

MINING IN THE BOUNDARY DISTRICT

Mr. Frédéric Keffer, the president of the Canadian Mining Institute, and engineer of the British Columbia Copper Company, contributes an interest article to the current number of *The Engineering Magazine* on "Mining in the Boundary District." While, naturally, the information given is not all new, the subject is treated for, perhaps, the first time in a manner at once concise and comprehensive. Mr. Keffer points out that four general conditions have contributed to the successful mining and smelting of the low grade ores of the district, these being: (1) The enormous extent of the ore bodies, admitting of mining on a large scale; (2) the solidity and firmness of the ground which renders the opening of great stopes without the use of timbers feasible and safe; (3) the chemical composition of the ores, which, by rendering them self-fluxing, obviates the use of any barren fluxes; and lastly, the presence in the near neighborhood of coal areas, by which a cheap and abundant supply of fuel is made available. Had any one of these conditions been absent, it is questionable whether mining in the Boundary could have been profitably carried on. The district enjoys the advantage also of an abundant water and timber supply, while the mines generally are dry and require little pumping.

The mining methods employed are two, one by open pits or "glory holes," and the other by pillars and stopes. The former may only be employed where the overburden of soil rock is not too great, and is most effective in mines where the dip of the ore deposit is high. But, owing to the low dip of many of the deposits, glory hole work is necessarily limited, and, as square-set timbering in underground work is impossible on account of the prohibitive cost, the usual plan is to open stope above a roof supported by pillars of ore.

The writer notes that the great irregularity in form of the deposits necessitates that each section of the work, even in the same mine, must be treated individually, and plans made to suit the form and dip of the ore contained in that section.

In the British Columbia Copper Company's Mother Lode Mine the ore is all conveyed to the main shaft, where it is dumped into pockets. The cars mostly used have a capacity of from 2 to 2 1-2 tons, and are drawn by horses in trains of from 4 to 5 cars. The ore is drawn from the pockets into 5-ton skips, and hoisted to a bin at the surface, whence it passes to electrically driven Blake crushers. From the crushers the ore falls on to a conveying belt, which carries it to the railway bins. At the Granby Mines most of the haulage is done by electric motors and steam locomotives, bins being located at two tunnel entrances to the mine on the upper levels. Here the ore is crushed in crushers with jaw openings of 30 and 42 inches, and then passed to railway bins. The ore from the Dominion Copper Company's mines is delivered directly to the railway bins without crushing.

Steam power has been practically displaced in the Boundary by electricity, which is generated at Cascade and Bonnington Falls. The capacity of the former plant is 2,000 to 3,000 horse-power, while the larger plant at Bonnington is capable, it is estimated, of generating 60,000 horse-power at low water.

The progress of mining in the Boundary is indicated by a comparison of the tonnage of ore smelted in 1900, which was 62,389 tons, and the returns for last year, 1,276,589 tons.

RICHNESS OF COBALT ORES*

By DR. ALBERT R. LEDOUX, New York.

I have been asked by several members of the Institute what is the grade of Cobalt ores, as determined by my sampling works in Jersey City. Since January, 1905, we have handled at our works 366 carload lots of this ore, and 52 other lots—less than carloads—including what we call nuggets, the nuggets either coming separately consigned or as part of a carload. I do not feel at liberty to state the assays of any particular lots of nuggets, as there have been some delicate questions concerning the value of some of these "Bonanza shipments." These nuggets, as you are aware, are not pure silver, but run anywhere from 700 parts to 870 parts of silver in the thousand. There are more or less gangue and other minerals associated with the silver, and the metallic silver itself, visibly free from gangue, runs about 950 fine.

Leaving out of consideration the nuggets and native silver, and including only the lots of regular ore, a review of 394 lots sampled shows that the highest lot ran 7,402 ounces of silver to the ton, the next in order being 6,909, 6,413, 6,163 and 5,948 ounces per ton. In the 394 lots we found:

	Per cent.
Over 6,000 ozs.	4 lots (say) 1
Between 5,000 ozs. and 6,000 ozs.	3 lots (say) 0.75
Between 4,000 ozs. and 5,000 ozs.	12 lots (say) 3
Between 3,000 ozs. and 4,000 ozs.	17 lots (say) 4.25
Between 2,000 ozs. and 3,000 ozs.	30 lots (say) 10
Between 1,000 ozs. and 2,000 ozs.	72 lots (say) 18.25
Between 900 ozs. and 1,000 ozs.	11 lots (say) 2.75
Between 800 ozs. and 900 ozs.	7 lots (say) 1.75
Between 700 ozs. and 800 ozs.	12 lots (say) 3
Between 600 ozs. and 700 ozs.	21 lots (say) 5.25
Between 500 ozs. and 600 ozs.	10 lots (say) 2.5
Between 400 ozs. and 500 ozs.	13 lots (say) 3.25
Between 300 ozs. and 400 ozs.	20 lots (say) 5
Between 200 ozs. and 300 ozs.	44 lots (say) 11.25
Between 100 ozs. and 200 ozs.	66 lots (say) 17
Less than 100 ozs. and	43 lots (say) 11

You are of course aware that while the greater part of shipments of cobalt have come to New York, some have gone abroad and many have gone to Copper Cliff.

It seems to me that this is a remarkable showing for a camp so young as Cobalt, the first car having reached our sampling works about the first of February, 1905.

Silver, of course, in point of value, is the more important element. The highest percentage of cobalt found in any one shipment is 11.96 per cent., the average being 5.99 per cent. The highest assay for nickel in any car is 12.49 per cent., the average being 3.66 per cent. The highest percentage of arsenic is 59.32 per cent., the average 27.12.

DISCUSSION.

Mr. Campbell—Could you tell us, in the case of these nuggets and of the silver, what it was which makes them less than one thousand fine?

Dr. Ledoux—There are mixed up with the nuggets other minerals; sulphides, arsenides, etc., and the gangue matter. We have paid no attention as to what reduces the fineness of the native silver—we do not know what it is.

*The above formed the subject for a brief address by Dr. A. R. Ledoux, following the reading of papers on the Cobalt District at the Toronto meeting, 1907.