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NOTES ON THE BLUE SPEC MINE

by

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NOTES ON THE BLUE SPEC MINE.

General Geology.

The country rock consists of pre-Cambrian slate and sandstone of varying grain size. The general strike is 65 to 70° E. and the dip from 40 degrees south to nearly vertical, averaging about 70 degrees. North of the lode and from 120 to 180 feet from it, is a consistent series over 50 feet in width of massive sandstone beds, in which only minor deviations from the general strike occur. South of the lode and a similar distance from it a thick series of massive sandstone beds outcrop, but these, in contrast to the northern beds, have been extensively folded, most of the folds pitching east at an angle of about 70 degrees. The principal fold dislocation in this set lies about 200 feet south west of the mine, where a series of close folds effects a right-handed displacement of the beds by about 50 feet. Elsewhere both right and left-handed displacements occur.

Between the two massive sandstone formations the less competent slate and thin-bedded sandstone have been intensely folded and sheared, so that many of the observed strikes are somewhat oblique to the general strike direction. In the mine numerous sharp folds were mapped and many of these are broken along the fold axes forming shears or faults more or less parallel to the bedding. At the western end of the lode the beds cut across the lode fissure from north to south in a series of irregular left-handed drag-folds, i.e. in the opposite sense to the main fold in the southern sandstone band.

Ore Geology.

The main lode is contained within a strong practically vertical shear system which strikes about 80°E. It therefore cuts across the country rock at an average angle of about 15 degrees, but owing to the dislocation suffered by the beds between the two main sandstone horizons, the horizontal angle between the beds and the lode shear ranges in places from 0 up to more than 30 degrees, and a similar variation takes place in vertical cross-section. The intersection of the bedding with/plane of the lode shear pitches east at an average angle of about 35 degrees but this also varies widely in accordance with local structure.

The principal ore-control appears to be directly related to the direction of the ore shear in accordance with the following diagrammatic representation of the lode shear on No.2 level.



Slickensiding on the walls of the shear are in practically all cases horizontal or within a few degrees of horizontal. This combined with the steep pitch of the folds shows that the principal movement was in a horizontal direction, and the character of the folding mapped on the surface and the underground evidence suggests that the movement was left-handed, i.e. south block east, north block west.

The extreme western limit of the ore is determined by a strong left-handed fold, which was mapped on the surface and on the two levels and which pitches west at 77 degrees. The eastern limit of the ore is probably to be correlated with a gradual change in strength and direction of shearing.

The ore consists of quartz, carrying stibnite, which has replaced coarse-grained beds or formed solid fissure fillings; of fine quartz veins in places parallel to the bedding or to the shearing; and of lenses of antimonial ore along shears, particularly at shear junctions, or in folds. Pyritic mineralisation is also common.

Gold appears to be associated with both stibnite and pyrite, and both antimonial and pyritic concentrates average about 8 oz. gold per ton, although individual samples vary widely in gold content.

Three orebodies have been worked in the mine and a fourth is exposed on No.2 level. These may be referred to as the Main or East Orebody, the No.1 West Orebody, the No.2 West Orebody and the No.2 Middle Orebody.

The Main Orebody.

The main orebody is 150 feet long with an extension of doubtful grade up to 40 feet long at the eastern end and ranges up to 16 feet in width. The orebody is practically vertical in both dip and pitch - actually there is a slight easterly pitch at 87 degrees. It is reasonably consistent in dimensions and, as far as can be ascertained, in value from the surface down to the No.2 (280') level. According to the level sampling the average grade of the ore over a length of 155 feet is 17 to 18 dwt. Au per ton, average sample width on No.2 level being 42 inches. Average grade for a further 45 feet east is 10 dwt. over an average width of 47 inches. The grade would probably be reduced somewhat when taken over the full stope width. Average grade of ore milled up to 31st August 1946, was 14.5 dwt. Au per ton and 2.8 per cent antimony. During August 1946, the antimony grade remained the same, but the gold content was 10.6 dwt. per ton. This however included a considerable proportion of near-surface ore from the eastern end of the main orebody.

Reserves in this orebody, on No.2 level dimensions, and using a factor of 14 cubic feet to the ton (sulphide content of the ore is only 5 to 6 per cent) are 140 tons per vertical foot, or 17000 tons between the No.2 level stope and No.1 level, allowing for a 10 foot level pillar beneath No.1 level. 17000 tons is a maximum figure as the ore dimensions in this shoot on No.1 level are somewhat less than on No.2, and correspond to about 100 tons per vertical foot. Extensions of the stope east to the limit of the 10 dwt. ore on No. 2 level could compensate to the extent of 1500 tons for the diminution in size of the orebody as it approaches No.1 level. The same tonnage per vertical foot can be tentatively adopted for calculations of possible ore below the No.2 level, and this would give approximately 20,000 tons per 150 foot lift.

Reserves in the block remaining to be mined by under-hand stoping near the surface of the main orebody at the east end amount to about 550 tons, with a possible further 1,000 tons or more in the surface pillars.

There is no apparent geological reason why the orebody should not persist in depth. It has gained in strength from the surface down to No.2 level, the shearing is strong and shows no signs of weakening. It is noticeable that the ore favours coarse sandstone beds and that when these are dip or strike into the lode channel and are affected by the shearing, they are more readily replaced by ore than the fine-grained shale beds. The massive

sandstone band north of the lode is dipping towards the lode channel at an average angle of 70 degrees and should begin to intersect the lode channel of the main orebody at a depth of not more than 300 feet below the No.2 level. From this horizon downwards for 150 feet, conditions should be exceptionally favourable for ore formation.

No.1 West Orebody.

This orebody differs in character from the others in that it is connected with a strong fold that pitches through the main shear system. A series of massive sandstone beds has been affected by the fold and sufficiently sheared to be mineralised where they are folded into the main shear zone. The fold pitches west at about 70 degrees and the fold axis strikes generally parallel to the bedding, cutting across the lode at an angle of about 20 degrees. The grade and dimensions of this orebody are apparently rather irregular and on No.1 level mineralisation has made along a series of shears arranged more or less en echelon over a maximum width of 40 feet and a total length of nearly 100 feet. As this orebody is controlled by the intersection of the fold axis with the shearing it pitches to the west and may merge with the main orebody above the No.1 level and with the No.2 west orebody between the Nos. 1 and 2 levels.

There is not sufficient reliable assay information to enable an estimate to be made of the grade of this orebody, though a series of 31 assay results shown on an old assay plan of the No.1 level in the position corresponding to the No.1 west orebody give an average of 14.2 dwt. per ton and 14 samples on the old 100 foot level 50 feet above the No.1 level averaged 19.0 dwt. Au per ton over 48 inches. The arithmetical average of all the above is 15.6 dwt. per ton.

Little reliance, however, can be placed upon this sampling and in any case the grade of the whole orebody would be greatly reduced by dilution and low-grade bands. Workings on this lode above No.1 level had collapsed and were not accessible. Estimation of reserves is difficult but if the mining of this orebody can be resumed it might be possible to extract up to 3000 tons from above the No.1 level and at least a similar amount below the No.1 level.

No.2 West Orebody.

Sampling of this orebody shown on the mine assay plan at the No.2 level, from 45 to 195 feet west of the main cross-cut, returned, 22.2 dwt. per ton over an average width of 48 inches. Assay results as plotted on the plan are inconsistent in part at least, particularly at the western end, with the actual distribution of ore on the level and must be treated with caution.

The ore is being mined in the No.2 West stope over a length of 110 feet and over widths ranging from 4 to 10 feet. There is practically no ore on or above the No.1 level corresponding to this orebody, partly because the limiting west fold cuts across the shearing, partly because the main shear is weak at this position on No. 1 level and the mineralisation has made farther east in the folded section which constitutes No.1 West Orebody. Values in the wings from No.1 level down to the No.2 West Stope were low, but this wing was not well sited with regard to the shearing on No.1 level.

The winze below the No.2 level was in good ore for a depth of 45 feet but from there to 75 feet, corresponding to a reversal in the direction of dip on the southern side of the lode, the values were low. The shear however remained strong right to the bottom (75 feet) and it cannot be considered that the bottom of the ore has necessarily been reached.

It is quite likely that the top of the No.2 West Orebody will merge into the bottom of the No.1 West Orebody and that it will be possible to stope continuously through to No.1 level.

Ore dimensions in the present stope correspond to 54 tons per vertical foot, but no information is available apart from the level sampling, with regard to the grade of this ore, which is expected to decrease with height above the No.2 level. Ore reserves might be estimated at 2,000 tons.

No.2 Middle Orebody.

This orebody consists of lenses of ore, in some cases in shear intersections, along a section of the main shear where the strike direction is favourable. No.2 level sampling over a length of 60 feet gave an average of 9.3 dwt. gold per ton over an average width of 60 inches. A 28 foot rise showed rather higher values. It is quite possible that this orebody also may persist up to the base of the No.1 West Orebody. On No.2 level dimensions this orebody represents 21 tons per vertical foot, with a possible 1500 tons above the level.

General Remarks.

The occurrence of ore in the shear zone west of the main lode tends to be sporadic, and is irregularly localised by shear junctions, folding and favourable beds, in addition to the general control exercised by the favourable or unfavourable strike of the main shear.

Only on No.2 level does the shear and lode pattern emerge clearly, as it is obscured on the No.1 level by the fold and the resultant stresses set up by it.

Consideration should be given to mining the Middle and No.2 West orebodies continuously but selectively by resuing methods, so that the "plums" and narrow lenses of good ore could be extracted and the barren sections left as filling in the stopes.

Estimation of ore reserves at present is seriously handicapped by lack of reliable assay data. No sampling appears to have been done in the stopes and it is impossible, owing to the absence of satisfactory datum points, to plot all the assays recorded in past mine reports in such a way that they correspond to ore occurrence. Some results have been recorded for as much as 15 feet beyond the end of the existing drive. In other places good values are shown where obviously no ore exists. More selective sampling is also required so that mine manager and shift bosses can more readily determine what type of material carries gold values and what is barren. Comparatively few mine assays have been run for antimony and in estimation of ore reserves the average grade of the ore milled up to the present, i.e. 2.8 per cent Sb, should be assumed.

The intersection of the bedding with the lode shear seems to have little effect on the distribution of ore except locally where it is noticeable that the coarser beds are more readily replaced than the fine-grained shale.