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RENO, NEVADA,
February 18, 1921.

Mr. F. Sommer Schmidt, Manager,
Copper Canyon Mining Company,
Battle Mountain, Nevada.

My dear Mr. Schmidt:-

During my recent visit to the Copper Basin Property I had my first opportunity to look over the beautifully illustrated report and maps submitted by Professor Bastin and find them very suggestive. The surface maps are an honest effort to subdivide the sedimentary rocks into mapable units and decipher some of the structural features under great difficulties and will prove to be of considerable assistance in the future work. While there are many features, especially along the lines of economics and mining engineering that I wholly disagree with, yet I wish to bear tribute to the efforts made to unravel the essential geological features, that have a bearing on the origin and location of the ore bodies under an enigmatic surface largely covered with soil. It is always an aid and stimulation to the man on the ground to have his work reviewd by another, and from the ideas suggested I believe we will be able to cull those that will test true and helpful to the more rapid and economical development of the property.

In comparing his work with that done previously, we should remember that his results and conclusions are based on a single visit even though the time seemed sufficient and had he had the advantage we have enjoyed of watching the development of the various mine openings from the very beginning of the present campaign of development he probably would have been lead to entirely different conclusions. We have had the opportunity to consider practically all of his reasonable hypotheses at one stage or another and test them out, so that now we are in possession of a fund of knowledge and information about the property that would be exceedingly difficult for any man to acquire in a single visit. In stating some of the geological points on which I differ radically from Professor Bastin I trust you will accept them as a honest unbiased difference of opinion based on an experience with the property ever since the first work was done in the search of bodies of disseminated sulphide ore.

I do not believe it is possible to say that the territory developed so far is essentially any more favorable than any of the remainder of the area he examined in detail. Had he visited the property before any of the deeper development work had been done, he, if consistant, would have eliminated all butthe Glory Hole and Sweet Marie; for there was nothing exposed on the surface to suggest the ore bodies since developed at the Chase, Contention and Widow shafts. Further the better grade ore bodies in the Sweet Marie are not under the fine surface showing of the Glory hole, but lie to the north under what appears to be a barren zone. You will find practically all of the criteria enumerated by him for surface indications in my reports of two years ago and while they hold good, When you can get down to the surface, yet we have already demonstrated that their absence does not preclude the existance of

large ore bodies below I do not think it is safe, therefore, to say "Here you will find ore, There you will not", from surface indications alone. Every one of our present ore bodies have been located by a careful study of the underground work and a logical application of the principles involved.

I believe that Bastin has erred in including the dikes traced across the Sweet Marie past the Chase with the prolematical area of what I, perhaps unfortunately, have called "Pseudo-prophyry". The rocks are entirely different both as to composition and degree of metamorphism and I know that the dikes cut the older rock. I have always admitted that "pseudo-porphyry" has been a misnomer, but have used it for want of a better name. It represents a contact phase of the larger mass of monzonite that underlies the area and cannot be separated from the contact metamorphic phase of the sedimentaries. Consequently, it is made up of both porphyry and metamorphosed sedimentaries but whatever it be called it is an established fact that it is older than the dikes and in large masses had little to do with the primary deposition of the ore.

The primary ore shoots lie in the zones of metamorphic rock which I have called "chlorite rock" on my maps and in my reports, as Bastin demonstrated unknowingly by his assays of the sulphides. Our richest ore bodies lie in the bleached and altered phases of the chlorite rock, which Bastin has erroneously included with the claystones. My previous reports are a history of the testing of every available hypothesis suggested by field evidence, previous experience, and the literature, until now I believe we have finally reached the true criteria that will enable us to develop the future ore bodies with a minimum of blind work.

I regret that Professor Bastin felt it necessary to call in a tremendous thrust fault to explain the conglomerate capping the hills about the property. Had he been more familiar with Nevada he would have known that thrust faulting is entirely absent as may be seen by reading any of the reports of previous structural studies by some of the most eminent geologists that have ever worked in the state. There are several simpler explanations, such as unconformity or differential silicification that would have served equally well. As to the Sweet Marie fault you will remember that I worked out the displacement on it on the basis of normal faulting and predicted ahead of the development work exactly where you would encounter the north dike in the foot wall in the South drift from the east end of the north 4 east. The finding of the dike where it was predicted is a fair demonstration of the normal movement on the fault.

I believe it is well that he recommended that the Sweet Marie shaft be sunk to its present level and with the connection made with the winze, I believe we will have the necessary evidence to determine the actual position and movement on the fault.

The drilling campaign recommended may lead to valuable information, but only because we are now in a position to properly interpret the results in the light of our underground experience. It must be borne in mind, however, that a drill hole gives but a limited amount of information and must be followed

eventually by underground work in the more favorable localities punctured by the drill. The past experience of the former companies and our present knowledge of the occurence of the ore bodies should not allow us to become discouraged because of the failure of the drill holes to disclose ore. Our past experience has shown us that by following the clues given us in the mine workings we can develop a large tonnage such as we now have and we should consider the information gained from the drill only as evidence from very narrow and inaccessable openings. I am not certain but the cheaper method of prospecting with a drill is more than offset by the fuller information gained from the mine openings, but the line of drill holes now in progress will give us an opportunity to test the value of systematic drilling and is a valuable experiment.

Without going further into detail the reports and maps will aid in the future work as stimulating further ideas and although I feel that certain of the conclusions are founded on insufficient evidence and erroneous interpretations, yet I am glad of the opportunity to have an independent study for comparison.

The specific recommendations I wish to make at this time are as follows:

Sweet Marie:

Shaft. The shaft is now down fifty four feet below the lower level. I recommend that you connect with the winze from the lower level at this time before deepening the shaft further to cut the fault, and determine the grade of the ore in the handing wall as partially developed in the winze. It should be of higher grade against the fault.

200 Level:

Drive a crosscut from the last station in the north drift to cut through the chlorite rock and develop the ore that should underly the gossan in the upper level against the intersection of the fault and the chlorite bed.

Widow:

200 Level:

Continue the north 6 west about forty feet through the foot wall of the Widow fault and continue drifting on the fault. The Widow fault has been offset to the west by a transverse fault striking nearly east and west and dipping 84 degrees south about ten feet from the crosscut.

Sink the winze in the north drift to the foot wall of the fault, (Widow fault) then follow the fault down its dip. There is evidently a body of high grade ore formed at the triple intersection of the chlorite rock, Widow fault, and the transverse fault.

Drive the south 2½ west to prospect the ground adjacent to the dike which the cross cut has cut at a slight angle and at a distance of fifteen feet is in the south wall of the crosscut.

Empire:

Raise and drift north at the forty foot mark in the north drift

The apparent vertical attitude of the beds at this point is due to closely spaced joints or sheeting, which has evidently controlled the deposition of both primary and secondary ore. As the bedding is actually hearly horizontal, the raise will have the advantage of determining whether any of the overlying beds were more susceptible to mineralization and the drift leads towards one of the best gossans on the surface where the sheeting apparently has been responsible for the carbonate ores mined in earlier days. Should this zone prove larger with development, the one found at the bottom of the shaft can then be prospected.

I am beginning a series of experimentstto determine whether Bastin's conclusion that much of the copper has been carried to depths practically inaccessable is true. My own opinion is that there has been but little of the copper removed beyond our reach, for after the copper has oncebeen precipitated as chalcocite it oxidized over to cuprite and is relatively insoluble. I am sure that chalcocitization may take place in clayey material high above the water table and believe I can demonstrate it by laboratory experiments. Because a raise goes directly from primary ore into barren gossan signifies only that the copper has descended along the beds to a lower level and the work recommended from the north drift in the Sweet Marie I believe will prove the point. Further the greater part of the enrichment that makes the ore probably took place before the rhyolite flow covered the area, for it is one of the axioms of geology that a coarse grained igenous rock cools and solidifies under at least a half mile of cofer. This cover was removed and exposed the monzonite*/below the old surface over which the rhyolite flowed. The bulk of the enrichment must have taken place during the period when the greater part of the erosion and weathering occurred.

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Further we know that in hostoric times the level of the ground water must have been much higher than at present. In working out the history of the ancient lake Lahontan (that occupied so much of Nevada and came as far east as Galconda) in connection with the exploration for potash salts, it was found that the lake reached its high water mark not over a thousand years ago, and that Nevada at that time had about two and a half times its present rainfall. We have no evidence as to the heighth of the water table during the long period of erosion that occurred between the intrusion of the monzonite and the outflow of the rhyolite other than the present position of the chalcocite, but with the possibilities of local elevated water tables and the fact that a considerable amount of clay exists in the basins formed by the beds and the westward dipping faults, I do not believe much of the copper once taken into solution escaped from the area without precipitation on the abundant sulphides within reach.

However the proof of the pudding is in the eating and the essential problem is to locate the ore bodies rather than work out the geological features that have little bearing on the problem. With the work outlined for the immediate future, I believe we will know all essential facts at no very distant date.

Sincerely yours,

(Sgd.) J. C. Jones.