

or gangue with little apparent mineralisation, but carrying pay values, and sometimes a high percentage of gold. Consequently, constant assaying is necessary to distinguish ore from waste. In places, the ore is quartzose, and calcite is occasionally abundant as gangue.

The values in typical ores of the camp are largely in gold, with some copper and a little silver. In the Giant and Jumbo the quantity of copper is negligible.

The ores mined from near the surface were, on an average, much richer, the first 128,428 tons shipped averaging 1.46 oz. of gold per ton, 1.96 oz. of silver per ton, and 1.73 per cent. of copper (after smelter deduction of 1.3 per cent). But the proportion of *free* gold does not appear to diminish in depth, and some of the ore recently encountered in the lowest levels compares favourably with that of the earliest shipments. The gold values do not appear to be dependent upon the presence of any one mineral, although in many cases ore richer in chalcopyrite is also richer in gold, but exceptions are frequent. Pyrrhotite, which, in some instances, is gold bearing, is, in general, very low grade.

The following average analyses may be taken as typical of the ores now being mined in the larger producers:—

Au. oz.	Ag. oz.	Cu. %	Fe. %	SiO <sub>2</sub> %	S. %	CaO. %	Al <sub>2</sub> O <sub>3</sub> %
0.441	0.5	1.15	19.8	43	7.25	8.7	15
0.5	0.3	0.9	22	37	10.8	4.2	14.9
0.4	0.54	0.7	15.5	42.1	6.8	17.6	....
1.18	2.318	3.62	....	....	....	....	....

#### LODES.

The ore is usually found in well defined lodes or veins, of which there are a considerable number in the camp. The general trend of these is for the most part easterly.

The chief lodes of the camp, the Le Roi-Centre Star, Main and South and the Josie lodes have a direction of about N. 60° E. The Le Roi North, War Eagle and Centre Star North veins have a trend of N. 70° W., and these seem to be offshoots from the "main" lode. The St. Elmo-Cliff-Monte Christo vein has an almost easterly direction. The dips are uniformly north, usually at an angle of from about 60° to 70°, although sometimes flattening, as in the War Eagle below the 8th level, where the vein dips away at an angle of 10° to 15°, though straightening up again at a lower level. Some of the veins show great persistence. The main Le Roi-Centre Star lode can be followed from the fault at the Josie dyke through the Le Roi, Centre Star, and Idaho claims, and probably extends through to the Kootenay claim.

As is to be expected from the nature of these lodes, sharply defined walls are frequently lacking, the mineralisation of the country rock gradually becoming less. Sometimes a fissure or fault plane bounds the ore, but often where this is the case, the slip has been formed after the mineralisation. The transition from

pay ore to what is—from a commercial standpoint—waste rock, is generally rapid, but such change is not proof that pay ore does not exist beyond the poor material. The pay ore is localised in shoots distributed within the lodes. These shoots vary greatly in size and shape. Lenticular bodies are commonest, but some terminate abruptly against a dyke or fault, sometimes swelling to an enormous width or becoming L-shaped against the dyke. In width, they vary from 1 ft. to, in exceptional cases, 130 ft.; in length, from 50 to 500 ft. or more, and the vertical dimension is, on an average, the greatest. Stopes, 250 ft. long by 20 to 30 ft. wide, are by no means uncommon. One shoot of ore that has been followed down nearly 500 ft. vertically, has averaged at least 150 ft. long by 56 ft. wide, and this is not the largest shoot that has been developed. The pitch of the shoots in the lodes varies from vertical to pronounced easterly or westerly, and seems dependent upon purely local conditions. In the shoots themselves, the better grade ore is often confined to particular bands, which are generally parallel to the vein, but which may lie along either wall or within the shoot; more than one such band may be encountered in running a cut across a shoot. The position of such rich bands in the lode may suddenly change, owing to the mineralisation forsaking one set of planes for another.

In the Le Roi and Centre Star, where there are two important parallel lodes—the "Main" and "South" veins—it would seem, in the light of present developments, that where important shoots occur in the one vein, heavy mineralisation is lacking at the corresponding point in the other. It is sometimes difficult to trace the vein from shoot to shoot, particularly where its continuity is interrupted by faults and dykes. In the Le Roi-Centre Star Main vein, a seam of calcite extends almost uninterruptedly along the vein, and occasionally forms a useful indicator where mineralisation is slight.

Until it is more fully known what were the determining factors in localising the ores into shoots, no certain rules for their discovery can be formulated. Apparently several causes were operative. The contact of the lode with a fault having an impervious wall, or with an important dyke—particularly the underside of the dyke—so frequently marks the position of an ore shoot, that all such contacts are worth prospecting. The physical character of the ground was of importance. Where the shearing of the rock was such that the mineralising solutions were restricted within a zone of reasonable width, but had free movement, within that zone—that is, where the rock within that zone was thoroughly fractured while the wall rock as a whole is characterised by solidity—conditions were favourable, and other things being equal, a shoot would be formed. Cross fractures in the otherwise solid wall rock are frequently a noticeable feature where ore shoots occur. In the Le Roi the ore shoots are generally, but not always, found along the contacts between the augite porphyrite (greenstone) and a rather coarse gray monzonite, and between the former and granodiorite porphyry. In some cases at least, the Main lode lies along the north contact and