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REPORT  
of the  
"TERTIARY" CHANNEL  
in the  
QUESNEL MINING DIVISION  
of  
BRITISH COLUMBIA

PROPERTY FILE 93G041

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INTRODUCTION

The existence of a concentration of placer gold in the section of an old channel exposed to the Fraser River in the Cottonwood Canon, has been known for many years. The first work done on it was by the Chinese, who gophered into the bank on bedrock but did not advance far from the surface. The bedrock gravels are cemented fairly tightly and the Chinaman does not take kindly to the use of dynamite for blasting. Some forty years ago, the late Senator Reed took a lease of the ground and caused a tunnel to be driven into the bank. This tunnel was advanced a little over 100 feet on one rim of the deep gutter of the channel. Thruout its length, it made a curve and ended in the same rim as the portal. Judging from the evidence in sight at the time, an engineer sent to report on the property, said that the deposit was left by the Fraser River, as it cut down in its present course and would be found to be of local extent only. This viewpoint was apparently accepted as stating the facts, for no more work was done until the Reed lease had lapsed. At the expiration of this lease, Bob Brittle, a practical miner, staked a record claim of 250 feet square on the ground adjoining the river. He started working the ground adjoining the Reed tunnel with good success. Some time later, the adjoining upstream ground was staked by Don Killam, another practical miner. Killam tapped the channel thru a 100-foot bedrock tunnel and continued work for ten years. In 1917, Killam sold out to the Tertiary Mining Co., Ltd., of Chicago for \$36,000. This company held the ground until 1923, when it was taken up by the present partnership, known as the Tertiary Mine, Limited Liability. Before Killam had spent many years at the work, it was evident that the deposit was a filled-in bed of an old river course, which apparently bore no relation to the present Fraser River. As will be noted on the accompanying map, the course of this old channel made a very small angle to the course of the Fraser River, and that course, if extended upstream, would be again

cut by the Fraser River a couple of miles ahead, as the river curved to the north. As it was evident that such was not the case, it was reasoned that the channel also made a curve in the same direction. Such a curve, altho a very slight one, was encountered in 1923 but it was not possible until 1926 to get any definite idea of the probable direction towards the headwaters of this old channel.

The channel has now been explored far enough to fairly accurately gauge this direction and sufficient knowledge has been gained regarding the nature of the deposit to base a report on the possibilities of the virgin ground upstream. It is considered by the owners, by whom this report is being made, that the possibilities of finding, not only a commercial deposit but a deposit of the bonanza type, are exceedingly good. Desirous of interesting capital in the deposit, the available data has been gathered and the significance of these facts, as seen by the writer, are embodied into this report.

#### LOCATION

The point where this old channel, locally known as the "Tertiary Mine", is exposed to the Fraser River is located 20 miles upriver from the town of Quesnel. The customary route taken to this point is to cross the Fraser River on a ferry at Quesnel and follow the Blackwater road for nine miles, thence six miles on a side road to the Fraser River at the Cottonwood Canon, a total of 15 miles over a road passable to automobiles. At the Cottonwood Canon a boat is used to cross to the Tertiary Mine. Quesnel is a town of some 300 population and is the distributing point for the district. It is the northern terminus of the Pacific Great Eastern Railroad, over which it is 23 hours to Vancouver.

#### TOPOGRAPHY

This section of country is embraced by the Quesnel Mining Division. The contours of the district have been smoothed over by a heavy deposition of glacial debris, which has resulted in a rough plateau, extending from the Cariboo Range, some 50 miles to the east, to the Coast Range in the west. The Fraser River runs in a general north and south line thru this plateau. It has cut thru the covering of glacial debris and well into a thick body of pre-glacial sediments, which had filled the old drainage valleys. After leaving the Fort George Canon,

the river flows southerly between high banks of small stratified gravel nearly to Whites Landing. Here it makes an abrupt turn to the west and cuts thru the Hixon Creek Range. It then flows southerly and turns east at the Cottonwood Canon. After leaving the Cottonwood Canon, it again flows southerly between banks of small stratified gravel about 300 feet high. From Whites Landing to the lower end of the Cottonwood Canon, the river has cut down thru rock, which can be seen on both rims for most of the distance. The main rocks thru this section are the Cariboo schists but a body of syenite-porphry crosses the river course at the head of the Cottonwood Canon. To the east of the Fraser River, gold-bearing quartz stringers are known to exist from above Hixon Creek to a point some ten miles south. Course gold has been recovered from the placers of Hixon Creek and the vicinity and an unsuccessful attempt was made to mine the quartz at that point. Along this stretch, the rock can be followed to an elevation of 1000 feet or more above the river and for some seven miles to the east. Following farther east from the river, glacial debris covers all croppings.

#### METHOD OF REASONING USED IN THIS REPORT

Since the existence of a concentration of gold in this channel is a proven fact, thru the workings of Brittle, Killam and others, the location of the upstream course of this channel is considered of prime importance. With the course towards the headwaters established, it will be possible with some accuracy, to locate the source of the gold. Then by ascertaining the probable grades and the nature of the bedrock existing in the channel, a good idea of the degree to which the gold has been concentrated in the various sections of the channel can be gained. By using the known gold concentration in the section mined as a basis, it will be possible to reckon the concentration to be expected in the various sections upstream.

#### UPSTREAM COURSE OF THE CHANNEL

The direction taken, when tracing the upstream course of this channel, is indicated at two points. The first, is that section of the channel, some 1500 feet long, worked at the Tertiary Mine. The second point is found in the valley of a small creek about three miles upstream. This stream, flowing transversely to the course of the channel, runs on bedrock for six or seven miles from the summit, at an elevation of some 1000 feet above the river, until it meets the river gravels, with the

exception of an interval of about 2000 feet, where the rock dips below the surface. This interval in the rock begins at a point three-quarters of a mile above the mouth of the stream and extends upstream. It lies well in line with the course of the channel as indicated in the Tertiary Mine workings. At this point the mud banks have slid into the stream on the north side, covering the natural bank and on the south side, the stream has cut a large half-circle, which has been partially filled with slides. The banks rise on either side at this point from 150 to 200 feet.

Following along the probable course of the channel above this stream but little information can be gained. It does not appear that the Fraser River has again cut the channel, at least as far as the mouth of the Blackwater River. High rock rims follow along the Fraser River, with but few breaks, up to that point. Above the Blackwater, the Fraser makes a decided turn to the east and a gap is again found in the rock and a short distance upstream the rock again can be seen. Whether or not the Fraser River cut the channel at that point is not known but it does seem possible. From the general continuity of the rock rims along the river up to this point, it seems highly improbable that the channel was cut farther downstream. Along the eastern side of the channel course, above this stream, high rock can be followed for a number of miles, which forces the channel to keep well towards the Fraser River. It is altogether possible that, some distance above this stream, the channel swings to the east and encounters the river at Whites Landing.

#### SOURCE OF THE GOLD

The physical characteristics of placer gold often indicate the distance it has travelled since leaving the solid rock. The gold found in the Tertiary Mine is almost all what is termed heavy gold, as in contradistinction to flour and flake gold. The two latter types are often carried many miles from their source but heavy gold is seldom transported great distances.

At the Tertiary Mine nuggets of solid gold to the value of \$3.00 and \$4.00 are occasionally found and nuggets of gold with adhering quartz to as high as \$27.00. A very noticeable feature of the gold recovered is the quantity of quartz found adhering to the gold. The quartz is dark in color and very hard. In such nuggets, both the gold

and the quartz are well worn by water action. The larger nuggets of solid gold would indicate a fairly local source. Many of the solid nuggets are worn smooth on one side and are but partially worn on the other, indicating that the gold was worn on one side while the quartz was still attached to the other side and, after being carried some distance down the channel, the quartz finally broke off and that side of the gold was partially worn. Since the addition of the quartz to the gold in the nugget would lower the specific gravity of the body, such nuggets might quite easily travel quite a ways. Taken as a whole, the character of the gold would indicate a source, while fairly local, might very easily be several miles away.

I have sampled and assayed various likely looking strata along the Fraser River in the vicinity, in hopes of finding some local evidence of the source of the gold but rarely got more than a trace. The nearest known source and I believe the nearest main source, is located on top of the mountain just east of the channel course, about 8 miles from the Tertiary Mine. Here the schist bedrock is exposed over quite an area and is laced with a network of stringers, which are gold-bearing. I have never sampled any of this rock but know of one assay which returned \$9.00 to the ton in gold. These exposures are probably the southern extension of the Hixon Creek gold belt. They lie a good 1000 feet above the Fraser River and, in all likelihood, as the Tertiary Channel gradually deepened its course, the gold from this section enriched the channel.

#### BEDROCK AND BEDROCK GRADIENTS

As with all streams, when the Tertiary Channel was young, the existing grades were steep, and all but the heaviest gold was transported quite a distance downstream. Each time the gold already in the channel was shifted by the deepening of the channel bed, it would work some distance ahead. As the channel cut from its original elevation to a depth of 300 feet or more to its present location, the first gold to enter the channel would doubtlessly work quite a distance downstream. As the channel gradually cut its way thru the rock, the grades became lower and more gold was retained in the channel fairly close to its source.

The strike of all the rocks in the section is diagonally across the course of the Fraser River and also that of the Tertiary Channel. As the courses of the river and that of the channel are roughly parallel and not over a mile apart, the rocks showing in the Fraser River will necessarily be identical with those existing in the channel.

For the points under discussion, the Fraser River, between the mouth of the Blackwater River and the lower end of the Cottonwood Canon, can be divided into two sections with radically different characteristics by passing a line across it at the head of the Cottonwood Canon. Just above the canon, the river crosses a mile of a coarse-grained syenite-porphyry and from there upstream, the bedrock is schist, which averages fairly soft. Both of these rocks have been easily cut by the river, with a resulting grade which is very flat, probably not over 20 feet in the entire distance. At the head of the Cottonwood Canon, a very hard schist lies below the porphyry and the schist strata thru the whole canon average much harder than the schist found in the upper section. Due to this harder rock the grades are much steeper than found in the upper part. Cottonwood Canon is a little over a mile long, the river narrow and the water boils thru a difference of elevation of 10 feet from end to end.

Conditions of bedrock and bedrock grades are similar in the Tertiary Channel. The grade existing in the channel from the lower end of the porphyry upstream may be just as low as that of the Fraser River. The grades existing from the porphyry downstream will be much greater than the grades found in the corresponding section of the Fraser River, the Cottonwood Canon. The reason for this statement is found in the elevations approximately known. The head of this canon in the Tertiary Channel will lie between 100 and 150 feet above the Fraser River. As the course of this channel crosses the course of the Fraser River at the Tertiary Mine, it drops down to a point some 25 feet below the river level. At a point from 2 to 6 miles farther on, this channel probably joined the major drainage system of that time, which lies under the Lower Cottonwood River and continues down the Fraser River Valley. From a hole drilled 125 feet to bedrock in the Cottonwood River, 9 miles from its mouth, it is assumed that this major valley lies about 150 feet below the Fraser River. It is then apparent that the channel drops up-

wards to 300 feet after leaving the porphyry, while the Fraser River drops about 15 feet.

### TERTIARY MINE

The workings of the Tertiary Mine are located in the steep section of the channel, which lies below the porphyry intrusion and gives definite information concerning that part of the channel.

The Fraser River has cut down thru the channel, exposing an oblique section 1100 feet long, as shown in the accompanying sketch. Coarse gravel lies on bedrock from one rim to the other. The superimposed gravels are smaller and interspersed with layers of sand and silt. At this point, the river has cut away the top gravels to within 80 feet of the bedrock in the gutter and has left 20 feet of loose gravel on top. Judging by the thickness of the gravels along the Fraser River, it seems probable that originally the channel was filled to a depth of about 300 feet. Thruout the Tertiary Mine workings, the gravels are cemented, apparently thru water action on the decomposed porphyry. The upper strata seem to be cemented tighter than those near bedrock. Blasting thoroly disintegrates the gravel, so that the gold is saved by sluicing.

The first 200 feet of channel adjacent to the Fraser River has been mined but as no records of its yield are known, no stress is laid on it.

The next 500 feet was worked by Brittle, Killam and the Tertiary Mining Co., Ltd., of Chicago. The general characteristics of the channel thru this section do not vary to any great extent. The average grade was 3.1%, which was made up of relatively long intervals of comparatively flat stretches, separated by narrow strata of hard rock with the consequent steep pitches. The bedrock gravels were coarse and from 1 to 6 feet thick. The boulders were composed mainly of metamorphic rocks of the bedrock series, quartz and porphyry. Boulders larger than three feet in diameter were seldom encountered. The gold was coarse and the total recovery was \$20,000 or \$40 per lineal foot of channel. The main paystreak varied in width up to a maximum width of 50 feet.

The next 800 feet of channel, mined by the present owners, represents somewhat different conditions. In general, the paystreak was narrower than in the previous section, the bedrock gravels thinner and



smaller and there was an entire absence of porphyry boulders in the paystreak. The average grade was 2% and the total recovery was \$15,000 or \$19 to the lineal foot of channel. The first 150 feet had a total grade of 20 inches, or 1.1%, over soft bedrock. The paystreak was from 35 to 40 feet wide and the gold unusually coarse. The average recovery was \$2.70 to the cubic yard, loose measure, with a high figure of \$5.65 for one 20-yard round. The next 100 feet was over very hard rock with a grade of 7%. The paystreak narrowed up and then became intermittent. The next 100 feet was over hard rock and the gravels were generally of low tenor, say \$1.60 to the loose yard, with occasional rich pockets. The remaining 400 feet to the face was over bedrock of varying hardness but averaging quite soft. The main paystreak varied from 10 to 25 feet wide and yielded about \$2.75 to the cubic yard.

When the present owners drove their crosscut tunnel to tap the channel, they encountered a new channel which lay a few feet higher than the gutter. This channel, while its gold tenor was low, threw considerable light on the conditions existing in the channel as a whole in that section. This minor channel was mined for 30 feet downstream and 100 feet upstream, when the grade became too steep to climb with a car. It was 35 feet wide and yielded \$10 to the lineal foot of channel over the entire width. The gold averaged coarser than the average of the gutter but of the same assay value, \$18.80 an ounce. The character of the gravels was similar to the gravels in the lower section of the gutter as described above, with the exception that the boulders were larger, more numerous and the porphyry boulders much more prevalent. As shown in the attached plan, the course of this channel, where mined, forms an arc. It empties into the gutter a little more than 800 feet back from the face of the workings. It was directly above this point in the gutter where it was first noticed that the width of the paystreak began to contract and where the gravels did not contain the porphyry boulders.

At this point it might be advisable to add that the only definite information at hand regarding the tenor of the upper gravels of the channel was derived from a mill run of some 300 cubic yards of material taken from the bank about 30 feet from bedrock. The recovery from this test gave a yield of  $7\frac{1}{2}\%$  to the cubic yard, loose. The gold was

coarse and contained several nuggets worth 25¢ each.

From the information gained in mining, the following facts are well established. Whenever a stretch of soft bedrock with its low gradient is encountered, the width of the paystreak will be greater and the values comparatively higher. Hard rock with the steep grade tends to eliminate the concentrating action of the channel and the paystreak is apt to be intermittent and of low tenor. Thruout the section worked, the channel as a whole is broken up into a number of minor channels, each carrying more or less gold. As proved by the higher channel worked, these channels do again return to the main channel or the gutter and increase the gold content of the gutter below their confluence. The narrow paystreak found in the last 800 feet of the channel mined, would indicate that but a relatively small portion of the stream flowed along the deepest part of the channel and that considerable gold was scattered along the rims, either generally or in higher channels. The prevalence of hard rock and the steep grades found in this section are not ideal for the concentration of gold. The absence of porphyry boulders in the last section worked indicates an intense grinding action in that part. The porphyry is a soft rock and is easily worn away. In the higher channel mined, the action of the current was not so strong and a large number of porphyry boulders still remain.

#### CONCLUSIONS

Thruout that section of the channel lying between the Tertiary Mine workings and the lower end of the porphyry, conditions should not vary a great deal from those found in the portion of the channel mined. The width of the paystreak will probably be found to vary in width and its richness will vary with the number and length of the intervals over soft bedrock. While the paystreak is fairly narrow towards the head of the workings, this condition may change at any time, Thruout this section the stream is apparently split into several channels, each carrying some gold and there is no reason to believe otherwise than that these several channels may merge into one major channel in the immediate neighborhood. In the event of such an occurrence, the paystreak should be richer and wider.

The chance for bonanza values however, lies in the porphyry area and perhaps above there. This <sup>statement</sup> is based on two conditions. First, the porphyry is a soft rock and is easily decomposed, with the result

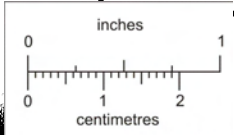
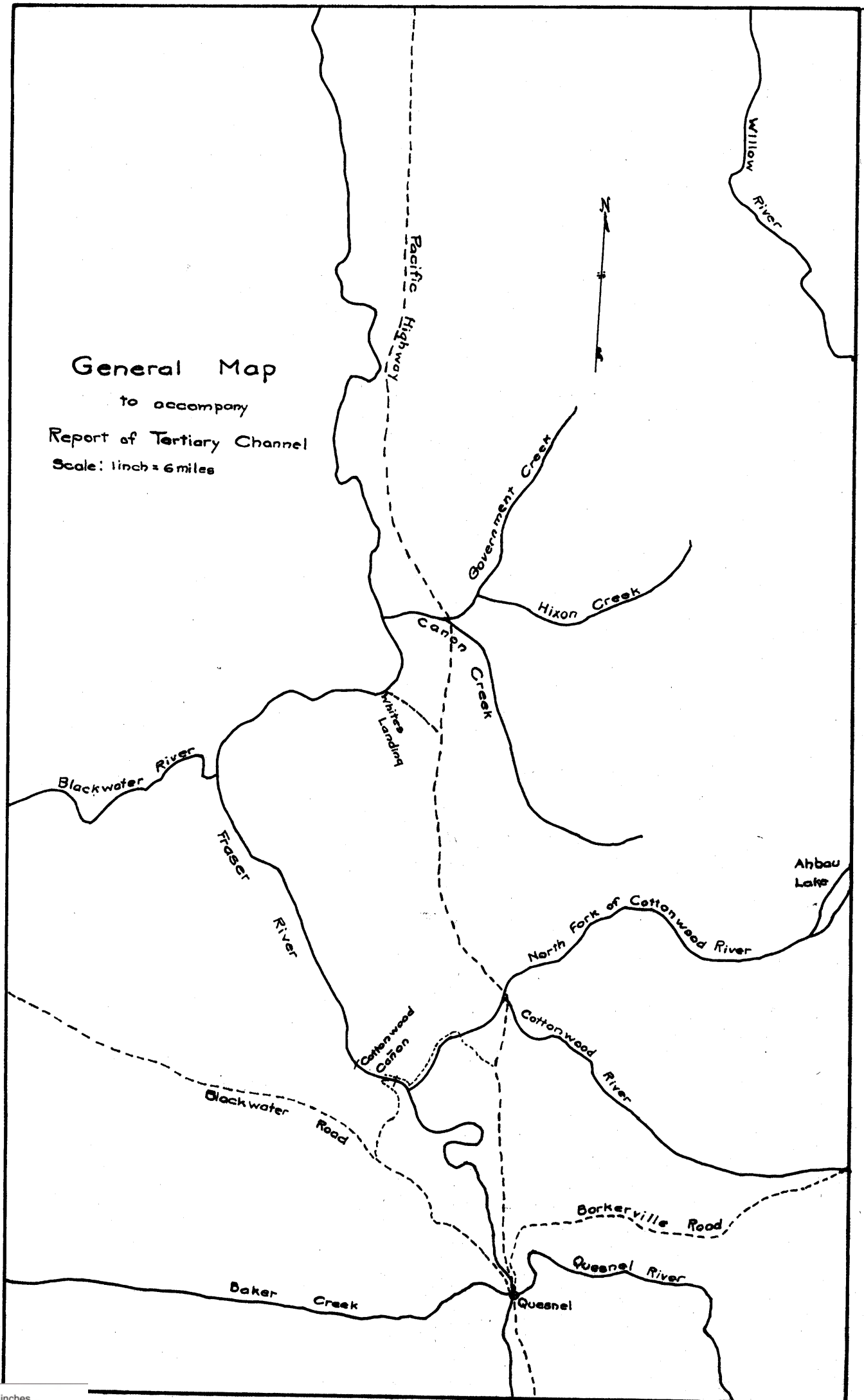
that the grade of the channel will be found to be very low. For the same reason, the width of the channel will increase and the decomposed rock in the channel bed will be mushy to some depth. Considerable gold will be found well down in this soft rock. From the quantity of porphyry found in the Tertiary Mine workings, it is evident that the old channel cut thru this porphyry for a considerable distance. Basing an estimate of this distance on the rock visible in the Fraser River, a fair figure for the length of the old channel across the porphyry, would be one mile. Secondly, the source of this placer gold is some distance upstream. With conditions as they exist in this channel, the closer one gets to the source, the richer the ground should be. Bearing in mind that the porphyry area, at least, should be ideal for the gathering of gold and that the gold found in the Tertiary Mine has worked its way across this porphyry, it would appear that the quantity of gold retained in that section should be many times greater than the amount found below.

September 5, 1926


Signed:

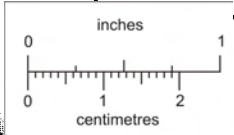
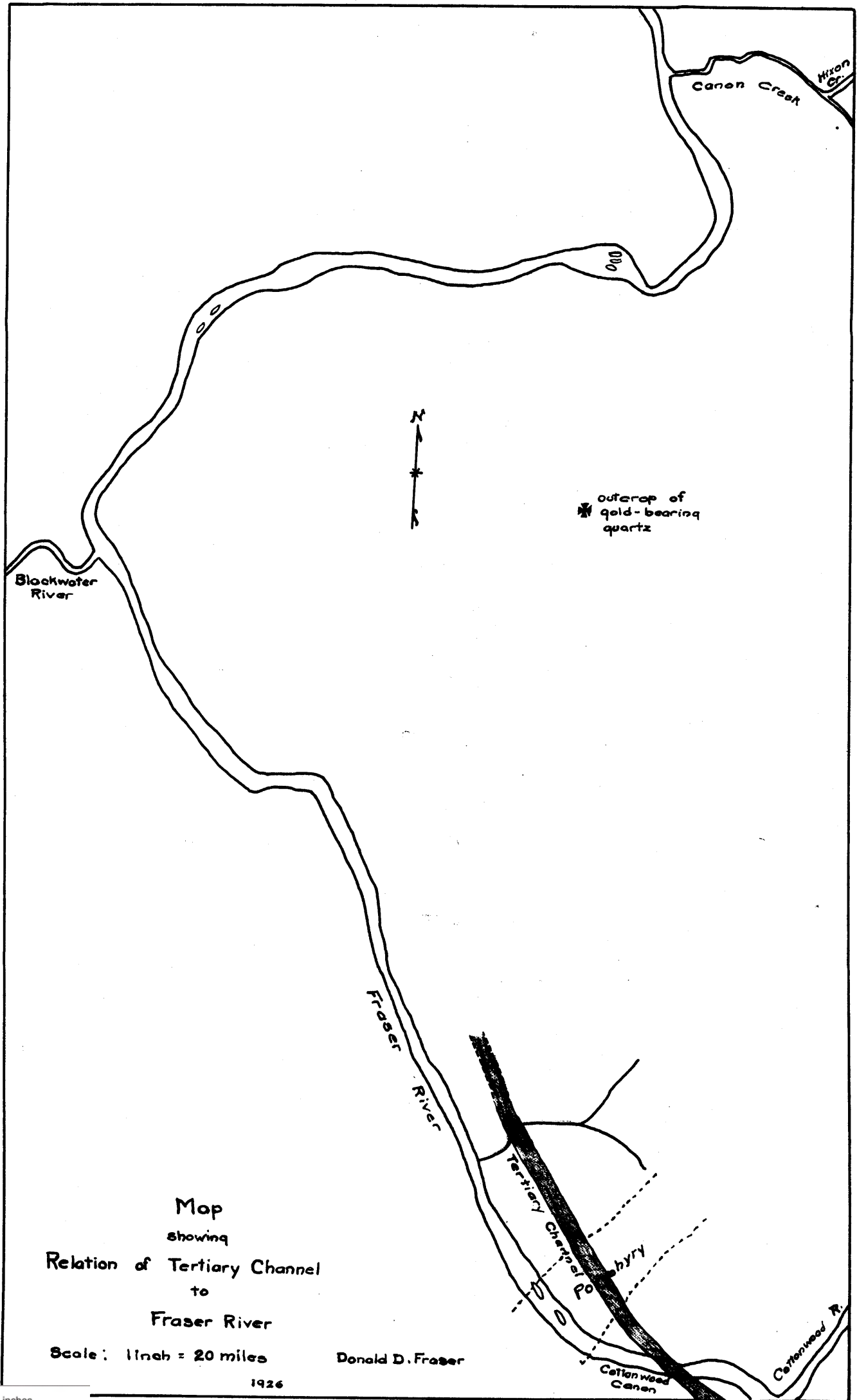
Donald J. Fraser

General Map  
to accompany  
Report of Tertiary Channel  
Scale: 1 inch = 6 miles



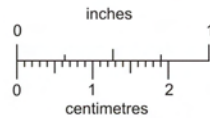
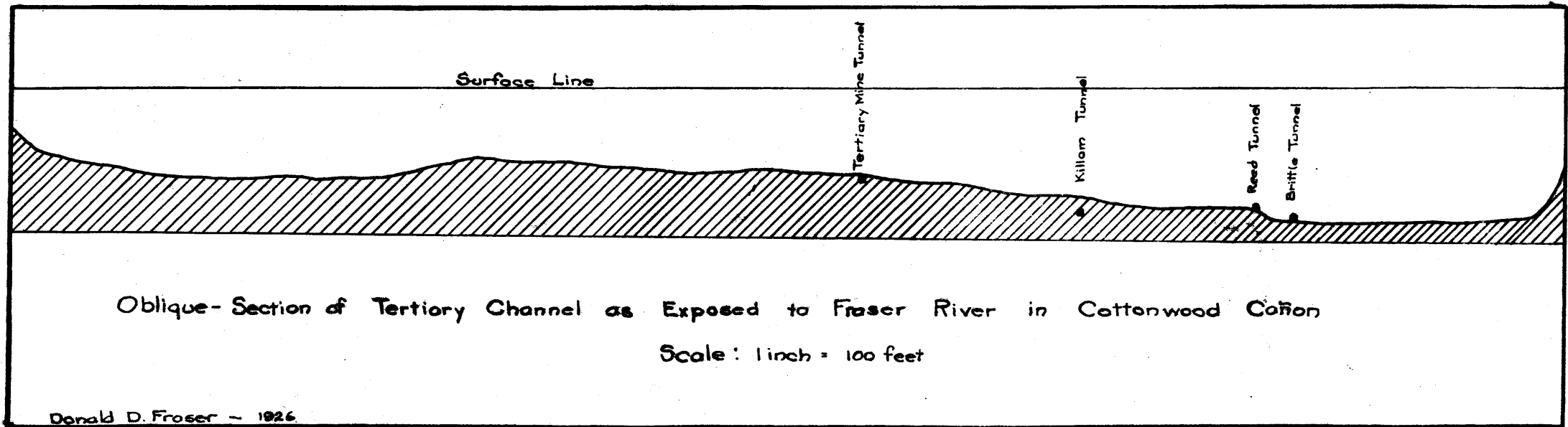
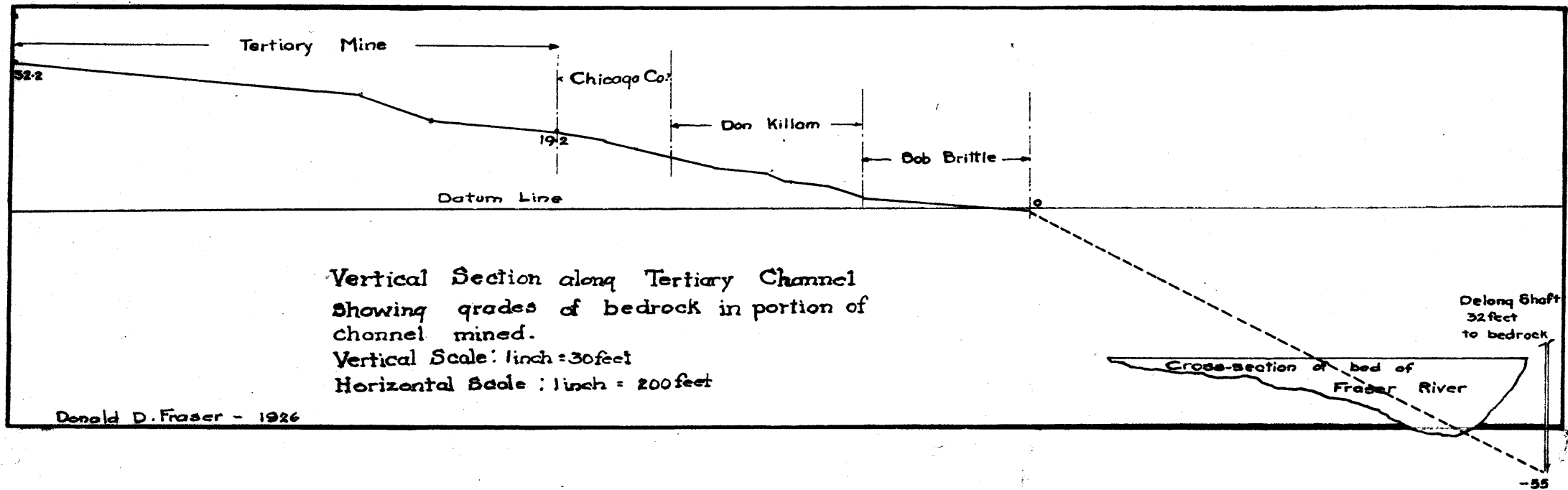
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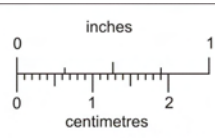
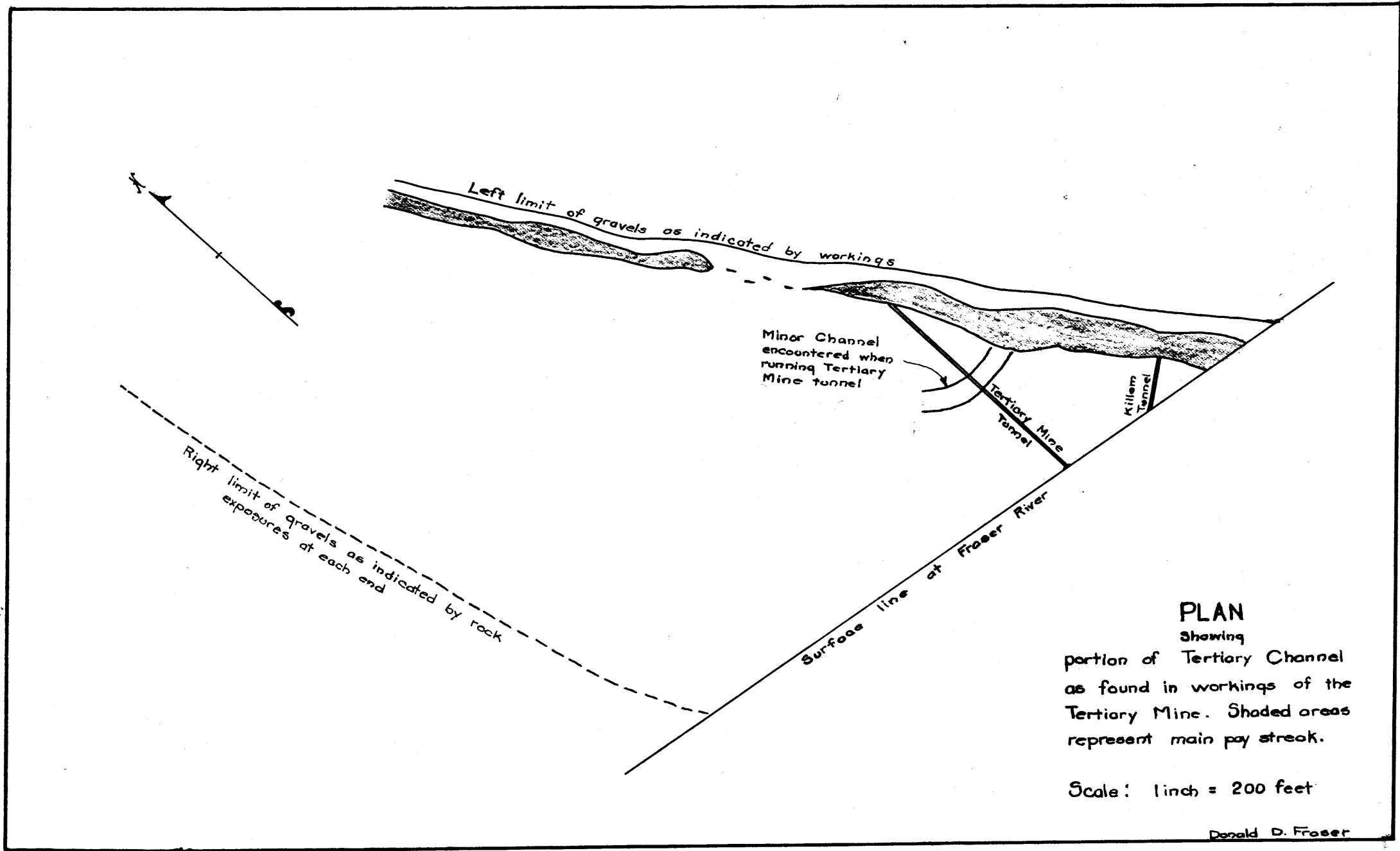




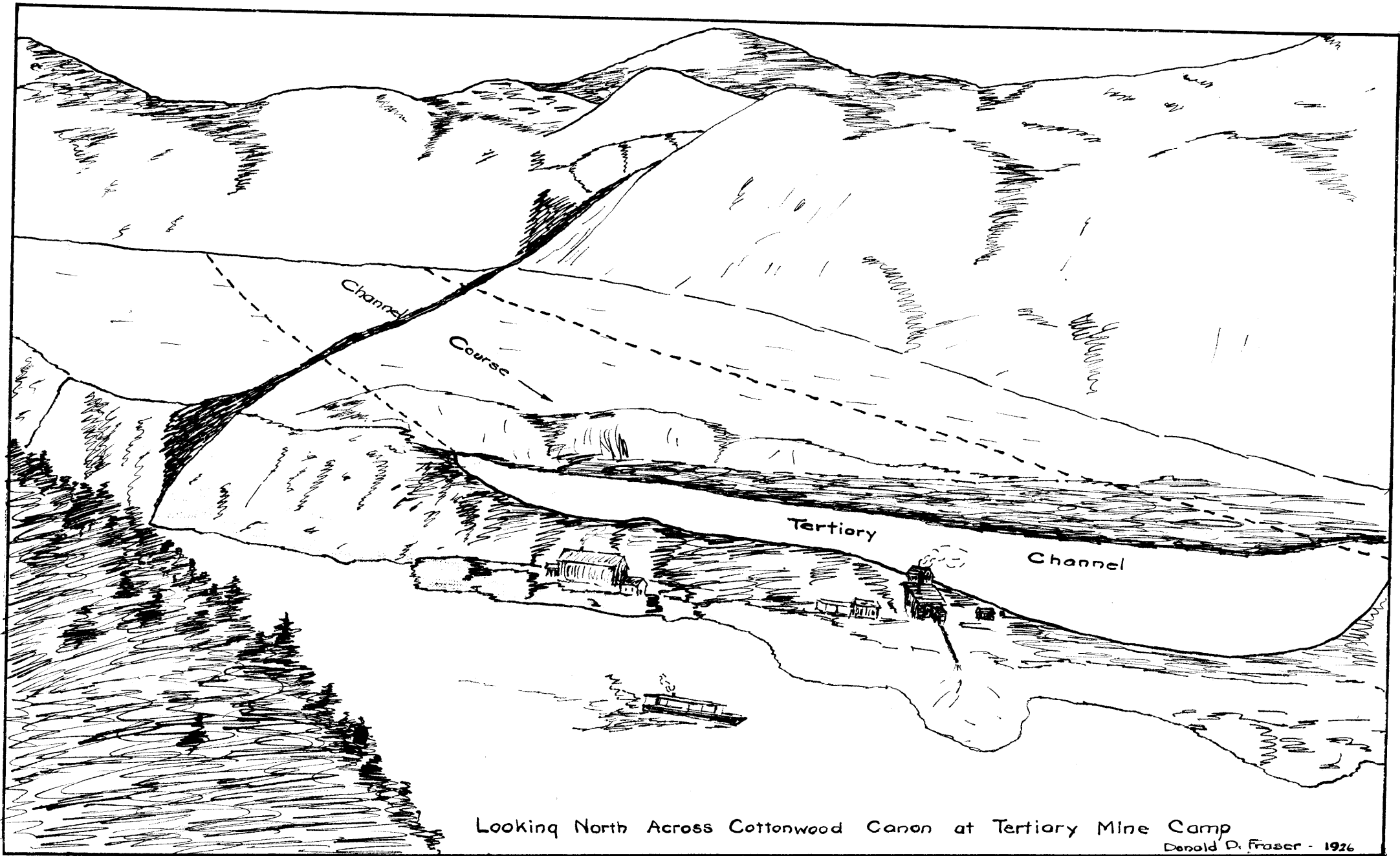
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BRITISH COLUMBIA GEOLOGICAL SURVEY





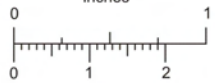
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Looking North Across Cottonwood Canon at Tertiary Mine Camp

Donald D. Fraser - 1926

inches



centimetres

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