

This document was produced
by scanning the original publication.

Ce document est le produit d'une
numérisation par balayage
de la publication originale.

GEOLOGICAL SURVEY OF CANADA.

A. P. LOW, DEPUTY HEAD AND DIRECTOR.

REPORT

ON

GOLD VALUES

IN THE

KLONDIKE HIGH LEVEL GRAVELS

BY

R. G. McCONNELL.



OTTAWA:
GOVERNMENT PRINTING BUREAU.
1907.

No. 979.

A. P. Low, Esq.,
Director, Geological Survey.

SIR,—I beg to transmit the following report on work done in the Klondike during the past season.

The object of the season's work was to estimate the recoverable values remaining in the high level gravels along Bonanza and Hunker creeks and a portion of the Klondike valley, and also to obtain as much information as possible in regard to the values remaining in the low level or creek gravels.

The necessity of completing this work in a single season compelled us to make a somewhat hurried examination, but we were successful in covering the whole field in a fairly satisfactory manner.

I was efficiently assisted during the season by Jos. Keele, geologist, and Messrs. F. H. McLaren and F. O'Farrell, topographers, to whom the measurements of the various areas were entrusted. I was also fortunate enough to secure the services, among others, of such experienced and trustworthy miners as Robert Henderson, the discoverer of the Klondike, and A. B. McDonald. Valuable assistance was also obtained from Mr. A. J. Beaudette, territorial mining engineer, and from many miners engaged in active work on the various creeks and benches.

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

R. G. McCONNELL.

OTTAWA, April 12, 1907.

CONTENTS.

	PAGE.
Classification of Gravels.....	5
White Channel Gravels.....	7
Distribution of gold in Gravels and Bedrock.....	8
Grade of Klondike gold.....	12
Transportation of coarse gold.....	14
Valuation of High Level Gravels.....	16
Bonanza Creek High Level Gravels.....	17
Lower Bonanza Hill Gravels.....	20
Hunker Creek White Channel Gravels.....	23
Upper Hunker Creek Hill Gravels.....	24
Workable Gravels in Upper Hunker Hills.....	25
Hills between Hester and Last Chance Creeks.....	25
Last Chance and Lower Hunker Creeks, White Channel Gravels..	27
Summary of Hunker Creek workable Hill Gravels.....	27
Klondike River High Level Gravels.....	29
High Level Gravels—Summary of General Production.....	30
General Summary.....	33
Indian River Creeks.....	34

REPORT

ON

GOLD VALUES IN THE KLONDIKE HIGH LEVEL GRAVELS

BY

R. G. McCONNELL

A general report by the writer on the geology, topography and gold-bearing gravels of the Klondike district was published by the Geological Survey in 1905. The present report, although a few other subjects are briefly discussed, is special in its object and deals principally with the values still remaining in the Bench and Creek gravels and especially in the important high level deposit known as the White Channel gravels.

Classification of Gravels.

Low level gravels.....	{ Gulch gravels. Creek gravels. River gravels.
Gravels at intermediate levels	Terrace gravels.
High level bench gravels.	{ Klondike gravels. White Channel gravels.

The gravels enumerated in this table are fully described in the report referred to above and only certain points on which additional information was obtained need be treated at length. The diagram on page twenty-one shows the relationship of the various types on the lower part of Bonanza creek.

The White Channel bench or hill gravels are the oldest in the district, and, excepting the present creek gravels, the most important from an economic standpoint. They were originally creek gravels, deposited in a similar manner to those occupying the low levels at present, and their

elevated position is due to an uplift which affected the whole region bordering the Yukon from the Stewart river northwest to the Alaskan boundary and for a considerable distance beyond. This uplift, and a small depression which preceded it, produced many notable changes in the topography of the country.

It is probable, although not conclusively proved, that during the White Channel period the lower portion of the Klondike valley, the portion into which the principal gold-bearing creeks discharge, was occupied by a small local stream and that the Klondike itself flowed either into the Stewart or into Twelve-mile river. The White Channel deposits are remarkable in this respect that even when completely destroyed their former position is marked by a trail of gold. They are traceable in this manner from the present mouth of Hunker, Bear and Bonanza creeks far out into the present valley of the Klondike, showing that the old valley was small, smaller than that of Hunker creek and unlikely to have contained a large rapid river such as the Klondike.

At the close of the White Channel period the district was depressed, and it was during this depression that the Klondike is considered to have broken into its present valley. It brought down an immense quantity of material from its upper reaches, and rapidly built up a wide gravel bed fully 150 feet in depth. These gravels at the mouth of Hunker and Bonanza creeks rest on the White Channel deposits and at other points, where not destroyed, are distributed along the hill sides at the same level. They are composed principally of well-rounded pebbles of quartzite, hard slate, diorite and occasionally granite, all, unlike the other gravels, foreign to the district, and so far not proved to be of much economic importance.

The depression was followed by an uplift of approximately 700 feet, which gave new life to all the streams by increasing their grades, and they immediately commenced to deepen their channels. This process was continued not only through the old gravel deposits but down into the bedrock to a depth of from 150 to 300 feet. The new valleys are sunk, as a rule, through the bottom of the old ones, but in a few places, as at the mouth of Bonanza creek, they deviate from them and have carved out independent courses.

The difference in character between the old and new valleys is striking. The old ones represent the product of long continued stable conditions, and are characterized by wide flats and gently sloping sides, from which all traces of angularity have been smoothed away. The flats of the old Hunker Creek valley have a width in places of over a mile. The new

valleys on the other hand, while opening out into occasional basins, are generally narrow, steep-sided and angular. This applies only to the creeks, all of which are small, as the Klondike river has cut a huge trench through the district since the uplift.

Only a portion of the deposits of the old valleys was destroyed during the excavation of the recent valleys, as the latter are much narrower and do not follow exactly the same courses. The undestroyed portions constitute the White Channel gravels of the miners.

Character of White Channel Gravels.

The White Channel gravels differ somewhat from the ordinary type of stream deposit. They are very compact as a rule and in some of the hydraulic cuts stand up in almost vertical cliffs, even when the face is unfrozen. The white or light grey coloration from which the deposit derives its name is very conspicuous in most of the sections but is not universal, as red, yellow and dark grey beds frequently occur. The deposit is highly siliceous, the principal constituent consisting of rounded pebbles and rounded and subangular boulders of vein quartz. Flat schist pebbles and boulders, usually in a more or less advanced stage of decomposition, occur with the quartz, and also occasional pebbles derived from the various dikes and stocks outcropping along the valleys. No material foreign to the district occurs in the deposit. The pebbles and boulders are usually small, seldom exceeding eighteen inches in diameter, and are embedded in a compact matrix consisting essentially of small sericite plates and fine angular quartz grains. A few large angular blocks from three to four feet in diameter are occasionally met with but are rare and usually occur on or near bedrock.

The uniformity of the deposit in composition and general character throughout sections a hundred feet or more in thickness is very striking. The bedding planes, as a rule, are inconspicuous, and there has been no sorting of the various constituents into separate beds.

The deposits, unlike the creek and gulch gravels, appear to be destitute of vegetable and animal remains. None were found by the writer and the few reported discoveries by miners lack confirmation.

The thickness of the White Channel gravels varies from a few feet to 150 feet and the original width from a couple of hundred yards to over a mile. The volume of the deposit on both Hunker and Bonanza creeks increases steadily down stream.

On Gold, Adams and other hills on Bonanza creek the typical compact white variety of the White Channel deposit is replaced towards the sides of the old valley by flat rusty coloured gravels, more loosely bedded and containing a smaller proportion of quartz than the ordinary white variety. These probably represent flood plains deposits. They have the appearance of overlying the white variety and were formerly, in the absence of sections, considered to be younger. The long exposures, however, now available for study in the various hydraulic cuts, show that the two varieties pass gradually one into the other both horizontally and vertically and in places are interbanded, evidence of contemporaneous deposition. The loose yellow variety is seldom productive.

The White Channel gravels were probably deposited by winding streams with easy grades and comparatively slack currents. The preponderance of vein quartz pebbles and boulders, the most resistant rock in the district, gives them the character of a residual deposit. They were built up slowly and in the long process the softer rocks were mostly destroyed and carried away.

The great length of the White Channel period is indicated by the enormous gold accumulations, all derived from the slow breaking up of auriferous quartz veins which took place in it. Since the close of the period the additions to the supply have been trifling, although a sufficient time has elapsed to enable small streams to excavate channels, mostly through hard schists from 300 to 600 feet in depth. Practically all the gold in the present low level valley flats is of secondary origin and derived from the partial distribution of the older gravels.

The age of the White Channel gravels has not been determined, but they must date back to the Pleiocene at least. They were certainly deposited before the advent of the present severe climatic conditions, as the white coloration is largely due to the leaching out of the greater portion of the iron by circulating surface waters, and this must have taken place before they were permanently frozen.

Distribution of Gold in Gravels and Bedrock.

The greater part of the gold both in the hill and creek gravels occurs on or near bedrock, either in the lower four to six feet of gravel or sunk for some distance in the bedrock itself. The distribution depends largely on the character of the bedrock. Soft schists such as those underlying the rich portion of Upper Dominion creek prevent the gold from descending, and it accumulates in a thin layer at the base of the

KLONDIKE HIGH LEVEL GRAVELS.

gravels. In many of the rich claims between the two discoveries on Dominion creek a thin stratum of gravel resting immediately on bedrock proved extraordinarily rich, while the bedrock and the upper gravels were comparatively lean. On Bonanza creek the bedrock as a rule is harder and more flaggy, and the action of frost has parted the layers and allowed a portion of the gold to descend along them. From three to five feet of bedrock are usually mined at a profit, and gold has been found in some quantity at a depth of twelve feet and probably descends still deeper.

On a couple of claims on Hunker creek below the mouth of Seventy pup practically all the gold occurred in a shattered porphyry bedrock, the overlying gravels proving almost barren.

The bedrock underlying the Hill or White Channel gravels is more decomposed than that in the creek bottoms, does not open out in the same way and retains most of the gold at or near the surface. In a few places gold has been found in paying quantities in the schist partings under the decomposed layer, but as a rule only the upper few inches are mined.

The rapid decrease in gold values in the White Channel gravels above bedrock is shown in the following table which gives the average values obtained in sampling Trail and Lovett hills. The samples were taken in successive six foot columns.

			Total value.
144-150 feet.	Average value per cubic yard.	.006....	.012
138-144 "	" "	.007....	.014
132-138 "	" "	.008....	.016
126-132 "	" "	.009....	.018
120-126 "	" "	.009....	.018
114-120 "	" "	.010....	.020
108-114 "	" "	.010....	.020
102-108 "	" "	.011....	.022
96-102 "	" "	.011....	.022
90-96 "	" "	.012....	.024
84-90 "	" "	.013....	.026
78-84 "	" "	.015....	.030
72-78 "	" "	.020....	.040
66-72 "	" "	.020....	.040
60-66 "	" "	.021....	.042
54-60 "	" "	.023....	.046
48-54 "	" "	.025....	.046

			Total value.
42-48 feet.	Average value per cubic yard.	.045....	.090
36-42 "	"	.030....	.060
30-36 "	"	.032....	.064
24-30 "	"	.034....	.068
18-24 "	"	.040....	.080
12-18 "	"	.047....	.094
6-12 "	"	.180....	.360
1-6 "	"	\$4.130....	8.260

Total values in square yard column fifty yds. high. \$9.532

The values in the lower four yards, including a foot of bedrock, average \$2.15 per cubic yard, while those in the upper forty-six yards of the column average less than two cents per cubic yard. The decrease in values from the bottom to the top of the section proved to be constant, except at one point forty-five feet above bedrock where a slight enrichment takes place.

The following table shows the values obtained in a square yard column of the White Channel gravels in the Last Chance Creek slope of Dago hill:—

			Total value.
84-90 feet.	Average value per cubic yard,	.007....	.014
78-84 "	"	.009....	.018
72-78 "	"	.012....	.024
66-72 "	"	.014....	.028
60-66 "	"	.020....	.040
54-60 "	"	.0675...	.135
48-54 "	"	.0275...	.055
42-48 "	"	.030....	.060
36-42 "	"	.041....	.082
30-36 "	"	.040....	.080
24-30 "	"	.0425...	.085
18-24 "	"	.050....	.100
12-18 "	"	.060....	.120
6-12 "	"	.114....	.228
1-6 "	"	\$2.200....	\$4.400

Total values in square yard column thirty yds. high. \$5.469

In this column a considerable enrichment takes place at a point sixty feet above bedrock. The enriched gravels have a thickness of a few

inches only and rest on a compact clayey stratum not easily penetrable which acts as a bedrock. The gold is moderately coarse, much coarser than that in the gravels immediately above and below, but finer than that on bedrock.

A marked exception to the general rule in the district, that the gold decreases in quantity and coarseness from bedrock upwards, occurs on Paradise hill on Hunker creek. The main gold zone here in many places is found not in bedrock but at elevations of from three to twelve feet or more above it. A section of the gravels twenty-four feet thick a short distance below Hester creek gave the following values:—

18-24 feet.	Average per cubic yard, \$	0.025.....	\$0.050
12-18 "	"	0.266.....	.532
6-12 "	"	0.776.....	1.552
1-6 "	"	0.576.....	1.152
Total values in square yard column eight yds. high ..			\$3.286
Average values per cubic yard.....			42.1 cents.

The lower gravels in this section and in other places on the hill are very siliceous, consisting almost entirely of vein quartz pebbles and boulders. The siliceous layer varies in thickness from a few inches up to eight or ten feet, and is overlaid by gravels containing a greater proportion of schist pebbles. The best drifting ground worked so far occurs above the siliceous layer, in the lower part of the upper gravels.

The gravels on Paradise hill although rich in places have seldom paid to drift on account of this irregular distribution of the gold. The pay zone, in place of lying in a plane, undulates along the surface of the uneven siliceous gravels and is very difficult to follow.

The concentration of all the coarse, and the greater part of the fine, gold in the White Channel gravels on or near bedrock seems incapable of explanation except on the assumption that the gravels have been worked over probably several times by the stream that deposited them. The deposit is over 150 feet thick in places, is very compact and includes numerous medium sized and a few large angular boulders which would serve to intercept a portion of the gold if it descended under the influence of gravity alone. That they have not done so is shown by the fact that in all our sampling not a single coarse piece was found in the upper gravels.

Grade of Klondike Gold.

Klondike gold varies greatly in grade not only on different creeks but also along different portions of the same creek. The difference of grade is due to the gold being in all cases alloyed with silver in varying proportions. The lowest grade gold in the camp occurs on Big Shookum and Henry gulches and has a value of about \$12.50 per ounce. The highest grade gold on the Klondike creeks is found on Upper Hunker creek where assays occasionally exceed \$17.50 per ounce. The gold from Gold Run creek on the Indian River slope averages over \$17.50 per ounce and assays of \$17.75 per ounce are reported from Allgold creek.

The average value of all the gold shipped from the camp in 1905 according to the U. S. Mint returns amounted to \$16.02 in gold and 10.94 cents in silver per ounce.

In the lowest grade gold the silver almost equals the gold in volume, the ratio being 1 to 1.4. In the high grade gold the ratio is 1 to 5 and the general average is 1 to 2.3. In value the ratio of silver to gold is very small, the proportion calculated from a number of returns being approximately 1 to 150. The total gold production of the camp is estimated at \$119,000,000 and the silver at \$793,000.

The variations in grade along the different creeks, as shown by assays furnished by the Bank of Commerce, are interesting. Bonanza Creek gold above Eldorado forks is fairly uniform in grade, running from \$16.73 to \$17.09 per ounce. The average grade decreases slightly but not uniformly down stream. Below the Eldorado forks the influence of the inferior Eldorado gold is shown by a sudden decrease in value to about \$16.00 per ounce. Farther down in the rich section above discovery claim the grade drops to \$15.75 per ounce. Below discovery claim the value increases to about \$16.15 per ounce and remains at that figure down into the Eighties, a distance of eight miles. Towards the mouth of the creek the grade again increases to over \$16.50 per ounce.

Eldorado Creek gold has an average value of \$15.70 per ounce, about a dollar less than that from Bonanza creek above the forks. The difference in grade is somewhat remarkable as the two streams cut the same rocks, are never far apart, and must have drawn at least a portion of their supplies from a common source, viz.: the comparatively narrow ridge separating them. Gulches cutting back into this ridge from both creeks have proved productive. Eldorado gold is generally coarser than that from Bonanza creek, and its inferior grade may be due to this cause,

as fine gold everywhere throughout the camp assays higher than the accompanying coarse gold.

The grade of Hunker Creek gold is extremely variable, ranging from over \$17.50 per ounce in the upper part of the creek down to \$14.50 below Henry gulch. The grade decreases slowly down stream from discovery claim to Hester creek, then drops suddenly over a dollar an ounce. Paradise Hill gold below Hester creek averages about \$15.20 per ounce. Farther down on Dago hill the grade increases again to \$16.50 per ounce, then drops down to \$14.50 per ounce near the mouth of the creek. Last Chance creek, a tributary of Hunker creek, and Bear creek, a parallel stream emptying into the Klondike, both contain low grade gold, assays seldom exceeding \$15 per ounce.

The Indian River creeks average higher in grade than Klondike River creeks. Dominion Creek gold above Gold Run averages about \$16.90 per ounce. Below Gold Run the grades increase to \$17.50 per ounce. Gold Run gold maintains an average grade along the main pay streak of fully \$17.50 per ounce. Sulphur Creek gold is somewhat lower, averaging about \$16.50 per ounce.

The variation in grade of the placer gold appears to depend mostly on original differences in grade of the vein gold from which it was derived. Creeks draining certain areas in the district carry low grade gold, while other areas supply high grade. An important centre of dispersion for low grade gold occurs west of the lower portion of Hunker creek. Hester and Last Chance creeks, Henry gulch and Bear creek all head in the same ridge within a comparatively short distance of each other and all carry low grade gold. Big Shookum creek, a tributary of Bonanza creek, heads in a low grade area and the gold brought down by it lowers appreciably the general grade of the Bonanza Creek gold for several claims. The Dome and surrounding region furnishes a good example of a high grade area. The streams flowing outwards from this centre, including Upper Dominion, Upper Hunker, Sulphur and Gold Bottom creeks, all carry high grade gold although the values differ considerably.

While the grade of the placer gold is supposed to conform in a general way with that of the original vein gold some changes are evidently produced by the leaching out of a portion of the silver contents.

Mr. M. Carey Lea in a series of articles in the American Journal of Science, commencing in Vol. XXXVII, p. 491, has shown that silver passes readily when treated with certain re-agents into an allotropic form, one of

the distinguishing characters of which is its easy solubility, and the same process may go on in nature.

Evidence of loss of silver is afforded by the fact that fine gold which would necessarily be affected more by leaching than the accompanying coarse gold invariably carries a smaller percentage of silver.

Nuggets also assay higher as a rule on the surface than in the centre. Five assays of selected nuggets made by Mr. Connor in the laboratory of the Survey gave the following results:—

	Centre of nugget.	Surface.	
1 Silver.	35.8	29.4	} Trail hill, Bonanza creek.
Gold	64.2	70.6	
2 Silver.	39.9	33.5	} Chechaco hill, Bonanza creek.
Gold	60.1	66.5	
3 Silver.	37.3	30.3	} Bonanza creek, No. 12 below.
Gold	62.7	69.7	
4 Silver.	46.1	41.0	} Treasure hill, Last Chance creek.
Gold	53.9	59.0	
5 Silver.	33.0	33.5	} Bonanza creek, No. 3 below.
Gold	67.0	66.5	

All the nuggets with the exception of No. 5 show losses in silver of from five to seven per cent on the surface, assuming that the composition was originally uniform. No. 5 was a large nugget filled with quartz and its exceptional character is probably due to its being much younger than the others.

Transportation of Gold.

The two main factors in the transportation of coarse gold by natural causes are grade and bedrock. With steep grades and smooth bedrock transportation is comparatively rapid, while little movement takes place when the grades are moderate and the valleys are floored with the tilted flaggy schists characteristic of the district.

The Klondike slopes are everywhere mantled with a thick covering of broken and partially decomposed schist fragments easily moved when not frozen and ever tending downwards towards the creek and gulch levels. The downward movement is slow and intermittent at present on account of the perpetually frozen condition of the surface, except on sunny slopes. During the period of the White Channel gravels,

the period of the great gold accumulations, climatic conditions were less severe and the movement must have been much more rapid.

The slide material carries with it the gold and gold-bearing quartz released by the breaking up of the auriferous quartz veins, and when running water is reached the gold is sluiced out and remains behind, while the rock fragments are ground up and carried away.

The distance travelled by the gold after reaching the waterways, neglecting the time element, depends on the grades and bedrock. The upper portions of the creeks, and the steep gulches, except where they cross the paystreak of the White Channel gravels and are directly enriched from them, have not proved rich and are only occasionally productive. The gold washed down into them moves slowly on, and all the great accumulations occur on portions of the creeks with grades of 150 feet or less to the mile. The rate of movement diminishes rapidly with the grade and near the mouths of the creeks is excessively slow.

Evidence of the tardy movement of coarse gold down streams of moderate grade, even where the latter are actively engaged in eroding their channels, is furnished at many points along Bonanza and Hunker creeks. The paystreak of the elevated White Channel gravels has been destroyed in places along both these streams. Whenever this occurs the creek bottoms directly opposite the destroyed portions are immediately enriched, showing that the gold, or a large portion of it at least, has remained almost stationary during all the time the creeks were employed in deepening their channels from 150 to 300 feet. The horizontal movement in some instances scarcely exceeds the vertical movement. The complementary relationship existing between the creek and the hill pay gravels has been recognised by the miners, and whenever the creek gravels are lean, pay is confidently expected on the hills, and in the productive portions of the creeks is usually found.

The influence of bedrock in retarding or accelerating the progress of gold down stream is almost as important as that of grade. The common bedrock of the district is a light coloured flaggy sericite schist of unequal hardness and usually tilted at high angles. The sericite schist alternates in places with bands of dark graphitic schists and is broken through by numerous porphyritic dikes and stocks. The light coloured flaggy schists when hard form an excellent bedrock from the miner's point of view as they weather unequally into irregular rock ripples which arrest the progress of the gold. The partings also open out under the influence of the alternate freezings and thawings to which the rocks are subjected and the gold descends along them, and continues to descend

as the surface is gradually lowered by erosion. Its progress down stream when caught in this manner is indefinitely delayed.

The porphyritic rocks when shattered, as is often the case, also arrest most of the gold. The soft varieties of the sericite schists and the dark graphitic schists, on the other hand, offer small resistance to the passage of the gold. They weather to a smooth surface along which the gold moves easily, and the portions of the creeks underlaid by them are usually lean.

Valuation of High Level Gravels—Method employed.

All the high level gravels along Hunker and Bonanza creeks, and the Klondike river below Hunker creek, considered to be of economic importance, were measured as accurately as conditions permitted. Two six inch stadia transits were used for this purpose and proved very satisfactory. The outlines of most of the areas could be defined very closely as nearly all the hills have been thoroughly prospected by drifts and shafts. In a few places where the surface is muck-covered the back limit of the gravels could only be drawn approximately, but the total error from this source is not believed to be large. The aggregate volume of gravels measured amounted to 354,000,000 cubic yards.

Sampling was carried on continuously throughout the season and all the important hill areas, except the Upper Bonanza hills, were examined as carefully as the time at our disposal allowed.

The sampling was done with rockers built specially for the purpose. The usual sample consisted of a column of gravel a foot square, each successive six foot section being washed separately. When the gravels were shallow continuous sections from the bottom to the top of the deposit were washed. In the deeper deposits continuous columns of the lower gravels only were washed. Above a height of thirty-six feet samples were taken at intervals of about twenty feet.

On most of the important hills long faces opened out by hydraulic operations, and numerous drifts and shafts were available for examination. Where these were absent shallow cuts and shafts were sunk at intervals by ourselves.

In estimating the gold contents of the various gravel areas due allowance was paid to the statements of miners in regard to the values obtained in drifting and hydraulic operations. In most cases the values given agreed very closely with the result of our own work.



MAGNET, AMERICAN AND OROFINO HILLS AND A PORTION OF BONANZA CREEK
View looking north from Adams hill.

The estimate of values in the Upper Bonanza hills and in the low level creek gravels is based almost entirely on the results of actual mining work and on information (carefully examined and sifted) obtained from miners and others familiar with the ground. The gravels have all been more or less mined and the remaining values are distributed so irregularly that effective sampling in the time at our disposal was obviously impossible.

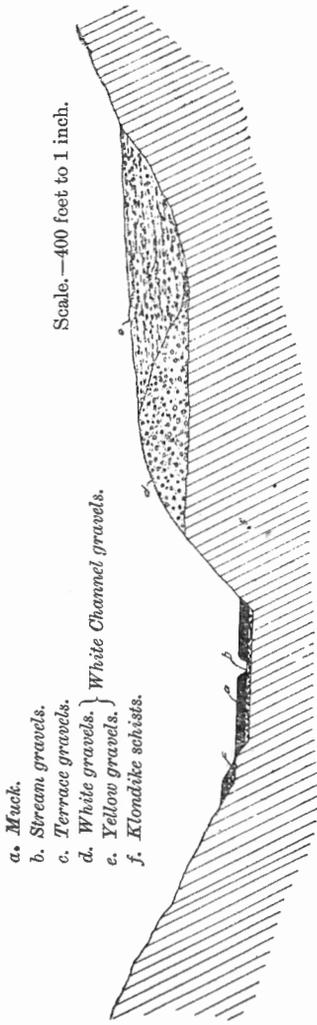
The values in the smaller hills, many of which are held separately, are grouped together in order to avoid affecting individual interests. The larger hills as a rule are divided up among a number of different owners.

Bonanza Creek High Level Gravels.

The White Channel gravels once continuous along Bonanza creek and its main tributaries have been partially destroyed by the deepening of the valleys, and have been cut through transversely at various points by tributary creeks and gulches. They are now represented by a number of separated areas distributed at irregular intervals along the valleys and designated by the miners by different names. With the exception of French hill on Eldorado creek none of the areas on the tributary streams have proved of much importance.

The White Channel gravels on Bonanza creek above the Eldorado forks, and on Eldorado creek, have been mostly destroyed and the gold contents washed down into the present low level valleys. The extraordinary richness of these valleys is due to this fact. The principal areas which have been preserved are Bunker hill, below Gauvin gulch on Bonanza creek, and French hill below French creek on Eldorado creek. Besides these, small patches, now mostly worked out, have been preserved on Bonanza creek below McKay and Homestake creeks and on Eldorado creek above Oro Grande gulch.

The most important strip of hill gravels on Bonanza creek at present commences at the Eldorado forks and extends down stream on the left limit to Boulder creek, a distance of about four miles. The gravels do not form a continuous stretch as they are cut across by Adams and Boulder creeks and various gulches, and separated into a number of areas known as Gold, Chechaco, Adams, Magnet, American, Orofino, Monte Cristo, King Solomon and Boulder hills. The gravel areas border the present secondary valley and extend back for distances varying from 800 feet on Magnet hill to 2,500 feet on King Solomon hill. The thickness ranges from a few feet up to 150 feet.



Scale.—400 feet to 1 inch.

- a. Muck.
- b. Stream gravels.
- c. Terrace gravels.
- d. White Channel gravels.
- e. White gravels.
- f. Yellow gravels.
- f. Klondike schists.

GENERALIZED SECTION ACROSS BONANZA VALLEY BELOW ELDORADO FORKS.

The volumes of gravel on the Upper Bonanza and Eldorado hills are as follows:—

Bunker hill.....	1,050,000	cu. yds.
French hill.....	1,670,360	"
Gold hill.....	3,684,940	"
Chechaco hill.....	5,805,236	"
Adams hill.....	7,561,370	"
Magnet hill.....	485,672	"
American hill.....	2,210,888	"
Orofino hill.....	6,892,130	"
Monte Cristo hill.....	3,710,490	"
King Solomon hill.....	10,780,587	"
Boulder hill.....	1,475,216	"
Total volume.....	45,326,889	"

A paystreak varying from 200 to over 400 feet in width has been traced through all these hills. It is partly destroyed in places, but on some of the hills, notably on Orofino and Monte Cristo, it is situated some distance back from the present secondary valley and is entirely preserved.

The gravels in the paystreak of all these Upper Bonanza hills proved rich everywhere, and, in places, the values returned appear almost fabulous. Whole claims are reported to have averaged from \$60.00 to \$100.00 per square yard of bedrock. Portions of French, Gold, Chechaco and Magnet hills were particularly rich and yields of a dollar a pan, or \$150.00 per cubic yard for the lower four or five feet of gravel, are stated to have been obtained from small areas on these hills.

The paystreak is now practically drifted out, portions of it twice over, and is estimated to have yielded gold to the value of \$24,000,000.

Drifting operations, however, never result in a full extraction of the gold. A few pillars and occasional small areas are usually neglected for various causes; the bedrock is seldom thoroughly mined and no attempt is, of course, made to recover the values in the upper lean gravels. The paystreak gravels are also bordered as a rule on both sides by considerable fringes of gravel, too lean to drift but rich enough in most cases to hydraulic.

The gravels in the Upper Bonanza hills, considered rich enough to be hydrauliced at a profit, include all those in the original paystreak, hose in a band behind the paystreak varying in width on the different

hills from 100 to 200 feet and those between the paystreak and the present valley. The gravels in the back portion of most of the hills are too lean to be worked by any method.

The volumes of workable gravels on the various hills are estimated as follows:—

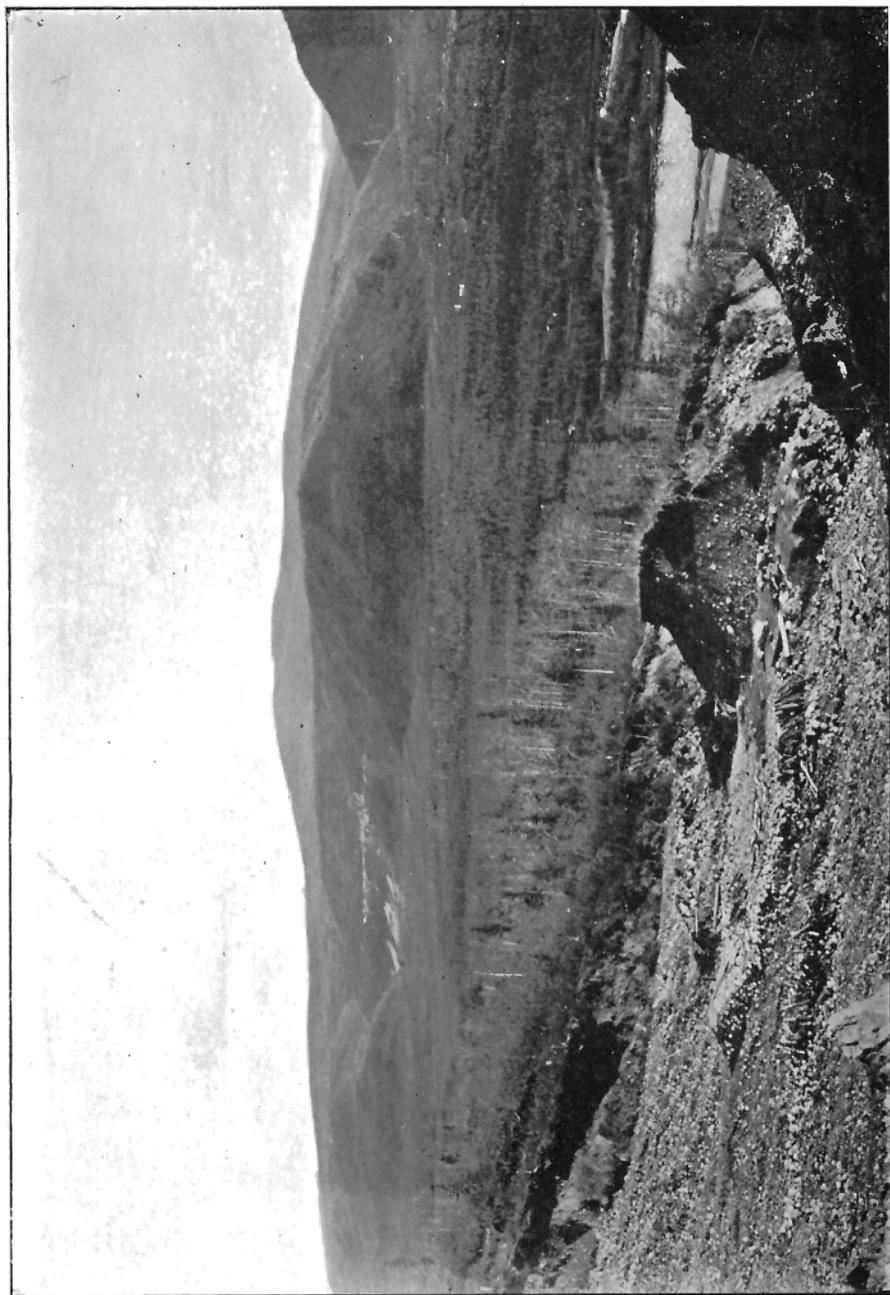
Bunker	850,000 cu. yds.
French	570,360 “
Gold	1,779,650 “
Chechaco	3,752,914 “
Adams	2,379,000 “
Magnet	395,677 “
American	1,989,218 “
Orofino	5,533,000 “
Monte Cristo	1,853,150 “
King Solomon	4,681,087 “
Boulder	332,000 “
Total	24,116,056 “

The average values in these gravels are estimated at 34.05 cents per cubic yard and the amount of recoverable gold at \$8,213,532. These figures are based on the results of the small hydraulic operations now in progress on most of the hills and on information obtained from private sources. The values are distributed so irregularly that it was considered a closer estimate could be formed in this way than by a limited amount of sampling done by ourselves.

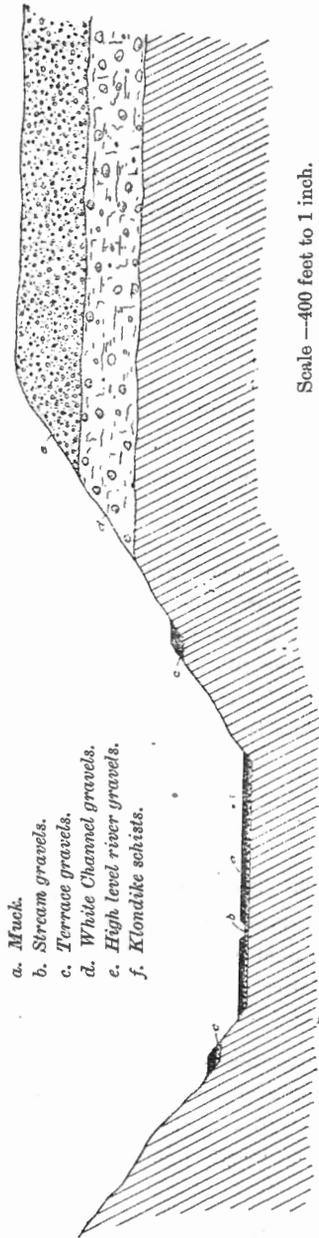
Lower Bonanza Hill Gravels.

Between Boulder and Cripple hills, a distance of three miles, the hill gravels bordering Bonanza creek are unimportant. A few small areas have been preserved at various points on both sides of the valley but these represent largely the lean rim gravels of the old deposit. The central portion containing the paystreak has been almost entirely destroyed.

Below Cripple creek pay gravels are again preserved on the benches, but occur on the right limit, the paystreak having crossed the valley. They extend through from Cripple creek to the Klondike valley, a distance of three miles, except where cut across by Trail and Lovett gulches. These gulches separate the gravels into three areas known as Cripple, Trail and Lovett hills.



LOVETT HILL AND MOUTH OF BONANZA CREEK.
View looking south across the valley of the Klondike river.



- a. Muck.
- b. Stream gravels.
- c. Terrace gravels.
- d. White Channel gravels.
- e. High level river gravels.
- f. Klondike schists.

Scale —400 feet to 1 inch.

GENERALIZED SECTION ACROSS THE LOWER PART OF BONANZA VALLEY.

Below Cripple creek the present Bonanza valley bends to the left away from the old valley and joins the Klondike some distance lower down. In consequence of this divergence only a small proportion of the gravels of the old valley on Trail and Lovett hills has been destroyed and the paystreak, except where cut transversely by gulches, has been preserved intact.

The volume of White Channel gravels on Lovett hill exceeds 71,000,000 cubic yards, an amount almost equalling the combined volumes on all the other hills bordering Bonanza creek. The deposit has a thickness in the centre of the channel of 168 feet and a width of 5,200 feet. It occupies a wide shallow depression in the Klondike schists and is overlaid and overlapped on both rims by 150 feet of younger gravels deposited by the Klondike river.

The White Channel gravels on Trail hill above Lovett hill have a thickness of 230 feet. They are overlaid in places by Klondike River gravels but are not completely buried as on Lovett hill.

The volumes of White Channel gravels and overlying Klondike gravels on the three lower Bonanza hills are as follows:—

Cripple hill (White Channel gravels)	7,820,460 cu. yds.
Trail hill (partly Klondike gravels)	22,235,390 “
Lovett hill (White Channel gravels)	71,366,370 “
“ (Klondike River gravels)	66,997,230 “
Total	168,419,450 “

These figures include all the White Channel gravels both in and off the paystreak, but only those portions of the Klondike River gravels which overlie the White Channel gravels and which would be required to be washed away if the latter were hydrauliced.

These lower Bonanza hills, although originally much lower in grade than the Upper Bonanza hills, are now almost as important economically, as they have been mined to a much less extent. The production to date is estimated at \$750,000, mostly obtained by drifting.

The paystreak is remarkably wide and very uniform in grade. It is partially destroyed on Cripple hill but on Trail and Lovett hills where fully preserved has a width of from 1,000 to 1,400 feet.

The workable gravels are practically limited to the paystreak. The volumes are estimated as follows:—

Cripple hill—White Channel gravels.....	614,910	cu. yds.	
Trail hill—Mostly White Channel gravels.....	11,802,250	“	
Lovett hill {	White Channel gravels.....	23,503,770	“
	Overlying Klondike River gravels....	14,511,760	“
		<hr/>	
	50,432,690	“	

The average grade of these gravels is estimated at 14.9 cents per cubic yard and the amount of recoverable gold in the three hills at \$7,528,720.

The low general average, notwithstanding values of over a dollar per square foot of bedrock, is due to the exceptional thickness of the gravels over the greater portion of Lovett hill, amounting to fully 300 feet, of which the upper 200 feet are practically barren. The values in Cripple and Trail hills, and the rim portions of Lovett hill, considerably exceed the general average, while these in the central portion of Lovett hill are somewhat less.

Summary of Bonanza Creek workable Hill Gravels.

	Volume.	Estimated Values.
Upper Bonanza hills.....	24,116,056 cu. yds.	\$ 8,213,532
Lower Bonanza hills.....	50,432,690	“ 7,528,720
		<hr/>
Total.....	74,548,746	“ \$15,742,252

Average estimated yield per cubic yard, 21.1 cents.

Total quantities of high level gravels along Bonanza creek.

Upper Bonanza hills (White Channel gravels).....	45,326,889	cu. yds.
Small hills between Boulder and Cripple hills not measured, estimated at.....	3,500,000	“
Lower Bonanza hills (partly Klondike gravels).....	168,419,450	“
		<hr/>
	217,246,339	“

Hunker Creek White Channel Gravels.

Bench gravels belonging to the White Channel period are extensively developed along Hunker creek but are much lower in average grade than

those on Bonanza creek. They have been mined at various points both by the drifting and hydraulic methods with an estimated production up to the present of \$2,500,000, the greater part of which came from Whisky hill, a small rich hill in the upper part of the valley. The generally inferior average grade of the Hunker Creek hill gravels as compared with those on Bonanza creek is due partly to their leaner condition originally, and partly to the fact that along the richest portions of the creek the paystreak of the old valley has been almost entirely destroyed and the gold contents washed down to the level of the present valley.

Upper Hunker Creek Hill Gravels.

The White Channel gravels are first met with descending Hunker creek above No. 6 pup. The occurrence here is small and the gravels although workable are comparatively low grade. Immediately below No. 6 pup is the famous Whisky hill. A short stretch of the old paystreak has been preserved at this point. The upper and richer portion of the hill has been hydrauliced completely away with a production variously estimated up to \$2,000,000 and probably approximating \$1,500,000. The lower portion of the hill is only partially worked out and still contains 199,400 cubic yards of workable gravels. The gravels are shallow, averaging about twenty-five feet in depth.

The gravels of the old channel are destroyed for some distance below Whisky hill, but appear again on the left limit on Delhi hill above Gold Bottom creek.

The Delhi Hill gravel area is comparatively small, measuring about 136,000 square yards. The gravels have an average depth of about twenty-five feet and a total volume of 1,121,080 cubic yards. The workable gravels are estimated at 869,450 cubic yards. The values are moderate except along the rim, where a few small fragments of the old paystreak were preserved. Some hydraulicing is being done on the hill with water brought from Upper Hunker creek, and a second ditch to a point on Gold Bottom creek is under construction.

Temperance hill immediately below Gold Bottom creek is covered by a triangular patch of gravel extending up Gold Bottom for a distance of 4,000 feet and down Hunker creek for 1,700 feet. The gravels are thin, seldom exceeding thirty feet, and averaging less than twenty-five feet in thickness. They are less compact than usual, and as a result of this most of the gold has settled down close to bedrock. The Temperance Hill gravels measure altogether 1,590,580 cubic yards, of which 788,750 cubic yards are considered to be workable.

Temperance hill has been a steady producer on a moderate scale since the early days of the camp, and is still of considerable economic importance. Some ground rivalling in richness that on the best Bonanza hills occurred along the rim at the junction of Gold Bottom and Hunker valleys. This is now largely worked out but portions of the hill still contain good values, occasionally exceeding 50 cents to the cubic yard. The back gravels as usual proved lean. Three small hydraulic plants operating with water obtained from tributaries of Gold Bottom creek are at work on the hill.

From Temperance hill down stream to Nugget hill above Hunker creek the central portion of the old high level channel, including the paystreak, has been destroyed. Portions of the rim gravels have been preserved at various points, some of which carry moderate values. An hydraulic plant has been installed to work two small areas below Bee gulch. These were estimated to contain 859,200 cubic yards of gravel.

At Nugget hill the paystreak of the old channel bends to the left and is again partly preserved. The upper part of the hill is lean but good values were obtained from the lower portions. The gravels are shallow, averaging about twenty-five feet in depth, and measure altogether 1,608,300 cubic yards. The workable gravels were estimated at 1,200,000 cubic yards. Nugget hill has been fairly well prospected but very little mining has been done on it owing to the difficulty of obtaining water. A small hydraulic plant is now in operation.

Summary of workable Gravels in Upper Hunker Hills.

Whisky hill	199,400 cu. yds.
Delhi hill	869,450 "
Temperance hill.	788,750 "
Williams concession.	859,200 "
Nugget hill.	1,200,000 "
	3,916,800 "

Estimated average grade, 25.2 cents per cu. yds.

Total valuation, \$988,000.

Hill Gravels between Hester and Last Chance Creeks.

A wide band of White Channel gravel borders the left limit of Hunker creek continuously except when cut across by Eighty pup from Hester creek down to Last Chance creek, a distance of over two miles. The deposits of the old valley in this stretch were originally over a mile in

width in places. They have been partially destroyed as the present Hunker valley has been sunk through them. The preserved portion on the left limit has a width of from 800 to 3,000 feet, an average depth of about sixty feet, and contains altogether 25,850,000 cubic yards of material. A few small areas occur also on benches on the right limit but are unimportant.

The upper portion of the gravel area on the left limit from Hester creek down to Seventy pup is known as Paradise hill, and is the most important stretch of hill gravels on Hunker creek, with the possible exception of Dago hill.

The Paradise Hill gravel area has a length of 2,500 feet, and an average width of 1,500 feet. The gravels have an average depth of about sixty feet, and measure altogether, including the muck and slide material which cover them, on the back rim, 7,786,000 cubic yards. The workable gravels are estimated at 5,285,000 cubic yards.

The average grade proved somewhat difficult to determine on account of the exceedingly irregular distribution of the gold through the gravel and the absence of a satisfactory section across the paystreak. It is estimated at 23 cents per cubic yard, and the gold contents of the workable gravels at \$1,215,500. This figure is based partly on mining returns and partly on a systematic sampling of all the available shafts and hydraulic cuts in the area. The best values occur in the upper part of the hill. Towards Seventy pup the gold diminishes both in quantity and coarseness.

Considerable mining, both by the drifting and hydraulic methods, has been done on Paradise hill, and two small hydraulic plants are now in operation.

The wide belt of White Channel gravels extending from Seventy pup to Eighty pup, a distance of 3,400 feet, is low grade everywhere so far as known. No definite paystreak has yet been located, although numerous shafts have been sunk for that purpose to bedrock throughout the area. The absence of a hill paystreak is somewhat remarkable as the bordering creek gravels are also lean, showing that it has not been destroyed. The gravels between the two pups have a depth in places of over a hundred feet and a total volume of 11,234,000 cubic yards. The gravels assumed to be workable include a small area below Seventy pup measuring 1,500,000 cubic yards, estimated at 13 cents per cubic yard, and portions of the rim gravels along Eighty pup. The latter are roughly estimated at 1,000,000 cubic yards, with a grade of 15 cents per

cubic yard. The probable production of the hill is estimated at \$345,000. No mining has been done on the hill.

Preido hill between Eighty pup and Last Chance creek is also comparatively low grade as a whole, but contains some gravels carrying good values in coarse gold on the Last Chance slope. The Preido Hill gravels cover an area of 474,000 square yards, have a maximum depth of ninety feet, an average depth of forty-three feet and a total volume of 6,828,000 cubic yards.

The best values occur in a belt crossing the centre of the hill, 1,600 feet wide on the Last Chance slope and 1,100 feet on the Eighty Pup slope. Samples from shallow shafts and hydraulic cuts along the Last Chance rim indicated an average grade of 35 cents per square foot of bedrock. Those obtained from the Eighty Pup slope were much lower, averaging only 15 cents per square foot of bedrock. The zone defined above contains 3,093,530 cubic yards of gravel, estimated to average 15 cents per cubic yard, a total valuation of \$464,000. This estimate is based on the assumption that the values obtained at the rims continue to the centre of the hill.

Summary of Values in Gravels between Hester and Last Chance Creeks.

	Workable Gravels. cu. yds.	Values. \$
Paradise hill.....	5,285,000	\$1,215,500
Hill between Seventy and Eighty pups	2,500,000	345,000
Preido hill.....	3,093,530	464,000
	10,878,530	\$2,024,500

Average grade, 18.6 cents per cubic yard.

Last Chance and Lower Hunker Creek White Channel Gravels.

Dago hill below the junction of Last Chance and Hunker creeks is covered by a large and important body of high level gravels. The gravel area deposit has a maximum depth of 100 feet, an average depth of 68.5 feet and covers a triangular shaped area 862,000 square yards in extent. The total volume of gravels on the hill measures 19,639,000 cubic yards.

Dago hill is crossed diagonally by a well defined coarse gold paystreak, 3,700 feet in length and from 300 to 500 feet in width. The workable

gravels have an estimated width of 600 feet (as the main paystreak is fringed with gravels carrying some values), and measure 6,423,000 cubic yards. The average grade calculated from the values obtained in sampling two sections across the paystreak is estimated at 19 cents per cubic yard.

In addition to the gravels on and bordering the main pay streak, portions of the rim gravels along Last Chance creek, roughly estimated at 750,000 cubic yards with a grade of 15 cents per yard, can probably be worked.

Total quantity of workable gravels, 7,173,000 cubic yards.

Estimated average grade, 18.6 cents per cubic yard.

Probable production, \$1,332,870.

Last Chance creek is bordered on the left limit for one and a third miles along Dago hill by a number of small areas of rich hill gravels. Considerable mining has been done on all the areas and a couple of them have been worked almost completely away. The two most important areas at present are Treasure and Discovery hills. These still contain 2,173,000 cubic yards of gravel, estimated to average 24.1 cents per yard. Probable production, \$524,000.

From Dago hill the White Channel deposit crosses the present Hunker valley to Australia hill, a small gravel-covered plateau separating Hunker creek from the Klondike river above their junction. The White Channel gravels on Australia hill cover an area of 1,586,000 square yards, have a thickness in places of over a hundred feet and a volume of 35,947,000 cubic yards. They are overlaid, as on Lovett hill at the mouth of Bonanza creek, by barren Klondike River gravels. The latter overlap the White Channel gravels on the Klondike River side. The portion resting on White Channel gravels has a thickness of 130 feet and a volume of 39,200,000 cubic yards.

Australia hill, although the largest both in extent and volume of gravels of all the Hunker hills, has so far proved of little economic importance. No definite paystreak crossing the hill has been located, and the chances are that none exist as the hill, apart from our own sampling, has been fairly well prospected. Coarse gold was found at one point near the mouth of Hattie gulch, and pay values are reported to have been found in a drift farther up the creek. The drift at the time of our visit was inaccessible. Samples from the rim near-by carried only light values. While some production may be expected from Hattie gulch, no definite statement in regard to the amount can be given. It is placed at \$150,000,

but this figure can only be regarded as a rough guess and may be largely exceeded.

Summary of Hunker Creek workable Hill Gravels.

	Volume. Cu. yds.	Values. \$
Upper Hunker hills.....	3,916,800	988,000
Hills between Hester and Last Chance creek.....	10,878,500	2,024,500
Hills below Last Chance creek (exclusive of Australia hill)....	9,346,000	1,856,870
Australia hill.....		150,000?
	24,141,300	\$ 5,019,370

Estimated average grade (exclusive of Australia hill), 20.17 cents per cubic yard.

Total quantities of White Channel Gravels and overlying Klondike Gravels along Hunker Creek.

	cu. yds.
Small hills above Hester creek.....	5,378,600
Hills between Hester and Last Chance creeks....	25,850,000
Dago hill.....	19,639,000
Last Chance hills.....	2,950,000
Australia hill	{ White Channel gravels..... 35,946,770
	{ Klondike River gravels..... 39,200,000
Small hills, not measured, estimated at.....	3,000,000
Total.....	131,964,370

Klondike River High Level Gravels.

High level gravels, usually at an elevation of from 200 to 300 feet above the valley flats, occur at various points along the Klondike river. These gravels differ altogether in character and appearance from the White Channel gravels of the creeks. The pebbles are smaller and more rounded, and consist mostly of slate, diorite and quartzite derived from the mountains of the Ogilvie range.

The Klondike River gravels as a rule carry only light values, but below the mouth of Bonanza creek they have been enriched and in places contain gold in commercial quantities.

The two most important areas of these gravels discovered so far occur on benches bordering the Klondike river at its mouth. These two areas contain approximately 4,780,000 cubic yards of gravel considered to be workable. The grade based on a somewhat hurried sampling of the various cuts and shafts is estimated at 20 cents per cubic yard. Probable production, \$956,000.

General Summary of Probable Production of High Level Gravels.

	Volume of workable gravels. cu. yds.	Estimated Values. \$
Bonanza creek.	74,548,746	15,742,252
Hunker creek.	24,141,300	5,019,370
Klondike river.	4,780,000	956,000
	103,470,046	\$21,717,622

Low Level Gravels.

The following estimates of the values remaining in the Klondike creeks are based mostly on data obtained from miners and others, as no satisfactory sampling of the creeks in addition to the hills in the time at our disposal was possible.

Eldorado Creek.

The rich paystreak in Eldorado creek, originally the richest in the district, has been pretty thoroughly worked, portions of it twice over. Experience in re-working claims has, however, shown that few if any were completely exhausted. This has proved to be the case not only in drifted claims but in those which were worked by the open cut method. The old tailings are also expected to yield a considerable sum when re-sluciced. The Eldorado paystreak has a length of about four miles and its production up to the present is estimated at \$25,000,000. The probable future output is placed at \$2,600,000, an average of \$65,000 a claim.

Upper Bonanza Creek.

Upper Bonanza creek, the portion above Eldorado forks, proved rich up to Victoria gulch, a distance of about four miles. The paystreak in places rivalled that on Eldorado creek in richness, but the general

average grade was considerably lower. It has been less thoroughly worked on the whole and at the present time the claims probably average somewhat higher than those on Eldorado creek. The past production is estimated at \$15,000,000 and the future at \$3,225,000.

Lower Bonanza Creek.

Lower Bonanza creek has a length of about ten miles and is more or less auriferous throughout. The grade decreases as a rule down stream, but in an irregular manner, enrichments occurring at various points along the valley. Some of the claims a short distance below the forks proved very rich, and few unproductive claims occur from the forks down stream for seven miles. In the lower portion the valley flats increase in width, the gold is less concentrated and the gravels, except in a few places, have not been drifted. Preparations are now being made to dredge them and it is believed that there are few, if any, claims on the creek which cannot be profitably worked or reworked by this method.

The irregular grade of the Lower Bonanza Creek gravels has resulted in portions of the valley being well worked, while considerable stretches are still practically virgin and others are only partially worked. The production up to the present time, including that from the rich tributary gulches, is estimated at \$11,000,000 and the future production at a minimum of \$11,500,000.

Klondike River Flats.

The Klondike River flats are expected to produce largely in the future. The work of the past season has led to the belief that the high level White Channel gravels of Bonanza, Bear and Hunker creeks originally extended for considerable distances out over what is now the valley of the Klondike and were destroyed during its excavation and the gold contents scattered along the river flats. Rich gravels have been found in the Klondike River flats below the mouth of all these streams. Evidence was obtained indicating that the destroyed portion of the old Bonanza high level valley was at least a mile in length. The destroyed portion represents the extension of the Lovett Hill gravels and for some distance must have been equally as rich. Allowing for diminishing values down stream it is estimated that they contained gold to the value of at least \$4,000,000 and possibly \$5,000,000. The gold contents of the destroyed lower portions of the old valley gravels of Bear and Hunker creeks are roughly estimated at a minimum of \$3,500,000.

Two dredges, one below the mouth of Bear creek and the other below the mouth of Bonanza creek, are at present working successfully on the Klondike River flats. The total production to date, partly obtained by dredging and partly by drifting and open cut work at the mouth of Bear creek, is estimated at \$1,000,000.

Bear Creek.

Bear creek is comparatively low grade compared with Bonanza or Eldorado creeks, but contained some rich ground near its mouth. It is estimated to have produced gold to the value of \$1,000,000 and the probable future production is placed at \$600,000.

Hunker Creek.

The Hunker Creek gravels, like those of Lower Bonanza creek, varied greatly in grade along the valley.

A long, almost continuous, stretch of pay gravels extended from a point a short distance below Hester creek up stream for eight miles and occasional good claims have been worked for a further distance of two and a half miles. Most of the claims in the eight-mile stretch carried good values and some of them, especially around discovery claim and in the thirties and forties below, were very rich. They have all been more or less completely worked, mostly by the drifting method. Lean ground commences below Hester creek, and with the exception of three claims below the mouth of Seventy pup, and a short stretch near the mouth of Last Chance creek, continues down so far as known nearly to Dago pup, a distance of three miles. Portions of the mile stretch between Dago pup and the mouth of the creek proved very rich. These lower gravels are probably the richest on the creek at present as they have been less thoroughly worked than the once rich stretches above Hester creek.

The production of Hunker creek up to the present, including that from the tributaries Last Chance, Hester and Gold Bottom creeks, is estimated at \$14,000,000, while the amount of recoverable gold remaining is placed roughly at \$7,500,000. The data for this determination are more meagre than on the other creeks as little is known of the possibilities of the three mile lean and mostly unworked stretch above Dago pup. Light drifting values occur in places and it is probable that a considerable portion of it carries dredging values.

SUMMARY OF ESTIMATED VALUES IN LOW LEVEL GRAVELS.

Eldorado creek.....	\$2,600,000
Upper Bonanza (above the Forks).....	3,225,000
Lower Bonanza.....	11,500,000
Klondike River flats.....	6,500,000
Bear creek.....	600,000
Hunker creek (with tributaries).....	7,500,000
	<hr/>
	\$31,925,000
	<hr/>

GENERAL SUMMARY OF ESTIMATED PAST PRODUCTION AND PROBABLE FUTURE OUTPUT OF ELDORADO, BONANZA, BEAR AND HUNKER CREEKS AND THE KLONDIKE RIVER, HILL AND VALLEY GRAVELS.

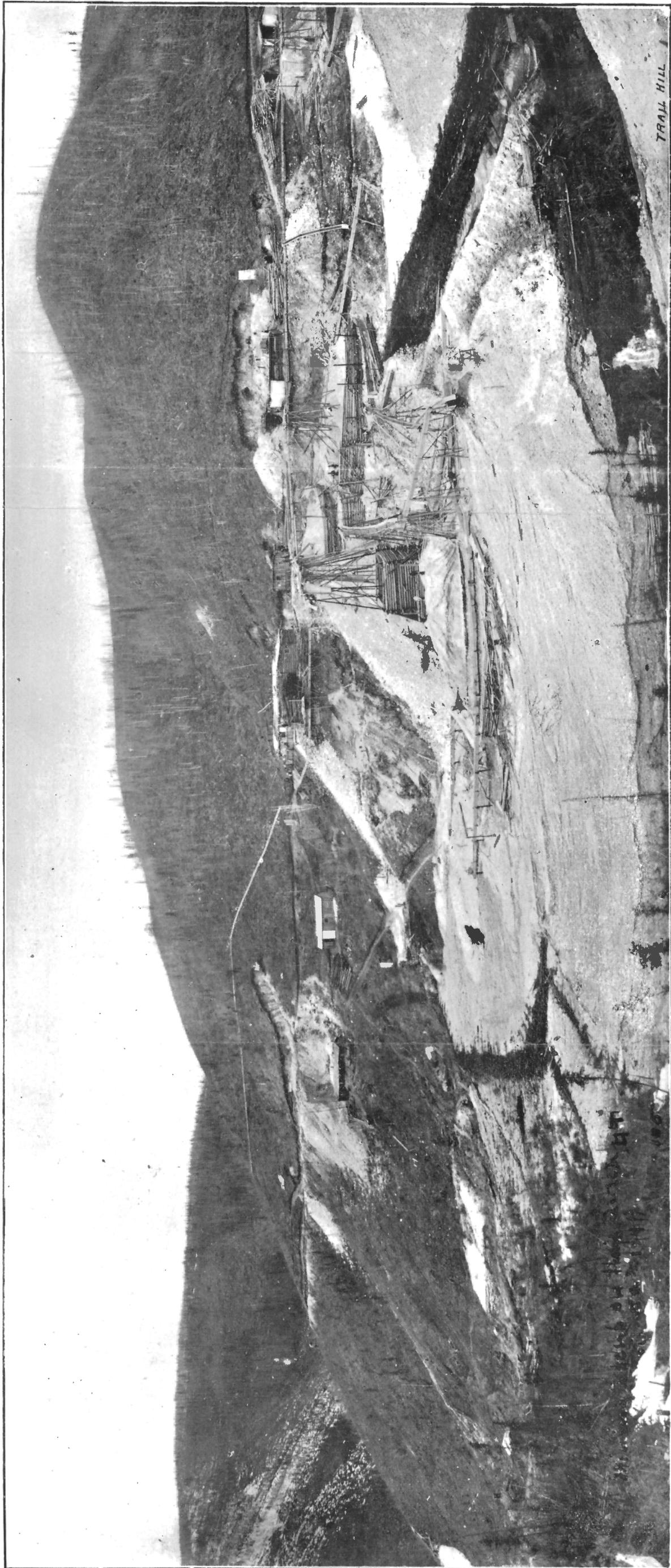
	Estimated past production.	Estimated future output.
Eldorado creek.....	\$25,000,000	\$ 2,600,000
Upper Bonanza creek.....	15,500,000	3,225,000
Lower Bonanza creek.....	11,000,000	11,500,000
Klondike River flats.....	1,000,000	6,500,000
Bear creek.....	1,000,000	600,000
Hunker creek.....	14,000,000	7,500,000
	<hr/>	<hr/>
	\$67,500,000	\$31,925,000
	<hr/>	<hr/>
Upper Bonanza and Eldorado hills.....	24,000,000	8,213,532
Lower Bonanza hills.....	750,000	7,528,720
Klondike River Hill gravels.....	Small production.	956,000
Hunker Creek hills.....	2,500,000	5,019,370
	<hr/>	<hr/>
	27,250,000	21,717,620
Creek values brought down.....	67,500,000	31,925,000
	<hr/>	<hr/>
Totals.....	\$94,750,000	\$53,642,620
	<hr/>	<hr/>

This estimate of the amount of recoverable gold remaining in the various Klondike creeks and benches is based, as stated previously, on sampling done by ourselves, on the results of actual mining operations and on information obtained from various miners, and is believed to be a reasonably close approximation. It, however, only represents present knowledge, and no allowance is made or can be made for fresh discoveries of rich spots, the day for which, as shown by a recent find on Hunker creek, is not altogether passed, notwithstanding the thorough manner in which the district has been explored. While it is unlikely that any large area of rich gravel has escaped detection minor discoveries may be expected as long as mining lasts and on this account any estimate is apt to be somewhat under rather than over the mark.

INDIAN RIVER CREEKS.

The estimate of values given above does not cover the whole of the Klondike district, as the creeks on the Indian River slope, including such important producers as Dominion, Gold Run, Sulphur and Quartz creeks, were not examined. These streams are estimated to have produced gold to the value of \$24,250,000, making the total production of the camp to date \$119,000,000. They have not been worked, on the whole, as thoroughly as the Klondike creeks, and the percentage of unmined gold is probably somewhat higher. A production of from eight to ten million dollars may still be expected from them.

The production of the Indian River creeks has been obtained mostly from the low level creek gravels. Bench gravels carrying good values occur at some points, notably along the central portions of Dominion and Quartz creeks, but their total yield has been relatively small.



TRAIL HILL.

TRAIL HILL