

RENISON BELL

In pursuance of your instructions dated 30/10/26, I have the honor to make the appended observations on report of Renison Bell field submitted by Messrs. A. Victor Legge & Co.

The chief considerations respecting the future of the Renison Bell Mining Field are (1) quantity of ore (2) tin content (3) cost of treatment.

Quantity

The estimate computed by Mr. G. Lindesay Clark, insofar as surface outcrops are concerned, is a reasonably conservative one.

The pyritic ore bodies cover a very wide area at the surface, but from data obtained in the Mine workings, exploratory tunnels and diamond drilling, it has been demonstrated that the ore bodies as exposed at the surface do not maintain the surface width for any considerable depth below the outcrops. The estimate of a certain tonnage per foot of depth, as submitted by Mr. Clark, may be realised for the first few feet below the outcrops, but it will be found with increasing depth below the surface to a certain point the quantity will decrease rapidly per foot.

It cannot be denied that there are very large quantities of ore available at and near the surface - quite sufficient to warrant it being treated in a large way providing payable values can be relied upon.

Value

The report gives the value of ore mined by former companies at an average grade of 0.86% tin. That figure is no doubt near the mark. Consideration, however, must be given to the fact that in past mining operations many instances of surface enrichments were met with, and much of the ore treated in the earlier days of the field was composed of rich detrital material derived from the decomposition of the surface of the pyritic ore bodies.

It may be said that practically the whole of the ore treated by former operating companies was superficial. The quantity of pyritic ore treated was very limited and would only be regarded as experimental. The tin values of the surface portions of the pyritic outcrops are invariably richer than underlying portions of the ore. The enriched surface portion varies from a thin layer to a depth of several feet. The character of the ore also varies. The primary ore of the district is pyrrhotite (magnetic pyrites); this mineral through atmospheric agencies is altered to Marcasite - a variety of iron pyrites. In many exposures of the pyrites both at surface and underground, the pyrrhotite is overlain by a stratum of marcasite varying in thickness as stated from a thin shell to several feet. Pyrrhotite is a very dense mineral whilst marcasite as it occurs at Renison Bell is usually a very porous, spongy variety of pyrites. In the conversion of pyrrhotite to marcasite a considerable portion of the iron contained in the former is oxidised to sulphate of iron, and being soluble is carried away in solution, leaving an enriched product containing a high sulphur content in the form of marcasite.

All occurrences of marcasite do not necessarily carry tin, as in many instances large areas of pyrrhotite are not tin bearing.

In taking samples for the purpose of estimating the tin content of the ore bodies it is obvious that great care should be taken in avoiding secondary products. The quantity of the latter of course may be very considerable, and should not be disregarded when estimating ore reserves. On the other hand it would be very misleading to take samples from surface outcrops and regard them as representative of the underlying ore. This does not imply that Messrs. Leggo's sampling and check sampling of the Renison Bell ore bodies have been taken from secondary products, but the writer has seen in some instances when on a recent visit to the district, instances where assay samples have been cut from secondary ore.

In former excavations at a depth of 20 feet or more from the surface where the faces have been exposed to weathering for some years the oxidation of the pyrites is so rapid in some portions of the ore bodies that secondary enrichment has resulted.

It stands to reason that unless such parts of the face are thoroughly cleaned down to a smooth surface and well cut channels made when taking a sample, misleading assays will result. The average grade of the pyritic ore bodies of Renison Bell District is so low that the margin of profit with the present market price of tin must necessarily be small. It is therefore of the utmost importance that any element in sampling which may tend to give a false representation of the value of the ore bodies should be guarded against.

From my knowledge of the district, particularly the Renison Bell mine, extending over a good number of years, I am inclined to the opinion that the average grade of the ore is somewhat lower than the estimation based on the results of Messrs. Leggo's sampling.

Some 14 years ago the Renison Bell Co. purchased a diamond drill and undertook the work of testing the ore bodies at depths hitherto not explored by tunnelling. Subsequently the Goldfields Diamond Drill Co. carried out several thousand feet of boring under contract for the Renison Bell Co. The sites for several of the bores were selected by Mr. L. Keith Ward in conjunction with the then mine manager. The former, at that time held the position of Assistant Government Geologist.

The greater number of the sites were selected by the writer, and the various ore bodies were penetrated at depths ranging up to 300 feet. The assay results of samples obtained from the bores averaged considerably under 0.5% tin. No enrichments of any description were located. The ore from the lowest depth attained consisted of dense pyrrhotite very low in sulphur content.

The Government subsidised the Renison Bell Co. on an equal expenditure basis to enable the drilling work to be carried out. Representative samples of all ores produced were forwarded to the Government Geologist together with particulars of boring, assay results etc.

The results of diamond drill boring in addition to exploratory work by tunnels and mine work generally undertaken in connection with the mining of oxidised ore, it is conclusively proved that a very large proportion of the pyrite ore bodies do not carry tin. It is therefore a matter requiring very serious attention as to what relative proportion of the ore bodies would be considered to carry sufficient tin for commercial exploitation. The tin values are unfortunately not confined to any definite part of the ore bodies. It is true that tin does not occur where quartz is absent but it does not necessarily follow where the latter occurs tin will be present.

Geology:

The economic geology of the field is now well understood at least to the depth reached by diamond drilling and the various mine workings.

The upper portions of the ore bodies can be cheaply mined being favourably situated, the outcrops occurring in elevated positions. At a depth of 50 feet or more below the surface the lodes and country rock become very hard, and it is doubtful with the grade of ore existing at that depth can be mined and treated at a profit, that is by underground methods. Open cut work may in some instances be carried on to a depth of 50 feet below the outcrops, but this would entail the removal of large quantities of overburden in order to give the requisite batter to the excavations.

Costs

Costs per ton will depend entirely upon the distribution of tin in the ore bodies and the size of plant providing the whole of the ore will give the average stated, in which case the total cost of 11/- per ton is a fair estimate. If however it is found that much of the ore will have to be rejected owing to its low value, the treatment costs will be considerably increased.

A comparison with the work now being carried out at the Mount Bischoff Mine as a basis for a guide as to probable costs at Renison Bell would be very misleading.

The Mount Bischoff Co. are not dependent solely on pyritic ore for milling. The greater portion of the ore mined there is obtained from large open faces of low grade oxidised ore which is very easily mined. Much of the ore treated is in a soft state, requiring very little crushing. A certain proportion of the ore supplies are pyritic. The greatest difference between the ores at Mt. Bischoff and those of Renison Bell is the relative fineness of the tin oxide. At the former it is comparatively coarse compared to that of Renison Bell where it is extremely fine. The situation of the Mt. Bischoff ore bodies and the general surroundings lend themselves to cheaper methods than could be possible at Renison Bell.

Treatment

The system of treatment outlined by Messrs. Leggo & Co. is eminently suitable for Renison Bell ores.

Drilling

Estimated costs under this heading are much lower than the actual cost of drilling in pre-war days. The Goldfields Diamond Drilling Co. contracted to bore a number of holes at the Renison Bell Mine at 15/- per foot. The ground proved so difficult to bore that the Goldfields Company applied for special consideration in the way of a reimbursement for loss incurred in drilling. Labor was much lower at that period. The cost of diamonds since that time has greatly increased. It will be seen therefore that the estimated cost of 12/- per foot is very low compared to former costs.

Personally I do not see the necessity for such a large expenditure in drilling and consider that much of the money allotted for that purpose would be spent to greater advantage in experimental treatment of the ore.

General

The proposal to establish a very large treatment plant at the outset is not to be recommended. It would be preferable to commence with a moderately small plant capable of dealing with say 300 to 500 tons of ore per week, with provision to enlarge it from time to time with any modifications that may be necessary from experience gained under actual working conditions.

I have the Honor to be Sir,
Your Obedient Servant.

J. B. Scott.
GOVERNMENT MINING ENGINEER.