

A GEOPHYSICAL REPORT ON
AN INDUCED POLARIZATION SURVEY

JUBILEE MOUNTAIN PROPERTY CONSISTING CROWN GRANTS ATLANTA
LOT 134, HORSESHOE LOT 266, LONDON LOT 15303, MANCHESTER
LOT 15304, CORNWALL LOT 15305, MOUNTAIN DAISY LOT 647,
LANCASTER LOT 1112 AND SILVER KING LOT 648. NEAR
SPILLIMACHEEN, B.C. GOLDEN MINING DIVISION, B.C.
(50° 116° N.E.).

82 K/16W

FOR

CALIX MINES LIMITED

Supervision and Reporting by: W.A. Finney, B.Sc.,
Geophysicist.

J.W. Prior, M.Sc., FGS.
Geophysicist.

February 28th to March 10th, 1968.

HOPE AND JUBILEE GROUP 142.



HUNTEC LIMITED

1241
1641

1247

REPORT ON
AN INDUCED POLARIZATION (I.P.)

SURVEY

JUBILEE MOUNTAIN PROPERTY

50° 116° NE

GOLDEN MINING DIVISION, BRITISH COLUMBIA

FOR

CALIX MINES LIMITED

BY

HUNTEC LIMITED
TORONTO, ONTARIO

APRIL, 1968

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INTRODUCTION

General

This report contains the results of an Induced Polarization survey carried out by Huntco Limited for Calix Mines Limited on the Jubilee Mountain Properties in the Golden Mining Division, British Columbia.

The purpose of the survey was to prospect for sulphide mineralization in both massive and disseminated form. A report by G. W. Edwards in 1927 outlines the prospecting done to that date and describes the mineralization in the area as being in three distinct zones: the galena bearing zone, the copper bearing zone and the barium sulphate zone, each being in large barite veins which Edwards considers to be replacement deposits within the southwesterly dipping Ottertail magnesian limestone. The early work appears to have produced favourable assays, but no large economic body of ore was found. The present I.P. survey was aimed primarily at resolving drilling targets within the more favourable areas.

The field work was carried out between February 28th and March 10th, 1968. The field crew was managed by W. Mairs and the project supervised from Vancouver by R. K. Watson.

The Property

The property surveyed includes the claims known as (from north to south):

Atlanta	Lot 134
Horseshoe	Lot 266
Fermanagh	Lot 15306
London	Lot 15303
Manchester	Lot 15304
Corwall	Lot 15305
Mountain Daisy	Lot 647
Lancaster	Lot 1112
Silver King	Lot 648

These properties are on the east side of Jubilee Mountain, 3,000 ft. northeast of Jubilee Mountain Forestry Look-Out, 2 3/4 miles south of Harrogate and 4 3/4 miles northwest of Spillimacheen. Access was by unpaved road (forestry) from the highway and the crew was based in Spillimacheen.

The claims are adjacent and form one irregular block about 8,000 feet long by 1,500 ft. wide with the long axis lying northwest, southeast. Parallel survey lines were cut at 400 ft. separation and staked at 200 ft. interval, each line being up to 1,500 ft. long in a north-east direction. Base line - 0 was along the southwest side of the area and extended down the centre of the Silver King claim as shown on Drawing No. 1. The geology is generally described as the Ottertail magnesian limestone with a dip to the southwest of 35°.

The mineralization occurs as numerous veins and bedding replacements of barite within the magnesian limestone. The sulphides of galena, sphalerite, and in some places chalcopyrite and chalcocite occur as scattered replacements or as small pockets of richer ore in the barite and limestone.

SURVEY SPECIFICATIONS

The Equipment

The Induced Polarization equipment used was a pulse-type system with the following specifications:

Type of Current	Direct current, interrupted periodically.
Frequency	1.5 seconds "current-on" and 0.5 seconds "current-off". Alternate pulses have reverse polarity.
Maximum power available	7.5 Kw
Maximum current available	8.0 amps.
Integration time	400 m.secs.

Measurements taken in the field were:

- (a) The current flowing through the current electrode C_1 and C_2 .
- (b) The primary voltage V_p between the measuring or potential electrodes P_1 and P_2 during "current-on" time.
- (c) The secondary voltage V_s between P_1 and P_2 during "current-off" time.

The apparent chargeability (M_a) in milliseconds is calculated by dividing the secondary voltage by the primary voltage and then multiplying by 400 which is the sampling time in milliseconds of the receiver unit. The apparent resistivity is calculated by dividing the primary voltage by the current and multiplying by the geometrical factor appropriate to the electrode array being used.

Electrode Configuration

The entire I.P. survey was carried out using the pole-dipole electrode configuration or array. In this array the current electrode C_1 and the two potential electrodes P_1 and P_2 are moved in unison along the line to be surveyed. The quantity "a" or electrode separation is the distance between C_1 and P_1 . The distance between P_1 and P_2 is kept at some convenient value usually equal to "a" or some simple fraction of "a". For the reconnaissance phase of the survey the value of "a" was maintained at 200 feet.

As the value of "a" is a rough approximation to the depth penetration, detailing of anomalies discovered in the reconnaissance phase was done by profiling across them using multiple electrode separations. This additional information facilitates the estimation of the depth and location of the causative body.

RESULTS AND INTERPRETATION

Presentation

The results of the reconnaissance phase of this survey are shown on Drawing No. 1 as contours of apparent resistivity and apparent chargeability at a scale of 1" to 300 feet. This drawing is located in the pocket at the back of the report. Parts of the lines which were detailed using more than one electrode array and spacing are indicated with double lines and arrows, and the results of this detailed work are shown separately in profile form in Drawings Nos. 2 to 4. These are included as separate fold-outs bound into the body of the report.

Sections of interpreted causative bodies are shown under the profiles. Outlines of these causative bodies, and other data relating to depth to upper surface are also shown in the Drawings.

Interpretation

The contour plan of apparent chargeability on Drawing No. 1 shows a large area of the claims as having apparent chargeabilities of between 2 to 3 milliseconds, this value of apparent chargeability is typical of non-mineralized rocks and is considered to be the background value. Anomalous zones of apparent chargeability are generally considered as twice background value, hence in this area apparent chargeabilities of 5 milliseconds would be considered significant. The significance of an apparent chargeability anomaly is enhanced if accompanied by a decrease in the apparent resistivity.

The observed apparent resistivities throughout the claim group indicate a strong resistivity gradient running in a sinuous manner from northwest to southeast diagonally across the property with high resistivities of 10,000 ohm-metre plus to the east and generally less than 600 ohm-metre to the west. This line, which approximates the 100 ohm-metre contour, is approximately along the local geological strike and indicates a distinct change in character of the rocks from west to east. The feature is tentatively interpreted as a fault but may prove to be a simple lithological boundary, however, the area of interest is mainly to the west of this feature.

The contours of apparent chargeability show three areas within the main body of the survey which have anomalous value of up to 7.2 milliseconds; the lines through these areas were detailed with multiple separation arrays and the profiles are presented on Drawings nos. 2 to 4.

Detail Line L-0 indicates three bodies, all of which are interpreted as approaching to approximately within 160 feet of surface. The two westerly bodies show depth extent and could possibly be joined below 300 feet.

Detail Line L-8S indicates a single body, coincident with the base line, which rises to within 100 feet of the surface; there may be smaller satellite bodies to the east a 3E and 6E.

Detail Line L-20S indicates two discrete bodies at about 200 feet depth. The curves indicate that the centre position are at about 1W and 4E.

These anomalies observed on the detail lines are all at or near the property boundary, and there are indications that the mineralization is transgressing across the boundary out of the property in a south-westerly direction. The detail lines were extended outside the property, but on Line L-20S there is no clear evidence that the peak of the anomaly has been passed at 3W and only the eastern extremity of the mineralized zone has been determined along this line.

The extension of B/L-0 onto the Silver King property is the longest section of high apparent chargeabilities with accompanying low apparent resistivities; the chargeabilities obtain values of 7.5 milliseconds which are higher than any other values recorded in the survey area. The apparent resistivities generally decrease to the southeast which would indicate that the fault feature remains east of B/L-0 and that the Silver King property is in the same geologic horizon as the other observed anomalies. The high apparent length of the Silver King property anomaly may be due to the low intersection angle between the traverse line and the local strike direction.

The strong resistivity contrast from west to east, as seen on all the detail lines, suggests a distinct lithologic change. The change in rock type might be associated with a possible fault which has been inferred from these results and is shown on the apparent resistivity map (Drawing No. 1). The interpreted causative bodies lie close to this fault which, if it exists, probably has had a strong influence on the mineralization in this area.

There is a strong possibility that the interpreted causative bodies are sulphide bearing and warrant further investigation. However, it is recommended that the ground immediately to the west of the baseline should be acquired before follow-up work is carried out and the western extent of the mineralized zone be determined by further I.P. work.

Drill targets could be tentatively sited to test the anomalies already detected but these locations are very close to or outside the present property boundary. Angled drill holes dipping to the east or north-east would appear to be best, but a close study of the local geology is necessary in order to site the drill holes which would extract the maximum information.

SUMMARY AND CONCLUSIONS

1. The I.P. survey over this claim group covered 3.77 line miles of reconnaissance and 1.14 line miles of detailed work.
2. The survey has revealed a prominent contact, possibly faulted, which runs diagonally across the properties from northwest to southeast. To the east of this line the apparent resistivities are high, generally in the order of 2,000 to 10,000 ohm-metre, with low apparent chargeabilities, typical of barren rock, with readings of 2 to 3 m.secs. To the west of the feature the resistivities are generally less than 5,000 ohm-metre with apparent chargeabilities of up to 7 m.secs., in several discrete anomalies across which detail profiles were made.
3. The Silver King property is believed to be to the west of the fault feature and is typified by high apparent chargeabilities and relatively low apparent resistivities. The length of the anomaly is considered to be a function of strike and traverse direction.
4. Extension of I.P. survey west of the base line is recommended in order to fully determine the extent of the mineralized zone. Drill targets could then be selected which would test the causative bodies and at the same time yield the maximum geological information.

Respectfully submitted,

HUNTEC LIMITED

W. A. Finney

W. A. Finney, B.Sc.,
Geophysicist.

J. W. Prior

J. W. Prior, M.Sc., FGS,

BIOGRAPHICAL NOTES

Authors' Qualifications

Name	Jason Wyn Prior
Company	Huntec Limited
Professional Capacity	Geophysicist
Nationality	British
Place and date of birth	Nottingham, England. October 14, 1935.
Marital status	Married, one child
Education	Primary and secondary education in Nottingham. University of Nottingham, 1954 - 1958. Imperial College, University of London, 1958-1960.
Academic Qualifications	B.Sc. in geology, 1958 M.Sc. in geophysics, 1960
Experience	1960 - Geophysicist with Ghana Geological 1962 Survey, Accra. Engaged on ground follow-up of airborne surveys; magnetic, electromagnetic and gravity surveys at mining properties and prospects; regional gravity survey of Volta Basin. 1962 - Joined Selection Trust group and was 1964 involved with Barringer Research Limited in adapting INPUT system for use on ground surveys. In charge of field testing and operation through Eastern States of Australia. 1964 - Geophysicist with Adastral Hunting 1966 Geophysics Pty. Ltd. in Sydney, Australia. Trained in detailed interpretation of aero- magnetic surveys for oil. Field re- sponsibility for Raydist and Doppler offshore aeromagnetic surveys and P.S.S.A. requirements. Field control and preliminary interpretation of twin frequency airborne electromagnetic surveys. Undertook several shallow seismic refraction surveys for engineer- ing projects.

1966 Joined Huntec Limited and has since
been involved in a variety of airborne
and ground mineral surveys, as well
as offshore and land seismic programs.

Professional Societies

London Geological Society
European Association of Exploration Geophysicists
Society of Exploration Geophysicists

BIOGRAPHICAL NOTES (CONT'D)

NAME	William Alexander Finney
COMPANY	Huntec Limited
PROFESSIONAL CAPACITY	Geophysicist
NATIONALITY	British
PLACE AND DATE OF BIRTH	Belfast, North Ireland, July 26th 1938.
MARITAL STATUS	Married
EDUCATION	Primary and Secondary education in Downpatrick, County Down, Queen's University of Belfast, 1956 - 1960.
ACADEMIC QUALIFICATIONS	B.Sc. in Physics, 1960.
EXPERIENCE	1960 - Engineer with Short Bros and Harland, Belfast. 1962 - Engaged on the development and use of analogue computing systems for solution non liner control systems. 1964 - Joined Bureau of Mineral Resources (B.M.R.) 1967 - Canberra, Australia. Employed as a geophysicist in the airborne section involved in aeromagnetic and radiometric surveys. In charge crews on both oil and metalliferous type surveys including all aspects such as field operations, interpretation and report writing. 1967 - Joined Huntec and have been involved in ground 1968 mineral surveys, mainly I.P., throughout B.C.

APPENDIX A

ASSESSMENT CREDIT DATA

<u>Miles Surveyed</u>	<u>Line Miles</u>
- Reconnaissance	3.77
- Detail Phase	<u>1.14</u>
	4.91

Personnel:

<u>Name</u>	<u>Position</u>	<u>Dates</u>
W. Mairs	Operator/Party Chief	Feb. 28-Mar. 10, inc. 1968.
J. Cox	Operator	Feb. 28-Mar. 10, inc. 1968.
B. Whiting	Helper	Feb. 28-Mar. 10, inc. 1968.
P. Hendricks	"	Feb. 28-Mar. 1, inc. 1968.
M. Samilski	"	Mar. 2-Mar. 10, inc. 1968.
R. Carisse	"	Mar. 2-Mar. 10, inc. 1968.
D. Orbine	"	Mar. 2 only, 1968.
E. Helkio	Drafting	Mar. 12-Mar. 15, 1968.
J. Wilson	Drafting	April 18, 1968.
D. Howard	Typing	April 15 & 18, 1968.
W. Prior	Geophysicist	Mar. 22, Apr. 2, 3rd, 1968.
W. Finney	"	Mar. 21, Apr. 17, 1968.

APPENDIX A (CONT'D)

The total costs of this survey are as follows:

Complete Huntec Induced Polarization Unit		\$840.00
Living and Transportation costs for entire crew		\$580.00
W. Mairs	Senior skilled Technician and Operator @ \$80.00 per day	\$925.00
J. Cox	Skilled Technician and Operator @ \$60.00 per day	\$700.00
B. Whiting	Helper @ \$25.00 per day	\$300.00
P. Hendricks	" @ \$25.00 per day	\$ 75.00
M. Samilski	" @ \$25.00 per day	\$225.00
R. Carisse	" @ \$25.00 per day	\$225.00
D. Orbine	" @ \$25.00 per day	\$ 25.00
E. Helkio	Drafting @ \$60.00 per day	\$240.00
J. Wilson	" @ \$60.00 per day	\$ 60.00
D. Howard	Typist @ \$25.00 per day	\$ 25.00
W. Prior	Qualified Geophysicist for Report Writing and Interpretation. @ \$150.00 per day	\$450.00
W. Finney	Qualified Geophysicist for Report Writing and Interpretation. @ \$125.00 per day	<u>\$300.00</u>
TOTAL COSTS:		<u>\$4,970.00</u>

Declared before me at the *City* }
of *Vancouver* , in the }
Province of British Columbia, this *16th* }
day of *May, 1968* , A.D. }

William A. Finney

J. Paul

A Commissioner for taking Affidavits within British Columbia or
A Notary Public in and for the Province of British Columbia.

Sub-mining Recorder

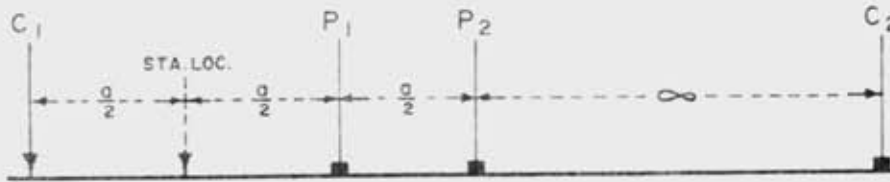
CALIX MINES LIMITED.

JUBILEE MTN., PROPERTY.
GOLDEN M.D., SPILLIMACHEEN - B. C.

3 - ELECTRODE ARRAY



POLE - DIPOLE ARRAY



NOTE:

P₁ P₂ are Receiver Electrodes.
C₁ C₂ are Transmitter Electrodes.

LEGEND

- ——— ● a = 50'
- ——— ○ a = 100'
- X ——— X a = 200'
- ——— ■ a = 300'
- △ ——— △ a = 400'
- ▲ ——— ▲ a = 600'
- ——— □ a = 800'

Horizontal Scale: 1 inch = 200 feet

Vertical Scales:

Chargeability 1 inch = 2.0 milliseconds.

Resistivity 2 inches = 1 logarithmic cycle (ohm-meters)

DATE: March 196

JOB N^o. PH. 762.



WHEN REPLYING PLEASE REFER TO

FILE NO. *[Handwritten signature]*

DEPARTMENT OF MINES AND PETROLEUM RESOURCES
VICTORIA

May 10th 1968

Mr. W. A. Finney,
Geophysicist,
Huntec Limited,
1409 West Pender Street,
VANCOUVER 5, B. C.

Dear Mr. Finney:

I have your letter of May 7th regarding the status of yourself and Mr. Prior in relation to the submission of assessment work.

If a geophysicist is not a member of the Professional Engineers he must submit his qualifications with each report; he is allowed only two such reports prior to registration. A copy of the Regulations is enclosed for your perusal, particularly items 4 to 6.

As far as you are concerned, having submitted an application to the Association of Professional Engineers, we are perfectly willing to accept reports from you until such time as the matter of your membership is settled, because I know that it may take some time to go through.

Mr. Prior's position is no different from any other. We recognize the fact of his competence but we must abide by our regulations which have been written as the result of a great deal of experience.

Yours, very truly,

A handwritten signature in cursive script, appearing to read "M. S. Hedley".

M. S. HEDLEY

for Chief, Mineralogical Branch

MSH:bg

Encl: Regulations re Assessment Reports

TELEPHONES
OFFICE: 263-9121
RESIDENCE: 261-6912

RESIDENCE
1638 WEST 62ND AVENUE
VANCOUVER 14, B.C.

M. BRUCE PATERSON

B.C. Land Surveyor

9031 HUDSON STREET
VANCOUVER 14, B.C.

18 May 1968

Calix Mines Ltd., (NPL)
605 - 535 Thurlow Street
Vancouver 5, B.C.

Re Surveys for line cutting for I.P.
Survey- Jubilee Mountain Claims.

Gentlemen;

As requested I submit a statement and breakdown of my account with your Company between February 2nd and March 5th, 1968 for surveying and cutting out lines required for an Induced Polarization Survey:

Invoices rendered	February 21,	\$ 1959.24
	March 5,	<u>1065.80</u>
		\$ 3017.04

Breakdown

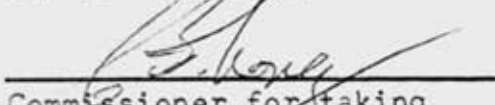
Party Chief - 21 days @ 48.00	\$ 1008.00
Axeman 21 @ 20.00	420.00
Axcman 9 @ 16.00	144.00
Board and Lodging	378.60
Truck Rental	105.00
Road Clearing (snow removal)	165.00
Snowshoe & Ski-Do Rental	132.13
Auto Mileage paid	156.00
Miscellaneous Plans purchased	5.71
Supervision & Office	<u>502.60</u>
	\$ 3017.04

This account has been paid in full.

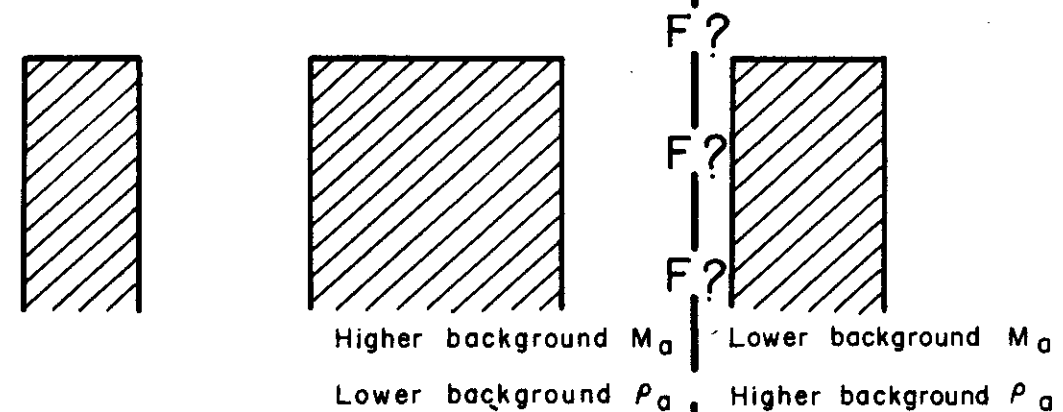
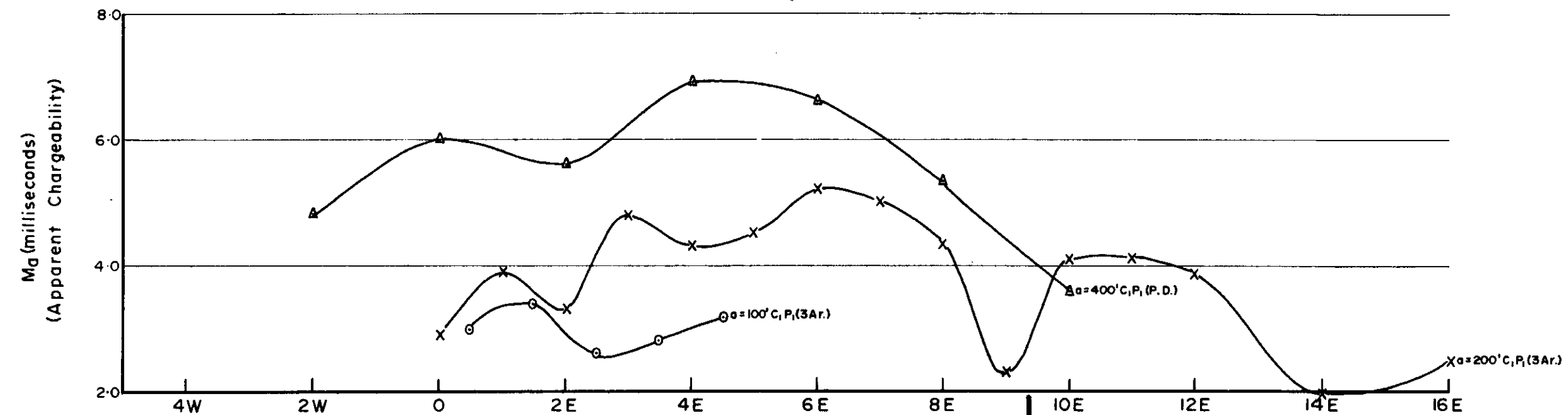
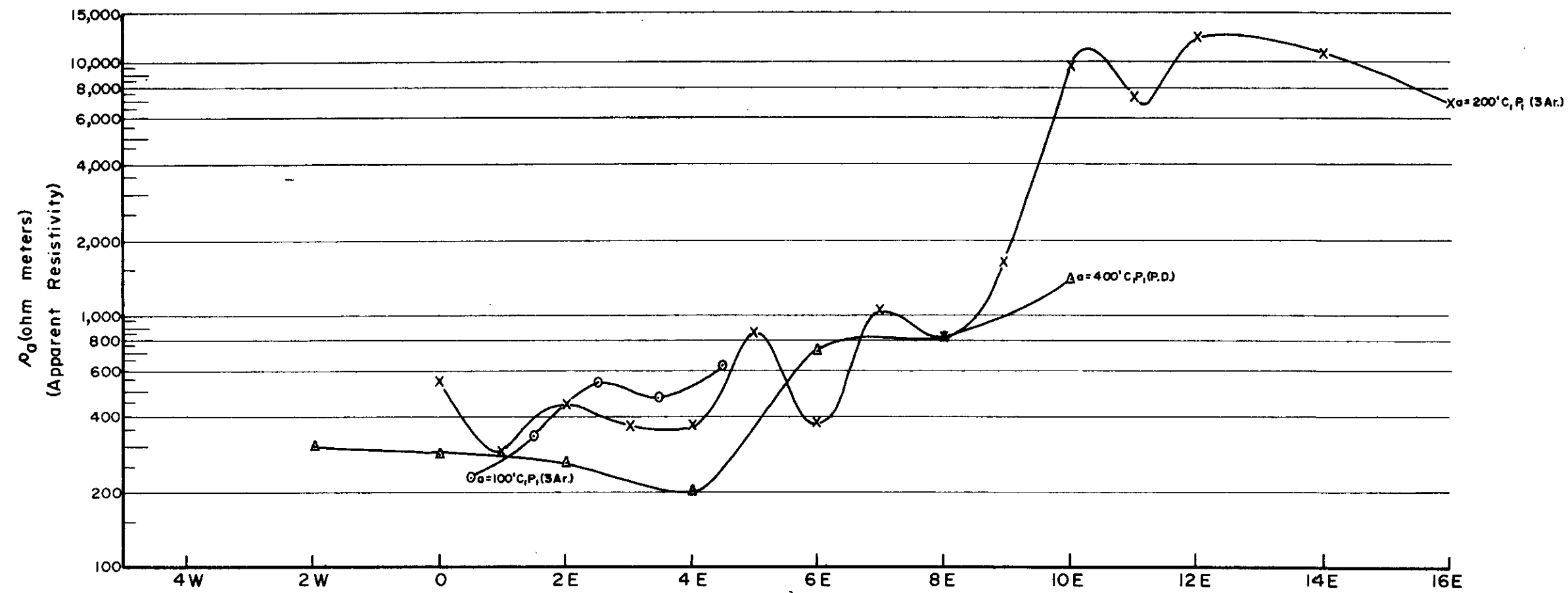
Yours very truly,


M. Bruce Paterson, B.C.L.S.

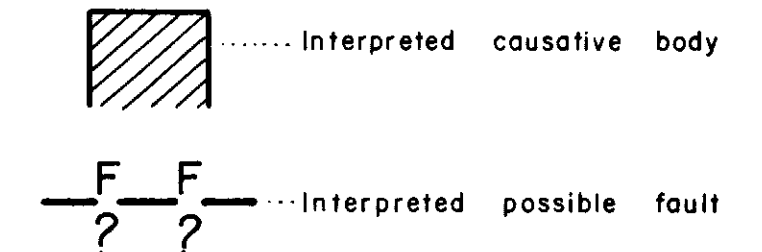
Sworn before me in the City
of Vancouver, Province of
British Columbia this 21st
day of May, 1968.


Commissioner for taking
Affidavits within the Province
of British Columbia.

INDUCED POLARIZATION SURVEY.
 DETAIL PROFILE: LINE - O.



LEGEND



CALIX MINES LIMITED.

JUBILEE MTN., PROPERTY.
 GOLDEN M.D., SPILLIMACHEEN - B.C.

Horizontal Scale: 1 inch = 200 feet.

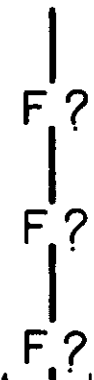
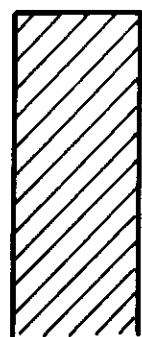
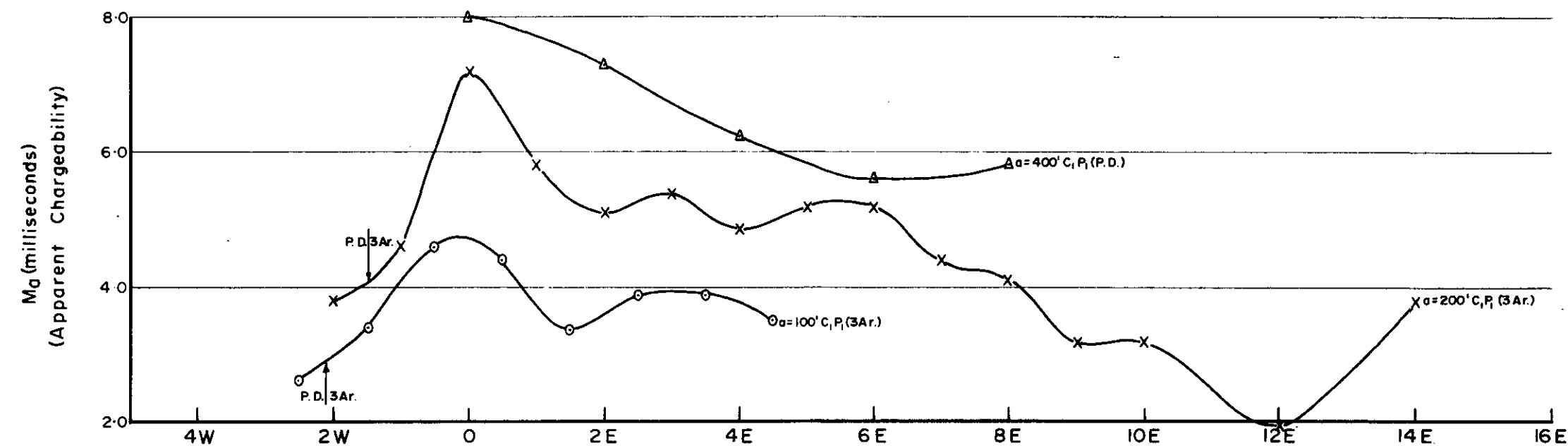
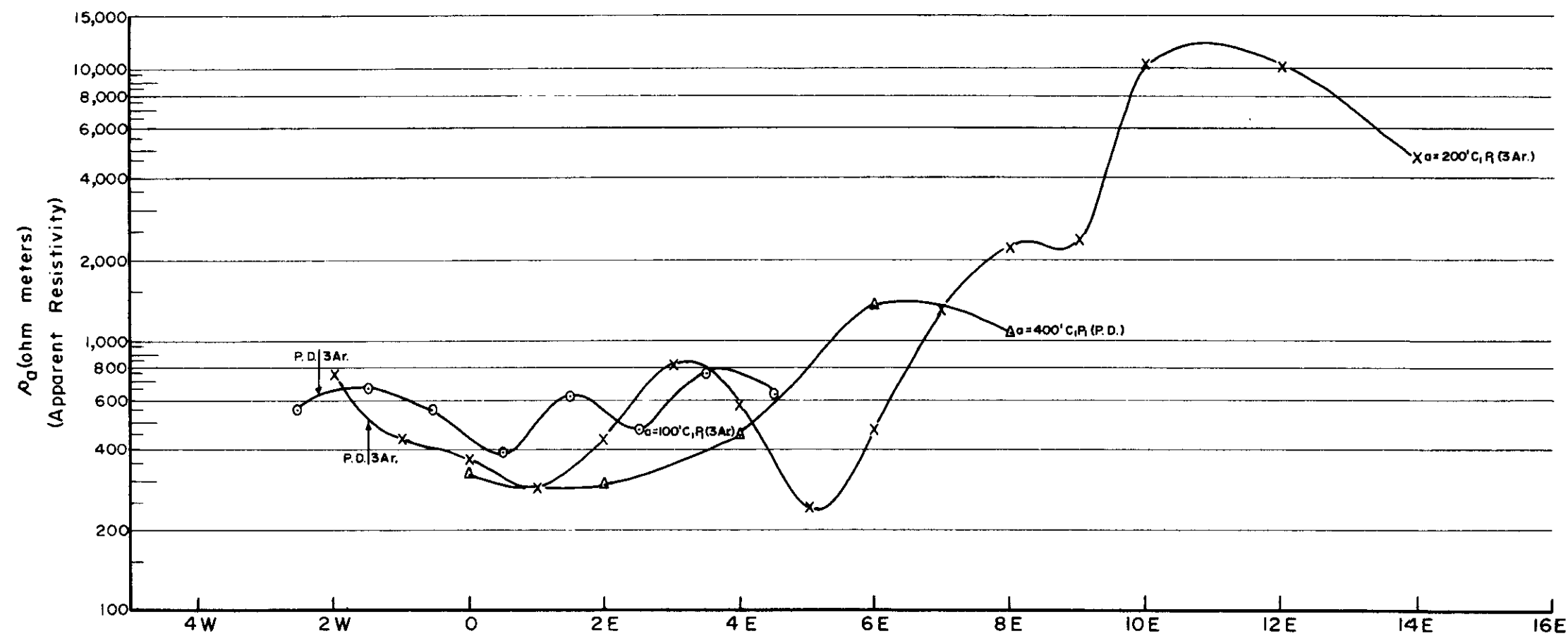
Vertical Scales:

Chargeability - 1 inch = 2.0 milliseconds.
 Resistivity - 2 inches = 1 logarithmic cycle (ohm-meters)

To accompany report by: *W. A. Finney*
 W. A. Finney, B. Sc., Geophysicist
J. W. Prior
 J. W. Prior, M. Sc., FGS, Senior Geophysicist
 HUNTEC LIMITED - Vancouver, Canada - March 1968.

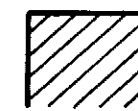
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INDUCED POLARIZATION SURVEY.
 DETAIL PROFILE: LINE - 8S.

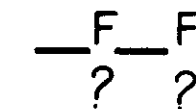


Higher background M_a | Lower background M_a
 Lower background P_a | Higher background P_a

LEGEND



Interpreted causative body



Interpreted possible fault

CALIX MINES LIMITED.

JUBILEE MTN, PROPERTY.
 GOLDEN M.D., SPILLIMACHEEN - B.C.

Horizontal Scale: 1 inch = 200 feet.

Vertical Scales:

Chargeability - 1 inch = 2.0 milliseconds.

Resistivity - 2 inches = 1 logarithmic cycle (ohm-meters)

To accompany report by: *W. A. Finney*

W. A. Finney, B. Sc., Geophysicist

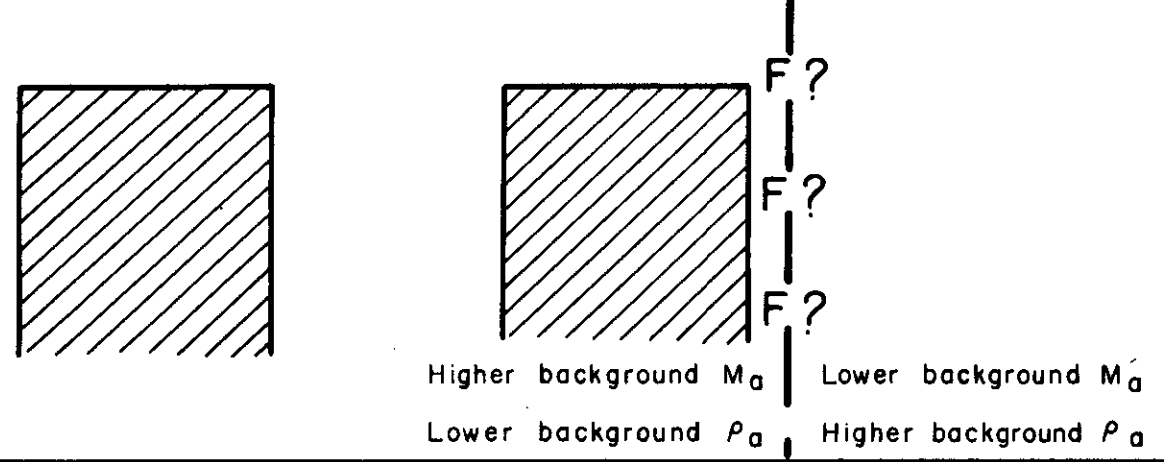
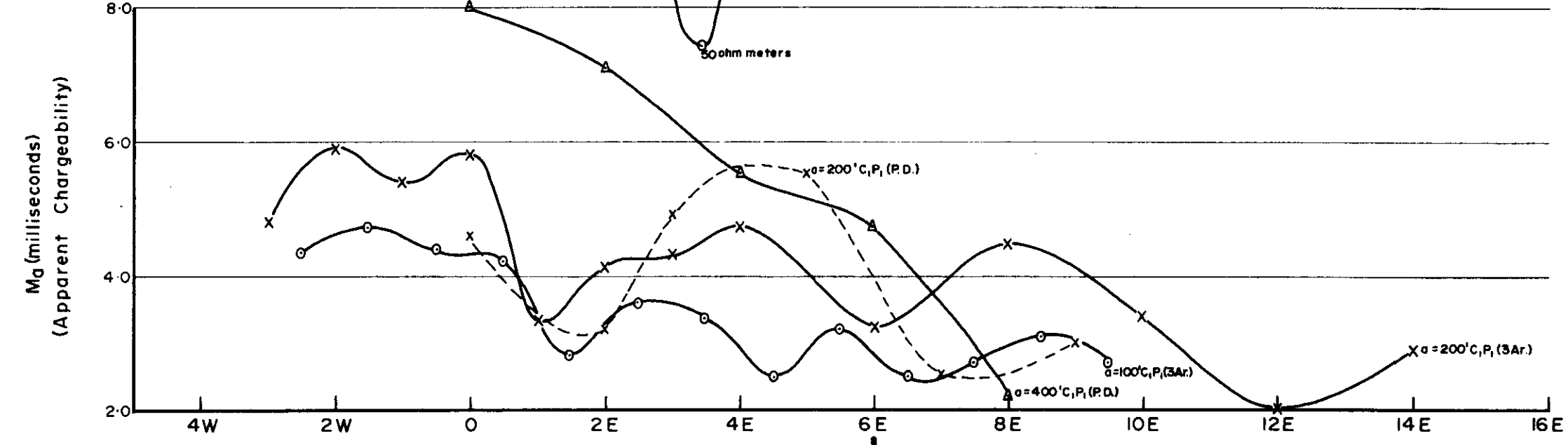
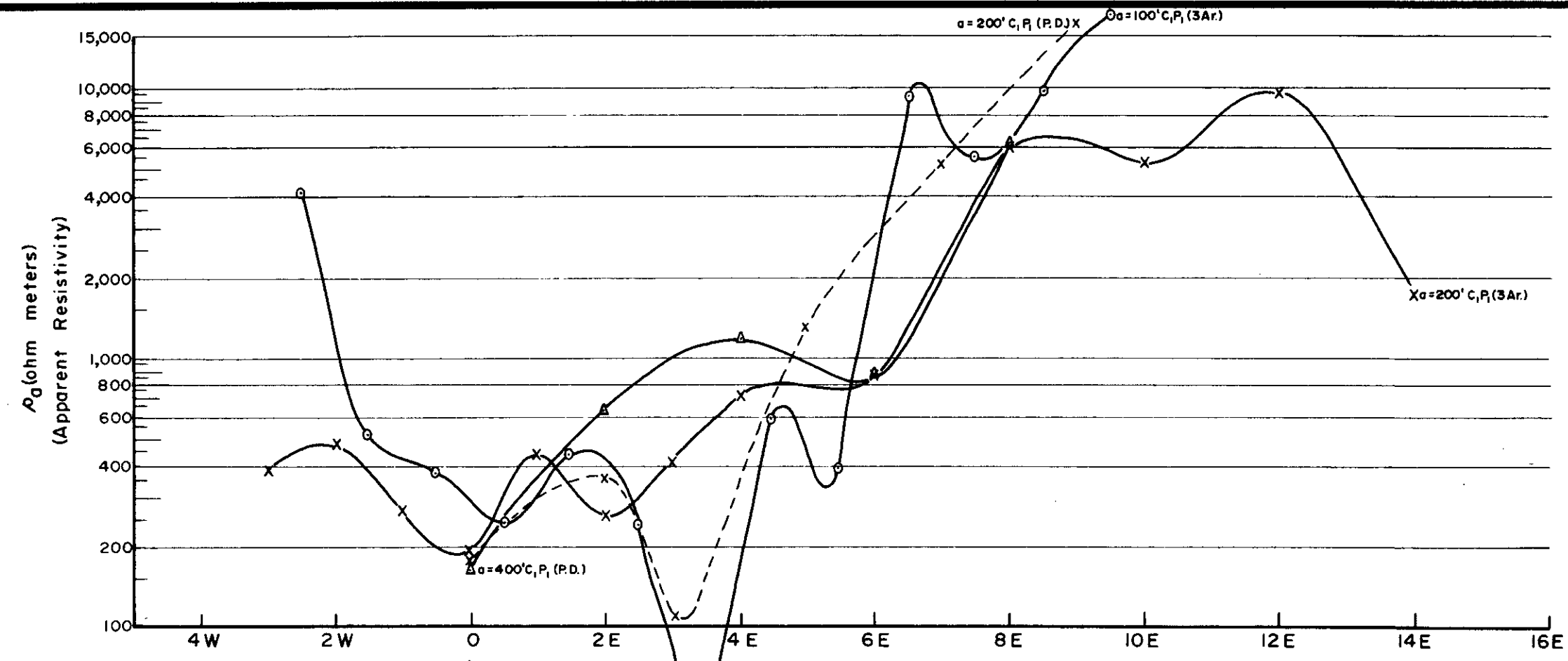
J. W. Prior

J. W. Prior, M. Sc., FGS, Senior Geophysicist

HUNTEC LIMITED - Vancouver, Canada - March 1968.

1247

INDUCED POLARIZATION SURVEY.
 DETAIL PROFILE: LINE - 20S.



LEGEND

..... Interpreted causative body

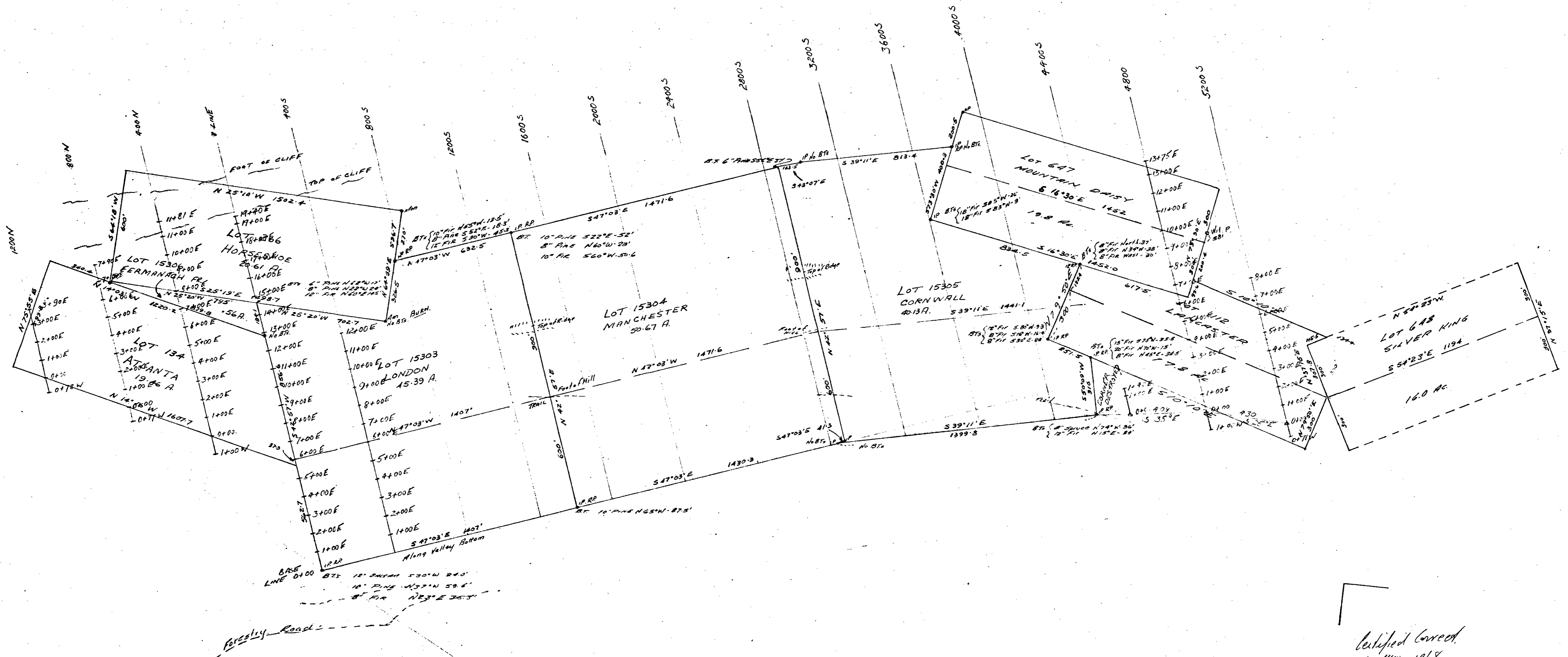
..... Interpreted possible fault

CALIX MINES LIMITED.
 JUBILEE MTN., PROPERTY.
 GOLDEN M.D., SPILLIMACHEEN - B.C.

Horizontal Scale: 1 inch = 200 feet.
 Vertical Scales:
 Chargeability - 1 inch = 2.0 milliseconds.
 Resistivity - 2 inches = 1 logarithmic cycle (ohm-meters)

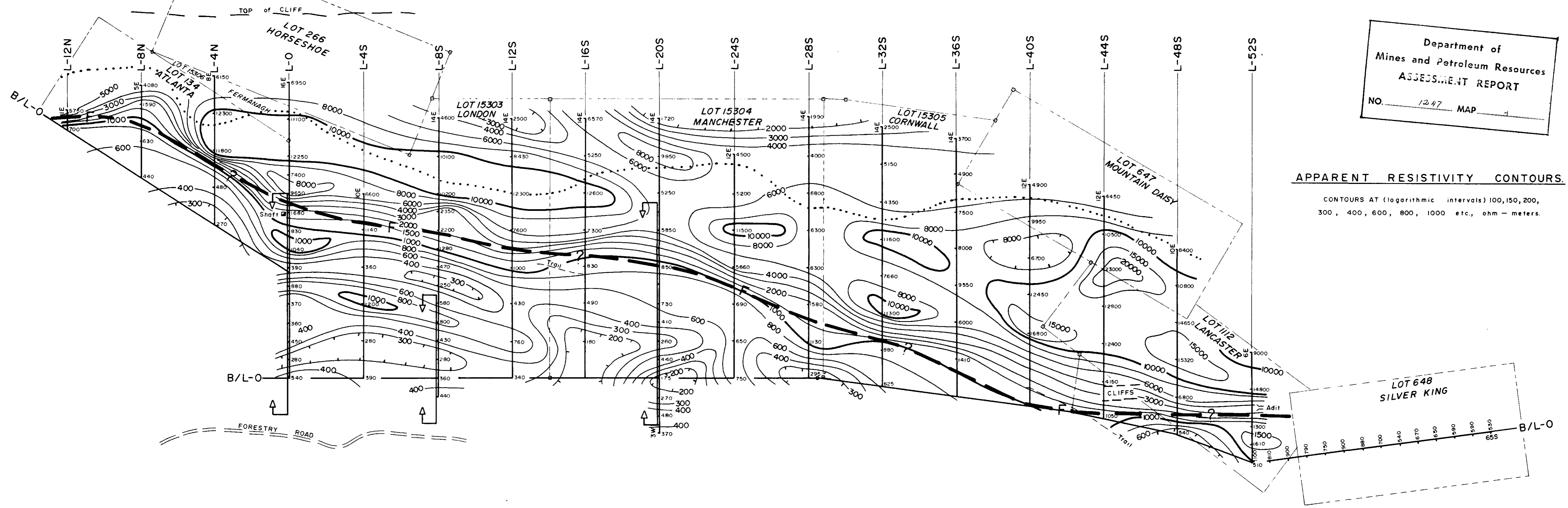
To accompany report by: *W. A. Finney*
 W. A. Finney, B. Sc., Geophysicist
J. W. Prior
 J. W. Prior, M. Sc., FGS, Senior Geophysicist
 HUNTEC LIMITED - Vancouver, Canada - March 1968.

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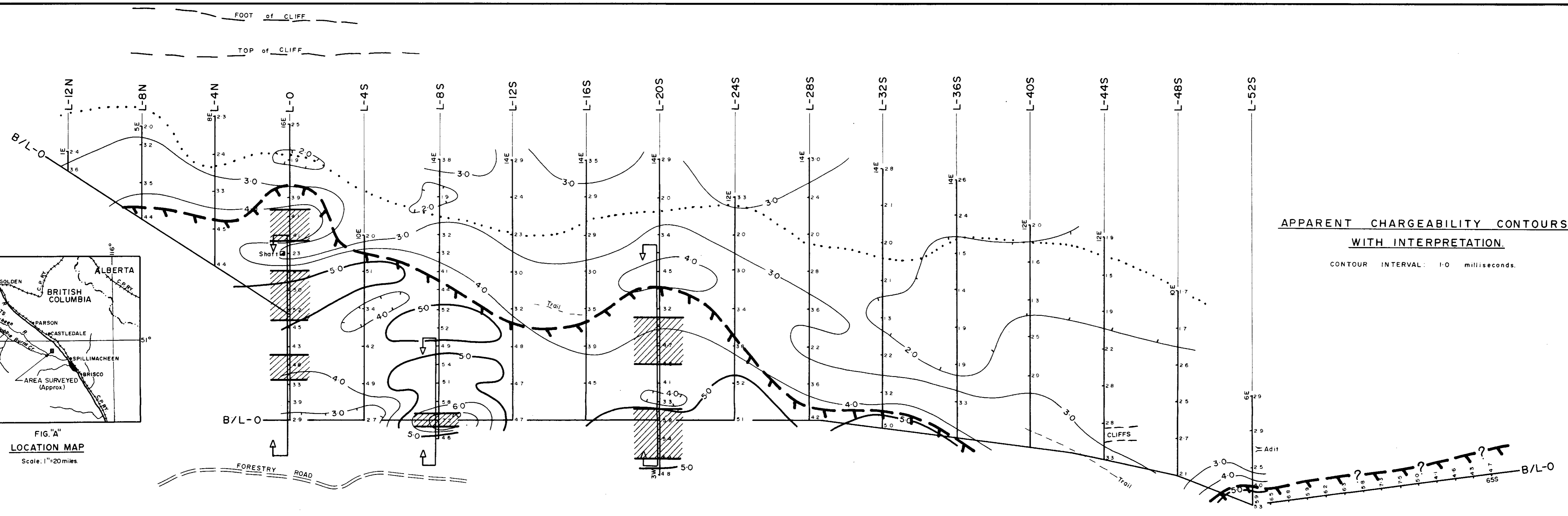


Certified Correct
 23 May 1968
 Hubert Peterson
 R.C.L.S.

1247



APPARENT RESISTIVITY CONTOURS.
CONTOURS AT (logarithmic intervals) 100, 150, 200, 300, 400, 600, 800, 1000 etc., ohm - meters.



APPARENT CHARGEABILITY CONTOURS
WITH INTERPRETATION.
CONTOUR INTERVAL: 1.0 milliseconds.

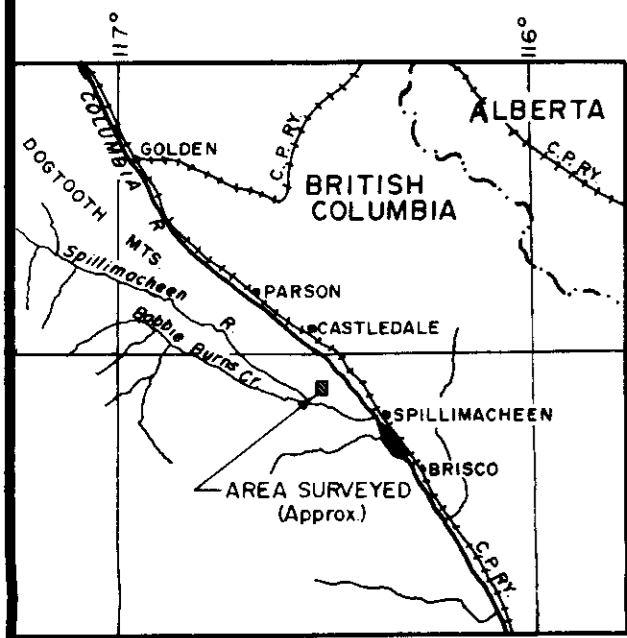
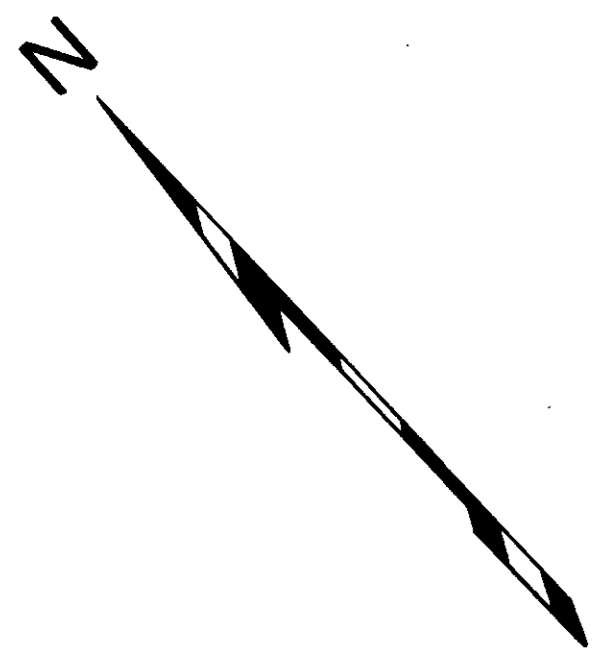
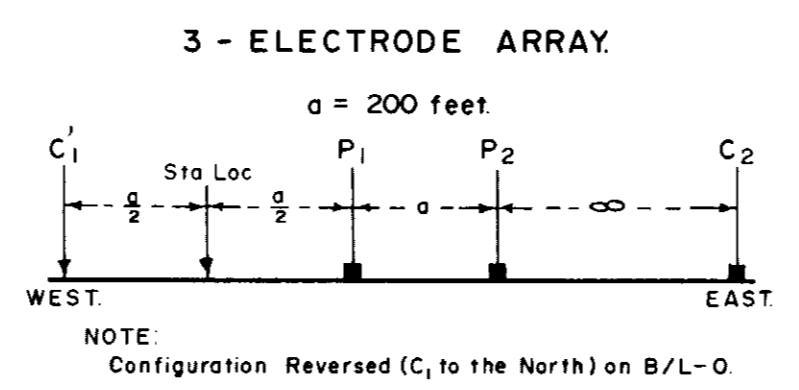


FIG. "A"
LOCATION MAP
Scale: 1" = 20 miles



- LEGEND**
- Portion of Line Covered by Detail Surveying.
 - Top of Ridge
 - Interpreted possible fault
 - Interpreted causative body
 - Outline of anomalous zone



CALIX MINES LIMITED.
JUBILEE MTN, PROPERTY.
GOLDEN M.D., SPILLIMACHEEN - B.C.

INDUCED POLARIZATION SURVEY.

To accompany report by: *W. A. Finney*
W. A. Finney, B. Sc., Geophysicist
J. W. Prior, M. Sc., FGS, Senior Geophysicist
HUNTEC LIMITED VANCOUVER-CANADA.

SCALE 1 inch = 300 feet
DRAWN: E.H.
DATE: March 1968.
JOB N° PH 762.

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