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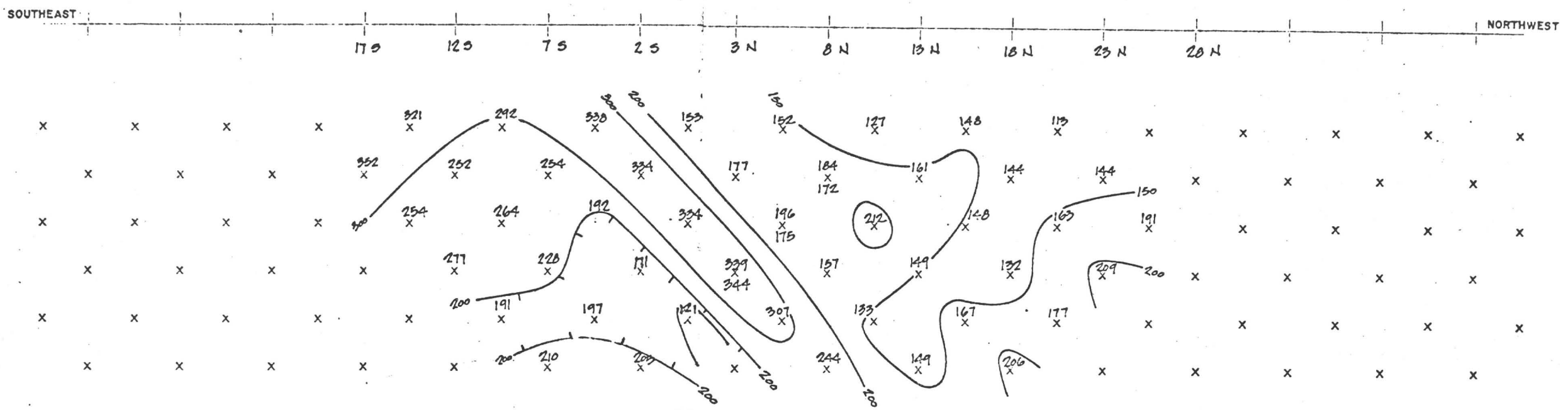
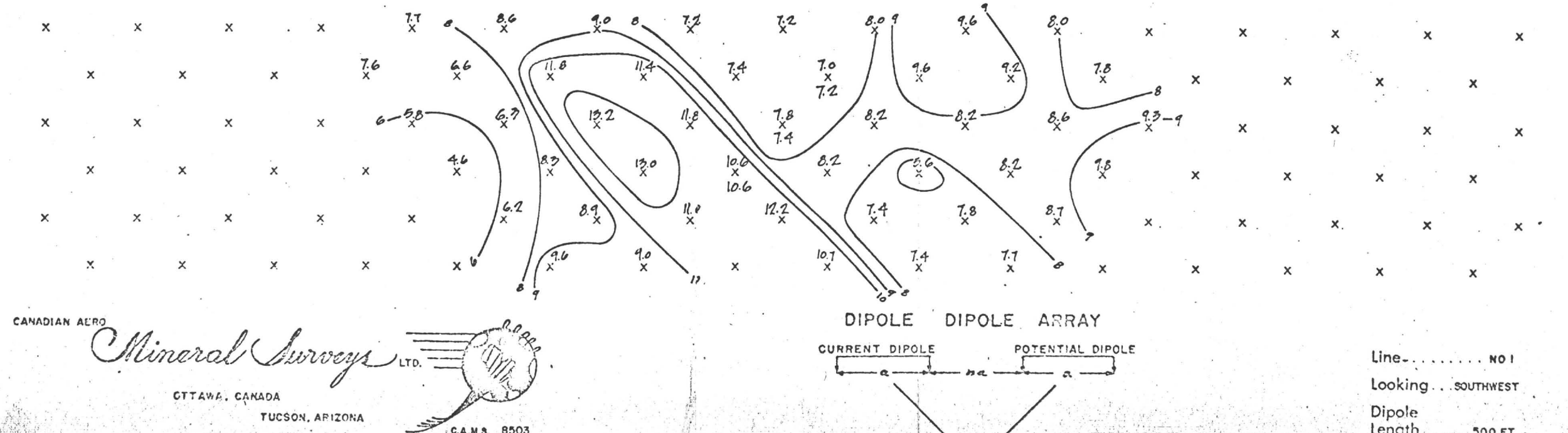
SWANSEA AREA – YUMA COUNTY, ARIZONA
for
MAGMA COPPER COMPANY

Resistivity ohm meters



Ma millivolt seconds/volt



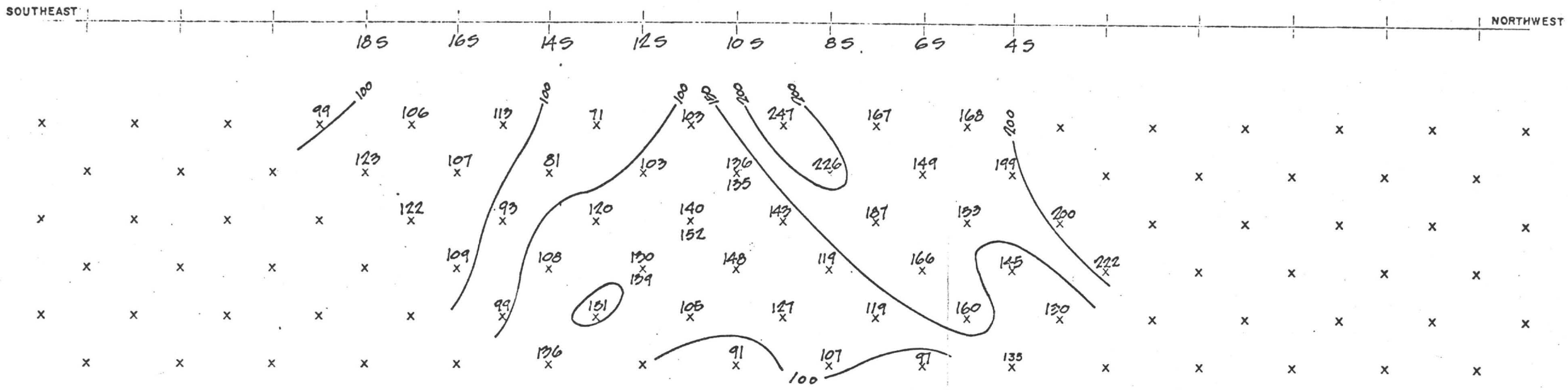
CANADIAN AERO
Mineral Surveys LTD.
OTTAWA, CANADA
TUCSON, ARIZONA
C.A.M.S. 8503

DIPOLE DIPOLE ARRAY

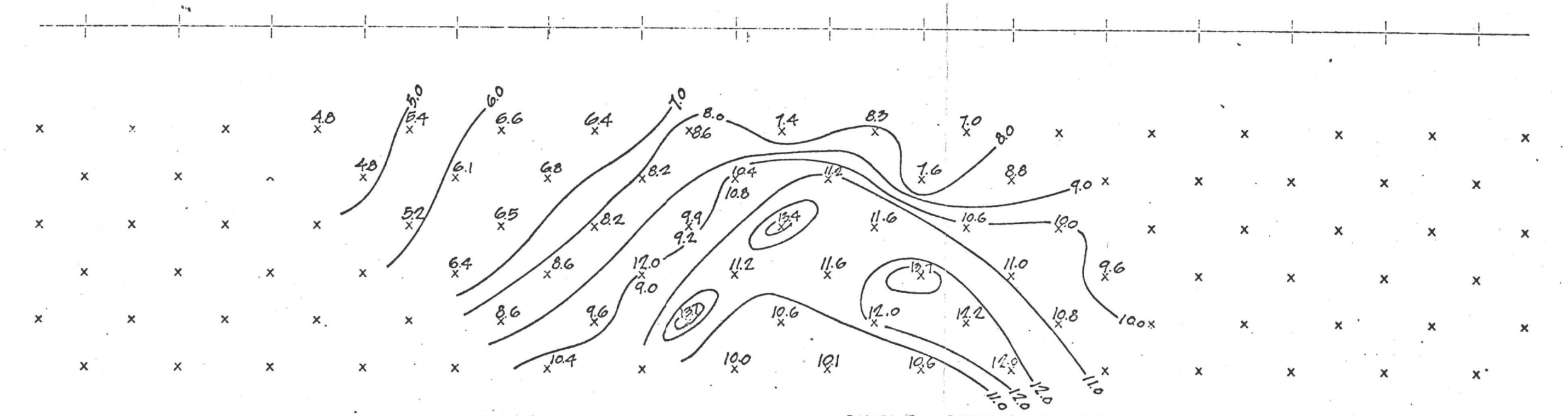
Line..... NO I
Looking... SOUTHWEST
Dipole Length..... 500 FT

SWANSEA AREA - YUMA COUNTY, ARIZONA
for
MAGMA COPPER COMPANY

Resistivity ohm meters



Ma millivolt seconds/volt



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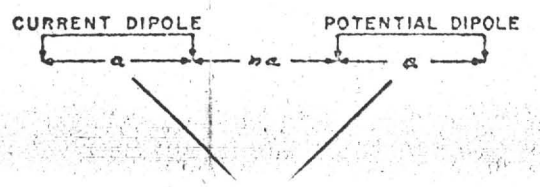
DIPOLE DIPOLE ARRAY



Line N02
Looking ... SOUTHWEST
Dipole Length ..... 200 FT

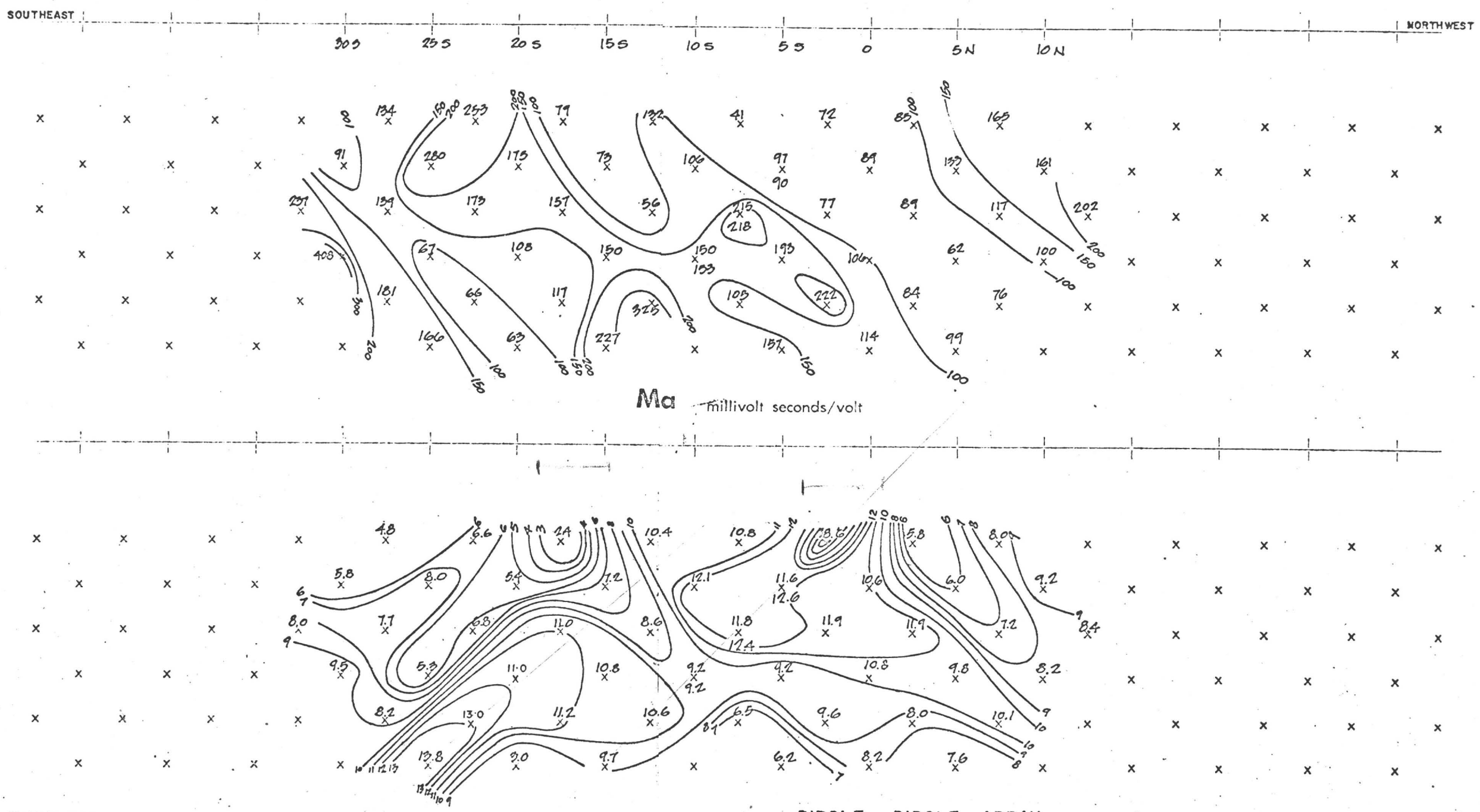
INDUCED POLARIZATION AND RESISTIVITY SURVEY

SWANSEA AREA - YUMA COUNTY, ARIZONA

for

MAGMA COPPER COMPANY

Resistivity ohm meters



Ma millivolt seconds/volt

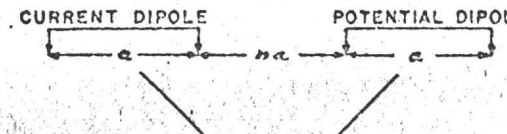
CANADIAN AERO

Mineral Surveys LTD.

OTTAWA, CANADA

TUCSON, ARIZONA

DIPOLE DIPOLE ARRAY



Line.....NO 3

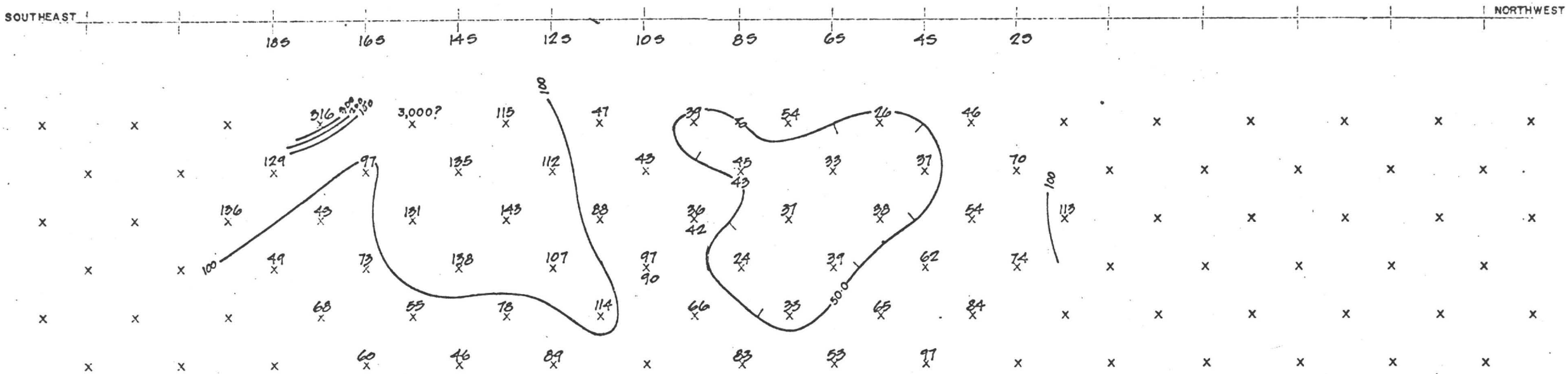
Looking...SOUTHWEST

Dipole length 500FT

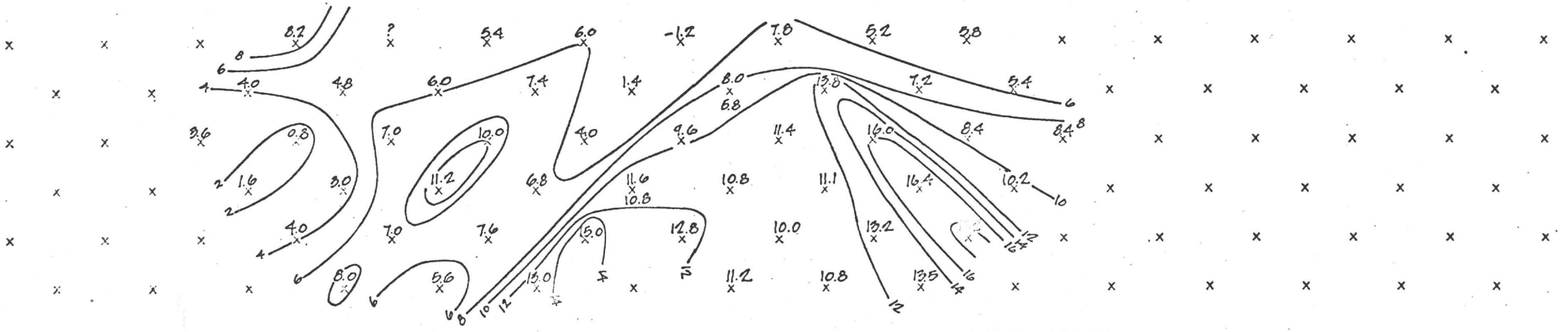
TIME DOMAIN INDUCED POLARIZATION AND RESISTIVITY SURVEY

SWANSEA AREA – YUMA COUNTY, ARIZONA
for
MAGMA COPPER COMPANY

Resistivity ohm meters



Ma millivolt seconds/volt



CANADIAN AERO
Mineral Surveys LTD.
OTTAWA, CANADA

DIPOLE DIPOLE ARRAY

CURRENT DIPOLE — POTENTIAL DIPOLE

a — na — a

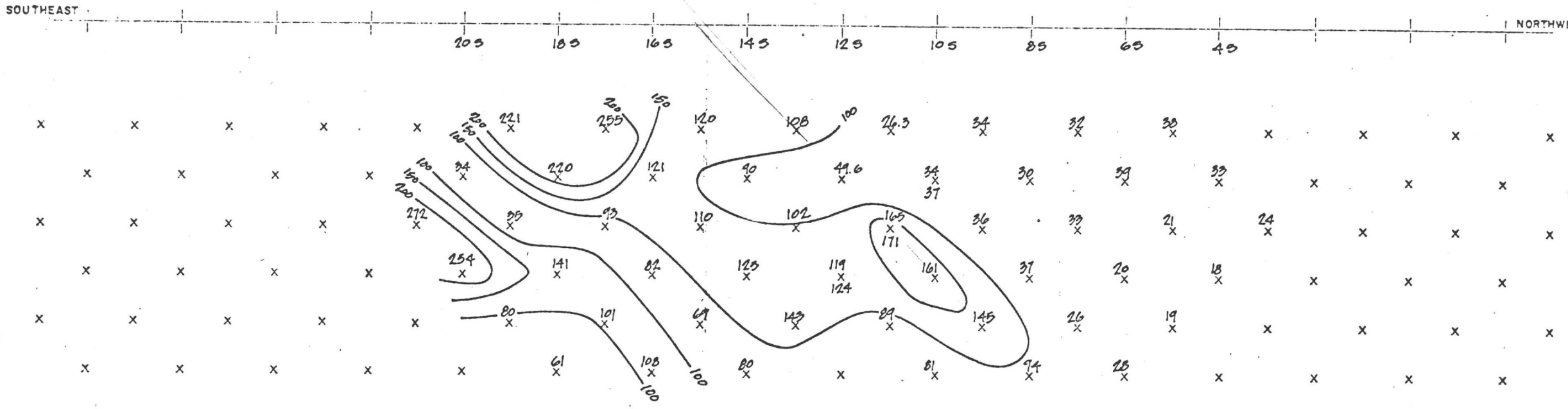
Line .....NO 3
Looking...SOUTHWEST
Dipole 200 FT.

SWANSEA AREA – YUMA COUNTY, ARIZONA

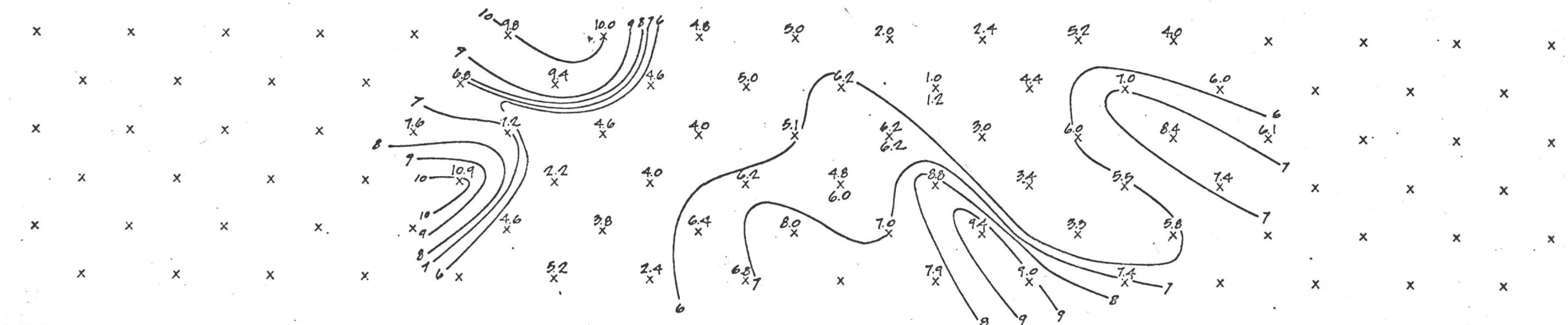
for

MAGMA COPPER COMPANY

Resistivity ohm meters



Ma millivolt seconds/volt



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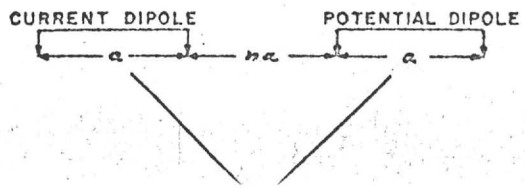
OTTAWA, CANADA

TUCSON, ARIZONA

C.A.M.S. 8503

DIPOLE DIPOLE ARRAY



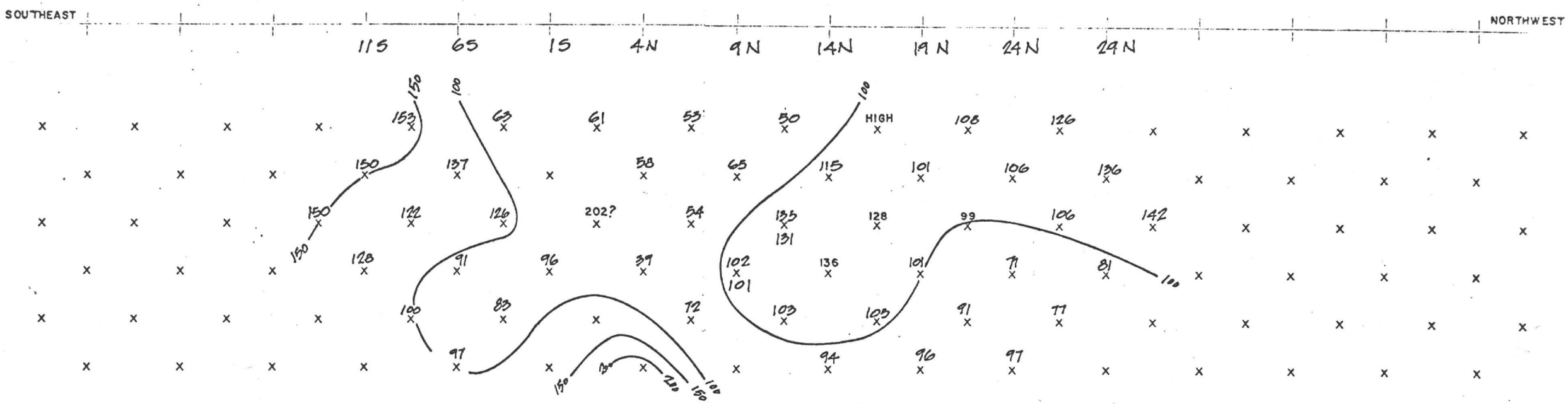
Line . . . . . NO 4

Looking . . SOUTHWEST

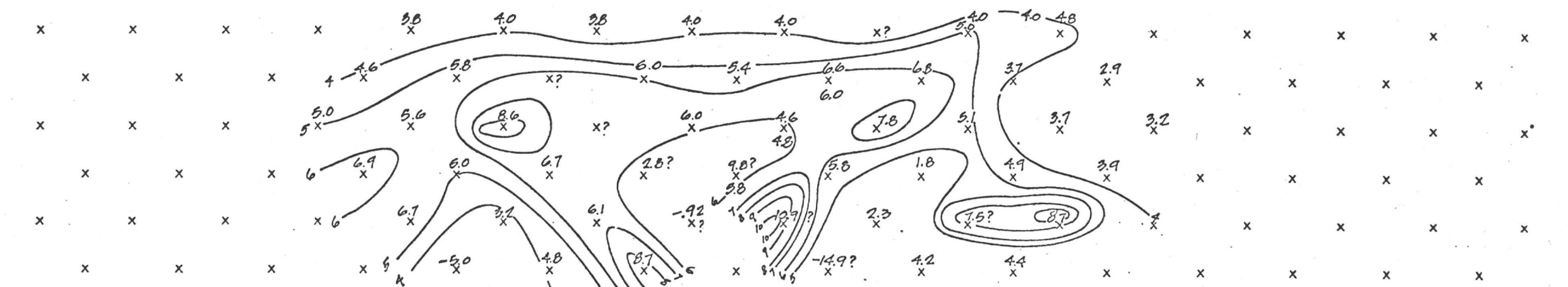
Dipole Length . . . . 200 FT.

SWANSEA AREA – YUMA COUNTY, ARIZONA
for
MAGMA COPPER COMPANY

Resistivity ohm meters



Ma millivolt seconds/volt



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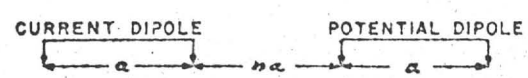
C.A.M.S. 8503

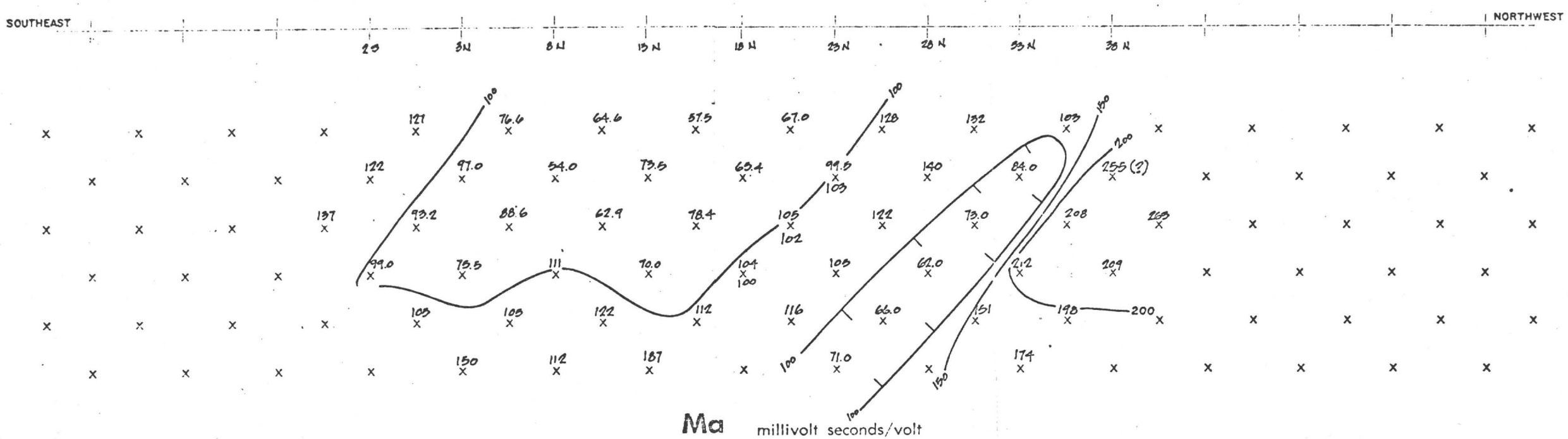
DIPOLE DIPOLE ARRAY



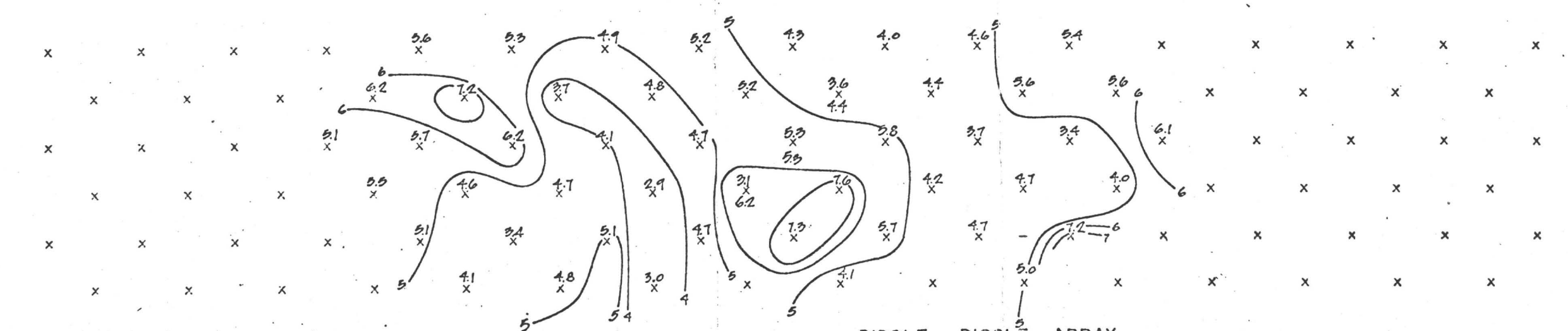
Line NO5
Looking SOUTHWEST
Dipole Length 500 FT

SWANSEA AREA – YUMA COUNTY, ARIZONA
for
MAGMA COPPER COMPANY .

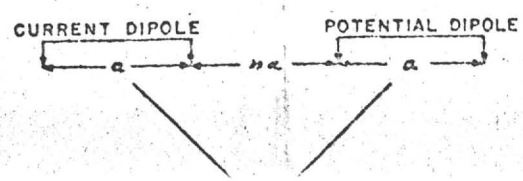
Resistivity ohm meters



Ma millivolt seconds/volt



DIPOLE DIPOLE ARRAY



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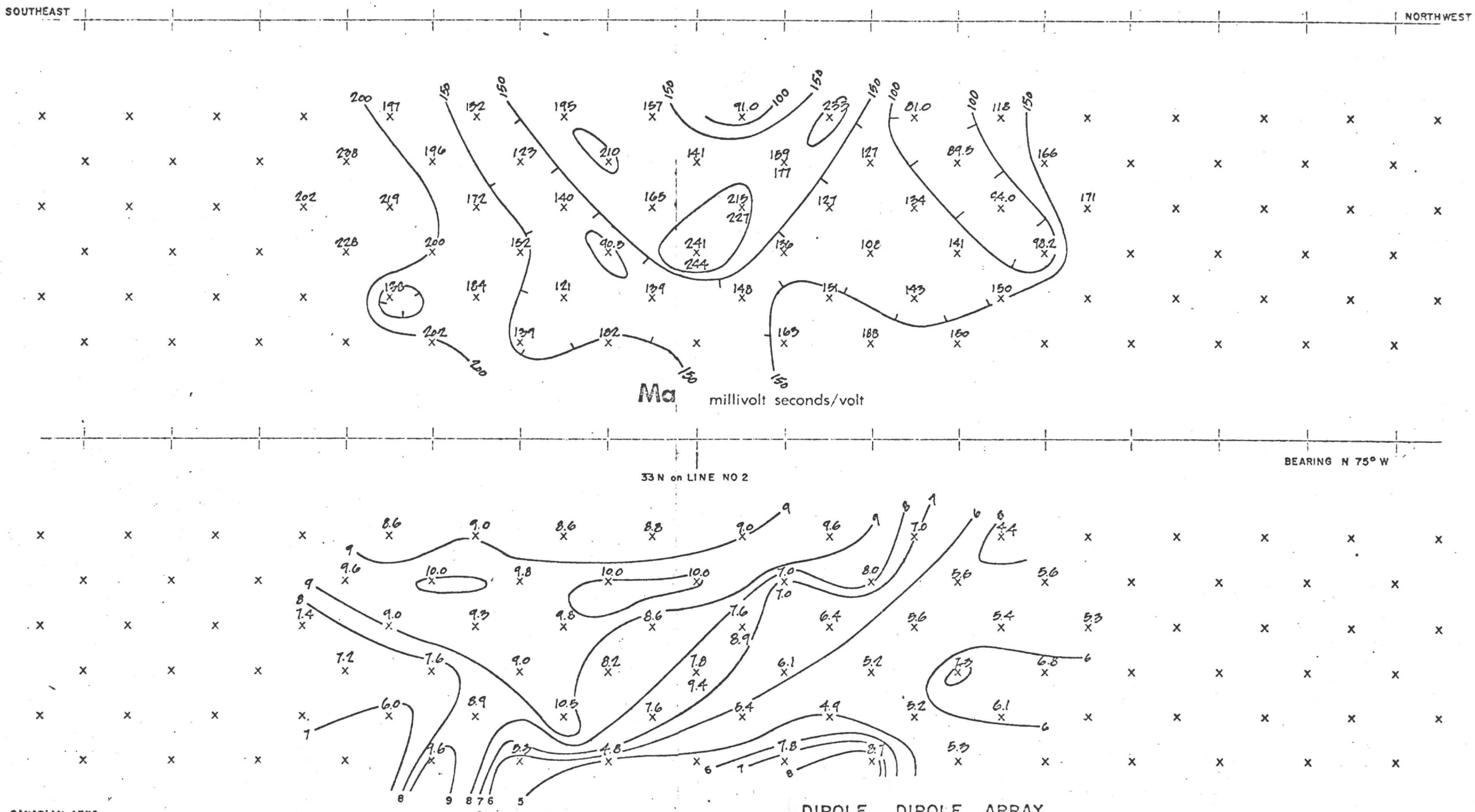
OTTAWA, CANADA
TUCSON, ARIZONA

CAMS 8503

Line..... NO 6
Looking.. SOUTHWEST
Dipole Length..... 500 FT

SWANSEA AREA - YUMA COUNTY, ARIZONA
for
MAGMA COPPER COMPANY

Resistivity ohm meters



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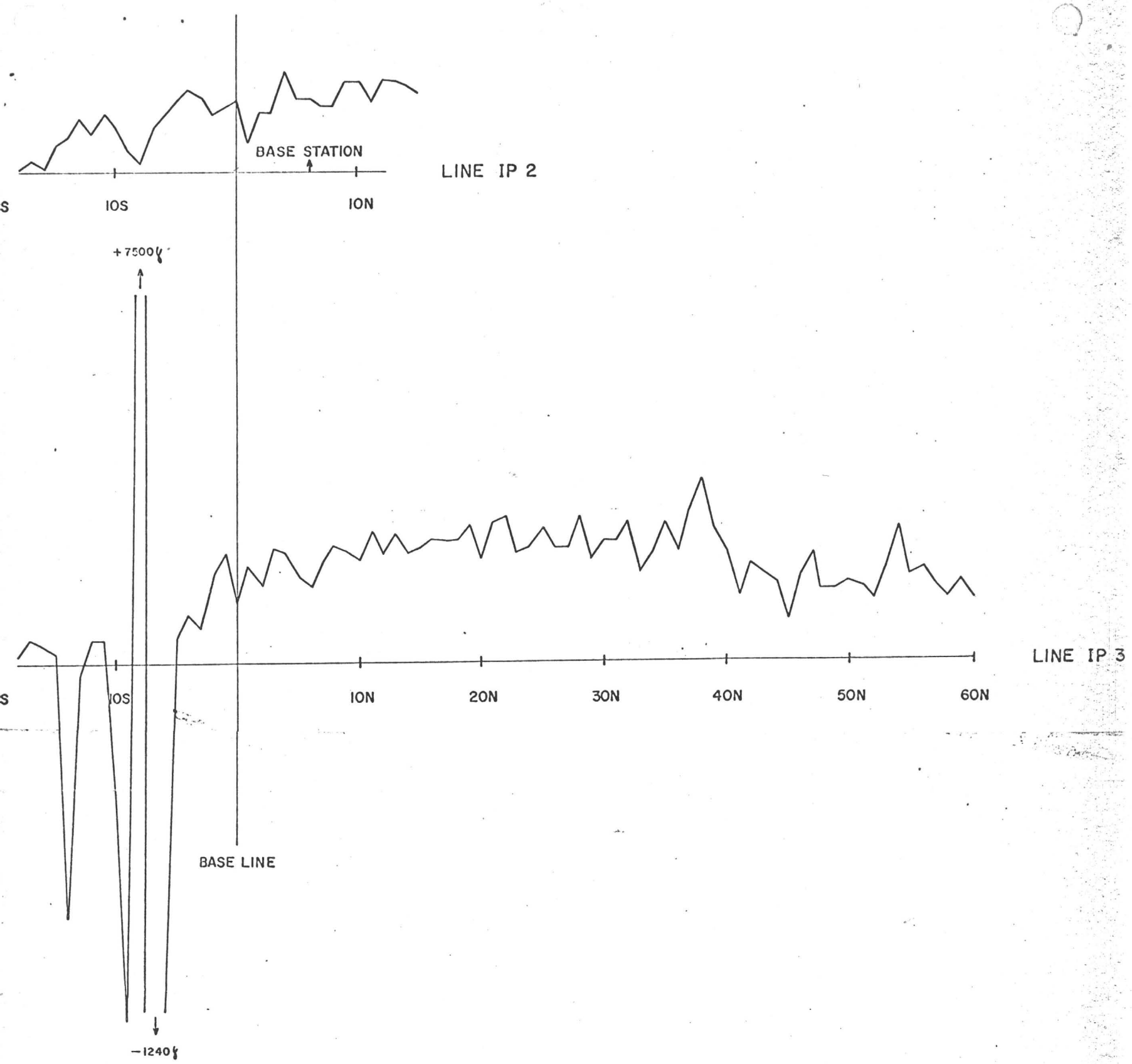
Mineral Surveys LTD.
OTTAWA, CANADA
TUCSON, ARIZONA
C.A.M.S. 8503

DIPOLE DIPOLE ARRAY

Line.....NO.7
Looking...SOUTHWEST
Dipole
Length.....500 FT



MAGNETIC PROFILES

SCALE 1" = 1000'

VERTICAL SCALE : 1" = 200 γ

SWANSEE AREA

(YUMA COUNTY, ARIZONA)

FOR

MAGMA COPPER COMPANY

(SAN MANUEL, ARIZONA)

BY

CANADIAN AERO *Mineral Surveys* LTD.

OTTAWA, ONT. CANADA

TUCSON, ARIZ. U.S.A.

LINE 7

4·4 7·0 9·6 9·0 8·8 8·6 9·0 8·6

center

GENERALLY HIGHER BACKGROUND RESPONSE AND RESISTIVITY

LINE 6

5 4·6 4·0 4·3 5·2 5 4·9 5·3 5·6 5

POSSIBLE ZONE

? ⊥

WW? POSSIBLE CONTACT

BASE LINE

MAGNETIC CONTACT?

4·8 5·0 ? 4·0 4·0 3·8 4·0

ZONE @ DEPTH RELATIVELY WEAK

WW CONTACT 3·8

GRANITE GNEISS COMPLEX

LINE 5

29 28 32 33 5·8 3·3 3·4 7·0 8·0 6·4 3·8 4·6

ZONE @ DEPTH

CONTACT

NARROW ZONE OR NEAR SURFACE

30 8·0 29 31 32 9·6 8·0 7·2 7·2 8 9·0 8·6 10 9 7·7

LIMESTONE AND SCHIST

ZONE NEAR SURFACE

8·0 5·8 10 15 18·6 10·8 11 12 10·8 12·2 12·0 10·6 13·1 9·6 8·6 10·4

STRIKE OF MAJOR UNDERGROUND WORKINGS

ZONE @ DEPTH

2·4 6·6 6 5 4·8

CONTACT

n = 5 a = 200'

n = 5 a = 200'

LINE 1

LINE 2

LINE 3

LINE 4

N

SCALE: 1"=1000'

STUDIES FOR BAGDAD COPPER CORP.

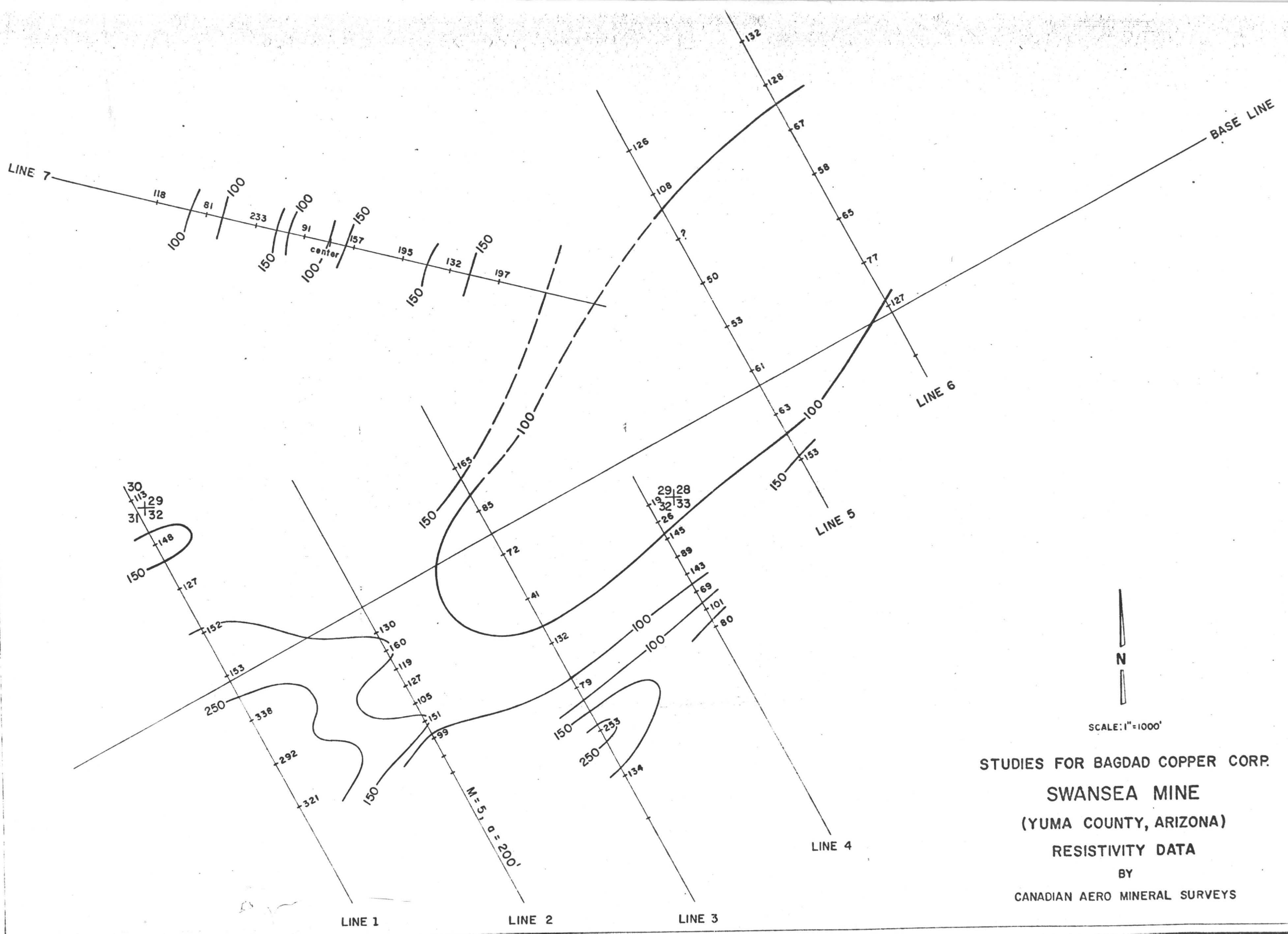
SWANSEA MINE

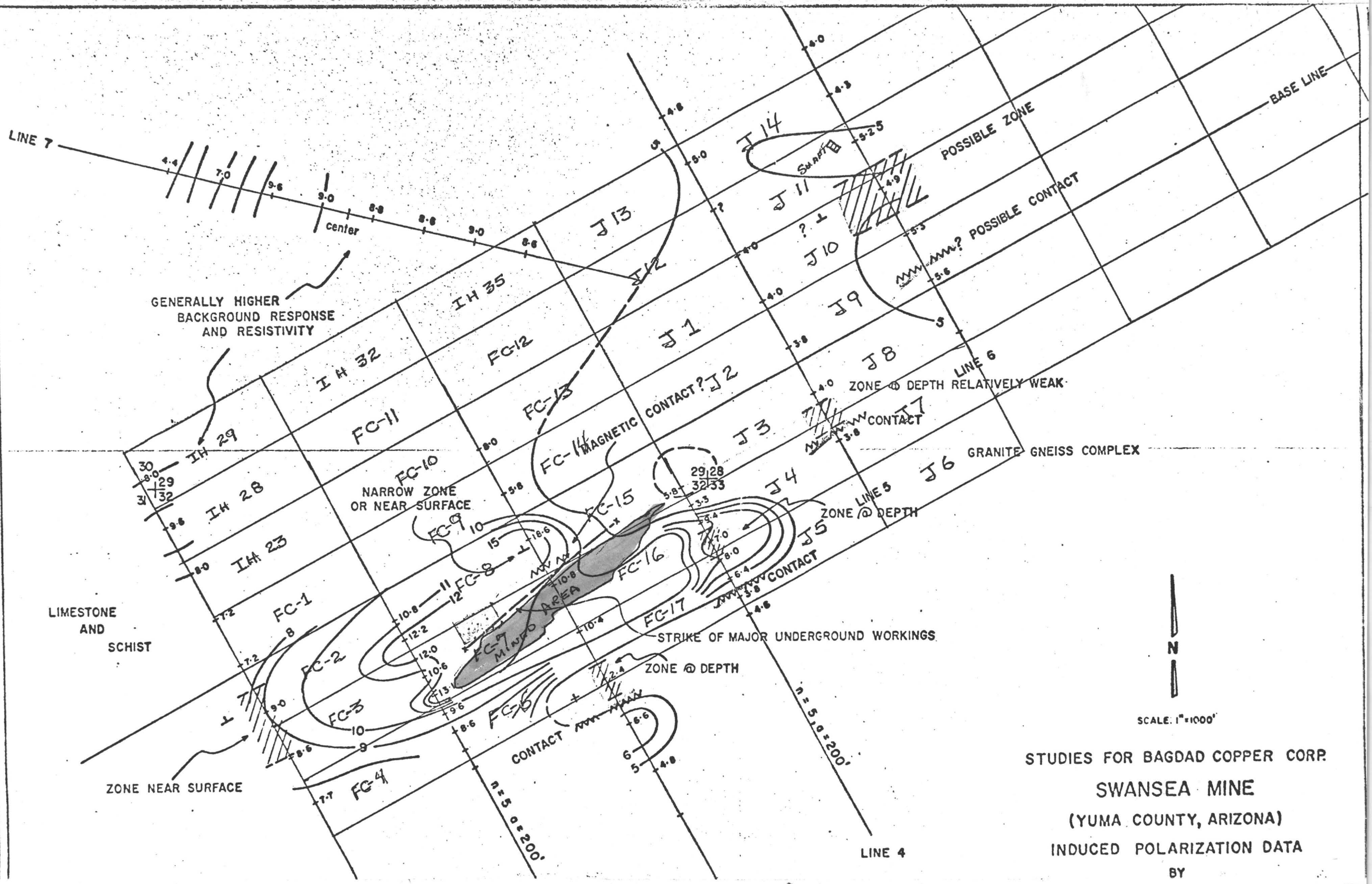
(YUMA COUNTY, ARIZONA)

INDUCED POLARIZATION DATA

BY

CANADIAN AERO MINERAL SURVEYS


LINE 7
BASE LINE
LINE 6
LINE 5
LINE 4
LINE 3
LINE 2
LINE 1
M=5, a=200'
center
N
SCALE: 1"=1000'
STUDIES FOR BAGDAD COPPER CORP.
SWANSEA MINE
(YUMA COUNTY, ARIZONA)
RESISTIVITY DATA
BY
CANADIAN AERO MINERAL SURVEYS



STUDIES FOR BAGDAD COPPER CORP.

SWANSEA MINE

(YUMA COUNTY, ARIZONA)

INDUCED POLARIZATION DATA

BY

223-1

Qal

Qal

Sch

Qal

Sch

Qal

Sch.

Qal

Gn

Gn

Gn

Road

MAP OF SWANSEA, ARIZONA
SHOWING GEOLOGY OF THE MINE AREA
Superimposed on a
Plan of Underground Workings
T.10N., R.15W., G&SRB&M

(Set #1)

Qal - Alluvium
Sch - Schist
Ls - Limestone
gn - Granite Gneiss Complex

1" = 500'

INDUCED POLARIZATION AND RESISTIVITY SURVEY

SWANSEA AREA

FOR

MAGMA COPPER COMPANY

PROJECT 8503

INTRODUCTION

On August 31, 1967, Canadian Aero Mineral Surveys Limited, at the request of the Magma Copper Company, conducted a magnetometer survey in the Swansea area of Yuma County, Arizona. The purpose of the survey was to determine if magnetite was associated with sulphide mineralization. For the magnetic survey, a Sharp's Model MF-1, verticle field intensity, Flux-gate magnetometer was used. The MF-1 is a hand held instrument with a sensitivity of 15% for the scales used in the survey.

On September 23, 1967, a Canadian Aero Mineral Surveys' crew returned to the Swansea area to complete an induced polarization and resistivity survey. The I.P. survey covered a total of seven dipole-dipole profiles. Mr. A. V. Hardas was in charge of the project which was finished on October 6, 1967.

For the I.P. survey, a high-sensitivity time domain I.P. receiver, designed by Newmont Exploration Limited and manufactured by Data Control Systems, Inc., was used. This receiver operates on the basis of a current-on time of 2.0 seconds and a measuring time of 0.65 seconds.

During the survey, a standard seven-electrode dipole-dipole array was used with dipole lengths of 200' and 500'. The values were plotted at 45° from midpoint of current and potential

dipoles as shown on the data sections.

Values of apparent polarization in millivolt seconds per volt were read directly for five current cycles by integrating the voltage decay after the current switched off. Primary voltage (Vp) existing between the potential electrodes during the current-on time was measured in millivolts and then apparent resistivity is calculated using the following formula:

$$\text{Rho} = K \times \frac{Vp}{I} \times a$$

Where K = geometric constant for the array
Vp = primary voltage in volts
I = current in amperes
a = electrode spacing in feet

This dipole-dipole method of profile and expanders was recommended instead of three-array profiles and expanders for greater detail and better interpretation of characteristics of overburden and structure. In order to obtain good, reliable values, several groups of readings were taken and then averaged. The repeatability of the readings is within 8%.

The I.P. method is fundamentally best suited to the detection of disseminated metallic sulphides (except sphalerite). However, graphite and certain oxides like magnetite and pyrolusite also respond to I.P. methods. Apart from the metallic sulphides and oxides, certain types of clays like montmorillonite and vermiculite also give rise to I.P. effects. Although considerable study has taken place, this method has not yet been perfected to differentiate between sulphide and clay polarization effects.

The data obtained from this survey has been presented in profile form.

GENERAL DESCRIPTION OF MINERALIZATION

The major structure in the area is a northeasterly striking thrust fault which dips approximately 45° to the northwest, with granite on the southeast and limestone on the northwest. An old mine indicates that mineralization consists of lens-like replacement bodies in the sedimentary hanging wall. The zone of replacement extends approximately 150' and 200' into the sediments and normal to the fault. In addition, specular hematite is scattered throughout the host. Depth to the major workings is 200' to 250'.

The problem was to establish how far the mineralization extended and also to determine if other such zones of mineralization existed along the strike of the thrust fault. It was hoped that the replacement bodies would have extensive disseminated mineralization surrounding them and could be therefore, located with I.P.

REVIEW OF RESULTS

Magnetometer Results

Lines IP-2 and IP-3 were surveyed using the magnetometer. It was determined in the field that no magnetic material was associated with the zones of mineralization. After reviewing the resistivity data, it appears that the magnetic profiles may indicate major structural features. On the southeast end of Line IP-2, a major structural break is indicated at 15 south. On the northwest end of Line IP-3, a major structural break is indicated between 40 north and 45 north.

I.P. AND RESISTIVITY RESULTS

LINE 1

Resistivity indicates a contact at 7 south which may dip

steeply northwest. Material to the southeast seems to be granite; whereas, resistivities to the northwest are lower and could indicate either limestone or schist. A zone of responsive material is noted on the southeast side of the contact. Typical background for the granite seems to be 5-9 milliseconds, which makes the zone 3 to 6 units above background. It should be noted, however, that this magnitude of response could be the result of a buried schist unit.

LINE 2

On the southeast end of Line 2, there is a low resistivity material which is known to be granite, as opposed to the high resistivity granite on Line 1. On the northwest end of the line, an area of higher resistivity is coincident with a broad zone of moderately responsive material. Limestone outcrops on surface. The response could be either from a small percentage of pyrite scattered throughout the limestone or from a unit of schist buried underneath the limestone.

LINE 3

Line 3 was surveyed first with a 200' dipole. Upon review of the data, it was felt that a larger dipole spacing would be needed and consequently a 500' dipole spacing was surveyed. With reference to the 500' dipole, the first type of granite (high resistivity granite on Line 1) can be seen on the extreme northwest end of the line. Going south-eastward, the line continues from the granite to alluvium, which seems to be responsive near surface. However, it is felt that no importance should be attached to it, since it is not expected to find economic sulphide deposits in alluvium. On the southeast end of the Line, responsive material is indicated at depth, between 15 south and

30 south. Resistivity indicates that the material is granite, but it is possible that limestone or schist could be present.

LINE 4

Line 4 was surveyed using a 200' dipole. In view of Lines 3 and 5, Line 4 should have been a larger dipole to obtain proper depth. Resistivity indicates a contact between alluvium and granite at 16 south, with the granite being to the southeast. At 10 south, there is a zone of weakly responsive material at depth in conjunction with a slight rise in resistivity. It is possible that this reflects a block of schist or mineralized limestone, but probably only reflects a charge of background. Some weak response is noted in the granite between 18 south and 20 south, but is not large enough in magnitude to be of much interest.

LINE 5

The low resistivity between 1 south and 19 north could be either alluvium or red sandstone. To the northwest, a higher resistivity indicates bedrock, likely granite. The area shows weak response, but not enough to retain interest.

LINE 6

Between 8 north and 28 north, the material is apparently alluvium. To the southeast of the alluvium, granite is evident. To the northwest, a zone of medium resistivity that is weakly responsive exists at depth between 18 north and 30 north. Northwest of 43 north, the high resistivity granite is apparent.

LINE 7

It seems that the material covered by Line 7 is predominately the high resistivity granite. It is possible, however, that there may be minor blocks of limestone and, or schist that would be too small to show up. The response is weak throughout and probably

reflects a high normal of the granite.

CONCLUSIONS

There seems to be a general high normal response in the area. Three possible reasons are:

1) high normal granite response
2) schist response
3) low percentage of pyrite well disseminated throughout the rock

An example should be noted that when a mineralized limestone is adjacent to a responding granite or schist, the sulphide response may not be discernible from the high normal of the adjacent material.

RECOMMENDATIONS

1) On Line 1, it is felt that the responsive zone between 3 south and 4 south should be tested with a 500' drill hole.
2) On Line 3, the response in the granite should be tested with an 800' drill hole between 22 south and 23 south.
3) Because of the complexity of this area, it is felt that if drilling proves interesting, the data should be re-interpreted in light of the information derived from the geologic logs of the holes.

Respectfully submitted,

Alan D. Grant
Geophysicist

Final interpretation is from:

C. L. Elliot, Consulting Geophysicist
1717 North Swan Road
Tucson, Arizona

REVIEW OF GEOPHYSICAL DATA
FROM THE SWANSEA PROPERTY;

YUMA COUNTY, ARIZONA

PROJECT 8526

JOHN CHALLINOR
6360 E. ROSE CIRCLE DR.
SCOTTSDALE ARIZONA 85251
1-946-1124

CANADIAN AERO Mineral Surveys LIMITED

REVIEW OF GEOPHYSICAL DATA FROM THE SWANSEA PROPERTY; YUMA COUNTY, ARIZONA

INTRODUCTION

Geophysical data on the above named property was submitted to Canadian Aero Mineral Surveys Limited for evaluation. This data includes Induced Polarization and resistivity profiles on seven lines and magnetic profiles on two of those seven lines. In addition, Bagdad Copper Corporation submitted prints of the mine workings with surface geology, a map of the claim groups, and one drill hole log of hole RS # 3.

GEOLOGY

From discussions with Messrs. Bonnis and Medhi of Bagdad Copper Corporation and from data submitted to CAMS, a general description of the geology is suggested as follows:

The major structural feature is a northeasterly striking fault with dip 25 to 45 northwesterly. A block of limestone and schist occurs in the hanging wall, the granite gneiss comples in the foot wall. Alluvium covers the major portion of the mine area with exposure of the limestone and schist in contact with the granite gneiss only to the southwest of the mine area.

The ore consists of lense-like bodies in the sedimentary block as replacement bodies that extend a few hundred feet into the sediments from the fault. The mineralization is mainly in

massive sulfide form with a fair amount of dissemination in the host rocks. Specular hematite is also noted in the host rocks.

The purpose of the original IP survey was to outline zones of disseminated sulfide mineralization which would be associated with massive sulfide replacement bodies.

REVIEW OF DATA

A review of the geophysical profiles and reconstruction of data in plan map form indicates the following high-lights:

A single large zone of anomalous response is centered about the known workings. This zone extends from Line 1 through Line 4 for a minimum distance of 4500' of length. The apparent width of the zone is 1500' and likely made of a series of narrower zones parallel or en echelon. The trend is not closed out on strike and the 1500' line interval is not condusive to the locating of small zones of mineralization.

It is expected that many relatively small but high grade replacement type bodies could exist within the anomalous trend and that these individual zones would not be detected.

A minor anomalous trend is located along the southeasterly contact of the major anomalous zone. The response is indicated to come from a depth 500' to 1000' below surface. This anomalous trend lies directly north of a contact feature occuring on Line 3, 4, 5, and 6, at 2000'S, 1600'S, 800'S, and 200'N, respectively. The contact revealed by the resistivity data, indicates low resistivity sediments to the north, higher resistivity granite gneiss to the south.

Generally higher than average background response is noted for rocks in the area of Line 1 (north half) and Line 7. Moderate resistivity values are associated with the response. No immediate value is placed on this response.

Magnetic activity in the vicinity of 600'S, Line 3, is a near-surface feature that may describe a characteristic of the fault, however, the extreme highs and lows are not unlike the magnetic characteristic of buried metallic objects.

CONCLUSIONS

We conclude that:

1) The present geophysical coverage has eliminated the possibility of large occurrences of mineralization extending laterally away from the present mine.

2) The strike extent of the major anomalous zone has not been fully determined and that some lines west of Line 1 and south of Lines 5 and 6 would be needed to close out the major zone.

We acknowledge that the easterly extent of the zone may well be limited by the contact feature, item mentioned above, and noted on the plan map. However, without data further south on Line 5 than has been previously collected, one would remain suspicious of closure.

3) The major zone itself has not been covered in enough detail to describe smaller features within the anomaly. Ore zones of 500' length could easily be missed by the 1500' line interval.

4) The contact feature with a moderate response in association has not been traced to its full extent or given enough detailed coverage in any one area to suggest a drill site. This target may well be worth testing but prudence would suggest further details of the zone at intervals less than the 1500' already considered.

RECOMMENDATIONS

Our recommendations would be:

Plan I: to cover the immediate area with lines at 500' intervals starting west of Line 1. We would suggest data over a width from 1000' north to 4000' south. These lines would shift north as we extended the coverage to the east so the contact feature could be fully described.

This work would require a minimum of 12 lines about 5000' each or two weeks' work. Extra lines to the east or west would depend on the extent of the anomalous zone. I would estimate that we are looking at a 15 day project whose total cost would be about $4,500.00 to $5,000.00.

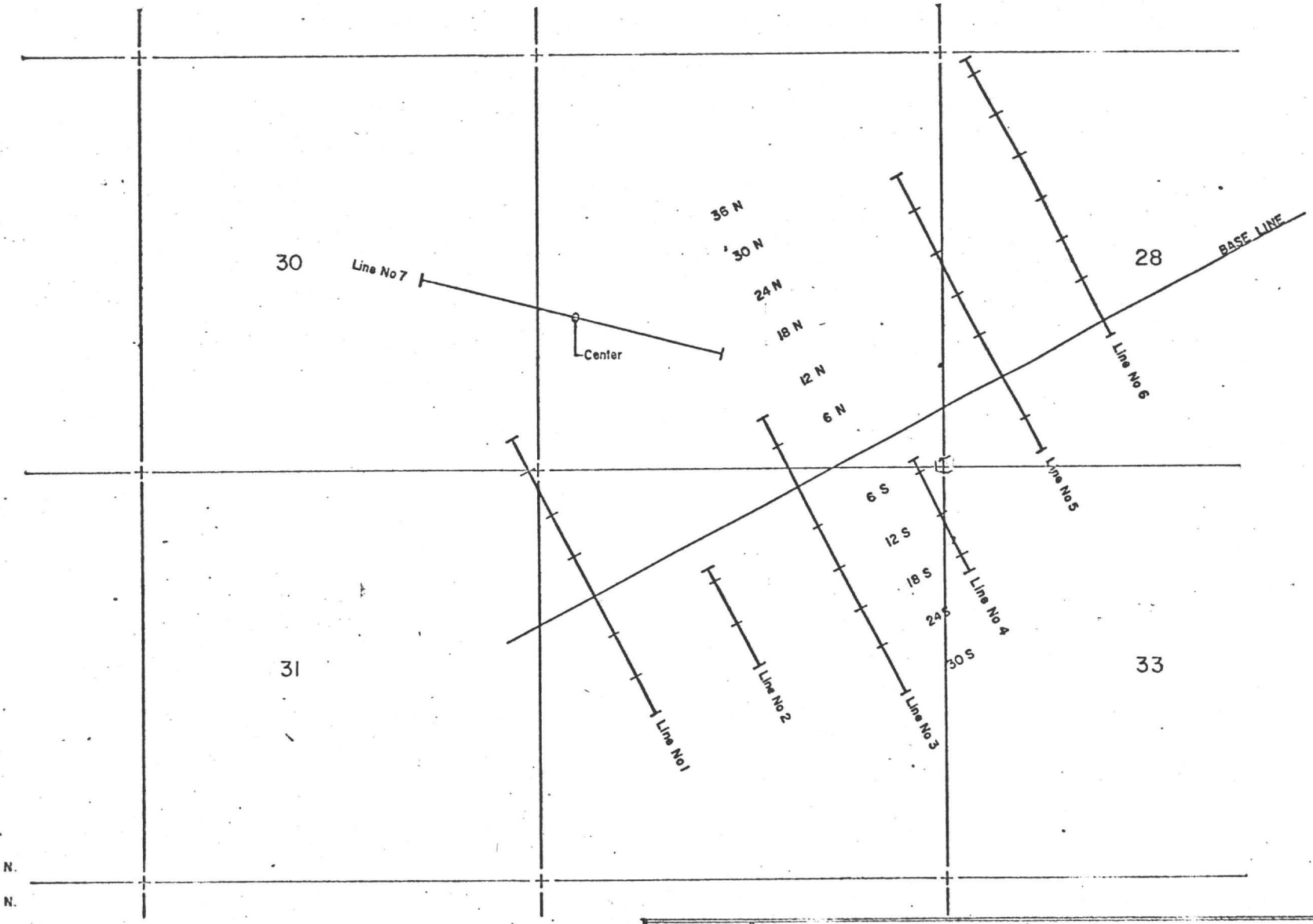
Plan II: A modified program could be considered which would detail the contact zone for purposes of a drill test. This would require about 4 lines in the vicinity of Lines 3 and 4, south of the base line. Such a program would take about a week and would be estimated to cost about $2,100.00.

Respectfully submitted,

W. Gordon Wieduwilt
Geophysicist

June 6, 1968
Tucson

CANADIAN AERO *Mineral Surveys* LIMITED



SCALE: 1" = 2,000'

NORTH

I. P. PLAN MAP

SWANSEA AREA – YUMA COUNTY, ARIZONA

for

MAGMA COPPER COMPANY

by

CANADIAN AERO MINERAL SURVEY – TUCSON, ARIZONA

CAMS 8503

Inf. "C"

7/14/75

Challinor (Phone 946-1124)

John Challinor owner Swansea Mine
6360 E. Rose Circle Scottsdale, 85251

E.M. 16 excellent correlation
1960-Weidenwalt I.P. for Magna
Canadian group
1000'-2000' deep.
Cams 8503 (Job 16.3)

Sed. Basin on granitic gneiss shore
on one side of basin
foot wall contacts.
Says LA. Land & Expl.?

May send data for our review, questions,
& suggestions, etc.
thinking of about 10 line miles I.P. other
"other limb" of basin during next 2 or 3 weeks?
GEOEX "probably" would have crew
available about then.

W.