

REPORT ON THE

C. O. D. MINE

Located in the

Cripple Creek District

Colorado.

By

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The Directors of "Consolidated Extension Mines Company"
Jacobson Building,
Denver, Colorado.

Gentlemen:

Agreeable to your request, I have made an examination of the property of the C. O. D. mine, at Cripple Creek, Colorado, during the last week, and respectfully submit the following result of my findings:

INTRODUCTION

At the outset, I may perhaps say that I know the Cripple Creek District well. I operated two properties, the Xenobia and the Monte Christo there, from early 1899 to late in 1901. Since that time, that is to say during the last 28 years, I have visited the District between 40 and 50 times, mostly on various mining examinations.

I have seen the District in its palmiest days of maximum production. I have seen its period of comparative inactivities, and I am seeing now its comeback, with new discoveries and the rehabilitation of old properties in the producing class again.

In the rehabilitation of the C. O. D. mine, the first question which comes to anyone's mind is why the mine was shut down for a number of years, if it has such a bright future? The answer is that at the time of its shut-down the mine had been worked to the very limit of an obsolete equipment. The District was not yet drained by the Roosevelt Tunnel, so that the mine was very wet and the pumping was a tremendous expense. The power used was steam power, burning coal and very much more expensive than the electric power available today. The great increase in the cost of all the supplies during the World's War, while the product of the mine--gold--was the only one of which the value could not be raised; but most of all, the near impossibility to get miners, as all the able bodied men had been conscripted by the U. S. Government. These were the reasons for shutting down and very little has been done since that time until the present active company took hold of the property and started a campaign of development work in an adequate and methodical manner, of which the electrification of the hoist has been the first step.

Today the whole Cripple Creek District is drained to a depth of close to or over 2,000 feet, so that the C. O. D. shaft can be deepened to a depth greater again than that it has already reached without any pumping expenses whatever. The cost of power, in buying electric current, is probably one-half of what it cost when coal was burned under boilers at the mine. The charges for freight and treatment of the ores are now less than one-half of what they were then. According to my best information, the District has now the lowest rate of freight and commercial treatment of the ores in the world. While the wages of labor are higher now than they were then, machine drills are so much improved that a much greater footage can be made per shift per man; a larger tonnage broken down, so that the costs of labor, when calculated on the basis per ton of ore are probably less now than they were then.

The geological conditions in prospecting for veins and new ore bodies are much better understood now than they were formerly and this will save a great deal of blind work. The importance of the flat veins, of which one is known to exist in the C. O. D. mine, and two others in two properties to the southeast of the C. O. D.--the Husted shaft of the Stratton's Estate, and to the northwest of the C. O. D., the Gold King mine--is much better understood. And it is likely that a great deal of ore will eventually be mined from them.

THE CRIPPLE CREEK DISTRICT

The Cripple Creek District is located in the Front Range of the Rocky Mountains, less than ten miles to the southwest of the celebrated Pikes Peak, and some twenty odd miles from the town of Colorado Springs, in direct air line.

It is a gold mining district. It was discovered in 1891 and mining operations have been carried on there continuously since then. The total production to date is well over four hundred million dollars. It reached eighteen million dollars a year as a maximum; it is over three million dollars a year at the present time.

The district is reached by a broad gauge railroad and three excellent automobile highways. It is at an altitude of between 9,500 and 11,000 feet. The winters are not severe and the summers are very pleasant. Mining can be carried on all the year round without any difficulty whatever.

GENERAL GEOLOGY OF THE DISTRICT

The Cripple Creek District differs in many respects from most gold mining camps. First by its location in the heart of an extinct volcano, which has determined the location and characteristics of the fissures.

As recognized by the geologists of the U. S. Geological Survey, nearly all the mines of the District are located within a complex volcanic neck of phonolite breccia, about four miles in major diameter. The fissures have a general radial arrangement and their formation was accompanied by very slight faulting.

Early during the Tertiary period the country where Cripple Creek is located was a plateau, made of rocks of pre-Cambrian Age, crystalline schists, gneiss and large areas of granite. The first manifestation of volcanism was the formation, by one or more tremendous explosions, of a great chasm in this plateau. The granite above the volcanic hearth was shattered and blown into the air, falling back as fine fragments, partly into the pit formed by the explosion and partly over the surface of the plateau. Eruption of volcanic rocks followed; these were phonolite, latite-phonolite and syenite, and they represent different modifications of the molten mass of rocks deep in the interior of the earth below the volcanic and called the "magma."

Successive eruptive paroxysms probably shattered and comminuted the products of the earlier outbursts. In that way was formed the breccia, which occupies the largest part of the volcanic neck. The latest phases of the volcanic activity were partly sheeting of the volcanic breccia, the intrusion of dikes of basalt, and finally the formation of the fissures which were filled with the ore by hot ascending mineralizing waters, acting as exceedingly hot springs and representing the last phase of the dying out volcanic activity.

The formation of the fissures which form the veins of the Cripple Creek District is due to the fact that after the phonolitic eruptions had ceased and the breccia had become solidly cemented, a readjustment took place and the whole mass of the breccia settled down within the steep-walled funnel in the ancient rocks of the plateau. As the walls of the volcanic neck are irregular and as they converge downward, such sinking, by forcing a rigid mass to adjust itself to a slightly smaller space of different shape produced compressive stresses in the subsiding mass and to some extent in the enclosing granite rocks. The stresses were relieved by fractures characterized by their number and their diversity of trend, rather than by great size or faulting.

The result of the fracturing due to the collapsing of the breccia within the volcanic neck has given the characteristics of the veins and the ore-shoots of the Cripple Creek District.

As a result, the lode fissures of Cripple Creek are exceedingly inconspicuous. They are marked neither by bold outcrops of quartz, nor by superficial bands of ferruginous gossan, as in the case in most districts. Underground, they appear as a series of parallel very thin fractures in what is known as a "sheeted zone." As a rule, the fissures are mere cracks, showing no evidence of tangential movement of the walls.

The ores are made of gold in combination with tellurium chiefly as calaverite, but partly also as the more argentiferous sylvanite. The usual gangue minerals are quartz, fluorite and dolomite. Owing to the occurrence of the ore minerals and gangue filling of narrow fissures, joints and cracks in the sheeted zone which usually constitute the lodes, or as a very incomplete replacement of the country rock, the ores of Cripple Creek, as mined, have approximately the composition of the somewhat altered rocks which immediately adjoin the veins.

What characterized the ores of the Cripple Creek District above everything else is the extraordinary richness in gold of the mineralizing waters that have deposited the ores, and on the whole the exceptional richness of the ores which have been mined, together with the inconspicuousness of the fractures that have been filled by the ore.

The shortness of the ore-shoots in many cases and the fact that there are a series of conjugated fractures instead of a single one, the great richness of these some ore-shoots which has more than compensated their lack of length; the fact that many fractures never come near the surface, but develop at the lower levels of the mines; the readjustment of the settlement of the breccia by numerous flat veins are all features that make the prospecting for ore in the Cripple Creek mines, both difficult and exceedingly interesting. As a corollary, there is every indication that the old mines which have had their development work done mostly on a single vein, like the C. O. D. mine have a great deal of virgin territory, where the proper amount of development work may be richly rewarded.

THE C. O. D. MINE

The C. O. D. mine is located in the northwest part of the Cripple Creek District, one-half mile from the town of the same name and the county seat of Teller County.

INTRODUCTION

It was one of the first properties to be worked extensively and was originally owned by Spencer Penrose and Charles L. Tutt, constituting the nucleus of these large Colorado mining fortunes.

Two of its neighbors have produced heavily: the Gold King to the west, is credited with a production of five million dollars, and the Abe Lincoln, to the south, with a production of three-quarters of a million dollars.

The U. S. Geological Survey Professional Paper No. 54, page 272, gives a good description of the C. O. D. mine. In it, it says: "The C. O. D. vein is contained in normal fine grained breccia, with a moderate amount of disseminated pyrite and carbonates. Level 7 is said to run out in schist 130 feet south of the shaft. A crosscut 300 feet long towards the east on level 8 remains throughout in breccia. The vein is a sharply defined fissure striking about N. 10 degrees E. and dipping about 84 degrees in an east by south direction. The Gold King vein is said to have been cut in a crosscut on level 5 about 200 feet west of the shaft. The crosscut east on level 8 cuts two veins 200 and 300 feet distant from the C. O. D. and approximately parallel to it ****One of them is believed to represent the extension of the Proper vein. The ore in the C. O. D. is of the usual type, with calaverite quartz and fluorite. Fresh tellurides were found close to the surface. Much of the ore averages 5 ounces per ton. A small cross seam containing tetrahedrite was struck on level 10 and is reported to have yielded assays of 850 ounces silver and 5 ounces gold per ton."

AREA

The property consists of two patented claims, the C. O. D. Mineral Survey No. 7523 and the Rebecca U. S. Mineral Survey No. 8790, located in Section 18, Tp. S., R. 69 W. 6th P. M., and containing a total of 11.586 acres.

ELEVATION

The collar of the C. O. D. shaft is 9822 feet above sea level.

IMPROVEMENTS

The mine has a good shaft house, with a first class 14X16 Hendrie & Bolthoff hoist good for a depth of 1500 feet, geared to a 75 HP. motor, and an Ingersoll-Rand air compressor geared to a 50 HP. motor and capable of furnishing air from 5 to 10 drills.

PRODUCTION

While the records of the production of the C. O. D. mine have not been kept and the exact figures are not known, the concensus of opinion of the people able to judge place it close to one million dollars.

ORE RESERVES

There is practically no measurable ore remaining in the mine, but there are a large number of places where new development work is likely to open up important ore bodies.

ECONOMIC FEATURES

The mine is dry and the district is drained to a point about 1,000 feet below the lowest level of the C. O. D. mine. Labor is plentiful and efficient. Electric power is used at the present time. The rock stands exceptionally well without timbering, as is shown by the very large chamber of the pumping station; so that very little timber is required in the mine. Work may be carried on every day in the year and there is a railroad with daily service one-half mile from the mine. The miners live in a good town with all the modern conveniences.

Following is the present schedule of freight and treatment charges to the Golden Cycle Mill, at Colorado City:

On all ores up to and including \$ 4.00 per ton-----	\$2.25
8.00 " " -----	3.25
10.00 " " -----	4.00
15.00 " " -----	5.25
20.00 " " -----	6.25
24.00 " " -----	6.60
30.00 " " -----	6.90
40.00 " " -----	7.50
100.00 " " -----	8.60

(Gold settled for \$20.00 per ounce)

THE MINE WORKINGS

In addition to the various shallow workings, the property has been developed by a main shaft 4X8 feet, single cage, 800 feet deep.

The first three levels were mined through what is known as the C. O. D. incline and these workings are now inaccessible. The other levels are all open and they have the following depths below the collar of the main shaft: 4th level 250 feet; 5th level 300 feet; 6th level 350 feet; 7th level 410 feet; 8th level 540 feet; 9th level 670 feet and 10th level 800 feet.

Level 4

This level has been driven on the C. O. D. vein; there are only two short crosscuts, starting at a point about 15 feet south of the shaft.

Level 5

This level has an extensive crosscut to the west; this crosscut has cut and exposed a number of important veins which have been very productive in the adjoining property, the Gold King mine.

In this crosscut, it is possible to recognize a set of parallel fractures, forming a sheeted zone 10 feet wide, which most likely represents the extension to the south of the important Gold King vein; next to it is a drift which has been driven for more than 200 feet on the Greve vein, which shows plainly its characteristic breccia with magniferous cement. Farther west two very short drifts have been driven on the extension south of the Discovery vein, and another drift, farther west has been driven a distance of 90 feet on the southern extension of the Iron vein. Both the Discovery and the Iron veins have produced heavily in the ground of the Gold King property, adjoining that of the C. O. D. mine.

You can drive in the ground of the C. O. D. property south on these four important veins for a distance of 200 to 300 feet, to a point where the boundaries of your property come close together, forming a narrow neck, and again beyond that point for a distance of 400 to 500 feet within the boundaries of your own property. There is no doubt, but that you could get a lease from the Stratton Estate, to drive on these veins where they cross that ground between the two areas where they are wholly within your own boundaries.

In the farther southern area, these four veins should be crossed by three important vertical veins, running much more east and west than the series of the Gold King, Greve, Discovery and Iron veins, and westerly veins have been exposed in a long drift driven south at the 8th level of the Gold King mine. They are headed directly for that southern area of the C. O. D. property and the 12 points of junction of these two sets of three and four veins respectively are all places where there should be good prospects to open up ore bodies.

The 5th and 6th levels of the C. O. D. mine have been driven north on the C. O. D. vein for short distances only; about three-fourths of their distance to the northern boundary of the property is yet good virgin ground.

At a point about 90 feet north of the shaft the 5th level shows a flat vein, very well defined, about 3 feet thick with a dip of 30 degrees and a strike N. 20 degrees E.

The last work done in the 5th level, under the direction of Senator Arthur, was to start a raise to undercut the Greve shaft; the work planned consisted of an incline upraise cross-cutting the various streaks in the big Greve vein and there was a good streak showing when they stopped work a few years ago.

Level 7

The 7th level has a long drift to the south. At a point about 100 feet south of the shaft a long crosscut has been driven from it towards the east; it is said to be within 30 feet of its objective, the point of junction of two vertical veins on the Stratton Estate property, called the Proper and the Keystone veins. A raise at the point of junction of these two veins would reach the important stopes of the flat vein mined by Oscar Sims from the 150 foot level of the Rusted shaft and shown on a profile that I have added to this report.

Eventually that flat vein will be followed by mining it to its northwest extension into the C. O. D. ground, where its prospecting may open up some important ore bodies.

Level 8

At a point about 300 feet north of the shaft, the 8th level shows a good looking cross vein, running approximately NW and SE, and 5 feet wide. At a point 110 feet farther north a second cross vein, parallel with the first one is 7 feet wide. No drifting to speak of has been done on either of these two veins.

The large pump station was located at this level and the manner in which the roof of this large chamber stands practically unsupported shows how solid is the ground in the mines of the Cripple Creek district; this is a great advantage.

Level 9

At this level a crosscut to the west has opened up the King and the Discovery veins some drifting has been done on the King vein, but almost none on the Discovery.

Level 10

No work has been done on this level south of the shaft. This level is connected by a raise about 30 feet high with the 8th level of the Gold King mine, giving good ventilation to both the C. O. D. and the Gold King properties and giving the miners two places of egress to the surface in case of an accident.

This level has been driven almost to the northern boundary of the property and an important ore body has been stoped from it for a length of about 150 feet to a point about 30 feet above the 9th level.

There is practically no doubt in my mind that this ore shoot goes down below the 10th level and that here is the place where you can open up in the easiest and the quickest way some good shipping ore.

POSSIBLE JUNCTION OF THE GOLD KING AND C. O. D. VEINS

At the southern end of the Rebecca claim is a locality of unusual interest. Its location is about 250 feet north of the place where the Chicago and Cripple Creek tunnel crosses the C. O. D. property. If the Gold King and the C. O. D. veins extend this far south with their normal strikes and dips, they should cross each other there and a good ore body should be found at the point of junction of two such major veins. The logical place to prospect this area should be at first from the Chicago and Cripple Creek tunnel and few hundred feet of development work there should locate this junction.

If an important ore shoot is found, it will be mined in depth in extending south into this territory the several levels of the C. O. D. mine, driven from its main shaft.

THE DUMPS

The C. O. D. mine has some large dumps and while some parts of them have been already sorted out, they have been only skimmed, so to speak. The low rates given on low grade ores have stimulated the working over of dumps in the Cripple Creek District.

It is important to devise carefully some scheme by which the ore of the dumps can be moved and washed and screened, and sorted at a minimum cost. While I have not made any study of the problem of working over the C. O. D. dumps, I cannot but feel that there is available there a large tonnage, which should show a profit of a great many thousands of dollars if they are properly handled.

THE NEIGHBORING TERRITORY

The ground of the Stratton Estate located immediately to the southeast of the C. O. D. mine has produced a good deal of ore from shafts less than 300 feet deep and all in a bad state of repair.

That territory is an attractive area with good possibilities and the logical way to mine it is through a series of levels driven there from the deep C. O. D. shaft.

CONCLUSIONS

While there are a great number of places in the mine, where intelligent prospecting may be rewarded by the discovery of new ore-shoots the most promising place at the present time to open up ore is the extension downwards of the ore-shoot stoped out at the north end of the property above the 10th level.

I suggest that you sink a winze near the center of that ore shoot to a depth of 100 feet, and that you run a sub-level from its bottom, to both the north and the south boundaries of the ore shoot and then stop it out up to the 10th level.

A little compressed air hoist, on a column, of the type known as "Leadville hoist" is all that you will need to do that work. An ore bin of a few tons capacity at the 10th level will give you the needed storage between the winze and the tram-

ming of the cars of ore at the 10th level and their hoisting to the surface.

I believe that with the proper amount of exploration work, the C. O. D. mine in the future may eclipse even its brilliant past performance.

Respectfully submitted,

(Signed) ETIENNE A. RITTER.