Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 2533 MAP

2533

COPPER GEOCHEMICAL SOIL SURVEY

MINERAL CLAIMS T1 - T28

T Group of Claims

Nicoamen River Area, Kamloops Mining Division, B.C.

Claims T1 - 28

50° 14' N. - 121° 24' W.

by: Alfred A. Burgoyne, M.Sc.

Work Performed For:	W.F. Filipek and Associates 7303 - 78 Street Edmonton, Alberta
Work By:	Crest Laboratories (B.C.) Ltd. 1068 - Homer Street Vancouver B.C.
Work Dates:	Geochemical Survey - Oct. 6-23, 1969. Analytical Work - Oct. 8-27, 1969. Report Compilation - Oct. 27-31, 1969.

REPORT ON COPPER GEOCHEMICAL SOIL SURVEY

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T1 - 28

NICOAMEN RIVER AREA, KAMLOOPS MINING DIVISION

BRITISH COLUMBIA

50° 14' N. - 121° 24' W.

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1068 - Homer Street

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October 31, 1969

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B.C. REGISTERED ASSAYERS
INDUSTRIAL and RESEARCH CHEMISTS

1068 HOMER STREET
VANCOUVER 3, B.C.

October 31, 1969

SUMMARY:

A soil geochemical survey for copper on the T mineral claims (T1 - 28) was completed on October 6-23, 1969. The analytical work was completed on October 8-27, 1969. A sample grid was placed on the claim group by cutting a base line in a N 40°E. direction by chain and compass; cross lines were placed every 400 feet apart in magnetic east and west directions by chain and compass. Soil samples were taken at 100 foot spacings on the cross lines. Approximately 25 line miles or 1,275 soil samples were collected in addition to 100 rock samples. The rock samples were taken in an effort to determine the relation between the trace copper content in the rock to the overlying soil and to map systematically the distribution or rock types.

The geochemistry soil survey in conjunction with field observations has defined to a large degree the distribution and contacts of the various lithologic units. The soil over volcanics have a mean copper content of 40ppm; the soil over limestone excluding anomalous areas has a mean copper content of 56.5 ppm; the soil over the dolomite has a mean copper content of 20-25 ppm; clastics, 40-45 ppm; and that of the granitic rocks, 28 ppm.

Within the limestone block and recrystallized domomite two or more zones of anomalous copper expressed in the overlying soil trend in a north-south direction which are open at the north and appears to be at depth to the south. The total length of the anomalous zones are +5,000 feet and vary in width from 1,000 to 3,000 feet. A distinct copper anomaly in the soil over the limestone is defined statistically at +100 ppm, a high order copper anomaly is +400 ppm, and a possible copper anomaly is from 70 to 100 ppm. A series of detailed recommendations are given for further follow-up work on the copper anomalies in the limestone.

Within the granitic rocks several low order copper anomalies are present and they are given a low priority for further follow-up work.

INTRODUCTION:

A copper geochemical soil survey was completed in the period of October 6-23, 1969, on the T Group of Mineral Claims. The T Group of Claims are situated approximately 14 miles south of Spences Bridge, B.C. and about 2-4 miles south of the Trans Canada Highway and the Canadian Pacific - Canadian National Railways. The claim block cover mountainous terrain west of the Nicoamen River - the topography varies from 2,000 to 4,000 feet in altitude and is sparsely to moderately wooded and has been partially logged. A good all weather forestry road provides access to the claim block.

GENERAL GEOLOGY AND MINERALIZATION:

A normal sequences of sedimentary rocks is present which comprises a series of clastics (conglomerate, sandstone, mudstone, argillite), dolomite and recrystallized dolomite, and fine to coarsely crystalline limestone. The lithology of the limestone is thought to vary appreciably from a pure white limestone to a dirty silty to clay limestone with lenses or admixtures of dolomite. This series of sedimentary rocks is overlain unconformably by lower Cretaceous continental volcanics of the Spences Bridge Group. The sedimentary sequence appears to be underlain and possibly intruded by Mid Jurassic Granodiorite to Quartz Diorite. The age of the clastic-dolomite-limestone sequence is probably Jurassic in age. The general trend of the sedimentary sequence is quite variable but appears to be northerly or north-easterly and dipping to the east.

Copper mineralization seen by this writer has been mainly in the form of malachite and minor azurite dissemenated in limestone and with magnetite-quartz-amphibole-epidote-sulphide (arsenopyrite, bornite, chalcopyrite) skarns. Some copper mineralization seen on Line 92 N., 52 W (note Figure 1) is found entirely in recrystallized dolomite. It is this writer's opinion that the more impure the limestone is, the greater the possibility of finding copper mineralization. It is inferred that if the source of the copper mineralization is hydrothemal in origin (possibly from the granitic rocks) then replacement of limestone or contact metamorphic effects would be greatly accelarated by impure limestone.

No detailed account of the geology is available from this writer as the above general observations were made during the geochemical survey. Further observations concerning geology are given under the geochemical survey results.

The trace element copper content of the soils collected during the geochemical survey has been quite specific and useful in outlining and tracing the various geologic units.

LINE CUTTING:

A sample grid was placed on the claim group by first placing a base line in a N 40° E direction by chain and compass. This base line was cut and marked with flagging tape at 100 foot intervals. The base line was placed by L. Bourgh of Merritt, B.C. At 400 foot intervals cross lines were placed by chain and compass and sample locations marked at 100 foot intervals along these lines with orange flagging tape. This cross-lines were numbered consecutively from 00N. to 96N. and varied in length from 3,000 to 8,3000 feet. All cross-lines were placed on a magnetic east or west bearing and are well marked and flagged. All lines where possible were tied into known claim location lines and claim posts. Approximately 25 line miles of line were placed in total and Crest Laboratories (B.C.) Ltd. placed 24 of the 25 line miles.

SOIL COLLECTION AND CLASSIFICATION:

The soil sampling was done simutaneously with the placing of the grid lines. At each soil sample location a pit or hole was dug with a grub hoe to a depth of 4-16 inches depending on the soil development and the depth of bedrock. In most cases a C soil sample (weathered bedrock) was sampled except in a few instances where it was not possible to obtain this type of horizon; this occurred only in the lower parts of the valleys and in very heavily wooded areas. At each sampling site 3-4 ounces of the soil was taken with a clean trowel and any large rock fragments were rejected. The soils for the most are residual in nature and the overburden is generally less than 4 feet in thickness. In the deeper parts of the main valleys and north of Line 96 N. the overburden appears to be in part transported (glacial) and the thickness gradually increases. The soil development is generally immature - the soil horizon development for the area is:

Ao: Orgainic liter, undecayed leaves, twigs, 0-1 inches thick in sparsely wooded areas and 2-4 inches thick in heavily wooded areas.

A_1: Partially decomposed orgamic debris, organic rich humus, black in

Colour, 0-½ inch thick; almost completely absent and only found in heavily wooded areas.

B: Brown to whitish brown in colour, loose structure, only found in lower parst of valleys or in heavily wooded areas, 0-4 inches thick.

C: Weathered bedrock, 0-12 inches thick.

The placement of lines and soil sampling was done by B. Needham and C. Blakey and the field work was completed in the period October 6-23, 1969. Approximately 1,275 soil and 100 rock samples were collected.

ANALYTICAL TREATMENT OF SOIL SAMPLES:

The samples were analyzed by Crest Laboratories (B.C.) Ltd. and the analyst was chemical technician, Harold Coughlan, supervised by this writer. The analytical work was done on October 8-27, 1969. The samples were dried in their respective sample bags at a temperature of 150° F. and then sieved to -80 mesh through a stainless steel scream. One half portions of these screened soils were placed in 25 x 200 millimeter culture tubes and then digested in a mixture of perchloric and nitric acids at 425° F. for a period of three hours. The resulting digested residues were then made up to 50 milliliters volume in 10 percent perchloric acid. The respective sample solutions were asperated into a Techtron Atomic Absorption Spectrophotometer Model 5 and absorption readings were recorded for copper. Calibration of the atomic absorption spectrophotometer is effected by preparation and analyses of copper standards each day.

RESULTS:

I Expressional Geologic Rock Units:

Concurrent with the soil sampling programme approximately 100 rock samples were taken on various parts of the property. This seved two purposes: a) to determine the trace element content of the rock in relation to the overlying soil and b) to map systematically the distribution of the rock types. By knowing the trace copper content of the soil over known rock types it was possible to project and map the rock units over most of the property. This is especially valuable because about 85 percent of the area is covered by a thin veneer of overburden. From inspection of Figure 1, it is seen that the trace copper content illustrates the distribution of the various geologic rock units and their contacts extremely well.

A. Volcanics. The contact between the volcanics and the limestone is an uncomformity that is illustrated by the 40 ppm (parts per million) contour traversing the north east edge of the property. This contact has also been verified from field inspection by this writer. The average content of the volcanics is 30-32 ppm and this is a typical copper content to expect over these rocks. No copper anomalies are found over the volcanic rocks.

B. Limestone. The limestone unit is host to the copper mineralization and numerous statistical analyses of the trace copper content and discussion are given of it at a later point in this report. The average copper content in the soils overlying the limestone excluding anomalous areas is 56.5 ppm. This is a very high mean copper content as compared to a world wide average of 5-20 ppm. Clearly, the background copper content in the limestone is highly anomalous on a regional basis. The contact between the limestone and the dolomite to the south and west is illustrated by the 30 ppm contour and this contact is thought to be conformable. However, lenses or bands of dolomite are present within the limestone unit.

C. Dolomite. The mean copper content in the dolomite is 20-25 ppm and this is a typical value on a regional or world wide basis. The dolomite appears to be intruded by granitic rocks (granodiorite to quartz diorite) in the west and lies in conformable contact with clastics (conglomerates, sandstones, argillites) in the south-west. The contact between the dolomite and granitic rocks is based both on field evidence and on the geochemical results. This contact is illustrated by the 30 ppm contour. The contact between the dolomite and clastics is also illústrated by the 30 ppm contour and this is based soley on the geochemical results and is tentative. No copper anomalies are evident within the dolomite.

D. Clastics. The mean copper content of the soil over the clastics is 40-45 ppm and this is thought to represent typical values for this rock type. The clastics have been intruded by the granitic rocks and in places the clastics have a granitized appearance. The contact between the clastics and the granitic rocks is based soley on the 30 ppm copper value contour. No signifigant copper anomalies are present in the clastics. A thin wedge of clastics was seen in the field over the last 250 feet of the south part of the West Road.

E. Granitic Rocks: The mean copper content in the soil over the granitic rocks exclucing anomalous areas is 28 ppm. This is typical value for this rock type. The dolomite-granitic contact at the extreme western edge of the property is only tentative. There are several low order copper anomalies in the soil overlying the granitic rocks and their signifigance is discussed below.

II Discussion of Copper Anomalies:

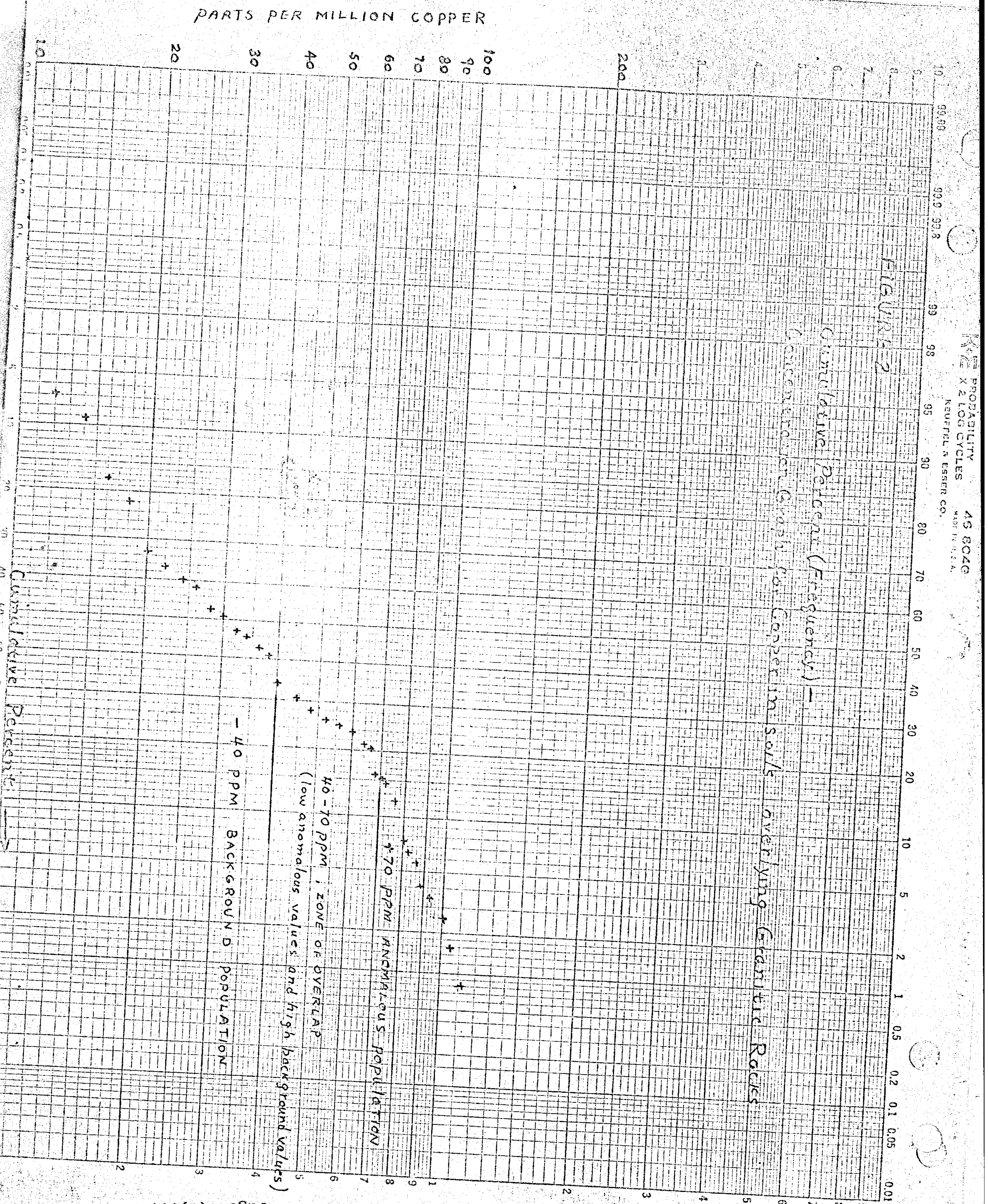
A. Granitic Rocks:

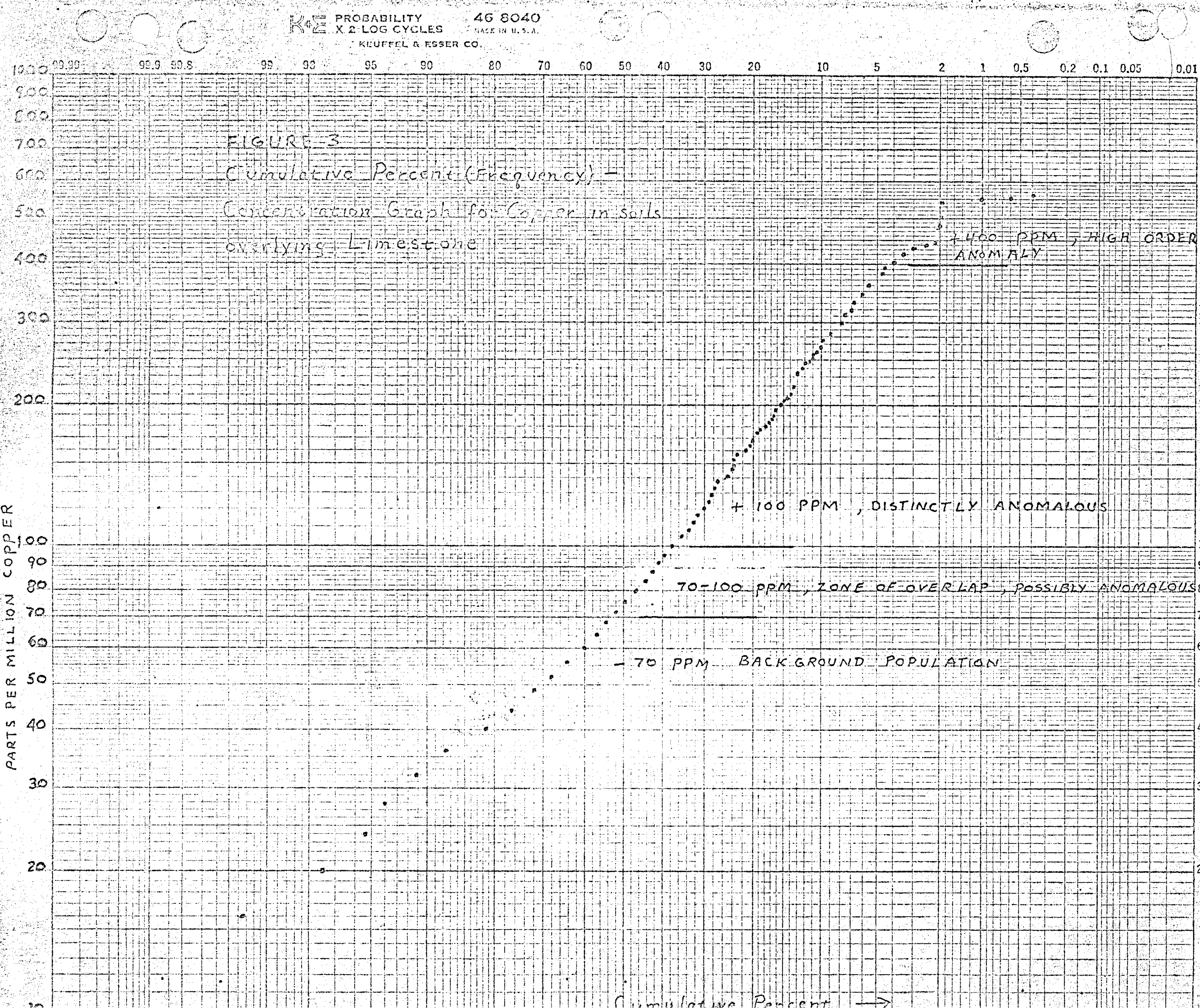
In Figure 2, a cumulative percent-concentration graph for copper over the granitic rocks is given. Copper values greater than or equal to 70 ppm are distinctly anomalous. From 40 to 60 ppm high background and low anomalous values mix and this is called the zone of overlap. Simply, the cumulative frequency-concentration graph expresses two distinct log normally distributed populations; the background population and an anomalous population probably caused by very low grade copper mineralization. However, the possibility of these low order copper anomalies being caused by a later intrusive granitic body with a higher copper content must be considered. In Figure 1, it is seen that all the anomalies with the exception of one on Line 32 N., 60 to 62 W. are of low order. This very high order anomaly mentioned above is thought to be caused by sorption and accumulation of copper in an acid swamp on Line 32 N., 60 to 62 W. However, this high order anomaly cannot be entirely ruled out due to swamp accumulation. The mean copper content in the soils over the granitic rocks excluding anomalous areas is 28 ppm.

B. Limestone:

In Figure 3, a cumulative percent-concentration graph for copper in the soil over limestone is given. The mean background copper concentration excluding anomalous areas is 56.5 ppm. A distinct copper anomaly is defined statistically as +100 ppm. The zone of overlap between low anomalous values and high background values is between 70 and 100 ppm and this may be considered as a possible copper anomaly. Copper values of +400 ppm are considered as high order copper anomalies. Copper anomalies in the range of 100 to 400 ppm are considered to be low to moderate order anomalies.

In Figure 1, it is noted that a good percentage of the limestone block north of Line 52 N. is distinctly anomalous and a good part that is not distinctly anomalous, is possibly anomalous. It is seen that there are two


PARTS PER MILLION COPPER
FIGURE 2
Cumulative Percent (Frequency) — Concentration Graph for Copper in Soils overlying Granitic Rocks
+70 PPM ANOMALOUS POPULATION
40-70 PPM, ZONE OF OVERLAP
(low anomalous values and high background values)
-40 PPM BACKGROUND POPULATION
Cumulative Percent
PROBABILITY X 2 LOG CYCLES
KEUFFEL & ESSER CO.
46 8040


K+E PROBABILITY X 2 LOG CYCLES
46 8040
MADE IN U.S.A.
KEUFFEL & ESSER CO.
FIGURE 3
Cumulative Percent (Frequency) -
Concentration Graph for Copper in soils
overlying Limestone
+400 PPM, HIGH ORDER ANOMALY
+100 PPM, DISTINCTLY ANOMALOUS
70-100 PPM, ZONE OF OVERLAP, POSSIBLY ANOMALOUS
-70 PPM BACKGROUND POPULATION
PARTS PER MILLION COPPER
Cumulative Percent →

or possibly three distinct zones of distinct copper anomalies that trend in a northerly-southerly direction. The high order anomaly portions of these anomalous zones are considered as the first priority for attention in further follow-up exploration. It must be remembered that the topography in certain parts of the limestone block is exceedingly steep and that physical processes (gravity movements) have dispersed copper bearing mineralization away from its source to a certain extent. It is felt that chemical dispersion of copper from its source is relatively unimportant due to the alkaline pH of the soils which will prevent solubilization and thus dispersionoof copper. A possible example of the physical dispersion of copper mineralization from its source is on the steep mountainside from 33 to 46 W. on Line 72 N.; the source in this case is east of 33 W. For a full understanding of the signifigance of physical dispersion the copper anomalies must be related to the topography.

The copper anomalies in at least two discrete zones are open to the north (north of Line 96N.). The total length of the anomalous copper zones is +5,000 feet and varies in width from 1,000 to 3,000 feet.

The significance of establishing the positions of possible copper anomalies is evident south of Line 56 N. The limestone in this case is topographically several hundred feet higher than north of Line 56 N. and it is postulated that the anomalous copper zones discussed above continue at depth (under the mountain) south of Line 56 N. It is seen that there are a cluster of possible copper anomalies south of Line 56 N. These are considered to be projections of the distinct copper anomalies to the north.

<u>CONCLUSIONS AND RECOMMENDATIONS</u>:

The geochemistry soil survey has defined to a large degree the distributio and contacts of the various lithologic units. The volcanics have a mean copp concentration of 40 ppm and their contact with the limestone is defined by the 40 ppm contour. The limestone has a mean copper concentration of 56, excluding anomalous areas. Within the limestone two or more zones of a copper trend in a north-south direction which is open at the north (of and appears to be at depth to the south (of Line 56N). The total l the anomalous copper zones is +5,000 feet and varies in width from 3,000 feet. A distinct copper anomaly in the soil over the lime ppm, a high order copper anomaly is +400 ppm and a possible an 70 to 100 ppm.

The contact between the limestone and dolomite is illust

Contour and the mean copper content in the soil overlying the dolomite is 20-25 ppm. The contact between the granitic rocks and the clastics is illustrated also by the 30 ppm contour.

The clastics have a mean copper soil content of 40-45 ppm and the contact with the granitic rocks is illustrated by the 30 ppm contour.

The mean copper content in the soils over the granitic rocks excluding anomalous areas is 28 ppm. There are several low order copper anomalies in the soil overlying the granitic rocks.

The following recommendations are made in order of priority:

1. a) The high order copper anomalies (+400 ppm) in the limestone block are considered as a first priority for further follow-up exploration work; however, before any extensive trenching, pitting, or drilling is performed, the anomalous copper areas in the limestone block should first be subjected to a detailed geologic study in order to determine structural and ore controls and any fine differences in lithology. Also, tie-in of existing trenches to lines and copper anomalies will be necessary.

b) Trenching as guided by geologic controls should initially be restricted to the high order copper anomalies (+400 ppm).

2. a) The anomalous area open to the north of Line 96N. should be well protected by staking of sufficient ground. Staking should cover the limestone and recrystallized dolomite belt and be guided by same and by any occurance of copper mineralization.

b) Evaluation of this newly staked ground can be obtained by a detailed geochemical soil survey for copper. The magnitude of the geochemical survey would be governed by area of ground staked, geologic controls, and depth of overburden.

3. A chain and compass survey of the claim block should be performed in order to know precisely where all claims lie and to prevent occurence of unstaked claim fractions.

4. Further exploration (and staking) of the limestone to the south off the claim block into the Nicoamen River Valley. A reconnaissance geochemical survey is advised for rapid evaluation of the area.

5. The low order copper anomalies in the soil over the granitic rocks on Lines 32 to 44 N. to the west should be subjected first to geologic investigations and then if warranted, to trenching.

Respectfully Submitted
CREST LABORATORIES (B.C.) LTD.

Alfred A. Burgoyne

Alfred A. Burgoyne, M.Sc.
Geologist-Geochemist

CERTIFICATE

I, Alfred A. Burgoyne, of Burnaby, British Columbia, do hereby certify that:

1) I am a geologist-geochemist employed by Crest Laboratories (B.C.) Ltd. 1068 - Homer Street, Vancouver 3, B.C.

2) I am a graduate of the University of British Columbia (B.Sc. Geology and Chemistry, 1962), and of the University of New Mexico (M.Sc. Geology, 1967).

3) I have practised my profession as a geologist-geochemist since 1962.

4) I personally have examined the property as described in this report.

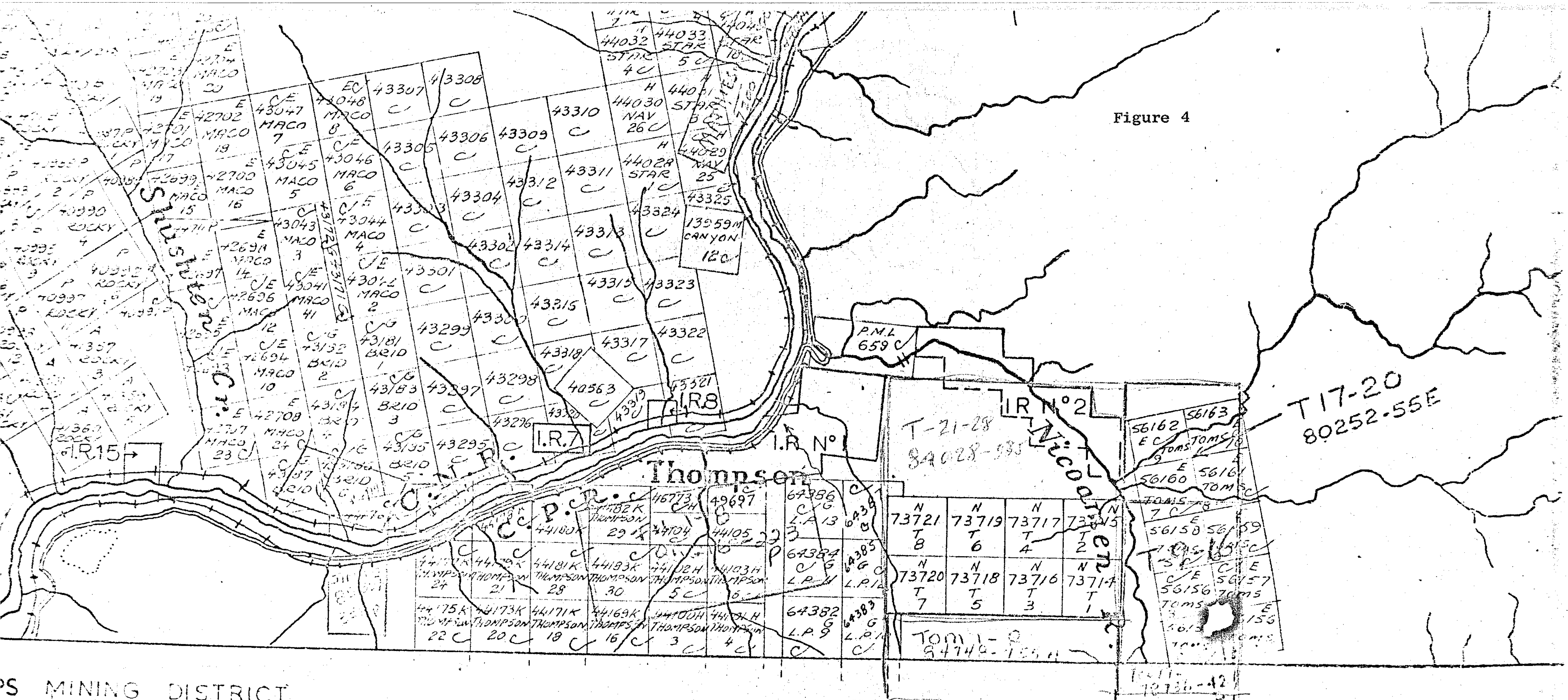
5) I have no interest, directly or indirectly, with the properties or securities of W.F. Filipek and Associates nor do I expect to receive any in the future.

Alfred A. Burgoyne

Alfred A. Burgoyne, M.Sc.
Geologist-Geochemist

Dated: October 31, 1969

Figure 4



...PS MINING DISTRICT

...e information on
... area you should
...Mining Recorder
... Division conc-

DEPARTMENT OF MINES AND PETROLEUM RESOURC...

VICTORIA, B. C.

MINERAL CLAIM MAP 92 I/6W(M)

SCALE 1/2 MILE TO 1 INCH

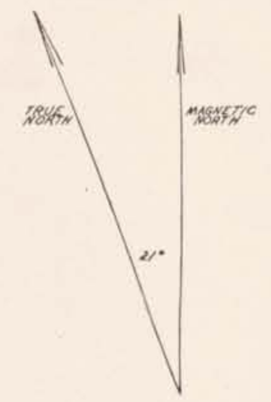
2533

A

B

"T" MINERAL CLAIM GROUP,
NICOAMEN RIVER AREA,
KAMLOOPS MINING DISTRICT, B.C.

SOIL GEOCHEMICAL SURVEY FOR COPPER.



SCALE — FEET

FIGURE 1

GEOCHEMICAL SURVEY BY:- CREST LABORATORIES (B.C.) LTD.
OCTOBER 6-23, 1969.

LEGEND

PPM - PARTS PER MILLION

- ○ - C (WEATHERED BEDROCK) SOIL SAMPLE LOCATION WITH COPPER CONTENT IN PPM.
- 30 PPM - 30 PPM COPPER CONTOUR
- ○ - POSSIBLE COPPER ANOMALY 70-100 PPM. IN SOILS OVER LIMESTONE, SOUTH OF LINE 56N.
- ○ - DISTINCT COPPER ANOMALY +100 PPM. IN SOILS OVER LIMESTONE.
- ○ - DISTINCT HIGH ORDER COPPER ANOMALY +400 PPM IN SOILS OVER LIMESTONE.
- ○ - DISTINCT COPPER ANOMALY +70 PPM. IN SOILS OVER GRANITIC ROCK.
- ······ - ROAD
- S - SKARN ROCK SAMPLE COLLECTED IN FIELD
- ■ - DOLOMITE AND RECRYSTALLIZED DOLOMITE ROCK SAMPLE COLLECTED IN FIELD
- □ - LIMESTONE ROCK SAMPLE COLLECTED IN FIELD
- + - GRANITIC ROCK SAMPLE COLLECTED IN FIELD.
- V - VOLCANIC ROCK SAMPLE COLLECTED IN FIELD.
- □ - CONTINENTAL VOLCANIC ROCK.
- □ - PURE TO IMPURE LIMESTONE.
- □ - DOLOMITE AND RECRYSTALLIZED DOLOMITE
- □ - CLASTICS (CONGLOMERATE SANDSTONE, MUDSTONE, ARGILLITE)
- □ - GRANITIC (GRANODIORITE, QUARTZ DIORITE)
- L - LINE
- N - NORTH
- W - WEST
- E - EAST

2533