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LEGEND

CENOZOIC

MODERN

3 — RECENT AND PLEISTOCENE
Recent alluvium and glacial deposits

MESOZOIC

JURASSIC AND, OR, CRETACEOUS

2 — *COAST RANGE INTRUSIVES: granodiorite, quartz diorite, diorite, feldspar porphyry*

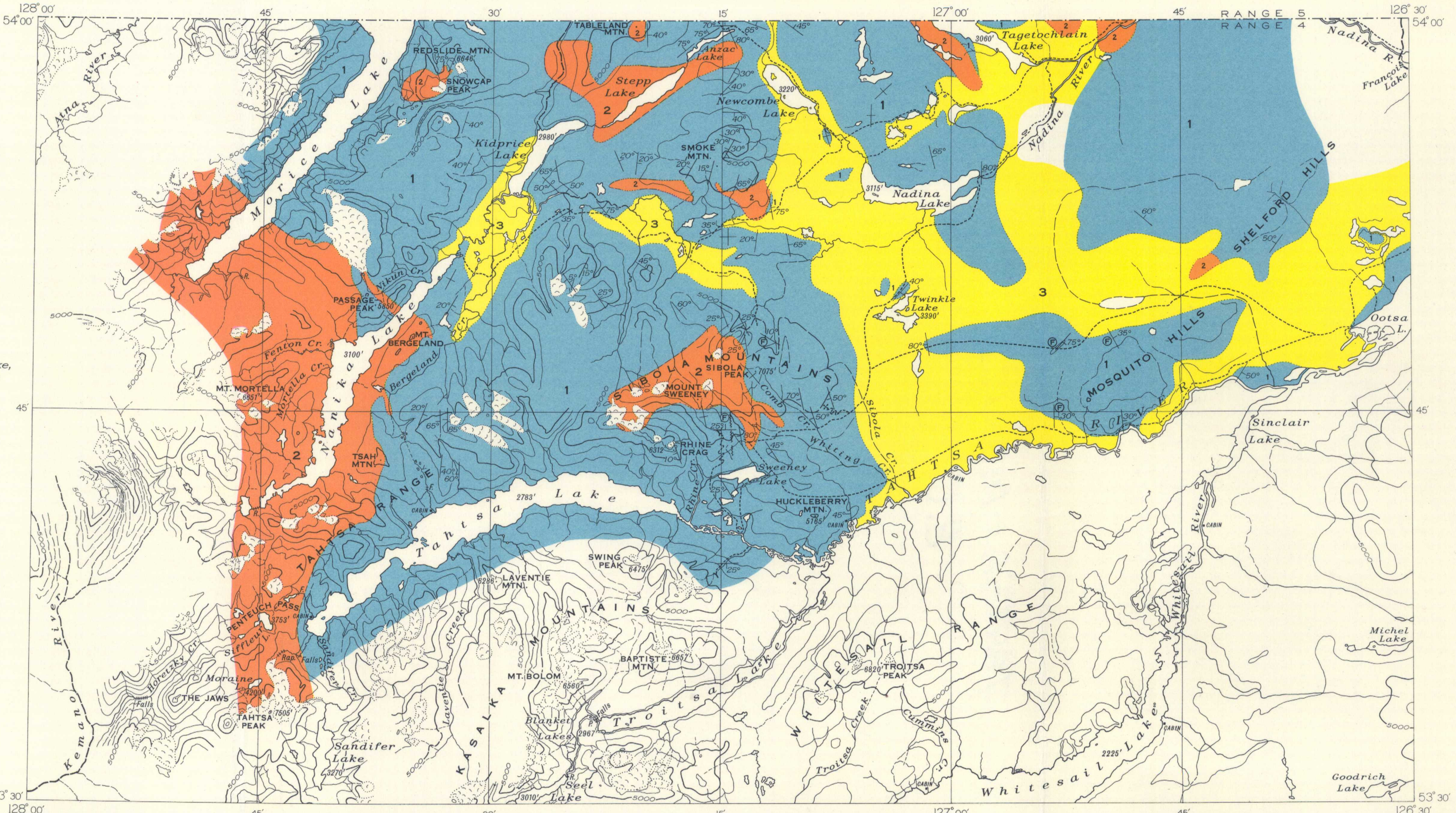
JURASSIC

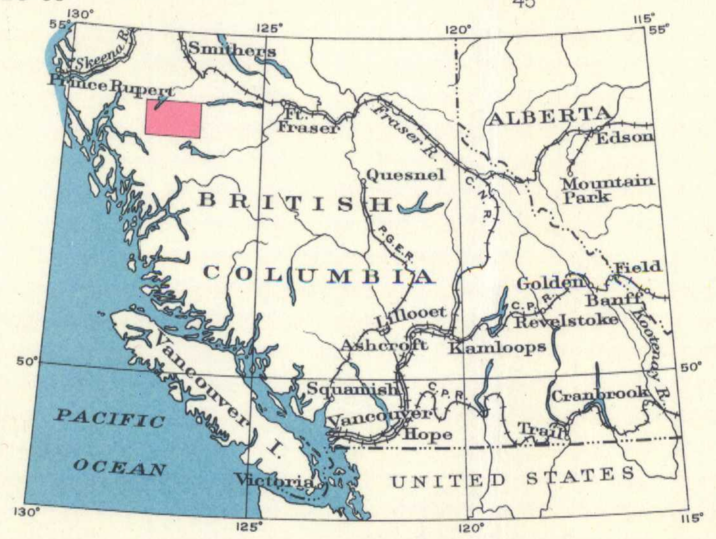
1 — *HAZELTON GROUP: andesite, dacite, rhyolite, breccia, agglomerate; tuff, greywacke, sandstone, argillite, conglomerate, limestone*

Geological boundary
Bedding (inclined, vertical, horizontal)
Fault
Fossil locality
Mine working
Prospect
Road (not well travelled)
Trail
Stream (position approximate)
Stream (intermittent)
Glacier

Geology by M. S. Hedley, 1935.

Base map prepared from information supplied by the Department of Lands, British Columbia.





Scale, 1 Inch to 200 Miles

MAP 367A

TAHTSA-MORICE AREA

COAST DISTRICT

BRITISH COLUMBIA

Scale, $\frac{1}{253,440}$ or 1 Inch to 4 Miles

Miles 4 0 4 8 12

Kilometres 5 0 5 10 15

Contour interval 1000 Feet

TRUE NORTH
MAGNETIC NORTH
29° 30′

Approximate magnetic declination 29° 30′ East.

PHYSICAL FEATURES

Heavily timbered lowlands separate isolated mountainous masses in the eastern and central parts of the district. Shelford and Mosquito hills rise to irregular hilly summits 5,000 feet in elevation; Smoke and Tableland mountains are still higher flat-topped isolated masses. The rugged Tahtsa and Nanika Lake mountains, west of the major lakes, pass insensibly into the more rugged mountains of the Coast Range. The lowlands and lower hills are dotted with lakes and soft meadows, and are thickly mantled with glacial drift. The drift mantle covers also the longer slopes and flatter summits of the Tahtsa and Nanika Lake mountains. Glaciation has modified the topography of the entire district, and is still active in the many alpine glaciers abreast of and westerly from Tahtsa, Nanika and Morice lakes. Timber thins at 4,000 feet, and timberline is at 4,900 feet elevation. Rocks are well exposed only in some burned areas, on the steeper slopes, and above timberline. The rocks in most places possess a marked blocky fracture that results in the production of heavy talus slopes on many of the higher mountains.

GENERAL GEOLOGY

The Hazelton group (1) is an assemblage of volcanic and sedimentary rocks at least 10,000 feet thick. It is divisible into a lower volcanic, an intermediate sedimentary, and an upper volcanic member. The lower volcanic member, the base of which is unknown, consists principally of massive, green and some purple andesites, often porphyritic, intercalated with which are green and purple breccias, flow breccias and agglomerates. The rocks are fresh-appearing, and are only recrystallized near granitic contacts. They become more fragmental towards the top of the series, and grade into banded fragmental volcanic rocks, and sediments, with no evidence of unconformity. The intermediate member is characterized by a sub-member 1,000 to 2,000 feet thick of sandstone, greywacke and argillite. In addition to the sub-member there are interbedded tuffs, andesite flows and coarse fragmental rocks, with occasional bands of sandstone, conglomerate, argillite and limestone. Varicoloured tuffs, ranging between cherty and coarse sandy textures, are common; many are waterlain, and may show complete gradation into other rock types. Most of the fragmental rocks are banded, and show some evidence of sorting; the fragments are of multicoloured volcanic rocks and occasionally cherts of unknown derivation; the size of fragments varies from that of rice to several inches across, with walnut-size common. The fragments are angular to sub-angular, and rounding is rare. Between Tahtsa and Nanika lakes the principal sandy sub-member rests directly on massive volcanic rocks, but farther to the east grades downward into rudely bedded volcanic rocks. Fossils place the age of the sub-member as Jurassic. The upper part of the sedimentary member consists locally of blocky, light coloured, granular and cherty rocks that include tuffs, sediments and acidic flows. These rocks contain a high content of pyrite and consequently form brilliantly coloured talus slopes on Sibola peak, Redslide mountain, and other intervening summits.

The upper volcanic member consists principally of dacitic, and also of rhyolite and andesite lavas and fragmental rocks, with no true sediments. The rocks are chiefly dense porphyritic lavas, coloured light shades of grey, purple, buff and green, and in some cases nearly black. Intercalated with the flows, and subordinate in amount to them, are sharply angular breccias, agglomerates and tuffs of similar composition. The series outcrops over the eastern part of the area, and the top is not exposed. In the Mosquito hills lavas rest on fossiliferous greywacke and sandstone of the middle sedimentary member. The base of the member may be represented on the summits of the Sibola mountains by the acidic tuffs and lavas already mentioned.

No source of the Hazelton volcanic rocks is known, but it is highly probable that they were poured out from a number of local fissures rather than from any central source. The fragmental rocks are commonly very like in appearance and composition to the nearby or enclosing flows; this likeness, together with the lenticular nature of the rock units, points to local and rapid accumulation. The vaguely defined middle sedimentary member consists of true sediments laid down in shallow water, above and below them every variety of coarse and fine fragmental rocks was formed in basins of rapid accumulation and is made up almost entirely of volcanic materials, with which are intercalated andesite flows and some true sediments.

The Intrusive rocks (2) include those of the Coast Range batholiths proper, and also smaller stock-like bodies to the east of the main contact. The Coast Range batholiths consist of granodiorites and quartz diorites that extend an unknown distance to the west of the map-area. They are fresh, quartz-bearing rocks of medium to fairly coarse grain; the granodiorite tends to be pinkish, and the quartz diorite grey or greenish grey. Variations in character apparently represent internal changes rather than separate intrusions, although separate intrusions may and probably do occur. Most of the outlying stocks are also granodiorite and quartz diorite. They are lithologically very like the main Coast Range rocks, particularly so in the case of that stock which occurs in Sibola peak and Mount Sweeney. A few stocks—those in the northeastern and eastern part of the district, and that southwest of Smoke mountain—are feldspar porphyries (diorites and quartz diorites) of a quite different character. They are greenish and grey porphyritic rocks with frequent local variations in texture, are dull in appearance, and are usually considerably altered. They are here included with the Coast Range intrusives because there is no definite evidence that they are of different age.

The intrusives have not as a rule much altered the older rocks. There has been some granitization of the older andesites along the main Coast Range contact, either by simple recrystallization or by introduction of feldspathic stringers. Except at the west end of Tahtsa lake, these effects die out a few hundred feet from the actual contact; and in many places there is practically no evidence of recrystallization. Contacts are clean cut and inclusions of older rocks are rare. Schistosity is nowhere developed in the surrounding rocks. Where sediments have been intruded, as on Mount Sweeney and Sibola peak, there is locally considerable contortion; the regional structure has in general been directly affected by intrusion of stocks, but this fact is not obvious except where the rocks involved are more or less bedded.

Dykes are fairly plentiful in the west, and include diorites, andesites, granite, aplite. They cut all rocks in the district and are most abundant near the main granitic contact. Some of the andesite dykes carry considerable pyrite, and may in some cases have acted as mineralizing agents. The arrangement of these dykes displays no recognizable pattern.

STRUCTURAL GEOLOGY

The structure of the Hazelton group is not easy to decipher due to the lenticular nature of rock units and the frequent lack of any good marker horizon. With the exception of the central sandy sub-member the volcanic and sedimentary rocks change rapidly in thickness and in character along both dip and strike.

The major structure is that of a comparatively flat-lying blanket warped into open flexures and caught locally into sharp folds. Angles of dip are usually less than 50°. The structure of the Hazelton group in other districts trends northwest, parallel to the Coast Range axis, but here there are variations. A sharp syncline developed in the intermediate member extends from central Tahtsa lake to Redslide mountain, west of which are exposed the massive lower andesites. This fold dies out to the south. North and south of the main body of Tahtsa lake nearly horizontal, banded and bedded rocks form the summits and higher slopes and rest on the lower andesites. A major north-south fault through the east side of Mount Sweeney disrupts the structure so that the bedded rocks on the east occur at higher elevations than those on the west side of the fault. On Sibola peak a syncline, trending west of north, is warped and compressed by the granodiorite intrusion on the west, and is truncated by erosion on the south slope of the mountain; to the north this syncline opens out flatly and loses its identity in the northern part of the Tahtsa mountain range, where the rocks swing into northeasterly trending folds. Smoke mountain is an open syncline of tuffaceous rocks that trends north 65° east, and the complementary anticline, intruded by quartz diorite, is found just south of Anzac lake. Bennett mountain with a core of quartz diorite, represents probably a warped anticlinal structure, west of which is the syncline already mentioned, trending north 20° east. The acidic volcanic rocks of Mosquito and Shelford hills are openly and irregularly folded, with a cumulative dip to the east. The middle sedimentary member is last seen passing, with nearly vertical dip, through the outlet of Nadina lake, and with rather low easterly dip through the western edge of Mosquito hills. The strata of the lowland about Twinkle and Nadina lakes may be anticlinal, although outcrops in this section are rare.

Granitic intrusion has influenced the structure in a number of places. It is probable that the sharp synclinal fold between Tahtsa and Nanika lakes is directly related to the easterly bulge in the main Coast Range contact in that area. The structure of Mount Sweeney and Sibola peak is considerably affected; the normally rather flat-lying rocks of Mount Sweeney are crumpled, contorted and broken near the granodiorite stock, and the open syncline on Sibola peak is locally nearly closed where abutted by the same body on the west. The intrusives near Bennett and Smoke mountains are bounded by rocks that warp about them in local contradiction to the structure of that region.

ECONOMIC GEOLOGY

There has as yet been no mineral production from the Tahtsa-Morice district; some development work has been done, but up to the present no body of ore has been proven sufficiently large or rich to warrant mining. It is probable that if any further discoveries are made they will, like other known deposits in the general region, be of small high grade rather than of large low grade type. The area as a whole has not been thoroughly prospected, but practically all evidences of mineralization are restricted to the western and north-central portions. Mineralization is more common near bodies of the Coast Range intrusives than elsewhere.

A little surface and near-surface development work has been done on Sibola and northeastern Swing Peak mountains, and drifting and diamond drilling was carried out over a two and a half year period on the Emerald group on Mount Sweeney by the Consolidated Mining and Smelting Company of Canada, Limited. The original discovery in the district was of placer gold, on Sibola creek, but values do not seem to have warranted any serious attempt at development of this creek.

Three general types of mineralization are known. (*1*) Gold-quartz veins that are almost entirely restricted to Sibola peak. They are narrow gash veins attaining a maximum width of about 30 inches. They occur in rudely banded tuffs and andesitic flows, and dip westerly to southwesterly towards the granodiorite stock, roughly conformable to the general structure. The quartz is coarsely crystalline and vuggy; mineralization consists of irregular grains and masses of pyrite and rare specks of molybdenite. Reported values are low. A few similar quartz stringers occur just south of Anzac lake. (*2*) Silver-lead-zinc deposits. These are shear zone fillings in which the gangue material consist of brecciated country rock with subordinate quartz and calcite. The metallic minerals are galena, sphalerite, pyrite, chalcopyrite, tetrahedrite, and occasionally arsenopyrite; they occur as lenticular bodies in shear zones. These deposits are chiefly restricted to Mount Sweeney and Sibola peak but one such deposit, rich in silver, is on Swing peak, the southern side of which is reported to be underlain by granite. The principal showing on the Emerald group contains lenses of a maximum width of 10 feet; the shear zone is in shattered sediments and tuffs, and mineral appears to have been concentrated beneath a thick sheet of undeformed andesite which overlies the locally contorted sediments. Some of the more calcareous tuffs and sediments contain scattered grains of sulphides other than pyrite; this is seen in drill cores on Mount Sweeney and in float from a creek on the south shore of Tahtsa lake. (*3*) Pyritic mineralization is widespread, and practically all rocks in the district contain scattered grains of this mineral. Stringers and lenses of pyrite, some accompanied by quartz, occur in andesites, tuffs and breccias on Huckleberry mountain, Sibola peak, Mount Sweeney, and on Tahtsa lake; a few such stringers, closely associated with andesite dykes, occur in granodiorite north of Mount Sweeney. Besides pyrite, specks of molybdenite are occasionally seen in quartz.

Large zones of shearing are not known in the massive, lower volcanic rocks of the Hazelton group, but if such were found they would be worthy of careful prospecting. On the northeastern wooded slopes of Sibola peak there is a diorite intrusion, not mapped; the rocks here are sheared and altered. Heavy alteration is to be seen on the high western slope of Tableland mountain. Prospectors would do well to examine areas where there is contortion and shearing of bedded rocks, particularly if near an intrusive body.