RED ROSE TUNGSTEN MINE

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The Red Rose mine is in the Rocher Déboulé Range, 8 miles south of Hazelton. The mill camp (elevation 4,000 feet) is on Red Rose Creek, 11 miles by road from Skeena Crossing. The mine camp is 1 mile northeast and 1,600 feet above the mill camp on a spur of Red Rose Peak.

The Red Rose mine was described in the Jubilee Volume, Structural Geology of Canadian Ore Deposits (Davis, pp. 129-131), but regional geology and mine development have progressed to a stage at which a more complete description is possible.

The property was first located in 1912, and for the next seven years was prospected actively for gold and copper on the southern extension of the Red Rose shear. Scheelite was first discovered in the vein in the northern part of the shear in 1923. The Consolidated Mining and Smelting Company of Canada, Limited optioned the property in 1939, and after a drilling programme in 1940 the present mine development was initiated in the vein in the northern part of the shear. A 75-ton-per-day mill started operating early in 1942 and continued until 1943. The property was inactive until 1951 when Western Tungsten Copper Mines Limited leased the property from The Consolidated Mining and Smelting Company of Canada, Limited. A mill, which later was enlarged to 140 tons per day, started operations at the end of 1951. The mine and mill were closed in December, 1954.

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The mine has twelve levels and sublevels, and most of the workings are in the plane of the vein (<u>see</u> Fig. 2a). The level interval is not constant, but between the lower four levels is 87 feet (100 feet in the plane of the vein). Access is provided by four adits; the 800 (elevation 6,659 feet), 600 (5,920 feet), 300 (6,133 feet), and 200 levels (6,237 feet). The 600 level is the main haulage, and from it the ore is transported to the mill by aerial tram. From this level an inclined shaft extends in the vein to the lowest level (1100).

Production in the five years of operations (1942-43, 1952-54) has amounted to 114,175 tons of ore yielding shipping products that contained 563 ounces of gold, 825 ounces of silver, 59,708 pounds of copper, and 110,544 units of WO_3. The tungsten was contained in 1,698 tons of concentrates. In 1954 the mine produced 29,642 tons of ore averaging 1.43 per cent WO_3. From this ore 272 tons of 75.5 per cent WO_3 (scheelite) concentrates, 97 tons of 31.4 per cent WO_3 (ferberite) concentrates, and 180 tons of copper-gold concentrates containing 31.8 per cent WO_3, were recovered. The mill tailings averaged 0.48 per cent WO_3.

Geology

The Rocher Déboulé Range is sculptured from a thick sequence of intermediate volcanic and fine detrital rocks of the Hazelton Group (Upper Jurassic - Lower Cretaceous) and the intruding Rocher Déboulé granodiorite stock (Upper Cretaceous?). The mine is within a hornfelsic aureole near the western contact of the stock Figure 1 shows the geology in the vicinity of the mine. The hornfels (Red Rose formation) at the mine strikes north 15 degrees east and dips 30 to 50 degrees northwest on the west limb of a minor anticline that plunges gently northward. The hornfelsic rocks are cut by a sequence of dykes of which the largest and most important are fine-grained diorite and associated porphyritic diorite dykes. These form two distinct mineralogical types, but their age relationships are similar, and in the dyke of chief interest, the "mine diorite", they form one composite body. The known scheelite orebodies are wholly contained within the mine diorite. This body trends north 65 degrees east, is 300 to 400 feet wide, and is tongue-like in shape (see Figs. 1 and 2b). The footwall of the tongue is controlled by the bedding of the hornfels and dips 38 degrees westward, the sides rake northward at 75 to 80 degrees. Possibly the porphyritic diorite, which forms the northern third of the body on the lower levels, is not tongue-like but extends below as a tabular body dipping steeply from the northern flank of the diorite tongue.

The rocks of the Rocher Déboulé Range are cut by a set of major normal faults trending approximately north 10 degrees west. One of these, the Chicago Creek fault, passes just west of the mine (see Fig. 1.) This fault can be traced more than 10 miles to the limit of mapping. The west block has moved down 2,000 to 3,000 feet relative to the east block. The Red Rose shear, in which the Red Rose vein occurs, strikes north 30 to 40 degrees west and dips 60 to 65 degrees southwest. It is about halfway between the Chicago Creek fault and the granodiorite contact, or about 600 feet from both at the 800 level. All are subparallel and have been subject to movement in the same sense, west block down. Because it dips less steeply and strikes more westerly, the Red Rose shear intersects and may be tributary to the Chicago Creek fault. The west block of the Red Rose shear has moved down and slightly north approximately 300 to 400 feet. The shear is well defined in the diorite tongue, but in the hornfels and porphyries it ramifies into a group of small tight fractures.

The Red Rose vein fills the full width of the shear, 4 to 8 feet, for 200 to 400 feet along strike and at least 1,100 feet down dip. The vein-filled area forms a large portion of the section of the mine diorite cut by the shear. Variation in width occurs in a short distance, e.g., on 900 level from 9 feet to nothing within 40 feet. The vein is massive and unsheared but contains many small drusy cavities filled by euhedral quartz. The vein is formed largely of quartz with lesser amounts of feldspar, biotite, hornblende, ankerite, tourmaline, apatite, scheelite, ferberite, molybdenite,and chalcopyrite. The vein has a pegmatitic appearance because of the many euhedral crystals of quartz, scheelite, ferberite, ankerite, and hornblende. The euhedral nature of many crystals is the result of vug-filling, but of other crystals the result of replacement. In detail the quantity of scheelite and ferberite varies widely, but in general is fairly uniform. Scheelite is the main ore mineral, and on the average constitutes about 1½ per cent of the vein. The Red Rose vein becomes richer in chalcopyrite with depth and on the lower levels contains some 2 per cent of that mineral.

There are two separate orebodies that rake steeply northwest. Between them the shear strikes more northerly, contains no vein filling and is barren. This barren zone is shortest on the 700 sublevel. The northwest orebody is as wide, long, and well mineralized on the 1100 level as anywhere in the mine, but the southeast orebody becomes thin and discontinuous below the 800 level. The orebodies are entirely within the mine diorite and adjacent porphyritic diorite. The footwall of the mine diorite dips at a shallower angle than the Red Rose shear, and at or shortly below the 1100 level the shear must pass entirely into the hornfels (Red Rose formation) unless the porphyritic diorite departs from the tongue-like shape of the diorite.

The control that appears to limit the vein, and consequently the ore, to the diorite and porphyritic diorite is largely structural, although Stevenson (1947, p. 455) suggests it is also chemical because a high-calcium rock such as diorite may be needed to precipitate the scheelite. The structural control is more obvious. The shear degenerates into a group of ramifying slips in other rocks but in general is strong and cleanly cut in the massive diorite. Furthermore, the attitudes of the shear determine whether it is vein-filled or not. Where the shear strikes north 35 to 40 degrees west in the diorite it is vein-filled, but where it strikes more northerly it is barren. In the hornfels the shear swings to a more northerly strike. Undoubtedly the northerly striking part of the shear was under compression, whereas the north-westerly striking part was more or less open. The vuggy nature of the vein confirms the existence of openings. The structure of the hornfels exerted a control on the footwall of the diorite tongue and consequently on the orebodies.

In summary the most obvious ore-controls are:

1. The footwall of the diorite tongue is controlled by the bedding of the hornfels.
2. The shear is well defined only in the massive fine-grained diorite and porphyritic diorite.
3. The northwesterly oriented section of the shear in the diorite is vein-filled, hence ore-filled, whereas the more northerly oriented section is tight, barren, and probably a bearing surface.

References

1. J. S. Stevenson (1947): Econ. Geol., vol. 42, pp. 433-464.
2. A. W. Davis (1948): Canadian Institute Mining and Metallurgy, Jubilee Volume, "Structural Geology of Canadian Ore Deposits", pp. 129-131.
3. A. Sutherland Brown (1954): Minister of Mines, B.C., Ann. Rept. pp. 86-95.