Late Paleozoic

Mountain City Copper

Mesothermal

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Item 39

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Notes

The Mountain City copper deposit is located some 75 miles slightly west of north from Elko and only about 10 miles south of the Idaho line.

The rocks of the district consist of the Ordovician Valmy (or Rio Tinto) formation and several upper Paleozoic units that lie unconformably on the Valmy. The Valmy belongs to Roberts' (1958) detrital volcanic (western) assemblage of eugeosynclinal rocks; the other two assemblages are: (1) the carbonate (eastern) miogeosynclinal and (2) transitional intermediate in character between the eastern and western. The upper Paleozoic rocks consist of clastics and largely intermediate to mafic volcanic rocks that range in age from Devonian or Mississippian to Pennsylvanian or Permian. None of the formations in the sequence resembles either the Precambrian or Triassic rocks of the general area. Within this series of formations, the probably Pennsylvanian, certainly Carboniferous, Nelson formation (originally designated as an amphibolite) consists largely of flows and tuff breccias of andesitic composition, with minor sills of diabase and one lens of rhyolitic tuff. It is a greenschist in the mine area. This formation is of particular importance since Coats and Stephens (1968) believe that the ore fluids came from the same magmatic source as the mafic volcanic materials of which this formation is composed. If their reasoning is correct, then the ores are late Paleozoic in age. They base their decision on comparison of the deposit with a number of others from various parts of the world such as those of the Huelva province; Shasta County and the Foothill belt in California; several in the Urals, of which Pychmisko-Klutchevsky is most like Mountain City; Cyprus; and most of the massive copper deposits of Scandinavia and Canada; Ergani Maden in Turkey; and Rammelsburg and others of that type. Just what the reasoning is that justifies this conclusion is not clear. If the deposits are related in time and source to this mafic volcanism, then this source magma underlies and presumably is younger than the regionally metamorphosed Mountain City and Reservation Hill formations. Further, Coats and Stephens argue that the regional metamorphism of the area is entirely pre-ore. Thus, the ore can hardly have been introduced until after the Reservation Hill was lithified and metamorphosed, presumably appreciably after the mafic volcanism that produced the Nelson formation. Despite the stratabound character of the ores, Coats and Stephens believe that the texture of the ores, the structure of the ore body, and the relationship of the ore to structures in the country rock all indicate that the ores are epigenetic; this would seem to be confirmed by the presence of an envelope of wall-rock alteration around the ore that is most intense near the sulfide lenses and gradually dies out away

from the ore. Granted
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Pliocene volcanic rock
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both chalcopyrite (fi
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Late Mesozoic to Early Tertiary

Cameron, E. N., and
Econ. Geol. Mono.

Hess, F. L., 1933, P

Jenney, C. P., 1935,
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Kerr, P. F., 1938, T
v. 23, p. 390-427

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Mem. 15, 241 p. (

Landes, K. K., 1933,
v. 18, p. 33-56,

Schaller, W. T., 193
(Lindgren Volume)

Shand, S. J., 1947,
Wiley & Sons, Inc

from the ore. Granted the nonmetamorphosed character of the ore and its epigenetic characteristics, it must have been introduced after the metamorphism within the Paleozoic and before the extrusion of the late Eocene to early Pliocene volcanic rocks. Although a Late Cretaceous quartz monzonite pluton is known on the surface less than a mile from the mine, and the ore fluids may have come from the same source as this body, it seems more reasonable to assume that the ore fluids came from the magma chamber from which the andesite of the Pennsylvanian Nelson formation came. The ores, therefore, here are considered to be late Paleozoic in age.

The primary ore bodies of the district occur as disc-shaped lenses in a portion of the Valmy formation that consists of dark shales with a little interbedded quartzite. This horizon has a maximum thickness of 200 feet. Although the ore lenses commonly are parallel to the stratification, they cut across it in places. Many of the lenses are massive bodies of quartz, pyrite, and chalcopyrite; no great difference exists in sulfide ratios from one lens to another, and no significant change in ratios is found within any single lens. In addition to the massive ore type, Coats and Stephens also recognize (1) a dark-gray quartzite type in which silicification is erratic, chalcopyrite is more abundant than pyrite, and the sulfides cut the quartzite in random directions; (2) a dark-quartz type in which the lens has been completely silicified and the sulfides occur as streaks and blobs and only rarely are accompanied by later white quartz; (3) banded white-quartz type in which the ore is in distinct layers, with the attitude of the layers seldom parallel to the attitude of the lens; later this quartz was crackled and glassy quartz, pyrite, and chalcopyrite were emplaced in that order.

The primary mineralization is of so simple a character that it might have been produced in any intensity range. The wall-rock alteration, however, consists of chlorite and clay minerals and suggests that the ores probably were formed in the mesothermal range.

The deposit has been tremendously enriched by secondary processes. The massive secondary ore has largely removed the primary ore textures, replacing both chalcopyrite (first) and pyrite (later) with sooty and massive secondary chalcocite. The oxidized zone above the then-existing water table seems to have been almost completely leached of copper, so the gossan gave essentially no clue to the high-grade ore below. The enrichment would, of course, be classified as ground water-B2.

OREANA

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