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# THE BRALORNE MINE

## BRITISH COLUMBIA

An essay submitted in partial fulfillment of the requirements of the Course in Applied Science, third year, at the University of British Columbia.

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Vancouver, British Columbia,
November 15, 1947.

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Gentlemen:

This report outlines the history, development, geology, and structure of the Bralorne mine at Bralorne, British Columbia.

Six weeks of June and July, 1947, were devoted to the geologizing of the mine by a party of the British Columbia Mines Department headed by Dr. J. S. Stevenson. The author was employed as an assistant to Dr. Stevenson.

The contoured plan of the 51 vein on page 10 and the block diagram of the mine in the back fly-leaf were prepared by the author from the 100 foot Bralorne mine level plans.

All photographs were taken by the author.

The report is chiefly descriptive. Any opinions expressed are those of the author and not necessarily those of any other person except where reference has been made.

Yours truly,

H. Stuart McColl

H. Stuart McColl.

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## SUMMARY

The Bralorne Mine is in the eastern contact zone of the Coast Range batholith, about 120 miles north of Vancouver. The gold ore is almost entirely found in two quartz veins of quite constant east-west strike and steep northerly dip which appear to meet at depth. A major north-south fault offsets the veins about 500 feet. A contact between serpentine and the gold-quartz bearing diorite and granite places a southern limit to the ore bodies.

Two shafts serve the twenty levels in the mine.

## LOCATION AND ACCESS

The Bralorne Mine, owned and operated by Bralorne Mines, Limited, is on Cadwallader Creek, about 120 miles north of Vancouver. Access is by road from Vancouver to Lillooett, 220 miles, by flat car from Lillooett to Shalalth, 15 miles, and by road from Shalalth to Bralorne,

55 miles. The Pacific Great Eastern Railroad runs from Squamish, on Howe Sound, northward through Shalalth.

## TOPOGRAPHY

The Bridge River district includes the eastern extent of the Coast Range. The topography is very rugged with a relief of over 6000 feet (fig.1-2). Extreme elevations are from Shalalth at roughly 1200 feet to Whitecap Mountain, 9600 feet.

The Bridge River flows through a broad glaciated valley which rises with increasing steepness to the sharp, flanking ridges (fig. 3). The river is near grade and meanders through much of its length forming oxbow lakes. It branches into several channels below the town of Goldbridge, six miles north of Bralorne.

The Hurley River also has its source in the Coast Range. It flows north-east through a glaciated valley narrower than that of the Bridge River and has many hanging valleys on the flanks over which cascade a series of unorganized streams. For the last six miles of its length the river flows northerly to join the Bridge River near Goldbridge.

Cadwallader Creek joins the Hurley River about one mile north-west of Bralorne. Above Pioneer Mine (two miles south of Bralorne) it flows through a typical glacial

valley. Below Pioneer it cuts a fairly level bench area extending from the Mount Fergusson ridge to the ridge dividing the Hurley and Bridge Rivers (fig. 5). The incision becomes progressively deeper so that after Cadwallader Creek unites with the Hurley River the latter flows through a canyon with very steep sides approaching 1000 feet in height (fig. 4).

The town of Bralorne is on a narrow bench up to 1500 feet wide on the east bank of, and 200 feet above, Cadwallader Creek (fig. 5). The present mine workings lie under the higher bench south-east of the town.

## HISTORY OF BRALORNE MINE

Placer gold near the mouth of Cadwallader Creek and on the Hurley River brought the first miners into the Bridge River district. The first mining claims were staked in 1897. Work was done on properties now containing the abandoned King Mine, the old Ida May Mine, now extended down on the Bralorne 51 vein, and in the Coronation Mine which followed the lead of the Bralorne 77 vein down to the present 1000 level.

"In 1930...Bralorne Mines, Limited, was formed...to acquire a 60% interest in Lorne Gold Mines.... In 1935 extensive underground development work (was done) at Coronation, Empire, and King mines, including the rapid

projection of an intercommunication drive (Empire crosscut) over 6000 feet long, designed to link up the amalgamated property throughout its length with the principal working adit, No. 8 (Crown adit), of the King Mine at Bralorne." ★

## GENERAL GEOLOGY

The principal vein deposits of Bralorne are found in intrusions of what has been termed soda granite (quartz-diorite) and augite diorite. ★ On the block diagram with this report the granite-diorite contact is not shown because of the added complexity and confusion which would result. At the extreme eastern end of the diagram, near the 1-51 level, greenstone, probably of the Pioneer greenstone, intrudes or is intruded by the granite. This contact is traced no lower than 6-51 and appears almost vertical with a fairly constant strike of about N 60° W. The granite-diorite contact is irregular and no generalization may be made except that it is most often encountered on the east side of the Empire fault. The contacts have wide transition zones where inclusions of a rock-type are difficult to determine as inclusions. It was only when the field notes were plotted on the level maps, with the levels above and

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★ Cairnes, C. E.: G.S.C. memoir 213, p. 78; Geology and Mineral Deposits of Bridge River Mining Camp, British Columbia.

below kept in mind, that a general contact line was established for the granite and diorite.

In the King mine, reached by a crosscut from the 800 level Crown adit, is found a contact between diorite and argillite. Bad air in the mine allowed for only a brief examination of the argillite. ~~and~~ The author knows no more about the contact than that it is roughly one mile west of the Empire fault.

Once the gold bearing quartz veins meet the serpentine contact they divide into stringers of low gold value which often end abruptly. For this reason considerable data is available about the contact.

On the west side of the Empire fault, on the block diagram, the generalized serpentine contact strikes S 22° E and dips 82° SW. On the east side of the fault it changes strike slightly to the south. Actually the contact is a complexity of warps and offsets due to minor faulting. On the 1200 level the 12-53 vein pierces the serpentine at two definite points. This zone is composed of highly sheared serpentine, intrusions of diorite, and faulted quartz veins and stringers. On the 1400 level the 14-55 vein terminates at the contact. From drilling records it seems the serpentine parallels the 14-53 vein about 100 feet south throughout much of the vein's length.

The serpentine is a greenish-black to glossy black variety which in some shears has been altered to gray talc. In such places the wall rock is loose and spalls readily.

Recently, serpentine with much free gold was found on the 13-53 vein along the contact. The author saw one specimen of talc shining with gold. This discovery may make ore of what has been usually considered waste.

Empire Fault

The Empire fault offsets the major veins and the serpentine contact about 500 feet in an almost north-south direction. There are two shears, the stronger of which is shown on the block diagram. The lesser shear appears to branch from the stronger somewhere above the 600 level and to dip westward at a flatter angle. The two shears are parallel in plan and enclose a wedge-shaped zone known as the "E" block. The fault offset is effected by the major shear. Cairnes gives the average strike as N 16° W and dip 60° W. * However, further work and intersection of the fault on the 51, 55, and 53 veins has shown that it warps greatly, with the strike varying as much as twenty degrees and the dip lessening as much as thirty degrees from Cairnes' observation. Moreover, between the 800 and 1000 levels and the 1200 and 1400 levels the fault produced

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* See footnote page 4.

to the limit of the block diagram changes dip to the east.

The movement of the Empire fault is not clearly understood. However a statement relative to the faulting in the King and Coronation mines may apply to the present Bralorne mine.

"Experience gained by underground explorations has shown that along the east-west fissures the north or hanging-wall has moved upwards and westerly with respect to the foot-wall at angles varying from forty to seventy degrees with the horizontal. In the case of those faults striking northerly the west side has been thrust upwards and northerly with respect to the east side. These faults have effected apparent displacements of east-west, vein-bearing fissures by amounts as much as several hundred feet vertically. The vertical displacements are of economic interest in that they afford an explanation for differences observed in the character of the vein matter on either side of a fault." ✱

Any Comment

Since major faults in the King and Coronation mines of approximately the same strike and of slightly smaller offset have these characteristics it is reasonable that the Empire fault is structurally the same.

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✱ See footnote on page 4.

## A DESCRIPTION OF THE MINE

There are two adits, the 800 level Crown adit at Bralorne townsite and the 300 level Empire adit at Bradian, one mile south of Bralorne. In from the 800 level adit a crosscut goes roughly north-east for 1500 feet then swings south-east for 3000 feet to reach the Crown shaft. A crosscut to the King mine branches north-westerly about 1000 feet east of the adit. The Crown shaft begins at the 800 level and descends to the 2000 level, about 1700 vertical feet. It was not carried higher than the 800 level because the Empire fault intersects the shaft projection 200 feet above. The 300 level Empire adit is 300 feet west of the Empire shaft which descends 2300 feet vertically to the 2000 level.

The 100 and 200 levels are reached by raises from the 300 level. These two levels are not extensive; they follow the 51 vein for relatively short distances. In general, the extent of drifts and crosscuts increases proportionately with the depth of the level until the 1000 level is reached. Below the 1000 level the lengths are roughly the same. An exception is the 1800 level which is quite short. There are over 42 miles of tunnelling in the entire mine.

Underground there is a system of communication to the surface by telephone. Electric trams are used and "mucking machines" limit hand mucking.

## THE VEIN SYSTEM

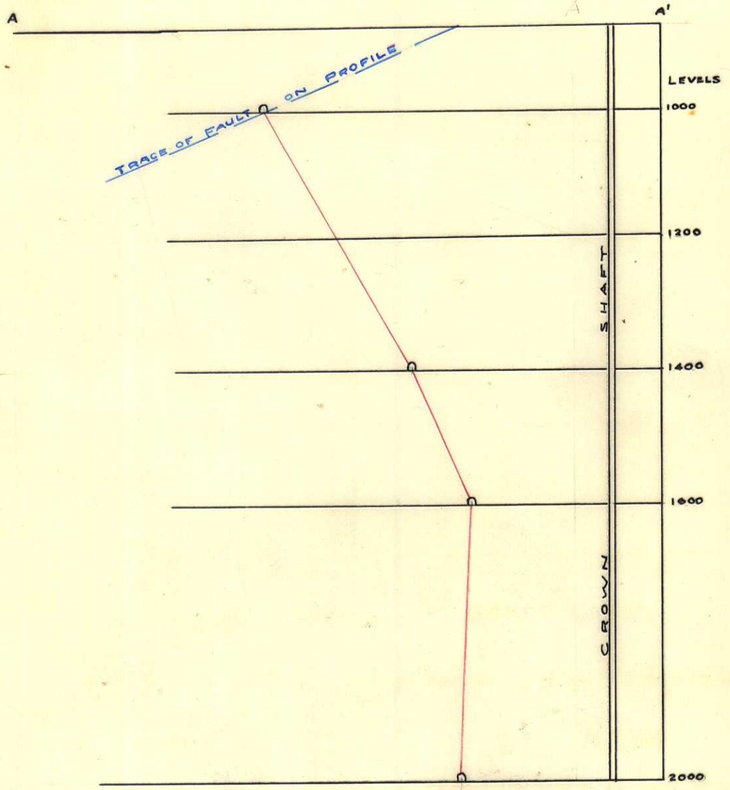
Work has been done on, and ore obtained from, seven principal veins, the 55, 53, 77, 51, 59, 73, and 75.

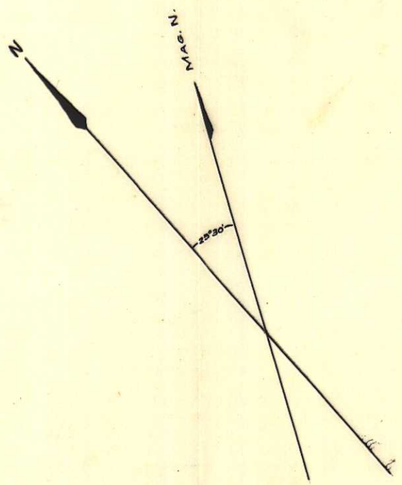
### 51 Vein

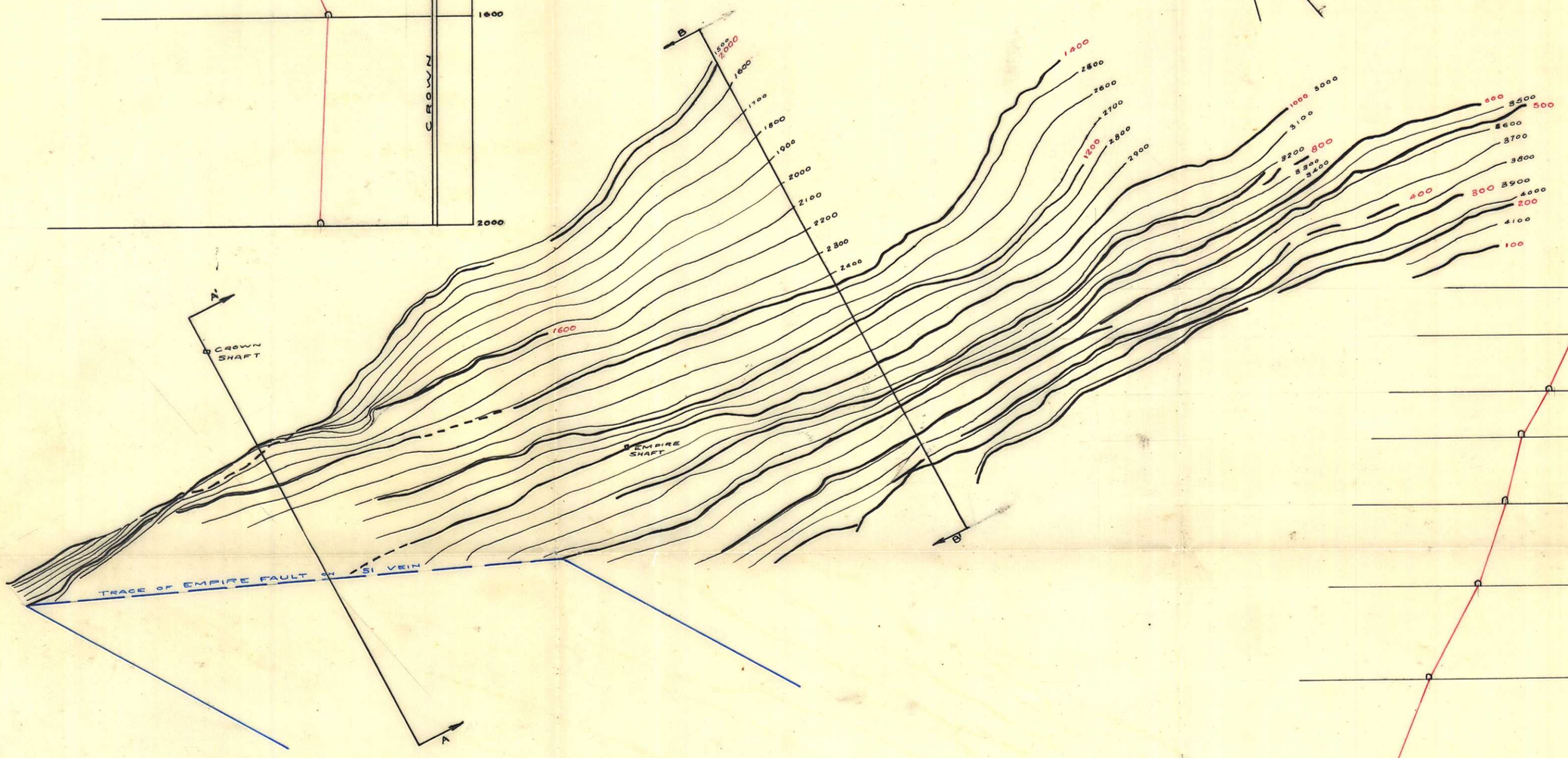
By far the most extensive and most productive vein is the 51 or what was formerly known as the "Ida May" vein. It was the surface discovery on the property as a short, narrow, moderate value quartz vein. As can be seen on the block diagram each successive level below 1-51 increases in length until the present bottom is reached at 20-51. The contoured plan of the 51 vein on page shows how relatively constant it is in strike and dip. At the west end, near the Empire fault and below 16-51, the dip changes from north-west to steep south-east. This situation has not been explained but since the vein has been explored on only the 1600 and 2000 levels further information will come from drifting along 17-51, 18-51, and 19-51, preferably 18-51 because of its central position.

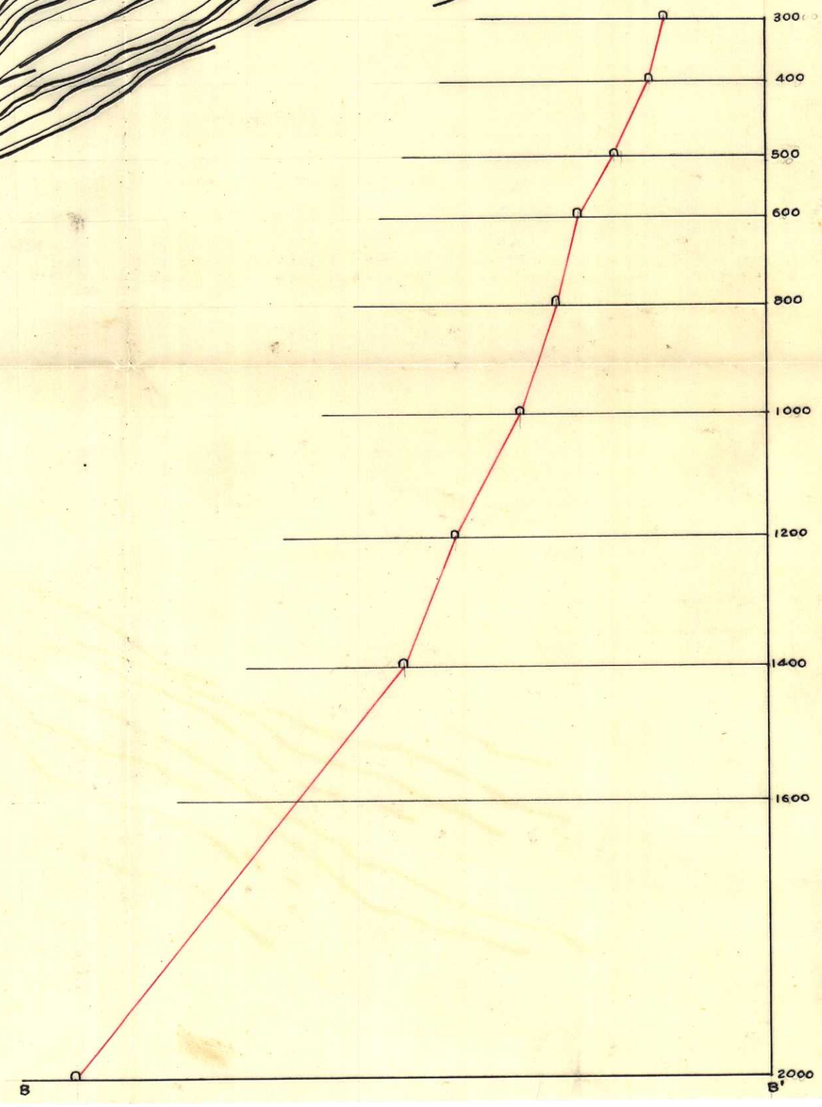
The vein is cut at its western extremity by the Empire fault, the trace of which is shown on the plan, page 10.

From observation the vein was seen to vary in widths (pinch and swell) from several inches to as much as ten or twelve feet. The "rolling plain" effect of the contoured plan is due to many small north-south faults.



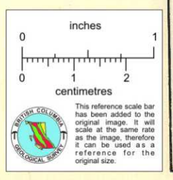




# CONTOURED PLAN OF "51" VEIN WITH CROSS-SECTIONS

SCALE 1"=300'

1400 – Level

3900 – Contour Elevation (datum sea level)



55 Vein

The 55 vein is said to be the continuation of the 51 vein west of the Empire fault. The author is not aware of any reasons for this assumption other than that of the extended offset of the fault. The statement quoted on page may have some bearing on the vein relationship.

This vein has been drifted along the 600 to 1400 levels. It is fairly constant in strike and dip. The west end of 14-55 was examined to verify the position of the serpentine contact, often mistaken for sheared greenstone. Here the vein divides into several veins which form stringers, mainly disappearing as it runs into the serpentine. Those quartz stringers present in the serpentine carry very little gold.

77 Vein

The 77, or "Countless", or "Coronation" vein was one of the original discoveries. About it the Coronation mine was built. As seen on the block diagram it has the same east-west trend of the 51 vein and a roughly parallel dip. No drifting has been done on the 1200 or 1100 levels so that it is questionable if the vein from 1400 to 2000 is the same as that from 1000 to the surface. (The highest level of the 77 vein shown on the block diagram is the 1000 but the vein has also been drifted along 600 and 400). The doubt is exemplified by the change in dip from 10-77 to

the surface. From 14-77 to 20-77 the dip is 40° -60° NE but above 10-77 the dip is nearly vertical with a slight inclination to the north-east. The author climbed down the Coronation shaft (now in disuse) sunk on the Coronation vein and noticed that for several hundred vertical feet the vein was visible on the shaft walls. Since there is no abrupt change of dip in the 51 vein it is questionable if the 77 vein should exhibit such change.

On 20-77 the 51 vein joins the 77, a situation which will probably be explained by deeper work. It does however indicate a common origin for the two veins.

53 Vein

The 53 vein is considered the 77 vein offset by the Empire fault. The offset on individual levels is generally greater than that between the 55 and 51 veins but the difference may be explained by the statement quoted on page .

The vein has not been explored above the 1200 level or below the 1600 level. It is typically east-west in strike and fairly steep in dip. The productive length of the vein is controlled by the Empire fault at the eastern end and by the serpentine contact at the western end. The serpentine is very close to 12-53 and where the vein is faulted southward about 100 feet it is broken into the characteristic quartz ribbons in a zone of intense shearing. The wall

rock in this case is grayish talc spotting greasy green-black serpentine.

Of interest is the paralleling of the serpentine contact by 14-53. A detailed plan shows that the vein lies about 100 feet north of the contact and has the same irregularities for much of its length.

73 and 75 Veins

Both of these veins are considered to be offshoots of the 51 and 77 veins. The 73 vein has been drifted completely between 20-51 and 20-77 and, if profitable, further drifting along the 1200, 1400, and 1600 levels will probably intersect the 77 vein. The 75 vein does not intersect either the 51 vein or the 77 vein and has been drifted along only three levels, but because of its similarity and parallel alignment to the 73 vein it is also considered an offshoot.

59 Vein

The 59 vein is of relative insignificance both in known size and grade. It has been worked on the 400 to 1000 levels, but not extensively. On the west it is cut by the Empire fault and as yet no vein has been encountered on the other side of the fault which could be called the western offset.

Other Veins

There are numerous minor offshoots of the 55 and 53 veins near the Empire fault. Of these, only several appear on two or three consecutive levels. The 55 vein, from the 1000 level

downwards, has a roughly parallel offshoot dipping at a lesser angle to the north. This offshoot has been named 55 Hanging Wall, or 55 H.W., and the adjacent 55 vein has been named 55 Footwall. The 55 H.W. has not been drifted extensively.

## CONCLUSION

In the author's opinion, based on observation and on casual knowledge of the mine affairs, there is ore still in place on most of the levels. Only a shortage of miners prevents rapid exploitation. In addition to this known reserve continued drifting along all veins has shown no decrease in grade and no indication of the veins running out. For example, the 51 vein appears to become stronger with increased depth and is now being worked over 3000 feet below the surface. It therefore seems safe to say that even on the present known veins there are many years of future production. Deeper and more northerly exploration may even locate new ore bodies. It has in the past.

Could have included to advantage:
① Megascopic characters of the ore
② Associations of gold.
③ Areal distrib. in veins i.e. are the whole veins ore or are there ore shoots? Possible relation of veins to rolls in the vein fractures
④ Any change in mineralogy with depth.

Figure 1.

Figure 2

Rugged topography of Bridge River district

Figure 3 View across valley of Bridge and Hurley Rivers. Bridge R. in left-center.

Figure 4 The canyon of the Hurley River five miles below Bralorne

Figure 5 View south over the broad bench land cut by Cadwallader Creek. Bralorne townsite shown in right-center

Figure 6 The 800 level Crown adit