

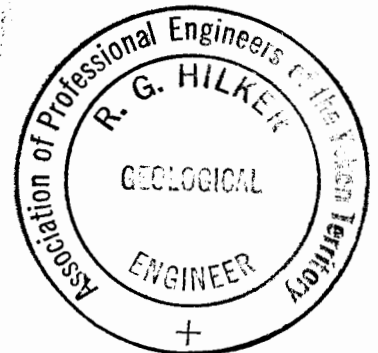
GEOLOGICAL AND GEOCHEMICAL REPORT
ON THE
MO 1-14 (Y35884-Y35897) and MO 17-32 (Y35898-Y35913)
MINERAL CLAIMS
DAWSON RANGE AREA
YUKON TERRITORY

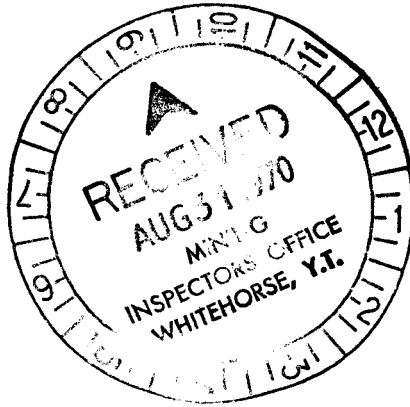
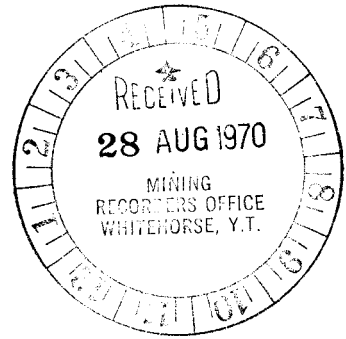
62°-38' N LATITUDE
138°-22' W LONGITUDE
N.T.S. DESIGNATION: 115-J-9
WHITEHORSE MINING DIVISION

BY
G.G. CARLSON, GEOLOGIST
R.G. HILKER LIMITED
WHITEHORSE, YUKON TERRITORY

UNDER THE SUPERVISION OF
R.G. HILKER, P.ENG.

21 AUGUST 1970





This report has been examined by the Geological Evaluation Unit and is recommended to the Commissioner to be considered as representation work in the amount of

\$3,329.80

D. B. Craig

Resident Geologist or
Registered Mining Engineer

Considered as representation work under Section 53 (4) Yukon Quartz Mining Act.

[Signature]

Commissioner of Yukon Territory

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INTRODUCTION

On July 22nd, 1970, G. Carlson (geologist), J. Smith (soil sampler), and L. Roy (linecutter) were moved to the MO claim group by Jet Ranger helicopter from a previous project located approximately 15 miles to the west. The camp was established during the day and linecutting, geological mapping, and soil sampling were started in the late afternoon.

During the period of July 22nd to July 24th (inclusive) a program of linecutting, geological mapping and soil sampling was carried out over the claim group. A total of 7.0 line-miles of picket lines, including baseline, were cut over the claim group as a basis for the geological mapping and soil sampling which were carried out more or less simultaneously with the linecutting. Claim posts were tied into the grid system as encountered.

The major portion of the MO group is located on the west side of the Selwyn River valley. Moderate growths of buckbrush and willow, plus two stands of heavy spruce and poplar on south-facing slopes, hinder the grid layout. A baseline was cut for 10,500 feet down the center of the claim group on a bearing of 164° azimuth. Grid lines were cut at right angles to the baseline and extended to both the east and west for 1/2-mile. The lines were spaced to reach an optimum arrangement whereby the maximum coverage could be obtained by a minimum amount of cutting in the shortest possible time. Accordingly,

.../2

the line spacing varies between 1500 and 3000 feet.

Soil samples were taken for analysis on 100-foot intervals on both the grid lines and the baseline. No physical difficulties were encountered during the sampling program. Permafrost was encountered, but the area contained numerous frost boils which were easily sampled. Due to the continuous slope down to the Selwyn River, the sampling will reflect up-slope conditions.

Geological mapping was also carried out over the grid lines and baseline. Due to the lack of outcrop (less than 1% of the claims area), boulder trains, talus and individual boulders were mapped to accumulate as much information as possible. As the area is generally non-glacial, the residual material is generally considered to be indicative of sub-surface geology with occasional variations due to solifluction.

The geological, geochemical and grid layout work was completed on the morning of July 24th. Crew and camp were moved to the Casino strip by helicopter on the afternoon of July 24th and then to Whitehorse by fixed-wing aircraft.

LIST OF PERSONNEL

The following personnel of R.G. Hilker Limited were directly involved in the geological and geochemical program on the MD claim group:

<u>Name</u>	<u>Address</u>	<u>Position</u>
R.G. Hilker, P.Eng.	Box 1566 Whitehorse, Y.T.	Geologist - supervision and report preparation.
G.G. Carlson	Box 548 Whitehorse, Y.T.	Geologist - field super- vision and report preparation.
J. Smith	c/o Box 566 Whitehorse, Y.T.	Soil sampler - field sampling.
L. Roy	Box 3245 Whitehorse, Y.T.	Linecutter
G.S. Zimmer	Box 1293 Whitehorse, Y.T.	Geologist - Report preparation.

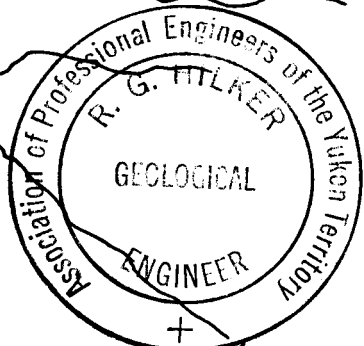
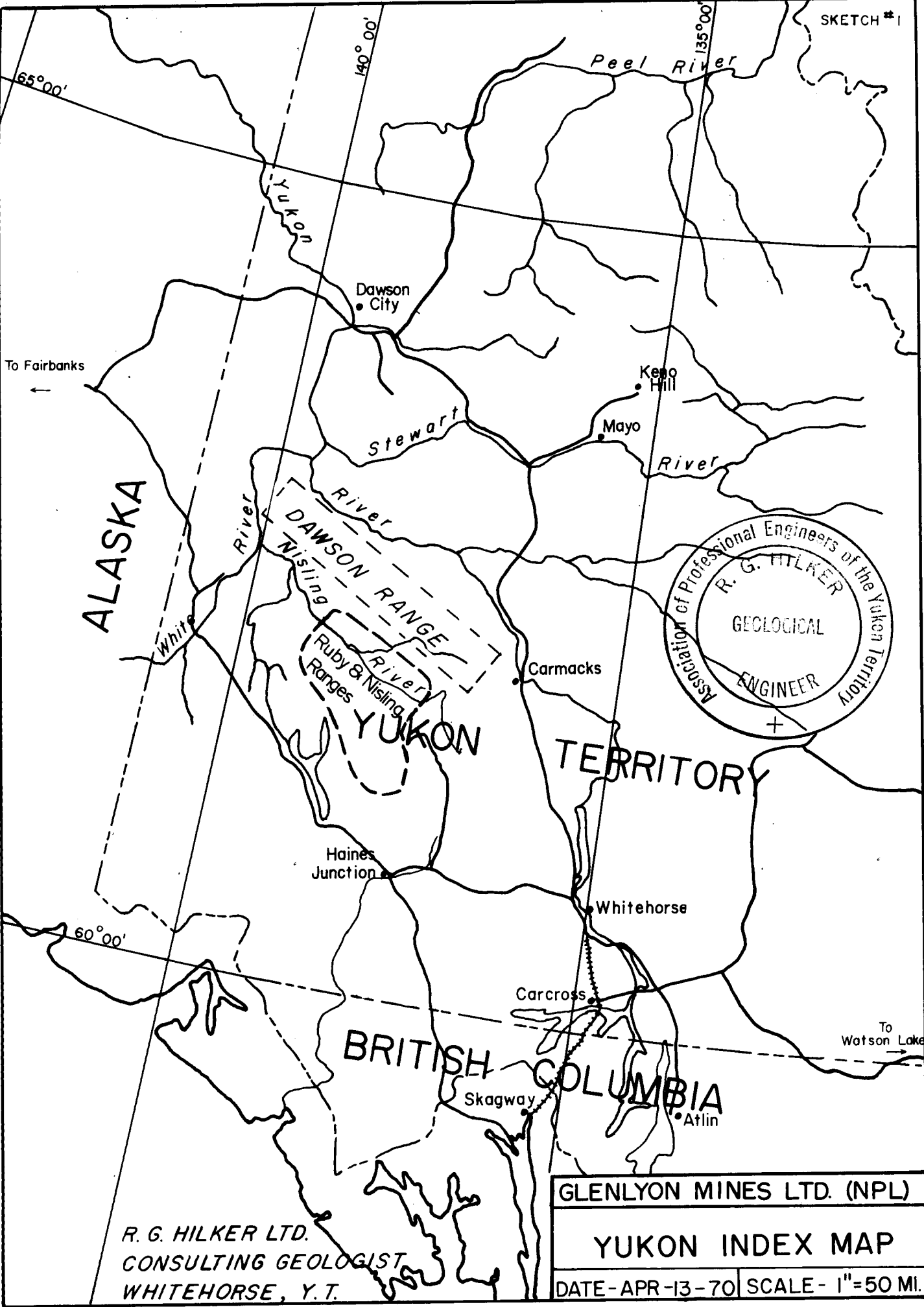
LOCATION AND ACCESS

The MD group of 30 claims is located in the west-central portion of the Yukon Territory within the Dawson Range. The Dawson Range is a low mountain belt, approximately N 45° W between latitudes 62°-00'N and 62°-45'N and longitudes 137°-00'W and 140°-00'W. The Range is bounded on the north and east by the Yukon River on the southwest by the Nisling River and on the north-west by the White River.

The claims are located in the immediate vicinity of 62°-38'N and 138°-22'W on Staking Sheet 115-J-9 in the Whitehorse Mining Division. The claims were staked over an area approximately 15 miles east-southeast of the Casino airstrip and about two miles west of the Selwyn River.

At present, the most practical access to the claim group is by fixed-wing aircraft to the Casino strip and by helicopter from the Casino strip to the property. Numerous fixed-wing aircraft are available for charter in Whitehorse and several helicopters are more or less permanently based or operating in the Casino strip - Dawson Range area. The Casino strip is located 194 miles northwest of Whitehorse.

Road access to the Casino Mines camp has been provided in the form of a winter road from the Burwash area (Mile 1097) of the Alaska Highway. Due to considerable areas of muskeg en route, this road is serviceable only in the winter months.



ALASKA

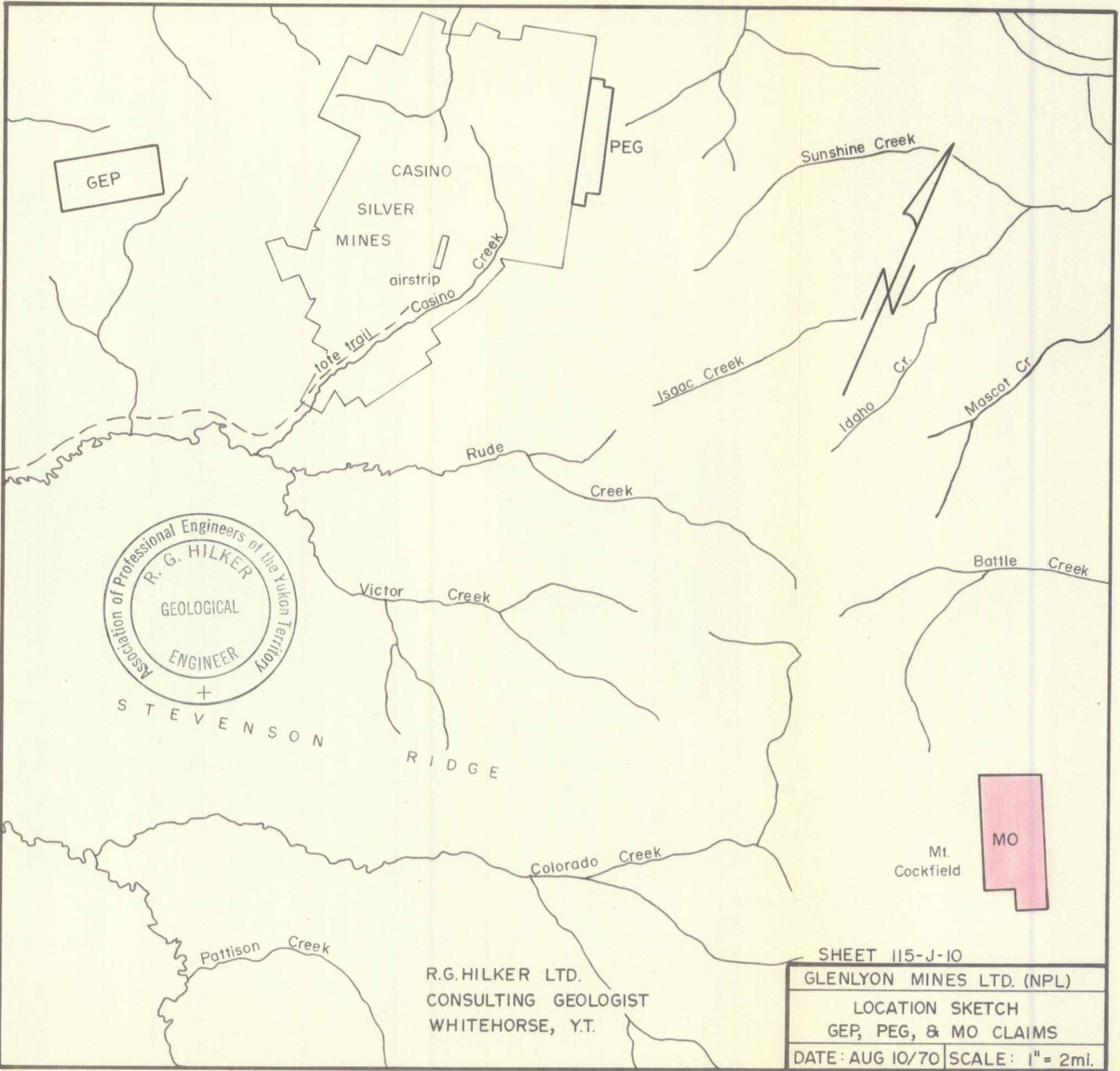
YUKON

TERRITORY

BRITISH COLUMBIA

R. G. HILKER LTD.
 CONSULTING GEOLOGIST
 WHITEHORSE, Y.T.

GLENLYON MINES LTD. (NPL)
 YUKON INDEX MAP
 DATE - APR -13 -70 | SCALE - 1" = 50 MI.



Association of Professional Engineers of the Yukon Territory
 R. G. HILKER
 GEOLOGICAL
 ENGINEER
 +

STEVENSON

RIDGE

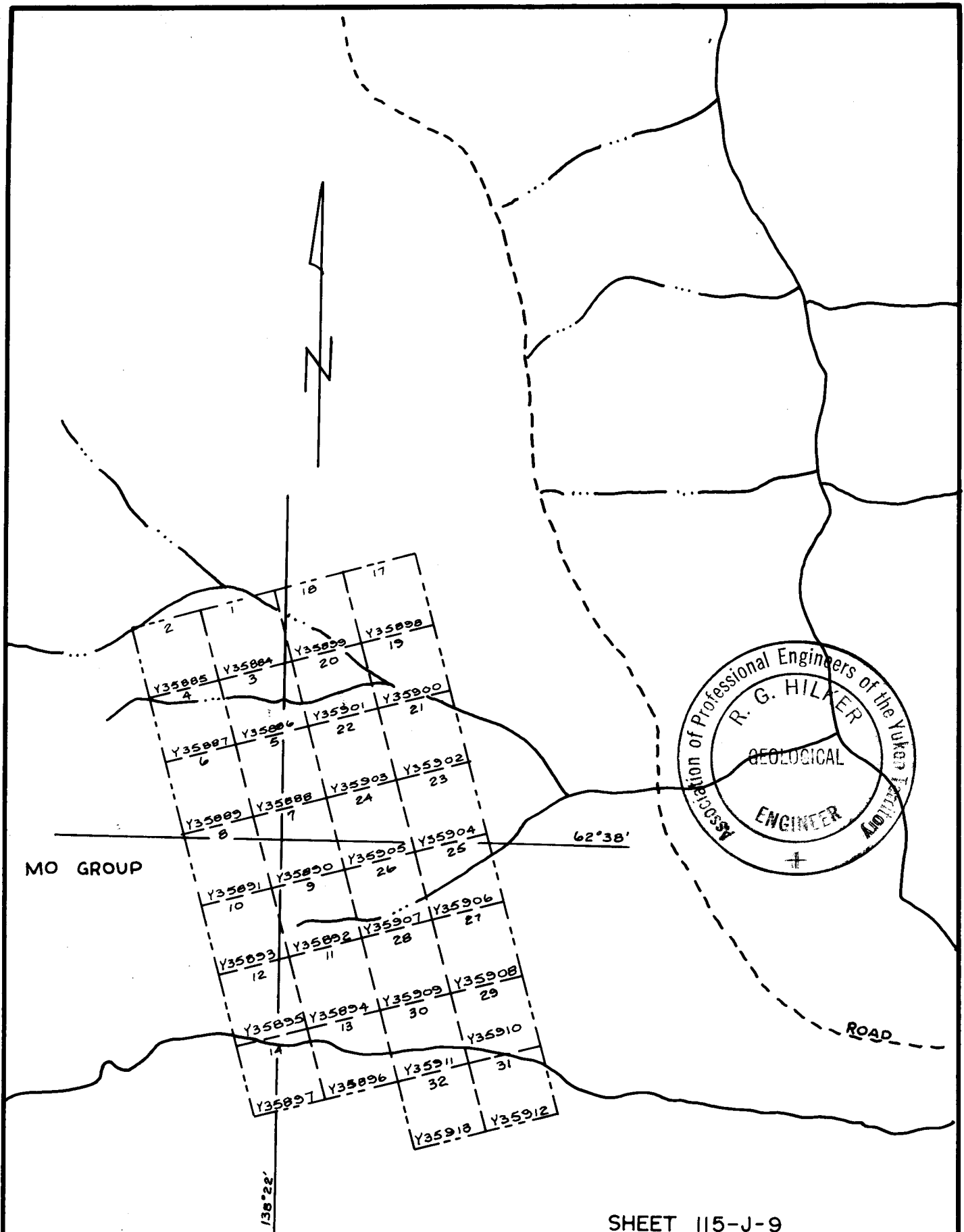
R.G.HILKER LTD.
 CONSULTING GEOLOGIST
 WHITEHORSE, Y.T.

SHEET 115-J-10	
GLENLYON MINES LTD. (NPL)	
LOCATION SKETCH	
GEP, PEG, & MO CLAIMS	
DATE: AUG 10/70	SCALE: 1" = 2mi.

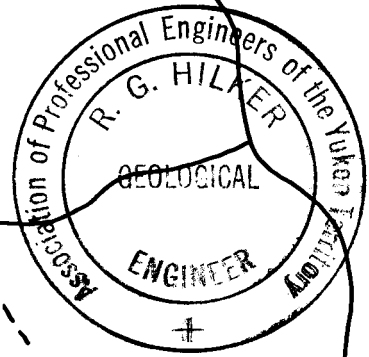
CLAIMS

The following information was obtained from the White-horse Mining Recorder's Office on August 18th, 1970:

<u>Claim</u>	<u>Sheet No.</u>	<u>Grant Nos.</u>	<u>Anniversary Date</u>	<u>Recorded Owner</u>
MO 1-14	115-J-9	Y35884-Y35897	29 July 1970	H.C. Fromme
MO 17-32	115-J-9	Y35898-Y35913	29 July 1970	H.C. Fromme



MO GROUP



R.G. HILKER LTD.
 CONSULTING GEOLOGIST
 WHITEHORSE, Y.T.

SHEET 115-J-9	
GLENLYON MINES LTD. (NPL)	
CLAIMS LOCATION	
MO 1-14, 17-32 CLAIMS	
DATE: JULY 2/70	SCALE: 1" = 1/2 mi.

REGIONAL GEOLOGY - DAWSON RANGE

The Dawson Range occurs in the physiographic Yukon Plateau Province. It is a mountainous terrain, with peaks rising more than 2,000 feet from the level of the plateau, and elevations within the range varying from 3,000 feet to 6,600 feet. Almost all of the area has been left completely untouched by recent glaciation. Accordingly, the outcrops, which predominate on the mountain tops and ridges, are quite irregular. Exposed rocks are highly jointed, fractured and weathered due to frost action and wind erosion. Overburden may reach thicknesses greater than 50 feet in the lower areas, restricting outcrop occurrences to the steeper valley slopes.

The predominant rocks in the area consist of the Upper Cretaceous Coastal Intrusive granites which form a batholith intruding the Yukon Group of sediments, Precambrian/Paleozoic in age. These are also in contact with the Jurassic Mount Nansen group of volcanics and sediments. The Tertiary Carmacks volcanics overlie all of the earlier rocks in some areas.

The following is a general summary of the granitic rock types which occur in the coast range intrusive:

1. Granite Porphyry - composed of 40% orthoclase feldspar and 30% smokey quartz with biotite, augite and minor magnetite. Generally jointed and fractured and weathers a rusty brown color.
2. Granodiorite Porphyry - composed of 50 to 60% orthoclase feldspar, 10 to 15% plagioclase feldspar, 15% clear

quartz, augite, biotite and minor magnetite. Occurs in the Casino Creek area and is characterized by large phenocrysts.

3. Granodiorite - composed of 60% orthoclase feldspar and 20% plagioclase feldspar with augite and biotite. Fine to medium-grained texture.

4. Diorite - composed of plagioclase and orthoclase feldspar with approximately 30% augite and biotite.

5. Quartz Monzonite - composed of 50% plagioclase feldspar, 10 to 15% orthoclase feldspar, 15% clear quartz, augite and fine to coarse crystalline biotite.

REFERENCE TO PUBLISHED GEOLOGY

The following listed publications and geological maps contain geological information in select areas of the Dawson Range, and reference was made to the information in the preparation of this report for Empire Mercury Corporation Ltd.:

1. D.D. Cairns 1916 - Klotassin Yukon Territory No. 1702, Geology Map, scale 1" = 2 mi. Canada Department of Mines Geological Survey, 1918.
2. H.S. Bostock 1944 - Paper 44 - 34 Preliminary Map Selwyn River, Yukon - Canada Department of Mines and Technical Surveys.
3. H.S. Bostock 1936 - Memoir 189 - Carmacks District, Yukon - Geological Survey of Canada - Department of Mines and Technical Surveys.
4. J.R. Johnston 1937 - Memoir 214 - Geology and Mineral Deposits of Freegold Mountain, Carmacks District, Yukon - Geological Survey of Canada - Department of Mines and Technical Surveys.

TABLE OF FORMATIONS

CENOZOIC

Quaternary

- [Q] - Alluvium, volcanic ash, ground ice.

Tertiary

Carmacks Volcanics

- [9] - Thick flows, basalt, amygdaloidal flows, top of flows breccia, local brecciation and porphyritic flows.

MESOZOIC

Jurassic - Upper Cretaceous

Coastal Intrusives

- [8] - Granite, granodiorite, quartz-monzonite, porphyry and breccia, altered (ore host rock).
[7] - Syenite and monzonite.
[6] - Diorite and gabbro.

Mount Nansen Group

- [5] - Basalt, andesites and dacite flows, breccias and tuffs. Green-black color, contains sedimentary rocks consisting of sandstone, siltstone, pyritic arkose and argillites. Bands and bedding distinct.

Tantalus Formation

- [4] - Conglomerate, sandstone, shale and coal seams.

Jurassic

- [3] - Laberge Group

Triassic

- [2] - Granite, monzinite.

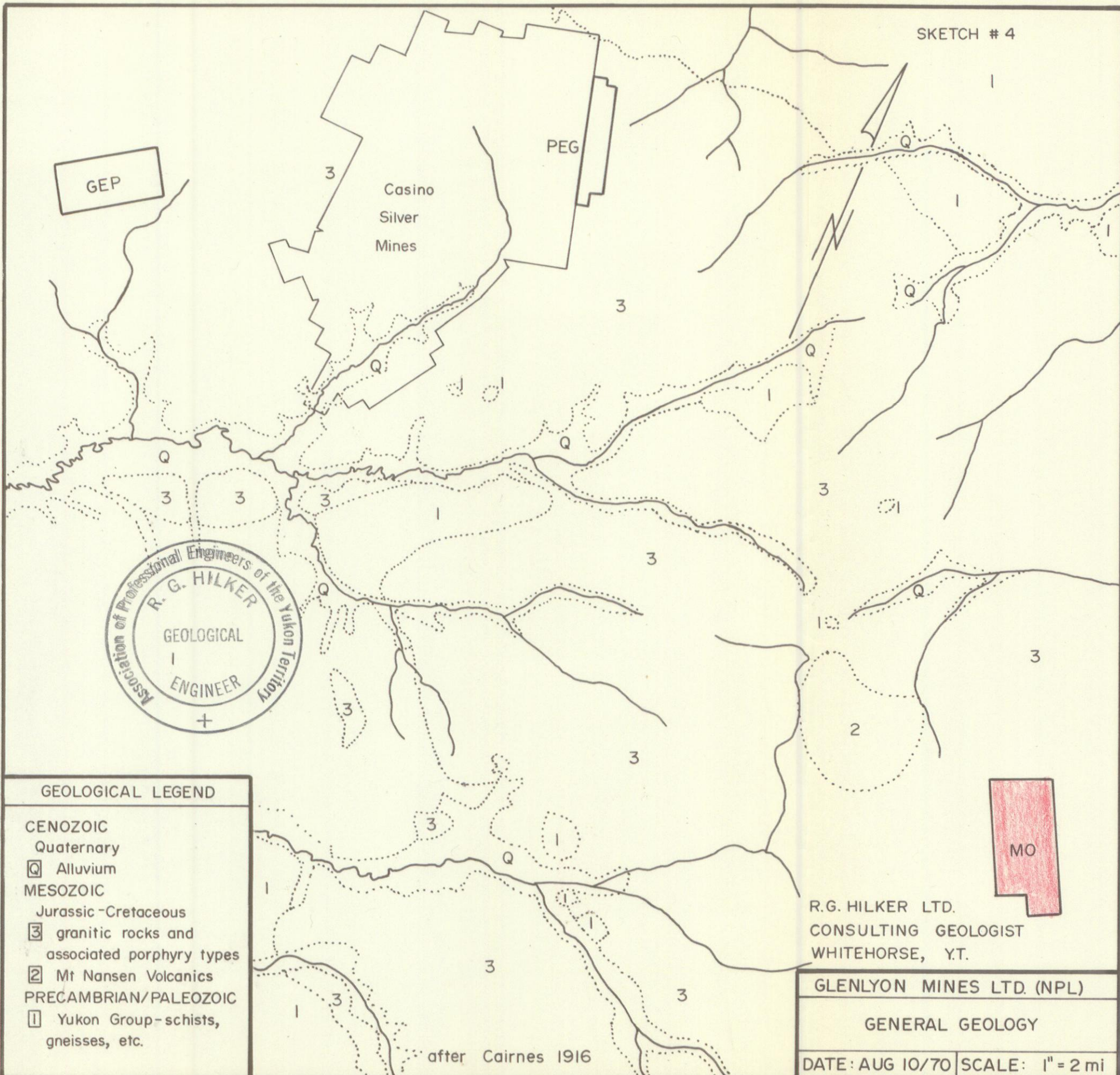
PRECAMBRIAN & LATER

Yukon Group

- [1] - Limestone, shale, mica-quartz schist, chlorite schist, quartzite.

After Bostock; G.S.C. Paper 44 - 34.

SKETCH # 4



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ENGINEER
+

GEOLOGICAL LEGEND

CENOZOIC

Quaternary

Q Alluvium

MESOZOIC

Jurassic-Cretaceous

3 granitic rocks and associated porphyry types

2 Mt Nansen Volcanics

PRECAMBRIAN/PALEOZOIC

1 Yukon Group-schists, gneisses, etc.

R.G. HILKER LTD.
CONSULTING GEOLOGIST
WHITEHORSE, Y.T.

GLENLYON MINES LTD. (NPL)

GENERAL GEOLOGY

DATE: AUG 10/70 | SCALE: 1" = 2 mi

after Cairnes 1916

GENERAL GEOLOGY

The geology of the PEG, GEP and MO Groups is quite typical of the Dawson Range area. The Table of Formations, which is listed on the following page, has been compiled both from previous observations in the Dawson Range area and from field observations made during the present survey. Geological mapping of the claim groups is to date only reconnaissance in nature, as the mapping was carried out mainly on or closely adjacent to the lines as they were cut. It is felt that most of the rock types in the various areas were observed, but a much more detailed investigation of the rocks themselves, their occurrence and their relation to each other, is necessary for a complete picture of the local geology within each claim group.

There are few outcrops in this area, with less than 1% surface rock exposure. However, talus and frost-heaved boulders occur extensively, and these may be used for mapping purposes. On the steeper slopes, talus is predominant, and this reflects mainly upslope geology, whereas the frost-heaved boulders on the gently sloping and flat areas may reflect bedrock geology more directly beneath the observed boulders. The area has not been regionally glaciated, but evidence of a small valley glacier was observed in the major valley at the south end of the MO group. However, the effects of glaciation would not appear to affect the geology, as mapped from the boulders, in any way.

TABLE OF FORMATIONS - MD PROJECT

CENOZOIC

Tertiary

- 4 Carmacks Volcanics - basalt and related basic dikes
- 4a - related andesite-dacite porphyries

MESOZOIC

Jurassic - Upper Cretaceous

- 3 Minor Intrusives - granite-diorite, quartz-feldspar porphyries
- 3a - associated (?) aplite and pegmatite dikes
- 2 Klotassin Batholith - hornblende-biotite-quartz granite, monzonite. Minor dioritic phases.

PRECAMBRIAN AND LATER

- 1 Yukon Group - biotite-hornblende schists and gneisses

The foregoing Table of Formations includes rock types found on all three claim groups. The Klotassin Batholith, which forms most of the Dawson Range, was intruded into the Yukon Group of sediments and volcanics during the Cretaceous period. The Yukon Group, Precambrian or Cambrian in age, was variously affected by this intrusion. In some areas, it has remained almost totally unaltered. Over most of the central area of the batholith, however, the sediments are evident only in a few remaining, highly metamorphosed roof pendant-like structures and in abundant smaller inclusions or xenoliths. The sediments appear now as biotite-hornblende gneisses which appear to grade into mafic lean granitic rocks. These are probably derived from the siliceous end members of the sediments. The distinction between these rocks and Unit 2 is very difficult in field observation, except in a few cases where relict sedimentary structures are still evident. No skarn minerals were observed. Epidote is quite common, either disseminated or in small veinlets, but it appears to be associated with the intrusive.

Unit 2, the main body of the Klotassin Batholith, is the dominant rock type over the three claim groups. Its composition is quite variable, apparently over even relatively short distances, and as a result its classification to date has been by its age, approximately 110 million years. It is predominantly a hornblende-biotite granite-granodiorite. Diorite and even

gabbro phases are evident, while other leucocratic varieties contain up to 50 percent quartz and less than 10 percent mafics. Biotite may be the dominant mafic mineral, but it is most often secondary to hornblende. Observed accessory minerals include epidote and pyrite.

Unit 2 is most readily identified by its texture, as its overall composition, especially the proportion of quartz and the various feldspars, is often difficult to determine in field examination. It is a coarse-grained rock with large, subhedral hornblende crystals which have grown, in some instances, to over ½ inch in length. Large plagioclase crystals have roughly intergrown with quartz and orthoclase, producing large areas of semi-continuous cleavage face which are quite evident on fresh rock surfaces.

Alteration is present in most of these rocks, generally to a minor extent. This consists mainly of oxidation of iron minerals, chloritization of hornblende, and, to a lesser extent, sericitization of feldspars.

Unit 3, a second phase of the Klotassin intrusive, has been dated at approximately 70 million years. It again has quite variable composition, ranging from granite through quartz monzonite, granodiorite, quartz, feldspar and quartz-feldspar porphyries, monzonite and quartz diorite, and it is also best distinguished by its texture. It is a medium-grained, light-colored rock which may have rounded quartz and/or euhedral

plagioclase phenocrysts. Biotite and hornblende may or may not be present in the groundmass. Alteration of these rocks is similar to that of Unit 2, except that rust may be a little more abundant.

Unit 3a is most probably related to Unit 3, although this is uncertain. It consists of fine to medium-grained aplite dikes and, to a lesser extent, pegmatite dikes. Only one substantial sized body, on the GEP claim group, was observed. Compositionally, this rock type is very similar to the mafic lean granitic phases of Unit 3.

With regard to relative ages of the above three rock types, Unit 3a has been observed, in outcrop, intruding Unit 2. Units 2 and 3 were observed in close relationship, mainly in boulders, but no cutting relationships were observed.

The rocks of Unit 4 are the youngest rocks in the area, probably Tertiary (?) in age. They are fresh, fine-grained gabbro dike rocks, probably associated with the Carmacks volcanic series. From one outcrop occurrence, the dikes were observed to be quite small (less than 3-foot width) and highly irregular and discontinuous. They appear to be associated with faulting and shearing. Unit 4a is most likely associated with the above Unit 4. It consists of fresh, dense, fine-grained andesite-dacite porphyry. The phenocrysts are quartz and/or plagioclase. This unit was observed only on the MO group, and its relations with all other intrusive rocks are yet very vague.

GEOLOGY - MO 1-14 and 17-32 CLAIM GROUP

The geology within the MO claim group is highly varied and, in some cases, extremely complex. Thus, the following account must fall short of providing a complete or totally accurate description.

Unit 1 is present only in a few scattered occurrences as basic inclusions, mainly within Unit 2. A fine-grained and highly siliceous phase of Unit 1, may have been observed, but a distinction between this rock type, if it exists, and the fine-grained varieties of Unit 3a, was not possible.

Units 2 and 3 are the dominant rock types in the area. In both outcrop and boulders they are evident side by side and the two different types are often indistinguishable. Unit 2 is, in some cases, a typically fresh or slightly altered hornblende-biotite granodiorite-diorite. In many cases, however, it may show the same composition while its texture is coarse-grained granular, almost mylonitic. This texture is often accompanied by small shears filled with chlorite or epidote. Unit 2, through the above textural change, grades indistinctly into Unit 3. The secondary intrusive is noted mainly for its lower content of mafics and its often porphyritic texture. Phenocrysts are sub-rounded quartz, euhedral plagioclase, or both. Well developed hornblende crystals may also be present. The matrix is generally medium-grained. From a short inspection of the outcrop zone in the south half of the claim group, it was observed that the rocks

of Unit 3 are quite variable in texture and composition over relatively short distances of 5 to 10 feet, and also that they are, at this location, consistently in close contact with rocks of Unit 2. Due to the broken nature of most of the outcrop, and the lack of a close geological investigation, these rock types and their relation to one another are poorly understood. Detailed mapping of this outcrop zone would be essential to a more accurate interpretation of the geology not only in this particular area, but also of the entire Klotassin Batholith.

Unit 3a is present throughout the claim group as generally small fine to medium-grained aplitic dikes, with fewer pegmatite dikes, and is not abundant at any location.

Unit 4 is also present, not in abundance, as typically fine-grained basic dike rock. It was not observed to outcrop. A second intrusive, Unit 4a, which appears most closely related to Unit 4, was observed solely on this claim group. It consists of a fresh, fine-grained andesite-dacite porphyry. Phenocrysts are rounded quartz, euhedral feldspar, or both. This rock type was observed in abundance in boulders beyond the east end of the outcrop zone, and also in a few scattered locations in the northern area of the grid.

Structurally, very little was revealed during the present survey. However, the abundance of small shears, and possible mylonitic textures, in some of the rocks, indicates that the area has possibly undergone intensive faulting.

GEOCHEMICAL SURVEY

INTRODUCTION

The systematic sampling of soils and the subsequent analysis of these samples for trace amounts of copper and molybdenum has been successfully used throughout the Cordilleran region in the search for porphyry-type copper-molybdenum mineralization. This success has been extended to the Dawson Range, where several mineralized zones, including the Casino Silver Mines deposit, have been outlined by this technique.

For the successful application of a soil sampling survey, however, a careful study of all factors which might affect the geochemical characteristics of the soils, referred to here as the geochemical environment, must be undertaken. This environment is defined mainly by the characteristics of the soil. Basically, two distinctly different environments exist in the Dawson Range area, and are described below.

The "slope" environment exists mainly on slopes steeper than 5° and on the hill and ridge tops. The soil is residual or it has been transported a short distance down slope, and is composed mainly of weathered granite. A thin layer of humus and partially decomposed organic material may form the surface horizon. Vegetation may be completely lacking, but generally moss, grass and buckbrush are prominent, with minor spruce. Drainage in these areas is good, due to the slope and the general permeability of the soils.

The "bench" environment, by far the most predominant in this area, occurs over most of the flat or gently sloping

areas. Here a thick humus, almost muskeg layer, has developed over the underlying soils. Drainage is poor, and the ground is often frozen quite close to surface. Vegetation consists of thick moss and grass with buckbrush and minor spruce. The underlying soils consist of alternating clay-rich and sand-rich horizons, which are partly colluvial (transported by gravity) and partly alluvial (transported by water).

Soil sampling conditions in "slope" areas are generally very good, except on very steep slopes where talus may be abundant. The "bench" environment, however, presents sampling difficulties. The humus layer is often very thick and hard to penetrate, especially if it is frozen at depth. A meaningful sample from this area, though, must be completely humus-free. As a result, during the survey, several "no sample" stations were encountered. Here, the ground in the vicinity of the station is either frozen or swampy, and a humus-free sample could not be obtained.

The soil samples are all taken from the upper "B" soil horizon, or the layer directly beneath the surface humus-rich "A" horizon. As the soils in this area have been transported only a short distance from the parent bedrock source, the samples collected are expected to reflect fairly accurately metal abundances in bedrock in the general vicinity.

SAMPLE HANDLING, ASSAYS AND TREATMENT OF DATA

After collection, samples were wired in strings of 30 to 40 samples, they were partially dried, and then packed in burlap sacks for shipment to Whitehorse. At Whitehorse, the samples were crated and sent via C.P. Air freight to Chemex Labs in North Vancouver, where they were analyzed for copper and molybdenum.

The analytical procedure at Chemex Labs consists of drying and sieving the samples, saving the -80 mesh fraction. One gram of this fraction is digested using perchlorate and is then dissolved in hot aqua regia. This solution is evaporated to dryness overnight. The residual is dissolved in hydrochloric acid and this solution is brought to volume for final analysis. The solution is run for copper and then molybdenum (using the Loring method) on a Techtron AA-5 Digital atomic absorption unit.

Results are returned to Whitehorse by First Class Mail. The copper and molybdenum values from this project have been plotted at 1 inch to 400 feet, and basic statistics, that is, the mean and standard deviation, of the copper values, have been calculated. The formulae used are as follows:

$$\bar{x} = \frac{P.P.M.}{n}$$

$$s = \left(\frac{n(\sum P.P.M.) - (\sum P.P.M.)^2}{n(n-1)} \right)^{1/2}$$

where: P.P.M. = copper value in parts per million

n = total number of values

\bar{x} = arithmetic mean

s = standard deviation

As the majority of molybdenum values is zero, one would expect a mean of zero and standard deviation less than 1. Thus, values of 2 or 3 P.P.M. Mo are anomalous values for this survey.

INTERPRETATION

The MO claim group is the most interesting, geochemically, of the three claim groups investigated. While the statistics again show the copper values to be relatively low and flat ($\bar{x} = 21$, $s = 11$), statistically anomalous copper values do occur and are associated with the complex geology at the south end of the grid. Three anomalous areas here have been labelled Zone M1, Zone M2 and Zone M3, and are approximately centred at L45+00S; 6+00W, L60+00S; 20+00E and L67+50S; 10+00W respectively. These three anomalies are not extremely continuous, and most values are not excessively high, but all three zones are downslope from the ridge of outcrops indicated on the Geology Map. Zones M1 and M2 contain the highest copper values and are on the northeast side of the ridge. Zone M3, to the south, is more widely scattered with lower values. No anomalous values occur on L60+00S from 16+00E to the baseline, where it roughly follows the ridge top, and on the baseline from 45+00S to 67+50S where sampling conditions are poor due to an abundance of boulders and a lack of good soil. Very few molybdenum values are associated with these anomalies, possibly due to a neutral to basic pH environment which would cause precipitation of Cu ions and solution of Mo ions.

These three anomalous zones appear to be related to each other as all three are probably derived from the same general bedrock source. This source, as described under Claim

Geology, is a very complex zone of intrusive rocks. The exposed rocks, in the upper zones of the outcrop ridge, do not appear to be very rich in copper, but a source of copper ions with possibly minor molybdenum, does appear to exist below this.

CONCLUSIONS

The geology of the MO claim group appears to be fairly complex, but basically consists of a large body (Klotassin Batholith) of hornblende-biotite granodiorite intruded by small bodies of more acid and occasionally porphyritic intrusives. Very minor amounts of Yukon Group metasediments were found as were minor amounts of aplite and pegmatite dikes. Epidote and chlorite filled shears were occasionally found within the granodiorite, indicating structural deformation and possible mineralization to an unknown extent.

The soil sampling program has outlined three areas (Zones M-1, M-2 and M-3) which are statistically anomalous for copper. The three zones all occur on the east-west grid lines and, accordingly, "open" to the north and south with the present 1500-foot line spacing. Occasional spot highs for copper occur very sparsely throughout the rest of the grid. No appreciable molybdenum mineralization is indicated by the geochemical survey. Further sampling will be required to define the extent and magnitude of the three zones.

RECOMMENDATIONS

The following program is recommended to further assess the potential of the MO claim group:

Soil sampling and geological mapping should be conducted over an additional 20 miles of line grid, consisting of 1/2 mile lines on a 500-foot spacing to fill in the existing grid system. Estimated costs are as follows:

Transportation (fixed-wing, helicopter, truck)	\$ 550.00
Camp Costs (equipment rental, food, etc.)	600.00
Soil Sampling	2,000.00
Geochemical Analysis (1040 determinations for Cu and Mo @ \$1.40)	1,450.00
Geological Mapping	1,000.00
Linecutting	1,700.00
Report Preparation	<u>500.00</u>
Total	<u>\$7,800.00</u>

SUMMARY OF EXPENDITURES

The geological-geochemical program carried out on the MD claim group was part of a project covering three blocks of claims on behalf of the same company, Glenlyon Mines Limited (N.P.L.). As the three claim groups (PEG, GEP and MD) were of similar size (either 30 or 32 claims), and as the programs were carried out consecutively, the various costs incurred have been divided by three for simplicity. Reference is made to Invoice No. 1035 -- R.G. Hilker Limited -- included in the Appendix of this report.

The following costs were incurred during the evaluation program on the MD claim group:

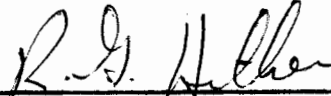
Transportation:	
Fixed-wing aircraft	\$227.25
Helicopter	290.60
Pickup truck	<u>16.66</u>
\$ 534.51
Camp Costs (equipment rental, food, etc.)	300.00
Radio Rental	53.63
Geochemical Sampling (7.0 linemiles @ \$100)	700.00
Geochemical Analysis - Chemex Labs (317 samples for Cu & Mo @ \$1.40)	443.33
Geological Mapping	300.00
Linecutting (7.0 linemiles @ \$85)	595.00

Report Preparation (includes both preliminary and final drafting) 403.33

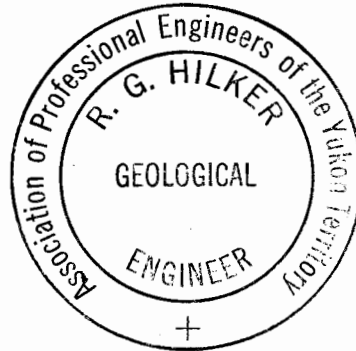
Total Costs claimed for assessment work .. \$3,329.80

CERTIFICATION OF EXPENDITURES

I, ROBERT G. HILKER, P.Eng., do hereby certify that the statement of costs incurred during the geological/geochemical evaluation of the MO claim group as stated on Pages 26-27 of this report (total expenditures: \$3,329.80) is a true statement to the best of my knowledge.



ROBERT G. HILKER, P.Eng.
Whitehorse, Yukon Territory
August 21st, 1970.

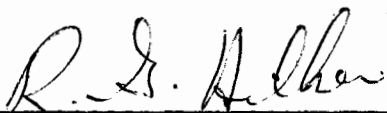


CERTIFICATION OF REPORT

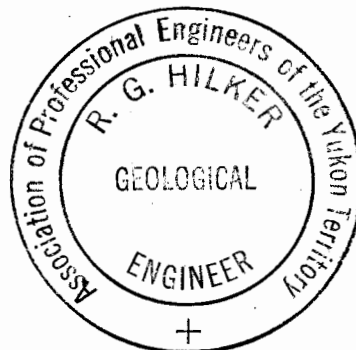
I, ROBERT G. HILKER of #6 Chalet Crescent, Hillcrest, in the City of Whitehorse, in the Yukon Territory, DO HEREBY CERTIFY:

1. THAT I am a Consulting Geologist, with an office located at #8 Northern Metallic Building and postal address P.O. Box 566, in the City of Whitehorse, in the Yukon Territory.
2. THAT I am a graduate of the Michigan Technological University located in Houghton, Michigan, U.S.A., where I obtained a Bachelor of Science degree in Geological Engineering (Exploration Option) in 1962.
3. THAT I am a registered member in good standing of The Association of Professional Engineers of the Yukon Territory.
4. THAT I have practised my profession as an engineer and geologist for the past eight years.
5. THAT I have personally supervised the geological-geochemical evaluation conducted by G.G. Carlson on the MO claim group in the Whitehorse Mining Division of the Yukon Territory, from July 22nd to July 24th, 1970.
6. THAT neither I nor G.G. Carlson have any direct or indirect interests in any of the mineral claims, or in any of the securities held by Glenlyon Mines Limited (N.P.L.) nor do we expect to receive any.

DATED this 21st day of August, A.D. 1970.



R.G. Hilker, P.Eng.



A P P E N D I X

FIELD DIARY - MO GROUP - G.G. CARLSON

Wednesday, July 22

Weather: Sunny, few clouds, small showers in evening.

Moved camp in a.m. from PEG to MO. Set up camp and started traverse at 5:00 p.m. Located P2, MO 27 and 28; P1, MO 29 and 30. The grid was started at this point, with grid coordinates 15+00E, 60+00S. The following lines were cut, chained and sampled, accompanied by geological mapping: L60S, 26+40E to B.L.; B.L., 60+00S to 45+00S; L45+00S, B.L. to 26+40E.

Thursday, July 23

Weather: Sunny, hot. Few clouds in late afternoon and evening.

The following lines were cut and chained, accompanied by geological mapping: B.L., 45+00S to 30+60N; L15N, 26+40E to 26+40W; L0N, B.L. to 26+40W; L15S, 26+40W to 26+40E; L30S, B.L. to 26+40E. (That's 4.5 miles!)

Soil sampling was carried out along B.L., 45S to 30+60N; L15N, 26+40E to 26+40W.

Friday, July 24

Weather: Sunny and hot in morning, clouding over and showers in afternoon.

The grid was completed with cutting, chaining, sampling and geology carried out on B.L., 60S to 90S and L67+50S, B.L. to 26+40W. Soil sampling was also carried out on L0, B.L. to 26+40W; L156, 26+40E to 26+40W and L30S, B.L. to 26+40W.

Move to Casino strip in afternoon (T.N.T.A. Jet Ranger - 1 trip - and then to Whitehorse. Globe Cessna 172 - 2 trips)

Soil Sampling

Basically two types of soils are encountered over the MO group, neither of which is particularly residual. A large area of the claims is occupied by old and now gently-sloping talus slopes which are now partially to totally vegetation-covered. The vegetation includes thick moss in most parts, and the soil beneath this, colluvial in nature, is often quite scarce. Where available, it is composed of coarse to fine sand with minor gravel and clay and often high in organic content. The second soil type occurs on the gently-sloping areas where boulders are not prevalent. The majority of this area is covered by a thick humus layer under moss, with a wet, organic-rich grey clay layer beneath. This is often frozen. In this area, however, abundant frost boils occur and provide excellent, easily accessible, sample material. This ranges in composition from the grey clay mentioned above, to brown or yellow-brown sand, clay or gravelly sand.

Both of the above types of sample material will geochemically reflect upslope conditions.

Geology

The geology of the MO claims is more complex than that of the PEG or GEP groups. The table of formations used here, roughly follows that of the previous areas:

- 1 - hornblende-biotite granite granodiorite
- 1a - altered granitic rock
- 1b - not encountered
- 1c - generally basic inclusions of Yukon Group sediments, from small xenoliths to larger pendants, etc.
- 1d - not encountered
- 1e - quartz and/or feldspar and/or hornblende porphyry, medium to coarse-grained matrix
- 2 - leucocratic intrusion, generally small aplite to pegmatite dikes
- 2b - andesite-dacite porphyry
- 3 - fresh fine-grained basic rock

Unit 1 here is roughly of the same composition as that previously encountered, but here it shows a prominent foliation, mainly of hornblende crystals, but also of all other minerals and small

elongated xenoliths of Unit 1e. In extreme cases, a distinctly gneissic texture is evident. The most distinct foliation, which is present in all types of granitic intrusive, occurs in a sheared, granular textured rock which is almost mylonitic. Chlorite and sometimes epidote stringers may be abundant in this rock.

Unit 1a is not abundant in this area. Alteration is restricted to light rusting on most rocks and the above-mentioned foliation and shearing.

Unit 1c is present mainly as small to medium-sized xenoliths which have been stretched and are often almost totally incorporated into the host granite. They are generally fine-grained, basic and biotite rich. More siliceous varieties may occur, but they would be very difficult to distinguish from Unit 2.

Unit 1e is very hard to define at this stage, except that it is granitic, more leucocratic than Unit 1, with 0 to 20% mafics, and often porphyritic. Phenocrysts are mainly rounded quartz, with or without plagioclase feldspar, and sometimes well-developed hornblende. The matrix is medium-grained. Unit 1e appears possibly to be a later intrusive than Unit 1, but relations between the two are quite difficult to determine. Compositions vary from extremely acid phases through to the more basic phases of Unit 1. Some rocks, which are indistinguishable, have been labelled 1 - 1e or 1e - 1. On the small amount of outcrop mapped, Units 1 and 1e occur together and appear to parallel each other in relatively narrow bands. Detailed mapping will be required on the main ridge in the south end of the claims to determine more exact relations.

Unit 2 is very similar to that observed at previous locations, and here consists mainly of fine to medium-grained aplite stringers, with minor pegmatite. It is not abundant through the area.

Unit 2b is a new rock type. Its composition is intermediate (andesite-dacite). Rounded quartz and/or euhedral feldspar phenocrysts occur in a dense, fine-grained matrix. This unit is quite distinct from all others observed, but it may be related to either Unit 1e or Unit 3.

Unit 3 is, as previously mapped, a dense, fine-grained diabasic (basaltic) intrusive which is probably related to recent volcanics. Biotite phenocrysts are a minor component of some of these rocks.

* * * * *



R. G. HILKER
 LIMITED
 CONSULTING GEOLOGIST . . . PROFESSIONAL ENGINEER
 P.O. Box 566
 WHITEHORSE, YUKON TERRITORY
 "LAND OF THE MIDNIGHT SUN"

Mr. Larry Reynolds
 Glenlyon Mines Ltd. (N.P.L.)
 c/o Pemberton Securities Ltd.
 744 West Hastings St.
 VANCOUVER, B.C.

JULY 27th, 1970

INVOICE NO. 1035

Transportation

July 11 - Inv. 0210 - Globe Air Serv.	167.30	
July 24 - Inv. 0728 - Globe Air Serv.	168.30	
July 24 - Inv. 0226 - Globe Air Serv.	84.15	
July 11 - Inv. 3214 - Trans North T.A.	129.60	
July 11 - Inv. 19976 - Great Northern	262.00	
July 24 - Inv. 7560 - Trans North T.A. ..	174.35	
July 11 & 16 - Inv. 37370 - Trans North Turbo Air	<u>567.86</u>	1,553.56

R.G. Hilker Limited

Camp Rental & Costs (Claims MO 1-32, GEP 1-32, PEG 1-32)		900.00
Truck Rental (for assessment work)		50.00
Rental of Radio - 1 Month	155.00	
- Batteries	<u>5.90</u>	160.90
Drafting Linegrids & Claim Location (Dawson Range)		70.00
Recording Fees - MO Group	160.00	
GEP Group	160.00	
PEG Group	<u>170.00</u>	490.00
Geochemical Sampling (MO, GEP & PEG Claim Groups)		2,100.00
Geological Mapping (MO, GEP & PEG Claim Groups)		900.00
Geological Assessment Work (Report on MO, GEP & PEG Claims)		1,140.00
Linecutting (21 linemiles)		<u>1,785.00</u>
TOTAL INVOICE		<u>\$ 9,149.46</u>



INVOICE

CHEMEX LABS LTD. 212 BROOKSBANK AVE., NORTH VANCOUVER, B.C. TELEPHONE 915-0642/9

R.G. Hilker Ltd.,

Box 566,

Whitehorse, Yukon

DATE August 5, 1970

INVOICE NO. 3497

CERTIFICATE NO. 10308-10314

GLENLYON PROJECT

ATTN: _____

ITEM	DESCRIPTION	SUB-TOTAL	TOTAL
	270 samples analyzed for Copper, Molybdenum @ \$1.40		\$ 378.00



INVOICE

CHEMEX LABS LTD. 212 BROOKSBANK AVE., NORTH VANCOUVER, B.C. TELEPHONE 915-0642/9

R. G. Hilker Ltd.,

Box 566

Whitehorse, Y. T.

DATE August 4/70

INVOICE NO. 3489

CERTIFICATE NO. 10291 to 10307

ATTN: _____

ITEM	DESCRIPTION	SUB-TOTAL	TOTAL
	680 Samples analyzed for Copper & Molybdenum @ \$1.40	\$952.00	\$952.00



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CANADA
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CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 10307

TO: R.G. Hilker Ltd.,
Box 566,
Whitehorse, Yukon

GLENLYON PROJECT

INVOICE NO. 3489

DATE RECEIVED July 29, 1970

DATE ANALYSED Aug. 4, 1970

ATTN:

SAMPLE NO.:	ppm Copper	ppm Molybdenum
10034	14	0
10035	8	0
10037	10	0
10038	13	0
10039	4	0
10040	13	0
10041	14	0
10042	14	0
10043	12	0
10044	16	0
10045	16	0
10046	16	0
10047	12	0
10048	12	0
10049	13	0
10050	13	0
10051	14	0
10052	12	0
10053	21	0
10054	12	0
10055	12	0
10056	14	0
10057	14	0
10058	13	0
10059	13	0
10060	14	0
10061	16	0
10062	6	0
10067	10	0
10071	13	0
10072	10	0
10073	14	0
10077	13	0
10078	20	0
10079	8	0
↑ 10080	8	0
PEG 10081	7	0
MO 10088	21	0
↓ 10089	21	0
10091	54	1
Std., #22	54	17

Certified by



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CERTIFICATE OF ANALYSIS

TO: R.G. Hilker Ltd.,
Box 566,
Whitehorse, Yukon

GLENLYON PROJECT

CERTIFICATE NO. 10308
INVOICE NO. 3497
DATE RECEIVED July 29, 1970
DATE ANALYSED Aug. 5, 1970

ATTN:

Mo 10092

SAMPLE NO.:	ppm Copper	ppm Molybdenum
Mo 10092	50	0
10093	78	0
10094	44	0
10095	36	0
10096	30	0
10097	16	0
10098	18	0
10099	16	0
10100	13	0
10102	10	0
10103	13	0
10104	10	0
10105	13	0
10106	16	0
10109	13	0
10110	13	0
10111	18	0
10112	16	0
10113	12	0
10114	18	0
10115	34	0
10116	18	0
10118	16	0
10126	28	0
10127	28	0
10128	28	0
10130	14	0
10131	21	0
10132	20	0
10133	8	0
10134	12	0
10137	4	0
Standard Soil #22	54	17

Certified by

[Signature]

10/10/70



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CERTIFICATE OF ANALYSIS

TO: R.G. Hilker Ltd.,
Box 566,
Whitehorse, Yukon

GLENLYON PROJECT

CERTIFICATE NO. 10309

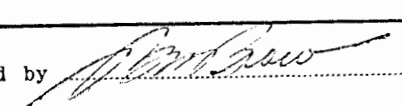
INVOICE NO. 3497

DATE RECEIVED July 29, 1970

DATE ANALYSED Aug. 5, 1970

ATTN:

SAMPLE NO.:	ppm Copper	ppm Molybdenum
10145	40	0
10147	26	0
10148	28	0
10149	28	0
10150	22	0
10151	14	0
10156	7	0
10157	26	2
10158	54	0
10159	54	0
10160	41	0
10161	36	0
10162	40	0
10163	34	0
10164	50	0
10165	54	0
10166	31	0
10167	20	0
10168	14	0
10169	22	0
10170	60	0
10171	40	0
10172	22	0
10173	31	0
10175	22	0
10176	21	0
10177	24	0
10178	21	0
10179	21	0
10180	21	0
10181	20	0
10182	21	0
10183	22	0
10186	16	0
10196	14	0
10197	22	0
10198	16	0
10199	13	0
10200	14	0
Standard Soil #22	54	17

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✓ 10



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TO: R.G. Hilker Ltd.,
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Whitehorse, Yukon

GLENLYON PROJECT

CERTIFICATE NO. 10310

INVOICE NO. 3497

DATE RECEIVED July 29, 1970

DATE ANALYSED Aug. 5, 1970

ATTN:

SAMPLE NO.:	ppm Copper	ppm Molybdenum
10202	31	0
10203	44	0
10204	18	0
10206	14	0
10208	20	0
10209	18	0
10210	12	0
10212	26	0
10213	22	0
10214	12	0
10215	18	0
10216	14	0
10217	8	0
10218	20	0
10219	12	0
10220	18	0
10221	12	0
10222	16	0
10223	16	0
10224	12	0
10225	10	0
10226	6	0
10228	6	0
10231	24	0
10233	14	0
10234	21	0
10235	18	0
10236	13	0
10237	12	0
10238	8	0
10239	10	0
10240	26	0
10241	24	0
10242	21	0
10244	14	0
10246	12	0
10247	10	0
10248	7	0
10249	8	0
10250	20	0
Std #22	52	17

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TO: R.G. Hilker Ltd.,
Box 566,
Whitehorse, Yukon

GLENLYON PROJECT

CERTIFICATE NO. 10311
INVOICE NO. 3497
DATE RECEIVED July 29, 1970
DATE ANALYSED Aug. 5, 1970

ATTN:

SAMPLE NO.:	ppm Copper	ppm Molybdenum
10252	13	0
10253	28	0
10254	14	0
10255	14	0
10256	14	0
10258	12	0
10259	10	0
10260	10	0
10261	7	0
10262	43	0
10263	10	0
10264	16	0
10265	7	0
10266	13	0
10267	8	0
10268	10	0
10269	14	0
10272	13	0
10274	13	0
10277	8	0
10281	8	0
10284	14	0
10285	18	0
10289	10	0
10290	10	0
10291	10	0
10292	8	0
10294	8	0
10295	14	0
10296	13	0
10297	10	0
10298	7	0
10301	18	0
10302	22	0
10309	18	0
10314	22	0
10315	21	0
10316	21	0
10317	16	0
10318	21	0
Std #22	54	17

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CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 10312

TO: R.G. Hilker Ltd.,
Box 566,
Whitehorse, Yukon

GLENLYON PROJECT

INVOICE NO. 3497

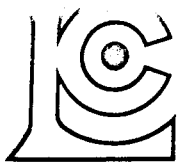
DATE RECEIVED July 29, 1970

DATE ANALYSED Aug. 5, 1970

ATTN:

SAMPLE NO.:	ppm Copper	ppm Molybdenum
10319	18	0
10320	21	0
10321	22	0
10322	34	0
10323	14	0
10324	38	0
10325	18	0
10326	20	0
10327	14	0
10328	10	0
10329	10	0
10330	13	0
10331	20	0
10332	36	0
10333	24	1
10334	41	3
10335	21	0
10336	21	0
10337	38	0
10338	20	0
10339	16	0
10340	18	0
10341	13	0
10342	21	0
10343	18	1
10344	13	0
10345	14	2
10346	16	0
10347	28	0
10348	14	0
10349	14	0
10350	13	0
10351	14	0
10352	14	0
10353	13	0
10354	18	0
10355	13	0
10356	13	0
10357	14	0
10358	14	0
Std #22	54	17

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CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 10313

TO: R.G. Hilker Ltd.,
Box 566,
Whitehorse, Yukon

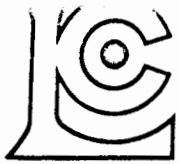
GLENLYON PROJECT

INVOICE NO. 3497
DATE RECEIVED July 29, 1970
DATE ANALYSED Aug. 4, 1970

ATTN:

SAMPLE NO.:	ppm Copper	ppm Molybdenum
10359	21	0
10360	22	0
10361	22	0
10362	21	0
10363	24	0
10364	22	0
10365	24	0
10366	24	0
10367	18	0
10368	21	0
10369	16	0
10370	14	0
10371	14	0
10372	16	0
10373	14	0
10374	12	0
10375	24	0
10376	21	0
10377	14	0
10378	16	0
10379	18	1
10380	21	0
10381	20	0
10382	16	0
10383	21	0
10384	21	0
10385	13	0
10390	20	0
10394	16	0
10395	18	0
10400	21	0
10401	18	0
10402	13	0
10403	8	0
10404	28	0
10405	22	0
10406	12	0
10407 A	8	0
10408	12	0
10409	26	0
Std #22	54	16

Certified by



CHEMEX LABS LTD.

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NORTH VANCOUVER, B.C.
CANADA
TELEPHONE: 985-0648

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CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 10314

TO: R.G. Hilker Ltd.,
Box 566,
Whitehorse, Yukon

GLENLYON PROJECT

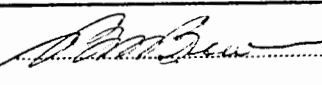
INVOICE NO. 3497

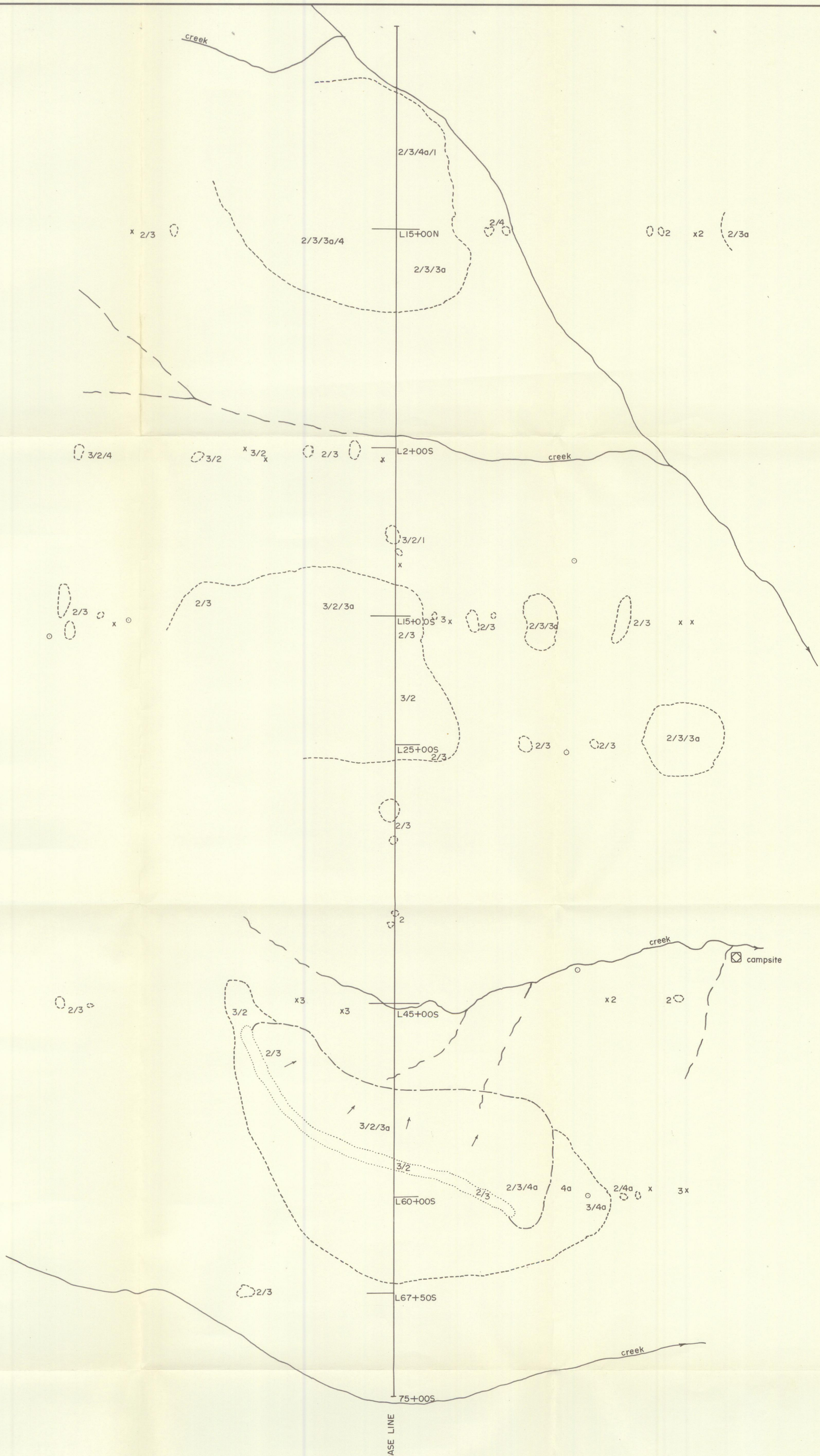
DATE RECEIVED July 29, 1970

DATE ANALYSED Aug. 5, 1970

ATTN:

SAMPLE NO.:	ppm Copper	ppm Molybdenum
10410	12	0
10411	13	0
10412	10	0
10413	21	0
10414	13	0
10415	24	0
10416	14	0
10418	12	0
10419	14	0
10420	12	0
10426	14	0
10427	13	0
10428	14	0
10430	18	0
10431	16	0
10434	24	0
10435	21	0
10437	33	0
10438	30	0
10439	31	0
10440	28	0
10441	38	0
10442	21	0
10443	30	0
10445	38	0
10446	41	0
10447	36	0
10448	20	0
10450	38	0
10452	34	0
10454	46	0
10455	31	1
10456	34	2
10457	36	1
10458	48	0
10459	30	0
10460	36	0
10469	34	0
10470	26	0
Std #22	52	17

Certified by 

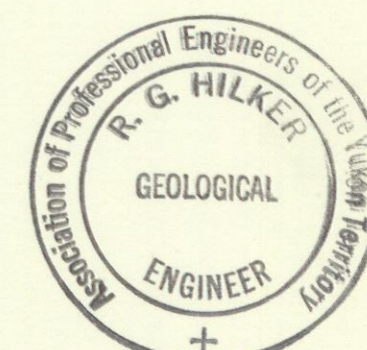


GEOLOGICAL LEGEND

- CENOZOIC**
- Tertiary
 - 4 Carmacks Volcanics - basalt and related basic dikes
 - 4a - related andesite-dacite porphyries
- MESOZOIC**
- Jurassic - Upper Cretaceous
 - 3 Minor Intrusives - granite-diorite, quartz-feldspar porphyries
 - 3a - associated aplite and pegmatite dikes
 - 2 Klotassin Batholith - hornblende-biotite-quartz granite, monzonite. Minor dioritic phases.
- PRECAMBRIAN and LATER**
- 1 Yukon Group - biotite-hornblende schists and gneisses

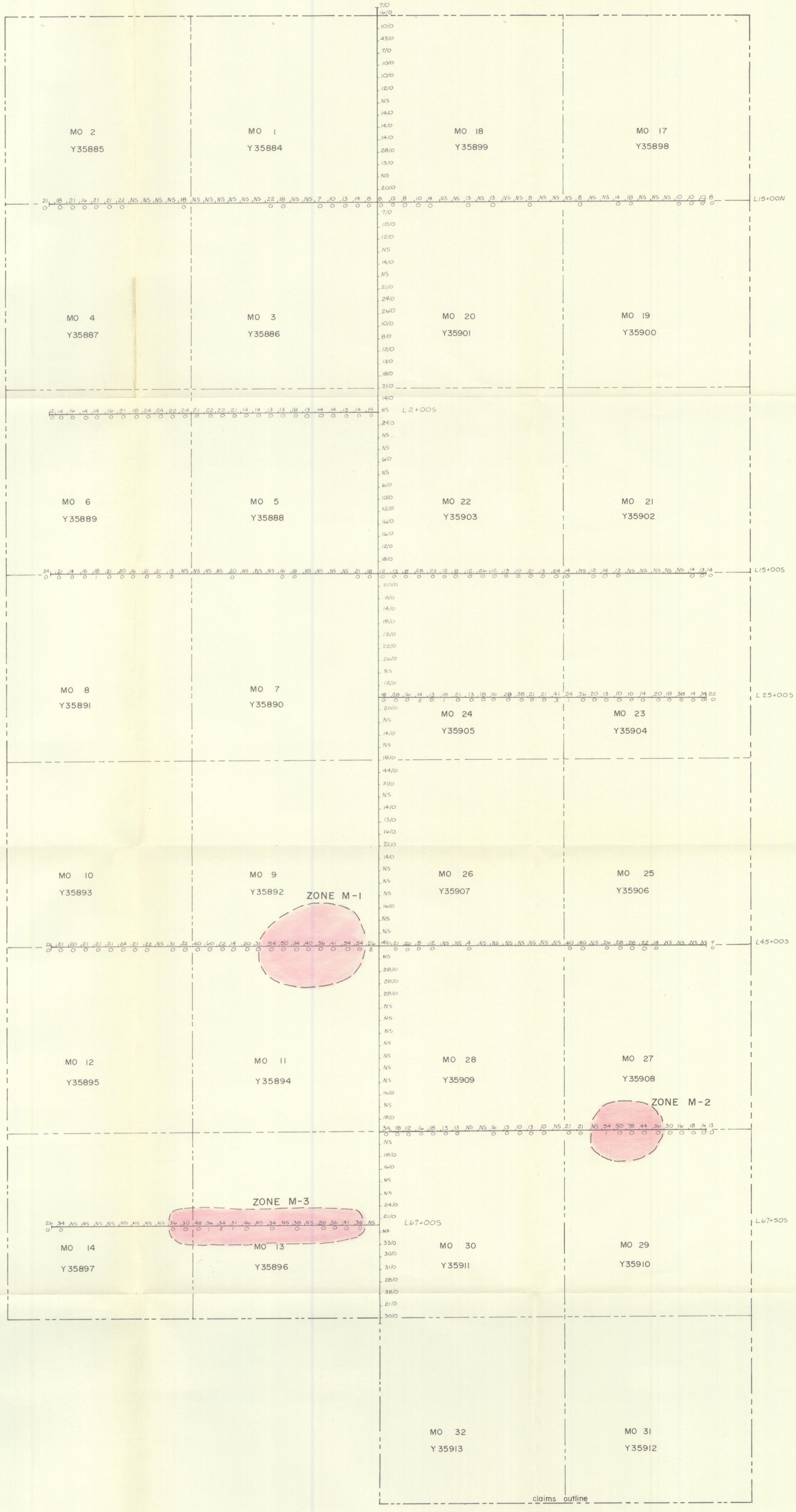
LEGEND

- x isolated boulders
- boulder train
- outcrop
- talus with direction of slope
- - - assumed geological contact
- ~ creek
- ~ swamp
- claimpost
- ⊠ campsite

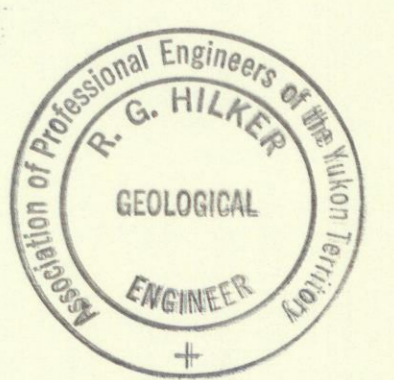


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Sheet 115-J-9
GLENLYON MINES LTD. (NPL)
GEOLOGY
MO CLAIMS
DATE: AUG. 10/70 SCALE: 1" = 400'



NOTE: 38/0 indicates copper/moly in p.p.m.
 38/0 indicates copper in p.p.m.
 0 indicates moly in p.p.m.



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