Report on Geomag "A"

015929

Test Survey over Noranda

Newman Property, Babine Lake, B. C.

Electronic Laboratories of Canada Limited

Vancouver, B. C.

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Babine Lake, B. C., February 8, 1965

PART I

Electronic Laboratories
OF CANADA LIMITED

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HIGH FREQUENCY RESEARCH
DESIGN ENGINEERING
CERTIFIED RADAR SERVICE AGENCY
PATENT DEVELOPING AND LICENSING
ELECTRONIC CONSULTANTS

281 NORTH HOWARD AVENUE
VANCOUVER, B.C.

February 12, 1965

<u>This is a report covering the trials of a dual component magnetometer developed by Electronic Laboratories, wherein tests were conducted over an undeveloped property having good geological control.</u>

The purpose of the trials were to determine the effectiveness of the geophysical system with the dual component magnetometer flown in a helicopter. More specifically, the tests were to determine the advantages of the two component magnetic system relative to other air-borne geophysical methods. This report is being made prior to receiving any comparable information or confirmation with regards to the location of the ore bodies on the property. It is understood upon receipt of this report that the geological information will be released for comparison.

The first property to be aerial surveyed by the dual component magnetometer is known as the Newman Property on the Newman Peninsula in Babine Lake, B. C. It was originally agreed prior to going to Babine Lake, that east/west lines across the Peninsula would be satis-factory and in addition, one south to magnetic north tie line across the property to establish interpretation techniques.

Plan 1 shows the portion of the Newman Property to be flown by the solid lines and also shows the additional lines that were flown as indicated by the dashed line. It was the original intent to fly these lines on February 8th in the afternoon, however, weather conditions were too severe and it was late in the afternoon before the wind calmed sufficiently for a second short trial. Lines 18N and 20N were flown by Mr. R. Wolverton, on February 8th, who was the most familiar with the orientation requirements for these flights. The anomaly was recognized from the Line 18N profiles and it was decided the following day to space a line 1,000 feet south and 1,000 feet north of Line 20N. This was accomplished with the aid of trees being placed on the ice for starter points with the course being held by the pilot's compass, and far shore markers. Markers north of the 40N line were not identified and some difficulty was experienced in trying to find the 60N and 80N lines as no ground control was attempted for these surveys.

RESULTS

The strip charts of the flights 10 North, 18 North, 20 North, 30 North and 40 North are shown on Figure 1 for the vertical component and on Figure 2 for the horizontal component. The strip chart, Figure 3, shows a south to north tie line with the phasing area hatched indicating areas of low resistance. The 2,000 foot lines commencing at the zero base line, on Line 20 North extends 400 feet and has a parallel 2,000 foot Line (2400N) to the north side. This short traverse was made by a Geomag ground instrument with the location suggested by Mr. Wolverton.

Plan 2 shows the anomaly A-1 having a low resistance centre and a wider area of influence crossing the 18N and 20N line. In addition, two linear anomalies, L-1 and L-2 are shown as indicated from their locations on the strip charts. The strip charts show the centre of low resistance with the letter 'R' and the area of influence shown as A of I. The relatively strong linear anomaly L-2 appears to go practically through the middle of the area of low resistance, and it would suggest that this linear formation may be associated with mineralization in this area.

The low resistance reading on Line 10N and on the north tie line, suggest a narrow extension of the anomaly extends to the southwest. It is interesting to note that the only low resistance reading on the tie line are in this vicinity.

CONCLUSIONS

The airborne survey appeared to respond favorably to the anomaly if the location as shown on Plan 2 is correct. The anomalous change represented an equivalent reading to approximately 1,000 gammas at 600 feet elevation. The background variation frequently was equivalent to this reading, principally from topography variations. There would appear to be some doubt whether the topographical influence is a serious threat to this system in view of the phasing requirement to identify anomalies as indicated on the tie line chart.

In studying the strip charts it will be noted that the random variations or short wavelengths that are predominant throughout the records, do not exist within the "area of influence" (A of I) from the anomaly. This is characteristic of porphyry copper anomalies experienced with the Geomag System.

The survey flying time for the lines shown plus reruns due to bad flying conditions, etc., did not exceed one hour over this property. The location and shape of the A-1 anomaly and the linear anomalies L-1 and L-2 are derived from the aircraft survey only.

ELECTRONIC LABORATORIES OF CANADA LIMITED

D. L. Hings,
Geophysicist.

DLH/j

PART 2

Electronic Laboratories
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HIGH FREQUENCY RESEARCH
DESIGN ENGINEERING
CERTIFIED RADAR SERVICE AGENCY
PATENT DEVELOPING AND LICENSING
ELECTRONIC CONSULTANTS

281 NORTH HOWARD AVENUE
VANCOUVER, B.C.

February 16th, 1965

This is a supplementary report to the airborne geophysical tests conducted over the Newman Property at Babine Lake, B. C. The following information relates in more detail to the interpretation and the results obtained.

FUNDAMENTALS

(a) The charts shown in Figures 1 and 2 of the previous report, are interpreted on the basis of the relationships between the two components as recorded. Generally speaking, the differential between the simultaneous recordings within a period of a cycle, are considered to be anomalous. For example, an east/west anomalous strike would produce a greater vertical component reading than horizontal componet reading. Inversely, a north/south anomalous strike would produce a stronger horizontal component reading than vertical component reading.

(b) The recorded cyclic polarization is interpreted with reference to time and travel, and is related to the positioning of the anomaly, within a magnetic quadrature, establishing below the aircraft's position and the distance of travel within the cycle.

(c) The frequency of the cyclic recordings are responsive to the rate of travel, and the spacing of the anomalous sources along the flight path. The earth's undulating eroded rock surface forms the background level that limits the sensitivity of the equipment. A noticeable smoothing occurs in this background, where zones of mineralization exist. These calmer regions are usually accompanied with large amplitude cyclic variations equal to the cross section of the mineralized zone traversed. These conditions apply to disseminated mineralization and especially porphyry type deposits.

SIGNATURES

The many variables that occur with differing percentages of sulphides, with accompanying shears of varying dips and strikes, plus the varying susceptibility from magnetic mineralization, combine to form a very complex combination of signatures. The interpretation from these signatures based on the above fundamentals may only be as accurate as the experience of the interpretor provides.

The fast analysis of these records is essential, and must be derived from tapes for economical operation. The interpretation from differential information from the two recordings, permits the automatic production of a differential profile, and also selective profiles through the choice of suitable frequency and phase filtering networks. The resulting differential profiles, cleaned of undesireable frequency and phase components, make a resulting signature that is less complex for interpretation, and greatly reduces the man hours of processing. The original records may be directly recorded and processed by electronic means and subsequently converted to the required profiles. The locations indicated on Plan 2A over the original Plan 2 are derived from careful overlays wherein the phase displacement of the two components does not exceed plus or minus zero phase by more than thirty degrees.

Plan 2A is submitted upon request for a more detailed assessment of the low resistive anomlies.

ELECTRONIC LABORATORIES OF CANADA LIMITED

D. L. Hings,
Geophysicist.

DLH/j

PART 3

Electronic Laboratories
OF CANADA LIMITED

TELEPHONE: CYPRESS 8-9619

HIGH FREQUENCY RESEARCH
DESIGN ENGINEERING
CERTIFIED RADAR SERVICE AGENCY
PATENT DEVELOPING AND LICENSING
ELECTRONIC CONSULTANTS

281 NORTH HOWARD AVENUE
VANCOUVER, B.C.

March 1st, 1965

SUMMATION

This third phase reports on the results of the Newman Test Survey conducted for Noranda Exploration Company and is in the form of a summation. The information has been supplied by Noranda from previous geophysical surveys and the comparisons form a case history.

Plan 3 shows the anomalies outlined by three geophysical methods, Junior Electromagnetic (JEM), Airborne Electromagnetic, (Airborne EM), and Ground Magnetometer. Plan 3 is overlaid on Plan 2A and it may be observed where the airborne geomag coincides with these anomalies. The anomalous area near the 00 Base Line between 50N and 100N is not supported on Plan 2A. The flight lines did not cross directly over this region, and we are informed these readings are largely attributed to a clay deposit.

The location shown on Plan 2 of the main mineralized zone, we are informed, is relatively accurate and the hatched area includes one of the best diamond drill locations. It has been conceded by the Noranda staff, that this survey was highly successful.

The information and detail derived from the enclosed records indicates how the Geomag System differs from Airborne Magnetometer in both the presentation and detail. This system enables the information to be derived from the X, Y, and Z components of the magnetic field, thus making it possible to determine the influence of the electric field. The fast response of the geomag equipment in this survey was limited to the pen reaction time of the recorders, and will henceforth be recorded on magnetic tape to obtain faster response than has been shown in this test survey. It may be observed from the records, linear structural features give off characteristic signatures, and are often important to the interpretation of anomalous conditions, and it is believed that with the new recording method, features a few feet wide will be observed at speeds of sixty miles an hour.

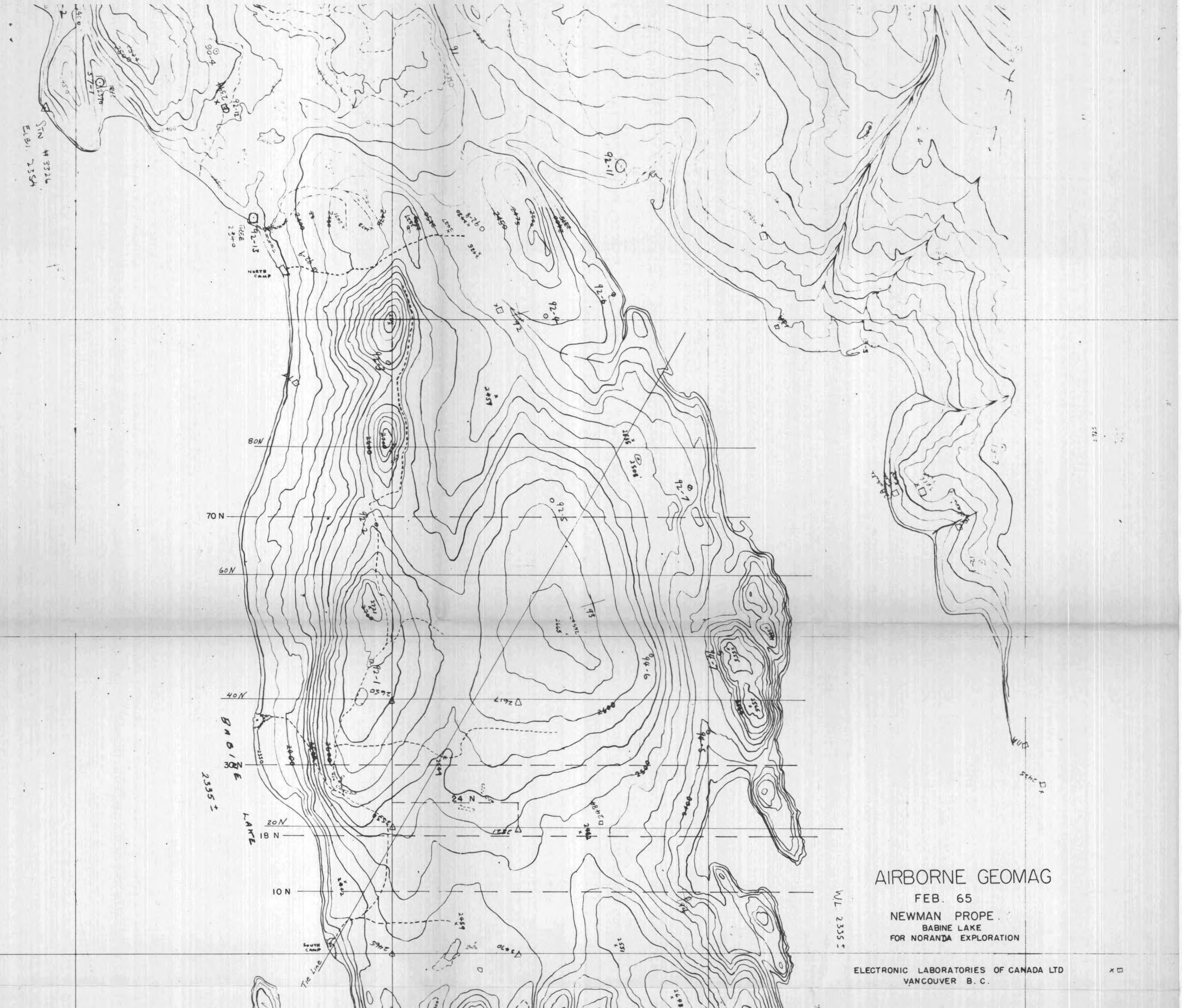
The interpretation of so much detail would be too time consuming for methodical human analysis, and apart from (eyeballing) of pen profiles prior to processing, all selection and discrimination must be exercised by electronic means, to produce profiles representative of varying depths of influence for contouring and subsequent geological study.

ELECTRONIC LABORATORIES OF CANADA LIMITED

D. L. Hings,
Geophysicist.

DLH/j

PART 4

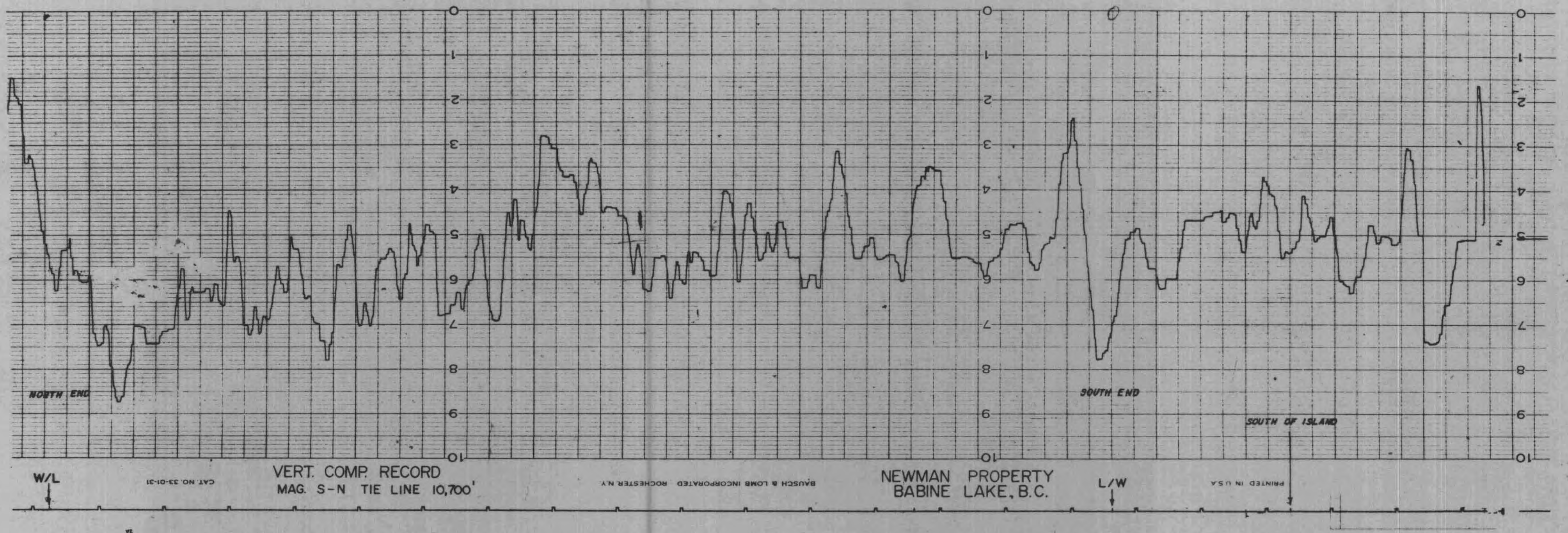

AIRBORNE GEOMAG
FEB. 65
NEWMAN PROPE.
BABINE LAKE
FOR NORANDA EXPLORATION
ELECTRONIC LABORATORIES OF CANADA LTD
VANCOUVER B.C.
PLAN I
NEWMAN PROPERTY
AIR - GEOMAG.
1"=1000'
W.L. 2335±
BABINE LAKE
2335±
80N
70 N
60N
40N
30N
24 N
20N
18 N
10 N
NORTH CAMP
SOUTH CAMP
Tie Line
TARGET
inches
centimetres
BRITISH COLUMBIA GEOLOGICAL SURVEY
This reference scale bar has been added to the original image. It will scale at the same rate as the image, therefore it can be used as a reference for the original size.

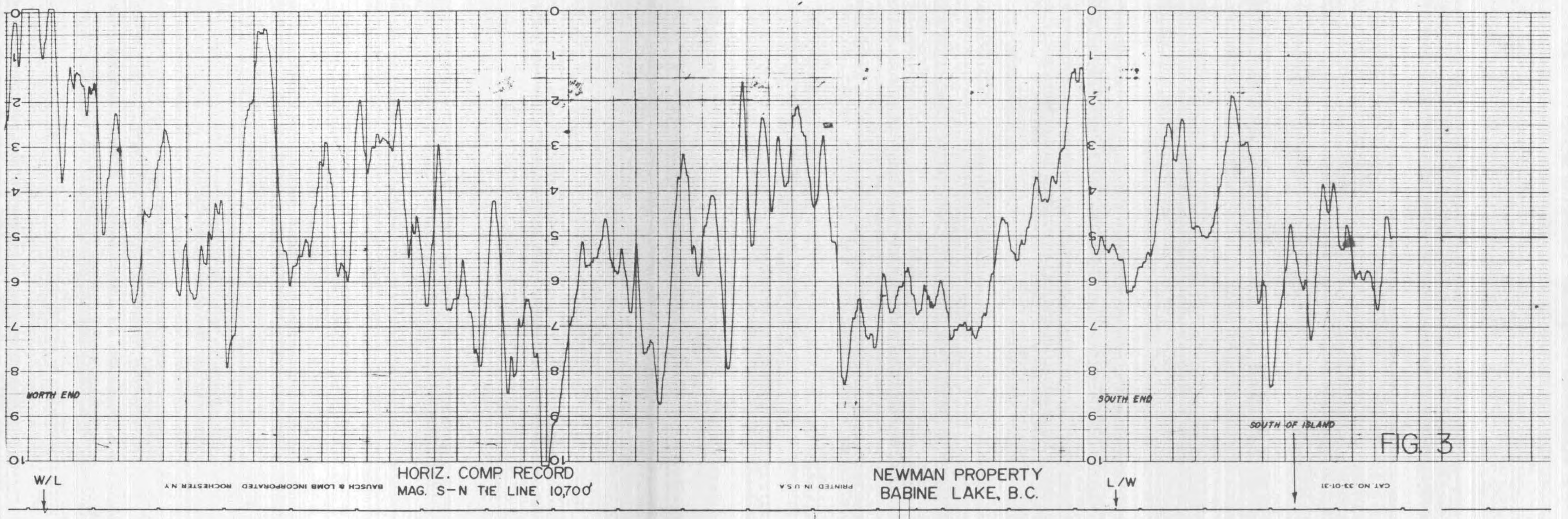

LINE 40 N. W–E 8300' FT.
VERT. COMP. SPEED 55 M. PH. HEIGHT 600' ABOVE LAKE
LINE 30 N. W–E 8300 FT.
VERT. COMP. SPEED 55 M. PH. HEIGHT 600' ABOVE LAKE
AIRCRAFT INSTABILITY
BAY
LINE 20 N. W–E 6300' FT
VERT. COMP. SPEED 55 M. PH. HEIGHT 600' ABOVE LAKE
LINE 18 N. W–E 6100 FT.
VERT. COMP. SPEED 55 M. PH. HEIGHT 600' ABOVE LAKE
LINE 10 N. W–E 6800 FT.
VERT. COMP. SPEED 55 M. PH. HEIGHT 600' ABOVE LAKE
W/L
A OF I
R
L1
L2

FIG. 1


LINE 40 N. W-E 8300 FT.
HOR. COMP. SPEED 55 M.PH. HEIGHT 600' ABOVE LAKE
A. OF I.
R
L1
L2
W/L
LINE 30 N. W-E 8300 FT.
HOR. COMP. SPEED 55 M. PH. HEIGHT 600' ABOVE LAKE
A. OF I.
R
L1
BAY
W/L
LINE 20 N. W-E 6300 FT.
HOR. COMP. SPEED 55 M. PH. HEIGHT 600' ABOVE LAKE
AIRCRAFT INSTABILITY
A. OF I.
R
L1
L2
W/L
LINE 18 N. W-E 6100 FT.
HOR. COMP. SPEED 55 M.PH. HEIGHT 600' ABOVE LAKE
A. OF I.
R
L1
L2
W/L
W/O
LINE 10 N. W-E 6800 FT.
HOR. COMP. SPEED 55 M. PH. HEIGHT 600' ABOVE LAKE
A. OF I.
R
L1
L2
W/L

FIG. 2


VERT. COMP. RECORD
MAG. S-N TIE LINE 10,700'
NEWMAN PROPERTY
BABINE LAKE, B.C.
NORTH END
SOUTH END
SOUTH OF ISLAND
W/L
L/W
0 1 2 3 4 5 6 7 8 9 10
CAT. NO. 33-01-31
BAUSCH & LOMB INCORPORATED ROCHESTER N.Y.
PRINTED IN U.S.A.

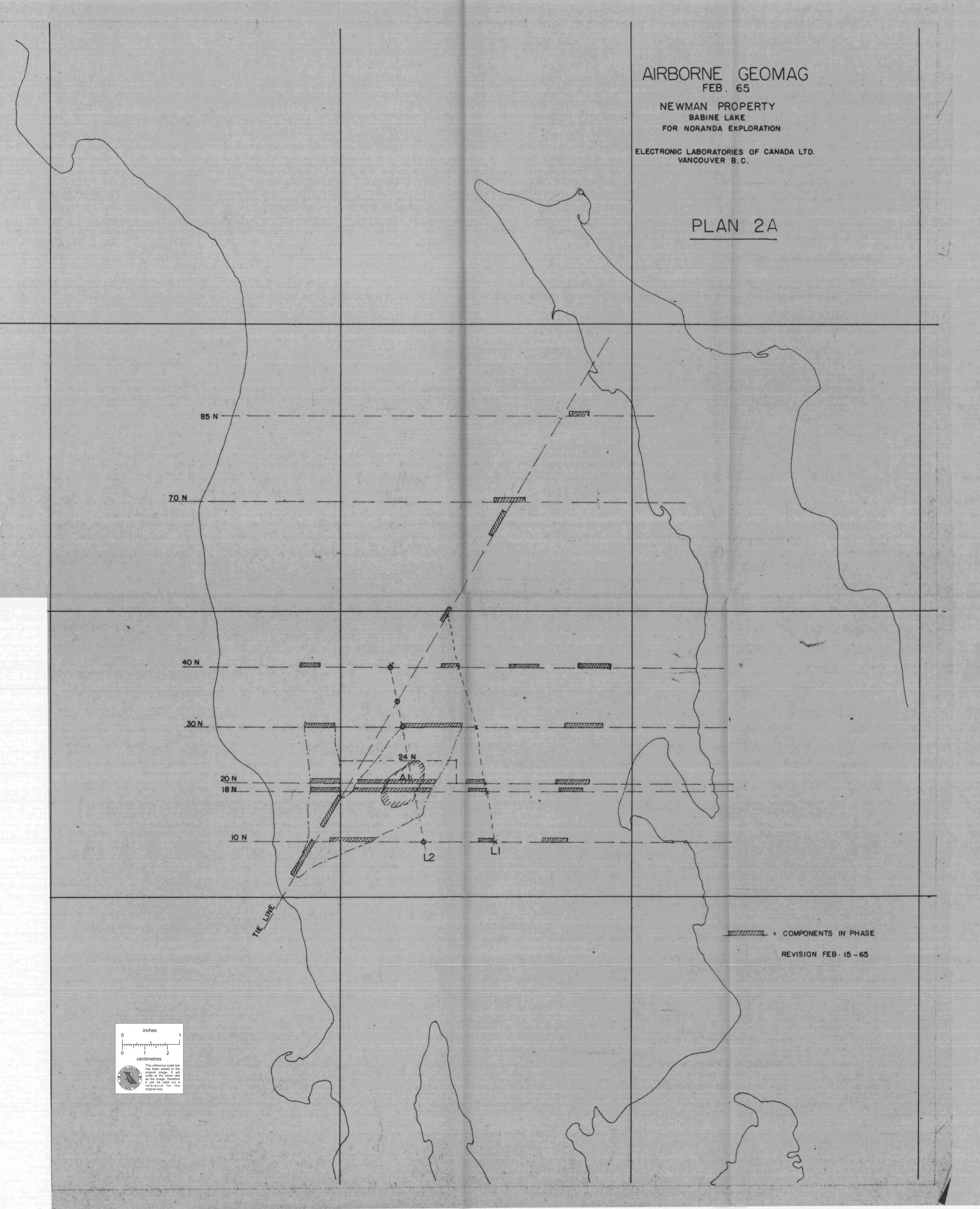


HORIZ. COMP. RECORD
MAG. S–N TIE LINE 10,700

NEWMAN PROPERTY
BABINE LAKE, B.C.

FIG. 3


AIRBORNE GEOMAG
FEB. 1965
NEWMAN PROPERTY
BABINE LAKE, B.C.
FOR NORANDA EXPLORATION
ELECTRONIC LABORATORIES OF CANADA LTD
VANCOUVER, B.C.
PLAN 2
85N
70N
40 N
30N
24 N
A1
20N
18N
10N
L2
L1
TIE LINE
BABINE LAKE
inches
0
1
centimetres
0
1
2
This reference scale bar has been added to the original image. It will scale at the same rate as the image, therefore it can be used as a reference for the original size.


AIRBORNE GEOMAG
FEB. 65
NEWMAN PROPERTY
BABINE LAKE
FOR NORANDA EXPLORATION
ELECTRONIC LABORATORIES OF CANADA LTD.
VANCOUVER B.C.
PLAN 2A
85 N
70 N
40 N
30 N
24 N
A1
20 N
18 N
10 N
L2
L1
TIE LINE
= COMPONENTS IN PHASE
REVISION FEB. 15-65
inches
0
1
0
1
2
centimetres
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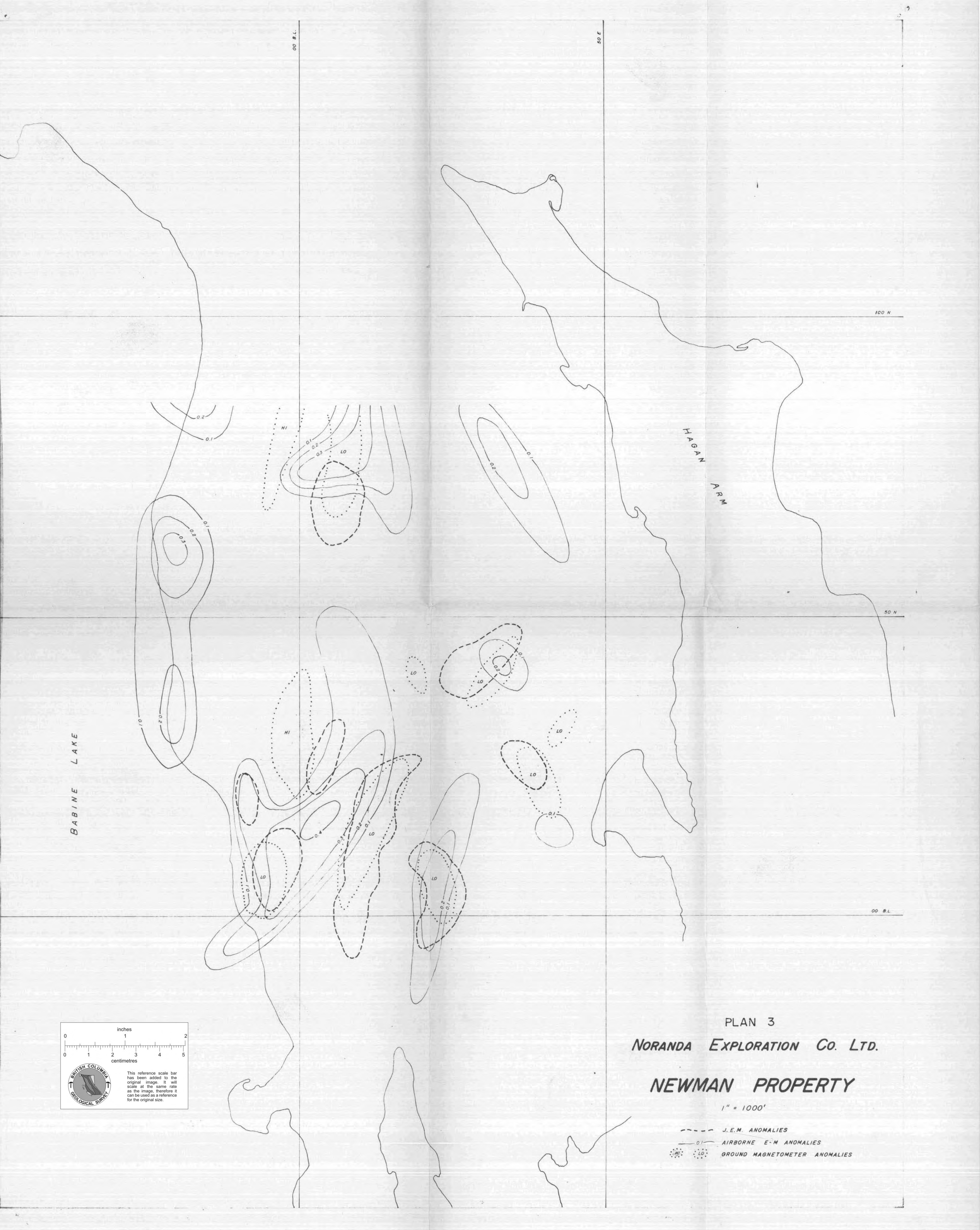
00 B.L.
50 E
100 N
50 N
00 B.L.
HAGAN ARM
BABINE LAKE
HI
LO
0.1
0.2
0.3
0.4
inches
0 1 2
0 1 2 3 4 5
centimetres
BRITISH COLUMBIA GEOLOGICAL SURVEY
This reference scale bar has been added to the original image. It will scale at the same rate as the image, therefore it can be used as a reference for the original size.
PLAN 3
NORANDA EXPLORATION CO. LTD.
NEWMAN PROPERTY
1" = 1000'
J.E.M. ANOMALIES
AIRBORNE E-M ANOMALIES
GROUND MAGNETOMETER ANOMALIES

COMMENTS ON THE CONTROLLED KLYSTRON MAGNETOMETER AIRBORNE SURVEY FROM NORANDA EXPLORATION DEPT.

This test followed ground E.M., airborne E.M., ground magnetometer, airborne magnetometer, and a diamond drilling program and was conducted specifically to determine the limitations of the component measurements of the Klystron Magnetometer.

* * * * * *

March 26, 1965

Dear Sir:

I wish to confirm that the geomag airborne test over our Newman copper property in February 1965 was carried out under rigid security control and supervision by our Smithers staff. Mr. Hings was given no information whatsoever other than a topographic map and the critical lines were flown by Mr. Roy Woolverton as a further security measure.

Mr. Hings' interpretation of his records coincided very closely to our airborne E.M. and various ground surveys. It is difficult to see how these results could have been influenced by Mr. Hings' limited knowledge of the area and I am forced to conclude that the survey was a technical success.

As far as I know, the only possible source of information which might have influenced Mr. Hings' judgement is from Mr. Saare. I am not implying in any way an attempt to qualify interpretation but Mr. Saare did run a rectangular traverse which, in part, crossed our zone of copper mineralization. This fact, of course, could easily have been inferred by Mr. Hings but it could just as easily have been purposely set up in this manner by us to make interpretation that much more difficult. I am of the opinion that this ground survey played a very small part if any, in Mr. Hings' interpretation of the airborne results.

One point well worth noting is that a strongly conductive zone of clays, well to the North of our copper zone, was picked up by our E.M. surveys but not indicated by Mr. Hings' survey. The interesting point here is that Hings may be registering a much deeper horizon than conventional E.M. is capable of doing. If this is the case, the geomag complements, rather than supercedes or duplicates E.M. surveys.

I fully realize much work lies ahead in conducting practical tests of this new instrumentation and in the refinement of interpretative procedures. This is, of course, normal for any new geophysical device. In addition to establishing the value of geomag to our own satisfaction, it is even more necessary and difficult to build up this same confidence in prospective clients.

I wish you well in your efforts to secure commercial contracts for Mr. Hings' airborne device and it is my hope that Hings' many years of endeavor will be fully justified over the coming months and years.

Yours very truly,

M. M. Menzies