

166

BC-766

Sheep Mountain Group
Gunnison County, Colo.

LIBRARY
COLORADO SCHOOL OF MINES
GOLDEN, COLORADO

REPORT
ON
THE SHEEP MOUNTAIN GROUP OF MINES,
TUNNEL & WATER POWER.

By
Robert S. Billings, E. M.

Denver, Colorado,
January 1914.

FOREWORD

Intelligent observers now recognize that activity in the legitimate industry of mining occurs in cycles, its arteries being clogged or cleared by the same factors that govern the rest of the commercial world.

In Colorado we have, however, a few exceptional instances where nature has stamped its "ore birthmark" on the rocks of certain districts, and yet so far as any appreciable commercial production is concerned, they lie stagnant and dormant, awaiting the advent of capital, railways, cheap transportation and power, modern and intelligent mining, and the application of up-to-date machinery and ore treatment methods.

Colorado now leads the world in all of these and is daily demonstrating that no mineral having any commercial value, whatever, is so varied or complex in its physical or chemical structure that it is not now amenable to profitable treatment through the research and practice of our electrical, mechanical, chemical and metallurgical experts.

In the mining camp of Crystal, Gunnison County, Colorado, we have one of those rare instances of proven deposits of high grade ore, superficially mined in the past, and vast quantities of low grade milling ores exposed and lying dormant, only awaiting the advent of the railway, (now four miles distant), the harnessing up of the power of Crystal River, and the application of simple and tried ore saving methods, to make it one of our largest and most profitable milling points and prolific ore producer; whose ores can be cheaply mined from its demonstrated fissure veins, contacts and deposits of gold, silver,

copper, lead and zinc, the geology of which, in many instances, is a replica of the famous and nearby camp of Aspen, with a production of nearly \$270,000,000.00.

R. S. B.

The Crystal River Mining, Milling & Power Co.,

Dear Sirs:-

In handing you, herewith, my report on your mines and water power at Crystal, Colorado, I beg to advise you that, in addition to looking into the merits of your enterprise and examining your holdings, I have hitherto had occasion to report in detail, on the geology, mines, timber, water power and transportation features of this camp.

After an experience covering over 25 years in mining, smelting and milling, and expert examinations throughout the entire West, I am most favorably impressed with the great possibilities of this camp and its mines, with its varied and large ore bodies, all susceptible to milling and smelting, with power to be furnished by your company, and no engineer can examine the surface ores of your holdings and your tunnel, that has developed, and will further develop them at depth, without being profoundly impressed with its very great possibilities, and with a small expenditure, an immediate profitable future.

I am,

Yours very truly,

(Signed) R. S. Billings, E. M.

THE SHEEP MOUNTAIN GROUP OF MINES
TUNNEL & WATER POWER.

LOCATION:

This mining property and water power is located on Sheep Mt. and its base, near the headwaters of Crystal River, at Crystal, Rock Creek Mining District, Gunnison County, Colorado, four miles distant from the railway at Marble. (See map.)

HOLDINGS:

The estate embraces the following claims, mill site and water power and rights, all of which is held under patent from the United States.

"The Crystal City", "Crystal City Nos. 2 and 3", "The Tiger", "The Cashier", "The Old Solitary", "The O.S.B.", "The Lost Horse", "The Michigan", "The American", "The Iron Clad", "The Atlantic", "The Spar", "The Black Hawk", "The Diadem", "The Lost Horse Mill Site", and "The Crystal River Water Rights & Power". (See map.)

GEOLOGY:

Sheep Mountain has an altitude of about 3,000 feet above Crystal River, which flows at its base. The structure of the mountain consists of granite at its base, followed and overlaid by quartzite, lime, shale, diorite and porphyry, all in the order named, with varying thickness in their stratas, except that near the summit of the mountain, we have an unusual stratum of quartzite 200 feet thick, covered and inter-sected by black lime, shale and slate, which in turn is overlaid with a bed of porphyry, having a varying thickness of from 100 to 200 feet, eroded in places. This porphyry breaks through and across the stratified rocks, forming cross ore fissures and junctions with the mineralized-ore contacts showing on the strike between the varying strata mentioned, and is also shown in the developments of the famous Black Queen Mine, from which 31 cars of ore were shipped that netted \$36,000.00; also in the Lucky Boy Mine and the Sheep Mountain Tunnel of this company. (See map.)

HISTORY:

The Sheep Mountain Tunnel was conceived in 1891, work beginning in July of that year and continued until November 1893, during which time about 3,400 feet of work was accomplished.

The prospectus of the company at that time stated:

"In view of the fact that extensive and expensive machinery would be required to sink a shaft or incline to a great depth, the Company, in July 1891, started a large double-track tunnel near the level of Crystal River, and is driving it into Sheep Mountain upon a north-westerly course, for the purpose of cutting the various contact and fissure veins known to exist on the Company's property. (See attached maps)

This tunnel will afford a cheap means of transporting the ores to the ore bins, and it will also drain the mines.

All mines tributary to and drained by the tunnel, will pay a settled sum monthly, for drainage and a rate per ton for the ores and waste hauled through the tunnel, the price being graduated according to the distance hauled.

It is expected that the company's tunnel will be earning, inside of the next twelve months, a revenue derived from tolls paid by tributary mines, a sum exceeding \$2,000.00 per month. Steel cars holding 1½ tons each, are used, these being coupled into trains of from three to eight cars and drawn by a single mule.

All the ground along the line of the Company's tunnel is known to be mineral bearing and a considerable portion of it already producing ore from the surface workings.

The following are the names of a few of the mining claims that will be directly developed by this tunnel to a greater or less extent. Some of the claims will be cut through on a straight line, while others will have to be reached by lateral drifts or levels run from the main tunnel, viz.,

The Crystal City Group,	Clark Nos. 2 and 3,
Lost Horse,	Lucky Boy,
Missouri Bell,	Fargo,
Black Queen,	Plymouth Star,
Black Eagle,	Black Hawk Group,
Evening Star,	Sweet Home,
Undine,	Milwaukee, and many others.

These claims are not one-tenth of those located on this mountain, and all that have received the benefit of development work have satisfied the most sanguine expectations."

Unfortunately the above "sanguine expectations" and calculations could not be realized at that time, as the bulk of the large bodies of ores encountered were considered at that time low grade and refractory; the nearest railway point was at Carbondale, 40 miles

distant, and over-shadowing and over-whelming all these discouraging factors, the operators had to face the re-demonetization of silver in 1893, with its accompanying panic and practical cessation of all railroad building in the mining West, and of all investments in mining and its kindred industries, particularly in silver-lead mines and mills.

Twenty years have now elapsed since these mines were closed and all developments practically abandoned in this camp, and during this interim, the entire commercial face of this enterprise has been altered by the extension of the railroad to within four miles of the mines. The zinc in the ores has become very valuable, and by the application of improved mechanical concentrating devices, the milling and saving of the gold, silver, copper, lead and zinc values, has become simplified, thus entirely offsetting the reduced price for the silver contents, by creating profitable concentrates of gold, silver-lead and copper, and zinc-copper and silver, and heavy zinc concentrates carrying a minimum amount of the other metals, resulting as stated in the "Foreword," in the commercial utilization of all of these low grade, base refractory ores, for a profit, by modern milling and economical mining with its reduced cost for gross production.

DEVELOPMENTS & ORE:

This group of mines is developed and opened by what is designated as the "Sheep Mountain Tunnel."

This tunnel was started at the extreme base of Sheet Mountain, its portal being near the County Road and within a few feet of the level of Crystal River.

As before mentioned, the object of this tunnel was not only to cut and develop the several known fissure Veins and ore contacts of this property, but also to serve as a drainage and transportation outlet for the adjoining and surrounding mines to the North, East and West, several of which in 1891-1893 were already shipping from shafts and gave promise of being large producers of gold and silver, and silver-lead ores, notably the Black Queen, Lucky Boy and Evening Star Mines, the former having within its confines six known ore contact veins, but only shipping from one - the Black Queen.

This latter ore body varied from three to four feet in thickness and the ore shipped at this period ran, in gold and silver, \$101.50 per ton, with the milling ore running from \$14.00 to \$35.00 per ton.

This Sheep Mountain Tunnel, $4\frac{1}{2}$ x $7\frac{1}{2}$ feet, was first driven and timbered through the wash and shale, a distance of 358 feet, and from there to the intersection of the Black Queen contact, in the quartzite, a distance of 157 feet, making a total of 515 feet in a northeast course to this junction.

After cutting this contact, a drift was run on it 177 feet southeast toward the southerly slope of the mountain. By extending this drift a short distance to the surface, you would have a straight tunnel and more dumping room at its portal.

From this point of intersection at 515 feet, the main tunnel, 6 x $7\frac{1}{2}$ feet in the clear, was driven 1,934 feet northwest on the Black Queen ore contact between perfect walls, not requiring a stick of timber, and in ore from 2 to 10 feet thick the entire distance, or within a few feet of the breast, where the contact is disturbed and broken, evidently from a cross fissure, which to all appearance will soon develop and open into high grade bodies, as found in the adjoining Black Queen Mine.

At a point about 400 feet from the mouth, in the cross-cut tunnel driven 515 feet, The Lucky Boy ore contact was encountered and from 250 to 300 feet of development was done in a large body of milling silver-lead zinc ore. This ore body affords immense ore reserves, supplying stoping ground (see cross section) to the surface, for many hundreds of feet on known ore shoots opened by numerous surface workings, all of which are in silver-lead and silver-lead zinc bodies of smelting and milling ores.

At 1,000 feet from the intersection in the main tunnel, on the Black Queen ore contact, a cross-cut was driven east for 240 feet, exposing what may be known as the Sheep Mountain or third ore contact. (See Map). This looks fine and will undoubtedly show large ore bodies when developed, on its northwest and southeast strike and upraises driven, there being at this point fully 2,000 feet of backs to the surface.

The additional development consists of three upraises in the roof of the main tunnel on the Black Queen contact. These are all in milling ore.

The record of the former operators shows that the last 150 feet driven in this tunnel was in a large ore body, having a value of \$15.00 per ton. Before arriving at this point another large sample was broken, 200 feet long and 4 feet wide, that gave an average of $5/100$ oz. gold, 22 oz. silver, 5% lead and 3% zinc, having a present market value of \$15.00 per ton. 113 samples and assays, taken from time to time as the work progressed, averaged 21.81 oz. silver, or \$12.50 per ton, present price of silver, the

ore being brittle and wire silver and a sulphide. The lead, zinc, copper and gold values are not included in the above average.

The ore in the East or Sheep Mountain contact is more of a quartz carrying gold and silver, but I anticipate when this vein is explored, bodies of smelting and milling sulphides will be opened.

In the Lucky Boy ore contact very large bodies of low grade milling silver, lead and silver-lead zinc ores are exposed, together with some smelting grades, particularly in the surface workings, from which several hundred tons of lead-silver ore and lead-zinc ore have been shipped.

WATER POWER & PLANT:

One of the most valuable assets owned by this company is its water power and plant, the latter being located on the company's patented mill site, near the mouth of the tunnel on the Crystal River, the dam being built at the junction of its two forks.

The average volume of water at this point, as given by the United States Reclamation Service Survey, is 32 cubic feet per second, with low water estimated at 12 cubic feet per second.

The power developed by the present plant with its dam, flume and wheel, is from 200 to 250 horse power. This horse power can be increased at will, up to several thousand, by extending the flumes and piping, creating a 500 foot fall. When this property was in operation, all the power and air required in the Sheep Mountain tunnel, "The Inez", "The Harris-Farley", "The Aspen", and "Bear Mountain", tunnels was furnished from this plant, and afforded an income up to \$7,500.00 per year, with only a 36 inch Leffell wheel, 6 drill Rand Compressor, 1,000 feet of flumes and a 30 foot fall.

SUMMARY:

My understanding of the present plans of your company, owning the Sheep Mountain Tunnel Mines & Water Power, is that you propose to operate and develop the Lucky Boy, Black Queen, Sheep Mountain and other known ore contacts embraced in your holdings, and tributary to the Sheep Mountain Tunnel.

This means a very large production of smelting and milling ores, the extent or volume of this production depending entirely on your milling capacity, as sufficient work has been done to expose immense ore bodies, and as has been shown in the Power Report, it is

only a question of installing machinery for electrical power, concentration and mining to bring the daily volume of business up to a large tonnage and, if desired, a custom milling plant could be operated by this company, to great advantage, on the supply of ores that are already available from many other mines in this section.

The present or preliminary installation proposed by your company, of a milling capacity of 50 tons per day, should not only be profitable from its start, but will serve to demonstrate the character of the machinery necessary, and the perfecting of the process for the highest saving of the metals contained in these ores.

Probably many details in connection with these mines, water power and district lack elaboration by me, due largely to the fact that, personally, from repeated examination of these mines, this section, its geology and ores, I have a most pronounced and favorable opinion of its future, as indicated in my letter and "Foreword", and now that lack of transportation is no longer a deterring factor and the zinc in the ores commands a premium, I am thoroughly satisfied as to the profitable future of this enterprise.

I am,

Yours very truly,

(Signed) R. S. Billings.

present plant is equipped as suggested, is good for \$400 a day net.

I enclose list of 54 assays cut from all over the present workings. I had also numerous samples of surface and "float" taken to check assertions made as to value of a vast quantity of material that has never been regarded as pay. These averaged about \$3.50 per ton and ran from \$1.50 to \$7.00. Pan showings were taken to estimate value of these samples. There is a vast amount of material of this grade or better that could be made profitable when working in capacity on an economic basis. But I estimate the present value of the mine on a \$15 per ton value.

The mine is at present 18 miles from rail. Good road. Plenty of water. Projected R. R. will bring it 4 miles from rail. Ten stamp mill, small KCY plant, 65 H.P. engine etc. 500 ft. from present tunnel.

Besides the assay list herewith, I have seen in the neighborhood of 1000 assays taken during the operation of the mine, and there is not a foot of the ground opened that has not been sampled from one to four times. The average results are surprising for as large a body. Fifteen dollars is a safe figure. The ore is hard and tough and the crushing machinery must be carefully adapted. Hand work in the mine is out of the question.

Trusting this information will convey a general idea of the situation, and that I will hear from you soon, I am,

Yours Sincerely,

26.20
20.30
25.60
29.60
28.24
60.00
18.20
30.20
22.00
18.00
32.00
33.60
14.80
36.00
25.60
38.40
14.50
27.00
22.60
24.00
28.40
22.20
29.00
19.80
39.20
20.00
30.00
25.60
58.80
16.00
36.50
32.40
32.40
25.00
37.00
18.20
42.00
35.00
37.00
22.00
30.00
22.00
19.60
25.00
18.00
26.00
44.00
14.80
20.00
23.50
24.50
32.40
27.50
30.00

These 54 samples were taken to determine the ground that could be opened and stoped in order to supply the present plant with \$30.00 ore. Known low grade ground (\$15 and under) was purposely omitted as was also samples outside of present workings. While there is a large tonnage that will grade as per this list, the average is too high for the run of the mine and should be regarded as available for special purposes, when circumstances indicate the advisability of selection.

The really significant results are those obtained from the assay of mass samples, as that from 42 ft. in the cross-cut tunnel \$12.00 per ton and that covering the drifts, winze and last 10 ft. of the cross-cut namely \$18.60 per ton.

The cross cut is being driven ahead slowly by 40 shifts per month, but the headway is immaterial. No one has yet cut through to the lime porphyry contact, and there is a probability of enrichment on or close to the contact proper, and values may extend into the igneous rock.

The body should be opened vigorously and the character and value along the porphyry contact determined.

54) 1490.40 \$27.60 Average.