

4567

REPORT ON
AIRBORNE GEOPHYSICAL SURVEY

TOP, IN and LIGHT GROUPS

Ruddock Creek Area

Lat. $51^{\circ}47'N.$, Long. $118^{\circ}52'W.$

Wesfrob Mines Limited

July 3 to August 28, 1973

D. H. Brown, P.Eng.(B.C.)

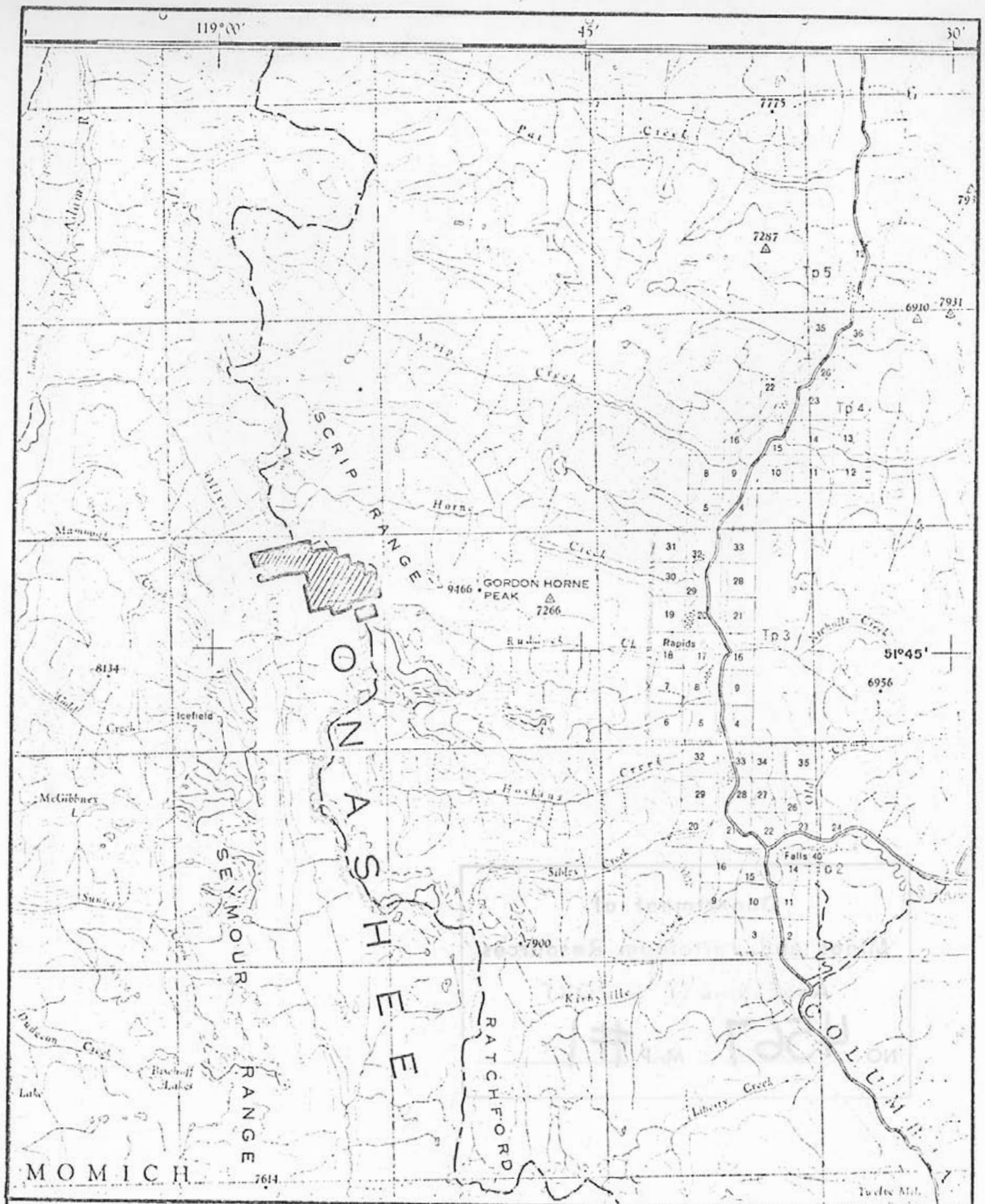
D. C. Fraser, Ph.D.
(Aerodat Limited)

Department of
Mines and Technological Resources
ASSESSMENT REPORT

NO. **4567** MAP

Vancouver, B.C.

August 28, 1973



INDEX MAP

4567

RUDDOCK CREEK PROPERTY

MI

Scale: 4 miles to 1 inch

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INTRODUCTION

A combined four-channel electromagnetic and magnetometer survey totalling 69 line-miles was flown for Wesfrob Mines Limited in the Ruddock Creek area of British Columbia in the interval of July 3rd to 8th, 1973. The survey was flown using a Jetranger helicopter, with an average EM bird height of 120 feet and airspeed of 70 mph. Ancillary equipment consisted of a Barringer Research Limited AM-104 proton precession magnetometer with its bird at an average height of 180 feet, a Bonzer radar altimeter, De Havilland Mk VII sequence camera, MFE 8-channel hot pen recorder, and a 60-hz monitor.

The Appendix provides details on the recorder channels and the data reduction procedure.

DATA PRESENTATION

Electromagnetics

The EM anomalies were interpreted by computer according to the conductivity-thickness product in mhos of a perpendicular vertical dike model. The EM map symbols indicate the conductivity-thickness category of each anomaly, and there are seven categories as shown in Table 1. The number attached to each anomaly symbol is the inphase amplitude in parts per million (ppm), which is not directly related to conductivity-thickness product. The purpose of indicating the inphase ppm is to provide an impression of the strength of the anomaly as recorded during the survey.

TABLE 1. EM Anomaly Categories

<u>Anomaly Category</u>	<u>Mho Range</u>
7	500 and over
6	100 - 499
5	50 - 99
4	20 - 49
3	10 - 19
2	5 - 9
1	1 - 4

The conductivity-thickness product in mhos is the reciprocal of resistance in ohms. The mho is a measure of conductance, and is a geologic parameter. Most swamps yield anomalies in the first (or lowest) conductance category, but highly conducting clays can give anomalies of the second category. The anomaly shapes often allow surface conductors to be recognized, and these are indicated by the letter S on the map. The remaining anomalies of the first and second categories could be weak bedrock conductors. The higher categories indicate increasingly higher conductances. Examples: The ore bodies of the Magusi River camp yield fourth category anomalies, while Mattabi and Whistle give fifth category. Graphite and sulphides can span all categories but, in any particular survey area, field work may show that the different categories indicate different types of conductors.

The mho value is a geologic parameter because it is a characteristic of the conductor alone. It generally is independent of frequency, and of flying height or depth of burial apart from the averaging of the response of a conductor over a greater portion of the body as height increases.

Small anomalies from deeply buried strong conductors are not confused with small anomalies from shallow weak conductors because the former will have larger mho values. Conductors of the first category may not respond to ground EM equipment using frequencies less than 2000 hz.

Aerodat maps are designed to provide a correct impression of conductor quality by means of the conductance symbols. The symbols can stand alone with geology when planning a followup program. The map provides an interpretation of the conductors in terms of length, strike direction and conductance.

The attached data sheets provide a tabulation of all anomalies in ppm, mhos, estimated depth, and the flying height. The anomalies are listed from top to bottom of the map for each line. The depth estimate may be unreliable because the stronger part of the conductor may be deeper or to one side of the flight line, or because of a shallow dip or conductive overburden effects.

Magnetics

Magnetic correlation is indicated directly on the EM anomaly photomosaic. An EM anomaly with magnetic correlation has a greater likelihood of being produced by sulphides than one that is non-magnetic. However, sulphide ore bodies may be non-magnetic (e.g., Kidd Creek) as well as magnetic (e.g., Mattabi).

The presence of a magnetic coincidence with an EM anomaly can result because the conductor is magnetic or because a magnetic body occurs in juxtaposition with the conductor. The majority of magnetic conductors represent sulphides containing pyrrhotite or magnetite. However, graphite and magnetite in close association can provide coinciding EM-magnetic anomalies. The truly magnetic conductors yield an EM anomaly pattern which usually is similar to the filtered magnetic pattern. The filtering, described below, provides data maps which therefore are useful in the evaluation of EM anomalies.

The magnetometer channels were digitized to yield a total field map contoured at 10 gamma intervals. The magnetic data also was bandpass filtered to produce a filtered magnetic map contoured at 5 gamma intervals. The digital filter provides a map which is somewhat similar to a first vertical derivative map. The filtered data enhances correlation with EM because it is free of regional gradients. It also simplifies the recognition of trends in the rock strata and the interpretation of geological structure.

INTERPRETATION

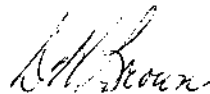
Only five EM anomalies were obtained in the survey area. Anomaly 17A is a single line anomaly having a conductivity-thickness product of the fourth conductance category. It occurs on a ridge and may have resulted from the bird grazing the ground. It certainly should be investigated in the field.

The remaining four EM anomalies are either questionable or possible surface responses. However, the magnetic association with anomalies 7A, 17B and 17C suggests that they might be bedrock conductors and, therefore, should be investigated further.

Respectfully submitted,



D.C. Fraser, Ph.D.,
Consulting Geophysicist.



A P P E N D I X

THE FLIGHT TAPE AND PATH RECOVERY

The flight tape is a roll of chart paper. It moves through the recorder console at a speed of 1.5 mm/sec. This provides a ground scale on the flight tape in feet/mm which is approximately equal to the helicopter flight speed in mph. Thus, for example, the ground scale of the flight tape is approximately 65 feet/mm when the helicopter flies at 65 mph.

The flight tape consists of seven channels of information as follows:

<u>Channel</u>	<u>Time Constant</u>	<u>Scale units/mm</u>	<u>Noise</u>
Radaraltitude	1 sec	10 feet	10 feet
Maximum-coupled coil inphase	1 sec	5 ppm	5 ppm
Maximum-coupled coil quadrature	1 sec	5 ppm	5 ppm
Maximum-coupled coil inphase	6 sec	2 ppm	2 ppm
Maximum-coupled coil quadrature	6 sec	2 ppm	2 ppm
Magnetometer: 1 gamma/step	1 sec	2.5 gamma	2 gamma
Magnetometer: 10 gamma/step	1 sec	25.0 gamma	20 gamma

In addition, three fiducial markers are used between the channels, as follows:

<u>Fiducial</u>	<u>Occurrence</u>
60-hz marker	occurs only over power lines
camera fiducials	occurs regularly at 3 mm intervals on every line
navigator fiducials	occurs discontinuously on every line

The 60-hz fiducial identifies anomalies generated by power lines, allowing them to be deleted from the EM map.

The navigator fiducial marks represent points on the ground which were recognized by the aircraft navigator. The beginning of flight line is flagged by a pair of navigator fiducials. These are followed by a series of unevenly-spaced fiducials moving right-wards along the tape, which is the direction of flight. The end of the line is flagged by a string of four navigator fiducial marks.

The camera fiducial marks indicate each point where a photograph was taken. These photographs are used to provide accurate photo-path recovery locations, which are then plotted on the geophysical maps to provide the track of the aircraft.

DCF:tmv

LINE AND ANOMALY	INPHASE PPM	QUADRATURE PPM	CONDUCTOR MHOS	DEPTH	HTPD HEIGHT
7A	2	3	3	71	238
17A	26	6	43	43	164
17B	2	10	1	41	71
17C	2	11	1	44	87
19A	3	3	5	97	250

ESTIMATED DEPTH MAY BE UNRELIABLE BECAUSE THE STRONGER PART OF THE CONDUCTOR MAY BE DEEPER OR TO ONE SIDE OF THE FLIGHT LINE, OR BECAUSE OF A SHALLOW DIP OR OVERRIDDEN EFFECTS.

PERSONNEL EMPLOYED

W.P. Boyko - Manager and Equipment Operator
 Field: 6 days - July 3 to 8
 Office: 3 days - August 6 to 8

D.C. Fraser - Geophysicist
 Office: 3 days - August 9 to 13

V. Clemente - Dataman and Draftsman
 Office: 6 days - August 1 to 8

R.G. Walker - Field Technician
 Field: 6 days - July 3 to 8

Fred Baird - Pilot - Okanagan Helicopters
 Field: July 5 and 8

DIRECT COSTS

W.P. Boyko and Survey Equipment	\$400/day - 6 days - \$2,400.00
Office:	\$150/day - 3 days - 450.00
D.C. Fraser	Office \$150/day - 3 days - \$ 450.00
V. Clemente	Office \$ 30/day - 6 days - \$ 180.00
R.G. Walker	Office \$ 30/day - 6 days - \$ 180.00
Helicopter costs on survey	- \$1,113.00
Materials and computer costs	- <u>\$ 227.00</u>
Total Cost	\$5,000.00

LIST OF CLAIMS

TOP GROUP: IN #2, 4, 6-12, 14, 16, 18.
IT #2, 15, 16, 27, 28-30, 34, 36, 38, 40, 42-44.
TO #9-14

IN GROUP: IN #13, 15, 17, 19.

LIGHT GROUP: IT #1, 3, 5, 7-14, 39, 41, 83-85, 59, 61.

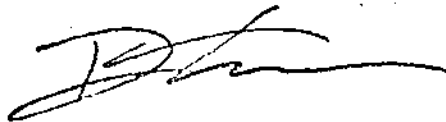
___ underscore indicates Revelstoke M.D.

all other claims are in Kamloops M.D.

CERTIFICATE

I, Douglas C. Fraser, of the City of Toronto, Ontario, Canada do hereby certify that:

1. I am a geophysicist residing at 3191 Cedartree Cres., Cooksville, Ontario.
2. I am a graduate of the University of New Brunswick with a B.A. Sc. degree (1957) and a M.A. Sc degree (1960) in Geology, and of the University of California with a Ph.D. degree (1966) in Geophysics.
3. I have been practising my profession since January 1966.



D. C. Fraser



WESFROB MINES LIMITED

(A wholly owned subsidiary of Falconbridge Nickel Mines Limited)

1112 West Pender Street
Vancouver 1, B.C., Canada

Tel. (604) 682-6242

Telex 04-53245

September 11, 1973

The Chief Mining Recorders
Revelstoke and Kamloops Mining Divisions

Dear Sirs:

Re: Statements of Qualifications

This is to certify that the work covered under the attached report was carried out under my supervision and direction.

The project layout and tie-in to ground control was carried out by J. J. McDougall, B.A.Sc., P.Eng., a graduate in engineering geology from the University of British Columbia.

I am a graduate of the University of B.C. with a B.A.Sc. degree in Geological Engineering, and am a member of the Associations of Professional Engineers of British Columbia and Ontario.

Yours respectfully,

WESFROB MINES LIMITED

D. H. Brown, P.Eng.

DOMINION OF CANADA:
 PROVINCE OF BRITISH COLUMBIA.
 TO WIT:

In the Matter of an Airborne Geophysical
 (E.M. and Magnetometer) Survey over the
 TOP, IN and LIGHT Groups,
 Lat. $51^{\circ}47'30''N.$, Long. $118^{\circ}52'00''W.$,
 Kamloops and Revelstoke Mining Districts.

I, David H. Brown

of 504 - 1112 West Pender Street, Vancouver 1, B.C.

in the Province of British Columbia, do solemnly declare that the following expenses were incurred in connection with an Airborne (Magnetometer and E.M.) Geophysical Survey covering the TOP, IN and LIGHT GROUPS of mineral claims, plus other areas of the Ruddock Creek property as detailed below.

Ruddock Creek Airborne Geophysical (Mag. and E.M.) Survey

Period 1973

July 3-Aug.13/73	Airborne E.M. and Magnetometer Survey Contracted by Aerodat Limited, Toronto	\$5,000.00
June 28-July 8/73	J. J. McDougall, P.Eng. - Layout and ground control	300.00
July 3-8/73	D. H. Brown, P.Eng. - Supervision & expediting	100.00
Aug. 6-13/73	D.H. Brown, P.Eng. - Report supervision	200.00
Aug. 14-28/73	D.H. Brown, P.Eng. - Report writing & supervision	200.00
		<u>\$5,800.00</u> *****

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 the **city**
 of **Vancouver**, in the
 Province of British Columbia, this **29th**
 day of **August**, **1973**, A.D.

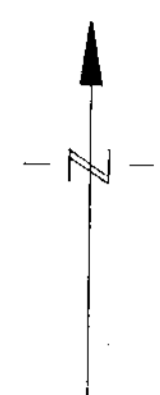
D.H. Brown

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

Sub - mining

APPENDICES

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EM RESPONSE

- Conductivity thickness in mhos
- 500 and over
 - 100 - 499
 - 50 - 99
 - 20 - 49
 - 10 - 19
 - 5 - 9
 - 1 - 4
 - 25 Inphase response

INTERPRETATION

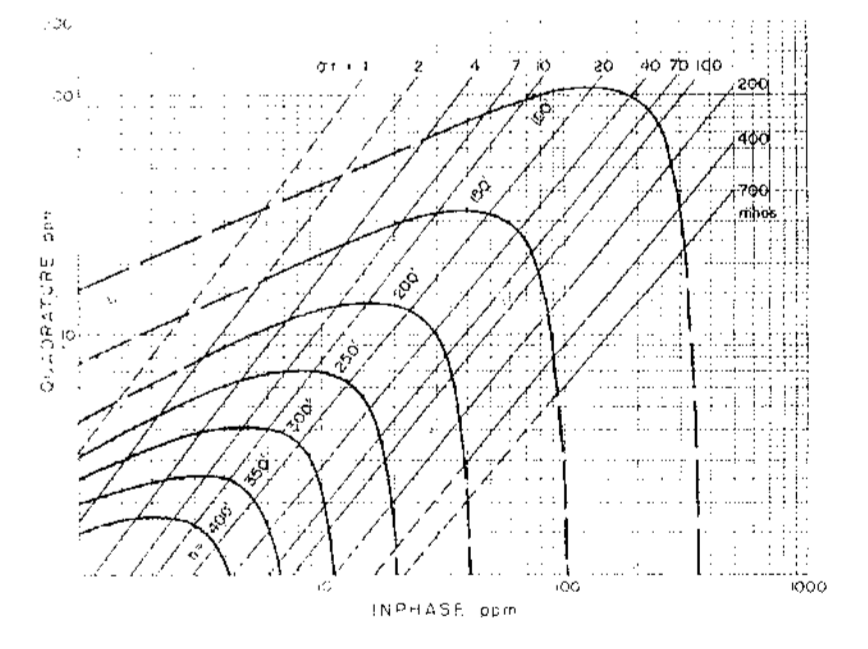
- Conductor mass
- S Surface response
- S? Possible surface response
- ? Questionable response
- L? Possible cultural feature

MAGNETIC CORRELATION

- 100% Direct magnetic correlation of 100 gammas
- 100% Conductor is on the flank of a 100 gamma magnetic anomaly located in the direction indicated

near zonal control based on photo laydown
 Average bird height 100 feet
 Line spacing 600 feet

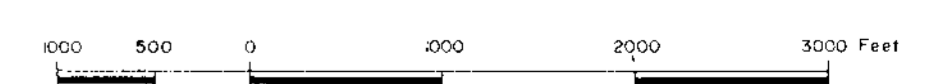
PHASOR DIAGRAM



Department of
 Mines and Technical Resources
 ASSOCIATED REPORT
 NO. 4567 M.P. #2

WESFROB MINES LTD.
 RUDDOCK CREEK AREA

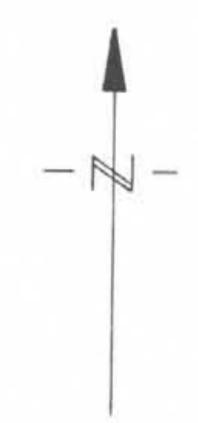
AIRBORNE ELECTROMAGNETIC SURVEY



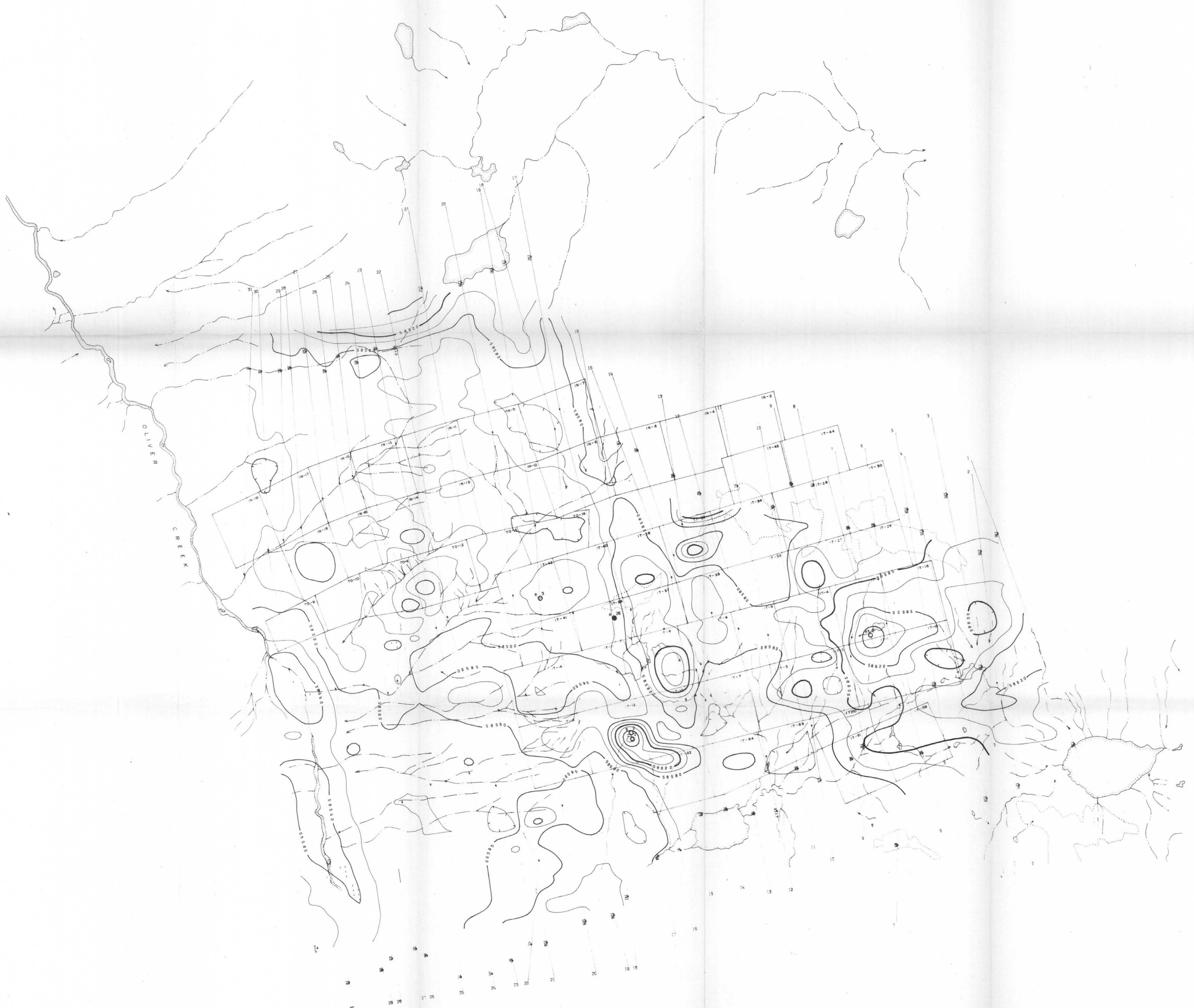
AUGUST 1973

FIG. RC73-1

L. L. Brown
4567-M2



LEGEND
100 gammas
20 gammas
10 gammas



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ASSESSMENT REPORT
NO. 4567 MAP #3

WESFROB MINES LTD.
RUDDOCK CREEK AREA
TOTAL FIELD MAGNETIC MAP



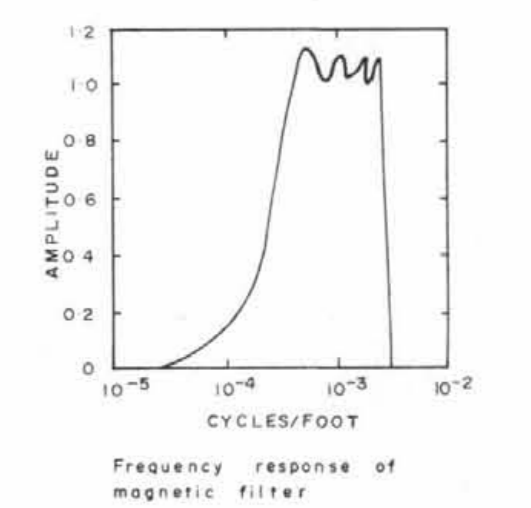
AUGUST 1973
FIG.-RC73-2.

Robson
4567 M3



LEGEND

- 20 gamma
- 10 gamma
- 5 gamma
- 0 gamma



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Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 4567 MAP #4

WESFROB MINES LTD.
RUDDOCK CREEK AREA
FILTERED MAGNETIC MAP



AUGUST 1973

FIG. RC 73-3

R. Brown

4567 MA