REPORT ON SUPPLEMENTARY INDUCED POLARIZATION SURVEY ON THE SAM ROSS CREEK PROPERTY ENDAKO AREA, B. C. FOR AMAX EXPLORATION INC.

McPHAR GEOPHYSICS LIMITED

1235

			Date Approved:	1967.01.01			Off Confidential:	
ASSESSMENT REPORT: 01235			Mining Division(s):	Omineca				
Property Name:								
Location:	NAD 27	Latitude: 54 04 54	Longitude:	125 15 06	UTM:	10	5994736	352700
	NAD 83	Latitude: 54 04 54	Longitude:	125 15 12	UTM:	10	5994956	352596
	NTS:	093K03E 093K03W						

Camp:

Claim(s): LORNE

Operator(s): Amex Ex.
Author(s): Bell, R.A., Fountain, D.

Report Year: 1967

No. of Pages:

Commodities Searched For:

General Work Categories: GEOP

Work Done: Geophysical
IPOL Induced Polarization (0.0 km;)

Keywords:

Statement Nos.:

MINFILE Nos.:

Related Reports:

REPORT ON SUPPLEMENTARY
INDUCED POLARIZATION SURVEY
ON THE
SAM ROSS CREEK PROPERTY
ENDAKO AREA, B.C.
FOR
AMAX EXPLORATION INC.

BY

ROBERT A. BELL, Ph.D.

AND

DAVID K. FOUNTAIN, B.A. Sc.

NAME AND LOCATION OF PROPERTY

SAM ROSS CREEK PROPERTY, ENDAKO AREA

OMINECA MINING DIVISION, B.C. 54°N, 125°W SE

DATE STARTED: JULY 2, 1967

DATE FINISHED: JULY 3, 1967

GOVERNMENT AGENT
RECEIVED
MAY 2 1 1968
SMITHERS, B.C.

FILMED

McPHAR GEOPHYSICS LIMITED

NOTES ON THE THEORY OF INDUCED POLARIZATION AND THE METHOD OF FIELD OPERATION

Induced Polarization as a geophysical measurement refers to the blocking action or polarization of metallic or electronic conductors in a medium of ionic solution conduction.

This electro-chemical phenomenon occurs wherever electrical current is passed through an area which contains metallic minerals such as base metal sulphides. Normally, when current is passed through the ground, as in resistivity measurements, all of the conduction takes place through ions present in the water content of the rock, or soil, i.e. by ionic conduction. This is because almost all minerals have a much higher specific resistivity than ground water. The group of minerals commonly described as "metallic", however, have specific resistivities much lower than ground waters. The induced polarization effect takes place at those interfaces where the mode of conduction changes from ionic in the solutions filling the interstices of the rock to electronic in the metallic minerals present in the rock.

The blocking action or induced polarization mentioned above, which depends upon the chemical energies necessary to allow the ions to give up or receive electrons from the metallic surface, increases with the time that a d.c. current is allowed to flow through the rock; i.e. as ions pile up against the metallic interface the resistance to current flow increases. Eventually, there is enough polarization in the form of excess ions at the interfaces to effectively stop all current flow through the metallic particle. This polarization takes place at each of the infinite number of solution-metal interfaces in a mineralized rock.

When the d.c. voltage used to create this d.c. current flow is cut off, the Coulomb forces between the charged ions forming the polarization cause them to return to their normal position. This movement of charge creates a small current flow which can be measured on the surface of the ground as a decaying potential difference.

From an alternate viewpoint it can be seen that if the direction of the current through the system is reversed repeatedly before the polarization occurs, the effective resistivity of the system as a whole will change as the frequency of the switching is changed. This is a consequence of the fact that the amount of current flowing through each metallic interface depends upon the length of time that current has been passing through it in one direction.

The values of the "metal factor" or "M.F." are a measure of the amount of polarization present in the rock mass being surveyed. This parameter has been found to be very successful in mapping areas of sulphide mineralization, even those in which all other geophysical methods have been unsuccessful. The induced polarization measurement is more sensitive to sulphide content than other electrical measurements because it is much more dependent upon the sulphide content. As the sulphide content of a rock is increased, the "metal factor" of the rock increases much more rapidly than the resistivity decreases.

Because of this increased sensitivity, it is possible to locate and outline zones of less than 10% sulphides that can't be located by E. M. Methods. The method has been successful in locating the disseminated "porphyry copper" type mineralization in the Southwestern United States.

Measurements and experiments also indicate that it should be possible to locate most massive sulphide bodies at a greater depth with induced polarization than with E. M.

Since there is no I. P. effect from any conductor unless it is metallic, the method is useful in checking E. M. anomalies that are suspected of being due to water filled shear zones or other ionic conductors. There is also no effect from conductive overburden, which frequently confuses E. M. results. It would appear from scale model experiments and calculations that the apparent metal factors measured over a mineralized zone are larger if the material overlying the zone is of low resistivity.

Apropos of this, it should be stated that the induced polarization measurements indicate the total amount of metallic constituents in the rock. Thus all of the metallic minerals in the rock, such as pyrite, as well as the ore minerals chalcopyrite, chalcocite, galena, etc. are responsible for the induced polarization effect. Some oxides such as magnetite, pyrolusite, chromite, and some forms of hematite also conduct by electrons and are metallic. All of the metallic minerals in the rock will contribute to the induced polarization effect measured on the surface.

In the field procedure, measurements on the surface are made in a way that allows the effects of lateral changes in the properties of the ground to be separated from the effects of vertical changes in the properties. Current is applied to the ground at two points a distance (X) apart. The potentials are measured at two other points (X) feet apart, in line with the current electrodes. The distance between the nearest current and potential electrodes is an integer number (N) times the basic distance (X).

The measurements are made along a surveyed line, with a constant distance (NX) between the nearest current and potential electrodes. In most surveys, several traverses are made with various values of (N); i. e. (N) = 1, 2, 3, 4, etc. The kind of survey required (detailed or reconnaissance) decides the number of values of (N) used.

In plotting the results, the values of the apparent resistivity and the apparent metal factor measured for each set of electrode positions are plotted at the intersection of grid lines, one from the center point of the current electrodes and the other from the center point of the potential electrodes. The resistivity values are plotted above the line and the metal factor values below. The lateral displacement of a given value is determined by the location along the survey line of the center point between the current and potential electrodes. The distance of the value from the line is determined by the distance (NX) between the current and potential electrodes when the measurement was made.

The separation between sender and receiver electrodes is only one factor which determines the depth to which the ground is being sampled in any particular measurement. These plots then, when contoured, are not section maps of the electrical properties of the ground under the survey line. The interpretation of the results from any given survey must be carried out using the combined experience gained from field, model and theoretical investigations. The position of the electrodes when anomalous values are measured must be used in the interpretation.

In the field procedure, the interval over which the potential differences are measured is the same as the interval over which the electrodes are moved after a series of potential readings has been made. One of the advantages of the induced polarization method is that the same equipment can be used for both detailed and reconnaissance surveys merely by changing the distance (X) over which the electrodes are moved each time. In the past, intervals have been used ranging from 100 feet to 1000 feet for (X). In each case, the decision as to the distance (X) and the values of (N) is largely determined by the expected size of the mineral deposit being sought, the size of the expected anomaly and the speed with which it is desired to progress.

The diagram in Figure 1 below demonstrates the method used in plotting the results. Each value of the apparent resistivity and the apparent "Metal factor" is plotted and identified by the position of the four electrodes when the measurement was made. It can be seen that the values measured for the larger values of (n) are plotted farther from the line indicating that the thickness of the layer of the earth that is being tested is greater than for the smaller values of (n); i. e. the depth of the measurement is increased.

METHOD USED IN PLOTTING DIPOLE-DIPOLE INDUCED POLARIZATION AND RESISTIVITY RESULTS

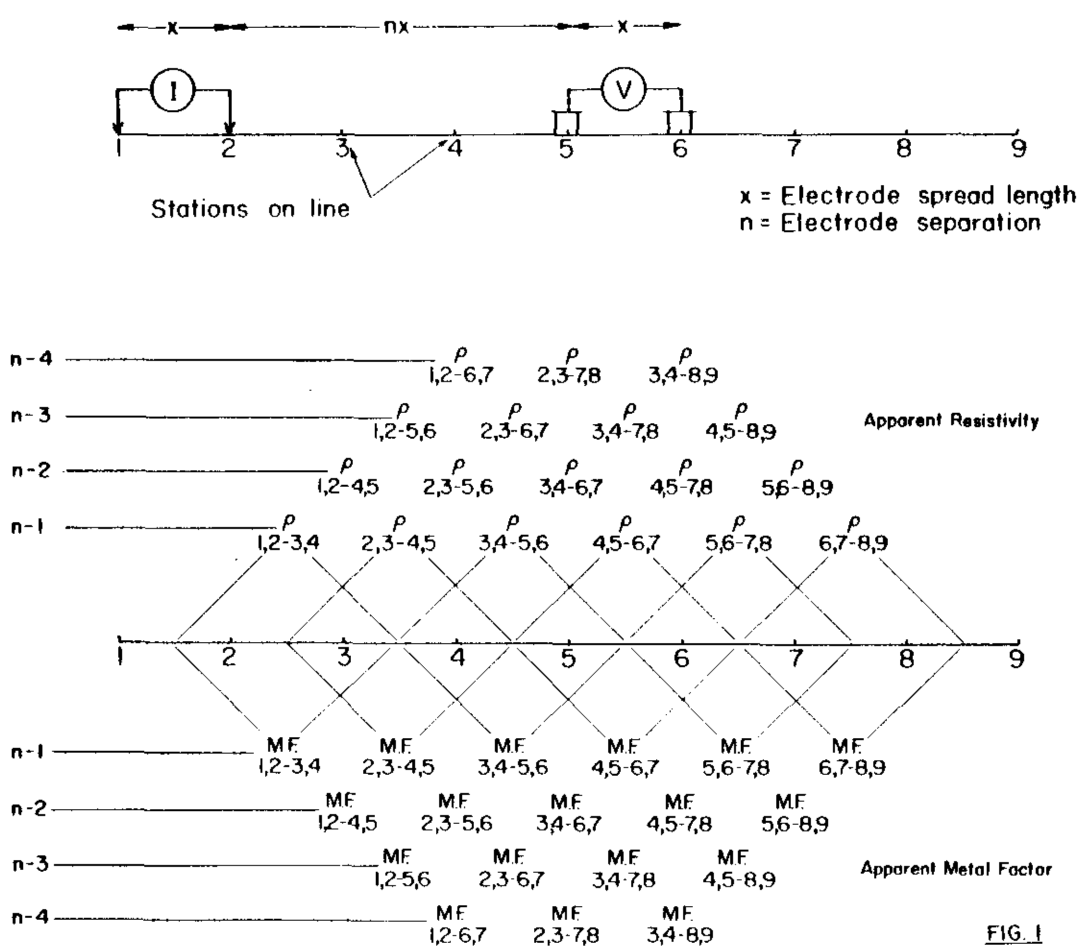


FIG. 1

TABLE OF CONTENTS

McPHAR GEOPHYSICS LIMITED

REPORT ON SUPPLEMENTARY INDUCED POLARIZATION SURVEY ON THE SAM ROSS CREEK PROPERTY ENDAKO AREA, B.C. FOR AMAX EXPLORATION INC.

1. INTRODUCTION

At the request of Mr. W. W. Shaw, geophysicist for the Company, we have carried out two additional induced polarization traverses on the Sam Ross Creek Property for Amax Exploration Incorporated. The property is in the Endako Area of the Omineca Mining Division, in the southeast quadrant of the 1° quadrilateral whose SE corner is at 54°N, 125°W.

The area is of interest because of a molybdenite showing and the purpose of the survey was to assist in outlining areas of metallic mineralization. A more extensive survey was carried out in 1966, as described in our report of December 7, 1966.

2. PRESENTATION OF RESULTS

The Induced Polarization and Resistivity results are shown on the following data plots in the manner described in the notes preceding this report.

Line 24W	500 foot spreads	Dwg. IP 5056-1
Line 35S	300 foot spreads	Dwg. IP 5056-2

Enclosed with this report is Dwg. I.P.P. 3295, a plan map of the grid, showing the geophysical results from the two surveys, at a scale of 1" = 400'. The definite and possible induced polarization anomalies are indicated by solid and broken bars respectively on this plan map as well as the data plots. These bars represent the surface projection of the anomalous zones as interpreted from the location of the transmitter and receiver electrodes when the anomalous values were measured.

Since the induced polarization measurement is essentially an averaging process, as are all potential methods, it is frequently difficult to exactly pinpoint the source of an anomaly. Certainly, no anomaly can be located with more accuracy than the spread length; i.e. when using 500' spreads the position of a narrow sulphide body can only be determined to lie between two stations 500' apart. In order to locate sources at some depth, larger spreads must be used, with a corresponding increase in the uncertainties of location. Therefore, while the centre of the indicated anomaly probably corresponds fairly well with source, the length of the indicated anomaly along the line should not be taken to represent the exact edges of the anomalous material.

3. DISCUSSION OF RESULTS

Line 24W

The previous data obtained with 300 foot electrode intervals indicated a possible anomaly near the Base Line, but the pattern was incomplete. This feature has now been checked with 500 foot dipoles and the results show a probable shallow anomaly centred at the Base Line.

Line 35S

This is a new line and was surveyed using a 300 foot interval. There are no easily recognized anomalies but there is a slight increase in the IP effects on the central portion of the traverse. These minor effects appear to correspond with possible weak anomalies obtained previously on Line 6W and Line 10E.

4. SUMMARY AND RECOMMENDATIONS

The two IP traverses have confirmed the results of the previous survey. Further work is therefor warranted to delimit the several zones and to serve as a guide for a drill test.

McPHAR GEOPHYSICS LIMITED

Robert A. Bell

Robert A. Bell,
Geologist.

David K. Fountain

David K. Fountain
Geophysicist.

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
D. K. FOUNTAIN

Expiry Date: April 25, 1968

Dated: March 11, 1968

ASSESSMENT DETAILS

PROPERTY: Sam Ross Creek		MINING DIVISION: Omineca
SPONSOR: Amax Exploration Inc.		PROVINCE: British Columbia
LOCATION: Endako Area		
TYPE OF SURVEY: Induced Polarization		
OPERATING MAN DAYS:	10	DATE STARTED: July 2, 1967
EQUIVALENT 8 HR. MAN DAYS:	15	DATE FINISHED: July 3, 1967
CONSULTING MAN DAYS:	1	NUMBER OF STATIONS: 31
DRAUGHTING MAN DAYS:	1	NUMBER OF READINGS: 138
TOTAL MAN DAYS:	17	MILES OF LINE SURVEYED: 1.9

CONSULTANTS:

R.A. Bell, 50 Hemford Crescent, Don Mills, Ontario.
D.K. Fountain, 44 Highgate Road, Toronto 18, Ontario.

FIELD TECHNICIANS:

G. Trefananko, 651 Sheppard Avenue W. Toronto, Ontario.
T. Yeo, Box 355, Fort Saskatchewan, Alberta.
Plus 3 helpers supplied by client.

DRAUGHTSMEN:

N. Lade, Apt. 503, 35 Esterbrooke Avenue, Willowdale, Ontario.
P. Coulson, 38 Mafeking Crescent, Scarborough, Ontario.
B. Marr, 19 Kenewen Court, Toronto 16, Ontario.

McPHAR GEOPHYSICS LIMITED

Robert A. Bell

Robert A. Bell,
Geologist.

David K. Fountain

David K. Fountain,
Geophysicist.

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
D. K. FOUNTAIN

Expiry Date: April 25, 1968

Dated: March 11, 1968

SUMMARY OF COST

Amax - Sam Ross Creek

Crew

2 days Operating	@ $195.00	$390.00

Expenses

Taxis		9.00
Mileage		4.40
Freight		32.38
Meals and Accommodation		49.50
Telephone and Telegraph		24.29
	Total Cost	$509.57

McPHAR GEOPHYSICS LIMITED

Robert A. Bell

Robert A. Bell,
Geologist

David K. Fountain

David K. Fountain,
Geophysicist.

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
D. K. FOUNTAIN

Expiry Date: April 25, 1968

Dated: March 11, 1968

CERTIFICATE

I, Robert Alan Bell, of the City of Toronto, Province of Ontario, do hereby certify that:

1. I am a geologist residing at 50 Hemford Crescent, Don Mills, (Toronto) Ontario.

2. I am a graduate of the University of Toronto in Physics and Geology with the degree of Bachelor of Arts (1949); and a graduate of the University of Wisconsin in Economic Geology with the degree of Ph. D. (1953).

3. I am a member of the Society of Economic Geologists and a fellow of the Geological Association of Canada.

4. I have been practising my profession for over fifteen years.

5. I have no direct or indirect interest, nor do I expect to receive any interest directly or indirectly, in the property or securities of Amax Exploration Incorporated or any affiliate.

6. The statements made in this report are based on a study of published geological literature and unpublished private reports.

7. Permission is granted to use in whole or in part for assessment and qualification requirements but not for advertising purposes.

Dated at Toronto

This 11th day of March 1968.

Robert A. Bell

Robert A. Bell, Ph. D.

CERTIFICATE

I, David Kirkman Fountain, of the City of Toronto, Province of Ontario, do certify that:

1. I am a geophysicist residing at 44 Highgate Road, Toronto 18, Ontario.

2. I am a graduate of the University of Toronto with a Bachelor of Applied Science Degree in Engineering Physics (Geophysics).

3. I am a member of the Society of Exploration Geophysicists, the European Association of Exploration Geophysicists and the Canadian Institute of Mining and Metallurgy.

4. I am a registered Professional Engineer in the Province of British Columbia and Ontario, and have been practising my profession for seven years.

5. I have no direct or indirect interest, nor do I expect to receive any interest directly or indirectly, in the property or securities of Amax Exploration Incorporated or any affiliate.

6. The statements made in this report are based on a study of published geological literature and unpublished private reports.

7. Permission is granted to use in whole or in part for assessment and qualification requirements but not for advertising purposes.

Dated at Toronto

This 11th day of March 1968.

David K. Fountain

David Kirkman Fountain, B.A. Sc.

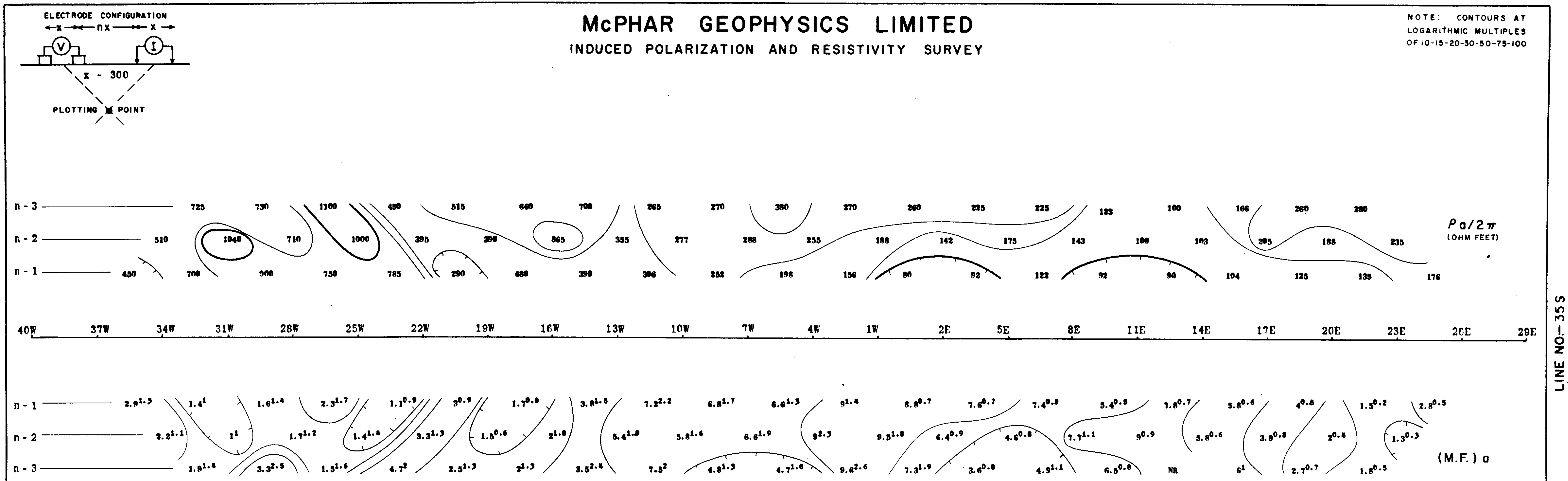
PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
D. K. FOUNTAIN

Expiry Date: April 25, 1968

McPHAR GEOPHYSICS LIMITED

INDUCED POLARIZATION AND RESISTIVITY SURVEY

NOTE: CONTOURS AT LOGARITHMIC MULTIPLES OF 10-15-20-30-50-75-100



SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE

PROBABLE

POSSIBLE

AMAX EXPLORATION, INC.

SAM ROSS CREEK PROPERTY, ENDAKO AREA—OMINECA M.D., B.C.

Scale—One inch = 300 Feet

NOTE LOGARITHMIC CONTOUR INTERVAL

1235

FREQUENCY 0.31-5 CPS

DATE SURVEYED SEPT. 1967

APPROVED

DATE

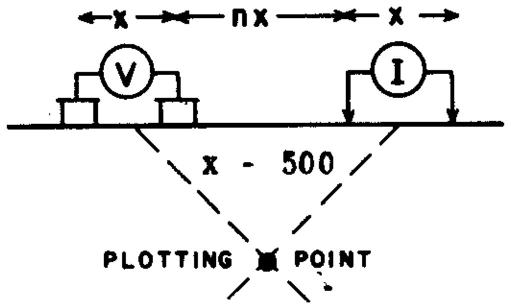
DWG. NO.–I.P.–5056–1

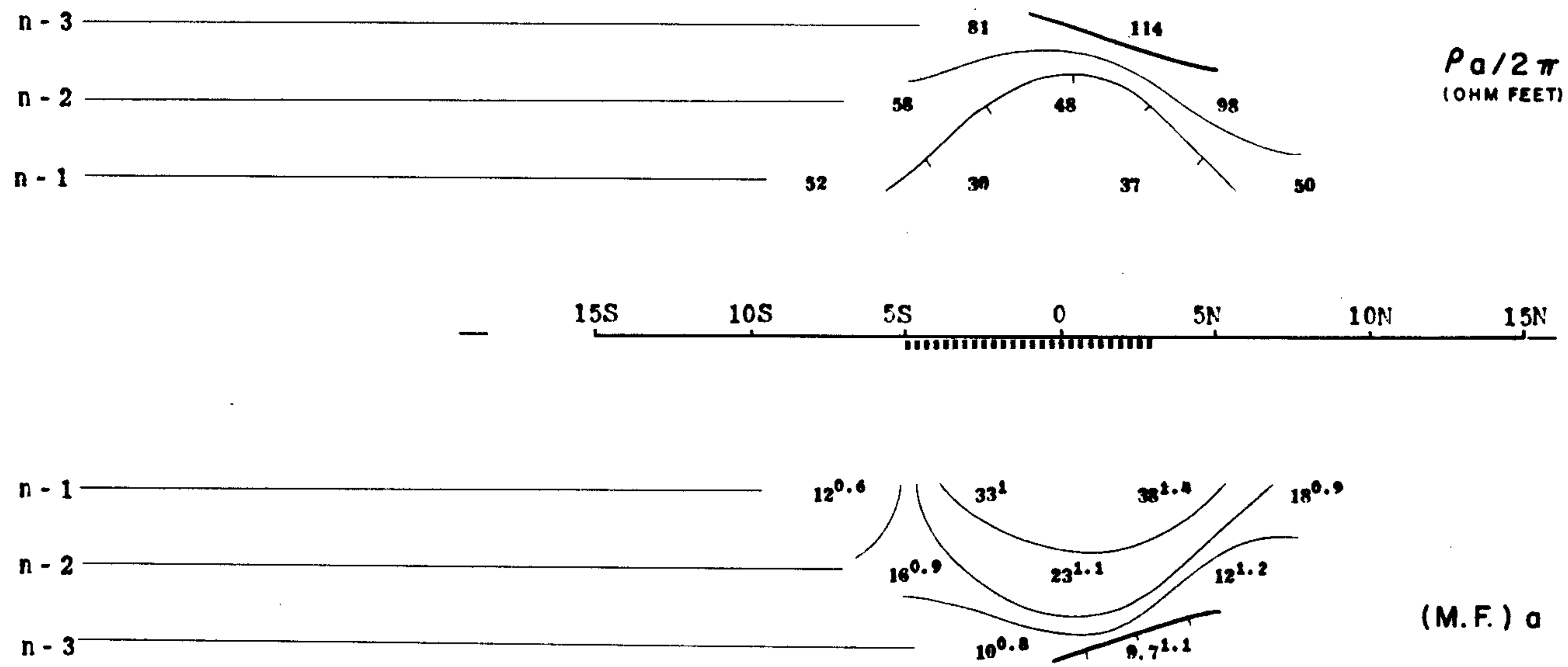
McPHAR GEOPHYSICS LIMITED

INDUCED POLARIZATION AND RESISTIVITY SURVEY

NOTE: CONTOURS AT LOGARITHMIC MULTIPLES OF 10-15-20-30-50-75-100

ELECTRODE CONFIGURATION





LINE NO.–24 W

SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE
PROBABLE
POSSIBLE

AMAX EXPLORATION, INC.

SAM ROSS CREEK PROPERTY, ENDAKO AREA–OMINECA M.D., B.C.

Scale–One inch = 500 Feet

NOTE: LOGARITHMIC CONTOUR INTERVAL

1235

FREQUENCY 0.31–5 CPS

DATE SURVEYED SEPT. 1967

APPROVED RABell

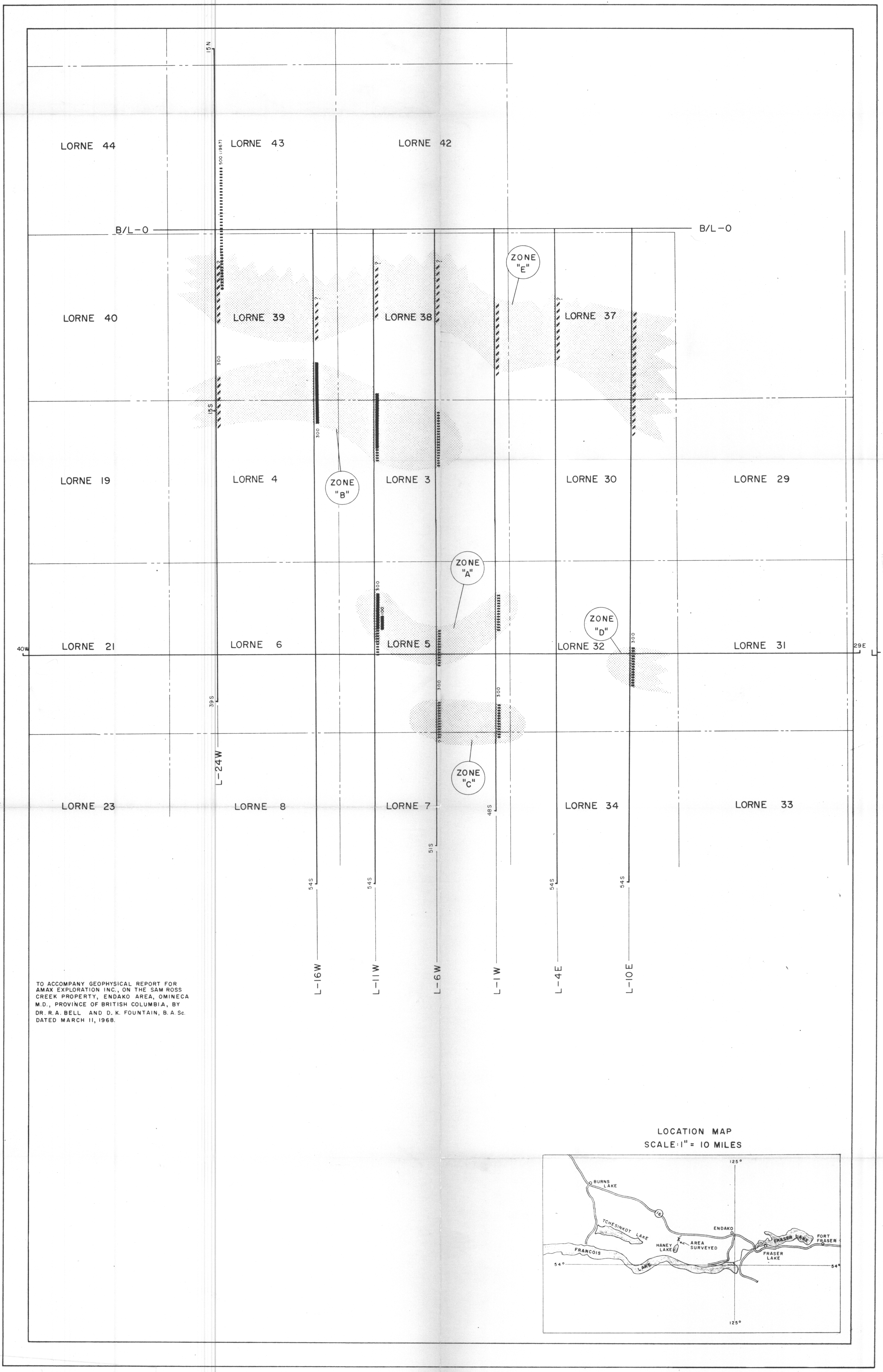
DATE Oct 19/67

McPHAR GEOPHYSICS LIMITED

McPHAR GEOPHYSICS LIMITED

INDUCED POLARIZATION AND RESISTIVITY SURVEY

PLAN MAP



N

SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE
PROBABLE
POSSIBLE

Numbers at the end of the anomalies indicate spread used.

AMAX EXPLORATION, INC.

SAM ROSS CREEK PROPERTY, ENDAKO AREA – OMINECA M.D., B.C.

SCALE

ONE INCH EQUALS FOUR HUNDRED FEET

ANOMALOUS I.P. ZONES

1235

DRAWN: P.C.
DATE: MAR. 1968
APPROVED: R. A. Bell
DATE: Mar. 8/68.