Box 7

GEOPHYSICAL - GEOCHEMICAL REPORT
HAWK AND HOPE CLAIM GROUPS

Tulameen Area, Similkameen M. D.
Gold River Mines Ltd. (NPL)
N.T.S. 92-H-10W

by David G. Mark, Geotronics Surveys Ltd.

December 28, 1972

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., B.C.

NOVEMBER, DECEMBER, 1972

Hawk and Hope Claim Groups:	4.5 miles N 30 W of Tulameen
:	49 degrees 120 degrees NW
N.T.S.:	92 H/10W

Written for:

Gold River Mines Ltd. (NPL)
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by:

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December 28, 1972

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SUMMARY

On the Hawk and Hope Claim groups, various methods of geophysical surveys were tested over the main showings, and some of these were continued over the rest of the property during November and December, 1972. The work was carried out under a geophysical operator and a geophyscist and under general supervision of the writer. The objects were to find out if the three known zones extended and/or joined together, to test the copper soil sample zones, and to locate any additional zones if they existed.

In addition to the above work, detailed soil sampling was carried out around the showings. Also, the writer re-evaluated the soil sample results from the 1971 survey.

The property consists of 61 claims and Crown grants and the registered owner is Gold River Mines Ltd. (NPL). It is located 4.5 miles N. 30 W. of Tulameen. Access is good except that a four-wheel drive vehicle is required. The terrain is fairly gentle except on the north-eastern part where the slope becomes quite prominent. Water on the property is limited to a few small creeks. Good stands of timber cover the property with little undergrowth.

The property is almost entirely covered by schists, greenstones and volcanics of the Nicola Group. To the immediate east occurs the Boulder granite and the Otter intrusive and six miles to the west is the Eagle granodiorite. Various types of alteration are found throughout the property, but mainly in the greenstone around the showings. Lead-zinc-copper mineralization is found in trenches and adits on the eastern part of the property. In addition, copper mineralization, mainly chalcopyrite, is found in three showings known as the south, middle, and north showings, respectively.

The IP survey was carried out using a time-domain portable instrument and a Wenner array with an electrode spread of 200 feet. From the results, the chargeability and resistivity values were calculated.

A Crone CEM instrument was used to carry out both the Horizontal shootback EM survey and the vertical loop EM survey. A frequency of 1810 Hz was used and on the horizontal shootback, a coil spacing of 200 feet was used.

The self-potential (SP) survey was carried out only over the three showings. One electrode was fixed and the other moving so that the SP was measured directly.

The VLF-EM was carried out with the IP survey. The data was reduced by applying the Fraser filter.

The magnetometer, a portable fluxgate type, was run only over the south showing on L - 20 N.

CONCLUSIONS

1. The detailed soil sampling has given a geochemical expression to the south and middle showing. It also has verified that the copper ion mobility is fairly low.

2. It has been verified that the main lead-zinc anomaly is found on the eastern side of copper anomaly AA'.

3. The chargeability, VLF-EM, and detailed soil sample results show that the south and middle showings do not join. It appears that the south showing strikes north to north-west and the middle showing, just east of north.

4. The chargeability and VLF-EM results show that the middle and north showings probably join. However, it should be pointed out that the zone between the two showings may not be mineralized with copper along its whole length.

5. The chargeability anomalous response over the south showing is fairly good, and over the middle and north showings, moderate. This is probably at least partly caused by different rock types over the three showings.

6. On the south showing the anomalous response between 1 and 2 msecs appears to be caused by disseminated pyrite and over 2 msecs. disseminated pyrite and chalcopyrite.

7. Over the middle and north showings, a lower anomalous response appears to be indictative of copper.

8. The eastern chargeability anomaly correlates excellently with the soil sample anomalies AA' and H. It appears also to continue on to anomalous zone E, which is supported by the VLF-EM, and anomaly G. The eastern anomalous zone has the same rock-type, porphyric greenstone, as the south showing.

9. The resistivity results do not map the lithological contacts as well as was hoped. However, the porphyritic greenstone and schists are largely reflected by values below 1200 ohm-meters.

10. The resistivity results correlate well with the chargeability results on the south showing and poorly on the middle and north showing. The eastern chargeability anomaly is found in a wide resistivity trough.

11. The SP results over the south showing correlate well with the known mineralization. The SP reflects the more massive mineralization and shows its dip to be to the west. Over the middle and north showings, the response is low.

12. Response from the horizontal shootback EM was very limited. A narrow high was found over the middle showing which correlates well with the SP anomaly.

13. The vertical loop EM response over the south showing is almost non-existent.

14. The VLF-EM response over the south showing appears to show a strike of north to north-west.

15. In a number of places, the VLF-EM has reflected faults and contacts.

16. The magnetometer response over the south showing is positive but barely above background.

RECOMMENDATIONS

1. As recommended in the writer's previous report, the soil sampling should be continued in detailed form between and around the main showings and within and around the copper anomalies obtained so far. Also, the sampling should be continued off the southeast end of the property to properly delineate anomaly G, and off the northwest end of the property to properly delineate anomalous zone E.

2. The IP survey should be continued over the rest of the property at a line spacing of 500 feet and a spacing of 200 feet where anomalous responses are obtained.

3. The VLF-EM should continue to be carried out with the IP survey.

4. The SP survey should be continued at least over any copper and chargeability anomalies, but preferably

over the whole property east of the baseline. Recommended line spacing is 500 feet and for detailing, 200 feet.

5. The horizontal shootback EM should be tested more thoroughly over the south showing before fully deciding whether or not it is useful to obtain information.

6. It is recommended not to continue with the vertical loop or magnetormeter surveys since their response was too negligible.

7. It is recommended to complete the above mentioned surveys before proceeding with diamond drilling. However, it is felt that diamond drilling can be continued over the south showing using the SP anomaly as the target. It should be remembered that the SP anomaly shows a dip of the body to the west and therefore the dip of the drill hole should be up to -45^{o} to the east.

It is felt there are good drill targets on the eastern chargeability anomaly , especially where values greater than 2.0 msecs. occur and where the correlation with the copper geochemistry is excellent. It is not certain which direction the causitive source dips but it should be assumed to be west. Therefore, the drill holes should also have a dip up to -45^{o} to the east.

Respectfully submitted,
Geotronics Surveys Ltd.

David G. Mark
Geophysicist.

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
T. R. TOUGH

December 28, 1972.

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HAWK AND HOPE CLAIM GROUPS

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

INTRODUCTION AND GENERAL REMARKS

This report discusses the survey procedures, compilation of results, and interpretation of various methods of geophysical surveys as mentioned in the title of the report. These were carried out during November and December over the Hawk and Hope Claim Groups.

Copper results of soil samples picked up on a detailed grid largely around the main showings, are discussed as well. In addition, the lead, zinc, and copper results of the 1971 survey were re-evaluated and are therefore also discussed.

The geophysical field work was carried out under the direct supervision of H.A. Larson, geophysicist, and A.T. LaRose, geophysical supervisor,and was under general supervision of the writer. The work was carried out in conjunction with T.R. Tough, consulting geologist on the property. The writer had made 3 previous visits to the property.

The several geophysical methods used on this property were tested over the main showings with the purpose of finding one method or more that would respond to the known sulphide mineralization. The objectives were then to find out if the zones extended and/or joined together, to test the copper soil sample zones, and to locate any additional zones if they existed.

Much of the following preliminary information has been presented in the writer's previous geochemical report and is given here only for the reader's convenience.

PROPERTY AND OWNERSHIP

The claims and crown grants of the property, which total 61, are placed into two claim groups named the Hawk and Hope Claim Groups respectively. They are described as follows and are shown on Figure 2.

HAWK GROUP (21)

CLAIMS

Name	Record No. or Tag No.	Expiry Date
Pit 1,2	29014, 25	October 21, 1974
Hope 11	33762	June 18, 1974
Hope 21-24	33772-75	June 18, 1974
Pit 3-6	33776-79	June 18, 1974
Hawk 1-4	29026-29	October 21, 1974
Worth 2 fr.	348154M (Tag No.)	November 3, 1973
Worth 3 fr.	348155M (Tag No.)	November 3, 1973

C R O W N   G R A N T S

Name	Lot No.	Mineral Lease	Expiry Date
Cousin Jack	L263	M-82	February 13, 1974
Freddie Burn	L270	M-84	June 24, 1974
Constitution	L282	M-87	December 18, 1974
International	L283	M-87	December 18, 1974

HOPE GROUP (40)

C L A I M S

Name	Record No. or Tag No.	Expiry Date
Ken 1, 2	29030, 31	October 21, 1974
JM 1, 2	28204, 05	September 1, 1974
Hope 1, 2	29022, 23	October 21, 1974
Hope 3-10	33754-61	June 18, 1974
Hope 12-20	33763-71	June 18, 1974
Rex 1-4	33780-83	June 18, 1974
Worth 1 fr.	348153 M (Tag No.)	November 3, 1973
Worth 4-8 fr.	348156M-60M (Tag No.)	November 3, 1973

C R O W N   G R A N T S

Name	Lot No.	Mineral Lease	Expiry Date
Morning	L265	M-83	June 24, 1974
Oskkosk	L266	M-83	June 24, 1974
Winnibago	L267	M-83	June 24, 1974
Black Bird	L268	M-83	June 24, 1974
Berlin Fraction	L269	M-83	June 24, 1974
Anaconda	L373	M-83	June 24, 1974
Ymir	L264	M-83	June 24, 1974

The property is registered in the name of Gold River Mines Ltd. (NPL) of Burnaby, British Columbia.

LOCATION AND ACCESS

The claim groups are located 4.5 miles N30W of the village of Tulameen on top of Boulder Mountain which is to the west of Otter Lake.

Geographical coordinates on the property are the latitudes of 49 degrees 36' and 37' N and the longitudes of 120 degrees 48' and 49' W.

Tulameen, mostly by gravel road, is found about fifteen miles northwest of Princeton, British Columbia. To reach the property, one travels about five miles north of Tulameen on the gravel road and then three miles west on a good hard-surface dirt road put in by Gold River Mines Ltd. (NPL). Four-wheel drive is required on this road, however, on account of one or two steep hills.

PHYSIOGRAPHY

The property is found within the southern part of the physiographic division known as the Thompson Plateau which is the southern part of the Interior Plateau system. The Thompson Plateau is characterized by gently rolling upland of low relief dissected by creeks and rivers producing steep valley sides.

Accordingly, the terrain is fairly even over most of the Gold River property except north of L-70N and east of 30E where the slope becomes quite pronounced. The property varies in elevation from under 3,400 feet near Elliot Creek to over 5,400 feet on top of Boulder Mountain to give a range of 2,000 feet.

The tributaries of Elliot, Perley and Lockie Creeks drain the property as shown on Figure 2 and on the maps in the pocket, and are the only sources of water.

The claims are covered by good stands of timber with relatively little undergrowth. A fair amount of deadfall exists in the northeast corner of the claim group.

HISTORY OF PREVIOUS WORK

The Gold River property contains several Crown grants some of which date prior to 1900. Work thus has been done on these grants since this time largely in the form of adits, shallow shafts, open-cuts and trenches.

Gold River Mines Ltd. (NPL) acquired the Crown grants in the summer of 1970 and, in addition, staked a number of claims.

The interest at the time was for lead, zinc, copper and silver largely on and around the Cousin Jack Crown grant. Accordingly, a soil sample survey was carried out mostly on the eastern part of the property and the samples were analyzed for lead, zinc and copper. Subsequent diamond drilling and a large amount of trenching was carried out which revealed lead, zinc and copper mineralization. At this time the south, middle and north copper showings were explored by 'cat' trenching.

In September and October of this year, a soil sampling program was carried out with the samples being tested for copper. Concurrent with the soil sampling, the property was geologically mapped and diamond drilled.

GEOLOGY

The geology is largely summarized from a report written by T.R. Tough during September of 1972 and from geological mapping presently being carried out by L. Sookochoff.

The property is almost totally underlain by the Nicola group of rocks which here consist of intercalated sericite-chlorite schists, greenstones, and volcanics. The schistose zones strike northerly and dip westerly at angles between 15 and 20 degrees. The greenstone is relatively widespread, has been metamorphosed to various degrees and may exhibit some degree of schistosity.

About six miles west of the center of the property is the Eagle granodiorite intrusive, a large member of the Coast Intrusions, which strike northwesterly. Immediately to the east is a more localized lenticular granitic intrusion, called the Boulder granite, which is adjacent to a granodiorite stock of the Otter intrusions.

A porphyritic greenstone is the predominant rock-type and indicates varying degrees of propylitization. Chloritic alteration of the matrix is widespread with the feldspar phenocrysts indicating some degree of saussuritization . In areas of mineralization and pyritization, the feldspar phenocrysts have been completely altered and incorporated into the matrix. Within these zones, silicification is also present.

The lead-zinc-copper mineralization is exposed in trenches and adits in the eastern part of the property. It occurs in parallel quartzitic veins that strike northwesterly. In a recent series of grab samples, the lead assayed up to 4½%, the zinc 11%, the copper 0.2%, the silver over 4 oz/ton and the gold over 0.6 oz/ton.

The copper mineralised zones are found in three showings called the south, middle, and north showings, respectively.

The south showing consists of veins of chalcopyrite striking northerly and dipping at a shallow angle to the west in a siliceous porphyritic greenstone. Moderate to heavy pyrite is found in the adjacent host rock. Three shallow holes were diamond drilled in this area and revealed the mineralization as chalcopyrite, azurite, malachite and pyrite occurring in veins, veinlets and disseminations.

In the middle copper showing, chalcopyrite occurs within quartz veins, quartz stringers and a silicified non-porphyritic greenstone host rock. The zone strikes northerly and dips at a shallow-angle to the west.

The north showing consists of veins of chalcopyrite with associated chalcocite and moderate to heavy pyrite within a shear zone with non-porphyritic greenstone. The zone strikes N55E and dips about 15 degrees to the southeast.

INSTRUMENT AND THEORY

1. INDUCED POLARIZATION, RESISTIVITY

The instrument used was a Geotronics Model A-2 portable time-domain pulse type manufactured by Geotronics Surveys Ltd. of Vancouver, B.C. A 12-volt lead acid storage battery (rechargeable) was used as a power supply. This unit has a transmitter power output of 300 watts normal and up to 400 watts with fully charged battery. Output voltage is 400, 800 or 1200 volts (1200 used almost exclusively in this survey) with selection by a switch. The time of pulse length is 1 to 12 seconds, variable, delay time is 250 milliseconds and integration time is 1 second. The self-potential buckout is operated manually by a ten turn precision pot with a range of +1 volt.

There are basically two methods of IP surveying, frequency-domain and time domain. Both methods are dependent on a current flowing across an electrolyte-electrode interface or an electrolyte-clay particle interface, the former being called electrode polarization and the latter being called membrane polarization.

In time-domain electrode polarization, a current is caused to flow along electrolyte-filling capillaries within the rock. If the capillaries are blocked by certain mineral particles that transport current by electrons (most sulphides, some oxides, graphite), ionic charges build up at the particle-electrolyte interface, positive ones where the current enters the particle, and negative ones where it leaves. This accumulation of charge creates a voltage that tends to oppose the current flow across the interface. When this current is stopped the created voltage slowly decreases as the accumulated ions diffuse back into the electrolyte. Thus is produced the induced polarization effect.

In membrane polarization a similar effect occurs. A charged clay particle attracts opposite charged ions from the electrolyte in the capillary around the particle. If a current is forced through the capillary, the charged ions are displaced. When the current is stopped, the ions slowly diffuse back to the same equilibrium state as before the current flow. This explains IP anomalies where no metallic-type minerals exist.

Frequency-domain IP is based on the fact that the resistance produced at the electrolyte-charged particle interface decreases with increasing frequency. Two parameters commonly used for measuring frequency-domain induced polarization are frequency effect and metal factor. The one used for time-domain measurements is chargeability (as in this survey).

In the process of carrying out an IP survey, two other geophysical methods are used and measured. These are self-potential (SP) and resistivity. The SP, its phenomenon described under 2. Self-Potential, must be nulled by the IP receiver in order to obtain accurate IP measurements. The resistivity value is calculated from the voltage and current readings obtained while measuring the IP effect and therefore can be utilized to determine how resistive (or conductive) the ground is.

2. SELF-POTENTIAL

The self-potential was measured with the receiver part of the IP instrument described above.

Self-potentials are produced in the crust of the earth from a variety of processes that are chemical, physical and electromagnetic inductive. Sulphide bodies produce a potential from chemical processes that range in magnitude from a few tens of millivolts to several hundred millivolts and, in rare cases, above 1,000 millivolts. The causes of sulphide self-potentials is not fully understood or agreed upon by geophysicists. However, the more accepted theory is that this 'battery action' is caused by a difference in pH in the upper ground water electrolytes (more acidic) and the lower ground water electrolytes (less acidic) and is abetted by the oxidation of sulphides near the surface forming acids that, therefore, increase the contrast. The current caused by the potential flows from the apex of the sulphide body to some point at depth (terminus of deposit or point of minimum acidity), into the wall rock, back to the surface and back into the sulphide apex. A negative pole is thus created at ground surface and, therefore, except for a few rare cases, sulphide bodies are reflected by negative anomalies.

Two field methods are in common practice. One measures the potential itself and its field work is carried out by keeping one electrode fixed and moving the other at equal intervals. The other measures the potential gradient by moving both electrodes, with a fixed interval, usually 100 feet. Each method can be calculated from the other.

3. ELECTROMAGNETICS (EM)

A Crone CEM electromagnetic instrument manufactured by Crone Geophysics Limited of Mississauga, Ontario, was used for the vertical EM survey and the horizontal shootback EM survey. The unit is composed of 2 identical coils both capable of receiving and transmitting at 3 fixed frequencies which on the instrument used for these surveys were 390, 1830, and 5010 Hertz, respectively. The instrument has a coil diameter of 22" and an inclinometer range of 200 degrees with an accuracy of $\pm \frac{1}{2}$ degree. The dip angle is determined by a visual minimum on the field strength meter from which the field strength is read directly and controlled by a gain control pot. The power supply consists of 1 to 3 6-volt lantern type batteries.

A VLF-EM receiver, Model G-28, manufactured by Geotronics Surveys Ltd., of Vancouver, B.C. was used for the VLF-EM survey. This instrument is designed to measure the electromagnetic component of the very low frequency field (VLF), transmitted at 18.6KHz, 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. Becuase of its relatively high frequency, the VLF-EM can pick up bodies of much lower conductivity and therefore is more susceptible to clay beds, electrolyte-filling fault or 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.

The vertical loop method (fixed source) is excellent for tracing out deeply buried formational conductors. This is especially true if the transmitter is placed over the conductor. However, its ability to detect an increase in width or differentiate single solid conductors from multiple ones is very poor. Also conductivity analysis tends to be averaged over large areas of the zone and is not as selective as with the moving coil method.

With the vertical loop method (and the convention employed here), a conductor is indicated by positive readings on the west side of the conductor and negative readings on the east side. The zero point (where positive readings change to negative readings) is then usually directly over the top edge of the conductor (certain transmitter locations and certain geologic conditions may change this) and this is called a "true crossover". If positive readings are east of the crossover and negative readings west of the crossover, then this type is called a "reverse crossover" and does not indicate a conductor.

The main advantage of the Horizontal Shootback method is that both horizontal and vertical conductive surfaces support each other producing a strong anomaly. It has excellent dip, depth and conductivity information as well as the ability to accentuate solid sulphide conductors from narrow multiple ones. It is two to three times as sensitive as the original JEM shootback method which effectively plugs the weakness of the JEM method to narrow vertical conductors at depth. It also has the decided advantages of the shootback method of being immune to rugged topographic effects.

Whereas in the vertical loop method the top of the conductor is below the crossover, in the horizontal shootback method, the top of the conductor is below either the positive peak or the lowest negative peak where a positive one does not exist. From analyzing the profile over a conductor, the dip, depth to the top, width and relative conductivity of the conductor can be determined.

4. MAGNETOMETER

The magnetic survey was carried out using a portable vertical component, Model G-110 fluxgate magnetometer manufactured by Geotronics 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 occurring 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 for reconnaissance in mapping geological lithology and structure since different rock types have different background amounts of magnetite and/or pyrrhotite.

SURVEY PROCEDURES

1. INDUCED POLARIZATION - RESISTIVITY

This survey was run on the 1000-foot separated east-west lines which had been cut out and picketed, and for detailing on non-cut lines in between. The Wenner array was used which has a constant and equal electrode separation. The 2 potential (or probing) electrodes are in the center and the 2 current electrodes are on the outside. The distance between each electrode was 200 feet and readings were taken every 200 feet. Non-polarizing, unglazed, porous pots with a copper electrode and a copper sulphate electrolyte were used for the potential electrodes. Steel stakes were used for the current electrodes. The charge time for each reading throughout the survey was 8 seconds. The voltage used to drive the current into the ground was 1,200 volts .

The surveying was limited by the oncoming snow conditions.

2. SELF-POTENTIAL

The self-potential readings were taken along 100-foot and 200-foot separated east-west lines over the 3 main showings. The south showing was covered in detailed form and the middle and north showings in limited detailed form.

The readings were taken by keeping one electrode fixed and moving the other at equal intervals, either 50 or 100 feet. the western electrode was always attached to the negative terminal. All readings at each showing were tied to a common "reference point" to which the value 0 millivolts was attached. For electrodes, unglazed porcelain pots with a copper sulphate sulution were used.

The SP survey was limited due to snow cover.

3. HORIZONTAL SHOOTBACK EM

This survey was also carried out along the 1000-foot separated east-west survey lines and in limited detailed form over the south and middle showings. Readings were taken with the coils separated 200 feet. The frequency used throughout the survey was 1830 Hz. Readings were taken every 200 feet and 100 feet over areas of interest.

In the horizontal shoot back EM method, both operators traverse along the same line. Both operators in turn transmit and receive measuring the dip angle of the field. The 2 dip angles are then added together and equal "0" if no conductors are present. The station measured is the mid-point between the 2 men.

Snow conditions limited the survey.

4. VERTICAL LOOP EM

This survey was carried out in detailed form only over the south showing. The survey lines, mainly 100 feet apart, and transmitter locations are as shown on fig. 5.

Readings were taken every 50 feet by the receiver on the 1830 Hz. frequency. For each reading, the transmitter coil was 'aimed' so that the point of observation was contained within the plane of the coil.

5. VLF-EM

This survey was carried out along with the IP survey and was read by one of the stake men. Readings were taken every 50 feet on the 1000-foot separated lines and on 200-foot separated lines over the south showing. The instrument was read facing the transmitter which is located near Seattle, Washington and transmits at a frequency of 18.6 KHz.

6. MAGNETOMETER

The magnetometer was read only on line 20N from 5W to 18E across the south showing. Readings were taken every 100 feet with the instrument always facing north.

7. SOIL SAMPLING

Detailed soil sampling was done at 100-foot intervals on 100 and 200-foot separated lines over and between the 3 main showings. The soils were picked up by L. Sookochoff, geological engineer on the property for T.R. Tough & Associates Ltd. They were dug by a D-handled spade from the B-layer which varied up to 18 inches in depth. The samples were put into brown wet-strength paper bags and sent to General Testing Laboratories of Vancouver, B.C. Their testing procedure is described in the writer's previous report on the property.

TREATMENT OF DATA

1. INDUCED POLARIZATION

The induced polarization results were normalized by dividing the integrated IP reading in millivolt seconds by the impressed emf (or primary voltage) in millivolts and multiplied by 1,000 to get what is generally referred to as chargeability in millivolt seconds/volt or milliseconds.

These results were then plotted on drawing no. 3 and contoured at a 0.5 millisecond interval from 1.0 milliseconds and up. It was felt by the writer upon examination of the data, that 1.0 milliseconds was significantly indicative of anomolous conditions. They were also profiled with the resistivity results on drawing no. 8.

2. RESISTIVITY

To get the resistivity value in ohm-meters, the primary voltage was divided by the primary current and multiplied by the constant, 383 meters (which is a geometric factor peculiar to the Wenner array with an electrode spacing of 200 feet). The results were then plotted on drawing no. 4 and contoured at an interval of 300 ohm-meters. On drawing no. 8, they were profiled with the chargeability values.

3. SELF POTENTIAL

The self-potential data are plotted on drawing no. 5 at a scale of 1" = 200'. A larger scale was chosen due to closely spaced readings and survey lines. It is contoured at an interval of 10 millivolts except where the contours are closely spacedwhere it's contoured at an interval of 20 millivolts. The profiles are also shown on the same drawing.

4. HORIZONTAL SHOOT BACK EM

The data from this survey are plotted on drawing no. 6 at a scale of 1" = 400'. The profiles are shown on sheet no. 9 with the VLF-EM Fraser filter profiles.

5. VERTICAL LOOP EM

The vertical loop EM data and profiles are shown on figure 5 at a larger scale of 1" = 100'. This scale was chosen also because of the tight detailing.

6. VLF-EM

Drawing no. 7 shows the VLF-EM results after they have been reduced applying the Fraser filter. Filtered data is plotted between actual reading stations. The positive dip-angle readings have been contoured at an interval of 10 degrees. Because of ambiguity, the writer has not contoured the results from survey line to survey line at many places. This is caused by the wide spacing between the lines.

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 crossover on the unfiltered data quite often will show up on the filtered data.

7. MAGNETOMETER

The diurnally corrected magnetic readings are plotted and profiled at a scale of 1" = 400' on figure 6 which is bound at the back of the report.

8. SOIL SAMPLING

The soil sample results from the detail sampling are plotted on drawing no. 2 which is a revision of the map from the writer's previous geochemistry report. The method of obtaining the background and threshold parameter's and the contour interval are discussed in the same report.

The writer used this same method in re-evaluating, replotting, and recontouring the copper, lead, and zinc results from the 1971 survey. The parameters obtained are as follows:

	copper	lead	zinc
mean background	39 ppm	30 ppm	200 ppm ?
sub-anomalous threshold	72 "	43 "	350 " ?
anomalous threshold	135 "	62 "	550 " ?

The copper parameters compare closely with the 1972 parameters and therefore the contours were chosen to be the same. The lead contour interval chosen was 1 logarithmic standard deviation starting at the sub-anomalous level of 45 ppm. The zinc results produced a very erratic cumulative frequency plot and therefore the parameters obtained are questionable. For this reason also only the 500 ppm contour was drawn. It appears, however, to be fairly definitive since it compared closely with the lead results. None of these maps are given in the present report.

9. COMPILATION MAP

Sheet no. 10 is a compilation map of the geology and anomalous results obtained from the geophysical and geo-chemical surveys.

The geology is as mapped by R. Sookochoff. Only the contacts, rock types, faults, and shears are shown. The geophysical anomalies shown are those of chargeability (IP), resistivity, Horizontal shootback EM, VLF-EM, and self-potential. The geochemistry (soil sampling) shown are the copper results from the 1972 survey and the lead results from the 1971 survey. In both cases, it is the sub-anomalous contour that is drawn on the compilation map. The zinc results are not drawn on this map since they correlate closely with the lead results, and since the compilation map is already overcrowded.

DISCUSSION OF RESULTS

There is such a mass of information to date that it is becoming difficult to properly discuss the results of each survey and how they correlate with each other. For this reason, the writer has chosen to discuss the results of each survey separately and how they correlate with the surveys previously discussed.

Most of the geophysical surveys were done along the east-west lines which are spaced at 1000 foot intervals. Readings are taken along these lines at intervals from 50 feet to 200 feet. Therefore it can be seen that there is extreme biassing along the north-south direction. As mentioned previously, the property was not covered in greater detail due to the snow conditions.

1. SOIL SAMPLING

The soil sampling results were discussed quite thoroughly in the writer's previous report on the property dated November 15, 1972. The detailed sampling carried out since has:

(a) given a geochemical expression to the south and middle showings where they didn't have it before.

(b) verified that the copper ion mobility is quite low. In other words, the copper anomalies are very tight and appear to delineate quite closely the causitive source.

The cause of the low copper ion mobility may be the pH of the soil. It is low where pH is below 5.5 (acidic) and high where it is 7.0 (neutral) and above (alkaline). The pH of 6 samples were tested and are as follows:

2E, 24N	5.6	10E, 90N	5.8
2E, 20N	6.1	16E, 93N	6.2
1W, 24N	5.9	17E, 96N	5.6

From these results the mobility of copper ions is restricted somewhat, but not entirely. Additional factors that no doubt affect it are probably low oxidation caused by the higher elevation and a thin layer of overburden.

The re-evaluated copper results of the 1971 soil sampling agree fairly well with the 1972 results though the 1971 anomalies are not as continuous, for example, in the area of anomaly AA'. The main lead-zinc anomaly as mentioned in the writer's previous report, is found on the eastern edge of copper anomaly AA' as shown on drawing no. 10.

The lead-zinc anomaly is underlain almost exclusively by the schists as mapped by Sookochoff. The copper anomaly is partly underlain by the schists but mainly by the porphyritic greenstones.

2. CHARGEABILITY (IP)

Over all 3 showings, there were definite chargeability anomalies. The best anomaly, however, was over the south showing. But it is over this showing that the IP survey parameters were set up, to obtain maximum response. Thus, over the middle showing, if a smaller electrode spacing was used, a higher response may have been obtained. That is, the middle showing may be narrower and perhaps not as deep as the south showing. On the north showing the response was lower also, but here only 2 lines of IP were done and therefore only inconclusive remarks can be made.

The south showing chargeability anomaly strikes north to northwest. The anomaly as defined by the 1 millisecond (msec) contour shows a strike closer to north. But the 2 msec. contours along with the VLF-EM results shows a strike approximately northwest from L-10N to L-50N. The length measured in a northwesterly direction is 4800 feet long and varies in width from 150 feet to 1400 feet averaging about 650 feet.

From drilling results and known surface geology it appears that the 1 to 2 msec response is caused by disseminated pyrite and the response greater than 2 msec. is caused by disseminated and fracture-filling chalcopyrite in addition to the pyrite.

The anomalous response over the middle showing only reaches as high as 1.8 msec. There is a different rock-type over this showing than over the south and it is felt that this probably affects the results over the south showing, the rock-type is largely porphyritic greenstone and some non-porphyrite greenstone. Over the middle showing it is mainly non-porphritic greenstone and a quartz sill. The showing itself is found within the greenstone but the IP anomalous response spreads westward to over a portion of the quartz sill. This suggests that the sill may not be too thick and that the mineralized zone extends to beneath the sill.

It is difficult to say what the strike is on account of the limited detailing but it appears to be approximately north-south. On L-8ON, 3 0.9 msec. values suggest that the middle showing may connect to the north showing. Also, it appears that it joins onto the north-south striking anomaly found to the south of the middle showing.

On the north showing, the IP results are lower than those over the other 2 showings but as pointed out previously, very limited IP was carried out here. However, the strike appears to be northwesterly which agrees with the geo-chemistry results in the writer's previous report which showed a strike here of noth northeasterly and northwesterly.

There is a moderately good IP anomaly striking north to northeast to north on the eastern part of the survey area. Its length is 7000 feet, its width is 600 to 1400 feet, and it is open on both the north and south ends. Also it appears to join onto the anomaly over the middle showing, as mentioned above.

This eastern anomaly correlates well with the porphyritic greenstone which is the rock type of the south showing. Also there is excellent correlation with the copper soil sample anomalies AA' and H. The IP anomaly on the south end is striking towards the copper anomaly G and on the north end towards the copper anomaly E.

Over the augite porphyry on the property as mapped by

Sookochoff, the IP response was low with the values ranging from 0 to 0.7 msecs. Besides being caused by lack of mineralization, this may be caused by a very tight rock in which there is limited fracturing filled with a minimum of water (which is important as an electrolyte which itself is important in the process of induced polarization.

3. RESISTIVITY

A cumulative frequency graph was plotted of the resistivity results and from it the mean background level was found to be 1200 ohm-meters, the low anomalous threshold value, 600 ohm-meters and the high anomalous threshold value 1800 ohm-meters. The writer further labelled those results between 600 and 1200 ohm-meters as low background and those between 1200 and 1800 ohm-meters as high background.

The strike of the contours as shown on drawing No. 4 is in general agreement with the strike of the rock contacts especially on the eastern side of the property. Here those values less than 1200 ohm-meters are found over the porphyritic greenstone (where copper anomaly AA' is found) the schists (lead and zinc anomaly) and some non-porphyritic greenstone. Also the lows in general correlate with the chargeability highs, though the lows cover a wider area than the IP highs do.

On the south showing it is seen that those values greater than 1200 ohm-meters are found to the west of the baseline, and those values less to the east. West of the baseline the high resistivity response could be caused by the non-porphyritic greenstone and east of the baseline the low response is most likely caused by the greater amount of mineralization found within the porphyritic greenstone. Here the very low resistivity correlates well with the very high chargeability. This is especially seen on the profiles on drawing no. 8.

Over the middle showing, the resistivity is much higher ranging from 2000 to 3500 ohm-meters. The cause may be the different rock types (non-porphyritic greenstone and quartz sill). Also the mineralization may not be as much (or as continous) as over the south showing. It is also noticed that the quartz sill seems not to affect the resistivity values appreciably. This is supportive to the probability that the quartz sill is not too thick.

Over the north showing there is insufficient data but the resistivity values are lower than over the middle showing. This may mean that the mineralization is in a greater amount.

4. SELF-POTENTIAL

Over the south showing, the SP results correlate well with the known copper occurrences. From the diamond drill results it appears that the -20 millivolt (mv) contour reflects the outline of the more massive copper mineralization. The length is about 600 feet and the high is -140 mvs. The profiles show that the mineralized body dips to the west.

On the middle showing, the anomaly is not nearly as high nor as extensive. Over the adit where the known mineralization occurs, the response was as high as -75 mvs. From the limited data, the strike appears to be just east of north, which is in agreement with the chargeability results.

Over the north showing, there is very little data, though there is low anomalous readings found over the known mineralization. The strike appears to be northwesterly which is in agreement to the chargeability results.

5. HORIZONTAL SHOOTBACK EM

Any anomalous response from the horizontal shootback EM survey has been very limited.

There are no high anomalies that correlate with any geochemistry anomalies or the known copper mineralization. However, no horizontal shootback EM work was carried out over the north showing and very limited work was done over the south showing.

There was one narrow high over the middle showing about 300 feet long and open on the south end. It correlates well with the SP anomaly and therefore also shows a strike of just east of north.

6. VERTICAL LOOP EM

The vertical loop EM which was only carried out over the south showing responded very poorly to the known mineralization. No definite conclusions could be drawn from the results and therefore it was discontinued. The cause of the poor coupling of the vertical loop EM with the known mineralization may be that the mineralized body dips at too flat an angle.

7. VLF-EM

Except for 2 or 3 places, the anomalous response on the VLF-EM has been low though definite.

In the south showing, the correlation with the known mineralization, chargeability, self-potential, and resistivity is good. There appears to be 2 VLF-EM anomalies that probably reflect the east and west side ofone conductor that strikes from north to northwest.

No VLF-EM was carried directly over the middle and north showings.

Elsewhere there is correlation with soil sample and chargeability results, though the response is low. This is especially seen on the eastern chargeability soil sample anomaly.

On the north end of this chargeability anomaly, no VLF-EM has been carried out. However, to the north of the same anomaly no chargeability has been carried out, but VLF-EM has. Here there appears to be 2 VLF-EM anomalies that strike just west of north and are in direct strike of the eastern and western edges of the chargeability anomaly to the south. This strongly suggests that the chargeability anomaly continues in a northerly direction and very possibly off of the claim group.

In a few places, the VLF-EM anomalies correlate fairly well with faults and contacts both of which are a common cause of VLF-EM anomalies. The faults and contacts that correlate are marked on the profiles which is drawing no. 9.

8. MAGNETOMETER

The magnetic work carried out over the south showing as shown on fig. 6 shows a limited response over the known mineralization. This probably means there is a very limited amount of magnetite associated with the mineralization. The anomalous response is only about 50 gammas above the noise envelope which has a range of about 100 gammas. Therefore, it was felt that the magnetometer had limited usefulness in delineating the mineralization.

Respectfully submitted,

GEOTRONICS SURVEYS LTD.

David G. Mark,
Geophysicist

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
T. R. TOUGH

December 28, 1972

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Resume of Technical and Field Experience of A.T. LaRose

Education

1957 Graduate of Smooth Rock Falls High School, Ontario.

Experience

September 1972 to present	Trans-Arctic Explorations Ltd., Field Supervisor and Personnel Manager.
January 1968 to August 1972	Kerr Addison Mines Ltd., Geophysics operator on I.P. electromagnetic and magnetic surveys, drill supervisor Quebec Ontario, Manitoba, British Columbia, Yukon and New Guinea.
September 1967 to December 1967	Contract work for Noranda Mines Ltd. North Western Ontario.
March 1965 to August 1967	Frobex Mines Ltd. Field Supervisor for airborne radiometric surveys, follow-up ground prospecting and staking, drill supervision; Ontario, Quebec and New Brunswick.
January 1958 to April 1965	Area Mines Ltd. Geophysical Party Leader for electro-magnetic, magnetic and gravity surveys; Ontario, Quebec and New Brunswick.

Instrument Experience

Electromagnetics	Sharpe SE 200 and 300, MacPhar REM Crone JEM and CEM, Geonics VLF-EM, Geonics Horizontal Loop.
Magnetometer	Sharpe A2, Sharpe MF-1, Radar, Askania and Saber
I.P.	Sabre Electronics Time Domain
Hammer Seismic	Huntec FS-3 Seismograph
Gravity	Warden and Worldwide
Airborne Systems	Elsec Proton Magnetometer. Barringer AM101A Proton Magnetometer, and Barringer Multichannel gamma ray Spectrometer.

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 poloarization, 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:

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 four years and have been active in the mining industry for the past seven 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 geophysical surveys carried out by H.A. Larson, geophysicist, and A.T. LaRose in November and December, 1972 on the Hope and Hawk Claim Groups, from three personal visits by myself to the property 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 Ltd. (NPL), Vancouver, B.C. nor do I expect to receive any interest therein.

David G. Mark
Geophysicist

December 28, 1972

ENGINEER'S 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 West 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 practising in my profession for the past seven years and have been active in the mining industry for the past fourteen years.

3. I am registered with the Association of Professional Engineers of British Columbia.

4. I have studied the accompanying report dated December 28, 1972 on geophysical surveys submitted to 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 Gold River Mines Ltd. (NPL) and do not expect to receive any interest therein.

PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA T. R. TOUGH

Thomas R. Tough, P. Eng.,
Consulting Geologist

January 2, 1973.

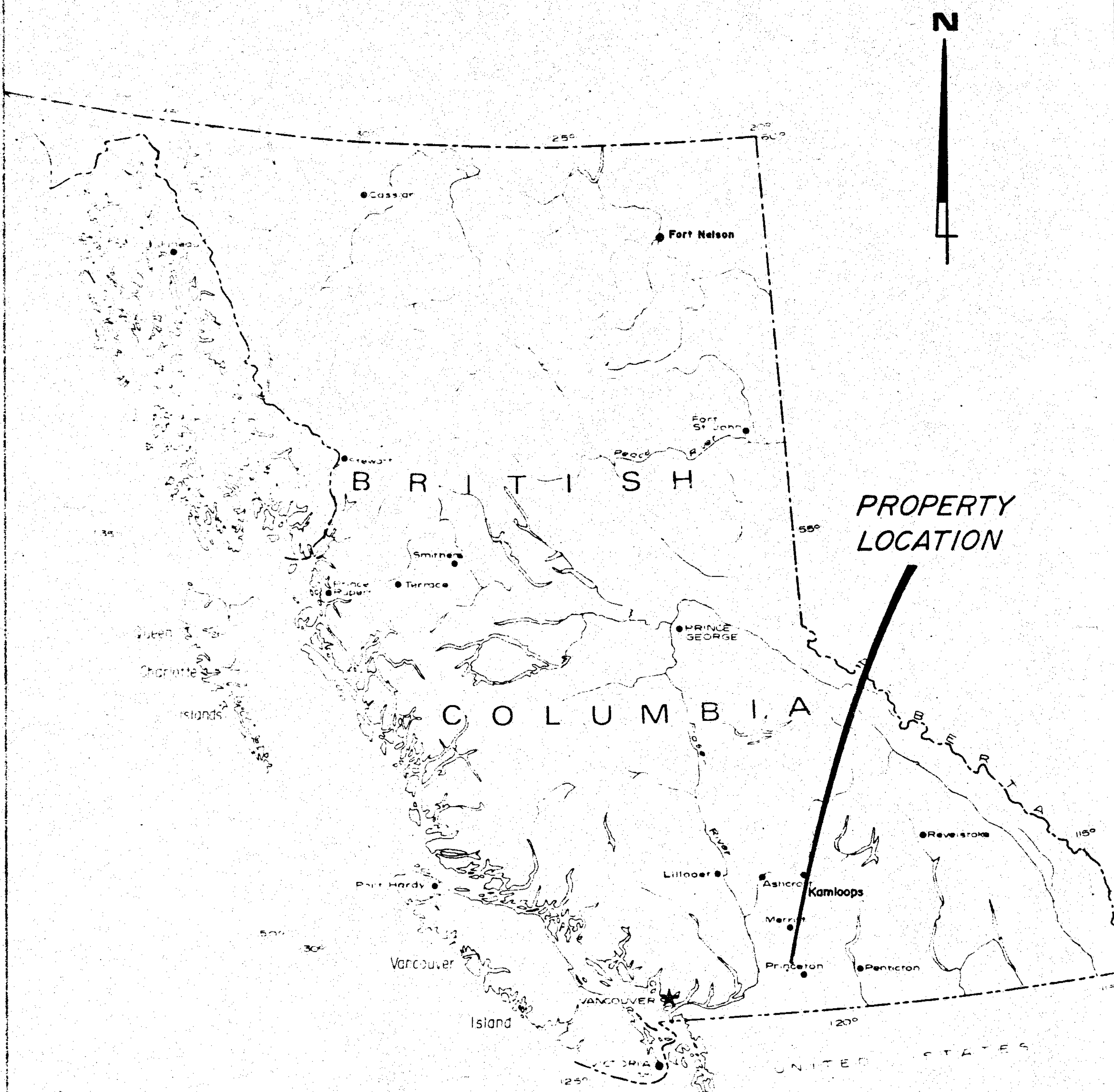


FIG. I

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
T. R. TOUGH

GEOTRONICS SURVEYS LTD.

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

BOULDER MOUNTAIN PROPERTY

SIMILKAMEEN M.D. , B.C.

LOCATION MAP

SCALE 1" = 134 mi

DRAWN PDT	CHECKED:	DATE October '72

PDT

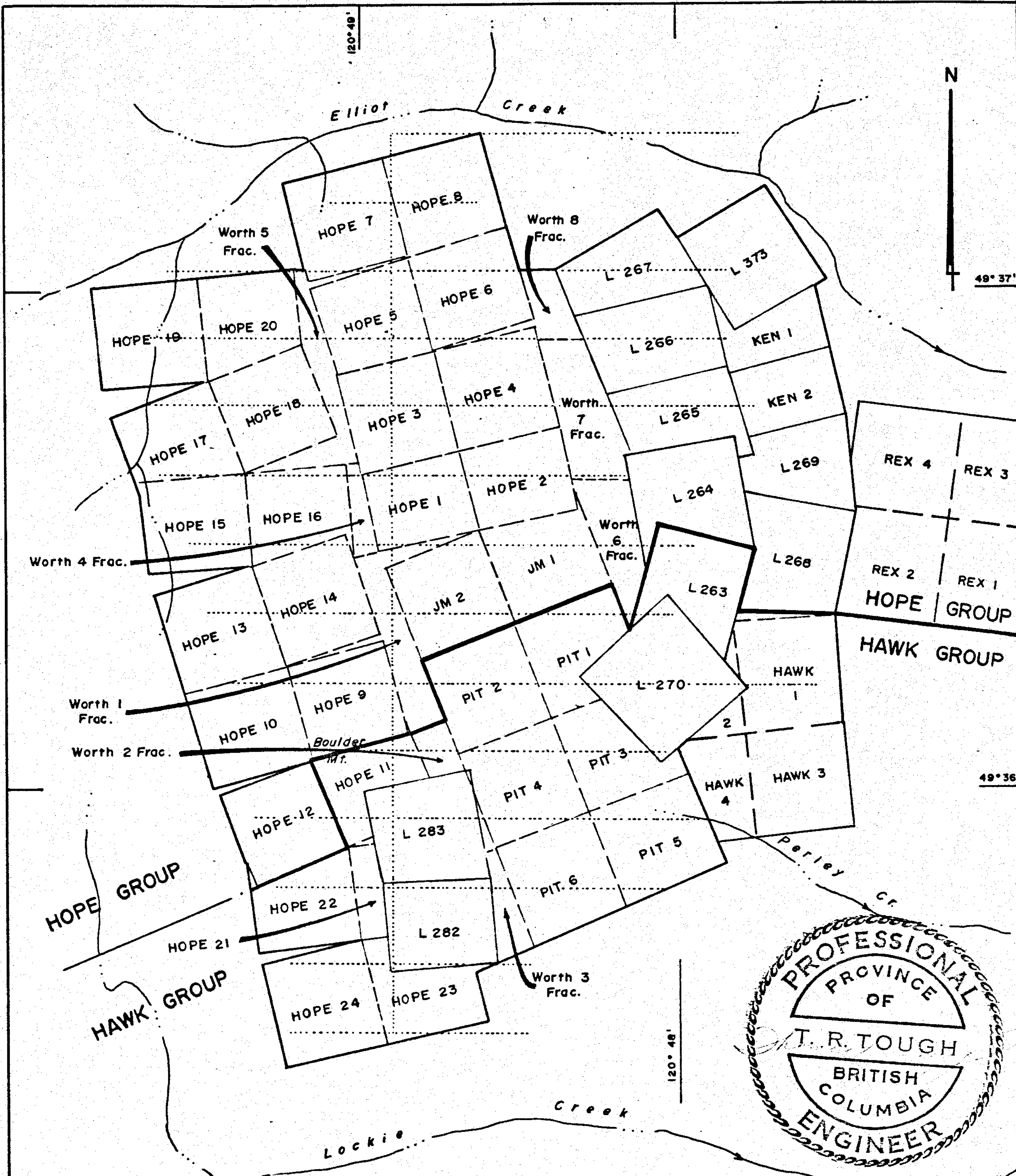


FIG. 2

LEGEND

———	CROWN GRANTED CLAIM BOUNDARY
– – – –	STAKED CLAIM
———	PROPERTY OUTLINE
....	SURVEY GRID 1972

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

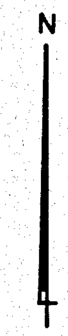
BOULDER MOUNTAIN PROPERTY

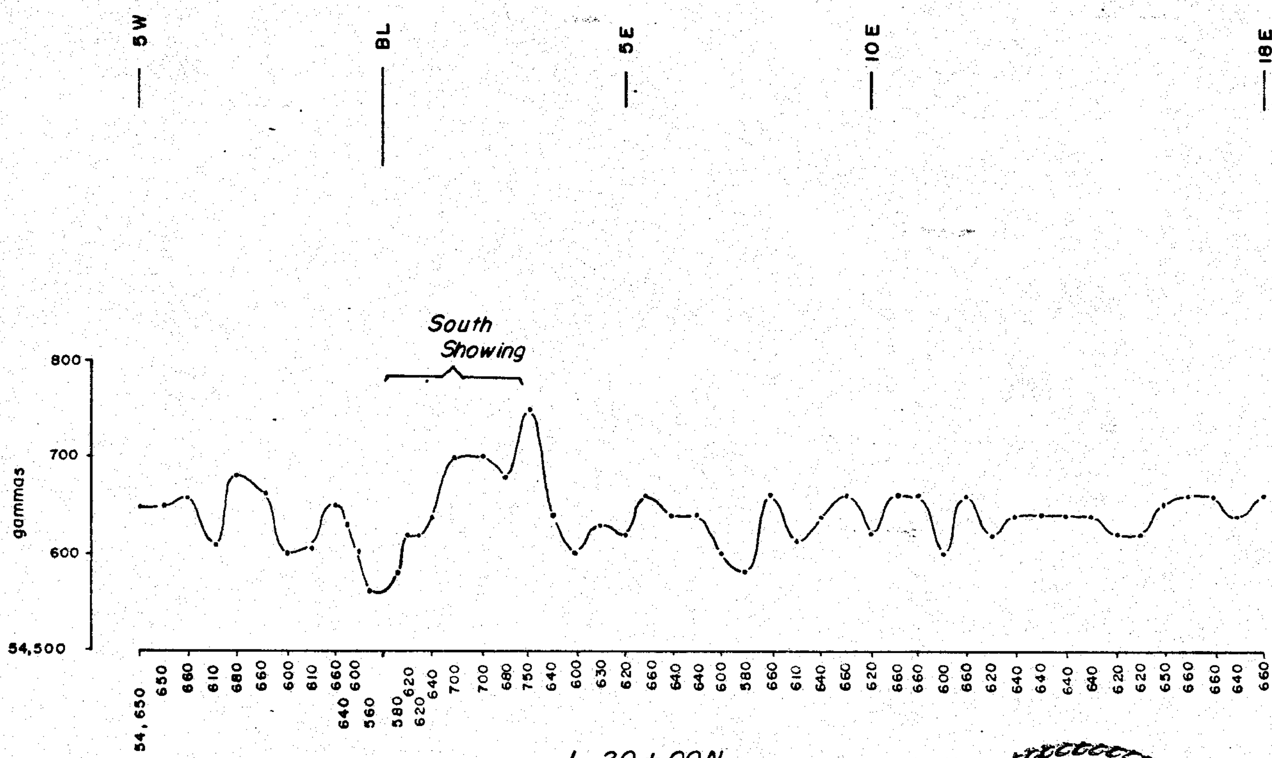
SIMILKAMEEN M.D.

B.C.

CLAIM MAP

GEOTRONICS SURVEYS LTD. PDT DRAFTING SERVICES	SCALE 1" = 2000'	DATE October 1972



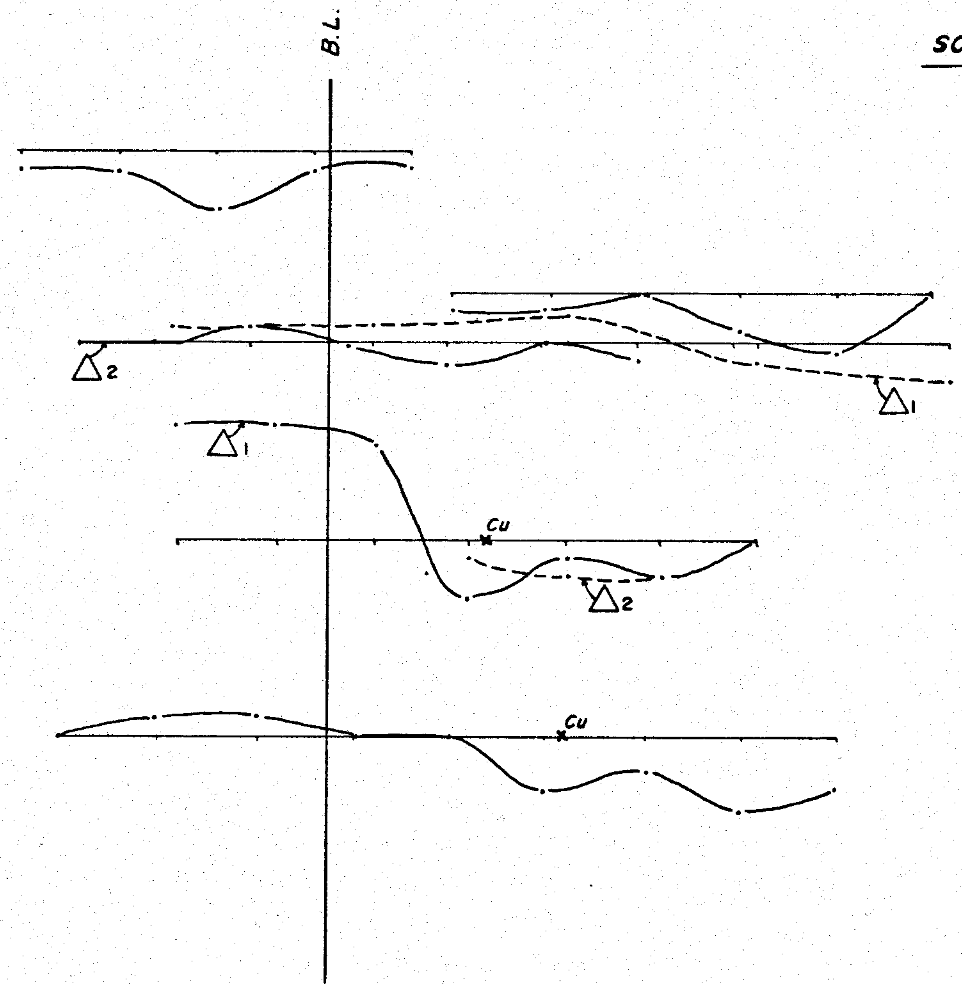


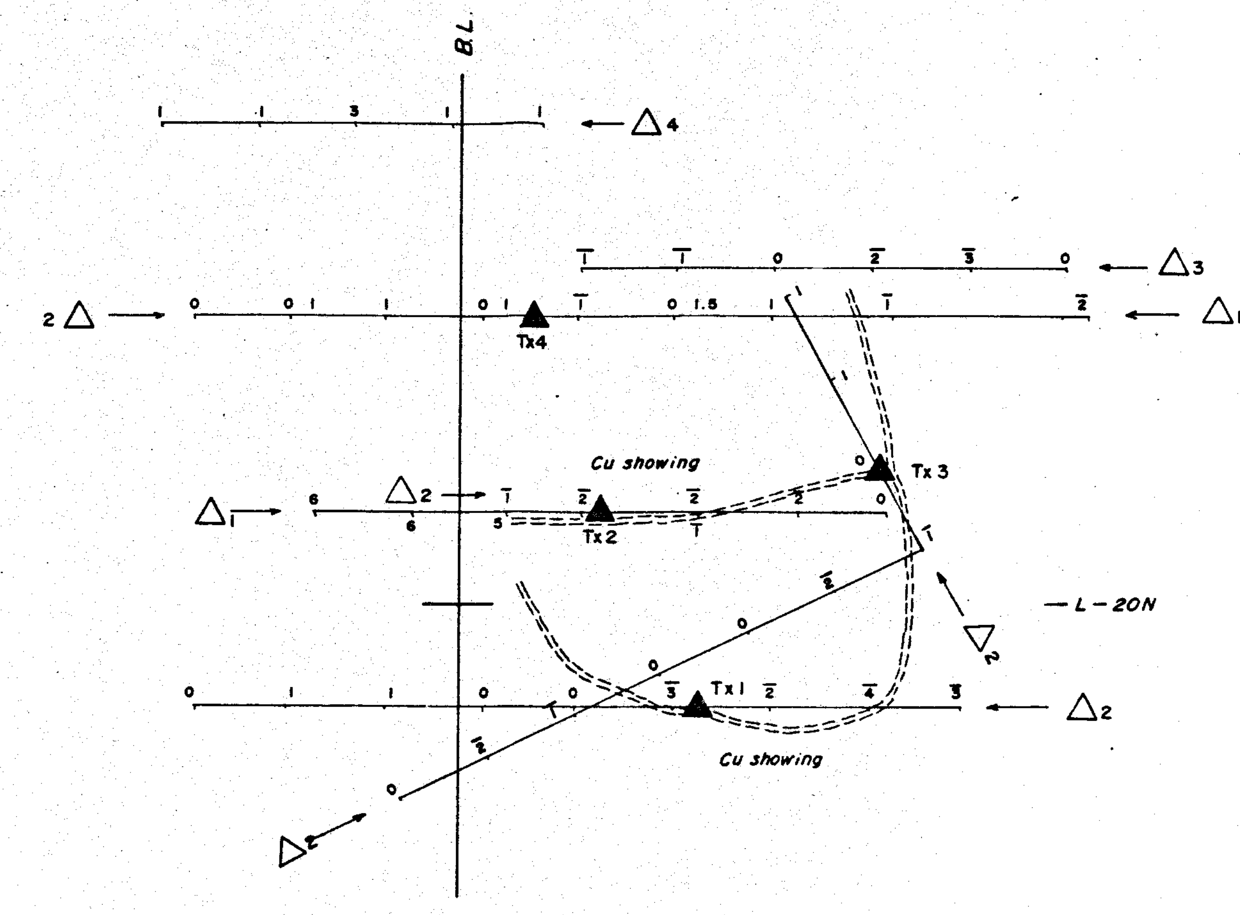
PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
T. R. TOUGH

FIG. 5

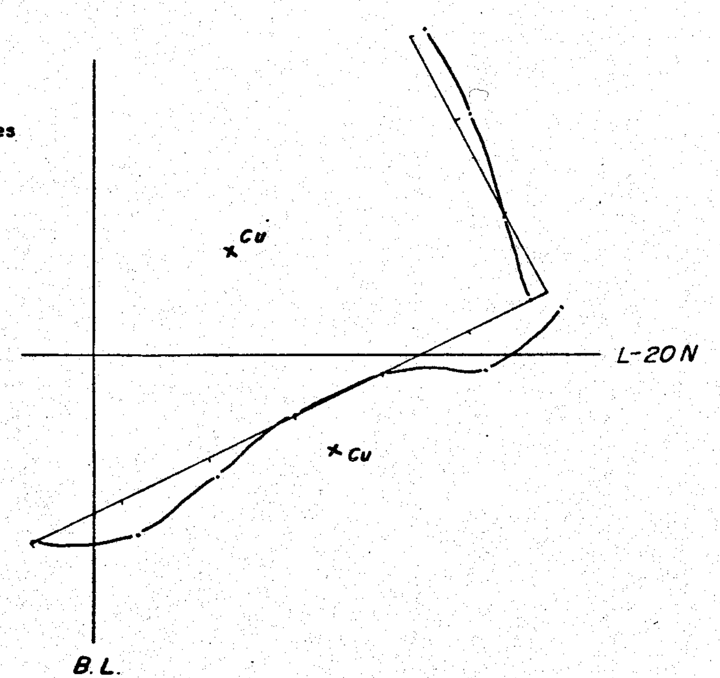
GOLD RIVER MINES LTD. (N.P.L.)		
BOULDER MOUNTAIN PROPERTY SIMILKAMEEN M.D. B.C. *MAGNETOMETER PROFILE* *L − 20N*		
GEOTRONICS SURVEYS LTD. PDT DRAFTING SERVICES	SCALE 1" = 400'	DATE DEC. 1972

SOUTH COPPER SHOWING





VERTICAL SCALE : 1" = 10 degrees



SYMBOLS

B.L. BASE LINE

▲Tx3 TRANSMITTER LOCATION

△2 TRANSMITTER LOCATION READINGS WERE TAKEN FROM

Cu × COPPER SHOWING

INSTRUMENT: CRONE C.E.M.

FREQUENCY : 1830 Hz

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
T. R. TOUGH

DAVID G. MARK

FIG. 4

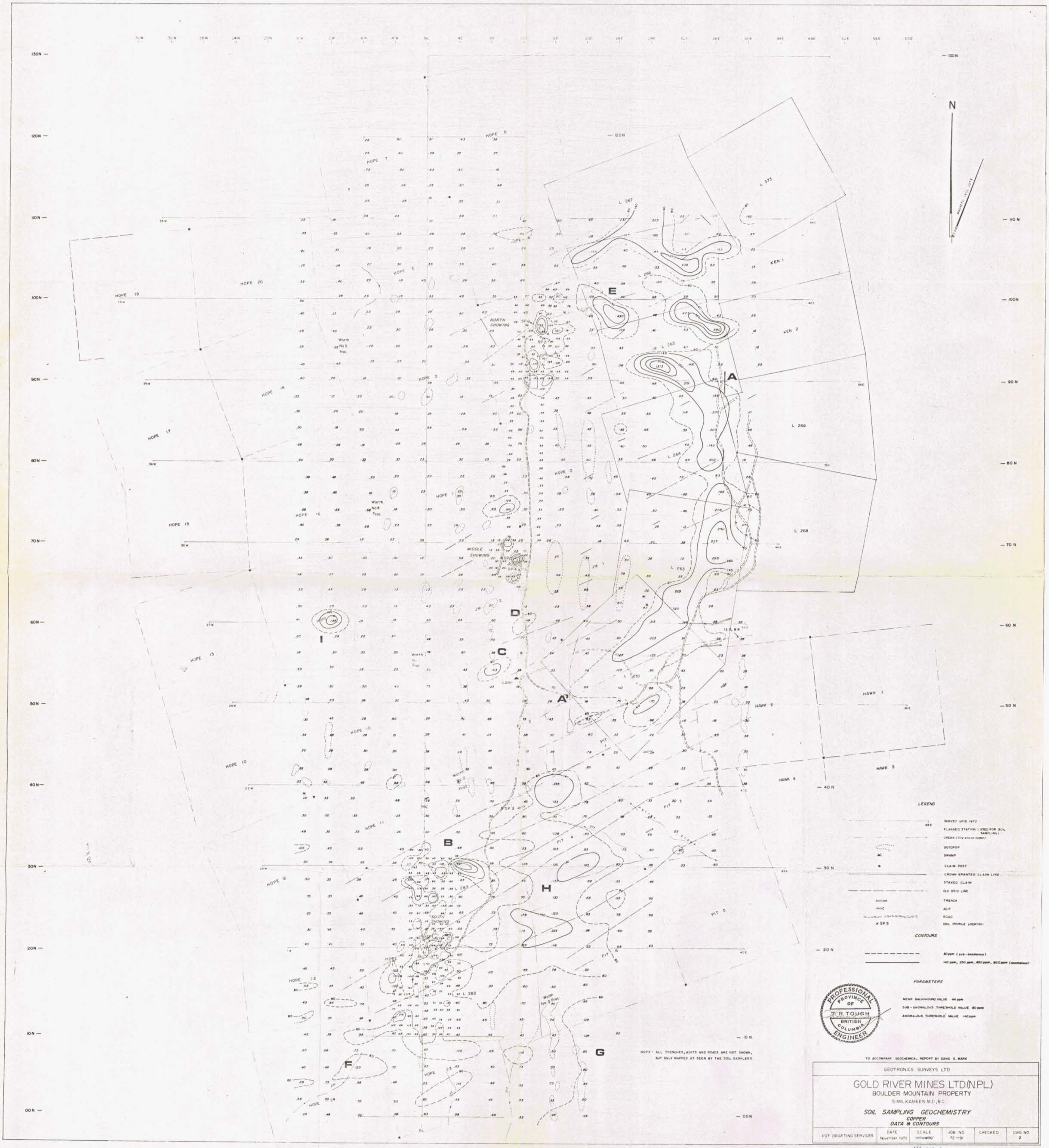
GEOTRONICS SURVEYS LTD.

GOLD RIVER MINES LTD. (N.P.L.)
BOULDER MOUNTAIN PROPERTY

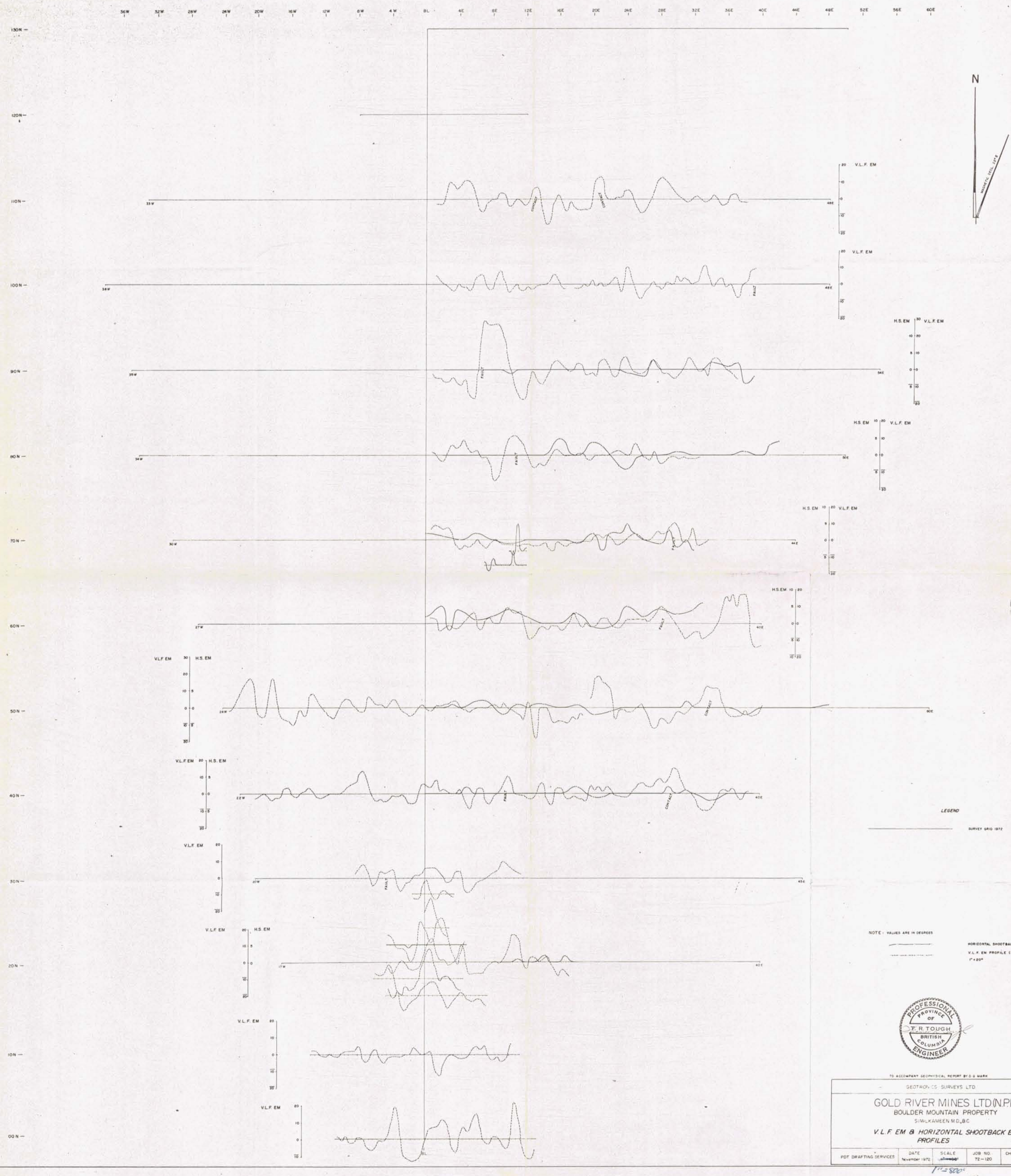
SIMILKAMEEN M.D., B.C.

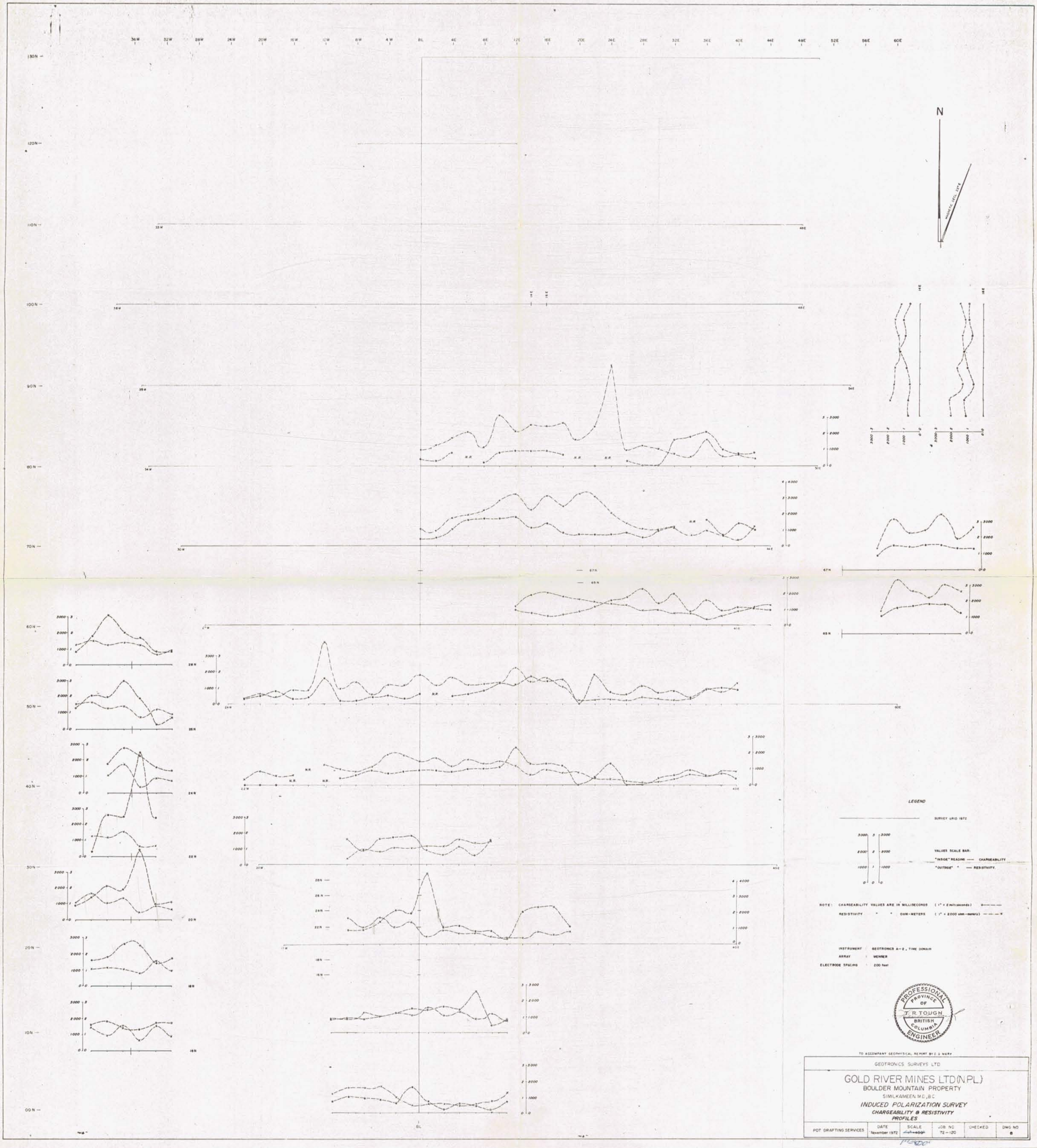
VERTICAL LOOP EM SURVEY
DATA & PROFILES

PDT DRAFTING SERVICES	SCALE 1" = 100' horiz.	DATE DEC. 1972

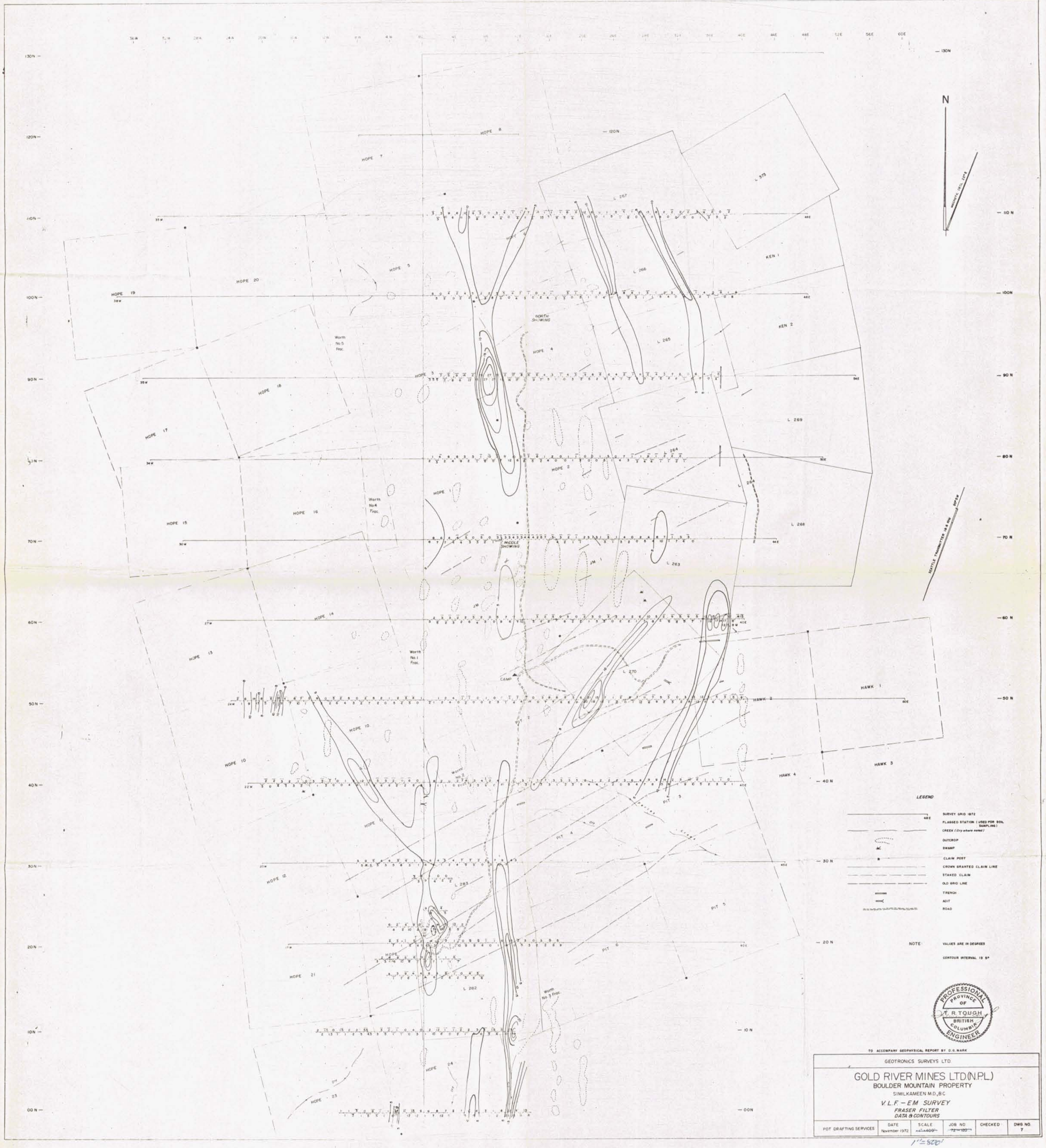

N
NORTH SHOWING
MIDDLE SHOWING
SOUTH SHOWING
A
A'
B
C
D
E
F
G
H
I
NOTE: ALL TRENCHES, ADITS AND ROADS ARE NOT SHOWN, BUT ONLY MAPPED AS SEEN BY THE SOIL SAMPLERS.
LEGEND
SURVEY GRID 1972
FLAGGED STATION (USED FOR SOIL SAMPLING)
CREEK (Dry where noted)
OUTCROP
SWAMP
CLAIM POST
CROWN GRANTED CLAIM LINE
STAKED CLAIM
OLD GRID LINE
TRENCH
ADIT
ROAD
SOIL PROFILE LOCATION
CONTOURS
80 ppm (sub-anomalous)
140 ppm, 250 ppm, 450 ppm, 800 ppm (anomalous)
PARAMETERS
MEAN BACKGROUND VALUE 44 ppm
SUB-ANOMALOUS THRESHOLD VALUE 80 ppm
ANOMALOUS THRESHOLD VALUE 140 ppm
PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
T. R. TOUGH
TO ACCOMPANY GEOCHEMICAL REPORT BY DAVID G. MARK
GEOTRONICS SURVEYS LTD
GOLD RIVER MINES LTD (N.P.L.)
BOULDER MOUNTAIN PROPERTY
SIMILKAMEEN M.D., B.C.
SOIL SAMPLING GEOCHEMISTRY
COPPER
DATA & CONTOURS
PDT DRAFTING SERVICES
DATE November 1972
SCALE
JOB NO 72-91
CHECKED
DWG NO 2
1" = 800'


N
HOPE 19
HOPE 20
HOPE 5
HOPE 7
KEN 1
KEN 2
L 269
L 268
HOPE 3
HOPE 18
HOPE 17
HOPE 16
HOPE 15
HOPE 13
HOPE 10
HOPE 12
HAWK
HAWK 3
NORTH SHOWING
SOUTH SHOWING
Worth No.5 Frac.
Worth No.4 Frac.
Worth No.1 Frac.
GEOLOGY
MIOCENE OR EARLIER
PRINCETON GROUP
Andesite
JURASSIC OR LATER
COAST INTRUSIONS
Granodiorite
POST UPPER TRIASSIC
Quartz sill
UPPER TRIASSIC
TULAMEEN SERIES
Porphyritic greenstone phenocrysts < 1/4"
" " " < 1/4"
Greenstone non porphyritic
Chlorite schist, sericite schist
Augite porphyry
GEOLOGICAL CONTACT
FAULT INFERRED
SHEAR
NOTE: GEOLOGY BY L. SOOKOCHOFF, P.Eng
LEGEND
SURVEY GRID 1972
FLAGGED STATION
CREEK
OUTCROP
SWAMP
CLAIM POST
CROWN GRANTED CLAIM LINE
STAKED CLAIM
OLD GRID LINE
TRENCH
ADIT
ROAD
GEOPHYSICS
L H
RESISTIVITY LOW / HIGH
CHARGEABILITY CONTOUR 2 msec / 1 msec
SUB-ANOMALOUS CONTOUR—COPPER (SOIL SAMPLING 1972)
SUB-ANOMALOUS CONTOUR—LEAD (SOIL SAMPLING 1971)
SELF POTENTIAL ANOMALY / POSSIBLE
VLF-EM CONDUCTOR DEFINITE/ASSUMED
HORIZONTAL SHOOTBACK CONDUCTOR DEFINITE / ASSUMED
PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
T. R. TOUGH
TO ACCOMPANY GEOPHYSICAL REPORT BY D.G. MARK
GEOTRONICS SURVEYS LTD
GOLD RIVER MINES LTD (N.P.L.)
BOULDER MOUNTAIN PROPERTY
SIMILKAMEEN M.D., B.C.
COMPILATION MAP
PDT DRAFTING SERVICES
DATE December 1972
SCALE ~~1"=400'~~
JOB NO 72-120
CHECKED
DWG NO 10
1"=800'

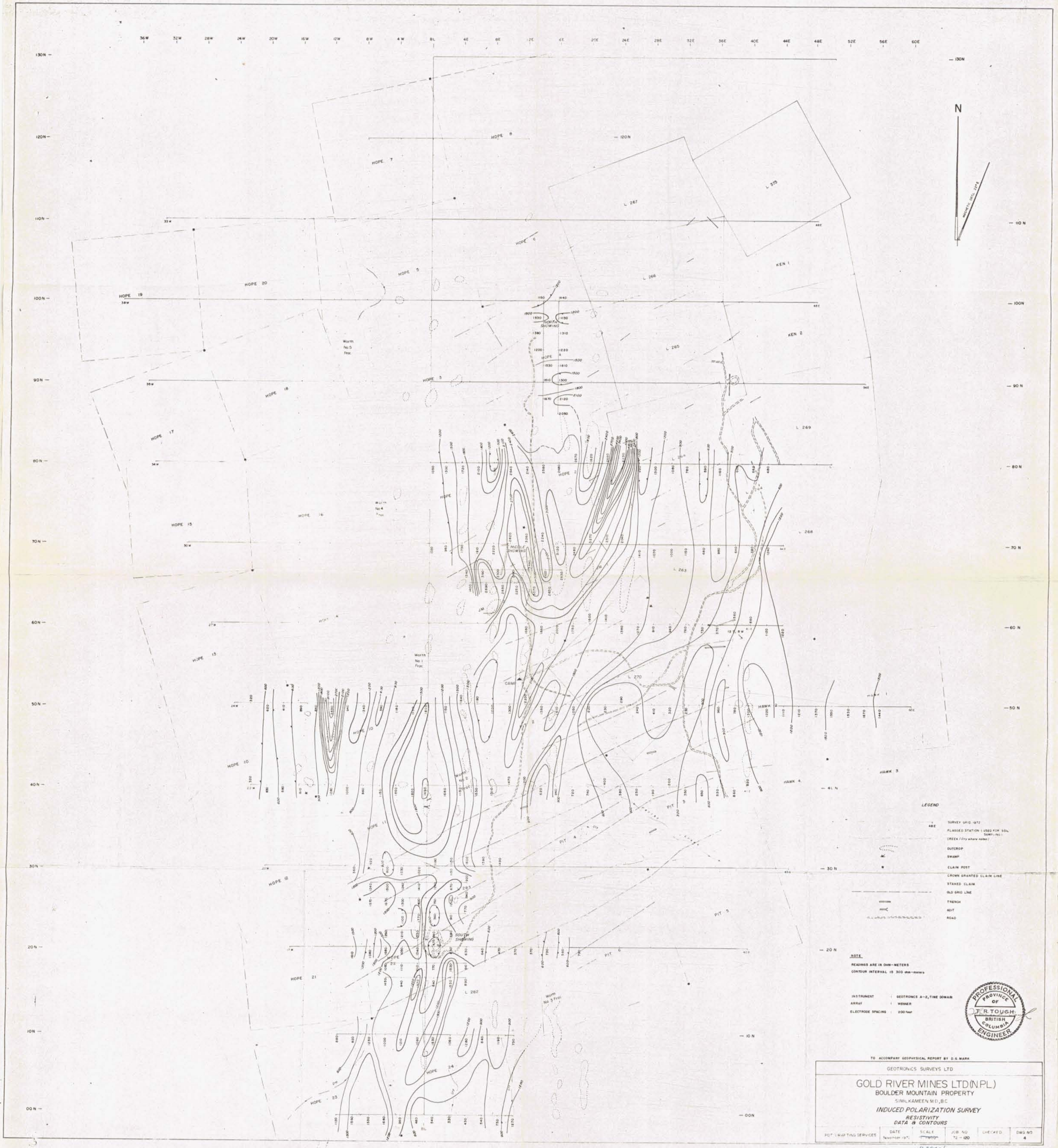

36W 32W 28W 24W 20W 16W 12W 8W 4W BL 4E 8E 12E 16E 20E 24E 28E 32E 36E 40E 44E 48E 52E 56E 60E
130N
120N
110N
100N
90N
80N
70N
60N
50N
40N
30N
20N
10N
00N
N
MAGNETIC DECL. 22½°E
V.L.F. EM
H.S. EM
FAULT
CONTACT
LEGEND
SURVEY GRID 1972
NOTE: VALUES ARE IN DEGREES
HORIZONTAL SHOOTBACK EM (H.S. EM), 1" = 10°
V.L.F. EM PROFILE (FRASER FILTER)
1" = 20°
PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
T. R. TOUGH
TO ACCOMPANY GEOPHYSICAL REPORT BY D G MARK
GEOTRONICS SURVEYS LTD
GOLD RIVER MINES LTD (N.P.L.)
BOULDER MOUNTAIN PROPERTY
SIMILKAMEEN M.D., B.C.
V.L.F. EM & HORIZONTAL SHOOTBACK EM PROFILES
PDT DRAFTING SERVICES
DATE November 1972
SCALE 1" = 800'
JOB NO. 72-120
CHECKED
DWG NO 9



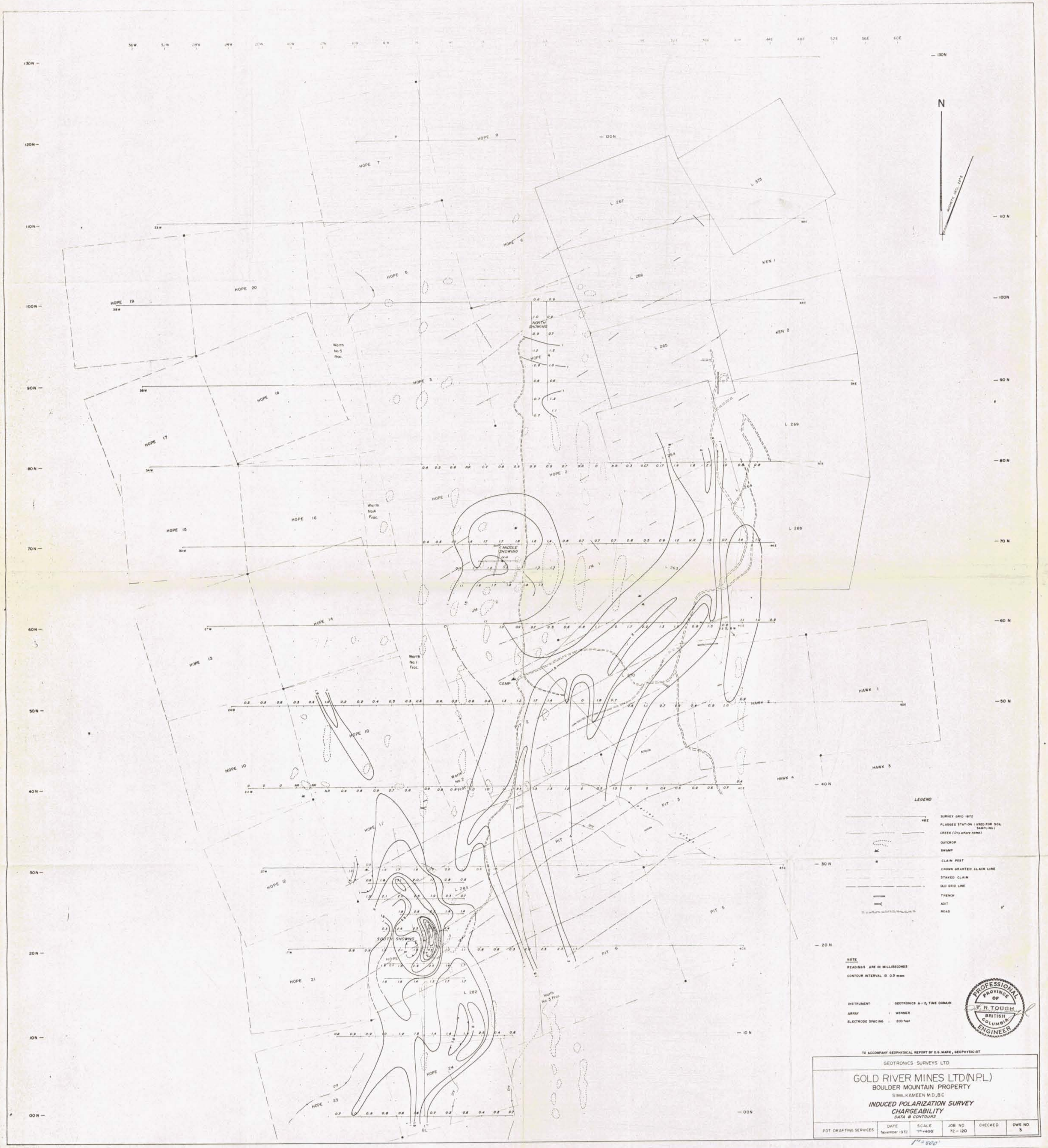
N
LEGEND
SURVEY GRID 1972
VALUES SCALE BAR:
"INSIDE" READING — CHARGEABILITY
"OUTSIDE" " — RESISTIVITY.
NOTE: CHARGEABILITY VALUES ARE IN MILLISECONDS (1" = 2 milliseconds)
RESISTIVITY " " OHM-METERS (1" = 2000 ohm-meters)
INSTRUMENT : GEOTRONICS A-2, TIME DOMAIN
ARRAY : WENNER
ELECTRODE SPACING : 200 feet
PROFESSIONAL
PROVINCE OF
T. R. TOUGH
BRITISH COLUMBIA
ENGINEER
TO ACCOMPANY GEOPHYSICAL REPORT BY C. G. MARK
GEOTRONICS SURVEYS LTD
GOLD RIVER MINES LTD (N.P.L.)
BOULDER MOUNTAIN PROPERTY
SIMILKAMEEN M.D., B.C.
INDUCED POLARIZATION SURVEY
CHARGEABILITY & RESISTIVITY PROFILES
PDT DRAFTING SERVICES
DATE November 1972
SCALE 1" = 400'
JOB NO 72-120
CHECKED
DWG NO 8

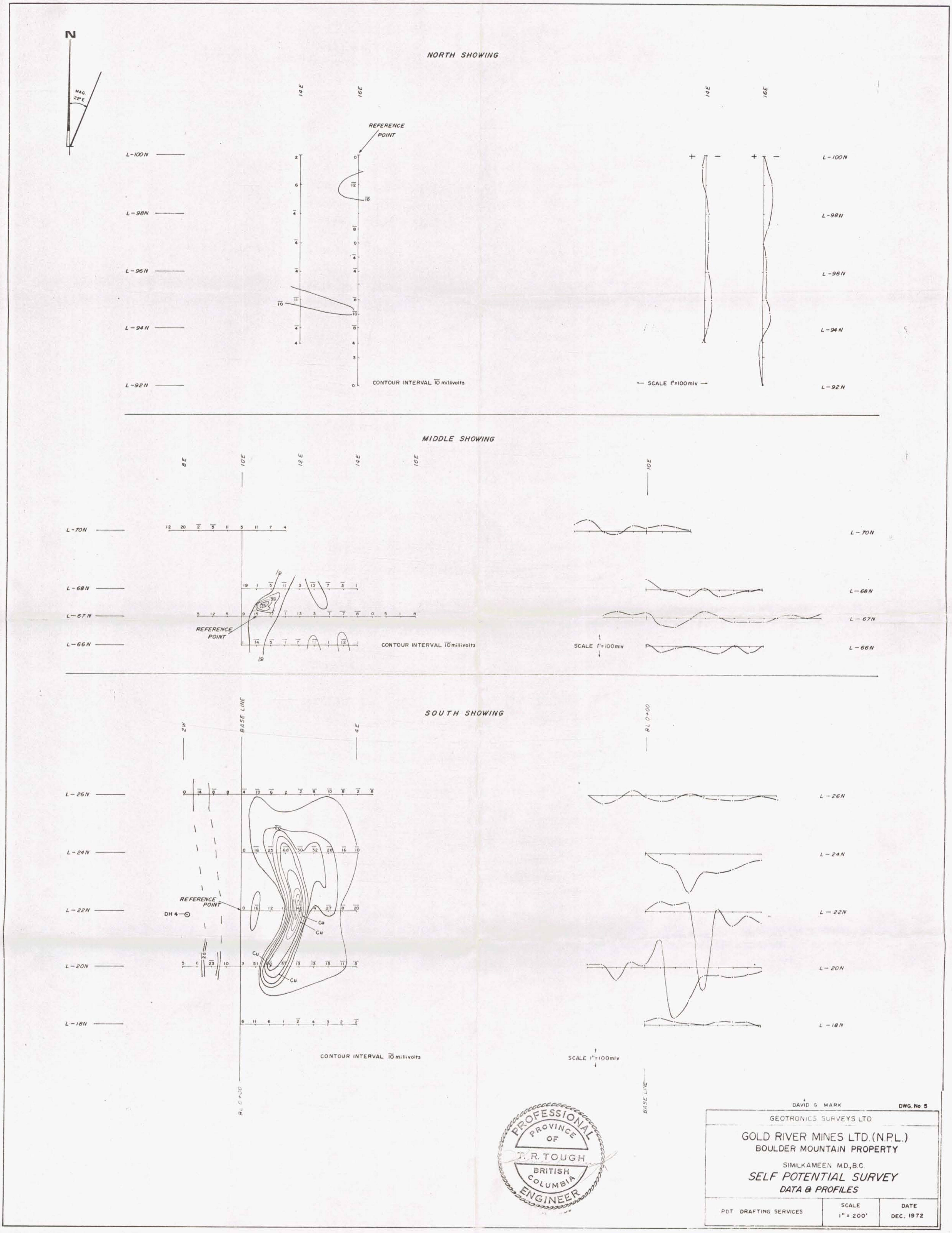

N
MAGNETIC DECL. 22°E
SEATTLE TRANSMITTER 18.6 KHZ
NORTH SHOWING
MIDDLE SHOWING
CAMP
HOPE 1
HOPE 2
HOPE 3
HOPE 4
HOPE 5
HOPE 7
HOPE 8
HOPE 10
HOPE 12
HOPE 13
HOPE 14
HOPE 15
HOPE 16
HOPE 17
HOPE 18
HOPE 19
HOPE 20
HOPE 21
HOPE 23
HOPE 24
KEN 1
KEN 2
HAWK 1
HAWK 3
HAWK 4
L 262
L 263
L 264
L 265
L 266
L 267
L 268
L 269
L 270
L 283
JM
JM 1
PIT 3
PIT 4
PIT 5
PIT 6
Worth No.1 Frac.
Worth No.3 Frac.
Worth No.4 Frac.
Worth No.5 Frac.
130N
120N
110N
100N
90N
80N
70N
60N
50N
40N
30N
20N
10N
00N
LEGEND
SURVEY GRID 1972
FLAGGED STATION (USED FOR SOIL SAMPLING)
CREEK (Dry where noted)
OUTCROP
SWAMP
CLAIM POST
CROWN GRANTED CLAIM LINE
STAKED CLAIM
OLD GRID LINE
TRENCH
ADIT
ROAD
NOTE: VALUES ARE IN DEGREES
CONTOUR INTERVAL IS 5°
PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
T. R. TOUGH
TO ACCOMPANY GEOPHYSICAL REPORT BY D.G. MARK
GEOTRONICS SURVEYS LTD.
GOLD RIVER MINES LTD.(N.P.L.)
BOULDER MOUNTAIN PROPERTY
SIMILKAMEEN M.D., B.C.
V.L.F. – EM SURVEY
FRASER FILTER
DATA & CONTOURS
PDT DRAFTING SERVICES
DATE November 1972
SCALE 1" = 400'
JOB NO. 72-120
CHECKED
DWG. NO. 7
1" = 800'

N
MAGNETIC DECL. 22°E
HOPE 7
HOPE 8
HOPE 6
HOPE 5
HOPE 4
HOPE 3
HOPE 2
HOPE 1
HOPE 19
HOPE 20
HOPE 18
HOPE 17
HOPE 16
HOPE 15
HOPE 14
HOPE 13
HOPE 10
HOPE 11
HOPE 12
HOPE 21
HOPE 22
HOPE 23
HOPE 24
L 267
L 375
L 266
L 265
L 264
L 263
L 268
L 269
L 270
L 282
L 283
KEN 1
KEN 2
HAWK 1
HAWK 2
HAWK 3
HAWK 4
JM 1
JM 2
PIT 3
PIT 4
PIT 5
PIT 6
NORTH SHOWING
MIDDLE SHOWING
CAMP
Worth No 5 Frac.
Worth No 4 Frac.
Worth No 1 Frac.
Worth No 2 Frac.
Worth No 3 Frac.
LEGEND
SURVEY GRID 1972
FLAGGED STATION (USED FOR SOIL SAMPLING)
CREEK (Dry where noted)
OUTCROP
SWAMP
CLAIM POST
CROWN GRANTED CLAIM LINE
STAKED CLAIM
OLD GRID LINE
TRENCH
ADIT
ROAD
INSTRUMENT : CRONE C.E.M.
COIL SPACING : 200 feet
FREQUENCY : 1830 Hz
PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
T. R. TOUGH
TO ACCOMPANY GEOPHYSICAL REPORT BY D.G. MARK
GEOTRONICS SURVEYS LTD.
GOLD RIVER MINES LTD (N.P.L.)
BOULDER MOUNTAIN PROPERTY
SIMILKAMEEN M.D., B.C.
HORIZONTAL SHOOTBACK EM SURVEY
DATA
PDT DRAFTING SERVICES
DATE November 1972
SCALE 1" = 400'
JOB NO 72-120
CHECKED
DWG. NO. 6



N
LEGEND
48E
SURVEY GRID 1972
FLAGGED STATION (USED FOR SOIL SAMPLING)
CREEK (Dry where noted)
OUTCROP
SWAMP
CLAIM POST
CROWN GRANTED CLAIM LINE
STAKED CLAIM
OLD GRID LINE
TRENCH
ADIT
ROAD
NOTE
READINGS ARE IN OHM-METERS
CONTOUR INTERVAL IS 300 ohm-meters
INSTRUMENT : GEOTRONICS A-2, TIME DOMAIN
ARRAY : WENNER
ELECTRODE SPACING : 200 feet
PROFESSIONAL PROVINCE OF T. R. TOUGH BRITISH COLUMBIA ENGINEER
TO ACCOMPANY GEOPHYSICAL REPORT BY D.G. MARK
GEOTRONICS SURVEYS LTD
GOLD RIVER MINES LTD (N.P.L.)
BOULDER MOUNTAIN PROPERTY
SIMILKAMEEN M.D., B.C.
INDUCED POLARIZATION SURVEY
RESISTIVITY
DATA & CONTOURS
PDT DRAFTING SERVICES
DATE November 1971
SCALE
JOB NO 72 - 120
CHECKED
DWG NO 4
1" = 800'
HOPE 19
HOPE 20
HOPE 5
HOPE 6
HOPE 7
HOPE 8
HOPE 3
HOPE 18
HOPE 17
HOPE 16
HOPE 15
HOPE 13
HOPE 12
HOPE 11
HOPE 10
HOPE 21
HOPE 23
HOPE 24
L 267
L 375
L 266
L 265
L 269
L 264
L 268
L 263
L 270
L 287
KEN 1
KEN 2
HAWK 3
HAWK 4
NORTH SHOWING
MIDDLE SHOWING
SOUTH SHOWING
CAMP
PIT 3
PIT 4
PIT 5
PIT 6


LEGEND
SURVEY GRID 1972
FLAGGED STATION (USED FOR SOIL SAMPLING)
CREEK (Dry where noted)
OUTCROP
SWAMP
CLAIM POST
CROWN GRANTED CLAIM LINE
STAKED CLAIM
OLD GRID LINE
TRENCH
ADIT
ROAD
NOTE
READINGS ARE IN MILLISECONDS
CONTOUR INTERVAL IS 0.5 msec
INSTRUMENT : GEOTRONICS A-2, TIME DOMAIN
ARRAY : WENNER
ELECTRODE SPACING : 200 feet
PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
T. R. TOUGH
TO ACCOMPANY GEOPHYSICAL REPORT BY D.G. MARK, GEOPHYSICIST
GEOTRONICS SURVEYS LTD
GOLD RIVER MINES LTD (N.P.L.)
BOULDER MOUNTAIN PROPERTY
SIMILKAMEEN M.D., B.C.
INDUCED POLARIZATION SURVEY
CHARGEABILITY
DATA & CONTOURS
PDT DRAFTING SERVICES
DATE November 1972
SCALE 1"=400'
JOB NO 72-120
CHECKED
DWG NO 3
1"=800'



N
MAG. 22° E
NORTH SHOWING
14E
16E
REFERENCE POINT
L-100N
L-98N
L-96N
L-94N
L-92N
CONTOUR INTERVAL 10 millivolts
SCALE 1"=100 mlv
MIDDLE SHOWING
8E
10E
12E
14E
16E
L-70N
L-68N
L-67N
L-66N
REFERENCE POINT
CONTOUR INTERVAL 10 millivolts
SCALE 1"=100mlv
SOUTH SHOWING
2W
BASE LINE
4E
BL 0+00
L-26N
L-24N
L-22N
L-20N
L-18N
REFERENCE POINT
DH 4
Cu
CONTOUR INTERVAL 10 millivolts
SCALE 1"=100mlv
BL 0+00
BASE LINE
PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
T. R. TOUGH
DAVID G. MARK
DWG. No 5
GEOTRONICS SURVEYS LTD
GOLD RIVER MINES LTD. (N.P.L.)
BOULDER MOUNTAIN PROPERTY
SIMILKAMEEN M.D., B.C.
SELF POTENTIAL SURVEY
DATA & PROFILES
PDT DRAFTING SERVICES
SCALE 1" = 200'
DATE DEC. 1972