

Department of
Mines and Petroleum Resources
ASSESSMENT REPORT

NO. 4397 MAP

4397

REPORT ON THE
COMBINED AIRBORNE MAGNETIC
AND KEM SURVEY **94E/6E**
TOODOGGONE RIVER AREA
OMINECA MINING DIVISION **Gold**
NORTH CENTRAL BRITISH COLUMBIA
FOR
NORTHAIR MINES LTD.
AND
BOW RIVER RESOURCES LTD.

BY

PETER K. SMITH, B.Sc.

AND

A.W. MULLAN, P.Eng.

Gold 2, 4, 6, 8, 9-16, 21-30, 37-48, 59-72, 81-86, 101 Mineral Claims

NAME AND LOCATION OF PROPERTY:

TOODOGGONE RIVER AREA

"GOLD" MINERAL CLAIMS *17-20*

OMINECA MINING DIVISION, B.C. *014-08*

NORTH CENTRAL B.C. 57°18'N - 127°04'W

DATE STARTED: APRIL 26, 1973

DATE FINISHED: APRIL 28, 1973

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GENERAL NOTES ON
AIRBORNE MAGNETIC
AND
KEM AIRBORNE ELECTROMAGNETIC
SYSTEMS

A. EQUIPMENT

The proton precession magnetometer and KEM electromagnetic system are the primary instruments employed in this airborne magnetic and electromagnetic survey. Ancillary equipment consists of an altimeter, a frame camera, an intervalometer-fiducial numbering system and a light beam recorder.

1) Proton Magnetometer

A Varian 4937A airborne proton precession magnetometer is used to record the variations in the earth's total magnetic field.

The proton free precession magnetometer operates on the principle of nuclear magnetic resonance to produce a measurement of the earth's total magnetic intensity, i. e., the scalar magnitude of the ambient field. In the proton magnetometer sensor, a uniform magnetic field is created by passing a few amperes of current through a coil about a small volume of proton-rich (hydrogen nuclei) hydrocarbon fluid such as kerosene. The spinning protons act as small magnetic dipoles and align themselves with the applied field. When the field is removed, the protons precess in phase about the direction of the earth's field at a rate proportional to the total magnetic intensity. This rate, or Larmor precession frequency, is determined by the value of the gyromagnetic ratio of the proton (23.4874 gammas per Hz) which is an atomic constant known to an accuracy of 7.5 parts per million. The precession frequency is independent of the direction of the spins with respect to the earth's

field; only the signal amplitude varies, being maximum when the spins are normal, and zero when they are parallel to the direction of the earth's magnetic field.

The precession signal is induced by the motion of the precessing protons in the same coil used for polarizing the sample. Thermal agitation causes the signal to decay in a few seconds from its peak value of a few tens of micro-volts. The frequency of the precession signal, as determined by the gyromagnetic ratio, is approximately 0.04 Hz per gamma, or between 1250 and 3400 Hz, corresponding to an approximate range of 30,000 to 80,000 gammas in the earth's magnetic field.

This instrument has a sensitivity of one gamma when pulsed at one second intervals. The proton magnetometer has the advantage of reading the absolute value of the earth's magnetic field and is almost completely free of drift or variations due to temperature or environmental changes.

2) Kilocycle Electromagnetic System

Electromagnetic prospecting is based on the measurement of fields induced in buried conductive bodies by a primary alternating electromagnetic field.

The McPhar airborne KEM (Kilocycle Electromagnetic) system employs the VLF radio stations operating in the 15 to 30 kilohertz frequency band as a source of primary field. At large distances, from these transmitters, the radiation is trapped in the earth-ionosphere waveguide and has an approximately horizontal magnetic field vector of almost constant amplitude. A conductor will distort this horizontal field and often change the amplitude of the received signal. The McPhar KEM system measures continuously the dip of the resultant field in degrees, as well as the relative field strength and may be regarded as a vertical loop system with the transmitter located at infinity. Conductor characteristics such as geometry and depth can be estimated from the amplitude and shape of the dip angle and field strength profiles.

B. DATA RECORDING & COMPILATION

A light-beam recorder employing a photo-sensitive paper is used to record the data. High-sensitivity galvanometers give almost instantaneous response to the incoming signals and the recorder time lag is essentially zero. The recorder normally employed is the 14 channel Honeywell Visicorder.

With the actual flight record oriented so that the fiducial numbers increase from left to right, the 5.7 inch trace width has been divided by 15 major grid lines with zero at the bottom and 15 at the top. These major divisions are in turn divided by five division lines which appear as lighter lines on the chart. Except where noted on the individual records, the traces are identified as follows:

1) Magnetometer

The magnitude of the earth's total magnetic field is recorded on both a fine scale (0 to 200 gammas) and a coarse scale (0 to 2000 gammas). Each scale is adjusted to provide a full scale deflection of ten major units on the recording chart. The position of the fine and coarse scale zero lines are usually centred on grid Line 3. The exact zero and full scale deflection positions can be checked from the flight calibrations. Since the value of the earth's magnetic field is a five digit number, the operator records the value of the first two digits on the flight report.

2) KEM System

The dip angle trace and relative field strength are recorded continuously on the analogue strip chart. A positive increase followed by a negative deflection (crossover) in the dip angle trace and a noticeable increase in the amplitude of the relative field strength normally indicates a conductor.

The zero degree field angle trace is usually centred on grid Line 5 while the relative field strength is recorded below the dip angle trace.

III) Fiducials

Fiducials are indicated by vertical lines appearing at the bottom of the chart. These lines are interpreted by a reversed marker to indicate every tenth fiducial. Each fiducial marking corresponds with a camera frame, so that the tracking film can be correlated with the data recorded on the chart.

IV) Altimeter

The trace appearing across the upper portion of the chart is a monitor of terrain clearance. The altimeter scale is non-linear. A calibration scale for this trace is recorded for each flight.

C. DATA PRESENTATION

1) Magnetometer Results

The magnetic data are presented in contour form. The contours represent lines of equal intensity of the earth's magnetic field. A contour interval of 20 gammas has been used where the gradient of the earth's magnetic field permits.

2) KEM Results

The letters "A", "B" and "C" are generally used to indicate the shape of the recorded dip angle trace. An "A" category anomaly would indicate a distinct crossover with a relatively high peak to peak amplitude, whereas a "B" category anomaly indicates a lesser response such as that expected from a source at depth. The "C" category anomalies are those that may be questionable, i.e. possibly due to swamps, conductive lake bottom sediments, cultural noise, or topographic effects. The peak to peak amplitude of the dip angle trace is recorded. Regardless of the sensitivity (i.e. the amount of deflection that represents 1 degree) the amplitude indicated on the final map is always in degrees.

McPHAR GEOPHYSICS LIMITED

REPORT ON THE
COMBINED AIRBORNE,
MAGNETIC AND ELECTROMAGNETIC SURVEY,
OVER THE "GOLD" MINERAL CLAIMS
IN THE
TOODOGGONE RIVER AREA
OMINECA MINING DIVISION, B.C.
FOR
NORTHAIR MINES LTD.
AND
BOW RIVER RESOURCES LTD.

1. INTRODUCTION

During April 1973, a combined Airborne Magnetic and Electromagnetic survey was carried out in the Toodoggone River Area, Omineca Mining Division, B.C., over the "Gold" mineral claims for Northair Mines Ltd. and Bow River Resources Ltd.

The purpose of the survey was to outline broad geologic features as well as to map any anomalous magnetic or electromagnetic responses that might aid in prospecting for economic mineral deposits.

2. SURVEY DETAILS

Figure 1 illustrates the relative location of the "Gold" mineral claims, owned by Northair Mines Ltd. and Bow River Resources Ltd., approximately 170 miles due north of Smithers, B.C. The claim group lies at 57°18'N latitude

and 127°04'W longitude 2.5 miles north of Black Lake. Survey coverage consists of approximately 160 line miles of traverse along east-west flight lines at a one-eighth flight line interval, of which 39.5 line miles are within the boundaries of Northair Mines Ltd. and Bow River Resources Ltd. "Gold" claim group. The average length of the flight lines is 7 miles. Continuous photography provided flight line location control and a mean terrain clearance of 450 feet was attempted in the rough topography. The survey was carried out utilizing a Bell Jet Ranger II 206B helicopter operating from the airstrip at Black Lake.

The KEM electromagnetic and the magnetic data were recorded simultaneously. Descriptions of these systems may be found in the notes preceding this report.

The survey was carried out over the following claims which are believed to be owned or held under option by Northair Mines Ltd. and Bow River Resources Ltd.

<u>Claim</u>	<u>No.</u>	<u>Record No.</u>	<u>Recording Date</u>
Gold 2, 4, 6, 8	(4)	109405, 407, 409, 411	May 17, 1972
Gold 9-16	(8)	109412-419	May 17, 1972
Gold 21-30	(10)	109424-433	May 17, 1972
Gold 37-48	(12)	109440-451	May 17, 1972
Gold 59-72	(14)	109462-475	May 17, 1972
Gold 81-86	(6)	109484-489	May 17, 1972
Gold 101	(1)	109504	May 17, 1972
Total	55		

Approximate boundaries of the above claim group are outlined on the accompanying maps.

3. PRESENTATION OF RESULTS

The results of the airborne magnetic survey have been contoured at a 20 gamma contour interval wherever the gradient of the total magnetic field permitted. These results are presented on Map Sheet AM 7308.

KEM electromagnetic results are presented in the manner outlined in the notes illustrating anomaly shape category and peak to peak anomaly tilt angle amplitude in degrees. These results are presented on Map Sheet AK 7308.

4. GEOLOGY

The general area is underlain by the Upper Triassic Takla Group which is intruded by granitic stocks and overlain by Toodoggone Volcanics. A sequence of non-marine, continental sedimentary rocks - the Sustut Group - overlies this succession unconformably. The regional geologic trend is northwest and is exemplified by both Takla Group and Omineca Intrusions. A lesser structural element hosting quartz veins of economic importance crosses this regional trend nearly at right angles.

Recently published mapping in the area by N.C. Carter, P. Eng., B.C. Mineralogical Branch, indicates that "Gold" mineral group is underlain principally by Toodoggone Volcanic rocks described as dacite and latite porphyries. Several granodiorite to quartz-monzonite plutons, roughly aligned northeasterly, extend both ways from the property, breaking the major northwesterly Cordilleran Trend.

High grade gold-silver mineralisation, associated with quartz veins and low grade, bulk tonnage type gold-silver mineralization associated with certain Toodoggone porphyries are the main objects of intensive exploration work now being carried out on the adjoining property to the south. Although the main mineralized vein is cut off by faulting and the extension, if any, has not been found, the property is regarded as well located geologically for the occurrence of either related or unrelated gold-silver veins.

5. DISCUSSION OF RESULTS

The "Gold" claims held by Northair Mines Ltd. and Bow River Resources Ltd., lie in two contiguous blocks.

The general geologic trend outlined by the magnetic response in the southwest block is in a northwest-southeast direction. The trend is broken in the eastern portion of the block by a strong north-south striking magnetic feature and a local magnetic high, within the feature, is outlined centred on flight line 25. It is postulated that a relatively recent volcanic flow is the source of this large elongated magnetic anomaly. Magnetic lows centred on Line 27 are outlined on either side of this flow type feature. Also within this claim block, contour discontinuities near the centre of the western boundary suggest a high degree of complexity in the geology of that area.

In the larger northeast claim block, a broad magnetic high feature is outlined, lying in the north central portion of this block. A second magnetic high anomaly of lower amplitude was recorded to the southeast centred on flight line 30. The region of lower magnetic intensity in the southwest corner of this block suggests that this area may be overlain by sedimentary cover.

In the southeast, a low feature of similar amplitude, but more restricted in extent, lies within claim "Gold 101". The general geologic trend indicated by the magnetic survey over this block is also northwest-southeast.

Electromagnetic anomalies recorded during the survey fall into the "C" anomaly classification. This category has been reserved for those anomalous responses which are questionable; i. e. possibly due to swamps, conductive sediments or topographical effects. The topographic relief in this region is extremely rugged. As with all electromagnetic systems, the KEM system responds to variations in sensor orientation and terrain clearance along the flight lines. It is important to maintain a nearly constant altitude above the ground. Although a high powered Jet Ranger II aircraft was utilized for this survey, variations in terrain clearance were large, resulting in many unwanted "topographic responses". Other responses appear to originate from conductive stream or river sediments.

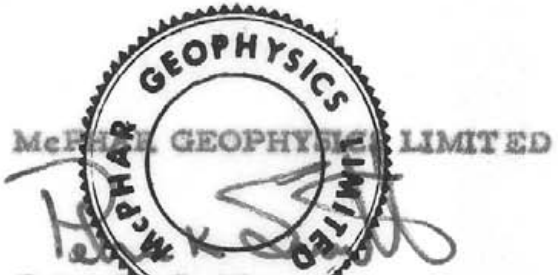
Definite EM conductors could not be interpreted from the results of this survey in the extremely rugged terrain. Anomalies recorded have been illustrated on the accompanying map. The validity of these EM responses can be checked on the ground.

6. SUMMARY AND CONCLUSIONS

The low level airborne magnetic survey shows good detail and definition. The anomalous responses and geologic trends outlined will be of considerable help in the geologic mapping of the "Gold" claims held by Northair Mines Ltd. and Bow River Resources Ltd.

Electromagnetic results were adversely affected by the extremely

rugged topography. It appears that anomalous EM responses recorded were mainly topographic effects.



Peter K. Smith,
Geophysicist.



Ashton W. Mullan, P. Eng.
Geologist.

Dated: June 8, 1973

ASSESSMENT DETAILS

PROPERTY: "Gold" Mineral Claims

MINING DIVISION: Omineca

SPONSOR: Northair Mines Limited
Bow River Resources Ltd.

PROVINCE: British Columbia

LOCATION: Toedoggone River Area

FLYING
DATE STARTED: April 26, 1973

TYPE OF SURVEY: Combined Helicopter
Borne Magnetic and VLF-EM

FLYING
DATE FINISHED: April 28, 1973

MEAN FLIGHT LINE DIRECTION: E-W

MILES OF LINE FLOWN: 160

MEAN FLIGHT LINE SPACING: 660 feet

MILES OF LINE INSIDE AREA: 39.5

MEAN TERRAIN CLEARANCE: 450 feet

NUMBER OF MINING CLAIMS: 55

AIRCRAFT: Jet Ranger II 206B (Helicopter)
CF-OAP owned by Okanagan Helicopters Ltd.

CONSULTANTS:

Peter K. Smith, 650 Parliament Street, Apt. 2212, Toronto, Ontario.
A.W. Mullan, 1440 Sandhurst Place, West Vancouver, B.C.

TECHNICIANS:

M. Kimmerer, 15 Valleywoods Road, Unit 92, Don Mills, Ontario.
E. Ross, 41 Forbes Road, Scarborough, Ontario.
N. Talbot, 24 Amberdale Drive, Scarborough, Ontario.

DRAUGHTSMEN:

R. Koenig, 3125 Lawrence Ave. E. Apt. 702, Scarborough, Ontario.
D. Taylor, 13 Bowden Street, Toronto, Ontario.

McPHAR GEOPHYSICS LIMITED

A.W. Mullan
A.W. Mullan, F.E.M.
Geologist



Dated: June 8, 1973

STATEMENT OF COST

**Bow River Resources Ltd., and Northair Mines Ltd.
Airborne Magnetic and K.E.M. Survey
Toodoggone River Area, Omineca Mining Division**

Period:- April 26 to April 28, 1973

Technician:- W. Magee

Consulting Geologist:- A.W. Mullan



Handwritten signature/initials running vertically down the right side of the page.

Flying 160 Line Miles	@ \$29.07 per line mile	=	\$4,651.20
Data Compilation - 160 Line Miles	@ \$5.00 per mile	=	800.00
Reporting - 3 days	@ \$150.00 per day		450.00
			<u>\$5,901.20</u>

McPHAR GEOPHYSICAL LIMITED

A.W. Mullan
A.W. MULLAN, P. Eng.
Geologist



Dated: June 8, 1973

June 13 1973
Province of British Columbia, this
of *W. Magee*
Declared before me at the
in the
City

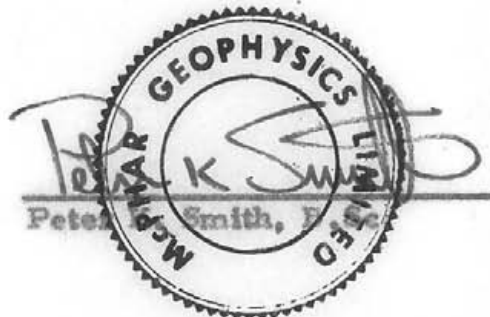
CERTIFICATE

I, Peter K. Smith, of the City of Toronto, in the Province of Ontario, hereby certify:

1. That I am a geologist/geophysicist with a business address at 139 Bond Avenue, Don Mills, Ontario.
2. I am a graduate of the University of British Columbia with a B.Sc. Degree in Honours Geology and Geophysics (1970).
3. I am a member of the Society of Exploration Geophysicists.
4. I have been practising my profession for 3 years.
5. I have no direct or indirect interest, nor do I expect to receive any interest directly or indirectly, in the property or securities of Northair Mines Ltd. and Bow River Resources Ltd. or any affiliate.
6. The statements made in this report are based on a study of published geological literature and unpublished private reports.
7. Permission is granted to use in whole or in part for assessment and qualification requirements but not for advertising purposes.

Dated at Toronto

This 8th day of June 1973.



CERTIFICATE

I, Ashton W. Mullan, of the City of Vancouver, in the Province of British Columbia, hereby certify:

1. That I am a geologist and a fellow of the Geological Association of Canada with a business address at Suite 811, 837 West Hastings Street, Vancouver, B.C.
2. That I am registered as a member of the Association of Professional Engineers of the Provinces of Ontario and British Columbia.
3. That I hold a B.Sc. degree from McGill University.
4. That I have been practising my profession as a geologist for about twenty years.
5. I have no direct or indirect interest, nor do I expect to receive any interest directly or indirectly, in the property or securities of Northair Mines Ltd. and Bow River Resources Ltd. or any affiliate.
6. The statements made in this report are based on a study of published geological literature and unpublished private reports.
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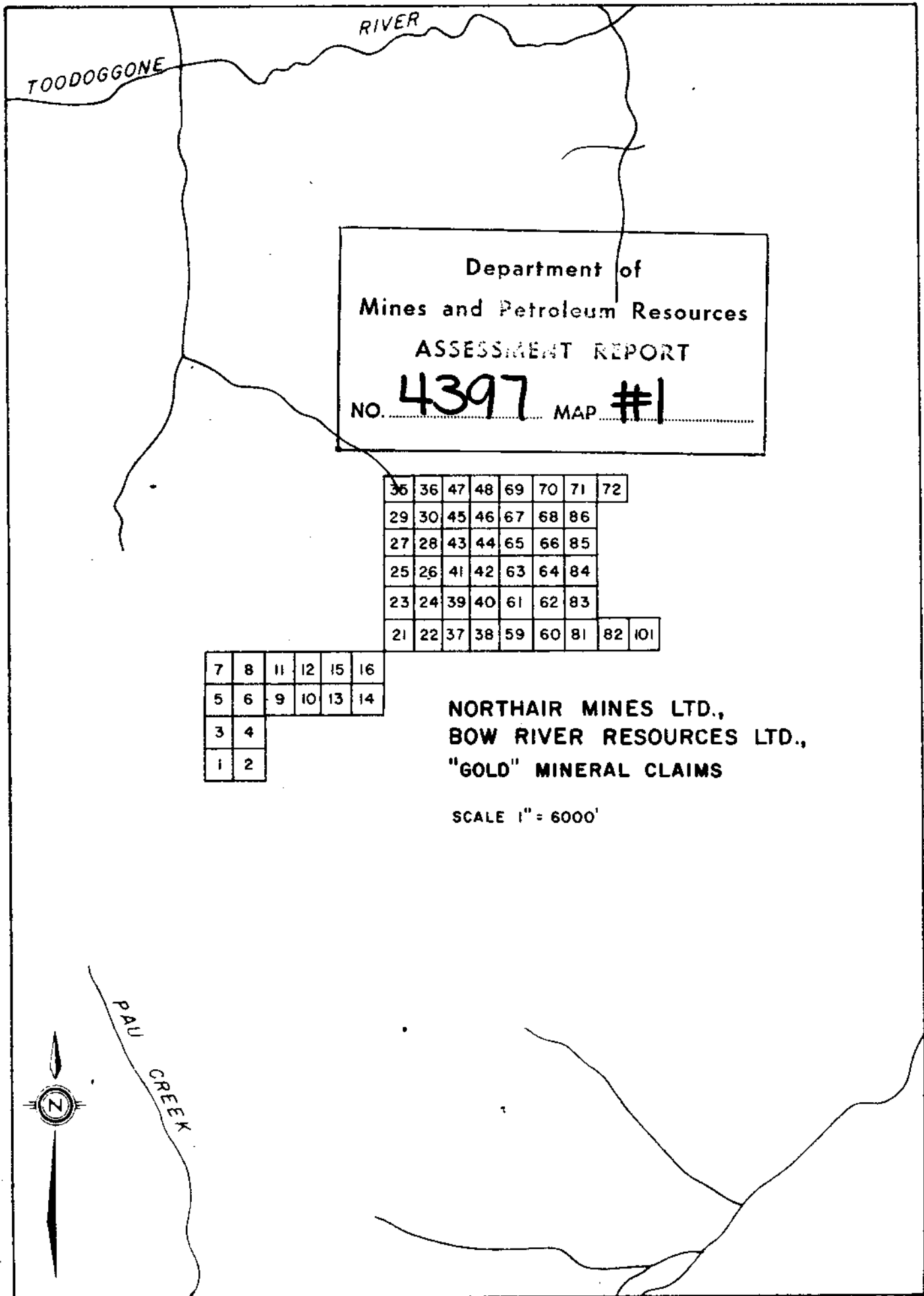
Dated at Toronto

This 8th day of June 1973.

A circular seal for a Professional Engineer in the Province of British Columbia. The seal contains the text "PROFESSIONAL PROVINCE OF BRITISH COLUMBIA ENGINEER". A signature, "A. W. Mullan", is written across the seal, and the name "W. MULLAN" is printed below it. Below the seal, the text "A. W. Mullan, B.Sc. P. Eng." is printed.

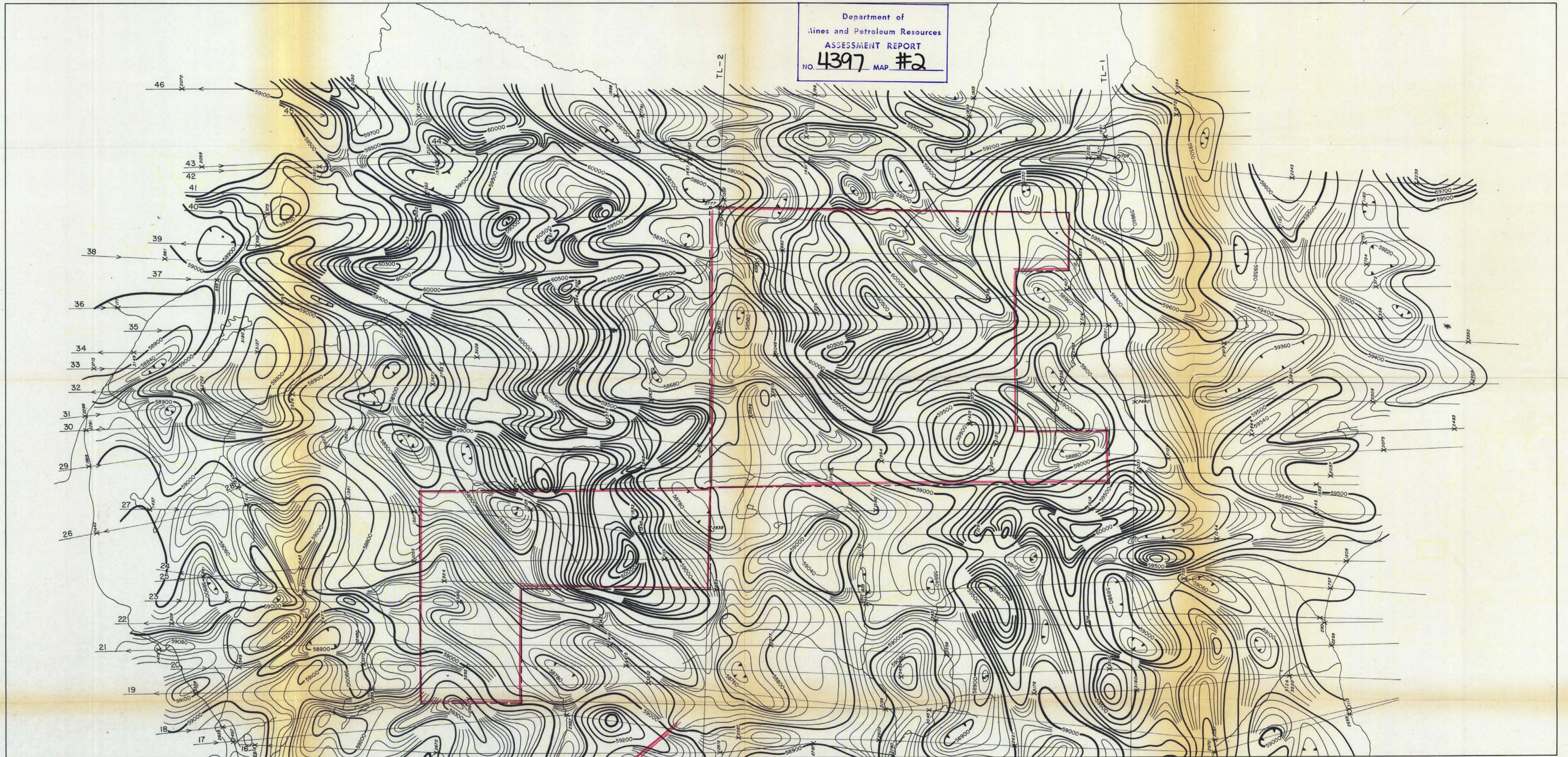
A. W. Mullan, B.Sc. P. Eng.

LOCATION MAP



McPHAR GEOPHYSICS LIMITED
AIRBORNE MAGNETIC SURVEY

Department of
Lines and Petroleum Resources
ASSESSMENT REPORT
NO. 4397 MAP #2



*See Report
Figure 1
for
Claims Configuration*

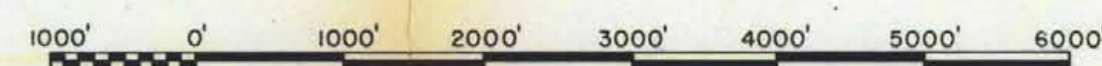
4397 M2

LEGEND

CONTOUR INTERVAL - - - - - 20 gammas
20 GAMMA CONTOUR - - - - -
100 GAMMA CONTOUR - - - - -
500 & 1000 GAMMA CONTOUR - - - - -
MAGNETIC LOW - - - - -
MEAN FLIGHT LINE SPACING - - - - - 660 FEET
MEAN TERRAIN CLEARANCE - - - - - 450 FEET
FLOWN AND COMPILED: APRIL TO JUNE 1973



BOW RIVER RESOURCES LTD.,
&
NORTHAIR MINES LTD.,
GOLD CLAIMS GROUP
OMINECA MINING DIVISION, BRITISH COLUMBIA



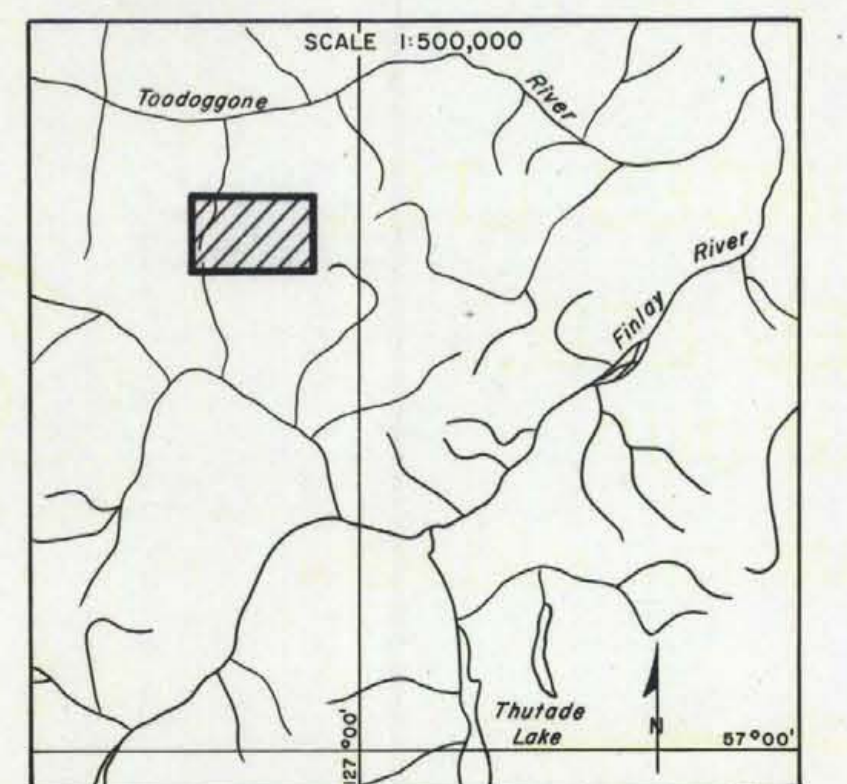
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NOTE: SCALE IS APPROXIMATE AS
PLANIMETRY HAS BEEN DRAWN
FROM AN UNCONTROLLED
AIRPHOTO MOSAIC.

NOTE: TO ACCOMPANY GEOPHYSICAL REPORT FOR
BOW RIVER RESOURCES LTD. & NORTHAIR
MINES LTD., GOLD CLAIMS GROUP, Omineca
Mining Division, B.C. BY A.W. MULLAN
(PENG) AND P.K. SMITH, GEOPHYSICIST.

DATED: JUNE 8, 1973

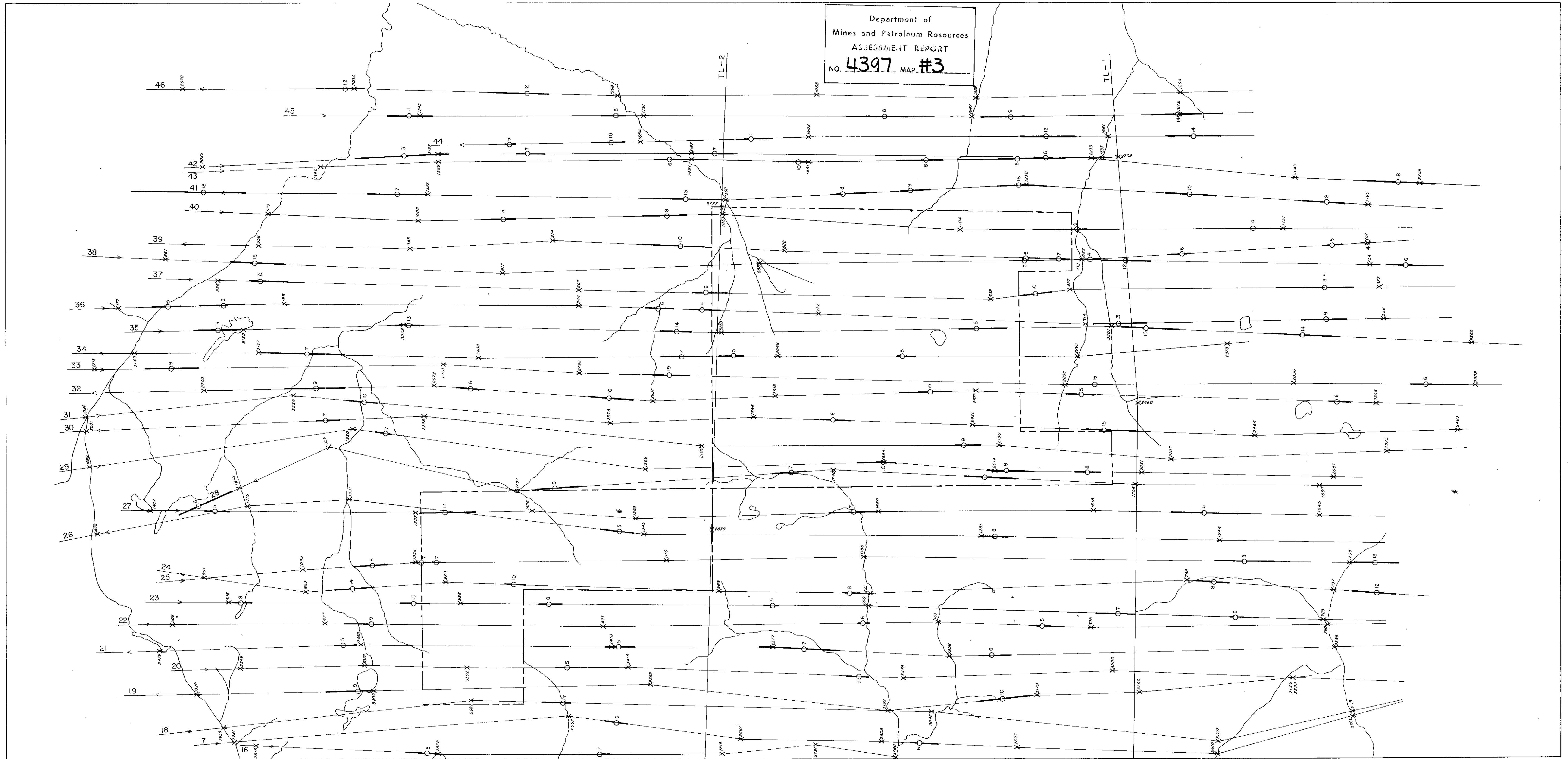


APPROVED: *[Signature]*



McPHAR GEOPHYSICS LIMITED
AIRBORNE KEM ELECTROMAGNETIC SURVEY

Department of
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ASSESSMENT REPORT
NO. 4397 MAP #3

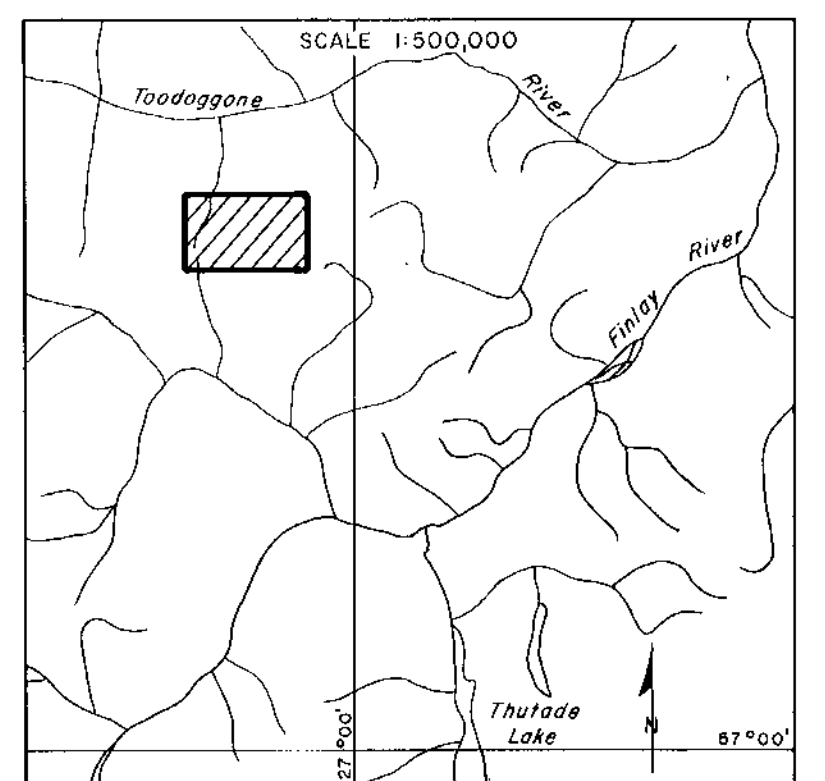


4397 M3

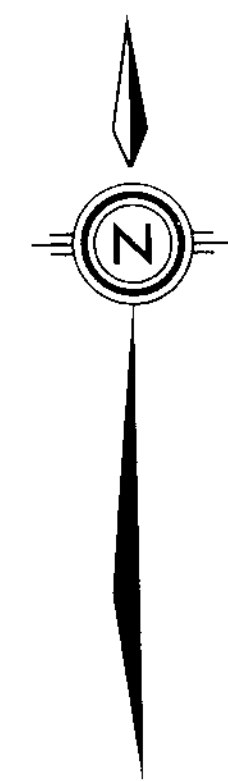
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(P.ENG) AND P.K. SMITH, GEOPHYSICIST.

DATED: JUNE 8, 1973

APPROVED:



LEGEND
A ——— DEFINITE
B ——— PROBABLE
C ——— POSSIBLE
○₁₀ — PEAK TO PEAK AMPLITUDE
IN DEGREES
— ANOMALY WIDTH PEAK
TO PEAK
--- FLIGHT LINE
x — FIDUCIAL



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&
NORTHAIR MINES LTD.,
GOLD CLAIMS GROUP
OMINECA MINING DIVISION, BRITISH COLUMBIA

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