FOR MAPS, SEE PROP. FILE

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MINERAL OCCURRANCE #38

MOUNT BUTTLE (ALLIES)

GUNNEX LTD

" ALLIES MOLYBDENUM SHOWING"

E & N

EN. 120

GENERAL INFORMATION:

Location and Access:

These showings and workings are located on the ridge and on northeast slope of the ridge north of Mount Buttle, southeast and east uphill on Delphi Lake at headwaters on Green River, a few miles south of 49th parallel. The creeks from this ridge (Mount Buttle) drain into Delphi Lake or into creek issuing from it. Green River drains into Nanaimo River between Third and Fourth Nanaimo Lakes. Elevations range from 3,000' to 4,000'.

Access is via Nanaimo Lakes logging road, and then up Green River road to Delphi Lake, The easiest way up is starting uphill along the rising ridge right after crossing a creek near Delphi Lake turnoff, or up a small creek about 1,000' below Delphi Lake (which will take one to an adit). A round trip can be made then by following the ridge south, until reaching a col (saddle) between Peaks 1 and 2, then following the ridge toward Peak 3 and crossing creek north of this peak. From here on it is easy walking down the ridge, north of Peak 3, coming out at north end of Delphi Lake, from east.

Access from Delphi Lake, climbing up creeks, is rather difficult, due to many shear cliffs, (see maps).

Lists of Reports, Maps and References:

B.C. Minister of Mines:

1) Annual Report, 1908, page 150.
2) Annual Report, 1918, page 269.
3) Annual Report, 1922, page 243.
4) Bulletin 9, 1940, pages 73-76 (by J.S. Stevenson).
5) Bulletin 37, 1955, page 60, with map of showing (J.T. Fyles).

CPOG Report: The Mineral occurrences of the E & N Land Grant, page 105 (by Matthews).

Gunnex Reports:

1) Geological Report #7, Sept - Oct., 1964, pages 2-5, with map (by H. Laanela)
2) Weekly Report, Sept. 7-13, 1964 (by T.F. Schorn).
3) Weekly Report, Sept. 14-20, 1964, (by T.F. Schorn).

Work done by Gunnex 1963/64:

H. Laanela spent one week on the showing last fall doing reconnaissance traversing and visiting the major molybdenum occurrences. Since this area was mapped in fair detail by Fules, no remapping was attempted; however, some checking and correcting was done, and also samples were taken at different

localities for assay.

At same time 3 prospectors spent about 2 weeks on the showing and immediate area, doing silt sampling on streams and locating mineral occurrences and old workings. One adit, one shaft and several trenches were seen on the property.

Some soil sampling was done along roads.

Standing:

While the, new claim posts were seen, showing that the area had been staked by M. Cloutier, agent for A. Cloke, on Nov. 15, 1963.

CPOG has the mineral rights, except for gold and silver. A concession was given to Gunnex on an area 7,800' square last summer.

GEOLOGY:

Local Geology:

The molybdenum occurs in roof-contact facies along shear zones and in quartz aplitic (Fyles:aplogranitic) veins associated with and near the margin of a granodioritic stock, part of Coast Range batholith, intruding Sicker group volcanics and sediments. Apparently most of this mineralization occurs at the upper and western contact of the stock; not much is found elsewhere.

The veins generally strike slightly west of north and dip deeply east, although some differ markedly from this attitude. The narrowest veins are irregular. Veins contain medium to coarsely-crystalline quartz, sometimes with combined texture and vugs. Sulphides, mostly molybdenite, pyrite, and minor chalcopyrite, are erratically distributed through the veins. Molybdenite occurs often in large patches and rosettes; others occur as coarse crystals and aggregates.

Regional Geology:

(The following summary is based on J.T.Fyles (1955) report, with emphasis on "aplogranite" of Mount Buttle area).

Remarks on Saanich Granodiorite (=Coast Intrusives) in Cowichan Lake Area.

Granitic rocks (quartz diorite to siliceous granite) intrude the Vancouver and Sicker groups. The plutons of granodiorite in the Cowichan Lake Area are steeply dipping, irregular dyke-like bodies, the long axes of which are approximately parallel to the fold axes of older rocks. In cross-section the plutonic masses cut across the complex structures of pre-granitic rocks. In composition the Saanich granodiorite ranges from quartz diorite to aplogranite. Aplogranite is a type of light-coloured granite containing more potash feldspar (orthoclase) than albite (light plagioclase)

and a very small proportion of dark minerals.

Quartz diorite is more common in the eastern part of the area than in the western near Mount Buttle, whereas aplogranite occurs only as a roof facies in protusions into the volcanic rocks near the top of Mount Buttle. The granodiorite is massive and everywhere contains a low proportion of small, rounded, matic inclusions.

The pre-granitic basic volcanics have undergone a low grade of regional metamorphism. In the lowest grade of metamorphism, actinolitic hornblende and minor amounts of clinozoisite have developed, and in somewhat higher grade ragged hornblende, biotite, apidote, and probably a more sodic, plagioclase have formed. In contact metamorphism the basaltic rocks have been recrystallized and changed in composition so that they exhibit granoblastic textures and contain minerals characteristic of the granodiorite. The regionally metamorphosed rocks appear to be spatially related to granitic masses. They may be regarded as "basic front", whereas the zone of contact metamorphism is one of granitization.

The Saanich granodiorite is probably of magmatic origin. It appears to have been emplaced by passive processes involving stoping, small mafic intrusions and larger fragments of wallrock in the granodiorite are regarded as remnants of stoped blocks. Crystallization of the granodiorite and its facies probably involved basification of the original magma by contaimination, migration of a late felsic differentiate to form the aplogranitic facies, and development of relatively large crystals of orthoclase in the granodiorite, mafic inclusions and wallrock, largely by replacement of plagioclase.

Structure:

On Mount Buttle a cross-section of the upper part of a granodiorite pluton is exposed and approximate form lines on the surface of the granodiorite can be shown-inferred from observed attitude of the contact on the mountain, from the shape of trace of the contact on surface, and from the assumption that the granite on the ridge north of Delphi Lake was not far below the volcanic roof rock being uncovered by erosion. On Mount Buttle, volcanics overlie the granodiorite along the ridge between Peaks 2 and 3. The upper contact of the granodiorite is essentially horizontal on the north side of the ridge, and forms a shallow rough on the south side. West of Peak 2, irregular dyke-like protusions cut through the volcanic capping. West of Peak 3 a similar northerly trending apophysis extends upwards into the volcanics and is exposed on both sides of the ridge. To the east, the eastern side of the pluton strikes north and dips eastward more steeply than the east slope of Peak 3. To the west, the western side appears to be vertical or to dip steeply westward.

From these observations, in longitudinal section the crest of this body of granodiorite appears to be relatively gently curved, and in cross-section the top is irregular and the sides dip steeply outward.

It has therefore been concluded that in the rest of Cowichan Lake area elongate bodies forming a fairly continuous belt "along strike" are

probably continuous at depth. Continuity in depth perpendicular to the long axes is less certain.

The large dyke-like plutons near Cowichan Lake have small dykes associated with them. A few of these extending upward and outward from granodiorite are seen on Mount Buttle, penetrating volcanics to distances of several tens of feet from granodiorite contacts and commonly dipping steeply and striking about parallel to the long axes of the main body of granodiorite.

The plutons appear to have been emplaced after the main period of deformation of the older volcanic and sedimentary rocks. The massive character of granodiorite and the attitude of overlying upper Cretaceous sediments (Nanaimo Group) indicate that the plutons have been no more than slightly deformed since emplacement. The Granodiorite is massive and displays no linear or planar structures. Poorly developed joints have no obvious pattern and do not show any systematic variation in attitude from place to place, but combined the fall into what are probably two sets at right angles to each other. They are nearly vertical; one strikes about N35^{o}W and the other N45^{o}E. No sliken sides were seen on any of the joint surfaces. The granodiorite has been epidotized adjacent to a few joints of both sets. Quartz-sulphide veins that cut the granitic rocks NW of Peak 2 are approximately parallel to the NW trending joints. The quartz veins are thought to be genetically related to the granodiorite, and if so, the NW trending joints developed soon after the crystallization of the granodiorite.

Characteristics of the aplogranite:

At several places in vicinity of Mount Buttle the granodiorite grades into granite, which in turn grades into aplogranite (the last two ore referred to as aplogranitic facies).

It occurs in 3 irregular masses between granodiorite and volcanics on Mount Buttle, in an isolated mass in granodiorite on the ridge north of Delphi Lake, and in a small body surrounded by volcanics NW of Mount Buttle.

The two masses of aplogranite exposed on each side of the ridge west of Peak 3 are almost certainly continuous beneath the volcanics, forming an elongate apophysis above the granodiorite. The contact between the granodiorite and granite is gradational, distinguished by a change in dark minerals from hornblende and biotite in the granodiorite to biotite only in the granite. Biotite granite above the granodiorite is 10 to 20 feet thick. It grades upward into aplogranite which makes up most of the aplogranitic facies; this change takes place over a distance of a few tens of feet, and rock maintains its massive character across the contact zone. The trace of this contact zone appears to be horizontal and at about the same elevation on each side of the ridge, - hence the contact zone is probably relatively flat and almost horizontal.

The dyke-like masses of aplogranite between Peaks 1 and 2 form apophyses above granodiorite. SE of pass (col) between Peaks 1 and 2 the contact zone is horizontal but 300-400 feet higher than that SW of Peak 3. North of Peak 2 the contact zone is horizontal but about 300 feet lower than on SE slope beneath Peak 2 and, NW of Peak 2 is probably dips NE. The form

of the band of aplogranite extending north along the granodiorite contact west of Delphi Lake is uncertain as the aplogranite is poorly exposed and none of the contacts are seen. The presence of aplogranite in the depression about 3,500 feet NW of Peak 2 suggests that the volcanic contact dips gently westward and the granite may form a relatively thin tebular body dipping and tapering NW.

Quartz-sulphide veins cut this body of aplogranite as well as the granodiorite west of Delphi Lake between elevations of 2,800 and 3,800 feet. Most of the veins are within 700 feet of the edge of the plutonic mass, they range from a fraction of an inch to about 4½feet wide, striking between north and NW, dipping steeply eastwards. They contain white, commonly vuggy quartz with sulphides, mainly flakes and rosettes of molybdenite and clusters of pyrite. The quartz veins are thought to be genetically related to the granodiorite because the aplogranite contains molybdenite as a minor accessory and because in all the Cowichan Lake area quartz-molybdenite veins are found only in or very close to granodiorite plutons.

Aplogranite on the ridge north of Delphi Lake may overlie the granodiorite in the same way as the aplogranite on Mount Buttle (there is lack of outcrop to confirm this), in a gently dipping tabular body.

Thus the aplogranitic facies near the top of Mount Buttle is a roof facies in apophyses at the top or upper most end of a large dyke-like mass of granodiorite. North of Delphi Lake it probably occupies a similar position. West of Delphi Lake it appears to follow the margin of granodiorite but it may form a gently dipping tabular mass below the volcanics and may also be a roof facies.

Aplogranite has not been seen elsewhere in Cowichan Lake are, though very small masses of leucogranite (a light coloured granite containing more albite than orthoclase) occur at the ends of narrow dykes in some contact zones.

(At this point reader's attention is drawn to mineral occurrences #22, Second Lake "Moly" showing, and to #24, Mount Hayes "Moly" showing - H.L.).

In the field aplogranite is a white, commonly rust-stained siliceous rock; equigranular, anhedral, and "sugary". Minerals present are quartz, orthoclase-microperthite and sodic plagioclase; biotite is present in sparce flakes. Magnetite and apatite are common accessories, pyrite is a minor accessory, and molybdenite is rare.

Metamorphism related to the granodiorite:

Volcanic and sedimentary rocks commonly as far as 50 feet from masses of granodiorite have undergone changes genetically related to the granodiorite. Contact metamorphism has involved recrystallization and the development of minerals characteristic of the granodiorite. Farther from granitic masses, volcanics and sediments have been altered, generally to hornblende-bearing rocks, and their original textures and structures have been modified, but not completely obliterated, by recrystallization. This regional metamorphism appears to be spatially related, and may also be genetically related to

the granodiorite. Both the contact and regional metamorphism are described here as metamorphism associated with plutonic activity.

The basaltic (volcanic) rocks appear to have undergone two types of metamorphism: (1) The, development of hornblende, apidote minerals and minor biotite with the preservation of original textures and structures until masked by secondary minerals; and (2) the development of minerals similar to those in the granodiorite with recrystallization tending to give granitic textures. The first is the more widespread change, whereas the second appears to be superimposed on the first and restricted to zones adjacent to granodiorite. On Mount Buttle, the second or contact type is missing.

The clastic sedimentary rocks have not been highly metamorphosed due to regional metamorphism except, near masses of granodiorite; in general they are blocky and not schistose. Biotite, hornblende, chlorite and epidote are present in all feldspatlic buffs and tuffaceous graywackes but in general amount to less than 10% of the rock; fragments of basic igneous rocks, clastic crystals of andesine, hornblende or pyroxene and siliceous or argillaceous matrix, are the main constituents.

The metamorphism of mafic elastic sedimentary rocks appears to parallel the contact metamorphism of mafic volcanics to some extent, - both having undergone a low grade, metamorphism that has resulted in development of ragged hornblende and minor amounts of epidote minerals.

On the east slope of Peak 3 thin bedded sediments of Sicker group are in contact with granodiorite; they include cherty and feldspathic tuffs and fine-grained argillaceous or tuffaceous sediments. The cherty rocks have been recrystallized near contact without formation of new minerals, whereas impure sediments have been converted to hornfels. Bedding is well preserved, and rocks are blocky and not schistose.

Cherty sediments contain mostly quartz, with less than 5% other minerals (biotite, plagioclase, hornblende, epidote, and magnetite in minute crystals.)

(Limestone and calcareous sediments in contact with granodiorite are not known to be exposed in the Cowichan Lake area. Deposits of skarn typical of metamorphosed calcareous rocks are found at two places, Blue Grouse Hill and Comego property).

SUMMARY OF WORK:

History:

There has been no production on this property, although considerable work has been done on it from time to time. The first recorded work on the property was done toward the end of World War 1. At this time the lack of access road presented a handicap, - only access being a trail along Nanaimo River and up Jump Creek (past Delphi Showing).

In 1918 the property consisted of 4 claims, owned by Archie Cowie and associates of Nanaimo. These claims were: "Britain", "France", "Japan", and "Serbia". They were grouped as the "Allies" group. Practically all the work was done on "France" and "Serbia" claims, with 30 feet adit on the first and a inclined shaft, plus several prospect holes on the second. There was a cabin near either working, and one also near outlet of Delphi Lake, east side.

Workings and Sampling:

In 1918 report assays of samples from several veins gave from 0.3% to 1.2% Mo, from trace to 1% Cu, and only traces of Au and Ag. A select specimen gave 23% Mo. All were taken from "Serbia" claim (one with the shaft and pits).

Report is also made to float found on Mount Buttle, near summit, carring good copper and silver values, but no through prospecting has been done to locate its source.

Stevenson (1940) reports 23 workings, mainly open cuts and including the shaft and adit, on the property. He states:

> "The veins range in width from 1 inch to 54 inches, and in exposed length, from a few feet to an observed maximum of 37 feet. They occur over an area measuring 6,500 feet north-south and 1,800 feet east-west. Samples taken from mineralized quartz assayed molybdenite from trace to 0.4%.

Fyles (1955) apparently spent considerable time and effort there mapping the area; however he does not give much detail about showings or workings. Most of his work was geological - petrographical.

Gunnex Limited had a prospecting-sampling crew there last fall, during which time most of the old workings were re-located and visited. The writer spent some time on it, also, visiting all the showing, thus found and trying to locate these on the map, - a difficult task at times. Some new trenching was observed in shear zone along a creek issuing from the col between Peaks 1 and 2. Several samples were taken (see map), and assayed. Results were:

Sample # on map	Description	Mo %	Ag	Au	oz/ton
2,3 and 4 (composite)	quartz vein up to 6", along road, with pyrite, sericite; (Cu?)	0.02	Tr.	Tr.	
6	Dump near adit; quartz in diorite; Pyrite, Mo,Cu (?)	0.1			
7	across 2' qtz. vein in creek, in diorite. Pyrite; rosetts of "moly", Cu?	0.93			

Sample # on map	Description	Mo%	Ag	Au
9	across 18" qtz. vein in canyon wall. Much Mo and pyrite in quartz.	0.68		
14	Higher grade pieces from shear in aplite along creek. Fractured pyrite, fine"moly" in walls.	0.4		

(other samples contained also some "moly" and pyrite, but were not assayed).

Several traverses were made, mostly to check geology mapped by Fyles, a few topographic and geological corrections were added to existing maps.

Silt-sampling:

All the creeks draining into Green River water-shed were sampled, plus few others toward SW. Mo in silts ranged from 0 to 8 ppm, with background values of 2 to 3 ppm. THM in silts ranged from 20 to 60 ppm, with background of 25 ppm. Most of the higher values were found in creeks draining into Delphi Lake or the creek blow it, and also in creeks flowing west from Mount Buttle. None of these can be considered significantly high.

Soil-sampling:

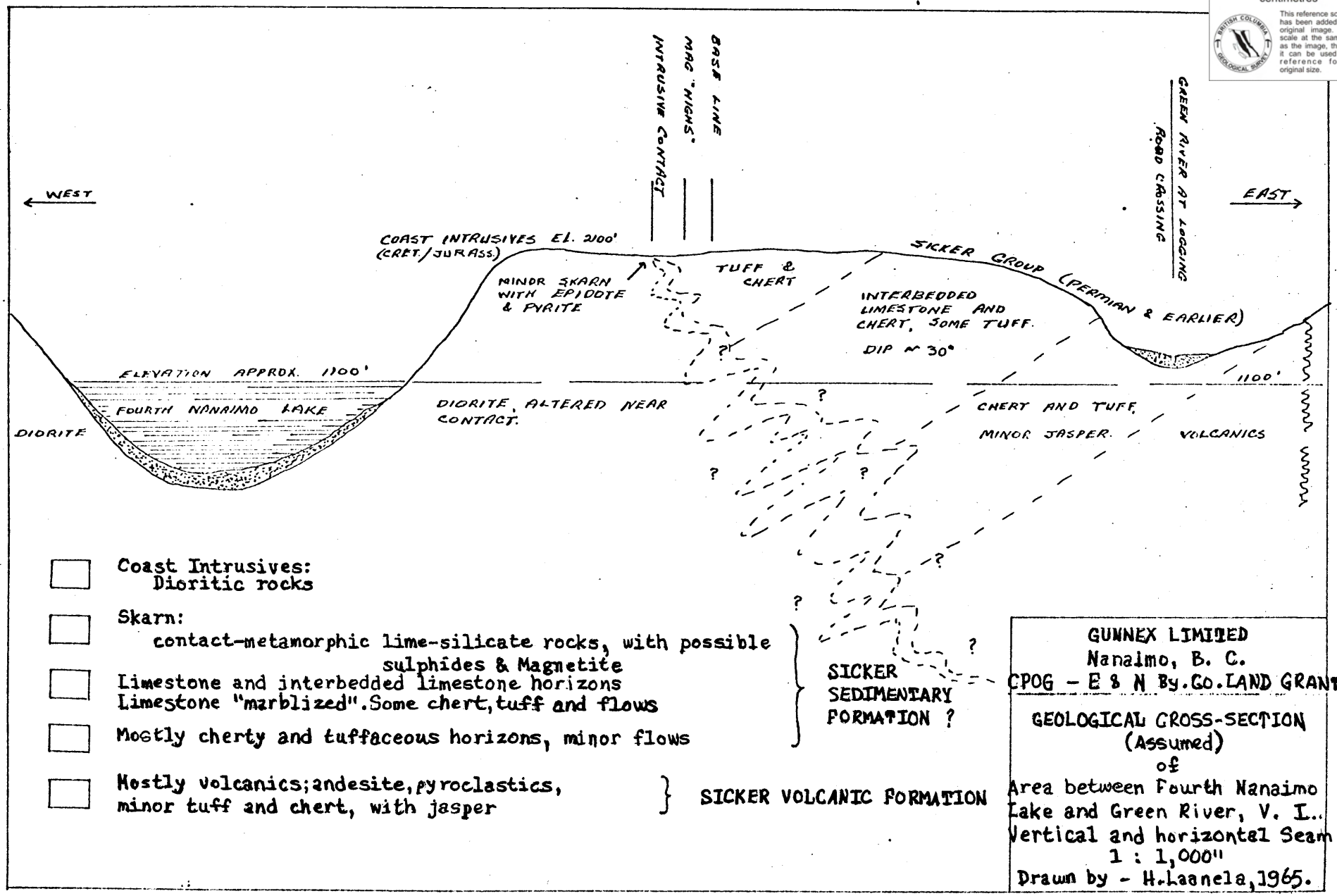
Along the roads gave similar values, with the higher values just below Delphi Lake and in the aplite exposure along road further north.

COMMENTS:

Based on what is known about this showing so far, the writer's opinion is that the chances of finding anything to make a mine are rather small. This, however should not rule out any future work,especially exploration along aplogranitic facies hidden by pre-intrusive rocks and by overburden. As far as the surface showings are concerned, the area certainly seems to be well prospected at one time or other. In case more work is planned, much time and effort can be saved by camping right up near the col between Peaks 1 and 2, or north of there, on the ridge.

H. Laanela
March, 1965.

HL:s



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GEOLOGICAL CROSS-SECTION
(Assumed)
of
Area between Fourth Nanaimo Lake and Green River, V. I..
Vertical and horizontal Seam : 1 : 1,000"
Drawn by - H.Laanela, 1965.