1903-1

MR

COPY OF REPORT.

Proposition
No.7
Examination
S.I.

GOSHEN HOLE PLACERS.

Synopsis of Report.

Location of Property.	Southeastern Wyoming, about 65 miles N.E. from Cheyenne, Wyo., and 6 miles W.of Nebraska line, in T.19 and 20, N. R. 61 W.
Title.	The property is held as farming land under U.S.patents and Desert Land Claims.
Extent.	Probably about 10,000 acres underlaid with the gravel Deposit.
Tests.	Only surface samples could be taken.
Results.	These show values probably in the neighborhood of $1.00 per cubic yard.
Gold	Gold in surface samples excessively fine and most difficult to handle, but not prohibitive if richer and heavier gold is found deeper down.
Present Value.	Results of surface samples would not justify buying options on property and making complete tests.
Unknown Values.	The two unknown conditions are depth of gravel and values towards and at bed rock
Recommendations.	That a few holes be sunk with well digging plant now on ground, if this can be safely and cheaply done.

Respectfully,

Proposition
No.7
Examination
No.1.S.

GOSHEN HOLE PLACERS.

REPORT OF EXAMINATION
By
Robert B. Stanton, Civil and Mining Engineer,
April, 1903.

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Location of Property. The Goshen Hole Placer deposits are situated in Southeastern Wyoming, about 65 miles N.E.of the City of Cheyenne, Wyo., and 6 miles W. of the Nebraska State line, in T.19 and 20,N., R. 61 W., being in the S.E. corner of what is known as Goshen Hole and lying in "The Gap," between Bear Creek Mountain and Sixty-six Mountain.

Extent of Gravel. Deposits. From examinations made by test Pits, it would appear that the underlying stratum of gravel covers an area of about 10,000 acres in one body, extending from the town of La Grange about 6 miles north along Horse Creek to Hawk Springs and being something over 2 miles in width. See Plat No.1.

Title. The property is held by various parties as farming and grazing land under U.S.patents and Desert Claim entries, Messrs. Weir and Sturgis, who offer the property,having only the "right of discovery" of the placer gold.

Topography. This particular part of the Goshen Hole, which I shall call the Gravel Basin, is a separate basin in itself, bounded by a high ridge south of La Grange, by the

Sixty-six and Bear Creek Mountains on the east and west, and separated from the balance of "the Hole" by a low ridge running east and west across its north end near Hawk Springs, making a basin of about 6 by 8 miles, not counting the small side valleys, This basin is cut through by Horse Creek and Bear Creek, which empties into it, having but one outlet, that of Horse Creek, just below (north of) Hawk Springs.

The valley of Horse Creek in this Gravel Basin is almost a level plain with a gentle slope to the North, and with the exception of a narrower valley where the present creek flows, practically level east and west, with a varying width of two to three miles, rising first with a gentle slope, then more rapidly, to the bases of Sixty-six and Bear Creek Mountains. See photo. Nos.

Geological Features.

In order to understand clearly the most important questions concerning these gold gravel deposits --their extent, depth and the probable value of the lower portion, or "bed rock" deposit, if such there be-- it will be necessary to give some little account of the geological formation of this section. In letters and reports submitted by Mr. Weir for my examination, Prof. E. C. Lindermann says of this deposit of gravel, "It is absolutely the bed of the stream which separated the present East from the West".

That is, one of those "ancient rivers", which seem to have deposited gold gravel all over our western plains.

I think, however, that this particular river is a myth. For the geological maps and much of the geological data, I am indebted to the report of Mr. George I. Adams of the U. S. Geological Survey. To these I have added notes of my own observations here, and from other localities bearing on the same subject, particularly the deposit of the gravel.

Geology. The formations represented in this region are broad sheets of rocks which extend from the foot hills of the mountains eastward into the Great Plains plateau, and have a dip that is a little less than the grade of the surface. They consist of two series.

The older formations consist of Cretaceous rocks and their substructure of Paleozoics, which were deposited before the present ranges of the Rocky Mountains were developed. Although the thickness of these rocks is thousands of feet they may be passed over in a short distance where they abut against the igneous and metamorphic rocks of the mountain ranges and have steep dips. On the portion of the plains in which we are interested the rock sheets are nearly horizontal. Lying on the floor of the older rocks is the Tertiary series, which has been spread over them in sheets of clay and sand. The source of this material was evidently the mountain region to the westward, which was elevated at the beginning of Tertiary time, and in which the rapid disintergration of the rocks under the processes of erosion furnished sediments for

the younger series. In recent times the Tertiary has been largely eroded, and near the mouth of Horse Creek the beds have been completely removed, revealing the underlying cretaceous.

The ridge spoken of above as bounding the Gravel Basin on the north of the section which I examined would seem to be an anticlinal elevation of the Cretaceous rocks.

The surface of the Cretaceous on which the Tertiary was deposited seems to have been very irregular, and the contact shows a decided unconformity.

The Tertiary.

In the Gravel Basin the Chadron formation, which is the basal formation of the Tertiary, does not appear. The Brule and the Arikaree formations are the only ones in evidence within this basin.

The Ogallala formation which succeeds the Arikaree has all been eroded except on the much higher ridges to the

South. The Brule formation which succeeds the Chadron beds and lies unconformably upon them, or in their absence, as in the Northern end of the Gravel Basin, upon the Cretaceous, is a thick mass of clay, uniformly of a pinkish or flesh colored tint, except in some portions where a whitish clay with thin beds of white limestone appear. In limited areas are also found conglomerate beds of small gravels.

The Arikaree formation instead of clay consists almost entirely of sands, slightly cemented, forming a protecting cap to the underlying formations.

Leaving out, for want of space, some marked phases of this formation, the phase of the Arikee, in which we are most interested are the conglomerate beds which represent channels or current deposits, and which occur at varying horizons.

These are more commonly found at the base of the formation, upon the Brule clay. In many places, however, they are found at much higher horizons. They vary in thickness from a few feet to 200 feet.

On the general geological map (No.2 and 3) borrowed from Mr. Adam's report and herewith submitted, it will be seen that these conglomerate beds, in their original form, only show far north of the Gravel Basin. In the neighborhood of this basin, what may have existed have been all carried away. I made particular examination on Sixty-Six and Bear Creek mountains and there found remains of these conglomerate beds high up above the valley of Horse Creek in the form of granite and other kinds of boulders and gravels, and to the south of the section reported upon by Mr. Adams, extending as far as Cheyenne, I observed and examined large deposits of these broken down conglomerates in the form of gravel hills and terraces, lying at a much higher elevation.

The gravels and material that constitute the conglomerate beds contain many varieties of rocks which are found in the Rocky Mountains. They vary in size from small, much-worn fragments up to boulders and were cemented in a matrix of sand. The disintegration of this conglomerate has given rise to terraces which maintain their form as a result of the heavy deposit of gravel lying upon them.

These terraces indicate the former greater extent of the conglomerate beds. In fact, these are most common occurrences in many parts of the West, both east and west of the Rocky Mountains, and are in my opinion the source of many of the placer deposits, secondary in their nature, and which I called to your attention several years ago, in a report made in answer to a Boston geologist as to the want of a source of certain gold gravel deposits in Utah.

If you will kindly keep the above imperfect description in mind you will see a little later on its bearing upon the probable value of the lower, or "bed rock" deposits of gravel in the Gravel Basin we are considering.

Examination of the Gravel Basin.

Accompanied by Mr. Wm. Sturgis, after waiting for the heavy snow of April 11th to disappear, I reached La Grange on Friday, April 17th, but on account of heavy rain storms could not actually begin the work of examination until

Monday, April 20th. Much to my disappointment I found that the gravel deposit could not be even superficially examined without doing considerable work. The gravel is not exposed, or near the surface, except in two insignificant points, and in the bottom of Horse Creek. High water prevented the examination of the Creek gravel; however, that is not important as the creek is a very small stream and the gravel in it, for various reasons, would not be representative of the deposit.

I employed a force of men and sunk some twenty pits down to, and into the gravel wherever possible.

On the blue print map submitted, I have platted these pits with other information regarding them. (See No.1)

Extent of Gravel.

The Gravel deposit underlying the agricultural land is apparently one continuous body covering an area of perhaps 10,000 acres.

It lies in the bed of the basin and is covered with a deposit of the detritus of the Brule and Arikaree formations topped by a few inches to several feet of soil proper.

Depth of Covering.

The depth of this covering of the gravel varies according to the pits sunk from 3 to 5 feet on the lowlands next to the creek, and from 5 to 12 feet on the general level of the plain.

Water Under the Gravel.

The underground portion of the whole basin is filled with what seems to me is a lake of water coming in most places up to the top of the gravel itself. On account of the

slow percolation of this water I found in pits sunk about one- half mile east of the creek and from wells sunk on the farms, the water stands nearly ten feet higher in places than in the creek itself, or in the flats near the creek. For this reason and for others stated below, I do not agree with Prof. Lindermann in thinking the flow of water is an underground stream in the bed of an ancient river, but is rather the local seapage from the surrounding higher country held in the basin by the anticlinal Cretaceous formation at the north end of the basin, and the narrow outlet cut through it by Horse Creek. And as further evidence I may state that the very large springs, known as Hawk Springs, come out of the lower slopes of Sixty-Six Mountain against the Cretaceous ridge at a much higher elevation than the valley of the basin, and again at a point several miles north of the basin in the supposed general line of "the river", a well was driven 300 feet through the Tertiary formation without reaching the Cretaceous rocks or water. This last fact is not positive proof, but all the facts taken together are to my mind convincing evidence. However, from whatever source, this lake of water furnishes ideal conditions, other things being equal, for a dredging proposition. This water is constant all the year round, but in the dry season is several feet lower.

The Gravel.

On account of the high water at this season of the year, it was impossible to sink the pits far into the gravel.

At one point where the creek has cut into a hump or small ridge of gravel (See Photo.No.) I was enabled to examine it to a depth of 5 feet, and one pit went 3-1/2 feet into gravel.

The gravel contains almost every variety of rock found in the Rocky Mountains, the larger ones being of granite, and the whole mixed with numerous pebbles of pure quartz of every size.

The deposit as far as I was able to examine it, was laid down in thin strata of from 1 to 2 inches to 5 and 6 inches in thickness. They alternate between a layer of almost clean gravel without sand to a layer of sand with few pebbles, and this impregnated with a very large proportion of black iron sand.

I have never seen a deposit of gravel that seemingly carried so large a proportion of black sand, or black sand so fine and light and so difficult to handle in a gold pan. One marked feature of this black sand deposit is that in almost every pit sunk, the sand, for from six inches to two feet <u>just above</u> the gravel proper, was almost black with this magnetic iron and streaks from one to two inches thick were <u>pure black</u> sand. This I have had tested separately.

Samples of Gravel and Sand.

The pits sunk, wherever possible, were driven into the gravel and samples taken from the top of the gravel to the lowest depth reached. On Plat No. 1 the depth of pit and gravel is given. Only one, however, was as much as

5 feet in gravel and two others below 3 feet. In several pits it was impossible to reach gravel on account of water. I took in all some thirty samples, varying in size from one to four pans full, nearly all of the larger size. These were carefully sacked and labeled, and for obvious reasons shipped to Denver for examination. The total samples taken weighed eleven hundred pounds.

Method of Testing.

Each sample was carefully measured, with reference to its proportional part of a cubic yard, bank measurement. These samples were handled in three ways:-

1st: by panning to various degrees of closeness.
2nd: by screening in still water in a tub.
3rd: by screening dry.

The large samples after screening through a 10 mesh screen formed from 1/3 to 1/2 the amount of the original gravel as taken from the pits, according to the amount of gravel stones they originally contained.
The screenings were then carefully cut down with a sampler, not arbitrarily "quartered", to a sample for assay.
For example. Say the original gravel sample was 1/10 of a cubic yard. The screenings were then cut in different cases from 1/4 to 1/32 of their bulk. In this last case the sample would represent 1/320 of a cubic yard of the original gravel: that is, including the gravel stones screened out.

Method of Assaying.

Each sample was thoroughly dried and accurately weighed. The samples were assayed in the usual way by taking one "assay ton", and the returns made of the actual amount of

gold found in the "assay ton." Then with the proportion of:-

Weight of Assay ton	Gold in Assay ton	Weight of total sample	Gold in total sample

This total amount of gold, using the same example as given above, multipliedby 320 gives the amount of gold per cubic yard of the <u>original gravel</u> as taken from the pit.

Nature of the Gold. Bear in mind for future reference in considering the possible commercial value of these deposits that all samples assayed were mere surface samples, the lowest being only 5 feet down. As to the nature of the gold, I have but little information, and for good reasons I did not think it necessary to takethe time or go to the expense of finding its real nature at this time.

However, one thing I can say, -- the gold <u>is invisible</u>, though it does exist. By careful panning I could <u>see</u> no gold whatever. I am told small flakes of gold have been found, in the surface gravel, but I saw none. It is extremely fine and light, so that the most careful and expert panning is impossible to hold it, while in the same samples not panned it is found by the assays to exist in very appreciable quantities. This will be referred to again in comparing the assays.

Assay Results. The method of making the assay and calculating the results has been explained. The assay work was done by what I consider the best firm doing such work in Denver,

Von Schulz & Low. I have known these gentlemen twenty years, and they gave this work their personal attention. I had check assays made on each sample, and the results may be relied upon.

GENERAL LIST OF ASSAYS, SHOWING VALUE PER CUBIC YARD, ORIGINAL GRAVEL NOT PANNED DOWN.

No. of Assay	Value $ & cts. per cu. yard.	Explanation.
3. A	0.13-1/4	Sample 1 to 2 ft. below top of gravel
4. A.	0.16-1/2	" 3 in. to 21 in. " " " "
7. A.	0.34-1/3	" from top to 1 ft. below top of "
8. A	0.20	" 6 in. below top of gravel
9. A	0.20	" 1 ft. " " " "
9. B.	0.32	" of sand just above top of gravel
12. A.	0.89	" 2 ft. below surface of low bottom-land. Heavy streaks of black sand.
12. B.	0.19	" 3 ft. below surface same pit.
13. A.	0.17	" 3 " " top of gravel
13. B	0.22-1/2	" 3-1/2 ft. below top of gravel same pit
14. A	0.23-1/2	" 8 in. to 18 in. below top of gravel
17. D.	0.37-3/4	" from bluff on creek bank. See Photo. No. taken 5 ft. from top of hump of gravel.
17. E.	0.15	" Same pit. Sample sifted dry.
18. A.	0.22-1/2	" from cut of irrigation ditch, on top of hump of gravel.
20. A.	0.20	" from dump of Sturgis's shaft.

General average without reference to area from which samples were taken is 26-2/3 cts. per cubic yard. This, however, is not strictly correct. The real value of the original gravel is considerably higher, and must be considered with the results of further and different tests given later on.

It may be said that sample No.12 A. being an exceptionally high one should be left out of the average. As

noted above, however, this streak of heavy black sand was found in every pit where we reached gravel lying 1 to 2 ft. deep on top of the gravel. Hence, considering that part actually tested, from two feet above to say an average of two below the top of the gravel, a much larger proportion of this rich sand should enter into the average than here given by one sample. This high value I did not know at the time and only took this one sample. What relation this rich sand would bear to the whole deposit down to bed rock (?), of course I cannot say.

Results of Panning Tests:

Some marked peculiarities are shown by my panning tests. Finding that the gold, and also the black sand, was very light, I made some careful panning tests with the following results:

No. of Sample	Value of assay per cu.yd.	Explanation.
1. A.	$0.24-3/4	Original sample of sand not screened
1. B	0.04	Same panned down, not very close.
2. A.	0. 01-1/2	Panned down close.
17. A.	Trace	One pan, panned down to about 1 tablespoonful
17. B.	0.01-1/3	" " " " leaving abt.50 times 17 A.
17. C.	0.05-1/5	" " " " " " 200 " 17.A.
17. D.	0.37-3/4	Original, sifted but not panned at all. (All four of these were parts of same sample)
3. A.	0.13-1/4	Original sifted but not panned at all.
3. B.	0.06-2/3	Panned down about one-half.

These results show that the gold is extremely light and fine, in the surface gravel, and cannot be saved by ordinary sluice box hydraulicking, but does not prove that it cannot be saved, commercially, by other methods.

Dry Screening.

My next test was to see what amount could be saved by dry screening, or to determine the effects of thorough washing on the gravel itself.

No. of Sample.	Value by assay per cu.yd.	Explanation (Both part of same sample from same pit)
17.D.	$0.37-3/4	Sifted in tub of still water
17.E.	0.15	Sifted dry gravel stones, not washed or scraped.

This test shows that considerable value adheres to the pebbles, stuck on by a film of lime, and must be washed or scoured off. This I observed by other methods also, and it is a very common occurrence in such gravel deposits.

Test of Floating Gold.

By floating gold I do not mean gold that floats on top of the water, but fine gold mixed with extremely fine sand and clay, and held in suspension in the water. I placed a gold pan in the bottom of a tub of water, and close down to the pan sifted several pans of gravel. A certain part of the siftings fell in the pan. The water of course in sifting was considerably agitated and carried quite a quantity of the finer particles which floated over the pan and settled down outside in the tub.

Results.

From the above test I found that the siftings that fell in the pan ran from 20 to 23-1/2 cts. per cubic yard of original gravel, and those which settled outside and in the tub ran 95 cts. per cu. yd. of original gravel.

This test, however, I do not wish you to consider as complete, it is only an approximation. It would have re-

quired a week of time and much expense to determine the exact amount of these fine values, and I did not think this was required at this time, since we cannot now ascertain either the depth of the gravel deposit or whether the values increase in quantity and quality (coarseness) towards bed rock -- two most important questions.
If this last test is comparatively correct and uniform, then this 95 cts. added to the results given in the first table of assays would raise the average value considerably over $1.00 per yards, and I am prepared to believe that this may be the case.

Test of Overlying Soil.

My last test consisted of assays on the overlying soil or detritus from the hills. Leaving out the top soil proper, say 2 to 3 ft:, that tested was a yellow and pinkish sandy soil consisting of a mixture of the Arikaree sands and the Brule clay, simply the breaking down of the former strata of these formations lying above, and mixed with the finer portions of the conglomerate beds, I expected, from the geological history given above to find values in this soil, but was surprised at the amount.

No. of sample pit.	Value per cu. yd.	Explanation.
16. A.	$0.42	From top of soil to water level, 7-1/2 ft. Dug in water 1 ft., could not reach gravel, took general sample of soil near water.
19. A.	0.14-1/2	Taken from hole blown out by wind in the plain 3 ft. below surface of hole and 10 ft. below general level of plain. All soil, no gravel.
21. A.	0.12.	Pit 10 ft. deep. Did not strike water or gravel. Sample a fair test of whole 10 ft. in this pit.

The above results are remarkable and bear strongly, and I fear adversely, upon the value of themwhole deposit,which will be noted in my conclusions which please see.
I did not think it necessary to go into other questions, of amalgamation etc. at this time. That will be in season when we settle other more important points.

CONCLUSIONS.

Surface Samples. Considing that all samples taken were practically from surface gravel, the results are really quite high in gold values.

Nature of Gold. The gold being so extremely fine and so difficult of handle makes the proposition as far as examined of little commercial value at this time. This, however, brings up the two most important questions to be considered.

1st. The probable depth of the gravel.

2nd. Its probable value and the probable increase in coarseness of gold towards and on bed rock.

Probable Depth. There is no evidence whatever topographically, geologically or otherwise to determine what may be the depth of the gravel. The only hole-besides wells- that has been sunk in the gravel proper was sunk by Mr. Sturgis, and has a depth from surface of ground of 22 feet. Between 10 and 12 feet of this was through soil, and this shaft is situated on a hump of gravel, as shown in Photo. No.9, right side, so that the bottom of the shaft would hardly be lower than the top of the gravel in flat to left of the picture. I could get no reliable data as to the depth

sunk into the gravel from the different wells on the farms. I can form no opinion whatever, it may be an average of 10 feet, or it may be 50 feet deep. This can only be proven by sinking shafts or drilling holes.

Value of Lower Gravels.

The probable value of the lower gravel compared with that tested at the surface brings me back to the geological questions stated in the first part of this report.

If the deposit was laid down by a large river ("ancient" or otherwise) and it contained coarse gold, then it would be concentrated and richer towards and on bed rock. All the evidence I could gather goes to show that this was not a river deposit, but a deposit in this basin (formed by erosion and wind) by water action of course, from the breaking down of the conglomerate beds, explained above, from the neighboring hills.

If this is the case, it is not likely that the lower gravels will be much richer or have much heavier gold. However, gold is where and how you find it, and a few test pits to bed rock, if there be any rock in its true sense, which is quite improbable, would settle positively the whole matter.

Present Value.

With the present showing it would not justify your Company to go to the expense of securing options on the property and making a complete test. If with a well digging plant already in the neighborhood this work could be done without raising too much suspicion, and for a small amount of money, -that is, the sinking of a few holes, thus

partially testing the depth and value of the lower gravel, it might be money well spent. For, with these points settled favorably, the two main objections to the top gravel would not be difficult to overcome: With a rich, heavier gold below, it would be profitable to handle the light upper portions by a separate process, and even the top soil, that the assays show to contain from 12 to 42 cents per yard, might be profitably handled also.

Other Conditions. Other conditions are most favorable.

The water is most perfect for a dredging operation.

Fuel will not be too expensive.

Roads are good most of the year, and all the time when they are needed.

Work could be carried on for perhaps nine months in the year. I do not think it necessary to go further into these or other details unless additional tests are made on the property.

Recommendation. I would therefore suggest, when Mr. Wm. Sturgis comes to New York, where he will be in the near future, that the question be taken up with him as to the manner and expense of sinking the few holes recommended above.

All of which is respectfully submitted,

K. R. Dempsey,
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New York City.