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Anaconda Copper Mining Company

GEOLOGICAL DEPARTMENT

WALKER MINING COMPANY

OPERATIONS

October 1923 to September 1925

Letter to Mr. William B. Daly

September 30, 1925

By

Paul Billingsley

September 30, 1923

Mr. William H. Daly
Monument Building
Butte, Montana

Dear Sir:

Since my return to duty with the International Smelting Company I have studied carefully the operations at the Walker mine during the past of my absence, and I wish to place before you the conclusions to which I am driven by the data at hand.

A. I first examined the Walker mine in April, 1923, when it seemed necessary to me to emphasize the following points:

First. The main orebody, upon which all mining operations were then based, was not as large or as rich as was currently assumed. The estimated grade of ore, 4 percent, applied to a lesser width than would be broken in mining, and further dilution would occur in pulling the broken ore. The current estimation of ore reserves were based on mining widths, but the grade, on the full widths; so that while they gave a tonnage which would probably be mined, including the waste that could not be avoided, they gave also an exaggerated grade. In short, I felt that the 'quantity of copper paid for' that we could count on from this

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orebody did not exceed 50,000,000. (As of May 3, 1933)
 On October 15, 1933 Messrs. Hart, Arriola and myself
 agreed on iron 37,075,000 to 44,525,000 pounds of
 copper as the content of the remainder of the main
 orebody.

Second. The inevitable conclusion from this was that
 exploration work must be pushed with sufficient rapidity
 to enable new bodies of ore to be made ready for opening
 in time to keep up production when the main orebody
 should be exhausted.

Third. There were three obvious places to look for new
 orebodies:- southward on the main zone, northward on the
 main zone, and below the 7th level on the main ore sheet.
 Of these the latter was both least attractive and most
 expensive, and was not pushed, although this department
 made the necessary recommendations (On Oct. 15, 1933)

B. The development work at the south end disclosed a
 narrow ore sheet of high grade ore, and that at the north end
 found a large body of low percent ore. The former was found by
 May, 1934 and the latter was well outlined on the 6th level by
 August 1, 1934. Meanwhile, on April 1st, I had issued recommen-
 dations for the 7th level to be extended northward as a main
 hanging level for this north orebody, and for raises to be driven
 connecting the 6th with the 300.

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G. Since that time, however, and in spite of repeated recommendations from this office, little has been done in the way of systematic preparation for stoping. In these shrinkage stopes low costs can only be attained if proper methods are employed from the beginning. We feel in particular that it is necessary to avoid:

crooked haulage drifts.
Raices irregularly spaced and run crookedly.
Unnecessary expansion of sills.
Breaking into waste or wall rock.

As shown by the map of the miller to date, all these evils have been introduced in the preparation of the north orebody. The latest blue prints, for example, show a totally unnecessary sill drift on the 5th level - 695 - which is almost entirely outside of the boundaries of the orebody, as could have been seen from the existing crosscuts 686 and 687. While this unnecessary work has been done, the raices, which are necessary, have not been started.

D. I now wish to call your attention to the accompanying chart 1, which has been made to emphasize certain features of the miller operations since October 1, 1923, when the ore reserve situation was thrashed out in full.

It can be seen that the operations are divisible in three periods: 1st, that from October, 1923 to May, 1924, when the stopes of the main orebody between the 4th and 7th levels were being mined; 2nd, that from June, 1924 to February, 1925, when the main orebody was being mined above the 6th level; and 3rd, that since March, 1925.

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when there has been little stoping area left on the main orebody. In other words, during this time, most of the ore extracted has come from stopes the development and preparation costs of which had already been paid. For a well balanced operation, an equal amount of development and preparation should have been currently done on new ore, but while the explanation work itself was done on an adequate scale, the development and preparation work were permitted to fall far behind. This can be shown in figures. During the first period, October 1923 to May 1924, there were available for mining 1600 feet of backe in 520, 650 and 780 stopes; and during the second period, June 1924 to February 1925, 1100 feet in 520 and 650 stopes. During the third period, since February 1925, these stopes have been exhausted, leaving only pillars, with the result that the mill was supplied only by drawing nearly 15,000 tons from the broken ore reserve. To replace the 2700 feet of stoping backe exhausted since October, 1923, preparatory work has to date made available only about 100 feet on the North Orebody, and even this is inadequately provided with chutes.

3. The chart and the figures upon which it is based, prove fully the contention that dilution is a serious factor in Walker stoping. Since October, 1923, there have been milled 400,329 tons of ore. There remain in pillars about 250,000 tons, and in broken ore 150,000 tons, making a total of 650,000 tons of material in the entire orebody. But, the 400,000 tons milled yielded only 24,546,000 pounds of copper, or 22,530,000 pounds paid for; showing

an average grade of 3.05 percent against 4 percent average of samples of vein proper. In other words, the necessities of mining have caused the breaking, drawing and milling of about 30 percent of wall rock and waste. I am confident that the material included in the estimates of broken ore and pillars will be similarly diluted, and will yield no more copper per ton than did that already drawn and milled. On this basis there remains in the main orebody about 22,000,000 pounds of copper to cover the property until new stops are made available. Even this can be mined only at a rate determined by the practicability of robbing pillars, and much of it may be lost by caving and excessive dilution with waste. The dilution shown by the above figures can be and should be controlled to some extent by caving on the sub level.

F. Since operations have not been balanced in the way of stoping, development and preparation, it follows that operating costs during the past two years have not been a true measure of the cost of either copper. Hence they cannot be used directly in estimating the cost of producing copper from the north orebody unless an appropriate allowance is made for stoping preparation. Since the north orebody is of low grade, it is essential that this preparation be made on systematic programs, with no lost action. It is obvious from the maps and sections that this is not the case at present, and I feel that the situation is critical. Unnecessary expense such as the foot wall mill 69E, crooked sub level, etc., may so add to the cost of stoping preparation that the percent ore cannot subsequently be mined at a profit.

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6. Speed is also of the essence of the problem. I have already stated that the remnants of the main orebody cannot be extracted at a rate sufficient to feed the mill. The output of copper dropped from 1,000,000 pounds in July to 500,000 pounds in August, and is not expected to exceed 600,000 in September. It cost 8.75 cents in July, rose to 10.05 in August, and will reach 12.00 cents a pound in September. These figures mark the exhaustion of available ore in the Main Orebody and the inadequacy of existing substitutes. The only substitute that can be utilized promptly is the North Orebody. The new ore recently found at the south end will take months to develop, and sinking is a last resort to which the showing on the 7th level offers little encouragement. At present, therefore, it is essential to extend the sub levels on the north orebody as rapidly as possible, and simultaneously cut the chutes and open the cones at the bottom of the stopes. Rises must be pushed to the 500 and to the surface for ventilation. At best there will be some lean months ahead, but it is clear that no further time should be lost in preparing the North Orebody for stoping. It has always been difficult for us to convince the management at the miller mine that stope preparation was an essential stage in shrinkage mining, and that a proper allowance of time and money must be made for it.

I will write you further after I have visited the mine, which I plan to do in a few days.

WB/P

cc: Mr. Heath
Mr. Sales
Mr. Eiton

Very truly yours,

Paul Billingsley
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