

Report of J. B. Stetson
on the
Greenville Placers
for
Geo E. McAmey
1901

REPRODUCED FROM THE ORIGINAL
IN THE HENRY E. HUNTINGTON
LIBRARY AND ART GALLERY
FOR REFERENCE ONLY
PERMISSION NECESSARY FOR
REPRODUCTION

REPORT OF THE EXAMINATION OF THE

GREATERVILLE

PLACERS

FOR MR. GEORGE B. Mc ANENY

FOREWORD:

For and in accordance with the instructions of Mr. George B. McAneny of Lawrence, California, I have made an examination of the gravel deposits at Greterville, the results of which are presented herewith.

LOCATION:

Greterville is a small settlement or camp situated in Pima County, Arizona, in the foot-hills east of the Santa Rita Mountains which is the highest range in that part of the country, and is 40 miles southeast of Tucson and 8 miles northeast of Sonoita, a flag station on the Nogales and Mexico branch of the Southern Pacific Railroad connecting with main line at Benson.

TOPOGRAPHY:

The surface of the placer area is cut by a number of parallel gulches whose general course is from northwest to southeast, a few of which head in Granite Mountain, a high granite butte a mile southwest of Greterville. These gulches are separated by high ridges ending in mesas and bare of gravel. Greterville forms very nearly the center of these deposits of auriferous gravel, the greatest volume of which is encountered in the gulches. There are several exceptions however to this general description of the gulches.

Nigger Gulch lies on the west or opposite side of Granite Mountain, heading in the east side of Quebec Mountain, flows east

to the base of the former, thence south and thence west toward the foot of Quebec Mountain.

The Chispa, a small gulch tributary to the Empire, heads in a high ridge immediately north of Greaterville and pursues a northerly course for a distance of about 3000 feet where it runs into Empire Gulch.

Hughes Gulch is situated to the westward of the main placer area, heading in the higher ridges to the west, it assumes a more easterly course and contains no auriferous deposits of gravel until it forms, in passing, the northern limit of Quebec Mountain; for the remainder of its length it forms the northwestern limit of the placers, forming a junction with the Ophir Gulch at Greaterville.

Louisiana Gulch heads in the high ridge which forms the southern boundary of Ophir Gulch. Its course is more nearly south.

All of the gulches in the district contain deposits of auriferous gravel at their heads excepting the Empire, Ophir, and the Hughes Gulch which has already been mentioned in this respect.

Empire Gulch contains a gold bearing gravel below the junction formed with it by Chispa Gulch but not above this point, while Ophir Gulch carries no values above the junction of the Hughes.

SOURCE OF THE GOLD:

The origin or source of the gold present in the gravel deposits has never been determined and there are several theories to account for its occurrence, one of which attributes its origin to Granite Mountain. This seems likely. What is most probable is that the gold has been washed down into the gulches from the ridges that separate them and which contain numerous veins and evidence of a large body of auriferous rock of which I am sending 3 sacks of samples for assay.

HISTORY:

For convenience I have divided the history of the district into 3 periods and shall refer to them in the following description as:

Period One - Embracing the years 1874 to 1878 (inclusive)

Period Two - Embracing the years 1879 to 1889 (inclusive)

Period Three - Embracing the years 1890 to 1901 (inclusive)

For many years previous to the discovery of the placers in the Greaterville district mines of gold and silver had been discovered and worked at various points in the Santa Rita Mountains by the early Spanish adventurers and clergy who made their way into the surrounding from Mexico during the latter part of the 16th century, claiming it for the Spanish Crown. Several hundred years later Mexican independence was accomplished and a short period of Mexican dominion followed. The war between the United States and Mexico, and the Gadsden Purchase brought this region within the domain of the United States and it was during the interval that followed that the Quebec, Yuba and other mines, principally of silver, were discovered and worked within the area that is now embraced in the Greaterville mining district. These mines shipped their ores to Yuma by ox-team, for reduction in spite of the constant Indian menace, and the several hundred miles of very difficult haul across the desert. This brings us down to the beginning of Period One.

Period One - 1874 to 1878 inclusive.

The gravel deposits near Greaterville were discovered by a man named Smith in 1874. The discovery was almost immediately followed by the usual influx of miners until within a short time there were about 80 Americans and some Mexicans and Indians in

the camp. I am particularly indebted to Mr. J. P. Coyne, a very quiet and conservative man and one of the early arrivals and for a long time recorder of this district, who has recently returned here from a two years trip to Alaska, for much of the history and records of the placers. Mr. Coyne states that a man known as Hefty cleaned up \$40,000 in one season on his claim on Los Posas Gulch. That a Mexican by the name of Lopez cleaned up \$15,000 on his claim on Kentucky Gulch and that a man, David Hawshaw, with two men helping him, in five months cleaned up \$25,000 from his claim in Hawshaw Gulch. Mr. Fred Hughes recovered over \$100 a day with two men working on his claim in Hughes Gulch. Mr. Coyne recovered over \$50 a day working alone on his claim situated on the mesa south of the Ophir Gulch at Greaterville. Mr. Daniel Johnson recovered \$40 per barrel of gravel on his claim in Boston Gulch. These are well authenticated instances of exceptional high values and there are numerous others of the same character.

All operations were carried on with rocker and pan and with very little water which was then procured at Kane's well about five or six miles distant, packed in to the placers and sold to the miners by the burro load. Others, where possible, hauled their gravel to this well to be washed there. The cost of water and the transportation of the gravel was very excessive and the extraction very low due to the crudeness of the methods employed, the scarcity of water compelled the miners to use it over and over until it became so thick that it was perforce deprived of the power to perform its function.

With the spread of the news of the strike at Greaterville together with the rumors of the richness of the gravels, much interest was aroused. With the advent of the new arrivals, some coming from great distances, the placer area became enlarged through new discoveries

until now the original placer area comprises about 4000 acres. This is probably the extent of the placers in-so-far as sufficient that was procurable with the methods then and up to the present employed to extract the values, but there are adjacent thousands of acres of virgin ground that will yield excellent returns with the employment of modern methods of placer mining and urge the acquirement of these tracts also as they will compare in values contained most favorably with much of the original placer area at present.

During this period the camp saw its greatest activity and the greatest production of gold was attained and which is claimed to have exceeded by several times the production recorded during Period Two from 1879 to 1889 inclusive which is much more than one million of dollars. For the first decade following discovery, owing to its remoteness, Indian troubles, unsettled condition of the country and the lack of the proper facilities there is no complete record of the amount of gold recovered during this period and part of the following period. Commercial channels and transactions and those with the banks, Well-Fargo Co. and the Mint present the only sources of information procurable and even some of these are not now available. However, such as I have had the opportunity to go over tend quite fully to substantiate the claims made of the production for this and the ensuing periods and it is fairly safe to conclude that owing to circumstances already referred to a rather large proportion of the gold produced during the first decade following discovery was disposed of through various other channels impossible to trace at this late date. I am indebted to the Zeckendorf Co. and Consolidated National Bank of Tucson and Messrs. Young, Enzenberg and Coyne, former merchants and postmasters of Greaterville and others for the information obtained.

Period Two - 1879 to 1889 inclusive.

About the beginning of this period some of the richer claims had

been worked over and other valuable discoveries were being made. However within a few years there was a noticeable lessening in the value of the clean-ups as the placer area became more extended. Some of the first miners to enter the district had left with large quantities of gold and others took their places. During all of this period the values recovered were high but not as high as during Period One. The latter part of this period was marked by the greater portion of the placer area being worked over, the working of poorer ground and the abandoning of the district by some of the early miners and a corresponding increase of Mexicans and some Indians.

More efficient mechanical means, adapted to the local conditions were soon being ^{sought} ~~seuthe~~, or those who would supply them, for working the claims or rather the gravels thereon, by those of the early miners who had worked over their claims. This effort culminated in a number of dry-washers and hydraulic machines being introduced into the district. The character of the gravels precluded successful dry-washing and there is no need to dwell upon the merits of the various hydraulic machines, so-called, in existence at that time. Needless to say one failure after another was recorded. However, there was no disposition to attribute the failures to the poverty of the gravels.

For instance two companies tried to operate in the Louisiana Gulch and both without success, one company spent \$25,000 in the effort. Their machines recovered a small amount of gold but not enough to cover the cost of the operation while those employed to sink shafts to test the ground to be worked recovered a little better than \$8 a day with rocker and pan. Several attempts of a similar character were made on Kentucky Gulch but without success; a Mr. Wemple, the superintendent of one of these companies was killed by the Apaches several miles from his camp.

It was about this time, I am informed by Mr. Thomas Borton,

attorney of Tucson, that the Baron Von Viente, A Russian engineer, seeking investments for European capital visited this district and remained for a considerable time testing and mapping the placer area at considerable expense. Mr. Borton who was not then an attorney and who had been working in the placers assisted him and exhibited to me copies of some of the maps and data then secured. The Baron Von Viente lost his life in returning to Europe following the completion of his investigation.

The latter part of this period brought the railroad running to Nogales with a flag station at Sonoita, about 8 miles from Greaterville and marked a further decrease of Americans in the camp and an increase in Mexicans. About \$1,500,000 in gold was the approximate production for this period and is confirmed by the records already referred to and to which I have had access. It is estimated that half as much more was recovered from the district of which there is no record.

Period Three - 1880 to 1901 inclusive.

This period is marked after the first few years, by a lessening of activity in the placer area. Some of the Americans that still remained devoted much of their time in an endeavor to discover new placers in the surrounding country while others continued to work lower grade gravels. However, some gave up placer mining for the most part to engage in an effort to discover the source of the gold found in the gravel deposits. The entire Mexican population gained their living in intermittent work in the placers.

Several attempts were made during this period to interest capital in the district but owing to a lack of co-operation and initiative among the various claim holders and insufficient knowledge and understanding of the value of the ground for modern mining methods together with the apparent scarcity of water in the immediate vicinity, no area sufficiently large of placer ground could be secured to

warrant investigation with a view of developing water and determining the average value of the gravels. The foregoing conditions of the extensive gravel deposits in Mexico all contributed to prevent any progress in this direction. However, a few years ago a Mr. Magee undertook to consolidate the individual holdings and discover and present adequate sources of water supply supplemented by a report on the value of the gravel deposits in order that capital could be interested in the district.

During this period about \$600,000 in gold was produced, most of which was during the early years with a constantly decreasing productivity toward the end, when placer mining in the district had practically been given over almost wholly to the Mexicans who worked everywhere.

GRAVEL DEPOSITS: These are encountered principally in the gulches of the district, the adjacent banks, and in the projecting and dividing bars and mesas. The gulches at their heads are narrow but broaden as they run eastward, presenting more extensive volumes of gravel for treatment of greatly increased depth. The values are discovered to exist in the red clay, the banks, mesas and bars and throughout the beds of the gulches. The character of much of this ground precludes the successful use of the dry method of extraction. Workable deposits are also encountered at a number of points in the caliche, soft partially lime-cemented gravels, underlying bedrock wherein recurring strata of gold-bearing gravels are present.

The overburden of the district consists principally of a reddish clay impregnated soil which carries very fair values from the surface to the "pay-streak." The latter consisting of a concentration of values lying on bedrock and averaging 2 ft. 4 $\frac{1}{2}$ inches in thickness. However while most often the greatest values are found in concentration on bedrock, this is not always so for in many

instances the greatest values are found in the over-burden.

The pay-streak or concentrated values in the gravels lies immediately under the over-burden and on bedrock and while very generally assuming much the same appearance as that of the over-burden, it contains less clay and more lime, is of greater density and is distinguished by a greater proportion of iron, sand and coarse gravel.

The gravel deposits of this area are free from much stumpage, large growing trees, sunken logs, large boulders and other impedimenta which are so often encountered and the character of the gravels are such as to render them most easily handled by hydraulic dredging and steam-shovel mining.

The bedrock encountered throughout the greater part of the examination consisted chiefly of small boulders of quartz, porphory, schist and other country rock, sharp and irregular in shape and not averaging more than 5 inches at their greatest diameter and partially cemented.

While pursuing the investigation Mr. Coyne mentioned that the cement, as it is termed here, indicating the soft, lime-cemented gravels underlying bedrock at various points throughout the district, sometimes carried very fair values in gold. Mr. Coyne then stated that an investigation along this line had led several familiar with the results attained thereby to the belief that perhaps the placer area had received a still earlier enrichment that yet awaited discovery. In order to determine the value of this theory one of the early miners on Louisiana Gulch after having encountered fair values at other points in the cement sank a shaft to a depth of 180 ft. in an endeavor to penetrate, which was not realized. An average value for the entire depth of the shaft is said to have been

\$1 per cubic yd. At the depth mentioned the owner of the shaft abandoned further work.

PLACER WORKINGS. The prevailing methods of working the gravel deposits up until the present have been substantially as follows: A shaft is sunk from the surface to bedrock. The over-burden being considered generally to contain insufficient values to rock is piled up out of the way, the pay gravel is then followed, undercutting and tunneling as much as possible and is then removed to the surface together with the gleanings from the cleaning of the bedrock, this material is then rocked and panned, with varying percentages of the total gold content being recovered, ^{owing to crude equipment and water scarcity,} however, it is seldom that even under favorable conditions a high percentage of recovery is possible. Very often the same method was pursued in working the adjacent abanks while at other times a tunnel or drift is employed near the face of the bank, bar or mesa to reach and remove the gravels to be washed.

METHOD OF EXAMINATION

In the present investigation, use was made of those methods most commonly employed and of which the following description is given.

Upon arriving at Greaterville a study of the maps of the district were made and then proceeded to verify their accuracy and become familiar with the topography and characteristics of the country and becoming acquainted with the names and relative positions of the gulches by walking and riding over the area.

The next step was to determine the general elevation of the gravel deposits and to visit the available sources of water to ascertain their relative elevation and if or not they would constitute an adequate supply and with a sufficient working head; also what provision could be made for impounding a sufficient volume of water

with which to carry on mining operations through the dry seasons.

This was followed by the sinking of shafts within the placer area, cross-cutting the gulches at intervals, beginning at or near the head of each gulch. The shafts were sunk to bed-rock, samples taken from the surface down, weighed, rocked, panned and assayed in the usual manner.

The number of shafts on each gulch, average of samples, length, width, depth and cubic yds. contained in each gulch is hereinafter given. The tabulation of samples, length, depth, width of each shaft, cubic content, weight of samples taken, weight and value of gold content in each sample will be forwarded under separate cover together with maps showing the location and number of each shaft sunk on the various gulches as soon as the same which is in course of preparation, is completed.

While preceeding with the examination of the gravels, determined at the same time to ascertain the precipitation and take the measurement of the creeks which would constitute the sources of water supply. The results thus attained is presented herewith under another head.

GULCHES EXAMINED - RESULTS.

A summary of the results obtained from the examination of each gulch is given below under separate heads following the name of each gulch respectively.

OPHIR GULCH

Length examined	10,670 ft.
Average width	1,120 ft.
Average depth (gravels)	23.5 ft.
Number of shafts sunk	60
Cubic yds. of gravel	10,401,274.13
Average value per cubic yd.	54.65 cents

LOUISIANA GULCH

Length examined	6,470 feet
Average width	151 feet
Average depth (gravels)	8.5 feet
Number of shafts sunk	45
Cubic yards of gravel	307,566.66
Average value per cubic yard	43.01 cents

SAN CARLOS GULCH

Length of gulch	3,140 feet
Average width	206 feet
Average depth (gravels)	8 feet
Number of shafts sunk	15
Cubic yards of gravel	130,619.3
Average value per cubic yard	46.2 cents

NOTE:- This gulch flows into the Louisiana Gulch

SUCKER GULCH

Length examined	13,400 feet
Average width	507 feet
Average depth (gravels)	11 feet
Number of shafts sunk	60
Cubic yards of gravel	2,767,844.46
Average value per cubic yard	45.37 cents

NOTE: The Louisiana Gulch forms a junction with this gulch which in turn flows into the Ophir Gulch at a point about four miles southeast of Greaterville and beyond the area embraced in the present examination.

KENTUCKY GULCH

Length of gulch	13,240 feet
Average width	227 feet
Average depth (gravels)	11.5 feet
Number of shafts sunk	60
Cubic yards of gravel	1,243,074.69 feet
Average value per cubic yard	51.06 cents

NOTE: This gulch forms a junction with Fish Gulch

BOSTON GULCH

Length examined	9,516 feet
Average width	220 feet
Average depth (gravels)	15.5 feet
Number of shafts sunk	50
Cubic yards of gravel	1,201,835.89
Average value per cubic yard	46.97 cents

NOTE: This gulch flows into the Kentucky Gulch

HUGHES GULCH

Length examined	4,620 feet
Average width	196 feet
Average depth (gravels)	9.5 feet
Number of shafts sunk	30
Cubic yards of gravel	318,808.82
Average value per cubic yard	36.16 cents

NOTE: This gulch flows into the Ophir Gulch at Greaterville.

LOS POSAS GULCH

Length examined	7,660 feet
Average width	646 feet
Average depth (gravels)	16 feet
Number of shafts sunk	45
Cubic yards of gravel	2,739,709.61
Average value per cubic yard	39.21 cents

HEFTY GULCH

Length examined	5,880 feet
Average width	188 feet
Average depth (gravels)	11 feet
Number of shafts sunk	40
Cubic yards of gravel	402,453.33
Average value per cubic yard	40.01 cents

COLORADO GULCH

Length examined	4,980 feet
Average width	190 feet
Average depth (gravels)	12 feet
Number of shafts sunk	30
Cubic yards of gravel	419,688.86
Average value per cubic yard	37.18 cents

GULCHES NOT EXAMINED

The Chispa, Fish, Empire and Nigger Gulches were not included in present examination mostly due to the difficulty in acquiring several of them and due to the ease of the others to their geographical position which renders the gravel deposits contained quite apart and remote from the rest of the placer area, although

the gravels compare very favorably with those present in the rest of the district. I believe the volume of the gravels obtained to hardly warrant the expenditures necessary in several instances to work them.

TOTALS AND AVERAGES

Total Length gulches	77,766 feet
Average width gulches	363.1 feet
Average depth gravel	12.65 feet
Least depth gravel	3.7 feet
Greatest depth gravel	38.31 feet
Total number of shafts sunk	435
Total cubic yards	19,932,675.85
General Average all samples)	
Value per cubic yard	43.99 cents

NOTE: The gold recovered in sampling the gulches is uniformly coarse in character. The value per ounce \$16.57. Average volume of iron sands 1.81%. Trace of platinum.

AVAILABLE WATER SUPPLY

A sufficient and an available water supply for hydraulic, dredge and steam-shovel mining is found at a distance of from $3\frac{1}{2}$ to 6 miles southwest of Greaterville, consisting of 3 creeks that drain the main water-shed of the Santa Rita Mountains and which flow for the greater part of the year. They are from north to south, the Sawmill, Gardner and South Creeks.

As these streams do not flow continuously throughout the year, although at various times their volume is considerable, the problem is therefore to make the proper provision to impound a sufficient quantity to insure continuous operation at the placers. This can only be accomplished by the construction of one or more dams at favorable points. The same should be as near as possible to the placer area and at an elevation that would insure a proper working-head upon delivery of the water at the point of operation. It is also desirable that a large quantity of the material for construction be as adjacent as possible and the area to be occupied by the impounded water sufficiently large to admit of storing the desired quantity. There are such locations available on these streams which flow through deep canyons and from the latter take their names.

THE WATER-SHED:

This is formed by the main and highest part of the Santa Rita Mountain range which is the highest of any in this part of the country. The area of the water-shed drained by the streams referred to is approximately 30 square miles, greatest elevation near 10,000 ft. The slopes carry a varying amount of snow during the winter months and are covered with a large amount of excellent timber of a number of varieties.

PRECIPITATION: The rainfall recorded in the vicinity of Greaterville is about 8.4 inches. That taken at Empire Rancho in the Sonoita Valley about 6 miles to the east is 16.5 inches. In the region of the water-shed observations lead to the belief that the precipitation there exceeds that of Greaterville by several inches. There are 3 periods of greatest precipitation and occur during the summer and winter months.

STREAM FLOW: The following tabulation of the flow of the several streams under consideration is the result of nearly continuous daily measurements taken during and while the investigation of the gravel deposits were being conducted. At times conditions were encountered that forbore the following of the usual methods of measuring the flow, such as severe floods due to excessive precipitation but in most instances, fairly good estimates of the volume of the flows could be made and these estimates are likely to be found considerably under the actual volume of water passing a given point.

Usually the maximum flow during floods began to fall in an hour after the rise but sometimes there was no diminution in volume for 3 hours. It also required from 8 to 37 hours for the streams to return to normal following these floods.

The period over which these measurements were taken and recorded was during the last 6 days of July, all of August and September, and the first 14 days in October and while the tabulation is very nearly accurate, it is incomplete and not comprehensive enough but is sufficient to indicate that these streams do form an adequate and available water-supply for working the gravel deposits at Greaterville. There are difficulties to be overcome in order to conduct the water to the points desired but they are not of such a character as to discourage the undertaking.

The tabulation following will give the average and the maximum and minimum flows of the streams under consideration for the period during which the same was taken. However, I am preparing and will forward upon completion a chart giving the daily flow of each creek and illustrating by diagram the various change and fluctuations.

SOUTH CANYON

Average daily flow	3,191 Miners Inches
Minimum daily flow	237 miners inches
Maximum daily flow	13,970 Miners inches

NOTE: This canyon is the furthest from the placers and the creek is the one recommended by parties here. The proposed dam-site at which these measurements were taken is satisfactory but the volume of water a moderate sized dam would impound is not sufficient.

CAVE CANYON

Average daily flow	3,668 Miners Inches
Minimum daily flow	251 " "
Maximum daily flow	10,171 " "

NOTE: This canyon is the next one north of South Canyon and immediately north of it is Saw-mill Canyon the nearest one to the gravel deposits. The measurements made of the flow of this and the following canyon were secured near the confluence of the two.

SAWMILL CANYON

Average daily flow	3,601 Miners Inches
Minimum daily flow	201 " "
Maximum daily flow	11,200 " "

NOTE: This canyon constitutes the nearest source of water-supply, it being situated $3\frac{1}{2}$ miles from the gravel deposits. The measurements were taken at the junction the Cave Creek makes with the one being considered in this paragraph and at which point there is an excellent dam-site and the reservoir area resulting is capable of

accommodating a large volume of water with less height of dam than any other of the sites presented.

RECOMMENDATIONS - WATER SUPPLY

The dam and reservoir site and the stream running through Gardner Canyon are the recommendations made by Mr. Magee and his associate the same is well chosen and the flow of Gardner Creek is in excess of either of the other two. It's relative elevation is sufficient but the area of reservoir resulting from the construction of a dam at this point would be insufficient unless the dam was carried up to a considerable height which of course, entails greater expense; also this point is situated about 2 miles further away from the auriferous gravel deposits than the dam and reservoir site situated at the junction of Sawmill and Cave creeks where a large reservoir is possible with the construction of a dam there and the advantage gained is that of two water sources instead of one.

I, therefore, suggest that the recommended source of water-supply and the reservoir sites on Gardner Canyon be abandoned in favor of the site proposed at the junction of the other 3 creeks unless it is desired to appropriate all of these sources of water with a view to irrigation and future development of the grass lands in the Sonoita Valley adjoining Empire Ranch.

All things being equal, I believe the conducting of the water to the placers would present less engineering difficulties from a reservoir on Sawmill Canyon. The distance is also less and therefore a less quantity of pipe would be required. However, it would be necessary to tunnel through the Limestone Ridge in order to take advantage of the most direct route to the gravel deposits. However, this can be avoided by the route recommended by Magee as indicated on Map 7.

RECOMMENDATIONS FOR WORKING GRAVLES

There is no problem of difficulty to be solved in determining the methods of mining best adapted to the conditions that exist in the Greaterville District. The character of these auriferous gravel deposits render them easily disintegrated by the use of water setting free the gold values contained. The gold itself which is uniformly coarse and of generally high specific gravity is easily separated and recovered and renders a high percentage of recovery assured. The placer area is free of large stumpage and large trees, either on or below the surface, is also free from the presence of quick sand or large boulders or other impediments or obstruction which are often difficult of removal and occasion loss of time in operation. However, the upper portions of the gulches are narrow and do not present extensive volumes of gravel that is desirable in hydraulic mining. However, the gulches at these points are usually flanked by mesas and bars presenting varying volumes of workable gravels. The only methods of mining at present adapted to handling this portion of the placer area successfully is by the hydraulic method and is the method recommended. Further east on, these gulches they widen to a degree that makes possible the use of the steam shovel as there are far greater volumes of gravel to be handled by the width of the gulch precludes the use of a dredge. Further down, these gulches broaden out into wide, long and nearly flat reaches containing large volumes of gravels of much greater depth. This portion of the placer area would be worked best by the employment of a floating dredge of fair capacity.

At many points where the employment of the dredge and steam-shovel are indicated, it would be necessary to also employ the hydraulic method in order to handle more cheaply some of the banks of gravel.

The system of water supply may be so installed so that the water may be used for mining in three different operations, thereby gaining a maximum of use therefrom.

The installation of a floating dredge is particularly indicated and warranted by the volume of adjacent deposits of virgin gravels lying still further to the east, the acquirement of which is hereby recommended.

RECAPITULATION:

That conclusions reached as the results of this investigation are that there is a sufficiently large volume of workable gravels of high enough value per cubic yard to insure mining operations for a long period of time at a high rate of profit to the owners and warrants the expenditure or expense necessary to conduct the waters available to the placer area for the recommended methods of mining, and that such waters are procurable in sufficient quantity to assure continuous operation throughout the year, if impounded for the purpose and that those undertaking to conduct the working of the gravel deposits are also warranted in taking the necessary steps to this end. The deposits are of a character that could hardly be more amenable to mining operations. There is also the likelihood of the existence of a large ore body within the area of the auriferous gravels also. The district is not far from a railroad and has other very fair transportation facilities. The climatic conditions are favorable to continuous operation and a large daily yardage feasible dependent only upon the equipment installed. The ground embracing the gravel deposits under consideration and the necessary water-rights can be acquired and upon favorable terms at a reasonable price.

Signed, J. B. Stetson,

Representing Geo. B. McAnenyk

Dated October 31, 1901.