

REPORT ON

INDUCED POLARIZATION (I.P.) AND
GROUND MAGNETOMETER SURVEYS,
REX CLAIM GROUP, WHITEHORSE, YUKON TERRITORY



FOR

QUATSINO COPPER-GOLD MINES LIMITED
NEW PRIVATEER MINES LIMITED
and
BUCHANAN MINES LIMITED

This report has been examined by
the Geological Institute and
approved as to content.

D.C. Findlay
RECORDS OFFICER

Approved as to cost by the
Minister of Mines and Technical
Surveys: \$ 15,946.89

R.S. DeGard
DIRECTOR

BY

Approved as to content for work
under Section 24 of the Yukon Quartz
Mining Act.

[Signature]
COMMISSIONER

EAGLE GEOPHYSICS LIMITED

REXDALE, ONTARIO

December, 1967

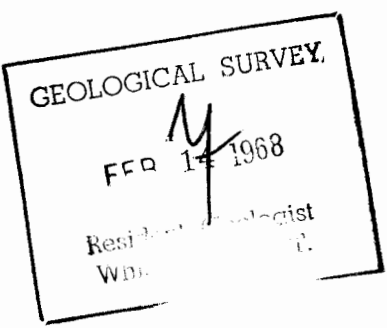
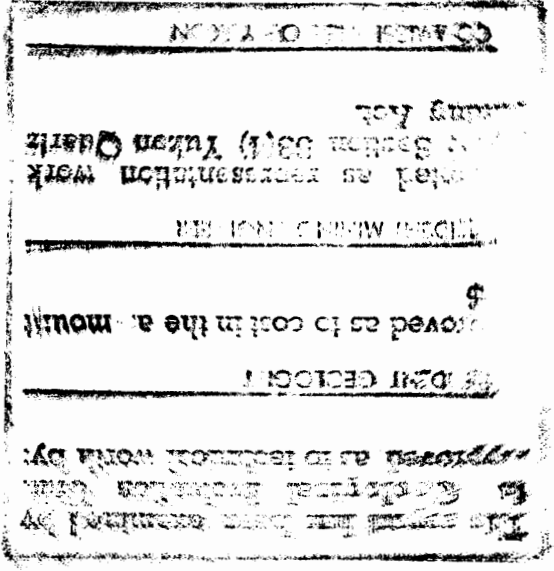


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INTRODUCTION

Between the 2nd June and 9th October, 1967, Eagle Geophysics Limited carried out Induced Polarization and ground magnetometer surveys on part of the Rex group of claims held jointly by Quatsino Copper-Gold Mines Limited, New Privateer Mines Limited and Buchanan Mines Limited. The property is located approximately 6 miles southwest of Whitehorse in the Yukon Territory.

The survey lines, along which the electrical and magnetic readings were taken, were approximately 500 feet apart, turned off at right angles from a baseline running approximately north-south.

The I.P. reconnaissance measurements were made using the "three electrode array" method of surveying. The basic electrode separation was 200 feet and the basic station interval was 100 feet. As the survey proceeded the anomalous zones located were re-surveyed using different electrode spacings at appropriate station intervals, to give additional information necessary to carry out a more thorough interpretation. In addition to readings of apparent chargeability (the I.P. response parameter) simultaneous measurements of apparent resistivity were also made.

The magnetic measurements were made at 100-foot station intervals along each survey line. In the case of steep magnetic gradients readings were taken every 50 feet.

In addition to the I.P. and magnetic measurements a few lines of electromagnetic surveying were carried out using a Crone E.M. unit.

The data from these surveys are shown on five maps accompanying this report. Map Ell2-1 is the magnetometer survey map contoured at 100

gamma intervals. The horizontal scale of this map is 1 inch to 200 feet. Map Ell2-2 shows the apparent chargeability and apparent resistivity values in profile form on a base map whose horizontal scale is 1 inch to 200 feet and vertical scale is 10 milliseconds per inch and 2 inches per logarithmic cycle for the apparent chargeability and the apparent resistivity respectively. Map Ell2-3 is the detail apparent chargeability and apparent resistivity values in profile form on a base map whose horizontal scale is 1 inch to 100 feet and vertical scale is 5 milliseconds per inch and 2 inches per logarithmic cycle for the apparent chargeability and apparent resistivity respectively. This map shows detailed I.P. work carried out west of the baseline on east-west lines. Map Ell2-4 shows the E.M. and magnetometer results carried out east of the Rex baseline. For the magnetometer survey the readings have been contoured at intervals of 100 gammas. For the E.M. survey 1 inch equals 10 degrees dip angle. Map Ell2-5 shows results of the I.P. work carried out east of the Rex baseline. The majority of these readings are along old picket lines running approximately northeast-southwest. The results shown are those of apparent chargeability and apparent resistivity, in profile form, on a base map whose horizontal scale is 1 inch to 200 feet. The apparent chargeability values are plotted at a scale of 40 milliseconds per inch and the apparent resistivity values are plotted at a scale of 1 inch per logarithmic cycle.

PROPERTY AND LOCATION

The property is located in the Whitehorse Mining Division, Yukon Territory and lies in the northeast quadrant of the one degree quadrilateral whose south-east corner is at 60°N latitude and 135°W longitude.

The following mineral claims in whole or in part were surveyed

Rex 15

Rex 17 to 22 inclusive

Rex 25 to 36 inclusive

Rex 41 to 42 inclusive

Rex 58 to 62 inclusive

Rex 73.

The claim group is located approximately six miles southwest of Whitehorse. It is possible to drive, with a two wheel drive vehicle, to within a few hundred feet of the property boundary.

SURVEY SPECIFICATIONS

The Induced Polarization (I.P.) Survey was carried out using a pulse-type system manufactured by Hunttec Limited of Toronto, Ontario. Measurements with this system are made in the time domain.

The system consists basically of three units, a receiver, a transmitter and a motor-generator. The transmitter, which provides a maximum of 7.5 kw. d.c. to the ground, obtains its power from the 7.5 kw. 400 cycle three phase generator driven by a gasoline engine. The cycling rate of the transmitter is 1.5 seconds "current on" and 0.5 seconds "current off", the pulses reversing continuously in polarity. The data recorded in the field consists of careful measurements of the current (I) in amperes flowing through electrodes C_1 and C_2 , the primary voltage (V_p) appearing between the potential electrodes, P_1 and P_2 , during the "current on" part of the cycle and a secondary or overvoltage (V_s) appearing between P_1 and P_2 during the "current off" part of the cycle. The apparent chargeability (M_a) is calculated by dividing the secondary voltage by the primary voltage and multiplying by 400, which is the sampling time in milliseconds of the receiver unit. The apparent resistivity (ρ_a) in ohm-metres is proportional to the ratio of the primary voltage and the measured current, the proportionality factor depending on the geometry of the array used. The chargeability and resistivity obtained are called apparent as they are values which that portion of the earth sampled would have if it were homogeneous. As the earth sampled is usually inhomogeneous the calculated apparent chargeability and resistivity are functions of the actual chargeability and resistivity of the rocks.

The survey was carried out using the "three electrode array" method of surveying. In this method the current electrode C_1 and the two potential electrodes P_1 and P_2 are moved in unison along the survey lines. The spacing between these three electrodes is kept constant for each traverse at a distance roughly equal to the depth to be explored by that particular traverse. The second current electrode C_2 is kept fixed at "infinity".

Thus, on a "three electrode array" traverse with an electrode spacing of 200 feet, a body lying at a depth of 100 feet will produce a strong response, whereas the same body lying at a depth of 200 feet will produce a much weaker response. By running subsequent traverses at different electrode spacings more precise estimates can be made of depth, width, thickness and percentage sulphides of any zones located by this method.

The "three electrode array" method of surveying with a 200 foot electrode separation was used over the entire area surveyed in order to detect and outline possible zones of sulphide mineralization. Subsequent detail work was also carried out using the "three electrode array" method of surveying. This detail work consisted of 100-foot and 400-foot electrode separations run over certain lines as deemed necessary to give additional information for the selection of possible drilling targets.

For the magnetic survey a Jalander fluxgate magnetometer was used. This instrument measures variations in the vertical component of the earth's magnetic field to an accuracy of ± 10 gammas. Corrections for diurnal variations were made by tying-in to previously established base stations at intervals not exceeding two hours.

INTERPRETATION PROCEDURES

Induced Polarization interpretation procedures have been most completely developed in situations of mineralized horizontal layering where the electrode separations used are small compared with the lateral extent of the mineralized bodies. Geologically the porphyry coppers of large lateral extent are practical examples where such interpretation procedures can be used to good advantage.

For more confined bodies, where the electrode separations used are often large compared with the lateral extent of the bodies themselves, the complex problem of resolving the combined effects of depth, width, dip and true chargeability of steeply dipping bodies together with the physical characteristics of overburden and country rocks has only recently been studied in detail. The results of this work are as yet unpublished. The interpreter must therefore use empirical solutions plus experience gained from surveys carried out over known sulphide bodies under similar geological conditions to assist in his interpretation.

GEOLOGICAL ENVIRONMENT

The property is situated within the Whitehorse Copper Belt and is very close to several mineable sized ore deposits. The original rocks of the Whitehorse Copper Belt were the Lewes River group, Upper Triassic in age and consisting mainly of quartzites, arkoses, greywackes, argillites and limestones and dolomites. In parts of the Copper Belt the Laberge group, of Lower Jurassic in age overlies the Lewes River group. The limestone and dolomites were the most predominant original rock types before being intruded and consequently metamorphosed by the large Coastal Intrusive batholith of Cretaceous age. In very recent times the Miles Canyon extrusive basalt has covered parts of the fore mentioned rock groups. The metamorphosed limestones and dolomites were changed to skarn rock types. In places along the contacts between the Lewes River group and the Coastal Intrusive, copper ores have been deposited in mineable sized deposits.

For a more general account of the geology of the Whitehorse Copper Belt the reader is referred to Memoir 312 of the Geological Survey of Canada entitled "Whitehorse Map-Area, Yukon Territory 105D" by J. O. Wheeler published in 1961. For a more concise account of the major copper and copper-iron deposits in the Whitehorse Copper Belt the reader is referred to Paper 63-41 of the Geological Survey of Canada entitled "Copper and Iron Resources, Whitehorse Copper Belt, Yukon Territory" by E. D. Kindle published in 1964. For a more detailed account of the geology of the Rex claim group the reader is referred to an unpublished report by L. G. Morrison P.Eng. of Roving Explorations Limited which describes geological mapping carried out by him during the summer of 1967.

DISCUSSION OF RESULTS

The Magnetometer Survey

The magnetometer survey has indicated that the area is underlain by at least two distinctive magnetic rock units as shown on Map E112-1. However to relate these two magnetic rock units to the rocks described and named by the various geologists who have studied the area is not exactly straightforward. It is the opinion of the writer that magnetic unit 1 corresponds to Triassic sediments of the Lewes River group, and that magnetic unit 2 corresponds to granites of the Coastal Intrusives.

In a paper by E. D. Kindle "Copper and Iron Resources, Whitehorse Copper Belt, Yukon Territory", a large portion of magnetic unit 2 has been mapped as sediments of Lower Jurassic age. Where such rocks have been indicated the writer has found a number of large outcrops of granite. However since the contacts indicated by Kindle are in good agreement with those indicated by the present ground magnetometer survey it is possible that the position of these contacts were derived from an airborne magnetometer survey, and that the rock types have been simply incorrectly named.

Anomalous Zone 1

This is a small fairly complex zone limited in depth, width and length. The complexities of the anomalies obtained on the various spacings used makes the interpretation of the position of the causative body less reliable than usual. It is believed that the causative body occurs at a depth of less than 80 feet below the surface of the ground and is located directly below station 27W on line 15+00S. It is limited in

strike length to less than 500 feet, and is most probably less than about 75 feet wide. It is interesting to note that this small anomaly lies about 200 feet west of a small antimony showing.

Anomalous Zone 2

This is a broad area of anomalous readings of moderate intensity and limited but indefinite strike length. It is located about 800 to 2,000 feet directly west of the main anomaly (anomalous zone 3, the East Anomaly). It has a general but indefinite strike direction which is approximately north northeast (NNE). Although only small specks of pyrite and pyrrhotite have been found in the rocks in the vicinity of this anomaly it is most probable that this mineralization is the cause of the anomaly.

Anomalous Zone 3 (the East Anomaly)

This is the most important anomaly located during the present survey. It strikes approximately north northwest (NNW) and runs within or very close to a 50 foot limestone escarpment. This limestone escarpment approximately parallels the inferred (faulted) contact between limestone and greywacke. This anomaly (different from those of zones 1 and 2) is associated with a strong resistivity low indicating a zone of good conductivity. However it was not detected during an E.M. survey carried out in an attempt to establish the strike direction of the conducting zone. The zone is 1,200 feet long and is still open at the south end.

The Polar Lake Copper Showing

No significant I.P. response was obtained in the region of the old copper showings at Polar Lake.

SUMMARY AND RECOMMENDATIONS

Between 2nd June and 9th October, 1967, Eagle Geophysics Limited carried out an Induced Polarization and ground magnetometer survey over parts of the Rex claim group held jointly by Quatsino Copper-Gold Mines Limited, New Privateer Mines Limited and Buchanan Mines Limited and located approximately 6 miles southwest of Whitehorse in the Yukon Territory.

As a result of a careful study of the data obtained from the above mentioned geophysical surveys it is recommended that:-

1. A diamond drill programme be carried out on Anomalous Zone 3 (East Anomaly).

Prior to the writer recommending any specific drill locations, the Directors of the three above mentioned companies should -

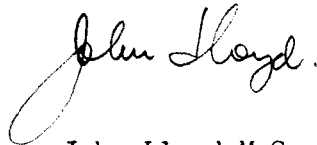
- (a) Bear in mind the fact that a portion of the anomaly lies beyond the boundaries of the Rex claims.
- (b) Determine ownership by legal surveys of the ground to the immediate east of Rex 25 and the immediate south of Rex 73 in order to establish the possibility of continuing the I.P. survey to delineate the probable southward extension of the anomalous zone.

2. No further work on Anomalous Zones 1 and 2 be carried out until Zone 3 has been fully tested.

3. In view of the favourable geological environment of the Polar Lake Copper showing a few closely spaced E.M. and magnetometer traverses be carried out during winter when the lake is frozen.

Respectfully submitted,

EAGLE GEOPHYSICS LIMITED

A handwritten signature in cursive script that reads "John Lloyd".

John Lloyd M.Sc.
Geophysicist

Toronto, Ontario.
December, 1967.

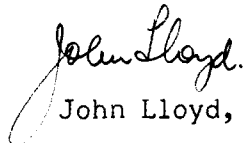
APPENDIX

(i)

CERTIFICATION

I, John Lloyd, of 45 Dunfield Avenue, Toronto, Ontario,
hereby certify that:-

1. I was born in Wales on the 10th of May, 1938.
2. I graduated from the University of Liverpool, England, in 1960 with a B.Sc. in Physics and Geology.
3. I was awarded the D.I.C. (Diploma of the Imperial College of Science and Technology) in 1961 in Applied Geophysics from the Royal School of Mines, Imperial College of Science, University of London.
4. I graduated from the Royal School of Mines, Imperial College of Science, University of London in 1962 with an M.Sc. in Geophysics.
5. I have been practising my profession for the last seven years.
6. I have no interest or shares in Quatsino Copper-Gold Mines Limited, New Privateer Mines Limited or Buchanan Mines Limited, nor do I expect to receive any.


John Lloyd, M.Sc.

29th December, 1967.

(ii)

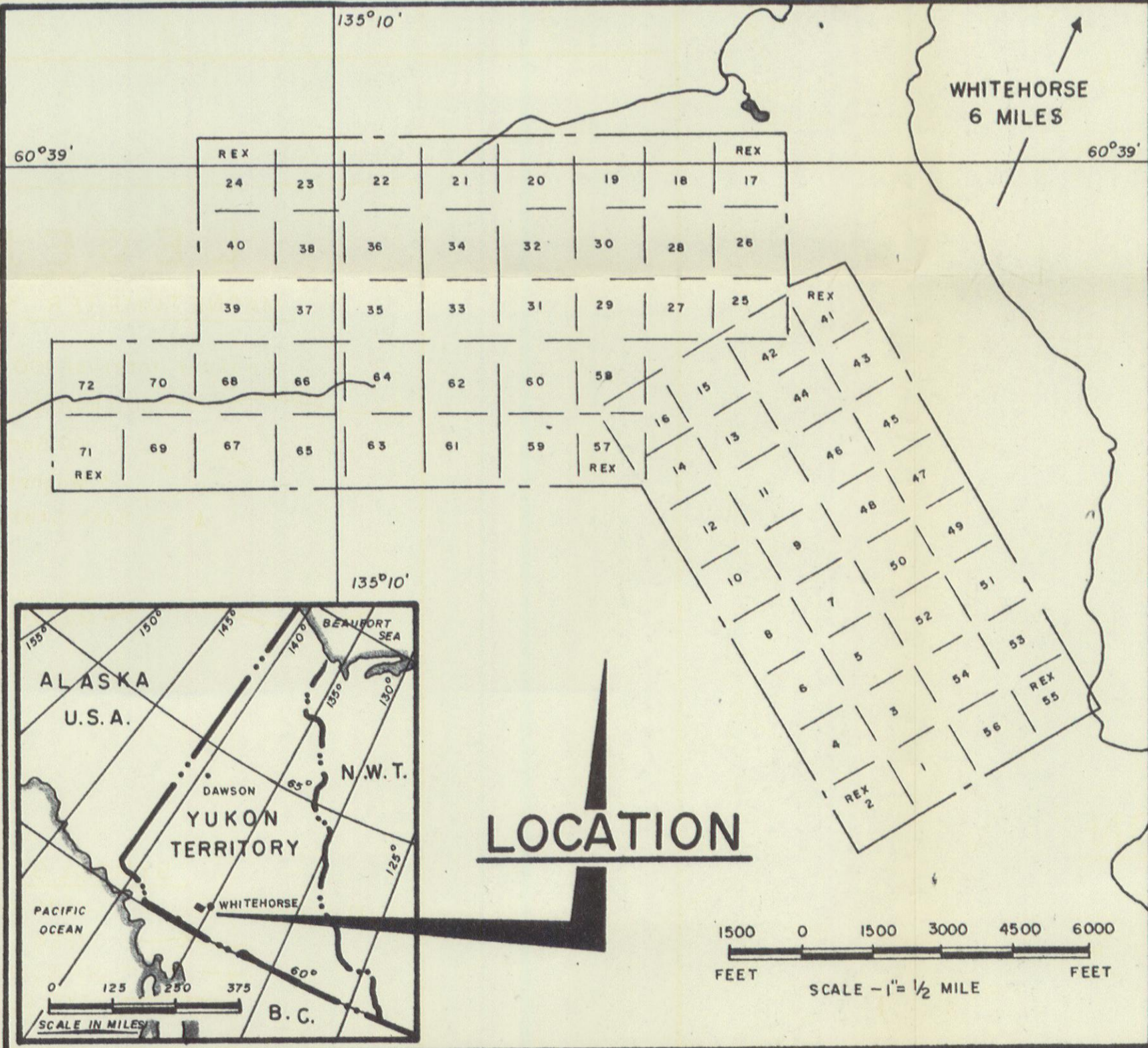
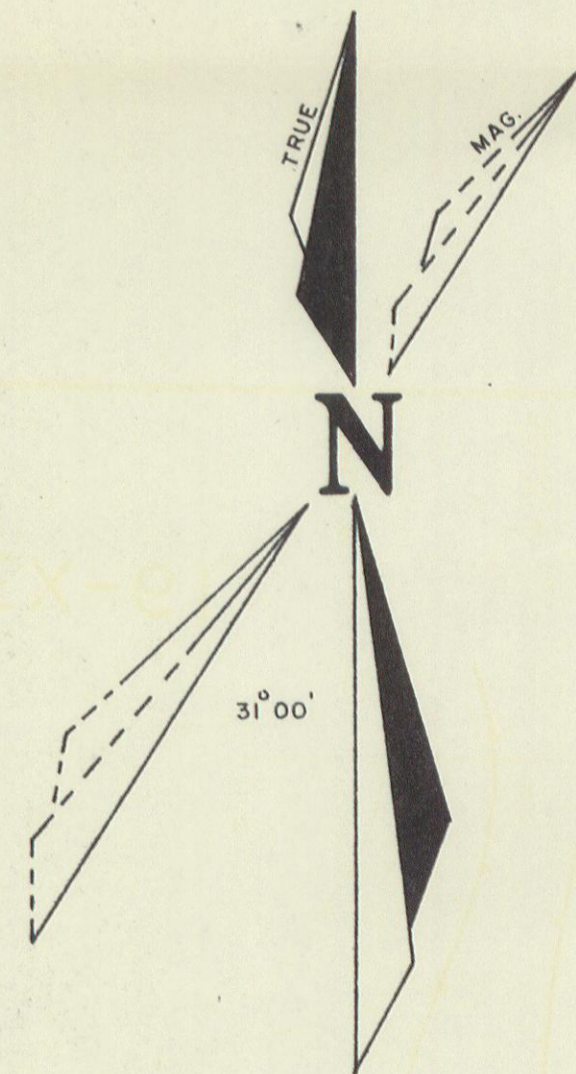
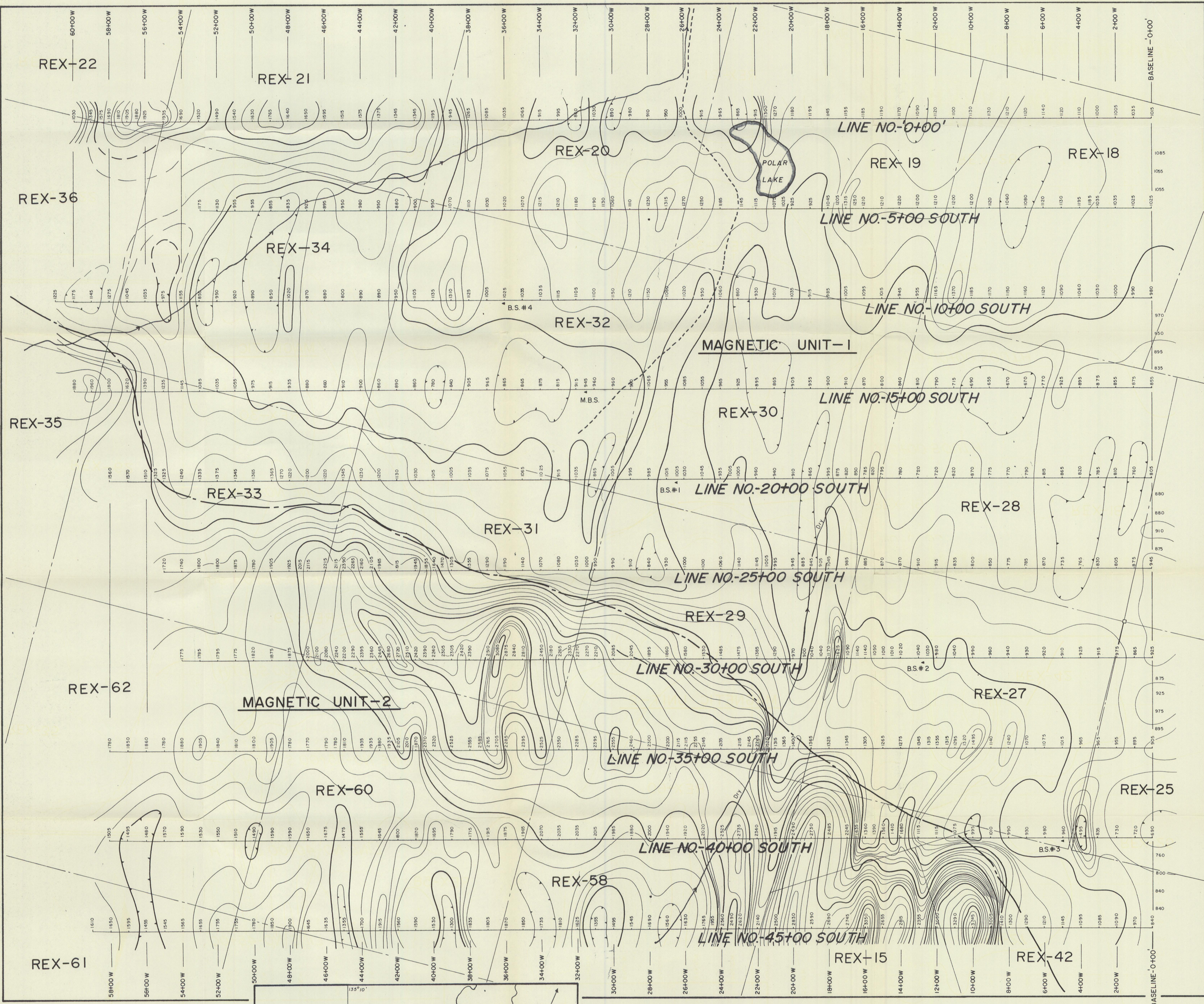
COST OF SURVEYS

From 2nd June to the 27th June, 1967, from 31st July to 3rd August, 1967 and from 6th October to 9th October, 1967, Eagle Geophysics Limited provided a geophysicist, a geophysical operator, a 7.5 kw I.P. equipment and a four-wheel drive truck at a cost of \$250.00 per day. From 12th June to the 17th June, Eagle Geophysics Limited provided a geophysicist and a magnetometer at a cost of \$95.00 per day. On 14th September and 28th September, 1967, Eagle Geophysics Limited provided a geophysicist, a geophysical operator and a Crone E.M. unit at a cost of \$160.00 per day.

Drafting and interpretation charges were extra. Therefore, the total cost of all services provided by Eagle Geophysics Limited was \$9,830.00.

PERSONNEL EMPLOYED ON SURVEYS

<u>Name</u>	<u>Occupation</u>	<u>Address</u>	<u>Dates</u>
J. Lloyd	Geophysicist	P. O. Box 125 Rexdale, Ont.	2nd June to 27th June, 1967 2nd, 3rd and 6th Aug, 1967 6th to 9th Oct, 1967 28th to 30th Dec. 1967
P. E. Walcott	Geophysicist	"	2nd June to 15th June, 1967 27th June, 1967 2nd and 3rd Aug, 1967 6th Aug. 1967 28th Sept. 1967 3rd Oct. to 9th Oct. 1967
V. R. Falstrom	Geophysical Operator	"	3rd June to 16th June, 1967
G. MacMillan	"	"	2nd June to 7th June, 1967 12th June to 16th June, 1967
V. Pashniak	"	Quatsino Copper-Gold Mines Ltd. 326 - 736 Granville St, Vancouver 2, B.C.	3rd June to 27th June, 1967 31st July to 3rd Aug. 1967 6th August, 1967 14th Sept. 1967 28th Sept. 1967
A. Caldwell	Geophysical Helper	"	14th Sept. 1967
F. Baker	"	"	3rd June to 26th June, 1967
P. Moore	"	"	8th June, 1967 10th June to 26th June, 1967
R. Carpenter	"	"	17th June, 1967
N. Frost	"	"	19th June to 27th June, 1967
F. Barazzuol	"	"	2nd, 3rd and 6th Aug. 1967
M. Fox	"	"	28th Sept. 1967
P. Peary	"	"	6th Oct. to 9th Oct. 1967
G. John	"	"	6th Oct. 1967
D. Jackson	"	"	7th to 9th Oct. 1967
D. Grant	Draftsman	P.O. Box 125 Rexdale, Ontario.	Nov. 10, 12, 13, 15, 17, 1967 28th December, 1967
Mrs. D. Longman	Typist	"	30th December, 1967



LEGEND

MAGNETOMETER SURVEY

- Contour Interval 100 Gammas
- 500,000 Gamma Interval Contour
- 100 Gamma Interval Contour
- Magnetic Low
- ▲ Base Station
- - - Assumed Contact From Magnetic Data

SYMBOLS

- CLAIM POST AND BOUNDARY
- CREEK
- - - CAT ROAD (TRACTOR)
- LAKE OUTLINE

QUATSINO COPPER-GOLD MINES LIMITED

NEW PRIVATEER MINES LTD.

BUCHANAN MINES LIMITED

REX CLAIMS - WHITEHORSE - YUKON TERRITORY - WHITEHORSE MINING DIVISION

MAGNETOMETER SURVEY

Scale - 1" = 200 Feet

0 200 400 600 800
FEET FEET

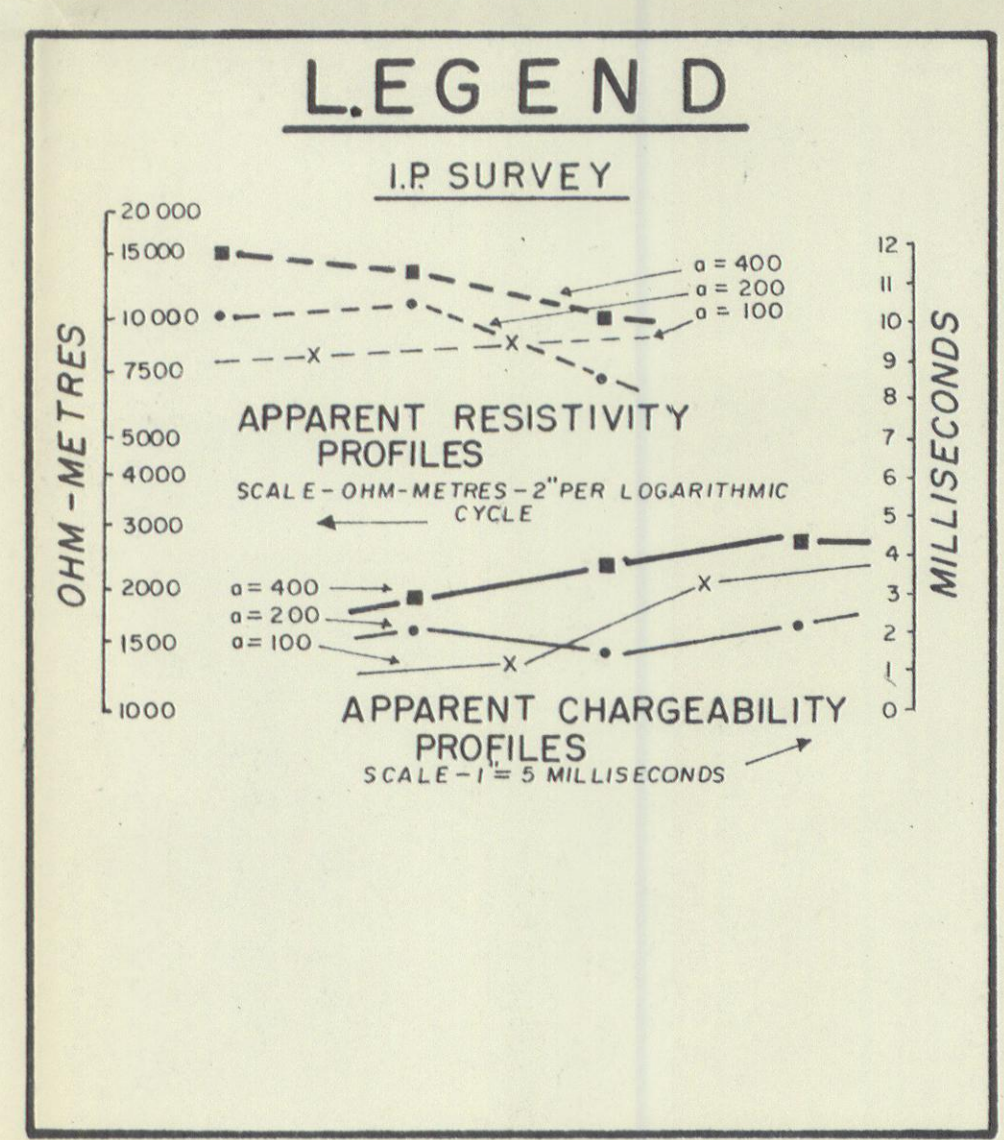
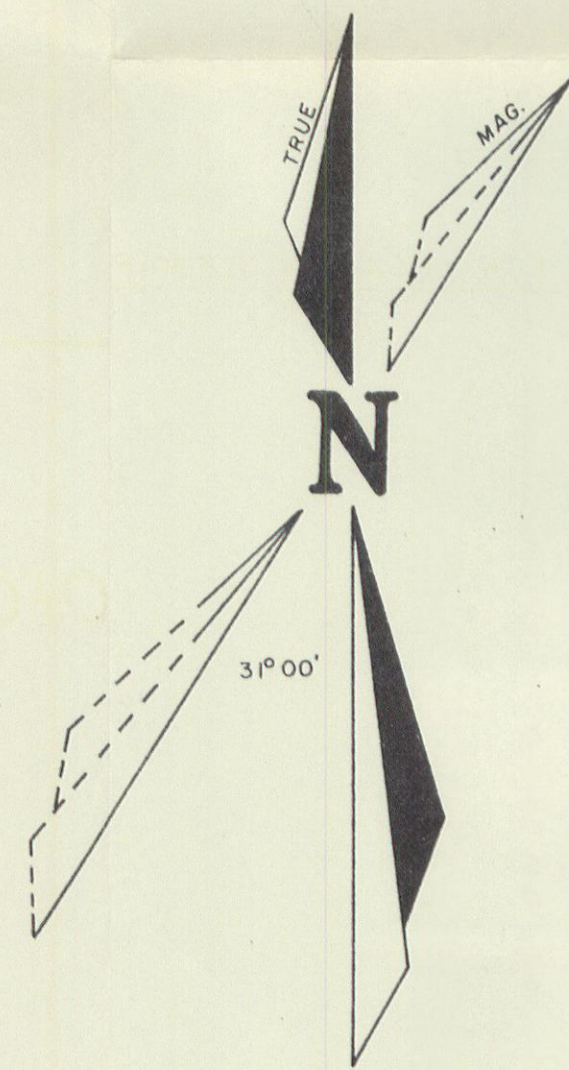
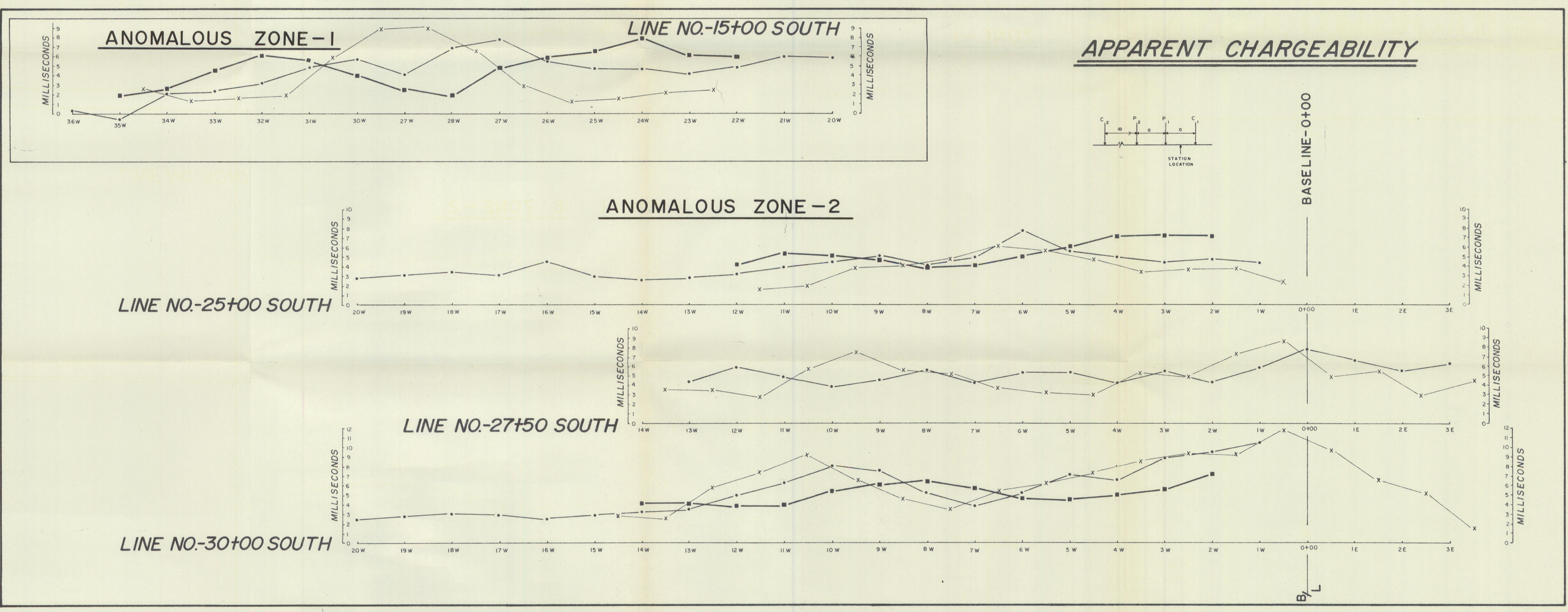
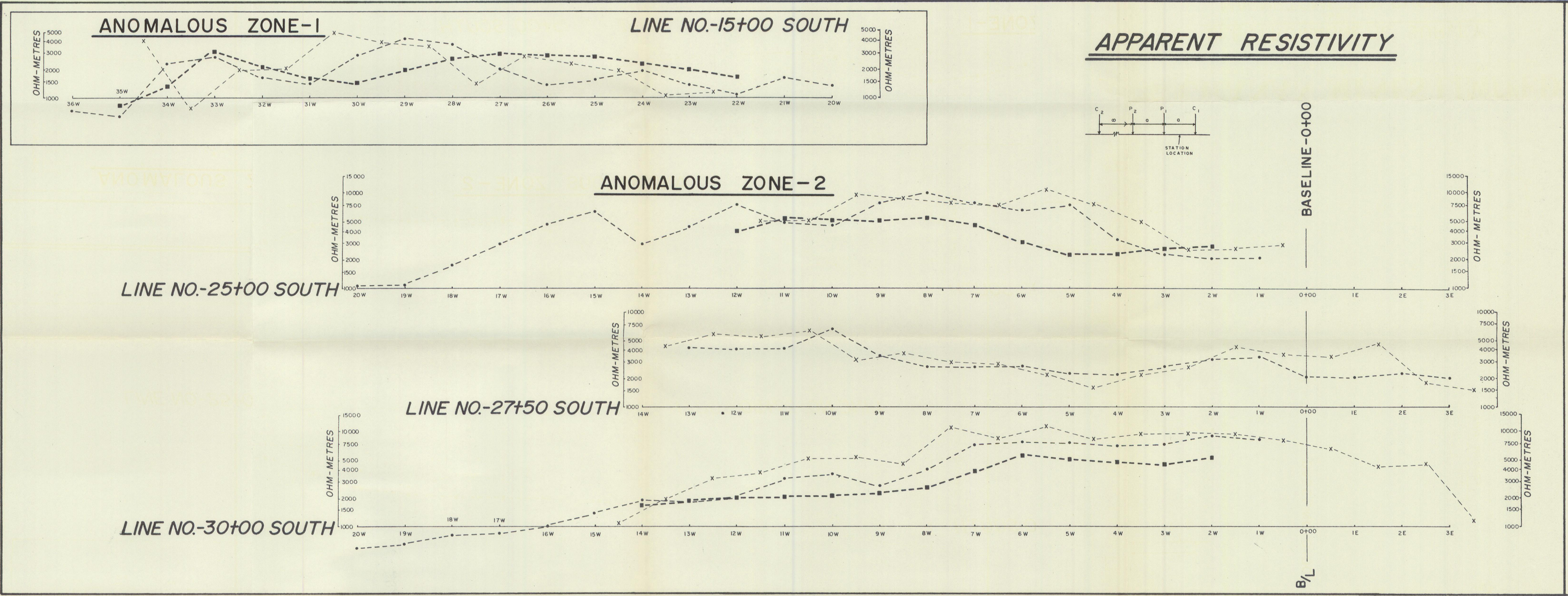
JUNE to OCTOBER - 1967

EAGLE GEOPHYSICS LIMITED

TO ACCOMPANY REPORT BY J. LLOYD-M. SC.

DATED DECEMBER - 1967

MAP NO. - E-112-1



FOR LOCATION SEE MAP NO.-E-112-2

QUATSINO COPPER-GOLD MINES LIMITED
NEW PRIVATEER MINES LTD.
BUCHANAN MINES LIMITED
 REX CLAIMS-WHITEHORSE-YUKON TERRITORY-WHITEHORSE MINING DIVISION

-DETAIL-
INDUCED POLARIZATION SURVEY
 APPARENT CHARGEABILITY AND APPARENT RESISTIVITY PROFILES

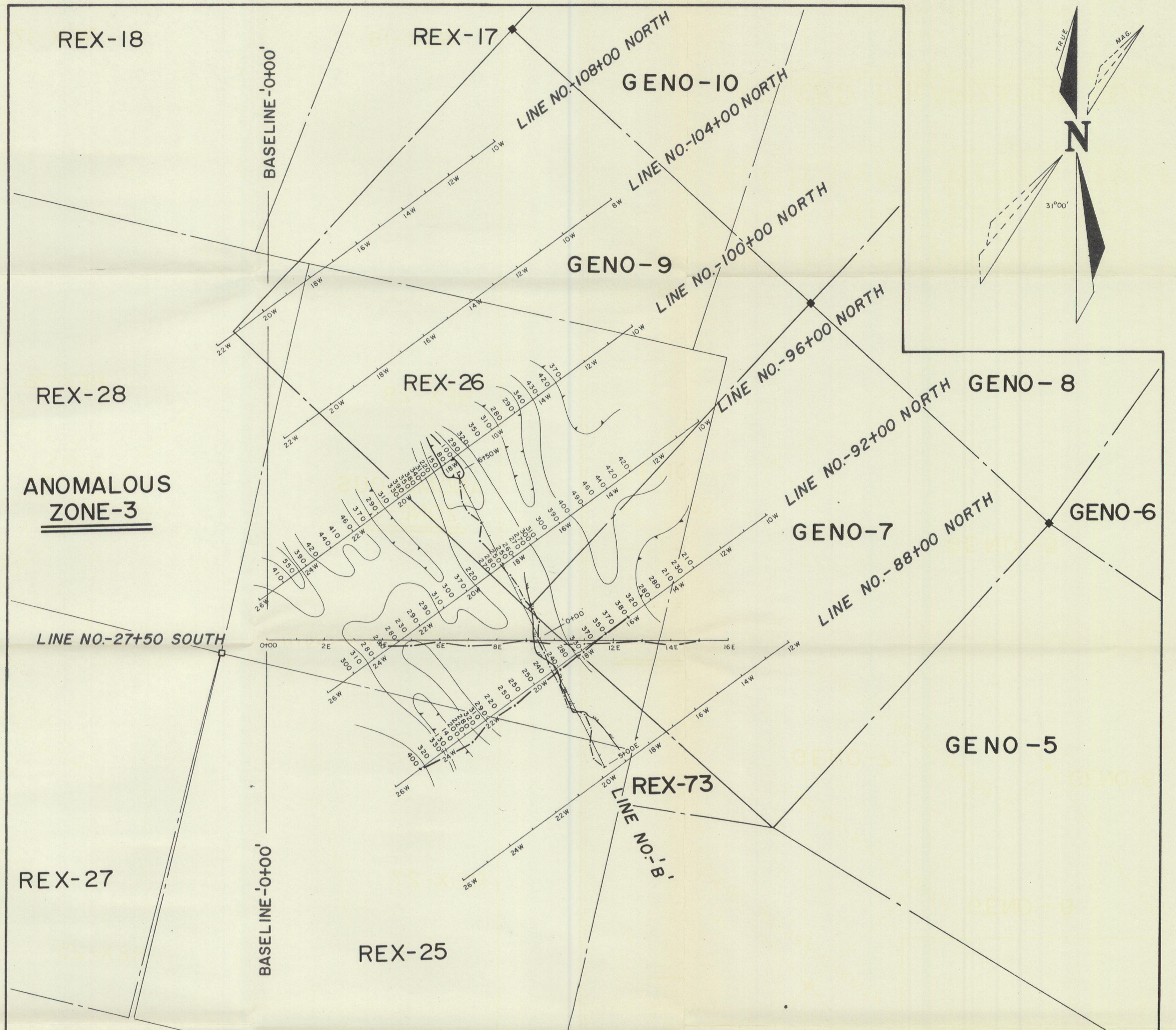
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 FEET FEET

JUNE to OCTOBER-1967

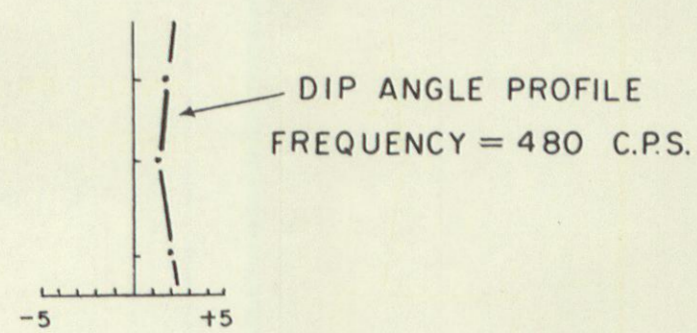
EAGLE GEOPHYSICS LIMITED
 TO ACCOMPANY REPORT BY J. LLOYD-M.S.C.
 DATED DECEMBER-1967

MAP NO.-E-112-3



LEGEND

E.M. SURVEY



MAGNETOMETER SURVEY

Contour Interval 100 Gammas

Magnetic Low

SYMBOLS

- — CLAIM POST AND BOUNDARY
- SCARP

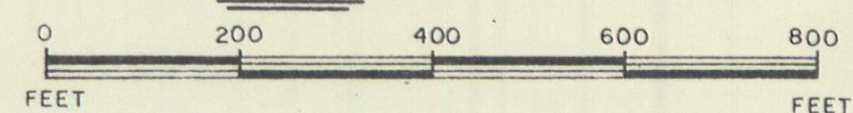
FOR LOCATION SEE MAP NO.-E-112-1

QUATSINO COPPER-GOLD MINES LIMITED
NEW PRIVATEER MINES LTD.
BUCHANAN MINES LIMITED

REX CLAIMS-WHITEHORSE-YUKON TERRITORY-WHITEHORSE MINING DIVISION

CRONE TYPE
ELECTROMAGNETIC SURVEY
 AND
MAGNETOMETER SURVEY

Scale - 1" = 200 Feet



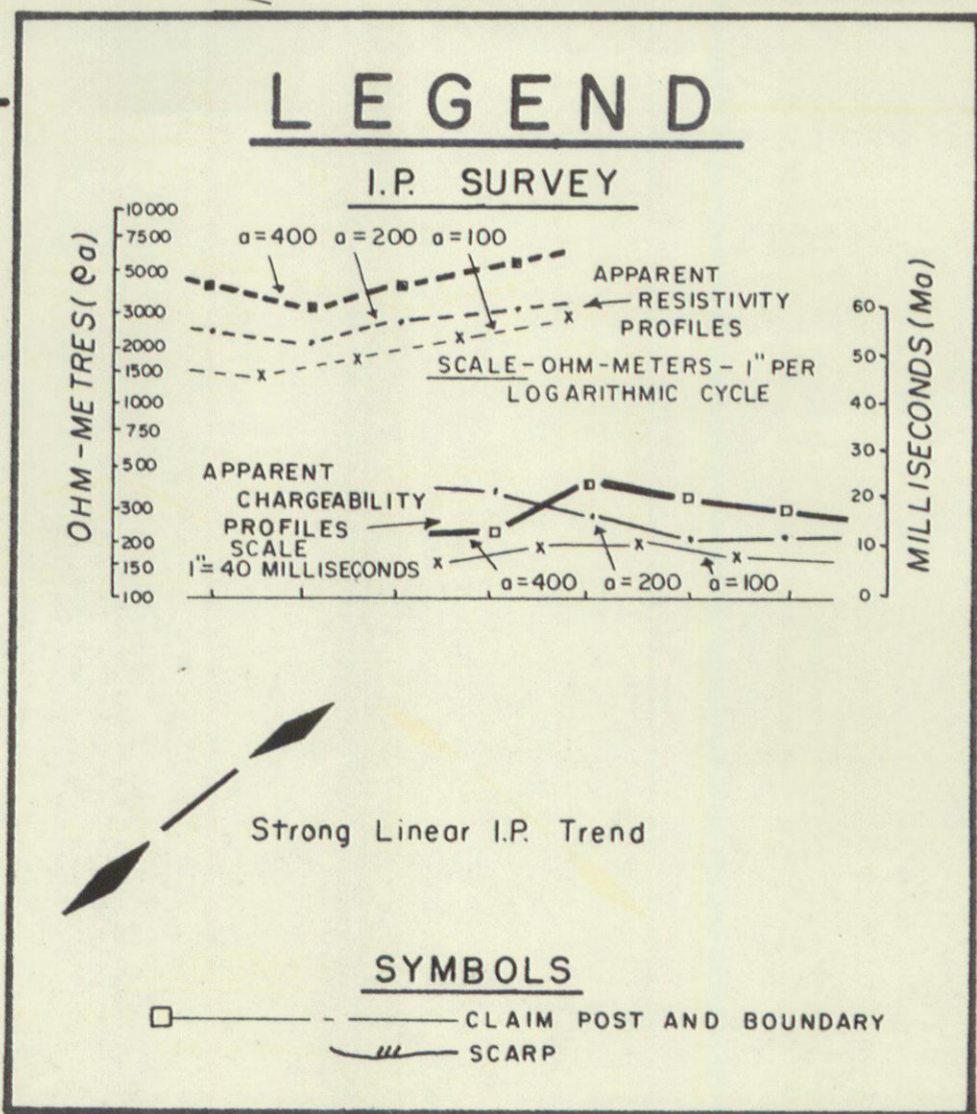
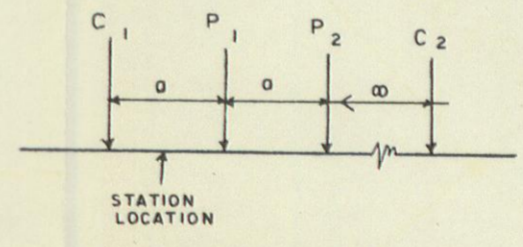
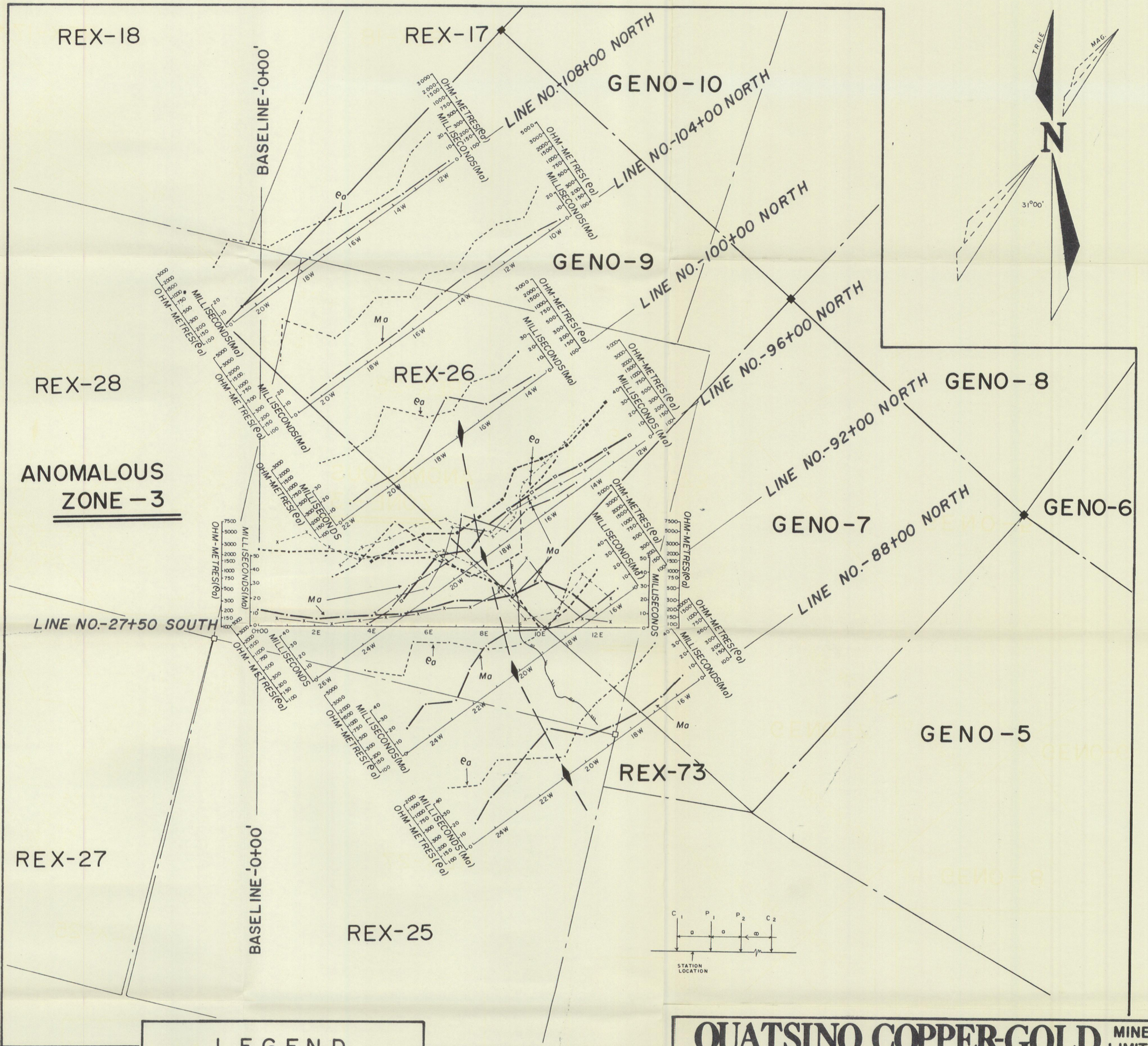
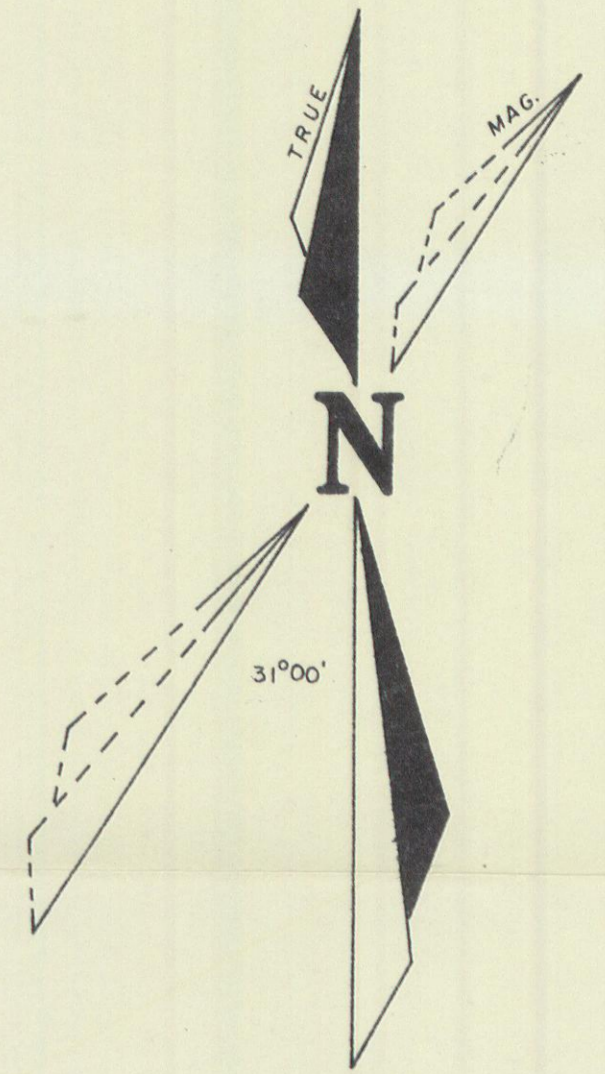
JUNE to OCTOBER-1967

MAP NO.-E-112-4

EAGLE GEOPHYSICS LIMITED

TO ACCOMPANY REPORT BY J.LLOYD-M.Sc.,
 DATED DECEMBER-1967

John Lloyd M.Sc.



FOR LOCATION SEE MAP NO-E-112-1

QUATSINO COPPER-GOLD MINES LIMITED

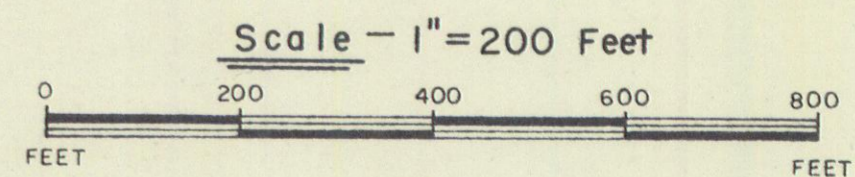
NEW PRIVATEER MINES LTD.

BUCHANAN MINES LIMITED

REX CLAIMS - WHITEHORSE - YUKON TERRITORY - WHITEHORSE MINING DIVISION

INDUCED POLARIZATION SURVEY

APPARENT CHARGEABILITY (Ma) AND APPARENT RESISTIVITY (ea) PROFILES



JUNE to OCTOBER - 1967

EAGLE GEOPHYSICS LIMITED

MAP NO - E-112-5

TO ACCOMPANY REPORT BY J. LLOYD - M.Sc.,
DATED DECEMBER - 1967

John Lloyd M.Sc.