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Hume Hotel,  
Nelson, B. C.

February 8, 1930.

Mr. Frank Eichelberger, Manager,  
Base Metals Mining Corporation,  
Field, B. C.

Dear Sir:-

My few days study of the underground geology of the Monarch Mine, just completed, has not brought to light any data of special importance, but has tended to strengthen the geological theories already held.

A description of the conditions observed in the new work follows:

Ore in Dolomite at Tramway Terminal:

In cutting out for the terminal of the aerial tramway, a little ore was found in the supposedly barren dolomites some forty or fifty feet below their contact with the ore-bearing limestones. The ore occurs in several easterly and westerly, nearly vertical fractures, and extends from them several feet out along certain bedding planes. There has been minor slipping along the fractures and the bedding planes of the adjacent rock are contorted and sometimes torn apart for a few feet from the fractures. The ore is bunched and not continuous. The minerals are galena, with very small amounts of pyrite around the borders, and calcite; - no zinc was noted. The galena occurs both in the calcite and in grains in the country rock which shows little alteration.

While the occurrence is interesting, it does not indicate that any valuable body of ore is likely to be found in the dolomite, since the dolomite is tougher than the ore-bearing limestones and resists brecciation and the entrance of ore-bearing solutions.

East Monarch:

The rich lead ore found in the south end of the East Monarch workings is accompanied by one or more faint longitudinal fractures of post-mineral origin, possibly also representing the course of pre-mineral fractures. The ore lies in a shallow trough, or minor syncline, and extends down practically to the top of the dolomite.

No bedding planes are discernible in the ore-bearing limestones and the structure can only be learned when the dolomite is exposed. Good exposures of the dolomite in the crosscut at the southwest corner of the Old Monarch stope, the crosscut at the end of #102 Drift, #126, and #128 crosscuts

all show a moderately steep dip at their extreme west ends which rapidly flattens under the orebody, and along the east edge of the ore (where exposed) sometimes has a slight westerly dip. It is probable that the ore will extend nearly back to the old stope at its southwest corner.

Examination of the ore under strong magnification shows galena in finely brecciated rock, accompanied by calcite and a little fine pyrite which occurs largely around the margins of the grains of galena. Little blende was noted.

West Monarch, #205 Drift etc.

No data were obtained as to the structure here, as the dolomite has not been exposed. There is little visible evidence of fracturing. The face of the drift has apparently reached the footwall of the orebody; the west crosscut shows waste in the bottom, which is also presumably the footwall, but the ore should extend some distance further westward up the dip. To the eastward waste, possibly a horse, shows in the bottom of the crosscut although the limit of the orebody is not yet due.

It seems quite definite that the orebody is narrowing (east and west), and that this narrowing is accompanied by a material increase in the metal content of the ore. Both galena and blende occur in considerable quantities; while they are often in contact they are seldom intimately mixed, and are accompanied by calcite which is sometimes intergrown with the metallic minerals, and sometimes filling post-metal fractures.

There seems to be no definite change in the structure of the ore from that at the north end of the orebody.

West Monarch, Stopes:

Stoping has hardly progressed far enough to afford data as to whether the ore as mined is checking well with the estimated values.

The stoping operations have not thrown any particular light on the fissuring; apparently in some cases the fissures have slightly enriched the ore, but more frequently they have somewhat impoverished it.

No new exposures of the dolomite have been made, so nothing new was learned of the structure, beyond the former indications that the ore occurred in a minor syncline.

Under strong magnification the galena and blende are usually seen to be separate, but in occasional specimens there is an intimate mixture. Calcite occurs with both metals and also alone both as a replacement of the rock and in fractures. There is little pyrite.

Occurrence and Origin:

No new data were gathered having any important bearing on the origin and occurrence of the ore. As far as the data goes it points to the orebodies occurring in

flat synclines, or wrinkles, which are accompanied by fracturing which is not proven to have any connection with the formation of the ore.

The presence of ore in the dolomite, associated with fractures, might be taken to indicate that the ore solutions rose through the fissures spreading out and depositing in the highly brecciated and easily replaceable limestones above. There is however no alteration along the observable fissures, such as would be expected if they were ore channels, and no orebody is known to have existed above them. So far as the evidence goes the galena might be of secondary origin and deposited from downward percolating meteoric waters.

Lacking any evidence to the contrary, the most acceptable theory of the origin of the orebodies seems to be that magmatic solutions, originating somewhere in depth to the northeast, followed the minor synclines where the brecciation was most intense, upward to the southwest, depositing their minerals on the way. In partial support of this theory is the reported presence of beds of marble about two miles to the northeast, indicating the presence of igneous rocks in that vicinity. In the Kicking Horse mine zinc considerably predominates over lead, and in the Monarch there is a slight increase in the ratio of lead to zinc from the north to the south end of the orebody.

Since sphalerite tends to precipitate sooner than galena from rising, cooling solutions, the observed occurrences are such as would be expected from deposition by solutions flowing upward to the southwest through the brecciated zones.

#### Recommendations:

It is hardly necessary to say that development should be continued to the southward on both the East and West Monarch orebodies.

Exploratory work for new orebodies should be undertaken soon, somewhat as follows:-

1. Raise vertically from the Incline between the East and West Monarch at a point 100 feet above survey station #125. Such a raise will start in the dolomite, go up along fractures parallel to the known orebodies, and through the middle of a small syncline. The conditions here are entirely similar to those existing under the known orebodies.

This exploration, while rather a long shot, will be inexpensive, since the ore zone should be found within about twenty feet.

2. Start exploration for a new orebody to the west of the West Monarch. The presence of such an orebody is suggested by reddish stained rock, lying in a syncline, some three or four hundred feet west of the West orebody. The outcrop is not accessible but may be seen with glasses from the Kicking Horse side. The most feasible method for such exploration would appear to be the extension of the

present incline, which should be driven in the limestones  
ten or fifteen feet above the dolomite contact.

Yours very truly,

*Probably from C.C. Stover  
who stayed at the Home Hotel*