RIDGEWAY W. WILSON & ASSOCIATES
MINING ENGINEERS

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MAPS IN FOLDER

Figure 1	Assay Plan
Figure 2	Detail Geology
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APPENDED:

Summary Report, Petrology of some Copper Canyon rocks by R. T. Carswell.

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REPORT ON GEOLOGY

COPPER CANYON

INTRODUCTION

Copper Canyon Creek is a south westerly flowing tributary of the East Fork of Galore Creek, which drains northerly into the Scud River and finally to the Stikine River. Access at this time is by helicopter only and supplies were flown in after being barged to the mouth of the Anuk River on the Stikine.

The showings are apparent as extensive copper carbonate stains on the steep walls of the 'canyon'. The principal showings are located on the CC claims retained by South West Potash Corporation but mineralization extends easterly and is covered by the Racicot Syndicate's Penny claims which occupy expired CC ground.

The extent of the intrusive body, referred to as the Copper Canyon stock, which contains the copper mineralization, has been studied and mapped first by Dobell, then revised by Spencer in 1957 and finally compiled by DeLeen. Surface sampling was carried out and a series of seven holes, about 3000 feet of generally poor recovery, were drilled in 1957 exploring the main showings. Following this program most of the CC claims lapsed and the ground was subsequently restaked by the Racicot Syndicate in 1964, encouraged by an air magnetometer anomaly reported by G.W.H. Norman which was located over some of the lapsed ground.

During the 1964 field season a program was instigated designed to assess the mineralized areas east of the main showings with surface mapping and a series of trenches, and to answer such questions as the possibility of a southerly extension of the stock to the south side of Copper Canyon glacier. A ground magnetometer survey was carried out in an attempt to further define the air anomaly and possibly to outline the periphery of the stock.

Control for mapping was supplied by a combination of: topographic data recorded from air photos, reference points on De-Leen's compilation map, a stadia traverse which approximately defined the Penny claims, and some stations established by a chain and brunton traverse.

The program was completed in nine (9) weeks, hindered by unusually wet, cold weather and a topography which generally does not lend itself to detailed examination, although structure does become more apparent under such conditions of extensive steep exposure.

A selection of 14 thin sections representing samples from the main stock and the country rocks were studies by H. T. Carswell whose results appear appended to this report.

TRENCHING

Some 1462 feet of trenching were carried out in an effort to obtain fresh surfaces for sampling. The results appear on Fig. 1.

A Copco Cobra jackhammer was used to drill short holes for the forcite which was employed for approximately one half of the total footage, in the zone shown as competent, relatively unfractured rock. For the remainder a chisel bit was employed, along with pick and shovel, to loosen the rock.

Unfortunately the terrain does not permit the necessary manoeuverability for adequate surface coverage of the mineralization. The competent rock is fairly fresh and the fractured rock is leached far beyond the reach of the hammer. Hence the

value of such a means is doubted.

GEOLOGY - REGIONAL

The Copper Canyon stock is exposed in an oblong form approximately one mile by one-half mile in Copper Canycn and Doghouse Creeks. To the south its termination is defined by the Copper Canyon glacier to the east, by Middle Triassic sediments and to the west by Upper Triassic volcanics.

The country rocks have been dated by the G.S.C. mainly through fossil identification. They are shown to be an overturned sequence of volcanic and sedimentary rocks. The middle and upper Triassic sediments and volcanics are separated by an unconformity along which considerable movement has taken place and are overlain by the older massive Permian limestones. None of this rock however, appears as a host for mineralization with the exception of a few isolated occurences of chalcopyrite and molybdenite along the unconformity and strong, extensive pyritization near the intrusive contact in the volcanic rock.

The volcanics are mainly massive felspar porphyry flows, the similar composition to that of the stock indicating a common magmatic origin. Andesites and even augite porphyries occasionally occur interbedded. A similar orthoclase porphyry occurs across the Copper Canyon Glacier about 2000 feet to the southwest in a pyritized fragmental form which probably represents a breccia pipe. Tnis is the outcrop which, by its weathering characteristics, was thought to be an extension of the stock.

About 3000 feet to the west of Doghouse Creek, steep north westerly dipping overturned graded conglomerates with flow porphyry pebbles, and sparse thin limestone beds, appear. The pebbles become basaltic to the north and fresh gabbros and basalts abut the unconformity further to the northeast.

North of the unconformity lie the middle Triassic carbonaceous shales dipping steeply east. They are severely dragged near the stock and are bulged to present an exaggerated thickness in the headwaters of Copper Canyon. Beds of impure limestone are altered and pyritized.

The shales are overlain by massive limestone with chert occasionally interbedded. This Permian unit has been dragged apparently conformably with the shales and some fragmental intermixing occurs on the contact, along with alteration to marble and graphite.

THE STOCK

The Copper Canyon Stock is variously composed and textured and no attempt was made to differentiate the zones on the map. It is essentially an equigranular or porphyritic syenite but the rock may be as high as 95% in orthoclase between DDH number's 3 and 4 or 50% in mafics. The rock may vary from holocrystalline to clastic or a mixture of both. A common occurence is a porphyry comprised of well-developed euhedral phenocrysts in a cloudy matrix, or the pheocrysts may also be hazy and partially replaced by mafics.

The previous maps have shown a zone of orthoclase porphyry in the southwest map corner but the author found such porphyry occuring more or less continuously in an elongate zone parallelling the Felsite dyke up to and beyond the fault plane although the rocks to the east of the fault are of questionable origin. The porphyries appear as disjointed pods within the zones and the margins are gradational. The texture is often masked by bleaching. The pheocrysts are not usually zoned near the dyke but are generally zoned where they appear to the west. A weak linneation plunging moderately due south can sometimes be recognized.

A zoned porphyry outcropping in an easterly branch of Doghouse Creek about 1300 feet upstream from DDH number 7 was shown in thin section to be a volcanic tuff and this may apply to other porphyries within the stock.

Miarolytic cavities up to four inches in diameter and filled with biotite are not common but are observed in the barren leached orthoclase-rich rock near DDH's 57-3 and 4 and to the southwest in the strong mineralization near DDH 57-7.

A slightly anomalous feature is a bluff forming wedge-shaped body of epiditic, chloritic, non-porphyritic, monzonite, defined sharply on the east by the regional fault, to the west by a faulted contact with the fractured, pegmatitic syenite and to the south by Doghouse Creek. It is a relatively fresh, competent, homogeneous rock with the usual green biotite or chlorite and lavendar orthoclase but with the addition of magnetite and epidote, especially with quartz and hematite in fractures. The rock is noticeably free of disseminated sulphides. The abrupt discontinuation of an otherwise continuous lamprophyre dyke through this unit suggests block faulting.

Immediately to the northeast of the map area, west of the fault, occurs a fresh syenite plug with medium-grained pink (as opposed to lavender) orthoclase in a mafic-poor rock. It is exposed for about one-quarter square mile and its contact relations are not clear. It is not altered or mineralized and is thought to be a late intrusion.

To the northwest of this plug are fine-to-medium-grained pyritized andesitic rocks with lavender orthoclase and a plutonic texture. This makes the northwest stock relations a matter for detailed study before its perimeter can be firmly established. Likewise the coarse porphyries which extend along the footwall of the unconformity are of uncertain origin.

In the north central map region defined by the shales to the east and the regional fault trace to the south occurs a unit whose origin is indetermidable at this time. The rock is a dense

purple fine-grained rock with or without non-oriented or gently south plunging euhedral, sometimes broken orthoclase phenocrysts. A vague fragmental outline can be envisaged occasionally. Secondary minerals include abundant finely disseminated pyrite, occasional biotite and frequent fluorite. It becomes siliceous and foliated near the fault. Samples were not studied in thin section.

A further enigma is a bed, varying in thickness from six inches to ten feet, of siliceous banded limestone dipping steeply east, and paralleling both the prominent fracturing of the neighbouring rocks and the bedding in the sediments. This bed lies in the 'andesites' approximately 400 feet east of the fault trace and several hundred feet west of the shales. It reappears again for about 50 feet at the head of Doghouse Creek and once more within 100 feet of the sediments immediately to the south of Copper Canyon Creek. On Fig. 3 this bed has been interpreted as the base of the sedimentary units where the stock's perimeter is in doubt in the vicinity of the highly altered hanging wall 'andesitic' rocks in the upper Copper Canyon Creek. The contact is further suggested by the abundance of secondary biotite to the north of the bed and strong porphyritic texture to the south.

STRUCTURE

It is thought that the tectonics of intrusion is related to the stresses which gave rise to the deformation of the sediments to the east. These stresses appear to have occured on an easterly dipping plane which is the common plane of the major faulting along the unconformity and drag folding and is conformable to the axis of the stock.

The movement along the unconformity has been described (Dobell, DeLeen) as a "regional thrust fault which forms the contact between the Permian and Triassic and which as a displacement of more than 1000 feet vertical and 425 feet horizontal".

These 'Permian' sediments have been declared middle Triassic on the basis of recent fossil dating; hence "thrusting" of older over younger rocks on this contact has not occured. The horizontal displacement of 425 feet, however, is observed in the displacement of the felsite dyke. The fault scarp disappears under morrain in Copper Canyon Creek but continues after a southwesterly displacement which probably occured along a southeasterly dipping fault.

In an effort to describe the local tectonics a number of joint and fracture sets were analyzed statistically but nothing became apparent which is not obvious from the map, i.e., a common moderate- to-steep south-southeasterly dipping cleavage throughout the stock, with some additional local variances, and several prominent faulting directions. These are: very gently north; steeply east-southeast; moderately north-northwest; and moderate to steeply north-east dipping. The cleavage is more intense in some areas than others and does occur such that the rock can be readily shovelled.

There are three kinds of dykes in the area, intruding all rock units. The most prominent is a trachytic felsite with aphanitic banded margins. The major form cutting the stock can be traced for at least 2 1/2 miles. It has been displaced and brecciated in several instances and a smaller parallel form has been subject to bleaching near DDH number 3. The felsites, which occur to the west, all trend slightly east of north and lie vertically or very steeply west dipping. A few east-west felsites occur several miles to the west but they lack the trachytic texture and are probably an earlier intrusion.

A second type is a fine- to medium-grained hornblende andesite, occasionally with felspar phenocrysts, which consistently trends east-west and dips steeply north. The principal example in the northern map area apparently has not suffered a net horizontal displacement from the fault which would support the idea of a reverse sense of movement of the fault, or else make it later than the fault, which is more likely. A third form is a one foot, continuous lamprophyre, trending roughly

parallel to the felsites. It is nearly entirely biotite with the exception of one dyke in the southwest, cutting a porphyry, which is low in biotite in an andesite matrix. There are also rounded quartz-rich igneous inclusions to one inch in diameter with folliated periferal biotite.

ALTERATION

The 'bleached' rock indicated on the map is a very fine-grained, hard siliceous, light coloured rock which has been altered from the volcanics, the stock itself, and even from the shale in one instance. It is especially prominent in an extensive zone on the hanging wall of the Copper Canyon fault extending to the sediments to the east. Kaolinization is strong in the bleached zone on the north side of Copper Canyon Creek about 300 feet east of the fault. Silicification occurs sporadically throughout the stock, with or without associated shears but is shown on the map only where it is extensive and strong.

According to Carswell, weak felspathization has occured in some pyroclastic and syenitic rocks.

Mineralized orthoclase-biotite pegmatites occur on the foot wall of the Copper Canyon fault where it intersects Copper Canyon Creek. They occupy steep easterly-dipping fracture planes and wall rocks are, in places, impregnated with grey quartz and pink orthoclase. According to Dobell's thin section analysis "mutual boundaries and veinlets of orthoclase and sericite cut all other minerals indicating that orthoclization, accompanied by seritization was one of the principal types of alteration and a part of the mineralization stage".

Other alteration minerals not so far mentioned include calcite, specularite, epidote, and gypsum (Dobell).

MINERALIZATION

Secondary minerals include chalcopyrite, bornite, azurite, malachite, pyrite, magnetite, specularite, rarely molybdenite, fluorite, quartz, hematite, and limonite. Others not identified are cuprite, barite, gypsum and apatite (Dobell), and tourmaline (Carswell).

A unique situation is provided by a 1 to 3 inch vein filling a steep north-west dipping fracture which intersects T 18. A suite of lead-silver-zinc sulphites and oxides occupy this vein.

Pyrite is more common in the volcanics west of the stock but does occur in the stock itself, although not usually in conjunction with chalcopyrite. It occurs as fine to coarse disseminated grains and in vugular cavities in bleached rock.

Chalcopyrite occurs in varying strengths throughout the stock but achieves ore grade in limited areas. In the southeast zone cut by Copper Canyon Creek mineralization occurs along fault planes, in pegmatites with ingrown large orthoclase crystals, and as disseminations in grey quartz-orthoclase-biotite impregnations. This mineralization occurs in precipitous terrain which is very difficult to examine closely but the competent rock is relatively fresh and surface indications are hence meaningful.

To the northwest the mineralization continues but is confined to approximately 50 feet of fault zone before opening out into a large area of chalcopyrite, malachite mineralization in a region of extreme fracturing and shearing in the vicinity of the felsite dyke as outlined on the map. The syenite here is about equally porphyritic and non-porphyritic and the abundance of poorly foliated coarse felspar may be responsible for its highly cleavable, permeable nature. The disseminated mineralization favours the more equigranular texture. Chalcopyrite also occurs massively in gritty orthoclase impregnations, fills occasional joints and is associated with massive specularite in the northwest part of the zone.

The northern extreme of this zone extends into the competent, precipitous hanging wall rocks of the Copper Canyon fault. The rock here is a heterogeneous composite of subhedral green mafics and orthoclase in various proportions with the latter often appearing as impregnations with associated disseminated grains, and massive lensy veinlets, of chalcopyrite. Unfortunately, the best mineralization appears in very precipitous terrain.

The mineralization in the southwest corner of the stock, delimited by the 1957 program, again favours the more equigranular syenite. The chalcopyrite is associated with specularite. The exception is an orthoclase porphyry at DDH number 7. This is fresh rock with sparce, slightly hazy orthoclase phenocrysts and biotite books in a grey siliceous groundmass with coarse disseminated chalcopyrite, In the same outcrop to the north of the hole the mineralization decreases and disappears with an increase in the phenocryst density.

Elsewhere in the stock to the northwest of the main showings described above chalcopyrite and malachite occur in several locations; weakly in a severely fractured zone at the head of the lower easterly tributary of Doghouse Creek and confined to an occasional fracture or vugular space in the more competent 'andesites' of the far north map area.

ECONOMIC GEOLOGY

Figure 1 illustrates the results of trenching and the assessment of the principal zones of mineralization on the Penny claims.

The sampling results were not encouraging but values obtained from surface sampling cannot be taken as indicative of the true value of the deposit, in the case of the severely cleaved permeable rock of the western zone, until the leaching factors are tested at depth. Leaching and oxidation is expected to continue

to considerable depth but a high errosion rate and a short time lapse since the period of glaciation indicates little chance of secondary enrichment.

Values obtained from the western zone range from 0.25% in totally oxidized to 1.25% in partly oxidized material respectively, excluding the southerly region covered by trenches 5 to 8 where values are too low to be considered interesting. The block of potential ore surficially delimited over an area of approximately 200,000 square feet or 16,000 tons per vertical foot gives a body of 8.3 million tons assuming a depth of 500 feet, which is one-half its length. The weighted average of the samples yield an overall grade of 0.54% which is far from ore grade but could conceivably become ore grade at depth.

The area to the southeast of this zone contains eratically distributed fresh chalcopyrite in quartz-orthoclase impregnations and the occasional pegmatite. Values of 0.77% and 2.0% over 30 feet are representative of good disseminated chalcopyrite in such zones which are associated with moderate to steep easterly and northeasterly dipping structures. The zones lack continuity, however, and the very precipitous terrain did not permit their delimitation.

The southerly continuation of this zone on the CC claims across Copper Canyon Creek was surface sampled in 1957. It yielded only 0.43% copper on the basis of about 400 feet of sampling across about 300 feet of mineralization. The rock is reasonably fresh and values probably representative and whereas grades of 1% are present over widths of 30 feet and slightly stronger mineralization occurs to the southeast of the sampled portion, the potential block, which was delimited at 7.2 million tons by DeLeen, is not expected to reach ore grade.

Elsewhere on the CC claims in the southwest DeLeen has outlined two contiguous blocks totalling 22.6 million tons of 'probable' and 'indicated' ore, grading 1.08% in fresh samples from surface and drill core, and 0.67% in oxidized surface material.

There is a considerable discrepancy between the original (1956) and check (1957) surface samples so that the grade cannot be said to have been established until much more detailed sampling has been done. On the basis of drill section data and this year's surface mapping it seems likely that this mineralization occurs with north-northwesterly dipping structures and that ore shoots will be inclined similarily.

CONCLUSIONS & RECOMMENDATIONS

1. DeLeen's stated 'excellent possibility' of producing an orebody of 100M tons of 1% copper is felt to be unduly optimistic considering the lack of continuity of the ore zones. The author feels however that there is a good possibility of delimiting several zones in the south (CC claim area), excluding a major extension under the glacier, totalling 20M tons and at least one zone of 8M tons on the Penny group, averaging 1% copper.

2. Further exploration should consist of diamond drilling which would necessarily be expensive due to anticipated problems of water loss and the extensive footage required to delimit what is expected to be erratic distribution of copper values.

3. The southern-most zones should be tested by a series of holes inclined @ 45° at S30°E, collared at intervals along a line extending through the surface projections of the termina-tions of holes 57-7 and 57-4 (see figure 2). This proposed direction is designed to give right angle intersection of the ore shoots which are expected to be inclined parallel to the prominent northwesterly dipping structures.

4. The northwest zone would be best explored by two holes drilled from a common collar located 200 feet southeast of the

intersection of the offset northerly continuation of the major felsite dyke with the Copper Canyon fault. Both of these holes would be inclined at 75°, the first at N70°W, the second at S65°W and both designed to intersect mineralization at considerable depth in an attempt to obtain fresh samples in the severely cleaved rock. Mineralization is expected to parallel the fault plane which roughly parallels the Copper Canyon fault immediately to the east.

5. The eastern zone has been tested by a hole inclined easterly but since the mineralization is again expected to parallel the Copper Canyon fault it is recommended that a series of vertical holes be collared at intervals, where physically practical, along a line extending for 600 feet N15°E from the surface projection of the termination of hole 57-2.

6. These three zones should be tested in the order mentioned and work on the latter two would depend on the success of the first, or principal, zone.

7. The two claim groups have been dealt with as a unit and it is obvious that they should be combined for most effective exploration.

8. Since this is a marginal prospect the feasibility of development would depend to a large extent on the emergence of transportation and milling facilities associated with the development of other major discoveries in the area, especially those of Stikine Copper some four miles downstream on Galore Creek.

January 1965

Hugh Naylor

EVIDENCE OF EXPENDITURES INCURRED

H. Naylor - Geologist	June 18 - Aug. 24	@ $550/month	=	$ 1,237.00
T. Buckham - A/Geologist	June 18 - Aug. 18	@ $375/month	=	$ 750.00
P. Wright - Surveyor	July 15 - July 31	@ $500/month	=	$ 250.00
G. Racicot - Helper (Surveyor)	July 15 - July 31	@ $ 250/month	=	$ 125.00
W. Dunn - Engineer in charge	Ten days	@ $35/day	=	$ 350.00
				$ 2,712.00

OTHER DIRECT COSTS

Helicopter costs	22 hours	@ $130/hour	=	$ 2,860.00
Living Expenses				$ 1,028.00
				$ 3,888.00
TOTAL COST				$ 6,600.00

Declared before me at the City of Vancouver in the Province of British Columbia, this 28 Day of January, 1965 A.D.

January 20, 1965

Certified correct:

W. St.C. Dunn

Sub-mining Recorder

STATEMENT OF QUALIFICATIONS

H. H. E. NAYLOR

1. Graduated from the University of British Columbia in 1962, B.Sc., with majors in geology and physics.

2. Has been engaged in geological mapping and mineral exploration in B.C. in an assistant capacity for several undergraduate field seasons and as a geologist for two seasons upon graduation.

3. Has personally examined the property in question, carried out, or supervised, the details of assessment, and has compiled the information from this, as well as previous examinations, which is assembled in this report.

SUMMARY REPORT

PETROGRAPHY OF SOME COPPER CANYON ROCKS.

Prepared for: SILVER STANDARD MINES LTD.(NPL)

Prepared by: H. T. CARSWELL - PETROGRAPHER

OCTOBER 1964

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SUMMARY

The Copper Canyon stock is composed of fine-to-coarse-grained, granular to porphyritic syenite. The body is probably mainly of magmatic origin with feldspathized country rocks.

The "southern extension" of the stock is, in fact, composed of pyroclastic rocks, as is a slightly feldspathized patch to the west of the stock.

Feldspars in both tuffs and syenites have been altered in part to muscovite and carbonate. Biotite, pistacite, clinozoisite and garnet (?) crystals are closely associated with metallic grains.

CONCLUSIONS

1. The only microscopic evidence of granitization of the stock is a slight feldspathization. The mineralogical similarity between syenite and pyroclastic rocks suggests that the two units are closely related and that the syenite is mainly of magmatic origin.

2. From examination of three specimens from the "south extension" of the stock, the body is pyroclastic in nature. It may be a breccia pipe.

3. The western "Feldspathized patch" proved to be similar to the "southern extension".

4. The estimated copper content of specimen 30-6-1 is ore grade.

INTRODUCTION

The Copper Canyon stock is a copper-bearing syenite body located at the head of Galore Creek in northwestern British Columbia. The exposed part of the stock is about 1/2 mile in diameter, the southern contact being hidden under a glacier. The country rocks are Permian limestones and argillites and Triassic volcanic rocks.

A possible extension of the stock lies on the south side of the glacier, and a possibly feldspathized patch occurs in Permian strata to the west of the stock.

Fourteen specimens were chosen from the main stock, the "south extension", and the feldspathized patch for microscopic study. The following questions were investigated:-

1. The possibility of granitization in the main stock.
2. The possible syenitic character of the "southern extension" of the stock.
3. The possible feldspathized character of the patch to the west of the main stock.
4. The estimated grade of a specimen of leached copper ore (30-6-1).

Note

Specimen 13-8-9	corresponds to thin section	13-8-19
Specimen 17-8-4	"	17-8-14
Specimen H 4	"	1 -14
Specimen 9	"	6

MINERALOGY

Orthoclase - low neg. relief, low grey birefr., biaxial (-) high 2V, perthitec in places.

Albite - relief as balsam or lower, low grey birefr., biaxial (+), low 2V, x, angle to c = +12°. Only carlsbad twinning is usually apparent.

Carbonate - low variable relief, extreme birefr., uniaxial (+).

Muscovite - mod. pos. relief, second order birefr., biaxial (-), moderate 2V, length = slow, bird's-eye texture, one perfect cleavage.

Biotite - mod. pos. relief, "uniaxial" (-), high birefr., one perfect cleavage.

Variety 1 - strong green pleochroism Z_1 greater than X_1.

Variety 2 - Z_1 yellow-orange X_1 gree (17-8-14).

Quartz - low pos. relief, low grey birefr., uniaxial (+), no cleavage, clear.

Chlorite - Low pos. relief, nearly isotropic, green, non-pleochroic, flakey.

Apatite - high pos. relief, low grey birefr., columnar, one basal cleavage, uniaxial (+).

Tourmaline - high pos. relief, high-birefr. masked by extreme blue pleochroism O greater than E.

Zircon - extreme pos. relief, extreme birefr., uniaxial (+), mod. 2V.

Garnet (?) - high pos. relief, nearly isotropic but shows faint birefringent concentric zones, no cleavage.

Pistacite - high pos relief, strong birefr., faint yellow pleochroism, biaxial, 2V = 90°.

Clinozoisite (?) - high pos relief, low first order birefr. with anomalous blue extinction parallel extinction, biaxial (+), moderate 2V.

PETROGRAPHY

SYENITE STOCK.

Specimens from the syenite are composed mainly of orthoclase with minor albite, quartz, biotite, muscovite, zircon, and coarse apatite. Other minerals present are probably alteration products and are discussed below.

The biotite and other minor constituents of the syenite are generally medium-grained and euhedral. Zircons, however, are in some cases rounded (specimen 30-6-1).

The grain size of the syenite varies from fine to coarse. Some specimens exhibit a granular, interlocking, equigranular texture (30-6-1). A granitic texture with large euhedral orthoclase crystals in a finer-grained granular matrix composed of euhedral albite and orthoclase grains is common (19-8-4). The granitic texture becomes porphyritic as the euhedral orthoclase crystals become larger (1-14).

Some of the groundmass crystals have been altered around their edges, giving them a hazy appearance in hand specimen. In other cases, alteration minerals give the groundmass a dark green or red appearance.

One specimen collected from the stock is, in fact, a tuff in which orthoclase fragments have been slightly enlarged by feldspathizing solutions. The fragments have fretted borders along which thin fingers of orthoclase penetrate between grains of the fine matrix. This specimen (13-8-19) probably represents an inclusion in the stock.

PYROCLASTIC ROCKS.

Specimens 2 and 3 were collected from a feldspathized zone in the country rocks to the west of the stock. Both are, in fact, unreplaced tuffs containing fragments of fine-grained igneous rocks, orthoclase, and a few pieces of glass.

Specimens 6, 5 and 7 were collected from the "southern extension" of the syenite. They are, in fact, tuffs and a volcanic breccia. They contain fragments of albite porphyry, tuff, volcanic glass, apatite, and orthoclase, in a fine-grained quartz-feldspar matrix. The breccia contains angular lithic fragments less than 3 cm. in size. Syenite fragments were not seen in the pyroclastic rocks.

ALTERATION

As mentioned above, dusty hematite imparts a red colour to many of the feldspars, particularly the anhedral groundmass grains of the syenites. The groundmasses of the pyroclastic rocks have been similarly altered.

Green biotite and closely associated minerals which, in part, mimetically replace biotite (garnet (?), pistacite, clinozoisite, muscovite and chlorite) are found with considerable disseminated fine-grained metallic crystals. However, in specimen 6 (9), opaque grains occur without these minerals.

Fine-to-coarse-grained muscovite and carbonate vein the rocks and replace orthoclase in some cases.

Weak feldspathization has occurred in some pyroclastic rocks as described above, and in some syenitic rocks (9-8-13).

Fine-grained tourmaline occurs in specimen 1-14 (hole 4).

ESTIMATION OF GRADE OF LEACHED ORE

SPECIMEN 30-6-1

The rock is a medium-grained syenite with a granular texture. Malachite is abundant, and the rock contains small cavities.

Assuming all the voids were originally filled with chalcopyrite, and that the unmineralized rock had a specific gravity of 2.5, an estimation of the original grade can be made.

Estimated percentage of voids by volume = 5%

1 cc of original ore contains

5% x 5.G chalcopyrite	=	weight of chalcopyrite
5% x 4.2 gm/cc	=	0.21 gm.
95% x S.G. rock	=	weight of rock
95% x 2.5	=	2.38 gm.

1 cc of ore weighs 2.59 gm.

chalcopyrite contains 34.5% Cu.

weight of Cu in 0.21 gm of chalcopyrite = 34.5% x 0.21 gm = 0.073 gm.

1 cc of ore weighs 2.59 gm., of which 0.073 gm. is Cu.

ore contains $\frac{0.073 \text{ gm.}}{2.59 \text{ gm.}}$ = 2.8 weight % Cu.

THEORETICAL CONSIDERATIONS.

Similar crystals of orthoclase and apatite occur in both pyroclastic rocks and syenite. In the tuffs the crystals are definitely broken fragments. These facts suggest a common magmatic origin for both units. No fragments of syenite were found in the pyroclastic rocks, indicating that the tuffs were formed earlier.

The patches of tuff and volcanic breccia may be breccia pipes.

Little evidence of granitization is evident in thin sections of the syenite. Both sharp and round zircons were found, indicating a mixed origin for the unit. This theory is supported by the following other facts:

1. Mineralogical similarity of tuffs and syenite indicates magmatic origin.

2. Slight feldspathization of syenite, wall rocks, and inclusions indicates replacement origin.

H.T. CARSWELL,
PETROGRAPHER.

Fig. 1 To accompany geology report Jan. 1965

RACICOT SYNDICATE

COPPER CANYON PROJECT

STIKINE RIVER AREA B.C.

ASSAY PLAN

SCALE: 1" = 100'

DEC. 1964 H. Naylor

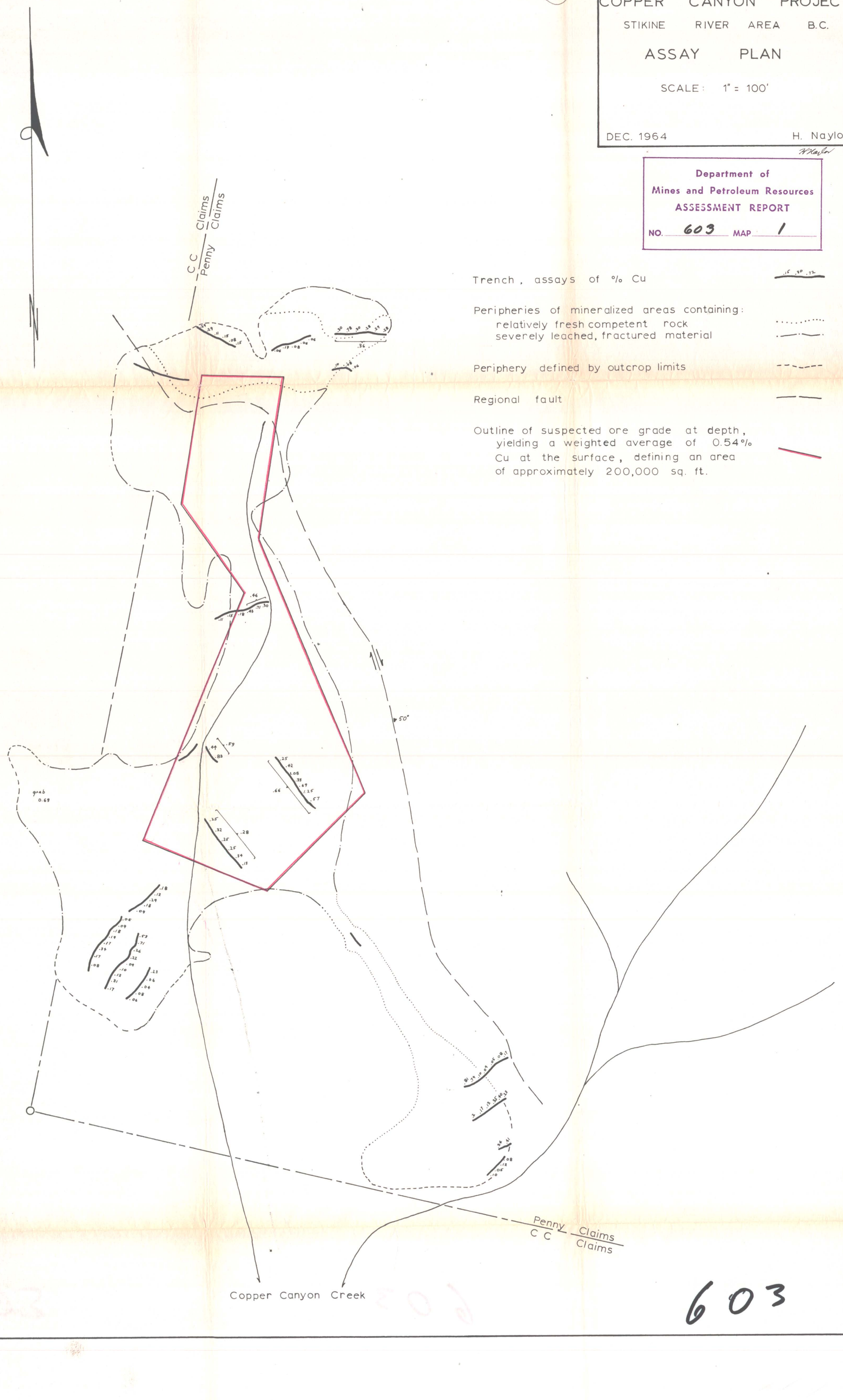
Trench, assays of % Cu

Peripheries of mineralized areas containing:
relatively fresh competent rock
severely leached, fractured material

Periphery defined by outcrop limits

Regional fault

Outline of suspected ore grade at depth, yielding a weighted average of 0.54% Cu at the surface, defining an area of approximately 200,000 sq. ft.



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(M2)

Drill collar (1957)
Prominent cleavage
Faulting

Permian massive limestone & minor black chert

U. Triassic pyroclastics, flows, minor limestone & sandstone

? limey greenstone unit

M. Triassic limey shales, minor impure limestone, quartzite

siliceous limestone bed

'andesite' & 'andesite' porphyry

syenite & syenite porphyry

mineralized syenite

'bleached' rock

dykes felsite

hornblende andesite

biotite lamprophyre

drag folding

Doghouse Cr.

Copper Canyon Cr.

57-1 57-2 57-3 57-4 57-5 57-6 57-7

COPPER CANYON GLACIER

(EAST FORK GALORE CREEK)

RACICOT SYNDICATE

COPPER CANYON PROJECT

STIKINE RIVER AREA

GEOLOGY PLAN

SCALE: 1" = 200'

Dec. 1964

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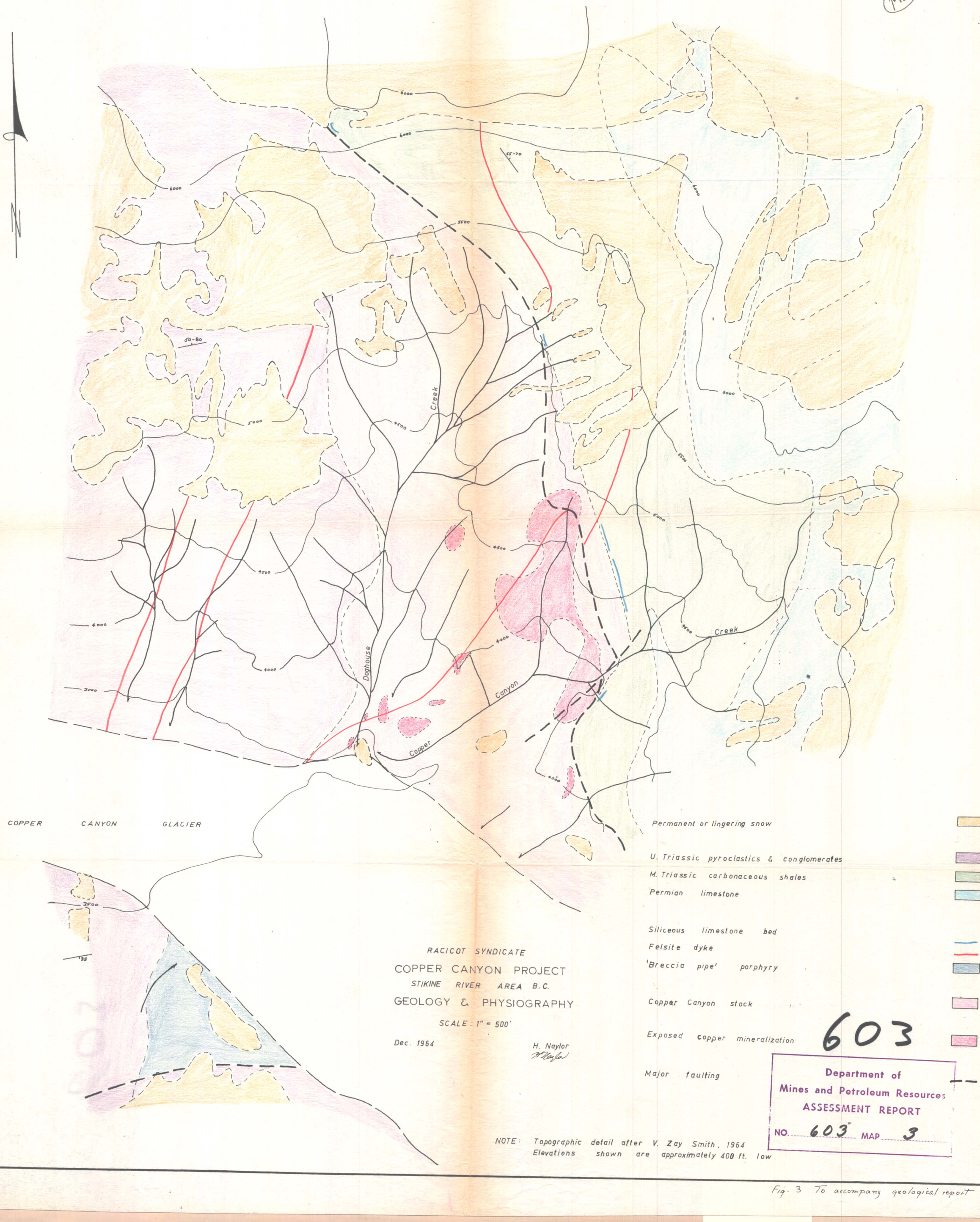
H. Naylor

Fig. 2 To accompany geology report Jan. 1965

M3



RACICOT SYNDICATE

COPPER CANYON PROJECT

STIKINE RIVER AREA B.C.

GEOLOGY & PHYSIOGRAPHY

SCALE: 1" = 500'

Dec. 1964

H. Naylor

Permanent or lingering snow

U. Triassic pyroclastics & conglomerates

M. Triassic carbonaceous shales

Permian limestone

Siliceous limestone bed

Felsite dyke

'Breccia pipe' porphyry

Copper Canyon stock

Exposed copper mineralization

Major faulting

NOTE: Topographic detail after V. Zay Smith, 1964
Elevations shown are approximately 400 ft. low

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Fig. 3 To accompany geological report Jan. 1965

M4

P51 P50 P49 P48 P47

P 52

P 46 P44 P42 P40 P38 P36

P 45

P 43 P41 P39 P37 P35

STIKINE EAST GROUP

P 32 CC 14 P34 P30 P28

P 33 CC 13 P 31 P29 P27

CC 6 Creek Dighouse Copper Canyon CC 4

COPPER CANYON

CC 5 CC 2 P22

GLACIER

P21

CC 3 CC 1 P23 P21

P 26 P25

P12 P10 P8 P6 P4 P2

P11 P9 P7 P5 P3 P1

P 20 P18 P16 P14

P19 P17 P15 P13

Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 603 MAP 4

COPPER CANYON
&
PENNY (=P) CLAIMS

LIARD M. D.

603

Scale : 500' = 1"

Nov. 1964

H. Naylor

FIG. 4 To accompany geology report, Jan. 1965