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"CLEAN" COPY IN GEOLOGY FILE

Mr. John B. Ehrhart,
Phoenix,
Arizona.

Dear Sir:

REPORT

on the

RICH HILL GOLD PLACERS

OCTAVE

BEAVER MINING DISTRICT

YAVAPAI COUNTY, ARIZONA, U. S. A.

BY - John M. Nicol,—
Consulting Engineer,

Crocker First National Bank Building,

San Francisco, California.

INDEX

OBJECT OF THE EXAMINATION:

The object of the examination on which this report is based was to make a reconnaissance of the district as a whole, - to check to some extent the data already obtain, - but more particularly to collect data as to the geology and the source of the gold, and as to structural conditions of the gravel as affecting the distribution of gold over such a large area; and generally to express an opinion as to the feasibility and value of the project as a whole, more particularly with respect to dredging operations on a large scale on the lower gravels.

No attempt to sample was made during the present examination, as a sufficient amount of work by other engineers appears to have been done along these lines to indicate very valuable areas of gravel, and I would not consider a limited hand sampling as giving any additional data of immediate value. Any further sampling of such a large deposit must be carried out with the proper equipment and in a systematic manner. This matter is referred to in another part of this report.

LOCATION OF THE AREA UNDER CONSIDERATION:

The properties are located a little to the west of the center of the State of Arizona, U. S. A., within the area outlined in red on the accompanying maps.

The immediate gravel areas are deltas built out by Antelope and Weaver Creeks on to the plains to the southwest of Weaver Mountains. The head of the delta is approximately at Octave (see Map). Located about nine miles southeast from Congress Junction on the Sante Fe Railroad.

TOPOGRAPHY, CLIMATE AND GENERAL CONDITIONS:

The district is typical of the desert areas of the central and southwestern part of Arizona.

Weaver Mountains rise abruptly from a great desert plain. They are a bold and deeply eroded range of mountains, carved out from an extensive area of very early granite intrusives of batholithic proportions.

The eastern portion of Weaver Mountains are of a complex of much more recent (geologically speaking) extrusive volcanic rocks. This area cuts off and forms the head of the valley of Antelope Creek. The highest point being 6, 391 feet altitude.

The railroad station at Congress Junction has an altitude of approximately 3,000 feet and the mine camp of Octave (quartz mine) has an altitude of approximately 3,300 feet.

From this point the delta fan of gravels slope gently down to the main drainage valley of the Hassayampa River.

There are two gradually diverging slopes. The first slope is to the south and southeast and is drained by Cuanido and Yaqui Gulches which finally join the Hassayampa above the "Box" (see map). The second slopes to the south and southwest and is the most important body of gravel. It is drained by the lower Weaver and Antelope Creeks. These, after joining Martinez Creek, flow into the Hassayampa below the "Box" (see Topographical map).

The division of these two deltas or gravel slopes, seems to be influenced by a line of low hills, viz, "Round Mountain". The Hassayampa has cut a gorge through this line of hills which is known as the "Box".

The general slope of the gravels gives a grade of approximately 150 feet to the mile and the beds of the present gulches which have been eroded through the gravels have slightly steeper grades, until they all unite in a big flat with the Martinez Creek. Taking a general line at right angles to the slope of the gravel, and also to the erosion of the gulches, it is noticeable that the top, or un-eroded parts of the main gravel banks, show a remarkably even peneplain; as is evidenced on reference to the contour line of the topographic sheet. Futher reference will be made to this when discussing the structural nature of the gravel deposits as it is indicative of some rather interesting possibilities.

The total surficial area of the gravels under consideration cover an irregular zone approximately two miles across at the upper end, and about three miles across at the lower end, and about five miles long.

Within this area approximately six thousand acres of placer claims have been tied up and are now held as one group, which forms the placer dredge mining ground the subject of this report.

The climatic conditions are favorable for work all the year, the winters are mild and the summers, although hot, are not subject to the excessive hot spells of some parts of Arizona.

The rainfall is small and erratic as is usual in all the desert areas of the southwest of the United States. Some years there are good seasons, and almost every year there are short spells of heavy rainfall which causes a heavy run-off in the streams and gulches, and admits of impounding water where impounding sites are available. In counting on water resources and annual impounding sites, the average of three to four successive dry years should be taken. When the impounding site admits of several years equalization-storage,

the mean of several years, including wet years, may be taken. In the appendix, data will be found on this subject.

The average at Congress may be considered as from 10 to 12 inches and for the Kirkland and Peoples Valley watersned as from 15 to 19 inches; and the upper Hassayampa River drainage area as from 14 to 16 inches of rainfall.

The average evaporation rate of central and southern Arizona is very high, but would be considerably less in dams at the higher altitudes.

There is a small and constant flow of potable water in Antelope Creek just above Stanton and there is a good well at Stanton.

There is potable water in a well at Weaver, and a very small flow in evidence on Weaver Creek at about the 4000 ft. contour. But over all of the great gravel area of the gravel slopes no water is in evidence and none can be found in shafts. But during heavy rainfall or cloudbursts, the gulches become raging torrents and become impassable for several hours.

There is a camp with a considerable number of good buildings at Octave Quartz Mine (at present inoperative) and there is a store, post office, and a telephone line connecting with the outside world. The camp is well supplied with a good supply of drinking water piped in with a pipe line several miles long from springs on Yarnell Mountain.

Excellent facilities forecamp arrangements could probably be made here, also a supply of water for test purposes, by rental from the company owning the property. This could be a great consideration during the operations of thorough test-sampling and also during the first stages of actual construction work.

TRANSPORT AND LINES OF COMMUNICATION:

The Santa Fe Railroad (branch line) between Phoenix (the capital of Arizona) and Ashfork Junction on the main line, passes within a few miles of the property. The nearest station siding is at Harquahala, about four miles from the lower end of the property, but there are no roads, but an auto truck road could easily be built.

The railroad point generally used is Congress Junction. Here there is a railroad, depot, post office, telegraph office, two hotels, restaurant, two stores, garage and repair shop and a total population of about fifty. From this point to Octave there is a rough road passable for autos, distance about nine miles.

The nearest town at which medical assistance can be obtained is Wickenburg. The nearest city of importance is Prescott, about fifty miles to the north.

There is a new highway of excellent construction and well surfaced which is now nearly completed and passes through both Wickenburg and Congress. This is the main State highway from Phoenix to Prescott, and forms a valuable and convenient addition to the means of communication and places the mines in easy communication with the outside world.

There would be no difficulty in opening up truck roads to any part of the property. For the transport of heavy dredging machinery, I consider a line from the lower end of the property to some point on the railroad as being better than to Congress Junction; but for all preliminary work Congress Junction should be the point of connection with therailroad.

AREA OF CLAIMS AND TITLES:

I have not investigated this matter as I have accepted the owners statement that an area up to 6,000 acres can be delivered with clear title when required.

WATER SUPPLY FOR DREDGING OR PLACER OPERATIONS:

As I have already indicated there are ample and excellent sources of water supply for camp and testing purposes; but in the immediate vicinity there is no water for mining purposes. This is the real reason why this valuable body of gravel is still intact.

All the recorded production to date has been from easy and shallow points of considerable natural concentration in mountain gulches and cross-wash gulches near the head of the delta or on the upper gravels.

The work has been entirely dependent on flood waters in good winters, or on crude hand dry-washing methods. Nothing but the richest zones of concentration averaging several dollars per cubic yard and upwards have so far been worked, and only relatively coarse gold could be saved by this means, and therefore all the large bodies of gravel are entirely virgin and intact.

Within the zone under consideration there are large areas suitable for standard dredging operations; these areas are the large flats of gravels of secondary concentration in the bottom of the lower gulches.

The delivery point for water for the first areas to be considered would be about the 2800 foot contour (see Topographic Map). Water may ultimately be required as high as the 3100 foot contour.

A preliminary study of the water situation has been made and a report rendered by Mr. Charles Kirby Fox. With certain reservations given below, I find that this report covers most of the available water sources. It shows conclusively that with sufficient capital ample water can be obtained for a number of dredges.

Briefly reviewing the report, it shows that there are four main sources of water supply:

(1) The main Hassayampa River at the Walnut Grove Dam Site:

(2) An impounding site at the outlet of the Lower Kirkland Valley:

(3) An impounding site at the outlet of Peoples Valley:

(4) Pumping water from the lower Hassayampa River.

There are several other minor sources of water which I consider as insufficient for any dredging operations of importance.

We may now analyze the comparative advantages of these different supplies as follows:

The main Hassayampa River with an impounding dam at Walnut Grove, which is known as the Whitman project. This involves the purchase of acquired rights and a construction outlay involving several million dollars. It also seems probable that part of the water would have to be diverted for agricultural purposes. The impounding area and volume of water available would be large, probably sufficient to equalize more than two years' rainfall and sufficient for a number of dredges.

The Kirland Valley project;- this has the largest watershed area, but there is not much recorded data as to the run-off available. This is the project recommended by Mr. Kibby Fox. He estimates an impounding capacity of 100,000 acre-feet with a delivery of 50 second feet continuous flow through a 40 mile conduit line.

He estimates a total cost of $2,000,000.00 which I think is too low an estimate. This would probably take two years' work to construct. I think that the difficulties and the capital outlay and time involved in preparatory work on both of these projects, puts them out of the question for a preliminary state with one or two dredges. They are to be considered as possible ultimate developments.

The Peoples Valley;- this forms part of the upper Kirkland Valley watershed. It has about 46 square miles of watershed. The impounding site is a good one, and a Cyclopean concrete dam could be constructed economically. (See photos). It is at a considerable elevation and so rainfall and run-off are relatively high and the evaporation rate would be lower. Allowing an available run-off of 120 acre-feet per square mile of watershed, the average annual catchment would be about 5520 acre-feet. Without an actual survey it is difficult to judge, but I made a visit to the spot and took a few hand levels, and I am inclined to believe that a dam under 60 feet high will impound a possible 3,000 to 4,000 acre-feet; as the lower end of Peoples Valley forms a large open flat which debouches through a narrow rock gorge forming an excellent dam site.

From this point it would be necessary to pump the water up to the divide between the Peoples Valley and Upper Antelope Creek;

The divide could be tunneled with about half a mile of drive and several hundred feet pumping lift saved; and the conduit route considerably shortened.

From the dam site to the tunnel there would be required about 6-1/2 miles of pressure pipe line and the lift would be about 600 feet or some -4300 feet elevation to -4900 feet elevation. With friction losses the pump would have to deliver against about 700 foot head, requiring about a 4-stage centrifugal pump at 65% efficiency it would take approximately 1,000 B. H. P. to deliver about 3,500 gallons per minute.

From the tunnel discharge there would be a fall to Stanton of 1,500 feet or from -4900' to -3400'. The distance would be about 3-1/2 miles. This fall could be used to develop power, probably sufficient or almost sufficient to meet the requirements of pumping the water up to the divide.

The water discharging from the power plant would still be on a sufficient altitude to distribute to any part of the lower gravels for dredging purposes.

The cost of this work would be much less than either No. 1 or No. 2. I roughly estimate the cost at $530,000.00 as follows:

Cyclopean Concrete Dam (water, sand, rock, all at site), 16,000 cu. yds. approx. for a dam, crest 160 yds. base length 20 yds. height 20 yds. base thickness 18 yds.	$160,000
Pumps	10,000
Motors	15,000
Buildings	5,000
35,000 ft. delivery pipe @ 3.00 ft.	105,000
Tunnel and approaches 3000 ft. @ $30.ft.	90,000
Power Plant and Buildings	30,000
17,000 ft. Pressure pipe @ 5.00 (H.P.)	85,000
Power line 10 miles @ $1,500	15,000
Contingencies	15,000
	$530,000.

This impounding site has the advantage of a high rainfall and relatively low evaporation rate, also the dam has rock foundations, a hard volcanic flow rock, and there is a small but steady water flow.

The water could be developed and delivered within a year to a year and a half of construction work.

If prior rights, and agricultural preference does not interfere, it is a water source well worth investigation.

The question of pumping water from the lower Hassayampa River has been dealt with by Mr. Fox. He shows a total capital outlay of $775,000.00 and a monthly cost of $ 31,200.00. On a basis of two dredges and a capacity of 300,000 cu. yds. per month this would cost 10½ cents per cubic yard for water.

I think his estimate should be reviewed and modified. I think the lift need not be as great as he indicates, and the plant and pump efficiency higher. The capital investment for plant can be cut down considerably. Also my estimate of dredge capacity is very conservative. So that we may count on a pumping supply at a cost not to exceed 3¢ per cubic yard gravel dredged.

As a summary I may state that sufficient water can be made available to work these placers by dredging even on a large scale if desired, and the cost will not be prohibitory considering the reported richness of the ground, and furthermore, any water system developed will always have value for agricultural purposes, and would be a permanent asset long after the mines are worked out.

The water question is more of a political and legal one than one of engineering difficulty. With sufficient capital I see no difficulty in providing all the water required.

GENERAL GEOLOGY OF THE DISTRICT:

All the central and southwestern part ofArizona is, geologically speaking, of great age. Weathering and erosion of the rock surfaces of mountain ranges has developed on a vast scale and throughout great epoches of time, with the result that large areas of underlying rocks of great age have been discovered by erosion. In other words, the gradual wearing down of the mountains and the leveling off processes and corresponding filling-up of the valleys (constructional) has been going on with less interruption from young or recent mountain building forces and extrusive processes than is the case in California.

There is evidence over considerable areas of tertiary eruptives, and some later flows of basalt, but over the greater part of central and southwestern Arizona there are very limited areas of the later sedimentary rocks. The mountain ranges are either a complex of schists (mostly archean), with intrusions of granitic rocks (mostly pre-cambrian), or else the remains of massive tertiary extrusives.

There has been no detail geological work done in the vicinity of Octave (Rich Hill) and in the short time available during a rather hasty reconnaissance I could not possibly do more than make a general observation of the quite complex geological conditions surrounding the base of Rich Hill. I took no geological samples and made no identifications of rocks other than megascopic field approximations.

But pending further investigation, I think the following will be found useful as a tentative if rather hypothetical interpretation of the surficial phenomena in evidence.

Rich Hill is a mass of very early intrusives, - granite, and appears to be distinctive to the main granite of Weaver Mountains to the northwest.

There is a fairly strong belt of schists with an almost vertical dip, and a general north-south strike that is in evidence on Antelope Creek, and which can be traced for a considerable distance above Stanton. A similar belt can be traced between Octave and Weaver on the east side of Weaver Creek.

Tentatively I can co-relate these schists as Archean. The granite is evidently intrusive to the schists, a little

above Weaver and again right on the top of the north end of Rich Hill, there are two large masses of what appear to be a dark, highly silicified schistose-slate, of great age, highly metamorphosed and contorted. I would classify them as a partly eroded roof-pendant of what were the overlying rocks at the time of the intrusion. They are similar to many of the early Paleozoic sedimentaries.

I noticed a great number of fragments of the same rock scattered all through the gravel even as far as four miles down the gulches.

There appears to have been a considerable amount of magma differentiation, and there are areas of rock rich in the ferro-magnesian minerals, in places forming almost a hornblendic-gabbro, this in places has been intrusive as irregular masses and vein-dikes into the fractured complex zone surrounding the granite. There are also a number of large pegmatite dikes cutting both granite and schists.

Later than these are a number of small vein-dikes of actinolite, intrusive and at times faulting an early series of quartz veins. I noticed a number of stringers of vein dike quartz veins cutting these almost at right angles and again evidencing faulting.

There is a more or less regular system of quartz veins, which have a NW to SE strike and dip into the hills. These have been worked as gold quartz mines, of which Octave was the principal producer. But in addition to these larger veins there is a vast complex network of quartz stringers, lenses, and pockety deposits, which cover Rich Hill and particularly the slopes of the hill to the east between Octave and Weaver and also above Stanton, and to a lesser extent on the slopes to the west of Antelope Creek.

The gradual weathering and decomposition of this vast complex of small gold bearing veins has been the source of the gold in the detrital gravels below.

I consider the general indications are that there have been a number of successive periods of gold impregnation in and about the Rich Hill granite plug; from very early geological times up to and probably including a final mineralization during tertiary times, - the corresponding period of enrichment accompanying the Miocene intrusives in Mexico and California.

There is evidence of great movement as affecting the granite plug of Rich Hill, which I could not trace in the main granite range to the northwest or at any rate they are not as

clearly in evidence. These movements, which were profound and intense, have developed a series of flat dipping cleavage planes in the granite mass, striking about NW and SE and dipping into the mountains. Towards the north the dip increases until in the northern central part of Rich Hill they appear to be almost vertical. Movement and pressure have developed a gneissodic structure in some places.

It is also evident that there was formerly an extensive "blanket" of earlier rocks into which the granites intruded, and that there have all been removed by erosion, the slate roof-pendants, mentioned above, being the only remaining evidence; and that it is more than probable that there were numerous and possibly richer gold quartz veins in this eroded "blanket". This probably represents at least several thousand feet removed through a period of many millions of years.

It is of course true that the greater part of the gold eroded during these earlier periods has gone far down the streams, but what I wish to emphasize is that the geological evidence shows intensive gold impregnation with successive periods of enrichment of the gold quartz veins of the Rich Hill District, also the great age of the District, with consequent long periods of erosion, with concentration and re-concentration of the gravels; so that there is the opportunity for a very general distribution of gold over large areas and far down on the course of the gravel deposition, - providing that we keep within the limits of the zone that has deployed from the source of the gold, viz. the gold bearing veins in the general zone of impregnation. This zone is covered by a "fan" of gravels deploying from Weaver and Antelope Creeks south, southeast and southwest.

Another fact that I wish to draw attention to is the following: Antelope Creek has eroded a valley following the line of the belt of schists (already referred to) and gives evidence of being the deepest valley cutting through the mountain barrier of granite, of any valley except the present Hassayampa River. The head of Antelope Valley is cut off by a mass of Tertiary eruptives (volcanic flow rocks). The valley is evidently older than these eruptives. It seems quite possible and even probable that the present Antelope Valley is the lower end of an extensive pre-tertiary valley that at one time drained a large area to the north; possibly an area now drained by the upper Hassayampa and Kirkland Rivers.

When the Tertiary eruptions started they dammed this valley, and eventually new drainage lines were formed. Possibly a large lake was formed, the overflow of which excavated the gorge of the Hassayampa below Walnut Grove. There is some

correlative evidence of this in that there are large areas of stratified water deposited tuffs in the Walnut Grove section.

Continued and extensive eruptions completely changed the topography and built up a high chain of mountain north of the head of Antelope Valley and new drainage lines were developed.

This larger valley that certainly once existed and continued southwards below the mouth of Antelope must have maintained a deeply eroded pre-tertiary channel down to some meeting point with other valleys, say at some point of the present lower Hassayampa, probably a little west of Round Mountain.

When the main flow was dammed back, the erosional power of the stream would be less, and it would begin to fill in and become constructional, especially as there was probably a great deal of detrital matter from the volcanic action.

It seems therefore highly probable that thereare deep-seated underlying beds of gravel, of pre-tertiary age; and also probably one or more well defined old river channels, which are now buried under the existing layers of Tertiary and Quahernary gravels.

These earlier gravels, naturally represent a much longer period of erosion, of sorting, concentration and re-concentration and may be completely preserved by the present fan of constructional gravels.

I consider it essential to explore and prove the question by a series of carefully located shafts and some drifting. It must also be remembered that there have been many changes of climate and that in the pleistocene period, subsequent to the volcanic eruption, there was a long period of very heavy rainfall and the sorting action of the flood waters was very active, and that therefore in any case there should be a zone of considerable re-contentration at the point where the grade changes, from the grade of Antelope Creek to the juncture point of the Hassayampa and Martinez Creek, at or about the flats just north and west of Round Mountain. Pit sinking and test work should be developed at this point.

I would suggest that if deep pits or shafts are put down to actual true bed-rock, that these should be located by survey and a cross-section should also be made, and asf ar as possible a contour line of the underlying bedrock established.

There are a number of other interesting geological features but which do not have an immediate relationship to the interpretation of these gravel deposits, so they are not germane to this report.

SUMMARY OF GEOLOGICAL INTERPRETATION:

(1) That the district is one of great geological age and erosion and gravel concentration has been active through a great period of time.

(2) That Rich Hill forms the center of a zone of intensive gold impregnation, as evidenced by the great number of veins and that furthermore there appears to have been a number of different and successive periods of mineralization.

(3) That Antelope Valley shows indications of having been part of a main valley of a larger drainage system, and that this may account for the great number of water worn boulders in the lower gravels; and that as a consequence there are great probabilities of there being buried old channels under the present fan-blanket of gravels.

(4) That the great age of the deposit and the evident long period of deposition, erosion and re-concentration of the gravels make it likely that there is a very general distribution of the gold, and also that the lower true bedrock zones should be rich and that it is necessary to explore for these. They will probably occur in well marked channels. There is also a chance of greater deposition at the meeting point of the lower cross valleys and lower Antelope valley - though this may be deep.

THE GRAVEL DEPOSITS:

Their extent, nature and structural conditions. Zone of distribution of gold and reported values: The whole of the slope from the foot of Weaver Mountains extending over the plains is covered with a great blanket of "wash", a great part of which is more or less waterworn and partly stratified gravel.

The area that debouches from Antelope Creek and Weaver Creek (marked with yellow on the topographic sheet) shows a far larger proportion of well washed gravel, and the positive evidence of being true river gravels. This area is the only one that is known to be gold bearing in a marked degree.

I have found various statements in which it is asserted that these gravels are relatively shallow. This is not true - I find that the existing exposed or surficial gravels may be classified as:

(1) Original primary gravels, in places, even on the surface, these are compact and partly cemented by infiltration of alkaline matter, - the so-called "caliche";

(2) Gravels in part re-concentrated and washed down by recent (late quaternary) gulch waters, and forming intermediary benches and gradual slopes, up to the main banks of No. 1;

(3) Loose and sandy gravels forming the most recent and actual stream beds in the floor of the existing gulches, forming a third stage of very recent re-concentration.

These later gravels generally rest directly on a floor of No. 1, with "Caliche" structure, the so-called false bed-rock.

I have already mentioned that the main body (No. 1) of gravels shows a remarkably even level at any point where a cross section is made at right angles to the median course of Antelope and Weaver Creeks, it forms what geologically is termed a peneplain.

With a hand level I took several approximate cross sections, and I found that the level of the peneplain is generally from 60 to 80 Ft. above the surface of the wash on top of No. 3 gravel.

In two cases I found shafts over 30 ft. deep below the level of No. 3, so in this case the total depth of original gravel was over 110 ft. Soffar <u>true</u> bedrock has never been reached.

From the general structural conditions and the position of bedrock at the upper end (it is exposed at Antelope and Weaver Creek where they debouch from the mountains) and also the slope of Round Mountain, I expect that bedrock will be found within 50 ft. at the upper end, and within 80 feet at the lower end of the present bottom gulch levels. In any event there is overwhelming evidence that the main body of No. 1 gravel will average over 75 feet in depth over the whole property.

The surficial area of the 6,000 acres is approximately 30 million square yards, and the average depth 25 yards gives a gross cubic content of 750 million yards of gravel.

There is good evidence that the source of all this gravel was gold bearing, and that it has been concentrated and reconcentrated over a vast period of time. There seems to be reasonable evidence that at least all the gravels of No. 2 and No. 3 class are recent local gulch concentrations, and that a large part of these carry gold in commercial quantities.

The structural nature of this great fan of gravels is not altogether easy to explain. If it was built up of more or less fine and well stratified gravel, it could be explained by the usual constructional out-building effect of a stream delta debouching from a mountain valley on to a plain. But there is very little regular stratification, and relatively coarse gravel and occasional large boulders are "peppered" all through the mass. Furthermore, rather large and perfectly waterworn gravel and occasional small boulders are to be found right on the surface of the top banks, at least four miles south of the mountain valley limit.

Tentatively, I think, that while it is not in any way a glacial deposit, I believe "levee building" by minor snow and ice action, has helped to control the flood and maintained the water within, at times, narrow limits, thus facilitating the transportation of coarse material over relatively great distances on the surface of the fan delta. This probably represents a period of heavy rainfall during the end of the ice age in the late Pleistocene.

However it came about, there is a very general and rather regular distribution of a limited amount of <u>well</u> water worn and <u>coarse</u> gravel over the whole fan of gravel.

Where recent flood action has cut gullies through the main mass of the gravel it has tended to wash away the lighter material and "drop" and concentrate a blanket of coarse rock on the bottom.

These blankets of coarse gravel and boulders, being very much in evidence, having caused some of the investigating engineers to form a wrong idea of the extent of these "boulders" to be handled in case of dredging operations being commenced.

The photograph taken just at the outlet of Twinshaft Flat, (see photos) shows a typical extreme case in the middle section of the ground. Actually just above and just below this ground there are shafts sunk to approximately 30 feet which show no excessive proportion of heavy gravel, and also clearly indicate structural conditions, - showing that the boulders are a total concentration out of 90 feet (vertical) of erosion, and that they rest on "Caliche" or a false bedrock formed of average primary gravels. In another section I suggest a method by which these boulders can be uncovered, mined and broken up or removed in advance of the actual dredge cut.

The recent, and up to the present, erosional forces that have cut the existing gulches below the general peneplain of what I term primary or No. 1 gravel, have also tended to concentrate the gold, so that the No. 2 and No. 3 gravels con-

tain a considerable enrichment, representing all the gold out of the gravels eroded to form the gulch, this as already stated is from 60 to 90 feet vertical depth, and as No. 2 gravels generally form a relatively shallow blanket of from 2 to 20 feet, averaging about 9 to 10 feet, the ratio of concentration has varied at from 8 or 10, to 1.

This accounts for some of the high sampling results of some of the shallow pits in No. 2, and also that the dry-washers have been able to make a living on the edges between No. 2 and No. 3. If the original average of the upper parts of the primary banks averages 40¢ or 50¢ it accounts for shallow pit sampling in No. 2 showing returns of several dollars per cubic yard. It also shows what we might expect if we can find, yet undisturbed, the original channels on true bedrock, and shows that it is well worth looking for them.

It is to be noted that even on the flat surface of the tops of the high banks there has been a certain amount of enrichment due to the concentrating action of the run-off of rain water, and there is a shallow blanket all over the surface of from 6 inches to 1 foot in depth that represents a probable concentration of from 3 to 5 to 1, so that all work on sampling must take into account the above structural facts, and the results of the blanket enrichments must be recorded separately from the average. This is also particularly true of all minor gulches, gullies, washes, draws, etc.

Care must also be taken to distinguish between upper primary gravels, i. e. No. 1 and gravels of the No. 2 and No. 3 grade, and if deep shafts are sunk, careful watch must be made to distinguish between the great mass of No. 1 gravels and possible underlying pre-tertiary gravels.

The existence throughout the upper exposed portions of even the big banks of rock fragments of the tertiary lavas, shows that all of the banks at present exposed are of quarternary constructional periods, although they may contain a considerable portion of reconcentration of early banks and benches. This seems probable as I noticed many fragments and even some boulders of the metamorphic rocks and schistose-slates, which evidently correspond to an erosional period of the upper capping of rocks above the granites.

I noticed that the proportion of heavy and large boulders is excessive in the upper gulches close to the debouchment from the mountains, but that further down the gullies the proportion steadily decreases, until from the middle section south I consider the ground as suitable for dredging, providing large sized and powerful dredges are used, with not less than 12 cubic ft. buckets. This is dealt with under another section.

The zone of the distribution of the gold is evidently limited to the fand ebouching from Antelope and Weaver Creeks, and to a minow degree from the gulches to the southeast up to Fool's Canyon. But to the northwest immediately you pass the zone of gravels built out by Antelope, gold in paying quantities is no longer found.

The Hassayampa River undoubtedly brings down a certain amount of fine gold, and there are indications which I did not have time to investigate, that it at one time flowed northwest from the entrance of the "Box" and probably passed to the north of Round Mountain and probably there was a general junction just about where Martinez, Antelope and Weaver now come together.

Gold seems to be distributed all the way down the fan to this point and also on the southeast slope, down to the Hassayampa River above the Box.

REPORTED VALUE OF THE GRAVEL:

Personally I did no sampling, as I could see no use in duplicating work already done, unless I could apply more thorough methods, which I did not have the time or equipment to carry out. I refer to a proposed plan of sampling in another section.

I did, however, see ample evidence that it has been a recognized dry placer district of considerable import; and I saw dry washing at work, and quite a number of samples of gold that had been bought by merchants. There is also sufficient data in the U. S. G. records to show the recognized importance of the camp.

A great quantity of data and various reports have been submitted to me, and I hereby beg to quote from these as follows:

"VALUE" DATA OF OTHER REPORTS:

J. E. Russell states: "I found gold in wvey pan---. Where I panned it would run from 30¢ to 60¢ per cubic yard, if not better. . .I got 60¢ from one pan. . . . Four white men constructed a short flume, took out a ditch, and ran 25 or 30 yards of gravel, their recovery was about 30¢ per cubic yard. . . . They worked with a machine. . . a semi-dredge, they worked for about two months. . . . I am advised they recovered about 30¢ per cu. yd. . .: Their costs were too high and they had no water."

W. L. Leland states: "You have in my judgement, made a big mistake in not going below your so-called false bedrock, because it is possible, and in fact quite likely, that your best values will be found down deeper. . . As a matter of fact, I got my best sample down in the false bedrock. . . . If the gold I found has been flaky, or if I had found places barren of gold altogether, which I did not, I would not, after making only 30 tests, even touch on the subject of values in this letter. However, the evidence of extensive dry-washing in all directions is a factor to be considered in connection with my own sampling. I did not weight the gold I panned out, but from forty years experience I am positive it was not less than 50¢ per cubic yard after estimating that half of your yardage is composed of small boulders and coarse gravel that does not carry values, and which are always thrown out in filling a pan. . . Now it is highly improbable, considering the general law of averages, that I would happen to stumble on to only rich spots every time, yet it might possibly be so. No one suggested where I should take the samples and no one was given the slightest chance to salt any of the dirt I took as samples.

So much for values so far as 30 samples can be considered as establishing same on a very large area."

W. A. Farish states: "In sampling this ground I dug a cubic yard of the ground at various points, loaded it into a wagon (after placing a canvas in the wagon to prevent any loss) and hauled each yard so obtained to the river and ran it through a small sluice box, catching and keeping the gold content of each sample separate. The results were taken to a laboratory and their amount and value carefully determined. I took about a dozen samples, over an area of about 300 acres, and the results ranged from 30¢ to $1.47 per cu. yd. . . . As I remember throwing out the high sample of $1. 47, the results averaged about 45¢ per bubic yard. . . . I met Mr. Axtell, who informed me he had made extensive drilling tests of the ground and the engineer referred to above was present and did the sampling of the holes and after throwing out the heavier particles of gold, to be safe, the gwound r an over $1.00 per cubic yard."

A. H. McNeer states: The area of ground under consideration (see diagram) is shown as follows: . . . . placing a reasonable average a t 20 feet; throughout the entire area checked on the diagram amounting to about 4,100,000 cubic yards. This at $1.51 per cubic yard, making a total value of about $6,191,000.00" (For the area of this section).

Chas. Kirby Fox states: "The lowest values I have heard of are about 30¢ per cubic yard. Along the benches near the Hassayampa River South of Rich Hill, it is said that the values are greater the higher one goes."

W. E. Plank states: "This ground is no exception to the rule and although there are 7,665 acres under location, I feel sure, speaking with circumspection, that but 4,000 acres of it are workable. . . . While nowhere near sufficient prospecting has been done for operating purposes, I have no hesitation in stating that it is my belief thatthe entire 4,000 acres will run some 35¢ per cubic yard".

1905 - U. S. Geological Survey Mineral Resources, "Weaver District, the Rich Hill, in this district, has yielded from the surface f abulous sums in the past. It was the scene of much activity during the spring months of the year. A total of $16,273.00 in gold dust extracted from the gravel on the Rich Hill and vicinity, was sold to storekeepers in the neighborhood camps."

1899 - Report of the Governor of Arizona to the Secretary of the Interior: "The gold placer deposits of Weaver are celebrated for their richness and the coarseness of weight of the grains of gold. (Nuggetts). They are at the southern base of the mountain and west of the Hassayampa River at the foot of Rich Hill at Stanton. They have been worked for many years, thirty or more."

History of Arizona by Farish: "The Rich Hill channel is noted for its coarse heavy gold (nuggets) . . . One of the largest found was worth $400.00, another $300.00, and another $150.00. . . Three lumps taken out were worth $1008.00. Nuggets to the aggregate value of some $2,000.00 were taken out within a small area. . . . Pedro Lucero, at Weaver, found one piece worth $450.00."

While I do not endorse the methods used to sample, and while I think some of the conclusions drawn in the reports are altogether correct, still we must accept, at their face value, the statements of so many different men, and there must be some ground for a tentative appraisal of the property.

Frankly, I think everybody has both over-estimated on the basis of shallow pits in No. 2, and entirely under-estimated, because none of them ever reached true bedrock or samples it. I consider this to be absolutely essential.

POSSIBLE DREDGING AREAS:

For our immediate purpose we need not consider the ultimate requirement or methods for mining any or all of the gravels within the area. All we need to consider are those sections which can be mined by standard dredging methods using a large dredge.

Eliminating the upper section, that is, all gravel within two miles of the foot of the mountains, as containing too many large boulders, and also all the high banks as being too deep for immediate consideration, we must then confine ourselves to gravel bank of No. 2 and No. 3 types, that is, to the wide flats of the lower gulches.

These may be divided into four zones:

(1) The lower end of Weaver Gulch, starting about 600 yards below its junction with Oro Fino Gulch, and working up stream for about 3000 yards. (See cross section of Rabbit Flat and photos).

(2) From Oro Fino and Weaver going up Oro Fino, and across a low divide to the middle section of Yaqui Gulch.

(3) A large flat extending about 1000 yards down from the juncture of Slaughter House Gulch and Weaver Gulch.

(4) A considerable extent of Lower Antelope Creek.

Of these zones I only examined No. 1 in detail, as I considered it as typical, and as being unquestionably good standard dredging land, and as being a good unit section on which to base a tentative estimate.

I named the lower part of No. 1 zone as "Rabbit Flat"; I made an E-W cross section with a hand level, across this section, crossing Weaver Gulch, within 100 yds. Below its juncture with Oro Fino. The results are shown in the attached sketch cross section.

Photo No. 1 shows the gulch bed, with No. 3 gravel and a partly eroded bank, about 18 feet high of No. 2 gravel. In the foreground there is a "blanket" of the concentration of heavy gravel and boulders referred to under "Geology" and "Gravel Structure"; this blanketrests on a false bedrock of Caliche of No. 1 gravel, and is typical of about theaverage heaviest ground a dredge would have to dig into.

Photo No. 2 shows the juncture of Weaver and Oro Fino. "Alonzo" is standing in the mouth of Oro Fino. To the left can be noted two of the largest type of boulders likely to be found. (See section on Dredging Methods and elimination of boulders). The ground up Oro Fino has been worked by dry washing, and judging by their methods must have averaged better than $1.50 per yard before they could begin to pay expenses.

Photo (Panoram) No. 3 shows the middle section of the north end of Rabbit Flat, looking up Weaver Gulch. Rich Hill stands in the center and Antelope Peak (Flat Top) to the left.

The high bank of gravel to the right is a block of partly eroded No. 1 gravel, sloping to the right (east) with a blanket of No. 2, down to the flats of Oro Fino, just out of the limit of the photo.

From the starting point up to this point the flat averaged 500 yards across, and I estimate an average of 40 ft. as an arbitrary convenient working depth below pond level; there is no real level of false bedrock. It is simply a question of how deep do you want to cut into the primary gravels, or how deep do you want to dredge. Based on this arbitrary depth I estimate that this first section is 1,500 yards long, averages 500 yards wide and as 16 yards average depth; (6 ft. to 10 ft. above pond level and 40 ft. below pond level); this gives an available 12,000,000 cubic yards.

The second section above this I estimate contains 4,000,000 cubic yards, or a total of sixteen million cubic yards for this No. 1 zone, consisting of Lower and Upper Rabbit Flat.

I made no cross-section or survey of the other three zones, but I think it safe to say that sixty million cubic yards of dredgable ground suitable for standard methods can be developed within the flats of these lower gulches.

Until I sample the ground myself I have no means of making even an approximate appraisal of the real value of this property. But based on the statements laid before me which I have quoted above, we make a tentative estimate to obtain some idea of its possibilities.

If we take the value of the dredgeable areas of these bottom gulches, as averaging 50¢ per cubic yard at 80% extraction, with a recoverable value of 40¢, and even if we place dredging costs as high say as 10¢ per yard and add to this costs for pumping water for breaking upper bank by hydraulic mining, and for extra high stacking, etc. and bring the total costs up to 20¢, it would still leave us a net valuation of these four zones of approximately $12,000,000.00.

In addition to this we have the possibilities of true bedrock gravels, and of the far greater area of high banks, for which I am prepared to suggest a suitable method of mining. These statements must be taken with the reservations that I have made, but I have seen sufficient to state that I consider the body of gravel one of the largest desert placers that I know, and that there are sufficient values in evidence to warrant a thorough, complete and systematic sampling; and if the values are then found to check up, I would in that event unhesitatingly urge the investment of the large capital necessary to bring on the water and equip with large dredges.

METHODS OF DREDGING SUGGESTED:

Due to the scarcity of water and the necessity of conserving it, dredging should be commenced at the upper end of any given section, and work driven down grade. By this means tight water-holding ground will be maintained as a water-dam on the down grade side, and the loose and porous tailings will remain behind on the up-stream side. The pond can be so maintained that the tailings piles will act as a break to protect the dredge in case of cloudburst floods.

This method would have a further advantage in developing any water that came "down gulch" as seepage or from upper ponds or during moderate rain flows.

In those cases where it is desired to work into fairly high banks and break ground hydraulically in advance of the dredge, it will be found that there will be an excessive load for the stacker, and that the increased volume to be handled will need very high stacking. In this case the "fines"can be handled by a dredge pump, and delivered a considerable distance back on to the top of the coarse tailings pile. In this case the water would filter down and return to the pond and thus conserve water, whereas, if dredging was up-stream this could not be done.

Until further exploration is underteken with deep shafts the nature and "position-depth" of true bedrock is unknown. The value found in true bedrock gravels will determine if it will be worth while to dig to the probably great depth required. Meanwhile I am assuming a digging depth of 40 feet below gulch floor, and in this case we would be creating a false bedrock and be simply digging to a given depth in No.1 gravels.

Assuming this to be the case I suggest the foll wing procedure as a means to meeting the difficulty of the blanket of boulders that exists in places (as shown in Photo No. 4).

The dredge pond level to be maintained a few feet below the level of the "Caliche" floor on which the boulders are

resting; an auxiliary pontoon with pressure pump to be provided to supply water to a small hydraulic mining outfit to "break bank" to a bench in advance of the dredge cut, thus exposing the boulders, the surrounding "fines" being sluiced to the dredge pond and taken care of in the normal process of digging.

The boulders as exposed could either be "block-holed" and blasted down to a size that can easily be handled by the dredge buckets, or else they could be stacked back by a derrick to one side, or to bedrock back of the digging ladder the derricks could be mounted on the side at the forepart of the dredge.

In case of required deep digging or in the event of it being found that the big banks will pay to mine, I can see no reason why an extension of this system should not be developed to take care of quite high banks in advance of the dredge cut; of course in this event extra high stacking of the additional coarse material would be required, and also a rather larger proportion of water; also there would be added costs for pumping back a considerable volume of fines. But there is no reason why a combination of pump-sluice hydraulicing and standard dredge work should not be worked out, which would, in my opinion, meet the requirements of extra-deep digging or of mining the high banks. Its adoption will entirely depend on the values found when the properties are systematically sampled. If these are high enough to warrant the dual and increased cost, there appears to me to be no mining-engineering difficulty in the way of finding means to work all of the gravels.

This view adds greatly to the prospective possibilities of the deposit viewed as a whole, and is an additional argument for a thorough study and sampling by pits of all of the types of gravels, and to prove bedrock depths.

It is evident that if the greater part of this vast deposit can be mined and it is proved that it will pay as a commercial venture, that we have here a very, very large undertaking, but at the same time one that can be proved-up by careful stages, and in which it will be a definite engineering development of an appraisable asset.

THE PROBABLE COSTS OF DREDGING:

I am personally satisfied that the structural conditions that built out this deposit and the richness and nearness of the source of the gold, and the long period of gravel concentration, all indicate a great probability that this

ground will be found to be far richer than the average California ground that consists essentially of lower river deltas.

But conversely the larger proportion of heavy gravels, the greater depth, the local absence of water, requiring considerable engineering work and expense to bring it in, and other factors, will necessarily make costs higher and require a certain amount of engineering constructive effort, to meet conditions not entirely in accord with standard practice. This however is a matter of small moment providing savable values are found to be correspondingly higher.

Tentatively I therefore estimate a base cost of 10¢ per yard for the easily worked flats of No. 2 gravels. But to meet the requirements of all four zones that I have mentioned, and to be in a position to meet possible special work, I think we should tentatively estimate as follows:

Standard heavy ground dredging	10¢ yds.
Extra high stacking costs	3¢
Pumping-fines, back over tailings	3¢
Cost of water conservation and delivery	4¢
Total cost.	20¢

This is a conservative and safe estimate. We may be able to cut costs to 12¢ or 15¢, but water costs alone will always average 3¢ to 4¢ on this basis - and assuming the data given by other engineers as more or less correct, and taking a mean average value of 50¢ per cubic yard and a recoverable value of 80%, we have a net valuation of 20¢ per cubic yard on the basis of an individual dredge capacity of 200,000 yds. for a 12 cubic foot bucket dredge. We would have a possible profit of $40,000. per month, and with ten months working season, a net redeemable value per dredge of $400,000. per year. And on the same basis the four proposed zones of dredging would have a net valuation of $12,000,000. as already stated. It must be clearly understood that this is not to be taken as my appraisal of the property, but merely as a tentative estimate based on such data as is available, and merely for the purpose of visualizing the possibilities of the property. The real appraisal can only be made by a complete study and a proper sampling with the right equipment.

Furthermore I wish to draw attention to the fact that I do not consider the above should be taken as a "limiting" valuation, because the total area of gravel is very great, and even if they prove to be lower than the estimate made, for the zones given above, if they are found to be of a commercial grade, and if a system of mining can be developed that will include the high banks and also the true bedrock zones, which so far have never been sampled, we may have to revise these tentative estimates and place the gross valuation ona much larger scale.

The above must only be considered as an economic perspective based on the limited data available.

PROPOSED PLAN FOR SAMPLING:

The gravel is not loose, there is no water, and the ground stands well with very little timbering, so I consider pit and shaft sinking as far preferable to any attempt at drilling.

Shafts have the advantage that they remain open for a long time, and therecords are easily checked.

The structural conditions of the gravel are easily observed in shaft sinking, and a possible deep zone of pretertiary gravels could be far more easily identified with a shaft than with a drill.

Bedrock conditions and richness can be proved, and if necessary a short drift driven from a shaft which cannot be done with a drill. If all the material taken from a shaft is washed, and all of the recoverable gold weighed, we are obtaining a real proportional sample, which means something. At the present stage a limited number of shafts will give a much better idea as to conditions and value, than a far larger number of drill holes.

I would therefore do all my testing with pits and shafts. I would provide two trucks, one to transport water from the Octave Mine to the point of operations and the other equipped with a small hoist, air compressor and space for transporting a demountable and portable washing platform, short sluices, screen and spetial concentrating-washing machine that I have designed for this class of work.

I would survey the property and keep a record of all test locations. The tests should show, - cubic content of shaft, size of largest boulders, proportion of coarse gravel - 6", total weight of gold saved, approximate screen analysis and records of nuggets. Record of the different zones penetrated so as to establish a vertical yard-cent basis, particularly to differentiate between zones of surface enrichment of No. 2 gravel type and zones of underlying primary gravel of No. 1 type.

All heavy dark sand concentrates should be saved and their weight recorded and reduced to per- yard weight. These concentrates can be separated into magnetic (black sand relatively valueless) and non-magnetic residues. These non-magnetic heavy sand concentrates are often of considerable value, and the additional cost of keeping the record and making the test is not great and is well worth while.

The concentrates should be assayed for value per ton and reduced back to value per cubic yard, of original gravel in place.

With data so obtained we would soon be in a position to give a definite and positive appraisal of each zone tested.

Even five shafts sunk on a cross section line, all reaching true bedrock, would give data as to the vertical zonal-distribution of the gold that would be of great value.

The first to be sunk on high bank, say to the west of a given gulch, three shafts on the floor of the gulch and one on high gravel to the east.

The bulk of the shafts would of course be sunk in the gulch floors, and would not average over 40 to 50 feet deep.

The shallow shafts should not average over $2 to $3 per foot, and the deep shafts about $5 per foot, providing we have the right equipment.

We may make a tentative estimate as follows:

1	deep shaft at lower end with drifts	$ 2,000.00
6	deep bank shafts, spaced 1000 yds apart on either side of Weaver Gulch 200' each $5	6,000.00
10	medium deep gully sides spaced 500 yds. apart, average 100' @ $5	5,000.00
30	shafts 50' deep gully floor, spaced 100 yds. apart @ $3	4,500.00
2	trucks and equipment	7,000.00
1	auto (second hand)	500.00
	Engineering and staff expense	5,000.00
	Total.....	$30,000.00

The above does not include the cost of a Consulting Engineer's report and check supervision.

SUMMARY:

Location: Middle of Arizona - 9 miles east and southeast of Congress Junction on Santa Fe Railroad.

Communication: Santa Fe Railroad and State Highway, Post Office on Property. Telegraph 9 miles.

Topography: Desert plains, and delta, debouching from Weaver and Antelope Creeks in Weaver Mountains. Altitude at mines 3300 feet.

Climate: Good for desert, open for mining all year. Rainfall about 10 inches. Evaporation high.

Water: Good drinking and camp supply at head of property. No water for mining on property. Abundance can be developed and brough t in with sufficient capital outlay and no great engineering difficulties.

Area: Over 6,000 acres gravel claim can be obtained.

Gravel Structure: A large delta of quaternary gravels with part reconcentration of tertiary gravels and possibly underlying bedrock area of pre-tertiary gravels. Gravels have been re-concentrated into three types by gulch waters:

(1) Primary gravels, deep--over 100 ft.
(2) Secondary gravels forming flats in bottom of lower gulches. Dredgeable gravels.
(3) Actual loose gulch wash.

Volume of Gravels: Surficial area 6,000 acres, or 30,000,000 square yards - average depth 25 yards - gives gross total of 750,000,000 cubic yards.

Volume of dredgeable gravels in gulch flats estimated 16,000,000 cubic yards.

Value of Gravels: No sampling made - data from other reports - shows 50¢ to $1.50 per cubic yard as average. Estimated average for working basis of valuation @ 50¢ cubic yd.

General Geology: Archean schists, pre-cambrian granitic intrusives, relatively recent Tertiary eruptives. Gold source from complex of rich veins in, and surrounding Rich Hill - at head of Delta.

CONCLUSION:

Well worth complete sampling and further exploration. Possible valuation very great. Immediate tentative valuation on data available $12,000,000 dredgeable ground.

Submitted,

February, 1926 (Sgd) John M. Nicol

HISTORY OF ARIZONA

By - Farish. Vol 2. Page 247.

"The next party to enter this new region in response to the letters left with the Pimas, and consisted as what was known as the "Peoples Party." This party was organized by A.G.Peoples in May 1863, and entered Arizona from California by way of Yuma, where they met Pauline Weaver, who had come by appointment; Peoples having written him from California. The party, with Weaver as guide, followed up the Colorado River to LaPaz; where the Mexicans had been Placer Mining for some time. They went east across the Plomosa Range and up the Cullen Valley. On nearing the mountains, some antelope were discovered, and Peoples followed them and succeeded in killing five. From this, he named the stream Antelope Creek; and the mountains which rose from its northern bank, Antelope Mountains.

The party camped near by and before sundown had panned out some gold, on what they named Weaver Creek, in honor of the guide.

The next day four Mexicans, who had joined the party at Yuma, started after their horses which had strayed during the night. In the evening they came in with their stock, and taking Peoples aside, exhibited a large quantity of gold nuggets; which they had picked up on top of the mountain. They could have kept the secret to themselves; but they gathered a large amount of gold and then rode safely into Mexico.

The next morning, the party went to the top of the hill where innumerable chunks and nuggets of gold were found in a sort of sloping basin. In about a month all the surface gold was gathered and the party scattered; some remaining to work the gravel bars of Weaver Creek. It is estimated that during the first month, a quarter of a million dollars in gold was gathered. The mountain was named Rich Hill; and has yielded many thousands of dollars since that time."

Page 252.

"He was one of the party that accompanied Colonel Jack Snively, a Veteran of the Texas war of Independence, and General Houston's private secretary, in a prospecting trip when the mines of Pinos Altos were discovered; and Weilling, it is said, was at the head of the party that discovered Rich Hill, near Weaver Creek, in the lower part of Yavapai County in the year 1863. Be this as it may, Jack Swilling accumulated quite a fortune, either from these placers or others.

A score or so of men are now working on these placers from year to year; and it is supposed that they get from [illegible] $2,000.00 to $4,000.00 in value per month.

The Rich Hill channel is noted for its coarse, heavy gold. Small scale gold does not occur there. It has not been transported far from its original matrix.

The same observations apply to the Placers of Weaver; which no doubt had their source in the same vein from which Rich Hill was supplied. It seems strange, however, to get such coarse gold on the top of a mountain. Tom Connell, who mines extensively on top of the Hill, assured me that he could not get even $10.00 worth of fine scale gold; but he took it out in coarse masses and nuggets. One of the largest found was worth $400.00. Another one $300.00, and another $150.00, in rough figures. Three lumps taken out by him were worth $1,009.00. Nuggets to the aggregate value of some $3,000.00 were taken out within a small area. Pedro Lucero, at Weaver, found one piece worth about $450.00."

Have complete report in geology file

Not complete

Dear Sir:

R E P O R T

On the

RICH HILL GOLD PLACERS

Octave

WEAVER MINING DISTRICT

YAVAPAI COUNTY, ARIZONA.

U.S.A.

By John M. Nicol
Consulting Engineer.

Crocker First National Bank Building,
San Francisco, California.

I N D E X.

OBJECT OF THE EXAMINATION:

The object of the examination on which this report is based was to make a reconnaissance of the district as a whole, - to check to some extent the data already obtained, - but more particularly to collect data as to the geology and the source of the gold, and as to structural conditions of the gravel as affecting the distribution of gold over such a large area; and generally to express an opinion as to the feasibility and value of the project as a whole, more particularly with respect to dredging operations on a large scale on the lower gravels.

No attempt to sample was made during the present examination, as a sufficient amount of work by other engineers appears to have been done along these lines to indicate very valuable areas of gravel, and I would not consider a limited hand sampling as giving any additional data of immediate value. Any further sampling of such a large deposit must be carried out with the proper equipment and in a systematic manner. This matter is referred to in another part of this report.

LOCATION OF THE AREA UNDER CONSIDERATION:

The properties are located a little to the west of the center of the State of Arizona, U. S. A., within the area outlined in red on the accompanying maps.

The immediate gravel areas are deltas built out by Antelope and Weaver Creeks on to the plains to the southwest of Weaver Mountains. The head of the delta is approximately at Octave (see Map$\frac{3}{4}$. Located about nine miles southeast from Congress Junction on the Santa Fe Railroad.

TOPOGRAPHY, CLIMATE AND GENERAL CONDITIONS:

The district is typical of the desert areas of the Central and southwestern part of Arizona.

Weaver Mountains rise abruptly from a great desert plain. They are a bold and deeply eroded range of mountains, carved out from an extensive area of very early granite intrusives of batholithic proportions.

The eastern portion of Weaver Mountains are of a complex of much more recent (geologically speaking) extrusive volcanic rocks. This area cuts off and forms the head of the valley of Antelope Creek. The highest point being 6,391 feet altitude.

The railroad station at Congress Junction has an altitude of approximately 3,000 feet and the mine camp of Octave (quartz mine) has an altitude of approximately 3,300 feet.

From this point the delta fan of gravels slope gently down to the main drainage valley of the Hassayampa River.

There are two gradually diverging slopes. The first slope is to the south and southeast and is drained by Cuanide and Yaqui Gulches which finally join the Hassayampa above the "Box" (see map). The second slopes to the south and southwest and is the most important body of gravel. It is drained by the lower Weaver and Antelope Creeks. These, after joining Martinez Creek, flow into the Hassayampa below the "Box" (see Topographical map).

The division of these two deltas are gravel slopes, seems to be influenced by a line of low hills, viz, "Round Mountain". The Hassayampa has cut a gorge through this line of hills which is known as the "Box".

The general slope of the gravels gives a grade of approximately 150 feet to the mile and the beds of the present gulches which have been eroded through the gravels have slightly steeper grades, until they are units in a big flat with the Martinez Creek. Takinga general line at right angles to the slope of the gravel, and also to the erosion of the gulches, it is noticeable that the top, or un-eroded parts of the main gravel banks, show a remarkably even peneplain; as is evidenced on reference to the contour line of the topographic sheet. Further reference will be made to this when discussing the structural nature of the gravel deposits as it is indicative of some rather interesting possibilities.

The total surficial area of the gravels under consideration cover an irregular zone approximately two miles across at the upper end, and about three miles across at the lower end, and about five miles long.

Within this area approximately six thousand acres of placer claims have been tied up and are now held as one group which forms the placer dredge mining ground, the subject of this report.

The climatic conditions are favorable for work all the year, the winters are mild and the summers, although hot, are not subject to the excessive hot spells of some parts of Arizona.

The rainfall is small and erratic as is usual in all the desert areas of the southwest of the United States. Some years there are good seasons, and almost every year there are short spells of heavy rainfall which causes a heavy run-off in the streams and gulches, and admits of impounding water where impounding sites are available. In counting on water resources and annual impounding sites, the average of three to four successive dry years should be taken. When the impounding site admits of several years equalization-storage,

the mean of several years, including wet years, may be taken. In the appendix, data will be found on this subject.

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The work has been entirely dependent on flood waters in good winters, or on crude hand dry-washing methods. Nothing but the richest zones of concentration averaging several dollars per cubic yard and upwards have so far been worked, and only relatively coarse fold could be saved by this means, and therefore all the large bodies of gravel are entirely virgin and intact.

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The total surficial area of the gravels under consideration cover an irregular zone approximately two miles across at the upper end, and about three miles across at the lower end, and about five miles long.

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Dear Sir:

R E P O R T

On the

RICH HILL GOLD PLACERS

Octave

BEAVER MINING DISTRICT

YAVAPAI COUNTY, ARIZONA.

U.S.A.

By John M. Nicol
Consulting Engineer.

Crocker First National Bank Building,
San Francisco, California.

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George M. Colvocoresses,
Mining and Metallurgical Engineer,
1108 Luhrs Tower,
Phoenix, Arizona.

Mr. John B. Ehrhart,
Phoenix, Arizona.

REPORT ON WEAVER GULCH GOLD PROPERTY

Dear Sir:

In compliance with your request, I visited this property on the 22nd inst., and made a very brief examination in order to advise you concerning its probable merit. My examination, as you realize, was of a preliminary nature, and cannot be made the basis for a detailed report, but I think that the information obtained is of considerable importance.

LOCATION, GEOLOGY AND HISTORY

Your claims are located in the southern part of Yavapai County, Arizona, along Weaver Creek, being about seven miles in an air line or twelve miles by fair road distant from the railway at Congress.

The camp on this creek has an elevation of slightly over 3,000 feet above sea level, and the ground rises rapidly to the east, forming the western slopes of the Weaver Mountains, with Rich Hill just to the north. The surface is rough and stony; there are no trees except along the washes and only scant vegetation consisting of cacti and various desert shrubs.

The country is Pre-Cambrian granite and schist, the higher mountains being capped by tertiary lava. Placer ground in this section comprises a total area of about eight by five miles, principally a sloping mesa composed of boulders, clay and sand formed by the erosion of the mountains and hills.

Gold was first discovered here in the 1860's and for several years there was a great mining activity at the vein mines on Rich Hill and vicinity and at the placers along Weaver and Antelope Creeks. The yield of gold prior to 1883 is said to have amounted to over $1,000,000 Value. Only sporadic mining has continued since that date and according to the records of the State Bureau of Mines, the reported yield has been only $75,000 since 1900, and practically negligible since 1914.

RED BANK PLACERS

This is located along the banks of Weaver Creek and I am given to understand that the property which you have under option consists of five unpatented placer mining claims of 20 acres, each, standing in the name of John B. Ehrhart.

The boundaries of these claims as pointed out to me would make the wo kable limits of the placer approximately 3000' in length along Weaver Creek, in an east and west direction, 2,000' in widht, and the

and the average depth from the surface to bedrock is extimated, from comparatively meager date, at 15'. All of this ground consists of a sedimentary fill between steeply rising hill sides, and is composed principally of boulders and rocks of all sizes and dimensions, cemeted together with gravel, and sand and rock; and clay; the gold occuring in small muggets and specks. The total content of the placer ground which m ght be worked on these claims is about one million cubic yards, and a rough estimate of the percentage of boulders to gravel and dirt indicates that the boulders represent approximately 80% of the total yardage.

DEVELOPMENT

Aside from the surface exposure of the entire mesa, extending from Weaver Creek to the point where the mountains rise sharply, the deposit is out through tobedrock near its south side by the creek a and much of the north bank stands up quite sheerand permits easy inspection and sampling. In this bank a number of short tunnels have been driven and one comparatively long tunnel near the camp has been run, as per sketch, sttached to the report, which is based on a rough survey with a Brunton Transit. On this sketch the locations of samples taken are noted.

QUALITY OF MATERIAL

A preliminary estimate was made in the following manner: A number of pans of dirt were picked up at various points on the surface of t the mesa and dry-panned by Dan Lucero, who was exceptionally skilled skillful at this kind of work. These pans averaged about 12 lbs apiece and the specks and colors I judged by the eye to run about 6¢ per pan. Along the bed of the creek and in the banks several other samples were panned which gave some what erratic results, but appeared to average about the same as the sample taken from the main tunnel. In the tunnel itself five samples were taken by picking down the cementing material between the boulders at points vayying from 2' to 5' above bedrock. These pans were carefully washed and the gold obtained from four of them aggregated 380 milligrams, derived from about 45 lbs of dirt. The specks of gold were all comparatively corarse and showed evidence of considerable travel and the recovery by panning was probably about what might be expected from any other form of operation or concentration. The fineness of the gold in Weaver Gulch, as given by the U. S. G. S. is 910, and, using the mean value of the surface sample and those obtained from the tunnel and assuming that the dirt susceptible to panning represented about 20% of the total cubic content of the ground, these tests indicated that each yard of your placer ground, boulders and rocks included, contains slightly over $2.00 value in gold. The total value of the gold which might be recovered from this placer might, therefore, be figured at approximat ly $2,000.000.

METHODS OF MINING

IN considering the possibility of operating this placer, the quantity of water available is of vital importance. Water as at present developed in some small springs or rock tanks along the bed of Weaver Creek and its tributaries shos that the e is a certain amount of underflow which is said to be continuous throughout the year.

However, the topography of the ground, coupled with the average rainfall which does not exceed 10" or 12" per annum, except near the tops of the mountains, would not indicate that there is any large amount of water locally available, although no definite statement on this point can be made without further investigation. Although some water might be obtained from Antelope and Martinez Creeks to the west, the nearest flow of any importance is found in the Hassayampa River five to six miles south and east and about 600' below the level of the placers.

Placers similar to the Red Bank, where the gold is free and comparatively coarse, and are genenlly worked by one of the following methods, excluding dry concentration which the moisture in the sand and clay would pretty surely render very inefficient.

First -- Mining by pick and shovel and washing by hand in pans or rockers.

Second -- Mining on a larger scale by pick and shovel, or with riffles or in ground sluices.

Third -- Mining by mechanical means such as power scraper, drag line excavator, dredge, or steam shovel, and recovery in sluices or washing plant.

Fourth -- Hydraulic mining, that is, washing down the banks with a stream of water under high pressure and running the dirt into washing plants or through sluices with riffles.

RECOMMENDATIONS

I, accordingly, recommend:

First -- That the legal status of the claims should be thoroughly investigated to determine whether the locations are valid and the claims in good standing, and whether the parties with whom you are dealing would be able to deliver clear title.

Second -- If the matters mentioned above are found to be entirely in order, that you extend your present option from the owners for as long as possible.

Third -- That you should further investigate the value and extend of your ground and the possibility of hydraulicing first, by carefully studying the water supply and calculating the maximum amount of water which might be obtained from the various sources, and the approximate

cost of bringing this water to one or more suitable points. If it appears that sufficient water can be obtained without prohibitice cost, I suggest that several pits should be sunk from the surface to bedrock and at least three more tunnels run in for say 100' from the bank and if the results are favorable that an experimental plant should be provided through purchasing or leasing a small high-pressure pump to be driven by a gas engine and equipped with pipe line, nozzle, (giant) and to be installed in connection with collecting flumes and sluices in which riffles would be provided. The water for such an experiment could probably be obtained from the well located near the camp which ought to be sufficient to permit a fair trial and an experimental operation of this nature conducted over a period of say three or four weeks should give extremely valuable data, particularly in respect to the following.

First -- The quantity and pressure of water required to actually break down the gravel from the boulders which it now cements and disintegrate the clay. Records of various placer operations indicate that the water required varies within such wide limits that no definite estimate can be made regarding any particular placer ground except after an experimental test of this kind.

Second -- The Average percentage of boulders and rocks and the cost of handling them to open up channels through the deposit for advancing the hoses and nozzles and installing the sluices.

Third -- The average recovery of gold per cubic yard excavated which can be made the basis of reliable calculations as to the ultimate profit, if any, that might be obtained from following this procedure on a much larger scale.

While this experiment was in progress more detailed estimates could be made regarding the initial supply of water required and cost of obtaining same and of reclaiming as much of the water from the tailings as possible and returning this to the storage tanks.

Everything considered, I am inclined to believe that there is a chance of operating this deposit with a reasonable margin of profit. But, if you decide to proceed, it would be very advisable to first obtain if possible without much expense, options on additional placer claims located further down the gulch, since if

operations proved successful in one section of the gulch, the price at which all other claims could be obtained will mount rapidly. In the lower sections of Weaver Gulch it is to be expected that the percentage of boulders will decrease in proportion th the gravel, so that operating costs should diminish, but, on the other hand, the gold will naturally be finer and probably scarcer so that a lower recovery, as well as cheaper costs, must be expected.

Hydraulicing operations have generally only been successful where a large flow of water was readily available, but for the most part these have been conducted on ground where the values were much less thanmis the case at the Red Bank.

CONCLUSION.

Summing up, I am satisfied that there is a great deal of gold in the placer and that the average values will probably prove to be in the order of those cites. I do feel that further exploration and investigation is justified and advise you to proceed along the lines indicated without making any large expenditure except for development and testing from which the recovered gold should cover a portion of the expense.

The money which will have to be spent to pretty definitely prove or disprove the value of your property will be essentially a mining gamble and may be entirely lost or yield many hundred per cent of profit.

I thinkthat this is a good gamble and that it should make an appeal to people who are willing and able to engage in such a speculative venture especially at the present time when the price of all other metals is low and when gold mines are being more sought after than at any time during recent years.

Very truly yours,

(signed) G. M. COLVOCORESSES

STATE OF ARIZONA
DEPARTMENT OF MINERAL RESOURCES
MINERAL BUILDING, FAIRGROUNDS
PHOENIX 7, ARIZONA

June 30, 1964

Mr. T. B. Williams,
Vice President and Trust Officer
Security First National Bank
P. O. Box 2097, Terminal Annex
Los Angeles, California 90054

COPY

Dear Mr. Williams:

With reference to your letter of June 25th soliciting our assistance in verifying the information submitted to you so that you may better judge what further action to take with respect to mineral rights in Arizona "said to be patented in the name of Robert M. Merrill".

Attached to your letter is a sketch of the 5,550 acres embraced in 49 contiguous claims (45 unpatented, 4 patented), described in a paragraph headed "Property".

We happen to have a photocopy of plat of "Mineral Survey 4304, claim of W. D. Merrill, known as the Onest, Deal, Gold Bar and Arizona Placers, and Diagonal Lode, situate in Sec. 6, T9N, R4W., G. & S. R. M., Yavapai County, Arizona." These claims would not conform to the small shaded portion within the claims on your sketch, which probably is the one you refer to as the red portion. There is no red on the sketch received. They therefore may not be the same 4 patented claims. In fact, they probably would be just outside of the group outlined.

We have no way of checking this property for you. The unpatented claims must be checked on the ground and in the Yavapai County records. However, the property is fairly well known; we have considerable information (in the form of copies of outside reports mostly) regarding it; and it is likely that the description is substantially correct, except for one probable typographic error. In the 7th line of the paragraph, "Township 0" should be "Township 9", I believe.

We are uncertain whether you desire more from us. It seems likely that you have mining associates or contacts to turn to for advice, but if we can be of further assistance, please do not hesitate to write us.

Yours very truly,

FRANK P. KNIGHT,
Director.

FK:p
Enc - Pgs. 43 thru 46 of Bulletin 168

SECURITY FIRST NATIONAL BANK

SAVINGS COMMERCIAL TRUST

HEAD OFFICE OF TRUST DEPARTMENT
SIXTH AND SPRING STREETS
LOS ANGELES, CALIFORNIA

MAILING ADDRESS
P. O. BOX 2097, TERMINAL ANNEX
LOS ANGELES, CALIFORNIA 90054

June 25, 1964

Arizona State Department of Mineral Resources
Mineral Building, State Fairgrounds
Phoenix, Arizona

Attention: Mr. Frank Knight, Director

Gentlemen:

I serve as a director of the Orthopaedic Hospital of Los Angeles, California, a charitable institution. Mr. Howard S. Hotton, 3018 Berkeley Avenue, Los Angeles, California, has proposed to us a plan for financing the development of some mineral rights in Arizona which is said to be patented in the name of Robert M. Merrill.

Our present set of facts does not give us any opportunity to properly evaluate this proposal, and our purpose now is to find out whether there is enough substance to the proposal to warrant any further time in investigating it to find out if we should seriously entertain the proposal submitted to us. The land as described to us is as follows:

PROPERTY: Contiguous claims, 49 in number, covering approximately 5,550 acres, of which 45 claims are unpatented. 4 patented, located in the Weaver Mining District in Yavapai County, slightly west of the geographical center of the state of Arizona, covering the equivalent of about 1.7 sections along the West boundary of Township 9 North; Range 4 West; about 6.4 sections along the East boundary of Township 9 North, Range 5 West; and a one-half section along the north boundary of Township 8 North, Range 5 West, Gila and Salt River Base Meridian, the ground lying substantially between the old Octave lode mine on the north and a landmark known as "Round Mountain" on the south. It is approximately 7½ miles east of Congress Junction on the Santa Fe railroad and 16 miles north of Wickenburg, United Verde, Jerome and Clarkdale are about 60 miles to the northeast.

This property is said to be in the name of R. M. Merrill Rich Hill Gold Placers, Octave, Yavapai County, Arizona, and may be otherwise identified as Weaver Gold Placers, Inc. Attached hereto is a sketch of the 5,550 acres referred to and incorporated in the red portion within the red outlines is 63 acres which is supposed to be patented in either of the names mentioned above.

The purpose of this inquiry is to solicit your assistance in verifying the information submitted to us so that we may better judge as to what further action we should take.

Your reply will be sincerely appreciated.

Very truly yours,

T. B. Williams
Vice President and
Trust Officer

TBW:BB
Enc.

United States Department of
the Interior Geological Survey

Congress, Ariz.
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