

4641

GEOCHEMICAL REPORT

ON A

SOIL GEOCHEMISTRY SURVEY

BY CLAIM GROUP

DELANO CREEK AREA, LIARD M.D., B.C.

AUGUST-SEPTEMBER, 1973

94K/11W

BY CLAIM GROUP: 98 miles S 80 W of Fort Nelson, B.C.

58° 125° NE

NTS - 94K/11W

REPORT BY: David G. Mark
Geophysicist
Geotronics Surveys Ltd.
514 - 602 W. Hastings Street
Vancouver, B.C.

FOR: Tanjo Mines Ltd (NPL)
520 - 602 W. Hastings Street
Vancouver, B.C.

October 22, 1973

Department of
Mines and Technical Resources

ASSESSMENT REPORT

NO. 4641 MAP

Geotronics Surveys Ltd.

Vancouver, Canada

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SUMMARY

A soil geochemistry survey in which the samples were tested for copper was completed over the By Claim Group in the Delano Creek area of the Liard M.D., B.C. during August and September, 1973. The purpose of the survey was to locate any potential zones of copper sulphide mineralization such as occurs at the Consolidated Churchill Copper mine.

The claims are located to the immediate south of the peak of Yedhe Mountain and about 3 miles northeast of the Churchill Copper mine site. Access is by helicopter or 4 miles by foot from Delano Creek. The terrain varies from gentle near the main creek to very rugged on Yedhe Mountain. The vegetation is alpine grass, small bushes, and a few trees.

The lithology of the whole area is almost entirely a sequence of sedimentary rocks. The greater part of the property is underlain by the Aida Formation which is the same as that of the Churchill Copper mine site. Intruding into this formation are gabbro dykes one of which is mapped on the property. On the eastern part and the southwest corner of the property occur rocks of the Atan Group and the Kechika Group. Copper mineralization in the area is in the form of chalcopyrite which occurs within quartz-ankerite veins within deformed argillite-shale.

The samples were picked up at 100-foot centers on 400-foot separated lines and on the baseline. The samples were analyzed for copper by the hot-acid extraction and atomic absorption. The results were statistically analyzed, plotted, and contoured.

Two main anomalous zones were located and were labelled zones A and B, respectively. Also an anomalous zone occurred along the main creek.

CONCLUSIONS

- (1) The property is underlain by the favourable Aida Formation. Also gabbroic dykes are known to occur on the property and in the area.
- (2) The Churchill Copper mine is about 3 miles to the southwest.
- (3) Two main anomalous zones were located on the property. Both are underlain by the Aida Formation and both occur near gabbroic dykes. There is therefore, a good possibility that the causative sources are copper sulphides.
- (4) The anomalous zone along the main creek is probably caused by transportation of copper ions by the creek.

RECOMMENDATION

Before any further work is undertaken, it is strongly recommended to geologically map and prospect the property. Special attention should be paid to anomalies A and B.

October 22, 1973

Respectfully submitted,
GEOTRONICS SURVEYS LTD.



A handwritten signature in black ink, appearing to read "David G. Mark".

David G. Mark
Geophysicist

GEOCHEMICAL REPORT
ON A
SOIL GEOCHEMISTRY SURVEY
FOR COPPER
BY CLAIM GROUP
DELANO CREEK AREA, LIARD M.D., B.C.

INTRODUCTION AND GENERAL REMARKS

This report discusses the survey procedure, compilation of results, and the interpretation of a soil geochemistry survey for copper carried out over the By Claim Group from the middle of August to the beginning of September, 1973.

The field work was carried out and supervised by L.A. Larson, geophysicist. The number of line miles completed was 12 and the number of samples picked up and analyzed was 580. The survey area is as shown on figure 2.

The object of the survey was to locate potential areas of copper sulphide deposits. Much copper mineralization is found throughout the area, most notably the orebody of Consolidated Churchill Copper Mines Ltd., 3 miles to the southwest of the By claims.

PROPERTY AND OWNERSHIP

The By claim group consists of 40 full-sized claims staked as shown on figure 2. All are fully owned by Tanjo Mines Ltd (NPL) of Vancouver, B.C.

The claims are as follows:

BY GROUP

<u>Name</u>	<u>Record No.</u>	<u>Expiry Date</u>
By 1 - 40	40039 - 40078	September 17, 1973

It is understood by the writer that an application for certificate of work has been made prior to September 17, 1973. Therefore, if the application is accepted, the claims are still in good standing.

LOCATION AND ACCESS

The property is located 98 miles S 80 W of the town of Fort Nelson, B.C., in an alpine valley to the immediate south of the peak of Yedhe Mountain. The center of the claims is about 2 miles south-east from the center of the Yedhe Lakes.

The geographical coordinates are $58^{\circ} 31'N$ latitude and $125^{\circ} 20'W$ longitude.

Access to the property is either by helicopter or by foot. The access by foot is from Delano Creek north along one of its tributaries for 4 miles. The Churchill Copper Mines access road parallels Delano Creek.

PHYSIOGRAPHY

The property is found in the Muskwa Range which forms part of the physiographic unit known as the Rocky Mountains. The terrain in the area is typical of the Muskwa Range which is broad U-shaped river valleys and precipitous, rugged mountains. The

elevation ranges from 2 to 3,000 feet in the valleys to 9 to 10,000 feet on the mountain peaks.

The relief on the By claims is about 3,500 feet which is from about 5,000 feet in the valley at the southern end of the property to about 8,500 feet to the immediate south of the peak of Yedhe Mountain. On each side of the main creek are talus slides with an incline from 30° to 45° and many abrupt cliffs.

The main water source of the area is a southern-flowing creek which flows through the western part of the claims. The Yedhe Lakes are located about 3,000 feet from the northern boundary of the claim group.

Longitudinal valleys of considerable length and width are common in the Muskwa Ranges. They are generally eroded parallel to the structural trend along lines of faulting or along belts of softer, more easily eroded rock. These valleys produce a pronounced trellis pattern.

Glaciation in the northern areas was uneven in intensity with some areas within the Muskwa Ranges showing little or no evidence of glacial erosion. However, the presence of an ice cover is revealed by an almost universal veneer of drift.

The major vegetation in the area is a light coniferous forest found mainly in the valleys and on the lower slope of the mountains. The higher peaks are devoid of vegetation other than some grasses and small bushes. On the By claims, only the southern part along the creek have any trees at all which are fairly sparse. Most of the claims area is covered by small bushes and alpine grass.

The climate of the area could be termed sub-arctic. Temperatures can thus dip to a minimum of -60°F in January to a maximum of about 90°F in July. Freeze-up starts approximately mid-October and break-up around April or May. There are thus only four or five months of exploration season and snow can fall any time during these months (as was the writer's experience).

HISTORY OF PREVIOUS WORK

An airborne magnetic survey was carried out in September, 1970, by GEOTRONICS SURVEYS LTD.

GEOLOGY

The geology is largely taken from Taylor & Stott, Vail, and Carr.

The whole Racing River area is generally underlain by an unmetamorphosed succession of sedimentary rocks of every type ranging in age from Late Precambrian to Upper Cretaceous. The only igneous rocks present are Precambrian diabase dykes. These sedimentary rocks possess a regional northwesterly strike and a dip towards the southwest at moderate angles.

Figure 3 shows the geology in the region of the By Claim Group. The following is a description of the geology as seen on this map.

The oldest rock-types within this area are of the Aida Formation and are Helikian in age. It underlies the greater part of the claim area. It is within this formation that many of the copper prospects of the area occur. Taylor and Stott say this formation is comprised of calcareous and dolomitic mudstones and siltstones

with minor sandstone; green chamositic mudstone and black carbonaceous mudstone; dolomite and limestone. However, Carr says that around the Churchill Mine, the rock-types are grey and black limestone, limy argillite, and limy shale. The writer, when in the area in the fall of 1969, noted the same rock-types as Carr.

Cutting the above formations are steeply dipping diabase dykes, also of Helikian age. These dykes are anywhere from 20 to 250 feet thick and contain 4 to 8% magnetite. They seem to be associated with the sulphide mineralization of the area. The G.S.C. have mapped one on the By claims and two to the west of the By claims.

Of Cambrian age are rocks of the Atan group which cover eastern and western parts of the claim group. This is largely composed of fanglomerates which are sheared, polymictic, very coarse, with boulders as much as ten feet in diameter, and grey in color. They are deposited next to active faults. The size of the clasts reduce in size the further from the fault trace. Sandstone, shale, and minor limestone are also found within this group.

Overlying the Atan group is the Ordovician Kechika group. In this area the group is composed of limestone and minor sandstone.

The Silurian Nonda Formation overlies the Kechika group and contains dark grey dolomite; basal sandstones, and minor limestone.

Striking north northwesterly to the immediate west of the claim group is a major thrust fault. Carr notes that folding becomes intense near faults and locally elsewhere, and is largely asymmetric with steep eastern limbs.

The sulphide mineralization of the area is chalcopyrite - pyrite that seems to occur mainly within the Aida Formation. The Magnum vein system of Churchill Copper Mines is the best known and is probably fairly representative. The system comprises a number of quartz-ankerite veins, mineralized with chalcopyrite and lesser pyrite, occurring in a steep northeasterly zone of deformation and subsequent dyke intrusion within otherwise little-deformed sedimentary rocks.

SURVEY PROCEDURE

A north-south baseline was chained, compassed and marked by orange flagging every 100 feet. The samples were taken every 100 feet along the baseline and along east-west survey lines. The survey lines cross the baseline at 400-foot intervals.

The samples were dug out with a mattock or a prospector's pick at an 8-inch depth and placed in brown, wet-strength paper bags with grid co-ordinates marked thereon.

TESTING PROCEDURE

All samples were tested by Acme Analytical Laboratories Ltd. of Burnaby, B.C. The sample is first thoroughly dried and then sifted through an -80 mesh screen. A measured amount of the sifted material is then put into a test tube with subsequent measured additions of a solution of perchloric and nitric acid. This mixture is next heated for a certain length of time. The parts per million (ppm) copper is then measured by atomic absorption.

TREATMENT OF DATA

The values in ppm copper were first grouped into a logarithmic interval of 0.10. Samples taken along the main stream (on the baseline) and one of its tributaries (L - 0) were not included since the values were significantly higher and, therefore, would bias the parameters higher than they should be. The cumulative frequency for each interval was then calculated and then plotted against the correlating interval to obtain the logarithmic cumulative frequency graph as shown on Figure 4.

The coefficient of deviation, indicative of the range or spread of values was calculated to be 0.26, an average figure. Therefore, the spread of values is moderate.

The graph shows the mean background value to be about 17 ppm taken at the 50% level. The sub-anomalous threshold value (a term used by the writer to denote the minimum value that is not considered anomalous but still important as an indicator of mineralization) is taken at one standard deviation from the mean background value which is at the 16% level and is in this case 32 ppm. The anomalous threshold value is two standard deviations away at the 2½% level and is on this property 57 ppm.

The graph shows a break at the 5% level which therefore indicates that there is a less-than-average number of high copper values above 47 ppm on the By Claim Group.

The data was plotted on Sheet No. 1 at a scale of 1" to 400 feet. The data was then contoured at intervals of one standard deviation. This gave contours of 30, 55, 100, 190 and 350 ppm. The 30 ppm sub-anomalous threshold contour was dashed in whereas the anomalous contours (55 ppm and above) were drawn in solid.

DISCUSSION OF RESULTS

The results are in general relatively low, as can be seen on Sheet 1. There are only a few anomalous values and all of the anomalous zones are comprised largely of sub-anomalous values. The low values may be a result of very little copper mineralization, low mobility of copper ions, or very slow physical and chemical breakdown of copper minerals. There are 2 main anomalous zones, however, and these are labelled A and B, respectively.

Anomaly A is 2,200 to 3,200 feet long, 500 to 1,000 feet wide, and appears to be striking northerly. It is essentially composed of sub-anomalous values as only 6 are above 55 ppm.

The favoured Aida Formation, as determined from the G.S.C. geology map, underlays anomaly A. Larson observed black shales of the Aida Formation only 2,000 feet south of the anomaly. Also it appears that the anomalous zone occurs very close to a gabbroic dyke as mapped by the G.S.C. (not confirmed in field). It therefore follows that there is a good possibility that the causitive source of this anomaly is copper sulphides.

Anomaly B is at least 1,200 feet long, 200 to 800 feet wide, and is open on the north, south, and west ends. The strike of the causitive source is probably north-south. It is also essentially composed of sub-anomalous values with only one value being anomalous.

The G.S.C. map shows this anomaly to be also underlain by the Aida Formation. In addition, a gabbroic dyke is shown only a few hundred feet west of the anomaly. Therefore, it is also felt that there is a good possibility that this zone is reflecting copper sulphides. The one anomalous value has a magnitude of 400 ppm

and therefore indicates that the sample was picked up fairly close to the causative source.

Almost all of the values along the main creek are sub-anomalous. Consequently, it can almost conclusively be said that these relatively high values are a result of the transportation of copper ions by the creek from a source of copper mineralization. It appears that many of the transported copper ions are from a western tributary as the number of sub-anomalous values becomes less north (upstream) of this tributary. The tributary flows across anomaly B and perhaps anomaly A.

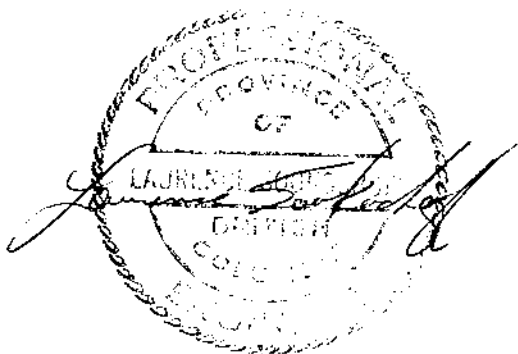
There are a number of other sub-anomalous values but these occur in small, isolated anomalies.

October 22, 1973

Respectively Submitted,
GEOTRONICS SURVEYS LTD.



David G. Mark
Geophysicist



BY CLAIM GROUP

REFERENCES

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1944.

Resume of
Professional and Technical Experience
of
Howard Larson, Geophysicist

Education

1971 Graduate of the University of British Columbia with a Bachelor's degree in Science (B.Sc.) in geophysics.

Experience

August 1971 to Present	Geotronics Surveys Ltd. Geophysicist in both mining and engineering geophysics.
May 1970 to September 1970	Tri-Con Exploration Surveys Ltd. Field Supervisor in geophysics.
May 1969 to September 1969	Atlas Explorations Ltd. Geochemical analyst and geophysical operator.
May 1968 to September 1968	Coast Eldridge Engineers and Chemists. Chemist's assistant on geochemical rock assays and soil samples.

Location of experience is British Columbia, Yukon, and the Northwest Territories.

Types of geophysical surveys experience are single and multi-channel seismic, induced polarization, resistivity, self-potential, magnetometer (air and ground), various types of electromagnetic, radiometric and soil sampling.

GEOPHYSICIST'S CERTIFICATE

I, DAVID G. MARK, of the City of Vancouver, in the Province of British Columbia, do hereby certify:

That I am a Consulting Geophysicist of Geotronics Surveys Ltd., with offices at 514 - 602 West Hastings Street, Vancouver 2, B.C.

I further certify that:

1. I am a graduate of the University of British Columbia (1968) and hold a B.Sc. degree in Geophysics.
2. I have been practising in my profession for the past five years and have been active in the mining industry for the past eight years.
3. I am an associate member of the Society of Exploration Geophysicists and a member of the European Association of Exploration Geophysicists.
4. This report is compiled from data obtained from a soil geochemistry survey carried out by Howard A. Larson, geophysicist, August and September during 1973, on the BY Claim Group, from references as mentioned under Selected Bibliography, and from a personal visit to the property and the area during the fall of 1969.
5. My interest in Tanjo Mines Ltd (NPL) and/or its properties is solely limited to a total number of 5000 shares.



David G. Mark
Geophysicist

October 22, 1973

ENGINEER'S CERTIFICATE

I, LAURENCE SOOKOCHOFF, 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 West Hastings Street, Vancouver 2, B.C.

I further certify that:

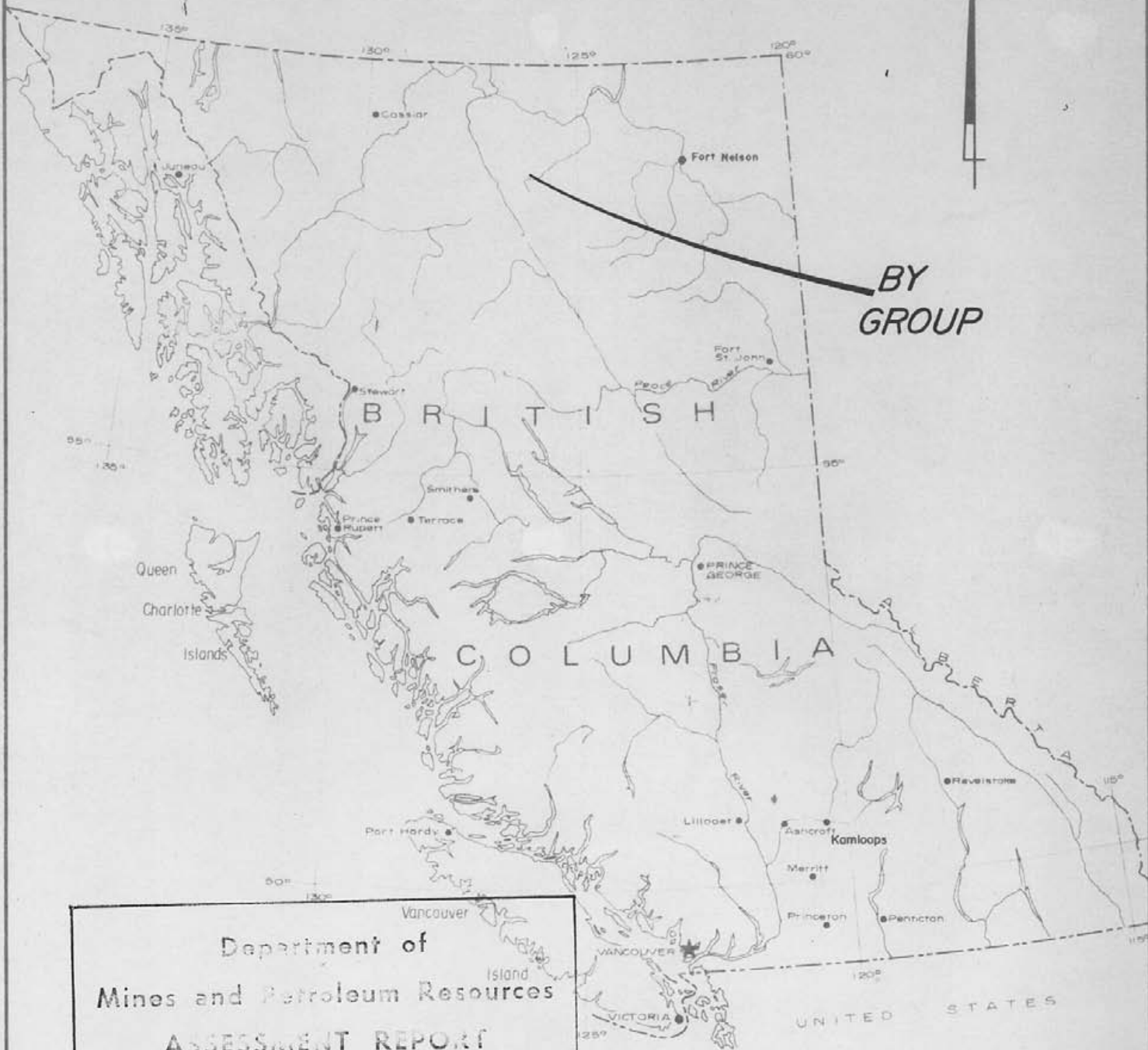
1. I am a graduate of the University of British Columbia (1966) and hold a B.Sc. degree in Geology.
2. I have been practising in my profession for the past six years.
3. I am registered with the Association of Professional Engineers of British Columbia.
4. I have studied the accompanying report dated October 22, 1973 on a soil geochemistry survey submitted by Geotronics Surveys Ltd., written by David G. Mark, geophysicist, and concur with findings therein.
5. I have no direct or indirect interest whatsoever in the property described herein, nor in the securities of Tanjo Mines Ltd (NPL), and do not expect to receive any interest therein.

A circular seal for the Association of Professional Engineers of British Columbia. The outer ring contains the text 'ASSOCIATION OF PROFESSIONAL ENGINEERS OF BRITISH COLUMBIA'. The inner circle contains 'PROVINCE OF'. A signature is written across the seal, and the name 'Laurence Sookochoff' is printed below it.
Laurence Sookochoff P. Eng.
Consulting Geologist

October 22, 1973

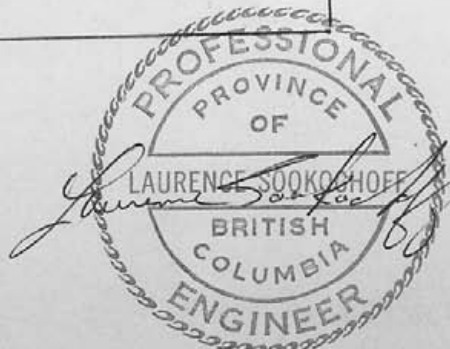


**BY
GROUP**

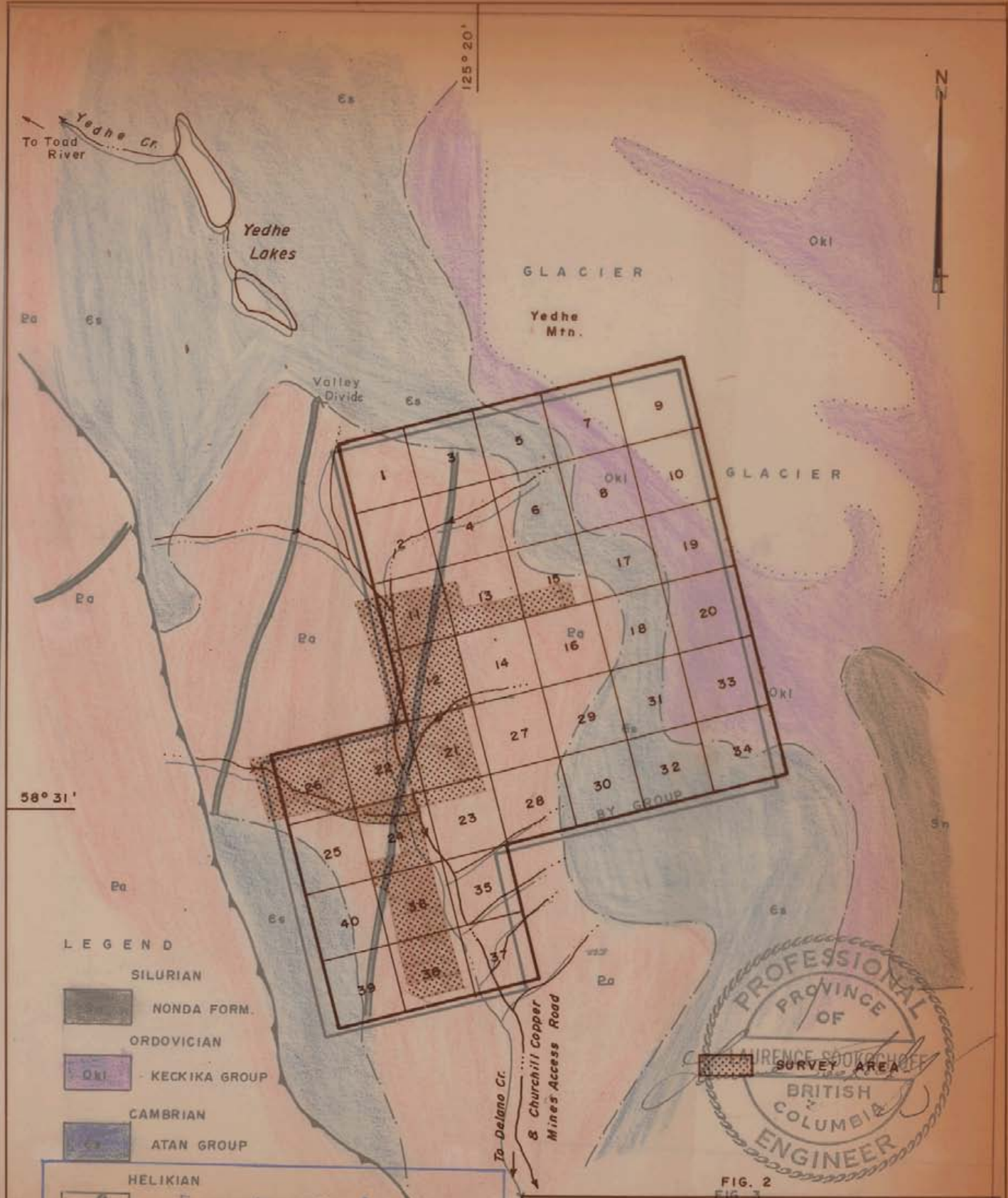


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ASSESSMENT REPORT
NO. **4641** MAP **#1**

FIG. 1



GEOTRONICS SURVEYS LTD.
TANJO MINES LTD.(N.P.L.)
BY GROUP
CHURCHILL COPPER AREA
LIARD M.D., B.C.
LOCATION MAP
SCALE 1" = 134 mi



58° 31'

125° 20'

LEGEND

- SILURIAN
 - NONDA FORM.
- ORDOVICIAN
 - KECKIKA GROUP
- CAMBRIAN
 - ATAN GROUP

Department of
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 INVESTIGATION REPORT

CONTACT
 NO. **4641** MAP #2

THRUST FAULT



FIG. 2
 FIG. 3

GEOTRONICS SURVEYS LTD.
 GEOTRONICS SURVEYS LTD.

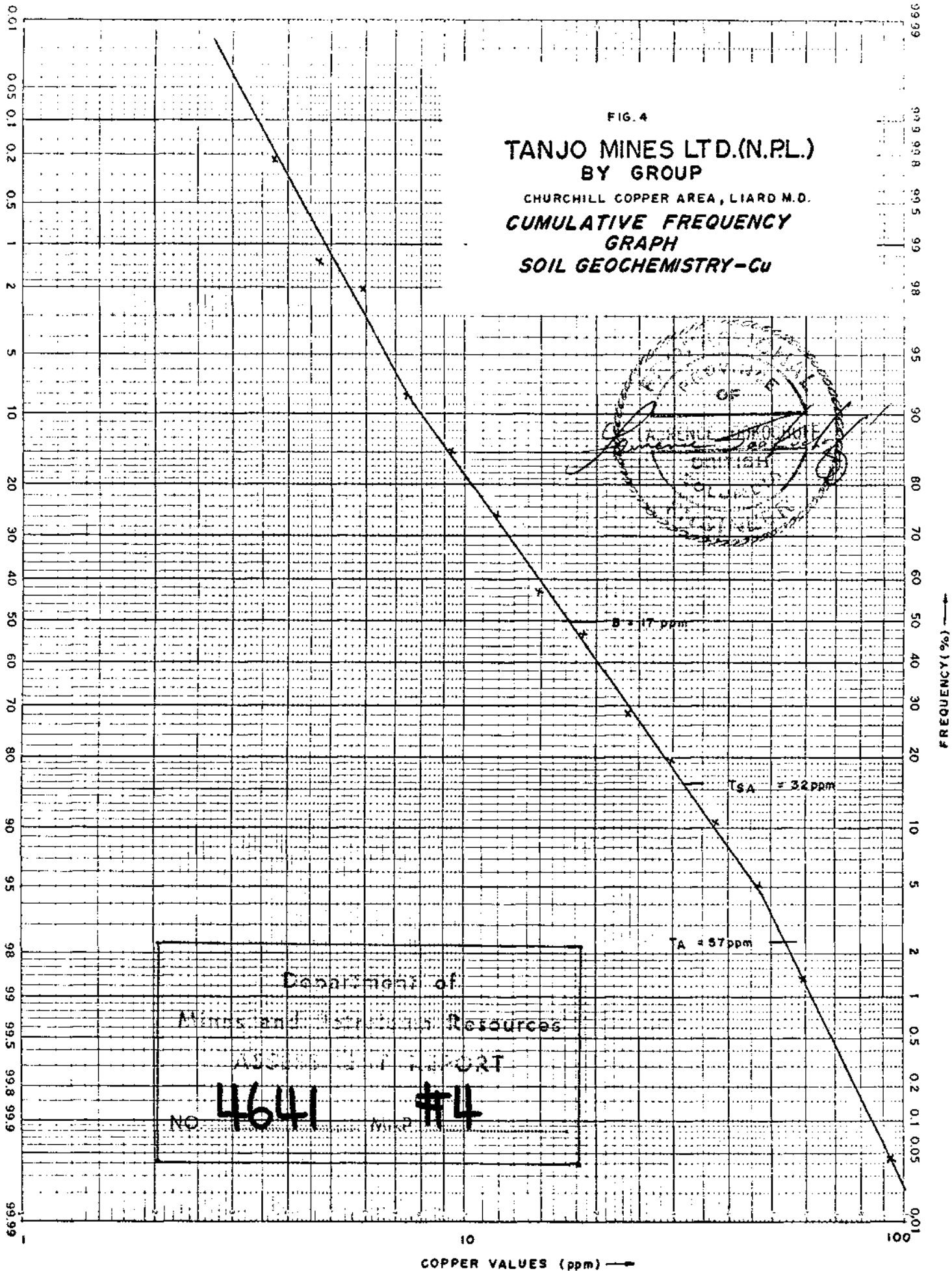
TANJO MINES LTD. (N.P.L.)
 BY GROUP
 CHURCHILL COPPER AREA, LIARD M.D.
 CHURCHILL COPPER AREA, LIARD M.D., B.C.

CLAIM MAP
GEOLOGY MAP

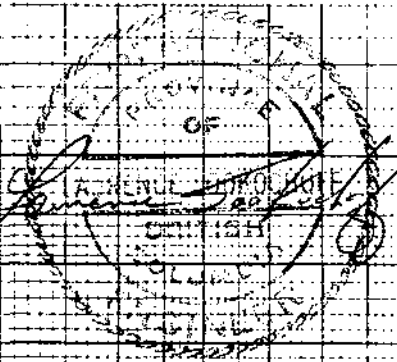
DRAWN BY PDT DRAFTING SERVICES	SCALE 1" = 5000' 1" = 3000'	DATE OCT 1973
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SKETCHED FROM TAYLOR & STOTT

FIG. 4
TANJO MINES LTD.(N.PL.)
BY GROUP
 CHURCHILL COPPER AREA, LIARD M.D.
CUMULATIVE FREQUENCY
GRAPH
SOIL GEOCHEMISTRY-Cu

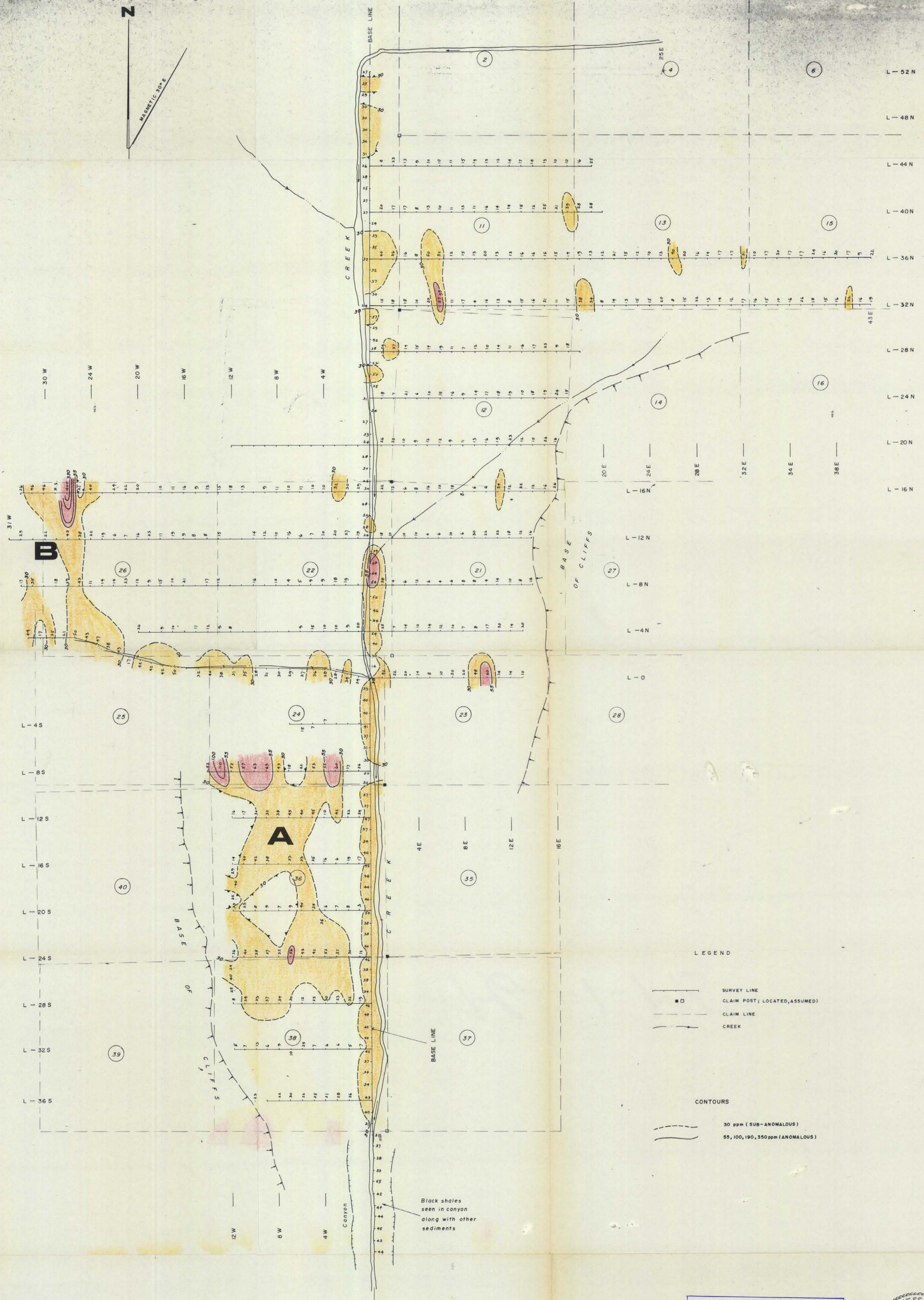


Department of
 Mines and Technical Resources
 ASSAY REPORT
 NO. **4641** Mine # **4**



10
 COPPER VALUES (ppm) →
 100

← FREQUENCY (%)



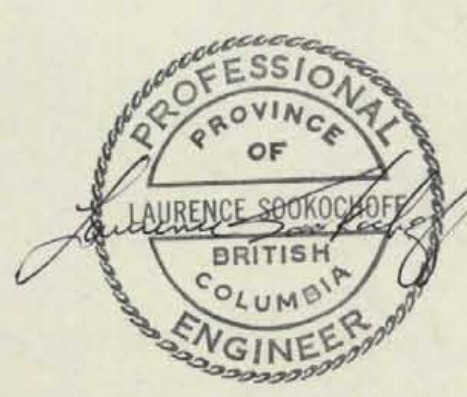
LEGEND

— SURVEY LINE
 ■ CLAIM POST (LOCATED, ASSUMED)
 --- CLAIM LINE
 --- CREEK

CONTOURS

--- 30 ppm (SUB-ANOMALOUS)
 --- 55, 100, 190, 350 ppm (ANOMALOUS)

Department of
 Mines and Petroleum Resources
 ASSESSMENT REPORT
 NO. **4641** MAP. #5



TO ACCOMPANY GEOCHEMICAL REPORT BY D. G. MARK, GEOPHYSICIST

GEOTRONICS SURVEYS LTD.

TANJO MINES LTD.(N.P.L.)
"BY GROUP"

CHURCHILL COPPER AREA, LIARD M.D., B.C.

SOIL GEOCHEMISTRY-Cu
DATA & CONTOURS

DRAFTING SERVICES P. PECK	SCALE 1" = 400'	JOB No. 73-57	DATE OCT. 1973	SHEET 1
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4641-M5