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REPORT
ON THE
KWANIKA CREEK PROSPECT
OF
HOGAN MINES LTD.
OMINECA M. D.

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Aug. 10/71

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VANCOUVER 2, B.C.

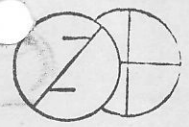
REPORT
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KWANIKA CREEK PROSPECT
OF
HOGAN MINES LTD.
OMINECA M.D.

by

R.H. SERAPHIM, Ph.D. P.Eng.

August 10, 1971.

This copy to be returned to:
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MAPS

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KWANIKA CREEK PROSPECT
OF
HOGAN MINES LTD.
OMINECA M.D.

SUMMARY, CONCLUSIONS, and RECOMMENDATIONS

The Kwanika Creek prospect has two exposed areas of low grade copper-molybdenum mineralization, associated with intrusive rocks and separated by several thousand feet of intermittent exposures of barren sediments. The North Area has mineralized trenches and drill holes spread over 4000 feet of length and 1000 to 2000 feet of width. A number of trenches were completed where overburden is shallow along the bed of Kwanika Creek. The area has also been tested with 7000 feet of drilling, from which the best intersection is 160 ft of 0.41% Cu. Longer intercepts in the .1 to .25% range are characteristic of the area.

The South Area has scattered trenches along Kwanika Creek, with, on the average, lower grade mineralization than in the North Area. It has been tested by only one drill hole, 128 feet long.

Geochemical surveys are not useful on this prospect.

Induced Polarization and magnetic surveys have provided some very useful information. The I.P. survey gave a large anomaly over the North Area. The drilling showed better copper values on the flanks where the readings are moderate rather than in the anomaly highs. The moderate I.P. responses continue southward to and beyond the South Area. An anomaly was also found in the western part of the surveyed area but it is presumed to be in the sediments. Much further drilling would be necessary to test the anomalies completely.

The magnetic survey shows that the granitoid rocks, with which the mineralization is associated, provide an intermediate response. This survey, like the I.P., indicates that the North and South areas join up, and that the intrusives likely extend to the north beyond the surveyed area.

The mineralized areas are relatively large, but the grade of mineralization has not made further work particularly attractive. A cheaper method than diamond drilling should be used to test the anomalous areas so that more ground can be covered. Percussion drilling could be employed on this prospect at roughly one-quarter of the overall costs of diamond drilling on a footage basis.

INTRODUCTION

This prospect was visited briefly by the writer in 1965. The following report summarizes and documents the engineering data accumulated by Hogan Mines, Canex Aerial Development, and Great Plains since that time.

The reports which were made available to the writer, and which can be referred to in Hogan's files are:

- (1) Summary Report - Kwanika Creek - by A.F. Reeve -
Dec. 16, 1964
- (2) Report on the Mineral Claims of Hogan Mines Ltd. NPL -
by S.W. Wright - Sept. 20, 1965
- (3) Report on Kwanika Creek Property, Hogan Mines Ltd. -
by B.C. Macdonald - Oct. 15, 1965
- (4) Report on Hogan Mines Ltd., Kwanika Creek Property
(Canex Aerial Exp)-by W.S. Pentland - Jan., 1967
- (5) Report on the Induced Polarization Survey and
Resistivity Survey on the Kwanika Creek Property, BC
for Great Plains Development Co. of Canada Ltd.
(McPhar) - Goudie & Hallof - June, 1970
- (6) A number of geological and claim sketches and memos
prepared by A.G. Hodgson - 1965 - 1967

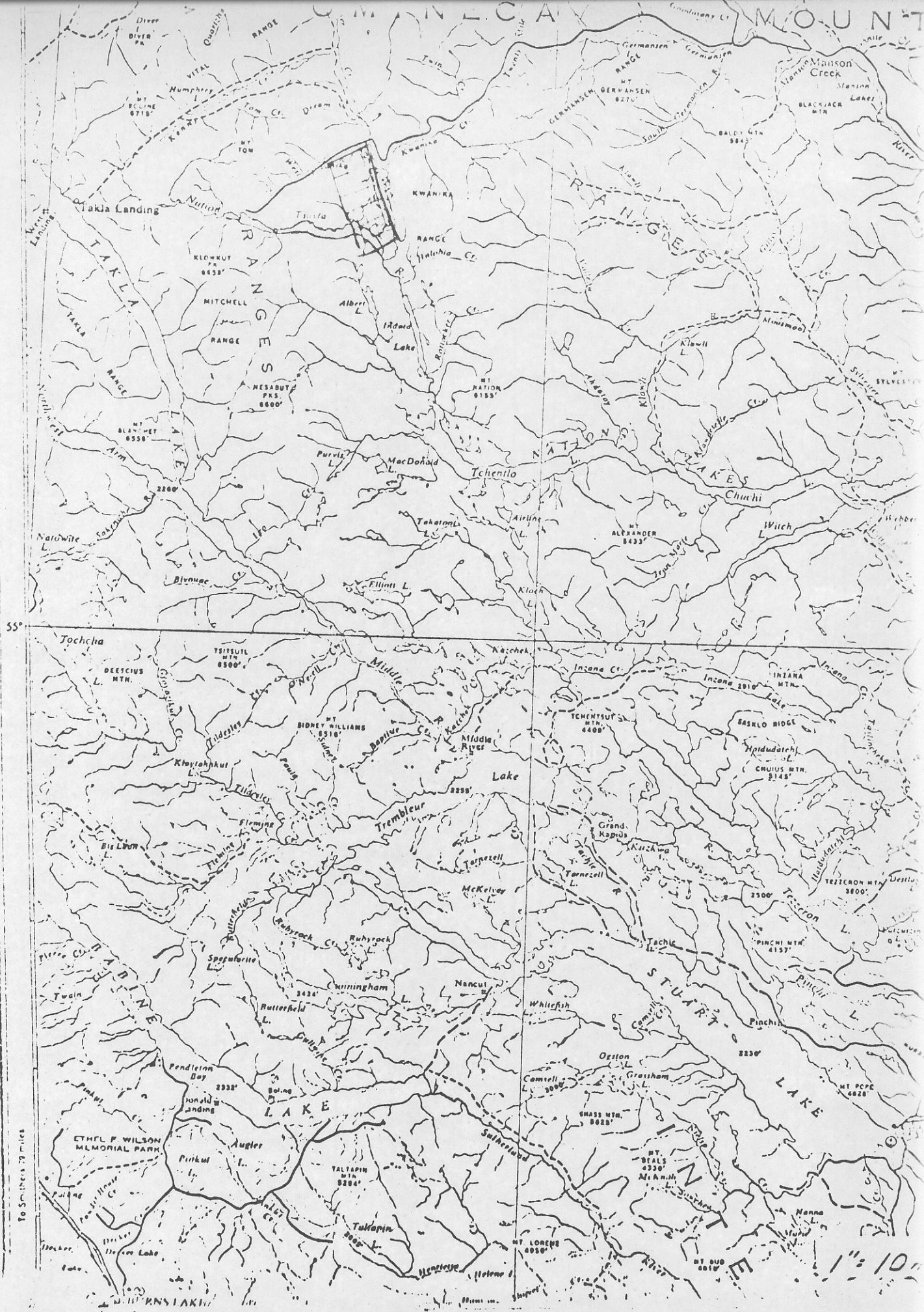
This data has all been reviewed, and some of it is incorporated in the following report.

LOCATION, ACCESS, TOPOGRAPHY

The location is shown on the included map. Access to the property at present is by aircraft or by a rough road from Fort St James and Germanson Landing. The railroad now under construction from Fort St James to Takla Landing will pass 20 miles to the west of the property. Kwanika Creek is at 3500 ft elevation. The mineralized showings are in a broad, well timbered valley bottom, mostly near the bed of Kwanika Creek itself.

CLAIMS

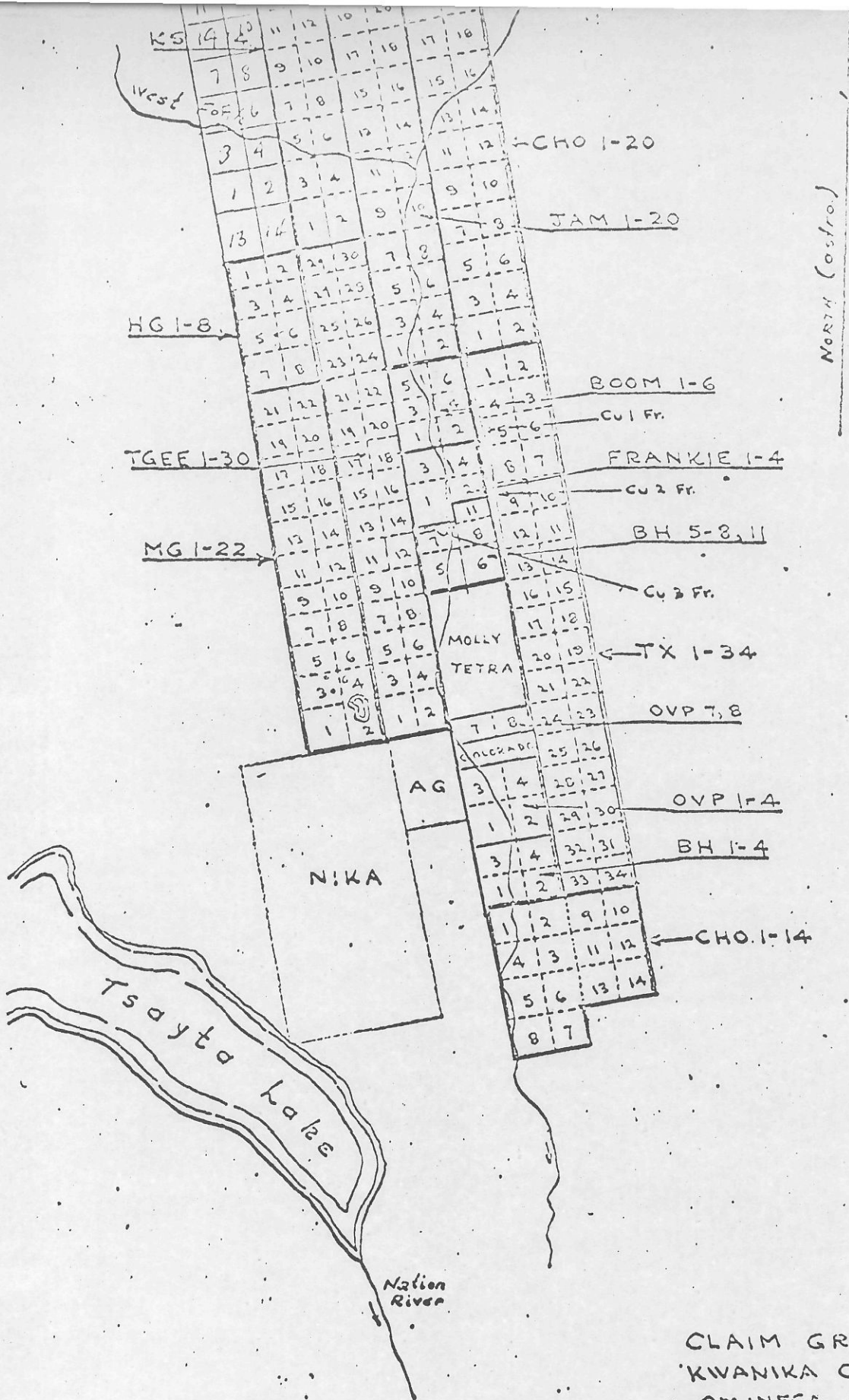
The accompanying claim map shows the claim groups in the area. The more important showings and the diamond drilling completed to date are on the FRANKIE, BOOM, and the southmost JAM claims. Titles and assessment records have not been checked by the writer. The MOLLY, TETRA, and AG claims are reported to be held by Len Beliveau and associates.



55°

To Smithers 70 miles

1" = 10"



CLAIM GROUPS
 KWANIKA CREEK
 OMINECA M.D.
 BC.

1" = 26.40'
 (approx)

100
 12/2/25

HISTORY

The area was originally prospected in detail by Cominco and other prospectors searching for cinnabar along the Pinchi fault zone. Copper and molybdenum mineralization were investigated in the early 1960's. Active work on the Boom etc. claims began in 1965 by Hogan Mines. Hogan's work was principally bulldozer trenching, X-ray drilling, and sampling. Canex optioned the property in 1966, cut 42 miles of line, and completed geological, geochemical, magnetic and I.P. surveys, as well as some trenching. Eleven drill holes totalling 2807 feet did not disclose enough copper-molybdenum mineralization to encourage them further.

Great Plains subsequently optioned the property. Five diamond drill holes (B1 to B5) were drilled in the spring of 1969 and two holes (C1 and C2) in the summer of 1970.

GEOLOGY

The geology of the claim group is well summarized in Bruce Macdonald's report, and is quoted as follows:

"The area is principally underlain by granitic rocks of the Omineca Intrusive of Upper Jurassic or Lower Cretaceous age and Palaeozoic sediments, predominately limestones, of the Cache Creek group. The division between these two major series is the Pinchi Fault, a regional and complex zone of fault strands which has been traced for a total length well in excess of 100 miles. The strike of the fault zone is NNW with minor flexures. Occasional inliers of older sediments and volcanics of the Takla Group (Triassic-Jurassic) are found within the intrusive rocks at or near the Pinchi Fault. Very little evidence of the fault's presence can be seen either on the ground or from aerial photographs, but its location has been fairly well localized from work done by former operators in the area as well as by geological mapping carried out by the G.S.C.

Economic Geology

(a) Copper-Molybdenum: Very little outcrop was found on the claim group, and where discovered invariably occurs on the banks of Kwanika Creek and West Fork Creek. Conventional prospecting in this type of terrain was therefore unrewarding. Kwanika Creek has been fairly thoroughly studied for a length of 5 miles south of camp, and general geology and outcrops have been mapped by A.G. Hodgson. The writer's examination was limited to the northern 2-mile section as shown on the appended plan.

The creek at this point is believed to be approximately one mile east of the Pinchi Fault and roughly sub-parallel to it. No definite evidence of structural weakness can be noted to account for the creek bed although some pronounced shearing can be noted along the banks and in one instance a 10' to 15' fault zone was cut in two trenches close to the shore line, which, when projected, coincides with a straight stretch in the creek. Strike of this fault would be roughly parallel to the Pinchi Fault.

The limited outcrop along Kwanika Creek in the northern section is entirely granitic, varying from granodiorite to syenite, with locally hybrid sections as well as intensely silicified areas. A profile along the bank would normally show one to two feet of humus, followed by from one to ten feet of gravel, then a layer of residual material overlying one to three feet of gossan, and finally weathered bedrock. Gravel horizons in excess of 10' are not uncommon.

South of this granitic section, a band of older sediments, one mile thick, has been mapped, again followed by granitic rocks to the south.

All bed-rock seen in the area, whether naturally exposed along the creek bank or uncovered by trenching, shows moderate to extreme weathering. Gossan development is quite pronounced on natural exposures, and moderate to nil on freshly uncovered surfaces, even though overlying cover and distance from creek are a matter of only a few feet. Leaching of primary sulphides in all exposures is attested to by limonitic pseudomorphs.

Varying degrees of alteration are encountered throughout the area. Basically, predominant rock types are believed to be granite, granodiorite and syenite, but original characteristics are often masked by silicification, feldspathization, chloritization and in some instances epidotization. In one local (Tr.6) intense "red alteration" similar to that encountered in the uranium areas of the western perimeter of the Precambrian, was noted.

Three main sets of fractures can be measured striking at 30° - 40° , 300° - 310° and 350° - 360° , all with steep dips. The stronger in each of these sets often show gouge up to several inches in width, while in one case, where a structure was cut in Trenches 3, 4 and 5E, gouge width measured several feet. A minor set of fractures at 70° also exists. The relationship of these fractures to the Pinchi Fault is at present obscure. The 300° - 310° set does, however, correspond to the general strike of the sedimentary beds. In one instance, gouge in the 30° - 40° set contained considerable pyrite, so it is presumed that this system in general is post mineralization.

All exposed intrusive areas show pyrite as the most abundant metallic mineral, occurring normally in fine disseminations throughout the rock. Replacement pockets and fracture fillings, however, are fairly common, the former often measuring several inches in diameter. Finely disseminated chalcopyrite accompanies the pyrite with minor occurrences as fracture fillings and pockets. Some bornite and native copper can also be seen, but these are subordinate to the chalcopyrite. Molybdenite is widely distributed as extremely fine disseminations and in hair-line fractures. The average MoS_2 content would appear to be 0.01-0.02%. Local areas measuring several square feet have been found, however, where MoS_2 content would be in excess of 0.25%. Pyrrhotite and magnetite were also noted but appear to be relatively scarce constituents.

Conventional sampling is made difficult by the weathered condition of the rocks with consequent partial leaching out of sulphides. As the company has conducted a fairly complete sampling program on all known outcrops, the writer limited sampling to a few check locations. Company sampling was carried out by A.G. Hodgson.

Two samples were cut by the writer in Trench 4E: (a) one on a section showing relatively heavy copper mineralization; (b) the other 30' to the north on an "average" exposure. Results were as follows:

- (a) 7.5'....0.94% Cu; 0.01% MoS_2
- (b) 11.0'....0.25% Cu; 0.01% MoS_2

Mr. Hodgson's sampling on corresponding areas was:

- (a) Area of 19'x10'....0.70% Cu; 0.01% MoS_2
- (b) Area of 32'x30'....0.26% Cu; 0.01% MoS_2

One sample was cut from Trench 5E which returned:

10.5'....0.48% Cu; 0.01% MoS_2

Mr. Hodgson's sample in this trench was:

Area of 12'x6'.....0.49% Cu; 0.03% MoS_2

A character sample of typical massive pyrite encountered throughout the property was taken from Trench 6E and returned:

0.73% Cu; Tr--Au; 0.10 ozs. Ag.

It will be noted that results from Mr. Hodgson's and the writer's sampling are extremely close.

No samples were cut from the highly weathered exposed outcrops along the creek. Mr. Hodgson has sampled all of these and a few results are submitted: 280'.....0.14% Cu; 200'.....0.10% Cu; 14'.....0.20% Cu; 275'.....0.35% Cu.

North of camp on West Fork Creek, similar occurrences of pyritized intrusive have been located but no work has been carried out on this section. Megascopic examination shows disseminated chalcopyrite, similar to that on Kwanika Creek.

A small outcrop of fresh granite with coarse disseminated chalcopyrite has been found up Knowlt Creek, approximately 3500' east of Kwanika Creek. This showing was not examined by the writer, but specimens seen showed a complete absence of pyrite and molybdenite. Copper content of the samples is estimated at between 1% - 2%.

Results of all sampling carried out on the property by various parties shows persistent copper content. The bulk of results fall below 0.50% Cu, but areas do exist where assays above this figure can be found. It is estimated that ten million tons grading between 0.60% and 0.70% Cu would constitute an economic operation. The chances of finding these requirements in the area are considered good.

(b) Mercury: The company's claims cover the Pinchi Fault system for a strike length of 5 miles. Within this area, and approximately one mile west of Kwanika Creek, two occurrences of cinnabar are known. One area, trenched by C.M.&S. in the 1940's, is said to contain disseminated cinnabar over an area 200'x50'. A selected sample taken from this area by the company returned 0.94% Hg. The area is sloughed at present, but company plans are to extend the road from camp to the Fault and carry out stripping. Three miles south of this old trenching, another showing was partially tested by C.M.&S. in a high-grade zone discovered from float. It is understood that limited diamond drilling was done on this show but results are unknown. Lack of time and adverse weather precluded the writer from visiting these showings."

S.W. Wright compiled some further assays from the trenching completed by Hogan subsequent to Macdonald's report. The information is quoted as follows:

"Copper-molybdenum: Originally small natural outcrops of altered and mineralized granitic rocks were exposed intermittently and at the water's edge along the banks of Kwanika Creek for a length of 2 miles. Chip sampling of these outcrops gave low but persistent values in copper and molybdenum. Iron sulphides are abundantly present and recognized as a severe leaching agent. It was reasoned that the somewhat protected and less weathered rock surface beneath the overburden should show improved values, but that true values would not be obtained except below the leached rock surface, - possibly several feet below the rock surface. The association of copper and molybdenum minerals is recognized as the indicator for a large low grade orebody of the 'porphyry-copper' type.

Bedrock was reached in 11 out of 13 trenches which were dozed out by pushing the overburden into the fast-flowing Kwanika Creek. After cleaning and hosing-down the trenches, panel chip-sampling results showed that four of the trenches, 2E, 3E, 4E, and 2W, spanning a length of 800 feet, gave improved values in copper at the rock surface. Results are as follows:

| <u>Trench #</u> | <u>Panel size</u> | <u>Pos'n in Trench</u> | <u>Cu%</u> | <u>MoS₂%</u> |
|-----------------|-------------------|------------------------|------------|-------------------------|
| 2E | 12'x13' | Main exposure | 0.55 | 0.02 |
| 3E | 9'x22' | N. Side | 0.13 | 0.02 |
| | 27'x11' | Main exposure | 0.69 | 0.02 |
| 4E | 14'x 7' | N.E. Part | 0.31 | 0.02 |
| | 32'x30' | N.W. Part | 0.26 | 0.01 |
| | 30'x10' | S.E. Part | 0.31 | 0.01 |
| | 19'x10' | S.W. Part | 0.70 | 0.01 |
| 2W | 20'x20' | E. Side | 0.31 | 0.02 |
| | 30'x 6' | W. Side | 0.81 | 0.07 |

Some sampling was done by X-Ray diamond drill coring to obtain samples below the rock surface. The first drill hole, DDH X-1, was collared in Tr 4E. DDH X-2 was collared in Tr 2W, 380' northward with the following results:

| | Core | | Sludge | |
|----------|------------|-------------------------|------------------------|-------------------------|
| | <u>Cu%</u> | <u>MoS₂%</u> | <u>Cu%</u> | <u>MoS₂%</u> |
| DDH X-1 | | | | |
| 0 - 10' | 0.25 | Tr | 0 - 20' | 0.24 Tr |
| 10 - 20' | 0.18 | Tr | - sludge not recovered | |
| 20 - 30' | 0.27 | Tr | for balance of hole | |
| 30 - 40' | 0.45 | 0.02 | | |
| 40 - 47' | 0.16 | Tr | | |
| DDH X-2 | | | | |
| 0 - 10' | 0.70 | 0.01 | 0 - 16' | 0.61 Tr |
| 10 - 20' | 0.31 | 0.01 | 16 - 23' | 0.59 0.01 |
| 20 - 30' | 0.61 | Tr | 23 - 31' | 0.62 0.02 |
| 30 - 40' | 0.50 | 0.04 | | |

Very considerable difficulty was experienced with the X-Ray drilling. The rented X-Ray drill was shipped in very poor mechanical condition. The drill was returned to the owners and sampling by X-Ray was given up at this time. Detailed geochemical and geophysical surveying is planned as guidance to the best areas before further drilling is done.

Molybdenum: Areas on the Hogan claims where molybdenite is the principal mineral are known but time has not allowed exploration work in these areas so far.

(a) Southward approximately 2 miles from the copper-moly mineralization described above, attractive molybdenite mineralization is exposed by the work of earlier operators.

(b) A recent new find of moly mineralization on the banks of the West Fork of Kwanika Creek will require work before its importance is known. The moly occurs on either side of a granitic intrusive. On the eastern side a very heavy mineralization can be seen over a 3-foot width. It was suspected to be graphite but a grab sample gave 0.68% molybdenite. On the western side disseminated moly occurs over an undetermined width. Grab samples gave 0.19% Cu with 0.01% moly, and 0.03% Cu with 0.10% moly. This area will be opened by dozing soon."

Assays from some of the trenching are also shown on the accompanying geological map adapted from the Canex geological map.

The geological maps show two areas of mineralization approximately one mile apart. These are labelled the North Area and the South Area. Both are associated with an area of intrusive. The intervening outcrops are limestone and argillite. Hodgson interpreted the two areas as separate zones of intrusive. The Canex geological map implies that the two areas may be part of one long zone.

DIAMOND DRILLING

The first ten of the eleven Canex drill holes, and all of the seven Great Plains drill holes tested the North Area. Detailed logs of these holes are available, and they are summarized below for the readers convenience. The locations are shown on the accompanying geological map, together with average grades where applicable.

DDH 1 (Canex)

0-15 - overburden
15-464 - syenite - equigranular, pink, feldspathized, sericitized, and chloritized - some epidote - 3%? pyrite
average .04% Cu with highest assay 10' of 0.11%

DDH 2

(Canex)

- 0- 49 - overburden
- 49-200 - syenite, equigranular, pink and green, feldspathized, sericitized, and chloritized - epidote and clay minerals - 2 to 3% sulfide
 average 170-200 = 0.18% Cu
 49-200 = 0.12% Cu

DDH 3

(Canex)

- 0- 34 - overburden
- 34-200 - granite, pink and green, silicified and quartz stringered, chlorite, clay minerals, epidote, sparse, less than 1% sulfide
 34-200 = 0.19% Cu
 90-100 = 0.46% Cu

DDH 4

(Canex)

- 0-106 - overburden
- 106- - quartz diorite equigranular, pink feldspathization, chlorite, clay minerals, carbonate alteration, little to no sulfides thus not assayed for copper

DDH 5

(Canex)

- 0- 42 - overburden
- 42- 70 - granite, pink, some brecciation, abundant mafics, minor chloritization - minor sulfide on fracture planes - not assayed for copper
- 70-112 - andesite dyke - fine grained, dark green - highly fractured - very little sulfide
- 112- - granite as above - more sulfide including chalcopryrite from 170 ft - a little molybdenite at 200-220 ft 170-220 = 0.16% Cu 0.02% Mo

DDH 6

(Canex)

- 0- 98 - overburden
- 98-246 - intrusive - feldspar porphyry to syenite - grey, green, to pink feldspathized, silica, chlorite, carbonate and hematite alteration, strongly shattered, traces of pyrite - trace (.005) Mo

DDH 7

(Canex)

- 0- 81 - overburden
- 81-167 - granodiorite - green grey - medium to coarse crystalline, chloritized hornblende - traces sulfide
- 167-198 - fault zone breccia in granodiorite
- 198-278 - granodiorite as 81-167, but fresher at depth
210-220 = .01% Cu

DDH 8

(Canex)

- 0- 15 - overburden
- 15-298 - granite - green grey, silicified, chloritized, minor feldspathization, fractured, locally a breccia, variable pyritization (1 to 5%) and local copper mineralization - 160 ft (non-contiguous) average 0.06% Cu

DDH 9

(Canex)

- 0- 15 - overburden
- 15-355 - syenite, equigranular, buff to green, feldspathized, also chlorite, and epidote, local crushed zones, 2% pyrite, scattered chalcopyrite -
190-200 = .05% Cu
220-230 = .05% Cu
250-260 = .12% Cu //

DDH 10

(Canex)

- 0-27 - All overburden - hole not completed

DDH 11

(Canex)

- 0- 20 - overburden
- 20-128 - quartz diorite - fine to medium grained, weak chlorite and quartz alteration

B-1

(Great Plains)

- 0- 7 - overburden
- 7-390 - granodiorite - pink - equigranular - feldspathize
silicified, epidote, clay, chlorite, hematite,
carbonate, pyrite - moderate fracturing
10-140 = 0.165% Cu - .005% Mo
140-300 = 0.41% Cu - .007% Mo
300-390 = 0.18% Cu - .007% Mo

B-2

(Great Plains)

- 0- 10 - overburden
- 10-381 - quartz diorite - coarse grained grey green,
feldspathized, chloritized, epidote,
carbonate, abundant clay minerals, moderate
to locally strong fracturing, 1 to 3% pyrite
10-380 = 0.25% Cu - .0066% Mo (30 ft missing
is included at average

B-3

(Great Plains)

- 0- 84 - overburden
- 84-402 - syenite - pink - coarse grained, feldspathized,
chloritized, clay minerals abundant, minor
silica, hematite, and carbonate. Very little
pyrite to 120 ft., 1 to 4% .120-402, moderate
fracturing, scattered copper assays
140-150 = .05% Cu - .005 Mo
240-270 = .05% Cu - .008 Mo
392-402 = .14% Cu - .005 Mo

B-4

(Great Plains)

- 0- 22 - overburden
- 22-432 - granodiorite - coarse and pink, feldspathized,
abundant quartz veining, chloritized, clay
minerals, carbonate, hematite, 1 to 4% pyrite -
a couple of 2 to 5 ft andesite dykes
20-430 = 0.17% Cu - .009% Mo

B-5

- 0- 12 - overburden
- 12-359 - granite to syenite, grey to pink feldspathized,
clay, silica, chlorite, minor hematite and
carbonate alteration, traces to minor
chalcopyrite - no assays provided - abundant
fault gouge and clay alteration

C-1

(Great Plains)

- 0- 30 - overburden
- 30-1190 - syenite to diorite, locally feldspathized, minor quartz, chlorite, epidote and clay minerals - 2 or 3% pyrite, scattered chalcopyrite and a trace of bornite, locally shattered rock, some fault zones up to 5' thick, a few small andesite dykes (up to 5 or 10 ft wide)
- 30-610 = 0.17% Cu
610-1192 = 0.06% Cu
Mo in the 0.005 range (not all assayed)

C-2

(Great Plains)

- 0- 28 - overburden
- 28-1170 - granodiorite, grey and green, altered with feldspars, quartz, chlorite, clay minerals, carbonate, 1 to 3% pyrite, local breccia and fault zones one or two 5 to 10 ft andesite dykes
- 30-620 = 0.21% Cu - .008% Mo
620-1170 = 0.036% Cu - .005% Mo

GEOCHEMISTRY

The heavy glacial till and gravel deposits make the area unsuitable for reliable soil sampling. Two silt samples from streams entering the valley from the east gave high copper values. The location of these geochem highs is shown on the geological map.

MAGNETICS

A map of the magnetics has been prepared by Canex to overlay their geological map. In general, the sediments have the lowest magnetic response, the syenites and diorites associated with the mineralization

provide an intermediate response, and some ultrabasics on the east (and west?) flanks of the valley give very high responses.

The magnetic information does support the hypothesis that the North and South mineralized areas may be associated with the same zone of continuous granitoid intrusive. The intermediate responses, 1250 to 2250 gammas, associated with this intrusive continue to approximately 44,800 south (Canex grid), and remain open to the north of the north showings. (see Canex maps)

INDUCED POLARIZATION

The I.P. survey of Canex was followed by all of the above recorded diamond drilling, and thus its interpretation has been facilitated. McPhar's survey for Great Plains covered only a small area inside the Canex survey, and thus adds very little useful information. As a generality pyrite has caused the strongest anomalies, and chalcopyrite has been found in greater abundance on the flanks of the highs. This characteristic is actually relatively common in other prospects of this type.

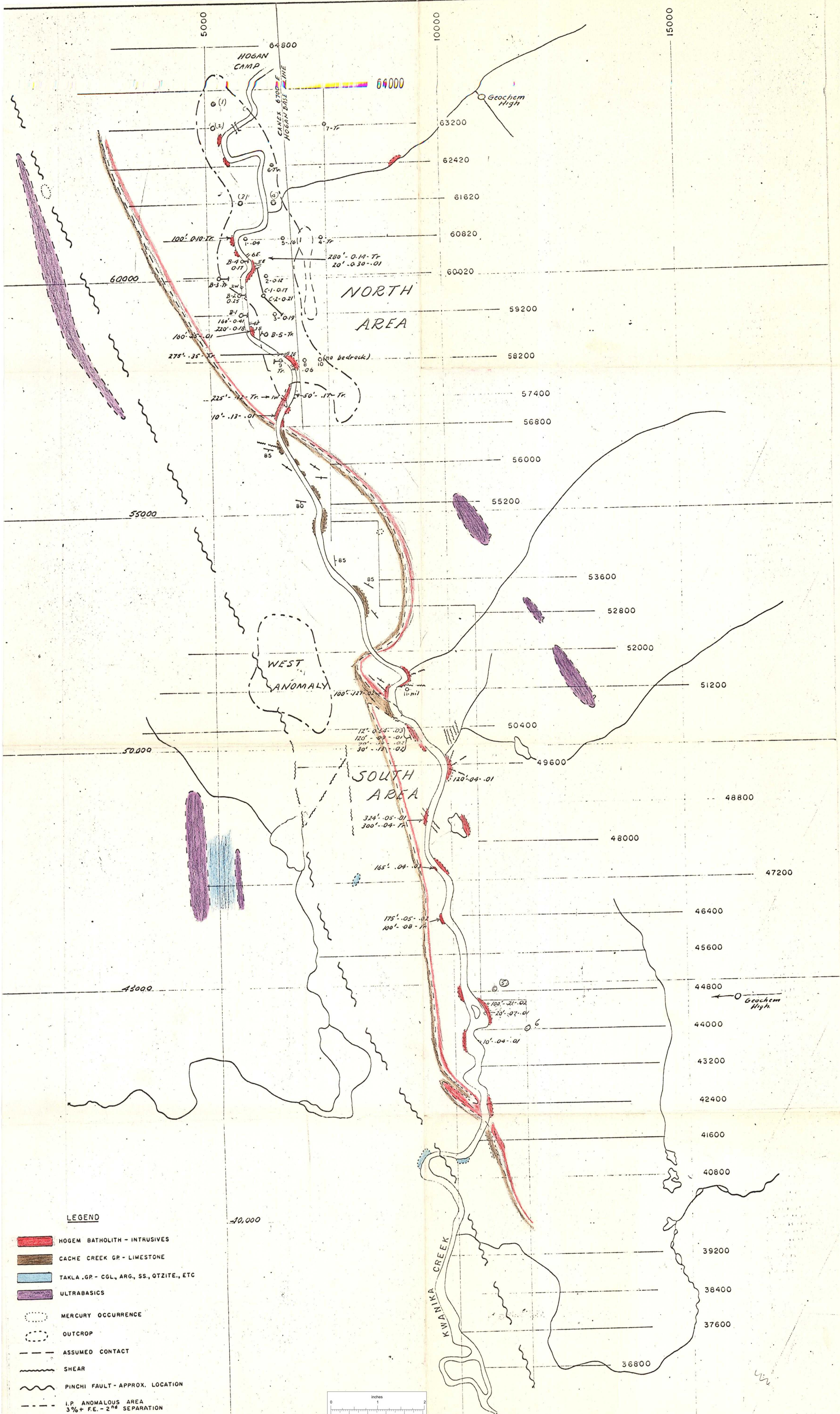
The zone of I.P. highs extends throughout the tested area, and remains open both to the north and to the south. The I.P. survey thus also supports the presumed continuity between the North and South Areas of mineralization.

An anomalous area labelled 'West Anomaly' near the west ends of lines 50,400N and 52,000N has not been tested by drilling, apparently because it lies within the area where sediments are expected. However, it does not show the long and narrow shape one would expect from a stratiform graphitic horizon.

August 10, 1971.



R.H. Seraphim, Ph.D. P.Eng.



LEGEND

- HOGAN BATHOLITH - INTRUSIVES
- CACHE CREEK GR - LIMESTONE
- TAKLA GR - CGL, ARG, SS, OTZITE, ETC
- ULTRABASICS
- MERCURY OCCURRENCE
- OUTCROP
- ASSUMED CONTACT
- SHEAR
- PINCH FAULT - APPROX. LOCATION
- I.P. ANOMALOUS AREA
3%+ F.E. - 2nd SEPARATION

D.D.A. assays shown as Cu only
Fench assays shown as ft-% Cu-10/10

