

Area Exploration Corporation Limited

Mt. Nansen Project.

A Geophysical Report

on

Ground Magnetic, Electromagnetic  
and

Induced Polarization Surveys

by

Peter E. Walcott, P.Eng.

Dated: January 1972

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A REPORT

ON

GROUND MAGNETIC, ELECTROMAGNETIC

AND

INDUCED POLARIZATION SURVEYS

Mt. Nansen Area, Yukon Territory

FOR

AREA EXPLORATION CORPORATION LIMITED

Vancouver, British Columbia

BY

PETER E. WALCOTT & ASSOCIATES LIMITED

Vancouver, British Columbia

JANUARY 1972

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## INTRODUCTION

Between July 8th and August 3rd, 1971, Peter E. Walcott & Associates Limited carried out an induced polarization (I.P.) survey over part of a property, located in the Carmacks district of the Yukon Territory, optioned by Area Exploration Corporation Limited.

The survey was originally initiated on June 14th but was immediately abandoned until July 8th due to the inability to embed foil electrodes in the still frozen ground. It was carried out over handcut (where necessary) picket lines which were turned off from a N 40° W baseline, and which were chained and picketed at 200 foot intervals.

The "dipole-dipole" method of surveying using a 400 foot dipole was initially attempted but had to be discarded in favour of the "pole-dipole" method in order to get a workable signal to noise ratio (it was extremely difficult to obtain adequate electrical contacts with the ground).

Measurements (first to fourth separation) of apparent resistivity and frequency effect (the I.P. response parameter) were made using a 400 foot dipole and frequencies of 0.3 and 5 c.p.s.

The I.P. data are presented in contour form on individual line profiles contained in this report, and also in contour form on plan maps of the line grid, Maps W-130-1 to 14, that accompany this report.

In addition this report contains a discussion of the results obtained on ground magnetic and E.M. 16 surveys conducted by Area Exploration Corporation Limited. The results of these surveys are presented in contour form on Maps W-130-15 and 16.

PROPERTY, LOCATION AND ACCESS

The property is located in the Whitehorse Mining District of the Yukon Territory and consists of the following minerals claims:

<u>Claim Name</u>	<u>Record Number</u>
BIT 1 - 6	93441 - 46
B.M. 1 - 30	77668 - 97
JOANNE 1 - 8	74283 - 90
DOME 19	73705
DOME 23 - 24	33709 - 10
DOME 25 - 48	77746 - 69
DOME 53 - 76	77774 - 97
DOME 85	81849
DOME 87 - 106	81851 - 69
DOLLY 1 - 8	81938 - 45
DOLLY 9 - 64	81970 - 82025
HARRY Fr 1 - 9	Y26391 - 99
STONE 1 - 8	93478 - 85
BETTY 1 - 32	93486 - 517
LAURA 1 - 5	93447 - 51
LAURA 6	93956
LAURA 7 - 9	93452 - 54
LAURA 10 - 15	93462 - 67
LAURA 18 - 25	93470 - 77
LAURA 26 - 32	93455 - 61
TEE 1 - 4	Y24049 - 52
BUN 1 - 4	Y12189 - 92
SUE 1 - 8	Y20649 - 56
CHICK 1 - 4	Y61405 - 08
JEANNE 1 - 4	Y61401 - 04
CROW 1 - 8	Y61101 - 08
EMIL 1 - 4	Y61390 - 93
EMIL Fr's 5 - 8	Y61397 - 400
EMIL 9 - 11	Y61394 - 96
CHAR Fr. 1 - 14	to be tagged

The claims are situated some 30 miles west of the settlement of Carmacks at the 5000 foot elevation between Nansen and Victoria Creeks.

Access is obtained by means of the Whitehorse - Mayo road to Carmacks and thence by a 41 mile all weather gravel road built by Mt. Nansen Mines Ltd.

PREVIOUS WORK

Mining and prospecting has been carried on intermittently in the Mt. Nansen area since 1907 when gold placers were found in the tributaries of Nansen and Victoria Creeks.

In 1968 Mt. Nansen Mines Ltd. started production of Pb-Ag-Au from the Huestis and Waller veins but shut down in 1969.

In 1970 F. Bianconi and R. Saager of Mt. Nansen Mines Ltd. recognized a porphyry copper environment north of the millsite, and as a result silt sampling and airborne radiometric survey programmes were undertaken.

PURPOSE

The purpose of the survey was to investigate the known porphyry situation using the induced polarization technique in the hope of outlining favourable zones of sulphide mineralization.

GEOLOGY

The reader is referred to a report by R. A. Dickinson and P. Lewis of Area Exploration Corporation Limited.

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 consists basically 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 P<sub>a</sub> is plotted.

A third parameter termed the "metal factor" is also calculated by dividing the apparent frequency effect by P<sub>a</sub> and multiplying by 1000.

The survey was carried out using the "pole-dipole" method of surveying. In this method the current electrode C<sub>1</sub> and the two potential electrodes, P<sub>1</sub> and P<sub>2</sub>, are moved in unison along the survey lines. The spacing "na" (n an integer) between C<sub>1</sub> and P<sub>1</sub> is kept constant for each traverse at a distance roughly equal to the depth to be explored by that traverse, while that of P<sub>1</sub> - P<sub>2</sub> (the dipole) is kept constant at "a". The second current electrode C<sub>2</sub> is kept fixed at "infinity".

Thus, on a "pole-dipole array" traverse with an electrode spacing of 400 feet, a body lying at a depth of 200 feet will produce a strong response, whereas the same body lying at a depth of 400 feet will only just be detected. By running subsequent traverses at different electrode spacings more precise estimates can be made of depth, width,

SURVEY SPECIFICATIONS cont'd

thickness and percentage of sulphides of causative bodies located by the I.P. method.

The survey was carried out using a 400 foot dipole to obtain first to fourth (n = 1 to 4) separation measurements over the area surveyed.

The magnetic survey was carried out using a Sharpe M.F.1 fluxgate 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.

The basic principle of any electromagnetic survey is that when conductors are subjected to primary alternating fields secondary magnetic fields are induced in them. Measurements of these secondary fields give indications as to the size, shape and conductivity of conductors. In the absence of conductors no secondary fields are obtained.

The electromagnetic survey was carried out using a Ronka E.M. 16 unit. This unit utilizes the V.L.F. radio stations that exist for submarine communications whereby the receiver, i.e. the E.M. 16 unit, measures the vertical components of the secondary fields that might be induced by concentric horizontal magnetic fields created by the stations' vertical antennae.

The in-phase data was subjected to filtering to transform it into contourable form (the manipulation consisted of the application of a difference operator to transform zero crossings into peaks, and a low pass smoothing operator to reduce random noise).

Only the filtered in-phase data is presented in this report.

## DISCUSSION OF RESULTS

The results of the geophysical survey should be studied in conjunction with those of the geological and geochemical surveys as reported by Messrs. Dickinson & Lewis.

The results of the magnetometer survey, as seen on Map W-130-15, suffer from contour bias due to the large line spacing (it was originally planned to carry out the survey on lines 400 feet apart). They do, however, show the area surveyed to be underlain by essentially two magnetic rock units, Units  $M_1$  and  $M_2$  believed by the writer to correspond to the Mt. Nansen volcanics and the intrusive respectively.

Several low intensity magnetic highs occur in Unit  $M_2$  which could be caused by magnetite deposition in the intrusive. However they could also be attributable to increases in concentration of primary magnetite in the granodiorite phase of the intrusive.

A major northeasterly trending fault cutting through the centre of the survey area is readily apparent from the ground and airborne magnetics.

The E.M. 16 survey located the presence of numerous E.M. conductors on that part of the property surveyed. These trend in a northwesterly direction (perpendicularly across the grid lines) and appear to be offset by numerous northeasterly movements.

No attempt will be made to explain the causative sources of these anomalies (they could be caused by sulphide mineralization, faults, shear zones, etc.) as the contours suffer from a severe bias due to the wide line spacing, and little emphasis should be placed on the contour results.

The I.P. survey, as performed with a 400 foot dipole, showed most of the area surveyed to exhibit moderate to high frequency effects - the frequency effects mostly drop off towards the perimeter of the area surveyed and in general over the mapped volcanics.

Several higher intensity frequency effect and metal factor areas are clearly discernible on the accompanying maps - the metal factor is perhaps the more diagnostic here as it allows for saturation effects.

These are for the most situated near and/or around junctions of major lineaments and domes of highly silicified material. In the case of the latter they are not apparent on the  $n=1$  data.

DISCUSSION OF RESULTS cont'd

They do not for the most correspond with areas of high geochemical expression, but it is unreasonable to compare surface geochemical results with those from deep penetration geophysical surveys in this permafrost environment.

The northeasterly fault apparent from the magnetics offsets the frequency effect anomalies (Map W-130-13)

The highly silicified zones appear for the most as resistivity highs on the  $n=1$  resistivity data, particularly the one that appears as a marked topographic high.

The holes drilled to date have been based on geochemical data, and have been located with one exception within and on the edges of frequency effect lows. As of now the only hole that showed significant mineralization was that drilled into a frequency effect-metal factor high.

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Between July 8th and August 3rd, 1971, Peter E. Walcott & Associates Limited carried out an induced polarization (I.P.) survey over part of a property optioned by Area Exploration Corporation Limited.

During this period Area Exploration Corporation Limited carried out magnetic and electromagnetic (E.M. 16) surveys in addition to its geological and geochemical investigations of the property.

The property, most of which consists of most of the holdings of Mt. Nansen Mines Ltd., is located some 30 miles west of the settlement of Carmacks, Yukon Territory.

The magnetic survey showed the property to be underlain by two magnetically different rock units believed by the writer to correspond to the Mt. Nansen volcanics and the intrusive.

The E.M. 16 survey detected a number of conductors on the property, the axes of which appeared to have a dominant northwesterly trend, as could be expected from the wide line spacing.

The I.P. survey indicated most of the property to exhibit moderate to high frequency effects.

Higher frequency effects and metal factors were obtained over areas near and/or around intersections of major lineaments and domes of highly silicified material.

Poor correlation was obtained between these higher readings and copper and molybdenum soil anomalies.

Limited drilling to date based on geochemical data has not been encouraging except in one hole where significant values of economic mineralization were encountered in a geochemical - frequency effect - metal factor high.

As a result the writer concludes that:

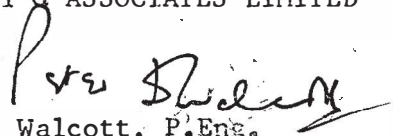
1. Most of the I.P. response in Unit M<sub>2</sub>, the intrusive, is probably due to the presence of sulphides.
2. The higher frequency effect - metal factor highs should indicate better concentrations of sulphides.

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS cont'd

He therefore suggests that although (1) I.P. results are generally representative of total sulphide content and (2) further drilling should be based on detailed geology, consideration be given to drilling the frequency effect - metal factor highs based on their good geological (to date) settings.

Respectfully submitted,

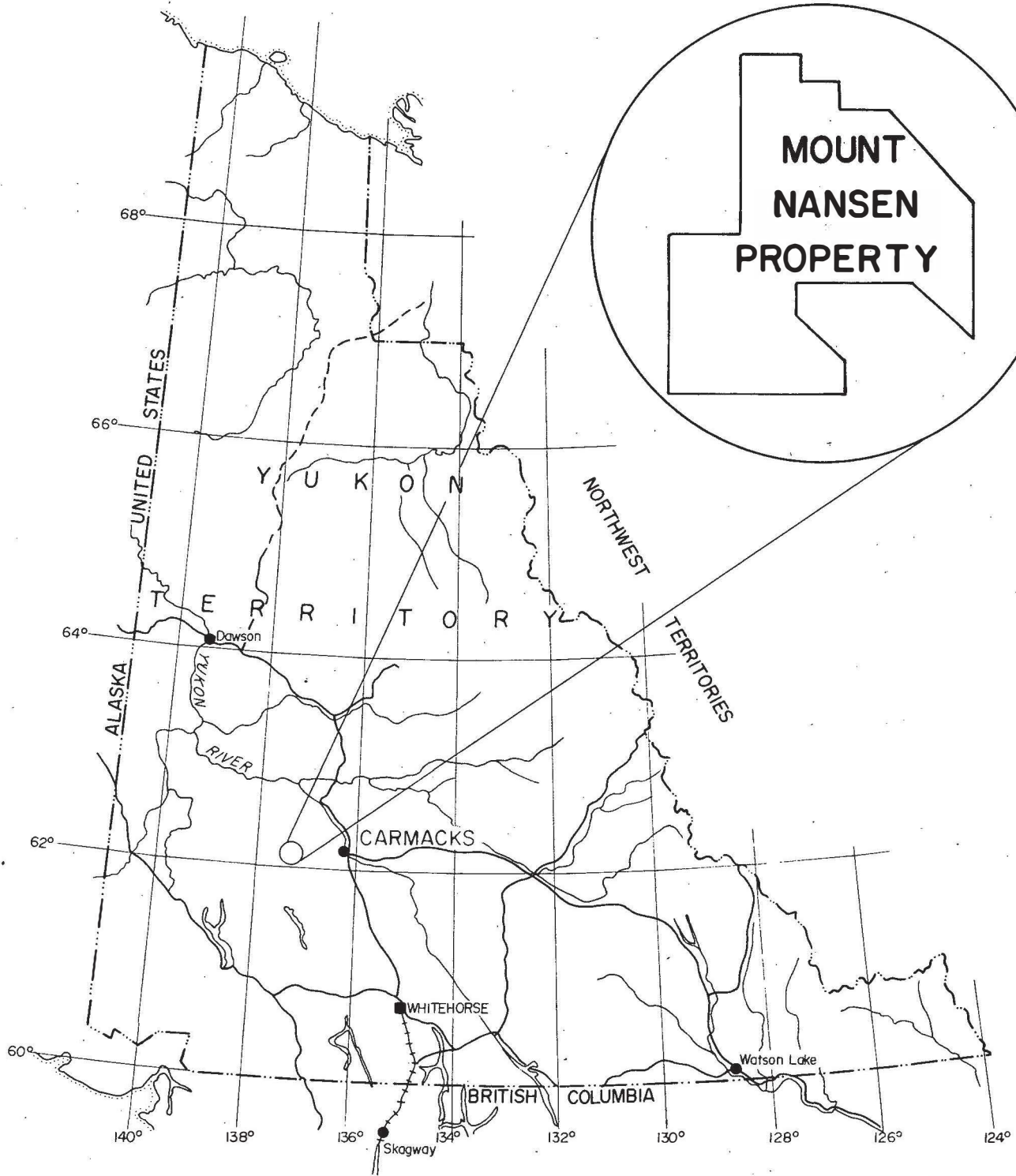
PETER E. WALCOTT & ASSOCIATES LIMITED



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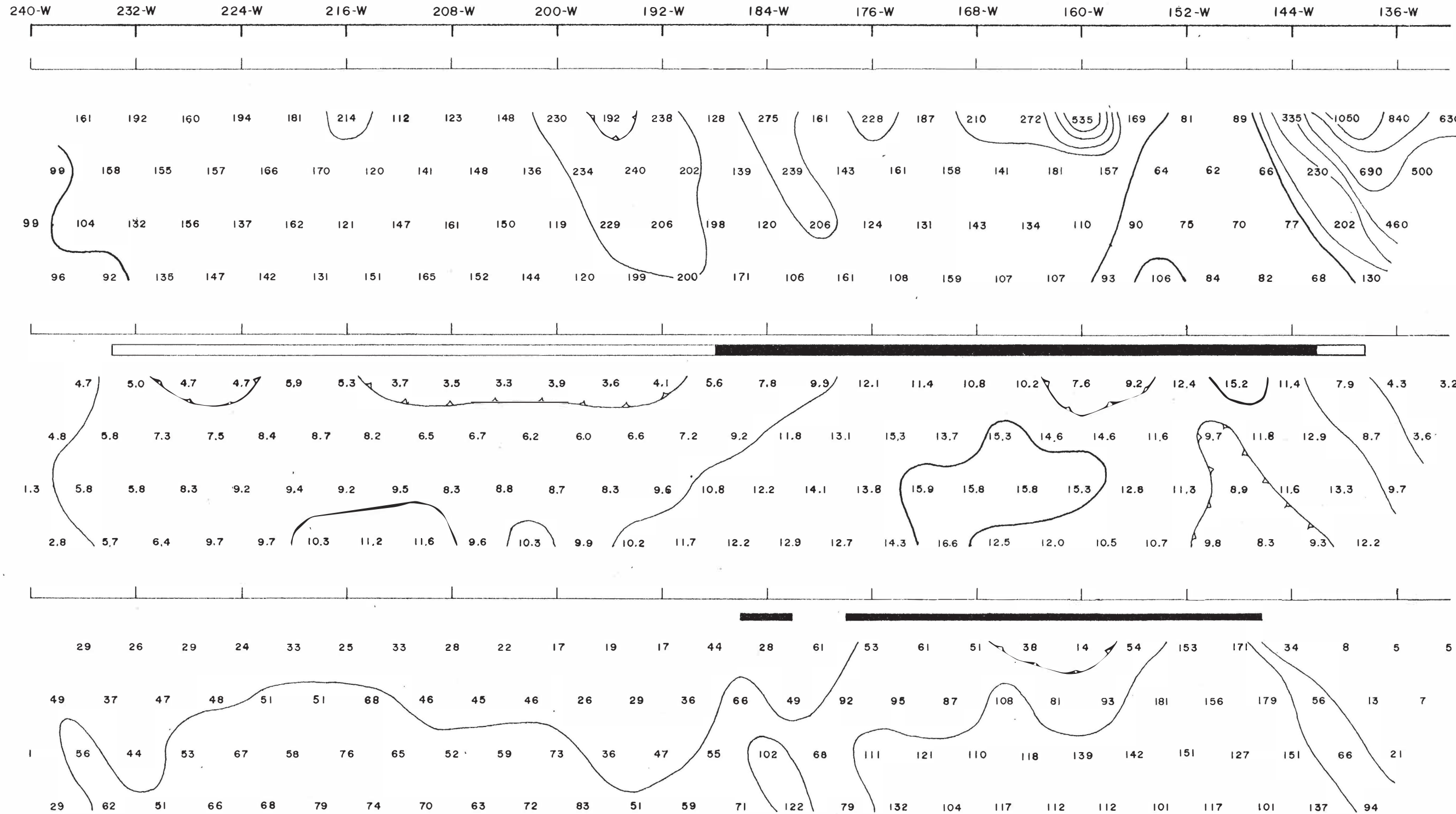
January 1972



AREA EXPLORATION CORPORATION LTD.

PROPERTY LOCATION MAP

SCALE : 1" = 100 MILES

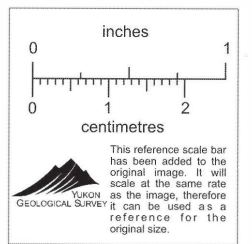


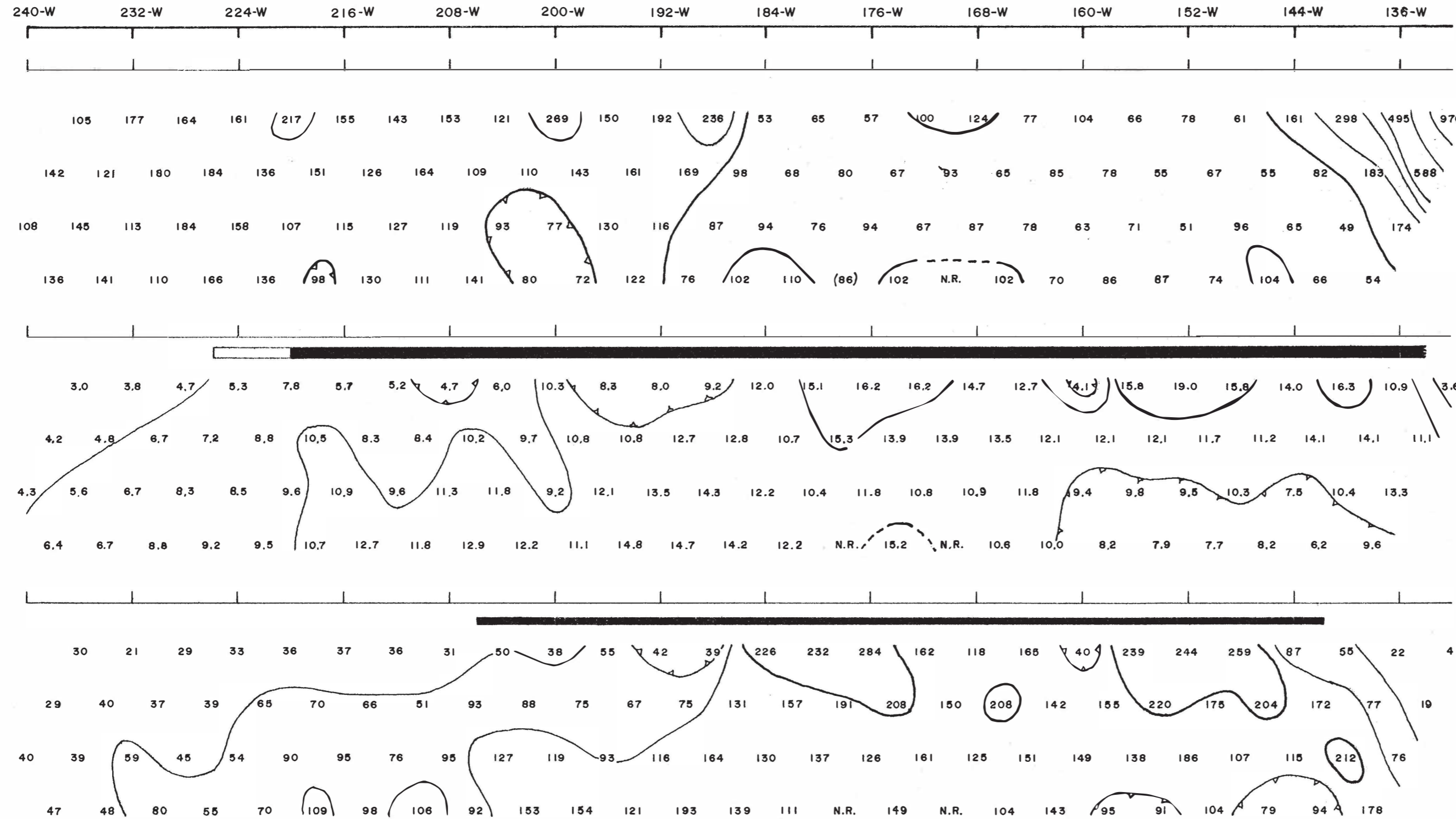
AREA EXPLORATION CORP LTD.

MT. NANSEN AREA

LINE 160+00 N

SCALE 1"=800'  
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 a = 400'





Pa/2π

AREA EXPLORATION CORP. LTD.

MT. NANSEN AREA

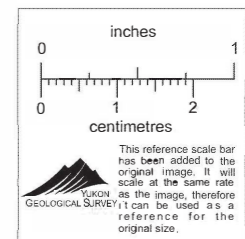
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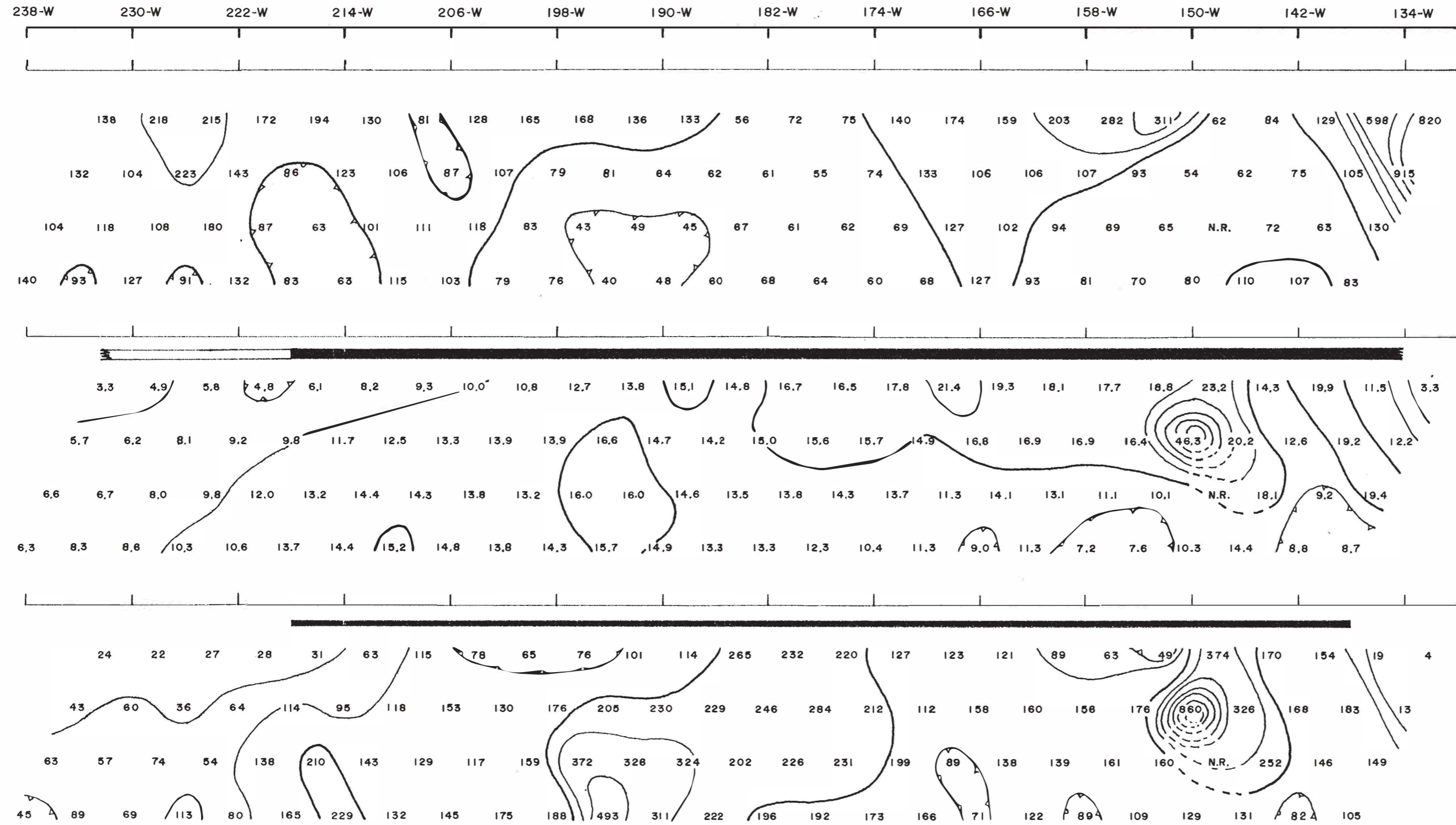
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a = 400'

F.E.



M.F.



Pa/2π

AREA EXPLORATION CORP. LTD.

MT. NANSEN AREA

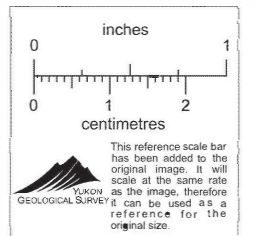
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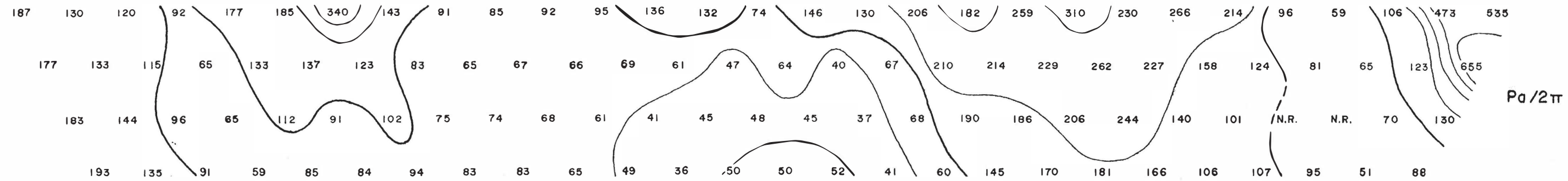
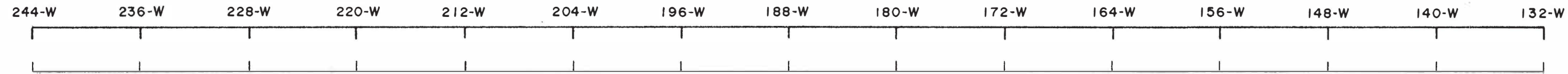
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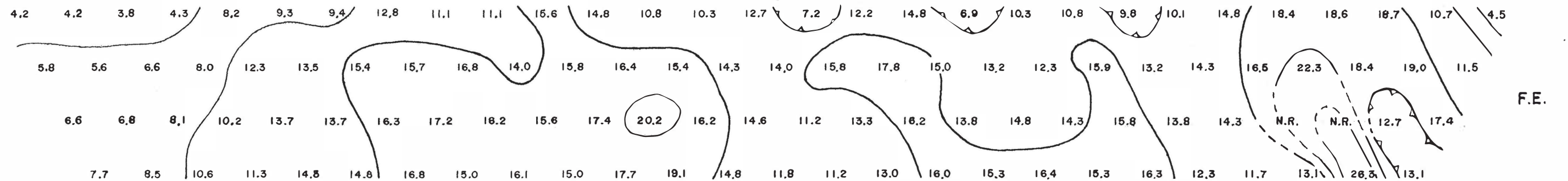
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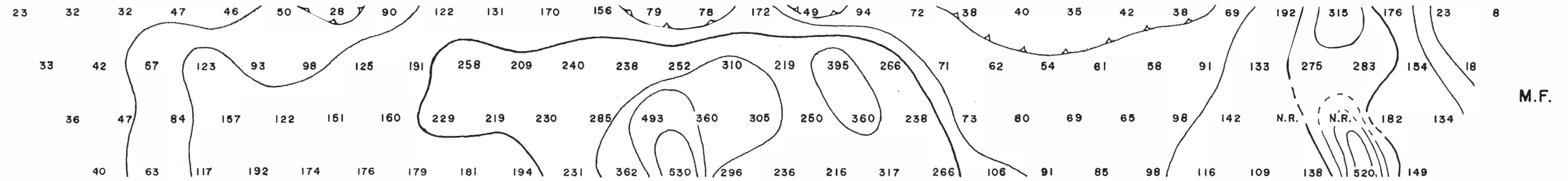
M.F.



Pa/2π



F.E.

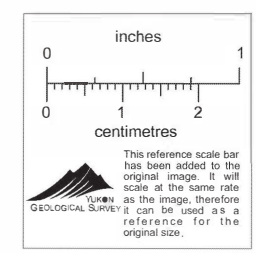


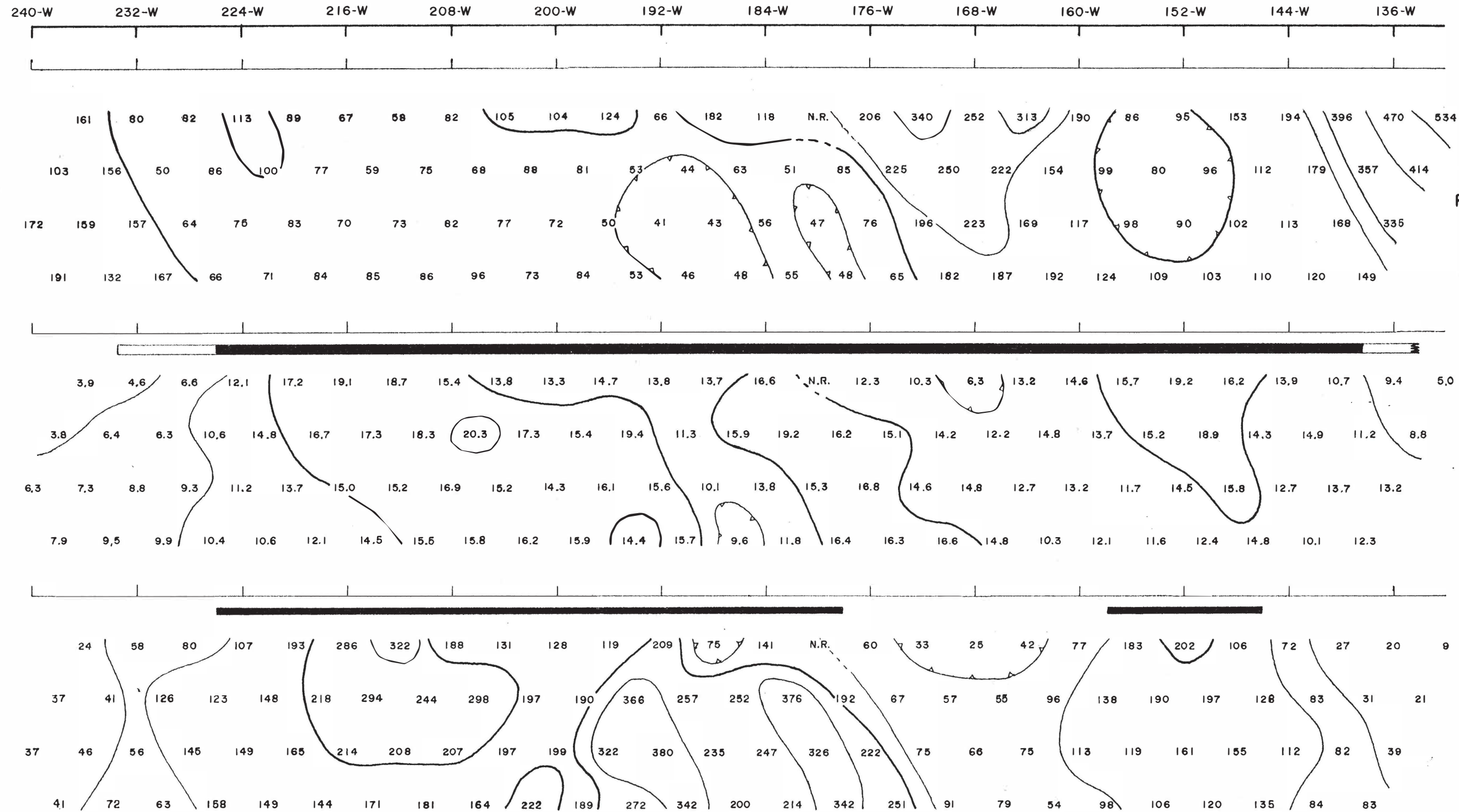
M.F.

AREA EXPLORATION CORP. LTD.

MT. NANSEN AREA  
LINE. 184+00 N

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Pa/2π

F.E.

M.F.

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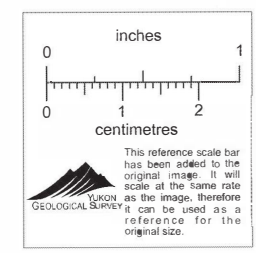
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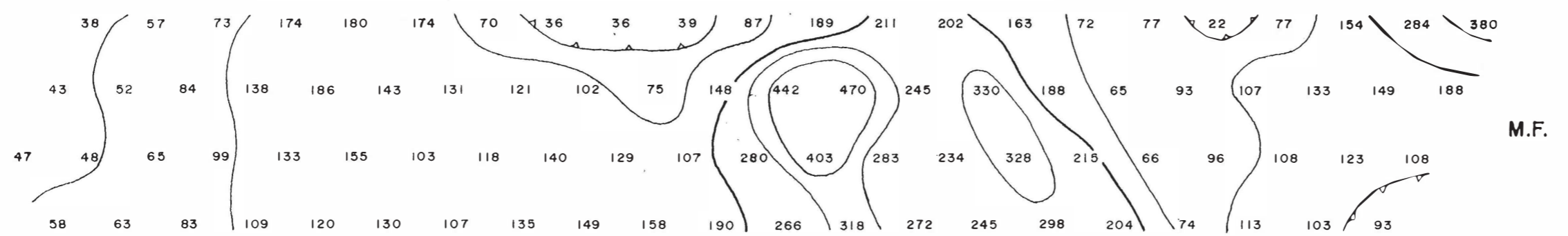
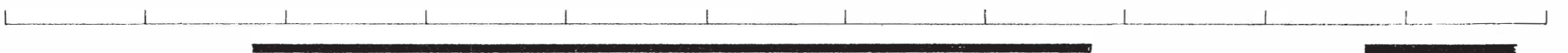
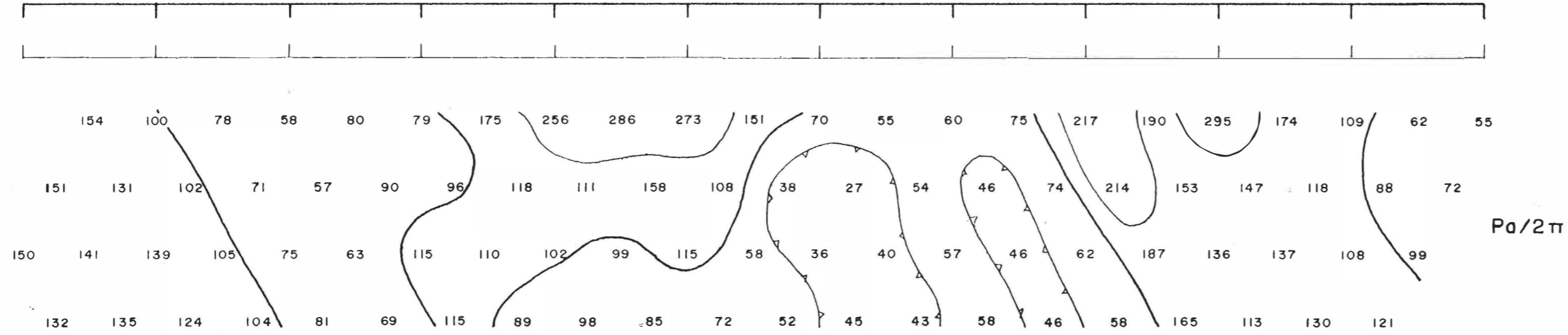
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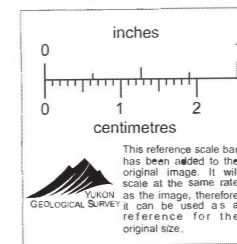
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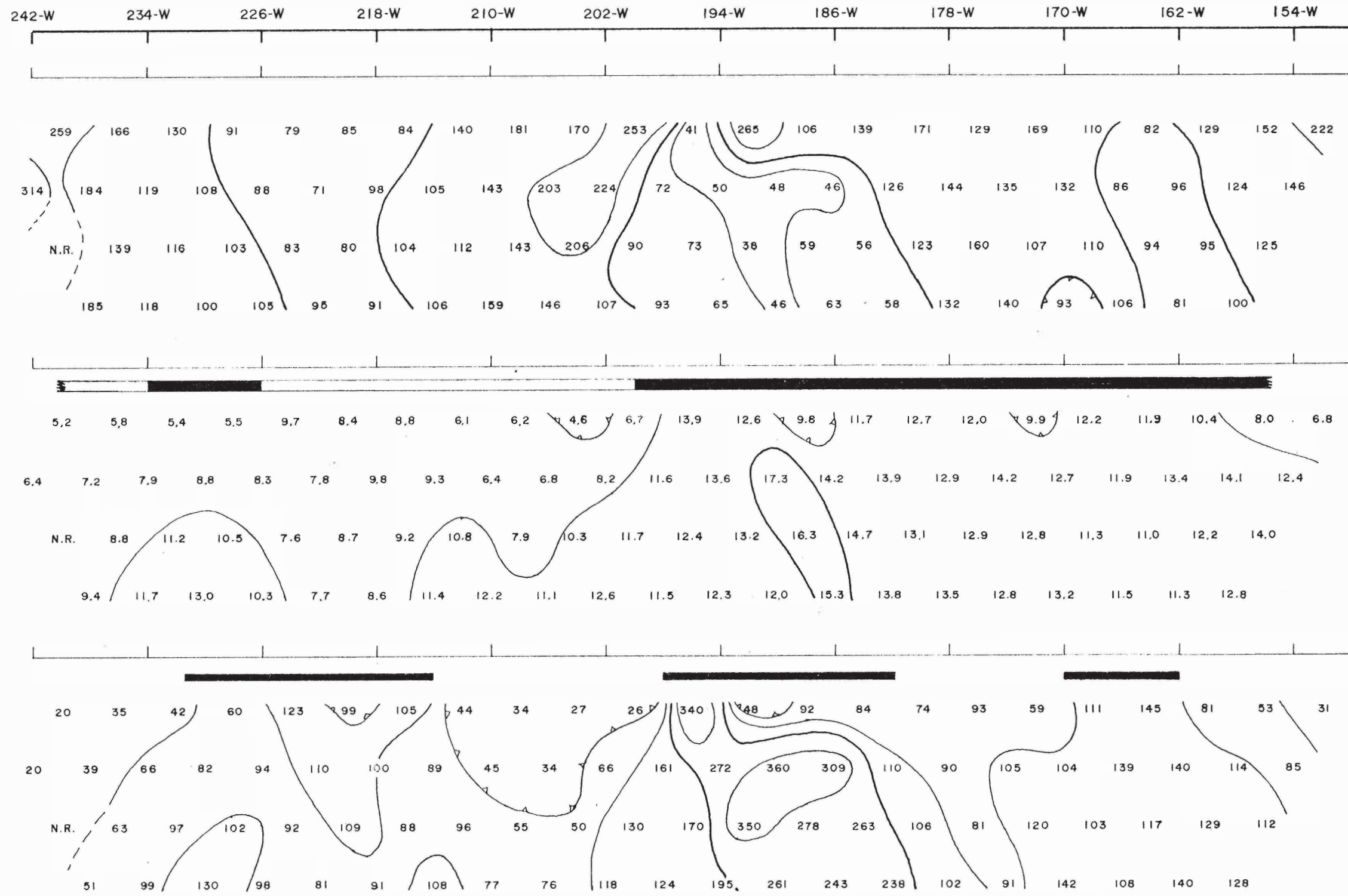
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$P\alpha/2\pi$

F.E.

M.F.



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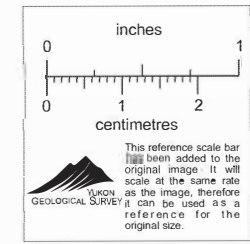
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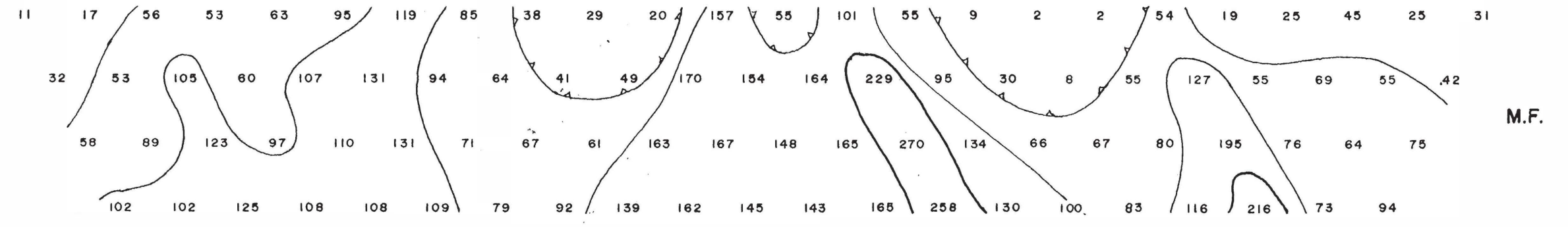
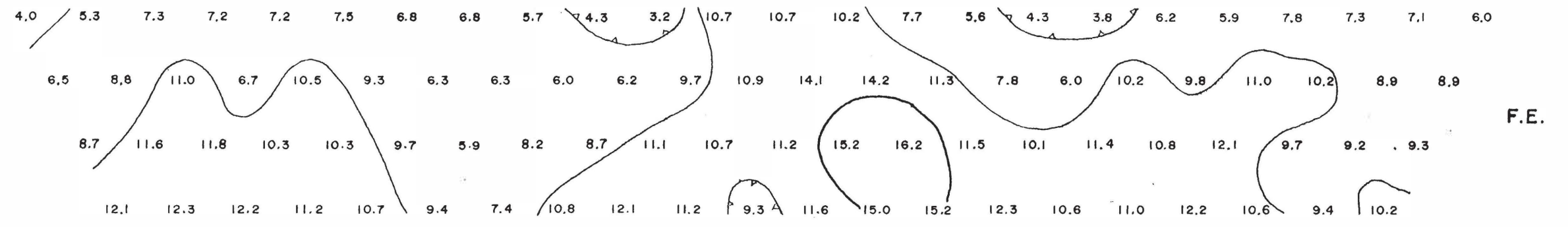
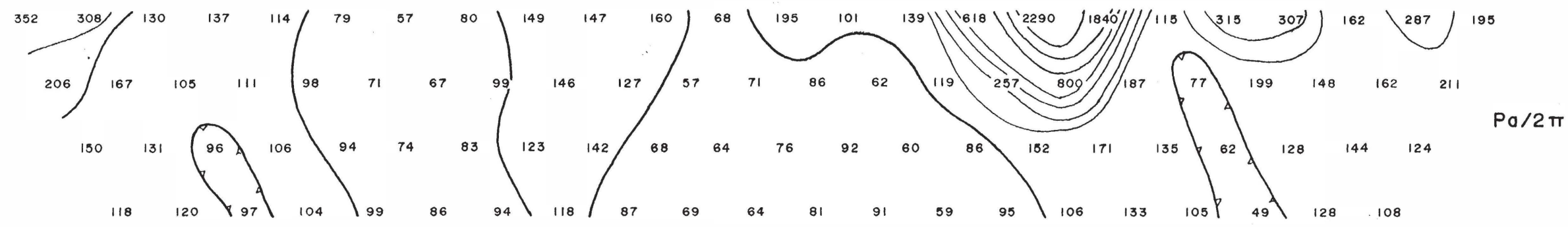
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$\alpha = 400'$



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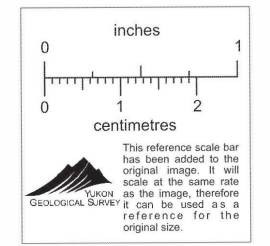


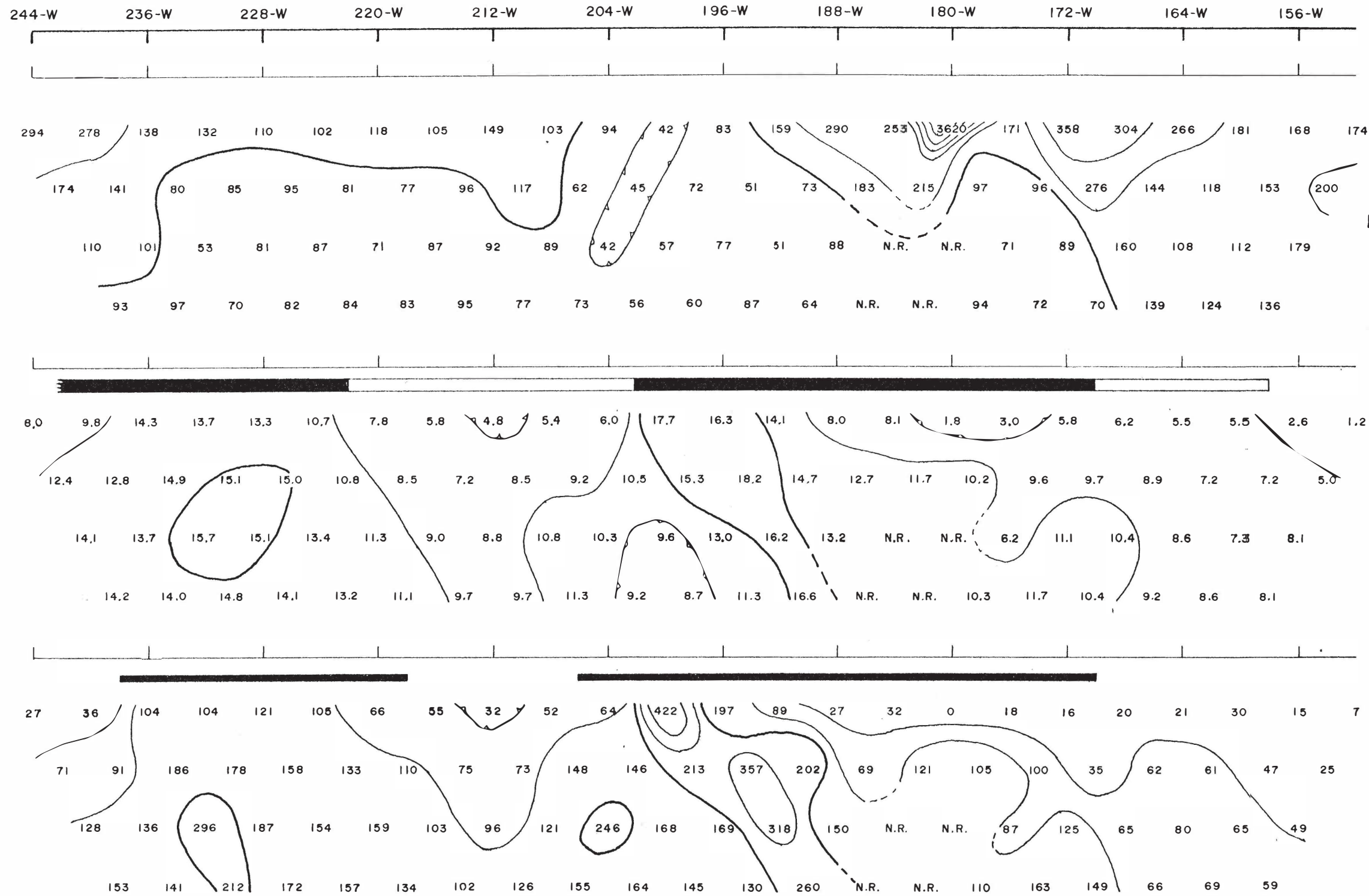
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MT. NANSEN AREA

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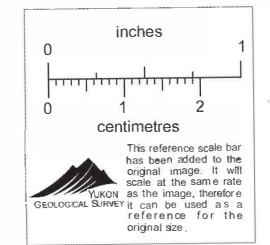


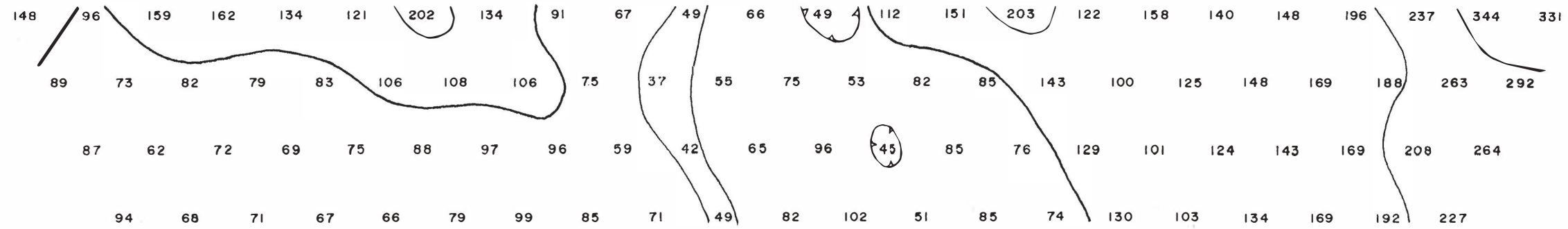
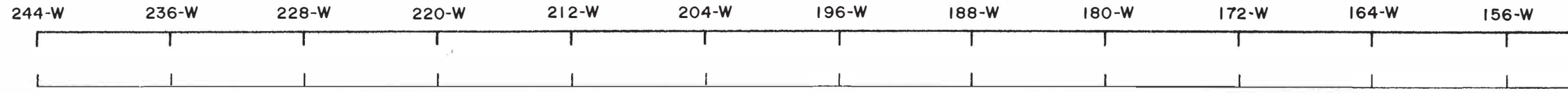
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MT. NANSEN AREA

LINE 224+00 N

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Pa/2π

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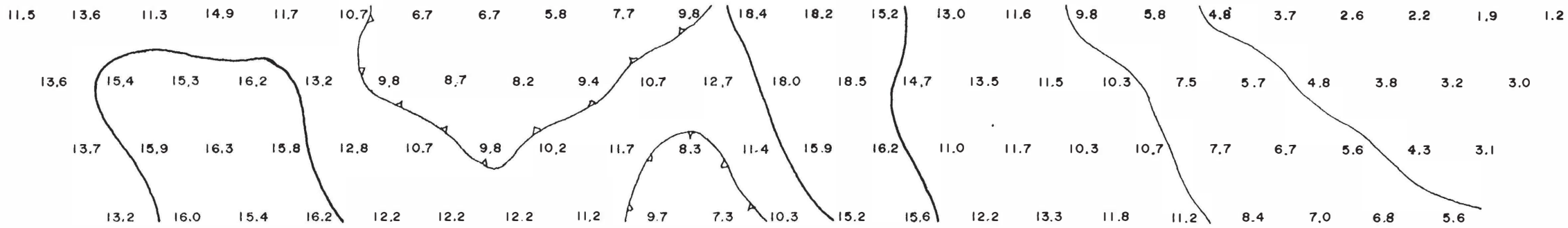
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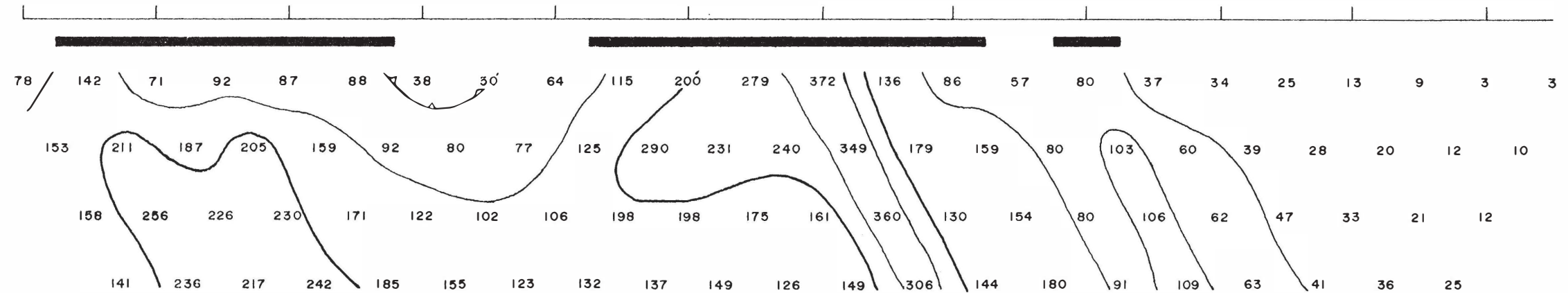
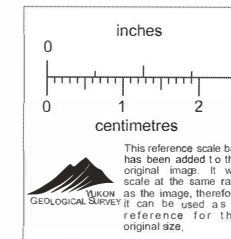
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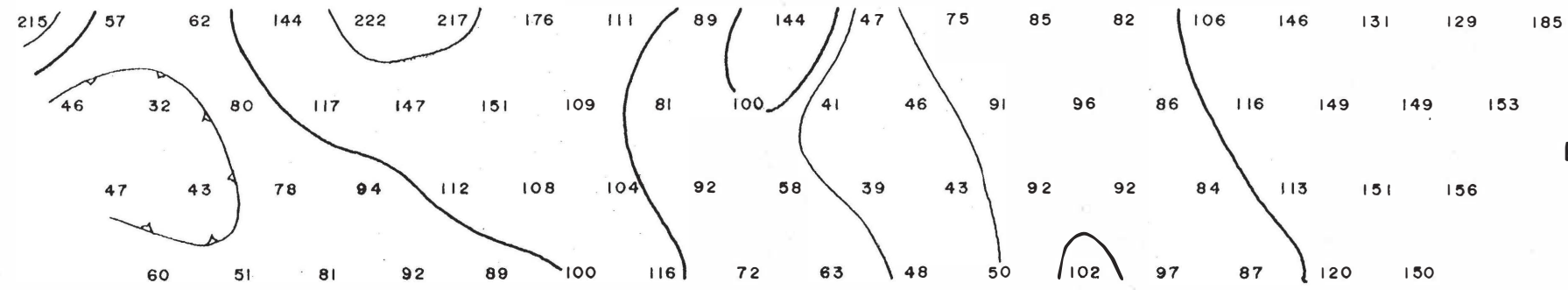
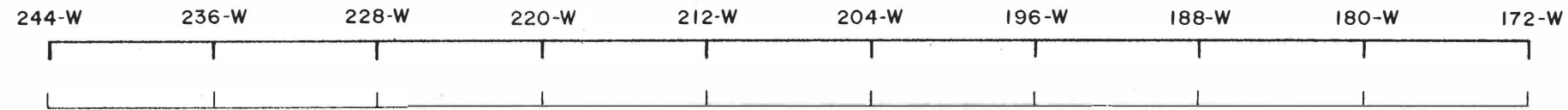
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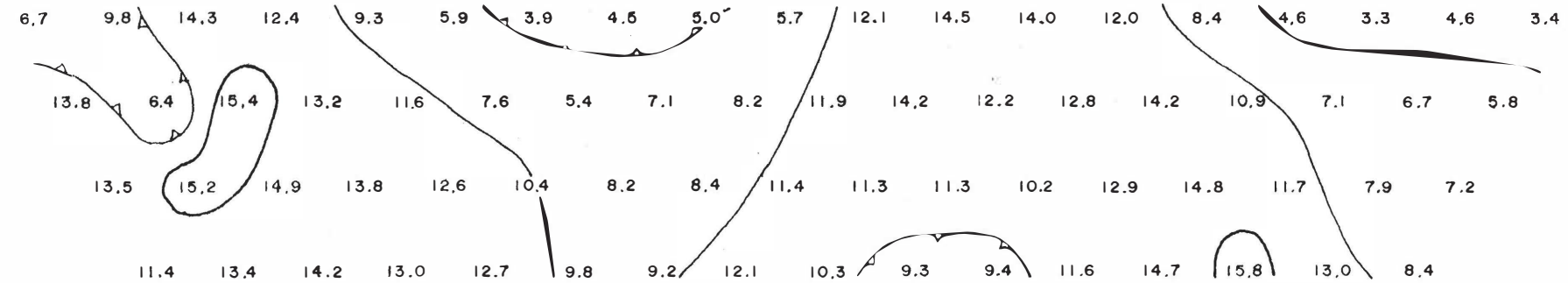
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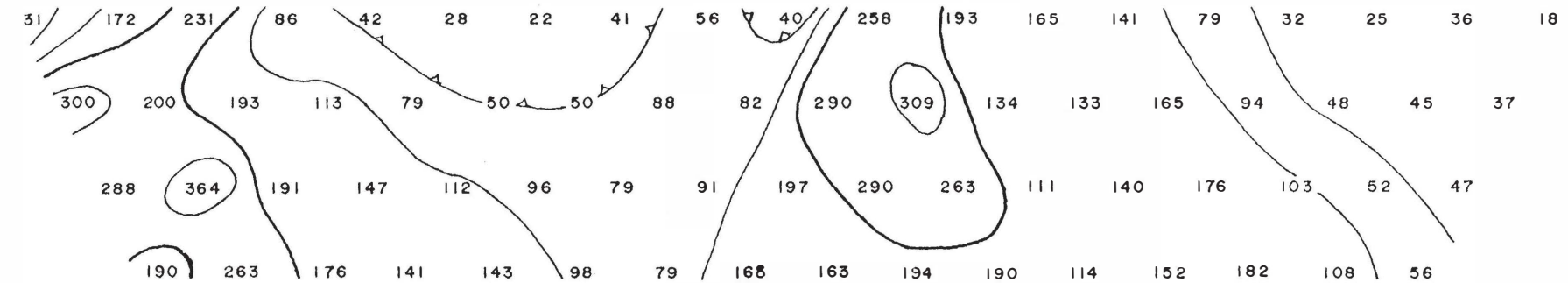
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Pa/2π



F.E.



M.F.

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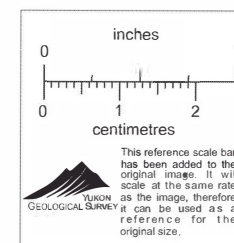
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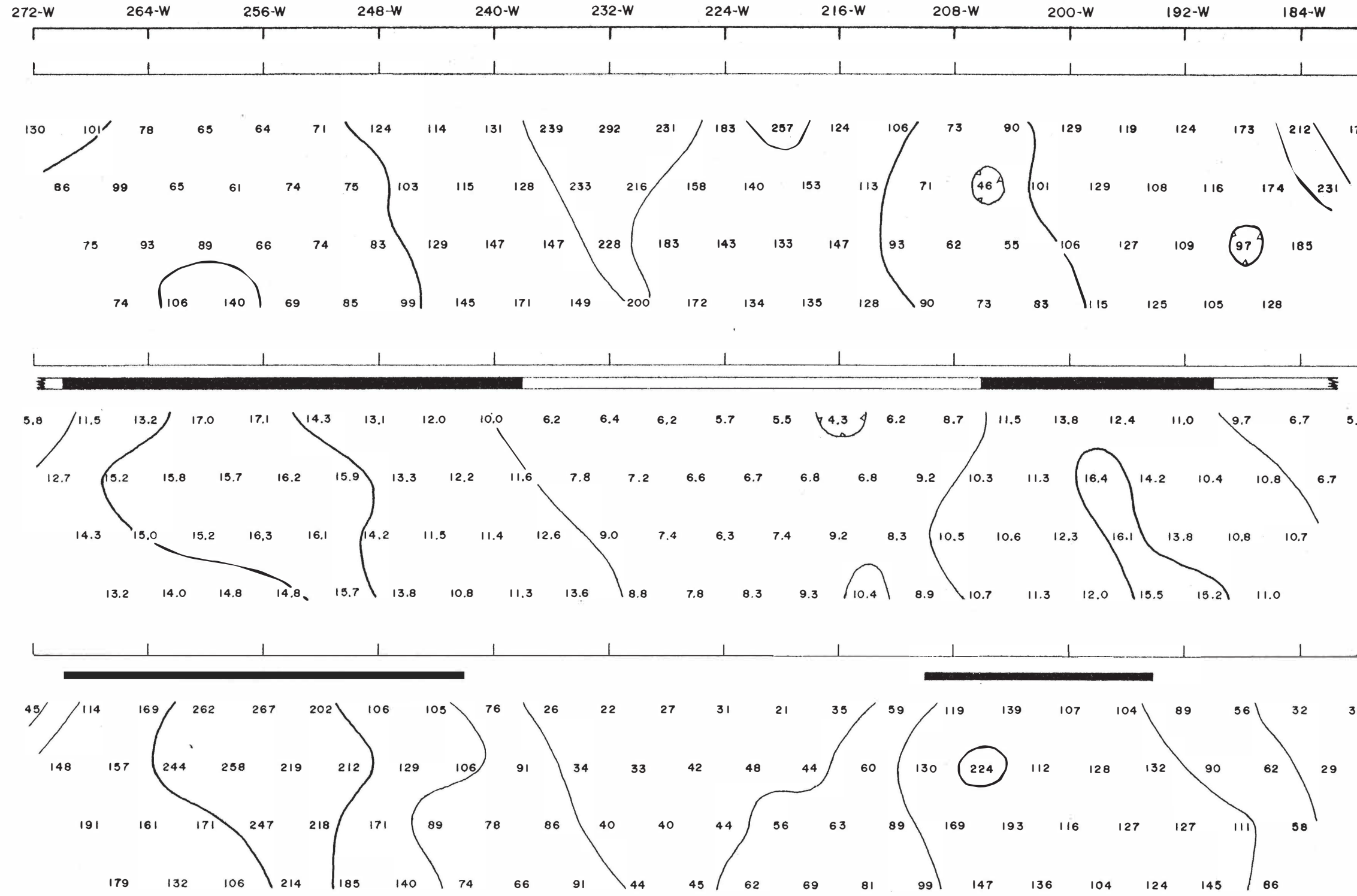
LINE 240+00 N

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F.R. — 5+0.3 C/SEC.

σ = 400'



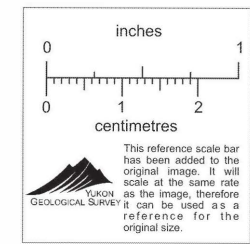


AREA EXPLORATION CORP. LTD.

MT. NANSEN AREA

LINE 256+00 N

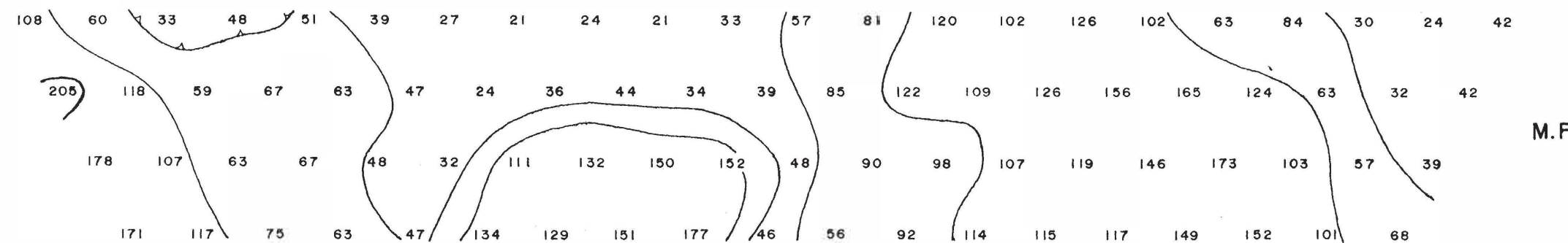
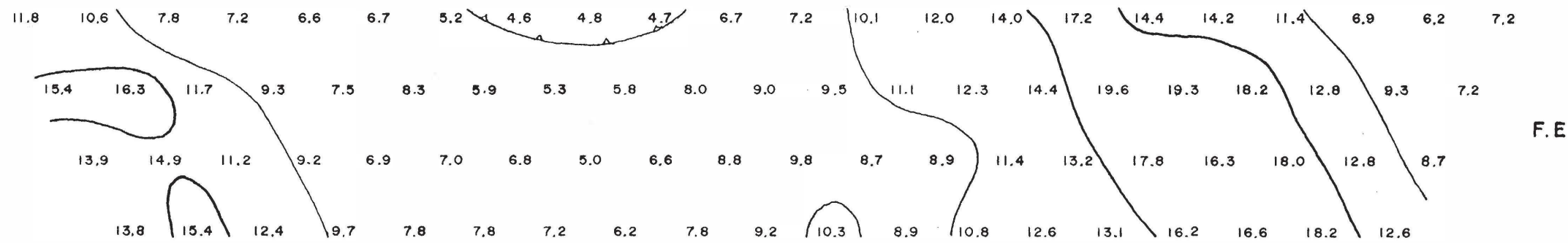
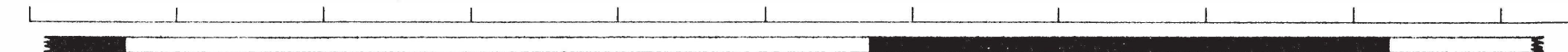
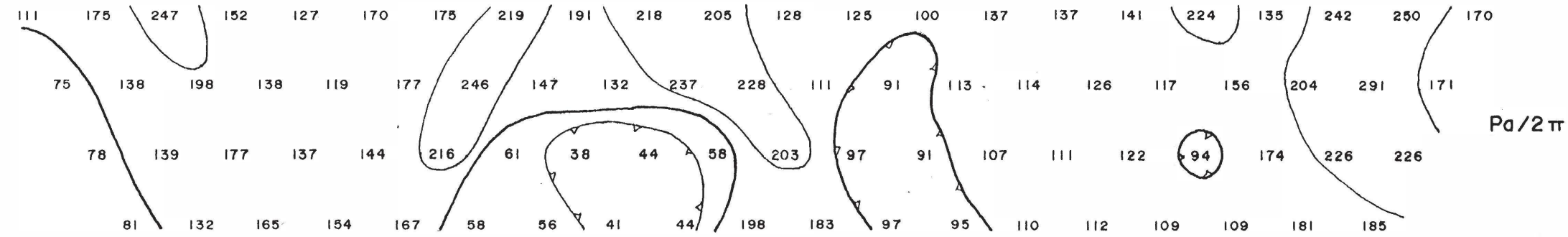
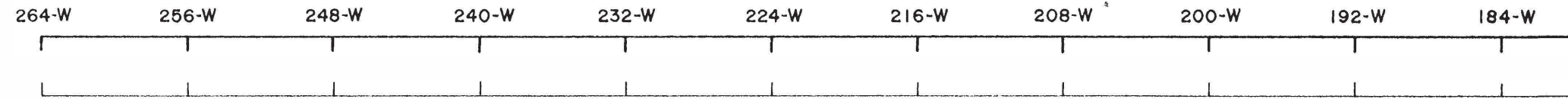
SCALE 1"=800'  
 F.R. — 5+0.3 C/SEC.  
 a = 400'



Pa/2π

F.E.

M.F.

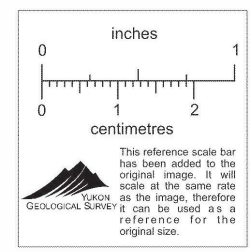


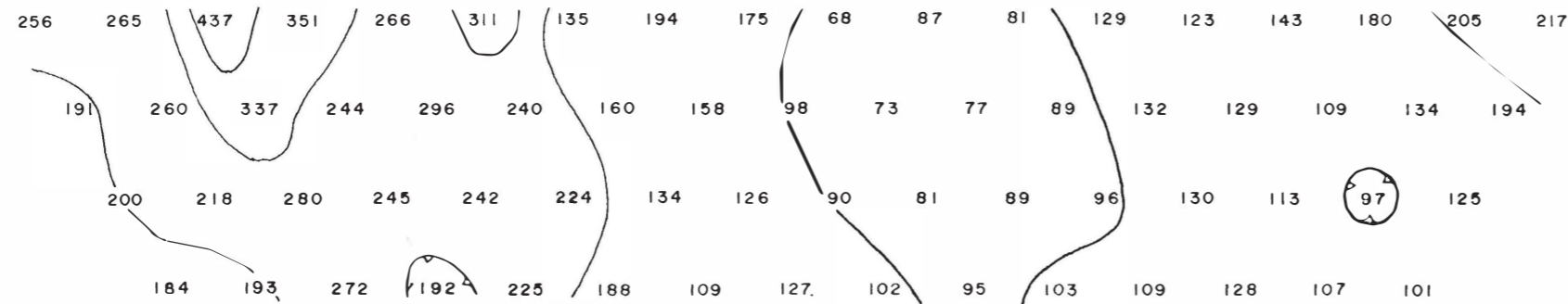
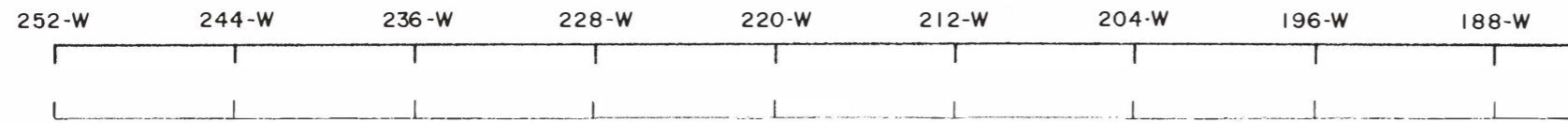
AREA EXPLORATION CORP. LTD.

MT. NANSEN AREA

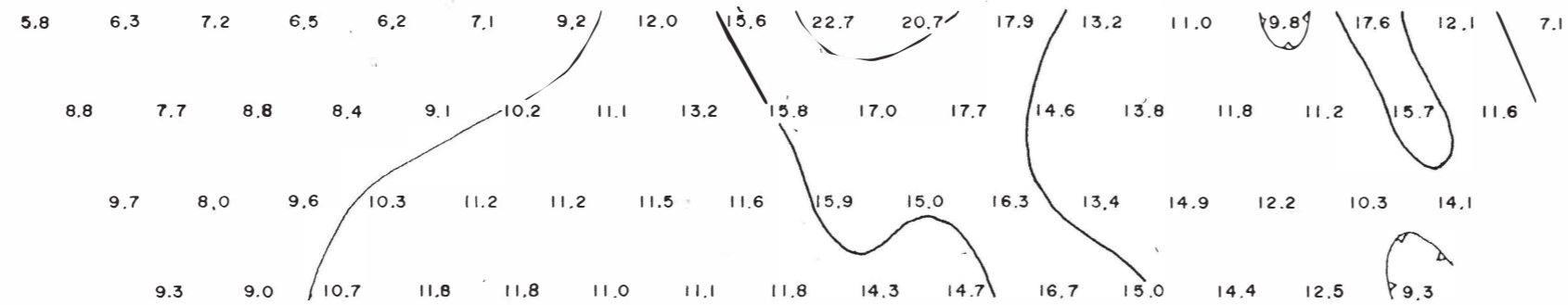
LINE 272+00 N

SCALE 1"=800'  
 F.R. - 5+0.3 C/SEC.  
 a = 400'

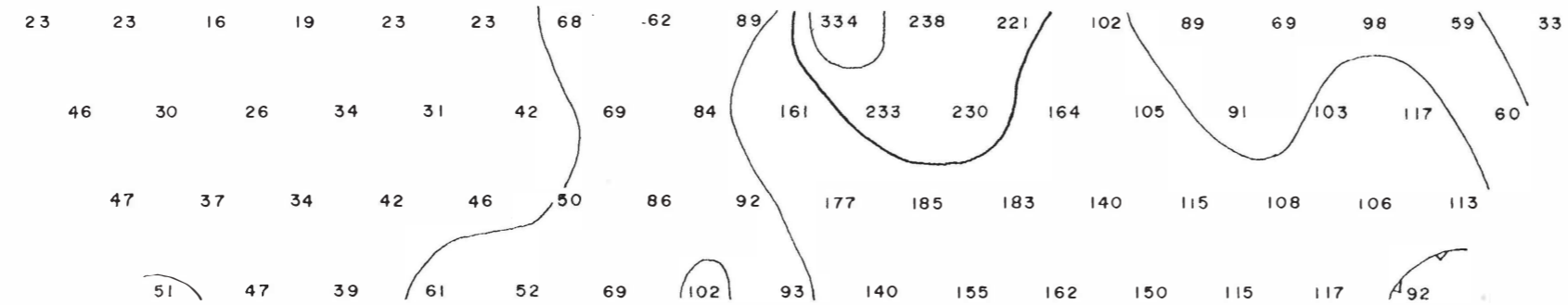




Pa/2π



F.E.



M.F.

AREA EXPLORATION CORP. LTD.

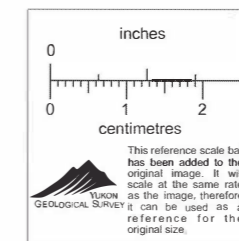
MT. NANSEN AREA

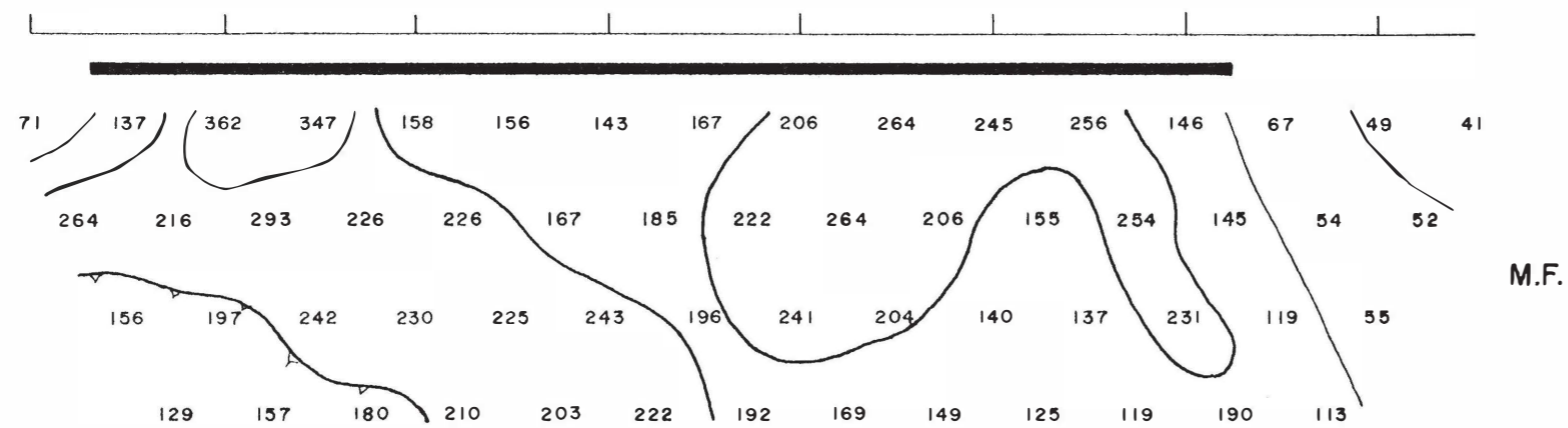
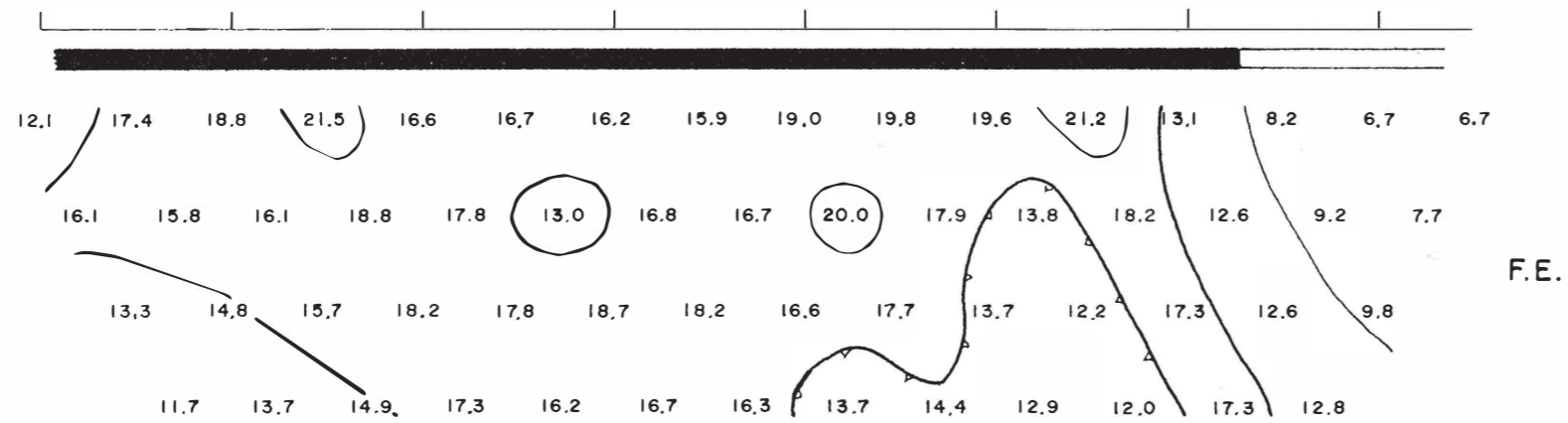
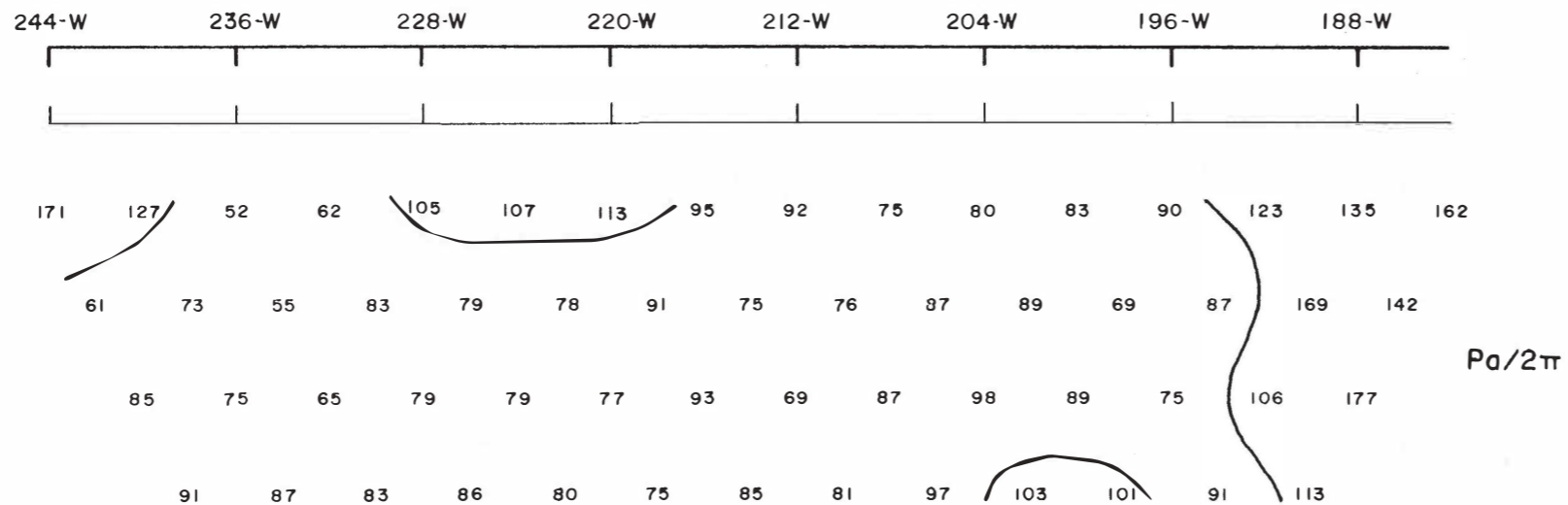
LINE 288+00 N

SCALE 1" = 800'

F.R. — 5+0.3 C/SEC.

a = 400'



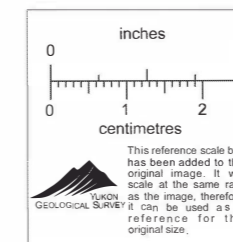


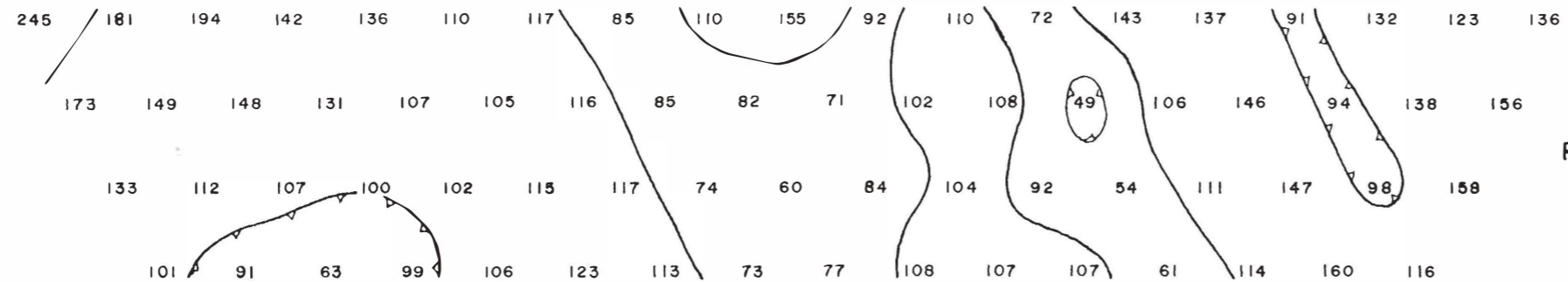
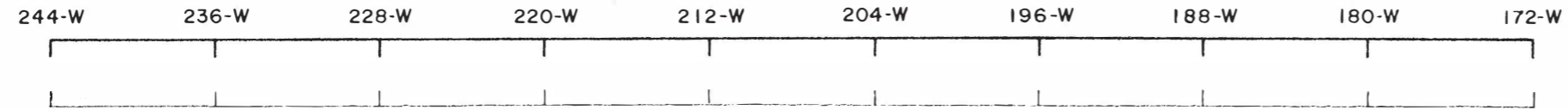
AREA EXPLORATION CORP. LTD.

MT. NANSEN AREA

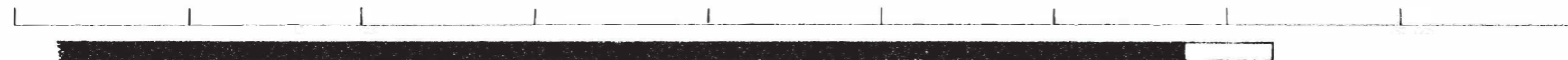
LINE 304+00 N

SCALE 1"=800'  
 F.R. — 5+0.3 C/SEC.  
 a = 400'

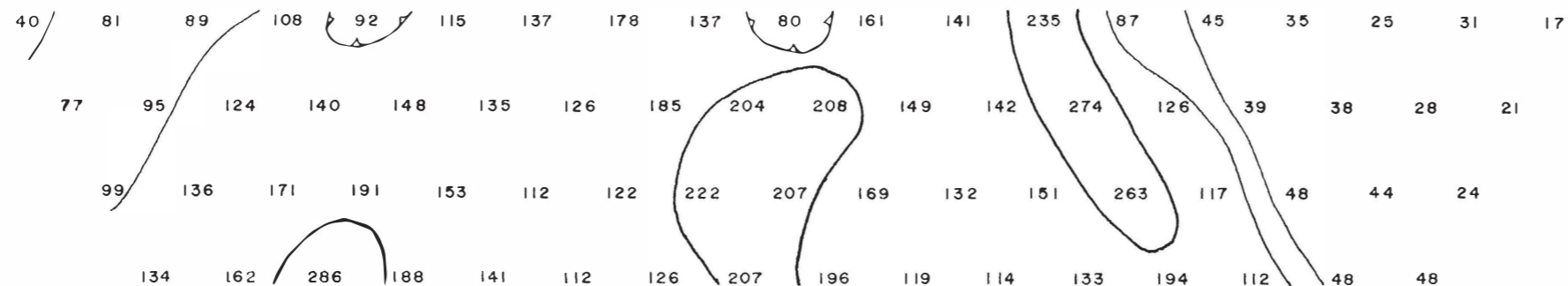




P<sub>0</sub>/2 π



F.E.



M.F.

AREA EXPLORATION CORP. LTD.

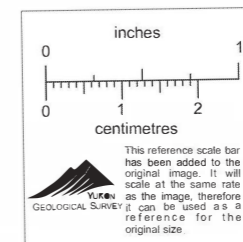
MT. NANSEN AREA

LINE 320+00 N

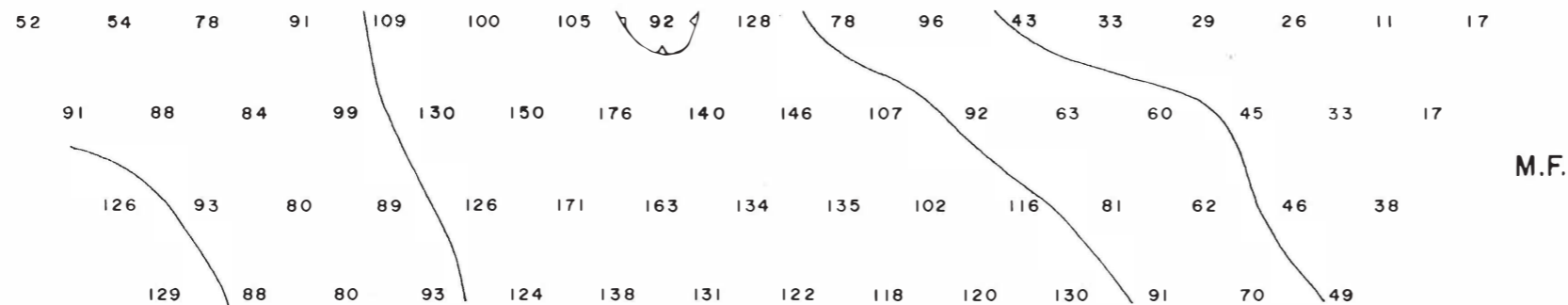
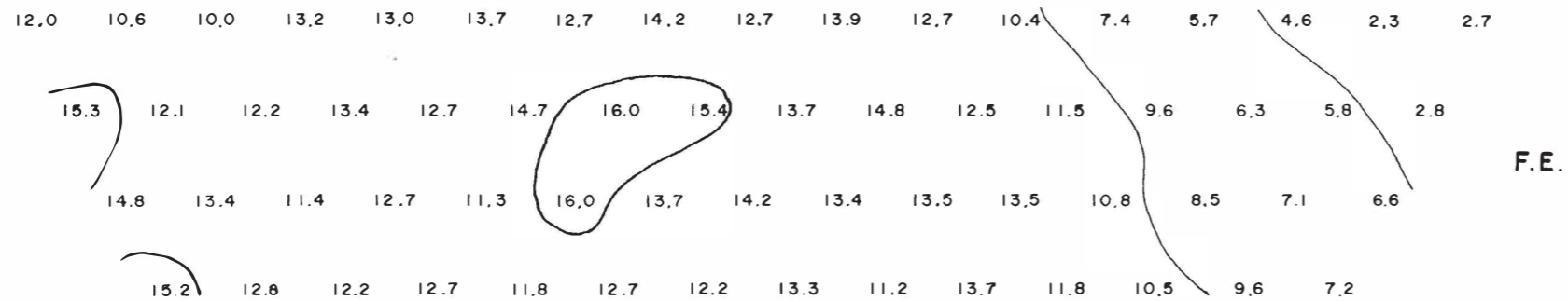
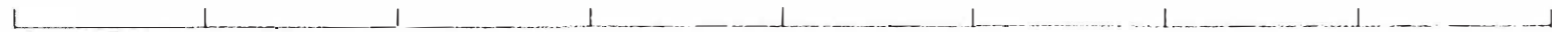
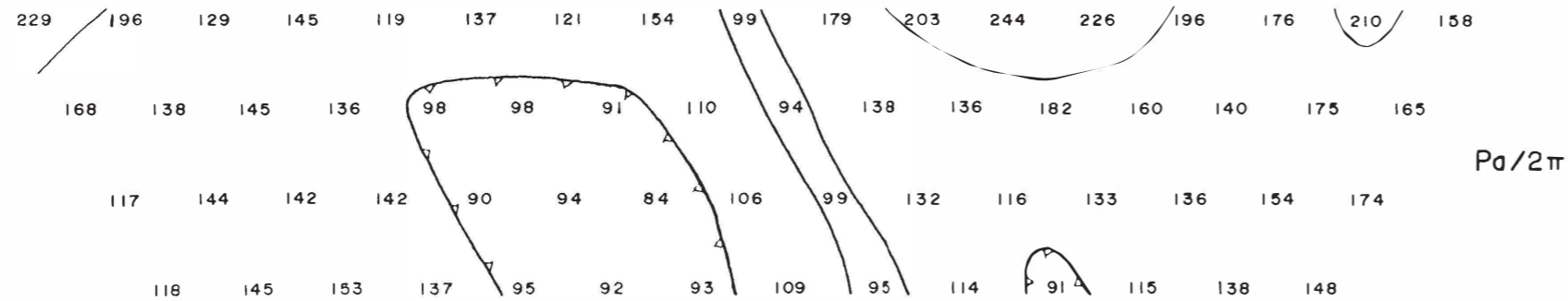
SCALE 1" = 800'

F.R. - 5+0.3 C/SEC.

a = 400'



234-W      226-W      218-W      210-W      202-W      194-W      186-W      178-W      170-W

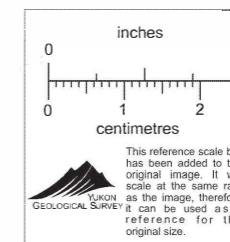


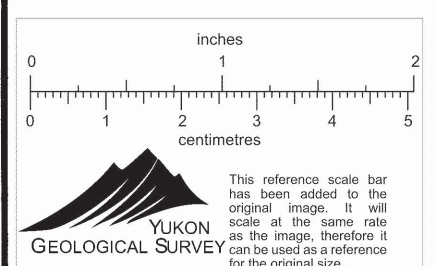
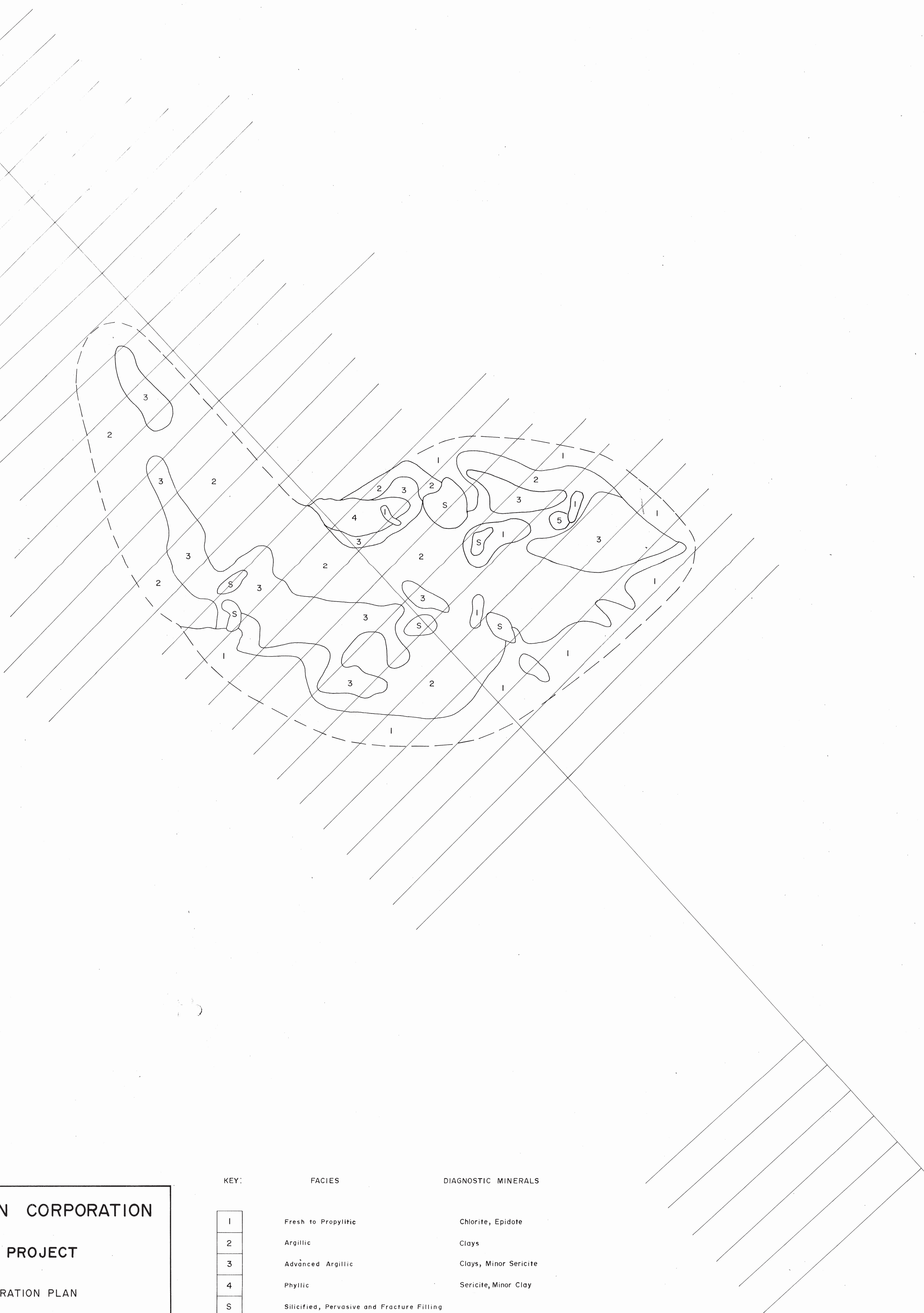
AREA EXPLORATION CORP. LTD.

MT. NANSEN AREA

LINE 336+00 N

SCALE 1"=800'  
 F.R. — 5+0.3 C/SEC.  
 a = 400'





AREA EXPLORATION CORPORATION

MT. NANSEN PROJECT

GENERALIZED ALTERATION PLAN

1 in = 1000 ft.

R. A. D., JANUARY, 1972

KEY:	FACIES	DIAGNOSTIC MINERALS
1	Fresh to Propylitic	Chlorite, Epidote
2	Argillic	Clays
3	Advanced Argillic	Clays, Minor Sericite
4	Phyllic	Sericite, Minor Clay
S	Silicified, Pervasive and Fracture Filling	
- - -	Edge of Defined Alteration	