BRITISH COLUMBIA DEPARTMENT OF MINES

Hon. W. A. McKenzie, Minister.

Robt. Dunn, Deputy Minister. J. D. Galloway, Provincial Mineralogist.

J. Dickson, Chief Inspector of Mines.

BULLETIN No. 2, 1930

PLACER-MINING IN BRITISH COLUMBIA

WITH SPECIAL REPORTS ON ATLIN, QUEEN CHARLOTTE, CARIBOO, QUESNEL, AND OMINECA MINING DIVISIONS

BY

HERBERT CARMICHAEL AND C. W. MOORE.

COMPILED BY

JOHN D. GALLOWAY, Provincial Mineralogist.

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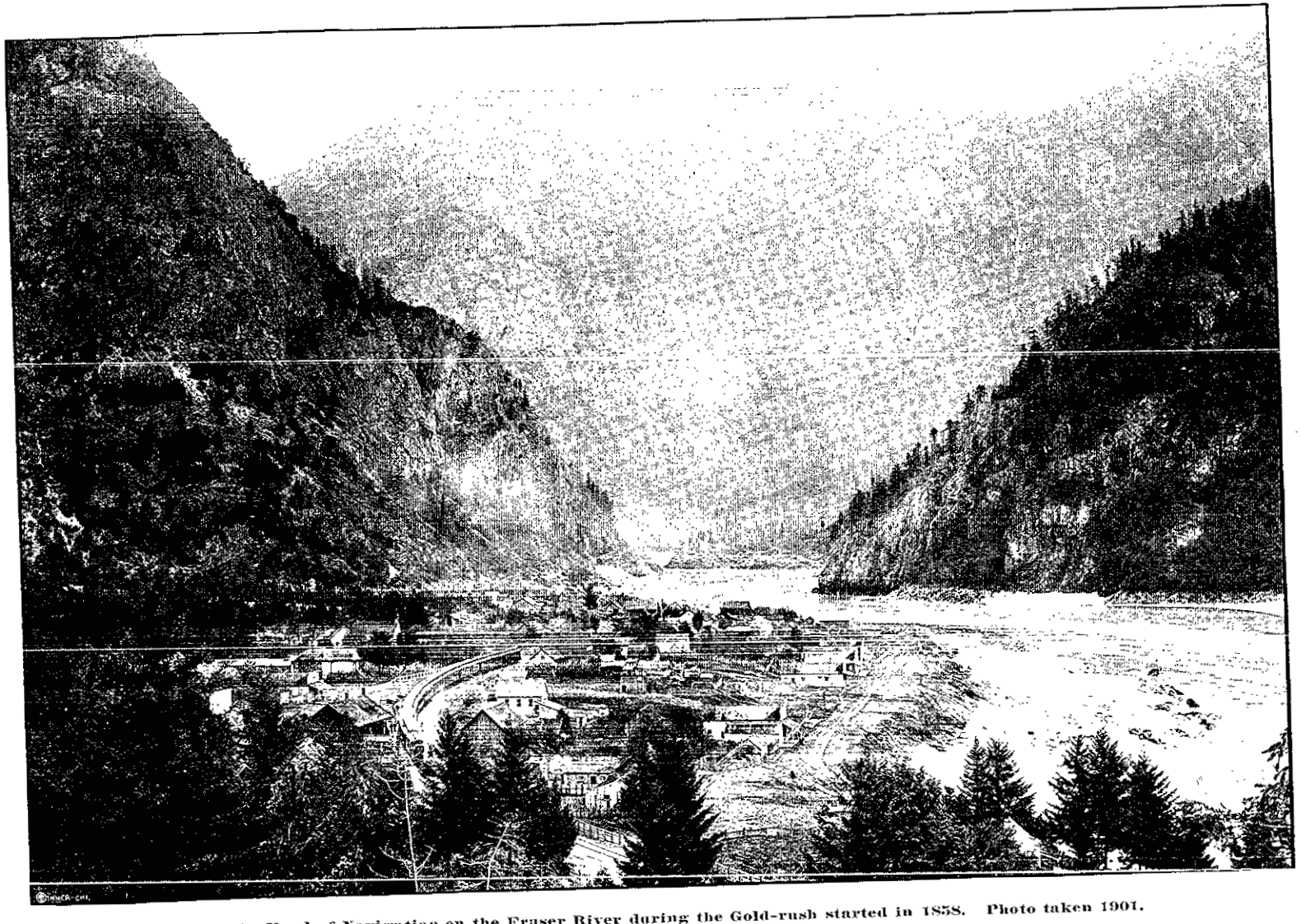


Yale, the Head of Navigation on the Fraser River during the Gold-rush started in 1858. Photo taken 1901.

To the Hon. W. A. McKenzie,
Minister of Mines, Victoria, B.C.

SIR,—I beg to submit herewith a special bulletin on Placer-mining in British Columbia. According to your instructions, special investigations were made during the field season of 1929 of certain placer areas of the Province. This bulletin has been issued in order that this information should be given to the public at as early a date as possible. The bulletin contains, in addition to the special reports, a general summary regarding placer-mining in British Columbia by myself, and condensed historical, geological, and statistical information regarding all the important placer areas of the Province. A bibliography of reports on British Columbia placers is also included, which it is believed will be useful to those interested in this branch of the mineral industry.

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

JOHN D. GALLOWAY,
Provincial Mineralogist.

Bureau of Mines,
Victoria, B.C., February 4th, 1930.

PLACER-MINING IN BRITISH COLUMBIA.

GENERAL SUMMARY.

By John D. Galloway, Provincial Mineralogist.

INTRODUCTION.

During recent years the placer-mining industry of the Province has steadily decreased in so far as production is concerned. This is well illustrated by the following table, showing the placer-gold output from 1858 to 1929:—

Yield of Placer Gold to Date.

1858	$705,000	1876	$1,786,648	1894	$405,516	1912	$555,500
1859	1,615,070	1877	1,608,182	1895	481,683	1913	510,000
1860	2,228,543	1878	1,275,204	1896	544,026	1914	565,000
1861	2,666,118	1879	1,290,058	1897	513,520	1915	770,000
1862	2,656,903	1880	1,013,827	1898	643,346	1916	580,500
1863	3,913,563	1881	1,046,737	1899	1,344,900	1917	496,000
1864	3,735,850	1882	954,085	1900	1,278,724	1918	320,000
1865	3,491,205	1883	794,252	1901	970,100	1919	286,500
1866	2,662,106	1884	736,165	1902	1,073,140	1920	221,600
1867	2,480,868	1885	713,738	1903	1,060,420	1921	233,200
1868	3,372,972	1886	903,651	1904	1,115,300	1922	364,800
1869	1,774,978	1887	693,709	1905	969,300	1923	420,000
1870	1,336,956	1888	616,731	1906	948,400	1924	420,750
1871	1,799,440	1889	588,923	1907	828,000	1925	280,092
1872	1,610,972	1890	490,435	1908	647,000	1926	355,503
1873	1,303,749	1891	429,811	1909	477,000	1927	156,247
1874	1,844,618	1892	399,526	1910	540,000	1928	143,208
1875	2,474,004	1893	356,131	1911	426,000	1929	109,599
						Total	$78,427,602

It will be noted that the most important period was from 1858 to 1877, with the maximum production in 1863, with an output valued at nearly four million dollars. From 1875 to 1893 a steady decline ensued and then the industry revived until 1904, when an output of $1,115,300 was recorded. Since that time the output has dwindled steadily until now it is down to $109,599 for 1929.

Although production has become almost negligible, it should not be concluded that there is no interest in the industry. Actually in the last five years much placer-mining has been carried on, but unfortunately without as yet very tangible production results. Much of this work has consisted of testing placer-ground, and in many instances the testing is not conclusive or completed. In a number of placer-fields of the Province plants for hydraulicking are being constructed, and some of these may be expected to be productive in the future. Much desultory small-scale work has been carried on, partly to recover gold and partly to prove up deposits of placer-gravels.

As the known placer-fields of the Province contain many areas which have not been tested, the question naturally arises whether there is not still a good possibility of reviving placer-mining to something like its former position in the mineral industry of British Columbia. With this objective in view, the Honourable the Minister of Mines decided to have some special investigations of placer areas made during the field season of 1929. Accordingly, Herbert Carmichael, a former Assistant Mineralogist and now a practising consulting mining engineer, was secured to make a report on certain placer areas in the Queen Charlotte and Atlin Mining Divisions. Also C. W. Moore, an experienced placer operator, was engaged to make a careful study of the placer-fields of Cariboo, Quesnel, and Omineca Mining Divisions. He was unable to fully cover this large field in the time available, but did examine many sections of these Divisions.

This bulletin has been issued in order that these reports may be made available to the public at as early a date as possible; and these reports have been supplemented with condensed general, statistical, historical, and geological information about the placer-fields of the Province.

Mr. Moore's report on the Cariboo, Quesnel, and Omineca Mining Divisions is essentially a report from the view-point of an operator and is intended to definitely state favourable possibilities. It is a record of his conclusions relative to various properties, with brief details regarding the occurrences.

In the preparation of this bulletin Mr. Carmichael kindly offered to write historical summaries regarding certain placer areas of the Province; these are given under the headings of the various Mining Divisions. In the compilation of this bulletin the writer has taken information from all available sources, but only direct references are acknowledged.

Most of the maps and photos included in this bulletin do not necessarily represent present placer operations, but have been used to illustrate the various phases of the industry since its commencement.

It is not intended that this bulletin on placer-mining will be reprinted in the Annual Report for 1929, which is now being prepared; it should, therefore, be preserved by those who desire a permanent file of the publications of the British Columbia Department of Mines.

GENERAL HISTORICAL REVIEW.

Although small amounts of gold were reported to have been obtained from veins on Queen Charlotte Islands, the first real metal-mining in the Province was the recovery of gold from placer-gravels.

At the time of the discovery of gold in quartz veins on Queen Charlotte Islands James Douglas was Governor of Vancouver's Island and Lieutenant-Governor of Queen Charlotte Islands. Accordingly, as Lieutenant-Governor, he issued a proclamation on March 26th, 1853, which was the first mining regulation in the Pacific North-west. This set forth the terms and licence under which the digging or mining of gold could be carried on in the Queen Charlotte Islands.

At this time the mainland of the Province was an almost unknown area, commonly known as New Caledonia, and mainly administered by the Hudson's Bay Company. The discovery of gold was reported on the Columbia river, near the confluence of the Pend d'Oreille, in 1855, but this was of little importance. With the discovery of gold on the Thompson river in 1857 and the rapid influx of thousands, Governor Douglas assumed authority to govern the area and issued the following proclamation to regulate the mining of gold:—

"PROCLAMATION.

"28th December, 1857.

"Whereas by law all mines of gold and all gold in its natural state of deposit within the Districts of Fraser River and of Thompson's River, commonly known as the Quaatlam, Couteau, and Shawswap countries, whether in the lands of the Queen or of any of Her Majesty's subjects belonging to the Crown:

"And whereas information has been received by the Governour that gold exists upon and in the soil of the said districts, and that certain persons have commenced or are about to commence searching and digging for the same, for their own use, without leave or other authority from Her Majesty:

"Now, I, James Douglas, the Governour aforesaid, on behalf of Her Majesty, do hereby publicly notify and declare that all persons who shall take from any lands within the said districts any gold metal or ore containing gold, or who shall dig for and disturb the soil in search of gold metal or ore, without having been duly authorized in that behalf by Her Majesty's Colonial Government, will be prosecuted both criminally and civilly as the law allows.

"And further notify and declare that such regulations as may be found expedient will be prepared and published, setting forth the terms on which licences will be issued for this purpose on the payment of a reasonable fee.

"Given under my hand and seal at Government House, Victoria, this 28th day of December, 1857, and 21st year of Her Majesty's reign.

"(Sgd.) JAMES DOUGLAS,
Governour.

"By His Excellency's Command.
"(Sgd.) RICHARD GOLLIDGE, Sec.

"God Save the Queen."

Shortly after this proclamation regulations were issued providing for a licence of 21 shillings a month and a commission appointed to deal with the size of claims, collect fees, etc.

On August 2nd, 1858, "British Columbia" was formally brought into existence by "An Act to provide for the Government of British Columbia," passed by the British Government. The mainland of the Province and Queen Charlotte Islands were included in the new colony of British Columbia, but Vancouver's Island remained a separate Crown Colony. James Douglas was Governor of both colonies.

In 1859 the "Gold Field Act" was passed; this was the first statutory recognition of mining in the Province, and in this Act the fee for a free miner's certificate was set at £1, substantially the same as the $5 fee to-day. Under this Act Gold Commissioners were appointed who had extensive administrative and quasi-judicial powers.

Many accounts have been written of the discovery of placer gold in British Columbia and the famous Cariboo rush from 1858 onwards. The Provincial Archives have numerous documents relating to this early history of the Province and many books and brochures have been written based on the historical documents which have been carefully preserved.

For the purpose of this bulletin it is believed that the following comprehensive and informative summary by G. M. Dawson* is most suitable:--

"It is now difficult to ascertain under what precise circumstances the first discovery of gold placers on the mainland of British Columbia occurred. Little attention was at first given to accounts of the finding of small quantities of gold, and at a later date, when gold-mining sprung into importance, numerous stories respecting its discovery were invented or exhumed. One statement is to the effect that the Hudson's Bay agent at Kamloops had bought gold from the Indians as early as 1852, but, if correct, the amount purchased must have been very small. In 1855 a servant of the same company discovered gold near Fort Colville, a short distance south of the International boundary, and moderately rich diggings began to be worked in that vicinity. It seems certain that the epoch-making discovery of gold in British Columbia was the direct result of the Colville excitement. Indians from Thompson river, visiting a woman of their tribe who was married to a French-Canadian at Walla Walla, spread the report that gold, like that found at Colville, occurred also in their country, and in the summer or autumn of 1857 four or five Canadians and half-breeds crossed over to Thompson river, and succeeded in finding workable placers at Nicoamen, on that river, 9 miles above its mouth. On the return of these prospectors the news of the discovery of gold spread rapidly. It is also probable that their arrival on the Thompson caused the Indians to take an interest in gold-mining, for we read in a dispatch of Governor Sir James Douglas that from October 6th, 1857, to the end of that year 300 oz. of gold had passed through the hands of the Hudson's Bay Company, this amount being all, so far as known to Douglas, which had been obtained. Douglas speaks of the region, including the lower Thompson, from which the gold came, as the 'Couteau country.'

"Nearly ten years previously, in 1849, gold had been discovered in California, and that country was swarming with a cosmopolitan population of gold-seekers; thus when the discovery of gold in the north became known and authenticated, by the exhibition of the gold itself, an extraordinary migration followed. Between March and June, 1858, from 20,000 to 23,000 persons arrived by sea from San Francisco in Victoria, and converted that place (first founded by the Hudson's Bay Company in 1843) from a quiet village of two or three hundred inhabitants into a city of tents. At the same time, many miners (estimated by some at 8,000 in number) reached British Columbia by overland routes from the south. A large proportion of those who arrived at Victoria never got as far as the mouth of Fraser river, their objective point, and so great were the natural difficulties and the resulting disappointment experienced that all except about 3,000 of this promiscuous migration returned to California before the following January. The inland country was entirely without routes of communication, by nature a singularly difficult one, and unprovided with means for the support of a large population. Meanwhile, by the more fortunate and energetic the development of its wealth had been fairly inaugurated. The auriferous river-bars in the vicinity of Hope and Yale on the lower Fraser, being the most accessible, were the first to be worked, and the return of gold began to assume important dimensions.

* "Mineral Wealth of British Columbia." Geological Survey of Canada Annual Report, Volume III. (pt. II.), pt. R, pp. 18–21 (1888).

"Before the close of the working season in 1858, some of the adventurers who had come overland from the south had pushed onward in face of extraordinary difficulties—resulting not alone from the roughness of the country itself, but combined with the want of supplies and occasional overt hostility of the Indians—as far as Fountain, a short distance above Lillooet on the Fraser, and by the line of the Thompson to Tranquille river on Kamloops lake. In the following year a renewed advance brought a number of miners to Quesnel river, and in 1860 rich diggings were found at the forks of the river and over 600 whites were at work on its length, while Antler creek was discovered and some work done upon it by a few score men—thus fairly entered on the extremely rich central region of Cariboo.

"The theory formed by the miners who first worked the fine 'flour' gold of the Fraser below Yale was that this gold had its origin in richer deposits toward the sources of the great river, and though this theory was only partly correct as regards the origin of these particular deposits, it none the less served as the impelling force which led to the opening up of Cariboo district.

"In 1861 Williams and Lightning creeks, Cariboo, the two most celebrated in the annals of British Columbia placer-mining, were discovered, and in this and the following year most of the other rich creeks in Cariboo became known. The first gleanings from the old Cariboo stream-courses were notable. It is estimated that gold to the value of $2,000,000 had been got out by a population not exceeding 1,500 before the end of 1861. In consequence of those finds a second important migration of miners and others towards the Province commenced before the close of 1861, which continued in greater or less volume until about 1864. A series of letters from a correspondent of the *Times* contributed largely to this result, and extended the area of interest to very wide limits, bringing adventurers from England, Canada, Australia, and New Zealand. A party of men even set out for Cariboo from eastern Canada overland in 1862. Of this party several members lost their lives in the mountains, but some eventually reached their destination."

The history of the placers of the Cariboo and Quesnel Divisions from 1864 to the present time is well known; it constitutes practically the history of the country for some years. The sudden outburst of wealth in the short space of a few years did much to lay the foundation of the material prosperity of British Columbia, and the influx of thousands changed the country from a wilderness inhabited by Indians and trappers into an area in which many forms of industrial activity commenced.

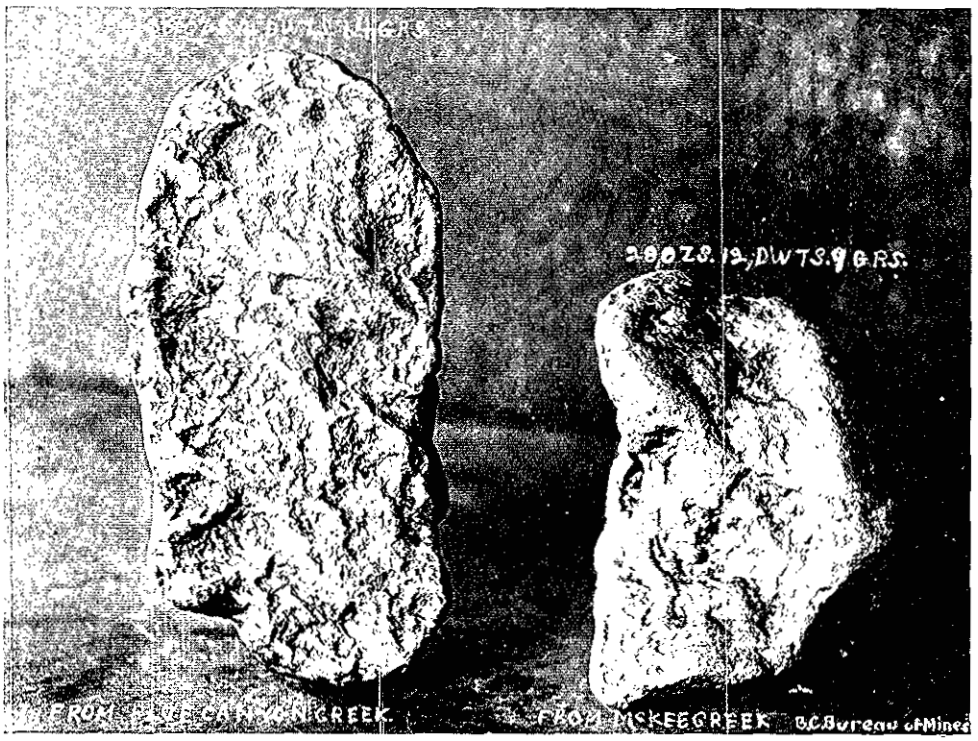
It is interesting to note that in the early years of mining the authorities were very careful not to give away too much ground. Considering the vast area administered, it seems strange that such small areas were allowed to each individual, and it is quite evident that the new placer-fields were considered to be extremely rich. The first placer claims were only 12 feet square—144 square feet—hardly worth while starting on. The permitted size of claims was gradually increased until now they are 250 feet along the stream and 1,000 feet wide. By the "Placer Act," passed in 1891, provision was also made for taking up placer leases half a mile in length and also 5-mile dredging leases along the beds of rivers. These present regulations contrast sharply with the early ideas that prevailed.

The same cautiousness is seen in the first regulations for lode-minerals, by which mineral claims only 100 feet square were granted, which compares with the present size of 1,500 feet square.

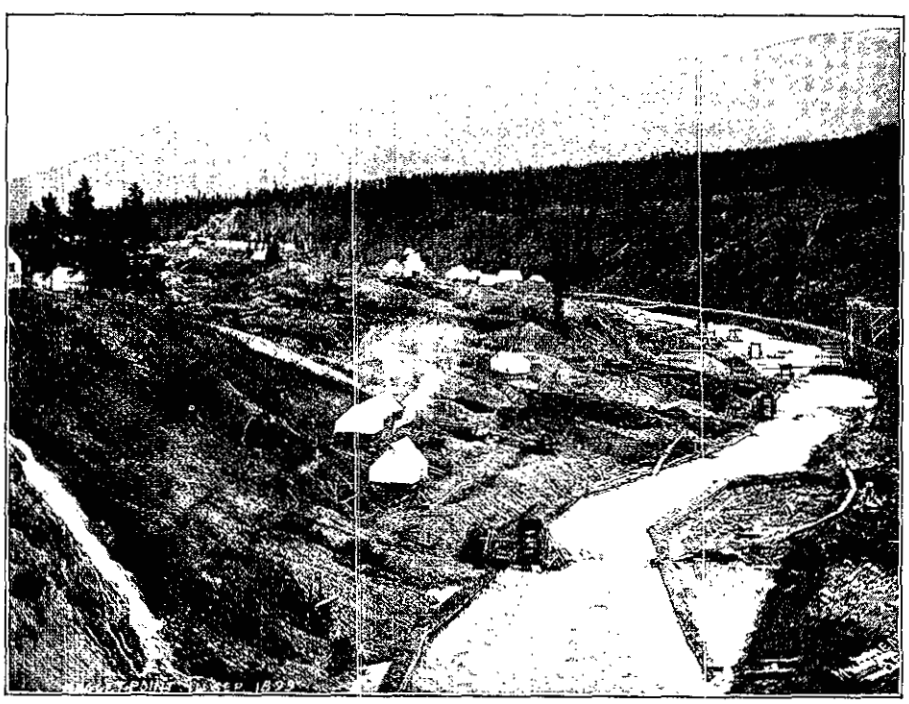
The easily worked bonanza deposits of the Cariboo quickly yielded their golden treasure and from 1863 a progressive decline in the yearly output ensued. As the rich diggings were worked out, many extensive hydraulic plants were put in to handle low-grade ground in large quantities; also numerous expensive enterprises were commenced to carry on deep drifting in ground that, owing to adverse physical conditions, was left by the old-timers. It is unfortunate that most of these projects were financially unsuccessful, and it is evident that lack of adequate knowledge of the placer deposits and the problems to be contended with were the primary causes of failure.

Since the Cariboo rush successive new placer-fields have been discovered in the Province, and each one has been marked by a greater or lesser "stampede" to the new diggings. While other important fields have been discovered, the Cariboo has been without doubt the richest and most productive placer-field discovered in the Province up to the present time.

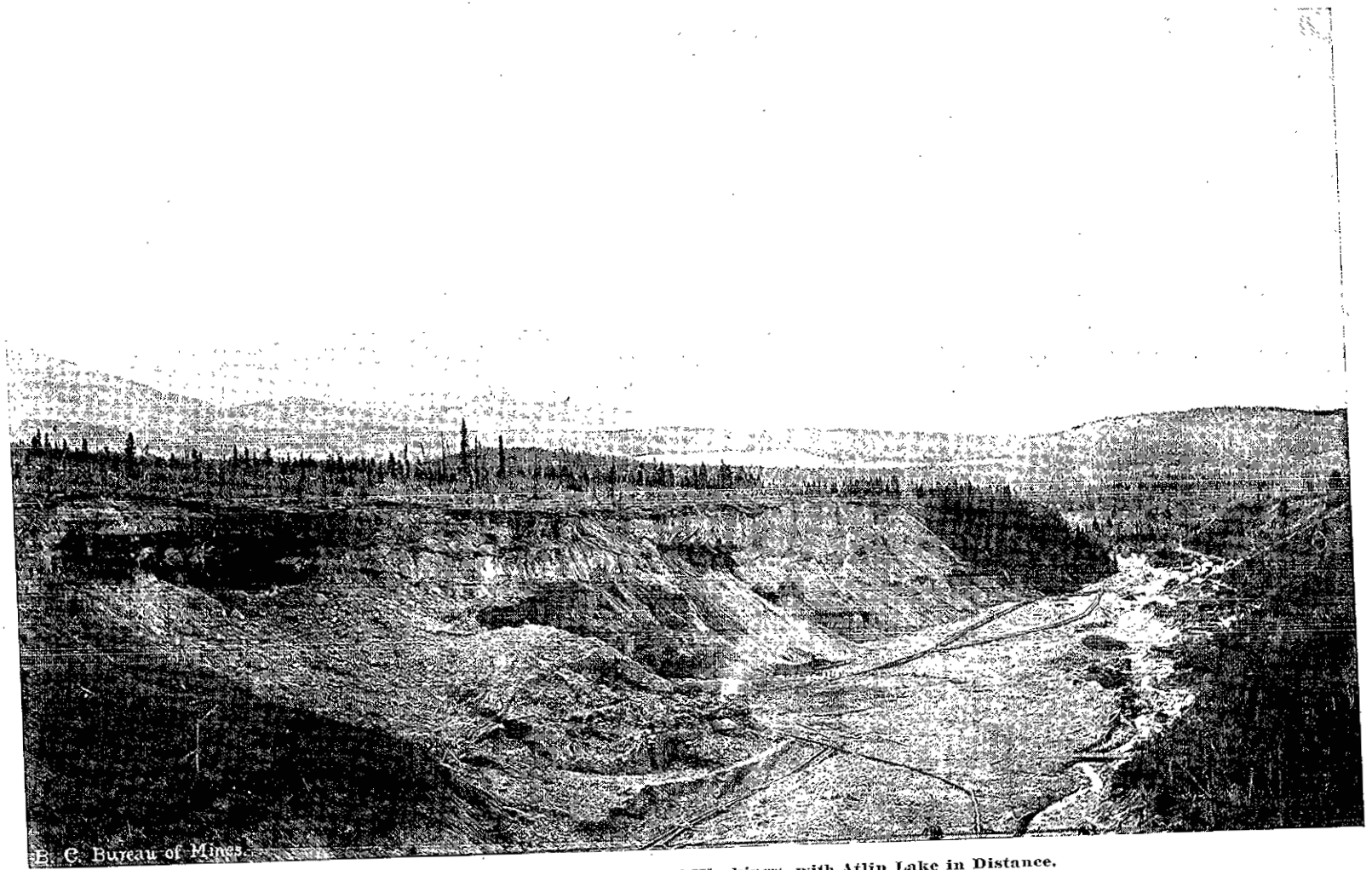
In 1863 rich placer deposits were found on Wild Horse creek, in East Kootenay, which caused some excitement at the time and were worked somewhat extensively in the following year.



McKee Creek, Atlin—Nuggets obtained from.



Pine Creek, Atlin—Workings at Nugget Point.



McKee Creek, Atlin—General View of Workings, with Atlin Lake in Distance.

In 1864 placer gold was found on the Leech river and in 1865 discoveries were made on the Big Bend (of the Columbia) north of Revelstoke. This latter resulted in quite an excitement in 1866, which, however, subsided very quickly.

Some placer-mining had been done on the Peace river as early as 1861, but it was not until 1869 that the Omineca placer-field, with discoveries on Manson and other creeks, was found. Placering in this field reached its height in 1871, but it was never a particularly rich area and it was practically abandoned when the more important Cassiar district, on the headwaters of the Dease river, was discovered in 1872.

The Cassiar fields have been quite productive and rank next in importance to the Cariboo district. From the Dease Lake area prospectors extended their discoveries and eventually the placers of Atlin Division were found in 1898, and this area is still being actively developed.

In the southern portion of the Province the Similkameen Division has been the scene of much placer-mining. Some mining was done on the bars of the Similkameen river, near the mouth of the Tulameen, as early as 1860, but it was not until 1885, when coarse gold was found in Granite creek, a tributary of the Tulameen, that real interest was aroused in this district. In 1886 a production of $193,000 in gold and platinum was credited to this area and since then the yearly output has gradually waned.

In recent years several companies have been started to explore the possibilities of the placer-gravels of this area, but as yet no great success has been obtained.

In connection with the early history of placer-mining in the Province, the following extracts from an article by H. T. Nation on the "Dewdney Trail," published in the proceedings of the British Columbia Historical Association, are interesting. This trail was primarily constructed to provide a route in British Columbia for the safe passage of gold to Victoria, without going through United States territory.

"Another event in the progress of the Province now took place, for in 1855 two ex-servants of the company discovered placer gold on the Columbia river at the confluence of the Pend d'Oreille river.

"As is usual, and as was certain in those days of placer discoveries, men came in from the south and spread along the Columbia, Kootenay, Similkameen, and upper Fraser rivers, following up the deposits of gold-bearing gravels in the rivers.

"In 1857 they found gold at the junction of the Fraser and Thompson rivers, where Lytton now stands. This last discovery was noted officially by Governor James Douglas, and he reported it privately to England. The news got out, however, and more discoveries being made in the lower reaches of the river, the Cariboo rush began in 1858. . . .

"From the Kootenay flats the Dewdney trail entered the mountains by Goat river, found by Carnes of Big Bend fame, and down a branch of the Moyie, striking that river at the present settlement of Yahk.

"Here the famous trail from Walla Walla, which had been serving the East Kootenay goldfields from the southern country, was met. This was followed through St. Joseph's Prairie, now Cranbrook, to the right bank of the Kootenay river, where it terminated at Galbraith's Ferry. The miners on Wild Horse creek built a road for themselves from the river for 5 miles. . . .

"As stated before, gold was discovered on the Columbia at the mouth of the Pend d'Oreille river. It was in 1863–64 found on the Kootenay, and a flourishing settlement arose on the Wild Horse Creek diggings, called Kootenay. Hence the establishment of Galbraith's Ferry at the end of the trail.

"Coincidental with the determination of the International boundary by the British and United States parties came the development of the gold-placer mines all along the boundary from Kootenay to the Tulameen river. Rock Creek was the centre of this activity, and the Gold Commissioner of that day lived there, Wm. G. Cox, and administered the mining and customs laws. His reports to Governor Douglas are preserved in the British Columbia Archives.

"New trails were opened up in every direction by reason of rushes to new fields, but the main lines of travel were still in use towards Fort Thompson (Kamloops), and up the Columbia to Canoe river and the pass over the Rockies.

"Owing to the isolation of Rock Creek area, the traffic was over the border, this being quicker and cheaper than by way of the Hope–Skagit trail, or the Lytton trail, which latter was previously used. . . .

"Commissioner Cox's reports were full of interesting matter, and some notes therefrom will be sufficient to indicate the values of gold recovered in that area. He says, on July 17th, 1861, that there were on the creek ninety-three men, four ditches, and two sluices; averaging a yield per day per man of $16; wages to hired men, $16 per day. Rufus Henry wrote that his best week, July 10th to 16th, 1861, gave him profit, four hands working, of $349.

"Cox relates how the 'Southern Boundary Act' stopped active building operations at Rock Creek, as it forced the collection of customs upon the traders from the south.

"Gold was discovered then, 1861, on a creek called Riviere de L'Anse du Sable, which is now Mission creek, at Kelowna, and Mr. Cox regretted this, as it made more trails to guard.

"In 1861 Rock Creek began to lose its miners, as the Nez Percé Indian Reserve was opened to prospectors, and they rushed over there. Some, however, came back, and between June and November, 1861, $83,000 was taken out of Rock creek. The discoverer of the creek was one Baume."

GENERAL GEOLOGY OF BRITISH COLUMBIA PLACER-FIELDS.

While it may seem to be rather out of the question to generalize regarding the geological features of placer-fields which are many hundreds of miles apart, still there are certain conditions which pertain to all the placer areas of the Province; and a realization of these may be decidedly useful.

In the following geologic discussion, only a brief summary is given and in general reasons are not given for the conclusions reached or ideas advanced. In the aggregate there is an extensive literature on British Columbia placer deposits, which contains much of the evidence on which this summary is based.

It is noticeable that the important placer-fields of the Province lie along a broad zone stretching north-westerly from the International boundary-line up to Atlin and extending into Yukon Territory. This fact gave rise to an early theory of an immense "flow" of gold-bearing gravels or "wash" traversing the Province along this line; the theory, of course, was quite untenable and erroneous.

This grouping of the main placer areas along one zone was noticed by Dawson, who said:—

"While it may now be safely affirmed that gold is very generally distributed over the entire area of the Province of British Columbia, so much so that there is scarcely a stream of any importance in which at least 'colours' of gold may not be found, the enumeration of the principal discoveries of important mining districts show very clearly that most of these are situated along the system of mountains and high plateaus which comprises the Purcell, Selkirk, Columbia, and Cariboo ranges and their north-western continuations, lying to the south-west of the Rocky Mountain range properly so called, and parallel in direction with it. Of all the gold-producing districts that of Cariboo has proved the richest and the most continuously productive."

Physiographically the placer-fields are situated in the Central Belt of the Cordilleras of Canada. This Central Belt is comprised of the Columbia, Interior, Cassiar, and Yukon systems, which systems in turn include the Selkirk, Monashee, and Cariboo mountains and the Fraser, Nechako, and Yukon plateaus.

Generally speaking, the placer-fields of British Columbia occur in plateau areas where alpine mountains are absent. As a rule the topographic relief is not great, although in places the deep valleys of the Fraser plateau give an appearance of true mountainous topography. Even in the Selkirk and Cariboo mountains the placer-fields are found in topographic areas transitional between plateaus and typical mountain ranges.

Rocks of many varieties and formed over a considerable range in geologic age are found in the various placer-fields. In many of these areas a noticeable feature of the rock formation is the large number of quartz veins that are exposed. For the purpose of this discussion it is unnecessary to enumerate the types of rock formations occurring in the placer camps, but it is important to bear in mind that quartz veins are almost always present, varying in size from mere stringers up to ledges 100 feet in width. In some areas auriferous slates are mentioned by some writers, but these generally consist of slates containing small irregular quartz stringers, and it is in these that the gold occurs.

The great period of mineralization in British Columbia was in Jura-Cretaceous times following the intrusion, or series of intrusions, of batholithic rocks expressed in the Coast

range, Bulkley mountains, Nelson batholith and other batholiths and stocks which form a dominant feature of the western and southern geology of the Province. It is believed that the quartz veins of the placer-fields stretching from South-east Kootenay to Yukon were formed by this agency. Although occurring in host rocks of a wide variety, these quartz veins are characterized by the presence of small amounts of sulphides (in particular pyrite and arsenopyrite) which are in part gold-bearing. It is further believed that the erosion of these quartz veins and later concentration and reconcentration of the contained gold gave rise to the placer deposits. It follows, therefore, that in all cases of rich placer deposits the gold had a local origin, but that the fine gold (flour-gold) from this source had a widespread distribution throughout the gravels of the Province.

Following mineralization in the Jura-Cretaceous, a long period of erosion took place in the late Cretaceous and Tertiary periods, and it is believed that extensive placer deposits were formed then in the stream-valleys. For a description of the processes by which the gold in the sulphides of the quartz veins was concentrated in the veins by solution, precipitation, and repetitions thereof, thereby deposited at the water-level, eroded and finally concentrated in the stream-gravels, the reader is referred to the convincing and elaborate discussion in the Report on the Barkerville Area, by Johnston and Uglow, Memoir 149, Geological Survey of Canada, 1926.

While this report is confined to the Barkerville area, it is believed that this is an excellent description of what has taken place in many placer-fields of the Province. Similar conditions are noticeable in East Kootenay, Granite Creek, Atlin, and other camps.

It is assumed that at the close of the Tertiary there were a number of rich and continuous placer deposits in the various fields of the Province. Then the Glacial age arrived and immediately much havoc was created with the placer deposits. In large part they were obliterated and the placer-gravels transported far and wide and the gold content so admixed with barren gravels as to make them of no economic value.

It is generally agreed that British Columbia was covered with a large ice-sheet and that there was a recurrence of this condition at intervals, with interglacial periods between. It is also evident that in the Central Belt the ice-sheet was not particularly active, but was more or less stagnant, in contrast to the active glaciation that prevailed in the more rugged mountainous belts of the Province where glaciation was a potent force of erosion. With the exception of valley glaciers at the end of the Glacial age or in Interglacial periods, the great ice-sheet did not actively erode the rock formations of the Central Belt. To this is due the fact that there are any placer-fields left and also explains (at least, in part) the virtual absence of important placer deposits in the Western Belt, where glaciation had a much greater erosive action. The Eastern Belt is also lacking in placer deposits, but this is probably due mainly to the lack of original gold mineralization in the rock formations.

Plenty of evidence is to be found in the Cariboo district to show that glaciation did not erode rock formations to any great extent, and in places there are remnants left of what undoubtedly are original Tertiary gravels. Glaciation, however, did profoundly affect the gravels of the area by eroding them in part, distributing them, and by means of glacial streams roughly resorting and partially concentrating them.

The writer would like to emphasize the point that the most important feature of placer geology in British Columbia is the effect of glaciation. It is the cause of many perplexities, and a lack of knowledge of glacial geology is the reason that so many ill-advised placer ventures have been attempted, with consequent financial failure.

It is confidently asserted that all bonanza placer deposits in British Columbia were either in original Tertiary gravels or in gravels which represent a direct reconcentration by Glacial or Post-Glacial streams of original Tertiary gravels.

Placers in British Columbia may be broadly divided into the following classes:—

(1.) Original Tertiary gravels. Only remnants and fragments of these are left and in following a Tertiary channel it may be cut off abruptly; this sudden termination is due to erosion by glaciation. They occur on bed-rock and are usually buried beneath glacial gravels. This is the "lead" gold of the old-timers.

(2.) Interglacial gravel deposits. In many instances these gravels are deposited on a previously deposited glacial clay, but may occur on bed-rock. These are derived by interglacial stream-action concentrating glacial gravels robbed from original Tertiary channels.

(3.) *Post-Glacial gravel deposits.* The Pleistocene or Glacial epoch scattered enormous masses of gravels across the country and particularly in the main stream-channels. In the zones of original Teritary placer deposits these glacial gravels contained more or less gold, but almost always the original placer-gravels were so diluted with extraneous material that the final depositions of glacial gravels were of no economic value as placer deposits. In this connection it should be remembered that ice-erosion did not concentrate. In places these glacial gravels have been concentrated by Post-Pleistocene stream-action, but as a rule these deposits are low grade, with the exception of bar deposits, which sometimes have rich shallow ground.

Variations of these three types occur, but in a broad general way this classification includes all placer deposits in the Province. In some cases ancient channels have been left stranded through diversion of the waters by glaciation, covered by glacial gravels, and later these ancient channels were robbed by recent stream-action giving rise to rich placers in the present streams. This was well exemplified by Keithley creek, Quesnel Division, and in part on Lightning creek.

Masses of Tertiary gravels with a rich gold content have apparently in places been plucked out by glaciation and deposited almost intact away from the original source and entirely surrounded by glacial gravels. This has been suggested as the explanation of the rich patch at Cedar creek, Cariboo Division.

Enough has been said to show that the dominant feature of British Columbia placer geology is glaciation and that much cautiousness must be used in assuming continuity of any placer deposit. Much futile work has been done on the assumption that a rich pay-streak in an ancient channel should continue for miles. The channels often do continue, but in many instances are barren of pay-gravels.

The Graham Island deposits are probably of type 3, but have been mainly concentrated in the present deposits by wave-action.

METHODS OF WORKING.

Practically every method of working has been used in the placer-fields of British Columbia. The early miners in each camp started with pans and rockers; and this was followed by deep-drifting methods, the pay-gravels being washed in sluice-boxes. The old-timers of the Cariboo did wonderful work in deep-drifting operations; Cornish pumps and water-wheels were used to handle the water and ground heavy with slum and water-pressure was successfully handled. In the Cariboo after 1864 many elaborate deep-drifting enterprises were commenced to mine continuations of channels worked by the old-timers. It was assumed that with more modern machinery areas unprofitable to the old-timer would pay to operate, but practically none of these projects have been successful.

Later, hydraulic operations were commenced and in recent years the bulk of the placer production of the Province has come from hydraulic operations. Variations of ordinary hydraulic practice have been used, including hydraulic elevators and the so-called "pump-hydraulic." This latter system is used where water is scarce and the water is caught in dams below the operation and pumped back to be used again under a pressure-head; it is a costly and generally inefficient system, only suitable for rich shallow ground. Some excellent hydraulic systems have been installed in the Province, particularly in the Cariboo, Quesnel, Liard, and Atlin Divisions.

Dredging has been tried in several places, but nearly all the dredges have been of poor design or a new unproven invention that proved unsuitable for the work. Probably the only really modern dredge installed in the Province was the one at Antler creek, Cariboo Division, operated by the Kafue Copper Development Company. Mechanically this dredge was successful, but the operation unfortunately was not a financial success. This dredge has now been scrapped and the machinery shipped out of the country.

Variations of dredging, such as steam-shovels, gas-shovels, and drag-line scrapers, have also been used to dig placer-gravels. Generally, every available device has been used in attempting to exploit the latent wealth of the placer deposits of the Province.

ANCIENT CHANNELS.

The history of every placer camp in British Columbia is filled with stories of ancient channels, and many channels are theorized running in all directions. While such theories are

valuable if reasonably based on proper field evidence, undoubtedly they are responsible for much work that was in no way justified.

In the Cariboo district it is apparent that the main lines of drainage in Tertiary times were very similar to what they are now. Local variations, however, were considerable, particularly in the smaller streams. Many of the present streams have stranded channels in the benches which represent various positions of the stream from Post-Pleistocene back to the Tertiary age.

Glaciation undoubtedly reversed, altered, and changed the local drainage in many places, but did not materially affect the master drainage of the country. Theories of ancient channels that parallel or diverge at slight angles from the present drainage are worthy of investigation and possible testing, but those ideas that postulate large channels, running at random across the country, should be dismissed as highly improbable.

It is apparent that a necessity for the future intelligent testing of the placer deposits of the Cariboo and probably of other placer areas in the Province is a careful study in detail of placer geology. This work was commenced in the Cariboo by the Geological Survey of Canada, but never carried to a conclusion. Reconnaissance-work was started by B. R. MacKay. Later, the Barkerville area was topographically and geologically mapped by W. A. Johnston and W. L. Uglow. This report contains much useful information on the placer deposits of that area, including a detailed discussion of their origin and physical occurrence.

An extension of this topographic mapping to take in the area extending to Quesnel, Quesnel lake, and Horsefly, to be followed by the mapping of the superficial geology (gravels, clays, and soils), would be of great assistance in sizing up the areas that warrant testing. Such geological work should afford much information regarding ancient channels and the former drainage, and it is in these ancient channels that the more important possibilities lie of further profitable placer deposits.

PLATINUM.

Metals of the Platinum group occur in sparing and irregular quantities in the placer-gravels of the Province. The most important area has been the Tulameen section of the Similkameen Division. The history of the discovery and mining of the platinum in this section is given under Similkameen Division.

The origin of this platinum is in a belt of peridotite rocks cut by the Tulameen river and its tributaries. In the gravels of this section there is a considerable content of black sand carrying varying amounts of fine gold and platinum which is difficult to recover by ordinary methods. An efficient and economical process for treating this black sand to recover these metals would probably make possible the profitable operation by hydraulicking or dredging of certain of these gravel-deposits which cannot be worked otherwise.

In this connection, if the Hanssen precious-metal separator, now in the experimental stage, proves successful, it will be of material assistance in helping placer-mining in this and other areas. This machine is described by Herbert Carmichael in his report in this bulletin on Graham island, under the heading of Queen Charlotte Mining Division.

Platinum also occurs in the gravels of the Quesnel river and its tributaries, but very irregularly distributed. Similarly, small amounts have been detected in black-sand concentrates from gravels of the Fraser river. No appreciable production of platinum has ever been recorded from these localities. The Quesnel River gravels in many places, however, carry in places a high content of black sand and a proper treatment system might show values in fine gold and platinum in these sands which would pay to recover.

Small amounts of platinum also occur in Atlin Division and Graham island, but are not of great importance. Other Platinum group metals, such as iridium, osmium, and palladium, occur in small amounts associated with the platinum, especially in the Tulameen section.

FINENESS OF PLACER GOLD.

In 1900 a comprehensive set of specimens of British Columbia placer gold was collected and exhibited at the Paris Exhibition. A complete detail record of the specimens is given in tabular form in the 1899 Annual Report. The information is interesting now to show the value to the ounce or fineness of the placer gold produced from various creeks and districts of the Province. The following table gives in abbreviated form this information:—

FINENESS OF PLACER GOLD.

Mining Division and Locality.	*How worked.*	Nature of Specimen.	Value per Ounce.
Lillooet—			
Fraser river		Gold-dust	$16.50
Upper Bridge river		Gold-dust	17.00
Lower Bridge river		Gold-dust	17.00
Cariboo—			
Fraser river		Gold-dust	16.00
Smoky river		Gold-dust	16.50
Cottonwood river		Gold-dust	17.00
Shepherd creek	Hydraulic	Gold-dust	17.00
Coffee creek	Hydraulic	Gold-dust	17.25
Slough creek		Gold-dust	17.25
Lightning creek		Gold-dust	17.25
Nelson creek		Gold-dust	17.25
Lower Williams creek	Hydraulic elevator	Gold-dust	16.00
Williams creek		Gold-dust	15.87
Upper Williams creek		Gold-dust	15.50
Cunningham creek		Gold-dust	16.50
Grouse creek		Gold-dust	16.00
8-Mile lake		Gold-dust	17.00
8-Mile lake		Nugget	16.00
Stout gulch	Sluice	Nuggets	17.25
Mosquito creek	Sluice	Nuggets	17.25
Williams creek	Sluice	Nuggets	15.75
Lowhee creek		Nuggets	17.25
Lightning creek	Sluice	Nuggets	17.50
Summit creek	Hydraulic	Gold-dust	18.33
Stevens creek	Hydraulic	Nugget	18.50
Quesnel—			
Quesnel Forks	Hydraulic	Nugget	16.80
Quesnel Forks	Hydraulic	Nuggets	16.30
Horsefly river		Gold-dust	16.90
Keithley creek		Gold-dust	17.40
Quesnel Forks		Gold-dust	16.50
Golden—Quartz creek		Gold-dust	18.00
Liard—			
Thibert creek		Gold-dust	16.00
McDame creek		Gold-dust	18.00
Dease creek		Gold-dust	15.00
Poorman gulch	Sluice	Gold-dust	18.00
Messetoe creek	Sluice	Gold-dust	18.00
Roselia creek	Sluice	Gold-dust	18.00
Snow creek	Sluice	Gold-dust	18.00
Quartz creek	Sluice	Gold-dust	18.00
Walker creek	Sluice	Gold-dust	19.00
Atlin—			
McKee creek	Sluice	Gold-dust	16.25
Spruce creek	Sluice	Gold-dust	16.25
Pine creek	Sluice	Gold-dust	16.25
Birch creek	Sluice	Gold-dust	16.25
Willow creek	Sluice	Gold-dust	16.25
Wright creek	Sluice	Gold-dust	16.25
Pine creek	Sluice	Nuggets	18.00
Wright creek	Sluice	Nuggets	18.00
Boulder creek	Sluice	Nuggets	18.00
Ashcroft—			
Fraser river	Dredging	Gold-dust	17.89
Texas Creek mouth	Dredging	Gold-dust	17.89
Greenwood—Rock creek	Sluice	Gold-dust	16.50
Fort Steele—Wild Horse creek	Sluice	Gold-dust	18.00
Arrow Lake—Fire Valley creek	Sluice	Gold-dust	16.00
Yale—North Bend	Dredger	Gold-dust	17.27
Revelstoke—			
Big Bend	Bed-rock flume	Gold-dust	18.00
Big Bend	Bed-rock flume	Gold-dust	18.00
Smith creek	Sluice	Gold-dust	18.00

FINENESS OF PLACER GOLD—*Continued.*

Mining Division and Locality.	How worked.	Nature of Specimen.	Value per Ounce.
Revelstoke—*Continued.*			
Columbia river	Sluice	Gold-dust	$18.00
French creek	Drifting	Nugget	18.00
French creek	Drifting	Gold-dust	18.00
Ashcroft—			
Lytton	Dredging	Coarse gold (1)	19.00
Lytton	Dredging	Medium gold (2)	19.00
Lytton	Dredging	Fine gold (3)	19.00
Omineca—Manson creek	Hydraulic	Nuggets	16.50

EXPERIENCE FROM RESULTS OF PLACER-MINING IN BRITISH COLUMBIA.

By studying the record of placer-mining in British Columbia it is seen that in every camp some good pay-ground was first discovered, which was easily worked at a satisfactory profit. Later on, extensions of the shallow bonanza ground were explored with varying degrees of success.

As a rule, when costly plants were installed to work by drifting methods deep ground with heavy water-pressure, no success was attained. On the other hand, many successful hydraulic plants have been operated on ground too low grade for drifting, or in places where a rich pay-streak had been partially drifted out by the old-timers.

It is quite apparent that deep-drifting operations in many instances were unsuccessful because the pay-streak or "lead" of rich gold gravel ceased owing to various causes. Pay-streaks of coarse gold, which undoubtedly were of direct local origin, could not be expected to extend to any great distance from the source of gold; secondly, many of these pay-streaks terminate abruptly through the gravels being eroded by glaciation.

The whole history of placer-mining in British Columbia shows that, in the majority of instances, altogether inadequate testing of the ground was carried out before proceeding with installation of costly equipment and construction-work. In the early days testing of ground was primitive, and in the bonanza fields probably unnecessary. Later, testing was done by pits, shafts, and tunnels, and on the results of one favourable test extensive plans were frequently laid out and executed. In many cases far too much was assumed without thorough testing.

In later years the use of churn-drills—such as the Keystone and others—have been used to test placer-ground, but, owing to many prejudices, not as full use has been made of this excellent device as would be desirable. Drilling, if properly conducted, is the most economical and efficient method of testing placer-gravels. It gives information as to values, character of gravels and clays, and depth of bed-rock; but it only gives this information if the work is systematically carried out by experienced operators. The writer has knowledge of much testing of placer-ground in British Columbia which is entirely valueless so far as reliability of results is concerned; some of this was by drilling and some by other methods.

Without elaborating further, it is quite evident that the moral to be taken from the results obtained from much money spent on unsuccessful placer enterprises in British Columbia is that careful and adequate testing of the ground is essential before assuming that any ground will pay to work. In some instances it is argued that the cost of drilling the ground would be as great as installing a hydraulic plant, and that if a reasonable assumption can be made that the ground carries pay-gravel, then the plant should be installed without testing. Such cases are extremely rare, and as a rule ground can be tested for a small percentage of the cost of plant and equipment to work it.

FUTURE POSSIBILITIES.

While the record of placer-mining in the various camps in British Columbia shows that after the originally discovered rich ground was exhausted many unsuccessful enterprises have been started, it should not be concluded that there are not many possibilities for the future. These opportunities may be listed as follows:—

(1.) The discovery of new untested deposits in the vast area of the Central Belt. It is not likely that bonanza deposits on unmined creeks will be as easily found as in the early days of the Province, but there are undoubtedly many creeks that have never been properly prospected.

(2.) The major possibility for the future is probably the finding of ancient channels (Tertiary drainage) which have not been recognized. Many of these channels may be barren of pay-gravels through ice-erosion, but some of them may contain workable placer deposits.

(3.) Low-grade Post-Glacial deposits occur in many places which have been formed by concentration of Glacial gravels by Post-Pleistocene stream-action. While many of these are too low in gold content to be profitably worked, it is probable that adequate testing will show many deposits that could be hydraulicked, provided there is an adequate supply of water and physical conditions are suitable. Some of these deposits, as well, may provide suitable ground for dredging.

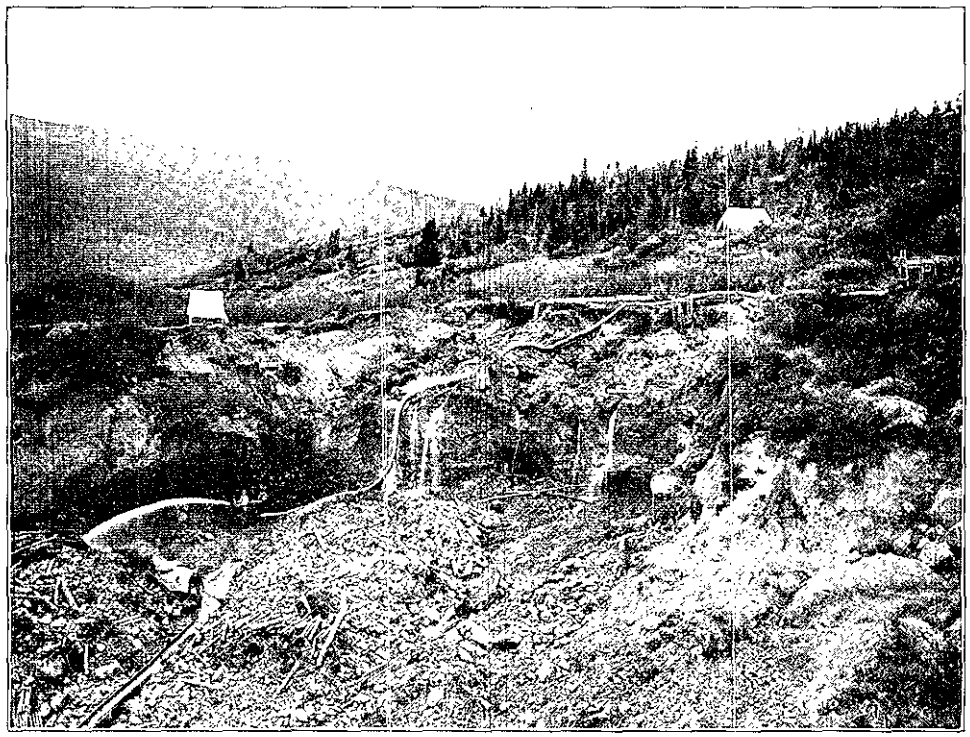
(4.) In some areas, particularly in the Tulameen and Quesnel sections, the efficient handling of the black-sand concentrates from placer operations to recover the gold and platinum content may make possible the working of present known deposits which cannot be profitably handled by present methods.

If further detail geologic work is done in the various placer areas, particularly in the Central Belt, it seems probable that many interesting possibilities will be brought to light and capital will be encouraged to test out various gravel deposits now unknown.

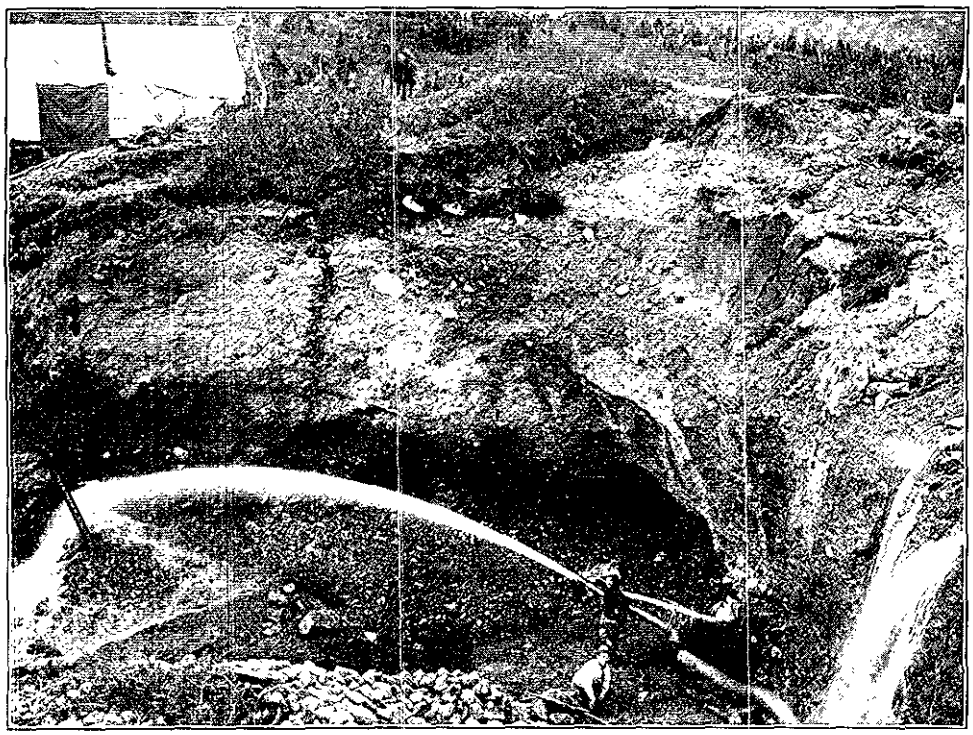
CHRONOLOGY OF BRITISH COLUMBIA PLACERS.

There have been reports and stories of the Spaniards washing for gold in the early days of their occupation of the west coast of Vancouver island, especially at Zeballos or Gold river, flowing into Esperanza inlet, but no evidence has definitely been found on that river of their having done so. The same may be said for Sombrio river.

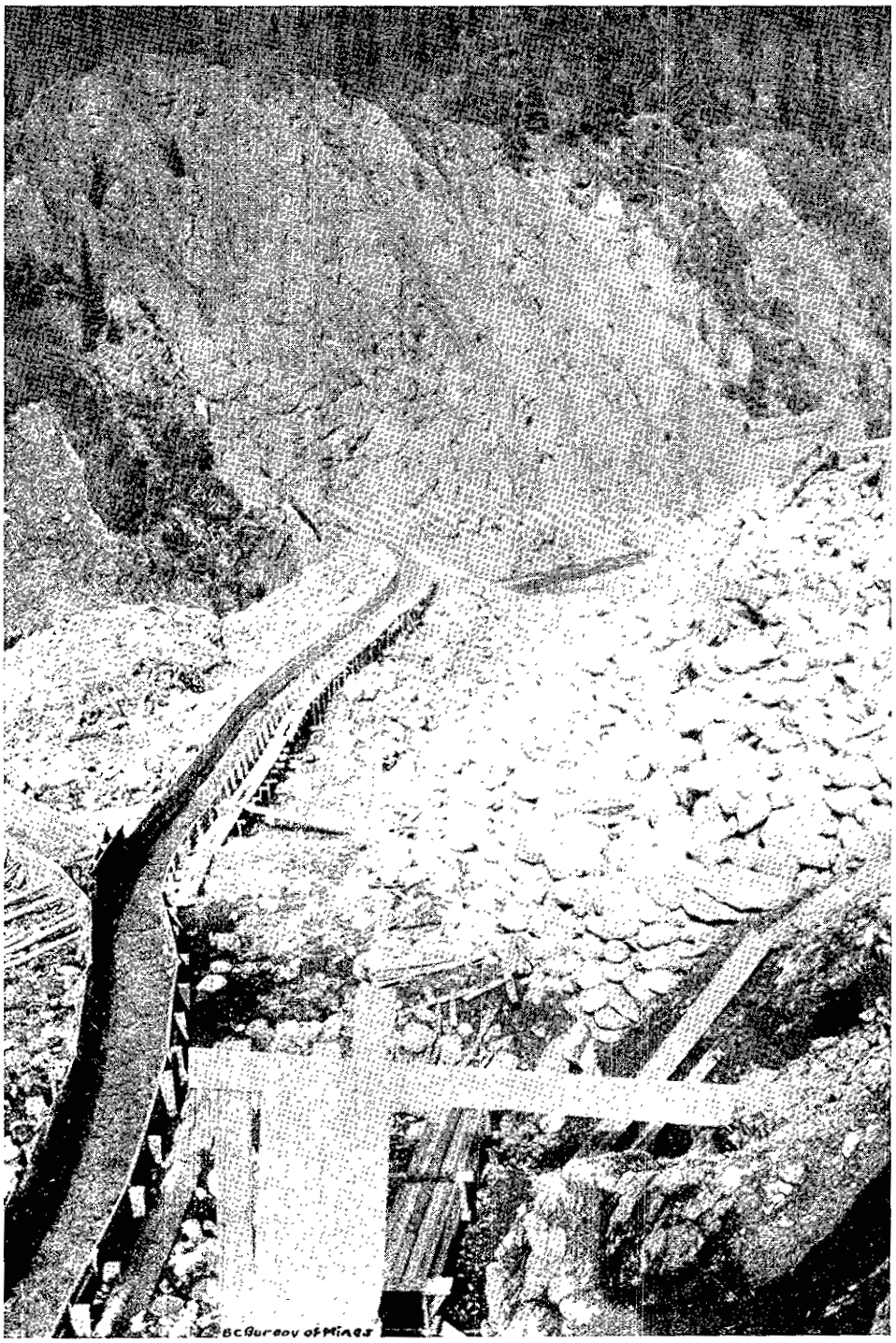
1850. J. W. McKay reported gold between Victoria and Nanaimo, but not enough to pay.
1852. Chief Trader McLean purchased gold-dust from Indians at Kamloops.
1853. Geo. B. McClellan found gold on the Similkameen river.
1855. Gold discovered on the Columbia at the confluence of the Pend d'Oreille river.
1857. Gold discovered at mouth of the Thompson river.
1858. Gold first discovered in quantity on the lower Fraser river.
1860. Rock creek in Boundary centre of much excitement.
1860. Cariboo and Quesnel areas opened.
1860. Placers regularly worked on Similkameen river.
1861. Gold discovered on Peace river.
1862. Placer gold discovered at Bedwell (Bear) river, Clayoquot, Vancouver island.
1863. Rich placers found on Wild Horse creek and Perry creek, East Kootenay.
1863. This was the year of greatest development and output of the placer-diggings of Cariboo. Maximum official recorded production of placer gold in history of Province.
1864. Leech River placers were discovered at the southern end of Vancouver island.
1864. Omineca gold first discovered.
1865. Placer gold found in the creeks at the Big Bend of the Columbia river. These creeks are about 40 miles north of the town of Revelstoke.
1867. Omineca placers regularly worked.
1868 to 1874. Government maintained an assay office at Barkerville.
1871. Placer gold found at China creek, Alberni, Vancouver island.
1872. In Cassiar district placer gold was found at Thibert and Dease creeks.
1879. Hydraulic mining on large scale commenced in Cariboo.
1883. Placers were discovered on Lorne creek, Skeena river.
1885. Rich placer found at Granite creek, Similkameen Division.
1898. Atlin placer-fields discovered.
1899, 1900, 1901. Black sands worked at Wreck bay, west coast of Vancouver island.
1901-12. Revival of interest in Cariboo and Quesnel with hydraulic mining.
1921. Cedar Creek area, Quesnel.
1924. Gold Pan creek, Liard.
1927. Squaw creek, Atlin.



Otter Creek, Atlin—Hydraulic Pit in 1903.



Otter Creek, Atlin—Close View of the Bank.



Thibert Creek, Liard—Close View of Bank.

ATLIN MINING DIVISION.

REPORT BY HERBERT CARMICHAEL.

HISTORICAL SUMMARY.

Before 1898 very little was known of Atlin Division beyond the fact that it contained a number of large lakes and big game; early in that year Fritz Miller, a German, and Kenneth Maclaren, a Canadian, left the Klondike trail at Bennett and, travelling on the ice, crossed Taku arm and Atlin lake to find gold in Pine creek. This stream they followed up, prospecting as they went, and finally decided to stake a claim about 6 miles from the mouth of the creek, where Pine City was eventually established. Dearth of supplies forced them to return to Juneau and from there the discovery of gold in the district was made known.

Public information concerning the new "strike" reached Alaskan ports about August 5th, 1898, and at the close of that season it was estimated that over 3,000 people were in the new field, and $75,000 in gold had been taken out. All the principal gold-bearing creeks and rivers seem to have been discovered and claims staked on them during the summer and fall of 1898, and very few new ones appear to have been added to the list since that date.

On December 1st, 1898, J. D. Graham was appointed Gold Commissioner for the *Atlin and Bennett Lake Mining Divisions of Cassiar district. Messrs. Rant and McKenna had acted as Mining Recorders for the district during the year. At this time there was a certain amount of trouble in the camp, as it was at first thought to be in the North-west Territories, the mining laws of which allowed a placer claim 250 feet square instead of 100 feet square as in British Columbia. During 1899 Mr. Justice Irving was sent to open a Court at Atlin to adjudicate on mining disputes, and it says a great deal for the good order of the district that no serious disturbances occurred in those early days.

It is interesting to note the amount of work that had been done on Pine creek by the end of the season of 1899, which was recorded by the Gold Commissioner as follows:—

	Feet.
Flumes put in	8,464
Wing, tail, and head dams	7,802
Sluice-boxes	15,459
Drain-ditches	2,580
Number of men employed	640
Expenditure incurred	$95,872

Pine creek in 1899 produced by far the largest yield of gold; while Spruce creek had the most work done on it, but the pay-ground was found to be too deep for the individual miner. Most of the other creeks were mined in 1899 by ordinary placer methods, but in many cases the 100-foot claim was found to be a useless size, due to the great depth to pay-gravel on many of the creeks, and only those were being worked where bed-rock was comparatively shallow, the costs of operating being excessive for value contained in the case of single 100-foot claims.

Wm. Fleet Robertson, Provincial Mineralogist, made a trip to Atlin in 1900, leaving Victoria on August 15th, and some of his remarks are now reproduced, as they may have been forgotten even by residents of Atlin.

"From the cursory survey which time alone permitted, it would appear as if there had been two distinct 'runs' of gold over the area indicated. The first 'run' is associated with a peculiar yellow gravel caused by the oxidation of the iron which seems to have penetrated the smaller boulders and pebbles to the very centre. The gold from this 'run' appears to be of higher value than that of the later run and has a peculiar reddish tinge.

"This yellow wash was being worked by various tunnels on Spruce creek and there are indications that it extends for some distance into the bench claims of this section. The first run, which may be said to have travelled westward, was followed by a period of heavy deposits of clay and gravel accompanied by some denudation and seemingly barren of gold.

"The second run, which was accompanied by bluish gravel, seems to have come from Boulder and Birch creeks and to have extended to McKee creek, the gold being bright, but not as high grade.

* In 1903 Bennett Lake and Chilkat Mining Divisions were abolished and the territory added to Atlin Division.

"After this second run came a period of general subsidence, followed by another general lowering of the water-level or raising of the land and accompanied with the wearing-down of the present channels of the creeks, which in places cut through the previous gold runs and concentrated the gold in the present channels. At this period the rocky barriers across both Pine and Spruce creeks were broken and the streams were enabled to cut out their present channels."

In 1900 lode-mining is first mentioned and a number of claims were staked round Atlin and Tagish lakes. With the exception of the *Engineer* group, most of these claims have lapsed. The year 1901 shows the beginning of the abandonment of the individual placer claims; this is in accord with the history of every placer-field on the Northern Pacific slope. There is the transition from the placer claim of 100 feet to an association of a group of claims to provide a bed-rock flume to supply the group with water, dump, and a generally cheaper handling of the ground; for the reason that the individual placer claims had become too low grade to give reasonable returns for the method in which the labour was applied.

Then there comes the day of the small hydraulic mining company, usually with a limited field and limited capital. At the same time there are the small companies who drift to bed-rock or drift to old channels; both companies often work under very disadvantageous circumstances with varying success.

When these companies begin to realize that they have no longer a paying proposition, then the stage is set for the final large hydraulic mining company. Atlin seems to have now reached this period. Experience has amply shown that there are numerous requisites for the success of a large hydraulic mining company, which might be stated as follows:—

The control of an entire creek or a long section of a river free from adverse claims by individual miners.

Sufficient ground to pay a profit on the undertaking. Efficient prospecting of such ground, to make sure that it does carry the values it is supposed to have, before any large sums of money have been spent. This is the rock on which many companies have come to grief.

Sufficient water to wash the ground during the period of the enterprise. Sufficient head to bring the water effectively to the highest point of working.

Sufficient grade in the creek so that the work is not retarded by the flume becoming choked.

Sufficient capital for the undertaking. Efficient management.

To offset the above, a sales organization for the product is not required.

Progress from the individual placer claim to the large hydraulic mining company is slow, usually covering a period of many years. A few individuals who are not in a position to do any effective work for themselves can hold up a camp and retard the progress of a district for years.

As to the actual quantities of gold shipped out of Atlin, the following figures will give very close information:—

	Oz.			Oz.	
1898 (discovery of the camp)	3,750	$75,000	1915	18,850	$377,000
1899	40,000	800,000	1916	18,025	360,500
1900	22,500	450,000	1917	15,600	312,000
1901	15,000	300,000	1918	11,025	220,500
1902	20,000	400,000	1919	8,850	177,000
1903	22,000	440,000	1920	6,930	138,600
1904	26,500	530,000	1921	7,210	144,200
1905	23,750	475,000	1922	7,450	149,000
1906	22,750	455,000	1923	7,570	156,500
1907	20,400	408,000	1924	8,647	147,000
1908	10,150	203,000	1925	2,896	49,229
1909	10,000	200,000	1926	2,607	44,318
1910	13,750	275,000	1927	2,428	41,276
1911	11,250	225,000	1928	3,174	53,958
1912	14,500	290,000	1929	2,082	35,394
1913	15,750	315,000			
1914	16,000	322,000			$8,569,475

DESCRIPTION OF PLACER PROPERTIES.

During the season of 1929 there was considerable activity amongst the placer-miners and a number of the properties give promise of becoming producers of some size.

Lake Surprise Mining Co., Ltd.—This company is working on Ruby creek, which flows into Surprise lake on the north side; work was started this year by building a flume and hydraulick-

ing with the object of reworking old ground. This creek yielded large returns to individual placer-miners, but was never carefully cleaned up. Matson & Schultz have leased the property from the above company, which has its headquarters in Seattle.

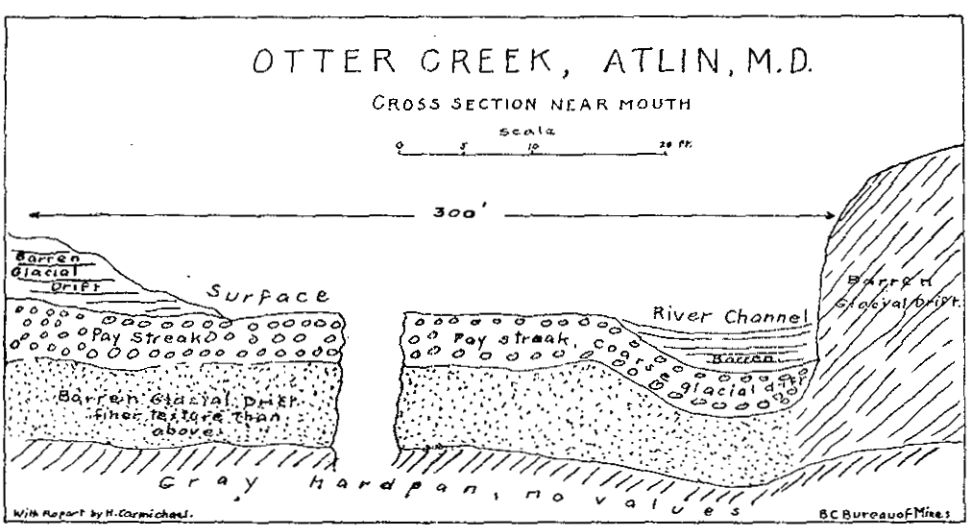
Boulder Creek.

Boulder creek flows into Surprise lake 3 miles east of Ruby creek. Boulder Creek Placers owns the whole of this creek and it is controlled and operated by the Consolidated Mining and Smelting Company of Canada, Limited.

There is some length of ground on this creek that was never worked, and to get sufficient grade to work this, 500 feet of bed-rock flume was built this year on a lower grade than the old flume, the total distance back from the lake being 2,000 feet. Piping is being done with a 4-inch monitor under a 100-foot head, the top of the bank being 55 feet above the flume; but this bank does not contain any values and none are expected until the unworked ground on bed-rock is reached.

Otter Creek.

Otter creek flows into Surprise lake on the south side, a short distance from the outlet of the lake. The Compagnie Française des Mines d'or du Canada, of Paris, France, under the management of J. E. Moran, controls this creek. This creek has been prospected for a considerable distance from the mouth and showed good pay-dirt, but the company has always been short of sufficient water to work it. To overcome this difficulty a flume and ditch is being constructed



along the hillside on the south side and from ½ to 1 mile back from Surprise lake. This will take in the waters of Wright, Idaho, Casino, Union, and eventually Quartz creeks, delivering the same to a dam high up on Otter creek—a total distance of nearly 9½ miles.

A semicircular galvanized flume is at present being built from Union creek to Wright creek, the intake at Union creek being 850 feet above Surprise lake. This work is being well done and shows very commendable enterprise on the part of the company. There is, they estimate, ground on Otter creek which it will take fifty years to work out, but which could not have been tackled without the water-supply now being installed. The ground has been prospected by drilling and by old placer-workings.

An interesting situation has been disclosed by recent piping near the mouth of Otter creek. Here the bed-rock is covered with a rather fine drift carrying only low values in gold; this in turn has been overlain by a much coarser deposit of gravel, the line of demarcation being distinct.

This upper layer contains much heavier and higher gold values than the deposit below. This might be accounted for by the expiration of a considerable period of geological time between the first deposit and the second one, designated the Interglacial period. At the end of this period the

melting snows produced powerful streams, which reworked the gravels and concentrated the gold over the deeper depressions which had been filled with glacial silt and in many cases forming a false bed-rock.

J. C. Gwillim, in his geological map of Atlin, has indicated practically all the region around Surprise lake as late Jurassic granite, and it was probably veins from this granite penetrating the overlying strata that furnished the gold of the Atlin placers. These older rocks in this section have for the most part been entirely eroded and the country generally is covered by 100 feet or more of glacial drift.

A careful study of the rocks included in the drift in these two periods of erosion might disclose a difference in character sufficient to place them geologically.

I am indebted to Mr. Moran, the engineer in charge of the Otter Creek development, for the data for the accompanying section of Otter creek.

Wright Creek.

L. Hodges and Fred McLennan, also Frank Brown, are placering and prospecting on the upper part of this creek, preparatory to more extensive work.

Pine Creek.

This creek is being worked by the Discovery Mining and Power Company. This company has a good water-supply derived from Surprise lake, where there is a dam and intake to the ditch. The company is prospecting for an old river-channel south of the present creek-bed. To find this channel and give the necessary grade for working it, a bed-rock flume has been run 1,800 feet back from the creek, cutting through a bank 80 to 90 feet high; this, however, does not contain values.

The management believes that the rim of the old channel has been reached, and before this season ends, piping should afford much information as to the channel both as to its direction and values. The engineer in charge is A. Sostad and the foreman is Gus. Holingren.

Spruce Creek.

This creek has never been worked by hydraulicking on any extensive scale and is still in the hands of the individual placer-miner.

J. Cole and J. Tintinger are working on lower Spruce, as is also Mrs. Erickson. Duncan Falkener has a lease on which he is runing a drift during the winter. J. Brown, about 2 miles up Spruce creek, has taken out some gold by small-scale work.

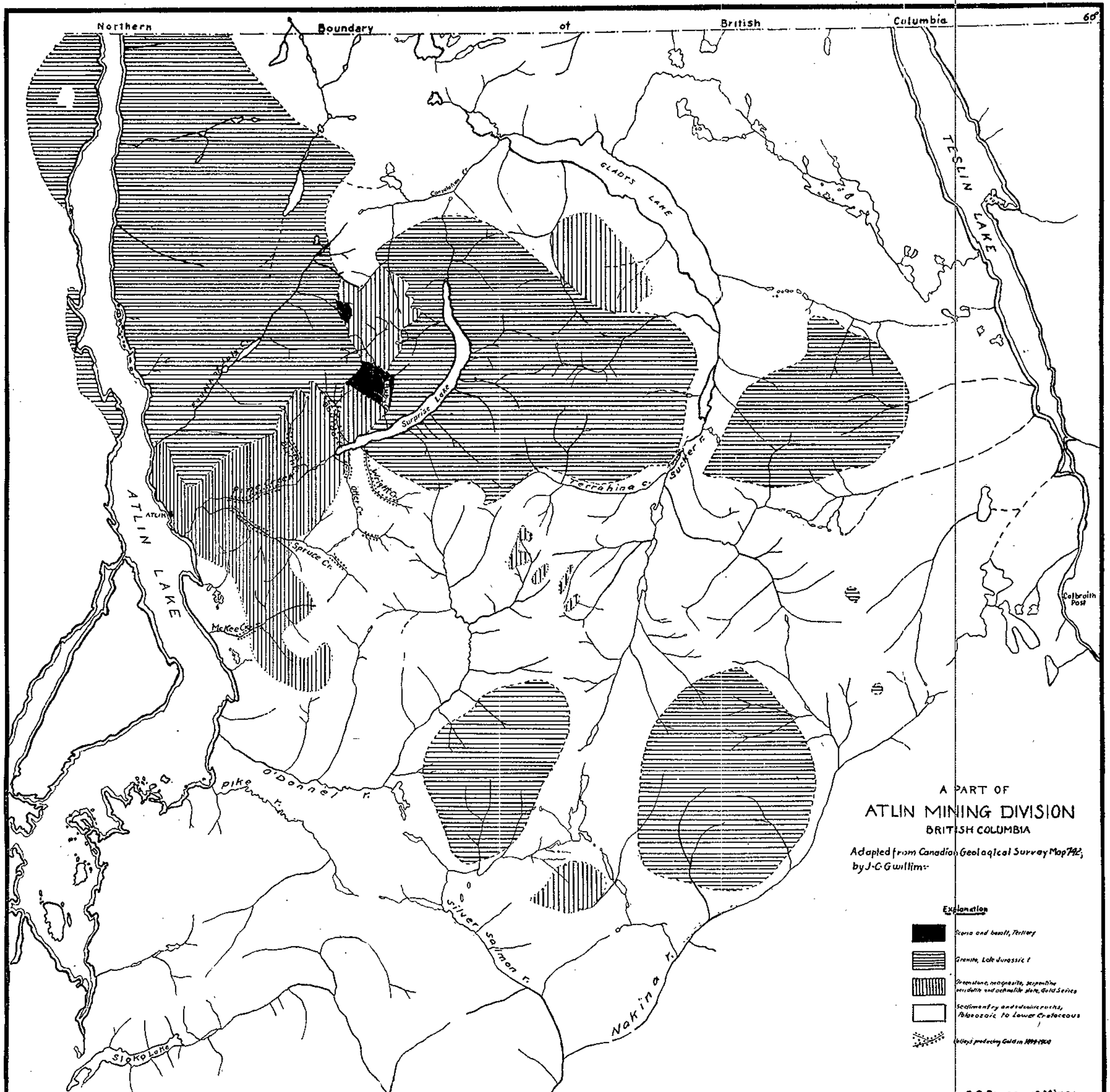
Morse, McKickenchim & Bratt, above Brown, have taken out some gold under a lease; above them John McPherson and Angus Beaton are working leases by drifting and taking out gold.

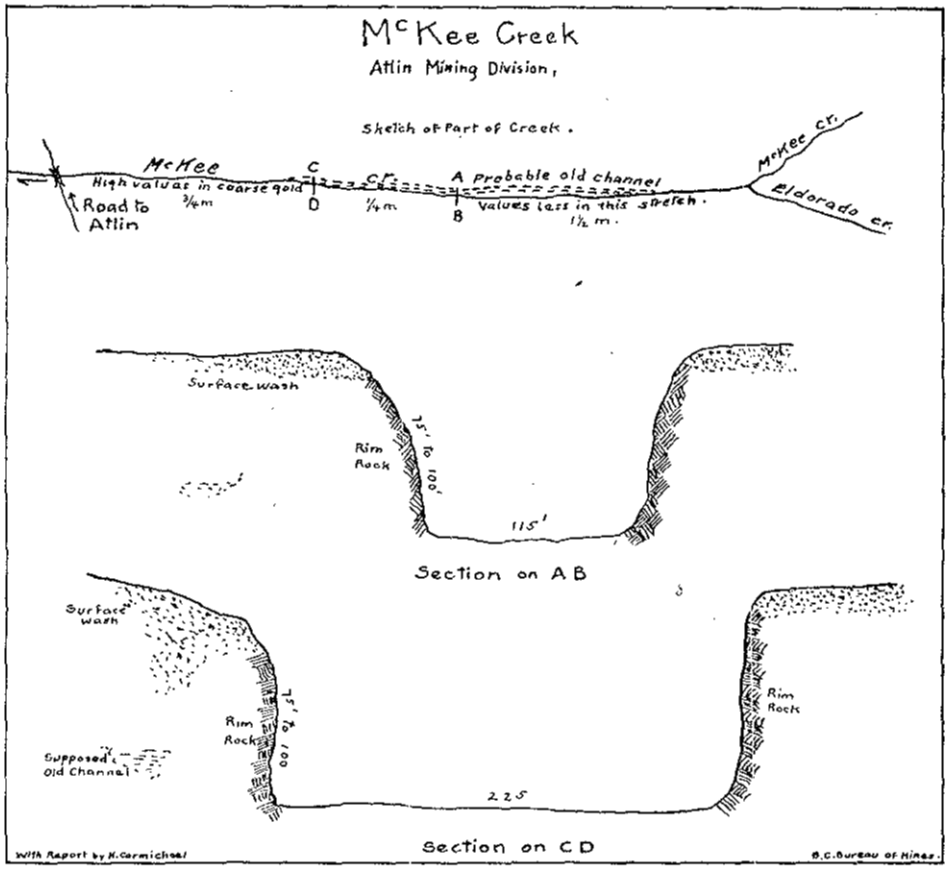
McKee Creek.

This creek was worked in the early days of the Atlin camp and a considerable amount of very coarse gold taken out. Now the whole creek is under the control of the Delta Gold Mining Company, Limited, with George Adams as manager.

Approximately 1½ miles of the creek was worked by drifting and hydraulicking in the first days of the camp, and in doing so it was found that at about three-quarters of a mile above the bridge on the main road the gold values in the bed of the creek suddenly became much less than they had been below. This raised the speculation that the present creek-bed from this point up did not follow the old channel. This inference was borne out by the fact that the rock which forms the right bank of creek at this point appeared to have a large amount of sedimentary deposit behind it and also that values had been found by drifting on that side of the channel. This is further supported by the fact that values were again found farther up where the present creek-bed leaves the supposed old channel; this can only be definitely ascertained by further prospecting. In the earlier days work on the creek was hampered by lack of water; this has now been overcome by making two storage-reservoirs—one at the head of McKee creek and the other at the head of El Dorado creek, a tributary of McKee.

Work has been delayed this year by the necessity of removing a large quantity of slide-dirt containing no values. This dead-work has consumed a considerable amount of time and money, but is now nearly completed, and there does not appear to be any further obstacle in the way of piping into the old channel and demonstrating what values it contains. Should this be successful there should be 1½ miles of virgin ground which should yield pay-dirt for many years to come.


Northern Boundary of British Columbia
60°
TESLIN LAKE
GLADYS LAKE
ATLIN LAKE
Surprise Lake
Pine Creek
Spruce Cr.
McKee Cr.
Terrahina Cr.
Sucker r.
Pike r.
O'Donnel r.
Silver Salmon r.
Nakina r.
Sloko Lake
ATLIN
Golbraith Post
A PART OF
ATLIN MINING DIVISION
BRITISH COLUMBIA
Adapted from Canadian Geological Survey Map 742;
by J.C. Gwillim.
Explanation
Scoria and basalt, Tertiary
Granite, Late Jurassic ?
Greenstone, magnesite, serpentine
Paleozoic to Lower Cretaceous
B.C. Bureau of Mines



O'DONNEL RIVER.

There is no hydraulicking on this river, but Nathan Murphy and T. Prpich are drifting during the winter and washing the extracted dirt during the summer months.

LIARD, STIKINE, AND SKEENA MINING DIVISIONS.

HISTORICAL SUMMARY BY HERBERT CARMICHAEL.

LOCALITY.

In the Annual Report for 1874 the following appears: "The name Cassiar is given to a large tract of land in a north-westerly direction from Omineca, just south of the 60th parallel of north latitude." There seem to have been no definite boundaries to this country, and in fact as late as 1890 the whole of northern British Columbia was known as Cassiar to the western side and Peace river or Liard to the east, with no definite mining boundaries between each other or to the south. Cassiar is a corruption of Kasha, the Nehane name for McDame creek.

Two very good maps were published in 1873—one by Captain Wm. Moore of the "Stekin and Cassiar Goldfields," and the other showing the Stikine and its tributaries from Wrangell to near Dease lake; the name of the surveyor is unknown.

By a series of Orders in Council the district of Cassiar became defined and subdivided until eventually the name disappeared entirely as a Mining Division, and the area is now covered by Atlin, Liard, Stikine, Omineca, Peace River, and Portland Canal Mining Divisions.

HISTORICAL.

Thibert Creek.

The story of Cassiar is largely the story of Thibert creek. Two distinct periods are noted. First, the period from 1873 to the eve of the Yukon rush. Those were the days of shallow diggings and the individual miner who needed no other capital than his pan and grub-stake. Second, that period following the Yukon rush and extending to the present—a period that witnessed the passing of the rocker and the wing-dam, the coming of machinery and the hydraulic miner, and the advent of capital and business methods. This latter is more truly the period of the Thibert Creek hydraulic workings.

THE DAYS OF SHALLOW DIGGINGS.

Thibert's Discovery.

Prospectors had been taking gold from the sands and bars of the Stikine for more than a decade before the strike on Thibert creek in 1873. But these takings were small and the Cassiar goldfields still awaited their discoverer—a stranger coming from the far Mackenzie. In 1869 Henry Thibert left Minnesota with one companion, intending to hunt and trap along the Mackenzie river for a few seasons, then cross the Rockies and traverse British Columbia to the coast. His journey was one of hardship and privation. In the spring of 1872, having crossed the Rockies during the autumn of the year before and wintered at a Hudson's Bay post on the Deloire, he was in the company of McCullogh, another intrepid explorer, making his way down that stream to the Liard. Together they followed the Liard to the northern boundary of British Columbia and then struck out for the Stikine by way of the Dease river and Dease lake. They spent that winter at Buck's bar on the Stikine, and here Thibert parted with McCullogh in February (1873) to retrace his steps and do a bit of prospecting.

Finally, at the mouth of the creek which bears his name, his efforts were rewarded and he found coarse gold on the bed-rock, running 2 or 3 oz. to the pan at a depth of little more than 18 inches.

Another party, in 1872, left Victoria, deciding to try their luck in that little-known Cassiar country; they were William Moore and his two sons, John and William. The elder Moore was later known as Captain Bill Moore, and I believe the White pass to the Yukon was discovered by him.

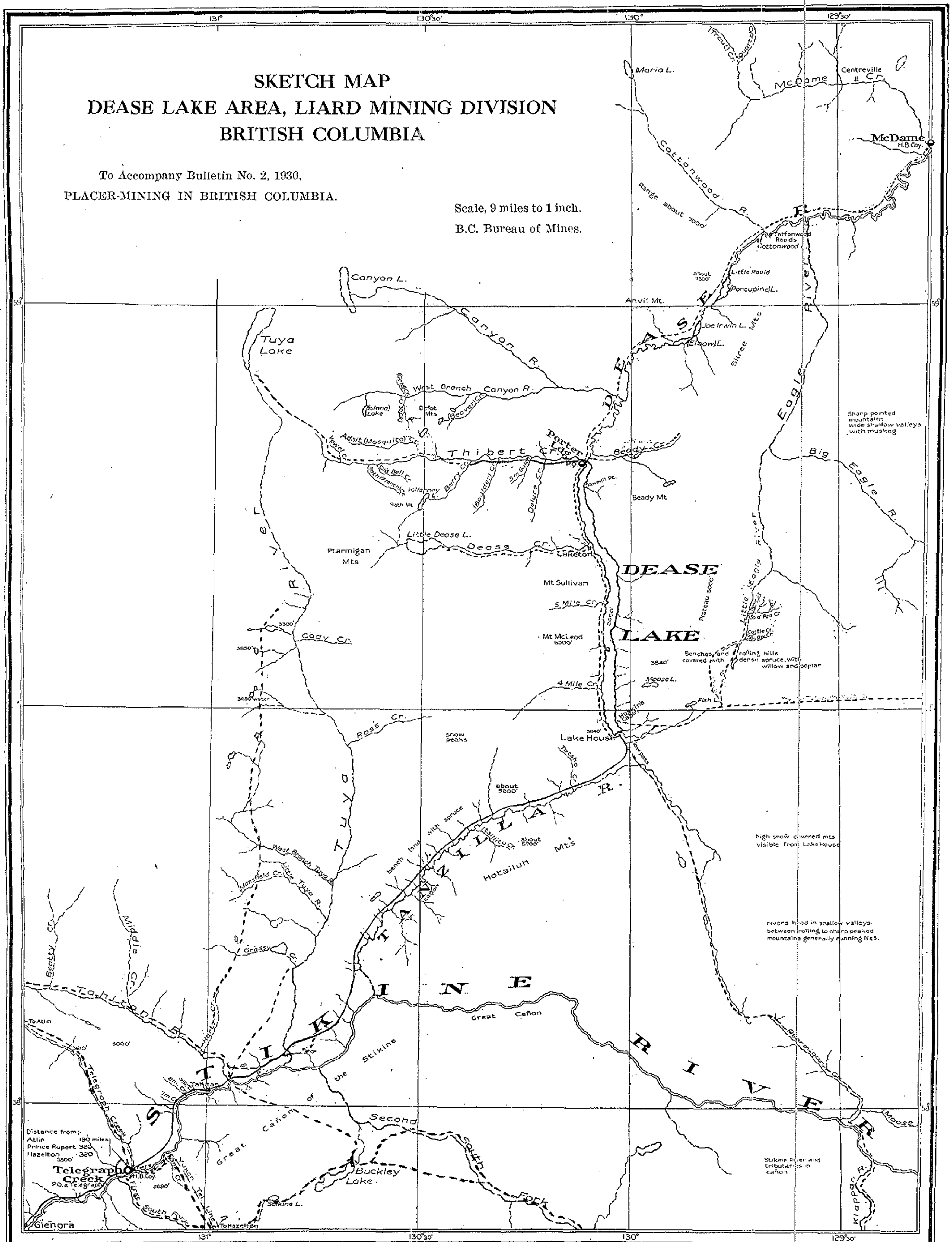
Moore and his party met Thibert and McCullogh at the head of Dease lake and went down the lake together. Moore and his sons stopped at the mouth of the first large creek they came to flowing into the lake from the west. Thibert and McCullogh went on to what is now Thibert creek.

The Stampede.

By August of that year twenty miners had arrived. In Cariboo and in Omineca the miners heard the news and left their diggings. By 1874 the population of the district had increased to 1,600; perhaps 2,000 persons in all visited the country that year. Other streams, now called after their discoverers, were prospected and proved as rich as Thibert creek. Claims on Dease creek averaged $20 a day to the man. One company took out 200 oz. in a week; another, $2,700 in five days. A single pan went $49, while two men together washed 50 oz. in a day. Laketon, at the mouth of Dease creek (or "Laketown," as it was called in the seventies), sprang into being overnight and became at once the centre of the district's activities. During the summer, rumours spread that Thibert creek was "spotted." This led to further explorations and resulted in the discovery of gold on McDame creek, some 90 miles north of Laketon and a tributary of the Dease. Of all the miners arriving in that season, scarcely a hundred remained to face an Arctic winter, and these suffered great hardship from disease and lack of food.

Subsequent Events.

The first Gold Commissioner, J. P. Sullivan, was appointed in 1874, the year of the creation of the Provincial Department of Mines. He issued 825 licences that season and reports especially on the difficulties of the trail and the excessive cost of transportation. The charge from Wrangell to Telegraph Creek was $110 a ton, and it cost 45 cents a pound to move stuff from there to Laketon. Labour received generally about $9 a day, but in some cases as high as $16 was paid where the diggings were remote from the mining camp.


SKETCH MAP
DEASE LAKE AREA, LIARD MINING DIVISION
BRITISH COLUMBIA
To Accompany Bulletin No. 2, 1930,
PLACER-MINING IN BRITISH COLUMBIA.
Scale, 9 miles to 1 inch.
B.C. Bureau of Mines.
131°
130°30'
130°
129°30'
59°
58°
Maria L.
McDame Cr.
Centreville
McDame
H.B.Coy.
Cottonwood R.
Range about 7000'
Cottonwood Rapids
Little Rapid
Porcupine L.
Anvil Mt.
Joe Irwin L.
Elbow L.
Skree Mts
DEASE R.
Eagle River
Canyon L.
Tuya Lake
Canyon R.
West Branch Canyon R.
Island Lake
Defot Mts
Thibert Cr.
Porter Landing P.O.
Beady Cr.
Beady Mt
Sawmill Pt.
Berry Cr.
Boulder Cr.
Delure Cr.
Rath Mt
Little Dease L.
Dease Cr.
Laketon
Ptarmigan Mts
Sharp pointed mountains wide shallow valleys with muskeg
Big Eagle R.
DEASE LAKE
Mt Sullivan
5 Mile Cr.
Mt McLeod 6300'
Plateau 5000'
Little Eagle River
Benches and rolling hills covered with dense spruce, with willow and poplar.
Moose L.
4 Mile Cr.
Fish L.
Cody Cr.
Ross Cr.
snow peaks
Lake House
Tuya River
Tanzilla R.
Hotailuh Mts
bench land with spruce
West Branch Tuya R.
Mansfield Cr.
Little Tuya R.
Grassy Cr.
high snow covered mts visible from Lake House
rivers head in shallow valleys between rolling to sharp peaked mountains generally running N & S.
Beatty Cr.
Middle Cr.
Tahltan R.
To Atlin
STIKINE RIVER
Great Cañon
Great Cañon of the Stikine
Second South Fork
Tahltan
Telegraph Creek
Buckley Lake
Stikine L.
Stikine River and tributaries in cañon
Klappan R.
Moose
Distance from:
Atlin 190 miles
Prince Rupert 320
Hazelton 320
Telegraph Creek
P.O. & Telegraph
H.B. Coy.
Glenora
To Hazelton

The following season brought fewer miners and conditions were generally better. Walsh and Rogers came in over the Ashcroft trail from Fort Fraser with 300 head of cattle. The total production of gold was almost up to the million mark of the year before and most of the claims were yielding from 1 to 3 oz. to the man.

Following the death of Mr. Sullivan on the steamship "North Pacific," A. W. Vowell succeeded to the office of Gold Commissioner in 1876. At that time there were twenty-five recorded claims on Dease creek; about half a dozen on McDame and forty-four on Thibert, with twenty-five men at work on Berry creek and twelve on Boulder. The Telegraph Creek trail was now employing 430 pack-animals and more were expected. The cost of packing was reduced to 15 cents that year. It was still further reduced in 1877 and in 1878; when the steamer "Lady of the Lake" was put into service it dropped to 7 cents and even lower.

The Decline.

But there were far too many miners for the country to support and the claims, most of them, were paying little better than wages. In 1878 the population stood at 1,500, a third of whom were Chinese, who generally worked the ground which the white man had worked and abandoned. Other creeks were found, enjoyed a brief notoriety, and were left. Most of the prospectors continued work on Dease, McDame, and Thibert. By 1879 it was known that the diggings were becoming worked out and the population commenced to fall off. Perhaps other strikes elsewhere, like Granite creek in 1885, or the beginnings of lode-mining in 1886, made possible by the coming of the Canadian Pacific Railway, enticed the miners to more profitable fields. When the Cassiar country was visited by G. M. Dawson in 1888, most of the claims were not even paying wages, although the population had dwindled down to but 125 and nearly all of these were Chinese. In 1895 there were a dozen white men and fifty Chinese on the creeks and production had fallen to scarcely more than $22,000.

Production of Gold in Liard Mining Division.

The sudden rise and gradual subsidence of gold production during the period is shown by the tabulation below:—

Year.	Dease.	Thibert.	McDame.	Various.	Total.
1874	$400,000	$400,000	$200,000	.....	$1,000,000
1875	350,000	150,000	300,000	$30,000	830,000
1876	160,300	139,700	163,700	.....	463,700
1877	81,300	173,700	144,800	.....	399,800
1878	62,800	65,600	101,300	290,000	519,700
1879	56,000	71,000	113,200	165,000	405,200
1880	60,900	57,900	120,000	60,000	298,800
1881	37,500	29,900	95,000	36,500	198,900
1882	29,000	39,600	70,500	43,700	182,800
1883	14,000	29,000	65,000	11,000	119,000
1884	10,000	30,000	49,100	12,500	101,600
1885	12,400	12,600	16,500	9,200	50,700
1886	21,500	14,200	20,600	7,400	63,700
1887	18,400	10,000	22,800	4,000	55,200
1888	13,600	6,700	19,000	4,000	43,300
1889	11,200	10,800	28,400	4,500	54,900
1890	12,000	10,000	18,000	4,000	44,000
1891	12,000	10,000	13,000	5,000	40,000
1892	8,700	6,500	8,500	5,300	29,000
1893	6,500	4,400	8,800	3,200	22,900
1894	8,300	4,000	9,700	700	22,700
1895	8,500	4,000	9,600	500	22,600
	$1,394,900	$1,279,600	$1,597,500	$696,500	$4,698,500

From 1896 to 1915 $410,040 was produced, of which $121,250 came out of Thibert creek.

These figures have been taken mainly from the annual reports of the Gold Commissioners, which appear in the published reports of the Minister of Mines. It should be remembered that gold in its raw, uncoined state is always the medium of exchange throughout placer-diggings. Wages are paid with it, balances with the trader are settled with it, and it is squandered over

the bar. It is therefore impossible to get accurate figures. Some of the amounts in the table must be far too low. It is safe to say they are all too low—perhaps from 10 to 20 per cent.

The biggest nugget ever found in British Columbia was taken from McDame creek in 1877. This nugget was valued at $1,300, greatly exceeding the $800 record which had been established by Dease creek two years before.

Rumours of Railways.

The Cassiar area entered the second period referred to with the discoveries in the Klondike in 1896. Deep diggings and tunnel claims had already paved the way to hydraulic mining. In Kootenay and in Cariboo hydraulic companies had been sluicing for several seasons past. Two companies had applied for hydraulic leases on Thibert creek. One of them had even started on a ditch, but nothing came of their activities. In that year James Porter, the Gold Commissioner, noted the appearance of new faces, for many miners en route for the Yukon remained to prospect. The following year four hydraulic leases were taken on Thibert creek, and Warburton Pike arrived from Victoria with news of the incorporation in that city of the Cassiar Central Railway Company, an enterprise whose purpose it was to supply transportation facilities and develop the mining resources of the district. Mr. Pike had promoted the new concern. His company, by virtue of a broad charter and liberal concessions from the Provincial Government, offered splendid inducements to prospectors and settlers, and it would commence forthwith with the building of a railway from Glenora, on the Stikine river, to Dease lake. With the discovery of gold in Atlin in 1898, more people traversing the country on their way to the Atlin diggings remained to prospect. It was learned that the Dominion Government had granted liberal concessions to McKenzie & Mann to build a railway from either Glenora or Telegraph Creek to Teslin lake, with a possible branch line to Dease lake. It was intended ultimately to extend this railway to tide-water in British Columbia, and a time-limit had been set for the completion of the Stikine–Teslin line. This was good news for the country, but needless to say these railways have never been completed. The schemes were too ambitious for the time and they seem to have been forgotten during the business depression which followed the outbreak of the South African war. It became increasingly difficult to compete for miners with Atlin and the Yukon, and in 1900 the construction of the Yukon telegraph-line offered better wages and steadier employment, and development suffered another set-back.

GEOGRAPHICAL.

The Route.

From Wrangell up the Stikine to Telegraph Creek is 150 miles by river-boat. Thence by trail to the head of Dease lake is 75 miles, and the traveller here enters the heart of Liard Mining Division. Porter, at the lake's outlet, some 25 miles northward, is reached by scow, and the mining camp on Thibert creek is 6 miles west by trail from Porter. There are other routes besides. The most famous is the old Ashcroft trail to Dease lake from Cariboo, overland by way of Fort Fraser and Hazelton, on the Skeena. Then there is the route of the Yukon telegraph-line to Telegraph Creek from either Hazelton or Atlin. But these are seldom used for traffic.

The Journey in.

Wrangell is reached by any of the steamers that run from Puget sound, Vancouver, or Victoria. Enterprising citizens of Wrangell as well as the Hudson's Bay Company operate boats upon the Stikine in season, for trade is brisk with the interior.

Given a dependable river-boat, light of draught and well powered, the Stikine is navigable with reasonable safety as far as Telegraph Creek. The boats travel only by daylight, for the current is swift and there is always danger from snags. Three days is the usual duration of the journey from Wrangell.

The Stikine finds its way to the sea through a wide delta of its own deposit. Here the current is sluggish and entrance is at times difficult because of bars. Once in, however, the channel rapidly narrows and the current becomes swifter. The Coast range is entered abruptly, where towering mountains covered with glaciers are seen, which at places extend to the water's edge; 100 miles beyond the Great Plateau is reached, lying beyond the Coast range.

At Glenora, about 12 miles below Telegraph Creek, the waters become shallower, though still navigable. Hence Glenora used to be the head of navigation and goods were forwarded by trail

to Telegraph Creek. A lively town in 1898 was this old-time administrative centre of the district, but Glenora lies now abandoned. All that remains are deserted buildings, evidences of its former grandeur, and a few miles of uncompleted railway-grade to mark the beginnings of a transportation enterprise of the late nineties, which died at its inception.

Glenora's former importance has been usurped by Telegraph Creek, the present seat of government. Here is the Gold Commissioner, Magistrate, and Government Agent all in one, and postal and telegraphic communication with the outside world. Telegraph Creek undertakes to outfit the traveller for the trail.

The Dease Lake trail was built for the Provincial Government in 1874 by Captain William Moore, before mentioned, who came into the country with the first gold-rush. It remained a pack-trail until its relocation in 1912, when a substantial sum became available by Government appropriation and work was commenced upon a permanent wagon-road. Construction, however, was discontinued at the outbreak of the war. For many miles above Telegraph Creek the Stikine cuts its way through the basalt formation forming the Great canyon, and further navigation is impossible. Leaving Telegraph Creek, the formation of the canyon forces the trail at once to the hillside and it soon reaches an altitude of 1,000 feet above sea-level—500 feet above Telegraph Creek—though not too rapidly for easy transport. Except for two well-bridged river crossings, the Tahltan and the Tuya, and a detour to tap Ward's ranch on the Stikine, this altitude is maintained and gradually increased as the trail climbs out upon a wide plateau bordered by the Tanzilla, and this stream is paralleled almost to the Arctic divide a few miles from Dease lake. The trail crosses the divide at an elevation of 2,730 feet, whence it gradually descends to 2,660 feet, the level of Dease lake. Pack-trains take ten days on the round trip; six days out, loaded, and four days back, returning light.

Modern Transportation.

Now the trail from Telegraph Creek to Dease lake has been graded and bridged by the Provincial Government into a good road, on which there is a regular service of tractor and "caterpillar" tractors right into Dease lake, the heart of the gold-producing area—a distance of 75 miles. Hydroplanes have flown in from Prince Rupert and landed on Dease lake in a comparatively few hours.

Dease lake, a deep, narrow strip of mountain lake of many feeders, the centre and heart of the Cassiar country, drains part of the great Mackenzie basin. The lake and its outlet bear the name of Peter Warren Dease, who explored the Northern Interior with Simpson in 1837, when British Columbia was called "New Caledonia."

A rough pack-trail has been built along the western shore of the lake, but is little used except in winter. Scows are operated on the lake by each of the two trading companies of Telegraph Creek, both of whom also maintain posts at Porter. Unless a head wind is blowing, the trip by scow presents no difficulties, for these scows are propelled by Evinrude motors, aided by sail, and are supplied with oars in case of break-down. In the golden seventies machinery was brought over the trail, and the steamer "Lady of the Lake" was built and did good service and kept down transportation costs until she foundered.

Laketon, at the mouth of Dease creek, about half-way down the lake on the west shore, was a roaring mining camp in the seventies. It was once the centre of the district, a more important town than Glenora in its time, but it too has passed away and now lies deserted.

Porter is but a collection of shacks at the end of the lake, scattered along the shore just south of the mouth of Thibert creek. Like Laketon, it was once a lively town, but to-day it is important only as a supply-point for posts along the Dease and the Liard, and it marks the beginning of the Thibert Creek trail. Travellers en route for the Thibert Creek mines seldom tarry long. Transportation arrangements are quickly made and the trail is good and easily traversed.

The first hydraulic leases on Thibert creek were acquired by the Cassiar Central Railway Company in 1889; in 1901 they were held by the Thibert Creek Mining Company, Limited, and there were then no other hydraulic mining companies in the district.

In 1902 some high values in platinum and osmiridium were taken from Thibert creek in the black-sand concentrates, but much of the values were lost before it was found out what the concentrates contained.

The Thibert Creek Mining Company had serious trouble with the carrying-away of their ditch and flume by mud-slides, and in 1904 the Berry Creek Mining Company took over the

leases and put in a small plant on Berry creek, a tributary of Thibert. In 1906 this company worked fifty days and took out $17,000 in gold. In 1907 the same company was working Thibert creek, when slides occurred, breaking the flume and burying the pipe-line and machinery. The same year the manager and principal owner of the Roselia Hydraulic Mining and Development Company, Limited, died and work on that creek was suspended. Since that date no hydraulic work of any extent has been done in the district, work being largely confined to individual placers and some drifting to old channels.

Wm. Fleet Robertson, Provincial Mineralogist, visited the Cassiar field in 1912, and his trip is described in the Annual Report of that year. He states that hydraulicking on Thibert creek could not be carried on profitably without a larger water-supply which could be obtained by a longer flume up Thibert creek.

In the Geological Survey of Canada Summary Report, 1925, Part A, there are very good reports on the district by W. A. Johnston and F. A. Kerr. These contain the latest official information available and from which the following quotations are made:—

"The general possibilities for placer-mining in the region include hydraulicking on Dease, Thibert, Deloire, and Mosquito creeks, dredging on Little Eagle river, and individual mining on Goldpan creek and at other places. The lava-buried placers of the Stikine and somewhat similar deposits in the Eagle River country, although they are not known to contain pay-streaks of any great value, appear to be worthy of further prospecting. There is a vast region north-east and east of Dease lake, drained by Turnagain and Kechika rivers, in which a great deal of prospecting has been done with no very important results, but it is very improbable that all the streams in this region have been prospected, and the discovery of Goldpan creek showed that, although some prospecting had been done on the creek, the pay-streak had been missed.

"Dease and Thibert creeks were the main gold-producing creeks of the region, because parts of the old channels of the creeks were preserved in the form of drift-covered rock benches along the sides of the present stream-valleys.

"Valleys that have the rounded U-shape of glacially eroded valleys should be avoided. In narrow, youthful-appearing valleys, such as Goldpan creek, placer gold, if it occurs, is likely to be most abundant in the bed of the stream in places where the surface gravels extend down to bed-rock. If boulder-clay occurs beneath the surface gravels in the bottom of the valley there may be some concentration of gold on the surface of the clay, but there is likely to be little beneath the clay. Narrow and deep V-shaped valleys, with moderate gradients, even if they do not have rich benches of the old channel along the sides, are more favourable than wide valleys. If boulder-clay occurs in the bottom of these, there is a possibility that a pay-streak lies beneath the clay. The recent rock canyons, which are usually easily recognized by their nearly vertical sides and youthful appearance, are unfavourable for the occurrence of placer gold, unless they happen to have been cut down directly below the old channel of the stream. Many of them indicate that a buried channel, in which placer gold is more likely to be found, occurs alongside the new channel.

"If the bed-rock in the vicinity of a creek-basin is mineralized even to a slight extent, it is possible that placer deposits occur in the creek-bottom, providing other conditions are favourable. If the bed-rock, as in parts at least of the granitic areas and in other areas, shows no signs of mineralization it is improbable that placer deposits occur."

This brings us to the present date: the placers have nearly all been worked out on the older creeks and hydraulic mining has not yet been begun by any of the bigger and efficiently managed companies.

It is, however, a large district and there is ample field for the discovery of some new gold-bearing creeks which will give a fresh impetus to prospecting.

SKEENA MINING DIVISION.

After the Cariboo excitement was over, miners followed up the rivers and creeks north of the Fraser river, prospecting them as they went. Ascending the Skeena they came to Lorne creek, about 100 miles from the mouth of the Skeena.

The first return from Lorne creek was in 1884, when thirty-five miners were working and produced $17,000; in 1885 there were about 108 men and the yield was $18,000. In the following year the Mining Recorder says the miners had considerable difficulty on account of high water; the yield for the year was $13,400. During 1887 only twenty-one men were at work, but those getting down to bed-rock made fair wages, the yield being $5,280; this is the last year in which

any returns were made. About this time the Stikine river was also prospected, but no important production was made from it.

PLACER LEASE No. 145, THIBERT CREEK, LIARD DIVISION.

REPORT BY JOSEPH T. MANDY, RESIDENT MINING ENGINEER.

This lease is located near the mouth of Thibert creek and its confluence with the northerly end of Dease lake. The property was inspected on September 18th, 1929. It was being explored by private Vancouver capital, represented chiefly by L. D. Wright, 434 Homer Street, Vancouver, and J. R. Walton, also of Vancouver.

At the time of my inspection the lease was being explored by a Keystone drill, under the direction of Barney J. O'Reilley, assisted by Clayton J. Leeds. These two men are experienced drillers and thoroughly familiar with the placer conditions of the area. Under this direction the work of exploration and valuation of the ground it is intended to work should be efficiently carried out. Providing this work is sufficiently extensive, an accurate criterion should be available from it regarding the possibility of working the ground at a profit or not.

Up to the time of my inspection eleven holes had been drilled and it was intended to drill three more before closing operations for the season. These holes were drilled systematically across the present bed of the creek. No assay plan was available for inspection, but Mr. O'Reilley informed me that bed-rock had been struck at depths of from 25 to 30 feet, and that the results were promising, with some holes showing up to 60 cents a cubic yard. Mr. O'Reilley estimated that about 50 per cent. of the gravel depth drilled was composed of old tailings that had come down the creek from the extensive workings that had been conducted higher up the creek in the past.

It was thought that better-grade material might be found in what appears to be an old bed of the creek lying northerly of the present creek course. If this can be substantiated the effect of dilution from the old tailing covering would be avoided. Useful drilling could be carried out in the attempt to trace this old bed and the operators are advised to concentrate on this work.

It is understood that the operations this year were more or less skeleton prospecting with a view to determine the most efficient type of drilling campaign necessary to prove area and values. It is estimated by Mr. O'Reilley that ground carrying 30 cents a cubic yard can be worked profitably.

Conclusion.—The ground embraced by the lease is a flat gradient area suitable to dredging. The gravel appears to be comparatively fine. The matter of boulder distribution, which condition is not favourable for a dredging operation, could not be determined during the short time available for my inspection.

Depth to bed-rock is satisfactory for dredging. Depth of water-level can only be determined by observation in the holes drilled. Mr. O'Reilley would have this data.

The matter of wreckage danger from floods would have to be considered. It would appear from the wide gravel-bar distribution about the mouth of Thibert creek that the creek has at times been very torrential, and there would possibly be great danger at times to a dredge installation from this source.

For operations during the winter months the comparatively severe cold would increase costs of operation during this period. The matter of an all-the-year-round operation or a close-down during the winter season would have to be carefully calculated from a point of view of economy.

The nearest point from which a criterion of costs can be formed is the Yukon Territory. Here large-scale dredging can be conducted at a cost of from 27 to 38 cents a cubic yard, dependent on the percentage of thawing necessary and lost time, and exclusive of depreciation. With the conditions existing in the area of Dease lake, it should be possible to keep costs down to the 30 cents a cubic yard, as estimated by Mr. O'Reilley, on a 500,000 cubic yardage annual output.

The matter of a profitable operation on lease 145 can only be determined by methodical drilling, careful estimation of yardage available, methodical sampling, and accurate determination of values to the cubic yard. In making this computation it must be stressed that total yardage must be sufficient to amortize the initial investment and yield a desired profit.

From the data herewith submitted it should be possible for the present operators to determine the desirability of further drilling on this lease, basing their conclusions on the results that have been achieved during the past season.

QUEEN CHARLOTTE MINING DIVISION.

BLACK-SAND DEPOSITS OF GRAHAM ISLAND.

REPORT BY HERBERT CARMICHAEL.

The Queen Charlotte group of islands lies in the Pacific ocean, the southern point being 140 miles north-west of Vancouver island and the north-eastern point is 60 miles west of Prince Rupert. Graham is the largest northerly island and Moresby, the southern. The east and north shore of Graham island is low-lying and has beaches which extend for miles. The western shore is bold, with few beaches, and the southern islands are practically devoid of the low-level shores seen on Graham island.

Numerous reports have been received by the Department of Mines of gold- and platinum-bearing black sands on Queen Charlotte islands, and recently a machine was mentioned as having been more successful in the recovery of the precious metals than some of the former appliances. I started my examination of these deposits with a considerable amount of scepticism as to a favourable report, as I had previously been over the black sands of Vancouver island and had investigated a number of black-sand gold-saving machines. The machines were often in the hands of persons who had only a vague knowledge of what the machines were supposed to do and were occasionally mere toys; in other cases they were no doubt designed to extract gold from an unsophisticated public.

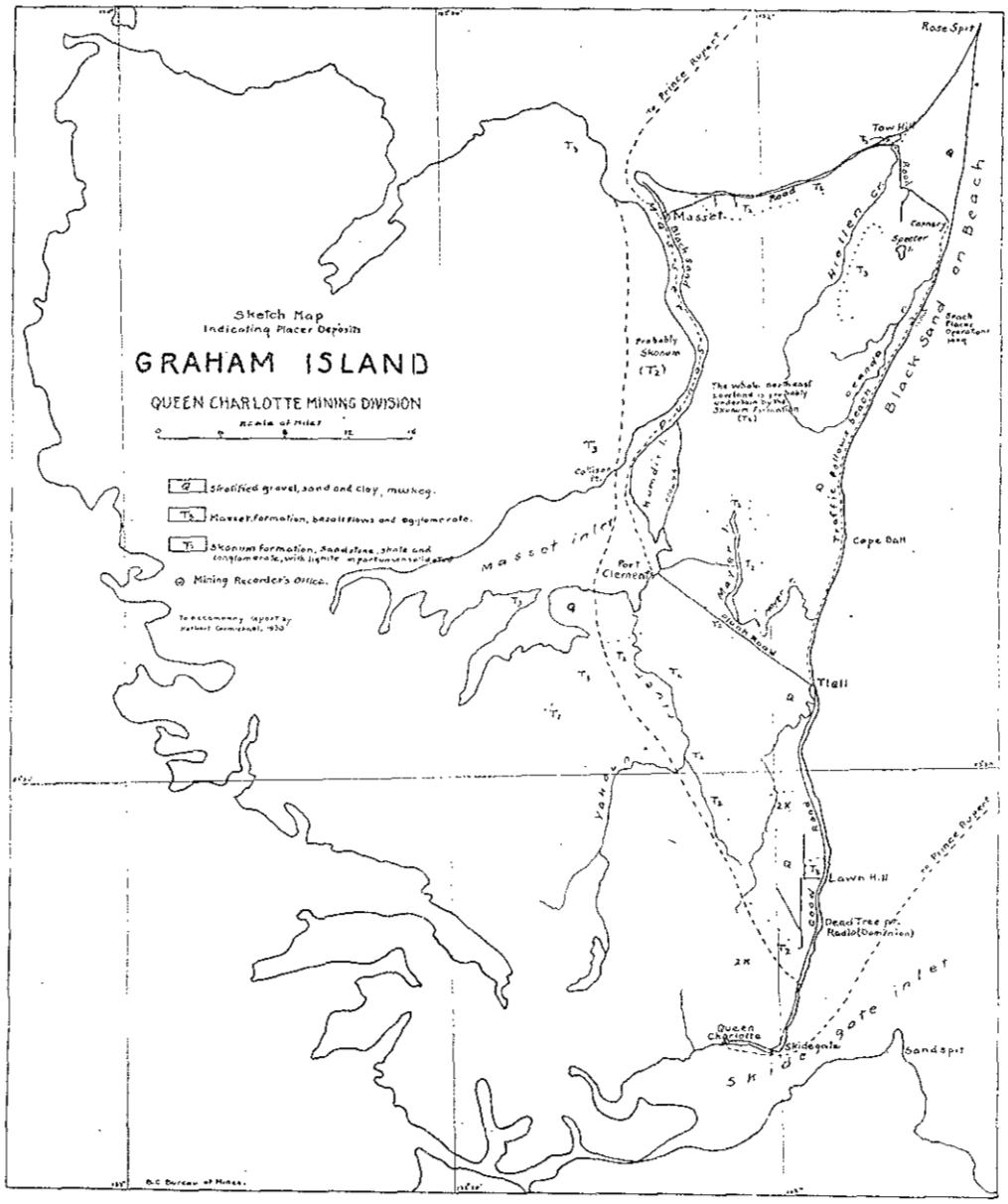
When I investigated the Graham Island deposits I was forced to change my views both as to the deposits and the machine used for saving the gold. The black-sand deposits are much more extensive than any I have seen on Vancouver island. It is probable that they cover all that part of Graham island on which glacial drift has been deposited to any extent; this approximates an area of 800 square miles.

It is unlikely that all this area will contain black sands that will pay to work, but there may be places where the sands might be so concentrated that they will pay, depending on the size of the undertaking and the area of sands that will be remunerative for such undertaking. There are places where the sands have been so concentrated by present-day streams that they have paid fairly good wages with a line of sluice-boxes and the most primitive method of moving the sand with shovels. Such areas are of limited extent and number. There are other less concentrated areas, but of much greater extent, which would probably support a larger undertaking in which the gravel would be entirely handled by mechanical power; this will be referred to later. The black sands carry both gold and the platinum group of metals. This has been proved by many assays made on samples from widely separated districts.

The origin of this gold and platinum is still a matter for speculation; it has been suggested that it came from quartz veins that existed on Graham island and that had been eroded. It seems, however, much more likely that the precious metals were carried by glaciers from farther north and deposited with glacial drift which forms the major portion of the eastern side of Graham island. South-eastern Alaska is known to contain many quartz veins carrying values in both platinum and gold, and it is more than likely that these were eroded by glacial action and millions of tons carried down and deposited on Graham island and the surrounding coast.

It is probable that these black sands have become concentrated by three different methods. First, by the action of glacial rivers when the sands were first laid down; the tendency of these rivers would be for a moderate concentration over a considerable area. Secondly, by wave-action; there is evidence that this has extended for a considerable distance beyond the present shore-line, probably by the elevation of the shore above the present high-water level. This is evidenced in test-pits which have been sunk 100 feet or more back from the beach at Masset inlet. The level of the ground where these pits have been dug is 15 to 20 feet above present high-water level; they have been sunk to a depth of 8 or 9 feet and clearly show bands of black sands from 1 to 12 inches thick and have every appearance of wave concentration; there are layers of black sand with siliceous sand in between. There are large trees on this ground which must be 500 or 600 years old. Thirdly, there is the concentration of present-day streams which cut through these sands; none of these streams are rapid and the area concentrated is therefore not great.

The only work now being done on the black sands is on the beach of the east coast of Graham island by the Queen Charlotte Syndicate, of Vancouver. The workings are reached by motor-road from Masset to Tow Hill, a distance of 15 miles, thence by wagon-road to the east coast, a distance of 7 or 8 miles; this road is barely passable owing to the boggy nature of the ground. From the end of this road the beach has to be traversed, and, as the sand is not



NOTE.—Area to east of broken line probably contains deposits of black sand.

particularly hard, the going is heavy and also it can only be done with comfort at low tide: this distance is 9 miles. If the operations are successful a road can be put in from Watun river, which would shorten the entire distance to 13 miles.

This point on the beach was selected on account of the concentration of the sands by a small stream known as Martell creek, where the high bank of the beach has been cut through by

the stream. On reaching the beach all these streams meander about, first taking one channel and then another, thus making the area concentrated greater than would at first be expected; this is further aided by wave-action.

The bank above high water is about 25 feet high, composed of sand, with 4 feet of peat on the top; farther south this peat has in places a layer of 10 feet of sand on the top of it which has been blown in by the fierce gales from the south-east up Hecate strait. This sand-bank lies unconformably on clay and cemented gravel-beds, some of the clay-beds being quite thick; one measured 225 feet. They have a dip of 15° to the north, striking east and west. The cemented layers of ferruginous gravel are only a foot or two thick and lie both above and below the clay-beds. The clay-beds hold numerous shells, described by Dr. Dawson as *Leda fossa*.

The upper layers of sand near Martell creek are concentrated so that they contain 50 per cent. black sand and colours of gold can be found at any point by panning. The management states that values as high as $11 to the cubic yard have been obtained. The writer panned the black sands of this creek in a number of places and got colours in nearly every pan. As nearly an average as possible was taken of the same sands amounting to about 5 lb.; this was carefully quartered in the assay office, but the resulting assay did not show any of the precious metals, though four half assay tons were put through. I am of the opinion that ordinary quartering cannot be relied on for this material, but that several pounds must be concentrated and the whole of the concentrate run down and the resulting metals calculated back to the amount of sand taken.

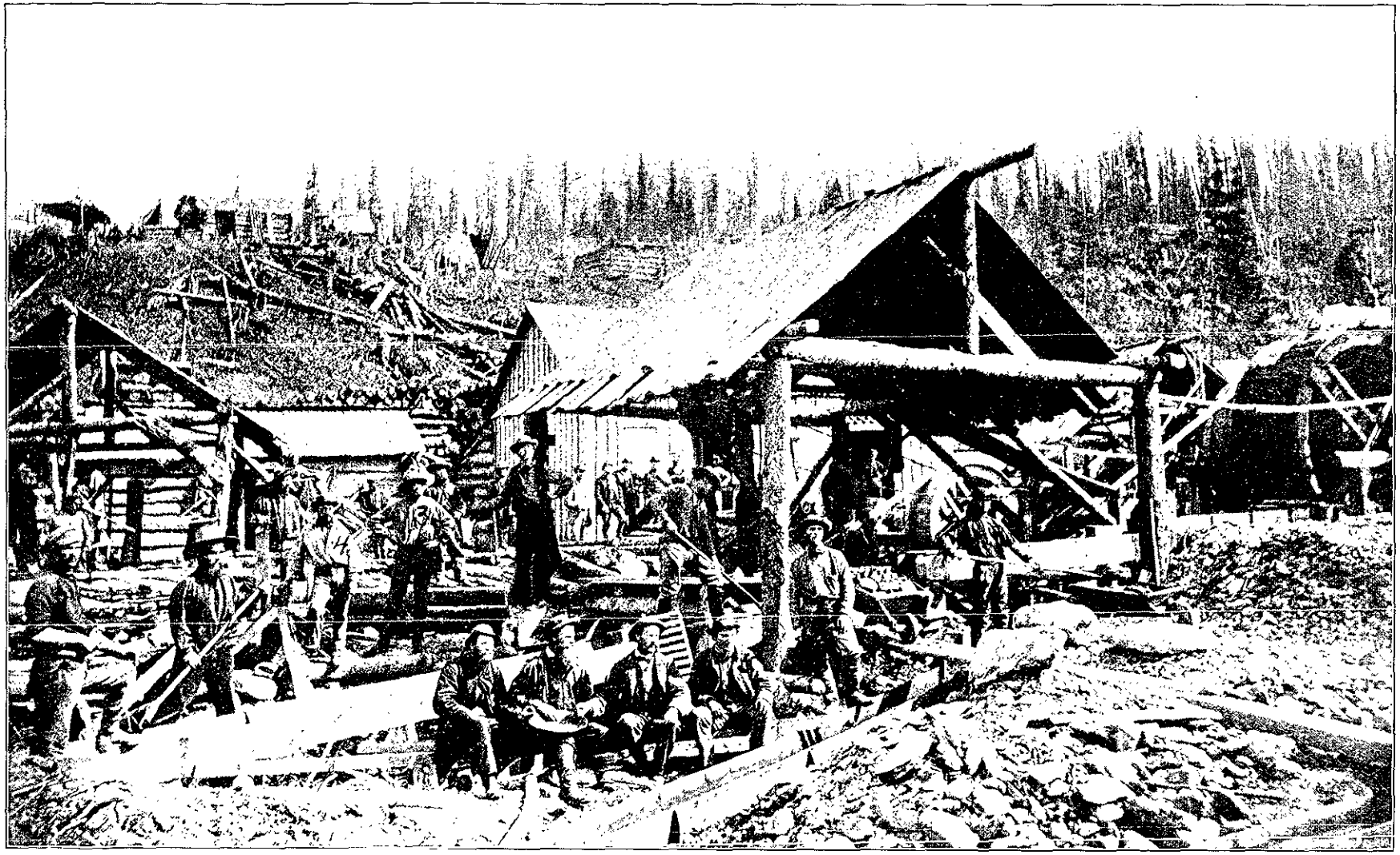
The concentrating action of the waves is curious. Hecate strait is subject to violent south-easterly gales which beat upon the eastern shore, driving northward. In fact, it is undoubtedly this action which has formed Rose spit (or Nai Koon, being the Indian name, meaning long nose). This promontory extends for miles out to sea. After a gale the entire aspect of the beach may be changed. What before showed black sand may be covered by a foot of white sand or the white sand may be removed, leaving the black sand. One striking peculiarity is that the black sand does not of necessity lie on any particularly impervious bed such as the clay or ferruginous gravel referred to, but may lie in a layer of distinct concentration on the top of white sand, mixing very little with it.

These concentrated layers may be from an inch to several feet thick; this variation in thickness and changes of location of the black sands is one of the factors which has to be taken into consideration in turning any black-sand venture into a profitable enterprise. Where concentration is great, such as at Martell creek, expensive methods of handling the sands may pay, but there are other places where it would not, but which might be quite attractive if worked on a larger scale.

The Queen Charlotte Syndicate proposes saving all the precious metals by the Hanssen precious-metal separator. This machine, the basic principle of which has been patented, is controlled by the Hanssen Positive Separation Mining Company, Limited. The Hanssen separator, operated by the Queen Charlotte Syndicate, is a simple but ingenious application of centrifugal force, particularly well adapted for separating the very fine gold or flour-gold and platinum from the dirt or heavy black-sand concentrates found on the east coast of Graham island.

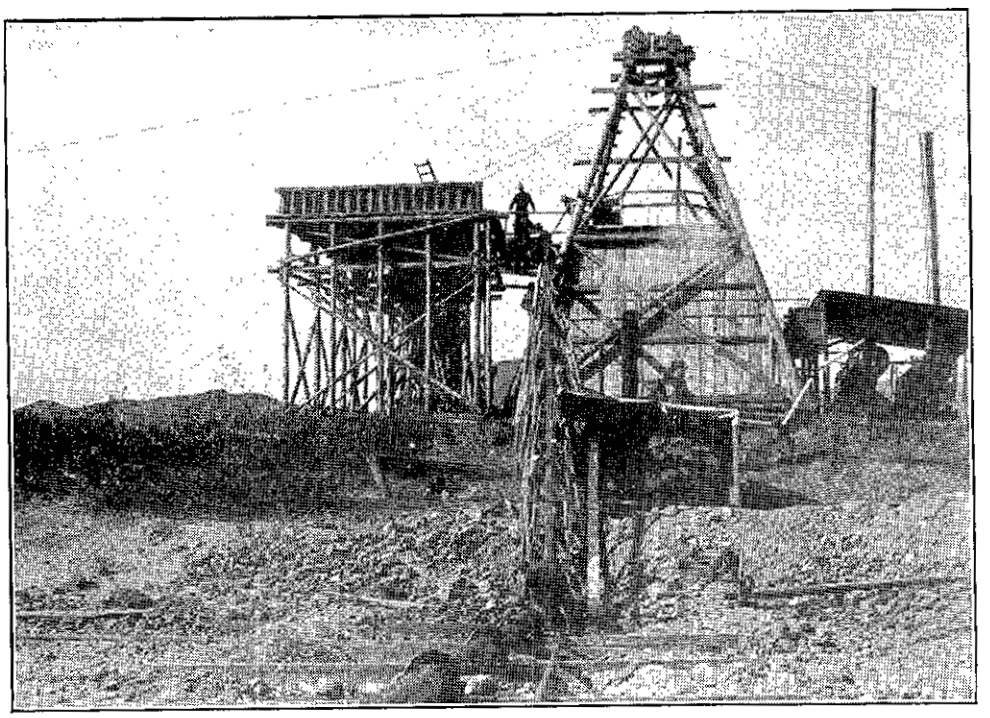
The machine consists of a bowl mounted in a casing, the bowl rotating at any desired speed. In the operation of the machine mercury is placed in the bottom of the bowl. When the machine is rotated the mercury will be caused by centrifugal force to flow upwardly along the inner wall until it forms a cylindrical wall or lining on the inside of the bowl. The auriferous and platiniferous sands are then fed into the feed-pipe with water. Special devices direct the pulp from the bottom outwards and upwards, and also give it an angular velocity equal to that of the bowl, causing it to travel upwards at a predetermined speed (depending on the nature of the feed) in a thin layer over the mercury. As soon as the gold- and platinum-bearing material is subjected to the action of the centrifugal force a separation of this material begins, the heavier particles moving to the outside.

In order to accelerate the separation of the heavy particles of metal from the other heavy particles (as magnetite, garnet, etc.) the pulp is kept agitated by special appliances, and the gold and platinum, having greater specific gravity than the mercury, will penetrate and remain in the mercury. In the case of clean gold it is quickly amalgamated thereby. Platinum and rusty or greasy gold will be retained against the wall of the bowl until the machine is brought to rest. The sand, being lighter than mercury, will pass over the surface and out of the bowl.



Williams Creek, Cariboo—Placer-mining on Cameron's Claim in 1863.

Cedar Creek, Quesnel—Hand-mining with Rocker.



Peace River—Drag-line Scraper Operations.

This machine had only been installed two days before my arrival and was given a test while I was there; it seemed to work perfectly, but it is still too untried to pronounce it an unqualified success. My fear is that it may not have the capacity for a large operation, but this might be overcome in two ways, either by multiplying the number of machines or by first concentrating the sand by jigging.

Provided careful prospecting showed that there was a sufficient body of payable sand, the following plan would seem to lend itself to a large operation: Suitable ground having been found, the centre of this would be chosen for the gold-saving plant. A portable tramway with light cars would be run out to one side; these cars to be filled by a gasoline or electric small shovel and hauled to the plant by rope, carried up an incline, and dumped into a bin. From the bin the sand and gravel would pass to trommels, which would screen out all over 40-mesh as being of no value; the trommels or screens would deliver to a Hancock jig, which for this class of work should have a capacity of 400 tons a day. The concentrates from the jig would pass to the Hanssen machine, where the values would be saved. Such a plant would allow of a large daily tonnage being put through, thus very much reducing the values at which it would pay to handle the sand. Further, the plant would be of such a nature that it could easily be moved from place to place where the values proved profitable.

If carefully thought out, both as to method of working and finance, I see no reason why some of the black-sand deposits of Graham island should not turn out to be paying ventures and hold good for a number of years, but it should be clearly understood that such undertaking must be approached with caution under expert advice and a thorough sampling of the ground made before any expense is incurred for machinery.

Taking a number of samples here and there over a deposit and getting them assayed in the way that would be done on a lode mine will, in my opinion, give results which may be entirely erroneous, either too high or unduly low. The method that suggests itself would be to take a small self-contained Hanssen separator on to the ground and run through it a definite yardage of sand from representative sections of the ground, then retorting the mercury and weighing the resulting precious metals and calculating the yield.

BLACK SAND ON MASSET INLET.

Peter Kay has a black-sand claim about 1 mile south of Masset wharf. The bank is 15 or 20 feet above high tide and some 50 feet back amongst the timber. Several test-pits have been sunk 8 or 9 feet deep, showing layers of black sand from 1 to 12 inches thick; a sample of concentrates from this claim gave 0.6 oz. gold and 2 oz. platinum to the ton, but a general sample on assay gave no values. The southern end of the claim is cut by a small stream which has concentrated the sand; here two men were able to make good wages with a sluice-box, shovelling in the sand and pumping the water from the stream. Colours of gold can be got nearly anywhere by panning and some of the colours are a fair weight, by no means what is known as fine gold. This property is over 15 miles from where the other black-sand deposit is being worked and will serve to show the wide distribution of the values.

CARIBOO AND QUESNEL MINING DIVISIONS.

HISTORICAL SUMMARY BY HERBERT CARMICHAEL.

The name Cariboo was apparently derived from the French Cerfboeuf or deer-ox, which became Cariboeuf and then Cariboo, the name being applied to the country inhabited by Cariboo deer.

The first mention of placer gold on the Mainland of British Columbia seems to be in 1852, when Chief Trader McLean, at Kamloops, procured gold from the natives which they got from the banks of the Thompson river at Nicoamen.

From 1855 to 1857 gold was reported from the region of the Thompson and Fraser rivers, and also in 1856 on the Columbia river near Colville, on the United States side. From there parties proceeded up the Columbia, the first placer gold being found at the mouth of the Pend d'Oreille river, and then over to the Thompson river. It was the exaggerated report of these discoveries that started the great gold-rush of 1858 from California.

The first ship-load of 450 adventurers left San Francisco on April 20th, 1858. Between April 20th and June 9th 2,500 miners, mostly from the interior of California, had taken passage by steamer from San Francisco; and it is estimated that 5,000 more at the same time collected in Puget sound on their way to the Fraser river.

Gradually the miners worked higher up the Fraser, past the junction of the Thompson with the Fraser at Lytton, to Cayoosh and Bridge rivers at Lillooet; then to the Chilcotin, and thence on past Fort Alexandria to the mouth of the Quesnel.

Late in the season of 1859 definite reports came that the search for gold had proved successful on the Quesniel, and in 1860, by the time the pioneers of the column reached Antler creek, 600 white miners were said to be engaged on this river, making $10 to $25 a day.

The significance of the discoveries in Cariboo did not become apparent at Victoria until the closing months of 1860, but at the end of the 1861 season this district, with a population of only 1,500 people, had shipped $2,000,000 worth of gold to Victoria.

In the spring of 1860 Keithley, Harvey, Antler, and Cunningham creeks were discovered; Keithley and Antler creeks seemed at first to be the most important, but were afterwards greatly surpassed by Williams and Lightning creeks. A party of five men in June, 1861, on Keithley creek, divided $1,200 between them as the product of a single day's labour, and their daily average for some time was said to be 1 lb. weight of gold.

Williams creek received its name from William Dietz, a German, who prospected from the headwaters of Willow river in the summer of 1861. This creek has a history similar in many respects to the other creeks; its first discovered rich deposits were shallow and in the bed of the present stream above the canyon. Below these diggings was a flat supposed to have been the bed of a former lake in which the channel sank and was lost. Here the problem of working the deep ground by means of shafts and pumping was for the first time systematically attempted.

On the completion of the road along Lightning creek in 1865, Barkerville, on Williams creek, became the principal distributing-point for the Cariboo region, the aggregate product of which amounted in seven years to $25,000,000.

The enterprising men who worked the bars of the Quesnel in the summer of 1859 were most successful in the valley of the main stream on the South branch opening into Quesnel lake.

Proceeding on rafts along the shores of that lake, they came to a large river entering from the south which was named Horsefly river. They ascended the stream until it branched, and on the smaller tributary, Horsefly creek leading to Horsefly lake, they discovered the richest placers found up to that time in the basin of the Quesnel. One party of five miners, working near the close of the season of 1859, with two rockers took out 101 oz. of gold in a week, after which they were obliged to abandon their operations on account of the severity of the weather.

Towards the close of the season of 1861 all previous discoveries were exceeded by the developments in the rich ground lying 50 or 60 feet under the flat below the canyon of Williams creek. To the Barker company belongs the credit of having sunk the first paying shaft into the new deposit and from this company the town of Barkerville was named. The Diller company was next in order to bottom a shaft into deep ground, washing out in one day, it is said, 200 lb. weight of gold, the largest yield recorded for one day in Cariboo.

Large as was the yield in 1862, the following season was even more prosperous, as numerous new claims were staked and forty produced handsomely, though some of them only reached bedrock in 1864. By the end of 1864 the big excitement was over and the exodus had begun.

In the early days there were several routes to the Cariboo diggings. When the miners came the first route used by them was up the Fraser river, following the old Kequeloose horse-trail away from the river some distance and then descended along Anderson river to the Fraser at Boston Bar. From five to eight days were usually expended between Langley and Boston Bar.

Another route was the Whatcom and Smess trail along the Fraser to Hope and thence along the plateau to the Thompson river, by which it was possible to reach the mines above the Fraser canyon independently of the canyon and canoe navigation.

On July 21st, 1858, the American boat "Umatilla" succeeded in reaching Yale and made this the steamer terminus; the achievement of the "Umatilla" decided the question in favour of the more direct road along the west side of the Fraser and the "Douglas" trail between Yale and Spuzzum was opened for pack-trains in August, 1858.

At Spuzzum a bridge had been constructed by Frank Way and a mile above he constructed the ferry which could carry ten loaded animals. Although the road was not quite clear for the 500 miles, it reached the Quesnel Forks on September 10th, 1858. Pedestrians still preferred

the foot-trail along the bluffs, and in 1859 a ferry across the Fraser was established at Boston Bar which enabled them to pass by Spuzzum. This trail had the disadvantage of being blocked by snow early in the winter, a difficulty averted by the opening in November of the Harrison–Lillooet road. This land and water route became for a considerable time the main line of traffic for the upper country.

The McLoughlin trail by way of Priest rapids was followed by the regular Oregon packers, ascending the Similkameen river to Red Earth fork (now Princeton), then across a divide to Nicola valley, reaching the Thompson river at Nicoamen, 13 miles above its mouth.

By October, 1860, a new and easier road, practicable during winter, was opened between Yale and Lytton; its transformation from a trail to a wagon-road was begun by cutting and blasting in 1862. This road was gradually extended and by 1864 the era of freight-wagons had set in.

Much of the above information on routes has been taken from Bancroft's "History of British Columbia."

In the years following 1863 the richer placer claims became worked out or at least much less productive, and there was a steady decline in mining, until in 1874 there were only 1,086 men working and the production was $682,560; in 1875 the output increased to $766,255, but fell off again the next year.

Hydraulic mining on any large scale began in 1879, when two projects were started—one by the Waverly Hydraulic Mining Company on Grouse creek and the other by the Cariboo Lake Ditch and Mining Company on the North fork of the Quesnel river. Largely due to hydraulic mining the output increased $100,000 over the previous year. In 1880 several hydraulic mining companies were started and in 1884 there was a considerable influx of Chinese. From 1884 to 1889 several of the small hydraulic companies and deep placers paid well and in 1891 there were fewer placer miners and more hydraulics.

Prospecting for deep channels was commenced about 1892, one being found on Slough creek at 245 feet from the surface, and considerable activity was displayed in this direction. In 1893 this activity rather increased and several large projects took shape, notably on the Horsefly river, the South fork of the Quesnel, and Williams creek.

The Cariboo Hydraulic Mining Company started work at the *Bullion* mine near Quesnel Forks, and some of the older claims were still paying well.

In 1897 Wm. A. Carlyle, Provincial Mineralogist, made an examination of the district and fully described the mines at work at that time, which were principally hydraulic mines and deep diggings. His description will be found in the Annual Report for 1897.

Wm. Fleet Robertson, Provincial Mineralogist, made a reconnaissance of the Cariboo in 1902 and his comprehensive survey will be found in the Annual Report for that year, from which the following extracts are taken:—

"The whole of the Cariboo district may be generally and roughly subdivided into two parts—namely, that portion of the country which has an elevation above the sea-level of from 2,000 to 4,000 feet, and that which lies at a still higher elevation. The first-mentioned, low-lying section comprises the large valleys and plateaus of pre-glacial days, with the larger old river-channels which cut them, such as the Quesnel River district. The latter or elevated portion was in pre-glacial days, as it is to-day, the mountainous region of the district, where the streams had their source, and is represented by the Barkerville district, of which the town of Barkerville is the centre. Behind the town Mount Agnes rises to a height of 6,200 feet above sea-level, and from this centre most of the important gold-bearing creeks seem to have radiated. In this high-level district the valleys are above 4,000 feet altitude; they are narrow and are more clearly defined by definite rock formations. These same rocks defined in a general way the older channels, so that, more or less, the drainage-channels of to-day follow those of the time when the gold-bearing gravels were being deposited. It is not meant by this that the ancient and modern streams flowed in the same channels, for they did not, nor did they often flow at the same level, but they were both confined within bounds by the same higher mountains of solid formation and within valleys with solid bed-rock at no very great depth. To quote from Dr. G. M. Dawson on this point: 'The old stream-courses of the Cariboo district are found to have pursued very much the same directions as their present representatives follow, crossing often from side to side of the valley with different flexures, and occasionally running through below a point of drift material projecting into the modern channel, but never, I believe, actually

leaving the old valley or running across the modern drainage system, as is so often the case in the deep placers of California and Australia.'

"This very confining of the channels effected that concentration of the values which made the rich placers of the early days, and to-day renders workable and profitable a number of small hydraulic propositions, operating on comparatively limited deposits of gravel containing unusually high gold values and occurring as old, high channels, or benches, or as ancient and buried outlets of creeks, where the modern creek has cut a new channel for itself. The ancient gravel-bearing streams, after leaving the confined mountain valleys, issued into the wider, more level valleys or plains, spreading out more, their courses being less sharply limited, their flow slower, and their channels larger. These latter represent the great gravel-deposits of the Quesnel and its tributaries, of Willow river, Cottonwood, etc., which are, on the whole, larger and lower grade, while their course is more obscure, having in many cases been covered with *subsequent flows or lake deposits.*"

J. D. Galloway, while Assistant Mineralogist in 1914, came through Cariboo district by way of Prince George; he states in the Annual Report for that year that there were three large hydraulic properties at work—namely, Lowhee, Stouts Gulch, and Mosquito Creek claims.

Prospecting by drilling was under way on Williams creek and Willow river, and Mr. Galloway stated then that "It cannot be said that a sufficient quantity of ground has as yet been proven up on Williams to warrant the expenditure necessary for a complete dredge installation, but in the event of a similar area being proven up on Willow river, then the two together might form an attractive dredging proposition."

From 1914 to 1924 a considerable amount of hydraulic mining was carried on, showing a yield round $200,000 per annum; the Resident Engineer for the district reports a very satisfactory year in 1924 and the installation of a dredge on Antler creek, which was working the following year with good results, the recovery for the year being $95,066, and in 1926 the gold returns for the year were $170,993, mostly contributed by the Antler Creek dredge.

An operation for dredging the bars of the Fraser river at Lillooet was started in 1925. A company acquired 6 miles of dredging-ground and installed a drag-line scraper as well as a patent device for saving gold. This method, however, did not work out in practice and was abandoned.

In 1927 and 1928 there was considerable activity amongst the smaller hydraulics and a large amount of Keystone-drilling done in prospecting new ground.

The writer wishes to acknowledge his indebtedness for the historical information herein given to Bancroft's "History of British Columbia," the Reports of the Geological Survey of Canada, and the Annual Reports of the Minister of Mines for British Columbia.

CARIBOO, QUESNEL, AND OMINECA MINING DIVISIONS.

REPORT BY C. W. MOORE.

INTRODUCTION.

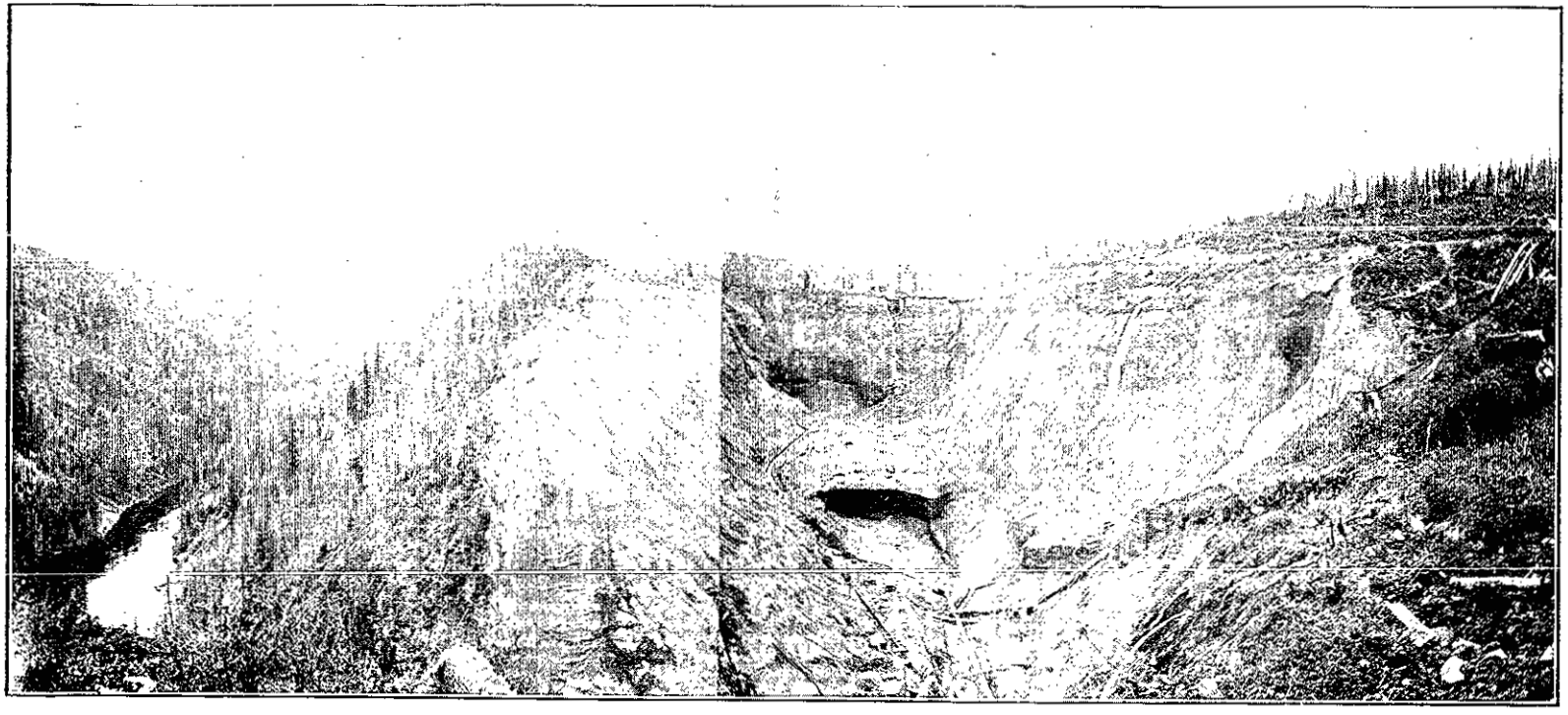
During the season of 1929 considerable activity was shown in placer-mining in this district, particularly in the Cariboo Division. The production for the year is estimated at $38,845 and the total for the North-eastern District at $63,342.

Water conditions were in general favourable for the hydraulic mines. The major hydraulics in operation were Lowhee Mining Company, Limited (formerly John Hopp Mines), on Lowhee creek, which continued in virgin ground; Carinelle Placers, Limited, operating the *Bullion;* and B. Boe, operating the *Platt* and *Lyne* leases on Cedar creek. The activities of the many smaller hydraulics in and about Barkerville, whose annual total contribution to the output is considerable, were much the same as usual.

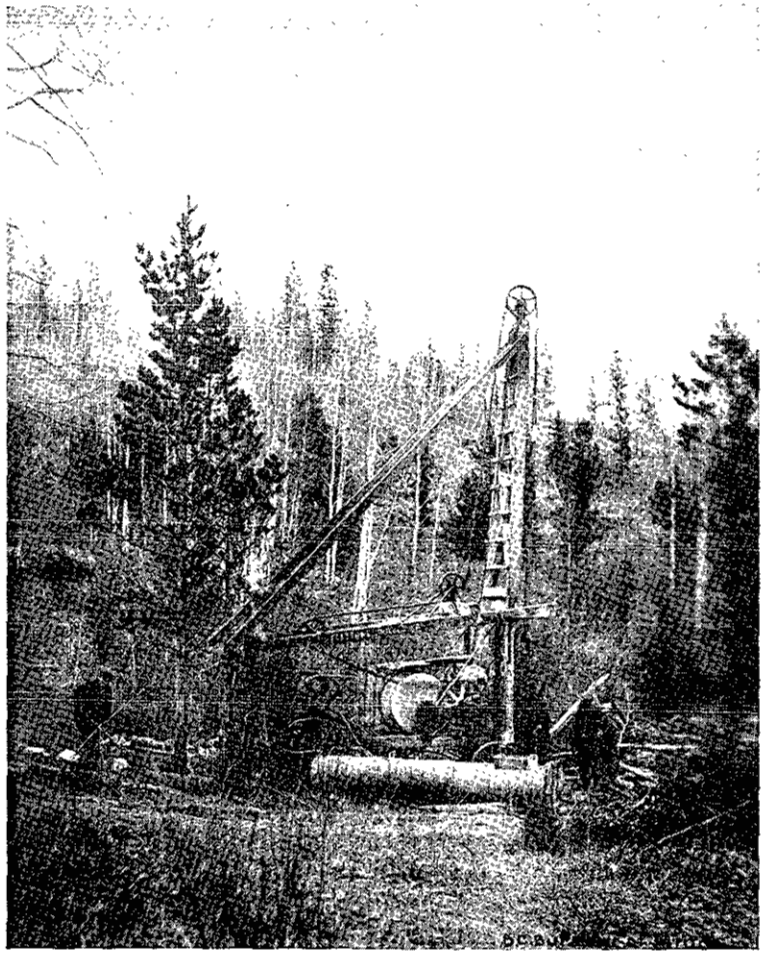
Interesting new discoveries were made on Spanish creek by A. Sutherland and A. Anderson, and in the Horsefly section by R. N. Campbell.

Keystone-drilling operations were carried on by the Consolidated Mining and Smelting Company of Canada, Limited, on Swamp river, and by Central B.C. Mines Development, Limited, in Beaver valley, in the Horsefly section.

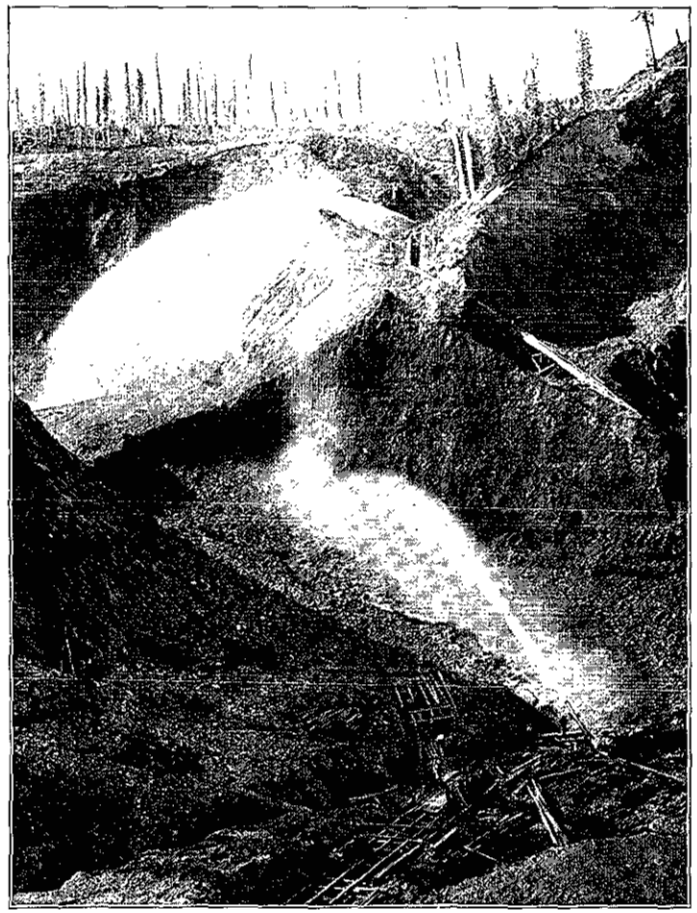
The dredge formerly owned by the Kafue Copper Development Company, Limited, has been sold to interests in the United States and has been dismantled and shipped to Oregon.



Quesnel River, South Fork—The Bullion Pit on Dancing Bill Gulch.



Horsefly River—*Keystone-drilling of* Placer-gravels.



Quesnel River, South Fork—Monitors in Bullion Pit.

From August to November I examined a number of placer areas in the Cariboo, Quesnel, and Omineca Divisions, with the object of ascertaining the possibilities of stimulating and reviving activity in placer-mining. In the following report the description of properties is divided under the three Mining Divisions of Cariboo, Quesnel, and Omineca.

SUMMARY AND CONCLUSIONS.

There are signs of a revival of interest in placer-mining in the Cariboo district, which has undoubtedly been stimulated by the action of the Department of Mines in actively aiding the industry. All indications point to a great deal of drilling and other methods of prospecting during the year. Not only will there be more prospecting, but, should the ground warrant, there is capital available to equip it and bring it into production. There are companies prepared to finance any undertaking big enough to show promise of a fair return on the money invested. It is to be hoped that these companies will tackle the problem in a businesslike way with the best geologists and engineers obtainable. This shows a healthy condition and we may look forward, confidently, to excellent results.

I would emphasize that practically all the placer-mining done in the Cariboo Division during the past fifteen years has been done within a radius *of 12 miles* from Barkerville. Geologists and engineers all recognize that if the industry is to be revived we must look for placer-fields outside this small area. This is what is now being done and with good results.

The cause of this new interest generally and more particularly in the Cariboo is easily accounted for: The Government has been supporting the placer industry, particularly in the matter of more and better trails. In some sections it started and practically completed a system of trail-building. These trails will make it possible for prospectors and engineers to take pack-horses to or near any area which they may wish to prospect or examine. In doing this work the Government has shown confidence in the future of the country, and by doing so has encouraged the capitalist to proceed with the work of investigation.

The Cariboo has the advantage of having good trunk roads to all its centres. The Omineca is not so fortunate in this respect. However, upon the completion of the road from Fort St. James to Manson Creek, we can look for improvement in that section.

Another reason is *that the results obtained* from testing by the Central B.C. Mines Development, Limited, and the New Era Mining Company, under the management of B. F. Lundy, have encouraged other interests to proceed with development-work.

The great need of the Cariboo is *a good topographical map*, linking up Horsefly, Quesnel river, and the Barkerville areas, extending north to the Fraser river and easterly to a point which would take in the whole of the Stony Lake area. This map should be on a scale of not more than 4 miles to the inch. Such a map would be of undoubted assistance in helping to trace out the old drainage systems and connecting up different sections of channels still in existence.

This section of the country has been well treated during the past year in so far as roads and trails are concerned. In every instance where assistance was recommended by the Resident Engineer the money has been granted by the Department of Mines. There has been more trail-building during the past year than there was during the preceding five years.

The Department of Mines and the Public Works Department have shown evidence of co-operation in trail-building which has resulted in a definite system of trail-building. For a comparatively small amount the whole country could be made accessible.

From the Horsefly river to Prince George, and from the Fraser river easterly as far as there appears any promising placer-ground, trails should be cut, over which pack-horses could be taken close to any desired location. Such trails would not only provide transportation facilities for prospectors and engineers who wish to examine any specific section of the country, but would also be of much assistance to the Forest Branch of the Government in the matter of fire-protection.

The population of the Manson Creek section (Omineca Division) at the time of my examination consisted of six white men and six Chinamen actually engaged in placer operations. Scattered through the district there were four men moving machinery to Germansen creek, four prospectors looking for quartz-showings, a Deputy Mining Recorder, and two or three trappers.

There are many reasons why this district is so depopulated. The main one is probably the condition, or perhaps I should say lack of condition, of the trails. This fact has been recognized for some time by the Department of Mines, but lack of funds has prevented as much trail-work

as would have been desirable. During the season of 1929 a start was made on a road from Fort St. James to Manson Creek, and generally the Department of Mines is fully alive to the necessity of building roads and trails in this section.

Upon completion of the road now under construction from Fort St. James to Manson Creek, it will be possible to get heavy drills into the country, and thus encourage capital to drill the larger areas. It will also provide the individual prospector with an opportunity to earn a grub-stake without having to travel hundreds of miles to do so. I would suggest that this road be completed with all possible dispatch.

There are several small creeks in this section which are well worth prospecting and some larger areas which are sufficiently attractive to warrant examination with a view to dredging. It requires a Keystone drill to prove the ground, and until there is a good road into the country a drill of this type cannot be taken in, except at an almost prohibitive cost. The few light drills which have been taken in have demonstrated that their usefulness is confined to a very limited amount of scout drilling.

In the Cariboo, Quesnel, and Omineca Mining Divisions there are without doubt many excellent opportunities, other than those mentioned in this report. It will, however, require considerable time and investigation to secure sufficient data to present a comprehensive description of the many points of interest to the mining industry.

Owing to the interest being taken in placer-mining at the present time, it is more than likely that advantage will be taken of the many opportunities which, upon investigation, should offer every prospect of satisfactory remuneration for both the prospector and operator, and will in all probability enable the Cariboo to regain its former place as a large placer-gold producing district.

As an instance of the possibilities, there is a high channel paralleling the Horsefly river on the north which probably has never had a pick in it. There is another channel running from Little Swift river to an outlet on Lightning creek, about 2½ miles below Wingdam, which is cut by numerous creeks and is quite likely to prove the source of the gold, found above the clay, on Peters creek and Lightning creek.

There are miles of old channels in the Cariboo in which there has never been a hole drilled to bed-rock. As a matter of fact, detail knowledge of the Cariboo and Omineca is limited to certain areas.

The excellent report of W. A. Johnston and W. L. Uglow (Memoir 149, Geological Survey of Canada) covers but a very small area in the vicinity of Barkerville. It is, however, a valuable report as it is a key to the placer geology of a much larger area.

As a result of my examinations I have reached the following conclusions:—

(1.) That there are large areas in Cariboo and Omineca which can be worked by dredging and hydraulicking.

(2.) The indications are that there are sufficient values, if properly managed, to pay handsome returns on money invested.

(3.) That every consideration should be given capital, during the next few years, in order that the greatest possible activity will take place, to the end that the industry will be placed on a firm and permanent foundation.

(4.) That the building of roads and trails for mining purposes should be continued and in a systematic way.

(5.) That the "Placer Act" should be revised, and particularly that the provisions dealing with free miners' certificates should be made much less drastic than at the present time.

(6.) That a good topographical map of the Cariboo district should be made as soon as possible.

CARIBOO MINING DIVISION.

Prince George Section.

Government Creek.

The Government Creek Hydraulic Gold Mining Company has had a geologist in the field all summer making an investigation, and I believe some very valuable work has been done. This company has also washed a considerable quantity of surface gravels, but as no report was made to the Resident Engineer, I am unable to make any definite statement as to what success was obtained.

Hixon Creek.

H. Brisco interested some Victoria people in the spring of 1929 who have examined the property, but I was unable to learn with just what results. For some years E. Hann and J. Strbac have been the principal producers on this creek. During the summer of 1929 they did some ground-sluicing and also worked on some quartz-showings on the creek.

Tertiary Channel.

D. D. Fraser and James McHardy have been prospecting the Tertiary channel at Canyon creek, about 38 miles north of the town of Quesnel. The Quesnel–Prince George highway runs through the leases, giving them good transportation. At Cottonwood canyon on the Fraser river, where the channel is between 800 and 900 feet wide, the ground has been worked intermittently for twenty years without any great success. D. D. Fraser claims that due to bed-rock conditions existing at this point the concentration action was poor and that the recovery of gold was only 13 per cent. of the total bed-rock values. They are now attacking the channel 20 miles north of the old workings, where they expect higher values as well as improvement in the bed-rock conditions. 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. The drilling will give them valuable information which will be of benefit when prospecting other Tertiary channels. They have sunk a shaft to a depth of 85 feet, and from the bottom of the shaft sunk a 5-inch drill-hole to a total depth of 175 feet. They claim to have had rim-rock at that depth and are now making arrangements to drill a section of holes the full width of the channel.

BARKERVILLE SECTION.

Antler Creek.

The only work being carried on at present in this vicinity is on California creek. Pete McLanders has a small hydraulic plant and at present is endeavouring to get up the creek beyond the point where the old-timers drifted. He is recovering some coarse gold on the rim and hopes to get good "pay" when he arrives beyond the old workings.

There is an old channel of the creek which starts somewhere near the lower end of Maloney flat. This parallels the present creek-channel on the west and joins it between the wagon-road and the lower end of the old China Creek hydraulic pit. About three-quarters of a mile below Sawmill flat a section of this channel has slid away, and I believe that this accounts for the very rich ground found at Antler Creek discovery. About 2½ miles of the old channel is still intact, although the lower half-mile may have been eroded by a local glacier. This channel is located in one of the richest sections of the Cariboo and is one of the major possibilities of the whole district. The cost of proving the ground is small, as there is a good wagon-road to Sawmill flat, over which drills could be taken, reaching to a point within half a mile of the upper end of the old channel. There is another road up Wolf creek, over which drills could be taken to within about 500 feet of the lower end.

Sawmill Flat.

This flat offers another possibility in the vicinity. At one time it was the drainage system for Victoria gulch and Nugget gulch, as well as part of the area now drained by upper Antler creek. At present about 1½ miles of this flat drains to Antler creek and the remainder to Swift river. The flat will average about 500 feet in width. There are no big boulders in sight, but there are a few big slide-rocks. This location should be sufficiently attractive, to any one seeking dredging-ground, to drill at least two sections of holes. This will give all preliminary information required regarding values, depth, bed-rock, etc.

Cunningham Creek.

Trehouse Hydraulic Mining Syndicate.—A description of this property is given in the Annual Report for 1928. The roads to the property have been greatly improved during the past year and autos and trucks can proceed right up to the camp. This work was done jointly by the Departments of Mines and Public Works.

This is one of the most promising properties in the Cariboo. The old channel parallels the present channel of Cunningham creek, with both rims well defined. There has not been sufficient prospecting done below the present operations to give any idea as to how far the channel will

extend down-stream before it is cut by the present channel of the creek. It is quite possible that it will extend down-stream approximately 2 miles.

There is sufficient water available in Cunningham creek to work this property twenty-four hours a day for three months, and to work twelve hours a day for the remaining three months of the season. The present ditch is so small that during the very hot weather, which causes heavy evaporation, it is impossible to get sufficient water to the penstock to supply a 3-inch nozzle with a 150-foot head.

Eight-mile Lake.

The road from Barkerville to this lake has been so greatly improved during the summer that automobiles and trucks can easily be driven to the lake.

M. McComish and Morris Anderson have been working all summer on the old Eight-mile Lake property, lowering the flume to enable them to get out some of the rich gravels still left in these leases. This property was one of the most spectacular finds in the latter days of the Cariboo. The pay-dirt was found on the top of hard boulder-clay. Due to the lack of sufficient grade and a limited supply of water this became a very expensive operation. When the ground was worked back from the lake, which was used for dumping purposes, the grade of the flume gradually rose above the clay, which made it impossible to secure the values, and consequently the work was discontinued for a time. There is known to be rich pay-dirt under the bank, where the previous operations ended, and it is this ground which the present owners are trying to recover.

Other Creeks.

R. D. Rees is working his leases on Shepherd creek. John Roddick is working a lease on Pine creek. John Chouse is working a lease on the right limit of Summit creek.

Willow River.

This river drains the largest area of rich placer-ground in the Cariboo. Williams creek is the headwaters of the East fork of this river, while Jack of Clubs creek and Slough creek form the West fork. The two forks converge at the north side of Island mountain, about 10 miles north-west of Barkerville. Practically all of the creeks draining into the river have been worked.

The Willow River Mining Company endeavoured to work the river itself just below the junction with Mosquito creek, but with little or no success, due, principally, to the depth and cost of pumping water. It did, however, prove that there were good values on the bottom, as some of the ground went as high as $7 to the square foot of bed-rock. Apparently the deep ground does not extend any very great distance down-stream, as the river flows over bed-rock 6 miles below the mining company's works. The rim-rock shows at several points above Valley (Big Valley) creek. Between Dragon creek and Valley creek, a distance of about 16 miles, there is some of the most promising ground for dredging operations in the Cariboo.

From where Valley creek empties into the Willow river to a point about 5 miles north, the valley is very wide and is probably an old lake-bottom. From this point for about 45 miles (as the river flows) there are excellent possibilities of finding dredging-ground. In the early days of the Cariboo there was considerable rocking done on the bars of this section.

There is an old channel, the source of which is very problematical, but which crosses Dragon creek about half a mile from the mouth. It runs almost parallel with Willow river, although in a slightly more westerly direction, for some miles, turns easterly, and joins Willow river about 16 miles from Dragon creek. Mr. Ford, of Dragon Creek, believes that this is the old channel of Lost creek, which is very likely correct. The channel is so deeply covered with glacial drift that it is impossible to determine its source.

From knowledge gained at the Dragon Creek exposure and from other evidence, I believe that it crosses Tregillus creek about 4½ miles from its mouth and is quite likely to be the source of the gold found in Rushon and Baldhead creeks, as well as the rich spots found on the right limit of Tregillus creek. From this point to about 10 miles north, where it empties into the Willow river, as a hanging valley, the old channel is well defined. Deadwood creek, which empties into the Willow river about 2 miles north of Tregillus creek, cuts the old channel and was worked from this point to its mouth. Canyon creek, which empties into the Willow river from the same side, about 2 miles farther north, did not cut the channel and carried no values. Archer creek, north of Canyon creek, cut the channel, and from this point to its mouth was

worked with success. Willow river, below the mouth of Tregillus creek, was wing-dammed and the ground also worked with success. With this evidence it is natural to conclude that the source of the gold was in the old channel and that there should be values in Willow river. All creeks emptying into Willow river on the east side carried gold. There is a good trail from Beaver Pass House to the mouth of Tregillus creek and from there up Willow river to Sugar creek and down-stream to Big Valley creek. There is a good trail from Ahbau lake to Willow river.

AHBAU LAKE SECTION.

There is a good pack-trail from Cottonwood House on the Quesnel–Barkerville road to the lower end of Ahbau lake. From here a good trail follows the easterly side of the lake for about 4 miles and then running almost due east to Willow river. Another trail follows the westerly side of the lake to Ahbau House, Hay lake, Lodi lake, Willow river, and Stony lake. Lodi lake is the head of the drainage system of the Little Cottonwood river, which flows in a westerly direction to the Fraser river.

Ahbau creek, between Lodi lake and Ahbau lake, has produced considerable gold. The chief producer was a Chinaman, for whom the creek was named. His workings were about half a mile below Alder gulch, which comes in on the west side of the creek. About half a mile up Alder gulch from Ahbau creek there is an old shaft about 80 feet deep. I was unable to secure much information about this work. However, Robert Cresswell (an old-timer known as Mountain Bob, now deceased) was credited with the statement that had the property been rightly managed it would have proven successful. The property was abandoned after a small amount of drifting. This shaft is of interest, inasmuch as all the gravel worked on Ahbau creek was from 4 to 12 feet deep. This Chinaman, Ahbau, had ground about 5 feet deep, to where the rock pitched to the west. His "pay" was close to the right limit, and as the gold was coarser than that found on any other part of the creek he was very probably working on the east rim of the deep channel found on Alder gulch. This deep channel shows that the old drainage-channel of this area was much deeper than the present one, likely with a reversed gradient north-westerly to Canyon creek. All the creeks, including Alder gulch, draining from the west into Ahbau creek have been worked on the surface and are reported to have paid better than wages.

In looking over this section during the summer I was impressed with its possibilities and consider it one of the best places in the Cariboo for a man to take out a grub-stake. The low cost of transporting supplies, the abundance of rainbow trout in the lakes, and the great number of deer, moose, black and grizzly bear in the vicinity tend to reduce the cost of living to a minimum in this section. This district was practically depopulated during the war and has remained so ever since.

Lower Swift River.

In the year 1922 a group of leases on this river were drilled by the Gold Dredging Syndicate, of Vancouver. M. M. Kerr was the secretary-treasurer of the company as well as manager in charge of field operations. The ground was drilled by G. A. Dunlop and the following results were reported: 5,000,000 cubic yards with an average value of 40 cents a yard. In my opinion, the yardage that would be dredged is much smaller than this and that the values claimed are much too high.

In 1924 this company installed a suction-jet dredge, but for some unknown reason did not operate this dredge until 1926. After about two months' trial they found that it was useless, as are all other contraptions of a similar type. This operation had one very serious aspect, inasmuch as those who were not familar with the situation were led to believe that as the undertaking was not a success the ground could not be profitably dredged. Careful investigation has established an entirely different view, and with a modern dredge the ground would be found very easy to dig. It is regrettable that in a placer-mining country there is nothing to prevent the formation of companies whose sole effort, apparently, is to dispose of stock in what purports to be a gold-dredging company, when the equipment or methods used are so absolutely useless that its mining efforts are doomed to failure almost before their inception. I believe that at least two of the leases in this group warrant further investigation, to the extent, at any rate, of checking some six or eight of the holes drilled by G. A. Dunlop. The gold in this section is on, or just above, the boulder-clay, and the gravel would average something under 20 feet in depth and should be suitable for a small dredge of modern type. Should the investigation prove the

area to have sufficient values to make modern dredging profitable, there would be available a large area under similar conditions, which would probably carry values about the same as these two leases.

On lower Swift river and on Lightning creek, as well as on the flats around Coldspring Ranch and Cottonwood House, there is a layer of gold-bearing gravels at a depth of from 8 to 20 feet on top of the clay. In the early days of the Cariboo, Chinamen worked large areas on the surface. In many instances the gravel was rich, as is proven by the records of the late John Boyd. The drilling on Swift river is the only work in this section which has tested the ground.

QUESNEL MINING DIVISION.

Horsefly Section.

On October 7th, in company with Douglas Lay, Resident Engineer for the North-eastern District, I visited this section. We examined the ancient channel where it is cut by Moffat creek and found the gravels to be overlain with volcanic rock. We also visited Triplet lake and inspected the work done last winter just east of the lake by J. R. Williams and Mikkelsen Bros. They had made two attempts to reach bed-rock by sinking shafts, but due to the great amount of water encountered were unsuccessful, although they did get below the lake-level. From the surface to the point at which they were compelled to stop they found Miocene gravels, with the exception of one stratum of lignite coal. This work is of value for the reason that it proves that the channel runs toward Star lake. To the south-east of Star lake they claim that the old channel can be traced. Since there appears no good reason for doubting this claim, then somewhere near Star lake the old channel may be found intact, and if so would be the proper place to start drilling.

I believe that the rich gravels found at Wards Horsefly originated from an old channel and that this old channel runs through Beaver valley to the Quesnel river. It then followed the course of the present Quesnel river for some distance and probably flowed west in the vicinity of Dragon mountain into the Fraser river, 7 miles below the town of Quesnel. It is believed this old channel was the source of the gold found at the well-known rich bar on the Fraser river at this point. It is to be hoped that some company will be sufficiently interested to test this channel in the vicinity of Star lake. Should such drilling prove the direction, then it could be followed and, if not too much disturbed with ice, would offer wonderful possibilities. Should the Central B.C. Mines Development, Limited, get to bed-rock at Beaver valley, it will be of very great assistance in helping to prove direction of this old channel.

New Era Mining Co.—About the first of December this company started drilling north of Horsefly, with the expectation of locating the extension of the rich "pay" found at Wards Horsefly hydraulic. It appears that they have succeeded. To date ten holes have been drilled. B. F. Lundy, the manager, reports the average result from drilling is about $1 a cubic yard. The average depth is 36 feet, which is ideal for dredging. There is an area of about 50 acres at least, or about 3,000,000 cubic yards. The area worked at Wards Horsefly was less than 5 acres, with a reported production of about $500,000. Mr. Lundy reports that the values are on and above hard blue clay, which acts as a false bed-rock.

The interesting feature of the discovery is that the gold found must have come from a higher level than the bed-rock under the clay. The gravels carrying the gold therefore must have been resorted from a higher level. The ancient channel near the mouth of Moffat creek shows signs of erosion and is quite likely the source of the gold. If this is the case the old channel at Triplet and Star lakes should offer good inducements for drilling.

Moffat Creek.

For further description *see* Annual Reports for 1927, page 180, and 1928, page 203. At the time of each of my two visits to this section the owners of the leases were away. The only portion of the creek examined was that below the falls. The following information on Moffat creek is from the report of Douglas Lay, Resident Engineer, in the Annual Report for 1928:—

"*Ancient River-channel cut by Moffat Creek.*—In the Annual Report for 1927, page 180, mention is made of the fact that Moffat creek apparently cuts through an ancient river-course. This was further investigated during the year. A short distance below the falls on Moffat creek there is exposed on both banks what appears to be an ancient river-channel. The gravel

SKETCH MAP OF THE SOUTH FORK OF QUESNEL RIVER

Showing Pre-Glacial Channels

Thus

After E.C. Annes.

Quesnel river

Slide mt.

1960' QUESNEL FORKS

South Fork

North Fork

↑ Falls

Waterpower Site

4,000 H.P. minimum

Sailor Cr.

1900

To Quesnel

Morehead Mining Synd.

3500 South Fork Pk.

Bullion Mine

2536'

Poquette l.

2762'

2777

LIKELY 2200'

Spanish Mt.

Spanish l.

2814

S. Prior old channel

Jackpine l.

Little Lake cr.

3400' Sisters mt.

Little 2597'

HYDRAULIC

2731

Little Lake mt.

Morehead cr.

Morehead l.

LW 2784 HW 2811

Morehead Mt.

cedar Creek.

Warren cr.

2977

3512

Eight mile cr.

Eight Mile mt.

3512'

Eight Mile l.

4000'

Trio l.

4300'

Six mile cr.

Five mile cr.

Bootjack lake

HW 3056 LW 3049

3600 Polley pk.

4050'

4000' Bootjack mt.

Polley lake

LW 2831.5

HW 2839.5

Quesnel lake

2200'

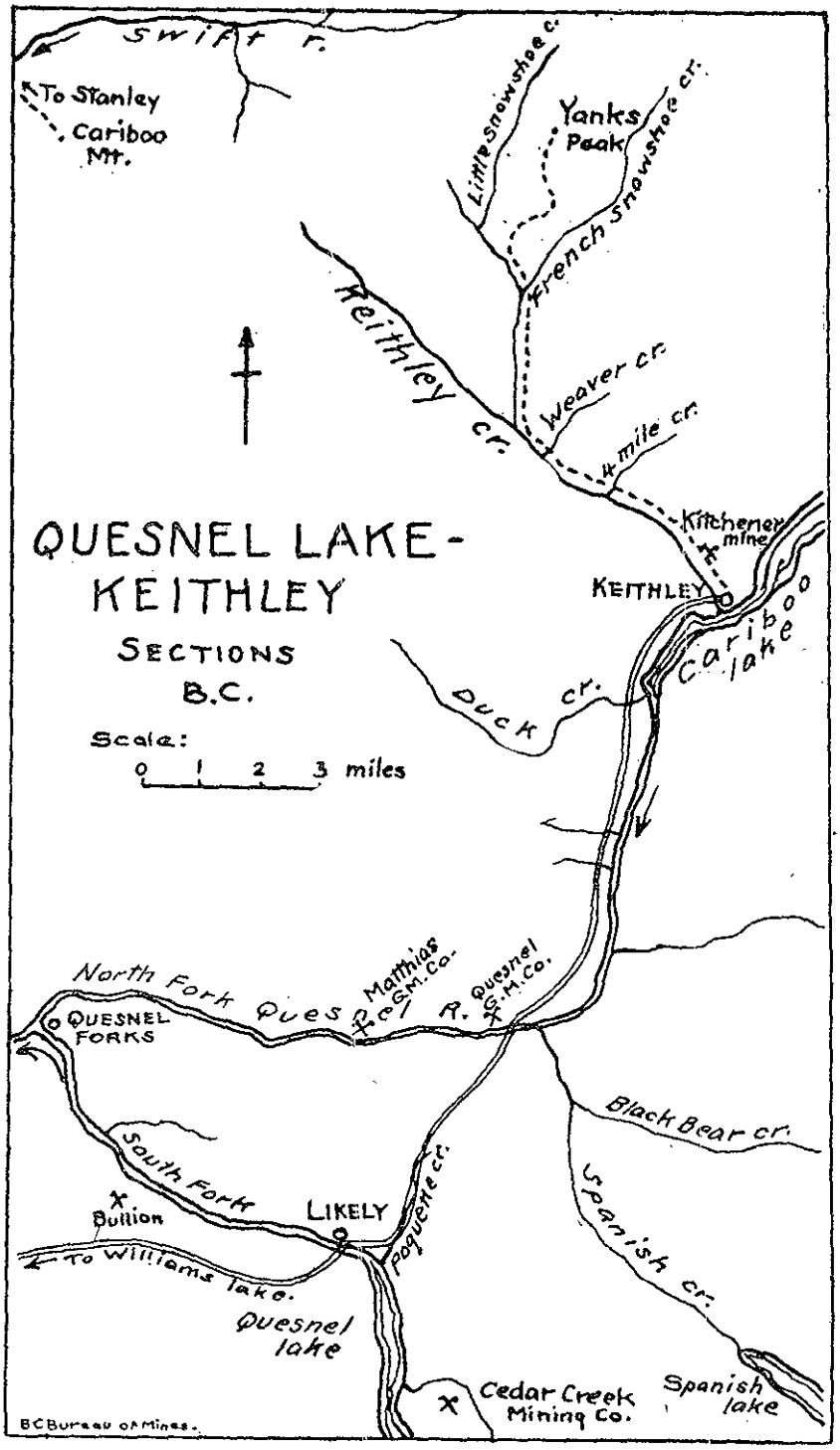
Scale of Miles

0 1 2 3

creek

Ditch

B.C. Bureau of Mines


Swift R.
To Stanley
Cariboo
Mt.
Little Snowshoe c.
Yanks
Peak
French Snowshoe cr.
Keithley cr.
Weaver cr.
4 mile cr.
Kitchener mine
QUESNEL LAKE-
KEITHLEY
SECTIONS
B.C.
Scale:
0 1 2 3 miles
KEITHLEY
Duck cr.
Cariboo lake
North Fork Quesnel R.
Matthias G.M. Co.
Quesnel G.M. Co.
QUESNEL FORKS
Black Bear cr.
South Fork
Bullion
LIKELY
Poquette cr.
Spanish cr.
To Williams lake.
Quesnel lake
Cedar Creek Mining Co.
Spanish lake
BC Bureau of Mines.

is residual and is composed almost entirely of well-worn quartz, closely resembling that from the deposit at Star and Triplet lakes, on which are the leases of J. Williams and G. Kuchan, and also that of the old *Miocene* property at Horsefly.

"Where intersected by Moffat creek the direction of this channel is N. 65° W. (mag.). The level of the bed of Moffat creek at this point is 235 feet vertically above Horsefly Post-office. On the left bank of Moffat creek at this point the gravel is overlain by volcanic lava-flow, but it is not certain whether the latter is in place. It is understood that some years ago a Keystone drill-hole was put down in this gravel at a point somewhat down-stream from this exposure, but bed-rock was not reached. This is obviously a point at which drilling should be carried out, because of the hydraulic possibilities which may exist, and which can only be proved by ascertaining the depth of the channel at this point as well as the values. Moffat creek would furnish a good supply of water for hydraulicking if the presence of the other conditions essential to success can be established by Keystone-drilling."

Antoine Creek.

This creek flows out of the eastern end of Beaver valley into the Horsefly river. It has never been properly tested and has been overlooked for years by prospectors. In 1928 R. N. and John Campbell staked ground on the creek and when doing their annual development-work last July found good "pay." R. N. Campbell reports good values in all their pits. In places the gravel went as high as $3 a cubic yard.

On October 8th, while on the creek, the ground was panned at several different places over about 1½ miles of the creek, and while I did not get values as high as reported by Mr. Campbell, the gravels did show high values over a large area. Although the pits put down by Campbell Bros. were from 6 to 7 feet deep, there is nothing known about the actual depth to bed-rock; consequently it is not possible to make any accurate estimate of yardage. If the ground is 20 feet deep, with the values holding to that depth, it will make a good hydraulic property. Physical conditions are ideal for hydraulicking. There is unlimited room for tailings in Roberts lake (Anderson). There are no big rocks in sight, nor is there likely to be in the ground. The water-supply was not investigated. R. N. Campbell states that they will have sufficient water to supply a No. 6 hydraulic plant for a season of six months. Campbell Bros. were more fortunate than the average prospector with regard to financing. This was quickly arranged with B. F. Lundy, who in consideration of a one-half interest agreed to furnish material and complete certain stipulated work. They have their storage-dam completed and it is their intention to start work on the ditch as soon as the frost is out of the ground. The ditch will be short and, as they have a road to the mouth of the creek over which to transport plant and material, the cost of equipping the property will be small. With any kind of luck they should be piping in July.

Beaver Valley.

R. N. Campbell, of Horsefly, was successful in interesting B. F. Lundy in his leases in the valley, with the result that Mr. Lundy formed the Central B.C. Mines Development, Limited, which started drilling in July. Mr. Lundy reports that the results to date have been very satisfactory, but sufficient drilling has not yet been done to develop any extensive area. The company intends to start drilling again in the early spring.

Black Creek.

Black creek empties into the Horsefly river about 20 miles east of Horsefly Post-office, from which point there is a good motor-road to the mouth of the creek.

The MacKeracher leases were taken over about a year ago by the Rountree Mines, Limited, of Vancouver. About 1½ miles from the mouth of the creek there is a drop of about 200 feet. Above the falls the creek flows through a narrow rock canyon 280 feet long and the leases are located just above this canyon. There is no sign whatever of bed-rock, or rim-rock, for 1,000 feet. The company claims to have good prospects in the gravel in this portion of the creek. Since taking over the property this company has installed a good No. 4 hydraulic plant and built a storage-dam. It has also lowered the rock canyon to a depth of 20 feet at the upper end, putting in a flume on grade, all of which has entailed a considerable expenditure of time and money. In the rock-cuts, or canyon, a 2-compartment flume has been installed, each compartment 3 feet wide.

This work was not completed until near the end of July, at which time the water-supply was nearly exhausted. Sufficient piping was done, however, to show that the rock-cut was not deep enough to get the flume on bed-rock. It is claimed that bed-rock will be reached at from 40 to 50 feet from the mouth of the flume. Should this be correct, the flume should be on the rock within thirty days of the starting of operations in the spring. I have been advised by Mr. Arms, the manager, that the company intends to send three men to put down some pits in order to locate the bed-rock. At the present time there is a limited supply of water, but the company claims that it can secure an unlimited supply at a very small cost. In my opinion there is nothing to justify any further expenditure until more definite information is acquired as to the depth of rock. It is quite likely that the flume will have to be lowered to get bed-rock or find the old outlet to the creek.

Quesnel Section.

Quesnel River.

One of the major possibilities of the Cariboo district is Drummond flat. The mouth of the flat is located 28 miles east of the town of Quesnel on the Quesnel river. A road which starts near the Quesnel River traffic-bridge runs across the ground, but it is not in a very good condition at the present time.

This property was prospected in the early nineties by Thomas Drummond, of Montreal, and would have been worked years ago had there been a sufficient supply of water available to justify the cost of constructing a ditch and flume. Physical conditions for hydraulicking are ideal. The Quesnel river is about 100 feet below the bed-rock in the channel, providing ample room for tailings. A certain amount of drilling is necessary to establish the exact yardage, but there should be about 40,000,000 cubic yards available.

The Quesnel Hydraulic Gold Mining Company discontinued operations on its property at Birrel creek (20-Mile creek) some years ago. This company had a water right on Swift river, but at the present time this water right is open to staking. The company also owns a ditch which carried the water from Swift river to Birrel creek. This ditch will carry 200 second-feet of water and the minimum flow in Swift river is above this amount. I believe that this ditch could be secured from the company at a very reasonable price. This water system could then be utilized to hydraulic the Drummond Flat deposit.

The valley of the Quesnel river is one of the warmest spots in the Cariboo district. The hydraulic season would be approximately nine months in the year, somewhat longer than at Barkerville. The gravels in this channel date back to a very early period, as a proof of which I have a section of a mammoth's tusk and a fragment of a molar tooth which were found in these gravels.

Likely Section.

Cedar Creek.

B. Boe was the only operator on Cedar creek and reports a successful year. An output of 500 oz. was made.

Kemp and Lackie did a small amount of work on their leases situated near the mouth of Poquette creek.

Spanish Creek.

*Leases of Alex. Sutherland and A. Anderson.**—The owners of these leases made an interesting discovery during the year, having obtained indications of an old gold-bearing channel in the left bank of Spanish creek, about 85 feet vertically above the present creek, at a point about 3 miles above Black Bear creek. At this point a tunnel has been run a distance of 30 feet into the bank, preceded by 20 feet of open-cut. In the near vicinity of the face of the tunnel, pits have been sunk a few feet in depth; and 50 feet from the portal of the tunnel, between the latter and Spanish creek, a shaft has been sunk to a depth of 18 feet. The face of the tunnel shows rim-rock up to a height of 3 feet, and above that, gravel. Encouraging values are being found, the owners stating that they are taking out sufficient gold to cover their wages.

* Report by Douglas Lay, Resident Mining Engineer.

While further work requires to be done before it can be determined whether or not this is an old channel of Spanish creek, the discovery is of interest in view of the fact that on this creek no material amount of gold was found above the mouth of Black Bear creek. A good cabin had been built by the owners of this property on the right bank of Spanish creek, a short distance from the workings.

North Fork of Quesnel River.

*Matthias Gold Mining Co.**—With reference to the 1928 Annual Report on this property, the owners state that at the time of examination (October 18th, 1928) sloughing at the face of the pit rendered it impossible to discern what was observed by them at the time of piping—namely, the fact that at the face of the pit bed-rock dipped into the hill, also that some gold was found at this point, and that the indications were that the face of the pit had *just* reached the *south* rim of a buried ancient channel running parallel to the North fork of the Quesnel river. The owners further state that an opening has been made on Wolverine creek, some 3,000 feet up-stream from the above-mentioned point, which also indicates the existence of such buried ancient channel.

This exposure on Wolverine creek has not yet been inspected and this property will be further examined during 1930. It should, however, be borne in mind that, even assuming that there does exist a buried ancient channel on this property, the question of profitable gold values therein remains to be determined by careful and adequate testing—by Keystone-drilling, for example. Until such has been done no intelligent and reliable opinion can be expressed as to possibilities. Further, it seems evident that such testing should precede any capital outlay in connection with any scheme of actual mining operations.

South Fork of Quesnel River.

Nelson and Fular Leases.—These leases were not worked during the season. The owners, J. P. Nelson and E. B. Defue, are contemplating some improvements to their pumping plant for next spring.

Bullion.—This property is now being worked by Carinelle Placers, Limited. During the spring and summer operations were carried on, but were discontinued early in the fall. I am unable to state with what success, for the reason that no report has been made to the Resident Engineer.

KEITHLEY SECTION.

The Consolidated Mining and Smelting Company of Canada, Limited, discontinued drilling on Swamp river in August. It is understood that results were unsatisfactory. Chester and Thomas were prospecting on Keithley creek. H. DeLong had a small hydraulic plant on Weaver creek, a tributary of Keithley creek.

The Quesnel Gold Mining Company, Limited, operated during the summer and did considerable development-work, but with what results I do not know as there was no report available.

OMINECA MINING DIVISION.

HOUSTON SECTION.

Buck and Bob Creeks.

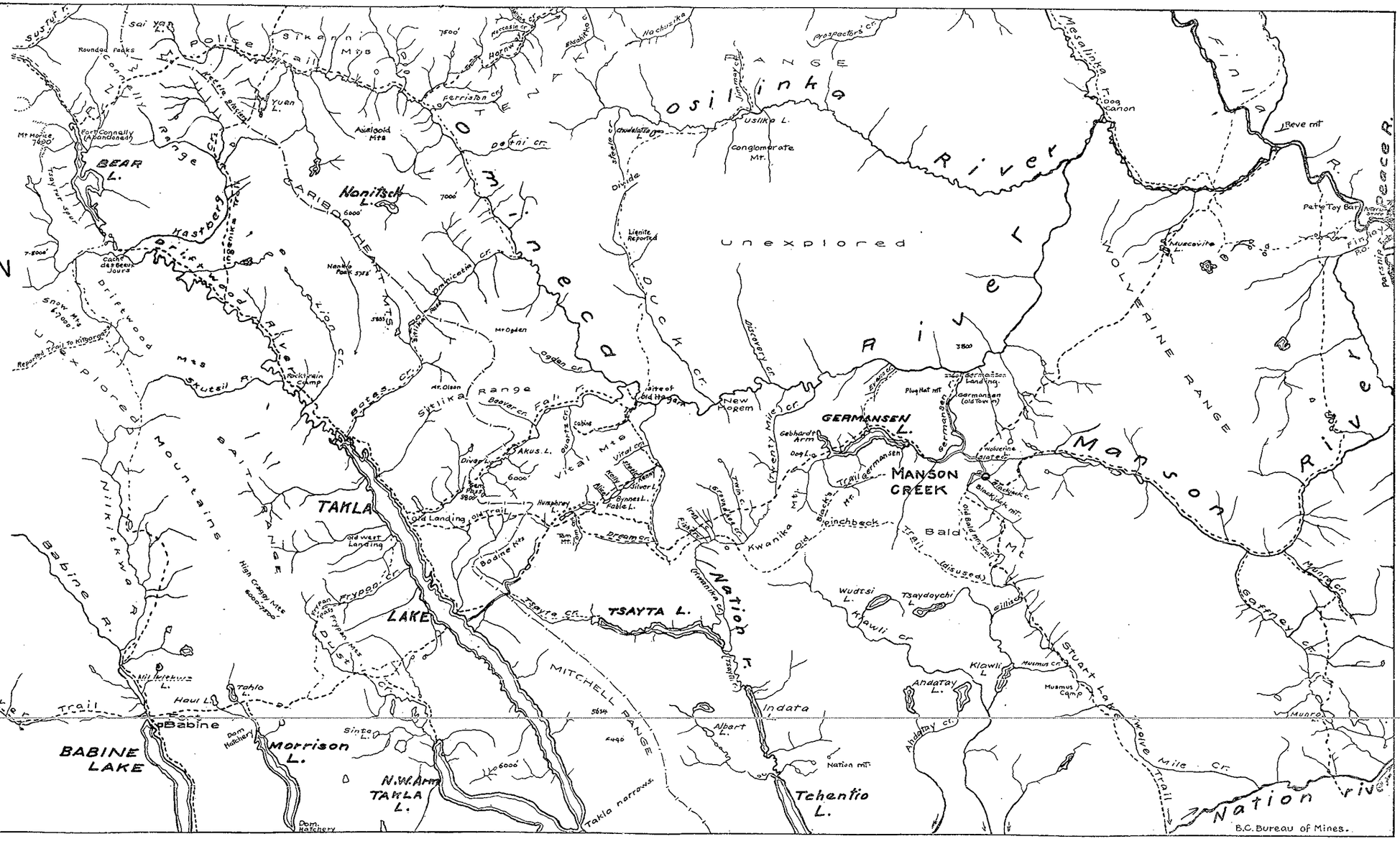
These two creeks are about 10 miles south of the town of Houston, on the Canadian National Railway. They can be reached by a fairly good auto-road from Houston. The leases are owned by W. A. Johnston, of Prince George.

There are small prospects on the surface and in the canyon just below the property. Some coarse gold has been taken out. The property extends over some 20 miles of creek-bottom and, while there has not been enough development-work done to prove values, it warrants at least three sections of drill-holes. The physical conditions are ideal for dredging.

MANSON SECTION.

The term "Manson section" is used to designate that portion of the Omineca Mining Division which in former years had some importance as a placer camp and which centred about

* Report by Douglas Lay, Resident Mining Engineer.



MAP OF PART OF

OMINECA MINING DIVISION

Between

HAZELTON and MANSON CREEK

B. C.

the old town of Manson Creek. In recent years this section has been dormant, but signs of returning activity are apparent.

In Dawson's "Mineral Wealth of British Columbia," published in the Geological Survey of Canada Report for 1888, mention is made of the Omineca placer-field and some information given in regard to the early mining operations.

In 1894 McConnell made a trip up the Finlay and Omineca rivers and examined the Omineca placer-diggings. His report is Part C of Vol. VII. (1894) of the Geological Survey of Canada.

A month's trip was made into this area by Camsell in 1915. His report, entitled "Explorations in the Northern Interior of B.C.," is contained in the 1915 Summary Report of the Geological Survey of Canada.

The main routes of travel are from Hazelton and Fort St. James. The trail from Hazelton goes through the Babine range to the foot of Babine lake; thence to Takla lake, which is crossed by ferry; and thence 65 miles farther, easterly, to Manson Creek.

Another route which is now much used to get into this section is from Vanderhoof, on the Canadian National Railway, to Fort St. James, 40 miles by motor-road; then by boat or canoe to Takla Landing. This water route is via Stuart lake, Tachie river, Trembleur lake, and Middle river to Takla lake. Twenty-ton scows can be taken in this way and it is a feasible route for transporting heavy machinery. From Takla Landing the Hazelton–Manson trail is used to Manson. The construction of a sleigh-road from Takla Landing to Manson would in connection with this water route make a fair transportation system for mining in the Manson section.

There is also a pack-trail which goes directly from Fort St. James to Manson, a distance of about 125 miles. As the water route to Takla Landing is quicker, this old trail is not now much used. A road is now under construction from Fort St. James to Manson and it is planned to complete this.

The following excerpts are taken from the report of John D. Galloway in the Annual Report for 1924:—

Topography and Physiography.

The trail from Hazelton to Babine cuts directly through the heart of the Babine range by way of the Suskwa River pass. This range is a part of the Cassiar system of the Central Belt and is bounded on the west by the Bulkley valley and on the east by the elongated valley occupied by Takla and other lakes. The range trends north-westerly and has a length of about 120 miles and a width of from 20 to 40 miles. Babine lake is 105 miles long and from 2 to 6 miles wide. It is bountifully stocked with fish and is a natural spawning-ground for the Skeena River salmon. Netting of salmon on the Babine river at the mouth of the lake is an important business for the Indians, and Babine smoked salmon are packed for long distances to many parts of the district.

Babine range is a well-defined range unit; it is rugged and picturesque. Numerous peaks rise to elevations of 7,000 to 9,000 feet and small glaciers are of frequent occurrence. Some of the higher peaks are above the line of glaciation and show the characteristic pinnated structure and lack of glacial rounding.

The creeks and rivers rising in the range have as a rule steep gradients, so that low-level passes through the range are conspicuous by their absence. The best passes are found near the southern extremity of the range, where it flattens off and merges into the plateau country of the Central Belt.

Glaciation is well pronounced, the river and creek valleys being deepened and rounded by ice-action. In the Babine range the layer of glacial drift is thin, as subsequent erosion has removed much of it, except in the terraces of the deeper valleys. In the less mountainous plateau area to the east much of the country, except at the higher elevations, is covered with glacial clays and gravels. Outcrops of bed-rock, however, are easily obtained, except in the deeper valleys.

From Babine lake to Takla lake the trail traverses a fairly mountainous portion of the Nechako plateau of the Central Belt. The low range of mountains bounding the eastern shores of Babine lake at its northern end is not well defined and is named the Frypan range. This area may be considered as a part of the plateau area extending from Takla lake to Manson. The apparent mountainous nature of this area is in part due to Babine and Takla lakes occupying valleys which have been maturely eroded into the general uplifted Nechako plateau.

The area lying between Takla lake and Manson is also more mountainous than the typical Nechako plateau lying to the south. Physiographically this portion of the country is part of the Nechako plateau, but forms a transitional stage to the mountainous country bordering the plateau to the north. The area is rolling and broken by short isolated hills rising 1,000 to 2,000 feet above the valley-levels. To the north and west this broken country merges into more prominent mountains on the headwaters of the Omineca and Nation rivers and the Babine range to the west.

Drainage from the Babine range and Babine lake is all to the Skeena river and thence to the Pacific ocean. The waters of Takla lake flow southward and eventually reach the Pacific ocean by the Nechako and Fraser rivers.

The area between Takla lake and Manson Creek is on the Pacific-Arctic divide, as the waters of the Omineca, Manson, and Nation rivers flow into the Finlay and Parsnip rivers, and by means of the Peace and Mackenzie rivers flow northerly into the Arctic, while the Takla Lake waters and tributaries flow southerly to join the Fraser system going into the Pacific. For a mountain region the gradients of the streams are not steep, except in the Babine range and on Babine river, which flows out of Babine lake.

The great waterway formed by Stuart, Trembleur, and Takla lakes and connecting streams has a very slight fall to the south-east, which permits of easy navigation by boats and scows from Fort St. James to the Driftwood river. The streams draining to the Arctic have steeper slopes and navigation by canoe from the Peace river up the Nation, Omineca, and Manson rivers, although attempted, is somewhat hazardous.

Good timber, consisting mainly of cedar, hemlock, and spruce, occurs on the Babine range on both the slopes to the Bulkley valley and to Babine lake. East of Babine lake for a few miles there is also a good stand of timber. Easterly from this point the country has been largely burned over many years ago; it is now covered with a scrub growth of jack-pine, willows, and alders, with occasional patches of good timber.

It is not considered that much of the country traversed by the Hazelton–Manson trail is suitable for agriculture.

Geologic Features.

The Babine range consists dominantly of considerably metamorphosed volcanic and sedimentary rocks, which are as a rule closely interbedded and intercalated. Wherever the range has been closely examined these rocks are found to be members of the Hazelton formation of Jura-Cretaceous age, and it is believed the whole range is largely made up of rocks of this formation.

Intrusive into these older rocks are small bodies—dykes, sills, and small batholiths—of granitic rocks; basic, lamprophyric, dykes also occur. Igneous intrusions in the range have not been on nearly as large a scale as in the Coast range and its subsidiary mountains, but are more comparable with those of the Bulkley mountains directly to the west.

The geologic conditions are excellent for the occurrence of mineral, and in many parts of the range mineralized areas have been discovered. Descriptions of the character of the Hazelton formation and intrusive granitic rocks as exposed along the Bulkley, Skeena, and tributary valleys can be found in several reports of the Geological Survey of Canada and in previous Annual Reports of the British Columbia Department of Mines.

Between Babine lake and Takla lake the rock formations have not been studied in detail. It is probable that the Hazelton formation continues easterly for some distance. On Takla lake there is a series of sedimentary rocks, consisting of conglomerate, sandstone, shale, and some coal, which has been classified by Camsell as being of Cretaceous age. These rocks are very similar to the Skeena formation, which overlies the Hazelton formation in the Hazelton-Telkwa sections. So far as is known, Hazelton formation rocks are continuous from Babine lake until within a few miles of Takla lake, where the Cretaceous sediments come in. Associated with these sediments are some beds of volcanic rocks.

East of Takla lake the Cretaceous sediments continue for about 5 miles. At this point the schistose series of rocks, which have a widespread distribution in the Manson section, commence. These rocks, which are tentatively classed by Camsell as being of Carboniferous age, consist of a schistose complex, including limestone, argillite, chert, slate, quartzite, and some highly altered volcanic rocks. Intrusive into this series are small bodies of granite. One of these crops out on the trail beyond Silver creek and another a short distance south of Manson Creek.

Quartz veins are of common occurrence in this formation and it is believed that gold from these veins is the source of the placer gold in the different creeks in the area.

Economic Geology.

The important mineral-deposits of the Manson section so far known are the gravel-deposits in which placer gold occurs. Prospecting for gold in "The Omineca," as the section was known in the early days, commenced in 1864, but very little production was made until 1869. The area within which the greater part of the mining has taken place is scarcely more than 50 miles in its greatest diameter, and includes the upper portions of the Germansen, Omineca, and Manson rivers and their tributaries.

After a few years of mining the area was practically abandoned owing to the placer discoveries in the Cassiar district. In 1879 the Omineca again attracted attention, but in 1887 was once more nearly abandoned, and since that time has only been worked more or less intermittently for placer.

The following table shows the placer returns for this district from 1874 to 1929:—*

Year.	Amount.	Year.	Amount.
1874	$38,000	1909	$15,000
1875	32,040	1910	15,000
1876–78	*	1911	10,000
1879	36,000	1912	8,000
1880	45,800	1913	6,000
1881	39,300	1914	6,000
1882	25 330	1915	12,000
1883	21,000	1916	17,000
1884	12,000	1917	12,000
1885	16,500	1918	8,000
1886	17,600	1919	8,000
1887	13,000	1920	3,000
1888–97	*	1921	3,000
1898	15,000	1922	5,000
1899	8,600	1923	4,000
1900	12,527	1924	5,000
1901	19,100	1925	4,560
1902	40,000	1926	1,000
1903	28,000	1927	4,012
1904	11,600	1928	3,995
1905	10,000	1929 (estimated)	2,000
1906	10,000		
1907	10,000	Total	$539,964
1908	20,000		

* No returns.

The important streams that have been worked for placer are Germansen and Manson rivers, Tom, Vital, Slate, Blackjack, and Lost creeks. Much coarse gold was obtained, but generally the diggings were said to be "spotted" or irregular. Some work was also done on the Nation river and tributaries, and in recent years a few prospectors have been at work there.

In addition to placer gold in the gravels, small quantities of arquerite, a native amalgam of silver, and native copper have been recovered in the sluice-boxes. These minerals occur in greatest abundance in the Vital Creek gravels, but are of scientific interest only, as the total amount is too small to have commercial value. They are, however, valuable indicators of the possibility of lode deposits of these minerals occurring in the district, and as such they should be noted by prospectors. Platinum has been reported as occurring in the black-sand concentrates from the gravels, but this cannot be definitely verified. In any case the platinum content is not of commercial importance.

The placer-gravels of this section do not carry much black sand; in fact, the percentage of black-sand concentrate to the gravel washed is very much lower than in many placer camps. A number of samples of black sand were taken from different creeks and assayed; these were obtained by panning and by taking samples from the discarded black sand from previous sluicing operations. The assays of these samples show that the actual black sand does not contain appreciable gold or platinum values. The black sands from sluicing operations return on assay varying amounts of gold, but careful examination shows that the gold occurs as fine gold associated with black sand. Thorough cleaning of the concentrate by amalgamation will recover practically all this gold content. It is therefore considered that the black-sand content of the placer-gravels of this district is not of much commercial importance.

So far as can now be observed, the placer-gold concentrations occur principally in the present stream-gravels. This concentration is from the reworking by stream-action of glacial gravels, which were slightly auriferous. It is possible that some of the rich ground mined by the old-timers consisted of remnants of Tertiary gravels, but no evidence to support this idea is obtainable.

The beds of the streams have in part been worked, but very little prospecting of benches has been done. There is a noticeable absence of old channels having been worked. In the Cariboo the phenomenally rich concentrations of placer gold that were mined on Williams, Lightning, Keithley, and other creeks were in large part contained in old channels or present stream-beds below a point where an old channel had been robbed by the modern stream. These places represent remnants of Tertiary channels containing Tertiary gravels which were not eroded by glaciation; in most instances, however, glaciation had concealed the Tertiary gravels under a thick mantle of glacial clays and gravels.

It is quite possible that in the Manson section similar remnants of Tertiary channels will be found to exist, and this fact should be kept in mind by prospectors. The discovery of rich ground in the Cedar Creek camp shows that placer gold may be found in what has been considered an unlikely place and at a considerable elevation above the modern stream-valleys.

It is also believed that the Manson section provides good opportunities for gold-dredging. The beds of the streams that have been worked have only been mined at what are relatively rich places

* Outputs from 1925 to 1929, inclusive, added in compiling.

and low-grade ground has been left. This ground is too low grade to be worked at a profit by small-scale individual mining, but will make good "pay" for dredging. Besides the stream-beds, the benches in places are believed to carry low values. Streams that were not worked by the old-timers carry more or less values and are worth investigation with a view to outlining dredging areas.

Streams such as Kenny, Silver, Upper Manson, and others have wide flat valleys, with, in places, small lake expansions, which have never been tested for placer gold. In many places there is undoubtedly a very considerable thickness of glacial clays and gravels, which are practically barren of values. But where stream-action has to some extent concentrated these glacial gravels low-grade auriferous gravel has been formed.

The average depth of gravels along the creeks are in many instances not great and well within the dredging limit. The gravels generally do not contain large boulders and the schistose bed-rock is very suitable for dredging. Although at some distance from the railway, good enough transportation could easily be provided for taking in dredging machinery.

Summing up, it may be said that the Manson section presents favourable opportunities for investigating the placer-gravels with a view to proving suitable dredging areas.

Slate Creek.

Since 1924 the only real development-work done is the drilling of Slate creek by W. M. Ogilvie for the Consolidated Mining and Smelting Company of Canada. While in conversation with Mr. Ogilvie, although no very definite statements were made regarding yardage and values, I was given to understand that the values were high, but that there was not sufficient yardage to justify the expense of building a ditch and equipping the ground with an hydraulic plant.

Above the point where the present channel of Slate creek empties into Manson creek there are three distinct channels. These cut the divide between the two creeks and undoubtedly at different periods Slate creek flowed through these channels. This would probably account for the rich spots on Manson creek just below where these channels were cut by the creek, and it is quite possible, should the company prospect or drill these three channels, that it would increase the yardage to a point where it would justify them in installing a ditch and plant.

Manson Creek.

R. H. Fleming and partners have taken in a small pump to be operated by an Evinrude engine and had just started to prospect when I visited the creek.

Germansen Creek.

Ah Lock had rather a poor year on account of the unusually dry season. McCorkell Bros. have acquired several leases on the upper end of the creek, above the point at which it was worked in the early days. About 1½ miles of this ground should be good. The old-timers made several efforts to work the ground by wing-damming and shovelling into boxes, but their efforts *did not meet with any very great results, principally on account of the heavy and sudden rains* which would wash out their wing-dams and sluices. McCorkell Bros. intend to install a drag-line scraper which works on a boom. Should it be possible to work the ground dry by this method, and if they have a proper washing-machine and some device for getting rid of the tailings, their operations may prove quite successful.

Vital Creek.

Lee Tong and associates are the only operators on this creek. Heretofore they have worked by ground-sluicing and a small hydraulic plant. Owing to the height of the clay-bank and the small amount of water available, their operations were not successful during the last year and they have devoted the summer of 1929 to getting ready to work the ground by drifting methods. They have taken as a partner Sing Cow, of Barkerville, who is a first-class underground man. Practically all summer was spent in doing dead-work in order to get the property in shape for drift-mining. No production was made during 1929.

On Tom creek W. McCormick is still looking for the outlet of the old channel. There was one other prospector prospecting for placer in the Omineca. As I failed to locate him, I cannot state whether he has met with any success.

NATION RIVER SECTION.

This section was not visited during the year. George Snell reports that he and his partners have half a mile on Philip creek and 3½ miles on Nation river which show exceptionally good values and claim that it could be dredged with every prospect of success. The transportation

facilities in this section are very inadequate at present. The Fort St. James–Manson Creek road, now under construction, will cross the Nation river above these leases and will provide some relief for this section and will help in solving the difficulties of Snell and partners.

In the Annual Report for 1924, John D. Galloway (then Resident Engineer, No. 2 District) noted that there was a very considerable area in this section that would lend itself to dredging, providing that there were adequate means of transportation, in order that drills may be taken in for testing purposes. At the present time there is under construction a road from Fort St. James to Manson Creek, and until this road is completed there is very little prospect of securing capital for development-work in this district.

COMMENTS ON REPORT OF C. W. MOORE.

By Douglas Lay, Resident Mining Engineer.

For some considerable time past the view has been expressed in the Annual Reports of the Minister of Mines, in the face of a declining placer-output, that field-study indicates a more hopeful outlook than that which might be inferred by mere scrutiny of statistics concerning the output. Such a view is very considerably strengthened by the investigations carried out by C. W. Moore in 1929, appointed for the purpose. His report is of great importance and should be closely studied by all interested. The purport of these remarks is to summarize the most important features of that report and to direct attention to certain facts which have an important bearing on placer occurrence in this district.

In some cases the report directs attention to specific properties or dredging areas, such, for example, as Drummond flat (hydraulic) and Saw Mill flat (possible dredging area), which offer very clear-cut and definite objectives to the initiation of mining enterprise. In other cases the report mentions certain old and possibly gold-bearing channels many miles in length which offer a field for much detailed investigation; such, for example, as the Pre-Glacial Horsefly river and the ancient buried channel parallel to the Willow river, cut by Dragon creek and other creeks north of this.

Among hydraulic possibilities of major importance, C. W. Moore places Drummond flat, and he is also impressed with the Trehouse hydraulic on Cunningham creek. The property of Morehead Mining Syndicate also possesses the earmarks of magnitude if an adequate supply of water can be procured. Hixon creek, in the Fort George section, also merits close study.

As to a promising field for prospecting, C. W. Moore stresses the importance of the region between Willow river and Fraser river, pointed out in the 1928 Annual Report.

It is perhaps germane to remark that, if success is to be met with in prospecting for placer in a glaciated country, knowledge of elementary glacial geology is essential, whether such has been acquired through long practical experience and has become instinctive, or through study.

There is every reason to suppose that the decline of the placer-output is due in large measure to the lack of interest shown in this branch of the mining industry by capital, and it is hoped that the investigation during 1929 by the Department will lead to a revival. Signs of an awakening of interest was manifested in the Horsefly section during the year. This section, with its remarkable potpourri of mineral occurrences, has probably been less studied than other sections of the Cariboo, but gives promise of growing in importance.

The broad basis upon which all placer-gold field-study rests in a glaciated country is that of the location of the Pre-Glacial and gold-bearing drainage systems. From the commercial point of view this is of the utmost importance, and as a preliminary it is desirable to establish the approximate position, at any rate, of any Pre-Glacial master-drainage systems. Pre-Glacial channels may or may not be markedly different from those occupied by the present drainage, and their importance lies not only by reason of their possible gold content in situ, but because, by more modern stream-piracy, they may be the source of gold on more modern creeks which cross their course and which have robbed and reconcentrated a portion of their gold contents. While careful study by the experienced observer may indicate with great exactitude the probable course of a gold-bearing channel, values and yardage are largely unknown quantities,

and the final appeal must be to the Keystone drill before heavy expenditure on plant for the recovery of the gold is justified.

As the result of investigation in the Cariboo and Quesnel Mining Divisions to date, the existence of three Pre-Glacial master-drainage systems have been established at one or more points in their respective courses. These are:—

(1.) The Pre-Glacial Fraser river.

(2.) The Pre-Glacial South fork of the Quesnel river.

(3.) The Pre-Glacial Horsefly river.

Of these, the Pre-Glacial South fork of the Quesnel river is of outstanding importance and has originated the important placer deposits exemplified in the *Bullion* mine, the property of Morehead Mining Syndicate, and Drummond flat. The importance of the other two Pre-Glacial rivers has not yet been fully gauged, but they both merit much further investigation.

(1.) Pre-Glacial Fraser river. In Pre-Glacial times it seems likely that there were two Fraser rivers—one flowing north-west in the Rocky Mountain trench, coinciding with the present upper reaches of the Fraser, but continuing north-westwards in the Rocky Mountain trench in the channels now occupied by the Crooked, Pack, and Parsnip rivers, and the other having its source somewhere north of Prince George, and flowing approximately due south, as has been indicated by authorities. It is now apparent that this southerly flowing and gold-bearing Pre-Glacial Fraser river is cut by the present Fraser river in the Cottonwood canyon above Quesnel, where is situated the *Tertiary* mine (refer to 1927 Annual Report). This channel has apparently been traced northwards by D. D. Fraser, who this year has been sinking a shaft and drilling on Canyon creek close to the main highway, at a point about 20 miles north of the *Tertiary* mine. He is endeavouring to trace this channel northwards, in the hope that it may be picked up in the vicinity of the known gold-bearing terrain cut by Hixon and Government creeks.

(2.) Pre-Glacial South fork of the Quesnel river. This offers more apparently obvious commercial possibilities than the other two mentioned. There are several different channels. Whether these were occupied simultaneously or successively by the ancient stream is not clear, nor is this point of any apparent importance. One channel, the shortest, is that of the *Bullion* mine. Another followed the depression now occupied by Long and Little lakes and Morehead creeks. On this is the property of the Morehead Mining Syndicate (*see* 1927 Annual Report, with map), largely a virgin property possessing an appearance of some size. Still a third phase of this ancient river branched from that just described near the upper reaches of Morehead creek, which cut through it, exposing the property of S. Prior (*see* 1927 Annual Report) and apparently joining the Quesnel river at Drummond flat, there constituting one of the major hydraulic possibilities. In fact, it is considered by C. W. Moore as being of outstanding importance.

(3.) The Pre-Glacial Horsefly river. Of this there is not a great deal of positive evidence. Its gravels, where exposed at the *Miocene* mine, Horsefly, and near by at Star and Triplet lakes, and on Moffat creek, indicate a stream of great age and proportions. It affords the only known instance, probably, of a residual gravel (that is, a gravel composed almost wholly of one resistant constituent, in this case quartz) in the Cariboo district, and its course is extremely difficult to follow owing to the fact that it is probably older than the surrounding volcanic rocks and is probably capped by them in places. Its course is largely a matter of conjecture, but evidence indicates that the Pre-Glacial Horsefly river had two branches, one following perhaps more or less the course of the present Horsefly river as far as the settlement of Horsefly, and the other a tributary north of this draining in part the area now drained by Moffat creek. These two streams united at or about Horsefly to flow through the Beaver valley into the Quesnel river at Beavermouth: from that point it followed more or less the course of the present Quesnel river, then flowed westerly in the vicinity of Dragon lake, and originated the rich bar on the Fraser river about 7 miles below the town of Quesnel.

The tracing of this ancient river in the vicinity of the settlement of Horsefly has quite likely an important bearing on gold distribution in the Horsefly section, and quite possibly the deposits of Ward's Horsefly and Hobson's Horsefly originated from stream-piracy of this ancient river. Keystone-drilling in the vicinity of Star and Triplet lakes and on Moffat creek would doubtless throw much light on this matter. Further information on this subject will be found in the Annual Reports for 1927, 1928, 1902, and 1920.

Other important ancient channels, indicated by C. W. Moore, are:—

(1.) Upper Antler creek, fully described in the report.

(2.) An ancient channel west of the Willow river, of considerable length, cut by Dragon creek and various creeks north of this to Archer creek.

(3.) A channel running from Little Swift river to a point on Lightning creek in the vicinity of the old *Bonanza* mine, on which end are the leases of W. C. Slade.

(4.) The old channels of Slate creek in the Manson section, Omineca Mining Division.

Among possible dredging areas in the Cariboo and Quesnel Mining Divisions mentioned are:—

(1.) Saw Mill flat.

(2.) (Big) Valley creek (*see also* 1926 Annual Report).

(3.) Willow river, fully described in the report.

(4.) Lower Swift river and lower Lightning creek.

(5.) Horsefly river.

To which might be added Milk Ranch Pass meadows, which appear to merit some preliminary investigation in view of proximity to Lightning creek. Further drilling between Shepherd creek and 8-Mile lake also seems justified. There seems a possibility of a gold run between the property of R. D. Rees and 8-Mile lake.

In the Omineca Mining Division the following are mentioned as areas having dredging possibilities:—

(1.) The Manson section proper (*see also* Annual Reports for 1924 and 1927).

(2.) The Nation river and tributary, Philip creek.

(3.) On Buck river and Bob creek, near Houston.

Placer on Bob creek attracted attention some years ago and during 1929 some promising prospect-pits were sunk at the mouth of Bob creek, but water prevented anything but rim-rock being reached. On Buck river below the mouth of this creek promising values are also said to have been obtained. The source of the gold on Bob creek appears to be the large "Porphyry Dyke," fully described in the Annual Reports for 1916 and 1928. Some preliminary drilling here seems warranted.

The investigations of C. W. Moore for the Department were primarily directed to new areas and points of particular promise, with the view of securing the development of such. Sight must not, however, be lost of the fact that well-established operations are likely to contribute materially to the future placer-output. In this class may be mentioned the Lowhee Mining Company, Limited, the most important contributor to the placer-output in 1929. The future of Cedar creek is largely an unknown quantity, but the operations of B. Boe in 1929 were gratifying.

Finally, it should be borne in mind that, as in the past so in the future, the sum total of the contributions of the individual small placer-owner-operators to the placer-output is likely to be very material. This class consists chiefly of small hydraulics. The owners are men who, for the most part, thoroughly understand their business and bring to bear upon it the experience of many years. Their efforts, individual and collective, are of real assistance to the placer-mining industry and merit appreciative recognition.

PEACE RIVER MINING DIVISION.

NOTES BY JOHN D. GALLOWAY, PROVINCIAL MINERALOGIST.

In 1923 an examination of the Peace River Mining Division was made by the writer and a fairly full account of the area and its mining possibilities is given in the Annual Report for that year. The following general statement on placer-mining is contained in that report:—

"PLACER-MINING.

"Varying amounts of placer gold are found in the gravels of the Parsnip, Finlay, and Peace rivers and their tributaries. Some placer platinum occurs with the gold, but as a rule the amount is very considerably less than the gold and in many places it is practically negligible. The gold occurring in these gravels is always fine and some of it may be classified as 'flour' gold. It is quite evident that this fine gold has not had a local source, but has come long distances from the headwaters of the rivers. The deposits in which this gold in appreciable

quantity is found are typical bar concentrations; in some cases these bars are the present ones in the streams, while in others they are old bars forming flats and low terraces along the valleys. The gold has been transported by glacial action and also by normal fluviatile action in both Pleistocene and Recent time. In the working-over of the clays, sands, and gravels in the stream-valleys the gold becomes concentrated at suitable places and a deposit is formed which is relatively much richer in gold than the bulk of the material. This action is going on continually, so that new auriferous bars are being formed in the rivers. In deposits of this nature only the upper parts are enriched and as a rule there is little or no concentration of gold on bed-rock.

"Small-scale mining of bars and flats along these rivers has been carried on for years. In this work rockers are used and in some places a small creek supplies water for ground-sluicing and washing. In a few instances power-pumps have been used to supply water from the river for the sluice and the gravel mined by hand. As the gold is fine and flaky, care has to be taken in saving it, for much of it has a tendency to float and is thereby lost. The yearly production of gold from this hand-mining is, however, small, and as a rule no record of it is obtainable.

"It has been considered by many that some of the gravel flats along the Peace river would pay to work by large-scale methods, such as dredging of some type. Two such attempts have been made and these will now be described."

The two large-scale mining enterprises referred to were the Peace River Gold Dredging Company, using a drag-line scraper and accessory equipment at Branham flat on the Peace river, and the operation of a single-bucket type dredge at Fort St. John. Both these operations were failures and nothing further has been done.

The most important deposit worked in this area was Pete Toy bar (this is in Omineca Division, not far from the boundary-line of Peace River Division), which yielded fair returns to individual efforts for some time. The following note is from R. G. McConnell's report on the Finlay and Omineca rivers in the Annual Report for 1894, Geological Survey of Canada:—

"The first discovery of gold in the Peace River country was made on the Parsnip, about 20 miles above its mouth, by Bill Cust in 1861. In the following year Pete Toy bar on the Finlay, a few miles below the Omineca, was found, and for some time proved wonderfully productive, the yield amounting to about $50 per day to the man."

In recent years small-scale individual work has been carried on at various places and some testing has been carried out on bars and flats with the objective of proving sufficient pay-gravels for dredging.

CENTRAL MINERAL SURVEY DISTRICT (No. 3).

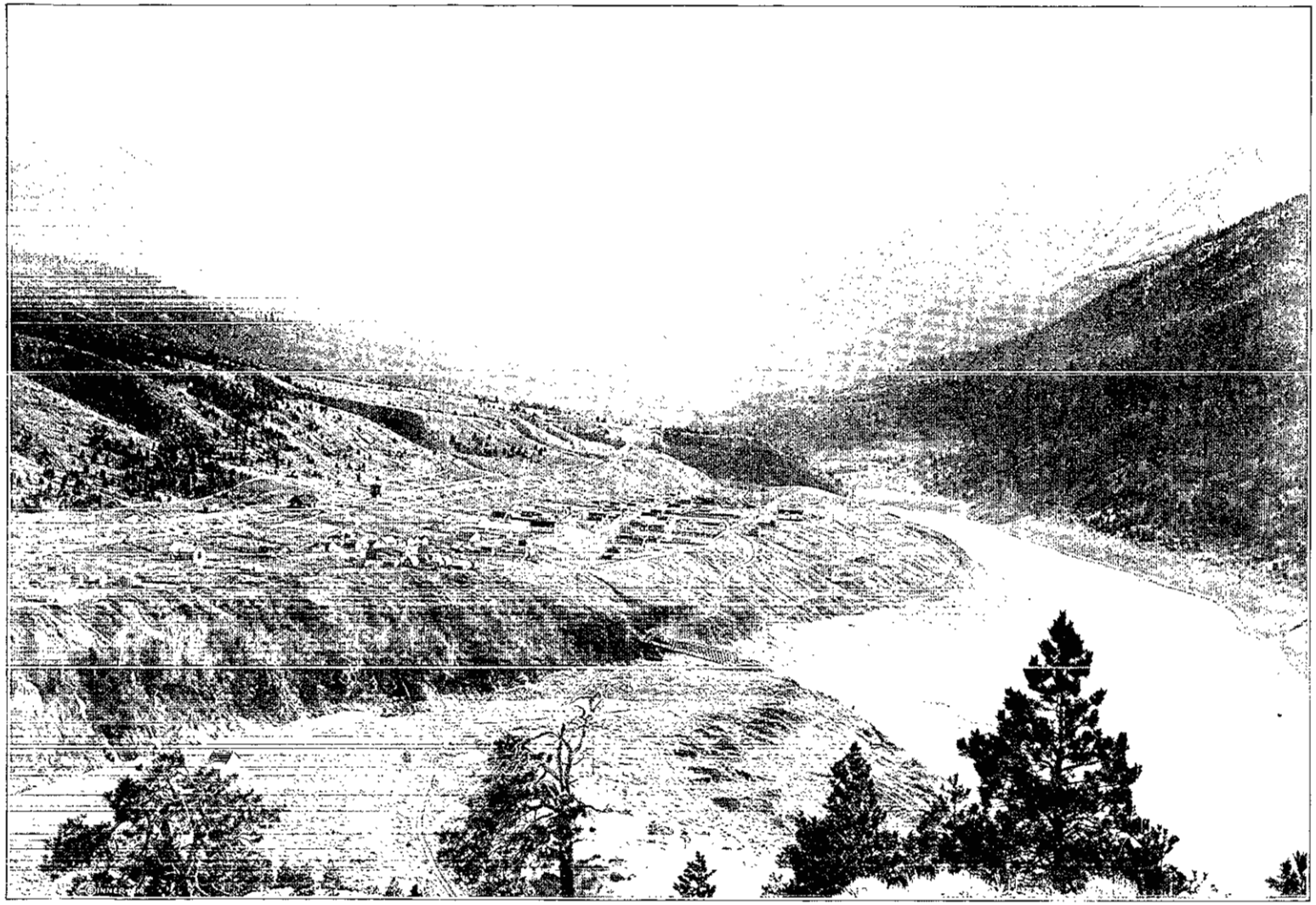
NOTES BY JOHN D. GALLOWAY, PROVINCIAL MINERALOGIST.

The Central District includes the seven Mining Divisions of Kamloops, Clinton, Lillooet, Ashcroft, Vernon, Nicola, and Yale. The district covers an area of approximately 44,000 square miles, or, roughly, one-third of the territory of the mainland of southern British Columbia, lying between the 53rd and 49th parallels of north latitude.

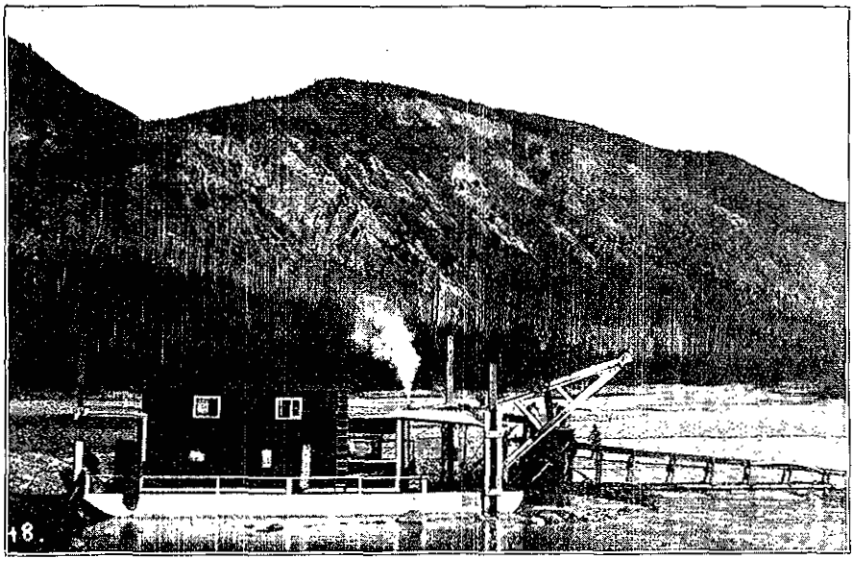
Active placer-mining in the Province commenced in this district with the discovery of gold on the Thompson river in 1857, and shortly after many creeks and rivers were being prospected and mined. Placer operations have been carried on ever since in the district, but the various camps were not as spectacular as the Cariboo, Cassiar, and Atlin diggings. In the aggregate, it is estimated that $6,000,000 worth of placer gold has been produced by the whole district. It is impossible to arrive at exact figures, through lack of official records, but it is believed this estimate is approximately correct.

The district is in the heart of the Central Belt, but the most important deposits worked have not been original placers formed close to the source of the gold. Many rich bar deposits have, however, been worked; these represent reconcentrations of gravels containing small amounts of fine gold that have been transported long distances by glaciation and stream-action.

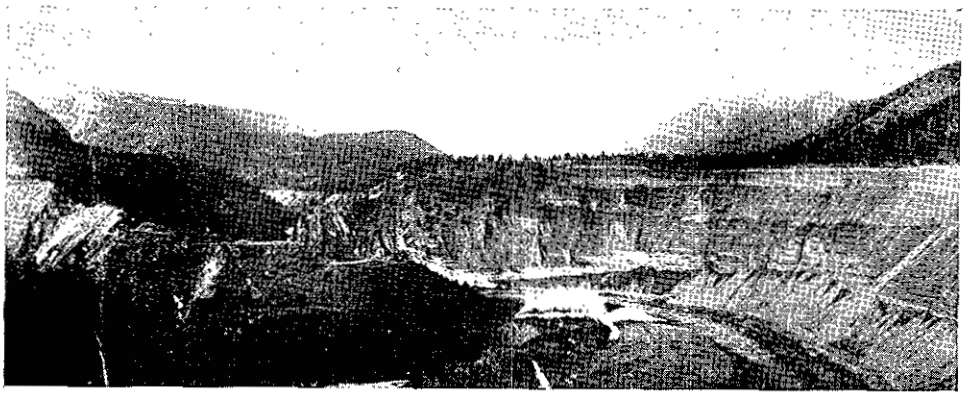
Numerous rich bars were worked on the Fraser and Thompson rivers, such as Cornish, Emory, Hill, Baxter, Foster, French, and Mormon, the latter being above Lillooet. Those below Yale carried no "scale" gold at all. These deposits are as a rule shallow and by the nature of their origin do not extend to bed-rock. It has been thought by many that rich values should occur on bed-rock in the immediate vicinity of these bar deposits, and various unsuccessful enter-



Lytton—Looking down Fraser River at Mouth of Thompson River. Scene of the Gold Discovies of 1857.



Fraser River—Dredging near Lytton.



Bridge River—Hydraulic below Canyon.

prises have been based on this erroneous theory. It is quite evident that, as a whole, the gravels of these large rivers do not carry an appreciable economic gold content, but that only where physical and topographic conditions have been suitable are the gravels concentrated into workable placer deposits. Careful testing should therefore precede any large-scale attempt—such as dredging—to work these gravels.

In the placer literature given in the bibliography at the end of this bulletin there are many descriptions and references to the placer deposits of this district, so that only a brief further account will be given.

The Fraser River and Thompson River bars were worked by thousands of miners who made the original rush in 1858–59. Some of these men pushed on, examining every part of the bars and banks, and, in the belief that coarse gold lay in the ground farther from the rivers, did a large amount of sluicing which resulted in some coarse gold being found in small quantities. Harrison and Bridge rivers also yielded some coarse gold.

Those not winning fortunes in the lower Fraser River area either returned to California or went on, finally opening the Cariboo and Quesnel areas, to which the Cariboo road was completed in 1863.

CHERRY CREEK.

Cherry creek, in Vernon Mining Division, has been mined intermittently for placer gold for many years. An excellent report on this occurrence of placer-gravels was made by G. M. Dawson in the Report of Progress of the Geological Survey for 1877. Lengthy extracts from this report are quoted in the Annual Report for 1925. The following paragraphs from Dawson's report are interesting as showing his conception of the geologic features:—

"Cherry creek, a tributary of the Shuswap river, has yielded a considerable quantity of gold. The portion of the creek which has proved remunerative is that part of the South fork extending for about 3½ miles above its junction with the North fork. The actual valley of the stream is here a narrow depression about 225 feet in depth, which scores the bottom of a broadly rounded valley, beyond which the mountains rise. This valley must have existed and carried a stream similar to the present in pre-glacial times, and it appears highly probable that the pre-glacial stream occupied, at least in part, the actual river-course now pursued by its successor. When the glacier-ice, which doubtless extended thus far from the axis of the Gold range, retreated, leaving the valley blocked with morainal material and boulder-clay due to action at this time, or in that immediately following it, the stream, again taking its way down the valley, began anew to excavate its bed. The soft materials were rapidly removed, the stream at first changing its bed frequently, but at last subsiding into the deep narrow valley in which it now flows. In some places this would appear to be identical with the original valley, while in others it is probable that a new course has been cut out in the rocky floor of the wide valley, leaving the old channel yet buried with drift on one side of the present. The canyons with steep rocky sides may represent such places, in which the stream has abandoned the pre-glacial channel and cut for itself a more direct course across some projecting rocky point. Such is a theoretical account of the Cherry Creek valley, which is, I believe, borne out by the facts, and, if so, becomes available as a valuable clue in tracing out the gold-deposits.

"In the progress of hydraulic mining, which has been practised on a small scale at Cherry creek, interesting sections of the lower part of the drift-deposits in that region, lying within the western border of the mountains of the Gold range, have been formed. From these it would appear that the gold occurs in paying quantity in pre-glacial gravels in the bottom of the valley of the stream. This accords with the position of the rich gravels of the Cariboo district, which in most cases would also appear to date from a time anterior to the glacial period."

HOBSON (CARIBOO) MINING COMPANY.*

This property is situated on Hobson creek, which flows into Hobson lake, in Kamloops Mining Division. It is reached by boat to the head of Quesnel lake from Likely, then by wagon-road 6 miles across the portage between Quesnel and Hobson lakes, then 5 miles by boat on Hobson lake to the mouth of Hobson creek, and finally by trail 1¼ miles up Hobson creek to the property. During 1929 the company improved the wagon-road and trail serving the property.

The history of this property as told by some of the old-timers in that part of the country is as follows:—

* Report by C. W. Moore.

In the summer of 1909 T. Drummond went in with a few men and built a dam and put the creek through a flume about 400 feet long in order to dry the creek-bed, which he did successfully. He then began to sluice, getting some coarse gold from below and under a very big boulder, some of the pieces being valued at $5. Apparently this was all the work that was done, but from a financial standpoint it was not a success, so he discontinued work.

From all accounts, nothing further was done until thirteen years ago, when a tunnel was run under the bank on the east side of the creek about 300 feet below Drummond's dam, and a few feet above the rock where Drummond was supposed to have found the gold. Morris Davis was not at the property while I was there, but his son informed me that the tunnel was 118 feet long. Mr. Davis, whom I saw in Likely, says the gravel from the tunnel went 65 cents a cubic yard, and that a blind shaft was sunk 9 feet deep at the end that went $6 a cubic yard. I could not make an estimate of the average values as they could not give the size of the tunnel or shaft. My aneroid reading showed 200 feet of glacial drift over the tunnel. This bank of drift has fallen down over the mouth of the tunnel, making it impossible to form an opinion as to a possibility of a channel being there.

In conversation with Mr. Davis before I left Likely for the property, he considered this was sufficient prospecting to justify the expense of building the road and putting on the hydraulic plant and other equipment. Hobson creek is fed by numerous small glaciers, making it ideal for hydraulicking during the dry season. It is claimed that 300 feet of pressure can be obtained with 3 miles of ditch. At the time a survey party was locating a ditch-line.

It is apparent that the Hobson Creek deposit is glacial and the concentration will likely be in spots. With the heavy grade and large flow of water, the fine gold, if any, will have been washed down to the delta at the mouth of the creek, leaving only the coarse gold or nuggets. It is difficult to say anything about the dump for the tailings until there is more information to be had on the depth of the supposed channel under the hill.

My opinion is that the Hobson Creek deposits are glacial and the concentration is local and in spots, also that there has not been sufficient prospecting done to justify the expenditure of $6,000 in building a road to reach the property. Much further testing should be carried out before it can be assumed that the deposit will pay to work as an hydraulic.

SIMILKAMEEN MINING DIVISION.

HISTORICAL SUMMARY BY HERBERT CARMICHAEL.

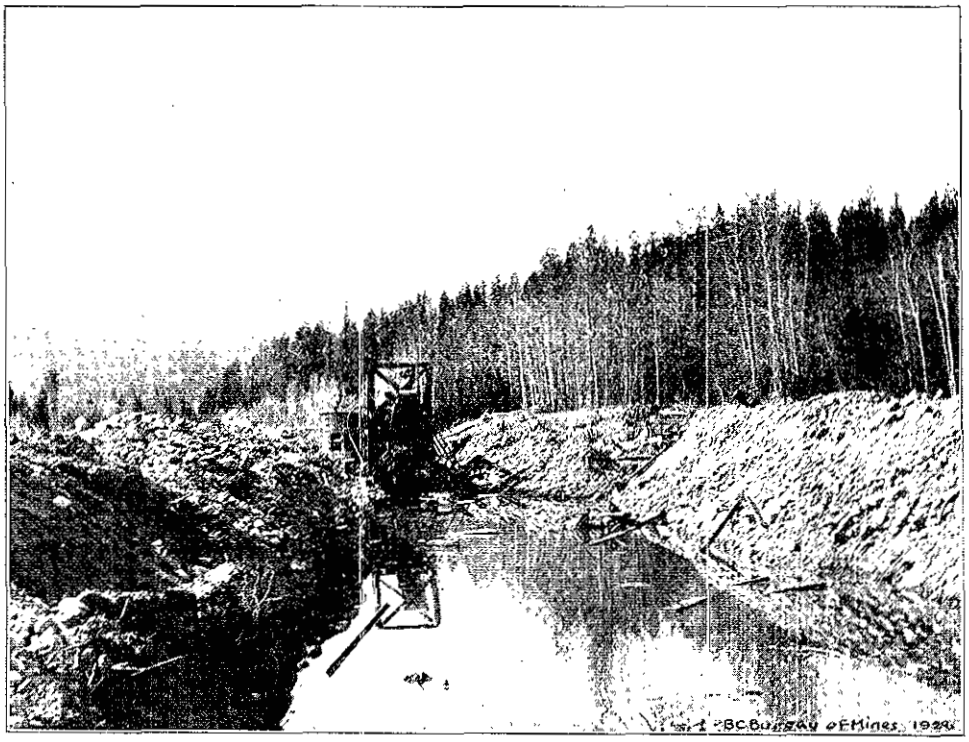
SIMILKAMEEN RIVER.

George B. McClellan first found gold in this river in 1853, but only in small amounts, and it was not until 1860 that regular placer-mining was carried on, the miners coming from the American side. The excitement of the rich diggings in Cariboo seems to have attracted most, if not all, of the miners and to have left this river deserted, as there is no mention of the district until placer gold was discovered on Granite creek, a tributary of the Similkameen, by John Chance in 1885.

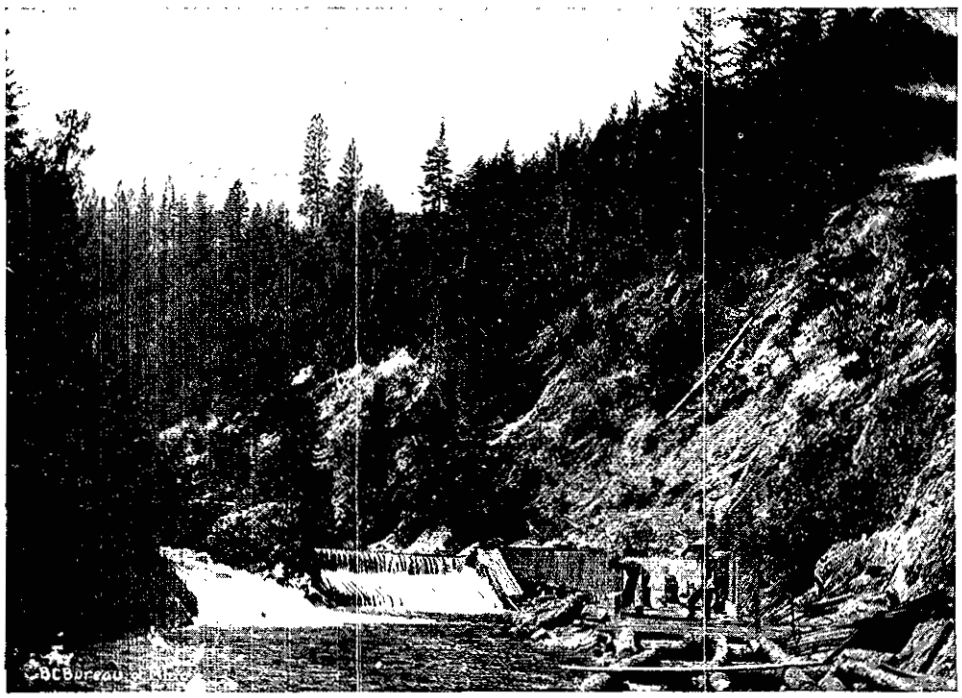
In October of that year T. Elwyn, Deputy Provincial Secretary, made a special trip into the district and reported to the Minister of Mines in November, 1885. He says in his report: "Granite creek is a tributary of the Tulameen or North fork of the Similkameen, and falls into that river on its right bank, 12 miles above its junction with the South Similkameen at Princeton, perhaps better known as Vermilion Forks. From near the mouth of the creek to a point something over half a mile below the forks, a distance of 4 miles, no claim which has been tested on both sides of the bed of the stream has failed to yield good returns, and it may safely be said that the ground for that distance will average over an ounce a day to the hand.

"On October 31st, 1885, on lower Granite creek, there were sixty-two companies owning creek claims, averaging probably 300 feet to the company who were working. The gold admitted to have been taken out by the several white and Chinese companies from July 5th to October 31st amounts to the large sum of $90,000, which, considering the great loss of time caused by the freshet and the difficulty of obtaining lumber for sluice-boxes, is a creditable showing.

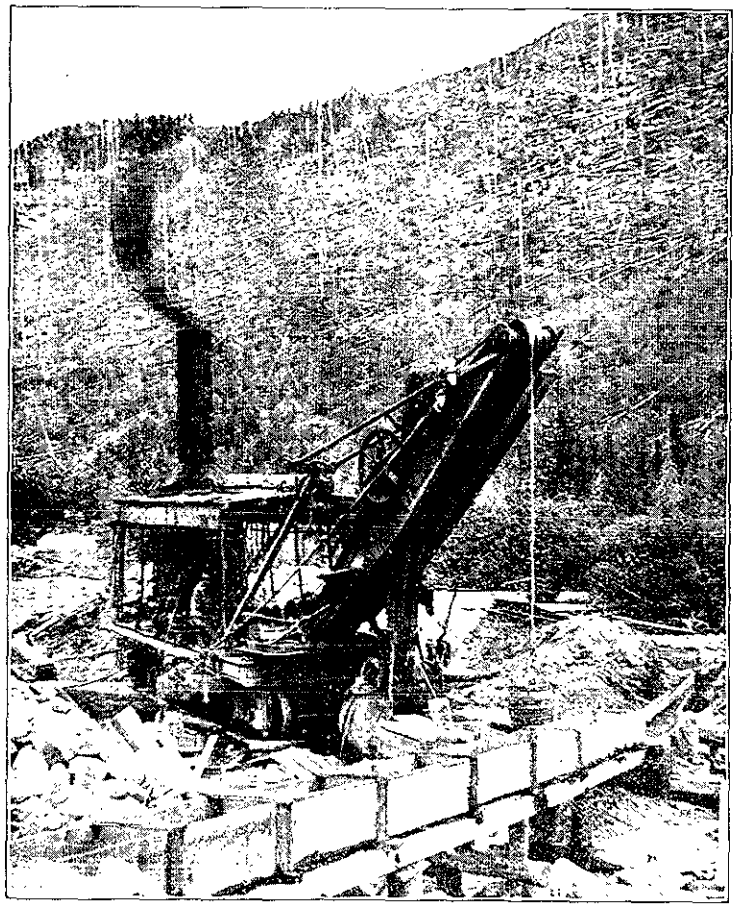
"Chinese have for years been mining on the banks of the Tulameen many miles above the mouth of Granite creek.



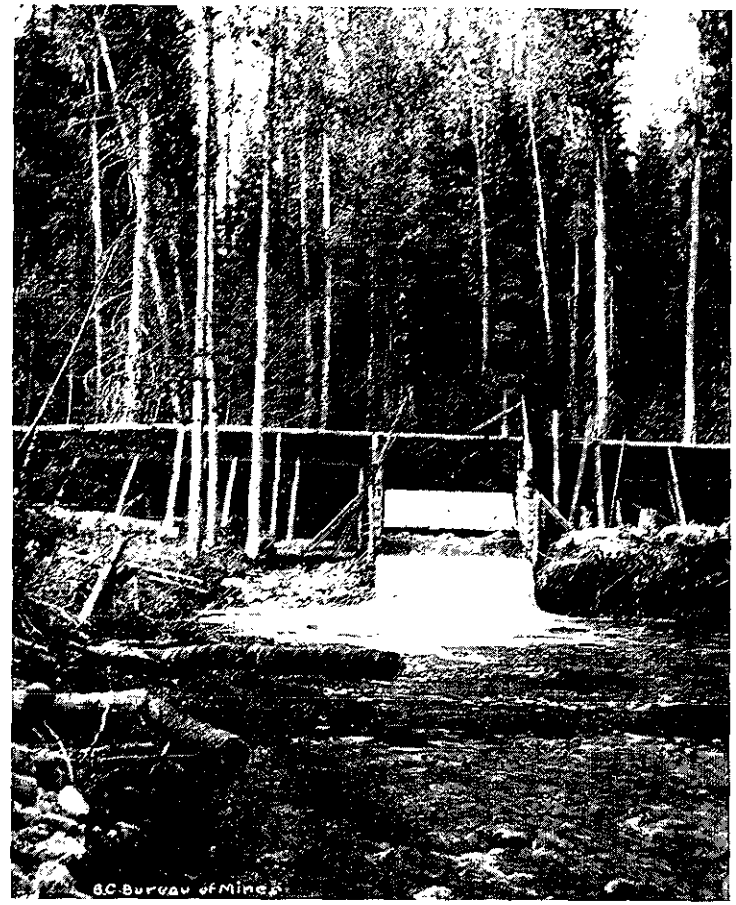
Similkameen River—Steam-shovel on Placer-ground.



Tulameen River—Diverting Stream by Dam and Flume.



Perry Creek—Steam-shovel in Placer-gravels.



Rock Creek—Dam and Boomer for sluicing Gravels.

"Chinese have been passing the mouth of Granite creek for years, and their failure to find out its value goes far to prove the assertion, often made, that they never prospect in any true sense of the word."

As to the yields on this creek, Mr. Elwyn says that Messrs. Briggs and Bromley took out $400 in an afternoon with a rocker, and the Point Company washed up 45 oz., or over $750, as the result of the labour of eight men for thirty hours.

It is noteworthy that platinum was first discovered in British Columbia in Granite creek, and in fact that creek has given by far the largest yield of platinum in the Province, the returns in 1891 being $10,000 worth of platinum. Here is the report of the discovery by Mr. Elwyn: "There is associated with the gold on Granite creek a very hard, heavy, and whitish metal which is probably platinum or iridium, perhaps a mixture of both."

The origin of the platinum in the placers of the Tulameen section has been carefully investigated. In 1900 J. F. Kemp spent three months in the area examining the gold-platinum placers and investigating the source of the platinum. His report is contained in Bulletin No. 193, United States Geological Survey. In it he definitely shows that the platinum originated in the belt of peridotite rocks cut by the Tulameen river and its tributaries, being mainly contained as irregularly distributed minute grains in the magmatic segregations rich in chromite occurring in this belt of rocks.

In 1909 and 1910 the Tulameen district was geologically examined and mapped by Charles Camsell, his report appearing as Memoir No. 25 of the Geological Survey of Canada. In this report Camsell further discusses the origin of the platinum and endorses the opinion of Kemp that it originated in the peridotite rocks. The platiniferous rocks of the Tulameen map areas were also studied by Eugene Poitevin, his report appearing in the Summary Report, 1923, Part A, Geological Survey of Canada. He estimated the total yield of platinum in the district to that date as 20,000 oz.

The yield of gold for 1885 is reported as follows:—

Granite creek	$54,000
Tulameen river	60,000
Similkameen river	3,500
Total	$117,500

In the next year or two several other small creeks were discovered to have gold, but none as good as the three just mentioned.

The yield for these was as follows:—

1886	$203,000
1887	128,000*
1888	96,000
1889	46,000
1890	49,450

* Platinum 2,000 oz., which sold for 50 cents an ounce.

From the year 1890 on, the usual transition from small-scale placers to hydraulics took place, the remaining small operations passing into the hands of Chinese. In 1895 flumes, ditches, and pipe-lines were constructed to work the benches, one ditch being 8,910 feet long and the flume 4,026 feet, the main pipe being 30 inches in diameter and 848 feet long.

From 1890 to 1898 the creeks in this district were worked with varying success, but the output gradually diminished until in 1898 it was $7,560. Writing in 1889, the Gold Commissioner, referring to the first years of the camp, says: "No official record has been kept of the gold obtained from this Division since its first occupation, but it must foot up to a large amount. This Division has produced some of the largest nuggets found in the Province. In 1886 two pieces were taken from Bear creek worth $400 and $415 respectively, and the following year a Chinaman unearthed a nugget on Boulder creek of the value of $900."

In 1898 the only important operations were either drifting for old channels or preparing for hydraulicking.

During the fall of 1901 Wm. Fleet Robertson, Provincial Mineralogist, visited the district. He reports very little hydraulic or any form of placer-mining, his time being principally devoted

to the lode mines. In 1911 there was a revival of interest in placer-mining. Platinum Goldfields, Limited, prospected ground on the Tulameen river and another company prospected Slate creek, which produced a considerable amount of platinum in the early days. J. D. Galloway, Assistant Mineralogist, visited the district in 1913, devoting most of his time to lode-mining. He states that only a few Chinamen were working on the Tulameen, and on Granite a placer lease was being prospected by Lambert & Stewart. In 1915 Wm. M. Brewer made a report for the Department of Mines, in which he describes Lambert & Stewart's hydraulic mine as being successful that year in making a clean-up of $2,000.

A drag-line scraper was tried on some ground in 1923, but was not successful owing to the number of boulders. There was a revival in both hydraulic and deep placer-mining in 1924, due largely to the higher price of platinum, which had risen to $115 an ounce; the output was $2,100. Next year ground was being tested for dredging and not so much productive work was done, as the yield of platinum fell to $1,000.

In 1926 a spectacular find was made by Garnet Sootheran on his placer lease about half a mile below Eagle creek, on the west side of the Tulameen river. He discovered a pay-streak along the side of and under the boulder-dumps of some old placer-diggings; this ran about an ounce of crude platinum to the cubic yard. Several other operators started to try out some of the old deep diggings. The next year the Resident Engineer reported a continued improvement in the outlook for placer-mining, though high water prevented Sootheran from working his lease; other operators produced over 15,000 oz. of crude platinum and gold.

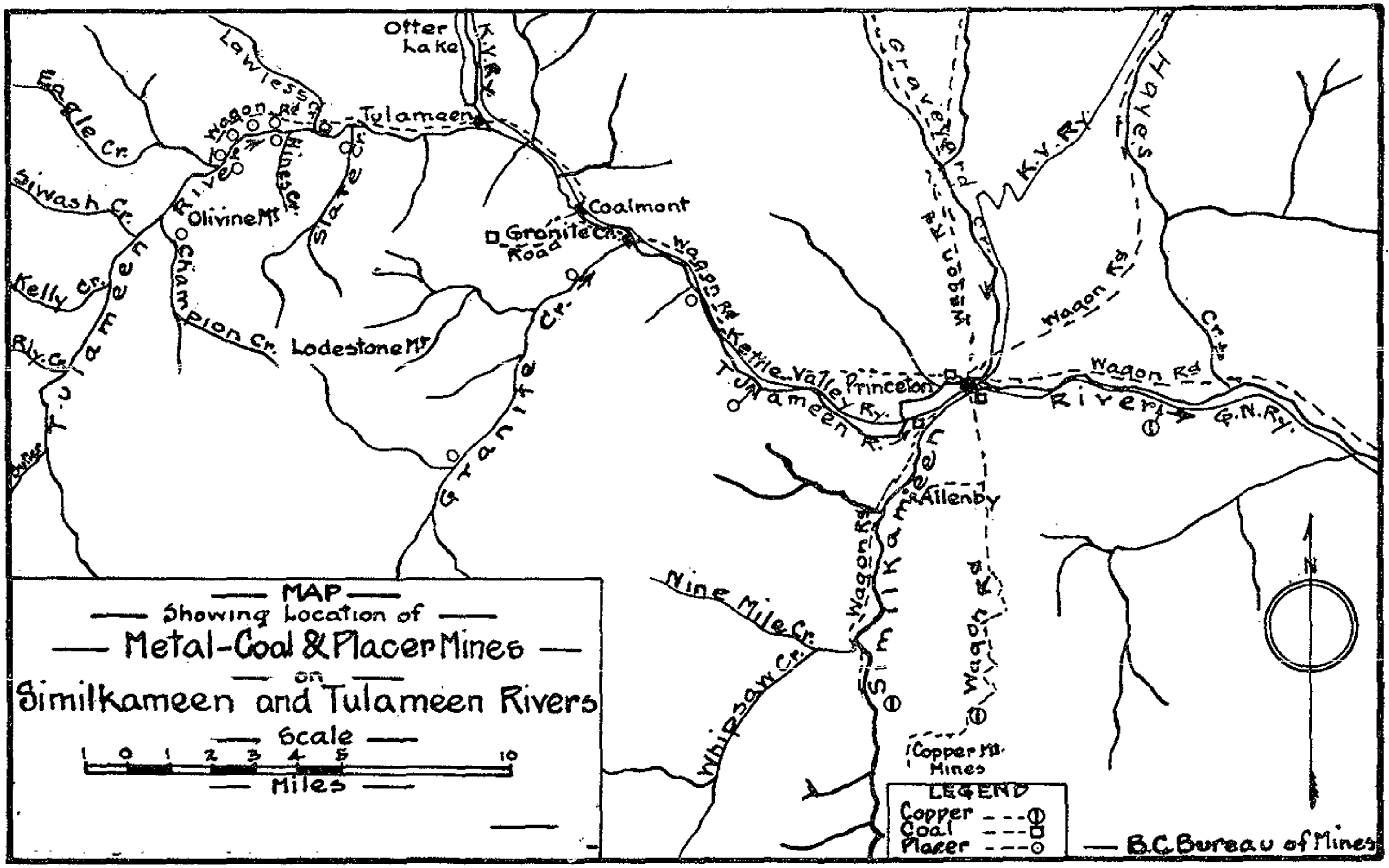
Prospecting occupied the attention of most of the companies during 1928, and it was found that testing of ground by sinking shafts and pumping was not successful on account of the water which had to be handled, so churn-drilling has been used instead. A gas electric shovel was tried on the Similkameen river, but the returns were not high enough to warrant the operation of this type of machine. The results from deep prospecting in 1929 have been encouraging in several directions.

PLACER CONDITIONS IN 1929.

REPORT BY P. B. FREELAND, RESIDENT MINING ENGINEER.

Several efforts have been and are being made from time to time to mine the bench-gravels on the Tulameen river. In the past every operation was commenced with the insurmountable handicap of not knowing the depth to bed-rock or the values to the cubic yard of the estimated yardage. It is well known that the old channels are sinuous and their location must be followed if success is to result. Most of these old channels are buried deep beneath glacial gravels which contain "spotty" values in gold and platinum. Along the edge of these moraines, next to the stream or water action, a gradual concentration of values takes place, which is apt to lead the unwary into the belief that the whole mass is similarly valuable. It is vitally necessary to churn-drill before installing machinery, and this has not been done, with the result that failure has followed. Close to Princeton some years ago a drilling campaign was financed by English capital with the idea of dredging the river-flats. Some values were found in channels, too narrow for this type of machine, but as a whole the gravels were too low grade to be profitable. This drilling was done about 22 miles from what is considered as the source of the gold and platinum, and it seems very likely that the values found were the result of reconcentration from glacial moraines rather than from direct stream-action. In any case the location appeared to be too far away from the source of the precious metals.

John Guest Leases.—These leases are situated about 2 miles below Coalmont, on the Tulameen river. The lease being worked lies on the south side of the river along the Kettle Valley Railway. A P. 4 model, 1¼-cubic-yard bucket shovel, with drag-line equipment, on a 50-foot boom, was installed. A grizzly and stationary 24- by 18-inch sluice-boxes have also been built. Water-supply is provided by a Fairbanks-Morse 75–80, heavy-duty, 5,000-gallons-a-minute pump through a 12-inch main. A Grant 4-inch nozzle is used for hydraulicking when the shovel is not working. The sluice-boxes are equipped with 4-inch poles, inverted rails set ½ inch apart, angle-iron 2 inches apart, followed by perforated screens and a trap for black sands. The grade used is an 11-inch drop in 10 feet. The tailings are being dumped across the Tulameen river. Numerous pits and two shafts, 36 feet and 26 feet deep respectively, have been sunk. The former struck rim-rock. Pay-gravel found in these workings prior to the installation of machinery averaged 44 cents a cubic yard in free gold and platinum.


MAP
Showing Location of
Metal-Coal & Placer Mines
on
Similkameen and Tulameen Rivers
Scale
1 0 1 2 3 4 5 10
Miles
LEGEND
Copper
Coal
Placer
B.C. Bureau of Mines
Otter Lake
K.V.Ry.
Lawless Cr.
Tulameen
Eagle Cr.
Wagon Rd.
Siwash Cr.
Olivine Mt.
Hines Cr.
Slate Cr.
Tulameen River
Champion Cr.
Kelly Cr.
Rly. Cr.
Lodestone Mt.
Coalmont
Granite Cr. Road
Granite Cr.
Wagon Rd.
Kettle Valley Ry.
Tulameen R.
Princeton
Graveyard Cr.
Wagon Rd.
Hayes Cr.
River
G.N.Ry.
Allenby
Nine Mile Cr.
Whipsaw Cr.
Similkameen
Copper Mt. Mines
N

The total yardage moved was 32,525, but values recovered have not been received at present. A sample of black sand taken from the sluice-boxes after the first "clean-up" and after panning out all visible metal assayed: Gold, 0.80 oz. to the ton; platinum, 0.60 oz. to the ton. No large-scale attempt has been made to save these sands by concentration. The residue from the boxes is being piled temporarily. Operations have been hindered to some extent by isolated masses of boulders varying in size up to 2 cubic yards. The shovel can handle most of these boulders once they are loosened. Until a larger area of bed-rock is uncovered, so that it can be properly cleaned and room excavated for the boulders, very little can be said regarding the possibilities of this endeavour. A good deal of time was lost when boulders piled up against the grizzly and the shovel had to remain inactive.

Granite Creek Mining and Development Co.—This company installed a steam-driven shovel and sluice-boxes on a small barge in the Tulameen river at the mouth of Granite creek. A short operation proved that this type of sluice-box was too congested to handle the sands and work was stopped for the time being.

Slate Creek Consolidated Placers, Ltd.—This company continued driving the tunnel up and under Slate creek during the year. In October a total of 1,200 feet had been driven without finding bed-rock. Advice from the manager, Norman McCormick, on November 20th stated that the work was continuing and that some trouble had been encountered when an old prospect-shaft was struck, which necessitated making a detour. A 12-inch tube sunk in the drift discovered river-gravel 7 feet below the floor. The management estimates that during December this gravel should be reached with the tunnel, when the success of this project will, to some extent, be ascertained.

Big Bend Platinum and Gold Mining Co., Ltd.—Under the management of John Marks, these leases, situated about 6½ miles up the Tulameen river from Tulameen village, were operated only a short time owing to water-shortage. A small amount of gold and platinum was recovered. This is an old high channel being worked to bed-rock and some good recoveries have been made.

Small amounts of gold and platinum were recovered from the Sootheran, Andrew Gordon, and several other leases along the Tulameen river and Granite creek.

The British Columbia Platinum Mining Company, Limited, reported upon in No. 1 Bulletin, 1929, has not, it is understood, commenced any large-scale operations up to the present time.

FORT STEELE MINING DIVISION.

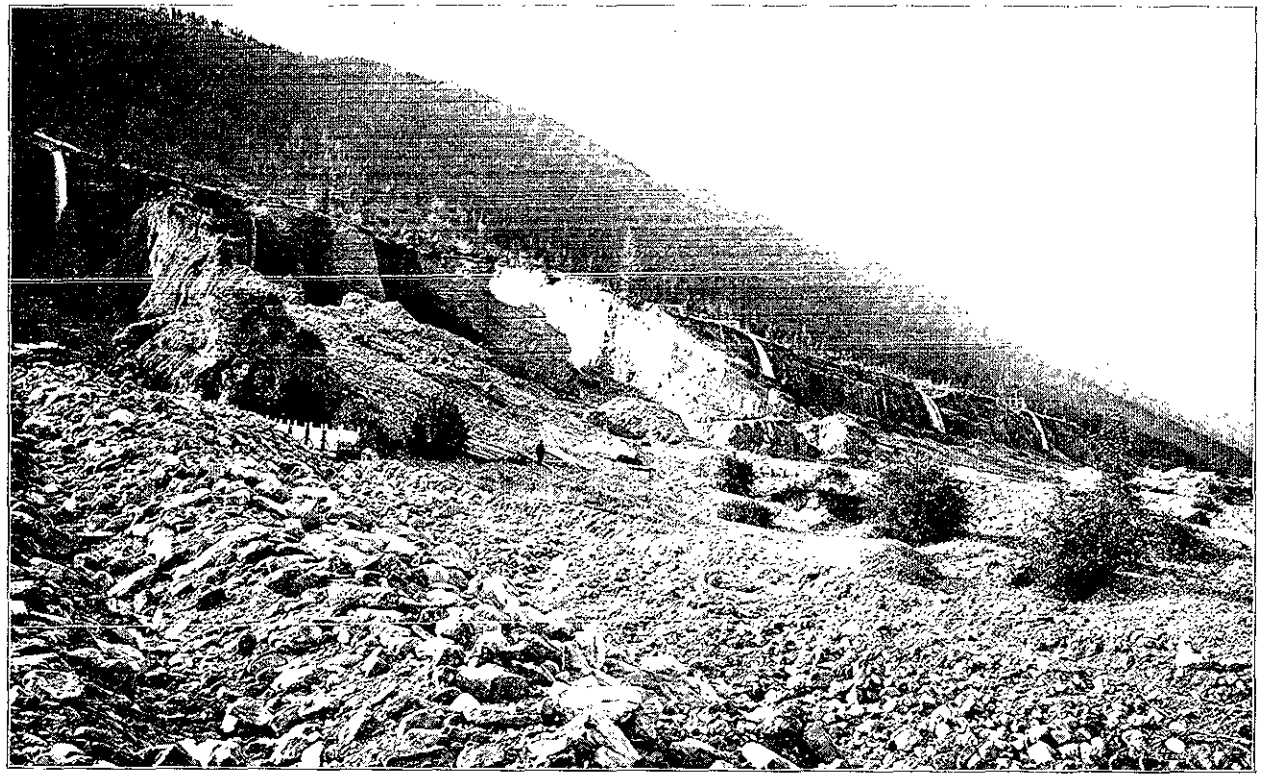
HISTORICAL SUMMARY BY HERBERT CARMICHAEL.

The bars of the Columbia river above Colville, in what is now the State of Washington, had been mined to some extent before the East Kootenay and Big Bend excitements attracted multitudes from a distance. Some gold colours had been found on the bank of the Columbia at Colville in 1855, and Angus McDonald's prospecting expedition found moderately remunerative diggings at the mouth of the Pend d'Oreille near the boundary-line. Miners having gradually worked their way up the Kootenay river from Idaho, rich diggings were at last discovered not far from the boundary-line, which gave rise in 1863–64 to the Kootenay gold-mining excitement. A trail from Walla Walla was built in to this point.

Wild Horse creek became the centre of the district when gold was discovered there in 1863, and in 1864 it became an important camp. The creek got its name from the number of wild horses there. By May, 1864, some 400 miners had distributed themselves along the creek. Prospects were obtained of $1 to the pan and ordinary claims were paying $20 to $30 a day to the man; nuggets running from $2.50 to $78 were found. Fisherville was the name of the town, but in 1866 it was pulled down for the purpose of working the ground on which it stood, and the operation is said to have been highly remunerative.

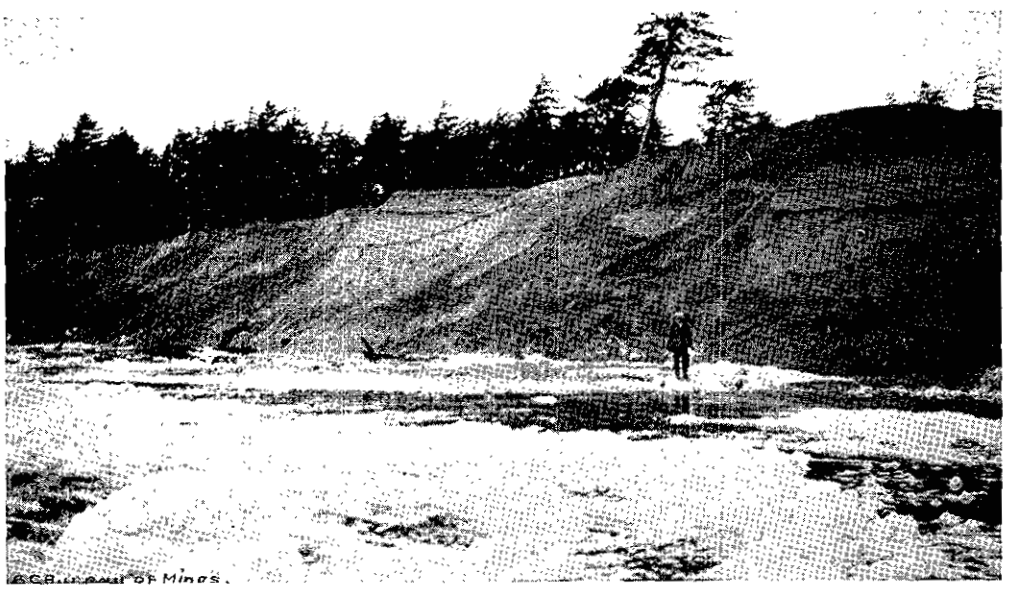
In 1865 the Dewdney trail was built to the Kootenay river to give an outlet to Victoria without going south of the International boundary.

From 1864 to 1869 hydraulic mining was carried on and a number of new gold-bearing creeks had been found, the most important being Perry creek, a branch of the St. Mary river. On this creek three men took out $225 in five days, while the ground generally gave an ounce a day to the man. Good prospects were found on Moyie river in 1869, but in 1872 A. W. Vowell, the



Wild Horse Creek at Fort Steele—General View of Workings started in 1863.

Wreck Bay Beach Placers, Clayoquot M.D.



Graham Island Beach Placers, Queen Charlotte M.D.

Gold Commissioner, states that the principal mines were worked out, with the exception of those on Wild Horse and Perry creeks.

In 1876 most of the white men had left and the output had dwindled to $25,000; the next year the output increased to $37,000, being the yield from Wild Horse, Perry, and Palmer creeks, chiefly through the work of Chinese.

The estimated output of the district from 1878 to 1885 was $188,380, with a total of $500,000 from the first days of the camp until 1885, the gold being valued at $18.25 an ounce. The official returns in 1884 were $60,826, principally from Wild Horse creek.

In 1888 gold was discovered by Henry Lovewell and a small prospecting-party on Porcupine and Quartz creeks, near the confluence of those creeks. The party was not able to get to work until October 14th, but before the season closed they made $11 a day to the man. From 1888 to 1895 hydraulicking and other mining were carried on, the yield of gold varying from $12,000 to $30,000; the year 1895 was fairly successful on Wild Horse creek, as from that creek alone the yield was $22,500 and prospecting of further ground was actively carried on.

W. A. Carlyle, Provincial Mineralogist, visited the district in 1896, and reported an hydraulic operation of some size carried on by the Invicta Gold Mining (Placers) Company, Limited, on Wild Horse creek. The company hydraulicked that year 70,000 cubic yards of gravel which gave an average of 7 cents in gold; a bank 5,000 feet long was worked. This was the only alluvial operation of any size going on at the time of Mr. Carlyle's visit.

Wm. Fleet Robertson, who succeeded Mr. Carlyle as Provincial Mineralogist, in 1898 made his first reconnaissance for the Government in East Kootenay district, and he made an extensive examination which will be found in the Annual Report for 1898. He found that the principal work was being done on Wild Horse creek, where three hydraulic companies were operating. On McMillan's placer claim the owners were driving a tunnel towards what they believed to be an "old channel."

The Perry Creek Hydraulic Mining Company in 1903 started operations on a large scale to hydraulic a high bank, and this work is fully described by Wm. Fleet Robertson in the Annual Report of that year. Unfortunately their efforts were not successful and interest in placer-mining fell off until in 1914 only a $1,000 yield was credited to the district.

In 1915 J. D. Galloway, then Assistant Mineralogist, visited South-east Kootenay. He found that placer-mining had dwindled to a small annual output, mining being largely confined to about 100 Chinamen working in groups of twos and threes.

This district became part of the Eastern Mineral Survey District in 1917, and A. G. Langley, Resident Engineer, in 1919 reported that the Gamble Mining Company and the Wild Horse Dredging Company were both starting operations, the former to sluice out an "old channel" parallel to Wild Horse creek and the latter to drain the creek with the object of getting at bed-rock.

From 1919 to 1925 a revival of interest in hydraulic mining is shown, and at least two companies have been at work either piping or opening up new ground, but this activity slacked off again, and with the exception of some prospecting on Quartz creek and Moyie river, no new work was in progress; the usual work was being carried on at Wild Horse creek.

REVELSTOKE MINING DIVISION.

HISTORICAL SUMMARY BY H. CARMICHAEL.

The "Big Bend" of the Columbia river north of the Canadian Pacific Railway at Revelstoke is the important placer area in Revelstoke Mining Division.

Salmo creek, emptying into the Pend d'Oreille river near its junction with the Columbia just north of the boundary, was wing-dammed by John Thornton and coarse, bright gold obtained. Bars on the creek as well as on the Columbia were at the same time worked by a great number of Chinese, and Forty-nine creek, 90 miles above Colville, was a cause of excitement in March, 1867. About twenty miners wintered at this place in 1866 and 1867 and reported that the diggings were not only easily reached but readily worked, and produced coarse gold like that from Kootenay, yielding $6 to $18 a day to the man. In one instance 2 oz. was taken out of a small prospect-hole in the bank.

About 200 men ascended the Columbia, prospecting all the creeks flowing into that river until the Big Bend country was reached. The first rich placers were found on French and McCulloch creeks, branches of Gold creek. The pioneers were four Frenchmen, who had settled on French creek as early as 1865 and had obtained $16 from eleven pans of dirt. All the bars along the Columbia as far as the Big Bend were found to yield well in coarse gold not unlike that found in East Kootenay. North of this no gold was found.

R. T. Smith, who acted as Gold Commissioner for the Big Bend district in 1865, left there in November and reported to the Government that the known yield of French creek for the season was $32,000; of McCulloch creek, $2,700; and Carnes creek, $3,000; but on account of the gold-export tax then in force he did not believe more than half the real amount had been declared.

In the spring of 1866 miners were beginning to flock in and Portland was doing a large business with the upper Columbia. Finding the trail would be inadequate to compete with the roads from the south, the British Columbia Government improved the Shuswap route early in the year and the Hudson's Bay Company built a steamer, the "Martin," which on May 27th began to make semi-weekly trips on Shuswap lake to Seymour, on the lake. In April, 1866, this town contained twenty buildings. The route, however, got a set-back, as boats and steamers began to ply on the upper Columbia from Colville, in Washington, to Death Rapids (or Dalles des Morts), in British Columbia.

The steamer "Forty-Nine" made her first trip from Colville to Death Rapids with eighty-five passengers and arrived at the latter place on April 26th, 1866, being ten days in making the trip up through the ice, taking passengers for $25 and freight at $200 a ton; she paid for herself during the first season. From Death Rapids freight was carried in boats, being dragged through the rapids to Wilson's Landing, 25 miles farther up the river. On May 19th one of these boats containing twenty-three persons came down over the rapids and, being overloaded and carelessly handled, capsized, and all but five were drowned. The "Forty-Nine" continued to make regular trips from Colville to Death Rapids.

The yield for the season of 1866 was estimated at $250,000, of which French and McCulloch creeks yielded each $100,000. In 1867 there were 100 miners wintering on French creek alone, but by 1869 the prestige of the district had departed, the shallow diggings were becoming worked out, and the deep ground had to wait for the more favourable conditions of a new era. Some of the deeper ground was worked for a year or two, but by 1874 all interest in the district as a placer camp seems to have died, as no mention is made of any gold returns in the Annual Report for that year or for some time.

About 1885 interest became renewed, principally in the deep placer-ground of McCulloch creek; three tunnel claims were taken up above the falls. French creek attracted some little attention and a bed-rock flume charter was applied for on that creek.

In 1886 good progress was made with deep placer-mining, the miners making fair to good wages by sluicing and shovelling into boxes. Work of a similar nature was started on Carnes creek and work continued on French creek and McCulloch creek.

A decided improvement in the placer situation is reported by the Gold Commissioner at the end of 1887; he mentions a dozen large creeks being worked and paying $3 to $5 a day to the man. The Ophir Bed Rock Flume Company put in a flume on a 1½-mile lease on McCulloch creek and took out $1,500 in coarse gold before the end of the season, but a flood prevented a final clean-up.

Several bed-rock flumes were put in on other creeks; on Carnes creek four men sluicing got out $127 in one day; the result of this work is shown in the returns for 1887, which were $8,550. From 1887 to 1890 placer-mining was steadily carried on and several long tunnels were run to tap old channels; the returns on the whole were fairly successful. Both work and prospecting fell off considerably between 1890 and 1896, due to lode-mining excitement farther south, but a number of claims and leases were steadily worked which paid good wages. In 1896 the *Consolation* mine on French creek paid $6,000 by wing-damming and bench diggings on Gold Drop creek gave a return of $2,000 to two men. A number of small operations were carried on, but the returns are not stated.

In the Annual Report for 1898 J. D. Sibbald, Gold Commissioner, gives a comprehensive account of the alluvial mining in the Big Bend district; most of the creeks were being worked to some extent, but the principal mention is of an hydraulic operation on French creek, where

a substantial plant had been put in, the company spending on packing in alone in that year the sum of $12,000 and the total investment being some $100,000. On French creek the Consolation Company in the four or five previous years took out the sum of $30,000 in coarse gold.

In 1899 the Gold Commissioner makes the following significant statement about an hydraulic plant on French creek that cost well over $100,000: "On this creek is the large and expensive hydraulic plant laid out during the past two seasons by the French Creek Mining Company, but which has not produced returns to the extent anticipated, as the greater part of the gravels had previously been worked out, a fact which was not discovered until after the completion of the expensive plant referred to." This mistake has unfortunately been repeated by other hydraulic operations in British Columbia.

For a number of years a limited amount of placer and hydraulic mining was carried on, but as the returns were all lumped together it is difficult to state the results of the work, but towards 1913 alluvial mining of any kind seems to have ceased. Some prospecting of deep ground by drilling was done in 1914 on French creek; this work was continued the following year and a shaft to deep ground was sunk on McCulloch creek, but had not reached bed-rock. Several of the other creeks had work done on them.

An hydraulic plant was working on French creek in 1916, but there was very little placering that year as the returns were only $1,000.

From 1916 to 1925 placer-mining on the upper Columbia was at a very low ebb, but in 1925 a company called the French Creek Development Company, Limited, was incorporated to work the gravels of French creek by hydraulicking. Three placer claims were worked on McCulloch creek.

In the following year the company working on French creek had a crew building a flume and making preparations for hydraulicking. The placer leases on McCulloch creek gave very satisfactory returns to the operators in coarse gold.

By the end of 1928 the Big Bend wagon-road was completed as far as Carnes creek, about 26 miles from Revelstoke. This will afford much better transportation for both lode and placer mines. The French Creek Mining Company built 6,000 feet of flume and put in 2,000 feet of pipe-line to convey water to two No. 6 Hendy Giant Monitors under a head of 200 feet. Placer-mining was continued on McCulloch creek.

VANCOUVER ISLAND.

NOTES BY HERBERT CARMICHAEL.

LEECH RIVER.

These placers were found in 1864 by Dr. R. Brown's Government exploring expedition, and were worked, off and on, for several years and from $100,000 to $200,000 taken out. Crevassing along bed-rock is still carried on to a limited extent when the river is low. The gold undoubtedly comes from the disintegration of numerous small quartz veins in slaty rocks.

CHINA CREEK, ALBERNI DIVISION.

This creek flows into Alberni canal some 6 miles below Port Alberni. The first record of placer gold there is in 1862, when the creek was worked principally by Chinamen, the returns covering several years, amounting to $40,000. It is reasonable to suppose that after the various gold excitements on the Mainland had died down the streams on Vancouver island would be given some attention; this would especially be the case where so many Chinamen were looking for something to do. In 1883 there were 12,000 Chinamen in British Columbia and in 1881 there were 4,350 in Esquimalt alone; some of these undoubtedly went after placer gold, as China creek got its name from the Chinese working there, and they were also working in 1862 on Bear river, Clayoquot; in fact, as late as 1893 about thirty Chinamen were working creek claims on this river, but the following year they all left suddenly. In 1895 the Gold Commissioner at Alberni reported two placer claims and four hydraulic leases.

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MINING DIVISIONS & RECORDING OFFICES

Mining Divisions	Location of Offices	Mining Divisions	Location of Offices
Atlin Mining Division	**Atlin**	Sub-office	Haylmore
Sub-office	Telegraph Creek	**Lillooet Mining Division**	**Lillooet**
"	Haines (U.S.)	Sub-office	Haylmore
"	Juneau (U.S.)	**Kamloops Mining Div.**	**Kamloops**
Stikine Mining Division	**Telegraph Creek**	Sub-office	Chu Chua
Sub-office	Boundary	"	Vavenby
Liard Mining Division	**Telegraph Creek**	**Ashcroft Mining Div.**	**Ashcroft**
Sub-office	McDame Creek	Sub-office	Lytton
"	Porter	**Nicola Mining Division**	**Merritt**
"	Fort St. John	**Yale Mining Division**	**Yale**
Skeena Mining Division	**Prince Rupert**	Sub-office	Hope
Sub-office	Kitimat	**Vernon Mining Division**	**Vernon**
"	Rosewood	**Similkameen Min. Div.**	**Princeton**
"	Copper City	Sub-office	Hedley
"	Terrace	**Greenwood Min. Div.**	**Greenwood**
"	Stewart (Portland Canal)	Sub-office	Vernon
Nass River Mining Div.	**Anyox**	"	Rock Creek
Sub-office	Aiyansh	"	Beaverdell
"	Alice Arm	**Grand Forks Min. Div.**	**Grand Forks**
Portland Canal Min. Div.	**Stewart**	**Osoyoos Mining Division**	**Penticton**
Bella Coola Min. Div.	**Prince Rupert**	Sub-office	Keremeos
Sub-office	Bella Coola	"	Hedley
"	Bella Bella	"	Fairview
"	Ocean Falls	**Golden Mining Division**	**Golden**
Queen Charlotte Min. Div.	**Queen Charlotte**	**Windermere Min. Div.**	**Wilmer**
Sub-office	Jedway	**Fort Steele Min. Div.**	**Cranbrook**
"	Masset	Sub-office	Fernie
"	Lockeport	**Ainsworth Mining Div.**	**Kaslo**
Omineca Mining Div.	**Smithers**	Sub-office	Howser
Sub-office	Fort Grahame	"	Trout Lake
"	Fort St. James	"	Poplar
"	Manson Creek	**Slocan Mining Division**	**New Denver**
"	Telkwa	Sub-office	Sandon
"	Fort St. John	**Slocan City Min. Div.**	**Slocan**
"	Copper City	**Trout Lake Min. Div.**	**Trout Lake**
"	Terrace	**Nelson Mining Division**	**Nelson**
"	Prince George	Sub-office	Creston
"	Fort Fraser	"	Ymir
"	Finlay Forks	"	Salmo
"	Pacific	**Arrow Lake Min. Div.**	**Nakusp**
"	Hazelton	Sub-office	Vernon
"	Burns Lake	**Revelstoke Min. Div.**	**Revelstoke**
"	Hudson Hope	**Lardeau Mining Div.**	**Beaton**
"	Usk	**Trail Creek Min. Div.**	**Rossland**
"	Takla Landing	**Nanaimo Mining Div.**	**Nanaimo**
Peace River Min. Div.	**Fort St. John**	Sub-office	Ladysmith
Sub-office	Prince George	"	Alert Bay
"	Finlay Forks	"	Vananda
"	Hudson Hope	"	Granite Bay
"	Pouce Coupe	**Alberni Mining Division**	**Alberni**
Cariboo Mining Div.	**Barkerville**	**Clayoquot Min. Div.**	**Clayoquot**
Sub-office	Quesnel	**Quatsino Min. Div.**	**Quatsino**
"	Prince George	**Victoria Min. Div.**	**Victoria**
"	McBride	**Vancouver Min. Div.**	**Vancouver**
Quesnel Mining Div.	**Williams Lake**	**New Westminster Min. Div.**	**New Westminster**
Sub-office	Quesnel	Sub-office	Harrison Lake
"	Likely	"	Chilliwack
"	Barkerville		
Clinton Mining Division	**Clinton**		
Sub-office	Williams Lake		

THE GOVERNMENT OF THE PROVINCE OF BRITISH COLUMBIA

DEPARTMENT OF MINES

HON. W. A. McKENZIE, MINISTER.

BRITISH COLUMBIA

MINING DIVISIONS

Scale, 50 miles to 1 inch

10 0 25 50 100 150 200

1930

02-1930

LEGEND

Mining Recorder's Offices
Sub " "
Mining district boundaries
Railways
" under construction
Roads
Trails and portages

NOTE:— The boundaries of Mining Divisions generally follow the height of land separating watersheds.

Prepared by the Geographic Division, B.C.

Principal gold-placer fields shown in yellow.