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Buckskin Mill, Buckskin District,

Douglas County, Nevada.

Operated by Ambassador Gold Mines, Ltd.

Frank Sharp.

Buckskin Mill, Buckskin District, Douglas County, Nevada. Operated by Ambassador Gold Mines, Inc.

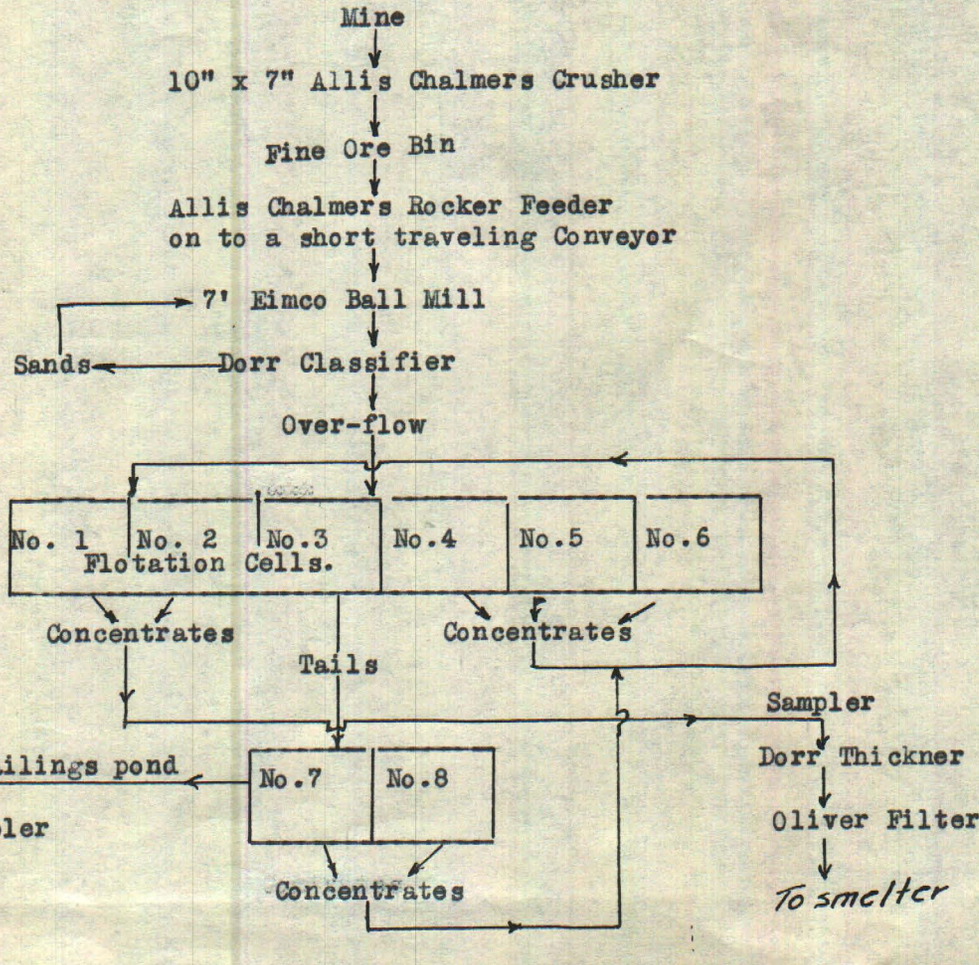
The Buckskin Mine is located two and one-half miles from Artesia, Douglas County, Nevada.

The mill is located in an old building that formerly held a 100 ton concentrating mill. The present metallurgical practice is bulk flotation. The mill in the present condition is capable of handling about 46 tons per day.

The scope of this paper is confined to the following facts related to the Buckskin Mill:

1. Flow sheet
2. Explanation of the flow-sheet and details.
3. Planned improvements and reasons for them.
4. Discussion of Operating Data and Marketing and Milling Costs.
5. Conclusions embrassing weak spots in the mill and possible changes.

FLOW-SHEET:



EXPLANATION of FLOW-SHEET AND DETAILS:

The ore coming to the jaw crusher is regular run of mine ore being dumped from the mine cars to a covered grizzly above the crusher. A mixture of fines and rock up to 6 to 8" in diameter is put through the crusher. This primary crusher is a Allis Chalmers Blake Type Jaw Crusher having a 10 x 7" throat opening and crushing to one and one-half inches with good jaws and proper adjustment. The moving jaw on the crusher is so worn at the present that the crusher only crushes the big rocks to two inch product. The crusher is powered by a 15 hp. Induction Motor which seems to handle it very satisfactorly.

The product from the crusher falls into a 50 ton storage bin below the crusher. This bin was formerly a storage and loading bin for truck hauling and for the old mill. From the bin the ore flows thru a shute to an Allis Chalmers Rocker feeder on to a traveling conveyor belt. At the ball mill end of the conveyor is a hand sampler that cuts the entire stream when it is thrown into position by means of a hand lever. A sample is cut every half hour for a half minute. The material cut out is weighed and the weight recorded, thereby, giving the operator a record of the feed going into the ball mill. The sample is then sacked and used as a heads sample.

The ore from the traveling conveyor feeds into the feed box of the 7' Eimco Ball Mill. A scoop feeder picks up the material and feeds it to the mill.

The ball mill is gear driven from a line shaft that is powered thru V-belts to a 60 hp. motor. The motor is to large for the mill but was one that was on hand so it was put in service. 18 rev./min.

The discharge from the ball mill is 75 to 80% solids. This product goes directly to Dorr classifier which is in closed circuit with the ball mill. Classifier overflow goes directly to flotation cell, while the sands are returned to the ball mill feed box. A circulating load of

200% is carried in the ball mill classifier circuit.

The classifier overflow runs from 25 to 28% solids and is about an 80 mesh grind or carries from 12 to 15% minus 200 mesh material.

The first flotation bank has six Kraut cells in it. The first two cells are cleaner cells which take off the final concentrate. Cell No.3 has no concentrate taken from it. The last three cells are roughers and the concentrate from them pass back to the first part of the bank and the concentrate cleaned in cells Nos. 1 & 2. The tails from this bank pass down to a two cell bank where further concentrate is removed and sent back to cells Nos. 1 & 2. The tails pass from this last bank to the launder that takes them to the tailings pond, after passing through an automatic sampler. The concentrate from cells Nos. 1 & 2 pass thru an automatic sampler and then to a 10' Dorr thickner.

The thickened concentrate passes to an Oliver filter and then to the drying racks out on the dump where they are air dried.

The water from the thickner passes out to settling barrels and on to the tailings stream. A tank is to be installed for settling this solution before it is wasted.

All the flotation machines now in use are Kraut machines. Vertical 5 hp. motors for every two machines are used on the cells.

Several different reagents are used:

Reagent No. 301 added as 6% solution:
22 cc. per minute to No. 1 cell.
40 cc. " " " " 4 "
10 cc. " " " " 7 "

Frother: 4 to 1 mixture of pine oil and Aerofloat No. 15 added to cells No. 5 and 7. No frother is added to cells No. 1 and 2 because enough is carried back with concentrates from other cells to froth cells not receiving it.

Sodium sulphide is added as a 6% solution to cell No.5. The amount varies from 0 to 75CC per. minute. The purpose of the sodium sulphide is not to sulphidize but it helps clean the pulp and gives a thinner froth to be returned to cleaner cells.

The Oliver filter is an old type with 3 revolving discs instead of the revolving cylinder. The vacumn is supplied by 12" x 6" Ingersoll Rand machine. The air is supplied from the mine compressors.

PLANNED IMPROVEMENTS AND REASONS FOR THEM:

A dry feeder is to be added to the circuit of ball mill for the purpose of adding lime for PH control. The water used in the mill is contaminated with sulphate salts that make it slightly acid. The lime will be added to make the circuit alkaline and maintain a constant Ph of about 8 instead of one that varies from acid to alkaline as is now the case.

The moving jaw of the primary crusher is so badly worn it need be replaced. A new set of jaws has been ordered andwhen they arrive and are installed will reduce the size of the ball mill feed. This will necessarily reduce the hourly capacity of the primary crusher but will not reduce it such that the daily tonnage can not be put through it. With the finer feed to the ball mill it is thought that the capacity can be increased to around 60 tons per day as against 46 tons at present. Another advantage of the finer feed to the ball mill will be the decrease in slimes from the circuit. As the circuit is now, the feed is so course that it stays in the circuit to long and slimes badly.

A unit cell is to be added between the ball mill discharge and the classifier. The purpose of this cell is to remove some of the heavy sulphides and relieve the classifier and ball mill circuit. This is developing to general practice with sulphide and free gold ores. The general practice is to have a gold trap in the cell that catches the heavy gold particles thus taking them out of the ball mill circuit, and keeping the circuit from building up to such high value as it generally does. From information received a Denver Sub-A machine is to be installed.

DISCUSSION of OPERATING DATA AND MARKETING AND MILLING COSTS:

Up to this last month oxidized ore has been treated. The ore being treated now is essentially a sulphide with some oxidation.

In the period from Feb. 16 to 28 an average extraction of 69% was obtained on oxidized ore. Average tons milled per day during the period 48.5; total tons milled 601; heads assay 0.26 oz. gold/ton,; tails assay 0.08 oz. gold/ton; concentrate 2.27 oz. gold/ton; average hours per day 21½ and ratio of concentration 12.3 to 1.

Following is the operating data for week March 7 to March 13:

		Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Average
Shift	*Rate	28.6	27.0	22.0	30.8	31.3	31.7	28.6
	Ratio	8.2	----	13.5	18.0	16.8		14.1
Day	Grade	2.1	----	2.0	2.56	1.88		2.1
	Rec.	87.8	----	78.8	77.7	78.5		80.1
	Rate	26.3	19.0	29.0	30.1	31.7		27.2
Nite	Ratio	7.0	----	----	16.9	14.2		12.7
	Grade	2.2	----	----	1.76	1.68		1.88
	Rec.	83.8	----	----	85.8	83.5		84.4
	Rate	27.4	15.2	30.9	29.0	36.1		27.7
Aft.	Ratio	5.4	8.1	13.9	10.8	----		9.6
	Grade	2.2	2.2	1.8	1.84	----		2.01
	Rec.	90.7	82.5	81.2	83.4	----		84.2

*Rate is expressed in pounds per half minute.
Ratio of concentration
Grade of concentrate Gold in oz. per ton
Recovery figured equal to Heads minus tails/Heads.
Tails for this period said to run at 0.04 oz.gold/ton, conc.

In comparing these two periods a rough comparison is all that can be made due to fact that the heads assay is not known for the last period

In the period from Feb. 16 to 28 the ore was chiefly oxidized ore while the ore in the weekly period here given the ore is chiefly sulphide This would to some extent give the difference in per cent of extraction. But a great deal of credit need be given to Mr. Benston for his endeavor to increase the per cent of extraction.

Quoting from Mr. Benston " by bi-passing the conditioners I have increased the extraction 10 to 15%."

Mr. Benston has made a real ende vor to increase the extraction but as it is, he is handicapped by certain factors such as: mechanical deffects, lack of proper feeding equipment for pH control, and lack of efficient grinding equipment.

The concentrates are shipped at present to the U.S. Smelting Co. at Midvale, Utah. They were formerly shipped to the Selby Smelter at Vallejo, California. The change was made because the cost of freight, treatment charge and assaying charge was cheaper at the U.S. smelter. They are hauled by truck to MaKay Siding, a distance of ten miles from the mill, where they are loaded loose on railroad cars.

The total freight to smelter "$10"
Smelting charges "$ 6"
Lot sampling "$ 4"

No figures were obtained on smelter deductions or on smelter payments, but the analysis of two shipments were obtained from which the per cent of the total value of the concentrate is absorbed by marketing costs can be figured out (approxiametly).

2-- 7 ton lots--	Lot 1	Lot 2
Gold Oz./ton	2.92	2.18
Silver Oz./ton	2.0	1.80
% Copper	4.7	6.8
% Sulphur	22.6	25.7
% Iron	26.0	26.8
% Insoluable	32.2	28.7

Gold @$35/Oz. -----	2.92 -----	$ 102.10
Silver @ 0.77/Oz. -	2.00 ------	1.44
Copper @ 2.40/%* -	4.7 ------	11.29
		114.83

16% 114.83 equals 13.9% of value is marketing expense without figuring in the smelter deductions or sampling costs, which if vere added would raise the cost materially.

*The price of copper assumed at 12¢ per pound which at the present price may be to low but was taken as a good conservative figure.

Two 30 tons lots of concentrate were shipped recently but as yet no returns had been received.

The milling costs per ton of ore treated averages (approx.) "$ 1.50". This cost is not excessive considering the tonnage milled per day, and the type and the condition of the machinery being used. A small decrease may be effected by putting in smaller motors where machines are overpowered and by trying to raise the power factor of the system and lowering the power costs. The power factor as it now stands is "72" which could stand some betterment.

CONCLUSIONS:

The grinding circuit at the present seems to be the poorest part of the plant. As was stated the primary crusher is badly in need of jaw replacements., When this is corrected it is hoped by the operator that the feed can be maintained much finer and the slimes from the circuit decreased. If the feed was to be cut down to the minimum size the crusher could crush to or to a ¾ inch product the capacity of the crusher would be greatly decreased. At the present time the ore for three shifts in the mill is put through the primary crusher in two 8 hour shifts with the crusher working about two-thirds of the time. The rated capacity of a crusher this size set at ¾ inch is about 2 tons per hour. To crush the 46 tons now put through the mill would take 23 hours at this 2 hour rate. With a finer feed it is hoped that the capacity of the mill can be increased to 60 tons per day which at a 2 ton crushing rate would take 30 hours to crush with a steady feed to the primary crusher. The feed to the crusher is not a steady flow but an intermittent feed by mine car lots. It seems apparent that some difficulty is going to be encountered if a finer crush is maintained.

Quoting from Mr. Benston " the normal crush is 1½" , while now it is 2" with the jaws in the present condition". With this 2 inch crush the complaint is to much sliming from the ball mill circuit, which they hope to correct to some extent by addition of a unit cell between the ball mill and classifier.

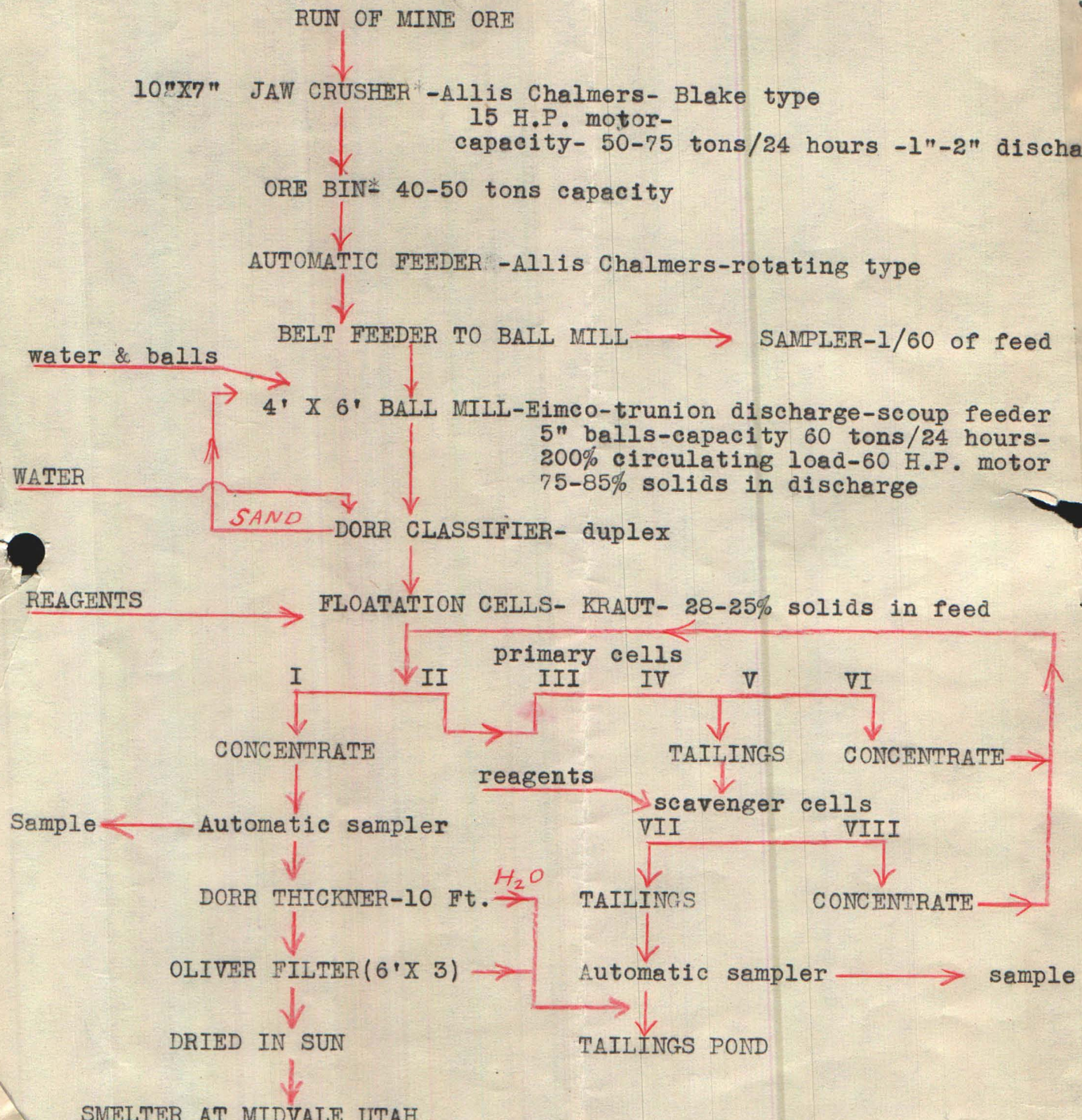
With a coarse feed of 1½" it seems that the addition of the unit cell is not going to help the sliming problem, unless the primary grind is reduced so the material will break down quicker in the ball mill and release the heavy sulphides with a much shorter period of grinding and a much smaller reduction ratio sliming will continue.

The filter now in use is an old type and does not seem to particularly adapted for the work it is doing or the work expected from it. If the capacity of the mill was to be increased this factor would have to be corrected with a filter of higher capacity.

Summing up would say that with a few miner changes and additions to the plant equipment a recovery over 90 per cent could be expected.

MARCH 14,1937 BUCKSKIN MINE LY

FLOW SHEET FOR MILL



Milton Steinheimer

Data on Inspection

trip to Buckskin Mine

March 14, 1931

Steinheimer

MARCH 14, 1936.

BUCKSKIN MINE LYON COUNTY, NEVADA

Under lease by The Ambassador Gold Mines Co.
Lackey-General Manager
Super.
Hume- Mine Foreman
Benson-Mill Foreman

Edward J. Schultz

Pumping Station In Mason Valley 2.3 miles south of mine.

Located at north end of valley.
Living Quarters for crew employed at pumping station
Assay equipment.
Office and records
Wells & pumps
Source of water.
2- artesian wells -water flows into large storage tank.
water contains minerals-corosive to pipes
sodium sulphite gives water odor of sulphur.
For domestic purposes water is allowed to stand in tanks before using.
Pumped 2.3 miles against 220 ft. static head to mine & mill.
United Iron Wks, 2 stage- 2½"-centrifugal pump.
4" intake pipe - 12" pipe to mine.
300 G.P.M.
85 % efficient.
Motor-50 H.P.- 3558 R.P.M.

Not in use now

Larger pumps & motors were used when placer was operated.
Turbin pump to pump water out of well
6" Byron Jackson - 3 stage centrif,. used to pump water to placer
1800 G.P.M.
1000 ft. static head
one 350 H.P. & one 200 H.P. motors.- 3550 R.P.M.

Supplies are trucked in from Reno & Yerington.

MINE- 2.3 MILES SOUTH OF PUMP STATION

Vein outcrops on the surface and strikes east - west
Considerable development work has been done- Three shafts have been sunk and several tunnels have been driven near the vein
Several large stopes have been worked in the oxidized zone.
At the present time a sulphide ore(pyrite & chalcopyrite) is being mined on the 90 ft. level on the NO 1 shaft.
The ore is coming from a raise which is has been started about 100 ft. from the NO.1 shaft.
I.R.-S A R-40 stoper is used. 85 # air at drill.
Mucked in to 600# buckets and tramed to shaft.
Hoisted in bucket and dumped by automatic device into pocket. Keystone Drill hoist used.
Shute on pocket is drawn from underground and trammed out of tunnel to the crusher.
Compressors- two I.R. portable compressors
Small blower used to carry fresh air to 90 ft level.
Production 60 tons in two shifts
Two shifts per day 7 to 4. & 6 to 2.
foreman 1 miner- 2 muckers-1 hoistman
1 trammer

Steinhilmer

MARCH 14.1937- Buckskin Mine Lyon Co. Nevada.

--MILL-

Flotation concentrater 440 volt -3 phase A.C. current used
Mill run 24 hours per day- three shifts
Crusher run two shifts (7 to 4 & 6 to 2)
1 mill man ,1 crusher operator.
Capacity
60 tons per 24 hours.
Heads- $8-$9
Tailings- $1.50
Feed rate 28.6# per half minute
Ratio of concentration-8.2 to 1.
Grade of concentrate 1.8 to 2.2 oz. of Au.
6% copper.
Recovery-77% to 90%
Cost of treatment- $1.50 per ton milled
Production- 30 tons of concentrates per 6 days
Concentrates are trucked 10 miles to siding
Contract- $2.50 per ton @ 25¢ per ton mile
Shipped by rail to Midvale ,Utah.
Total cost for shipping- $10.50 per ton
Reagents--
(I) A.C.Co.-6% sol.of 301
Floatation Cell NO.1---20 c.c. per. min.
" " " 4---40 " " " "
" " " 7---10 " " " "
(II) 1 part pine oil to 4 parts Areofloat 50
To cell 5 & 7
(III) Na_2S- used to lighten froth
To cell NO.5- 50 to 70 c.c. of 6% sol.
Ball mill discharge 75-85% solids.
Dorr classifier discharge 25% solids-80 mesh grind(15% -200 mesh)
Feed to Kraut Flotation cells 25-28% solids.
Flow sheet on next page.

THE BUCKSKIN MINE
(Visited March 14, 1937)

Location and Management:

The mine is located at the Northwest end of Smith Valley, 18 miles from Wellington, Nev. The property is owned by the Ambassador Mining Co., Mr. Lackey, Manager; W.A. Burton, superintendent; R. Hume, mine foreman; and Benston, mill foreman.

Labor:

A total of 22 men are employed at the mine. Work is carried on two shifts per day. The wage scale is $2.70 to $3.60 plus board. This gives a labor cost of approximately $1.60 per ton of ore milled.

In the past good miners have not remained on the job, due mainly to the irregularity of the payday. Also during the past winter supplies for the boarding house have not been easy to secure, thus making it even harder to secure and keep good labors.

The boarding house is near the mine workings so that the men on day shift have their lunch in the boarding house.

Breaking Gorund:

For drilling there are two mounted jackhammers, (IR-S-49) two spare jackhammers, one self-rotating stoper and one hand-rotated stoper. Detachable bits are used, requiring at least one set of bits per hole. The bits are reground on the property by the foreman and the hoistman, but after grinding the bits do not give as good service as before. According to the foreman detachable bits are not adapted to drilling in this ground.

40% gelatin DuPont dynamite is used for breaking and safty fuse and No. 6 blasting caps are used to set off the charge. In drifting not more than 10 holes are required to break the ground 5x7.

Two portable compressors furnish air for the drills. The largest (220 cu. ft.) is used continously during the shift the smaller (110 cu. ft.) is used when more air is required to keep the pressure up. These two compressors use 60 gallons of gasoline per day. The main air line is of 2 in. pipe, and distribution to the working faces is through three quarter in. pipe.

The water for drilling is stored in a 200-gallon tank at the collar of the working shaft, and piped through three quarter in. pipe to the workings faces, flowing by gravity. 20-gallon pressure tanks are used in the upper tunnels. The water pressure is great enough without the use of pressure tanks on the lower levels.

Transportation:

In the upper levels the ore is trammed from an adit at the same elevation as the course crusher in the mill, and trammed directly to the mill, in 18 cu.ft. cars. From the lower level the ore is mucked into 660 pound buckets and trammed to a vert-

ical shaft where it is hooked onto the cable and hoisted to the surface. Two buckets are used one is being filled while the other is being hoisted. The buckets are dumped (by means of a swinging slide) into an old inclined shaft to the main haulage adit. The old shaft serves as an ore bin. An old Keystone drill has been converted into use as a hoist. A four cylinder gasoline motor runs the hoist. It is said by the hoistman that the motor uses 2 to 2 and a half gallons of gasoline per shift, hoisting 65 to 70 buckets.

General Conditions:

The ground stands well where it is permitted to break to a natural arch, but has a tendency to be blocky.

The main complaint of the foreman is that development never gets ahead of the mining far enough to permit the most economical extraction of the ore. A well organized program has not been adopted.

The condition of the compressors is such that they are no longer reliable.

In the 90-level ventilation is provided by air coming thru a six inch pipe from a blower situated at the collar of he shaft. The blower is driven by a 3-h.p. electric induction motor.

Drinking water is carried underground in one gallon glass jugs.

All of the timber used is wrough finish, trucked to the mine from Reno. (96 mi.) No round timber is being used.

From a safty stand point there were but two places seen in the mine that are dangerous. The first of these places is near the end of the drift on the mill level, where preparations are being made to raise in the ore. Here are faults and fracture plains filled with talcy gough causing the ground to give way in large blocks. The other place that is dangerous is on the 90-level where an ore chute has been incountered and the drift has been widened out 15 to 20 ft. This condition alone was bad enough but a raise is being started in one of the widest parts of the drift thus weakening the back greatly by breaking the arch that was none too good to begin with.

Subject: A $5000 loan to the Buckshin Mine to unwater flooded portions of supposed value.

Remarks: The area under discussion lies on the 130' level of the Buckshin Mine. Unfortunately the water level lies at a depth of approximately 90' and the area is flooded in consequence of this.

In an effort to ascertain the values in this flooded area, the first reference is Mr. L. E. Sinclair, company engineer since 1929. Mr Sinclair estimates that below the 130' level there exists a block of proven sulfide ore $\frac{340' \times 20' \times 100}{10 \text{ ft}^3 \text{ @ ton}} = 68{,}000$ tons. The average value of this ore is given by Sinclair as $10.20 (Au. $20) This amount of "proven" ore - 68,000 tons - is based (I assume (by interpreting his assay (Sept. 1929) maps,) on one single assay, $18 on the 210 level where 15' of ore was encountered of $10.60 total value. To base "proven" ore on one assay seems unwarranted and therefore I believe his figures on ore below the 130' level are fantastic. Proven ore should be blocked.

A second reference is Mr. A. Syverson who examined the mine in 1930. Since the 260' level was submerged at the time of his examination, his inspection was confined to above the 130' level. He estimates above the 130' level 32,500 tons of proven ore, average value $10.13 (Au $20.) Below the 130' level he estimates probable ore, 50,000 tons @ $10 per ton (Au $20.) This estimate, just as Sinclair's estimate, is based on sparse information. Syverson says in his report, "from reliable sources he learned that

Buckskin Mine

Outline of reports:

1) Ore below 130' level

2) Ore above 130' level

3) Conclusion

Reports used:

Snider 1929.

Lyncross 1930

J.A. Carpenter 1936.

chalcopyrite ores of commercial grade were encountered on the west drift, a short distance from the 260' station." Syverson goes on to state, "The edges of the old dumps, which contain rock from the 260' level, show strong mineralization in the form of chalcopyrite, identical in character to the ores exposed on the 130' level."

The foregoing seems to me that the tonnage pictured from above the 130' level serve as a guide to ore lying [illegible] I believe there is little proof of real ore [illegible] below 130' in either Snider's or Syverson's

Now for ore lying on and around the 130' level. Snider estimates that above the 130' level there is a block of ore $\frac{340 \times 30 \times 60}{10 \text{ ft}^3/\text{ton}} = 71{,}000$ tons, average value $10.20 (Au 0.20). Samples were taken from both "A" and "B" crosscuts. Syverson, in a later report, found his assays checked closely with Snider's estimates on ore above the 130' level; his calculations are:

$$\frac{60 \times 375 \times 20}{13 \text{ ft}^3/\text{ton}} = 37{,}500 \text{ tons of proven ore.}$$

value $10.13 (Au 0.20)

In addition there is an area beneath the developed ores on the tunnel level near #2 shaft. This has not been explored from the 130' level, and may hold promise of fair values.

In conclusion I believe that enough proven ore exists above the 130' level to warrant a loan for unwatering this area. The undeveloped region west of the 130' level may contain a good tonnage of millable ore.

There also is some basis for belief of more sulfide ore bodies below the 130' level

Charles A. Finney II

Subject: 5000 loan for unwatering Buckskin Mine

3/6/43.

Mining Project.