

NOTES ON THE MINING OF LOW GRADE GOLD ORE IN NOVA SCOTIA.*

BY C. F. ANDREWS.

In view of the interest which at present is being awakened in the low grade gold ores of Nova Scotia, some personal observations in this line may not come amiss; the purpose of this paper is, therefore, to give an outline of some personal experience while manager of the Richardson mine, at Isaac's Harbor, N.S. The writer does not claim that all the methods adopted during this experience have been as satisfactory as he could have wished. Circumstances often compel us to accept that which of things obtainable comes nearest to meeting our wishes.

The Richardson belt is composed of slate and quartz, between regular walls of which. It is located on what is known in Stormont gold district as the Gold Brook Anti-clinal (also called the Upper Seal Harbor Anti-clinal), the course of which is N. 62° W. and S. 62° E.; and along which auriferous belts, lodes and drift have been discovered for a distance of three miles. The Richardson belt was first discovered and worked on its south dip, where the average width was 11½ feet. In working west the belt narrowed down considerably. Eastward, the belt turned in a northerly direction, increased in width to 18 feet and lay very flat, the dip changing from south to east; continuing, it swung around and ran westwardly, assuming a north dip and growing smaller again than on the turn.

The mill for crushing this ore is located about three hundred yards from the mine on the shore of a lake, from which the water supply is obtained. The ore is conveyed from the mine in cars running over steel rails, laid the greater part of the distance on trestle work. These cars are hauled by means of a steel cable, the power being taken from the mill. The total expense for haulage averages about three cents per ton, including renewals of cars, ropes, wheels, axles, etc. When first started the mill was furnished with but 15 stamps; a few months later the number was increased to twenty, and later to forty.

The following extracts from a report to the directors in June, 1894, may be of interest, it being remembered that the mill then consisted of twenty stamps with hand breaking and feeding. "At the mine three shafts have been sunk. The west shaft is not more than 30 feet deep and was put down mainly to test the length of the belt, which is here about seven feet wide. The middle shaft is down 100 feet; width of belt here from 8 to 14 feet. Tunnels and stopes are driven west from it 72 feet, or to a point within eighteen feet of the west shaft." The labor expenses here for drilling and blasting amounted to 26 cents per ton. The cost of dynamite per ton of ore sent to mill was 3½ cents. "Tunnels and stopes are also driven east from here to connect with the east shaft, which is 108 feet deep. The southerly dip of the middle shaft is about 52° from horizontal, that of the east shaft about 42°. East of the east shaft a tunnel has been driven on the belt 89 feet, the belt at this point having a width of 17½ feet. Here a bend of 70 per cent. to the northward takes place in the course of the belt. A tunnel has been driven here on the belt for a distance of 85 feet, the dip being 23° in an easterly direction, the width 18 feet."

The total cost for mining, transporting to mill, and milling at this time, was \$1.90 per ton, including an allowance for total depreciation in value of plant in five years, and for taxes, insurance and all charges.

"The belt for the most part is composed of one large lode on the back-wall side, varying in width from 1 to 4 feet, and a varying number of smaller lodes intermixed with slate. At places, nearly the entire belt is quartz, and gold is sometimes found in the soft slate between the lodes. Enough black or waste rock cannot be obtained below to load the scaffolds; and the walls have to be supported by leaving in blocks or pillars of ore."

The underhand method of stoping was employed. In an attempt to use the overhand method it was found that the slate between the veins of quartz was not firm and solid enough to hold the quartz in place overhead, and, consequently, large masses of rock were falling, making it dangerous to the miners beneath. I am of opinion that at greater depths the slate becomes more firm and solid, and overhand stoping may be resorted to. At this time hoisting was done from the east and middle shafts by a single cylinder engine, geared to a single friction-drum. The gear was so located that the rope could be shifted from one shaft to the other as occasion required. Wheelbarrows were used below ground as a means of transporting the ore to the shaft, and the ore was then hoisted in tubs to the surface, where it was washed, the waste rock thrown out, and the good ore shovelled into cars to be hauled to

the mill. Since then the belt has been followed farther west on the south dip; the east shaft, now the pump shaft, sunk to a depth of 200 feet, and the belt driven and stoped, carried around the turn and continued west on the north dip. At the time of writing the belt produces more waste slate than in 1894.

The present plant consists of a hoisting, pumping and breaking gear, located on the apex of the semi-cone formed by the turn of the belt. Two shafts are worked from here, one on the south dip and one on the north. The bottoms of these shafts are about 250 feet apart, as measured on the belt around the turn; and as they are sunk this distance is, of course, increasing. At the surface they are 48 feet apart and converging towards each other. At a height of twenty-six feet above the surface, the skip-tracks from each meet above the same deck head; and self dumping skips empty their loads beside the same rock-breaker. The "sump" at the deck-head into which the skips dump their loads is lined on the bottom with open-sand cast iron plates seven-eighths inch thick laid in five-eighths of an inch of cement. The ore is here thoroughly washed, the waste rock thrown into trolleys and run out on the dumps, and the good ore shoveled into a hopper which drops it between the jaws of a 9 x 15 Blake Breaker, from which it falls into a bin. Cars are run under the bin, where the ore is allowed to fall into them; they are then run out on the main track and hauled by the wire cable to the mill, where the ore is dumped into a bin of 500 tons capacity. Thence it runs through shoots into the automatic feeders supplying the mortars. Copper plates are used inside these mortars. The surface dimensions of the outside plates are 12 feet 6 inches by 4 feet. After passing over the outside plates and through mercury traps, the sand is discarded, no attempt being made at concentration.

(To be Continued.)

THE DOMINION GOLD MINING AND REDUCTION COMPANY.

The following letter, which has we believe been refused publication by the *Mining Review*, has been forwarded us by Alan Sullivan, C.E.:—

The Editor of the Mining Review, Ottawa, Ont.:

DEAR SIR,—As one familiar with the Dominion Gold Mining and Reduction Company, Limited, of London, England, and as one also intimately associated with R. H. Ahn in business in Rat Portage, I beg to take exception to certain editorial remarks in your last issue, assuming that your publication, like all others, is equally available for the exposition of both sides of a question. The gist of the exception you take to the report is contained in the following paragraph:—

"What do our constructing mill engineers think of the sum of over \$27,000 being spent to remodel a ten-stamp mill? And what do our Rat Portage friends think of the equity of paying over \$800,000 for the purchase of the reduction works and the few prospects that went with that sale?"

It is due to those whom your criticism may have affected to state that the expenditure of \$27,000 includes the following items: Rebuilding of the reduction works, including the purchase of four batteries of 20 stamps, each battery with its own ore bin; purchase of one Frue vanner, two Krupp vanners, two Colorado Perfection concentrators, Cornish rolls, sample grinders, all connections, belting, pulleys, shafting, etc., including all costs of construction. Estimate, \$12,000; actual cost, \$11,500. Will the average qualified constructing mill engineer do much better? The balance of the \$27,000 was spent as follows: Equipment of two mines, viz., Black Jack and Gold Hill. Full equipment, including pumps, two hoists in place, one not set up; two boilers, cables and running gear, buckets, ore cars, rails, etc., and also the remodelling of the ten-stamp mill on the Gold Hill property.

I think the impartial observer of the above expenditure will consider it was economical for the value received, and this, coupled with the fact that competent engineers have invariably expressed themselves favorably impressed by the Reduction Works, and their standard of workmanship, will rob the quoted paragraph of some of its apparent point. As to the purchase of the Reduction Works, the two mines and the other properties amounting to 2,500 acres, that went with them, this was a matter arranged in London to the satisfaction of the company, and altogether outside of the Canadian office; the latter had no say whatever in the matter. The directors made their own arrangements to suit themselves, without consulting the *Mining Review* in the matter, and those who are directly interested in the outcome are those who will make the necessary criticisms.

I regret that the remarks in the *Mining Review* should be so prompted by personal animosity, as they evidently are, judging

* A paper read before the Federated Canadian Mining Institute.