

The development work has consisted of 1,204 feet of drifting and cross-cutting with 1,732 feet of raising; a total of 2,936 linear feet. The greater part of the work was done on the 385 level in the further blocking out of the No. 1 orebody on this plane. Two new ore passes, one having a capacity of 5,000 tons of broken rock, were driven between the 385 and 530 levels and were among the important pieces of development. Sufficient work was done to make the No. 4 orebody, which is the heaviest sulphide orebody in the mine and valuable as a flux at the smelter, available for shipment. The development work in many cases, especially in the No. 1 orebody, encountered ore of higher grade than would be expected from our previous exploration.

Considerable construction was completed, including a new bunk house, additional cottages and a substantial electric sub-station. There is at the present time in process of erection a second crusher station and ore bins, which will enable us to introduce a more economical system of crushing and shipping. This plant also makes possible a large additional storage of crushed ore. The storage is much needed in order to more closely approach the ideal condition of handling with our mine haulage a fixed number of tons a day. We are now mining and shipping at the rate of 2,000 tons a day, which is our designed output. This we expect to increase to average 3,000 tons a day upon the blowing-in of the recently added fourth smelting furnace.

There has been a gain during the year in the personnel of the employees and in their efficiency in their places. Due credit should be given to all for their interest in the work, through which we have been able to successfully meet many unusual conditions.

The daily shipments have been very irregular in their bulk, through depending on two uncertain factors which controlled the ore demands. These were the metallurgical difficulties in smelting and shortage of power. The former were continually being eliminated, while the latter is a seasonable factor during the winter months that is still to be encountered. To control erratic shipments there was not ample storage capacity between the mine and the smelter to give either protection. The mine difficulties of an internal nature, as crusher troubles for example, have not at any time prevented the shipment of sufficient ore to keep the furnace in blast.

The amount of ore drawn from each mine chute is tabulated on the daily reports. In this manner the amount of ore drawn from the different orebodies, and portions of the bodies, is at all times under supervision. The character of the shipments can be determined and controlled as much as it is possible in the system of mining employed.

Of the ore shipped, 66 per cent. was from the No. 1 orebody, 34 per cent. was from the No. 2 orebody, while no shipments of any amount were made from the No. 3 and No. 4 orebodies, although they are developed for shipment. The No. 1 ore was mined mainly above the 530 level, 77 per cent. of the ore coming from here, while 23 per cent. was mined between the 385 and 530 levels. The No. 2 ore was mined mainly from the 530 and 700 levels; 40 per cent. coming from above the 700 level, 14 per cent. from between the 630 and 700 levels, 38 per cent. from between the 530 and 630, while 8 per cent. came from below the 530 level.

The smelter asked for a further classification of the ore during the year. This involved the screening of the fines from the ore; the selection of the heaviest sulphides from the No. 1 orebody; the shipment of siliceous ma-

terial from the hanging wall of this body, of sacked granular pyrite and of clean pyrrhotite. The two latter came from the surface of the mine hill. These special lots and demands necessitated further outlays in construction, development, alteration and operation to make possible their shipment. They have been discontinued for several months. The ore now shipped is nearer the run of the mine ore in equal proportions from the main orebodies.

The content of the ore in copper, lime and magnesia is very close to the estimated normal. Ore of a low siliceous and heavy sulphide nature has been in demand. We have been able to supply No. 1 ore averaging 4.6 per cent. and No. 2 ore averaging 6.3 per cent. under the estimate in silica, with the sulphur and iron content high and the alumina content low in percentage. This has come through being able to stope in the centre of the bodies rather than along the walls. This condition cannot be regarded as being capable of being maintained in the future, if full advantage is to be taken of the full tonnage in the mine.

With the alteration of the shipping terminal and the building of the second crusher station completed, there will be an ore storage of 6,000 tons above the shipping tunnel. The shipments of ore will thereby be severed from their dependency on the crushing and mine haulage. The train loading which now takes two shifts, can be done on one shift by a loader and two helpers. This takes for granted the supply of a sufficient number of railroad cars.

The haulage throughout the mine is accomplished in self-dumping steel cars of 3.7 tons capacity, hauled by 6-ton locomotives. The locomotives carry headlights of unusual capacity as an aid to the safety of the men and to the ease and safety of the haulage. The switches on the main lines are protected by colored switch lights. This account does not vary directly as to the tonnage, as a variation in the tonnage may signify a train which is not working at its full efficiency. A uniform gauge of two feet, laid with 30-lb. rail is used in all the tunnels and drifts.

There has been considerable alteration and repair work on the cars in excess of that expected in the daily haulage. The maintenance on cars of this type for the duty they will have on our main haulage tunnels (especially if the tonnage is increased) will be severe.

In the first two months of the year ore was crushed and belt conveyed to the shipping pockets. The next month began to develop conveyor troubles and two breaks occurred through inferior steel in the sectionalized Traylor crusher. The second break was serious enough in its effect to leave the plant without a crusher in the next four months. In this time, 169,000 tons of ore were broken by block-holing, bull-doing and sledging on 90-lb. rail grizzlies having 14 in. spaces. The crusher was re-started in February with the belt-conveying of ore entirely eliminated.

The only timber utilized in the mine is that used in the construction of chutes on the sill floors. These chutes are substantially built in the rock collar of the raises to withstand bull-doing at the gates without great damage. Where expected to withstand exceptionally heavy duty, the chutes are lined with steel plates, and an iron finger gate operated by an air lift is used instead of the usual type arc gate. Three hundred and fifty-nine chutes have been repaired during the year and 11 new chutes built. The size of the timber crew has to be sufficient to undertake at any time the maximum