Office of the Regional Manager
JAN 26 1982
Yukon Territory

# GEOLOGICAL AND GEOCHEMICAL ASSESSMENT REPORT

ON THE

C.C. 1-860 (Fractions included), SLUGGO 1-20,

RAIN 1-30 and BEE 1-14 CLAIM GROUPS

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# GEOLOGICAL AND GEOCHEMICAL ASSESSMENT REPORT

ON THE

C.C. 1-860 (Fractions included), SLUGGO 1-20,

RAIN 1-30 and BEE 1-14 CLAIM GROUPS

Dawson Mining Division

N.T.S.: 115 P/14, 15

64°00'N Latitude; 137°40'W Longitude

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November, 1981

This report has been examined by the Geological Evaluation Unit under Section 53 (4) Yukon Quartz Mining Act and is allowed as representation work in the amount of $ 268,450 — Yukon. (2400 in Mayo District, 266.050 in Dawson District)

for Regional Manager, Exploration and Geological Services for Commissioner of Yukon Territory.

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SUMMARY

The WEST RIDGE claim block comprises one thousand, fifty-four (1,054) quartz claims located approximately equidistant from Dawson City and Mayo in the central Yukon. All claims are owned by the Canada Tungsten Mining Corporation Ltd. of Vancouver, British Columbia. Work on the claims during 1981 was performed between May 11 and September 13 by employees of Bema Industries Ltd. of Langley, British Columbia as agents for Canada Tungsten.

The area is underlain by a thick succession of mildly deformed, shallow dipping metapelitic rocks of Late Precambrian to Early Paleozoic age (Grit Unit). Grit Unit rocks have been intruded by several phases of Middle to Late Cretaceous acid plutonic and hypabyssal rocks. Mineralization in the form of scheelite-bearing calc-silicate skarn, scheelite and auriferous arsenopyrite-bearing quartz stockworks and possible tin-bearing greisen-breccia rocks all appear to be related to hydrothermal activity associated with this period of acid plutonism.

Geological mapping as well as soil and stream sediment geochemistry were employed to locate related tungsten-gold mineralization at the headwaters of Left Clear Creek and Josephine Creek. A possible tin source lies in an area drained by upper Clear Creek, to the east of the Left Clear Creek fork.

Work during the 1981 field season has outlined the following conclusions:

1. Tungsten skarn showings on Rhosgobel Creek are too low grade and the host lithologies of too low a lime content to be of economic interest. The location of calc-rich beds is imperative to the development of scheelite-bearing calc-silicate assemblages at West Ridge.

2. A positive correlation exists between significant tungsten and gold geochemical anomalies associated with a vein stockwork system in the central region of the Rhosgobel quartz-monzonite stock.

3. Tungsten showings in the hornfels stockwork and anomalous tungsten values from heavy mineral concentrates from the headwaters of Josephine Creek suggest a possible higher grade tungsten source in this area associated with a quartz vein stockwork.

4. The occurrence of greisen-like rocks and possible diatreme breccia in association with acid plutonic rocks near Barney Ridge present a suitable environment for tin mineralization. Whole rock, soil and heavy mineral geochemistry has not indicated the presence of tin in this area. It is possible, however, that this occurrence may only be the surface expression of alteration in a mineralized zone which could lie at depth or at considerable lateral distance.

5. High tin values for heavy mineral concentrates from tributaries of Clear Creek and from Clear Creek itself would suggest possible tin sources within the southern portion of the C.C. claim block. The source of these anomalies could be related to a mineralized zone described under Point 4.

6. A strong gold geochemical anomaly of greater than three hundred ( 300) ppb up to one thousand, five hundred forty (1,540) ppb is outlined by one (1) soil geochemical line north of the Rhosgobel Grid. This anomaly is associated with a gold-bearing quartz-arsenopyrite vein system and may be one of the sources for placer gold in Left Clear Creek.

Given the above conclusions, the following exploration program for the 1982 field season is proposed:

1. Extension of the Rhosgobel Grid to the north to meet the southern boundary of Josephine Grid. Soil geochemistry should delineate the extent of gold and tungsten anomalies in the area. Follow up trenching to be done if necessary.

2. Detailed mapping and prospecting of the Josephine quartz stockwork. Possible follow up blasting and diamond drilling. The drilling target would be an intersection between stockwork veins and an unexposed calc-silicate hornfels. Showings should be night lamped.

3. Four (4) contour soil sampling lines with one hundred (100) metre sample spacing should be established along the north and south slopes of Clear Creek between its upper reaches and the Left Clear Creek fork. The strongly anomalous tin heavy mineral concentrate samples and high concentrations of cassiterite in the Queenstake placer concentrates are indicative of a tin source along the slopes of Upper Clear Creek.

4. Pionjar (overburden) drilling along the flanks of Left Clear Creek in the vicinity of 65 Pup and Barney Creek to locate the source of placer cassiterite concentrations.

5. Trenching to assess the potential of possible tungsten-gold stockwork near the central portion of the Rhosgobel stock. This could be combined with the follow up work mentioned above (Point 1).

6. Development of a conceptual model for tin-tungsten mineralization. This should include reference to structural and stratigraphic levels, mode of emplacement and metal source.

## 1.0 INTRODUCTION

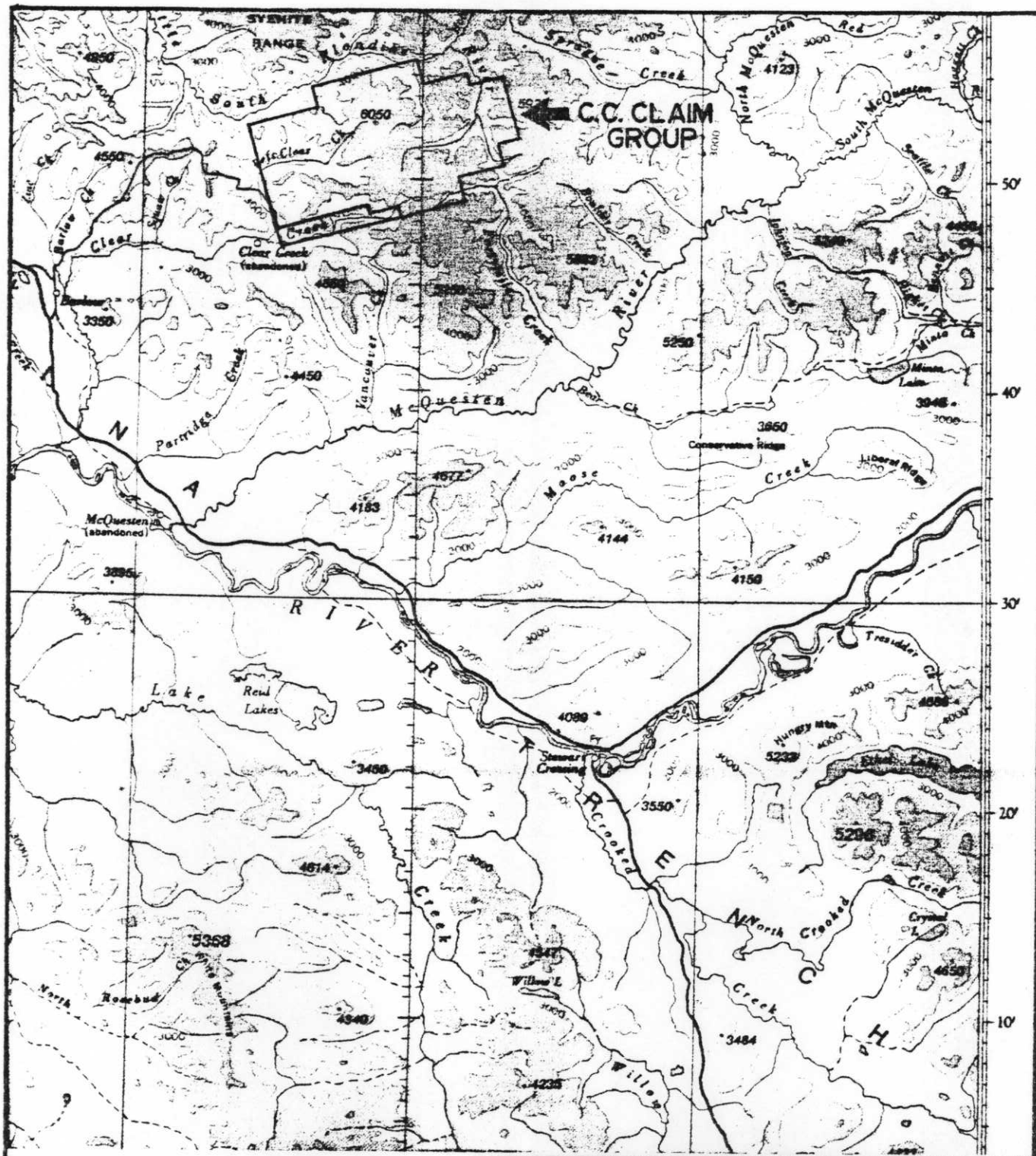
The WEST RIDGE claim block now comprises one thousand fifty-four (1,054) quartz claims. Included in this figure are one hundred thirty-eight (138) C.C. claims staked between September 1 to 5, 1981. These claims are situated in the southwest corner of the block and will not be assessed in this report.

Claims applied for assessment include: seven hundred sixty-five (765) original C.C. claims (recorded September 5, 1980); sixteen (16) additional C.C. claims (recorded May 8, 1981) located west of Left Clear Creek, adjoining the SLUGGO claims; fifty (50) additional C.C. claims and twenty-one (21) fractional claims (recorded August 10, 1981) staked to cover gaps between the original C.C. claims and optioned RAIN and BEE claims; twenty (20) SLUGGO claims (recorded September 26, 1980) and thirty (30) RAIN and fourteen (14) BEE claims optioned to Canada Tungsten Mining Corporation Ltd. by Mr. Albert Thom. The Canada Tungsten Mining Corporation Ltd. is the recorded owner of all the above claims.

A geological and geochemical exploration program was carried out between May 11 and September 13, 1981. Geological work included reconnaissance geological mapping of the entire claim block at 1:10,000 scale with detailed mapping of five (5) grid areas at 1:5,000 scale. Geochemical work comprised rock chip, heavy mineral, sludge, silt and soil sampling of selected areas of the property. Ultra-violet lamps were used to assess scheelite occurrences.

## 1.1 LOCATION AND ACCESS

The WEST RIDGE claim block is located in the central Yukon one hundred (100) kilometres east of Dawson City and is centered at about 64°0'N latitude and 137°40'W longitude (reference: N.T.S. 115 P/14, 15), (see Figure 1). The claim block is situated at the eastern extremity of the







Scale 0 5 10 20 km.

1:500,000 APPROXIMATE

CANADA TUNGSTEN MINING CORPORATION

WEST RIDGE Y.T.

1981 GEOLOGICAL EXPLORATION PROGRAMME

# LOCATION MAP

| | |
|---|---|
| DATE NOVEMBER, 1981 | JOB NO 81-05G |
| REVISED BY | FIG NO 1 |

BEMA INDUSTRIES LTD.

Dawson Mining District. Thirteen (13) of these claims extend into the Mayo Mining District. Access may be gained by four-wheel drive vehicle from the Klondike Highway via the Clear Creek road turn-off near Barlow Lake. The road winds and climbs northeastward for about fifty (50) kilometres up to Left Clear Creek where the road forks. The northern fork continues northeastward along Left Clear Creek and across the central and eastern portions of the block. Much of the area is not accessible by road and therefore required helicopter support. A rough four-wheel drive road was constructed in September, 1981 to give access to the southern portion of the claim block and to alleviate the need for helicopter support.

## 1.2 PHYSIOGRAPHY

The study area is situated among the high plateaus and rolling mountains of the southern Ogilvie Mountain range and is dominated by a central northwesterly-trending ridge from which the area gains its name. Elevations range from one thousand, three hundred, thirty (1,330) metres on West Ridge to six hundred fifty (650) metres in the southeast corner of the claim block. The area is drained by a dendritic pattern of streams and creeks which flow east and west from West Ridge. Vegetation consists of low lying scrub and moss in upland areas (i.e. above 1,200 metres) and by small coniferous and deciduous trees in creek valleys. Rock exposure is most abundant in the eastern elevated part of the claim block, particularly along the West Ridge; but is limited in the western lower lying areas.

## 1.3 PROPERTY

The WEST RIDGE claim block consists of one thousand fifty-four (1,054) quartz claims and fractions presently owned by the Canada Tungsten Mining Corporation Ltd. of Vancouver. Of these, eight hundred ninety-four (894) full claims and seventeen (17) fractional claims have been applied for three (3) years' assessment. All the C.C. claims but eight (8) are located within the Dawson Mining Division. The eight (8) claims, C.C. 697 - C.C. 704 are located in Mayo Mining Division and two thousand, four hundred ($2,400) dollars has been filed for three (3) years' assessment credit to keep these claims in good standing (see Table 1, Appendix IV).

TABLE 1

CLAIM SYNOPSIS

| CLAIM NAME | GRANT NUMBERS | EXPIRY DATE | OWNERSHIP | COMMITMENTS |
|---|---|---|---|---|
| C.C. 1-765 * | YA 52985 - 53737 | September 5/84 | Canada Tungsten | |
| C.C. 766-781 | YA 55267 - 55282 | " | " | |
| C.C. 782, 783 | YA 64309, 64310 | " | " | |
| C.C. 784-786 | YA 64311 - 64313 | " | " | |
| C.C. 787-791 | YA 64304 - 64308 | " | " | |
| C.C. 792-799 | YA 64317 - 64324 | " | " | |
| C.C. 800-804 | YA 64325 - 64329 | " | " | |
| C.C. 805F | YA 64330 | " | " | |
| C.C. 806, 807 | YA 64331, 64332 | " | " | |
| C.C. 808F, 809F | YA 64315, 64316 | " | " | |
| C.C. 810F, 811F | YA 64333, 64334 | " | " | |
| C.C. 812, 813 | YA 64335, 64336 | " | " | |
| C.C. 814F | YA 64337 | " | " | |
| C.C. 815-817 | YA 64338 - 64340 | " | " | |
| C.C. 818F | YA 64341 | " | " | |
| C.C. 820, 821 | YA 64342, 64343 | " | " | |
| C.C. 822F, 823F | YA 64344, 64345 | " | " | |
| C.C. 824-826 | YA 64346 - 64348 | " | " | |
| C.C. 828 | YA 64349 | " | " | |
| C.C. 831 | YA 64350 | " | " | |
| C.C. 832F-834F | YA 64351 - 64353 | " | " | |
| C.C. 836 | YA 64354 | " | " | |

Note: C.C. 817-820 and C.C. 837F have been staked but were not recorded.

| CLAIM NAME | GRANT NUMBERS | EXPIRY DATE | OWNERSHIP | COMMITMENTS |
|---|---|---|---|---|
| C.C. 838, 839 | YA 64355, 64356 | September 5/84 | Canada Tungsten | |
| C.C. 840 | YA 64357 | " | " | |
| C.C. 841F | YA 64360 | " | " | |
| C.C. 842, 843 | YA 64358, 64359 | " | " | |
| C.C. 845, 846 | YA 64361, 64362 | " | " | |
| C.C. 847F, 848F | YA 64363, 64364 | " | " | |
| C.C. 849 | YA 64365 | " | " | |
| C.C. 850F | YA 64366 | " | " | |
| C.C. 851 | YA 64367 | " | " | |
| C.C. 858F | YA 64368 | " | " | |
| C.C. 859 | YA 64369 | " | " | |
| C.C. 860F | YA 64370 | " | " | |
| SLUGGO 1-19 | YA 53782 - 53800 | " | " | |
| SLUGGO 20 | YA 55002 | " | " | |
| RAIN 1-30 | YA 31503 - 31532 | " | Optioned from Albert E. Thom, et al. | To work on claims and keep in good standing. |
| BEE 1-14 | YA 31794 - 31807 | " | " | " |

* Mayo Mining Division - C.C. 697 - C.C. 704 YA 42745 - YA 42752
September 5th, 1984 Canada Tungsten.

Canada Tungsten Mining Corporation Ltd. acquired, by option agreement on April 21, 1981, the RAIN one to thirty (1 to 30) claims, recorded August 18, 1978 and the BEE one to thirty (1 to 30) claims, recorded September 1, 1978. These claims were optioned from Albert Edward Thom, et al. The BEE fifteen to thirty (15 to 30) claims were allowed to lapse on September 1, 1981, consent obtained from Albert Thom, et al. The above claims have been brought to a common due date of September 5 and are paid up until September 5, 1984. (See Table 1 for Claim Synopsis; the locations of the various groups within the WEST RIDGE claim block is illustrated in Figure 31.)

## 1.4 PREVIOUS WORK AND HISTORY

The West Ridge area has been actively explored for placer gold and gold-silver-lead-zinc veins since the early 1900's. Reference to placer gold mining was made by H.W. Bostock (1979) during his mapping of the area from 1946 to 1949. Bostock states that a gold placer dredge, owned by Clear Creek Mining, worked the lower portion of Left Clear Creek between 1942 and 1949. (The same dredge was purchased in 1979 by Queenstake Resources Ltd. and has been relocated and restored for dredging on the upper reaches of Clear Creek.)

More recently, exploration emphasis has focused on W, Sn and Au mineralization associated with small hypabyssal stocks in the area. A 1969 stream sediment survey by Archer, Cathro and Associates Ltd. and the release of G.S.C. Open File 51 (Garrett, 1971, "Mo, W and U in Acid Plutonic Rocks as a Guide to Regional Exploration, Southeast Yukon") prompted the staking of several groups of claims in the West Ridge area. Follow up work by Archer, Cathro (for the Chevron Standard - Canada Tungsten,North Stewart River Joint Venture) resulted in the staking of the PUKELMAN, RHOSGOBEL, LUGDUSH and NOP claim groups in 1971. Soil geochemistry and geologic mapping on the PUKELMAN and RHOSGOBEL groups indicated significant potential for stockwork scheelite and associated gold bearing arsenopyrite vein mineralization. At the LUGDUSH claim group, situated at the headwaters of Vancouver Creek, a similar survey outlined two calc-silicate skarn zones with scheelite mineralization and

assays up to one (1) percent $WO_3$. This group was subsequently dropped and restaked as the HOP claims by Amax Canada Ltd. in 1979 who again allowed the claims to lapse after one (1) year's tenancy. The NOP claim group was staked near West Ridge at the headwaters of Left Clear Creek for United Keno Hill Mines Ltd. Soil geochemistry and geological mapping outlined a northwesterly trending W and Mo soil anomaly associated with scheelite bearing quartz veins within acid granitic intrusives.

Four groups of claims, the RAIN - BEE, JUB JUB, JABBERWOCK and NEL, were staked along the West Ridge in 1978. The RAIN and BEE, both thirty (30) unit blocks, are optioned from Mr. Albert Thom to Canada Tungsten Mining Corporation Ltd. These cover most of the ground previously staked as the PUKELMAN and RHOSGOBEL blocks and are described within this report. The JUB JUB and JABBERWOCK groups, presently held by Campbell Resources Ltd. and the NEL group, held by Cominco Ltd., were staked to cover high Sn values from stream sediments at the head of Forty Mile Creek. The NEL property was drilled and sampled during the 1980 field season, although results are not yet available.

The C.C. claim block was staked in August, 1980 by Bema Industries Ltd. as agents for Canada Tungsten Mining Corporation Ltd. A regional geological reconnaissance and heavy mineral sampling program later that year outlined target areas in the vicinity of Upper Josephine Creek (W, Au), Upper Left Clear Creek (W, Au) and Barney Creek (Sn).

The SLUGGO claim block, which adjoins the C.C. block on its western border, was staked for Canada Tungsten in September, 1980 to cover a suspected tin occurrence. This property of twenty (20) claims was previously held by Welcome North Mines Ltd. and allowed to lapse in April of 1980.

A small unnamed block of ten (10) claims was staked by T. Bazylinski and N. Harper to cover their placer ground on Left Clear Creek.

## 1.5 PRESENT WORK

The 1981 exploration program of the West Ridge area commenced on April 1, with office preparation studies. The exploration field season commenced on May 4, with the construction of a thirteen (13) man camp located just west of Left Clear Creek at one thousand (1,000) metre elevation. The camp was constructed alongside the Clear Creek access road into the claim area.

The exploration program consisted of: 1) surveying and grid establishment; 2) geological mapping and prospecting and 3) soil, sludge, heavy mineral, silt and whole rock sampling. All maps constructed from this work are referenced and indexed in Figure 2.

## 1. Surveying and Grid Establishment

Baselines for five (5) geological/geochemical grids were surveyed and picketed. Crosslines were compassed and flagged in timbered areas and above treeline, stations were picketed. The baselines run east-west (090°) and crosslines intersect north-south (180°) for four (4) of the grids. The barney tin grid has a northwest-southeasterly baseline (060°) with perpendicular crosslines intersecting at one hundred (100) metre intervals. Sample stations are at one hundred (100) metre intervals along crosslines. All lines were corrected for slope. Grid locations are indicated on the Key Map, Figure 2.

| | Area |
|---|---|
| Rhosgobel Grid | 4.0 x 3.0 kilometres |
| 65 Pup Grid | 3.0 x 3.0 kilometres |
| Barney Grid | 3.0 x 1.7 kilometres |
| Josephine Grid | 2.5 x 3.0 kilometres |
| Barney Tin Grid | 1.5 x 1.0 kilometres |

## 2. Geological Mapping and Prospecting

Geological mapping was conducted at various scales depending on the amount of detailed information required.

- 1:25,000 scale - regional geological overview
- 1:10,000 scale - regional mapping of entire claim group
- 1:5,000 scale - detailed geology (grids listed above) and cross sections
- 1:5,000 scale - detailed stratigraphic sections

The soil geochemical grid and orthophoto maps were used as controls for geological mapping. Due to the absence of outcrop in certain areas, emphasis was placed on felsenmeer mapping.

## 3. Sampling

### Soil Samples

Approximately two thousand six hundred sixty (2,660) soil samples were collected on the four (4) grid areas. Three (3) elements were analysed from the five (5) grid areas: tungsten (W), tin (Sn) and gold (Au). Not all the grids were run for the same elements, i.e.

| | |
|---|---|
| Rhosgobel | W, Au, Sn |
| 65 Pup | W, Au, Sn |
| Barney | W, Au, Sn |
| Barney Tin | Sn |

### Sludge Samples

Fifty-seven (57) sludge samples of about ten (10) kilograms each were taken at the break in slope on the east and west banks of Left Clear Creek. The area sampled extended from the juntion of Left Clear Creek and Clear Creek north to where the creek swings in an easterly direction. The samples were concentrated on a Wifley diagonal deck shaker table and sent for geochemical analysis for tungsten (W), gold (Au) and tin (Sn).

### Silt Samples

Silt samples were taken in creeks along geological traverses.

### Whole Rock Samples

Numberous whole rock samples were collected for assay and geochemical analysis. The samples come from regions of high tungsten (W), tin (Sn) and gold (Au) anomalies. Some quartz vein samples were also analysed for silver (Ag), lead (Pb) and uranium ($U_3O_8$). A selected suite of rock specimens were sectioned and petrographically analysed.

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## 2.0 GENERAL GEOLOGY

The West Ridge area is located within the Selwyn Basin at the southern extremity of the Ogilvie Mountains. The area is underlain by a thick sequence of weakly metamorphosed and deformed sedimentary rocks intruded by acid plutonic and later stage hypabyssal rocks (see Figure 3).

The metasedimentary rocks are considered to be Late Precambrian (Bostock 1964, Green 1971) to Early Paleozoic age (Kuran et al., 1981) and are tentatively assigned to the upper portion of the "Grit unit" (Green, 1971). Rocks of this unit strike generally east-west with weak to moderate inclination to the north and comprise massive to gritty quartzite, phyllite, phyllitic quartzite and a variety of biotite hornfels and calc-silicate hornfels including minor calc-silicate skarn. These rocks bear striking similarity to the metasedimentary rocks of the Dublin Gulch-Haggart Creek area (N.T.S. 106 D/4).

The West Ridge intrusive rocks are thought to be Upper Cretaceous in age and are typical of those throughout the Selwyn Basin. They are small in area and have not been extensively unroofed. Their size ranges from discontinuous dykes, less than two (2) metres wide, to the Rhosgobel Stock, which is about three (3) kilometres by one (1) kilometre wide. Acid plutonic rocks include porphyritic quartz monzonite (Pukelman and Rhosgobel Stocks), diorite and granodiorite (Josephine, Barney and South Klondike Stocks). Later stage differentiates include quartz porphyry, aplite, lamprophyre and other associated biotite-rich intrusive rocks. Locally derived float samples of basalt and tuff have also been recognized. These rocks represent several intrusive events and emplacement at more than one (1) structural level. Stratigraphic relationships are given in Table 2.

Quaternary unconsolidated alluvial and minor glacial deposits blanket valley floors and hillsides to elevations of one thousand (1,000) metres. Above this elevation overburden consists of locally derived talus, felsenmeer and clays developed by frost action.

The West Ridge area is located on the northern limb of a large structure which has been termed the McQuesten River Anticline. The anticline axis trends about seventy (070) degrees plunging ten to twenty (10 - 20) degrees northeast and is located approximately twenty (20) kilometres south of West Ridge. Structural features such as folding and layering indicate that there have been three (3), and possibly four (4), phases of rock deformation within the Grit unit. Stratigraphic and structural interpretations suggest that these rocks may comprise part of a large nappe-like structure which is correlative with similar rocks at Dublin Gulch. Deformation occurred prior to intrusive emplacement.

# WEST RIDGE 81-05G

## TABLE of FORMATIONS TABLE II

| ERA | PERIOD | MILLIONS of YEARS | BOYLE, R.W 1965 | GREEN, L.H. 1971 TEMPELMAN-KLUIT 1970 | BLUSSON, S.L. 1978 | BEMA 1981 |
|---|---|---|---|---|---|---|
| CENOZOIC | TERTIARY | 65 | | Quartz-Feldspar Porphyry | | |
| MESOZOIC | CRETACEOUS | 100<br>136 | Quartz-Feldspar Porphyry<br>Biotite Lamprophyre | Greenstone<br>Keno Hill Quartzite fm | | Biotite Lamprophyre Dykes<br>Quart-Feldspar Porphyry<br>Granodiorite<br>Quartz Diorite<br>Porphyritic Quartz Monzonite |
| | JURASSIC | 190 | Greenstone | Lower Schist fm | | Greenstone<br>Keno Hill Quartzite fm<br>Lower Schist fm |
| | TRIASSIC | 225 | | | | |
| PALEOZOIC | PERMIAN | 280 | | | | |
| | CARBONIFEROUS | 345 | | | Central Quartzite | |
| | DEVONIAN | 395 | | | Lower Schist | |
| | SILURIAN | 430 | | | | Road River Formation |
| | ORDOVICIAN | 500 | | | | |
| | CAMBRIAN | 570 | | | | |
| PRECAMBRIAN | | 4600 | Upper Schist fm<br>Central Quartzite fm<br>Lower Schist fm | Upper Schist fm | | Grit Unit |

Tungsten, tin and gold are of prime economic interest within the area. Tungsten, in the form of scheelite, occurs as a fine grained constituent of calc-silicate (pyroxene) skarn. Scheelite is also developed within stockwork quartz veins and rarely along thin laminae in hornfelsed quartzite. Native gold occurs enclosed within arsenopyrite which is a common constituent of some of the larger stockwork quartz veins. Native gold is actively mined by placer operations throughout the region; however, it has not been traced to a bedrock source. The occurrence of tin, in the form of cassiterite, has been documented as early as the 1940's when dredging operations on Left Clear Creek encountered anomalous concentrations of cassiterite nuggets from dredge concentrates. A bedrock source is not entirely evident although very fine grained crystals of cassiterite are suspected to be present along fractures in brecciated quartzite (Smith, F.M. and Dawson, K.M., 1981: personal communication). The tin development is likely the result of crystallization of very late stage hydrothermal fluids and vapours associated with S-type granite emplacement (Smith, 1981: personal communication).

## 2.1 PROPERTY GEOLOGY

The area is underlain by quartzites, quartz mica schist, micaceous phyllites and minor limy units and is referred to as the Early Paleozoic to Late Proterozoic "Grit Unit". To the northeast the "Grit Unit" is overlain by late Ordovician to early Silurian continental and marine shales and limy phyllites, believed to be part of the Road River formation. Both units are folded and appear to be structurally positioned on the upper limb of a major nappe structure. Rocks are regionally metamorphosed to lower greenschist facies. Rocks of the Grit Unit and Road River formation are intruded by several intrusive phases thought to be of Upper Cretaceous age. Compositionally they range from quartz monzonite to biotite lamprophyre and form hypabyssal stocks, plugs and dykes. These intrusives were emplaced at shallow depths with little or no accompanying folding. Hornfelsing of the country rocks took place up to lower amphibolite facies with the formation of biotite, calc-silicate hornfels and scheelite bearing calc-silicate pyroxene skarn. Hydrothermal solutions associated with the late stages of magma cooling invaded fracture sets and quartz stockworks were formed with associated gold (Au) and scheelite (W) mineralization. In late stage differentiates, brecciation and fracturing occurred and possible cassiterite deposition took place.

The sequence as a whole is remarkably similar to Dublin Gulch (the northeast of West Ridge), except for the presence of large limestone-marble beds. The West Ridge property lies in the upper portion of the Grit Unit and the Dublin Gulch property lies in the lower section of the Grit Unit. (See Structural Geology, Section 3.)

## 2.2 STRATIGRAPHY AND LITHOLOGIES

The West Ridge claim area is underlain by a Late Proterozoic to Early Paleozoic unit informally called the "Grit Unit". The "Grit Unit" is documented as being part of the Yukon Group, introduced by Carnes in 1914 and since applied to most metamorphic rocks in the southern Yukon. The term Yukon Group is criticized as having no time-stratigraphic significance (Templeman-Kluit, 1976) and is becoming redundant.

A disconformable contact exists between the Grit Unit and an overlying unit to the northeast believed to be the Road River Formation of Ordovician-Silurian age. Age determination is based on fossils, mainly graptolites, formed in massive carbonates in various localities in the southern Yukon. The type section for this formation is on a tributary of Road River to the north of the West Ridge area, (66°44'N, 135°44'W). Within the map area, the Grit Unit is intruded by six (6) phases of intrusive believed to be Upper Cretaceous in age, (80 to 100 million years). This is based on K/Ar dating of biotites and hornblendes on various plutons throughout the Yukon (Templeman-Kluit and Wanless, 1975 and Kuran et al. 1981). Few crosscutting relationships were recognized, however the age sequence suggested is as follows: porphyritic quartz monzonite, quartz diorite/granodiorite, quartz porphyry and late stage aplite and biotite-rich dyke events. For detailed petrography of all units see Appendix I.

### "Grit Unit" - Sub Units 1a to 1g

The Grit Unit crops out throughout the map area but is best exposed on ridge tops above one thousand, two hundred (1,200) metres elevation. The thickness of the unit is unknown due to limited exposure and structural repetition, however greater than one thousand (1,000) metres has been suggested (Green, 1972). Outcrop weathers a light to dark grey colour and is disrupted by frost action leaving scree and felsenmeer on most slopes.

Rocks of this unit comprise massive and thinly layered impure quartzites, gritty quartzites and phyllites of muscovite-sericite, chlorite and graphite composition. The prominent compositional layering and foliation has a northwest-southeast strike and dips generally north to northeast. Original bedding features have generally been overprinted by the regional and contact metamorphic events and are rarely recognized. A mean modal analysis is reported by Green on three (3) specimens from the Grit Unit, taken to the north of West Ridge (Table 3).

TABLE 3 MEAN MODAL COMPOSITION OF THREE GRIT UNIT SPECIMANS (after Green 1972)

| MINERAL | MODAL PERCENTAGE |
|---|---|
| Quartz | 80 |
| Potash feldspar | X |
| Plagioclase | 6 |
| White mica | 10 |
| Chlorite | X |
| Biotite | 3 |
| Epidote group | -- |
| Opaques | 1 |
| Other | X |

Sub-Units 1a and 1b

The "layers" in this unit have little lateral continuity and no marker horizons were recognized, however a gritty quartzite band with quartz pebbles in a quartzitic matrix crops out to the north of Left Clear Creek and continues intermittently on strike for three (3) kilometres. Quartz comprises approximately seventy (70) percent of the rock and has modes, 1) quartz augens (1.0 to 3.0 mm) are lens shaped and strongly flattened in the plane of foliation and 2) smaller quartz (0.2 to 0.5 mm) grains of the matrix which also appear to be strained. This bimodal occurrence, with strain showing predominantly in the coarse grains is typical of strong deformation accompanied by recrystallization. K-feldspar and plagioclase grains are sericitized and partly replaced by fine grained quartz and occur both as megacrysts and in the groundmass. Wispy biotite trains parallel the main foliation. Variations occur with brittle fracturing and brecciation.

Iron oxides fill fractures between quartz clasts and shattered quartz fragments. These and other strain indicative textures would suggest that cataclasis has occurred in some areas. In other localities more massive, less deformed quartzites exist and biotite defines only a weak foliation. This indicates that stresses were distributed inhomogeneously throughout the rock package with the majority of the stress being taken up in more mica-rich lithologies. Grain boundaries are irregular and this may be due to poor sedimentary sorting.

Throughout the Grit Unit impure quartzites occur with mica stretched along the foliation. These foliated quartzites have compositional banding of light and dark layers with biotite and muscovite in the quartzitic groundmass. Minor amounts of actinolite, apatite, zircon, epidote, chlorite and tourmaline are also present.

Sub-Units $1c_1$ to $1c_3$

Interlayered with the quartzites are phyllites of various compositions (muscovite-sericite, chlorite and graphite). The phyllites weather dark grey to black and are stained a rusty colour due to the breakdown of iron-rich micas and sulphides. The predominant member is a fissile muscovite-sericite phyllite which often occurs as repetitious interbeds with quartzite. Other minerals recognized include plagioclase, apatite, zircon and tourmaline. Tourmaline forms scattered anhedral to subhedral grains and is probably of metamorphic origin. These rocks were originally fine mudstones and siltstones. Foliation planes usually parallel bedding and all exhibit a lustrous phyllitic sheen.

Chloritic phyllite occurs in some localities and is massive and dark green, whereas graphitic phyllite was observed only rarely in this area, but is known to occur extensively in lower sections of the "Grit Unit". In some areas carbonate occurs along the phyllitic partings.

Sub-Units $1d_1$ to $1d_4$

During the intrusion of the Grit Unit by Upper Cretaceous stocks, hornfelsing of the quartzites and phyllites took place. The hornfels zone is sharply defined and is irregular in outline. The rock is massive, fine grained and varies with different compositions; chloritic, quartzitic and biotite rich. The most common lithologies found are biotite-quartzite schist and quartzitic hornfels.

In the biotite-quartzite schist, biotite-rich layers alternate with quartz-rich laminae on a scale of two (2) millimetres. The quartz forms lenses composed of fine aggregates point zero five (0.05) to point one (0.1) millimetres in size. Plagioclase also forms lenses, but is generally finer grained than the quartz. Dark grey biotites with some intergrown sericite plates define the foliation. Hematite can occur scattered throughout. Where chlorite exists, the rock is dark green and easily mistaken for calc-silicate pyroxene hornfelses. The chlorite may pseudomorph the biotite and pervades the whole groundmass with quartz noticeably absent. Andalusite is a component of biotite-muscovite schist and represents a contact metamorphic mineral. It is strongly elongate within the plane of foliation and occurs as interlocking aggregates. Red to medium-brown gossan zones accentuate contact aureoles and are the result of oxidation of iron-rich silicates and sulphides.

The quartzitic hornfels is common throughout the intrusive zone. Biotite-rich laminae separate quartz-rich laminae in some cases but generally the hornfels are massive and fine grained. The quartz grains tend to be bimodal with the finer grains (0.02 to 0.05 millimetres) interlocking around the larger equant grains (0.1 to 0.2 millimetres). Foliation is rare except in some biotite grains. K-feldspar and plagioclase feldspar occur in the groundmass with minor chlorite.

Following the final consolidation of the intrusives in the area, and particularly the Barney Ridge quartz diorite, fugitive constituents were released affecting changes in the mineral composition of the country rock. (See Mineralization Section). The alteration product is a white mica and quartz-rich rock commonly referred to as greisen. The white mica and quartz occur as coarse lamellae interlayered in a finer quartz-biotite matrix. Chlorite occurs around the white mica and iron staining parallels layering. Topaz and fluorite were not observed.

Sub-Units $le_1$ and $le_2$

In the east of the area and on a tributary of Left Clear Creek, dark green pyroxene skarn with associated light coloured (wollastonite) or actinolite hornfels crops out. The calc-silicate hornfels occurs as beds within quartz and biotite hornfels adjacent to the Rhosgobel porphyritic quartz monzonite intrusive contact. The pervasive layering within the hornfels is at right angles to the intrusive contact and dips to the north at twenty (20) to thirty (30) degrees. The calc-silicate hornfels and skarn is intermittently developed up to one (1) kilometre from the intrusive contact. In areas to the north of Rhosgobel stock, on the flanks of the Pukelman and Josephine intrusives, scattered boulders of calc-silicate rocks have also been recognized. Calc-silicate skarn development and scheelite mineralization is discussed under Mineralization, Section 4.1.

Sub-Unit 1f

At various localities within the map area, breccias were observed. The breccias are likely associated with intrusive emplacement and vary from strongly clast supported to weakly clast supported. Two types are described as follows.

1. Strongly Clast Supported:

These breccia types are located on Barney Ridge and at the head of Left Clear Creek on West Ridge. Most occurrences are found locally as felsenmeer on north facing slopes scattered among altered, rusty coloured quartzites. The breccias are strongly clast supported with angular fragments ranging from two (2) millimetres to two (2) centimetres in size. The clasts are composed of quartzite and minor phyllite fragments and comprise approximately eighty (80%) percent of the rock. The rocks are strongly rust coloured with hematite, limonite and manganese oxide staining. The matrix has a vuggy texture and is composed of fine quartz grains with very small, undistinguishable dark fragments which could be biotites. The breccias on Barney Ridge outcrop in an area of greisen alteration. One suggestion is that they formed later in the same structural zone as the earlier formed muscovite greisens. Breccia formation may be the result of explosive venting of residual volatiles in which metasedimentary wall rocks such as quartzite and phyllite were strongly fractured and redistributed. Venting likely occurred along fractures and other such zones of structural weakness. Another plausible suggestion is that the breccias are associated with movement along east-west fractures which occur in the surrounding quartzites. These fractures are characterized by the same Mn and Fe oxide mineralization that permeates the breccias.

2. Weakly Clast Supported:

In the area around the Josephine granodiorite intrusives, two (2) weakly clast supported breccias were located. These breccias have approximately equal amounts of clasts and matrix and are better sorted than the strongly clast supported breccias. The clasts range from one (1) centimetre to three (3) centimetres in size and are very angular. They are composed of quartzites, some with chlorite staining. The matrix is fine-grained quartz, feldspar, biotite-rich and exhibits fine-grained granitic textures.

These breccia types are believed to be formed during late stage, high structural level explosive activity associated with the grandiorite intrusion.

Metamorphism

The "Grit Unit" is regionally metamorphosed to greenschist facies metamorphism with the presence of muscovite, chlorite and quartz being characteristic. The presence of K-feldspar is believed to be secondary and indicates a higher grade of metamorphism possible nearer the contact intrusive zone. Within the contact zone, metamorphic minerals indicate a higher grade of metamorphism with the presence of wollastonite-actinolite in calc-silicate hornfelses and andalusites in the biotite hornfels. Biotite is developed due to prograde metamorphism of pelitic sediments. The occurrence of rare garnet indicates metamorphism up to lower amphibolite facies within the contact aureole. Regional metamorphism is believed to be Early Cretaceous in age. Intrusive emplacement and contact metamorphism followed during Mid-Cretaceous time.

Unit lg

In the northeast corner of the map area (Figure 13), north of Josephine Creek, the quartzites and phyllites of the Grit Unit are in local disconformable contact with overlying limy shales and argillites. These strata are now believed to be part of the Road River formation of Ordovician-Silurian age (Bostock, 1964; Green, 1972).[1] The contact between the Grit Unit and the Road River formation is sharp with a clean gritty quartzite or pebble conglomerate southwest of the contact and a thin band of rusty coloured schists on the northeast side grading into limy shales and quartz-rich argillites. The formation crops out as light grey bluffs on ridge tops, however outcrop is sparse in valley bottoms. The beds strike northwest-southeast with moderate dip to the northeast. Shales vary from fissile to massive, depending on silica content. Beds vary from one (1) to ten (10) centimetres in thickness and are cut by thin calcite stringers. The argillites are composed of silty quartz in a carbonate matrix. Some beds are strongly deformed with folding being common between beds of different competency.

Footnote 1. Unit lg was originally mapped as a member of the "Grit Unit". We now recognize this to be a separate mappable package of rocks, very similar in lithology and stratigraphic position to other Road River Fm rocks which occur throughout the Selwyn Basin.

Metamorphism

The Road River strata have undergone a low grade regional metamorphic event up to low greenschist facies. Calcite and quartz are the most characteristic minerals. These rocks have undergone the same deformation as the Grit Unit.

Intrusive Rocks - Units 2a to 2h

Six (6) intrusive phases were recognized at West Ridge during the 1981 field season. The different phases from quartz monzonite to biotite lamprophyre are believed to be typical of composite intrusions of middle to upper Cretaceous age throughout the Selwyn Basin. Six (6) small stocks were outlined as well as two (2) ages of dykes. The stocks vary in area from one point five (1.5) square kilometres at Barney Ridge to twelve (12) square kilometres at Rhosgobel. The dykes vary from one (1) metre to several hundreds of metres in length with varying widths up to several metres. All the intrusive stocks in this area are believed to be middle to upper Cretaceous in age and part of the one hundred (100) million year suite (Tempelman-Kluit, personal communication, 1981). Few crosscutting relationships were recognized, except for lamprophyre and aplite dykes which crosscut all other intrusives and are therefore younger. Other suggested age relationships in this report are based on composition and structural level.

| Locality | Rock Type |
|---|---|
| - throughout area - cross cutting all phases except quartz porphyry | biotite lamprophyre |
| - throughout area | aplite |
| - Barney Ridge | quartz porphyry |
| - Josephine/Barney/S. Klondike | quartz diorite/granodiorite |
| - Rhosgobel/Pukelman | porphyritic quartz monzonite |

All the intrusives weather to form large boulder strewn slopes (felsenmeer) which are light grey in colour. Contacts are easily distinguished by the dark weathering finer grained felsenmeer, characteristic of the country rocks. Intrusive rocks are typically on the flanks of high ground with the more resistant hornfels rocks forming the ridges.

Aplite - Unit 2a

These rocks occur as dykes and were observed in association with the Rhosgobel and Pukelman quartz monzonite stocks. Dykes are only traceable for several metres and are up to one (1) metre in width. Aplite dykes penetrate beyond intrusive boundaries into the adjacent country rocks and may occur in association with biotite-rich intrusive rocks (Unit 2f). Chemically, they are characterized by a high silica and alkali content with subordinate iron and magnesium. In hand specimen they exhibit an even, fine-grained saccharoidal texture which is seen in thin section to be microgranitic. The dominant constituent is usually feldspar with variable quartz content. Compositions vary according to the composition of the granitic associate. Quartz rich varieties pinch out laterally into quartz veins and veinlets. This rock is easily confused with recrystallized hornfelsic quartzites, especially in the vicinity of Barney Ridge.

Porphyritic Quartz Monzonite - Unit 2c

The two (2) porphyritic quartz monzonite stocks, Rhosgobel and Pukelman, outcrop at the headwaters of Left Clear Creek and between Left Clear Creek and Josephine Creek respectively. They occur in a linear fashion along the crest and west facing slopes of West Ridge.

The Rhosgobel Stock is twelve (12) square kilometres in area and has a lenticular shape with its long axis striking north-northwest over four point zero (4.0) kilometres (see Figure 15, detailed in Figure 22a and 22b). Its contact with the "Grit Unit" is usually sharp and steeply dipping and generates a hornfels zone up to one point five (1.5) kilometres from the contacts. It was passively emplaced with a wide metamorphic aureole and no evidence of doming or brecciation (Smith, F.M.; personal communication, 1981). Jointing usually strikes north-northwest, and faulting is absent.

The Pukelman Stock is one point five (1.5) square kilometres in area and has an irregular shape (see Figure 15, detailed in Figure 30). It has nearly equidimensional axes with sharp, steeply dipping contacts. Like Rhosgobel, it was intruded slowly and has a widespread hornfels zone. Minor brecciation was noted near the western contact. Jointing strikes north but no large scale fracturing was observed.

Both stocks at Rhosgobel and Pukelman are medium to coarse grained and include phenocrysts of K-feldspar (40 to 45%) which are in part of replacement origin. The K-feldspar forms megacrysts up to a few millimetres across which commonly contain inclusions of plagioclase and less commonly, quartz. K-feldspar also forms within the finer grained groundmass, intergrown with quartz and plagioclase. The plagioclase (25 to 30%) forms subhedral to anhedral grains zero point five (0.5) to one point five (1.5)

millimetres in size. Grains show strong concentric zonation with composition varying from An 40 at the core to An 23 at the rims. The plagioclase, with myrmekitic inclusions of quartz, occurs along grain boundaries with K-feldspar megacrysts. Quartz forms fifteen (15) to seventeen (17%) percent of the rock and is intergrown with the feldspars. Biotite (5 to 7%) is locally altered to chlorite. Hornblende forms anhedral grains with alteration patches and rims of diopside-calcite due to metasomatic or retrograde alteration. Apatite, epidote and zircon occur in minor and trace amounts.

The overall texture suggests that alteration has occurred on a large scale, especially in the relationships of the feldspars and hornblende. Some of the potassic feldspars are secondary and due to the introduction of potassium rich fluids before emplacement or perhaps a metamorphic alteration event by hydrothermal solutions. The former idea is probably more correct, due to the lack of potassic alteration in the country rocks. It is also suggested that the intrusives of this area are 'S' type granites and are formed by anatexis where the magma is composed of partially melted crustal rock (White and Chappell, 1977). Partial melting may have added additional K-feldspar to the granodiorite magma.

Granodiorite-Quartz-Diorite - Units 2b and 2d

Stocks of quartz-diorite-granodiorite composition occur at Josephine Creek, Barney Ridge and just south of the Little South Klondike River at the northwest end of the claim area.

At Josephine Creek two (2) small subrounded stocks intrude the country rock occupying a combined area of seven point five (7.5) square kilometres (see Figures 13 and 16, detailed in Figure 30). The stocks have equidimensional axes and have sharp contacts with the surrounding country rocks. Emplacement was passive as little brecciation is seen around the contacts. Between the two stocks a thin band of quartz and biotite hornfels exists but it is suggested that the two stocks join at depth. The stocks are dominantly granodiorite in composition, however more mafic-rich quartz diorite was observed. The occurrence of quartz diorite is likely due to differentiation of the intruding magma or possibly an interaction between the more mafic host rocks and the granodiorite at contact zones causing more mafic minerals to be formed.

At Barney Ridge, where Left Clear Creek takes a sharp southerly bend, a quartz-diorite stock intrudes into the "Grit Unit" rocks (see Figures 11 and 14, detailed in Figure 21). The stock is "hour-glass"shaped and covers approximately two point five (2.5) square kilometres. Like the other stocks of the area its axes are equidimensional, however, it has north-north-west orientation. At its northern contact a small boss of granodiorite occurs. This is the reverse situation of the Josephine stock and appears that quartz diorite and granodiorite represent multiple pulses of mafic and felsic compositions occurring over a short period of time. The contact is sharp and emplacement was passive.

Just south of the Little South Klondike River and to the northwest of the claim area, a small elongate stock of quartz diorite intrudes the Grit Unit (Figures 11 and 12). The stock covers an area of one (1) square kilometre and its long axis (2.0 kilometres) striking east-west. Its contact is sharp and dips steeply and is believed to be emplaced contemporaneously with the other quartz diorite-granodiorite stocks of the area. Jointing strikes north however its contacts, unlike the other intrusives of the area, are concordant with the pervasive foliation and layering.

The granodiorite tends to be porphyritic with feldspar quartz and biotite phenocrysts in a groundmass of feldspars, quartz, biotite and some calcite. The plagioclase and K-feldspar form anhedral to subhedral phenocrysts up to a few millimetres wide. Plagioclase (5 to 7%) is altered to sericite and the K-feldspars (5 to 7%) are perthitic. Quartz (1 to 2%) forms rounded grains and biotite (5 to 7%) forms subhedral elongate flakes point five (0.5) to one (1) millimetre in size. Biotite alters locally to chlorite.

The groundmass is dominated by plagioclase grains (45 to 50%) with quartz (20 to 25%) with K-feldspar (less than 15%). Biotite (5 to 7%) is intergrown with secondary calcite. Muscovite (0.5%), apatite (0.2%) and hematite (0.2%) occur in scattered aggregates.

The quartz diorite stocks are fine to medium-grained and like the granodiorite tend to be porphyritic, but not distinctly so. The quartz diorite contains scattered phenocrysts of plagioclase and clinopyroxene in a groundmass of plagioclase, actinolite, biotite and interstitial quartz.

Plagioclase (5 to 7%) forms phenocrysts from point seven (0.7) to one point three (1.3) millimetres in size which show fine concentric zoning from calcic cores to more sodic rims. Clinopyroxene (5 to 7%) occurs as single grains and clusters which have thick alteration rims of actinolite. Some hornblende is present but is completely altered to actinolite. Both these textures indicate retrograde or metasomatic alteration.

In the groundmass plagioclase (40 to 45%) forms premature to anhedral grains averaging point three (0.3) to point seven (0.7) millimetres. Hornblende is pseudomorphed by secondary actinolite (30 to 35%). Biotite (7 to 8%) is also present with quartz (7 to 8%). Sphene and zircon are present in trace amounts.

The quartz diorite/granodiorite stocks of the area, like the quartz monzonite stocks, are strongly altered, as evidenced by the occurrence of metamorphic minerals, such as actinolite, diopside and chlorite. This suggests that all the stocks of this area have undergone a metamorphic or retrograde alteration during late stage cooling.

Quartz Porphyry-Rhyolite - Unit 2e

Quartz porphyry was recognized in sill-like bodies throughout the area. Their form is roughly concordant with the trend of the "Grit Unit" host rocks. The sills vary from a few metres to hundreds of metres in length and have varying widths from several up to twenty (20) metres. The rock weathers to a light cream colour and in places, due to the alteration of feldspars, to kaolinite and sericite. Quartz porphyry outcrops throughout the area but is especially prevalent along Barney Ridge east of the quartz diorite stock and just south of the southern contact of the Rhosgobel quartz monzonite (see Figures 11 to 16). Near the Barney Stock it is believed that the sills are the surface expression for an underlying quartz porphyry stock, a possible differentiate of the quartz diorite/granodiorite magma. No contact metamorphism is associated with the porphyries indicating rapid emplacement along an irregular zone of weakness. The texture of the "porphyry" varies from strongly to very weakly porphyritic. Composition grades from quartz-rhyolite to a more feldspar-rich quartz-feldspar-biotite porphyry.

The quartz porphyry contains quartz and plagioclase phenocrysts and fragments of plagioclase-quartz-muscovite in a groundmass of plagioclase-quartz-sericite. Pyrite altered to hematite forms scattered grains and clusters.

Quartz (10 to 15%) forms rounded to subhedral phenocrysts averaging one (1) to one point five (1.5) millimetres in size with a few up to three (3) millimetres across. Phenocrysts have sharp borders with the groundmass and tend to have a subrounded outline. Plagioclase (5 to 7%) forms subhedral phenocrysts averaging point seven (0.7) to one (1) millimetre in size. Plagioclase is variably altered to sericite. Glomerophenocrysts (7 to 10%) of plagioclase-quartz-muscovite, a few millimetres across, occur and probably represent early formed crystals in the magma. Muscovite (1.5 to 2%) occurs in two forms: 1) muscovite flakes, one point five (1.5) millimetres in size, and 2) muscovite flakes with inclusions of opaques and ti-oxide. Formation of the latter is probably due to replacement of primary biotite whereas the former may be a porphyroblast alteration.

The groundmass is dominated by very fine to fine-grained plagioclase (40 to 45%) with lesser quartz (15 to 20%) and sericite (15 to 17%). Pyrite, ti-oxide, apatite and cassiterite occur in minor and trace amounts.

Hypabyssal acid intrusive rocks are related in several other areas of the world to tin mineralization in breccia pipes and disseminations with pyrite.

Lamprophyre and Associated Biotite-Rich Intrusive Rocks

Dark biotite-rich intrusive dyke rocks referred to as lamprophyre occur throughout the claim area. Dykes up to two hundred (200) metres in length with widths from less than a meter up to ten (10) metres have been recognized. Dykes are concentrated to the northeast of the area near the Pukelman and Josephine Stocks where they strike roughly northwest. This unit is recognized as the latest intrusive event in the area as evidenced by its crosscutting of other intrusives. Lamprophyre dykes have sharp contacts with their host rocks and rare chilled margins. They are jointed with joints striking north and contain abundant phenocrysts of clinopyroxene and phlogopite. The dominent mica is biotite which gives the rock a distinctive red-brown hue. Other minerals include clinopyroxene and phlogopite which forms elongate phenocrysts, some altered to chlorite. The groundmass is dominated by plagioclase which occurs as randomly oriented subhedral lathes. Minor constituents include quartz and apatite.

Amydaloidal Basalts - Unit 2g

Amydaloidal basalt-like rocks were located in float and outcrop at several localities. The only outcrop occurrence is a sill-like body approximately one point five (1.5) metres wide and seven (7) metres long. This rock is believed to occur at a relatively high structural level and is postulated to be the extrusive equivalent of one of the more mafic rich intrusives. The rock is fine grained and dark coloured with calcite and plagioclase amygdules up to one (1) centimetre diameter. Feldspars are altered to clay minerals.

Felsic Volcanics - Unit 2h

Felsic tuffs were recognized in talus material at the head of Left Clear Creek. The rock is buff coloured and very fine grained with small fractures filled with hematite and Mn oxides. Like the basalts, their relationship is dubious but it is suggested from their position that they represent extrusive equivalents of hypabyssal dykes and stocks.

## 3.0 STRUCTURE

### Introduction

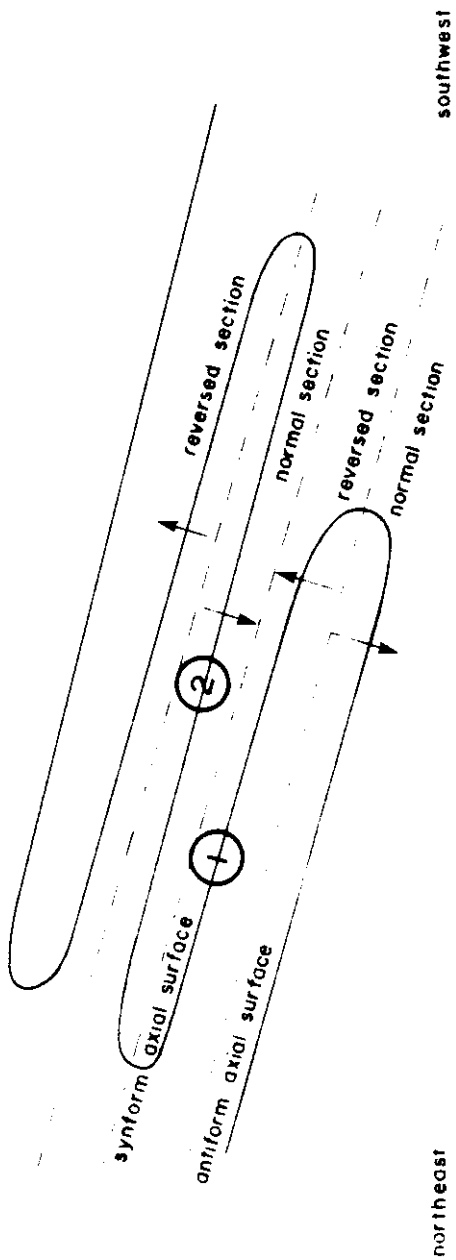
As a result of reconnaissance mapping in the West Ridge area, four (4) separate phases of deformation have been recognized. The structural fabric at West Ridge is dominated by the penetrative foliation associated with the first phase of deformation. This foliation transposes original sedimentary layering especially in phyllitic units. Folds vary in size from the inferred Phase I nappe, the limbs of which are measured in terms of kilometres, to microscopic crenulation formed in later phases.

### Phase I

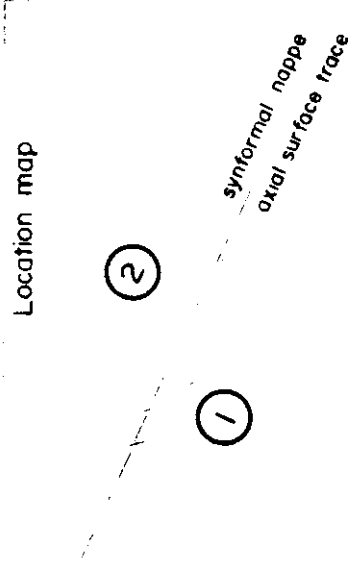
Phase I deformation is recognized by rare, tight to isoclinal minor folds ($F_1$'s) and a common penetrative foliation ($S_1$) oriented parallel to the axial surfaces of the folds, three hundred twelve (312°) degree strike, twenty (20) to thirty (30°) degree dip northwest. Shear zones are associated with the tight to isoclinal $F_1$'s and are parallel to compositional layering (except in the hinges of $F_1$'s). The shear zones separate strata that shows little, if any, evidence of shearing. Hence, the shearing is not distributed homogeneously throughout the strata but is confined to discrete zones along which associated cataclasis, movement and recrystallization is concentrated. Mylonites and gleibrett folds are recognized along with the preservation of original sedimentary structures, i.e. graded grit beds north of Josephine Creek and cross-bedding in impure quartzites south of Rhosgobel intrusive. From study of these smallscale folds, it is suggested that the local strata are structurally positioned on the upper limb of a major Phase I nappe ($F_1$, see Position 2, Figure A). The minor folds correlated with the initial phase of deformation show a consistent direction of antiformal culmination to the southwest. Axial surfaces dip gently towards the northeast, except where visibly rotated. The shearing and associated cataclasis is evidence of possible major thrusting throughout the area and small scale thrust faults were recognized.

### Phase II

Phase II folds ($F_2$'s) are the most common in the area and are generally open to tight, with hinge thickening being characteristic. A second planar fabric $S_2$, which is weakly developed, was seen crosscutting $S_1$ and striking fifty-four (054°) degrees and dipping twenty-six (26°) degrees northeast. This fabric is parallel to the axial surface of the northeast-southwest trending McQuesten anticline just to the south of the West Ridge area. It is believed that $F_2$ folds warp the $F_1$ nappe structure.




Location map




(1) DUBLIN GULCH

(2) WEST RIDGE

→ direction of strtigraphic top

approximate scale

65 kms

40 miles

CANADA TUNGSTEN MINING CORPORATION

WEST RIDGE Y.T.

1981 GEOLOGICAL EXPLORATION PROGRAMME

# SCHEMATIC DIAGRAM TO ILLUSTRATE DUBLIN GULCH AND WEST RIDGE STRUCTURAL INTERPRETATIONS

DATE: *NOVEMBER 1981* JOB NO.: 81-05G

APPROVED BY: FIG. NO.: A

BEMA INDUSTRIES LTD.

Phase III

Minor phase three folds ($F_3$'s) were also found and are open upright folds with their axes striking north. The structural location of these folds were not determined with respect to Phase I and II in the area.

Phase IV

Kink bands are commonly developed and appear to cut across previously described structures. They are probably a late feature produced as a result of stress relaxation within the region.

The period of major deformation of the Grit Unit and Road River formation was pre-intrusive in age, i.e. one hundred (100) million years in the West Ridge area. It is believed to have occurred in Lower Cretaceous times, weakening the crust allowing Middle to Upper Cretaceous stocks to intrude in a linear fashion. The mineralization in the area is associated with the composite intrusives and not with the earlier deformation, however the possibility of underlying structural control does exist.

Faulting

The West Ridge area occurs approximately thirty-five (35) kilometres east of the Tintina Fault, believed to be a major transcurrent structure, for which right-lateral movement of four hundred (400) kilometres has been postulated (Roddick, 1967). It separates the Yukon Crystalline Terrane from the metamorphic rocks of the Selwyn fold belt. It is suggested that movement on this fault occurred during three (3) separate intervals (Tempelman-Kluit, 1972), early Triassic strike-slip movements, Mid-Cretaceous vertical movements and in Eocene-Oligocene time, normal movements. Major faulting was not recognized, however where faulting occurs, it is believed to be conjugate to the Tintina Fault. Dykes and joints also appear to be conjugate and a general east-west trend is observed. Airphoto studies indicate some major north-south topographic lineaments which may be surface expressions of fault movement, however, no displacement was recognized in the field. Faults and associated fractures and joints were likely an important control in the movement and localization of mineral-rich hydrothermal fluids at West Ridge.

## 4.0 MINERALIZATION

The economic mineral association of the WEST RIDGE claims' area consists of scheelite, auriferous arsenopyrite and minor amounts of cassiterite, molybdenite, chalcopyrite, stibnite and pyrrhotite. All mineralization appears to be closely related in origin to the Late Cretaceous intrusive stocks. Three (3) distinct types of mineral occurrence have been recognized: 1) scheelite-bearing calc-silicate skarn; 2) scheelite and auriferous arsenopyrite-bearing quartz vein stockworks; 3) possible cassiterite-bearing greisen-breccia.

### 1. Scheelite Bearing Calc-Silicate Skarn

Calc-silicate rocks have been recognized at several localities at West Ridge; however tungsten (scheelite) mineralization is confined to one (1) creek outcrop showing near the centre of the Rhosgobel grid (see Figure 15). Calc-silicate skarn occurs along strike from an intrusive contact (Rhosgobel quartz monzonite) for about eight hundred (800) metres and over a combined stratigraphic thickness of approximately four point five (4.5) metres. Individual skarn beds vary from one (1) centimetre up to two (2) metres (see Rhosgobel Creek Detailed Cross Sections A to I - Figures 27, 28 and 29). The location of each section has been plotted on the Rhosgobel Grid Geology map (Figure 22a).

As previously mentioned the calc-silicate skarn includes two (2) distinct lithologic assemblages, both of which are present at this locality. The wollastonite-plagioclase-quartz assemblage (light skarn - Unit $le_2$) represents over ninety-five (95) percent of the calc-silicate rocks present. The diopside-plagioclase-quartz assemblage (dark skarn - Unit $le_1$) is actually a sub unit of the latter, but is economically more significant in that it hosts all scheelite mineralization. Mineralogical and textural characteristics suggest that these skarn types represent two (2) phases of metasomatism.

Crosscutting relationships between both skarn types indicate that the first phase of metasomatism resulted in formation of the light skarn. This process is likely syncronous with intrusion of the Rhosgobel quartz monzonite and involves selective replacement and metasomatism of calcareous host beds by silica-rich fluids and heat emanating from the intrusive. It has also been suggested that these solutions could leach calcium from calc-rich rocks and deposit it in adjacent pelitic rocks. Here calcium combines with $SiO_2$, $Al_2O_3$ and lesser amounts of FeO, MgO, $Na_2O$ and $K_2O$ to form the light skarn assemblage (Orrsich, 1980). The light skarn at West Ridge comprises (in decreasing order of abundance) actinolite (wollastonite), plagioclase, quartz, with minor diopside, K-feldspar, garnet, epidote, sphene and calcite. A detailed description of the assemblage is given in Appendix I (Section R-555). Evidence for

the latter genetic model is supported by the fact that no unaltered calcareous beds were observed to the west of the showing. Skarn lithologies appear to grade laterally westward into impure quartzites. This does not preclude the suggestion that the light skarn completely replaced pre-existing calcareous beds. Calcareous rocks were not recognized in the vicinity of the main West Ridge intrusive stocks. Limy grey shales and limy phyllites outcrop on the northeast of the property but are too far away from the intrusives to have been affected by metasomatic processes.

A subsequent phase of metasomatism resulted in formation of the dark skarn assemblage, including scheelite mineralization. Magmatic fluids enriched in Si, Fe, W and Mn entered the country rock along fractures and veinlets that formed during the latter stages of emplacement of the Rhosgobel Stock. These fractures and veinlets are part of an extensive quartz vein stockwork system which appears to originate within the intrusive. Some of the tungsten has combined with calcium in the intrusive stockwork to form scheelite. Quartz stockwork scheelite mineralization is sporadic and not considered to be of economic importance. Tungsten, which wasn't removed in the stockwork, is transported into the country rock along with excess Fe, Si and Mn. Selective replacement of calc-silicate light skarn minerals renders an assemblage of (in decreasing order of abundance) diopside, plagioclase, quartz, K-feldspar, minor pyrrhotite, scheelite, sphene, calcite and epidote. A detailed description of this assemblage is given in Appendix I (Sections R and R-555). Scheelite occurs as fine (0.05 to 0.5 millimetres) disseminated grains within Zone 2 of both sections. Petrographic studies by Vancouver Petrographics Limited (Appendix I) did not indicate the presence of scheelite, however lamping of the cut slab from thin section indicates up to twenty (20) percent scheelite.

Along the detailed traverse of Section A to G (Figure 27) several skarn chip samples were taken and assayed for $WO_3$:

| | | | |
|---|---|---|---|
| 90988 | (1WR0047R) | light skarn | 0.05% $WO_3$ |
| 90989 | (1WR0048R) | quartz veinlets mantled by dark skarn | 0.01% $WO_3$ |
| 90990 | (1WR0049R) | quartz veinlets mantled by dark skarn | 0.09% $WO_3$ |

| | | | |
|---|---|---|---|
| 90991 | (1WR0050R) | light skarn with fracture controlled dark skarn development | 0.68% $WO_3$ |
| 90992 | (1WR0051R) | siliceous light skarn | 0.01% $WO_3$ |
| 90993 | (1WR0052R) | massive dark skarn | 1.31% $WO_3$ |
| 90994 | (1WR0053R) | biotite hornfels | 0.01% $WO_3$ |
| 90995 | (1WR0054R) | siliceous light skarn | 0.01% $WO_3$ |
| 90996 | (1WR0055R) | massive dark skarn and minor light skarn | 0.59% $WO_3$ |

Analysis by Chemex Labs, North Vancouver.

It is quite obvious from these figures that there is a direct correlation between dark skarn content and scheelite concentrations.

2. Au and W Bearing Quartz Vein Stockworks

During the latter stages of pluton emplacement, processes such as cooling resulted in shrinkage and fracturing of the intrusive rock and the surrounding metamorphic aureole. This event likely altered pressure, temperature and phase relationships allowing the infiltration of silica-rich tungsten and auriferous sulphide-bearing solutions.

Quartz stockwork development is confined to the three (3) main intrusive stocks on West Ridge; Rhosgobel, Pukelman and Josephine. The most intense vein development appears to be near the centres of these stocks. Vein intensity varies from ten (10) centimetres spacing up to spacings of five (5) metres. Widths vary from hairline up to five (5) or six (6) centimetres. The widest veins occur toward the margins of the intrusive extending up to two hundred (200) metres into country rock. Scheelite and auriferous arsenopyrite are common mineralizers of these veins. Fine to coarse-grained subhedral grains of scheelite are common in most of the quartz veins, both within the intrusive and in those which intrude the country rock. Arsenopyrite occurs as fine disseminated grains or in massive aggregates along vein walls. Rare galena and stibnite have also been recognized in association with the arsenopyrite mineralization. Sulphides are confined primarily to larger veins (greater than 3 centimetres) within the intrusive/hornfels zone. Scheelite is not normally associated with arsenopyrite which may indicate that there was more than one (1) mineralizing event or that arsenopyrite was more mobile and was transported to the perimeter of the stockwork vein system.

(a) Rhosgobel

Detailed mapping and soil geochemistry has outlined a stockwork zone about eight hundred (800) metres long and between two hundred (200) and four hundred (400) metres wide (see Figures 24 and 25). The zone is in the approximate centre of the Rhosgobel Grid and trends roughly east-west. Veins average one (1) centimetre in width and are regularly developed in two (2) or more orientations. Vein spacing is about point five (0.5) metres on average. Quartz veining is rare elsewhere, except near the intrusive contact. Scheelite occurs as randomly distributed grains within the quartz veins. Arsenopyrite was not recognized although anomalous geochemical values for gold are prevalent. A sampling program by the North Stewart River Joint Venture (NSRJV - Cathro, 1971) collected nine (9) rock samples from the Rhosgobel stockwork, which averaged point zero six (0.06%) percent $WO_3$. All samples taken during the 1981 field season assayed less than point zero five (0.05) percent $WO_3$. Random samples of hornfels hosted arsenopyrite quartz veins from the Rhosgobel grid assayed as follows:

| | |
|---|---|
| 30601 | 1.313 oz/ton Au, 1.33 oz/ton Ag |
| 30605 | 0.112 oz/ton Au |
| 90955 | 0.880 oz/ton Au |

Analysis by Chemex Labs, North Vancouver.

(b) Pukelman

The quartz vein stockwork appears to be concentrated near the centre of the Pukelman Stock. According to Cathro, 1971; the zone is about two hundred (200) metres square with vein spacing as close as fifteen (15) centimetres. Widths vary from hairline up to three (3) centimetres. Disseminated grains of scheelite up to point five (0.5) centimetres across, with occasional flakes of molybdenite, occur both in quartz veins and within the granite. Arsenopyrite is developed along fractures and in larger quartz veins near and beyond the margin of the stock. Nine (9) North Stewart River Joint Venture assays for stockwork $WO_3$ averaged point zero five (0.05) percent $WO_3$ (Cathro, 1971). Grab samples of contact zone arsenopyrite-quartz veins collected during 1981 field work assayed as follows:

| | |
|---|---|
| 90986 | 0.570 oz/ton Au |
| 90987 | 0.882 oz/ton Au |
| 90994 | 0.020 oz/ton Au |
| 90997 | 0.624 oz/ton Au |

One sample contained significant galena with arsenopyrite and was assayed with the following results:

| | |
|---|---|
| 30606 | 0.562 oz/ton Au, 6.64 oz/ton Ag, 4.48% pb |

Analysis by Chemex Labs, North Vancouver.

A strongly developed scheelite-bearing stockwork was recognized at a road cut outcrop near the upper switchback of the main access road to Josephine Creek (see Figure 30). The showing is located between the Pukelman and Josephine Stocks and comprises east-west trending quartz veins up to five (5) centimetres wide. Vein spacing is varied but generally greater than point five (0.5) metres. Rock chip and soil samples were taken at five (5) metre intervals from the switchback and up the road approximately six hundred (600) metres to the Rhosgobel Stock contact. Analysis of these samples indicates tungsten soil values averaging three hundred (300) ppm over a distance of two hundred (200) metres west from the switchback. Rock samples along the same traverse gave an average assay of point zero three (0.03) percent $WO_3$ with values up to point one (0.1) percent $WO_3$. Night lamping of the showing indicated that the strongest scheelite mineralization was in the vicinity of the switchback. Lamping also revealed two beds of siliceous hornfels (quartzite) containing significant concentrations of fine disseminated scheelite (visual estimate of 0.5% $WO_3$). The beds are roughly point two (0.2) to point three (0.3) metres thick, although their lateral continuity is obscured by talus and overburden.

(c) Josephine

Scheelite-bearing quartz veins were not observed within the Josephine Stocks. The only showings are two arsenopyrite bearing quartz veins which were noted in a creek bed outcrop at the southern contact of the easternmost pluton. The larger of the two (2) veins assayed point fifteen (0.15) oz/ton Au.

3. Possible Tin-Bearing Greisen-Breccia Zone

Information obtained through personal communications and literature indicated a considerable potential for the discovery of tin (cassiterite) mineralization within the area drained by Lower Clear and Left Clear Creeks.

Follow up work in this area included soil geochemistry, (Barney Ridge - 65 Pup Grids) heavy mineral sampling, rock sampling and geological mapping. To date few significant results have been received, although two (2) panned concentrate samples from Left Clear Creek, believed to be rich in cassiterite nuggets assayed one (1) percent and three point sixty-five (3.65) percent Sn. At least three (3) heavy mineral samples from creeks on the south side of the property gave Sn values of greater than two hundred fifty (250) ppm. Cassiterite mineralization in this area is likely the result of very late stage hydrothermal activity associated with the emplacement of an S-type granite (White and Chappell, 1977; Smith, F.M., personal communication, 1981). Smith believes that tin may be present on open space fillings within a very siliceous pneumatolitic breccia (Unit 1f) which has been identified at several localities in the property. Microscopic crystals of cassiterite were identified in a breccia sample from the Barney Ridge occurrence, although an assay of the same sample indicated only point zero one (0.01) percent Sn. Three (3) fifteen (15) kilogram bulk samples of similar rock from the Barney Tin Grid assayed less than point zero one (0.01) percent Sn each. Sample locations B86, B87 and B88 are shown in Figure 8. Mr. Smith has also indicated that tin may be associated with a greisenized cusp or cupola that represents the apex of an underlying "tin granite". A greisen-like rock (Unit $1d_4$) was identified during mapping of the Barney Ridge Grid and appears to be related to the intrusion of the Barney Stock (Unit 2d). A chip sample of this rock assayed point zero one (0.01) percent Sn.

It is realized now that the greisen-breccia zone on Barney Ridge is not the source of cassiterite in concentrates from Left Clear Creek and Clear Creek. Exploration in 1982 will focus on the location of similar lithologies and tin mineralization to the south and west of Barney Ridge.

## 5.0 GEOCHEMISTRY

Geochemical sampling procedures employed during the 1981 exploration program include: soil, stream sediment, sludge[1] and whole rock sampling.

### 1. Soil Geochemistry

Soil geochemistry was carried out on five (5) separate grids. Control base lines were established and picketed in an east-west orientation. North-south cross lines intersect the base line at one hundred (100) metre intervals with sample stations at fifty (50) metre intervals. Stations have been picketed and all grid lines flagged. Grid locations are noted on the Key Map (Figure 2) and include:

(a) 65 Pup-Barney Ridge Grid - 3.2 kilometres x 2.7 kilometres
- SLUGGO and C.C. claims

(b) Barney Tin Grid - 1.0 kilometre x 1.5 kilometre
- C.C. claims

(c) Rhosgobel Grid - 4.0 kilometres x 2.8 kilometres
- C.C., RAIN and BEE claims

(d) Josephine Grid - 3.0 kilometres x 2.0 kilometres
- C.C., RAIN and BEE claims

Approximately two thousand, six hundred sixty (2,660) 'B' horizon soil samples were taken, and the minus eighty (-80) mesh size fraction analysed for Sn, W, Au by Chemex Labs Ltd., North Vancouver. Results for each grid have been contoured and are presented as figures in the back pouch of the report. Contour values were set arbitrarily in order to best illustrate anomalous trends.

Footnote 1. Sludge samples - name given to large (9 kilogram) soil samples which are sieved and processed (by concentration using the sludge top of the Wilfley table) in the field before being sent for analysis.

65 Pup Grid

This grid, as well as the Barney Ridge Grid were established in response to a suspected tin anomaly from Left Clear Creek, between 65 Pup and Barney Creek. Each sample was analysed for Sn, W and Au. Analytical methods are outlined in Appendix II. A statistical treatment of the data, from 65 Pup Grid gave threshold values of two (2) ppm, eight (8) ppm and twenty-seven (27) ppb for Sn, W and Au, respectively. An outline of the statistical analysis is listed in Appendix III.

Figure 18 is an illustration of the grid and lists results for all three (3) elements. Figures 19 and 20 show the values contoured for W and Au. Sn values were not contoured as no anomalous values were obtained (highest value - 5 ppm). Anomalous values for W and Au are sporadic and do not seem to outline any obvious trends or patterns.

Barney Ridge Grid

Only samples from the western portion of the Barney Ridge Grid were analysed (Sn, W, Au). Results obtained were quite similar to those from the 65 Pup Grid (see Figure 17). Anomalous Au values from samples taken proximal to Left Clear Creek should be considered unreliable due to contamination by stream sediments and placer gold operations on 65 Pup, Left Clear Creek and Barney Creek.

Apart from these anomalies no other significant trends were noted. Due to the lack of significant geochemical values for tin (Sn) in a geologically favourable environment it was thought that much of the cassiterite might be present in the coarse (+80 mesh) fraction. The plus eighty (+80) mesh fraction is generally discarded by labs during sample preparation. The Barney Tin Grid was established to test this hypothesis.

Barney Tin Grid

A soil sample grid was established at the western end of Barney Ridge as a follow up to earlier soil sampling and geological mapping (see Figure 21). Mapping has outlined a zone of suspected cassiterite bearing breccia (Unit 1f) and greisen-like rocks (Unit $1d_4$). Unlike the Barney Ridge Grid samples which all analysed below three (3) ppm Sn, the Barney Tin Grid samples were pulverized in order that any coarse (+80 mesh) cassiterite would now be included in the analysis. No geochemically anomalous Sn values were outlined in the soil grid of the one hundred,

twenty-three (123) samples analysed. Only ten (10) samples registered better than one (1) ppm Sn; and those only at two (2) ppm. Geochemical analyses were not plotted or contoured.

Rhosgobel Grid

The Rhosgobel Grid can be subdivided into southern, central and northern sections. Samples from the southern section were analysed primarily for tin and tungsten, samples from the central section were analysed for tungsten, gold and some tin. The northern section was not analysed, with the exception of one (1) line which was analysed for gold and tungsten (see Figures 23a and 23b).

Results from the central section indicate a strong northeast-southwest trending tungsten-gold anomaly (Figure 24a). The co-incidental nature of this high would suggest that tungsten and gold are genetically related, perhaps as scheelite and auriferous arsenopyrite in a quartz vein stockwork. The anomalous zone is about one thousand (1,000) metres long by four hundred (400) metres wide and occurs over porphyritic quartz monzonite (Unit 2c). The gold anomaly extends further to the northeast in soils overlying hornfelsic rocks (Units 1d and $1d_3$). This fact would confirm our assumption that gold mineralization is generally peripheral to tungsten and that hard rock showings of auriferous arsenopyrite are typically in the hornfels zone. Rock exposure is poor, especially over the intrusive which tends to be recessive relative to the more siliceous hornfelsic rocks. Trenching will be necessary in these areas, to outline the vein density and grade of the stockwork system. The water-saturated soils and permafrost will hinder such work.

Within the southern section of the Rhosgobel Grid a tungsten soil anomaly trends roughly east-west appearing to coincide with the southern contact of the Rhosgobel Stock (see Figures 22b and 24b). Tungsten values ranging from forty (40) ppm up to five hundred, sixty (560) ppm may be related to contact metasomatism and minor skarn development. Some siliceous light green skarn float was recognized in mapping of the southeastern portion of the Rhosgobel Grid. A heavy mineral concentrate anomaly of six hundred, fifty (650) ppm from a creek draining the southeastern portion of the grid prompted preferred analysis of tin rather than gold. Tin soil values do not exceed two (2) ppm and therefore are considered insignificant. The source of the tin anomaly is likely to the south of this grid and will be followed up by contour soil sampling in 1982.

In the north a chain and compass tie-line was established to meet the Josephine Grid. As a matter of course the line was sampled and analysed for gold and tungsten. Results indicate a significant gold anomaly within the hornfels zone to the south of the Pukelman Stock (see Figure 23a). Values range from thirty (30) ppb up to one thousand, five hundred forty (1,540) ppb and average three hundred (300) ppb over a length of eight hundred, fifty (850) metres. The area of concern is on a steep moss covered scree slope at the head of the northern fork of Left Clear Creek. The source of these high gold geochemical values is thought to be a gold bearing arsenopyrite-quartz vein system. More extensive grid and sampling is needed in this area.

2. Stream Sediment Geochemistry

Heavy mineral and stream silt geochemistry were used as a follow-up to a 1980 reconnaissance heavy mineral stream sediment sampling program. About fifty-eight (58) heavy mineral samples have been collected, of which forty (40) have been analysed (see Figure 4). The majority of the tungsten silt values presented in Figure 4 are the result of work by Archer, Cathro and Associates Ltd. in 1971 for the North Stewart River Joint Venture between Canada Tungsten Mining Corporation Ltd. and Chevron Standard Ltd. (Cathro, 1971).

Heavy Mineral Sampling

Heavy mineral sampling in 1981 was concentrated in four (4) particular areas:

(a) at the headwaters of Lewis Gulch;

(b) at the headwaters of Left Clear Creek;

(c) in southerly draining tributaries to Clear Creek and;

(d) in several of the lower tributaries to Left Clear Creek as well as along Left Clear Creek itself.

In area (a) tungsten and gold anomalies are recognized, particularly in the southern fork of Lewis Gulch. These are likely a function of scheelite and arsenopyrite quartz vein stockworks within and peripheral to the Pukelman Stock. In area (b) high tungsten and gold values from the northern fork of Left Clear Creek originate from the same source as in area (a). The notably high gold values may be a reflection of the high gold soil values obtained along the tie-line between Rhosgobel and Josephine Grids. High tungsten

values from the southern fork originate from scheelite bearing, calc-silicate skarn beds which outcrop at the head of the creek (Rhosgobel Creek). Anomalous tin values in area (c) suggest a possible tin source along the southern slopes of the ridge between Clear Creek and Left Clear Creek. Tin mineralization is likely an extension of the system described under tin mineralization (see Section 3). Sampling in area (d) was set up to try and locate the source of coarse cassiterite from Left Clear Creek described by Aho (1949) and Bostock (1979). Few anomalous results have been obtained from this area to date.

Before analysis some of the heavy mineral concentrates were separated into size fractions in order to determine which fraction yielded useful results and to see if there was any correlation between size fractions for each particular element. Table 4 illustrates this comparison. From this it can be seen that the finer fraction (-20 mesh) yields a wider and more useable range of results. There seems to be no direct correlation between size fractions for either element. This is contrary to what one might expect and therefore we must consider one of the size fractions to be non-representative of stream sediment concentrations of tin and tungsten. The minus twenty (-20) mesh values have already proven accurate in locating mineralized sources (Rainbird, 1980) so the coarse fraction concentrates (-5 +20 and -10 +20) will be considered non-representative.

3. Sludge Sample Geochemistry

Reports of anomalous concentrations of cassiterite from dredging operations on Left Clear Creek prompted interest in this area particularly from the viewpoint of finding a bedrock source (Aho, 1949, Bostock, 1979). In addition to heavy mineral sampling large (approximately 9 kilograms) soil samples were collected and then sieved to minus ten (-10) mesh and processed using the special sludge top of the Wilfley "Diagonal Deck" concentrating table.[1]

Footnote 1. It should be noted that the sludge samples have been concentrated to a similar degree to heavy mineral samples and therefore would be roughly comparable.

TABLE 4 HEAVY MINERAL CONCENTRATE SIZE FRACTION COMPARISON

| | -20 mesh | | - 5 +20 mesh<br>-10 +20 mesh* | |
|---|---|---|---|---|
| SAMPLE NO. | W(ppm) | Sn(ppm) | W(ppm) | Sn(ppm) |
| IWA0002 | > 800 | 8 | * 60 | 3 |
| IWA0003 | > 800 | 2 | * 18 | 2 |
| IWN0004 | 15 | 1 | * - | 1 |
| IWR0001 | 225 | 300 | - | 1 |
| IWR0002 | 15 | 6 | - | 1 |
| IWR0003 | 80 | 1 | - | 2 |
| IWR0004 | 15 | 1 | - | 3 |
| IWR0005 | 50 | 110 | - | 1 |
| IWR0006 | > 800 | 1 | 12 | 1 |
| IWR0007 | > 400 | 1 | 9 | 1 |
| IWR0008 | > 800 | 10 | 5 | 1 |
| IWR0009 | 400 | 1 | 13 | 1 |
| IWR0010 | 775 | 17 | 5 | 1 |
| IWR0011 | 75 | 1 | 7 | 1 |
| IWR0012 | 300 | 1 | 80 | 2 |
| IWR0013 | > 800 | 1 | 3 | 2 |
| IWR0014 | 600 | 1 | 125 | 1 |

- analysis by Chemex Labs, North Vancouver

Samples were collected at three hundred (300) metre lateral spacings from the break-in slope points along lower Left Clear Creek, Barney Creek, 65 Pup and along the upper section of Clear Creek just upstream from the Queenstake placer camp. Results from the fifty (50) samples taken are listed in Table 5 and are plotted on Figures 5 and 8. Each sample was analysed for gold (Au), tungsten (W) and tin (Sn)

The advantage of taking a large soil (sludge) sample is that it provides a more representative analysis of a larger source area. The results in Table 5 do not illustrate any specific anomalous regions although there are some sporadic highs for all three elements. Gold highs may be unreliable due to the fact that it is measured to such a low detection limit. Anomalous values can therefore arise from the so-called "nugget effect".

One high gold value (1,900 ppb) was obtained from a sample taken on the south bank of Clear Creek four hundred (400) metres up stream from the Left Clear Creek fork. This anomaly is probably due to fine gold from bench gravels along Clear Creek. This area is presently being worked by the Queenstake Resources gold dredge. The highest tin value for a sludge sample (50 ppm) was also obtained from this sample site. Again this may be attributed to contamination of bank soils by creek sediments. High tin values have already been recognized from Clear Creek heavy mineral concentrates. Queenstake Resources has also reported high tin percentages from dredge concentrates taken from this section of Clear Creek in 1981. The tin source is therefore upstream from this point. High tungsten values are sporadic and do not appear to outline any significant anomalous trends.

TABLE 5 SLUDGE SAMPLE RESULTS - SAMPLES FROM EASTERN PART OF C.C. CLAIM GROUP

| SAMPLE NO. | Au(ppb) | W(ppm) | Sn(ppm) |
|---|---|---|---|
| 1WK 0006 SL | 20 | 30 | 10 |
| 1WK 0011 SL | 20 | 12 | 3 |
| 1WK 0012 SL | 200 | 10 | 4 |
| 1WK 0013 SL | 50 | 31 | 2 |
| 1WK 0014 SL | 20 | 165 | 7 |
| 1WK 0017 SL | < 10 | 7 | 4 |
| 1WK 0018 SL | 1,900 | 8 | 50 |
| 1WK 0019 SL | 20 | 62 | 2 |
| 1WK 0021 SL | 20 | 7 | 10 |
| 1WK 0022 SL | < 10 | 12 | 1 |
| 1WK 0023 SL | 140 | 1 | 3 |
| 1WK 0024 SL | 40 | 1 | 2 |
| 1WK 0026 SL | 240 | 82 | 4 |
| 1WK 0027 SL | < 10 | 6 | 11 |
| 1WK 0029A SL | 10 | 1 | 1 |
| 1WB 0126 SL | 10 | 1 | 1 |
| 1WB 0127 SL | 20 | 1 | 2 |
| 1WB 0129 SL | - | 9 | 1 |
| 1WB 0130 SL | 60 | 7 | 4 |
| 1WB 0132 SL | < 10 | 12 | 1 |
| 1WB 0133 SL | 20 | 10 | 1 |
| 1WB 0134 SL | 80 | 3 | 3 |
| 1WB 0135 SL | 80 | 1 | 1 |
| 1WB 0136 SL | 840 | 27 | 1 |
| 1WB 0137 SL | 80 | 800 | 13 |
| 1WB 0138 SL | 20 | 19 | 6 |
| 1WB 0139 SL | 10 | 7 | 2 |
| 1WB 0140 SL | < 10 | 22 | 4 |
| 1WB 0141 SL | < 10 | 1 | 1 |
| 1WB 0142 SL | < 10 | 1 | 1 |
| 1WB 0143 SL | 640 | 1 | 1 |
| 1WB 0300 SL | 575 | 40 | 1 |
| 1WB 0301 SL | 5 | 14 | 1 |
| 1WB 0302 SL | 25 | 11 | 1 |
| 1WB 0303 SL | < 5 | 50 | 1 |
| 1WB 0304 SL | 25 | 60 | 1 |
| 1WB 0305 SL | 15 | 45 | 1 |

continued.....

TABLE 5 SLUDGE SAMPLE RESULTS - SAMPLES FROM EASTERN PART OF C.C. CLAIM GROUP

.....continued

| SAMPLE NO. | Au(ppb) | W(ppm) | Sn(ppm) |
|---|---|---|---|
| 1WB 0306 SL | 10 | 1 | 1 |
| 1WB 0307 SL | 10 | 17 | 1 |
| 1WB 0308 SL | 100 | 8 | 2 |
| 1WB 0309 SL | 35 | 35 | 2 |
| 1WB 0310 SL | 5 | 10 | 1 |
| 1WB 0311 SL | 10 | 70 | 4 |
| 1WB 0312 SL | 100 | 9 | 1 |
| 1WB 0313 SL | 60 | 10 | 1 |
| 1WB 0314 SL | 15 | 1 | 1 |
| 1WB 0315 SL | 135 | 13 | 1 |
| 1WB 0316 SL | < 5 | 4 | 1 |
| 1WB 0317 SL | 15 | 5 | 1 |

- analysis by Chemex Labs, North Vancouver

4. Rock Assay and Geochemistry

A total of one hundred twenty-seven (127) rock samples were collected for analysis during the 1981 field season. Of these fifty-six (56) were assayed and seventy-one (71) were analysed by geochemical methods. In general only rocks with known mineralization were assayed. Elements assayed include tungsten ($WO_3$), gold (Au), tin (Sn), lead (Pb), zinc (Zn), silver (Ag), antimony (Sb), and fluorine (F). Elements for geochemical analysis include tungsten (W), gold (Au), tin (Sn), silver (Ag), copper (Cu) and uranium (U). Analytical methods employed by Chemex Labs Ltd. for tin, tungsten and gold are outlined in Appendix II.

Assay and geochemical results are listed in Appendix V and have been categorized as follows:

| Assay | Geochemistry |
|---|---|
| calc-silicate skarn | calc-silicate skarn |
| arsenopyrite-quartz veins | hornfels zone rocks |
| hornfels zone rocks | intrusive rocks |
| breccia | miscellaneous rocks |
| intrusive rocks | |

A description and grid reference is given for each sample. Samples located outside surveyed grids are given UTM grid coordinates and are plotted on the sample site maps (Figures 5 through 10).

Significant assay and geochemistry results have been discussed in the preceeding text.

## 6.0 CONCLUSIONS

1. Tungsten skarn showings on Rhosgobel Creek are too low grade and the host lithologies of too low a lime content to be of economic interest. The location of calc-rich beds is imperative to the development of scheelite-bearing calc-silicate assemblages at West Ridge.

2. A positive correlation exists between significant tungsten and gold geochemical anomalies associated with a vein stockwork system in the central region of the Rhosgobel quartz-monzonite stock.

3. Tungsten showings in the hornfels stockwork and anomalous tungsten values from heavy mineral concentrates from the headwaters of Josephine Creek suggest a possible higher grade tungsten source in this area associated with a quartz vein stockwork.

4. The occurrence of greisen-like rocks and possible diatreme breccia in association with acid plutonic rocks near Barney Ridge present a suitable environment for tin mineralization. Whole rock, soil and heavy mineral geochemistry has not indicated the presence of tin in this area. It is possible, however, that this occurrence may only be the surface expression of alteration in a mineralized zone which could lie at depth or at considerable lateral distance.

5. High tin values for heavy mineral concentrates from tributaries of Clear Creek and from Clear Creek itself would suggest possible tin sources within the southern portion of the C.C. claim block. The source of these anomalies could be related to a mineralized zone described under Point 4.

6. A strong gold geochemical anomaly of greater than three hundred (>300) ppb up to one thousand, five hundred forty (1,540) ppb is outlined by one (1) soil geochemical line north of the Rhosgobel Grid. This anomaly is associated with a gold-bearing quartz-arsenopyrite vein system and may be one of the sources for placer gold in Left Clear Creek.

## 7.0 RECOMMENDATIONS

1. Extension of the Rhosgobel Grid to the north to meet the southern boundary of Josephine Grid. Soil geochemistry should delineate the extent of gold and tungsten anomalies in the area. Follow up trenching to be done if necessary.

2. Detailed mapping and prospecting of the Josephine quartz stockwork. Possible follow up blasting and diamond drilling. The drilling target would be an intersection between stockwork veins and an unexposed calc-silicate hornfels. Showings should be night lamped.

3. Four (4) contour soil sampling lines with one hundred (100) metre sample spacing should be established along the north and south slopes of Clear Creek between its upper reaches and the Left Clear Creek fork. The strongly anomalous tin heavy mineral concentrate samples and high concentrations of cassiterite in the Queenstake placer concentrates are indicative of a tin source along the slopes of Upper Clear Creek.

4. Pionjar (overburden) drilling along the flanks of Left Clear Creek in the vicinity of 65 Pup and Barney Creek to locate the source of placer cassiterite concentrations.

5. Trenching to assess the potential of possible tungsten-gold stockwork near the central portion of the Rhosgobel stock. This could be combined with the follow up work mentioned above (Point 1).

6. Development of a conceptual model for tin-tungsten mineralization. This should include reference to structural and stratigraphic levels, mode of emplacement and metal source.

## STATEMENT OF QUALIFICATIONS

I, ROBERT H. RAINBIRD OF BEMA INDUSTRIES LTD. DO HEREBY CERTIFY THAT:

1. I am a graduate of Carleton University, Ottawa, Ontario and hold the following degree:

   B.Sc. Honours Geology, 1980

2. I have practised my profession as a geologist since 1980.

3. I have no interest, direct or indirect, in the property or shares of Canada Tungsten Mining Corporation Limited nor do I expect to receive any such interest.

4. That the information contained in this report is both true and correct to the best of my knowledge.

Signed: R.H. Rainbird

Robert H. Rainbird, B.Sc.
Geologist

Date: November 26, 1981

BEMA
Industries Ltd.

## STATEMENT OF QUALIFICATIONS

I, DAVID A. KELLY OF BEMA INDUSTRIES LTD. DO HEREBY CERTIFY THAT:

1. I am a graduate of the University of Dublin (Trinity College), Ireland and hold the following degree:

   B.A. mod. Honours Geology, 1979

2. I have practised my profession as a geologist since 1979.

3. I have no interest, direct or indirect, in the property or shares of Canada Tungsten Mining Corporation Limited nor do I expect to receive any such interest.

4. That the information contained in this report is both true and correct to the best of my knowledge.

Signed: David A Kelly

David A. Kelly, B.A. mod.
Geologist

Date: November 26, 1981

W for 65 Pup Grid

| WO3(ppm) | Frequency |
|---|---|
| 1 | 1029 |
| 3 | 3 |
| 4 | 1 |
| 5 | 4 |
| 7 | 2 |
| 8 | 1 |
| 10 | 2 |
| 12 | 1 |
| 15 | 1 |
| 20 | 1 |
| 25 | 1 |
| 30 | 3 |
| 35 | 1 |
| 40 | 1 |
| 75 | 1 |
| | N = 1052 |

$X = 1416$

$\overline{X} = \frac{X}{N} = \frac{1416}{1052} = 1.346$

$\overline{X}^2 = 1.812$

$\sum Xi^2 = 14078$

$\frac{\sum Xi^2}{N} = 13.38$

$S = 13/38 - 1.812$

$S = 3.40$

$2S = 6.80$

$\overline{X} + 2S = 8.14$

threshold for tungsten = 8

Au for 65 Pup Grid

| Interval Au(ppb) | Frequency |
|---|---|
| 0 - 10 | 816 |
| 10 | 139 |
| 20 | 32 |
| 30 | 4 |
| 140 | 4 |
| 150 | 1 |
| | N = 996 |

$X = 816(5) + 1390 + 640 + 120 + 560 + 150 = 6940$

$\overline{X} = \frac{6940}{996} = 6.97$ ppb $\quad \overline{X}^2 = 48.55$

$\sum Xi^2 = 816(5^2) + 139(10^2) + 32(20^2) + 4(30^2) + 4(140^2) + 1(150^2) = 151,600$

$\frac{\sum Xi^2}{N} = \frac{151,600}{996} = 152.2$

$S = 152.2 - 48.55 = 10.18$

$2S = 20.36$

$2S + \overline{X} = 27.33$

threshold for gold is 27 ppb

# APPENDIX I

# PETROGRAPHIC REPORT

Vancouver Petrographics Ltd.

JAMES VINNELL, Manager
JOHN G. PAYNE, Ph. D. Geologist

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8887 NASH STREET
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VOX 1JO

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Invoice 2897

Report for: David Kelly,
Bema Industries Ltd.,
# 203 19945 56th Ave.,
LANGLEY, B.C.

Samples: Cretaceous stock intrusive into quartzite-phyllite sequence.
I-N-series 11, 20, 22, 29, 38, 43, 51, 55
I-R-series 5, 31, 36
BR, R, R-555, L

Several of the samples (I-N-53, I-N-55, I-R-5, and BR were suspected to contain a tin mineral. No specific tin minerals were identified in these or any other samples. However, some very fine to extremely fine grained semiopaque and opaque aggregates and patches might contain some tin minerals. Grain size is too fine, and optical properties not sufficiently distinctive at this grain size for definitive identification.

The rocks are divided into the following types:

1. Porphyritic Intrusive Rocks (Hypabyssal or Contact zones)

   phenocrysts of feldspars, quartz, and micas in very fine grained groundmass dominated by the same minerals. Some K-feldspar is secondary. Predominant mafic minerals (including muscovite) are indicated.

   I-N-38 granodiorite to quartz monzonite (bio-hblde-diop)
   I-N-55 granodiorite (bio-calcite)
   I-R- 5 quartz diorite (muscovite-sericite-pyrite)

   the presence of diopside in I-N-38 suggests that the rock occurs in the zone of contact metamorphism and diopside was formed by replacement of hornblende.

2. Andesite-Diabase (probably a dike)

   plagioclase and clinopyroxene phenocrysts in a groundmass of plagioclase, actinolite, biotite and quartz.

   I-N-51

3. Lamprophyre

   phenocrysts of clinopyroxene and phlogopite in a groundmass of plagioclase

   L

4. Metasedimentary Rocks

   weakly to strongly foliated schists, phyllites, quartzites, with very variable composition.

   a) impure quartzites

      mainly quartz with minor to moderately abundant other minerals as indicated below

      I-N-11 (K-spar, plag, bio)
      I-N-20 (calcite, plag, epid)
      I-R-31 (musc, plag)

(continued)

4. b) mica-rich phyllites

I-N-22 muscovite-biotite- (tourmaline)
I-N-29 sericite-biotite-(tourmaline)

5. Contact Quartz Diorite with Altered Rock

medium to coarse grained quartz diorite with muscovite as the only mica, no mafic minerals; sharp contact with strongly altered rock possibly a finer grained intrusive rock? composed of plagioclase-biotite, replaced by muscovite-chlorite-tourmaline

I-R-36

6. Skarns

characterized by the presence of one or more of diopside, actinolite, calcite, epidote, garnet

R skarn vein with host diop-gar-qtz-plag (very fine to fine grained), grading into diop-plag-qtz (fine grained), grading into plag-diop-K-feldspar-(quartz) (medium to coarse grained), with core of vein composed of coarse grained quartz.

R-555 zoned skarn, some zones dominated by diopside, others with equal amounts of diopside, quartz, and plagioclase, one zone dominated by actinolite. These are cut? by a banded zone containing all these minerals. Calcite-epidote alteration is common in some zones, mainly at the expense of plagioclase

I-N-43 irregular actinolite-quartz skarn replaces flow banded andesite with strong contortion of flow bands.

7. Brecciated Quartz Vein

BR a medium to fine grained quartz vein, irregularly brecciated and recrystallized to an extremely fine grained aggregate, veined by hematite-limonite, possibly some cassiterite in opaque and semiopaque aggregates.

The quartz diorite of type 5 is probably of similar origin to the porphyritic intrusive rocks of type 1. Most of the K-feldspar may be of secondary origin. Biotite commonly has a texture suggesting that it formed in the contact metamorphic zone in both intrusive rocks and in metasediments. The diopside and actinolite-rich skarns may have formed from different rock types than the quartzite-phyllite assemblage, possibly from andesitic volcanic and hypabyssal rocks. I-N-51 may be related to these volcanic rocks, or may be a late dike. L is probably a late lamprophyre dike.

John Payne
October 1981

I-R-36 Contact: Muscovite Quartz Diorite and Mica-rich Altered Rock of unknown parentage (abundant Tourmaline)

The rock shows a sharp contact between a medium to coarse grained muscovite quartz diorite and a strongly altered rock with a very variable texture, dominated by muscovite with biotite-chlorite and patches containing abundant tourmaline.

quartz diorite

| | |
|---|---|
| plagioclase | 50-55% |
| quartz | 30-35 |
| muscovite | 15-17 |
| Ti-oxide | minor |
| hematite | minor |

Plagioclase forms anhedral grains with irregular outlines against other plagioclase and quartz grains, with grain size averaging 0.5-1 mm. It is slightly altered to scattered very fine to fine grained sericite flakes and moderately altered to dusty opaque.

Quartz forms anhedral grains averaging 0.3-0.7 mm in size with a few grains up to 2 mm across. Grains are uniform or slightly strained in extinction.

Muscovite forms clusters of flakes averaging 0.5-1.2 mm in grain size, with a few coarser, commonly poikilitic grains up to 1.5 mm long. Most grains have irregular outlines.

Ti-oxide forms scattered patches up to 0.2 mm across of very fine grained aggregates. Hematite forms scattered irregular patches and discontinuous selvages.

altered rock

| | |
|---|---|
| muscovite | 50-55% |
| chlorite | 15-17 |
| plagioclase | 5- 7 |
| biotite | 5- 7 |
| tourmaline | 7-10 |
| quartz | 1½-2 |
| opaque | 1 |
| hematite | 1- 1½ |
| Ti-oxide? | trace |
| zircon | trace |

Muscovite forms irregular flakes averaging 0.2-0.5 mm in size in random orientation. Biotite and plagioclase occur only near the quartz diorite contact. Plagioclase forms anhedral grains averaging 0.1-0.3 mm in size. Biotite is intergrown with plagioclase and muscovite as grains averaging 0.05-0.2 mm in size. Pleochroism is from pale to medium brown. Chlorite occurs in clusters of grains averaging 0.2-0.7 mm in size intergrown with muscovite clusters. Probably chlorite formed by replacement of biotite, because several clusters in the contact zone between biotite and chlorite-rich zones consist of biotite altered to chlorite.

Tourmaline occurs in two modes. The first is as scattered subhedral to anhedral grains from 0.2-0.7 mm in average size; these commonly have prismatic shapes. Pleochroism is from colorless or pale amber to light or medium greenish-brown. It occurs in clusters of grains averaging 0.05-0.15 mm long intimately intergrown with muscovite and in some patches with extremely fine to very fine grained opaque. These patches average 1-1.5 mm in size.

(continued)

Quartz forms scattered grains and clusters of grains averaging 0.03-0.1 mm in grain size.

Opaque forms scattered grains up to 0.1 mm in size, and is concentrated in patches with tourmaline as described above.

Hematite forms anhedral patches from 0.03-0.2 mm in size of extremely fine grained aggregates with a deep reddish brown to orangish brown color.

Ti-oxide? forms one subhedral prismatic grain 0.2 mm long. The mineral has very high relief with low to moderate birefringence, suggesting that it might not be Ti-oxide, or if so, that it is nearly perpendicular to the c-axis.

Zircon forms scattered grains up to 0.03 mm in size associated with biotite.

The original rock type is impossible to determine because of the intensity of alteration. Perhaps the biotite-plagioclase zone in the rock is the least altered; this suggests that the original rock might have been a finer grained intrusive or hypabyssal rock.

I-R-5 Porphyritic Quartz Diorite (Hypabyssal or Contact)

The sample contains quartz and plagioclase phenocrysts and fragments? or glomerophenocrysts of plagioclase-quartz-muscovite, with scattered phenocrysts of muscovite, in a groundmass of plagioclase-quartz-sericite. Pyrite? altered completely to hematite forms scattered grains and clusters. Minor cassiterite? is present. The rock is either a contact phase of an intrusion or a hypabyssal dike.

| | |
|---|---|
| phenocrysts | |
| quartz | 10-15% |
| plagioclase | 5- 7 |
| clusters | 7-10 |
| muscovite | 1½-2 |
| groundmass | |
| plagioclase | 40-45 |
| quartz | 15-20 |
| sericite | 15-17 |
| pyrite | 1- 1½ |
| Ti-oxide | minor |
| apatite | trace |
| cassiterite? | trace |

Quartz forms rounded to subhedral phenocrysts averaging 1-1.5 mm in size, with a few up to 3 mm across. They generally have sharp borders with the groundmass, but locally are intergrown with groundmass along at least one side. Some occur in clusters of two or three grains.

Plagioclase forms subhedral phenocrysts averaging 0.7-1 mm in size, They are altered slightly to moderately to fine grained sericite similar to that in the groundmass.

Clusters of plagioclase and quartz with lesser muscovite flakes are up to a few mm across. Grain size generally is medium. Plagioclase is altered as in the phenocrysts. These clusters probably represent early-formed crystals in the magma. Muscovite in these generally forms ragged to subhedral flakes from 0.3-0.5 mm in size.

Muscovite forms a few phenocrysts of two types. The first ranges up to 1.5 mm in size, and consists entirely of muscovite. The second up to 1 mm in length, generally has more ragged outlines and contains inclusions of opaque and Ti-oxide. The second type probably was formed by replacement of primary biotite, whereas the first type may be a porphyroblast which grew during alteration.

The groundmass is dominated by very fine to fine grained plagioclase with lesser quartz and sericite. Plagioclase grains average 0.03-0.1 mm in size, with a few slightly elongate grains up to 0.3 mm long. Quartz forms interstitial equant grains averaging 0.02-0.05 mm in size. Some K-feldspar may be present, but its identification was not confirmed. (It would be best to stain the rock with sodium cobaltinitrite soulution to test for K-feldspar in the groundmass). Sericite forms ragged to subradiating flakes and clusters averaging 0.05-0.15 mm in grain size.

Pyrite forms scattered clusters up to 1 mm in size of fine to locally medium grains. They are completely altered to reddish brown, generally transparent hematite.

Ti-oxide forms one patch 0.3 mm in size consisting of an extremely fine grained aggregate.

Apatite forms scattered euhedral to subhedral prismatic grains up to 0.2 mm in size, commonly associated with pyrite or muscovite after biotite.

Cassiterite? forms a few grains from 0.05-0.1 mm in size. The mineral is colorless with very high relief, but with relatively low bire-

(continued)

fringence. If the mineral is cassiterite, these grains would have to be oriented with the c-axis nearly perpendicular to the section. Another possibility is zircon, but the relief appears higher than normal for zircon. The only similar mineral with this relief and a low birefringence is powellite.

I-N-38 Porphyroblastic Granodiorite - Quartz Monzonite

The rock is a medium to coarse grained intrusive, whose original composition probably was granodiorite. It contains porphyroblasts of K-feldspar up to a few mm across, probably in part of replacement origin. Diopside occurs with hornblende in textures which in part suggest that diopside is secondary.

| | |
|---|---|
| K-feldspar | 40-45% |
| plagioclase | 25-30 |
| quartz | 15-17 |
| biotite | 5- 7 |
| hornblende | 3- 4 |
| diopside | 1- 1½ |
| sphene | 0.2 |
| calcite | minor |
| apatite | minor |
| epidote | trace |
| zircon | trace |
| opaque | trace |

K-feldspar forms megacrysts up to a few mm across. Some are perthitic, with either irregular patches of plagioclase or in a few a network of extremely fine grained parallel lenses. Megacrysts commonly contain irregular to euhedral inclusions of plagioclase and less commonly inclusions of quartz. K-feldspar also forms grains averaging 0.5-1 mm in size intergrown with quartz and plagioclase.

Plagioclase forms subhedral to anhedral grains averaging 0.5-1.5 mm in size. Grains commonly show strong concentric zonation formed during growth of the crystals from the magma. A composition by the combined Carlsbad-albite twin method gave a range from a core of $An_{40}$ to a rim of $An_{23}$. Some grains have extremely fine grained patches containing myrmekitic inclusions of quartz; these patches average 0.1-0.3 mm in size, and occur along grain borders with K-feldspar megacrysts. Sericite forms scattered fine grained alteration patche

Quartz forms anhedral grains averaging 0.5-2 mm in size intergrown with feldspars.

Biotite forms flakes from 0.3 to 1.5 mm in size. They are pleochroi from straw to medium-dark brown. Locally, biotite is altered to chlorite with alteration in part controlled by cleavage directions. Chlorite is pleochroic from pale to light green with purplish-blue interference color. Locally, in a mafic cluster of hornblende and biotite, the biotite is almost completely altered to chlorite.

Hornblende forms anhedral grains ranging widely in size from 0.2 to a few mm. It is pleochroic from light to medium green with shades of yellow and bluish green in some grains. Some grains are euhedral, others are ragged. Hornblende is intimately associated in many grains with diopside. In a few, diopside appears to be forming as a rim on hornblende, probably as a replacement of hornblende. In other grains, the minerals are very intimately intergrown in irregular aggregates; textures indicate replacement, but it is impossible to determine which mineral is replacing which. A few grains consist entirely of diopside. Some of these are included in K-feldspar megacrysts, suggesting a possible relationship between the two as secondary minerals formed in the contact zone.

Sphene forms anhedral to euhedral grains from 0.2-0.7 mm in size, generally associated with hornblende.

Calcite forms patches up to 0.5 mm across associated with mafic minerals, and in part appears to be an alteration product of mafic

(continued)

minerals, particularly hornblende. Minor quartz occurs in some of these alteration zones with calcite. Calcite also forms irregular wispy networks of veins in K-feldspar megacrysts. These commonly show one crystallographic orientation over a large area, indicating a porphyroblastic nature to the calcite.

Apatite forms subhedral to euhedral prismatic crystals from 0.05-0.15 mm in length. They generally are associated with and commonly intergrown with hornblende.

Epidote forms scattered patches of grains associated with hornblende; grains average 0.05-0.1 mm in length, and commonly are elongate grains along the border of coarser hornblende grains.

Zircon forms scattered subhedral to euhedral prismatic grains averaging 0.1 mm in length. These occur in quartz and in mafic minerals.

Opaque forms one distorted rhombic grain 0.2 mm long in a K-feldspar megacryst.

I-N-55 Porphyritic Granodiorite (Hypabyssal)

The rock contains phenocrysts of feldspars, quartz and biotite in a groundmass of feldspars, quartz, biotite and calcite. Biotite in the groundmass appears in part to be secondary. The rock is a very fine grained border phase of an intrusion or a dike.

| | | |
|---|---|---|
| phenocrysts | | |
| plagioclase | 5- 7% | |
| K-feldspar | 5- 7 | |
| quartz | 1- 2 | |
| biotite | 5- 7 | |
| groundmass | | |
| feldspar | 45-50 | (probably mostly plagioclase, less than 15% K-spar) |
| quartz | 20-25 | |
| biotite | 5- 7 | (locally altered to chlorite) |
| calcite | 3- 5 | |
| muscovite | 0.5 | |
| apatite | 0.2 | |
| hematite | 0.2 | |
| opaque | minor | |

Plagioclase and K-feldspar form euhedral to subhedral phenocrysts up to a few mm across (the largest phenocrysts are of K-feldspar). Plagioclase is moderately to very strongly altered to patches of fine to very fine grained sericite. Some K-feldspar phenocrysts are slightly perthitic. Few inclusions are present. The largest phenocryst contains a subhedral plagioclase inclusion and an irregular quartz inclusion, both about 1 mm in size.

Quartz forms rounded grains and clusters of a few grains averaging 0.5-0.7 mm in grain size.

Biotite forms ragged to subhedral elongate flakes averaging 0.5-1 mm in size. Pleochroism is from straw to medium brownish red or orangish brown. Some grains contain lenses of opaque or Ti-oxide along cleavage, and in some grains, Ti-oxide is seen to occur in pseudohexagonal networks along crystallographic directions of biotite. At one end of the section, biotite is altered to pale to light green chlorite with minor Ti-oxide. Chlorite has a greyish blue interference color.

The groundmass is dominated by very fine grained aggregates of equan grains of plagioclase, and lesser quartz and K-feldspar. The exact amount of K-feldspar is uncertain, but probably is less than 15%. Some slightly coarser slightly elongate plagioclase grains are present, ranging from 0.1-0.2 mm in length. Biotite occurs in irregular very fine grains and wispy patches of grains. It also forms scattered patches up to 1.5 mm across intergrown with calcite. The texture of biotite suggests that it may be secondary, formed in a contact zone. Calcite also forms irregular patches up to 0.5 mm across with grains up to 0.1 mm in size.

Muscovite forms scattered flakes averaging 0.05-0.1 mm in size, some with feldspars and quartz and some in biotite-calcite clusters.

Apatite forms subhedral prismatic grains up to 0.3 mm long, and some elongated prismatic to acicular grains of similar length but much narrower width.

Hematite forms irregular patches up to 0.7 mm across intergrown with biotite. Minor opaque patches up to 0.3 mm across occur with biotite; grains probably are very fine, as suggested by minor quartz? inclusions in the opaque and the very irregular outline of the aggregate.

I-N-51 Andesite-Diabase

The rock contains scattered phenocrysts of plagioclase, clusters and scattered phenocrysts of clinopyroxene and hornblende? in a groundmass dominated by plagioclase, actinolite (after hornblende), biotite, and interstitial quartz. It probably is a dike rock.

| | |
|---|---|
| phenocrysts | |
| plagioclase | 5- 7% |
| clinopyroxene | 5- 7 |
| groundmass | |
| plagioclase | 40-45 |
| actinolite | 30-35 |
| biotite | 7- 8 |
| quartz | 7- 8 |
| opaque | 1- 1½ |
| sphene | trace |
| zircon | trace |

Plagioclase forms a few phenocrysts from 0.7-1.3 mm in size. Some are intergrowth twins, with textures suggesting cyclic twins. Most show very finely zoned concentric variation in composition, with oscillatory zoning common, and gradation from calcic cores to more-sodic rims. No composition was determined, but the average composition appears to be andesine. Alteration is slight to sericite.

Clinopyroxene occurs in singel grains and clusters of grains averaging 0.3-0.7 mm in size, with clusters up to 2 mm across. These generally have a thick alteration rim to secondary actinolite.

Some hornblende phenocrysts may be present; these are completely altered to secondary actinolite, and grade in size into groundmass actinolite.

Plagioclase in the groundmass forms prismatic to anhedral equant grains averaging 0.2-0.5 mm in size. These also show concentric zones, with less variation in composition than in the phenocrysts.

Hornblende? forms prismatic grains averaging 0.3-0.7 mm in size. These are completely replaced by subparallel aggregates to pseudomorphs of secondary actinolite. Many of these as well as pyroxene phenocrysts are irregularly rimmed by secondary biotite as very fine to fine grains.

Biotite is also intergrown to a lesser extent with plagioclase and quartz. Quartz forms interstitial grains averaging 0.05-0.1 mm in size, with a few up to 0.2 mm across.

Opaque forms scattered clusters up to 0.5 mm in size of grains averaging 0.02-0.03 mm in size. It also forms disseminated grains of similar grain size. All are surrounded by or at least partly rimmed by secondary biotite clusters of very fine grain size. A few secondary actinolite aggregates contain disseminated opaque grains of very fine grain size.

Sphene forms a few grains up to 0.03 mm across, with anhedral outline

Zircon forms a ragged grain in biotite 0.02 mm across; it shows a dark halo in the surrounding biotite.

The rock is cut by two veinlets averaging 0.02 mm wide of quartz. Along the veinlets plagioclase is moderately altered to very fine grained sericite.

L Lamprophyre Dike

The sample contains very abundant phenocrysts of clinopyroxene and phlogopite in a groundmass dominated by plagioclase. Some pyroxene is altered to actionlite. Opaque forms irregular clusters of very fine grains.

| | |
|---|---|
| phenocrysts | |
| clinopyroxene | 30-35% |
| phlogopite | 20-25 |
| groundmass | |
| plagioclase | 35-40 |
| opaque | 2- 3 |
| quartz | minor |
| apatite | trace |

Clinopyroxene forms in a wide variety of textures. Some coarser phenocrysts are up to 1.5 mm in size, averaging 1 mm across. Many of these are euhedral to subhedral in outline. Some are altered along their borders to secondary actinolite? which forms an extremely fine grained irregular intergrowth with pyroxene. Finer grained phenocrysts range from euhedral to subhedral, and commonly occur in clusters up to 1.5 mm across. Grain size ranges from 0.05-0.5 mm. Some clusters are replaced in their cores by patches up to 0.5 mm across of secondary actinolite in feathery to locally fibrous aggregates. A few clusters are extremely to very fine grained (0.02-0.05 mm) and contain moderately abundant disseminated opaque of similar grain size.

Phlogopite forms phenocrysts ranging up to 1.5 mm long, and grading down into groundmass size. Most are elongate flakes. Pleochroism is mainly from nearly colorless to light reddish brown. A few grains are altered in part to chlorite, with a colorless to pale green pleochroism and brownish interference color. A few coarser phlogopite phenocrysts contain patches and scattered grains of clinopyroxene averaging 0.1-0.15 mm in size, and may have irregular outlines.

Plagioclase generally occurs as irregular to slightly lathy grains averaging 0.02-0.05 mm in length, with a few patches of grains up to 0.3 mm in size. It is fresh.

Opaque forms irregular patches up to 1.5 mm in size consisting of very fine grained aggregates averaging 0.02-0.03 mm in grain size.

Quartz forms scattered interstital grains averaging 0.02-0.05 mm in size.

Apatite forms scattered anhedral grains averaging 0.05-0.1 mm in size.

I-N-20 Impure Quartzite (Ct-Plag-Ep)

The rock is a moderately foliated to strongly foliated impure quartzite, with lenses rich in plagioclase and epidote, and others with abundant calcite. Lenses are all very narrow, giving the rock an overall uniform appearance.

| | |
|---|---|
| quartz | 60-65% |
| calcite | 12-15 |
| plagioclase | 10-12 |
| epidote | 10-12 |
| opaque | minor |
| hematite | minor |
| zircon | one grain |

veinlets
calcite-(quartz)

Quartz occurs in a mosaic aggregate of grains averaging 0.03-0.1 mm in size. Grain size varies slightly between different layers and lenses. A few coarser grained patches and lenses of quartz up to 0.25 mm in size occur with coarser grained calcite.

Calcite forms irregular grains from 0.03-0.3 mm in size. It commonly is concentrated slightly in lenses and veinlets parallel to foliation. Coarser calcite commonly is intergrown with quartz of similar grain size, but locally forms calcite-rich veinlets with only minor quartz.

Plagioclase occurs in two modes. It forms scattered megacrysts from 0.5 to 1. 2 mm in size. Thes probably represent detrital grains. One is partly replaced in a coarse patch by K-feldspar. One contains an irregular patch of hematite up to 0.5 mm across. Most show dusty alteration to opaque and semiopaque, and locally to epidote. Plagioclase also forms lenses parallel to foliation averaging 0.05-0.15 mm in width; these consist of extremely fine grained aggregates, with locally coarser grains up to 0.3 mm in size.

Epidote occurs as very irregular grains and patches, commonly associated with plagioclase, and perhaps in large part formed by alteration of plagioclase. Grain size is mainly extremely fine, with carser grains up to 0.2 mm in size being skeletal to very irregular in outline.

Opaque forms a few patches up to 0.3 mm across of extremely fine grains rimmed by extremely fine grained semi-opaque Ti-oxide.

Zircon forms one rounded grain 0.1 mm across in quartz.

I-R-31 Impure Quartzite (Musc-Plag)

The rock is a strongly foliated quartzite with scattered megacrysts of plagioclase, and abundant seams of muscovite. Tourmaline forms scattered detrital grains. One seam contains moderately abundant chlorite; this may be a late vein.

| | | |
|---|---|---|
| quartz | 70-75% | vein |
| muscovite | 12-15 | sericite-chlorite-Ti-oxide-opaque |
| plagioclase | 7-10 | |
| Ti-oxide | 1½-2 | |
| calcite | ½- 1 | |
| hematite-opaque | ½ | |
| tourmaline | minor | |
| zircon | trace | |

Quartz occurs in an irregular aggregate of grains averaging 0.03-0.3 mm in size, with a weak to moderate elongation parallel to foliation. It also forms scattered coarser grains up to 1 mm in size, with a moderate to strong elongation parallel to foliation.

Muscovite forms seams averaging 0.03-0.15 mm thick composed of flakes up to 1 mm across. It also occurs in scattered unoriented grains intergrown with quartz. Associated with muscovite are irregular patches up to 0.3 mm across of extremely fine grained Ti-oxide and of opaque-hematite. In places opaque grains are rimmed by Ti-oxide.

Plagioclase forms scattered megacrysts from 0.5 to 1.5 mm in size. These generally are elongated parallel to foliation, with albite twins oriented subperpendicular to foliation. Plagioclase also forms irregular grains up to 0.5 mm in size intergrown with quartz. Plagioclase has about the same refractive index as quartz, indicating an oligoclase composition, and is distinguished from quartz in untwinned grains by a slight alteration to fine to very fine grained sericite.

Ti-oxide forms equant to irregular patches from 0.02-0.2 mm in size, composed of extremely fine grains. Hematite-opaque occur in similar patches, and gradations exist between different minerals in terms of optical properties.

Calcite forms irregular to regular patches averaging 0.02-0.1 mm in size, with a few up to 0.2 mm across.

Zircon forms scattered anhedral to subhedral grains averaging 0.03-0.1 mm in size. One elongated euhedral prismatic grain is 0.3 mm long.

Tourmaline forms scattered detrital grains and fragments, with the largest being 0.3 mm across, and most being between 0.05 and 0.1 mm in size. Pleochroism is from light brownish green to dark green in the largest fragment and from light to medium green in most other grains.

One seam up to 0.5 mm wide contains abundant intergrown muscovite and chlorite with lesser Ti-oxide and opaque patches. Muscovite and chlorite grains are up to 1.2 mm long. Chlorite is light green in color with weak pleochroism, and a bluish-white interference color. Ti-oxide and opaque patches are irregular in outline and average 0.05-0.2 mm in size.

I-N-11 Impure Quartzite (K-spar-Plag-Bio)

The rock is a strongly foliated very fine to fine grained impure quartzite with lenses parallel to foliation richer in quartz and others richer in biotite and feldspars, and with scattered feldspar megacrysts.

| | | | |
|---|---|---|---|
| quartz | 75-80% | | |
| K-feldspar | | | |
| megacrysts | 5- 7 | | |
| groundmass | 2- 3? | | |
| plagioclase | | | |
| megacrysts | 3- 4 | | |
| groundmass | 1- 2? | | |
| biotite | 5- 7 | apatite | trace |
| opaque | 0.2 | zircon | trace |
| sericite | minor | epidote | trace |
| actinolite | trace | chlorite | trace |
| hematite | trace | | |

Quartz occurs in quartz-rich layers as a submosaic aggregate of grains averaging 0.1-0.2 mm in size. In other layers, quartz is finer grained, averaging 0.02-0.05 mm in size. Scattered quartz grains are up to 0.8 mm in length, and generally elongated parallel to foliation Locally quartz occurs in a few patches at one end of the section intergrown with plagioclase or sericite; these probably represent original rock fragments of plagioclase-quartz, some of which have been replaced. An alternate hypothesis is that the plagioclase was formed as a megacryst with quartz inclusions during metamorphism.

K-feldspar and plagioclase form megacrysts which probably are of detrital origin. Commonly they are elongated parallel to foliation, and range in size from 0.5 to 2.5 mm long. K-feldspar commonly is slightly perthitic, and locally contains irregular inclusions of quartz and of sericite, the latter probably after plagioclase. Some plagioclase megacrysts are slightly to moderately altered to very fine grained sericite, and a few near one end are strongly altered to sericite.

The finer grained quartz layers contain moderately abundant very fine grained biotite in trains parallel to foliation. Biotite is pleochroic from light to medium brown, and has a texture suggesting that it was formed in a contact aureole. A few coarser grains of similar biotite up to 0.5 mm long are present. These layers also contain lenses of extremely fine to very fine grained K-feldspar and of plagioclase. Distinction og the two feldspars is difficult without the sodium cobaltinitrite stain.

Opaque forms scattered grains averaging 0.02-0.03 mm in size associated with biotite, and some lenses of grains up to 0.5 mm long parallel to the foliation in biotite-rich layers. A few grains are up to 0.2 mm across.

Sericite occurs mainly at one end as an alteration of plagioclase megacrysts and of plagioclase in aggregates with quartz.

Actinolite forms a cluster of a few grains up to 0.5 mm in size, irregularly intergrown with quartz.

Hematite forms irregular patches averaging 0.05-0.1 mm across.

Apatite forms a few irregular grains up to 0.15 mm long.

Zircon forms scattered grains from 0.1-0.15 mm in size. One is partly surrounded by opaque. Some others have unusual shapes, and may not be zircon. Epidote forms a few grains from 0.02-0.05 mm in size with K-feldspar megacrysts. Chlorite forms one irregular grain 0.1 mm across with a plagioclase megacryst.

I-N-22 Meta-mudstone to meta-siltstone

The rock is a very fine to fine grained clastic metasediment, whose parent was in the range mudstone-siltstone. Present layers probably represent original variation from a quartz-rich siltstone to a clay-rich mudstone. The rock was metamorphosed to the assemblage sericite-quartz-biotite-plagioclase-opaque. Later the rock was moderately to strongly kink folded, with recrystallization of mineral grains into new orientations around the folds.

| | |
|---|---|
| sericite-muscovite | 45-50% |
| quartz | 25-30 |
| biotite | 10-12 |
| plagioclase | 8-10 |
| opaque | 1½-2 |
| tourmaline | minor |
| apatite | trace |
| hematite | trace |
| zircon | trace |

Sericite-muscovite occurs as subparallel aggregates of flakes averaging 0.05-0.2 mm in length, with a few over 0.3 mm long. Some layers are coarser grained than others, and generally grains are more strongly oriented in the foliation plane in coarser grained layers. Some finer grained layers grade into very fine grained plagioclase-rich layers; textures indicate that sericite is replacing plagioclase. Plagioclase generally forms an anhedral aggregate of grains averaging 0.015-0.02 mm in size, with a few scattered grains up to 0.15 mm across. Plagioclase-rich lenses generally are discontinuous and less than 0.2 mm thick.

Quartz-rich lenses generally consist of mosaic aggregates of quartz averaging 0.05-0.1 mm in grain size. In some biotite is rather common, as scattered grains and clusters of grains averaging 0.03-0.1 mm in grain size. Biotite is pleochroic from pale to medium reddish to orangish brown.

Biotite also occurs in clots up to 0.5 mm in size in sericite-rich layers, generally surrounding a core of opaque. The opaque grains average 0.03-0.1 mm in size, with a few up to 0.3 mm across. They appear to be aggregates of very fine to extremely fine grains. Biotite grains are generally unoriented in the clots surrounding opaque, with grain size averaging 0.07 mm in length.

Opaque also occurs in some sericite and plagioclase-rich layers as dusty to extremely fine grained disseminated grains.

Tourmaline forms scattered subhedral grains averaging 0.02-0.03 mm in size. Pleochroism is from light or pale green to medium or light green.

Apatite forms scattered anhedral grains from 0.02-0.03 mm in average size.

Hematite forms a few irregular veinlets and selvages subparallel to foliation. It may be a late alteration mineral along fractures.

Zircon forms scattered anhedral grains from 0.02-0.03 mm in average size.

I-N-29 Meta-siltstone

The rock is a uniform schist to gneiss composed of lensy layers rich in quartz and others rich in sericite-biotite-(tourmaline), with gradations between the end members.

| | |
|---|---|
| quartz | 55-60% |
| sericite | 15-20 |
| biotite | 15-20 |
| hematite-Ti-oxide | 2- 3 |
| tourmaline | ½- 1 |
| opaque | minor |
| apatite | trace |
| zircon | trace |

Quartz occurs as an irregular mosaic aggregate averaging 0.05-0.2 mm in grain size. Generally it is slightly coarser in quartz-rich layers than in layers intergrown with micas.

Sericite and biotite occur together as irregular aggregates with a moderately preferred orientation parallel to foliation, and with grain size averaging 0.05-0.1 mm. Some of the grains appear to be intermediate in composition between sericite and biotite, with a pleochroism from nearly colorless to light brown. Biotite occurs in clusters of grains up to 0.5 mm across, commonly associated with opaque cores. In these biotite grains generally are not oriented parallel to foliation. Possibly these represent secondary aggregates formed in the contact zone. Biotite is pleochroic from pale to medium reddish to orangish brown.

Hematite and Ti-oxide occur in two types of aggregates; identification of minerals in these aggregates is indefinite. One type consists of extremely fine grained patches and lenses parallel to foliation. These appear to be mainly of hematite-limonite, and have a medium to dark orangish brown to reddish brown color. The second type is intergrown intimately with biotite and sericite, and appears to be secondary patches, veinlets, and selvages along fractures. The patches are extremely fine grained and almost opaque to opaque, with vaguely recognizable intergrown biotite and sericite. Some similar extremely fine grained patches appear to contain zircon? grains averaging 0.01-0.015 mm in size. The latter are identified by the fact that they are rimmed by dark color halos in surrounding biotite grains.

Tourmaline forms scattered anhedral to subhedral grains, probably of metamorphic origin. Some have well developed prismatic outlines with ragged terminations.Many are oriented with their c-axes parallel to the foliation plane. Pleochroism is from pale amber to medium yellowish olive. A few grains are very irregular in outline and some contain abundant poikilitic inclusions of quartz and sericite.

Apatite forms scattered anhedral grains from 0.1-0.2 mm in size.

Opaque forms scattered grains from 0.02-0.1 mm in size, generally surrounded by biotite clusters.

Zircon forms scattered subhedral prismatic grains from 0.03-0.07 mm in length in both quartz and micas, as well as the clusters in biotite described earlier.

BR Brecciated and Veined Quartz Vein; veins of Hematite-Limonite and possibly Cassiterite

The sample consists of a medium to fine grained quartz vein which was irregularly brecciated and recrystallized to an extremely fine to very fine grained aggregate, and then cut by irregular veins, mainly in the breccia groundmass.

| | |
|---|---|
| fragments of quartz vein (large) | 20-25% |
| small fragments enclosed in breccia matrix | 45-50 |
| breccia matrix with sparse fragments | 17-20 |
| muscovite | 1- 2 |
| sericite-muscovite patches, flakes | 0.5 |
| tourmaline | trace |
| veins | |
| hematite-limonite | 4- 5 |
| opaque | 1- 2 |
| cassiterite? | |

The original rock was a medium to fine grained quartz vein with a submosaic texture of anhedral grains averaging 0.2-0.5 mm in grain size. Larger fragments commonly contain irregular zones (generally as veinlets) along which the rock was crushed and recrystallized to extremely fine grained aggregates. Some patches contain moderately abundant muscovite flakes and clusters of flakes averaging 0.1-0.2 mm in size; in some fragments these show a preferred orientation. Sericite-muscovite forms scattered patches up to 1 mm in size; these appear to be secondary replacements of original plagioclase? grains. Some contain dusty to very fine grained opaque as disseminated grains and clusters of grains.

Much of the rock consists of smaller fragments of the quartz vein in a recrystallized groundmass of a very irregular aggregate of extremely to very fine grains of quartz. This commonly contains disseminated sericite flakes averaging 0.03-0.05 mm in length.

Some parts of the rock consists mainly of breccia matrix with only scattered fragments of quartz grains.

Tourmaline forms one anhedral grain 0.1 mm across; it is pleochroic from pale to medium yellowish brown, and is associated with a patch of sericite-muscovite.

The rock is cut by irregular, in part braided veins and veinlets. These consist mainly of opaque to semiopaque grains along narrower parts of veins and throughout some veins. Most wider veins have cavities into which are grown colloform aggregates of hematite-limonite averaging 0.05-0.07 mm in thickness. Parts of the breccia matrix contain very abundant interstitial Fe-oxides; these generally are near the major oxide veins. The oxide is orangish to reddish brown in color, extremely fine grained (commonly no apparent extinction), with a orange to red color in crossed nicols which is due manily to the mineral color.

Cassiterite may be present in the veins associated with hematite-limonite. The optical properties of cassiterite and hematite-limonite are not all that different, and it is possible that cassiterite is a minor to major component of the veins.

I-N-43 Actinolite-(Quartz) Skarn in Flow-Banded Andesite?

The original rock appears to have been a flow banded andesite composed mainly of laths of plagioclase. These show very tight folds probably formed during flow or possibly early deformation. The rock is replaced by an irregular aggregate of actinolite and lesser quartz.

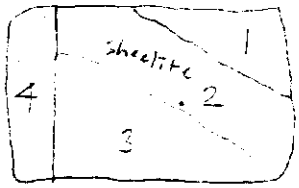
| | | |
|---|---|---|
| host rock | | |
| plagioclase | 20-25 | (moderately replaced by epidote, sericite) |
| apatite | minor | |
| quartz | 1- 2 | |
| skarn | | |
| actinolite | 60-65 | |
| quartz | 7-10 | |
| plagioclase | 2- 3 | |
| sphene | 0.4 | |
| biotite | trace | |
| chlorite | trace | |
| calcite | minor | |

The original rock occurs in patches up to a few mm across, mainly concentrated in the center of the section. It consists mainly of laths of plagioclase averaging 0.1-0.2 mm in length in parallel orientation. Tight folds with periods of 1-2 mm and similar amplitudes are common in the main zone of fragments. The origin of the folds is uncertain; the texture is similar to that of kink folds in sample I-N-22, but because of the difference in mineralogy, a similar origin is not expected. Rather, the folding may be an early feature formed during flowage of a magma. This data should be checked out by comparison with field data for both origin of the rock and age of deformation. Plagioclase is variably altered to irregular patches of extremely fine grained epidote or sericite; epidote commonly follows the folding pattern of the plagioclase. Apatite forms scattered anhedral grains averaging 0.1-0.2 mm in size. Quartz forms scattered grains averaging 0.03-0.1 mm in size. It may be related in origin to the skarn minerals.

The skarn is dominated by a very irregular aggregate of medium to coarse grained actinolite. The mineral is pale green in color with no noticeable pleochroism. Quartz forms scattered patches of fine to medium grains, commonly with scattered to moderately abundant inclusions of acicular actinolite. Plagioclase forms scattered patches of grains, commonly associated with quartz, averaging 0.05-0.15 mm in size.

Sphene forms scattered grains and clusters of grains with anhedral to euhedral outlines, and averaging 0.03-0.1 mm in size. Biotite forms scattered grains up to 0.15 mm long. Pleochroism is from nearly colorless to light brown. Chlorite forms a patch 0.2 mm across of a few fine grains The mineral is light greyish green in color with brownish to bluish interference color. Calcite forms scattered grains from 0.02-0.05 mm in size, and a few skeletal patches in some coarser actinolite grains.

R-555 Zoned Skarn




The rock is zoned as in the sketch, with gradational contacts between zones.

Zone 1 (dark skarn assemblage)

This zone is dominated by diopside (60-65%) as equant grains averaging 0.1-0.3 mm in size. Plagioclase (30-35%) forms interstitial grains of similar size. These are moderately altered to extremely fine grained patches of epidote. Quartz (3-5%) forms a few patches up to 1.2 mm in size of grains averaging 0.3-0.5 mm across. K-feldspar (2-3%) forms a few patches of grains up to 0.7 mm in grain size.

Zone 2 (dark skarn assemblage)

This zone contains about equal amounts (30-35%) of diopside, quartz, and plagioclase in fine grained aggregates with most grains averaging 0.05-0.1 mm in size, and a few over 0.2 mm across. Textures are irregular. A few quartz grains are up to 0.5 mm in size; coarser quartz commonly shows moderately strained extinction. Calcite (2-3%) forms scattered irregular grains up to 0.2 mm in size. Epidote (2-3%) forms irregular, generally extremely fine grained patches up to 0.3 mm in size, probably as an alteration of plagioclase.

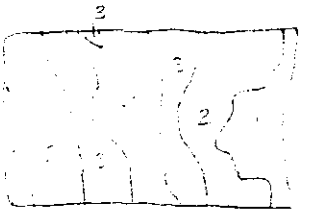
Zone 3 (light skarn assemblage)

This zone is dominated by actinolite (50%) and plagioclase (40%) with lesser quartz (10%) and minor diopside (2-3%), K-feldspar (2-3%) and garnet (1-2%). Actinolite forms anhedral aggregates of equant to slightly prismatic grains averaging 0.05-0.2 mm in size, with scattered poprhyroblasts as elongate prismatic grains from 0.7 to 2 mm in length. Plagioclase and quartz form irregular very fine to fine grained aggregates. Plagioclase is moderately altered to extremely fine to very fine grained epidote in irregular patches. Quartz also forms scattered patches of grains averaging 0.05-0.3 mm in size. Diopside forms irregular grains averaging 0.2-1 mm in size; it probably is being altered to actinolite. K-feldspar occurs with plagioclase and quartz as grains averaging 0.05-0.1 mm in size. Garnet forms scattered porphyroblasts? up to 0.5 mm across. These are skeletal, and contain abundant inclusions of quartz and feldspar. They are very similar in texture to epidote patches, the difference being that epidote shows a weak birefringence and garnet is isotropic. Sphene forms scattered grains up to 0.05 mm in size. The zone is cut by a very fine grained calcite vein 0.5 mm wide.

Zone 4

This zone is well banded, with bands rich in quartz and quartz-diopside, and others rich in plagioclase-epidote. Diopside and actinolite occur with plagioclase-epidote as fine grains. Some actinolite grains are up to 0.5 mm long, and a few porphyroblasts are over 1 mm long Calcite forms irregular grains and patches averaging 0.05-0.5 mm in size. K-feldspar (2-3%) occurs with quartz aggregates as grains averaging 0.05-0.2 mm in size. Opaque (1-1½%) forms clusters of grains averaging 0.03-0.05 mm in size. Garnet (2-3%) forms scattered very fine grained patches associated with epidote and diopside. Quartz and quartz-diopside bands commonly are medium grained, with grains elongated parallel to banding.

R Skarn Vein




The sample is zoned as shown in the sketch.

Zone 1 diopside-garnet-quartz-plagioclase

This zone is generally very fine grained, composed of anhedral diopside averaging 0.02-0.05 mm in size, with scattered irregular, in part skeletal garnet grains, and interstitial quartz and plagioclase. Scattered coarser grains of all minerals are present, with grain size of quartz up to 1 mm and of the others up to 0.3 mm. Mineral abundances are dio(60-65%), gar (10-12), qtz (7-10), plag (7-10).

Zone 2 diopside-plagioclase-quartz-(K-feldspar-opaque)

This zone averages 0.05-0.15 mm in grain size with diopside (60%) forming equant anhedral grains and clusters of grains. Plagioclase (20%) and quartz form interstitial grains averaging 0.05-0.2 mm in size, with a few coarser grains. K-feldspar (2-3%) forms interstitial, irregular grains averaging 0.03-0.1 mm in size intergrown with plagioclase. Opaque (½-1%) forms scattered grains averaging 0.03-0.1 mm in size, with a few grains up to 0.7 mm in size. Sphene (minor) forms scattered grains up to 0.05 mm in size, commonly in irregular patches of grains up to 0.3 mm across. Calcite and epidote form scattered very irregular patches along the border with zone 3. Quartz forms about 15% of the zone.

Zone 3 plagioclase-K-feldspar-diopside-quartz

Plagioclase forms irregular grains averaging 0.5-1 mm in size. These are slightly to moderately interlocking with other plagioclase grains. K-feldspar forms irregular patches replacing plagioclase grains. Quartz forms scattered medium to coarse grains. Interstitial to the coarser grained minerals are irregular patches of very fine grained feldspars and quartz. Calcite and epidote form irregular alteration patches as along the border with zone 2. A few veinlike zones up to 0.1 mm wide consist of fine grained calcite and epidote. Diopside forms scattered irregular grains from 0.3-3 mm in size, and a few subhedral to euhedral grains up to 0.5 mm across. Mineral abundances are as follows plag - 60, diop - 10, qtz - 15, ct - 2, ep - 2, K-feldspar 10.

Zone 4 quartz

This zone consists of coarse grained quartz averaging 1 to 2 mm in grain size. Grains are slightly to moderately strained.

# APPENDIX II

## ANALYTICAL METHODS

APPENDIX II

## ANALYTICAL METHODS

### 1. Geochemical Analytical Procedure

PPM Tungsten:

1.00 gm sample is fused with potassium bisulfate and leached with hydrochloric acid. The reduced form of tungsten is complexed with toluene 3,4 dithiol and extracted into an organic phase. The resulting color is visually compared to similarly prepared standards.
Detection limit - 4 ppm.

PPM Tin:

1.00 gm of sample is sintered with ammonium iodide. The resulting tin iodide is leached with a dilute HCl - ascorbic acid solution. The TOPO complex is then extracted into MIBK and analysed via A.A.
Detection limit - 1 ppm.

PPB Gold:

5 gm samples ashed at 800°C for one hour, digested with aqua regia - twice to dryness - taken up in 25% HCL, the gold then extracted as the bromide complex into MIBK and analysed via A.A.
Detection limit - 10 ppb

### 2. Assay Analytical Procedure

(a) F.A. - A.A. Gold Combo Method:

For low grade samples and geochemical materials 10 gram samples are fused with the addition of 10 mg of Au-free Ag metal and cupelled. The silver bead is parted with dilute $HNO_3$ and then treated with aqua regia. The salts are dissolved in dilute HCl and analysed for Au on an atomic absorption spectrophotometer to a detection of 5 ppb.

(b) Tin Method:

1.00 gm sample of Sn is fused with peroxide and acid leached. The precipitate is dissolved in base and runs on an atomic absorption spectrometer.

(c) Tungsten Methods:

i) 1.00 gm sample of tungsten is acid digested in a flask. A portion is taken and reduced with stannous chloride forming a complex of KSCN and the yellow colour is produced on a colourimeter.

ii) Neutron activation - 1.00 gm sample of tungsten is irradiated in a neutron flux. Tungsten is measured on a detector by different energy levels reflecting different half-lifes.

# APPENDIX III

## STATISTICAL TREATMENT OF DATA FROM 65 PUP

APPENDIX III

STATISTICAL TREATMENT OF DATA FROM 65 PUP

1. Theory

The standard deviation (S) is defined as the square root of the arithmetic mean of the squared deviations from the mean.

1a symbols:

$$S = \sqrt{\frac{\sum_{i=1}^{N} (Xi - \bar{X})^2}{N}}$$

Social Statistics
2nd Edition, H.M. Blalock, 1972
pp 80 - 83

with the workable form of the equation becoming

$$S = \sqrt{\frac{\sum_{i=1}^{N} Xi - \bar{X}^2}{N}}$$

where -
2 S + X = threshold

2. Data and Calculations

Sn for 65 Pup Grid

| Sn(ppm) | Frequency |
|---|---|
| 1 | 990 |
| 2 | 58 |
| 3 | 2 |
| 4 | 1 |
| 6 | 1 |
| | N = 1,052 |

$X = 990 + 116 + 6 + 4 + 6 = 1,122$

$\bar{X} = \frac{1122}{1051} = 1.068$ $\bar{X}^2 = 1.14$

$\sum X_i^2 = 989(1^2) + 58(2^2) + 2(3^2) + 1(4^2) + 1(6^2) = 1291$

$\frac{\sum X^2}{N} = \frac{1291}{1052} = 1.227$

$S = 1.227 - 1.14 = 0.295$

$2S = .592$

$2S + \bar{X} = 1.659$

threshold = 2

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## ROCK CHIP SAMPLE DATA

CALC-SILICATE SKARN (ASSAY)

| Number | Location | Grid Reference | Notes | Date | Type | Depth | Length | Width | Remarks | VALUES $WO_3$ % | Sn % | Au oz/t | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1WA0005R | Rhosgobel Grid | 3+250E 5+470N | | | | | | | Calc-silicate skarn | 0.03 | 0.01 | 0.003 | | |
| 1WA0087R | Rhosgobel Grid | 4+900E 4+000N | | | | | | | Calc-silicate skarn | 0.05 | | | | |
| 1WA0008R | Rhosgobel Grid | 4+900E 4+000N | | | | | | | Calc-silicate skarn | 0.03 | 0.02 | | | |
| 1WR0048R | Rhosgobel Creek Sections A-G | UTM 3974E 70802N | | | | | | | Calc-silicate skarn | 0.01 | | | | |
| 1WR0049R | Rhosgobel Creek Sections A-G | UTM 3974E 70802N | | | | | | | Calc-silicate skarn | 0.09 | | | | |
| 1WR0050R | Rhosgobel Creek Sections A-G | UTM 3974E 70802N | | | | | | | Calc-silicate skarn | 0.68 | | | | |
| 1WR0051R | Rhosgobel Creek Sections A-G | UTM 3974E 70802N | | | | | | | Calc-silicate skarn | 0.01 | | | | |
| 1WR0052R | Rhosgobel Creek Sections A-G | UTM 3974E 70802N | | | | | | | Calc-silicate skarn | 1.31 | | | | |
| 1WR0054R | Rhosgobel Creek Sections A-G | UTM 3974E 70802N | | | | | | | Calc-silicate skarn | 0.01 | | | | |
| 1WR0055R | Rhosgobel Creek Sections A-G | UTM 3974E 70802N | | | | | | | Calc-silicate skarn | 0.59 | | | | |
| 1WR0037R | Rhosgobel Grid | 3+400E 5+575N | | | | | | | Calc-silicate skarn | 0.64 | 0.01 | | | |
| 1WR0001R | Rhosgobel Grid | UTM 3989E 70794N | | | | | | | Calc-silicate skarn | 0.35 | | | | |
| 1WN001R | Josephine Area | UTM 3985E 70844N | | | | | | | Massive calc-silicate skarn | 0.04 | | | | |
| 1WN0012R | Josephine Area | UTM 3985E 70844N | | | | | | | Massive calc-silicate skarn | 0.03 | | | | |
| 1WN0013R | Josephine Area | UTM 3985E 70844N | | | | | | | Massive calc-silicate skarn | 0.04 | | | | |
| 1WN0014R | Josephine Area | UTM 3983E 70844N | | | | | | | Massive calc-silicate skarn | 0.03 | | | | |
| 1WN0015R | Josephine Area | UTM 3983E 70848N | | | | | | | Massive calc-silicate skarn | 0.03 | | | | |
| 1WN0016R | Josephine Area | UTM 3986E 70849N | | | | | | | Laminated skarn - biotite quartzite schist | 0.02 | | | | |

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## ROCK CHIP SAMPLE DATA

CALC-SILICATE SKARN (ASSAY)

| Number | Location | Grid Reference | Notes | Date | Type | Depth | Length | Width | Remarks | VALUES $WO_3$ % | Sn % | Au oz/t | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1WN0019R | Left Clear Creek Harpers Placer | UTM 3936E 70809N | | | | | | | Dark calc-silicate skarn | 0.02 | | | | |
| 1WN0020R | Left Clear Creek Harpers Placer | UTM 3936E 70809N | | | | | | | Dark calc-silicate skarn | 0.03 | | | | |
| 1WN0022R | Left Clear Creek Harpers Placer | UTM 3936E 70805N | | | | | | | Dark calc-silicate skarn | 0.03 | | | | |
| 1WN0023R | Left Clear Creek Harpers Placer | UTM 3959E 70801N | | | | | | | Dark calc-silicate skarn | 0.05 | | | | |
| 1WA0004R | Rhosgobel Grid | 3+000E 5+300N | | | | | | | Light calc-silicate hornfels | 0.02 | | | | |

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# ROCK CHIP SAMPLE DATA

ARSENOPYRITE-QUARTZ VEINS (ASSAY)

| Number | Location | Grid Reference | Notes | Date | Type | Depth | Length | Width | Remarks | VALUES Au oz/t | Ag oz/t | Sb % | $WO_3$ % | Pb % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30650 | BOB Claims | | | | | | | | Mineralized quartzite float from Big Creek | 0.003 | 0.05 | 1.770 | | |
| 1WK0300R | Josephine Area | UTM 3956E 70860N | | | | | | | Quartz-scorodite-arsenopyrite felsenmeer | 0.005 | | | | |
| 1WC0950R | Josephine Area | UTM 3989E 70834N | | | | | | | Quartz-arsenopyrite vein | 0.570 | | | | |
| 1WS0606R | Josephine Grid | | | | | | | | Quartz-arsenopyrite vein | 0.882 | | | | |
| 1WR0045R | Josephine Grid | 3+400N | | | | | | | Quartz-arsenopyrite vein | 0.624 | | | | |
| 1WR0035R | Josephine Creek Contact Zone | UTM 4006E 70848N | | | | | | | Quartz-arsenopyrite vein | 0.088 | | | 0.01 | |
| 1WA0071R | Josephine Grid | 3+975E 13+180N | | | | | | | Quartz-arsenopyrite vein | 0.028 | | | | |
| 30666 | Little South Klondike | UTM 3943E 70899N | | | | | | | Quartz-arsenopyrite-jamesonite float | 0.020 | 0.44 | 1.930 | | 3.14 |
| 30667 | Little South Klondike | UTM 3943E 70899N | | | | | | | Quartz-arsenopyrite-jamesonite float | | | | 0.01 | |
| 1WR0016R | Ridge between Josephine & Rhosgobel | UTM 3984E 70828N | | | | | | | Quartz-arsenopyrite vein | 1.313 | 1.33 | | | |
| 1WR0017R | Ridge between forks Big Creek | UTM 4032E 70818N | | | | | | | Quartz-arsenopyrite vein | 0.112 | | | | |
| 1WN0010R | Little South Klondike | UTM 3983E 70843N | | | | | | | Quartz-arsenopyrite-scorodite vein | 0.386 | 0.12 | | 0.01 | |

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# ROCK CHIP SAMPLE DATA

HORNFELSES (ASSAY)

| Number | Location | Grid Reference | Notes | Date | Type | Depth | Length | Width | Remarks | VALUES $WO_3$ % | Sn % | Au oz/t | Zn % | Ag oz/t |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1WA0006R | Rhosgobel Grid | 4+100E 4+520N | | | | | | | Hornfelses | 0.06 | 0.01 | 0.003 | | |
| 1WK0301R | Josephine Grid | 3+650E 13+470N | | | | | | | Biotite hornfels with arsenopryite | | | 0.003 | | |
| 1WX0001R | Josephine Area | UTM 3985E 70843N | | | | | | | Hornfels | | | 0.003 | | |
| 1WR0053R | Rhosgobel Creek Section A-G | UTM 3974E 70802N | | | | | | | Biotite hornfels | 0.01 | | 0.02 | | |
| 30668 | Rhosgobel Creek | UTM 3978E 70803N | | | | | | | Biotite hornfels | 0.03 | | 0.003 | 0.01 | |
| 1WK0001R | Barney Ridge | UTM 3888E 70798N | | | | | | | Quartz hornfels | | 0.01 | | | |
| 1WK0002R | Barney Ridge | UTM 3888E 70798N | | | | | | | Quartz hornfels | | 0.01 | | | |
| 1WR0018R | Ridge of South of Lewis Gulch | UTM 3960E 70835N | | | | | | | Arsenopyrite-scorodite-galena in hornfels | | | 0.386 | Pb % 4.48 | 6.64 |

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# ROCK CHIP SAMPLE DATA

BRECCIA (ASSAY)

| Number | Location | Grid Reference | Notes | Date | Type | Depth | Length | Width | Remarks | VALUES Sn % | F % | $WO_3$ % | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30683 | Barney Ridge | UTM 3897E 70803N | | | | | | | Aplite/quartzite breccia | 0.01 | | | | |
| 30684 | Rhosgobel (West Ridge) | UTM 3992E 70815N | | | | | | | Dark limonitic breccia | 0.01 | | | | |
| 30685 | Barney Ridge | UTM 3888E 70798N | | | | | | | Quartzite breccia | 0.01 | | | | |
| B86 | Barney Ridge | UTM 3888E 70798N | | | | | | | Bulk sample, quartzite breccia | 0.01 | 0.02 | | | |
| B87 | Barney Ridge | UTM 3888E 70798N | | | | | | | Bulk sample, quartzite breccia | 0.01 | 0.02 | | | |
| B88 | Barney Ridge | UTM 3888E 70798N | | | | | | | Bulk sample, quartzite breccia | 0.01 | 0.02 | | | |
| 1WR0047R | Josephine Grid | 4+350E 13+750N | | | | | | | Breccia, biotite quartzite schist | | | 0.05 | | |
| 30664 | Barney Grid | 5+000E 4+200N | | | | | | | Breccia | 0.01 | | | | |
| 30669 | Between Josephine & Rhosgobel Grids | UTM 3985E 70829N | | | | | | | Breccia | 0.01 | | | | |
| 1WRCAS | Left Clear Creek Panned | UTM 3873E 70792N | | | | | | | Panned cassiterite nodules | 1.00 | | 0.04 | | |
| 1WRCAS2 | Queenstake Placer | UTM 3882E 70746N | | | | | | | Dredged cassiterite nodules | 3.38 | | | | |
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# ROCK CHIP SAMPLE DATA

INTRUSIVE ROCKS (ASSAY)

| Number | Location | Grid Reference | Notes | Date | Type | Depth | Length | Width | Remarks | VALUES $WO_3$ % | Sn % | Au oz/t | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1WB0144R | Rhosgobel Grid | 4+460E 4+780N | | | | | | | Porphyritic quartz monzonite | 0.01 | 0.02 | 0.003 | | |
| 1WX0003R | Josephine Area North of Grid | UTM 3972E 70846N | | | | | | | Quartz-feldspar poprhyry | | | 0.003 | | |

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# ROCK CHIP SAMPLE DATA

CALC-SILICATE SKARN (GEOCHEMISTRY)

| Number | Location | Grid Reference | Notes | Date | Type | Depth | Length | Width | Remarks | Values W ppm | Sn ppm | Au ppb | Ag ppm | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1WD0003R | Rhosgobel Grid | 2+900E 5+550N | | | | | | | Dark skarn | 1 | 1 | | | |
| 1WJ0276R | Rhosgobel Grid | 2+650E 5+350N | | | | | | | Dark skarn | 1 | 1 | | | |
| 1WJ0281R | Rhosgobel Grid | 4+700E 4+600N | | | | | | | Dark skarn | 1 | 1 | 20 | | |
| 1WR0041R | Rhosgobel Grid | 4+800E 4+000N | | | | | | | Light siliceous skarn | 60 | 1 | | | |
| 1WR0041R | Rhosgobel Grid | 4+800E 4+000N | | | | | | | Light siliceous skarn | 800 | 1 | | | |
| 1WR0042R | Rhosgobel Grid | 4+800E 4+000N | | | | | | | Light siliceous skarn | 35 | 1 | | | |
| 1WK0003R | Rhosgobel Grid | UTM 3915E 70830N | | | | | | | Dark skarn with altered phyllite | 8 | | | | |
| 1WR0019R | Left Clear Creek Area | UTM 3968E 70833N | | | | | | | Dark skarn with no visible scheelite | 1 | | | | |
| 1WN0005R | North slope of ridge above Harpers Placer | UTM 3998E 70858N | | | | | | | Light skarn | 1 | | | | |
| 1WN0007R | North slope of ridge above Harpers Placer | UTM 3984E 70848N | | | | | | | Light skarn | 1 | | 5 | 0.2 | |
| 1WN0008R | North slope of ridge above Harpers Placer | UTM 3984E 70848N | | | | | | | Light skarn | 1 | | | | |
| 1WN0009R | North slope of ridge above Harpers Placer | UTM 3977E 70859N | | | | | | | Light skarn | 4 | | | | |
| 1WN0006R | North slope of ridge above Harpers Placer | UTM 3980E 70858N | | | | | | | Light skarn | 15 | | | | |
| 1WJ0313R | Rhosgobel Grid | 4+400E 5+500N | | | | | | | Light skarn | 1 | | | | |
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## ROCK CHIP SAMPLE DATA

HORNFELS ZONE ROCKS (GEOCHEMISTRY)

| Number | Location | Grid Reference | Notes | Date | Type | Depth | Length | Width | Remarks | VALUES Au ppb | W ppm | Sn ppm | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1WW0403R | Rhosgobel Grid | 4+000E 4+275N | | | | | | | Biotite hornfels from western contact with Rhosgobel Stock | 20 | 100 | 2 | | |
| 1WR0034R | Rhosgobel Grid | 3+800E | | | | | | | Light green hornfelsic quartzite | 120 | 325 | 2 | | |
| 1WK0032R | Rhosgobel Grid | 4+750E 4+180N | | | | | | | Gossanous biotite hornfels | | 32 | 1 | | |
| 1WJ0277R | Rhosgobel Grid | 4+600E 4+400N | | | | | | | Biotite hornfels | 10 | 12 | 1 | | |
| 1WJ0278R | Rhosgobel Grid | 4+600E 3+600N | | | | | | | Biotite hornfels | 10 | 10 | 1 | | |
| 1WJ0274R | Rhosgobel Grid | 4+700E 3+750N | | | | | | | Biotite hornfels | 10 | 1 | 1 | | |
| 1WJ0280R | Rhosgobel Grid | 4+700E 4+150N | | | | | | | Biotite hornfels | 10 | 1 | 1 | | |
| 1WJ0281R | Rhosgobel Grid | 4+700E 4+600N | | | | | | | Biotite hornfels | 20 | 1 | 1 | | |
| 1WB0145R | Rhosgobel Grid | 4+475E 4+275N | | | | | | | Quartzitic hornfels | 10 | 12 | 1 | | |
| 1WB0146R | Rhosgobel Grid | 4+800E 3+565N | | | | | | | Quartzitic hornfels | 10 | 1 | 1 | | |
| 1WB0147R | Rhosgobel Grid | 4+380E 3+815N | | | | | | | Chloritic hornfels | 10 | 1 | 1 | | |
| 1WB0148R | Rhosgobel Grid | 4+470E 5+450N | | | | | | | Chloritic hornfels | 10 | 1 | 1 | | |
| 1WW468R | Rhosgobel Grid | 4+500E 3+900N | | | | | | | Biotite hornfels | | 1 | 1 | | |
| 1WW469R | Rhosgobel Grid | 4+450E 3+700N | | | | | | | Biotite hornfels | | 18 | 1 | | |
| 1WW470R | Rhosgobel Grid | 4+315E 4+490N | | | | | | | Biotite hornfels | | 15 | 2 | | |
| 1WW523R | Rhosgobel Grid | 3+400E 5+275N | | | | | | | | 10 | 2 | | | |
| 1WW524R | Rhosgobel Grid | 3+400E 5+275N | | | | | | | | 10 | 40 | | | |
| 1WW525R | Rhosgobel Grid | 3+300E 6+000N | | | | | | | Interbedded biotite and quartzitic hornfels | 10 | 1 | | | |

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# ROCK CHIP SAMPLE DATA

HORNFELS ZONE ROCKS (GEOCHEMISTRY)

| Number | Location | Grid Reference | Notes | Date | Type | Depth | Length | Width | Remarks | VALUES Au ppb | W ppm | Sn ppm | U ppm | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1WW528R | Rhosgobel Grid | 3+300E 5+950N | | | | | | | Interbedded quartzitic and calc-silicate hornfels | 100 | 90 | | | |
| 1WW568R | Rhosgobel Grid | 3+200E 6+000N | | | | | | | Interbedded biotite hornfels and phyllite | 10 | 1 | | | |
| 1WW571R | Rhosgobel Grid | 3+100E 5+900N | | | | | | | Interbedded biotite hornfels and phyllitic quartzite | 10 | 1 | | | |
| 1WS0183R | Rhosgobel Grid | 5+000E 5+250N | | | | | | | Hornfels | | 6 | 1 | | |
| 1WS0194R | Rhosgobel Grid | 5+000E 5+150N | | | | | | | Hornfels | 10 | 5 | | | |
| 1WS0206R | Rhosgobel Grid | 5+000E 4+550N | | | | | | | Biotite hornfels | | 41 | 1 | | |
| 1WJ0302R | Rhosgobel Grid | 4+600E 5+500N | | | | | | | Biotite hornfels | | 1 | | | |
| 1WB0167R | Rhosgobel Grid | 4+900E 5+900N | | | | | | | Quartzitic hornfels | 10 | 12 | | | |
| 1WB0247R | Rhosgobel Grid | 3+400E 3+800N | | | | | | | Biotite hornfels | | 1 | 2 | | |
| 1WK0031R | Rhosgobel Grid | 4+110E 3+330N | | | | | | | Gossanous hornfels | 10 | 1 | 1 | 1 | |
| | | | | | | | | | | | | | | |
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# ROCK CHIP SAMPLE DATA

INTRUSIVE ROCKS (GEOCHEMISTRY)

| Number | Location | Grid Reference | Notes | Date | Type | Depth | Length | Width | Remarks | VALUES Au ppb | W ppm | Sn ppm | U ppm | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1WW0404R | Rhosgobel Grid | 4+000E 4+300N | | | | | | | Porphyritic quartz monzonite from Rhosgobel Stock | 10 | 35 | 1 | | |
| 1WW0051R | Rhosgobel Grid | 3+700E 5+250N | | | | | | | Porphyritic quartz monzonite from Rhosgobel Stock | 10 | 1 | 1 | | |
| 1WR0020R | Rhosgobel Grid | 4+200E 5+150N | | | | | | | Porphyritic quartz monzonite from Rhosgobel Stock | | 30 | | | |
| 1WR0021R | Rhosgobel Grid | 4+200E 6+000N | | | | | | | Porphyritic quartz monzonite from Rhosgobel Stock | 5 | 9 | 4 | 4 | |
| 1WR0022R | Rhosgobel Grid | 4+100E 5+575N | | | | | | | Porphyritic quartz monzonite from Rhosgobel Stock | | 10 | | | |
| 1WR0023R | Rhosgobel Grid | 4+050E 5+300N | | | | | | | Porphyritic quartz monzonite from Rhosgobel Stock | | 30 | | | |
| 1WR0024R | Rhosgobel Grid | 4+300E 5+650N | | | | | | | Porphyritic quartz monzonite from Rhosgobel Stock | | 20 | | | |
| 1WR0025R | Rhosgobel Grid | 4+300E 5+800N | | | | | | | Porphyritic quartz monzonite from Rhosgobel Stock | | 7 | | | |
| 1WR0038R | Rhosgobel Grid | 3+700N | | | | | | | Granodiorite from Rhosgobel Stock | 10 | 1 | 1 | | |
| 1WW0526R | Rhosgobel Grid | 3+400E 5+800N | | | | | | | Porphyritic quartz monzonite from Rhosgobel Stock | 100 | 90 | | | |
| 1WW0635R | Rhosgobel Grid | 4+000E 6_200N | | | | | | | Porphyritic quartz monzonite from Rhosgobel Stock | 10 | 42 | | | |
| 1WM0456R | Rhosgobel Grid | 3+600E 5+200N | | | | | | | Porphyritic quartz monzonite from Rhosgobel Stock | 10 | 1 | | | |
| 1WM0468R | Rhosgobel Grid | 3+800E 5+450N | | | | | | | Porphyritic quartz monzonite from Rhosgobel Stock | 10 | 5 | | | |
| 1WM0469R | Rhosgobel Grid | 3+800E 5+500N | | | | | | | Porphyritic quartz monzonite from Rhosgobel Stock | 20 | 1 | | | |
| 1WB0158R | Rhosgobel Grid | 4+900E 5+450N | | | | | | | Porphyritic quartz monzonite from Rhosgobel Stock | 10 | 1 | | | |
| 1WB0191R | Rhosgobel Grid | 4+700E 5+000E | | | | | | | Porphyritic quartz monzonite from Rhosgobel Stock | 10 | 1 | | | |
| 1WN0017R | North slope of ridge above Harpers Placer | UTM 3940E 70798N | | | | | | | Quartz-feldspar porphyry | 10 | 1 | Ag ppm 0.6 | | |
| 1WK0302R | Josephine Grid | 3+650E 13+470N | | | | | | | Lamprophyre dyke containing sulphides | | | | Cu ppm 960 | |

**BEMA INDUSTRIES LTD.** DATE _____ PROJECT 81-05G
COLLECTOR _____ N·T·S· 115 P/14, 15
ANALYST CHEMEX LABS LTD. North Vancouver, B.C.

# ROCK CHIP SAMPLE DATA

MISCELLANEOUS ROCK GEOCHEMISTRY

| Number | Location | Grid Reference | Notes | Date | Type | Depth | Length | Width | Remarks | VALUES U ppm | Au ppb | W ppm | Sn ppm | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1WK0005R | Clear Creek Road Cut | UTM 3789E 70744N | | | | | | | Quartz-arsenopryite scorodite vein | 0.5 | 10 | 1 | 1 | |
| 1WK0007R | Clear Creek Road Cut | UTM 3789E 70749N | | | | | | | Quartz vein | 0.5 | 10 | 1 | 1 | |
| 1WK0008R | Clear Creek Road Cut | UTM 3788E 70744N | | | | | | | Calcareous quartzite and phyllite | 0.5 | 10 | 1 | 1 | |
| 1WK015R | Clear Creek Road Cut | UTM 3790E 70746N | | | | | | | Quartz vein with iron oxides | 0.5 | 10 | 1 | 1 | |
| LWK0016R | Clear Creek Road Cut | UTM 3790E 70744 | | | | | | | 1 metre quartz vein with pyrite and arsenopyrite | 0.5 | 10 | 1 | 1 | |
| 1WK0030R | 65 Pup Grid | 3+500E 2+970N | | | | | | | Phyllitic quartzite with iron oxide staining | 1.0 | 10 | | 1 | |
| 1WK0028R | 65 Pup Grid | 3+500E 2+645N | | | | | | | Phyllitic quartzite | 1.0 | 10 | | 1 | |
| 1WK0029R | 65 Pup Grid | 3+560E 2+550N | | | | | | | Massive quartzite | 1.0 | 10 | | 1 | |
| 1WK0031R | Rhosgobel Grid | 4+110E 3+330N | | | | | | | Gossanous phyllitic quartzite | 1.0 | 10 | | 1 | |
| 1WN0002R | Little South Klondike River area | UTM 3895E 70844N | | | | | | | Arsenopyrite disseminated on fracture planes | | | 1 | | |
| 1WN0003R | Little South Klondike River area | UTM 3895E 70852N | | | | | | | Green chloritic quartzite | | | 8 | | |

# APPENDIX IV

## BUDGET - 1981 SUMMER PROGRAM

WEST RIDGE GEOLOGICAL PROGRAM

BUDGET EXPENDITURES

April 1 to September 30, 1981

LABOUR

Geology:

| Name & Position | Days | Rate | Extension |
|---|---|---|---|
| G. Nordin<br>Senior Geologist | 51.777 | $350.00/day | $ 17,911.95 |
| D. Shaw<br>Senior Project Geologist | 4.0<br>2.358 | $350.00/day<br>$325.00/day | 1,400.00<br>766.35 |
| R. Rainbird<br>Geologist | 18.144<br>109.43 | $200.00/day<br>$225.00/day | 3,628.80<br>24,621.75 |
| D. Kelly<br>Geologist | 16.501<br>99.82 | $200.00/day<br>$225.00/day | 3,300.20<br>22,459.50 |
| A. Morrison<br>Junior Geologist | 103.00 | $200.00/day | 20,600.00 |
| J.T. Borthwick<br>Geological Assist. #2 | 58.00 | $125.00/day | 7,250.00 |
| R. Cahill<br>Geological Assist. #2 | 71.00 | $125.00/day | 8,875.00 |
| J. Donnelly<br>Geological Assist. #2 | 23.00 | $125.00/day | 2,875.00 |
| B. Mann<br>Geological Assist. #2 | 37.00 | $125.00/day | 4,625.00 |
| S. Butler<br>Geological Assist. #2 | 52.00 | $125.00/day | 6,500.00 |
| P. Romard<br>Geological Assist. #2 | 0.5 | $125.00/day | 62.50 |
| S. Wollner<br>Geological Assist. #3 | 83.572 | $ 95.00/day | 7,939.34 |
| R. Gardner<br>Geological Assist. #3 | 3.50 | $ 95.00/day | 332.50 |

Geology Cont'd.

| Name & Position | Days | Rate | Extension |
|---|---|---|---|
| V. Koyanagi<br>Geological Assist. #3 | 2.5 | $ 95.00/day | $ 237.50 |
| P. Jones<br>Geological Assist. #3 | 65.0 | $ 95.00/day | 6,175.00 |
| K. Miller<br>Geological Assist. #3 | 86.0 | $ 95.00/day | 8,170.00 |
| T. Olson<br>Geological Assist. #4 | 19.0 | $ 85.00/day | 1,615.00 |
| | TOTAL GEOLOGY | | $149,345.39 |

Operations:

| | | | |
|---|---|---|---|
| B.J. Newton<br>Camp Cook | 118.0 | $175.00/day | $ 20,650.00 |
| B. Newton<br>Camp Manager | 26.0<br>91.0 | $175.00/day<br>$145.00/day | 4,550.00<br>13,195.00 |
| C. Johnson<br>Yukon Operations Manager | 3.0 | $200.00/day | 600.00 |
| N. Marcy<br>Field Supervisor #2 | 15.5 | $175.00/day | 2,712.50 |
| K. Hansen<br>Field Supervisor #2<br>Warehouseman | 18.0<br>.78 | $175.00/day<br>$135.00/day | 3,150.00<br>105.30 |
| D. Larsen<br>Field Technician #1 | 2.5 | $165.00/day | 412.50 |
| D. Powell<br>Field Technician #2 | 13.5 | $145.00/day | 1,957.50 |
| E. Nyland<br>Field Technician #2 | 12.0 | $145.00/day | 1,740.00 |
| R. Jordon<br>Field Technician #2<br>Warehouseman | 16.714<br>.429 | $145.00/day<br>$135.00/day | 2,423.53<br>57.91 |
| J. MacRae<br>Field Technician #2 | 21.0 | $145.00/day | 3,045.00 |
| M. Wyllie<br>Field Technician #2 | 12.0 | $145.00/day | 1,740.00 |

Operations Cont'd.

| Name & Position | Days | Rate | Extension |
|---|---|---|---|
| D. Stephens<br>Field Technician #3 | 3.0 | $125.00/day | $ 375.00 |
| C. Risebrough<br>Field Technician #3 | 14.0 | $125.00/day | 1,750.00 |
| I. Sturrock<br>Field Technician #3 | 13.0 | $125.00/day | 1,625.00 |
| R. Horth<br>Field Technician #3 | 3.0 | $125.00/day | 375.00 |
| | TOTAL OPERATIONS | | $ 60,464.24 |

Surveying:

| | | | |
|---|---|---|---|
| J. Pierce<br>Surveyor | 14.5 | $175.00/day | $ 2,537.50 |
| P. Newton<br>Surveyor's Assist. #1 | 14.0 | $125.00/day | 1,750.00 |
| | TOTAL SURVEYING | | $ 4,287.50 |

Support Staff:

| | | | |
|---|---|---|---|
| M.J. Beley<br>Project Manager | 4.27 | $250.00/day | $ 1,067.50 |
| I. Johnson<br>Operations Manager | 4.84 | $200.00/day | 968.00 |
| R. Barclay<br>Project Manager | 2.0 | $250.00/day | 500.00 |
| D. Dick<br>Geological Manager | 3.0 | $425.00/day | 1,275.00 |
| A. Thacker<br>Purchaser | 5.27 | $135.00/day | 711.45 |
| C. Smith<br>Accountant | 2.0 | $145.00/day | 290.00 |
| S. Oxenbury<br>Accountant | 10.82 | $145.00/day | 1,568.90 |

Support Staff Cont'd.

| Name & Position | Days | Rate | Extension |
|---|---|---|---|
| P. Dickinson<br>Geological Secretary | 4.24 | $135.00/day | $ 572.40 |
| V. Kwantes<br>Secretary | 0.5 | $135.00/day | 67.50 |
| 7 Draftsmen | 683.50 hours | $ 22.00/hour | 15,037.00 |
| | TOTAL SUPPORT STAFF | | $ 22,057.75 |

| | |
|---|---|
| Geology | $149,345.39 |
| Operations | 60,464.24 |
| Surveying | 4,287.50 |
| Support Staff | 22,057.75 |
| TOTAL LABOUR | $236,154.88 |

DISBURSEMENTS

| CODE | DISBURSEMENTS | EXPENDITURES AS OF SEPTEMBER 30 |
|---|---|---|
| 1000 | Accommodation | $ 961 |
| 1500 | Aircraft Charter | |
| 1518 | Helicopter Charter | 55,480 |
| 1527 | Helicopter Fuel | 10,949 |
| 1800 | Assaying | |
| 1867 | Rock Samples | 409 |
| 2500 | Camp Construction | |
| 2523 | Electrical Supplies | 1,361 |
| 2547 | Lumber Supplies | 5,308 |
| 2561 | Plumbing Supplies | 2,501 |
| 2600 | Camp Equipment | 10,854 |
| 2800 | Caterpillar Tractor | |
| 2826 | Fuel | 882 |
| 2860 | Parts & Service | 63 |
| 3200 | Communication | |
| 3224 | Equipment & Supplies | 433 |
| 3268 | Radio Rentals | 625 |
| 3276 | Telephone Rentals | 3,998 |
| 3500 | Copying | 277 |
| 3900 | Drafting | |
| 3956 | Orthophoto | 21,990 |
| 3966 | Reproduction | 2,860 |
| 3924 | Supplies | 145 |
| 4500 | Fees | |
| 4511 | Assessment Fees | 15,215 |
| 4551 | Miscellaneous Fees | 3,256 |
| 4700 | Freight | 3,854 |
| 4800 | Fuel | |
| 4826 | Camp Fuel | 3,193 |
| 4828 | Equipment Fuel | 1,417 |

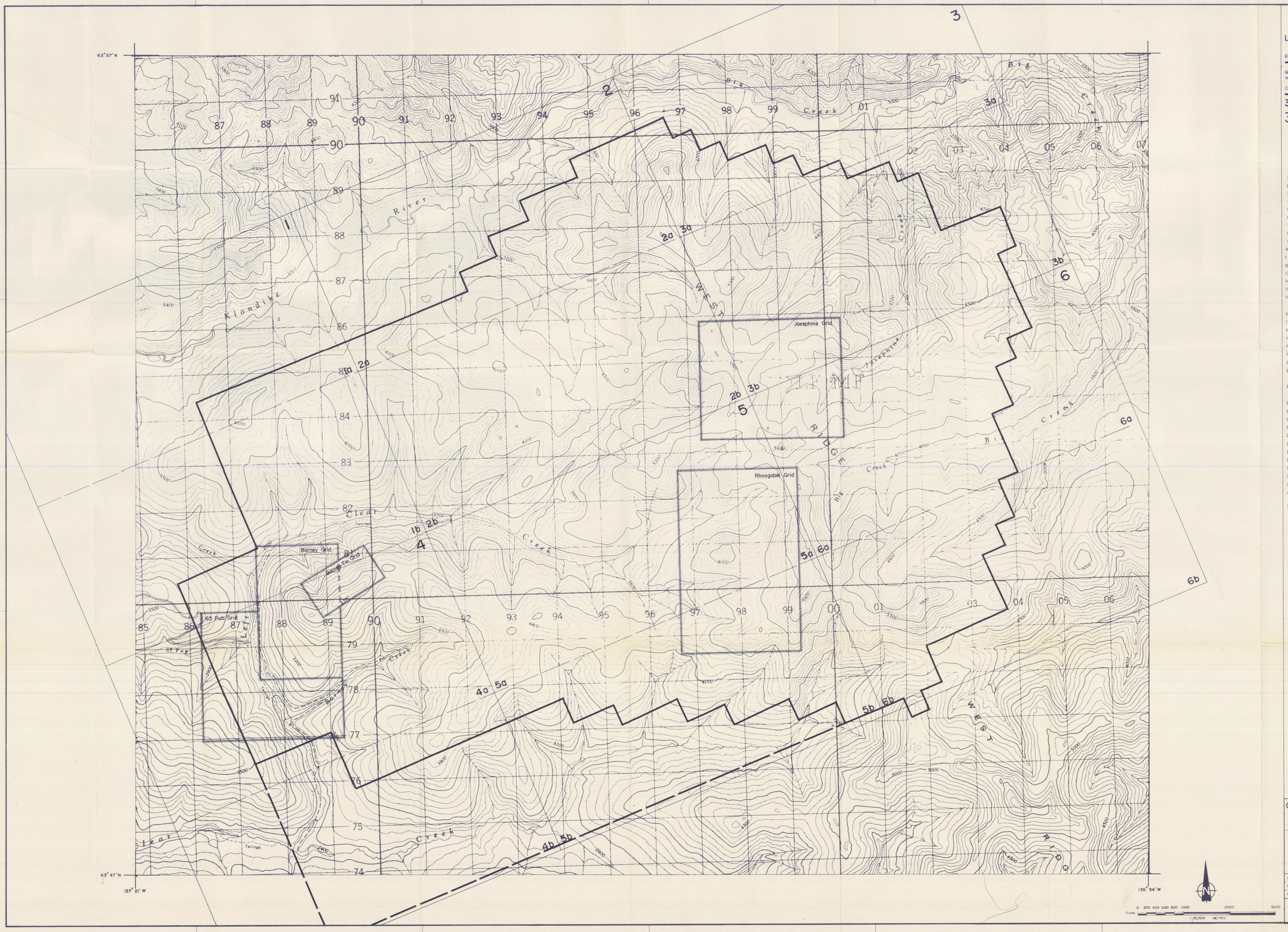
| CODE | DISBURSEMENTS | EXPENDITURES AS OF SEPTEMBER 30 |
|---|---|---|
| 5000 | Geochemical Analysis | 28,696 |
| 5300 | Groceries | 24,882 |
| 6000 | Linecutting Equipment & Supplies | 1,875 |
| 7000 | Office Supplies | 1,457 |
| 7800 | Small Field Tools | 4,826 |
| 8000 | Surveying Supplies/Equipment | 478 |
| 8500 | Travel (Personnel) | 14,941 |
| 9000 | Vehicles | |
| 9026 | Fuel | 6,264 |
| 9060 | Parts & Service | 741 |
| 9068 | Rentals | 15,588 |
| | TOTAL DISBURSEMENTS | $245,779 |

## TOTAL BUDGET EXPENDITURES

| | |
|---|---|
| DISBURSEMENTS | $245,779.00 |
| LABOUR | 236,154.88 |
| RENTALS | 10,462.00 |
| EXPEDITING (Warehousing) | 12,000.00 |
| TOTAL | $504,395.88 |

# APPENDIX V

## ASSAY AND GEOCHEMISTRY ANALYSES




## LEGEND

CLAIM GROUP BOUNDARY

GRID BOUNDARY

CLAIM GROUP BOUNDARY EXTENSION - 81

3a 1:5,000 MAPPED AREA

3 1:10,000 MAPPED AREA

1 Location Map - 1:500,000
2 Key Map
3 Regional Geology 1:25,000
4 Heavy Mineral and silt Geochemistry 1:25,000
5 1:10,000 Sample Location (No silt or Heavy Mineral)
6 1:10,000 Sample Location (No silt or Heavy Mineral)
7 1:10,000 Sample Location (No silt or Heavy Mineral)
8 1:10,000 Sample Location (No silt or Heavy Mineral)
9 1:10,000 Sample Location (No silt or Heavy Mineral)
10 1:10,000 Sample Location (No silt or Heavy Mineral)
11 1:10,000 Regional Geology
12 1:10,000 Regional Geology
13 1:10,000 Regional Geology
14 1:10,000 Regional Geology
15 1:10,000 Regional Geology
16 1:10,000 Regional Geology

BARNEY RIDGE - 65 PUP GRID (1:5,000)

17a Geology Barney Ridge - 65 Pup Grid (1:5,000) Index 1b
17b Geology Barney Ridge - 65 Pup Grid (1:5,000) Index 4a
18a Soil Sample Location with Geochemistry Map (1:5,000) Index 1b
18b Soil Sample Location with Geochemistry Map (1:5,000) Index 4a
19a Soil Geochemistry Contour Maps for W (1:5,000) Index 1b
19b Soil Geochemistry Contour Maps for W (1:5,000) Index 4a
20a Soil Geochemistry Contour Maps for Au (1:5,000) Index 1b
20b Soil Geochemistry Contour Maps for Au (1:5,000) Index 4a

BARNEY TIN GRID

21 Geology (1:5,000)

RHOSGOBEL GRID

22a Geology (1:5,000) Index 5a
22b Geology (1:5,000) Index 5b
23a Soil Sample Location with Geochemistry Map (1:5,000) Index 5a
23b Soil Sample Location with Geochemistry Map (1:5,000) Index 5b
24a Soil Geochemistry Contour Maps for W (1:5,000) Index 5a
24b Soil Geochemistry Contour Maps for W (1:5,000) Index 5b
25a Soil Geochemistry Contour Maps for Au (1:5,000) Index 5a
25b Soil Geochemistry Contour Maps for Au (1:5,000) Index 5b
26 Rhosgobel Grid Cross Section A to B + C to D
27 Rhosgobel Creek Sections A to G
28 Rhosgobel Creek Section H
29 Rhosgobel Creek Section I

JOSEPHINE GRID

30 Geology (1:5,000)

090926

CANADA TUNGSTEN MINING CORPORATION
WEST RIDGE Y·T·
1981 GEOLOGICAL EXPLORATION PROGRAMME

# KEY MAP

| | | |
|---|---|---|
| DATE NOVEMBER 1981 | JOB NO 81-05G | FIG NO 2 |
| DRAWN BY K.K. | | |
| REVISED BY | SCALE 1:25,000 | METRES |

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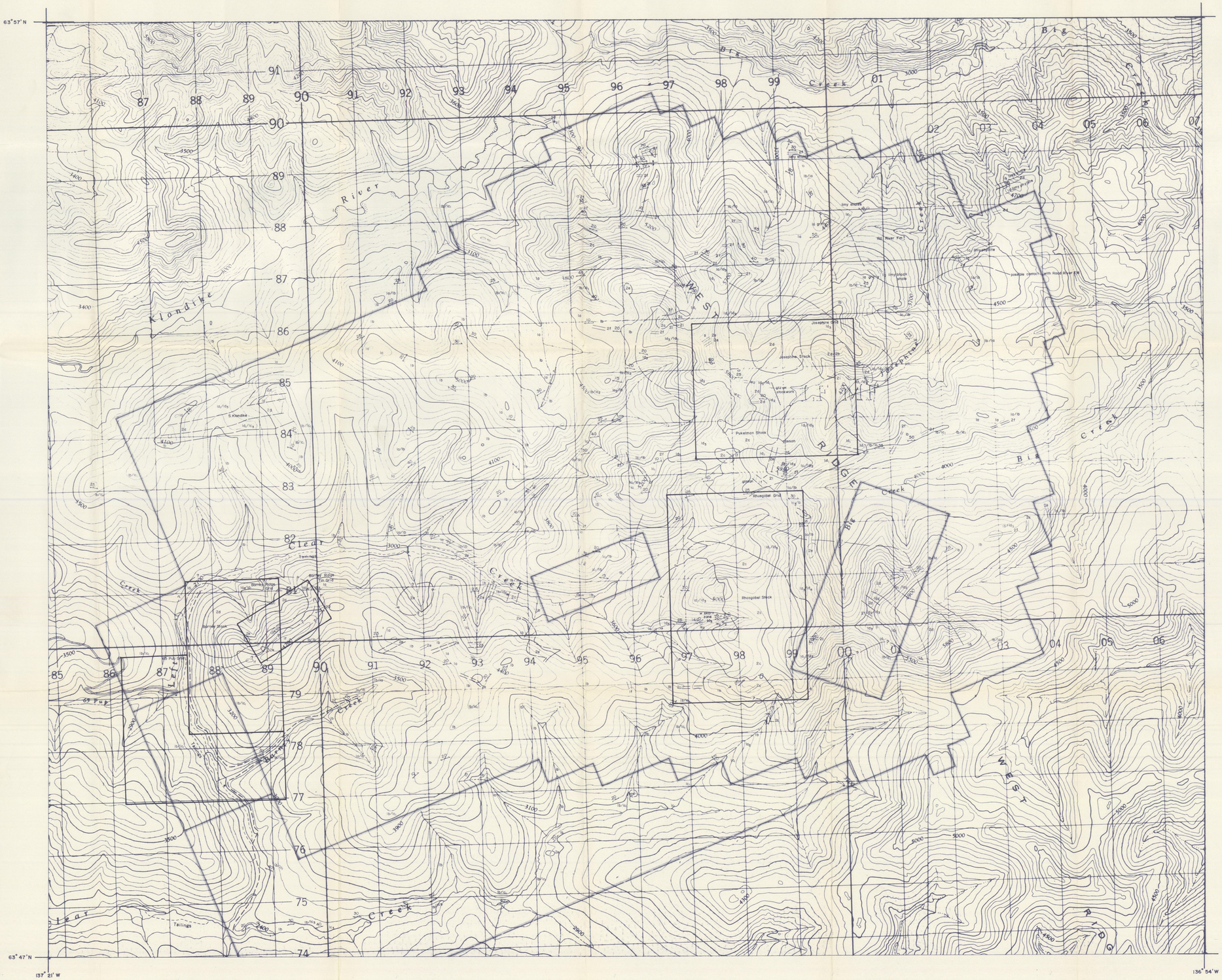
BEMA DRAFTING




## LEGEND

### SYMBOLS

GEOLOGICAL BOUNDARY
- defined
- approximate
- assumed

LIMIT of GEOLOGICAL MAPPING

OUTCROP

FELSENMEER

TALUS

FAULTS
- defined
- approximate
- assumed

VEIN STRUCTURE
- defined
- approximate
- assumed

BEDDING
- horizontal
- vertical
- inclined
- overturned

FOLIATION
- horizontal
- vertical
- inclined
- unknown

ANTICLINE
- defined
- approximate
- overturned

SYNCLINE
- defined
- approximate
- overturned

JOINTING
- vertical: weak, moderate, strong
- inclined: weak, moderate, strong

MINOR FOLDS
- style & direction

GLACIAL STRIAE
- movement known
- movement known

SHAFT

RAISE

WINZE

ADIT or TUNNEL
- caved

QUARRY or MINE
- active
- abandoned

TRENCH
- closed end
- open end

PIT

GRAVEL PIT
- active
- dormant

DUMP or TAILINGS

DDH & NUMBER
- location
- surface projection

OVERBURDEN DRILL HOLE
- location

CHIP SAMPLE

ROCK SAMPLE

FLOAT
- with rock type

SURVEY STATION

TRIANGULATION POINT

CLAIM POST

CLAIM BOUNDARY

ROAD

CAT TRAIL

CABIN

SPRING

### LITHOLOGY

JURASSIC AND OR CRETACEOUS
Intrusive and subvolcanic (hypabyssal) rocks

2

- 2a Aplite
- 2b Granodiorite
- 2c Porphyritic quartz monzonite
- 2d Quartz diorite and diorite
- 2e Rhyolite (quartz porphyry)
- 2f Lamprophyre and other associated biotite rich intrusive rocks
- 2g Basalt and amygdaloidal basalt
- 2h Felsic volcanic rocks and tuff
- 2i Quartz-arsenopyrite vein rock

LATE PRECAMBRIANN OR EARLY PALEOZOIC
Upper schist / Grit unit

1

- 1a Massive, gritty and thin bedded quartzite
- 1b Phyllitic quartzite
- 1c Phyllite: $c_1$ Muscovite-sericite phyllite
  - $c_2$ Chloritic phyllite
  - $c_3$ Graphitic phyllite
- 1d Hornfelsic rocks: $d_1$ Interlayered quartzite and biotite schist
  - $d_2$ Massive and interlayered biotite and chloritic schist
  - $d_3$ Massive quartzitic hornfels
  - $d_4$ Greisen
- 1e Calc-silicate skarn: $e_1$ Pyroxene
  - $e_2$ Wollastonite-quartz-light
- 1f Breccia
- 1g Marble

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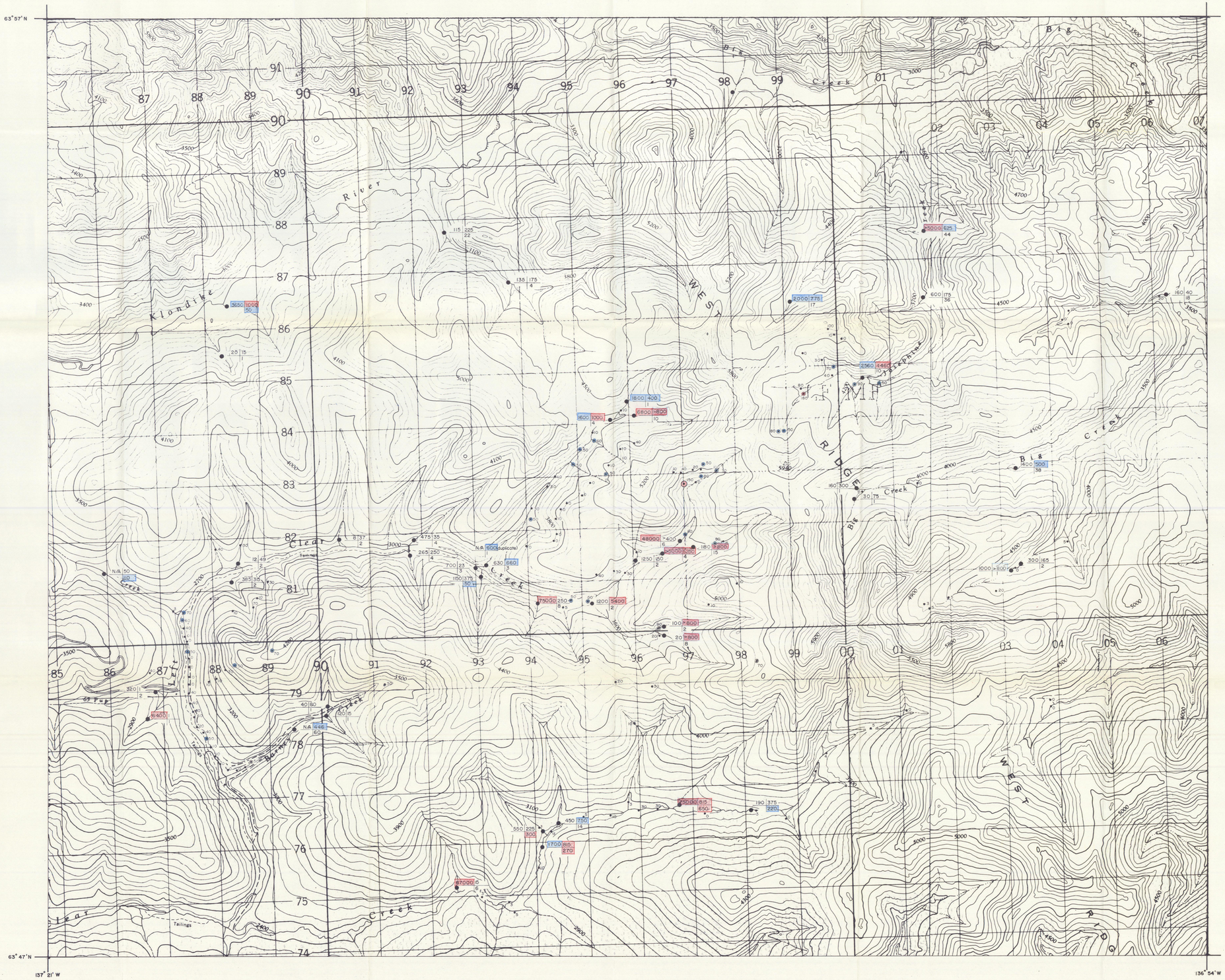
1981 GEOLOGICAL EXPLORATION PROGRAMME

# REGIONAL GEOLOGY

| | | |
|---|---|---|
| DATE NOVEMBER, 1981 | JOB NO 81-05G | FIG. NO. 3 |
| DRAWN BY K.K. | | |
| REVISED BY | SCALE 1:25,000 | METRES |

BEMA INDUSTRIES LTD.




## LEGEND

HEAVY MINERAL SAMPLE SITE

- Au | W / Sn
- W — greater than 800 ppm
- W — 400-800 ppm
- Au — greater than 5000 ppb
- Au — 1500-5000 ppb
- Sn — greater than 250 ppm
- Sn — 50-250 ppm

• SILT SAMPLE SITE - W (results after Archer-Cathro 1971 North Stewart River Joint Venture)

- greater than 100 ppm W
- 50-100 ppm W

09^926

CANADA TUNGSTEN MINING CORPORATION

# WEST RIDGE Y·T·

1981 GEOLOGICAL EXPLORATION PROGRAMME

# HEAVY MINERAL & SILT GEOCHEMISTRY

| | | |
|---|---|---|
| DATE NOVEMBER 1981 | JOB NO 81-05G | FIG. NO 4 |
| DRAWN BY MJU. | | |
| REVISED BY | SCALE 1:25,000 | METRES |

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BEMA DRAFTING




## LEGEND

| Au (ppb) | W (ppm) | Ag (ppm) |
|---|---|---|
| U (ppm) | Sn (ppm) | Pb (ppm) |

• (K0005 SL) SAMPLE LOCATION

099926

CANADA TUNGSTEN MINING CORPORATION

WEST RIDGE Y.T.

1981 GEOLOGICAL EXPLORATION PROGRAMME

# SAMPLE LOCATION

| | | |
|---|---|---|
| DATE NOVEMBER, 1981 | JOB NO 81-056 | FIG NO 5 |
| DRAWN BY T.D. | SCALE 1:10,000 | METRES |
| REVISED BY | | |

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BEMA DRAFTING




INDEX No 2

LEGEND

| Au (ppb) | W (ppm) | Ag (ppm) |
|---|---|---|
| U (ppm) | Sn (ppm) | Pb (ppm) |

●(K0006SL) SAMPLE LOCATION

096926

CANADA TUNGSTEN MINING CORPORATION

WEST RIDGE Y·T·

1981 GEOLOGICAL EXPLORATION PROGRAMME

# SAMPLE LOCATION

| | | |
|---|---|---|
| DATE: NOVEMBER, 1981 | JOB NO. 81-05 G | FIG. NO. 6 |
| DRAWN BY: M.J.U. | | |
| REVISED BY: | SCALE: 1:10,000 METRES | |

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BEMA DRAFTING

396 000 E | 397 000 E | 7 092 000 N | 398 000 E | 399 000 E | 7 093 000 N | 400 000 E | 401 000 E | 402 000 E | 7 094 000 N

7 091 000 N | 396 000 E | 7 090 000 N | 7 089 000 N | 397 000 E | 7 088 000 N | 7 087 000 N | 7 086 000 N | 398 000 E | 7 085 000 N

399 000 E | 400 000 E | 402 000 E | 7 086 000 N | 403 000 E | 404 000 E | 406 000 E | 7 087 000 N

Scale 0 200 500 1000 Metres

INDEX No 3

LEGEND

| Au (ppb) | W (ppm) | Ag (ppm) |
|---|---|---|
| U (ppm) | Sn (ppm) | Pb (ppm) |

• (K0005 SL) SAMPLE LOCATION

090926

CANADA TUNGSTEN MINING CORPORATION

WEST RIDGE Y.T.

1981 GEOLOGICAL EXPLORATION PROGRAMME

# SAMPLE LOCATION

| | | |
|---|---|---|
| DATE: NOVEMBER, 1981 | JOB NO. 81-05 G | FIG NO. 7 |
| DRAWN BY: T.D. | SCALE: 1:10,000 | METRES |
| APPROVED BY: | | |

BEMA INDUSTRIES LTD.

BEMA DRAFTING




LEGEND

| Au (ppb) | W (ppm) | Ag (ppm) |
|---|---|---|
| U (ppm) | Sn (ppm) | Pb (ppm) |

• (K0005SL) SAMPLE LOCATION

09-926

CANADA TUNGSTEN MINING CORPORATION
WEST RIDGE Y·T·
1981 GEOLOGICAL EXPLORATION PROGRAMME

# SAMPLE LOCATION

| | | |
|---|---|---|
| DATE NOVEMBER, 1981 | JOB NO 81-05G | FIG NO 8 |
| DRAWN BY MJU | | |
| REVISED BY: | SCALE 1:10,000 | METRES |

BEMA INDUSTRIES LTD.

BEMA DRAFTING




INDEX No 5

## LEGEND

| Au (ppb) | W (ppm) | Ag (ppm) |
|---|---|---|
| U (ppm) | Sn (ppm) | Pb (ppm) |

•(K0035R) SAMPLE LOCATION

09 926

CANADA TUNGSTEN MINING CORPORATION

WEST RIDGE Y·T·

1981 GEOLOGICAL EXPLORATION PROGRAMME

# SAMPLE LOCATION

| | | |
|---|---|---|
| DATE NOVEMBER, 1981 | JOB NO 81-05G | FIG NO 9 |
| DRAWN BY KN | | |
| REVISED BY | SCALE 1:10,000 | METRES |

BEMA INDUSTRIES LTD.

BEMA DRAFTING




INDEX No 6

## LEGEND

| | | |
|---|---|---|
| Au (ppb) | W (ppm) | Ag (ppm) |
| U (ppm) | Sn (ppm) | Pb (ppm) |

● (K00055L) SAMPLE LOCATION

090926

CANADA TUNGSTEN MINING CORPORATION

WEST RIDGE Y·T·

1981 GEOLOGICAL EXPLORATION PROGRAMME

# SAMPLE LOCATION

| | | |
|---|---|---|
| DATE NOVEMBER, 1981 | JOB NO 81-05G | FIG NO 10 |
| DRAWN BY MJU | | |
| REVISED BY | SCALE 1:10,000 | METRES |

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BEMA DRAFTING

7 086 000 N 382 000 E | 383 000 E | 384 000 E | 7 087 000 N | 385 000 E | 386 000 E | 387 000 E | 7 088 000 N | 388 000 E

7 085 000 N | 382 000 E | 7 084 000 N | 7 083 000 N | 383 000 E | 7 082 000 N | 7 081 000 N | 384 000 E | 7 080 000 N | 7 079 000 N

385 000 E 7 079 000 N | 386 000 E | 387 000 E | 7 080 000 N | 388 000 E | 389 000 E | 390 000 E 7 081 000 N | 391 000 E

7 087 000 N | 389 000 E | 7 086 000 N | 390 000 E | 7 085 000 N

INDEX No I

## LEGEND

### SYMBOLS

GEOLOGICAL BOUNDARY — defined; approximate; assumed

LIMIT of GEOLOGICAL MAPPING

OUTCROP

FELSENMEER

TALUS

FAULTS — defined; approximate; assumed

VEIN STRUCTURE — defined; approximate; assumed

BEDDING — horizontal; vertical; inclined; overturned

FOLIATION — horizontal; vertical; inclined; unknown

ANTICLINE — defined; approximate; overturned

SYNCLINE — defined; approximate; overturned

JOINTING — vertical: weak, moderate, strong; inclined: weak, moderate, strong

MINOR FOLDS — 10° style & direction; 10°; 10°

GLACIAL STRIAE — movement known; movement known

SHAFT

RAISE

WINZE

ADIT or TUNNEL — caved

QUARRY or MINE — active; abandoned

TRENCH — closed end; open end

PIT

GRAVEL PIT — active; dormant

DUMP or TAILINGS

DDH & NUMBER — ⊙80-00 location; surface projection

OVERBURDEN DRILL HOLE — ●OBH-80 location

CHIP SAMPLE

ROCK SAMPLE

FLOAT — △2 with rock type

SURVEY STATION

TRIANGULATION POINT

CLAIM POST

CLAIM BOUNDARY

ROAD

CAT TRAIL

CABIN

SPRING

### LITHOLOGY

JURASSIC AND OR CRETACEOUS
intrusive and subvolcanic (hypabyssal) rocks

2
- 2a Aplite
- 2b Granodiorite
- 2c Porphyritic quartz monzonite
- 2d Quartz diorite and diorite
- 2e Rhyolite (quartz porphyry)
- 2f Lamprophyre and other associated biotite rich intrusive rocks
- 2g Basalt and amygdaloidal basalt
- 2h Felsic volcanic rocks and tuff
- 2i Quartz-arsenopyrite vein rock

LATE PRECAMBRIANN OR EARLY PALEOZOIC
Upper schist / Grit unit

1
- 1a Massive, gritty and thin bedded quartzite
- 1b Micaceous quartzite
- 1c Phyllite - $c_1$ Muscovite-sericite phyllite; $c_2$ Chloritic phyllite; $c_3$ Graphitic phyllite
- 1d Hornfelsic rocks - $d_1$ interlayered quartzite and biotite schist; $d_2$ Massive and interlayered biotite and chloritic schist; $d_3$ Massive quartzitic hornfels; $d_4$ Greisen
- 1e Calc-silicate skarn $e_1$ Pyroxene-(dark); $e_2$ Wollastonite-quartz-(light)
- 1f Breccia
- 1g Marble

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CANADA TUNGSTEN MINING CORPORATION
WEST RIDGE Y.T.
1981 GEOLOGICAL EXPLORATION PROGRAMME

# REGIONAL GEOLOGY

INDEX I

| | | |
|---|---|---|
| DATE NOVEMBER, 1981 | JOB NO 81-05G | FIG NO. 11 |
| DRAWN BY K.K. | | |
| REVISED BY | SCALE 1:10,000 METRES | |

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BEMA DRAFTING

389 000 E 7 089 000 N 390 000 E 391 000 E 392 000 E 7 090 000 N 393 000 E 394 000 E 7 091 000 N 395 000 E

7 088 000 N 7 087 000 N 7 086 000 N 7 085 000 N 7 084 000 N 7 083 000 N 7 082 000 N

392 000 E 7 082 000 N 393 000 E 394 000 E 395 000 E 7 083 000 N 396 000 E 397 000 E 7 084 000 N 398 000 E

INDEX No 2

# LEGEND

## SYMBOLS

GEOLOGICAL BOUNDARY
- defined
- approximate
- assumed

LIMIT of GEOLOGICAL MAPPING

OUTCROP

FELSENMEER

TALUS

FAULTS
- defined
- approximate
- assumed

VEIN STRUCTURE
- defined
- approximate
- assumed

BEDDING
- horizontal
- vertical
- inclined
- overturned

FOLIATION
- horizontal
- vertical
- inclined
- unknown

ANTICLINE
- defined
- approximate
- overturned

SYNCLINE
- defined
- approximate
- overturned

JOINTING
- vertical: weak, moderate, strong
- inclined: weak, moderate, strong

MINOR FOLDS
- style & direction

GLACIAL STRIAE
- movement known
- movement known

SHAFT

RAISE

WINZE

ADIT or TUNNEL
- caved

QUARRY or MINE
- active
- abandoned

TRENCH
- closed end
- open end

PIT

GRAVEL PIT
- active
- dormant

DUMP or TAILINGS

DDH & NUMBER
- 80-00 location
- surface projection

OVERBURDEN DRILL HOLE
- OBH-80 location

CHIP SAMPLE

ROCK SAMPLE

FLOAT
- △2 with rock type

SURVEY STATION

TRIANGULATION POINT

CLAIM POST

CLAIM BOUNDARY

ROAD

CAT TRAIL

CABIN

SPRING

## LITHOLOGY

JURASSIC AND OR CRETACEOUS
intrusive and subvolcanic (hypabyssal) rocks

2
- 2a Aplite
- 2b Granodiorite
- 2c Porphyritic quartz monzonite
- 2d Quartz diorite and diorite
- 2e Rhyolite (quartz porphyry)
- 2f Lamprophyre and other associated biotite rich intrusive rocks
- 2g Basalt and amygdaloidal basalt
- 2h Felsic volcanic rocks and tuff
- 2i Quartz - arsenopyrite vein rock

LATE PRECAMBRIAN and OR EARLY PALEOZOIC
Upper schist / Grit unit

1
- 1a Massive, gritty and thin bedded quartzite
- 1b Micaceous quartzite
- 1c Phyllite: $c_1$ Muscovite - sericite phyllite
  - $c_2$ Chloritic phyllite
  - $c_3$ Graphitic phyllite
- 1d Hornfelsic rocks: $d_1$ Interlayered quartzite and biotite schist
  - $d_2$ Massive and interlayered biotite and chloritic schist
  - $d_3$ Massive quartzitic hornfels
  - $d_4$ Greisen
- 1e Calc-silicate skarn: $e_1$ Pyroxene-(dark)
  - $e_2$ Wollastonite-quartz-(light)
- 1f Breccia
- 1g Marble

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WEST RIDGE Y·T·
1981 GEOLOGICAL EXPLORATION PROGRAMME

# REGIONAL GEOLOGY

INDEX 2

| | | |
|---|---|---|
| DATE: NOVEMBER, 1981 | JOB NO. 81-05G | FIG. NO. 12 |
| DRAWN BY: K.N. | SCALE: 1:10,000 | METRES |
| REVISED BY: | | |

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BEMA DRAFTING




INDEX No 3

## LEGEND

### SYMBOLS

GEOLOGICAL BOUNDARY — defined; approximate; assumed

LIMIT of GEOLOGICAL MAPPING

OUTCROP

FELSENMEER

TALUS

FAULTS — defined; approximate; assumed

VEIN STRUCTURE — defined; approximate; assumed

BEDDING — horizontal; vertical; inclined; overturned

FOLIATION — horizontal; vertical; inclined; unknown

ANTICLINE — defined; approximate; overturned

SYNCLINE — defined; approximate; overturned

JOINTING — vertical: weak, moderate, strong; inclined: weak, moderate, strong

MINOR FOLDS — style & direction

GLACIAL STRIAE — movement known; movement known

SHAFT

RAISE

WINZE

ADIT or TUNNEL — caved

QUARRY or MINE — active; abandoned

TRENCH — closed end; open end

PIT

GRAVEL PIT — active; dormant

DUMP or TAILINGS

DDH & NUMBER — ⊙80-00 location; ⊙—45° surface projection

OVERBURDEN DRILL HOLE — ●OBH-80 location

CHIP SAMPLE

ROCK SAMPLE

FLOAT — △2 with rock type

SURVEY STATION

TRIANGULATION POINT

CLAIM POST

CLAIM BOUNDARY

ROAD

CAT TRAIL

CABIN

SPRING

### LITHOLOGY

JURASSIC AND OR CRETACEOUS
Intrusive and subvolcanic (hypabyssal) rocks

2
- 2a Aplite
- 2b Granodiorite
- 2c Porphyritic quartz monzonite
- 2d Quartz diorite and diorite
- 2e Rhyolite (quartz porphyry)
- 2f Lamprophyre and other associated biotite rich intrusive rocks
- 2g Basalt and amygdaloidal basalt
- 2h Felsic volcanic rocks and tuff
- 2i Quartz - arsenopyrite vein rock

LATE PRECAMBRIANN OR EARLY PALEOZOIC
Upper schist / Grit unit

1
- 1a Massive, gritty and thin bedded quartzite
- 1b Micaceous quartzite
- 1c Phyllite - $c_1$ Muscovite - sericite phyllite; $c_2$ Chloritic phyllite; $c_3$ Graphitic phyllite
- 1d Hornfelsic rocks - $d_1$ Interlayered quartzite and biotite schist; $d_2$ Massive and interlayered biotite and chloritic schist; $d_3$ Massive quartzitic hornfels; $d_4$ Greisen
- 1e Calc-silicate skarn - $e_1$ Pyroxene - (dark); $e_2$ Wollastonite - quartz - (light)
- 1f Breccia
- 1g Marble

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# WEST RIDGE Y.T.
1981 GEOLOGICAL EXPLORATION PROGRAMME

# REGIONAL GEOLOGY
INDEX 3

| | | |
|---|---|---|
| DATE NOVEMBER, 1981 | JOB NO. 81-05G | FIG NO. 13 |
| DRAWN BY: K.K. | | |
| APPROVED BY: | SCALE: 1:10,000 | METRES |

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WEST RIDGE CAMP

BARNEY GRID

BARNEY TIN GRID

65 PUP GRID

SCOTT PLACER

SUNDANCE PLACER

QUEENSTAKE PLACER

INDEX No 4

## LEGEND

### SYMBOLS

GEOLOGICAL BOUNDARY
- defined
- approximate
- assumed

LIMIT of GEOLOGICAL MAPPING

OUTCROP

FELSENMEER

TALUS

FAULTS
- defined
- approximate
- assumed

VEIN STRUCTURE
- defined
- approximate
- assumed

BEDDING
- horizontal
- vertical
- inclined
- overturned

FOLIATION
- horizontal
- vertical
- inclined
- unknown

ANTICLINE
- defined
- approximate
- overturned

SYNCLINE
- defined
- approximate
- overturned

JOINTING
- vertical: weak / moderate / strong
- inclined: weak / moderate / strong

MINOR FOLDS
- style & direction

GLACIAL STRIAE
- movement known
- movement known

SHAFT

RAISE

WINZE

ADIT or TUNNEL
- caved

QUARRY or MINE
- active
- abandoned

TRENCH
- closed end
- open end

PIT

GRAVEL PIT
- active
- dormant

DUMP or TAILINGS

DDH & NUMBER
- 80-00 location
- surface projection

OVERBURDEN DRILL HOLE
- OBH-80 location

CHIP SAMPLE

ROCK SAMPLE

FLOAT
- with rock type

SURVEY STATION

TRIANGULATION POINT

CLAIM POST

CLAIM BOUNDARY

ROAD

CAT TRAIL

CABIN

SPRING

### LITHOLOGY

JURASSIC AND OR CRETACEOUS
intrusive and subvolcanic (hypabyssal) rocks

2
- 2a Aplite
- 2b Granodiorite
- 2c Porphyritic quartz monzonite
- 2d Quartz diorite and diorite
- 2e Rhyolite (quartz porphyry)
- 2f Lamprophyre and other associated biotite rich intrusive rocks
- 2g Basalt and amygdaloidal basalt
- 2h Felsic volcanic rocks and tuff
- 2i Quartz-arsenopyrite vein rock

LATE PRECAMBRIANN OR EARLY PALEOZOIC
Upper schist / Grit unit

1
- 1a Massive, gritty and thin bedded quartzite
- 1b Micaceous quartzite
- 1c Phyllite: $c_1$ Muscovite-sericite phyllite; $c_2$ Chloritic phyllite; $c_3$ Graphitic phyllite
- 1d Hornfelsic rocks: $d_1$ Interlayered quartzite and biotite schist; $d_2$ Massive and interlayered biotite and chloritic schist; $d_3$ Massive quartzitic hornfels; $d_4$ Greisen
- 1e Calc-silicate skarn $e_1$ Pyroxene-(dark); $e_2$ Wollastonite-quartz-(light)
- 1f Breccia
- 1g Marble

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WEST RIDGE Y.T.
1981 GEOLOGICAL EXPLORATION PROGRAMME

# REGIONAL GEOLOGY
INDEX No 4

| | | | |
|---|---|---|---|
| DATE NOVEMBER, 1981 | JOB NO 81-05G | FIG NO 14 | |
| DRAWN BY T.D. | | | |
| REVISED BY | SCALE 1:10,000 | METRES | |

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## LEGEND

### SYMBOLS

GEOLOGICAL BOUNDARY: defined; approximate; assumed

LIMIT of GEOLOGICAL MAPPING

OUTCROP

FELSENMEER

TALUS

FAULTS: defined; approximate; assumed

VEIN STRUCTURE: defined; approximate; assumed

BEDDING: horizontal; vertical; inclined; overturned

FOLIATION: horizontal; vertical; inclined; unknown

ANTICLINE: defined; approximate; overturned

SYNCLINE: defined; approximate; overturned

JOINTING: vertical — weak, moderate, strong; inclined — weak, moderate, strong

MINOR FOLDS: style & direction

GLACIAL STRIAE: movement known; movement known

SHAFT

RAISE

WINZE

ADIT or TUNNEL: caved

QUARRY or MINE: active; abandoned

TRENCH: closed end; open end

PIT

GRAVEL PIT: active; dormant

DUMP or TAILINGS

DDH & NUMBER: ⊙80-00 location; ⊙ 45° surface projection

OVERBURDEN DRILL HOLE: ●OBH-80 location

CHIP SAMPLE

ROCK SAMPLE

FLOAT: △2 with rock type

SURVEY STATION

TRIANGULATION POINT

CLAIM POST

CLAIM BOUNDARY

ROAD

CAT TRAIL

CABIN

SPRING

### LITHOLOGY

JURASSIC AND OR CRETACEOUS
Intrusive and subvolcanic (hypabyssal) rocks

2

- 2a Aplite
- 2b Granodiorite
- 2c Porphyritic quartz monzonite
- 2d Quartz diorite and diorite
- 2e Rhyolite (quartz porphyry)
- 2f Lamprophyre and other associated biotite rich intrusive rocks
- 2g Basalt and amygdaloidal basalt
- 2h Felsic volcanic rocks and tuff
- 2i Quartz - arsenopyrite vein rock

LATE PRECAMBRIANN OR EARLY PALEOZOIC
Upper schist / Grit unit

1

- 1a Massive, gritty and thin bedded quartzite
- 1b Micaceous quartzite
- 1c Phyllite: $c_1$ Muscovite - sericite phyllite; $c_2$ Chloritic phyllite; $c_3$ Graphitic phyllite
- 1d Hornfelsic rocks: $d_1$ interlayered quartzite and biotite schist; $d_2$ Massive and interlayered biotite and chloritic schist; $d_3$ Massive quartzitic hornfels; $d_4$ Greisen
- 1e Calc-silicate skarn: $e_1$ Pyroxene-(dark); $e_2$ Wollastonite - quartz - (light)
- 1f Breccia
- 1g Marble

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1981 GEOLOGICAL EXPLORATION PROGRAMME

# REGIONAL GEOLOGY

INDEX 5

| | | | |
|---|---|---|---|
| DATE NOVEMBER, 1981 | JOB NO 81-05G | FIG NO 15 | |
| DRAWN BY A.W.D. | | | |
| REVISED BY | SCALE 1:10,000 | METRES | |

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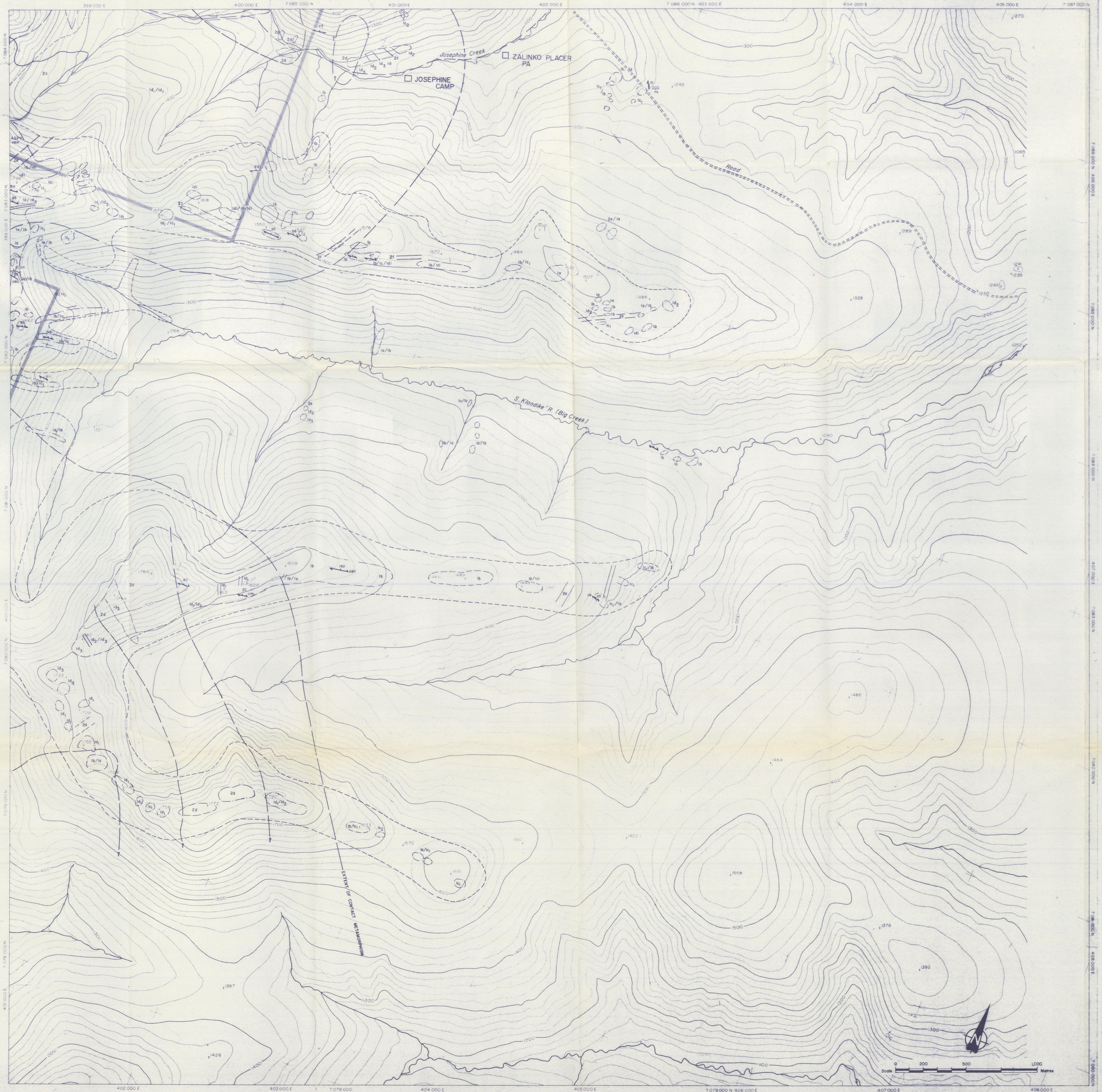


INDEX No 6

## LEGEND

### SYMBOLS

GEOLOGICAL BOUNDARY — defined; approximate; assumed

LIMIT of GEOLOGICAL MAPPING

OUTCROP

FELSENMEER

TALUS

FAULTS — defined; approximate; assumed

VEIN STRUCTURE — defined; approximate; assumed

BEDDING — horizontal; vertical; inclined; overturned

FOLIATION — horizontal; vertical; inclined; unknown

ANTICLINE — defined; approximate; overturned

SYNCLINE — defined; approximate; overturned

JOINTING — vertical: weak, moderate, strong; inclined: weak, moderate, strong

MINOR FOLDS — style & direction

GLACIAL STRIAE — movement known; movement known

SHAFT

RAISE

WINZE

ADIT or TUNNEL — caved

QUARRY or MINE — active; abandoned

TRENCH — closed end; open end

PIT

GRAVEL PIT — active; dormant

DUMP or TAILINGS

DDH & NUMBER — 80-00 location; surface projection

OVERBURDEN DRILL HOLE — OBH-80 location

CHIP SAMPLE

ROCK SAMPLE

FLOAT — with rock type

SURVEY STATION

TRIANGULATION POINT

CLAIM POST

CLAIM BOUNDARY

ROAD

CAT TRAIL

CABIN

SPRING

### LITHOLOGY

JURASSIC AND OR CRETACEOUS
Intrusive and subvolcanic (hypabyssal) rocks

2 —
- 2a Aplite
- 2b Granodiorite
- 2c Porphyritic quartz-monzonite
- 2d Quartz diorite and diorite
- 2e Rhyolite (quartz porphyry)
- 2f Lamprophyre and other associated biotite rich intrusive rocks
- 2g Basalt and amygdaloidal basalt
- 2h Felsic volcanic rocks and tuff
- 2i Quartz-arsenopyrite vein rock

LATE PRECAMBRIANN OR EARLY PALEOZOIC
Upper schist / Grit unit

1 —
- 1a Massive, gritty and thin bedded quartzite
- 1b Micaceous quartzite
- 1c Phyllite: $c_1$ Muscovite-sericite phyllite; $c_2$ Chloritic phyllite; $c_3$ Graphitic phyllite
- 1d Hornfelsic rocks: $d_1$ interlayered quartzite and biotite schist; $d_2$ Massive and interlayered biotite and chloritic schist; $d_3$ Massive quartzitic hornfels; $d_4$ Greisen
- 1e Calc-silicate skarn: $e_1$ Pyroxene-(dark); $e_2$ Wollastonite-quartz-(light)
- 1f Breccia
- 1g Marble

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WEST RIDGE Y·T·
1981 GEOLOGICAL EXPLORATION PROGRAMME

# REGIONAL GEOLOGY

INDEX 6

| | | |
|---|---|---|
| DATE: NOVEMBER, 1981 | JOB NO. 81-05G | FIG. NO. 16 |
| DRAWN BY: J.P. Paquet | SCALE: 1:10,000 | METRES |
| REVISED BY: | | |

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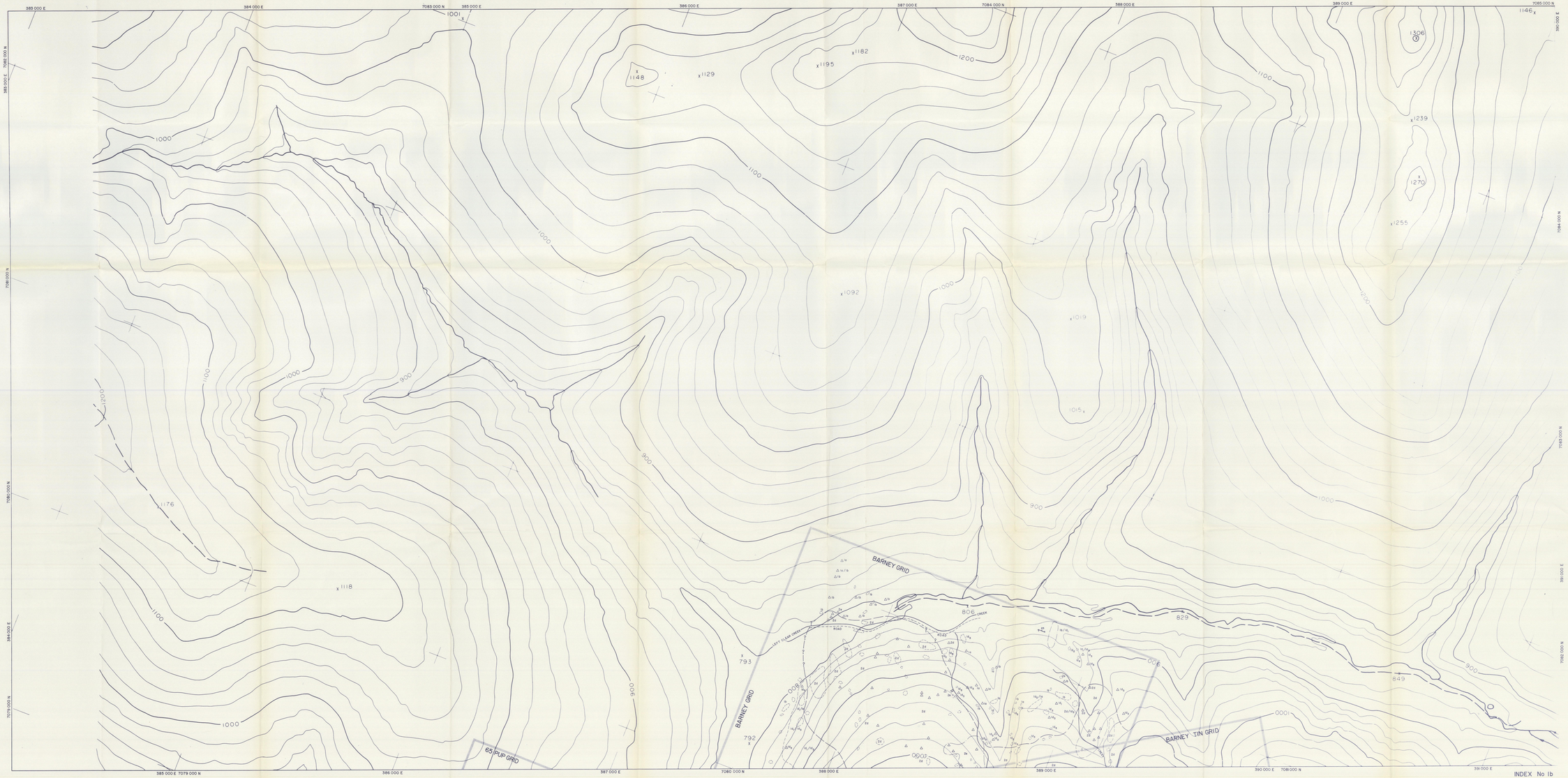
BEMA DRAFTING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384 000 E
7083 000 N
385 000 E
386 000 E
387 000 E
7084 000 N
388 000 E
389 000 E
7085 000 N
390 000 E
7082 000 N
7081 000 N
7080 000 N
7079 000 N
7078 000 N
7081 000 E
7084 000 E
7083 000 E
7082 000 E
7080 000 E
7079 000 E
7078 000 E
1001
1146
1148
1129
1182
1195
1200
1100
1000
900
1306
1239
1279
1255
1092
1019
1015
1176
1118
793
792
806
829
849
BARNEY GRID
BARNEY TIN GRID
65 PUP GRID
LEFT CLAIM CREEK
ROAD
0001
0002
0003
0004
0005
0006
0007
0008
0009
0010
0011
0012
0013
0014
0015
0016
0017
0018
0019
0020
0021
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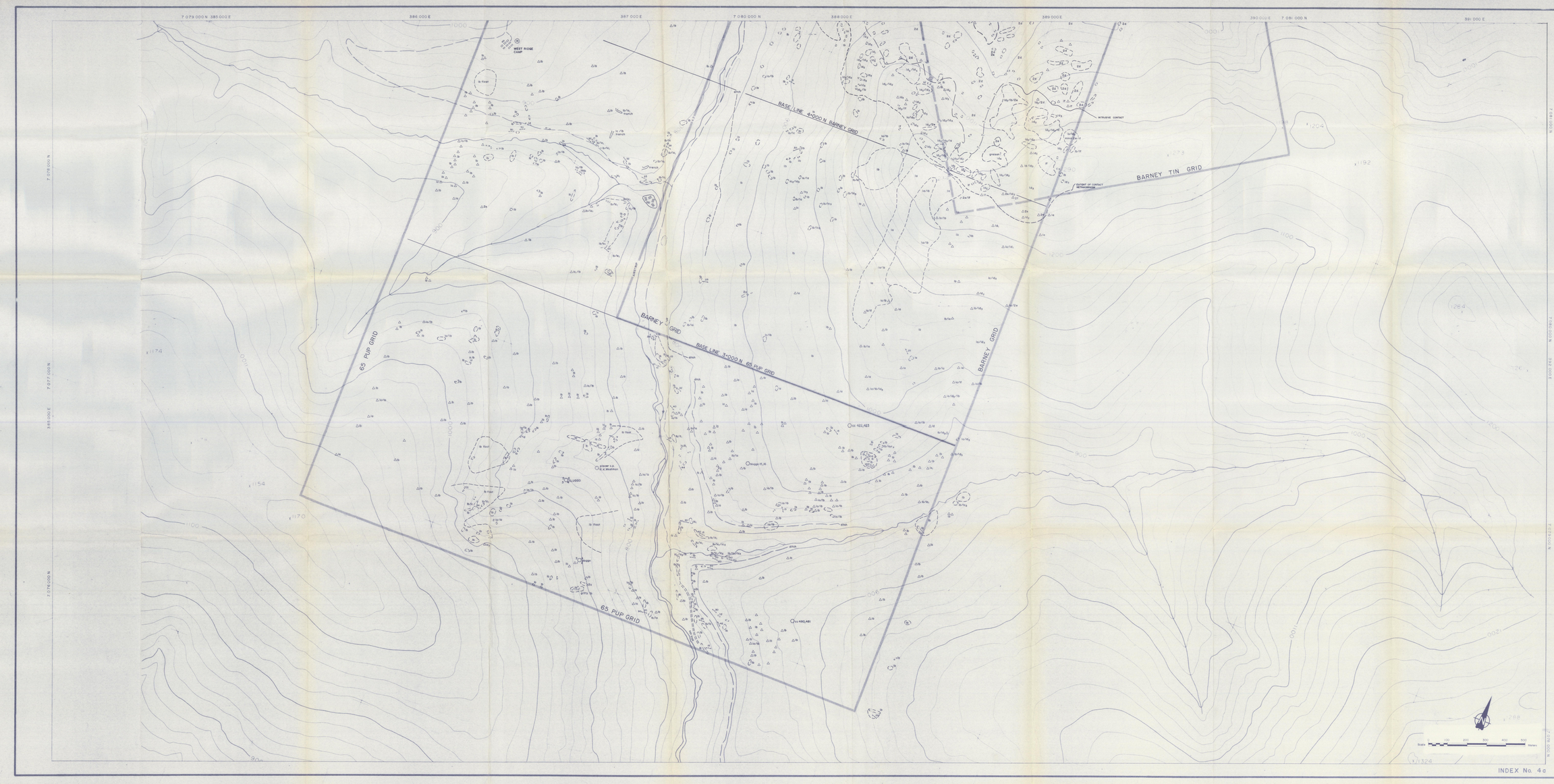
0038
0039
0040




## LEGEND

### SYMBOLS

GEOLOGICAL BOUNDARY: defined; approximate; assumed

LIMIT of GEOLOGICAL MAPPING

OUTCROP

FELSENMEER

TALUS

FAULTS: defined; approximate; assumed

VEIN STRUCTURE: defined; approximate; assumed

BEDDING: horizontal; vertical; inclined; overturned

FOLIATION: horizontal; vertical; inclined; unknown

ANTICLINE: defined; approximate; overturned

SYNCLINE: defined; approximate; overturned

CONTACTS: assumed; approximate; strong; moderate; weak; inferred; unknown

JOINTS: vertical; 5 direction

GLACIAL STRIAE: movement known; movement known

SHAFT

RAISE

WINZE

ADIT or TUNNEL: open; caved

QUARRY or MINE: active; abandoned

TRENCH: open cut; closed and open end

PIT

GRAVEL PIT: active; dormant

DUMP or TAILINGS

DDH & NUMBER: 1980-00 location

surface projection

OVERBURDEN DRILL HOLE: 80-00 location

CHIP SAMPLE

ROCK SAMPLE

FLOAT: with rock type

SURVEY STATION

TRIANGULATION POINT

CLAIM POST

CLAIM BOUNDARY

ROAD

CAT TRAIL

CABIN

SPRING

### LITHOLOGY

JURASSIC AND OR CRETACEOUS
intrusive and supracrustal (hypothesized) rocks

- 22 Aplite
- 23 Granodiorite
- 23 Porphyritic quartz monzonite
- 24 Quartz diorite and biotite
- 24 Rhyolite (quartz porphyry)
- 27 Lamprophyre and other associated biotite rich intrusive rocks
- 28 Basalt and amygdaloidal basalt
- 29 Felsic volcanic rocks and tuff
- 21 Quartz porphyry vein rock

LATE PRECAMBRIAN (MACKENZIE) PALEOZOIC
(pre sills) / (post sills)

- 15 Massive, gritty and thin bedded quartzite
- 15 Micaceous quartzite
- 15 Phyllite $q_1$ Muscovite-sericite phyllite
  $q_2$ Chloritic phyllite
  $q_3$ Graphitic phyllite
- 14 Hornfelsic rocks of interlayered quartzite and biotite schist
  $q_4$ Massive and interlayered biotite $q_5$ and chloritic schist
  $q_6$ Massive quartzitic hornfels
  $q_7$ Gneiss
- 14 Calc-silicate rocks: $c_1$ Pyroxene-clastic
  $c_2$ Wollastonite-quartz-diopside
- 17 Breccia
- 18 Marble

INDEX No. 4a

0 0 926

CANADA TUNGSTEN MINING CORPORATION
WEST RIDGE Y.T.
1981 GEOLOGICAL EXPLORATION PROGRAMME

BARNEY RIDGE - 65 PUP GRID

# GEOLOGY

| | | |
|---|---|---|
| DATE NOVEMBER, 1981 | JOB NO. BR-056 | FIG. NO. 17b |
| DRAWN BY K.C. | | |
| REVISED BY | SCALE 1:5,000 | METRES |

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Au (ppb) | W (ppm)
Sn (ppm)

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CANADA TUNGSTEN MINING CORPORATION
WEST RIDGE Y. T.
1981 GEOLOGICAL EXPLORATION PROGRAMME

BARNEY-65 PUP GRID

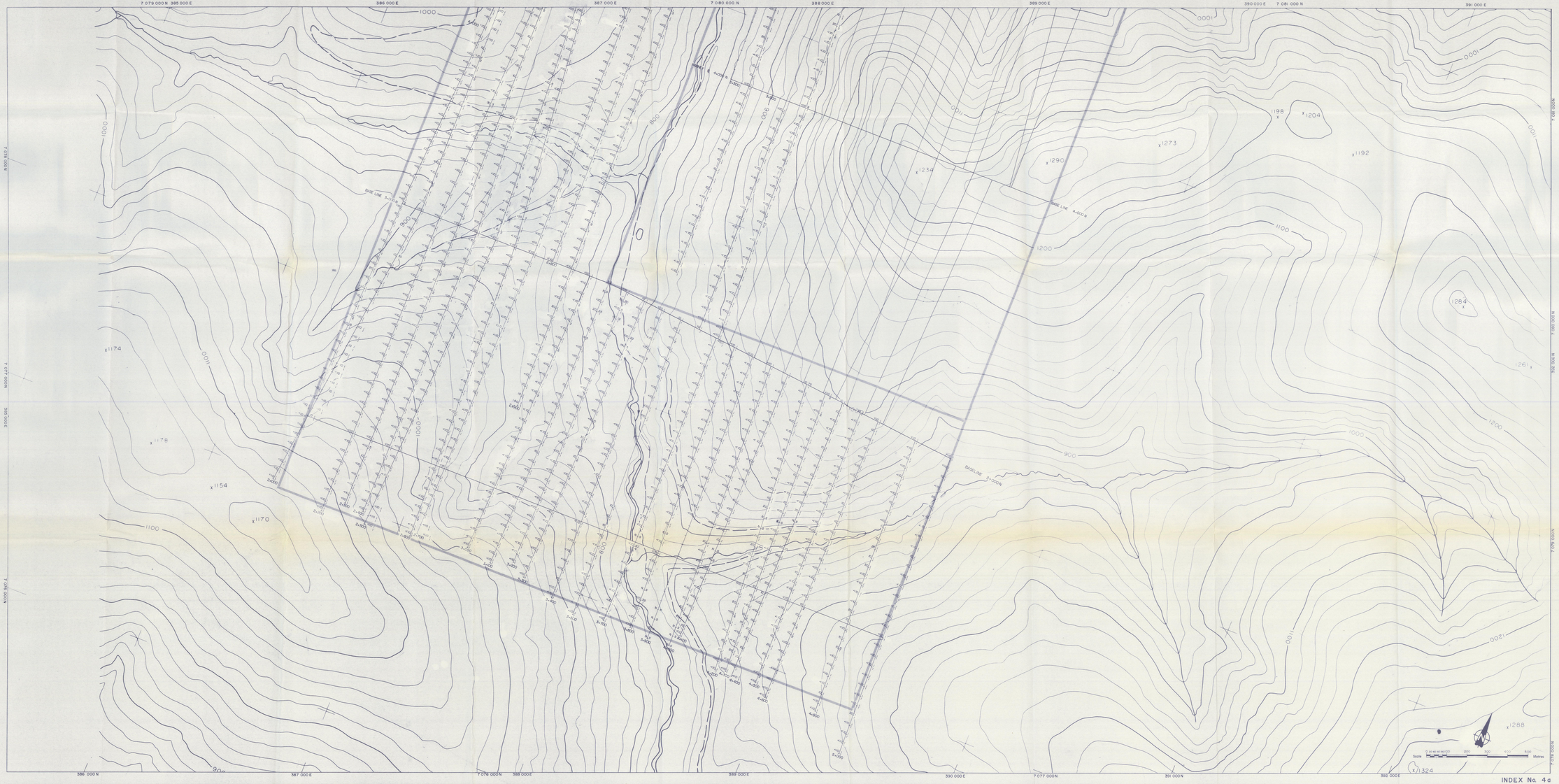
# SOIL SAMPLE LOCATION

INDEX Ib

| | | |
|---|---|---|
| NOVEMBER 1981 | 81-05G | 18a |
| DRAWN BY K.K., AMD | 1 / 5,000 | METRES |

BEMA INDUSTRIES LTD.

INDEX No Ib




Au(ppb) | W(ppm)
Sn(ppm)

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CANADA TUNGSTEN MINING CORPORATION
WEST RIDGE Y. T.
1981 GEOLOGICAL EXPLORATION PROGRAMME

BARNEY-65 PUP GRID

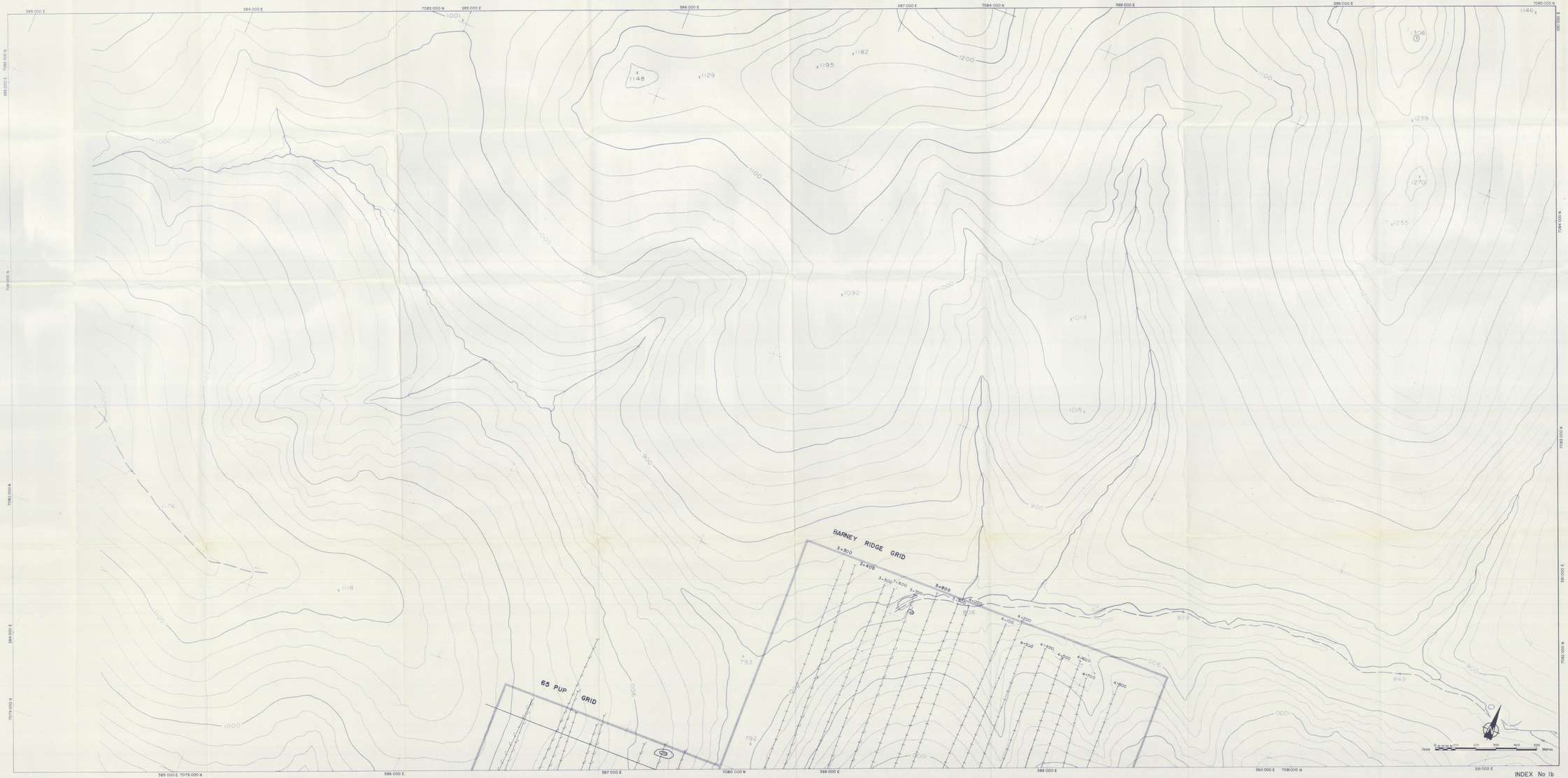
# SOIL SAMPLE LOCATION

INDEX 4a

| | | |
|---|---|---|
| DATE: NOVEMBER, 1981 | FILE: 81-056 | PLAN No. 18b |
| DRAWN BY: AMCS | SCALE: 1:5,000 | METRES |
| REVISED BY: | | |

BEMA INDUSTRIES LTD.

BEMA DRAFTING

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CANADA TUNGSTEN MINING CORPORATION
WEST RIDGE Y. T.
1981 GEOLOGICAL EXPLORATION PROGRAMME

BARNEY-65 PUP GRID

# SOIL GEOCHEMISTRY W

INDEX Ib

| | | |
|---|---|---|
| DATE NOVEMBER 1981 | JOB NO. 81-05G | FIG. NO. 19a |
| DRAWN BY A.W.D., K.K. | SCALE 1:5,000 | METRES |
| APPROVED BY | | |

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BEMA DRAFTING




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CANADA TUNGSTEN MINING CORPORATION

WEST RIDGE Y. T.

1981 GEOLOGICAL EXPLORATION PROGRAMME

BARNEY-65 PUP GRID

# SOIL GEOCHEMISTRY W

INDEX 4a

| | | |
|---|---|---|
| NOVEMBER, 1981 | 81-05G | 19b |
| A.M.D. | 1:5,000 | METRES |

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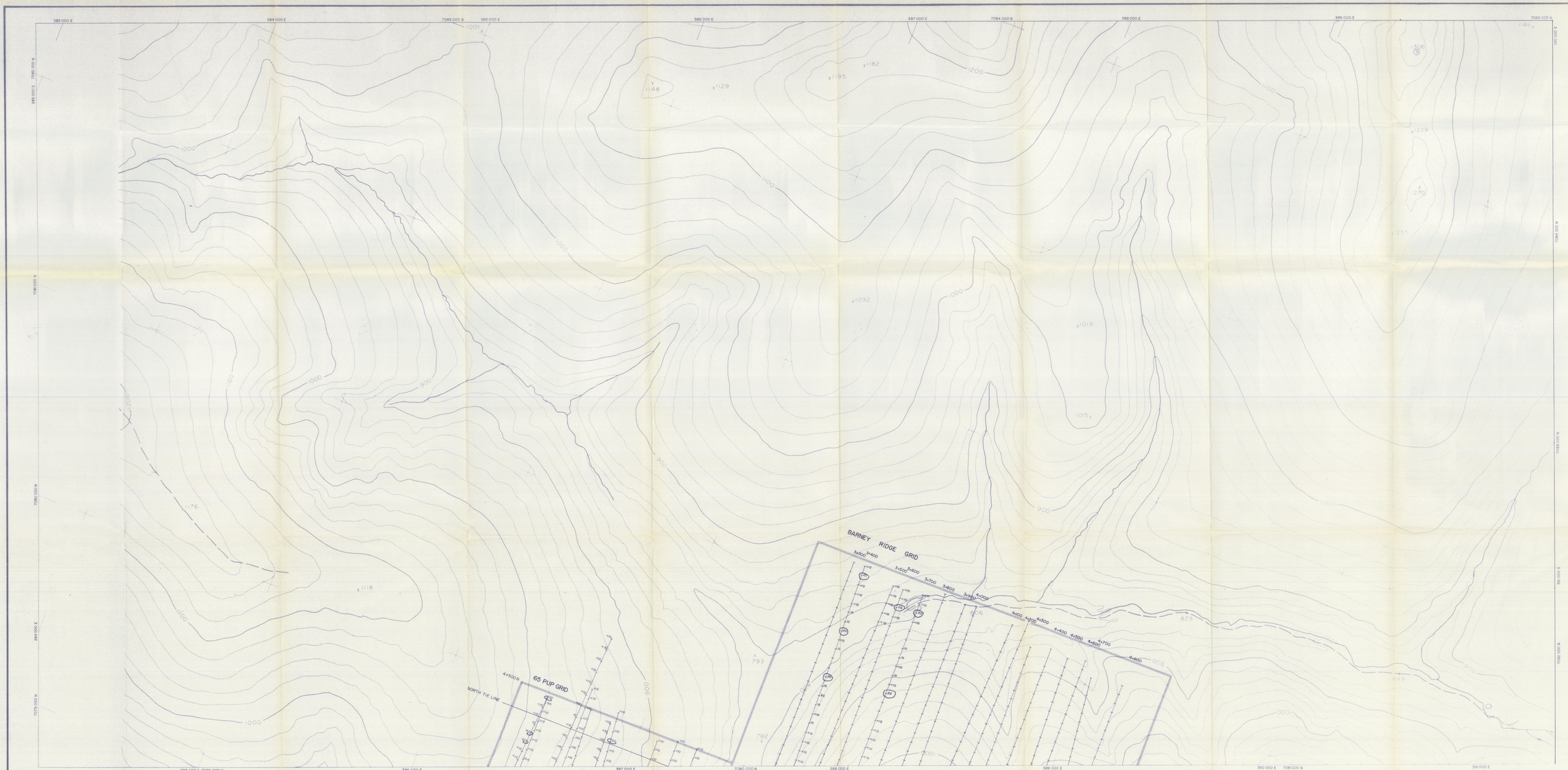
BEMA DRAFTING




INDEX No 1b

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CANADA TUNGSTEN MINING CORPORATION
WEST RIDGE Y.T.
1981 GEOLOGICAL EXPLORATION PROGRAMME

BARNEY-65 PUP GRID

# SOIL GEOCHEMISTRY "Au"

INDEX 1b

| | | |
|---|---|---|
| DATE NOVEMBER 1981 | JOB NO 81-05G | FIG NO 20a |
| DRAWN BY K.K. | SCALE 1:5,000 METRES | |
| APPROVED BY | | |

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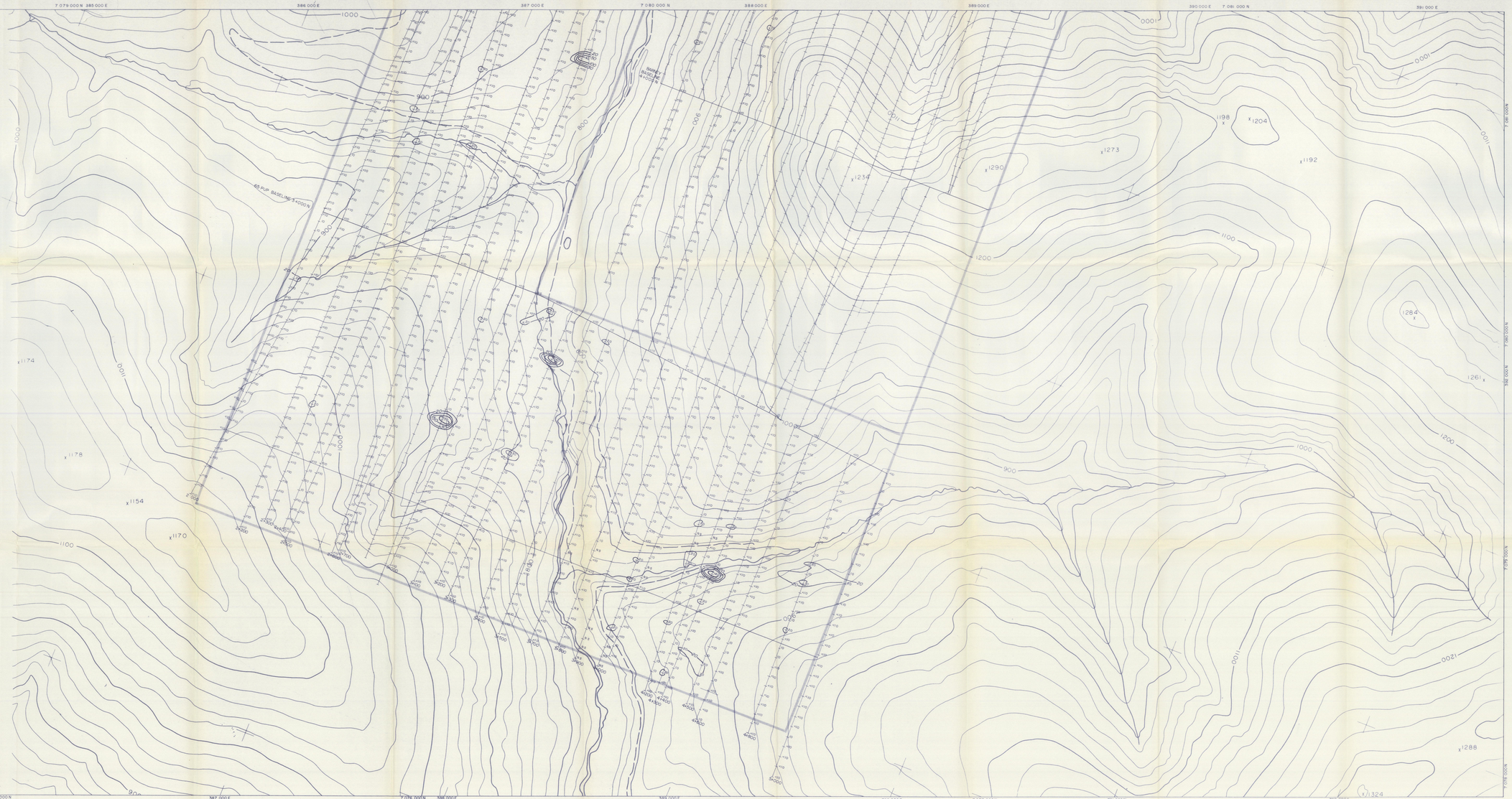


CONTOUR INTERVAL

100 ppb
50 ppb
30 ppb
20 ppb

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CANADA TUNGSTEN MINING CORPORATION
WEST RIDGE Y. T.
1981 GEOLOGICAL EXPLORATION PROGRAMME

BARNEY-65 PUP GRID

# SOIL GEOCHEMISTRY "Au"

INDEX 4a

| | | |
|---|---|---|
| DATE NOVEMBER, 1981 | JOB NO. 81-05G | FIG. NO. 20b |
| DRAWN BY K.K., A.M.D. | SCALE 1:5,000 | METRES |
| REVISED BY | | |

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## LEGEND

SYMBOLS

GEOLOGICAL BOUNDARY
——?—?—— approximate
——?—?—— assumed

OUTCROP

FELSENMEER

CLAIM POST

FLOAT
△ with rock type

## LITHOLOGY

JURASSIC AND OR CRETACEOUS
Intrusive and subvolcanic (hypabyssal) rocks

2
- 2a Aplite
- 2b Granodiorite
- 2c Porphyritic quartz monzonite
- 2d Quartz diorite and diorite
- 2e Rhyolite (quartz porphyry)
- 2f Lamprophyre and other associated biotite rich intrusive rocks
- 2g Basalt and amygdaloidal basalt
- 2h Felsic volcanic rocks and tuff
- 2i Quartz arsenopyrite vein rock

LATE PRECAMBRIANN OR EARLY PALEOZOIC
Upper schist/Grit unit

1
- 1a Massive, gritty and thin bedded quartzite
- 1b Phyllitic quartzite
- 1c Phyllite $c_1$ Muscovite sericite phyllite
  - $c_2$ Chloritic phyllite
  - $c_3$ Graphitic phyllite
- 1d Hornfelsic rocks $d_1$ Interlayered quartzite and biotite schist
  - $d_2$ Massive and interlayered biotite and chloritic schist
  - $d_3$ Massive quartzitic hornfels
  - $d_4$ Greisen
- 1e Calc-silicate skarn $e_1$ Pyroxene
  - $e_2$ Wollastonite-quartz-light
- 1f Breccia
- 1g Marble

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CANADA TUNGSTEN MINING CORPORATION
# WEST RIDGE Y. T.
1981 GEOLOGICAL EXPLORATION PROGRAMME

BARNEY TIN GRID

# GEOLOGY

| | | |
|---|---|---|
| DATE: NOVEMBER 1981 | JOB NO. 81-05G | FIG. NO. 21 |
| DRAWN BY: A.W.D. | | |
| APPROVED BY: | SCALE: 1:5,000 METRES | |

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## LEGEND

### SYMBOLS

GEOLOGICAL BOUNDARY — defined; approximate; assumed
LIMIT of GEOLOGICAL MAPPING
OUTCROP
FELSENMEER
TALUS
FAULTS — defined; approximate; assumed
VEIN STRUCTURE — defined; approximate; assumed
BEDDING — horizontal; vertical; inclined; overturned
FOLIATION — horizontal; vertical; inclined; unknown
ANTICLINE — defined; approximate; overturned
SYNCLINE — defined; approximate; overturned
JOINTING — vertical: weak, moderate, strong; inclined: weak, moderate, strong
MINOR FOLDS — axis & direction
GLACIAL STRIAE — movement known; movement known

SHAFT
RAISE
WINZE
ADIT or TUNNEL — open; caved
QUARRY or MINE — active; abandoned
TRENCH — cased and open end; open end
PIT
GRAVEL PIT — active; dormant
DUMP or TAILINGS
DDH & NUMBER — location; surface projection
OVERBURDEN DRILL HOLE — location
CHIP SAMPLE
ROCK SAMPLE
FLOAT — with rock type
SURVEY STATION
TRIANGULATION POINT
CLAIM POST
CLAIM BOUNDARY
ROAD
CAT TRAIL
CABIN
SPRING

### LITHOLOGY

JURASSIC AND OR CRETACEOUS
intrusive and subvolcanic Hyalobasaltoid rocks

- 2 — Dykes
  - 2a Aplite
  - 2b Granodiorite
  - 2c Porphyritic quartz monzonite
  - 2e Quartz diorite and diorite
  - 2g Rhyolite (quartz porphyry)
  - 2h Lamprophyre and other associated basaltic rich intrusive rocks
  - 2i Basalt and amygdaloidal basalt
  - 2k Felsic volcanic rocks and tuff
  - 2l Quartz - diatomaceous vein rock

LATE PRECAMBRIAN OR EARLY PALEOZOIC
Upper schist - fan unit

- 1 — Massive gritty and thin bedded quartzite
  - 1a Massive quartzite
  - 1b Phyllite - Massive to laminite phyllite
    - $c_1$ Chloritic phyllite
    - $c_2$ Graphitic phyllite
  - 1d Hornfelsic rocks derived from interbedded quartzite and biotite schist
    - Massive and interlayered biotite and chlorite schist
    - $d_1$ Massive quartzite hornfels
    - $d_2$ Calcsilicate
  - 1e Calcsilicate rocks (tactite, tuffaceous rocks)
    - $e_1$ Wollastonite quartz-calcite-garnet
  - 1f Breccia
  - 1g Marble

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**CANADA TUNGSTEN MINING CORPORATION**
WEST RIDGE Y.T.
1981 GEOLOGICAL EXPLORATION PROGRAMME

# RHOSGOBEL GRID
# GEOLOGY
(INDEX 5a)

| | | |
|---|---|---|
| DATE: NOVEMBER, 1981 | 81-05 G | 22a |
| DRAWN BY: K.K. | SCALE: 1:5,000 METRES | |

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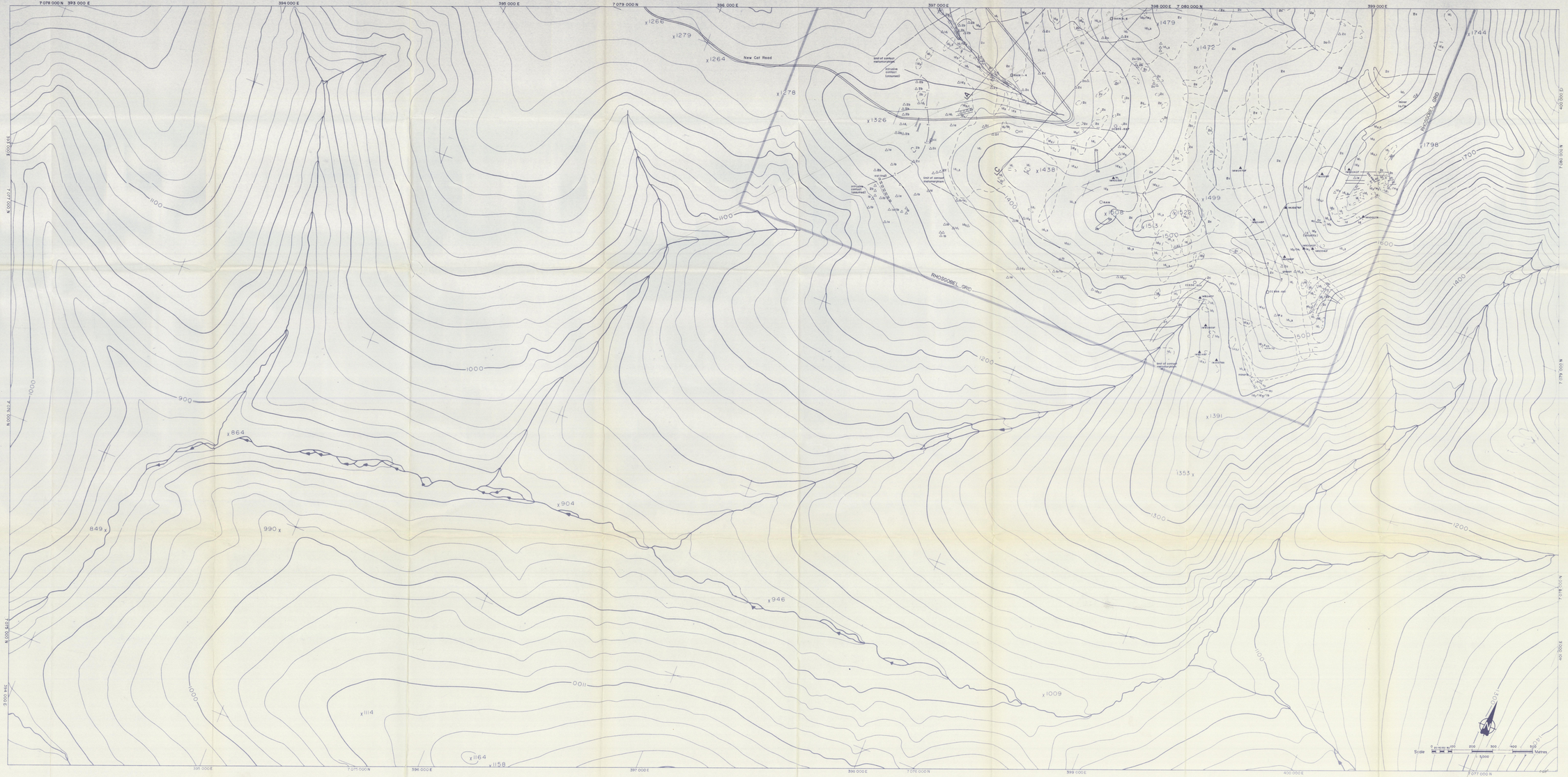
INDEX No. 5a


7 078 000 N 393 000 E
394 000 E
395 000 E
7 079 000 N
396 000 E
397 000 E
398 000 E 7 080 000 N
399 000 E
New Cat Road
RHOSGOBEL GRID
Rhosgobel Grid
x1266
x1279
x1264
x1278
x1326
x1438
x1479
x1472
x1744
x1798
x1608
x1513
x1522
x1499
x1391
x1353
x1009
x1114
x1164
x1158
x946
x904
x864
849 x
990 x
1100
1000
900
1200
1300
1400
1500
1600
1700
1800
1900
2000
1011
1012
1013
1014
1015
1016
1017
1018
1019
1020
1021
1022
1023
1024
1025
1026
1027
1028
1029
1030
1031
1032
1033
1034
1035
1036
1037
1038
1039
1040
1041
1042
1043
1044
1045
1046
1047
1048
1049
1050




INDEX No. 5a

Au (ppb) | W (ppm)
Sn (ppm)

Scale 1:5,000 — 100 0 100 200 300 400 500 Metres

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CANADA TUNGSTEN MINING CORPORATION
WEST RIDGE Y. T.
1981 GEOLOGICAL EXPLORATION PROGRAMME

RHOSGOBEL GRID

# SOIL SAMPLE LOCATION

INDEX 5a

| | | |
|---|---|---|
| DATE NOVEMBER 1981 | JOB NO 81-05G | FIG No 23a |
| DRAWN BY K.K. | SCALE 1:5,000 | METRES |
| REVISED BY | | |

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INDEX No. 5b

Au (ppb) | W (ppm)
Sn (ppm)

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CANADA TUNGSTEN MINING CORPORATION
WEST RIDGE Y. T.
1981 GEOLOGICAL EXPLORATION PROGRAMME

RHOSGOBEL GRID

# SOIL SAMPLE LOCATION

INDEX 5a

| | | |
|---|---|---|
| DATE NOVEMBER 1981 | JOB 81-05G | DWG. NO. 23b |
| DRAWN BY K.K. | | |
| REVISED BY | SCALE 1:5,000 | METRES |

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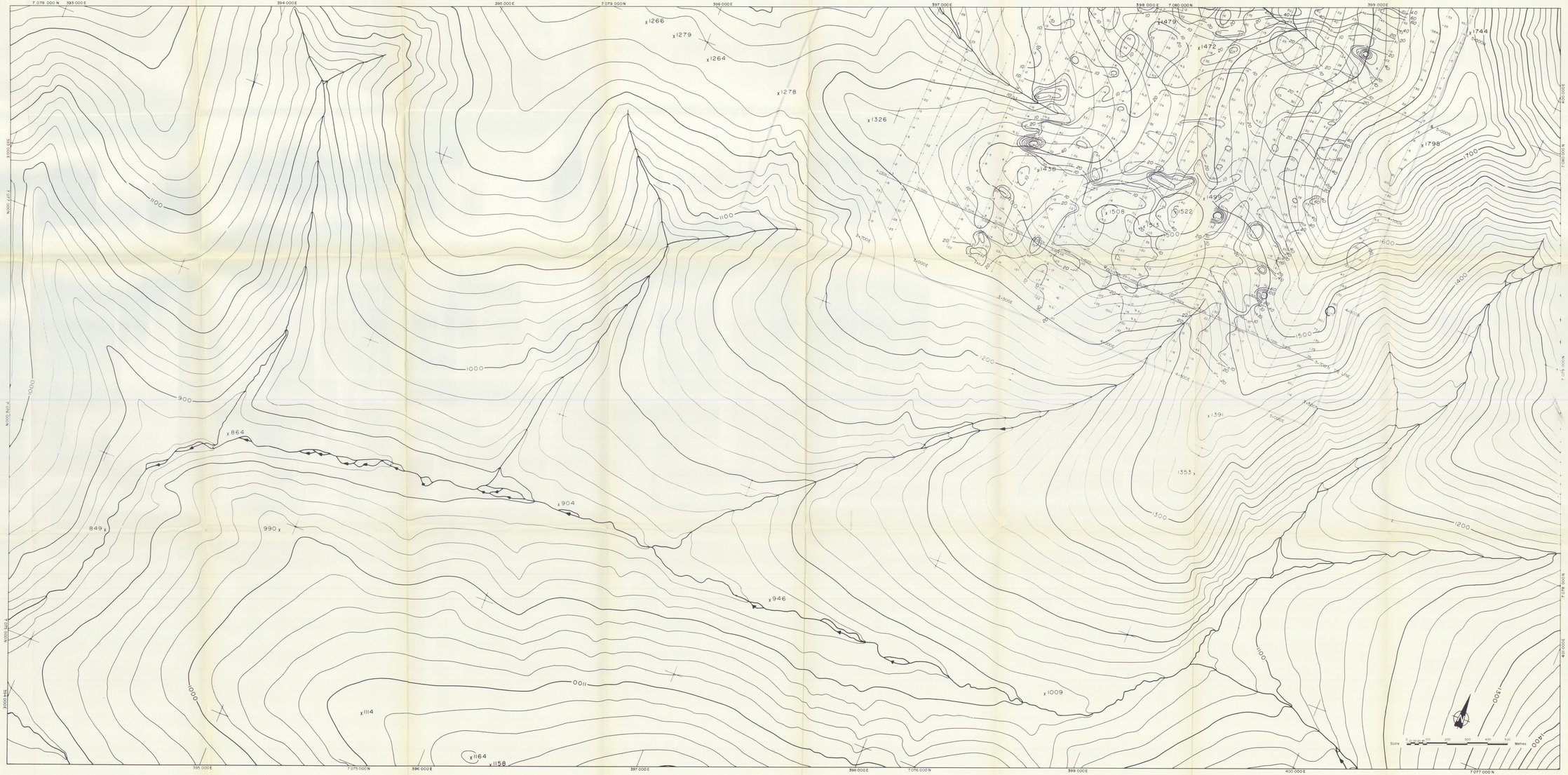
392 000 E
393 000 E
394 000 E
395 000 E
396 000 E
397 000 E
398 000 E
399 000 E
7 082 000 N
7 081 000 N
7 080 000 N
7 079 000 N
7 078 000 N
7 077 000 N
N 000 360 E
N 000 840 E
N 001 320 E
N 001 800 E
x1174
x1509
x1502
x1515
x1579
x1648
x1592
x1314
x1305
x905
x915
x1296
x1314
x1295
x1355
x1310
x1344
1323 x
x1326
x1332
1314 x
x1312
x1278
x1301
x1241
x1259
1495
x1493
x1762
1738 y
1622 x
x1674
1700
1600
1500
1400
1300
1200
1100
1000
900
800
7 500N
7 600N
7 700N
7 800N
7 900N
8 000N
8 100N
8 200N
8 300N
8 400N
8 500N
8 600N
8 700N
8 800N
8 900N
9 000N
9 100N
9 200N
9 300N
9 400N
9 500N
9 600N
9 700N
9 800N
9 900N
10 000N
10 100N
10 200N
10 300N
10 400N




INDEX No. 5b

CONTOUR INTERVAL

- 150 ppm
- 100 ppm
- 80 ppm
- 60 ppm
- 40 ppm
- 20 ppm
- 10 ppm

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CANADA TUNGSTEN MINING CORPORATION
WEST RIDGE Y. T.
1981 GEOLOGICAL EXPLORATION PROGRAMME

RHOSSOBEL GRID

# SOIL GEOCHEMISTRY W

INDEX 5b

| | |
|---|---|
| DATE NOVEMBER 1981 | JOB NO. 81-056 |
| DRAWN BY K.R./J.P.P. | FIG. NO. 24b |
| REVISED BY | SCALE 1:5,000 |

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BEMA DRAFTING


392 000 E
7 082 000 N
393 000 E
394 000 E
7 083 000
396 000 E
397 000 E
7084 000N
398 000 E
7 084 000 N
7 083 000N
7 082 000N
7 081 000N
7 080 000N
7 079 000N
N 3 000 180 FT
N 3 000 360 FT
N 3 000 540 FT
N 3 000 720 FT
N 3 000 900 FT
395 000E
396 000E
397 000E
398 000E
399 000 E
7 080 000N
x 1174
x 1509
x 1502
x 1515
x 1648
x 1579
x 1592
x 1622
x 1674
x 1762
x 1314
x 1305
x 1296
x 1314
x 915
x 905
x 1295
x 1355
x 1310
x 1344
1323 x
x 1326
x 1332
1314 x
x 1312
x 1278
x 1301
x 1259
x 124
1700
1600
1500
1400
1300
1200
1100
1000
900
800
1700
1600
1500
1400
1300
1200
1100
1000
900
800
1200
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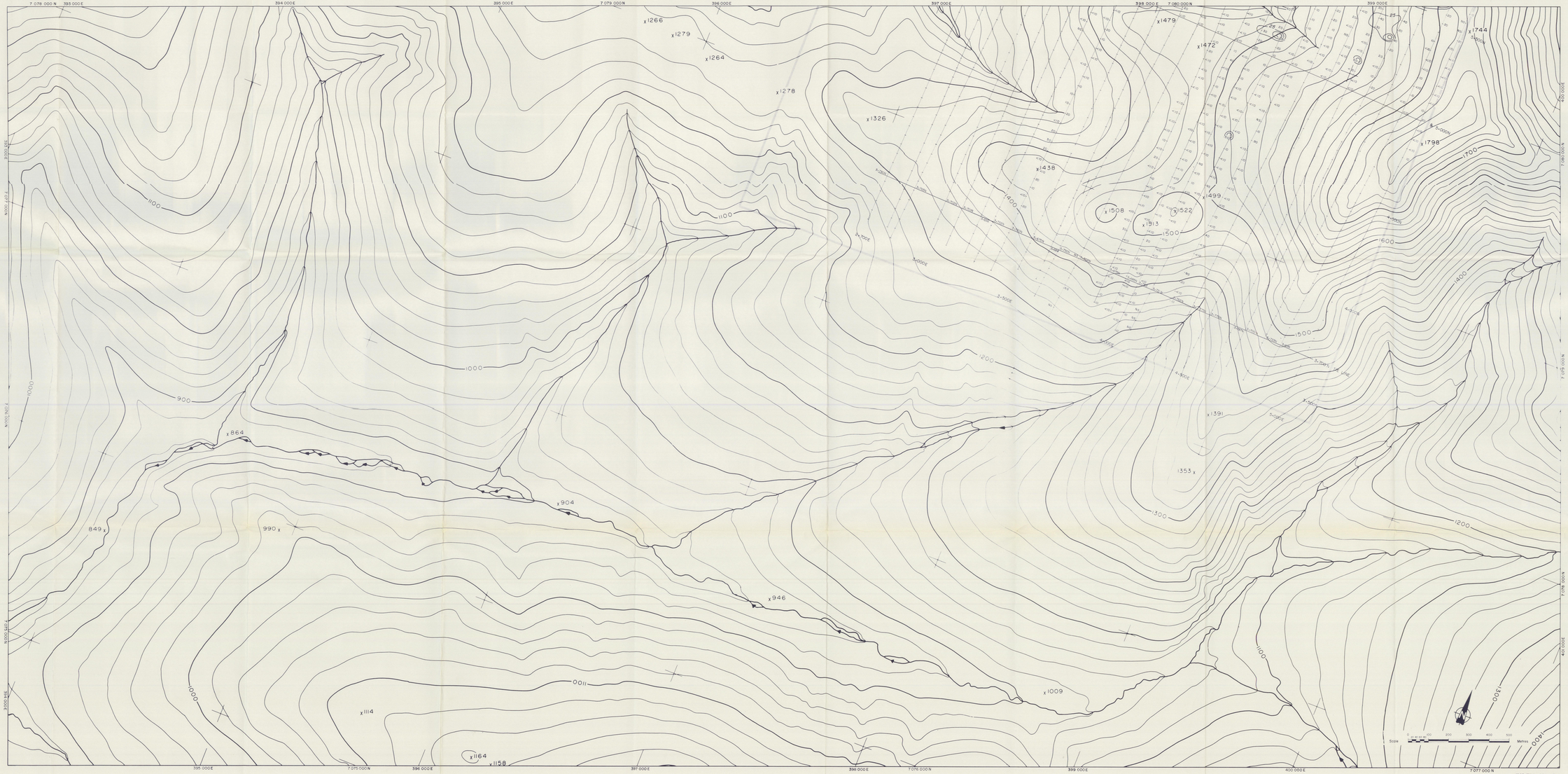
1000
1200
1300
1200
1100
1000




INDEX No. 5b

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CANADA TUNGSTEN MINING CORPORATION
WEST RIDGE Y. T.
1981 GEOLOGICAL EXPLORATION PROGRAMME

RHOSGOBEL GRID

# SOIL GEOCHEMISTRY Au

INDEX 5b

| | | | |
|---|---|---|---|
| DATE NOVEMBER 1981 | JOB NO 81-056 | FIG NO 25b |
| DRAWN BY K.N. JFP | SCALE 1:5000 | |
| REVISED BY | | |

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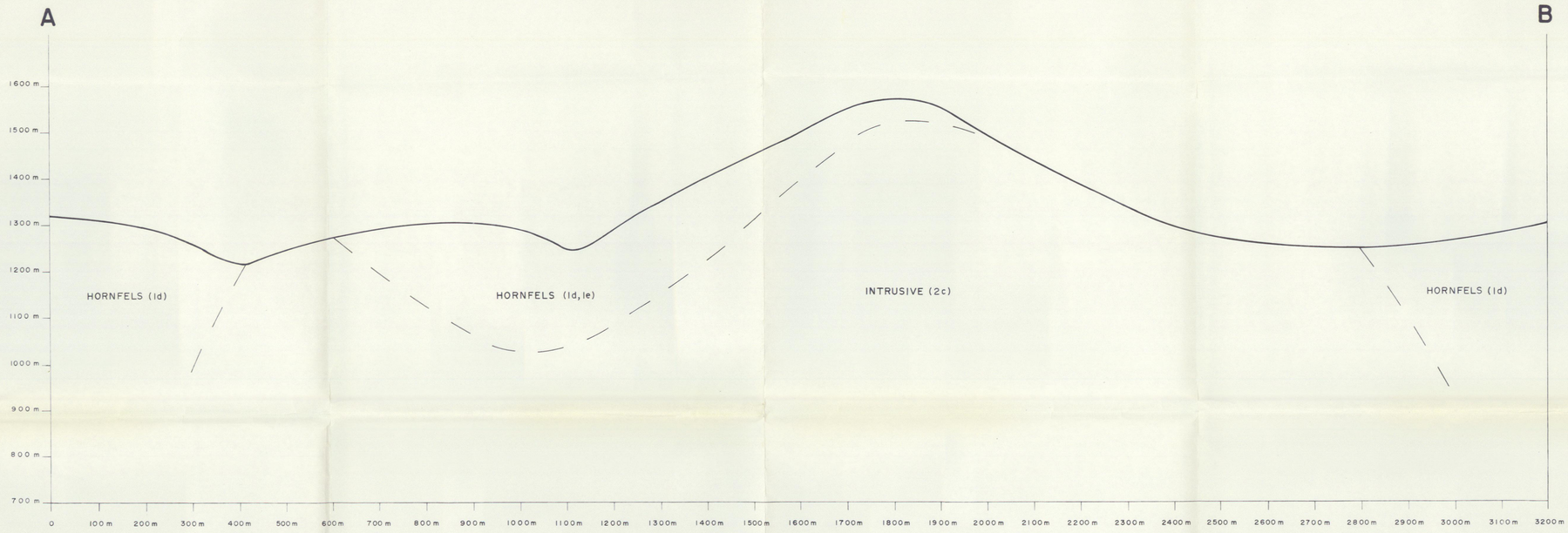
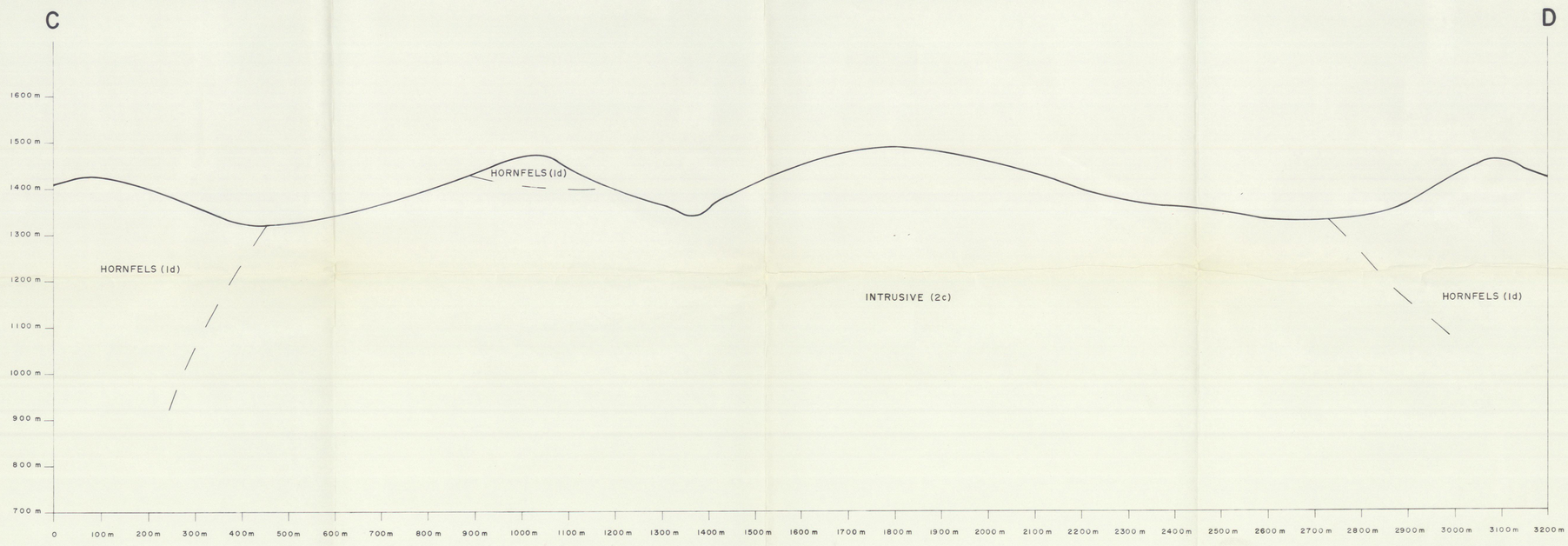
BEMA DRAFTING







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CANADA TUNGSTEN MINING CORPORATION

# WEST RIDGE Y·T·

1981 GEOLOGICAL EXPLORATION PROGRAMME

RHOSGOBEL CREEK

## CROSS SECTIONS

A-B , C-D

| | | |
|---|---|---|
| DATE: AUGUST 1981 | JOB NO. 81-05 G | FIG. NO. 26 |
| DRAWN BY: AWD. | | |
| REVISED BY: | SCALE: 1:5,000 METRES | |

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# SECTION "A" To "G"




## LEGEND

### LITHOLOGY

JURASSIC AND OR CRETACEOUS
Intrusive and subvolcanic (hypabyssal) rocks

- 2
  - 2a Aplite
  - 2b Granodiorite
  - 2c Porphyritic quartz monzonite
  - 2d Quartz diorite and diorite
  - 2e Rhyolite (quartz porphyry)
  - 2f Lamprophyre and other associated biotite rich intrusive rocks
  - 2g Basalt and amygdaloidal basalt
  - 2h Felsic volcanic rocks and tuff
  - 2i Quartz-arsenopyrite vein rock

LATE PRECAMBRIANN OR EARLY PALEOZOIC
Upper schist / Grit unit

- 1
  - 1a Massive, gritty and thin bedded quartzite
  - 1b Phyllitic quartzite
  - 1c Phyllite $c_1$ Muscovite-sericite phyllite
    - $c_2$ Chloritic phyllite
    - $c_3$ Graphitic phyllite
  - 1d Hornfelsic rocks $d_1$ interlayered quartzite and biotite schist
    - $d_2$ Massive and interlayered biotite and chloritic schist
    - $d_3$ Massive quartzitic hornfels
    - $d_4$ Greisen
  - 1e Calc-silicate skarn $e_1$ Pyroxene
    - $e_2$ Wollastonite-quartz-light
  - 1f Breccia
  - 1g Marble

SCALE: 1:50 VERTICAL
1:500 HORIZONTAL

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CANADA TUNGSTEN MINING CORPORATION
WESTRIDGE Y.T.
1981 GEOLOGICAL EXPLORATION PROGRAMME

# RHOSGOBEL CREEK DETAILED SECTION "A" To "G"

| | | | |
|---|---|---|---|
| DATE NOVEMBER, 1981 | JOB NO 81-05 G | FIG NO | 27 |
| DRAWN BY A.W.D. | | | |
| APPROVED BY | SCALE 1:500 & 1:50 | METRES | |

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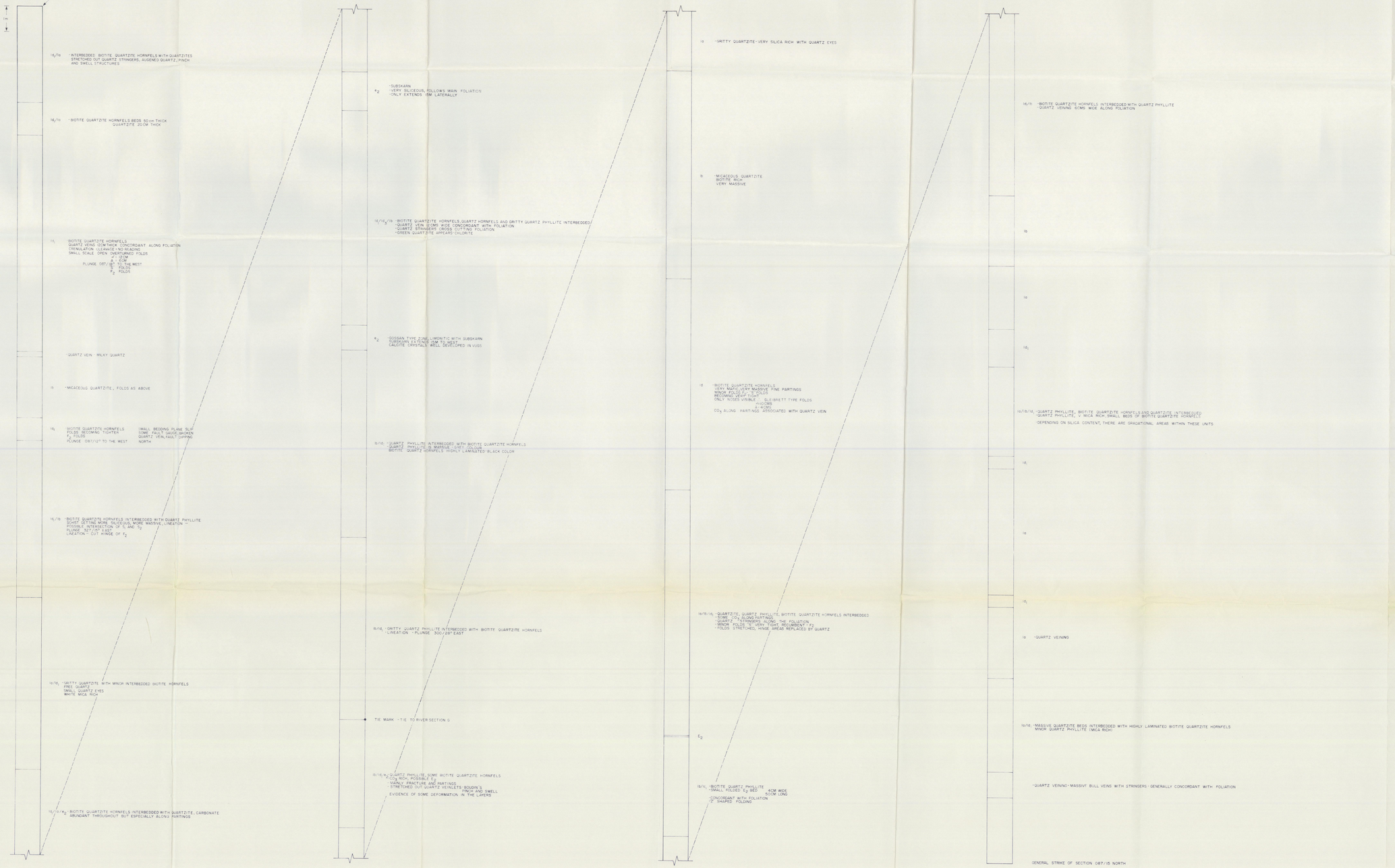
# SECTION H

END OF BLUFF




TOTAL 134.2 meters

SCALE: HORIZONTAL 1:500
VERTICAL 1:50

## LEGEND

### LITHOLOGY

JURASSIC AND OR CRETACEOUS
Intrusive and subvolcanic (hypabyssal) rocks

2

- 2a Aplite
- 2b Granodiorite
- 2c Porphyritic quartz monzonite
- 2d Quartz diorite and diorite
- 2e Rhyolite (quartz porphyry)
- 2f Lamprophyre and other associated biotite rich intrusive rocks
- 2g Basalt and amygdaloidal basalt
- 2h Felsic volcanic rocks and tuff
- 2i Quartz - arsenopyrite vein rock

LATE PRECAMBRIANN OR EARLY PALEOZOIC
Upper schist / Grit unit

1

- 1a Massive, gritty and thin bedded quartzite
- 1b Micaceous quartzite
- 1c Phyllite $c_1$ Muscovite - sericite phyllite; $c_2$ Chloritic phyllite; $c_3$ Graphitic phyllite
- 1d Hornfelsic rocks $d_1$ interlayered quartzite and biotite schist; $d_2$ Massive and interlayered biotite and chloritic schist; $d_3$ Massive quartzitic hornfels; $d_4$ Gneiss
- 1e Calc-silicate skarn e.g. Pyroxene-dark; $e_2$ Wollastonite-quartz-light
- 1f Breccia
- 1g Marble

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CANADA TUNGSTEN MINING CORPORATION
WEST RIDGE Y·T·
1981 GEOLOGICAL EXPLORATION PROGRAMME

RHOSGOBEL CREEK
SECTION 'H'

| | | |
|---|---|---|
| DATE NOVEMBER, 1981 | JOB NO 81-05G | FIG NO 28 |
| DRAWN BY A.W.D. | SCALE 1:500 & 1:50 METRES | |
| APPROVED BY | | |

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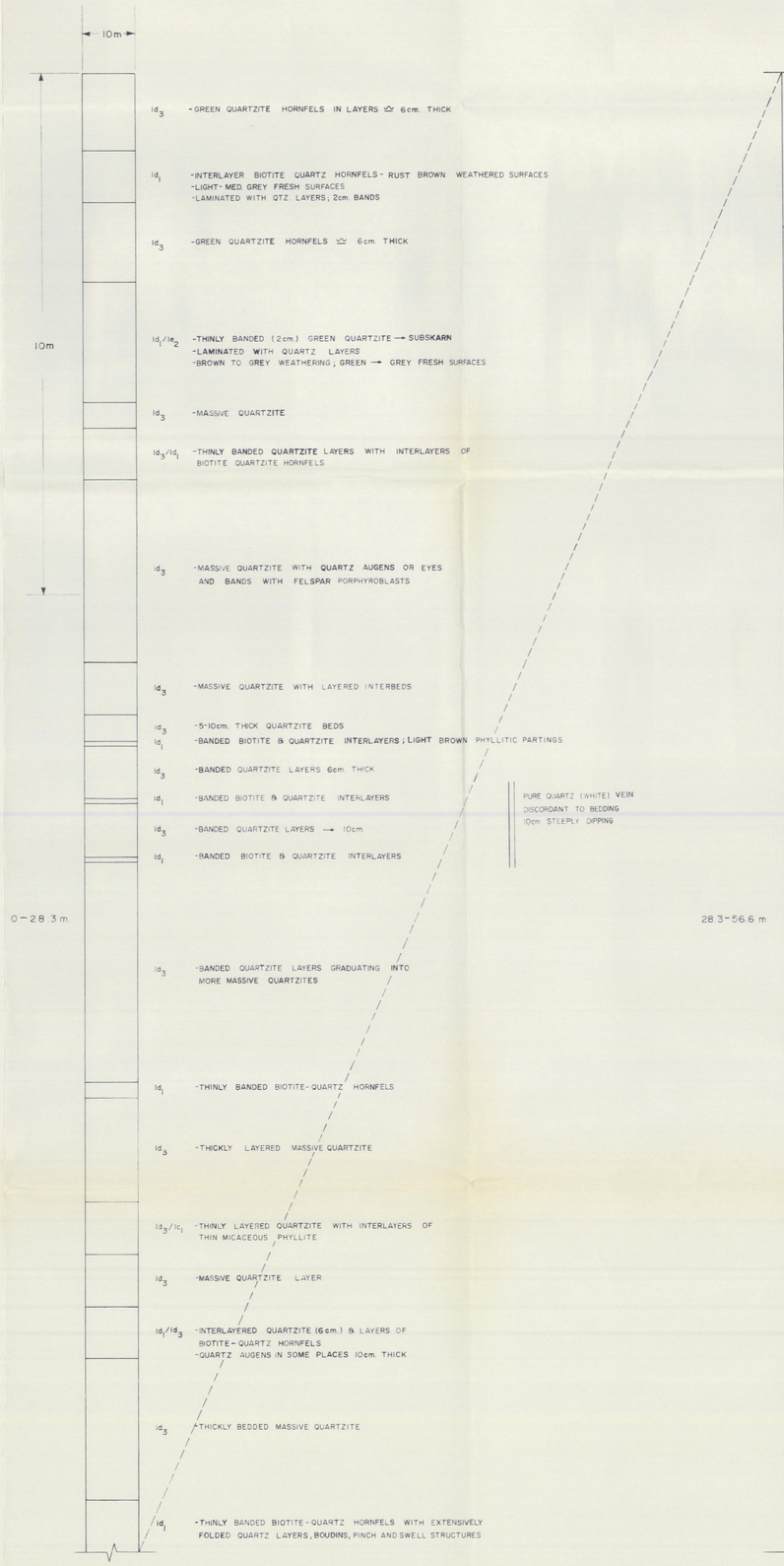
# SECTION I

Section Through Eagles Nest Outcrop




SCALE: 1:50 Vertical
1:500 Horizontal

## LEGEND

### LITHOLOGY

JURASSIC AND OR CRETACEOUS
Intrusive and subvolcanic (hypabyssal) rocks

2
- 2a Aplite
- 2b Granodiorite
- 2c Porphyritic quartz monzonite
- 2d Quartz diorite and diorite
- 2e Rhyolite (quartz porphyry)
- 2f Lamprophyre and other associated biotite rich intrusive rocks
- 2g Basalt and amygdaloidal basalt
- 2h Felsic volcanic rocks and tuff
- 2i Quartz arsenopyrite vein rock

LATE PRECAMBRIANN OR EARLY PALEOZOIC
Upper schist / Grit unit

1
- 1a Massive, gritty and thin bedded quartzite
- 1b Phyllitic quartzite
- 1c Phyllite $c_1$ Muscovite sericite phyllite
  $c_2$ Chloritic phyllite
  $c_3$ Graphitic phyllite
- 1d Hornfelsic rocks d interlayered quartzite and biotite schist
  $d_2$ Massive and interlayered biotite and chloritic schist
  $d_4$ Massive quartzitic hornfels
  $d_4$ Greisen
- 1e Calc-silicate skarn $e_1$ Pyroxene
  $e_2$ Wollastonite quartz-light
- 1f Breccia
- 1g Marble

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CANADA TUNGSTEN MINING CORPORATION
WEST RIDGE Y·T·
1981 GEOLOGICAL EXPLORATION PROGRAMME

# RHOSGOBEL CREEK DETAILED SECTION I

| | | | |
|---|---|---|---|
| DATE: NOVEMBER, 1981 | JOB NO. 81-05 G | FIG. NO. 29 | |
| DRAWN BY: M.J.U. | | | |
| REVISED BY | SCALE: 1:500 & 1:50 | METRES | |

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BEMA DRAFTING




## LEGEND

### SYMBOLS

GEOLOGICAL BOUNDARY
defined
approximate
assumed
LIMIT of GEOLOGICAL MAPPING
OUTCROP
FELSENMEER
TALUS
FAULTS
defined
approximate
assumed
VEIN STRUCTURE
defined
approximate
assumed
BEDDING
horizontal
vertical
inclined
overturned
FOLIATION
horizontal
vertical
inclined
unknown
ANTICLINE
defined
approximate
overturned
SYNCLINE
defined
approximate
overturned
JOINTING
weak
moderate
strong
weak
moderate
strong
MINOR FOLDS
style & direction
GLACIAL STRIAE
movement known
movement known
SHAFT
RAISE
WINZE
ADIT or TUNNEL
caved
QUARRY or MINE
active
abandoned
TRENCH
closed end
open end
PIT
GRAVEL PIT
active
dormant
DUMP or TAILINGS
DDH & NUMBER
80-00 location
surface projection
OVERBURDEN DRILL HOLE
DBH-80 location
CHIP SAMPLE
ROCK SAMPLE
FLOAT
2 with rock type
SURVEY STATION
TRIANGULATION POINT
CLAIM POST
CLAIM BOUNDARY
ROAD
CAT TRAIL
CABIN
SPRING

### LITHOLOGY

JURASSIC AND OR CRETACEOUS
Intrusive and subvolcanic (hypabyssal) rocks

2

- 2a Aplite
- 2b Granodiorite
- 2c Porphyritic quartz monzonite
- 2d Quartz diorite and diorite
- 2e Rhyolite (quartz porphyry)
- 2f Lamprophyre and other associated biotite rich intrusive rocks
- 2g Basalt and amygdaloidal basalt
- 2h Felsic volcanic rocks and tuff
- 2i Quartz-arsenopyrite vein rock

LATE PRECAMBRIANN OR EARLY PALEOZOIC
Upper schist / Grit unit

1

- 1a Massive, gritty and thin bedded quartzite
- 1b Micaceous quartzite
- 1c Phyllite $c_1$ Muscovite sericite phyllite
  - $c_2$ Chloritic phyllite
  - $c_3$ Graphitic phyllite
- 1d Hornfelsic rocks $d_1$ Interlayered quartzite and biotite schist
  - $d_2$ Massive and interlayered biotite and chloritic schist
  - $d_3$ Massive quartzitic hornfels
  - $d_4$ Greisen
- 1e Calc-silicate skarn $e_1$ Pyroxene-(dark)
  - $e_2$ Wollastonite quartz (light)
- 1f Breccia
- 1g Marble

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CANADA TUNGSTEN MINING CORPORATION
WEST RIDGE Y.T.
1981 GEOLOGICAL EXPLORATION PROGRAMME

# JOSEPHINE GRID GEOLOGY

| | | |
|---|---|---|
| DATE NOVEMBER, 1981 | JOB NO. 81-05G | FIG. NO. 30 |
| DRAWN BY J.P. Paquet | | |
| APPROVED BY | SCALE 1:5,000 METRES | |

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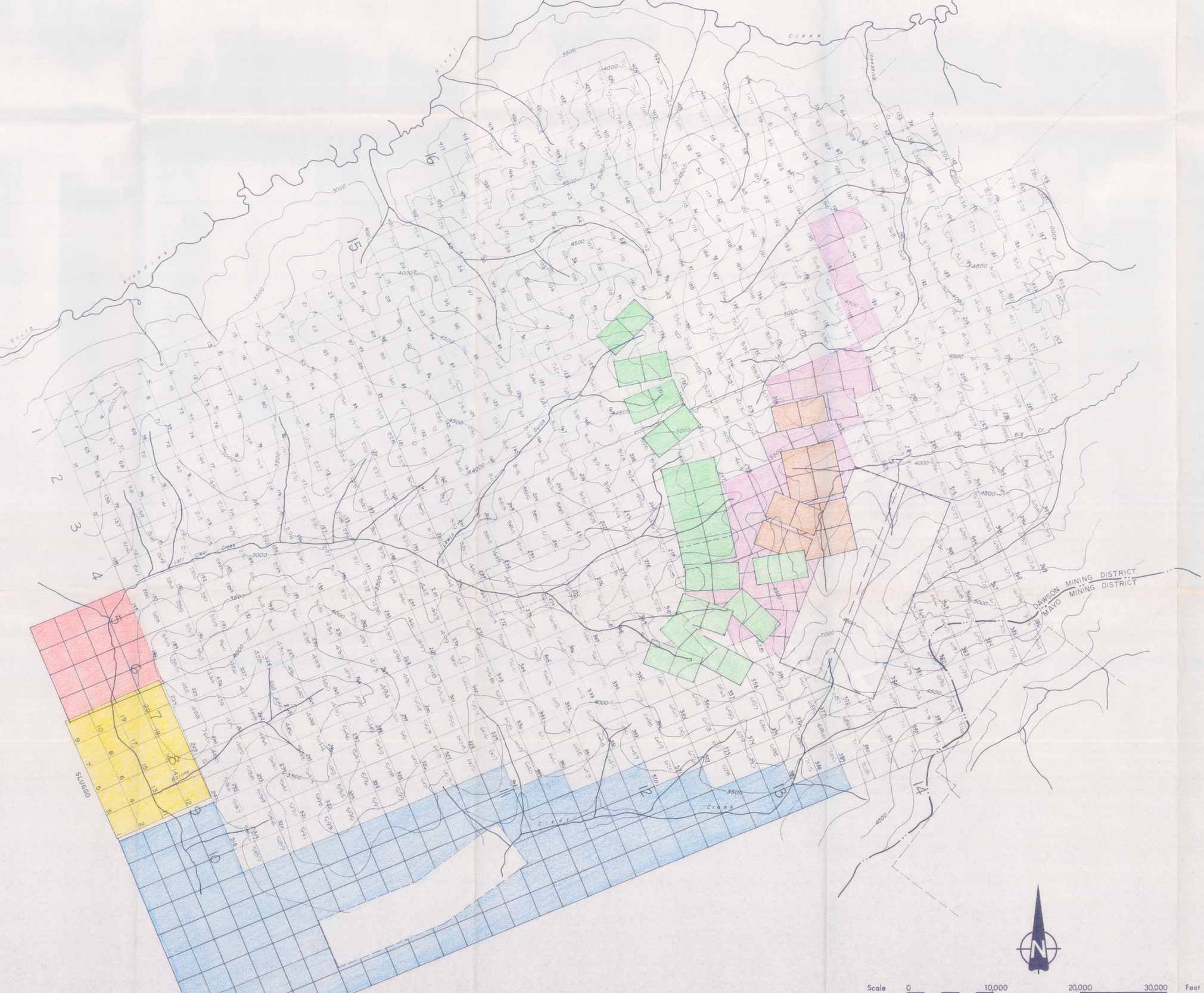
BEMA DRAFTING




C.C. CLAIMS - STAKED AUGUST 1980

SLUGGO CLAIMS - STAKED SEPT. 1980

C.C. CLAIMS - STAKED MAY 1981

C.C. CLAIMS - STAKED AUGUST 1981

C.C. CLAIMS - STAKED SEPT. 1981

RAIN CLAIMS

BEE CLAIMS

090926

CANADA TUNGSTEN MINING CORPORATION

# WEST RIDGE

1981 GEOLOGICAL RECONNAISSANCE PROGRAMME

## CLAIM STATUS

OCTOBER 1981

090926

| | | |
|---|---|---|
| DATE: NOVEMBER 1981 | 81-05G | 31 |
| DRAWN BY: S.H.Mc. | | |
| REVISED BY: RHR | SCALE: 1/2 in. : 1 mile | |

REMA INDUSTRIES LTD.