

3317

Department of
Mines and Petroleum Resources
ASSESSMENT REPORT

NO. 3317 MAP.....

GEOPHYSICAL REPORT
ON 94K/11W
COMBINED MAGNETIC & VLF-EM SURVEY
TANJO MINES LTD. (N.P.L.)
BY CLAIM GROUP
RACING RIVER AREA, LIARD M.D., B.C.

BY Claim Group: 100 miles S80 W. of Ft. Nelson, B.C.
58° 125° NE
N.T.S. - 94K/11W

Report by: Barclay C. Isherwood, M.Sc.
Geophysicist
GEOTRONICS SURVEYS LTD.
514 - 602 W. Hastings St.
Vancouver 2, B.C.

Submitted to: TANJO MINES LTD. (N.P.L.)
12503 Grandview Drive
Edmonton, Alberta

October 1971

Magnetic & VLF-EM Survey
 BY Claim Group

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Magnetic & VLF-EM Survey
BY Claim Group

S U M M A R Y

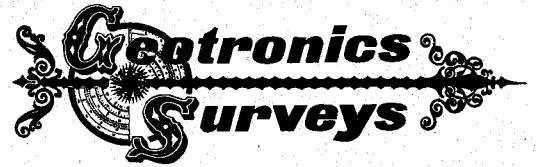
A combined magnetic and VLF-EM survey has been carried out over the BY claims of Tanjo Mines Ltd.

The object of the magnetic survey was to follow-up the results of an earlier airborne magnetic survey which indicated the possibility of magnetite-bearing diabase dykes associated with high grade copper deposits in the form of chalcopyrite.

A VLF-EM survey was undertaken at the same time to correlate electromagnetic and magnetic data as regards magnetite mineralization as well as to detect chalcopyrite mineralization directly.

The results of the magnetic survey do not agree with the results of the previous aeromagnetic survey and in fact indicate that the area is magnetically barren.

However, the electromagnetic survey results are quite encouraging and suggest the possibility of massive chalcopyrite and/or pyrite mineralization.



514-602 West Hastings Street, Vancouver, British Columbia, Canada ★ Telephone 687-6671

GEOPHYSICAL REPORT
ON
COMBINED MAGNETIC & VLF-EM SURVEY
BY CLAIM GROUP
RACING RIVER AREA, LIARD M.D., B.C.

INTRODUCTION

This report discusses the results of a combined magnetic and very low frequency electromagnetic (VLF-EM) survey covering 22 line miles on the BY property of Tanjo Mines Ltd. The field work was carried out by Messrs. R. Simpson and E. Dodd of Geotronics Surveys Ltd. during the period September 16 to 18, 1971, inclusive.

The ground magnetometer survey was undertaken as a follow-up to a previous airborne magnetic survey (Isherwood, 1970), which indicated the possibility of magnetite-bearing diabase dykes associated with high grade copper deposits in the area.

The object of the VLF-EM survey was to delineate any vein-type and/or heavily disseminated mineralization which commonly responds to radio

frequency EM techniques, and also to correlate electromagnetic and magnetic data with respect to magnetite mineralization. The VLF-EM technique should also provide some geological information as regards structural faults and contact zones.

LOCATION

The BY property is located approximately 100 miles west of Fort Nelson at $58^{\circ} 32'$ latitude and $125^{\circ} 21'$ longitude.

TOPOGRAPHY

The terrain over the property is relatively rugged with a relief in excess of 3,000 feet. The elevation varies from 5,000 feet in the southwest corner to 8,000 feet in the northeast corner. A tributary of the Delano Creek flows through the west end of the property in a southerly direction.

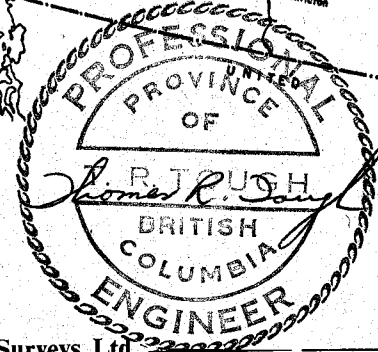
LOCATION MAP

BY GROUP

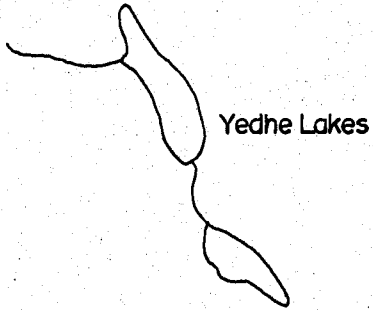
TANJO MINES, Racing River Area

BY GROUP
TANJO MINES

SCALE 1" = 110 miles

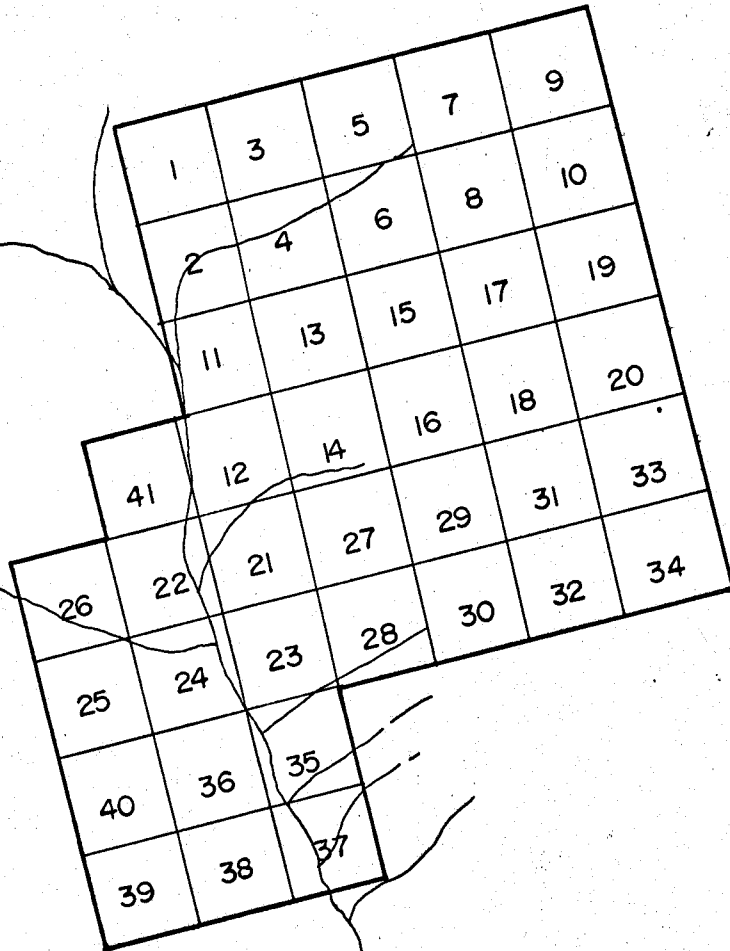


CLAIM MAP



BY GROUP
TANJO MINES

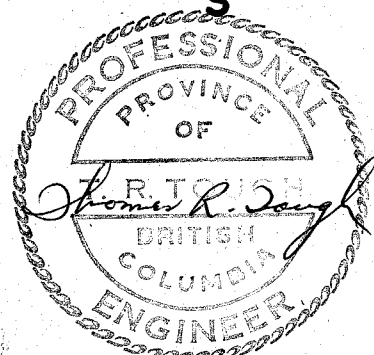
Racing River Area
Liard M.D.



Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 3317 MAP **12**



SCALE 1" = 3000'



SURVEY PROCEDURE

The survey base line was established in a north-south direction adjacent to the western edge of the BY claims. The survey grid was laid out east of the base line with 250-foot line spacing. Magnetic and electromagnetic readings were taken at 100-foot station intervals over the entire survey.

INSTRUMENTATION

A VLF-EM receiver, Model G-28, manufactured by Geotronics Surveys Ltd. of Vancouver, B.C., was used for the electromagnetic survey. This instrument is designed to measure the magnetic component of the 18.6 KHz low radio frequency signal transmitted from Seattle, Washington. The direction of this field, in particular the dip angle, is distorted by the presence of an electrically conductive body within the earth. Thus, by measuring the dip angle, the presence of a conductor can be detected and its location determined.

The magnetic survey was done using a portable, vertical component, fluxgate magnetometer, Model G-110, also manufactured by Geotronics

Surveys Ltd. It is a visual-null type, utilizing a meter, with a digital dial readout that has a range of 100,000 gammas and a reading accuracy of 10 gammas. The magnetometer has a maximum temperature drift of 2 gammas per degree centigrade. The G-110 incorporates a self-leveling device, an oil-damped gimbal that will level the sensing element within ± 16 degrees.

MAPPING OF RESULTS

All maps are plotted on a scale of 1" = 500' and include the drainage system and survey grid.

The VLF-EM data in its original form appears on sheet 1. Sheet 2 shows the same data after they have been reduced applying the Fraser filter. The positive dip-angle readings have been contoured at an interval of 10° . The Fraser filter is essentially a four point difference operator, which transforms zero crossings into peaks, and a low pass smoothing operator which reduces the inherent high frequency noise in the data, rendering it much easier to contour.

The magnetic data, appropriately corrected for diurnal change, is plotted on sheet 3. These

data represent the result of subtracting a background value of 57,000 gammas from each reading. The results are contoured at 100 gamma contour intervals.

GEOLOGY


The BY claim group is located on lower Cambrian sediments of the Windermere Formation. According to Vail, 1957, this sequence consists of shales, in places calcareous, then sandstone and quartzite bands, limestones and argillites. Cutting these older sedimentary rocks are a series of basic igneous dykes. They are generally vertical or steeply dipping and strike in mainly northeast and northwest directions. Vail has done an extensive microscopic analysis of the rocks from these dykes and found some of them to contain as much as 15% magnetite. In many cases, these basic dykes contain or are associated with quartz-carbonate fissure veins which contain lenses of chalcopyrite, bornite and chalcocite. Under the microscope, chalcopyrite is seen to make up about 80% of the metallic minerals. It occurs as massive ore, or as exsolution laths in bornite in Widmanstetten texture.


GEOLOGY
BY GROUP
LIARD M.D.
TANJO MINES




Traced by D. Mark after J.R. VAIL



LEGEND

 - Drift & Alluvium


 - Grey Limestones


 - Conglomerate
 (McDougal Formation)
WINDERMERE TYPE


 undifferentiated
 quartzitic
 argillaceous

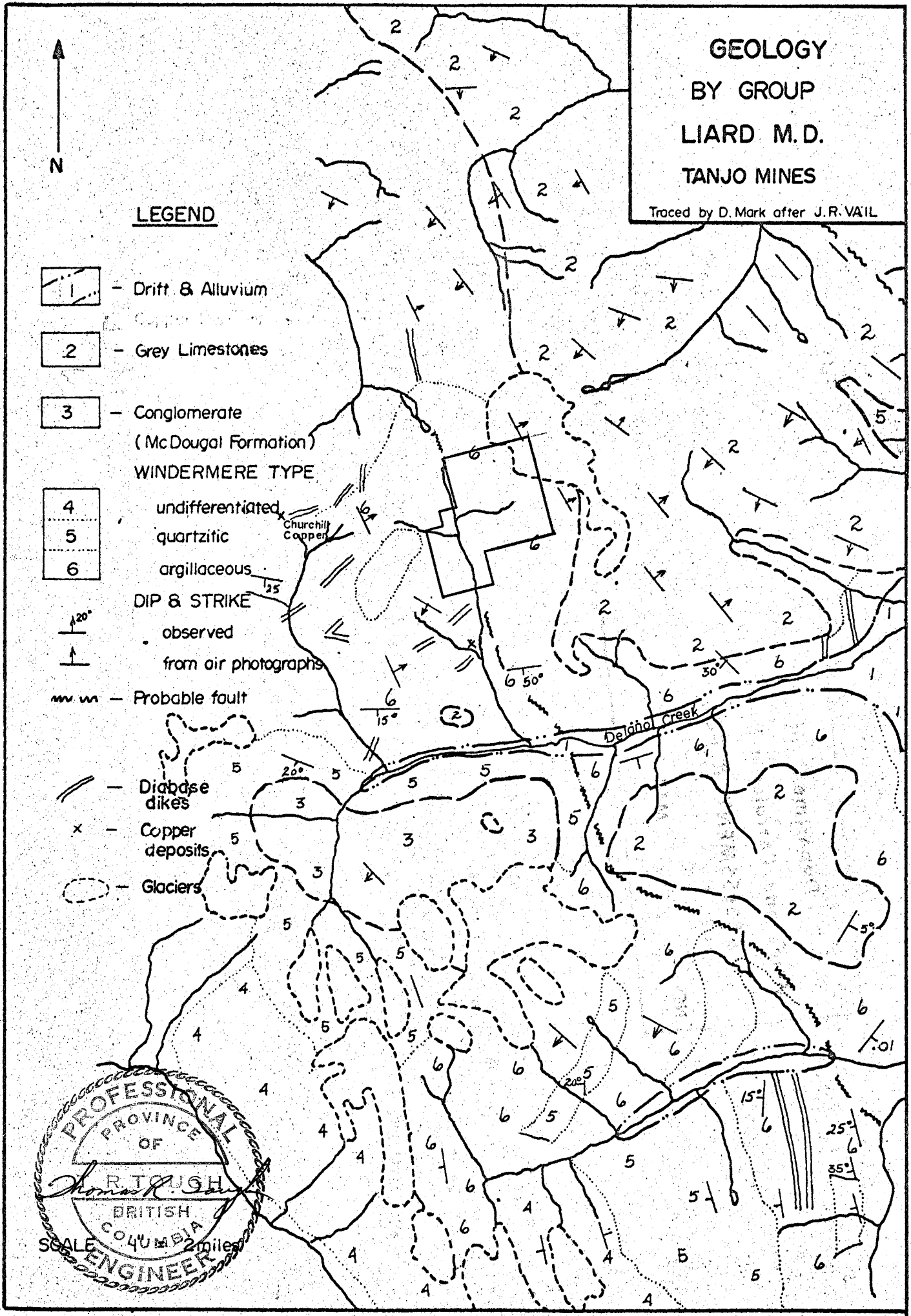
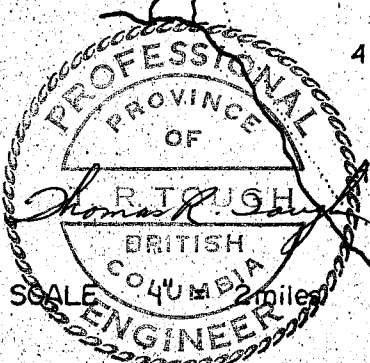
DIP & STRIKE
 observed
 from air photographs

 - Probable fault

 - Diabase dikes

 - Copper deposits

 - Glaciers



DISCUSSION OF RESULTS

1) MAGNETIC

Sheet 3 is a contour map of the magnetic survey data. Undoubtedly, these data indicate that the property is magnetically uniform within the limits of the survey. The total overall magnetic relief is less than 350 gammas, while most readings lie in the range of 300 to 400 gammas. Such a low magnetic contrast (100 gammas) is barely within the accuracy limits of this type of survey. The only slightly anomalous area indicated by the magnetic data is over the western end of lines 50+00N and 47+50N. However, this feature does not correlate with the electromagnetic data. This may be due to the fact that in most cases the chalcopyrite and/or pyrite mineralization is not found in the diabase dykes, but rather in fissure veins associated with the dykes.

Any disagreement between these data and the previous aeromagnetic results should be attributed to the inherent noise associated with airborne surveys over areas with rugged topographical relief.

2) ELECTROMAGNETIC (VLF-EM)

As indicated by the VLF-EM contour map, the survey results show several conductive zones striking mainly in a north-south direction. Since the transmitting station used for this survey area is in Seattle, Washington, maximum electromagnetic coupling will occur only for conductive zones striking in a general north-south direction. Hence, this survey will only detect conductors lying within approximately $\pm 45^\circ$ of north with maximum coupling, hence, maximum magnetic induction for north-south orientations.

The Fraser filter was applied to the electromagnetic data to remove the high frequency noise and hence transform non-contourable data into a contourable form. Also, a conductor that does not show up as a crossover on the unfiltered data quite often will show up on the filtered data.

Generally speaking, the electromagnetic data indicate several quite strong anomalies. There are several well defined features with maximum dip angle readings of 40° and one area across L-40N shows a maximum reading of 56° .

It seems unlikely that such sharp effects would be produced by structural changes within the sedimentary strata.

In terms of possible mineralization these data indicate the presence of some strongly conductive material such as graphite, magnetite, chalcopyrite and/or pyrite. The presence of graphite mineralization seem unlikely considering the intensities of the dip-angle readings plus the fact that no graphite showings have been reported by Menzies or Vail. The absence of any magnetic relief over the property eliminates the possibility of magnetite deposits. However, Vail has noted surface evidence of pockety copper mineralization in the form of chalcopyrite as well as some pyrite. Chalcopyrite and/or pyrite mineralization would seem to be a probable explanation for the EM results.

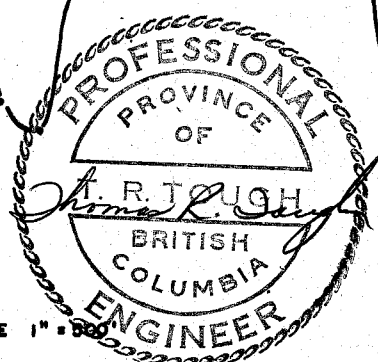
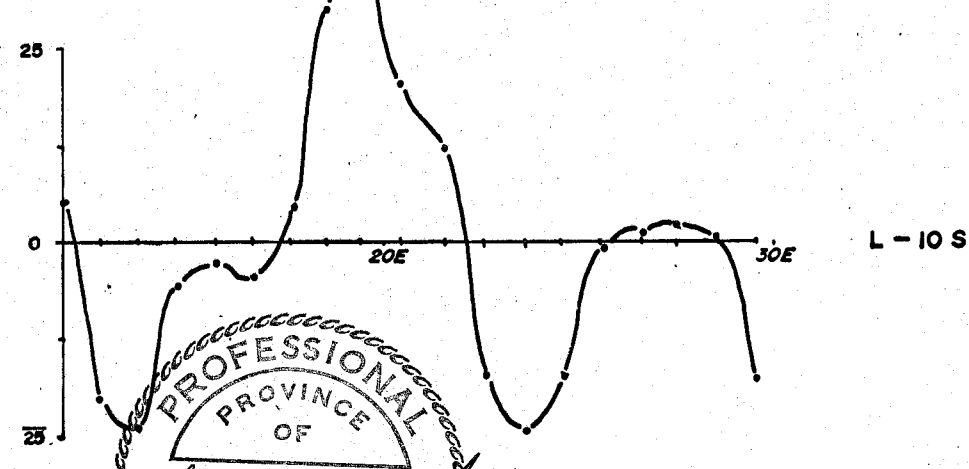
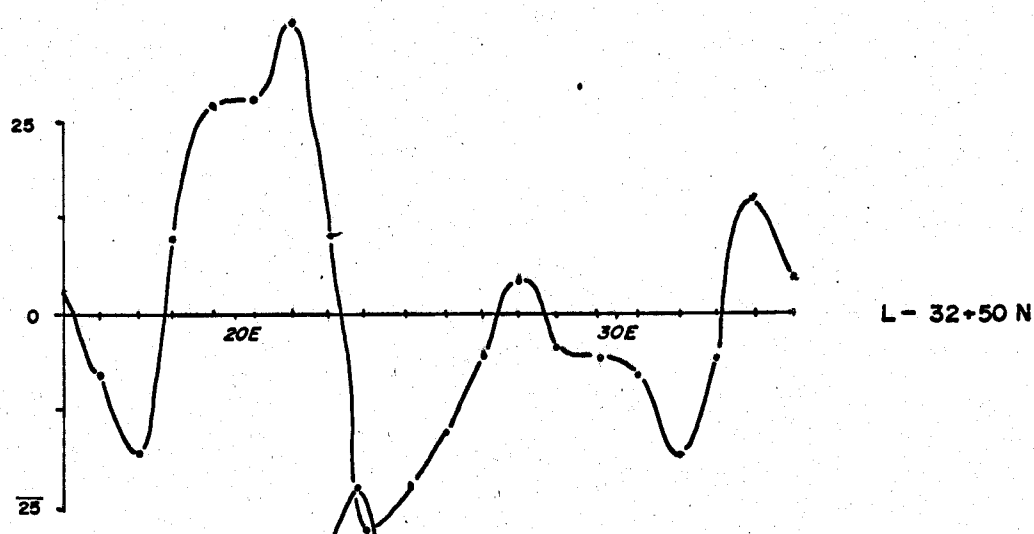
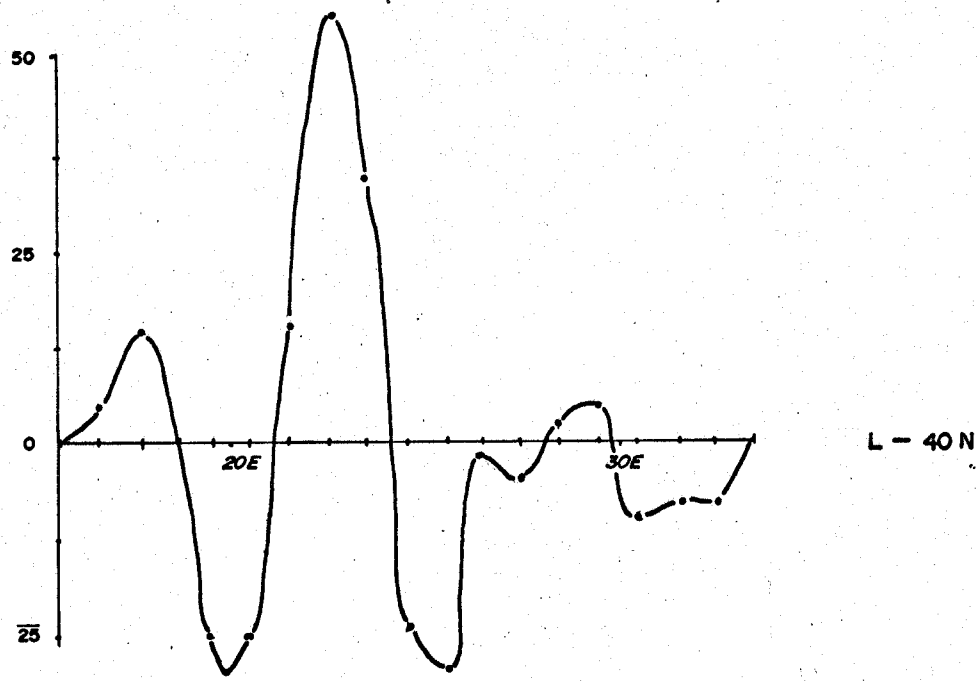
Figure 3 shows three different filtered EM profiles taken across lines 4+00N, 32+50N and 10+00S at the positions marked A, B and C, respectively, on the contour map. All three profiles are characteristic of "pockety" highly conductive sources. Further, several of the anomalous features show a lineal character and strike in a general north-south direction in accordance with the known orientation of the mineralized veins and/or dykes common to this area.

CONCLUSIONS AND RECOMMENDATIONS

There seems to be reasonably strong geophysical evidence suggesting possible copper mineralization over this property.

It is strongly recommended that the electromagnetic target areas be located and followed up by conventional electromagnetic survey techniques to obtain detailed information on depth and extent of the conductors. At the same time the claims area should be geologically mapped and prospected and selective geochemical soil sampling undertaken.

VERTICAL SCALE 1" = 25 DEGREES



HORIZONTAL SCALE 1" = 500

FIG. 3

TANJO MINES LTD.
BY CLAIM GROUP
PROFILES
VLF-EM FRASER FILTER

Magnetic & VLF-EM Survey
BY Claim Group

10.

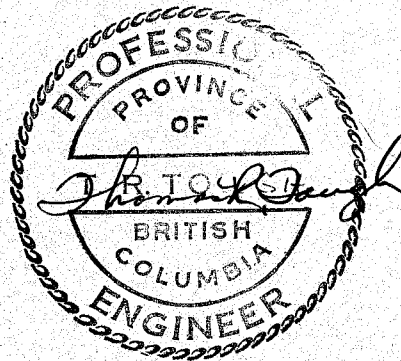
Based on the results of the above investigations, a drilling program should be carried out to prove out the quality of the mineralization.

Respectfully submitted,
GEOTRONICS SURVEYS LTD.

Barclay C. Isherwood

BARCLAY C. ISHERWOOD, M.Sc.
Geophysicist

BCI:ly
October 19, 1971



REFERENCES

Hoge, C. O., Geology Adjacent to the Alaska Highway, Fort St. John to Nelson Forks; Geological Survey of Canada, Paper 44-30, 1944.

Isherwood, B. C., Aeromagnetic Survey, BY Claim Group, Racing River Area, Liard M.D., B.C.; Geotronics Surveys Ltd., October 1970.

Menzies, N. M., Geology and Mineralogy of the Strangward Copper Property, South Tetsa River, B.C.; University of British Columbia, M.A.Sc. Thesis, 1951.

Vail, J. R., Geology of the Racing River Area, British Columbia; University of British Columbia, M.Sc. Thesis, 1957.

Williams, M. L., Geology Along the Alaska Highway, Fort Nelson to Watson Lake; Geological Survey of Canada, Paper 44-28, 1944.

RESUME OF TECHNICAL AND FIELD EXPERIENCE OF E. A. DODD

1. Presently President and Field Manager for Trans-Arctic Explorations Ltd.
2. Three years of applied field experience in various aspects of geophysical surveying, prospecting, blasting, sampling and geochemistry.
3. Two years contracting experience in geophysics, property management, expediting and property evaluation.
4. Instrument operator on ground and airborne magnetic surveys, Ronka EM-16, Sabre Magnetometer, Geotronics G-100 Magnetometer, Sharpe MF-1 Magnetometer, Sharpe Ground Scintillometer, Worden Gravity Meter, Self Potential, Crone J.E.M. Shootback E.M., Sharpe Horizontal Loop E.M. and Induced Polarization.
5. Workable knowledge of placer gold properties.
6. Field Supervisor for Geotronics Surveys Ltd. since November 1, 1969 and presently employed by same.
7. Above mentioned experience applied in Idaho, Montana, Nevada, British Columbia but primarily in the Arctic region of the Northwest Territories and Yukon Territory.
8. Specializing in exploration in the western and eastern Arctic regions of Canada.

RESUME OF PROFESSIONAL AND TECHNICAL EXPERIENCE

OF

BARCLAY C. ISHERWOOD, M.Sc.

EDUCATION

Graduate of the University of British Columbia with a B.Sc. and a M.Sc. in Geophysics.

EXPERIENCE IN INDUSTRY

Considerable experience in the computer analysis of seismic and potential field data, at both the hardware and software levels.

1970 - Present - Geophysicist for Geotronics Surveys Ltd., Vancouver, B.C.

1969 - 1970 (exploration seasons) - Geophysicist with Geo-Recon Explorations Ltd., Vancouver, B.C. - refraction seismic and resistivity investigations including interpretation.

1968 (exploration season) - Geophysicist with Chevron Standard Ltd., Calgary, Alberta, designing digital filter operators for seismic data.

1967 - Seismological and geological studies for the Department of Geophysics at the University of British Columbia during the exploration season.

* * * * *

Member of the British Columbia Geophysical Society, Vancouver, B.C.

P. Eng. applied for with the Association of Professional Engineers of B.C.

Magnetic & VLF-EM Survey
BY Claim Group

COST BREAKDOWN

Ground Magnetometer and VLF-EM Survey conducted on
the BY Claim Group for TANJO MINES LTD. (N.P.L.),
from August 11 to September 17, 1971.

Wages:

E. Dodd, Supervisor & Instrument Operator, 35 days @ \$80.00/day	\$2,800.00	
R. Simpson, Instrument Operator, 35 days @ \$70.00	2,450.00	
C. Tsetso, Assistant, 35 days @ \$30.00	<u>1,050.00</u>	\$6,300.00
Magnetometer Rental, 35 days @ \$10.00/day		350.00
VLF-EM Rental, 35 days @ \$10.00/day		350.00
Survey Supplies & Equipment Rental		300.00
Mapping (PDT Drafting Services)		300.00
Geophysical Report		600.00
Engineering Fees		<u>300.00</u>
TOTAL COST		<u><u>\$8,500.00</u></u>

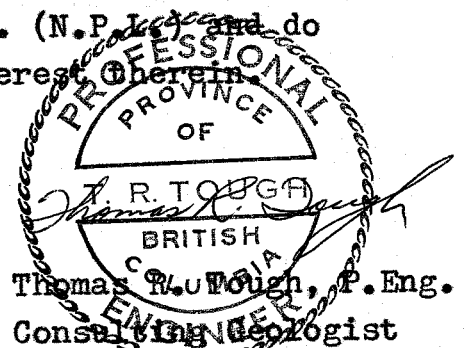
CERTIFICATE

I, Thomas R. Tough, of the city of Vancouver, in the Province of British Columbia, do hereby certify:

That I am a Consulting Geologist and an associate with T. R. Tough & Associates Ltd., with offices at 519 - 602 W. Hastings Street, Vancouver 2, B.C.

I further certify that:

1. I am a graduate of the University of British Columbia (1965) and hold a B.Sc. degree in Geology.
2. I have been practicing in my profession for the past six years and have been active in the mining industry for the past thirteen years.
3. I am registered with the Association of Professional Engineers of British Columbia.
4. I have studied the accompanying report dated October 1971, of the combined magnetic and VLF - EM survey submitted by Geotronics Surveys Ltd., written by Barclay C. Isherwood, M.Sc., Geophysicist and concur with findings therein.
5. I have no direct or indirect interest whatsoever in the property described herein, nor the securities of Tanjo Mines Ltd. (N.P.L.) and do not expect to receive any interest therein.



October 21, 1971



NOTE: READINGS ARE IN GAMMAS
57 000 gammas subtracted from all readings

LEGEND

- SURVEY LINE
- CLAIM LINE
- CREEK
- LOWS



Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 3317 MAP #36

Bartley P. Isherwood
Oct 20/71

TO ACCOMPANY GEOPHYSICAL REPORT BY B.C. ISHERWOOD, B.Sc.

TANJO MINES LTD.(NPL)
BY CLAIM GROUP
RACING RIVER AREA, LIARD M.D., B.C.

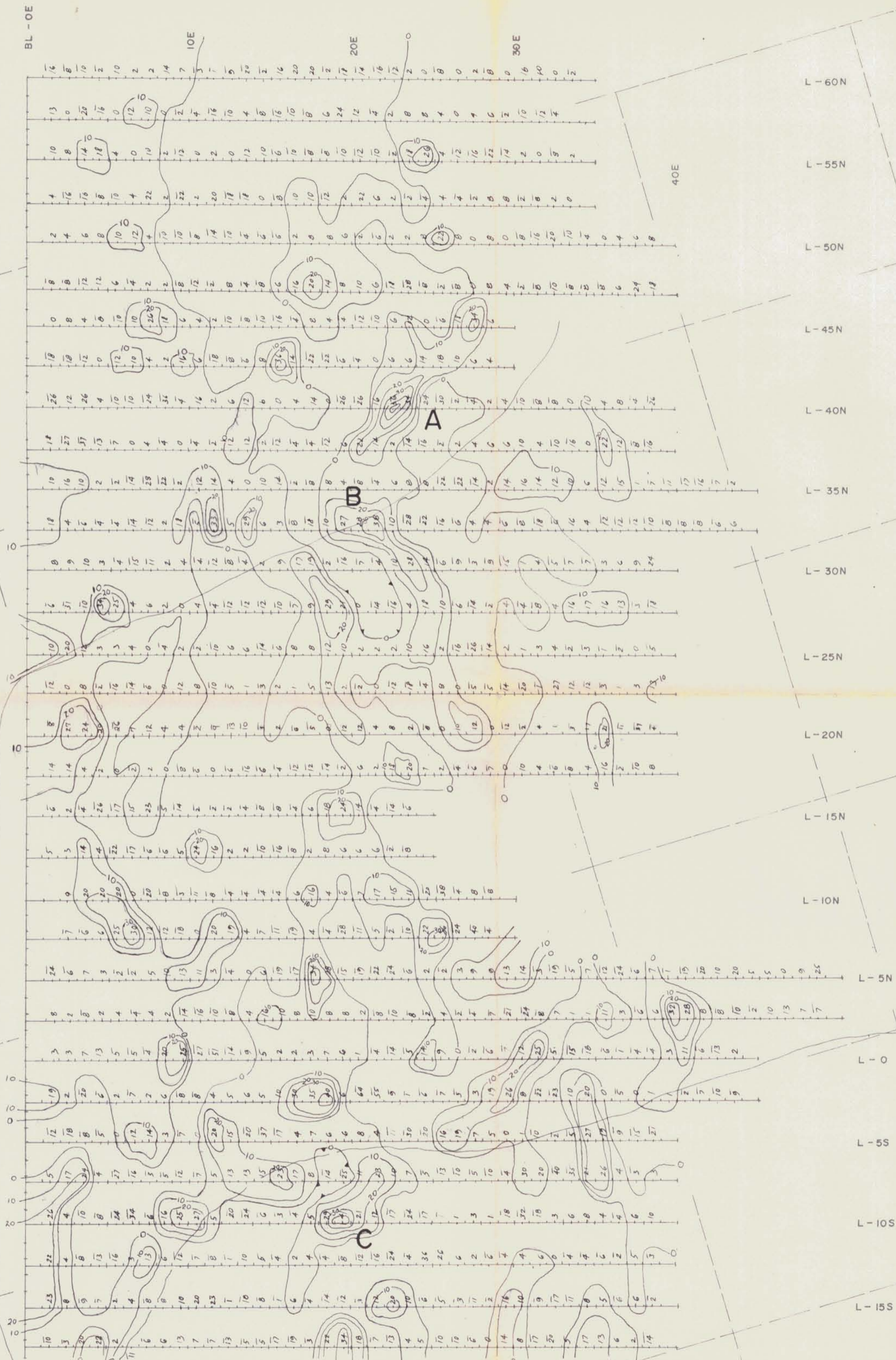
MAGNETOMETER
MAGNETIC DATA & CONTOURS

Scale 1" = 500'	Date OCT. 71	Sheet No. 3	Drawn by P.P.
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Geotronics Surveys Ltd.
117 - 802 West Hastings Street, Vancouver, British Columbia



SEATTLE TRANSMITTER STATION
SOUTH - 8° EAST



L-60N
L-55N
L-50N
L-45N
L-40N
L-35N
L-30N
L-25N
L-20N
L-15N
L-10N
L-5N
L-0
L-5S
L-10S
L-15S

LEGEND

- SURVEY LINE
- CLAIM LINE
- CREEK
- LOW

NOTE: VALUES ARE IN DEGREES



Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 3317 MAP #5

Barley L. Sherwood
Oct 20/71

TO ACCOMPANY GEOPHYSICAL REPORT BY B.C. ISHERWOOD, Sc.

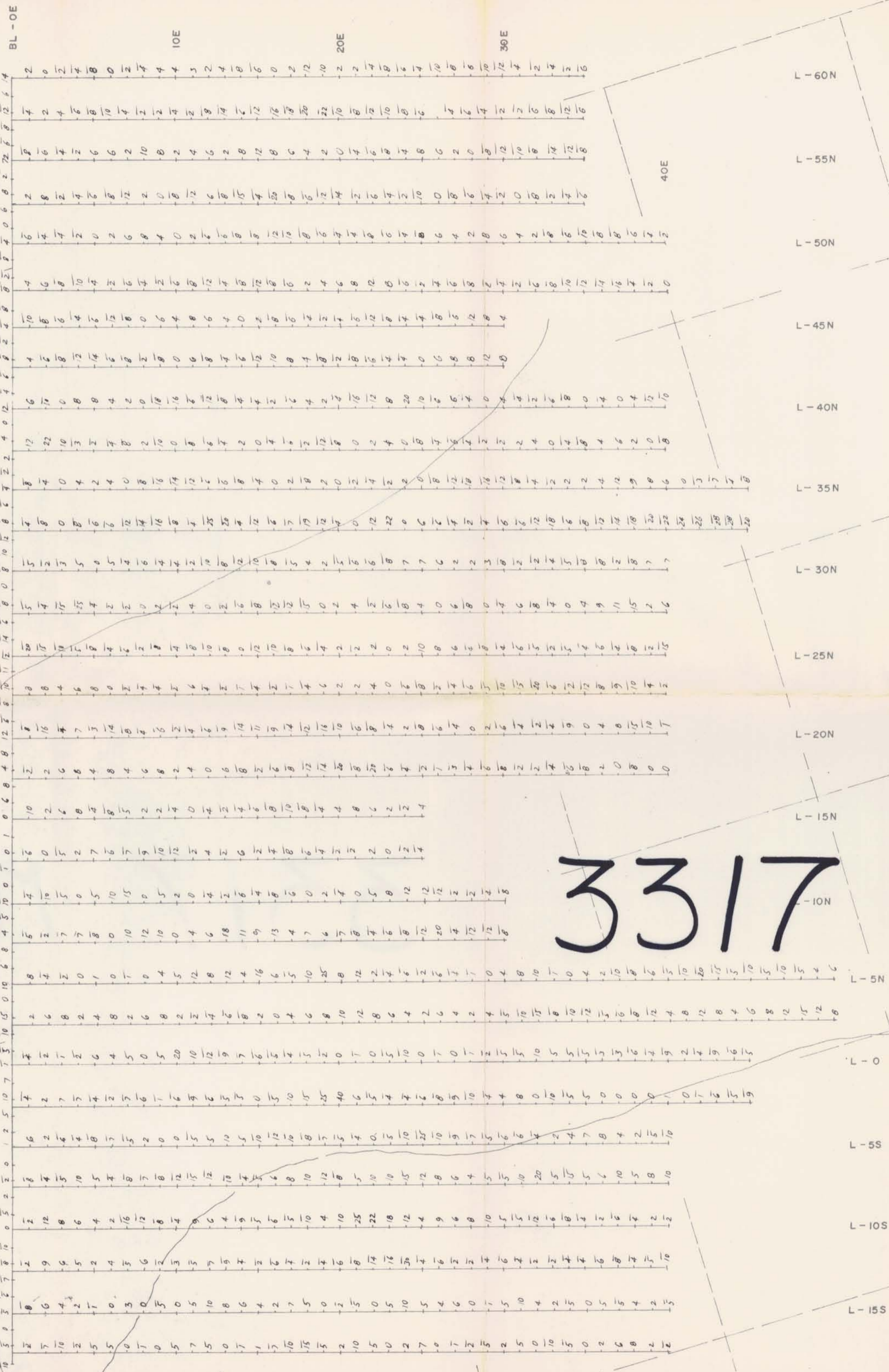
TANJO MINES LTD.(NPL)
BY CLAIM GROUP
RACING RIVER AREA, LIARD M.D., B.C.

VLF EM
FRASER FILTER & CONTOURS

scale 1"=500'	date OCT. 71'	job no. 71-72	sheet no. 2	drawn by P.P.
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Geotronics Surveys Ltd.
137 - 501 West Hastings Street, Vancouver, British Columbia

SEATTLE TRANSMITTER STATION
SOUTH-5° EAST



3317

M-4

NOTE: READINGS ARE IN DEGREES

LEGEND

- SURVEY LINE
- - - CLAIM LINE
- ~ CREEK



Department of
Mines and Petroleum Resources
ASSESSMENT REPORT #41
NO. 3317 MAP

Barclay P. Isherwood
Oct 20/71

TO ACCOMPANY GEOPHYSICAL REPORT BY B.C. ISHERWOOD, B.Sc.

TANJO MINES LTD.(NPL)			
BY CLAIM GROUP			
RACING RIVER AREA, LIARD M.D., B.C.			
VLF EM			
FIELD DATA			
scale 1" = 500'	date OCT. 71'	job no. 71-72	sheet no. 1
			drawn by P.P.