

THE GEOLOGICAL FACTORS CONTROLLING THE FUTURE

OF

THE TASMANIA MINE, BEACONSFIELD

The following statement is the outcome of a geological survey of the Beaconsfield area initiated in connection with the systematic investigation of the north-eastern goldfields.

Such a survey would necessarily include a study of all mineral deposits occurring in the area. There is no need in this report, however, to include any detailed reference to the iron and asbestos deposits as these are comprehensively dealt with in previous publications of the Geological Survey of Tasmania, viz. Mineral Resources No. 6 and Report No. 8 respectively. Attention will therefore be confined at the present stage to the gold deposits and particularly to the future prospects of the Tasmania Mine.

It is a well known fact that the gold output of Beaconsfield has been derived almost wholly from one lode, namely the Tasmania lode. The recent investigation has shown that the exploratory work carried out by a large number of companies has been of a somewhat comprehensive character. The objective of such work has been to locate either the continuation of the Tasmania lode or new and similar lodes. The non-success of these rather comprehensive undertakings is distinctly discouraging and on the geological evidence at present available it would seem that the Tasmania lode is the only really important zone of gold deposition in the Beaconsfield district. Any discussion as to the future prospects of Beaconsfield as a gold producer must, therefore, at the present moment be confined to a consideration of the geological factors which control the behaviour of the Tasmania Lode in those portions of it not yet penetrated. In such a discussion the two phases of the problem are the structural features of the lode as a whole and the distribution and persistence of the gold contents. The salient points of both these phases of the problem will now be concisely indicated.

THE STRUCTURAL FEATURES OF THE TASMANIA LODGE AS AFFECTING POSSIBLE EXTENSIONS

The Tasmania Lode represents a definite fracture or fissure in which the quartz filling has been deposited by the ore-bearing solutions. This fracture possesses a distinct bend in its most westerly portion bringing the strike or bearing of the lode in that locality markedly towards a meridional direction.

In this western portion of the lode occur the two well known "cross courses" which are in reality definite faults. Much discussion has centred around these two parallel faults particularly as to whether the lode continues westwards of the "western cross-course". The answer to this question is bound up in the problem of the relative ages of the "cross-courses" and the lode fissure itself. If the "cross-courses" were of later date than the lode fissure a continuation of the latter to the westwards could be confidently looked for. The recent study of the structural geology of the area, however, has shown that these two faults, known as "cross-courses" were formed at a much

earlier period than that which provided the fissure for the formation of the Tasmania Lode. The swing of the lode in the neighbourhood of the "cross-courses" is a structural feature due to the superposition of a younger east-west fracture on an older zone of faulting more nearly meridional in direction. The adjustment of the rock mass to the pressure causing the younger fault was completed by the time the "western cross-course" was reached and consequently no continuation of the Tasmania Lode westwards of that point need be looked for.

Much capital has been expended in the search for the eastern continuation of the Tasmania Lode. Shaft sinking and boring with this objective have only resulted in locating extensive limestone beds. In the eastern workings of the Tasmania Mine the lode at its eastern extremity is seen to feather out in an occurrence of pug or clay which separates the slates and sandstone series (which carry the Tasmania Lode) from the limestone series. This pug existed before the formation of the lode fracture and the same applies to this eastern portion of the lode as to the western, namely, that the forces producing the fracture in the rock system achieved their ultimate adjustment within this clay bed and therefore the continuation of the fracture into the limestone need not be looked for.

Summing up, therefore, it may be concisely stated that the Tasmania Lode does not continue beyond the "western cross-course" on the west and the clay bed on the east and that expenditure on attempts to locate it beyond these points is not justified.

In regard to the continuation of the lode in the other direction, namely, downwards, there are, however, far more promising features. The length of the lode, its width, and the type of compressive faulting responsible for the development of the fracture justify the conclusion that such fracture may be expected to persist to at least some hundreds of feet and probably a thousand or more feet below the 1500 feet level.

Finally, therefore, it becomes clear that the structural features of the Tasmania Lode will only permit of future developments in a vertical direction, i.e. below the 1500 feet level. Whether the downward continuation of the lode, when ultimately demonstrated, will carry payable gold values is the next question to decide and this will now be considered.

THE DISTRIBUTION AND PERSISTENCE OF THE GOLD VALUES IN THE TASMANIA LODGE

The experience in the Tasmania Mine in common with so many gold mines throughout the world has demonstrated that the richer or payable part of the lode is of smaller dimensions than the lode itself. The gold values of the Tasmania Lode are confined to a definite shoot which at the surface extends to the western portion of lode but as depth is gained moves away from the western end and displays a pronounced easterly pitch. At the same time the eastern end of the pay-shoot shows a less pronounced pitch eastwards. As a consequence of this the pay-shoot has decreased from 1200 feet in length at the 800 feet level to 300 feet at the 1500 feet level.

Coinciding with this shortening of the gold-shoot there is a progressive decrease in the average gold content down to the 1200 feet level. From 1200 feet to 1500 feet,

however, the assay values show an appreciable increase of about 2 dwts. per ton. Even with this increase at the lowest level the values were too low to be mined and treated at a profit.

As to whether the mine could be profitably worked in the future depends, quite apart from considerations of pumping and labour costs, on the possibility of a continuation of the increase of the average gold content which has occurred from the 1200 feet level downwards, and the lengthening of the gold-shoot by a reversal of the easterly pitch of its western end. There is no geological factor in evidence which would preclude the possibility of either of these improvements actually eventuating. On whether such continued increase in both assay values and length of gold shoot actually occurs, depends the future of the Tasmania Mine. There is no evidence against this possibility but it cannot be taken for granted, and it is essential that a certain procedure should be adopted, designed to establish the facts in this connection, as a preliminary to any consideration of the re-opening of the mine. What the essential procedure must be will now be outlined.

ESSENTIAL EXPLORATORY WORK

It is certainly a very great pity that diamond drill bores were not put down from south drives from the 1500 feet level before the mine was closed down. Such bores provide the cheapest and most expeditious method of penetrating to the lode at a depth in order to ascertain the length and approximate value of the gold-shoot. The mine being now filled with water is not available for such boring from the 1500 feet level unless it were unwatered. Such unwatering, however, involves such a high capital cost and operating expense that it would probably be more advisable to start boring from the surface. Such bores will have to be about 2000 feet in depth and therefore will be costly especially as at least six along the whole length of lode would be necessary to adequately deal with the investigation.

The carrying out of this work must be insisted on as an essential preliminary to the solving of the financial and technical problem of the re-opening of the Tasmania Mine. When these bores have been completed it will be possible to calculate the approximate amount and value of the ore-reserves down to the 2000 feet level. With these data available the mining engineer can then estimate whether the total profit to be expected from the mining and treatment of that amount of ore will provide adequate interest on the capital cost of re-equipping the mine and supplying cheap electric power and at the same time allow of the amortisation of the capital. The proportion of the capital to be so recovered on mining operations down to the 2000 feet level must be determined by the degree of encouragement as to the further continuance of the lode values in depth provided by the geological evidence of the bore results.

All considerations in regard to the Tasmania Mine therefore are dependent on the information to be obtained by diamond drilling. It is therefore recommended that no expense should be incurred as a preliminary to the proper consideration of this question than that necessary for the putting down of the six bores indicated above.

(Sgd.) LOFTUS HILLS, M.B.E., M.Sc.

DIRECTOR, GEOLOGICAL SURVEY OF TASMANIA

26th May, 1923.