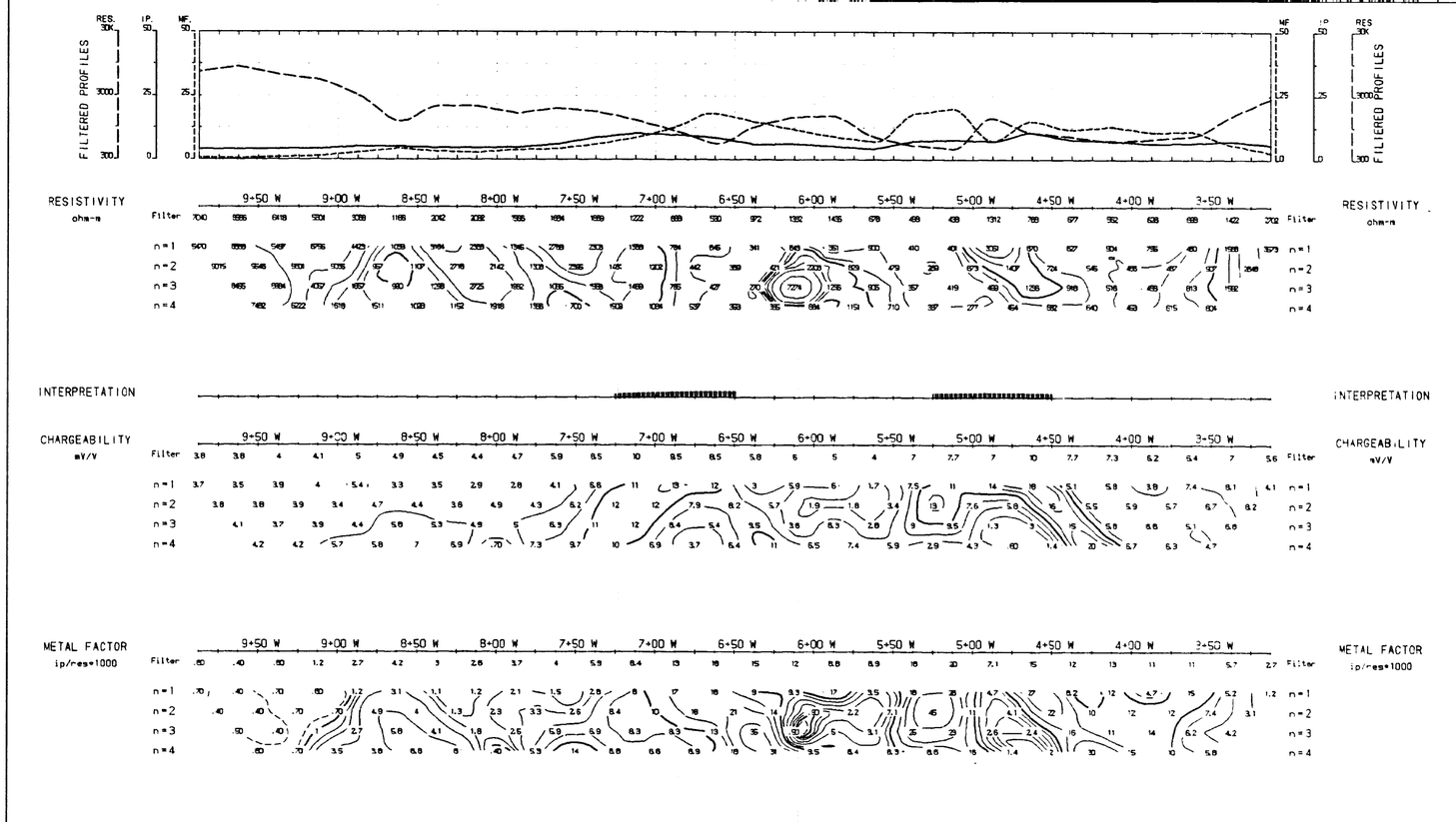
29 26

## GRANGES INC.

INDUCED POLARIZATION SURVEY
UNUK RIVER PROJECT
R ZONE GRID

Survey Date: July-Aug. 1990 N.T.S.: 104 B/10
Interpretation: P.E.W.

**PETER E. WALCOTT & ASSOC. LTD.**

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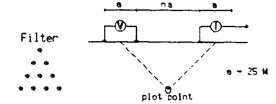
## Line 600 N

## Dipole-Pole Array




Instrument: Huntec 7.5 kw Tx. BRGM IP5 Rx.
Frequency: .125 Hz.
Operators: A.W., M.A.

Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10,....

### INTERPRETATION

Well defined, strong increase in polarization with or without marked decrease in resistivity.

Fairly well defined moderate increase in polarization.

Poorly defined polarization increase.

Resistivity feature.

Scale 1:2000

25 0 25 50 75 100 125
(metres)

Pg 27

# GRANGES INC.

INDUCED POLARIZATION SURVEY
UNUK RIVER PROJECT
R ZONE GRID

Survey Date: July-Aug. 1990 N.T.S.: 104 B/10
Interpretation: P.E.W.

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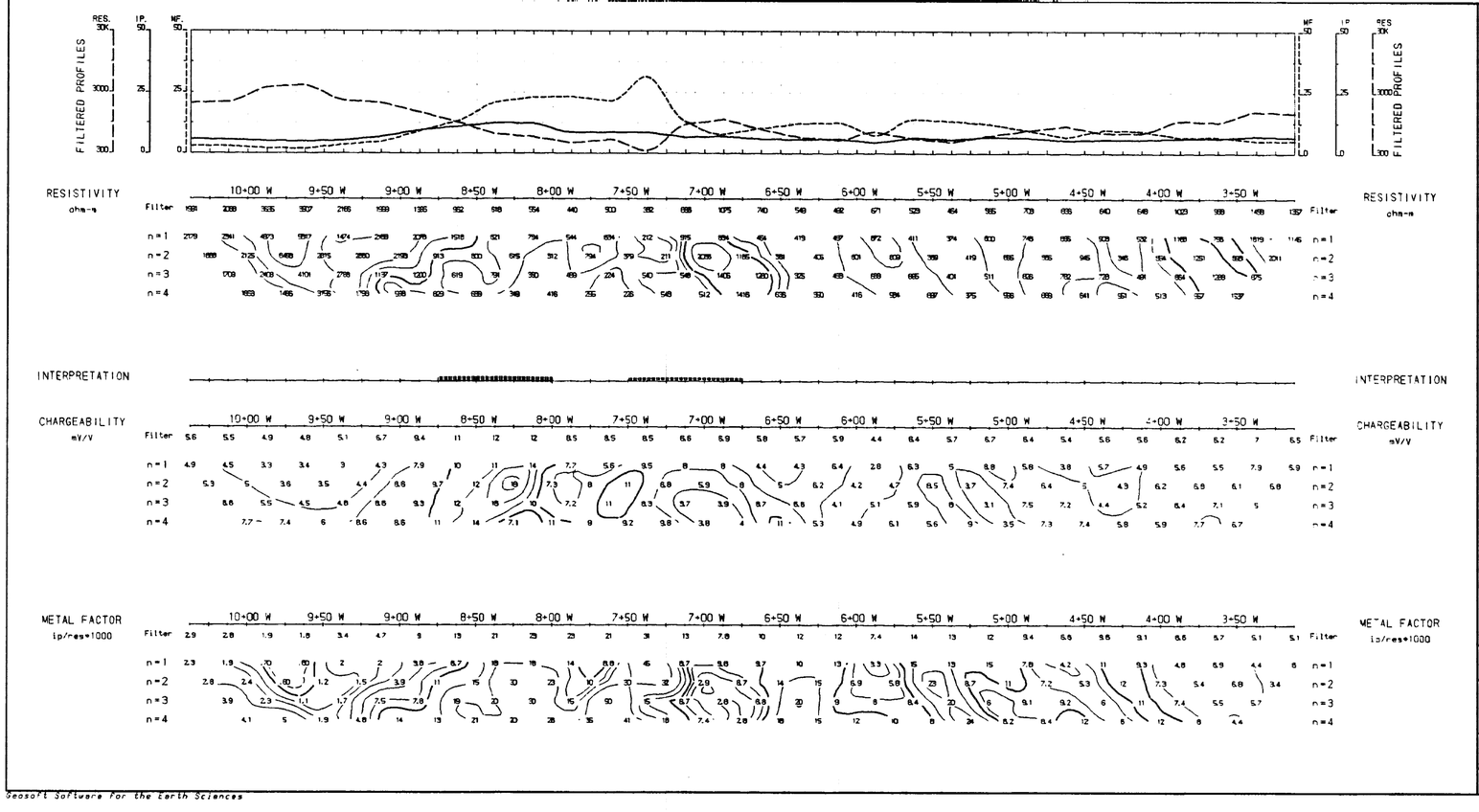
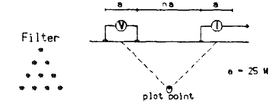
20993
App 5




## Line 400 N

## Dipole-Pole Array




Instrument: Huntec 7.5 kw Tx. BRGM IP6 Rx.
Frequency: .125 Hz.
Operators: A.W., M.A.

Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10....

### INTERPPETATION

Well defined, strong increase in polarization with or without marked decrease in resistivity.

Fairly well defined moderate increase in polarization.

Poorly defined polarization increase.

Resistivity feature.

Scale 1:2000

25 0 25 50 75 100 125 (metres)

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## GRANGES INC.

INDUCED POLARIZATION SURVEY
UNUK RIVER PROJECT
R ZONE GRID

Survey Date: July-Aug. 1990 N.T.S.: 104 B/10
Interpretation: P.E.W.

**PETER E. WALCOTT & ASSOC. LTD.**

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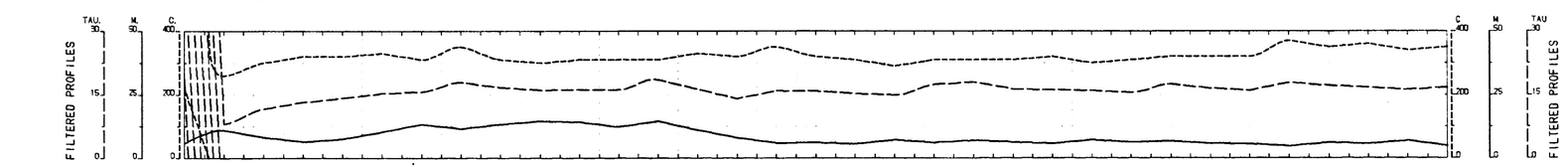
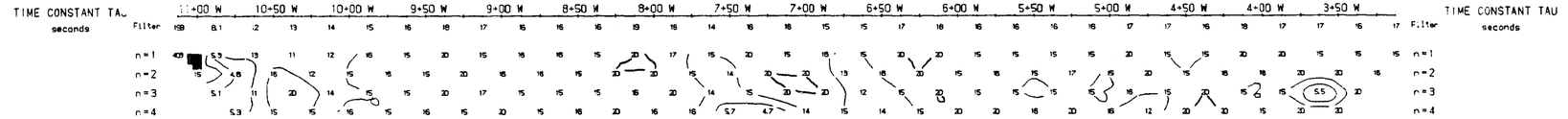
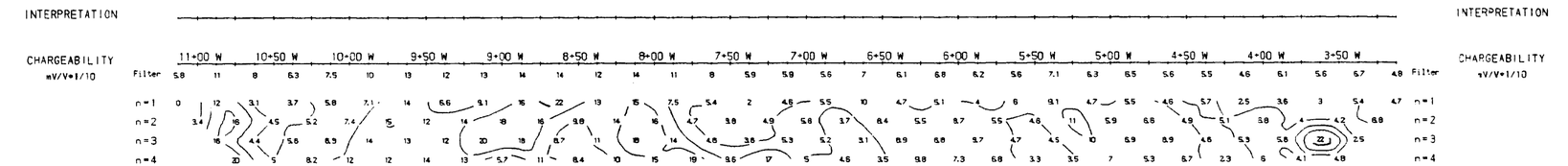
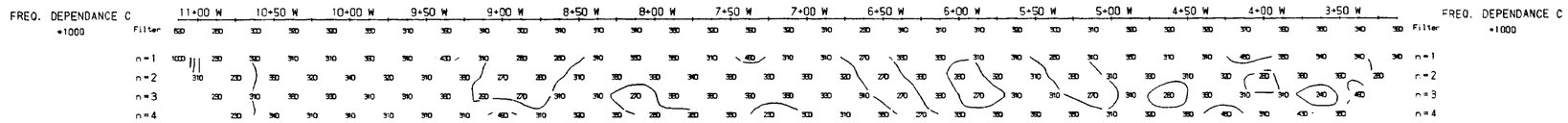
20993
App. 5



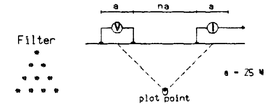




Line 200 N

Dipole-Pole Array




Instrument: Huntec 7.5 kw Tx. BRGM IP6 Rx.
Frequency: .125 Hz.
Operators: A.W., M.A.

Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10....

INTERPRETATION

Well defined, strong increase in polarization with or without marked decrease in resistivity.

Fairly well defined moderate increase in polarization.

Poorly defined polarization increase.

Resistivity feature.

Scale 1:2000

25 0 25 50 75 100 125
(metres)

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GRANGES INC.

INDUCED POLARIZATION SURVEY
UNUK RIVER PROJECT
R ZONE GRID

Survey Date: July-Aug. 1990 N.T.S.: 104 B/10
Interpretation: P.E.W.

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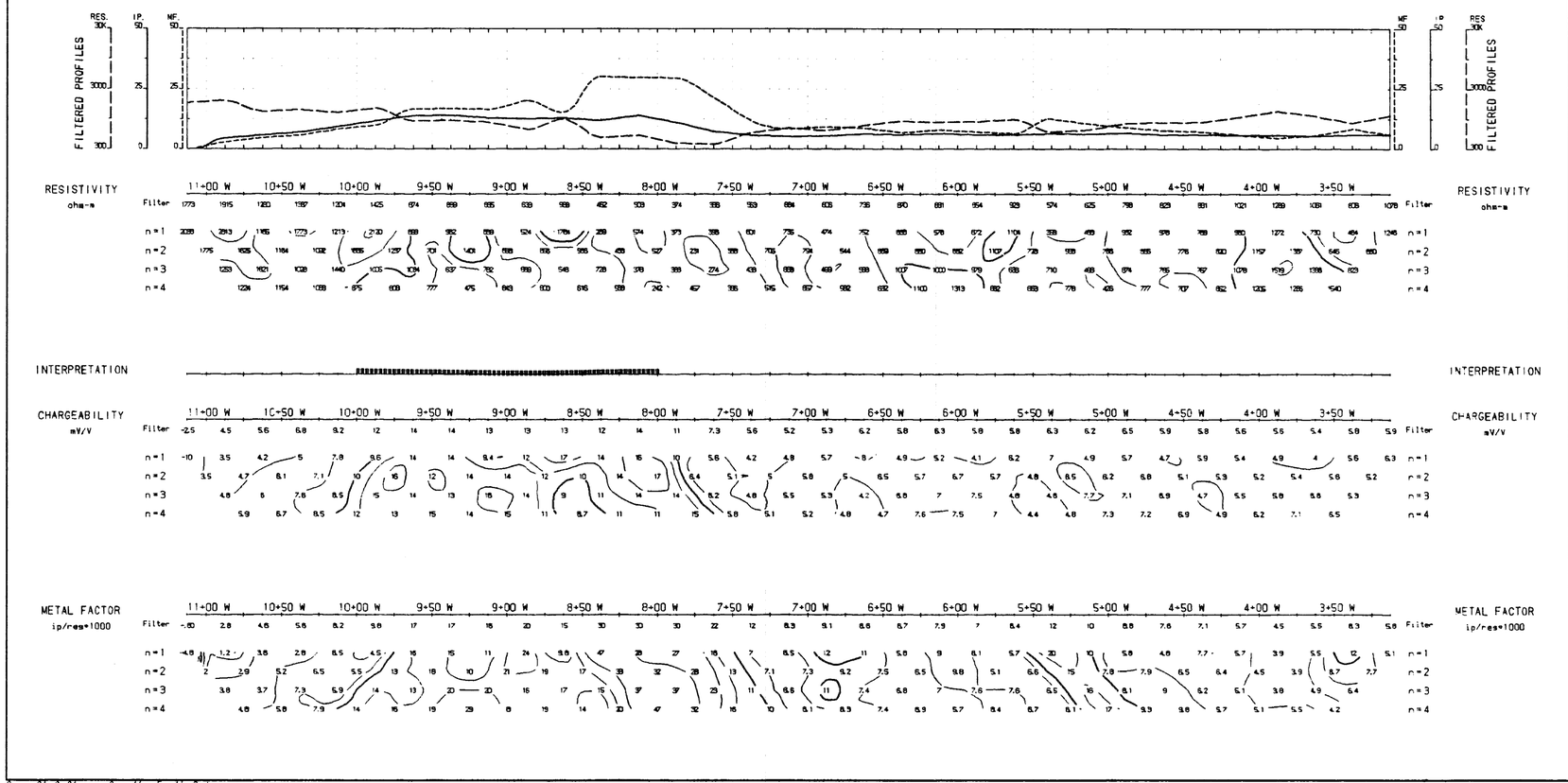
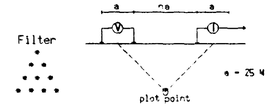



Line 200 N

Dipole-Pole Array




Instrument: Huntec 7.5 kw Tx. BRGM IP6 Rx.
Frequency: .125 Hz.
Operators: A.W., M.A.

Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10,...

INTERPRETATION

Well defined, strong increase in polarization with or without marked decrease in resistivity.

Fairly well defined moderate increase in polarization.

Poorly defined polarization increase.

Resistivity feature.

Scale 1:2000

25 0 25 50 75 100 125
(metres)

Pg. 30

GRANGES INC.

INDUCED POLARIZATION SURVEY
UNUK RIVER PROJECT
R ZONE GRID

Survey Date: July-Aug. 1990 N.T.S.: 104 B/10
Interpretation: P.E.W.

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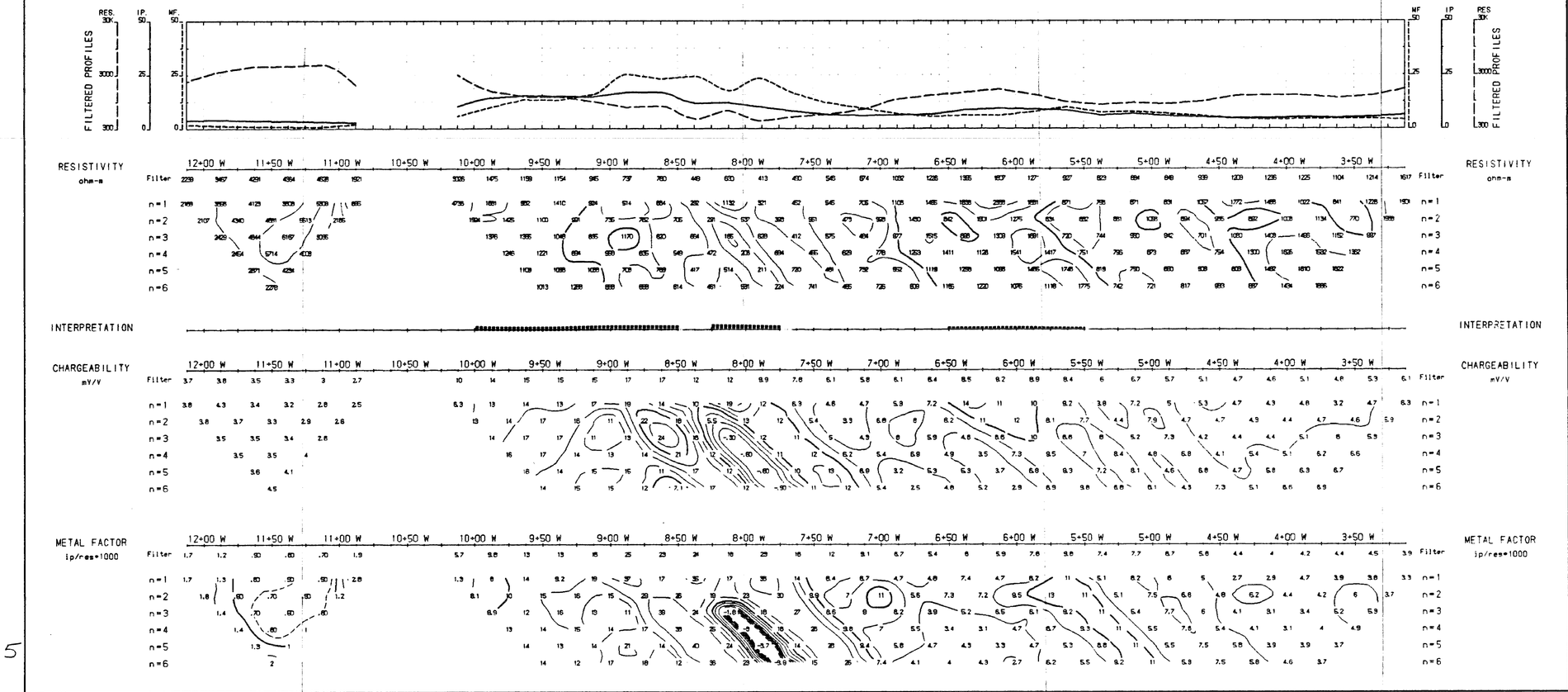


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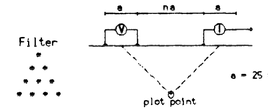
## Line 100 N

## Dipole-Pole Array




Instrument: Huntec 7.5 kw Tx. BRGM IP6 Rx.
Frequency: .125 Hz.
Operators: A.W., M.A.

Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10....

### INTERPRETATION

Well defined, strong increase in polarization with or without marked decrease in resistivity.

Fairly well defined moderate increase in polarization.

Poorly defined polarization increase.

Resistivity feature.

Scale 1:2000

25 0 25 50 75 100 125
(metres)

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# GRANGES INC.

INDUCED POLARIZATION SURVEY
UNUK RIVER PROJECT
R ZONE GRID

Survey Date: July-Aug. 1990 N.T.S.: 104 B/10
Interpretation: P.E.W.

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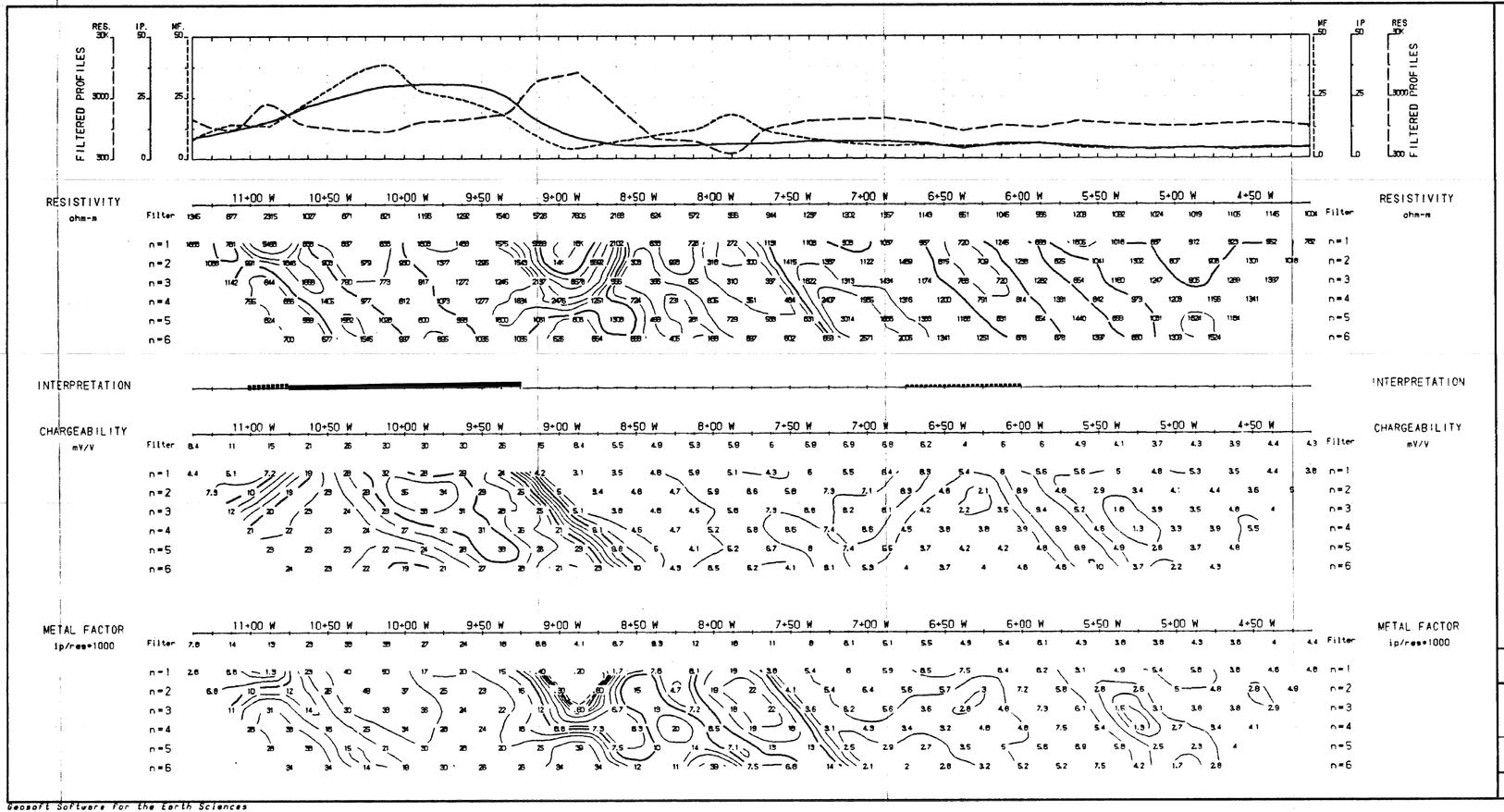
20993 App 5

20993 App 5

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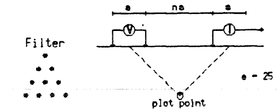
## Line 100 S

## Dipole-Pole Array




Instrument: Huntec 7.5 kw Tx. BRGM IP6 Rx.
Frequency: .125 Hz.
Operators: A.W., M.A.

Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10....

INTERPRETATION

- Well defined, strong increase in polarization with or without marked decrease in resistivity.
- Fairly well defined moderate increase in polarization.
- Poorly defined polarization increase.
- Resistivity feature.

Scale 1:2000

25 0 25 50 75 100 125
(metres)

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**GRANGES INC.**

INDUCED POLARIZATION SURVEY
UNUK RIVER PROJECT
R ZONE GRID

Survey Date: July-Aug. 1990 N.T.S.: 104 B/10
Interpretation: P.E.W.

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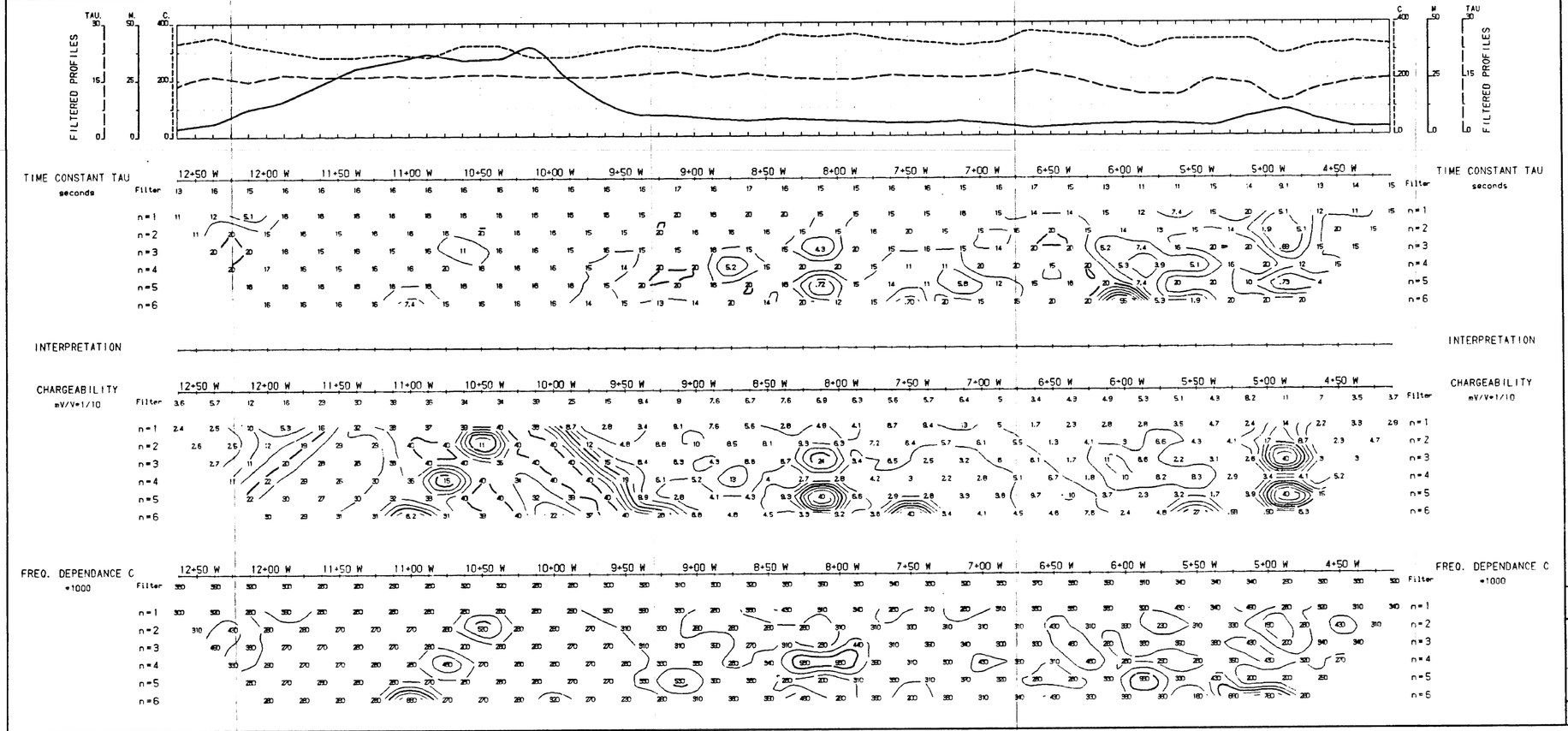
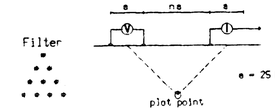



Line 200 S

Dipole-Pole Array




Instrument: Huntec 7.5 kw Tx. BRGM IP6 Rx.
Frequency: .125 Hz.
Operators: A.W., M.A.

Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10....

INTERPRETATION

Well defined, strong increase in polarization with of without marked decrease in resistivity.

Fairly well defined moderate increase in polarization.

Poorly defined polarization increase.

Resistivity feature.

Scale 1:2000

25 0 25 50 75 100 125
(metres)

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**GRANGES INC.**

INDUCED POLARIZATION SURVEY
UNUK RIVER PROJECT
R ZONE GRID

Survey Date: July-Aug. 1990 N.T.S.: 104 B/10
Interpretation: P.E.W.

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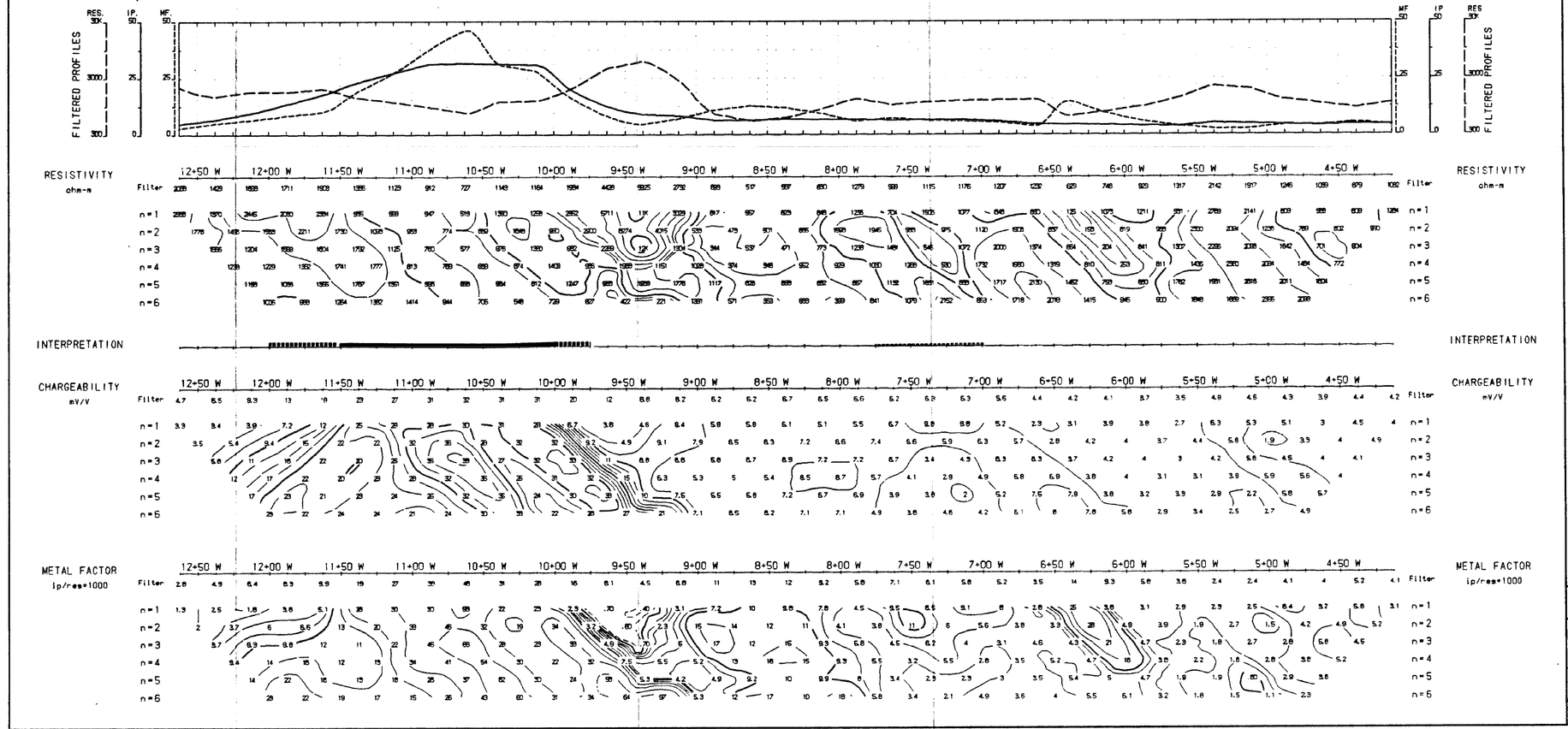
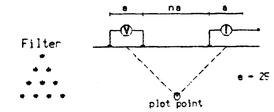



Line 200 S

Dipole-Pole Array




Instrument: Huntec 7.5 kw Tx. BRGM IP6 Rx.
Frequency: .125 Hz.
Operators: A.W., M.A.

Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10....

INTERPRETATION

- Well defined, strong increase in polarization with or without marked decrease in resistivity.
- Fairly well defined moderate increase in polarization.
- Poorly defined polarization increase.

Resistivity feature.

Scale 1:2000

25 0 25 50 75 100 125 (metres)

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# GRANGES INC.

INDUCED POLARIZATION SURVEY
UNUK RIVER PROJECT
R ZONE GRID

Survey Date: July-Aug. 1990 N.T.S.: 104 B/10
Interpretation: P.E.W.

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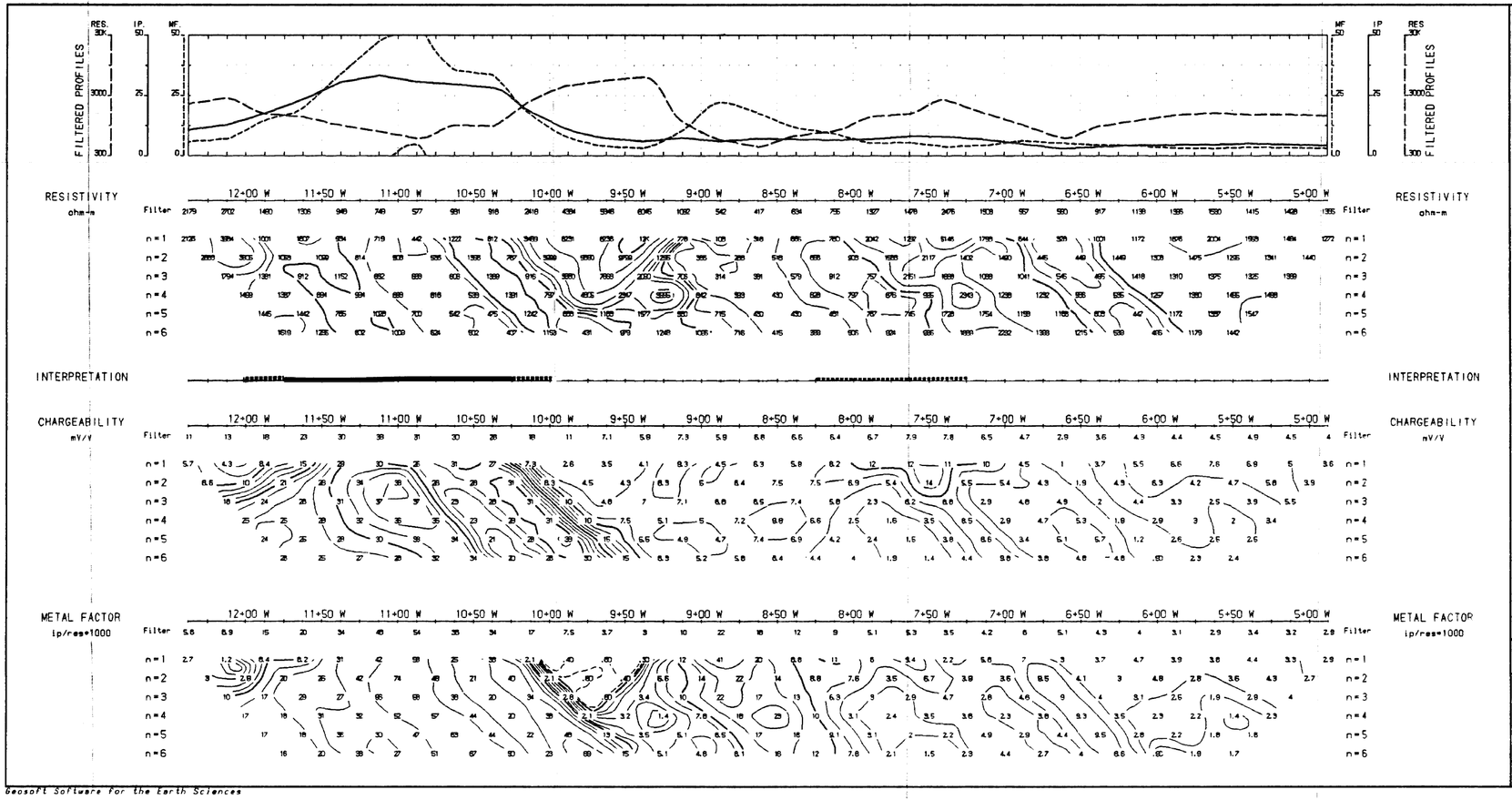
20993 App. 5

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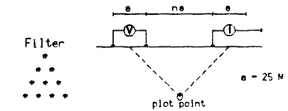
## Line 300 S

## Dipole-Pole Array




Instrument: Huntec 7.5 kw Tx. BRGM IP6 Rx.
Frequency: .125 Hz.
Operators: A.W., M.A.

Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10....

INTERPRETATION

- Well defined, strong increase in polarization with or without marked decrease in resistivity.
- Fairly well defined moderate increase in polarization.
- Poorly defined polarization increase.
- Resistivity feature.

Scale 1:2000

25 0 25 50 75 100 125 (metres)

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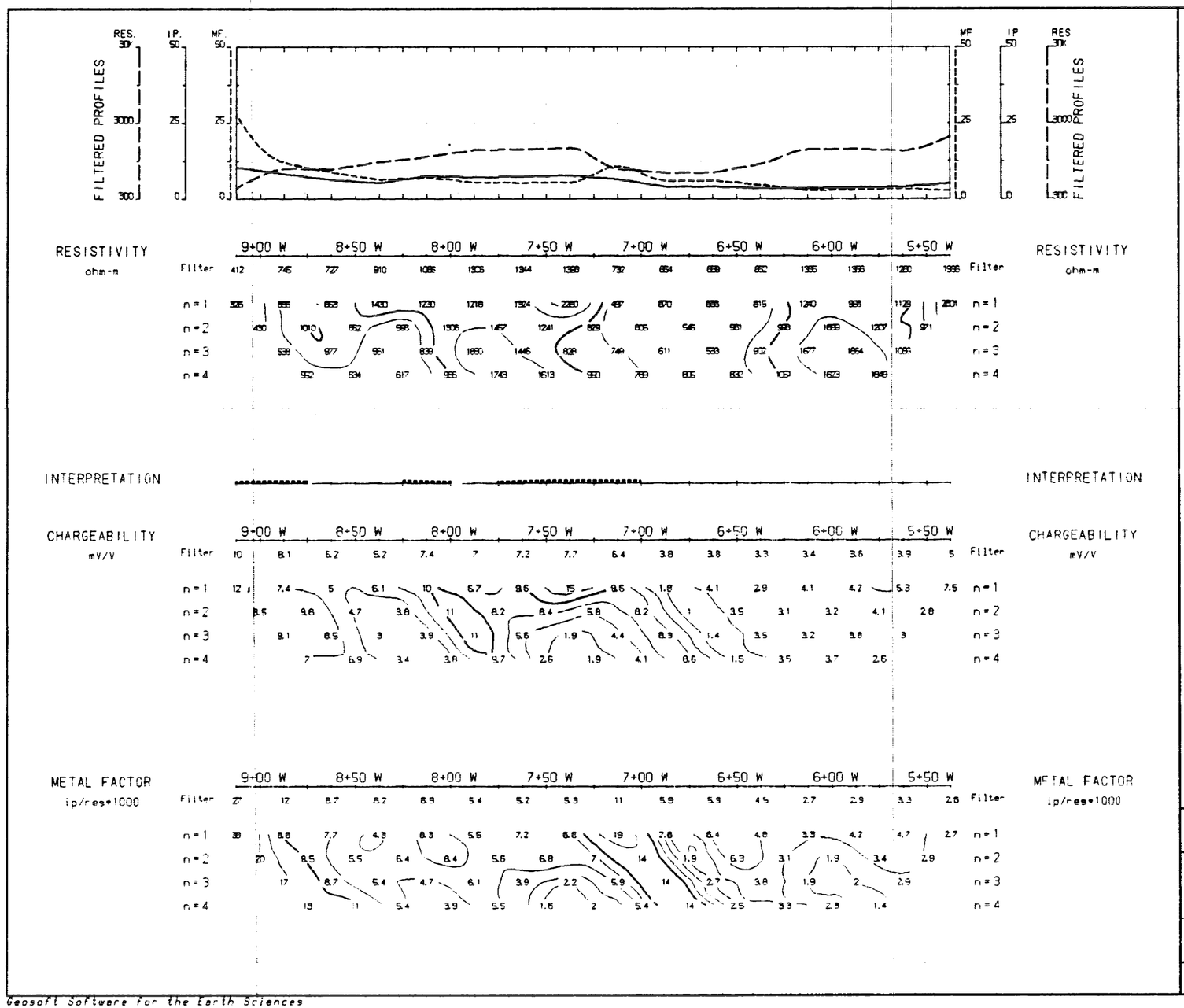
## GRANGES INC.

INDUCED POLARIZATION SURVEY
UNUK RIVER PROJECT
R ZONE GRID

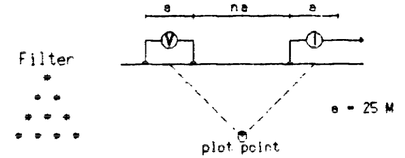
Survey Date: July-Aug. 1990 N.T.S.: 104 B/10
Interpretation: P.E.W.

PETER E. WALCOTT & ASSOC. LTD.




# Line 400 S

## Dipole-Pole Array




Instrument: Huntec 7.5 kw Tx. BRGM IP6 Rx.
Frequency: .125 Hz.
Operators: A.W., M.A.

Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10,...

### INTERPRETATION

Well defined, strong increase in polarization with or without marked decrease in resistivity.

Fairly well defined moderate increase in polarization.

Poorly defined polarization increase.

Resistivity feature.

Scale 1:2000

25 0 25 50 75 100 125
(metres)

P9. 36

## GRANGES INC.

INDUCED POLARIZATION SURVEY
UNUK RIVER PROJECT
R ZONE GRID

Survey Date: July-Aug. 1990 N.T.S.: 104 B/10
Interpretation: P.E.W.

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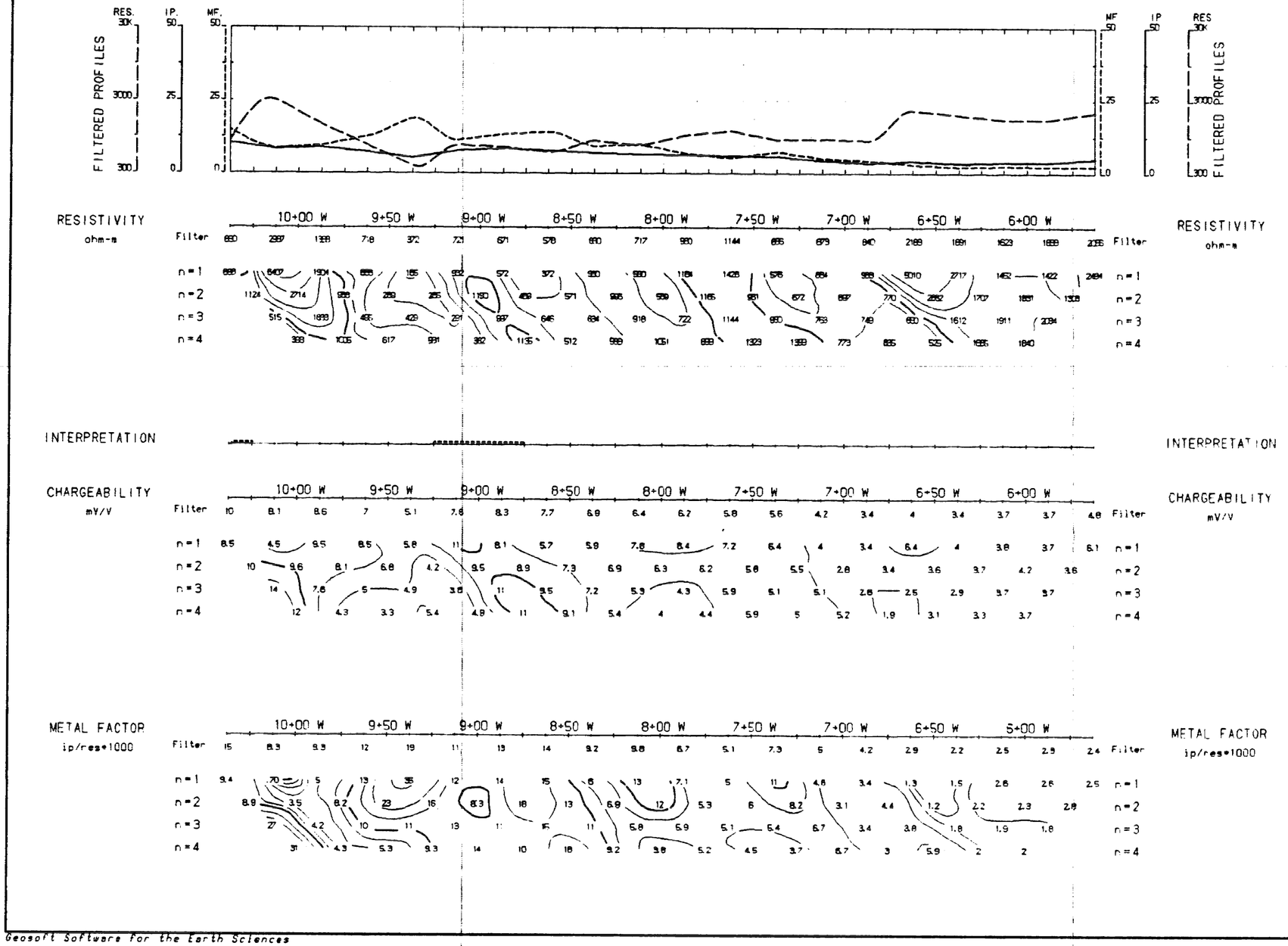
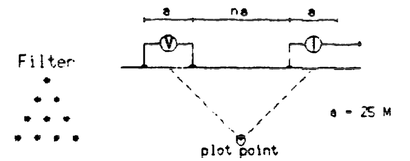
20993 App. 5




# Line 500 S

## Dipole-Pole Array




Instrument: Huntec 7.5 kw Tx. BRGM IP6 Rx.
Frequency: .125 Hz.
Operators: A.W., M.A.

Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10....

### INTERPRETATION

Well defined, strong increase in polarization with or without marked decrease in resistivity.

Fairly well defined moderate increase in polarization.

..... Poorly defined polarization increase.

Resistivity feature.

Scale 1:2000

25 0 25 50 75 100 125
(metres)

DD 37

## GRANGES INC.

INDUCED POLARIZATION SURVEY
UNUK RIVER PROJECT
R ZONE GRID

Survey Date: July-Aug. 1990 N.T.S.: 104 B/10
Interpretation: P.E.W.

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APP. 5

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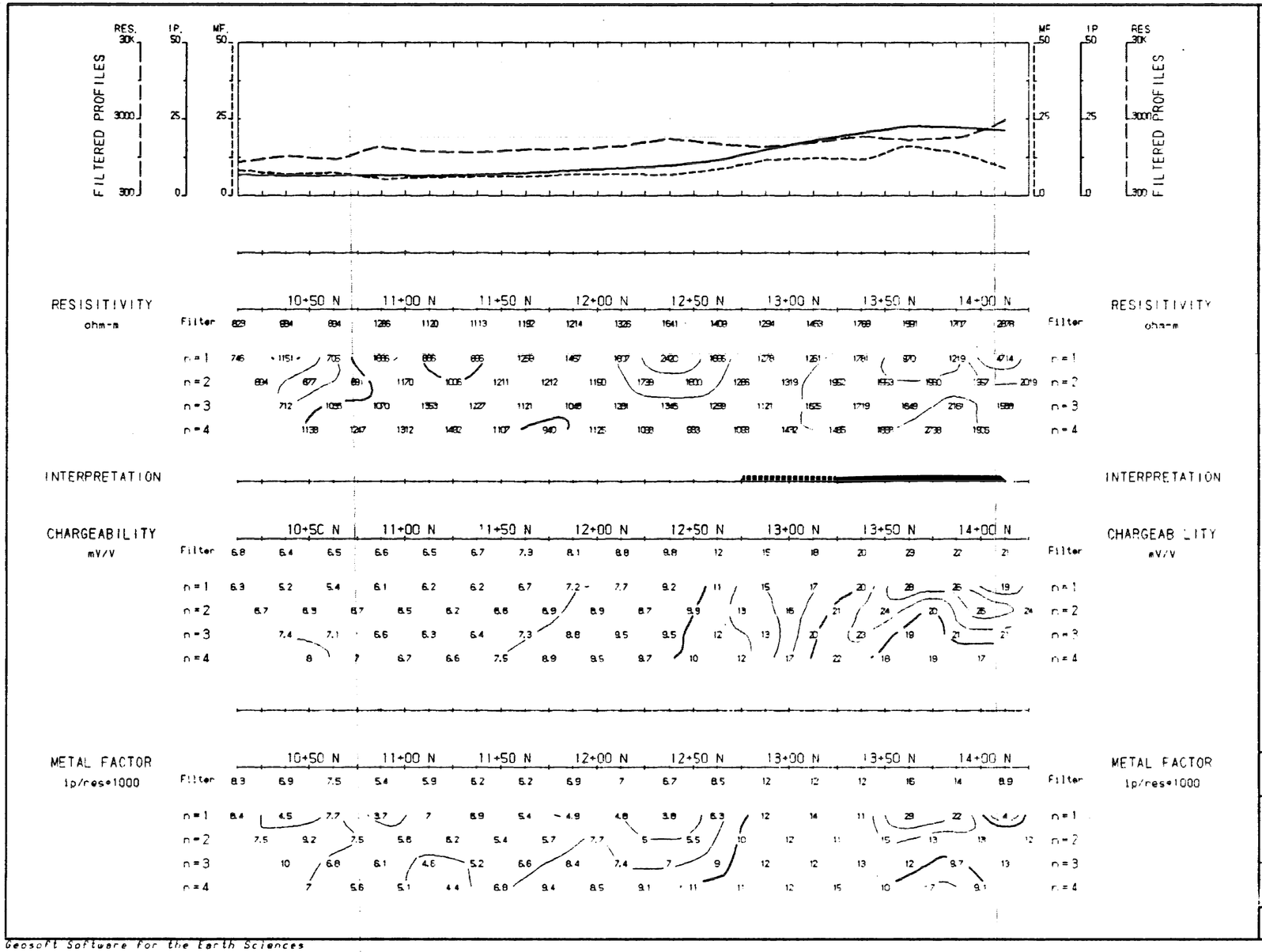


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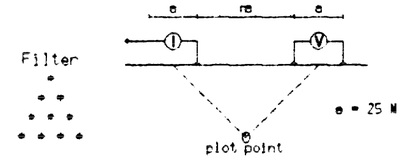
# Tie 600 W

## Pole-Dipole Array




Instrument: Huntec 7.5 kw Tx, BRGM IP6 Rx.
Frequency: .125 Hz.
Operators: P.E.W., A.W., M.A.

Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10....

INTERPRETATION

Well defined, strong increase in polarization with or without marked decrease in resistivity.

Fairly well defined moderate increase in polarization.

Poorly defined polarization increase.

Resistivity feature.

Scale 1:2000

25 0 25 50 75 100 125
(metres)

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GRANGES INC.

INDUCED POLARIZATION SURVEY
UNUK RIVER PROJECT
ZONE 1 GRID

Survey Date: July-Aug. 1990 N.T.S.: 104 B/9W
Interpretation: P.E.W.

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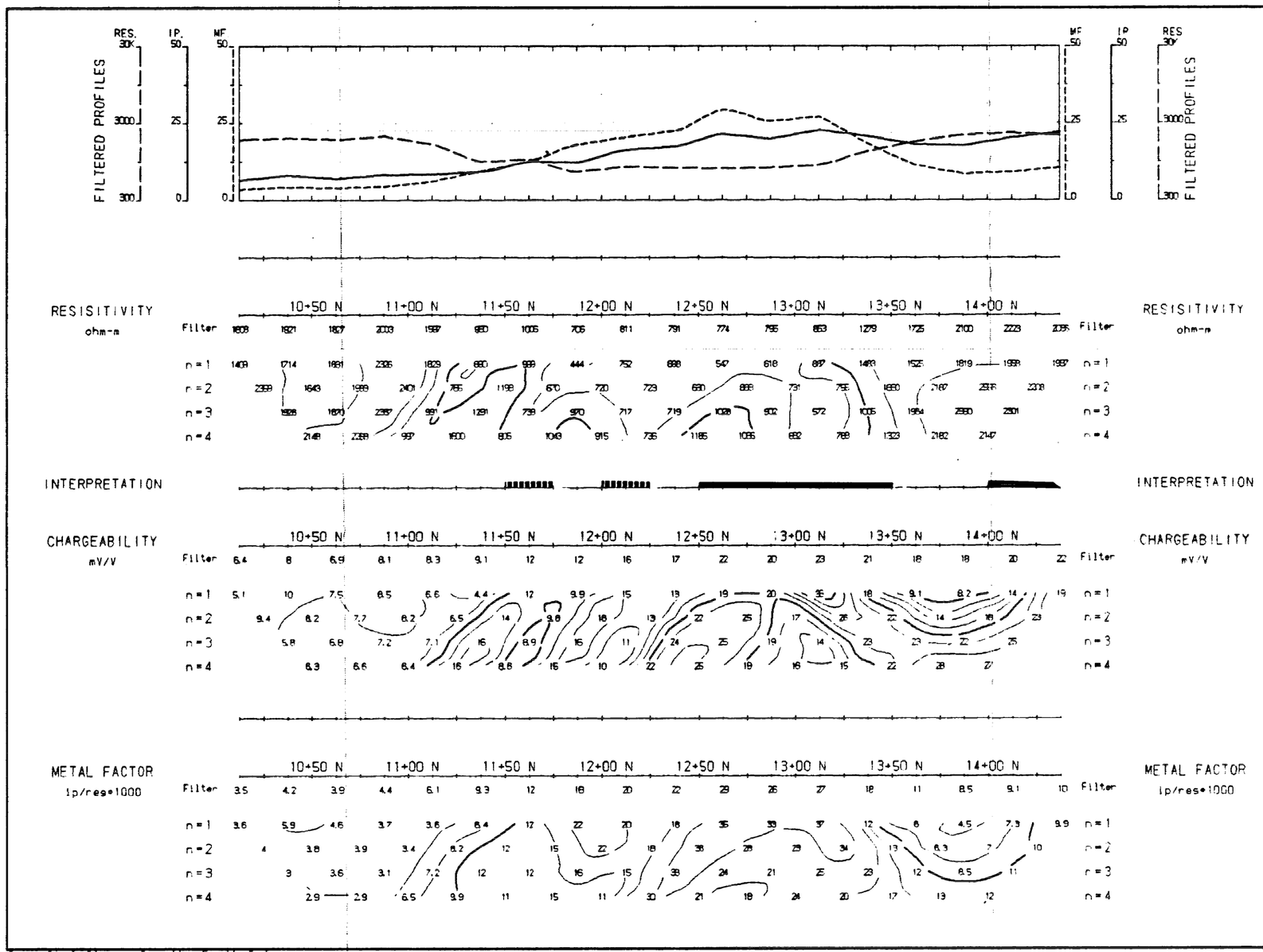
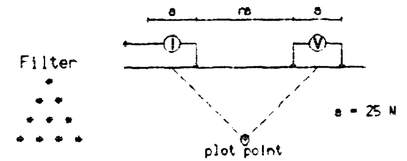
App. 5




# Tie 800 W

## Pole-Dipole Array




Instrument: Huntec 7.5 kw Tx. BRGM IP6 Rx.
Frequency: .125 Hz.
Operators: P.E.W., A.W., M.A.

Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10....

### INTERPRETATION

Well defined, strong increase in polarization with or without marked decrease in resistivity.

Fairly well defined moderate increase in polarization.

Poorly defined polarization increase.

Resistivity feature.

Scale 1:2000

25 0 25 50 75 100 125
(metres)

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**GRANGES INC.**

INDUCED POLARIZATION SURVEY
UNUK RIVER PROJECT
ZONE 1 GRID

Survey Date: July-Aug. 1990 N.T.S.: 104 B/9W
Interpretation: P.E.W.

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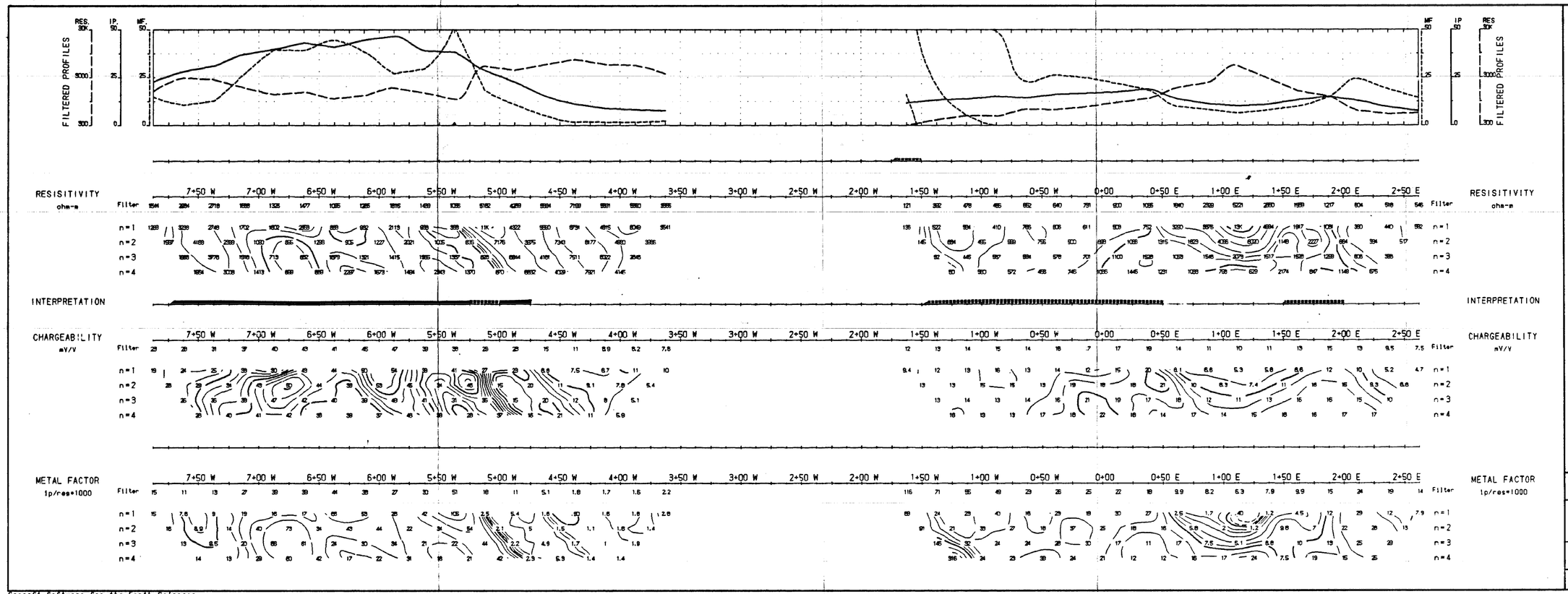
20993
App. 5

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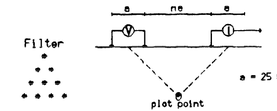
# Line 1700 N

## Dipole-Pole Array




Instrument: Huntec 7.5 kw Tx. BRGM IP6 Rx.
Frequency: .125 Hz.
Operators: P.E.W., A.W., M.A.

Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10....

INTERPRETATION

Well defined, strong increase in polarization with or without marked decrease in resistivity.

Fairly well defined moderate increase in polarization.

Poorly defined polarization increase.

Resistivity feature.

**20993** App 5

Scale 1:2000

25 0 25 50 75 100 125
(metres)

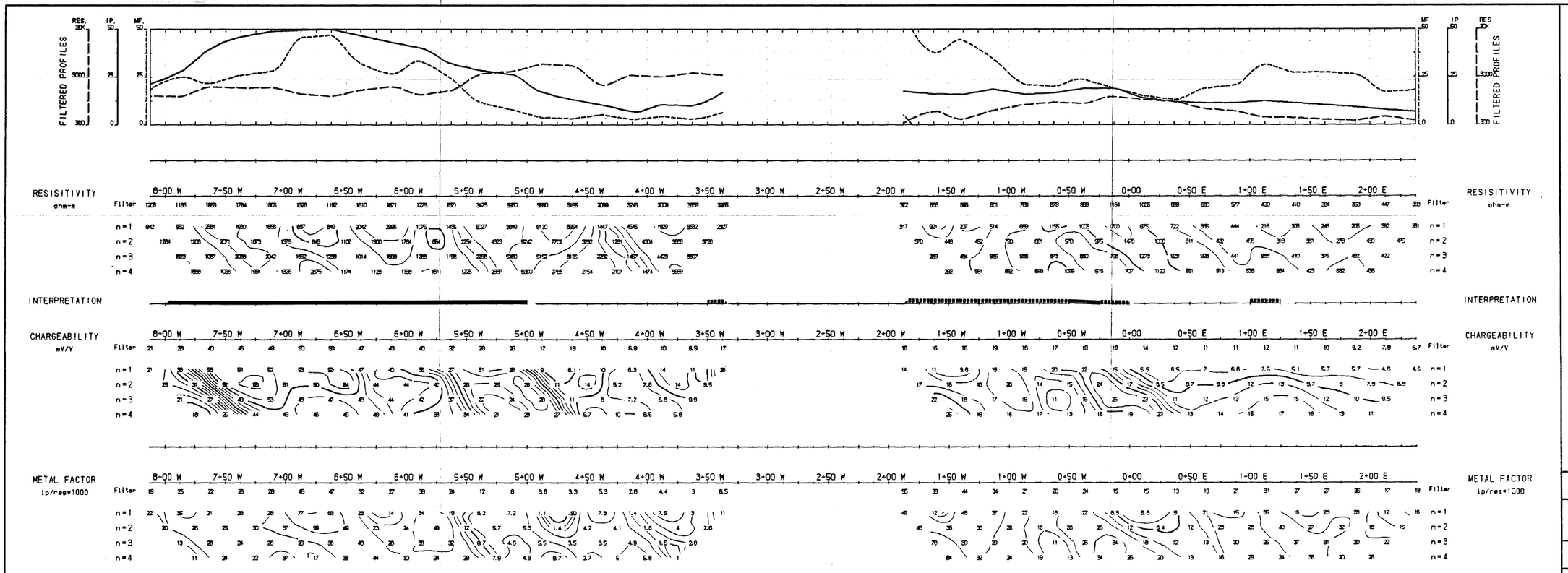
P9.90

**GRANGES INC.**

INDUCED POLARIZATION SURVEY
UNUK RIVER PROJECT
ZONE I GRID

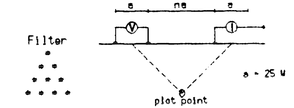
Survey Date: July-Aug. 1990 N.T.S.: 104 B/9W
Interpretation: P.E.W.

**PETER E. WALCOTT & ASSOC. LTD.**




# Line 1600 N

## Dipole-Pole Array




Instrument: Huntec 7.5 kw Tx. BRGM IP6 Rx.
Frequency: .125 Hz.
Operators: P.E.W., A.W., M.A.

Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10,...

INTERPRETATION

Well defined, strong increase in polarization with of without marked decrease in resistivity.

Fairly well defined moderate increase in polarization.

Poorly defined polarization increase.

Resistivity feature.

Scale 1:2000

25 0 25 50 75 100 125
(metres)

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**GRANGES INC.**

INDUCED POLARIZATION SURVEY
UNUK RIVER PROJECT
ZONE 1 GRID

Survey Date: July-Aug. 1990 N.T.S.: 104 B/9W
Interpretation: P.E.W.

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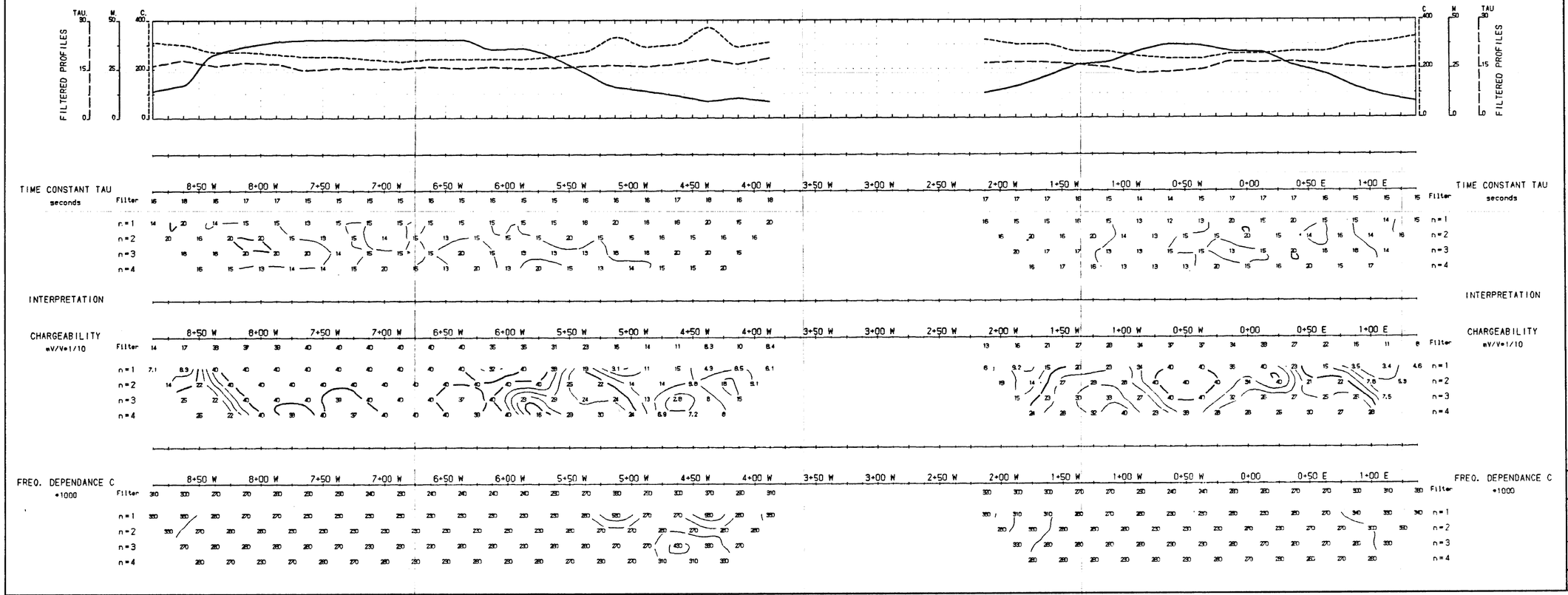
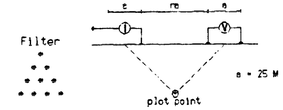



# Line 1500 N

## Pole-Dipole Array




Instrument: Huntec 7.5 kw Tx. BRGM IP6 Rx.
Frequency: .125 Hz.
Operators: P.E.W., A.W., M.A.

Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10....

### INTERPRETATION

Well defined, strong increase in polarization with or without marked decrease in resistivity.

Fairly well defined moderate increase in polarization.

Poorly defined polarization increase.

Resistivity feature.

20993 App. 5

Scale 1:2000

25 0 25 50 75 100 125
(metres)

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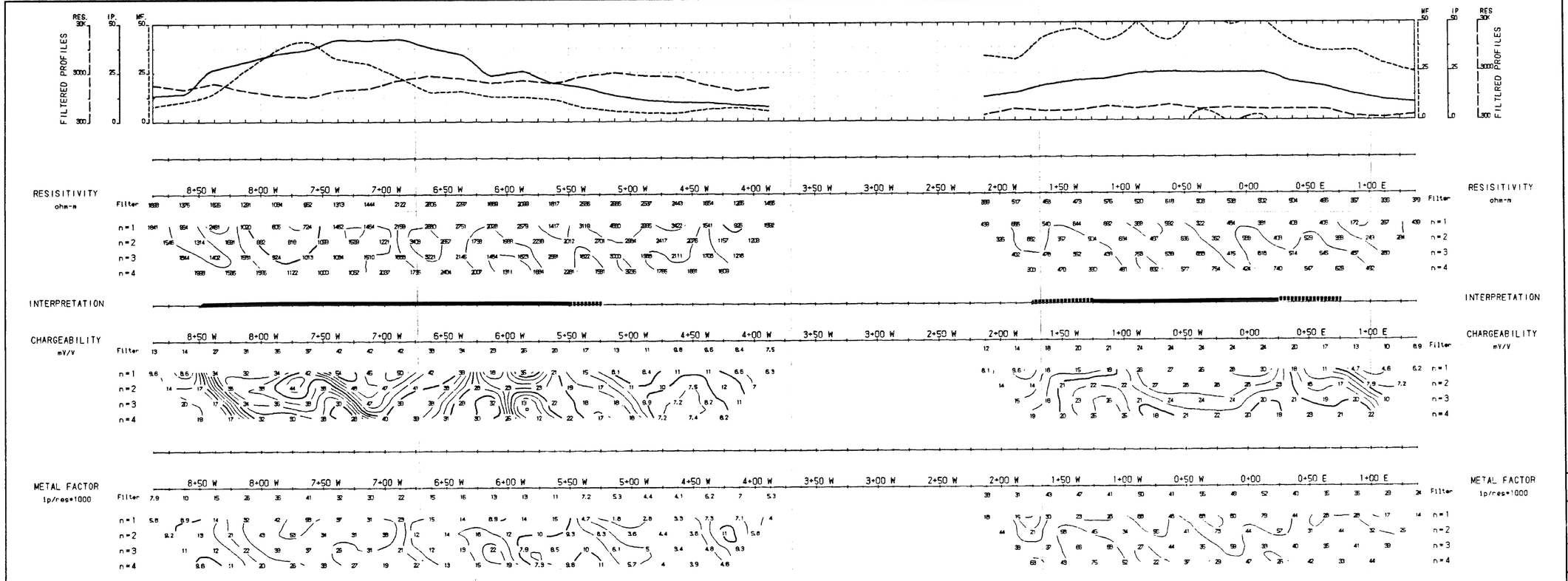
## GRANGES INC.

INDUCED POLARIZATION SURVEY
UNUK RIVER PROJECT
ZONE 1 GRID

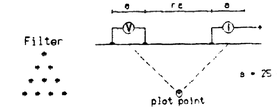
Survey Date: July-Aug. 1990 N.T.S.: 104 B/9W
Interpretation: P.E.W.

PETER E. WALCOTT & ASSOC. LTD.




Line 1500 N

Dipole-Pole Array




Instrument: Huntec 7.5 kw Tx. BRGM IP6 Rx.
Frequency: .125 Hz.
Operators: P.E.W., A.W., M.A.

Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10....

INTERPRETATION

Well defined, strong increase in polarization with or without marked decrease in resistivity.

Fairly well defined moderate increase in polarization.

Poorly defined polarization increase.

Resistivity feature.

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Scale 1:2000

25 0 25 50 75 100 125
(metres)

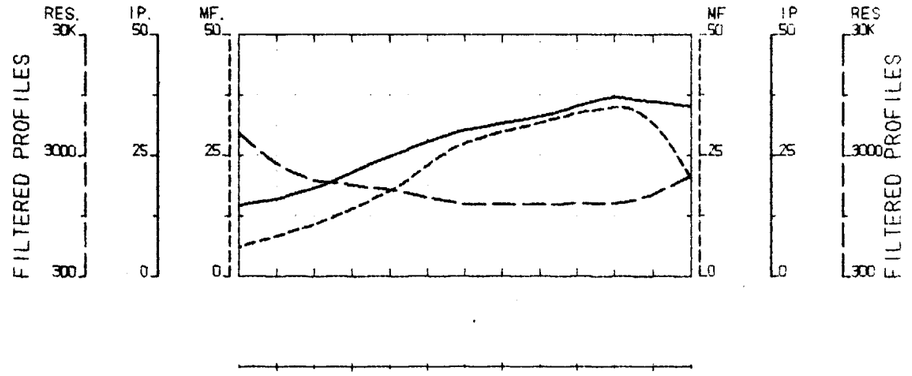
Dr. 43

GRANGES INC.

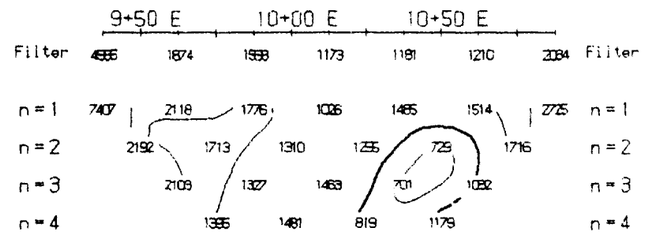
INDUCED POLARIZATION SURVEY
UNUK RIVER PROJECT
ZONE 1 GRID

Survey Date: July-Aug. 1990 N.T.S.: 104 B/9W
Interpretation: P.E.W.

PETER E. WALCOTT & ASSOC. LTD.




RESISTIVITY
ohm-m

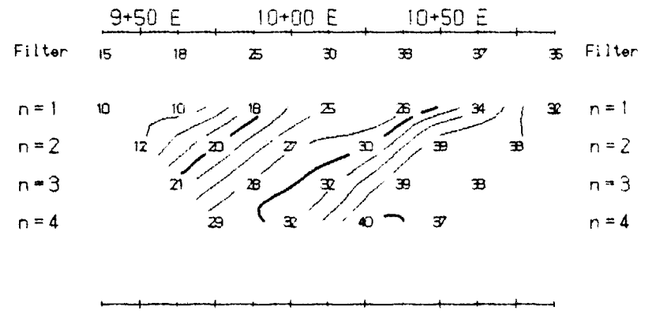



RESISTIVITY
ohm-m

INTERPRETATION

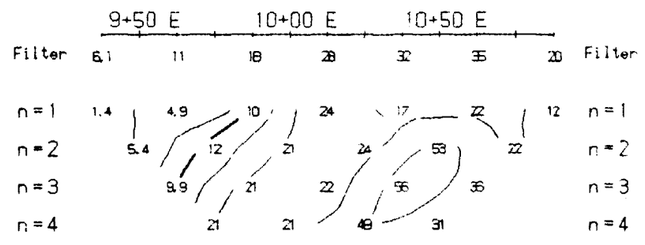
INTERPRETATION

CHARGEABILITY
mV/V




CHARGEABILITY
mV/V

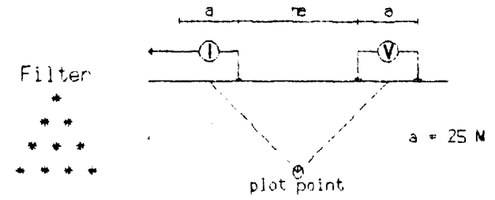
METAL FACTOR
ip/res*1000




METAL FACTOR
ip/res*1000

# Line 1400 N

## Pole-Dipole Array




Instrument: Huntec 7.5 kw Tx. BRGM IP6 Rx.
Frequency: .125 Hz.
Operators: P.E.W., A.W., M.A.

Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10....

### INTERPRETATION

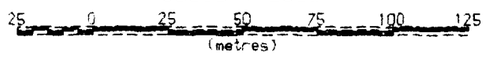
Well defined, strong increase in polarization with of without marked decrease in resistivity.

Fairly well defined moderate increase in polarization.

Poorly defined polarization increase.

Resistivity feature.

Scale 1:2000

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## GRANGES INC.

INDUCED POLARIZATION SURVEY
UNUK RIVER PROJECT
AP GRID

Survey Date: July-Aug. 1990 N.T.S.: 104 B/9W
Interpretation: P.E.W.

**PETER E. WALCOTT & ASSOC. LTD.**

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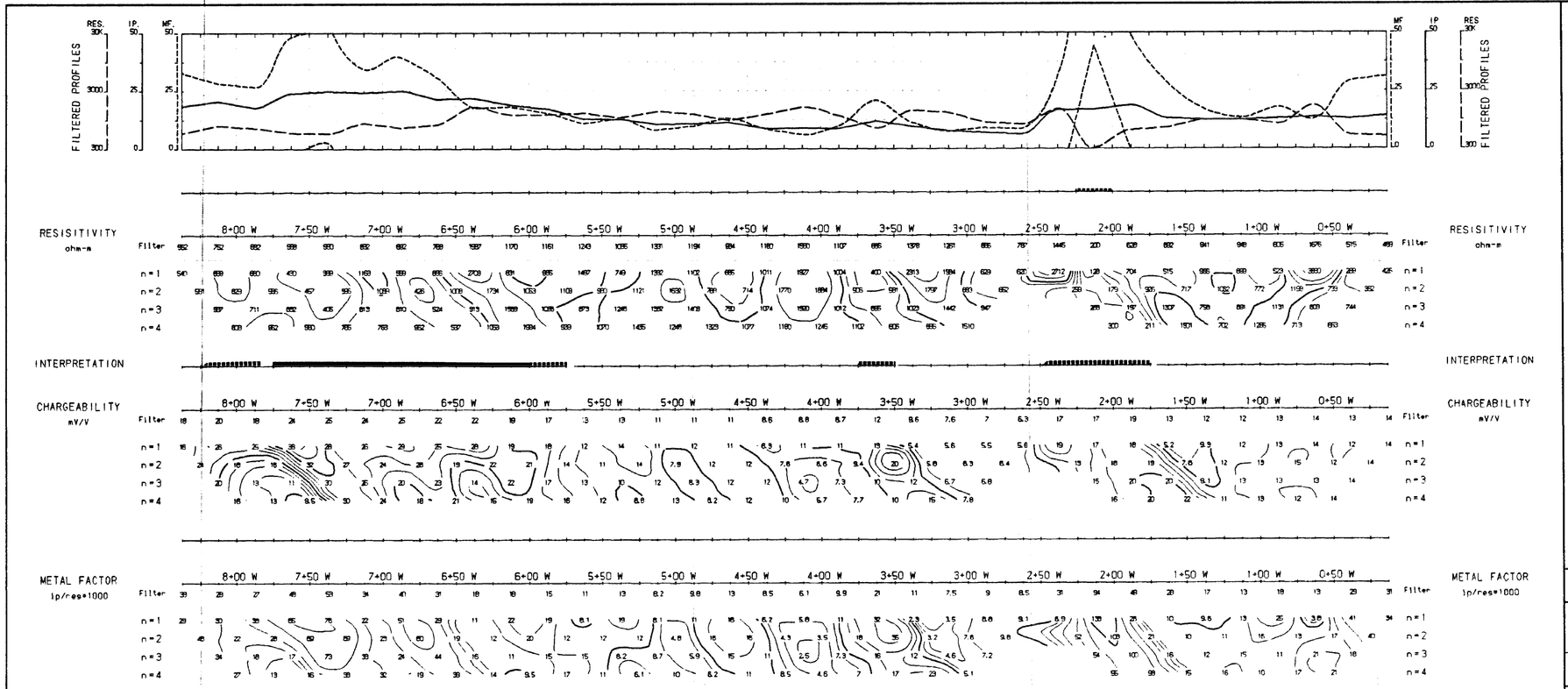
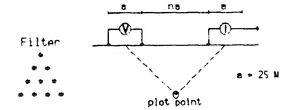



Line 1300 N

Dipole-Pole Array




Instrument: Huntec 7.5 kw Tx. BRGM IP6 Rx.
Frequency: .125 Hz.
Operators: P.E.W., A.W., M.A.

Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10....

INTERPRETATION

Well defined, strong increase in polarization with or without marked decrease in resistivity.

Fairly well defined moderate increase in polarization.

Poorly defined polarization increase.

Resistivity feature.

Scale 1:2000

25 0 25 50 75 100 125 (metres)

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GRANGES INC.

INDUCED POLARIZATION SURVEY
UNUK RIVER PROJECT
ZONE 1 GRID

Survey Date: July-Aug. 1990 N.T.S.: 104 P/3W
Interpretation: P.E.W.

PETER E. WALCOTT & ASSOC. LTD.

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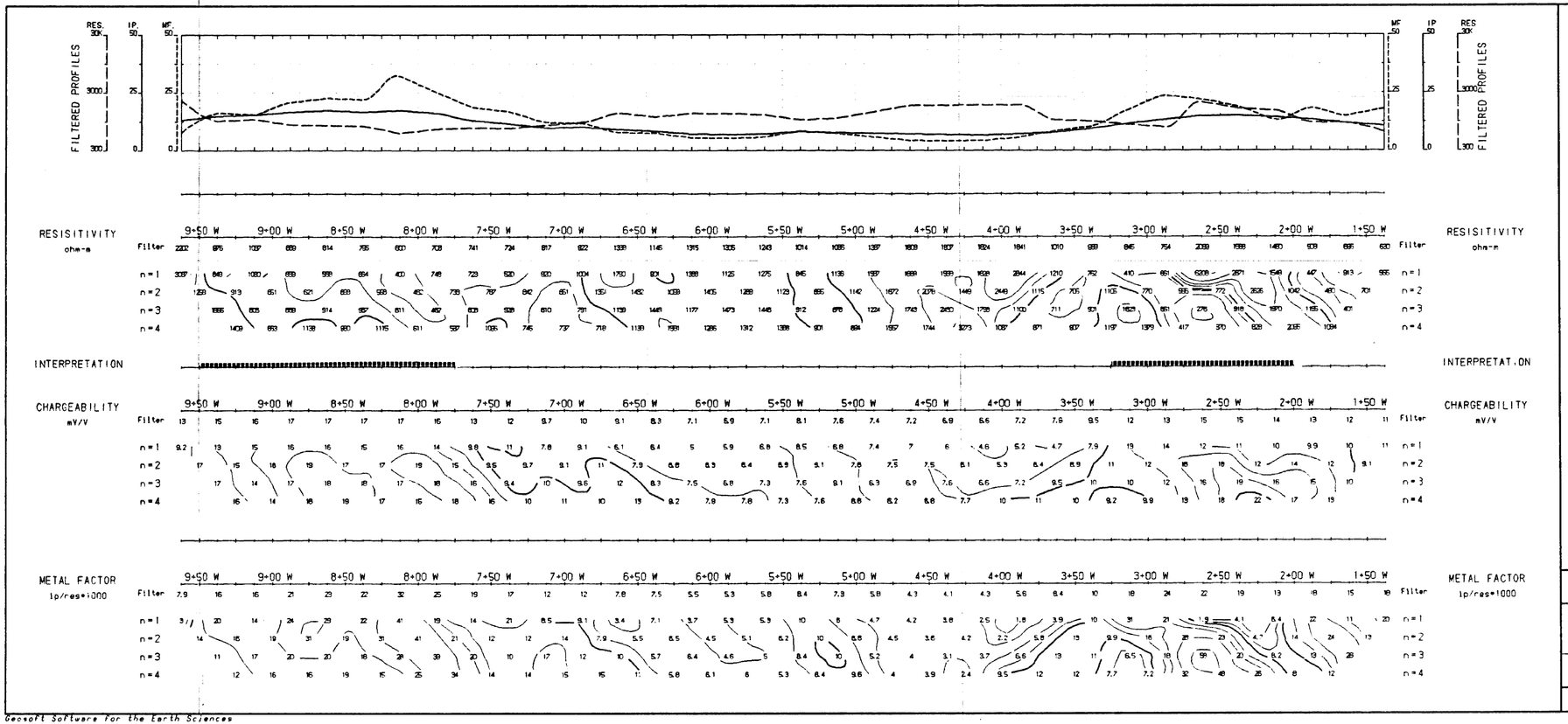
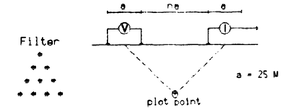



## Line 1200 N

### Dipole-Pole Array




Instrument: Huntec 7.5 kw Tx. BRGM IP6 Rx.
Frequency: .125 Hz.
Operators: P.E.W., A.W., M.A.

Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10....

INTERPRETATION

Well defined, strong increase in polarization with or without marked decrease in resistivity.

Fairly well defined moderate increase in polarization.

Poorly defined polarization increase.

Resistivity feature.

Scale 1:2000

25 0 25 50 75 100 125
(metres)

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**GRANGES INC.**

INDUCED POLARIZATION SURVEY
UNUK RIVER PROJECT
ZONE 1 GRID

Survey Date: July-Aug. 1990 N.T.S.: 104 B/9W
Interpretation: P.E.W.

*PETER E. WALCOTT & ASSOC. LTD.*

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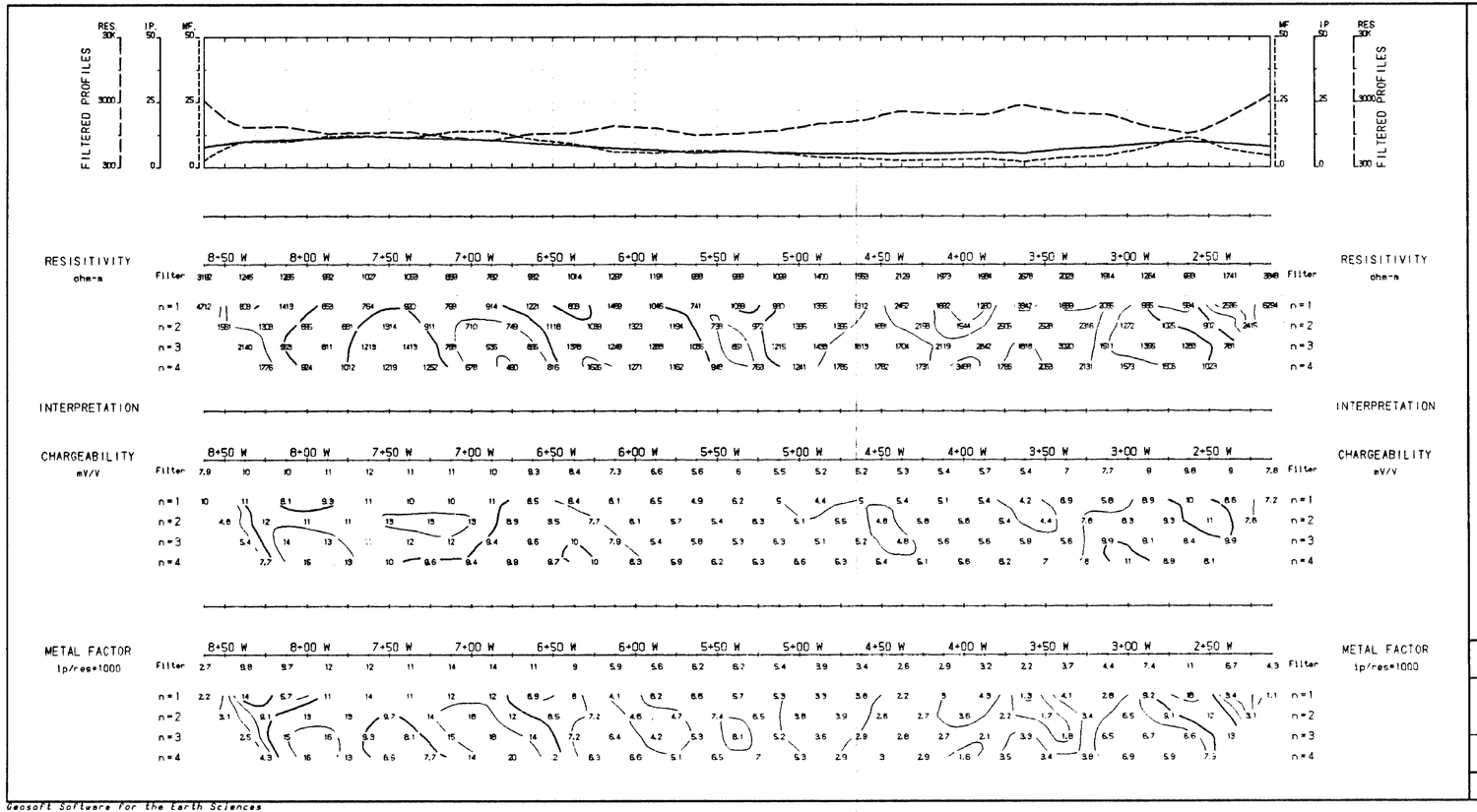
App. 5

20993

App. 5

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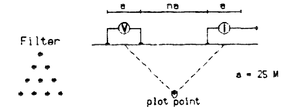
## Line 1100 N

### Dipole-Pole Array




Instrument: Huntec 7.5 kw Tx. BRGM IP6 Rx.
Frequency: .125 Hz.
Operators: P.E.W., A.W., M.A.

Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10....

### INTERPRETATION

Well defined, strong increase in polarization with or without marked decrease in resistivity.

Fairly well defined moderate increase in polarization.

Poorly defined polarization increase.

Resistivity feature.

Scale 1:2000

25 0 25 50 75 100 125
(metres)

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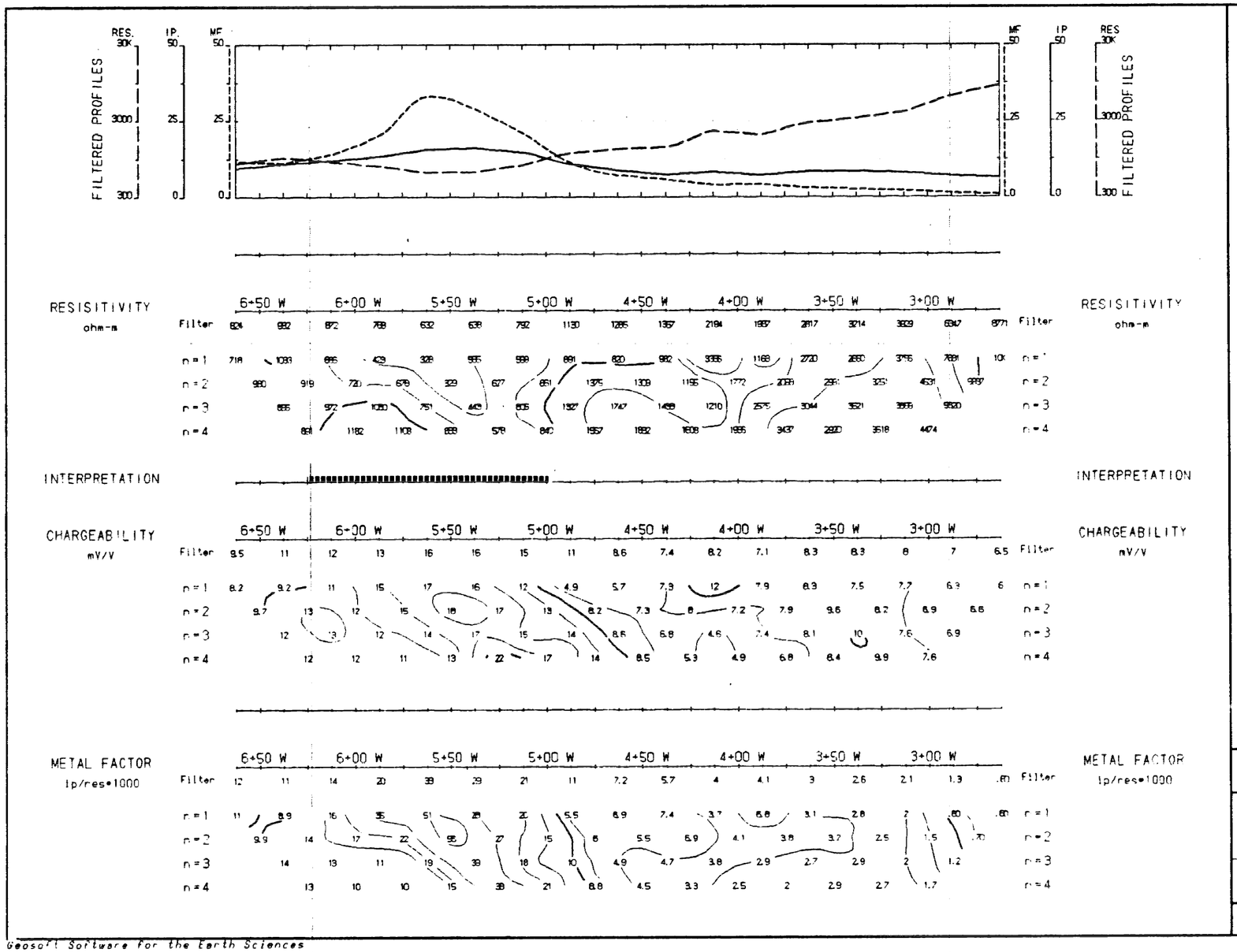
## GRANGES INC.

INDUCED POLARIZATION SURVEY
UNUK RIVER PROJECT
ZONE 1 GRID

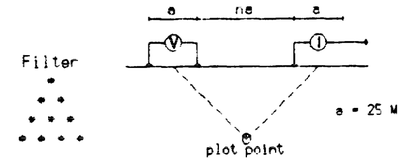
Survey Date: July-Aug. 1990 N.T.S.: 104 B/9W
Interpretation: P.E.W.

PETER E. WALCOTT & ASSOC. LTD.




## Line 900 N

## Dipole-Pole Array




Instrument: Huntec 7.5 kw Tx. BRGM IP6 Rx.
Frequency: .125 Hz.
Operators: P.E.W., A.W., M.A.

Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10....

### INTERPRETATION

Well defined, strong increase in polarization with or without marked decrease in resistivity.

Fairly well defined moderate increase in polarization.

Poorly defined polarization increase.

Resistivity feature.

Scale 1:2000

25 0 25 50 75 100 125
(metres)

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## GRANGES INC.

INDUCED POLARIZATION SURVEY
UNUK RIVER PROJECT
ZONE 1 GRID

Survey Date: July-Aug. 1990 N.T.S.: 104 B/9W
Interpretation: P.E.W.

**PETER E. WALCOTT & ASSOC. LTD.**

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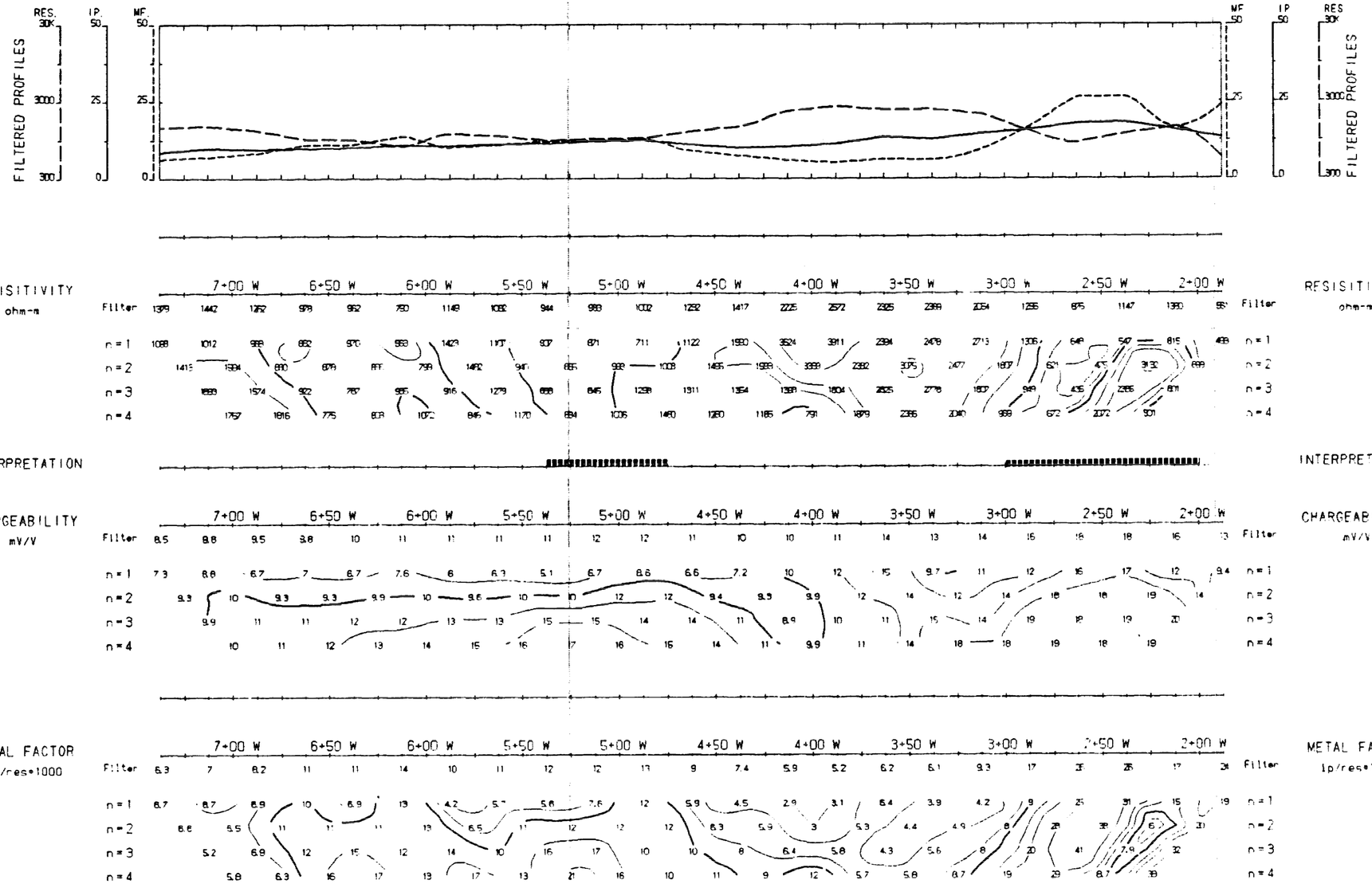
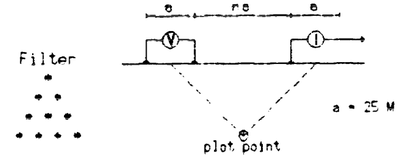
App. 5

20993 App. 5




## Line 700 N

## Dipole-Pole Array




Instrument: Huntec 7.5 kw Tx. BRGM IPS Rx.
Frequency: .125 Hz.
Operators: P.E.W., A.W., M.A.

Logarithmic Contours: 1, 1.5, 2, 3, 5, 7.5, 10....

### INTERPRETATION

Well defined, strong increase in polarization with or without marked decrease in resistivity.

Fairly well defined moderate increase in polarization.

Poorly defined polarization increase.

Resistivity feature.

Scale 1:2000

25 0 25 50 75 100 125
(metres)

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**GRANGES INC.**

INDUCED POLARIZATION SURVEY
UNUK RIVER PROJECT
ZONE 1 GRID

Survey Date: July-Aug. 1990 N.T.S.: 104 B/9W
Interpretation: P.E.W.

**PETER E. WALCOTT & ASSOC. LTD.**

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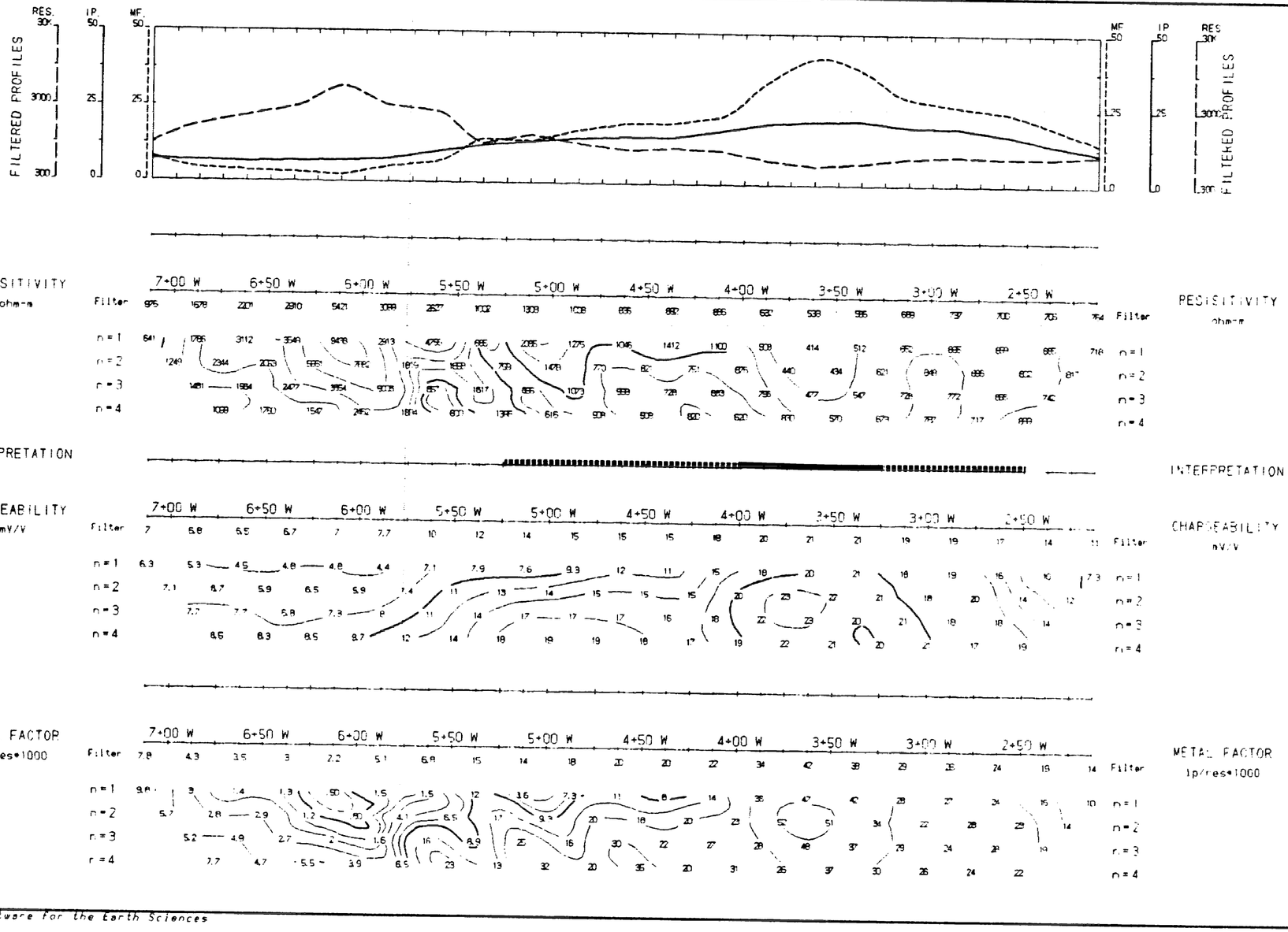
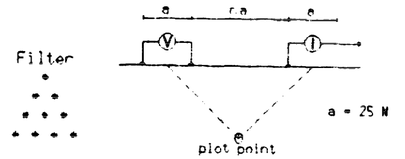
20993 App. 5




Line 600 N

Dipole-Pole Array




Instrument: Huntec 7.5 kW Tx. BRGM IP6 Rx.
Frequency: .125 Hz.
Operators: P.E.W., A.W., M.A.

Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10,...

INTERPRETATION

Well defined, strong increase in polarization with or without marked decrease in resistivity.

Fairly well defined moderate increase in polarization.

Poorly defined polarization increase

Resistivity feature.

Scale 1:2000

25 0 25 50 75 100 125
(metres)

Pg. 50

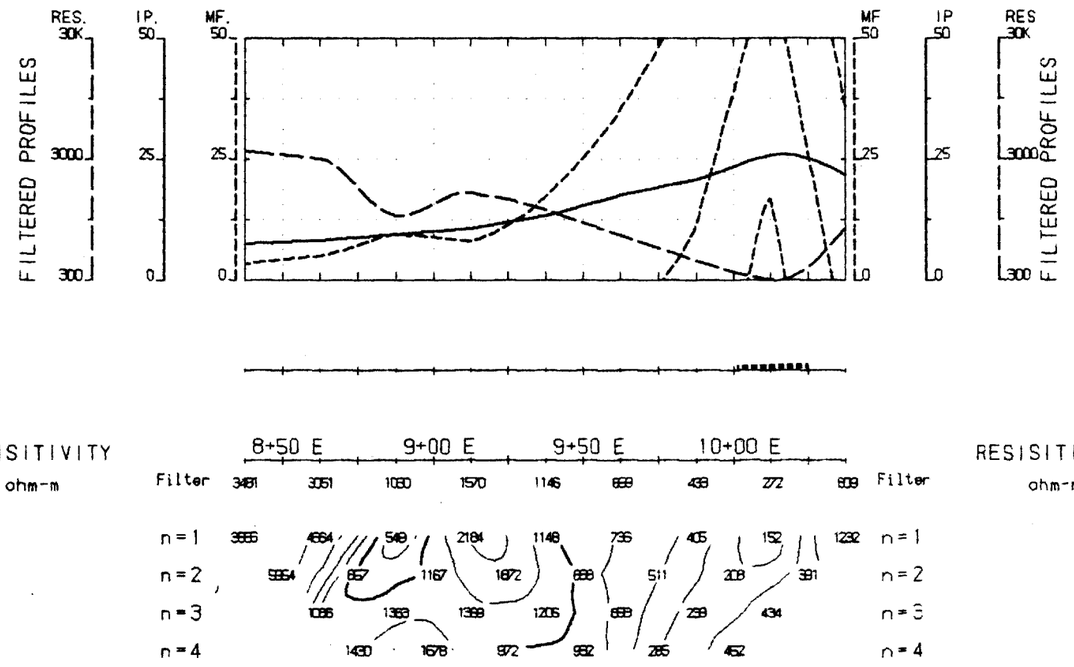
GRANGES INC.

INDUCED POLARIZATION SURVEY
UNUK RIVER PROJECT
ZONE 1 GRID

Survey Date: July-Aug. 1990 N.T.S.: 104 B/9W
Interpretation: P.E.W.

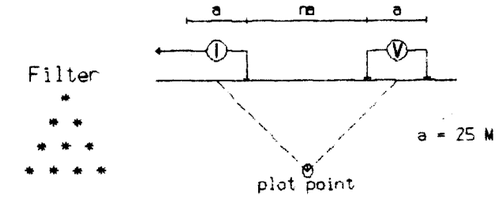
PETER E. WALCOTT & ASSOC. LTD.

Geosoft Software for the Earth Sciences




# Line 1650 N

## Pole-Dipole Array




Instrument: Huntec 7.5 kw Tx. BRGM IP6 Rx.
Frequency: .125 Hz.
Operators: P.E.W., A.W., M.A.

Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10,...

INTERPRETATION

- Well defined, strong increase in polarization with or without marked decrease in resistivity.
- Fairly well defined moderate increase in polarization.
- Poorly defined polarization increase.
- Resistivity feature.

Scale 1:2000

25 0 25 50 75 100 125
(metres)

D9.51

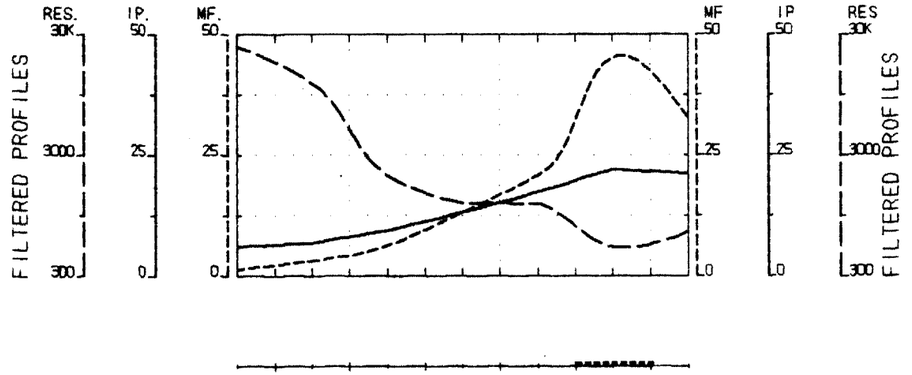
# GRANGES INC.

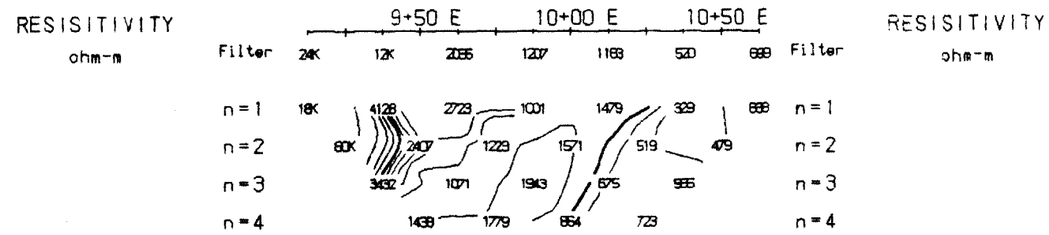
INDUCED POLARIZATION SURVEY
UNUK RIVER PROJECT
AP GRID

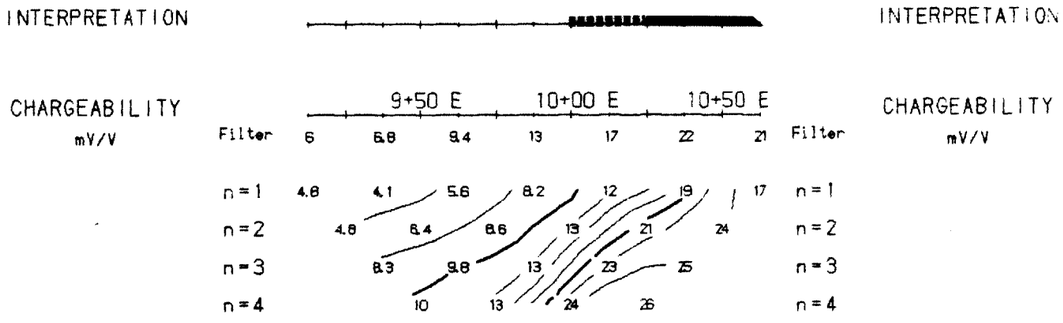
Survey Date: July-Aug. 1990 N.T.S.: 104 B/9W
Interpretation: P.E.W.

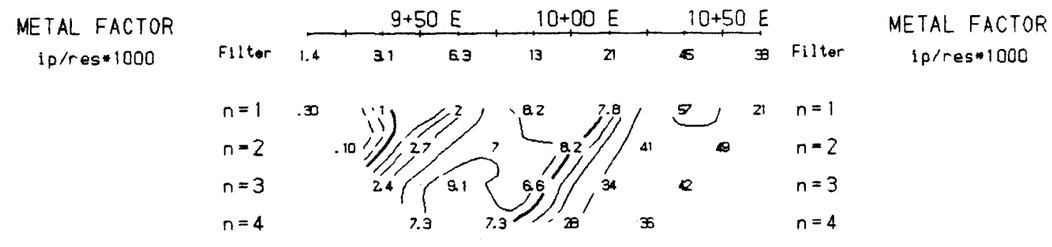
**PETER E. WALCOTT & ASSOC. LTD.**

20993



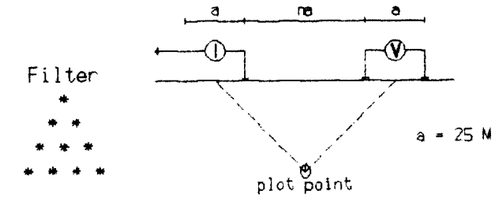




# Line 1550 N

## Pole-Dipole Array




Instrument: Huntec 7.5 kw Tx. BRGM IP6 Rx.
Frequency: .125 Hz.
Operators: P.E.W., A.W., M.A.

Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10,...

### INTERPRETATION

Well defined, strong increase in polarization with or without marked decrease in resistivity.

Fairly well defined moderate increase in polarization.

Poorly defined polarization increase.

Resistivity feature.

Scale 1:2000

25 0 25 50 75 100 125
(metres)

P9.52

## GRANGES INC.

INDUCED POLARIZATION SURVEY
UNUK RIVER PROJECT
AP GRID

Survey Date: July-Aug. 1990 N.T.S.: 104 B/9W
Interpretation: P.E.W.

**PETER E. WALCOTT & ASSOC. LTD.**

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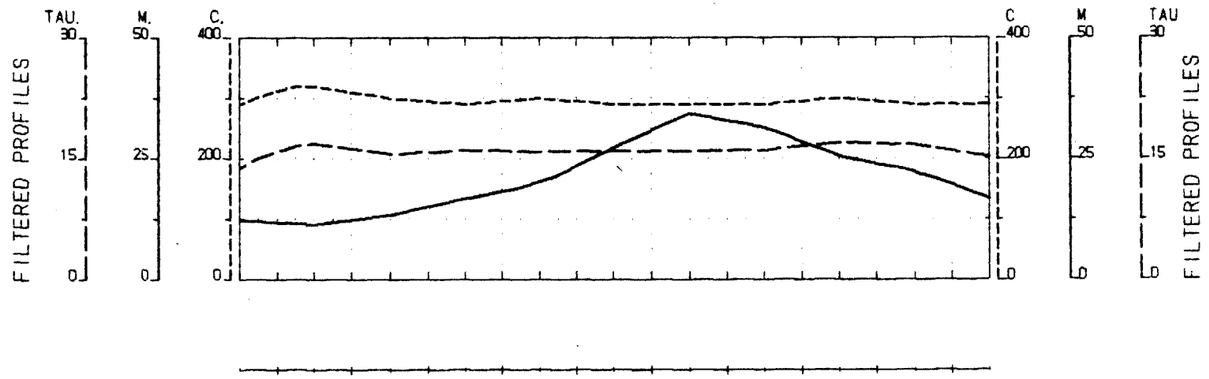
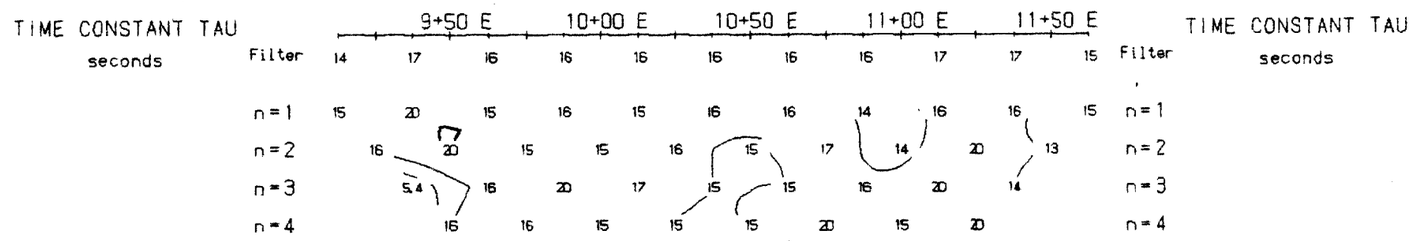
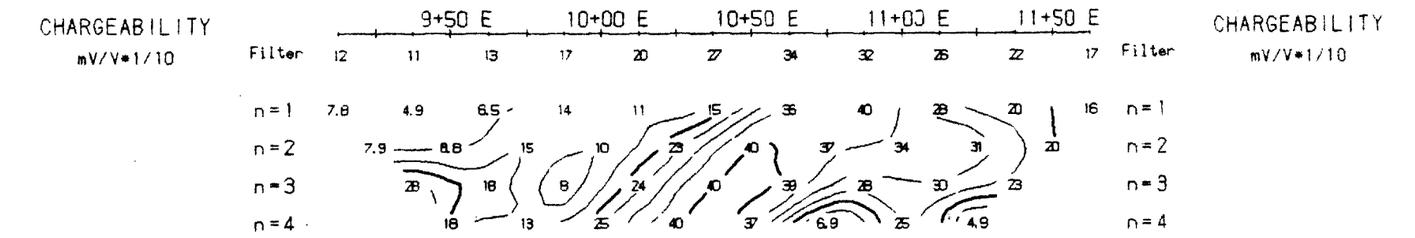
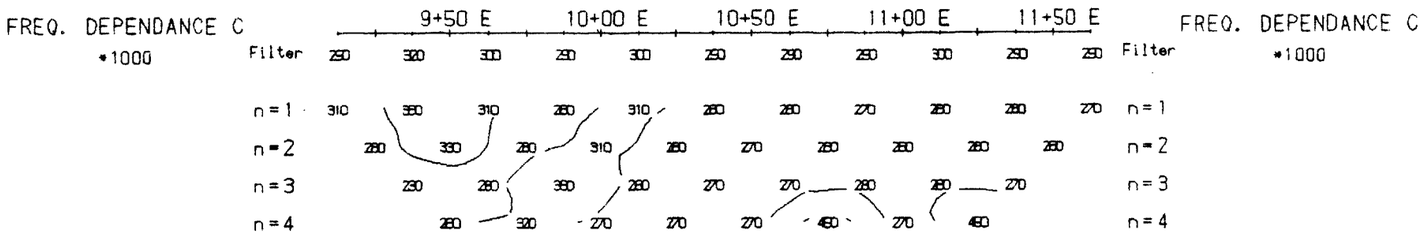


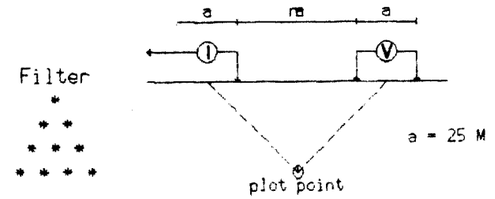




# Line 1500 N

## Pole-Dipole Array




Instrument: Huntec 7.5 kw Tx. BRGM IP6 Rx.
Frequency: .125 Hz.
Operators: P.E.W., A.W., M.A.

Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10,...

### INTERPRETATION

Well defined, strong increase in polarization with or without marked decrease in resistivity.

Fairly well defined moderate increase in polarization.

Poorly defined polarization increase.

Resistivity feature.

Scale 1:2000

25 0 25 50 75 100 125
(metres)

P9.53

## GRANGES INC.

INDUCED POLARIZATION SURVEY
UNUK RIVER PROJECT
AP GRID

Survey Date: July-Aug. 1990 N.T.S.: 104 B/9W
Interpretation: P.E.W.

**PETER E. WALCOTT & ASSOC. LTD.**

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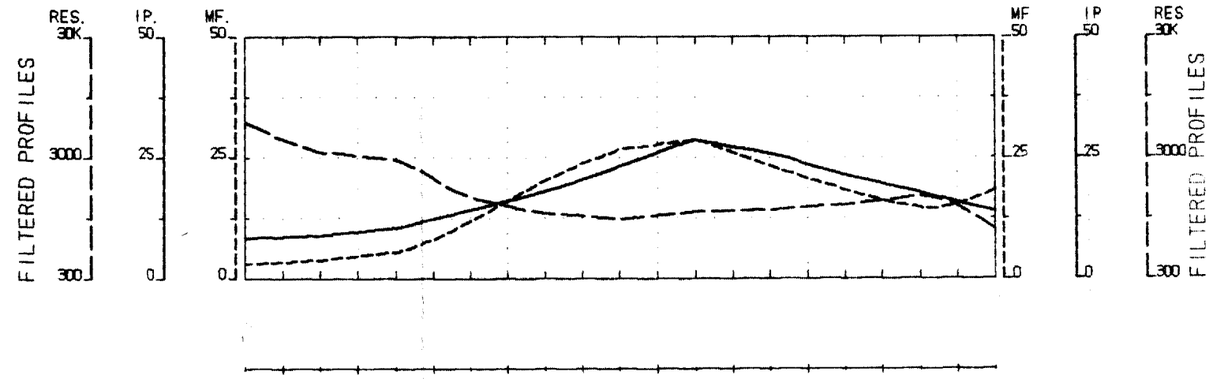
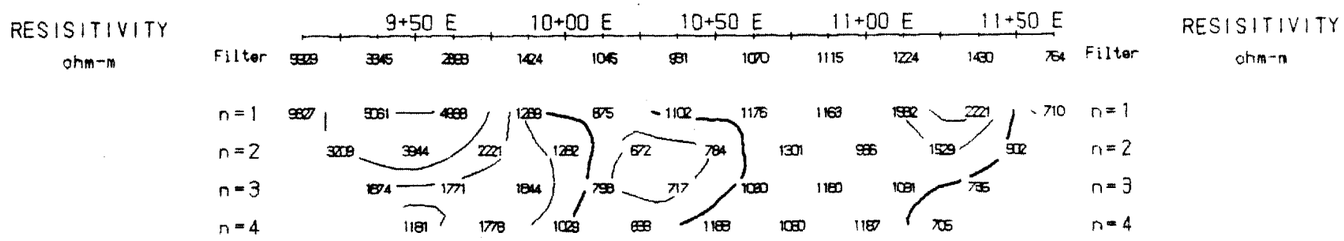
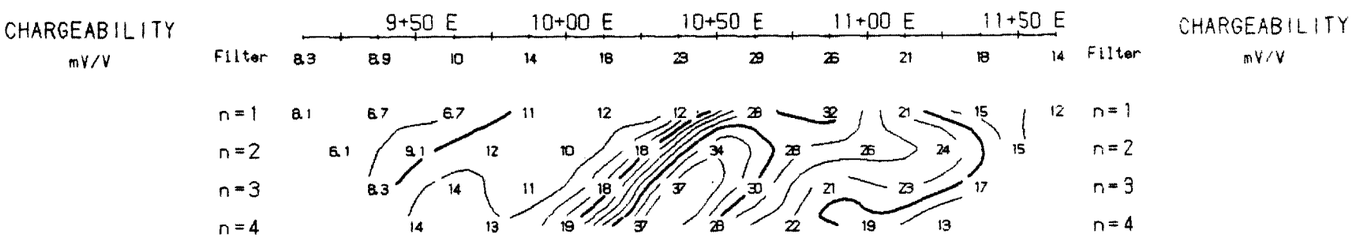
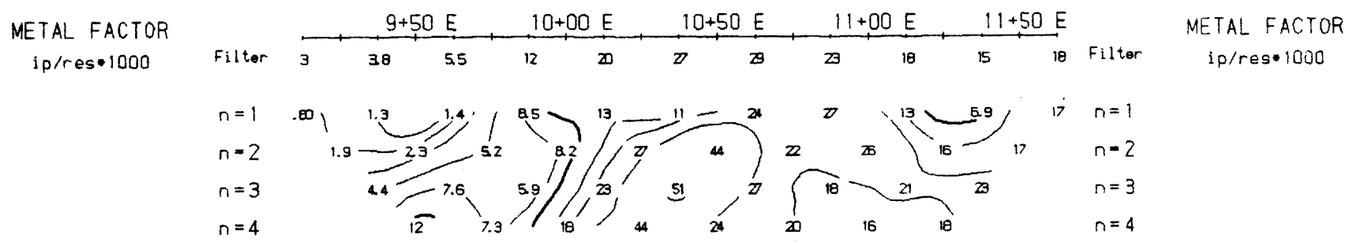


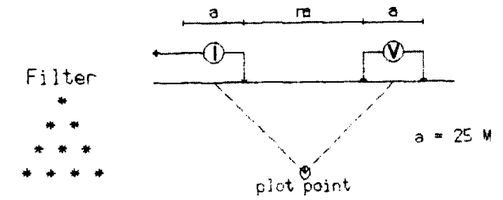





# Line 1500 N

## Pole-Dipole Array




Instrument: Huntec 7.5 kw Tx. BRGM IP6 Rx.
Frequency: .125 Hz.
Operators: P.E.W., A.W., M.A.

Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10....

### INTERPRETATION

Well defined, strong increase in polarization with or without marked decrease in resistivity.

Fairly well defined moderate increase in polarization.

Poorly defined polarization increase.

Resistivity feature.

Scale 1:2000

25 0 25 50 75 100 125
(metres)

P9. 54

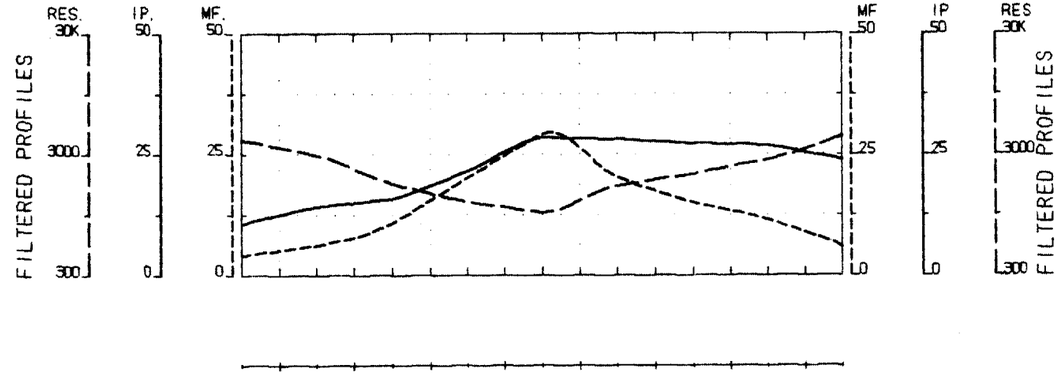
## GRANGES INC.

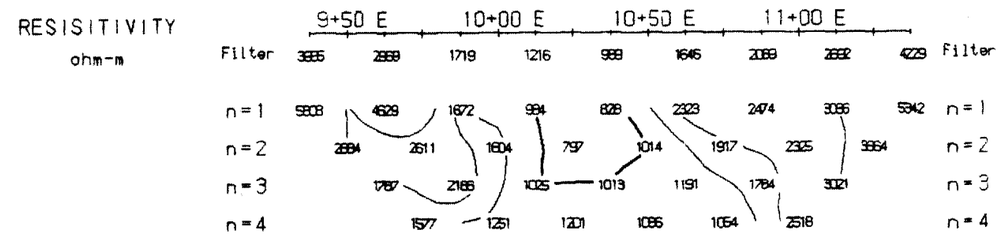
INDUCED POLARIZATION SURVEY
UNUK RIVER PROJECT
AP GRID

Survey Date: July-Aug. 1990 N.T.S.: 104 B/9W
Interpretation: P.E.W.

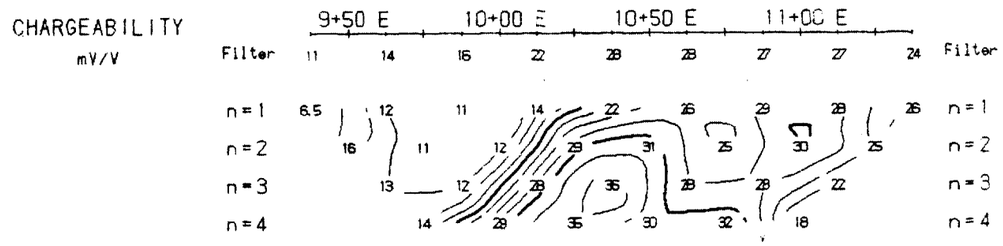
**PETER E. WALCOTT & ASSOC. LTD.**

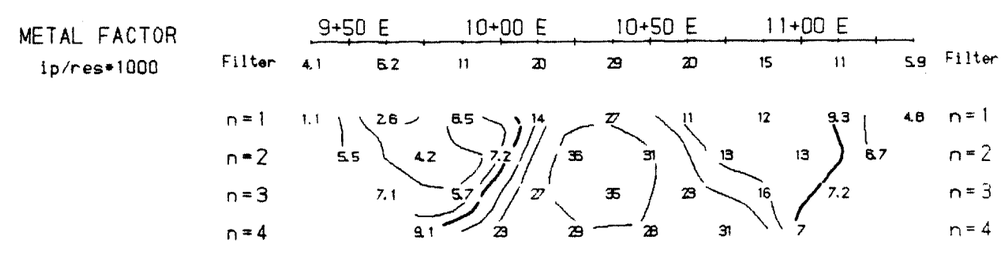
20993



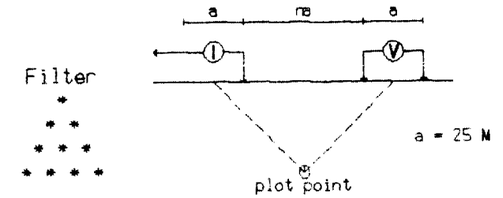





# Line 1450 N

## Pole-Dipole Array



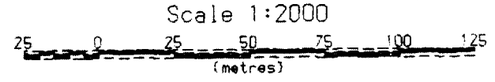

Instrument: Huntec 7.5 kw Tx. BRGM IP6 Rx.
Frequency: .125 Hz.
Operators: P.E.W., A.W., M.A.

Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10,...

### INTERPRETATION

- Well defined, strong increase in polarization with or without marked decrease in resistivity.
- Fairly well defined moderate increase in polarization.
- Poorly defined polarization increase.
- Resistivity feature.

Scale 1:2000

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## GRANGES INC.

INDUCED POLARIZATION SURVEY
UNUK RIVER PROJECT
AP GRID

Survey Date: July-Aug. 1990 N.T.S.: 104 B/8W
Interpretation: P.E.W.

**PETER E. WALCOTT & ASSOC. LTD.**

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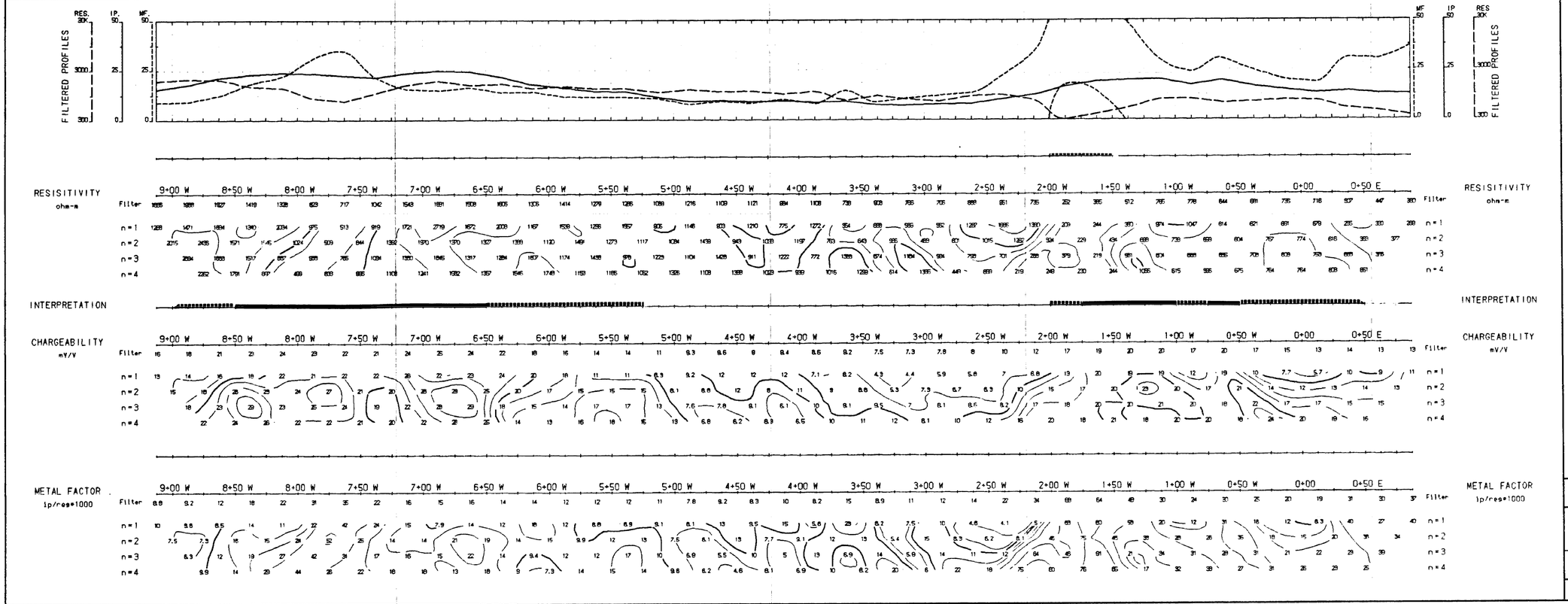
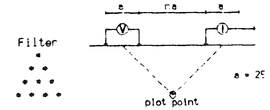



# Line 1400 N

## Dipose-Pole Array




Instrument: Huntec 7.5 kw Tx. BRGM IP5 Rx.
Frequency: .125 Hz.
Operators: P.E.W., A.W., M.A.

Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10,...

INTERPRETATION

- Well defined, strong increase in polarization with or without marked decrease in resistivity.
- Fairly well defined moderate increase in polarization.
- Poorly defined polarization increase.
- Resistivity feature.

Scale 1:2000

25 0 25 50 75 100 125
(metres)

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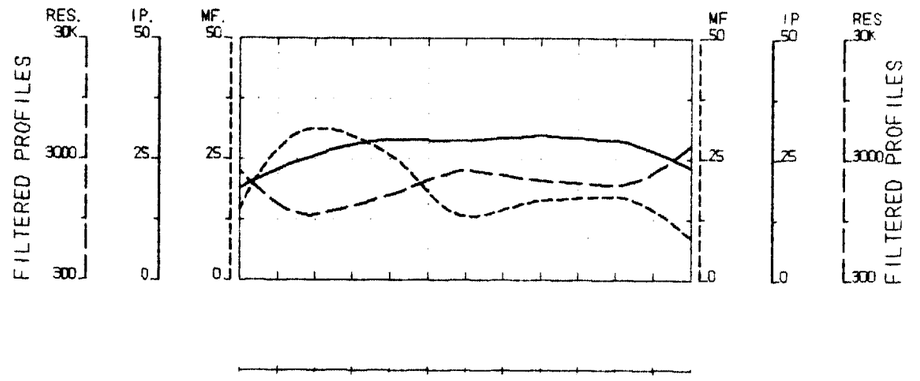
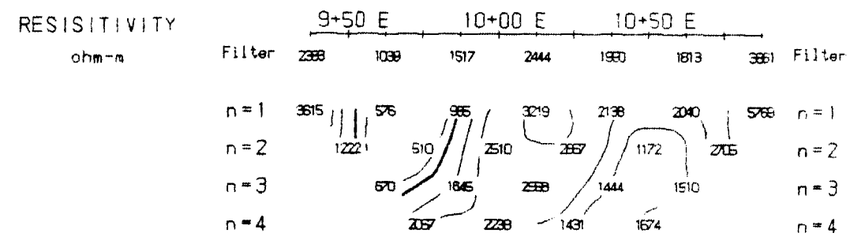
# GRANGES INC.

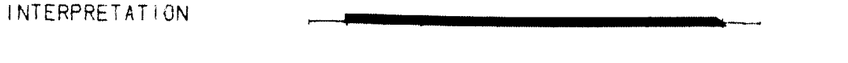
INDUCED POLARIZATION SURVEY
UNUK RIVER PROJECT
ZONE 1 GRID

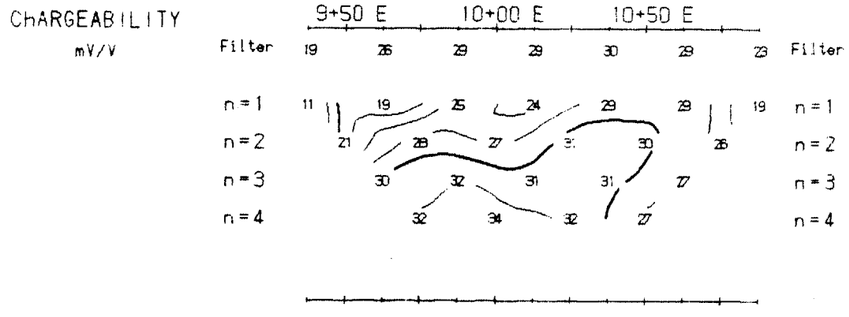
Survey Date: July-Aug. 1990 N.T.S.: 104 B/9W
Interpretation: P.E.W.

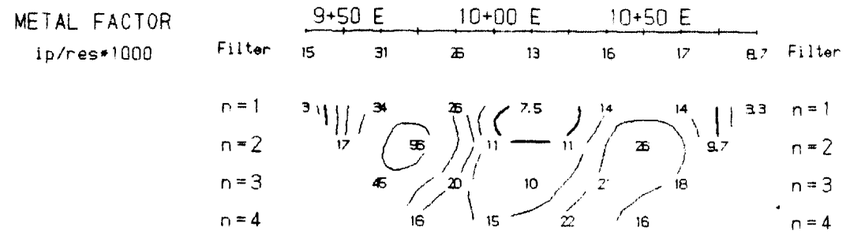
PETER E. WALCOTT & ASSOC. LTD.



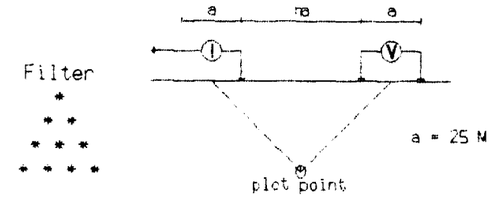




# Line 1350 N

## Pole-Dipole Array




Instrument: Huntec 7.5 kw Tx. BRGM IP6 Rx.
Frequency: .125 Hz.
Operators: P.E.W., A.W., M.A.

Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10,...

### INTERPRETATION

Well defined, strong increase in polarization with or without marked decrease in resistivity.

Fairly well defined moderate increase in polarization.

Poorly defined polarization increase.

Resistivity feature.

Scale 1:2000

25 0 25 50 75 100 125
(metres)

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## GRANGES INC.

INDUCED POLARIZATION SURVEY
UNUK RIVER PROJECT
AP GRID

Survey Date: July-Aug. 1990 N.T.S.: 104 B/9W
Interpretation: P.E.W.

**PETER E. WALCOTT & ASSOC. LTD.**

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