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August 16th, 1934.

Robt. Dunn, Esq.,  
Deputy Minister of Mines,  
Victoria, B. C.

Sir:

re Tertiary Mine  
Cariboo Mining Division.

I beg to acknowledge your letter and enclosures of the 26th instant with reference to the above-mentioned property. In reply, I am enclosing for your information all the published reports we have on this particular property. The 1926 Report by Mr. Douglas Lay is probably the most detailed.

On perusing Mr. Lay's report in connection with the summary of the report by Mr. Donald D. Fraser, I do not know just how the said figures are arrived at, namely, a gross profit of \$337,500 per year when operating at 300 tons per day. Mr. D. D. Fraser operated for several years at this property and, according to Mr. Lay's 1926 Report, the values of the gravels did not exceed between \$150. and \$2.00 a ton.

Basing a computation on Mr. Fraser's assumed width of paystreak, namely 100 feet, (which I would point out is roughly twice as wide as the paystreak average in the old section of the company workings, and nearly eight times as wide as the paystreak in the last 400 feet of workings done up to the end of 1926), and using a channel length equal to the length of the property, namely 4,400 yards, and further assuming that it will be necessary to mine the 6-foot bedrock section of the gravels, and also assuming an average value of \$3.00 per cubic yard, the gross value of the gold content is only about \$871,000. 00, which is very different than the figure arrived at by the gentleman who summarized Mr. D. D. Fraser's report.

PROPERTY FILE

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Mr. Fraser's costs in 1925-1926 were apparently about \$1.25 per ton, roughly \$1.80 per cubic yard. Subtracting this operating cost from the gross value of the metals in the ground, the net total profit on the above basis of estimation before allowing for plant depreciation and interest, would be \$350,000.

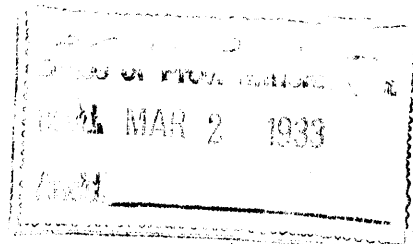
In the 1929 Annual Report on page 198, Mr. Lay says: "At Cottonwood canyon on the Fraser river, where the channel is between 800 and 900 feet wide, the ground has been worked intermittently for 20 years without any great success." He further states: "They are now attacking the channel 20 miles north of the old workings, where they expect higher values as well as improvement in the bedrock conditions." Mr. Lay also states: "If this proves correct as to values and they are able to recover 50 per cent of the gold, they should have a paying proposition."

With reference to production from the Tertiary mine, we do not segregate individual production from placers on account of the many small lots of gold that are received, and furthermore, the reports very often come in from banks and small store-keepers who purchase gold from the individual miners.

I have the honour to be,  
Sir,  
Your obedient servant,

Resident Mining Engineer.

AMR/KB



TERTIARY CHANNEL.

Canyon Creek Section.

SUMMARY.

The "Cariboo Syndicate" controls four miles of the Tertiary Channel in the Cariboo District of British Columbia. This ancient placer deposit has been opened at the Cottonwood Canyon of the Fraser River, where is disclosed a Channel some 900 feet wide, estimated, at that point, to carry over \$200.00 in gold to the lineal foot of Channel, with a yield of over \$40,000.00 from underground mining there.

Recognizing the possibilities of the deposit, the "Syndicate" reasoned that, since the country traversed by the Channel was many times richer in gold bearing veins in the vicinity of Canyon and Hixon Creeks than at the Cottonwood Canyon, the Tertiary Channel would, in that section, hold very rich placer deposits. After securing the ground, they drilled one hole at Canyon Creek but it was located too far to the west and bottomed on the rim of the Channel. It is now desirable to carry on this testing work by drilling a line of holes across the Channel at Canyon Creek, at an estimated cost of \$10,000.00.

The possibilities of these holdings can not be definitely gauged until additional information regarding the area is known. The hypothetical case based on possibilities will give some idea of the possible profits. A conservative expectation for values in the bedrock gravels in this section would be \$10.00 a ton and the width of the pay streak might conservatively be taken at 300 feet. Such values would give a gross value of \$6,336,000.00 to the mile. Working costs might be taken at \$1.00 a ton, which would leave a profit of \$5,700,000.00 over working costs. On a capitalization of \$100,000.00, these figures show a very handsome profit.

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TERTIARY CHANNEL  
of  
CARIBOO, B.C.

LOCATION.

The "Tertiary Channel" is located in the Cariboo Mining Division of British Columbia. It parallels the course of the Fraser River, to the east, from the east of the town of Prince George to the Cottonwood Canyon, where the Fraser River turns east and cuts across its course.

The holdings of the "Cariboo Syndicate" control the entrance to the Channel, where it crosses the valley of Canyon Creek, midway between the towns of Prince George and Quesnel. The shaft and drill hole, sunk by the Syndicate, are near the NW corner of Lot 3175.

ACCESSIBILITY.

The holdings of the "Cariboo Syndicate" can be reached from either Prince George or Quesnel. From Prince George, on the Canadian National Railroad, an auto can be driven south over the Pacific Highway 44 miles to the camp. From Quesnel, the northern terminus of the Pacific Great Eastern Railroad, the same highway can be taken north 37 miles to the location.

The extended line of the Pacific Great Eastern Railroad crosses the property at Canyon Creek, so with development of the railroad, rail transportation will be available on the property.

PROPERTY & TITLE.

The property held by the "Cariboo Syndicate" is composed of one creek lease, one half-mile square, covering the valley of Canyon Creek and one hydraulic lease, adjoining to the north, which is 1500 feet wide and 2323 feet along the Channel. These leases were granted in 1932 for a twenty-year period with renewal privileges. They carry the rights to all placer within their limits. Additional area can be secured adjoining both to the north and the south, where the overburden is a couple of hundred feet thicker.

TOPOGRAPHY.

The section between Prince George and Quesnel is a portion of the Interior Plateau of British Columbia, which has been left as a relic of the glacial period. This plateau lies at an elevation of some 2500 feet above sea level and, originally, must have been fairly level. With the elevation of the West Coast of the continent at the end of the glacial period, the Fraser River and its tributaries have cut deep below the plateau level.

To the east of the section lies the Cariboo Range, of a rounded profile, resulting from heavy glaciation. This range is composed of granodiorite intrusions and the older schist series. In its upper reaches the Fraser River flows westerly and cuts thru this range east of Prince George and then swings south paralleling the range some fifteen miles to the west, thru the section covered by this report.

In a general north and south line, the Fraser River has cut some 600 feet below the plateau level. Thru the section of interest, Canyon Creek and its tributaries are the only streams which have cut the plateau level at right angles to the course of the Fraser River.

DESCRIPTION.

The Tertiary Channel is a portion of the oldest of the three main channel systems of the Cariboo. The bedrock level of this channel system is slightly higher than the level of the present streams and its course has been traced from the Cottonwood Canyon of the Fraser River, northward some twenty-five miles, past Hixon Creek. From the general configuration of the surface contours and, with regard to our geological knowledge of the section, it is probable that this Channel remains intact for some forty miles north of Hixon Creek, where it turns eastward. In other words, the Tertiary Channel roughly parallels the course of the Fraser River, from some point east of Prince George to the Cottonwood Canyon, where the river cuts across its course and gives the only cross-section of the Channel visible.

As seen at the Cottonwood Canyon, the schist bedrock is covered by some 400 feet of channel sediments, which in turn is capped by a heavy layer of glacial debris. Northward from the Cottonwood Canyon, where the bedrock elevation is about 1600 feet above sea level, the overburden is least in the valley of Canyon Creek, some 20 miles distant, where the surface elevation is approximately 1975 feet above sea level. Bedrock at that point is probably about 200 feet below the surface. At Hixon Creek, the estimated depth is 400 feet and elsewhere along its course greater.

The cross-section seen at Cottonwood Canyon shows a channel some 900 feet wide, which is probably considerably in excess of the average width, as along the left limit, the Channel has locally widened in that direction and formed a deep gutter along a strata of very soft schist. The gravels, sands and silt filling the Channel are unique in the district, partially as they are cemented throughout and partially due to the bluish color imparted by the predominance of granodiorite boulders and sand. On bedrock is a layer, varying in thickness from a few inches to over thirty feet, of coarse gravel composed of quartz, granodiorite and rocks from the schist series, which carries the main gold values. Above are layers of sand, smaller gravels and silt, with considerable carbonized wood, with lesser gold values.

At Canyon Creek, the only other point along the Channel where the overburden has been sufficiently eroded to expose the gravels, the same bluish gravels are to be seen. The main difference apparent in the gravels is the larger percentage of granodiorite boulders and the large amount of mica in both the gravel and sands. Here the gravels are cemented as at the Canyon. The distinctive feature of the gravels at this point is the displacement of the upper gravels, due to subsidence toward the valley of a newer, deeper channel to the west, which was subsequently filled to an elevation fully as great as the gravels of the Tertiary Channel. The amount of this displacement is not definitely known, but, horizontally may be about 500 feet with a possible 200 feet vertical displacement.

From above Hixon Creek south to the Cottonwood Canyon, the Channel crosses schistose bedrock with many intrusions of granitic rock. At Hixon Creek, the rock along the right limit is a syenite granite and the left limit a highly altered schist. Drilling at Canyon Creek showed granitic bedrock. At Whites Landing, a fairly large intrusion is known to exist between the Channel and the present river. At the Cottonwood Canyon the bedrock is schist, but exposures along the Fraser River indicate that about a mile of granitic bedrock will be encountered a short distance back from the Canyon.

#### MINERAL POSSIBILITIES THRU SECTION TRAVERSED BY CHANNEL.

The area immediately contiguous to Hixon Creek might be termed the focal point of mineralization in the section between Prince George and Quesnel. To the east of Hixon Creek are the largest intrusives of granitic rock, which is usually associated with mineralization. From Hixon Creek south to the Cottonwood Canyon, there is but one known vein which carries appreciable gold values. That vein lies some eight miles north of the canyon, and assayed \$8.00 a ton in gold. It is a small vein of no economic importance. The most of the area is heavily covered by glacial debris, so that other veins may occur, altho there is very little evidence along the Fraser River, where the rock is exposed.

The schistose rocks in the valley of Hixon Creek are cut by many gold-bearing veins. The creek, from the point where it crosses the Tertiary Channel upstream for some distance, is now covered by mineral claims. One of the holders told me that over a width of 2200 feet the average value was \$1.80 a ton. 2000 feet from the left limit of the Channel is the shaft of the Quesnel Quartz Mining Co. The shaft was sunk about 1885 to a depth of 200 feet, from which there are numerous lateral workings. The total production is not known, but Bowman reported in 1886 that the ore milled showed a recovery of over \$20.00 a ton, with no recovery from the concentrates. The ore bodies were said to be rich but lack continuity.

Previous placer production is not known, altho variously estimated up to \$1,500,000., which is undoubtedly high, but does indicate that considerable placer gold has been recovered from the post glacial concentration. Elsewhere thru the section the placer production has been negligible.

## PREVIOUS WORK DONE ON CHANNEL.

### At the Cottonwood Canyon.

The only yield of the Channel has come from the Tertiary Mine, located on the north side of the Cottonwood Canyon, where it is estimated that \$40,000. or more has been recovered. Some 1500 feet of the Channel has been mined thru tunnels. The last 700 feet mined yielded \$16,000., with recoveries varying from \$1.50 to \$5.35 a ton, averaging about \$2.00. Mining costs are about \$1.25 a ton.

The gravel is drilled with compressed air drills and shot with 40% or 60% powder. The broken gravel is trammed to the surface and washed thru a sluice box to save the gold. Blasting frees the gold, which is fairly coarse and easily saved, sufficiently to save practically all of it. Nuggets up to \$27.00 have been recovered, altho the most of the gold recovered is small.

All the underground work done at this point was in the gutter of the Channel, along the left limit. The width of the pay gravel varied from about 100 feet at the river to about twelve feet at the head of the workings, 1500 feet distant. The grade thru the workings is 3.1%. Towards the head of the workings, the gutter was rising to meet the main trough of the Channel, which caused the heavy grade and the narrowing of the pay streak. A study of the rock formation showed that the Channel was leaving a hard formation ahead and breaking into the soft argillites. The formation of the gutter and the consequent steep grade had a distinctly retarding effect on the concentration. This point is well brought out in the fact that, of the estimated \$300 per lineal foot of bedrock gold, about 13% was recoverable in pay gravel. The balance was scattered over some 800 feet of bedrock towards the right limit.

About 2½ miles from the Canyon, a shaft was sunk along the course of the Channel. This shaft was 100 feet deep but it did not penetrate the overburden. The collar of the shaft was estimated to be 400 feet above the bedrock at the Tertiary Mine.

### At Canyon Creek.

In 1929, the Cariboo Syndicate sunk a shaft on the exposure of Channel gravels in Canyon Creek. The shaft was sunk to 85 feet when too much water was made to be bailed, one shift only working, and a hole was drilled from the bottom of the shaft to a depth of 175 feet, encountering bedrock at 160 feet. In picking a point to sink this shaft, there was very little data to go on, as the rim to the west had been destroyed by the late Tertiary deepening of the Fraser River and the east rim was covered by glacial material. For lack of a better site, a point was selected midway across the exposure. Soon after work started, it was recognized that the gravels were tilted some 26 degrees to the west. The lower 30 feet of the drill hole showed a broken formation and it bottomed on the west rim of the old Channel, and no gravel was encountered on bedrock.

## CONCLUSIONS.

### TENOR of Bedrock Gravel in the Holdings of Cariboo Syndicate.

As no actual tests of bedrock gravels have been made on the holdings of the Cariboo Syndicate, no figures can be given regarding the gold content of the property. It is however axiomatic of placer deposits that the maximum gold content of the channel will be found a short distance downstream from the richest mineral zone cut by that channel. Downstream from that point the gold content of the gravels gradually diminishes.

The concrete data to be had regarding the Tertiary Channel is the location of the main mineral zone along the Channel at Hixon Creek and the existence of very appreciable amounts of gold in the Channel 20 miles downstream at the Cottonwood Canyon. No other conclusion can be drawn than that the total gold content in the Channel near Hixon Creek must be many times greater than found at the Cottonwood Canyon.

The fact that gold does not travel far after entering the channel is well exemplified on Upper Lightning Creek, where practically the whole production, estimated between \$8,000,000 and \$13,000,000, was made from two and one-half miles of channel where it circled the foot of Burns Mountain, which carries many gold-bearing veins. Below that stretch, the value per foot of channel decreased rapidly and only fine gold was found.

The total bedrock gold estimated in the Channel at the Cottonwood Canyon is in excess of \$200 to the lineal foot. With the average width of the Channel of 500 feet, which seems likely at that point, the average of all the gravel on bedrock would be \$1.25 a ton, which would just cover working costs. From these figures and from results obtained in like deposits in California it would seem a reasonable expectation that in the holdings of the Cariboo Syndicate, the pay gravel should run \$10.00 or more a ton.

Comparable figures in other fields may be cited. The Tertiary Channels of California yielded \$300,000,000., with channel values running from \$70 to \$500 to the lineal foot. At Nome, Alaska, the principal creeks were values at \$100 a foot. The White Channel in the Klondyke ran \$380 a foot and the Berry drift mines in Victoria, Australia, from \$440 to \$1293 a foot.

Testing Required.

A cross section of holes drilled at Canyon Creek should definitely establish the desired information. Starting with the hole now drilled, two or three additional holes should be drilled at intervals of not over 400 feet. The bedrock contour, as established by these holes would govern additional drilling but it is probable that five holes would establish the necessary information. From evidence at hand, the depth of drilling necessary should be set at 200 feet but it is possible that the Channel bedrock will be found at a much less depth. The cost of this work should not exceed \$10,000.

Until this work is done and the information gained is interpreted, it would be futile to give recommendations for operating purposes. It will suffice to say that the area will have to be mined thru shafts and the total amount of capital required to bring one shaft into production should not exceed \$50,000.00.

Dated: Quesnel, B.C.  
February 3rd, 1933.

*Donald D. Fraser*

Donald D. Fraser, B.S., E.M.



