973

REPORT ON

AN INDUCED POLARIZATION SURVEY

NEAR BILLY LAKE

HIGHLAND VALLEY, BRITISH COLUMBIA

(50°, 120°, S.W.)

FOR

ORO MINES LIMITED

BY

HUNTEC LIMITED

TORONTO, ONTARIO

NOVEMBER, 1966

TABLE OF CONTENTS

INTRODUCTION

From August 8th to 27th and September 14th to 16th, 1966, an Induced Polarization (I. P.) survey was carried out by Huntec Limited for Oro Mines Limited over two areas near Billy Lake, Highland Valley, British Columbia.

The field crew of four men was managed by Mr. W. Mairs and supervised from Vancouver by Mr. P. E. Lane. Final drafting, interpretation and report writing were done at the Toronto office of Huntec Limited.

The survey consisted of 12.5 line miles of I. P. readings taken at 200 foot intervals on lines 400 feet apart, using the 'pole-dipole array' electrode configuration with a separation of 400 feet. A selected part of one line was subsequently detailed, using the same electrode configuration with separations of 100, 200, 600 and 800 feet. Resistivity measurements were taken concurrently throughout the survey.

The reconnaissance data are presented in the form of contoured maps of apparent chargeability and resistivity, at a scale of 1 inch to 400 feet. The data for the detailed line are presented in the form of profiles, at the same scale.

SURVEY SPECIFICATIONS

The equipment used on this survey was the Huntec pulse-type I.P. unit manufactured in Toronto by Huntec Limited. Power is obtained from a JLO motor, coupled to a 2.5 kw 400 cycle three-phase generator, providing a maximum of 2.5 kw d.c. to the ground. The cycling rate is 1.5 seconds "current on" and 0.5 seconds "current off", the pulses reversing continuously in polarity. Power is transmitted to the ground through two current electrodes, C_1 and C_2, and measurements taken across two potential electrodes, P_1 and P_2.

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 electrodes P_1 and P_2 during the "current on" part of the cycle, and the secondary voltage (V_s) appearing between electrodes 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, in ohmmeters, is proportional to the ratio of the primary voltage to the measured current, the proportionality factor depending on the geometry of the electrode array used. The chargeability and resistivity obtained are called "apparent" as they are values which that portion of the earth sampled by the array would have if it were homogeneous. As the earth sampled is usually inhomogeneous, the calculated apparent chargeability and apparent resistivity are functions of the actual chargeabilities and resistivities of the rocks sampled, and of the geometry of these rocks.

For this survey the 'pole-dipole array' was used throughout. For this array one current electrode (C_1) and the two potential electrodes (P_1 and P_2) are moved in unison along the survey lines, the other current electrode (C_2) remaining fixed at 'infinity'. In this way the flow of current from C_1 is approximately radial within the range of the three moving electrodes. The spacing between these electrodes is kept constant for each traverse, the distance between C_1 and P_1, designated 'a', being roughly equal to the depth to be explored by that traverse. Detailing is done by running subsequent traverses at different electrode separations, enabling more precise estimates to be made of depth to the top or center of causative bodies, and more detailed information obtained on the geometry and extent of the bodies.

INTERPRETATION PROCEDURES

I. P. interpretation procedures have been most completely developed in situations of horizontal layering, approximating bodies such as porphyry coppers of large lateral extent; and spherical shapes, which can generally be applied only when the depth to the center of a body greatly exceeds its average dimensions. 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 not yet been solved theoretically. However, by judicious use of the theoretical solutions to the situations mentioned above, together with experience from other I. P. surveys, it is generally possible to locate the center of the cause of anomalies with reasonable accuracy and, in some cases, to give an estimate of the true chargeability. In the case of bodies approximating the spherical shape, the parameters of volume and true chargeability are interdependent so far as the surface response is concerned, and it is therefore only possible to give an estimate of the combination of the two, such as a chargeability-volume factor.

An estimate of the average percentage sulphides can be made after the true chargeability of the body or bodies causing the observed anomalies has been calculated. These estimates are, of course, approximate inasmuch 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 inter-connection of mineralization, and other factors. Based on past experience, 1% by volume of sulphide mineralization corresponds to between 5 and 15 milliseconds of true chargeability. In the realm of massive sulphides (say 25% by volume or greater), this relationship is still less exact since increasing quantities of sulphide may produce only minor changes in I. P. response.

INTERPRETATION

General

The apparent chargeability values encountered in this survey are relatively flat and low, which is typical of the background level in the Highland Valley area. The barren rocks of the Guichon batholith are expected to have a true chargeability of between 2 and 5 milliseconds which, combined with an overburden layer of variable thickness and rather lower chargeability, could account for all apparent chargeability fluctuations seen in these two areas.

The apparent resistivity values are also fairly typical of the area, but show rather more extreme fluctuations than is usual. These fluctuations could be caused by varying thickness of conductive overburden, rugged terrain or bedrock alteration such as weathering, sericitization or silicification, any of which would change the bedrock resistivity. A combination of these causes is possible. It is not considered likely that low resistivities are caused by massive mineralization, unless such zones are very limited in extent.

Price Claim Group

This area is divided into two parts on the basis of the apparent chargeability values, as shown on the chargeability contour map. The dividing line marks a change in background level from a range of 2.2 to 3.2 milliseconds in the northern part to a range of 3.3 to 4.3 milliseconds in the southern part of the area. Although this difference is not great it does appear to be fairly clearly defined, and could indicate a change in rock type. A very minor change would be sufficient to move the chargeability background level by one millisecond.

Within these two parts of the area the majority of the chargeability measurements fall within the background ranges given. The few readings outside these ranges are isolated and are not considered significantly anomalous.

Detailing on Line 80+00E gives the only readings which are considered to be of possible interest. The wider electrode spacings used on this line give weakly anomalous chargeability values between 110+00S and 114+00S, indicating a possible source either deep below this line or near surface some 400 feet to the west. Further I. P. work would have to be done to resolve this ambiguity before the readings could be assessed or more direct investigation, such as drilling, recommended.

MM Claim Group

The chargeability values over this area are as flat as those on the Price group, and of rather lower amplitude. In this case a background range from 1.8 to 2.8 milliseconds covers the majority of the readings. Those falling outside this range are again limited in extent and only very weakly anomalous. The three chargeability values of 3.5

milliseconds or greater, situated on Line 68+00E, could be caused by metallic sulphides in bodies of very limited extent. Since there is a resistivity low associated with each one these could be short, narrow veins of massive sulphides. However, there are many other possible causes of such slight chargeability increases which are equally likely. Exact source locations cannot be given without further work.

SUMMARY AND RECOMMENDATIONS

The I. P. survey over these two properties revealed the flat low apparent chargeability values characteristic of the barren Guichon rocks of the Highland Valley area. None of the variations observed were sufficiently strong or extensive to indicate more than very minor amounts of metallic sulphides within the depth sampled (about 400 feet). The wider electrode separations used on Line 80+00E of the Price claim group indicate the possibility of a deep source, but this response could have come from near surface to the west of the line.

The survey does not indicate any areas of interest on which drilling can be recommended. If further investigation of the higher chargeabilities obtained at about 112+00S on Line 80+00E of the Price group is considered to be warranted, it is suggested that the I. P. survey be extended to the west, using electrode spacings of 400 and 800 feet on Lines 76+00E and 72+00E.

Respectfully submitted,

HUNTEC LIMITED

Andrew R. Dodds, B. Sc.,
Geophysicist.

APPENDIX

Instrument Used

The measurements discussed in this report were taken with a Huntec pulse-type Induced Polarization unit, with a power rating of 2.5 kw.

Claims Surveyed

Price Claim Group:	Price 127-132 incl., 135 and 136, 135B and 136B, 143 and 144, 500, 501, 503, 505, 530 fr.
MM Claim Group:	MM 7 - 12 incl., 23 - 26 incl., Rob 12.

Line-miles Surveyed

The survey consisted of two phases: reconnaissance (covering all lines once with one electrode separation) and detail (resurveying selected lines using different electrode separations). The number of line-miles covered and measurements taken in each phase were as follows:

		Line-miles	Stations
Reconnaissance		12.5	353
Detail		1.8	60
	Total	14.3 line-miles	413 stations

Man-days Required

	Man-days
Operating geophysical equipment	70
Interpretation and report writing	3
Drafting	4
Typing	1

Personnel Employed on Survey

Name	Occupation	Address	Dates
A. R. Dodds	Geophysicist	1450 O'Connor Dr. Toronto 16, Ont.	Oct. 13, 16, Nov. 3, 4, 1966
P. E. Lane	"	"	Aug. 8-27, 1966
W. Mairs	Operator	"	Aug. 8-27, 1966
M. Samilski	"	"	Sept. 14-16, 1966
A. Andrews	Helper	Kamloops, B. C.	Aug. 8-19, 1966
R. Leonard	"	"	Aug. 8-27, 1966
P. Slominski	"	"	Aug. 22-26, 1966
D. Morton	"	"	Sept. 14-16, 1966
A. Gohn	"	"	Sept. 14-16, 1966
H. Ricketts	Drafting	1450 O'Connor Dr. Toronto 16, Ont.	Nov. 3, 4, 7, 8, 1966
L. Brunton	Typing	"	Nov. 7, 1966.

Total Cost of survey by contract $7670.00

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 23 day of April 1967, A.D.

Neville Lohn.

Neville Lohn

M. L. De Mosi

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

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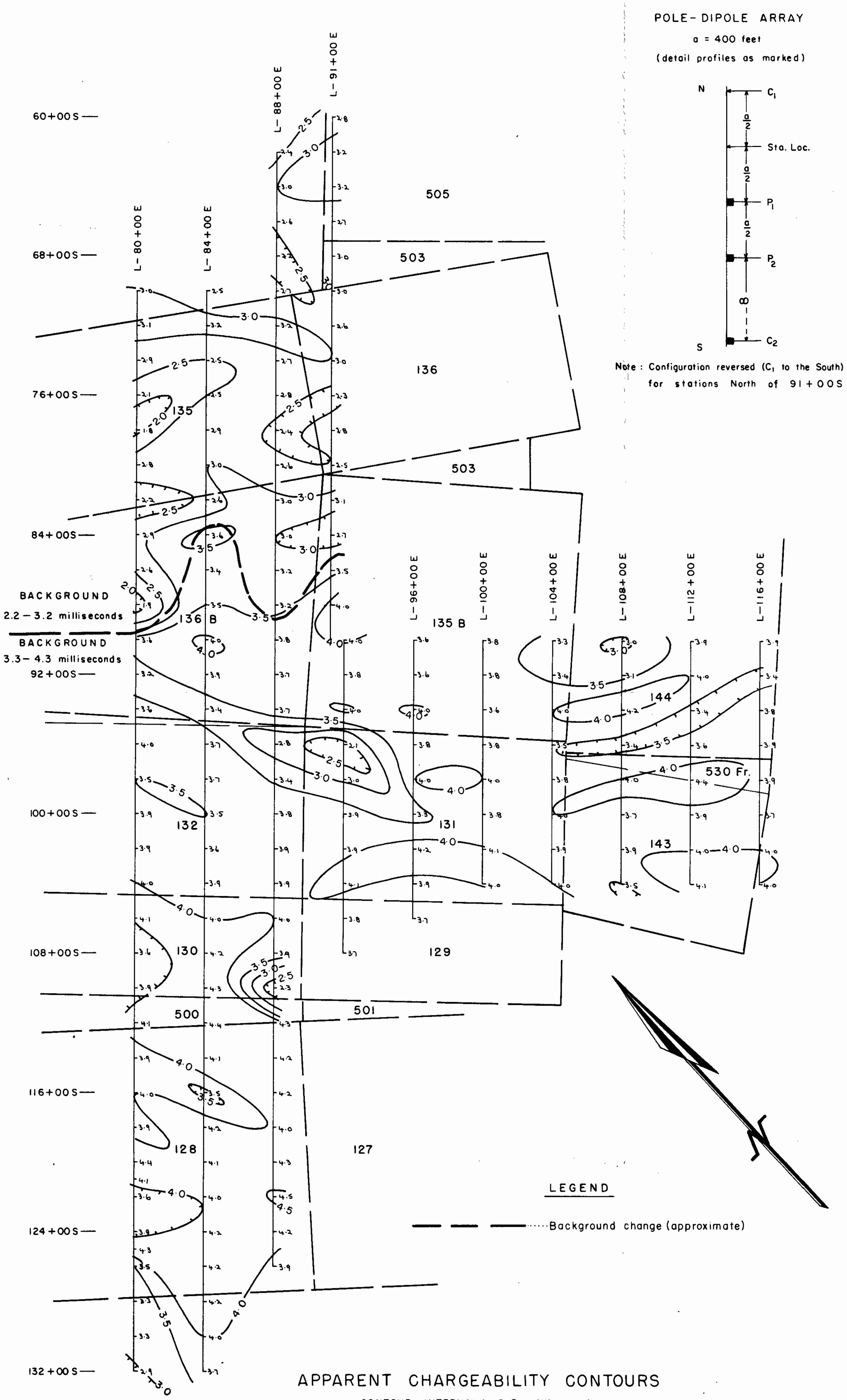
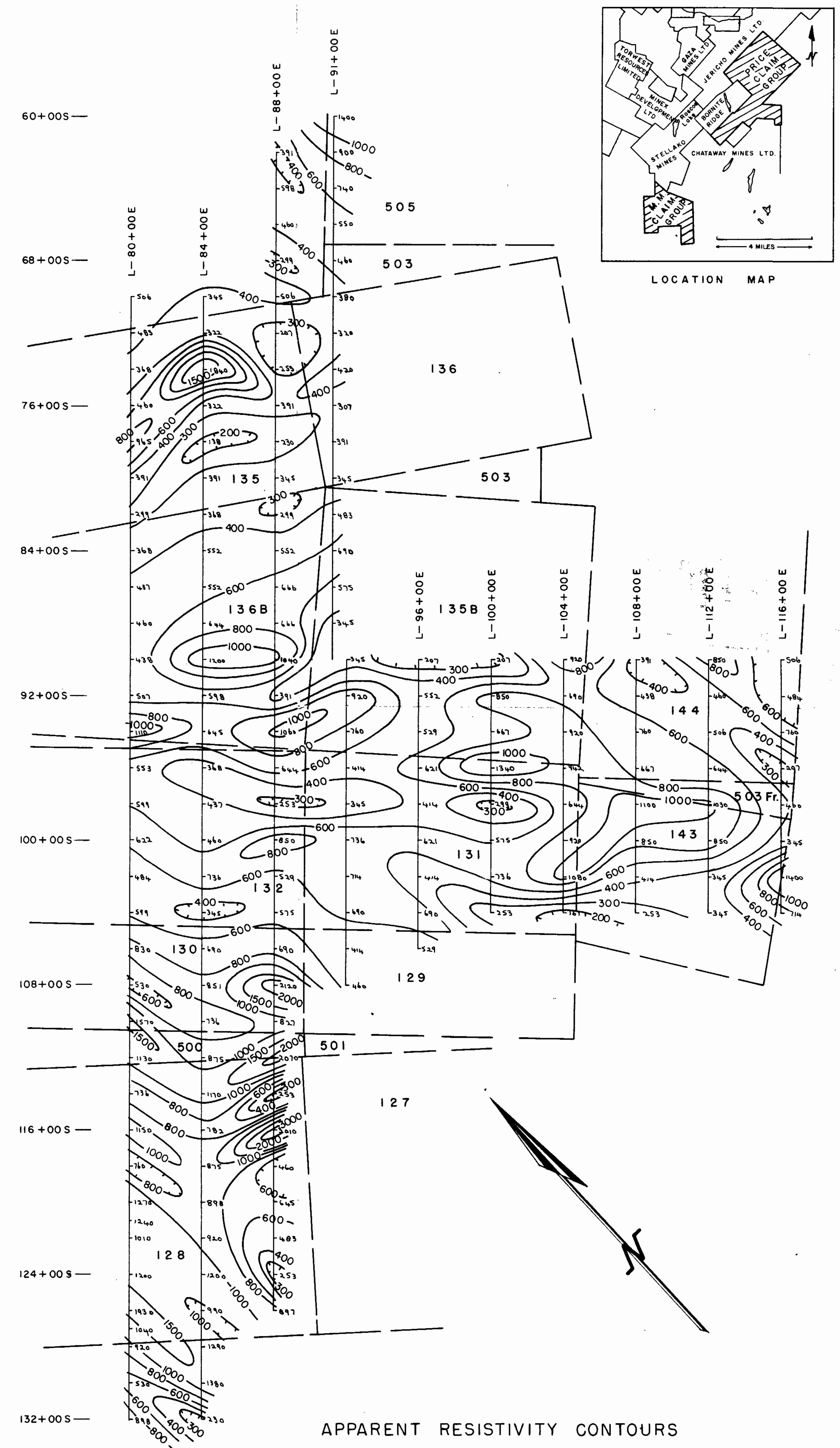


APPARENT CHARGEABILITY CONTOURS

CONTOUR INTERVAL: 0.5 milliseconds

Scale: 1 inch : 400 feet

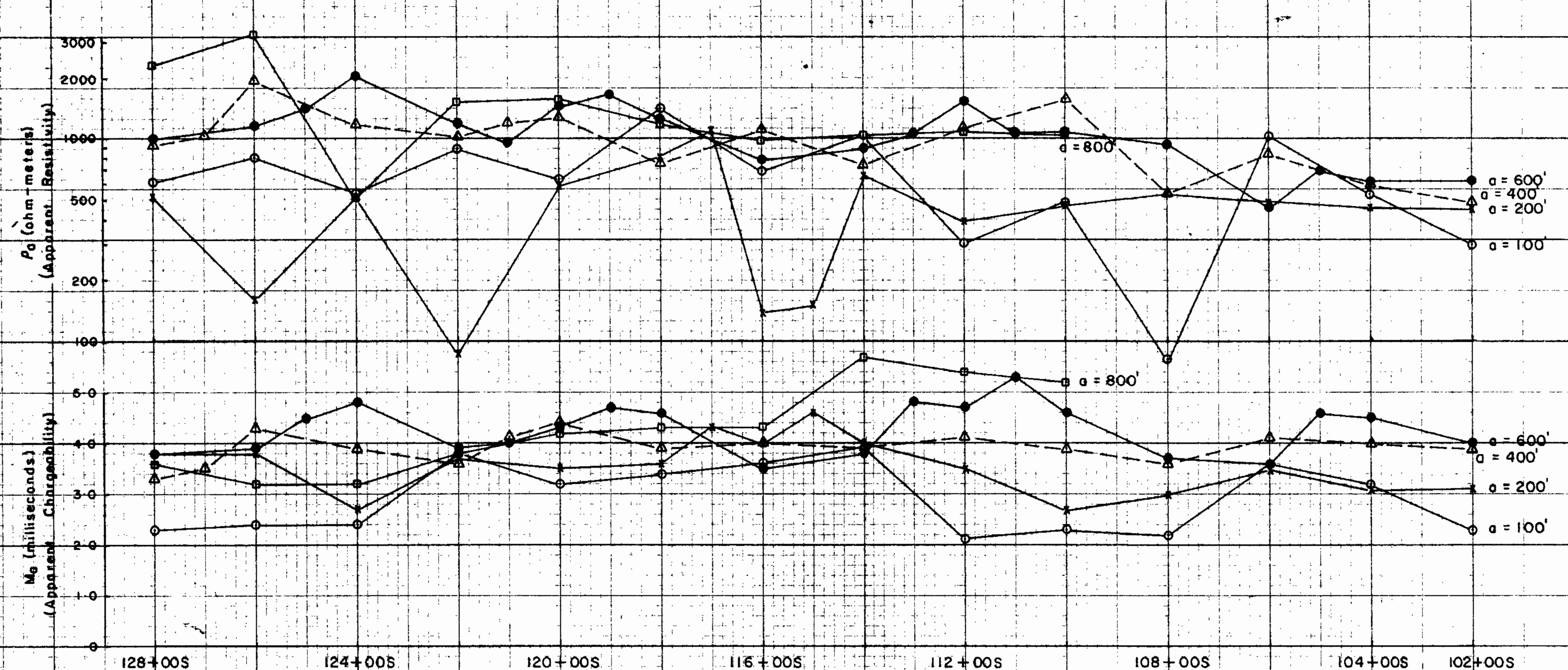


APPARENT RESISTIVITY CONTOURS

Contours at (logarithmic intervals) 300, 400, 600, 800, 1000, 1500, 2000 etc. ohm-meters.

Scale: 1 inch : 400 feet

DETAIL PROFILES - LINE 80+00E



Horizontal Scale 1 inch : 200 feet

ORO MINES LIMITED

INDUCED POLARIZATION SURVEY

HIGHLAND VALLEY, B.C.

PRICE CLAIM GROUP

To accompany report by [signature]

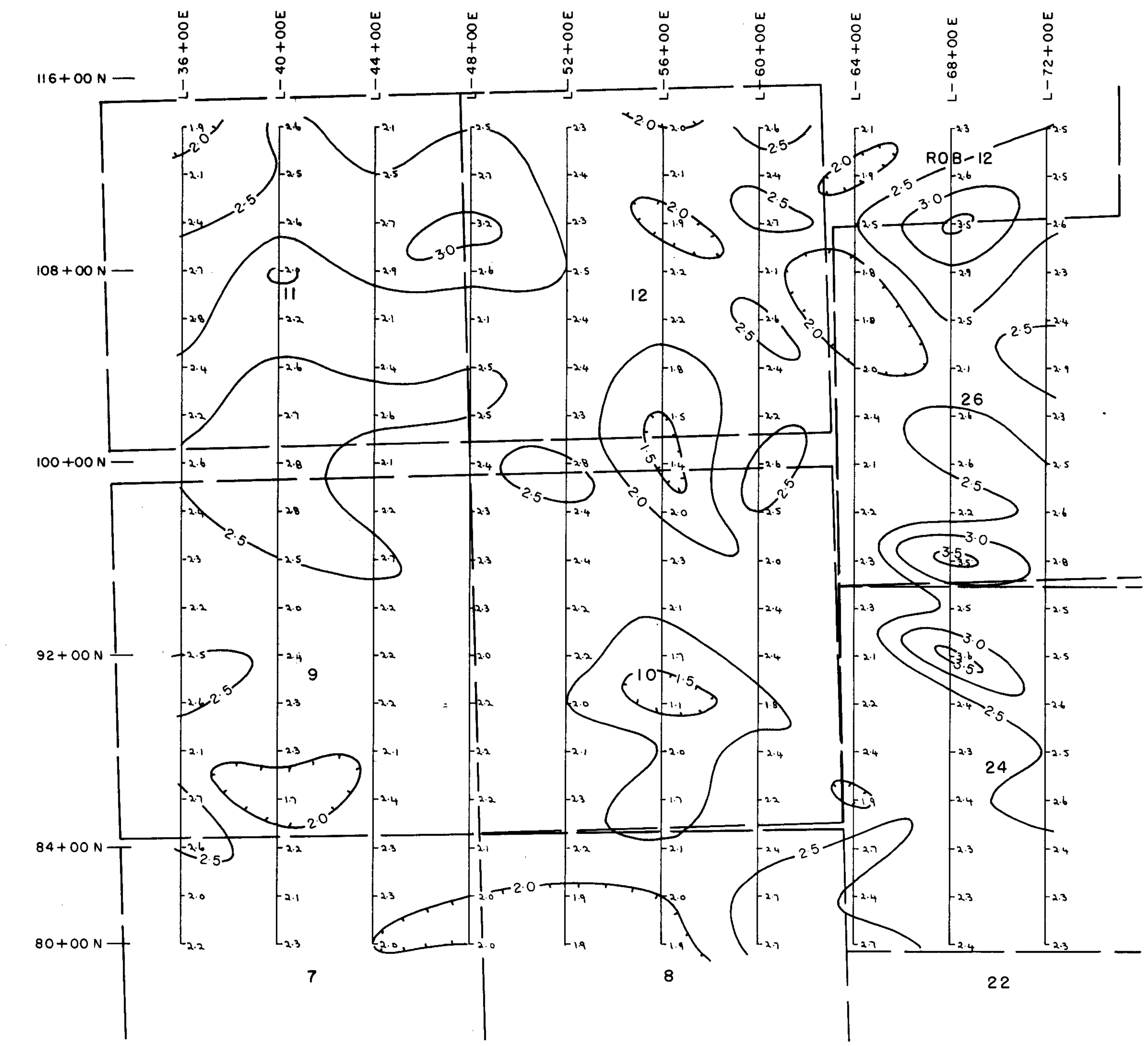
A. R. Dodds, B. Sc., Geophysicist.

HUNTEC LIMITED, Toronto, Canada - November 1966

Department of Mines and Petroleum Resources ASSESSMENT REPORT NO. 973 MAP 1

973

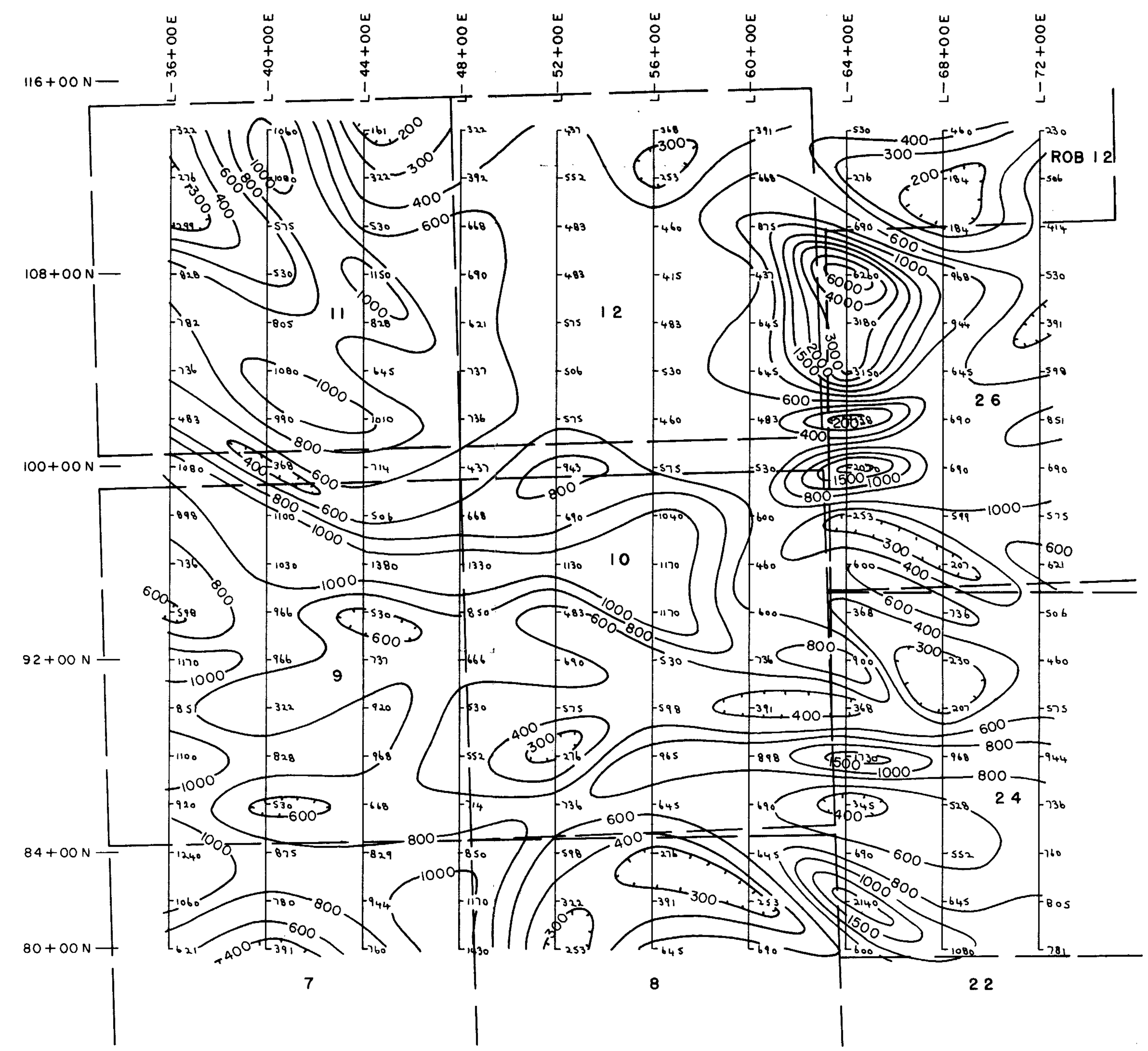
P.H. 472/66



APPARENT CHARGEABILITY CONTOURS

CONTOUR INTERVAL: 0·5 milliseconds

Scale: 1 inch : 400 feet

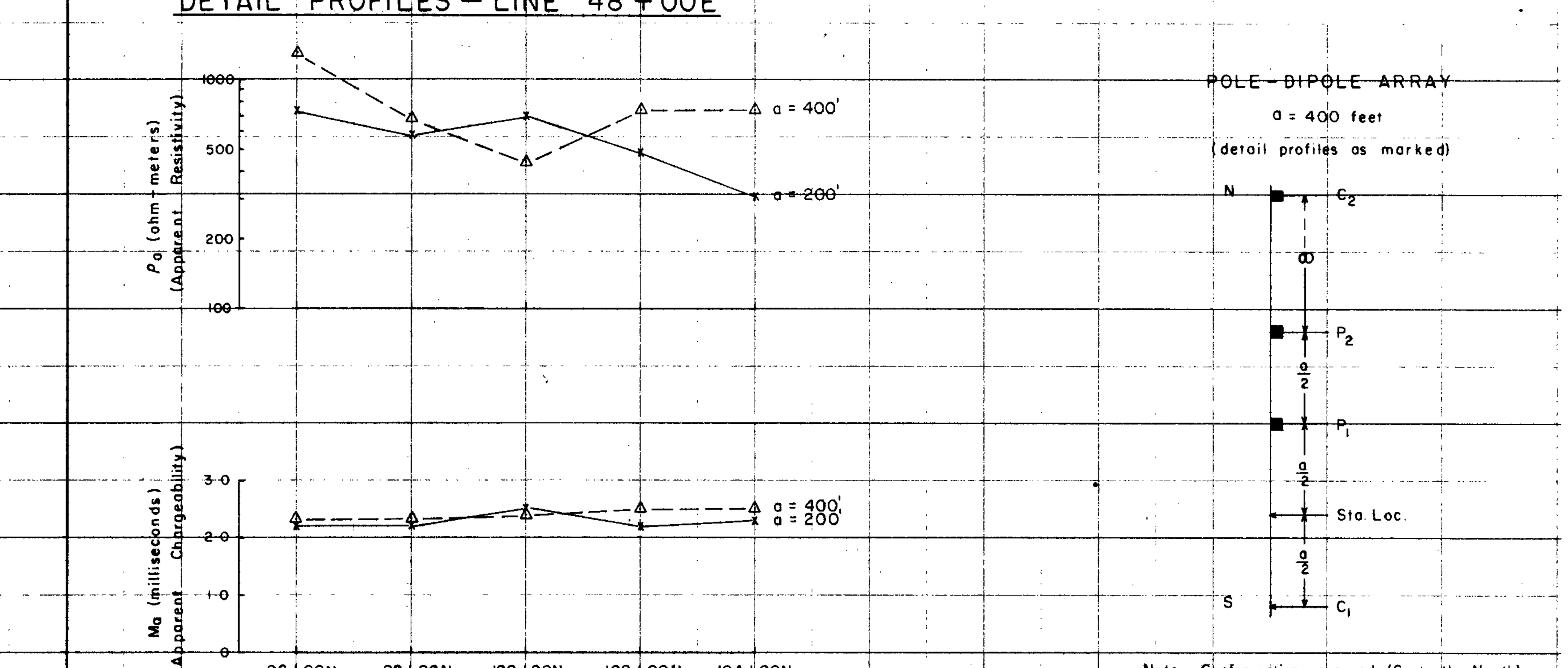


APPARENT RESISTIVITY CONTOURS

Contours at (logarithmic intervals) 200, 300, 400, 600, 800, 1000, 1500 etc. ohm-meters.

Scale: 1 inch : 400 feet

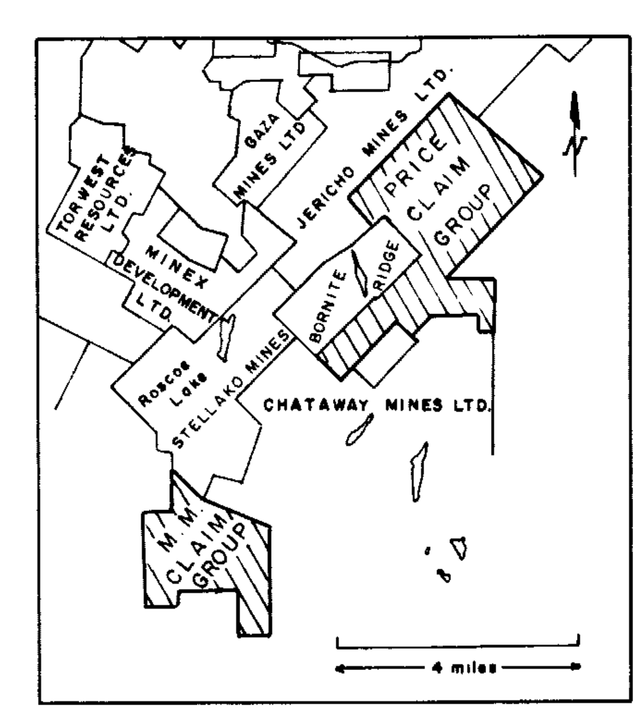
DETAIL PROFILES – LINE 48+00E



Horizontal Scale : 1 inch : 200 feet

Note : Configuration reversed (C_1 to the North) for stations South of 86+00N

LOCATION MAP



ORO MINES LIMITED

INDUCED POLARIZATION SURVEY

HIGHLAND VALLEY, B.C.

M. M. CLAIM GROUP

To accompany report by *A. R. Dodds*

A. R. Dodds, B. Sc., Geophysicist.

HUNTEC LIMITED, Toronto, Canada – November 1966

PH 472/66

973