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Mining 5

(183)
Item 2

Summer Work 1936, Assaying at Ramsey

To understand the problems that came up during my summer job it will be necessary to go over the history of the camp.

The mine for which I was working was the Ramsey-Comstock, located in the Ramsey district. This is a gold mine with such a small amount of silver present that it was not assayed for. This is in Lyon county but is less than a mile from the boundary of Lyon and Storey. In a straight line it is about 25 miles from Reno but by road it is 35 miles. Of this distance 20 miles is over paved highway and 15 is over desert roads, It is 25 miles to Fallon or Fernley and 20 miles to Dayton. The nearest rail-road siding is 10 miles distant.

This district is in a basin, about three miles wide, on the south flank of the Flowery range. It adjoins the Talpoosa district on the east and the towns are about five miles distant in an air line.

The first location in the district was about the time of Virginia City but it seems to have been forgotten for about 40 years untill 1904. At this time some high grade was found in an outcrop by Tom Ramsey and the news of this started a rush to this district. A few years after this the town had a population of 1,000. When this district was visited by Mr. Hill in 1910 there were about 100 people in the district. Today there are two deserted houses atthe site of the once booming camp.

The history of the mine was much the same as that of the district. It was one of the first found, and during the rush of 1904 had a small amalgmation mill built on the property. In 1909 the property was acquired by the present owner, Mr. Liddell. For a number of years this property was under option to Mr. Rhinemiller of Reno who did a large amount of development work as well as keeping the small mill running. This property is now back in the hands of the old owner, Liddell.

The mine is on a silicified zone in andesites and the ore contains pyrite, some copper minerals, and free gold in a shattered quartz gange.

This zone runs roughly east and west and dips 50° to the north. The oldest workings on the property consist of an old inclined shaft which can be seen to start in the footwall, cuts thru the vein at about the 180 level, and at the bottom, 400 feet, they had to crosscut 90 feet back to the vein. It dips from 57°-60° and there are four levels: 60, 160, 300, and 400

This shaft later caved where it cut thru the vein and had to be retimbered. Some time after this the mine inspector condemed this shaft and a new one was sunk in the hanging wall to a depth of 600 feet. From this shaft, on the 400 foot level, a cross cut was driven about 800 feet. to the vein and some of the old workings. This was for the purpose of ventilation and to develope pre. From this level a winze was sunk 300 feet and it was reported, on the assay map, to be still in ore.

The levels were run along the hanging wall which is composed of 15 feet of clay gouge formed from a strike fault which showes both vertical and horizontal movement. This ground was wet and very heavy and had to be timbered all the way. Today this timber is in bad shape from rot and from heavy ground swelling around ~~them~~ it which has broken many of the sets and has strained all of them. This was swelling ground and cost a lot to keep open. They would not have had this trouble if they had stayed on the footwall.

Today they have cleaned out and repaired the old inclined shaft, and tightened up the timber sets to the 60' level up to the time that I left. They have also installed a hoist powered with a Chev. motor of 32 H.P., a small compressor 8x8x170 r.p.m. which is an old type, and are working on the 60' level taking out a small amount of ore. The future plans are to open up the next level soon and in time all the levels will be opened.

The improvements in milling as time goes on can be noted at this property. The first mill was a six stamp mill with amalgmation plates and concentrating tables. The tailings from this mill were run into three ponds one below the other. These tailings assay $9.80 in gold at

the present price there being over 1,000 tons avaible.Those in the upper pond are -10 mesh while those in the lower one are -200 mesh.

A later improvement was the installation of an Ellenpass mill, which is a rod mill containing three rods which are two feet in diameter and two feet long.They also installed two Huntington mills as regrinders. These mills were never very effieient and the parts can be seen today outside the present mill.A sand leaching plant was later installed to work some of the old amalgmation tailings.The tailings from this plant assay about $3.50 a ton.

Now they have an all slime,counter-current,decantation plant. This mill was first tried in the summer of 1934 with the following equipment:A 6'x2'Hardinge ball mill,a new Dorr classifier,two old agitators,and two wooden Dorr thickners with the necessary water and gold tanks.It was powered with a 100 H.P. Fairbanks-Morse Diesel which drove a 100 H.P. generator.This mill was not a success because of the limited settling area in the thickners which made them"slime"giving a muddy overflow and with a high soluble loss as well as filling the zinc boxes. The tailings were not given enough wash because of the small number of thickners.An interesting but costly experience was had at this mill one time during the winter.They were not clarifying their gold solution and there was a deposit of slimes which formed in the zinc boxes as well as a white precipitate,probably anhydroxide.One day when the solutions were cold and probably foul they found that the tailings from thenmill were assaying much higher than the heads.This was due to the gold solution dissolving the values from the zinc boxes.Another thing that happened was the head on the diesel cracking because of a scale,composed of silicates,forming from the water.This happened twice at a cost of $250.00 a time.

During the month of June,1936 they rebuilt the mill,installing two new iron tank thickners as well as a new gold tank and a clarifying arrangement.A closed circut was made for the diesel so that pure water

could be reused,with a coil in the bottom of the storage tank for cooling it.This can be compared to the radiator in a car as the water system is much the same,This mill was put in operation at the end of June. My job started the same time as the mill did.

The first ore thru the mill were some old tailings that were taken from the bottoms of the agitators and the thickners when the mill was shut down.These made a good bottom for the thickners and there was no great loss in the gold retained in them.The only trouble they had with the equipment was when one of the thickners became stuck.The rakes on this became loaded with coarse sand "island" and this fell down all of a sudden.This stopd the rakes and nearly broke the gear before it was noticed.This difficulty was overcome by raising the rakes and putting more man power on the belt drive.Another thing that was remedied was the diaphragm sand pumps on the thickners.These would suck air part of the time because the valve seat was not covered.This was fixed by raising the discharge level so there was an inch of pulp over the valve.

Another thing that was changed was the high soluble value in the last or number four thickner.This was caused by circulating the solutions from the bottom to the top of the thickner untill they built up the gold solution until it had enough value to precipitate.It took them about a week to get the thickners full and the gold solution of a high enough value.At this time they were running about 50 tons a day but soon after they started precipitating the gold solution the tailings went up to $3.00,half of this being soluble value.The tailings were about one part water to one part ore or pulp.This was not a good saving on $5.00 head.

The ore for the mill came from previous waste dumps,the average value of the first one being $10.00.About 1,000 tons came from this. The second dump was not as good grade,averaging $6.00.At the end of August they were running the old amalgmation tailings.An interesting thing about these was that free gold could be panned from them.

The gold in all this ore was coarse and it was hard to check on duplicate assays. When I started I ran ½ A.T. fusions on the heads with duplicate samples. Because of the coarse gold they would vary as much as $3.00 on a $10.00 head. I later ran 1 A.T. fusions and these would check much better. The heads sample was taken every half hour from the conveyer belt that fed the ball mill. Another head sample was a grab from every car while still another was the classifier overflow. None of these would check very well with one another.

The charge that I used was as follows: For ½ A.T.

soda ash--------16 gms.
borax---------- 4 gms.
litharge--------20 gms.

This charge did not have enough litharge compared to "Bugbee" but it worked all right on this ore. It is very cheap and there should be about three times as much litharge. For the first month there were enough sulfides in the ore to reduce the right sized buttons when 1 A.T. was used. Later a small amount of flour had to be added.

The cost of the assaying could be divided as follows;

20 assays at $4.00 a day is 20¢ each for labor.

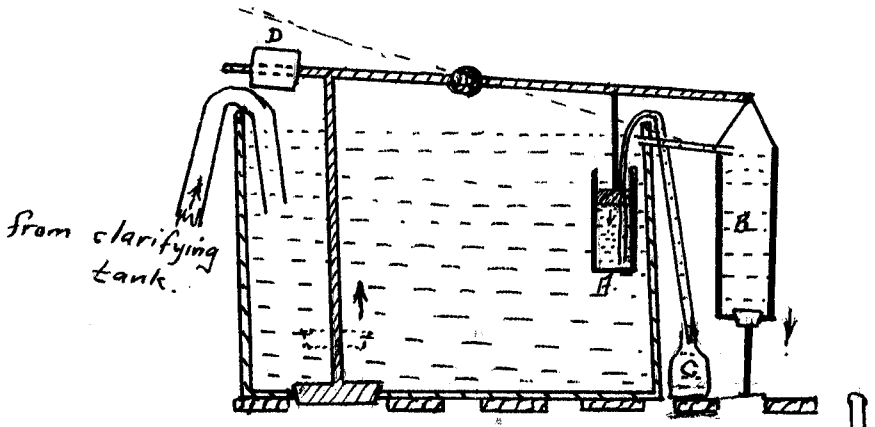
20 to 30 grams of litharge at about 1¢

the gasoline was about 2¢ per assay, 1½ gal. per day.

At the end of the second week that the mill ran it was decided to cut the tonnage to 30 tons in order to reduce the values in the tailings. As a result the values in the tailings went down to 75¢ with 35¢ of this being soluble loss. After a month of running they decided to change the flow sheet. Before this they had two agitators in series followed by three thickners for washing. With this arrangement most of the values were desolved in the first one. They changed the circut so the pulp from the first agitator went to a thickner and then back to the second agitator. From here it went to the number three thickner. This arrangement worked much better as the soluble and the values in pulp both dropd and the value of the gold solution went up.

The extraction was 90% or better with this arrangement.

To check the amount and value of the gold solution they installed a weir. This recorded the tonnage, and with every 250 gallons of solution a sample was cut out.



Gold Tank.

This works by the following principle: The discharge from the clarifying tank discharges into this "weir". When the level of the water gets to the level shown it discharges into the tank marked "B" and when this gets full it forces the support bar down on its end as the arrow showes. This lifts the large valve in the tank and the small piston in cylinder "A" is also forced down and takes up the force of the fall and forces out a sample which collects in the sample bottle "C". When the bar goes down it records and the tonnage is figured from this. This was a check on the values in the zinc boxes and in a way a check on the heads. The tonnage of the gold solution, which was about 100 tons, precipitated each day was recorded as well as the assay value of the pregnent and barren solution. The value of the gold solution varied but was about $2.50 while the barren was an average of $.04 . The values precipitated in the zinc boxes were figured at the biginning of each clean up and checked fairly well with the bullion.

For the first clean up they had a complicated precipitate. All the short zinc from the previous operations were in the boxes as well as some of the slimes and the white precipitate. The solutions for the first month were fairly high in cyanide, 1.5 lb./ton, and as there was some copper in the ore it would precipitate in the boxes under this conditions. For the clean up they put the zinc thru 20 mesh screen, and acid treated it with H_2SO_4 to remove the excess zinc but did not remove the copper. They did not wash it very good and there was lots of zinc

sulfate in it. When the precipitates were melted down it ate a hole in tow different graphite crucibles. This was probably due to the imcomplete removal of the acid used. A clay crucible was not tried so no data on the action of this could be obtained. The bullion from this was about 350 fine, with the impurities mostly copper. This was too low to be satisfactory as there was no reason why it should not be higher.

Before the next clean up they had decreased the strength of the solution to about .8 lb in cyanide. This kept a lot of the copper out of the zinc boxes. This idea was gotten from Mc Ferren "Cyanide Practice". They sereened the zinc thru 5 mesh and then thru 40 mesh. The plus 40 mesh zinc was calcined and then treated with H_2SO_4. These precipitates, when melted, ate a hole in the crucible and the bullion was about 350 fine. A large amount of spice was formed also. The fine precipitates were dried and melted without acid treatment, and the bullion from this was over 700 fine.

A short time after this Bob Shiroda, the mill supertendent, and I did some expermenting with useing HNO_3 to treat the precipitates. This proved to be much better for the following reasons: It cut them to a smaller bulk. It disolved the copper out. It disolved out the zinc as zinc nitrate which was easy to wash out compared to the zinc sulfate. This was probably due to the nitrates being more soluble than the sulfates. In the next clean up the nitric acid was used. It is more expencive but they found that it was cheaper in the end. The crucible was not effected, and the final bullion was over 750 fine.

Another interesting experment was made when the tailinge were running $3,00. This was a screen test with the various products assayed. The conclusions were that the slimes carried the values. The reason given was that they contained most of the sulfides. This was because the classifier works on specific gravity and as the sulfides have a higher specific gravity than the quartz they must be ground finer to overflow.

We tried another test on the same group of tailings.We panned most of the sulfides out of them and assayed the two products.The sulfide free tailings assayed 35¢ while the sulfides were over $10.00.

Another part of my duties was to make up the titrating solution of silver nitrate and nitric acid for the mill.I also checked the standard of these solutions to see that there was no mistake.

The assay office equipment consisted of the following:pulp balances, Keller gold scales,coal stove for heating the samples,gasoline furnace which held about 8 fusions and 25 cupples,bucking board,small jaw crusher, Braun pulverizer,etc.This equipment could have been better but it was probably better than the average around Nevada.The gasoline burner was changed to one that burned fuel oil and with an air pressure of 4 pounds.This burner worked all right but had a smokey flame until it got hot and it was not quite as hot as the gasoline one.It was also harder to control.When I vistsd the office a few weeks after quiting the job I notived that this burner was replaced by a gasoline one.

With this report it can be seen that this job was with one of the small typical mills in Nevada with their many troubles.With all their troubles I think that I learned a lot.In closing I want to thank Professor Carpenter for helping me out before starting this job.