

The recoveries at the Anyox smelter were: Copper, 16,597,737 lb.; silver, 197,704 oz.; gold, 3,581 oz.

Mr. W. A. Williams, smelter superintendent, reports as follows on the Anyox smelter:

In its first real year of operation this plant shows, in ores treated and in copper produced, a good healthy progress for the better. Since high water in March, the plant has practically run at full capacity, having changed at that time from the old schedule of always operating two furnaces steady and the third in repair and waiting, as was formerly the practice, to keeping all three in blast as much as possible.

The new charge cars have helped the feeding and the distribution of the ore in the blast furnaces, and the tendency of the furnaces to crust has become less as a result of their installation. With the better understanding which everyone has of both the ores and the operation of the furnaces, the campaigns have lengthened, until campaigns of a month are now the rule. We look for this to improve as time goes on. This will give us more furnace days per year.

The troubles encountered on the lower floor were chiefly with the settlers and spouts, owing to the great amount of low-grade, corrosive matte handled. These have been overcome and we now have few stoppages from this source.

The stoppages of the crane service which troubled us at first have been entirely overcome with the installation of the heavier forty-ton trolleys with which we replaced the twenty-ton trolleys.

A number of improvements have been made in order to lower costs, such as silica bins over the converters, skull grid for ladle skulls, new charge cars and matte digging machine, all of which have been charged to "Operation." The No. 4 furnace and agglomerating plant were purchased this year and are now under construction. The furnace will be ready to put in commission by August 15th, and the agglomerator by September 10th. We are preparing to increase our storage capacity for ore by the erection of more bins. This work is charged to "Operation" and will be finished by November. We have found the plant fairly well designed for economical work and have made very few changes. So far, we have found it to be the better practice to regrade our matte, giving to the converters nothing less than twenty to twenty-five per cent. cu. matte. Everything is in good working condition.

We commenced operations as a pyritic plant, using low coke and very little flux. No. 1 ore being used as a base to melt No. 2 ore. We have been trying to make a converter grade of matte in the first operation. The ores have not come to us as free from inert material such as dyke and schist as we could wish. They have been more or less erratic as to silica content from day to day and the tendency in both ores is to higher silica and alumina. This fact coupled with the shipments of about 100 tons of foreign ore per day has made it hard to operate the furnaces as originally intended, and the coke and flux percentages have risen to some extent. With the greater development of our own ore-bodies, and with the better storage facilities at the mine and smelter, this condition should be materially helped. The making of converter grade of matte in the first smelting, we believe, will eventually be accomplished.

With No. 4 furnace in operation, the agglomerator handling our converter slag and matte cheaper, thus giving us a greater recovery per ton of ore, owing to its handling the flue dust; with a fuller understanding

of our problems; longer campaigns of the furnaces and with the labor-saving installations mentioned above, we should and will make a decrease in our costs during the coming year.

Last year's record, we believe, we will beat this winter, even if identical conditions prevail, as we know better what to expect. With an earlier start in the shipping matte to Grand Forks in order to conserve our water supply, and with steadier campaigns, we should show better results. February is the worst period during the low water season.

Of the Grand Forks smelter, Mr. Williams says:

The Grand Forks plant was completely shut down for one hundred and twenty-two total days. We were enabled to commence operating four furnaces about the first of January, 1915, six in February and March, seven in April, and in May we were able to operate on an eight furnace basis. We smelted 617,544 tons of ore and 648,751 tons of charge.

With this irregular running and small tonnage the smelting and converting costs were the lowest in the history of the plant in the face of the high siliceous ores handled and the very high siliceous slags made. The per pound cost of copper is high on account of the low-grade ore handled.

A great deal of credit is due Mr. Bishop and staff subordinate to him for this remarkable showing. The results go to show that very close attention has been given to detail.

Under an eight-furnace operation the total pay roll is 200 men. This means that 16.6 tons of ore were handled per man.

Mr. A. J. Bone, smelter superintendent at Anyox, reports as follows:

In the year ending June 30th, 1915, considerable advance was made in the metallurgy of Hidden Creek ores at the Anyox smelter. Each month almost without exception showed a natural improvement over the one preceding. We acquired a more extended acquaintance and experience with the ores; the workmen have grown more proficient, and, for the most part, what mechanical difficulties were presented have been overcome. At the conclusion of the year, and barely fifteen and one-half months since the original start was made, it is apparent from all angles that we are approaching that condition of smooth, steady running which characterizes operations of long-established plants.

The ores melted covered a wide range in analysis, from low silica, low alumina, requiring quartz and little coke to smelt, to the other extreme of high silica, high alumina, taking a basic flux and higher coke. Of late the tendency has been toward higher silica content. We are also receiving about 100 tons daily of siliceous custom ore. The result of these conditions is to curtail the use of quartz in the blast furnaces and increase the consumption of lime rock and basic "Mamie ore," and consequently the percentage of coke.

It may be suggested that as our slag is comparatively low in silica, the obvious remedy for increased silica in the ore would be to make slags higher in silica. In this connection it should be remembered that the bulk of the iron which enters the slag is oxidized in the furnace and combines with silica in conformity with the principle underlying slag formation in pyritic smelting, namely, that the temperature prevailing in the focus determines the particular ferrous silicate which results. Working along natural lines, our endeavor would be to make more slag in the furnace—not to alter its character. In other words, by obtain-