2148

REPORT ON
INDUCED POLARIZATION SURVEY
RED ROCK CLAIM GROUP, LIKELY AREA
CARIBOO MINING DIVISION
BRITISH COLUMBIA

FOR

ARDO MINES LIMITED

REPORT

ON

INDUCED POLARIZATION SURVEY

RED ROCK CLAIM GROUP

LIKELY AREA

CARIBOO MINING DIVISION

BRITISH COLUMBIA

FOR

ARDO MINES LIMITED

VELOCITY SURVEYS LIMITED
R. G. Agarwal, Ph.D.
G. A. Jameson, A.C.S.M.

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ILLUSTRATIONS

INTRODUCTION

During the period July 9th to August 15th, 1969, an induced polarization survey was carried out by Velocity Surveys on the Red Rock Claim Group of Ardo Mines Limited, in the Likely Area, British Columbia.

Line-cutting and picketing were done by crews hired by Primac Exploration Services Ltd., under the supervision of Mr. C. Fortin.

Previously, reconnaissance Induced Polarization and Geochemical Surveys were carried out over the area by Velocity Surveys. The results were very encouraging and warranted further work. Subsequently, a detailed induced polarization survey was carried out to further outline previously indicated areas of high chargeability. The geochemical survey was also extended to obtain additional information. In view of the encouraging results of the above surveys, a continuing programme of bulldozer trenching, diamond drilling, and sampling is recommended. This continuing programme would entail the expenditure of some $145,200.00.

PROPERTY

The property consists of some 42 contiguous located mineral claims identified as follows:

Red Rock 1-6 Incl.	31388-31393
Pine 1-18 Incl.	48501-48518
Fir 1-18 Incl.	48483-48500

The above claims are recorded in the Cariboo Mining Division, in the Province of British Columbia.

LOCATION AND ACCESS

The attached map shows the location and plan of Red Rock Claim Group. The Claim Group is centered about one mile west of the village of Likely, on the Quesnel River. The property is located about 400 miles north-west of Vancouver and is accessible by paved highway up to McLeese Lake. The village of Likely is about 50 miles west of McLeese Lake and is accessible by an all-weather gravel road.

HISTORY

Prior to acquisition by Ardo Mines Limited, very little is known of the previous exploration history of the property. The area of the Claim Group is a part of a gold province and as such has been subjected to exploration activities primarily in relation to placer gold. The adit occurring on the property was probably driven in an effort to find precious metal values in and around highly oxidized shear zones. The condition of the timbers within this adit would suggest that work was carried out some 30 to 40 years ago. After acquisition of the ground, Ardo Mines Limited, conducted a reconnaissance geochemical survey followed by a reconnaissance induced polarization survey. No other geophysical methods have been applied to the property with the exception of an air-borne magnetometer survey conducted by government agencies in June and September, 1961.

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GEOLOGY

Reconnaissance geological mapping of the property was seriously impeded by the paucity of rock outcrop available for examination. Overburden consisting primarily of glacial detritus varies in depth from 0 to some 150 to 200 feet. In the main, the area is underlain by volcanic andesitic rocks with minor intercollated strata of conglomerate, argillite and limestone. The andesitic rocks are represented by a dark green pyroxene bearing andesite, highly chloritized and with an abundance of secondary epidote and albite. These rocks are generally silica-poor and are thought to be either Upper Triassic or Lower Jurassic in age. Near the point 31+00W, 4+50N occurs an outcrop of limited extent, consisting of a hybridized volcanic rock, felsitic in nature. Locally these rocks are highly sheared and show evidence of introduced secondary feldspar.

The main structural lineation in the area is west-north-west, east-south-east, parallelling the local direction of the Quesnel River. A secondary direction, less well-developed, strikes north-east, south-west. The above mentioned lineation directions, i.e. faults and joints, are of steep orientation and approach the vertical. Further, several shear zones have been observed and tend to parallel the two above named directional lineations.

MINERALIZATION

The area immediately south of the adit described above was stripped with a bulldozer. Mineralization, at this

cont'd...

point, consisting of disseminated pyrite, pyrrhotite, and chalcopyrite with malachite and azurite was observed. The mineralization was contained in the felsic hybrid rock in immediate proximity of the andesite-hybrid rock contact. The observed mineralization was found lining fracture faces and where these fractures coalesced on a macro scale the stringers of mineralization increased in size to form knots and blebs of massive sulphides. The extremely steep topography precluded sufficiently to determine the actual dimensions of the mineralized areas; however, sulphide mineralization has been observed over a width of some 20 feet and copper carbonates have been observed over a more extensive area.

Near the point 30+00W, 27+00S occurs a minor shear zone striking north-east with a steep easterly dip, containing highly oxidized material with disseminated pyrite and minor disseminated chalcopyrite. In this instance the host rock is a chloritized andesite containing abundant epidote, calcite, and disseminated magnetite.

Along the road extending from the bridge at 0+00 to 60+00W carbonate minerals, i.e. malachite and azurite, have been observed along the road-bank however, the extent of the observed mineralization could not be determined due to sloughing of the steep road cut.

GEOCHEMICAL SURVEY

Method

Wherever possible geochemical samples were extracted at 100 foot intervals along the previously cut grid-lines

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by means of a stainless steel auger. An attempt was made to consistently sample the "B" horizon, i.e. the soil layer immediately below the humus layer. Samples were placed in heavy manila envelopes, labelled, catalogued, and dried. Under the direction of Mr. Sawyer of Crest Laboratories Limited, Edmonton, samples were then screened to minus 80 mesh; subjected to cold nitric acid extraction, and then analyzed for copper content using the atomic absorption technique. Individual analyses are expressed as parts per million and plotted in their appropriate geographical location on the accompanying map.

INDUCED POLARIZATION SURVEY

Equipment and Field Measurements

The induced polarization equipment used was the Huntec pulse-type system. The unit provides maximum power of 7.5 kw d.c. to the ground. The cycling rate is 1.5 seconds "current on" and 0.5 seconds "current off"; The pulses reverse alternately in polarity.

The measurements taken in the field consist of the current (Ia) supplied through the current electrodes C1 and C2, primary voltage (Vp) between potential electrodes P1 and P2, during current "on" position and the secondary voltage (Vs) between the same potential electrodes during the current "off" position. The apparent chargeability (Ma) of the ground is calculated by dividing the secondary voltage by the primary voltage and multiplying the factor 400 which is the sampling time in milliseconds

cont'd...

of the receiving unit. The apparent resistivity is calculated by dividing the primary voltage by the primary current and multiplying by a geometrical factor appropriate to the electrode array being used.

Data Presentation

On the basis of previous experience in the area, it was decided to continue exploration in the area with the induced polarization method, using the pole-dipole array. An electrode separation of 400 feet was chosen as this separation provides relatively good resolution and at the same time responds to sources lying up to 400 feet below the surface. A basic station of 200 feet and a line interval of 250 feet were chosen to survey the area of immediate interest.

The apparent chargeability and the apparent resistivity results are shown as contour maps in Plates I and II, respectively.

GENERAL INTERPRETATION

Apparent Chargeability

The apparent chargeability contours on Plate I produce a relatively uncomplicated picture; broad, generally simple anomalies stand out clearly about a fairly smooth background of approximately 3 to 4 milliseconds. Main anomalies are denoted by A, B, C, D, and E, and the following general comments are intended to act as background for a more detailed description of each induced polarization anomaly or trend.

1. The contour patterns are somewhat elongated and circular in shape and reflect about the type of rocks or structures

cont'd...

which may contain mineralization causing induced polarization anomalies. From the observation of contour patterns, it seems that the area has been subjected to a widespread intrusive activity and the intrusive bodies are separated by various lineations or shear zones. General magnetic data (see attached map) confirms these conclusions.

2. Most of the mineralization in the area must have formed during the cooling process of the intruded magma.
3. There is evident correspondence between the chargeability patterns, the nature of the country rocks and the intrusive bodies containing the mineralization.
4. The general trend of the country rocks seems to be in a north-westerly direction.
5. The relatively simple anomaly forms suggest sources whose main concentrations occur at a depth of at least 400 feet. The absence of strong chargeability lows flanking the anomalies suggests a downward extent of several hundred feet in the case of most of the anomalies.

It should be noted that the induced polarization measurements indicate the total amount of metallic constituents in the rock. Thus, all of the metallic minerals such as pyrite, as well as ore mineral chalcopyrite, pyrrhotite, chalcocite, galena and other metallic sulphides are responsible for the induced polarization effect.

cont'd...

Apparent Resistivity

The apparent resistivity contours on Plate II show somewhat similar patterns as the chargeability contours on Plate I. A few general comments are relevant both in the geological interpretation and in the evaluation of the chargeability anomalies.

1. Resistivity trends, where developed, seem to be structurally rather than lithologically controlled.
2. Lineations and shear zones in general display resistivity lows.
3. Increase or decrease in overburden effects the resistivity patterns.

Description of Induced Polarization Anomalies

A. Anomalies A-1 and A-2 form a part of the large intrusive body located in the extreme western part of the survey area (Plate I.)

Anomaly A-1 - This anomaly occurs in the northern part of the intrusive body and is somewhat circular in shape. The anomaly is at least 1500 feet long and 1000 feet wide. The maximum chargeability amplitude is 32.6 milliseconds, and it has more or less coincident low resistivity. Such a large chargeability value on this anomaly could be due to highly disseminated nature of the mineralization. Further induced polarization work is recommended to define the shape of the anomaly in detail.

Anomaly A-2 - This anomaly occurs south of A-1 and forms a part of the same intrusive body. It is at least 1000 feet long and about 700 feet wide. The maximum

cont'd...

chargeability amplitude is 11.5 milliseconds. A-1 and A-2 are the most interesting anomalies in the area and should be thoroughly investigated.

B. Anomalies B-1, B-2, and B-3 form a part of another intrusive which is located along lines 3+00S to 16+00S and 5+00E to 10+00W.

Anomaly B-1 - This anomaly occurs in the southern part of the intrusive body. It is located on line 9+00S to 14+00S and 2+50E to 5+00W. Peak chargeability amplitude is 14.5 milliseconds; the anomaly has a more or less coincident low resistivity. This anomaly is also considered most interesting in the area and warrants detailed investigation.

Anomaly B-2 - This anomaly is located north of B-1 and has a peak chargeability amplitude of 12.1 milliseconds and requires a detailed investigation.

Anomaly B-3 - This anomaly is located only one line and seems to be one of the off-shoots in the same intrusive body.

C. Anomalies C-1 and C-2 form part of the intrusive body located on lines 24+00S to 36+00S and 12+50W to 30+00W. It is suggested that more induced polarization work should be carried out to define the shape and size of the body.

Anomaly C-1 - This anomaly has a peak chargeability amplitude of 11.4 milliseconds and has a coincident low resistivity. It is another interesting anomaly and should be thoroughly investigated.

cont'd...

Anomaly C-2 - It is located on two lines and has a peak chargeability amplitude of 8.3 milliseconds.

D. This anomaly is located on line 22+50W and 2+00S to 4+00S. It has a peak chargeability amplitude of 9.8 milliseconds.

E. It is a comparatively weak anomaly and is located on the southern end of line 2+50W.

GEOCHEMICAL SURVEY

Discussion of Results

Three main zones of anomalous copper content in the overburden cover have been outlined by the geochemical survey.

The first zone extends from 30+00W, 2+00N to 45+00W, 8+00N. Peak values of up to twelve times background were experienced. The outlined anomaly parallels the main structural lineation in the area as well as the northerly portion of induced polarization anomaly designated A-1. Cupriferous mineralization is exposed at the easterly end of the anomaly and thus affords a reasonable cause for the anomalous copper content indicated. Locally steep grades approaching 100% in a northerly direction could account for the displacement of the anomaly in that direction by means of gravitational solifluction of the overburden and by normal water runoff.

The second zone is somewhat discontinuous between lines 10+00W to 30+00W at 28+00S. Peak values of six times background occur along the northern margin of an area of high chargeability and under similar conditions of topography. Minor chalcopyrite mineralization has been observed in the area and it is pro-

cont'd...

posed that the indicated anomalous values have similar causative factors to that described above.

The third area indicated as anomalous occurs between lines 5+00E and 12+50W along the co-ordinate 2+00N. Several readings of up to five times background comprise the anomalous zone between the baseline and the Quesnel River. The presence of the river precluded taking sufficient samples to facilitate closure of the zone indicated. Similarly the anomalous geochemical readings occur some four hundred feet north of an area of indicated high chargeability. Minor copper mineralization has been observed at this location.

Several single point anomalous readings were obtained however, the absence of continuity of high readings in the immediate vicinity tend to minimize the significance of these high values. In the absence of correlating geological or geophysical information, it is assumed that they owe their origin to mineralized erratics in the overburden.

CONCLUSIONS

The induced polarization survey indicated five discrete zones of anomalous chargeability designated A, B, C, E, and E. Three of these zones, namely A-1, B-2, and C-2 may be correlated with zones of anomalous copper content in the overburden with similar orientations. The geochemical anomalies may not be directly superimposed. In the above stated cases the geochemical anomalies are invariably displaced some hundreds of

cont'd...

feet consistently in a northerly direction. It is plausible that this northerly migration is due to gravitational solifluction of the overburden cover and in part due to accelerated capillary action as affected by gravity in view of the extreme topography, i.e. slopes approaching 100% dropping off in a northerly direction.

Near the eastern end of the induced polarization anomaly designated A-1, significant cupriferous mineralization has been observed. Further, the first hole of the diamond drilling programme collared at approximately 38+50W, 3+00N encountered sulphide mineralization at a depth of some 330 feet. This mineralization consisted of disseminated pyrite, pyrrhotite with lesser amounts of chalcopyrite with a total sulphide content approaching 6%.

The correlation of induced polarization anomalies, geochemical anomalies, and in part with available geological information qualifies these zones as prime exploration targets for further subsurface investigations, namely bulldozer trenching and diamond drilling.

RECOMMENDATIONS

In view of the extensive areas indicated as anomalous by virtue of the induced polarization survey and geochemical surveys, correlated in part by observed surface mineralization, it is recommended that the current programme of diamond drilling and stripping be continued and greatly expanded. Such a programme would entail the following estimated expenditures:

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A. Bulldozer Stripping - road construction and drill site preparation, using a bulldozer of the capacity of a Caterpillar D-8 with hydraulically controlled rippers - estimated, 600 hours at 35.00/hr.	$ 21,000.00
B. Diamond Drilling - 8,000 feet B.Q. Wireline Core at 11.00/ft.	88,000.00
C. Engineering Supervision and Consulting	15,000.00
D. Sampling and Assaying	8,000.00
E. Contingency - at 10%	13,200.00
ESTIMATED TOTAL:	$145,200.00

Depending upon the results of the diamond drilling, bulldozing, and sampling, the programme outlined above might be greatly expanded.

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
G. A. JAMESON

Respectfully submitted,

R. G. Agarwal, Ph.D.
G. A. Jameson, A.C.S.M., P.Eng.

VELOCITY SURVEYS LIMITED
September 22, 1969.

CERTIFICATION

I, Ram Gopal Agarwal, of the City of Calgary, Province of Alberta, hereby certify that:

1. I am a geophysicist with Velocity Surveys Ltd., at 1323 48th Avenue N.E., Calgary, Alberta.

2. I am a graduate of the University of Toronto, M.A. (Geophysics) 1956, and Alberta, Ph.D., (Geophysics) 1968.

3. I have been actively and continuously engaged in mineral exploration for the past 12 years.

4. I am a member of the Associations of Professional Engineers of Saskatchewan and Alberta.

5. I have no interest directly or indirectly nor do I expect to receive any interest in the property of Ardo Mines Ltd. (NPL) or in the securities of Ardo Mines Ltd. (NPL).

6. This report is based on data derived from work carried out under my supervision on the property, from personal experience in the area, and from government publications relevant to the area.

Dated this 22nd day of September, 1969 in the City of Vancouver, Province of British Columbia.

R. G. Agarwal, Ph.D.

CERTIFICATION

I, George Archibald Jameson, of the City of Vancouver, British Columbia, hereby certify that:

1. I am a mining engineer with offices at 824 - 602 W. Hastings Street, Vancouver, British Columbia.

2. I am a graduate of the Camborne School of Mines, England, A.C.S.M. (1947).

3. I have been actively engaged in mining engineering for the past 15 years.

4. I am a member of the Associations of Professional Engineers in Ontario and British Columbia.

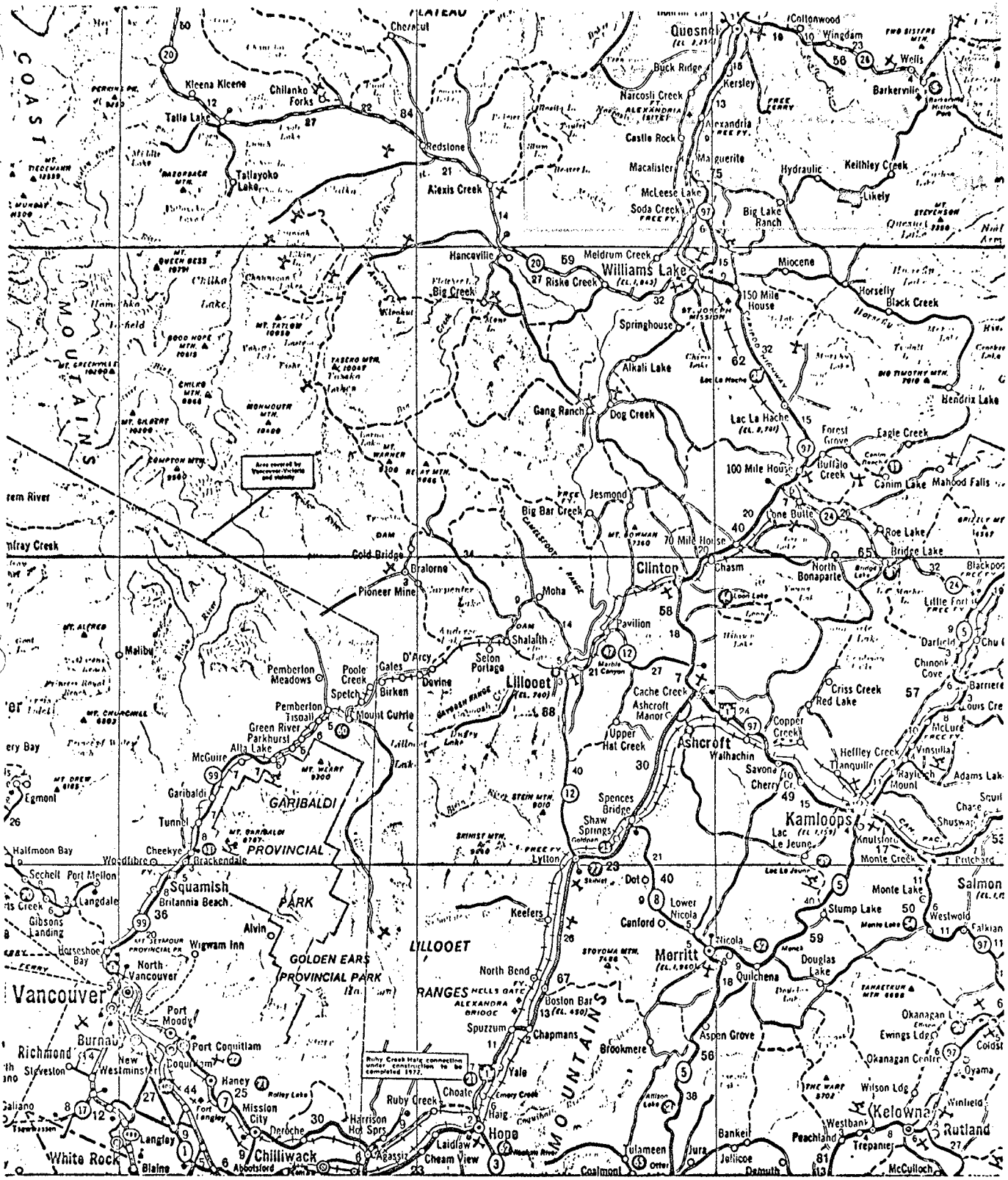
5. I have no interest, directly or indirectly, nor in the securities of, nor do I expect to receive any such interest in Ardo Mines Limited, NPL.

6. That this report is based on data derived from work carried out by Velocity Surveys Limited and I concur with the content of the report.

Dated this 22nd day of September, 1969, in the City of Vancouver, Province of British Columbia.

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
G. A. JAMESON

G. A. Jameson, A.C.S.M.

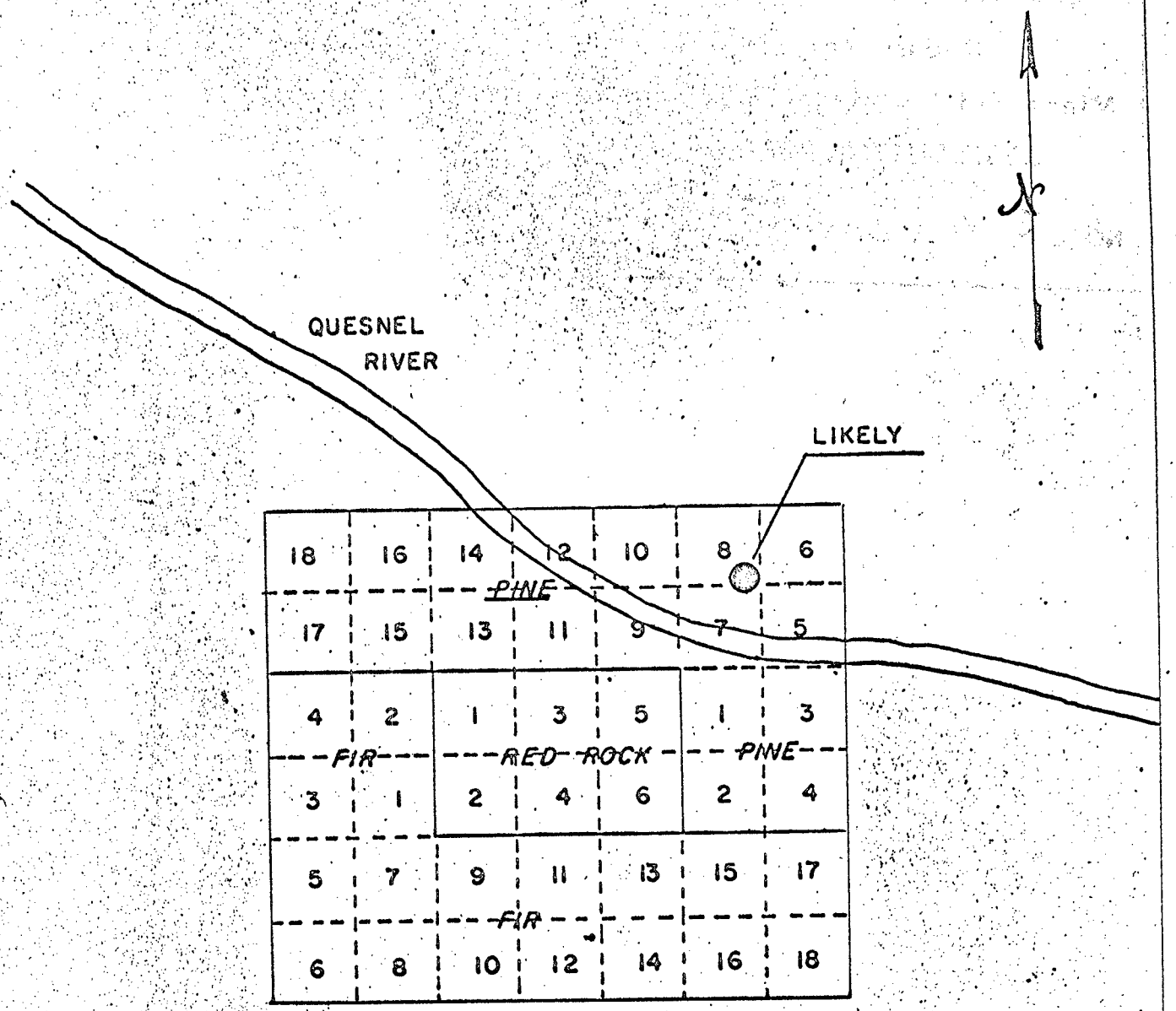


LOCATION MAP

Department of
Mines and Petroleum Resources
ASSESSMENT REPORT

NO. 2148 MAP #1

Fig 2



PLAN OF

RED ROCK CLAIM GROUP, LIKELY AREA.
CARIBOO MINING DIVISION, BRITISH COLUMBIA
VELOCITY SURVEYS, CALGARY.

Department of
Mines and Petroleum Resources
ASSESSMENT REPORT

NO. 2148 MAP #2


QUESNEL FORKS
RIVER
Poquette
Lake
MAGNETIC CONTROL LINE
QUESNEL
RIVER
LIKELY
Prior Lake
Cedar Cr.
POLLEY
LAKE
BOOTJACK
LAKE
Trio
Creek
Bootjack
QUESNEL LAKE
TOTAL MAGNETIC FIELD CONTOURS
SCALE 1 INCH = 1 MILE

Department of
Mines and Petroleum Resources
ASSESSMENT REPORT

NO. 2148 MAP #3

DOMINION OF CANADA:
PROVINCE OF BRITISH COLUMBIA.
TO WIT:

In the Matter of

SUB - MINING RECORDER
RECEIVED
DEC 9 1969
M.R. # 24942 E $ 1315.00
VANCOUVER, B.C.

I, Sankar V Ramani

of Primac Exploration Services Ltd., Vancouver, B.C.

in the Province of British Columbia, do solemnly declare that

we have done exploration work on the Red Rock, Polley and Pine Groups of Claims and the expenditures incurred during this program are as follows:

SALARIES	
Mr Pasieka, Geologist, 4 days @$150.00/day	$ 900.00
Mr S V Ramani, Geologist, 10 days @$150.00/day	1,500.00
Mr J B Prendergast, Geophysist, 1 day@$150.00/day	150.00
Mr Clarence Fortin, Field Supervisor, $600.00/month 6 months	3,600.00
Mr Steeve Chornlesky, 6 months, @$425.00/month	2,550.00
William Meilleur, 3 months, @$600.00	1,800.00
John Slater, 3 months @$400.00	1,200.00
Mike Tratch, 3 months @$400.00	1,200.00
Peter Dunn, 2 months @$350.00	700.00
I.P.Survey	
Mike Mearns Bob Arsenault) 40 days plus equipment Dan Reagan rented from Velocity Surveys	8,154.82
Rentals	
Equipment Rentals	2,300.00
Supplies	5,707.19
Drilling	
Diamond Drilling, 2458 feet @$9.25/foot	22,736.50
Drilling Supervision, Core logging, SV Ramani, Geologist, 60 days @$150.00/day	9,000.00
S Ponnayya, Mag. Operator, 5 days @$50.00	250.00
Assays	2,937.80
	$ 64,686.31

And I make this solemn declaration conscientiously believing it to be true, and knowing that it is of the same force and effect as if made under oath and by virtue of the "Canada Evidence Act."

Declared before me at the City of Vancouver, in the Province of British Columbia, this 9 day of Dec. 1969, A.D.

S V Ramani
Sankar V Ramani
Free Miner's Licence # 85888

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

SUB - MINING RECORDER

In the Matter of

Statutory Declaration

(CANADA EVIDENCE ACT)

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104 + 36 W
100 + 00 W
90 + 00 W
80 + 00 W
70 + 00 W
60 + 00 W
50 + 00 W
40 + 00 W
30 + 00 W
20 + 00 W
10 + 00 W
0 + 00

QUESNEL

RIVER

BRIDGE

ANDESITE & HYBRID

HIGHLY DECOMPOSED SHEAR ZONE

MONZONITE INTRUSION & HYBRID ROCK SHEAR ZONE Py. cPy Mol. A2

ANDESITE

ANDESITE

4 + 00 N
0 + 00 B.L.
4 + 00 S
8 + 00 S
12 + 00 S
16 + 00 S
20 + 00 S
24 + 00 S
28 + 00 S
32 + 00 S
36 + 00 S
40 + 00 S
44 + 00 S

Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 2148 MAP #4

2148

LEGEND
OUTCROPS
1 ANDESITE
2 HYBRID
JOINTING
75° SHEAR ZONE

ARDO MINES LIMITED

GEOCHEMICAL SURVEY PLAN

RED-ROCK CLAIM GROUP
LIKELY AREA
CARIBOO MINING DIVISION, B.C.

SCALE 1" = 400'

VELOCITY SURVEYS LIMITED

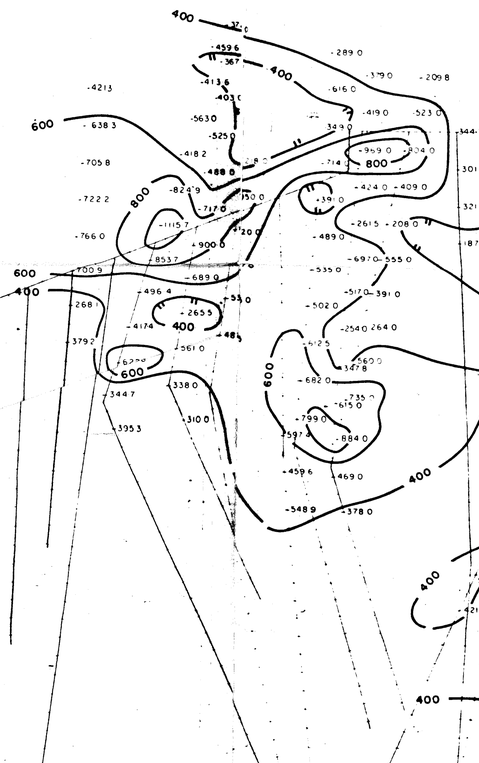
To accompany report by :

R.G. AGARWAL Ph.D., P.Eng., Geophysicist
VELOCITY SURVEYS LIMITED Sept. 22, 1969

104+36 W
100+00 W
90+00 W
80+00 W
70+00 W
60+00 W
50+00 W
40+00 W
30+00 W
20+00 W
10+00 W
0+00

N

0+00 BL
4+00 S
8+00 S
12+00 S
16+00 S
20+00 S
24+00 S
28+00 S
32+00 S
36+00 S
40+00 S
44+00 S
48+00 S
52+00 S
56+00 S
60+00 S



POLE-DIPOLE ARRAY
a = 400 feet

Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 2148 MAP #6

2148

ARDO MINES LIMITED

INDUCED POLARIZATION SURVEY

RED-ROCK CLAIM GROUP, LIKELY AREA.

CARIBOO MINING DIVISION, BRITISH COLUMBIA.

APPARENT RESISTIVITY CONTOURS

CONTOUR INTERVAL = 200 ohm-meters

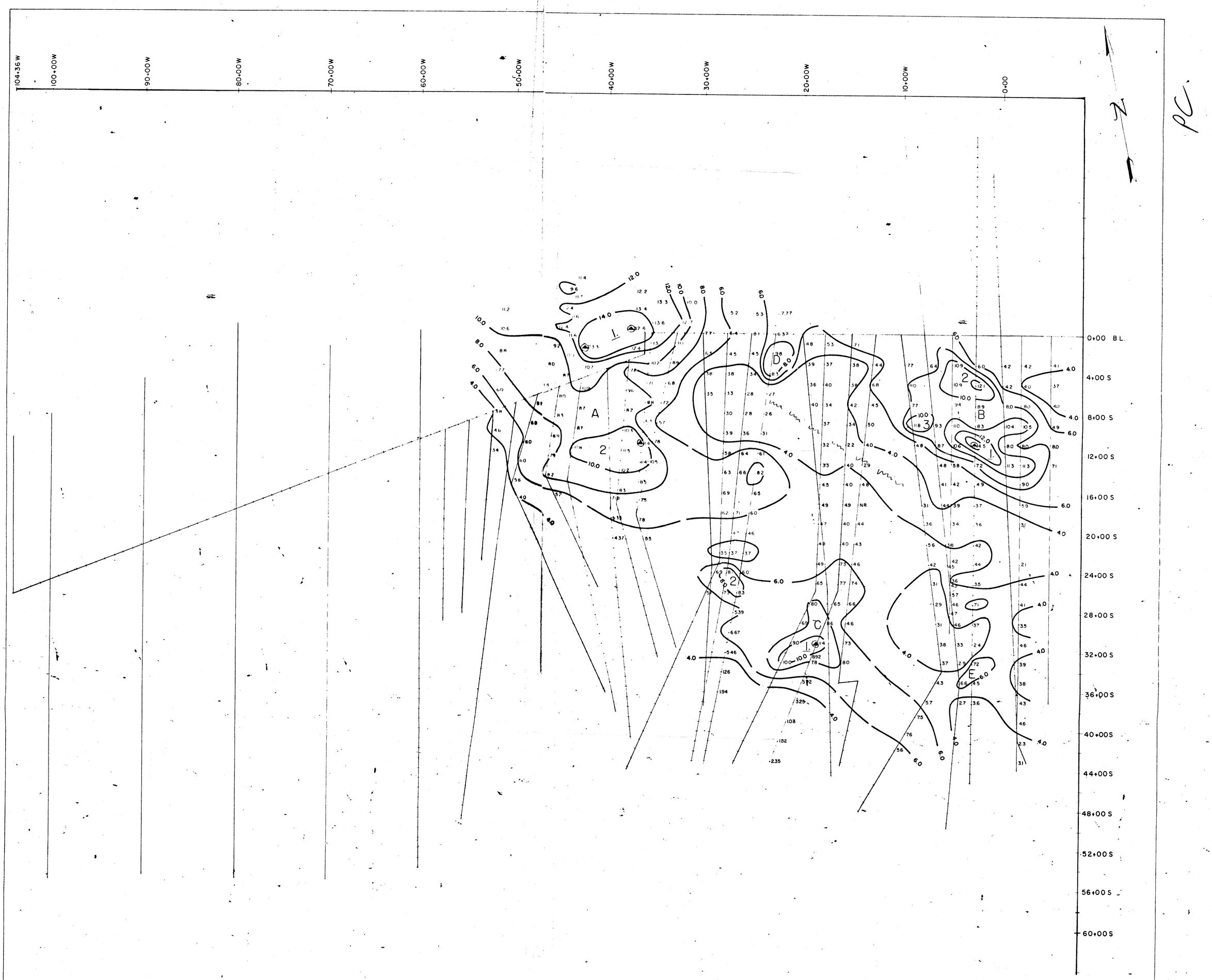
SCALE: 1 INCH = 400 FEET

To accompany report by

R.G. AGARWAL Ph.D., P.Eng., Geophysicist.
VELOCITY SURVEYS, CALGARY, ALBERTA.
SEPTEMBER 1969.

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
G. A. JAMESON

PLATE 2.



2148

CHARGEABILITY GREATER THAN 10 MILLISECONDS

CHARGEABILITY BETWEEN 8 TO 10 MILLISECONDS

DRILL-HOLE LOCATIONS

Shear zone or fault

POLE-DIPOLE ARRAY
a = 400 feet

Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 2148 MAP #5

ARDO MINES LIMITED

INDUCED POLARIZATION SURVEY

RED ROCK CLAIM GROUP, LIKELY AREA.
CARIBOO MINING DIVISION, BRITISH COLUMBIA.

APPARENT CHARGEABILITY CONTOURS

CONTOUR INTERVAL : 2.0 MILLISECONDS
SCALE 1 INCH TO 400 FEET

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
S. A. JAMESON

To accompany report by
R.G. AGARWAL Ph.D., P.Eng., Geophysicist.
VELOCITY SURVEYS LIMITED
SEPTEMBER 1969.

PLATE I