GEORGE H. GARREY
Geological and Mining Engineer
Bullitt Building, Philadelphia

247

Item 21

4020 0010

* * * *

REPORT ON THE

GOLD HILL DEVELOPMENT COMPANY

BY

GEORGE H. GARREY

* * * *

see also map-files for
Gold Hill Mine 9 Maps

GEORGE H. GARREY
Geological and Mining Engineer
Bullitt Building, Philadelphia

Gold at #20.67/oz during this period. x 7.26 to convert to #150/oz

REPORT UPON THE PROPERTIES OF THE GOLD HILL DEVELOPMENT COMPANY, ROUND MOUNTAIN, NYE COUNTY, NEVADA, by GEORGE H. GARREY.

July 15, 1931.

Table of Contents.

George H. Garrey
Geological and Mining Engineer
Bullitt Building, Philadelphia

Report Upon the Properties of

GOLD HILL DEVELOPMENT COMPANY

- by -

GEORGE H. GARREY

* * *

COMMERCIAL SUMMARY:

July 15, 1931

The Main productive vein of the Gold Hill Mine which is exposed at intervals for a length of about 930 feet on surface, has been opened up continuously for a length of about 1075 feet underground upon the 225 Foot Level and for a length of approximately 900 feet upon the 400 Foot Level, which is the deepest level of the mine.

While the vein is cut off to the westward by a strong fault, yet the writer believes that by proper development work the west extension of the vein can again be picked up beyond the fault and that the displacement will not be in excess of 50 to 100 feet.

In the east breasts of both the 225 and 400 Foot Levels the vein shows 2 to 4 feet of vein material but the vein filling instead of being hard banded quartz consists of crushed quartz associated with considerable crushed rhyolite wall rock and gouge that only carries values of $3.00 to $7.00 per ton. $21.78 to $50.82 at $150/oz gold.

There is no doubt in the writer's mind that the main veins extend for hundreds of feet and possibly for much greater distances both east and west beneath the coverings of rock talus and wash, or of andesite and opalescent rhyolite flows that show on surface and probably form a "capping" to the veins.

There are apparently at least two periods of vein formation - ~~older~~ period veins consisting of light to medium gray dense massive chalcedonic textured quartz that are characterized by a definitely banded structure and that usually have a slightly darker gray or greenish gray color than the older period veins and also generally carry considerably higher ore values than the older veins. At points where unions of the two types of quartz veins have taken place the older veins usually carry higher values due probably to a re-opening or fracturing of the older veins and an injection of the younger and richer quartz into the quartz veins of the older type. Where subsequent movements have caused a crushing of the united veins it is usually difficult or impossible to identify the quartz of the two periods of ore deposition.

COMMERCIAL SUMMARY : (Cont)

The vein zone which has a width of 400 feet or more, is comprised of a series of nearly parallel veins of the linked or looping and branching type, many of which tend to converge when followed eastward and most of which also tend to converge in depth. The "Silver" vein which dips 75° to 85° to the northward above, flattens to only 50° to 60° dip to the north just above the 400 Foot Level. The "Nos. 1 and 2 South Veins" which have a nearly vertical attitude at surface, also appear to flatten and to dip 65° to 75° to thenorth between the 225 and 400 foot Levels. The Gold Hill vein and practically all of the other veins outcropping to the north of the "Silver" vein on surface dip to the southward at varying angles and converge toward junctions with the "Silver" vein in depth.

Owing to the looping and branching character of the veins and to the great variation in dip along some of the veins with depth such as the Gold Hill vein, and also to offsets of from a few feet to 20 feet in the veins, due to occasional faults, it is at times difficult to identify the various veins upon the different levels without the running of more crosscuts than now exist in the mine.

The best idea of the looping and branching character of the veins and their strikes and dips and their possible junctions, can be obtained from a study of the writer's geological maps of the surface and the various levels as well as of the vertical cross-section maps.

Since the richer or pay ore deposits so far developed occur along the younger banded quartz veins similar to the Gold Hill type of vein, or also along the older lower grade veins such as the "Silver" vein where these older veins have been reopened and pay ore shoots have been formed in them by the injection into these openings of the ore bearing quartz of the later and richer period, the junctions of these younger, richer veins with the "Silver" vein and other older period veins warrant thorough development.

As a result of displacements due to faulting, certain faulted portions of the Gold Hill vein were not definitely identified or their locations determined with certainty until fairly recently. In consequence there are still undeveloped and unstoped blocks of this Gold Hill vein above the 225 Foot level and above the junction with the "Silver" vein, which though narrow, probably carry extra good pay ore values and merit immediate development, as they will probably yield better than the present average grade of mill ore. The location of those undeveloped portions of the Gold Hill vein are described herein under the heading " Places for Possible Ore Development."

COMMERCIAL SUMMARY: (Cont)

Quite a number of other places where vein leads showing encouraging ore values are exposed, or points where vein junctions favorable to pay ore occurrence probably take place, are also outlined under the same heading " Places for Possible Ore Development" and the Suggestions for development work given thereunder warrant careful consideration for if the work is carried out it will undoubtedly result in the opening up of additional fairly large tonnages of ore probably similar in grade to the ore that was opened up in the various mine workings.

Although the ore opened up in future may not be of any higher grade than that exposed by previous work, the grade of the ore actually stoped and sent to the mill might be of better average grade than the o milled in the past, provided the utmost care is exercised in future to mine the ore clean and to try to, if possible, keep the stope widths narrow and confined to the actual width of the pay quartz streak. To do this it may be necessary to mine only a portion of the quartz vein itself at places where the higher grade banded quartz of the younger period richer veins is running along side of the older period more barren quartz leads.

Since several branch veins to the north are converging toward a junction with the probably united Gold Hill-Silver vein to the east of the present east breasts of the 225 and 400 Foot Levels, further development of the vein zone to the east of the present workings is justified.

Furthermore since the south dipping Volcano and North Veins as well as numerous south dipping mineralized stringers and possibly also the Gold Hill vein toward the west, are converging towards a junction with the "Silver" vein at elevations below the 400 Foot Level, further development in depth especially in the west portion of the mine in the vicinity of the main shaft is justified, and the best way to do this development work appears to be to sink the present shaft an additional 100 feet and then cross cut north to the main vein and develop this vein by a drift along it both east and west of the shaft on the 500 Foot Level and also by raises to the 400 Foot Level upon the best looking ore showings opened up on the 500 Foot Level.

As pointed out in the body of this report there appear to be quite a number of places where additional sizable tonnages of ore of milling grade can probably be developed. Although the grade and character of this ore will probably be very similar to the ore developed in the past, yet due to the often erratic occurrence of gold values in veins, bunches of higher grade ore might yet be encountered

COMMERCIAL SUMMARY: (Cont)

in carrying out the suggested development work in depth or above the 400 Foot Level, but one cannot count upon being fortunate enough to run into such deposits of richer ore. Accordingly the writer is of the opinion that the management can not count upon making a financial success of the Gold Hill enterprise unless it can succeed in opening up additional large tonnages of ore, and can succeed in improving the average grade of the ores mined by constant and careful supervision of the daily sampling and stoping operations to enforce the cleaner mining of only the higher grade quartz exposures along the veins.

In order to try to raise the grade of the ore mined, the writer also wishes to suggest the possibility of using waste filled stopes where the walls are loose, and doing selective mining (with sorting of the higher grade ores) right in the stopes and then removing the higher grade ores mined through mill holes carried up through the waste filled stopes.

Provided it is found impossible to raise the present average grade of the ores mined and sent to the mill by more careful selectiv mining in the stopes and by the carrying of narrower stopes, the writer is of the opinion that it will be necessary to install the necessary additional equipment in the mill to permit of treating a tonnage of at least 175 to 200 tons per day of present grade ore, to ever produce sufficient profit to make the mine a commercial success.

Yours very truly,

(Signed)*GEO. H. GARREY.

LOCATION :

The group of claims belonging to the Gold Hill Development Company are situated some four and five-tenths miles north of the town of Round Mountain, Nye County, Nevada, and some sixty-three miles distant by fair auto road from Tonopah, Nevada, the nearest railroad point.

CLAIMS:

The property consists of some fourteen lode claims, at least four of which are fractional claims. The group covers approximately 238 acres.

DEVELOPMENT:

The Main Gold Hill shaft has reached the depth of about 430 feet. Drifts and cross-cuts on the main levels aggregate some 3840 feet, divided as follows:-

50 foot level approximately 350 feet;
100 foot level approximately 200 feet;
150 foot level approximately 550 feet;
225 foot level approximately 1190 feet;
400 foot level approximately 1550 feet;
3840 feet of development work.

In addition to the above footage on the main levels is a considerable footage of development work upon various sub-levels and some 49 ore chutes installed upon the 225 foot level besides some 12 timbered manways put up for varying distances from 45 to over 200 feet above the 225 foot level, and all of the stoping above the various levels in addition to 14 ore chutes and some 6 manways put up for varying distances, from 30 to 180 feet above the 400 foot level.

The vein has been drifted upon for about 150 feet to the west of the shaft upon both the 225 and 400 foot levels, and for approximately 925 feet eastward from the shaft on the 225 foot level and for some 770 feet east of the shaft on the 400 foot level by June 9, 1931. The vein still showed strongly in the east breast of both the 225 and 400 foot levels on that date, but the values were too low to make pay ore.

THE GEOLOGY:

The ore bearing veins all appear to be confined to a light colored rhyolite formation similar in character to the rhyolite forming the wall rocks of the veins of the Sunnyside and other productive mines at Round Mountain, Nevada, some four and a half miles distant.

THE GEOLOGY (Cont.)

This rhyolite mass shows in surface outcrop in an irregular area that is exposed for a distance of some 400 or 500 feet southwest of the collar of the Gold Hill shaft and extends easterly and northeasterly from this same main shaft for some 1800 feet to near the east end line of the Eureka claim. In places this rhyolite area is exposed for a width of 500 to 600 feet.

With the exception of the above rhyolite area and also of a small area of rhyolite outcropping near the summit of the hill close to the extreme east end of the Lizzie No. 2 claim, the surface of the balance of the Gold Hill claims as far as Noted was covered with a rock talus chiefly of andesitic rocks, or by andesite flows and by surface wash, which probably cover and conceal much larger areas of the rhyolite and probably also the east-west extensions of a number of known veins.

Evidence was obtained indicating that a flow of a basic rock containing abundant biotite mica phenocrysts, probably a biotite andesite, over lies the rhyolite a short distance east of the Eureka Claim. The contact between the rhyolite and this overlying andesite flow appear to have a general trend of north-northwest and south-southeast and a dip of 20 to 30° to the east.

Large piles of boulders of this probably andesitic rock, many of which were sub-rounded, occurred on the hill slopes some 300 feet south and southeast of the Gold Hill shaft and also to the north and northwest of the gulch located some 400 feet north of the main shaft. Some of these boulders were so large that it seemed as though they could not have been moved very far, yet the fact that the writer was unable to find any andesitic rocks in these last mentioned localities that he deemed to be definitely in place, coupled with the fact that smaller rounded boulders seemed to be always associated with these large boulders, led to the conclusion that most of the andesitic rocks exposed within a radius of 1500 feet or more of the main Gold Hill shaft may be simply a talus of andesite boulders covering the rhyolite mass instead of portions of an andesite flow capping the rhyolite.

The highly altered rocks that occur along the andesite-rhyolite contact just east of the Eureka claim might have been caused by solutions that circulated along the contact and altered the crushed and sheared contact material that resulted from oscillatory adjustment movements along the contact. However, the white and yellow intensely altered rhyolite that outcrops on the east half of the Euraka claim for considerable distances to the west of this contact, appears to the writer to be due to a permeation of a somewhat shattered rhyolite mass by weakly mineralized ore-bearing solutions, for the altered mass is cut by a net work of sparsely spaced, small, discontinuous, quartz

THE GEOLOGY (Cont.)

stringers or films. Some values in gold have been found associate with some of these small quartz stringers which vary from 1/16 of an inch to 4 inches in width, but no well defined vein leads were noted in the vicinity of this east end of the Eureka claim.

The writer agrees with Mr. Frederick Bradshaw that the south breast of the 150 foot level cross-cut is in the normal rhyolite and not in the andesite as claimed by Mr. John A. Burgess in his report upon the property, and the writer found no further evidence to indica that andesite had been brought in to the south of the 150 foot level breast by a large fault as also stated by Mr. Burgess.

All the mine workings are in the rhyolite. No andesite was observed in any of the mine workings although rhyolite showing occasi al altered biotite mica flakes was noted in a couple of places near the west end of the 225 foot level.

Little information regarding the depth to which the rhyolite will probably extend was obtained but the fact that the collar of the Gold Hill shaft appears to be considerably higher than most of the mines at Round Mountain and that those workings are still in rhyolite, at the lowest or 900 foot level, in one of the Round Mountain mines, would lead one to conclude the chances are good that the rhyolite will probably extend to depths in excess of 1000 feet in the Gold Hill Mine

Within the main rhyolite area outlined above is a glassy or opalescent mass some 200 or 300 feet in diameter that probably repres a remnant of a later glassy rhyolite flow that is more recent in age than the main rhyolite mass and is also younger than the ore-bearing veins for the writer was unable to find any real ore-bearing veins cutting through this opalescent rhyolite. In places this opalescent rhyolite consisted of quartz-like banded glassy rhyolite or of an acid, volcanic breccia cemented by an opalescent quartz ground mass and in other places the whole rock consists of massive opalescent or glassy q uartz. Bandings of this rhyolite which have the appearance of flow bandings, dip from 10 to 65° to the west. This opalescen rhyolite, although it may be a diko, has the appearance of being the erosion remnant of a flow and therefore it is doubtful if it will ever be encountered in the lower levels of the mine, provided the workings are extended westward to beneath this area.

THE VEINS AND THEIR OCCURRENCE:

The various ore-bearing veins and also the mineralized stringers or veinlets, occur in an area of partly silicified rhyolite which shows in surface outcrops with a width from north to south of 200 to 600 feet and a length of some 1200 feet, in the veins which are probably of two or possibly more, ages or periods, form a belt or system of parallel and branching vein leads that in general trend in east-west or northwest-scutheast directions, The main productive veins so far

THE VEINS AND THEIR OCCURRENCE: (Cont).

opened up generally strike east-west or a little north of west. These veins are of the linked or looping and branching type, the various loops or branches uniting either laterally or vertically. Where exposed in the 150 foot level cross-cut the veins have the appearance of a series of nearly parallel east-west veins but the veins as mapped on the surface, topographic map, indicate that at least most of them have a tendency to converge and unite as they are followed eastward and some of them as seen from the writer's vertical cross-section maps tend to converge and join or cross in depth.

One loop in the Gold Hill vein, which completely encloses a large, lenticular, "horse" of rhyolite, extends to 40 or 50 feet west of the main shaft on both the 100 and 150 foot levels and probably converges at points 90 or 100 feet east of the shaft. This vein loop and "horse" of rhyolite also extend from just below the 50 foot level to about 20 or 25 feet above the 225 level as can be seen on "3000-W" cross-section.

A good idea of the branching character of the veins can be obtained from a study of the writer's geological vertical cross-section maps "2900-W" & "3000-W", and also the plan maps of the surface and various mine levels.

The branching and looping character of the veins and the frequent and often abrupt changes in the dip of the various vein leads, in the writer's opinion warrants, or necessitates, much more cross-cutting during the carrying on of exploration work, than has been done at the mine in the past.

The Gold Hill vein and the united Gold Hill-Silver vein to the east is exposed at intervals in outcrops and prospect pits on surface for a length of about 930 feet in an east-west direction, while underground this vein is continuously exposed upon the 225 foot level for a length of 1075 feet.

The opalescent rhyolite mass which extends to points from two hundred to 300 feet west, southwest and northwest of the main shaft probably represents a remnant of a surface flow which is of more recent age than the veins and caps over and conceals portions of the veins beneath it.

The Gold Hill vein formerly showed in a prospect shaft located 50 feet west-northwest of the collar of the main shaft, and then disappeared under rock talus and the opalescent rhyolite area to the west.

While veins which are considered to correlate with the Nos. 1 and 2 south veins on the 150 foot level were mapped to points as far

THE VEINS AND THEIR OCCURRENCE: (Cont).

as 300 to 350 feet southwest of the collar of the main shaft, yet the writer was unable to trace or definitely identify the main Gold Hill vein west of the point 50 feet distant on the surface from the collar of the main shaft, or further than a point 155 feet west of the shaft upon the 225 foot level, where the vein was cut off and displaced by a strong fault. The claims of the company cover the probable strike of this main vein for a distance of some 2600 feet west of the main shaft, but owing to the small patch of opalescent rhyolite and to a surface covering of rock talus and wash, the writer was unable to locate the main vein in outcrop farther west than the point specified, although he is of the opinion that if the vein can be picked up beyond the fault near the west breast of 225 foot level that the vein, with possibly pay ore shoots along it, will be found to extend for possibly hundreds of feet further to the westward beneath the talus and wash covering near surface.

The last point the main vein was identified on surface to the east was in the prospect shaft located some 35 feet S70E of the southwest corner of the Eureka claim. This main vein with a strike of about S78E and a nearly vertical dip disappears to the eastward under a fairly thick and continuous covering of what appears to be a surface talus of large and small andesitic boulders. If the main vein continues with this same strike it could extend beneath the andesite talus and andesite flows for a long distance and possibly even for an additional 3000 feet to the east across the Hoodoo and Lizzie No. 2 claims belonging to your Gold Hill Development Company.

The existence of some small vein leads were noted in prospects in the rhyolite located on the top of a ridge near the media line of the east end of the Lizzie No. 2 claim. While picked specimens of ore carrying from $2.00 to $15.00 in values have been obtained from these prospects on the Lizzie claim, the writer did not see any vein lead upon this Lizzie No. 2 claim that could be correlated with the main Gold Hill of "Silver" veins, or that had enough strength to merit any work being done upon it at the present time, in spite of the fact that the Gold Zone Mining Company is endeavoring to develop the extensions of these minor vein showings of the Lizzie No. 2 claim, farther to the east.

The so-called "Silver" vein is chiefly a gold bearing vein that appears to be of older age, more massive structure, and generally of considerably lower grade than the Gold Hill vein, which latter vein is usually characterized by a banded structure to its quartz.

In surface outcrops the "Silver" vein and the Gold Hill vein may junction with each other in the vicinity of the Windlass Shaft at 11905- 2465W, but diverge going westward until in the vicinity of the

THE VEINS AND THEIR OCCURRENCE: (Cont)

change house and on the 50 foot level of the mine the two veins are 65 to 75 feet or more apart. These two veins converge in depth and appear to unite, or else make a crossing, in the vicinity of the 400 foot level in the neighborhood of Vertical Cross Section lines "3000W" and "3100W". The west pitching line of junction of these two veins then appears to rise rapidly to the eastward and occurs in the vicinity of "2900W" on the 225 foot level and probably also at "2570W" at 80 or 90 feet above the 225 Foot level.

The strong but low grade vein exposed upon the so-called 115 foot sub-level from the 203 Raise (27 Chute) appears to represent the eastward extension of the combined "Silver" and Gold Hill veins even though the values in it are low. Further work however may prove that this is only the "Silver" vein. Another narrow branch vein carrying higher values probably lies some 30 to 35 feet north of the vein in the main 115 foot sub-level drift, and pay ore may be found along this branch vein both above and below its junction with the "Silver" vein.

East of co-ordinate line "2570W" at 80 or 90 feet above the 225 foot level and also east of the Windlass Winze of Shaft (Raise 203) on surface, the Gold Hill and "Silver" veins which run along together at these points may again diverge and loop about a large "horse" of rhyolite, but definite information is lacking regarding this occurrence, and the vein leads indicated in vertical cross-sections may be simply other branch veins that will unite with the main or united Gold Hill-Silver vein as they are followed eastward beneath the andesite talus or later flow.

The 4" to 9" veinlets exposed in the 50 foot north cross-cut located about 65 feet above the 225 foot level along coordinate line "2250W" some 10 feet east of chute #39 as seen on vertical section "2250W", probably make a junction with the main vein a short distance below the 225 foot level and may result in pay ore near the junction.

The 1½ to 2 feet wide veins showing in the small prospect #16 on surface at 1072S-2522W and prospect #8 at 1178S-2172W are probably one and the same vein, which appears to be trending for a junction with the main vein showing in the 225 foot level drift, a short distance east of the present 225 Level breast.

The 5 to 6 inch wide later banded quartz vein showing in prospects #10 and #11 on surface at 1117S-2210W which is claimed to have produced some 30 or 40 tons of good shipping ore for former owners, also is probably trending towards a junction with the main vein at some point a considerable distance east of the present east face of the 225 foot level drift and may also make pay ore along the

THE VEINS AND THEIR OCCURRENCE: (Cont)

main vein near the junction.

A cross-cut run northward for 100 to 110 feet from near the present east breast of the 225 foot level at 1202S-2087W would undoubtedly throw much light upon probable vein junctions and possible ore values farther east.

The vein bearing rhyolite mass is undoubtedly much more extensive than the surface outcrops indicate because the rhyolite over large areas is probably covered by rock talus chiefly of an andesitic character, or possibly in places also by more recent andesite flows. The writer believes that some of the veins upon development will be found to extend for hundreds of feet and possibly even considerably further in an easterly and westerly direction along their strikes beneath the talus covering or andesite cappings.

THE CHARACTER OF THE VEINS AND VEIN PERIODS:

These Tertiary veins in rhyolite appear to have been intruded or deposited during at least two periods of mineralization. Between points 1123S- 3020W and 1125S - 2990W on the 400 Foot Level a 6 inch to 1 foot vein of darker banded quartz is seen cutting diagonally through and across the broader 5 to 7 foot width of lighter colored and more massive type of quartz of what is probably the "Silver" vein. This narrow more recently banded quartz vein carries values as high as $30.00 to $60.00 to the ton while the broader, lower grade, older "Silver" vein only carries values of a few dollars to $10.00 per ton.

What is evidently this same younger, richer, vein also shows near the west end of the 325 foot sub-level which at the time of the writer's visit represented the back of the 400 East stope above the 400 Foot Level. Upon this sub-level this vein of more recent origin showed a width of 3 to 3½ feet of $15.00 to $19.00 ore which appeared to cut completely across and to displace the older, $8.00 to $10.00 ore vein that is considered to be the "Silver" vein, which had been followed by the 400 East Stope.

The vein material in this younger richer vein appears to be similar in character to that of the Gold Hill and Volcano veins and consists of a relatively hard, fine grained, quartz of porcelainic or chalcedonic texture that is often characterized by a definitely banded structure in which bands of dark gray, hard quartz of varying thickness from a fraction of an inch up to 5 or 6 inches alternate with each other, or else with usually narrower bands of a

THE CHARACTER OF THE VEINS AND VEIN PERIODS:- (Cont)

softer white or yellowish vein material which may represent friable quartz or kaolin derived from the crushing and alteration of feldspar (probably adularia).

The older, lower grade type of veins similar to the "Silver" vein are characterized by very hard, massive jaspery or chalcedonic quartz, somewhat resembling so called "Bull-quartz", that shows little or no evidence of banding and consists usually of light or medium gray quartz of generally a lighter color than the younger richer veins. The older type of veins also appear to be more likely to include slabs or small "horses" of sheared and altered country rock or to give way in depth to stretches of white kaolinized vein material or of friable or sheared quartz.

The best place to study the two types of earlier and later veins is in the "Windlass Winze or 203 Raise" from surface to a point 50 feet below surface where the Gold Hill vein on the north is in contact with the "Silver" vein on the South.

The development work to date is insufficient to identify or correlate the younger richer vein at the 1123S- 3020W on the 400 level with definiteness although the geology mapped on the vertical cross section along the north-south co-ordinate lines 3000W - and 3100W indicates it might be the downward extension of either the Gold Hill vein or the Volcano vein, or possibly of these two veins united. The vertical section along line 3100W indicates that this one foot younger and richer vein, which has yielded assay returns of $30.00 to $60.00 per ton will make a junction with the main vein somewhere below the 400 foot level. In case this younger and richer vein is not the downward extension of the Volcano vein that shows on the 150 foot level, then this same cross section 3000W indicates that the Volcano vein will probably make a junction with the main Gold Hill vein at an elevation below the 400 foot level and this is one reason that your company is warranted in sinking the Gold Hill shaft another 100 feet deeper, and prospecting the vicinity of these junctions at this lower level.

The Volcano vein is a banded quartz vein very similar in character to the Gold Hill vein and the other younger and richer ore-bearing vein. This vein although only 6 inches to one foot in width where exposed by the 150 foot level cross-cut some 75 to 85 feet north of the Gold Hill vein may increase in width and carry good pay ore over a minable width, in case it is drifted upon, especially to the eastward, to possible junctions with other branch veins.

THE CHARACTER OF THE VEINS AND VEIN PERIODS: (Cont)

The North Vein where exposed in the 150 Foot Level north X-cut although considerably crushed and associated with clay gouge was noted to in places show dense grayish quartz somewhat similar to the quartz of the "Silver" Vein, while in other places in the 150 Foot Level drift it was comprised of a greenish gray quartz similar to some of the quartz of the younger period veins but lacking the banded structure of these veins. The so-called North Vein on surface in places shows dark gray banded quartz and considerably higher ore values, than it did in the 150 foot level drift where it carried average values slightly in excess of $5.00 per ton over widths varying from 1 to 3½ feet.

It would be well to note that this south dipping "North Vein" and the several south dipping veinlets or vein stringers, some of which show banded quartz and lie between the "Volcano" and the "North" veins in the 150 Foot Level crosscut, appear to be dipping southward to a possible junction with the Gold Hill vein and the "Silver" vein at points below the 400 foot level. While vein junctions do not always result in higher ore values yet the best values found to date in the stopes on the Gold Hill vein appear to have occurred in the vicinity of vein junctions. Accordingly the main vein warrants development in the vicinity of the junctions with these branch veins below the level of the 400 foot Level. This is especially true of such of these branch veins as are composed of the darker appearing banded quartz that appears to characterize the richer veins of the later ore bearing period.

The so-called No. 1 and No. 2 South Veins that only gave assay returns of $3.49 and 33.07 where they cross the south end of the 150 Foot Level X-cut, and show low grade quartz leads of only 1 and 1½ feet maximum width on surface, were also exposed in the 400 Foot Level, 280 foot X-cut to the south and its associated drift. Since these veins showed even less strength and only occasional ore values on ths 400 FootLevel no work on these veins is recommended at this time.

FAULTING:

Faults with a few inches to 5 or 6 feet horizontal displacement are of fairly common occurence in the various mine workings. Two or three of the faults of the mine such as the "Gold Hill Fault" and the "203 Raise Fault" show horizontal displacements in places as great as 10 to 20 feet, while the various split leads of the "Gold Hill Fault" in the vicinity of the three chutes leading to the 403 Stope have an aggregate displacement of about 25 feet as can be seen on vertical cross-section 2635W.

FAULTING : (Cont)

All of the faults mapped upon the 400 Level maps appear to be normal or gravity faults, while most of these faults showing upon the 225 Foot Level map and the other plan maps and the various cross-section maps, also appear to be normal, or gravity faults.

A few fault blocks between closely spaced fault planes give the appearance of the existence of some minor reverse faults although this is probably due to the irregular slipping of small fault blocks or to some sudden local change or variation in dips of one or the other wall of the vein near the fault exposure.

Near the west end of the 225 foot level at points 1113S - 3133W and 1103S-3160W are two strong faults. If the geology in the now inaccessible west 60 feet of the 400 foot level could have been mapped, the dip of these faults could probably have been definitely determined but as it was the writer was unable to obtain definite information regarding what was encountered in this 60 feet. The ground in the vicinity of these two faults on the 225 foot level is so crushed and sheared that it is difficult to make out the true dip and strike of these faults with certainty. All of the evidence collected however seems to indicate that the eastern one of these two faults strikes N49E and is nearly vertical in attitude or else dips 80 to 85° to the southeast and that the western most fault strikes about N40E and apparently dips 75 or 80° to the northwest. This was the only fault noted that appeared to have a dip to the westward.

The vein material exposed in the block of ground between these two faults is badly crushed but the quartz present may represent the west extension of the main vein to the east which has been displaced only 6 or 8 feet to the north, if it does however this would indicate this fault was a reverse fault which would be unusual.

The main vein has not as yet been picked up to the west of the western most fault located at 1103S-3160W on the 225 Foot Level and no definite information regarding its whereabouts either at this level or at the 400 foot level was obtained. Only a slight amount of work to pick up the main vein has been done and this consists of only about 20 to 22 feet of real cross-cutting at right angles to the strike of the main vein. If the true dip of this fault is to the northwest, and with the dip of the Gold Hill vein between the 225 and 100 foot levels being to the south, a normal or gravity fault should result in the vein segment to the west of the fault being displaced to the northward.

Since the western most two faults, just mentioned above, project on surface to the west of the mapped surface outcrops of

FAULTING : (Cont)

THE No. 1 and No. 2 South veins, no information can be obtained from these mapped areas. Accordingly lacking definite information, I would suggest that in order to try to pick up the west extension of the Gold Hill vein, a cross-cut be run north 15°E from the present northwestern most point on the 225 Foot Level (20 ft Northwest of Survey point 210) for 30 to 50 feet and then if the main Gold Hill vein has not been encountered, to cross-cut S50W for a similar distance from the south breast of the cross-cut spur at 1112S-3175W on the 225 foot level.

In case the main Gold Hill vein is picked up on the 225 Foot Level to the west of the present western most faults, development work could then be undertaken to open up this same vein on the 400 Foot Level to the west of these same faults.

Near the top of the manways at chutes 31 and 35, some 65 to 75 feet above the 225 Foot Level, there was evidence of a flat lying or nearly horizontal fault that offset the upper portion of the Gold Hill vein some 8 or 10 feet to the northward. The available exposures of this fault were so poor that the writer was unable to determine the true strike or dip of this fault.

The best idea of the abundance of the faults and their trends and dips can be obtained from a study of the writer's geologic maps of the various mine levels. It can be readily seen that most of the principal faults trend a few degrees east of the north although some of them strike N30 to 50E and generally dip 30 to 50 degrees to the southeast, although a few trend N20 to 30W and dip 30 to 60 degrees northeast.

WATER:

While the mine makes only enough water to necessitate the operation of a small sinker pump only 8 or 10 hours a day yet there is sufficient water developed in the mine to supply all water needed for a milling plant of 150 or possibly 200 tons per day. Moreover conditions in the mine indicate that additional, although not excessive quantities of water will be encountered when the vein zone is encountered in successive new levels from the shaft at greater depths. Water for drinking purposes is hauled from Round Mountain at present although it could be obtained from springs about 2½ miles distant.

Additional supplies of water if needed could be developed upon and piped from springs on a small acreage of land that is owned

WATER: (Cont)

by the Company and which is located about 2¼ miles east-northeast of the shaft and at a several hundred feet higher elevation. To obtain a supply of water from this site that would be available in winter as well as summer the writer believes it would be necessary to develop water from these springs by driving a short tunnel up the gulch until bed-rock is entered and then running a trench or drift along or partly in the bed-rock across the stream channel, and making a reservoir out of this drift and tunnel, and then connecting this reservoir with the mine by a pipe line some 12,000 feet or thereabouts in length. This improvement, if needed, would probably cost $7000.00 or $8000.00.

ORE VALUES IN THE VEINS:

The chief factor controlling the location of the higher grade ores seems to have been the relative age of the veins developed. For example, the Gold Hill vein, judging by the evidence available, belongs to the younger banded quartz type of vein which carries the higher ore values. Wherever the Gold Hill vein has been mined separately it has yielded a very good average grade of ore, for example, in both the stopes east and west of the shaft and nearest to the shaft that extends from the 225 Foot Level to above the 50 foot level. Also in the stope on the north or Gold Hill vein that was mined upward from the cross cut above the top of the 225 Foot Level No. 18 chute manway, to surface below the 203 Foot Raise fault, westward to a line 50 feet or so west of the No. 18 winze from surface. As will be outlined later, there are still undeveloped blocks of this Gold Hill vein above the 225 foot level that should yield sizeable tonnage of good grade milling ore.

The "Silver" vein although 5 feet wide where cut upon the 150 foot level only carried values of $1.42. It also carried similar low values on surface, and where exposed in the crosscut upon the 225 foot level at 1170S-2910W carries values of only $2.50 to $3.00. The "Silver" vein makes a junction with the Gold vein near chute 5 on the 225 Foot Level just east of the crosscut just mentioned. The high values found along the Gold Hill vein to the west of the junction quit immediately east of the junction of the two veins but the rather erratically distributed values in the united Gold Hill-Silver vein for some 250 feet to the east of the junction are considerably higher in average grade than the non-commercial values occurring in the Silver vein itself to the west of the union of the two veins. The assays on the 225 Foot Level indicate only an average low grade mill ore for this 250 foot stretch between chutes 5 and 18. The assay values show marked improvement along the 225 foot level between chutes 18 and 25, a distance of some 140 or 150 feet. These values appear to be part of the richer ore shoot in the united vein that was also represented by the good ore produced from the 403 stope.

The good ore in the combined or united Gold Hill-Silver

ORE VALUES IN THE VEINS: (Cont)

vein is probably due to a shattering, shearing or reopening of the older Silver vein at the time of the formation of the more recent Gold Hill type of vein fractures and then an injection of the richer gold-bearing quartz of the later vein period into these fractures in the lower grade older "Silver" vein type of deposits.

Since the process of stoping the ore found in the especially good 403 Stope ore-shoot the richest ores mined usually appeared to be located adjacent to and immediately above the several east dipping fault planes that cut the 403 stope, the evidence seems to indicate that there has been considerable enrichment of the ore values along the upper side of these post mineral fault planes due either to mechanical concentration of the gold values by circulating solutions of by by the solvent action of ferric oxide, and possibly to a lesser extent by manganese oxide, at higher elevations and a redeposition of the ore minerals along the upper side of these fault planes at lower elevations, down to points in the 403 stope some 30 or40 feet above the 400 Foot Level.

Although portions of the main vein on the 400 Foot Level showed fair assay values in spots, yet the assay values obtained alongthe 400 Foot Level drift have in general been disappointingly low. Whether or not these low values are due to the sudden flattening of the combined Silver-Gold Hill vein between the 225 and 400 Levels could not be determined. The flat attitude of the vein might have had a detrimental effect upon the deposition of the ore minerals and richer deposits of the ore minerals may again be encountered in depth in case the main vein straightens up at greater depth than the 400 Foot Level.

While the writer was unable to collect any evidence to indicate such a condition, the sudden diminution in values a short distance above the 400 Foot Level might be due to the fact that all or a portion of the richer, younger, or Gold Hill portion of the combined vein, may have crossed entirely through the lower grade "Silver" vein and diverged from it before the 400 Foot Level drift was reached and therefore that the 400 Foot Level to the east of the 401 South X-cut develops only the low grade or slightly enriched "Silver" vein. Crosscutting for 50 feet both to the north and to the south from some point near Survey Point #425, might throw light on this subject.

Since the younger richer veins exposed at 1123S-3018W on the 400 foot level and at 1145S-2930W in the 400 Foot East Stope back at 80 feet above the 400 Foot Level both cut entirely through the older "Silver" vein, it is very important to keep this fact in mind and to keep watch for other places where the younger richer veins of the

ORE VALUES IN THE VEINS: (Cont)

Gold Hill and Volcano type possibly cut completely through and diverge from the older, less highly mineralized "Silver" vein or other older period veins.

THE VEINS IN DEPTH:

The character of the younger, richer banded type of veins exposed in the 400 Foot west drift do not seem to have varied any in character or values from the same type of veins above. However the "Silver" vein in places appears to carry a slightly greater ratio of silver to gold than on the 225 Foot and upper Levels. It is not known whether this is due to the normal greater silver bearing characteristics of the "Silver" vein and to the inclusion of smaller quantities of the later period quartz injections into the "Silver" vein, or to an actual increase of the silver content in depth. The writer's opinion is that little, if any, increase in the silver content should take place with greater depth in the Gold Hill Type of gold vein.

In certain spots along the 400 level drift and especially near the east end of this drift there is a pronounced increase in the white or yellowish soft kaolinized vein matter or friable white quartz comprising the vein filling when compared with the amounts of the same soft vein matter exposed in the upper levels. As this soft white vein material usually carries only very low assay values the writer considers it an unfavorable development. It is to be hoped that this is only a local occurrence and that it does not indicate that this is likely to be the general character that the veins will assume at greater depth. Only further development at lower elevations will prove this point.

Since the apparently younger, richer, south dipping veins at points 1123S - 3018W,- 1125S - 3043W, and 1130S - 3090W on the 400 level still show the hard banded quartz characteristics and since they are converging toward junctions with the "Silver" vein at elevations below the 400 level the indications are that stretches of solid quartz vein material will be found to extend to depths greater than 100 feet below the 400 level and therefore the sinking of the main shaft at least 100 feet deeper is justified.

Although the exact thickness of the rhyolite is not yet known but since the rhyolite mass in which the veins occur gives every evidence of extending to depths of possibly 1000 feet or more below the collar of the main shaft, it is possible that the veins and some shoots of pay ore may extend to that depth or at least considerably below the 400 Foot Level.

REGARDING ENDEAVORING TO INCREASE THE OUTPUT:

With adequate ore reserves and with an ore of as low an average grade as that produced from the Gold Hill mine, the proper thing to

THE MINING OF THE ORES :(Cont)

the grade of the ore to such a point it can be treated with only slight, if any, profit.

Since the present location of the shaft ore bin and crushers prevent any efficient sorting of the ores, it is absolute necessity to mine the ores clean if a success is to be made of the Gold Hill mining operations, therefore, it is imperative that the underground superintendent and shift bosses be men who will keep extremely close check upon every day's and night's stoping operations and will continually impress upon the miners in a tactful way the necessity of mining the ore clean and of keeping the stopes narrow where the pay ore is narrow.

The writer's observations tend to indicate that in the earlier stoping operations in the mine, the stopes were often carried much wider than the width of pay ore and also much wider than the character of the wall rocks necessitated or justified. Much improvement has been made in the way of cleaner mining of the quartz ore in the latest stoping operations but it is believed that the continual vigilence and the persistent efforts of the superintendent on the job and of all of the shift bosses to get the ores mined as clean as possible will result in still greater improvement in the higher grade of the ores mined and sent to the mill.

PLACES FOR POSSIBLE ORE DEVELOPMENT : (The larger the number of asterisks the more important the suggestion.)

* 1.) Along the 1 to 3 feet wide banded quarts Footwall branch or North Loop of the Gold Hill vein east of the Shaft pillars on the 100 and 150 foot levels and above the 225 foot level.

*** 2.) By developing the as yet practically unexplored large block along the Gold Hill vein that exists above the 225 foot level, and above the westward pitching line of junction of the Gold Hill vein with the "Silver" vein and that extends from the Gold Hill fault eastward to the Stope on the North or Gold Hill vein in the vicinity of "No. 18 Winze" from surface. This undeveloped block of ground has a length varying from 175 feet below to 250 feet or more above, near surface.

Possibly the best way to develop this ore block is by an east drift along the narrow streak of good ore showing on the north side of the 180 Foot Sub-Level - 45 feet to 50 feet above the 225 Foot Level at point 1168S-2765W or from the top of the raise just west of this point; or else after the Gold Hill vein has been encountered by developing laterally from the inclined raise recently started up to the northward from near the top of the stope on the "Silver" vein some 55' east of chute 14 and 50 feet above the 225 foot level.

REGARDING ENDEAVORING TO INCREASE THE OUTPUT: (Cont)

do would be to practically double the tonnage mined and milled. Before the writer was engaged to make this examination he gained the impression that the capacity of the mill could be brought up to 175 or 200 tons per day with the expenditure of only $6000.00 to $10,000.00, and that the mine could supply this tonnage of ore with little, if any, additional expense.

The observations of the writer however convince him that it would be very difficult to mine and hoist to advantage in excess of 150 tons of ore per day, and he doubts if this tonnage could be assured unless mine timbers could be stored and sawed underground and warehouses installed on the main working levels in order to eliminate the necessity of timbermen, mechanics and miners frequently interfering with hoisting operations, as they do at present, in order to go to surface for timbers, tools or supplies.

It appears also that the bin capacity at the shaft and the mill bins due to about 50% of the ore sticking in the bins is barely adequate for even present operations of about 100 tons per day.

From information obtained while at the property it seems that instead of being about 150 tons per day the maximum capacity of the mill at present is about 110 tons per day, for whenever as much as 110 tons or more per day is run through the mill the pulp in the tanks becomes so thick that the agitators stick and the tanks become clogged. The writer understands that to equip the mill to treat an average of anywhere between 150 and 200 tons per day, an additional ball mill and another tube mill, and possibly a new crusher would have to be installed besides adding settling tank capacity and additional filtering apparatus to the equipment. It is estimated that the installation of the foregoing additions to the mill equipment would cost in the neighborhood of $25,000.00 to $30,000.00.

THE MINING OF THE ORES :

In a few isolated places pay ore values have been found to occur associated with the crushed or sheared iron stained rhyolite and gouge of the vein zone adjacent to the quartz leads as well as with the quartz itself, but in general the pay values occur only in the vein quartz itself. Accordingly where the wall rocks are fairly solid every effort should be made to stope only the width of the quartz vein and to keep the miners from drilling into and blasting down any of the rhyolite wall rocks.

The general average grade of the ores in the Gold Hill mine is so low that any dilution of the ore by waste during stoping operations is almost fatal from an economic standpoint, for it decreases

THE MINING OF THE ORES :(Cont)

the grade of the ore to such a point it can be treated with only slight, if any, profit.

Since the present location of the shaft ore bin and crushers prevent any efficient sorting of the ores, it is absolute necessity to mine the ores clean if a success is to be made of the Gold Hill mining operations, therefore, it is imperative that the underground superintendent and shift bosses be men who will keep extremely close check upon every day's and night's stoping operations and will continually impress upon the miners in a tactful way the necessity of mining the ore clean and of keeping the stopes narrow where the pay ore is narrow.

The writer's observations tend to indicate that in the earlier stoping operations in the mine, the stopes were often carried much wider than the width of pay ore and also much wider than the character of the wall rocks necessitated or justified. Much improvement has been made in the way of cleaner mining of the quartz ore in the latest stoping operations but it is believed that the continual vigilence and the persistent efforts of the superintendent on the job and of all of the shift bosses to get the ores mined as clean as possible will result in still greater improvement in the higher grade of the ores mined and sent to the mill.

PLACES FOR POSSIBLE ORE DEVELOPMENT : (The larger the number of asterisks the more important the suggestion.)

* 1.) Along the 1 to 3 feet wide banded quarts Footwall branch or North Loop of the Gold Hill vein east of the Shaft pillars on the 100 and 150 foot levels and above the 225 foot level.

*** 2.) By developing the as yet practically unexplored large block along the Gold Hill vein that exists above the 225 foot level, and above the westward pitching line of junction of the Gold Hill vein with the "Silver" vein and that extends from the Gold Hill fault eastward to the Stope on the North or Gold Hill vein in the vicinity of "No. 18 Winze" from surface. This undeveloped block of ground has a length varying from 175 feet below to 250 feet or more above, near surface.

Possibly the best way to develop this ore block is by an east drift along the narrow streak of good ore showing on the north side of the 180 Foot Sub-Level - 45 feet to 50 feet above the 225 Foot Level at point 1168S-2765W or from the top of the raise just west of this point; or else after the Gold Hill vein has been encountered by developing laterally from the inclined raise recently started up to the northward from near the top of the stope on the "Silver" vein some 55' east of chute 14 and 50 feet above the 225 foot level.

PLACES FOR POSSIBLE ORE DEVELOPMENT: (Cont)

*** 3.) Stope the triangular shaped block of unprospected ground still existing along the Gold Hill vein between Raise 203 and the "Windlass Winze" from surface westward to the "203 Raise" fault. The Gold Hill vein shows with a width of 1½ to 2½ feet of dark gray banded quartz that lies along the north side of and in contact with the massive "bull-quartz" of the "Silver" vein in the upper 50 or 60 feet of the "Windlass Winze" from surface at 1178S-2638W.

Samples taken of the banded quartz of the younger Gold Hill vein along the north side of the winze at my request by Messrs. Johnson and Stables, showed pay ore values of $10.00 to $12.00 per ton while the massive quartz of the older period "Silver" vein carried values too low to be worked commercially. Accordingly it will be necessary to mine the banded quartz of the narrower richer Gold Hill vein by itself and leave the low grade quartz of the "Silver" vein unstoped. In order to do this a narrow stope will have to be carried westward from this "Windlass Winze". As the vein is followed westward the Gold Hill vein will undoubtedly diverge from the "Silver Vein" and will probably have firm walls that will permit of narrow stoping widths.

** 4.) Provided the stoping suggested under (3) above results in the production of good pay ore it would also be advisable to stope the higher grade quartz of the Gold Hill vein separate from that of the "Silver" vein, to the east of the "Windlass Winze" (or 203 Raise).

* 5.) It is possible that the 1 foot of good grade ore that shows upon the north side of the sub-level located east of the 203 Raise (#27 Chute) and about 46 feet above the floor of the 225 Foot Level, is either the downward extension of the Gold Hill banded quartz vein or a branch of the Gold Hill vein. The best way to work the Gold Hill vein between this elevation and surface might be to raise up along this narrow but good grade quartz vein from this sub-level.

* 6.) Since a small tonnage of good shipping ore is said to have been produced from the shaft and tunnel No. 11 that show on surface at 1108S-2205W a cross-cut run N15E for 105 or 110 feet from some point near the east breast of the 225 Foot Level might expose a pay ore streak, or at least might give definite information regarding the converging of veins to the eastward and regarding the possibilities of ore deposits near the junctions of branch veins lying to the north with the main vein farther to the east than the present east breast of the 225 Foot Level. This work would probably be the best way to prospect the "North Vein",

PLACES FOR POSSIBLE ORE DEVELOPMENT: (Cont)

here where better values should occur along it nearer its junction with the main vein.

** 7.) The Volcano vein that shows in the north X-cut on the 150 Foot Level, although only 6 inches to 1 foot wide, is claimed to carry values of $14.65 per ton. As several of the small banded quartz stringers showing in the 150 foot X-cut trend toward a junction with the Volcano vein farther to the east, the Volcano vein might increase in width at and beyond these points of junction to the east and therefore it might be advisable to develop this Volcano vein to the East on the 150 foot level by drifting along it to the eastward. In case the ore values increase in the Volcano vein when drifted upon it might be advisable to strip the vein and break the ore down separately and in this manner save enough good ore to pay for a portion or all of this development work. $104.3

** 8.) Although the ore body developed by the 200 Foot West Stope appears to decrease in value or weaken to the westward before the strong faults near the west end of the 225 Foot Level have been encountered, nevertheless the vein still shows enough strength to warrant trying to pick up the off set extension of the main Gold Hill vein to the west of the strong faults. Since the No. 1 and No. 2 South veins show undiminished strength in surface outcrop to points as far as 300 to 350 feet west of the main shaft, the main Gold Hill and "Silver" veins probably extend at least that far and probably much farther west beneath the opalescent rhyolite flow and surface covering of rocks, talus and wash and, therefore, other pay ore shoots may occur along them.

The vein could probably be picked up on the 225 Foot Level by the development suggested herein under the heading "Faulting". Exploration could then be undertaken to pick the vein up and develop it to the west of the faults on the 400 Foot Level after it had been definitely located upon the 225 Foot Level.

In this connection it is well to keep in mind that the line of westward pitching junction of the Gold Hill vein with the "Silver" vein apparently projects to the west of these strong faults at an elevation somewhere between the 400 and 500 levels. Accordingly good bodies of pay ore may be found on the 400 and 500 foot levels to the west of these strong faults.

*** 9.) Additional tonnages of very good grade ore can undoubtedly be obtained by continuing to develop and mine out the ore above, below and laterally as far as pay values continue from the younger and richer vein that strikes in a N 87° W direction through point 1145S-2935W on the 320 Foot Sub-Level some 80 feet above the 400 Foot Level near the back of 400 East Stope.

PLACES FOR POSSIBLE ORE DEVELOPMENT: (Cont)

There has been insufficient evidence obtained to date to determine whether or not this younger, richer vein, which appears to cut entirely through the older "Silver" vein, is the downward extension of either the Gold Hill Vein or of the Volcano vein. The writer considers that definite information on this point would be valuable, and work to prove this up by raising up along the vein to a connection is important.

** 10.) The 400 East Stope is producing a good grade of milling ore from the two younger and older intersecting veins.

The 401 East Stope had only reached a height of 18 or 20 feet above the 400 foot level. It showed 1 to 2½ feet of quartz that carries values as high as $29.00 in spots while bands of crushed rhyolite 1 to 2 feet wide along side of the quartz carried values of about $7.00.

The 402 East Stope which had reached a height of about 35 feet above the 400 Foot Level track, showed only 8 to 12 inches of good grade quartz ore associated with 1½ to 2½ feet of crushed and sheared rhyolite carrying $4.00 to $8.00 per ton in gold values in the center of the stope back and 1½ to 2 feet of quartz at the east and west ends of the stope. Assays as high as $17.00 across 2 feet were obtained from the crushed quartz near the west face of the back.

The 404 East Stope:- Some 2½ to 5 feet of medium grade quartz was exposed in the back of this 404 East Stope at 42 feet above the floor of the 400 Foot Level, while 4 to 5 feet of good grade banded quartz showed in the back of a 30 foot raise put up above the back at the west end of the Stope.

Since the ore in the backs of all these stopes just mentioned has shown considerable improvement over the ore exposed upon the 400 Foot Level directly beneath them and since experience in the 403 and 400 East Stopes indicate that the ore values seem in general to improve rapidly above a point 40 to 50 feet above the 400 Foot Level, active and thorough development of the main vein above all of these present 400 foot stope backs is warranted.

* 11.) The large tonnage of ore so far produced from the 403 East Stope has been of extra good grade. The richest ore mined was found to occur adjacent to and directly above the 35 to 50 degree east dipping faults that were encountered about 28 feet, 75 feet and 90 feet above the floor of the 400 Foot Level, in the 403 Manway.

During the writer's stay at the property the 403 West Chute Raise passed through the west branches of the Gold Hill Fault above the 400 Foot Level and also encountered good ore on the hanging wall or east side of these faults. This 403 W raise makes available

PLACES FOR POSSIBLE ORE DEVELOPMENT: (Cont)

another east dipping block of extra good ore some 40 to 50 feet wide between the 225 foot level and a point 40 to 50 feet above the 400 Foot Level provided care is used to mine the ore clean.

* 12.) Provided the cross-cut suggested in (6) above northward from a point near the east breast of the 225 Foot Level, indicates the probability of ore shoots in this vicinity or farther east it might be well to also run crosscuts for 50 feet N 15°W from some favorable point near the present east breast of the 400 Foot Level to determine if other parallel or possibly east converging veinlodes occur in that vicinity. Those veins should be much closer to a junction here than they are on the 225 Foot Level.

*** 13.) Since the 80° south dipping 6 inch to 1 foot wide younger vein at 1122S - 3020W on the 400 Foot Level has given assay returns of $30.00 to $60.00 per ton and since both the 68° south dipping 4 inch banded quartz stringer at 1125S - 3040W and the 2 to 3½ feet 50 to 65 degree south dipping quartz vein at 1130S - 3090W, which yielded assay values of $6.00 to $14.00 per ton carry considerably higher values than the 65 to 85 degree north dipping low grade, probably "Silver" vein which has been stoped up along to a height of 25 feet above the 400 Foot Level and only yielded $3.00 values, and moreover since all of these three south dipping banded quartz veins appear to be converging upward toward a union with one another above the 400 Foot Level, the writer feels that these veins warrant thorough development either by raising up along the 50 to 65 degree south dipping vein by a raise connecting with the 400 West Chute No. 1 at 1135S-3072W, or else by first drifting N 85°W along the 1 foot of good ore showing at 1123S-3020W for a distance of 50 feet and then raising up along this 78 to 84 degree South dipping vein to a possible junction with the two other more flatly south dipping vein leads, just mentioned, that show in the 400 Foot Level drift farther to the west.

The writer considers this work offers one of the best chances for the development of good pay ore between the 400 and 225 foot levels.

*** 14.) Since the south dipping veins showing in the west end of the 400 Foot Level as well as the Volcano and North veins showing in the 150 Foot Level north cross-cut all appear to be converging for a junction in depth with the main or the "Silver" vein and since there is a good chance for these narrow richer veins causing an enrichment of the main vein, below the junction, union, or crossing of the veins, your Company is easily warranted

PLACES FOR POSSIBLE ORE DEVELOPMENT: (Cont)

in sinking the present main shaft another 100 feet deeper and in cross-cutting northward through the main vein and then developing the main Vein both east and west of the shaft cross-cut by a drift and raises.

This sinking of the shaft another 100 feet and the developmentwork upon the 500 Foot Level will yield definite information regarding the possible straightening of the main vein in depth and the effect on pay ore deposition of the union or crossing of the younger banded quartz veins with the "Silver" vein below the 400 Foot Level and in the vicinity of where the westward pitching junction of the "Silver" and Gold Hill veins also appears to project. This definite information regarding the ore possibilities at great r depth, in the writer's opinion, is well worth the expenditure for the development outlined above.

Respectfully submitted,

July 15, 1931. GEO H. GARREY.

Bullion Returns After Payment of Mint Charges From Ore Extracted From Gold Hill Mine, Located Near Round Mountain, Nevada, Under Morrin-Steinmeyer-Frawley Lease and Option Between September 20, 1940, and September 26, 1942:

September 20,	1940	Lot 1	$3,457.00
October 8,	"	Lot 2	5,051.70
October 24,	"	Lot 3	4,120.60
November 7,	"	Lot 4	4,635.20
November 26,	"	Lot 5	3,781.00
December 13,	"	Lot 6	3,803.40
January 6,	1941	Lot 7	5,179.40
March 20,	"	Lot 8	3,300.00
April 10,	"	Lot 9	4,251.30
April 30,	"	Lot 10	3,134.40
May 23,	"	Lot 11	3,833.60
June 11,	"	Lot 12	3,590.50
July 7,	"	Lot 13	3,774.70
July 26,	"	Lot 14	3,412.30
August 14,	"	Lot 15	3,372.30
September 1,	"	Lot 16	3,860.00
September 16,	"	Lot 17	3,368.83
September 30,	"	Lot 18	4,065.50
November 4,	"	Lot 19	3,909.00
November 25,	"	Lot 20	3,126.80
December 23,	"	Lot 21	622.10
December 23,	"	Lot 22	5,964.70
January 17,	1942	Lot 23	3,713.30
February 22,	"	Lot 24	2,749.90
April 2,	"	Lot 26	3,980.00
May 1,	"	Lot 25	379.60
May 1,	"	Lot 27	4,356.60
June 20,	"	Lot 28	7,738.90
September 26,	"	Lot 29	7,730.70
November 5,	"Cleanup	Lot 30	582.10
November 5,	"Cleanup	Lot 30	925.70

July 15, 19

at $150/oz Au & $4/oz Ag

Au = $5,153,464

Ag = 808,162

Total $5,961,626

PRODUCTION DATA - GOLD HILL DEVELOPMENT CO.

Ounces Gold	34356.424	$5,840,592
Ounces Silver	202040.59	1,010,203
Gold Value	$ 712,634.42	$6,850,795
Silver Value	$ 57,176.39	
Total Gross Value	$ 770,010.81	
Tailings Losses	$ 87,160.34	
Mill Operating Expense	$ 233,916.13	
Shipping & Marketing Bullion	$ 4,127.52	
Net Returns from Smelter	$ 444,806.82	
Cost of Stoping	$ 345,302.81	
Cost of Development	$ 35,517.60	
Ore Sorting	$ 9,340.32	
Shaft Sinking	$ 3,208.58	
500 Winze Sinking	$ 5,579.39	
500 Pump Installation	$ 2,396.25	
Total Mine Operating Expense	$ 401,344.95	1932 $4.25/T. = 1974 $34.00
Operating Profit	$ 43,461.87	= $347,396

Period of Operation Aug. 1, 1930, to Mar. 31, 1933

Pilot Terms

GOLD HILL GROUP

DESCRIPTION

The Gold Hill group of claims consists of 36 claims, held under possessory rights by the Gold Hill Mines, Inc.

Fourteen of these claims having an area of approximately 238 acres were formerly held by the Gold Hill Development Company, while the remaining 22 claims, with an area of approximately 400 acres, were owned by THOMAS F. COLE. Total area of this group is approximately 638 acres.

These two properties were acquired in January 1934 by the Gold Hill Mines, Inc. and now form a part of that company's holdings.

LOCATION

The Gold Hill group is located 4-1/2 miles north of the town of Round Mountain, Nye County, Nevada, in the foothills of the Toquima Mountain Range. Immediately below the property is the large Smokey Valley, through which runs the auto road from the rail head at Tonopah, Nevada, a distance of about 70 miles.

On this property are two shafts--one the Gold Hill shaft, a two-compartment incline shaft 500 ft. deep and inclined to the south at an angle of about 75 degrees. This shaft is equipped with a one-ton skip and pockets cut on the various levels; while the other, known as the Toquima shaft, is situated about 2500 feet in a northeasterly direction from the Gold Hill shaft, is of three well timbered, 4-1/2' x 5' compartments, and is three hundred feet deep. As the collar of this Toquima shaft is about two hundred feet above the Gold Hill collar, additional depth in this shaft would be necessary to connect with the main Gold Hill workings.

TRANSPORTATION

Handling of company freight is usually done by a company truck, unless unusually heavy loads must be hauled, when the services of local trucking companies can be secured at reasonable rates. Most freight comes into Tonopah over Southern Pacific and Tonopah & Goldfield Railroad lines, where transfer is made to trucks.

Climatic conditions are such in this vicinity that roads can be kept open throughout the year.

Nature of the ore makes it possible to concentrate values in the form of gold bullion, thereby eliminating charges from outgoing freight.

WATER RIGHTS

Water Rights to springs in the adjacent Toquima Mountain Range on a property known as the Bailey Ranch have been secured. These springs secure a gravity flow of water for domestic purposes and are distant about two miles from the Mine. Water for milling purposes could also be developed from this source if desirable.

POWER

Power for this district is from the Nevada California Power Company which obtains hydroelectric power in the Sierra Nevada Mountains of California. Their system is well maintained and charges reasonable. Power lines have been run out to the property and electric power is available at both the Gold Hill and Toquima shafts.

HISTORY

This property was formerly known as the Ramshorn property and had been under development for several years when taken over by the Gold Hill Syndicate composed of Philadelphia capitalists, who in turn formed the Gold Hill Development Company.

This company actually developed the property up to April 1933, sinking the main Gold Hill shaft to the 500 ft. level putting a winze below the 500 ft. level, for a distance of 140 feet and extending drifts on the Gold Hill vein, some 1400 feet in an easterly and westerly direction.

At this time, due to increase in flow of water on the lower levels, low values obtained on the 500 and 600 levels and decrease in values on the easterly extension of the Gold Hill vein, it was decided to suspend operations.

However, since this cessation of operations took place, we have a great change in conditions governing gold mining industry due to increase in the value of gold, in terms of United States currency, from 20.67 to 34.45, as of January 25, 1934. This places material, formerly considered as non-commercial in the class of pay ore. Such being the case, a further campaign of exploratory work in search of extensions to the known vein systems or for new veins, seems to be justified.

GEOLOGY

The veins of this district appear to be confined to a formation known as the Gold Hill rhyolite, a light siliceous rock containing abundant quartz phenocrysts and more or less altered to the lower workings of the Mine. The Toquima shaft, however, has encountered a dark rock on the north crosscut from the 300 level, probably an andesite. Boulders of andesite can be seen covering the Gold Hill rhyolite east of the Gold Hill shaft and may be found to cover this rhyolite as a capping on the eastern part of the property.

To the west of the Gold Hill shaft, the veins are covered by a glassy rhyolite flow later than mineralization and forming a capping to the vein system on the west.

About three thousand feet east of the Gold Hill shaft on the east end line of the Lizzie No. 2 claim is found a vein some two feet in width of similar character to the Gold Hill veins and occurring in similar rhyolite formation. Such being the case, reasonable hope can be entertained for the easterly extension of the Gold Hill vein system for several thousand feet. Likewise, extension in a westerly direction can well be expected.

VEIN SYSTEMS

The veins consist of a number of chalcodonic quartz veins--the richer members of which are frequently banded--which branch form loops at various intervals. Up-to-date, the Gold Hill vein and branches thereof have been by far the most productive.

However, other veins have merit and should be further prospected. The Volcano and North veins on the 150 level, north of the Gold Hill vein, carry good values and, although small where encountered in the crosscut, may improve with drifting.

Likewise, the South vein on the 400 level shows good values and should be further developed.

Although the fact that water in the mine stood at a level fifty feet above the 400 level at the time of the writer's inspection of the property; still, study of the mine maps, assay maps and geological reports leads one to believe that post mineral faulting has caused a condition whereby the vein in proximity to such faults has been enriched by downward percolating waters which have redeposited values on the upper side of the fault. If this theory is correct, similar enrichment should occur in the easterly and westerly extensions on the Gold Hill vein system whenever similar conditions are encountered.

Two periods of vein deposition are in evidence in this deposit. First, we have the chalcodonic quartz, hard and massive, as typified by the Silver vein, usually of low grade material; and second, the higher grade banded dark grey quartz of younger age than the quartz of the "Silver Vein". This banded quartz is characteristic of the Gold Hill vein.

The easterly and westerly workings on the Gold Hill vein have been crushed to such an extent that it is difficult to tell the nature of the quartz contained therein, whether belonging to the earlier "Silver Vein" material or later "Gold Hill Vein" material. However, as the various veins converge and join the main Gold Hill Vein on both strike and dip, at various intervals, very good zones for ore deposition may be expected at such points of junction.

At the Sunnyside Mine of the Nevada Porphyry Gold Mines Company, located at Round Mountain, some four and one half miles south of the Gold Hill property, a large deposit of gold bearing material has been developed

in a formation similar to the Gold Hill rhyolite. This rhyolite in Round Mountain shows a thickness of well over one thousand feet with no bottoming of the formation yet in sight on the lower levels.

Consequently, a similar thickness of formation may well be expected in this district, barring the encountering of some unexpected igneous intrusive.

Furthermore, the length of some fourteen hundred feet which has been developed on this vein system leads us to expect continuation of said veins to much greater depth.

MINING METHODS

In a mine of this character, the methods used in extracting ores becomes very important. In fact, the success or failure of the enterprise may well hinge on this very point.

The nature of the walls of the veins as exposed in the various stopes show that some dilution of the ore by the barren wall rock will be unavoidable. As the grade of the ore in certain portions of the vein are not high, too high a percentage of dilution may take the product from the class of good ore to that of poor ore, or even the class of unprofitable material.

The average mine foreman can usually be depended upon to furnish as high a grade of material as possible, with the proviso made that he is not pushed too hard for tonnage to keep a mill operating at full capacity. When this tonnage is insisted upon, quite frequently it is supplied by the inclusion of some very low grade material with the ore.

As some of the veins now exposed in the mine are of eighteen inches to two feet in width, and as the walls are frequently soft, it becomes important to extract this ore without dilution if possible. This can be done probably by using a cut and fill system and by stripping the ore where the grade will justify. Furthermore, an adequate system of ore sorting on the surface could well be inaugurated.

This system of mining does not make for large tonnage. Consequently, it becomes necessary to develop new or larger deposits if the 100 ton mill on the property is to be operated to capacity.

Difficulty has been encountered in the past with heavy ground on the lower levels of the mine in the western section of the property. This difficulty can be lessened somewhat by draining these areas thoroughly for some period of time before attempting mining operations. Possibly the extensive faulting in the West may not continue much further in case drifting to the West is undertaken on a lower level.

Be that as it may, the 500 west drift has shown quite a shoot of commercial ore which should be further investigated.

ORE AVAILABLE

As some of the workings were inaccessible at the time of the writer's inspection of the property, the Gold Hill Development Company maps were used for estimating the size and values of the ore still available in the mine. These figures are based on blocks partially developed; figuring gold values at $34.00 per oz. and silver at 64-1/2 cents per oz.

Estimate of Available and Prospective Ore

115 Sub Level - East
200 ft. long by 100 ft. to surface, 3 ft. wide
5000 tons @ $8.80 per ton

225 East stope to survey station 241
125 ft. long by 200 ft. to surface, 2 ft. wide
4000 tons @ 10.80 per ton

225 East stope - survey station 241 to east face
110 ft. long by 200 ft. to surface, 1.8 ft. wide
3000 tons @ 8.21 per ton

400 East stope to face
200 ft. long by 90 ft. below 225 level, 2 ft. wide
3000 tons @ 7.00 per ton.

NORTH VEIN and VOLCANO VEIN

150 ft. level to surface - 1 ft. to 2 ft. wide
1200 tons @ 10.00 per ton

PILLARS

3000 tons @ 13.60 per ton

500 level - West
200 ft. long x 100 ft. to 400 level, 2 ft. wide
3400 tons @ 12.80

600 ft. level - West
200 ft. long x 100 ft. assumed to extend to 600 level, 2 ft. wide
3400 tons @ 7.00 per ton.

TOTALS

3400	tons	@	12.80	per ton	...	$ 43,520
3400	"		7.00	" "		23,800
5000	"		8.80	" "		44,000
4000	"		10.80	" "		43,200
3000	"		8.20	" "		24,600
3000	"		13.60	" "		40,800
3000	"		7.00	" "		21,000
1200	"		10.00	" "		12,000
26000	"					$252,920

The above tonnage and gross value indicate the material available in the mine at the present time. Additional development work might well change these figures quite materially in a short space of time.

DEVELOPMENT RECOMMENDED

In order to put this increased amount of ore in sight the following pieces of development work are recommended:

1. Resume drifting east on the Gold Hill vein on the 225 level from the face of 225 east drift. Eighteen inches of ore of a value of 5.30 per ton now shows in this face;

2. Resume drifting east from the east face of the 115 ft. sub level east. Material above this sub-level shows values of 8.80 per ton at present values. This level is approximately on the same level as the Toquima 300 level and could be connected with this shaft provided development to the east continues favorable;

3. Develop the North Vein and Volcano Veins on the 150 ft. level by drifting on these veins in a southeasterly direction or towards the junction with the Gold Hill vein system. The volcano vein on this level, although only 8 to 12 inches wide, has values of $20 per ton and better and may develop into a vein of importance. Likewise, the North Vein has a width of from 18 inches to two feet and shows in the forty or fifty feet of drifting values of from five to seven dollars per ton;

4. Pump water down to the four hundred level and resume drifting from the east face on this level. The amount of pumping necessary to lower the water for the fifty feet required will require little work; some water will be required for mine operations, machinery for pumping operations is on hand and will require little work in the way of installation and the development work proposed for the east face will be well worthwhile;

5. If development work as outlined above shows favorable results, the shaft could be unwatered to the 500 ft. level and plans made for additional exploratory work on the westerly extension of the ore shoots.

METALLURGY

The gold and silver contained in this ore, having an average ratio of six ounces silver to one ounce gold, occurs in a finely divided condition, and contains little sulfide. As a consequence, the cyanide system was considered the most suitable method to use and a one hundred ton cyanide plant was therefore installed.

This plant consists of crushing machinery and fine grinding ball mill and tube mill capable of reducing the hard chalcedonic quartz to the necessary degree of fineness. Following this machinery we have the required cyanide thickening and agitating tanks followed by a one hundred ton Oliver filter, fitted with the Merrill Crowe vacuum precipitating system. Finally, the precipitate obtained is smelted in an oil fired furnace and shipped as bullion.

Costs had by this method of treatment are approximately $2.50 per ton of ore treated which is good when the amount of grinding required and the locality of the mill is considered.

However, I would recommend that several changes be made in the mill, with the object of first eliminating waste rock before same enters mill and second, conserving values after such values have gone into solution.

The first object can be attained by redesigning the crushing plant and putting an adequate sorting plant at the head of the mill where large boulders of waste can be rejected.

Values can better be conserved by increasing the amount of concrete flooring in the mill together with drain launders to a central sump. Wastage of pregnant cyanide solutions can thereby be very largely avoided.

CONCLUSIONS

When the fact that the value of the product of the mine under consideration has increased materially in the past year (Gold - from $20.67 to 34.45, and silver from about 30 cents to 64-1/2 cents per oz) and the further fact that all equipment, having a first cost value in excess of $100,000, is still intact and ready for operation, then one is justified in recommending renewal of exploratory work.

Such exploratory work as recommended under the heading of DEVELOPMENT RECOMMENDED can be undertaken and prosecuted at low cost, as the item of Mine Pumping would not be a factor in the initial work undertaken. Drifting under those conditions would probably cost about $10 per foot.

Before attempting to start the mill, ample ore reserves should be built up. The nature of the veins and the careful mining of the ores required, demand this.

Finally, extension of the Gold Hill vein system to the eastward would carry the mineralized area into that portion of the property which would be adequately served through the Toquima shaft. A crosscut of 500 to 600 ft. south from this shaft should encounter the easterly extension of the vein system and would be of material benefit in future development, both from the viewpoint of ventilation and for handling of supplies. Moreover, a second point of exit would be afforded the workmen.

As drifting advances to the east the topography of the country increases progressively the amount of ore developed between the advancing faces and the surface.

The possibilities involved in the above campaign of development work, together with the limited expenditures required, make this investment of required capital justifiable.

VALUATION OF AMERICA GROUP

Development

The development work on this group consists of about 1500 feet of crosscuts - drifts and raises. Setting a cost of $10 per foot on these mine workings gives a value of $15,000.

Property

The area of this group which consists of four patented and nine located claims, is approximately 260 acres. This property, when compared with the area and geological conditions of the Gold Hill group, together with original prices paid for said Gold Hill group, will justify a valuation of $100,000.

VALUATION OF GOLD HILL GROUP

TOQUIMA SHAFT

Development Work

The development work from the Toquima Shaft (a three compartment shaft, 300 ft. deep,) consists of the cutting of two stations on the 300 ft. level and the running of 512 ft. of crosscuts therefrom.

A shaft of the dimensions of the Toquima shaft, properly timbered, would cost in this district about $60 per foot while drifting and crosscutting can be figured at $10 per foot.

The amount expended on development work at this shaft, therefore, can be given as follows:

Shaft, 300 ft. @ $60 per ft.	$18,000.00
Stations and Sump	2,500.00
512 ft. of crosscutting @ $10	5,120.00
Total	$25,620.00

Equipment at Toquima Shaft

Surface equipment consists of headframe, hoist house, foundations for hoist and compressor, large tank for fire protection and water supply, change house, and several dwelling houses.

Estimated cost	$10,000.00

The Surprise shaft located near the western end of the Surprise claim is of two compartments and is about 200 ft. deep.

Value of shaft @ $40 per ft.	$ 8,000.00

GOLD HILL SHAFT

Development Work

Development work at the Gold Hill shaft, which is a two compartment incline shaft, 500 ft. deep, consists of approximately 4580 ft. of drifting and 1640 ft. of crosscutting.

Cost of sinking the Gold Hill shaft can be set at $40 per foot, while drifts and crosscuts can be set at $10 per foot.

Gold Hill shaft, 500 ft.	@ $40/ft.	$20,000
4580 ft. of drifting	@ $10	45,800
1640 ft. of crosscutting	@ $10	16,400
Total for Gold Hill shaft		$82,200

Equipment at Gold Hill Shaft

Mine & Mill Equipment	$50,439
Installation cost	50,000
	$100,439.

Mining Claims of Gold Hill Group

This group consists of 36 claims of approximately 638 acres. Using prices paid for the ground originally as a basis for comparison, a present valuation of $80,000 for these claims is justifiable.

CONSOLIDATED ESTIMATE OF VALUATION FOR GOLD HILL MINES, INC.

PROPERTY	America Group	$100,000	
	Gold Hill Group	80,000	$180,000
DEVELOPMENT	America Group	15,000	
	Gold Hill Group	115,820	$130,820
EQUIPMENT	America Group	--	
	Gold Hill Group	110,439	$110,439.
	Total		$421,259

AMERICA GROUP

ORE - Developed and immediately prospective	$1,408,750	
Valuation placed on Property & Equipment	115,000	$1,523,750

GOLD HILL GROUP

ORE - Developed and immediately prospective	$ 260,752	
Valuation placed on Property & Equipment	306,259	$ 567,011
TOTAL VALUATION		$2,090,761

The above figures set forth the expenditures already made upon this property as a whole, set a reasonable figure on the value of the claims and give a conservative estimate of the ore available and immediately prospective.

Respectfully Submitted, this 31st day of January, 1934.

(Homer L. Williams)