

92I/9W
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**GEOPHYSICAL REPORT
ON THE PROPERTY OF
GALAXY COPPER LIMITED**

**KAMLOOPS MINING DIVISION
KAMLOOPS, BRITISH COLUMBIA**

BY - E. B. NICHOLLS, 1965

SULMAC EXPLORATION SERVICES LIMITED

JULY 30, 1965

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In Pocket:

Claim Map

Induced Polarization Survey - Chargeability

- Resistivity

Magnetometer Survey

All at scale 1" = 400'

GEOPHYSICAL REPORT
ON THE PROPERTY OF
GALAXY COPPER LIMITED

KAMLOOPS MINING DIVISION
KAMLOOPS, BRITISH COLUMBIA

Introduction

During the period September 1964 to April 1965 an Induced Polarization (I.P.) survey and a magnetometer survey were carried out by Sulmac Exploration Services Limited over the group of claims held by Galaxy Copper Limited (N.P.L.).

The claims are located to the west of Kamloops, British Columbia, in the Kamloops Mining Division. Picket lines were cut and chained prior to the geophysical survey. The relative locations and orientations of the lines are shown on the maps accompanying this report. The basic coverage of the survey consisted of readings at 100 foot intervals along lines 200 feet apart.

The results obtained from these surveys are shown on the maps and profiles located at the rear of this report.

Summary and Recommendations

A magnetometer and an Induced Polarization survey were carried out over the property of Galaxy Copper Limited, near Kamloops, British Columbia. The magnetometer survey has not indicated any major anomalous zones, however interpretation of the data obtained has aided in determining the geological structure of the property. It has been possible to indicate the contacts of the various underlying rock types and the locations of possible faults that appear to cross the area.

The I.P. survey, using a 200 foot electrode, indicated three anomalous areas which may be mineralization. Two of these zones, #2 and #3, are associated with magnetic 'highs', which suggests that magnetite is partly the cause of the anomaly. However, the small amount of detail survey carried out over zone #2 indicated that magnetite was not the only cause. No detail work was carried out over zone #3.

Across the main anomalous zone detail I.P. work was performed and the zone of interest was outlined. This work indicated the cause of the anomaly could be 1-3% total sulphides by volume. Drilling was undertaken and a number of holes were put down to investigate the anomaly. The results of this

drilling will be reported separately, but it can be stated that in general the results obtained from the drilling and from the I.P. survey are in close agreement.

The reconnaissance survey has indicated all areas of possible mineralization, and drilling has partly outlined zone #1. It is, therefore, recommended that detail work be conducted over zones #2 and #3 and followed by a drilling programme should it be warranted.

Property, Location and Access

The group of claims discussed in this report is shown on a map accompanying this report and are listed as follows:

Crown Granted Mineral Claims - L835, L845, L998, L1013, L1037, L 1038

Mineral Claims Key #1 FR and 2 FR		2+
Dart 1 to 3 inclusive		3+
Rocket 1, 2FR, 3, 4, 5FR, 6 to 14 inclusive, 15FR, 16FR	675/10411314	16+
Ursus 1, 2, 3, 4FR, 5FR, 6, 7FR		7+
Shear 1 to 4 incl., 5FR, 6, 7FR		7+
Venus 1 to 10 incl., 11FR		11+
Gal 3FR, 4FR, 5FR		3
		49

The property is located in the Kamloops Mining Division, some four miles west of Kamloops, B. C. Access to the claims can be made by car.

Method of Survey and Instrument Data

I.P. Electrode Arrays

The data were obtained using the "three-electrode array". This array consists of one current (C_1), two potential electrodes (P_1 and P_2), and the second current electrode (C_2) being fixed at "infinity".

The data were obtained using basic electrode spacings of 200 feet over the surveyed area. Additional detail information was obtained over the anomalous area with electrode spacings of 50, 100, and 400 feet. The basic station interval was 100 feet.

I.P. Instrument

The instrument used was of the pulse-type and is similar in design and operation to that described by R. W. Baldwin in "A Decade of Development in Overvoltage Survey", A.I.M.E. Transactions, Vol. 214, 1959. Power for the unit is obtained from a Briggs and Stratton 4 H.P. motor coupled to a 400 c.p.s. generator which provides a maximum of 1500 watts d.c. to the ground. The cycling rate is 1.5 seconds current on and 0.5 seconds current off, the pulses reversing continuously in polarity. The data collected consists of measurement of the current (I) flowing through C_1 and C_2 and of the primary voltage (V_p) between P_1 and P_2 during the 'current on' period. During

the 'current off' period the overvoltage appearing between P_1 and P_2 is measured. This gives a measurement of the polarization (Vs) in milliseconds. The "apparent chargeability" in milliseconds is calculated by dividing the polarization (Vs) by the primary voltage (Vp). The "apparent resistivity" in ohm-meters is obtained by dividing the primary voltage Vp by the current I, and multiplying by a proportionality factor which depends on the geometry of the array used.

I.P. Data

The survey was carried out over a group of claims based on a grid system of 200 foot lines and 100 foot stations. The base line of the grid was established in a northwest direction and traverse lines were turned off at right angles. A total of 104 miles of line and base line were cut and chained. The basic I.P. survey was carried out using an electrode spacing of 200 feet. Anomalous areas indicated by this reconnaissance survey were detailed using 50 foot and 100 foot electrode spacings. A total of 104 miles of I.P. survey was conducted using the various electrode spacings.

The results of the survey are shown as contour maps of 'chargeability' and 'resistivity' for the basic 200 foot

electrode spacing at a scale of 400 feet to an inch. Results of the detail work are shown as profiles. These profiles have a horizontal scale of one inch to one hundred feet. The 'apparent chargeability' is plotted at a vertical scale of 2 milliseconds per inch. The 'apparent resistivity' is plotted to a vertical scale of 500 ohm-meters per inch.

Magnetometer Survey

The magnetometer survey was conducted over the same grid system as the I.P. survey. A total of 90 miles of lines were surveyed.

The survey was conducted using a Sharpe MF-1 Fluxgate magnetometer. The sensitivity of the instrument was 20 gammas per division on the 1000 gamma scale. The results obtained were plotted and contoured on a map at a scale of 400 feet to the inch. A copy of this map accompanies this report.

Discussion of Results

Magnetometer Survey

Considerable magnetic relief is shown throughout the property, however no well-defined anomalous areas were indicated. Contacts between the various rock types have been

interpreted from the magnetic data and these are shown on the accompanying map. From the nature of the results obtained it appears that the overburden throughout the property is fairly shallow.

The areas showing erratic magnetic 'highs' probably indicate that the underlying rocks are part of the Iron Mask Batholith. Variations in the magnetite content account for the erratic high readings. These concentrations of magnetite appear to be localized, fairly shallow, and do not extend to any great depths. The area of relative low magnetics is in all probability indicative of the presence of rocks of the Nicola series.

A number of faults are also interpreted from the magnetic data and these are shown on the accompanying map. From previous work carried out in the general area it is known that ore occurrences are associated with the formations known to be present on this property.

Induced Polarization Survey

The variations in the resistivity obtained may be ascribed to changes in the overburden thickness and in the overburden and bedrock resistivities.

The I.P. data indicates that the background values of chargeability for the surveyed area is 2 milliseconds. Areas which showed as anomalous, that is having 'chargeability' values of twice background or better, were selected for detail surveying. These anomalous zones are depicted on the accompanying 'chargeability' map by the numbers 1 to 3. In addition to these zones, a number of smaller anomalies were indicated, however these have not been designated. Detail work, using electrode arrays of 50 feet and 100 feet, was carried out over anomalous areas #1 and #2 to better define the conducting zone and also aid the interpretation of the data. The results of this detail work are shown as profiles at the end of the report. Along with the chargeability profiles, are those of the resistivity and magnetics.

The main anomalous area is located in an area where previous exploration has been carried out. The present survey has indicated extensions to the mineralization zone previously drilled. Calculations carried out indicate that the anomaly is probably caused by mineralization in varying concentrations, giving an average of 1-3% total sulphides across the zone. The conductor is located in an area of

relatively little magnetic relief, indicating little or no magnetite within the zone. The cause of the anomaly is, therefore, thought to be due to sulphide mineralization. Further investigation of the anomaly has been carried out by drilling, both during the geophysical survey and since. This drilling tended to confirm the results obtained by the I.P. survey, however further drilling is required before any definite conclusions can be reached regarding the full potential of the mineralized zone.

Areas #2 and #3 are located in the southern part of the claim group, and are associated with a series of magnetic 'highs'. Detail survey using 50' and 100' spacings was carried out in area #2 on Line 12W between stations 64S and 78S. Calculations of the data obtained showed that the anomaly could be caused by 2-5% total sulphides by volume located at a depth of approximately 100 feet. Past experience has shown that 5% magnetite by volume will give rise to I.P. anomalies of the same order as those due to 1% total sulphides by volume. The magnetite present in the anomalous zone #2, although erratic, could be in quantities of 10% or more. It is, therefore, thought that the magnetite may be the main cause of the anomaly.

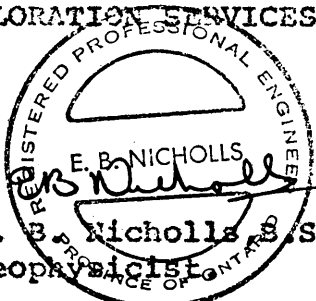
It is not necessarily the only cause. Further investigation is, therefore, necessary of the anomaly.

As area #3 is situated close to the property boundary, it was not completely outlined by the reconnaissance survey. As with area #2, this anomaly is associated with magnetic 'highs' and is probably caused by the same conditions as is the anomaly of area #2. However, no detail work was carried out in this zone, and until this has been done no conclusions can be drawn regarding the cause of the anomaly.

In conclusion, three main anomalous zones have been located, one of which has been partly proven and the other two require further investigation.

Respectfully submitted,

SULMAC EXPLORATION SERVICES LIMITED

A circular seal for a Registered Professional Engineer. The outer ring contains the text "REGISTERED PROFESSIONAL ENGINEER" at the top and "PROFESSIONAL ENGINEER" at the bottom. The center of the seal contains the name "E. B. NICHOLLS" and a handwritten signature. Below the seal, the text "E. B. Nicholls, B.Sc., P.Eng., Geophysicist" is printed.
E. B. Nicholls, B.Sc., P.Eng.,
Geophysicist

July 30, 1965

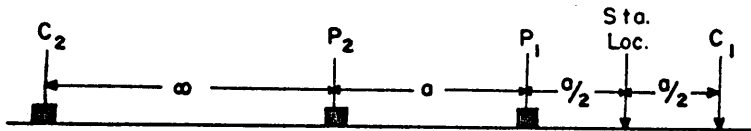
APPENDIX

The following personnel worked on the survey:

E. B. Nicholls	Chief Geophysicist	Nov. 2-6/64, Jan. 4-6/65, Feb. 15-18/65, July 8, 9, 14 & 27/65
R. Pild	Geophysicist	Sept. 19 - Oct. 2/64 Nov. 20/64 - April 4/65
G. Roos	Technician/Operator	Sept. 20 - Dec. 22/64
D. Thorburn	" "	Dec. 22/64 - April 4/65
G. Westwood	Geophysical Helper	Sept. 25/64 - Dec. 22/64
H. Dykstra	" "	" " " "
R. Trimming	" "	" " " "
L. Anderson	" "	" " - Mar. 19/65
A. Langston	Magnetometer Operator	Oct. 2 - Nov. 30/64
R. Clark	Geophysical Operator	Nov. 30/64 - April 4/65
D. Gray	" "	Nov. 30/64 - April 4/65
G. Espaniel	Magnetometer Operator	Nov. 30 - Dec. 20/64
R. McLeod	" "	Dec. 21/64 - Jan. 17/65
K. Schulte	Surveyor	Oct. 15-31/64
A. Bower	Line cutting	Sept. 25 - Oct. 28/64
G. Mackenzie	" "	Sept. 25 - Oct. 24/64
E. Coker	" "	Sept. 22 - Oct. 1/64
C. MacDonald	" "	" " " "
S. Wirth	" "	Sept. 30 - Oct. 10/64
D. Grant	Draughtsman	Oct. 22-30/64 Jan. 3-5, 10 & 24/65 Mar. 1, 8, 15/65 April 1, 5, 8/65 July 27-30/65
P. Tapson	"	Dec. 3, 8, 11 & 21/64 Jan. 6-8, 14, 15, 18-20/65 April 12-15/65 July 27-29/65

LEGEND

INDUCED POLARIZATION SURVEY



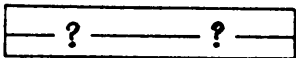
PROFILES



AREA OF SPECIAL INTEREST



AREA OF INTEREST

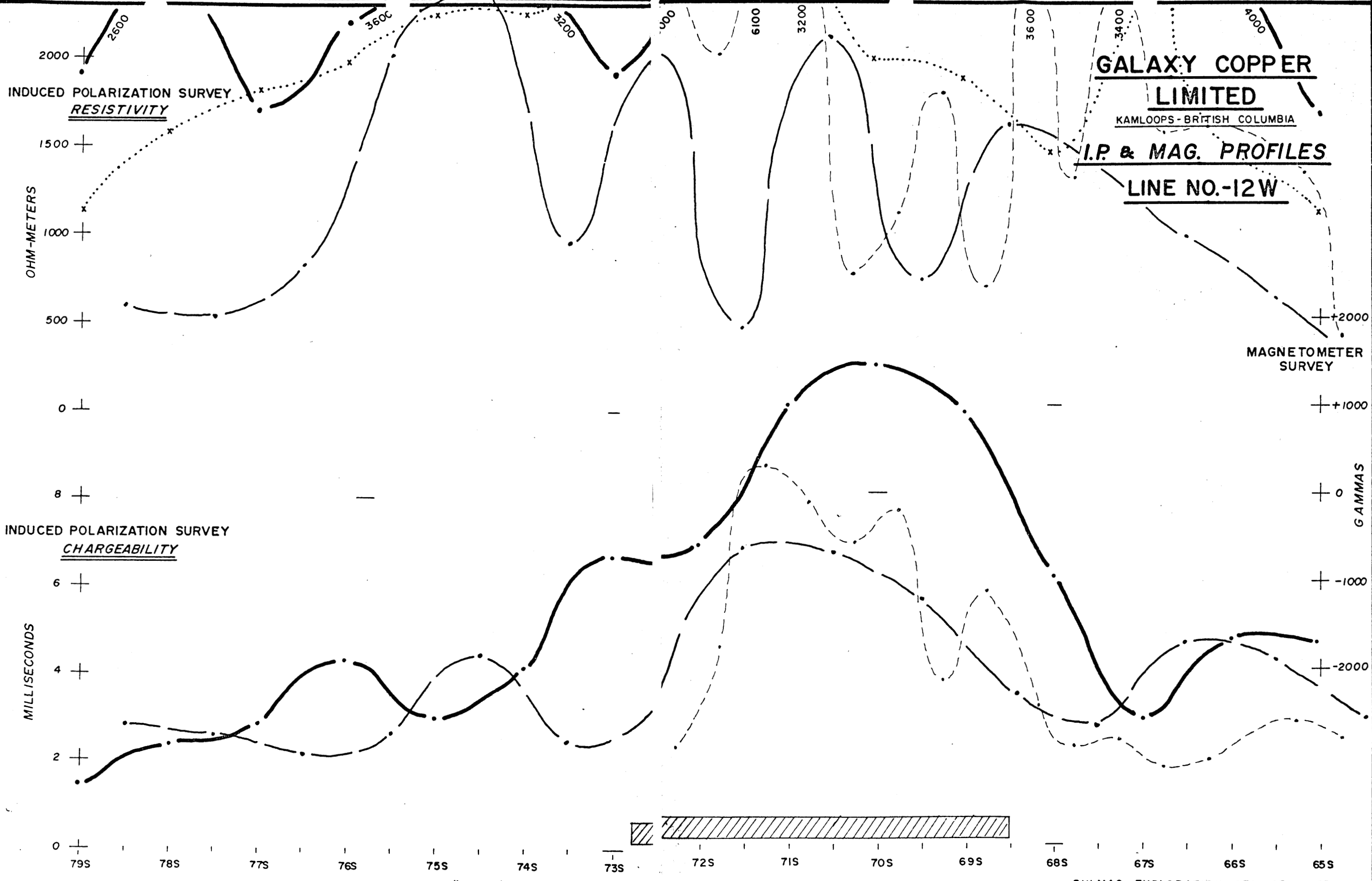


AREA OF POSSIBLE INTEREST

MAGNETOMETER SURVEY

PROFILE





SULMAC EXPLORATION SERVICES LTD.

**GALAXY COPPER
LIMITED**

KAMLOOPS - BRITISH COLUMBIA

I.P. & MAG. PROFILES

LINE NO.-60W

INDUCED POLARIZATION SURVEY
RESISTIVITY

2000 +
1500 +
1000 +
500 +
0 +

OHM-METERS

MAGNETOMETER
SURVEY

+2000
+1000
0
-1000
-2000

INDUCED POLARIZATION SURVEY
CHARGEABILITY

8 +
6 +
4 +
2 +
0 +

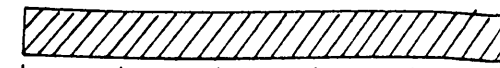
MILLISECONDS

GAMMAS

+2000
+1000
0
-1000
-2000

3N 4N 5N 6N 7N 8N 9N 10N 11N 12N 13N 14N 15N 16N 17N

STATIONS. SCALE - 1" = 100'



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**GALAXY COPPER
LIMITED**

KAMLOOPS - BRITISH COLUMBIA

I.P. & MAG. PROFILES

LINE NO.-62W

2000 +
INDUCED POLARIZATION SURVEY
RESISTIVITY

1500 +

OHM-METERS

1000 +

500 +

0 +

INDUCED POLARIZATION SURVEY
CHARGEABILITY

8 +

MILLISECONDS

6 +

4 +

2 +

0 +

MAGNETOMETER
SURVEY

+2000

+1000

0

-1000

-2000

GAMMAS

6N

7N

8N

9N

10N

11N

12N

13N

14N

15N

16N

17N

18N

19N

20N

STATIONS SCALE - 1" = 100'

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LIMITED**

KAMLOOPS - BRITISH COLUMBIA

I.P. & MAG. PROFILES

LINE NO.-64W

2000 +
INDUCED POLARIZATION SURVEY
RESISTIVITY

1500 +

OHM-METERS

1000 +

500 +

0 +

INDUCED POLARIZATION SURVEY
CHARGEABILITY

8 +

MILLISECONDS

6 +

4 +

2 +

0 +

+2000

+1000

0

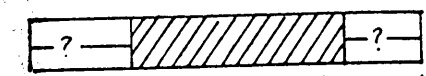
-1000

-2000

GAMMAS

6N 7N 8N 9N 10N 11N 12N 13N 14N 15N 16N 17N 18N 19N 20N

STATIONS SCALE - 1" = 100'



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KAMLOOPS-BRITISH COLUMBIA

I.P. & MAG. PROFILES

LINE NO.-68W

2000 +
INDUCED POLARIZATION SURVEY
RESISTIVITY

1500 +

OHM-METERS

1000 +

500 +

0 +

INDUCED POLARIZATION SURVEY
CHARGEABILITY

8 +

6 +

4 +

2 +

0 +

MILLISECONDS

MAGNETOMETER SURVEY

+2000

+1000

0

-1000

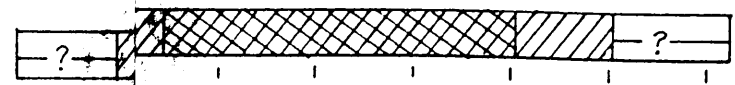
-2000

GAMMAS

9N 10N 11N 12N 13N 14N 15N 16N 17N 18N 19N 20N 21N 22N 23N

STATIONS SCALE - 1" = 100'

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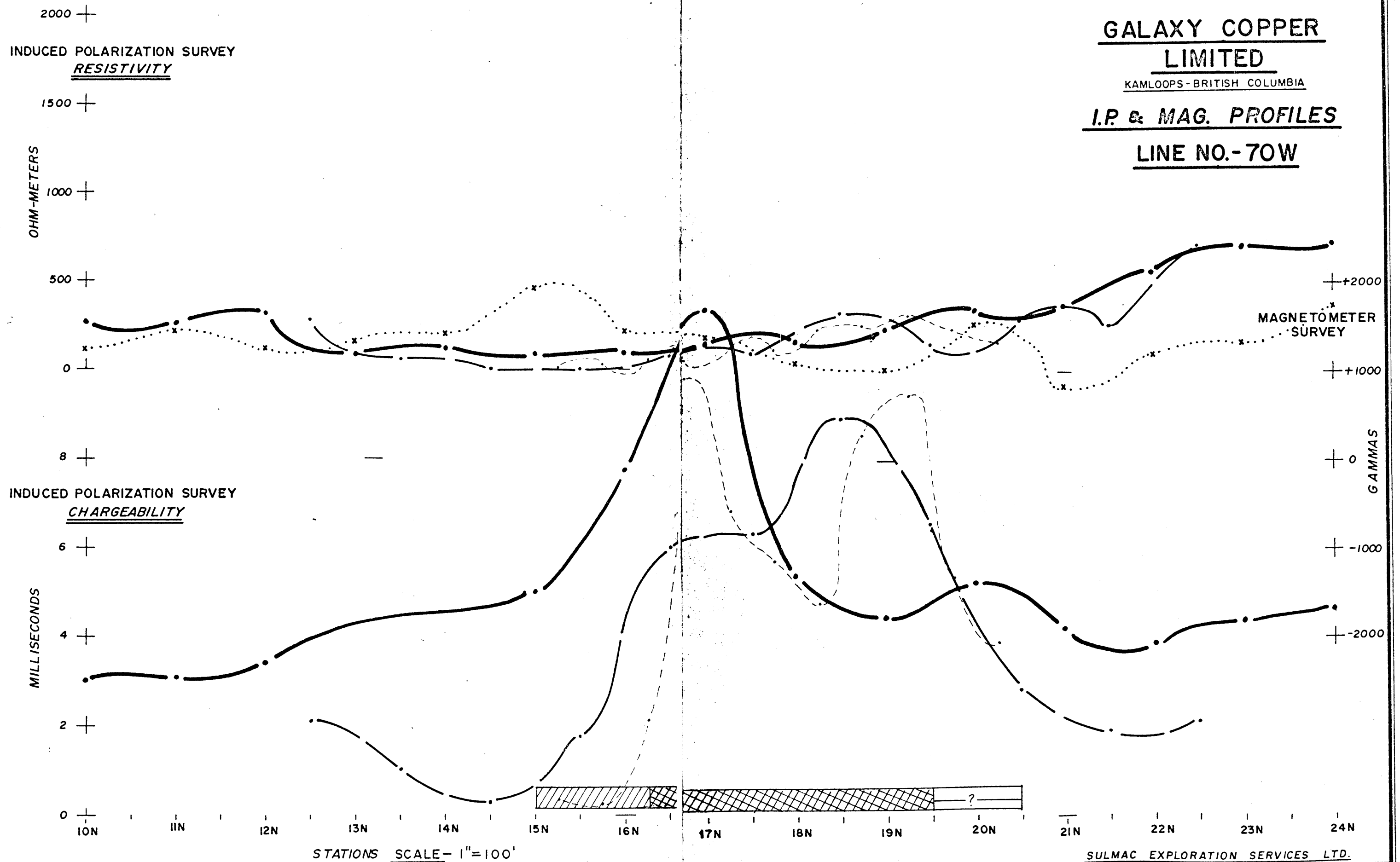
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KAMLOOPS - BRITISH COLUMBIA

I.P. & MAG. PROFILES

LINE NO.-70W



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LIMITED**

KAMLOOPS - BRITISH COLUMBIA

I.P. & MAG. PROFILES

LINE NO.-72W

2000 +
INDUCED POLARIZATION SURVEY
RESISTIVITY

1500 +

OHM-METERS

1000 +

500 +

0 +

L A K E

MAGNETOMETER
SURVEY

+2000

+1000

GAMMAS

0

-1000

-2000

INDUCED POLARIZATION SURVEY
CHARGEABILITY

6 +

MILLISECONDS

4 +

2 +

0 +

L A K E

12N

13N

14N

15N

16N

17N

18N

19N

20N

21N

22N

23N

24N

25N

26N

STATIONS SCALE - 1" = 100'

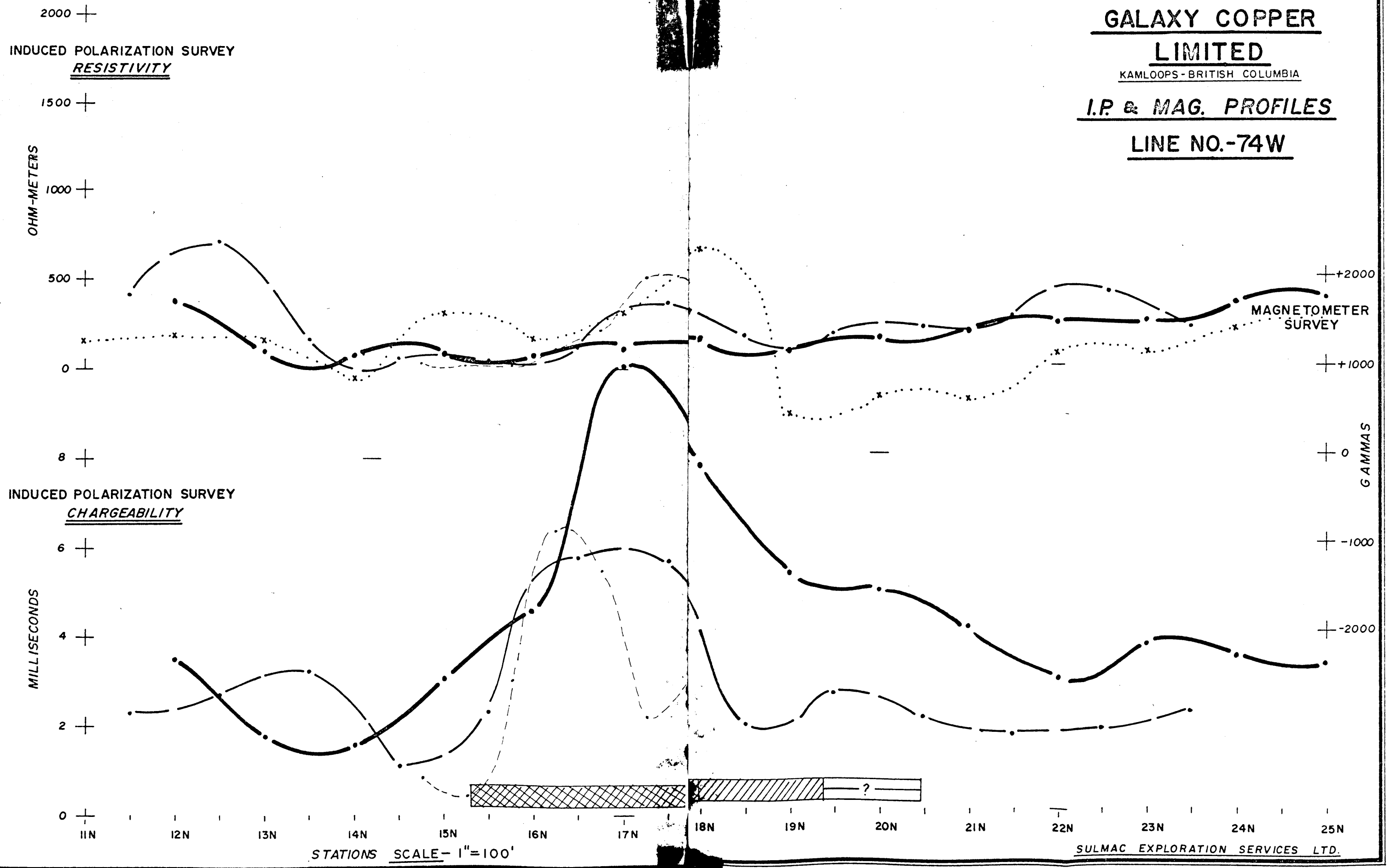
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KAMLOOPS - BRITISH COLUMBIA

I.P. & MAG. PROFILES

LINE NO.-74W



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LIMITED**

KAMLOOPS - BRITISH COLUMBIA

I.P. & MAG. PROFILES

LINE NO.-76W

2000 +
INDUCED POLARIZATION SURVEY
RESISTIVITY

1500 +

OHM-METERS

1000 +

500 +

0 +

INDUCED POLARIZATION SURVEY
CHARGEABILITY

MILLISECONDS

8 +

6 +

4 +

2 +

0 +

MAGNETOMETER
SURVEY

+2000

+1000

0

-1000

-2000

GAMMAS

STATIONS SCALE - 1" = 100'

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KAMLOOPS - BRITISH COLUMBIA

I.P. & MAG. PROFILES

LINE NO.-78W

INDUCED POLARIZATION SURVEY
RESISTIVITY

2000 +

1500 +

1000 +

500 +

0 +

OHM-METERS

INDUCED POLARIZATION SURVEY
CHARGEABILITY

8 +

6 +

4 +

2 +

MILLISECONDS

0 +

12N

13N

14N

15N

16N

17N

18N

19N

20N

21N

22N

23N

24N

25N

26N

STATIONS SCALE - 1" = 100'

+2000

+1000

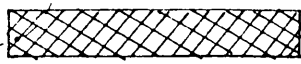
0

-1000

-2000

GAMMAS

MAGNETOMETER SURVEY



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LIMITED**

KAMLOOPS - BRITISH COLUMBIA

I.P. & MAG. PROFILES

LINE NO. - 82W

2000 +
INDUCED POLARIZATION SURVEY
RESISTIVITY

1500 +

OHM-METERS

1000 +

500 +

0 +

8 +

INDUCED POLARIZATION SURVEY
CHARGEABILITY

6 +

MILLISECONDS

4 +

2 +

0 +

MAGNETOMETER
SURVEY

+2000

+1000

GAMMAS

0

-1000

-2000

10N 11N 12N 13N 14N 15N 16N 17N 18N 19N 20N 21N 22N 23N 24N

STATIONS SCALE - 1" = 100'

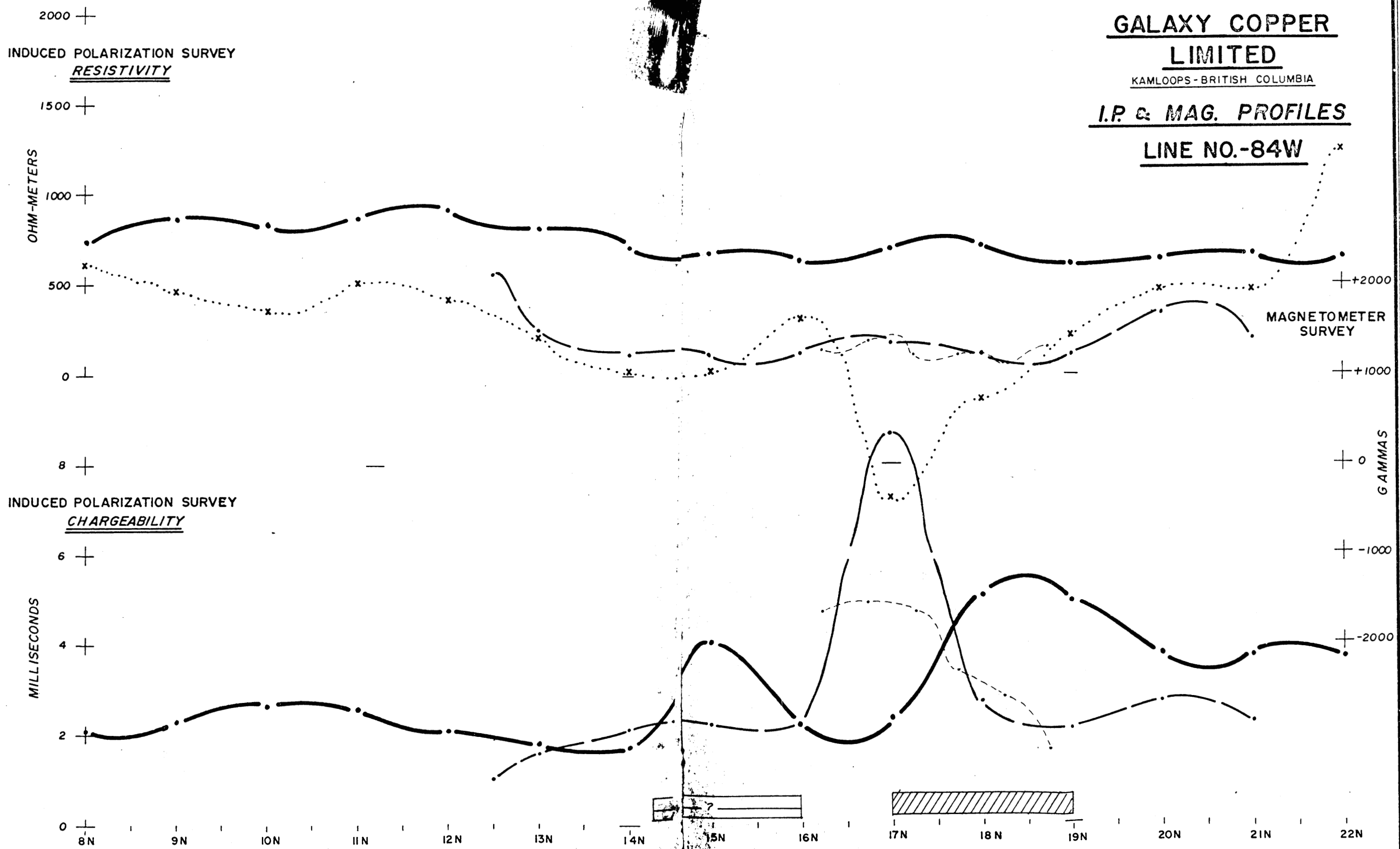
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**GALAXY COPPER
LIMITED**
KAMLOOPS - BRITISH COLUMBIA

I.P. & MAG. PROFILES

LINE NO.-84W



STATIONS SCALE - 1" = 100'

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2000 +
INDUCED POLARIZATION SURVEY
RESISTIVITY

1500 +

OHM-METERS

1000 +

500 +

0

GALAXY COPPER
LIMITED

KAMLOOPS-BRITISH COLUMBIA

I.P. & MAG. PROFILES

LINE NO.-92W

MAGNETOMETER
SURVEY

+2000

+1000

INDUCED POLARIZATION SURVEY
CHARGEABILITY

8 +

6 +

MILLISECONDS

4 +

2 +

0

GAMMAS

0

-1000

-2000

22N

23N

24N

25N

26N

27N

28N

29N

30N

31N

32N

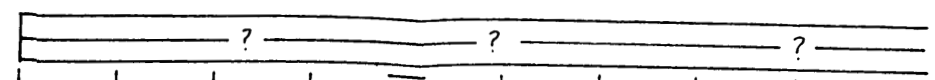
33N

34N

35N

36N

STATIONS SCALE - 1" = 100'



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