4588

GEOPHYSICAL AND GEOCHEMICAL REPORT
on a Combined
MAGNETOMETER, VLF-EM and SOIL SAMPLING SURVEY
MUG CLAIM GROUP
Boulder Mountain Area, Similkameen MD BC
August 1973

92H/10W

MUG CLAIM GROUP: 3 miles N30W of Tulameen
49° 120° NW

N T S - 92 H/10W

Report by: David G. Mark
Geophysicist
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September 12, 1973

TABLE OF CONTENTS

	Page
SUMMARY	i
CONCLUSIONS	ii
RECOMMENDATIONS	iii
INTRODUCTION AND GENERAL REMARKS	1
PROPERTY	2
LOCATION AND ACCESS	2
PHYSIOGRAPHY	3
HISTORY OF PREVIOUS WORK	3
GEOLOGY	4
GEOPHYSICAL SURVEY	5
A. Instrumentation and Theory	5
B. Survey Procedure	6
C. Compilation of Data	7
D. Discussion of Results	7
GEOCHEMISTRY SURVEY-SOIL SAMPLING	
A. Survey Procedure	10
B. Testing Procedure	10
C. Treatment of Data	10
D. Discussion of Results	11
SELECTED BIBLIOGRAPHY	14
RESUME - BERNARD MORAAL	15
GEOPHYSICIST'S CERTIFICATE	16
ENGINEER'S CERTIFICATE	17

MAPS AND GRAPHS - AT END OF REPORT

	SCALE
#1 LOCATION MAP, Fig. 1	1" = 134 miles
#2 CLAIM MAP, Fig. 2	1" = 3,000 feet
#3 GEOLOGY MAP, Fig. 3	1" = 3,000 feet

#4 CUMULATIVE FREQUENCY GRAPH
MAGNETOMETER SURVEY
MAGNETIC DATA, Fig. 4

#5 CUMULATIVE FREQUENCY GRAPH
SOIL GEOCHEMISTRY
COPPER, Fig. 5

MAPS - IN POCKET

#6 MAGNETOMETER SURVEY DATA AND CONTOURS, SHEET 1	1" = 400 feet
#7 VLF-EM SURVEY - FRASER FILTER DATA AND CONTOURS, SHEET 2	1" = 400 feet
#8 SOIL GEOCHEMISTRY - COPPER DATA AND CONTOURS, SHEET 3	1" = 400 feet

SUMMARY:

A combined magnetometer, VLF-EM and soil geochemistry survey was completed over a portion of the MUG Claim group in the Tulameén Area, BC, during the month of August 1973. The purpose of the survey was to map lithological contacts, faults and shear zones, and to locate any potential areas of copper sulphide mineralization.

The claims are located on Boulder Mountain about 3 miles N30W of Tulameen. Access is by the Otter Valley road and a private road. The terrain varies from gentle to very steep on the sides of Perley and Lockie Creeks. The property is covered by a coniferous forest.

The GSC geology map shows that the MUG Claims are underlain by Nicola volcanics on the west side and granodiorite of the Coast Intrusions on the east. The Otter Intrusives occur off of the east side. No sulphide mineralization is so far known to be on these claims. Copper, lead and zinc sulphides with gold and silver values exist on the adjoining claims of the Gold River Mines property.

The magnetic survey was carried out using a portable vertical-component fluxgate magnetometer. The values were diurnally corrected, statistically analyzed, plotted and contoured at an 80-gamma interval. The VLF-EM results were Fraser-filtered plotted, and contoured at a 5-degree interval.

The soil samples were analyzed for copper. These results were statistically analyzed, plotted and contoured.

CONCLUSIONS:

1) The MUG Claims adjoin the southeast end of the Gold River Mines property on which occur copper, lead and zinc sulphides with gold and silver values.

2) The MUG Claims seem to exist on the same Nicola volcanic-granodiorite contact that exists on the adjoining claims of the Gold River property.

3) The magnetic survey seemed to more accurately delineate this contact than as mapped by the GSC.

4) The VLF-EM anomalies were few and of low intensity. Fault, shear, or fracture zones were probably the causitive sources. There was minor correlation with the magnetic and soil geochemistry copper surveys.

5) There was several copper soil anomalies which were quite localized. However, the anomalies over the copper showings to the west and northwest were localized also and therefore all anomalies could be reflecting copper sulphides of economic interest.

6) There is a possibility concluded from the results of all 3 surveys that the overburden is quite deep. The localization of the copper anomalies, however, tends to preclude this possiblity.

RECOMMENDATIONS:

From the conclusions outlined above, it is felt that the property warrants additional exploration.

1) The geology of the property should be thoroughly mapped.

This is very important for a more correct interpretation of geochemistry and geophysical surveys and for planning any future work. Special attention should be paid to the soil geochemistry copper anomalies.

2) Since zinc and lead mineralization are present on the Gold River property, the soil samples already taken should also be analyzed for lead and zinc.

3) Soil samples should be picked up around the copper anomalies on 100-foot grids.

4) The depth of overburden should be measured by seismic refraction.

5) Self-potential should be run across each soil sample anomaly. This worked well over the south showing.

6) Induced polarization should be carried out over the entire property. This also worked well on the Gold River property.

7) Depending on the above results, trenching and/or diamond drilling may then be recommended.

Respectfully submitted

GEOTRONICS SURVEYS LTD.

September 12, 1973

David G. Mark
Geophysicist

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
LAURENCE SOOKOCHOFF

GEOPHYSICAL - GEOCHEMICAL REPORT

on a Combined

MAGNETOMETER, VLF-EM, and SOIL SAMPLING SURVEY

MUG CLAIM GROUP

Boulder Mountain Area, Similkameen MD BC

INTRODUCTION AND GENERAL REMARKS

This report discusses the procedure, compilation and interpretation of a combined fluxgate magnetometer, very low frequency electromagnetic (VLF-EM), and geochemical soil sampling survey carried out on the MUG CLAIM GROUP on Boulder Mountain during August 1973.

The field work was carried out under the supervision of the writer. The number of line miles of survey completed was 10.2 and the number of soil samples taken was 496. The area covered by the survey is as shown on figure 2.

The objectives of these surveys were as follows:

1) To map contacts; in particular, to more accurately delineate the contact between the Nicola volcanics and a granodiorite of the Coast Intrusions that is shown on the GSC geology map. A magnetic survey is usually the best method for mapping contacts.

2) To map faults and shear zones. This objective was felt to be best met by a VLF-EM survey.

3) To outline areas of possible sulphide mineralization such as occur on the adjoining claims of Gold River Mines. This is best achieved by a geochemistry survey in which the samples are tested for copper. Of particular interest would be areas in which soil geochemistry anomalies correlated with those of VLF-EM and magnetic surveys.

PROPERTY:

The property is composed of 22 contiguous mineral claims called the MUG GROUP and held by location. They are described as follows and as shown on figure 2:

NAME	RECORD NUMBERS	EXPIRY DATE
JOSIE 1-6	38001 - 38006	Sept. 25, 1973
MUG 1-16	38282 - 38297	Oct. 24, 1973

LOCATION AND ACCESS:

The property is located on the southeast slope of Boulder Mountain approximately 3 miles N30W of Tulameen, BC.

The geological coordinates are 49°35' N latitude and 120°47.5' W longtitude.

Access to the MUG GROUP is best obtained by travelling 3 miles north from Tulameen along the west side of Otter Lake. 200 feet before the Otter Lake Park campground is a private road that branches west off the main road and the claims are located about 1.5 miles up this road. The road can be driven by 2 wheel drive vehicle. Keys to the gate are kept by Mr. Harold Adams.

PHYSIOGRAPHY:

The property is found within the physiographic unit known as the Thompson Plateau which forms part of the Interior Plateau system. Generally the terrain of this system is that of flat uplands dissected by creeks and rivers within steep sided ravines or valleys.

The elevation of the property itself ranges between 3,300 feet a.s.l. on Lockie Creek to approximately 4,400 feet a.s.l. on the slopeof Boulder Mountain. The terrain of the survey area ranges from gentle slopes to very steep slopes on the sides of Perley and Lockie Creeks.

Perley Creek flows southeasterly through the northern part of the claims and at the time carried no water. Lockie Creek flows easterly through the southern part and carried a small flow.

Pleistocene ice occupied the Thompson Plateau and thus much of the claim area is probably covered by glacial drift which could become fairly deep over the flatter areas.

The MUG CLAIMS are generally covered by pine trees, both logged and virgin. There is a small amount of deadfall and some moderately thick underbrush on the east side of the property.

HISTORY OF PREVIOUS WORK:

The MUG CLAIMS were staked in October, 1972 and were subsequently examined by L. Sookochoff, geological engineer. To the best of the writer's knowledge, no other work has been carried out on the property.

GEOLOGY:

The geological description of the property is largely taken from Rice. The geology map, figure 3, is sketched from Rice's map.

The olders rocks in the area are those of the Nicola Group (3) which are of Upper Triassic age and which probably underlie the western portion of the property. This group consists of varicoloured lava; argillite, tuff, limestone; chlorite and sericite schist. According to mapping carried out on the adjoining claims of the Gold River property to the northwest, the Nicola Group is comprised of greenstones, volcanics, and chlorite-sericite schists.

Reddish, coarse-grained, siliceous granodiorite (6) of the Coast Intrusions strikes in a northerly direction through the property. It is of Jurassic or later age.

Off of the eastern edge of the property are the Otter Intrusions (14) of Upper Cretaceous or later age. This group consists of pink and grey granite and granodiorite.

The main fault of the area is the north-striking Otter Lake fault which is found on the eastern edge of Otter Lake.

The mineralization which occurs on the adjoining claims of the Gold River property, consists of chalcopyrite in stockwork of quartz veins with replacement in the host rock as well as galena, sphalerite and gold in quartz veins up to six feet wide. Silver values are also present. The mineralization occurs in a greenstone and within sericitic schists formed by intense faulting in the area.

As can be seen on the GSC map, many other mineral occurrences, especially copper, are found in the immediate vicinity of the MUG CLAIMS.

GEOPHYSICAL SURVEY:

A. Instrumentation and Theory:

1. Magnetometer - The magnetic survey was carried out using a portable vertical component Model G-110 fluxgate magnetometer manufactured by Sabre Electronic Instruments Ltd. of Vancouver B.C. This is a visual-null type instrument using a digital dial readout with a range of 100,000 gammas and a reading accuracy of 10 gammas. The G-110 has a temperature co-efficient of 2 gammas per degree centigrade.

Only two commonly occuring minerals are strongly magnetic; magnetite and pyrrhotite. Hence, magnetic surveys are used to detect the presence of these minerals in varying concentrations. Magnetic data are also useful as a reconnaissance tool for mapping geologic lithology and structure since different rock types have different background amounts of magnetite and/or pyrrhotite.

2. VLF-EM - A VLF-EM receiver, Model G-28 manufactured by Sabre Electronic Instruments Ltd. of Vancouver, B.C. was used for the survey. This instrument is designed to measure the electromagnetic component of the very low frequency field (VLF), transmitted at 18.6 KHz from Seattle, Washington.

In all electromagnetic prospecting, a transmitter produces an alternating magnetic field (primary) by a strong alternating current usually through a coil of wire. If a conductive mass such as a sulphide body is within this magnetic field, a secondary alternating current is induced

within it which in turn induces a secondary magnetic field that distorts the primary magnetic field. It is this distortion that the EM receiver measures. The VLF-EM uses a frequency range from 16 to 24 KHz. whereas most EM instruments use frequencies ranging from a few hundred to a few thousand Hz. Because of its relatively high frequency, the VLF-EM can pick up bodies of a much lower conductivity and therefore is more susceptible to clay beds, electrolyte-filling fault of shear zones and porous horizons, graphite, carbonaceous sediments, lithological contacts as well as sulphide bodies of too low a conductivity for other EM methods to pick up. Consequently the VLF-EM has additional uses in mapping structure and in picking up sulphide bodies of too low a conductivity for conventional EM methods and too small for induced polarization (in places it can be used instead of IP). However, its susceptibility to lower conductive bodies results in a number of anomalies, many of them difficult to explain and, thus, VLF-EM preferably should not be interpreted without a good geological knowledge of the property and/or other geophysical and geochemical surveys.

B. Survey Procedure:

A north-south base line was first flagged and blazed out along the claim line for the MUG 1-10 claims. East-west survey lines were then chained and compassed in at 400-foot intervals with the survey stations being marked by blue flagging at 100-foot intervals.

The magnetometer readings were taken at the 100-foot survey stations with the instrument always facing north. The magnetic diurnal change was monitored in the field by the closed loop method and double checked by a series of sub-base stations, spaced every 400 feet on the base lines. Only those diurnal changes greater than 20 gammas were corrected.

The VLF-EM readings were taken at the same 100-foot stations with the instrument always facing towards the transmitter at Seattle, Washington.

C. Compilation of Data:

1. Magnetic Survey: A cumulative frequency graph, figure 4, was drawn from all the magnetic data and the mean background value was read off to be 55,920 gammas. For ease of drafting 50,000 gammas were subtracted from all values plotted on Sheet 1. The data was then contoured at an 80-gamma interval with contours 55,820 (5,820) gammas and lower being dashed and those 55,980 (5,980) and above being solid.

2. VLF-EM Survey: Sheet 2 shows the VLF-EM results after they have been reduced by applying the Fraser filter. Filtered data is plotted between actual reading stations. The positive dip angle readings were contoured at intervals of 5^{o}.

   The Fraser filter is essentially a 4-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. Therefore, the noisy, non-contourable data are transformed into less noisy, contourable data. Another advantage of this filter is that a conductor that does not show up as a cross-over on the unfiltered data quite often will show up on the filtered data.

D. Discussion of Results:

1. Magnetic Survey: The magnetic field ranges from a low of 55,520 gammas to a high of 56,210 gammas, giving a range of 690 gammas. This is a relatively small range and indicates that the survey area is entirely underlain by one rock-type.

The cumulative-frequency graph is a relatively straight line except near the 2 extreme ends. Therefore this seems to also show that most of the property is underlain by a single rock-type. The 2 extremes may be reflecting small areas of different rock-types and/or slight concentrations of magnetite.

As shown on Sheet 1, the magnetic field is of lower intensity in the southwest part of the survey area and of higher intensity in the northeast part. The geology so far has not been mapped on the MUG GROUP. However, the writer did compare the magnetic survey map with the detailed geology map done by Sookochoff. From this, it's almost conclusive that the higher intensity area is underlain by granodiorite of the Coast Intrusions, and the lower intensity area, Nicola volcanics.

The strike of the alleged contact between the 2 rock-types appears to be about northwest. However, where the contact is located, is difficult to ascertain. There is a slight break in the cumulative frequency graph at the 55,860-gamma interval and therefore the areas outlined by the 55,820-gamma contour may be underlain by the Nicola rocks.

The horizontal gradient of the magnetic data (the change in magnetic intensity per horizontal distance), over the area that is probably underlain by the Nicola volcanics, is quite comparable to that of the magnetic test line carried out across the south copper showing, which is underlain by Nicola volcanics. This is additional evidence that the areas of less than 55,820 gammas are underlain by the Nicola rocks.

The intensities were quite different but this is highly likely caused by the 2 sets of readings taken at entirely 2 different times of the year.

The horizontal gradient over that area thought to be granodiorite cannot be compared as no magnetic testing has been done over known areas of granodiorite.

Over the Nicola volcanics the horizontal gradient of the present survey is very low when compared with that of the survey carried out on the Jackpot Copper claims one mile to the south. It is entirely possible that 2 different phases or units of the Nicola group underlie the 2 different properties. Another less probable reason is that the overburden is much thicker over the Gold River MUG CLAIMS.

2. VLF-EM Survey: The VLF-EM data, as can be seen on Sheet 2 is very quiet. The highest value is 12^{o} and the intensities of many of the anomalies are below 10^{o}. The intesities of the VLF-EM anomalies on the Jackpot MUG claims to the south were mugh higher. A possible reason for the difference is the Gold River Mug claims has deeper overburden. Or it may simply be that the causitive sources of the Gold River anomalies are of lower conductivity.

The anomaly on lines 0 and 4S near the baseline correlates very well with a magnetic high and therefore its causitive source may be fracture-filling magnetite.

There was very little correlation between the other VLF-EM anomalies and the magnetic data.

The other VLF-EM anomalies could well be caused by shear, fault, and/or fracture zones. The 2 anomalies along the lineation a-a' are probably caused by one source.

The causitive source of any of the anomalies could also be lead or copper sulphides. However, the correlation between the VLF-EM anomalies and the soil geochemistry anomalies is poor.

GEOCHEMISTRY SURVEY - SOIL SAMPLING:

A. Survey Procedure:

The samples were picked up at 100-foot centres on the 400-foot separated survey lines. Samples were taken at an approximately 6- to 10- inch depth with a mattock and placed in brown wet-strength paper bags with grid co-ordinates marked thereon. The soil horizon tested was largely B. A note was made of any extraordinary soil conditions that may give rise to misleading assay results.

The overburden on most of the ground sampled consisted of very rocky soil or gravel. Because of this sample bags were filled as much as possible to ensure enough material for assaying.

B. Testing Procedure:

All samples were tested by Acme Analytical Laboratories Ltd. of Burnaby BC. The sample is first thoroughly dried and then sifted through a -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.

C. Treatment of Data:

The values in ppm copper were first grouped into a logarithmic interval of 0.10. 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 in figure 5.

The coefficient of deviation, indicative of the range or spread of values was calculated to be 0.26, a close to average figure.

The graph shows the mean background value to be about 19 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 about 28 ppm. The anomalous threshold value is two standard deviations away at the 2½% level and is on this property 42 ppm.

The graph shows a break at the 10% level which therefore indicates that there is an excess of high copper values on the MUG Claim Group. This is usually the case where copper sulphide mineralization occurs.

The results on Sheet 3 were contoured at approximately an interval equal to one standard deviation. This gave a sub-anomalous contour of 30 ppm (which was dashed in) and anomalous contours of 40, 60, 90, and 135 ppm (which were drawn in solid).

D. Discussion of Results:

The background and threshold values for copper over the Gold River MUG claims are lower than those over the Jackpot Copper MUG claims. This therefore seems to preclude that the Gold River MUG claims are underlain by thick overburden. However, the Gold River MUG Claim values are lower than that over the area between the north and south copper showings on the adjacent claims. Therefore the lower values may be caused by thicker overburden.

Contrary evidence however to the last-mentioned possibility is that the anomalies as shown on Sheet 3 are very localized and some are of relatively high intensity. If the overburden was quite deep, then the copper soil values would be attenuated much more.

The localization of these values is very similar to that of the soil geochemistry survey carried out between the north, middle and south copper showings on Gold River's adjacent claims. The whole survey area was underlain by Nicola volcanics. This introduces the possibility that most of the MUG GROUP is underlain by Nicola volcanics. However, no soil geochemistry was done on the granodiorite on the adjacent claims.

The anomalies labelled by the letters A to E correlate quite well with magnetic highs. The copper mineralization of these anomalies is therefore associated with magnetite. In support of this, there is a small magnetic high over the south copper showing.

Anomaly A, being the largest is by far the most interesting. It is a least 1,200 feet long, from 200 to 600 feet wide and is open on the north and east sides. its strike appears to be north-south.

If the magnetic survey interpretation is correct, the anomaly is underlain by granodiorite.

Because of the low copper ion mobility and resulting localization of anomalies over the north, south and middle upper showings, the rest of the anomalies could easily be indicative of fairly substantial amounts of copper sulphides. This is true of one-value anomalies as well as multi-anomalies, and is especially true of those anomalies that are felt to be underlain by Nicola volcanics.

Respectfully submitted
GEOTRONICS SURVEYS LTD.

David G. Mark
Geophysicist

September 12, 1973

SELECTED BIBLIOGRAPHY

FRASER, D.C., Contouring of VLF-EM Data, Geophysics, Vol. 34, No 6 pp 958-967, 1969.

LEPELTIER, Claude, A Simplified Statistical Treatment of Geochemical Data by Graphical Representation, Economical Geology. Vol. 64 pp 538 - 550, 1969.

MARK, D.G., Geochemical Report on a Soil Sample Survey, Hawk and Hope Claim Groups, Tulameen Area, Similkameen, M.D. BC Geotronics Surveys Ltd., November 15, 1972.

MARK, D.G., Geophysical-Geochemical Report on IP, Resistivity, SP, VLF-EM, Horizontal Shootback EM, Vertical Loop EM, Magnetometer, and Soil Sample Surveys, Hawk and Hope Claim Groups, Tulameen Area, Similkameen, M.D. BC Geotronics Surveys Ltd., December 28, 1972.

MARK, D.G., Geophysical and Geochemical Report on a Combined Magnetometer, VLF-EM, and Soil Sample Survey, MUG Claim Group, Mt. Riddell Area, Similkameen M.D., BC. Geotronics Surveys Ltd., May 28, 1973.

MINISTER OF MINES, B.C. Annual Reports
1901, pp. 1088-1178
1922, p. 168
1933, pp. 173-174
1934, pp. D22-23
1937, pp. D27-28

MITCHELL, J.A. Geochemical Report, Cousin Jack Group, Similkameen M.D., BC for Gold River Mines Ltd., (NPL), 1971

PRETO, V.A. Geology of Copper Mountain, Bull 59, BC Dept. of Mines and Pet Resources, 1972.

RICE, H.M.A. Geology and Mineral Deposits of the Princeton Map Area, British Columbia. Geol. Surv. of Can. Mem. 243, 1960.

SOOKOCHOFF, L. Preliminary Notes on Geology of Gold River Property Tulameen Area, T. R. Tough & Associates Ltd., November, 1972

TOUGH, T.R., Summary Geological Report on the Boulder Mountain Property of Gold River Mines Ltd. (NPL) Tulameen Area, Similkameen M.D., BC, T.R. Tough & Associates Ltd., September 1972.

RESUME OF EDUCATION AND FIELD EXPERIENCE OF

BERNARD MORAAL

Education

- Graduated with equivalent of Grade 12 from ATENAS ACADEMY, Chillan, Chile.
- Post-Graduate courses in cabinet-making and tourism.

Experience

1972 to the present date - Crew chief for GEOTRONICS SURVEYS LTD.
Experience includes staking, linecutting, soil sampling, magnetometer, VLF-EM, vertical loop EM, shootback EM, self-potential, and induced polarization surveys.

1970 One month of navigating on aero-photographic surveys for Department of Transportation, Chile.

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 magnetometer, VLF-EM and soil sampling surveys carried out by B. Moraal under my supervision during August 1973 on the MUG Claim Group, and pertinent data from published maps and reports as listed under Selected Bibliography.

5. I have no direct or indirect interest in the properties or securities of Gold River Mines and Enterprises Ltd. (NPL), Vancouver, British Columbia, nor do I expect to receive any interest therein.

David G. Mark
Geophysicist

September 12, 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 September 12, 1973 on Magnetometer, VLF-EM and Soil Geochemistry surveys submitted by Geotronic 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 Gold River Mines and Enterprises Ltd. (NPL), and do not expect to receive any interest therein.

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
LAURENCE SOOKOCHOFF

Laurence Sookochoff, P. Eng
Consulting Geologist

September 12, 1973

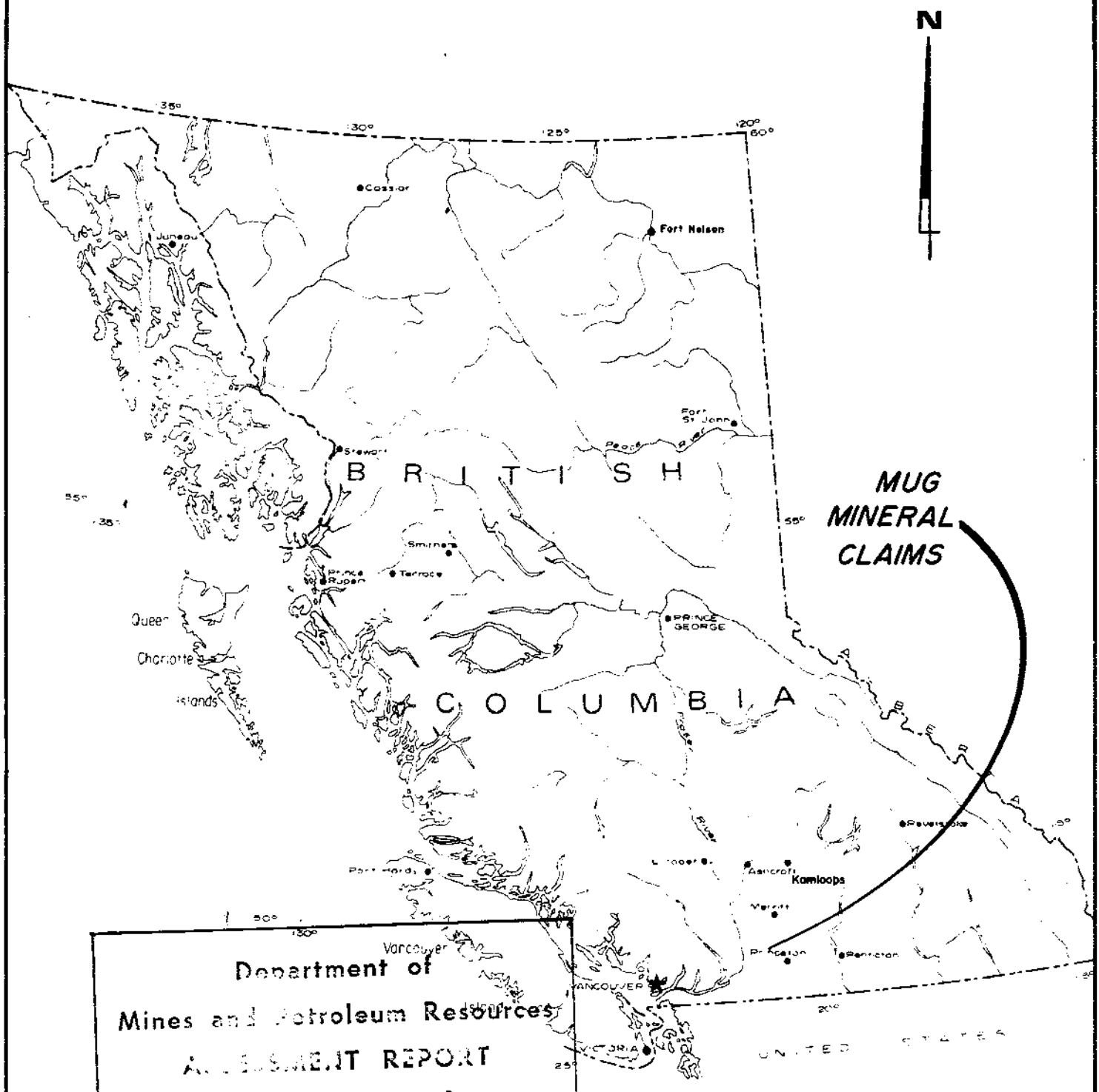


FIG. 1

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
LAURENCE SOOKOCHOFF

GEOTRONICS SURVEYS LTD.

GOLD RIVER MINES & ENTERPRISES LTD.
MUG CLAIMS

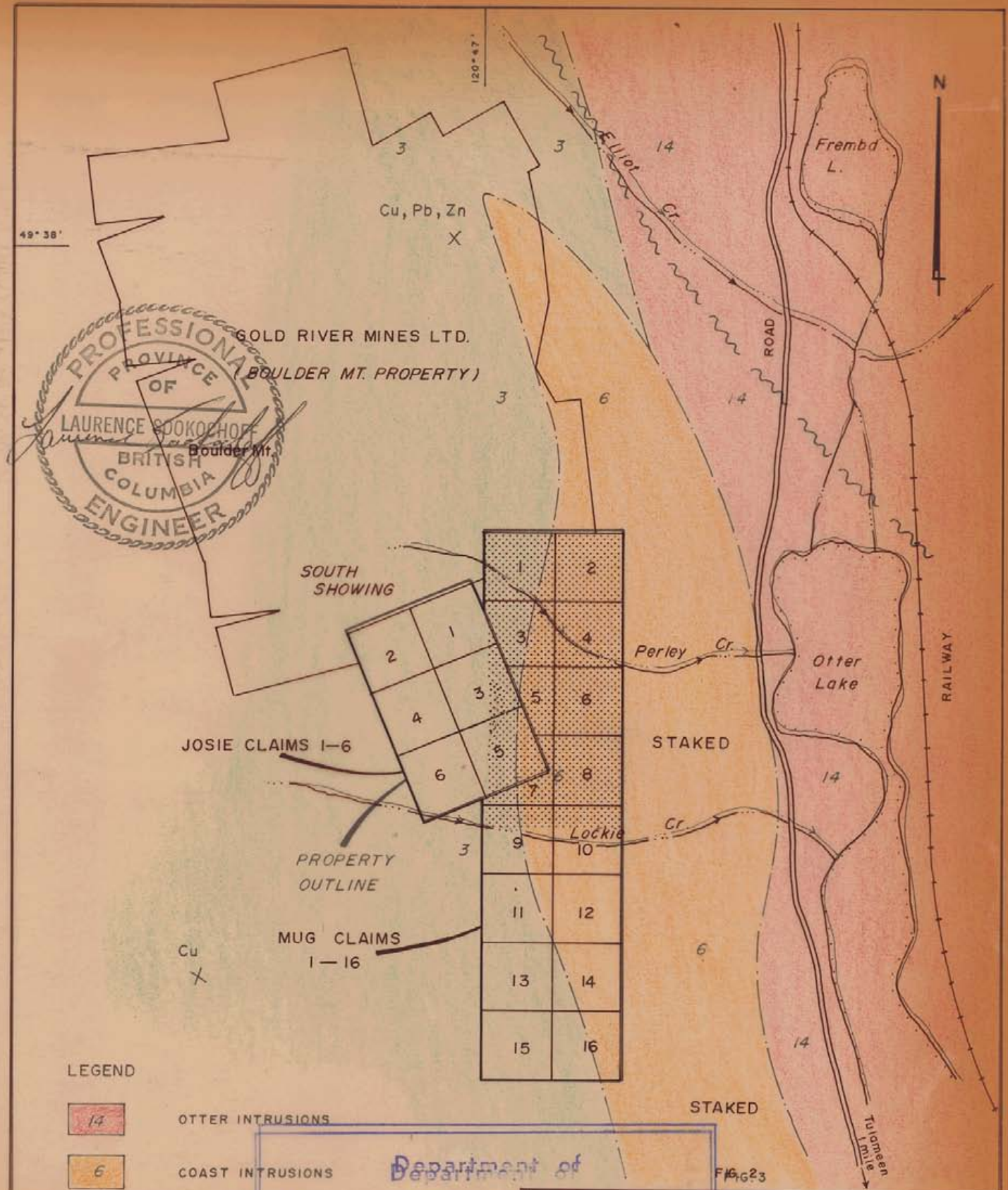
SIMILKAMEEN M.D., B.C.

LOCATION MAP

SCALE 1" = 134 mi

DRAWN. PDT		DATE AUG. '73

PDT



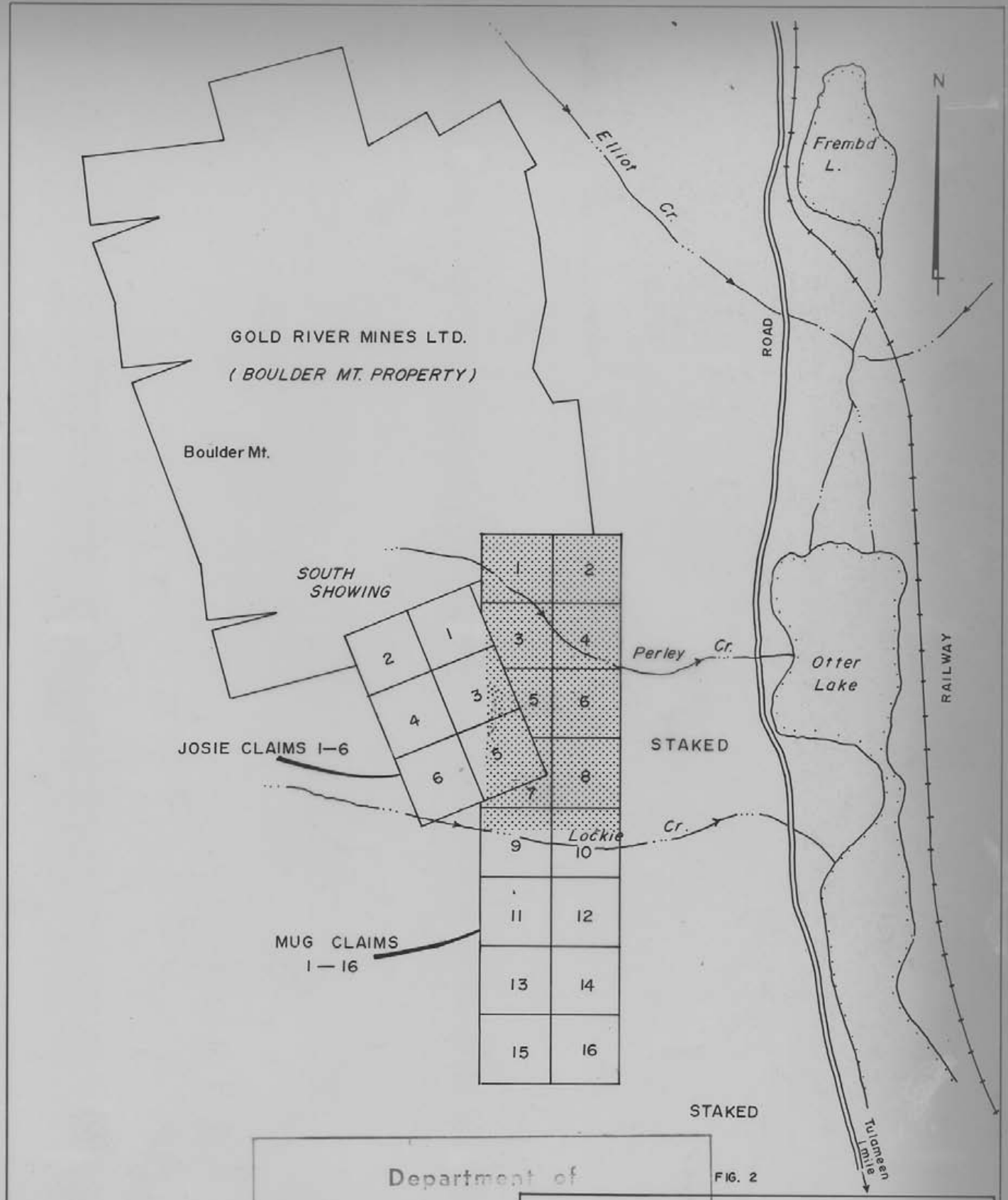


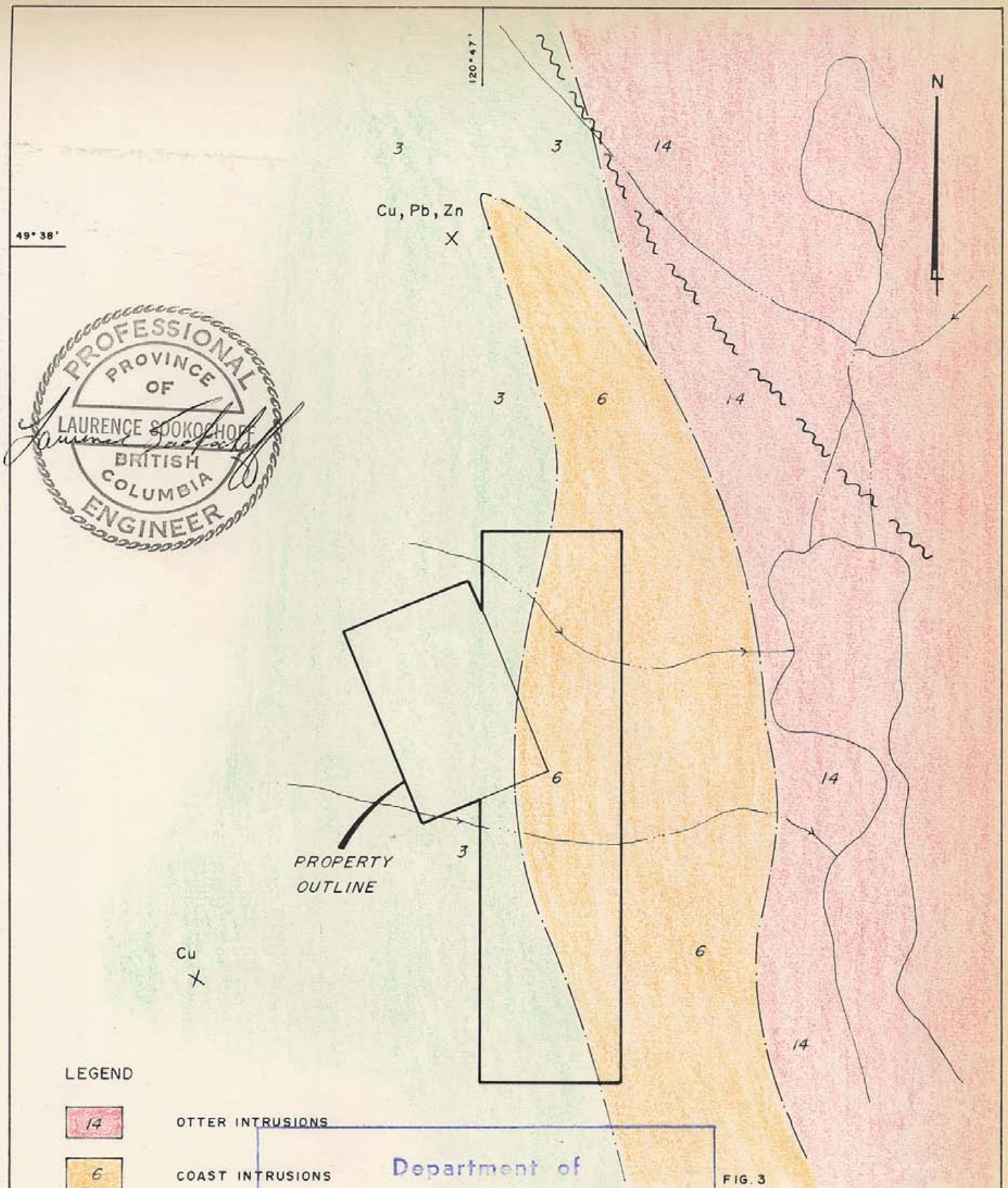
FIG. 2

GEOTRONICS SURVEYS LTD.

GOLD RIVER MINES & ENTERPRISES LTD.
MUG CLAIMS
SIMILKAMEEN M.D., B.C.

CLAIM MAP

DRAWN BY	SCALE	DATE
PDT DRAFTING SERVICES	1" = 3000'	AUG. 1973



PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
LAURENCE SOOKOCHOFF

FIG. 3

GEOTRONICS SURVEYS LTD.

GOLD RIVER MINES & ENTERPRISES LTD.
MUG CLAIMS
SIMILKAMEEN M.D., B.C.

GEOLOGY MAP

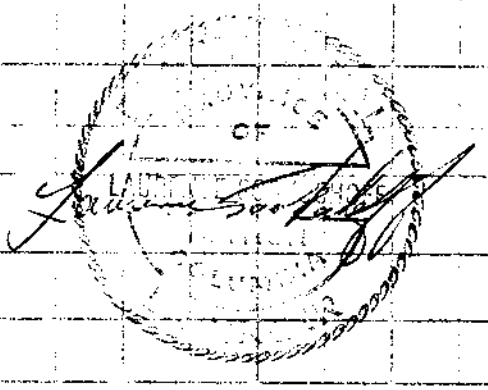
DRAWN BY	SCALE	DATE
PDT DRAFTING SERVICES	1" = 3000'	AUG. 1973

SKETCHED FROM H.A. RICE

FIG. 4

GOLD RIVER MINES & ENTERPRISES LTD.
MUG CLAIMS
SIMILKAMEEN M.D., B.C.

CUMULATIVE FREQUENCY GRAPH
MAGNETIC DATA



FREQUENCY (%) ⟶

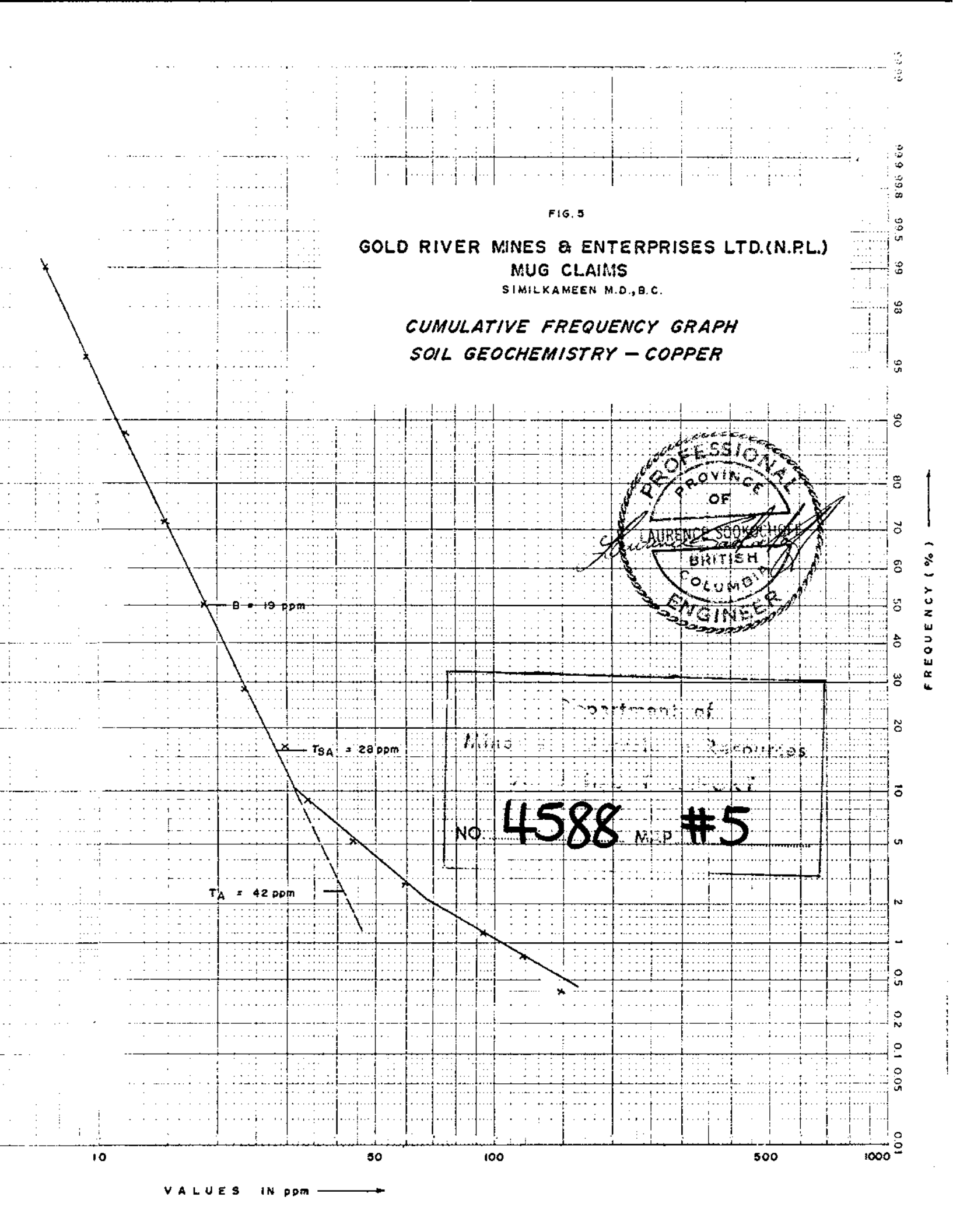
5500 5540 5580 5620 5660 5700 5740 5780 5820 5860 5900 5940 5980 6020 6060 6100 6140 6180 6220 6260

MAGNETIC VALUES (GAMMAS) ⟶

FIG. 5

GOLD RIVER MINES & ENTERPRISES LTD.(N.P.L.)
MUG CLAIMS
SIMILKAMEEN M.D., B.C.

CUMULATIVE FREQUENCY GRAPH
SOIL GEOCHEMISTRY — COPPER



PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
LAURENCE SOOKOCHOFF

Department of Mines & Petroleum Resources
NO. 4588 M.P. #5

COST BREAKDOWN

MAGNETOMETER, VLF-EM AND SOIL GEOCHEMISTRY SURVEYS

ON THE

MUG CLAIM GROUP

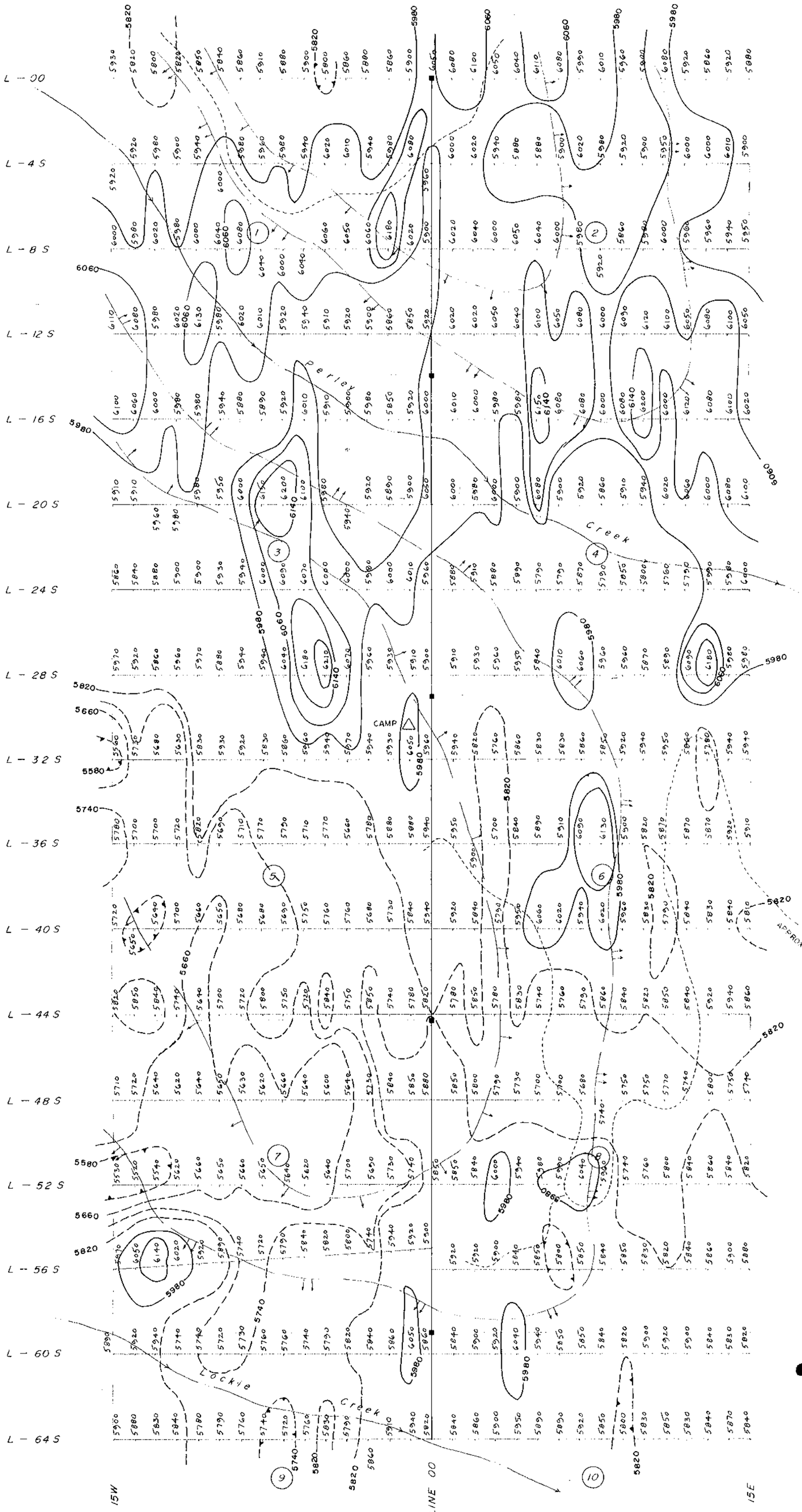
BOULDER MOUNTAIN AREA, SIMILKAMEEN, M.D., B.C.

B. Moraal, crew chief and instrument operator @ $85/day for 21 days	$ 1,785.00
M. Lokvenc, instrument operator, $65/day for 21 days	1,365.00
1 G-110 Magnetometer @ $20/day for 21 days	420.00
1 G-28 VLF-EM insturment @ $20/day for 21 days	420.00
1 4-wheel drive rental @ $30/day for 21 days	630.00
Survey Supplies	100.00
Geochemical Analysis @ $1.25/sample for 496 samples	620.00
Mapping and Geophysical report	800.00
Engineering fees	300.00
	$ 6,440.00

Declared before me at the City of Vancouver, in the Province of British Columbia, this 19 day of Sept. 1973, A.D.

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

Geotronics Surveys Ltd.



N

23°

MAGNETIC

LEGEND

- SURVEY LINE
- ROAD (4 WHEEL DRIVE)
- CREEK
- CLAIM POST
- CLAIM LINE
- SLOPE (MEDIUM STEEP, STEEP)
- 8 MUG CLAIM No.

NOTE

READINGS ARE IN GAMMAS.

CONTOUR INTERVAL IS 80 GAMMAS.

5900 GAMMAS CONTOUR IS NOT DRAWN IN.

4588 M6

PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA LAURENCE SOC

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

GEOTRONICS SURVEYS LTD

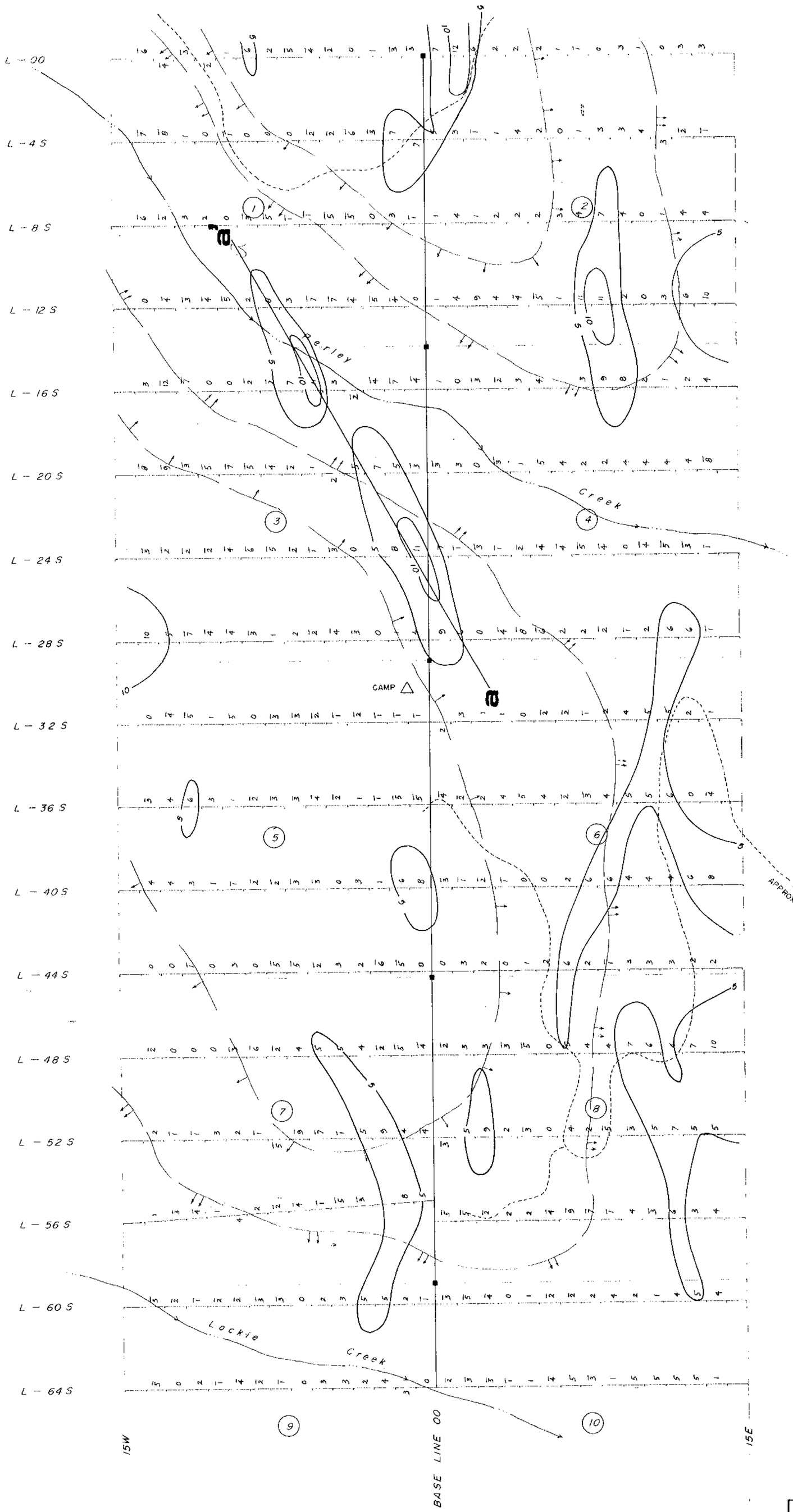
GOLD RIVER MINES & ENTERPRISES LTD.(N.P.L.)

MUG CLAIMS

PRINCETON AREA, SIMILKAMEEN M.D., B.C.

MAGNETOMETER SURVEY DATA & CONTOURS

DRAWN	SCALE	JOB No.	DATE	SHEET No.
P. PECEK	1" = 400'	73—61	August 1973	1



N

23°

MAGNETIC

SEATTLE TRANSMITTER 18.6 KHz

S 15° W

TULAMEEN APPROX. 3 MILES

LEGEND

- SURVEY LINE
- ROAD (4 WHEEL DRIVE)
- CREEK
- CLAIM POST
- CLAIM LINE
- SLOPE (MEDIUM STEEP, STEEP)
- 8 MUG CLAIM No.

NOTE : READINGS ARE IN DEGREES.

CONTOUR INTERVAL IS 5°

4588

M7

PROVINCE OF BRITISH COLUMBIA LAURENCE SOOKOCHOFF ENGINEER

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

GEOTRONICS SURVEYS LTD.

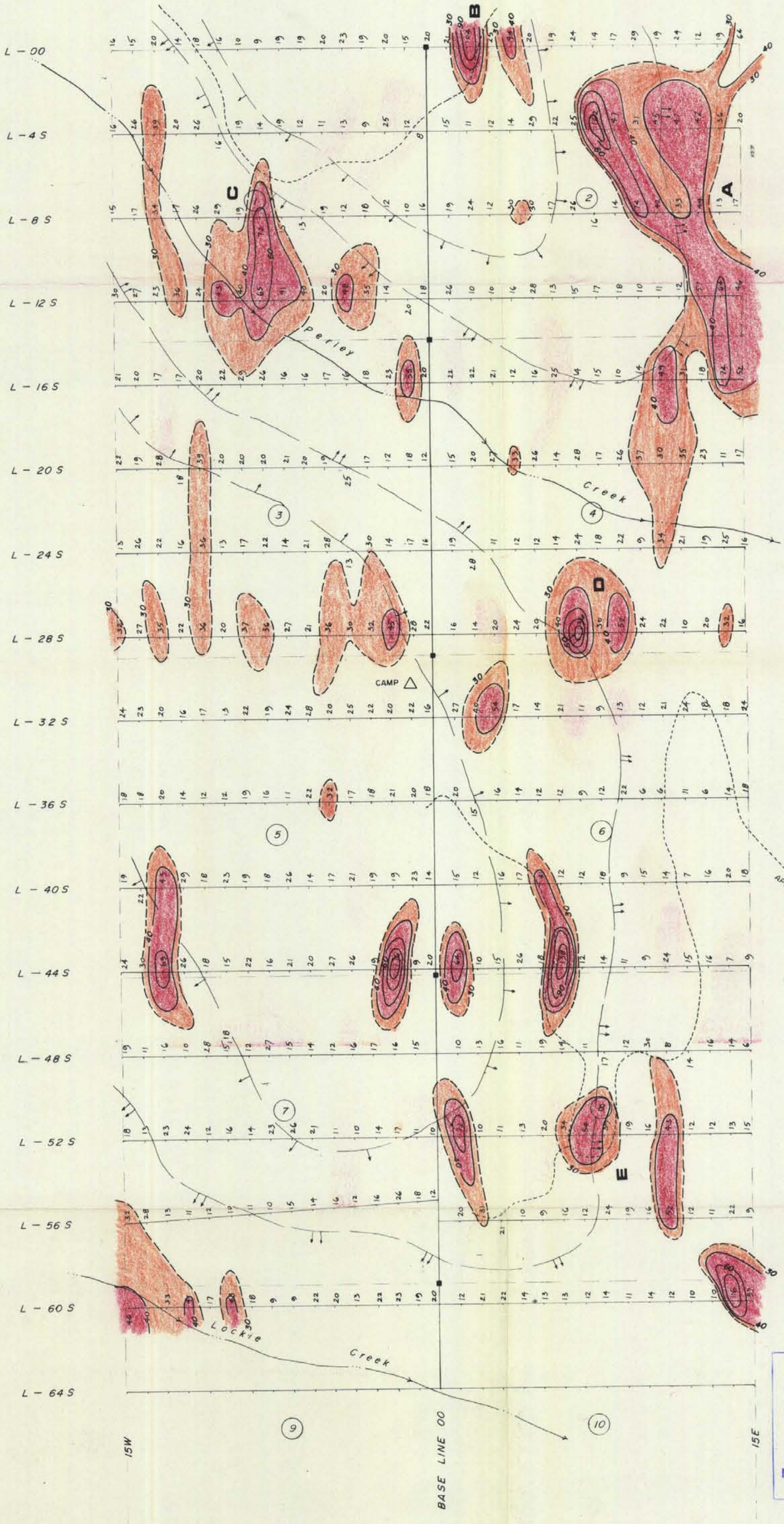
GOLD RIVER MINES & ENTERPRISES LTD.(N.P.L.)

MUG CLAIMS

PRINCETON AREA, SIMILKAMEEN M.D., B.C.

VLF — EM SURVEY — FRASER FILTER DATA & CONTOURS

DRAWN	SCALE	JOB No.	DATE	SHEET No.
P. PECEK	1" = 400'	73—61	August 1973	2



N

MAGNETIC

LEGEND

- SURVEY LINE
- ROAD (4 WHEEL DRIVE)
- CREEK
- CLAIM POST
- CLAIM LINE
- SLOPE (MEDIUM STEEP, STEEP)
- 8 MUG CLAIM No.

4588 M8

NOTE : READINGS ARE IN ppm.

CONTOURS

30 ppm

40, 60, 90, 135 ppm

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

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
LAURENCE SOUKOCHOFF

GEOTRONICS SURVEYS LTD.

GOLD RIVER MINES & ENTERPRISES LTD.(N.P.L.)

MUG CLAIMS

PRINCETON AREA, SIMILKAMEEN M.D., B.C.

GEOCHEMISTRY SOIL SAMPLING—COPPER DATA & CONTOURS

DRAWN	SCALE	JOB No.	DATE	SHEET No.
P. PECEK	1" = 400'	73—61	August 1973	3