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# A GEOPHYSICAL REPORT ON

# AN INDUCED POLARIZATION (I.P.) SURVEY

# MINERAL HILL PROPERTY, NEAR HOUSTON,

# OMINECA MINING DIVISION, BRITISH COLUMBIA (54°, 126°, N.W.)

FOR

MOLYMINE EXPLORATIONS LIMITED

BY

HUNTEC LIMITED

TORONTO, ONTARIO

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TABLE OF CONTENTS

# INTRODUCTION

Between November 6th and 8th, 1966, Huntec Limited carried out an Induced Polarization (I. P.) survey over a property held by Molymine Explorations Limited and located in the Smithers area of British Columbia.

The survey was conducted along picket lines turned off at right angles every 200 feet from a N 30° W baseline and chained at 100 foot intervals.

Reconnaissance chargeability (the I. P. response parameter) measurements were made every 200 feet using the "three-electrode array" method of surveying with an eleotrode separation of 200 feet. Where necessary additional measurements were made at appropriate station intervals using multiple electrode spacings to further examine possible anomalies.

Simultaneous readings of resistivity were made in addition to these chargeability measurements and in all 2.92 miles of reconnaissance and 0.49 miles of detail surveying were completed.

The reconnaissance data are presented in contoured form on plan maps of the line grid at a scale of one inch to 200 feet, while the detail data are presented in profile form. The profile scales are one inch to 4 milliseconds and 2 inches per logarithmic cycle for chargeability and resistivity respectively.

## PROPERTY AND LOCATION

The Mineral Hill property of Molymine Explorations Limited is in the Omineca Mining Division of British Columbia and is located approximately 12 miles northwest of the town of Houston (54°, 126°, N.W.)

Access is by bush road from Highway 16. However, this 3 mile stretch of road is only passable to 4-wheel drive vehicles.

The following mineral claims representing part of the property were surveyed:

Huber 15, 16, 17, 79 and FR #4.

### Purpose of the Survey

The purpose of the survey was to try and locate, by the Induced Polarization method, the presence of any mineral deposits in the area.

### Geological Environment

The area in general is covered by Pleistocene and recent deposits such as glacial outwash, sand and gravel. These are underlain by acid-intermediate volcanics of the Hazelton group.

Outcrops of hornfels and altered volcanics occur on the property. Minor amounts of pyrite, chalcopyrite and molybdenite can be observed in this volcanic breccia.

## SURVEY SPECIFICATIONS

The survey was carried out using a Huntec pulse-type Induced Polarization unit, comprised basically of a transmitter, receiver and motor generator.

In this system a gasoline motor, coupled to a 2.5 kw, 400 cycle three-phase generator allows the transmitter to provide a maximum of 2.5 kilowatts d.c. to the ground at a cycling rate of 1.5 seconds "current on" and 0.5 seconds "current off", the pulses reversing continuously in polarity.

The data recorded in the field consist 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 over-voltage ($V_s$) appearing between $P_1$ and $P_2$ during the "current off" part of the cycle. The apparent chargeability ($M_a$) in milliseconds 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 ($\rho_a$) 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 resistivity and chargeability 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 resistivity and apparent chargeability are functions of the actual resistivities and chargeabilities of the rocks.

The survey was carried out using the "three-electrode array" system. In this system, the current electrodes ($C_1$) and the two potential electrodes, $P_1$ and $P_2$, are moved in unison along the survey lines. The spacing between them is kept constant for each traverse, at a figure roughly equal to the depth to be explored by that traverse. The second current electrode ($C_2$) is kept fixed at "infinity".

Thus, on a three electrode traverse with a spacing of 200 feet, a body lying at a depth of 100 feet will produce a strong response, whereas one at a depth of 200 feet will produce a weaker one. By running subsequent traverses at different electrode spacings, more precise estimates can be made of depth to the top of causative bodies, as well as more information on the geometry and extent of the bodies.

The "three-electrode array" with a 200 foot electrode separation was used over the entire survey area to try and detect zones of sulphide mineralization. Subsequent detail work was then done with 100 and 400 foot electrode separations respectively along certain lines as deemed necessary to give additional information for the selection of drilling targets.

## INTERPRETATION PROCEDURE

Induced Polarization interpretation procedures have been most completely developed in situations of horizontal layering and for bodies of large lateral extent such as porphyry coppers. The complex problem of resolving the combined effect of depth, width, dip and true chargeability of steeply dipping bodies, together with the physical characteristics of overburden and country rocks have not been completely solved theoretically. The interpreter must, therefore, use empirical solutions, plus experience gained from surveys over known bodies in other area in addition to existing type curves.

The interpretation submitted in this report indicates three large anomalous zones which could correspond to disseminated sulphide mineralization. The actual bodies, if existent, are probably smaller than the indicated zones as shown on the accompanying maps. Estimates of depth to the top of mineralization have been made by virtue of the three-electrode data. Drill holes have been spotted based on these depths and positions of the probable causative bodies.

Estimates of average percentage sulphide have been made. These are minimum estimates as they are based on the value of the observed chargeabilities and not on the true chargeabilities of the anomalies themselves. They are necessarily approximate as the relationship

between chargeability and percentage sulphide is affected by such things as grain size, resistivity contrast, quantity and nature of absorbed water, degree of interconnection of mineralization, and other factors. The rule-of-thumb used in this interpretation, based on past experience, is that 1% by volume of sulphide mineralization corresponds to between 5 and 15 milliseconds of true chargeability.

## DISCUSSION OF RESULTS

The Induced Polarization survey, as performed with a 200 foot electrode separation, is characterized by a moderately high chargeability background, above which three anomalous zones, two strong and one weak, are discernible.

The outlines of these zones are simple and of maximum extent as determined by the 200 foot electrode separation, but they could conceivably be narrower and more complex. They are shown on the accompany map as Zones 1, 2 and 3 respectively, Zone 3 being the weakest ont.

The resistivity survey, which was done simultaneously with the I.P. survey, appears only to reflect changes in topography and overburden conductivity. However, lower resistivity values, indicating higher conductivity, are obtained with the higher chargeability readings in Zone 1.

The results of a magnetometer survey, conducted by the client, indicate the presence of a number of small magnetic highs. These highs do not bear any particular relationship to the chargeability high, thus negating the possibility of the I.P. response being due to magnetite.

Detail Induced Polarization work using electrode separations of 100, 200 and 400 feet respectively was done over the anomalous readings on Lines 2S and 6N (i.e. on Zones 1 and 2) to give additional information for the selection of drilling targets.

The results, as shown on the accompanying profiles, exhibit the highest response with the 100 and 200 foot electrode separations. They lead to the interpretation that the anomalous readings are probably caused by shallow bodies of disseminated sulphide mineralization. As a result two boreholes have been suggested to test the nature of the causative sources of Zones 1 and 2. They are:

Hole No. 1

This angle hole, preferably 50°, of minimum length 400 feet, should be collared on Line 2S and drilled westwards on line so as to intercept 5+00E at 150 feet perpendicularly below the surface. This hole has been recommended to test the existence of a shallow causative body, bearing a minimum of 1 to 2% sulphide mineralization by volume, indicated by the chargeability peaks on the 100 and 200 foot electrode spacings.

Hole No. 2

This angle hole, preferably 50°, of minimum length 450 feet, should be collared on Line 6N and drilled eastwards on line so as to intercept 7+50E at 175 feet perpendicularly below the surface.

This hole has been recommended to test the existence of a shallow causative body, bearing a minimum of 1 to 2% sulphide mineralization by volume, indicated by the chargeability peaks on the 100 and 200 foot electrode spacings.

## SUMMARY AND RECOMMENDATIONS

Between November 6th and 8th, 1966, Huntec Limited carried out an Induced Polarization (I.P.) survey over a property held by Molymine Explorations Limited and located in the Smithers area of British Columbia.

The survey indicated the presence of three possible zones of mineralization. Multiple electrode spacing work done over Zones 1 and 2 suggested the causative source to be shallow.

Drilling has been recommended to test the nature of the interpreted mineralization on the two zones. The location of two boreholes have been suggested, as described in the previous section.

Should the results obtained by drilling be encouraging, the third zone should be subjected to further investigation, preferably by detail surveying using the Induced Polarization method.

Respectfully submitted,

HUNTEC LIMITED

Peter E. Walcott, P. Eng.
Consulting Geophysicist.

Andrew R. Dodds, B. Sc.
Geophysicist.

# APPENDIX

## Survey Data

### Claims Surveyed:

The following mineral claims were covered in whole or in part by the survey:

Huber 15 to 17 inclusive, 79 and FR #4.

### Line-miles Surveyed:

The survey comprised two phases: reconnaissance (covering all lines once with one electrode separation), and detail (resurveying selected lines with different electrode separations). The number of line-miles of readings taken in each phase was as follows:

| | Line-miles | Stations |
|---|---|---|
| Reconnaissance | 2.92 mi. | 88 |
| Detail | 0.49 mi. | 23 |
| Total | 3.41 | 111 |

### Man-days Required:

The number of 8-hour man-days required to complete the survey was:

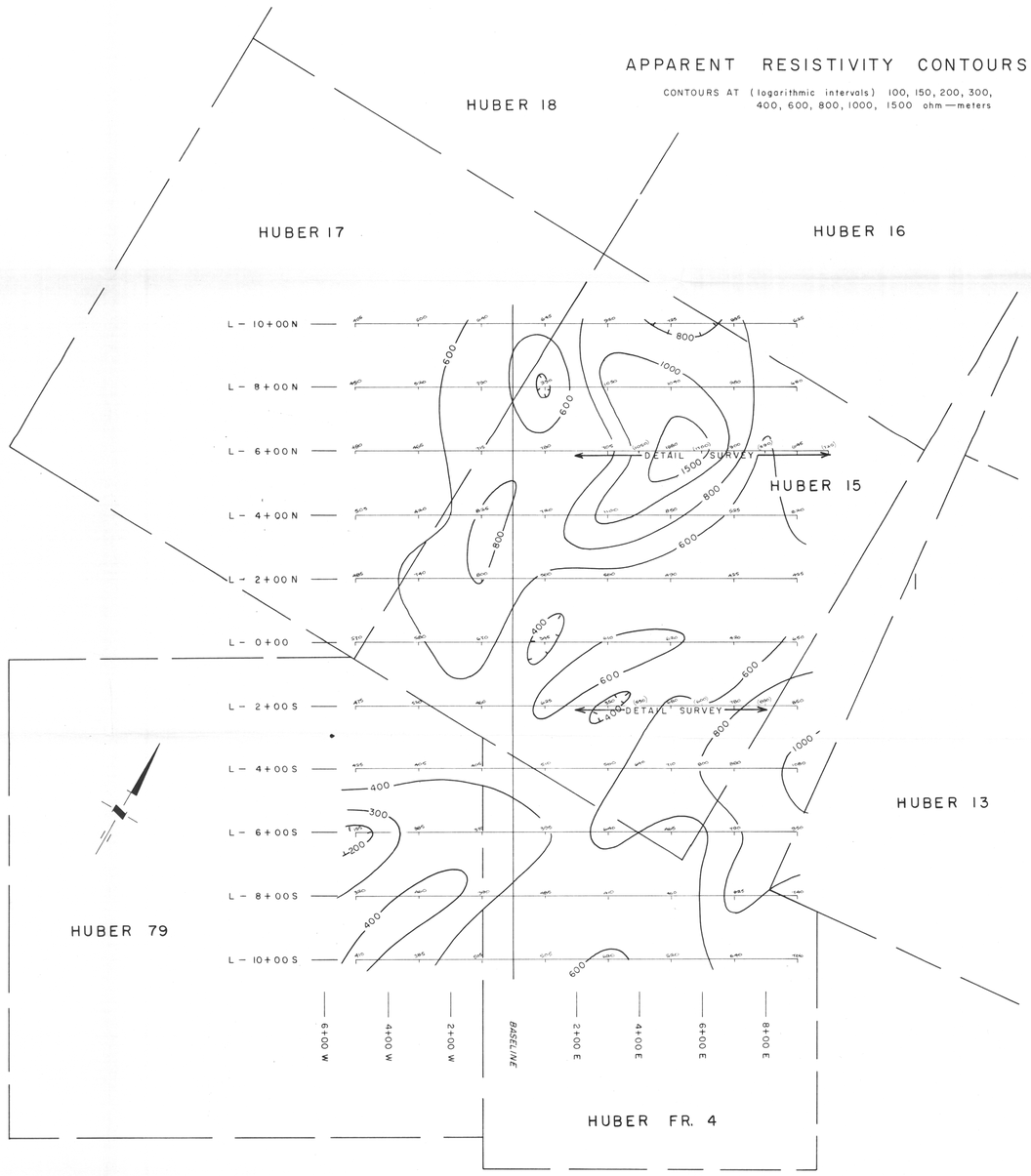
| | Man-days |
|---|---|
| Operating geophysical equipment | 15 |
| Interpretation and report writing | 2 |
| Drafting | 3 |
| Typing | 1/2 |
| Total | 20 1/2 |

Personnel Employed on Survey:

| Name | Occupation | Address | Dates |
|---|---|---|---|
| P. E. Walcott | Consulting Geophysicist | Rexdale, Ontario | Dec. 23, 1966 Jan. 3, 1967 |
| A. R. Dodds | Geophysicist | 1450 O'Connor Dr., Toronto 16, Ont. | Nov. 14, 22, 1966 |
| A. Schamotta | Geophysical Operator | " | Nov. 6-8, 1966 |
| G. Boulay | " | " | " |
| R. Carisse | " | " | " |
| R. O'Brien | Helper | Smithers, B. C. | " |
| K. D. Haftner | " | " | " |
| P. Tapson | Drafting | 1450 O'Connor Dr., Toronto 16, Ont. | Jan. 11, 12, 13, 1967 |
| L. Brunton | Typing | " | Jan. 13, 1967 |

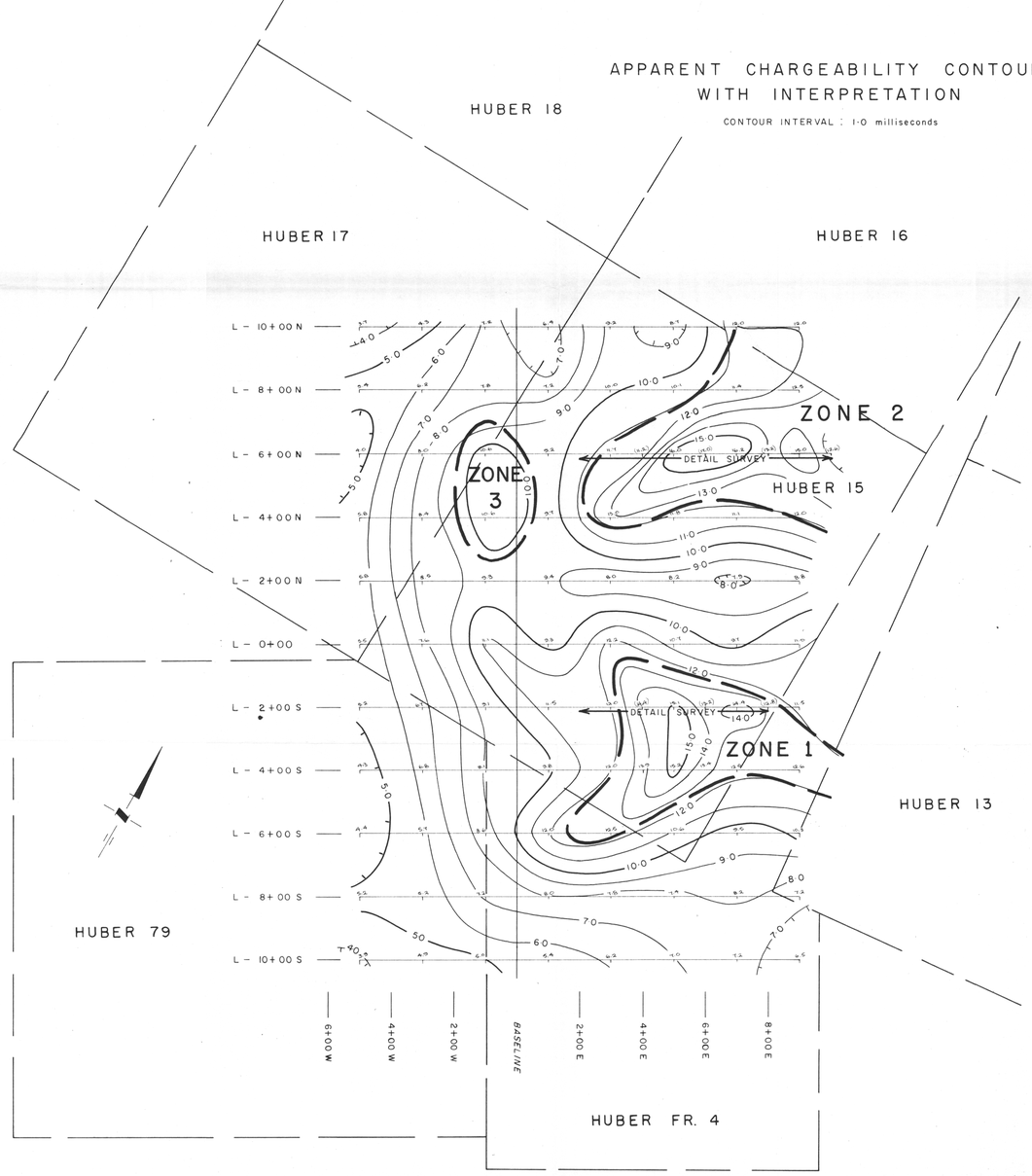
## APPARENT RESISTIVITY CONTOURS

CONTOURS AT (logarithmic intervals) 100, 150, 200, 300, 400, 600, 800, 1000, 1500 ohm—meters

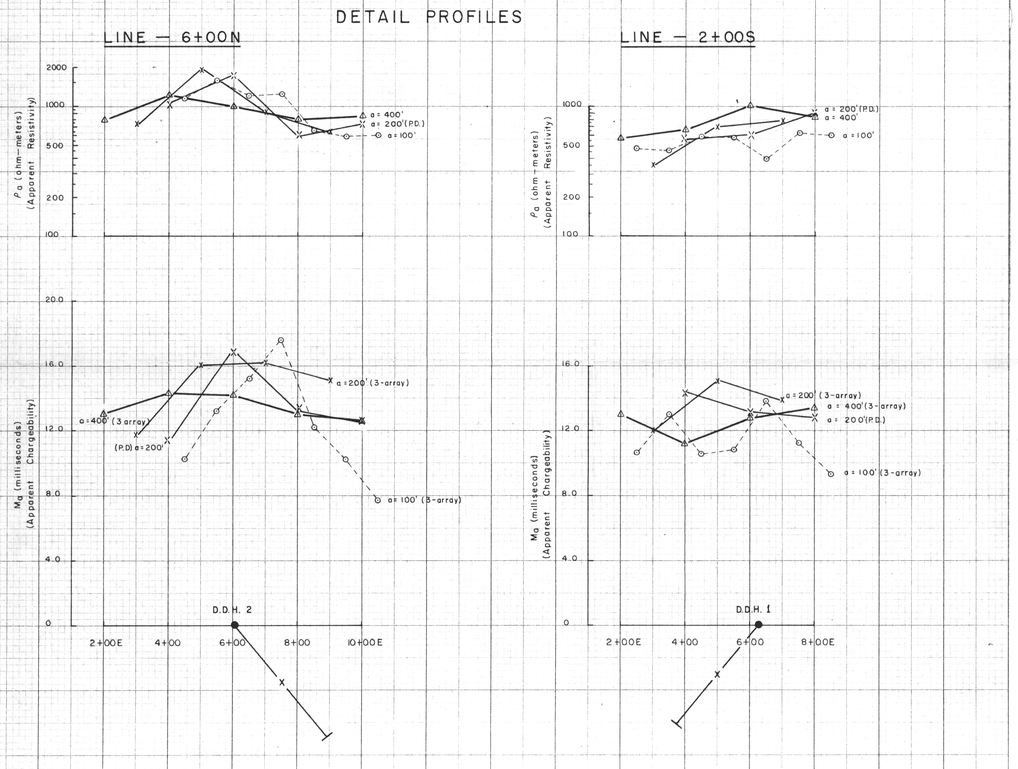



## APPARENT CHARGEABILITY CONTOURS WITH INTERPRETATION

CONTOUR INTERVAL : 1·0 milliseconds




## DETAIL PROFILES

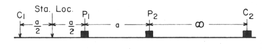



INTERPRETATION LEGEND

Zone of interest

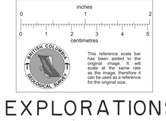
D.D.H. .... Recommended Diamond Drill Hole

3 ELECTRODE ARRAY




CONTOUR MAPS 3—ELECTRODE ARRAY, a = 200', $P_1-P_2$ = 200'
(Pole – Dipole Array, a, = 200', $P_1-P_2$ = 100' where figures bracketed)

DETAIL PROFILES a AS MARKED




# MOLYMINE EXPLORATIONS LIMITED

INDUCED POLARIZATION SURVEY

## MINERAL HILL PROPERTY

OMINECA MINING DIVISION, B.C.

SCALE : 1 inch = 200 feet

To accompany report by P. E. Walcott, P. Eng., Geophysicist

HUNTEC LIMITED, Toronto, Canada — January, 1967

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