

Glory-Hole Mining at DeLamar, Nevada

The Material Is Drawn from an Old Widened Ore Chute, the Total Cost of Extraction Being Less Than Thirty-four Cents per Ton

B Y W. R. W A R D N E R *

The De Lamar mines are situated 30 miles west of Caliente, Nev., a division point on the Salt Lake route, and have been worked for the last 14 years. The Lumberger De Lamar Gold Mines Company, controlled by Salt Lake and New York men, has operated the property for the last six years. The company owns its own electric power plant, situated on the railroad at Stine. Utah coal is used as fuel and the power is transmitted to the mine 13 miles away. There are 14 miles of pipe lines and four pumping stations to supply water to the town and works. All supplies for the mine are hauled from Caliente over a very fair wagon road at a cost of 55c. per hundredweight.

sets, for the workings are so extensive that it is impossible to make an intelligible representation.

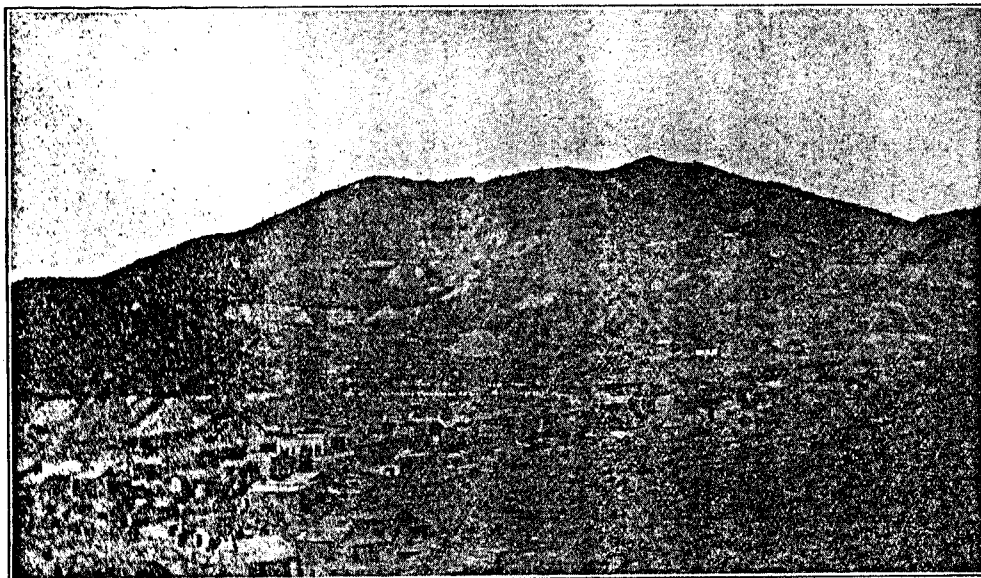
Originally the present glory hole was a prospect raise from No. 10 level to the surface, which was later used as a mill hole and called rock chute No. 5. By years of use the chute was cut out until it was in places more than 50 ft. across. As will be seen on the sketch plan the chute lies between the southeast and southwest veins. Owing to its unusual size it was a constant menace in the extraction of the surrounding orebodies by the square-sets system. In fact stoping had been carried beyond a point of safety and it would not have been possible to

broken down; it is evident that gravity alone will break most of the ground for some time to come. As shown in the drawings the ore will slip away from the gouges; since the formation back of them is very hard it does not slab off to any great extent. In fact there are perpendicular walls of quartzite 200 ft. high in the open-cut workings that have been standing unsupported for several years.

The broken ore varies in size from dust to boulders of very hard quartz, many of them weighing several hundred tons. Up to date practically the only expense for breaking ground has been in handling these boulders. There is considerable waste in the ore, most of it being gouge



GLORY-HOLE FROM SURFACE



DE LAMAR, NEV., SHOWING TOP OF GLORY HOLE

The country is quartzite dipping to the east at an angle of 15 deg. from the horizontal. The ore occurs in relation to a system of north and south gouges and east and west cross dikes. The ore deposits and peculiarities of mineralization are very large subjects in themselves and will not be considered in this article.

CONDITION OF THE WORKINGS

The accompanying sketch of the glory-hole zone shows a part of the vein system on the plane of Level No. 6. The sections A-A and B-B give a good idea of the way the ore lies about the glory hole. In these drawings no effort is made to show the areas already stoped by square

take out much more ground by that method.

Assuming a workable area by glory hole down to the level No. 8, there remained in these two orebodies alone something like 250,000 tons of ore, of proved value, in pillars and backs, to say nothing of stope fillings of ore from previous years operations which could not be worked profitably when a high mill heading was maintained. To obtain this tonnage cheaply and safely was the engineering problem that confronted the management.

METHOD OF OPERATION

The commencement of glory-hole operations was the caving of the stopes around chute No. 5 into the mill hole. At this time there was about 50,000 tons of rock

and dike matter with some country rock. It has been found more economical to neglect the small waste entirely, and the only sorting that is done is to pick out the larger pieces. By so doing the dirt is handled quickly and at a low cost.

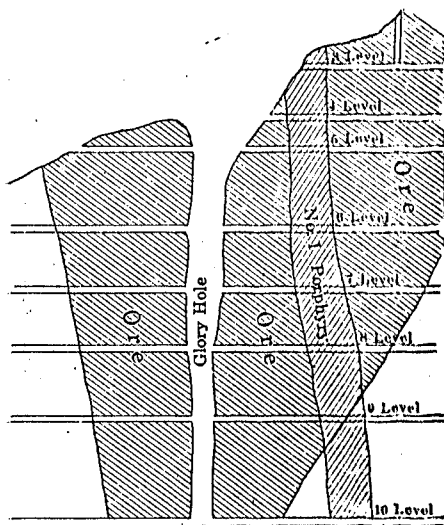
On account of the very large tonnage of broken ore contained in the glory hole—20,000 tons most of the time—it is advisable to draw the ore in such a manner that the grade will average fairly high, and with this end in view it is customary to attack the pile at any convenient entry in the upper levels, being governed by the position of the better ore. For instance, if the rock in the lower part of the hole is of low grade, and there is a cave of better ore on top, instead of waiting for this to be drawn down to the level No. 10,

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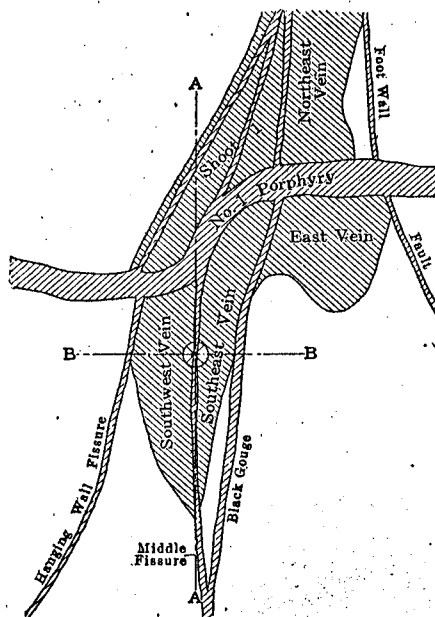
as large a part of the tonnage as necessary is tapped from entries on the upper levels. In this way a steady output is maintained without any material sacrifice of grade.

HANDLING MATERIAL.

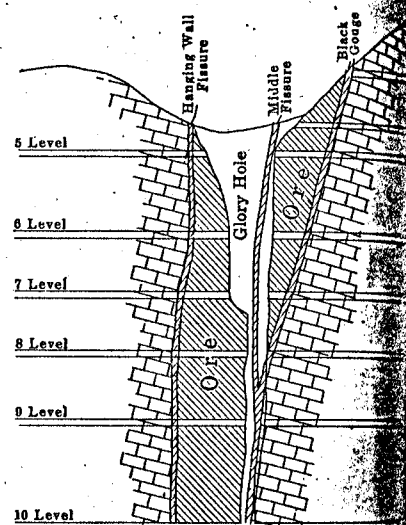
The sketches showing the sorting chambers and entries on level No. 10 give a fairly clear idea of the arrangements for handling and sorting this material in the most economical manner. The broken rock is drawn down upon 10x12-ft. shoveling plats, the larger waste is thrown into the waste pocket and the ore into the ore pocket. There are four of these chambers. It often happens that a large boulder comes down and completely blocks a chamber; this must be broken up, the other chambers being used in the meantime in making the required output. The train draws the pockets as needed, usually twice a day. The method of handling the rock on the upper level entries is about the same with the exception that the waste



SECTION A-A



SKETCH OF ORE ZONE



SECTION B--B

COST OF PRODUCING GLORY-HOLE ORE
(28,400 Tons).

	Amount.	Per Ton.
Labor (handling and sorting)	\$7,958	\$0.280
Labor (hauling to mill)	1,137	0.040
Powder, fuse and caps	258	0.009
Candles	191	0.007
Hardware and tools	13	0.000
Total	\$9,556	\$0.336

CONTINGENT EXPENSES OF MINE
(48,900 Tons).

	Amount.	Per Ton.
Foreman and shiftbosses....	\$4,499	\$0.092
Tool dressing and nipping...	5,281	0.108
Track and pipe work.....	1,027	0.021
Holting (men, timbers and tools).....	1,858	0.038
Compressed air.....	4,401	0.090
Assays.....	2,103	0.043
Surveying.....	334	0.015
Total.....	\$19,903	\$0.407

COST OF PRODUCING STOPE ORE
(20,500 Tons).

	Amount.	Per Ton.
ORE BREAKING:		
Labor.....	\$12,435	\$0.606
Powder, fuse and caps....	3,144	0.153
Candles.....	332	0.016
Hardware and tools.....	130	0.007
Total.....	\$16,041	\$0.782
TIMBERING:		
Labor.....	\$3,840	\$0.188
Lumber (plank)	\$4,649.94	
Round timber.....30c	532.20	
Pole lagging.....20c	52.40	
	\$5,235	\$0.255
Operating sawmill.....	305	0.015
Hardware and tools.....	230	0.011
Total.....	\$9,610	\$0.469
HAULING AND MUCKING:		
Labor (including haulage to mill)	\$12,217	\$0.596
Operating electric haulage system.....	876	0.043
Candles.....	335	0.016
Hardware and tools.....	58	0.003
Total.....	\$13,485	\$0.658
Grand total.....	39,136	\$1.909

COMPARISON OF COSTS PER TON.

	Stopes.	Glory Hole.	Run Mine.
Cost of producing.....	\$1.909	\$0.336	\$0.400
Contingent expenses.....	0.407	0.407	0.400
Total mine cost.....	\$2.316	\$0.743	\$0.800

From these tables it appears that there is a margin of \$1.57 per ton in favor of the glory-hole product, a large difference in itself. The system allows a profit on exceedingly low-grade material. It is evident that even should the value of the glory-hole ore fall so low that there would actually be no profit, so long as there is no loss, it would pay to continue operations by this method, since the cost of producing the run-of-mine ore is greatly reduced that it is possible to make the maximum profit from the better grades of ores such as the mine affords.

must be laid aside, the ore loaded into smaller cars and run to the nearest mill hole, and the waste to the waste hole.

The danger is small, for about all the men have to do is to protect themselves from a run of rock in the breast of the room. Most of the time they are working under cover. There is some risk in blasting the boulders when a chamber is blocked; but for an intelligent miner accustomed to this work the danger is not great.

Costs

The accompanying tables of costs are for five months' operations. During this time the glory-hole ore amounted to 58 per cent. of the mill tonnage; the other 42 per cent. was obtained from the stopes, 36 per cent. from square-set stopes, 6 per cent. from stull stopes, 4 per cent. from fillings, and 4 per cent. from development. For this period the mill monthly average was 9800 tons.

C. D. Leslie, general manager for Simmer & Jack Proprietary Mines, in a company report for the year ending 30, 1908, states that, while the cost of recruiting and repatriating the Chinese laborers has been great, the remarkable high standard of efficiency attained by them proved a valuable object less than the native "boys," and he attributes the increased efficiency of the Kafir "boys" to a great measure to the example of the Chinese. While the Simmer & Jack company employs more Chinese than any other mining company on the Rand, by reorganizing the work to the best advantage the number of Chinese employed was gradually reduced during the year without any diminution in profits.

It is not always an advantage to connect several mines, for often the ventilation becomes poorer than before, and the farther the air travels through mine workings the more it becomes vitiated.