John Betz Limited

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CANADA, M9C 2W1

REPORT ON THE MAXMIN II EM SURVEY
WELCOME NORTH MINES LTD.
RAZ GRID
WHITEHORSE MINING DISTRICT, YUKON TERR.
LAT 62°19'N LONG 133°02'W N.T.S. 105 K/6

Toronto, Ontario
August, 1977

John E. Betz
John Betz Limited

LIST OF CONTENTS

090266

This report [illegible] by the Geological [illegible] is recommended [illegible] considered as [illegible] amount of

$4800.00

D B Craig

[illegible] under [illegible]

B. R. BAXTER
Supervising Mining Recorder

MINERAL CLAIMS

The RAZ 1-182 claim group consists of the following 147 contiguous mineral claims located in the Whitehorse Mining District of the Yukon Territory (see Fig. 1).

CLAIMS	GRANT NUMBERS	RECORDING DATE
RAZ 1- 20	YA3424-YA3443	Sept. 2, 1975
RAZ 25- 34	YA8452-YA8461	Dec. 30, 1976
RAZ 39- 48	YA8466-YA8475	Dec. 30, 1976
RAZ 52- 99	YA8479-YA8526	Dec. 30, 1976
RAZ 101	YA8528	Dec. 30, 1976
RAZ 103	YA8530	Dec. 30, 1976
RAZ 105	YA8532	Dec. 30, 1976
RAZ 107	YA8534	Dec. 30, 1976
RAZ 109	YA8536	Dec. 30, 1976
RAZ 113-124	YA8539-YA8550	Dec. 30, 1976
RAZ 126-147	YA8552-YA8573	Dec. 30, 1976
RAZ 149-154	YA8575-YA8580	Dec. 30, 1976
RAZ 157-169	YA8583-YA8595	Dec. 30, 1976
RAZ 182	YA8607	Dec. 30, 1976

LOCATION AND ACCESS

The RAZ 1-182 claims are located in the Whitehorse Mining District of the Yukon Territory (N.T.S. 105K-6) at latitude 62°19'N and longitude 133°02'W, 125 miles northeast of Whitehorse, Yukon Territory and 12 miles northeast of the town of Faro (Fig. 2).

Access to the property can be gained by helicopter from Faro or the Anvil mine site situated 12 miles west of the property, in Rose Creek Valley.

The property is centered on a narrow alpine valley northeast of Mount Mye and includes the main peak of Mount Mye. Elevation varies from 5000 feet in the valleys to over 6700 feet at Mount Mye. Outcrop is restricted to sidehills, especially northwest-facing slopes, and ridge tops, with the valley bottoms being covered with glacial till and felsenmeer.

The property is above treeline with only buck brush and minor stunted black spruce in the lower valley bottoms.

REPORT ON THE MAXMIN II EM SURVEY,
WELCOME NORTH MINES LTD,
VANGORDA 1977 PROJECT,
RAZ GRID, CLAIMS 1-20 &
WHITEHORSE MINING DISTRICT, YUKON TERRITORY.
LAT 62°19'N LONG 133°02'N N.T.S. 105 K/6

INTRODUCTION

The MaxMin II system is a portable electromagnetic system designed to be used effectively under difficult conditions such as in areas of a) "noisy" conductive overburden, b) rough terrain, and c) strong atmospheric and power line noise. The equipment and its modes of operation, with field examples, are amply described in a test report available from Apex Parametrics Ltd. of Markham, Ont. They will not be repeated here.

For the Raz project, the system was used in a maximum-coupled coplanar mode with the turns of the transmitting and receiving coils held parallel to the mean slope of the terrain (along the traverse line) between the coils. On flat ground, this mode of operation is the well-known horizontal loop mode.

Coil control is of paramount importance in getting "clean" in-phase data in rough terrain.

By secant chaining* the lines and recording the contingent slope information in the process, it is possible to get very accurate coil control under all conditions of rough terrain. In the absence of secant chaining, it is possible to get reasonably good coil control under many conditions of rough terrain. But to achieve this, continual use of a hand-held inclinometer and continual use of graduation marks on the reference cable are required during the course of the MaxMin II work.

In extremely choppy tree-covered terrain, it could be more time-consuming to get reasonably "clean" in-phase data with the simultaneous inclinometer-graduation mark technique than to get very "clean" in-phase data with pre-secant chaining. However, in fairly open rolling terrain with long sustained slopes, some saving in field time can be obtained by the use of the simultaneous inclinometer-graduation mark technique during the course of the MaxMin II coverage. The most time-consuming part of the latter

* The method of secant chaining, and subsequent data reduction, is described in the MaxMin II operations manual. It will not be repeated here.

technique is the control of the coils when they straddle sharp crests and valleys. For a sharp crest, in-the-field calculations are required from picket-to-picket inclinometer shots across the crest, in order to determine the mean slope between the coils. Generally for sharp valleys, there is a direct line of sight across the valley; so, the inclinometer can be used directly to determine the mean slope between the coils. But, for both sharp crests and sharp valleys, it is difficult to keep the coil spacing constant, because it is difficult to make an on-the-spot estimate of the amount of reference cable"consumed" by such topographic features. However, by taking picket-to-picket inclinometer shots across crests and valleys, it is possible to reconstruct a topographic section and make a first order determination of the straight-line distance between the coils. This will permit a first order correction to the MaxMin II readings prior to plotting.

With a conscientious simultaneous inclinometer-graduation mark approach, the in-phase noise envelope can be kept to within 6 parts per hundred of the primary field strength, while it can be kept to within 2 parts per hundred with secant chaining.

The smaller in-phase noise envelope achieved through secant chaining is certainly advantageous in the search for deep "good" conductors, where the last anomalous "gasp" is always in the in-phase reading. Apart from the greater search-depth advantage for "good" conductors, secant chaining leads to accurately located stations in plan, and to directly calculated accurate topographic profiles. Secant chaining also leads to more accurate location and width determinations for conductive zones.

The greater search-depth capability, more accurate station and conductor locations, and more accurate topographic profiles afforded by secant chaining are to be weighed against the slower rate of coverage in the field. For example, of a full day in Raz-type terrain, it would be possible to secant chain 3 miles of line per day (moving previously marked pickets), or to run 3 miles of MaxMin II per day on pre-secant chained line, giving an average porduction of 1½ miles per day. On the other hand, it would be possible to run 2 miles of MaxMin II per day using the simultaneous inclinometer-graduated mark technique. So, the advantage in field production of the latter technique is about 33% over the former technique in Raz-type terrain. However, some of this field time advantage is lost in the office when it is necessary to reconstruct ridge and valley pictures to correct for coil spacing errors. Still more of the field time advantage is lost in the office when it is necessary to construct topographic profiles to help in the interpretation of the conductor picture, because the profiles must be first constructed from orthophoto contours then amended by the mean slope values determined by the inclinometer. Without orthophoto contours, it is even more difficult to construct topographic profiles from the mean slope inclinometer measurements, and the end product is much more approximate.

For the sake of reducing the time spent in the field, the simultaneous inclinometer-graduated mark technique was used on the Raz grid. The topographic profiles shown on the profile sheets were taken from the orthophoto contour plan and amended by the mean slope figures obtained during the MaxMin II survey.

A reconnaissance coil spacing of 400 ft (122 meters) and frequencies of 222 and 3555 Hz were used throughout the survey. The reasons for this choice of coil spacing and frequency are:

a) A coil spacing of 400 ft is a compromise value to get moderately good resolution of near-surface conductors and moderately good search-depth for deep conductors. It is always possible to use another coil spacing for follow-up work.

b) Two widely-spaced frequencies lead to a fairly accurate conductivity-thickness estimate for conductive zones, as well as helping to interpret the shape and attitude of non-simplistic conductive zones. A very high frequency will detect very "poor" conductors which are scarcely visible to a very low frequency. A very low frequency will detect deep "good" conductors in the presence of shallow "poor" conductors--something that a very high frequency cannot do.

c) The results at one frequency serve to monitor the inevitable reading and/or recording error at the other frequency.

The magnetic profiles shown on the profile sheets were obtained by a Scintrex MF-2 fluxgate magnetometer. The frequent looping technique was used to monitor and correct for diurnal variations and instrument drift. In the absence of magnetic storms and micropulsations, the noise envelope of this model of magnetometer, used in this technique, is 50 to 60 gammas; so, anomalous readings would have to be above this value in order to be detectible with certainty.

The writer operated the MaxMin II receiver throughout the entire survey covering the 12½ miles of traverse line in 6 days. Two assistants were provided by Welcome North Mines Ltd.

The magnetometer coverage was done by Welcome North personnel.

Location and access maps and descriptions have been, and will be, given in other reports composed by Welcome North personnel. They will not be repeated here beyond the latitude, longitude, and N.T.S. number.

PRESENTATION OF RESULTS

The MaxMin II profiles, topographic profiles, magnetic profiles, and the interpreted conductor picture for each line were plotted on special profile sheets. Reduced-scale copies of these sheets are bound with an index and legend sheet toward the end of this report.

A plan--showing the grid lines, topographic contours, and interpreted conductive zones--is included in the pocket at the end of the report.

INTERPRETATION OF RESULTS

There is a prominent conductive zone on the property, which zone can be seen on the enclosed plan and profile sheets. This zone has an appreciable overall width and it dips flatly, e.g. 10^{0} to 20^{0}, in a grid-westerly direction.

Because the conductive zone is flat-dipping, and the dip cannot be deternined precisely, the true overall width of the zone can vary considerably from that shown on the sectional views. Nonetheless, the overall width is appreciable, e.g. 300 to 500 feet.

The major part of the conductive zone is very poorly conductive. But, there is evidence of two "thin", more highly conductive units related to the wide zone. One of the more highly conductive units is on the hanging-wall side of, and the other within, the poorly conductive zone.

The range of conductivity-thickness values of the poorly and more highly conductive zones is 0.1 to 1 mho and 1 to 5 mhos, respectively. This translates to specific resitivities of 100 to

1000 ohm meters for the more poorly conductive material and 5 to 20 ohm meters for the more highly conductive. The specific resistivity values of 100 to 1000 ohm meters are typical of a boulder till, or of a porous or slightly fractured ionic-water-permeated rock, with or without disseminated "metallic"* mineralization. The values of 5 to 20 ohm meters cover the range of marine & varved clays through to very poorly interconnected "metallic" materials. Because the conductive zones encountered lie within bedrock, the most likely interpretation is that the wide poorly conductive zone is a porous and/or fractured water-permeated lithilogical unit, while the narrower more highly conductive zone contains loosely interconnected stringers of graphite and/or sulphides.

The conductive phenomenon under discussion strikes essentially grid-south between lines 40N and 16N, after which it assumes a grid-southeasterly direction. Most, if not all, of the grid-southeasterly swing is due to the combination of a flat grid-westerly dip and rising topography toward the grid south, rather than to a fold.

There is an apparent change in character in the conductive phenomenon to the grid-south of line 16N. The 1 to 5 mho hanging-wall zone seems to disappear, while the 1 to 5 mho inner zone swings grid-southeasterly across lines 8N and 0. The latter zone appears to take over as the hanging-wall zone of the wide poorly conductive unit. An alternative possibility is that the inner zone terminates, while the hanging-wall zone swings grid-eastward. But, this interpretation would require a very sharp change in the direction of the hanging-wall zone. The former interpretation is shown on the enclosed plan.

To get a firm handle on the conductive picture in the area of the change of direction, it would be necessary to run a line between lines 8N and 16N, as well as to run a couple of grid-north-south lines. In fact, grid-north-south lines would generally be more suitable than grid-east-west lines for outlining the conductive picture to the south of line 16N.

The conductive phenomenon has been closed off at its north end, but not at its south end. Grid-north-south lines extending well to the south of line 0 would be required to close off the south end of this conductive phenomenon.

* The word "metallic" is used for any solid conductor, i.e. graphite to sulphides. Sphalerite is excluded from this statement because it is non-conductive.

In a broad sense, it can be said that there is magnetic activity related to the broad conductive zone detected by the MaxMin II system. But, the magnetic expression is one of disseminated magnetite or pyrrhotite scattered irregularly through a lithological unit. There does not appear to be a distinctive magnetic correlation with the "narrow" more highly conductive bands within the broad poorly conductive unit. The strongest and most definite magnetic expression is on line 24N and it falls between the two more highly conductive bands at 25W and 31W.

There is another area of extremely poor (non-magnetic) conductivity seen in the results at 3555 Hz. It falls roughly between 0 and 20E on line 40N, between 2E and 20E on line 32N between 5E and 20E on line 24N, and between 2E and 18E on line 16N. Its anomalous response is so weak that it is difficult to determine its exact limits or its attitude. For this reason, it is not shown either in plan or in section. However, it is mentioned perchance it may be of assistance in the geological mapping.

RECOMMENDATIONS & CONCLUDING REMARKS

This section has obviously been affected by the fact that two holes were drilled on the property between the completion of the field work and the completion of this report.

The results in the upper part of the recommended hole at 32+50W on line 24N correspond quite well with the interpreted conductive picture under the line. In other words, the graphite stringers encountered in the hole between depth 65 ft and 140 ft* correspond quite well with the interpreted 1 to 5 mho conductor on the hanging-wall side of the wide poorly conductive unit. It is not surprising that the poorly conductive unit itself is not recognizable in the core as being EM anomalous, if it is only a water-permeated porous or fractured rock. However, it is thought that a second more highly conductive zone should have been intersected somewhere between 200 and 300 ft in the hole--see the sectional view on the profile sheet. The EM results indicate a lesser conductivity-thickness for the latter conductive zone than for the hanging-wall zone, but nonetheless its conductive content should be recognizable to a visual and/or ohmmeter inspection. The most likely explanation for an absence of conductive material from the lower zone is either a hole in, or a

* These depths are a recollection from an oral description via telephone and may not be exact.

limited dip-extent to, the conductive zone. Actually, nothing can be said about the lower zone after it passes beneath the hanging-wall zone, because the latter zone will then predominate the anomalous picture.

The cause of the magnetic anomaly around 29+00W on line 24N should be apparent in the drill core between depths 150 and 250 ft, unless the magnetic material has limited dip-extent.

A detailed interpretation was not done for the results on line 0 immediately following the MaxMin II survey, because this area was not seriously considered for drilling at that time. A preliminary interpretation for line 0 was that of a wide conductive zone under the line. A first order depth of 200 ft was interpreted under station 0+00, increasing to a first order depth of 300 ft under station 12+00W. This conductive zone was believed to correspond to the zone between 25+00W and 31+50W on line 24N, and between 26+00W and 34+00W on line 16N.

A more detailed interpretation for line 0 is shown both in plan and in section in this report. The fairly rapid tail-off of anomalous readings around station 15+00W on the line can be related to the combined deepening of the conductive zone and rise in the surface topography and/or a termination of the conductive zone in this area. In any event, the conductive zone if it exists under station 14+00W (the site of the other drill hole on the property) could be close to 500 ft deep. For this reason, it is quite possible that the drill hole did not go quite deep enough to reach it. However, it must be remembered that a conductive zone with a conductivity-thickness value of a little more than 1 mho is not necessarily a metallic conductor. It can be a wide clay-permeated shear zone in the bedrock. Evidence of this should be looked for in the core from the lower part of the drill hole.

Based on the present interpretation, a more certain drill site for testing the conductive zone under line 0 would have been at station 7+00W. The interpreted depth under this station is about 300 ft. But, it would be advisable to run the MaxMin II system on a couple of grid-north-south lines with both a 400 and a 600 ft coil spacing, before any further drilling is planned in the area of line 0.

To the north of line 16N, the electrical picture is fairly well defined by the work to date. There is some question, however, about the behaviour of the inner 1 to 5 mho conductor between lines 24N and 32N. With the large (800 ft) gap between these lines, there is room to speculate on whether or not a) the inner conductor swings westward to join the hanging-wall conductor, or b) the inner conductor terminates to north of line 24N while the hanging-wall conductor thickens under line 32N. Some detailing MaxMin II coverage with a 200 or 300 ft coil spacing would answer this question.

Although more MaxMin II work would have given a firmer handle on the elctrical picture, it was felt at the completion of the initial work that a fairly representative part of the condutor had been outlined well enough to guide an initial drill hole (line 24N at 32+50W) and several subsequent holes, if necessary.

WRITER'S DECLARATION

Neither I, nor John Betz Limited, have any financial interest in any of the properties of Welcome North Mines Ltd or its joint venture partners.

I hold B.A. (1952) and M.A. (1953) degrees in geophysics from the University of Toronto. I have worked full time in mining exploration geophysics since 1953, and two summer seasons prior to 1953.

All statements made in this report are correct to the best of my knowledge.

John E. Betz

August, 1977
Toronto, Ontario

REGISTERED PROFESSIONAL ENGINEER
J. E. BETZ
PROVINCE OF ONTARIO

John E. Betz, M.A., P.Eng. Ont.
John Betz Limited

PROFILE INDEX

Line #

64N

56N & 48N

40N & 32N

24N & 16N

8N & 0

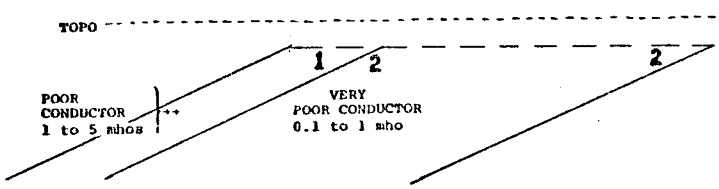
The above-listed profiles are bound in the order shown.

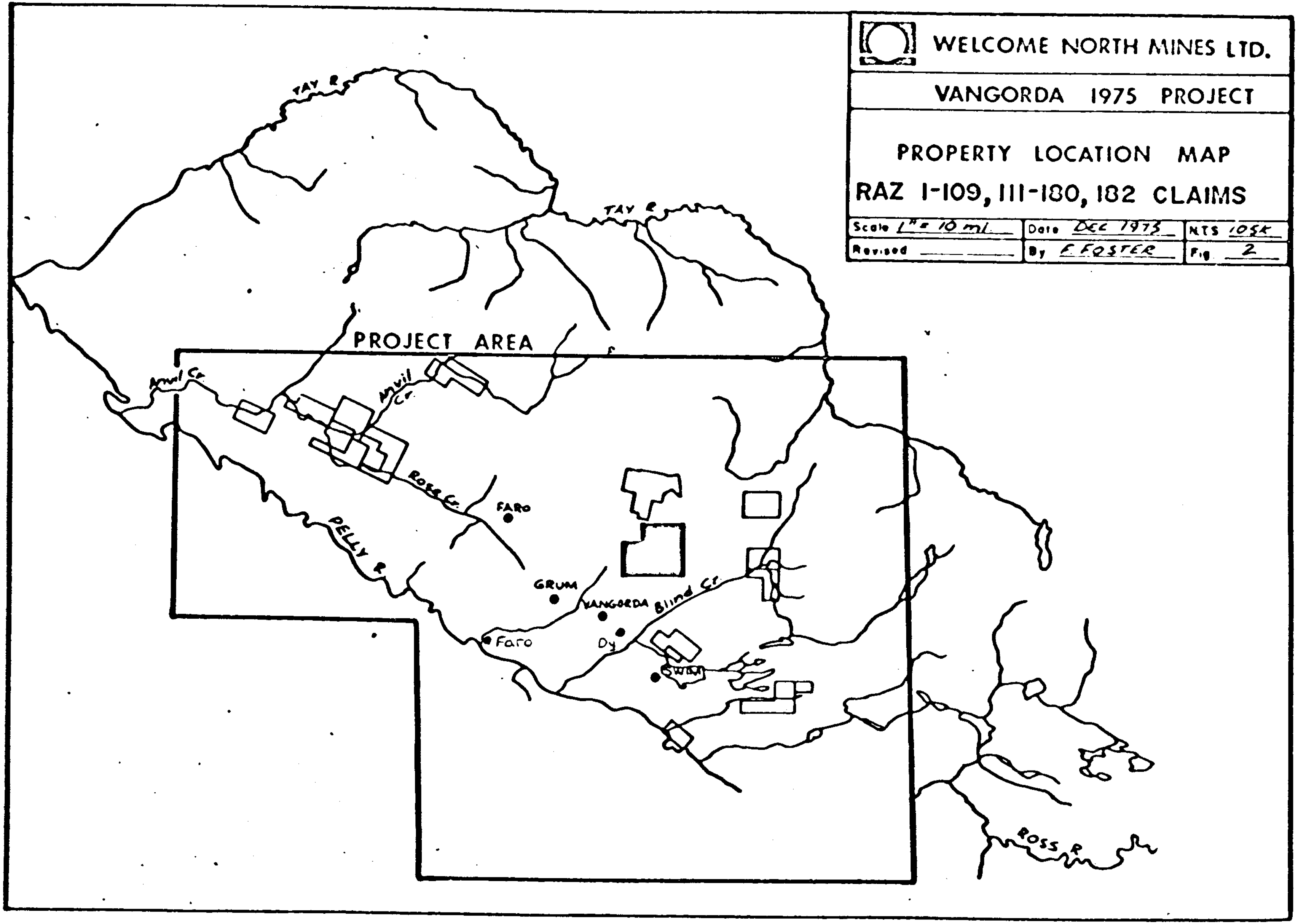
Additional Notes:

The background in-phase and out-of-phase values are +2, +2 at 222 Hz and -4, +3 at 3555 Hz.

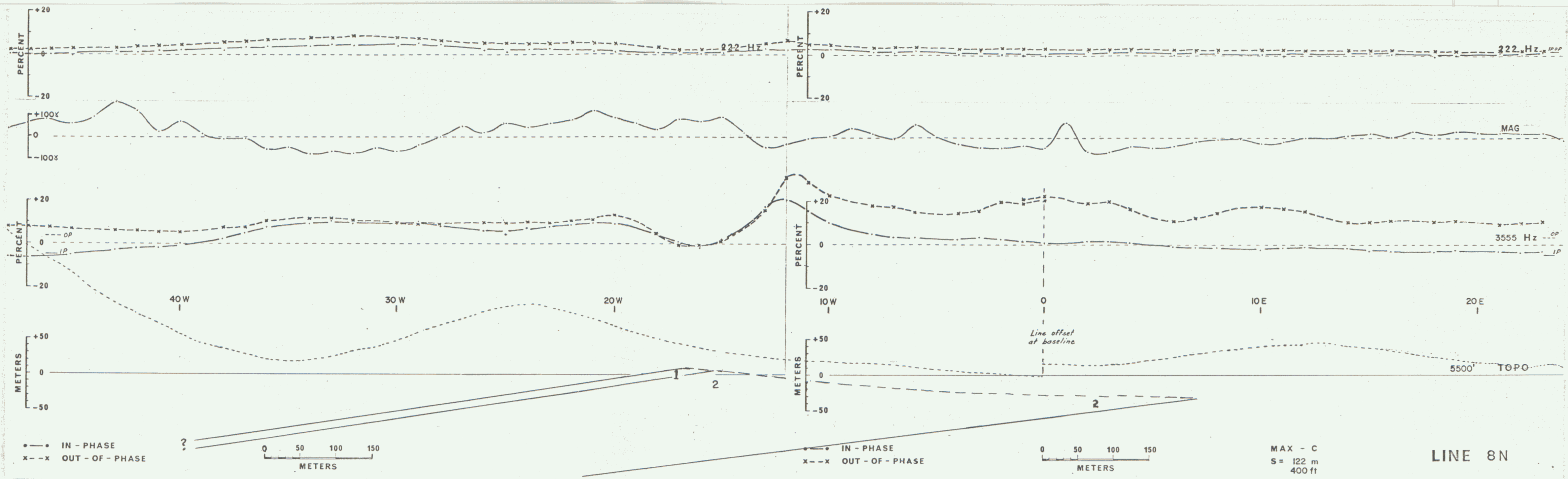
"S" on the profile sheet is the abbreviation for the coil spacing, which was 122 meters or 400 ft, throughout the survey.

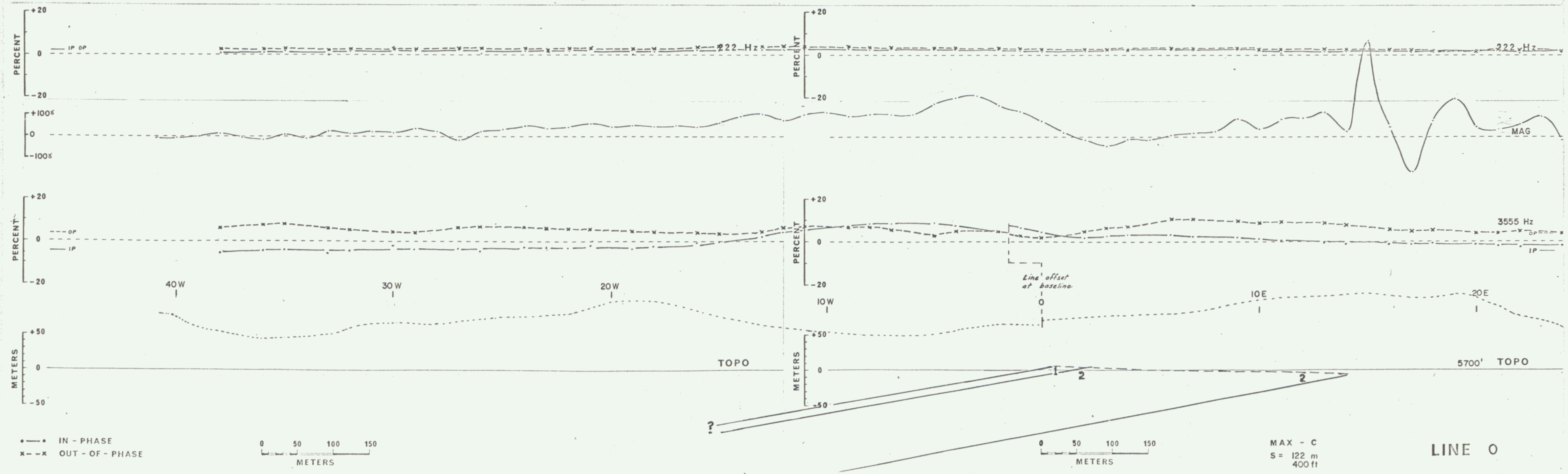
Conductor Legend:

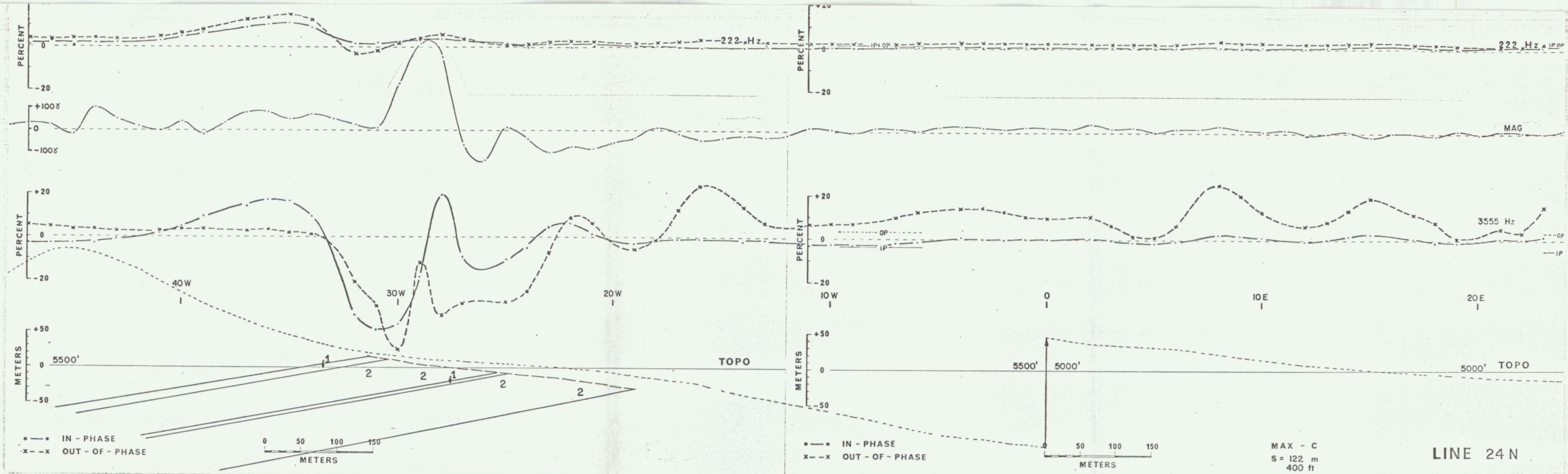



WELCOME NORTH MINES LTD.
VANGORDA 1975 PROJECT
PROPERTY LOCATION MAP
RAZ 1-109, 111-180, 182 CLAIMS
Scale 1" = 10 mi.
Date DEC 1975
NTS 105K
Revised
By F. FOSTER
Fig 2
TAY R.
TAY R.
PROJECT AREA
Anvil Cr.
Anvil Cr.
Rose Cr.
FARO
PELLY R.
GRUM
VANGORDA
Blind Cr.
Faro
Dy
SWIM
ROSS R.

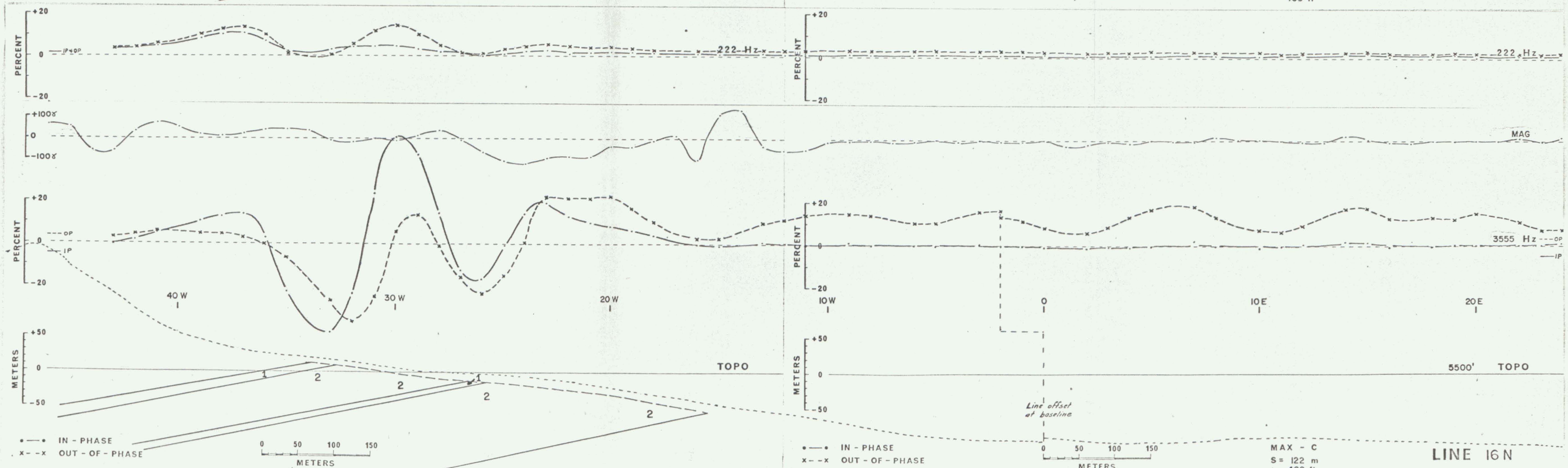

FAT Claims
Cyprus Anvil
ELLE Claims
WYNNE Claims
Vangorda
DDH 77
VZ-1
DDH 77 VZ-2
Mt. Mye
6763
N
Area of 1977 Geophysical Work
Area of 1977 Line-Cutting
Diamond Drill Hole 1977
No work done, proposed to let lapse
WELCOME NORTH MINES LTD.
VANGORDA 1977 PROJECT
RAZ CLAIMS
ASSESSMENT WORK
Scale: 1" : 1/2 mi.
Date: Dec. 1977
N.T.S. 105K-6
Revised:
By: J. G.
Fig.


PERCENT
+20
0
-20
222 Hz
IP OP
+100%
-100%
MAG
OP
IP
3555 Hz
40 W
30 W
20 W
10 W
0
10 E
20 E
Line offset at baseline
METERS
+50
-50
5500'
TOPO
1
2
?
IN - PHASE
OUT - OF - PHASE
0 50 100 150
METERS
MAX - C
S = 122 m
400 ft
LINE 8N

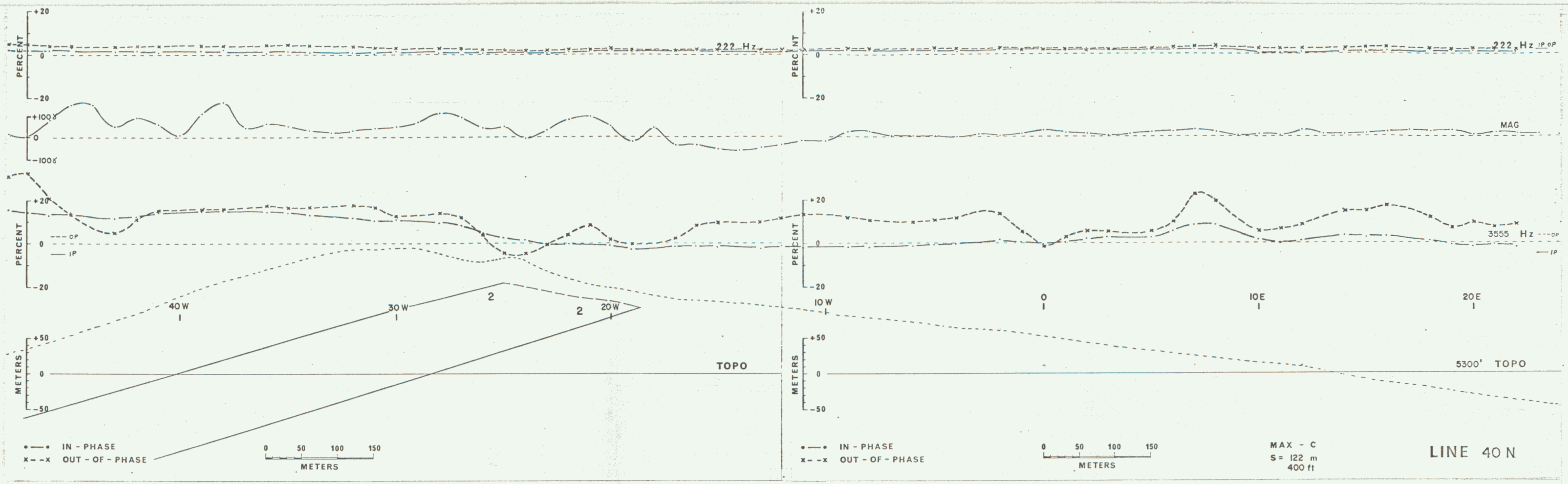

PERCENT
+20
0
-20
IP OP
222 Hz
+100%
-100%
MAG
OP
IP
3555 Hz
Line offset at baseline
40 W
30 W
20 W
10 W
0
10 E
20 E
METERS
+50
-50
TOPO
5700'
TOPO
1
2
?
IN - PHASE
OUT - OF - PHASE
0 50 100 150
METERS
MAX - C
S = 122 m
400 ft
LINE 0

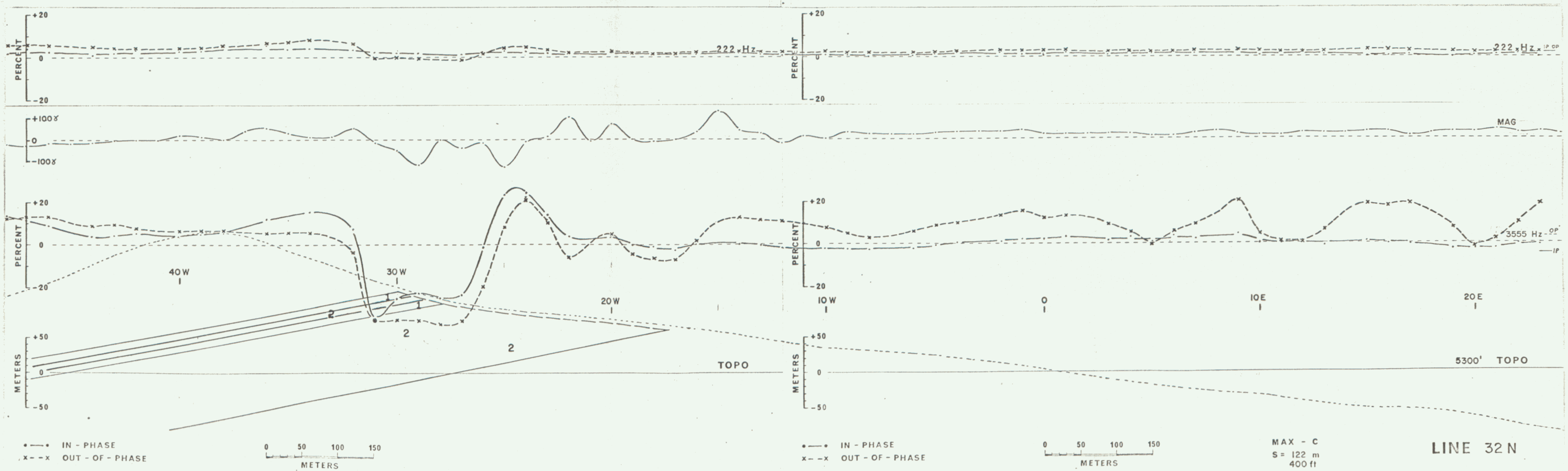


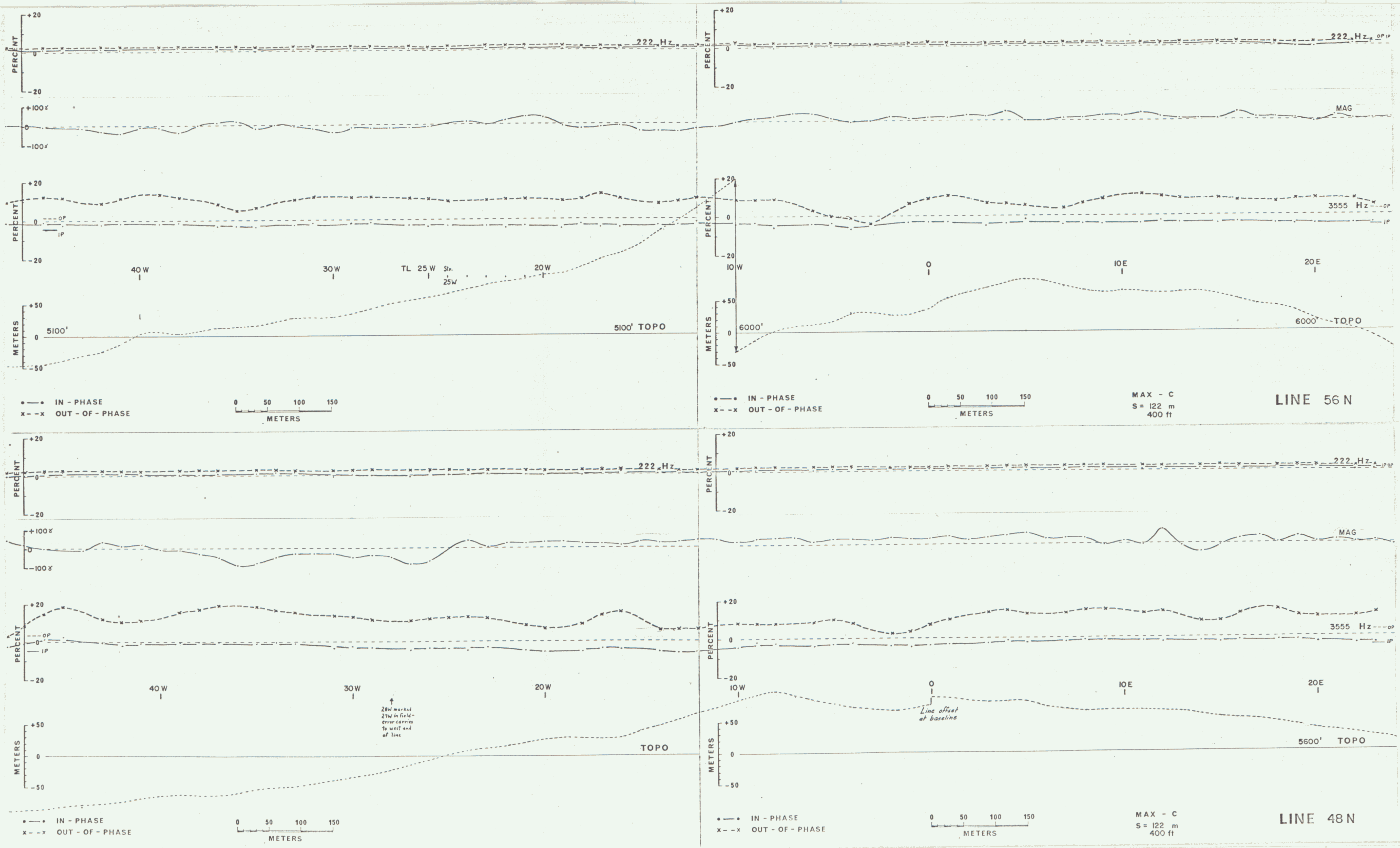
PERCENT
222 Hz
IP+OP
MAG
+100γ
-100γ
3555 Hz
OP
IP
40W
30W
20W
10W
0
10E
20E
METERS
5500'
5000'
TOPO
IN - PHASE
OUT - OF - PHASE
0 50 100 150
METERS
MAX - C
S = 122 m
400 ft
LINE 24 N



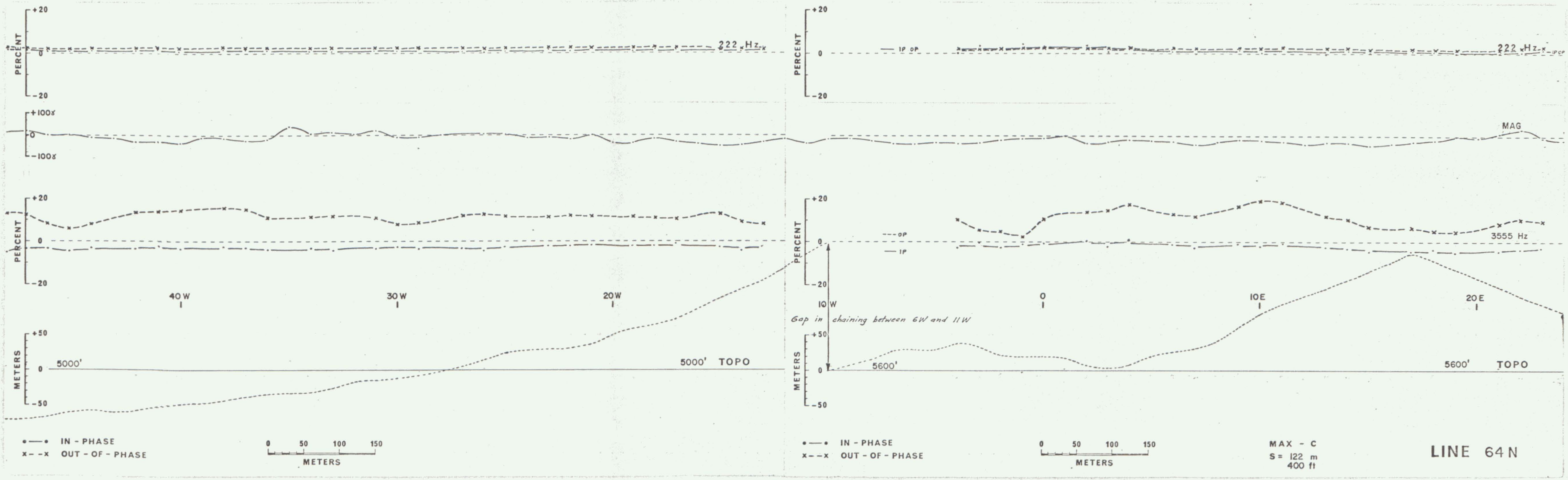
PERCENT
222 Hz
IP+OP
MAG
+100γ
-100γ
3555 Hz
OP
IP
40W
30W
20W
10W
0
10E
20E
METERS
5500'
TOPO
Line offset at baseline
IN - PHASE
OUT - OF - PHASE
0 50 100 150
METERS
MAX - C
S = 122 m
400 ft
LINE 16 N


PERCENT
+20
0
-20
222 Hz
IP OP
+100γ
-100γ
MAG
OP
IP
3555 Hz
40 W
30 W
20 W
10 W
0
10 E
20 E
2
METERS
+50
-50
TOPO
5300' TOPO
IN - PHASE
OUT - OF - PHASE
0 50 100 150
METERS
MAX - C
S = 122 m
400 ft
LINE 40 N


PERCENT
+20
0
-20
222 Hz
IP OP
+100γ
-100γ
MAG
3555 Hz
OP
IP
40 W
30 W
20 W
10 W
0
10 E
20 E
1
2
METERS
+50
-50
TOPO
5300' TOPO
IN - PHASE
OUT - OF - PHASE
0 50 100 150
METERS
MAX - C
S = 122 m
400 ft
LINE 32 N



PERCENT
+20
0
-20
222 Hz
OP IP
MAG
+100γ
-100γ
3555 Hz
OP
IP
40 W
30 W
TL 25 W
Stn. 25W
20 W
10 W
0
10E
20E
METERS
+50
-50
5100'
5100' TOPO
6000'
6000' TOPO
IN - PHASE
OUT - OF - PHASE
0 50 100 150
METERS
MAX - C
S = 122 m
400 ft
LINE 56 N
28W marked 27W in field - error carries to west end of line
Line offset at baseline
TOPO
5600' TOPO
LINE 48 N



+20
PERCENT
0
-20
222 Hz
IP OP
+100γ
0
-100γ
MAG
+20
PERCENT
0
-20
OP
IP
3555 Hz
40 W
30 W
20 W
10 W
0
10 E
20 E
Gap in chaining between 6W and 11W
+50
METERS
0
-50
5000'
5000' TOPO
5600'
5600' TOPO
IN - PHASE
OUT - OF - PHASE
0 50 100 150
METERS
MAX - C
S = 122 m
400 ft
LINE 64 N

LEGEND
Very poor conductor — 0·1 to 1·0 mhos
Poor conductor — 1·0 to 5·0 mhos
5500 Topo contour — elevation in feet above sea level
NOTE : Depths only shown where greater than 50 ft.
REGISTERED PROFESSIONAL ENGINEER
J. E. BETZ
PROVINCE OF ONTARIO
WELCOME NORTH MINES LTD.
VANGORDA 1977 PROJECT
RAZ 1-20 CLAIM GROUP
WHITEHORSE MINING DISTRICT, YUKON TERR.
62° 19' N, 133° 02' W
N.T.S. 105-K-6
0
400
800 FEET
TO ACCOMPANY REPORT
JOHN BETZ LTD.
AUGUST, 1977