Relation of Faulting and Mineralization in Goldfield

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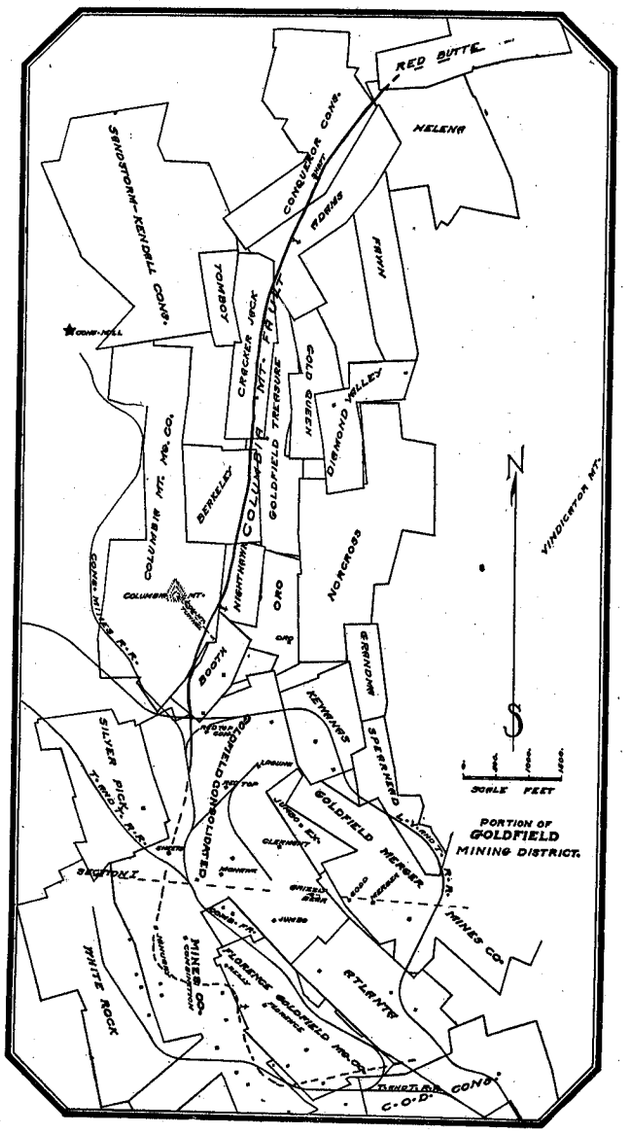
That portion of the Goldfield mining district which has so far proved the most productive, includes the Goldfield Consolidated and Florence mines, and it is here intended to point out the relation existing between the Columbia Mountain fault and this mineralization.

System of Fissuring

F. L. Ransome, in his report on the Goldfield district, suggested a relation between this fault and



GOLDFIELD DISTRICT.

the ore deposits of this portion of the district, but while the extent and character of the fault were well demonstrated, there was not at that time sufficient development in the underground workings to determine its relation to the ore deposits. Later developments have furnished information from which this relation may be deduced, and the general system of mineralization outlined.

This fault, as shown on the plan map, is traceable along the surface from its northern end near the Conqueror mine shaft, south a distance of some two miles to the vicinity of the Red Top, where it disappears beneath the dacite. It may be followed underground from here fairly close to its southern end, by means of the relative positions of the different formations, as disclosed in the underground workings. Its approximate position on the surface south of the Red Top is indicated on the map by a dotted line.

Between the January and the Florence it makes a sharp bend to the east, and then again to the south to its southern extremity, where it ends at an east-west fault. At its northern extremity the manner of its ending has not been disclosed, but it appears here also to end at an east-west fault which probably extends to Diamondfield. The dip of the fault is to the east, all that part north from the January having a regular dip, averaging about 28 degrees. From the Florence south the dip is much steeper to the east, the amount of which has not as yet been determined, but is probably about 60 degrees.

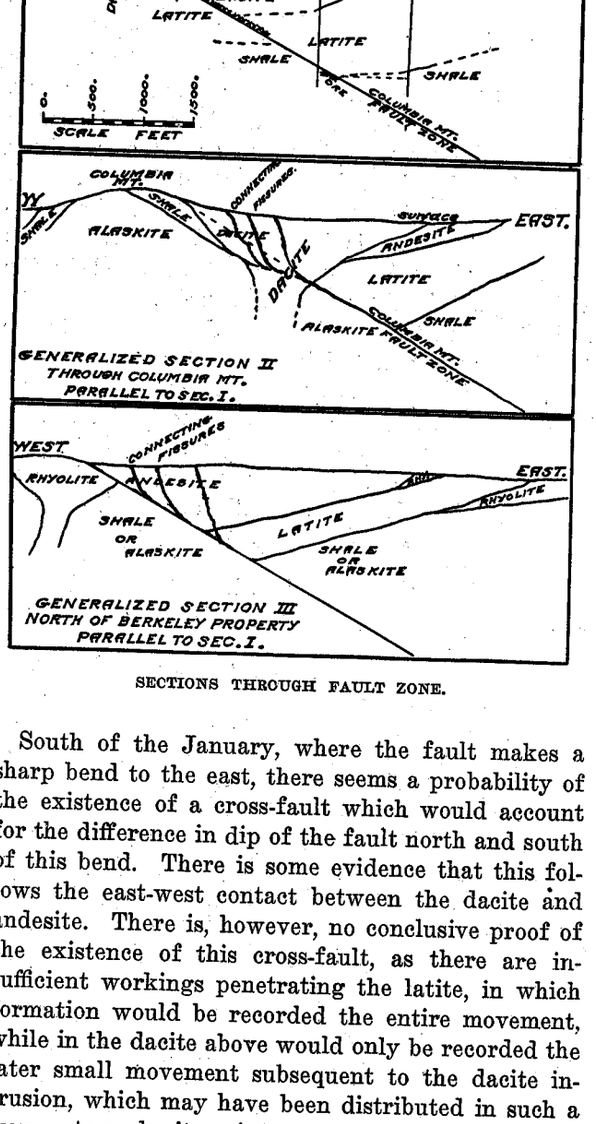
Mr. Ransome has concluded that the main movement of the Columbia Mountain fault was prior to the dacite intrusion, and that it occurred in the andesite and in the underlying rocks. Then came the intrusion of the dacite through the latite, to the fault and across it, and into the latite-andesite contact, lifting up the andesite which has in places since been eroded leaving the dacite at the surface. This conclusion has been disputed by some, but there seems abundance of evidence to support it, and Ransome's idea is now generally accepted.

Situation of Fault Zone

Section I, as shown in the illustration, is through the Mohawk, Grizzly Bear, and Merger Mines Co. shafts. This section furnishes data for a close location of the fault zone on its dip, and work now in progress on the Grizzly Bear and the shaft of the Merger Mines Co. will still further demonstrate it. The fault zone, shown in this section on its dip, is approximately the sloping fault-contacts of dacite with latite, and latite with shale, and at deeper workings probably the fault-contact of shale with alaskite. The downward throw on the east side of the fault has not been sufficient in amount to allow the approximately horizontal layers of latite and shale to entirely pass their corresponding layers on the west side; therefore, the fault zone in places passes through latite upon both sides, and similarly through shale. In consequence of the dacite intrusion across this fault along a portion of its length, which practically obliterated it to a depth of some three hundred feet, it follows that the relative position of the geological formations caused by the fault do not properly show above or at this intrusion, though they do below it.

After the dacite intrusion, there has been a further small movement along this fault zone, and where the intruded dacite lies across the upward extension of the zone, no pre-existing fracture is present; and the movement, while following in general the extension, has been recorded in irregular

fractures extending upward to the surface, having a steeper dip and connecting below with the fault as shown in section I. The mass of eruptives and solidified dacite intrusion has settled irregularly, due to the additional movement of the fault in its original position below, and we consequently find many irregular fractures extending from this fault zone to the surface. These fractures connect below and finally with depth merge with the original fault zone; the foot-wall of which in effect forms the foot-wall of the mineralization.



SECTIONS THROUGH FAULT ZONE.

South of the January, where the fault makes a sharp bend to the east, there seems a probability of the existence of a cross-fault which would account for the difference in dip of the fault north and south of this bend. There is some evidence that this follows the east-west contact between the dacite and andesite. There is, however, no conclusive proof of the existence of this cross-fault, as there are insufficient workings penetrating the latite, in which formation would be recorded the entire movement, while in the dacite above would only be recorded the later small movement subsequent to the dacite intrusion, which may have been distributed in such a way as to make its existence not apparent.

As shown in section I, a cross-cut west from the Mohawk shaft on the 450-ft. level penetrates a body of dacite, the position of which indicates that it is a dike, and while there are not workings enough at proper depth to the north to prove it all, the evidence supports the idea that this is a dike of dacite with a north-south direction with apparently greater width north of the Laguna, which is probably the source of a portion of the dacite intrusion. If this dike is as suggested, and wider to the north of the Laguna, it will be expected that the fault in breaking its way upward through this dacite will show greater irregularity than would otherwise be expected. Generalized section II illustrates this situation and practically represents the conditions existing as far north as the end of the dacite area, in the vicinity of the Berkeley property.

Mineralization

The various orebodies of the Goldfield Consolidated and the Florence mines are directly connected with this Columbia Mountain fault zone; all of them being either in the zone itself or in the irregular fractures extending from it upward. It seems reasonable, therefore, to conclude that this fault has been the connecting channel to the deep seated source of mineralization, and the path for mineralizing solutions.

What is believed to be primary ore has already beeen found on the 1300-ft. level of the Grizzly Bear in this fault zone. The natural tendency, in a fault as flat as this, is a closing of the fracture by compression, and the consequent difficulty of the circulating waters to maintain their open channels. This accounts for the larger size of the orebodies in the upper and more nearly vertical and irregular connecting fissures than in the main channel below. It is reasonable to expect that the deposition of mineral in the channel itself as depth is increased will be of less thickness, while in the steeper intersecting veins it will not be so much restricted.

Relation of Mineralization to Faults

The mineralization appears to depend entirely upon the system of fissuring, and there appears to be no essential relation between the ore deposits and the different kinds of eruptive rock in which they exist, and references to the different kinds of rock are made here for the purpose of exhibiting the system of faulting and fissuring. There has been some cross-faulting both prior to and after the deposition of the ore, which has not been mentioned here, and has to some extent modified the uniformity of the fault and connecting fissures, but has not substantially altered the general scheme.

To the north of the Berkeley property the conditions are somewhat simplified by the absence of the dacite intrusion. This situation is represented in generalized section III. Some ore has been found in the fault zone at the Conqueror mine, which leads to the inference that there are connections along the zone to the source of the mineral solutions, through which they have penetrated this far to the north. There may be a branch from this fault or a connecting fissure extending farther to the west, which has mineralized the area including the Sandstorm and Kendall properties. This system of connected faults and branching fractures is by no means unusual and many notable similar instances are found in mining camps throughout the country. It is not intended here to convey the idea that there are not other sources of mineralization for other portions of this district, or that there may not be many more connecting mineralized fractures extending from this system, which as yet remain undiscovered and which the future will reveal.