A Report on the "Whale" Mines.

Property of the Woodstock Gold Mining Company.

The Whale mine is located in the North western part of Park Co., Colorado, on the Eastern slope of the Continental Divide, at an altitude of about 12,000 feet. A portion of some of the mining claims extend into Summit County.

Webster is the shipping point, 9 1/2 miles down Hall's Creek. Webster is a station on the Colorado and Southern Railroad, 69 1/2 miles west by south of Denver. There is a good wagon road from the mine to Webster, down hill all the way./

A reference to the accompanying sectionized map will give a clear idea of the situation of the mine, mill site and power site with reference to each other, and also to the railroad station.

The Whale group of mines consists of the Whale, Lane, Golden, Cyvert, Swordfish and Ohio lode mining claims, patented and containing about 39 acres. The Golden and Cyvert mill sites containing about 10 acres. The Birthday tunnel site containing 206 acres. The Hall's Creek and Hand cart ditches and rights to 69 cu.ft. per second of water.

The property is being worked through the Lane and Birthday tunnels; the latter being 125 ft., vertical feet above the former. Blacksmiths shops are located at the mouth of each tunnel. A winze is being sunk in the Lane tunnel on the Whale vein. The hoisting is done with a 12H.P. gasoline engine.

The accompanying map shows the relative position of the mining claims and the two working tunnels.

The climate is the same as found in all high altitudes of the United States. With proper equipment the mine can be worked every day in the year in an economical manner.

The district is the same belt of veins that runs from the Georgetown district into the Summit County district.

The Whale was discovered in 1869 by a negro while out from Georgetown on a prospecting expedition. Nothing was accomplished towards opening the vein until a Col. J. W. Hall became interested in it, about 1872. Col. Hall made a trip to England where he succeeded in placing the property and was retained as manager. On his return he proceeded to develope the property by means of adit levels. In '74 he built a smelter and connected it with the mine by a surface tramway four miles long.The smelter was a failure,principally because the Metallurgist did not understand the treatment of rebellious ores. In fact at this time and for some years later, there were only two concerns treating rebellious ores with marked success,Hill at Black Hawk and the Golden Smelting Co. at Golden. Some ore was shipped from the Whale to these two places, but the freight was from $25.00 to $40.00 and the treatment charges from $25.00 per ton up. These prices naturally prohibited the shipment of any but very high grade ore.

This state of affairs continued until the railroad was finished to Webster in '82. The freight rates became lower, but the smelting charges remained very high,with nothing paid for lead and not full price for silver.

Failure to successfully smelt their own ores;prohibitive prices for freight and smelting, except for <u>very high grade</u> ore;mismanagement and tradition says dishonesty, all combined, made the venture a failure for the English Co.

For several years the property was worked at irregular intervals, by leasers who took the high grade ore in sight and did no developement. work.

The panic of '93 depopulated nearly every silver camp in the west. The property laid idle till '98 when work was started by parties who sold their holdings to the present company.

The mine is said to have produced a million dollars. How near the truth this statement comes I have no means of ascertaining,but it is certain it has produced a large quantity of good ore.

One of the incidents in the decline of the English Co. was the burning of the manager's house. It is said the records of the English Co. perished in the flames.

I have been able to find one report of the manager of the English Co. dated Nov.I.1876.

The report says " in a run of 347 I/2 tons through the Co.s furnace, 300 tons of which was Whale ore, bullion was produced which sold for $22,213.27, at a cost for smelting of $30.00 per ton."

The manager fails to give the assay value of the ore, or the per cent of the values saved, but it must have been very closely sorted to make it high grade, for the figures indicate a saving of something over $63.00 per ton. I have been told by men who worked sorting ore in those days, that they frequently spent three days sorting up one sack(150 lbs.)of ore, and that one sack per day was the usual rule.

The Swordfish in '99 and '00 produced $7,355.23 of an average value of $48.79 per ton above smelting charges from a block of ground equal to 106 ft. long by 47 ft. high. This block of ground was left standing by the English Co. and subsequent operators, presumably because it was too low grade.

This ore was hand sorted at a cost of $5.00 to $10.00 per ton.

A couple of years ago an experiment was made(covering a period of two months) hand sorting the present ore in sight. The results were not satisfactory, for the reason that the lead and copper is too finely disseminated through the rock.The ore bearing rock can not be broken by hand and the mineral picked out except at a very great cost per ton; $15.00 to $25.00.

This is too high a cost per ton to permit a profitable handling of the ore.

Since then experiments in all the known methods of concentration have been carried on, with the result that a process has been found by which the ore can be concentrated at a profit.

Reference to this phase of the subject will be made later on.

The formation of the district is gneiss, principally banded gneiss, tilted to an angle of 45 degrees. The gneiss is cut in various directions with dykes of andesite. The Whale vein is a true fissure, running through the country at about N. 76 degrees E.and dipping to the north at an angle of about 60 degrees. The vein cuts across the formation. It is faulted by an andesite dyke. This dyke is very closely associated with the ore bearing zone of the vein. The ore commences on the westerly side of this dyke and so far no profitable ore has been discovered on the east side of the dyke.

The gangue of the vein is changed gneiss with porphyretic material showing at times. The gangue of the ore is sulphate of Baryta, commonly called heavy spar.

The ore is principally galena and grey copper, carrying silver and at times a little gold. Near the surface anglesite, malachite and azurite have been found. At greater depths chalcopyrite and bonite appear. The galena is generally a course grained cube, carrying low grade silver values, although steel galena carrying a hundred ozs. silver per ton has been taken out. The grey copper carries the principal silver values.

The accompanying plan map showing a longitudinal section of all the workings will serve to give a clear idea of the ore already extracted and the ore blocked out ready to be extracted.

The following assays were taken clear across the ore streak, at intervals of I5 ft. At each point where the sample was taken the width of the ore streak was measured. The width of the ore streak at each point sampled is given on the map, also the value per ton of the sample taken, expressed in whole dollars.

Samples of ore opened.

| No. | Gold ozs. per ton. | Silver ozs. per ton. | Lead % in each ton. | Copper % in each to n | Total value per ton. |
|---|---|---|---|---|---|
| I | Trace | 4.5 | 20.0 | Trace | $I5.I0 |
| 2 | " | 4.I | I8.0 | " | I3.63 |
| 3 | " | I9.5 | 3.8 | 0.5 | I6.73 |
| 4 | " | 4.8 | 3.0 | Trace | 5.II |
| 5 | " | II.4 | I.8 | 0.5 | 9.94 |
| 6 | " | 8.2 | I2.2 | 0.3 | I3.45 |
| 7 | " | I6.6 | I0.0 | 0.5 | I8.45 |
| 8 | " | 4.0 | I3.5 | Trace | I0.86 |
| 9 | " | 5.2 | 5.0 | 0.3 | 7.I8 |
| I0 | " | 29.4 | I6.0 | I.3 | 30.6I |
| II | " | 66.8 | 2.00 | I.7 | 50.69 |
| I2 | " | I5.8 | 2.0 | 0.5 | I3.I0 |
| I3 | " | 77.4 | 3.0 | 2.0 | 59.20 |
| I4 | " | 42.8 | I5.0 | I.3 | 42.I3 |
| I5 | " | 6.5 | I7.5 | Trace | I4.98 |
| I6 | " | 8.5 | 6.0 | 0.3 | 9.06 |
| I7 | " | I7.4 | I7.2 | 0.5 | 23.32 |
| I8 | " | 24.6 | 20.2 | I.3 | 30.69 |
| I9 | " | 22.0 | 7.5 | 0.5 | 20.68 |
| 20 | " | 25.6 | 8.5 | 0.5 | 23.76 |
| 2I | .02 | I54.5 | 4.0 | 5.5 | I20.00 |
| 22 | Trace | 7.9 | II.5 | 0.3 | I2.95 |
| 23 | " | I0.8 | I6.5 | 0.3 | I7.95 |
| 24 | " | 8.3 | I4.0 | 0.4 | I4.92 |
| 25 | " | 5.7 | II.5 | 0.5 | I2.I3 |
| 26 | .0I | I9.6 | I6.0 | 0.5 | 24.I2 |
| 27 | Trace | 6.7 | 23.0 | 0.3 | I9.05 |
| 28 | " | 9.0 | I0.0 | 0.3 | I2.8I |

| No. | Gold ozs. per ton. | Silver ozs. per ton. | Lead % in each ton. | Copper % in each ton. | Total value per ton. |
|---|---|---|---|---|---|
| 29 | Trace | I6.0 | I6.7 | 0.5 | 22.06 |
| 30 | " | I7.0 | 23.0 | 0.5 | 26.53 |
| 3I | " | 20.8 | 8.5 | 0.5 | 20.45 |
| 32 | .05 | 80.0 | I3.5 | 2.0 | 68.30 |
| 33 | Trace | 35.0 | 32.0 | I.3 | 45.95 |
| 34 | " | 26.7 | I6.6 | 0.5 | 29.38 |
| 35 | " | I8.6 | I0.0 | 0.3 | I9.43 |
| 36 | .0I | 30.3 | Trace | I.4 | 23.7I |
| 37 | .0I | 75.4 | 6.2 | I.9 | 59.55 |
| 38 | .0I | 33.3 | 5.0 | 0.8 | 27.58 |
| 39 | Trace | 2.5 | 5.0 | Trace | 4.73 |
| 40 | .0I | 22.5 | II.3 | 0.5 | 23.3I |
| 4I | Trace | 24.3 | 3I.5 | 0.4 | 36.47 |
| 42 | " | 9.0 | 43.0 | 0.2 | 32.4I |
| 43 | " | 7.8 | 25.5 | 0.2 | 2I.08 |
| 44 | " | I3.2 | 7.I | Trace | I3.26 |
| 45 | " | 7.0 | II.6 | " | II.79 |
| 46 | " | I28.0 | Trace | II.5 | I2I.32 |
| 47 | " | 5.4 | 8.8 | Trace | 9.00 |
| 48 | " | 23.2 | I3.I | " | 23.86 |

Note Silver figured at 69¢ per oz. Lead 60¢ per unit; Copper ½¢ per unit.

Block A contains about 8I9.95 tons of an average value of$I7.67 per ton, total ------------------------------ $I4,488.5I

Block B contains 2,032.42 tons of an average value of $31.85 per ton, total ---------------------------- 64,732.57

Block C contains I5I4.9 tons of an average value of $28.I3 per ton, total ---------------------------- 52,6I4.I3

Block D contains 2222.04 tons of an average value of $I4.75 per ton, total ----------------------------35,775.09

Block E contains 2845.06 tons of an average value of $29.93 per ton, total ---------------------------- 85,I52.64

There is a total of 9434.37 tons of ore opened on two and three sides of an equalized value of $22.95 per ton, total ------------------------------------$252,763.94

The width of the ore streak through out the ground opened is from 4 inches to 6 feet wide and will average something over one foot.

The drift on the Lane tunnel level has only penetrated about half the length of the known ore shute, as exposed in the old workings. The winze at present is 97 ft. deep. With the extension of the drift on the vein on Lane tunnel level and the drifts from the bottom of the winze to the full length of the known ore shute as much ore should be opened, in this one shute, as is already opened with out further sinking.

It should be noted that the present bottom of the winze is in better ore than at any time since sinking operations have begun. In a addition to this thereis a large amount (several thousand tons at least) of ore on the stulls of the old workings and in the old dumps which will, in my judgement, yeild a good profit in a concentrating mill. This ore is already broken and will only have to be transported and milled. Just how much there is of this kind of ore it is impossible to say, but I believe I can safely say that there is at least 10,000 tons of this ore that is worth from $6.00 to $10.00 per ton, and there may be twice that amount.

It is quite within reason to suppose that something like the same quantity and quality of ore will continue to an indefinite depth. The lower ore is an unaltered sulphide and the bottom of this kind of ore has never been found in fissure veins.

The value of the Golden, Cyvert and Ohio claims is problematical, but there are strong indications that good ore can be opened in each of them. They should be further developed just as soon as the Company is able to do so.

For the past two years experiments in concentrating this ore has been carried on at considerable coat. Every known method has been tried. These experiments have been tried with quantities of ore varying from a few pounds to car lots.

A method has been found which will save 85% and better of the values. At least a dozen seperate tests have been made and a practical plan of milling the ore has been worked out.

The cost of a mill to successfully treat the ore will depend on the size, but nothing less than 25 tons per day should be considered and, in my judgement, a mill of 50 tons per day capacity should be erected.

The mill will have to be erected at least 4500 ft. from the mouth of the working tunnel, on account of the water supply. It will have to be connected with the mine by an over head gravity tram.

Not less than $25,000.00 should be raised to build a mill, tramway and necessary buildings.

When the mine is equipped with the proper mill and accessories there is no reason why it can not be made to pay.handsome dividends on the capital invested and there is every reason to believe that the period of the economical working of the present ore shute will cover quite a number of years.

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Allowing for a loss of 20% in milling(the loss should not be over 10%) the ore has a net value of $17.36 per ton.

Taking the cost of mining at $8.00 per ton, including development (and it should not be over half of that, if the best up to date methods are used in mining) the cost of milling at $2.00 per ton (it should not exceed $1.50); the cost of freight reckoned at 4 tons of crude ore being run into one of concentrates should not exceed $1.50 per ton( and it ought to be brought down to $1.00 per ton);the cost of smelting at 50 cents per ton ( and it will be nothing if the lead contents of the concentrates is kept up to 45%);still we have 33% of the values for profit. The profit should be run up to 40%of the out put with out any trouble.

If any one desires to verify my statements in regard to the values in this property I will gladly make a joint examination. In the event my figures are substantially correct my time shall be paid for, If they are not found to be so no charge will be made for my time.

Claude E Street

Jan. 4, 1907.

Consulting Engineer.