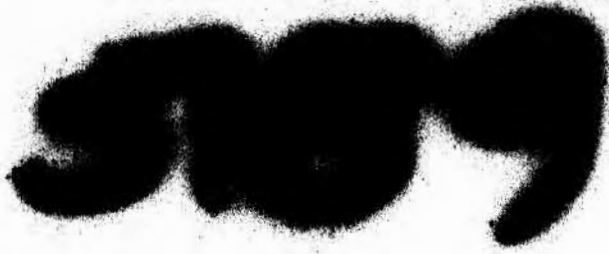


NORTHWAY GEOPHYSICAL SERVICES



N.T.S. 82M/13 AND 14
82M/13E REPORT ON #5189
AN AIRBORNE GEOPHYSICAL SURVEY
CLEARWATER AREA, BRITISH COLUMBIA
CK, RAFT, ON BEHALF OF
RIO TINTO CANADIAN EXPLORATION LIMITED

82M/13E

LOCATION: 30 miles North of Adams Lake

Lat. 51°N

Long. 119°W

Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 5189 MAP.....

NORTHWAY SURVEY CORPORATION LIMITED
TORONTO, CANADA

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APPENDIX

Fig. 2 Sample Magnetic Profile

Fig. 3 Sample Electromagnetic Profile

Map in Envelope

#1 Magnetic and Electromagnetic Map

#2 Location map

INTRODUCTION

Northway Survey Corporation Limited was contracted by Rio Tinto to carry out an airborne geophysical survey over a group of claims in the south-eastern part of British Columbia. A combined magnetic and electromagnetic survey was completed during the period January 21st to February 7th, 1974.

1.1 LOCATION

The area covered lies 30 miles north of Adams Lake at Latitude 51°52'N and Longitude 119°37'W.

1.2 TOPOGRAPHY

The area is extremely rugged, the local relief is approximately 2500 feet with valley floors at an average elevation of 3500 feet and ridge tops up to 5919 feet. The valleys have been eroded by glaciers, they are very often drift filled and they are covered by heavy timber. Bedrock exposures are meagre.

1.3 SURVEY FLIGHT PLAN

The geophysical survey consisted of parallel traverse lines flown at a spacing of 600 feet in a N60°E direction. The flight lines were flown in drape fashion to minimize the ground clearance.

2. AIRCRAFT INSTRUMENTATION AND DATA RECORDING

The following equipment was installed in a Bell Jet Ranger 206A helicopter, registration CF-NMK, operated by Northern Thunderbird Airways of Prince George, B.C.

(a) The Gulf Mk.III Magnetometer

The magnetometer, in a towed bird configuration, is a saturable core fluxgate system which is used to measure the earth's magnetic field intensity in the direction of the main earth's field. It is sensitive to magnetic field intensity variation of about 1 gamma.

The magnetometer head consists of two saturable core orienting fluxgates whose axes are at right angles to each other. The axis of the measuring fluxgate is normal to the plane containing the two orienting fluxgates. In operation, the self-orienting fluxgates are maintained by servometers in a position of maximum coupling with the earth's magnetic field. The output from the magnetometer is recorded in profile form in red ink on a moving chart paper, at an approximate scale of 1 inch to 1,320 feet. The operating range for this survey was 1,200 gammas across a 10 inch chart; with

steps of 5/6th the full scale range, i.e. 1,000 gammas. Chart speed was 3 inches per minute.

(b) The Northway LHEM-250 Electromagnetometer

The helicopter-borne E.M. system used for this survey was developed by Lockwood Survey Corporation. This system measures the in-phase and out-of-phase components of the secondary electromagnetic field, in terms of the primary field at the receiver, viz., in parts per million of the primary field. The frequency of the alternating electromagnetic field is 1,000 cycles per second. Receiving and transmitting coils are held vertical and coaxial in a towed "bird", a distance of 30 feet apart and 100 feet below the helicopter. The sensitivity of the measuring system is such that the minimum recognizable in-phase anomaly is about 12 parts per million.

Full scale deflection of the in-phase and out-of-phase channels is 400 parts per million across a distance of 2 inches. Recorder used was an MFE with a chart speed of 3 inches per minute. Scale of the record is 1" - 1,320 feet.

is an average within a cone of response of 90° fore to aft and 45° laterally. Output from the altimeter was recorded on the bottom trace of the MFE recorder along with the electromagnetometer traces. The vertical scale of the output is indicated in Fig. 2.

3. FIELD SURVEY PERSONNEL

The survey was conducted in the field by the following personnel:

| | | |
|-----------------|---|------------|
| Pilot | : | K. Knight |
| Navigator | : | K. Stone |
| Operator | : | H. Sandau |
| Data Technician | : | J. Azuelos |

The address of Mr. Knight is Northern Thunderbird Airways, Prince George, B.C. The address of Mr. Sandau, Mr. Stone and Mr. Azuelos is 1450 O'Connor Drive, Toronto, Ontario.

4. POSITIONING

The positioning of the helicopter was recorded by the vertically mounted tracking camera on 35 mm. film. The developed film was then related to the 1,320 feet to 1 inch mosaics to obtain accurate positioning. The related points plotted on the mosaic were then

connected in order to produce the flight path recovery.

5. DATA COMPILATION AND PRESENTATION

(a) Aeromagnetic Data

The magnetic data is presented as contours of the earth's total magnetic field intensity at a basic contour interval of 20 gammas. The horizontal scale of the map is 1,320 feet = 1 inch. Since the flight was of short duration and the diurnal variation minimal, a common linear datum was drawn on all the traverse profiles.

From this datum magnetic values are read at the pre-determined 20 gamma interval and transcribed on the base map with reference to the flight path. Points of equal magnetic intensity are joined to produce the final magnetic contour map.

(b) Electromagnetic Data

The electromagnetic data is represented as the half wavelength of the in-phase component, being the extent of the heavy line with the dot representing the peak of the anomaly.

The raw electromagnetic data includes (a) the instrument drift and (b) response due to regional variations in ground conductivity. These components were corrected for by fitting to both the in-phase and out-of-phase records, a series of linear datum lines to approximate the broad or regional variations in the records.

The in-phase component records were then read at the anomaly peak and the half-wave amplitude marked. The corresponding out-of-phase anomaly peaks were read. The extent and amplitude were then located on the base map with their in and out-of-phase values transcribed beside the peak.

6. GEOLOGY

The following geological description has been taken from G.S.C. Map 48-1963, Adams Lake.

The northern, the north-western parts of the survey area, and also a band along Raft River are underlain by glacial deposits and recent alluvium, with few bedrock exposures.

Some Permian or earlier limy phyllite with some greenstone is present along the Quaternary deposits on the north side of Raft River, in the south-central part of the survey area.

The remainder of the area is underlain by the Shuswap Metamorphic Complex, of the Palaeozoic - or earlier, whose contact with the Permian is not certain. The Shuswap complex is a strongly folded, foliated assemblage of metasedimentary gneisses and schists, intruded by a large number of dykes, sills and small irregular bodies of granitic rocks which themselves are intruded by pegmatite. Some masses of weakly foliated biotite-grandiorite are present in the southwest of the area. The metamorphic rocks are also cut by basaltic dykes from a few inches to several feet wide, trending towards the north.

INTERPRETATION7.1 Electromagnetic Survey

Conductivity-widths of each anomaly were calculated by assuming a vertical half plane model. Survey experience has shown that overburden or weakly conductive shale beds within sedimentary formation exhibit conductivity-thickness values (σt) of less than 5 mhos; sulfide bodies should be expected to show values greater than 5 mhos. However, in the environment covered by the present survey, very low responses may be expected from vein systems of metallic sulphide minerals and it is possible that all anomalies, not just the highly conductive ones, should be considered as potential sulphide deposits.

The surveyed area shows very few electromagnetic anomalies. Three distinct conductive zones have been outlined as described below, in order of decreasing response.

- (a) A conductor across the lines 8, 9 and 11, south east of the area, has values of conductivity-thickness, respectively of 6, 7 and 3 mhos. This conductor is located in a predominantly

granitic-gneiss environment. The south part of this anomaly appears to be related to magnetic features seen in the magnetic map, thereby indicating them to be conductors within bedrock and not overburden.

- (b) On lines 145 and 146, in the northern part of the area, an anomaly cluster with a σt value of 5 mhos and lower.
- (c) South of this anomaly lies a zone crossing lines 141, 142 and 143, with a σt value of 2 and 1 mhos.

Both of these anomalous zones lie in an area covered by Quaternary overburden, but presumably underlain by the granitic Shuswap metamorphic complex. A minor association of anomaly (c) with magnetic features suggests its source is in bedrock rather than the overburden.

7.2 Magnetic Survey

The magnetic survey shows a pattern of scattered weak anomalies which is characteristic of granitized

sediments. No particular response is seen over the Permian phyllite on the north side of the Raft River which would enable it to be distinguished magnetically from the rocks of the Shuswap Complex.

As pointed out above, two of the E.M. anomalies have a partial correlation to magnetic anomalies which suggests that their source is in bedrock rather than overburden.

8. CONCLUSIONS AND RECOMMENDATIONS

Anomaly (a) has conductivity-thickness values in the range of massive sulphides and is recommended for further investigation by ground inspection.


The conductivity-thickness of anomaly (c) is within the range of values usually attributed to conductive overburden. However, its possible association with nearby magnetic anomalies suggests a source in bedrock and it is recommended this anomaly be investigated further by induced polarization and magnetic surveys.

Anomaly (b) is similar to (c) but has no magnetic response. Any further work on it should await encouraging results from work on anomaly (c).


SUMMARY

An airborne magnetic and electromagnetic survey was carried out using a total field magnetometer and a coaxial electromagnetic system at 1,000 hertz. Two anomalies were discovered which have the characteristics of sulphide deposits and are believed worthy of ground follow-up by magnetic surveys and electromagnetic or I.P. surveys.

NORTHWAY SURVEY CORPORATION LIMITED

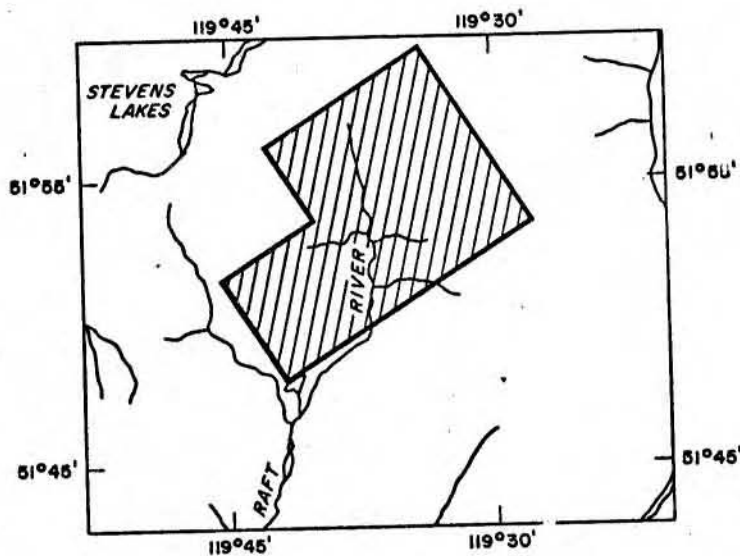


Juda Azuelos, B.Sc.,
Geologist.



Roger K. Watson, B.A.Sc., P. Eng.,
Consulting Geophysicist.





LOCATION MAP

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NO. **5189** MAP **#2**

↑ 1200 GAMMAS

GULF MAGNETOMETER PROFILE

1000 GAMMA STEP

← DIRECTION OF FLIGHT

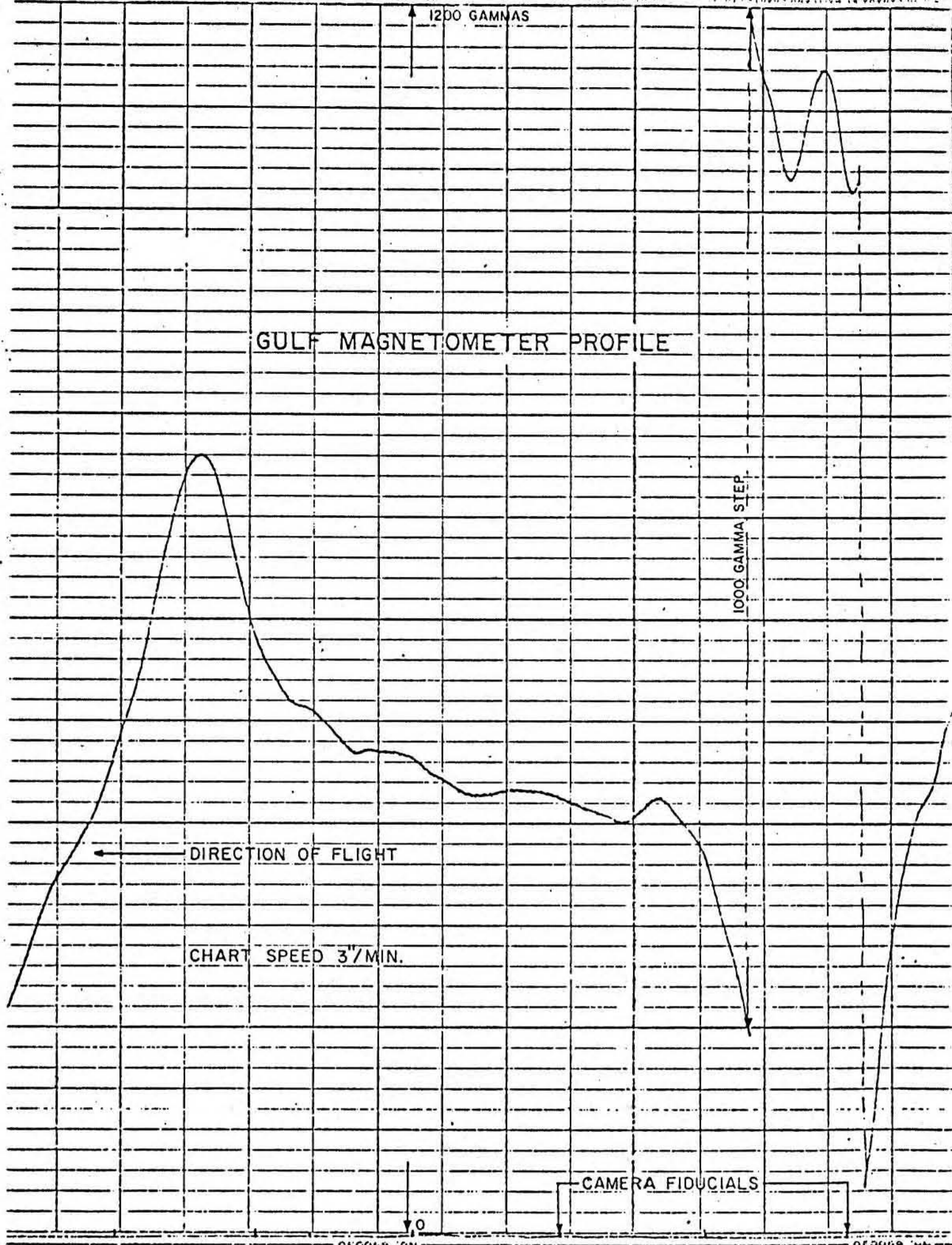
CHART SPEED 3"/MIN.

CAMERA FIDUCIALS

0

020009 ON

020009 ON



400 PPM

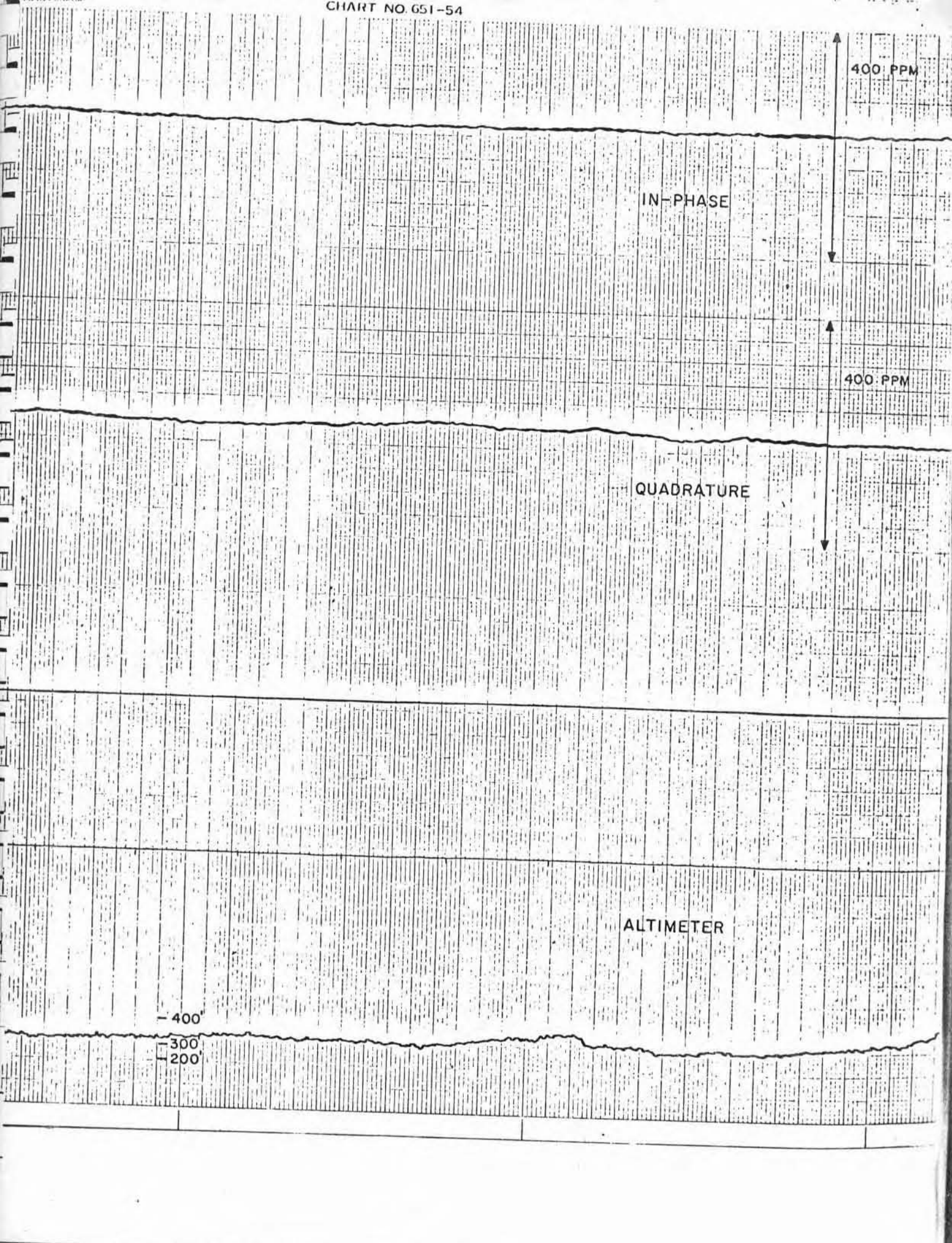
IN-PHASE

400 PPM

QUADRATURE

ALTIMETER

- 400'
- 300'
- 200'



Department of
Mines and Petroleum Resources

ASSESSMENT REPORT

NO. **5189** MAP.....

Mar. 19/74 Inv. 4283

\$ 25,525.93

E

7030

March 29th 74

25,525.93

Northway Survey Corporation Limited
1450 O'Connor Drive
Toronto, Ontario
M4B 2V2

15
OB 14
[Signature]
RIO TINTO CANADIAN EXPLORATION LIMITED

GENERAL ACCOUNT
DISTRIBUTION

DR.

CR.

ACCOUNT NUMBER

Attached

\$ 25,525.93

ACCOUNT NUMBER

123

\$25,525.93



NORTHWAY SURVEY CORPORATION LIMITED

1450 O'CONNOR DRIVE, TORONTO, ONTARIO, CANADA M4B 2V2
TELEPHONE (416) 755-1141 CABLES: AQUARIUS TELEX: 02-21571

INVOICE

8616

Riotinto Canadian Exploration Limited
615 No.2 Bentall Centre
555 Burrard Street,
Vancouver 1, B.C.

Attention: Mr. H. Hall

INVOICE #
DATE
YOUR ORDER NO.
JOB NO.
PACKING SLIP NO.

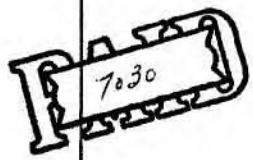
4283
March 19th 1974
Contract
A6230

TERMS: NET CASH, INTEREST AT THE RATE OF 1 1/2% PER MONTH (18% PER ANNUM) CHARGED AFTER 30 DAYS

| QUANTITY | DESCRIPTION | UNIT PRICE | TOTAL |
|----------|-----------------------------------------------------------------------------------------------------------------------|---------------------------|----------------------------|
| | Reference - Letter of Agreement dated January 4th 1974 For the Calander Period January 20th to February 11th, 1974 | | |
| | January 21 to February 7 - 18 days Equipment and Personnel at \$704.00/day <i>706.00</i> | \$ 12,708.00 ✓ | \$ 12,708.00 |
| | Helicopter charges 26 hours at \$250.00/hour Surcharge on A/C fuel | \$ 6,500.00 ✓ 520.68 | |
| | Tilden Truck Rental - January 19 to February 9 | \$ 7,020.68 ✓ 538.64 | |
| | Plus 10% ----- | \$ 7,559.32 ✓ 755.93 ✓ | \$ 8,315.25 ✓ |
| | Compilation and Reporting ----- Minimum 600 miles at \$7.00/mile | | \$ 4,200.00 ✓ |
| | F.S.T. 1.2% P.S.T. Not Applicable | | \$ 25,223.25 ✓ 302.68 ✓ |
| | | | \$ 25,525.93 ✓ |

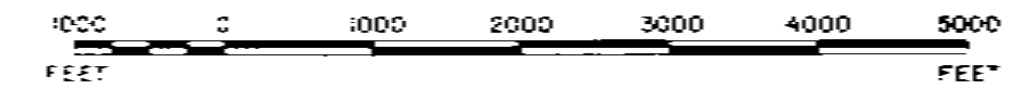
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|---------------|-----------|
| QUANTITY | |
| MAT'L REC'D | |
| EXTR. CHG. | |
| PRICES | |
| ADJ. | |
| 520 | 15,000.00 |
| 8616 40 | 14,323.93 |
| PART APPROVED | |

OK for Payment
H. Hall



RIO TINTO CANADIAN EXPLORATION LIMITED
 AIRBORNE GEOPHYSICAL SURVEY
 TOTAL MAGNETIC INTENSITY
 AND
 ELECTROMAGNETIC RESPONSE
 CLEARWATER AREA
 BRITISH COLUMBIA

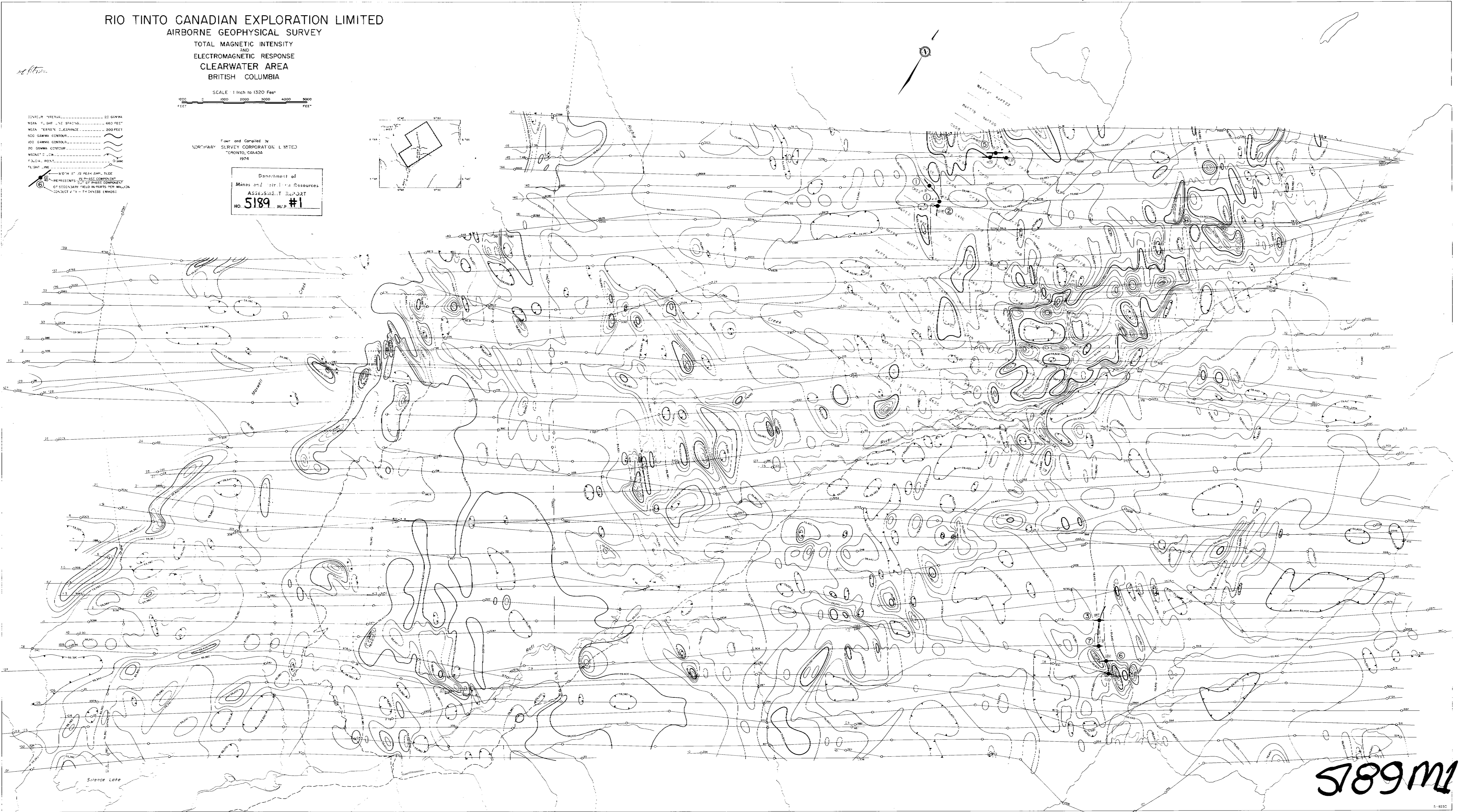
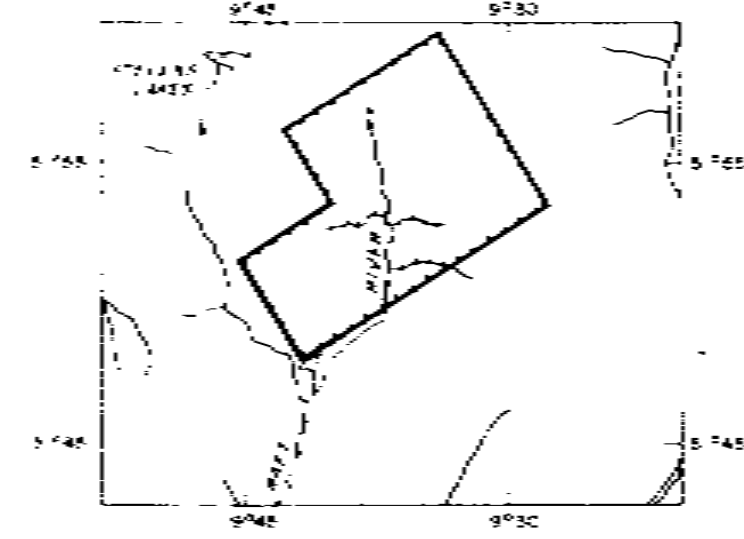
SCALE 1 inch to 1320 Feet



- 200 GAMMA INTERVAL..... 20 GAMMA
- MEAN FLIGHT LINE SPACING..... 680 FEET
- MEAN "SERVEY" CLEARANCE..... 200 FEET
- 500 GAMMA CONTOUR.....
- 100 GAMMA CONTOUR.....
- 20 GAMMA CONTOUR.....
- MAGNETIC LINE..... 0.5000
- FLIGHT LINE.....

Drawn and Compiled by
 NORTRAVEL SURVEY CORPORATION LIMITED
 TORONTO, CANADA
 1974

Department of
 Mines and Technical Surveys
 ASSESSMENT REPORT
 NO. 5189 M.P. #1



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