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PRELIMINARY REPORT

REDMOND LEAD-ZINC MINE, HAYWOOD COUNTY, N. C.

By
G. H. Espenshade, M. H. Staatz, and E. A. Brown

October 1947

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ABSTRACT

The Redmond lead-zinc mine lies in the foothills of the Great Smoky Mountains, about 12 miles north of Waynesville, N. C. When visited in 1943, the ore deposit was being explored by the Haywood Mining Corporation, aided by an R. F. C. loan. The ore deposit consists of several sulfide-bearing quartz lenses that occur near the contact of a granite gneiss and mica schist over an exposed length of 250 feet. Its southeastern extension is covered by alluvium. The quartz lenses plunge 60° or more in a direction about S30°E. They are less than 100 feet long and have an average width of 4 to 5 feet. The principal ore minerals are galena and sphalerite; chalcopyrite is a minor constituent of the ore. Quartz and fluorite are the chief gangue minerals. Production from the mine has been small. Any future exploration of the deposit should be directed toward the covered portion of the vein system as well as the downward extension of the exposed lenses that have already been explored.

Introduction— The present report on the Redmond mine is based upon three weeks' field work by the writers in June and July, 1943, and a brief visit to the mine in November 1943. The mine was examined in July 1940, by a geologist of the T. V. A., in 1942 by R. F. C. engineers, and in 1943 by C. J. Cohen of the Bureau of Mines.

Location— The Redmond lead-zinc mine lies in the foothills of the Great Smoky Mountains, about 12 miles north of Waynesville, the county seat of Haywood County, N. C. The mine is about 18 miles by road from Waynesville, and is reached by following route N. C. 209 to Cove, and thence traveling northwest on a dirt road along the valley of Pines Creek. Waterville Lake is half a mile south of the mine.

History— The outcrop of the Redmond ore deposit is said to have been discovered by R. J. Rathbone about 1905. A shallow shaft, 25 to 30 feet deep, was sunk soon afterwards. About 1925 another shaft was sunk by Rathbone and Adkins to a depth of 20 feet, at the point which is now the north end of the open cut. In 1929-30 the U. S. Smelting, Refining and Mining Co. carried out a brief exploration program under the supervision of H. D. McDonald. Thirty men were employed for ninety days deepening the Rathbone-Adkins shaft to about 40 feet, and digging trenches to trace the ore deposit to the north. In 1934-35 a small amount of open-cut work was done south of the Rathbond-Adkins shaft. The Haywood Mining Corp. completed the open cut in 1939-40. The mine remained idle from that period until April 1, 1943, when the Haywood Mining Corp., aided by a loan from the R. F. C., began a drift from the north end of the open cut under the direction of B. D. Cassady of Waynesville.

Production— In 1940, 44.5 tons of hand-picked ore assaying 12.1% Pb and 6.5% Zn were shipped to the Ozark Smelting and Refining Co., Coffeyville, Kansas.

Development— An open cut and adit, having a combined length of 245 feet, are the principal openings in the Redmond ore deposit. The Rathbone-Adkins shaft was obliterated by the open cut. To the north of the open cut the ore deposit has been traced by pits and deep trenches dug by the U. S. S., R. and M. Co. The ore deposit has not been explored in the valley bottom south of the open cut. In 1941 six drill holes were bored on the deposit. Only drill hole 1 was significant (see figure 2), the others 20 to 60 feet long, were poorly located.

Geology— The principal types of rocks at the Redmond mine are granitic gneiss, tough mica schist, and fine-grained chlorite schist. The first two rock types may be the equivalents of the Max Patch granite and the Snowbird formation mapped by Keith 1/ in the Asheville quadrangle to the east of the

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1/ Keith, Arthur, U. S. Geol. Survey Geol. Atlas, Asheville folio (No. 116), 1904.

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mine area. The granitic gneiss at the Redmond mine has a medium-to coarse-grained texture, and is gray to brown in color. The rock is composed of quartz, large feldspar crystals, and irregular aggregates of fine-grained biotite or chlorite. A strong gneissic structure has been developed and the feldspars are commonly mashed. The mica schist is a tough, tan-colored, fine-grained schist which carries garnets in places. Along the walls of the vein, and at a number of places in the granite, is a greenish-black, fine-grained chlorite schist. This schist is probably highly sheared and

chloritized granite in a shear zone enclosing the ore deposit, or could possibly be inclusions in the granite of the mica schist which has been chloritized. The ore deposit is made up of sulfide-bearing quartz lenses, and lies near the granite-schist contact.

Structure— Both the granitic gneiss and the mica schist have a well-developed foliation. In the schist the foliation strikes northwest and dips southwest at angles of 50 to 75 degrees. The foliation of the granitic gneiss generally strikes to the north or northeast, and dips 60 degrees or more to the east. The opposing strikes and dips of the foliation of the granitic gneiss and the mica schist are probably indicative of a fault contact between the rocks. East of the open cut, the granitic gneiss is much less sheared than it is near the open cut, which also suggests the presence of a fault. Linear structures, consisting largely of an alinement of minerals and striations, are present nearly everywhere in the country rocks and also occur in the quartz lenses. The orientation of the linear elements is quite uniform, plunging S 20° E to S 40° E at angles of 60 degrees or more.

Structure of the ore deposit— The Redmond ore deposit is made up of a system of disconnected sulfide-bearing quartz lenses lying in what appears to be a chloritized shear zone near the contact of granitic gneiss and schist. The vein system is exposed for about 250 feet, and is buried beneath the valley fill southeast of the open cut.

The exposed lenses have a length of less than 100 feet, and an average width of 4 to 5 feet, with a maximum width of 10 feet. They dip 80° eastward to vertical. Linear structures (striations), plunging 60° or more in a direction S. 30° E., are common in the quartz lenses, and the lenses

themselves appear to plunge in a similar fashion. The axis of a tightly folded quartz stringer, three inches thick, about 80 feet in from the adit portal, plunged about 60° in a direction S. 15° E., nearly conformable with the attitude of the linear structures in the quartz lenses and the country rock. The plunge length or downward extension of the quartz lenses is unknown, but it is likely that the plunge length exceeds the strike length.

The quartz lenses of the vein system follow two trends, the predominant strike being N. 20° W. to N. 30° W., and the other trend about N. 30° E. Two major lenses with these trends have been followed in the open-cut and adit, and are evidently the downward extension of the lenses exposed on the hillside south of the northeasterly trench that terminates at the 2,610-foot contour (fig. 1). The northwest trending split of the vein system that has been opened by a surface trench between the 2,600-foot and 2,630-foot contours (fig. 1) has not been explored by the underground workings, but probably lies to the northwest of the small crosscut 60 feet from the adit face (figs. 2 and 3).

The system of quartz lenses lies in the granitic gneiss very close to its contact with the mica schist. At the open cut and adit the lenses probably are within 50 to 75 feet of the contact. To the northwest, the vein system diverges from the contact, branches, and dies out, which suggests that the contact of the granitic gneiss and the mica schist has exerted some sort of controlling influence upon the development of the

vein pattern. If such is the case, then it is expected that to the southeast of the open cut, under the area covered by alluvium, the lenses will converge toward the contact, and may possibly cross into the mica schist and die out in the schist as they do to the north in the granite.

Character of the ore— A seam about one foot wide of fine-grained galena and sphalerite enclosed in quartz is exposed in the face of the open cut above the adit portal and similar massive ore is said to have been mined from the open cut. A number of large blocks of massive galena-sphalerite ore occur on the dumps. The massive ore contains rounded inclusions of clear quartz, fluorite, and chlorite. A second variety of ore, apparently more abundant than the massive variety, consists of quartz with irregular stringers of galena, sphalerite, chalcopyrite, and pyrite. A fine-grained white carbonate and scarce pyrrhotite also accompany the ore. Fine-grained white, gray to purple fluorite is abundant in the quartz lenses, occurring as seams several inches thick.

Near the surface the sulfides have been oxidized to a gray, gritty mass which is probably mostly cerussite. Small crystals of green pyromorphite occasionally occur along cracks in the quartz. Limonite coatings are common on the quartz, and malachite is also present.

Grade of the ore— The principal sulfide minerals in order of abundance are galena, sphalerite, and chalcopyrite. The higher grade ore is reported to carry about 1.5 percent zinc, 6 to 7 percent lead, and about 0.5 percent copper. Lower grade ore carries between 0.5 and 1 percent lead and about 0.5 percent of each zinc and copper. Some of the ore carries a higher ratio of zinc than is represented in the assays, for the carload of hand-picked ore shipped in 1940 carried 12.1% Pb and 6.5% Zn.

Conclusions— The exploration that has been carried out shows that the quartz lenses in the portion of the vein system exposed on the hillside have a short lateral extent, but perhaps a greater length down the plunge of the lenses. This part of the vein system has a known extent of about 250 feet and appears to die out northwest of the easterly trending trench at elevation 2,630 feet. One lens exposed on the surface, the NW split (figs. 1 and 3), has not yet been explored in the underground workings.

The southeast part of the vein system, buried under the soil and alluvium of the valley bottom, appears to converge toward the contact of granitic gneiss and schist. It seems desirable to direct future exploration toward this buried part of the vein system.