

# 4554

## REPORT ON THE INDUCED POLARIZATION SURVEY

on the

- ROB 15-17, 41-44, 47, 57 Fr
- CLEO 1-4, 6, 105-108, 90, 92, 136, 142
- MV 73-78, 23, 80 Claims

Robb Lake Area  
Liard Mining District  
British Columbia

115 Miles North of MacKenzie, B.C.

56° 123° NW

By

J. Lloyd, M.Sc., P.Eng.  
Eagle Geophysics Limited

Supervised by

O. S. Hairsine, B.Sc., P.Eng.

For

CORDILLERAN ENGINEERING LIMITED  
and  
BARRIER REEF RESOURCES LTD. (N.P.L.)  
and  
ARROW INTER-AMERICA CORPORATION  
and  
ECSTALL MINING LIMITED

Date Started: June 14, 1973  
Date Finished: July 1, 1973

TABLE OF CONTENTS

	<u>Page</u>
INTRODUCTION .....	1
INSTRUMENT SPECIFICATIONS .....	1
SURVEY SPECIFICATIONS .....	5
PRESENTATION OF DATA .....	6
DISCUSSION OF RESULTS .....	7
CONCLUSIONS AND RECOMMENDATIONS .....	13

Appendices

APPENDIX "A"	Declaration of Expenditures
APPENDIX "B" #1	Induced Polarization and Claim Location Map

List of Illustrations

Pseudo Sections:

<u>Drawing Number</u>	<u>Line Number</u>	<u>Status</u>
E73177-1D#2	564+00E	Plotted & Contoured
" -2D#3	568+00E	" " "
" -3D#4	572+00E	" " "
" -4D#5	576+00E	" " "
" -5D#6	584+00E	" " "
" -6D#7	592+00E	" " "
" -7D#8	596+00E	" " "
" -8D#9	600+00E	" " "
" -9D#10	604+00E	" " "
" -10D#11	608+00E	" " "
" -11D#12	616+00E	" " "

Department of  
Mines and Petroleum Resources  
ASSESSMENT REPORT  
NO. **4554** MAP .....

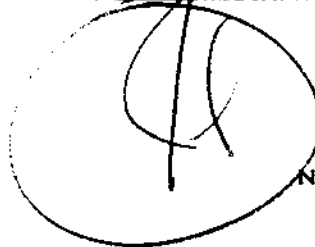
TABLE OF CONTENTS (cont'd)

List of Illustrations (cont'd)

Contour Plans:

<u>Map Number</u>	<u>Parameter Contoured</u>	<u>Status</u>
E73177-1M	#13 First Separation Apparent Chargeability	Field Plot Complete & Contoured
" -2M	#14 Second Separation Apparent Chargeability	" " "
" -3M	#15 Third Separation Apparent Chargeability	" " "
" -5M	#16 Second Separation Apparent Resistivity	Plotted, Not Contoured
" -8M	#17 Second Separation Metal Factor	" " "

JOHN LLOYD, M.Sc., P.Eng.  
PETER E. FOX, Ph.D., P.Eng.



575 LUCERNE PLACE  
NORTH VANCOUVER, B.C.  
TELEPHONE (604) 988-6488

July 2, 1973

Cordilleran Engineering Limited,  
1418 - 355 Burrard Street,  
Vancouver 1, B. C.

For the attention of Mr. John W. Stollery

Dear Mr. Stollery:

This letter will act as a preliminary report on the IP survey just completed on your Robb Lake Joint Venture project. Copies of field data plots and maps are included; they are a little untidy, but I trust they will be sufficient for the present time.

#### Introduction

The IP crew left Vancouver on June 14th and returned on June 30th, 1973. The originally planned work, consisting of approximately 9 line miles, was completed in 10 survey days. An additional 2.5 line miles were completed in a further 3 survey days in an attempt to close off some anomalous zones. Some in situ tests with a 10-foot measuring dipole were also carried out over some dolostone outcrops.

#### Instrument Specifications

The survey was carried out with a time domain measuring equipment developed and manufactured by Hunttec Limited of Toronto, Ontario.

The system used for this work consisted of a transmitter, a motor generator and a Mark III receiving unit incorporating a digital display read-out for apparent chargeability measurements.

The equipment specifications and choice of parameters are summarized

below:-

Motor: 20 H.P. gasoline powered, manufactured by Onan.  
Alternator: 3 phase, 400 cycle unit manufactured by Leland.  
Transmitter: 7.5 Kw, solid state switching, with variable crystal controlled timing.

Transmitter Cycle Time ( $T_c$ ): Either 4, 6 or 8 seconds.

Duty Ratio (R): Either 3:1, 2:1 or 1:1.  
(ON:OFF ratio)

Receiver: Presents 4 individual (M) values of the decay curve for each reading. Each (M) value is the ratio  $\frac{V_s}{V_p}$ , expressed as a percentage and measured at the centre of each individual integrating interval, where ( $V_p$ ) is the primary voltage and ( $V_s$ ) is the secondary voltage at that particular instant in time. See Figure 1.

Receiver Delay Time ( $t_d$ ): Either 15, 30, 60, 120 or 240 milliseconds.

Receiver Integrating Interval ( $t_p$ ): Either 20, 30, 40, 50 or 60 milliseconds.

Receiver Total Integrating Time ( $T_p$ ): (15 x  $t_p$ ) milliseconds.

Parameters Selected For Present Survey:

$T_c$  = 6 seconds

R = 2 : 1

$t_d$  = 60 milliseconds

$t_p$  = 40 milliseconds

$T_p$  = 600 milliseconds

The selection of these parameters is based on past experience in searching for zinc-lead deposits in other limestone areas.

$$M_1 = \frac{e(t_1)}{V_p} = \sum_1^n \int_{(t_d)}^{(t_d+t_p)} \frac{V_s \cdot dt}{V_p \cdot t_p}$$

$$M_2 = \frac{e(t_2)}{V_p} = \frac{1}{2} \sum_1^n \int_{(t_d+t_p)}^{(t_d+3t_p)} \frac{V_s \cdot dt}{V_p \cdot t_p}$$

$$M_3 = \frac{e(t_3)}{V_p} = \frac{1}{4} \sum_1^n \int_{(t_d+3t_p)}^{(t_d+7t_p)} \frac{V_s \cdot dt}{V_p \cdot t_p}$$

$$M_4 = \frac{e(t_4)}{V_p} = \frac{1}{8} \sum_1^n \int_{(t_d+7t_p)}^{(t_d+15t_p)} \frac{V_s \cdot dt}{V_p \cdot t_p}$$

$$M_0 = t_p \times 10^{-2} \sum (M_1 + 2M_2 + 4M_3 + 8M_4) \quad (\text{Milliseconds})$$

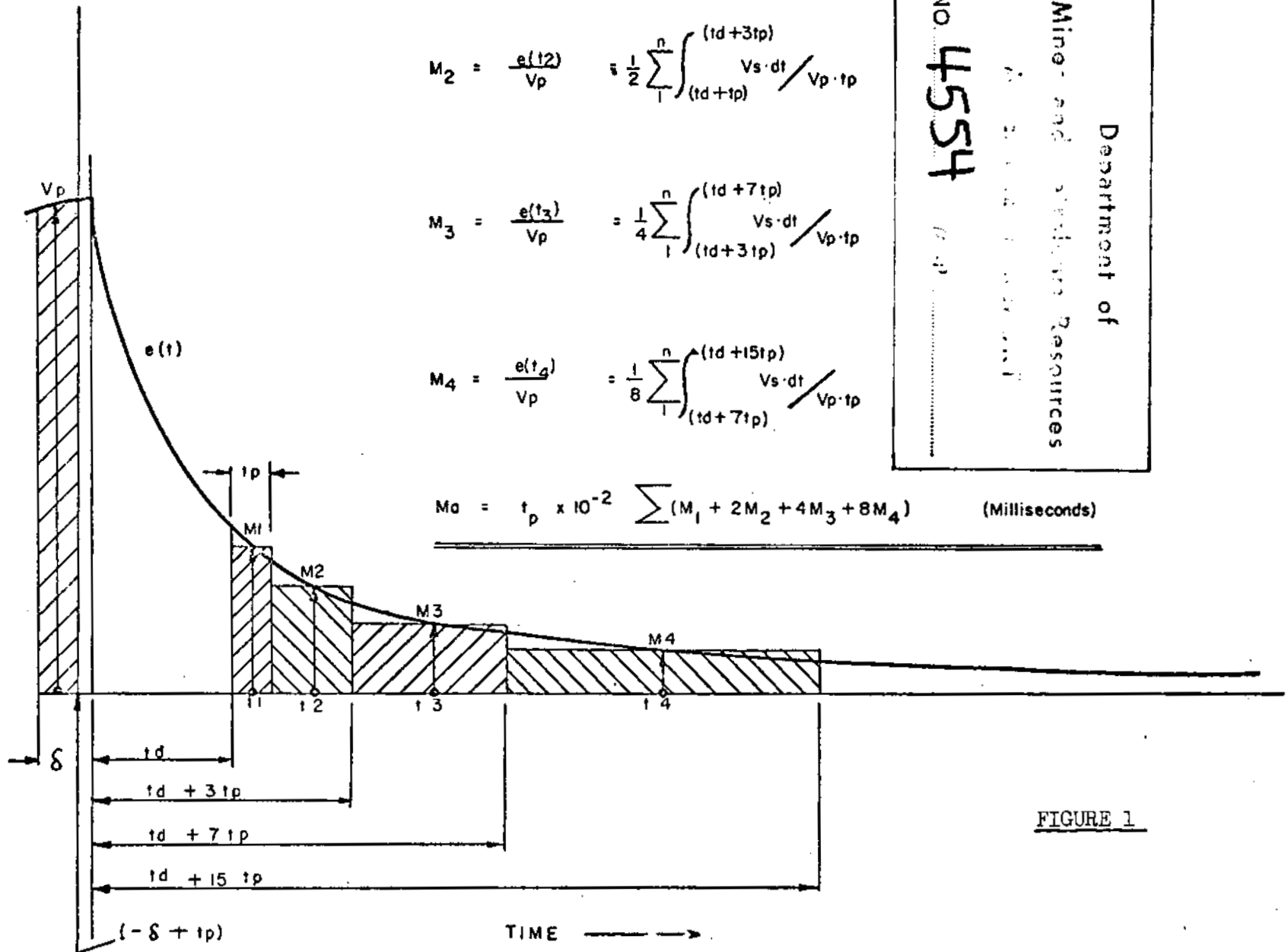


FIGURE 1

The apparent chargeability ( $M_a$ ) in milliseconds is obtained by summing the (M) factors, weighted for their individual integrating times as follows:-

$$M_a = t_p \times 10^{-2} \sum (M_1 + 2M_2 + 4M_3 + 8M_4) \text{ milliseconds ----- (1)}$$

The apparent resistivity ( $\rho_a$ ) in ohm-metres is obtained by dividing ( $V_p$ ) by the measured current ( $I_g$ ) and multiplying by a factor (K) which is dependent on the geometry of the array used.

$$\rho_a = \frac{V_p}{I_g} \times K \text{ ohm-metres ----- (2)}$$

The chargeabilities and resistivities 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 chargeabilities and resistivities are functions of the actual chargeabilities and resistivities of the rocks.

The majority of geophysicists, using time domain equipment, quote their apparent chargeability measurements in milliseconds. These units are actually millivolt seconds per volt. Therefore data obtained with different systems, having different sampling times will give different "millisecond" values over the same orebody. The interpreter must therefore pay special attention to these matters before making comparisons between data obtained with different systems in different areas.

In the early and middle 1960's the writer collected a great deal of time domain data in the Pine Point area with the following equipment parameters:-

$$\begin{aligned} T_c &= 4 \text{ seconds} \\ R &= 3 : 1 \end{aligned}$$

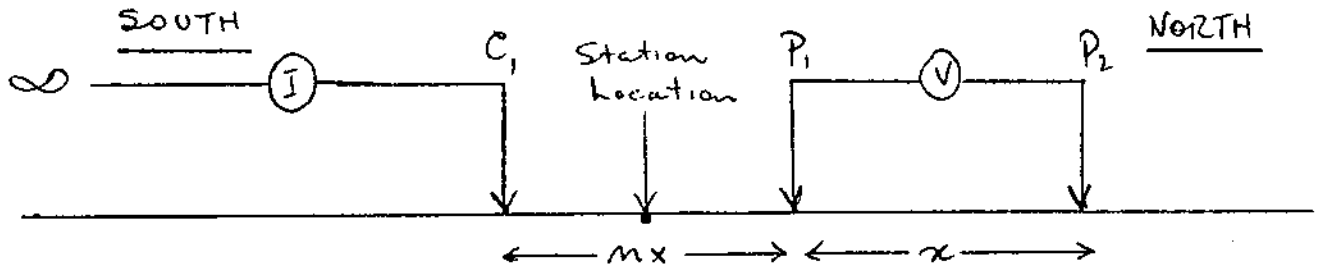
- $t_d$  = 15 milliseconds (fixed)
- $t_p$  = No individual integrating intervals
- $T_p$  = 400 milliseconds (fixed)

The present system, used last year at Pine Point, gave apparent chargeability readings approximately 2 times greater than the data obtained in the 1960's with the above system. Apparent resistivity values will always be comparable since they are always measured in ohm-metres or ohm-feet.

### Survey Specifications

The survey was carried out using the pole-dipole array, with a measuring dipole equal to 200 feet and measurements were taken, at 200-foot station intervals, for  $n = 1, 2$  and  $3$ .

### Pole-Dipole Array



All lines were surveyed with the measuring dipole ( $P_1P_2$ ) to the north of the leading current electrode  $C_1$ . This information is important when selecting drill targets from the pseudo-sections.

This choice of electrode array and electrode separations was based on a previous IP test, 1972 drilling results, expected size and depth of known mineralized zones and experience gained from surveys in similar geological environments. This method of surveying is expected to give good resolution



for small bodies at shallow depths (say 100 to 200 feet) and still retain sufficient penetration to detect large bodies at greater depths (say 500 or 600 feet).

On the north part of the grid the lines were 400 or 800 feet apart and on the south part of the grid they are 800 feet apart.

#### Presentation of Data

To date field data plots (pseudo-sections) and contour plans have been prepared as follows:-

#### Pseudo-Sections

<u>Drawing Number</u>	<u>Line Number</u>	<u>Status</u>
E73177-1D	564+00E	Plotted and Contoured
" -2D	568-00E	" " "
" -3D	572+00E	" " "
" -4D	576+00E	" " "
" -5D	584+00E	" " "
" -6D	592+00E	" " "
" -7D	596+00E	" " "
" -8D	600+00E	" " "
" -9D	604+00E	" " "
" -10D	608+00E	" " "
" -11D	616+00E	" " "

Log contour intervals of 1, 1.5, 2, 3, 5, 7.5 and 10 and multiples thereof have been used for contouring.

## Contour Plans

<u>Map Number</u>	<u>Parameter Contoured</u>	<u>Status</u>
E73177-1M	First Separation Apparent Chargeability	Field Plot Complete and Contoured
" -2M	Second Separation Apparent Chargeability	" " "
" -3M	Third Separation Apparent Chargeability	" " "
" -4M	First Separation Apparent Resistivity	Not Plotted
" -5M	Second Separation Apparent Resistivity	Plotted, Not Contoured
" -6M	Third Separation Apparent Resistivity	Not Plotted
" -7M	First Separation Metal Factor	Not Plotted
" -8M	Second Separation Metal Factor	Plotted, Not Contoured
" -9M	Third Separation Metal Factor	Not Plotted

The quality of the data obtained is excellent. In the process of extending certain lines some 10 to 15 readings were repeated to within  $\pm 10\%$  and often considerably better.

## Discussion of Results

The magnitude of the IP parameters measured on the Robb Lake property are quite different from those obtained over a number of other limestone areas throughout North America and Ireland.

Usually apparent resistivities are much the same in magnitude, ranging from about 300 to 3000 ohm-metres, and are generally uniform over

large areas. This situation is as would be expected, since most rock forming minerals are effectively insulators, the resistivity of the rock is essentially a measurement of the porosity of the rock and the salinity of the solutions contained within it. Local zones of lower resistivity may be the result of clay and/or porous overburden lying on top of the limestones or of zones of increased porosity within the limestones due to faulting or shearing. In the case of collapse breccias the degree to which they have been recemented and mineralized has a direct bearing on the magnitude of the apparent resistivity measurements.

The porous dolomites at Pine Point may be expected to produce recognizable resistivity lows, useful for geological mapping purposes; this in fact is not the case. On the other hand the unmineralized "reef" limestones (the lower unit of the Middle Carboniferous) in County Galway, Ireland produce recognizable resistivity highs ranging from about 2000 to 6000 ohm-metres. This has been most useful in outlining areas underlain by "reef" limestones especially where there is little outcrop on which to base detailed geological mapping and because the "reef" limestone is the host rock for the Tynagh ore deposit.

At Robb Lake, the crystalline dolostone, (unit B of the Middle Devonian) has apparent resistivity values ranging from about 4000 to 8000 ohm-metres. In the southwest corner of the grid however apparent resistivity values of less than 1000 ohm-metres were recorded, and may be due to thick valley clays.

Below are some approximate values of apparent resistivity measurements made at Pine Point and Robb Lake:-

<u>Rock Type</u>	<u>Area</u>	<u>Apparent Resistivity</u>
Barren Dolomite	Pine Point	300 to 1000 ohm-metres
Mineralized Dolomite	" "	100 to 1000 "
Sandy Textured Dolomite	" "	2000 to 4000 "
Overburden	" "	20 to 150 "
Dolostone	Robb Lake	4000 to 8000 "

Associated with the higher apparent resistivity values are higher apparent chargeability values. Below are some approximate values of apparent chargeability measurements made at Pine Point and Robb Lake:-

<u>Rock Type</u>	<u>Area</u>	<u>Apparent Chargeability Range</u>	<u>Apparent Chargeability Range</u>
		<u>1960 System</u>	<u>1970 System</u>
Barren Dolomite	Pine Point	1 to 5 ms.	2 to 3 ms.
Mineralized Dolomite	" "	5 to 40 ms.	10 to 80 ms.
Sandy Textured Dolomite	" "	2 to 3 ms.	4 to 6 ms.
Overburden	" "	0.5 to 1 ms.	1 to 2 ms.
Dolostone	Robb Lake	(5 to 12.5 ms.)	10 to 25 ms.

In the Robb Lake area the much higher apparent chargeability background decreases the ability of the IP method to detect weakly mineralized zones, at least theoretically.

In view of the fairly large apparent chargeability background variations (10 to 25 milliseconds) and the detection of a very strong complex anomalous zone on the southern part of the grid area, 3 in situ surface IP measurements were made on a dolostone outcrop at the south end of line 608+00E

on the north bank of the Halfway river. The readings were taken using a 10-foot measuring dipole. The results of these measurements are given below:-

<u>Dipole Length</u>	<u>Apparent Chargeability</u>	<u>Apparent Resistivity</u>	<u>Comments</u>
10 feet (n=1)	6.5 ms.	8050 ohm-metres	On ridge of outcrop.
10 feet (n=1)	8.2 ms.	8085 ohm-metres	On dip slope of outcrop.
10 feet (n=1)	7.5 ms.	Current too low for reliable measurement.	On dip slope of outcrop.

Also with the current electrode at the same location the following measurement was made:-

200 feet (n=0.5)	48.3	4000
------------------	------	------

If these three measurements are sufficiently representative of the true chargeability of the dolostone as seen in a surface outcrop then there is clearly a large increase in apparent chargeability with depth particularly at this location. The results of this experiment are most interesting and intriguing.

Six anomalous zones have been interpreted and are outlined on map number E73177-2M. The comments on the IP response of these zones that follow are based mainly on a study of the pseudo-sections, which are always used for spotting drill holes. At the time of writing I have before me a summary of the pyrite intersections obtained during the 1972 drilling programme. The galena (and sphalerite) intersections, which form only a small portion of the total conducting sulphides, are not available at this time. My recommended drill holes are therefore aimed at zones with high conducting sulphide content and may appear erratic with respect to significant intersections located during the 1972 drilling programme.

Zone 1 shows a clearly defined anomalous pattern on line 608+00E which appears to be caused, at this point, by a shallow source dipping gently to the south. The anomalous pattern on the adjoining line, line 604+00E is poorly defined. This zone has been partially drill tested by DDH 72-3 and DDH 72-4. In DDH 72-3 pyrite occurs first at bedrock surface, at a depth of 22.5 feet. This hole (277 feet long) contains 131 feet of pyrite mineralization ranging from traces to 10%. In DDH 72-4 pyrite also occurs at bedrock surface, at a depth of 17 feet. This hole (786 feet long) contains 499 feet of pyrite ranging from traces to 15%. Additional drilling would be within 200 feet of DDH 72-4.

Zone 2 is centred mainly on lines 592+00E and 596+00E. Line 584+00E was extended to test for a westward extension of this zone. On the map showing the first separation contours of apparent chargeability (E73177-1M) the existence of the zone relies solely on one reading, viz. 29.4 ms. at station 755+00N. This reading was repeated and the same value obtained. Despite this the second and third separation data and the overall pattern of the pseudo-section leaves considerable doubt for the existence of this zone on line 584+00E. This zone has been partially drill tested by DDH 72-6. Here pyrite occurs first at 50 feet. The hole (417 feet long) contains 144 feet of pyrite mineralization ranging from traces to 15%. Additional drilling here would be within 300 or 400 feet of DDH 72-6.

Zone 3 is centred mainly on lines 572+00E and 576+00E. It is poorly defined on lines 568+00E and 584+00E. It is different from zones 1 and 2 in at least two respects. Firstly it appears to improve with depth and secondly it is associated with a moderate intensity apparent resistivity low and therefore shows a fairly strong metal factor anomaly.

The south of the grid area, in particular the area south of the baseline (700+00N), is underlain by material showing rapid changes in apparent chargeability. Such high values over such a large area suggests it is underlain by a geological formation having a high IP response. The writer observed dark black carbonaceous limestone (Silurian) on the cliffs to the south of the Halfway river and similar rocks (Unit A of the Middle Devonian) near the Sheep Creek showing. Such rocks ("dirty" limestones) often give strong apparent chargeability responses. However an examination of the geological map shows outcrop of Unit B (the favourable dolostone unit) exposed along the Halfway river from line 600+00E east to line 624+00E. I am open to suggestions here on a new structural interpretation. It requires that a geological unit with a high apparent chargeability response underlies the grid area from about the baseline south to the Halfway river (at least 1500 feet wide) and from line 568+00E east to line 616+00E (a strike length of almost 5000 feet).

Other possibilities for this zone are a large pyrite deposit (there is no geochemical response here) or a clay filled valley. The former is more probable since only the southwest corner of the grid is underlain by very low resistivities indicative of clays.

Within this large area at least three individual zones have been interpreted.

Zone 4 is at least 3000 feet long and varies in width from 500 feet to 1000 feet. It is characterized by high apparent chargeability values, low apparent resistivity values (less than 1000 ohm-metres) and very high metal factor values. This anomaly could be caused by thick clay overburden, but must be tested by drilling.

Zone 5 is characterized by average apparent resistivity values, moderate apparent chargeability values and moderate metal factor values. This anomalous zone is much less likely to be caused by clay overburden than is Zone 4, and should be tested by drilling even if Zone 4 is caused by clay and/or non-economic mineralization.

Zone 6 is similar to Zone 5 with the added possibility of a shallow source.

Overburden conditions are known for Zones 1, 2 and 3. Zone 4 may be caused by abnormal overburden conditions and the overburden cover on Zones 5 and 6 is probably quite thin (less than 50 feet and maybe as little as 10 feet).

#### Conclusions And Recommendations

From a study of the IP data, the known geology and the 1972 drilling results it has been concluded that:-

- (A) Although the apparent chargeability background is high, the survey has detected at least 2 known zones of sulphide mineralization.
- (B) Three or possibly four other anomalous zones warrant further investigation by diamond drilling.

Based mainly on the IP data contained in the pseudo-sections the following drill programme is recommended. Priorities are as shown by the drill hole number. These will undoubtedly change as drilling progresses.



<u>Area</u>	<u>Hole No.</u>	<u>Line No.</u>	<u>Station</u>	<u>Depth</u>	<u>Angle</u>
Zone 3	1 ✓	576+00E	736+00N	450 ft. ✓	Vertical or at right angles to bedding
" 3	2 ✓	576+00E	734+00N	450 ft. ✓	"
" 3	3 ✓	576+00E	738+00N	450 ft. ✓	"
Zone 2	4 ✓	592+00E	753+00N	500 ft. ✓	"
" 2	5 ✓	592+00E	751+00N	550 ft. ✓	"
" 2	6 ✓	592+00E	755+00N	450 ft. ✓	"
Zone 1	7 ✓	608+00E	743+00N	750 ft. ✓	"
" 1	8 ✓	608+00E	741+00N	750 ft. ✓	"
" 1	9 ✓	608+00E	745+00N	750 ft. ✓	"
Zone 4	10 ✓	584+00E	688+00N	500 ft. ✓	"
" 4	11 ✓	584+00E	686+00N	500 ft. ✓	"
" 4	12 ✓	584+00E	690+00N	500 ft. ✓	"
Zone 5	13 ✓	608+00E	700+00N	400 ft.	"
" 5	14 ✓	608+00E	702+00N	400 ft.	"
" 5	15 ✓	608+00E	698+00N	400 ft.	"

Drilling of Zone 6 will depend on the results obtained from drilling Zones 4 and 5.

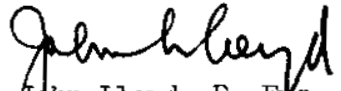
If 300 feet or more of overburden is encountered in hole #10 you may wish to discontinue drilling of Zone 4.

Preference has been given to drilling of Zones 1, 2 and 3 since these zones are close to known mineralization. If the anomaly remains unanswered at the suggested hole depth you may wish to deepen the hole. Similarly if the anomaly is answered before reaching the suggested hole depth you may wish to curtail drilling and save some footage.

The fifteen drill holes recommended here (7800 feet) have been selected in an attempt to locate the source of each IP anomaly. The completion of this programme will of course depend on the success of the initial few holes.

Respectfully submitted,

EAGLE GEOPHYSICS LIMITED

  
John Lloyd, P. Eng.,  
Geophysicist.

JL:aa

*Handwritten signature*

APPENDIX "A"

DECLARATION OF EXPENDITURES

**Canada**

**In the Matter of**

Province of BRITISH COLUMBIA

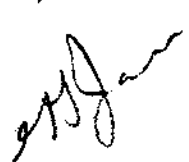
To Wit:

A geophysical report on behalf of  
 CORDILLERAN ENGINEERING LIMITED  
 BARRIER REEF RESOURCES LTD. (N.P.L.)  
 ARROW INTER-AMERICA CORPORATION  
 ECSTALL MINING LIMITED

I, Owen S. Hairsine, of the City  
 Cordilleran Engineering Limited, of the City  
 of Vancouver in the Province of British Columbia

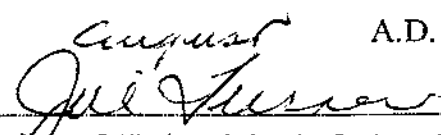
Do Solemnly Declare that under my direction a geophysical survey was conducted on parts of the Rob, Cleo and MV Claims in the Liard Mining Division. These claims are located east of Robb Lake, about 110 miles north of MacKenzie, B.C. Work was conducted during the period June 14th to July 1, 1973 during which time the following expenses were incurred:

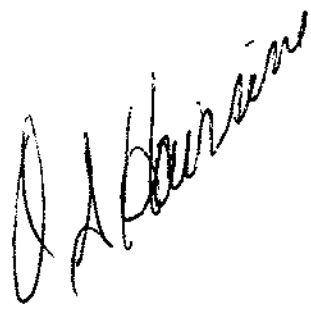
1. Geophysical Services: Eagle Geophysics Ltd. ....	\$ 6,384.88
2. Camp Support (cook, food, etc) 91 man days @ \$10.00/man/day .....	910.00
3. Cordilleran Engineering Limited Personnel:	
Supervision: - O.S.Hairsine, P.Eng. June 21 - June 28, 1973 8 days @ \$100/d .....	800.00
Line Cutting & Geophysical Assistance:	
G.Paulson - June 16-28, 1973 13 days @ \$25/d .....	\$325.00
T. McCluney - June 16-28, 1973 13 days @ \$30/d .....	390.00
A. Goedicke - June 18-24, 1973; 26, 27th. 7 days @ \$25/d .....	175.00
G. Webb - June 18-22, 1973 5 days @ \$30/d .....	<u>150.00</u>
4. Direct Helicopter Support:	
1,441 hours @ \$160.00/hour .....	<u>2,305.60</u>
	<u>\$11,440.48</u>

2  
 14,41 hrs  


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 Vancouver  
 in the Province of British Columbia  
 this 10 day of  
 August A.D. 19 73

  
 Julie Turner  
 A Notary Public in and for the Province of British Columbia.  
 A Commissioner for taking Affidavits for British Columbia.



APPENDIX "B"

INDUCED POLARIZATION AND  
CLAIM LOCATION MAP

1" = 500'

EAGLE GEOPHYSICS LIMITED

P.1

PROJECT FIELD REPORT

CLIENT Cordilleran Eng. (RIU) AREA Robb Lake, B.C. PERIOD 11 to 17 JUNE 19 73  
 PROJECT No. E 73177 TYPE OF SURVEY Time Domain IP EQUIPMENT USED 7.5kw Amtec unit (Month)

DATE	PERSONNEL WORKING	DETAILS OF DAILY WORK	REMARKS
Monday 11 JUNE 73			
Tuesday 12 "			
Wednesday 13 "			
Thursday 14 "	Lloyd, Brydle, Cooté	Travelled by truck: Vancouver to Mackenzie. Stayed night in Mackenzie.	Travel Day 0
Friday 15 "	"	At 11.00 a.m. $c=500\text{ft}$ ; $V=1/2$ mile & snowing lunch in Mackenzie. Left Mackenzie at 2.00 pm. Reccey of property with chopper.	Standby Day 0
Saturday 16 "	Lloyd, Brydle, Cooté Paulsen, McCluskey.	Setup Tx. and land $\infty$ . Laid 28,000 ft of wire (incl $\infty$ ).	Survey Day 1
Sunday 17 "	"	Moderate rain till 11.00 am. Went to work at 12.45 pm. Several broken wires due to hole. Read part of line 596 (1800 feet)	Survey Day 2

SPECIFIC REMARKS

Readings are for  $x = 200 \text{ f}^0$ ;  $n = 1, 2$  and  $3$

SIGNATURE

*J. M. Lloyd*  
 J. M. Lloyd

NAME

PARTY CHIEF

## EAGLE GEOPHYSICS LIMITED

P.2

## PROJECT FIELD REPORT

CLIENT Cordillera Engineering (RIU)AREA Robb Lake, BC.PERIOD 18 to JUNE 24 1973PROJECT No. E73177TYPE OF SURVEY Time Domain IPEQUIPMENT USED 1 Skw Hunter Unit  
(Month)

DATE	PERSONNEL WORKING	DETAILS OF DAILY WORK	FOOTAGE	REMARKS
Monday 18 JUNE/73	Heard, Brydell, Cooté, Paulsen, McCluney.	Read L596E (741N → 729N) = 1200ft Read L592E (759N → 695N) = 6400ft	7600ft ✓	Survey Day 3.
Tuesday 19 "	Heard, Brydell, Cooté Paulsen & Goedicke	Read L600E (759N → 729N) = 3000ft " L604E (759N → 729N) = 3000ft	6000ft ✓	Survey Day 4
Wednesday 20 "	"	Read L600E (731N → 695N) = 3600ft Laid wire on L584 and L576 in pm	3600ft ✓	Survey Days
Thursday 21 "	"	Read L608E (759N → 695N) = 6400ft. 8:15am → 10:25am } Moore broke 2:10pm → 2:40pm } wires	6400ft ✓	Survey Days
Friday 22 "	"	8:00 → 11:20am. Repair broken wires Read L584E (743N → 683N)	6000ft ✓	Survey Day 7
Saturday 23 "	Heard, Brydell, Cooté Paulsen & McCluney Goedicke (1/2 day)	Laid L572E and L568E. Three broken wires L572E (743N → 725N) = 1800ft L576E (741N → 719N) = 2200ft	4000ft ✓	Survey Day 8
Sunday 24 "	"	Read L576E (719N → 683N) = 3600ft " L564E (743N → 725N) = 1800ft	5400ft ✓	Survey Day 9

SPECIFIC REMARKS

Readings for  $x = 200$ ;  $n = 1, 2 + 3$ 

SIGNATURE

NAME

PARTY CHIEF

*John Lloyd*  
JOHN LLOYD

## EAGLE GEOPHYSICS LIMITED

P.3

## PROJECT FIELD REPORT

CLIENT Cordilleran Eng. (RTU)AREA Robb Lake, PCPERIOD JUNE 25 to 1 JULY 1973PROJECT No. E73177TYPE OF SURVEY Time Domain IP.EQUIPMENT USED 7.5kw Amitee unit

DATE	PERSONNEL WORKING	DETAILS OF DAILY WORK	FOOTAGE	REMARKS
Monday 25 JUNE/73	Leard, Brydell, Cooté Paulsen, McCluney.	Read L 568E (740N → 682N) = 5800ft	5800ft ✓	Survey Day 10
Tuesday 26 "	" + Goedicke (1/2 day)	L 592E (694 → 680N) = 1500 ft L 600E (694 → 686N) = 1000ft L 608E (694 → 686N) = 1000 ft. (+ Tests on outcrops)	3500ft ✓	Survey Day "
Wednesday 27 "	" + Goedicke (8.00 → 10.00am)	Read L 616E (757N → 687N) = 7000ft Heavy snow so all day.	7000ft ✓	Survey Day 12
Thursday 28 "	Leard, Brydell, Cooté Paulsen & McCluney	Extended L 584E (763N → 741N) = 2200ft Moved gear back to camp. Packed etc snowing at 10.00 pm	2200ft ✓	Survey Day 13
Friday 29 "	Leard, Brydell, Cooté	Waited for altar till 4.00 pm. Travel property → Mackenzie (octet) Mackenzie → P. George (Truck)	✓	Travel Day ②
Saturday 30 "	Leard, Brydell, Cooté	Travel with P. George → Vancouver.	✓	Travel Day ②
Sunday 1 JULY/73	Leard - July 1 and 2 - preparation preliminary report.		✓	

SPECIFIC REMARKS

Readings for x = 200'; n = 1, 2 + 3.

SIGNATURE

NAME

PARTY CHIEF

John Leard  
JOHN I. LEARD



TELEPHONE 688-5777  
988-6488

1973-07-19-1973

VANCOUVER BLOCK  
JUL 24 1973

# EAGLE GEOPHYSICS LIMITED

575 Lucerne Place, North Vancouver, B. C.

TO Robb Lake Joint Venture,  
c/o Cordilleran Engineering Limited,  
1418 - 355 Burrard Street,  
Vancouver 1, B. C.

DATE July 19, 1973

TERMS: Net 10 Days

Attention: Mr. J. W. Stollery

Re: Clause	DESCRIPTION	AMOUNT
	Re: IP Survey, Robb Lake, B. C. As Per Survey Agreement Dated April 23, 1973	
1. (a)	13 Survey days @ \$315.00 per day . . . . .	\$ 4,095.00 ✓
(b)	2 Standby days @ 195.00 per day . . . . .	390.00 ✓
(c)	2 Travel days @ 165.00 per day . . . . .	330.00 ✓
2. (a)	D. Coote (Geophysicist) to work as helper	
(b)	13 Survey days @ 35.00 per day . . . . .	455.00 ✓
(c)	2 Standby days @ 25.00 per day . . . . .	50.00 ✓
	2 Travel days @ 25.00 per day . . . . .	50.00 ✓
	Plus 20% of 2 (a) and (b) + (c) . . . . .	111.00 ✓
3.	Provision of Truck for 14th June @ 25.00/day . . . . .	25.00 ✓
	" " " " 29th and 30th June @ 25.00/day . . . . .	50.00 ✓
	" " " " 15th to 28th June (2 weeks at 150.00/week)	
	HALF RATE applies . . . . .	150.00 ✓
	*Gas and Oil purchases . . . . .	62.60 ✓
	Mileage Charge - 1366 miles @ 15 cents/mile . . . . .	204.90 ✓
4. (a)	*Charges per Expense Account of Mr. L. D. Brydle . . . . .	89.70 ✓
(b)	*June 14th: Taxi (Coote) W. Vancouver to N. Vancouver . . . . .	3.45 ✓
(c)	June 15th: Lunch - Lloyd, Brydle and Coote . . . . .	8.10 ✓
	Plus 10% of 4 (a), (b) and (c) . . . . .	10.13 ✓
8.	Interpretation of IP data and preparation of letter report	
	2 days at \$150.00 per day . . . . .	300.00 ✓
	SUB-TOTAL . . . . .	\$ 6,384.88
	LESS Deposits (1,500.00, 3,000.00) . . . . .	4,500.00
	TOTAL PAYABLE . . . . .	\$ 1,884.88

Receipts, except for meals, sent on request  
1% PER MONTH CHARGED ON OVERDUE ACCOUNTS.

CORDILLERAN  
ENGINEERING LIMITED  
Account No. 206/1884/88  
Project  
Extensions  
Voucher No.  
Applied  
Date Paid 5/8 2/24/73

INVOICE No 1184

## EAGLE GEOPHYSICS LIMITED

### EXPENSE REPORT

NAME L. D. BRYDLE

DATE July 3 19 73  
(last day of report)

(please print)  
PURPOSE OF EXPENSE Zobbo Lake Joint Venture (E73177) + Miscellaneous

Date	Job No.	Paid To	Description of Expense	AMOUNT				
				Sundry	Fares	Meals	Hotel	Total
12/6/73		Total Electronics Ltd.	Batteries, etc	22.46				22.46
13/6/73		Surrey Coop Assn.	Nails <del>Salt</del> , Plastic Tarp.	9.52				9.52
13/6/73	E73177*	" " "	50 lb. Salt.	1.70				1.70
14/6/73	E73177*	Delta Sunshine Taxi Ltd.	Lalbert to N. Van.	<del>12.55</del>	12.55			12.55
"	" *	Kanaka Bar.	Lunch <sup>for 2</sup> + Coffee.			6.05		6.05
"	" *	BC. Tel. Pay Phone	Reservations at Alex. Mackenzie	1.15				1.15
"	" *	Inn of The North	Dinner for 2			10.00		10.00
"	" *	Texaco	Gas <del>XXXXXX</del>	4.15				4.15
"	" *	Alexander Mackenzie Hotel	Twin Room				12.60	12.60
<del>15/6/73</del>	" *	" " "	Bkfst. for 2			5.10		5.10
29/6/73	" *	Slumber Lodge Motel	Twin Room				16.80	16.80
"	" *	Inn of the North	Dinner for 2			11.00		11.00
30/6/73	" *		Bkfst for 2			3.90		3.90
"	" *		Lunch for 2			4.70		4.70
3/7/73		Total Electronics Ltd	Clippers, Batteries	18.02				18.02
* Charge to Cordilleran Engineering (REU)								
Total Charges = \$ 89.70								
<b>TOTALS</b>				57.06	12.55	40.75	29.40	139.76

FARES — Incl. air, boat, rail, taxis, etc.  
MEALS — Incl. groceries.

SIGNATURE L. D. Brydle

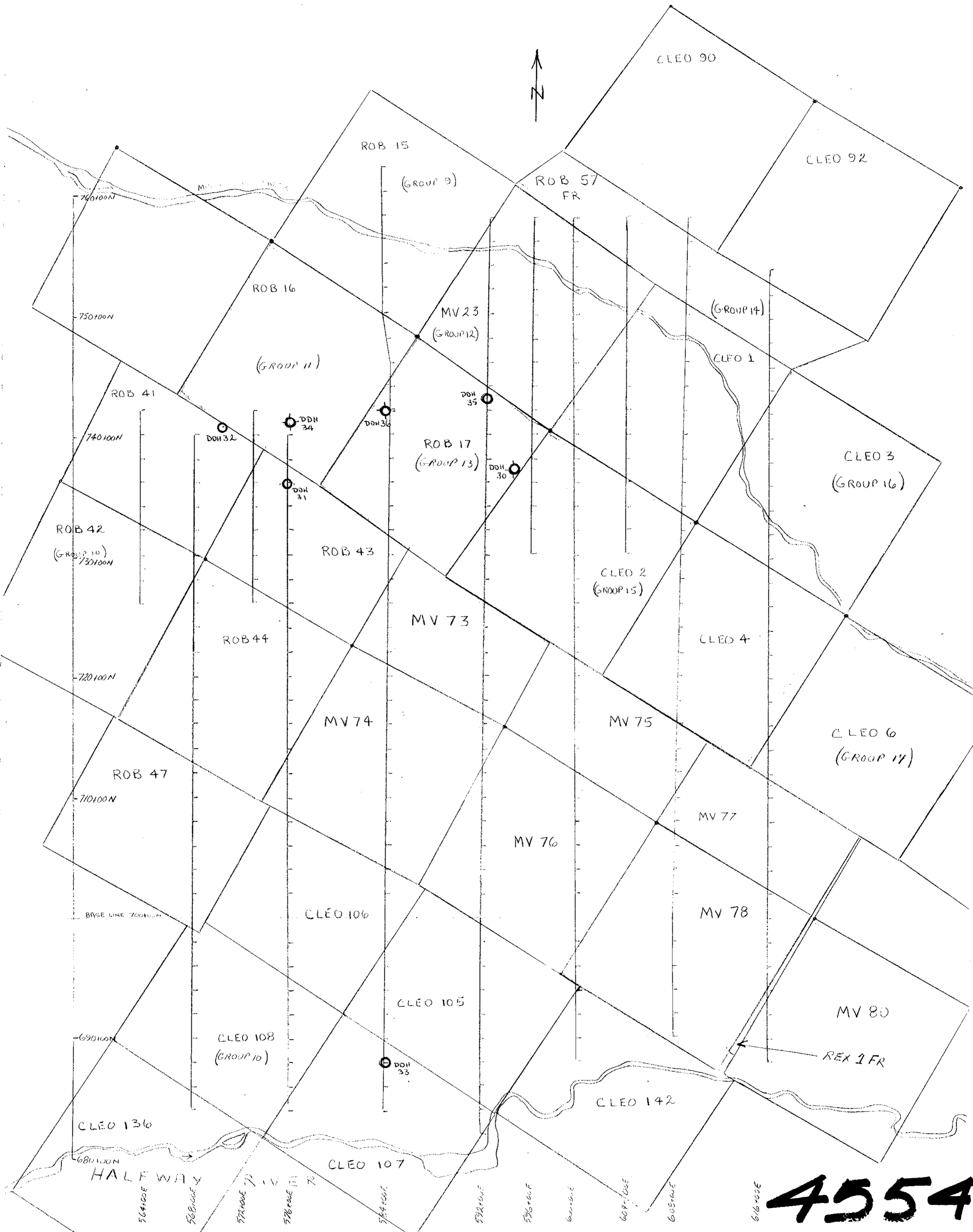
**CASH ACCOUNT RECONCILIATION**

On hand beginning \$ \_\_\_\_\_  
Rec'd during period \$ \_\_\_\_\_  
Paid as above \_\_\_\_\_  
On hand, End \$ \_\_\_\_\_

For office use only  
**ACCOUNT CHARGE**

**AMOUNT**

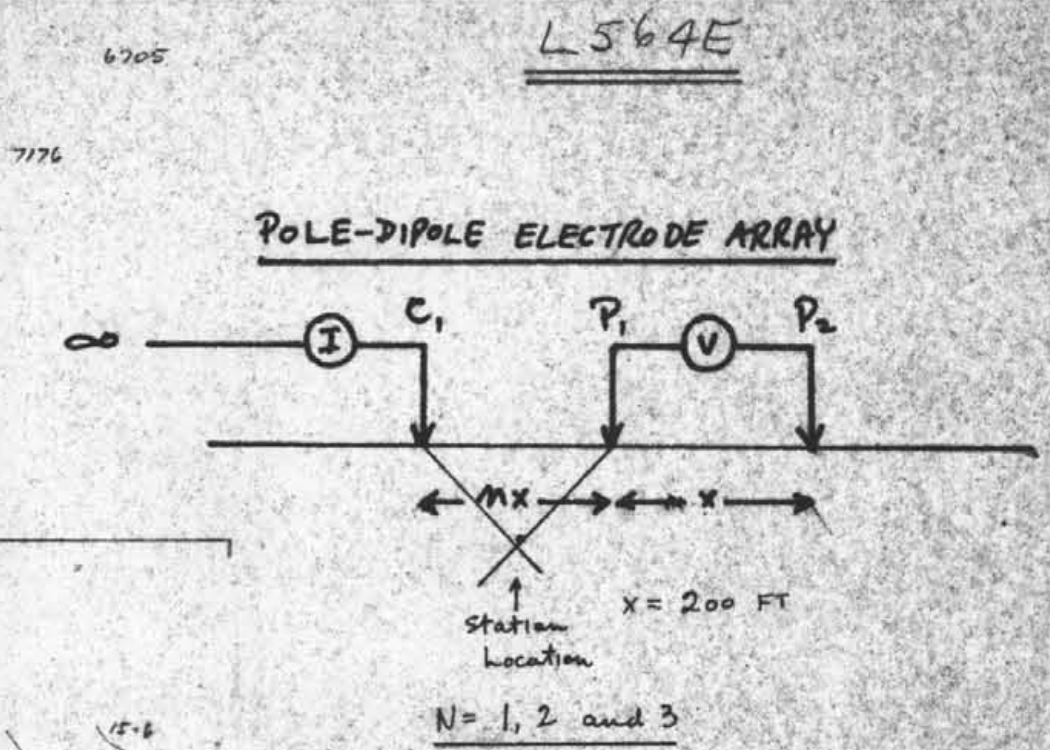
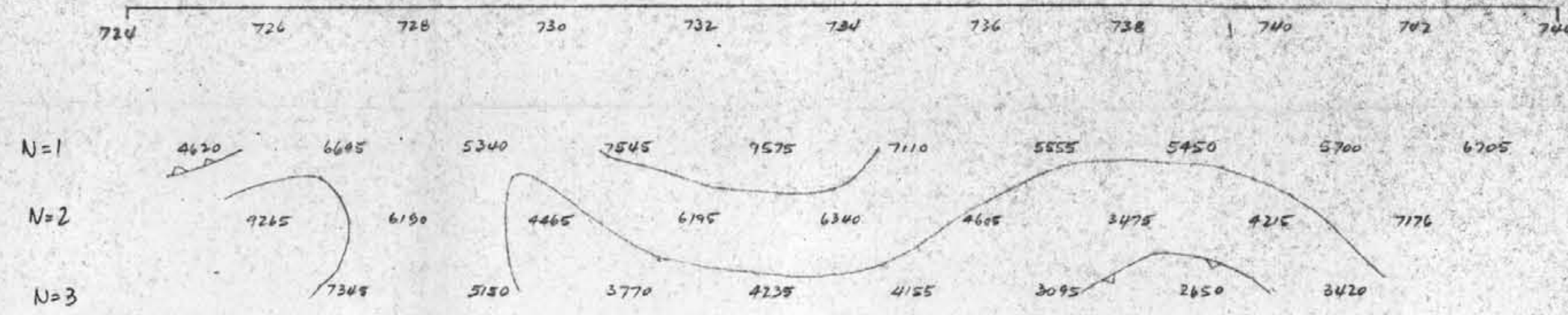
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**4554**

*J. J. [Signature]*  
**MI**

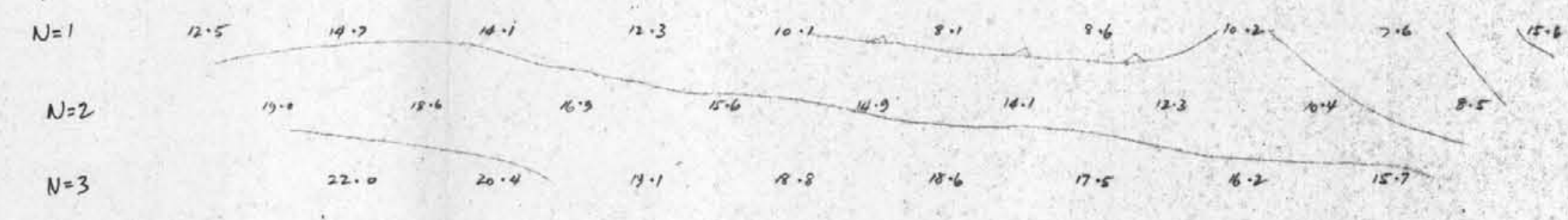
Apparent Resistivity  $\rho_a$



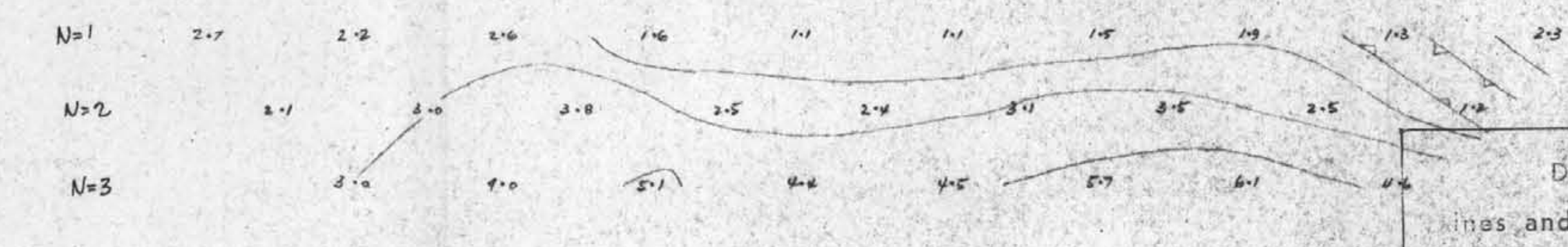
The measuring dipole (P<sub>1</sub>P<sub>2</sub>) was always to the NORTH of the leading current electrode C<sub>1</sub>.

To Accompany Geophysical Report  
By: J. Lloyd, M.Sc. P.E.M.  
ON THE ROB. CLEO & MV CLAIMS  
by ROBB LAKE WARD MINING DIVISION  
DATED: JULY 2, 1973.

Apparent Chargeability  $M_a$



Apparent Metal Factor  $M.F._a$



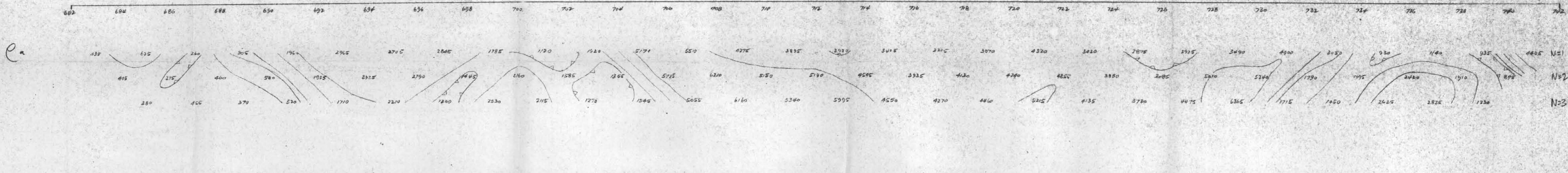
NOTE: Contours at log intervals  
1, 1.5, 2, 3, 5, 7.5 and 10

CYCLE TIME = 6 sec  
DUTY RATIO = 2:1

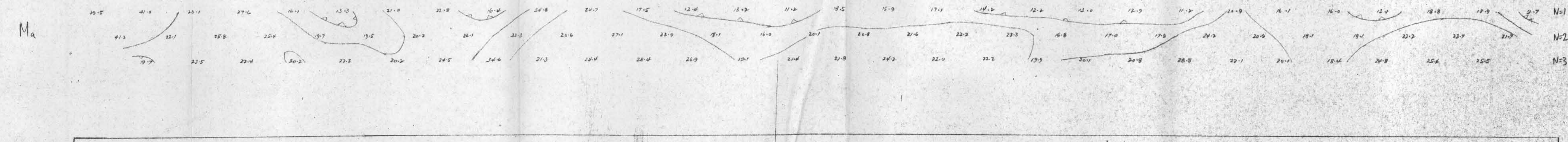
Department of Mines and Petroleum Resources  
ASSESSMENT REPORT  
NO. 4554 MAP #2

4554

DWG. No: E73171-ID  
M2



L568E



(For legend see)  
E73177-1D

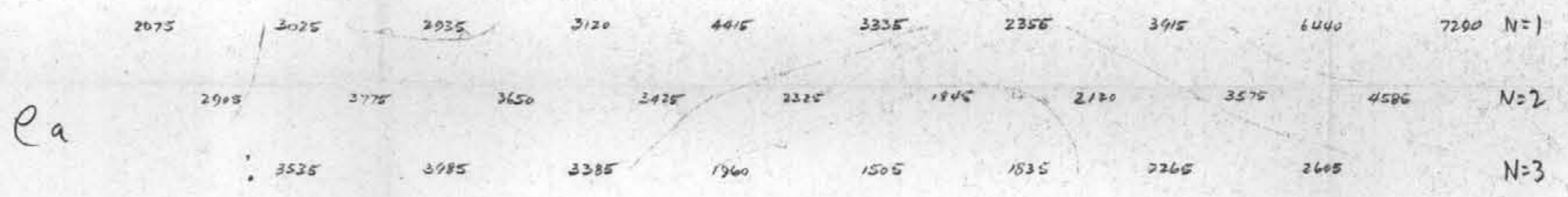


To Accompany Geophysical Report  
By J. HODG, M.Sc., P.E.N.G.  
ON THE ROB, CLEO & MV CLAIMS  
BY ROSS LAKE, LARD MINING DIVISION  
DATED: JULY 2, 1973.

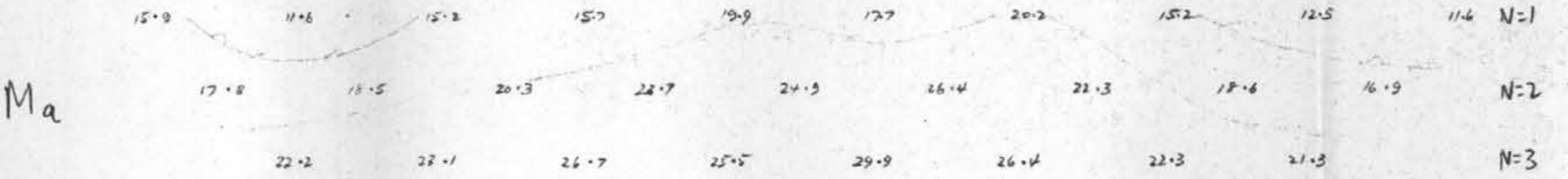
**4554**

Department of  
Mines and Petroleum Resources  
ASSESSMENT REPORT  
**M3**  
4554 #3 DWG. No. E73177-2D

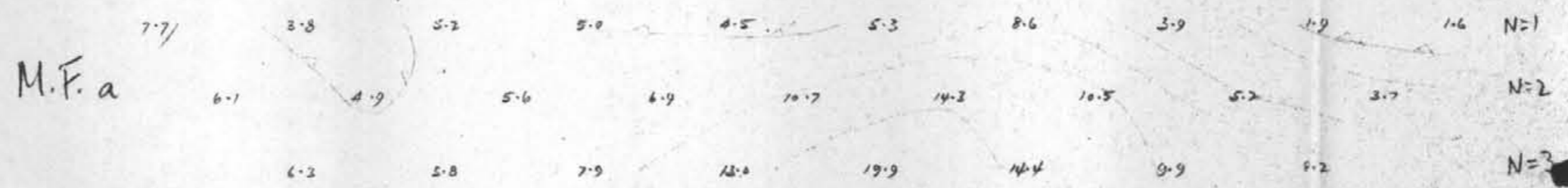
724 N 726 728 730 732 734 736 738 740 742 744 N



L572 E



(For legend see  
E73177-1D)

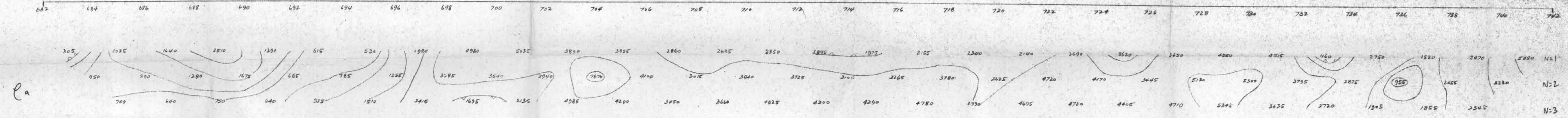


To ACCOMPANY GEOPHYSICAL REPORT  
By: J. LLOYD, M.Sc. P.E.N.C.  
ON THE ROB, CLEO & MV CLAIMS  
by ROBB LAKE, LIARD MINING DIVISION  
DATED: JULY 2, 1973

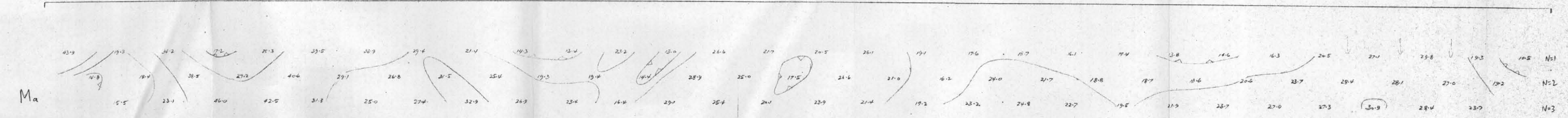
**4554**

Department of  
Mines and Petroleum  
ASSESSMENT REPORT  
NO. **4554** MAP #4 DWG. No E73177-3D

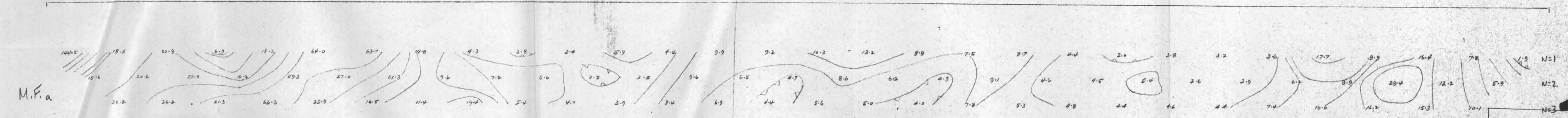
*J. L. Lloyd*



L576E



(For legend see)  
E13177-1D

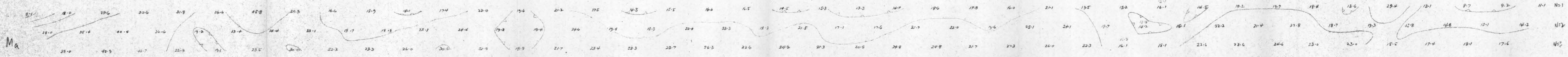
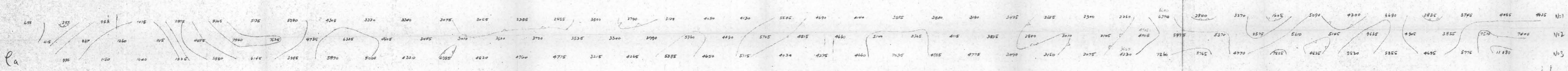


To Accompany GEOPHYSICAL REPORT  
By J. LLOYD, M.Sc., P.Eng.  
on the ROB. CLEO & MV CLAIMS  
by ROBB LAKE, Hard Mining Division  
DATED: JULY 2, 1973.

**4554**

Department of  
Mines and Petroleum  
ASSESSMENT REPORT  
NO. 4554 MAP #5 DWG. No E13177-4D

692W 694W 696 698 700 702 704 706 708 710 712 714 716 718 720 722 724 726 728 730 732 734 736 738 740 742 744 746 748 750 752 754 756 758 760 762 764W



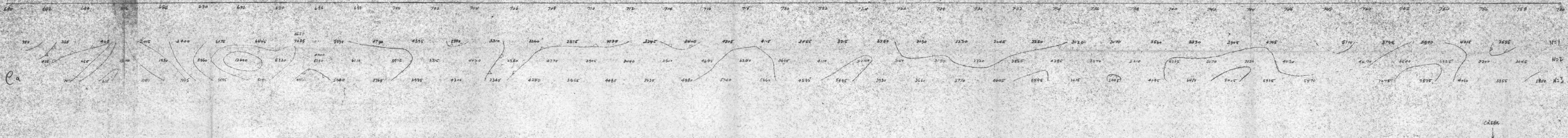
L584E

(For legend see  
E73177-1D)

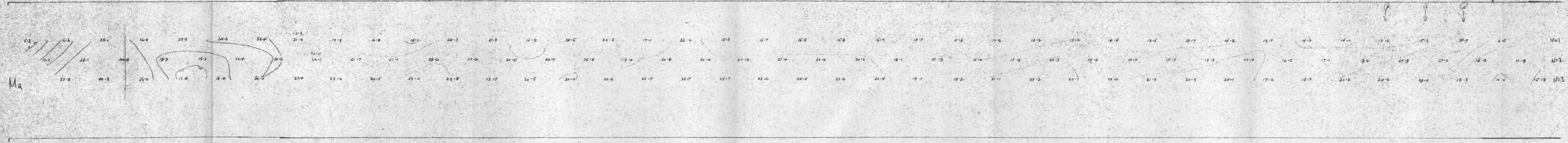
To ACCOMPANY GEOPHYSICAL REPORT  
By: J. LLOYD, M.Sc., P. Eng.  
on the ROB. CLEO & MV CLAIMS  
by ROBB LAKE, Liard Mining Division  
DATED: JULY 2, 1973

4554  
M6  
Department of  
Mining and Petroleum Resources  
ASSESSMENT REPORT  
NO. 4554 MAP #6 DWG. No E73177-5D

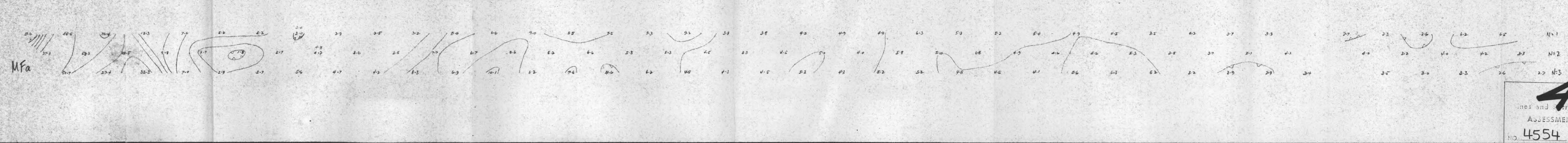




L 592E



(For legend see  
E73177-ID)



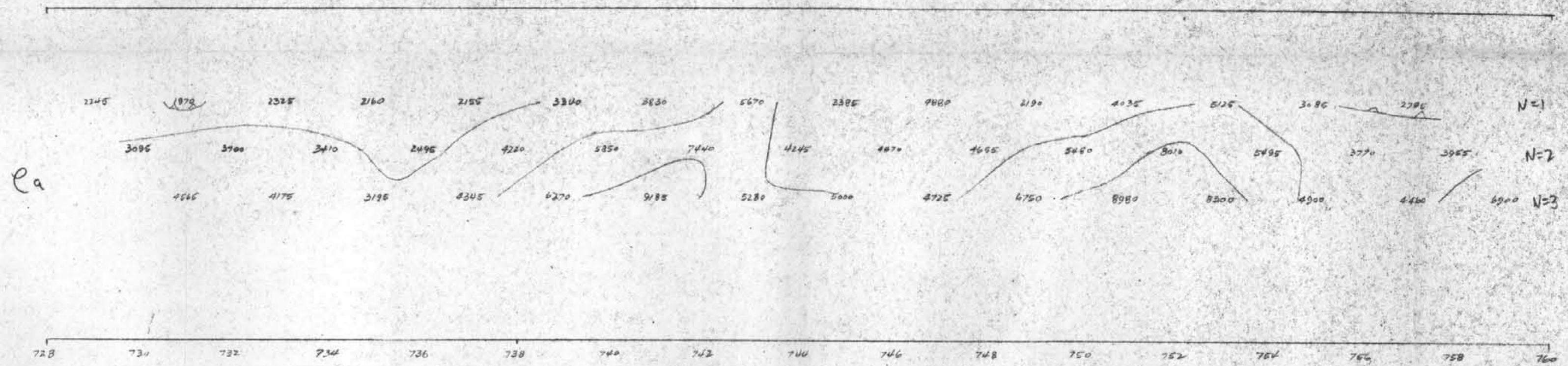
To ACCOMPANY GEOPHYSICAL  
REPORT

By J. LLOYD, M.Sc., P. Eng.

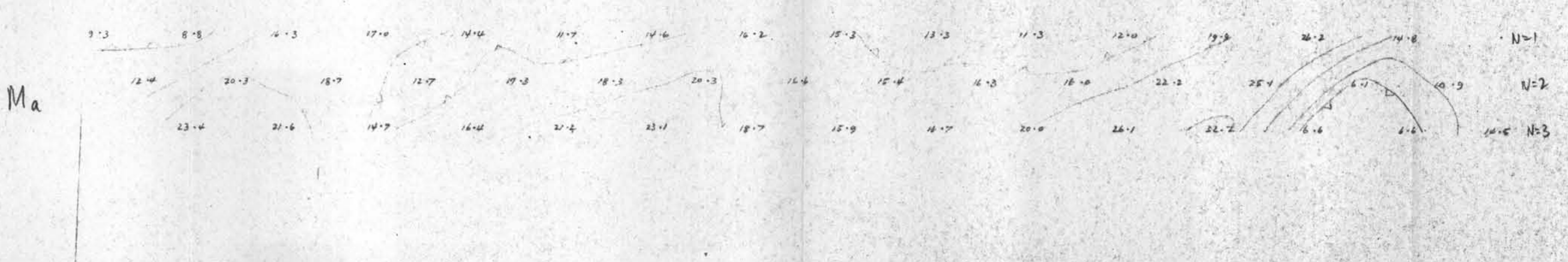
on the ROB, CLEO & MV CLAIMS  
by ROBB LAKE LIARD MINING DIVISION

DATE: JULY 2, 1973

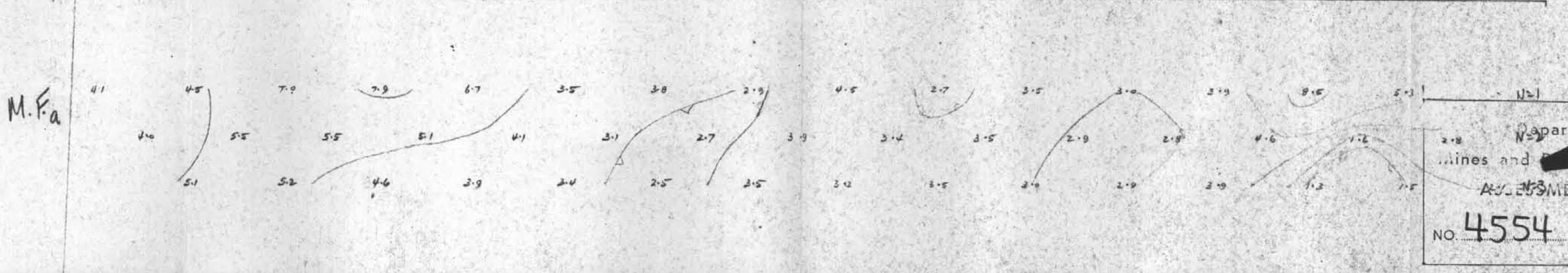
**4554**  
ASSESSMENT REPORT  
No. 4554 MAP #7 M7 No. E73177-6D



L596E



(For legend see  
ET3177-1D)



To ACCOMPANY GEOPHYSICAL  
REPORT

By J. LLOYD, M.Sc. P. ENG  
on the ROB, CLED & MV CLAIMS  
by ROBB LAKE, LIARD MINING DIVISION

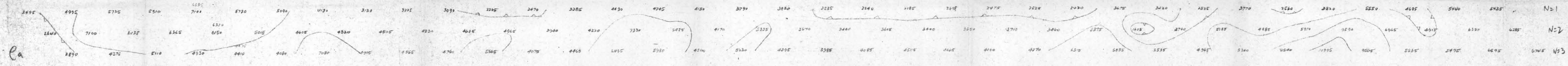
DATE: July 2, 1973

Department of  
Mines and Technical Surveys  
ASSESSMENT REPORT  
NO. 4554 MAP #8  
DWG. No. ET3177-1D

**4554**

**M8**

686 688 690 692 694 696 698 700 702 704 706 708 710 712 714 716 718 720 722 724 726 728 730 732 734 736 738 740 742 744 746 748 750 752 754 756 758 760

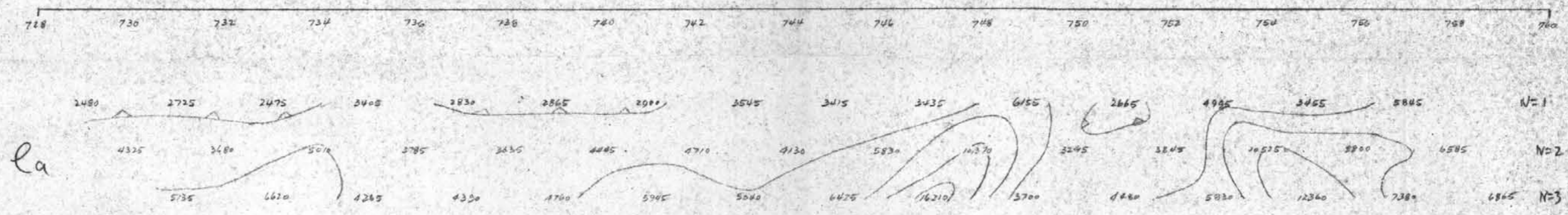


(For legend See E78177-1D)

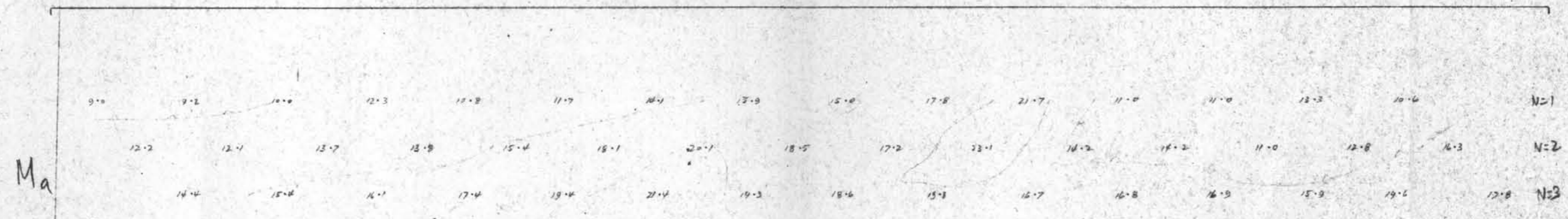
To Accompany: GEOPHYSICAL REPORT  
By: J. LLOYD, M.Sc. REGR.  
on the ROB. CLEO & MY BEAMS  
by ROBB LAKE, LIARD MINING DIVISION  
DATED: JULY 2, 1973

**4554**  
**M9**

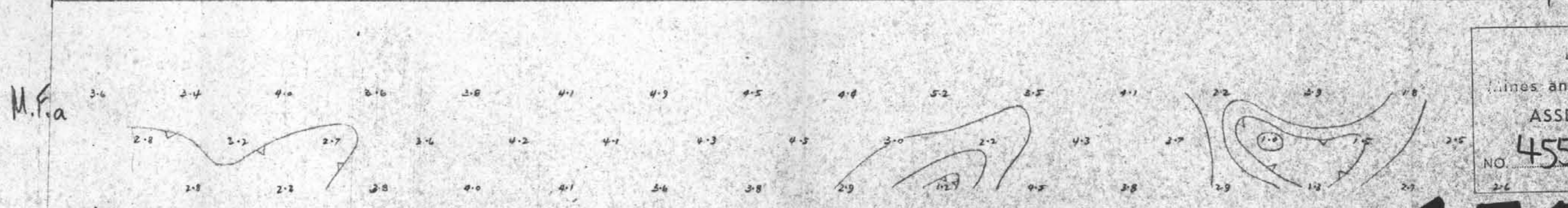
Department of  
Mines and Petroleum Resources  
ASSESSMENT REPORT  
No. 4554 MAP #9 DWG. No: E78177-8D



L604E



(For legend see  
E13177-1D)



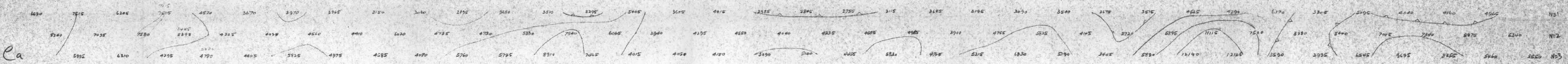
To Accompany: GEOPHYSICAL REPORT  
By: J. LLOYD, M.Sc., P. Eng.  
on the ROB. CLEO & MV CLAIMS  
By ROBB LAKE, LIARD MINING DIVISION

DATED: JULY 2, 1973

Department of  
Mines and Petroleum Resources  
ASSESSMENT REPORT  
NO. 4554 MAP #10

4554-M10  
DWG. No. E13177-9D

688 690 692 694 N 696 N 698 N 700 702 704 706 708 710 712 714 716 718 720 722 724 726 728 730 732 734 736 738 740 742 744 746 748 750 752 754 756 758 760



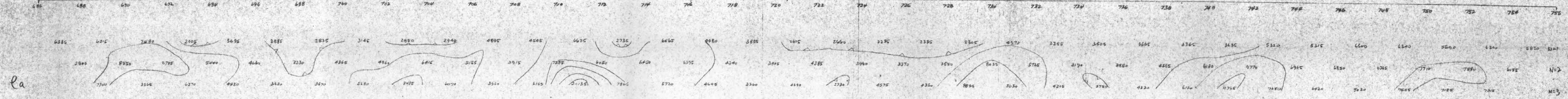
L608E

(For legend see ET3171-1D)

To Accompany: GEOPHYSICAL REPORT  
 By J. Lloyd M.S. Reg.  
 on the Rob. CLED & MY CLAIMS  
 by ROBB LAMP, Liara Mining Division  
 DATED: July 2, 1973

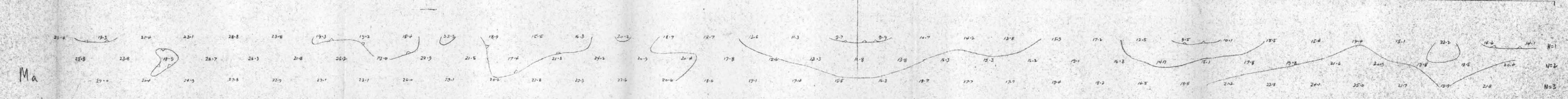
Department of  
 Mines and Petroleum Resources  
 ASSESSMENT REPORT  
 No. 4554 MAP #11  
 DWG. No. ET3171-1D

**4554-M11**



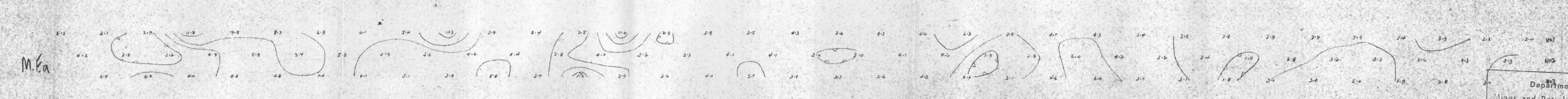
La

L 616 E



Ma

(For legend see  
E73177-1D)



M.Ea

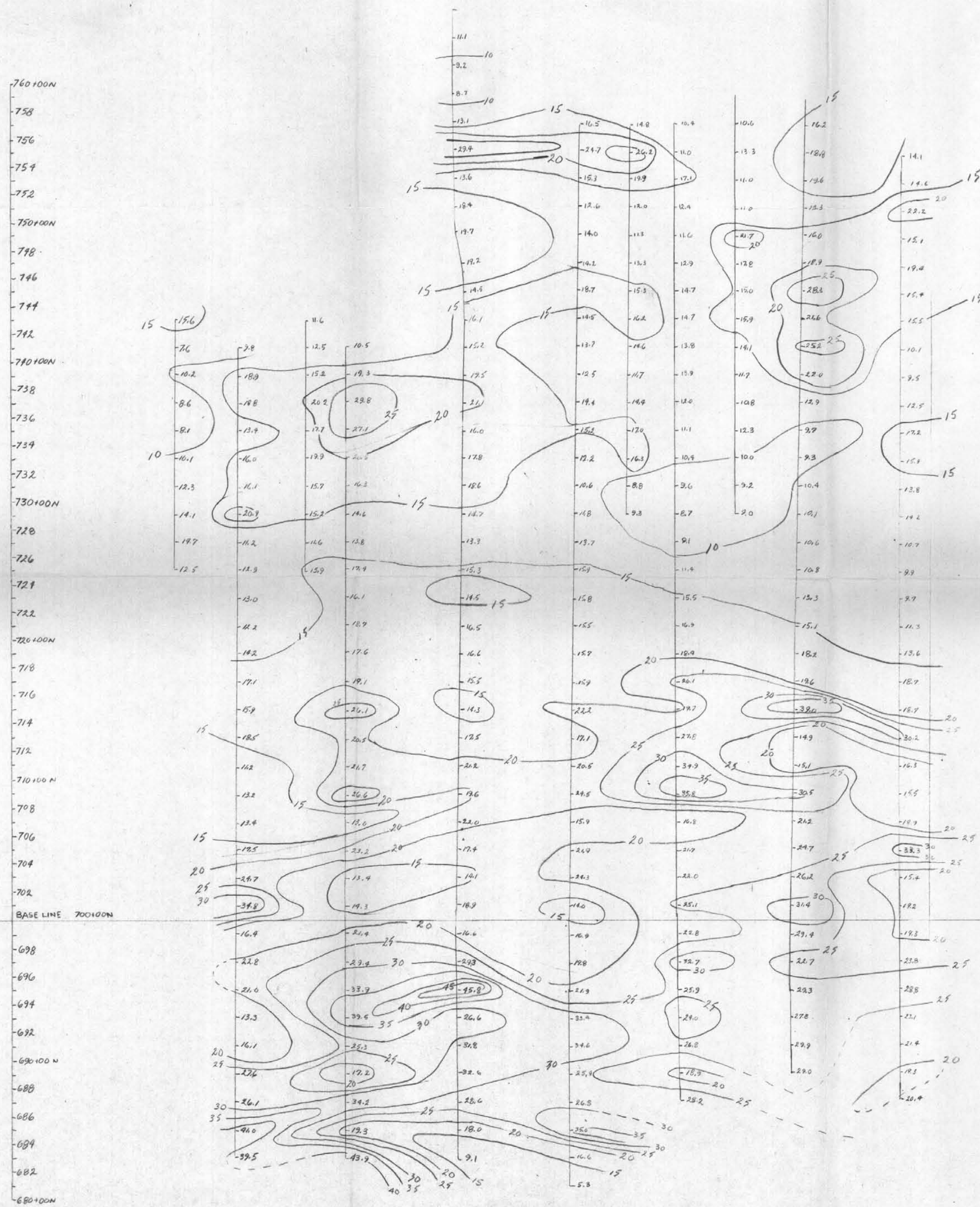
To Accompany: GEOPHYSICAL REPORT  
 By: J. HOND, M.Sc., P.Eng.  
 on the ROB, CLEO & MV CLAIMS  
 by ROSS LAKE LIARD MINING DIVISION  
 DATED: July 2, 1973

Department of  
 Mines and Petroleum Resources  
 ASSESSMENT REPORT  
 4554 #12

Fig. No. E73177-11D

**4554-112**

Department of  
Mines and Petroleum Resources  
ASSESSMENT REPORT  
NO 4554 #13

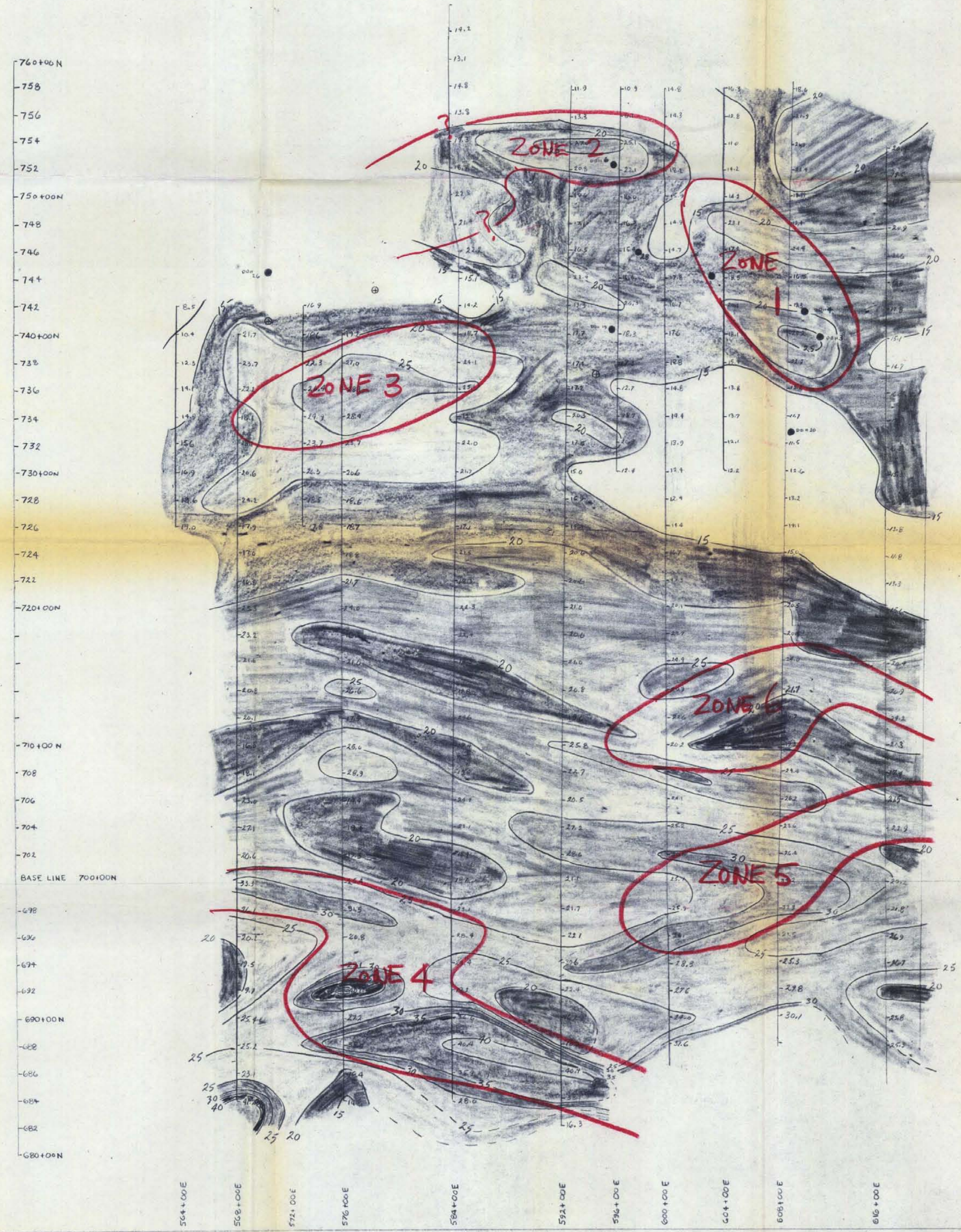


**4554**  
**M13**  
**PRELIMINARY**  
**COPY**

ROBB LAKE JOINT VENTURE  
1973 IP SURVEY  
First Separation Contours of  
Apparent Chargeability  
 $\alpha = 200 \text{ ft}$ ;  $n = 1$   
E73177-1M

T. Accompanying Geophysical Report by J. H. 11040, M.Sc., P. Eng.  
on the Robb, Cleo & M.V. Claims, Robb Lake, Liard Mining Division, dated Feb 2/73

Department of  
 Mines and Petroleum Resources  
 ASSESSMENT REPORT  
 NO. 4554 MAP #14



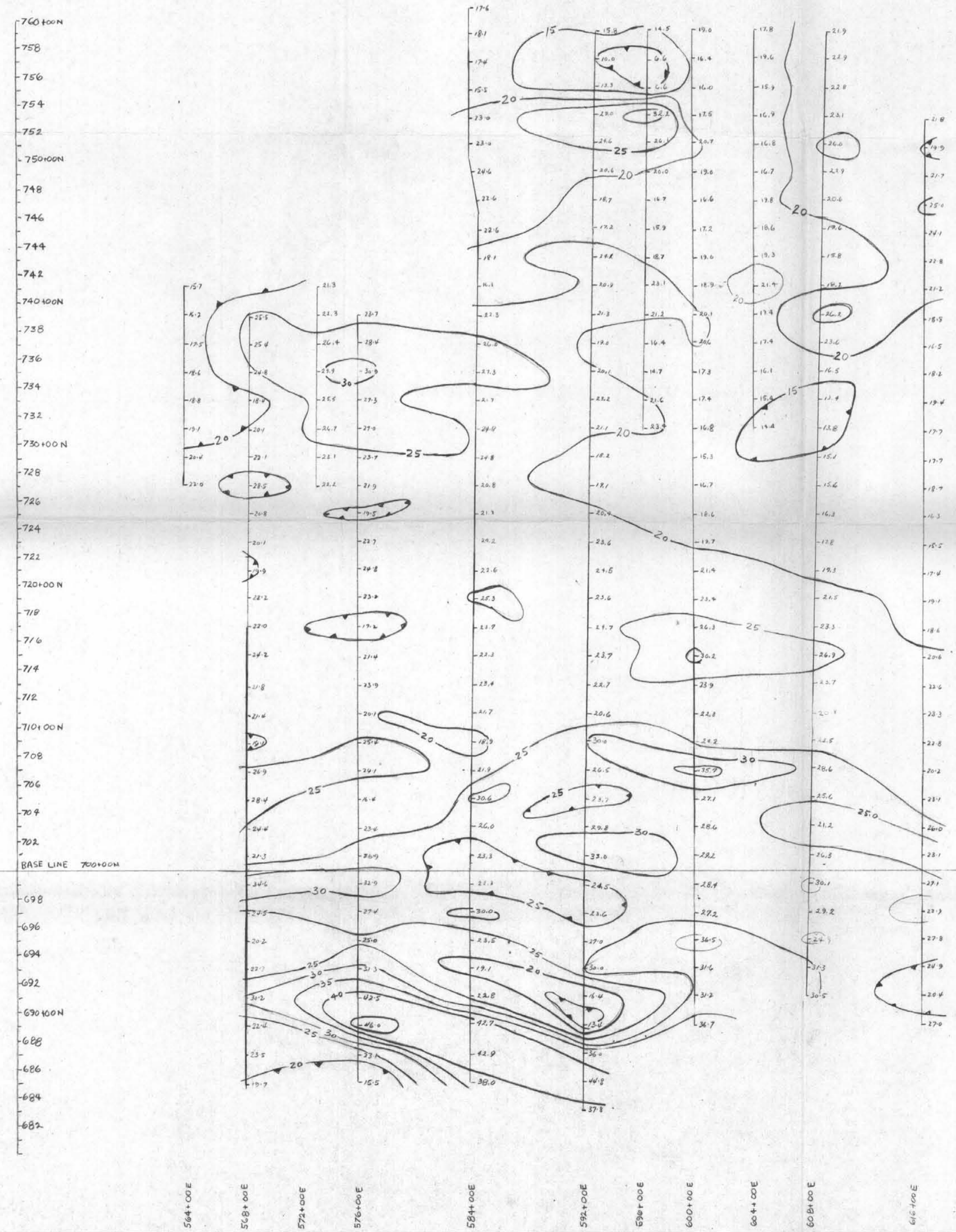
**4554**  
**M14**  
**PRELIMINARY**  
**COPY**

ROBB LAKE JOINT VENTURE  
 1973 IP SURVEY  
 Second Separation Contours  
 of Apparent Chargeability  
 $n = 200 \text{ ft} ; m = 2$   
 E73177-2M

To ACCOMPANY GEOPHYSICAL REPORT By J. Lloyd, M.Sc. Ph.D. on the  
 Robb, CLP & MV claims by Robb Lake, Liard Mining Division. Dated July 2, 1973



Department of  
Mines and Petroleum Resources  
ASSESSMENT REPORT  
NO. 4554 MAP #15

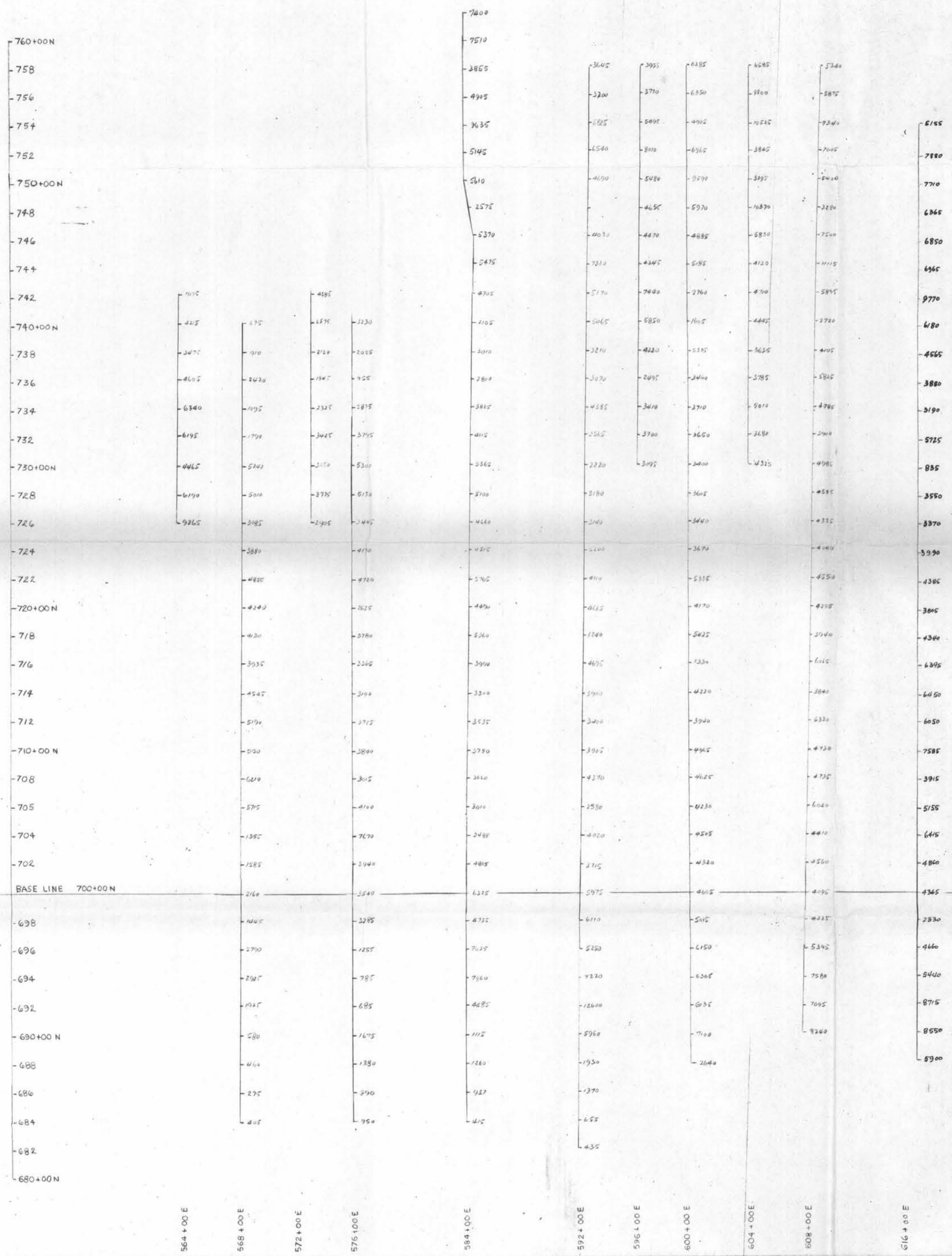


**4554**  
**M15**  
**PRELIMINARY**  
**COPY**

ROBB LAKE JOINT VENTURE  
1973 IP SURVEY  
Third Separation Contours  
of Apparent Chargeability  
 $\alpha = 200 \text{ ft}; n = 3$   
E73177-3M

To Accompany Geophysical Report by J. Lloyd, M.Sc. Eng. on the  
Robb, Oled & MV Claims by Robb Lake, Lead Mining Division. Dated July 2, 1973

Department of  
Mines and Petroleum Resources  
ASSESSMENT REPORT  
NO. **4554** MAP #16

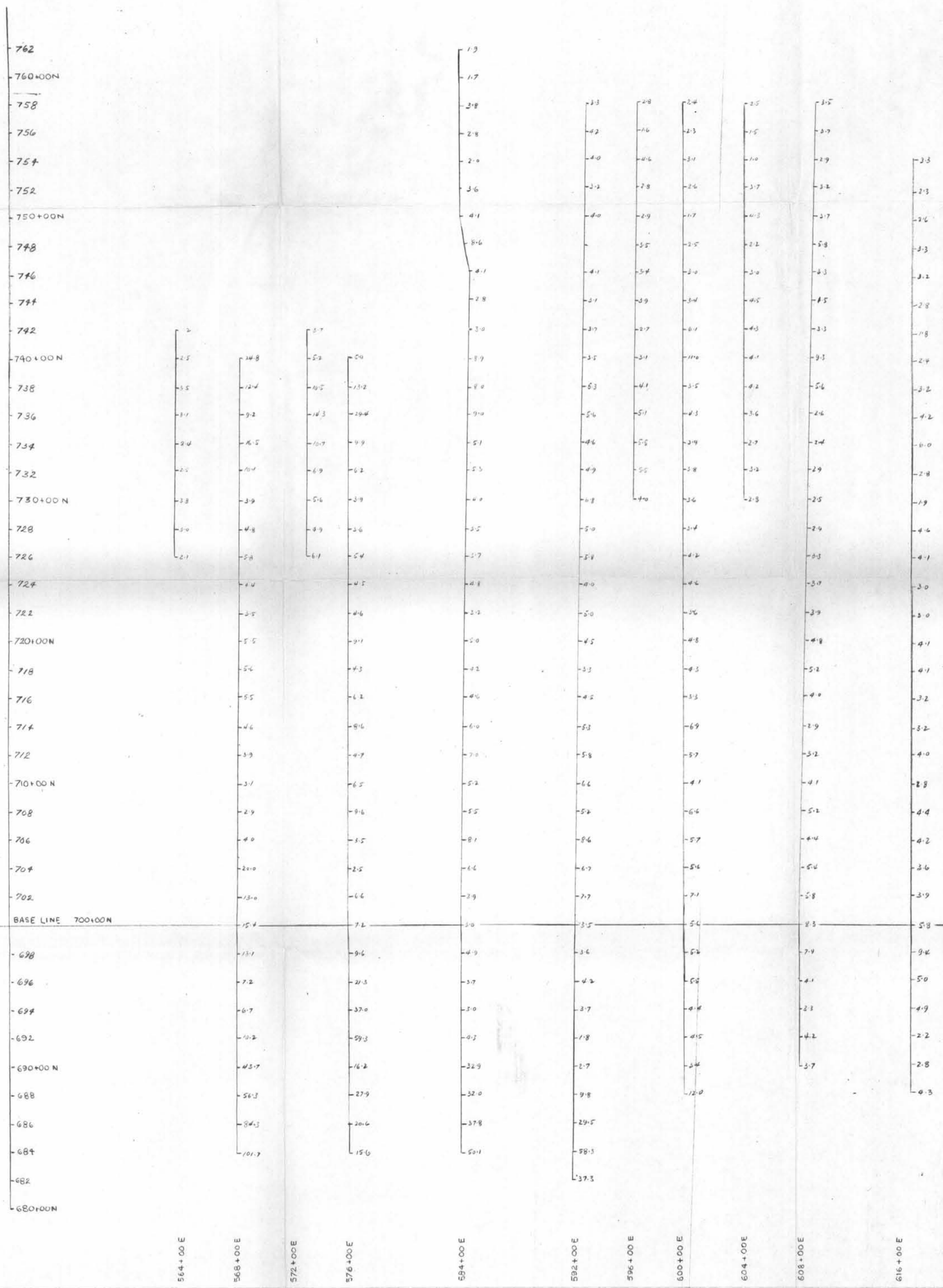


**4554**  
**M16**  
**PRELIMINARY**  
**COPY**

ROBB LAKE JOINT VENTURE  
1973 IP SURVEY  
Second Separation Contours of  
Apparent Resistivity  
 $x = 200 \text{ ft}; m = 2$   
E73177-5M

To Accompany Geophysical Report by F. Lloyd M.Sc. P.Eng. on the  
Robb Lake IP Survey, Robb Lake, Liard Mining Division. Dated: July 2, 1973

Department of  
Mines and Petroleum Resources  
ASSESSMENT REPORT  
NO. 4554 MAP #17



**4554**  
**M17**  
**PRELIMINARY**  
**COPY**

ROBB LAKE JOINT VENTURE  
1973 IP SURVEY  
Second Separation Contours of  
Apparent Metal Factor  
 $x = 200 \text{ ft}$ ;  $n = 2$   
E73177-8M

To Accompany Geophysical Report by J. Lloyd, M.Sc.P.Eng. on the  
Robb Lake Claims by Robb Lake, Laird Mining Division. Dated July 2, 1993