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PAVILION GOLD MINE

Essay
Submitted

by

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CONTENTS.

	Page
Introduction.....	1
Location.....	1
History.....	2
Previous work in the vicinity.....	2
Geography.....	3
Routes of approach.....	3
Topography.....	4
Climate and vegetation.....	5
Drainage.....	6
General Geology.....	7
Character and composition of rocks.....	7
Cache Creek Series.....	7
Igneous rocks.....	7
Glacial and recent deposits.....	8
Distribution and structural relations.....	9
Metamorphism.....	10
Ore deposits.....	10
General characteristics.....	10
Genesis of the deposits.....	11
Mineralogy.....	11
Values.....	12
Practical applications.....	13
Equipment and development.....	14
Conclusion.....	16

ILLUSTRATIONS

Maps

	Page.
Sketch map showing location of Pavilion Gold Mine.....	1
Property of Pavilion Gold Mines Ltd.....	1a
Sketch map of Pavilion Gold Mine.....	in pocket

Photographs

View from railway showing location of property.....	3
View looking north, showing gorge, terraces, and inner canyon...	4
View of canyon, taken from Pavilion property.....	5
Looking into the valley from Pavilion Mt.....	5
View from the terrace showing sagebrush in foreground and jackpine on the slopes	6
Railway cut showing glacial deposits.....	9
Section of the silt beds in the valley.....	9
View showing dump, headframe, and compressor shed.....	15
The Hut, Pavilion Mt. in the background.....	15

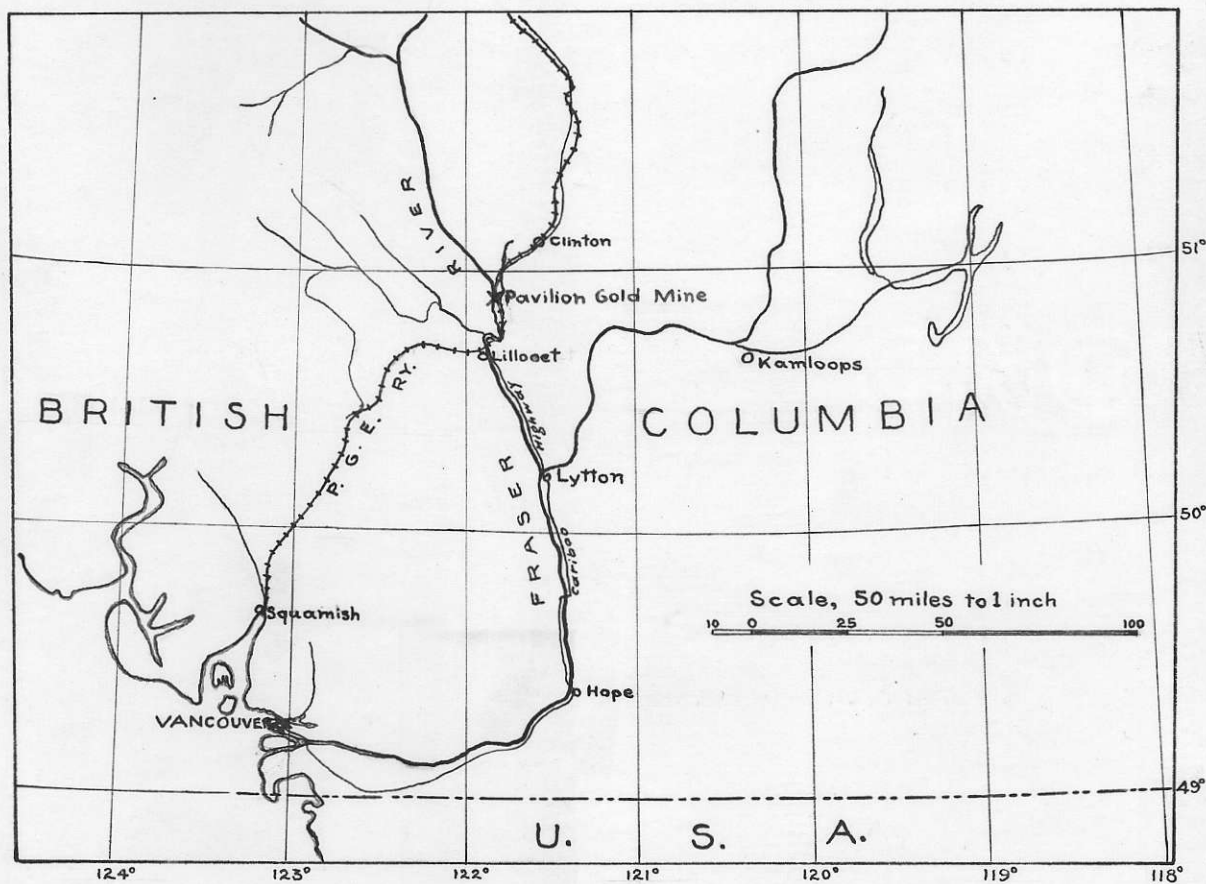
ROCK SPECIMENS.

No.		Page.
1	Argillite of Lower Cache Creek formation.....	7
2	" " " " " " "	7
3	Argillaceous Quartzite of Lower Cache Creek for...	7
4	Limy sandstone of Lower Cache Creek for.....	7
5	" " " " " " "	7
6	Specimen from grano-diorite stock.....	7
7	Sample from outcrop at the shaft.....	10
8	From vein outcrop, 50 feet south of shaft.....	10
9	From silt beds in Fraser Valley.....	8
10	From vein outcrop at shaft (pyrite).....	10
11	From outcrop 2500 feet north-west of shaft.....	10
12	" " " " " " "	10
13	From drift on 75-foot level (pyrite crystals).....	11
14	From 75-foot level (pyrite and chalcopryrite).....	12
15	From fault zone on 75-foot level.....	12
16	From wall rock at depth of 100 feet (hornblende diorite)...	7
17	From wall rock at depth of 165 feet (quartzite impregnated with pyrite	12
18a	Ore from 165-foot level.....	
18b	" " 165- " "	

INTRODUCTION

Location













Pavilion Gold Mine, lying in the rugged gorge of Fraser River, is situated in the Clinton Mining Division of British Columbia. Geologically, the property is favourably located, being in the "Interior Mineral Belt," a general mineral province constituting the eastern contact zone of the Coast Range Batholith.



Sketch Map Showing Location of Pavilion Gold Mine



LEGEND

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PROPERTY
- OF -
PAVILION GOLD MINES LTD.
PAVILION, B. C.
SCALE: 1 IN. = 300 FT.

History

Gold-bearing quartz was discovered in this vicinity about 1872 at the mouth of Kelly Creek. This outcrop, one mile north of the Pavilion property, is now known as the "Big Slide" and has been worked at different times since that date.

Only recently, however, have any further discoveries been made in the locality. In the fall of 1932, J. Anderson found the Pavilion "lead." He staked the ground and commenced work at once. In May, 1933, The Burrard Stock & Bond Ltd. bought from Anderson the controlling interest and organized the Pavilion Gold Mines Ltd. To date there has been no production, operations having been restricted to development work.

I gathered material for this report during the summer of 1933 while engaged at the camp as timekeeper and in surveying the company's claims. In view of my limited knowledge of geology and the technical aspects of mining, my observations must necessarily be of an elementary and descriptive nature. Dr. Schofield was most kind in explaining certain geological features and in lending me his paper on the ore deposits of British Columbia.

Previous work in the vicinity

Geological literature on the area is very limited. In 1887, G. M. Dawson made a survey which covered this part of the country. He visited the Big Slide Mine and in his report advised further gold prospecting in that vicinity. Reinecke made a survey covering the area, but his reportⁱ merely
(i) Memoir 118, Canadian Geological Survey.

mentions the occurrence of a gold lode at Kelly Creek. In April of 1933, A. M. Richmond made a thorough examination of the "Big Slide" property. His observations are contained in the Annual Report of the Minister of Mines for 1932.

GEOGRAPHY

Routes of approach

The geographical location on the east side of the Fraser makes the mine readily accessible. The property is reached from Vancouver in a day's journey either by motor car or by boat and train. The Pacific Great Eastern Railway cuts across one corner of the company's ground, while the highway passes just a mile and a half from the camp.



View from railway showing location of property.

An old construction road leads from the highway in the direction of the property and could be easily repaired to allow trucks to come within three-quarters of a mile from the camp. From this point a trail goes down over the railway to the mine. Another pack trail, seven miles in length, leads from the property along the bench and over the shoulder of Pavilion Mountain

to the town of Pavilion. The nearest railway station is Moran Siding at Mile 146. Supplies, however, are unloaded at Mile 147½ where they are packed on rough sleighs, "snaked" down a steep rock slide, and dragged across the gently sloping bench to the camp. The steep side-hill behind the terrace is one unfavourable feature about the situation of the property. However, a new trail with a good grade and one "switch-back" has been built this fall, thus making the trip to the railway comparatively easy.

Topography

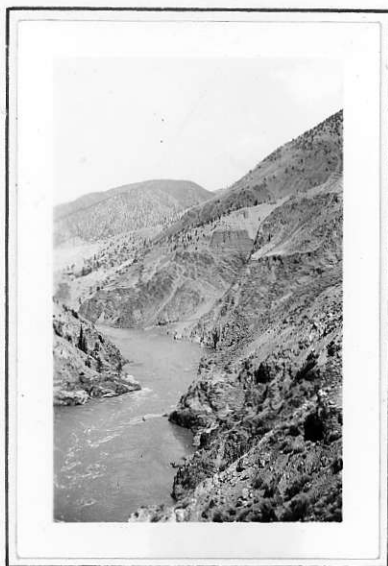
The dominating topographical feature of the country is the rugged gorge-like valley of the Fraser. Here the river, flowing in a southerly direction, forms the extreme western boundary of the Interior Plateau.



View looking north,
showing the gorge, terraces and inner canyon

To the west, within a few miles, the peaks of the Coast Range reach an elevation of 7000 feet, Back of the mine, Pavilion Mountain rises to an altitude of about 5000 feet. The waters of the Fraser boil and thunder in the narrow canyon, 1000 feet

below the terrace on which the mine is situated.



View of canyon,
taken from Pavilion Property
Big Slide Mine in distance

Climate and vegetation

Climatic conditions are typical of the dry-belt country. During the summer it is very hot and arid. Strong winds frequently blow up the valley and fill the air with sand and fine dust.



Looking into the valley from Pavilion Mt.
Effects of arid climate are evident

Rain, which comes all too seldom, lasts but a few hours. Winter does not materially affect working conditions at the mine. It is moderately mild down on the terrace, and the snowfall is light. Lower temperatures, more snow, and cutting winds prevail at the higher elevations.

Vegetation is restricted by the lack of water. Sagebrush and cacti grow on the benches, while the steep hillsides are sparsely wooded with jackpine and mountain fir. Two of the



View from the terrace
showing
Sagebrush in the foreground
and
Jackpine on the slopes.

company's claims lie on these slopes. Timber, suitable for use in the mine, could be cut from these claims.

Drainage.

Kelly Creek, other than the river, is the only stream in the vicinity. Three small springs come to the surface on the property, but the water from them is very alkaline. Moreover, it provides a breeding ground for mosquitoes which infest the country during June and July.

GENERAL GEOLOGY

Character and composition of rocks

Cache Creek Series

The country rock of the region is composed of fine grained argillites (specimens, No. 1, 2, and 3) and cherty quartzites, occasionally interbedded with bands of limy sandstone (specimens, No. 4 and 5). These rocks, belonging to the Lower Cache Creek Series, are the oldest which are exposed in the immediate vicinity. They are Carboniferous in age, probably Permian. The quartzites are grey, and the argillites range from grey to reddish-black. These argillaceous rocks tend to erode rather quickly, splitting off to form tabular pieces of various sizes, ranging from one or two hundred pounds down to small chips. The broken-off pieces keep tumbling down the steep valley walls and form a loose talus.

Igneous Rocks

On the property, 400 feet north-west from the camp, a grano-diorite cliff (specimen No. 6) has been exposed by the down-cutting of the river channel. This igneous intrusion is of Jurassic age, probably an off-shoot of the Coast Range Batholith. 400 feet north-east of this grano-diorite rock, the main quartz vein outcrops through the argillite. Samples from the shaft show the wall rock to contain a green-black hornblende porphyry at a depth of 100 feet, underlain again by grey quartzite. All the wall rocks are impregnated by pyrite. The hornblende diorite in the shaft is probably a metamorphic phase of the grano-diorite stock.

In his report,ⁱ Reinecke describes some igneous rocks, probably old lava flows now much metamorphosed, as occurring in the Cache Creek formation near Pavilion. Dawson mentions the presence of green altered diabases on the Railway near Moran Siding.

Glacial and recent deposits

Fine grey silts are found deposited at intervals along the Valley of the Fraser. They are thought to have been laid down at the close of the glacial epoch. Their occurrence, only in the valley of the river, together with their thickness and very pronounced bedding planes, indicate that the silts were deposited by a heavily-laden river. These beds of silt are very quickly eroded; when baked in the sun, they crumble into fine sand which slides into the river below and is then carried away to the sea.

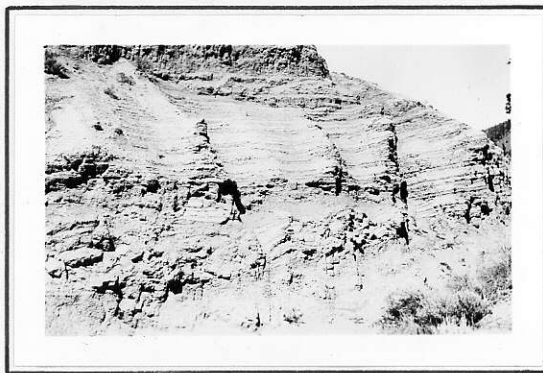
The terraces along the Fraser owe their level surfaces to the deposits of sand and river gravel which are laid down on old flood plains. In places, these deposits have been washed away again when the river continued cutting its channel deeper into the underlying rocks.

High up on Pavilion Mountain, there are some deposits of glacial or interglacial origin. I found striated pebbles in one of these gravel beds.

(i)Reinecke, L., Memoir 118, G.S. C., page 9



Railway cut
showing glacial deposit



Section of the silt beds
in the valley

Distribution and structural relations

Dawson divided the Cache Creek Series into an upper and lower portion, mapping these two divisions separately. The lower Cache Creek rocks outcrop in two long strips, one of which follows the east side of the Fraser from Eleven Mile Creek, north of Lillooet, up the river past Kelly Creek.

"Cache Creek Rocks have a general strike of 20 degrees to 25 degrees West and lie in a great syncline whos trough-line runs along Pavilion and Marble Mountains with the lower portion of the formations dipping under the upper limestones from both the east and west sides."

The diorite intrusion on the property is the southern contact of a small stock that extends north for about 4 miles past the "Big Slide." The veins of the Pavilion and Big Slide mines are related to this stock: both belong to the same vein system.

(i) Reinecke, Leopold, Memoir 118, G. S. C., page 9, 1920

Metamorphism

All the rocks in the area have suffered metamorphism, probably a direct result of the Coast Range Batholithic intrusion. Faulting and shearing are also very evident; sample No. 7 shows slickensiding. Numerous quartz stringers which dissect the argillites bear evidence to the fracturing that took place at the time of igneous intrusion. This metamorphic phase would explain the quartz porphyries and hornblende andesites seen on the railway 3 miles south of the property.

ORE DEPOSITS

General Characteristics

The ore deposits occur in a quartz fissure vein that averages 2 feet in width. The vein strikes North 49 degrees West, dipping to the West at an angle of 85 degrees. It has been uncovered at a number of points along the surface for a distance of 350 feet. Samples, No. 7, 8, and 10, from these open cuts show green copper stains, iron pyrite, and chalcopyrite; also limonite, azurite, and malachite.

Another good outcrop occurs right on the strike of this vein, 2500 feet from the shaft. Here on the bank of the river, exposed at low water, is a 3-foot quartz vein containing iron pyrite and green copper stains (sample No. 11 and 12). In all probability, this is an outcrop of the same vein. This would give a horizontal extension of at least 2800 feet.

Mineralization is continuous throughout the vein, and not restricted to segregated ore bodies. One fault, with a horizontal displacement of 7 feet, was encountered in the top drift. There are some minor quartz stringers on the property, but they contain little or no mineral. The Pavilion ore is of a type that would allow of a good mechanical separation of the valuable mineral from the gangue.

Genesis of the deposits

The origin of the quartz deposits is traced to the granodiorite stock. It is probably that the fissure was filled by solutions from this stock which in its turn came from the great molten mass of the Coast Range Batholith. The solutions, carrying the gold and other mineral substances solidified to form the quartz vein. Cooling must have been slow, for the crystals of pyrite are large (sample No. 13).

In discussing the ore deposits of British Columbia, Dr. Schofield makes this remark: "I drew attention to the fact that the evidence collected by many observations, over a period of 20 years, all pointed to the ore deposits of British Columbia having been formed from solutions derived from the granodiorite intrusions of Mesozoic age, or to be more exact, probably of Upper Jurassic age."¹

Mineralogy

Quartz is the chief gangue mineral in the deposit. The quartz carries a little gold and silver, a large percentage of iron pyrite and chalcopyrite, and lesser amounts of bornite, pyrrhotite, and arsenopyrite.

(1) reference given at the foot of page 12

The pyrite and chalcopyrite occur together in large crystalline masses throughout the quartz (samples No. 14 and 15) and impregnates the wall rocks (sample No. 17) at various points.

Mineralogists have shown that pyrite, arsenopyrite, and pyrrhotite are by far the most usual minerals that carry deposits of gold. In the Cariboo, arsenopyrite seems to be the best indicator of gold; while in the Lillooet district, iron pyrite is the more likely mineral to carry gold. Pavilion mine possesses a high pyrite percentage, but that of arsenopyrite is low.

Just how the gold is associated with iron pyrite, would be difficult to determine. The indications are that it is a mechanical association. A German mineralogist has recently shown that the association of gold with pyrite is of a mechanical, not of a chemical nature.

Values

A determination of the values must be based on assay returns. During the summer I was able to take some samples from the mine. Except in the case of two grab samples, I used a single-jack and moils, taking care to make a good channel cut across the vein. The assays were made by J. R. Williams & Sons, Provincial Assayers, Vancouver, B. C.

(i) Schofield, S. J., Ore Deposits of B. C.

Assay Results, Pavilion Samples

Sample No.	Level	Width feet	Gold oz./Ton	Silver oz./Ton	Copper percent.
100 A	Surface	2.4	Trace	Nil	1.20
101 A	Surface	2.5	Trace	Nil	2.1
103 B	Surface	3.1	.03	.40	3.47
200 A	75 ft.	1.5	2.96	2.26	9.3
201 A	Grab		0.3	0.65	6.2
202 A	75 ft.	1.3	1.25	3.7	7.2
300 A	165 ft.	1.6	.10	1.9	8.2

Although the above assays show conflicting variations, the results are, on the whole, reassuring. Gold averages 0.66 ounces per ton and silver, 1.3 ounces per ton. These averages include two surface samples. Since the exposures are will oxidized and weathered, the surface samples have a lower value than the ore down in the mine. The copper content has an average of 5.4 percent. Sample No. 200 A, selected from a heavily mineralized portion of the vein, assayed \$59.20 in gold and \$2.26 in silver. (Gold valued at \$20 per ounce and silver, at 40¢ per ounce.) The average gross value of the ore is \$27 per ton. However, only the gold and the silver could be considered as a possible source of profit.

Practical Applications

Mining is essentially a practical operation, carried on for profit. Quantity and value are the basic factors which determine whether or not a given mineral deposit justifies investment. Values, as shown by the assays, are promising. Quantity,

too, makes a good showing. It must be remembered that three feet is the minimum width which is practical to mine by machine-stopping. The Pavilion vein, for a depth of 150 feet at least, averages only 2.1 feet, thus cutting down the value of the ore that would be mined. A widening of the vein at depth will materially increase possibilities. With this in view, the proposed cross-cut should be driven near the outcrop on the river bank, (see map of property, page 1a), to try to intersect the vein at as low a level as possible. It is most necessary that frequent and careful sampling be carried on during all the prospect work, since pyrite high in gold can occur in the same deposit with pyrite carrying little or no gold.

The question of better value at greater depth is one that cannot be easily foretold. Indeed, this very problem exists in all the gold quartz veins in the Cariboo. Until it has been answered correctly, quartz mining in this district must remain a rather speculative procedure.

EQUIPMENT AND DEVELOPMENT

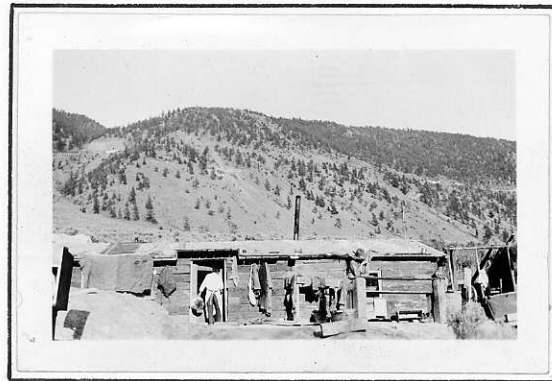
Since the Burrard Stock & Bond Ltd. took control of the mine, development has gone ahead rapidly. A Sullivan portable compressor was installed to drive a jack-hammer, a drifting machine, and an air hoist. The bucket which was shipped at the same time was too heavy for the hoist, so an improvised bucket was made from an old oil drum. A 30-foot headframe was built with old bridge ties "borrowed" from the Pacific Great Eastern Railway. The shaft has been lined to a depth of 80 feet with



View showing dump,
headframe, and compressor shed

poles cut from the hillside. Timbering in the drift has not yet been necessary. There is a good blacksmith's shop at the head of the shaft.

Living conditions are anything but comfortable. The bunk-house, dining-room, kitchen, store-room, and office are all combined in a squat, 15 by 25-foot hut. The drinking water is



The hut,
Pavilion Mt. in the backgroud

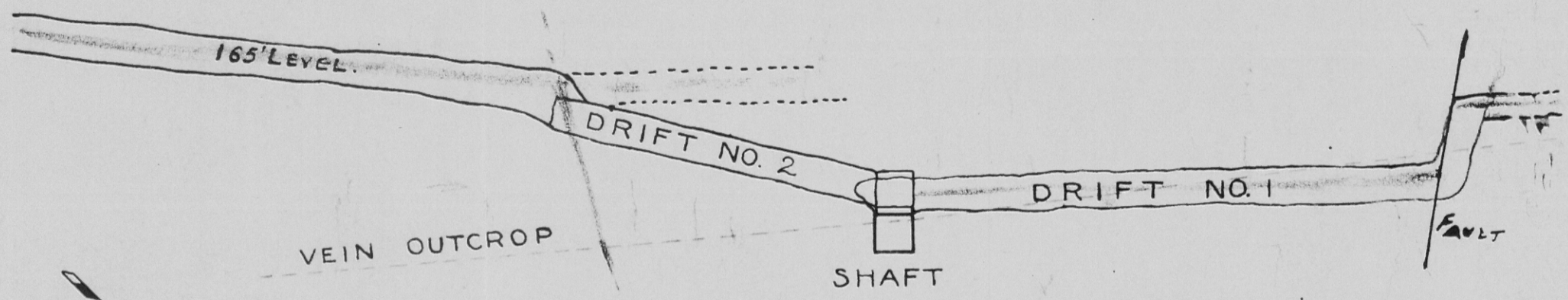
supplied by the spring behind the bunk-house and is so alkaline that the men can scarcely swallow it. To wash in it with any

degree of success, is quite impossible. (I tried.) It cannot be stressed too strongly that an improvement in living conditions is a prime necessity. Until they are improved, satisfactory work from the crew can hardly be expected. Drinking water could be packed up from the river in two large bags, slung on a pack-horse. One trip a day would supply a crew of twenty men. Sleeping-quarters away from the cook-house could be built at a low cost, thus enabling the night crew to sleep undisturbed during the day.

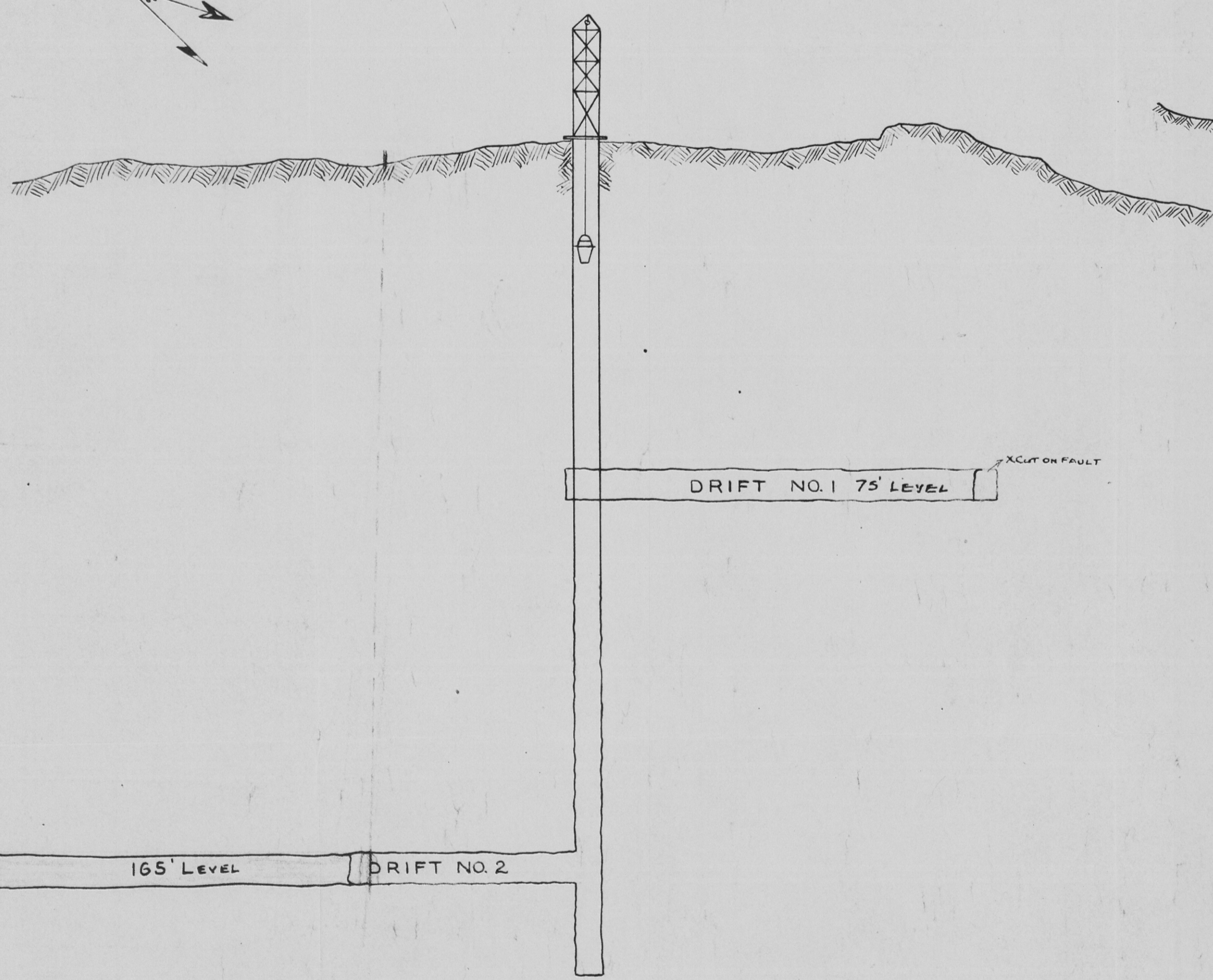
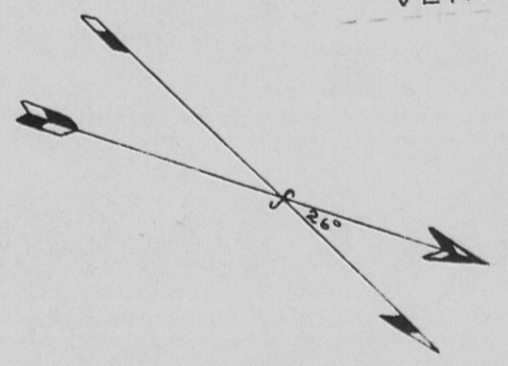
CONCLUSION

Results of the prospect work on the Pavilion property have gone far toward proving its possibilities. The main vein, averaging two feet in width, is persistent along the outcrop for at least 350 feet, with a possible extension of 2800 feet. Depth is well assured, while the mineralization is continuous and fairly heavy. Assays show the ore to carry values in gold that average \$13.20 per ton.

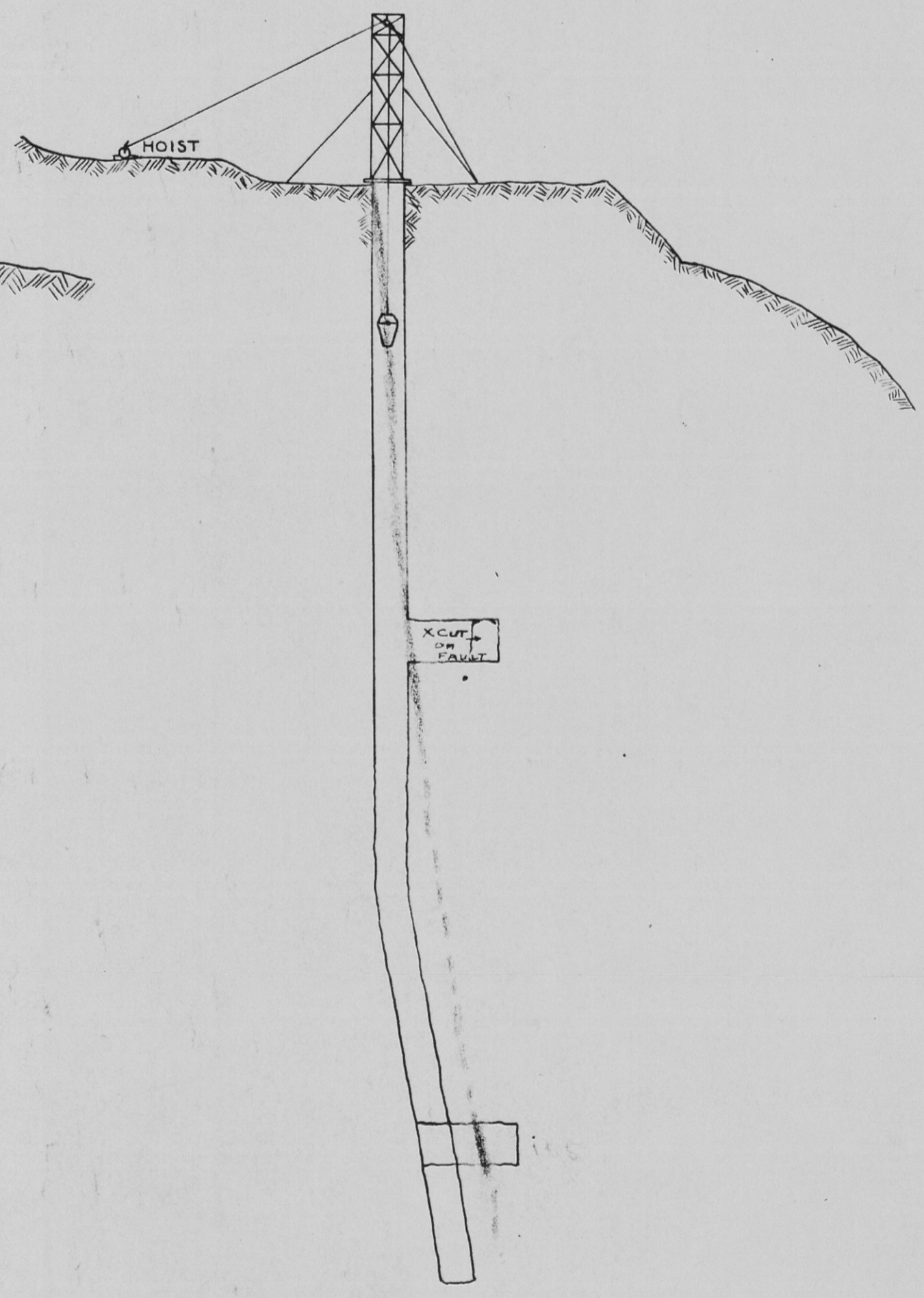
In conclusion, I have no hesitation in stating that the Pavilion Mine ranks as one of the best prospects in British Columbian gold fields.



PLAN OF UNDERGROUND WORKINGS



LONGITUDINAL SECTION
LOOKING WEST



TRANSVERSE SECTION
LOOKING SOUTH

SKETCH MAP
PAVILION GOLD MINE
SCALE: 1 IN. = 20 FT.

