Geological Fieldwork

a summary of field activities
of the geological division,
mineral resources branch

1974

British Columbia Department of Mines and Petroleum Resources.

FOREWORD

Geological Fieldwork, 1974 is a new publication designed to acquaint the interested public with the preliminary results of the Geological Division as soon as possible after the field season. Fieldwork described includes reports of Project and District Geologists as well as those of graduate students whose work represents an integral part of the Division's projects. The reports are written mainly without the benefit of laboratory or extensive office studies. To speed publication, editing has been minimal and figures have been draughted by the authors. *Geological Fieldwork, 1974* is not designed to replace *Geology, Exploration, and Mining in British Columbia* which will continue as the comprehensive volume on the work of the Industry and of the Department.

A. Sutherland Brown,
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REPORTS OF PROJECT GEOLOGISTS

ZINC DEPOSITS SOUTHEASTERN BRITISH COLUMBIA

By Trygve Hoy

A study of lead-zinc deposits in southeastern British Columbia was initiated in the latter part of the 1974 field season. The following deposits were visited and sampled: the Kootenay King and Sullivan mines, stratabound zinc-lead deposits in Aldridge Formation (Lower Purcell) argillites and quartzites; the St. Eugene mine, a transgressive vein deposit in argillaceous quartzites of the Aldridge Formation; the Mineral King mine, sphalerite - galena - pyrite - barite replacement deposits in Mount Nelson Formation dolomites. 'Shuswap-type' deposits visited include the CK property, 40 kilometres northeast of Clearwater, and Colby Mines Ltd.'s property, 30 kilometres east-northeast of Enderby. These two occurrences are described in more detail as both are being actively explored.

CK – RIO TINTO (82M/13E)

The CK property, owned by Rio Tinto Canadian Exploration Limited, includes 270 claims located just north of the Raft River-Ritchie Creek junction. The area is accessible by a logging road branching north from Highway 5, 12 kilometres east of Clearwater and continuing north approximately 65 kilometres along the west side of the Raft River.

The area is underlain by metasedimentary rocks of the Shuswap Metamorphic Complex (Campbell, 1963). These include biotite - quartz - muscovite - feldspar ± garnet gneisses with minor amphibolite, quartzite, calc-silicate gneiss, and marble units. In the western part, a light-coloured, fine to medium-grained 'granitic' intrusive rock is present. Quartz-feldspar pegmatite sills and dykes, up to 80 metres thick, intrude the metasedimentary rocks.

Sulphide mineralization occurs as massive sphalerite, pyrrhotite, and minor galena within an original quartz-plagioclase-rich metasedimentary rock (?), and as disseminated sphalerite and minor galena within biotite-diopside quartzite and tremolite-calcite marble. The observed mineralization is confined to patches within a 20-metre stratigraphic thickness of metasedimentary rocks and over a strike length of 120 metres. Some of the mineralized patches are marked by pronounced gossan breccias consisting of rotated blocks of massive sulphide cemented by limonitic material.

FX, FC – COLBY (82L/10E)

Colby Mines Ltd.'s property is located 48 kilometres by road east of Enderby, 15 kilometres north of the Shuswap River, and just east of Kingfisher Creek.

The area is underlain by garnet - biotite - quartz - feldspar gneiss, tremolite-calcite marble, calcareous quartzite, and occasional amphibolite units. Quartz - feldspar ± garnet pegmatite dykes are common throughout the area, and 'quartz-eye' porphyry dykes are less common.

Sulphide mineralization consists of sphalerite and pyrrhotite with minor galena and pyrite in quartz-rich biotite gneiss, biotite quartzite, and calc-silicate gneiss. Sphalerite, pyrrhotite, and galena are also concentrated in quartzite breccia zones and sphalerite and pyrrhotite are disseminated in a tremolite-calcite marble. The marble is at least 300 metres thick and appears continuous over a strike length of at least 6 kilometres. Sulphide mineralization within the marble unit is restricted to distinct zones near the centre of the claim group, and at both the northern and southern extensions of the marble unit.

REFERENCE

Campbell, R. B. (1963): Adams Lake, British Columbia, *Geol. Surv., Canada,* Map 48-1963, 82M/W.

GEOLOGY OF THE NICOLA GROUP BETWEEN MISSEZULA LAKE AND ALLISON LAKE

(92H/15E, 10E)

By V. A. Preto

INTRODUCTION

Mapping was continued southward from the area covered in 1973 and an additional 55 square miles was completed (Fig. 1). Of the three belts that had previously been described as comprising the Nicola assemblage in the Aspen Grove area (Preto, 1974), only the Central and Eastern Belts are recognized in the present map-area, and these differ appreciably from their northern counterparts in the composition and/or types of rocks involved. The boundary between the Eastern and Central Belts in the map-area is marked by a major fault system, locally known as the Summers Creek fault, which is the southern extension of the Alleyne-Kentucky fault system.

CENTRAL BELT

As in the Aspen Grove area, the Central Belt is composed of a thick sequence of massive and fragmental volcanic rocks but the individual rock units differ considerably from their northern counterparts. Pyroxene-rich flow units, probably of basaltic to andesitic composition, are still common but no longer predominate. A common type of flow rock is a massive, greenish grey andesite or dacitic andesite with abundant plagioclase and a lesser amount of pyroxene crystals. Fine-grained variations of these rocks are very light green to green-grey in colour and are commonly interlayered with thinly laminated tuffs of similar composition.

The fragmental units also differ from their counterparts to the north. The red and green breccias which are so common in the Aspen Grove area, where they are thought to represent high-density mudflow or landslide deposits, are found only in the extreme north-central part of the present map-area and are rapidly replaced to the south by comparably thick accumulations of flow breccia and rubble breccia derived from nearby flow units. Typical of these breccia units are reaction rims around many of the clasts, and close similarity in composition between clasts and matrix.

The eastern part of the Central Belt consists of dacitic andesite flows and widespread lithic tuff with abundant fragments of grey and light grey fine-grained rhyolitic rocks.

Sedimentary rocks in the Central Belt are limited to small, widely scattered lenses of impure reefoid limestone and to a few layers of generally graded bedded volcanic siltstone, sandstone, and conglomerate.

With the exception of the southern part of a small stock of syenite-monzonite that is found in the extreme northwestern corner of the belt, intrusive rocks in the Central Belt

Figure 1. Generalized geology, Missezula-Allison Lake area.

LEGEND

JURASSIC

ALLISON LAKE INTRUSIVE BODY

RED GRANITE AND QUARTZ MONZONITE, GREY GRANO-DIORITE, DIORITE, AND QUARTZ DIORITE

UPPER TRIASSIC

NICOLA GROUP

EASTERN BELT

MEDIUM-GRAINED PORPHYRITIC SYENITE AND MONZONITE; LAHAR DEPOSITS, VOLCANIC CONGLOMERATE, AND SAND-STONE; MINOR FLOWS AND TUFF

CENTRAL BELT

MEDIUM-GRAINED GREY MONZONITE AND DIORITE

ANDESITIC AND DACITIC FLOWS, FLOW BRECCIA, RUBBLE BRECCIA, AND TUFF; MINOR VOLCANIC SEDIMENTS AND IMPURE LIMESTONE

SYMBOLS

● MINERAL SHOWINGS

FAULT

POWER TRANSMISSION LINE

are a rather uniform, grey, medium-grained pyroxene monzonite and diorite that form five distinct plutons. Most of the mineral occurrences in the belt are associated with these plutons. Areas of pink K-feldspar flooding and associated brecciation are common in the largest of these intrusive bodies and are closely associated with copper mineralization.

EASTERN BELT

Rocks within this belt occur east of the Summers Creek fault along the eastern boundary of the map-area and differ considerably from their counterparts a short distance to the north.

During the previous field season (Preto, 1974, p. 3) it was found that some flow units and an increasing amount of crystal tuff appeared in a section of generally well-bedded, fine-grained volcaniclastic rocks east and southeast of Bluey Lake. During the course of the present mapping it was found that these flow and pyroclastic units rapidly and almost entirely replaced volcaniclastic rocks immediately northeast of Missezula Lake. They centre, both in distribution and structurally, around an elongated body of microsyenite and syenite breccia which is thought to represent a shallowly eroded volcanic dome. The clasts in the pyroclastic and conglomeratic units around this dome are almost exclusively syenite from the dome. The composition of the flow units in this area is at this time not exactly known, but appears also to correlate fairly well with that of the intrusive, the lavas being mostly trachytic andesites and/or basalts which in places probably contain phenocrysts of analcite.

Further to the south, three more similar syenitic stocks were mapped in the belt, and the volcanic rocks surrounding them were found to consist almost exclusively of a thick succession of volcanic conglomerate, greywacke, and lahar deposits with abundant syenite clasts. Sedimentary rocks in the Eastern Belt consist of a few small lenses of impure limestone, calcareous sandstone, and grit with some tuffaceous siltstone and argillite northeast of Missezula Lake.

ALLISON LAKE INTRUSIVE BODY

This post-Nicola pluton occupies the western part of the map-area and has been previously described as consisting of red granodiorite (Rice, 1947, p. 39). The intrusive was found to consist of abundant red granite and quartz monzonite, reddish grey granodiorite, grey diorite, and quartz diorite, and also to contain large inclusions, or roof pendants, of metavolcanic rocks. North of Allison Lake the intrusive rocks are cut by a large number of dark-coloured basic dykes, many of which trend northeasterly, indicating a zone of widespread tension in the pluton.

STRUCTURE

The structure in the map-area is dominated by the Allison fault to the west and by the Summers Creek fault and its subsidiaries to the east. The Summers Creek fault marks the boundary between the Eastern and the Central Belts. With the exception of the area northeast of Missezula Lake, where structures in the stratified rocks are dominated and controlled by the syenite pluton, rocks of the Eastern Belt dip moderately to steeply to the west.

Within most of the Central Belt, layered rocks exhibit moderate to steep east and northeast or vertical dips, but in the vicinity of Missezula Mountain several westerly dips occur, indicating the presence of either a northerly trending syncline or some severely tilted fault panels. Lack of clearly recognizable stratigraphic markers and suitable minor structures preclude the positive identification of a major fold structure in this area.

Another major structural feature in the map-area is a large northerly trending zone of intense shearing and faulting which marks the western boundary of Summers Creek fault system. This shear zone has been mapped from Missezula Lake to the southern boundary of the map-area and continues to the south. It ranges in width from a few feet to more than one thousand feet and the rocks within it are reduced to highly fissile greenschist and sericite schist with a strong foliation that dips steeply to the west.

MINERAL DEPOSITS

Within the Central Belt, copper mineralization consists of disseminations and minor replacements of pyrite and chalcopyrite and, occasionally, some chalcocite. Mineralized occurrences are confined almost exclusively to dioritic and monzonitic intrusions or to volcanic rocks along faults of the Summers Creek system.

Within the Eastern Belt, copper occurrences are best exemplified by the showings at the Shamrock prospect south of Missezula Lake where disseminations and minor replacements of chalcocite and some native copper occur in volcanic conglomerate and lahar deposits.

ACKNOWLEDGMENTS

The help and cooperation of S. J. Atkinson, J. Nebocat, and L. K. Robertson during the 1974 field season was greatly appreciated.

REFERENCES

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Rice, H.M.A. (1947): Geology and Mineral Deposits of the Princeton Map-Area, British Columbia, *Geol. Surv., Canada,* Mem. 243.

STRATIGRAPHY AND COPPER MINERALIZATION OF THE NICOLA GROUP, FAIRWEATHER HILLS

(92H/15E)

By David V. Lefebure

(Graduate Student, Queen's University)

This project was sponsored by the British Columbia Department of Mines and Petroleum Resources and carried out as partial fulfillment of the requirements for a Master's degree at Queen's University, Kingston, Ontario. It is a re-mapping in greater detail (1 inch equals 500 feet) of the Fairweather Hills area which was shown by Christopher (1973) to be an unusually well-exposed volcanic centre and which was known to contain numerous copper prospects. The scope of the project was to study in greater detail the volcanic stratigraphy of the area particularly in its relation to the distribution and type of copper occurrences.

The rocks of the area were subdivided into 16 units, but have been grouped into five major divisions on the following generalized preliminary map (Fig. 2). Previous work by Christopher (1973) and Preto (1974) does not seriously disagree with the general pattern indicated.

The red volcanic breccias in the Fairweather Hills area are all augite lahars that have the following characteristics:

(1) heterolithologic and polymictic fragments
(2) intercalated volcanic flows
(3) thin lenses of red sandstone with graded bedding
(4) a chaotic, intimate mixture of all fragment sizes

The red colour is believed to have resulted from oxidation in a subaerial environment.

The green breccias are mainly laharic with some intercalated green autobreccias. They were probably deposited in a submarine (reducing) environment, so they have a green colour, are generally magnetic, and display no thin lenses of reworked matrix material.

Christopher (1973) divided the augite andesite porphyry into two units on textural grounds. In fact, the red autobrecciated flows and massive green flows are generally intercalated on a random basis and are the same composition. These two units were combined.

The Fairweather Hills area can be divided into three assemblages according to their lithology and spatial relationships. If a correlation can be made with Schau's divisions of the Nicola Group near Nicola Lake (1968), it might be as shown following.

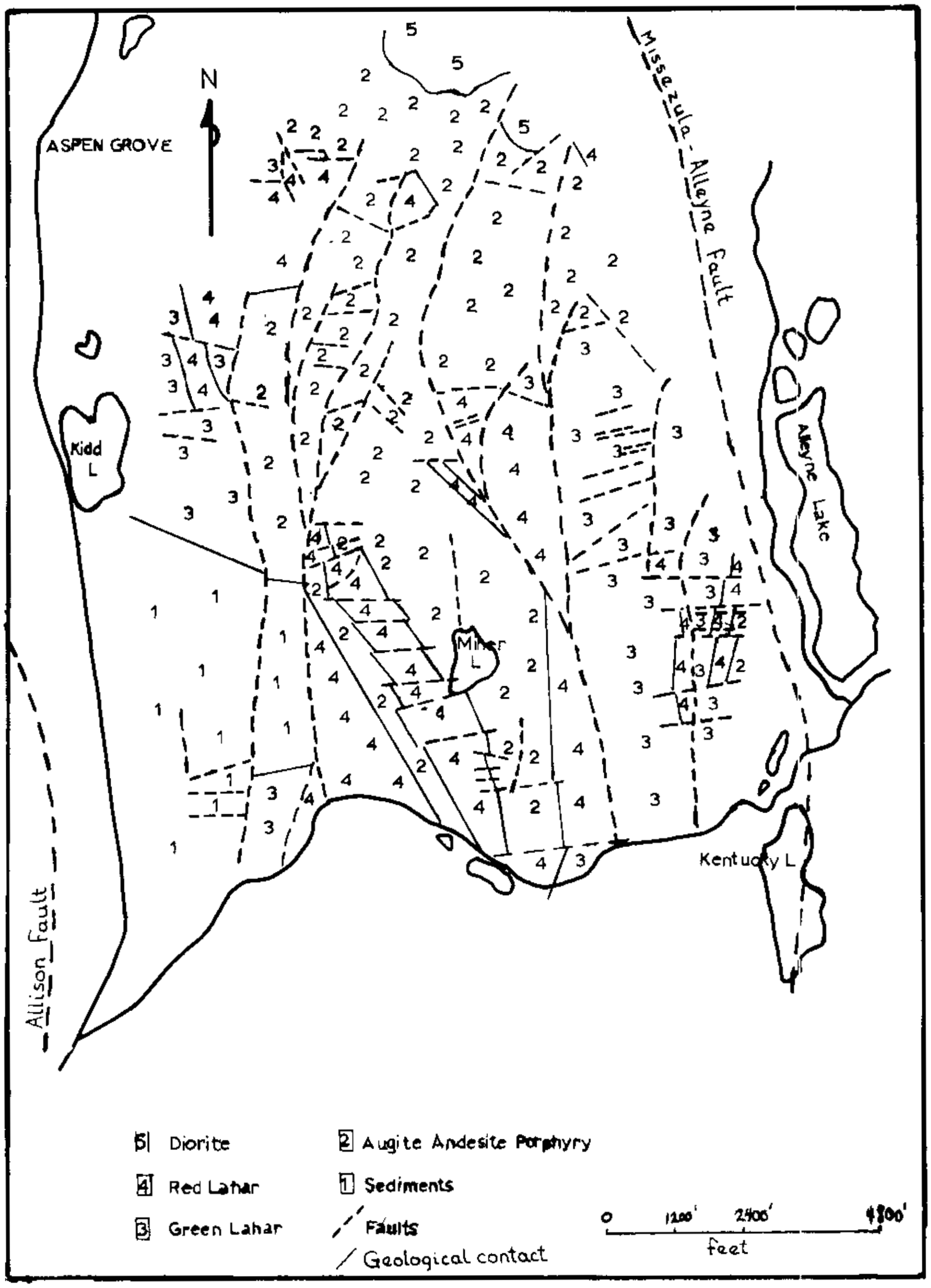

Figure 2. Generalized geology, Fairweather Hills area.

Nicola Lake *(Schau, 1968)*		Fairweather Hills *(This Report)*	
A_2	sediments, tuff, minor limestone	3	green augite lahar, sandstone, red augite lahar, augite andesite porphyry
A_1	basalt flows, associated pyroclastic and epiclastic sediments	2	augite andesite porphyry, red augite lahar, dacite, augite plagioclase andesite porphyry
P_2	andesites, andesitic basalt and rare dacite, and abundant pyroclastics and sediments including limestone	1	sandstone, siltstone, conglomerate, green lahar, red lahar
P_1	basaltic andesite and associated pyroclastic and epiclastic sediments		

The units generally strike to the north-northwest and dip to the east. The area is dominated by north-trending gravity faults similar to the two regional faults, the Allison fault and the Missezula-Alleyne fault, that are the boundaries of the map-area. Characteristically, these faults are splayed. A second group of much more numerous, possibly rotational, transverse faults occur commonly in series.

As there has been no significant folding, only tilting of the fault blocks, it is believed that the oldest rocks are to the west and the youngest to the east in the map-area. Recent evidence (Preto, 1974) indicates the Nicola Group may span the Upper Triassic to Lower Jurassic periods.

Copper mineralization is ubiquitous in the augite andesite porphyry and present in some lahars and limestones. Notably, the lahars on the west side of the map-area are barren. Additions to Christopher's (1973) list of copper occurrences are:

(1) Chalcocite and malachite are found on fractures in the country rocks adjacent to gabbro dykes such as some showings southwest of the Big Kid prospect.

(2) Not only contacts between red and green lahars, but all contacts between lahars in copper-rich areas appear to be favourable areas for mineralization.

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Schau, M. P. (1968): Geology of the Upper Triassic Nicola Group in South Central British Columbia, unpublished Ph.D. thesis, *U.B.C.*

GIANT MASCOT MINE

(92H/6)

By P. A. Christopher

INTRODUCTION

The Giant Mascot mine (latitude 49° 25'-30', longitude 121° 12'-18', New Westminster Mining Division) represents the only significant nickel producer in British Columbia. With the depletion of ore reserves and closure of the mine imminent, a study of the deposit was undertaken to consolidate geological data for future reference in exploring ultramafic rocks in this and other parts of the Canadian Cordillera. The study has included underground mapping, core logging, surface mapping, examination of showings, sampling for petrographic and geochemical studies, and a review of mine plans and engineering reports.

This report incorporates data compiled by the geological and engineering staff of Giant Mascot Mines Limited. The assistance and information provided by F. W. Holland (mine manager), L. DeRoux (mine geologist), and R. Gonzalez (exploration geologist) are acknowledged.

HISTORY

The initial discovery on the Giant Mascot mine property (also called: Pride of Emory mine, B.C. Nickel, Pacific Nickel, Western Nickel, and Giant Nickel mine) was made in 1923 when Carl Zofka, a trapper, located outcrops of the Pride of Emory orebody on Emory Mountain. B.C. Nickel Company was reorganized as B.C. Nickel Mines, Ltd. by the Smith, Sloan, Spencer Syndicate. Refinancing permitted underground development on the 3550 (No. 1 tunnel) and 3275 (No. 2 or Chinaman tunnel) levels. By 1937 the Syndicate had spent $1,300,000 to develop 1.2 million tons of ore at 1.38 per cent nickel and 0.50 per cent copper. Four ore shipments, totalling 2,134 short tons at 5 per cent nickel were made to Japan for test purposes and gross returns of $63,600 were obtained.

In 1938 B.C. Nickel Mines, Ltd. was reorganized as Pacific Nickel Mines Limited, but poor market conditions caused the property to remain idle till 1942. In 1952, Western Nickel Mines Limited was formed as an operating company of Newmont Mining Corporation of Canada Limited and Pacific Nickel Mines Limited. The property was further explored by establishing the 2600 (main haulage), 2950, and 3250 levels and connecting the levels with an internal inclined shaft. A favourable sales contract was arranged by Western Nickel and from January to July of 1958, under the management of The Granby Mining and Smelting Company Limited, 181,133 tons of ore was treated before market conditions again forced closure.

In 1959 Newmont's interest in the property was sold to Giant Mascot Mines Limited and Giant Nickel Mines Limited was formed as an operating company. In March of 1961,

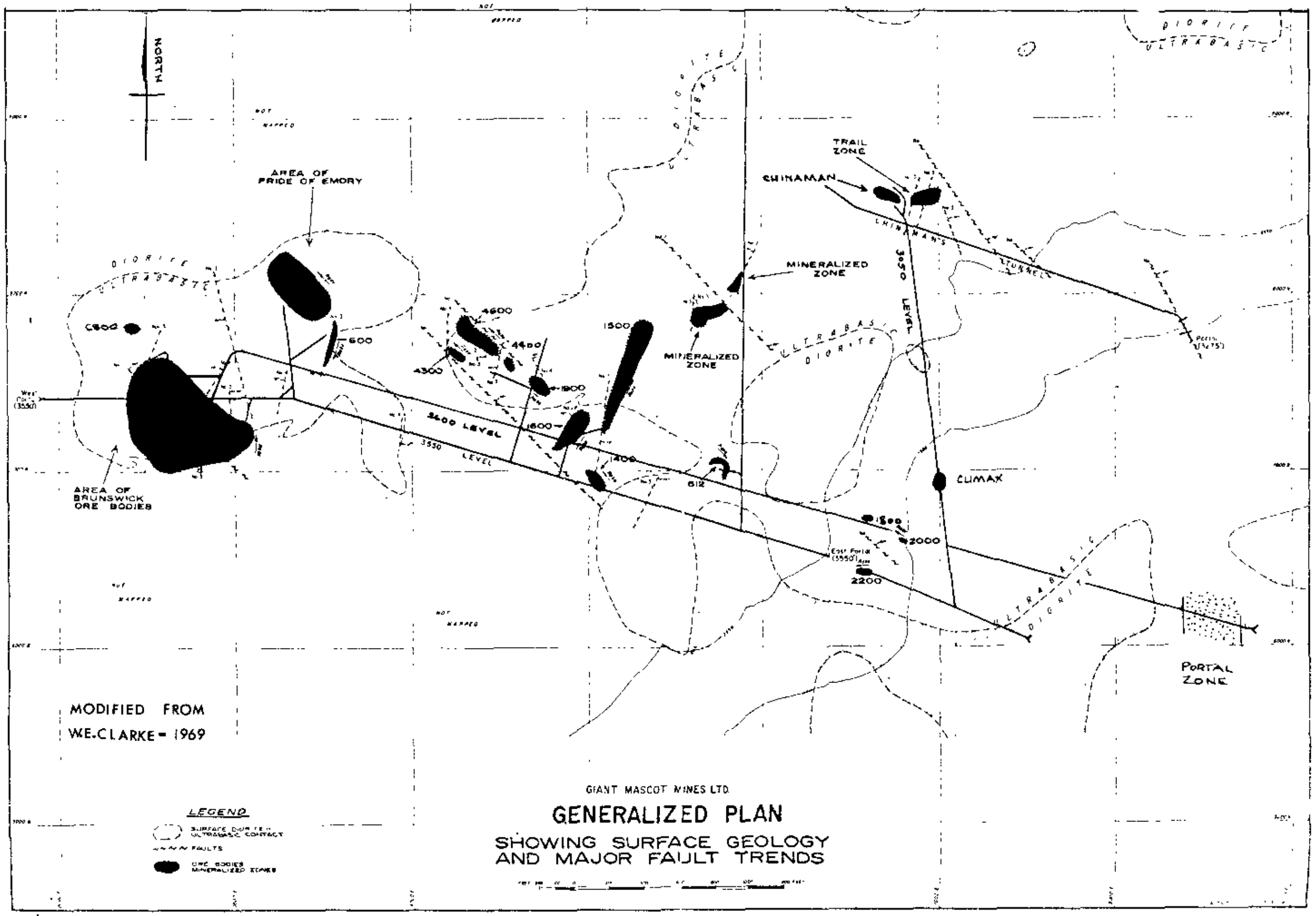

Figure 3. Generalized plan, Giant Mascot Mines Limited.

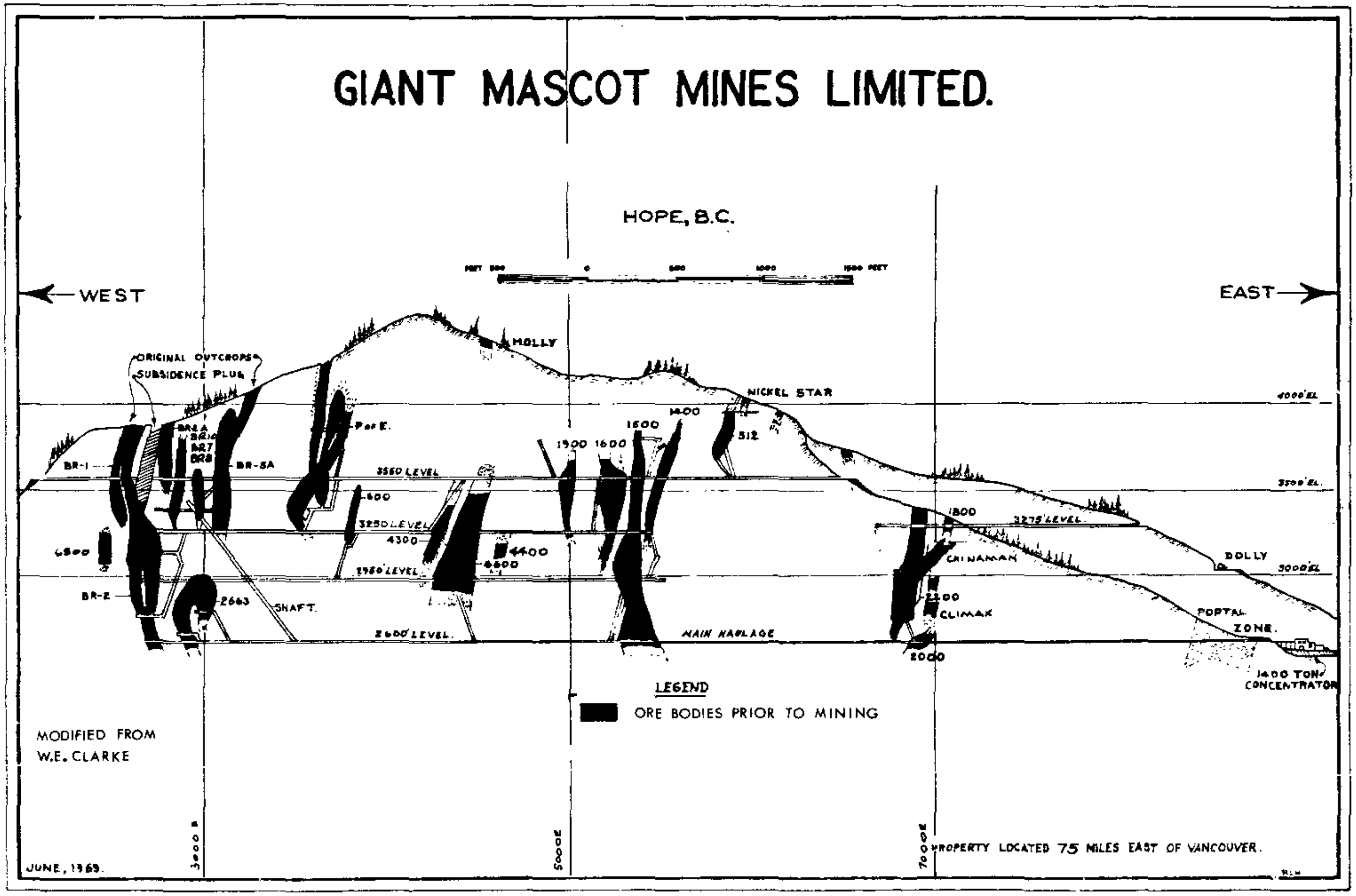

Figure 4. Longitudinal projection, Giant Mascot Mines Limited.

Giant Mascot Mines Limited gained full control of the property by purchasing Pacific Nickel's 49 per cent interest. The mine was reopened as a salvage operation in July of 1959 and continued production until August 31, 1973.

From 1958 to closure, total production from 26 orebodies was approximately 4,700,000 tons of ore, containing 59,000,000 pounds of nickel and 28,000,000 pounds of copper.

REGIONAL SETTING

Pyrrhotitic nickel-copper deposits are situated in an ultrabasic complex with chronologically and probably genetically related basic, dioritic, and noritic phases. The complex forms part of a 15-mile-wide, north-trending block of Late Paleozoic metamorphic rocks and Mesozoic intrusive rocks. The block is bounded on the east by the Fraser River fault zone and on the west by the Shuksan fault zone.

LOCAL GEOLOGY

Pipe-like mineral deposits occur within a segmented, crudely elliptical ultramafic complex about 1.5 miles in diameter. The stock-like mass contains pendants of metamorphosed Paleozoic rocks of the Chilliwack Group (?) and is in turn enclosed in younger granitic rocks considered to be part of the Spuzzum pluton. K-Ar ages from the ultramafic complex range from about 120 m.y. to 95 m.y. (J. McLeod, personal communication); the older ages were obtained from the hornblende pyroxenite phase with late hornblendite dykes having the youngest ages. All ages from the ultramafic complex are older than ages obtained from the Spuzzum pluton.

The complex contains a complete spectrum of ultramafic rocks with pyroxenite and peridotite (generally hornblendic) the most common rock types and dunitic phases rare. Hornblendite is often found adjacent to a granitic contact, prompting several workers to suggest a metamorphic or metasomatic origin for these bodies.

Clarke (1969) concluded that structure has played an important role in the control of orebodies and that the intersection of north 45 degrees west to north 50 degrees west striking faults and north 10 degrees west to north 30 degrees east striking faults exerts control over ore deposition. The four main fault trends recognized at the mine have the following strikes and dips:

(1) north 45 degrees west to north 50 degrees west; 50 to 75 degrees northeast
(2) north 15 degrees east to north 30 degrees east; 70 degrees southeast to 70 degrees northwest
(3) north 10 degrees west to north 10 degrees east; 55 degrees east to 55 degrees west
(4) north 30 degrees west to north 30 degrees east; 20 to 30 degrees east or west

The first three sets appear to provide ground preparation and access for ore while the fourth group appears to be post ore and often displaces ore zones. Tectonic and intrusive breccia zones and agmatite are found to be spatially related to several orebodies and breccia fragments are found in some massive ores. The genetic relationship between breccia zones and ore deposits is not clear, but remobilization is apparent in some of the breccia ore.

Alteration seems to be closely related to structure and intrusive contacts and, therefore, is often associated with orebodies. Four main types have been recognized: (1) crumbly alteration (also called pervasive shearing), (2) talc - amphibole ± magnetite, (3) uralitization, and (4) hornblendization. Crumbly alteration is a descriptive term applied to breakdown of olivine grains to micaceous minerals (phlogopite and chlorite) and to where intense serpentine is formed. Crumbly alteration is generally restricted to peridotite or dunite and is often present as a partial envelope around orebodies. Talc-amphibole alteration is generally associated with intensely faulted or fractured bodies of pyroxenite and is often found adjacent to the ore zones. Although alteration is generally present as a partial envelope around orebodies, there is no established pattern that can be relied upon as an ore indicator.

Twenty-eight mineral deposits have been outlined within the main ultramafic mass (Figs. 3 and 4). Of these deposits, production has been obtained from twenty-two, and five (4600, Pride of Emory, 1500, Brunswick 2, and Brunswick 5) accounted for over two-thirds of the production. Pipe-like orebodies range from a vertical continuity of 1,200 feet to 100 feet and have horizontal sections ranging from 250 by 120 feet to 20 by 40 feet. The orebodies can be divided into three types: (1) zoned, in which sulphides are disseminated through one or more rock types and show gradational change in tenor (for example, Brunswick Nos. 1, 5, 6 and 4600, 1900, and 512), (2) massive, generally confined to fault or contact zones and having sharp contacts (for example, Pride of Emory and Brunswick Nos. 2, 8, and 9), (3) vein, narrow tabular bodies that may enrich an ore zone but have limited tonnage potential.

SUMMARY

A geological study is presently being conducted at the Giant Mascot mie rear Hope, to consolidate geological information on this unique deposit. Chemical and petrographic examinations to be carried out should help define ore controls and consolidate genetic theories.

Since low-grade reserves are present within the ultramafic complex and less than a third of the known ultramafic complex has been explored by underground development, this deposit provides an intriguing exploration target.

REFERENCE

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GEOLOGY OF NORTHWEST HALF OF IRON MASK BATHOLITH

(92I/9)

By K. E. Northcote

REGIONAL SETTING

The Iron Mask batholith was emplaced in a high level volcanic to subvolcanic environment and is comagmatic and coeval with Nicola volcanic and minor sedimentary rocks which it cannibalizes and intrudes. The Nicola rocks and Iron Mask batholith are unconformably overlain by Tertiary volcanic and sedimentary rocks of the Kamloops Group. Major systems of northwesterly, northerly, and northeasterly trending recurring fractures or faults controlled emplacement of the various units of the Iron Mask batholith. Post-batholith movement on faults around the margin of the batholith results in graben structures with off-batholith rocks on the down-thrown side.

GEOLOGY

The descriptions of the rocks shown on Figure 5 are based on field observations of texture, composition, and kind and intensity of alteration. Laboratory studies of the rocks will be carried out so descriptions given here are subject to revision.

NICOLA ROCKS

Nicola Group rocks in the vicinity of the northwest end of the Iron Mask batholith consist largely of pyroclastic rocks with some interbedded flows. Minor amounts of interbedded Nicola sediments and sedimentary blocks in breccia were observed northwest of Sugarloaf Hill (fossiliferous) and north of Hughes Lake. Ammonite fossils found northwest of Sugarloaf Hill are tentatively thought to be Upper Triassic (Tipper, H. W., personal communication). Tuff breccias and lahars with interbedded flows are probably of andesitic to basaltic composition.

The Nicola lahars and tuff breccias contain fragments of the same kind of Cherry Creek rocks that intrude them. In some places the fragment density is so great (>90 per cent) that it is difficult to distinguish these fragmental rocks from intrusion or explosion breccias occurring within the batholith. The Nicola rocks are chloritized, epidotized, and mineralized by copper and iron as a result of intrusion of the Iron Mask batholith, particularly at the northwest end of the batholith. The intensity of metamorphism and mineralization decreases markedly a short distance from the batholith contact. The presence of fragments of intrusive rocks with volcanic rocks cut by identical intrusive material, and the contact effects of the batholith on these volcanic rocks demonstrate the close spatial and time relationship between Nicola volcanism, emplacement of young varieties of intrusive rocks, alteration, and mineralization.

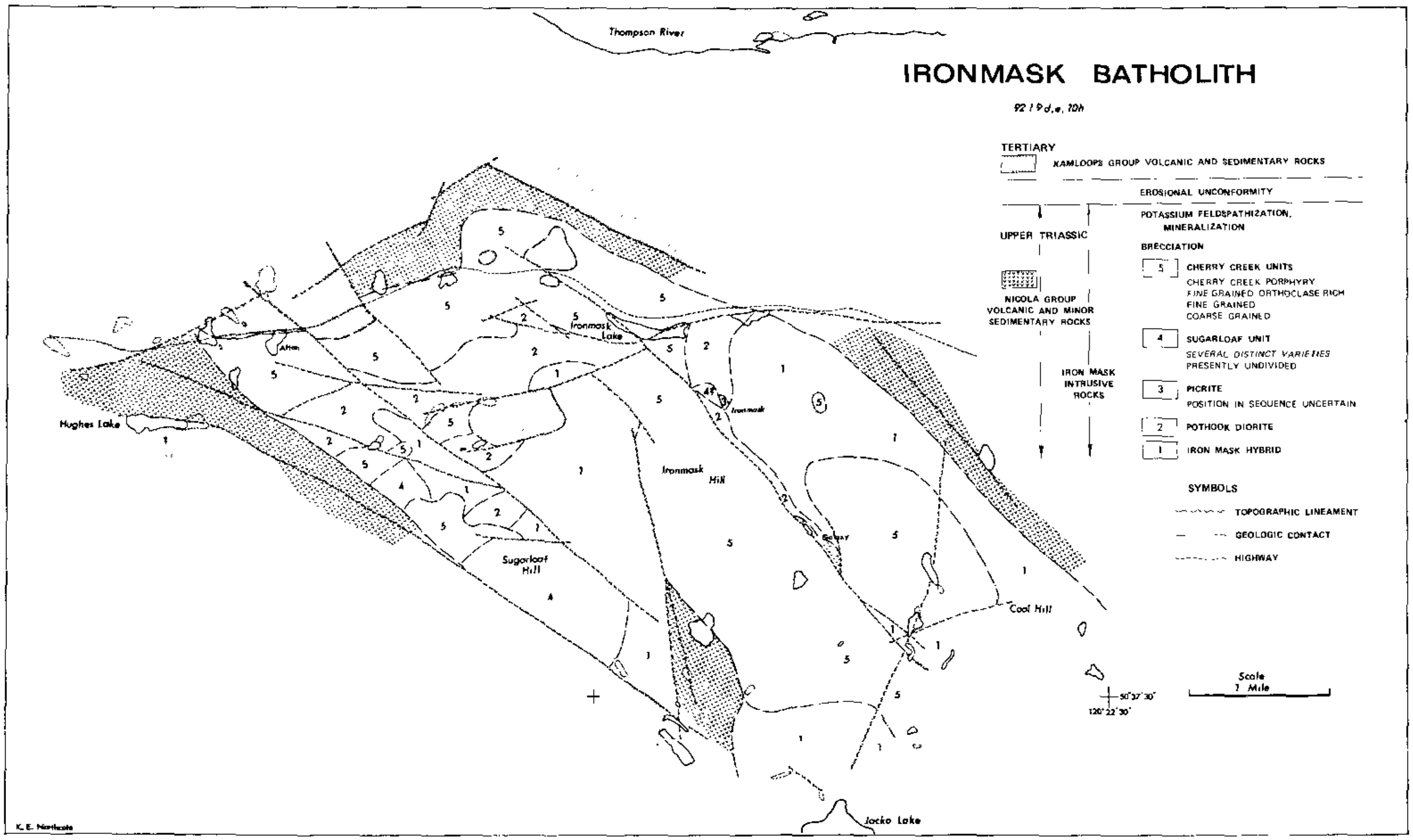

Figure 5. Generalized geology, northwest half of Iron Mask batholith.

INTRUSIVE ROCKS OF THE IRON MASK BATHOLITH

All intrusive units, with the possible exception of 'picrite,' are believed to be genetically related. They all show some degree of saussuritization which in many places is intense. However, in most cases original textures are still visible and are used as the main criteria for distinguishing among units and varieties.

IRON MASK AND POTHOOK UNITS

The Iron Mask (1) and Pothook (2) units are high level intrusions emplaced along northwesterly, northerly, and easterly trending zones of weakness.

The Iron Mask unit is agmatitic, containing varied sizes of rounded and angular fragments of coarse and fine-grained diorite, coarse-grained gabbro, medium and coarse-grained hornblendite, and scattered xenoliths of Nicola rocks in a diorite matrix. The origin of the intrusive fragments in agmatite is unresolved but these may represent slightly older intrusive equivalents of Lower Nicola volcanic rock carried up to a higher level by resurgence of magmatic activity. These rocks are intruded by younger units. The dominant structural control for emplacement of the Iron Mask rocks is a system of northwesterly trending recurrent faults. Copper and iron mineralization is associated with this intrusive stage.

The Pothook unit is of dioritic composition and is medium to coarse grained. The low degree of differentiation of these rocks indicates that they are most closely related to unit 1 rocks and their distribution suggests strong control of emplacement by northwesterly and northeasterly trending fracture systems. Although this unit is abundantly mineralized by magnetite, it also contains numerous copper showings.

PICRITE

The picrite unit (3) is composed of rocks of basaltic composition, with serpentinized olivine, reported by Carr (1956) and Preto (1967). Emplacement of picrite appears to closely follow loci of recurring, northwesterly trending fracture systems and is found in many parts of the batholith (Carr, 1956). The unit is cut by clean fine-grained rocks akin to the Cherry Creek unit.

SUGARLOAF UNIT

Sugarloaf (4) porphyritic rocks crop out on Sugarloaf Hill and as a smaller body containing fine-grained non-porphyritic varieties northwest of Sugarloaf Hill. The rocks are mainly porphyritic with hornblende, pyroxene, and plagioclase phenocrysts and are of fairly uniform diorite-andesite composition. Strong recurring northwesterly trending fracture systems presently flanking Sugarloaf Hill probably localized emplacement of this unit. Copper mineralization occurs in cross-fracture systems within this unit.

CHERRY CREEK UNIT

The name 'Cherry Creek' (5) is retained for the unit of rocks which extend along the north margin of the batholith (Preto, 1967), and is applied to equivalent rocks underlying Iron Mask Hill and an area east of Galaxy.

The Cherry Creek unit was emplaced in a high level volcanic to subvolcanic environment, from localized magma sources of different degrees of differentiation, into a widely varied physical and chemical environment. The resulting textures of the related intrusive varieties varied according to chemical and physical changes including retention or loss of volatiles. It was possible, therefore, to obtain textural varieties such as Cherry Creek porphyry at any time during emplacement of the Cherry Creek unit. Varieties of Cherry Creek rocks have a characteristic texture which is recognizable through differences in grain size and composition. Compositional differences are mainly the result of varied amounts of K-feldspar present. Composition ranges through diorite, monzonite, syenite, and their porphyritic and fine-grained equivalents.

AFTON – IRON MASK LAKE BRECCIA

One of the latest magmatic events to occur along the Afton – Iron Mask Lake belt of Cherry Creek intrusions was intrusive or explosive brecciation accompanied by potassium feldspathization and copper and iron mineralization. The economic significance of this breccia was noted by Preto (1967).

STRUCTURE

Major systems of northwesterly and northerly trending recurring faults occur on the southwest and northeast flanks of the batholith in intrusive and in Nicola rocks. Similar systems also occur within the batholith on the northeast side of Sugarloaf Hill and on the west and northwest side of Iron Mask Hill. These northwesterly and northerly trending faults played an important role in the emplacement of old and intermediate age intrusive rocks. Important systems of easterly and northeasterly trending faults localized emplacement of varieties of the younger Cherry Creek unit, subsequent brecciation, potassium feldspathization, and mineralization. Late movement along fault systems flanking the Iron Mask batholith has resulted in downward movement of Nicola and overlying Kamloops Group rocks relative to the batholith.

MINERALIZATION

J. M. Carr (1956, pp. 47-69) and V. A. Preto (1967, pp. 137-147; 1972, pp. 209-220) have given detailed descriptions of mining properties and mineralization.

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STRATIGRAPHIC SECTION FROM THE JURASSIC ASHCROFT FORMATION AND TRIASSIC NICOLA GROUP CONTIGUOUS TO THE GUICHON CREEK BATHOLITH

(92I/11E)

By W. J. McMillan

INTRODUCTION

As part of a continuing study of the Guichon Creek batholith, its ore deposits, and its surrounding terrain, stratigraphic sections were measured in the Ashcroft Formation and the Nicola Group.

The Ashcroft Formation, which is of Jurassic age, unconformably overlies rocks of both the Nicola Group and the Guichon Creek batholith. There exists, therefore, the possibility that copper derived from weathering of the older rocks may have been deposited as stratiform deposits within the sedimentary succession. The Nicola Group, on the other hand, is of Late Triassic age and is intruded by the batholith. It, therefore, is a potential site for contact metamorphic and contact metasomatic deposits adjacent to the batholith. One such deposit, Craigmont, is now a major copper producer in British Columbia. Rocks of the Nicola Group are also favourable strata to explore for metal occurrences of volcanigenic origin.

THE JURASSIC SECTION

In the creek which drains northward from Barnes Lake, the unconformity between Nicola Group and Ashcroft Formation rocks is exposed (Fig. 6). Nicola Group rocks consist of interlayered porphyritic andesites and basaltic andesites with local thinly bedded layers of tuff. The tuffs strike southeast and dip steeply toward the northeast below the unconformity. At the unconformity, the underlying rocks are rusty and rust extends downward several tens of feet into closely fractured areas (Fig. 7, columnar section 2). The overlying conglomerate contains cobbles to boulders of Nicola rocks in a rusty, sandy matrix. The larger clasts have weathered borders and are apparently rounded at least in part as a result of spalling-off of angular edges. Upward in the section, the size of the clasts decreases and fetid grey limestone clasts occur. At the top of this unit, only limestone clasts are found. Locally (Fig. 7, columnar sections 2 and 3) the rusty conglomerate grades upward into limestone conglomerate with a grey, sandy limestone matrix. Shell fragments occur and the limestone is fetid. It is probably of bioclastic origin.

The limestone conglomerate is overlain (Fig. 7, columnar section 2) unconformably (?) by a thin sandy 'soil' layer (regolith) which gives way to volcanic conglomerate, then limestone with scattered mud pellets. Conglomerate clasts are well rounded and are variable from deeply weathered feldspar porphyry to fresh dark grey basalt. A second regolith developed on a surface which truncates the underlying beds with gentle angular unconformity. This regolith is overlain by fetid, dark grey, crystalline (bioclastic ?) limestone.

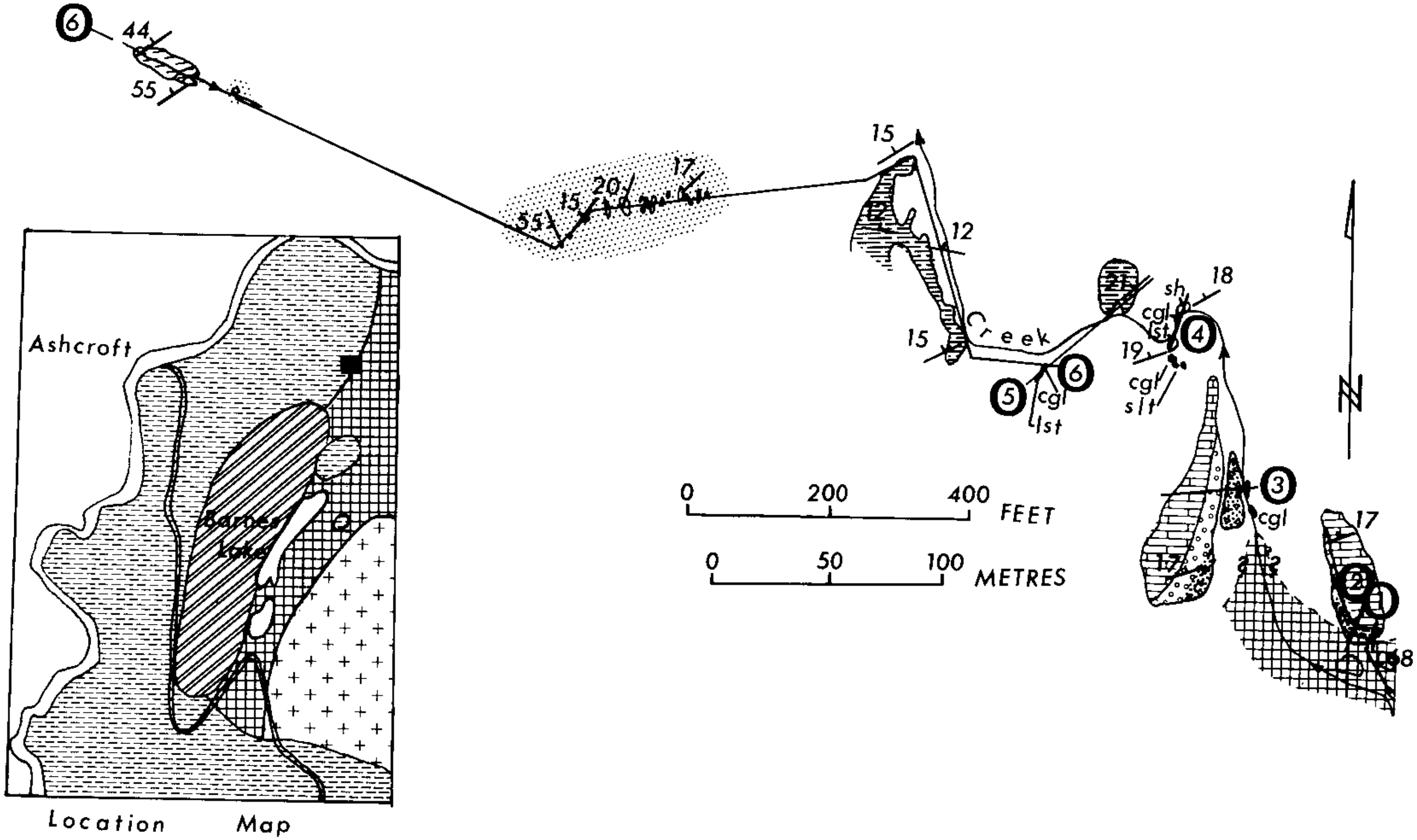


Figure 6. Location map and plan; columnar sections through Jurassic Ashcroft Formation (for legend, *see* Figure 7).

In columnar section 1, the rusty basal conglomerate is directly overlain by massive dark grey limestone. In columnar section 3, the rusty conglomerate itself is underlain by a poorly sorted, Nicola volcanic conglomerate. This conglomerate has acid to basic volcanic clasts in a sandy matrix. It is well indurated. By comparison with rocks elsewhere in the map-area, this conglomerate is interpreted to be part of the Ashcroft Formation. Its occurrence and clast distribution suggest that it formed in a stream channel.

Columnar section 4 shows the limestone member overlain by conglomerate. This conglomerate has some well-rounded pebbles to cobbles of Nicola volcanic rocks but white to tan, deeply weathered granitic clasts predominate. It also has lenses of shale and 'rip-up' clasts of siltstone. Beds are variably dark grey to brown but overall the zone looks black. Erosion truncated softer clasts in the conglomerate at the siltstone interface but more resistant clasts project up into the siltstone. One thin lens of conglomerate was noted in the siltstone. Ammonites and pelecypods from near the top of the 'black' member are of Callovian age. Fossils from localities indicated on columnar sections 5 and 6 have not yet been identified but judging from collections elsewhere in the Ashcroft Formation they are likely to be of Callovian age.

Columnar section 6 was begun at the same lowermost outcrop as that for section 5. The 'black' member (A) here is black shale with several very thin siltstone beds. The overlying unit has more siltstone interlayers, which are bedded with alternating golden brown and black beds. In unit D, rusty layers cemented by limonite (?) occur within the shale-siltstone succession. Virtually all the layers within units A to G are thin bedded. Calcite veins cut beds at high angles locally and small-scale high-angle reverse faults occur.

Above unit G, outcrop is less abundant (Fig. 6) but it is clear that the shale-siltstone succession is gradually replaced by a succession characterized by fine-grained brown to red-brown sandstone and siltstone with local black organic-rich partings. Layers are massive to thin bedded and local mudstone layers and partings occur.

To this point in the succession strike and dip of bedding are fairly uniform. The uppermost outcrop in the sandstone-siltstone succession dips 55 degrees toward the west but the outcrop was poor and bedding may have been disrupted. The next outcrop is poorly exposed but consists of fine-grained sandstone with mudstone partings. Above it is a bluff of mainly carbonaceous black shale. These shales are cut by calcite veins at high angles to bedding and selenite crystals occur locally. Beds in these rocks strike northeast and dip 44 to 55 degrees northwestward.

The black shales are definitely stratigraphically higher than the sandstone-siltstone succession but the change in dip and strike of bedding suggests that either a fold or more likely a fault (Fig. 7, columnar section 6) separates the two successions. Displacement is probably minor but the sandstone-siltstone succession may be somewhat thicker than it now appears.

An outlier of Jurassic rock crops out east of Barnes Lake. Fossils from the outlier include two species of Weyla, pectenid pelecypods and rhynchonellid brachiopods. This fauna suggests the rocks are of Pleinsbachian age (Tipper, 1973, personal communication).

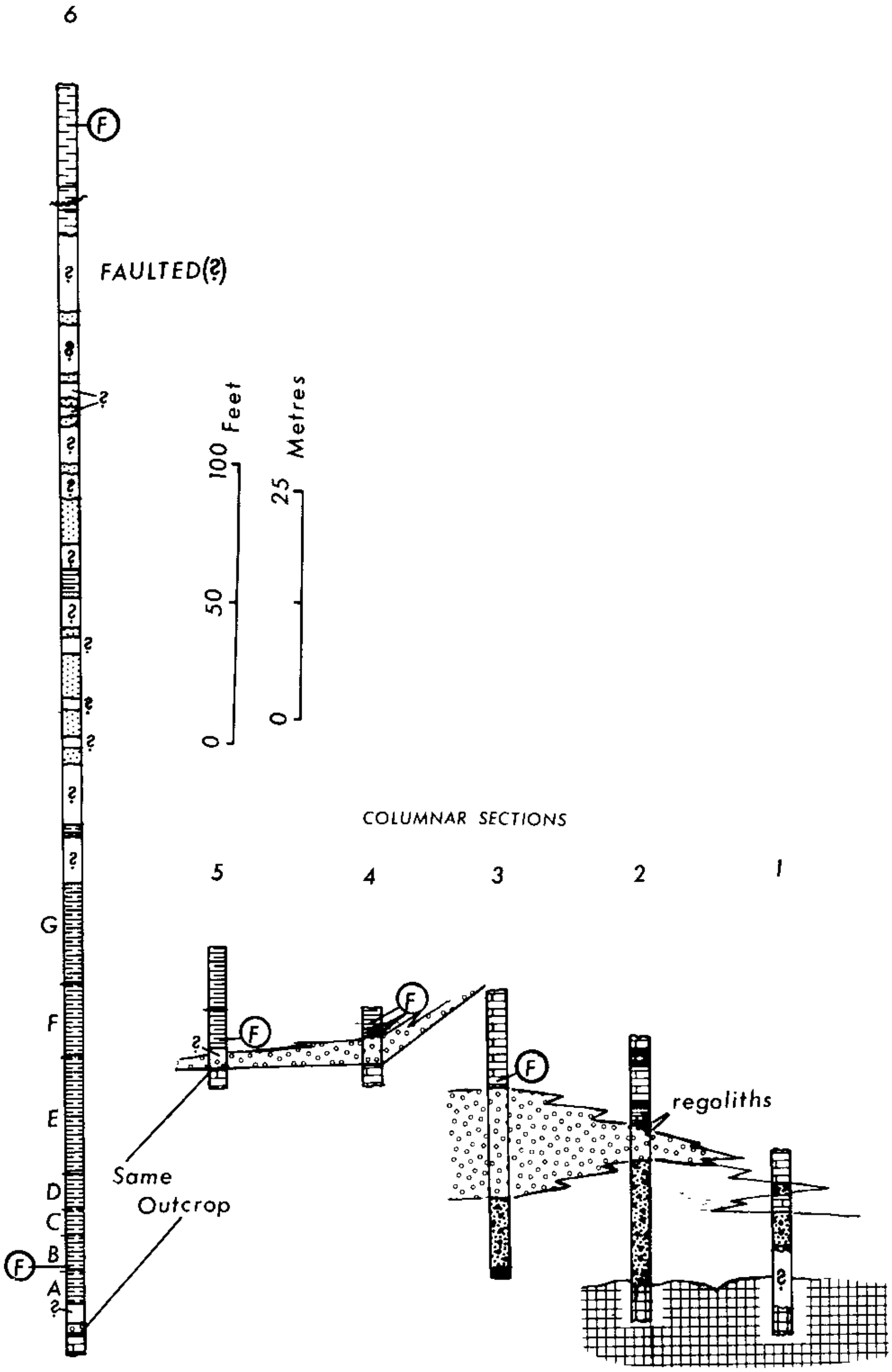


Figure 7. Columnar sections, Ashcroft Formation.

LEGEND

TERTIARY

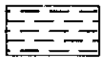
KAMLOOPS GROUP

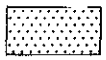
JURASSIC

UNDIFFERENTIATED

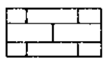
CALLOVIAN

ASHCROFT FORMATION


BLACK CARBONACEOUS SHALE WITH GREY SHALE AND SILT-STONE INTERBEDS


SILTSTONE AND SANDSTONE WITH LOCAL SHALE INTER-LAYERS


INTERLAYERED BLACK SHALE AND THIN-BEDDED SILTSTONE; HAS LOCAL CONGLOMERATE LENSES NEAR ITS BASE

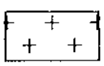

MASSIVE TO THIN-BEDDED, DARK GREY FETID LIMESTONE


FETID LIMESTONE CONGLOMERATE THAT GRADES DOWNWARD INTO A RUSTY CONGLOMERATE WITH A SANDY 'SOIL' MATRIX

PLEINSBACHIAN (?)


CONGLOMERATE WITH POORLY SORTED, WELL-ROUNDED CLASTS OF NICOLA VOLCANIC ROCK IN A SANDY MATRIX

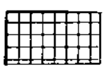
GUICHON CREEK BATHOLITH


HYBRID PHASE: QUARTZ DIORITE

TRIASSIC

CARNIAN

NICOLA GROUP

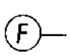

ANDESITIC VOLCANIC ROCKS AND TUFF

SYMBOLS

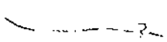

OUTCROP


AREA WITH NUMEROUS SMALL OUTCROPS

5 LOCATION AND NUMBER OF COLUMNAR SECTION



FOSSIL LOCALITY



GEOLOGIC CONTACT: SHARP, GRADATIONAL, INFERRED

INTERPRETATION

Jurassic sedimentation began with deposition of conglomerates composed of material derived from the surrounding rocks of the Nicola Group in stream channels. Active erosion and weathering were occurring but the terrace had considerable relief. If the tentative fossil ages are correct, it seems likely that a marine incursion occurred during the Pleinsbachian stage. This was followed by a period of erosion during which stream valleys were cut and filled, soils developed, and much of the Pleinsbachian succession was eroded. During Callovian time, the area was again inundated by marine waters. During the early phase of this transgression, the lithologic succession records considerable tectonic instability with development of rusty conglomerates which were probably of subareal scree slope origin initially but were subsequently covered by marine waters. Limestone clasts predominate near the top of the conglomerate. Two soil zones developed at the apex of the conglomerate suggest subareal erosion, followed by deposition which was at least partly marine. Subareal erosion then removed some of the material deposited above the first soil zone. Transgression and biogenic (?) limestone development followed. The limestone is overlain by conglomerate that is in part of marine origin and interfingers with marine shale and siltstone of Callovian age. Above the conglomerate is a rhythmic succession of marine shales and siltstones that may indicate deeper marine conditions. These give way in turn to a succession of siltstones and sandstones which are presumably marine and may represent gradual infilling of the sedimentary basin. Carbonaceous black shales above the sandstone rarely contain fossils but often contain carbonized wood fragments. Only a few ammonite impressions and one bed rich in pelecypod remains were found. These data suggest the shale was deposited in a restricted marine basin, probably under anaerobic conditions.

THE TRIASSIC SECTION

Rocks of the Late Triassic Nicola Group were studied in an area near Basque which is 8 miles south of Ashcroft (Fig. 8). The Nicola succession there forms a large block dipping 45 degrees westward. Emplacement of the Guichon Creek batholith uptilted the block but deformation and faulting within it are not intense. Metamorphic alteration of the rocks has produced mineral assemblages typical of middle to upper greenschist facies. Near the batholith contact, local areas have almandine amphibolite facies assemblages.

Section 1 (Fig. 8) consists of a lower unit of interlayered volcaniclastic rocks and porphyritic lavas and an upper unit of skarn and limestone.

No copper mineralization was seen in the lower pyritic unit (A) but chalcopyrite was observed as grains strung out along bedding and as small pods in one skarn layer and in a quartz-epidote veinlet in another. A copper occurrence was also noted on the NOD 12 claim. In test pits on these showings clumps and pods of chalcopyrite, bornite, and tetrahedrite (?) occur in a white garnet (?) skarn.

Section 2 (Fig. 8) can be divided into several segments (A to G) based on relative proportions of limestone and chert and grain size of clastic sedimentary units.

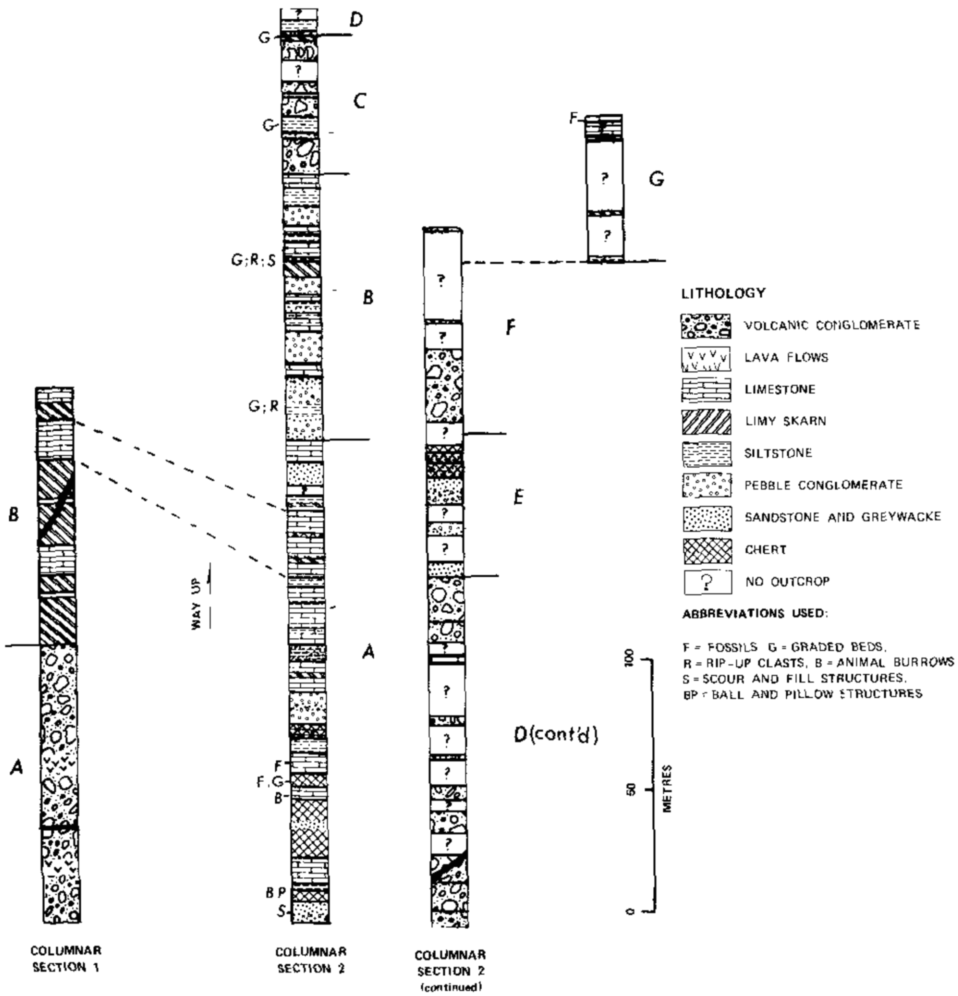


Figure 8. Columnar sections through Triassic Nicola Group, near Basque.

Unit A is characterized by interlayered limestone and chert. Sandstone and siltstone interlayers are relatively common. Chert in unit A is pale green to black and pyritiferous. It has interbeds of siltstone and sandstone and in some areas has been called cherty siltstone. Limestone throughout section 2 is typically tightly folded internally but has undeformed or only gently folded contacts. Locally, layers are richly fossiliferous with pelecypod and ammonite impressions. Fossils in the unit are correlative with the Tropites zone of Late Carnian time.

Soft sediment deformation structures, ball and pillow structures, rip-up clasts, scour erosion, and grading all occur locally in various siltstone or sandstone layers.

Unit B consists of roughly equal proportions of: limestone; siltstone and greywacke; and conglomerate. Skarn, usually associated with limestone, is a minor constituent. Limestone and siltstone layers are similar internally to those in unit A. Volcanic conglomerates in this and higher sections are dark-coloured, well-indurated rocks composed almost entirely of subrounded to subangular basic volcanic fragments in a finer volcanic-derived matrix. Granitic, aplitic, and acid volcanic clasts occur but are rare. In many instances, as for similar rocks in section 1, the fragmental nature of the rock is difficult to see unless there is an appropriate weathered surface. Unlike section 1, no flows were recognized in section 2. Bedding is almost never developed in the conglomerate layers but some have interlayers of laminated siltstone.

Unit C is two-thirds volcanic conglomerate with the remainder consisting of siltstone with minor greywacke and limestone layers. Grading in some siltstone beds enables 'tops' to be determined. In unit D, volcanic conglomerate is the major constituent, with a few siltstone interlayers and rare, thin limestone layers. In one area, quartz diorite dykes from the Guichon Creek batholith cut conglomerate. It must be stressed that while unit D is estimated to be 120 metres thick, 50 metres are covered by overburden.

Unit E consists mainly of interlayered volcanic conglomerate and greywacke. Odd fine-grained ellipsoidal features (mud balls ?) comprise up to 10 per cent of the volcanic conglomerate and greywacke in the central part of the unit.

The upper parts of unit F and unit G are poorly exposed. Unit F is predominantly volcanic conglomerate but only siltstone, skarn, and limestone were exposed in unit G. Because of poor exposure, it is not possible to be sure that unit G is in its true stratigraphic location.

Pyrite commonly makes up 2 to 3 per cent of the volcanic conglomerates, some siltstones, and some cherts. Chalcopyrite was found as pods and stringers in skarns and, rarely, in epidotized volcanic conglomerates.

BRIDGE RIVER MAP-AREA

(92J/15)

By David E. Pearson

INTRODUCTION

The 1974 field season was spent in the Bridge River area, remapping the structurally complex rocks that host numerous epigenetic mineral deposits. The work is part of a continuing study that is aimed at understanding the metallogeny of this important metal-producing region.

The Bridge River area, which lies on the east flank of the Coast Plutonic Complex at about latitude 51 degrees north, is underlain by a rock sequence that includes cherts, pillowed basalts, argillites, and limestones of Middle and Late Triassic age (Cairnes, 1937; Monger and Cameron, 1971). Because of a lack of structural data on the existing geological map, part of the summer was spent preparing a map that could form the basis of the present study. Figure 9 illustrates the progress to date in the mapping programme.

GEOLOGY

The oldest rocks of the area, the Middle Triassic Fergusson Group, include pillowed basalts, cherts, and brown-weathering pelites, the type-section of which is exposed on the western slopes of Mount Fergusson. An east-trending fault with right lateral separation bisects the area at the latitude of Kingdom Lake, and on the downthrown area to the north, approximately one-half mile of strike shift can be observed.

In map view, the type section of Fergusson Group rocks (section A, Fig. 9) is terminated to the west by a reverse fault, referred to by earlier workers as the 'Fergusson overthrust.' This fault brings Upper Triassic Hurley Formation argillites, conglomerate, or limestone into contact with the older Fergusson Group cherts and basalts in stratigraphic section B of Figure 9. The western boundary of section B is also a fault zone recognized by earlier workers as the 'Cadwallader Break.'

East of Gold Bridge the unconformable relationship between pillowed Pioneer basalts and overlying Hurley argillites is exposed. In section B, south of the east dextral fault, the argillaceous Hurley Formation is apparently in contact with chert that encloses the Pioneer basalts. This relationship cannot be inferred from Cairnes' (1937) map for two reasons:

(1) The continuity along strike of the Hurley Formation was not realized, and as a consequence the argillites exposed at the 'Success showings' between the dextral fault and Bralorne were incorrectly identified as Noel Formation.

(2) Basalts exposed between the 3400 level and 3700 level west of the 'Success showings' similarly were not recognized as the continuation of the Pioneer basalt.

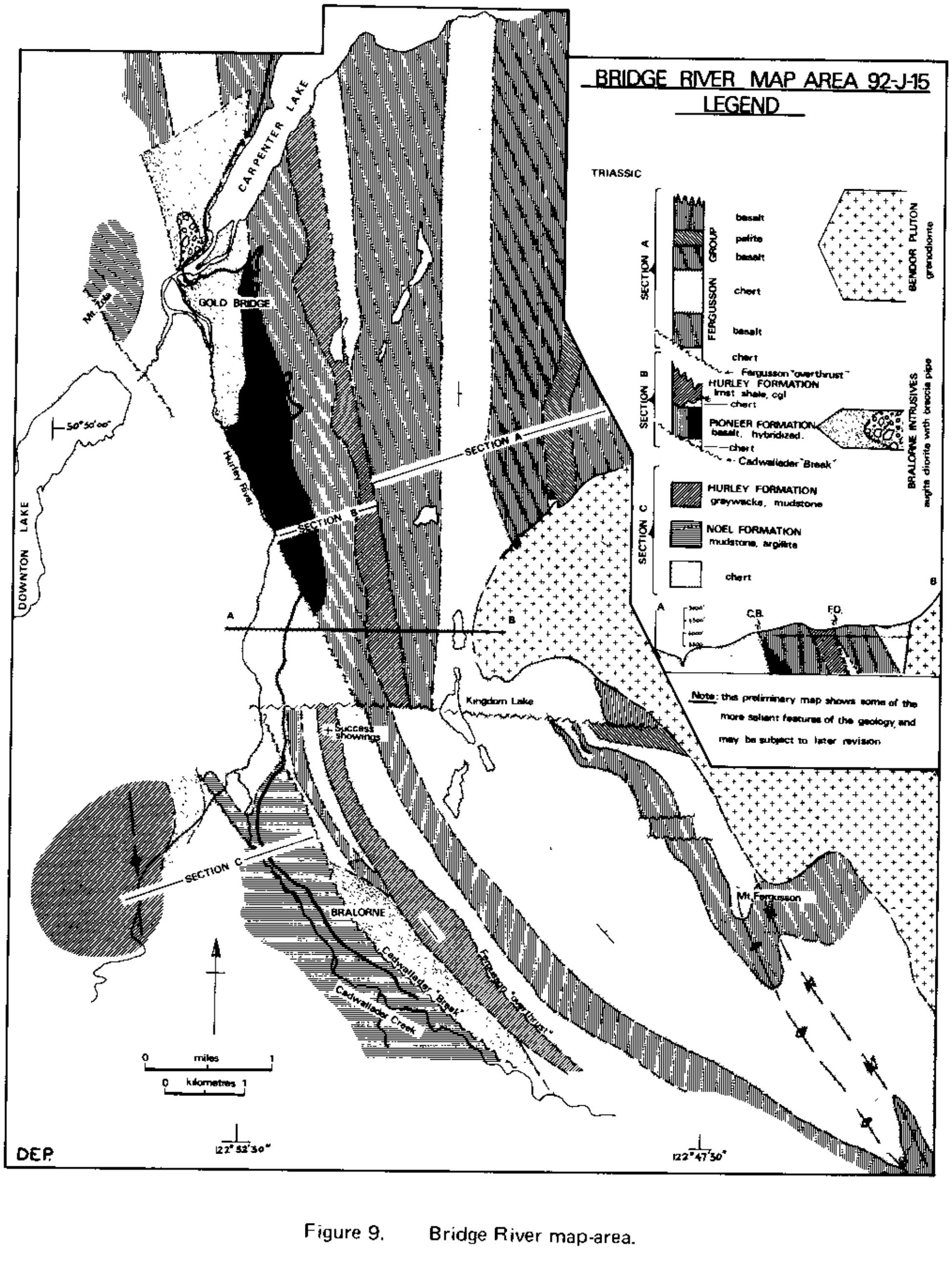


Figure 9. Bridge River map-area.

The economically important Bralorne Intrusives are wholly contained within stratigraphic section B. In the quarry west of Gold Bridge the augite diorite is intruded by a breccia pipe that presumably vented to the surface. Between the augite diorite and the pillowed Pioneer basalt, the controversial 'Pioneer greenstone-diorite' occurs. In the writer's opinion this admixture of two rock types, evident down to hand specimen scale, represents hybridization caused by diorite intruding the basalt.

West of the 'Cadwallader Break,' in section C, details of the stratigraphy have not yet been satisfactorily elucidated. For example, on the west side of Cadwallader Creek below the Mines Hotel, Noel Formation argillites that occur in a rotated fault block strike approximately northeasterly, about perpendicular to the structural grain of the valley. These are in turn flanked by cherts and then by overturned Hurley Formation along Hurley River valley.

STRUCTURE

Folding is ubiquitous in rocks of the Fergusson Group. The two largest complementary structures that have been traced for any distance are found between the summit of Mount Fergusson and Hawthorn Creek. Although refolded minor folds in the hinges of these steeply inclined neutral folds indicate that they are structures of the second generation (F_2), no major structures of an earlier age (F_1) can be demonstrated on the east side of the valley in Fergusson Group rocks. Such folds, if present, would clearly be very large flattened isoclines.

On the west side of the valley in Noel and Hurley rocks, only one deformation is discernible, and this is of distinctly different tectonic style. Large, open to close cleavage folds in argillites that still preserve evidence of tops are common. Indeed, at one locality on Mount Zola, immediately west of Gold Bridge, asymmetric minor folds around a large hinge in Noel Formation argillites are crossed by, and therefore predate, the cleavage that is genetically related to the *same* fold hinge.

In short, it would seem that the contrast in tectonic style is too great to blame entirely on the competency contrasts that exist between Middle Triassic Fergusson Group rocks and Upper Triassic Hurley and Noel Formations. An equally plausible explanation is that the Fergusson Group was subjected to Middle Triassic deformation prior to deposition of the Hurley and Noel sedimentary rocks.

MINERAL DEPOSITS

The latter part of the field season was spent examining mineral deposits north of Gold Bridge as far as Relay Creek and Tyaughton (Tyax) Creek. The type and distribution of these deposits indicate the presence of a previously unrecognized regional mineral zoning pattern in the area (Fig. 10).

Cinnabar is present as vein fillings and disseminations in Middle Triassic Fergusson Group cherts and Lower Cretaceous Taylor Creek Group chert pebble conglomerate.

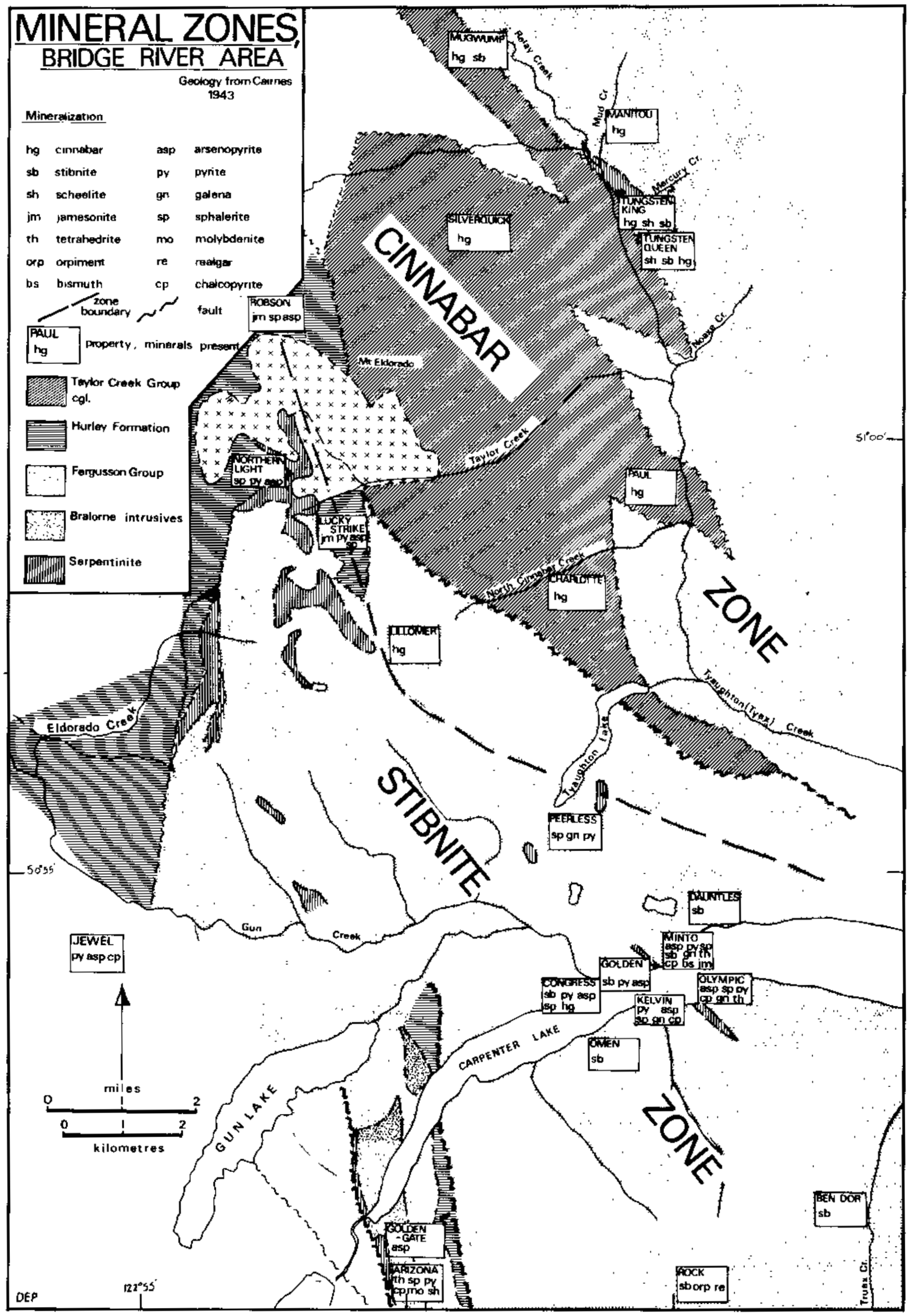


Figure 10. Mineral zones, Bridge River area.

Antimony is found in either the sulphide form, stibnite, or as the sulphantimonides tetrahedrite and jamesonite, within a broad band of variable rock type from Mount Eldorado in the north to the headwater of Truax Creek in the south. The stibnite mineralization is genetically related to the emplacement of feldspar porphyry dykes.

When these two mineral zones are superimposed on the British Columbia Department of Mines and Petroleum Resource's Preliminary Inventory Maps 92O, Taseko Lakes and 92J, Pemberton, it is apparent that a copper-molybdenum-rich zone flanks the stibnite zone to the west. The trace of this zone through the Bridge River area is imprecisely known, though the presence of molybdenite, scheelite, and chalcopyrite at Arizona, chalcopyrite at Jewel, and bornite 1 mile west of Gun Lake suggest that it may be present in the southwest sector of Figure 10.

Field work in the coming season will be aimed at establishing age relationships between the zones together with their lateral extent.

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CURRENT ACTIVITY – HOGEM BATHOLITH

(93N)

By J. A. Garnett

Three major exploration projects were conducted in the southern Hogem batholith during the 1974 field season. Percussion-drilling programmes were initiated by Pechiney Development Limited on their Kwanika Creek option and by Cominco Ltd. on their Jean Marie Creek property. An extensive diamond-drilling investigation was begun by Union Miniere Explorations and Mining Corporation Limited on a new discovery adjacent to their TAM property in the Duckling Creek area.

The general locations and geological settings of these properties have been documented previously (Garnett, 1974a). A brief property description on each of these occurrences follows.

KWANIKA – PECHINEY (93N/6W, 11W)

This property (BOOM, FRANKIE, etc.) is owned by Bow River Resources Ltd., and, since 1964, has had more or less continuous investigation by various major exploration companies. Pechiney Development Limited optioned the ground in 1973, and as a result of detailed geological and IP surveys conducted that year, initiated a follow-up percussion-drilling programme in July, 1974.

A detailed geological investigation of this property has previously been completed by this department (Garnett, 1974b). Briefly, granitic rocks of Lower Cretaceous age intrude Lower Jurassic basic units of the Hogem batholith along the border of the Pinchi fault zone. Within the silicified and potash feldspathized hybrid zone created by this intrusion, pyrite with minor chalcopyrite and molybdenite occur within local highly fractured zones. The best mineralized sections occur along the banks of Kwanika Creek, which has cut through the extensive overburden covering most of the surrounding area. A north and a south mineralized hybrid zone is separated by a wedge of Triassic Takla Group banded argillites. Previous detailed diamond and percussion drilling had concentrated on the north mineralized zone, but no drilling had been conducted on the less well-exposed south zone.

Thirty percussion holes were attempted during the 1974 season. Six failed to reach bedrock after encountering overburden cover in excess of 100 feet (30 metres). Seventeen holes were drilled in the south anomaly while 13 were drilled in the north zone, for a total of 9,800 feet (2,990 metres).

JEAN, JW – COMINCO (93N/2W)

This large claim block is located within an intrusive outlier occurring south of Tchentlo Lake, about 6 kilometres due south of Mount Alexander. The area was staked in 1969 by

NBC Syndicate and geochemical and IP surveys and diamond drilling were performed on a central anomalous zone during 1970 and 1971. In 1973, Cominco Ltd., one of the original partners in the syndicate, returned to conduct geological and IP surveys on an anomalous area west of the initial drilling. During the 1974 field season, a 32-kilometre road was built from Chuchi Lake to this location, and 11,000 feet (3,350 metres) of percussion drilling was completed.

Reconnaissance traversing within the fresh intrusive rocks in the vicinity of the anomalous zones indicates that the rock type is mainly a grey, medium-grained granodiorite containing roughly 60 per cent plagioclase, 15 per cent orthoclase, 15 per cent quartz, and 10 per cent hornblende with minor biotite. Textures are mainly granitic with local porphyritic varieties exhibiting euhedral plagioclase. This rock type looks similar to the Hogem granodiorite, a major phase of the main batholith to the north.

The anomalous zones being investigated occur along the contact of this stock with dark grey aphanitic andesites and pyroxene porphyries of the Takla Group. This contact is pyritized and there is local garnet-epidote skarn development.

The main intrusive rocks within these zones are bleached granodiorites and quartz diorites cut by numerous dykes ranging in composition from plagioclase syenite porphyry through aplitic syenite to red granite.

Chalcopyrite, molybdenite, and hematite occur on orange-bleached (potash feldspathized) fractures in otherwise fresh granodiorites and quartz diorites. Chalcopyrite occurs as hornblende replacements in syenite dykes, and also occurs along with pyrite in quartz veins and fractures cutting both granodiorites and syenites. Malachite is common within fault zones along which granite and syenite dykes have cut the main intrusive and the adjacent volcanic rocks. The volcanic rocks exhibit blocky fracturing generally more pervasive than the fracture density of the crosscutting intrusive rocks, and chalcopyrite is locally significant along hairline fractures and smeared along small faults in the andesites within the altered contact zone.

TAM – UMEX (93N/13E, 14W)

The TAM, HAM, and REM claims straddle Haha Creek, a northeast-flowing tributary of the Osilinka River. During the late 1940's, reconnaissance exploration of the Duckling Creek area by Kennco Explorations, (Western) Limited uncovered mineralization along a north-facing cirque wall overlooking the Haha Valley. The original showing was staked in 1968 by Omineca Explorations Ltd., and again by Union Miniere Explorations and Mining Company Limited in 1969. Intermittent work continued around this showing until late 1973, when geological mapping discovered a new showing in the forested area below an adjacent cirque valley. After completing detailed geochemical and IP surveys, a diamond-drilling project was initiated at the beginning of the 1974 field season. Over 7,000 feet (2,100 metres) of drilling was completed. This new showing represents the most significant new discovery in the Duckling Creek area in over 30 years of intermittent exploration.

The property lies entirely within the Duckling Creek Syenite Complex, near its northeaatern boundary with biotite monzonites of the older basic sequence of the Hogem batholith. The new mineral occurrence is within a lenticular lens of foliated fine-grained leucocratic syenite. The foliation trends northwesterly with steep to vertical dips, paralleling the long axis of the foliated syenite body, whose surface dimensions are roughly 125 metres by 800 metres. Foliation is defined by sericite and chlorite alignment and streaky colour banding of K-feldspar. The foliated syenites exhibit sugary textures, and range in colour from grey to pink. Both varieties are predominantly K-feldspar with minor sericite, chlorite, and calcite and locally accessory biotite. Magnetite is an erratically distributed accessory, and some specimens show orange rusted hematite peppered throughout. This lens is surrounded and cut by pink, medium to coarse-grained leucocratic syenite.

Copper occurs mainly as chalcopyrite disseminations erratically distributed throughout the fine-grained syenites. Examination of drill core clearly illustrates the control of disseminations and veinlets of chalcopyrite (and rare bornite) along the foliation planes. However, chalcopyrite also occurs along fractures in both the fine-grained and coarse-grained syenites.

Quartz veins cut both units, and chalcopyrite was noted with quartz veining as well as with calcite-filled fractures in brecciated sections of core. This indicates two stages of mineralization, with the earlier foliated, disseminated type being the more predominant.

The mineralization here is identical to that on the original TAM showing, another smaller lens of the same foliated material. Also, these mineralized lenses are along the same general strike as those of the LORRAINE deposit to the southeast, and the potential for further occurrences of this type within the Duckling Creek Syenite Complex is high.

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GEOLOGY OF GERMANSEN LAKE AREA
(93N/10)

By H. D. Meade

(Graduate Student, University of Western Ontario)

The investigation of the Takla Group volcanic sequence in the Germansen Lake area is part of a comparative study of the mineralogy of the Takla volcanic rocks and the adjacent Hogem and Germansen batholiths. This study will be completed as a Ph.D. thesis at the University of Western Ontario, and has been, in part, supported by the British Columbia Department of Mines and Petroleum Resources. The following represents a preliminary report on field work done during 1974.

GENERAL GEOLOGY

Regional mapping by Armstrong and Thurber (1945) south of Germansen Lake outlined the Germansen batholith in contact with rocks of the Upper Triassic Takla Group and Upper Paleozoic Cache Creek Group. The contact of the Germansen batholith and Takla Group rocks is well exposed in this area, and outcrop permits construction of a part geological section of the layered rocks.

TAKLA GROUP VOLCANIC ROCKS

Foliated and unfoliated rocks of the Takla Group are juxtaposed by a major east-trending fault, which follows part of Olson Creek and continues eastward through a major break in a north-trending ridge (Fig. 11). North of the Olson Creek fault, the rocks are augite andesite porphyry and feldspar porphyry flows, flow breccia, coarse pyroclastics, and dykes overlain by a few thin beds of waterlain tuff that dip 60 to 75 degrees to the northwest. The tuffs provide the best attitudes as the andesites are structureless except for brecciation and altered flow tops.

South of the fault, and between the fault and the batholith, grey-brown to grey-green hornblende plagioclase andesite with interbedded pyritic tuff horizons overlie a predominantly sedimentary and metavolcanic section. Within these andesites, hornblende alignment and schistosity show variable development, and are best observed on weathered surfaces. The interbedded siliceous tuff units are 2 to 10 feet thick, more sheared than the andesites, and contain abundant limonite after pyrite. At least 200 feet of thin-bedded argillite, siltstone, chert, limestone, and silicified tuff underlie the andesite. They are described as they occur in a fault gully, between Olson Creek fault and the batholith, which forms a linear depression in the aforementioned north-trending ridge. In this sedimentary section, black pyritic chert units are interbedded with 6 to 18-inch-thick grey limestone units and are gradational to grey to brownish, very fine-grained tuff and siltstone units, and contain up to 1 per cent of very fine-grained disseminated pyrite. The abundance of biotite in thin sections of the tuffs and siltstones gives a brownish colour

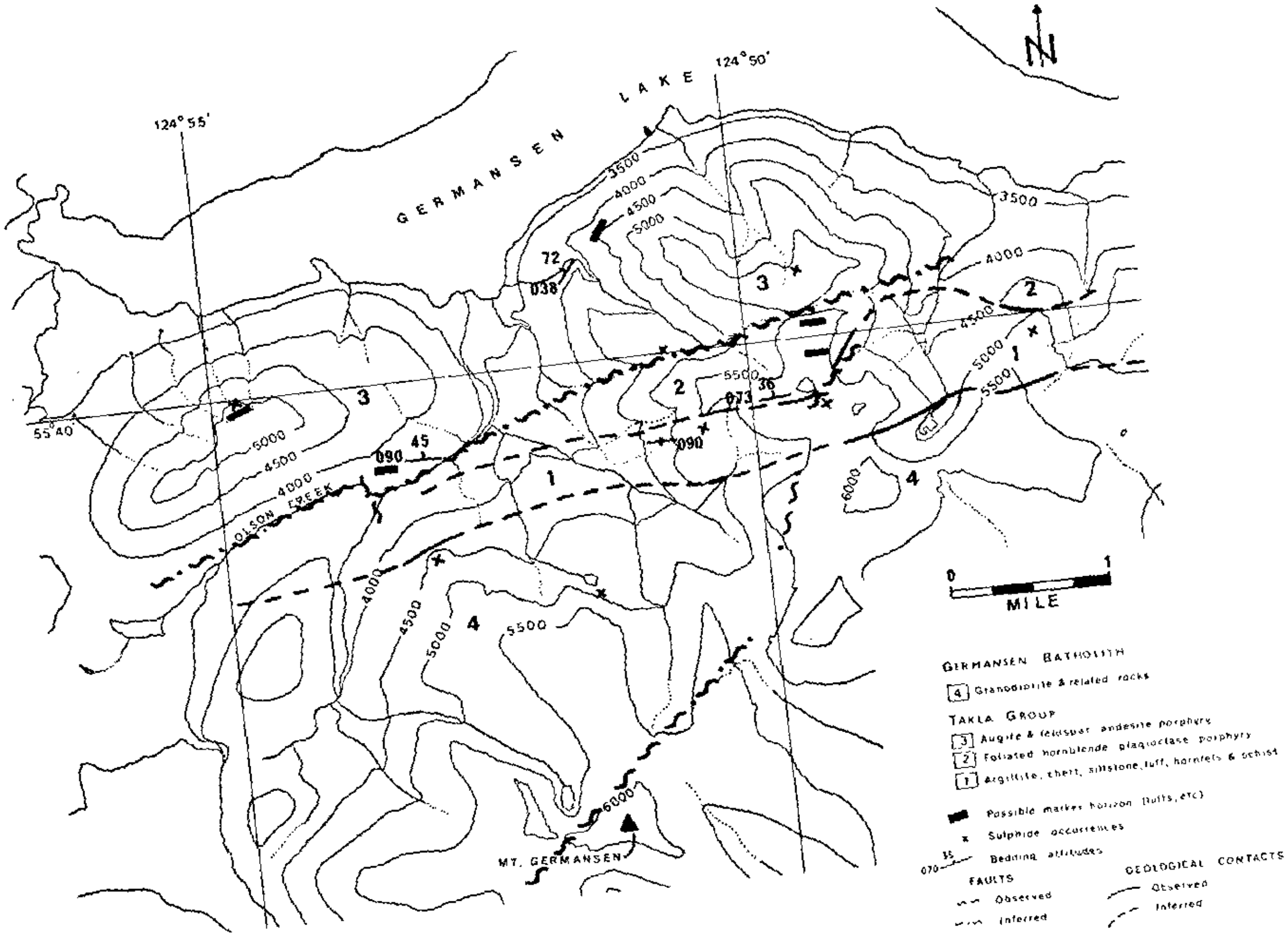

Figure 11. Generalized geology, Germansen Lake area.

and sometimes a felty appearance. This may be the result of contact metamorphism related to the batholith approximately 1,500 feet to the south. On the north wall of the gully the cherts, tuffs, and siltstones have a fracture cleavage parallel to compositional layering, which is disrupted by minor faults and intruded by dykes. These rocks dip approximately 35 degrees to the northwest, but down slope to the east in the gully, strikes are more easterly and dips are steeper. This change in attitude suggests a northward-plunging anticline. South of a holofelsic monzonite dyke that intrudes the axis of the gully, sedimentary rocks that are lithologically similar to those of the north wall, have a well-developed cleavage parallel to axial planes of isoclinal folds and compositional layering. Slaty cleavage and hinges of isoclinal folds have been buckled, forming open folds and warps; fold axes of both fold systems plunge shallowly to the west. In thin section, mica parallels the axial plane of microscopic folds and is subparallel to bedding. Flow folds in recrystallized limestone lenses and pre-lithification slump structures in cherts also occur. In other areas and nearer the batholith in this area, these predominantly sedimentary rocks tend to be more micaceous and schistose.

Descriptions of the Takla Group do not include occurrences of tight folding, fracture cleavage, and schistosity (Armstrong, 1949, p. 56; Roots, 1954, p. 159); but Paterson (1974) notes that siltstones near faults exhibit good fissility parallel to bedding. Penetrative deformation in these sedimentary rocks suggests that they belong with lithologically similar foliated and folded Upper Paleozoic rocks of the nearby Manson Creek belt. Alternatively, these rocks are similar in lithology to argillite, limestone, and tuffaceous siltstone that form the base of the Takla Group in the Dewar Peak area (Monger and Paterson, 1974). If conodonts are obtained from limestone samples, the age of this folded wedge should be defined.

GERMANSEN BATHOLITH

Intrusive rocks of the Germansen batholith clearly intrude the volcanic and sedimentary rocks, and are predominantly foliated, leucocratic biotite granodiorite porphyry cut by minor aplite and holofelsic quartz monzonite and monzonite dykes. Away from the batholith contact, alignment of biotite and other mineral grains forms a northeast-trending, steeply dipping regional foliation in the granodiorite. Weakly foliated granodiorite is gradational to the protoclastic peripheral zone of the batholith which contains pegmatite dykes, holofelsic granite, mafic schlieren, and crosscutting quartz veins. This contact zone dips 30 to 70 degrees out from the central part of the batholith. Hornblende-rich schlieren is gradational to mafic xenoliths, and both schlieren and holofelsic granitic patches are elongate in the plane of the protoclastic foliation. Graphic granite pegmatites containing muscovite and biotite occur as sheets, 15 to 20 feet thick, gradational to 1 to 2-foot-thick quartz veins. They are spatially associated with the contact zone of the batholith and are generally conformable with the foliation. Quartz veins and 30-foot-wide granitic dykes intrude along the cleavage planes of schistose volcanic and sedimentary rocks near the batholith contact. K-Ar age determination on a sample of granodiorite from near Mount Germansen is not yet available.

DISTRIBUTION OF METAL OCCURRENCES

Local concentrations of fine-grained disseminated pyrite and pyrrhotite are ubiquitous in the massive and fragmental andesites; the more abundant sulphide-bearing areas are shown in Figure 11. The aforementioned tuff horizons in hornblende plagioclase andesite porphyry south of the Olson Creek fault are particularly pyritic. Thin sulphide-bearing quartz veins occur along the cleavage planes of argillites and tuffaceous siltstones in the sedimentary rocks that parallel the batholith contact. Armstrong and Thurber (1945, p. 15) noted that a number of quartz veins in this area, and on the east end of Germansen Lake, contain minor amounts of copper, gold, and silver. Within this same sedimentary section there are thin-bedded, pyritic, carbonaceous black cherts and siliceous tuffs. These are chemical sediments similar to the auriferous sulphide facies of distal exhalites described by Ridler (1970, 1973) in the Noranda-Kirkland Lake area. These chemical sediments have been produced by exhalative activity associated with volcanism, and are observed to have a close spatial and stratigraphic relationship with base metal massive sulphide and gold-quartz vein deposits. In this regard, Olson Creek, Twenty Mile Creek, and other creeks draining Takla Group rocks have produced placer gold since the early 1900's.

Very few occurrences of base metal sulphide minerals have been found in the granodiorite. Most fractures are barren or contain a thin coating of chlorite. Disseminated pyrite is common in the protoclastic contact zone, and an area south of Olson Creek contains up to 3 per cent pyrite. Granite pegmatites and associated quartz veins contain minor amounts of disseminated pyrite, chalcopyrite, and a few flecks of fine-grained molybdenite. Most quartz veinlets and veins are barren of sulphide minerals. The exhalites are probably the most attractive exploration target and may be the source of placer gold that occurs in nearby creeks.

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PROPERTY EXAMINATIONS
WEST CENTRAL BRITISH COLUMBIA

By N. C. Carter

TWEEDSMUIR PARK (93E/2)

Two contiguous claim groups south of Pondosy Bay on Eutsuk Lake were examined in 1974. A directive from the provincial Parks Branch in 1973 curtailed exploration work on these and other properties lying within the boundaries of provincial parks.

The Bob, Jam, Ron, and Pete groups of claims, owned by Stenecha Exploration Ltd., are situated on the northeast slope of Mount Preston, which is underlain by Hazelton Group volcanic rocks.

Copper mineralization occurs in several areas on the property. The principal showings are on the north side of a northeast-trending creek canyon at about 1,370 metres elevation. Northwest-striking fracture zones in massive andesitic flow rocks contain disseminated chalcopyrite and bornite over a distance of 150 metres along the canyon wall. Copper staining is visible on the steep rock faces. Some copper mineralization is also contained in a bedded pyroclastic sequence in the cirque area at the head of the creek.

The Pond claims, owned by Adastral Mining Corporation Ltd., are situated on the steep southwest-facing slope of Mount Preston. The central part of the property features a prominent gossan area which appears to be restricted to a northeast-striking fault block 1.5 kilometres wide. Rocks within this area of gossan are principally rhyolite flows and breccias and small (250-metre diameter) quartz-feldspar-porphyry plugs. Basic dykes cut all rock types. Fracturing is intense and pyrite is widespread both as disseminations and as fracture fillings.

POPLAR (93L/2W)

This porphyry copper prospect is situated 48 kilometres south-southwest of Houston on the north side of Tagetochlain (Poplar) Lake. Access is by four-wheel-drive vehicle off the Tahtsa Reach road, or by helicopter. The following description is based on field observations and information gathered by the writer and T. G. Schroeter, District Geologist, Smithers.

The property was originally located for El Paso Mining and Milling Company by M. Callaghan, F. Onucki, and C. Critchlow in 1971. In 1971 and 1972, El Paso carried out soil geochemistry, geological mapping, and bulldozer trenching on the property. Results were disappointing and the property was subsequently acquired by the original locators. Limited drilling and hand trenching were done on the claims in mid-1974, and the property was optioned by Utah Mines Ltd. in late September. Geochemical and geophysical surveys and diamond drilling were in progress in November.

Original soil samples yielded anomalous copper values distributed around a crudely circular area 1,500 metres in diameter. Trenching, done to test some of these anomalous areas, exposed hornfelsed volcanic and sedimentary rocks cut by dykes of feldspar porphyry. All of these rocks exhibit features typical of a quartz-sericite-pyrite or phyllic alteration zone. Pyrite and minor chalcopyrite are contained in closely spaced fractures.

Work by one of the owners in 1974 in the central part of the claim group resulted in the discovery of sub-outcrops of biotite-feldspar porphyry and hornfels containing copper mineralization (over an 1,800-square-metre area). Three directions of closely spaced fractures are evident and each contains finely disseminated chalcopyrite and some pyrite.

Four hundred metres southeast of this zone, intensely fractured hornfels is exposed in a creek canyon. Abundant pyrite occurs in narrow fractures and in northerly striking quartz veins up to 30 centimetres wide. Old claim posts nearby suggest that this zone was investigated many years ago. The hornfels exhibits significant bleaching marginal to the closely spaced (one per 5 centimetres) fractures. Just south of this zone the hornfels is capped by a small remnant of non-mineralized Tertiary basalt.

REFERENCE

Assessment Report 3665 (Government file, *B.C. Dept. of Mines & Pet. Res.)*

BABINE RANGE (93L/15)

A study of the mineral potential of the Babine Range, 25 kilometres northeast of Smithers, was undertaken in 1974 as part of an integrated resource study involving several provincial government departments. The study was conducted by the writer and T. G. Schroeter.

The Babine Range is underlain by a northwest-trending sequence of Lower and Middle Jurassic volcanic and sedimentary rocks. Argillaceous sedimentary rocks of possible mid-Cretaceous age are found along the east flank of the range. Eastward-directed thrust faulting is evident along the west flank of the Range where the bulk of the volcanic - sedimentary sequence exhibits features of dynamic metamorphism. Intruding the layered rocks are elongate plugs, dykes, and sills of rhyolite and lesser granitic rocks. The intrusive rhyolites contain abundant dissemimated pyrite.

The great number of mineral showings in the Babine Range were originally explored and developed in the early 1900's. Of these, only one, the Cronin silver-lead-zinc deposit, has had any record of sustained production.

The known mineral deposits may be broadly subdivided into four main types, including: (1) copper-silver deposits in volcanic rocks, (2) silver-lead-zinc deposits in volcanic rocks, (3) silver-lead-zinc deposits in sedimentary rocks, and (4) porphyry copper-molybdenum deposits.

Copper-silver deposits in volcanic rocks are apparently restricted to the predominantly maroon pyroclastic sequence of Early Jurassic age on the west flank of the Range. These deposits consist of discontinuous quartz veins, fracture fillings, and disseminations of bornite, chalcopyrite, chalcocite, and minor tetrahedrite. Examples of these deposits include the Rainbow, Harvey, and Copper Queen showings.

Silver-lead-zinc deposits in volcanic rocks include the Silver King showings at the head of Driftwood Creek and similar showings near the head of Debenture Creek on the east side of the Range. At the Silver King deposit, branching quartz veins up to 4 feet wide, crudely parallel to the schistosity in enclosing silicified andesites, contain pyrite, galena, sphalerite, and tetrahedrite. At Debenture Creek, argentiferous galena occurs in quartz veins and in massive lenses in pyritized and silicified volcanic rocks.

Silver-lead-zinc deposits in sedimentary rocks are represented by the Cronin, Hyland Basin, Native Mines, and Little Joe properties, all of which are situated on the east flank of the Babine Range. The mineral showings are veins and fissures which occur in schistose argillaceous sedimentary rocks and sericite schists adjacent to plugs, dykes, and sills of rhyolite. The deposits consist essentially of argentiferous galena, sphalerite, tetrahedrite, and some native silver in a gangue of quartz and siderite. The rhyolite intrusions contain disseminated pyrite and near the principal showings, narrow quartz-filled fractures with silver-lead-zinc mineralization.

The Big Onion porphyry copper-molybdenum deposit on Astlais Mountain at the southeast end of the Range is the only example of this type. An elongate intrusive consists of two phases including a quartz-feldspar porphyry which has been intruded by an inner quartz diorite porphyry. Chalcopyrite and molybdenite mineralization is best developed near the contacts between the two intrusive phases.

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BLUNT (93M/3E)

The Blunt porphyry copper-molybdenum prospect is situated on the southwest side of Blunt Mountain near the headwaters of Luno Creek, 25 kilometres east-southeast of New Hazelton. Exploratory work including diamond drilling was carried out by Noranda Exploration Company, Limited in the late 1960's.

Copper and molybdenum mineralization occurs near the western contact of a large granodiorite stock which forms the core of Blunt Mountain and intrudes Bowser Group sedimentary rocks. The sedimentary rocks near the intrusive contact are notably hornfelsed and pyritized.

The principal mineral showings are in a spur ridge underlain by medium-grained equigranular to sub-porphyritic granodiorite cut by narrow fine-grained aplite dykes. Chalcopyrite and molybdenite are disseminated in quartz-K-feldspar-filled fractures which range in width from hairline to 3 millimetres. Two fracture directions, trending north and east and having steep dips, are spaced 7 to 12 centimetres apart. Only the north-trending fracture set was seen to contain copper-molybdenum mineralization.

GEOLOGY OF THE SUSTUT AREA

(94D/9, 10)

By B. N. Church

A programme of reconnaissance and detailed mapping has been completed in the Sustut area. The reconnaissance work was directed toward expanding the area of geological control from a cross-section established during the 1973 field season; the detailed investigation focused on Wesfrob Mines Limited's DAY prospect and the ASITKA prospect of Nomad Mines Ltd.

The extent of the reconnaissance area is shown on Figure 12. This covers the main block of Wesfrob's claims, centred on the company's Sustut Copper prospect, tracing the important Triassic volcaniclastic beds for a total distance of about 14 miles.

Except in a few areas where folding and faulting are especially pronounced, the main belt of Triassic Takla strata is tilted to the southwest exposing the underlying Paleozoic beds along the west side of Moose Valley. At the west boundary of the map-area near Two Lake Creek, rocks of the Takla Formation are downfaulted against the Paleozoic succession.

In the type area (Church, 1973), the Mesozoic section includes three main stratigraphic divisions. The lowest division, about 7,000 feet thick, consists primarily of augite-rich basalt with intercalations of aphyric basalt and coarse feldspar-bearing basaltic andesites. Massive volcanic breccia deposits predominate although lava flows, bedded breccias, and pillow lavas are locally conspicuous. A unit consisting of dark, thinly bedded sandstone and siltstone, locally ranging to several hundred feet thick, is lowermost in the exposed section. The middle division consists of about 3,500 feet of mixed andesite and basalt volcaniclastic rocks — lahar, tuff breccia, volcanic sandstone, and conglomeratic beds — which rest on relatively thin, fossiliferous, tuffaceous argillite, chert, and carbonate beds. The upper division, about 4,000 feet thick, comprises locally well-layered maroon and grey, welded and nonwelded ash flow tuffs and volcanic breccias ranging from basalt to rhyolite in composition.

The stratigraphic position of a polymictic conglomerate formation has now been established in the section as occurring above the volcaniclastic beds in the middle division. This formation, displaying numerous boulders and pebbles of Permian limestone, jasper, chert, etc., was evidently derived from Paleozoic units once elevated and exposed by faulting in the Two Lake Creek area.

Wesfrob's Sustut Copper prospect is the main mineral occurrence in the region. This is an unusual stratiform chalcocite-rich deposit of a few tens of millions of tons grading slightly more than 1 per cent copper. The deposit appears to be related in some way to a sandstone and conglomerate-rich layer in the volcaniclastic formation of the middle division. It is interesting to note, however, that south of the Sustut Copper prospect near Willow Creek, although the sandstone and conglomerate beds increase in volume, especially in the lower half of the formation, no additional significant mineralization has been located.

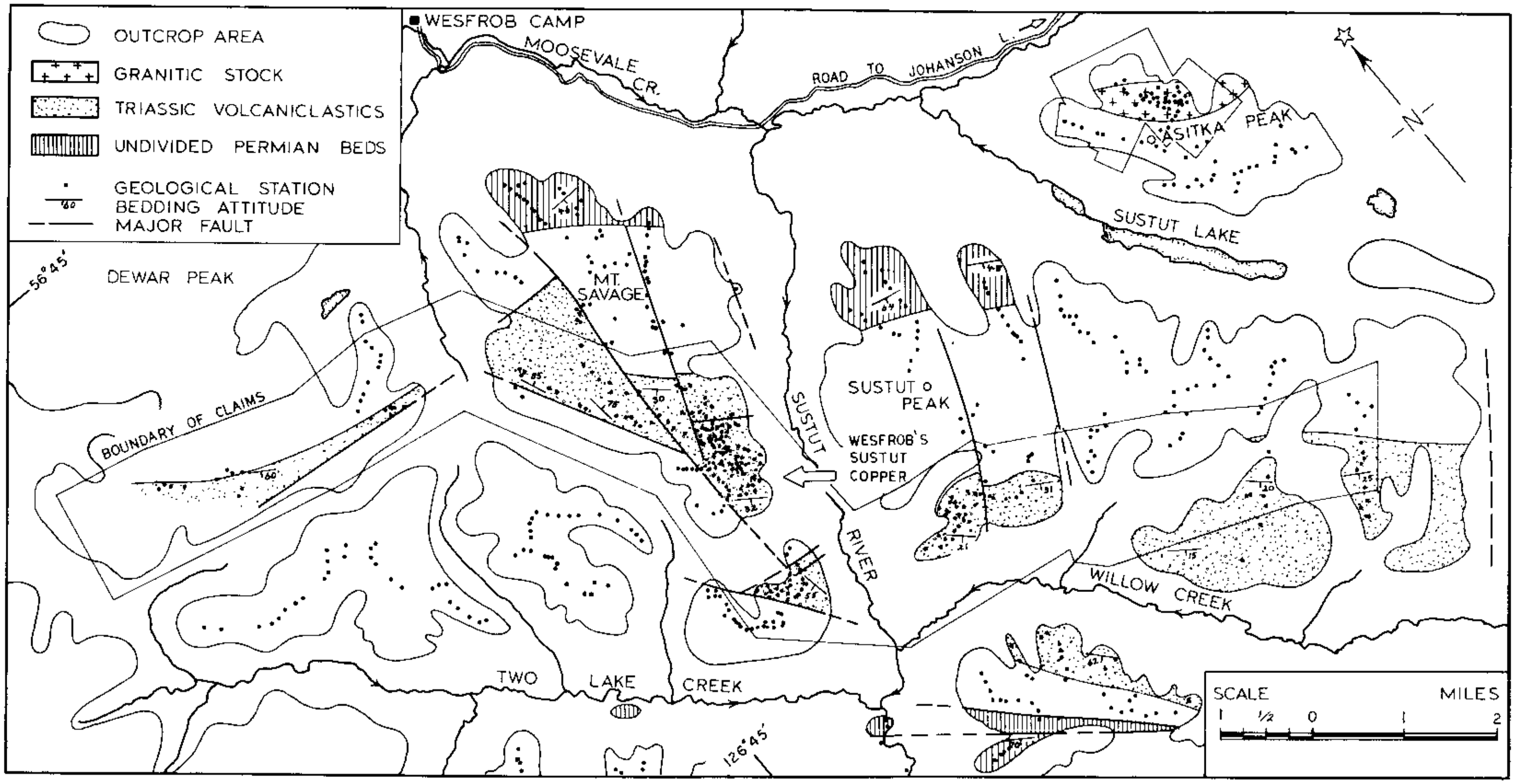

Figure 12. Generalized geology, Sustut area.

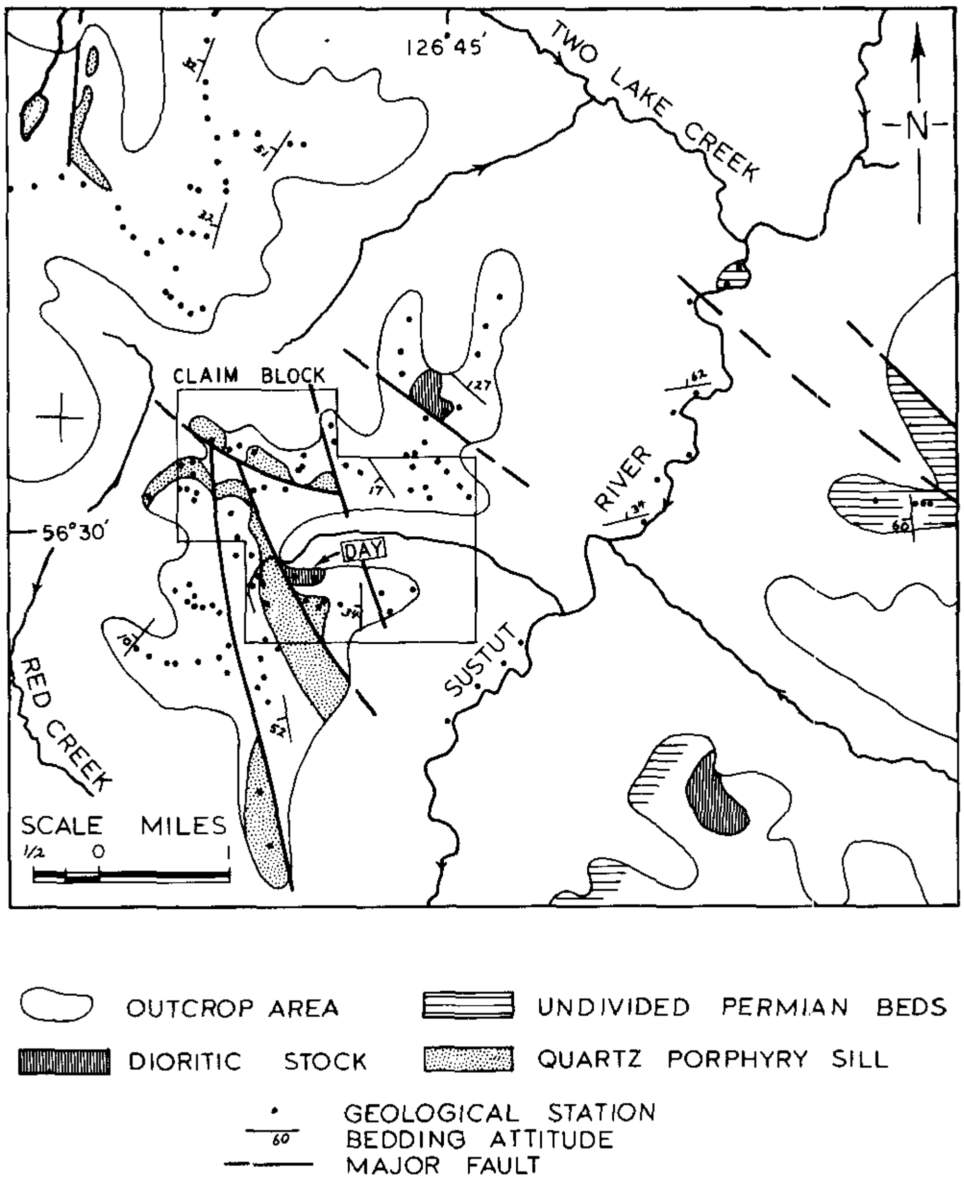

Figure 13. Generalized geology, DAY claims and vicinity.

Other small stratiform-type deposits have been discovered by Wesfrob on the WILLOW and SIT claims located approximately 2.5 and 6 miles respectively, southeast of the Sustut Copper prospect. The WILLOW mineralization consists of thin, discontinuous chalcopyrite and chalcocite disseminations in shales at the base of the volcaniclastic formation. The SIT occurrence is a small deposit of chalcopyrite, bornite, and chalcocite in fractures and gas cavities in aphyric basalt near the top of the lower division. Also, a few stratiform copper deposits of apparent minor significance have been found in association with the ash flow tuffs and breccias of the upper division. Such is the occurrence on the 'A' claims of Rio Tinto Canadian Exploration Limited (latitude 56° 38'; longitude 126° 45') and Wesfrob's PLUTO prospect a few miles to the north. The 'Topper showings' optioned to Brascan Resources Limited (latitude 56° 38'; longitude 126° 45') may be similar.

Intense prospecting was also in progress in the diorite and granodiorite intrusions northeast and southwest of the main belt of Takla rocks. In August, Nomad Mines Ltd. moved drill equipment onto a gossan area of a biotite hornblende granodiorite stock on the northeast flank of Asitka Mountain (*see* Fig. 12). Silt samples taken from this area show some exceptionally high copper values.

TABLE OF SILT ANALYSES

	1	2	3	4	5
	ppm	*ppm*	*ppm*	*ppm*	*ppm*
Cu	270	1000	340	170	250
Pb	22	22	22	17	23
Zn	60	75	90	50	100
Ag	0.7	0.8	1.0	0.9	1.1
Mo	7	4	4	6	8
Mn	590	430	480	350	810
	per cent	*per cent*	*per cent*	*per cent*	*per cent*
Fe	0.27	0.20	0.22	0.23	0.27

Further west, more drilling was completed on Wesfrob's DAY prospect near the Sustut River (*see* Fig. 13). The target area is a small but locally well-mineralized dioritic stock. This appears to be the oldest of a series of intrusions which cut the volcanic rocks of the upper division. A fresh sample of hornblende from the DAY diorite yields a K-Ar age of 184±11 m.y.

Potassium (per cent)	$\overline{X} = 0.367$
Ar^{40*} ppm	0.005066
Ar^{40*} / total Ar^{40}	0.493
Ar^{40*} / K^{40}	0.01130
Apparent age	184±11 m.y.
K^{40} / K contstant	1.22×10^{-4} g/g

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DENTONIA MINE, JEWEL LAKE AREA

(82E/2E)

By B. N. Church and J. Winsby

Renewal of mining activity near Jewel Lake in the Greenwood area is the direct result of recent spectacular increases in the price of gold and silver, a good local market for flux-grade silica, and the success of Colt Resources Ltd. in gaining control of key Crown-granted claims in the vicinity of the old Dentonia mine.

Production, averaging about 50 tons per day, began in March from an extension of the Dentonia quartz vein about 600 feet south of the Jewel shaft on the 250-foot level below Colt's new Denero Grande shaft. Currently this ranks as the largest lode gold-silver operation in the province. Previous work, intermittent in the years from 1900 to 1948, produced about 135,000 tons of ore averaging 0.30 ounce per ton gold and 1.7 ounces per ton silver. Most of this ore was derived from the Jewel and Enterprise zones with important subsidiary tonnage from the Anchor and Rowe zones.

Investigation of the property was completed in the latter part of June; the new underground workings were investigated together with detailed surface mapping of the Dentonia mine area and reconnaissance of the surrounding region to the north and east (Fig. 14).

Briefly, the geology of the area consists of highly metamorphosed volcanic and sedimentary rocks, mostly gneisses and schists, intruded by a large granodiorite body.

The Dentonia quartz vein is exposed over a length of approximately 6,000 feet, traceable from a point 1,500 feet north of the Ethiopia adit and south a distance of about 4,500 feet to the Colt workings. It strikes across the fabric of the country rocks which dip variably 30 to 60 degrees easterly.

Shearing has obscured many primary structures, but the vein does appear to be largely the result of fissure filling with only local evidence of wallrock silicification or replacement.

Splays and screens of country rock and post-vein dykes cause considerable dilution in some zones. Nevertheless, the silica content of the ore, maintained during present mining, averages 85 per cent.

Sulphides are not especially abundant, occurring mainly as grey streaks of fine disseminated grains or pockets and lenses of coarser admixtures composed mostly of pyrite with some galena and chalcopyrite. The presence of sphalerite, tellurides, and native gold has also been reported.

Control of the ore zones has been attributed to deflections in the overall vein attitude, the enriched thickened segments of the vein bearing more to the northeast and being inclined more gently than normal. This generalization appears to be true for the main Jewel orebody, which is an enlarged part of the vein roughly coinciding with the

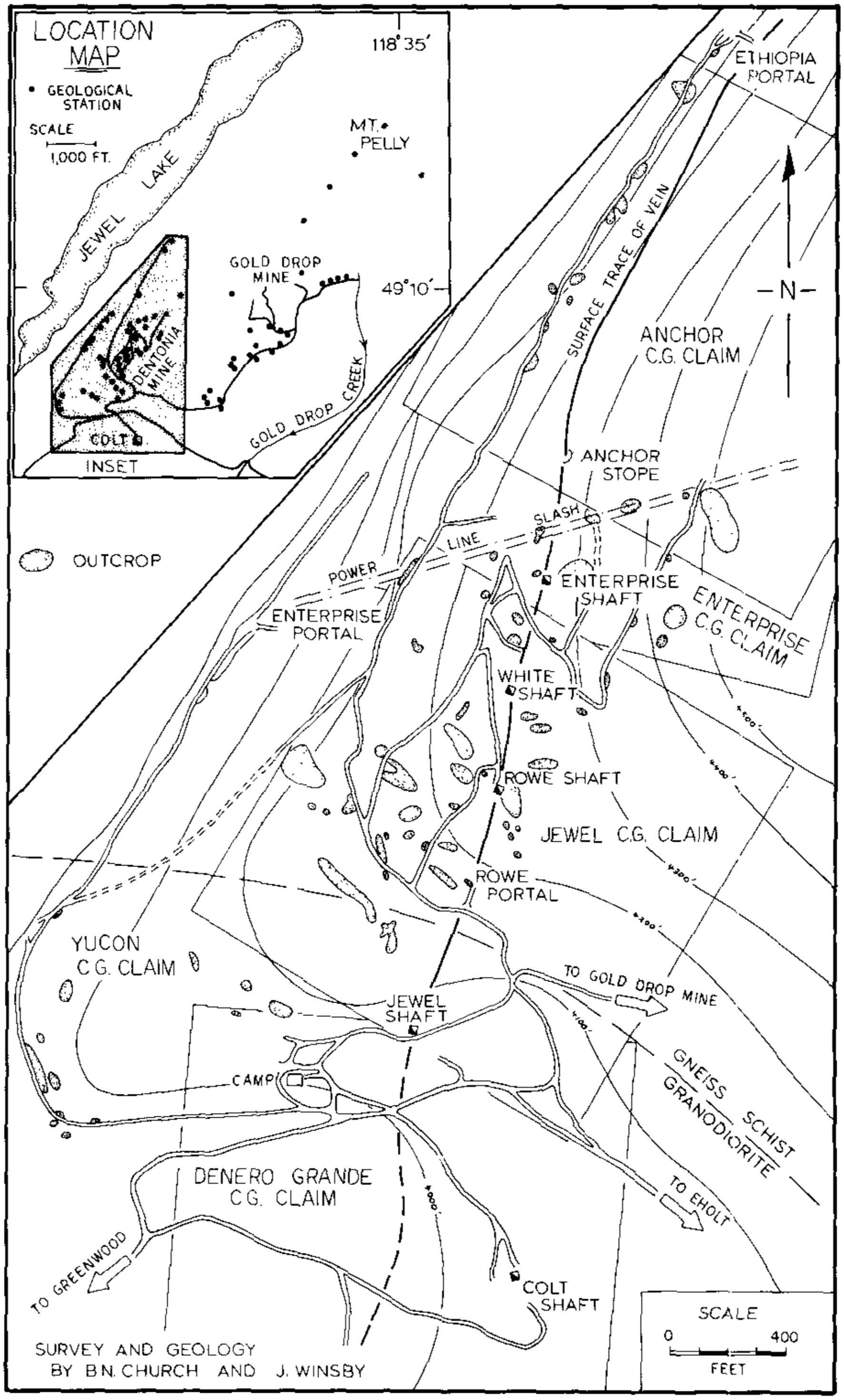

Figure 14. Geology of Dentonia mine, Jewel Lake area.

intersection of the vein and the north boundary of the granodiorite intrusion. The nature of the Colt orebody, which is located several hundred feet south of the Jewel area, is still unknown because of the preliminary state of mine development.

The age of the Dentonia vein is bracketed by the granodiorite, which locally hosts the vein, and by crosscutting dykes. The dykes are correlated with petrographically similar Tertiary lavas at the summit of Pelly Mountain and with volcanic rocks which occur to the southwest near Midway, dated at 49±2 m.y. by Mathews (1964). A sample of the granodiorite, taken from a point near the Denero Grande shaft on the 250-foot level of the Colt workings, was recently dated at 125±5 m.y. by Geochron Laboratories Ltd.

Potassium (per cent)	$\overline{X} = 4.188$
Ar^{40*} ppm	0.3864
Ar^{40*} / total Ar	0.632
Ar^{40*} / K^{40}	0.007564
Apparent age	125±5 m.y.
K^{40} / K constant	1.22×10^{-4} g/g

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GALORE CREEK MAP-AREA

(104G/3W, 4E)

By A. Panteleyev

Geological mapping at a scale of 1:31,680 (1 inch equals one-half mile) initiated in 1973 was continued in 1974 (*see* Fig. 15). Base maps are Sphaler Creek (104G/3W) and Flood Glacier (104G/4E), 100-foot contour preliminary maps available from the Surveys and Mapping Branch, Department of Lands, Forests, and Water Resources, Victoria. These maps are especially suited for reconnaissance mapping as they are derived from and match the scale of recent (1965) air photographs.

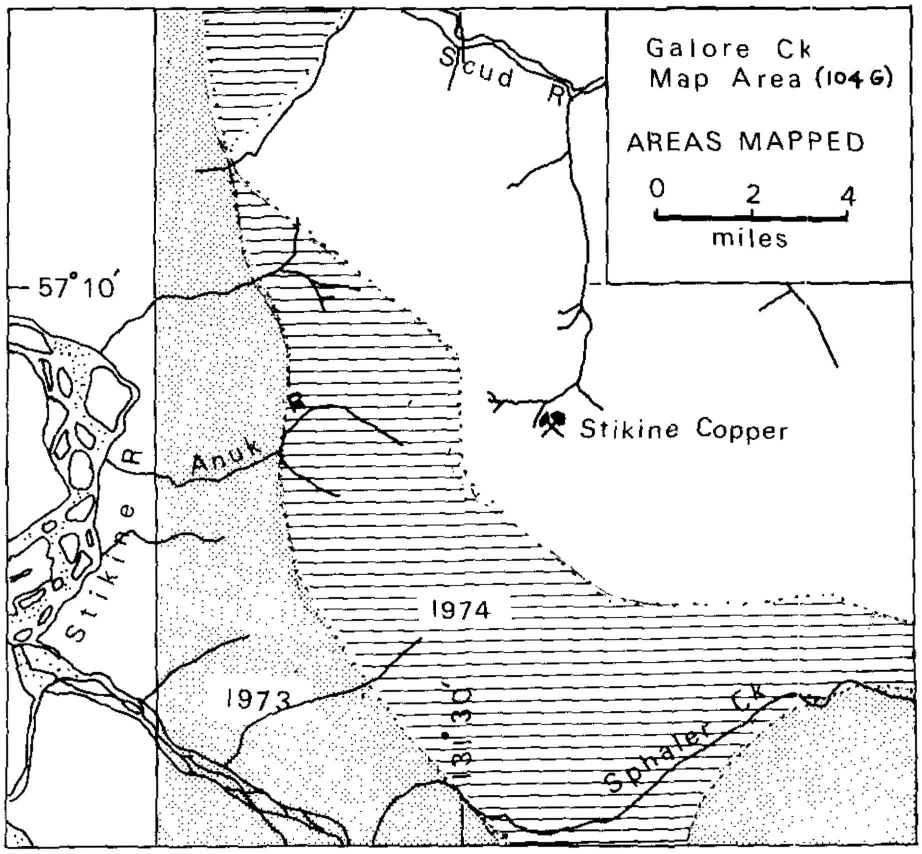

Figure 15. Location of mapping, Galore Creek area.

Regional mapping is being done in order to evaluate ore potential of known showings and to predict undiscovered resource capability of the map-area. Mapping during 1973 was concerned mainly with intrusive rocks along the western and extreme southeastern map

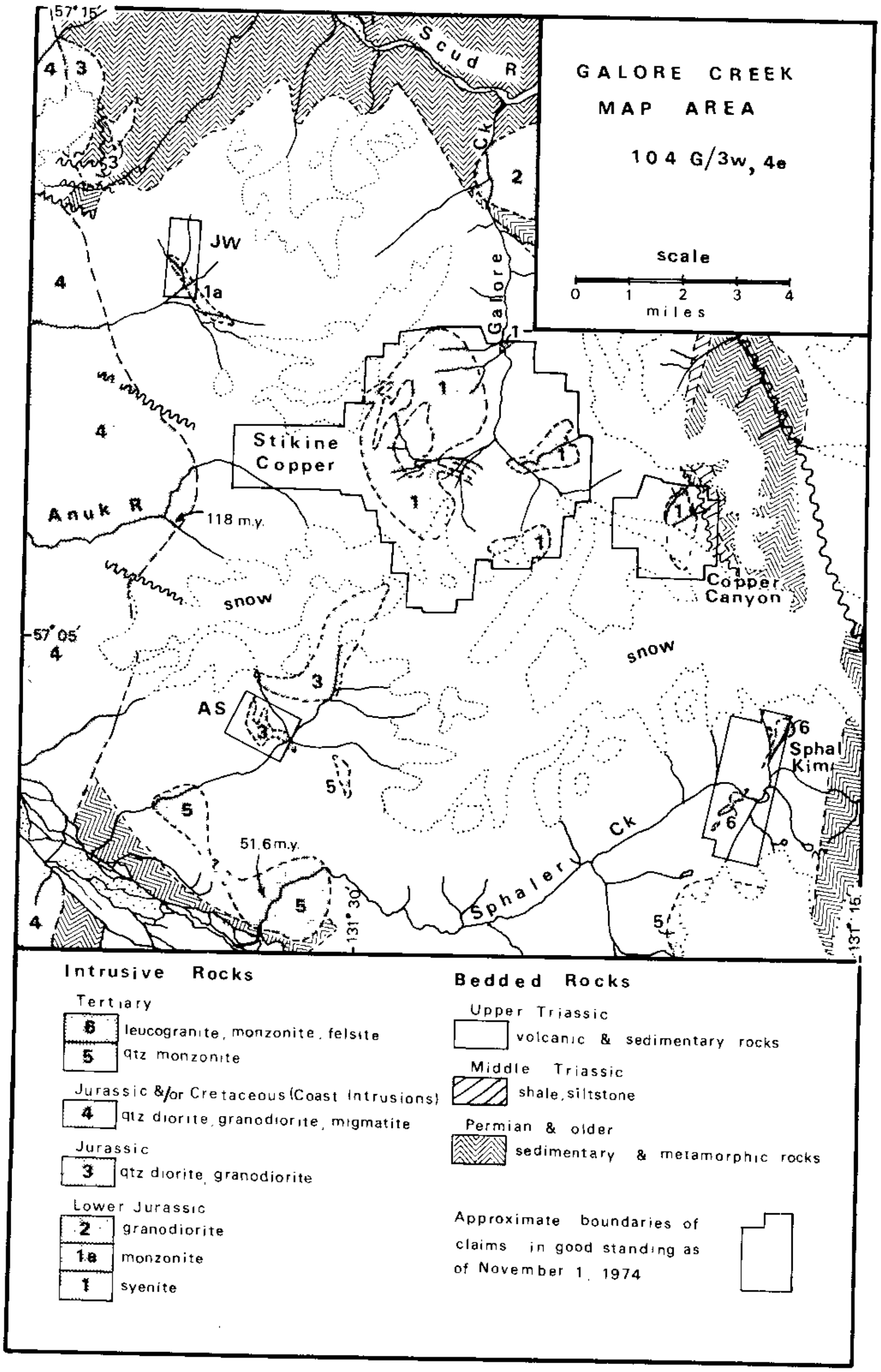

Figure 16. Generalized geology, Galore Creek map-area.

boundaries. Intrusive contacts were located and contact relations with country rocks, age of intrusions, and relation to mineralization were investigated. Mapping during 1974 established a stratigraphic framework for the area by defining major stratigraphic units and structures. Petrology and chemistry of volcanic rocks from a number of measured sections are currently being investigated.

Regional mapping is being done in conjunction with detailed investigation of the Galore Creek deposits of Stikine Copper Limited (*see* GEM, 1972, 1973). These and further studies will determine the validity of the suggestion that syenite porphyries and related mineralization are coeval and cogenetic with intruded volcanic rocks in Galore Creek map-area.

Work to date is summarized on Figure 16. The area of highest economic potential consists of alkalic intrusive and Upper Triassic volcanic rocks and is outlined in the centre of the map-area. To the west are intrusive rocks of the Coast Plutonic Complex and to the southwest, north, and east are Paleozoic rocks. South of Sphaler Creek, glaciers and large snowfields form an effective southern boundary for the map-area.

Ages of intrusive rocks shown on Figure 16 are tentative. They are based on six published and two new K-Ar dates. Alkalic rocks of map units 1 and 1a are associated with copper mineralization and contain hydrothermal biotites ranging in age from 174 to 198 m.y. Medium to coarse-grained granodiorite of unit 2 has an apparent age of 182 m.y. These earlier published dates are summarized elsewhere (Panteleyev, 1973). Map unit 3 consists of fine to medium-grained hornblende quartz diorite or granodiorite. Intrusive contacts are sheared and the rocks are commonly hydrothermally altered. Epidote, chlorite, quartz veining, and small amounts of pyrite as well as traces of chalcopyrite are common. Map unit 4 represents rocks of the Coast Plutonic Complex. These rocks display a variety of rock types and textures ranging from massive, coarse-grained leucogranite to foliated hornblendite. Rocks of unit 4 in Galore Creek map-area are commonly weakly to noticeably foliated, medium-grained hornblende and hornblende biotite granodiorite. Biotite from a weakly foliated, fine-grained hornblende biotite quartz diorite collected from Anuk River yielded a K-Ar date of 118±5 m.y. (Lower Cretaceous).

Rocks of map unit 5 are little altered, medium-grained, pink to grey biotite quartz monzonite or granodiorite. The intrusions form a number of small stocks satellitic to Coast Plutonic rocks along the southwest and south map boundaries. They are considerably younger than Coast Plutonic rocks, as biotite from a quartz monzonite stock at the mouth of Sphaler Creek yielded a K-Ar date of 51.6±1.6 m.y. (Eocene). Unit 6 comprises a number of small subvolcanic stocks, dykes, and possibly intrusive breccia bodies. The rocks are mainly leucocratic porphyritic to felsitic rocks tentatively called monzonite. Minor hornblende-bearing phases may approach quartz monzonite in composition. Some pyrite and chalcopyrite are associated with these rocks as disseminations and fracture fillings in breccia zones. Significant bornite and some molybdenite have also been noted.

Structural relationships between Paleozoic, Middle Triassic, and Upper Triassic bedded rocks will be investigated by further field work and Upper Triassic rocks will be subdivided as petrologic and analytical data become available.

PROPERTY EXAMINATIONS

Two areas of exploration activity representing the bulk of exploration expenditure in the Liard Mining Division were examined in some detail. These are the RED/SUS, CHRIS claim groups 10 miles southeast of Iskut (Eddontenajon) (104H) and the SMRB/JEFF groups on a southeast fork of Kutcho Creek, about 12 miles south-southeast of Rainbow Lakes (104I).

Reports are forthcoming in *Geology, Exploration, and Mining in British Columbia, 1974.* Further field work is planned in 1975 for Kutcho-Tucho Creek areas in the vicinity of SMRB/JEFF claim groups.

REFERENCES

Panteleyev, A. (1972): GC, Hab, Buy (Stikine Copper), *B.C. Dept. of Mines & Pet. Res.,* GEM, 1972, pp. 520-526; 1973, in press.

Souther, J. G. (1972): Telegraph Creek Map-area, British Columbia, *Geol. Surv., Canada,* Paper 71-44, 38 pp.

GEOCHEMICAL SAMPLING, GEOLOGY, AND MAGNETICS OF THE KAKETSA STOCK

(104J/4W)

By W. J. McMillan, A. Panteleyev, and V. A. Preto

INTRODUCTION

As part of a geochemical study of Triassic Cordilleran plutons being conducted in cooperation with the B.R.G.M. of France, several composite intrusions containing ore deposits *in southern* British Columbia have been sampled. The samples will be analysed and tested by statistical techniques developed by the B.R.G.M. For comparative purposes, it was decided to sample a stock of similar age and tectonic setting that was petrologically simple but contained no known ore deposits. The Kaketsa stock was chosen because it has been dated at 218±8 m.y., cuts Triassic volcanic and associated sedimentary rocks, and although there are mineral showings in volcanic rocks adjacent to the stock, it contains no *known* deposits of significant size (GEM, 1972, pp. 547-549). The ultimate purpose of these studies is to attempt to discover geochemical criteria which will distinguish productive from barren plutons.

SAMPLING PROCEDURE

A grid with l-kilometre squares was overlain on a 20-chain topographic map covering the area of the stock. An attempt was then made to collect at least one sample from each grid square. Each of the 50 samples collected consists of several fist-sized specimens with a composite weight of 2 to 3 kilograms. All samples will be analysed for trace elements, *selected samples will be subjected to major element analysis, and biotite from one sample* will be separated for a K-Ar age determination to test the existing date which is based on hornblende.

GENERAL GEOLOGY

An attempt was made to map petrological variations within the stock. Because time available was limited, reconnaissance mapping was conducted along traverse lines and only areas around sample stations were examined carefully. Hence, map figures in the report are based almost entirely on data from 50 sample sites.

The stock consists mainly of fine to medium-grained diorite. Based on visual estimates, quartz content is approximately 10 per cent. Locally, the rock is monzonite or quartz monzonite. Local pods of amphibolite and mafic diorite occur and are attributable to contamination by the basic volcanic country rock. Volcanic rock adjacent to the stock is recrystallized and cut by dyke stockworks and dyke swarms.

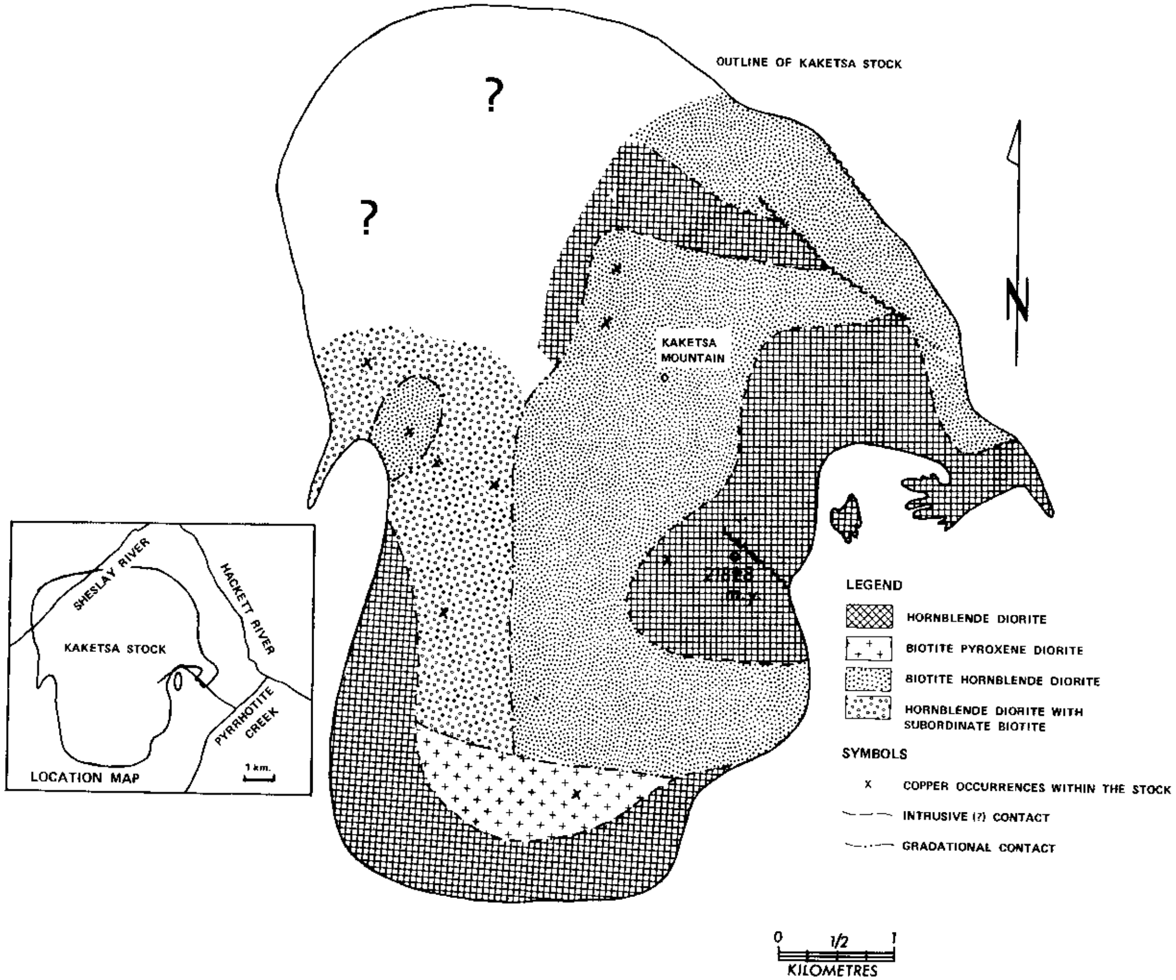

Figure 17. Location and geology, Kaketsa stock.

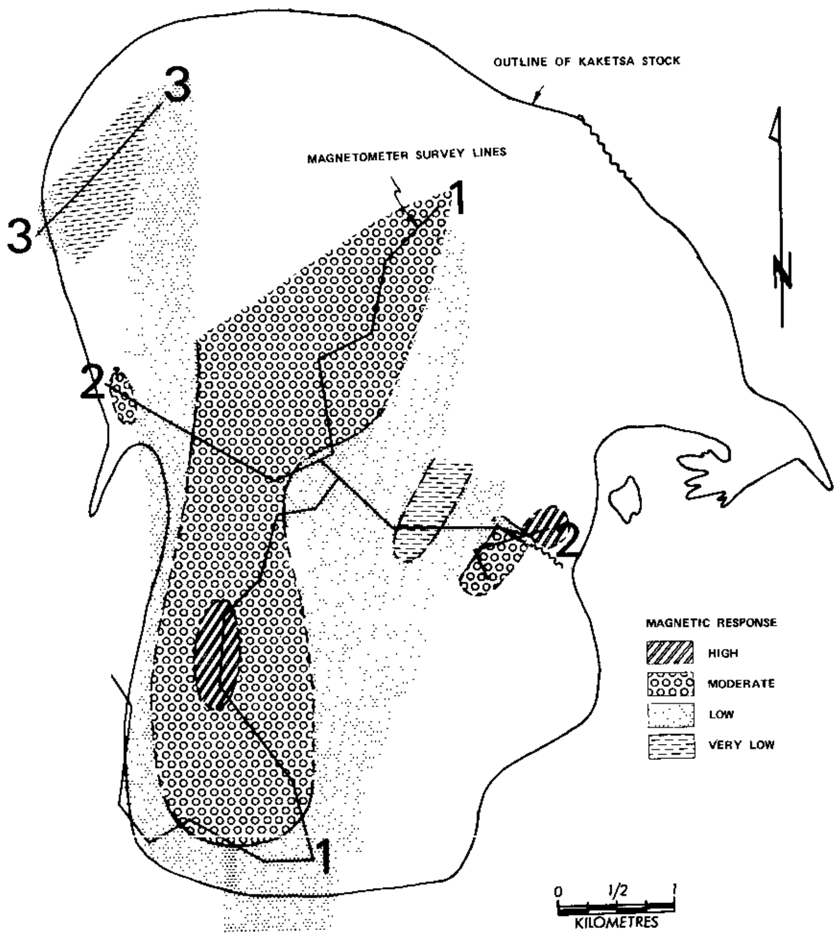

Figure 18. Magnetometer survey, Kaketsa stock.

Mapping suggests that the stock can be subdivided into 'phases' and 'varieties' based on the types and relative proportions of mafic minerals present (Fig. 17). Four divisions can be made: hornblende diorite, biotite hornblende diorite, biotite pyroxene diorite, and hornblende diorite with subordinate biotite. In the biotite hornblende diorite, hornblende to biotite ratios vary from 3 to 1 to less than 1 to 1. In the diorite with subordinate biotite, these ratios are typically 10 to 1 or more.

The stock has a discontinuous border zone of hornblende diorite. The biotite-bearing rocks are internal to and perhaps intrude this border 'phase.' The biotite-bearing 'phase' of the stock consists of two main 'varieties' which separate the stock into east and west halves. Hornblende is the predominant mafic mineral in the west half whereas biotite is a major constituent of rocks in the east half. Biotite pyroxene diorite occurs near the south edge of the stock. No intrusive relationships were noted between the biotite-bearing varieties and they appear to have intergradational contacts. However, the higher content of hydrous minerals in the biotite hornblende diorites suggests that they may have crystallized later than the less hydrous hornblende-dominated diorites. The relationship of the biotite pyroxene diorite variety to the other rocks is uncertain.

In biotite-bearing rocks, biotite often occurs along planar zones. Furthermore, biotite is locally coarse grained and poikilitic. It is possible that the biotite either separated into layers by magmatic flow differentiation or grew during a later hydrothermal event.

ALTERATION, VEINING, AND MINERALIZATION

Mineralization, associated alteration, and veining in the country rock east of the stock were briefly described by Panteleyev (GEM, 1972, pp. 547-549). No significant mineral showings were encountered during the sampling project, but several copper occurrences (Fig. 17) were found. Weak to moderate propylitic alteration of the granitic rocks is common. It is often accompanied by potassic alteration along fractures and quartz or epidote veining and fracture coating. Chlorite and carbonate also coat fractures locally. Chalcopyrite was the only primary copper mineral found. It normally occurs in association with epidote or quartz in veins. In one instance, chalcopyrite formed a veinlet in a potassic alteration zone and rarely, minute grains of chalcopyrite are disseminated in the diorite. Pink zeolite (laumontite) coats fractures in many areas of the stock.

GROUND MAGNETOMETER SURVEY

In conjunction with the sampling programme, an attempt was made to obtain magnetic profiles across the long and short dimensions of the stock using a hand held Arvella Everyman magnetometer. Locations of the magnetometer survey lines are shown on the contoured magnetic map (Fig. 18).

Although the profiles are not complete, there are a series of magnetic lows near the contacts of the stock which are accompanied by higher readings closer to or outside the contact (Fig. 19). It is inferred that these paired highs and lows are caused by the borders of the stock acting as a dipole. From this, we infer that the stock is shallow.

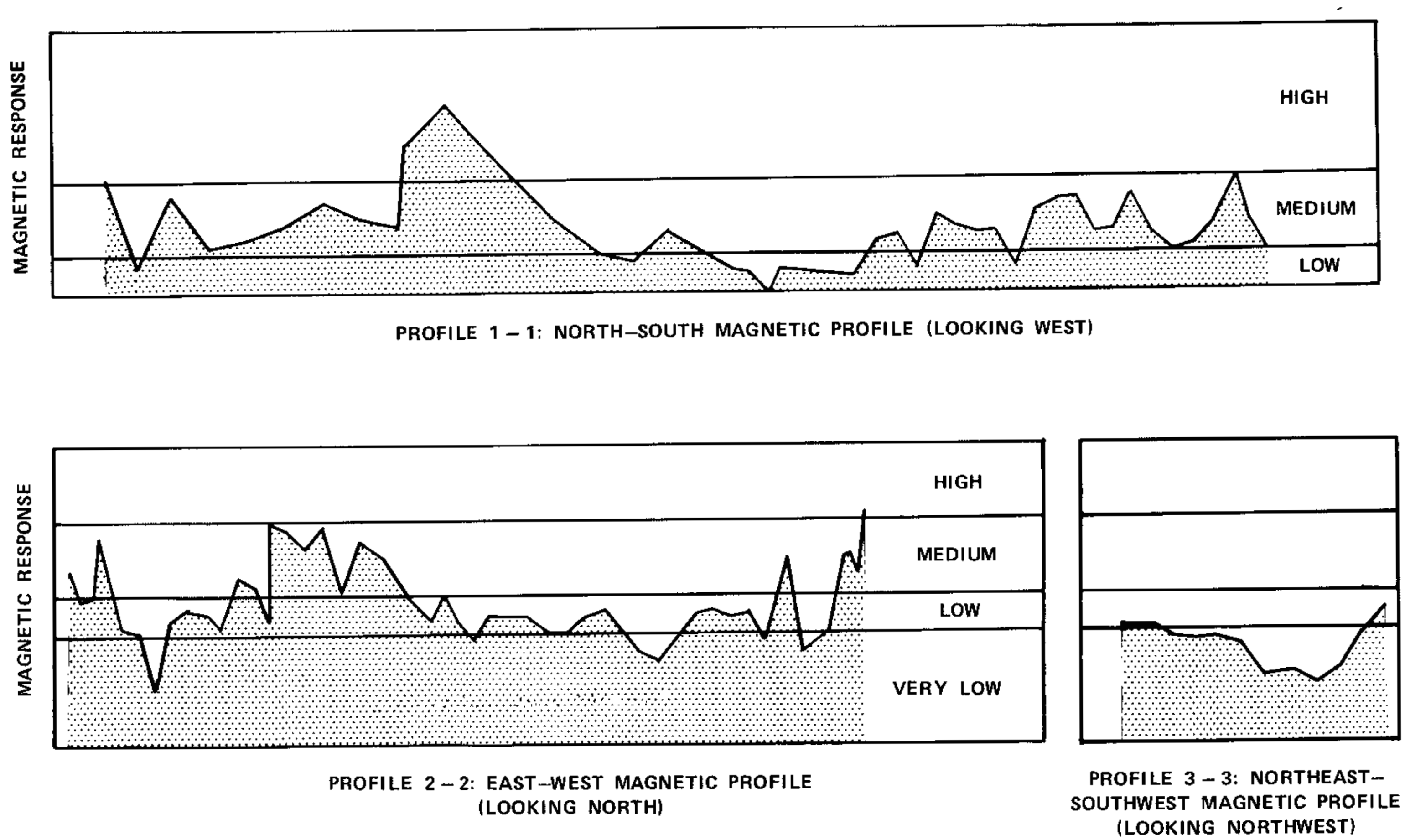

Figure 19. Magnetic profiles across the Kaketsa stock (*see* Figure 18 for location of profiles).

The map interpretation of the magnetic data shows a general magnetic high zone over the western half of the stock. The high is more or less coincident with the hornblende-dominated variety of the biotite-bearing diorite phase. Perhaps these rocks are somewhat richer in magnetite than the more hydrous biotite hornblende diorite to the east.

In one area, southeast of Kaketsa Mountain, a linear magnetic low coincides with a gully which is inferred to be a fault. Presumably, magnetite in the fault gouge was destroyed by oxidation.

REPORTS OF DISTRICT GEOLOGISTS

SOUTH CENTRAL BRITISH COLUMBIA

By Gordon P. E. White

A number of mineral deposits were examined in south-central British Columbia during the 1974 field season. Brief descriptions of some of the more active properties follow.

CARMI (82E/6E)

This molybdenum prospect, under option to Vestor Explorations Ltd., is situated 13 kilometres north of Beaverdell.

Blocks of Monashee quartz - biotite - hornblende - plagioclase gneiss have been rotated in what appears to be a strong zone of faulting and brecciation of unknown dimensions. Interstitial material consists of quartz, white feldspar, quartz-eye porphyry with an aphanitic light-coloured matrix, and pockets of greenish mica and rounded quartz grains.

One to 2-millimetre blebs of molybdenite occur in the gneiss blocks and in the interstitial material.

DONEN (82E/10W)

The Donen claims, owned by Nissho–Iwai Canada Ltd., are situated 25 kilometres northeast of Beaverdell.

Uranium is being explored for in the Cup Lake, Kallins Creek, and Hydraulic Lake areas in a sedimentary unit of diatomite, sandstone, conglomerate, coaly mudstone, and black shale that occurs at the base of Miocene plateau basalts which are up to 65 metres thick. The sedimentary and volcanic rocks have been deposited on an eroded, stream-channelled land surface of Monashee gneiss complex, Valhalla granite, or Nelson batholith. The better U_3O_8 values in any one of the above named sedimentary units are found by tracing old river or stream channels.

REFERENCES

B.C. Dept. of Mines & Pet. Res., GEM, 1972, p 43; 1973, pp. 49, 50.

FX, FC (KINGFISHER, BLACKJACK) (82L/10E)

This lead-zinc deposit, owned by Colby Mines Ltd., is situated 8 kilometres west of the north end of Mabel Lake.

Sphalerite with lesser quantities of galena occur with pyrrhotite, pyrite, and occasional chalcopyrite in quartzites and marbles, part of a sequence of recrystallized limestones, calcareous quartzites, quartzites, and garnet - sillimanite - biotite - quartz - feldspar gneisses. Mineralization is usually near but not always in the marble.

Sulphides are massive to banded and mineralization is present over 4 kilometres in strike length in and near the carbonates (*see also* Hoy, T., p. 7).

MARJI (82M/3E)

These claims are situated on Crowfoot Mountain, north of Magna Bay on Shuswap Lake.

Two white marble bands, 20 and 50 metres thick, are interbedded with phyllite, quartzite, and greywacke, and are intruded by sills and dykes of dacite.

Compositional variations of MgO and SiO_2 occur vertically and laterally throughout the marble.

HOMESTAKE (82M/4W)

The Homestake property, owned by Kamad Silver Co. Ltd., is situated on the west side of Adams Lake, 65 kilometres northeast of Kamloops.

Two near parallel, undulating veins of variable thickness dip 45 degrees easterly and are roughly concordant with enclosing quartz - sericite - talc schist. The veins contain galena, sphalerite, tetrahedrite, chalcopyrite, pyrite, proustite, and argentite with barite.

During 1973 and 1974 a haulage drift was driven under the veins and a 156-metre raise made. Between 79 to 85 metres in the haulage level channel samples by the operators gave weighted assays of gold, 0.035 ounce per ton; silver, 8.96 ounces per ton; barite, 70.21 per cent; lead, 1.69 per cent; zinc, 2.69 per cent; and copper, 0.28 per cent.

REFERENCE

B.C Dept. of Mines & Pet. Res., GEM, 1973, p 114.

IDAHO, AURUM, PIPESTEM (92H/6W)

This gold deposit, owned by Carolin Mines Ltd., is situated 12 kilometres northeast of Hope.

Two near parallel mineralized zones of variable thickness occur in a sedimentary sequence of siliceous argillite, greywacke, and cherty conglomerate. Away from the mineralized zone the sedimentary rocks at one locality occupy open folds about a 060-degree axis which plunge 10 to 15 degrees northeast.

Mineralization is reported as pyrite, arsenopyrite, pyrrhotite, some chalcopyrite, and minor free gold. The gangue is mostly a grey carbonate. The two zones appear to strike 120 degrees and dip 50 degrees northeast.

Serpentinite bodies which probably occur along a diorite/sedimentary rock contact outcrop to the west and southwest.

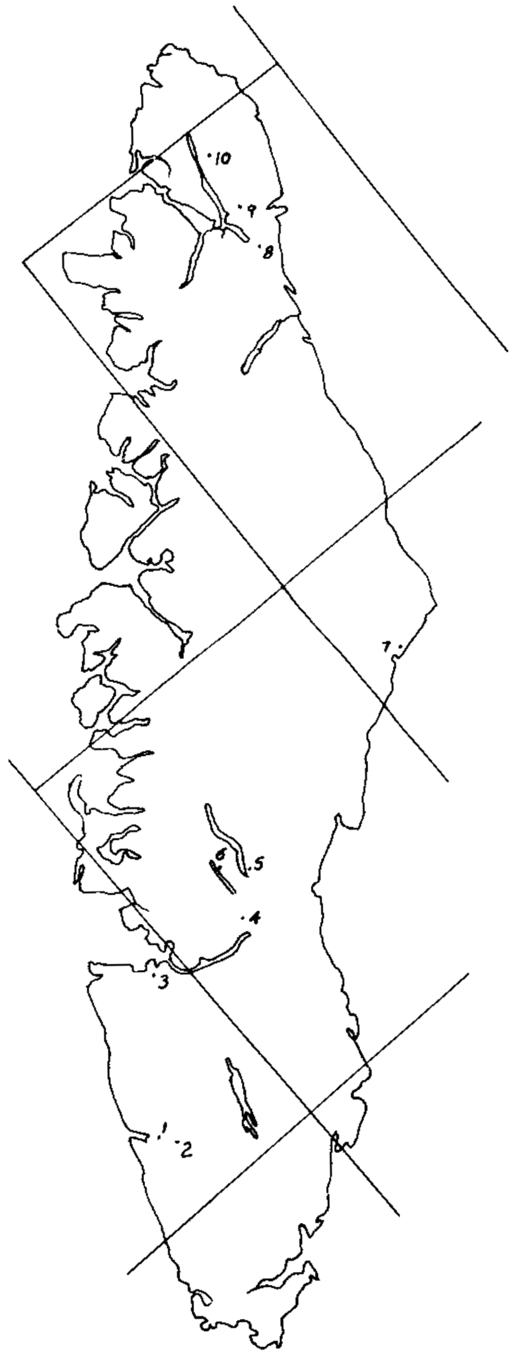

Figure 20. Index map of Vancouver Island.

VANCOUVER ISLAND

By G.E.P. Eastwood

INTRODUCTION

In 1974 the writer took over responsibility for Vancouver Island from K. E. Northcote, who commenced a project in the Kamloops area. Continuing office duties precluded a full field season; 56 days were spent responding to requests for property examinations and geological assistance, investigating reports of interesting mineralization, and doing follow-up work in the area mapped by Northcote at the north end of the Island (*see* Northcote's report and map in GEM, 1970, pp. 254-262). Areas and properties reported on are arranged in NTS order and keyed by number to Figure 20.

1. PERBELL MINES LTD. (Victoria Mining Division, 92C/9W)

The claims extend eastward from the Gordon River along the north side of the San Juan River. Regional mapping by the Geological Survey of Canada postulates an east-striking fault through the claims, separating metasedimentary rocks of the Leech River Formation on the south from batholithic intrusive rocks on the north. An assessment Report (No. 4940) shows the claims underlain mainly by chert and tuff, identified as Leech River, intruded by diorite to the north and northwest. The writer confirmed that metasedimentary rocks of Leech River aspect extend north of the fault into the mountainside. A thin-bedded chert is well exposed where a logging road formerly crossed the principal creek between Brown and Fairy Creeks. Paragneisses were identified north of the diorite toward the head of Brown Creek.

2. REAKO EXPLORATIONS LTD. (Victoria Mining Division, 92C/9W)

A property examination in May was prompted by press reports of a potential 10 million tons of iron-copper ore. The showings were visited with the company's consulting geologist, R. L. Roscoe, and some geological mapping was done later. He explained that 1,225,000 tons was indicated as probable from surface exposures and drill core, and the extrapolation was based on strong magnetic anomalies not yet investigated.

The showings are in the upper valley of Renfrew Creek and are not well exposed. Magnetite, pyrrhotite, and chalcopyrite occur in skarn zones in an intrusive breccia. Two bands of limestone trend northwest across the valley, little affected by the intrusion and containing only one minor sulphide occurrence. The intrusive breccia grades west to diorite, which contains a large lens of massive magnetite.

3. CARNATION CREEK (Alberni Mining Division, 92C/15W)

T. W. Chamberlin requested geological assistance for the multidisciplinary Carnation Creek Watershed Study, managed by Pacific Biological Station of the

Department of the Environment. The writer was a guest in the Study camp while making three forays into the watershed to estimate what work is needed. It was concluded that two weeks mapping should be done when the logging roads have been put in but before logging commences.

Carnation Creek flows west into Barkley Sound between Consinka Creek and the Sarita River. In the lower part of the valley the principal rock is grey to very dark grey, fine grained to dense, and is generally porphyritic. In places it appears to be very siliceous. Minor lapilli tuff and ignimbrite are intercalated. The rock appears generally fresh, but locally contains abundant disseminated pyrite. Most outcrops show weak to moderate fracturing, and intense fracturing was seen in some creek channels.

The summit area of Mount Blenheim is underlain by quartz diorite, which contains tongues and inclusions of fine-grained grey rock on the north and northeast flanks. The quartz diorite is mostly fresh and hard, but locally it is sheared and ravelling. Quartz diorite is again exposed, with diorite and gabbro, on the southwest ridge 2,500 feet from the summit; these rocks are locally sheared and crumbly. The fine-grained grey rock is exposed in a saddle farther southwest, where it is crumbly and extensively veined. Argillite was found still farther southwest, on the south-facing slope; it may or may not extend into the watershed.

A flow-measuring weir has been installed at 500 feet elevation on Carnation Creek. The access road enters the watershed from the north and descends the valley of a small tributary. At the weir the rock is medium grey to greenish grey and dense, with close, blocky fracturing. Two zones of intense shearing strike southwest and west-northwest and intersect immediately south of the weir. Just above the weir and closest to the creek the rock is harder but is cut by epidote veins and hematite slips. Road cuts along the access road show considerable shearing and alteration. Where relatively fresh, the rock is grey to black and mostly dense, though locally granular or porphyritic. Diorite was identified in one exposure. The grey rock is altered to epidote and replaced by silica, and locally is closely veined by carbonate.

It seems likely that many of the creeks follow zones of shearing or close fracturing, which could contribute considerable debris if exposed to accelerated erosion. The grey rock has been mapped as Bonanza by the Geological Survey of Canada. The apparent scarcity of fragmental layers is surprising, but no better lithologic correlation can be made with any other unit.

4. A CLAIMS (Alberni Mining Division, 92F/2W)

Two new showings were examined at the request of the owner, Lawrence Vezina. The claims cover a broad saddle between tributaries of Cous and St. Andrew Creeks, and extend across a contact between Quatsino limestone on the southwest and Karmutsen amygdaloidal lava on the northeast. The limestone is intruded by small, irregular bodies of andesite, of which at least two have been altered to garnet-epidote skarn. In the north showing, chalcopyrite, less bornite, and superficial malachite and azurite occur in both skarn and limestone near their mutual contact, whereas in the south showing the same copper minerals are confined to the altered andesite. The mineralization is irregular and pockety; while specimens of very good grade may be obtained, any practical volume outlined must include much barren rock. The potential tonnage appears small.

Several rusty patches were found in the amygdaloidal lava north of the north showing. A broken surface disclosed thickly disseminated pyrite with some chalcopyrite.

5. CENTENNIAL (Alberni Mining Division, 92F/6E)

The Centennial and No. 5 showings were examined at the request of the owner, Frank Murphy. Briefly, the showings occur in Karmutsen lava respectively on the northwest and northeast slopes of Little Thunder Mountain, north of Great Central Lake. The Centennial is a small body of rock which has been abundantly mineralized with chalcopyrite and pyrrhotite. The No. 5 showing comprises sparsely disseminated chalcopyrite and a trace of bornite in a narrow calcite vein, a narrow felsic dyke, and adjacent lava.

6. HERB (Alberni Mining Division, 92F/6E)

Mineralized argillite had been reported to occur in rocks mapped as Karmutsen by the Geological Survey of Canada, and this was investigated when the Centennial and A were examined. Much time was spent hunting for the exposures, due to inaccuracies in available maps, and when they were finally found, only a brief examination could be made. Petrographic study of some of the specimens is needed.

The exposures are on the north side of Sproat Lake, about 100 feet above the new highway, 1.0 mile from the head of Taylor Arm, on the southeast rim of a creek canyon. Natural outcrops have been augmented by trenching, but exposure is discontinuous. There are at least three exposures of black and dark grey argillite resting on an unidentified light grey rock, which in turn rests on amygdaloidal lava typical of the Karmutsen Formation. The top of the argillite was not seen, and the interrelationships of the argillite exposures were not determined. Pockets and disseminations of chalcopyrite occur in the argillite, but the mineral potential is limited by the apparent small size of the argillite occurrences.

Drilling was in progress on another part of the property at the beginning of May. The target evidently was the weak chalcopyrite disseminations reported in *Geology, Exploration, and Mining in British Columbia, 1971,* page 247. The operation was not visited, and results are not known.

7. FS (Nanaimo Mining Division, 92K/3W)

Assessment Reports 4179 and 4823 had described sparse copper mineralization immediately below a flat-lying amygdaloidal flow in the Karmutsen Formation. A ribbon of limestone at the base of the flow was interpreted as a channel filling. This suggested to the writer some interruption in volcanism, which might be significant for mineralization. The flow was identified, but time did not permit tracing it around to the reported limestone and mineralization.

The flow is exposed at 900 feet elevation on a bluffy hillside half a mile west of Brown Bay. It may be reached via the Adams Resort road and logging skid road which leaves it one-third mile past the second lake. Most of the Karmutsen Formation on this hillside is variably porphyritic and amygdaloidal with white phenocrysts and amygdules. The flow of interest is distinguished by hard black amygdules which weather in relief, and could be a useful marker in mapping. In thin section the rock is andesite and the amygdules were estimated to have the following composition: quartz, 25 per cent; pumpellyite, 35 per cent; serpentine, 40 per cent. The base of the flow was not identified; the black amygdules thin out downward and the rock grades to massive andesite over an interval of 6 feet. No sulphides nor malachite were found in the rock or in quartz-epidote veins.

8. ISLAND COPPER TO KEOGH RIVER (92L/11W)

In order to gain more familiarity with the Bonanza Subgroup the writer called at the Island Copper mine and toured sections of the open pit. Discussions with mine geologists indicated that it would be helpful to have the Parson Bay-Bonanza contact more precisely defined and located. Several new exposures were found between the head of Rupert Arm and the logging-road bridge over the Keogh River, and several quarries were examined in the belt north of the mine.

The best exposure of the contact is in a quarry at the east end of a hill tentatively named Washlawlis Hill. This hill rises to an elevation of over 500 feet from a small plateau between Washlawlis Creek and the north fork of Waukwaas Creek, and is 2.2 miles east of Rupert Arm. In the quarry the beds dip gently to moderately south. Considerable faulting is evident, but displacement ranges from a few inches to a few feet, and the main units can readily be traced through the quarry. Typical slates of the Parson Bay Formation grade up to soft argillaceous siltstones, which are abruptly succeeded by about 15 feet of greenish grey volcanic conglomerate and coarse sandstone containing black granules in the upper part. This is overlain by about 10 feet of distinctive banded, dense siliceous beds, and then more than 15 feet of massive green rock which appears to be a volcanic flow. The banded unit was identified in two quarries north of Island Copper mine and appears to be a useful marker. The formational contact for this belt is placed at the base of the volcanic sandstone and conglomerate, for two reasons: this unit consists of grains and pebbles of volcanic origin and is clear evidence of the onset of Bonanza volcanism nearby; and the banded beds are very different from the Parson Bay and do not merely represent a resumption of Parson Bay sedimentation.

The contact extends almost due east to the Keogh River, just south of the highway, where it is bracketed by outcrops of typical Parson Bay slate and Bonanza tuff 140 feet apart. It was not traced through in the opposite direction, but its position in the quarries north of the mine indicates an east-southeast strike. There is increased displacement on faults in these quarries, accompanied by local folding, and a felsic sill intrudes the rocks in two adjacent quarries.

A mafic dyke containing spectacularly large hornblende phenocrysts transects the Quatsino-Parson Bay contact at an oblique angle northeast of the last-mentioned quarries. It is a fresh-looking rock, contrasting with the variably altered andesite which commonly intrudes the Quatsino limestone, and may be relatively young.

9. QUATSE LAKE AREA (Nanaimo Mining Division, 92L/12E)

As shown on Figure 29 in *Geology, Exploration, and Mining in British Columbia, 1970,* a belt of Quatsino limestone extends from Washlawlis Creek to the area north of Quatse Lake, where it is disrupted by faulting and at least two ages of intrusion. This disturbed area contains a number of mineral showings, which are covered by claims belonging to North Island Mines Ltd. The showings include the old Caledonia copper - silver - lead - zinc mineralization in skarn, and recently discovered copper mineralization associated with faults and fractures in andesite in the east part of the property. Detailed mapping in and over the Caledonia adit disclosed that the Quatsino limestone has been massively invaded by andesite and only scattered inclusions remain. The andesite has in turn been intruded on the southwest by a sheared granitic rock, which has been reddened along fractures and red aplite dykelets. There are scattered exposures of andesite and limestone along the tractor road up to the ridge crest, where altered diorite is exposed; none of the andesite could be positively identified as Karmutsen. On the east part of the property, however, many andesite outcrops are amygdaloidal and can be assumed to be Karmutsen lava. One repetition of section by strike faulting was deduced, and additional faults are probable. Systematic mapping is required.

10. HUSHAMU MOUNTAIN (Nanaimo Mining Division, 92L/12W)

A visit was made to Utah Mines Ltd.'s diamond-drill camp southwest of the rugged, gossaned peak at the head of Hushamu Creek which it is proposed to call Hushamu Mountain. This peak has been carved from the siliceous, pyritic rocks of a Bonanza volcanic centre. The geology is described in Assessment Report 3400, where it is recorded that the main silicified zone is essentially barren of copper; some chalcopyrite was found along the northeast margin, coincident with magnetic highs and rock geochemistry spot highs. This marginal zone underlies a heavily timbered valley occupied by Hushamu Lake and a tributary of Hepler Creek. The 1974 drilling was directed to testing and evaluating this zone; 5,100 feet in eight holes had been drilled by July 25.

The rocks cored were mainly chloritized lapilli tuff, pyritic silicified rock, and large masses of quartz-feldspar porphyry. Andesite was encountered on the north side of the valley. Pyrophyllite was sporadic, except near Hushamu Lake where it forms a breccia.

NORTHWESTERN BRITISH COLUMBIA

By T. G. Schroeter

The effective field season extended from April through October. During this period of time several visits were made to current exploration camps, past exploration camps, and producing mines in northwestern British Columbia. Following are brief descriptions of the more important exploration ventures visited during the 1974 field season.

BERG (93E/14W)

The Berg porphyry copper-molybdenum deposit is located approximately 90 kilometres southwest of Houston. Canex Placer Limited, under an option agreement with Kennco Explorations, (Western) Limited, conducted a diamond-drilling programme consisting of 19 PQ-size holes totalling 1,800 metres. Drilling on the property totals some 17,700 metres. From this summer's drilling Canex has 30 tons of rock for mill testing.

Relogging of previous core by company geologists this summer has added more detail to the geological picture at Berg.

REFERENCE

Minister of Mines, B.C., Ann. Rept., 1966, pp. 105-111.

SMOKE, NF (93E/14W)

This porphyry copper prospect is situated some 60 kilometres southwest of Houston. Noranda Exploration Company, Limited under an option agreement with Norwich Resources Ltd. followed up a geochemical and geophysical programme by drilling eight holes totalling 700 metres.

A body of quartz diorite-granodiorite, 1 mile in diameter, with an inner core of porphyritic trachyandesite measuring approximately 800 metres by 150 metres, intrudes Hazelton Group volcanic and sedimentary rocks.

Alteration zones are typical of those found in porphyry environment. An outer chlorite-carbonate zone grades into a sericite (± quartz) zone which in turn envelopes a secondary biotite-K-feldspar zone. The inner secondary biotite zone is the most important with regard to mineralization. Subeconomic amounts of chalcopyrite occurring as both disseminations and along fracture planes were found mainly in the trachyandesite although some was observed in the granodiorite. Pyrite is ubiquitous, in amounts averaging 3 per cent by volume.

SAM GOOSLY (93L/1W)

The Sam Goosly copper-silver-gold property is located approximately 40 kilometres southeast of Houston. The Goosly partners (Equity Mining Capital Limited and the Golden, Colorado firm of Congden and Carey) under an option agreement with Kennco Explorations, (Western) Limited renewed work on the property about the middle of March. During the next month, 14 diamond-drill holes of H-size core were drilled yielding a total footage of about 1,525 metres. This drilling programme confirmed the grade and tonnage of the deposit but also showed it to be more discontinuous than previously thought.

Present ore reserves quoted are 40,319,000 tons of 2.82 ounces silver and 0.026 ounces gold per ton and 0.35 per cent copper. The ore will be mined by two open pits, one containing approximately 32 million tons (North zone) and the other containing approximately 8 million tons (South zone).

In early July approximately 1,525 metres of backhoe trenching was completed in 12 trenches on the South zone. Geochemical sampling from the trenches showed significant values (for example, 2 ounces per ton silver). The trenching also showed some good examples of leached tetrahedrite.

Surveying of a new road and hydro line from Houston up Dungate Creek to the minesite was carried out during the summer.

Metallurgical testing continues to be carried out at Hazen Research Inc. of Golden, Colorado. The two minerals to be recovered, chalcopyrite and tetrahedrite, are present in very finely divided form, therefore making conventional grinding and flotation difficult. An initial production rate of 3,000 tons per day is anticipated.

REFERENCES

B.C. Dept. of Mines & Pet. Res., GEM, 1969, pp. 142-148; 1970, pp. 126-128.

SILVER QUEEN (NADINA) (93L/2E)

The Silver Queen gold-silver-copper-lead-zinc deposit, operated by Bradina Joint Venture, is situated immediately east of Owen Lake, 45 kilometres by road south of Houston. Mining and milling operations were suspended in late 1973.

The mine was reopened, after a closure of about 6 months, to implement both underground and surface exploration by diamond drilling. Three surface and six underground holes totalling approximately 760 metres were drilled. In addition, three crosscuts each about 75 metres in length, were driven into the hangingwall on the 2600 level. No significant discoveries were made from the surface holes. Some encouragement came from one of the underground holes which intersected a 30-centimetre vein containing sulphides including sphalerite, galena, and chalcopyrite.

The drilling phase ended on May 13 and the mine was closed soon thereafter.

REFERENCES

B.C. Dept. of Mines & Pet. Res., GEM, 1969, pp. 126-139; 1970, pp. 134-137; 1973, pp. 338, 339

HOT, CHIEF (DUNGATE CREEK) (93L/7E)

The Dungate Creek porphyry prospect is located 6 kilometres southeast of Houston. Canadian Superior Exploration Limited, under an option agreement with Chinook Resources Ltd., conducted a percussion-drilling programme consisting of six holes, each to a depth of 91 metres. Previous work on the property was done by Southwest Potash Corporation (1965), Normont Copper Ltd. (1966-67), and Noranda Exploration Company, Limited who drilled seven AQ wireline holes totalling 600 metres, in 1969. The 1974 Canadian Superior Exploration Limited programme was designed to test in more detail the induced polarization anomalies outlined previously. Although abundant pyrite was observed in chips of predominantly biotite-quartz-feldspar porphyry, no significant assay results were obtained. This Upper Cretaceous or Tertiary porphyry intrudes volcanic rocks of the Hazelton Group. Pyrite and subordinate chalcopyrite occur as thin fracture fillings and fine-grained disseminations both in the porphyry intrusion and adjacent volcanic rocks.

Alteration includes albitization, sericitization, kaolinization, and silicification.

The option was terminated by Canadian Superior Exploration Limited.

REFERENCE

B.C. Dept. of Mines & Pet. Res., GEM, 1972, pp. 384-390.

BIG ONION (93L/15W)

The Big Onion porphyry copper prospect is located 20 kilometres east of Smithers on Astlais Mountain. Canadian Superior Exploration Limited under an option agreement with Twin Peak Resources Ltd. completed four diamond-drill holes. Previously, Noranda Exploration Company, Limited, Texas Gulf Sulphur Company, and Cyprus Exploration Corporation had drilled nearly 8,500 metres of core on the property. All of this core was relogged by Canadian Superior geologists during the summer. In addition a detailed geologic mapping programme and a ground magnetometer survey were completed.

Copper (mainly chalcopyrite with minor amounts of bornite, native copper, and chalcocite) and molybdenum mineralization is known to be widely distributed in minor amounts in the Big Onion pluton, particularly between the two intrusive phases (quartz feldspar porphyry and quartz diorite porphyry) and the peripheral basic volcanic rocks.

Canadian Superior's work helped to further define the mineralization, It appears possible that the mineralization is structurally controlled by a fault zone trending northeasterly. As such the zone appears to be linear with higher grade North and South zones.

REFERENCE

Minister of Mines, B.C., Ann. Rept., 1966, pp. 83-86.

CRONIN MINE (93L/15W)

The Cronin silver-lead-zinc-gold-cadmium property is located in the Babine Range, approximately 30 kilometres northeast of Smithers.

Hallmark Resources Ltd. purchased the Cronin mine through an agreement with Kindrat Mines Ltd. in 1972. The mine has been producing high-grade ore intermittently since 1917 on a small scale. Very little exploration and development work has been carried out. In 1972 and 1973 Hallmark trenched and stripped the plateau above the underground workings. This area, referred to as the Upper showing, is at an elevation of 1,530 metres. Samples taken from the Upper showing returned interesting and significant silver and lead values.

Mineralization is contained in a complex zone of intrusive rhyolite, sericite schist, and intensely folded black argillite. The main body of light greyish green-coloured rhyolite is roughly 900 metres by 600 metres, elongated in a northerly direction. The major mineralization has been uncovered at or near the northwestern border of the rhyolite mass. The western border of the rhyolite body has been altered to a sericite schist with a strong southeasterly trending, steeply dipping foliation. In the vicinity of the Upper showings, the rhyolite is intrusive into argillite and in places contains pendants of argillite. The argillite is strongly foliated and locally intensely folded. A strong easterly trending quartz vein system with steep dips is exposed over an area having a length of 610 metres and a width of 150 metres. One major mineralized quartz vein having an average width of 0.6 metre was traced over a length of 80 metres.

Northerly trending diorite and lamprophyre dykes up to 2 metres in width intrude all other rocks.

The mineralization consists of argentiferous galena, sphalerite, and relatively minor pyrite and chalcopyrite. Boulangerite, freibergite, and arsenopyrite have been noted elsewhere in the mine area. The minerals are found in quartz veins, as massive sulphide lenses, breccia zones, or as fracture fillings in the rhyolite with little quartz. The major veins strike northeast. Structural controls are incompletely known.

The silver values are directly related to lead content, usually 2 ounces silver per ton for each per cent lead. Cadmium is associated with sphalerite, with 1 per cent zinc containing 0.15 per cent cadmium.

There appears to be some evidence of zoning between surface (1,530 metres elevation) and the lowest level of the mine (1,420 metres), as expressed by an increase in the zinc to lead ratio. Freibergite also appears to increase with depth. Leaching and oxidation on the surface appear to be significant.

The mill was started up on July 10 and ran for about 30 milling days at an approximate rate of 30 tons per day. Mining operations were carried out on the uppermost, or No. 1 level. Mining and milling operations ceased on September 6.

REFERENCES

B.C. Dept. of Mines & Pet. Res., GEM, 1973, pp 347, 348,
Minister of Mines, B.C., Ann Rept., 1949, pp. 94-98.

SUMMIT (93L/10W)

The Summit copper prospect is located near Burbridge Lake approximately 30 kilometres east-southeast of Smithers. Cities Service Minerals Corporation, under an option agreement with M. H. Chapman of Smithers, conducted a small diamond-drill programme consisting of two holes. The drilling tested a linear induced polarization zone outlined by a survey conducted earlier in the summer. Chalcopyrite mineralization occurs sparsely in foliated diorite, andesite tuff, and a quartz feldspar porphyry dyke. Pyrite is a significant constituent. A distinct propylitic alteration zone surrounds an inner quartz-sericite alteration zone.

REFERENCE

B.C. Dept. of Mines & Pet. Res., GEM, 1973, p. 345.

UTE (FRENCH PEAK) (93M/7E)

The French Peak silver-lead property is located on the southeast flank of French Peak, approximately 70 kilometres north-northeast of Smithers. Four local prospectors worked on a high-grade silver-lead vein between March and July 15. A total of 31.5 tons of hand cobbed silver-lead ore was shipped to Smithers.

The main vein consists of coarse-grained galena and tetrahedrite and is contained in shear zones in bedded volcanic rocks of the Hazelton Group. The vein has a maximum mineable width of 40 centimetres and was being mined from a trench approximately 40 metres in length, 1 to 3 metres wide, and 4 metres deep. According to the owners, the silver content of the ore averages 240 ounces per ton.

HOT (93M/7W)

This porphyry copper prospect is located on the north flank of Mount Thoen, approximately 70 kilometres north of Smithers. Cities Service Minerals Corporation conducted a small diamond-drill programme on the property which was optioned from Cobre Explorations Ltd. Two diamond-drill holes totalled 740 metres. Uneconomic amounts of chalcopyrite and molybdenite were encountered in feldspar-quartz-biotite porphyry and biotite hornfels. Chalcopyrite occurs as fracture fillings and as disseminations.

REFERENCE

B.C. Dept. of Mines & Pet. Res., GEM, 1973, p. 358.

SKUTSIL KNOB (93M/15E)

This copper prospect is located on Skutsil Knob in the Driftwood Range, approximately 100 kilometres north of Smithers. The property, optioned from Cominco Ltd. by Craigmont Mines Limited, includes several old showings on Crown grants which were explored in the early 1900's. Craigmont has drilled nine holes in 1973 and 1974.

Mineralization consists of high-grade chalcocite, chalcopyrite, and bornite in bedded pyroclastic volcanic rocks. The mineralization appears to be structurally controlled, occurring in fractures within the pyroclastic pile. The average grade of higher grade sections would assay 2 per cent copper over a width of 0.6 metre.

BRITISH COLUMBIA MOLYBDENUM (103P/6W)

This former producing molybdenum mine is situated 8 kilometres southeast of the head of Alice Arm.

Climax Molybdenum Corporation of British Columbia, Limited conducted a five-hole diamond-drilling programme in the open pit to further outline the ore potential which is estimated to be 48 million tons grading 0.20 per cent molybdenite.

Climax also made an offer to purchase the nearby Roundy Creek molybdenite deposit of United Chieftain Resources Ltd. where ore reserves are reported to be 1.5 million tons grading 0.347 per cent molybdenite.

REFERENCE

B.C. Dept. of Mines & Pet. Res., GEM, 1971 pp. 122, 123.
Minister of Mines, B.C., Ann. Rept., 1964, pp 30-36.

BEAR (94D/2W)

The Bear porphyry copper-molybdenum prospect is located on Tsaytut Spur west of Bear Lake, approximately 100 air-miles north of Smithers. The property is owned by Canadian Nickel Company Limited and was discovered in 1973 during a reconnaissance exploration programme. An intrusive complex measuring approximately 1,500 metres in length and 750 metres in width intrudes volcanic rocks of the Hazelton Group.

Three main intrusive rock types host the mineralization:

1. Syenodiorite.
2. Quartz monzonite porphyry.
3. Alaskite (aplite).

Chalcopyrite and molybdenite occur as disseminations on fracture planes and in quartz veins in all three rock types. The oldest unit, the syenodiorite, is medium grained, equigranular, and grey in colour. Locally it is foliated near contacts with surrounding volcanic rocks. The quartz monzonite porphyry, intrusive into the syenodiorite, ranges from equigranular to highly porphyritic in appearance. Phenocrysts of orthoclase range up to 5 centimetres in length and 2.5 centimetres in width. The youngest intrusive phase, the alaskite, is a medium to fine-grained light pink rock. Aplite and quartz stringers are associated with this intrusive phase, usually occurring as a stockwork.

The host volcanic rocks include varieties of tuff, andesite, agglomerate, and volcanic porphyry. A significant pyrite halo in the volcanic rocks surrounds the intrusive rocks.

Canadian Nickel Company Limited conducted a small diamond-drill programme on the property.

REFERENCE

B.C. Dept. of Mines & Pet. Res., GEM, 1973, p. 401.

CHAPPELLE AND LAWYERS PROPERTIES (94E/6E)

A short visit was made to the Chappelle and Lawyers gold-silver properties situated 30 kilometres northwest of the north end of Thutade Lake.

At the Chappelle property, Du Pont of Canada Exploration Limited, under an option agreement with Kennco Explorations, (Western) Limited, carried out a surface diamond-drilling programme to further test the potential of the gold-silver-bearing quartz vein.

Kennco Explorations, (Western) Limited conducted a small diamond-drill programme on the Lawyers property to test the zone of very fine-grained gold and silver mineralization explored previously by surface trenching.

REFERENCE

B.C. Dept. of Mines & Pet. Res., GEM, 1973, pp. 459, 460.

REPORTS ON INDUSTRIAL MINERALS AND STRUCTURAL MATERIALS

BARITE

By J. W. McCammon

OMINECA QUEEN PROPERTY (93N/9E)

The *Omineca Queen (latitude 55° 31.6'; longitude 124° 06.4') is a barite property* situated 600 metres south of Manson Creek, at 823 metres elevation on the east bank of a *small tributary stream, about 3 kilometres east of the bridge where the Omineca Road* crosses Manson Creek. The property consists of the Omineca Queen 3 and 4 claims, located in 1966 and still held by R. Bjerring of Manson Creek.

From the creek bed the bank rises steeply for about 6 metres in elevation and then flattens off to a gentler slope. The ground is completely drift and bush covered. The only bedrock exposed is the original discovery outcrop of barite in the creek and in areas stripped by bulldozer.

The barite lies conformably between slate walls in an area of rocks mapped as part of the Pennsylvanian (?) and Permian Cache Creek Group (*Geol. Surv., Canada,* Map 907A).

Barite is exposed in the creek and in strippings for 75 metres northeasterly to a small gully. More barite has been uncovered in strippings 120 and 156 metres southeast of the gully. West of the gully the strike of the rocks is north 75 degrees east and the dip is generally vertical but in places the rock is contorted and sheared. The visible barite forms a single 4 to 7-metre-wide zone of fine-grained dark material that is striped parallel to foliation in the slates. It does not contain much impurity other than the dark colouration. At the gully there is much contortion and shearing and in stripping along the east side, *the barite appears to be offset a few metres southward. In the stripped area 120 metres* southeast of the gully the barite and enclosing slates are near vertical and strike south 55 *degrees east. Two mineral zones are exposed here. A 3-metre-wide band of white barite* on the north is separated from a 5-metre-wide band of dark striped material by 3 metres of slate. Analyses of the barite are reported to show high purity.

NIOBIUM

By J. W. McCammon

VIRGIL PROPERTY (93N/9W)

The Virgil property (latitude 55° 42.7'; longitude 124° 24.6'), consisting of the Virgil 1 to 6 and 45 surrounding claims, is on the west flank of the Wolverine Range. The main showing is on the Virgil 3 and 4 claims. It is at 1,625 metres elevation, 7 kilometres northeast of Manson Creek settlement. It can be reached by helicopter or on foot by following a rough tractor trail 4.8 kilometres long that leads north from the Omineca Road at a point 1 kilometre east of the bridge over Wolverine Creek. The original discovery was made in July 1971 by Ernie Floyd, of Manson Creek, who located and recorded the six Virgil claims in September of that year.

The showing is on the top of a small hump at the west end of a ridge. Trees are abundant but underbrush is thin. The only bedrock seen was in cuts opened up by bulldozer and in one small bluff.

Interesting niobium assays have been reported on samples taken from the showing. The exposures reveal a syenite-carbonate complex in schists of the Precambrian-Lower Cambrian Wolverine Complex. The general geological setting appears to be the same as that at the Lonnie property (*Minister of Mines, B.C.,* Ann. Rept., 1955, p. 30) which is 4 kilometres to the southeast.

The present workings consist of two main northwest-trending cuts about 90 metres apart. A heliport has been established 30 metres east of the centre of the west cut.

Rocks of the syenite-carbonate complex are exposed in the southern two-thirds of the east cut, at the heliport, along most of the west cut except at the southeast end, and in the upper part of the west limb of the west cut. Schist can be seen in the lower part of the west limb of the west cut, in the southeast end of the west cut, in a bluff 30 metres southeast of the heliport, and in float at the northwest end of the east cut. Foliation in the rocks strikes north 20 to 45 degrees west and dips about 55 degrees southwest. The outcrop distribution and rock attitudes suggest the presence of a band of the complex about 50 metres wide on the west separated by 40 metres of schist from a second band of complex at least 20 metres wide on the east. The exposed length along strike of the west band is at least 250 metres and of the east band, about 60 metres.

SAND AND GRAVEL

By J. W. McCammon

SAND AND GRAVEL DEPOSITS ON THE SUNSHINE COAST PORT MELLON TO POWELL RIVER (92F/9, 16; 92G/5, 12)

During the 1974 field season two months were spent on a reconnaissance survey of the surficial geology of the Sunshine Coast area between Port Mellon and Powell River (latitude 49° 22′ to 46′; longitude 123° 25′ to 124° 20′). The object of the survey was to study the sand and gravel potential of the region. In brief, it would appear that small to moderate supplies of sand and gravel are available but, except possibly at the Chapman Creek delta, no large recoverable reserves are present in the area examined.

Bare bedrock is exposed over much of the area. A relatively thin mantle of glacial till or till covered by a thin layer of marine lag sand, lag gravel, clay, or stoney clay forms the surface layer over most of the remaining area. In a few places sand and gravel alluvial fans or deltas constitute the uppermost deposits. Bog and swamp deposits are minimal. Marine deltas and deposits containing marine fossils extend upward to elevations of between 170 and 200 metres above present sea level.

Sand and gravel are found in recent stream and beach deposits, in post-glacial deltas, fans, and veneers, in kames and ridgelets, and in outwash deposits older than the latest till. Most of the deltas and pre-till deposits observed have been or are being worked.

The recent stream deposits are all fairly small and most, if not all, of the beach deposits are along residentially developed seafront so it is unlikely either type can offer commercial possibilities.

Raised deltas and alluvial fans occur up to 185 metres above present sea level along the sides of most streams. These have provided much of the sand and gravel produced to date. The largest reserve of this type is contained in the wide delta complex at the mouth of Chapman Creek, just east of Sechelt. Several small pits have been operated in this delta in the past and two are now worked periodically. Unfortunately much of the deposit consists of sand or very sandy gravel. Other deltaic and fan deposits are relatively small although they now provide material for at least 12 operating pits.

Small irregular kames and ridgelets, along the upper reaches of some of the main streams at elevations above the delta deposits, contain poorly sorted sand and gravel. One or two had provided small amounts of aggregate, probably for logging roads.

The sub-till sand and gravel deposits underlie undefined but perhaps sizeable areas between Highway 101 and Gower Point, on the high land east of Northwest Bay Road 3.5 kilometres northwest of Sechelt, and at Powell River. Pits operate in all of these deposits now, but further development is confined to a large extent by residential subdivisions.

TALC

By J. W. McCammon

J&J PROPERTY (92I/4E)

Pacific Talc Ltd., of 404, 604 Columbia Street, New Westminster, owns 10 claims, J&J 1 to 10 inclusive (latitude 50° 00.1'; longitude 121° 34.6'), on a talc deposit situated between 227 and 308 metres elevation on the south bank of Nahatlatch River, 4.3 kilometres west of Fraser River and 18.7 kilometres north and west by gravel road from North Bend. The two original claims, JJ 1 and 2, were recorded by J. Massey in March 1970. Visible exposures of talc all appear to be on the JJ 1 claim.

Talcose rock is exposed just east of a small creek, down the wooded, steep, bluffy northwest end of a low hill. Outcrops are scarce. The best talc showings are visible in cuts on the road and at the base of a bluff 60 metres south of the road.

The talc rock forms a band 35 to 45 metres wide in phyllite. A strongly developed schistosity strikes northwest and dips vertically to steeply east. The band is revealed by intermittent outcrops from the road at 227 metres elevation southeasterly for 190 metres to a trench at 308 metres elevation. None was seen between the road and Nahatlatch River at 205 metres elevation 100 metres to the north, nor in the drift-covered area within a 150-metre diameter semicircle south of the trench at 308 metres elevation. Map 1010A (*Geol. Surv., Canada,* Ashcroft Sheet, 1951) shows the rocks to be Triassic or earlier in age and Map 737A shows them as Carboniferous and later.

The rock containing the talc consists essentially of talc and carbonate (probably mainly magnesite), with lesser chlorite, limonite, magnetite, and pyrite. Analyses quoted by the company show the talc content to range between 30 and 50 per cent. The rock varies from light to dark greyish green and weathers buff to brown stained. It is schisted and platey. Composition and texture vary considerably and rapidly from place to place.

Development work at the end of August 1974 consisted of an east-west cut 45 metres long parallel to the road along the base of a knoll at the south edge of the road, an east-west cut 40 metres long across the base of the main bluff at 245 metres elevation 60 metres south of the road, a northwest-trending cut 70 metres long at elevation 308 metres 120 to 190 metres south of the road, and a pit 3 metres diameter halfway between the second and third cuts.

Extraction and beneficiation tests are being done on a bulk sample of material from the cut 60 metres south of the road.

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