

Geological Report on the Property of the
Arizona-Globe Copper Company.

Introductory Statement.

This report is based on data collected during two consecutive days spent on the property at the request of John Stockdale, Esquire. The time thus occupied was insufficient to permit me to trace the many smaller veins existing on the property or to visit surrounding mines. As I am planning to make another trip to the property in the course of the next few days I hope to secure considerable additional data which I shall embody in a supplementary report.

Topography:

The topography on the property is decidedly mountainous, many of the slopes making at least a 30° angle with a horizontal plane. One prominent gulch roughly parallels the main fault mentioned later, to the southeast; and a smaller gulch tributary to the one just mentioned cuts across the fault from the northwest. These two gulches will in this report be called the main gulch and the tributary gulch, respectively.

Geology of the District:

The property of the Arizona-Globe Copper Company lies in the midst of an extensive area of Pinal Schist near the southwestern corner of the Globe quadrangle as mapped by the United States Geological Survey. A large dike of diabase is mapped as occurring northwest of the property, but no rock other than schist was seen during my stay on the ground. The schist was

undoubtedly once covered with thick deposits of quartzite, limestone, and other rock; but there have all been removed by erosion.

On the property is a prominent fault which strikes on an average about S. 40° W., and dips 40° to the northwest. The slipping or faulting has not taken place along a single, clean-cut fracture, but, on the other hand, the movement has occurred along a large number of rather closely spaced fault planes throughout a zone some fifty feet wide. This fault is shown in the Globe folio of the United States Geological Survey, written by F. L. Ransome in 1902, and is there given as being about a mile long. Just how much of this fault is included in the property under consideration cannot be determined until the boundaries of this property have been accurately located; but it seems certain that many hundreds, and probably one or two thousand, feet are present.

Character of the Ore Deposits:

The principle deposit, or, at least, that which has been most extensively developed, occurs in connection with the fault zone just described. The mineralizing solutions doubtless worked upward from far below along the lines of weakness represented by the fault planes, and deposited ore and gangue minerals in one or more of these planes, forming fault fissure veins.

The ore minerals are principally pyrite (iron sulphide) and chalcopyrite (copper-iron sulphide), with a very little chalcocite (copper sulphide), and occasional small amounts of sphalerite (zinc sulphide) and galena (lead sulphide) in the upper levels. Near the surface the ore minerals have been entirely leached out with the exception of the iron which has been oxidized and now exists

as either limonite (hydrous iron oxide) or hematite (iron oxide). A few feet below the surface copper carbonate and a little copper silicate appear, and these are plentiful down to about the 200-foot level, although they are more or less closely associated with sulphide ores which appear comparatively close to the surface and become increasingly prominent as depth is attained. On the 400-foot level these oxidized ores seem to be entirely lacking excepting in the workings where the sulphides have been altered by exposure to the air. There is no doubt but that the ore from here down is entirely primary, although some of the sulphides show an irridescent tarnish which represents insipient alteration.

The gangue minerals are quartz with decidedly subordinate amounts of calcite and rhodochrosite. It is worthy of note that the last named mineral seems to accompany good ore in the Globe district.

Numerous veins which seem to bear a close resemblance to the deposit previously described outcrop in the tributary gulch. They strike nearly east and west and are nearly vertical. Whether they are simple fissure veins or fault fissure veins cannot be ascertained without further investigations, but they appear to be identical in character with the main deposit already described. One of these deposits has been worked rather extensively, and is said to have yielded good ore.

Possibility of Secondary Enrichment.

I do not believe that any enriched deposit of copper ore will be encountered at greater depth. I base this conclusion upon the following facts:

1. There has been very little actual leaching of that portion of the deposit above the 400-foot level. In fact most of this leaching is confined to a few feet directly below the outcrop. Below the leached outcrop there has been considerable oxidation, but the grade of this ore seems to compare so favorably with that of the unoxidized sulphides below that it seems likely that little copper has been carried downward in solution.

2. There is no doubt of the primary character of the ore exposed in the lowest workings and for some distance above these points. Enrichments usually occur between oxidized ore and primary sulphides. It seems so very improbable that copper bearing solutions could have descended through the primary sulphides without leaving some trace of their passage that the possibility does not seem worthy of consideration.

Probable Persistence of the Main Ore Deposit:

Fault fissure veins are probably the most persistent of all types of ore deposits. They may be expected to go down to a depth at least as great as their horizontal length, and the last mentioned dimension is usually large. They are, however, very apt to show great irregularity, especially in thickness. Swells and pinches usually alternate frequently, both horizontally and vertically; and the richest mineralized portions may be expected to take a tortuous course throughout the faulted zone. It is to be expected that almost barren stringers will lead into good ore shoots, and that at some points there may be several good parallel ore shoots separated by lower grade milling ore.

There is no reason to expect any great difference in the average grade of ore shoots as the property is developed to greater depth, and future development plans should be laid on the basis of the ore now exposed or which will be exposed with a little additional work, rather than upon the assumption that better ore will be encountered at greater depth.

Recommendations:

I should recommend that the entire faulted zone be cross-cut at the 400-foot and 450-foot levels, and that these crosscuts be carefully sampled. If a considerable quantity of ore which can be milled profitably is thus exposed, I should further recommend that either the present shaft be sunk deeper, and the fault zone crosscut every fifty feet; or that the tunnel started near the bottom of the main gulch be driven to intersect the vein. When the survey about to be made is completed it will be possible to decide which of these two plans should be followed. Some drifting along the fault will also be desirable.

The transportation problem is so serious that I do not believe it is wise to try to develop any shipping ore. The property should be regarded as a milling proposition and a small mill should be installed near the bottom of the main gulch when sufficient ore has been developed to justify such action. I believe that enough water to run such a mill can be obtained throughout the year by pumping.

Conclusion:

I regard the property of the Arizona-Globe Copper Company as one of the most promising that I have had the privilege of examining for some time. While I took no samples and made no

attempt to measure up the ore now exposed, there seems to me to be little doubt that at least the main fault zone can be worked profitably as a milling proposition, provided the price of copper does not fall too low. If the smaller veins exposed in the tributary gulch fork off from or intersect the main fault zone, large ore bodies may be expected at their intersection. An attempt will be made to locate these points when the property is surveyed.

As the amount of money required to do the development work suggested is not large, and as the cost of the property does not appear to be unreasonable, I regard the proposition as an extremely promising speculation, and heartily recommend its further consideration.

Respectfully submitted,

A handwritten signature in cursive script, appearing to read "J. M. Butler". The signature is written in dark ink and is positioned below the typed name "J. M. Butler".

December 16, 1918.