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A Geophysical Report

on

A Magnetic & Induced Polarization Survey

ASH Claims

Princeton Area, British Columbia

by

PETER E. WALCOTT, P.Eng.

November 1979



PETER E. WALCOTT & ASSOC. LTD.

A REPORT

ON

A GROUND MAGNETIC

&

INDUCED POLARIZATION SURVEY.

Princeton Area, British Columbia

FOR

CANADIAN NATURAL RESOURCES LTD.

Calgary, Alberta

BY

PETER E. WALCOTT AND ASSOCIATES LIMITED

Vancouver, British Columbia

NOVEMBER 1979

MINERAL RESOURCES BRANCH ASSESSMENT REPORT 1974 NO. _____
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of 2

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Introduction.

Between July 26th and August 18th, and August 31st to October 1st, 1979, Peter E. Walcott & Associates Limited carried out a combined ground magnetic and induced polarization (I.P.) survey programme over a property, located in the Princeton area of British Columbia, optioned by Canadian Natural Resources Ltd.

The magnetic survey was carried out over two grids on essentially compass and flagged lines. Readings of relative vertical intensity were obtained using a LePhar M-700 fluxgate magnetometer at 50 metre intervals (25 metre readings were taken on the northernmost grid).

The I.P. survey was carried out on selected areas on the southernmost grid on the basis of the geochemical results.

Measurements (first to fourth separation) of apparent resistivity and frequency effect (the I.P. response parameter) were made using the "dipole-dipole" method of surveying with a 75 metre dipole and frequencies of 0.3 and 5 c.p.s. Additionally some 25 metre measurements were made over the showing on Line 4 N.

The progress of the survey was hampered by the dry, gravelly soil conditions and lack of water resulting in poor electrical contacts.

The magnetic data are presented in contour form on Map No. W-271-1 that accompanies this report, whereas I.P. data are presented in contour form on individual line profiles contained in this report. In addition the n=2 frequency effect data are presented in contour form on Map 271-2.

PROPERTY, LOCATION AND ACCESS.

The property, known as the Ash Claims, is located in the Similkameen Mining Division of British Columbia.

It is situated just northwest of Wells Lake, which in turn is some 18 miles southwest of the town of Princeton.

Access can be obtained from Princeton - a distance of some 40 miles - using a 4 x 4 vehicle by taking the Whipsaw Creek turnoff from Hwy. No. 3.

PREVIOUS WORK.

Previous work on the property probably consisted of at least some mapping and prospecting, soil sampling and possibly some geophysical surveying as the showing was examined before. However the writer has seen no records of any such work.

PURPOSE.

The magnetic survey was carried out in an effort to assist in rock type differentiation whereas the purpose of the I.P. survey was to investigate for the possibility of an economic sulphide occurrence at depth as could be expected from the anomalous geochemical results.

GEOLOGY.

The reader is referred to reports by the staff of Sawyer Consultants Inc. who conducted the mapping and soil sampling and managed the overall programme.



SURVEY SPECIFICATIONS.

The induced polarization (I.P.) survey was carried out using a system manufactured by McPhar Geophysics Limited of Don Mills, Ontario. Measurements with this system are made in the frequency domain.

The system basically consists of three units; a receiver, a transmitter and a motor generator. The transmitter, which obtains its power from the 2.5 kw 400 cycle generator driven by a gasoline engine, injects current into the ground at two electrodes, C<sub>1</sub> and C<sub>2</sub>, at two preselected frequencies, while the receiver, a very stable and sensitive potentiometer tuned to the frequency selected, makes measurements of observed voltages across the potential electrodes P<sub>1</sub> and P<sub>2</sub>.

The data recorded in the field consists of careful measurements of the current (I) flowing through electrodes C<sub>1</sub> and C<sub>2</sub>, the voltage (V) appearing between the potential electrodes P<sub>1</sub> and P<sub>2</sub> on the low frequency, and the "percentage apparent frequency effect" appearing between P<sub>1</sub> and P<sub>2</sub> (the receiver is designed to measure directly:

$$\text{the \%age F.E.} = \frac{(P_a \text{ low} - P_a \text{ high}) \times 100}{P_a \text{ high}}$$

The apparent resistivity (P<sub>a</sub>) in ohm-feet is proportional to the ratio of the measured voltage and current, the proportionality factor depending on the geometry of the array used. In practise  $\frac{P_a}{Z_{II}}$  is plotted.

A third parameter termed the "metal factor" is also calculated by dividing the apparent frequency effect by  $\frac{P_a}{Z_{II}}$  and multiplying by 1,000.

The survey was carried out using the "dipole-dipole" electrode array. This electrode configuration and the methods of presenting the results are illustrated in the appendix. Depth penetration with this array is increased or decreased by increasing or decreasing "a" and/or "n".

In practise, the equipment is set up at a particular station of the line to be surveyed: three transmitting dipoles are laid out to the rear; measurements are made for all possible combinations of transmitting and receiving dipoles, the latter consisting of two porous pots filled with an electrolyte copper sulphate solution "a" feet apart, up to the fourth separation, i.e. n=4; the equipment is then moved 3 "a" feet along the line to the next set-up.

SURVEY SPECIFICATIONS cont'd

A 75 metre dipole was used on the survey. In addition some 25 metre work was carried out on Line 4 F.

The magnetic survey was carried out using a McPhar M-700 flux-gate magnetometer. This instrument measures variations in the vertical component of the earth's magnetic field to an accuracy of  $\pm 10$  gammas. Corrections for diurnal variations were made by tying in to previously established base stations at intervals not exceeding two hours. In all some 75 kilometres were surveyed by this method.

DISCUSSION OF RESULTS.

On comparing the results of the magnetic survey - Map W-271-1 - with those of the geologic mapping it can be seen that no differentiation between the various phases of the gneiss is possible on the basis of the magnetics. It should be mentioned here that although at a first glance the northernmost grid area appears to be different as it exhibits more contours - this is primarily due to an increase in the density of readings.

Readings on the whole are in the high 400 to low 500 range with local highs and lows (steep gradients) suggesting shallow overburden - the bedrock is probably subcropping for the most except in the valley bottoms.

The I.P. results were also disappointing. No pronounced responses were obtained over the showings on Line 3 N and 4 N respectively, the initial lines surveyed. However a moderate anomalous response was obtained on the n=1 and 2 separations in a swamp some 75 metres to the west of the showing on Line 4 N.

Accordingly it was decided to try a smaller dipole - a=25 metres - in an effort to obtain a response from the showing. The highest reading on the 1st separation was obtained over the showing - not much of a response - whereas the maxima readings on subsequent separations migrated to the west as per the 75 metre work suggesting to the writer that the I.P. anomaly is most probably related to the showing and hence sulphide mineralization.

Subsequent surveying to the north with the a=75 metre dipole resulted in the delineation of a medium sized anomalous area having similar characteristics, i.e. the best response on the first two separations and possible double peaking as suggested by the pant leg effects. This zone is readily discernible on the n=2 contours of frequency effect, Map W-271-2, and is also outlined on the respective pseudo-sections - maximum widths shown.

This anomalous zone lies to the west of the main geochemical anomaly.

Another similar but less intense I.P. anomalous zone can be seen striking across Line 3 N to 6 N respectively around 10 E to 12 E. This zone corresponds to a region of copper and moly highs.

DISCUSSION OF RESULTS, cont'd

No I.P. effects were obtained over the two lines run to the west of the baseline namely Lines 6 3 and 15 H.

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS.

Between July 26th and October 1st, 1979, Peter E. Walcott & Associates Limited carried out ground magnetic and induced polarization surveys as part of an exploration programme carried out by Sawyer Consultants Inc. over a property optioned by Canadian Natural Resources Ltd.

The property, the Ash Claims, is located some 18 miles south-west of Princeton, British Columbia.

The magnetic survey did little except suggest the overburden to be generally shallow - a fact corroborated by the numerous windfalls - and consequently was not a help in rocktype differentiation.

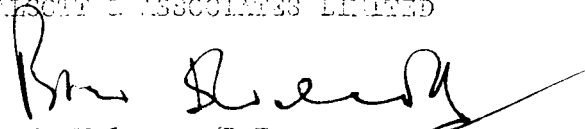
The I.P. survey did outline the presence of two weak anomalous zones, the causative sources of which are believed by the writer to be due to sulphide mineralization.

Although these anomalies could be justifiably downgraded on the basis of their characteristics as discussed previously it should be borne in mind that should the mineralization be primarily MoS<sub>2</sub> then presumably such low grade responses would be in order.

As a result the writer would be tempted - on the basis of the geophysical results - to test for the causative source of the stronger anomaly with a borehole.

Respectfully submitted,

PETER E. WALCOTT & ASSOCIATES LIMITED

  
Peter E. Walcott, P.Eng.  
Geophysicist

Vancouver, B.C.

November 1979

A P P E N D I X  
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COST OF SURVEY.

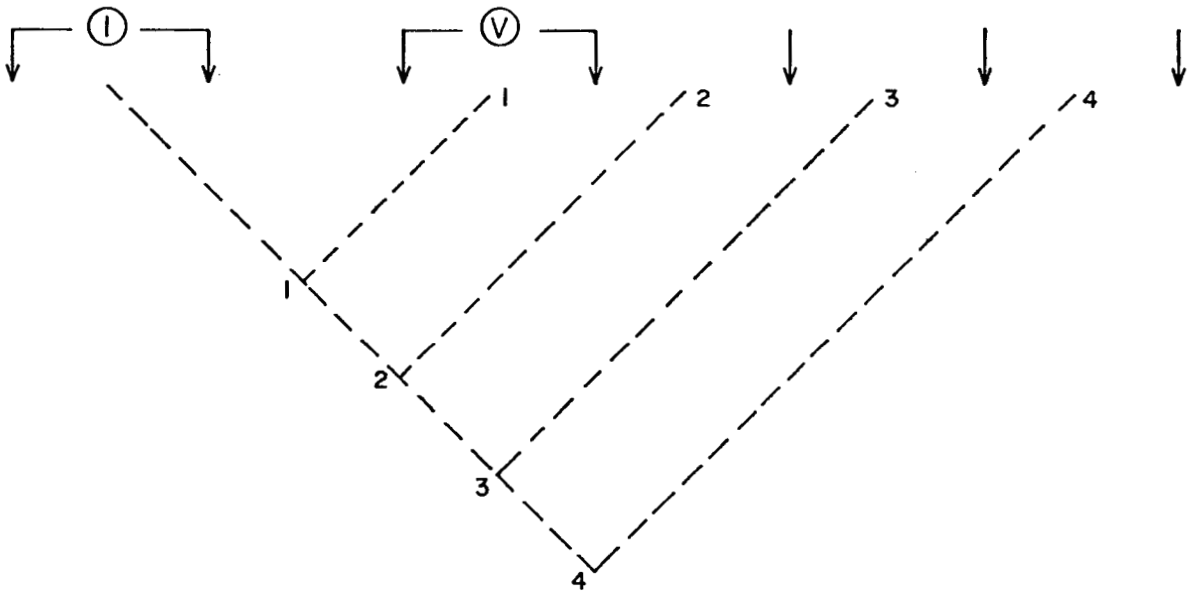
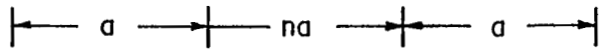
Peter E. Walcott & Associates Limited carried out the magnetometer survey on a line kilometre basis whereas the linecutting for the I.P. survey and the I.P. survey itself were undertaken on a daily basis. Mobilization and draughting charges were extra so that the total cost of services provided was \$25,246.91.

PERSONNEL EMPLOYED ON SURVEY.

Name	Occupation	Address	Dates.
Peter E. Walcott	Geophysicist	Peter E. Walcott & Assoc. 605 Rutland Court, Coquitlam, B.C.	August 24, 1979 Sept. 17 - 24, 29 - Oct. 1, Oct. 11, Nov. 19th, 1979
G. MacMillan	Geophysical Operator	" "	Sept. 24 - Oct. 1, Oct. 13 - 25, 1979
L. Perreault	"	" "	Jul. 26 - Aug. 18, Aug. 31 - Oct. 1st.
D. Cross	"	" "	Sept. 17 - Oct. 1, 79
T. Kirby	"	" "	Sept. 21 - Oct. 1, 79
J. Walcott	Typing	" "	Nov. 20th, 1979



DIPOLE - DIPOLE ARRAY



ANOMALOUS ZONE



POSSIBLE ANOMALOUS ZONE

Pa/2π

N=1

N=2

N=3

N=4

Pa/2π

Pa/2π

Pa/2π

N=1

N=2

N=3

N=4

F.E.

N=1

N=2

N=3

N=4

F.E.

F.E.

F.E.

N=1

N=2

N=3

N=4

M.F.

N=1

N=2

N=3

N=4

M.F.

M.F.

M.F.

N=1

N=2

N=3

N=4

12-W 11-W 10-W 9-W 8-W 7-W 6-W 5-W 4-W 3-W 2-W 1-W 0 1-E 2-E

CANADIAN NATURAL RESOURCES LTD.

ASH CLAIMS

LINE 6-S

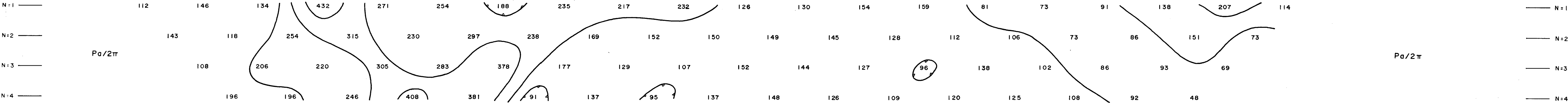
a = 75 meters  
FREQUENCY - 0.3 & 5.0 c.p.s.

SCALE 1:2500

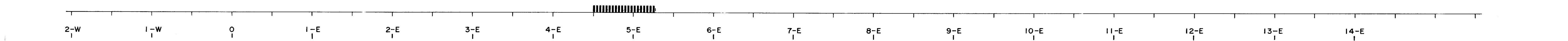
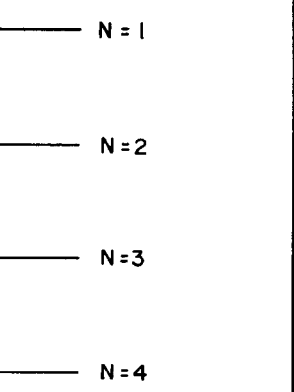
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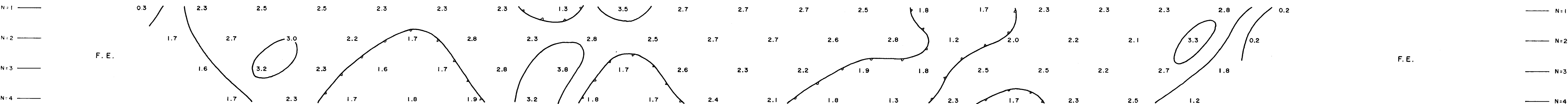
Pa/2π



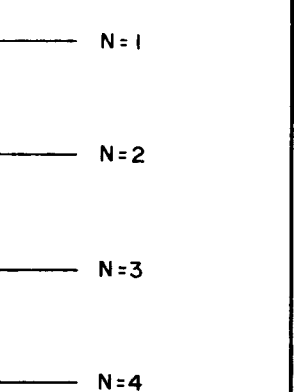
Pa/2π



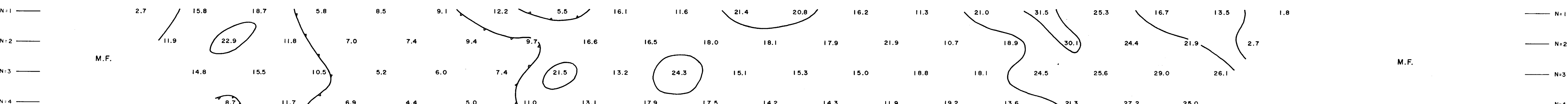
F.E.



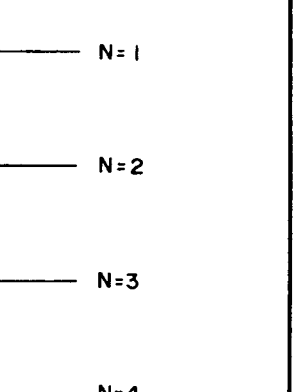
F.E.



M.F.



M.F.



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ASH CLAIMS

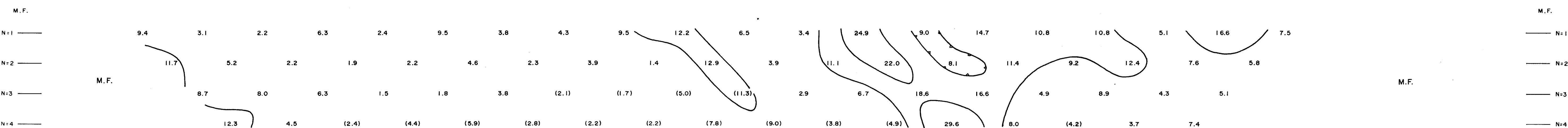
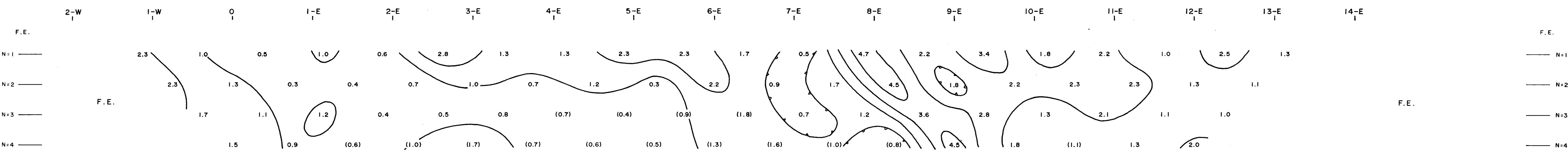
LINE 4-S

a = 75 meters  
FREQUENCY - 0.3 & 5.0 c.p.s.

SCALE 1:2500

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ASH CLAIMS

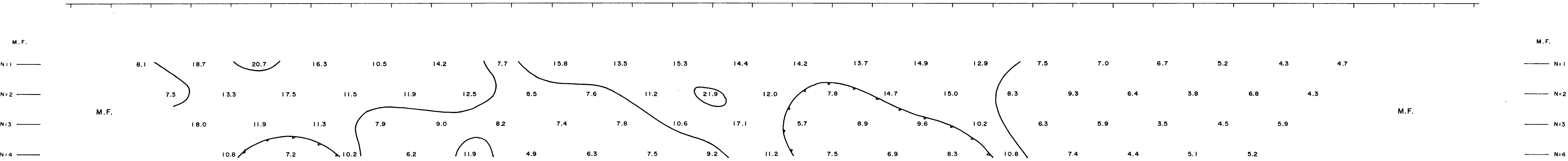
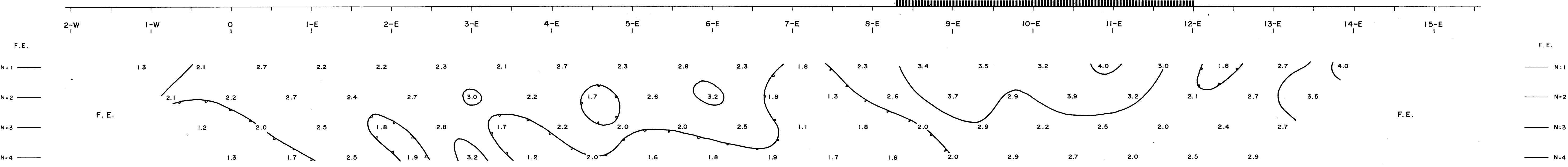
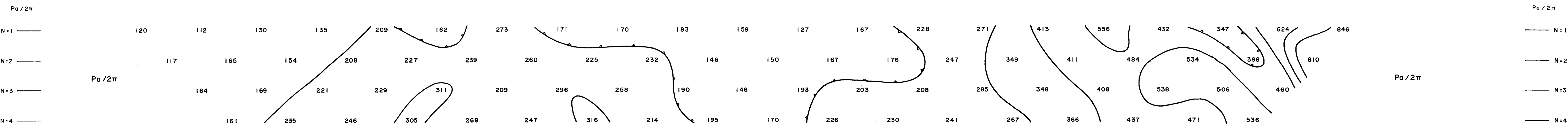
LINE 0+0

$a = 75$  meters  
FREQUENCY - 0.3 & 5.0 c.p.s.

SCALE 1:2500

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CANADIAN  
NATURAL RESOURCES LTD.  
ASH CLAIMS

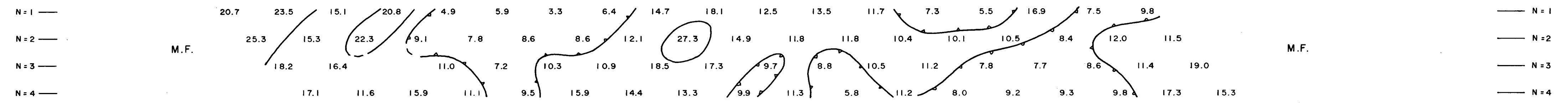
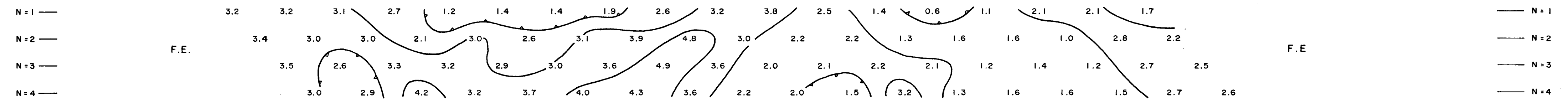
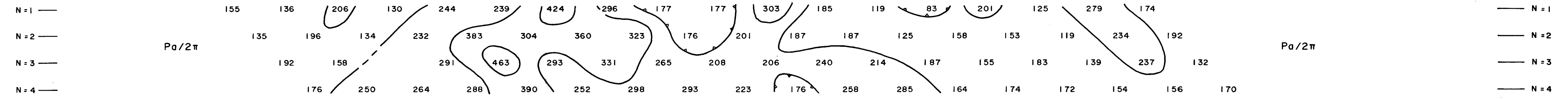
LINE 3-N

a = 75 meters  
FREQUENCY - 0.3 & 5.0 c.p.s.  
SCALE 1:2500

MINERAL RESOURCES BRANCH  
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200-E 250-E 300-E 350-E 400-E 450-E 500-E 550-E 600-E 650-E 700-E 750-E



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NATURAL RESOURCES LTD.

ASH CLAIMS

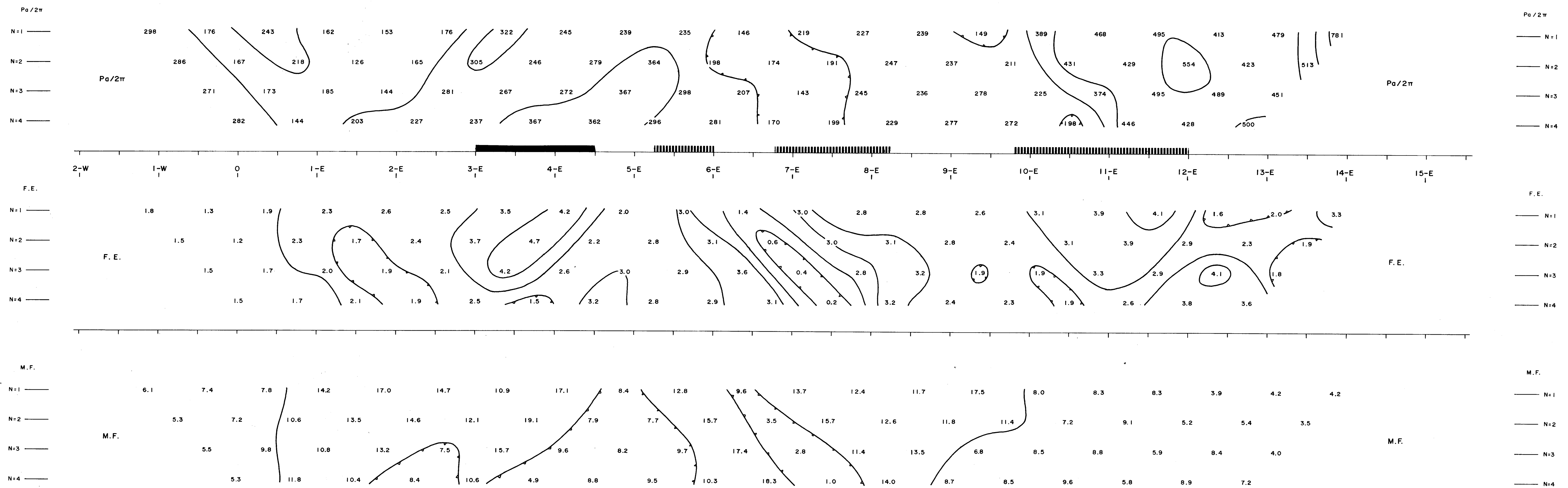
LINE 4-N

a = 25 meters  
FREQUENCY - 0.3 & 5.0 c.p.s.

SCALE 1:1250

MINERAL RESOURCES BRANCH

1974  
part 2  
OP 2



CANADIAN  
NATURAL RESOURCES LTD.  
ASH CLAIMS

LINE 4-N

a = 75 meters  
FREQUENCY - 0.3 & 5.0 c.p.s.  
SCALE 1:2500

MINERAL REVENUE BRANCH  
ASH CLAIMS  
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NO. 1092  
1 of 2

Pa/2π

N=1

N=2

N=3

N=4

Pa/2π

Pa/2π

Pa/2π

N=1

N=2

N=3

N=4

2-W 1-W 0 1-E 2-E 3-E 4-E 5-E 6-E 7-E 8-E 9-E 10-E 11-E 12-E 13-E 14-E 15-E

F.E.

N=1

N=2

N=3

N=4

F.E.

F.E.

F.E.

N=1

N=2

N=3

N=4

M.F.

N=1

N=2

N=3

N=4

M.F.

M.F.

M.F.

N=1

N=2

N=3

N=4

CANADIAN NATURAL RESOURCES LTD.

ASH CLAIMS

LINE 5-N

a = 75 meters  
FREQUENCY - 0.3 & 5.0 c.p.s.

SCALE 1:2500

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OF 2



Pa / 2π

N=1

N=2

N=3

N=4

Pa / 2π

Pa / 2π

Pa / 2π

N=1

N=2

N=3

N=4

F. E.

N=1

N=2

N=3

N=4

F. E.

F. E.

F. E.

N=1

N=2

N=3

N=4

M. F.

N=1

N=2

N=3

N=4

M. F.

M. F.

M. F.

N=1

N=2

N=3

N=4

2-W 1-W 0 1-E 2-E 3-E 4-E 5-E 6-E 7-E 8-E 9-E 10-E 11-E 12-E 13-E 14-E 15-E

CANADIAN NATURAL RESOURCES LTD.

ASH CLAIMS

LINE 6-N

a = 75 meters  
FREQUENCY - 0.3 & 5.0 c.p.s.

SCALE 1:2500

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part 2  
TOP 2

$P_a / 2\pi$

N=1  
N=2  
N=3  
N=4

$P_a / 2\pi$

$P_a / 2\pi$

$P_a / 2\pi$

N=1  
N=2  
N=3  
N=4

F.E.

N=1  
N=2  
N=3  
N=4

F.E.

F.E.

F.E.

N=1  
N=2  
N=3  
N=4

M.F.

N=1  
N=2  
N=3  
N=4

M.F.

M.F.

M.F.

N=1  
N=2  
N=3  
N=4

2-W 1-W 0 1-E 2-E 3-E 4-E 5-E 6-E 7-E 8-E 9-E 10-E 11-E 12-E

CANADIAN  
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ASH CLAIMS

LINE 7-N

a = 75 meters  
FREQUENCY - 0.3 & 5.0 c.p.s.

SCALE 1:2500

MINERAL RESOURCES ACT

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TOP 2

Pa/2π

N=1

N=2

N=3

N=4

Pa/2π



Pa/2π

N=1

N=2

N=3

N=4

Pa/2π

2-W 1-W 0 1-E 2-E 3-E 4-E 5-E 6-E 7-E 8-E 9-E 10-E 11-E 12-E

F.E.

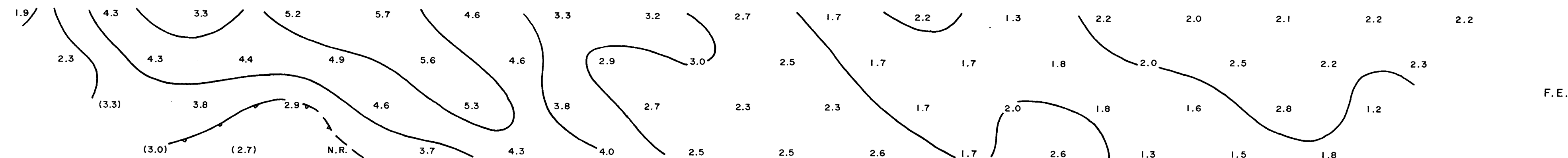
N=1

N=2

N=3

N=4

F.E.



F.E.

N=1

N=2

N=3

N=4

F.E.

M.F.

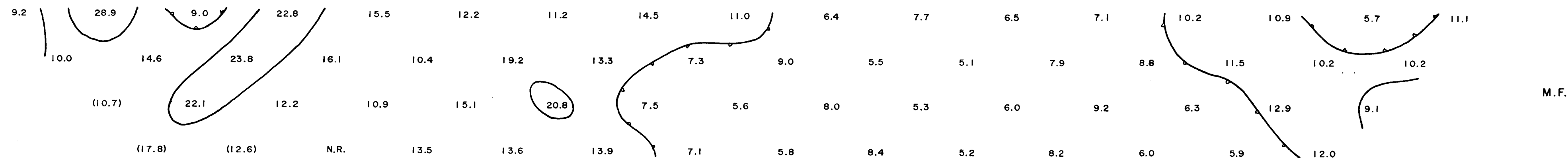
N=1

N=2

N=3

N=4

M.F.



M.F.

N=1

N=2

N=3

N=4

M.F.

CANADIAN  
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ASH CLAIMS

LINE 8-N

a = 75 meters  
FREQUENCY - 0.3 & 5.0 c.p.s.  
SCALE 1:2500

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Pa/2π

N=1

N=2

N=3

N=4

Pa/2π

Pa/2π

Pa/2π

N=1

N=2

N=3

N=4

F.E.

N=1

N=2

N=3

N=4

F.E.

F.E.

F.E.

N=1

N=2

N=3

N=4

M.F.

N=1

N=2

N=3

N=4

M.F.

M.F.

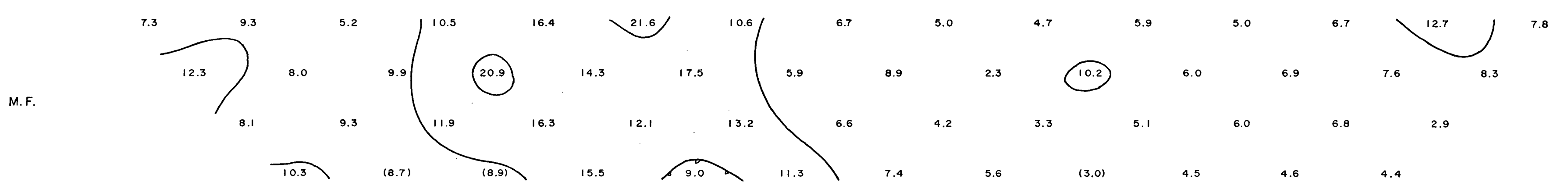
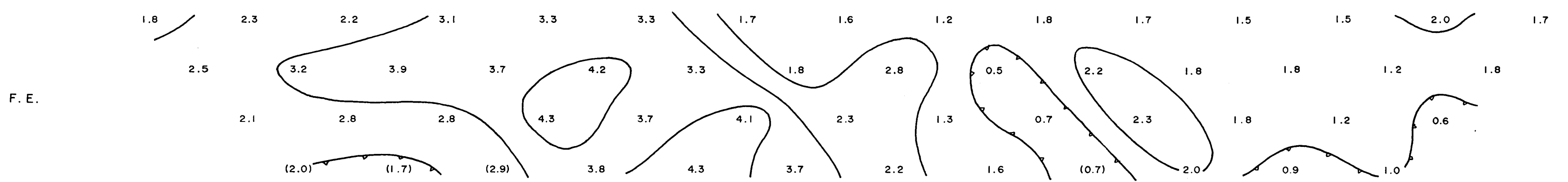
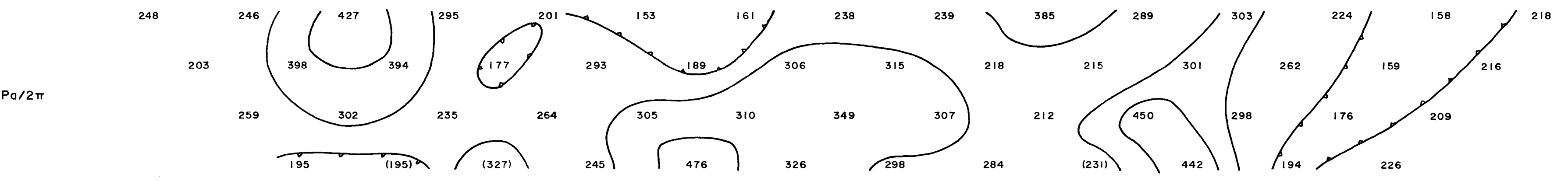
M.F.

N=1

N=2

N=3

N=4



CANADIAN  
NATURAL RESOURCES LTD.  
ASH CLAIMS

LINE 9-N

a = 75 meters  
FREQUENCY - 0.3 & 5.0 c.p.s.  
SCALE 1:2500

MINERAL DEVELOPMENT BRANCH  
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Pa / 2π

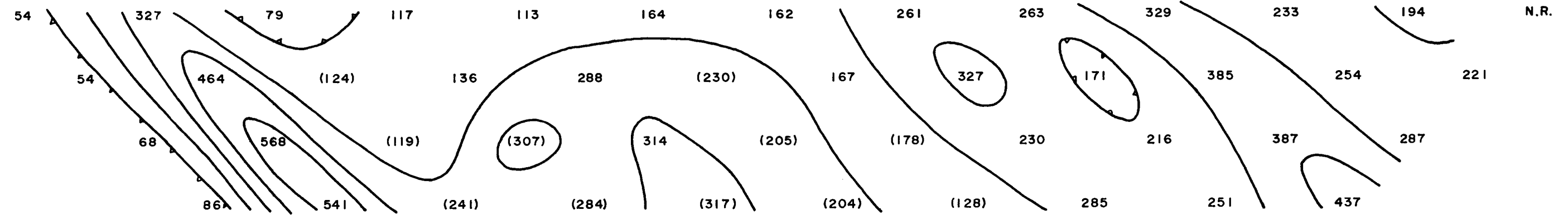
N=1

N=2

N=3

N=4

Pa / 2π



Pa / 2π

Pa / 2π

N=1

N=2

N=3

N=4

2-W

1-W

0

1-E

2-E

3-E

4-E

5-E

6-E

7-E

8-E

9-E

F. E.

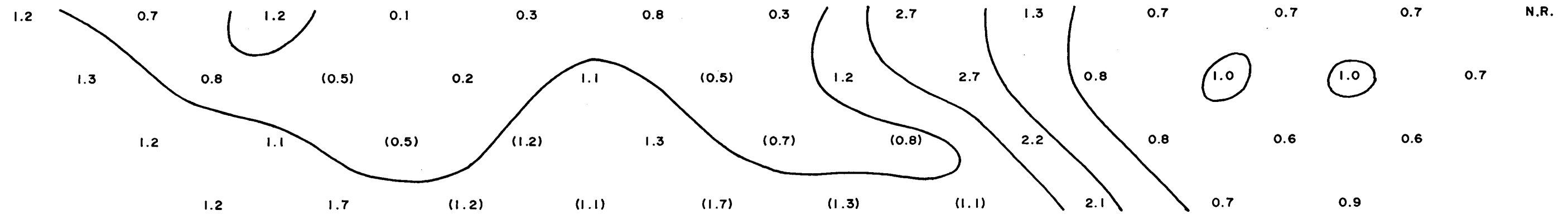
N=1

N=2

N=3

N=4

F. E.



F. E.

F. E.

N=1

N=2

N=3

N=4

M. F.

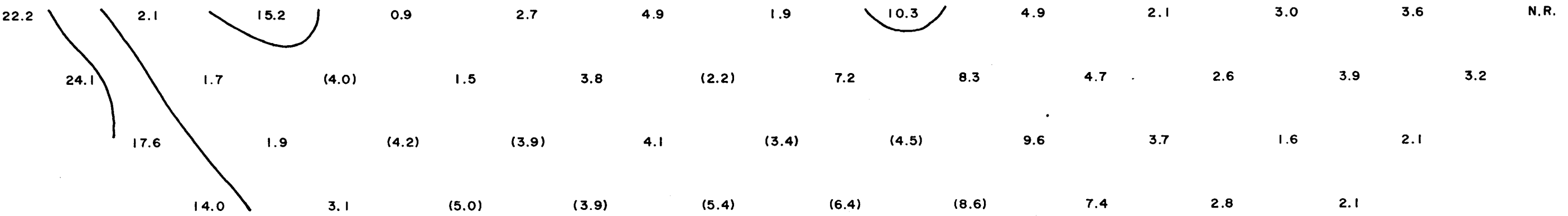
N=1

N=2

N=3

N=4

M. F.



M. F.

M. F.

N=1

N=2

N=3

N=4

CANADIAN NATURAL RESOURCES LTD.

ASH CLAIMS

LINE 10-N

a = 75 meters  
FREQUENCY - 0.3 & 5.0 c.p.s.

SCALE 1:2500

MINERAL RESOURCES BRANCH

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TOP 2

Pa/2π

N=1

N=2

N=3

N=4

Pa/2π

6-W

5-W

4-W

3-W

2-W

1-W

0

1-E

2-E

3-E

4-E

F.E.

N=1

N=2

N=3

N=4

F.E.

F.E.

M.F.

N=1

N=2

N=3

N=4

M.F.

Pa/2π

N=1

N=2

N=3

N=4

Pa/2π

F.E.

N=1

N=2

N=3

N=4

M.F.

N=1

N=2

N=3

N=4

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ASH CLAIMS

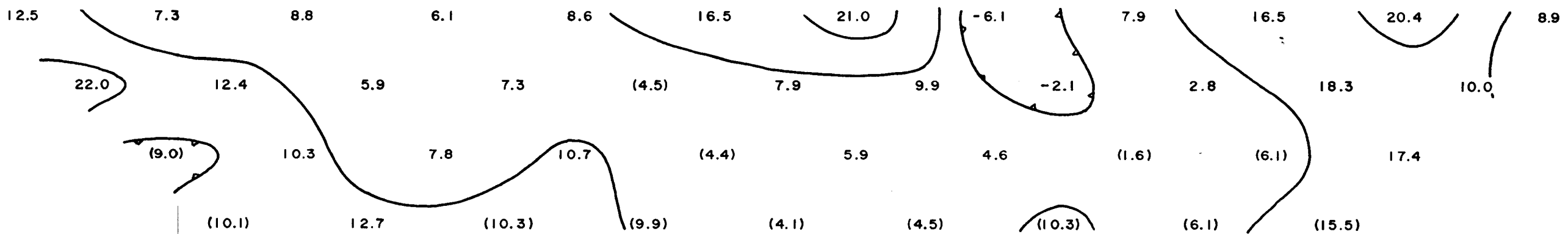
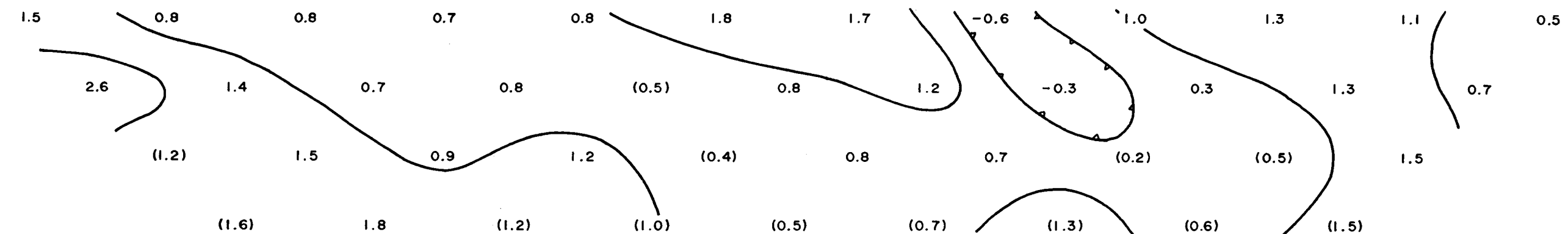
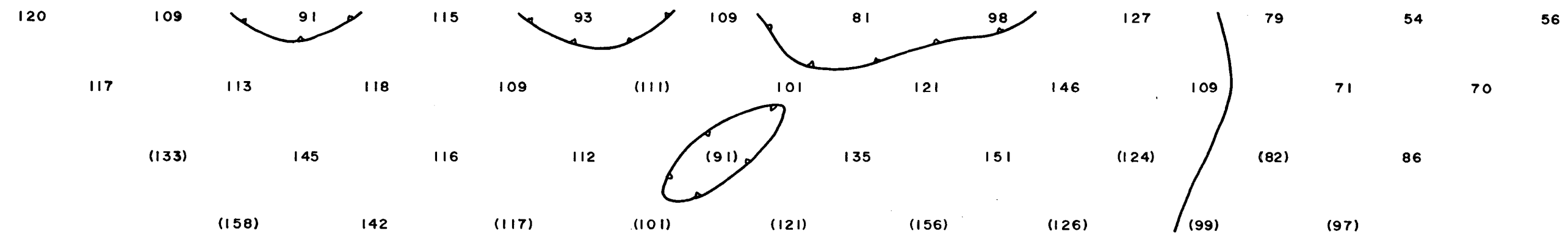
LINE 15-N

a = 75 meters

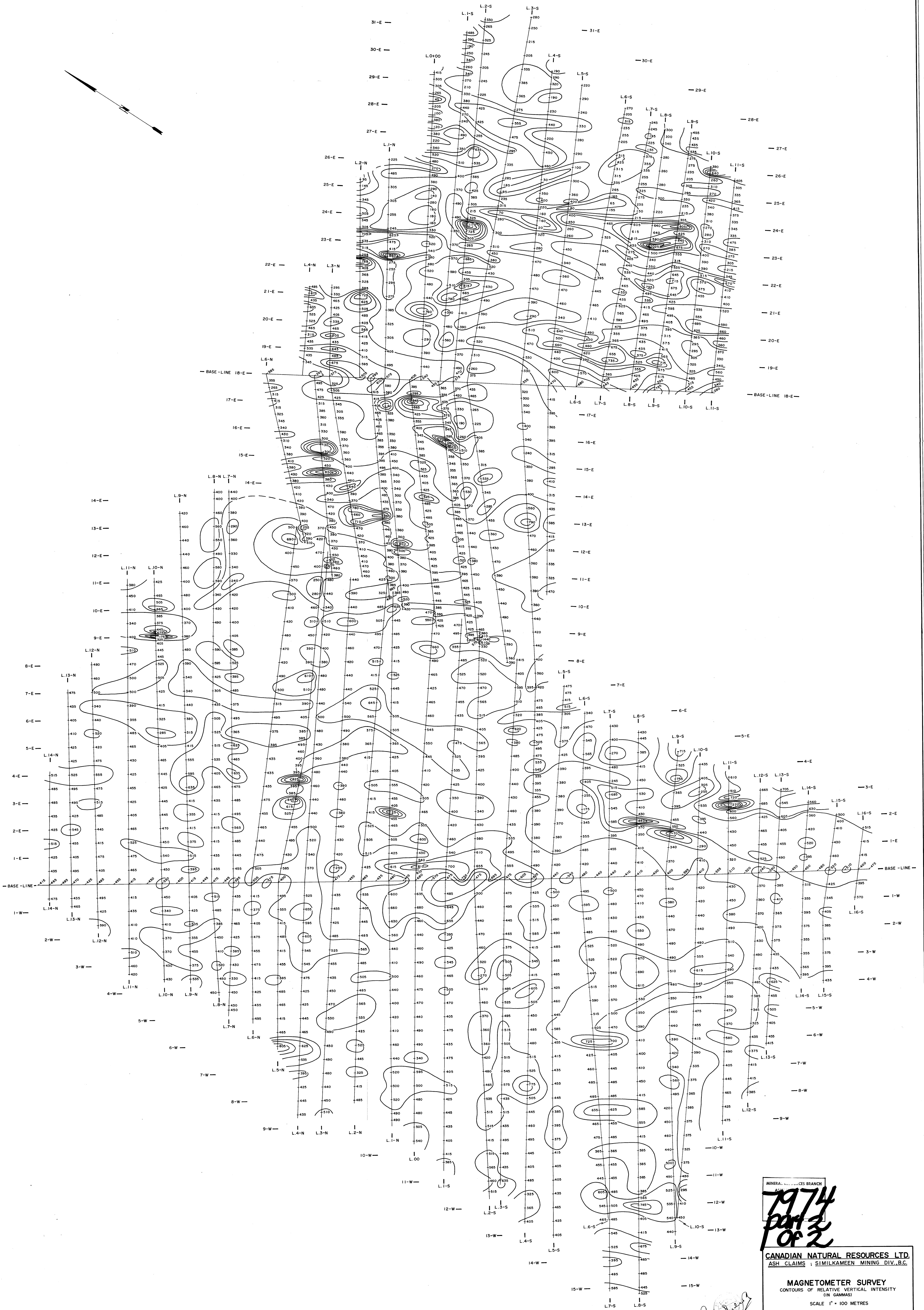
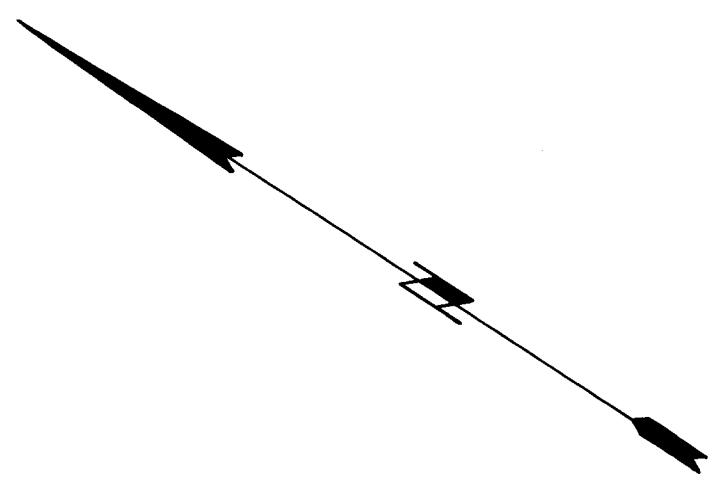
FREQUENCY - 0.3 & 5.0 c.p.s.

SCALE 1:2500  
MINOR UNIT 1 INCH

1974  
part 2  
of 2







MINERAL RESOURCES BRANCH  
**1974**  
**part 2**  
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ASH CLAIMS; SIMILKAMEEN MINING DIV., B.C.  
MAGNETOMETER SURVEY  
CONTOURS OF RELATIVE VERTICAL INTENSITY  
(IN GAMMAS)  
SCALE 1" = 100 METRES  
MAP NO. W-271-1  
TO ACCOMPANY A REPORT BY  
PETER E. WALCOTT, P. ENG., DATED OCT-1973  
PETER E. WALCOTT & ASSOC. LTD.  
AUGUST - 1973

