

# 4806



92 H/8W

PHELPS DODGE CORPORATION OF CANADA, LIMITED

GEOLOGICAL REPORT

RB, Tas, Tat

PROJECT 137 - COPPER MOUNTAIN AREA

Similkameen M.D.

Lat. 49°17', Long. 120°27'

N.T.S. (92 H/8W)

Department of  
Mines and Petroleum Resources  
ASSESSMENT REPORT  
NO. **4806** MAP \_\_\_\_\_

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Similkameen M.D.

Lat.  $49^{\circ}17'$ , Long.  $120^{\circ}27'$

N.T.S. 92 H/8W

December 19, 1973

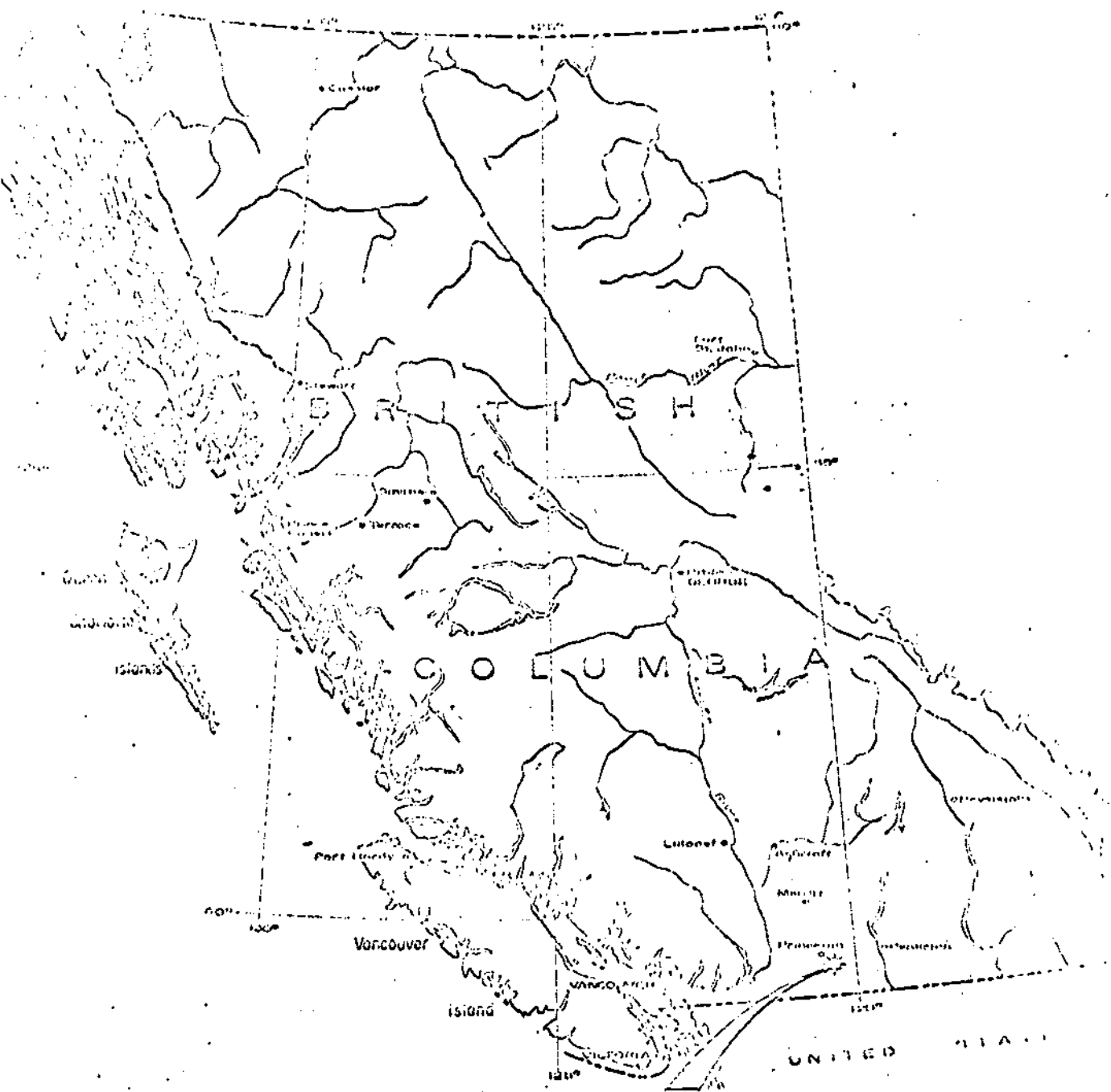
A. Morris, P.Eng.

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RB, TASSAT GROUPS

Department of  
 Mines and Petroleum Resources  
**ASSESSMENT REPORT**  
 NO. **4806** MAP **#3**

PHELPS DODGE CORP. OF CANADA LTD.  
 LOCATION MAP

## PROJECT 137 - SUMMARY REPORT

### Summary:

Phelps Dodge Corporation of Canada, Limited has on record 144 claims and/or fractions that, with the exception of a narrow gap (less than four claim lengths) form a rectangular block about seven miles long and from one-and-a-half to two miles wide. The orientation of this block is northerly. The claims on the north side of the above mentioned gap comprise the SHL group. South of this gap the block comprises 84 RB, 18 TAS, and 12 TAT claims - total = 114 contiguous claims.

The west margin of the north end of our RB group of claims is about two miles east of the Copper Mountain ore body.

After completion of our claim staking programme, work on the claims included: (a) geological mapping (b) collecting rock specimens for geochemical metal analysis and petrographic studies, and (c) checking locations of claim posts encountered on traverses.

After completing preliminary field and office studies, it was decided to concentrate our efforts on the larger (south) block of claims.

In the vicinity of our claims outcrop is sparse; possibly not more than 5% of the total area. Locally, traverses were made difficult by steep slopes of stream channels, and by abundant windfall or dense underbrush.

Most of our claims area appears to be underlain by Upper Triassic volcanic rocks of the Nicola Group. Along the east side of the RB and TAS claims the Nicola Group rocks are in contact with Lower Cretaceous, Verde Creek intrusives (porphyritic quartz monzonite) but this contact has not yet been found in outcrop. Along the west side of our property outcrops include dioritic rocks of the Copper Mountain and Voigt stocks, and, to a lesser extent, Lost Horse intrusion type rocks. These intrusives are intimately associated with Nicola Group volcanic rocks. In places on the west side of our RB claims the rock assemblage appears to be similar to that of the Copper Mountain mineral deposit area; to date however similar rock alteration and structure have not been discovered. Sulphide mineralization observed in outcrop also is very sparse and copper minerals, chiefly chalcopyrite, have been identified in minor amounts only.

### Conclusions:

1. Many of our claims are underlain by Nicola Group rocks only and at this time are of doubtful interest to our company.
2. In areas where we have found Copper Mountain type intrusives (including Lost Horse) more work is justified to extend outcrop mapping and hopefully to identify favourable rock alteration, structure, and more abundant sulphide mineralization.

3. In areas of interest, geochemical soil sampling would be justified, with a possible following of an I.P. survey.

#### Introduction:

Phelps Dodge Corporation of Canada Limited hold 144 claims and/or fractions east of the old Copper Mountain camp. These claims comprise two groups. The smaller (SHL) group is situated between Wolfe Creek and Verde Creek on the west side of Willis Creek. The larger group is mostly located south of Verde Creek to the west of Willis Creek. The northerly claims of this large group are about two miles east of Newmont's Copper Mountain property. All claims are situated in the N.T.S. map sheet 92 H/8W.

Five days were spent checking the outcrop geology of the SHL claims. The area of these claims appears to be mostly underlain by Verde Creek quartz monzonite of Upper Cretaceous age and even younger volcanic rocks of the Princeton Group. Along the west side of our group, though, there are outcrops of dioritic rock, possibly related to the Voigt stock.

Minor amounts of pyrite were to be found in some of the intrusive rocks. However, the economic potential of these claims is considered to be poor.

About eighty percent of our field work was performed on the following 70 claims: TAT 25-32 (8); RB 1-34 (34), 49-54 (6), 63-84 (22), all inclusive.

The topography of the area is moderate. Elevations range from about 3500 feet in the northeast area of the RB group to about 6700 feet in the southwest part of the TAS group. Commonly the stream drainage patterns are dendritic and slopes are steep. At higher elevations slopes are more gentle.

From Princeton, which is about 180 miles east of Vancouver on Highway No. 3, access to the property is good. The claims are reached via the old Princeton-Copper Mountain road to the old Voigt Camp area. The SHL group is accessible via old logging roads to the north and east from this location. The RB, TAS, and TAT claims are reached (a) by continuing along the main access road and then via a forest access road to the southwest end of our TAS and TAT claims, or (b) via the main logging road to Willis Creek. The junction of this road with the Copper Mountain mine road is in the vicinity of the old Voigt Camp. This road provides access to the north-east corner of the RB group of claims.

#### History:

The mining history of the Copper Mountain area has been long; copper was first discovered in the area in 1884. Dr. V. A. Preto provides a reasonably complete historical summary in his Bulletin #59 titled "Geology of Copper Mountain" (1972).

Although there has been no metallic mineral production from the area encompassed by our claims, some of these claims appear to be favourably located with respect to an extension of the Copper Mountain area

geology. A study of Minister of Mines Annual Reports and Assessment Reports indicates that some parts of our claim area have been examined by geophysical methods during reconnaissance surveys. There is no evidence of examinations having advanced beyond this stage.

With respect to our 1973 exploration programme, company geologists who worked on, and in the vicinity of, our claims are: Messrs. A. K. Burton, R. H. Beaton, F. M. Smith, and A. Morris.

Activities of these staff personnel are tabulated as follows:

	<u>Days</u>		
	<u>Field</u>	<u>Travel</u>	<u>Office Studies</u>
A.D.K. Burton	3	2	-
R. H. Beaton	3	1	-
B. Khin	-	-	5 (petrographic studies)
F. M. Smith	8	2	4
A. Morris	<u>45</u>	<u>4</u>	<u>11</u>
	<u>59</u>	<u>9</u>	<u>20</u>

TOTAL = 88 days

Field work comprised geological mapping, and collecting selected rock samples for geochemical and petrographic studies.

Office studies comprised area literature research and report writing, petrographic studies, etc.

Our 1974 programme will comprise geological mapping and geochemical soil sampling, with the possible follow-up of an I.P. survey in selected areas.

#### Geology:

The mineral deposits in the Copper Mountain area occur in a volcanogenic-intrusive assemblage.

Among the oldest rocks in this terrain are the Upper Triassic Nicola Group. In the Copper Mountain area the Nicola Group consists dominantly of volcanic-clastic rocks of basic to intermediate composition, with minor intercalations of calcareous sedimentary rocks. Also in this area age-dating indicates that emplacement of the Copper Mountain, Voigt, Smelter Lake stocks, and the Lost Horse intrusions occurred during this period of volcanic activity. The economic copper mineralization is associated with these rocks, more particularly with Nicola Group volcanic rocks, the Copper Mountain stock, and the Lost Horse intrusions.

Verde Creek quartz monzonite (which underlies much of our SHL group) and younger volcanic and sedimentary rocks, to date have proven to be devoid of economically significant metallic minerals.

Dr. Preto summarizes the rock alteration in the vicinity of Copper Mountain as follows:

"Volcanic and some intrusive rocks at Copper Mountain are considered to have undergone metasomatism which is physically controlled by the presence and intensity of fractures and by the proximity of large bodies of Lost Horse intrusive rocks. Such alteration overprints a generally earlier biotitization of the rocks. It involves bleaching, as a result of the destruction of ferromagnesian minerals, such as biotite and pyroxene, and of magnetite, as well as albitization and later growth of epidote, minor biotite, pink potash feldspar, and in places pyrite and chalcopyrite."

Geology: (RB, TAS and TAT Claims Area)

About two miles west of our RB claims the concentrically differentiated Copper Mountain stock crops out. This stock is elliptical in plan and is about four miles long. The strike of the long axis is about  $150^{\circ}$ . To the north and northeast of the main stock are two satellite stocks which show no differentiation, but are similar in composition to the dioritic outer phase of the Copper Mountain stock. The northeasterly situated stock is the Voigt which lies almost entirely east of Wolfe Creek, and probably is to be found in outcrop on our claims. The Lost Horse Intrusives comprise a complex of dykes, sills, and irregular bodies, displaying variable and complex contact relationships. The compositional range of these last mentioned rocks is from diorite to syenite but monzonites predominate. Most commonly they exhibit a porphyritic texture and contain disseminated crystals of apatite. Lost Horse Intrusives rocks have been found in our claims area.

The area of the RB, TAS, and TAT claims is chiefly underlain by Nicola Group rocks, locally identified as Wolfe Creek Formation. This formation is subdivided into (a) massive andesite, basalt, dacite; (b) pillow lavas; (c) volcanic breccia and agglomerate; (d) grey, green, buff andesite tuff, and minor volcanic siltstone, etc. Units (c) and (a) predominate in the area of our claims.

Dioritic rocks similar to those of the outer dioritic phase of the Copper Mountain stock were found in outcrops on claims TAT 31 and 32, RB 69, 63 and 64. Lost Horse Intrusives were identified in outcrop on claims TAT 31 and RB 73. A dioritic outcrop situated at the north edge of RB 5 is possibly related to Voigt stock intrusives. Verde Creek quartz monzonite probably underlies most of the eastern border of our claims but to date has been found in outcrop only on claims RB 1-7 incl, 19, 20, 21, 22, 24 at the northeast end of our property.

The rock alteration observed in the outcrops of all the above mentioned rocks in and adjacent to our blocks of claims did not appear to be of special significance. One could find none of the bleaching, K-spar, etc. alteration that is of significance in the Copper Mountain pits. However, twenty-six specimens were sent to our own laboratory in Douglas, Arizona for a petrographic study. The following is a condensation of the analyses by Dr. B. Khin:-



Both the intrusive and the volcanic rocks are weakly to moderately metamorphosed in the epi-mesozonal range with the usual assemblage of epidote, chlorite, fine-grained, incipient biotite, and minor sericite. No evidence of introduced minerals attributable to hydrothermal processes were detected. The strong epidote veining seen in many of the samples may be regarded by some as propylitic alteration; however, the epidote occurs mainly as veins, stringers, and lenses which are remarkably like what is considered low-temperature metamorphic veining, somewhat akin to retrograde effects. Relic actinolite, probably from an earlier stage of metamorphism, is present in some samples. The pyroxenes, in lesser disturbed intrusives, are almost invariably unaltered, a deuteric feature. No albitization, orthoclase veining or remnant biotite alteration which seem to play predominant roles in the Ingerbelle-Copper Mountain area, were detectable.

#### Structural Geology:

In the Copper Mountain area faults have been classified as:

- (1) Easterly trending faults and crushed zones.
- (2) Southeasterly trending faults, i.e. the Main Fault which had considerable influence on the location of ore in that deposit.
- (3) Northeasterly trending breaks or fractures; the "ore fractures" in the mine area strike northeasterly.

A study of air photographs indicates that many lineaments to be found in our claims area are possible extensions of faults and/or shear zones of the Copper Mountain, described by V. A. Preto in Bulletin #59 - Geology of Copper Mountain (1972).

If projected, the southeasterly trending Main Fault and the easterly trending subsidiary faults of the Copper Mountain mine area would transect our property. The obvious westerly and northwesterly drainage pattern of the Wolfe Creek tributaries appear to have been controlled by these and parallel structures. Unfortunately, very little outcrop is exposed, even in stream channels in this area, so it has not yet been possible to check this probable fault control.

#### Economic Geology:

The ore deposits of Copper Mountain have been described as being of three principal types: (a) bornite deposits (b) chalcopryrite-pyrite deposits, and (c) chalcopryrite-hematite deposits.

The bulk of Newmont's present copper ore reserves are of the chalcopryrite-pyrite category; associated with Nicola Group volcanics, Copper Mountain stock, and Lost Horse intrusives. The chalcopryrite-hematite deposits are mostly confined to an association with the Voigt stock and to date have not proven to be of economic size.

Although copper mineralization has been found only in minor amounts to date, the geologic setting on the west side of the RB group, the association of Nicola Group volcanic and Copper Mountain intrusive

rocks, offers encouragement. (This is particularly true since not all the claims have been checked and we are not certain of the extent of Copper Mountain intrusives in significant areas of our claims). The north and northwest sides of the RB claims also appear to be partly underlain with Voigt stock diorite which locally exhibits shearing and rusty weathering; and from which minor copper mineralization has been reported. Consequently a closer study is justified in these and adjacent localities.

#### Geochemistry:

During 1972 a geochemical soil survey was conducted on TAS and TAT claims. In three localities the soil copper assays proved to be anomalous.

Our 1973 geological mapping programme included an investigation and rock chip sampling of outcrop in the vicinity of the anomalous areas. In every instance the geochemical assays of rock chips were high, i.e. 103, 146, 697 ppm. Cu. Minor copper mineralization was visible in the outcrop from which the last mentioned specimen was collected. It is of interest to note that the 697 ppm. assay is from outcrop in the vicinity of a lineament that could be the projection of the Main Fault at Copper Mountain. The copper mineral noted in this occurrence is finely disseminated chalcopyrite.

In conjunction with the geochemical rock chip sampling, specimens were collected for a petrographic study and 26 of these were analyzed in our research laboratory at Douglas, Arizona. The results of this study have been reported above.

#### Observations & Recommendations:

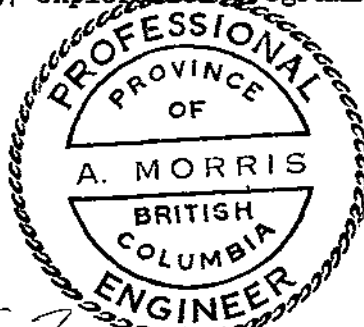
1. Outcrop in the area of our claims is sparse. On the east side of the RB and TAS claims the terrain is plateau type, dissected by a few steep sloped easterly flowing stream channels. Little or no outcrop was found, even in the stream beds, on traverses in this area. Float was mostly boulders of Nicola Group volcanic material. During the season it was not possible to complete an exhaustive examination of all of our claims. Most of the claims were covered in a reconnaissance fashion, then we confined most of our efforts to selected areas on the west side of our block of claims. The geology of several of these claims indicates that further study is not required and they need not be retained. However, it should be noted that in the Copper Mountain open pits the strong rock alteration associated with the copper mineralization grades very rapidly into the moderate type, similar to that found in our area.

2. Claims that should be retained for further investigation include: (a) those in the vicinity of outcrops of Copper Mountain intrusives (including Lost Horse); (b) those that possibly could be transected by easterly or southeasterly trending structures which could be related to Copper Mountain area faulting. Identification of these lineaments is based almost entirely on air-photo studies.

Using these criteria as a guide, the following 40 claims should be retained:

TAT 29 to 32 inclusive  
RB 21, 23 to 34 inclusive  
RB 49 to 53 inclusive  
RB 63 to 80 inclusive

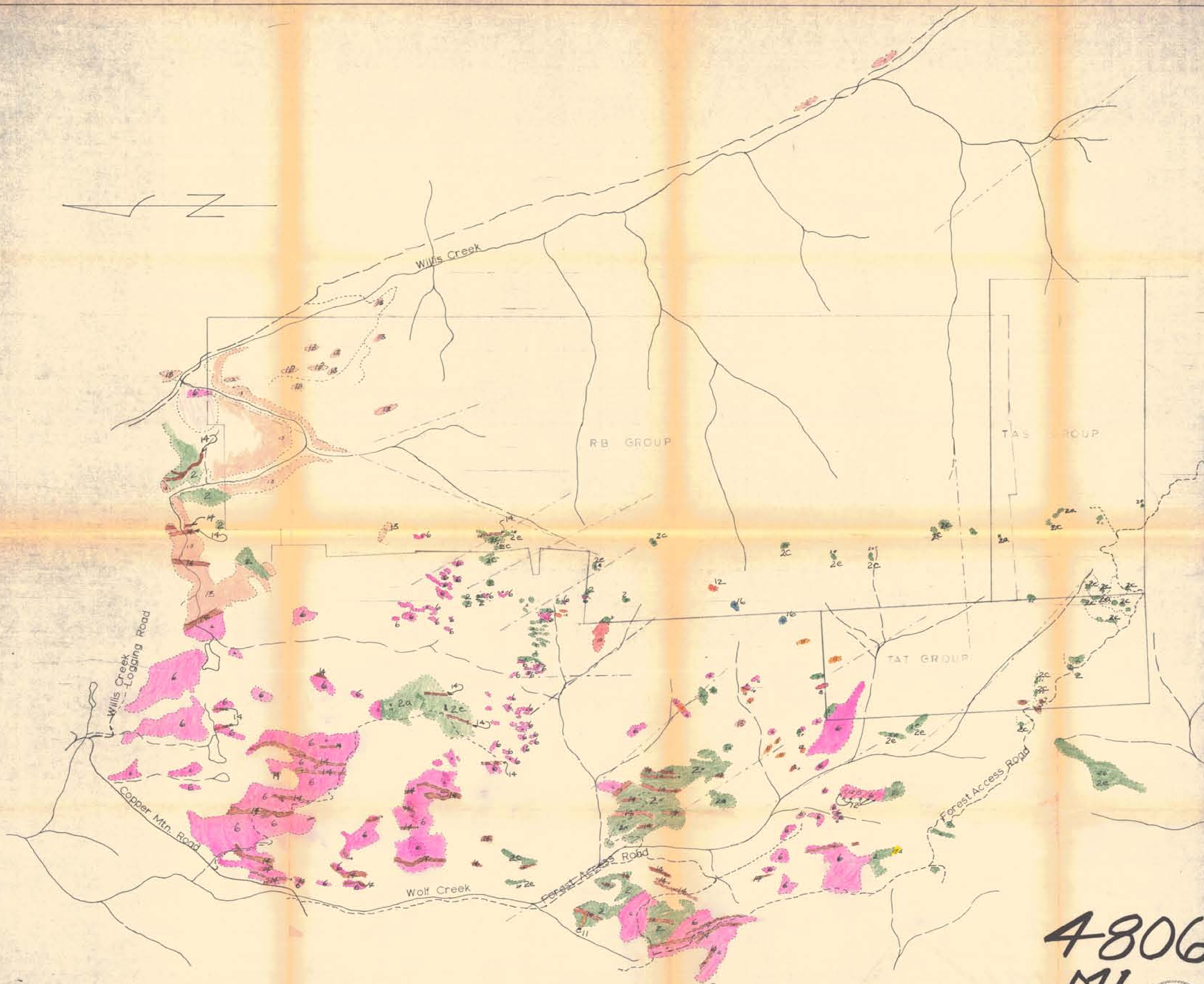
A proposal of work and a budget estimate has already been submitted for our 1974 Project 137 exploration programme.



*A. Morris*  
A. Morris, P.Eng.  
Research Geologist.

REFERENCES

1. B. Khin (1973) Petrographic Study - (26 thin sections)  
- Inter-office communication.
2. V. A. Preto (1972) Geology of Copper Mountain - Bulletin 59  
- B.C. Dept. of Mines.
3. Similkameen Mining Company Limited (1971-1972) - Geology of  
the Ingerbelle and Copper Mountain Deposits.
4. Minister of Mines & Petroleum Resources, B.C. - Annual Reports  
- 1967, pp. 137-141, 178-182; 1968, pp. 202-212;  
G.E.M. 1969, pp. 283-287.



**LEGEND**

- MIDDLE EOCENE**
- PRINCETON GROUP**
- 17 Grey andesite & dark mafic dykes
- 30 Conglomerate, minor sandstone
- POST-LOWER CRETACEOUS**
- 14 Mine dykes, light grey & buff felsite
- UPPER LOWER CRETACEOUS**
- 13 Verde Creek quartz monzonite
- UPPER TRIASSIC**
- COPPER MOUNTAIN INTRUSIONS**
- LOST HORSE INTRUSIONS**
- 12 Latite, microdiorite, & microsyenite porphyry
- 11 Porphyritic augite & biotite-augite microdiorite, micromonzonite, & microsyenite
- COPPER MOUNTAIN, VOIGT, & SMELTER LAKE STOCKS**
- 10 Microdiorite & latite porphyry dykes
- 8 Monzonite
- 6 Diorite
- NICOLA GROUP**
- 2 Wolf Creek Formation
  - 2a massive andesite
  - 2c volcanic breccia & agglomerate
  - 2e undifferentiated

**SYMBOLS**

- Geological contact
  - located
  - approximate
  - assumed
- Lineament - (fault, fracture zone)
- Area of rock exposure
- Highway (paved)
- Roads (secondary & forest access)

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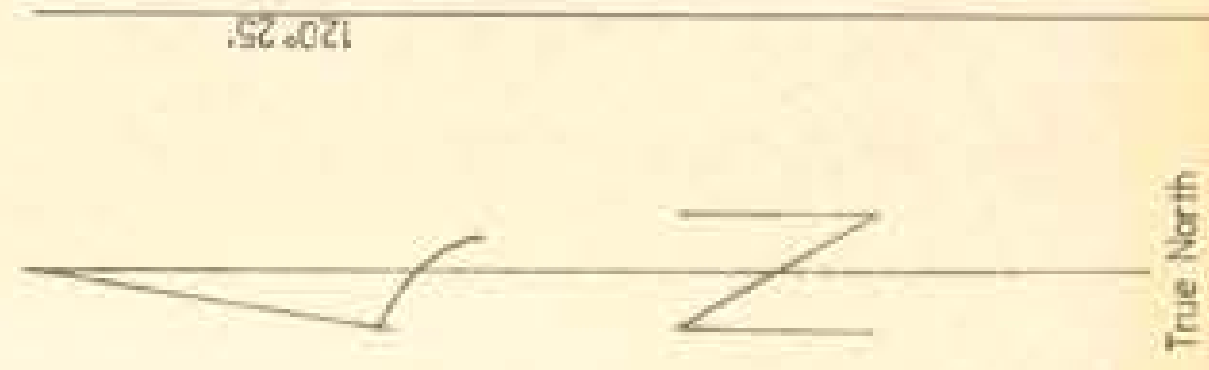


Department of  
Mines and Petroleum Resources  
ASSESSMENT REPORT  
NO. 4806 MAP #1

**PHELPS DODGE CORPORATION OF CANADA, LIMITED**  
VANCOUVER OFFICE

**GEOLOGY**  
in Vicinity of  
RB-TAS-TAT Claims

Scale 1"=1000' Dec. 21/77

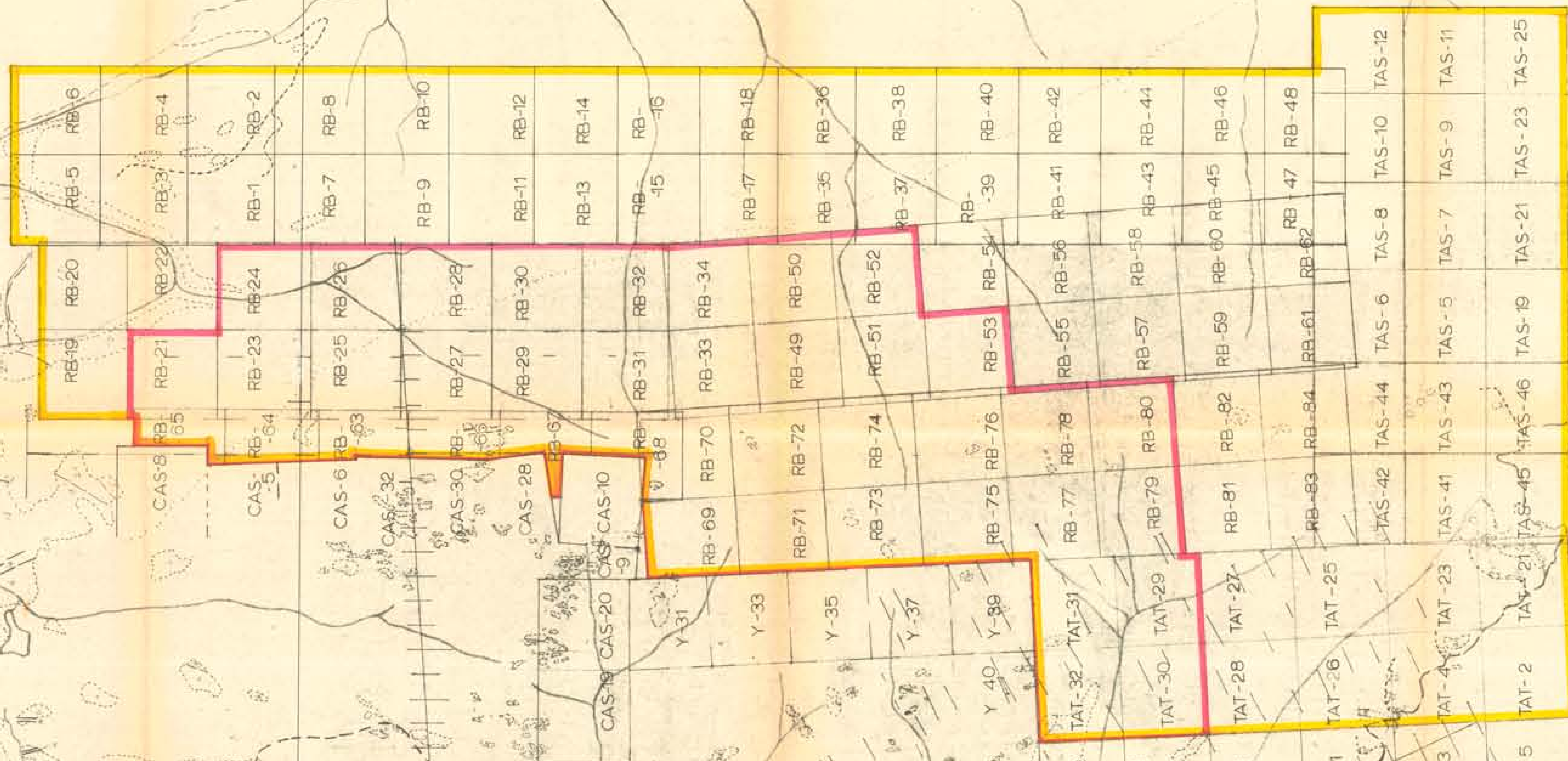


120° 25'

120° 25'

49° 20'

49° 20'



4806  
M2

Department of  
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ASSESSMENT REPORT  
NO. 4806 M2 #2



PHELPS DODGE CORPORATION OF CANADA, LIMITED  
VANCOUVER OFFICE

CLAIM MAP  
RB, TAS, & TAT Claims  
Similkameen M.D.

Scale: 1" = 1000' DATE: REVIEWED BY: AM