# STRATEGIC MINERAL RECONNAISSANCE AND INVESTIGATIONS

## BIG BEND AND LARDEAU DISTRICTS

1942

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By

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## ILLUSTRATIONS

## PREFACE

This bulletin includes geological descriptions of a number of areas known or inferred to contain deposits of "critical minerals" that were visited during the 1942 field season. No attempt has been made to review the literature of occurrences similar to those described; rather, an effort has been made to report, as concisely as possible, only the results and conclusions derived from the field work. For information on related occurrences the reader is referred to the bibliography that follows this report.

The writer wishes to acknowledge the courtesies and assiatance given him by prospectors, residents, and mining officials in the areas visited. Field work was greatly facilitated by the effective cooperation of the student assistants, Hector R. MacRae and George F. Brandon.

51-117 SW

# MC DOUGAL CREEK

Location:- Means of Communication:

McDougal Creek flows southeasterly to join the Incomappleux River 18 miles above the town of Beaton on the northeast arm of Upper Arrow Lake.

The Canadian Pacific Railway maintains a branch line from Revelstoke to Arrowhead, and regular ferry service from Arrowhead to Beaton. At Beaton a second grade road follows the east side of the Incomappleux River for 5½ miles to Camborne, a ghost town, crosses the river one mile beyond Camborne and continues on the west side to "10 mile" (distance from Beaton).

From "10 mile" a pack trail, which is in fair condition except for the crossing at Sable Creek, leads to "12 mile" where a Forest Cabin is kept in excellent condition. From this point a rough but well-blazed foot trail follows the west side of the river to "13 mile," a trapper's cabin ½ mile below the mouth of McDougal Creek. Trails cut during this investigation are shown on the accompanying sketch map.

Physical Features; Climate:

McDougal Creek heads in finger-like, glacier-fed, streams of its north fork and Crystal Creek branches, both of which terminate in bare-rock glacial cirques. From its source, at an elevation of approximately 6500 feet, the creek flows southeasterly within a narrow steep-sided U-Valley to join the Incomappleux River at an elevation of 1650 feet.

Numerous evidences of an active glaciation are to be found. High on the steep granite surface at the head of the north fork, the toe of the retreating Albert Glacier is plainly evident. The tributaries of McDougal Creek head in cirques; these same tributaries maintain a gentle gradient in their upper reaches but cascade in a waterfall or through steep-walled canyons to join the main creek. These hanging valleys indicate glacial overdeepening of the master valley. A terminal moraine just upstream from the mouth of Crystal Creek evidences a pause in the retreat of Albert Glacier.

That the Pre-Cambrian sediments are more easily eroded than the granite may be deduced from the sudden change in gradient of McDougal Creek where it crosses the granite-sediment contact, just above the third fork. Upstream from this point the gradient is markedly flat, whereas downstream from the contact the grade is steep, the creek flows in a box canyon with walls from 30 to 100 feet in height.

Precipitation in the area is heavy. At Ferguson the mean annual precipitation is 48 inches, snowfall accounting for rather more than a third of this.[1] At Glacier, which is not far east of the head of McDougal Creek, the snowfall is 34 feet, and judging by the winter talus ridges at the head of Crystal Creek, the snowfall in this area would appear to be of a similar order of magnitude.

As a natural consequence of such abundant precipitation the hillsides and valley-floor, with the exception of the steep walls of the north fork, display a luxuriant vegetation. In the lower reaches of the creek, spruce, hemlock, and cedar are plenti-

ful, while in the valley-bottoms, and extending part way up the mountain-slopes, a thick growth of alders, devil's club, and ferns flourishes. Trails cut in the area become obscured by the ferns within a year's time.

History:

N. W. Emmens, in the Annual Report of the Minister of Mines for 1915[4,2], records that a group of prospectors discovered cassiterite in a pegmatite dyke at the head of Crystal Creek, the northwest fork of McDougal Creek. He states, however, that little work was done on the find. Due to the inaccessibility of the creek, very little prospecting was done in succeeding years, up to the time of the present investigation.

General Geology:

Two contrasting rock types, granitic and sedimentary, are exposed by the creeks and at the higher elevations in the McDougal Creek watershed. The rocks have been described by Walker and Bancroft.[2(1)]

The sediments, referred to as the Lardeau Series, of late Pre-Cambrian age, consist largely of dark-colored argillite, phyllite, quartzite, and schist, and have an average strike of north 40 degrees west with vertical dip. They are transected by numerous quartz, or quartz-calcite veins, which are often bedded and range from 1 to 12 inches in width. Some of the veins carry a little pyrite or magnetite.

The granite (Nelson batholith), which is considered to be post-Triassic in age, is generally porphyritic, often biotite-

rich, and seldom fine-grained except at the contact. It is cut by numerous irregular or lens-shaped quartz veins, which are usually barren. Occasionally one of these veins may carry a little magnetite, and at one point a few specks of molybdenite were noted.

On the ridge just northeast of the mouth of McDougal Creek, the contact is well exposed between elevations of 1710 and 2400 feet. The contact is gradational; a transition from quartzite, through gneiss or biotite gneiss, to fine-grained granite, to porphyritic granite, indicates assimilation of some of the sedimentary material by the granite. Within the contact zone, which is some 200 to 300 feet in width, are numerous pegmatite sills or dykes, from 1 to 10 feet in width, which often contain patches of rather large black tourmaline crystals, and occasionally show the development of greisen. Quartz lenses within this zone may carry pyrite, pyrrhotite, magnetite and tourmaline.

As granite adjoining the contact zone at one point carries patches of large calcic pyroxene crystals and minor amounts of sphene, the presence of an unexposed limestone band within the sediments may be inferred.

The granite of the upper reaches of the creek is generally coarse-grained, and commonly carries a rather even distribution of pyrite in cubic crystals up to $\frac{1}{2}$ inch in diameter.

Prospecting:

In addition to traversing accessible outcrops within the area, pan samples were taken at intervals throughout the entire length of McDougal Creek and from its tributaries. The concentrates were saved and spectroscopic analyses of these have been made. An analysis of

the concentrate from 5 pans taken at the mouth of the creek is typical of the results obtained.

| Percentage | Elements |
|---|---|
| 3 - 30 | Iron |
| 1 - 10 | Titanium, Silicon |
| 0.3 - 3 | Calcium, Sodium, Potassium, Zirconium, Tungsten, Aluminium. |
| 0.1 - 1 | Bismuth, Manganese, Tin, Aluminium |
| 0.03 - 0.3 | Magnesium, Lead, Chromium |
| 0.01 - 0.1 | Copper, Silver, Zinc, Caesium, Gallium? |
| 0.003 - 0.03 | Boron, Arsenic |
| 0.001 - 0.01 | Ytterbium, Lutecium (?), Tantalum (?) Ruthenium (?) |
| 0.0003 - 0.003 | Nickel, Cobalt, Molybdenum, Indium (?), Germanium (?), Lanthanum (?), Barium |

Conclusions:

The presence of tin in the pan concentrates, especially those from Crystal Creek, indicates the possibility of worthwhile deposits of that element in the area. Further, the tungsten potentialities of the area may be considered as yet uninvestigated, as no ultra-violet lamp was available at the time of the reconnaissance.

50-117 NW

## ASBESTOS GROUP MANGANESE

This property consists of the mineral claims Asbestos Group Nos. 1-8 inclusive, owned by the partners J. T. Lauthers and Dan McIntosh, of Revelstoke. The property is on the west slope of Sproat Mountain, and may be reached by a trail three miles in length. The trail leaves the highway at Sidmouth station, crosses farmland owned by R. A. Pilkey, and follows the old highway grade for one-half mile, where it turns north-easterly up the hill. The trail, which at present writing is in good condition, continues on a uniform grade for two and one-half miles to the cabin on the asbestos showings at an elevation of 4200 feet. From the cabin a trail continues north-easterly for approximately one-quarter of a mile to the workings.

The workings extend over a horizontal distance of 435 feet, and a vertical distance of 145 feet between elevations of 4440 and 4585 feet.

The mountainside in the vicinity of the workings is steep, well timbered with spruce, pine, and fir, and there is considerable underbrush. Outcrops, except near the showings, are rare.

The cabin, which is in good condition, commands an excellent view of the Columbia River Valley, and of Upper Arrow Lake. Water may be obtained from a small spring 50 yards east of the cabin.

The manganese occurrence has been described by Bancroft.[3]

The workings lie along the eastern border of a band of serpentine in greyish quartzites and phyllites, part of the Hamill

Series of late Pre-Cambrian age. The serpentine carries magnetite and some carbonate. The sediments have a rather uniform attitude, striking north 40 to north 45 degrees east and dipping from 45 to 60 degrees south-eastward.

The quartzite is fine-grained, greyish in color, often transected by lenses, veins, or anastomosing stringers of quartz.

The phyllite is dark brown to dark blue in color, has uniform, well-developed, pearly cleavage planes and is sometimes schistose.

Ore Zone:

The manganese ore (carbonates of iron, manganese, calcium, and magnesium) varies from white to dark grey in color, and occasionally shows a slight pinkish tinge. It effervesces vigorously with cold concentrated hydrochloric acid. Essentially it is confined to an area eleven and one-half feet by seven and one-half feet in area in Open Cut "A" (See plan). Blasting exposes it for five feet down the dip. A few inches of carbonate were observed in Open Cut "B". Considerable wad, derived by oxidation of the carbonate is evident at the surface and in the fissures of the carbonate. The wad is generally earthy, jet black in color, and carries considerable limonite; occasionally it is hard and massive. Manganese and iron stain are common in the area between Trench No. 2 and Open Cut "B".

The carbonate, which carries a little pyrite and magnetite occurs as a replacement of a dark greenish, brown weathering, impure quartzite bed. The replacement at Open Cut "A" is complete, no ves-

tiges of original minerals remain, but at Open Cut "B" carbonatization is slight.

Cross-joints have exerted structural control in the emplacement of the carbonate ore-body. In Open Cut "A" cross-joints strike south 70 degrees east and dip 85 degrees to the north-eastward. Similar joint planes are apparent in the quartzite in Open Cut "B", and also at the outcrop shown at the southern limit of the accompanying map sheet.

Another set of joints, equally well-developed and striking 0 degrees, dipping 85 degrees west, apparently exerted no structural control on the ore.

Two feet north-eastward, at right angles to the strike of the cross-joints, from Open Cut "A", the carbonate dies out, and strong magnetite mineralization is evident. The same effect was noted in travelling south-westward from the cut; within a foot of the edge of the cut magnetite appears to take the place of the carbonate. Quartz veins and stringers cut the carbonate and the quartzite and replace the phyllite. No manganese minerals were observed in any of the quartz veins.

Though the carbonate appears to be a primary replacement, it is extremely local. There is, however, sufficient carbonate to sink a shaft down the dip and remain within the ore.

Some time was spent prospecting within a radius of approximately one mile of the showings, but no manganese was discovered.

Eight hundred feet vertically above the showings, a large block of marble, apparently float, was noted. Presumably the limestone, as shown on Canadian Geological Survey Map 235A, is not far from the surface at this point.

Spectographic and qualitative analysis of the best carbonate obtainable yielded the following results:

| | |
|---|---|
| Manganese | 25.1% |
| Tin, Molybdenum, Lead | less than 1% |
| Copper, Silver, Titanium, Zinc Bismuth | less than 0.1% |
| Phosphorus | between 2 and 10% |

## OLE BULL TUNGSTEN

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This property may be reached by following the newly-constructed Big Bend Highway for a distance of fifty-four miles north from the town of Revelstoke. At "fifty-four mile," marked by a dilapidated log barn, a branch road runs north-easterly for one-tenth of a mile to a Government cabin. From this point an excellent pack-trail trends north-easterly, through the valley of "Old Goldstream," for four and three-quarter miles to the ferry crossing of Goldstream River. A rowboat on each side of the river makes crossing in either direction possible.

From the ferry the trail follows up McCulloch Creek for one-half mile to Dunc Fulmore's cabin. At this point the trail steepens, rising three thousand feet in a distance of four and one-half miles to a branch trail which leaves the main McCulloch Creek trail one-third of a mile beyond the crossing of Barret Creek. This branch trail, three-quarters of a mile in length, switch-backs up the hill to the Ole Bull cabin, at an elevation of 6,100 feet. In spite of but little use, the trail from the ferry to the Ole Bull cabin is in surprisingly good condition. Without any cutting, pack-horses carrying 150 pounds could be taken over this section of it.

Geology:

The property has been described by Gunning[3] and is referred to in the Annual Reports of the Minister of Mines, 1895-1896.

Within "Groundhog Basin" and the adjoining area the prevailing rock types are quartzites and mica schists of Pre-Cambrian age,

which strike north-westerly and dip from 10 to 50 degrees to the northeast. These rocks are cut by a number of prominent quartz veins, which strike from north 9 degrees to north 30 degrees east, and generally dip steeply to the west.

Veins:

A number of quartz veins, from a few inches to several feet in width, outcrop, or have been exposed by trenching, within Groundhog Basin. Mineralization is distinctly erratic, one portion of a vein being heavily mineralized, and adjoining it a stretch of completely barren quartz. The minerals, in order of abundance, are: quartz, pyrite, ankerite, scheelite, pyrrhotite, chalcopyrite, galena, tetrahedrite.

Two generations of quartz are apparent. The earlier, comprising the greatest part of the vein filling, is always milky, often iron-stained, and occasionally crushed along shear zones. The later occurs as well-developed crystals, sometimes clear, in vugs within the veins.

The pyrite is sometimes massive, but is more often crystallized in distinct cubes (which are often striated) of one-eighth inch edge or smaller.

The ankerite is dark brown in color and may be massive or crystalline.

The scheelite varies from light brown to greyish in color and occurs commonly as small crystals, not readily visible without the use of the ultra-violet lamp. It replaces the quartz.

Pyrrhotite, chalcopyrite, galena, and tetrahedrite are minor in amount.

Ole Bull Shaft (No. 1 Vein):

A shaft, 12 feet by 5 feet, and at present writing 25 feet deep, has been sunk following the dip of the No. 1 vein (For location see accompanying plan). This vein strikes north 9 degrees east and dips 75 degrees to the north-west. It varies from a maximum of 2 feet to a minimum of 8 inches in width. At the level of the top of the dump, the vein splits into 3, the most westerly of which, 8-9 inches in width, carries down to the bottom of the shaft (which is now caved below the 25 foot level). The other two branches, 1-7 inches in width, carry downward for 7 feet, where both pinch out.

Scheelite was observed in the lower 3 feet of these two small veins. It occurs as an irregular replacement of the quartz, in patches and lenses. Patches of solid scheelite the size of an egg were noted.

The vein walls are free. Crushed schist flanking the veins indicates post-mineral movement. Minor faulting is evident and has effected a slight crushing of the scheelite. Although two veins of scheelite are to be seen in the north wall of the schaft, none was observed in the south wall.

No. 2 Vein:

On the west bank of Ole Bull (Lund) Creek) an adit has been driven on a bearing of north 60 degrees west for a distance of 18 feet to crosscut the vein.

Three feet from the portal, in the north wall of the adit, a 2-3 inch quartz vein carries heavy scheelite. The vein strikes north 25 degrees east and dips 75 degrees southeastward. This vein pinches out in the roof of the drift and also in the floor. In addition to scheelite this vein carries considerable pyrite. The vein walls are free, and in contrast to the number 1 vein the scheelite here shows little tendency to crumble.

Three feet farther in, the adit cuts a rather strong vein, striking north 12 degrees east and dipping 80 degrees southeastward. It varies from 3-7 inches in width, with irregular branching offshoots. It carries some pyrite and a few specks of scheelite.

Three feet from the face of the adit, a quartz vein, striking north 25 degrees east and dipping 75 degrees northwestward carries a little pyrite.

"A" Vein:

A trench 85 feet long exposes this vein, which is 1 foot wide, strikes north 20 degrees east and dips 65 degrees northwestward. Although dominantly barren, portions of this vein carry pyrite and galena.

"B" Vein:

A trench 20 feet long and a pit 6 feet long by 5 feet wide by 5 feet deep expose this vein, which is 20 inches wide and strikes north 25 degrees east and dips 70 degrees to the northwest. The vein is barren, for the most part, but carries some pyrite.

Seven hundred feet downstream from the trail crossing of Middle Creek, at an elevation of 5,970 feet, on the north bank of the creek, a small adit has been driven for 15 feet on a bearing of 13

degrees to follow a 7- to 12-inch quartz vein which strikes north 13 degrees east and dips 75 degrees to the northwest. This vein shows erratic mineralization of pyrite. Three feet west of the portal a parallel 1- to 2-inch vein is similarly mineralized.

Eight hundred and forty feet downstream from the above-mentioned adit, at an elevation of 5,770 feet, on the north bank of the creek, some of the specimens from the dump at the mouth of a caved adit, show a little scheelite. Strong pyrite mineralization was noted; the scheelite occurs as a replacement of the quartz in particles from pin-point size to rice-grain size.

Thirty-five yards downstream from the adit first mentioned above, on the northeast bank of the creek, at an elevation of 5,950 feet, a trench 10 feet long and from 2 to 4 feet deep was excavated in soil and glacial drift. Panning glacial drift 1½ feet below the surface yielded several angular and some small grains of scheelite. Panning 4 feet from the surface yielded some small grains of scheelite. It is possible that a vein carrying scheelite crosses the creek at this point, though trenching did not reveal it. Upstream from this point a marked decrease in scheelite content of concentrates obtained by panning was noticed. However, scheelite was obtained by panning the glacial drift. Upstream from this point glacial cover is very thin or absent.

"C" Vein:

This vein, which varies from 6 inches to 1 foot in thickness, strikes north 5 degrees east and is vertical. The vein, which has been exposed for 400 feet along the strike by a number of pits and

trenches, is erratically, though at some points strongly, mineralized with pyrite.

Orphan Boy Adit:

On the northeast bank of Barret Creek, at an elevation of 5,880 feet, an adit 72 feet in length has been driven due north to cut a number of quartz veins and lenses. Five feet from the portal, where the west wall joins the roof, a one- to two-inch quartz vein carries a little scheelite. An occasional speck or small patch of scheelite was noted in other lenses or veins cut by the adit.

Ole Bull Adit:

This adit, which is now caved up to a point 15 feet from the face, has been driven on a bearing of north 25 degrees east for a distance of 50 feet through quartzites which strike north 35 degrees west and dip 30 degrees to the northeast. The adit follows an 8- to 12-inch quartz vein which strikes north 25 degrees east and dips 70 degrees to the northwest. Erratic pyrite mineralization was noted.

Veins exposed by pits and trenches northeast of Ole Bull (Lund Creek) vary from north 25 to north 35 degrees east in strike and are vertical or dip steeply to the northwest. They are predominantly barren, occasionally carry pyrite, and in one instance a very little galena.

Factors Affecting Development:

The scheelite veins belong to the intermediate temperature (mesothermal) type of deposit. With regard to this type Stevenson (B.C. Department of Mines, Bull. 10, 1941) states: "In only a few

places has tungsten, mainly the mineral scheelite, been found in intermediate temperature veins in sufficient quantities to justify mining for tungsten alone; usually such veins are mined for their gold-silver, or base-metal content."

The veins are small and pinch out over a short vertical range and do not appear to have great horizontal extent. Whether other scheelite veins will be discovered along the strike of a quartz vein when the present deposits pinch out is still a question.

The scheelite of No. 1 vein shows a tendency to crumble (although solid chunks were found on the dump) and would tend to slime in any simple process of concentrating.

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## MICA CREEK AREA

The muscovite deposits of this region may be reached by following the Big Bend Highway for a distance of 86 miles from Revelstoke to the road crossing of Mica Creek. Just downstream from the Mica Creek bridge a trapper's cabin serves as a convenient point for storing supplies or for stopping overnight.

Since the trails of the area have fallen into disrepair, possibly the best route to follow in travelling to the headwaters of Mica or Potlach Creek is to continue along the highway for approximately 1 mile beyond the Mica Creek bridge, then to strike directly up the hill to an elevation in the neighbourhood of 5000 feet. Once at this elevation travel is no longer impeded by the thick undergrowth which makes walking difficult at lower elevations. Good going is to be found on the south-west slope of Fred Laing ridge to the headwaters of Mica Creek. The northeast side of this ridge is steep and rugged.

## Muscovite

(1) * Highway Deposit:

One and one-tenth miles north of the Mica Creek bridge a branch road, 100 yards in length, leads easterly to an abandoned gravel pit, situated at the base of the slope of an old burn. On a bearing of 67 degrees from this pit, and at elevations of approximately 2380 feet and 2500 feet (i.e. 470 feet and 590 feet above the pit) are located exposures of a mica-bearing pegmatite dyke. The outcrops may be referred to as the "Lower Showing" and the "Upper Showing"; both appear to be on the same dyke though the area between the showings is covered.

Lower Showing:

At this point a pegmatite dyke, 4 feet in width, striking north 65 degrees east, dip vertical, cuts mica schists that are presumably Pre-Cambrian or Mesozoic in age.[4] The schists strike north 35 degrees east and dip at 10 to 20 degrees southeastward.

The dyke here carries books of muscovite up to 3 inches by 3 inches by 2 inches thick. The larger books of mica appear to be localized to an area some two feet in diameter. Some 1 inch by 1 inch books were noted and a great deal of smaller mica, ¼ inch to ;

* Numbers indicate location shown on accompanying map.

½ inch in diameter. The zone carrying the larger books of mica would consist of possibly 20 per cent by volume of muscovite. Biotite, which by transmitted light is dark ruby-red, was noted in books up to 1 inch by 1 inch by ¼ inch thick.

Within the schist at this outcrop, a ½ inch band carrying considerable kyanite was noted.

Upper Showing:

Here the pegmatite dyke is 6 feet in width, strikes due east and has a vertical dip. It is exposed by a tension fault that has produced an open fissure, approximately 6 feet wide and open to the surface for some 25 yards. The fissure follows either at, or within a few inches of, the south side of the dyke. With the aid of a rope and flashlight the fissure may be followed for a considerable distance underground and an excellent longitudinal section of the dyke obtained. Zones within the dyke, which shows considerable block disintegration, carry 5 to 10 per cent by volume of 1 inch by 1 inch by 1/2 - 3/4 inch thick books of muscovite. The zones of commercial grade mica are generally but a foot or two in diameter. A great deal of smaller than 1 inch by 1 inch muscovite was observed. The muscovite, except where acted upon by surface waters, is clear but is often strained. In addition to muscovite the dyke carries considerable garnet (the pink variety, almandite) in crystals up to one-eighth inch diameter, and also some black tourmaline.

Should mining be contemplated, the open fissure would greatly facilitate removal of the pegmatite.

(2) 1st Fork of Mica Creek:

At an elevation of approximately 6250 feet, and immediately above an old campsite on a small northwesterly-flowing branch of the 1st fork, pegmatite sills, varying from 6 inches to 2 feet, and occasional lenses up to a maximum of 15 feet in width, carry some muscovite. The bulk of this muscovite is in books of some ¼ inch diameter, though occasional books up to 1 inch diameter were noted. The sills lie within a garnetiferous-micaceous gneiss, are generally discontinuous, pinching or swelling suddenly. The average strike of the sills is due east with a dip of 55 degrees to the south. Almandite is a conspicuous mineral of the gneiss and often occurs in the pegmatite sills, lenses, or in the quartz veins.

At an elevation of approximately 7100 feet, high on the south wall of the 1st fork at its head, a pegmatite sill, varying in width from 6 to 15 feet, carries a very little one-eighth inch diameter muscovite. The sill also carries almandite and black tourmaline. The gneiss, which has well-marked banding, strikes south 85 degrees east and dips 10 degrees southwestward.

At an elevation of approximately 7350 feet, at the 1st fork - Potlach Creek Divide, the country rock is a micaceous schist, containing the minerals kyanite, muscovite, biotite, almandite, in approximately equal proportions. At this point a pegmatite lens, 3 feet thick, striking north 20 degrees east and dipping 15 degrees southeastward, carries muscovite in books up to ½ inch in diameter. The muscovite here makes up possibly 5 per cent of the lens by volume.

(3) 2nd Fork of Mica Creek and Headwaters of Potlach Creek:

At an elevation of approximately 6810 feet, on the Potlach slope of the 2nd Fork - Potlach Creek Divide, a pegmatite lens, 35 feet in length, with its long axis along a direction of north 50 degrees west, carries muscovite. The mica books are up to 1½ inches in diameter and 1 inch thick. The books make up possibly 5 per cent of the lens by volume. The enclosing rocks are micaceous schist (carrying muscovite, biotite, kyanite and almandite).

Just south-east of the above mentioned outcrop, at an elevation of approximately 6940 feet, and directly above two small glacial lakes at the head of Potlach Creek, an irregular pegmatite sill, 5 to 30 feet thick, striking south 70 degrees east and dipping 15 degrees southwestward, carries some muscovite. The books are generally one-eighth inch in diameter. Occasional patches of black tourmaline were noted within the sill.

Pegmatite lenses and sills outcrop in the steep slopes at the head of the second fork of Mica Creek, carry muscovite in books up to 1½ inches in diameter, and almandite in patches up to ½ inch in diameter. The muscovite is to be found only locally within these sills or lenses.

(4) Mica Creek Above 2nd Fork:

One-half mile upstream from the junction of the main northerly-flowing fork of Mica Creek, on the north side of the creek, between elevations of 3830 feet and 4130 feet, pegmatite lenses and sills outcrop. They occasionally carry zones of muscovite in books up to 1

inch diameter and 3/4 inch thick, though most of the books are one-eighth to one-quarter inch in diameter.

Directly up the slope from these outcrops, at an elevation of approximately 5810 feet, a pegmatite sill, 3 feet thick and striking north 50 degrees west, dipping 30 degrees to the northeast, carries an unusual amount of rather better than average grade muscovite. Books up to 3½ inches in diameter by 2 inches thick were noted. Possibly 5 per cent to 10 per cent of the sill by volume consists of mica.

(5) Lower Reaches of Mica Creek:

Upstream 1½ miles from the Mica Creek bridge, on the north bank of the creek, at an elevation of approximately 2320 feet (100 feet above creek level) a pegmatite dyke, approximately 30 feet wide, striking north 20 degrees west, and dipping 80 degrees northeastward, was observed. This dyke carries some muscovite in books generally of ¼ to ½ inch diameter, and a small amount of well-crystallized kyanite.

## Kyanite

Descriptions of kyanite deposits observed have been included in the body of the report. Small amounts were noted at the Highway Deposit, the headwaters of the 1st and 2nd forks of Mica Creek, and in the lower reaches of Mica Creek. It is suggested that further work, preferably in the lower reaches of the creek, might reveal worthwhile deposits of this mineral. Thin bands of kyanite were noted in the schists of lower Mica Creek, whereas at the headwaters of the creek kyanite was observed as a component of the schist.

## Garnet

The pink variety of garnet, almandite, is common throughout the area. At the head of the 2nd Fork of Mica Creek crystals up to ½ inch in diameter were observed. Prospecting in this region may reveal garnets of gem quality.

Area Covered:

Both slopes of Fred Laing Ridge, embracing the northerly-flowing tributaries of Potlach Creek (with the exception of the most south-easterly tributary); the southerly-flowing tributaries of Mica Creek (with the exception of the northeast forks of the North Fork); and portions of the valley-bottom of the main Mica Creek.

Summary:

Pegmatites carrying books of muscovite up to 3½ inches in diameter and 2 inches thick occur at a number of places within the area. The greatest portion of the muscovite of the pegmatites occurs in books less than 1 inch diameter. Large books of muscovite occur as local concentrations within the sills or dykes.

Should the price of muscovite advance greatly, or should an acute shortage of this mineral develop, commercial grade muscovite could undoubtedly be produced from the area.

Conclusion:

The region merits further prospecting, particularly in the lower reaches of Mica Creek, where, should commercial mica be found the transportation factor would not be so large. Should further work be contemplated, it is suggested that it be undertaken during the months of July and August.

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