A GEOPHYSICAL REPORT ON
THE BAR CLAIM GROUP, HIGHLAND VALLEY
50° 121° SE. 92I/6E
FOR
NORTHLODE EXPLORATION LTD.
JULY 19 - OCT. 14, 1967
BY
W. A. FINNEY, B.Sc., AND
R. K. WATSON, B.A.Sc., P.Eng.

HUNTEC LIMITED Toronto

1199

REPORT ON

AN INDUCED POLARIZATION (I.P.) SURVEY

AND

A MAGNETOMETER SURVEY

BAR CLAIM GROUP

HIGHLAND VALLEY AREA, BRITISH COLUMBIA

FOR

NORTHLODE EXPLORATION LIMITED

BY

HUNTEC LIMITED

VANCOUVER, B.C.

NOVEMBER 1967

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ACCOMPANYING MAPS

INTRODUCTION

General

This report contains the results of a combined Induced Polarization and Magnetometer survey carried out by Huntec Limited for Northlode Exploration Limited on the Bar Claim Group in the Kamloops Mining Division, British Columbia (Fig.A).

The purpose of the survey was to prospect for sulphide mineralization in both massive and disseminated form. The survey area lies near the Highland Valley mining camp and the I.P. method has been relatively successful in the past in detecting the type of mineralization found in that area.

The field work was carried out between July 19th and August 5th; August 11th and August 23rd; and October 1st and October 14th, under the direction of Mr. W. Mairs. The project was supervised from Vancouver by Mr. R.K. Watson.

The Property

The survey area lies approximately two and a half miles west of Calling Lake and access to the property is by road from the Highland Valley mining camp. The claims surveyed included:

BAR 1 - 12, 21 - 31, 33, 35
BAR Fr. 1, 2 & 3
M.B. 31 - 34

The detailed surface geology is not fully known but the whole property is underlain by rocks of the Guichon Creek Batholith which are mainly granite, granodiorite, quartz-diorite and diorite.

The survey was carried out along a grid of lines at

400 ft. intervals, oriented approximately N 30° E. Readings were taken at 200 ft. intervals along the lines in the reconnaissance phase of the survey.

SURVEY SPECIFICATIONS

The Equipment

The Induced Polarization equipment used was a pulse-type instrument manufactured in Toronto by Huntec Limited. The reconnaissance and some of the detail data was obtained using a 7.5 kw unit, and the remaining detail data was obtained using a 2.5 kw unit. The following specifications apply:

Type of current	Direct Current broken at periodic intervals
Frequency	1.5 seconds "current on" and 0.5 seconds "current off". Alternate pulses have reverse polarity
Integrating time	400 milliseconds
Maximum power available	7.5 kw and 2.5 kw respectively
Maximum current available	8.0 amps and 3.0 amps respectively

Measurements taken in the field were:

1. The current flowing through the current electrodes C_1 and C_2.
2. Primary voltage V_p between measuring electrodes during "current on" time.
3. Secondary voltage V_s between measuring electrodes during "current off" time.

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

The magnetometer survey was carried out using a Jalander fluxgate instrument. Values of vertical magnetic intensity were read to an accurancy of $\pm$ 10 on the most sensitive scale, and the usual corrections were made for diurnal and instrument drift.

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 distance equal to "a" or a simple fraction of "a". For the reconnaissance phase of this survey the value of "a" was kept at 200 feet.

Since the value of "a" is a rough approximation to the depth penetration, detailing of anomalies discovered in the reconnaissance phase was done by profiling the anomalies at different electrode separations. This additional data provides information from which depth, dip and location may more easily be calculated than from a single profile.

Data Presentation

The results of the reconnaissance phase of the I.P. survey are shown on Plates 1 and 2 as contours of apparent chargeability and resistivity at a scale of 1" to 400 ft. Outlines of interpreted causative bodies associated with anomalies are also shown.

Those parts of lines which were surveyed in detail

with a variety of electrode spacings are indicated on the Plates with double line and arrows, and the results of the detail phase of the survey are presented in Figs. 1 - 7. These show profiles of apparent chargeability and resistivity at a horizontal scale of 1" to 200 ft. Sections of interpreted causative bodies, as well as recommended diamond drill holes, are shown under the profiles.

The results of the magnetometer survey are shown separately on Plate 3 as a contour map of the vertical intensity field at a scale of 1" to 400 ft. Some interpretation data is also shown on this Plate.

RESULTS AND INTERPRETATION

The apparent chargeability contour map (Plate 1) shows a relatively smooth background, between 1.8 and 2.2 milliseconds. There are several small areas in which the values rise to twice background or more, but only three of these appear to be significant. These areas are centred approximately at 48W,37S; 15W,13S and 64W,20S and will be referred to as anomalies 1, 2 and 3 respectively.

Anomaly 1 has a peak value of about 3.0 milliseconds above background as shown on the contours. A slightly higher response was observed on the profiles using a 50 ft. electrode spacing which suggests that the top of part of the source material is very shallow, possibly even at bedrock surface. The anomaly is still quite strong using the 200 ft. electrode spacing and the centre of the causative body is estimated to be approximately 200 ft. deep. An outline of the interpreted causative body is shown below the profile (Fig.5).

There are increases in the resistivity readings corresponding to this chargeable anomaly. From this it is deduced that there is a possibility that the causative body consists mainly of clay minerals disseminated within the rock matrix and not sulphides. In the case of the latter, one expects either very little change in resistivity or a significant decrease, depending upon whether the mineralization is of the disseminated or massive type. It has been noted in the past that in the Highland Valley area clay minerals, which are usually an alteration product of this rock type, have given rise to concurrent chargeability and resistivity "highs."

However, it is recommended that the anomaly be tested by drilling in view of the fact that copper sulphides have been detected in outcropping rock near the centre of the anomaly. At least two diamond drill holes, D.D.H.1 and D.D.H.2, positioned at 48+00W, 39+00S, dipping 45° to the north, and 48+00W, 35+70S, dipping 45° to the south, should be drilled to a depth of about 350 ft.

Anomaly 2 was detected with a maximum apparent chargeability response of 4.3 milliseconds using the 200 ft. electrode spacing. Slightly anomalous readings are recorded at other spacings (Fig.3) and from this data it is concluded that the causative body is probably fairly broad and centred at approximately 200 ft. below surface or even deeper. Nothing more definite can be deduced without additional information at 600 ft. or 800 ft. electrode spacings. Two diamond drill holes, D.D.H.3 and D.D.H.4, have been tentatively positioned (Plate 1), but the writer recommends that more data at different electrode spacings should be obtained in order to be more certain of the best drill hole locations.

It is emphasized also that there is a resistivity 'high' associated with the anomaly and this considerably reduces the economic potential of this region. It is suggested, therefore, that, even if further I.P. data delineates a target more clearly, the drilling of this anomaly should be undertaken only if the results from anomaly 1 are encouraging.

On the reconnaissance contour map anomaly 3 is a fairly broad 'high' which is not as strong as anomalies 1 or 2. However, using the 100 ft. and 50 ft. electrode spacings sharp relatively intense 'highs' of about 13 milliseconds were recorded at station 20S (Fig.7).

These are interpreted as being caused by a narrow section of highly chargeable material within a larger body of weaker chargeability. This could represent a more intensely mineralized zone of stringers or veins within a larger body of disseminated mineralization.

The strongly anomalous section is thought to be shallow, probably reaching bedrock surface and could possibly be exposed by trenching. One diamond drill hole is proposed to investigate this region to a depth of about 200 ft. and is located at 64+00W, 21+00S, dipping 45° to the north.

Several small anomalies were detected in the early part of the reconnaissance phase of the survey and these were examined more carefully at a later stage using closer station intervals and, in most cases, multiple electrode spacings. The results are shown in Figs. 1, 2, 4 and 6 or they are included on the contour map.

A number of these small anomalies which had been recorded as high readings on one station only were not substantiated by the extended survey. It is felt now that the high values might have been caused, in part at least, by the effect of a very poor electrical contact at the current stakes due to the extremely dry ground in the area at that time of the year.

A feature of the resistivity results is the distinctive 'low' which trends through the survey area in a direction approximately N 30° W and this is indicated on Plate 2 as a dashed line.

The character of the resistivity contours changes abruptly across this trend. To the north-east the values are generally high and the pattern is more disturbed,

whereas to the south-west the values are lower and the contours are relatively smooth. The contrasting resistivity results in these two regions probably reflects a change in rock type and the 'low' trend is probably due to a strong conductor in the contact zone between the two.

A similar trend, though not so distinct, exists on the chargeability contour map (Plate 1). Low readings have been recorded along this feature which indicates the contact zone between the two rock types does not contain metallic sulphide minerals in more than average quantities. The good conductor producing the resistivity depression is interpreted, therefore, as most likely to be saline solutions impregnating a fault or shear zone at the junction of the two rock types.

This interpretation is supported by the magnetic results. Two distinctive magnetic regions are separated by northwest trending magnetic 'low' (Plate 3) coinciding with the 'low' trends on the chargeability and resistivity contour maps.

The strongest and most disturbed magnetic response occurs south of the 'low' and east of line 76W. The values are of the order of 1500 gammas or more, higher than those to the north-east of the 'low'. The higher magnetic readings possibly represent one of the intrusions within the Guichon Creek Batholith which is carrying a larger percentage of magnetite than the rocks to the north east.

It has been noted that the coincident 'lows' shown on Plates 1 - 3, generally speaking lie close to the edge of the swamp area. The swamp is probably a product of the erosional characteristics of the rock type underlying it and this is further evidence of a different rock type in this region which is clearly terminated along a line corresponding to the geophysical lineament.

SUMMARY AND CONCLUSIONS

1. The I.P. survey over the Bar Claim Group in the Highland Valley area covered 21.14 line-miles of reconnaissance and 4.38 line-miles of detail work. The magnetometer survey covered the same lines as the I.P. reconnaissance phase.

2. Anomaly 1 appears to represent a subsurface zone with high chargeability and a low conductivity which could be caused by clay minerals rather than metallic sulphides. However, favourable geological evidence in the vicinity probably justifies two explanatory diamond drill holes, D.D.H.1 and D.D.H.2, to test this anomaly and these are recommended.

3. Anomaly 2 is not very strong but is relatively extensive. However, the resistivity 'high' associated with this anomaly detracts from its economic potential. More data using 600 ft. and 800 ft. electrode spacings is required for a full interpretation. Two diamond drill holes, D.D.H.3 and D.D.H.4, are tentatively positioned from the present data but additional I.P. work is recommended first.

4. Anomaly 3 is interpreted as being due to concentrated mineralization within a larger disseminated mass. One angled diamond drill hole, D.D.H.5, is proposed to test this.

5. Two different rock types (in the general sense) are interpreted as covering the survey area and the contact between the two has been delineated clearly from the I.P. and magnetic results. Investigation of this region is recommended to determine the relationship between the two types as an aid to the geological interpretation of the origin and control of mineralization in the area.

HUNTEC LIMITED

W. A. Finney

W. A. Finney, B.Sc.
Geophysicist

R. K. Watson

R. K. Watson, B.A.Sc., P.Eng.
Geophysicist

APPENDIX A

ASSESSMENT CREDIT DATA

Miles Surveyed		Line-Miles
	Reconnaissance Phase	21.14
	Detail Phase	4.38
	Total	25.52

Personnel:

Name	Occupation	Dates
W. Mairs	Operator/Party Chief	July 19 - Aug. 5, 1967 Aug. 11 - Aug. 23, 1967 Oct. 1 - Oct. 14, 1967
N. Taylor	Operator	July 19 - Aug. 3, 1967
D. Mather	"	July 20 - Aug. 5, 1967 Aug. 11 - Aug. 23, 1967
D. Reynolds	Helper	Oct. 1 - Oct. 14, 1967
H. Tittmar	"	July 19 - Aug. 3, 1967 Aug. 11 - Aug. 23, 1967
T. Welch	"	July 19, 1967 Aug. 12 - Aug. 23, 1967
J. Cox	"	July 19 - Aug. 3, 1967
F. Froste	"	Aug. 4 - Aug. 5, 1967 Aug. 11 - Aug. 23, 1967
T. Baker	"	Oct. 1 - Oct. 14, 1967
T. Bond	"	Oct. 5 - Oct. 14, 1967
N. Tanner	"	Oct. 5 - Oct. 14, 1967
E. Helkio	Drafting	Aug. 21 - Aug. 31, 1967 Sept.20 - Sept.22, 1967 Oct. 10 - Oct. 12, 1967
D. Wilson	"	Sept.12 - Sept.14, 1967 Nov. 28 - Nov. 30, 1967
R. K. Watson	Geophysicist	Sept.20 - Sept.22, 1967 Nov. 27 - Dec. 1, 1967
W. A. Finney	"	Nov. 26, 1967
R. Harrington	Typing	Nov. 30, 1967

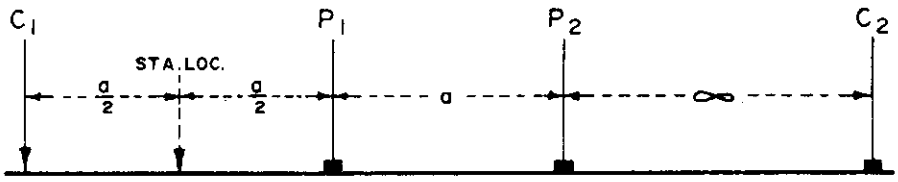
DETAIL PROFILES of APPARENT CHARGEABILITY & RESISTIVITY

NORTHLODE EXPLORATION LIMITED

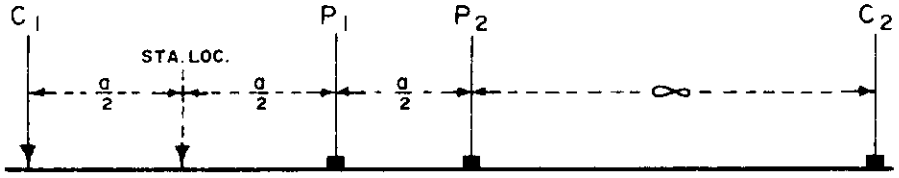
GRID SYSTEM - BAR GROUP

FIGS. - - 1 to 7

3 - ELECTRODE ARRAY



POLE - DIPOLE ARRAY



NOTE:

P_1 P_2 are Receiver Electrodes.

C_1 C_2 are Transmitter Electrodes.

LEGEND

- a = 50'
- a = 100'
- a = 200'
- a = 300'
- a = 400'
- a = 600'
- a = 800'

Horizontal Scale: 1 inch = 200 feet.

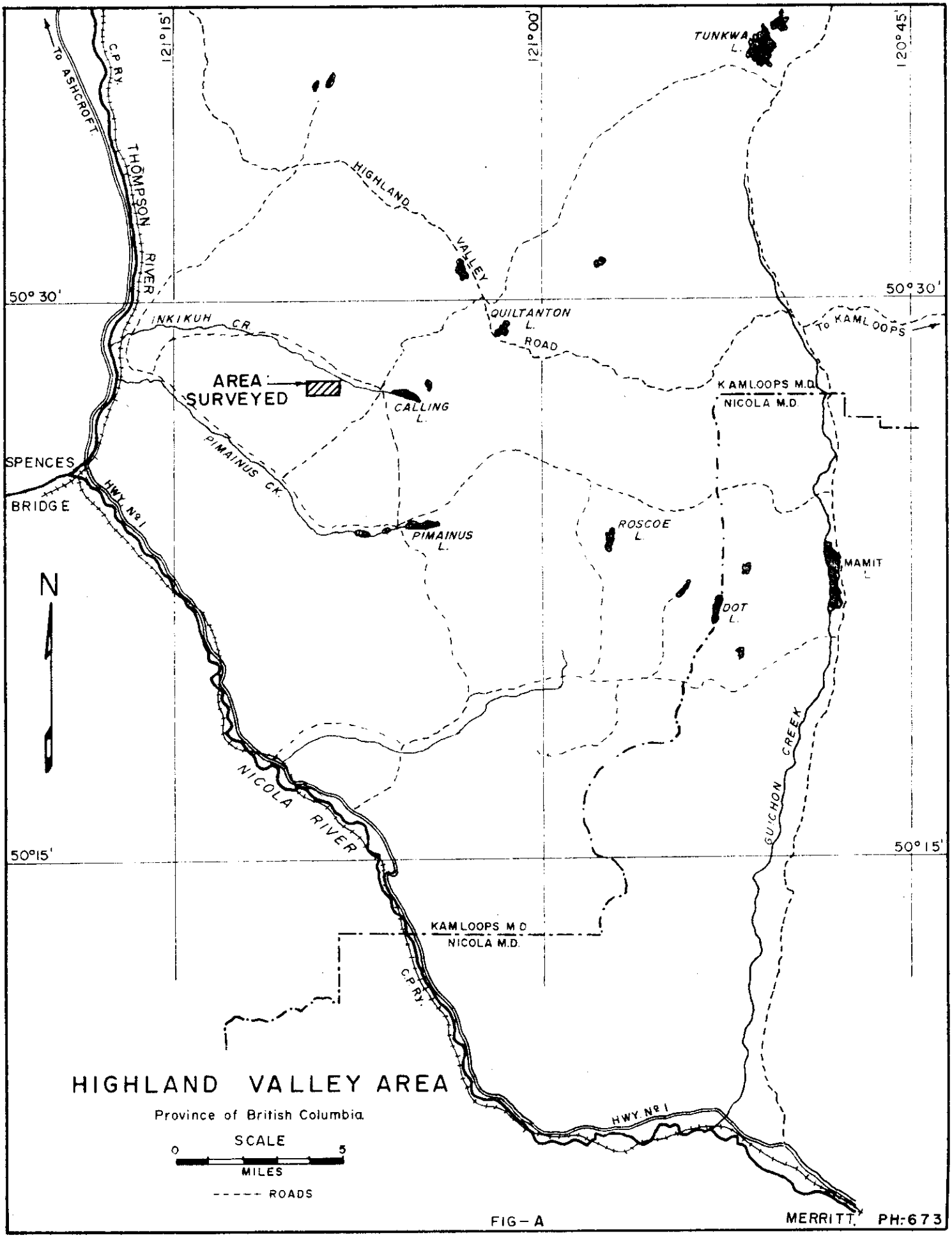
Vertical Scales:

Chargeability 1 inch = 20 milliseconds.

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

DATE: DEC.-1967

JOB Nº: PH.-673-67



HIGHLAND VALLEY AREA

Province of British Columbia

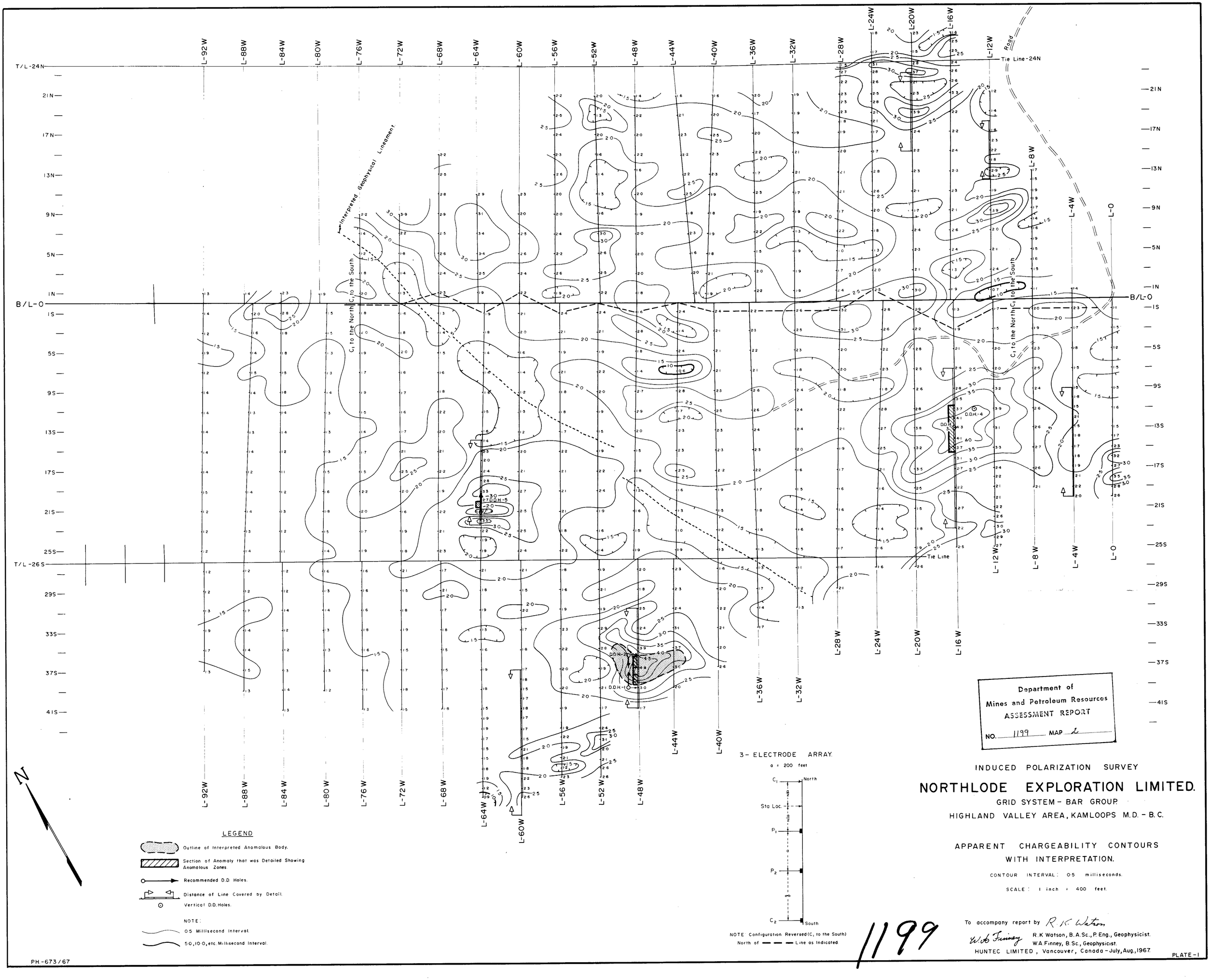
SCALE

0 5

MILES

----- ROADS

FIG – A



LEGEND

- Outline of Interpreted Anomalous Body.
- Section of Anomaly that was Detailed Showing Anomalous Zones.
- Recommended D.D. Holes.
- Distance of Line Covered by Detail.
- Vertical D.D. Holes.

NOTE:

- 0·5 Millisecond Interval.
- 5·0, 10·0, etc. Millisecond Interval.

3- ELECTRODE ARRAY.

a = 200 feet

NOTE: Configuration Reversed (C1 to the South) North of — — — Line as Indicated.

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ASSESSMENT REPORT
NO. 1199 MAP 2

INDUCED POLARIZATION SURVEY

NORTHLODE EXPLORATION LIMITED.

GRID SYSTEM - BAR GROUP.

HIGHLAND VALLEY AREA, KAMLOOPS M.D. - B.C.

APPARENT CHARGEABILITY CONTOURS WITH INTERPRETATION.

CONTOUR INTERVAL: 0·5 milliseconds.

SCALE: 1 inch = 400 feet.

1199

To accompany report by R.K. Watson

W.A. Finney

R.K Watson, B.A.Sc., P.Eng., Geophysicist.
W.A.Finney, B.Sc., Geophysicist.
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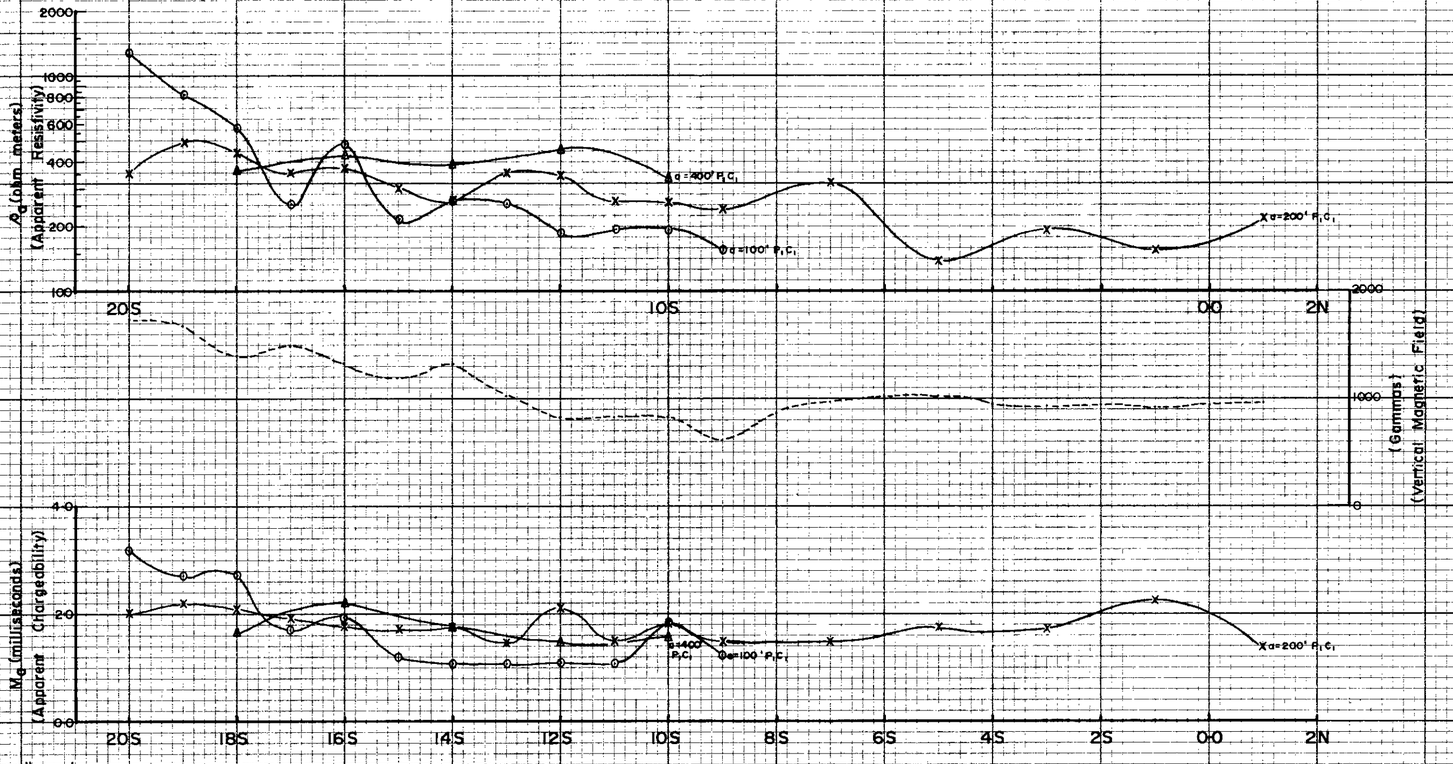
PLATE-1



INDUCED POLARIZATION & MAGNETOMETER SURVEY.

DETAIL PROFILE: LINE—4W.

1199

GRID SYSTEM—BAR GROUP

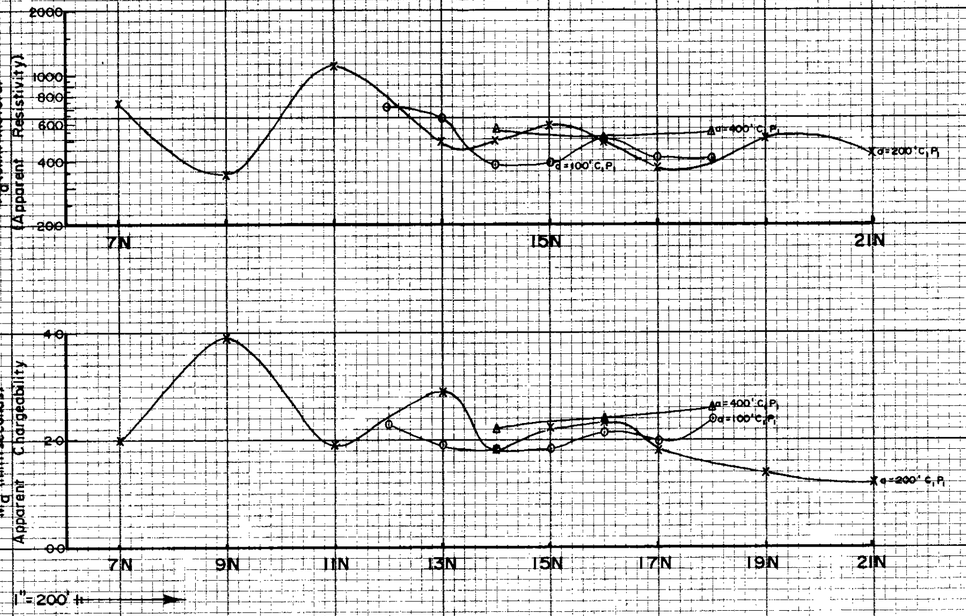
To accompany report by: R.K. Watson
R.K. Watson, B.A.Sc., P.Eng., Geophysicist
W.A. Finney
W.A. Finney, B.Sc., Geophysicist.
HUNTEC LIMITED, Vancouver, Canada, December, 1967

H 673/P7

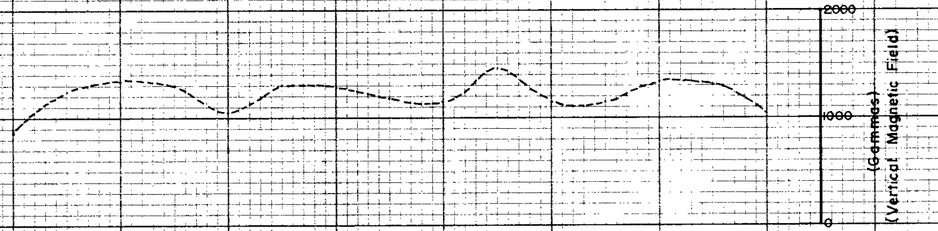
FIG-1

INDUCED POLARIZATION & MAGNETOMETER SURVEY

DETAIL PROFILE: LINE-12W.



1"=200'



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GRID SYSTEM - BAR GROUP

R.K. Watson

To accompany report by:

R.K. Watson, B.A. Sc., P.Eng., Geophysicist.

W.A. Finney

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

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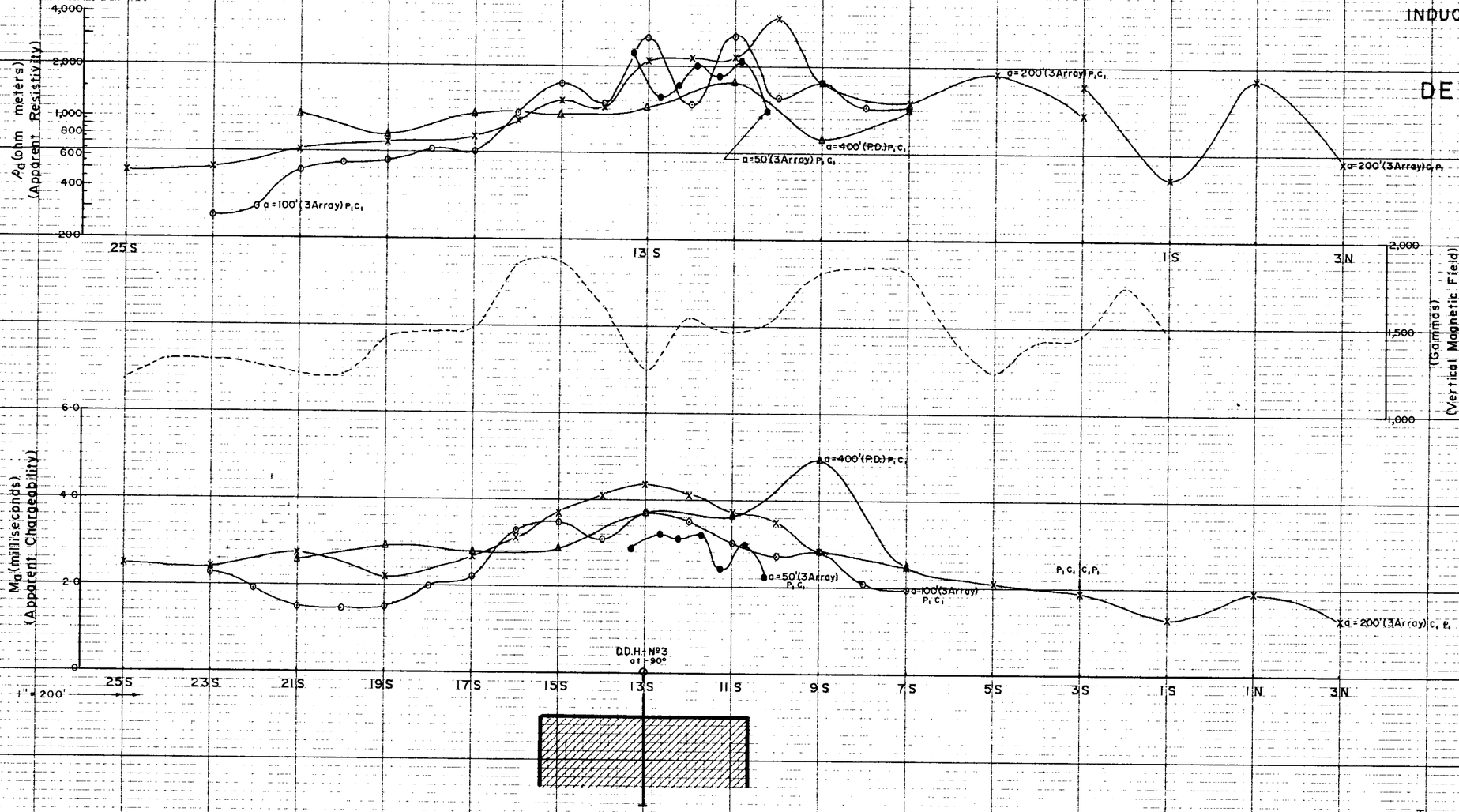
FIG - 2

INDUCED POLARIZATION & MAGNETOMETER SURVEY

DETAIL PROFILE. LINE - 16W



LEGEND

ANOMALOUS ZONE.

RECOMMENDED D.D. Hole.

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GRID SYSTEM - BAR GROUP

To accompany report by R.K. Watson
R.K. Watson, B.A.Sc., P.Eng., Geophysicist.
W.A. Finney
W.A. Finney, B.Sc., Geophysicist.
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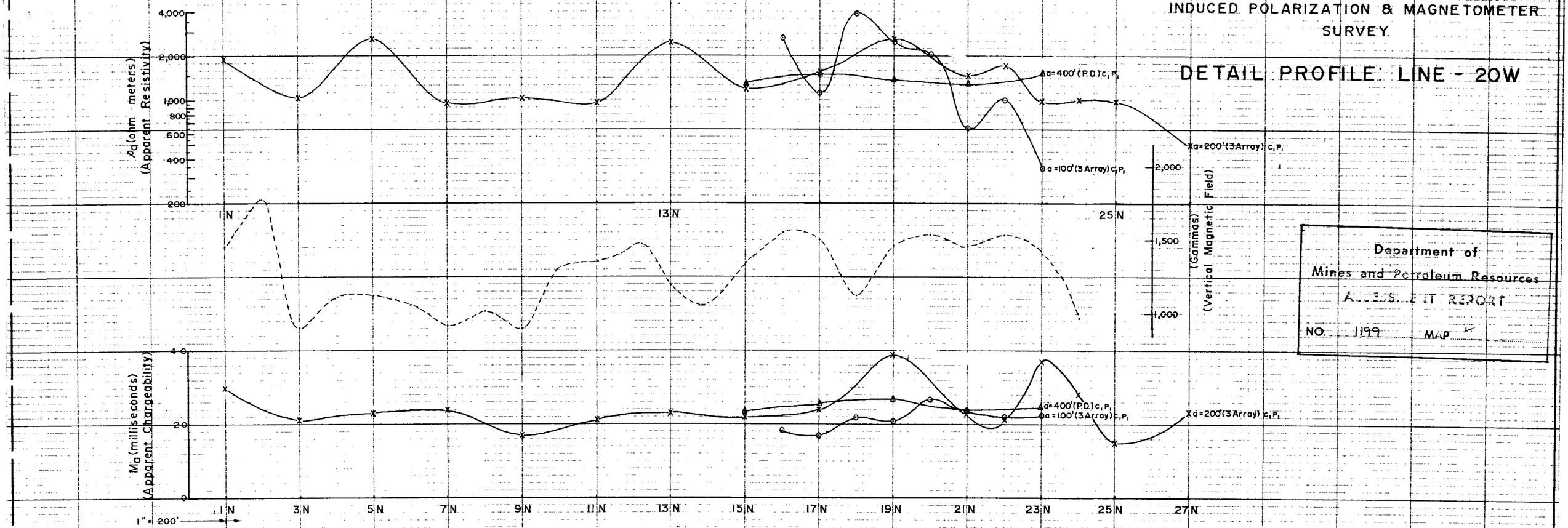
FIG. 3

INDUCED POLARIZATION & MAGNETOMETER SURVEY.

DETAIL PROFILE: LINE - 20W



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GRID SYSTEM - BAR GROUP

To accompany report by R. K. Watson

R.K. Watson, B.A.Sc., P. Eng., Geophysicist.
W.A. Finney, B.Sc., Geophysicist.
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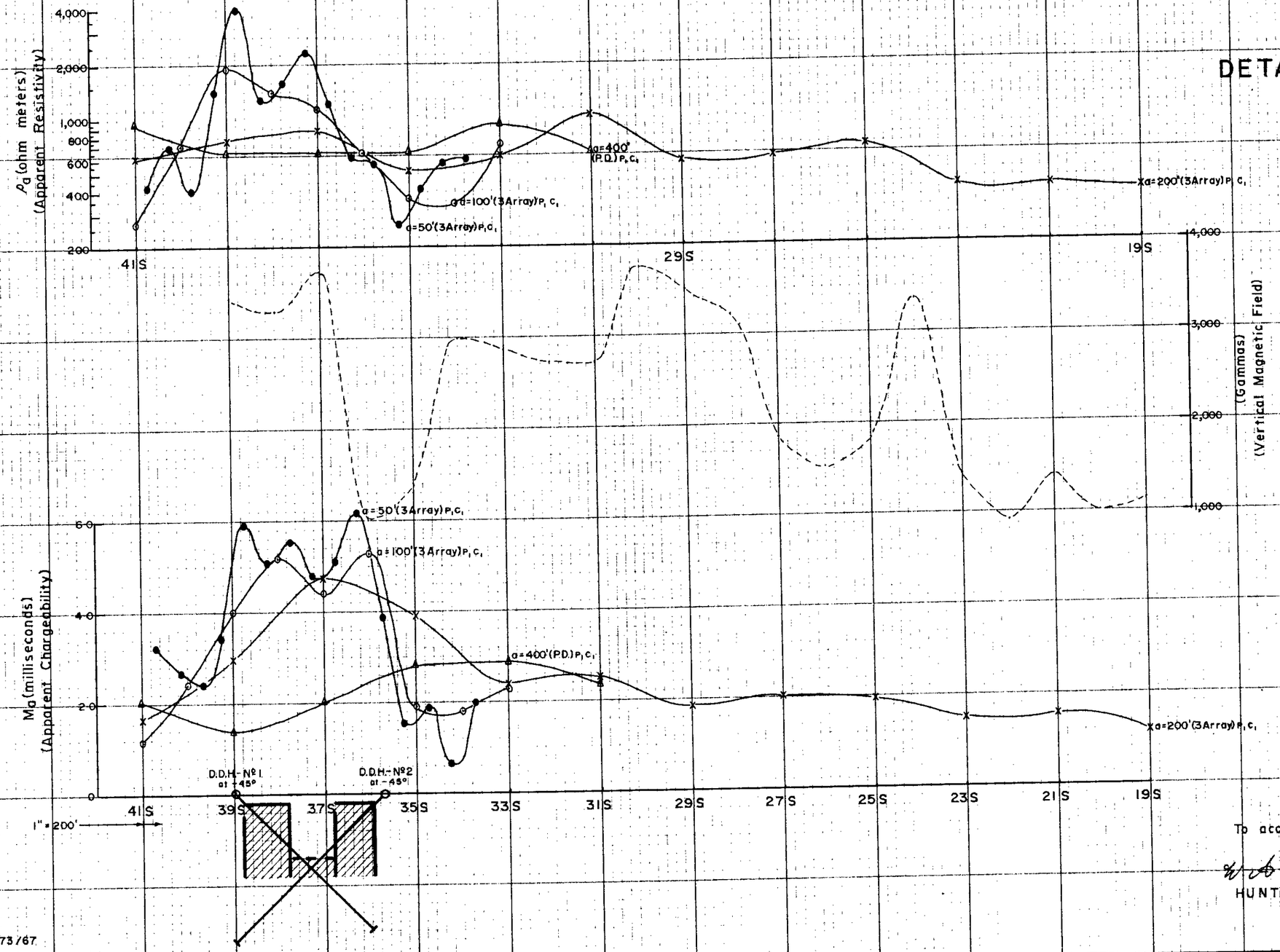
FIG.- 4

INDUCED POLARIZATION & MAGNETOMETER SURVEY.

DETAIL PROFILE. LINE - 48W



LEGEND

ANOMALOUS ZONE.

RECOMMENDED D.D. Holes.

Department of Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 1199 MAP

1199

GRID SYSTEM - BAR GROUP

To accompany report by R.K. Watson

R.K. Watson, B.A.Sc., P.Eng., Geophysicist.

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

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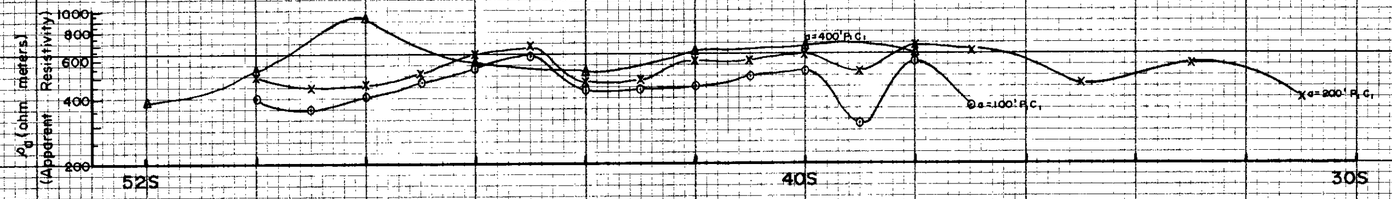
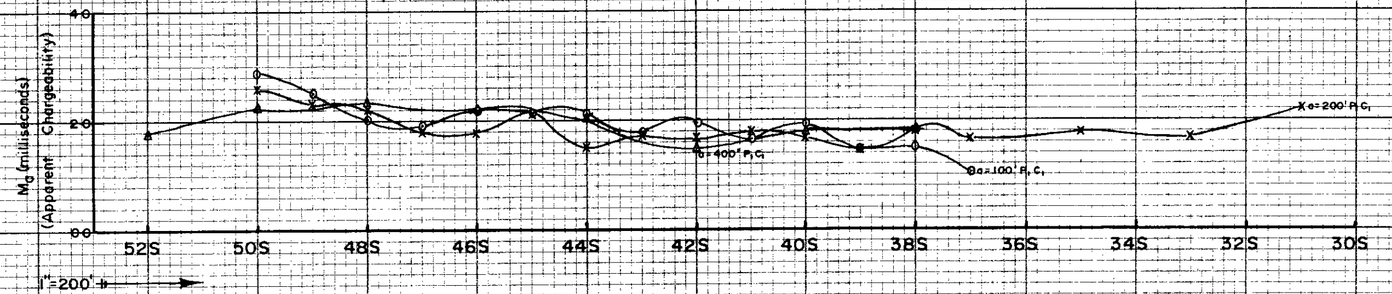
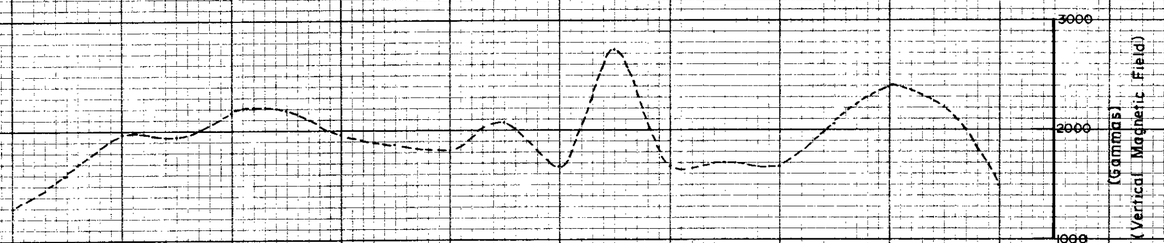
FIG.-5

INDUCED POLARIZATION & MAGNETOMETER SURVEY.

DETAIL PROFILE. LINE-60W.







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GRID SYSTEM — BAR GROUP

R.K. Watson

To accompany report by:
R.K. Watson, B.A.Sc., P.Eng., Geophysicist.
W.A. Finney, B.Sc., Geophysicist.
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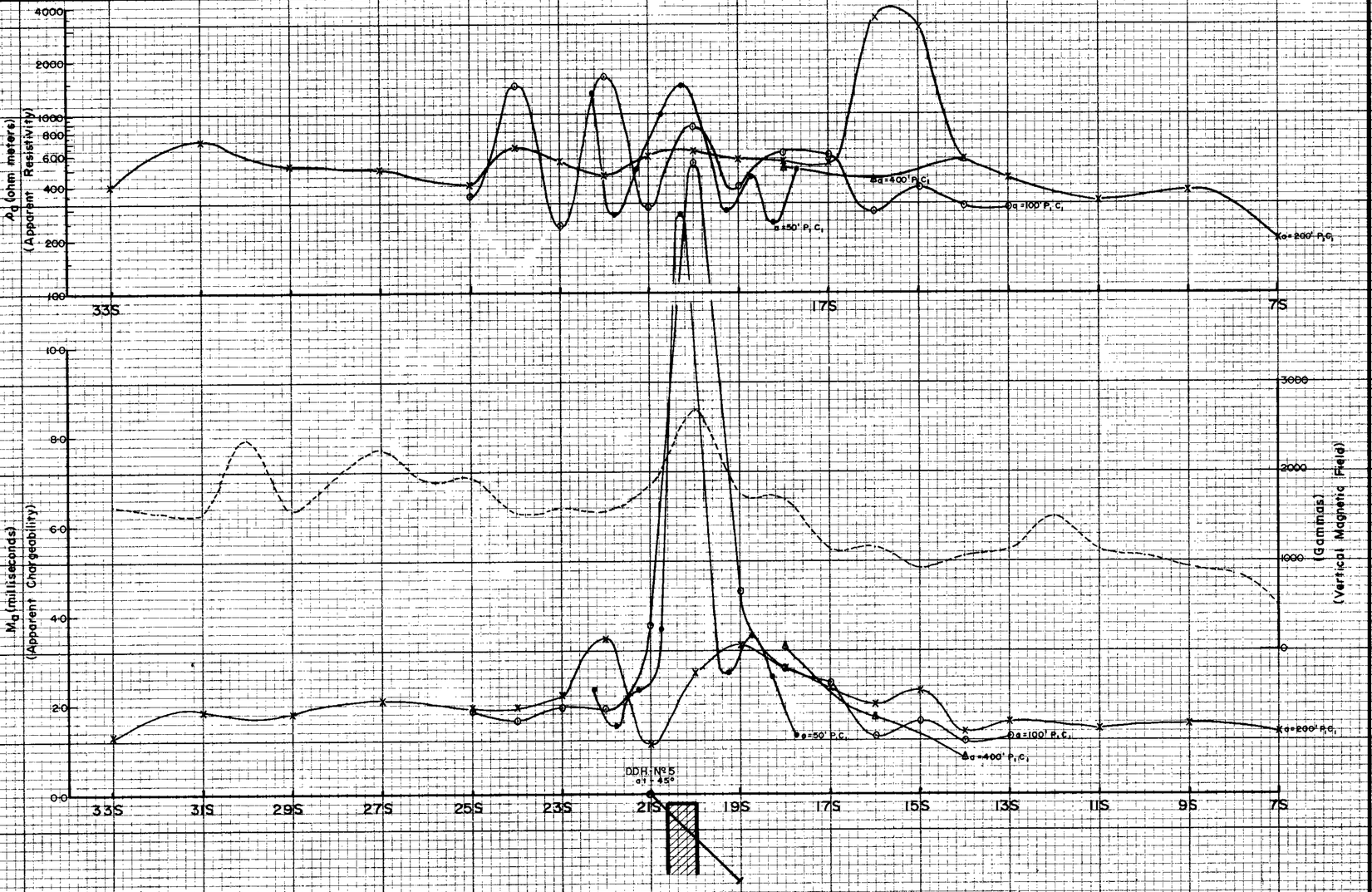
FIG-6

PH-673/67.



INDUCED POLARIZATION & MAGNETOMETER SURVEY.

DETAIL PROFILE: LINE-64W.

LEGEND

ANOMALOUS ZONE.

RECOMMENDED D.D.H. Hole.

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GRID SYSTEM — BAR GROUP

To accompany report by: R.K. Watson

R.K. Watson, B.A.Sc., P.Eng., Geophysicist.

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

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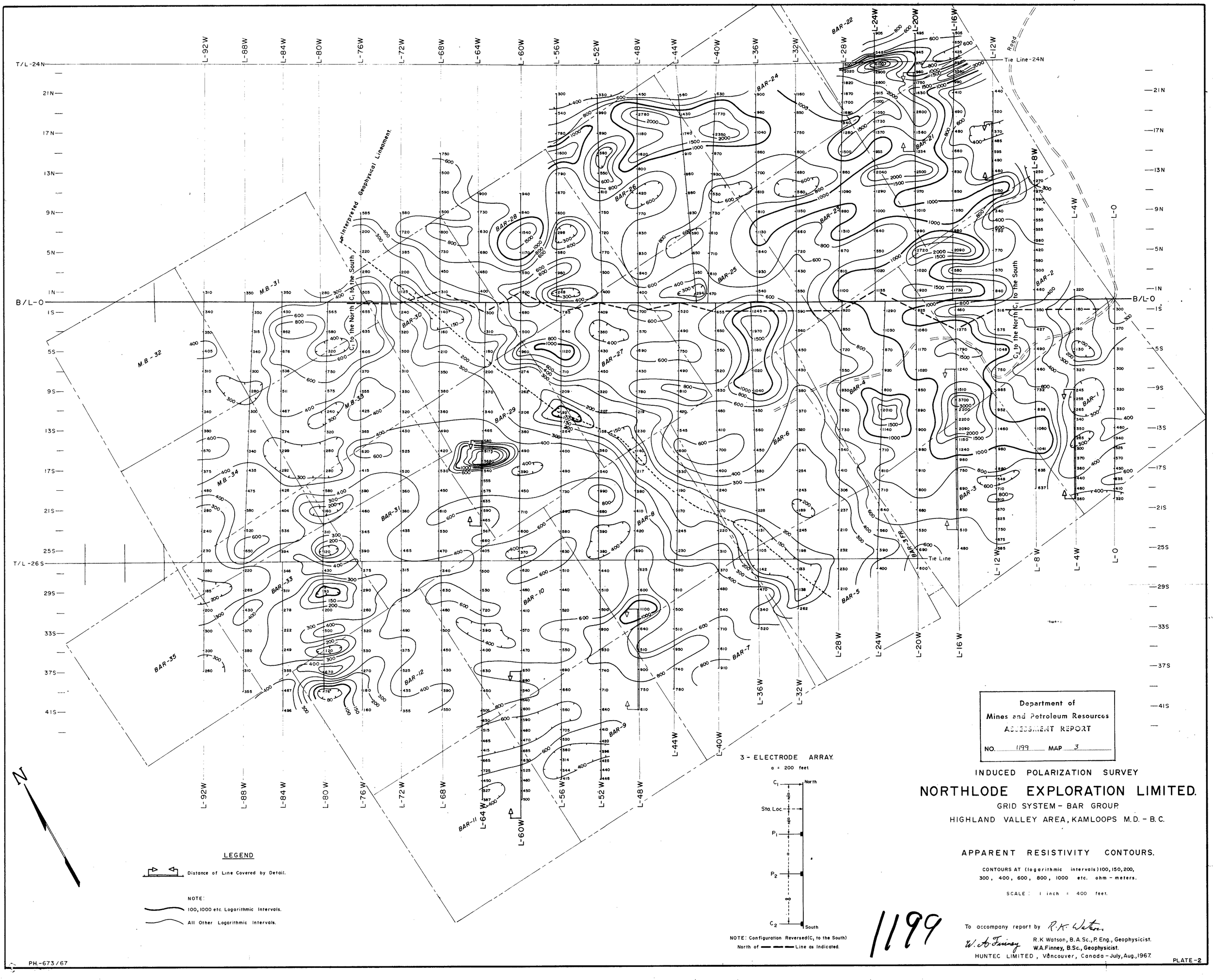
FIG-7



N

LEGEND

Distance of Line Covered by Detail.

NOTE:
100, 1000 etc. Logarithmic Intervals.
All Other Logarithmic Intervals.

3 - ELECTRODE ARRAY.

a = 200 feet.

NOTE: Configuration Reversed(C_1 to the South) North of ——— Line as Indicated.

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NO. 1199 MAP 3

INDUCED POLARIZATION SURVEY

NORTHLODE EXPLORATION LIMITED.

GRID SYSTEM - BAR GROUP.

HIGHLAND VALLEY AREA, KAMLOOPS M.D. - B.C.

APPARENT RESISTIVITY CONTOURS.

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

SCALE: 1 inch = 400 feet.

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To accompany report by R.K. Watson.

W.A. Finney R.K Watson, B.A.Sc., P.Eng., Geophysicist.
W.A.Finney, B.Sc., Geophysicist.

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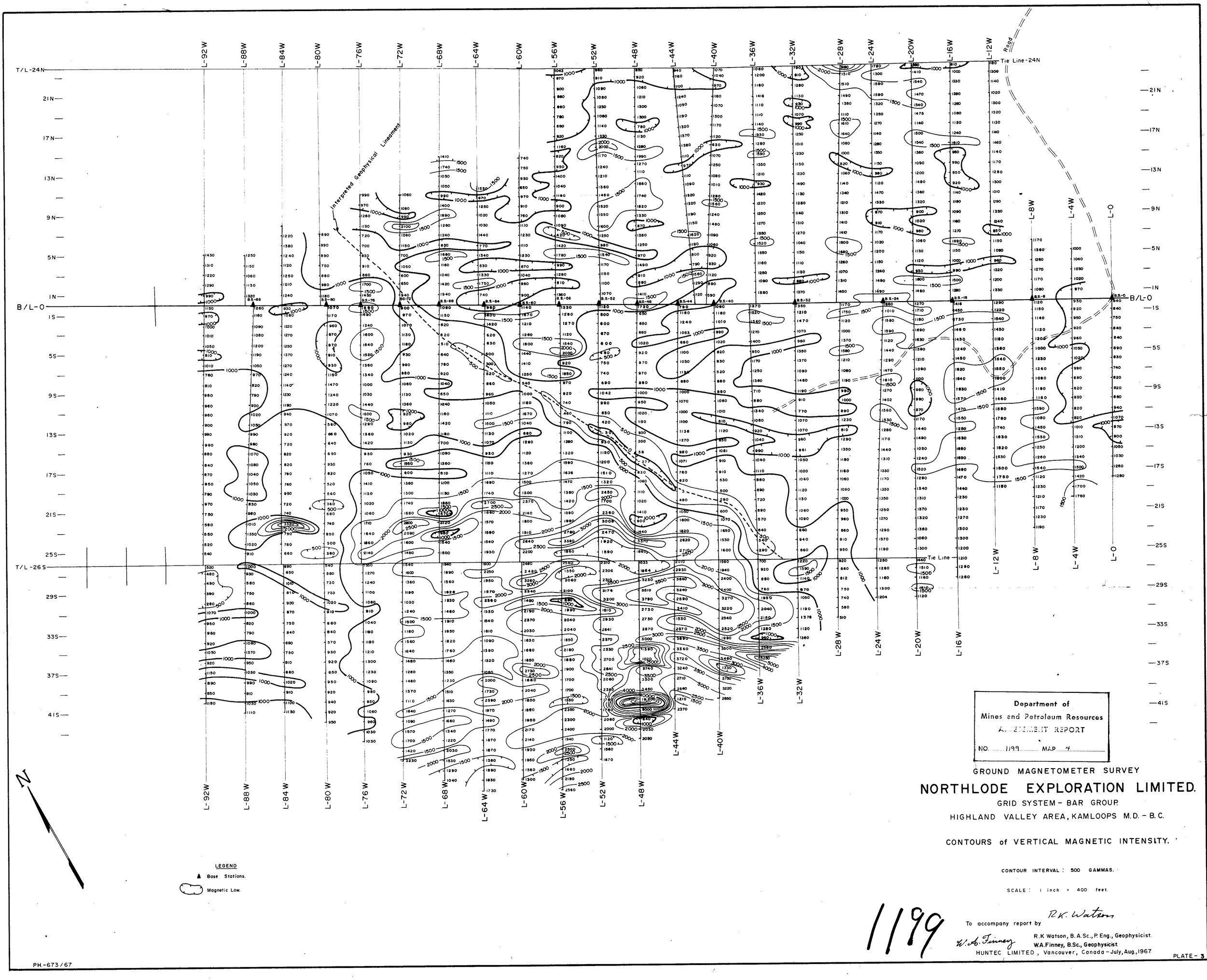
PLATE-2



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NO. 1199 MAP 4

GROUND MAGNETOMETER SURVEY

NORTHLODE EXPLORATION LIMITED.

GRID SYSTEM - BAR GROUP

HIGHLAND VALLEY AREA, KAMLOOPS M.D. - B.C.

CONTOURS of VERTICAL MAGNETIC INTENSITY.

CONTOUR INTERVAL : 500 GAMMAS.

SCALE : 1 inch = 400 feet.

LEGEND

▲ Base Stations.

Magnetic Low.

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To accompany report by R.K. Watson

W.A. Finney

R.K Watson, B.A.Sc., P.Eng., Geophysicist.
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PLATE - 3