

PRELIMINARY REPORT

ON

FIELD NOTES

IN

CARIBOO DISTRICT, B. C., 1885.

BY AMOS BOWMAN, MINING ENGINEER.



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FIELD WORK IN CARIBOO DISTRICT, B. C., 1885.

BY AMOS BOWMAN, MINING ENGINEER.

To A. R. C. Selwyn :

SIR,—

Herewith is presented a summary of field work done by me in the mining district of Cariboo, British Columbia, under your direction, during the season of 1885.

I have the honour to be, Sir,

Yours truly, &c.,

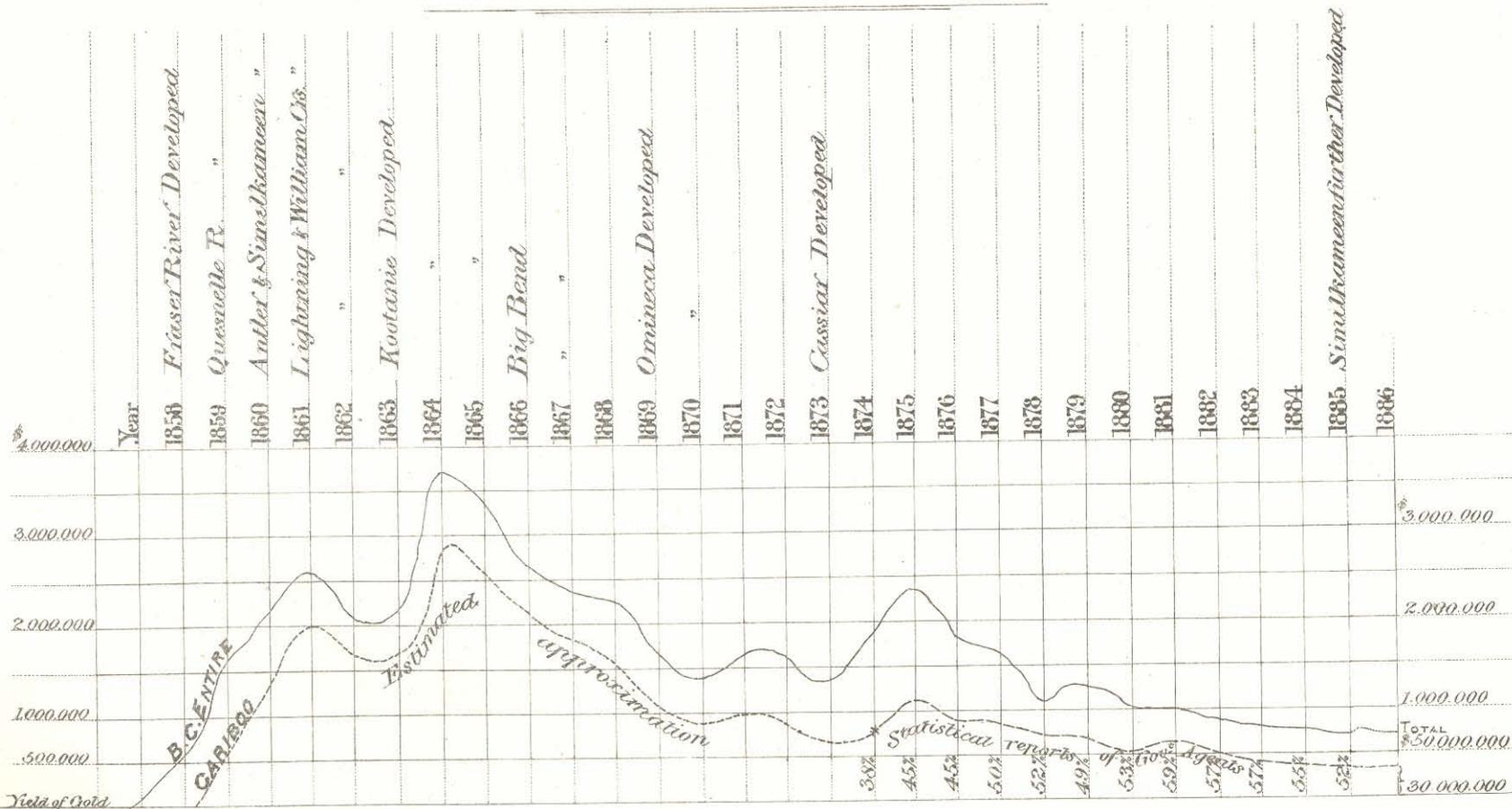
AMOS BOWMAN.



DIAGRAM SHOWING RELATIVE YIELD OF GOLD

From

CARIBOO DISTRICT & BRITISH COLUMBIA GENERALLY



REPORT.

The want of any trustworthy map of the Cariboo District has, so far, prevented the detailed geological examination which its prominent position in respect to gold production has long called for. So much geographical information was necessary, as a first step toward its geological mapping on such a scale as to be useful to those engaged in the development of its placers and auriferous lodes, that the Geological Survey was not in a position to undertake this otherwise desirable work.

Geological survey of Cariboo.

In consequence, however, of an arrangement entered into last spring, between the Government of British Columbia and the Geological Survey, by which, on account of the extent of the geographical work, that Government agreed to furnish one-half of the amount necessary to prosecute the survey, this long-desired work was entered on in the season of 1885. The conduct of the survey was placed in the hands of the Director of the Geological Survey, and I was instructed to carry it out.

Joint action of Provincial and Dominion Governments.

The present report is intended merely as an interim one, in which the operations of the season of 1885 are detailed, and the method of completing the survey is indicated.

Progress.

Accompanied from Ottawa by Mr. James McEvoy as general assistant, Victoria was reached by us July 3rd; and as soon as possible thereafter the necessary arrangements were made, and we proceeded to Cariboo District. While in Victoria I engaged Mr. S. P. Tuck as surveyor; and at New Westminster, Mr. L. R. Valigny as draughtsman and surveyor. Mr. E. B. Adams was engaged at Sumas as teamster, packer, and general assistant.

Assistants.

Having arranged a rendezvous at Yale, Mr. McEvoy was, on Saturday, July the 18th, dispatched in charge of the waggon party, with equipments and supplies, northwards by the Cariboo Waggon Road. On Sunday, July the 19th, Mr. Tuck and myself proceeded more expeditiously by rail and stage.

Equipment and start.

At Quesnelle, situated on the Fraser, in latitude 53° N., Mr. Tuck, on the 24th of July, began the measurement of a wheel traverse of the waggon road from that point into the mining region, which reached Barkerville, distant 56 miles, on the 4th of August, simultaneously with the waggon party. The latter had travelled for seventeen days at the rate of twenty-seven miles a day.

Road Traverse.

Cariboo District, famous for its yield of twenty-eight to thirty million dollars of placer gold between the years 1859 and 1886, or fifty-five to sixty per cent. of the entire product of British Columbia, may be defined as the area enclosed by the great bend of the Fraser, and lying north of latitude 52° . In its narrower sense, as referred to in connection with actual mining operations, it lies within the parallels of latitude 52° and 54° N., and the meridians 120° and 123° W.; and it comprises, thus limited, an area of about 6,000 square miles. Judicially, and politically, Cariboo District covers the entire plateau between the coast and Rocky Mountains. It is the plateau of the cordillera lying north of the Canadian Pacific Railway and within the drainage basin of the Fraser. But this region is bisected in a north and south line by Fraser River, and it is only the eastern half, or the Rocky Mountain slope, that can be embraced, in virtue of its economical bearing, as within our field of investigation.

Geographical position.

Limits of field.

Its position and orographic relationships are shown upon the accompanying outline map.

Map.

The pre-eminence of Cariboo among the gold-producing regions of British Columbia is shown by the diagram, in which the broken line represents the annual gold product of Cariboo, and the firm line that of all the other districts, including Cariboo, in the corresponding years, from 1858 to 1885.

Importance of the Cariboo development.

Cariboo, indeed, was the first rich gold field found in the entire region of the Central North American cordillera, but ten years after the great discovery in the Sierra Nevada of California. As the coast was first taken

possession of by the Canadian fur traders in this northern latitude, so the reflux from west to east of the army of gold miners was northward and eastward, by the valley of the Fraser, to the northern Rocky Mountain gold region, aside from the central and later developed country. Thus, from all points of view, it has been deemed best to commence detailed surveys of this mining region first.

Instrumental work.

By the Canadian Pacific Railway surveys in 1871-6, instrumentally measured lines were carried almost completely round the Cariboo region, while the central and mining portion, with the exception of the small part explored by Lieut. Palmer in 1863, has been only sketched.

Trend of Mining Belt.

To lay the foundation for our geography, the road traverse already mentioned, with Barkerville as a centre, was next extended by means of measuring wheels in the hands of two assistants working independently, along the principal roads and trails of the mining region. The trend of the richly auriferous district so covered, embracing 64.7 miles of traverse, from Sugar Creek on the north to Quesnelle Forks on the south, is from N.N.W. to S.S.E., or, more precisely, from N. 39° W. to S. 39° E., running with the drainage parallels of the Quesnelle, Cottonwood and Willow Rivers, C D and E F. These closely repeat the axial trend A B, of the Upper Fraser and Columbia River Valleys, as shown on the map.

Triangulation.

While this work was in progress, a triangulation and topographical party occupied the prominent mountains of the mining region with the transit, and delineated the intermediate and outlying country in sight. The plateau surface, 6,000 feet above the sea, surveyed by the topographical party, and the erosions or valleys followed by the traverse party, are so unlike each other as scarcely to be recognizable as belonging to the same country. A series of latitude observations with a good Troughton & Sims sextant, was taken at Barkerville. And when in September and October the advancing winter drove us down out of the mountains, the position in longitude of the whole was fixed by measuring from Quesnelle southwards along the waggon road, to a connecting point at Lac La Hache with the Provincial land surveys, which join with the railway surveys and the several longitude stations recently established by the aid of the telegraph.

Latitude.

Longitude.

Distances measured.

The total distances measured with the wheel amounted to 255.5 miles. This included surveys of the diggings and mining camps, which usually follow the valley of a stream for two or three miles, and were plotted on a larger scale, of 12½ inches to the mile. In carrying out this work bearings were taken with the prismatic compass, with frequent observations for variation of the needle by means of the solar transit. The wheels used were metallic hoops; one made of brass with brass hub and wire spokes, by Vipond of Victoria, the other of iron and wood, contrived with a carriage screw and washers, by ourselves; both of them light and strong. These were driven with one hand, and were so arranged that each revolution represented one-thousandth of a mile, or 5.28 feet. Revolutions were counted, added up into miles, and courses were plotted in the field, to enable details to be recorded on the spot. At convenient times in camp all these courses were separately calculated by latitudes and departures, to establish fixed points for the final map.

Table of distances.

Following is a table of distances so obtained, and plotted on a scale of 2½ inches to one mile:—

Going eastward from Quesnelle (H. B. Co.'s corner)—

To Four-Mile Creek	3.8 miles.
„ Wallace's ranch	13.3 „
„ Bohannan's, Cottonwood	20 „
„ Cottonwood Ranch	21.5 „
„ Boyd's Cold-Spring House	25.2 „
„ Beaver Pass House	38.3 „
„ Stanley Post-office	44.8 „
„ Eagle Creek Bridge	47.5 „
„ Barkerville	56.5 „

Going S.E. from Barkerville *via* Saw-Mill Flat—

To Grouse Creek	4	miles.
„ Antler Creek Bridge	8	„
„ Porter's (old Antler Town)	10.5	„
„ Littler's cabin, Saw-Mill Flat	13	„
„ Veith's store, Little Snow-shoe	24.4	„
„ Junction Little Snow-shoe and Keithley	27	„
„ Veith & Borland's, mouth of Keithley	32.1	„
„ Quesnelle Forks	49	„

Going S.E. from Barkerville *via* Cunningham Creek over Snow-shoe Plateau—

To Sharp's cabin, Cunningham Creek	16.9	miles.
„ Harvey Creek Forks	25.3	„
„ Veith & Borland's, mouth of Keithley	35.4	„

Going north from Barkerville—

To Mosquito Creek	6.2	„
„ Cornish Creek	8.4	„
„ Hardscrabble Creek	10.5	„
„ Walker's mine, Sugar Creek	15.7	„

Branching aside from these measured lines at many points, and for various purposes, are nearly twice as many miles of track surveys, with estimated distances, subject to correction by fitting the ends between fixed points. They were plotted in the field, mostly $2\frac{1}{2}$ inches to one mile. Some of them lead to outlying mines; others connect with topographical stations. In view of the importance of obtaining increased facility of communication for the proper development of the mining resources of the district, long lines of traverse were made in this way at the close of the season, to get the information required for a connection by railway of the Cariboo mining district with the Canadian Pacific Railway, by the valleys of the Bonaparte, Green Lake, and Beaver and Quesnelle Rivers.

The time occupied in the field was from July to October. The cost, including outfit of waggon and horses chargeable to capital account, was \$4,801.57.

Of the scope and character of the season's work, and the work remaining to be accomplished, I may say, while the investigation was designed primarily for the development of the mineral resources of Cariboo, the necessity of procuring first the geographical data above mentioned, and of superintending this work myself—assisted though I was by competent surveyors, the latter being inexperienced in the special work required—unavoidably determined that only a part of my own time, during this season, should be available for the investigation of the auriferous deposits. Questions of economical and stratigraphical geology which occurred were necessarily relegated to a secondary position on the programme at this time. In any event these would have to remain in the background until the principal features of the country had been mapped, and the line of scientific work worth doing defined and limited.

Apart from the details of the placers observed in the order visited, and noted on the plotted sheets of Lightning, Williams, Grouse, Antler, Snow-shoe, Keithley, Harvey, Cunningham, and Sugar Creeks, by this method of procedure it followed in natural order—in virtue of our need of transit stations upon the commanding summits—that the Round Top, the Sisters, Snow-shoe Peak, Cariboo Mountain, and Mount Agnes, themselves, in good time told us the interesting truth about the distribution of the gold.

In the Cariboo District the cordilleran plateau is built up of slates associated with limestones, forming a gently swelling parallel elevation to that of the Rocky Mountains. The mining country is found to be about forty miles distant from the north-western continuation of the Selkirk parallel range, and about eighty miles distant from the continental watershed. As in the Waxatch and Bitter Root Mountains, the mineral-bearing rocks are seen

Track Surveys.

Time employed, and cost.

Object and method of attainment.

Geological features.

resting upon the shoulders of the same crystalline core as the gold and silver-bearing rocks of the south.

Mining developments.

Before the railways disclosed the latter's wealth—between 1870 and 1880—Cariboo had already yielded a great amount of treasure from the easily developed placer mines. But to proceed further, now following the example of the later developed gold and silver-bearing districts mentioned, to the successful exploitation of the lodes from which in part these placers have been originally supplied, will require an equally intelligent investment of a reasonable amount of capital, and possibly also the facilities of transport afforded by a branch railway.

Surface Geology.

From the Round Top, near latitude 53° N., longitude 121° W., the characteristic features of the region disclose themselves in the flat expanse of Snow-shoe Plateau. It is free from timber, green and grass-covered—a prairie remnant of the dry area extending over the entire plateau of the cordilleras to the southward. Its surface is soil-covered—some of it detrital, and suggestive of the levelling presence of water in post-glacial times. From the plateau, or parallel swell, streams falling both eastward and westward have intersected the gold-bearing zone, or zones, of the fissured slates.

The ancient streams.

Debouching into what were formerly swampy valleys (miocene, lignite-bearing), and more recently lakes (pliocene gravel ranges), we see these water-courses blending on the horizon with the volcanic outflows which separate here as in California, the materials belonging to an older drainage system from those of the recent. Next all the phenomena of the drift are seen altering, and hiding, the channels so interesting to the gold miner. The pay dirt passes under and mingles with the deposits of a vast interior lake.

Drift.

Interior Lake.

Terrace formation.

The drainage of this lake, in recent times, has terraced the British Columbia plateau from the inner margin of the Coast Range to the Rocky Mountains. As in the mining region, however, the volcanic matter is wanting, it appears that the gold miners of the country are working indiscriminately in placers which date, probably, from the miocene period down to the present.

Different kinds of placers.

Quartz mining and milling.

Quartz mining has never yet been permanently established, nor indeed fairly tried in the Cariboo District. In 1877 some attention was drawn to the quartz veins of Cariboo, and a good deal of capital was invested in quartz mills. There was, however, a lacking element which thwarted success. As to the nature of this obstacle, there has been much difference of opinion. It is certain that the larger investments have all, so far, proved disastrous. It is also certain that iron pyrites was worked which contained very little gold; while other samples of pyritous quartz, containing as much as \$20 per ton of finely disseminated gold locked up in the sulphuret, were worked in considerable quantity as though they had been free milling ores. Owing to the want of concentrating machinery, the pyrites passed off; and without wasting, or chlorinating, or other appliance to save it, of course, the gold contained in the pyrites was lost at the same time. As it has never been decided to the satisfaction of all concerned on whom the blame for the failure of this attempt should be placed, there appears to have been a tendency in some quarters to conclude that the quartz lodes themselves are worthless—a tendency which the writer cannot too strongly deprecate.

Failure and cause.

Experience.

Inquiring into the real causes of failure, it will not be out of place to recall well-known facts. In the first place, it is to be observed that the Cariboo quartz excitement of 1877-8 followed upon the heels of the Washoe bonanza developments. Cariboo inherited some of the methods of handling stocks connected with the latter. The Washoe method worked badly as applied to British Columbia quartz. Secondly, it is undoubtedly true that the gold-bearing quartz veins, or veinlets, which have contributed to the wealth of the placers are, to a considerable extent, disseminated throughout the slates. Net-works of small fissures of this character are quite usual in slate formations, and are found here precisely as in other gold regions. The auriferous fissures have been exposed in detail by the disintegration of the friable rock, in combination with the conditions of sluicing.

Character of auriferous placer regions.

There are also, however, already known in Cariboo District well defined ^{Permanent veins.} and wide veins, which appear to occupy true fissures; and, doubtless, there will be found in abundance metaliferous veins of every other variety known to miners, in so rich and extensive a district. Cariboo, in fact, has reached that stage (well remembered in California and Colorado) at which people without experience or means are found propounding to themselves the question, "Will quartz mining pay?" Its richer deposits and permanent veins ^{Discrimination.} are being segregated from the worthless by intelligent miners and prospectors. Obstacles heretofore sufficient to keep out the necessary capital and practical skill with which to handle quartz will not much longer be suffered by investors to retard the development of this promising district.

The way out of the difficulty with quartz in Cariboo is by close attention ^{Economics.} to the details and economics of handling any given ore. The conditions must be met, usually with capital. The amount of capital necessary will be somewhat governed by the knowledge of details and skill possessed. Taking, for example, the sulphuret ores of the Burns Mountain, the Enterprise, and the Cariboo Companies, where separation, roasting and chlorination may be necessary, the costs of labour and material might readily be deduced from a working test made at Grass Valley, San Francisco, or Chicago. Applied to the conditions obtaining in Cariboo, the investor, once sure of his rock and of his process, can calculate in advance the quality and extent of his bonanza. Free milling ores are now worked profitably in California and Wyoming, at an assay value of \$3.50 per ton. The assay value per ton of a "bonanza" ledge must rise with the costs of material, labour, and process, to the proper relative figure. Even a \$60 ore (as at Austin, Nevada, not many years ago) may have to be thrown upon the dump as worthless.

Several quartz mining and milling enterprises of Cariboo are worthy of note. Struggling under adverse circumstances for several years, toward the solution of the problem under consideration, were the Nason, the Beedy, the British Columbia and the Enterprise mills—the last two being valuable properties placed on the ground by capitalized milling and mining companies. Facilities for the reduction of free milling ores, more or less complete and available, belonging to these concerns, remain on the ground, at Barkerville, the Meadows, and at Van Winkle.

Showing vitality and a degree of persistent confidence significant by reason of the character of the stockholders, are the Burns Mountain and the Hixon Creek Mining Companies. These companies are composed mainly of resident and non-resident old Cariboo miners, who are now by avocation independent of mining, yet who have shown much enterprise in the development of their respective properties.

It is still, however, largely a matter of transportation and supplies. Freights from the coast averaged this season \$240 per ton—as much as they were fifteen years ago. With these conditions somewhat improved, and the necessary facts concerning the country and its resources made known on good authority, capital and skill will both speedily find a foothold in the district. Such, at least, is my firm conviction, based on the observations so far made.

There are engaged in actual mining in Cariboo District at the present time ^{Population and wealth produced.} about 1,200 men, of whom four-fifths are Chinese. The total product of placer gold for the year 1885 amounted (according to Mr. Bowron's reported figures) to \$350,000. In former years (1875-76-77) those engaged in mining comprised sixty-five per cent. of the entire population in the diggings. The total population of the district closely connected with or dependent upon the mining industry may now be reckoned at more than double the mining population; or including Indians inhabiting the district in its wider sense, of which Quesnelle is the centre, at more than treble. Including the fur, stock and agricultural interests, it is presumed that the total wealth produced, from the plateau north of the railway, might be reckoned at about double the product of the mines.

Branch railway.

With these facts in view as a basis, the question now anxiously canvassed by those interested in the development of the Cariboo District is, whether the time has not already arrived when a railway connection with the lately completed Canadian Pacific line may fairly be considered practicable?

Intermediate country.

With a view of ascertaining the most favourable route, and the nature of the difficulties to be encountered in the construction of such a railway—with which the future of mining enterprise in Cariboo District is so closely connected—it was considered advisable, as a supplement to the work above outlined, to carry out certain examinations to the southward. Explorations were made by way of the valleys of the Quesnelle, Beaver, Horsefly and Bonaparte Rivers; and I am happy to be able to report, touching the question of a railway, that these have disclosed an easy and “natural” route, through an agricultural and stock-raising country and climate, for the entire distance intervening between Cariboo and the railway.

Distance and cost.

The distance from Ashcroft, on the Canadian Pacific at the junction of Bonaparte Valley, to Quesnelle Lake, by this route, would be about 130 miles; and the cost might be limited, or permitted to range, according to the gauge and equipment determined upon, at any figure between one million and two and a half million dollars. Tapping the great Quesnelle Lake near its outlet, such a branch line or feeder of the Canadian Pacific would avail itself of 100 miles of steamboat navigation eight months of the year, in the heart of the metaliferous Cariboo and Selkirk parallels of the Rocky Mountains.

Navigable waters.

An inland empire.

To reach Quesnellemouth, the easiest route would be by way of Beaver Lake Valley and lower Quesnelle River. But alternative routes, with excellent grades and an equally good country, though increased side-hill work, are available, either by the valley of Quesnelle River throughout, or by Lac La Hache, San Jose River, and the valley of the Fraser. An extension of 65 miles, or thereabouts, depending on the route followed, to Soda Creek, or to Quesnellemouth, would tap another 150 miles of navigable water on the Upper Fraser, and bring under development the entire sweep of the plateau, as far north as the great bend of the Fraser. Of the value of this great northern interior, in mines, agricultural and grazing lands, the fur trade, and other unthought of industries likely to follow present developments, only the need thereof, and a knowledge of its resources, seem to be wanting to remove the last doubt.

Summary of what has been done.

In brief, the connections have been made with the outside world, and the mining region has been preliminarily surveyed and examined. Thirty-one sheets of plotted surveys, of the diggings on a detail scale, and of the roads and trails to be embodied in a general map, are in hand and remain to be filled and worked up.

What remains to be done.

Much material collected, and more to be gotten in one additional season of field work, will have to be prepared for publication, with the necessary delineation of formations, and sections, and studies of mines.

In order to do justice to Cariboo District and its resources, it is designed to complete a good map of a limited area, on a sufficiently large scale to be valuable to the miner and prospector. Such a map, comprising the rectangle shown in the accompanying outline sketch, approximately 50 by 75 miles, or 3,700 square miles in superficial area [See the heavy firm line], can be completed in the season of 1886. Owing to the expensiveness of supplies and commodities of every kind, however, should the amount appropriated for this work be reduced below the figure allowed this season, the cost of the work would not be to that extent reduced. The useful part of it would only be cut off. It is believed no one will question the fact that Cariboo is entitled to a fair consideration, in view of its phenomenal yield of gold in the past, and its promise of maintaining a good reputation in the future.

