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REPORT ON PROPERTIES  
OF RED TOP MINING COMPANY

*Esmeralda*

Esmeralda Co., Nevada

LOCATION

The mining properties controlled by the Red Top Mining Company, under lease and bond contracts, consisting of two groups of lode mining claims contain the four claims of the Red Top group and the nine claims of the Brownie group. They are situated in Sections 20, 21, 22, 28 and 29, Township 1 North, Range 33 East, M.D. B. & M.

*pm Snyder*

CLAIMS.

The following claims are held by the company:

Brownie or IXL Group

Unpatented: IXL, IXL No. 2, IXL No. 3, IXL No. 4, IXL No. 5, IXL No. 6, IXL No. 7, IXL No. 8.

RED TOP OR TIP TOP MINE.

Unpatented: Red Top, Red Top No. 2, Red Top No. 3, Red Top No. 4.

These claims are all in Esmeralda County with the exception of IXL No. 6, No. 7 and No. 8, which are in Mineral County.

The principal workings of the Brownie Mine (or IXL) are on the claim known as IXL, while on the Red Top (or Tip Top) group the principal workings are on the Red Top claim. The trend of the vein on the Red Top claim will carry it beyond the northern boundary of the claims and an additional claim should be taken up to cover the vein on its strike.

The location of the various claims is shown on map drawn by S.T. McElroy under date of November 22, 1938.

The titles to the property were not investigated, but as far as known are in satisfactory condition.

HISTORY

Little is known of the history of the two groups of claims, but the Tip Top Mine (Red Top claims) is briefly described in U. S. Bureau of Mines Information Circular No. 6941 as follows:

*was* "The Tip Top mine is about 10 miles south of Mount Montgomery station, which is on the narrow-gauge railroad between Mina, Nevada, and Keeler, California. This mine was worked from 1913 to 1915 by the Atkins-Kroll Co. of San Francisco, which equipped the property with a 10-stamps cyanide mill of 50-ton capacity. About \$100,000 in gold and silver is reported to have been produced.

"Development comprises several tunnels and other workings that total about 1,000 feet.

"The formations are said to be andesite and rhyolite. Two veins have been found on the property."

The Brownie mine or IXL group is said to have been located by S. T. McElroy, a mining engineer, in 1905. Most of the development work was done by him over a long term of years, and a small tonnage of gold ore was milled in a 2-stamp mill. The gross production was small, however.

In 1938 the two groups of claims were taken over by C. E. Wood and J. C. Horton who control the property at the present time. At that time the mine could only be reached by a trail, but they made a satisfactory road over the rugged mountains to the lower tunnel and mill site.

In 1939 they installed a 40-ton ball mill with leaching tanks for cyaniding, later adding four flotation machines. Neither process gave a satisfactory recovery, the ore liming too much for leaching and not being well adapted to the flotation process. The ore really requires an all airtight agitating plant. Recent tests show good recovery by this process.

This mill was installed just below the upper tunnel level at an elevation of 8,300 feet, where climatic conditions are unfavorable. In winter both living and working conditions are very severe except for underground working. The power plant is at an elevation 1800 feet below the mill and a mill site has been selected alongside the power plant, it being intended to connect the mine and mill with an 8,000-foot tramway.

The total expenditure by present owners on the property is about \$65,000 for equipment, operating expenses and payments on account of the purchase of property.

#### GEOLOGY

The rugged mountains enclosing the Red Top Mine are principally made up of volcanic lavas and tuffs. Two well defined volcanic necks are located, one on each side of the mine, and doubtless the very heavy extrusive flows came from these sources. No intrusives were seen on the property, but the high peaks to the west are made up largely of granitic rocks.

The wide vein or lode follows along a brecciated fault zone between rhyolite as the hanging wall and andesite as the foot wall. There have been apparently several flows of volcanic rocks which are all believed to be of Tertiary age. Most of the ore body or lode is made up of brecciated rhyolite, in part silicified and cemented together by quartz. A portion, however, on the foot wall side is made up of crushed and altered andesite.

The andesite appears somewhat less basic than true andesite and is probably a dacite. It has been greatly altered, particularly by the development of green chlorite and fine crystals of pyrite. This is porphyritic alteration, and wide areas have been so affected.

In the foot wall andesite on the fifth level, acid solutions have kaolinized the andesite into blue clay, containing pyrite.

The lode in the Brownie Mine is from 10 to 50 feet in width, and has a dip of 50° to 70° to the South, and a strike of North 60° East to North 70° East. It can be traced for a mile or more along its strike and in places shows silicification and mineralization.

On the IXL claim where the principal development has been done all the tunnels except the No. 5 show a remarkable development of sugar quartz filling open fissures and brecciated zones in the rhyolite. This sugar quartz is remarkably fine,

so fine that it gives trouble in leaching. In places these bands of sugar quartz are 4 to 10 feet in width, with the harder rhyolite or andesite on each side. Apparently the sugar quartz carries about the same values as the harder ores or possibly a little less. Several of my samples made up largely of sugar quartz showed \$4.00 to \$5.00 in gold, while some of the harder ores gave much higher returns.

It will be noted from the assay map that the values are very low in the western part of the workings and much better in the central and eastern workings. There is apparently a western limit to the ore shoot, but the drifts do not appear to have shown the eastern limit.

On the Red Top claim the formation is similar to that on the IXL group, but the lode is not quite as wide and strikes at an angle to the Brownie lode. The general strike of the vein is a little East of North with a dip to the East of about  $50^{\circ}$  to  $55^{\circ}$ . The enclosing rocks are largely felsitic and the quartz in the lode itself is much harder, and there is little or no sugar quartz as with the Brownie lode.

In both cases the gold is very fine but free, with considerable iron oxide accompanying it. In the lower level some sulphides are showing and doubtless the gold will be found associated with pyrite and other sulphides at depth. The silver values are low, usually from 2 to 5 percent of the gold values.

#### SAMPLING DATA.

The mine was thoroughly sampled, usually at 10-foot intervals or in 10-foot sections where wide widths were shown in the crosscuts. One hundred thirty samples were taken in the two main workings. The assay maps and assay sheet hereto attached show closely the results obtained.

All this work and the Brunton surveying and mapping were done by me personally or under my direction. A crew of four men was employed in the sampling work, which was very carefully done with a pick or with mauls where required, great care being taken to secure as much of the hard rocks as of the softer sugar quartz and gouge. These samples averaged about three pounds per foot of channel; they were broken by hand and carefully quartered on rubberized canvas to prevent the loss of fine free gold through the canvas.

The final samples averaged 10 pounds in weight and were crushed and assayed by Ed. Eisenhauer, Jr., one of the leading assayers of Los Angeles. All assays were run in duplicate and the results are believed to be quite accurate and representative of the ore body wherever sampled.

#### DEVELOPMENT.

The workings of the two groups of claims are shown on the two assay maps hereto attached. The total footage on the IXL Claims is approximately 1800 feet, and in the Tip Top Tunnel of the Red Top Claim is approximately 1100 feet. In the latter group the upper tunnel workings and stopes were not sampled, most of the ore having been extracted and milled in the old 10-stamp mill on the ground. Some good ore still remains in the pillars but the ore above the Tip Top Tunnel level can be considered largely stoped out. On the IXL Group nearly all the ore above the tunnel levels is in place, only a small percentage having been stoped and milled.

#### Brownie Mine or IXL Group:

Five tunnels have been driven on the lode in this mine, numbered respectively 1, 2, 3, 4 and 5, as shown on maps hereto attached. The most easterly working within the ore shoot is an open cut which shows 7 feet of ore assaying \$4.94. This is

practically all sugar quartz and is apparently on the hanging wall of the lode.

Almost 60 feet west of this open cut is Tunnel No. 1, a crosscut, at about 50 feet depth below the surface, exposing the lode for a horizontal width of 47 feet, which averages \$5.47 for the entire width. Tunnel No. 2 is also a crosscut and shows a horizontal width of the ore body of about 60 feet. The equalized average for 54 feet of this ore body is \$5.34.

Twelve feet below this tunnel is the No. 2 sub-level which is a drift on the vein with a crosscut at its east end. The equalized average of the lode in this crosscut for a width of 47 feet is \$1.95 per ton, a figure much below the average of the nearby No. 1 and No. 2 Tunnels. No. 3 Tunnel crosscuts the lode and shows across 41 feet an average of \$1.21.

No. 4 Crosscut tunnel is apparently west of the ore shoot and shows very low values across a width of 16.5 feet from the andesite foot wall, with no well defined rhyolite hanging wall in sight.

Tunnel No. 5 is 140 feet lower than Tunnel No. 4 and crosscuts the lode for a width of 20.5 feet, averaging \$3.72. An equalized average of all of the crosscuts within the ore shoot shows an average width of 36.4 feet with values of \$3.19.

It is recognized that while these values are rather low, they represent the entire lode along a distance of over 200 feet in length; certain portions of this wide lode are too low grade to warrant extraction and would be left as pillars, taking out the better grade ores along the foot wall and hanging wall sections.

The equalized average assay of the drifts on the hanging wall side is \$5.56 for a width of 7.6 feet, and on the foot wall side \$6.20 for 7.5-foot width. It is probable that the grade of approximately \$5.88 could be maintained by selective mining within this wide lode, but of course the tonnage would be considerably reduced if such a method were followed.

The total probable (but not blocked) tonnage of this grade within the ore shoot down to the 5th level is approximately 80,000 tons. This probable tonnage could be blocked at reasonable cost and this should be done at once.

#### Tip Top Mine (Red Top Claims):

The last 70 feet in the Tip Top Tunnel is beyond the ore shoot and the values are below \$1.00 in each sample taken. The stopes extend along a distance of nearly 200 feet on the tunnel level and some good ore was evidently taken out and milled in the old 10-stamp mill and tube mill. The tailings from this plant are scattered down the gulch and are reliably reported to assay \$1.80 per ton.

Three winzes sunk below the tunnel level show the vein in place. Winze No. 1 shows a width of 4.4 feet of \$5.68 ore. Winze No. 2 shows along a distance of 80 feet at a depth of 54 feet below the tunnel level, an average width of 5.8 feet of \$4.28 ore. This ore is also rather low grade, but with a suitably located mill it could be mined and milled at a small profit, after screening out the overwise.

Winze No. 3 is in brecciated rhyolite and a sample across 6 feet at the bottom gave an assay of \$18.07. A nearby crosscut shows 21 feet of ore assaying \$6.40.

A crosscut not far to the south and 15 feet above the level shows a lode 25 feet in width assaying only 85¢ per ton. These wide differences in values between nearby samples are characteristic of many gold veins such as this. Along the stoped areas there are a number of pillars of good ore as shown on the assay map, but these do not represent such tonnage.

A long crosscut near the portal of the tunnel has been driven through the altered andesite formation, but three samples taken in this formation show low values. The first sample of 55 feet in width shows a prophyllized blue andesite containing pyrite finely divided, but assaying only 61¢ per ton. The middle sample showed 32 feet in width, of which part apparently is mineralized and similar to other veins on the property, but it sampled only 43¢ per ton.

The altered andesite to the west of this lode assayed 37¢ per ton.

#### PROVEN AND PROBABLE ORE.

While the Brownie (or IXL) lode has been crosscut in several places and has many drifts and raises, most of the indicated ore is not fully blocked in the accepted sense of being exposed on four sides. The wide and continuous lode, within the limits of the ore shoot is shown on map hereto attached, shows from the surface to the 5th level 150,000 tons of lode material, not all of which is commercial ore, however. This figure is based on a length of 240 feet in the upper levels and only 80 feet on the 5th level.

The crosscuts within the ore shoot, as shown on the assay map, show an average width of 36.4 feet of \$3.19 ore. The profit on this grade of ore would be small and it would doubtless be necessary to screen the ore if mined, in its entirety, to bring up the grade and thus eliminate about 50 percent of the lode material.

That this can be done is proven clearly by screen tests on Sample No. 139, representing crushed ore in the mill bins. Primary crushing of the ore releases gold values held in the seams, and the harder, unmineralized rock when screened out shows about half the values of the undersize. In the screen test referred to, the ore was screened over  $\frac{1}{4}$ -inch aperture and the oversize amounting to 50.3 percent assayed \$3.67, while the minus  $\frac{1}{4}$ -inch ore, amounting to 49.7 percent by weight, assayed \$7.56. This is confirmed by a screen test on Sample No. 25, which was an average of 50 tons of broken ore in the stopes on the No. 2 level. When screened over 1-inch aperture the oversize of 40 per cent assayed \$2.80 in gold, while the undersize, amounting to 60 percent by weight, assayed \$5.60, just double the assay of the oversize.

These tests clearly indicate that the average ore of the lode can be materially raised in grade by coarse crushing and screening, a very cheap and simple process. In other words, the average ore as shown by the crosscuts could undoubtedly be raised to \$4.50 and possibly \$5.00 in grade by merely coarse crushing and screening, 50 to 60 percent of the ore being rejected as oversize.

However, the sampling rather clearly indicates that the best ore lies along the hanging wall and the foot wall, with an occasional streak of ore in between. The drifts run by the former owner, Mr. McElroy, who was looking for a good grade of ore to mill in his 2-stamp mill, are usually along one wall or the other. It is considered to be the best policy to mine the foot wall vein and the hanging wall vein, separately, leaving the hard rhyolite low grade ore in between as pillars.

The average width of the foot wall vein as sampled is 7.5 feet, the equalized average value of which is \$6.20 within the ore shoot. The hanging wall vein sampled with practically the same width, namely 7.6 feet average, gave an equalized assay of \$5.56. In other words, 15 feet of this wide lode could be mined, one half on the hanging wall and one half on the foot wall, with an average value of \$5.88.

The probable tonnage of this grade of ore as indicated by the drifts and crosscuts on the various levels, figuring a length of shoot of 240 feet on the upper

levels and 80 feet length on the 5th level, as shown by the workings there, gives a tonnage for 15 feet width of 62,700 tons, the average grade of which is \$5.88. To allow for ore stoped and milled, this figure is taken as 60,000 tons, and the grade is placed at \$5.50 average mill-heads. It must be clearly understood that this is probable, not blocked tonnage.

In addition to the 15 feet of ore indicated as of commercial grade without sorting or screening, there is an average width of about 20 feet between the hanging wall and the foot wall veins that is more or less mineralized throughout. It will probably be found profitable at a later time to mine part of this ore, which can be done cheaply, and give it a primary crushing and screening through  $\frac{1}{4}$ -inch mesh screen, then mills the undersize. This could be done at the mine in a crushing and screening plant, just above the upper terminal of the aerial tramway, so that only the milling ore would be sent to the mill.

The compilation of the figures on which the above is based will be found in the appendix.

In addition to the ore in the Brownie Mine workings, there are surface indications of other ore shoots that should be developed, along the same lode.

In the Tip Top Tunnel workings and on the dump at the portal are a few thousand tons of ore of milling grade, but no estimates have been attempted on this lode. It will be noted that the assay map indicates the best ore has been stoped, along a distance of 200 feet of an ore shoot, with low grade virgin ore in winse workings below the tunnel level. Some of this ore could be crushed and screened to make a mill feed, and there are some good pillars of ore available above the level. Including the dump, a general sample of which assayed \$9.34 per ton, I estimate a probable 5000 tons of milling ore can be had from present workings. Some of this is gob which sampled \$6.01 per ton. This ore would have to be hauled by truck to the upper tramway terminal, at a cost of, say, 40¢ per ton.

#### MINING AND MILLING METHODS.

The mining of this lode appears to offer little difficulty, as the hanging wall stands fairly well and little timbering is required, and as the dip, which averages 60° or more, makes the shrinkage method of stoping of the hanging and foot wall veins the best method. Dilution with waste will be very slight and the cost of mining, including development, in these wide veins should not exceed 75 cents per ton. No small part of the ore is sugar quartz, which can be drilled with an auger and needs only light shooting to bring it down. The somewhat erratic distribution of values will call for considerable checking by sampling and assaying or panning, but in the event of a low grade zone being encountered, either in the foot wall or hanging wall veins, screening of the low grade ore can be resorted to in order to keep up the grade.

Down to the 5th level there will be no hoisting or pumping expense whatsoever, and as the mine makes very little water even at the lower level, the pumping expense will probably never be very heavy at any time. There is also a splendid tunnel site further down the canyon, the driving of which when the ore body is developed at depth will probably be warranted to avoid hoisting and pumping expense.

Delivery of ore to the mill, which is to be located adjacent to the present power plant, at an elevation 1800 feet below the mine, should be over an aerial tramway 8000 feet in length. The ore should all be dropped at the 5th level and trammed out to the mine bins, then given a primary crushing to 1-inch maximum, thence dropping to the upper terminal bin of the tramway. One man could operate the crusher and tramway, with automatic loading and unloading facilities.



Among other advantages of having the mill at the foot of the mountain is that men working in the mine could live on the flat under much better living and transportation conditions, just two miles off the paved highway. They could come up in the morning on the tramway to go to work. This should not be over a ten minute trip. A few men could live in the cabins at the mine, one of these being the tramway operator, who would start the tramway early in the morning to bring up the miners.

There is an excellent mill site near the present power plant, with room for tailings in unlimited amount, and with a gravity flow of water from the several springs and canyons adjacent thereto. Being only a little over two miles from the highway and 51 miles from Bishop, with a reasonably good climate, operating conditions will be quite favorable for milling, which is not the case at the mine.

The ore is ideal for cyaniding by the all-slime agitation method, as shown by tests recently made by the American Cyanamid Company (see Appendix). The cyanide consumption is low, there being little or no cyanide in the ore. The tests indicate an average recovery by medium fine grinding and agitation for 24 hours of 92.58 percent of the gold. Silver recovery will probably be slightly less, but was not determined in the tests mentioned. In the computation of profits following, the combined gold and silver extraction is taken at 90 percent.

A higher recovery can be had by finer grinding and longer agitation, but with such low grade ore the additional recovery would not cover the increased costs of operation.

#### OPERATING CONDITIONS.

At the mine heavy snows make transportation difficult during most of the winter months, and living conditions are unpleasant except during the summer months. With an aerial tramway connecting mine and mill, supplies could be sent up to the mine at nominal cost and the mine road be allowed to remain closed during the winter months.

Supplies are available at Bishop, 51 miles distant from the power plant, or at Mount Montgomery, where there is a good store. Heavy supplies could be trucked from Los Angeles at reasonable cost, the distance being 338 miles. The mill site and power plant adjoin the Baker Ranch which can supply milk, eggs, meat and vegetables to the camp.

With suitable accommodations at the camp near the power house there would be no difficulty in getting and keeping good men for mine and mill work. Miners receive \$5.50 to \$6.00 and millmen \$6.00 per 8-hour day; laborers \$4.50 and \$5.00.

#### WATER SUPPLY.

The important question of water supply, sometimes quite difficult to settle in desert country, appears to be capable of solution without too great an expense. The company already has a 2-inch pipe line bringing water from the Buena Vista spring 500 feet above the mill, and this spring will supply more than enough water for all mining and camp purposes, under high pressure.

If, as stated, the flow can be increased to 12 gallons per minute, there will be a surplus that can be used in the mill. In addition, the mine makes a little water, about two gallons a minute, and this will probably increase somewhat as depth is obtained.

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Willow Springs, west of the mine, can supply about 12 to 15 gallons a minute to the mill. By putting in a small bedrock dam at the lower end of the creek, all the water drainage of this section could be picked up and taken to the proposed mill site by gravity.

There are some possible sources of water in nearby springs, but in my opinion the best place to secure an ample and unfailing water supply for a 200-ton mill is by piping it in from Queen Canyon, draining the east flank of a high peak of the White Mts. I estimate the flow of water in this creek, as of March 23, 1940, at not less than 150 gallons per minute. By putting in a dam at the lower end of the canyon, a large storage reservoir could be created, retaining the water that now goes to waste during the spring, for use during the summer. This would probably be needed since the water right on this creek is claimed by the Baker Ranch and during the summer they use all the water flowing in the creek. During seven months of the year they make no use of the water. By storing the excess flow behind a dam and conserving the water at the mill during four or five months of the year, no difficulty should be experienced in running the mill to capacity.

#### ESTIMATE COSTS AND PROFITS.

Based on production and milling of 200 tons Brownie ore daily, the following estimate of costs is made:

	<u>Per ton ore.</u>
Mining, including development,	\$ .75
Crushing and delivery to mill over tramway,	.15
Milling and cyaniding,	1.25
Management and overhead,	<u>.45</u>
Total estimated costs	\$ 2.60

With shrinkage stoping on such veins, each 7.5 feet wide, stoping of 200 tons a day will require not to exceed 10 men, it is believed. Actual stoping and tramming costs should be under 50¢ per ton, thus allowing 25¢ for development, a figure believed more than ample.

Grinding ore of the character produced in the Brownie Mine, using Diesel power, should not exceed 30¢ per ton; reagents would cost at mill about 18¢ per ton; labor and superintendence 45¢; supplies and repairs, 17¢; total \$1.10 per ton (taken at \$1.25 to allow for delays and unforeseen).

Overhead includes compensation insurance, social security and other taxes (except income, manager, office and assay office, and general expense, totaling \$90.00 a day.

Amortization of investment is not included in the above estimate of costs. It should be stated also that this estimate is based on operating results with good mining and milling equipment throughout, to be installed only after further development proves enough ore tonnage to warrant such installation and investment.

The estimated profits, based on above costs, would be:

Mill heads (average of hanging wall and foot wall vein samples), \$5.50 per ton, yielding gold and silver bullion valued at (\$5.50 x .90) \$4.95 per ton.

Estimated profit, \$4.95 - \$2.60 = \$2.35 per ton.



The estimated 65,000 tons of probable ore of this grade would net, therefore, \$152,750.00, if mined and milled in a modern 200-ton plant, with good management. Additional development work should be first undertaken to prove this and other blocks of ore, before erection of a milling plant.

## RECOMMENDATIONS.

..... I recommend the following program, taken step by step:

1. Further development of the mine, both within the Brownie ore shoot and to explore the surface croppings of the lode, with a view to opening up a new ore shoot if such exists. Also the development of the Tip Top showings. A suggested development program is:

Crosscut the hanging wall on the No. 5 level over the sump to determine if the vein is in the wall as may possibly prove to be the case. Drive the east drift on the 5th level to increase the length of the ore shoot on that level and get under the good ore found on the upper levels.

Sink the 16-foot winze on the 5th level another 100 feet and drift on and crosscut the lode at that depth and prove up additional tonnage. It is reported the winze is not in sulphide ore of good grade.

On the 4th level extend the drifts to the east 100 feet or more, following both the hanging wall and foot wall veins. Crosscuts should be driven at 100-foot intervals across the lode and upraises put through from level to level. Raisses from the 5th level will provide ore chutes through which the ore stoped from the upper levels can be dropped, all haulage being done through the No. 5 tunnel. This tunnel should be enlarged somewhat as it is at present too low to use as a haulage way.

2. When sufficient new ore of commercial grade has been fully proven and the ore figured in this report is blocked, consideration should then be given to the installation of an aerial tramway 8,000 feet in length to the proposed mill site.

A mill of 200 tons daily capacity should then be installed adjoining the power plant. Suitable camp buildings for the men would have to be built and the water supply arranged for as discussed herein. With all of these steps accomplished, only good management would be needed to make the venture a success.

## CONCLUSIONS.

The two groups of claims held by the Red Top Mining Company have had some production, the Tip Top property having had a 10-stamp and cyanide plant in operation for several years. The Brownie Mine has been operated on a small scale, extracting the high grade ores, but the production has been small. With a moderate amount of additional development the property should be in shape to produce from 100 to 200 tons a day of \$5.00 to \$6.00 ore, which with a mill on the ground would show a profit of at least \$20.00 per ton.

The ore bodies occupy a brecciated fault zone along the contact of andesite and rhyolite and as these flows have been very heavy and apparently have considerable depth, there is no reason why the vein should not go to at least several hundred feet greater depth than has been attained on the 5th level.

The possibilities of opening up new ores are good and with a vigorous campaign of development under good engineering supervision, it is believed a large ore reserve can be provided.

I believe the property fully warrants further expenditure for development, and if this results favorably, a large cyanide plant should then be installed.

Respectfully submitted,

April 4, 1940

117 So. Sycamore Ave.,  
Los Angeles, California

B. M. SNYDER (signed)  
B. M. Snyder,  
Mining Engineer