

GEOCHEMICAL-GEOPHYSICAL REPORT
1048/625/74 ON
MAGNETIC & SOIL SAMPLING SURVEYS
NORTHERN VALLEY MINES LTD. (N.P.L.)
SCHAFT CREEK CLAIMS
LIARD MINING DIVISION
JUNE-SEPTEMBER 1969; 1970

SCHAFT CREEK CLAIM GROUPS:

PEPSI, HICKS, BOY, BIG S, SNO & NVM
44 miles SSE of Telegraph Creek, B.C.
57° 131° SE
N.T.S. - 104G/6, 7

Report written for: NORTHERN VALLEY MINES LTD. (N.P.L.)
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Magnetic & Soil Sampling Surveys
PEPSI, HICKS, BOY, BIG S, SNO & NVM

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Magnetic & Soil Sampling Surveys
PEPSI, HICKS, BOY, BIG S, SNO & NVM

2.

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Magnetic & Soil Sampling Surveys
PEPSI, HICKS, BOY, BIG S, SNO & NVM

S U M M A R Y

A soil sample and magnetic survey was completed over a portion of the Schaft Creek property of Northern Valley Mines which adjoins the property of Liard Copper Mines. This area is about 44 miles south of the town of Telegraph Creek and 210 miles north of Prince Rupert on the eastern flank of the Coast Range. Access is best by fixed-wing aircraft as there is an airstrip on the northern end of the property.

Liard Copper has so far delineated an orebody of about 250 million tons. Their property is on the contact of the Hickman Batholith with Permian volcanics. The volcanics have several phases, 2 of which are found on the property, grey-green andesite and purple volcanics. Altered andesite is the main host rock for the sulphide mineralization. The intrusive in this area is mainly a monzonite. The structural control are several NNW-trending faults that cut the property within the andesite.

The Northern Valley property has very similar geology including outcrops of copper sulphides.

The soil sample survey revealed several copper and molybdenum anomalies that are definitely worthy of further interest. The magnetic survey differentiated between the monzonite and the andesite but correlated very poorly

with the geochemistry results and the copper sulphide outcrops. No faults or shear zones were delineated.

Further exploration is recommended in the form of geological mapping, soil sampling, induced polarization and perhaps magnetics.

GEOCHEMICAL-GEOPHYSICAL REPORT
ON
MAGNETIC & SOIL SAMPLING SURVEYS
SCHAFT CREEK CLAIMS

Submitted to: Northern Valley Mines Ltd. (N.P.L.)

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

INTRODUCTION

This report encompasses the results and corresponding discussion on a soil sample and magnetic survey on the Schaft Creek property of Northern Valley Mines Ltd. The surveys were supervised by consulting geologist, Jos. Sullivan, and were carried out during the exploration seasons of 1969 and 1970 by employees of Northern Valley. Jos. Sullivan wrote a report on the surveys carried out in 1969.

The property consists of 202 claims named as follows: PEPSI 1-50, BOY 1-48, HICKS 1-12, NVM 1-36, BIG S 1-24, and SNO 1-32. The survey covered claims, in part or in full, PEPSI 1-12, 19, 21, 29-31, 33, 37, 39 and 41;

BOY 2, 21, 22, 41-44, 46 and 48; HICKS 1-6; NVM 1-4 and 13 and BIG S 1-3, 10 and 12.

The object of the magnetic survey was to map structure and bedrock lithology and find out if there was any correlation between the magnetic pattern and the geochemistry anomalies, and/or mineralization. That of the soil sampling was to locate additional areas of mineralization.

LOCATION AND ACCESS (57°20' 131°00')

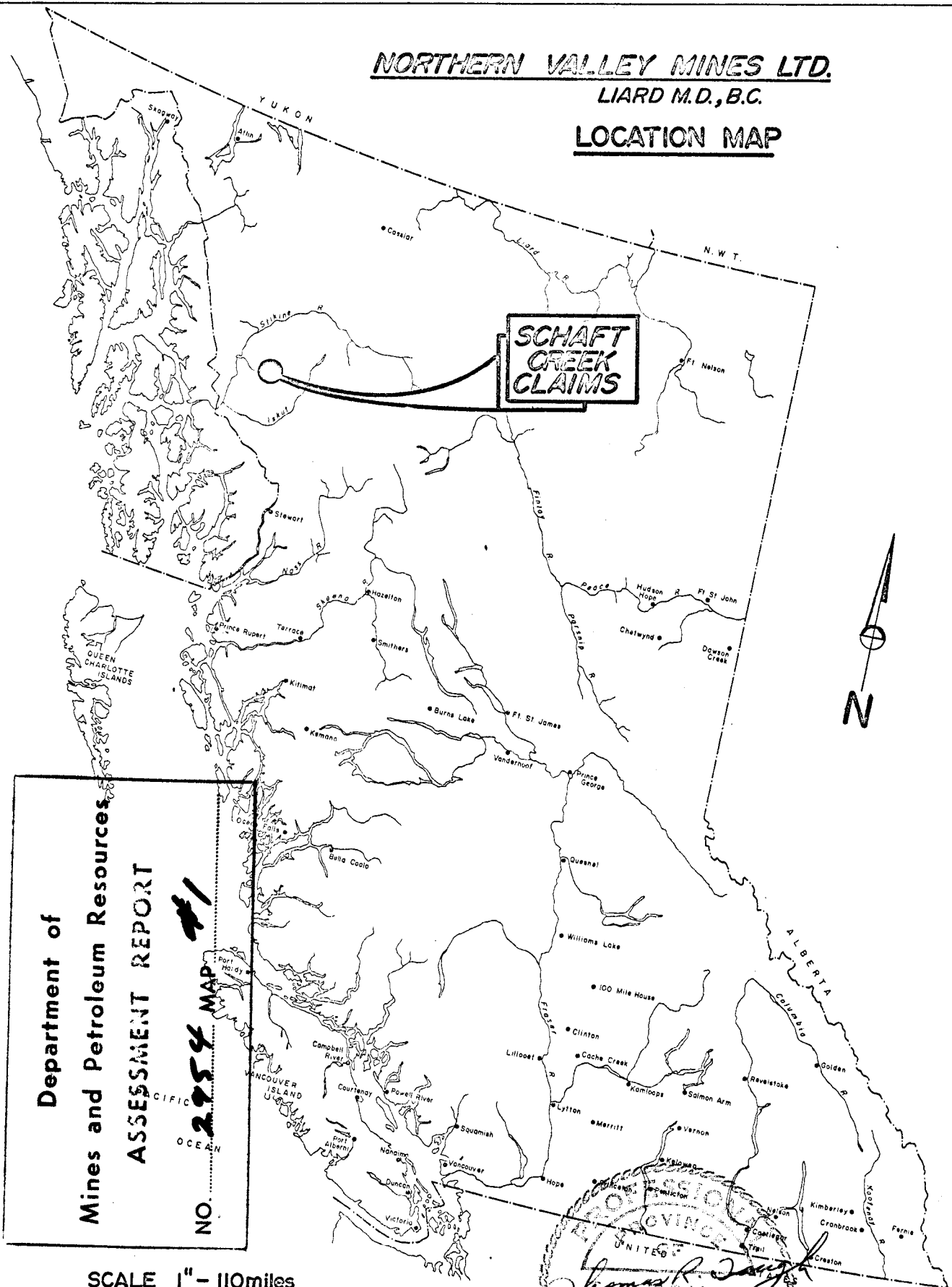
The claims are in northwestern B.C. in the Coast Range Mountains within the Liard Mining Division. They are located at the confluence of Hickman Creek and Schaft Creek which is about 44 miles south of the town of Telegraph Creek and 210 miles north of Prince Rupert. The property of Liard Copper Mines Ltd., which to date have developed an orebody of 250 million tons, adjoins Northern Valley's property on the north.

Access is best by fixed-wing aircraft, being there is an airstrip on the northern end of the claim group on the bed of Schaft Creek. There is also a horse trail from Telegraph Creek. The unfinished portion of the Cassiar-Stewart Highway is about 28 miles to the east of the property in the Iskut River Valley.

NORTHERN VALLEY MINES LTD.

LIARD M.D., B.C.

LOCATION MAP



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NO. 2754 MAP #1

PACIFIC
OCEAN

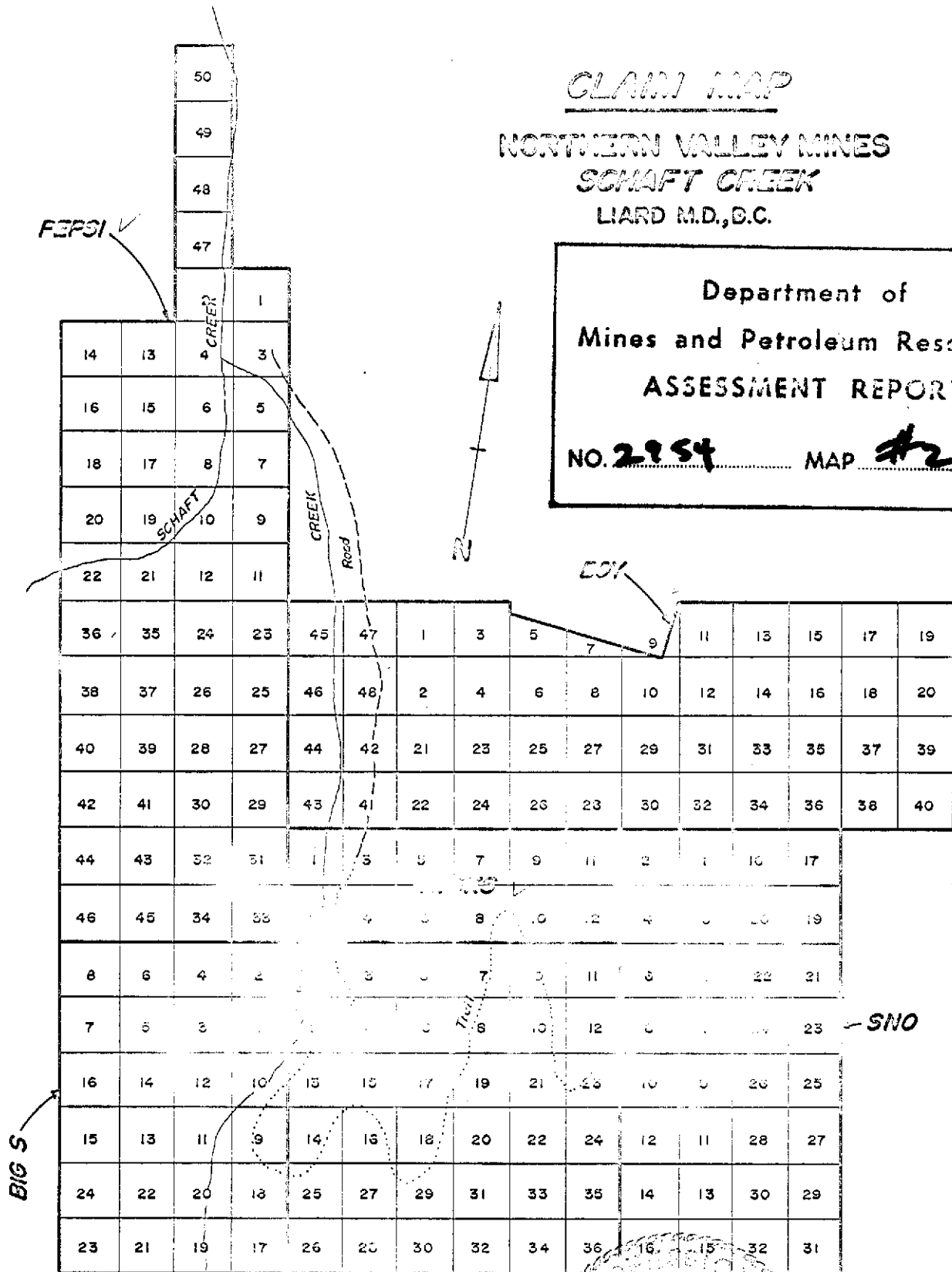
SCALE 1" = 110 miles

CLAIM MAP

NORTHERN VALLEY MINES
SCHAFT CREEK
LIARD M.D., B.C.

Department of
Mines and Petroleum Resources
ASSESSMENT REPORT

NO. 2954 MAP #2



SCALE 1" = 4000'

LEGEND

CLAIM BOUNDARIES

GROUP BOUNDARIES

CLAIM No.

TOPOGRAPHY

The claims are found in broad U-shaped creek valleys which are adjacent to high rugged mountain peaks. Schaft Creek, which flows through the northern portion of the claim group, is widely braided. The property is largely on a western slope of a north-trending ridge and has an elevation varying from 3,000 feet to over 6,000 feet. The slopes are moderate to steep (from almost flat to 45°) with local variations such as rock bluffs.

The timberline is 3,800 feet to 4,000 feet, below which is heavily forested with dense underbrush.

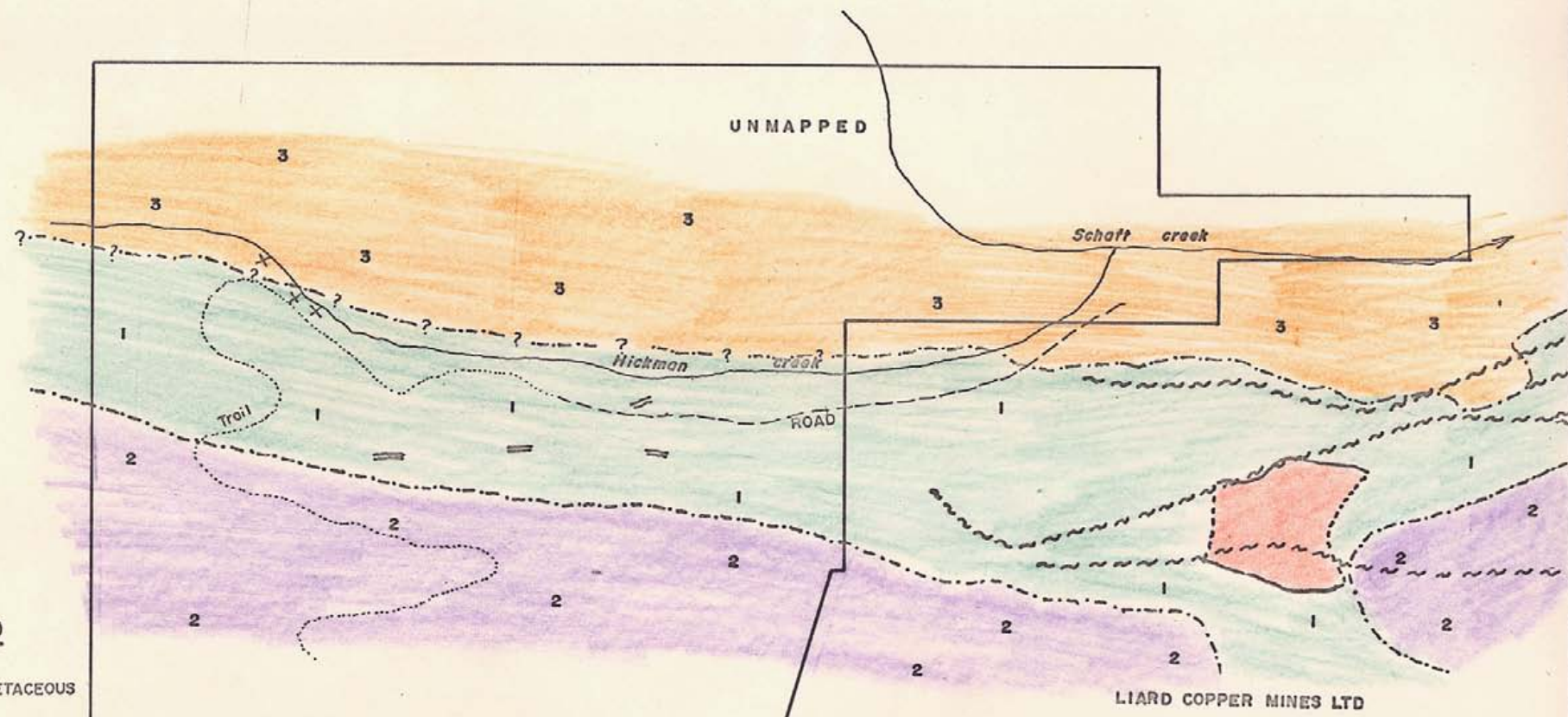
SURVEY GRID

Five different lines, B, C, G, J and K, were used as base lines and run in approximately a north-south direction. Base line B follows the claim line of PEPSI 1-12 and 23-32 claims. Survey lines are cut out, blazed and flagged at 500-foot intervals in an east-west direction in the north part of the survey area and in a S60E-N60W direction in the south part. Soil samples and magnetometer readings were taken at 100-foot centers on these lines.

GEOLOGY

The Schaft Creek property of Northern Valley Mines is found on the contact of the Jurassic or Cretaceous Hickman Batholith, an apophyse of the Coast Range Batholith, with Permian (or older) volcanics. The mineralization is within the volcanics and was probably injected by the intrusive.

The orebody of Liard Copper Mines, only known one in the area, has been drilled so far to 250 million tons (see accompanying geology map). The sulphide mineralization is found principally within a grey-green andesite member of the Permian volcanics, which runs north-south through the property. Overlying the andesite is a purple volcanic which is a different phase of the Permian volcanics. Near this contact within the andesites is a band of augite porphyry. On the western part of the property is the contact with the intrusive, which has been identified as a pink monzonite. Copper sulphide mineralization has also been found within the monzonites and the purple volcanics. The principle structural control, and probably the plumbing system, for the orebody is a system of anastomising faults that strike NNW, approximately parallel to the intrusive contact, and dip steep to vertical. The sulphides occur as fine disseminations, fracture fillings (the fractures being caused by the faulting), and blebs. The sulphides are pyrite, bornite, chalcopyrite and molybdenite.



LEGEND

JURASSIC OR CRETACEOUS

3 Monzonite intrusives

PERMIAN (?)

2 Purple volcanics

1 Gray green volcanics

— AUGITE PORPHYRY

--- FAULT

--- CONTACT

x COPPER SHOWINGS

APPROX. ORE ZONE

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Mines and Petroleum Resources
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NO. 2954

MAP #3

SCALE 1" = 4000'



NORTHERN VALLEY MINES
LTD. (SCHAFF CREEK PROP.)

GEOLOGY

SKETCHED BY D. MARK

The Northern Valley property has much the same geology as Liard Copper Mines', though much of Northern's is unmapped. On the geology map, the contact between the 3 main rock types is roughly drawn in, as shown. The property, in all likelihood, also contains a system of faults. Sulphide mineralization has been noted in all rock types, but mainly within the grey-green andesites, as disseminations, fracture fillings and blebs. One showing consists of a substantial vein of bornite.

SOIL SAMPLING SURVEY

1) Survey Procedure - The samples were taken as shown on sheets 2 and 3 (in the pocket). The samples were dug by a D-handled shovel at the depth of the shovel blade. The soil horizon sampled was B, and A where B was difficult to obtain such as in swampy areas. All samples were placed in brown, wet-strength paper envelopes with line and station number marked thereon.

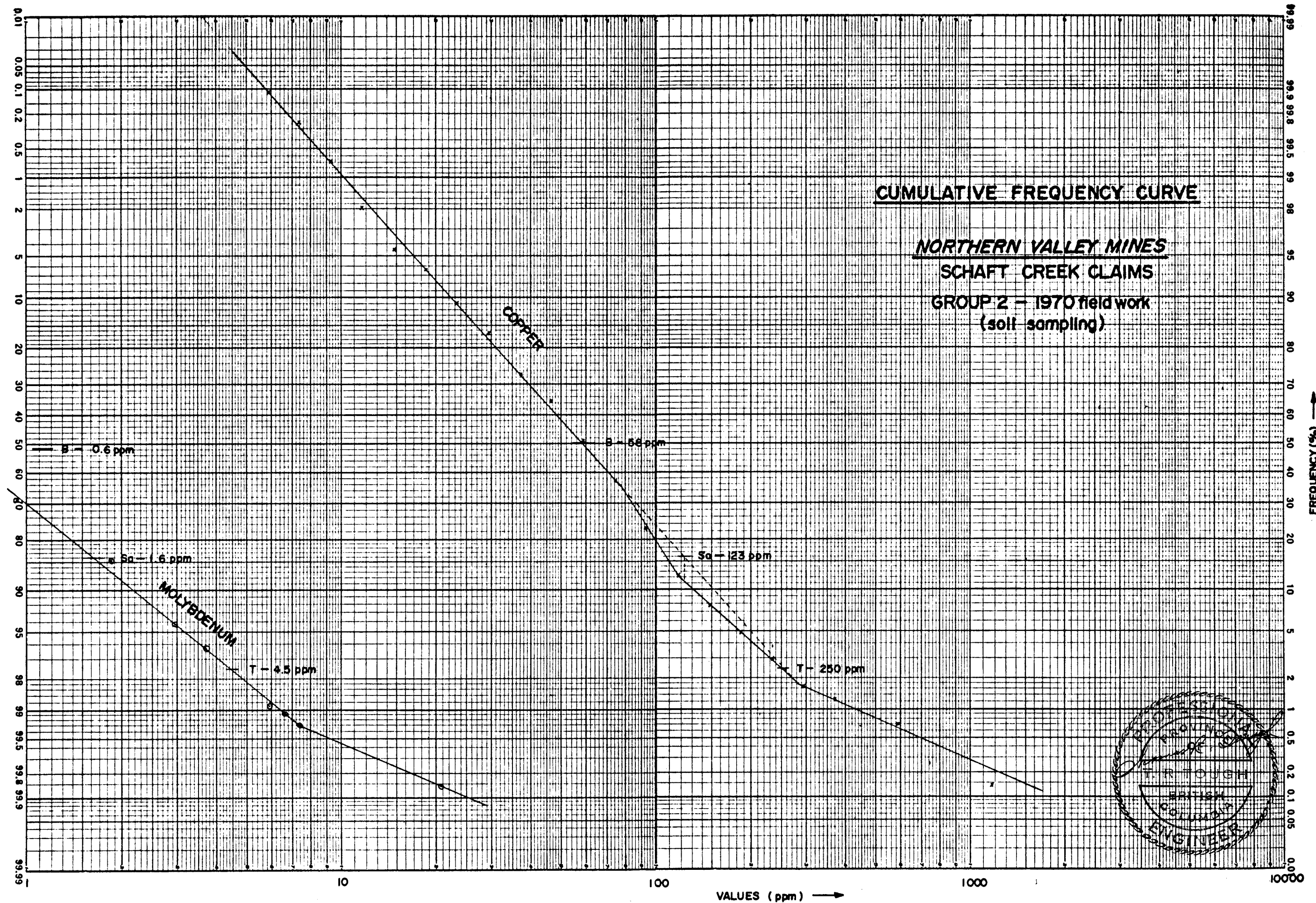
2) Testing Procedure - The 1969 soil samples were tested by Seymour Laboratories Ltd. and are referred to as group 1. Part of the 1970 samples, referred to as group 2, were tested by Seymour Laboratories in August, 1970 and the rest were tested by Acme Analytical Laboratories Ltd. in March, 1971.

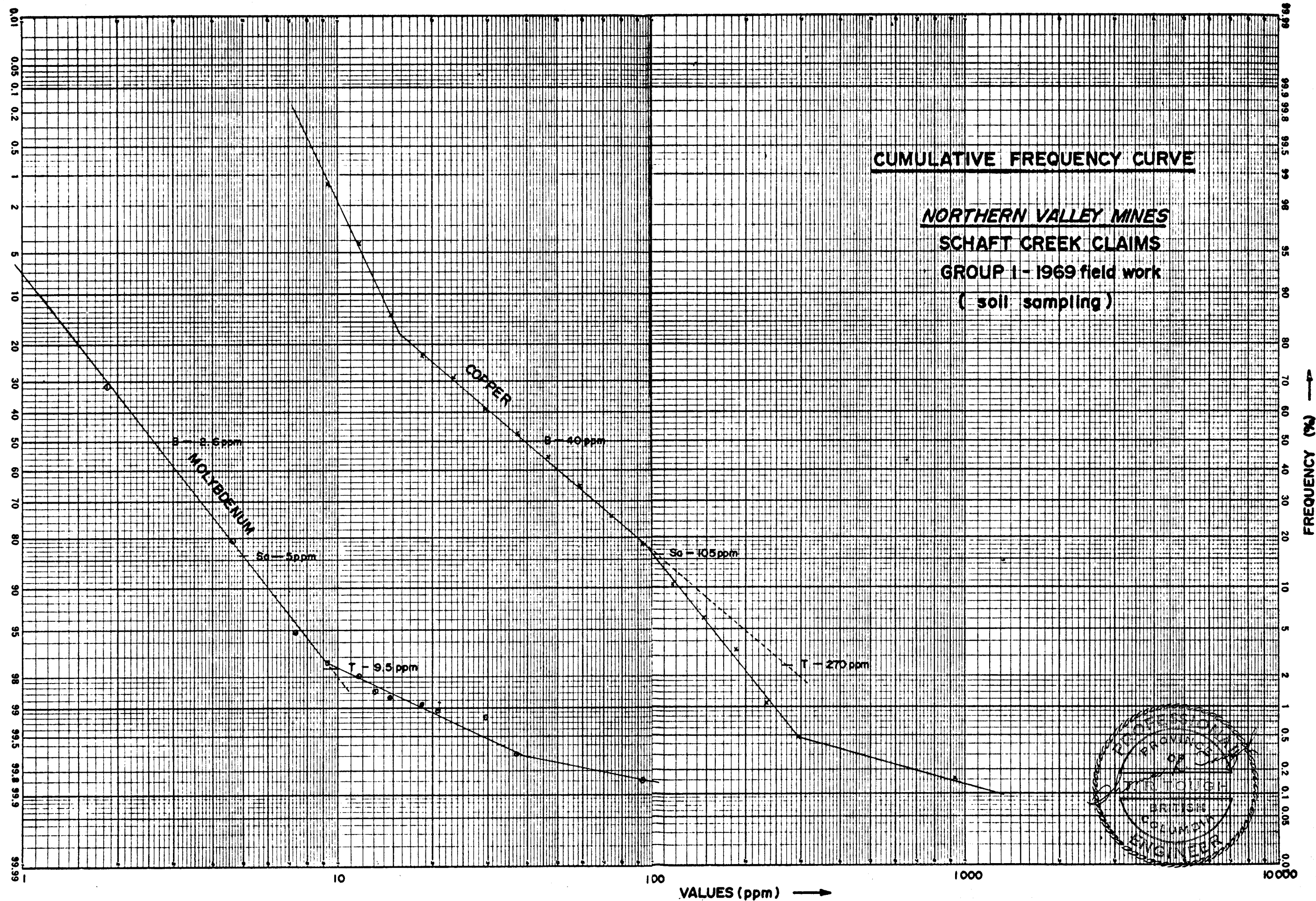
All samples were tested by hot acid extraction using perchloric-nitric acid as the digester. The sample was first thoroughly dried and then sifted through an 80-mesh screen. A measured amount of the sifted material was then put into a test tube with subsequent measured additions of the acid. The mixture was then heated approximately 3 hours. The parts per million (ppm) material, whether copper or molybdenum, was then measured by atomic absorption.

3) Statistical Analysis - Cumulative frequency graphs for each group were plotted of the 2 metals in order to find out various statistical parameters such as the background and threshold values.

The group 1 samples were taken over the monzonite intrusive and the group 2 samples, over the volcanics. Because of this and the fact that the 2 groups were picked up in different years, different parameters could result and, therefore, each group was plotted separately.

For copper, the parameters were fairly close. In group 1, they were: background - 40 ppm, sub-anomalous - 105 ppm, and threshold (or anomalous) - 270 ppm. In group 2, they were: background - 58 ppm, sub-anomalous - 123 ppm, and threshold - 250 ppm (Sub-anomalous is a term used by the writer to denote the minimum value, that is, one standard deviation from the mean, or background, at the 16% level, that is not necessarily anomalous, but not background either and, therefore, could still possibly





indicate mineralization.). Hence, for the whole area, the parameters were taken as follows: background - 50 ppm, sub-anomalous - 100 ppm, and threshold - 250 ppm.

The different straight-line segments of the 2 plots represent a varying distribution of copper ions within the soil. On the group 1 plot, the segment from 16 to 95 ppm is the main and normal distribution plot, and it is from this segment that the parameters are derived. The upward angle at 16 ppm shows that there is a less than normal amount of values below 16 ppm. The downward angle at 95 ppm also indicates that there is a less than normal amount of values above 95 ppm. The upward angle at 300 ppm probably indicates that results above this value are very close to the source. In group 2, there is close to a straight line, and normal distribution up to 300 ppm. The upward angle at this value also indicates that results 300 ppm and above are very close to the source.

On the molybdenum plots, the parameters are quite different between the 2 groups, a probable result of the differing bedrock. In group 1, the parameters are: background - 2.6 ppm (say 3), sub-anomalous - 5 ppm, and threshold - 9.5 ppm (say 10). In group 2, they are: background - 0.6 ppm, sub-anomalous - 1.6 ppm (say 2) and threshold - 4.5 ppm (say 4). Therefore, the monzonite has a higher background amount of molybdenum than the volcanics (here, principally, the grey-green andesites).

The molybdenum graph of group 1 has 3 straight-line segments. The one up to 9.5 ppm is due to a normal distribution. There is a greater than normal amount of values above 9.5 ppm and these values indicate that they are probably taken close to sulphides. In group 2, it is the values above 7.5 ppm (say 8) that are above average and, therefore, probably close to sulphides.

4) Discussion of Anomalies - As shown on the copper contour map (sheet 2a), there are a number of interesting anomalous zones and are labelled A to J. Generally speaking, the more promising ones (A to F, except perhaps D) are found in the andesites, the host rock for Liard Copper.

Zone A is located in an area of known copper mineralization and is composed of 2 smaller zones. The south one is about 500 by 500 feet reaching a high of over 1100 ppm and the north one 700 by 800 feet open at the west end and reaching a high of over 600 ppm. The 2 anomalies are separated by one line of low results that could very possibly be due to poor samples (such as A₀ soil or great depth of overburden) and therefore the sulphide zones could join as one.

Zones B and C contain only a few anomalous values each but both have a larger sub-anomalous zone that is open uphill on the east side. B is also open on the N end and could, therefore, possibly join C.

Both D and E zones have small anomalous contours, but if sub-anomalous contours are indicative of further mineralization, the areas of interest would be somewhat large. D is open on the northwest end.

F contains only sub-anomalous values but is on the edge of the survey area and therefore completely open on the east and uphill end.

G is also open on the east end, but it contains anomalous values. It is within the monzonites, as are anomalies H, I and G.

H contains only one high single value and is likely close to the sulphide source. It possibly extends across Hickman Creek.

Both zones I and J are almost wholly sub-anomalous, but are large. Zone I is about 1000 by 1000 feet and open on east and south ends. Zone J is about 1400 by 500 feet and could possibly connect to I.

The molybdenum anomalies are smaller and more sporadic which is no doubt due to its low mobility through soil.

Zone A is relatively large and is composed of many anomalous and sub-anomalous values. It is 2000 feet long

in an east-west direction, at least 1000 feet wide being open on the N end and has a high of 24 ppm.

Anomaly B is much smaller being composed of 1 anomalous value but is open on the north end.

Zones C and D are small sub-anomalous zones but are in the area of known copper mineralization.

Anomalous zone E is composed of 11 small sporadic anomalies and, therefore, could be due to one large, perhaps disseminated, sulphide source.

On sheet 4 has been drawn the outlines of both the copper and molybdenum anomalies. There is little correlation between the two which is probably due to the molybdenite being emplaced after the other sulphides and being controlled by late microfractures (as noted by Campbell). It can be readily seen that the most promising area is that containing molybdenum anomaly A and copper anomalies B, C and D. It is in the andesites, there is semi-correlation between the 2 metals and it is a fairly large area.

MAGNETIC SURVEY

1) Survey Procedure - The survey was carried out using a portable fluxgate magnetometer over the same grid

as the soil sampling was. As noted in Jos. Sullivan's report on the 1969 field results, the diurnal change was not closely kept track of. However, the writer discussed the survey with the operator, Carl Stevenson, who said that each time he closed his loop, his readings agreed within a few gammas of the established value. The 1970 survey was improperly carried out (by a different operator) and, therefore, as a result is entirely useless. Not only was the diurnal change not kept track of, but the loops apparently were not closed. In addition, the 10K scale was used throughout the survey which was much too insensitive to any important magnetic variations. The writer attempted to correlate those results of 1970 with those of 1969, but without success.

2) Instrumentation - The instrument used was a portable, vertical component fluxgate magnetometer, Model MF-1, manufactured by Scintrex Limited of Downsview, Ontario. The instrument reads directly in gammas on a meter and has a range from 0 to 100,000 gammas through 5 different scales. The accuracy is 0.5% of full scale on the 1000 to 10,000 gamma ranges and 1% on full scale on the 30,000 to 100,000 gamma ranges. Sensitivity varies from 20 gammas/div. on the 1000 gamma scale to 2000 gammas/div. on the 100,000 gamma scale. Temperature stability is 1 gamma/^oF and stability is kept at 1 gamma for 24 hours at constant temperature.

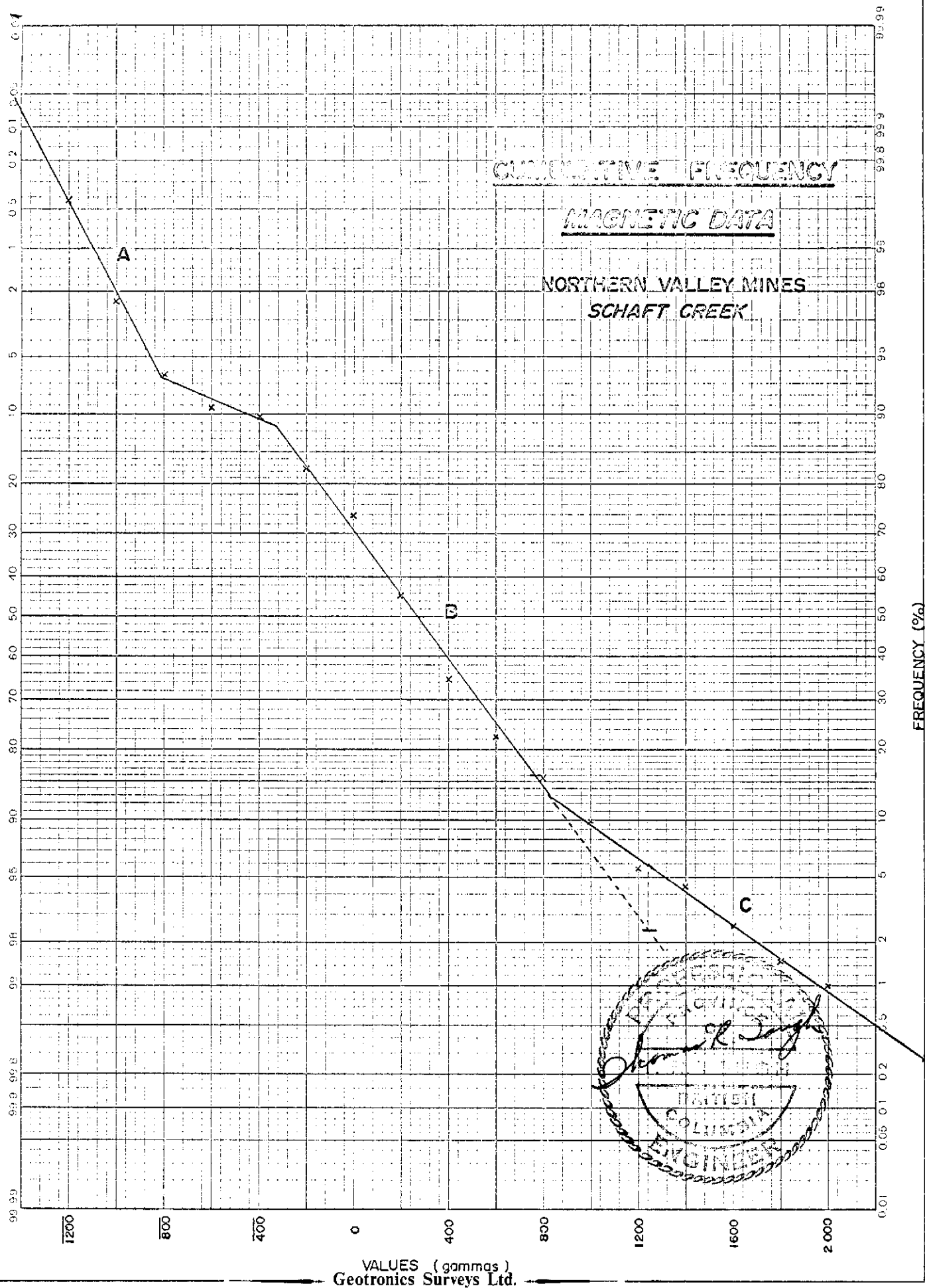
3) Statistical Analysis - A cumulative frequency graph was also plotted for the magnetic data, but on arithmetic probability paper instead of logarithmic probability as for the geochem data.

Magnetic data usually must be interpreted somewhat differently than geochemistry data since one is interested only in relative values within a very small area, say a few hundred feet. Statistical parameters, therefore, are not so important (unless the object of interest is magnetite for iron or magnetite associated with economic sulphides).

The different straight-line segments of this graph show that the magnetic data is a result of 2 different rock types. Segment A (approximately -600 gammas and less) is indicative of the grey-green andesites and segment B the normal distribution of the monzonite intrusive. Segment C indicates that there is a higher than average number of values above 800 gammas within the monzonite.

Therefore, it can easily be seen that there will be different background levels for each rock type. The background for the volcanics is approximately -800 to -1000 gammas and that for the monzonites, -200 to 800 gammas. Generally speaking, anything above or below these levels in each rock type would be anomalous.

GB-23
PROBABILITY



4) Discussion of Results - The magnetic contour map (sheet 1) shows that almost all of the 1969 survey area was done over the monzonite and, except for the north part, the survey area on the east side of Hickman Creek was over the andesite. A small anomalous low on the survey line leaving the 10,200-foot mark of base line B is also indicative of andesite. These results correlate fairly well with the known geology.

There seems to be very little correlation between the magnetic pattern and the geochemistry results or the known mineralization. Some of the geochem anomalies are on the flank of anomalous lows but this could well be incidental.

Little else can be said, largely because of the relatively small survey area. The 1970 results could perhaps have added much, but unfortunately they are valueless. Possibly for this reason no faults or shear zones were delineated.

CONCLUSIONS AND RECOMMENDATIONS

The geochemistry results are very encouraging. As noted above, the area around moly anomaly A is the most promising, though the other anomalies mentioned are certainly worthy of further attention, especially the areas of copper anomaly A and moly anomaly E. All of these

anomalies should be further soil sampled between the survey lines and in the unsurveyed areas around the open ends of some of the anomalies.

The rest of the claim group should be soil sampled, especially in the grey-green andesites. Considering that mineralization has been found in the monzonites and purple volcanics, it is felt these areas should not be overlooked, at least on a reconnaissance basis.

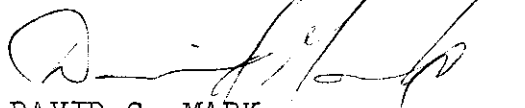
It is considered important that the whole claims area be thoroughly mapped geologically. This greatly assists in properly assessing the property as well as helps the interpretation of geochemical and geophysical anomalies.

The magnetic survey should only be continued if it can aid in mapping the bedrock lithology. Though perhaps not enough magnetics was completed, its value as correlation with the geochemistry results or sulphide mineralization is quite questionable. As far as faults and shear zones, they probably in this case can be better mapped by a geologist on the property. According to Erik Ostensoe of Hecla Mining the orebody of Liard Copper had no magnetic expression, either as a low or a high. He felt, however, that their magnetic survey was somewhat useful as a geological mapping tool.

An induced polarization survey should be completed over the areas of geochemical and geological interest. Further exploration work such as diamond drilling would be entirely dependent on these results.

Respectfully submitted,

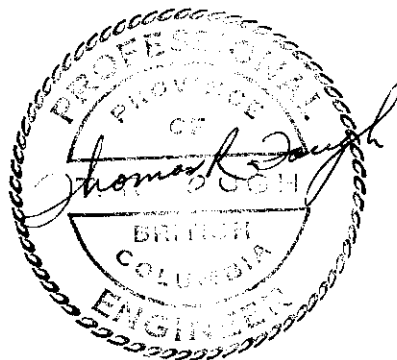
GEOTRONICS SURVEYS LTD.



DAVID G. MARK
Geophysicist

DGM:ly

April 1, 1971



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Sullivan, Jos., Property Report on Pepsi - Boy - Hicks Mineral Claims, Schaft Creek District, Liard M. D., British Columbia, July, 1969.

RESUME OF TECHNICAL AND FIELD EXPERIENCE

OF

DAVID MARK, B.Sc.

EDUCATION

Graduate of the University of British Columbia in Science (B.Sc.) in Geophysics.

EXPERIENCE IN INDUSTRY

1. Prospecting and geological evaluation for New Taku Mines Ltd. during exploration season of 1965.
2. Field supervisor for geophysical and geochemical work and prospecting for Mastadon-Highland Bell Mines Ltd. during exploration season of 1966.
3. Field supervisor in geochemical work and geological mapping for Anaconda (Canada) Company during exploration season of 1967.
4. Field geophysicist for Geo-X Surveys Ltd. during exploration season of 1968.
5. Presently geophysicist for Geotronics Surveys Ltd., Vancouver, B. C.
6. Experience in various geophysical instrument surveys: magnetometer, electromagnetic, self-potential, gravity, induced polarization, resistivity and seismic methods.
7. Member of the British Columbia Geophysical Society and the Vancouver Branch of The Canadian Institute of Mining and Metallurgy.
8. P. Eng. applied for with the Association of Professional Engineers of B. C.



Department of
 Mines and Petroleum Resources
 ASSESSMENT REPORT
 NO. 2954 MAP M-5



2954 M-5

To accompany geochemical report by D.G. MARK, B.Sc.

NORTHERN VALLEY MINES LTD.
 PEPSI, HICKS, BOY CLAIMS, SCHAFF CREEK

LIARD M.D.

SOIL SAMPLING - COPPER
 SURVEY PLAN

Scale: 1" = 400' Date: MARCH 71 Job no.: 71-28 Sheet no.: 2 Drawn by: P.P.





Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 2954 MAP #7



TO ACCOMPANY GEOCHEMICAL REPORT BY D.G.MARK, B.Sc.

NORTHERN VALLEY MINES LTD

PEPSI, HICKS, BOY CLAIMS, SCHAFT CREEK

LIARD M.D.

SOIL SAMPLING - MOLYBDENUM

SURVEY PLAN and CONTOURS

scale 1" = 400'	date MARCH 71	job no. 71-28	sheet no. 3	drawn by P. P.
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